Express Mail Label No. EV 156 915 183 US

UTILITY PATENT APPLICATION TRANSMITTAL
(Large Entity)

(Only for new nonprovisional applications under 37 CFR 1.53(b))

Docket No.
4247.51

Total Pages in this Submission
90

TO THE ASSISTANT COMMISSIONER FOR PATENTS
Box Patent Application
Washington, D.C. 20231

Transmitted herewith for filing under 35 U.S.C. 111(a) and 37 C.F.R. 1.53(b) is a new utility patent application for an invention entitled:

ENHANCED VIDEO PROGRAMMING SYSTEM AND METHOD FOR INCORPORATING AND DISPLAYING RETRIEVED INTEGRATED INTERNET INFORMATION SEGMENTS

and invented by:

Craig ULLMAN
Jack D. HIDARY
Nova T. SPIVACK

If a CONTINUATION APPLICATION, *check appropriate box and supply the requisite information:*

☒ **Continuation** ☐ **Divisional** ☐ **Continuation-in-part (CIP)** of prior application No.: **09/998,590**

Which is a:

☒ **Continuation** ☐ **Divisional** ☐ **Continuation-in-part (CIP)** of prior application No.: **09/633,351**

Which is a:

☒ **Continuation** ☐ **Divisional** ☐ **Continuation-in-part (CIP)** of prior application No.: **09/472,385**

which is a continuation of U.S. application Serial No. 09/109,945, now U.S. Patent No. 6,018,768, which is a continuation-in-part of U.S. application Serial 08/615,143, now U.S. Patent No. 5,778,181, which is a continuation-in-part of 08/613,144, abandoned.

Enclosed are:

Application Elements

1. ☒ Filing fee as calculated and transmitted as described below

2. ☒ Specification having 47 pages and including the following:

   a. ☒ Descriptive Title of the Invention
   b. ☒ Cross References to Related Applications *(if applicable)*
   c. ☐ Statement Regarding Federally-sponsored Research/Development *(if applicable)*
   d. ☐ Reference to Sequence Listing, a Table, or a Computer Program Listing Appendix
   e. ☒ Background of the Invention
   f. ☒ Brief Summary of the Invention
   g. ☒ Brief Description of the Drawings *(if filed)*
   h. ☒ Detailed Description
   i. ☒ Claim(s) as Classified Below
   j. ☒ Abstract of the Disclosure

P01ULRG/REV06

UTILITY PATENT APPLICATION TRANSMITTAL (Large Entity) *(Only for new nonprovisional applications under 37 CFR 1.53(b))*	Docket No. 4247.51 Total Pages in this Submission 90

Application Elements (Continued)

3. ☒ Drawing(s) *(when necessary as prescribed by 35 USC 113)*
   a. ☒ Formal Number of Sheets 7
   b. ☐ Informal Number of Sheets
4. ☐ Oath or Declaration
   a. ☐ Newly executed *(original or copy)* ☐ Unexecuted
   b. ☒ Copy from a prior application (37 CFR 1.63(d)) *(for continuation/divisional application only)*
   c. ☒ With Power of Attorney ☐ Without Power of Attorney
   d. ☐ *DELETION OF INVENTOR(S)*
   Signed statement attached deleting inventor(s) named in the prior application, see 37 C.F.R. 1.63(d)(2) and 1.33(b).
5. ☒ Incorporation By Reference *(usable if Box 4b is checked)*
   The entire disclosure of the prior application, from which a copy of the oath or declaration is supplied under Box 4b, is considered as being part of the disclosure of the accompanying application and is hereby incorporated by reference therein.
6. ☒ CD ROM or CD-R in duplicate, large table or Computer Program (Appendix)
7. ☒ Application Data Sheet (See 37 CFR 1.76)
8. ☐ Nucleotide and/or Amino Acid Sequence Submission *(if applicable, all must be included)*
   a. ☐ Computer Readable Form (CRF)
   b. ☐ Specification Sequence Listing on:
      i. ☐ CD-ROM or CD-R (2 copies); or
      ii. ☐ Paper
   c. ☐ Statement(s) Verifying Identical Paper and Computer Readable Copy

Accompanying Application Parts

9. ☒ Assignment Papers *(cover sheet & document(s))*
10. ☐ 37 CFR 3.73(B) Statement *(when there is an assignee)*
11. ☐ English Translation Document *(if applicable)*
12. ☒ Information Disclosure Statement/PTO-1449 ☐ Copies of IDS Citations
13. ☒ Preliminary Amendment
14. ☒ Return Receipt Postcard (MPEP 503) *(Should be specifically itemized)*
15. ☐ Certified Copy of Priority Document(s) *(if foreign priority is claimed)*
16. ☒ Certificate of Mailing
   ☐ First Class ☒ Express Mail *(Specify Label No.)*: EV 156 915 183 US

UTILITY PATENT APPLICATION TRANSMITTAL
(Large Entity)

(Only for new nonprovisional applications under 37 CFR 1.53(b))

Docket No.
4247.51
Total Pages in this Submission
90

Accompanying Application Parts (Continued)

17. ☐ Additional Enclosures *(please identify below):*

Request That Application Not Be Published Pursuant To 35 U.S.C. 122(b)(2)

18. ☐ Pursuant to 35 U.S.C. 122(b)(2), Applicant hereby requests that this patent application not be published pursuant to 35 U.S.C. 122(b)(1). Applicant hereby certifies that the invention disclosed in this application has not and will not be the subject of an application filed in another country, or under a multilateral international agreement, that requires publication of applications 18 months after filing of the application.

Warning

An applicant who makes a request not to publish, but who subsequently files in a foreign country or under a multilateral international agreement specified in 35 U.S.C. 122(b)(2)(B)(i), must notify the Director of such filing not later than 45 days after the date of the filing of such foreign or international application. A failure of the applicant to provide such notice within the prescribed period shall result in the application being regarded as abandoned, unless it is shown to the satisfaction of the Director that the delay in submitting the notice was unintentional.

UTILITY PATENT APPLICATION TRANSMITTAL (Large Entity)

(Only for new nonprovisional applications under 37 CFR 1.53(b))

Docket No. **4247.51**

Total Pages in this Submission **90**

Fee Calculation and Transmittal

CLAIMS AS FILED

For	#Filed	#Allowed	#Extra		Rate	Fee
Total Claims	159	- 20 =	139	x	$18.00	$2,502.00
Indep. Claims	5	- 3 =	2	x	$84.00	$168.00
Multiple Dependent Claims (check if applicable) ☐						$0.00
					BASIC FEE	$740.00
OTHER FEE ***(specify purpose)***						$0.00
					TOTAL FILING FEE	$3,410.00

☒ A check in the amount of **$3,410.00** to cover the filing fee is enclosed.

☒ The Commissioner is hereby authorized to charge and credit Deposit Account No. **04-1415** as described below. A duplicate copy of this sheet is enclosed.

- ☐ Charge the amount of as filing fee.
- ☐ Credit any overpayment.
- ☒ Charge any additional filing fees required under 37 C.F.R. 1.16 and 1.17.
- ☐ Charge the issue fee set in 37 C.F.R. 1.18 at the mailing of the Notice of Allowance, pursuant to 37 C.F.R. 1.311(b).

Signature

Dated: 11/13/02

John T. Kennedy, Esq.
Reg. No. 42,717
DORSEY & WHITNEY LLP
Customer No. 20686

cc:

PATENT
Attorney Docket No. 4247.51
Express Mail Label No. EV 156 915 183 US

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Patent Application of: ULLMAN et al. Serial No. Not Yet Assigned Filed: November 18, 2002 For: ENHANCED VIDEO PROGRAMMING SYSTEM AND METHOD FOR INCORPORATING AND DISPLAYING RETRIEVED INTEGRATED INTERNET INFORMATION SEGMENTS	Examiner: Not Yet Assigned Art Unit: Not Yet Assigned

CERTIFICATE OF MAILING BY EXPRESS MAIL

Commissioner for Patents
Washington, D.C. 20231

Sir:

The undersigned hereby certifies that the following documents:

1. Utility Patent Application Transmittal (Large) Entity (4 pages);
2. Utility Patent Application (47 pages);
3. 7 Sheets of Drawing;
4. Application Data Sheet (2 pages);
5. a copy of an executed Declaration and Power of Attorney for Patent Application (5 pages);
6. Preliminary Amendment (4 pages);
7. Transmittal Letter and Two (2) compact discs (CDs);
8. Information Disclosure Statement and PTO 1449 (9 pages);
9. Certificate of Mailing by Express Mail, Recordation Form Cover Sheet and Assignment document (4 pages);
10. Check for $ 40.00
11. Check for $3,410.00;
12. Return Acknowledgement Postcard; and
13. Certificate of Mailing by Express Mail.

relating to the above application, were deposited as "Express Mail," Mailing Label No. EV 156 915 183 US with the United States Postal Service, addressed to Commissioner of Patents, Washington D.C. 20231, on this 18th day of November 2002.

November 18, 2002

Mailer

Express Mail No. EV 156 915 183 US
Attorney Docket No. 4247.51

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re: Application of

ULLMAN et al.

Appl. No.: Not Yet Assigned Group Art Unit: Not Yet Assigned

Filed: November 18, 2002 Examiner: Not Yet Assigned

For: ENHANCED VIDEO PROGRAMMING SYSTEM AND METHOD FOR INCORPORATING AND DISPLAYING RETRIEVED INTEGRATED INTERNET INFORMATION SEGMENTS

CERTIFICATE OF MAILING BY EXPRESS MAIL

BOX Assignment
Commissioner for Patents
Washington, D.C. 20231

Sir:

The undersigned hereby certifies that the attached: RECORDATION FORM COVER SHEET, ASSIGNMENT DOCUMENT, $40.00 CHECK; and this CERTIFICATE OF MAILING BY EXPRESS MAIL, all relating to the above application were deposited as "Express Mail", Mailing Label No. EV 156 915 183 US with the United States Postal Service, addressed to BOX Assignment, Commissioner for Patents, Washington, D.C. 20231, on November 18, 2002.

18 November 2002
Date

Mailer

DORSEY & WHITNEY LLP
Customer No. 20686

PATENT
Attorney Docket No. 4247.51
Express Mail Label No. EV 156 915 183 US

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Patent Application of:

ULLMAN et al.

Serial No. Not Yet Assigned — Examiner: Not Yet Assigned

Filed: November 18, 2002 — Art Unit: Not Yet Assigned

For: ENHANCED VIDEO PROGRAMMING SYSTEM AND METHOD FOR INCORPORATING AND DISPLAYING RETRIEVED INTEGRATED INTERNET INFORMATION SEGMENTS

TRANSMITTAL OF COMPACT DISCS (CDs)

Commissioner for Patents
Washington, D.C. 20231

Sir:

Applicant submits herewith two (2) compact discs (CDs) prepared in IBM-PC format for MS-Windows containing a computer program listing in one file entitled "Appendix A.txt". The file is 27KB and was created on July 21, 2002. The two (2) compact discs are identical.

Any questions pertaining to the enclosed CDs should be addressed to the undersigned attorney at (303) 629-3400.

Respectfully submitted,

Dated: 11/18/02

By: _____
John T. Kennedy, Esq.
Reg. No. 42,717
Dorsey & Whitney LLP
Customer No. 20686

APPLICATION DATA SHEET

Electronic Version 0.0.11
Stylesheet Version: 1.0

Attorney Docket Number: **4247.51**

Publication Filing Type:	**new-utility**
Application Type:	**utility**
Title of Invention:	**ENHANCED VIDEO PROGRAMMING SYSTEM AND METHOD FOR INCORPORATING AND DISPLAYING RETRIEVED INTEGRATED INTERNET INFORMATION SEGMENTS**

Customer Number Attorney: 20686
20686

Customer Number Correspondence Address: 20686
20686

Continuity Data:

This application is a continuation of 09/998,590 A 2001-11-16 US pending

which is a continuation of 09/633,351 A 2000-08-04 US abandoned

which is a continuation of 09/472,385 A 1999-12-23 US abandoned

which is a continuation of 09/109,945 A 1998-07-06 US now, U.S. Patent No. 6,018,768

which is a continuation in part of 08/615,143 A 1996-03-14 US now, U.S. Patent No. 5,778,181

which is a continuation in part of 08/613,144 A 1996-03-08 US abandoned, and is related to U.S. Application No. 08/622,474, filed March 25, 1996, now U.S. Patent No. 5,774,664, which is herein incorporated by reference.

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Express Mail Label No.: EV 156 915 183 US
Attorney Docket No.: 4247.51
PATENT

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Applicant(s): ULLMAN et al.

Serial No.: Not Yet Assigned Examiner: Not Yet Assigned

Filed: November 18, 2002 Group Art Unit: Not Yet Assigned

For: ENHANCED VIDEO PROGRAMMING SYSTEM AND METHOD FOR INCORPORATING AND DISPLAYING RETRIEVED INTEGRATED INTERNET INFORMATION SEGMENTS

Commissioner for Patents Washington, D.C. 20231	Express Mailing label number EV 156 915 183 US Date of Deposit: November 18, 2002 I hereby certify that this paper or fee is being deposited with the United States Postal Service "express Mail Post Office to Addressee" service under 37 CFR 1 10 on the date indicated above and is addressed to the Commissioner for Patents, Washington, D.C. 20231. Name Craig Hunaway /DORSEY & WHITNEY LLP Signature:

PRELIMINARY AMENDMENT

Commissioner of Patents
Washington, D.C. 20231

Dear Sir:

Applicant respectfully requests entry of this Preliminary Amendment before commencement of examination of the above-identified patent application. Two (2) compact discs (CDs) containing the computer program listing in accordance with 37 CFR 1.96(c) accompany this Preliminary Amendment.

AMENDMENT

In the Specification:

On page 2, after the section entitled "Cross-Reference to Related Applications" and before the Section entitled "Background of the Invention," please insert the following paragraph:

Express Mail Label No.: EV 156 915 183 US
Attorney Docket No.: 4247.51

-- <u>REFERENCE TO A COMPUTER PROGRAM LISTING</u>

One compact disc containing a computer program listing appendix in one file entitled "Appendix A.txt" created July 21, 2002, (27 KB) forms a part of this application and is herein incorporated by reference. --

Please replace the paragraph beginning on page 12 at line 18 with the following rewritten paragraph:

-- In a preferred embodiment, a JAVA enabled browser 98 as well as specialized software 106 for performing part of the method of the present invention are installed on the computer 16. The JAVA enabled browser 98 allows the computer 16 to retrieve the Web pages 102 and is preferred software, since it is platform independent, and thus, enables efficient and flexible transfer of programs, images, etc., over the Internet 20. The specialized interface software 106 (hereinafter, "client software") acts as an interface between the video programming and the Internet functions of the present invention. Attached on one compact disc is a computer program listing appendix ("Appendix A.txt"). The client software 106 retrieves URLs from the video program (embodiment of Figure 1) or directly from the Internet connection (embodiments of Figures 2 and 4), interprets these URLs and directs the JAVA enabled browser 98 to retrieve the particular relevant Web pages 102, and synchronizes the retrieved Web pages to the video content for display on the user's computer 16, as shown in Figures 3 and 4 and explained in more detail below. --

Express Mail Label No.: EV 156 915 183 US
Attorney Docket No.: 4247.51

REMARKS

Attached hereto is a marked-up version of the changes made to the specification and claims by the current amendment. The attached page is captioned **"Version with markings to show changes made."**

Applicant has amended the specification to correctly reference submission of Appendix A on a compact disc at the beginning of the specification and on page 12 thereof. Two (2) identical compact discs containing one file are submitted herewith.

Applicant thanks the Examiner for his thorough review of the claims in this application. Further, Applicant submits that the application is in condition for allowance and respectfully requests that the application be passed to allowance. In the event the Examiner has questions or comments and a telephone conversation would expedite resolution of same, Applicant invites the Examiner to contact the undersigned attorney at (303) 629-3400.

Respectfully submitted,

Dated: 11/18/02

By: _____
John T. Kennedy, Esq.
Reg. No. 42,717
Dorsey & Whitney LLP
Customer No. 20686

Express Mail Label No.: EV 156 915 183 US
Attorney Docket No.: 4247.51

VERSION WITH MARKINGS TO SHOW CHANGES MADE

In the specification:

The paragraph beginning on page 12, line 18, has been amended as follows:

In a preferred embodiment, a JAVA enabled browser 98 as well as specialized software 106 for performing part of the method of the present invention are installed on the computer 16. The JAVA enabled browser 98 allows the computer 16 to retrieve the Web pages 102 and is preferred software, since it is platform independent, and thus, enables efficient and flexible transfer of programs, images, etc., over the Internet 20. The specialized interface software 106 (hereinafter, "client software")[, attached as Appendix A,] acts as an interface between the video programming and the Internet functions of the present invention. Attached on one compact disc is a computer program listing appendix ("Appendix A.txt"). The client software 106 retrieves URLs from the video program (embodiment of Figure 1) or directly from the Internet connection (embodiments of Figures 2 and 4), interprets these URLs and directs the JAVA enabled browser 98 to retrieve the particular relevant Web pages 102, and synchronizes the retrieved Web pages to the video content for display on the user's computer 16, as shown in Figures 3 and 4 and explained in more detail below.

Express Mail Label No.: EV 156 915 183 US
Attorney Docket No.: 4247.51
PATENT

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Applicant(s): ULLMAN et al.

Serial No.: Not Yet Assigned Examiner: Not Yet Assigned

Filed: November 18, 2002 Group Art Unit: Not Yet Assigned

For: ENHANCED VIDEO PROGRAMMING SYSTEM AND METHOD FOR INCORPORATING AND DISPLAYING RETRIEVED INTEGRATED INTERNET INFORMATION SEGMENTS

Commissioner for Patents Washington, D.C. 20231	Express Mailing label number EV 156 915 183 US Date of Deposit: November 18, 2002 I hereby certify that this paper or fee is being deposited with the United States Postal Service "express Mail Post Office to Addressee" service under 37 CFR 1.10 on the date indicated above and is addressed to the Commissioner for Patents, Washington, D.C. 20231. Name: Craig Hunsucker /DORSEY & WHITNEY LLP Signature:

PRELIMINARY AMENDMENT

Commissioner of Patents
Washington, D.C. 20231

Dear Sir:

Applicant respectfully requests entry of this Preliminary Amendment before commencement of examination of the above-identified patent application. Two (2) compact discs (CDs) containing the computer program listing in accordance with 37 CFR 1.96(c) accompany this Preliminary Amendment.

AMENDMENT

In the Specification:

On page 2, after the section entitled "Cross-Reference to Related Applications" and before the Section entitled "Background of the Invention," please insert the following paragraph:

Express Mail Label No.: EV 156 915 183 US
Attorney Docket No.: 4247.51

-- <u>REFERENCE TO A COMPUTER PROGRAM LISTING</u>

One compact disc containing a computer program listing appendix in one file entitled "Appendix A.txt" created July 21, 2002, (27 KB) forms a part of this application and is herein incorporated by reference. --

Please replace the paragraph beginning on page 12 at line 18 with the following rewritten paragraph:

-- In a preferred embodiment, a JAVA enabled browser 98 as well as specialized software 106 for performing part of the method of the present invention are installed on the computer 16. The JAVA enabled browser 98 allows the computer 16 to retrieve the Web pages 102 and is preferred software, since it is platform independent, and thus, enables efficient and flexible transfer of programs, images, etc., over the Internet 20. The specialized interface software 106 (hereinafter, "client software") acts as an interface between the video programming and the Internet functions of the present invention. Attached on one compact disc is a computer program listing appendix ("Appendix A.txt"). The client software 106 retrieves URLs from the video program (embodiment of Figure 1) or directly from the Internet connection (embodiments of Figures 2 and 4), interprets these URLs and directs the JAVA enabled browser 98 to retrieve the particular relevant Web pages 102, and synchronizes the retrieved Web pages to the video content for display on the user's computer 16, as shown in Figures 3 and 4 and explained in more detail below. --

Express Mail Label No.: EV 156 915 183 US
Attorney Docket No.: 4247.51

REMARKS

Attached hereto is a marked-up version of the changes made to the specification and claims by the current amendment. The attached page is captioned **"Version with markings to show changes made."**

Applicant has amended the specification to correctly reference submission of Appendix A on a compact disc at the beginning of the specification and on page 12 thereof. Two (2) identical compact discs containing one file are submitted herewith.

Applicant thanks the Examiner for his thorough review of the claims in this application. Further, Applicant submits that the application is in condition for allowance and respectfully requests that the application be passed to allowance. In the event the Examiner has questions or comments and a telephone conversation would expedite resolution of same, Applicant invites the Examiner to contact the undersigned attorney at (303) 629-3400.

Respectfully submitted,

Dated: 11/18/02

By: ____________________
John T. Kennedy, Esq.
Reg. No. 42,717
Dorsey & Whitney LLP
Customer No. 20686

Express Mail Label No.: EV 156 915 183 US
Attorney Docket No.: 4247.51

VERSION WITH MARKINGS TO SHOW CHANGES MADE

In the specification:

The paragraph beginning on page 12, line 18, has been amended as follows:

In a preferred embodiment, a JAVA enabled browser 98 as well as specialized software 106 for performing part of the method of the present invention are installed on the computer 16. The JAVA enabled browser 98 allows the computer 16 to retrieve the Web pages 102 and is preferred software, since it is platform independent, and thus, enables efficient and flexible transfer of programs, images, etc., over the Internet 20. The specialized interface software 106 (hereinafter, "client software")[, attached as Appendix A,] acts as an interface between the video programming and the Internet functions of the present invention. Attached on one compact disc is a computer program listing appendix ("Appendix A.txt"). The client software 106 retrieves URLs from the video program (embodiment of Figure 1) or directly from the Internet connection (embodiments of Figures 2 and 4), interprets these URLs and directs the JAVA enabled browser 98 to retrieve the particular relevant Web pages 102, and synchronizes the retrieved Web pages to the video content for display on the user's computer 16, as shown in Figures 3 and 4 and explained in more detail below.

SPECIFICATION

TO ALL WHOM IT MAY CONCERN:

BE IT KNOWN, that we, Craig Ullman, Jack Hidary, and Nova Spivack, citizens of the United States and residents of the State of New York, have invented certain new and useful improvements in:

ENHANCED VIDEO PROGRAMMING SYSTEM AND METHOD FOR INCORPORATING AND DISPLAYING RETRIEVED INTEGRATED INTERNET INFORMATION SEGMENTS

of which the following is a specification.

ENHANCED VIDEO PROGRAMMING SYSTEM AND METHOD FOR INCORPORATING AND DISPLAYING RETRIEVED INTEGRATED INTERNET INFORMATION SEGMENTS

CROSS-REFERENCE TO RELATED APPLICATIONS

This application is a continuation of U.S. application Serial No. 09/998,590, filed November 16, 2001, which is a continuation of U.S. application Serial No. 09/633,351 filed August 4, 2000, which is a continuation of U.S. application Serial No. 09/472,385 filed December 23, 1999, which is a continuation of U.S. application Serial No. 09/109,945 filed July 6, 1998, now U.S. Patent No. 6,018,768, which is a continuation-in-part of U.S. application Serial No. 08/615,143 filed March 14, 1996, now U.S. Patent No. 5,778,181, which is a continuation-in-part of U.S. application Serial No. 08/613,144 filed March 8, 1996, abandoned, and is related to U.S. application Serial No. 08/622,474 filed March 25, 1996, now U.S. Patent No. 5,774,664, which is herein incorporated by reference.

BACKGROUND OF THE INVENTION

Today, the capabilities of computers to provide massive amounts of educational and entertainment information has exploded with the Internet. The Internet has the power to transform society through unprecedented levels of information flow between members. Currently, on-line systems offer a variety of different services to users, including news feeds, electronic databases (either searchable by the user directly on the on-line system, or downloadable to the user's own computer), private message services, electronic newsletters, real time games for play by several users at the same time, and job placement services, to name a few. However, today, most on-line communications occur merely through text. This currently stands in great contrast to the audio/visual presentation of the alternative electronic medium, television. However, it is expected that as multi-media's incessant growth

continues, audio/visual programs will proliferate and text will become less and less dominant in the on-line environment. Even though these programs will be introduced, the Internet, will remain essentially user unfriendly due to its very massiveness, organization, and randomness. Simply stated, there is no order or direction in the Internet. Specific pieces of information are many times hard to find, and harder yet, is the ability to put that piece of information into a meaningful context.

Television, on the other hand, has been criticized for being a passive medium– "chewing gum for the eyes," as Fred Allen once observed. Television has always been something you watched, not something you do. Many social critics believe that the passivity television depends on has seeped into our entire culture, turning a nation of citizens into a nation of viewers. While interactive television systems have increased the level of user interaction, and thus, provided greater learning and entertainment opportunities, vast information resources such as databases are inaccessible from such a medium.

What is needed is a means to close the gap between video programming and the information superhighway of the Internet. What is needed is a wider, richer experience integrating audio/visual and textual database elements into an organized unique interactive, educational, entertainment experience. Currently, the Internet is a repository of information on virtually any subject. However, what is needed is a mechanism for combining the user-friendly visual experience of television with the vast information resources of the Internet.

SUMMARY OF THE INVENTION

The system of the present invention combines broadcast television programming and/or video programming which appears on a VHS or Beta tape, CD-ROM, DVD or other medium, or video programming at a video server (hereinafter "video programming") with the massive Internet, creating a new and powerful educational and entertainment medium. The system allows consumers to receive more information in a more efficient manner than either

television or the Internet alone. Consumers not only can see a news report on television, but they can also read pertinent information about the report, as well as explore related information about the story. The program becomes the introduction to a particular subject, rather than the entire subject itself. The act of viewing a program has now become a more engaging, enriching experience.

The system can also create a more intimate relationship between the viewer and the program. The user might be solving problems or performing virtual experiments on the Internet site that a teacher is discussing in an educational television program. Similarly, the consumer might be solving problems that the fictional characters in a television program must solve. In both cases, the consumer is an active participant in the process, rather than a passive observer.

Instead of an undirected and unfocused exploration of Internet sites, by synching specific Internet pages to the video signal, the system puts the Internet in context. The television program producers now can decide what additional information to offer their audience. This material can now be seen in the context of the television program.

An additional advantage is that consumers don't have to search through the literally hundreds of millions of pages on the Internet to find appropriate material. The material has already been filtered by the program producers and delivered to the consumer automatically.

Another advantage of the system is that it changes the nature of advertising. Since additional information can be given to consumers automatically, advertising can now be more substantive, allowing customers to make more informed choices. Now, the act of purchasing a product seen on television can be streamlined — the consumer can be given the choice of buying the product instantly using the two-way capabilities of the system.

In addition, users can take advantage of the two-way capabilities of the Internet to respond to polls, to send e-mail or to link to additional sites. For example, a viewer watching

a television news program, through the system of the invention, can receive a stream of Web pages which provide additional, specific information relating to the news content — whether background on the Presidential primaries or the latest change in interest rates.

The video programming and corresponding Internet pages can be viewed on personal computers equipped with a television card, but the open software-based approach enables anyone with a television set and JAVA enabled PC to experience the system of the invention.

By marrying the appeal of video with the two-way data transfer capabilities of the Internet, the system creates a powerful new medium: Video producers and Internet site creators can enhance their content to extend their brand identity and differentiate their program offerings to the millions of people who are spending more time navigating through the resources of the World Wide Web rather than watching television; advertisers can speak more directly to consumers by directly sending Web pages to the consumer instead of only displaying Web addresses in their commercials; and consumers can gain a new level of interest and interactivity over a video-based medium. In addition to providing significant and immediate benefits to broadcasters and advertisers, the system will also present educational programmers with a way to more effectively use Internet resources in the classroom.

Recently, several media companies have joined to create a system for linking the Internet and television on the personal computer, called "Intercast." In this system, content will be provided simultaneously with the TV video signal. This system, however, requires that stripped down Web pages be sent in the vertical blanking interval (VBI) of the video signal, using up to three scan lines limiting effective bandwidth to approximately 28.8 kbps. This approach, however, requires specialized hardware to both insert the Web pages into the VBI and extract these codes at each PC since it takes up to three scan lines of the VBI. Thus, the complexity and cost of the PC is increased. Because the Web pages are transmitted with the video signal, the Intercast system is not a true "two-way" system, but merely a one-way

"piggyback" system. In addition, the Intercast is an analog video product, and thus, cannot handle digital video data.

The system of the present invention, on the other hand, is a much more flexible, but less complex, system. The present invention supports either analog or digital television broadcasts without broadcasters or end-users having to alter their existing systems, thus enabling broadcasters to reach a wide audience within a short time.

In a first embodiment, the actual Web pages are not forced into the very limited bandwidth of the vertical blanking interval (VBI). Instead, merely eight fields of line 21 of the VBI are used to deliver the relevant Internet Web page addresses to the PC. These addresses are called "uniform resource locators" (URLs). The system then directs the particular Web browser to retrieve the identified Web pages from the Internet. Upon receipt of the particular Web page(s), the system syncs the Web page(s) to the video signal, and at the appropriate times, presents the Web pages on one portion of the computer screen with the television video signal, shown in a window on another portion of the screen, and thus, provides the synergistic Internet and television experience. One of the advantages of the system of the present invention is that no specialized chip set need be produced and implemented into the standard PC. Thus, complexity is kept to a minimum.

In another preferred embodiment of the present invention, the VBI is not used to transmit the URLs to the user. In this alternative embodiment, member broadcasters enter the Internet through a member account, and will be provided with a graphical user interface for pre-scheduling Internet addresses, or URLs, for transmission to users at particular times of day. This interface could also be used to transmit real time live transmissions of URLs to users at the same time as a broadcast. The URLs are stored in a "Link File" for later transmission over the Internet to the user at the broadcasters entered time, which corresponds to the broadcast time of an associated program. The timing of URL's could be determined in

advance or can be sent out live. This embodiment eliminates the need to place the URLs in the VBI, and also allows the broadcaster to store more than one Link File for transmission to users in different time zones, for example. Further, more than one broadcaster could access the same master schedule if desired, and add or delete certain URLs to personalize the program for their local audiences. Also, personalization can be taken to the single user, or small group of users, by having the system send a different stream of URLs to each user, depending on a unique user profile, for example. Thus, the personalization feature of the present invention allows each user to receive information uniquely relevant to their interests, demographics, history, etc. This embodiment makes the transmission of URLs to the user even less complex than the first embodiment disclosed herein.

Thus, it is an object of the present invention to provide order and direction to the Internet by using television signals to place, orient and control such information in a meaningful context.

It is an object of the present invention to create a more intimate relationship between the viewer and the program by enriching the learning experience through the provision of more in-depth information.

DESCRIPTION OF THE DRAWINGS

Figure 1 is a diagram of the system design, showing the receipt and decoding of video signals at the subscriber location using the method of the present invention.

Figure 2 is a diagram showing an alternative system embodiment to achieve the integration of the Internet information with the video content by decoding the uniform resource locators at a server site and then transmitting the URLs to the subscriber stations via the Internet.

Figure 3 is a flow diagram of the basic software design of the present invention.

Figure 4 is a diagram showing another preferred system embodiment to achieve the direct transmission of URLs over the Internet to the user at a broadcaster's entered time without encoding the URLs into the VBI.

Figure 5 is a diagram of another preferred embodiment including a digital cable box.

Figure 6 is a diagram of another preferred embodiment including a digital T.V.

Figures 7 and 8 are a sample display provided to a student of a lesson.

Figure 9 is a diagram of the distributed Com Server embodiment.

PREFERRED EMBODIMENT

The system of the present invention combines the rich visual capabilities of video with the vast resources of the Internet. As shown in Figure 1, a preferred embodiment of the invention is a computer based system for receiving a video program along with embedded uniform resource locators (URLs)--which direct the user's computer 16 to address locations, or Web sites, on the Internet 20 to retrieve related Web pages. These Web pages correspond to the video presentation. The particular video programming can be delivered in analog, digital or digitally compressed formats (e.g., MPEG2) via any transmission means, including satellite, cable, wire, television broadcast or sent via the Web.

The video programming is preferably created at a centralized location, i.e., content creation 4 as shown in Figure 1, for distribution to subscribers in their homes, for example. Program creation is accomplished according to any conventional means known in the art. After a video program is created, uniform resource locators are embedded, in one preferred embodiment, into the vertical blank interval of the video programming by the URL encoder 8, shown in Figure 1. In this embodiment, the URLs are encoded onto eight fields of line 21 of the VBI. Line 21 is the line associated with close captioning, among other things. However, the URLs could also be embedded in other fields of the VBI, in the horizontal

portion of the video, as part of the audio channel, in any subcarrier to the video, or if digital, in one of the data fields.

Although Figure 1 shows the video with URLs over the same transmission line, the URLs can be sent down independently of the video program on a data channel. In this embodiment, the URLs can be forwarded to the remote sites either prior to initiation or during the program. Preferably, the URLs have associated time stamps which indicate to the subscriber stations when, during the video program, to display the particular Web pages addressed by the URLs. Alternatively, the user can select when to call the particular Web pages for display with the video program.

The particular information in line 21 is not part of the visual part of the program, and thus, is not perceptible to the human eye, thereby making it ideal to send data information to the users. While the bandwidth capacity of line 21 is limited, because the system of the present invention transmits only the uniform resource locators (URLs), and not full Web pages, there is more than enough capacity. Furthermore, no additional hardware is necessary at the PC 16 to implement the elements of the present invention. Thus, the present invention has the additional advantages of being very efficient and takes advantage of conventional hardware.

Once the video program is created, it can be transmitted to user sites over any transmission means, including broadcast, cable, satellite, or Internet, and may reside on video servers. Furthermore, the video program, with or without embedded URLs, can be encoded on a VHS or Beta tape, DVD or other medium.

Preferably, each receiver station comprises any Intel x86 machine (preferably a 486 processor, pentium processor, etc.), an Apple Computer, UNIX or any other type of standard computer workstation. The local PC 16 is preferably connected to either a cable and/or broadcast television connection or to a local VCR or other video source. At each subscriber

site, the local personal computer 16 preferably receives the cable transmission by cable connection on the back of the personal computer 16. The video/audio program can then be processed for display on the computer screen using any conventional PC card capable of displaying NTSC signals on a computer monitor, such as a WinTV card. In addition to the cable connection, however, in the present invention there is also an Internet 20 connection created concurrently with the cable connection.

The Internet 20 connection can be via high-speed line, RF, conventional modem or by way of two-way cable carrying the video programming. The local PC 16 has Internet access via any of the current ASCII software mechanisms. In a preferred embodiment, at each subscriber home, an associated local URL decoder 12 receives the cable video television program, as shown in Figure 1. The local URL decoder 12 extracts the URLs, preferably embedded in the vertical blanking interval, with the use of any conventional VBI decoder device. The URL decoder 12 may be either a stand-alone unit or a card which is implemented into the personal computer 16.

In another preferred embodiment shown in Figure 2, the uniform resource locators (URLs) are encoded into the video in the same manner as described above. Again, the URLs are preferably encoded onto eight fields of line 21 of the VBI, but may also be sent independently of the video. In this embodiment, the URL decoder 24 is located at the server site, as opposed to the subscriber location. When the decoder 24 receives the video program signal, it strips out the URL codes on line 21 of the VBI and delivers these codes independently to an Internet server 28. The URL code is then subsequently delivered over the Internet 20 to the user PC 16. Simultaneously, the video is broadcast over conventional broadcast or cable transmission means 36 to the user's personal computer 16.

Another preferred embodiment of the system, shown in Figure 4, does not depend on, or even use, the VBI. In this preferred embodiment, the system will run an online service

over the Internet 20. This service will be in the form of an Internet Web site 62 that provides a user-interface to a database 78 and to one or more associated data servers 90. The service will provide member-accounts to TV broadcasters 66 who sign up to use the system of the invention in conjunction with their broadcasts. Each member broadcaster will enter the service at their computer 70 through Web browser software 74 using their member account by entering various identification and password information. Once within their account, the member will be provided with a graphical user interface for pre-scheduling URLs for transmission to users 118 over a direct Internet connection 94 at particular times of day. The same user interface, or a variation on it, can be used by broadcasters for live transmission 82 of URLs to users at the same time as a broadcast 86.

For example, one example of this interface might be a scheduling calendar (daily, weekly, monthly, yearly) in which the broadcaster 66 may allocate time periods which coincide with their broadcasts 86, and during which they will send out URLs to their users to link to Web pages. For each time period (for example, a particular hour long period during the day) determined by the broadcaster 66 to be a broadcast period (a period during which they want to transmit URLs that correspond to a television show being broadcast from their TV broadcast facility 110 to the external TV 114 of the user 118 at that time), the broadcaster 66 may then enter a series of URLs into an associated file ("Link File") for transmission over the Internet 20 at that time. This Link File might have a user interface such as a spreadsheet, table, or list, or it could be simply a tab-delimited or paragraph-delimited text-file. As an example, each of the records in the Link File consists of a data structure which could contain information such as:

(<timecode>,<URL>,<label or title>,<additional information>,<additional information>,...)

The above data structure is just one example. The records in the Link File preferably specify the time, Internet address (i.e. URL), label (such as an associated name), and some optional additional information, for each Web page the broadcaster 66 desires to launch during a show.

When a broadcaster 66 modifies their calendar and/or the Link File associated with any given time period(s) in their calendar, this information is saved into the database 78 that is attached to the site 62. Each broadcaster 66 may maintain multiple calendars in the database 78 if they broadcast in different time zones, for example.

The database 78 provides the Link File records for upcoming time periods to a server 90, which may be one server or a distributed network of server programs on multiple computers across the network, to be utilized for scaling to large national or global audiences. The server 90 provides the Link File records, including the URLs, to the user's personal computer 16, which is connected via a network. Examples of possible networks include the public Internet 94, a direct private network, or even a wireless network.

One feature of the above embodiment is that one or more broadcasters 66 may utilize the same schedule in the database 78 for their own broadcasts 86 or during the same broadcast. For example, a network broadcaster may develop a master schedule and various affiliate broadcasters may subscribe to that schedule or copy it (in the database) and add or delete specific URLs in the schedule for their local audiences or unique programming. This scheme enables affiliates to insert URLs for local advertisers or local subjects into a sequence of more general URLs provided by their network broadcaster 66. In other words, the affiliate can add links that ride on the network feed and then redistribute it to their local audiences.

The above embodiment can also enable personalization in the form of unique series of URLs specific to each user's unique profile, which is directly sent over the Internet 20 to each user's specific client software 106. This can be achieved from the broadcaster 66 to

each individual user 118, or to particular collections of users. To accomplish personalization, the service may send a different stream of URLs to each user's client software program 106. The stream of URLs sent would depend on a user profile stored in the database 78 or the client software program 106, a user profile which is built on demand or over time for each user 118 based on criteria such as the location of the user, choices the user makes while using a client software program 106, or choices the broadcaster 66 makes during a broadcast 86, or automatic choices made by an algorithm (such as a filter) residing on the service 62. Personalization enables each user to receive URLs which are uniquely relevant to their interests, demographics, history, or behavior in the system.

System Operation

Once the URLs have reached the personal computer 16, system operation is similar for all of the embodiments diagramed in Figures 1, 2, and 4.

In a preferred embodiment, a JAVA enabled browser 98 as well as specialized software 106 for performing part of the method of the present invention are installed on the computer 16. The JAVA enabled browser 98 allows the computer 16 to retrieve the Web pages 102 and is preferred software, since it is platform independent, and thus, enables efficient and flexible transfer of programs, images, etc., over the Internet 20. The specialized interface software 106 (hereinafter, "client software"), attached as Appendix A, acts as an interface between the video programming and the Internet functions of the present invention. The client software 106 retrieves URLs from the video program (embodiment of Figure 1) or directly from the Internet connection (embodiments of Figures 2 and 4), interprets these URLs and directs the JAVA enabled browser 98 to retrieve the particular relevant Web pages 102, and synchronizes the retrieved Web pages to the video content for display on the user's computer 16, as shown in Figures 3 and 4 and explained in more detail below.

In a preferred method, the URLs are encoded and embedded into the video signal by inserting them into the vertical blanking interval (VBI), as mentioned above.

In another preferred embodiment, the URLs are entered by member TV broadcasters 66 along with specified times for transmitting the URLs to the user. At the appropriate times, the URLs are sent directly over the Internet to the user's PC 16 via the client software 106 over a direct point-to-point or multicasting connection.

One method of the present invention has the capability to detect identical URLs sent directly after one another which causes the browser not to fetch URLs in these particular cases. As shown in Figure 3, once the URL code is received at the computer, the client software 106 first interprets the URL and determines in step 42 whether the particular URL has been received previously. If it has already been received, the next received URL is interpreted for determination of prior receipt. If the particular URL has not been detected before, the software checks for misspelling in step 46 and any other errors, and if errors exist, corrects these particular errors. Once again, it is determined whether the URL has been previously detected. If it has, the next URL is accessed in step 38. If the URL has not been detected, the specific URL is added to the URL list in step 54. The specific URL is then sent to the Web browser, preferably a JAVA enabled browser 98. Upon receipt of the URL, the browser 98, in step 58, will access the Web site address 122 (Figure 4) indicated by the URL and retrieve the cited Web page(s) 102 via the Internet.

Viewers can view the integrated presentation in the following manner. As mentioned above, the video signal is processed and displayed on a video window on the PC screen using a WinTV card, for example. The corresponding audio is forwarded to the audio card and sent to the PC speakers.

The actual retrieved Web pages 102, referenced by the URL, are optionally time stamped to be displayed on the computer screen when predetermined related video content is

displayed in the video window, thus, enlightening and enhancing the video presentation by providing in-depth information related to the video content thereto. Another section on the screen is also preferably used to represent an operational control panel. This control panel provides a list of the URLs that have been broadcast and correspondingly received by the computer 16. This control panel is updated to add a URL code each time a new URL code is received by the PC 16. This list gives the subscriber the flexibility to go back and retrieve particularly informative or interesting Web pages that have already been displayed earlier in the program, or alternatively, to print them out for future reference. Furthermore, the list could include URLs referring to Web pages not displayed with the broadcast program, but that provide further information on a certain topic of interest to the viewer.

The present invention can best be understood with reference to an example. A viewer can begin watching a musical video featuring a new band, for example. As the video is received by the PC 16, URLs are either being received with the video signal or are being received directly via the Internet 20 or another data channel, and are being interpreted by the client software 106. Upon direction and command, the JAVA enabled browser 98 retrieves particular Web pages 102 from Internet 20 Web sites identified in the URLs. These Web pages 102 will then be displayed on the video screen at particular times. Thus, for example, while the viewer is watching the music video, biographical information on the band can also be displayed adjacently to the video window. Web pages 102 could also include an upcoming concert schedule, or even audio clips of the band's music may be downloaded from the Internet 20. As another example, a user could be watching a program relating to financial news. While the narrator is shown discussing high tech stocks, Web pages corresponding to detailed financial performance information on high tech stocks, environment and characteristics can be displayed with the video on the computer screen. If the personalization features are included, Web pages associated with a particular user's stock

can be fetched and displayed on the computer screen with the video program. When the program narrator switches to a discussion on the weekly performance of the Dow Jones, Web pages presenting related financial performance information can be simultaneously displayed. Thus, it is evident that the present invention profoundly enriches the viewing and learning experience.

It is understood that there can exist alternative embodiments for use with the present invention. For example, the user can view the interactive program using a television set 114 or other display monitor in conjunction with the display screen of the personal computer 16. In this embodiment, the relevant Web pages are shown on the personal computer 16 while the video program is displayed on the television monitor 114. In this alternative embodiment, a cable set top box receives the television program from the multichannel cable. The personal computer 16 also receives the video program from the multi-channel cable and extracts the URLs, embedded in the vertical blanking interval of the video signal or directly transmitted 94 over the Internet 20. The client software 106 extracts the URLs and retrieves the particular Web pages as described above. The Web pages are then synchronized with the particular video frames and presented to the user. It is understood that a hyperlink may exist on the Web site that will allow the user to automatically load the client software and call up the specific television channel referenced in the Web site. For example, someone browsing the Internet 20 may come upon a major television network's Web site. They scroll to an interesting story then click on an hyperlink to turn on the software which tunes the TV window to the network to enhance the information residing at the Web site.

Furthermore, instead of receiving the video program from a transmission means, the video program can be addressed directly from the user site if the video program, with or without embedded URLs, is stored on a VHS, Beta, DVD or other medium. In this

embodiment, the user PC 16 and/or television 114 are connected to a VCR, DVD player or other appropriate device.

Figures 5 and 6 show two alternative embodiments for use with the present invention. For example, the user can view the interactive program using a television set 18 or other display monitor in conjunction with a digital cable box 140, as shown in Figure 5. In this embodiment, the digital cable box 140 performs the functions of the personal computer 16 shown in Figures 1, 2 and 4. In the embodiment shown in Figure 5, the client software is stored in memory in the digital cable box 140. In the preferred embodiment, the digital cable box 140 includes two tuners, thus allowing both the Web Page and the Video program to be simultaneously viewed on the same screen. If Video and Webstream, however, are carried on one channel, then only one timer is necessary.

The client software retrieves URLs from the received video program, directly from the Internet connection 20 or via a separate data channel, interprets these URLs and directs the Web enabled browser to retrieve the particular relevant Web pages, and synchronizes the retrieved Web pages to the video content for display on the television 18, as shown in Figure 5. In this embodiment, the relevant Web pages are shown in one frame of the television 18 while the video program is displayed in another frame.

In this alternative embodiment, the digital cable set top box 140 receives the television program from the multichannel cable. The URLs can be encoded into the digital program channel using MPEG 1, MPEG2, MPEG4, MPEG7 or any other compression video scheme. Alternatively, the URLs can be transmitted to the digital cable boxes 140 from an Internet server 148. The digital cable box 140 decodes the URLs from the digital video signal or directly transmitted over the Internet 20. The client software decodes the URLs and retrieves the particular Web pages as described above. The Web pages are then preferably synchronized with the particular video frames and presented to the user.

As with all the embodiments described above, instead of receiving the video program from a transmission means, the video program can be addressed directly from a local video source 144 if the video program, with or without embedded URLs, is stored on a VHS, Beta, DVD or other medium. In this embodiment, the digital cable box 140 is connected to a VCR, DVD player or other appropriate device.

Figure 6 discloses an embodiment where a digital TV 152 is the remote reception unit. In this embodiment, the digital TV 152 performs the functions of the personal computer, shown in Figures 1, 2 and 4, and the digital cable box 140 shown in Figure 5. In the embodiment shown in Figure 6, a processor means and memory are incorporated into the digital TV 152. Further, the client software and Web browser software are implemented into memory in the digital TV 152. All of the functions described above with reference to the other embodiments are performed in a similar manner by the digital TV 152 embodiment.

Although the digital cable box/TV 140, 18 and digital TV 152, shown in Figures 5 and 6, are incorporated into the embodiment of Figure 1, in substitution for the PC 16, they also could be substituted for the PC 16 shown in Figures 2 and 4.

The user can view the video and web content on one screen (in two windows), or with the video on one display screen and the Web content on a separate display monitor. Alternatively, the user can access the video or web content separately. Thus, the user can branch from video to web content and vice versa.

The present invention is well-suited to the education environment. In this embodiment, students and teachers access one or more Web servers. The software components include instructor and student user software, authoring software and database assessment software. In one such embodiment, an instructor uses content creation software on a personal computer to easily integrate into their curriculum current information published on the Web, through an easy to use interface 156 such as that shown in Figure 7. The

instructor creates a playlist (i.e. linkfile) 160, the playlist 160 comprising a listing of Web pages, text notes and questions. The Web sites and questions are set forth in a predetermined order and can be assigned times. Preferably, the URLs identifying the Web site and time stamps are sent automatically to the desktop of each student in the virtual community, either during playback of a pre-recorded program or during a live event.

At each of the student workstations, the program is directed by the playlist 160. In other words, the playlist 160 provides the structure for the program. At predetermined times as dictated by the playlist 160, the browser will go fetch and display a Web page in a frame on the computer screen. Because program events can be set up in this manner at predetermined times, the entire program and playlist can be prerecorded and stored in a Web database for later access by students.

A significant advantage of the present invention for educational applications is that the students and the instructor can be located anywhere, as long as they are all connected to the Web. Because a server is essentially controlling the program, the instructor output comes from the server and the student workstations get automatically updated by the Web server.

This educational embodiment integrates Web content and other media with collaborative groupware functionality to create an interactive environment for students and teachers. In this embodiment, the student can receive a traditional video lesson through a frame in his or her Web browser, or from a television. Simultaneously, the present invention provides separate frames, an example of which is shown in Figure 8, in the browser displaying: (1)Web pages 176 automatically delivered to each student's desktop with information or exercises that complement the video presentation; (2) a chat dialogue frame 168 for conversing with the instructor and/or other students online; and (3), an interactive playlist 164 of Web pages and questions comprising the lesson.

In the student interface of Figure 8, each student can perform a virtual experiment during a physics lesson to learn about gravity, for example. Further, the students are conversing with one another and the instructor in the chat dialogue frame 168. They may also send Web pages to one another and provide answers to questions from the teacher via the chat dialogue frame 168 of the student interface 176. With the chat feature, students may break into subgroups for collaborative learning. Whenever a student in the group sends a message, the message is sent to the Internet server 20 and every other student in the subgroup receives and views the message in their Chat dialogue frame 168.

The instructor, however, may retain control over the chat feature. For example, the instructor can terminate the chat feature or web pushing to terminate unruly on-line conversations or the sending of Web pages by students.

Unlike conventional distance learning systems, the present invention is more powerful by allowing the instructor to freely and conveniently exercise almost any time of testing strategy. The instructor can test students using a combination of the Chat dialogue feature and Web pages. For example, multiple choice questions and short answer questions can appear in the Chat window 168. Essay questions, requiring longer answers, become Web pages. As mentioned above, students can perform virtual experiments on-line. Once the instructor's personal computer receives student answers, student scoring can be presented to the instructor in any format including tables, charts, diagrams, bar graphs, etc.. The instructor, thus, can analyze the results and has the capability of providing real-time feedback to the students.

Students can also receive individualized feedback via branched interactive audio, video and/or graphics responses. For example, the workstation may branch to a particular audio response, preferably prerecorded in the instructor's own voice, based on the student response to a multiple choice question. In this embodiment, a plurality of potential audio

responses are made available at the student's workstation according to any one of the methodologies set forth in U.S. Patent No. 5,537,141, entitled DISTANCE LEARNING SYSTEM, herein incorporated by reference. Alternatively, personalized video, audio and graphics segments can be delivered and displayed to the student based on a student answer or personal profile in the manner set forth in U.S. Patent No. 5,724,091, entitled COMPRESSED DIGITAL DATA INTERACTIVE PROGRAM SYSTEM, herein incorporated by reference.

Responses to student answers can be more substantive based on the memory feature of the present invention. The memory feature is an algorithm that selects an interactive response to the user based not only on the student's current answer selection, but also his or her previous responses, as discussed in the aforementioned applications. The algorithm, preferably stored in memory at each student's workstation and under processor control, merely selects an output interactive response based on student responses. As another example, if a student gets three answers in sequence right, he or she receives a more difficult question. If, however, the student misses one or more of the three questions, he or she receives an easier question.

In another embodiment of the present invention, a system is described capable of handling the education requirements of several schools in an efficiently designed network. The system shown in Figure 9 solves the problems inherent in attempting to service large numbers of users, the most obvious obstacles being the issues of load and performance. In this embodiment shown in Figure 9, communications servers 180 distribute and route messages across a LAN, WAN and the Internet. Referring to Figure 9, in the center of the diagram is the Group Database server. Surrounding the database server are several Com Servers 180, each serving an area 192. Surrounding each Com Server 180 are squares

representing user stations 188. The Communication Servers 180 are organized in node relationships with one another.

Each node is responsible for serving an Area 192. An Area 192 is defined as a Virtual location serviced by a single Communications Server 180 (or "Com Server"). An Area 192 may be a single school, an office, or may consist of several actual physical locations. The defining characteristic of an Area 192 is that messages sent from one member of an Area 192 to another need not be routed outside of the servicing Com Server 180.

An Area member is analogous to the frequently used term "user." For example, a "user" may be a student in the educational embodiment described above with reference to Figures 7 and 8.

The Distributed Communication System of Figure 9 shall permit the dynamic addition of Communication Servers 180 within a group with little or no administrative tasks as well as the addition of groups within an overall communications network. A Communication Server group consists of several defined Virtual Areas 192 (preferably, consisting of no more than 250 members each), each area 192 serviced by a single Com Server 180. This system shall allow members of one Area 192, or group to easily communicate with members of another Area 192 or group without any configuration changes.

Generally, service of very large numbers of users has required large expensive servers and networks. As the user base increases, performance suffers and hardware must be upgraded to service the demand.

The Distributed Communication System of the present invention allows the same, relatively inexpensive machines to serve an ever-increasing user base. The technique by which this will be accomplished will be through the routing of messages from one server to another when necessary.

The method essentially follows the same core pattern as IP routing and DNS lookups. If a message is for a member not belonging to the current Area 192 or group, the message shall be routed through the Distributed Communication System until its destination, or someone who knows the destination and can deliver the message, is found.

The destination will be cached so subsequent messages for that member or group may be more efficiently delivered.

Referring again to Figure 9, if a message is posted by member "A" and is intended only for the members of group 1 the message shall never leave Area 1 Com Server. However, if the message is intended for members of Area 1 and the members of Area 2, the Area 1 Com server forwards the message to the group database server 184. The message shall be broadcast to the members of Area 1 and tagged in the database 184 as belonging to Area 2. The message is then routed to Area 2 and broadcast to Area 2 members. With this technique any member can potentially send a message to any other member. If the Area Com server 180 does not recognize the destination, the message is forwarded up the line. Each Com server 180 does not need to know about any other server 180. Messages are routed until they are delivered. If undeliverable, the original sender is notified.

New Areas 192 can be added on the fly. When a new Com server 188 is added to the network, it registers itself with the database application. Henceforth, any message destined for the new Area 192 can be routed properly without altering the other Area Servers 180.

This method and system works for global messages or for user to user messages. Furthermore, new Groups may also be dynamically added. Once added, each new Group Database Server 184 registers itself with the existing database servers 184. This distribution of load permits nearly unlimited expansion with existing software and hardware. Each server manages a finite number of members, cumulatively serving a growing community.

Users need not be informed as to the particular Com Server 180 they should connect to. Members are directed to a single URL. The selection of the server for user connection is determined by load balancing software. In this manner, the network may appear to be a global network of Servers or simply a local classroom.

The unique aspects of this architecture, using database servers as routing gateways, using techniques resembling IP routing and DNS lookup, enables this system to serve with minimum administration and configuration and with lower end, cost-effective hardware.

Using the foregoing embodiments, methods and processes, the system of the present invention creates a synergistic experience combining the vast resources of the Internet with the presentation capabilities of television.

CLAIMS

We claim:

1. A system for receiving a programming signal containing an embedded address, the address identifying a source of at least one online information segment related to the programming signal, the system comprising:

a receiver for receiving a programming signal and the embedded address, the address identifying the source of the online information segment which relates to the programming signal;

an address extractor which extracts the address from the programming signal;

a web browser; and

a processor which automatically directs the web browser to establish a communications link with the online information source identified by the address, whereby the processor retrieves the online information segment from the online information source via the communications link.

2. A system as described in claim 1, wherein the system is provided in at least one device selected from the group consisting of: a cable box, a satellite receiver, a television, a hand held computer, a personal computer, and a VCR.

3. A system as described in claim 1, wherein the system is provided in a wired device.

4. A system as described in claim 1, wherein the system is provided in a wireless device.

5. A system as described in claim 1, wherein the system further comprises:

a first presentation device for presenting the programming signal; and

a second presentation device for presenting the online information segment.

6. A system as described in claim 1, wherein the system further comprises:

a display monitor for presenting the programming signal, comprising a video signal or an audio signal, concurrently with the online information segment.

7. A system as described in claim 6, wherein the programming signal comprises the video signal and the video signal and the online information segment are presented on the display monitor in a picture-in-picture format.

8. A system as described in claim 6, wherein the programming signal comprises the video signal and the video signal is presented on one half and the online information segment is presented on the opposite half of a split screen display format.

9. A system as described in claim 6, wherein the programming signal comprises the video signal and the video signal is presented in a first window and the online information segment is presented in a second window in a multiple window display format.

10. A system as described in claim 6, wherein the programming signal comprises the video signal and the video signal and the online information segment are presented on the display monitor.

11. A system as described in claim 6, wherein the programming signal comprises the audio signal and the audio signal and the online information segment are presented on an audio reproduction device.

12. A system as described in claim 1, wherein the source of the online information segment is the Internet.

13. A system as described in claim 1, wherein the source of the online information segment is selected from the group consisting of: the Internet, an intranet, a private network, and a public network.

14. A system as described in claim 1, wherein the programming signal further comprises at least one audio or video signal selected from the group consisting of: animation,

text, graphics, multimedia, slow frame video, data, music, dialogue, video stills, and a sequence of individual frames.

15. A system as described in claim 1, wherein the programming signal is received from a source selected from the group consisting of: a cable head-end, an Internet content server, a broadcaster, a wireless service source, a telephone circuit, and a satellite broadcast operations center.

16. A system as described in claim 1, wherein the programming signal is a presentation of a live event.

17. A system as described in claim 1, wherein the programming signal is a presentation of a pre-recorded program.

18. A system as described in claim 1, wherein the programming signal includes an advertisement.

19. A system as described in claim 1, wherein the address is an Internet URL, the URL identifying the online information source.

20. A system as described in claim 1, wherein the received online information segment includes at least one presentation form selected from the group consisting of: text, graphics, animation, individual video frames, data, video stills, slow frame video, video, audio and multimedia.

21. A system as described in claim 1, further comprising an electronic mail interface, the electronic mail interface allowing a user to send and receive electronic messages.

22. A system as described in claim 1, wherein the programming signal includes a news program and the online information segment contains additional information related to the news program.

23. A system as described in claim 1, wherein the programming signal includes an advertisement and the online information segment contains additional information related to the advertisement.

24. A system as described in claim 1, wherein the programming signal includes a sports program and the online information segment contains additional information related to the sports program.

25. A system as described in claim 1, wherein the programming signal includes an entertainment program and the online information segment contains additional information related to the entertainment program.

26. A system as described in claim 1, further comprising a data management storage device wherein information about a user is stored in the data management storage device.

27. A system as described in claim 26, wherein the user information includes user clicks made by the user on a user interface while using an online service source.

28. A system as described in claim 26, wherein information on a plurality of users is stored in the data management storage device.

29. A system as described in claim 26, wherein the programming signal is selected, at least in part, based on the user information.

30. A system as described in claim 26, wherein the online information segment is selected, at least in part, based on the user information.

31. A system as described in claim 26, wherein the address is selected, at least in part, based on the user information.

32. A system as described in claim 1, wherein the programming signal contains at least one program selected from the group consisting of: a sports program, an advertisement, a motion picture program, a game show program, a video program, a live program, an audio

program, a music video program, a pre-recorded program, a sitcom program, a non-commercial program, and a news program.

33. A system as described in claim 1, wherein the online information segment relates to a polling question.

34. A system as described in claim 1, further comprising a chat interface which facilitates interactive communications between a user and the online information source or a second user.

35. A system as described in claim 26, wherein the programming signal received comprises a sporting event; the user information identifies the user as a potential fan of the sporting event; and the address identifies the online information source as one wherein the online information segment relates to the sporting event.

36. A system as described in claim 26, wherein the programming signal received comprises a sporting event; the user information identifies the user as a potential player of the sport presented in the sporting event; and the address identifies the online information source as one wherein the online information segment relates to the sporting event.

37. A system as described in claim 26, wherein the programming signal received comprises a sporting event; the user information identifies the user as a potential fan of a specific team or player presented in the sporting event; and the address identifies the online information source as one wherein the online information segment relates to the sporting event.

38. A system as described in claim 26, wherein the user information contains information selected from the group consisting of: the geographic location of the user, clicks made by the user on a user interface while using an on line service source, user viewing habits, and demographics of the user.

39. A system as described in claim 26, wherein the data management storage device is located at a location selected from the group consisting of: a user station, a personal computer, a cable box, a cable head-end, a satellite receiver, an intranet site, a public network, a private network, and an Internet site.

40. A system as described in claim 26, wherein the programming signal contains a predetermined advertisement and wherein selection of the predetermined advertisement is based at least in part on the user information.

41. A system as described in claim 26, wherein at least one online information segment contains an advertisement and wherein the advertisement is selected at least in part based on the user information.

42. A system as described in claim 26, wherein the programming signal contains a graphics segment and wherein the graphics segment is selected at least in part based on the user information.

43. A system for presenting online information obtained from an online information source identified by an address, the online information related to a programming signal, the system comprising:

a receiver which receives the programming signal and the address;

a browser which automatically establishes a communications link with the online information source using the address which is provided to the browser by the receiver, the communications link facilitating a push transfer of the online information from the online information source; and

a presentation device which presents to a user the online information obtained from the online information source via the communications link.

44. A system as described in claim 43, wherein the address is received via a transmission medium selected from the group consisting of: the Internet, an intranet,

terrestrial broadcast, satellite broadcast, cable, fiber optics, a wireless connection, a telephone network, a public network, and a private network.

45. A system as described in claim 43, wherein the system further comprises a storage device for storing at least one of the group consisting of: the programming signal, the address, and the online content.

46. A system as described in claim 45, wherein the storage device further comprises at least one selected from the group consisting of: a digital versatile disk, a storage device provided with a computer workstation or set top box, a magnetic storage device, RAM, ROM, an optical storage device, a DVD, and a CD ROM.

47. A system as described in claim 43, wherein the presentation device further presents the programming signal to the user.

48. A system as described in claim 43, wherein the programming signal further comprises a presentation of a live event.

49. A system as described in claim 43, wherein the programming signal further comprises a presentation of a pre-recorded program.

50. A system as described in claim 43, wherein the programming signal includes an advertisement.

51. A system as described in claim 43, wherein the programming signal includes an audio program.

52. A system as described in claim 43, wherein the address is received independent of the programming signal.

53. A system as described in claim 43, wherein the address is received via the Internet.

54. A system as described in claim 43, wherein the programming signal further comprises a video signal and the address is embedded in the video signal.

55. A system as described in claim 54, wherein the address is embedded in the video signal so as not to interfere with the presentation of the video signal.

56. A system as described in claim 55, wherein the address is embedded in a vertical blanking interval provided in the video signal.

57. A system as described in claim 55, wherein the address is embedded in a horizontal blanking interval provided in the video signal.

58. A system as described in claim 55, wherein the address is embedded in a sub-carrier of the video signal.

59. A system as described in claim 55, wherein the address is embedded in a side-band of the video signal.

60. A system as described in claim 43, wherein the programming signal further comprises an audio signal and the address is embedded in the audio signal.

61. A system as described in claim 43, wherein the received online content includes content with form selected from the group consisting of: text, graphics, animation, individual video frames, slow frame video, video, data, video stills, audio and multimedia.

62. A system as described in claim 43, wherein the system further comprises a chat dialogue frame interface, the chat dialogue frame interface allowing the user to send and receive messages from others.

63. A system as described in claim 62, wherein at least one of the users is the online information source.

64. A system as described in claim 43, further comprising an electronic mail interface, the electronic mail interface allowing the user to send and receive messages from others.

65. A system as described in claim 64, wherein at least one of the users is the online information source.

66. A system as described in claim 43, wherein the programming signal includes a news program and the online content contains additional information related to the news program.

67. A system as described in claim 43, wherein the programming signal includes an advertisement and the online content contains additional information related to the advertisement.

68. A system as described in claim 43, wherein the programming signal includes a sports program and the online content contains additional information related to the sports program.

69. A system as described in claim 43, wherein the programming signal includes an entertainment program and the online content contains additional information related to the entertainment program.

70. A system as described in claim 43, wherein the programming signal includes a music video and the online content contains additional information related to the music video.

71. A system as described in claim 43, wherein the system is provided on a device selected from the group consisting of: a wireless device, a cable box, a satellite receiver, a television, a VCR, a hand held computer, and a personal computer.

72. A system as described in claim 43, wherein the system comprises a wired device.

73. A system as described in claim 43, wherein the system comprises a wireless device.

74. A system as described in claim 43, further comprising a data management storage device, wherein information about the user is stored in the data management storage device.

75. A system as described in claim 74, wherein the user information contains information on clicks made by the user on a user interface while using an online service source.

76. A system as described in claim 74, wherein information on clicks made by a plurality of users on respective user interfaces is stored in the data management storage device.

77. A system as described in claim 74, wherein the programming signal is selected, at least in part, based on the user information.

78. A system as described in claim 74, wherein the online information source is selected, at least in part, based on the user information.

79. A system as described in claim 74, wherein the address is selected, at least in part, based on the user information.

80. A system as described in claim 74, wherein the data management storage device is local to the receiver.

81. A system as described in claim 43, wherein the online information relates to at least one selected from the group consisting of: a sports program, an advertisement, a motion picture program, a game show program, a video program, a live program, an audio program, a music video program, a prerecorded program, a sitcom program, a non-commercial program, and a news program.

82. A system as described in claim 43, wherein the online information relates to a polling question.

83. A system as described in claim 74, wherein the programming signal received comprises a sporting event; the user information identifies the user as a potential fan of the sporting event; and the address identifies the online information source as one wherein the online information segment relates to the sporting event.

84. A system as described in claim 74, wherein the programming signal received comprises a sporting event; the user information identifies the user as a potential player of the sport presented in the sporting event; and the address identifies the online information source as one wherein the online information segment relates to the sporting event.

85. A system as described in claim 74, wherein the programming signal received comprises a sporting event; the user information identifies the user as a potential fan of a specific team or player presented in the sporting event; and the address identifies the online information source as one wherein the online information segment relates to the sporting event.

86. A system as described in claim 74, wherein the user information contains information selected from the group consisting of: the geographic location of the user, clicks made by the user on a user interface while using an on line service source, user viewing habits, and demographics of the user.

87. A system as described in claim 74, wherein the data management storage device is located at one of the locations selected from the group consisting of: a user station, a cable box, a satellite receiver, a cable head-end, an intranet site, a public network, a private network, and an Internet site.

88. A system as described in claim 74, wherein the programming signal contains a predetermined advertisement and wherein selection of the predetermined advertisement is based, at least in part, on the user information.

89. A system as described in claim 74, wherein the online information contains an advertisement and wherein the advertisement is selected, at least in part, based on the user information.

90. A system as described in claim 74, wherein the programming signal contains a graphics segment and wherein the graphics segment is selected, at least in part, based on the user information.

91. A computer readable medium containing instructions for receiving and displaying online information signals containing online information related to a programming signal by:

receiving an address identifying a source of online information containing the online information related to the programming signal;

automatically sending message requests to the online information source specified by the address; and

automatically retrieving the online information from the online information source in response to the message requests.

92. A computer readable medium as described in claim 91, wherein the programming signal comprises an audio signal, the address is embedded within the audio signal, and the instructions further comprise extracting the address from the audio signal.

93. A computer readable medium as described in claim 92, wherein the address is embedded within the audio signal so as to not interfere with the presentation of the audio signal.

94. A computer readable medium as described in claim 91, wherein the programming signal comprises a video signal, the address is embedded within the video signal, and the instructions further comprise extracting the address from the video signal.

95. A computer readable medium as described in claim 94, wherein the address is embedded within the video signal so as to not interfere with the presentation of the video signal.

96. A computer readable medium as described in claim 94, wherein the address is embedded within the video signal in at least one element of the video signal selected from the group consisting of: a vertical blanking interval, a horizontal blanking interval, a side-band, and a sub-carrier.

97. A computer readable medium as described in claim 91, wherein the instructions further comprise receiving the programming signal concurrently with the address.

98. A computer readable medium as described in claim 91, wherein the instructions further comprise receiving the programming signal after receiving the address.

99. A computer readable medium as described in claim 91, wherein the instructions further comprise receiving the programming signal before receiving the address.

100. A computer readable medium as described in claim 91, wherein the programming signal comprises at least one selected from the group consisting of: animation, text, graphics, multimedia, slow frame video, music, data, video stills, dialogue, and a sequence of individual frames.

101. A computer readable medium as described in claim 91, wherein the address is received from a source selected from the group consisting of: a cable head-end, an Internet content server, a terrestrial broadcaster, a wireless service source, a telephone circuit, and a satellite broadcast operations center.

102. A computer readable medium as described in claim 91, wherein the online information is related to a live event.

103. A computer readable medium as described in claim 91, wherein the online information is related to a prerecorded program.

104. A computer readable medium as described in claim 91, wherein the online information is related to an advertisement.

105. A computer readable medium as described in claim 91, wherein the online information is related to an audio program.

106. A computer readable medium as described in claim 91, wherein the online information is related to a news program.

107. A computer readable medium as described in claim 91, wherein the online information is related to a music video.

108. A computer readable medium as described in claim 91, wherein the computer readable medium is utilized in at least one device selected from the group consisting of: a cable box, a satellite receiver, a television, a hand held computer, a personal computer, a wireless device, and a VCR.

109. A computer readable medium as described in claim 91, wherein the instructions further comprise storing information about a user in a data management storage device.

110. A computer readable medium as described in claim 109, wherein the user information includes user clicks made by the user on a user interface while using an online service source.

111. A computer readable medium as described in claim 109, wherein the programming signal is selected, at least in part, based on the user information.

112. A computer readable medium as described in claim 109, wherein the online information is selected, at least in part, based on the user information.

113. A computer readable medium as described in claim 109, wherein the address is selected, at least in part, based on the user information.

114. A computer readable medium as described in claim 109, wherein the online information segment relates to at least one selected from the group consisting of: a sports program, an advertisement, a motion picture program, a game show program, a video

program, a live program, an audio program, a music video program, a prerecorded program, a sitcom program, a non-commercial program, and a news program.

115. A computer readable medium as described in claim 109, wherein the online information relates to a polling question.

116. A computer readable medium as described in claim 91, wherein the instructions further comprise establishing a chat interface, the chat interface facilitating interactive communications between the user and at least one of the group consisting of: the online information source and a second user.

117. A computer readable medium as described in claim 91, wherein the instructions further comprise initializing an electronic mail interface, the electronic mail interface facilitating the sending and receiving of electronic messages to others.

118. A computer readable medium as described in claim 109, wherein the user information contains information selected from the group consisting of: the geographic location of the user, clicks made by the user on a user interface while using an on line service source, user viewing habits, and demographics of the user.

119. A computer readable medium as described in claim 109, wherein the data management storage device is located at one of the locations selected from the group consisting of: a user station, a cable box, a cable head-end, a satellite receiver, an intranet site, a public network, a private network, and an Internet site.

120. A computer readable medium as described in claim 109, wherein the programming signal contains a predetermined advertisement and wherein selection of the predetermined advertisement is based, at least in part, on the user information.

121. A computer readable medium as described in claim 109, wherein the address is selected, at least in part, based on the user information.

122. A computer readable medium as described in claim 109, wherein the online information contains an advertisement and wherein the advertisement is selected, at least in part, based on the user information.

123. A computer readable medium as described in claim 109, wherein the programming signal contains a graphics segment and wherein the graphics segment is selected, at least in part, based on the user information.

124. A receiver system for receiving video programming and network-delivered on-line information segments having content related to the video programming, comprising: a first receiver for receiving a signal carrying the video programming; and

a processor coupled to a network for receiving at least one address in respective specified timing relationship with the video programming, and using the at least one address for retrieving from at least one server on the network the on-line information segments,

wherein the video programming and the on-line information segments are presented for viewing in respective predetermined timing relationship.

125. A system as described in claim 124, wherein each one of the at least one address received by the processor includes an associated time indicia for controlling when each one of the at least one address is to be used for retrieving respective ones of the on-line information segments, so that the on-line information segments are presented for viewing in respective predetermined timing relationship with the video programming.

126. A system as described in claim 124, wherein the signal is encoded to carry the at least one address in respective specified timing relationship with the video programming, and further comprising a decoder for extracting the at least one address from the encoded signal, and for providing the at least one address extracted from the encoded signal to the processor.

127. A system as described in claim 124, wherein the network comprises the Internet; the at least one address comprises at least one uniform resource locator; the at least one network server comprises at least one Internet web site; and the processor receives the at least one uniform resource locator and includes a web browser responsive to the at least one uniform resource locator for retrieving over the Internet from the at least one Internet web site at least one web page comprising the on-line information segments, the at least one web page and the video programming being presented for viewing in respective predetermined timing relationship.

128. A system as described in claim 124, wherein the first receiver causes the video programming carried by the signal to be presented on an audio visual monitor, and the processor causes the on-line information segments to be presented on a display.

129. A system as described in claim 124, wherein the video programming comprises education subject matter.

130. A system as described in claim 124, wherein the video programming comprises entertainment matter.

131. A system as described in claim 124, wherein the video programming comprises advertising subject matter.

132. A system as described in claim 124, wherein the on-line information segments include advertising subject matter.

133. The system of claim 124, wherein the online information segments include a request for viewer response and wherein the network has a two-way capability enabling the viewer to enter information in response to the request included in the on-line information segments.

134. A system as described in claim 127, wherein the at least one web page includes a request for viewer response and wherein the viewer is enabled to send information over the Internet in response to the request.

135. A system as described in claim 133, wherein the video programming comprises advertising subject matter, and the on-line information segments includes a request which enables the viewer to enter response information related to the advertising subject matter of the video programming.

136. A system as described in claim 134, wherein the video programming comprises advertising subject matter, and the at least one web page including a request for viewer response enables the viewer to enter response information related to the advertising subject matter of the video programming.

137. A system as described in claim 133, wherein the on-line information segments including a request for viewer response comprises advertising subject matter and enables the viewer to enter response information concerning the advertising subject matter of the on-line information segments.

138. A system as described in claim 134, wherein the at least one web page including a request for viewer response comprises advertising subject matter and enables the viewer to enter response information concerning the advertising subject matter of the at least one web page.

139. A system as described in claim 133, wherein the on-line information segments including a request for viewer response comprises an offer to sell a product or a service, and enables the viewer to enter response information for making a purchase of the product or the service.

140. A system as described in claim 134, wherein the at least one web page including a request for viewer response comprises an offer to sell a product or a service, and enables the viewer to enter response information for making a purchase of the product or the service.

141. A system as described in claim 124, wherein the first receiver and the processor are included in a single receiving device.

142. A system as described in claim 141, wherein the single receiving device is a personal computer.

143. A system as described in claim 141, wherein the single receiving device is a cable television set-top box.

144. A system as described in claim 141, wherein the single receiving device is a satellite broadcast receiver.

145. A system as described in claim 141, wherein the network is the Internet; the at least one network address comprises at least one uniform resource locator; the at least one server comprises at least one Internet web site; and the on-line information segments comprise at least one web page retrievable over the Internet from the at least one Internet web site using the at least one uniform resource locator, the processor having a web browser responsive to the at least one uniform resource locator for retrieving over the Internet from the at least one Internet web site the at least one web page, and being coupled to a display for presenting the at least one web page in respective predetermined timing relationship with the presentation of the video programming on the display.

146. A method for receiving video programming and network-delivered on-line information segments having content related to the video programming, comprising the steps of:

receiving a signal carrying the video programming;

receiving, in respective specified timing relationship with the video programming carried by the signal, at least one address for retrieving over a network the on-line information segments from at least one server on the network;

wherein the video programming and the on-line information segments are presented for viewing in respective predetermined timing relationship.

147. A method as described in claim 146, wherein each one of the at least one address is received with an associated timing indicia for controlling when each one of the at least one address is to be used for retrieving respective ones of the on-line information segments so that the on-line information segments are presented for viewing in respective predetermined timing relationship with the video programming.

148. A method as described in claim 146, wherein the network is the Internet; the at least one address comprises at least one uniform resource locator; the at least one server comprises at least one Internet web site; and the on-line information segments comprise at least one web page retrievable over the Internet from the at least one Internet web site using the at least one uniform resource locator.

149. A method as described in claim 146, wherein the video programming comprises education subject matter.

150. A method as described in claim 146, wherein the video programming comprises entertainment subject matter.

151. A method as described in claim 146, wherein the video programming comprises advertising subject matter.

152. A method as described in claim 146, wherein the on-line information segments include a request for viewer response, and wherein the network has a two-way capability enabling the viewer to enter information in response to an on-line information segment.

153. A method as described in claim 152, wherein the network is the Internet; the at least one network address comprises at least one uniform resource locator; the at least one server comprises at least one Internet web site; and the on-line information segments comprise at least one web page retrievable over the Internet from the at least one Internet web site using the at least one uniform resource locator, the at least one web page including a request for viewer response, and wherein the viewer is enabled to enter response information in response to the request, the response information being sent over the Internet to a respective one of the at least one Internet web site providing the at least one web page including the request.

154. A method as described in claim 152, wherein the video programming comprises advertising subject matter and the request for viewer response is related to the advertising subject matter of the video programming.

155. A method as described in claim 153, wherein the video programming comprises advertising subject matter and the request for viewer response is related to the advertising subject matter of the video programming.

156. A method as described in claim 152, wherein the on-line information segments contains advertising subject matter and enables the viewer to enter response information relating to the advertising subject matter of the at least one information segment.

157. A method as described in claim 153, wherein the at least one web page contains advertising subject matter and enables the viewer to enter response information relating to the advertising subject matter of the at least one web page.

158. A method as described in claim 152, wherein the on-line information segments comprise an offer to sell a product or a service and enables the viewer to enter response information for making a purchase of the product or the service.

159. A method as described in claim 153, wherein the at least one web page comprises an offer to sell a product or a service and enables a viewer to enter response information for making a purchase of the product or the service.

ABSTRACT

A system for integrating video programming with the vast information resources of the Internet. A computer-based system receives a video program with embedded uniform resource locators (URLs). The URLs, the effective addresses of locations or Web sites on the Internet, are interpreted by the system and direct the system to the Web site locations to retrieve related Web pages. Upon receipt of the Web pages by the system, the Web pages are synchronized to the video content for display. The video program signal can be displayed in a video window on a conventional personal computer screen. The actual retrieved Web pages are time stamped to also be displayed, on another portion of the display screen, when predetermined related video content is displayed in the video window. As an alternative, the computer-based system receives the URLs directly through an Internet connection, at times specified by TV broadcasters in advance. The system interprets the URLs and retrieves the appropriate Web pages. The Web pages are synchronized to the video content for display in conjunction with a television program being broadcast to the user at that time. This alternative system allows the URLs to be entered for live transmission to the user.

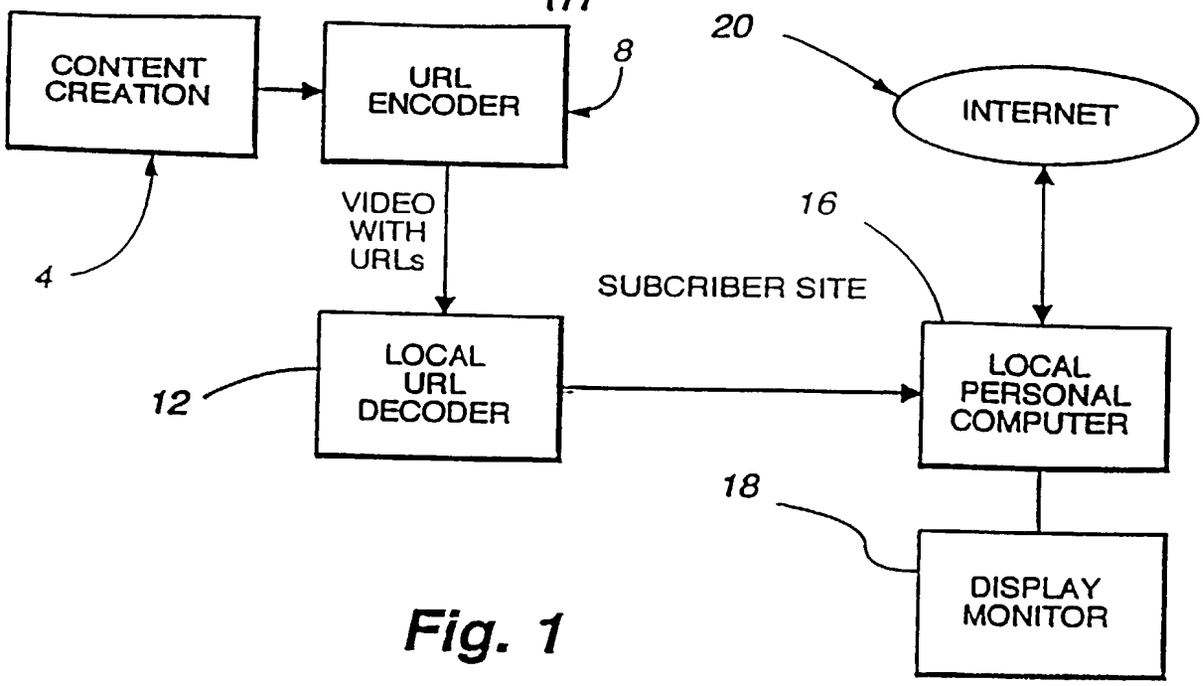

CONTENT CREATION
URL ENCODER
8
20
INTERNET
4
VIDEO WITH URLs
16
SUBCRIBER SITE
LOCAL URL DECODER
12
LOCAL PERSONAL COMPUTER
18
DISPLAY MONITOR

Fig. 1

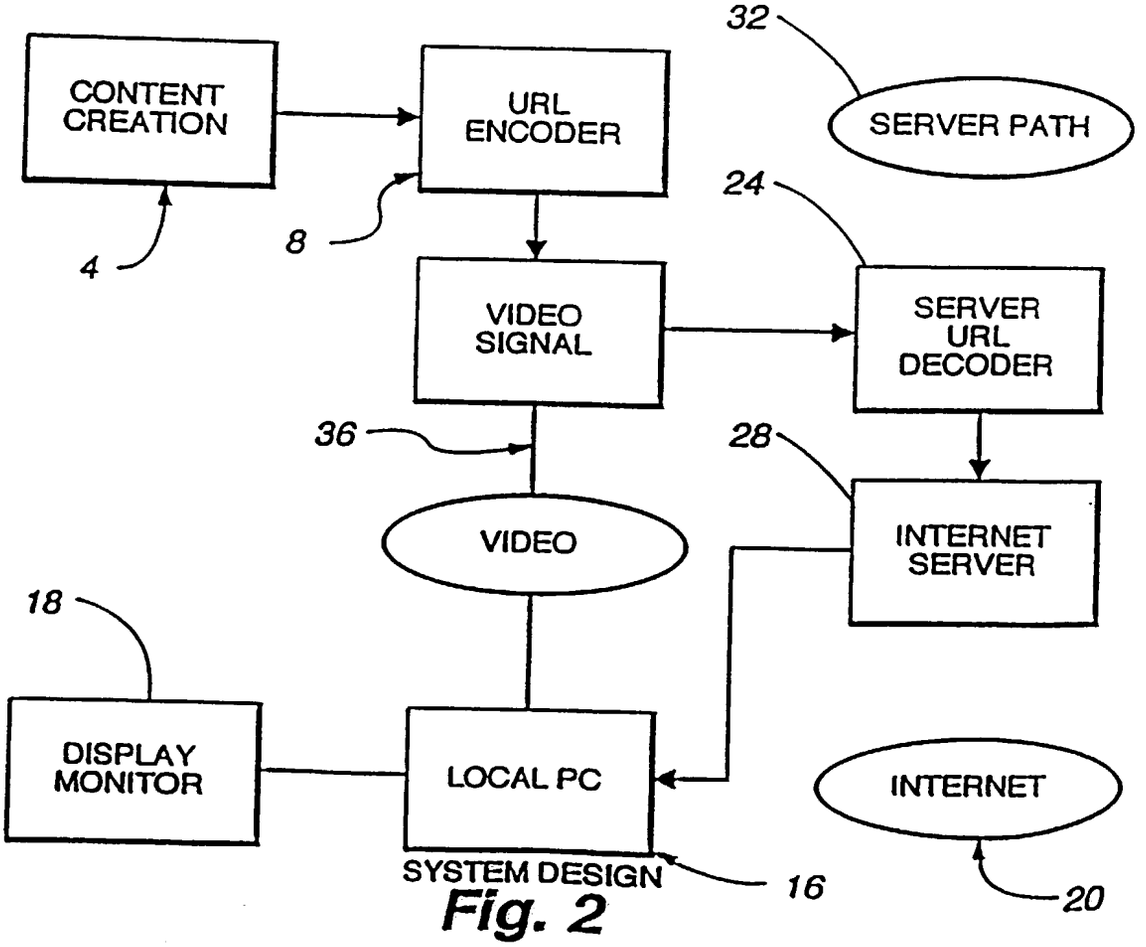
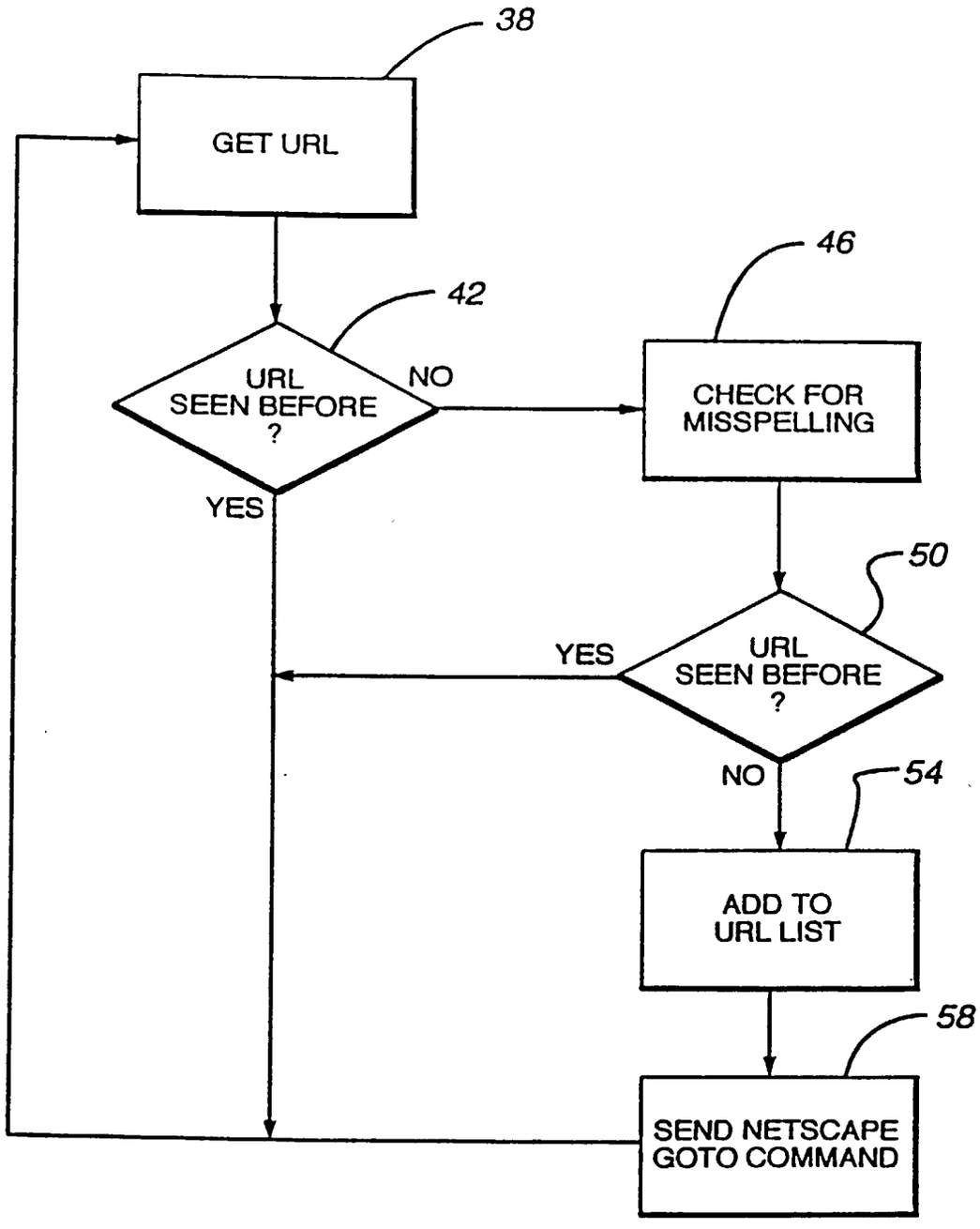

32
SERVER PATH
CONTENT CREATION
URL ENCODER
4
8
24
VIDEO SIGNAL
SERVER URL DECODER
36
28
VIDEO
INTERNET SERVER
18
DISPLAY MONITOR
LOCAL PC
INTERNET
SYSTEM DESIGN
16
20

Fig. 2



SOFTWARE DESIGN

Fig. 3

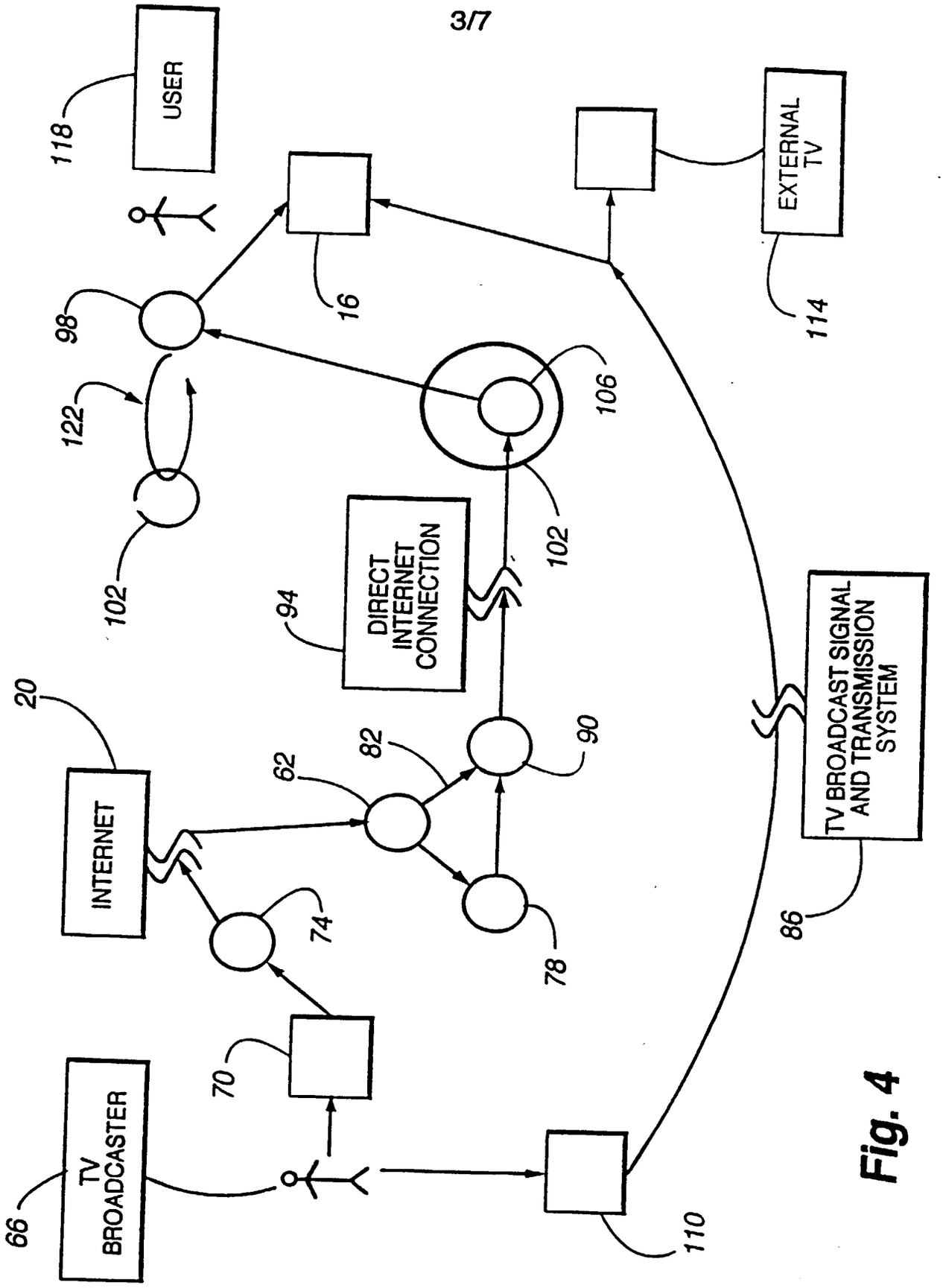

USER
118
16
98
122
102
106
102
EXTERNAL TV
114
DIRECT INTERNET CONNECTION
94
20
INTERNET
62
82
90
74
78
70
TV BROADCAST SIGNAL AND TRANSMISSION SYSTEM
86
TV BROADCASTER
66
110

Fig. 4

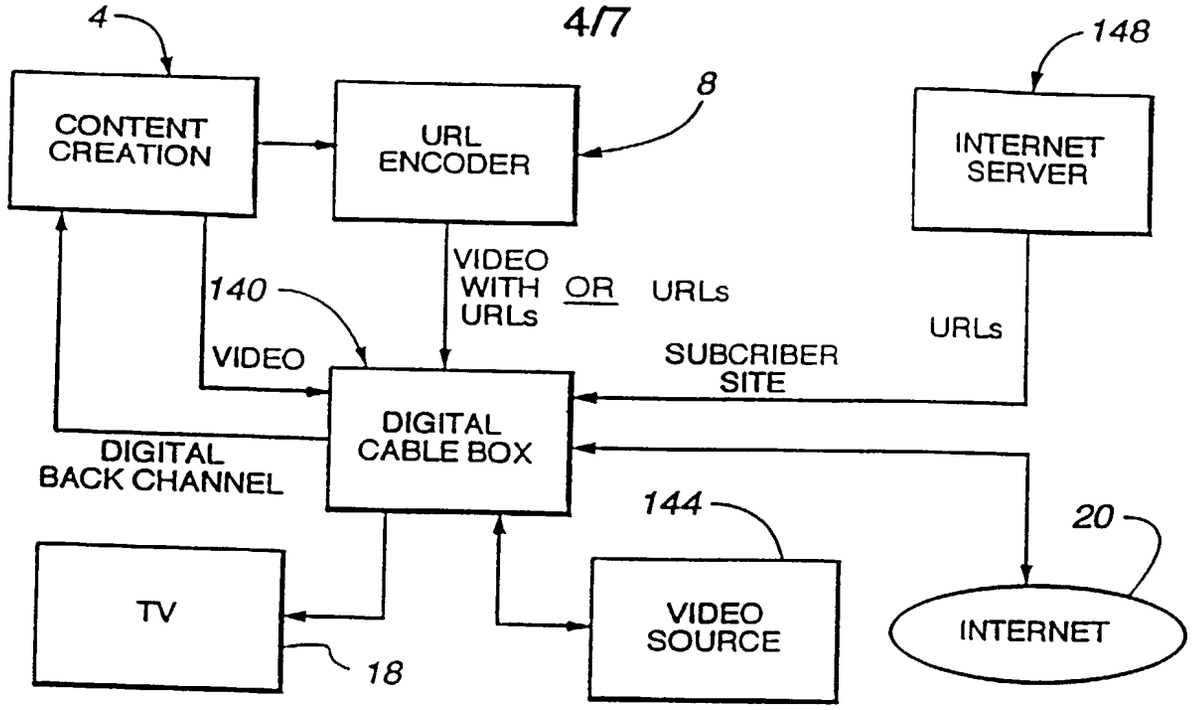

4
CONTENT CREATION
URL ENCODER
8
148
INTERNET SERVER
VIDEO WITH URLs OR URLs
140
VIDEO
URLs
SUBCRIBER SITE
DIGITAL CABLE BOX
DIGITAL BACK CHANNEL
144
20
TV
VIDEO SOURCE
INTERNET
18

Fig. 5

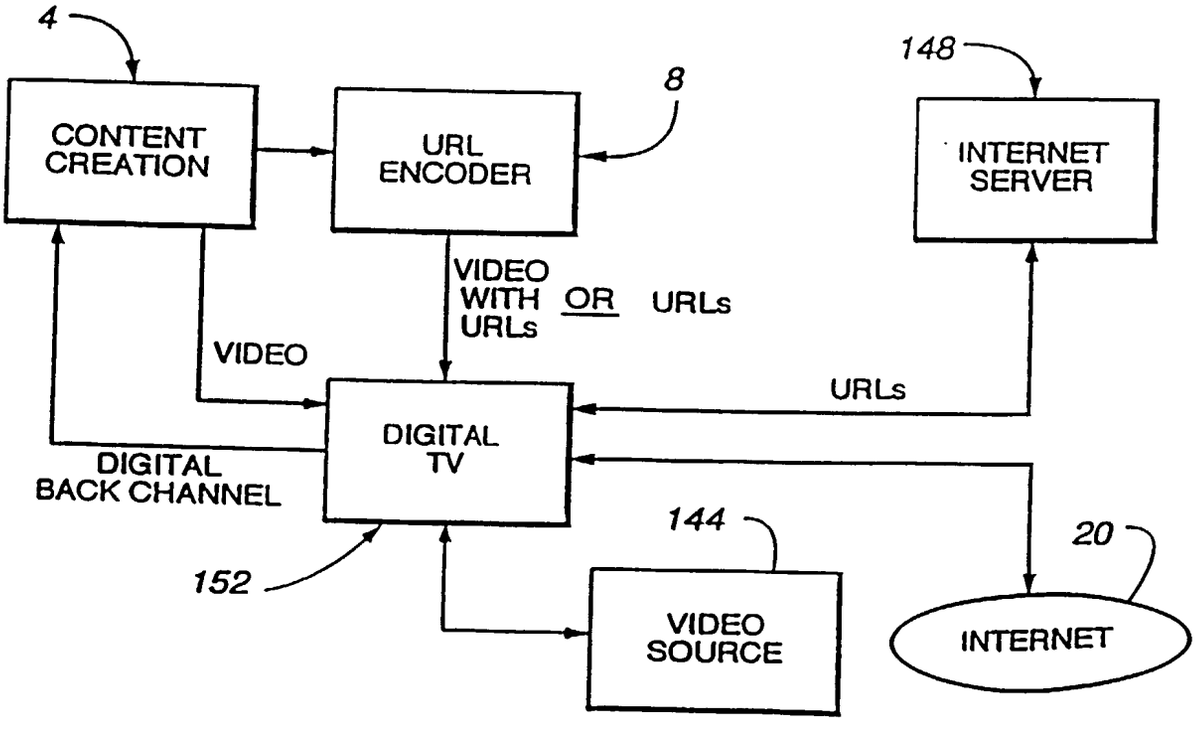

4
CONTENT CREATION
URL ENCODER
8
148
INTERNET SERVER
VIDEO WITH URLs OR URLs
VIDEO
URLs
DIGITAL TV
DIGITAL BACK CHANNEL
144
20
152
VIDEO SOURCE
INTERNET

Fig. 6

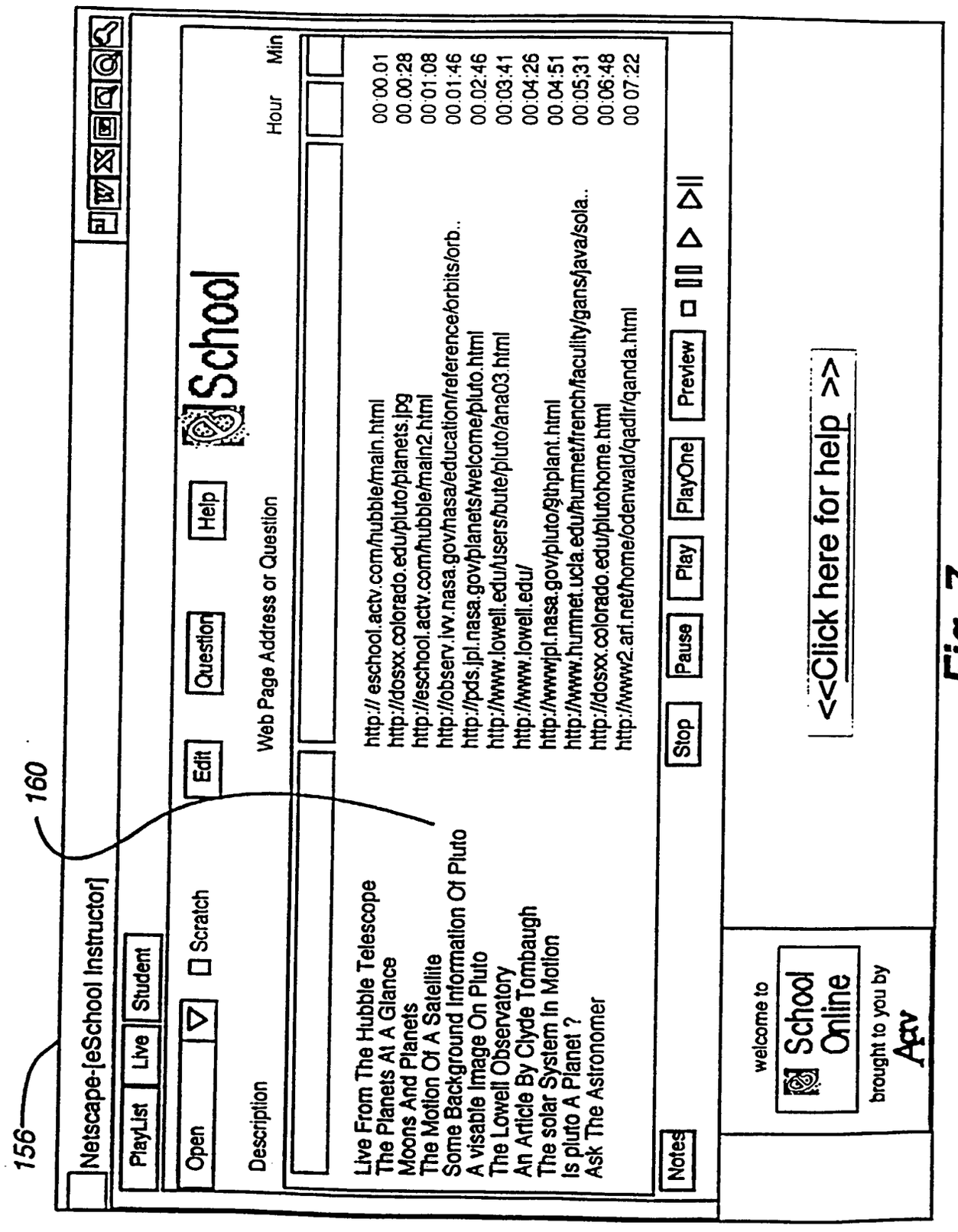

156
160
Netscape-[eSchool Instructor]
PlayList
Live
Student
Open
Scratch
Edit
Question
Help
eSchool
Description
Web Page Address or Question
Hour
Min
Live From The Hubble Telescope
The Planets At A Glance
Moons And Planets
The Motion Of A Satellite
Some Background Information Of Pluto
A visable Image On Pluto
The Lowell Observatory
An Article By Clyde Tombaugh
The solar System In Motion
Is pluto A Planet ?
Ask The Astronomer
http:// eschool.actv.com/hubble/main.html 00:00.01
http://dosxx.colorado.edu/pluto/planets.jpg 00.00:28
http://eschool.actv.com/hubble/main2.html 00:01:08
http://observ.ivv.nasa.gov/nasa/education/reference/orbits/orb.. 00.01:46
http://pds.jpl.nasa.gov/planets/welcome/pluto.html 00.02:46
http://www.lowell.edu/users/bute/pluto/ana03.html 00:03:41
http://www.lowell.edu/ 00:04:26
http://www/jpl.nasa.gov/pluto/gthplant.html 00.04:51
http://www.humnet.ucla.edu/humnet/french/faculity/gans/java/sola.. 00:05;31
http://dosxx.colorado.edu/plutohome.html 00:06:48
http://www2.arl.net/home/odenwald/qadlr/qanda.html 00 07:22
Notes
Stop
Pause
Play
PlayOne
Preview
<<Click here for help >>
welcome to
eSchool Online
brought to you by
Actv

Fig. 7

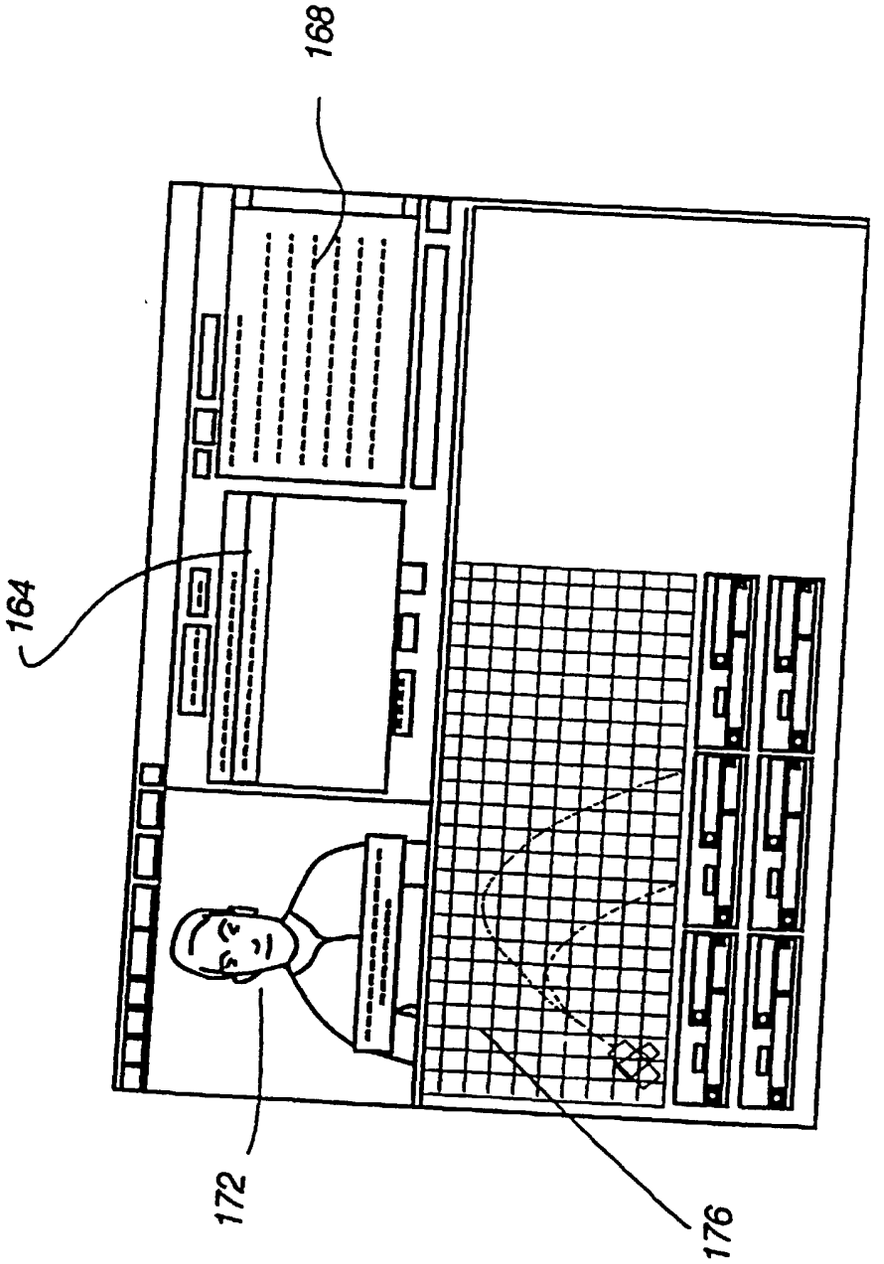


Fig. 8

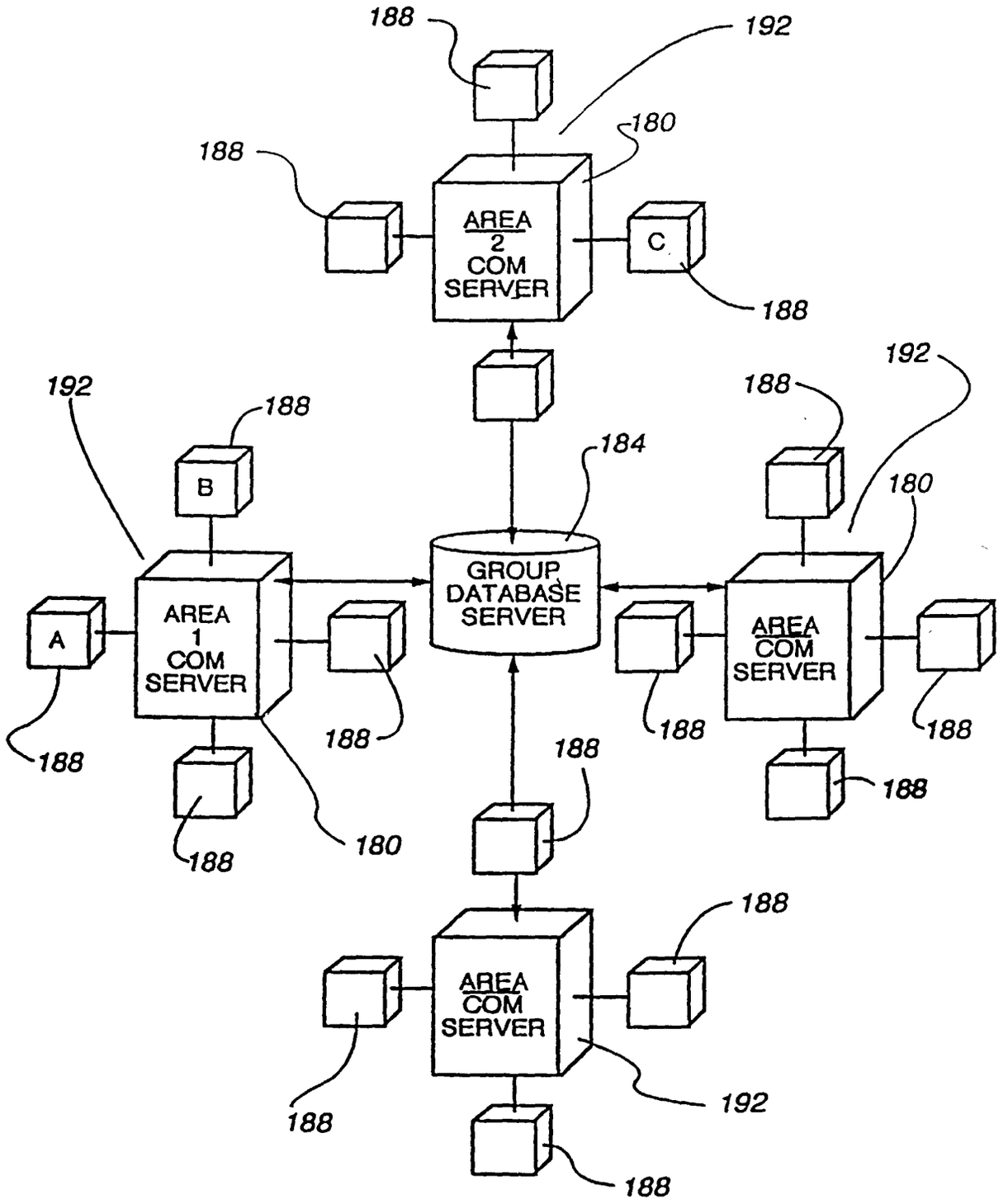

188
192
180
188
AREA 2 COM SERVER
C
188
192
188
192
188
184
B
180
A
AREA 1 COM SERVER
GROUP DATABASE SERVER
AREA COM SERVER
188
188
188
188
188
188
180
188
AREA COM SERVER
188
192
188

Fig. 9

Express Mail Label N

This copy is intended for the attached application entitled "ENHANCED VIDEO PROGRAMMING SYSTEM AND METHOD FOR INCORPORATING AND DISPLAYING RETRIEVED INTEGRATED INTERNET INFORMATIO SEGMENTS", Inventors: Craig ULLMAN, et al. *and identified a Attorney Docket No.* **4247.51**, *filed November 18, 2002*

Docket No.
4247.02

Declaration and Power of Attorney For Patent Application

English Language Declaration

As a below named inventor, I hereby declare that:

My residence, post office address and citizenship are as stated below next to my name,

I believe I am the original, first and sole inventor (if only one name is listed below) or an original, first and joint inventor (if plural names are listed below) of the subject matter which is claimed and for which a patent is sought on the invention entitled

ENHANCED VIDEO PROGRAMMING SYSTEM AND METHOD FOR INCORPORATING AND DISPLAYING RETRIEVED INTEGRATED INTERNET INFORMATION SEGMENTS

the specification of which

(check one)

☐ is attached hereto.

☒ was filed on **July 6, 1998** as United States Application No. or PCT International Application Number 09/109,945

and was amended on _____
(if applicable)

I hereby state that I have reviewed and understand the contents of the above identified specification, including the claims, as amended by any amendment referred to above.

I acknowledge the duty to disclose to the United States Patent and Trademark Office all information known to me to be material to patentability as defined in Title 37, Code of Federal Regulations, Section 1.56.

I hereby claim foreign priority benefits under Title 35, United States Code, Section 119(a)-(d) or Section 365(b) of any foreign application(s) for patent or inventor's certificate, or Section 365(a) of any PCT International application which designated at least one country other than the United States, listed below and have also identified below, by checking the box, any foreign application for patent or inventor's certificate or PCT International application having a filing date before that of the application on which priority is claimed.

Prior Foreign Application(s)			Priority Not Claimed
(Number)	(Country)	(Day/Month/Year Filed)	☐
(Number)	(Country)	(Day/Month/Year Filed)	☐
(Number)	(Country)	(Day/Month/Year Filed)	☐

I hereby claim the benefit under 35 U.S.C. Section 119(e) of any United States provisional application(s) listed below:

(Application Serial No.)	(Filing Date)
(Application Serial No.)	(Filing Date)
(Application Serial No.)	(Filing Date)

I hereby claim the benefit under 35 U. S. C. Section 120 of any United States application(s), or Section 365(c) of any PCT International application designating the United States, listed below and, insofar as the subject matter of each of the claims of this application is not disclosed in the prior United States or PCT International application in the manner provided by the first paragraph of 35 U.S.C. Section 112, I acknowledge the duty to disclose to the United States Patent and Trademark Office all information known to me to be material to patentability as defined in Title 37, C. F. R., Section 1.56 which became available between the filing date of the prior application and the national or PCT International filing date of this application:

08/615,143	**03/14/96**	**pending**
(Application Serial No.)	(Filing Date)	(Status) (patented, pending, abandoned)
08/613,144	**03/08/96**	**abandoned**
(Application Serial No.)	(Filing Date)	(Status) (patented, pending, abandoned)
(Application Serial No.)	(Filing Date)	(Status) (patented, pending, abandoned)

I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of the application or any patent issued thereon.

POWER OF ATTORNEY: As a named inventor, I hereby appoint the following attorney(s) and/or agent(s) to prosecute this application and transact all business in the Patent and Trademark Office connected therewith. *(list name and registration number)*

Customer No. 20686

Send Correspondence to: **Customer No. 20686**

Direct Telephone Calls to: *(name and telephone number)*

Scott W. Doyle (303) 628-1504

Full name of sole or first inventor **Craig Ullman** 8/3/98 Date
Sole or first inventor's signature Craig Ullman
Residence **Brooklyn, New York**
Citizenship **USA**
Post Office Address ~~76 Cook Street~~ 112 Willow St. #4b
~~Brooklyn, NY 11203~~ Brooklyn NY 11201

Full name of second inventor, if any **Jack D. Hidary** (see attached duplicate page 3)
Second inventor's signature Date
Residence **New York, New York**
Citizenship **USA**
Post Office Address **320 East 46th Street, Apt. 8A**
New York, NY 10017

POWER OF ATTORNEY: As a named inventor, I hereby appoint the following attorney(s) and/or agent(s) to prosecute this application and transact all business in the Patent and Trademark Office connected therewith. *(list name and registration number)*

Customer No. 20686

Send Correspondence to: **Customer No. 20686**

Direct Telephone Calls to: *(name and telephone number)*

Scott W. Doyle (303) 628-1504

Full name of sole or first inventor **Craig Ullman**
Sole or first inventor's signature Date
Residence **Brooklyn, New York**
Citizenship **USA**
Post Office Address **76 State Street**
Brooklyn, NY 11203

Full name of second inventor, if any **Jack D. Hidary**
Second inventor's signature Date 8/13/98
Residence **New York, New York**
Citizenship **USA**
Post Office Address **320 East 46th Street, Apt. 8A**
New York, NY 10017

Full name of third inventor, if any
Nova T. Spivack

Third inventor's signature

Date
8/13/98

Residence
New York, New York

Citizenship
USA

Post Office Address
184 Thompson Street, Apt. 4G

New York, NY 10012

Full name of fourth inventor, if any

Fourth inventor's signature

Date

Residence

Citizenship

Post Office Address

Full name of fifth inventor, if any

Fifth inventor's signature

Date

Residence

Citizenship

Post Office Address

Full name of sixth inventor, if any

Sixth inventor's signature

Date

Residence

Citizenship

Post Office Address

PATENT APPLICATION SERIAL NO. _____

U.S. DEPARTMENT OF COMMERCE
PATENT AND TRADEMARK OFFICE
FEE RECORD SHEET

11/21/2002 WASFAW1 00000091 10299335

01 FC:1001	740.00 OP
02 FC:1201	168.00 OP
03 FC:1202	2502.00 OP

PTO-1556
(5/87)

*U.S. Government Printing Office: 2002 — 489-267/69033

PATENT APPLICATION FEE DETERMINATION RECORD
Effective October 1, 2001

Application or Docket Number: 4247.51

CLAIMS AS FILED - PART I

	(Column 1)	(Column 2)
TOTAL CLAIMS	159	
FOR	NUMBER FILED	NUMBER EXTRA
TOTAL CHARGEABLE CLAIMS	159 minus 20=	* 139
INDEPENDENT CLAIMS	5 minus 3 =	* 2
MULTIPLE DEPENDENT CLAIM PRESENT		☐

* If the difference in column 1 is less than zero, enter "0" in column 2

SMALL ENTITY TYPE ☐		OR	OTHER THAN SMALL ENTITY	
RATE	FEE		RATE	FEE
BASIC FEE	370.00	OR	BASIC FEE	740.00
X$ 9=		OR	X$18=	2502
X42=		OR	X84=	168
+140=		OR	+280=	
TOTAL		OR	TOTAL	2410

CLAIMS AS AMENDED - PART II

	(Column 1)		(Column 2)	(Column 3)
AMENDMENT A	CLAIMS REMAINING AFTER AMENDMENT		HIGHEST NUMBER PREVIOUSLY PAID FOR	PRESENT EXTRA
Total	*	Minus	**	=
Independent	*	Minus	***	=
FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM				☐

SMALL ENTITY		OR	OTHER THAN SMALL ENTITY	
RATE	ADDITIONAL FEE		RATE	ADDITIONAL FEE
X$ 9=		OR	X$18=	
X42=		OR	X84=	
+140=		OR	+280=	
TOTAL ADDIT. FEE		OR	TOTAL ADDIT. FEE	

	(Column 1)		(Column 2)	(Column 3)
AMENDMENT B	CLAIMS REMAINING AFTER AMENDMENT		HIGHEST NUMBER PREVIOUSLY PAID FOR	PRESENT EXTRA
Total	*	Minus	**	=
Independent	*	Minus	***	=
FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM				☐

RATE	ADDITIONAL FEE		RATE	ADDITIONAL FEE
X$ 9=		OR	X$18=	
X42=		OR	X84=	
+140=		OR	+280=	
TOTAL ADDIT. FEE		OR	TOTAL ADDIT. FEE	

	(Column 1)		(Column 2)	(Column 3)
AMENDMENT C	CLAIMS REMAINING AFTER AMENDMENT		HIGHEST NUMBER PREVIOUSLY PAID FOR	PRESENT EXTRA
Total	*	Minus	**	=
Independent	*	Minus	***	=
FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM				☐

RATE	ADDITIONAL FEE		RATE	ADDITIONAL FEE
X$ 9=		OR	X$18=	
X42=		OR	X84=	
+140=		OR	+280=	
TOTAL ADDIT. FEE		OR	TOTAL ADDIT. FEE	

* If the entry in column 1 is less than the entry in column 2, write "0" in column 3.
** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 20, enter "20."
***If the "Highest Number Previously Paid For" IN THIS SPACE is less than 3, enter "3."
The "Highest Number Previously Paid For" (Total or Independent) is the highest number found in the appropriate box in column 1.

MULTIPLE DEPENDENT CLAIM FEE CALCULATION SHEET

(FOR USE WITH FORM PTO-875)

SERIAL NO.	FILING DATE
APPLICANT(S)	

CLAIMS

	AS FILED		AFTER 1st AMENDMENT		AFTER 2nd AMENDMENT			*		*		*	
	IND.	DEP.	IND.	DEP.	IND.	DEP.		IND.	DEP.	IND.	DEP.	IND.	DEP.
1							51						
2							52						
3							53						
4							54						
5							55						
6							56						
7							57						
8							58						
9							59		1				
10							60						
11							61						
12							62						
13							63						
14							64						
15							65						
16							66						
17							67						
18							68						
19							69						
20							70						
21							71						
22							72						
23							73						
24	1						74						
25							75						
26							76						
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38							88						
39							89						
40							90						
41							91						
42							92						
43							93						
44							94						
45							95						
46	1						96						
47							97						
48							98						
49							99						
50							100						
TOTAL IND.							TOTAL IND.	5					
TOTAL DEP.							TOTAL DEP.	154					
TOTAL CLAIMS							TOTAL CLAIMS	159					

PTO-1360 (3-78)

*MAY BE USED FOR ADDITIONAL CLAIMS OR AMENDMENTS

U.S. DEPARTMENT of COMMERCE
Patent and Trademark Office

MULTIPLE DEPENDENT CLAIM FEE CALCULATION SHEET

(FOR USE WITH FORM PTO-875)

SERIAL NO.

FILING DATE

APPLICANT(S)

CLAIMS

	AS FILED		AFTER 1st AMENDMENT		AFTER 2nd AMENDMENT			•		•		•	
	IND.	DEP.	IND.	DEP.	IND.	DEP.		IND.	DEP.	IND.	DEP.	IND.	DEP.
1	/						51						
2							52						
3							53						
4							54						
5							55						
6							56						
7							57						
8							58						
9							59						
10							60						
11							61						
12							62						
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14							64						
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16							66						
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33							83						
34							84						
35							85						
36							86						
37							87						
38							88						
39							89						
40							90						
41							91	/					
42							92						
43	/						93						
44							94						
45							95						
46							96						
47							97						
48							98						
49							99						
50							100						
TOTAL IND.							TOTAL IND.	3					
TOTAL DEP.							TOTAL DEP.						
TOTAL CLAIMS							TOTAL CLAIMS						

PTO-1360 (3-78)

*MAY BE USED FOR ADDITIONAL CLAIMS OR AMENDMENTS

U.S. DEPARTMENT of COMMERCE
Patent and Trademark Office

#2

Express Mail Label No.: EV 156 915 183 US
Attorney Docket No.: 4247.51

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Patent Application of:

Inventor: ULLMAN et al.

Classification:

Serial No.: Not Yet Assigned

Group Art Unit: Not Yet Assigned

Filed: November 18, 2002

For: ENHANCED VIDEO PROGRAMMING SYSTEM AND METHOD FOR INCORPORATING AND DISPLAYING RETRIEVED INTEGRATED INTERNET INFORMATION SEGMENTS

Commissioner for Patents
Washington, D.C. 20231

Express Mailing label number: EV 156 915 183 US

Date of Deposit: November 18, 2002

I hereby certify that this paper or fee is being deposited with the United States Postal Service "Express Mail Post Office to Addressee" service under 37 CFR 1.10 on the date indicated above and is addressed to the Commissioner for Patents, Washington, D.C. 20231.

Name: Craig Hennessy /Dorsey & Whitney LLP

Signature:

INFORMATION DISCLOSURE STATEMENT
(37 C.F.R. 1.97 (b) and 1.98(d))

Sir:

The Examiner is requested to consider the references noted on the enclosed Form PTO-1449 during examination of the above-identified patent application. These references are submitted for the Examiner's consideration and are submitted pursuant to the Applicants' duty of disclosure under 37 C.F.R. § 1.56.

Copies of all of the cited documents have been previously furnished to the Office in prior application Serial No. 09/988,590, filed November 16, 2001, from which priority is claimed. Therefore, no copies of the cited documents are included herewith.

Pursuant to 37 C.F.R. § 1.97, no fees are due with respect to this filing. However, should any fees be deemed necessary, such fees may be charged to Deposit Account No. 04-1415. A duplicate copy of this disclosure statement is enclosed for use as may be appropriate.

Dated: 11/18/02.

Respectfully submitted,

John T. Kennedy, Esq.
Registration No. 42,717
DORSEY & WHITNEY LLP
Customer No. 20686

INFORMATION DISCLOSURE CITATION
(Use several sheets if necessary)

ATTY DOCKET NO.	SERIAL NO.
4247.31	Not Yet Assigned
ULLMAN et al.	
FILING	**GROUP**
November 18, 2002	Not Yet Assigned

U.S. PATENT DOCUMENTS

*EXAMINER INITIAL		DOCUMENT NUMBER	DATE	NAME	CLASS	SUBCLASS	FILING DATE IF APPROPRIATE
	A	4,734,764	03/1998	POCOCK et al.			
	B	4,894,789	01/1990	YEE			
	C	4,905,094	02/1990	POCOCK et al.			
	D	4,941,040	07/1990	POCOCK et al.			
	E	5,014,125	5/07/91	POCOCK et al.	348	7	
	F	5,128,752	07/1992	VON KOHORN			
	G	5,140,419	8/18/92	GALUMBECK et al.			
	H	5,191,410	03/1993	McCALLEY et al.			
	I	5,262,860	11/1993	FITZPATRICK et al.			
	J	5,285,278	02/1994	HOLMAN			
	K	5,438,355	08/1995	PALMER			

FOREIGN PATENT DOCUMENTS

		DOCUMENT NUMBER	DATE	COUNTRY	CLASS	SUBCLASS	TRANSLATION YES	TRANSLATION NO
	L	WO 97/27546	7/31/96	PCT				
	M	WO 96/13124	5/2/96	PCT				
	N	EP 0 757 485	2/5/97	Europe				
	O	WO 96/07270	3/7/96	PCT				
	P	EP 0 982 943	5/10/00	Europe				

OTHER DOCUMENTS *(Including Author, Title, Date, Pertinent Pages, Etc.)*

		Q	"Web TV over Digital Cable," Dake Cripps; May 4, 1998; http://web-star.com/hdtvnews/webtvoverdigitalcable.html; pages 1-4.
		R	"Internet TV Advertising," Dale Cripps; May 8, 1998; http://web-star.com/hdtvnews/internettvadvertising.html; pages 1-3.

EXAMINER	DATE CONSIDERED

*EXAMINER: Initial if reference considered, whether or not citation is in conformance with MPEP 609; Draw line through citation if not in conformance and not considered. Include copy of this form with next communication to applicant.

INFORMATION DISCLOSURE CITATION

(Use several sheets if necessary)

ATTY DOCKET NO.	SERIAL NO.
424[illegible]51	Not Yet Assigned
ULLMAN et al.	
FILING	GROUP
November 18, 2002	Not Yet Assigned

U.S. PATENT DOCUMENTS

*EXAMINER INITIAL		DOCUMENT NUMBER	DATE	NAME	CLASS	SUBCLASS	FILING DATE IF APPROPRIATE
	S	5,453,794	9/26/95	EZAKI			
	T	5,479,268	12/1995	YOUNG			
	U	5,481,542	1/02/96	LOGSTON et al.	348	7	
	V	5,526,035	6/11/96	LAPPINGTON et al.			
	W	5,534,913	7/09/96	MAJETI et al.	348	7	
	X	5,537,141	7/16/96	HARPER et al.			
	Y	5,539,471	7/23/96	MYHRVOLD et al.			
	Z	5,543,849	8/06/96	LANG			
	AA	5,553,221	9/03/96	REIMER et al.			
	AB	5,564,073	10/08/96	TAKAHISA			
	AC	5,570,295	10/1996	ISENBERG et al.			

FOREIGN PATENT DOCUMENTS

		DOCUMENT NUMBER	DATE	COUNTRY	CLASS	SUBCLASS	TRANSLATION	
							YES	NO
	AD	19545882	06/1997	Germany				
	AE	WO 9413107	06/1994	PCT				
	AF	WO 9702699	1/23/1997	PCT				

OTHER DOCUMENTS *(Including Author, Title, Date, Pertinent Pages, Etc.)*

EXAMINER	DATE CONSIDERED

*EXAMINER: Initial if reference considered, whether or not citation is in conformance with MPEP 609; Draw line through citation if not in conformance and not considered. Include copy of this form with next communication to applicant.

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ATTY DOCKET NO.	SERIAL NO.
4247.51	Not Yet Assigned
ULLMAN et al.	
FILING	**GROUP**
November 18, 2002	Not Yet Assigned

U.S. PATENT DOCUMENTS

*EXAMINER INITIAL		DOCUMENT NUMBER	DATE	NAME	CLASS	SUBCLASS	FILING DATE IF APPROPRIATE
	AG	5,572,442	11/5/96	SCHULHOF et al.	364	514 C	
	AH	5,585,858	12/17/96	HARPER et al.			
	AI	5,589,892	12/31/96	KNEE et al.	348	731	
	AJ	5,353,283	10/1994	TSUCHIYA	370	392	
	AI	5,604,542	2/1997	DEDRICK			
	AK	5,612,730	3/18/97	LEWIS	348	8	
	AL	5,633,918	5/27/97	MANKOVITZ			
	AM	5,640,193	6/1997	WELLNER			
	AN	5,643,088	7/1/97	VAUGHN et al			
	AO	5,649,284	7/15/97	YOSHINOBU			
	AP	5,659,366	8/19/97	KERMAN			

FOREIGN PATENT DOCUMENTS

		DOCUMENT NUMBER	DATE	COUNTRY	CLASS	SUBCLASS	TRANSLATION YES	TRANSLATION NO

OTHER DOCUMENTS *(Including Author, Title, Date, Pertinent Pages, Etc.)*

		AQ	"Gates TV, Interactivity," Dale Cripps, May 5, 1998; http://web-star.com/hdtvnews/gatestvinteractivity.html; pages 1-4.
		AR	"ICTV Brochure (a reproduced copy provided); copyright 1988 by ICTV; 27 pages.

EXAMINER	DATE CONSIDERED

*EXAMINER: Initial if reference considered, whether or not citation is in conformance with MPEP 609; Draw line through citation if not in conformance and not considered. Include copy of this form with next communication to applicant.

INFORMATION DISCLOSURE CITATION

(Use several sheets if necessary)

ATTY DOCKET NO.	SERIAL NO.
4247.91	Not Yet Assigned
ULLMAN et al.	
FILING	GROUP
November 18, 2002	Not Yet Assigned

U.S. PATENT DOCUMENTS

*EXAMINER INITIAL		DOCUMENT NUMBER	DATE	NAME	CLASS	SUBCLASS	FILING DATE IF APPROPRIATE
	AS	5,668,592	9/16/97	SPAULDING, II			
	AT	5,677,708	10/14/97	MATTHEWS, III et al.			
	AU	5,686,954	11/1997	YOSHINOBU et al.	345	13	
	AV	5,694,163	12/2/97	HARRISON	348	13	
	AW	5,696,905	12/09/97	REIMER et al.			
	AX	5,724,103	3/03/98	BATHELOR			
	AY	5,724,091	3/03/98	FREEMAN et al.			
	AZ	5,729,252	3/17/98	FRASER			
	BA	5,734,437	3/31/98	BACK			
	BB	5,761,602	6/02/98	WAGNER et al.			
	BC	5,761,606	6/02/98	WOLZIEN	455	6.2	

FOREIGN PATENT DOCUMENTS

		DOCUMENT NUMBER	DATE	COUNTRY	CLASS	SUBCLASS	TRANSLATION YES	TRANSLATION NO

OTHER DOCUMENTS *(Including Author, Title, Date, Pertinent Pages, Etc.)*

		BD	"Microsoft Web TV" brochure, copyright 1998 by Web TV Networks, Inc.; 16 pages.

EXAMINER	DATE CONSIDERED

*EXAMINER: Initial if reference considered, whether or not citation is in conformance with MPEP 609; Draw line through citation if not in conformance and not considered. Include copy of this form with next communication to applicant.

INFORMATION DISCLOSURE CITATION
(Use several sheets if necessary)

ATTY DOCKET NO.	SERIAL NO.
4247	Not Yet Assigned
ULLMAN et al.	
FILING	**GROUP**
November 18, 2002	Not Yet Assigned

U.S. PATENT DOCUMENTS

*EXAMINER INITIAL		DOCUMENT NUMBER	DATE	NAME	CLASS	SUBCLASS	FILING DATE IF APPROPRIATE
	BE	5,774,664	6/30/98	HIDARY et al.	395	200.48	
	BF	5,778,181	7/07/98	HIDARY et al.	395	200.48	
	BG	5,793,365	8/1998	TANG et al.	345	329	
	BH	5,818,441	10/1998	THROCKMORTON et al.			
	BI	5,892,909	4/1999	GRASSO et al.	709	201	
	BJ	5,912,700	06/1999	HONEY et al.			
	BK	5,940,082	8/1999	BRINEGAR et al.	345	442	
	BL	6,018,768	1/25/00	ULLMAN et al.	709	218	
	BM	6,122,658	9/02/00	CHADDHA	709	203	
	BN	5,264,933	11/23/93	ROSSER et al.			
	BO	5,498,000	3/12/96	CUNEO			

FOREIGN PATENT DOCUMENTS

		DOCUMENT NUMBER	DATE	COUNTRY	CLASS	SUBCLASS	TRANSLATION YES	TRANSLATION NO

OTHER DOCUMENTS *(Including Author, Title, Date, Pertinent Pages, Etc.)*

		BP	"TV Navigator" brochure; copyright 1997 by Network Computer, Inc.; 6 pages.
		BQ	"Worldgate" brochure; copyright 1998 by Worldgate Communications; 12 pages.

EXAMINER	DATE CONSIDERED

*EXAMINER: Initial if reference considered, whether or not citation is in conformance with MPEP 609; Draw line through citation if not in conformance and not considered. Include copy of this form with next communication to applicant.

Substitute for form 1449A/PTO U.S. DEPARTMENT OF COMMERCE (Modified) PATENT AND TRADEMARK OFFICE INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Use as many sheets as necessary)				ATTY. DOCKET NO.: 4247.52	APPLICATION NO.: Not Yet Assigned
				FIRST NAMED INVENTOR: ULLMAN et al.	
				FILING DATE: November 18, 2002	ART UNIT: Not Yet Assigned
Sheet	6	of	7	EXAMINER NAME: Not Yet Assigned	

U.S. PATENT DOCUMENTS

EXAMINER INITIALS*	Cite No.[1]	DOCUMENT NUMBER Number – Kind Code[2] (if known)	PUBLICATION DATE MM-DD-YYYY	Name of PATENTEE or Applicant of Cited Document	Pages, Columns, Lines, Where Relevant Passages or Relevant Figures Appear
	BR	US-5,710,884	1/20/1998	DEDRICK	
	BS	US-5,734,413	3/31/1998	LAPPINGTON et al.	
	BT	US-5,782,692	7/21/1998	STELOVSKY	
	BU	US-5,905,865	5/18/1999	PALMER et al.	
		US-			
		US-			
		US-			
		US-			

FOREIGN PATENT OR PUBLISHED FOREIGN PATENT APPLICATION

EXAMINER INITIALS*	Cite No.[1]	DOCUMENT NUMBER Country Code[3] – Number[4] – Kind Code[5] (if known)	PUBLICATION DATE MM-DD-YYYY	Name of PATENTEE or Applicant of Cited Document	Pages, Columns, Lines, Where Relevant Passages or Relevant Figures Appear	T[6]
	BV	EP 0 163 577 A2	12/04/1985	DIGITAL EQUIPMENT CORPORATION		
	BW	UK 2 359 708 A	08/29/2001	ACTV, INC.		
	BX	UK 2 359 958 A	09/05/2001	ACTV, INC.		
	BY	WO 93/06675 A1	04/01/1993	COMMUNICATIONS SATELLITE CORPORATION		
	BZ	WO 97/02689 A1	01/23/1997	NOVELL, INC.		
	CA	WO 99/45726 A1	09/10/1999	ORTONY		
	CB	WO 00/14987 A1	03/16/2000	TENZING, INC.		
EXAMINER SIGNATURE				DATE CONSIDERED		

* EXAMINER: Initial if citation considered, whether or not citation is in conformance with MPEP 609. Draw line through citation if not in conformance and not considered. Include copy of this form with next communication to applicant.

[1] Applicant's unique citation number (optional). [2] See Kinds Codes of USPTO Patent Documents at www.uspto.gov or MPEP 901.04. [3] Enter Office that issued the document, by the two-letter code (WIPO Standard ST.3) [3]Enter Office that issued the document, by the two-letter code (WIPO Standard ST.3). [4] For Japanese patent documents, the indication of the year of the reign of the Emperor must precede the serial number of the patent document. [5] Kind of document by the appropriate symbols as indicated on the document under WIPO Standard ST. 16 if possible. [6] Applicant is to place a check mark here if English language Translation is attached.

Substitute for form 1449B/PTO U.S. DEPARTMENT OF COMMERCE (Modified) PATENT AND TRADEMARK OFFICE INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Use as many sheets as necessary)				ATTY. DOCKET NO.: 4247.52	APPLICATION NO.: Not Yet Assigned
				FIRST NAMED INVENTOR: ULLMAN et al.	
				FILING DATE: November 18, 2002	ART UNIT: Not Yet Assigned
Sheet	7	of	7	EXAMINER NAME: Not Yet Assigned	

OTHER PRIOR ART – NON PATENT LITERATURE DOCUMENTS			
EXAMINER INITIALS*	Cite No.[1]	(Include name of Author) in CAPITAL LETTERS), Title of article (when appropriate, title of the item (book, magazine, journal, serial symposium, catalog, etc.), date, page(s), volume-issue number(s) publisher city and/or country where published)	T[2]
	CC	INTERCAST INDUSTRY GROUP, Press Release, *Leaders in PC, Broadcast and Cable Industries Announce Formation of Industry Group to Promote New Digital Medium for the Home PC,* Business Wire, October 23, 1995.	
	CD	VINAY KUMAR, JAY GLICKSMAN AND GLENN A. DRAMER, *A SHAREd Web to Support Design Teams*, Third Workshop on Enabling Technologies: Infrastructure for Collaborative Enterprises, Morgantown, West Virginia, April 17-19, 1994, at 178.	
	CE	PER EINAR DYBVIK AND HAKON W. LIE, *Combining WWW/Mosaic with Realtime Multimedia Conferencing in Distance Education*, The Second International WWW Conference '94, Mosaic and the Web, Advance Proceedings, Vol.1, October 17-20, 1994, at 423.	
	CF	TAK K. WOO AND MICHAEL J. REES, *A Synchronous Collaboration Tool for the World-Wide Web*, The Second International WWW Conference '94, Mosaic and the Web, Advance Proceedings, Vol.1, October 17-20, 1994, at 315.	
	CG	THE INTERCAST INDUSTRY GROUP, *Frequently Asked Questions, The Intercast Industry Group*, Fall 1995, pp. 1-7.	
EXAMINER SIGNATURE		DATE CONSIDERED	

* EXAMINER: Initial if citation considered, whether or not citation is in conformance with MPEP 609. Draw line through citation if not in conformance and not considered. Include copy of this form with next communication to applicant

[1] Applicant's unique citation number (optional).

[2] Applicant is to place a check mark here if English language Translation is attached.

ARTIFACT SHEET

Enter artifact number below. Artifact number is application number + artifact type code (see list below) + sequential letter (A, B, C. . .) The first artifact folder for an artifact type receives the letter A, the second B, etc. . . Example: 59 123 456 PA, 59 123 456 PB, 59 123 456 ZA, 59 123 456 ZB

10299335PA

Indicate quantity of a single type of artifact received but not scanned. Create individual artifact folder/ box and artifact number for each Artifact Type.

[X] CD(s) containing:
Computer program listing
Doc Code: Computer
[ ] Artifact Type Code: P

Pages of specification and / or sequence listing and /or table
Doc Code: Artifact
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Content unspecified or combined
Doc Code: Artifact
[ ] Artifact Type Code: S

[ ] Staple Set(s) Color Documents or B / W Photographs
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Doc Code: Artifact Artifact Type Code: X

Other, description: _____
Doc Code: Artifact Artifact Type Code: Z

03-17-03 #4 2154

Express Mail Label No.: EV 156 913 752 US
Attorney Docket No.: 54247.51

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Patent Application of:

Inventors: ULLMAN et al.

Appl. No.: 10/299,335 Group Art Unit: 2154

Filed: November 18, 2002 Examiner: Not Yet Assigned

For: ENHANCED VIDEO PROGRAMMING SYSTEM AND METHOD FOR INCORPORATING AND DISPLAYING RETRIEVED INTEGRATED INTERNET INFORMATION SEGMENTS

Commissioner for Patents Washington, D.C. 20231	Express Mailing label number: EV 156 913 752 US Date of Deposit: March 14 2003 I hereby certify that this paper or fee is being deposited with the United States Postal Service "Express Mail Post Office to Addressee" service under 37 CFR 1.10 on the date indicated above and is addressed to the Commissioner for Patents, Washington, D.C. 20231. Name: Kristi Murray / DORSEY & WHITNEY LLP Signature: Kristi Murray

INFORMATION DISCLOSURE STATEMENT
Under 37 C.F.R. §§ 1.97(b)(1)

Sir:

The Examiner is requested to consider the references cataloged on the enclosed Form PTO-1449 during examination of the above-identified patent application. These references are submitted for the Examiner's consideration and are submitted pursuant to the Applicant's duty of disclosure under 37 C.F.R. § 1.56. The items identified in this Information Disclosure Statement may or may not be "material" to the patentability of one or more of the pending claims in this application pursuant to 37 C.F.R. § 1.56. The submission of this Information Disclosure Statement by the Applicant shall not be construed as an admission that any such patent, publication, or other information referred to herein is, or is considered to be, material to

patentability (37 C.F.R. § 1.97(h)), or even qualified as "prior art" under 35 U.S.C. § 102 with respect to this invention, unless specifically designated by the Applicant as such. In addition, the filing of this Information Disclosure Statement shall not be construed to mean that a search has been made or that no other material information, as defined in 37 C.F.R. § 1.56, exists.

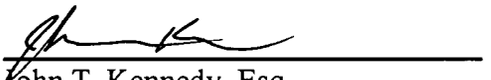
The Applicant hereby formally petitions for consideration of the information disclosure statement filed herewith.

If this statement crosses in the mail with an office action, or is otherwise not in the indicated category of 37 C.F.R. § 1.97, it is respectfully requested that this statement be treated in the next appropriate category and made of record. To the extent required, please treat this paper as a conditional petition for acceptance of the information disclosure statement. In the event any fees are due, please charge Deposit Account No. 04-1415.

Should the Examiner have any questions concerning the relevance of the cited references in this disclosure, please contact the undersigned attorney.

Dated: March 14, 2003.

Respectfully submitted,



John T. Kennedy, Esq.
Registration No. 42,717
Attorney for Applicant

Customer No. 20686
DORSEY & WHITNEY LLP

JTK/CAF

Express Mail Label No.: EV 156 913 752 US
Attorney Docket No.: 4247.51

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Patent Application of:

Inventors: ULLMAN et al.

Appl. No.: 10/299,335 Group Art Unit: 2154

Filed: November 18, 2002 Examiner: Not Yet Assigned

For: ENHANCED VIDEO PROGRAMMING SYSTEM AND METHOD FOR INCORPORATING AND DISPLAYING RETRIEVED INTEGRATED INTERNET INFORMATION SEGMENTS

CERTIFICATE OF MAILING BY EXPRESS MAIL

Commissioner for Patents
Washington, D.C. 20231

Sir:

The undersigned hereby certifies that the attached **INFORMATION DISCLOSURE STATEMENT, FORM PTO-1449 AND COPIES OF CITED REFERENCES, RETURN POSTCARD, AND THIS CERTIFICATE OF MAILING BY EXPRESS MAIL**, relating to the above application, were deposited as "Express Mail," Mailing Label No. EV 156 913 752 US, with the United States Postal Service, addressed to Commissioner for Patents, Washington, D.C. 20231, on March 14, 2003.

Kristi Murray
Mailer
Print Name: Kristi Murray

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DORSEY & WHITNEY LLP
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Fax: 303-629-3450

Substitute for form 1449A/PTO (Modified) U.S. DEPARTMENT OF COMMERCE PATENT AND TRADEMARK OFFICE INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Use as many sheets as necessary)				ATTY. DOCKET NO.: 4247.51	APPLICATION NO.: 10/299,335
				FIRST NAMED INVENTOR: ULLMAN et al.	
				FILING DATE: November 18, 2002	ART UNIT: 2154
Sheet	1	of	1	EXAMINER NAME: Not Yet Assigned	

U.S. PATENT DOCUMENTS

EXAMINER INITIALS*	Cite No.[1]	DOCUMENT NUMBER Number – Kind Code[2] (if known)	PUBLICATION DATE MM-DD-YYYY	Name of PATENTEE or Applicant of Cited Document	Pages, Columns, Lines, Where Relevant Passages or Relevant Figures Appear
	A	US- 5,801,750	09/01/1998	KURIHARA	
		US-			
		US-			
		US-			
		US-			

FOREIGN PATENT OR PUBLISHED FOREIGN PATENT APPLICATION

EXAMINER INITIALS*	Cite No.[1]	DOCUMENT NUMBER Country Code[3] – Number[4] – Kind Code[5] (if known)	PUBLICATION DATE MM-DD-YYYY	Name of PATENTEE or Applicant of Cited Document	Pages, Columns, Lines, Where Relevant Passages or Relevant Figures Appear	T[6]
	B	JP 4-127688 A	04/28/1992	FIJITSU GENERAL LIMITED		
	C	JP 7-307813 A	11/21/1995	NIPPON TELEGRAPH & TELEPHONE CORPORATION		
	D	JP 8-8860 A	01/12/1996	SONY CORP.		
	E	JP 7-288606 A	10/31/1995	AT&T CORP.		

OTHER PRIOR ART – NON PATENT LITERATURE DOCUMENTS

EXAMINER INITIALS*	Cite No.[2]	(Include name of Author) in CAPITAL LETTERS), Title of article (when appropriate, title of the item (book, magazine, journal, serial symposium, catalog, etc.), date, page(s), volume-issue number(s) publisher city and/or country where published)	T[3]
	F	NIKKEI BP CORP., *Intercast Using Gap Television Signal*, Nikkei Electronics, Japan, 18 December 1995, No. 651, p. 106.	
	G	TELEVISION SOCIETY, *Interactive Television Broadcast Using Character Broadcast System*, Video Information and Broadcast Technology, 20 November 1995, Vol. 49, No. 11, p. 1482-1487.	

EXAMINER SIGNATURE		DATE CONSIDERED	

* EXAMINER: Initial if citation considered, whether or not citation is in conformance with MPEP 609. Draw line through citation if not in conformance and not considered. Include copy of this form with next communication to applicant.

[1] Applicant's unique citation number (optional). [2] See Kinds Codes of USPTO Patent Documents at www.uspto.gov or MPEP 901.04. [3] Enter Office that issued the document, by the two-letter code (WIPO Standard ST.3) [3]Enter Office that issued the document, by the two-letter code (WIPO Standard ST.3). [4] For Japanese patent documents, the indication of the year of the reign of the Emperor must precede the serial number of the patent document. [5] Kind of document by the appropriate symbols as indicated on the document under WIPO Standard ST. 16 if possible. [6] Applicant is to place a check mark here if English language Translation is attached.

* EXAMINER: Initial if citation considered, whether or not citation is in conformance with MPEP 609. Draw line through citation if not in conformance and not considered. Include copy of this form with next communication to applicant

[2] Applicant's unique citation number (optional).

[2] Applicant is to place a check mark here if English language Translation is attached.

Publication of Unexamined Patent Applications

Japanese Patent Application Laid-Open No. 4-127688 specification
Publication Date: April 28, 1992

Title of the Invention: TELETEXT BROADCAST RECEIVER
Application Number: 2-248019
Application Date: September 18, 1990
Inventor: YASUSHI SUZUKI
Applicant: FUJITSU GENERAL LIMITED

Claim:

(1) A teletext broadcast receiver for separating teletext broadcast superposed on a television broadcast and displaying the separated teletext broadcast on a screen of a television receiver, characterized in that the receiver includes:

a function of displaying with captions the teletext broadcast on the screen of the television broadcast,

a function of connecting to a telephone line by a predetermined operation, and

a function of storing data of at least an address, a name or the like of an owner of the teletext broadcast receiver and a merchandise number of television shopping by the teletext broadcast,

a telephone set of a provider or the like which introduces merchandise in the telephone shopping being called with automatic dialing by merchandise purchasing operation of the television shopping, and the merchandise number which is displayed with captions

and the stored address and name of the purchaser being transmitted to the provider or the like.

Publication of Unexamined Patent Applications

Japanese Patent Application Laid-Open No. 5-176306 specification
Publication Date: July 13, 1993
Application Number: 3-341122
Application Date: December 24, 1991
Applicant: TOSHIBA CORPORATION
Applicant: TOSHIBA AVE CO., LTD.
Inventor: TAKEO MORIKAWA ET. AL

[TITLE OF THE INVENTION]
TRANSMITTING DEVICE AND RECEIVING DEVICE OF TELEVISION SIGNAL

[ABSTRACT]
[OBJECT]

To provide an auto-dial control device for automatically carrying out dialing operation of a telephone set by means of a telephone number displayed on a TV program.

[CONSTITUTION]

Telephone information is superposed during the vertical blanking interval of a TV signal in a broadcasting station side 1 and transmitted therefrom. The telephone information is extracted in a telephone information extracting part 26 on a receiving side 2 and stored in a memory 28 when the information is effective, and when a viewer turns on a switch 29, a telephone line switching part 31 is connected to an NTT side line 32. Then, dialing the telephone number stored in the memory 28 permits correct and prompt calling.

Publication of Unexamined Patent Applications

Japanese Patent Application Laid-Open No. 7-307813 specification
Publication Date: November, 21, 1995
Application Number: 6-100314
Application Date: May 13, 1994
Applicant: NIPPON TELEGRAPH AND TELEPHONE CORPORATION
Inventor: TAKAAKI AKIMOTO ET. AL

[TITLE OF THE INVENTION]

METHOD FOR RECEIVING REQUEST FROM USER UTILIZING BROADCAST MEDIUM AND COMMUNICATION TERMINAL USED FOR THE METHOD

[ABSTRACT]

[OBJECT]

To permit ordering merchandise by automatically calling a mail order reception center in a mail order service utilizing a broadcast.

[CONSTITUTION]

A mail order reception center 1 previously advises a broadcasting station 2 of mail order information such as a telephone number of the center, merchandise number introduced in a broadcast and a period of sale. The broadcasting station 2 inserts the mail order information in a television signal and transmits the same. A mail order information extracting device 5 extracts the mail order information from the television signal received by a television receiver 4 and sends the information to a communication terminal 6. The communication terminal 6 stores the mail order information in a memory 61, reads the mail order information from the memory 61 when

a calling switch 63 is pressed, and automatically calls the mail order reception center 1 with the telephone number. Then, the communication terminal 6 receives detailed information of merchandise from the center 1 and presses an order switch to transmit order data.

[0013]

Next, a manner of providing a mail order service in a configuration in FIG. 1 will be described based on steps of providing service in FIG. 3.

(1) A mail order reception center 1 previously advises a broadcasting station 2 of mail order information such as a telephone number of the center, merchandise number introduced in a television broadcast and a period of sale.

(2) The broadcasting station 2 generates encoded data of the mail order information advised from the mail order reception center 1 as shown in FIG. 2 and inserts the data in a picture signal to be broadcast.

(3) A user receives a television program broadcast by the broadcasting station 2 with a home television receiver 4 and watch the program. The picture signals currently received by the television receiver 4 is transmitted to a mail order information extracting device 5.

(4) A mail order information extracting device 5 extracts the encoded data of the mail order information from the picture signal and decodes the data, and sends the encoded data of the mail order information such as a telephone number of the mail order reception center 1, merchandise number and a period of sale to a picture terminal 6.

(5) The communication terminal 6 records data sent from the mail order information extracting device 5 in a memory 61 and records the fact that the mail order information is effective in the memory 61.

(6) The user presses a calling switch 63 of the communication terminal 6 when finding merchandise which the user wants in the television program watched with the television receiver 4.
(7) When the calling switch 63 is pressed, a control section 66 of the picture terminal 6 contains a clock or the like, and first checks that the mail order information is effective and that the period of the mail order is lasting by referring to the memory 61, and when both of them are effective, reads the telephone number of the mail order reception center 1 from the memory 61 and calls the mail order reception center 1 with the number via a network interface 62.
(8) The mail order reception center 1 receives a call from the communication terminal 6 and is connected to the communication terminal 6 via a telecommunication network 3.
(9) The control section 66 of the communication terminal 6 confirms connection with the mail order reception center 1, and then reads the merchandise number from the memory 9 and sends the data to the mail order reception center 1.
(10) The mail order reception center 1 retrieves detailed data of the merchandise from the merchandise number sent from the communication terminal 6, and sends the data to the picture terminal 6. The detailed data of the merchandise includes a picture of appearance of the merchandise, sound of explaining the merchandise or background music.
(11) The control section 66 of the communication terminal 6 displays and outputs a picture of appearance of merchandise or sound of explaining the merchandise sent from the mail order reception center 1 on a display hand set 65.

(12) The user watches and listens to the same, and if having an intention to purchase, presses an order switch 64 of the communication terminal 6. The order switch 64 includes a numeric keypad or the like for inputting the number of articles. When the order switch 64 is pressed, the communication terminal 6 sends the data indicating an order for merchandise to the mail order reception center 1. At this time, user information such as a name, address, user number, credit card number or bank account number, or the like of the user are previously set in the memory 61, and when the order switch 64 is pressed, the control section 66 reads the user information from the memory 61 and send them to the mail order reception center 1 together with the data indicating the order for merchandise.

(13) The mail order reception center 1 receives the data of the order for merchandise and the user information, carries out a processing of receiving the order for merchandise, and forwards the merchandise to the user's house.

Publication of Unexamined Patent Applications

Japanese Patent Application Laid-Open No. 8-8860 specification
Publication Date: January 12, 1996
Application Number: 6-142721
Application Date: June 24, 1994
US. 5801750
Applicant: SONY CORPORATION
Inventor: AKIRA KURIHARA

[TITLE OF THE INVENTION] INFORMATION PROVIDING SYSTEM

[ABSTRACT]

[OBJECT]

To allow desired information to be easily obtained independent of a skill of a user.

[CONSTITUTION]

The system includes a center CE as an information provider side and a terminal TE which is a user side terminal for receiving the information provided by the center CE. A transmission antenna AT for transmitting antenna radio waves RF1 to a communication satellite SA is located on the center CE side, while retransmission radio waves RF2 are configured to be transmitted from the communication satellite SA to the terminal TE. Thus, a satellite broadcasting network is constructed as a first communication form for providing partial information from the center CE side to the terminal TE side. Further, between the center CE and the terminal TE, a communication network which has, for example, a cable CA of ISDN or the like as a medium is constructed and whole information specified on the terminal TE

side is adapted to be transmitted from the center CE to the terminal TE by a second communication form by a line transmitting form.

and the stored address and name of the purchaser being transmitted to the provider or the like.

Publication of Unexamined Patent Applications

Japanese Patent Application Laid-Open No. 7-288606 specification
Publication Date: October 31, 1995
Application Number: 7-84489
Application Date: March 17, 1995
Priority Number: 210802
Priority Date: March 18, 1994
Priority Country: US
Applicant: AT&T CORP.
Inventor: DAVID S. ISENBERG

[TITLE OF THE INVENTION]

SYSTEM AND METHOD OF CAPTURING ENCODED DATA TRANSMITTED OVER A COMMUNICATIONS NETWORK IN A VIDEO SYSTEM

Excerpts from Japanese Laid Open Patent Application No.7-288606

[0014]

The central provider 14 broadcasts a program created, sponsored or promoted illustratively by a particular commercial service provider 26. The service provider 26 is a company or an individual or group of individuals that intends to advertise a particular service or product over a network. In accordance with the present invention, telephone number data, which illustratively corresponds to a telephone number of the service provider 26, is encoded into the program. As a viewer watches the program on his/her display device 12, the telephone number data is captured by the viewer's set-top box 16. An LED indicator or a visual indicator 17 such as screen display (not shown) located on the set-top box makes an indication when telephone number data has been captured. When the viewer wishes to dial the captured telephone number, the viewer transmits an access signal to the set-top box 16. The set-top box 16 sets call to the service provider 26, illustratively by generating DTMF tones corresponding to the telephone number data. When the call is connected, the viewer can directly interact with the service provider 26.

[0018]

As described above, the telephone number data are preferably demarcated by an escape sequence that is encoded into a program when the program is recorded or transmitted. In the case of a live broadcast, the escape sequence and the telephone number data are illustratively encoded into a vertical fly-back period of at least one of video frames comprising the program. If the system transmitting the program is a digital system, the escape sequence and telephone number data are digitally encoded into a convenient portion in a digital data bitstream to be broadcast. In the case of a digital telephony protocol with out-of-band (OOB) signaling, such as ISDN, the escape sequence can be encoded into an OOB channel.

#3

Express Mail La[illegible] No.: EV 304 884 185 US
Docket No.: 4247.51

UNITED STATES PATENT AND TRADEMARK OFFICE

First Named Inventor	:	ULLMAN et al.	
Appln. No.	:	10/299,335	
Filed	:	November 18, 2002	Group Art Unit: 2611
Title	:	ENHANCED VIDEO PROGRAMMING SYSTEM AND METHOD FOR INCORPORATING AND DISPLAYING RETRIEVED INTEGRATED INTERNET INFORMATION SEGMENTS	Examiner: Faile, Andrew I.

ASSOCIATE POWER OF ATTORNEY

(37 CFR 1.34)

(For Representation Related To A Patent Application)

Commissioner for Patents
PO Box 1450
Alexandria, VA 22313-1450

Sir:

In the above-referenced patent application, please recognize **Scott W. Doyle**, Registration No. **39,176**, as Associate Attorney in this application to prosecute the patent application identified above and to transact all business in the Patent and Trademark Office connected therewith, including full power of association, substitution, and revocation.

Please direct all telephone calls to: **Scott W. Doyle** at **(703) 760-7721**.

Please send all correspondence to **Customer No. 25227**, at the address corresponding thereto, currently:

Morrison & Foerster LLP
1650 Tysons Boulevard, Suite 300
McLean, VA 22102

Dated: 10/10/03

Signature: _____
Name: John T. Kennedy
Reg. No.: 42,717

4821-1566-2592\1 10/8/2003 12:15 PM

10-14-03

Express Mail Label No.: EV 304 884 185 US
Docket No.: 4247.51

2611

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

First Named Inventor	:	ULLMAN et al.	
Appln. No.	:	10/299,335	
Filed	:	November 18, 2002	Group Art Unit: 2611
Title	:	ENHANCED VIDEO PROGRAMMING SYSTEM AND METHOD FOR INCORPORATING AND DISPLAYING RETRIEVED INTEGRATED INTERNET INFORMATION SEGMENTS	Examiner: Faile, Andrew I.

CERTIFICATE OF MAILING BY EXPRESS MAIL

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PO Box 1450
Alexandria, VA 22313-1450

Sir:

The undersigned hereby certifies that the attached: ASSOCIATE POWER OF ATTORNEY, REQUEST FOR WITHDRAWAL AS ATTORNEY OR AGENT AND CHANGE OF ATTORNEY'S ADDRESS IN APPLICATION, RETURN ACKNOWLEDGEMENT POSTCARD, and this CERTIFICATE OF MAILING BY EXPRESS MAIL, all relating to the above application were deposited as "Express Mail", Mailing Label No. EV 304 884 185 US with the United States Postal Service, addressed to Commissioner for Patents, PO Box 1450, Alexandria, VA 22313-1450, on October 10, 2003.

10/10/2003
Date

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Express Mail Label No.: EV 304 884 185 US
Docket No.: 4247.51

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

First Named Inventor	:	ULLMAN et al.	
Appln. No.	:	10/299,335	
Filed	:	November 18, 2002	Group Art Unit: 2611
Title	:	ENHANCED VIDEO PROGRAMMING SYSTEM AND METHOD FOR INCORPORATING AND DISPLAYING RETRIEVED INTEGRATED INTERNET INFORMATION SEGMENTS	Examiner: Faile, Andrew I.

REQUEST FOR WITHDRAWAL AS ATTORNEY OR AGENT AND CHANGE OF ATTORNEY'S ADDRESS IN APPLICATION

(37 CFR 1.36 and 37 CFR 1.8(a))

Commissioner for Patents
PO Box 1450
Alexandria, VA 22313-1450

Sir:

I hereby apply to withdraw as attorney or agent for the above-identified patent application since the Assignee for this patent application has requested transfer of the files.

Please change the correspondence address and direct all future correspondence to:

Customer No. 25227,
at the address corresponding thereto, currently:

Morrison & Foerster LLP
1650 Tysons Boulevard, Suite 300
McLean, VA 22102

Please direct all telephone calls to: **Scott W. Doyle** at **(703) 760-7721**.

This request is made on behalf of myself and all the attorneys of record This request is enclosed in triplicate.

Dated: 10/10/03

Signature: _____
John T. Kennedy
Reg. No. 42,717

4822-3310-3104\1 10/7/2003 5:20 PM

2611

PATENT
Docket No. 559442600201

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In the application of:

Craig ULLMAN , et al.

Serial No.: 10/299,335

Filing Date: November 18, 2001

For: ENHANCED VIDEO PROGRAMMING SYSTEM AND METHOD FOR INCORPORATING AND DISPLAYING RETRIEVED INTERGRATED INTERNET INFORMATION SEGMENTS

Examiner: Not Yet Assigned

Group Art Unit: 2154

REVOCATION OF POWER OF ATTORNEY WITH NEW POWER OF ATTORNEY AND CHANGE OF CORRESPONDENCE ADDRESS

U.S. Patent and Trademark Office
P.O. Box 1450
Alexandria, VA 22313-1450

Sir:

ACTV, Inc., the assignee of the entire right, title and interest in this patent application, hereby revokes all Powers of Attorney previously granted relating to this application and appoint as its attorneys or agents, with full power of substitution, association, and revocation, to prosecute this application and to transact all business in the United States Patent and Trademark Office connected herewith to the Practitioners associated with **Customer Number 25227.**

Further, please change the correspondence address for this application to the address associated with **Customer Number 25227**. Said appointment to be to the exclusion of the inventors and their attorneys in accordance with the provisions of 37 C.F.R. § 3.71.

va-52458

Telephone communications concerning this application should be directed to Scott Doyle at (703) 760-7721, facsimile communications should be made Attn: Scott Doyle at (703) 760-7777.

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Dated: December 12, 2003

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TRANSMITTAL FORM

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Total Number Of Pages In This Submission	114

Application Number	10/299,335
Filing Date	November 18, 2002
First Named Inventor	Craig ULLMAN et al.
Group Art Unit	2611
Examiner Name	Andrew I. FAILE
Attorney Docket No.	55944-2600201

ENCLOSURES (check all that apply)

- [ ] Fee Transmittal Form
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- [ ] Amendment / Reply
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- [ ] After Allowance Communication to Group
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- [ ] Appeal Communication to Group *(Appeal Notice, Brief, Reply Brief)*
- [ ] Proprietary Information
- [ ] Status Letter
- [x] Other Enclosure(s) *(please identify below):*

1. PTO Form 1449;
2. 9 references.

Remarks

SIGNATURE OF APPLICANT, ATTORNEY OR AGENT

Firm Or Individual Name	Jonathan Bockman, Registration No. 45,640
Signature	
Date	February 13, 2004

CERTIFICATE OF HAND DELIVERY

I hereby certify that this correspondence is being hand filed with the United States Patent and Trademark Office in Alexandria, Virginia on February 13, 2004.

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va-57860

PATENT
Docket No. 559442600201

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IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In the application of:

Craig ULLMAN et al.

Serial No.: 10/299,335

Filing Date: November 18, 2002

For: ENHANCED VIDEO PROGRAMMING SYSTEM AND METHOD FOR INCORPORATING AND DISPLAYING RETRIEVED INTEGRATED INTERNET INFORMATION SEGMENTS

Examiner: Andrew I. Faile

Group Art Unit: 2611

SUPPLEMENTAL INFORMATION DISCLOSURE STATEMENT UNDER 37 C.F.R. § 1.97

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Sir:

Pursuant to 37 C.F.R. § 1.97 and § 1.98, Applicants submit for consideration in the above-identified application the documents listed on the attached Form PTO-1449. Copies of the documents are also submitted herewith. The Examiner is requested to make these documents of record.

va-57857

This Supplemental Information Disclosure Statement being submitted within three months of the application filing date or prior to the mailing of a first Office Action on the merits; accordingly, no fee or separate requirements are required.

Applicants would appreciate the Examiner initialing and returning the Form PTO-1449, indicating that the information has been considered and made of record herein.

The information contained in this Supplemental Information Disclosure Statement under 37 C.F.R. § 1.97 is not to be construed as a representation that: (i) a complete search has been made; (ii) additional information material to the examination of this application does not exist; (iii) the information, protocols, results and the like reported by third parties are accurate or enabling; or (iv) the above information constitutes prior art to the subject invention.

In the event that the transmittal letter is separated from this document and the Patent Office determines that an extension and/or other relief is required, applicant petitions for any required relief including extensions of time and authorizes the Commissioner to charge the cost of such petitions and/or other fees due in connection with the filing of this document to **Deposit Account No. 03-1952** referencing 559442600201.

Dated: February 13, 2004

Respectfully submitted,

By: _____

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Form PTO-1449

INFORMATION DISCLOSURE CITATION IN AN APPLICATION

(Use several sheets if necessary)

Docket Number: 559442600201	Application Number: 10/299,335
Applicant: Craig ULLMAN et al.	
Filing Date: November 18, 2002	Group Art Unit: 2611
Mailing Date: February 13, 2004	

U.S. PATENT DOCUMENTS

Examiner Initials	Ref. No.	Date	Document No.	Name	Class	Subclass	Filing Date If Appropriate
	1.	05/25/1999	5,907,322	KELLY et al.			
	2.						

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Examiner Initials	Ref. No.	Date	Document No.	Country	Class	Subclass	Translation YES	Translation NO
	3.	02/01/1996	44 27 046 A1	GERMANY			X	
	4.	03/07/1996	44 31 438 A1	GERMANY			X	
	5.	06/19/1997	WO 97/22207	PCT			Abstract	X
	6.	11/25/1998	EP 0879 536 B1	EUROPE			X	
	7.							

OTHER DOCUMENTS *(including author, title, Date, Pertinent Pages, Etc.)*

Examiner Initials	Ref. No.	Title
	8.	"Funkschau Fachzeitschrift für elektronische Kommunikation", Volume 6/96 of 3-1-96., pages 70-75. and English Translation of extract from Funkschau Fachzeitschrift für elektronische Kommunikation".
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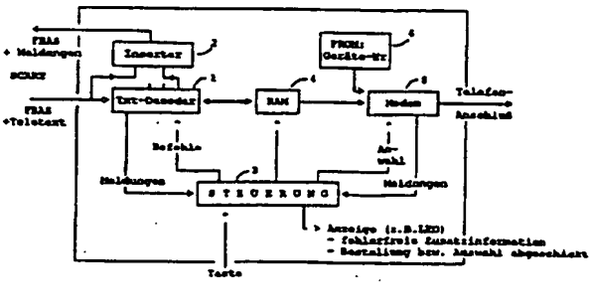
(54) Verfahren zum Wiedergeben von in einem Fernseh- oder Hörfunk-Programmsignal enthaltenen Zusatzinformationen

(57) Um das Bestellen von Produkten, die im Fernsehen oder Hörfunk präsentiert werden, für den Fernseh- bzw. Hörfunkteilnehmer so einfach wie möglich zu machen und gleichzeitig die für eine Bestellung erforderliche Rechtssicherheit zu gewährleisten, wird vorgeschlagen, Zusatzinformationen, insbesondere in Form von Schrift und ggf. von Grafikelementen, innerhalb des Programmsignals in zeitlicher Korrelation zu dessen Programminhalt zu übertragen und empfängerseitig zu decodieren. Die empfangenen Zusatzinformationen werden empfängerseitig für eine bestimmte Dauer zwischengespeichert. Auf einen ersten Befehl des Benutzers wird eine in der zuletzt empfangenen Zusatzinformation enthaltene Klarschrift und ggf. Grafikinformation für eine bestimmte Zeitdauer wiedergegeben. Während der Wiedergabe der Klarschrift und ggf. der Grafikinformation wird auf einen zweiten Befehl des Benutzers aus der zuletzt zwischengespeicherten Zusatzinformation eine der Klarschrift und ggf. Grafikinformation zugeordnete Bestell- oder Auswahlinformation entnommen und an eine Wählvermittlungseinrichtung (z. B. Modem) weitergeleitet.



DE 44 27 046 A 1

Die folgenden Angaben sind den vom Anmelder eingereichten Unterlagen entnommen

BUNDESDRUCKEREI 11. 95 508 065/354

Beschreibung

Die Erfindung bezieht sich auf ein Verfahren gemäß dem Oberbegriff des Patentanspruchs 1. Ein derartiges Verfahren ist aus Rundfunktechnischen Mitteilungen, Heft 1, 1978 "Anlage zur Aufbereitung und Einblendung von Untertiteln nach dem englischen Teletext-Standard" bekannt.

Aus der vorgenannten Literaturstelle ist es bekannt, bei fremdsprachigem Fernsehton oder für Gehörlose in das Fernsehbild Untertitel einzublenden. Die eingeblendeten Untertitel sind dabei zeitlich mit dem Fernsehbild korreliert.

Es ist ferner bekannt, in Fernseh-Werbesendungen Produkte vorzustellen, und am Ende der Werbesendung getrennt für jedes Land die Preise und die Telefonnummern anzugeben, unter welchen die zuvor geworbenen Produkte bestellt werden können. Dieses sogenannte "Teleshopping" hat jedoch den Nachteil, daß vom Fernsehteilnehmer die betreffenden Telefonnummern mitgeschrieben werden müssen; außerdem leidet der unmittelbare Bezug zwischen der fernsehmäßigen Präsentation des Produktes und der Anzeige von Preis und Telefonnummer. Hinzu kommt, daß der Fernsehteilnehmer, nachdem er die Telefonnummer abgeschrieben hat, einen telefonischen Bestellvorgang durchführen muß, was dann, wenn viele Fernsehteilnehmer gleichzeitig bestellen wollen, eine Vielzahl von Wählversuchen erforderlich macht.

Die Aufgabe der Erfindung besteht darin, ein Verfahren der eingangs erwähnten Art für den Bestellvorgang von Produkten nutzbar zu machen, um das Bestellen für den Teilnehmer so einfach wie möglich zu machen und gleichzeitig die für eine Bestellung erforderliche Rechtssicherheit zu gewährleisten.

Diese Aufgabe wird erfindungsgemäß durch die kennzeichnenden Merkmale des Patentanspruchs 1 gelöst.

Vorteilhafte Ausgestaltungen und Weiterbildungen des erfindungsgemäßen Verfahrens nach Anspruch 1 ergeben sich aus den Unteransprüchen.

Die Erfindung beruht auf der Überlegung, dem Fernseh- oder Hörfunkteilnehmer per Knopfdruck die Möglichkeit zu geben, bei der bildlichen oder akustischen Präsentation von Produkten oder Dienstleistungen eine Klarschriftinformation abzurufen, welche ihm durch Einblendung in das Fernsehbild bzw. Wiedergabe auf einem Display am Empfänger sichtbar gemacht wird. Insbesondere handelt es sich bei der Klarschriftinformation um nähere Angaben über das Produkt einschließlich Preis, welche für eine Kaufentscheidung des Teilnehmers erforderlich sind. Zur Bestellung braucht der Teilnehmer nur noch ein weiteres Mal auf eine spezielle Taste seines Empfängers bzw. dessen Fernbedienung zu drücken, worauf der Bestellvorgang automatisch ausgelöst wird. Ferner erhält der Teilnehmer nach Auslösung eines Bestellvorganges eine Quittiermeldung.

Die Erfindung wird anhand eines in den Zeichnungen dargestellten Ausführungsbeispiels näher erläutert. Es zeigen

Fig. 1a und Fig. 1b zwei Teletextseiten mit dann enthaltenen Zusatzinformationen;

Fig. 2 eine empfängerseitige Einrichtung nach der Erfindung zur Dekodierung der Zusatzinformation,

Fig. 3 eine Darstellung der zeitlichen Aufeinanderfolge zwischen einzelnen Fernsehbeiträgen und den zugehörigen Zusatzinformationen, und

Fig. 4 eine Darstellung der zeitlichen Aufeinanderfolge zwischen der Anzeige der Klarschriftinformation und der den Zeitfenstern zur Auslösung eines Bestellvorgangs bzw. der Übermittlung einer Auswahlinformation.

Die für eine Bestellung bzw. eine Auswahl notwendigen Daten werden als Zusatzinformation zeitlich korreliert zum Fernsehprogramm auf Teletextseiten ähnlich wie Untertitel mit bestimmten Seitennummern gesendet, die der Empfangseinrichtung bekannt sind. Das in Fig. 1a dargestellte Beispiel ("Rotes Sommerkleid für DM 19,95") enthält eine Klarschrift-Information, eine Telefon-Nummer und eine Produkt-Nummer zur Bestellung des Sommerkleids. Alternativ kann, wie Fig. 1b zeigt, anstelle der Produkt-Nummer eine Nummer für eine Auswahlidentifikation, beispielsweise für eine anonyme Umfrage ("Gewinnt XYZ die nächste Wahl?") übertragen werden.

In Fig. 2 ist ein Blockschaltbild einer Empfangseinrichtung nach der Erfindung dargestellt, die extern aufgestellt und mit einem Fernsehgerät über ein Scart-Kabel verbunden ist. Über das Scart-Kabel wird das empfangene Fernsehsignal mit den Teletextdaten aus dem Fernsehgerät auf einen in der Empfangseinrichtung eingebauten Teletext-Dekoder und einen Inserter geführt. Der Teletext-Dekoder 1 detektiert aus den einlaufenden Teletext-Daten diejenigen Seiten, die von einer Steuerung angefordert werden und untersucht den Seiteninhalt der selektierten Seiten (sh. Fig. 1a oder Fig. 1b) nach einer Zusatzinformation.

Eine in ein Fernsehgerät eingebaute Empfangseinrichtung nach der Erfindung ist ähnlich wie eine Empfangseinrichtung mit Scart-Kabel aufgebaut. Bei der eingebauten Empfangseinrichtung entfällt der Inserter und die RGB-Signale am Ausgang des Teletext-Dekoders werden direkt über einen Schalter und entsprechende Verstärker auf den Fernsehbildschirm gegeben.

Wird eine fehlerfreie Zusatzinformation von dem Teletext-Decoder 1 festgestellt, so erfolgt eine Zwischenspeicherung in einem RAM-Speicher, eine Meldung an die Steuerung 3 und eine entsprechende Anzeige für den Benutzer, beispielsweise durch Blinken einer grünen LED-Anzeige. Bei bereits in Fernsehempfängern integrierten Empfangseinrichtungen nach der Erfindung ist es auch denkbar, eine entsprechende Signalisierung an der Gehäusefrontseite des Fernsehgerätes vorzunehmen.

Außerdem kann dem Benutzer das Vorhandensein von einer Zusatzinformation dadurch signalisiert werden, daß beispielsweise ein Logogramm vom Teletext-Dekoder generiert, vom Inserter in das Fernsehsignal eingestanzt, über das Scart-Kabel zum Fernsehgerät zurückgeführt und auf dem Bildschirm zusammen mit dem gewählten Programm in einer Ecke auf dem Bildschirm angezeigt wird.

Sind nun Zusatzinformationen vorhanden und betätigt der Benutzer eine Taste, die der Empfangseinrichtung zugeordnet ist und die entweder am Gehäuse der Empfangseinrichtung oder an der Fernbedienung des Fernsehgerätes oder der erfindungsgemäßen Empfangseinrichtung angeordnet sein kann, so wird ein entsprechendes Steuersignal an die Steuerung übermittelt, die daraufhin den Teletext-Dekoder 1 veranlaßt, die zuletzt zwischengespeicherte Zusatzinformation aus dem RAM 4 zu laden und die darin enthaltene Klarschriftinformation (Fig. 1a, 1b) über den Inserter auf dem Bildschirm des Fernsehgerätes anzuzeigen.

Wird die Taste ein zweites Mal vom Benutzer gedrückt, so wird aus der im RAM 4 zwischengespeicher-

ten Zusatzinformation die Telefonnummer (Fig. 1a, 1b) in ein Modem übergeben und ein Wählvorgang ausgelöst. Vom Modem 5 führt eine entsprechende Telefonleitung aus der Empfangseinrichtung nach der Erfindung auf einen Telefonanschluß des Benutzers. Ist die Verbindung mit dem angewählten Teilnehmer hergestellt, werden bei einer Bestellinformation die Produktnummer (Fig. 1a) für das gewünschte Produkt zusammen mit einer Geräte-Nummer zur Identifikation des Benutzers aus einem PROM-Speicher übertragen. Enthält dagegen die Zusatzinformation eine Auswahlidentifikations-Nummer (Fig. 1b), so wird nur sie, ohne Geräte-Nummer, zur Wahrung der Anonymität des Benutzers dem angewählten Teilnehmer übermittelt.

Die erfolgreiche Übertragung der Daten wird vom Modem an die Steuerung signalisiert, die wiederum eine entsprechende Meldung an den Teletext-Dekoder zur Anzeige auf dem Bildschirm abgibt. Außerdem ist eine entsprechende Anzeige auf einer zugeordneten LED-Anzeige oder am Fernsehgerät bei einer eingebauten Empfangseinrichtung denkbar.

Kann dagegen vom Modem keine Verbindung hergestellt werden, so erfolgt eine Wiederholung des Wahlvorgangs nach einer Zeitspanne, die von einem Zufallsgenerator in der Steuerung bestimmt wird. Diese Vorgehensweise ist insbesondere zur zeitlichen Entzerrung von Anwahlwiederholungen notwendig, die auftreten können, wenn bei vielen Empfangseinrichtungen zum gleichen Zeitpunkt ein Bestellvorgang bzw. ein Auswahlvorgang vom Benutzer ausgelöst wird (beispielsweise bei einem Preisausschreiben "Die ersten zehn Anrufer gewinnen").

Zur Verdeutlichung der Erfindung werden die zeitlichen Aufeinanderfolgen der einzelnen Fernsehbeiträge mit den zugehörigen Zusatzinformationen und die möglichen Bestell- bzw. Auswahlmöglichkeiten näher in Fig. 3 und Fig. 4 gezeigt.

Fig. 3 (a) zeigt zwei aufeinanderfolgende Werbeprogramme "Spot A" und "Spot B". In Fig. 3 (b) sind die Zusatzinformationen "A" für "Spot A" und "B" für "Spot B" dargestellt, die beispielsweise alle $t_0 = 20$ sec. übertragen werden.

Das Eintreffen der Zusatzinformation und damit die Möglichkeit, direkt zu reagieren und das Angebot wahrzunehmen, wird dem Benutzer durch eine entsprechende Anzeige signalisiert, beispielsweise durch Eintasten eines Logogramms in das betreffende Programm. Wird dagegen keine Zusatzinformation beispielsweise für mehr als $t_1 = 30$ sec. von der Empfangseinrichtung detektiert, wird die Anzeige wieder gelöscht (Fig. 4 (a)).

Beim ersten Tastendruck des Benutzers (Fig. 4 (b)) wird die Klarschrift-Information aus der Zusatzinformation "A" in das laufende Werbeprogramm "Spot A" eingeblendet. Beim Eintreffen der Zusatzinformation "B" wechselt die Anzeige automatisch und es werden die zu "Spot B" gehörenden Klarschrift-Informationen angezeigt. Die Klarschrift-Information zu "Spot B" wird vom Bildschirm gelöscht, wenn nach dem ersten Tastendruck innerhalb von beispielsweise $t_2 = 100$ sec. kein zweiter Tastendruck erfolgt.

Um auszuschließen, daß bei einem unvorhergesehenen Wechsel der Zusatzinformation eine Bestellung des falschen Produkts bzw. eine falsche Auswahl erfolgt, ist vorgesehen, nach einem Wechsel für beispielsweise $t_3 = 2$ sec. einen etwaigen zweiten Tastendruck zur Auslösung des Bestellvorgangs bzw. der Auswahl zu ignorieren (Fig. 4 (c)).

Bei einem Bestellvorgang (Fig. 1a) erhält der angewählte Teilnehmer (z. B. eine Kreditkartenorganisation) die Produkt-Nummer und die Geräte-Nummer; er identifiziert den Bestellenden anhand der Geräte-Nummer, gibt Adresse, Kontoverbindung und angefordertes Produkt an eine für die Auslieferung zuständige Stelle weiter und regelt ggf. die Bezahlung. Ein Auswahlvorgang (Fig. 1b) läuft ähnlich wie ein Bestellvorgang ab; es erfolgt nur keine Übermittlung der Geräte-Nummer zur Identifikation des Benutzers.

Ein erfolgreicher Bestell- bzw. Auswahlvorgang und eine erfolgreiche Übermittlung der Bestell- bzw. Auswahldaten wird dem Benutzer von der Empfangseinrichtung in geeigneter Weise angezeigt.

Anstelle einer fernsehmäßigen Übertragung der Zusatzinformation und deren Einblendung in ein Fernsehbild ist es ebensogut möglich, die Zusatzinformation in einem Hörfunk-Programmsignal zu übertragen und auf einem Display am Hörfunkempfänger wiederzugeben. Insbesondere eignet sich hierfür wegen der großen Übertragungskapazität ein digitales Hörfunk-Programmsignal. In Betracht kommt aber auch ein mit RDS-(Radio-Daten-System)-Signal versehenes analoges Hörfunk-Programmsignal (FM- und AM-Signal), da das RDS-Signal noch nichtbelegte Kennungen aufweist, welche für die erfindungsgemäße Zusatzinformation genutzt werden können.

Patentansprüche

1. Verfahren zum Wiedergeben von in einem Fernseh- oder Hörfunkprogrammsignal enthaltenen Zusatzinformationen, insbesondere in Form von Schrift und ggf. von Grafikelementen, welche innerhalb des Programmsignals in zeitlicher Korrelation zu dessen Programminhalt übertragen und empfängerseitig decodiert werden, **dadurch gekennzeichnet**, daß die empfangenen Zusatzinformationen empfängerseitig für eine bestimmte Dauer zwischengespeichert werden, daß auf einen ersten Befehl des Benutzers eine in der zuletzt empfangenen Zusatzinformation enthaltene Klarschrift und ggf. Grafikinformation für eine bestimmte Zeitdauer wiedergegeben wird, und daß während der Wiedergabe der Klarschrift und ggf. der Grafikinformation auf einen zweiten Befehl des Benutzers aus der zuletzt zwischengespeicherten Zusatzinformation eine der Klarschrift und ggf. Grafikinformation zugeordnete Bestell- oder Auswahlinformation entnommen und an eine Wählvermittlungseinrichtung (z. B. Modem) weitergeleitet wird.
2. Verfahren nach Anspruch 1, dadurch gekennzeichnet, daß im Wiedergabebetrieb bei einem Wechsel der Zusatzinformationen die Auslösung des zweiten Befehls für eine bestimmte Zeitdauer gesperrt wird.
3. Verfahren nach Anspruch 1 oder 2, dadurch gekennzeichnet, daß die empfangsseitige Zwischenspeicherung einer Zusatzinformation dem Benutzer, zumindest für eine festgelegte Zeitdauer, optisch signalisiert wird.
4. Verfahren nach einem der Ansprüche 1 bis 3, dadurch gekennzeichnet, daß die Bestellinformation eine Produktkennung und eine Telekommunikationsnummer, ggf. in codierter Form, enthält, und daß die Wählvermittlungseinrichtung einen Wählvorgang entsprechend der Telekommunikationsnummer durchführt und bei aufgebauter Telekommunikationsverbindung die Produktkennung zu-

sammen mit einer Benutzerkennung an den gerufenen Teilnehmer überträgt.

5. Verfahren nach Anspruch 4, dadurch gekennzeichnet, daß die entnommene Produktkennung und die entnommene Telekommunikationsnummer zwischengespeichert werden und daß die Benutzerkennung dauerhaft gespeichert ist.

6. Verfahren nach Anspruch 4 oder 5, dadurch gekennzeichnet, daß bei fehlerfreier Übertragung der Produkt- und der Benutzerkennung der gerufene Teilnehmer eine Quittiermeldung an die Wählvermittlungseinrichtung rücküberträgt.

7. Verfahren nach Anspruch 6, dadurch gekennzeichnet, daß die rückübertragene Quittiermeldung an der Wiedergabeeinrichtung in geeigneter Weise angezeigt wird.

8. Verfahren nach Anspruch 6, dadurch gekennzeichnet, daß die rückübertragene Quittiermeldung eine optische und/oder akustische Signalisierung auslöst.

9. Verfahren nach einem der Ansprüche 4 bis 8, dadurch gekennzeichnet, daß bei erfolglosem Vermittlungsversuch oder bei fehlerhafter Übertragung der Produkt- und der Benutzerkennung die Wählvermittlungseinrichtung einen erneuten Vermittlungs- und Übertragungsversuch nach einer Wartezeit durchführt, welche entsprechend einem Zufallsgesetz bestimmt wird.

10. Verfahren nach einem der Ansprüche 4 bis 9, dadurch gekennzeichnet, daß ein Wahlvorgang nur dann erfolgt, wenn die Benutzung der Wählvermittlungseinrichtung vom berechtigten Benutzer freigegeben ist.

11. Verfahren nach einem der Ansprüche 1 bis 3, dadurch gekennzeichnet, daß die Auswahlinformation eine Auswahlidentifikation und eine Telekommunikationsnummer, ggf. in codierter Form, enthält, und daß die Wählvermittlungseinrichtung einen Wählvorgang entsprechend der Telekommunikationsnummer durchführt und bei aufgebauter Telekommunikationsverbindung die Auswahlidentifikation an den gerufenen Teilnehmer überträgt.

12. Verfahren nach Anspruch 11, dadurch gekennzeichnet, daß die entnommene Auswahlidentifikation und die entnommene Telekommunikationsnummer zwischengespeichert werden.

13. Verfahren nach Anspruch 11 oder 12, dadurch gekennzeichnet, daß bei fehlerfreier Übertragung der Auswahlidentifikation der gerufene Teilnehmer eine Quittiermeldung an die Wählvermittlungseinrichtung rücküberträgt.

14. Verfahren nach Anspruch 13, dadurch gekennzeichnet, daß die rückübertragene Quittiermeldung an der Wiedergabeeinrichtung in geeigneter Weise angezeigt wird.

15. Verfahren nach Anspruch 13, dadurch gekennzeichnet, daß die rückübertragene Quittiermeldung eine optische und/oder akustische Signalisierung auslöst.

16. Verfahren nach einem der Ansprüche 11 bis 15, dadurch gekennzeichnet, daß erfolglosem Vermittlungsversuch oder bei fehlerhafter Übertragung der Auswahlidentifikation die Wählvermittlungseinrichtung einen erneuten Vermittlungs- und Übertragungsversuch nach einer Wartezeit durchführt, welche entsprechend einem Zufallsgesetz bestimmt wird.

Hierzu 2 Seite(n) Zeichnungen

Nummer: DE 44 27 048 A1
Int. Cl.⁶: H 04 N 5/445
Offenlegungstag: 1. Februar 1996

Rotes Sommerkleid für 15.95 DM
Produkt-Nummer | Telefon-Nummer

Fig. 1a

2 teletext pages

Umfrage: Gewinnt XYZ die nächste Wahl ??
Identifik.-Nr. | Telefon-Nummer

Fig. 1b

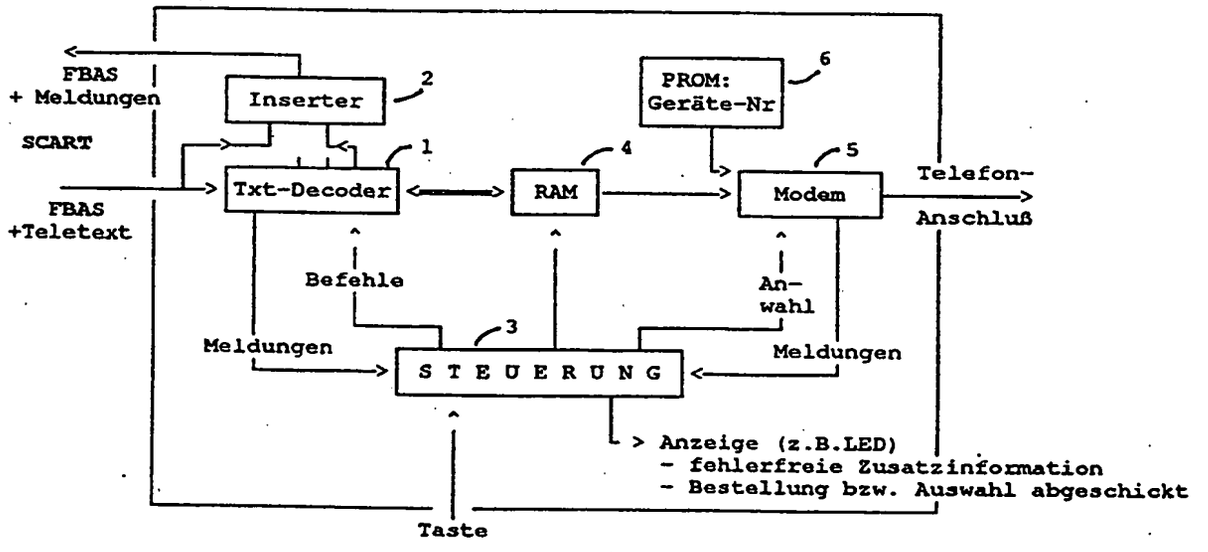


Fig. 2

Nummer: DE 44 27 046 A1
Int. Cl.[6]: H 04 N 5/445
Offenlegungstag: 1. Februar 1996

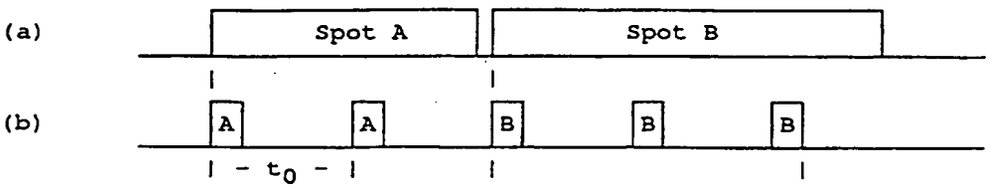


Fig. 3

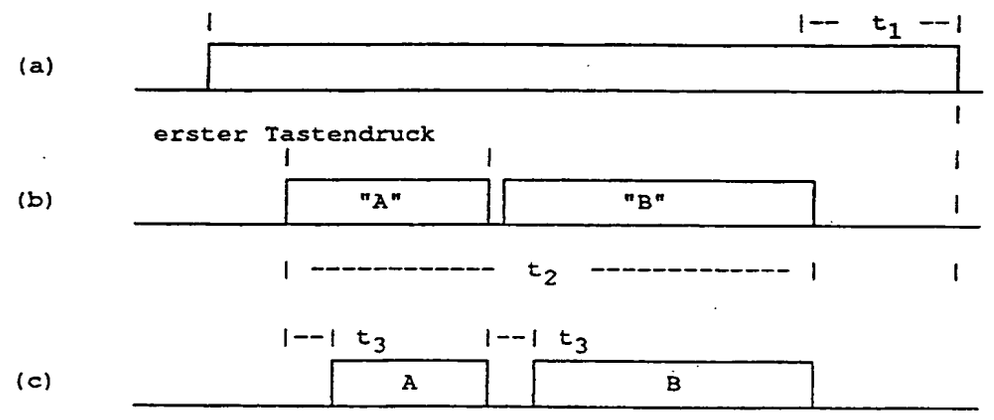


Fig. 4

D10

DE 44 27 046 A 1

Method of reproducing additional information contained in a television or radio programme signal

In order to make the ordering of products presented on television or radio as simple as possible for the television or radio broadcast user and simultaneously to guarantee the legal security required for ordering, it is proposed to transmit additional information, particularly in the form of text and possibly graphics, within the programme signal in temporal correlation with the programme content and to decode it at the receiving end. The additional information received is stored temporarily at the receiving end for a specific period of time. Plain text and possibly graphics information contained in the additional information last received is reproduced for a specific period of time in response to a first command from the user. During the reproduction of the plain text and possibly the graphics information, ordering or selection information associated with the plain text and possibly graphics information is extracted from the additional information last stored temporarily and forwarded to an automatic exchange (e.g. modem) in response to a second command from the user.

Description

The invention relates to a method according to the pre-characterising part of claim 1. A method of this kind is known from Rundfunktechnische Mitteilungen, Vol. 1, 1978, "Anlage zur Aufbereitung und Einblendung von Untertiteln nach dem englischen Teletext-Standard" [System for processing and inserting subtitles in accordance with the British teletext standard].

It is known from the aforementioned literature reference to insert subtitles into the television picture in the case of foreign-language television sound or to assist the deaf. The inserted subtitles are in temporal correlation with the television picture.

It is furthermore known to present products in television commercials and to specify the prices and the telephone numbers by means of which the products advertised previously can be ordered separately for each country at the end of the commercial. However, this process referred to as "teleshopping" has the disadvantage that the relevant telephone numbers have to be written down by the television broadcast user. The direct reference between the television presentation of the product and the display of the price and the telephone number moreover suffers. In addition, after writing down the telephone number, the television broadcast user has to order by telephone, with a large number of call attempts being required if a large number of television broadcast users wish to order at the same time.

The aim of the invention consists in turning a method of the type mentioned at the outset to good use for the ordering of products in order to make ordering as simple as possible for the user and simultaneously to guarantee the legal security required for ordering.

This problem is solved according to the invention by the characterising features of claim 1.

Advantageous embodiments and developments of the method according to the invention according to claim 1 will be clear from the dependent claims.

The invention is based on the concept of giving the television or radio broadcast user the opportunity to retrieve plain text information during the graphic or acoustic

presentation of products or services at the touch of a button, rendered visible by insertion into the television picture or reproduction on a display on the receiver. In particular, the plain text information consists of more details about the product, including the price, required for the user to make a decision about purchase. To order, the user simply has to press once again on a special key on his receiver or his remote control, after which the ordering procedure is initiated automatically. The user furthermore receives an acknowledgement once an ordering procedure has been initiated.

The invention will now be described in more detail with reference to one embodiment illustrated in the accompanying drawings, in which:

Fig. 1a and Fig. 1b show two teletext pages containing additional information;

Fig. 2 shows a receiving device according to the invention for decoding the additional information;

Fig. 3 is a representation of the time sequence of individual television items and the associated additional information, and

Fig.4 is a representation of the time sequence of the display of the plain text information and of the time windows for initiating an ordering procedure or transmitting selection information.

The data required for ordering or selection is broadcast in temporal correlation with the television programme as additional information on teletext pages similar to subtitles with specific page numbers known to the receiving device. The example shown in Fig. 1a ("Red summer dress for DM 19,95") contains plain text information, a telephone number and a product number for ordering the summer dress. Alternatively, as shown in Fig. 1b, a number for selection identification, e.g. for an anonymous poll ("Will XYZ obtain the next election?") can be transmitted instead of the product number.

Fig. 2 is a block diagram for a receiving device according to the invention, set up externally and connected to a television set via a scart cable. The television signal with the teletext data received from the television set is sent via the scart cable to a

teletext decoder installed in the receiving device and to an inserter. The teletext decoder 1 detects the pages from the incoming teletext data requested by a controller and checks the content of the selected pages (see Fig. 1a or Fig. 1b) for additional information.

A receiving device according to the invention installed in a television set is designed in a similar manner to a receiving device with a scart cable. When the receiving device is installed, the inserter is dispensed with and the RGB signals at the output of the teletext decoder are sent directly to the television screen via a switch and corresponding amplifiers.

If error-free additional information is detected by the teletext decoder 1, it is stored temporarily in a RAM, a message is sent to the controller 3 and a corresponding display is provided for the user, e.g. the flashing of a green LED display. In the case of receiving devices according to the invention already integrated into television receivers, it is also conceivable to effect corresponding signalling on the front of the casing of the television set.

The presence of additional information can moreover be indicated to the user in that, e.g. a logogram is generated by the teletext decoder, inserted into the television signal by the inserter, returned to the television set via the scart cable and displayed in a corner of the screen together with the selected programme.

If additional information is present and the user actuates a key which is associated with the receiving device and can be arranged either on the casing of the receiving device or on the remote control of the television set or on the receiving device according to the invention, a corresponding control signal is transmitted to the controller, after which the teletext decoder 1 can load the additional information last stored temporarily from the RAM 4 and display the plain text information contained therein (Figures 1a and 1b) on the screen of the television set via the inserter.

If the key is pressed a second time by the user, the telephone number from the additional information stored temporarily in the RAM 4 (Figures 1a and 1b) is sent to a modem and a dialling procedure is initiated. A corresponding telephone line from the receiving device according to the invention leads from the modem 5 to a telephone

connection of the user. Once the connection with the dialled subscriber has been established, in the case of ordering information, the product number (Fig. 1a) for the desired product is transmitted together with a device number for identification of the user from a PROM. If, on the other hand, the additional information contains a selection identification number (Fig. 1b), only it is transmitted to the dialled subscriber, without the device number, in order to preserve the anonymity of the user.

The modem indicates successful transmission of the data to the controller, which in turn sends a corresponding message to the teletext decoder for display on the screen. Corresponding display on an associated LED display or on the television set if a receiving device is installed is moreover conceivable.

If, on the other hand, no connection can be established by the modem, the dialling procedure is repeated after a time interval determined by a random generator in the controller. This method of procedure is required, in particular, for the temporal equalisation of repeat dialling, which can occur when an ordering procedure or a selection procedure is initiated by the user in many receiving devices at the same time (e.g. in the case of a competition "The first ten callers win").

The time sequences of the individual television items with the associated additional information and the ordering and selection possibilities are shown in more detail in Figures 3 and 4 in order to illustrate the invention.

Fig. 3(a) shows two successive commercials "Spot A" and "Spot B". Fig. 3(b) shows the additional information "A" for "Spot A" and "B" for "Spot B", all transmitted, e.g. for t_0 = 20 sec.

The arrival of the additional information and therefore the possibility of reacting immediately and taking up the offer is indicated to the user by a corresponding display, e.g. by inlaying a logogram into the relevant programme. If, on the other hand, no additional information is detected by the receiving device, e.g. for more than t_1 = 30 sec, the display is cancelled again (Fig. 4(a)).

When the user presses the key for the first time (Fig. 4(b)), the plain text information from the additional information "A" is inserted into the current commercial "Spot A". When the additional information "B" arrives, the display changes automatically and

the plain text information relating to "Spot B" is displayed. The plain text information for "Spot B" is cancelled from the screen if the first keystroke is not followed by a second keystroke within, e.g. t_2 = 100 sec.

In order to prevent ordering of the wrong product or incorrect selection in the event of the additional information changing unexpectedly, it is provided that any second keystroke to initiate the ordering procedure or selection is ignored for, e.g. t_3 = 2 sec after a change (Fig. 4(c)).

In an ordering procedure (Fig. 1a), the dialled subscriber (e.g. a credit card organisation) receives the product number and the device number. It identifies the orderer by way of the device number, sends the address, association where the account is held and the product required to the body responsible for delivery and arranges payment if necessary. A selection procedure (Fig. 1b) is similar to an ordering procedure, except that there is no transmission of the device number to identify the user.

A successful ordering or selection procedure and successful transmission of the ordering or selection data is displayed in a suitable manner for the user by the receiving device.

Instead of the additional information being transmitted by television and inserted into a television picture, the additional information can equally be transmitted in a radio programme signal and reproduced on a display on the radio receiver. A digital radio programme signal is particularly suitable to this end on account of the large transmission capacity. However, an analog radio programme signal (FM and AM signals) provided with an RDS (radio data system) signal is also possible, as the RDS signal still has unallocated identities that can be used for the additional information according to the invention.

Claims

1. Method of reproducing additional information contained in a television or radio programme signal, particularly in the form of text and possibly graphics, transmitted within the programme signal in temporal correlation with the programme content and decoded at the receiving end, characterised in that the additional information received is stored temporarily at the receiving end for a specific period of time, that plain text and possibly graphics information contained in the additional information last received is reproduced for a specific period of time in response to a first command from the user and that during the reproduction of the plain text and possibly the graphics information, ordering or selection information associated with the plain text and possibly graphics information is extracted from the additional information last stored temporarily and forwarded to an automatic exchange (e.g. modem) in response to a second command from the user.

2. Method according to claim 1, characterised in that, when the additional information changes during reproduction, execution of the second command is disabled for a specific period of time.

3. Method according to claim 1 or claim 2, characterised in that the temporary storage of additional information at the receiving end is indicated optically to the user, at least for a fixed period of time.

4. Method according to one of claims 1 to 3, characterised in that the ordering information contains product identification and a telecommunication number, possibly in coded form, and that the automatic exchange carries out a dialling procedure in accordance with the telecommunication number and, once the telecommunication link has been established, transmits the product identification together with a user identification to the called subscriber.

5. Method according to claim 4, characterised in that the product identification extracted and the telecommunication number extracted are stored temporarily and that the user identification is stored permanently.

6. Method according to claim 4 or claim 5, characterised in that, in the event of error-free transmission of the product identification and user identification, the called subscriber transmits an acknowledgement back to the automatic exchange.

7. Method according to claim 6, characterised in that the acknowledgement transmitted back is displayed in a suitable manner on the reproduction device.

8. Method according to claim 6, characterised in that the acknowledgement transmitted back triggers optical and/or acoustic signalling.

9. Method according to one of claims 4 to 8, characterised in that, in the event of an unsuccessful switching attempt or in the event of defective transmission of the product identification and user identification, the automatic exchange carries out another switching and transmission attempt after a waiting period determined in accordance with a law of chance.

10. Method according to one of claims 4 to 9, characterised in that a dialling procedure is only effected if the use of the automatic exchange is approved by the authorised user.

11. Method according to one of claims 1 to 3, characterised in that the selection information contains selection identification and a telecommunication number, possibly in coded form, and that the automatic exchange carries out a dialling procedure in accordance with the telecommunication number and, once the telecommunication link has been established, transmits the selection identification to the called subscriber.

12. Method according to claim 11, characterised in that the selection identification extracted and the telecommunication number extracted are stored temporarily.

13. Method according to claim 11 or claim 12, characterised in that, in the event of error-free transmission of the selection identification, the called subscriber transmits an acknowledgement back to the automatic exchange.

14. Method according to claim 13, characterised in that the acknowledgement transmitted back is displayed in a suitable manner on the reproduction device.

15. Method according to claim 13, characterised in that the acknowledgement transmitted back triggers optical and/or acoustic signalling.

16. Method according to one of claims 11 to 15, characterised in that, in the event of an unsuccessful switching attempt or in the event of defective transmission of the selection identification, the automatic exchange carries out another switching and transmission attempt after a waiting period determined in accordance with a law of chance.

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2 pages of drawings

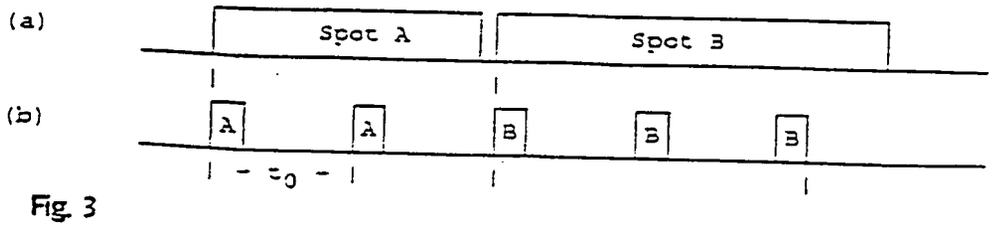

Fig. 3

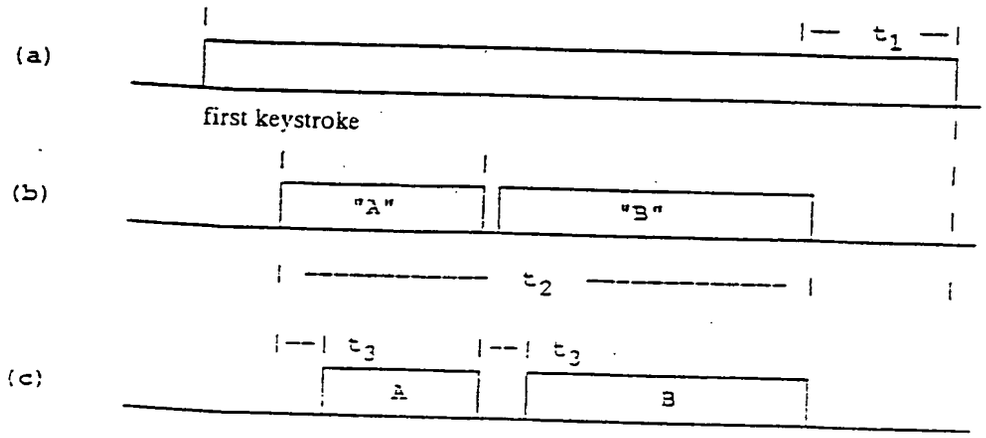

Fig. 4

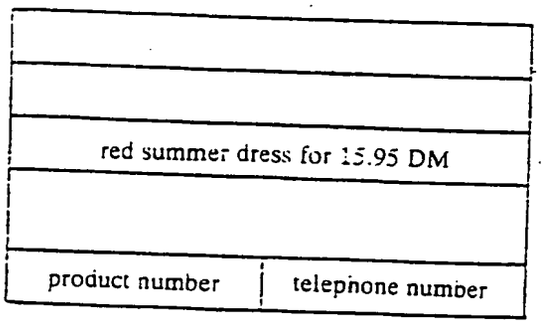

Fig. 1a

teletext pages

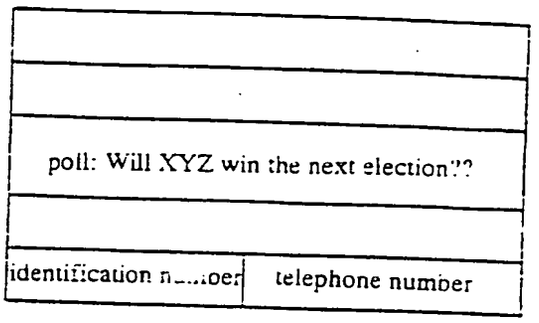

Fig. 1b

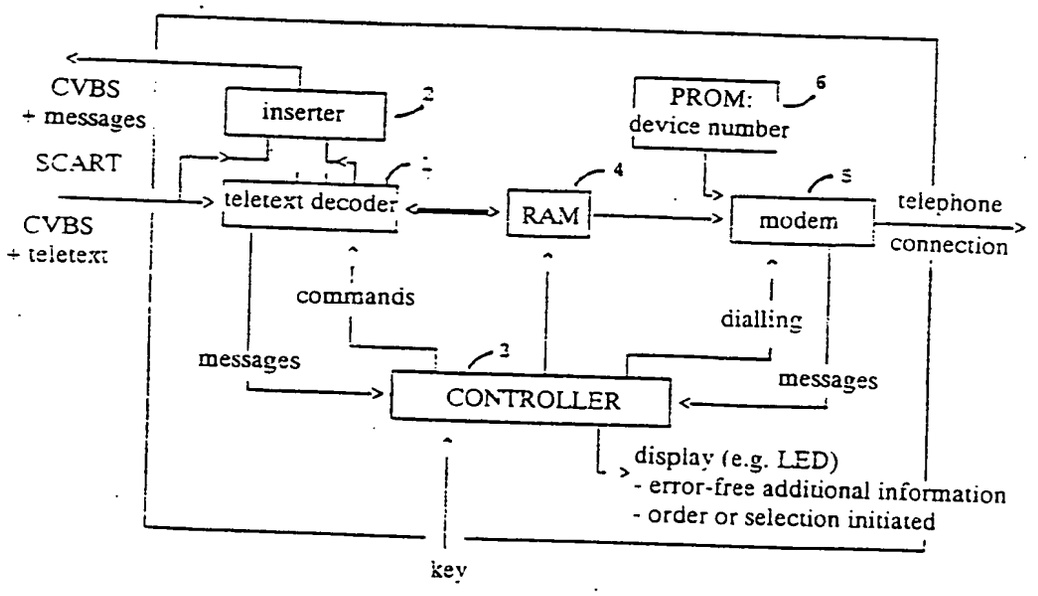

Fig. 2

(19) BUNDESREPUBLIK DEUTSCHLAND

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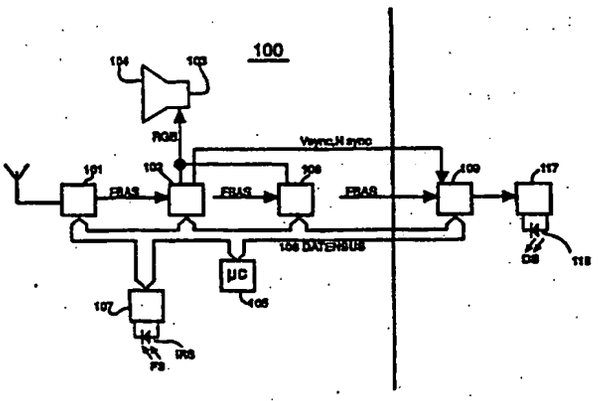
(56) Für die Beurteilung der Patentfähigkeit in Betracht zu ziehende Druckschriften:

DE 43 09 504 A1
DE 41 13 542 A1
DE 39 05 048 A1
DE 33 09 588 A1
DE 94 00 011 U1
DE 92 07 423 U1
EP 00 29 248 A1
ARMBRÜSTER, Heinrich: Auf breitem Band für jedermann. In: Funkschau 15/1984, S.46-49;

(54) **Einrichtung zur Kommunikation eines Fernsehempfängers mit einem Telefonapparat**

(57) Die Einrichtung zur Kommunikation eines Fernsehempfängers (100) mit einem Telefonapparat (200) realisiert einerseits das Übernehmen von alphanumerischen Zeichen aus einem Fernsehbildsignal durch den Telefonapparat (200) und andererseits das Übertragen von Zeichen, die der Telefonapparat (200) über ein Telefonnetz erhält oder die über sein Eingabefeld (201) eingegeben werden, zum Fernsehempfänger (100).
Der Fernsehempfänger (100) weist eine Leseeinrichtung (109) und einen Zeichensender (117) mit einem Sendeelement (118) auf. Die Leseeinrichtung (109) enthält einen Analog/Digitalwandler (111), einem Bildpunktspeicher (112) und einer Analyseeinrichtung (114) auf, die die gespeicherten Digitalwerte des FBAS-Signals analysiert und erkannte alphanumerische Zeichenfolgen in binäkodierte Zeichen umsetzt, die vom Zeichensender (117) als Datensignal (DS) zum Telefonapparat übertragen werden.
Der Telefonapparat (200) enthält ein Mikrocomputersystem (203) mit Speichern (204, 205), eine Kodier- und Moduliereinrichtung (208) zum Erzeugen von Fernbediensignalen (FS) für den Fernsehempfänger (100), einen Infrarotsender (209) zum Senden der Fernbediensignale (FS) und Mittel (211, 212 und 213) zum Empfangen und Umsetzen des Datensignals (DS) in Signale, die auf einem Telefonkanal in einem Versprechnetz übertragbar und/oder in den Speichern (204, 205) des zweiten Mikrocomputersystems (203) ablegbar sind.



DE 44 31 438 A1

Beschreibung

Technisches Gebiet

Die Erfindung betrifft eine Einrichtung zur Kommunikation eines Fernsehempfängers mit einem Telefonapparat, der mit einem Telefonnetz verbunden ist. Diese Einrichtung realisiert einerseits das Übertragen von alphanumerischen Zeichen, die der Fernsehempfänger mit dem Fernsehbildsignal als Schrifteinblendungen ins aktive Bild empfängt, an den Telefonapparat und andererseits das Übertragen von Signalen an den Fernsehempfänger, die der Apparat über das Telefonnetz erhält und Bedienbefehle, die über ein Bedienfeld des Fernsprechapparat eingegeben werden.

Stand der Technik

In zahlreichen Fernsehsendungen fordern Fernsehstationen jeder Art den Fernsehzuschauer auf, während oder nach der Sendung bestimmte Aktivitäten, wie die Beantwortung von Meinungsumfragen oder Preisfragen, Auslösung von Warenbestellungen oder Überweisen von Geldspenden auf ein bestimmtes Konto, mittels eines Telefonapparates vorzunehmen. Dazu werden auf besonderen Fernsehtexttafeln (Videotext) oder in den meisten Fällen direkt in das zur Zeit übertragene Fernsehbild alphanumerische Zeichen eingeblendet. Diese Einblendungen beinhalten in der Regel einerseits Daten wie einen Namen, ein Kennwort, eine Anschrift einer Fernsehstation, eines Versandhandels oder einer Bankeinrichtung in Form von alphanumerischen Zeichen und andererseits Daten mit rein numerische Zeichen wie Telefonnummern, Bestellnummern, Kontonummern und Bankleitzahlen.

Der Zuschauer hat damit im Bedarfsfall die Aufgabe, entweder die Daten manuell zu notieren oder während des Erscheinens auf dem Bildschirm die benötigte Ziffernfolge unmittelbar in die Speicher- oder Wähleinrichtung eines Telefonapparates einzugeben, um die geforderte Aktivität spontan auszulösen. Beide Aktivitäten erfordern die volle Aufmerksamkeit des Zuschauers und eine gewisse Sorgfalt beim Übertragen der Daten, was letztlich zu Übermittlungsfehlern und Informationsverlust führen kann. Andererseits kann bei spontan ausgelösten Aktivitäten nicht mit der entsprechenden Sorgfalt vorgegangen werden. Es kann zu voreiligen Handlungen kommen, die teilweise nicht widerrufbar sind.

Es sind bereits Einrichtungen bekannt, bei denen ein Fernsehempfänger mit einem Telefonapparat zum Übermitteln von Information vom Telefonapparat zum Fernsehempfänger verbunden ist.

Beispielsweise offenbart die DE-C2-36 34 836 eine Fernbedieneinrichtung für eine Kabelfernsehanlage in einem Krankenhaus, bei der ein Patient einen Fernsehempfänger in seinem Zimmer mit Hilfe eines Telefonapparates aus- und einschalten, auf einen anderen Programmplatz umschalten und den Tonanschluß desselben mit seinem Kopfhöreranschluß verbinden kann. Dieses geschieht durch Eingeben der entsprechenden Ziffern in die Wähleinrichtung des Telefonapparates. Diese Ziffern überträgt die Telefonanlage zu einer zentralen Erfassungs- und Steuereinrichtung, welche daraufhin über gesonderte Datenleitungen entsprechende Steuerbefehle in Form von seriellen Impulstelegrammen an eine im betreffenden Raum befindliche Fernsteuereinrichtung sendet. Die Fernsteuereinrichtung weist Mittel zum Empfangen, Dekodieren und Auswerten der digitalen Fernbediensignale auf, die einen Fernsteuersender ansteuern.

Der Fernsteuersender enthält mit Ausnahme des Eingabefeldes sämtliche Einrichtungen eines drahtlosen Fernbediengebers für Fernsehgeräte, wobei die Information über eine betätigte Taste über die Telefonanlage bereitgestellt wird, die dem Fernsehempfänger entsprechende Bedienbefehle übermittelt. Gleichzeitig erfolgt über die Datenleitung eine Rückmeldung an die zentrale Erfassungs- und Steuereinrichtung, um zum Beispiel die Einschaltdauer von gebührenpflichtigen Programmen zu erfassen. Als Datenleitung kann auch die Antennenzuleitung des Fernsehgerätes oder das Lichtnetz genutzt werden.

Entsprechend einer Weiterentwicklung der Erfindung werden auch Zusatzaufgaben realisiert, wie zum Beispiel das Steuern von Bildschirmtextanzeigen. Damit kann zum Beispiel der Patient mit der Wähleinrichtung des Telefonapparates über die Erfassungs- und Steuereinrichtung auf einen bestimmten Fernsehsonderkanal, auf den im Moment der Abfrage nur der entsprechende Telefonanschluß Zugriff hat, krankenhaus- oder patientenspezifische Text- oder Bildtafeln abfordern. Damit ist beispielsweise eine Speisekarte auf dem Bildschirm darstellbar und der Patient kann über die Wähltasten des Telefonapparates seine Essenauswahl treffen. Ein Arzt kann das Patientenblatt des jeweiligen Patienten abfordern und ins Krankenzimmer übertragen lassen oder der Patient kann sich sein Telefon- und Fernsehgebührenkonto auf dem Bildschirm anzeigen lassen.

Bei der beschriebenen Einrichtung erfolgt die Ansteuerung der Fernbedieneinrichtung stets über das Telefonnetz, der Erfassungs- und Steuereinrichtung und der zusätzlichen Datenleitung. Ein direktes Ansteuern des Fernsehempfängers über den Telefonapparat erfolgt nicht. Eine solche Einrichtung ist deshalb für die Nutzung in privaten Haushalten ungeeignet.

Es besteht auch keine Möglichkeit, Information, die mit dem Fernsehsignal zum Fernsehempfänger übertragen werden, in den Telefonapparat zu übernehmen.

Aus der Patentschrift DE-C2-38 19 863 ist weiterhin eine Vorrichtung zum Fernsteuern eines elektronischen Gerätes, insbesondere eines Videorecorders bekannt, bei der über ein allgemeines Telefonnetz Steuerinformationen, wie Kanalnummer, Datum, Anfangs- und Endzeit von aufzuzeichnenden Fernsehsendungen, von einem externen Telefonapparat zu einem am Ort des Gerätes befindlichen Telefonapparat übertragbar sind.

Der Telefonapparat am Ort des Gerätes weist eine Steuereinrichtung auf, an der ein Fernbediensender zum drahtlosen Übertragen von Fernbediensignale an das elektronische Gerät angeschlossen ist.

Auch bei dieser Einrichtung erfolgt keine direkte Ansteuerung des Fernsehempfängers über den Telefonapparat und es ist auch nicht möglich, auf Wunsch des Zuschauers Informationen in den Telefonapparat zu übertragen.

Des weiteren ist aus der Druckschrift RUNDFUNKTECHNISCHE MITTEILUNGEN, Band 30, Nr. 5, Sept.—Okt. 1986, Seiten 223—229, Norderstedt, DE; G. EITZ et al.: "Videotext programmiert Videoheimgerät (VPV)" ein Verfahren zum Vereinfachen des Programmierens von Videorecordern bekannt. Die Eingabe der Aufzeichnungswünsche geschieht durch automatisches Übernehmen der notwendigen Information aus Fernsehtext-Programmseiten, auf denen ein gewünschter

Beitrag angekündigt ist. Der Videorecorder wird durch die in der Datenzeile 16 mitübertragenen VPS-Daten gesteuert. Die Bedienung vereinfacht sich dadurch, daß der Zuschauer den gewünschten Beitrag auf einer angewählten Fernsehtext-Programmseite mit einem Fernbediengeber kennzeichnet.

Daraufhin programmiert die in den Fersehtext-Seiten enthaltene Information automatisch den Videorecorder. Das Verfahren wertet zwar alphanumerische Zeichen, die mit dem Fernsehbildsignal übertragen werden, selektiv aus und nutzt diese zum Auslösen von bestimmten Aktivitäten. Jedoch ist dieses nur mit Hilfe einer entsprechenden Fernsehtextseite möglich. Eine Kommunikationsverbindung zwischen beiden Geräten besteht nicht.

Es ist Aufgabe der Erfindung, eine Einrichtung für eine Kommunikation zwischen einem Fernsehempfänger und einem Telefonapparat zu schaffen, die mit dem Eingabefeld eines Telefonapparates eine Auswahl von eingeblendeten Daten ermöglicht, die ein Fernsehempfänger mit dem Bildsignal empfängt, um diese nebst anderen Daten, die bestimmte Betriebszustände des Fernsehempfängers kennzeichnen, direkt mit dem Telefonapparat zu übernehmen und Signale, die ein Telefonapparat über das Eingabefeld oder einen Telefonkanal empfängt, zum Fernsehempfänger zu übertragen.

Wesen der Erfindung

Die Erfindung geht bei der Lösung der Aufgabe von folgenden Gegebenheiten aus:
Mit der Entwicklung auf dem Gebiet der Mobilfunk-Telefone sind in vielen Haushalten sehr handliche Telefonapparate vorhanden, die drahtlos betreibbar sind und bereits eine Vielzahl von elektronischen Mitteln enthalten, die sich mit einem geringen technischen Mehraufwand zusätzlich für die Nutzung als Fernbediengeber von einem Fernbediensystem eignen.

Ein an sich bekanntes Mobilfunk-Telefon verfügt über ein Eingabefeld für numerische Zeichen und für Sonderzeichen für Bedienfunktionen, ein mehrzeiliges Anzeigedisplay für alphanumerische Zeichen und ein Mikrocomputersystem mit der entsprechenden Beschaltung wie Speicherschaltkreise, Soft- und Hardwarekomponenten, zum Empfangen, Dekodieren, Speichern, Kodieren, Ausgeben und Anzeigen von Information in Form von Signalen und Zeichen.

Ein Fernsehempfänger mit einem Bildschirm und einem fernbedienbaren digitalen Abstimm- und Speichersystem verfügt ebenfalls über ein Mikrocomputersystem mit Speicherschaltkreisen zum Empfangen, Dekodieren, Speichern, Kodieren, Ausgeben von Signalen und Anzeigen von Information in Bildform.

Die Erfindung löst die Aufgabe dadurch, daß in einen solchem Telefonapparat zusätzlich eine Kodier- und Moduliereinrichtung zum Erzeugen von Fernbediensignalen für einen Fernsehempfänger angeordnet und mit einem Infrarotsender verbunden ist. Des weiteren enthält der erfindungsgemäße Telefonapparat einen Empfänger für den drahtlosen Empfang und das Umsetzen von Datensignalen in Signale, die auf einem Telefonkanal übertragbar und im Speicher des Telefonapparates ablegbar sind.

Der Fernsehempfänger enthält eine Leseeinrichtung, mit der ein Teil des Bildsignals ausgewählt, digitalisiert und gespeichert werden kann. Dieser Teil des Bildsignals besteht aus gleichlangen Zeitintervallen von aufeinanderfolgenden Bildzeilen des aktiven Zeilensignals, die jeweils zum Zeilensynchronsignal die gleiche zeitliche Lage aufweisen. Der Ausgang der Leseeinrichtung ist mit einer Analyseeinrichtung verbunden. Die Analyseeinrichtung beinhaltet einen Mikroprozessor, der die Signalstruktur des gespeicherten Teils des Bildsignals analysiert und mit intern gespeicherten Strukturmustern vergleicht.

Auf diese Weise können Daten, die in Form von alphanumerischen Zeichen, die im aktiven Bildsignal eingeblendet sind, erkannt und in Folgen von binärkodierten Zeichen umgesetzt werden. Ein Zeichensender im Fernsehempfänger kodiert, moduliert und überträgt diese Zeichen zum Telefonapparat.

Die erfindungsgemäße Einrichtung dient somit einerseits zum Übertragen von alphanumerischen Zeichen aus dem Bildsignal vom Fernsehempfänger zum Telefonapparat und andererseits zum Übertragen von Signalen aus dem Telefonnetz und solchen, die in das Eingabefeld des Telefonapparates eingegeben werden, zum Fernsehempfänger.

Der erfindungsgemäße Telefonapparat setzt im Gegensatz zu bekannten Lösungen die Eingaben, die über die Tastatur erfolgen selbst in Signale um und sendet diese direkt an den Fernsehempfänger.

Das Mikrocomputersystem des Fernsehempfängers ist in einer Weiterbildung der Erfindung derart ausgelegt, daß es mit einem Anzeigemenü auf dem Fernsehbildschirm und einem Cursorsystem den Ablauf eines Kommunikationsprozesses selbsttätig steuert. Somit können einerseits auf einfache Weise mit dem Anzeigedisplay im Telefonapparat und andererseits auf komfortable Weise unter Nutzung des Fernsehbildschirms erforderliche Dateneingaben durch den Benutzer abgefragt und Informationen, die im Ergebnis der Kommunikation entstehen, dargestellt werden.

Bevorzugte Ausführung der Erfindung

Die Erfindung soll an einem Ausführungsbeispiel erläutert werden. Die zugehörigen Zeichnungen zeigen:

Fig. 1 ein Prinzipschaltbild der Grundausführung eines erfindungsgemäßen Fernsehempfängers;

Fig. 2 ein Blockschaltbild der erfindungsgemäßen Leseeinrichtung des Fernsehempfängers;

Fig. 3 eine erweiterte Ausführungsform eines erfindungsgemäßen Fernsehempfängers;

Fig. 4 ein Prinzipschaltbild eines erfindungsgemäßen Telefonapparates.

Ein in der Fig. 1 dargestellter an sich bekannter Fernsehempfänger 100 mit einem Fernbediensystem beinhaltet einen HF-Empfangsteil 101 zum Empfangen und Demodulieren eines Fernsehsignals, das mit einem FBAS-Signal moduliert ist, einen Videosignalteil 102, der aus dem FBAS-Signal ein RGB-Signal zum Ansteuern einer Bildröhre 103 mit einem Bildschirm 104 gewinnt und neben einem nicht dargestellten Audioteil ein digitales Abstimm- und Speichersystem, das mit einem Mikrocomputersystem 105 die Zentraleinheit des Fernbediensystems bildet und beispielsweise über einen Datenbus 106 ein Ein- und Ausschalten des Fernsehempfängers 100, die Wahl der Sendestation, das Verändern von Einstellwerten für Bild und Ton und das Umschalten auf bestimmte Funktionen des Gerätes ermöglicht.

Das Mikrocomputersystem 105 enthält in bekannter Weise einen Dekoder für Fernbediensignale FS, Speicher für Sendefrequenzen und Bild- und Toneinstellwerte, Speicher für Bildsignalmuster zum Darstellen von alphanumerischen Zeichen auf dem Bildschirm 104 und

einen Prozessor zum Auslösen und Kontrollieren der Funktionen des Fernsehempfängers 100 und ist über einen Fernbedienempfänger 107 mit einem Infrarot-Sensor IRS durch Infrarotsignale ansteuerbar.

Der Fernsehempfänger 100 enthält des weiteren noch einen Fernsehtextteil 108 zum Abtrennen, Dekodieren und Speichern von Fernsehtextsignalen aus dem FBAS-Signal und Generieren eines RGB-Signals zum Darstellen von Fernsehtextseiten auf dem Bildschirm 104.

Zusätzlich zu diesen bekannten Baugruppen enthält der Fernsehempfänger 100 erfindungsgemäß eine Leseeinrichtung 109 zum Auswählen, Speichern und Analysieren von Zeitintervallen des FBAS-Signals. Die Leseeinrichtung 109 ermöglicht mit dem Fernbediensystem serielle Zeitintervalle des FBAS-Signals, in denen sich Schrifteinblendungen mit einer Textzeile befinden und die im Fernsehbild einen Bildstreifen darstellen, auszuwählen, optisch zu markieren, digital zu speichern und auszuwerten.

Die Leseeinrichtung 109 kann beispielsweise wie in der Fig. 2 dargestellt, aufgebaut sein. Diese beinhaltet eine Torschaltung 110 mit einem Signaleingang und einem Steuereingang, einen Analog/Digitalwandler 111, einen Bildpunktspeicher 112, eine Auslesesteuerung 113 und eine Analyseeinrichtung 114. Am Signaleingang der Torschaltung 110 liegt das FBAS-Signal. Der Steuereingang der Torschaltung 110 ist mit der Auslesesteuerung 113 verbunden und dient zum Erzeugen eines Datenfensters, das die Torschaltung bei beiden Halbbildern für die Zeitintervalle mit eingeblendetem Signal einer Textzeile aktiviert. Dieses erfolgt durch ein Steuersignal, das die Auslesesteuerung 113 an Hand der laufenden Zeilennummer der aktuell übertragenen Bildzeile innerhalb eines Halbbildes erzeugt. Dazu ist die Auslesesteuerung 113 mit dem vertikalen und horizontalen Synchronsignal V_{Sync} und H_{Sync}, die im Videosignalteil 102 vom FBAS-Signal abgetrennt werden, und mit dem Datenbus 106 verbunden. Die Auslesesteuerung 113 steuert somit die Zeiten, in denen die Torschaltung 110 das FBAS-Signal zum Eingang des Analog/Digitalwandlers 111 durchstellt. Sie beinhaltet einen Bildzeilenzähler zum Ermitteln der Zeilennummer der aktuell übertragenen Bildzeile und einen Vergleicher, der die aktuelle Zeilennummer mit Referenznummern vergleicht, welche die eingestellte Position und die Breite des ausgewählten Bildstreifens kennzeichnen.

Die Referenznummern stellt das Mikrocomputersystem 105 über den Datenbus 106 bereit, wobei sie mit dem Fernbediensystem veränderbar sind und auf gebräuchliche Werte voreingestellt sein können, so daß durch Cursortasten auf dem Eingabefeld eines Fernbediengebers die Breite und Position des Bildstreifens leicht einzustellen sind.

Während die Torschaltung 110 für das FBAS-Signal durchlässig ist, markiert das Mikrocomputersystem 105 an Hand der eingestellten Referenznummern die Lage des Bildstreifens im Fernsehbild beispielsweise durch Farb- und/oder Helligkeitsumtastung auf dem Bildschirm 104. Die Ansteuerung der Torschaltung 110 bewirkt, daß nur zu der Zeit das FBAS-Signal am Eingang des Analog/Digital-Wandlers 111 liegt, in der eine relevante eingeblendete Textzeile übertragen wird. Der Analog/Digitalwandler 111 wandelt während der ausgewählten Zeitintervalle das FBAS-Signal in entsprechende Digitalwerte um und legt diese als Bildpunkt-Signalraster im Bildpunktspeicher 112 ab.

Da in der Praxis Schrifteinblendungen niemals direkt an den Bildschirmrändern beginnen oder enden, ist es nicht nötig, von den Bildzeilen des Bildstreifens das vollständige Signal der aktiven Bildzeilen auszulesen. Die Torschaltung 110 kann so angesteuert werden, daß zum Beispiel der erste und der letzte Signalabschnitt der Bildzeilen nicht digitalisiert und gespeichert werden muß.

Auf diese Weise kann Speicherkapazität und Auswertezeit eingespart werden.

Der Bildpunktspeichers 112 weist einen parallelen Datenausgang auf, an dem gleichzeitig die Digitalwerte von mehreren aufeinanderfolgenden Bildzeilen abgerufen werden können und an dem die Analyseeinrichtung 114 angeschlossen ist. Diese beinhaltet einen Mikroprozessor 115, der mit einem digitalen Zeichenmusterspeicher 116 verbunden ist.

Im Zeichenmusterspeicher 116 sind Referenzstrukturen des Bildsignal von alphanumerischen Zeichen digital gespeichert. Der Mikroprozessor 115 ruft die im Bildpunktspeicher 112 gespeicherten Digitalwerte des FBAS-Signals ab und vergleicht diese mit den im Zeichenmusterspeicher 116 gespeicherten Strukturen von Bildsignalen. Auf diese Weise werden die alphanumerischen Zeichen, die im Fernsehbildsignal enthalten sind, erkannt, in eine Folge von binärkodierte Daten umgesetzt und stehen am Ausgang der Analyseeinrichtung 114 abrufbereit zur Verfügung.

Wie in der Fig. 1 dargestellt ist, enthält die Analyseeinrichtung 114 einen Datenausgang O_{dat} an dem ein Zeichensender 117 angeschlossen ist, der eine Kodier- und Moduliereinrichtung und einen Treiber zum Ansteuern eines Sendeelementes 118 aufweist. Das Sendeelement ist im Beispiel eine Infrarotdiode. In einer anderen Ausführungsform der Erfindung kann es jedoch auch eine Sendeantenne für ein HF-Signal sein. Im Zeichensender 117 wandelt die Kodier- und Moduliereinrichtung die binärkodierten Daten in ein Datensignal DS, das aus seriellen Impulsworten mit jeweils einem Adreßteil und einen Datenteil besteht. Das Sendeelement 118 strahlt dieses Datensignal DS drahtlos ab.

Dabei enthalten die seriellen Kodeworte im Adreßteil eine von den Fernbediensignalen des Fernsehempfängers 100 verschiedene Adressen. Diese Maßnahme ist erforderlich, um zu verhindern, daß die vom Sendeelement 118 ausgesandten Kodeworte über Fernbedienempfänger 107 zurück in das Mikrocomputersystem 105 des Fernsehempfängers 100 gelangen und Steuerungsfehler verursachen.

Um die Erkennungssicherheit der Analyseeinrichtung 114 zu erhöhen, können vor dem Bildpunktspeicher 112 noch Mittel zum Vergrößern des Kontrastes angeordnet sein, welche die Verteilung der Helligkeits- und/oder Farbwerte im Luminanz- und/oder Chrominanzsignal zu Extremwerten hin verschieben. Dieses hat den Vorteil, daß der Einfluß von Signalrauschen sowie Helligkeits- und Farbmustern im Hintergrund der Schrifteinblendung beim Analysieren unterdrückt werden können.

Im dargestellten Ausführungsbeispiel wurden im Interesse der Übersichtlichkeit der Erfindung die einzelnen Stufen der Leseeinrichtung 109 und der Zeichensender 117 als getrennte Signalstufen dargestellt. Bei der praktischen Realisierung der Erfindung ist es jedoch vorteilhaft, den überwiegenden Teil dieser Signalstufen mit Hilfe des Mikrocomputersystems 105 zu realisieren. Dieses gilt insbesondere für die Auslesesteuerung 113 und die Analyseeinrichtung 114.

Die Leseeinrichtung 109 kann auch abweichend von der Darstellung in der Fig. 2 so aufgebaut sein, daß mit

der Torschaltung 110 ein Bildstreifen ausgelesen wird, der Schrifteinblendungen über mehrere Textzeilen aufweist. Diese Zeitintervalle des FBAS-Signals werden ebenfalls vom Analog/Digitalwandler 111 gewandelt und in einem entsprechend größeren Bildpunktspeicher 112 abgelegt. Bevor die Analyseeinrichtung 114 die gespeicherten Digitalwerte des FBAS-Signals analysierte und erkannte alphanumerische Zeichen in binärkodierte Zeichen umsetzt, wird der im Bildpunktspeicher 112 gespeicherte Bildstreifen über das Mikrocomputersystem abgerufen und von einem in den Figuren nichtdargestellten Standbildsignalgenerator, der ebenfalls mit einem Cursorsystem verbunden ist, als Standbild auf dem Bildschirm 104 angezeigt. Mit dem Cursorsystem können nun die relevanten alphanumerischen Zeichen zum Analysieren markiert und Hinweise zur Datenverwaltung, wie das Festlegen einer Speicheradresse, einer Verwendungsart und ähnliches angebracht werden.

Diese Leseeinrichtung weist gegenüber der erstbeschriebenen die Zuverlässigkeit und den Bedienungskomfort bei der Übernahme von Schrifteinblendungen wesentlich, da auch ergänzende Daten, welche nicht zur Verwendung im Telefonnetz vorgesehen sind, wie Namen, Bezeichnungen und Anschriften ausgelesen und gespeichert werden können.

In einer Weiterbildung der Erfindung ist, wie in Fig. 3 dargestellt, an den Datenbus 106 des Fernsehempfängers 100 neben den bereits genannten Baugruppen zusätzlich ein Fernsehtextgenerator 120 angeschlossen, der mit einem Programmspeicher 121 und einem Seitenspeicher 122 für Fernsehtextseiten und einer Cursorsteuereinrichtung 123 verbunden ist. Vorteilhaft kann der Seitenspeicher, der sich im Fernsehtextteil 108 befindet, verwendet werden. Der Fernsehtextgenerator 120 weist einen Signalkonverter auf. Dieser konvertiert die binärkodierten Daten, die in Form von Kodeworten für das Fernbediensystem zum Mikrocomputersystem 105 gelangen und die optisch darstellbaren Zeichen entsprechen, in die Signalform des Fernsehtextsystems.

Dadurch können sowohl die binärkodierten Daten vom Datenausgang der Analyseeinrichtung 114 als auch binärkodierte Daten, die vom Telefonapparat 200 auf dem Infrarotweg zum Fernsehempfänger übertragen werden in den Seitenspeicher 122 des Fernsehtextsystems geladen werden.

Der Fernsehtextgenerator 120 ermöglicht mit im Programmspeicher 121 abgelegten Generatorprogrammen aus diesen binärkodierten Daten eigene, spezielle Fernsehtextseiten zu generieren. Diese können im Seitenspeicher 122 abgelegt, auf Abruf auf dem Bildschirm 104 des Fernsehempfängers in Form von speziellen Fernsehtextseiten dargestellt und mit der Cursorsteuereinrichtung 123 bearbeitet werden.

In einer weiteren Fortbildung der Erfindung weist der Fernsehempfänger 100 eine Vorrichtung zum Markieren und Auslesen von Schrifteinblendungen aus dem Fernsehtextteil 108 auf, deren Ausgang ebenfalls mit der Zeichensender 117 verbunden ist. Eine solche Vorrichtung ist vom Programmiersystem "Videotext programmiert Videoheimgerät (VPV)" bekannt und muß deshalb an dieser Stelle nicht beschrieben werden.

In Fig. 4 ist ein Telefonapparat 200 mit den erfindungsgemäßen Erweiterungen dargestellt. Dieser ist im Ausführungsbeispiel ein Mobilfunk-Telefon, das in bekannter Weise ein Eingabefeld 201, ein Anzeigedisplay 202 für gespeicherte oder über das Eingabefeld 201 eingegebene alphanumerische Zeichen, ein Mikrocomputersystem 203 mit einem flüchtigen Speicher 204 als Arbeitsspeicher, einen nichtflüchtigen Speicher 205 für Rufnummern, Namen und Anschriften, eine automatische Wähleinrichtung 206 sowie eine Tonzeichenwahleinrichtung 207 enthält. Darüber hinaus ist eine Kodier- und Moduliereinrichtung 208 zum Erzeugen von Fernbediensignalen FS vorhanden, die bezüglich des Adreß- und Datenteils den Kodewörtern gleichen, die von einem Fernbediengeber für den Fernsehempfänger 100 erzeugt werden, jedoch einen erweiterten Zeichenvorrat aufweisen.

Die Kodier- und Moduliereinrichtung 208 kann vom Mikrocomputersystem 203 gebildet werden und ist mit einem Infrarotsender 209 verbunden.

Der Zeichenvorrat der Kodier- und Moduliereinrichtung 208 ist derart erweitert, daß zusätzliche Zeichen erzeugt und über das Fernbediensystem zum Fernsehempfänger 100 übertragen werden können, um diese auf dem Bildschirm 104 als Text oder Graphik abzubilden.

Der Telefonapparat 200 weist außerdem eine Empfangs- und Sendeeinrichtung 210 auf, mit der eine Verbindung zu einem Telefonnetz hergestellt werden kann.

Erfindungsgemäß enthält der Telefonapparat 200 einen Datenempfänger 211 für den drahtlosen Empfang der Datensignale DS, die der Fernsehempfänger 100 über das Sendeelement 118 aussendet.

Der Datenempfänger 211 ist mit einem Datendekoder 212 und einem Datenkonverter 213 verbunden. Der Datendekoder 212 dekodiert das empfangene Datensignal DS und prüft, ob ein für den Telefonapparat 200 adressiertes Infrarotsignal empfangen wurde. Im Falle eines positiven Prüfergebnisses konvertiert der Datenkonverter 213 die mit dem Datensignal DS übertragenen Zeichen, legt diese in den Speicher 204 des Mikrocomputersystem 203 ab und zeigt sie auf dem Anzeigedisplay 202 an. Damit kann das Ergebnis der Zeichenanalyse der Analyseeinrichtung 114 geprüft werden. Der Datenkonverter 213 konvertiert die Kodeworte des Datensignals DS in Signale, die für die Benutzung im Mikrocomputersystem 203 im Telefonapparat 200 geeignet sind.

Die erfindungsgemäße Einrichtung ermöglicht einerseits, Zeichen mit dem Eingabefeld 201 des Telefonapparates 200 auszuwählen, die als Schrifteinblendungen in das Fernsehbild einer Fernsehsendung mit dem Fernsehsignal unabhängig von einem Fernsehtextsystem übertragen werden, ausgewählte Zeichen zum Mikrocomputersystem 203 des Telefonapparates 200 drahtlos zu übertragen diese Zeichen im Anzeigedisplay 202 zur Kontrolle der Richtigkeit anzuzeigen und in den Speicher 204 zu übernehmen, um die ausgewählten Zeichen auf Wunsch in einem Telefonnetz zu verwenden.

Andererseits können, wie bekannt, vom Telefonapparat 200 zum Fernsehempfänger 100 Fernbediensignale FS übertragen werden.

Auf diese Weise können die Mikroprozessoren beider Geräte selbsttätig einen Dialog führen und Daten austauschen, wobei der Telefonapparat 200, der vorteilhaft ein Mobilfunk-Telefon ist, gleichzeitig so aufgebaut und programmiert ist, daß er unabhängig von einem Telefonnetz an die Stelle des Fernbediengebers des Fernsehempfängers treten und zumindest dessen Hauptfunktionen realisieren kann.

Die erfindungsgemäße Einrichtung weist den Vorteil auf, daß zum Realisieren der Kommunikationsverbindung weder die bestehende Übertragungsnorm für die Fernsehübertragung noch die zum Telefonsystem geändert werden muß.

Die erfindungsgemäße Einrichtung läßt sich aus-

schließlich empfängerseitig beim Gerätehersteller für Fernsehempfänger und Telefonapparate realisieren.

Senderseitig kann die Erkennungswahrscheinlichkeit für das richtige Erkennen von Schrifteinblendungen durch Verwenden einer bevorzugten Schriftart, einer bevorzugten Lage des Beginns der Schrifteinblendung im FBAS-Signal und das Anwenden von bestimmten Farben für Schriftzeichen und/oder Untergrund unterstützt werden.

Mit der erfindungsgemäßen Einrichtung kann zum Beispiel das Eintragen von Namen, Adressen und Rufnummern in den nichtflüchtigen Speicher 205 des Telefonapparats 200 vereinfacht werden. Des weiteren ist es möglich, mit zwischengespeicherten Rufnummern, die vom Fernsehempfänger 100 übertragen wurden, die automatische Wähleinrichtung 206 des Telefonapparates 200 zu betätigen und auf Wunsch auf einem Telefonkanal des Telefonnetzes durch die Tonzeichenwahleinrichtung 207 Daten zu übertragen, die zum Beispiel Bestellnummern, Kunden-, Kode- oder Kontonummern darstellen und ebenfalls vom Fernsehempfänger 100 übertragen wurden.

Mit der erfindungsgemäßen Weiterbildung der Erfindung kann zum Beispiel im Mikrocomputersystem 105 ein komfortables Anzeige- und Verwaltungssystem für Daten, die sowohl im Speicher des Mikrocomputersystems 105 im Fernsehempfänger 100 als auch in den Speicher 204 und 205 des Telefonapparates 200 vorliegen, installiert werden, das mit der Cursorsteuereinrichtung 123 betätigt wird und den Ablauf eines Kommunikationsprozesses kontrolliert und unterstützt. Somit können einerseits auf konventionelle Weise mit dem Anzeigedisplays 202 im Telefonapparat 200 und andererseits wesentlich komfortabler unter Nutzung des Bildschirms 104 erforderliche Dateneingaben durch den Benutzer abgefragt und Informationen, die im Ergebnis der Kommunikation entstehen, dargestellt und verwaltet werden.

Ein solches System kann vorteilhaft zum Abwickeln eines Handels nach dem Prinzip des sogenannten "Teleshopping" bei dem von einem Versandhändler ein Kaufangebot innerhalb einer Fernsehsendung unterbreitet wird und die Möglichkeit besteht, eine telefonische Bestellung über ein Telefonnetz auszulösen.

Bevor der Telefonapparat über einen Telefonkanal eine Verbindung zum Händler herstellt, kann ein Fernsehzuschauer in aller Ruhe mit einem speziellen Menüprogramm, das im Programmspeicher 121 abgelegt ist, die Daten ansehen, die die Leseeinrichtung 109 aus dem Fernsehsignal ausgelesen hat und die sich nun im Seitenspeicher 122 befinden. Diese Daten können beispielsweise den Name des Händlers, seine Rufnummer, eine Bestellnummer der Ware, eine Bezeichnung und den Preis der Ware enthalten. Für eine telefonische Bestellung sind jedoch die Rufnummer des Händlers, die Bestellnummer, die zu liefernde Anzahl von Erzeugnissen, gegebenenfalls die Nummer einer Konfektionsgröße und die Nummern einer Kontoverbindung, eine Kundennummer oder eine Kreditkartennummer erforderlich. Das entsprechende Menüprogramm ergänzt die erforderlichen Bestelldaten, in dem es den Zuschauer zum Beispiel zur Eingabe einer Stückzahl, Konfektionsgröße, Farbwunsches und Kontoverbindung auffordert, stellt die Telefonverbindung zum Händler her, überträgt die Daten zum Händler, wartet gegebenenfalls eine Lieferzusage ab und trägt diese Daten gemeinsam mit den vom Händler nicht benötigten Daten, wie Name des Händlers, Preis und Bezeichnung der Ware in einen nichtflüchtigen Speicher im Fernsehempfänger 100 ein.

Ein solcher Speicher kann vorteilhaft das Datenformat einer Fernsehtextseite aufweisen und die Bestellung wird im Datenformat einer Fernsehtextseite gespeichert.

In ähnlicher Weise können mit der erfindungsgemäßen Einrichtung Kontoüberweisungen vom eigenen Konto auf ein anderes Konto vorgenommen werden.

Des weiteren bietet diese Einrichtung für den Betreiber von gebührenpflichtigen Fernsehprogrammen nach einem sogenannten "Pay-TV-System" die Möglichkeit, einem Fernsehempfänger 100 für seinen internen Empfangsdekoder über ein Telefonnetz die entsprechenden Schlüsselkodes zum Entschlüsseln von kodierten Fernsehsignalen des Pay-TV-Systems zu übermitteln.

Bezugszeichenliste

100 Fernsehempfänger
101 HF-Empfangsteil
102 Videosignalteil
103 Bildröhre
104 Bildschirm
105 Mikrocomputersystem
106 Datenbus
107 Fernbedienempfänger
108 Fernsehtextteil
109 Leseeinrichtung
110 Torschaltung
111 Analog/Digitalwandler
112 Bildpunktspeicher
113 Auslesesteuerung
114 Analyseeinrichtung
115 Mikroprozessor
116 Zeichenmusterspeicher
117 Zeichensender
118 Sendeelement
120 Fersehtextgenerator
121 Programmspeicher
122 Seitenspeicher
123 Cursorsteuereinrichtung
200 Telefonapparat
201 Eingabefeld
202 Anzeigedisplay
203 Mikrocomputersystem
204 flüchtiger Speicher
205 nichtflüchtiger Speicher
206 automatische Wähleinrichtung
207 Tonzeichenwähleinrichtung
208 Kodier- und Modulierereinrichtung
209 Infrarotsender
210 Empfangs- und Sendeeinrichtung
211 Datenempfänger
212 Datendekoder
213 Datenkonverter

Patentansprüche

1. Einrichtung zur Kommunikation zwischen:
   — einem Fernsehempfänger (100) mit einem Bildschirm (104) und einem über Fernbediensignale (FS) bedienbarem Abstimm- und Speichersystem in Form eines ersten Mikrocomputersystems (105), der ein FBAS-Signal empfängt, das Zeitintervalle enthält, in denen alphanumerische Zeichen übertragen werden
   — und einem Telefonapparat (200) mit einem Eingabefeld (201), einem Anzeigedisplay (202)

für alphanumerische Zeichen, einem zweiten Mikrocomputersystem (203) mit Speichern (204, 205), einer Kodier- und Moduliereinrichtung (208) zum Erzeugen der Fernbediensignale (FS) für den Fernsehempfänger (100) und mit einem Infrarotsender (209) zum Senden der Fernbediensignale (FS), **dadurch gekennzeichnet**, daß der Fernsehempfänger (100) enthält:

— eine Leseeinrichtung (109) mit einem zeitlichen Datenfenster, das über das erste Mikrocomputersystem (105) steuerbar ist, und eine Analyseeinrichtung (114) zum Auswählen und Analysieren der Zeitintervalle, zum Erkennen der alphanumerischen Zeichen im FBAS-Signal und zum Wandeln dieser Zeichen in binärkodierte Zeichen

— sowie einen Zeichensender (117) zum Senden der binärkodierten Zeichen in Form eines Datensignals (DS) und daß der Telefonapparat (200) Mittel (211, 212 und 213) enthält zum Empfangen und Umsetzen des Datensignals (DS) in Zeichen, die auf einem Telefonkanal in einem Telefonnetz übertragbar und/oder in den Speichern (204, 205) des zweiten Mikrocomputersystems (203) ablegbar sind.

2. Einrichtung nach Anspruch 1, dadurch gekennzeichnet, daß der Fernsehempfänger (100), der ein FBAS-Signal empfängt, das im aktiven, auf dem Bildschirm (104) darstellbaren Teil Zeitintervalle enthält, die Schrifteinblendungen mit alphanumerischen Zeichen entsprechen, eine Leseeinrichtung (109) aufweist, welche folgenden Komponenten enthält:

— eine Torschaltung (110) mit einer Auslesesteuerung (113) zum Erzeugen des Datenfensters in Form von Zeitintervallen im FBAS-Signal,

— einen Analog/Digitalwandler (111), der mit dem Ausgang der Torschaltung verbunden ist, zum Digitalisieren des FBAS-Signals während der ausgewählten Zeitintervalle

— einen Bildpunktspeicher (112) für das digitalisierte FBAS-Signal

— die Analyseeinrichtung (114) für das gespeicherte FBAS-Signal, die mit einem Zeichenmusterspeicher (116) für Referenzstrukturen des Bildsignals von alphanumerischen Zeichen verbunden ist, zum Erkennen der Zeichen im gespeicherten FBAS-Signal durch Vergleich mit den Referenzstrukturen und zum Erzeugen entsprechender binärkodierter Zeichen.

3. Einrichtung nach Anspruch 1, dadurch gekennzeichnet, daß der Zeichensender (117) eine Kodier- und Moduliereinrichtung und einen Treiber zum Ansteuern eines Sendeelementes (118) aufweist und mit der Analyseeinrichtung (114) verbunden ist, um das Datensignal (DS) drahtlos zu übertragen.

4. Einrichtung nach Anspruch 3, dadurch gekennzeichnet, daß der Zeichensender (117) eine Kodier- und Moduliereinrichtung zum Umwandeln der binärkodierten Zeichen in serielle Impulsworte aufweist und das Sendeelement (118) eine Infrarot-Lichtemitter-Diode ist.

5. Einrichtung nach Anspruch 1 und 2, dadurch gekennzeichnet, daß die Leseeinrichtung (109) im Signalweg zwischen dem Bildpunktspeicher (112) und der Analyseeinrichtung (114) einen Standbildsignalgenerator enthält, der mit einem Cursorsteuersystem verbunden ist, zum Abbilden des ausgelesenen und gespeicherten FBAS-Signals auf dem Bildschirm (104) und zum Markieren von alphanumerischen Zeichen.

6. Einrichtung nach Anspruch 1 und 2, dadurch gekennzeichnet, daß die Leseeinrichtung (109) vor dem Bildpunktspeicher (112) im Signalweg Mittel zum Vergrößern des Kontrastes enthält, welche die Verteilung der Helligkeits- und/oder Farbwerte im Luminanz- und/oder Chrominanzsignal zu Extremwerten hin verschieben.

7. Einrichtung nach Anspruch 1, dadurch gekennzeichnet, daß an den Datenbus (106) des ersten Mikrocomputersystems (105) im Fernsehempfänger (100) ein Fernsehtextgenerator (120) angeschlossen ist zum Erzeugen von Fernsehtextseiten aus den binärkodierten Daten, der mit einem Programmspeicher (121) für Programme zum Generieren von Fernsehtextseiten und einem Seitenspeicher (122) für Fernsehtextseiten und einer Cursorsteuereinrichtung (123) zum Markieren von Teilen von Fernsehtextseiten verbunden ist.

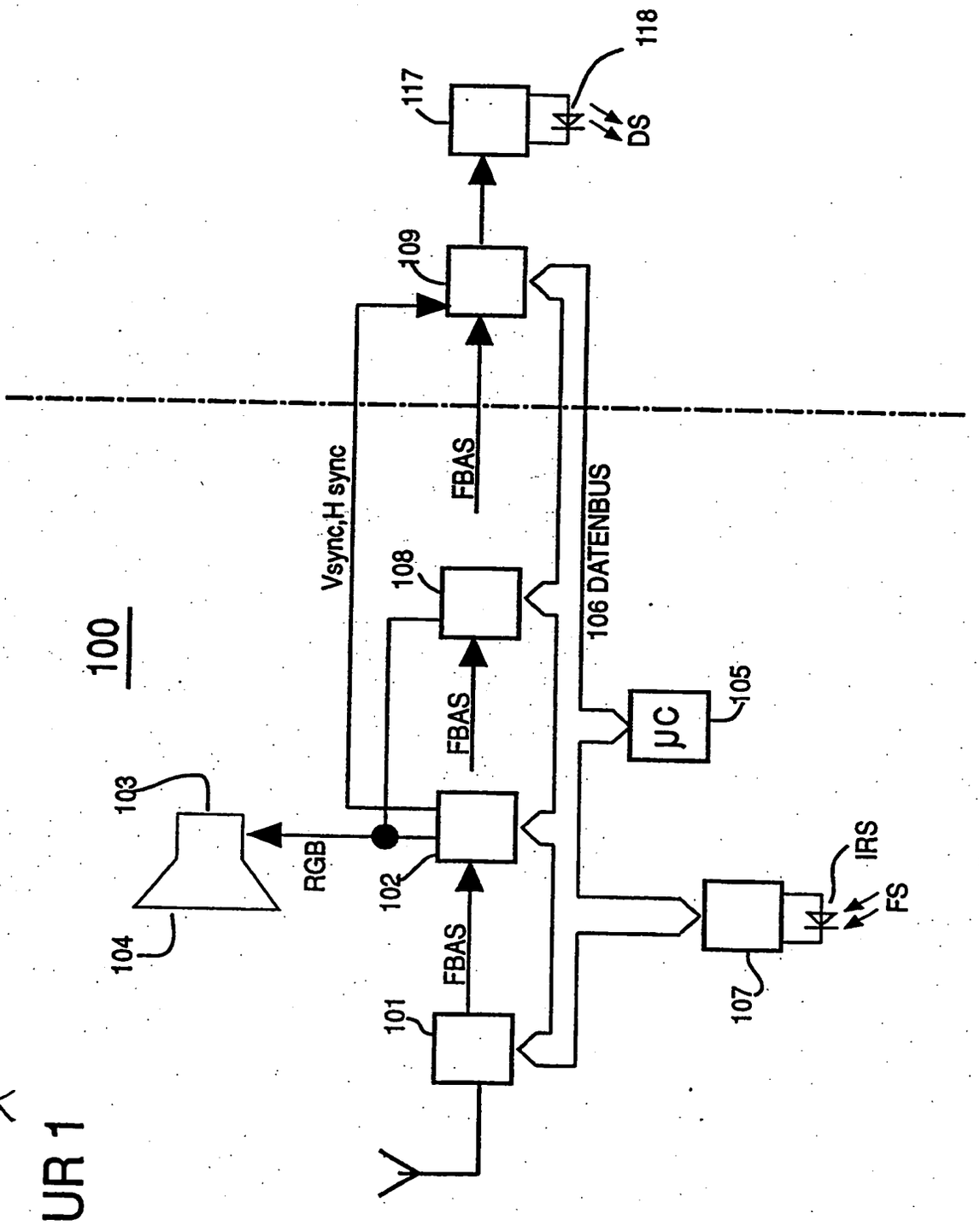
8. Einrichtung nach Anspruch 1, dadurch gekennzeichnet, daß der Fernsehempfänger (100) eine Vorrichtung zum Markieren und Auslesen von Zeichen aus dem Fernsehtextteil (108) aufweist, die ebenfalls mit der Zeichensender (117) verbunden ist.

9. Einrichtung nach Anspruch 1, dadurch gekennzeichnet, daß das Mikrocomputersystem (203) im Telefonapparat (200) eine Programmschaltung zum Senden von alphanumerische Zeichen an Stelle der Fernbediensignale (FS) über die Kodier- und Moduliereinrichtung (208) und den Infrarotsender (209) enthält und daß das Mikrocomputersystem (203) im Fernsehempfänger (100) eine Programmschaltung zum Abbilden der alphanumerischen Zeichen auf dem Bildschirm (104) aufweist.

Hierzu 4 Seite(n) Zeichnungen

– Leerseite –

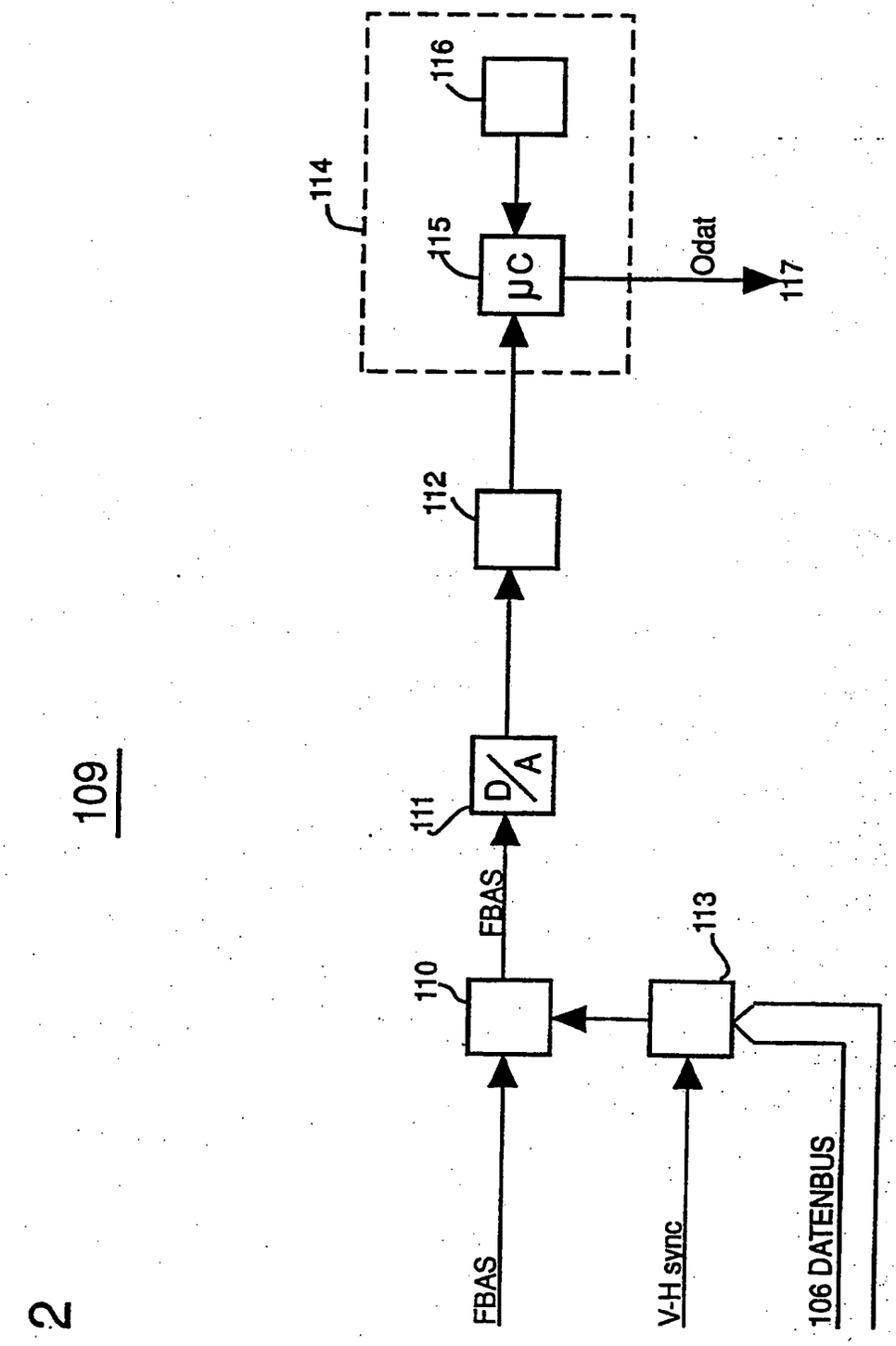
Nummer: DE 44 31 438 A1
Int. Cl.: H 04 N 5/44
Offenlegungstag: 7. März 1996



FIGUR 1

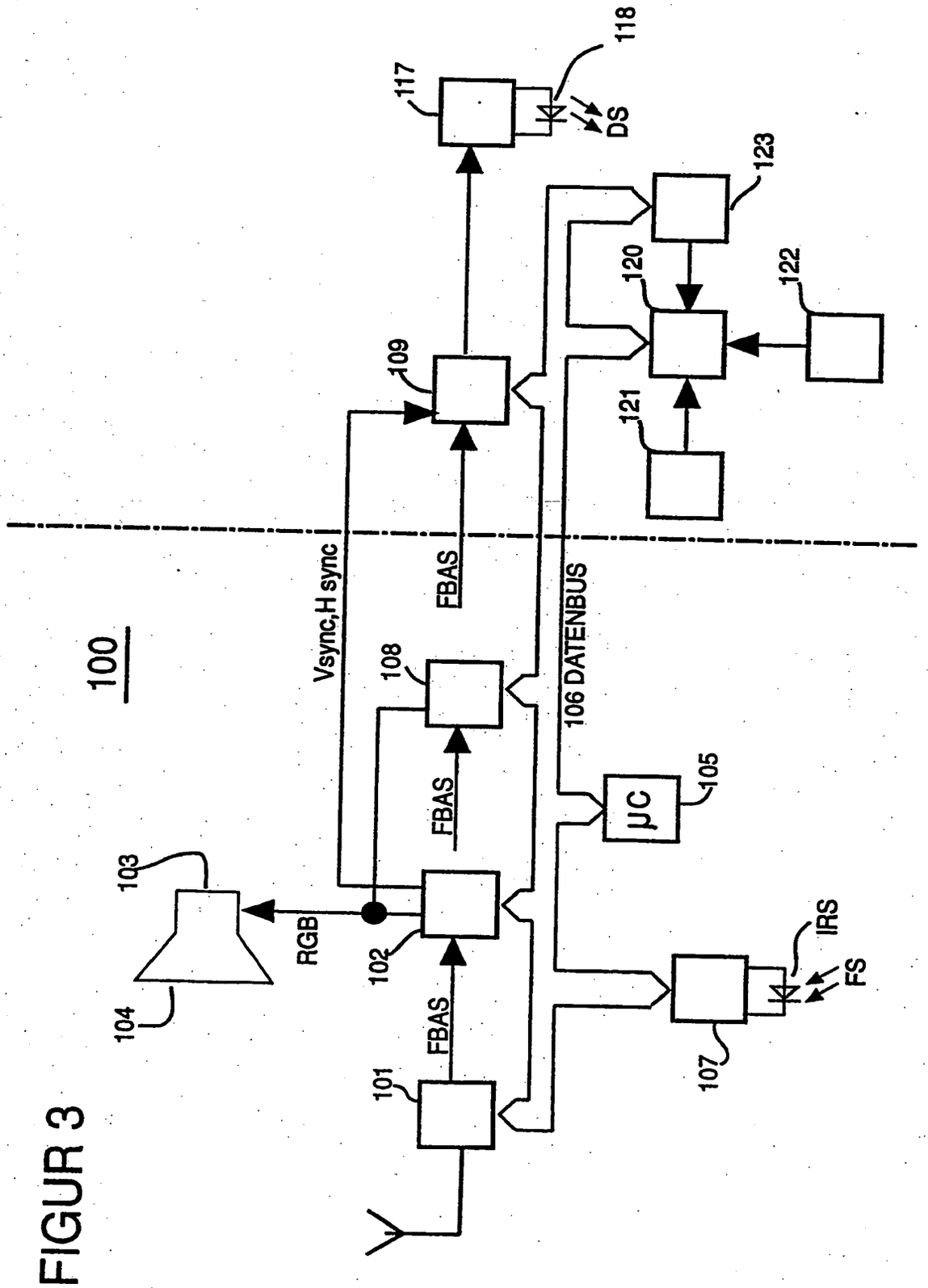
508 070/347

Nummer: DE 44 31 438 A1
Int. Cl.6: H 04 N 5/44
Offenlegungstag: 7. März 1996



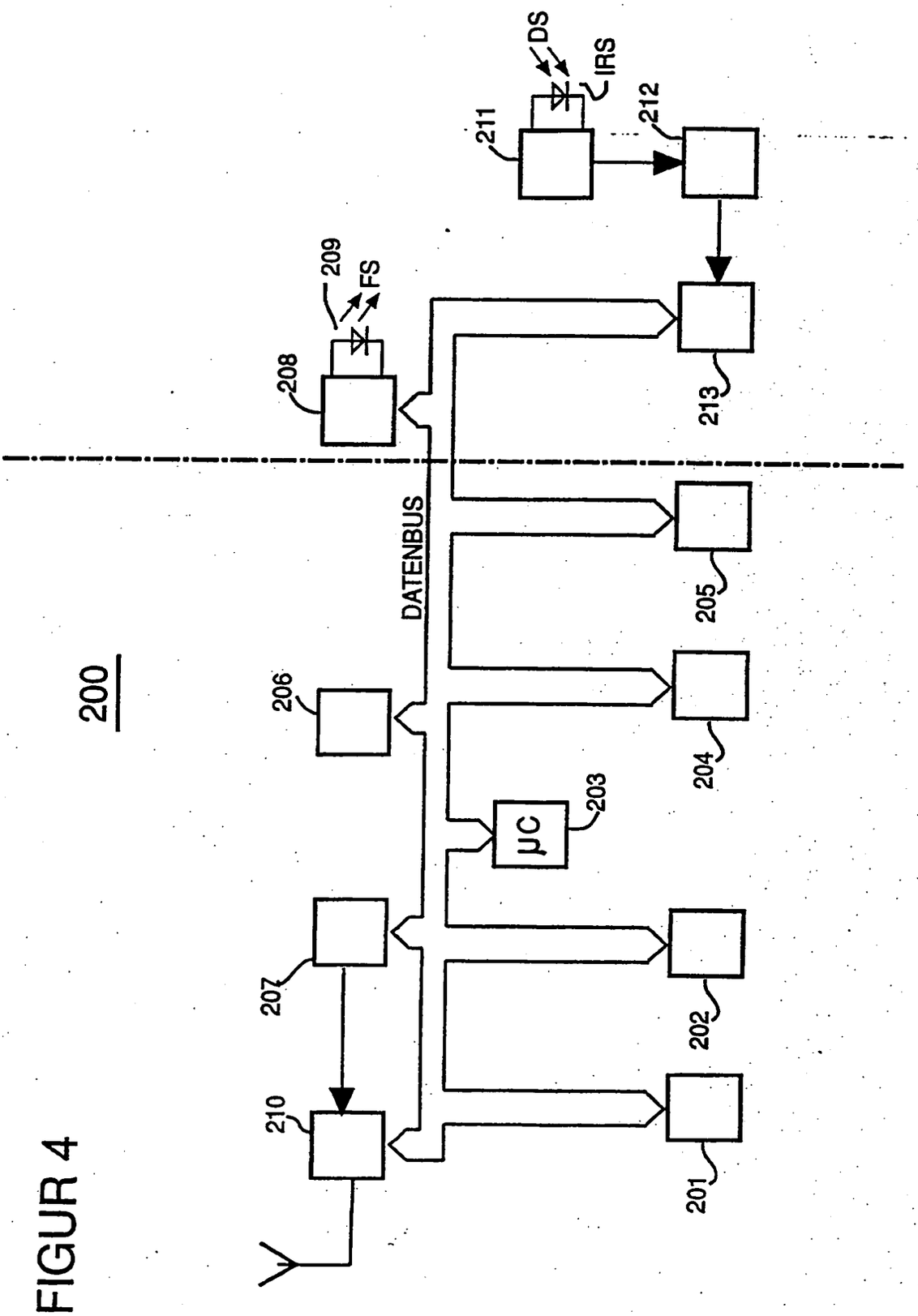
FIGUR 2

Nummer: DE 44 31 438 A1
Int. Cl.⁶: H 04 N 5/44
Offenlegungstag: 7. März 1996



FIGUR 3

Nummer: DE 44 31 438 A1
Int.Cl.⁶: H 04 N 5/44
Offenlegungstag: 7. März 1996



FIGUR 4

508 070/347

D11

DE 44 31 438 A 1

Device for communication between a television receiver and a telephone set

The device for communication between a television receiver (100) and a telephone set (200), on the one hand, transfers alphanumeric characters from a television picture signal through the telephone set (200) and, on the other hand, transmits characters received by the telephone set (200) via a telephone network or entered via its input panel (201) to the television receiver (100).

The television receiver (100) has a reading device (109) and a character transmitter (117) with a transmission element (118). The reading device (109) contains an analog/digital converter (111), a pixel memory (112) and an analyser (114) which analyses the stored digital values of the CVBS signal and converts recognised alphanumeric character sequences into binary-coded characters transmitted by the character transmitter (117) in the form of a data signal (DS) to the telephone set.

The telephone set (200) contains a microcomputer system (203) with memories (204, 205), a coding and modulating device (208) for generating remote signals (RS) for the television receiver (100), an infrared transmitter (209) for transmitting the remote signals (RS) and means (211, 212 and 213) for receiving and converting the data signal (DS) into signals which can be transmitted on a telephone channel in a telephone network and/or can be stored in the memories (204, 205) of the second microcomputer system (203).

Description

Field of technology

The invention relates to a device for communication between a television receiver and a telephone set connected to a telephone network. This device, on the one hand, transmits alphanumeric characters received by the television receiver by means of the television picture signal in the form of caption insertions into the active picture to the telephone set and, on the other hand, transmits signals to the television receiver received by the telephone set via the telephone network and operating commands entered via a control panel of the telephone set.

Prior art

In numerous television programmes, television stations of all kinds invite the viewer to perform specific activities during or after the programme, such as responding to opinion polls or prize questions, ordering goods or transferring donations to a specific account, by means of a telephone set. To this end, alphanumeric characters are inserted into particular teletext pages or, in most cases, directly into the television picture being transmitted at the time. These insertions generally contain, on the one hand, data such as a name, a password, an address of a television station, a mail-order firm or a bank in the form of alphanumeric characters and, on the other hand, data with purely numeric characters, such as telephone numbers, order numbers, account numbers and bank sorting codes.

The viewer therefore if necessary has to either note down the data manually or enter the required sequence of digits immediately into the storage device or dialling device of a telephone set while they appear on the screen in order to initiate the required activity spontaneously. Both activities require the full attention of the viewer and a certain degree of care when transmitting the data, which can ultimately lead to transmission errors and loss of information. However, with spontaneously initiated

activities, it is not possible to proceed with the appropriate degree of care. This can lead to rash actions which sometimes cannot be undone.

Devices are already known in which a television receiver is connected to a telephone set in order to transfer information from the telephone set to the television receiver.

E.g. DE-C2-36 34 836 discloses a remote-control device for a cable television system in a hospital, in which a patient can switch a television receiver in his room on and off, change over to a different programme site and connect the sound connection thereof to his headphone connection with the aid of a telephone set. This is effected by entering the appropriate digits into the dialling device of the telephone set. The telephone system transmits these digits to a central detection and control device which then transmits corresponding control commands in the form of serial pulse telegrams via separate data lines to a remote-control device situated in the relevant room. The remote-control device has means for receiving, decoding and evaluating the digital remote signals, which actuate a remote-control transmitter.

With the exception of the input panel, the remote-control transmitter contains all of the devices of a cordless remote control for television sets, the information being provided via an actuated key via the telephone system which transmits corresponding operating commands to the television receiver. At the same time, an acknowledgement is transmitted via the data line to the central detection and control device in order to determine, e.g. the connection time of premium programmes. The aerial lead-in of the television set or the lighting circuit can also be used as the data line.

According to a development of the invention, additional functions are also performed, e.g. controlling teletext displays. E.g. the patient can therefore request hospital-specific or patient-specific teletext pages or pictures on a specific special television channel to which only the corresponding telephone connection has access at the time of the query by means of the selecting device of the telephone set via the detection and control device. E.g. a menu can therefore be displayed on the screen and the patient can select his meal via the push-buttons of the telephone set. A doctor can request the case notes for the respective patient and have them transmitted to the

hospital room or the patient can have his telephone and television account displayed on the screen.

In the device described, the remote-control device is always actuated via the telephone network, the detection and control device and the additional data line. There is no direct actuation of the television receiver via the telephone set. A device of this kind is therefore not suitable for use in private households.

It is also impossible for information transmitted by the television signal to the television receiver to be transferred to the telephone set.

DE-C2-38 19 863 furthermore discloses a device for the remote control of an electronic device, in particular a video recorder, in which control information, such as channel number, date, start and end time of television programmes to be recorded, can be transmitted via a general telephone network from an external telephone set to a telephone set situated at the location of the device.

The telephone set at the location of the device has a control device to which a remote-control transmitter for the wireless transmission of remote signals to the electronic device is connected.

In this device once again, there is no direct actuation of the television receiver via the telephone set and it is also impossible to transmit information to the telephone set at the request of the viewer.

A method of simplifying the programming of video recorders is furthermore known from the printed publication RUNDFUNKTECHNISCHE MITTEILUNGEN, Vol. 30, No. 5, Sept.-Oct. 1986, pp. 223-229, Norderstedt, DE; G. EITZ et al.: "Videotext programmiert Videoheimgerät (VPV)" [Home video programming by teletext]. The recording requirements are entered by automatic transfer of the required information from teletext programme pages on which a desired item is advertised. The video recorder is controlled by the VPS data also transmitted in the data line 16. Operation is simplified in that the viewer marks the desired item on a selected teletext programme page with a remote control.

After that, the video recorder automatically programmes the information contained in the teletext pages. Although the method selectively evaluates alphanumeric characters transmitted by the television picture signal and uses these to initiate specific activities, this is only possible with the aid of a corresponding teletext page. There is no communication link between the two devices.

The aim of the invention is to provide a device for communication between a television receiver and a telephone set allowing for the selection of inserted data received by a television receiver via the picture signal by means of the input panel of a television set in order to transfer this data directly by means of the telephone set together with other data identifying specific operating states of the television receiver and to transmit signals received by a telephone set via the input panel or a telephone channel to the television receiver.

Nature of the invention

When solving the problem, the invention departs from the following facts:

With the developments in the field of mobile telephones, many households have access to very handy telephone sets which can be operated in a cordless manner and already contain a plurality of electronic means which, with a little additional technical work, are additionally suitable for use as remote controls in a remote-control system.

A mobile telephone known per se has an input panel for numeric characters and for special characters for control functions, a multi-line display for alphanumeric characters and a microcomputer system with the corresponding wiring, such as storage circuits and software and hardware components for receiving, decoding, storing, coding, outputting and displaying information in the form of signals and characters.

A television receiver with a screen and a remotely controllable digital tuning and storage system also has a microcomputer system with storage circuits for receiving, decoding, storing, coding and emitting signals and displaying information in picture form.

The invention solves the problem in that a coding and modulating device for generating remote signals for a television receiver is additionally arranged in a telephone set of this kind and is connected to an infrared transmitter. The telephone set according to the invention furthermore contains a receiver for cordless reception and for converting data signals into signals which can be transmitted on a telephone channel and can be stored in the memory of the telephone set.

The television receiver contains a reading device by means of which part of the picture signal can be selected, digitised and stored. This part of the picture signal consists of identical time intervals of successive picture lines of the active line signal, each having the same temporal position relative to the line-synchronising signal. The output of the reading device is connected to an analyser. The analyser contains a microprocessor which analyses the signal structure of the stored part of the picture signal and compares it with internally stored structural patterns.

Data in the form of alphanumeric characters inserted into the active picture signal can thus be recognised and converted into sequences of binary-coded characters. A character transmitter in the television receiver codes, modulates and transmits these characters to the telephone set.

The device according to the invention therefore serves, on the one hand, for the transmission of alphanumeric characters from the picture signal of the television receiver to the telephone set and, on the other hand, for the transmission of signals from the telephone network and signals entered into the input panel of the telephone set to the television receiver.

In contrast to known solutions, the telephone set according to the invention itself converts the entries made via the keyboard into signals and transmits these directly to the television receiver.

In a development of the invention, the microcomputer system of the television receiver is designed in such a manner that it controls the course of a communication process automatically by means of a display menu on the television screen and a cursor system. Required data inputs can thus be requested by the user and information produced as a result of the communication displayed, on the one hand, in

a simple manner by means of the display in the telephone set and, on the other hand, in a convenient manner using the television screen.

Preferred embodiment of the invention

The invention will now be described by way of one embodiment. In the associated drawings:

Fig. 1 is a block diagram of the basic design of a television receiver according to the invention;

Fig. 2 is a block diagram of the reading device of the television receiver according to the invention;

Fig. 3 shows an extended embodiment of a television receiver according to the invention, and

Fig. 4 is a block diagram of a telephone set according to the invention.

A television receiver 100 known per se shown in Fig. 1 with a remote-control system contains an HF receiving component 101 for receiving and demodulating a television signal which is modulated by a CVBS signal, a video signal component 102 which extracts an RGB signal from the CVBS signal in order to actuate a picture tube 103 with a screen 104 and, alongside an audio component (not shown), a digital tuning and storage system which, together with a microcomputer system 105, forms the central unit of the remote-control system and allows, e.g. via a data bus 106, for the switching on and off of the television receiver 100, the selection of the broadcasting station, the varying of setting values for picture and sound and the switching over to specific functions of the device.

The microcomputer system 105 contains in a known manner a decoder for remote signals RS, memories for transmitting frequencies and picture and sound setting values, memories for picture signal patterns for displaying alphanumeric characters on the screen 104 and a processor for executing and controlling the functions of the television receiver 100 and can be actuated via a remote-control receiver 107 with an infrared sensor IRS by means of infrared signals.

The television receiver 100 furthermore also contains a teletext component 108 for separating, decoding and storing teletext signals from the CVBS signal and generating and RGB signal for displaying teletext pages on the screen 104.

In addition to these known modules, the television receiver 100 according to the invention contains a reading device 109 for selecting, storing and analysing time intervals of the CVBS signal. The reading device 109 allows serial time intervals of the CVBS signal in which caption insertions with a text line are situated and which represent a band in the television picture to be selected, optically marked, digitally stored and evaluated by the remote-control system.

The reading device 109 can be designed, e.g. as shown in Fig. 2. It contains a gate circuit 110 with a signal input and a control input, an analog/digital converter 111, a pixel memory 112, a read-out controller 113 and an analyser 114. The CVBS signal is present at the signal input of the gate circuit 110. The control input of the gate circuit 110 is connected to the read-out controller 113 and serves to generate a data window which activates the gate circuit with both fields for the time intervals with the inserted signal of a text line. This is effected by means of a control signal generated within a field by the read-out controller 113 by way of the current line number of the currently transmitted picture line. To this end, the read-out controller 113 is connected to the vertical and horizontal synchronising signal V_{Sync} and H_{Sync} separated from the CVBS signal in the video signal component 102, and to the data bus 106. The read-out controller 113 therefore controls the times in which the gate circuit 110 transfers the CVBS signal to the input of the digital/analog converter 111. It contains a picture line counter for determining the line number of the currently transmitted picture line and a comparator which compares the current line number with reference numbers identifying the set position and the width of the selected band.

The microcomputer system 105 provides the reference numbers via the data bus 106, wherein these can be varied by means of the remote-control system and pre-set to common values so that the width and position of the band can be set in a simple manner by means of cursor keys on the input panel of a remote control.

Whereas the gate circuit 110 for the CVBS signal is transparent, the microcomputer system 105 marks the position of the band in the television picture, e.g. by means of colour and/or brightness shifting on the screen 104, by way of the reference numbers set. Activation of the gate circuit 110 means that the CVBS signal is only present at the input of the analog/digital converter 11 at the time during which a relevant inserted text line is transmitted. The analog/digital converter 111 converts the CVBS signal into corresponding digital values during the selected time intervals and stores the latter in the form of a pixel signalling pattern in the pixel memory 112.

As caption insertions in practice never start or end directly at the edges of the screen, it is not necessary to read out the complete signal of the active picture lines from the picture lines of the band. The gate circuit 110 can be activated in such a manner that, e.g. the first and the last signal portions of the picture lines do not have to be digitised and stored.

Memory capacity and evaluating time can be saved in this manner.

The pixel memory 112 has a parallel data output at which the digital values of a plurality of successive picture lines can be retrieved simultaneously and to which the analyser 114 is connected. The latter contains a microprocessor 115 which is connected to a digital character pattern memory 116.

Reference structures of the picture signal of alphanumeric characters are stored digitally in the character pattern memory 116. The microprocessor 115 retrieves the digital values of the CVBS signal stored in the pixel memory 112 and compares these with the structures of picture signals stored in the character pattern memory 116. The alphanumeric characters contained in the television picture signal are thus recognised, converted into a sequence of binary-coded data and made available for retrieval at the output of the analyser 114.

As shown in Fig. 2, the analyser 114 contains a data output O_{dat} to which a character transmitter 117 comprising a coding and modulating device and a driver for actuating a transmission element 118 is connected. In the example shown, the transmission element is an infrared diode. However, in another embodiment of the invention, it can also be a transmitting aerial for an HF signal. The coding and modulating device

converts the binary-coded data into a data signal DS consisting of serial pulse words each with an address component and a data component in the character transmitter 117. The transmission element 118 transmits this data signal DS in a wireless manner.

The serial code words in the address component thus contain different addresses from the remote signals of the television receiver 100. This measure is necessary in order to prevent the code words emitted by the transmission element 118 from being transmitted back to the microcomputer system 105 of the television receiver 100 via the remote-control receiver 107 and causing control errors.

In order to increase the reliability of the recognition by the analyser 114, means for increasing the contrast which shift the distribution of the brightness and/or colour values in the luminance and/or chrominance signal towards extreme values can also be arranged in front of the pixel memory 112. This has the advantage that the influence of signal noises and brightness and colour patterns in the background of the caption insertion during analysing can be suppressed.

In the embodiment shown, the individual stages of the reading device 109 and the character transmitter 117 have been shown as separate signal stages for the sake of clarity of the invention. However, in the practical embodiment of the invention, it is advantageous to produce the greater part of these signal stages with the aid of the microcomputer system 105. This applies, in particular, to the read-out controller 113 and the analyser 114.

Deviating from the representation of Fig. 2, the reading device 109 can also be designed in such a manner that a band having caption insertions over several text lines is read out by the gate circuit 110. These time intervals of the CVBS signal are also converted by the analog/digital converter 111 and are stored in a correspondingly larger pixel memory 112. Before the analyser 114 analyses the stored digital values of the CVBS signals and converts recognised alphanumeric characters into binary-coded characters, the band stored in the pixel memory 112 is retrieved via the microcomputer system and is displayed on the screen 104 in the form of a still frame by a still frame signal generator (not shown in the drawings) also connected to a

cursor system. The relevant alphanumeric characters can then be marked for analysis by the cursor system and instructions for data management, such as the fixing of a storage address, a method of use and the like, can be provided.

Compared to the reading device first described, this reading device displays the reliability and ease of operation essential for the transfer of caption insertions, as supplementary data not provided for use in the telephone network, such as names, designations and addresses, can also be read out and stored.

In a development of the invention, as shown in Fig. 3, a teletext generator 120 is additionally connected to the data bus 106 of the television receiver 100 in addition to the modules already mentioned and is connected to a program memory 121 and a page memory 122 for teletext pages and a cursor controller 123. The page memory situated in the teletext component 108 can advantageously be used. The teletext generator 120 has a signal converter. This converts the binary-coded data arriving at the microcomputer system 105 in the form of code words for the remote-control system and corresponding to the optically displayable characters into the signal form of the teletext system.

Both the binary-coded data from the data output of the analyser 114 and the binary-coded data transmitted from the telephone set 200 to the television receiver by infrared means can thus be loaded into the page memory 122 of the teletext system.

The teletext generator 120 allows its own special teletext pages to be generated from this binary-coded data by means of generator programs stored in the program memory 121. These teletext pages can be stored in the page memory 122, displayed on the screen 104 of the television receiver in the form of special teletext pages upon request and processed by the cursor controller 123.

In a further development of the invention, the television receiver 100 has a device for marking and reading out caption insertions from the teletext component 108, the output of which is also connected to the character transmitter 117. A device of this kind is known from the programming system "Videotext programmiert Videoheimgerät (VPV)" [Home video programming by teletext] and therefore does not have to be described here.

Fig. 4 shows a telephone set 200 extended in accordance with the invention. In this embodiment, it is a mobile telephone containing in the known manner an input panel 201, a display 202 for alphanumeric characters stored or entered via the input panel 201, a microcomputer system 203 with a volatile memory 204 serving as a main memory, a non-volatile memory 205 for call numbers, names and addresses, an automatic dialling device 206 and a touchtone dialling device 207. A coding and modulating device 208 is moreover provided for generating remote signals RS which, with respect to the address component and data component, are similar to the code words generated by a remote control for the television receiver 100, but have an extended character set.

The coding and modulating device 208 can be formed by the microcomputer system 203 and is connected to an infrared transmitter 209.

The character set of the coding and modulating device 208 is extended in such a manner that additional characters are generated and can be transmitted via the remote-control system to the television receiver 100 in order to image them on the screen 104 in the form of text or graphics.

The telephone set 200 moreover comprises a receiving and transmitting device 210 by means of which a connection can be established with a telephone network.

According to the invention, the telephone set 200 contains a data receiver 211 for the wireless reception of the data signals DS emitted by the television receiver 100 via the transmission element 118.

The data receiver 211 is connected to a data decoder 212 and a data converter 213. The data decoder 212 decodes the data signal DS received and checks whether an infrared signal addressed to the telephone set 20 was received. In the case of a positive test result, the data converter 213 converts the characters transmitted by the data signal DS, stores them in the memory 204 of the microcomputer system 203 and displays them on the display 202. The result of the character analysis carried out by the analyser 114 can thus be checked. The data converter 213 converts the code words of the data signal DS into signals suitable for use in the microcomputer system 203 in the telephone set 200.

The device according to the invention allows, on the one hand, for the selection of characters which can be transmitted in the form of caption insertions into the television picture of a television programme by means of the television signal independently of a teletext system by means of the input panel 201 of the telephone set 200, the wireless transmission of selected characters to the microcomputer system 203 of the telephone set 200, the display of these characters in the display 202 in order to check that they are correct and the transfer thereof to the memory 204 in order to use the selected characters as required in a telephone network.

On the other hand, as is known, remote signals RS can be transmitted from the telephone set 200 to the television receiver 100.

The microprocessors of both devices can thus carry out a dialogue and exchange data automatically, the telephone set 200, which is advantageously a mobile telephone, simultaneously being designed and programmed in such a manner that it can be used instead of the remote control of the television receiver independently of a telephone network and can carry out at least the main functions thereof.

The device according to the invention has the advantage that neither the existing transmission standard for television transmission nor the standard relating to the telephone system has to be altered in order to establish the communication link.

The device according to the invention can be produced exclusively at the receiving end by the television receiver and telephone set manufacturer.

At the transmitting end, the probability of the correct recognition of caption insertions can be increased by using a preferred font, a preferred position for the beginning of the caption insertion in the FBAS signal and by using specific colours for characters and/or background.

E.g. the recording of names, addresses and call numbers in the non-volatile memory 205 of the telephone set 200 can be simplified by the device according to the invention. It is furthermore possible to actuate the automatic dialling device 206 of the telephone set 200 by means of temporarily stored call numbers transmitted by the television receiver 100 and, if desired, to transmit data, e.g. representing order numbers, customer, code or account numbers and also transmitted by the television

receiver 100, to a telephone channel of the telephone network by the tone dialling device 207.

By virtue of the development of the invention, a convenient display and management system for data present both in the memory of the microcomputer system 105 in the television receiver 100 and in the memories 204 and 205 of the telephone set 200 can be installed, e.g. in the microcomputer system 105, actuated by means of the cursor controller 123 and controlling and assisting the progress of a communication process. Required data inputs can thus be requested by the user and information produced as a result of the communication displayed and managed, on the one hand, in the conventional manner by the display 202 in the telephone set 200 and, on the other hand, substantially more conveniently using the screen 104.

A system of this kind can advantageously be used for running a business according to the principle of what is referred to as "teleshopping", in which an offer is made by a mail-order firm within a television programme and it is possible to initiate an order by telephone via a telephone network.

Before the telephone set establishes a connection with the firm via a telephone channel, a viewer can look at the data read out of the television signal by the reading device 109 and now found in the page memory 122 at his leisure via the special menu program stored in the program memory 121. This data may contain, e.g. the name of the firm, its call number, an order number for the goods, a designation and the price of the goods. For telephone ordering, however, the call number of the firm, the order number, the number of products to be delivered, possibly a size and the numbers of an association where the account is held, a customer number or a credit card number are required. The corresponding menu program supplements the required ordering data, in that it requests the viewer to enter, e.g. a piece number, size, colour choice and association where the account is held, establishes the telephone connection with the firm, transmits the data to the firm, waits for conformation if necessary and enters this data together with the data not required by the firm, such as name of the firm, price and designation of the goods, in a non-volatile memory in the television receiver 100.

A memory of this kind can advantageously contain the data format of a teletext page and the order is stored in the data format of a teletext page.

In a similar manner, the device according to the invention can be used to make transfers from the user's own account to another account.

This device furthermore offers the operator of premium television programmes according to what is referred to as a "pay TV system" the possibility of transmitting the corresponding code for decoding coded television signals of the pay TV system to a television receiver 100 for his own internal receiving decoder via a telephone network.

Legend

100 television receiver
101 HF receiving component
102 video signal component
103 picture tube
104 screen
105 microcomputer system
106 data bus
107 remote-control receiver
108 teletext component
109 reading device
110 gate circuit
111 analog/digital converter
112 pixel memory
113 read-out controller
114 analyser
115 microprocessor
116 character pattern memory
117 character transmitter
118 transmission element
120 teletext generator
121 program memory
122 page memory
123 cursor controller
200 telephone set
210 input panel
202 display
203 microcomputer system
204 volatile memory
205 non-volatile memory

206 automatic dialling device

207 touchtone dialling device

208 coding and modulating device

209 infrared transmitter

210 receiving and transmitting device

211 data receiver

212 data decoder

213 data converter

Claims

1. Device for communication between:
   - a television receiver (100) with a screen (104) and a tuning and storage system in the form of a first microcomputer system (105) which can be operated by means of remote signals (RS), which receives a CVBS signal containing time intervals in which alphanumeric characters are transmitted
   - and a telephone set (200) with an input panel (201), a display (202) for alphanumeric characters, a second microcomputer system (203) with memories (204, 205), a coding and modulating device (208) for generating the remote signals (RS) for the television receiver (100) and an infrared transmitter (209) for transmitting the remote signals (RS), characterised in that the television receiver (100) contains:
   - a reading device (109) with a temporal data window which can be controlled by means of the first microcomputer system (105), and an analyser (114) for selecting and analysing the time intervals, for recognising the alphanumeric characters in the CVBS signal and for converting these characters into binary-coded characters,
   - and a character transmitter (117) for transmitting the binary-coded characters in the form of a data signal (DS) and that the telephone set (200) contains means (211, 212 and 213) for receiving and converting the data signal (DS) into characters which can be transmitted on a telephone channel in a telephone network and/or can be stored in the memories (204, 205) of the second microcomputer system (203).

2. Device according to claim 1, characterised in that the television receiver (100) which receives a CVBS signal containing time intervals corresponding to caption insertions with alphanumeric characters in the active part which can be displayed on the screen (104) has a reading device (109) containing the following components:
   - a gate circuit (110) with a read-out controller (113) for generating the data window in the form of time intervals in the CVBS signal.

- an analog/digital converter (111) connected to the output of the gate circuit for digitising the CVBS signal during the selected time intervals.
- a pixel memory (112) for the digitised CVBS signal.
- the analyser (114) for the stored CVBS signal connected to a character pattern memory (116) for reference structures of the picture signal of alphanumeric characters for recognising the characters in the stored CVBS signal by comparison with the reference structures and for generating corresponding binary-coded characters.

3. Device according to claim 1, characterised in that the character transmitter (117) has a coding and modulating device and a driver for actuating a transmission element (118) and is connected to the analyser (114) for wireless transmission of the data signal (DS).

4. Device according to claim 3, characterised in that the character transmitter (117) has a coding and modulating device for converting the binary-coded characters into serial pulse words and the transmission element (118) is an infrared light-emitting diode.

5. Device according to claims 1 and 2, characterised in that the reading device (109) contains a still frame signal generator connected to a cursor control system in the signal path between the pixel memory (112) and the analyser (114) for imaging the CVBS signal read out and stored on the screen (104) and for marking alphanumeric characters.

6. Device according to claims 1 and 2, characterised in that the reading device (109) contains means for increasing the contrast in front of the pixel memory (112) in the signal path, these means shifting the distribution of the brightness and/or colour values in the luminance and/or chrominance signal towards extreme values.

7. Device according to claim 1, characterised in that a teletext generator (120) is connected to the data bus (106) of the first microcomputer system (105) in the television receiver (100) for generating teletext pages from the binary-coded data, connected to a program memory (121) for programs for generating teletext pages

and a page memory (122) for teletext pages and a cursor controller (123) for marking parts of teletext pages.

8. Device according to claim 1, characterised in that the television receiver (100) has a device for marking and reading out characters from the teletext component (108) which is also connected to the character transmitter (117).

9. Device according to claim 1, characterised in that the microcomputer system (203) in the telephone set (200) contains a program circuit for transmitting alphanumeric characters instead of the remote signals (RS) via the coding and modulating device (208) and the infrared transmitter (209) and that the microcomputer system (203) in the television receiver (100) has a program circuit for imaging the alphanumeric characters on the screen (104).

---

4 pages of drawings

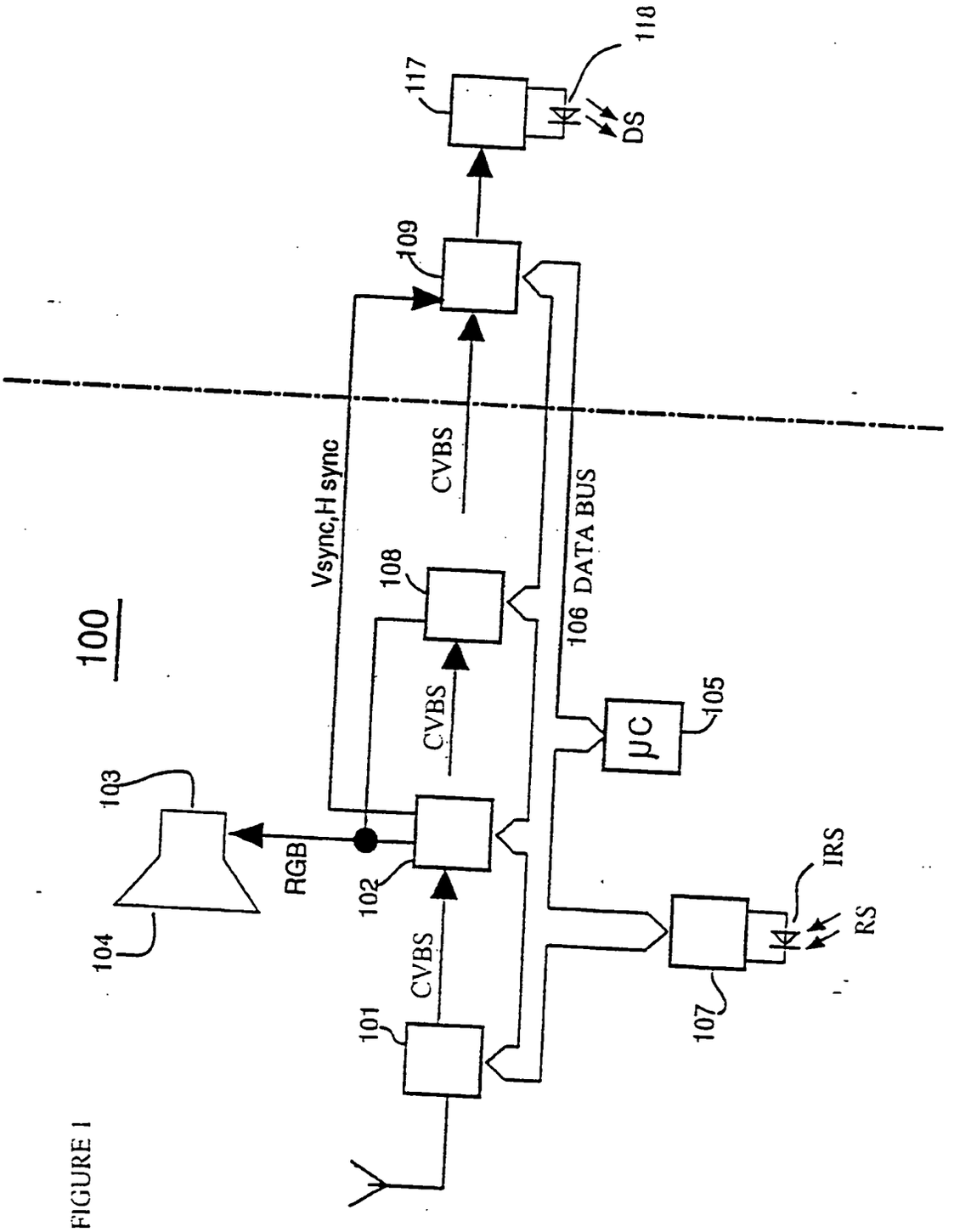

100
101
102
103
104
105
106 DATA BUS
107
108
109
117
118
CVBS
CVBS
CVBS
Vsync,H sync
RGB
μC
IRS
RS
DS

FIGURE 1

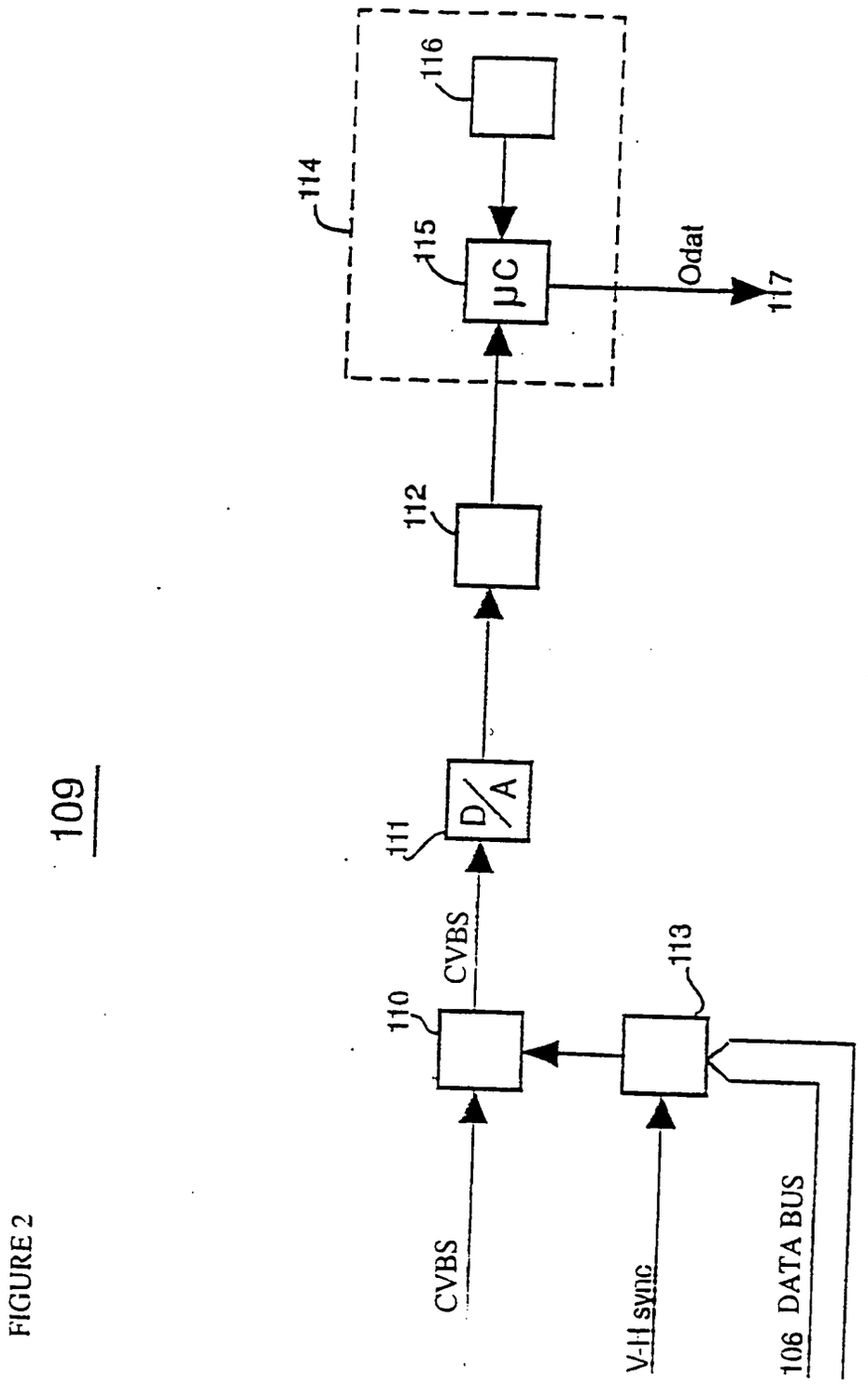

109
CVBS
V-H sync
106 DATA BUS
110
113
CVBS
111
D/A
112
114
116
115
µC
Odat
117

FIGURE 2

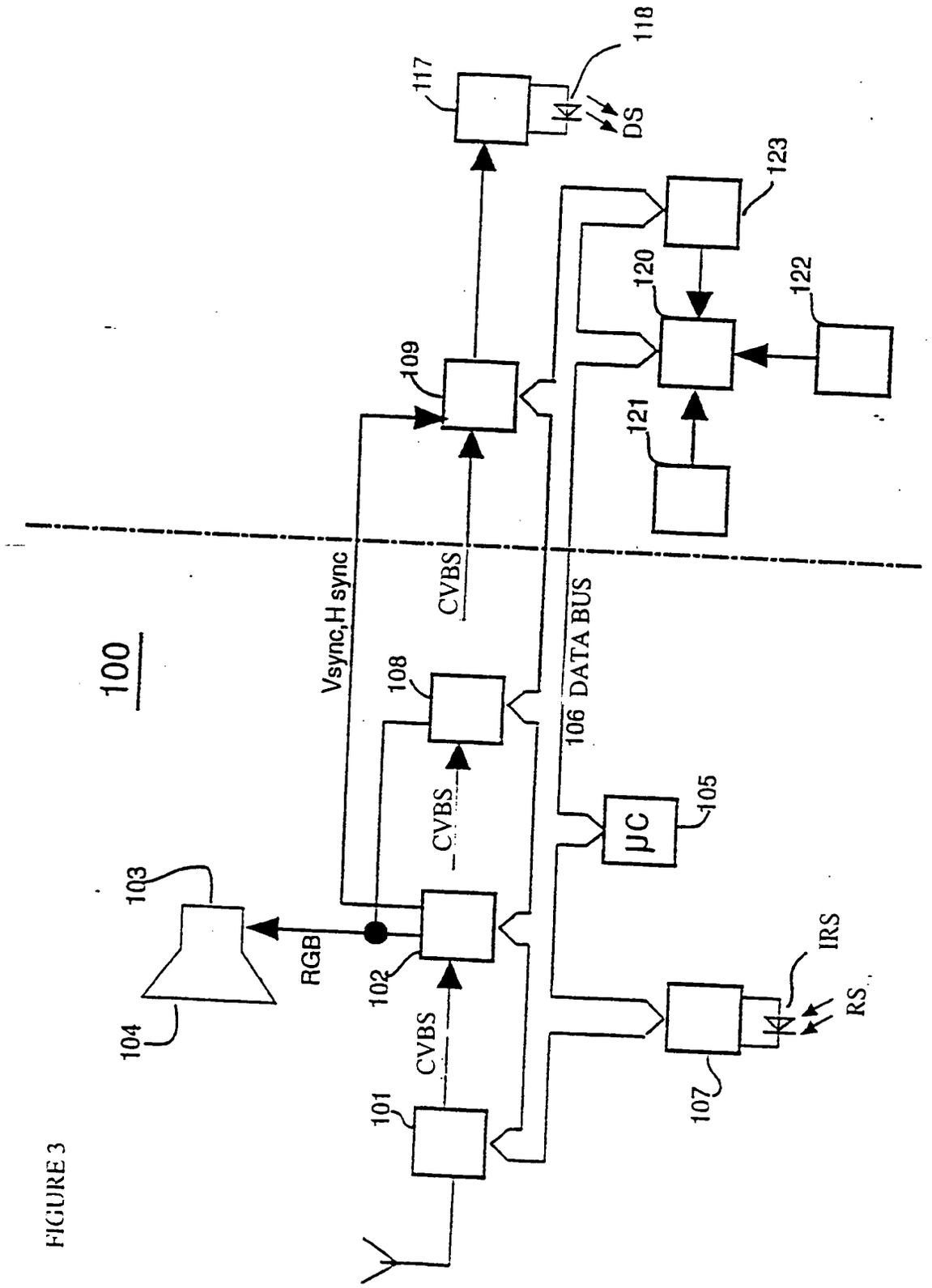

100
101
102
103
104
105
106 DATA BUS
107
108
109
117
118
120
121
122
123
CVBS
CVBS
CVBS
Vsync,H sync
RGB
DS
IRS
RS
µC

FIGURE 3

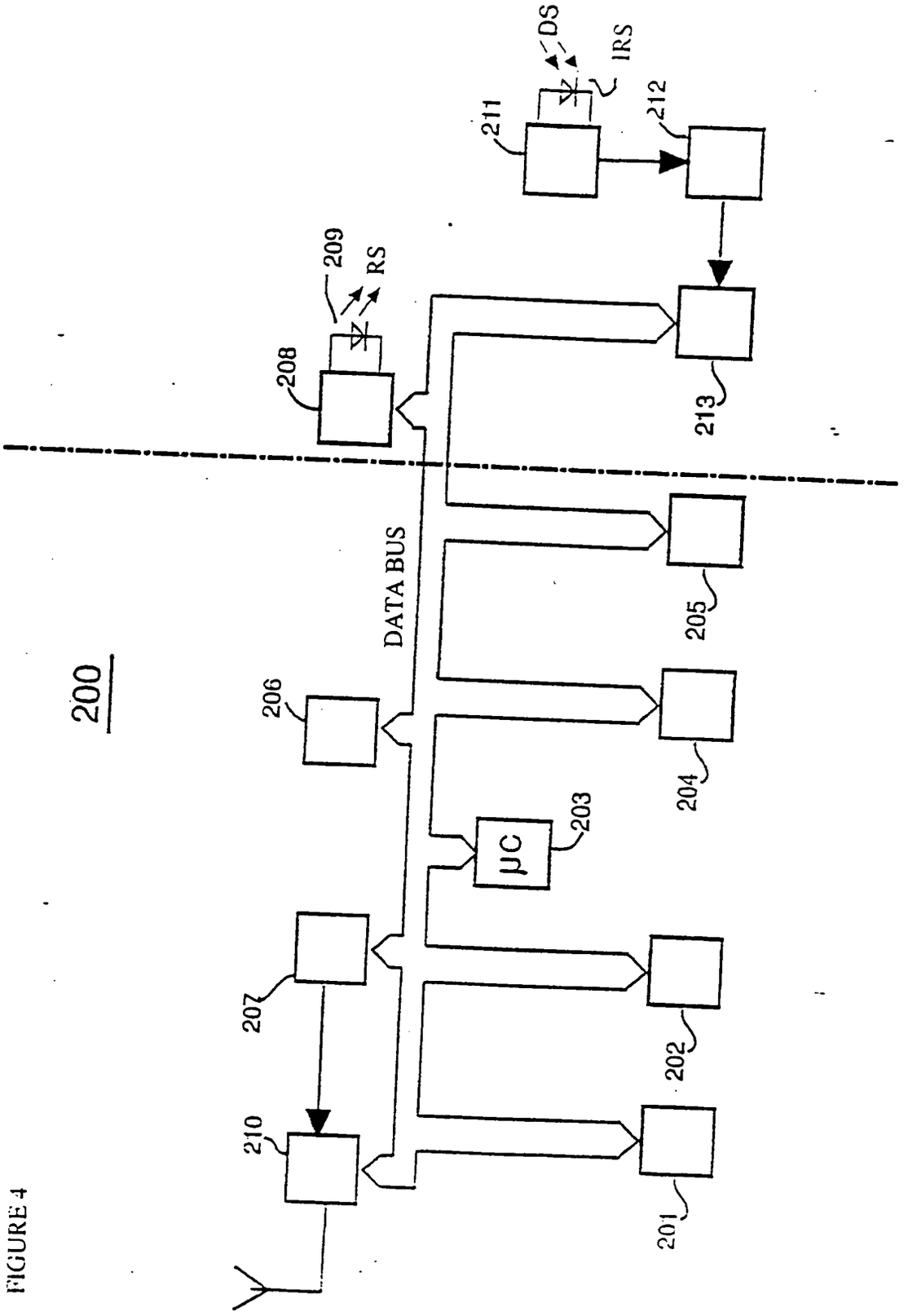

200
DS
IRS
211
212
209
RS
208
213
DATA BUS
205
206
204
μC
203
207
202
210
201

FIGURE 4

PCT

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INTERNATIONALE ANMELDUNG VERÖFFENTLICHT NACH DEM VERTRAG ÜBER DIE INTERNATIONALE ZUSAMMENARBEIT AUF DEM GEBIET DES PATENTWESENS (PCT)

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195 45 882.6 8. December 1995 (08.12.95) DE

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(81) Bestimmungsstaaten: JP, KR, US, europäisches Patent (AT, BE, CH, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE).

Veröffentlicht
Mit internationalem Recherchenbericht.

(54) Title: SYSTEM FOR REPRODUCING VISUAL INFORMATION

(54) Bezeichnung: SYSTEM ZUM WIEDERGEBEN VON VISUELLEN INFORMATIONEN

(57) Abstract

To position advertising content in a telecommunication system, for example known throughout the world as the *Internet*, with a high level of acceptance by system users, it is proposed to transmit within a television signal which can be reproduced by a television receiver an address (HTTP) for a server program of the digital communication network. Optical signals are transmitted to the user on the screen of the television receiver in any form (in the form of a marking or plain writing). The address (HTTP) is evaluated at the command of the user to the effect that the content of the server program and other visual information which can be retrieved using the server program, in particular advertising-related information, can be reproduced on the screen of the television receiver.

(57) Zusammenfassung

Um Werbeinhalte in einem Telekommunikationssystem, wie es beispielsweise unter der Bezeichnung Internet weltweit verbreitet ist, mit hoher Akzeptanz von Seiten der Systembenutzer zu plazieren, wird vorgeschlagen, innerhalb eines Fernsehsignals, welches mittels eines Fernsehempfängers wiedergebbar ist, eine Adresse (HTTP) für ein Serverprogramm des digitalen Telekommunikationsnetzes zu übertragen. Diese Übertragung wird dem Benutzer auf dem Bildschirm des Fernsehempfängers in beliebiger Form (als Markierung oder in Klarschrift) optisch signalisiert. Die Adresse (HTTP) wird auf Befehl des Benutzers dahingehend ausgewertet, daß die Inhalte des Serverprogramms und weitere, mittels des Serverprogramms abrufbare visuelle Informationen, insbesondere werbungsbezogene Informationen, auf dem Bildschirm des Fernsehempfängers wiedergebbar sind.

WO 00/05702

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GA	Gabon	MW	Malawi		

System zum Wiedergeben von visuellen Informationen

BESCHREIBUNG

Die Erfindung bezieht sich auf ein System zum Wiedergeben von visuellen Informationen, die in einem digitalen Telekommunikationsnetz, beispielsweise dem "Internet" übertragen werden.

In digitalen Telekommunikationsnetzen werden unter sogenannten HTTP-Adressen Serverprogramme übertragenen, mit deren Hilfe visuelle Informationen von Datendiensten in Form von Schrift, Grafiken und/oder Bildern abrufbar sind. Die Wiedergabe der angewählten Serverprogramme und der damit abgerufenen visuellen Informationen erfolgt auf dem Bildschirm des Monitors eines PC-Arbeitsplatzes, d.h., in einem Umfeld, in dem die Akzeptanz von Werbeinhalten gering ist. Elektronische Werbung erfolgt daher überwiegend in Verbindung mit Fernsehunterhaltung.

Es ist ferner bekannt, in Fernseh-Werbesendungen Produkte vorzustellen und am Ende der Werbesendung getrennt für jedes Land die Preise und die Telefonnummern anzugeben, unter welchen die zuvor beworbenen Produkte bestellt werden können. Dieses sogenannte "Teleshopping" hat jedoch den Nachteil, daß vom Fernsehteilnehmer die betreffenden Telefonnummern mitgeschrieben werden müssen. Zudem leidet der unmittelbare Bezug zwischen der fernsehmäßigen Präsentation des Produktes und der Anzeige von Preis und Telefonnummer. Um den Bestellvorgang zeitgleich mit der Präsentation des Produktes durchzuführen und zu vereinfachen, ist es aus der DE 44 27 046 A1 bereits bekannt, Zusatzinformationen innerhalb des Fernsehprogrammsignals in zeitlicher Korrelation zu dessen Programminhalt zu übertragen. Auf einen ersten Befehl des Benutzers wird eine in

der zuletzt empfangenen Zusatzinformation enthaltene Klarschrift und gegebenenfalls Grafikinformation für eine bestimmte Zeitdauer auf dem Fernsehbildschirm wiedergegeben. Während dieser Wiedergabe wird auf einen zweiten Befehl des Benutzers aus der zuletzt empfangenen Zusatzinformation eine Telefonnummer als Bestellinformation entnommen und über ein Modem eine Telefonverbindung zu einer automatischen Bestellannahme hergestellt.

Die Aufgabe der Erfindung besteht demgegenüber darin, Werbeinhalte in einem Telekommunikationssystem der eingangs erwähnten Art mit hoher Akzeptanz von Seiten der Systembenutzer zu plazieren.

Diese Aufgabe wird erfindungsgemäß durch die kennzeichnenden Merkmale des Patentanspruchs 1 gelöst.

Eine vorteilhafte Ausgestaltungen des erfindungsgemäßen Systems ergibt sich aus dem Unteranspruch.

Die Erfindung geht von der Überlegung aus, die Akzeptanz von Werbeinhalten bei Benutzern von digitalen Telekommunikationsnetzen dadurch zu erhöhen, daß dem Benutzer beim Betrachten von Fernsehunterhaltung mit eingeblendeter Werbung signalisiert wird, daß er auf Knopfdruck die HTTP-Adresse eines Serverprogramms in einem digitalen Telekommunikationsnetz, z.B. Internet, anwählen kann. Wesentlich ist, daß die Inhalte des Serverprogramms auf dem Bildschirm des Fernsehempfängers wiedergegeben werden, so daß der Benutzer mit Hilfe des Serverprogramms nähere Informationen über die Werbeinhalte einer noch laufenden

Fernsehwerbung aus dem digitalen Telekommunikationsnetz abrufen und sofort auf auf dem Bildschirm des Fernsehempfängers wiedergeben kann. Für die technische Umsetzung ist es lediglich erforderlich, die HTTP-Adresse als Zusatzsignal in dem Fernsehsignal in zeitlicher Korrelierung zu den Werbeinhalten zu übertragen und diese Zusatzsignalübertragung dem Benutzer auf dem Bildschirm in beliebiger Form zu signalisieren, beispielsweise durch Einblenden einer bestimmten Markierung. Auf Befehl des Benutzers (Knopfdruck) wird die HTTP-Adresse aus dem Fernsehsignal ausgelesen und an ein mit dem Fernsehempfänger gekoppeltes Modem weitergeleitet, welches eine Kommunikationsverbindung zu dem digitalen Telekommunikationsnetz unter der ausgelesenen Adresse herstellt. Für die Wiedergabe der digitalen Informationssignale des Telekommunikationsnetzes auf dem Bildschirm des Fernsehgerätes ist neben einer Digital/Anlog-Wandlung der Signale im Falle eines analogen Fernsehempfängers bzw. einer Digital/Digital-Wandlung im Falle eines digitalen Fernsehempfängers in jedem Falle eine Synchronisation mit dem Takt des Fernsehsignals erforderlich.

SYSTEM ZUM WIEDERGEBEN VON VISUELLEN INFORMATIONEN

P A T E N T A N S P R Ü C H E

1. System zum Wiedergeben von visuellen Informationen in Form von Schrift, Grafiken und/oder Bildern, die in einem digitalen Telekommunikationsnetz übertragen werden, **dadurch gekennzeichnet**, daß innerhalb eines Fernsehsignals, welches mittels eines Fernsehempfängers wiedergebbar ist, eine Adresse (HTTP) für ein Serverprogramm des digitalen Telekommunikationsnetzes übertragen wird, welche dem Benutzers auf dem Bildschirm des Fernsehempfängers in beliebiger Form (als Markierung oder in Klarschrift) optisch signalisiert wird, und daß die Adresse (HTTP) auf Befehl des Benutzers dahingehend ausgewertet wird, daß die Inhalte des Serverprogramms und weitere, mittels des Serverprogramms abrufbare visuelle Informationen (beispielsweise werbungsbezogene Informationen) auf dem Bildschirm des Fernsehempfängers wiedergebbar sind.

2. System nach Anspruch 1, **dadurch gekennzeichnet**, daß die aus dem digitalen Telekommunikationsnetz empfangenen Datensignale vor der Wiedergabe auf dem Bildschirm des Fernsehempfängers auf den Takt des Fernsehsignals synchronisiert werden.

INTERNATIONAL SEARCH REPORT

Int... onal Application No
PCT/EP 96/05261

A. CLASSIFICATION OF SUBJECT MATTER
IPC 6 H04N7/173

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
IPC 6 H04N

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	US 5 410 326 A (GOLDSTEIN) 25 April 1995 see the whole document ---	1,2
A	EP 0 673 164 A (ATT) 20 September 1995 see the whole document ---	1
A	GB 2 207 838 A (TELACTION) 8 February 1989 see the whole document ---	1
A	COMMUNICATIONS OF THE ASSOCIATION FOR COMPUTING MACHINERY, vol. 36, no. 12, December 1993, NEW YORK US, pages 19-23, XP000414935 LARRY PRESS: "the internet and interactive television" see the whole document --- -/--	1

[X] Further documents are listed in the continuation of box C.

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Date of the actual completion of the international search	Date of mailing of the international search report
6 March 1997	27. 03. 97

Name and mailing address of the ISA	Authorized officer
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INTERNATIONAL SEARCH REPORT

Int. nal Application No
PCT/EP 96/05261

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Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	WO 94 23537 A (BELL ATLANTIC NETWORK SERVICES) 13 October 1994	

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INTERNATIONAL SEARCH REPORT

Information on patent family members

Inter... al Application No
PCT/EP 96/05261

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
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		CA 2141976 A	19-09-95
		JP 7288606 A	31-10-95
GB 2207838 A	08-02-89	US 4792849 A	20-12-88
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WO 9423537 A	13-10-94	AU 6699994 A	24-10-94
		US 5528281 A	18-06-96

INTERNATIONALER RECHERCHENBERICHT

Angaben zu Veröffentlichungen, die zur selben Patentfamilie gehören

Internationales Aktenzeichen
PCT/EP 96/05261

Im Recherchenbericht angeführtes Patentdokument	Datum der Veröffentlichung	Mitglied(er) der Patentfamilie	Datum der Veröffentlichung
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INTERNATIONALER RECHERCHENBERICHT

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PCT/EP 96/05261

C.(Fortsetzung) ALS WESENTLICH ANGESEHENE UNTERLAGEN

Kategorie*	Bezeichnung der Veröffentlichung, soweit erforderlich unter Angabe der in Betracht kommenden Teile	Betr. Anspruch Nr.
A	WO 94 23537 A (BELL ATLANTIC NETWORK SERVICES) 13.Oktober 1994	

1

Formblatt PCT/ISA/210 (Fortsetzung von Blatt 2) (Juli 1992)

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2.	European patent number or publication number of application *(or International publication number (see note (e))*	0879536
3.	Full name and address of the or of each applicant for or proprietor of the European patent (UK)	Fridley Technologies Limited Skelton Building P.O. Box 3136 Road Town Tortola
	Patents ADP number *(if you know it)*	VG
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I, Simon Wiles, on behalf of The Language Shop, Rosetta House, 2 Wood Lane, Thorpe Willoughby, North Yorkshire, YO8 9PT declare that I am conversant with the German and the English languages and that the attached English, to the best of my knowledge, is a correct translation of Patent Application No. 96940655.2 in GREAT BRITAIN in the name of Fridley Technologies Ltd - Reproducing visual information.

Signed.....on 12 day of APRIL 1999

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(11) EP 0 879 536 B1

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(54) VERFAHREN ZUM WIEDERGEBEN VON VISUELLEN INFORMATIONEN
METHOD FOR REPRODUCING VISUAL INFORMATION
METHODE POUR LA REPRODUCTION D'INFORMATIONS VISUELLES

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WO-A-94/23537
GB-A- 2 207 838
US-A- 5 410 326

- **COMMUNICATIONS OF THE ASSOCIATION FOR COMPUTING MACHINERY, Bd. 36, Nr. 12, Dezember 1993, NEW YORK US, Seiten 19-23, XP000414935 LARRY PRESS: "the internet and interactive television"**

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Beschreibung

[0001] Die Erfindung bezieht sich auf ein Verfahren zum Wiedergeben von visuellen Informationen, die im "Internet" übertragen werden.

[0002] In digitalen Telekommunikationsnetzen werden unter sogenannten HTTP-Adressen Serverprogramme übertragenen, mit deren Hilfe visuelle Informationen von Datendiensten in Form von Schrift, Grafiken und/oder Bildern abrufbar sind. Die Wiedergabe der angewählten Serverprogramme und der damit abgerufenen visuellen Informationen erfolgt auf dem Bildschirm des Monitors eines PC-Arbeitsplatzes, d.h., in einem Umfeld, in dem die Akzeptanz von Werbeinhalten gering ist. Elektronische Werbung erfolgt daher überwiegend in Verbindung mit Fernsehunterhaltung.

[0003] WO-A-94 23 537 zeigt die Multimedia-Übertragung über ein öffentliches Telefonnetz.

[0004] Es ist ferner bekannt, in Fernseh-Werbesendungen Produkte vorzustellen und am Ende der Werbesendung getrennt für jedes Land die Preise und die Telefonnummern anzugeben, unter welchen die zuvor beworbenen Produkte bestellt werden können. Dieses sogenannte "Teleshopping" hat jedoch den Nachteil, daß vom Fernsehteilnehmer die betreffenden Telefonnummern mitgeschrieben werden müssen. Zudem leidet der unmittelbare Bezug zwischen der fernsehmäßigen Präsentation des Produktes und der Anzeige von Preis und Telefonnummer. Um den Bestellvorgang zeitgleich mit der Präsentation des Produktes durchzuführen und zu vereinfachen, ist es aus der DE 44 27 046 A1 bereits bekannt, Zusatzinformationen innerhalb des Fernsehprogrammsignals in zeitlicher Korrelation zu dessen Programminhalt zu übertragen. Auf einen ersten Befehl des Benutzers wird eine in der zuletzt empfangenen Zusatzinformation enthaltene Klarschrift und gegebenenfalls Grafikinformation für eine bestimmte Zeitdauer auf dem Fernsehbildschirm wiedergegeben. Während dieser Wiedergabe wird auf einen zweiten Befehl des Benutzers aus der zuletzt empfangenen Zusatzinformation eine Telefonnummer als Bestellinformation entnommen und über ein Modem eine Telefonverbindung zu einer automatischen Bestellannahme hergestellt.

[0005] Die Aufgabe der Erfindung besteht demgegenüber darin, Werbeinhalte in einem Telekommunikationssystem der eingangs erwähnten Art mit hoher Akzeptanz von Seiten der Systembenutzer zu plazieren.

[0006] Diese Aufgabe wird erfindungsgemäß durch die kennzeichnenden Merkmale des Patentanspruchs 1 gelöst.

[0007] Eine vorteilhafte Ausgestaltung des erfindungsgemäßen Verfahrens ergibt sich aus dem abhängigen Anspruch,

[0008] Die Erfindung geht von der Überlegung aus, die Akzeptanz von Werbeinhalten bei Benutzern von digitalen Telekommunikationsnetzen dadurch zu erhöhen, daß dem Benutzer beim Betrachten von Fernsehunterhaltung mit eingeblendeter Werbung signalisiert wird, daß er auf Knopfdruck die HTTP-Adresse eines Serverprogramms in einem digitalen Telekommunikationsnetz, z.B. Internet, anwählen kann. Wesentlich ist, daß die Inhalte des Serverprogramms auf dem Bildschirm des Fernsehempfängers wiedergegeben werden, so daß der Benutzer mit Hilfe des Serverprogramms nähere Informationen über die Werbeinhalte einer noch laufenden

[0009] Fernsehwerbung aus dem digitalen Telekommunikationsnetz abrufen und sofort auf auf dem Bildschirm des Fernsehempfängers wiedergeben kann. Für die technische Umsetzung ist es lediglich erforderlich, die HTTP-Adresse als Zusatzsignal in dem Fernsehsignal in zeitlicher Korrelierung zu den Werbeinhalten zu übertragen und diese Zusatzsignalübertragung dem Benutzer auf dem Bildschirm in beliebiger Form zu signalisieren, beispielsweise durch Einblenden einer bestimmten Markierung. Auf Befehl des Benutzers (Knopfdruck) wird die HTTP-Adresse aus dem Fernsehsignal ausgelesen und an ein mit dem Fernsehempfänger gekoppeltes Modem weitergeleitet, welches eine Kommunikationsverbindung zu dem digitalen Telekommunikationsnetz unter der ausgelesenen Adresse herstellt. Für die Wiedergabe der digitalen Informationssignale des Telekommunikationsnetzes auf dem Bildschirm des Fernsehgerätes ist neben einer Digital/Anlog-Wandlung der Signale im Falle eines analogen Fernsehempfängers bzw. einer Digital/Digital-Wandlung im Falle eines digitalen Fernsehempfängers in jedem Falle eine Synchronisation mit dem Takt des Fernsehsignals erforderlich.

Patentansprüche

1. Verfahren zum Wiedergeben von visuellen Informationen in Form von Schrift, Grafiken und/oder Bildern, die im Internet übertragen werden, **dadurch gekennzeichnet,** daß innerhalb eines Fernsehprogrammsignals, welches mittels eines Fernsehempfängers wiedergebbar ist, als Zusatzsignal in zeitlicher Korrelation zu Werbeinhalten des Fernsehprogrammsignals eine Internet-Adresse für ein Serverprogramm des Internet übertragen und zusammen mit den Werbeinhalten als Markierung auf dem Bildschirm des Fernsehempfängers wiedergegeben wird, und daß die Internet-Adresse auf Befehl eines Betrachters der Werbeinhalte aus dem Fernsehprogrammsignal ausgelesen und an ein mit dem Fernsehempfänger gekoppeltes Modem weitergeleitet wird, welches eine Kommunikationsverbindung zum Internet unter der ausgelesenen Internet-Adresse herstellt, um die Inhalte des adressierten Serverprogramms auf dem Bildschirm des Fernsehempfängers wiederzugeben.

2. Verfahren nach Anspruch 1, **dadurch gekenn-**

zeichnet, daß die aus dem digitalen Telekommunikationsnetz empfangenen Datensignale vor ihrer Wiedergabe auf dem Bildschirm des Fernsehempfängers auf den Takt des Fernsehprogrammsignals synchronisiert werden.

Claims

1. A method for reproducing visual information in the form of writing, graphics and/or images, which are transmitted on the Internet, **characterized in that** an Internet address for a server program of the Internet is transmitted within a television program signal that can be reproduced by a television receiver as additional signal in a temporal correlation to the advertising content of the television program signal, and that it is reproduced together with the advertising content as marker on the television receiver screen, and that the Internet address is read out of the television program signal upon command from a viewer of the advertising content and is transmitted to a modem, connected to the television receiver, which modem establishes a communication link to the Internet under the read-out Internet address in order to reproduce the content of the addressed server program on the television receiver screen.

2. A method according to claim 1, **characterized in that** the data signals received from the digital telecommunication network are synchronized with the clock pulse of the television program signal prior to being reproduced on the television receiver screen.

Revendications

1. Procédé pour la reproduction d'informations visuelles sous forme de caractères, de graphiques et/ou d'images qui sont transmises par Internet, caractérisé en ce qu'à l'intérieur d'un signal de programme de télévision, lequel est reproductible par un récepteur de télévision, on transmet, en tant que signal complémentaire en corrélation temporelle avec un contenu publicitaire d'un signal de programme de télévision, une adresse Internet pour un programme de serveur Internet, et ensemble avec le contenu publicitaire, on la reproduit, sous forme d'un marquage, sur l'écran du récepteur de télévision, et en ce que l'adresse Internet, sur ordre d'un spectateur du contenu publicitaire, est lue dans le signal de programme de télévision et est transmise grâce à un modem couplé au récepteur de télévision, lequel modem produit une connexion de communication à Internet sous l'adresse Internet lue, afin de reproduire, sur l'écran du récepteur de télévision, le contenu du programme du serveur adressé.

2. Procédé selon la revendication 1, caractérisé en ce que les signaux de données reçus du réseau de télécommunications numériques sont synchronisés, avant leur reproduction sur l'écran du récepteur de télévision, au rythme du signal de programme de télévision.

The invention relates to a process for the reproduction of visual information which can be transferred on the Internet.

In digital telecommunications networks, server programs are transferred under what are referred to as HTTP addresses, and with the aid of such programs it is possible to call up visual information from data services in the form of script, graphics, and/or images. The reproduction of the selected server programs and the visual information which is called up with them is effected on the screen of the monitor of a PC workstation; i.e. in an environment in which the acceptance of web contents is low. Electronic advertising is therefore effected predominantly in conjunction with television entertainment.

WO-A-94 23 537 describes multimedia transfer via a public telephone network.

It is further known how to present products in television advertising broadcasts, and, at the end of the broadcast, to provide the prices and telephone numbers separately for each country by means of which the products previously advertised can be ordered. This technique, referred to as "teleshopping", has the disadvantage, however, that the relevant telephone numbers must be written down simultaneously by the television subscriber. In addition, the immediate reference also suffers between the television presentation of the product and the display of price and telephone numbers. In order to carry out the ordering process at the same time as the presentation of the product and to simplify it, the principle is already known from DE 44 27 046 A1 of transmitting additional information within the telephone program signal in a temporal correlation with the content of that program. At the user's first command, the clear text contained in the last supplementary information received, and, if appropriate the graphics information, is reproduced for a specific period of time on the television screen. During this reproduction period, in response to a second command from the user, a telephone number is drawn as ordering information from the last supplementary information received, and a telephone connection is established via modem to an automatic order acceptance facility.

The object of the invention, by contrast, consists of placing the content of the advertising in

a telecommunications system of the type described in the preamble with a high level of acceptance on the part of the system user.

This objective is achieved according to the invention by the characterisation features of patent Claim 1.

An advantageous embodiment of the process according to the invention is derived from the independent Claim A.

The invention is based on the consideration of increasing the acceptance of the contents of advertising at users of telecommunications networks in such a way that it is signalled to the user, when watching television entertainment with advertising merged in, that at the push of a button he can dial the HTTP address of a server program in a digital telecommunications network, such as the Internet. The essential factor is that the contents of the server program are reproduced on the screen of the television receiver, so that the user can call up more detailed information about the contents of the advertising from a television advert which is still running, from the telecommunications network, and reproduce it immediately on the screen of the television receiver. For the technical implementation, all that is required is for the HTTP address to be transferred as a supplementary signal in the television signal in a temporal correlation to the contents of the advert, and to pass this additional signal transfer to the user on the screen in any desired form, for example by merging in a specific marking. At the user's command (press of a button), the HTTP address is read out from the television signal and passed on by means of a modem coupled to the television receiver, which creates a communications link with the digital communications network under the address which is read out. The reproduction of the digital information signals from the telecommunications network on the screen of the television unit in any event requires, in addition to a digital/analog conversion of the signals in the case of an analog television receiver or a digital/digital conversion in the case of a digital television receiver, a synchronisation with the cycle pulse of the television signal.

PATENT CLAIMS:

1. Process for the reproduction of visual information in the form of script, graphics, and/or images, which are transferred in the Internet, characterised in that, within a television program signal which is capable of reproduction by means of a television receiver, as an additional signal in a temporal correlation with the advertising content of the television program signal, an Internet address for an Internet server program is transferred, and reproduced together with the contents of the advertising on the screen of the television receiver, and that the Internet address is read out from the television program signal on the command of an observer of the advertising content, and forwarded to a modem coupled to the television receiver, which creates a communications link to the Internet under the Internet address which has been read out, in order to reproduce the contents of the server program addressed on the screen of the television receiver.

2. Process according to Claim 1, characterised in that the data signals received from the digital telecommunications network are synchronised to the cyclic pulse of the television program signal before reproduction on the screen of the television receiver.

PATENT
Docket No. 559442600201

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Date: March 1 , 2004

Lynn A. Lacyk

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In the application of:

Craig ULLMAN et al.

Serial No.: 10/299,335

Filing Date: November 18, 2002

For: ENHANCED VIDEO PROGRAMMING SYSTEM AND METHOD FOR INCORPORATING AND DISPLAYING RETRIEVED INTEGRATED INTERNET INFORMATION SEGMENTS

Examiner: Andrew I. Faile

Group Art Unit: 2611

SUPPLEMENTAL INFORMATION DISCLOSURE STATEMENT UNDER 37 C.F.R. § 1.97

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Alexandria, Virginia 22313-1450

Sir:

Pursuant to 37 C.F.R. § 1.97 and § 1.98, Applicants submit for consideration in the above-identified application the documents listed on the attached Form PTO-1449. Copies of the documents are also submitted herewith. The Examiner is requested to make these documents of record.

va-57857

This Supplemental Information Disclosure Statement being submitted within three months of the application filing date or prior to the mailing of a first Office Action on the merits; accordingly, no fee or separate requirements are required.

Applicants would appreciate the Examiner initialing and returning the Form PTO-1449, indicating that the information has been considered and made of record herein.

The information contained in this Supplemental Information Disclosure Statement under 37 C.F.R. § 1.97 is not to be construed as a representation that: (i) a complete search has been made; (ii) additional information material to the examination of this application does not exist; (iii) the information, protocols, results and the like reported by third parties are accurate or enabling; or (iv) the above information constitutes prior art to the subject invention.

In the event that the transmittal letter is separated from this document and the Patent Office determines that an extension and/or other relief is required, applicant petitions for any required relief including extensions of time and authorizes the Commissioner to charge the cost of such petitions and/or other fees due in connection with the filing of this document to **Deposit Account No. 03-1952** referencing 559442600201.

Dated: March 1, 2004

Respectfully submitted,

By: _____

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PTO/SB/08 (2-92)
Sheet 1 of 1

Form PTO-1449

INFORMATION DISCLOSURE CITATION IN AN APPLICATION

(Use several sheets if necessary)

Docket Number 559442600201	Application Number 10/299,335
Applicant: Craig D. ULLMAN et al.	
Filing Date November 18, 2002	Group Art Unit 2611
Mailing Date March 1, 2004	

U.S. PATENT DOCUMENTS

Examiner Initials	Ref. No.	Date	Document No.	Name	Class	Subclass	Filing Date If Appropriate
	1.	11/15/1994	5,365,346A	ABUMI			
	2.	3/1/1994	5,291,486A	KOYANAGI			

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Examiner Initials	Ref. No.	Date	Document No.	Country	Class	Subclass	Translation YES	Translation NO
	3.	08/23/2000	2,347,055	GREAT BRITAIN			N/A	
	4.	05/03/1989	0 314 572	EUROPE			N/A	
	5.	09/29/1993	0 562 221A	EUROPE			N/A	
	6	11/11/1993	W0 93/22877	WIPO			N/A	
	7.	6/10/1993	WO 93/11617	WIPO			N/A	

OTHER DOCUMENTS

(including author, title, Date, Pertinent Pages, Etc

Examiner Initials	Ref. No.	Title
	8.	January 30, 2004 Supplemental Search and Examination Report from GB0022707.4.
	9.	YU P.S. et al. "DESIGN AND ANALYSIS OF LOOK AHEAD SCHEDULING SCHEME TO SUPPORT PAUSE-RESUME FOR VIDEO-ON-DEMAND APPLICATIONS, Multimedia Systems, Volume 3, No. 4, Jan. 1995, pp. 137-149, XP000576898.
	10.	WITTIG et al. "INTELLIGENT MEDIA AGENTS IN INTERACTVE TELEVISION SYSTEMS" Proceedings of the International Conference on Multimedia Computing and Systems, Los Alamitos, CA, US, 15 May 1995, pages 182-189, XP000603484

EXAMINER:	DATE CONSIDERED:

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TRANSMITTAL FORM

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First Named Inventor	Craig ULLMAN et al.
Group Art Unit	2611
Examiner Name	Andrew I. FAILE
Attorney Docket No.	55944-2600201

ENCLOSURES (check all that apply)

- ☐ Fee Transmittal Form
  - ☐ Fee Attached
- ☐ Amendment / Reply
  - ☐ After Final
  - ☐ Affidavits/declarations
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- ☑ Information Disclosure Statement
- ☐ Certified Copy of Priority Document(s)
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  - ☐ Response to Missing Parts under 37 CFR 1.52 or 1.53
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- ☐ Drawing(s) -
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- ☐ Proprietary Information
- ☐ Status Letter
- ☑ Other Enclosure(s) *(please identify below):*
  1. **PTO Form 1449;**
  2. **9 references.**

Remarks

SIGNATURE OF APPLICANT, ATTORNEY OR AGENT

Firm Or Individual Name	Jonathan Bockman, Registration No. 45,640
Signature	
Date	March 1, 2004

CERTIFICATE OF HAND DELIVERY

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Lynn A. Lacyk

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H4P PPBC PPNE
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(54) Abstract Title
Network connections

(57) A network includes one or more passive communications hub 12 having a number of ports 12a, with the network being made up of connections to, and optionally interconnections between, the ports. The network is arranged to carry electrical signals of different frequencies and characteristics. In particular the network distributes DC signals substantially without attenuation, and oscillation signals substantially without reflection. In the preferred implementation, the network carries both TV signals and computer network signals, such as ethernet signals. In this context the carrying of DC signals substantially without attenuation, by way of a controlled DC resistance in the network, enables the proper functioning of ethernet collision detection.

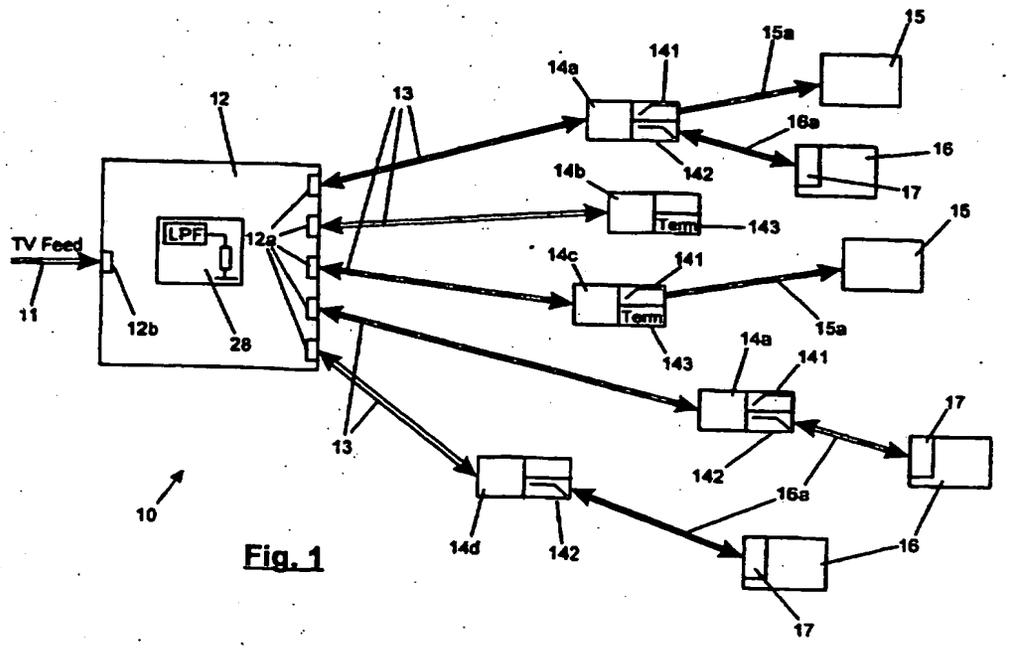


Fig. 1

GB 2 347 055 A

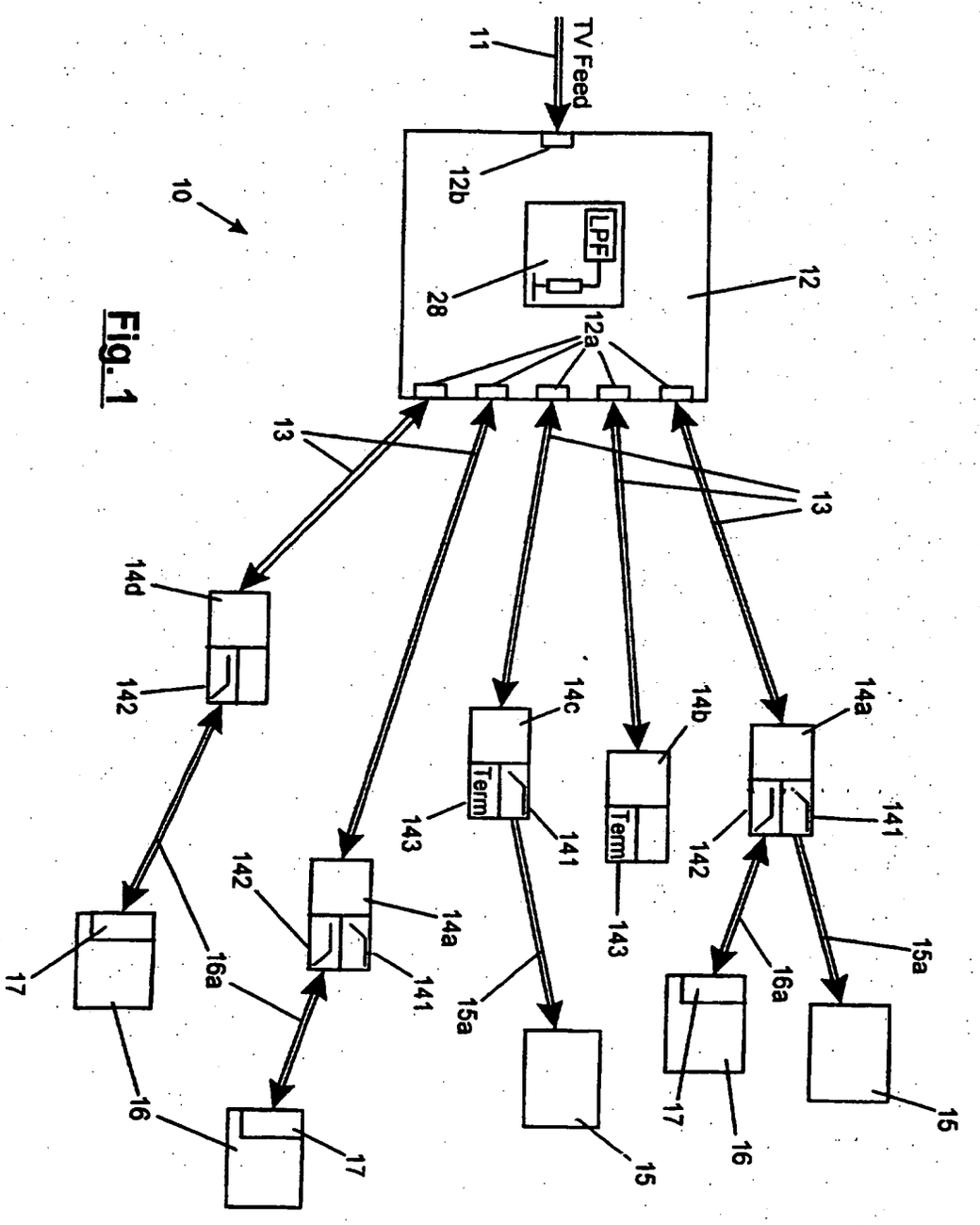

TV Feed
11
12b
10
LPF
28
12
12a
13
13
14d
142
14c
14b
14a
Term
143
141
Term
142
141
142
14a
143
17
16a
141
15a
16a
15a
17
16
17
15
16
15

Fig. 1

Fig. 2a

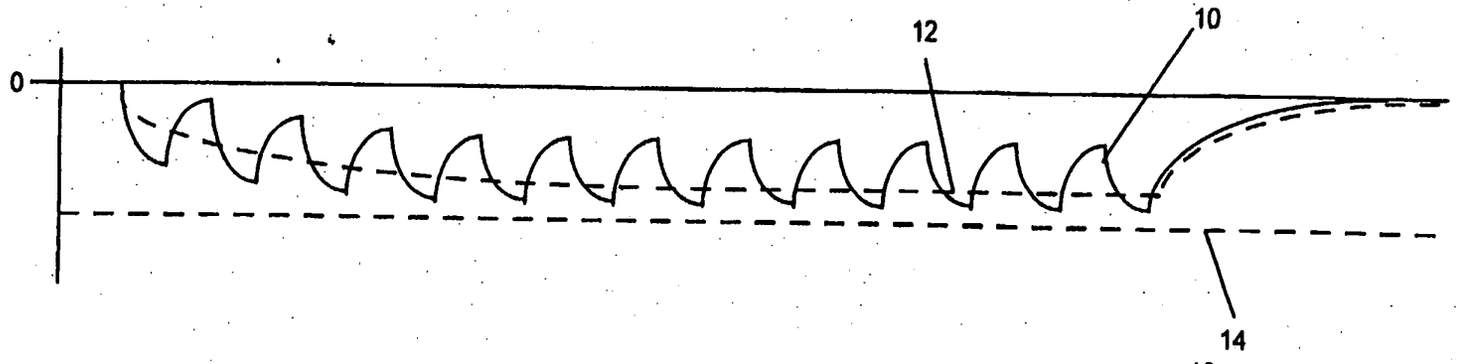


Fig. 2b

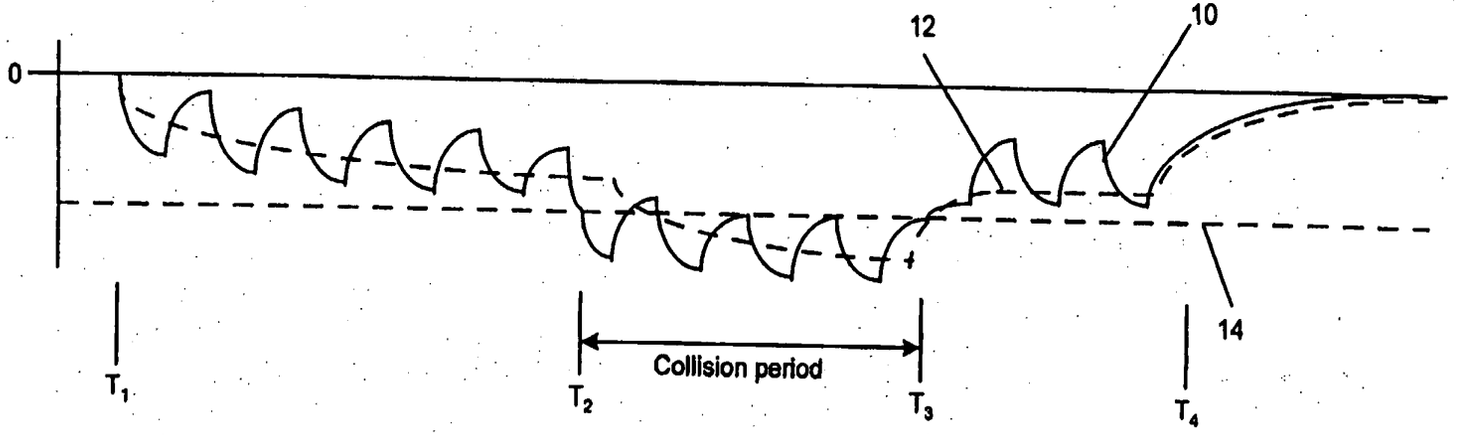


Fig. 2c

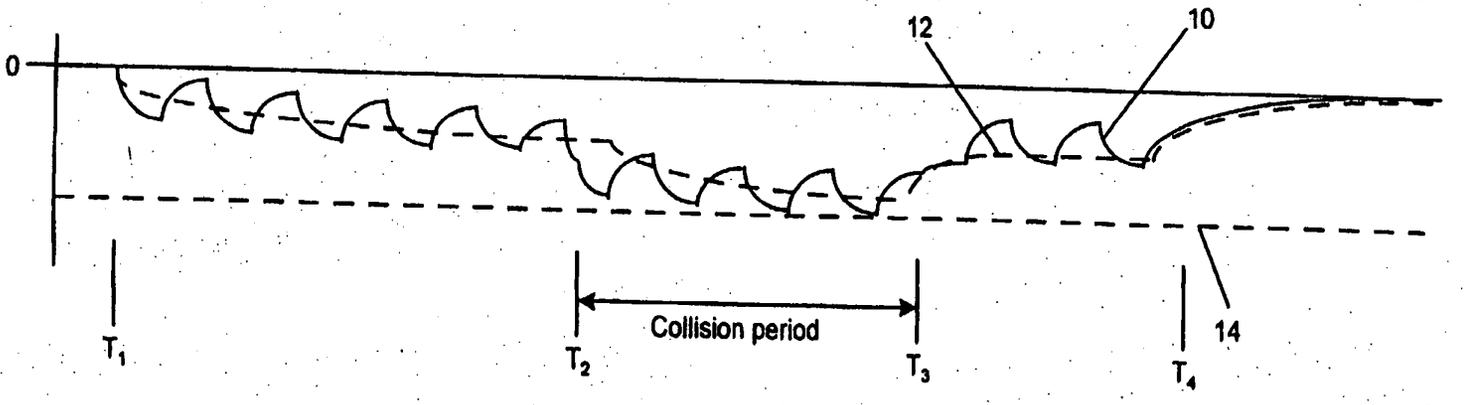


Fig. 3

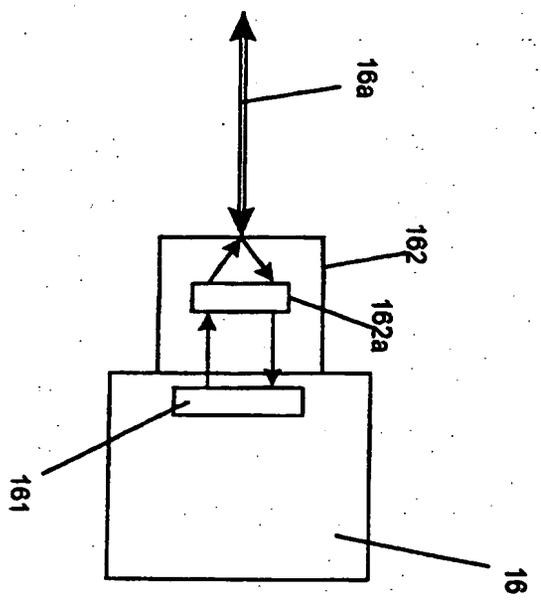
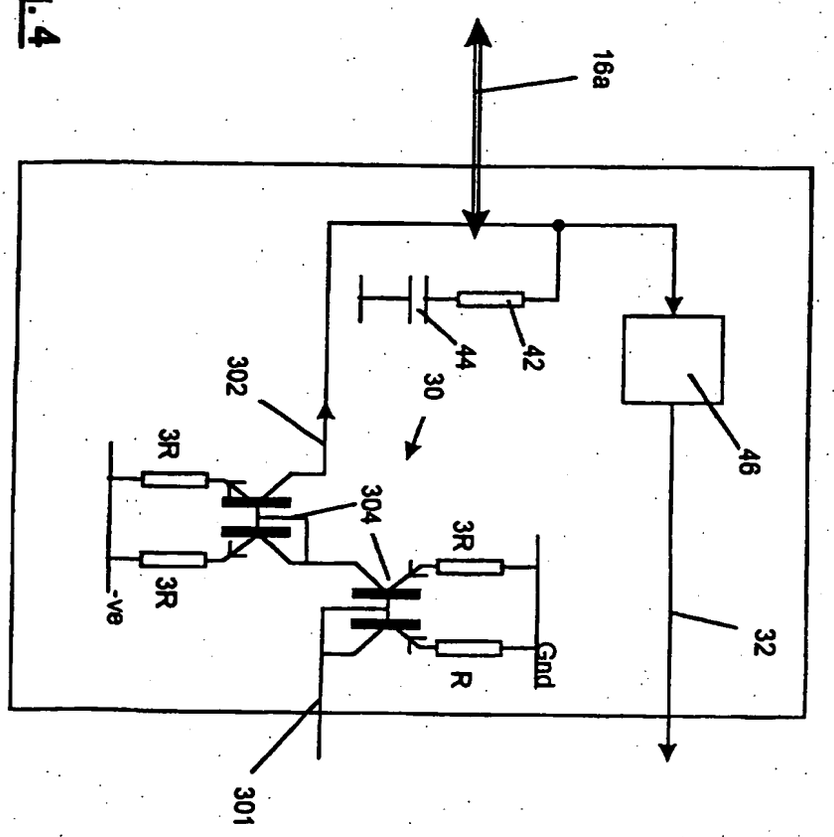


Fig. 4



COMPUTER/TELEVISION NETWORK

BACKGROUND OF THE INVENTION

Field of the Invention

The present invention relates to the provision of a network of cabling and other elements which is suited to the distribution of electrical signals of different frequencies, including DC signals. One type of such network carries television signals and also communications in a computer network, for instance operating according to the Ethernet protocol.

The Prior Art

In domestic situations it is well known to distribute television signals to different rooms in a house. In particular this may be implemented by taking an input feed from a receiving aerial, satellite antenna, cable TV supply or other signal source and pass it through a signal splitting device from where the signal can be carried via coaxial cables, to other desired locations. One or more such splitting devices may be used to construct what is essentially a tree or star arrangement of cable segments to provide convenient distribution of the TV signal to the desired locations in the home. Such arrangements are not limited to domestic use and may be implemented in any relatively small scale environment where the cable runs are not so long that active amplification and/or reconstitution of the distributed signal is necessary.

In a domestic or other small scale arrangement as outlined above, the splitting devices are designed so as distribute TV signals which are typically in the frequency range 45 - 900 MHz.

It is also well known to provide computer networks comprising cabling arranged to interconnect computers and other network devices in order to enable the devices to communicate with each other for instance to facilitate the sharing of resources and data and to enable users of the network equipment to

communicate with each other. A number of different network topologies and associated communication protocols have been proposed to enable communication between computing devices in this fashion, and some of these are outlined in the following.

In one system, an essentially passive transmission line arrangement is provided to carry communications between devices attached to the network. In essence, this is one length of transmission line, having appropriate terminations at each end to which all of the network devices are connected and to which all of the network devices apply communications to be sent to other devices. Such an arrangement is typically implemented using co-axial cable looped from one network device to the next and having a terminator device at each end. Each network device therefore effectively looks both ways along the transmission line and the same impedance is presented to each network device.

One communications protocol which is well known to be used on networks connected in this fashion is 10Base-2 Ethernet which is a collision sense protocol in which any network device which requires to send a communications packet attempts to apply the packet to the transmission line. In the event that no other device is attempting to communicate at the same time, the transmitted communications packet travels to all of the other devices connected to the network and can therefore be identified and received by the intended recipient. If however it is detected that two or more devices have attempted to put a communication on transmission line at the same time this is sensed by the devices attempting to send communications and these devices assume that the transmitted communication has not been properly received and, after an appropriate time, transmission is reattempted.

In a protocol such as 10Base-2 Ethernet the transmission protocol is arranged such that during the transmission of a data packet a constant DC voltage level different from zero is created on the transmission line and this is

used in the collision detection mechanism. In particular, if two packets are being transmitted onto the communication line simultaneously, the overall DC level will be twice the value as that which would be the case if only one communication were being attempted. The network devices have threshold detectors which detect such an increase in the DC level and which therefore detect the occurrence of collisions. This system, broadly outlined above, functions satisfactorily on a single transmission line arrangement as mentioned above and is a well used protocol.

Other, later, Ethernet standards are fundamentally different from the 10Base-2 arrangement outlined above in that they are not passive transmission arrangements but include active components. In particular, networks operating according to, for instance, the 10Base-T protocol, are connected in a star or tree formation in which there are provided communication hubs having a plurality of ports to each of which a network device or another hub may be connected. The communications hubs function according to various well known principles to retransmit communications received on their ports to the others of the ports thereby enabling the communication sent out by the network devices to reach the other network devices in the network. The connections between the network devices and the communications hub in this arrangement are typically made by twisted pair data cable and the active communications hubs ensure proper retransmission of the data throughout the network thereby enabling, among other things, proper collision detection to be conducted.

There have also been proposals to integrate Ethernet with TV distribution. One such arrangement proposes remodulating the Ethernet communication signals to fall within the typical frequency band of the TV signals such that they are properly distributed by TV distribution equipment. This arrangement however requires complex further re-modulation equipment which would be dynamic or active equipment requiring a power supply.

The parallel distribution of TV and Local Area Network (LAN) signals is also considered in other areas, for instance in a video conferencing network in US Patent 5,374,952. In such an arrangement however separate cables are provided to carry the TV and the computer network signals.

SUMMARY OF THE INVENTION

The present invention has been made against the above background and aims to implement a star or tree connected computer network, preferably in the context of a TV distribution system, which operates as a passive network in which data is distributed and proper collision detection takes place. Such a network has particular advantages where it is desired to provide a relatively low cost network, in which case it is useful to have a passive network, but where the devices to be connected in the network are relatively widely spaced, where it would be inconvenient to provide a looped transmission line from one network device to the next.

The invention as mentioned also aims to combine the distribution of TV signals with the interconnection of network devices to form a network, taking advantage of the fact that both TV distribution systems and 10Base-2 networks utilise coaxial cable to carry the signals. Such an arrangement would be particularly useful for instance in the circumstance where it is desired to implement a computer network in a home or other environment where a TV distribution system as outlined above is already in place. This would have clear advantages in terms of not requiring the installation of further cabling as the TV distribution system already provides cable to a number of locations.

Potential difficulties with such an implementation include the different topographies of the two systems. That is, as outlined above, a typical TV distribution system is generally a star or tree configuration while a known 10Base-2 type network is essentially a single transmission line arrangement. Also, communication signals in a computer network such as Ethernet 10Base-2 are

typically in the frequency range 5 - 20 MHZ and therefore would not be carried properly by standard TV distribution devices as discussed above. A further difficulty is the fact that TV signals are typically distributed using 75Ω steel cored coaxial cable while the coaxial cable used to form the transmission lines for a typical Ethernet 10Base-2 network is 50Ω cable.

Also, as will be explained in more detail later, it is important when dealing with Ethernet type signals, to ensure that low frequency and DC signals are carried properly around the network in order to ensure proper operation of collision detection mechanisms in the network devices.

Broadly speaking the invention provides a network which handles signals in three different frequency ranges differently. Firstly, high frequency TV signals typically having a frequency higher than approximately 50 MHZ are carried around a star or tree type network in a manner similar to known TV signal distribution arrangements. Secondly, Ethernet data signal, typically in the frequency range 5-17 MHZ are carried around the network without reflection such that they reach all of the users attached to the network. Thirdly, effectively DC signals, say having a frequency less than 2 MHZ, are carried around the network without substantial attenuation to facilitate proper operation of collision detection mechanisms.

The present invention provides a network arranged to distribute TV signals and to carry data communications between computing devices attached to the network, the network comprising a passive communications hub having a plurality of ports, a plurality of cable segments suitable for the transmission of TV signals and a plurality of termination devices, the cable segments each being arranged to connect a termination device to a port on the communications hub, the communications hub being arranged to distribute TV signals therethrough and also comprising means arranged to receive data communications at any port without reflection and to provide the received data communications as outputs at

others of said plurality of ports, each said termination device comprising termination means arranged such that data communications are not reflected at such termination means, at least one of said termination devices being arranged to present said TV signals as an output from the network and at least one of said termination means being arranged to present data communications received via a respective cable segment as an output from the network.

In such an arrangement the cable segments already in place in a domestic installation for carrying TV signals between the splitting devices and locations in the home are utilised also to carry Ethernet or other network signals. As compared to the standard TV distribution arrangement, the signal splitters are replaced by passive communication hubs which are designed to handle signals in the frequency range of data communications in a computer network in addition to the TV signal frequency range. The termination devices are arranged to terminate the cable segments properly from the point of view of the computer network communications. They may also provide one or other of the TV signals and the computer network communications as outputs enabling a network device or a TV station or both to be connected at each of the locations served by the network. A preferred arrangement for this is to provide appropriate filters for the two types of signal, typically a high pass filter for the video signal and a low pass filter for the baseband data signal. If only the video output is required, a correct impedance load for the unused data signal is provided.

The arrangement according to the present invention is advantageous as compared to the prior art as it does not require any additional wiring extra to that provided in a normal TV distribution arrangement also to carry communications in a computer network. Also, the distribution device is merely a passive device which retains the simplicity inherent in a normal TV distribution arrangement.

In another aspect of this invention there is provided a network

interface connector for a network device to be attached to a computer network, the device comprising means to convert standard computer network signals suitable for distribution via a network presenting a first characteristic impedance to signals suitable for distribution via a network presenting a second characteristic impedance. For instance, the interface may be arranged to convert signals suitable for transmission via a standard 10Base-2 arrangement to signals suitable for transmission via the TV cabling discussed above.

In particular, it will be appreciated from the above discussion that the characteristic impedance presented to a standard Ethernet network transceiver differs from that presented by cable typically used to distribute TV signals. The cable generally used in Ethernet networks has a characteristic impedance of 50Ω while TV coaxial cable is typically of 75Ω characteristic impedance. In this aspect of the invention therefore currents are applied to the cabling of a suitable magnitude such that the expected voltage levels are detected for proper operation of the collision detection mechanism.

In the preferred embodiment of a network according to the present invention it may be the case that one of the communication hubs is designated a master device. This device would receive the TV signal to be distributed and may also include means to prevent the transmission of the network communications along the cabling carrying the incoming TV signal, as such transmission may affect the proper functioning of the overall TV network.

Alternatively it may be that a cable TV company may designedly provide for instance Internet access via the same cable as it provides TV feed signals. In this case the master device would be arranged also to receive and distribute the received Internet signals in an appropriate fashion.

In another aspect the present invention provides a computer network for the interconnection of a plurality of network devices to enable data communications to be sent therebetween comprising a passive communications

hub having a plurality of ports, and a plurality of cable segments each arranged to connect a network device to a port on the communications hub, the communications hub comprising means arranged to receive data communications at any port without reflection and to provide the received data communications as outputs at the others of said plurality of ports, and means defining a low DC resistance between the ports, the network further comprising means defining an effectively infinite DC resistance at the ends of said cable segments distant from said communications hub, except that there is further provided within the network means defining a predetermined DC resistance effective throughout the network.

It is envisaged that such a network would be implemented using co-axial cable to connect from the passive hubs to the network devices and the network devices would put their communications onto the cables in the normal way. In such a network clearly the cable is selected and the passive hubs designed so as to provide correctly matched impedance at the data transmission frequencies such that the data is correctly carried around the network. Also, at each network device there will be provided an interface having the correct termination impedance at the data frequency.

This aspect of the invention is preferably implemented together with the combined TV/Ethernet arrangement outlined above. In this case the network transceivers must either be especially designed or provided with interface means such that appropriate signal levels are generated in the TV cabling which is of a different characteristic impedance.

The network may alternatively be designed such that unaltered 10Base-2 network transceivers may be used at the network devices. This could be achieved by the use of 50Ω co-axial cable and the passive hubs would have appropriately matched impedances at the ports.

In these arrangements however the signals are liable to be attenuated as they pass through the hub and around the network. For the transmission and

reception of the data communications this does not present a significant problem as the dynamic range of the transceivers is able to cope with some attenuation.

However, as discussed above, the detection of collision in, for example, a 10Base-2 network relies on the proper detection of DC voltage levels, and therefore any significant attenuation of the DC signal will cause the collision detection to fail and the network to function incorrectly.

In the present invention therefore the above defined measures mean that DC signals are carried around the network without substantial attenuation occurring, permitting the collision detection to function in the normal way.

BRIEF DESCRIPTION OF THE DRAWINGS

This invention will be better understood from the following description of preferred embodiments given by way of example and with reference to the accompanying drawings, in which:

Figure 1 is a schematic illustration of a network according to a preferred embodiment of this invention;

Figure 2 is a diagram useful to assist understanding of the collision detection mechanism; and

Figures 3 and 4 illustrate one embodiment for connection of a network device to the network of Figure 1.

DETAILED DESCRIPTION OF THE DRAWINGS

In general terms in the described arrangement a network includes one or more passive communications hub having a number of ports, with the network being made up of connections to, and optionally interconnections between, the ports. The network is arranged to carry electrical signals of different frequencies and characteristics. In particular the network distributes DC signals substantially without attenuation, and oscillation signals substantially without reflection. In the preferred implementation, the network carries both TV signals and computer network signals, such as ethernet signals. In this context the

carrying of DC signals substantially without attenuation, by way of a controlled DC resistance in the network, enables the proper functioning of ethernet oscillation detection.

Fig. 1 is a schematic illustration showing a first example network 10 which distributes TV signals to TV devices 15 and provides a local area network enabling data communications to pass between computer network devices 16. The TV signals and data communications are both carried via the coaxial cable segments 13.

It is envisaged that the cable segments 13 are those previously present, for instance, in a home for the purpose of distributing TV signals from a single feed point to various rooms in the home. Alternatively it may be that cable segments 13 are specifically installed for implementing a network according to this invention, but in any event, and advantageously from the wiring point of view, the same cable is used to carry the TV and data communication signals.

At the heart of network 10 is hub 12 which has a plurality of ports 12a. It also has a port 12b via which a TV signal feed is received. The TV signal feed may be derived from an appropriate source, eg. TV aerial, satellite dish, cable TV supplier, VCR or a combination of these. Hub 12 handles the received TV feed signal in a similar fashion to known TV signal distributers, that is it presents the TV signal as an output at each of ports 12a such that it is carried via cable segments 13.

Typically, the TV signals will be in the frequency range 45-900 MHZ. As will be described in detail below, the cable segments 13 also carry data communications passing between network devices 16, and these are typically in the frequency range 5 to 20 MHZ.

As can be seen in Fig. 1, each cable segment 13 which is connected to a port 12a of hub 12 is also connected at its other end, to a termination device 14. Although in a simple TV signal distribution system, cable segments not

attached to a TV device can be simply left unconnected to anything, in this network it is important, for reasons explained below, that each cable segment 13 is connected to a termination device 14, of which there may be present a number of different types, designated 14a, 14b, 14c, 14d.

In termination devices 14a, 14c, to which a TV device 15 may be connected there is provided a TV signal output means 141. This is essentially a high pass filter means arranged to output, via a further cable segment 15a, the TV signal only, for reception by TV device 15. As mentioned above, there are no problems caused by leaving a TV signal output not connected or electrically "hanging" and therefore it may well be that all the termination devices 14 in a network would be provided with TV signal output means 141, even where no TV device 15 was currently present. However it is possible to provide some termination devices 14b, 14d without TV signal output means 141, for instance for use where it is known that no TV device 15 will be used or where it is desired to prevent access to the TV signal.

The TV feed signal is thus distributed by being received at port 12b of hub 12, transmitted to cable segments 13 via ports 12a, passing through termination devices 14 via TV signal output means 141 where present and passing via cable segments 15a to TV devices 15.

The termination devices 14 also are arranged to handle the data communications which pass via cable segments 13 between the network devices 16 connected to the network. As will be described in more detail in the following, each termination device 14 is provided either with data communication output means 142 when it is desired to connect a network device 16 to the particular termination device 14 or with a termination means 143 where no network device in connected. Although each termination device 14 in Figure 1 is illustrated as having one or other of these items it would equally be possible and convenient to have both provided within each termination device, the necessary one being

switched into operation according to whether a network device is connected.

As illustrated in Figure 1 termination devices 14a, 14d are provided with data communication output means 142. Essentially this is a low pass filter means arranged to output, via a further cable segment 16a, the data communication signals only for reception by network devices 16. In the simplest arrangement the data communication output means 142 may simply provide a straight through path between cable segment 13 and cable segment 16a for the lower frequency signals forming the data communications such that they reach network devices 16. As will be described in more detail below, network devices 16 are provided with transceiver means 17 which, amongst other functions, properly terminate cable segments 16a at the data communication frequencies such that no reflections are generated as is well known to be important in data communication arrangements.

In termination devices 14 to which no network device 16 is connected, there is no such termination provided by a transceiver 17. It is therefore necessary to provide termination means 143 in termination devices 14b, 14c to which no computing device 16 is attached. Termination means 143 simply provide the necessary data frequency impedance at the end of the cable segments 13 such that no reflection of the data communications is generated which would otherwise interfere with the proper operation of the data communication side of the overall network.

It will be appreciated that data communication output means 142 is in fact a two-way communication device allowing data communications received from a connected cable segment 16a to be passed to the corresponding cable segment 13 and thereby to hub 12. Hub 12 is provided with means to ensure that all communications received at any one of ports 12a that the data communication frequency is provided as an output at the others of ports 12a such that data communications transmitted by any one of computing devices 16 reach the others of computing devices 16 to enable the computer network to function.

Hub 12 also implements measures to ensure that the collision detection mechanisms in network devices 16 function correctly. In order to assist a full understanding of this aspect of the present invention, an outline of the operation of a collision detection system in accordance with the 10Base-2 Ethernet protocol will be given in conjunction with the diagrams in Figure 2.

In the 10Base-2 protocol the data is transmitted in accordance with a system which ensures that, whenever data is being transmitted, a particular DC voltage level appears on the communications medium. This is achieved, in this protocol, by ensuring that, whatever the sequence of data bits which is being transmitted, the applied current is on for half the time and off for half the time. In particular, timeslots are defined for the transmission of the data bits and the value of the data bit which is being transmitted in any timeslot is not represented by an absolute current level but rather by the direction of a current transition in the centre of the timeslot. Thus, for instance, if it is desired to transmit a zero bit, the corresponding transition may be negative going, while if it is desired to transmit a one bit the corresponding transition is positive going. It will be appreciated then that whatever value of bit is being transmitted, the current applied during the corresponding timeslot is on for half the time and off for half the time ensuring that a constant average or DC level is created during the transmission of a sequence of bits.

Figure 2a illustrates in schematic form the voltage which appears on the communications medium when a data packet in the 10Base-2 protocol is applied to the medium. In this protocol it is in fact the case that the voltages which appear are negative as compared to the quiescent state of the transmission medium, but it will be understood that all of the following description is equally appropriate to a system in which positive currents and voltages are used. Also, it should be noted that the diagrams in Figure 2 merely illustrate oscillating waveforms representative of the transmission onto the transmission medium. In

practice, the oscillation would not be regular as it represents a sequence of bits of different values, and would also have many more transitions than illustrated in the transmission of a data packet.

In Figure 2a the oscillating voltage level on the transmission medium generated by the application of the desired bit sequence is illustratively represented by the solid line 10 and it will be understood that this creates a short term average or DC level on a communications medium as represented by the dashed line 12.

In order to perform collision detection, each network device connected to such a network compares the present DC voltage level with a threshold level, represented by line 14, and if the DC level reaches or crosses the threshold then it is indicated that a collision has occurred. As is shown in Figure 2a, during the transmission of a single communications packet, the DC level 12 never reaches threshold level 14 and therefore no collision is detected.

Figure 2b illustrates the occurrence of a collision in such a network caused by attempts being made to transmit more than one communications packet on the network at one time. Figure 2b illustrates a situation in which a first communications packet is transmitted onto the communications medium beginning at time T1. This alters the voltage levels on the transmission medium in a corresponding manner to the beginning of diagram 2a. However, at time T2 a second network device begins applying a second communications packet to the transmission medium. The applied currents are simply additive and therefore the overall voltage level, and in particular the DC voltage level represented by line 12, significantly increases. This pushes the DC value 12 across threshold 14 and the devices attached to the network detect a collision and assume that neither of the two communications packets have been properly received and that both require retransmission.

At time T3 one of the two communications packets is stopped from

being transmitted and the collision period ends, with the other communications packet continuing to be transmitted until time T4. However, because of the occurrence of the collision period between times T2 and T3 it is assumed, as mentioned above that neither of the two communications packets has been properly transmitted.

Figure 2c illustrates the same situation as Figure 2b as regards the application of communications packets to the communications network, but in this case the communications network has characteristics such that the voltages appearing on the network to it are attenuated. In such a situation, the reception of the data in the communications packets in the absence of collisions may not be significantly affected because, as discussed above, it is represented by the changes between different voltage levels. However, as illustrated in Figure 2c, the operation of the collision detection mechanism is significantly affected by the attenuation in the voltage. In particular, as shown in Figure 2c, even between times T2 and T3 where in fact two communications packets are being applied to the network, DC level 12 never reaches threshold level 14 because of the attenuation and therefore the devices do not properly detect the occurrence of the collision. As the two packets will be interfering with each other during this time their data will be corrupted, but the network devices do not detect that this has occurred, causing a significant deterioration in the operation of the network.

It will therefore be seen from the above discussion that it is important that, at least, the DC levels generated on the network are properly maintained in order to ensure proper functioning of the network and in particular the collision detection.

Returning to Figure 1 each of ports 12a of communications hub 12 is provided with matching circuitry so as to receive data communications via an attached cable segment 13 without reflection and communications hub 12 is arranged such that communications received at any port 12a are distributed to all

of the cable segments 13 attached to the device. It is inevitable, given the nature of the required matching circuitry and the number of cable segments which the signals may be distributed to, that some attenuation of the signals will be caused, but as discussed above, this does not cause significant difficulties for the proper reception of the data by the other network devices 16 attached to network 10.

However, also as discussed above, if this attenuation also arises in the DC signal, this can cause significant difficulties for the proper detection of collisions in the network. As a first step to overcoming this difficulty, the communications hub 12 is arranged such that it presents a low port to port resistance at DC while still presenting, as discussed above, a matched impedance to the cable segments at signal frequencies. This arrangement ensures that the DC level is not significantly attenuated as it passes through the communications hub 12.

This is not sufficient alone to overcome the collision detection problem because now there is a low port to port DC resistance at communications hub 12 the transceivers 17 and termination means 143 all now appear as simple parallel connected devices at DC. The overall resistance presented at DC by the transceivers 17 and termination means 143 will therefore be a function of the number of devices connected to the network and, in this situation, the performance of the collision detection would be dependent upon the number of devices connected to the network, which is clearly unsatisfactory.

As a further measure therefore network 10 is arranged such that transceivers 17 and termination means 143 provide an infinite DC resistance. This can be achieved by using a termination impedance that is matched to the characteristic impedance of the cable at the signal frequency but is open circuit at DC. This may be achieved by using a series R-C combination.

Finally, to ensure proper operation, a single defined DC resistance must be provided and this is arranged by connecting a single resistor of the

required value across the line at one point in network 10. This resistor must be connected across the line via a suitable low pass filter so that it only defines the DC or low frequency load and does not affect the signal frequency impedance.

In Figure 1 it is illustrated that this final single resistance means is provided as means 28 in communications hub 12. This is illustrated schematically as a resistor connected via a low pass filter and this is, as mentioned, simply connected across the line.

In fact, this single DC resistance can be provided anywhere in network 20 and although it is convenient to provide it in the communications hub which is the centre of the network in at least some circumstances, it may equally well be provided in one of the transceivers 17, perhaps in combination with the circuitry providing the AC termination, or as a further alternative it would be possible to provide it as an entirely separate device having a further connection via a cable segment 13 to one of the ports 12a of communications device 12.

It will be seen therefore that this embodiment provides a star or tree connected passive network in which the transmitted data is communicated properly around the network to the various network devices and also the DC level is maintained around the network to ensure that a situation as illustrated in Figure 2c does not occur and collisions may be properly detected as illustrated in Figure 2b.

In broad terms then, the network deals with three frequency signal bands in different ways: the high frequency TV signals are simply distributed as in a normal TV distribution system; the lower frequency data signals are communicated throughout the network, albeit with some attenuation, but with proper termination such that reflections do not occur; and the very low frequency and DC signals are passed around the network with no attenuation to ensure proper operation of the collision detection systems.

As illustrated in Figure 1, network devices 16 are connected to cable

segments 16a by way of transceiver devices 17. As mentioned above, these devices are arranged to provide correct termination both at data rates and at DC. They also function to apply the signals to the network communication medium and, in one arrangement, are arranged to apply appropriate currents to the medium, according to the characteristic impedances of the cabling.

Figure 3 illustrates the connection of a network device 16 to a cable segment 16a in an alternative arrangement which facilitates the connection of a network device 16 arranged in a standard fashion as if it were to be attached to a standard Ethernet 10Base-2 network. It is therefore provided with transceiver 161 which is arranged to provide signals to and receive signals from a standard 10Base-2 network and in particular it provides outputs signals at appropriate amplitudes for the characteristic impedance of the cables used in 10Base-2 networks and is arranged to receive signals and the normal amplitudes in such a network.

In the embodiment of Figure 3, network device 16 has associated with it interface means 162 for receiving the signals output from transceiver 161 and also arranged to provide input signals to transceiver 161 in the expected form. In more detail, interface means 162 provides separate signal paths for the incoming and outgoing signals such that these can be treated in different fashions by signal conversion means 162a in order to provide the necessary interfacing between transceiver 161 and cable segments 16a which may have different characteristics from the coaxial cable normally used in Ethernet 10Base-2 networks. It may in fact be only one of the incoming or outgoing signals requires any treatment by signal conversion means 162a and therefore it may be that signal conversion means 162a simply provides a straight through path for the other one of the incoming or outgoing signals.

Figure 4 illustrates a particular embodiment of interface means 162 which is used in one embodiment of this invention. As discussed above, what is important is that the expected voltage levels generated in the network by the

application of the signal currents are at the appropriate levels to enable the correct functioning of the collision detection mechanisms. The impedance presented to transceiver 161 when it is attached in the normal fashion to an Ethernet 10Base-2 network is 25Ω. If standard TV coaxial cable is used for the cable segments in the network of Figure 1, the characteristic impedance presented by cable segment 16a is 75Ω. The embodiment illustrated in Figure 4 is arranged to be used in such an embodiment.

Figure 4 schematically illustrates the provision of data frequency line termination by appropriately specified capacitor 44 and the resistor 42.

Outgoing signals transmitted from transceiver 161 are received via line 301 in Figure 4 and are passed through a dual current mirror formed by transistor pairs 304 and resistors R, 3R interconnected in a standard fashion to present a new output signal on line 302. Basically this arrangement reduces by a factor of 3 the current in the output signal and it will be appreciated that, as the load impedance is increased by a factor of 3 this keeps the voltage amplitude the same as that on a conventional 10Base-2 network. The significance of this is that it enables the collision detection mechanisms at the other network devices 16 to function properly as such mechanisms rely on the threshold detection of voltage magnitude.

In this embodiment all of the requisite signal conversion is therefore conducted on the outgoing signals from network devices 16 and therefore incoming signals do not require conversion. It may be therefore that interface means 162 simply provides a straight through path for received signals from cable 16a for presentation to transceiver 161, but it is also possible that an amplifier 46 may be provided before the input is provided on line 32.

It will be appreciated therefore that this invention provides a network of considerable usefulness in that it combines the distribution of both Ethernet and TV signals, and also provides a simple passive arrangement for the transmission of Ethernet signals. Variations on the described arrangements are of course

possible and fall within the scope of the invention. For instance, although the network has been described in simple terms having only a single communication hub, it is equally possible to implement the invention in a tree network having a plurality of interconnected hubs, and such an arrangement may be particularly advantageous for some required physical arrangements of connected devices.

CLAIMS:

1. A network comprising a plurality of end stations, a passive communications hub having a plurality of ports and a plurality of cable segments each arranged to connect one of said plurality of end stations to a port of said passive communications hub; wherein

said end stations are arranged to apply oscillating electrical signals to the respective cable segments, said oscillating electrical signals having a substantially DC component and an oscillating component in a predetermined frequency range;

said passive communication hub comprises means defining a low or zero DC resistance between said ports such that a said substantially DC component received at one of said plurality of ports appears substantially without attenuation at the others of said plurality of ports, and impedance means matched to the characteristic impedance of said cable segments arranged such that a said oscillating component received at one of said plurality of ports is received without reflection and appears at the others of said plurality of ports; and

each of said end stations comprises termination means defining an effectively open circuit DC resistance at the end of the cable segment to which it is attached and an impedance matched to the characteristic impedance of said cable segment in said predetermined frequency range;

except that there is further provided within the network means defining a predetermined DC resistance effective throughout the network.

2. A network arranged to distribute TV signals and to carry data communications between computing devices attached to the network, the network comprising a passive communications hub having a plurality of ports, a plurality of cable segments suitable for the transmission of TV signals and a plurality of termination devices, the cable segments each being arranged to connect a

termination device to a port on the communications hub, the communications hub being arranged to distribute TV signals therethrough and also comprising means arranged to receive data communications at any port without reflection and to provide the received data communications as outputs at others of said plurality of ports, each said termination device comprising termination means arranged such that data communications are not reflected at such termination means, at least one of said termination devices being arranged to present said TV signals as an output from the network and at least one of said termination means being arranged to present data communications received via a respective cable segment as an output from the network.

3. A network according to claim 2 in which said passive communication hub comprises means defining a low or zero DC resistance between said ports such that a said substantially DC component received at one of said plurality of ports appears substantially without attenuation at the others of said plurality of ports; and

each of said termination devices comprises termination means defining an effectively open circuit DC resistance at the end of the cable segment to which it is attached;

except that there is further provided within the network means defining a predetermined DC resistance effective throughout the network.

4. A network according to claim 1, 2 or 3 comprising a plurality of said communication hubs interconnected by ones of said cable segments.

5. A network according to claim 2 or 3 in which one of said ports of said communication hub is connected to a source of TV signals and is arranged to distribute TV signals received at said one port to the others of said ports and is arranged not to output signals received at the others of said ports to said source.

6. A network interface connector for a network device to be attached to a computer network, the device comprising means to convert standard computer network signals suitable for distribution via a network presenting a first characteristic impedance to signals suitable for distribution via a network presenting a second characteristic impedance.

7. A network interface device according to claim 6 arranged to convert signals suitable for transmission via a standard 10Base-2 arrangement to signals suitable for transmission via TV cabling.

The Patent Office

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Databases searched:

UK Patent Office collections, including GB, EP, WO & US patent specifications, in:

UK Cl (Ed.Q): H4P: PPBB, PPBC, PPC. PPNE

Int Cl (Ed.6): H03H, H04H, H04L

Other: Online: WPI, JAPIO, EPODOC

Documents considered to be relevant:

Category	Identity of document and relevant passage		Relevant to claims
A	EP 0412220 A1	HEWLETT - see especially abstract and figure 1	1, 2
A	EP 0292072 A1	PHILIPS - see especially abstract and figure 1	1, 2

X	Document indicating lack of novelty or inventive step	A	Document indicating technological background and/or state of the art.
Y	Document indicating lack of inventive step if combined with one or more other documents of same category.	P	Document published on or after the declared priority date but before the filing date of this invention.
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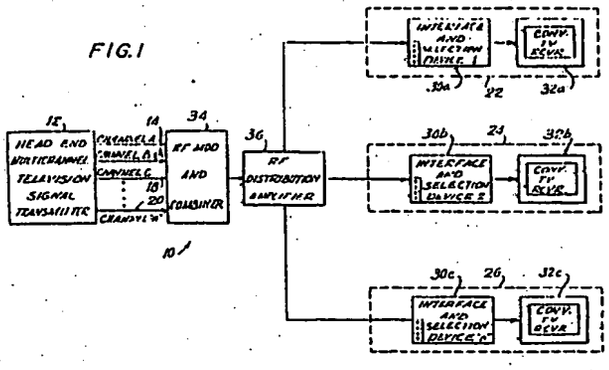
(54) Closed circuit television system having seamless interactive television programming and expandable user participation.

(57) A closed circuit interactive television system (10) provides a multichannel television signal from a localized head end (12) which is used for individualized interactive selections by a plurality of users (22, 24, 26). Each user station contains a conventional television receiver (32a, 32b, 32c) and a smart box or interface and selection device (30a, 30b, 30c). The smart box or interface and selection device (30) is disposed between the television receiver (32) and the RF distribution amplifier (36). The number of user stations (22, 24, 26) on the system (10) is virtually unlimited. The system (10) provides the audio/video television signals (14, 16, 18, 20) in at least frame accurate synchronization to enable seamless video switching between channels, which seamlessness is enhanced through the view of a pair of tuners in the interface selection box (30a, 30b, 30c) which are alternately commanded to pretune to the channel of the next actual choice made prior to the changeover under control of a microprocessor in response to command signals embedded in the television signals being received.

FIG.1



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Description

Closed Circuit Television System Having Seamless Interactive Television Programming And Expandable User Participation

CROSS REFERENCE TO RELATED APPLICATIONS

This application is related to previously issued U.S. Patents Nos. 4,507,680 entitled "One Way Interactive multisubscriber Communication System"; 4,573,072 entitled "Method for Expanding Interactive CATV Displayable Choices for a Given Channel Capacity"; 4,602,279 entitled "Method for Providing Targeted Profile Interactive CATV Displays" 4,264,924 entitled "Dedicated Channel Interactive Cable Television System", and 4,264,925 entitled "Interactive Cable Television System", the contents of all of which are specifically incorporated by reference herein in their entirety, and is an improvement thereon to enable the provision of discrete closed circuit interactive television systems, such as for training or educational purposes, as opposed to a larger scale cable television or broadcast system such as described in the aforementioned related patents.

TECHNICAL FIELD

The present invention relates to interactive television communication systems and particularly to closed circuit television systems for providing seamless interactive television programming with unlimited expandability of usership.

BACKGROUND ART

Real time conversational student response teaching apparatus are known, such as described in U.S. Patents Nos. 3,947,972 and 4,078,316. In addition, multiple choice student response systems are well known, such as exemplified by the system disclosed in U.S. Patents Nos. 2,921,385 ; 3,020,360 ; 2,826,828, 3,623,238 ; 3,546,791 ; 3,273,260 ; 3,665,615 ; 3,245,157 ; 3,284,923; 3,538,621 ; 3,477,144 ; 3,708,891 ; 3,255,536 ; 2,777,901 ; 2,908,767 ; 3,774,316 ; 3,194,895 ; 3,484,950 ; 3,343,280 , and 3,763,577 by way of example. None of these Prior Art systems, however, has been adapted to be employed in a closed circuit interactive television system having seamless interactive television programming in what appears to be a two-way interactive network in which the individualized television programming information to be received by the individual users of such a training or educational system may be independently displayed on a common program display channel of a conventional television in response to independent user selection from a multichannel television signal. Moreover, although prior art cable television systems are known in which a plurality of unrelated television programs, under control of a computer, are transmitted over a common television channel for selection by the individual subscribers, such as disclosed in U.S. PatentsNos. 3,814,841 and 3,757,225, such systems are not one way interactive systems capable of independent subscriber selectable reception of simultaneously transmitted multi-information television programming for providing a closed circuit television system having seamless interactive television programming independently displayable on a common program display channel. Furthermore, although U.S. Patents Nos. 4,624,924 ; 4,624,925 ; 4,507,680, 4,573,072; and 4,602,279 are all interactive television systems, they are primarily directed to mass audience cable or broadcast television systems as opposed to a discrete localized closed circuit television system capable of readily providing seamless interactive television programming. Such local education television programming has generally previously been provided through video disc or compact disc searching systems and methods with inherent disadvantages such as requiring one video disc per user with visible rather than seamless branching due to the time required to search and locate an upcoming branch. Moreover, such systems are quite costly, generally cannot run for a great length of time, can only be used by one user at a time and require each user to have a complete system of a player, a video disc and a computer. These disadvantages of the prior art are overcome by the present invention.

DISCLOSURE OF THE INVENTION

The present invention relates to a closed circuit discrete multichannel interactive television system for providing individualized interactive television programming to an expandable plurality of users connected into the closed circuit interactive television system in which switching between individualized television signals in a multichannel television signal transmitted from a head end occurs in a seamless manner for enabling display on a common program display channel of a given user interactive selection on an associated conventional television receiver via an interface and selection device, or smart box, connected between the television receiver and the head end. The head end is a multichannel television signal transmitter, such as a multiplexed video player or a plurality of single video players for continuously transmitting a multichannel television signal. The multichannel television signal transmission comprises a plurality of different interactively selectable audio/video television signals which are at least in frame accurate synchronization with respect to each other and contain command signals embedded therein for controlling provision of the individualized television programming on the common program display channel. The interface and selection device is responsive to the embedded command signals for enabling the aforementioned switching between the individualized television signals in a substantially instantaneous seamless interactive television display presentation having invisible

branching (searching). Different television receivers in the system are capable of displaying different individualized television signals on the common program display channel at substantially the same time dependent on the various independent interactive user selections for the plurality of users at any given time. The interface and selection device may include a microprocessor and a pair of television signal tuners for pretuning the associated television receiver to a television signal frequency corresponding to the next individualized television signal for display on the associated television receiver common program display channel dependent on the user selection before an actual change in the television display on the common program display channel occurs in response to the independent user interactive selection for maintaining seamlessness on the television display despite interactive changes in the television signal selected for display from the multichannel television signal. If desired, the capability of the interactive television programming provided on the closed circuit interactive television system of the present invention may be expanded through the use of stacking of the available responses to be selected. In addition, the system is transparent to the number of users connected to it and may readily be expanded by merely connecting a conventional television receiver to the system via an interface and selection device.

BRIEF DESCRIPTION OF DRAWINGS

Fig. 1 is a block diagram of the overall presently preferred closed circuit interactive television system in accordance with the present invention ;

Fig. 2 is a block diagram of a typical presently preferred interface and selection device, or smart box, in accordance with the present invention, for use on the system of Fig. 1 ;

Fig. 3 is a schematic diagram, partially in block of a typical presently preferred selector board portion of the interface and selection device of Fig. 2 ; and

Fig. 4 is a schematic diagram, partially in block, of a typical presently preferred control board or microprocessor control portion of the interface and selection device of Fig. 2.

BEST MODE FOR CARRYING OUT THE INVENTION

Referring now to the drawings in detail, and initially to Fig. 1 thereof, the presently preferred closed circuit interactive television system in accordance with present invention, generally referred to by the reference numeral 10, is shown. The closed circuit television system 10 preferably provides a plurality, preferably four by way of example, of audio/video television signals in at least frame accurate synchronization from a head end multichannel television signal transmitter 12, with four such channels labeled "A" 14, "B" 16, "C" 18 and "n" 20 being shown by way of example in Fig. 1. Preferably, all of these television signals 14,16,18,20 are continuously transmitted to the plurality of users in the closed circuit interactive television system 10 which may readily be expanded to include any desired number of users, with "n" such users being represented in Fig. 1 by the three user stations 22, 24 and 26 in Fig. 1. As shown and preferred in Fig. 1, and as will be described in greater detail hereinafter, each user station 22, 24, 26 preferably includes a conventional RF demodulator 28a, 28b, 28c, respectively, an interface and selection device or smart box 30a, 30b, 30c, respectively, and a conventional television receiver 32a, 32b, 32c, respectively, which may preferably receive the desired interactive television programming on a common program display channel, such as channel 3, which is preferably an unused channel for normal television broadcast so that the television receiver 32a, 32b, 32c may also receive conventional television broadcast. This becomes particularly important in a classroom environment where the television receiver 32a, 32b, 32c is normally used to receive localized television programming created in the school as well as outside conventional television broadcasts as part of the educational instruction in the classroom. In this regard, the presently preferred closed circuit interactive television system 10 of the present invention readily lends itself to such uses as localized educational system for schools, localized training systems, localized control of marketing displays, localized where the head end 12 is located in one room in the building and the users distributed gambling systems in hotels, etc., by way of example, throughout the building as opposed to the mass audience systems provided by conventional cable television networks.

As further shown and preferred in Fig. 1, the audio/video television signals 14, 16, 18, 20 which are preferably provided simultaneously in frame accurate or better synchronization, may be provided to the various users as a multiplexed multichannel television signal from conventional RF modulators 34 and a combiner via a conventional RF distribution amplifier 36 having as many output ports as students or users connected on the system 10. Users may readily be added or subtracted from the closed circuit interactive television system 10 merely by adding or removing another typical user station 22, 24 or 26. To do thus, assuming a user is to be added to the system 10, the user need only add a smart box or interface and selection device 30 between a conventional television receiver 32 and one of the output ports of the RF distribution amplifier 36. On the system 10 itself is transparent to the number of users 22, 24 or 26 on the system 10, which provides an unlimited expansion of users with no additional headened hardware or software.

Preferably, each smart box or interface and selection device 30 takes commands, only from the particular channel the associated user is on, from command signals embedded in the audio/video television signals being transmitted from the head end 12 (or can be on the audio subcarriers) and can switch or change between the multiple channels being transmitted. Since the multiple channels in the multichannel television signal being transmitted from the head end are preferably in frame accurate synchronization or better, such switches appear to be seamless, that is the television display never freezes or goes blank, and are essentially

instantaneous. As will be described in greater detail hereinafter, preferably the interactive television program being transmitted from the head end 12 is made in such a way as to anticipate possible switches or branch changes and to design the camera shots and audio so that each change will match each other similar to the way a conventional television edit matches. In this manner, the user or viewer would therefore see a seamless television program that contains regular camera cuts as well as camera cuts that also create branches, which means that in addition to a camera cut the channel may also change, such as illustrated by way of example below in Table A :

Table A

Channel A	Channel B	Channel C	Channel "n"
/Camera shot is wideshot/ Thank you for indicating your education level.	Nothing is on this channel at this point	Nothing is on this channel at this point	Nothing is on this channel at this point.
/Cut to close up camera shot/	/Cut to close up camera shot/	/Cut to close up camera shot/	/Cut to close up camera shot/
I can see from your answer that you never finished high school. I'll remember this and refer to it later.	I can see from your answer that you are a high school graduate. I'll remember this and refer to it later	I can see from your answer that you are a college graduate. I'll remember this and refer to it later.	I can see from your answer that you have done graduate work. I'll remember this and refer to it later.

Preferably, in creating the above interactive television programming, the most likely branch is the one that is shot through on a continuous basis. As a result, most of the time camera angle changes are not necessary for a likely branch.

With respect to the head end 12, the source of the prerecorded television signals for the desired interactive television programming can be conventional four 1/2 inch VHS machines, 3/4 inch video tape machines, 1 inch professional machines, video disc players run on synch as opposed to search, or a single tape source that is multiplexed down to hold four separate signals, such as the alternate field and alternate frame approach. The wire or connection from the head end 12 to the various smart boxes or interface and selection devices 30, may preferably be coaxial cable, fiber optics, or direct baseband video and audio, by way of example.

Referring now to Figs. 2-4, a typical preferred smart box or interface and selection device 30 is shown. As

shown and preferred in Figs. 2-4, the interface and selection device is preferably a microprocessor 40 based device that receives all of the transmitted television signals, such as four in the above example, and can preferably instantaneously switch between all four signals only letting one through to the associated television receiver 32. As shown in Fig. 4, which is a detailed schematic of the microprocessor or control board 40 portion of the system 10, the control board 40 has logic, intelligence, and memory. In addition, as shown and preferred, a pair of conventional tuners 44, 46 are provided in interface and selection device 30 each of which can tune to the one of the plurality, or 4 by way of example, of signals which it wishes to receive and pass through to the associated television receiver 32. Preferably, the second television tuner 46 is provided to enhance the seamlessness of the system 10. Thus, since conventional television tuners may not be able to tune to one of the other television frequencies fast enough to maintain the seamless nature of the system 10, the second tuner 46 is provided which preferably returns to the proper television frequency that the microprocessor 40 tells it will be the next channel it will be changing to. This preferably happens microseconds before the actual change but this is enough to maintain seamlessness. The first tuner 44 would then be instructed to pretune to the next change that is coming up. Thus, the tuners 44 and 46, which are conventional such as available from Sanyo, and which preferably each comprise an RF section 50a, 50b, respectively and a demodulator section 52a, 52b, respectively alternate in pretuning the channel to the television frequency of the next channel under control of the microprocessor 40 and tuner control 160. The interface and selection device 30 also preferably includes a conventional vertical interval synch detector 54 which detects the vertical synch in the received television signal so as to enable the change or switching between channels at the vertical interval to, once again, enhance seamlessness. The actual switch between tuners/demodulators is accomplished by conventional video switch 42 and conventional audio switch 41. In addition, on input selector 56, such as a four button keypad is provided either independently or on the smart box 32 for enabling the interactive selection of a plurality of different user interactive choices or responses during the interactive programming being transmitted from the head end 12. The input selector is either wired directly to the smart box or communicates via an infrared communication link. In addition, conventional joysticks sensors, buttons and the like may also be employed as user input devices.

Preferably, as previously mentioned, embedded in the various television signals, are instrumentation codes that instruct the smart box 30 in switching, memory, logic and computional codes, such as the manner of coding explained by way of example, in U.S. Patent No. 4,507,680, the contents of which are incorporated by reference herein in their entirety. The codes, as described in U.S. Patent No. 4,507,680, are preferably embedded on line 21 and the video signals are decoded by decoder 43 to provide this command information to the microprocessor 40. The smart box 30 preferably only requires the codes that exist on the various television channels it passes through to its associated television receiver 32. It will, thus preferably, not receive, and will ignore, the embedded codes on the other channels. Of course, for each user in the system 10, the resulting code stream is likely to be different because the combinations of the different channels they see will likely be different.

Thus, the presently preferred system 10 has instant invisible branching because the branches come from one of the other three channels that are already in frame accurate synchronization with the source channel. The interactive television programming used with the system 10 is preferably designed so that the channel the user is on will always cut or edit match any other channel the user might change to in the interactive television transmission. This is preferably similar to how an edit is performed in post production video except that in that instance the video will always be on the same channel. Thus, in effect, the present invention 10 is a real time dynamic editing system that creates innumerable combinations and versions of the program based on how the channels are switched, which, in turn, depends on the selections made by the user in conjunction with the corresponding smart box commands.

The system 10 of the present invention may incorporate any of the features set out in any of the aforementioned patents incorporated by reference herein, such as stacking, which is described by way of example in U.S. Patent No. 4,573,072. Suffice it to say that four channels, for example, do not limit the system 10 to only four outcomes. Stacking can increase this number to 6,9 or even more. Stacking provides time delays in responses. Such time delays, which are invisible to the user since program material or filler is created on one of the channels, allow for branching to be expanded to more alternatives than the number of available channels. For example, with one channel as filler, six possible outputs can be given ; and if this channel filled 2 time slots, then 9 outputs could be given, such as illustrated below in Table B :

Table B

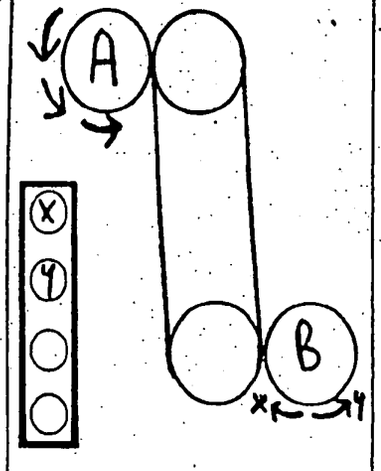
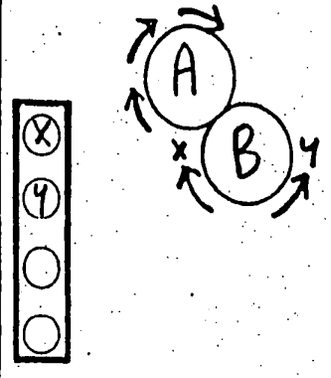
CHANNEL 1	DIALOGUE	DIALOGUE FILLER	DIALOGUE FILLER
2	OUTPUT 1	OUTPUT 4	OUTPUT 7
3	OUTPUT 2	OUTPUT 5	OUTPUT 8
4	OUTPUT 3	OUTPUT 6	OUTPUT 9

In addition to the above, annexed hereto as Table C is an example of a typical script for an interactive television program in accordance with the present invention.

By utilizing the system of the present invention, a discrete closed circuit multichannel interactive television system is provided, having instantaneous invisible branching between interactively selected choices, and which is readily expandable through the use of a smart box and a conventional television.

ACTUAL SCRIPT EXAMPLE

CHANNEL 1	CHANNEL 2	CHANNEL 3	CHANNEL 4
Let's do some training. These are called Pulley Problems, and they always appear on the college board exams: Now, if Wheel A is moving in the direction indicated, in which direction would Wheel B move? Answer either "X" or "Y" -- you've got seven seconds. So answer either X or Y. COMPUTER COMMANDS: If viewer selects X, then stay on Channel 1; if viewer selects Y, then go to Channel 2; if viewer selects an unlabeled button, then go to Channel 3; or, if viewer fails to answer, then go to Channel 4. You have answered...	NOTE: The horizontal dotted lines indicate the instant of possible channel changes.		

CHANNEL 1	CHANNEL 2	CHANNEL 3	CHANNEL 4
...Direction X -- good work! Tracing through it, we can see that you are right. So <u>let's give you a more difficult pulley problem</u> for the next one:  	...Direction Y, and I'm sorry -- that's wrong. Tracing through it, you can see that Wheel B should move in Direction X. Since you answered that one wrong, <u>let's try an easier pulley problem:</u>  	...by pushing an unlabeled button, so I would have to score you wrong. Tracing through, you can see that Wheel B should move in Direction X. <u>I'd better give you an easier pulley problem;</u> this time, please follow the instructions. (Same diagram as on Channel 2.) ←	...too late. You only had seven seconds, so I'll have to mark you wrong. You see, if Wheel A moves this way, then Wheel B should move in Direction X. <u>I think I'd better give you an easier pulley problem.</u> But this time, try to answer more quickly please: (Same diagram as on Channel 2.) ←
If Wheel A is moving in the direction indicated, in which direction would Wheel B move this time? Answer either Direction X, or Direction Y. You have six seconds -- Direction X or Direction Y.	If Wheel A moves in the direction indicated, in which direction would Wheel B move? You have six seconds. Answer either Direction X or Direction Y.	If Wheel A moves in this direction, which direction does Wheel B move? You have six seconds. Answer either Direction X, or Direction Y.	Wheel A moves in this direction; in which direction does Wheel B move? You have six seconds. Answer either Direction X or Direction Y.
<u>COMPUTER COMMANDS:</u> If the viewer selects X, then go to Channel 2. If the viewer selects Y, then stay on Channel 1. If the viewer selects an unlabeled button or fails to answer, then go to Channel 2.	<u>COMPUTER COMMANDS:</u> If the viewer selects X, then go to Channel 4. If the viewer selects Y, then go to Channel 3. If the viewer selects an unlabeled button or fails to answer, then go to Channel 4.	<u>COMPUTER COMMANDS:</u> If the viewer selects X, then go to Channel 4. If the viewer selects Y, then stay on Channel 3. If the viewer selects an unlabeled button or fails to answer, then go to Channel 4.	<u>COMPUTER COMMANDS:</u> If the viewer selects X, then stay on Channel 4. If the viewer selects Y, then go to Channel 3. If the viewer selects an unlabeled button or fails to answer, then stay on Channel 4.

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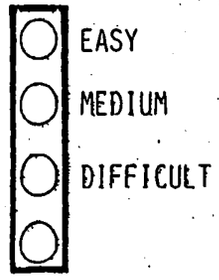
CHANNEL 1	CHANNEL 2	CHANNEL 3	CHANNEL 4
You've answered Direction Y. That's right -- good work! You're really good at these! Let's trace through it together: Wheel A moves in that direction; Wheel B moves in Direction Y. (Stay on Channel 1.) Let's go to another kind of problem found on college board exams. These are called "Fulcram Displays," and since we haven't encountered these problems yet in this course, why don't you choose the level of difficulty.  Choose either easy, medium, or difficult. COMPUTER COMMANDS: If viewer selects easy, stay on Channel 1; if viewer selects medium, go to Channel 2; if viewer selects difficult, go to Channel 3; or if viewer selects an unlabled button or fails to respond, go to Channel 4.	You have answered Direction X, and I'm sorry -- but you're wrong this time. Tracing through, you can see that the correct answer would be Direction Y. (Automatic switch to Channel 1.)	You have answered Direction Y. Good work -- you're improving! If Wheel A moves in this direction, then Wheel B moves in Direction Y. (Automatic switch to Channel 1.)	You have answered X, and you are wrong again! Now, this is a very easy problem; watch, and I'll show you. Wheel A moves in this direction, then Wheel B moves in Direction Y. (Automatic switch to Channel 1.)

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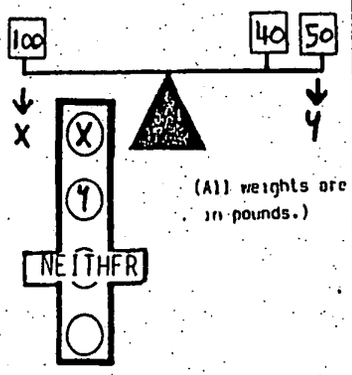
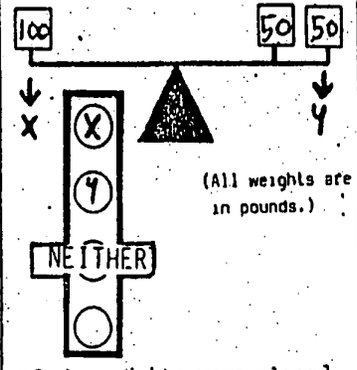
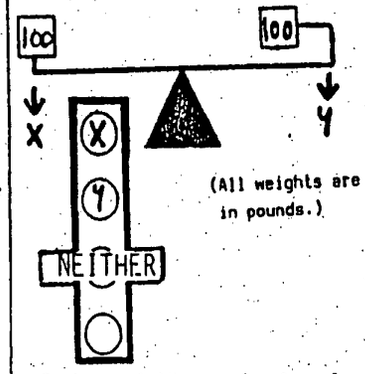
CHANNEL 1	CHANNEL 2	CHANNEL 3	CHANNEL 4
OK, let's do the <u>easy</u> question.  (All weights are in pounds.) If the weights were placed on this see-saw as indicated, which side would go down: X or Y? Please answer either X, Y, or neither if you think the weights would balance. This time you'll only have five seconds. <u>COMPUTER COMMANDS:</u> If viewer selects X, then stay on Channel 1. If the viewer selects Y, neither, an unlabeled button, or fails to answer, go to Channel 4.	OK, let's do the <u>medium</u> question.  (All weights are in pounds.) If the weights were placed on this see-saw as indicated, which side would go down: Side X, or Y? Please indicate your answer -- X, Y, or neither if you think they'd balance. You only have five seconds. <u>COMPUTER COMMANDS:</u> If the viewer selects X, then stay on Channel 2. If the viewer selects Y, neither, an unlabeled button, or fails to answer, then go to Channel 4.	OK, let's do that <u>difficult</u> one!  (All weights are in pounds.) If the weights were placed on this see-saw as indicated, which side would go down? Answer either X, Y, or neither if you think they'd balance. This time you have five seconds. <u>COMPUTER COMMANDS:</u> If the viewer selects X, then stay on Channel 3. If the viewer selects Y, neither, an unlabeled button, or fails to answer, then go to Channel 4.	OK, I see that you've made some error, so I'll choose the <u>easy</u> one for you. (Same diagram as Channel 1.) If the weights were placed on this see-saw as indicated which side would go down? Answer either X, Y, or neither if you think they'd balance. You have five seconds. <u>COMPUTER COMMANDS:</u> If the viewer selects X, then go to Channel 1. If the viewer selects Y, neither, an unlabeled button, or fails to answer, then go to Channel 4.

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CHANNEL 1	CHANNEL 2	CHANNEL 3	CHANNEL 4
You are right -- X would go down. And even though this was an easy question, it's still good work.	You are right -- X would go down. And even though you chose the medium question, this is still good work.	You are right -- X would go down. And since you chose the difficult question, this is especially good work.	You are wrong. X would go down. Now, at this point I would explain the principles behind Fulcram Display problems, and then I would give you a group of remedial ones to go through. In addition, shows like these can keep track of your cumulative progress, and at the end of each program, I can review your overall performance.
COMPUTER COMMANDS: If the viewer answered both pulley problems wrong, or answered the first pulley problem right and the second pulley problem wrong, then go th Channel 1. If the viewer answered the first pulley problem wrong and the second pulley problem right, then go to Channel 2. If the viewer answered both pulley problems right, then go the Channel 3.			COMPUTER COMMANDS: If the viewer answered both pulley problems incorrectly, then go to Channel 1. If viewer answered one pulley problem wrong and the other right (in either order), then go to Channel 2. If the viewer answered both pulley problems correctly, then go to Channel 3. (Switch to Channels 1, 2, or 3, as indicated above.)
Well, that's all the time we have for today. Now, in reviewing your performance I can see that although you had trouble with the pulley problems, you did get the Fulcram Display problem right. The appropriate program for you on this system would be the intermediate program. (Automatic switch to Channel 4.)	Well, that's all the time we have for today. Now, in reviewing your performance I can see that although you got the first pulley problem wrong, you did get the easier one right, and the Fulcram Display problem right. The appropriate program for you on this system would be the intermediate program. (Automatic switch to Channel 4.)	Well, that's all the time we have for today. In reviewing your performance, I see that you got both pulley problems and the Fulcram Display problem right. Congratulations -- that's perfect performance! The appropriate program for you on this system would be the advanced program. (Automatic switch to Channel 4.)	
In this program you missed both the pulley problems and the Fulcram Display problem. This is not good performance. The appropriate program for you on this system would be the beginners program. Good day.	In this program you had mixed results with regard to the pulley problems, and you missed the Fulcram Display problem. The appropriate program for you on this system would be the intermediate program. Good day.	In this program, although you got both the pulley problems right, you did miss the Fulcram Display problem. The appropriate program for you on this system would be intermediate program. Good day.	Thanks for joining me -- have a nice day. (Closing filler.)
END	END	END	END

Note: In the above script, all camera shots were designed so that the resulting show appears continuous and seamless to the user, no matter which allowable branch path was taken.

Claims

1. A closed circuit discrete multichannel interactive television system for providing individualized interactive television programming to a plurality of users connected into said closed circuit interactive television system (10), characterized in that said system comprises a localized head end multichannel television signal transmission means (12), a plurality of conventional television receiver means (32a, 32b, 32c) for selectively receiving individualized television programming on a common program display channel, and an interface and selection means (30a, 30b, 30c) disposed between each of said television receiver means (32a, 32b, 32c) and said localized head end multichannel television signal transmission means (12) for receiving said transmitted multichannel television signal and converting it into an individualized television signal for display on said common program display channel on the television receiver means associated with a given user making an independent interactive user selection in response to said independent user selection of a given interactive response to a plurality of selectable interactive responses in said multichannel television signal transmission, each of said users having an associated television receiver means (32a, 32b, 32c) and interface and selection means (30a, 30b, 30c) for making said independent interactive user selection for providing said individualized television programming on said common program display channel, said multichannel television signal transmission comprising a plurality of different interactively selectable audio/video television signals (14, 16, 18, 20) in at least frame accurate synchronization with respect to each other, said interactively selectable television signals (14,16,18,20) further comprising command signals embedded therein for controlling provision of said individualized television programming on said common program display channel, said interface and selection means (30a, 30b, 30c) being responsive to said embedded command signals for enabling switching of said individualized television signal for display on said common program display channel between said plurality of interactively selectable television signals in a substantially instantaneous seamless interactive television display presentation on said common program display channel of said associated television receiver means, different television receiver means (32a, 32b, 32c) in said system being capable of displaying different individualized television signals on said common program display channel at substantially the same time dependent on the various independent interactive user selections of said plurality of users at any given time.

2. A closed circuit interactive television system in accordance with claim 1 characterized in that said interface and selection means (30) comprises a microprocessor means (40) and a television signal tuner means (44,46), said microprocessor means (40) responding to said individualized independent user interactive selection and said embedded command signals for pretuning said associated television receiver means to a television signal frequency corresponding to the next individualized television signal for display on said associated television receiver means common program display channel dependent on said independent user selection before an actual change in said television display on said common program display channel occurs in response to said independent user interactive selection; whereby said seamlessness is maintained for said television display on said common program display channel despite interactive changes in said television signal selected for display from said multichannel television signal.

3. A closed circuit interactive television system in accordance with claim 1 or claim 2 characterized in that said plurality of different selectable television signals (14,16,18,20) in said multichannel television signal comprise a plurality of edit matched individualized television signals, whereby the television frequency said conventional television means is tuned to at any given time will edit match into any other television frequency said television means is subsequently tuned to in response to a change in said user selection.

4. A closed circuit interactive television system in accordance with claim 3 characterizd in that one of said edit matched individualized television signals comprises a source channel television frequency and said other edit matched individualized television signals comprise different branch channel television frequencies being in frame accurate synchronization with said source channel television frequency ; whereby instant vertical interval invisible branching may be provided in response to different user selections.

5. A closed circuit interactive television system in accordance with claim 4 characterized in that said plurality of different selectable television signals (14,16,18,20) including said source channel comprises four.

6. A closed circuit interactive television system in accordance with claim 1, characterized in that one of said individualized television signals comprises a source channel and said other television signals in said plurality of different selectable television signals comprise different branch channels, said different branch channels being in frame accurate synchronization with said source channel ; whereby instant invisible branching may be provided in response to different user selections.

7. A closed circuit interactive television system in accordance with claim 6 characterized in that one of said edit matched individualized television signals comprises a source channel television frequency and

said other edit matched individualized television signals comprise different branch channel television frequencies being in frame accurate synchronization with said source channel television frequency ; whereby instant invisible branching may be provided in response to different user selections.

8. A closed circuit interactive television system in accordance with any one of claims 4 to 7 characterized in that said source channel comprises the most likely response in a plurality of selectable responses for said user during said television transmission.

9. A closed circuit interactive television system in accordance with any one of claims 1 to 8 characterized in that said multichannel television signal is continuously transmitted to said plurality of conventional television receiver means during a given program interval.

10. A closed circuit interactive television system in accordance with any one of claims 1 to 9, characterized in that said transmitted multichannel television signal comprises a sequence of a plurality of different multichannel television message stacks, each stack comprising a plurality of time concurrent multichannel television messages, said plurality of stacks comprising a stacking array, said stacking array providing a plurality of selectable time and space multiplexed complete prerecorded television messages from said head end (12), said array being transmitted in said closed circuit system (10) to said interface means (30a, 30b, 30c), a single substantially complete television message being interactively selectable from said array in response to said user selection for providing an interactive television message as said individualized television signal to said conventional television receiver means (32a, 32b, 32c) in said interface means (30a, 30b, 30c), the quantity of available interactively selectable prerecorded television messages in said array being greater than the quantity of available different television signals, said array comprising a television programming sequence having an interactively variable program information content for a given television program, said interface means comprising means for interactively selecting a multichannel message path through said array for providing said television programming sequence program information content, said interactive selection being multiplexed in both time and space in said array said interface means (30a, 30b, 30c) selecting said message path through said array in response to a single interactive selection, a different interactive selection providing a different message path through said array and a different program information content for said television programming sequence.

11. A closed circuit interactive television system in accordance with claim 10 characterized in that said program content for said given television program further comprises a common prerecorded television message commonly displayable during said given television program irrespective of any interactive selections of said interactively selectable television messages.

12. A closed circuit interactive television system in accordance with claim 11 characterized in that each of said complete television messages in said array comprising said television programming sequence comprises a segway portion for providing an information transition between said common television message and said television programming sequence, said television programming sequence and said common television message being adjacent in real time in a given television program.

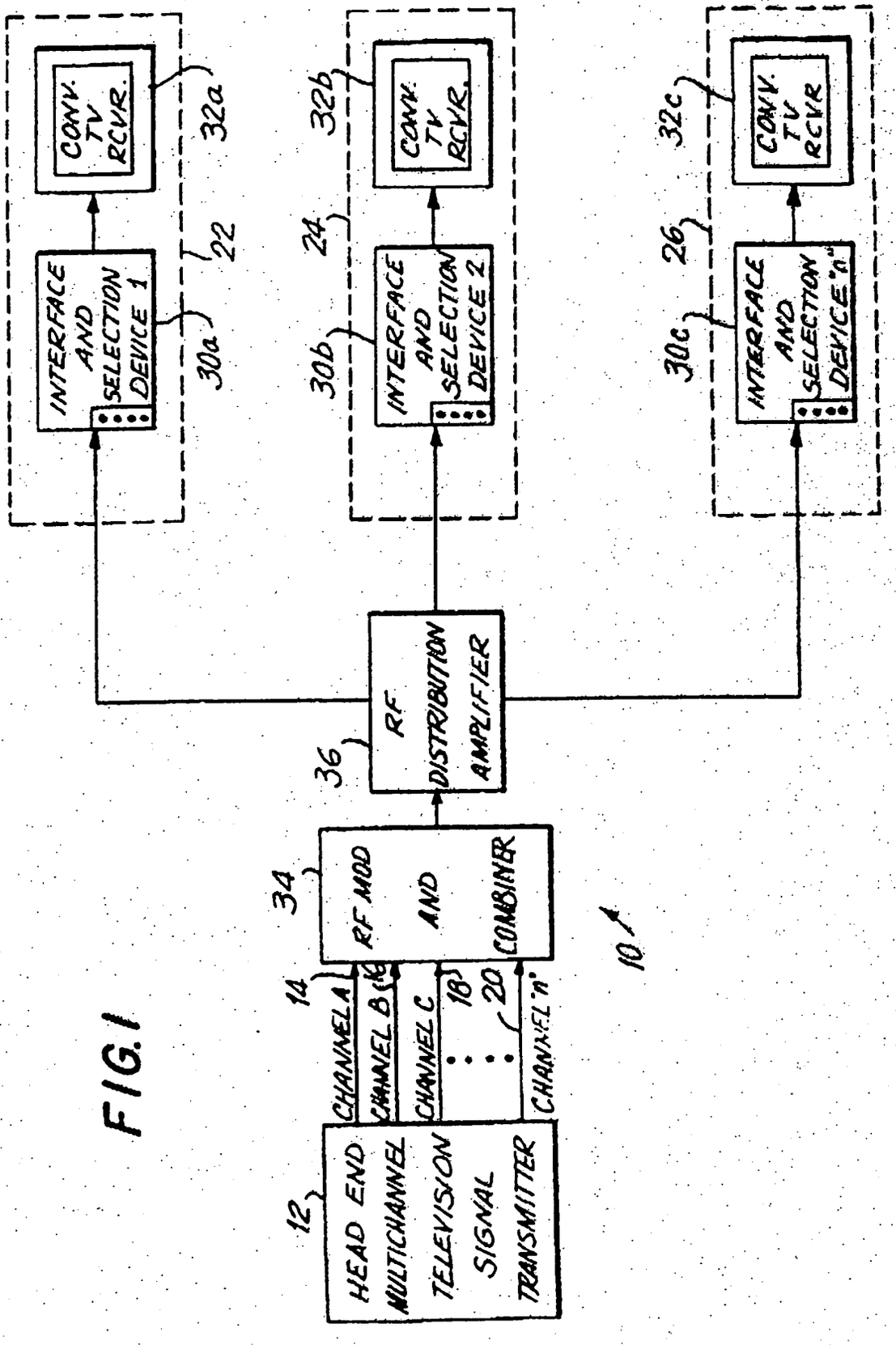

HEAD END MULTICHANNEL TELEVISION SIGNAL TRANSMITTER
12
CHANNEL A
CHANNEL B
CHANNEL C
18
20
CHANNEL 'n'
14
RF MOD AND COMBINER
34
RF DISTRIBUTION AMPLIFIER
36
10
INTERFACE AND SELECTION DEVICE 1
30a
22
CONV. TV RCVR.
32a
INTERFACE AND SELECTION DEVICE 2
30b
24
CONV. TV RCVR.
32b
INTERFACE AND SELECTION DEVICE "n"
30c
26
CONV. TV RCVR
32c

FIG.1

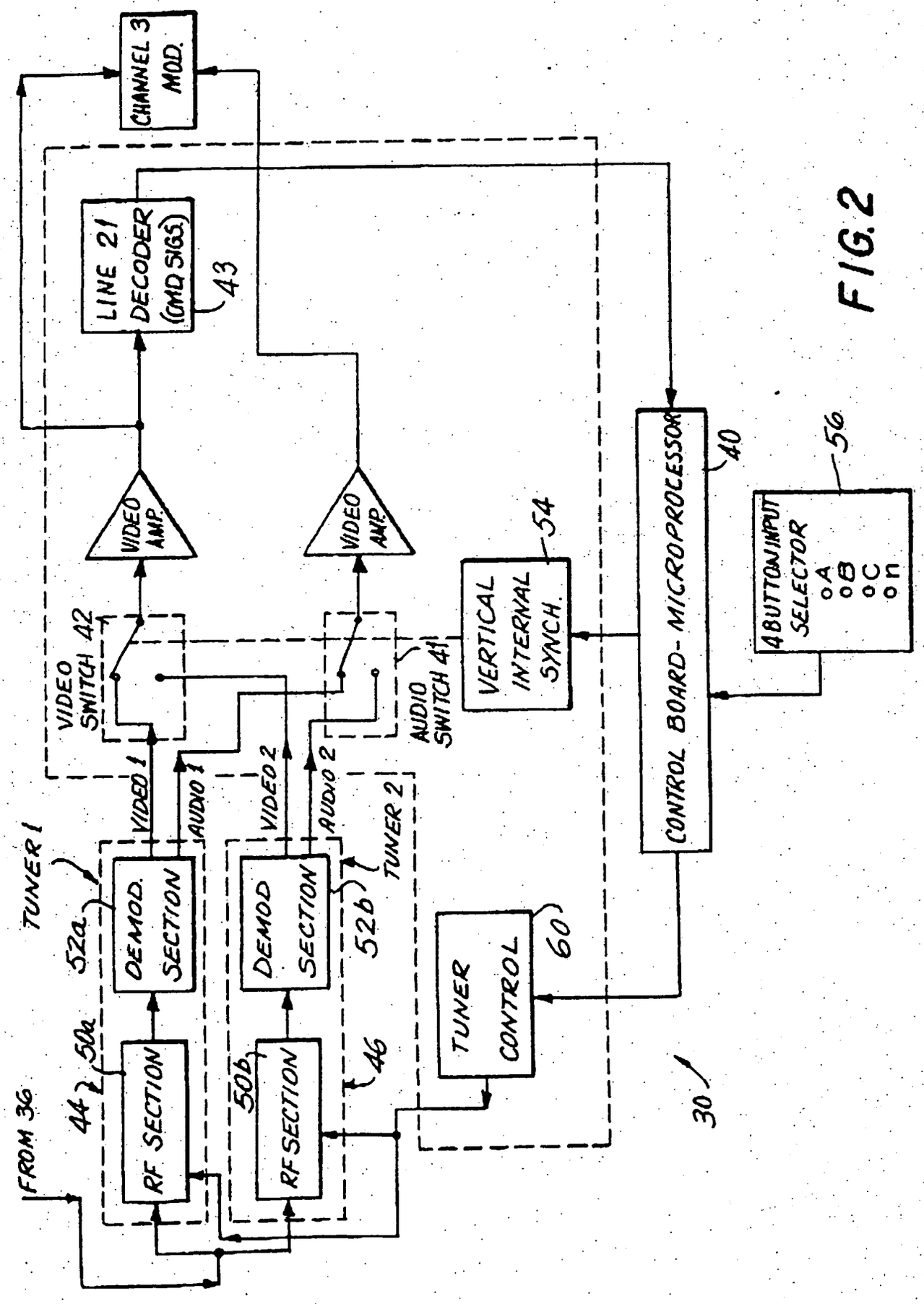

CHANNEL 3 MOD.
LINE 21 DECODER (CMD SIGS)
43
VIDEO AMP.
VIDEO AMP.
VIDEO SWITCH 42
AUDIO SWITCH 41
VERTICAL INTERNAL SYNCH.
54
CONTROL BOARD- MICROPROCESSOR
40
4 BUTTON INPUT SELECTOR
56
oA
oB
oC
on
TUNER 1
TUNER 2
VIDEO 1
AUDIO 1
VIDEO 2
AUDIO 2
DEMOD. SECTION
DEMOD SECTION
52a
52b
RF SECTION
RF SECTION
50a
50b
44
46
TUNER CONTROL
60
FROM 36
30

FIG.2

FIG. 3

FIG. 3A	FIG. 3B	FIG. 3C

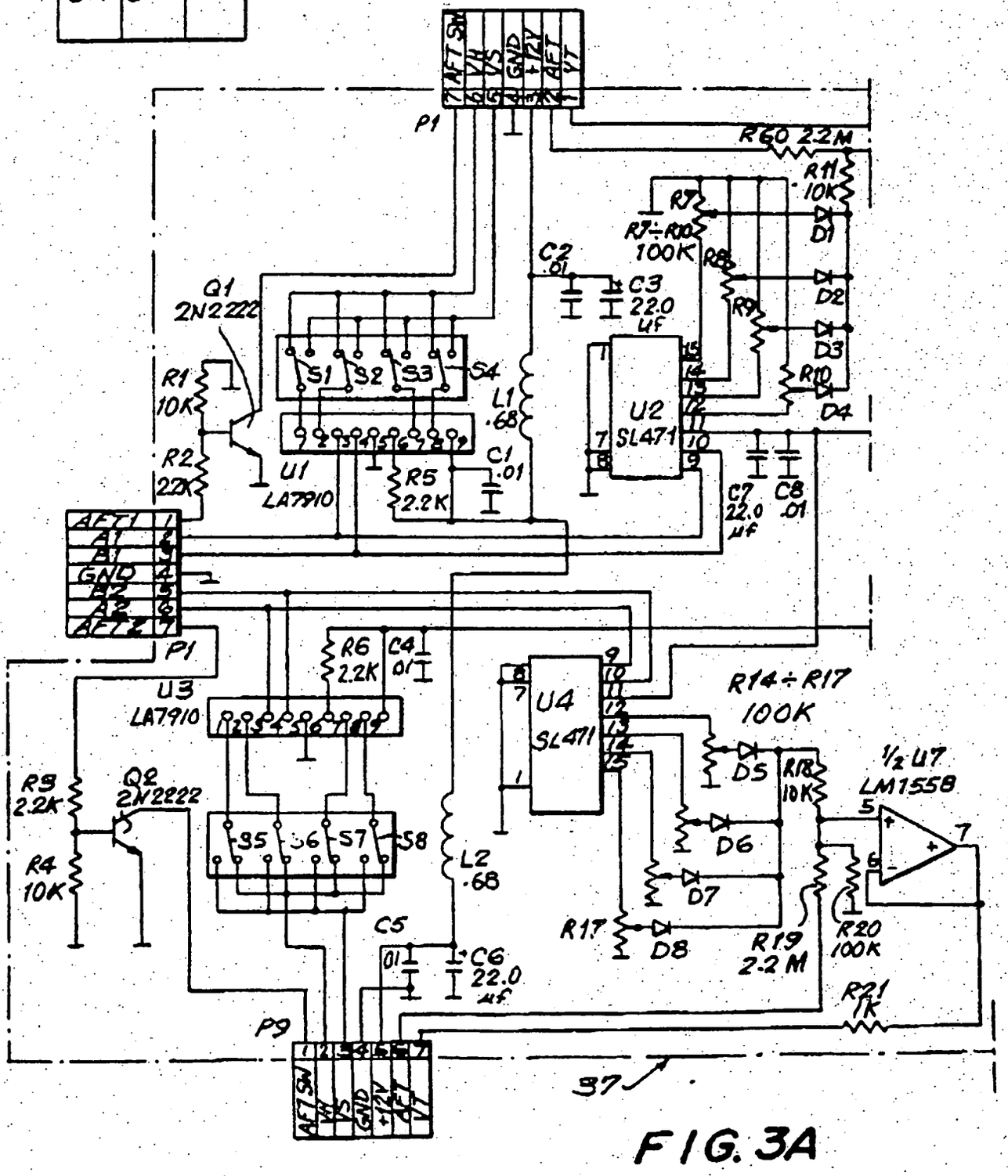
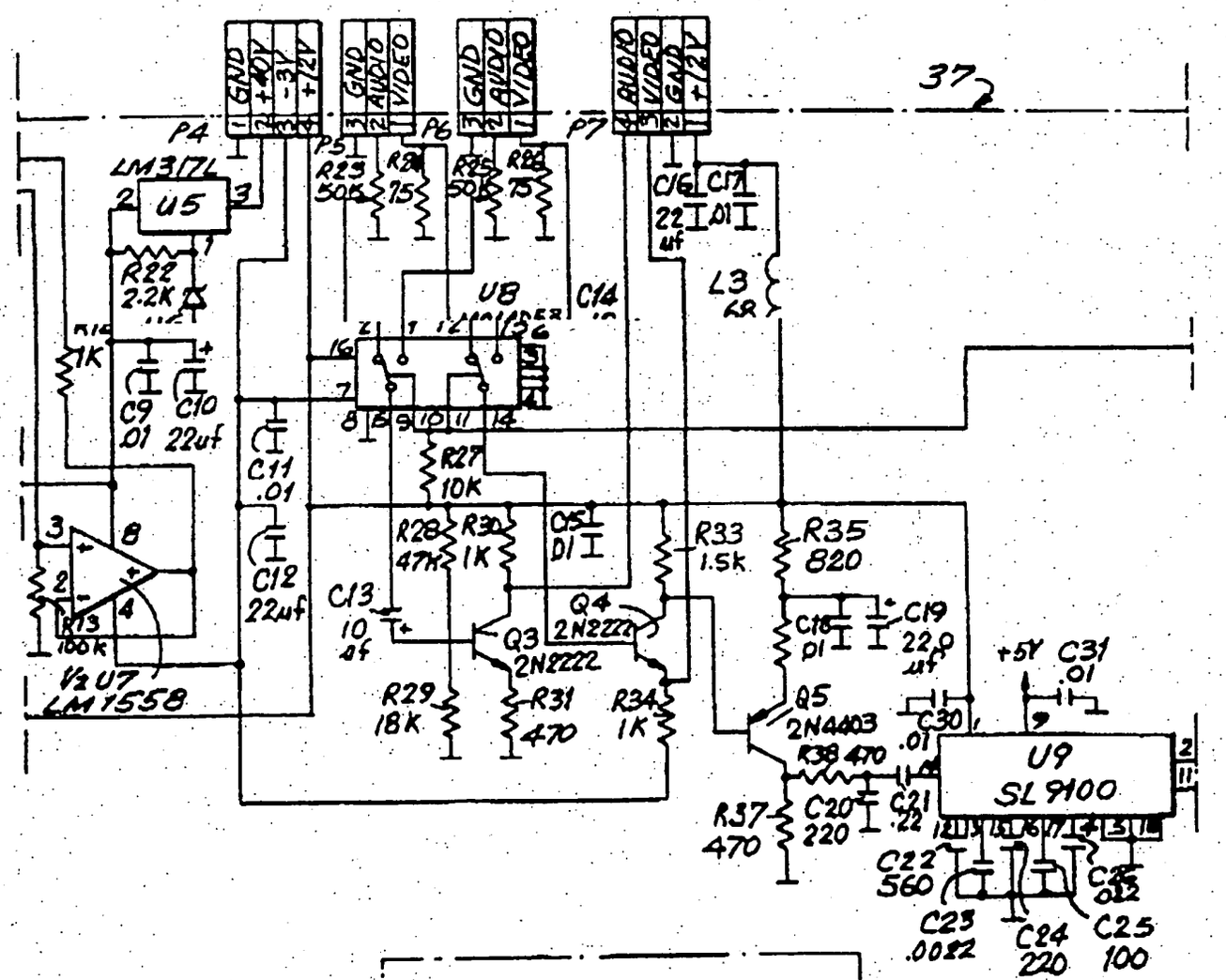


FIG. 3A

FIG. 3B



DESIGNATION	
LAST	UNUSED
C36	-
L3	-
P9	-
S8	-
Q7	-
X1	-
U16	-
D14	D9
R60	R32,42,51 THRU 58

FIG. 3C

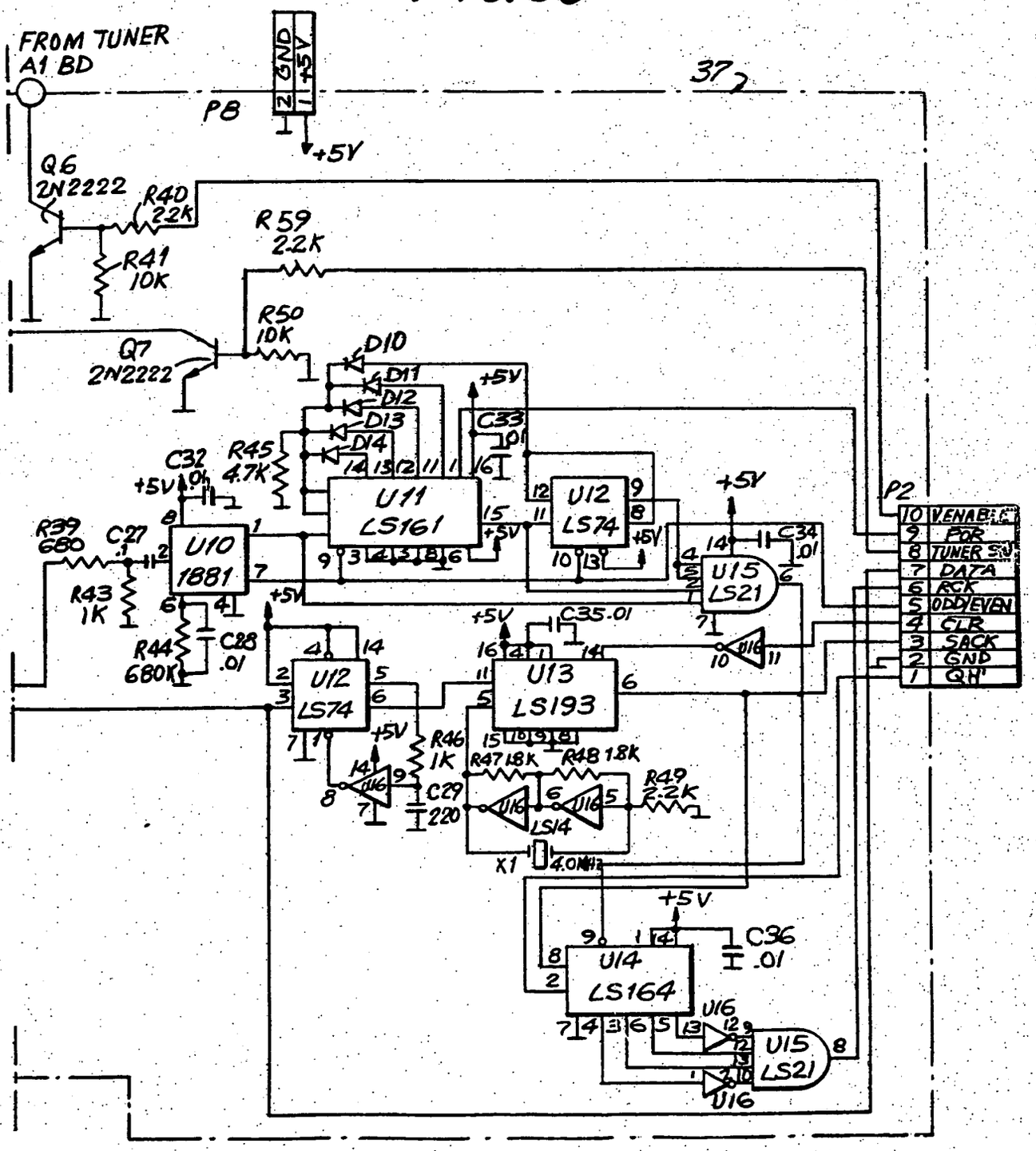
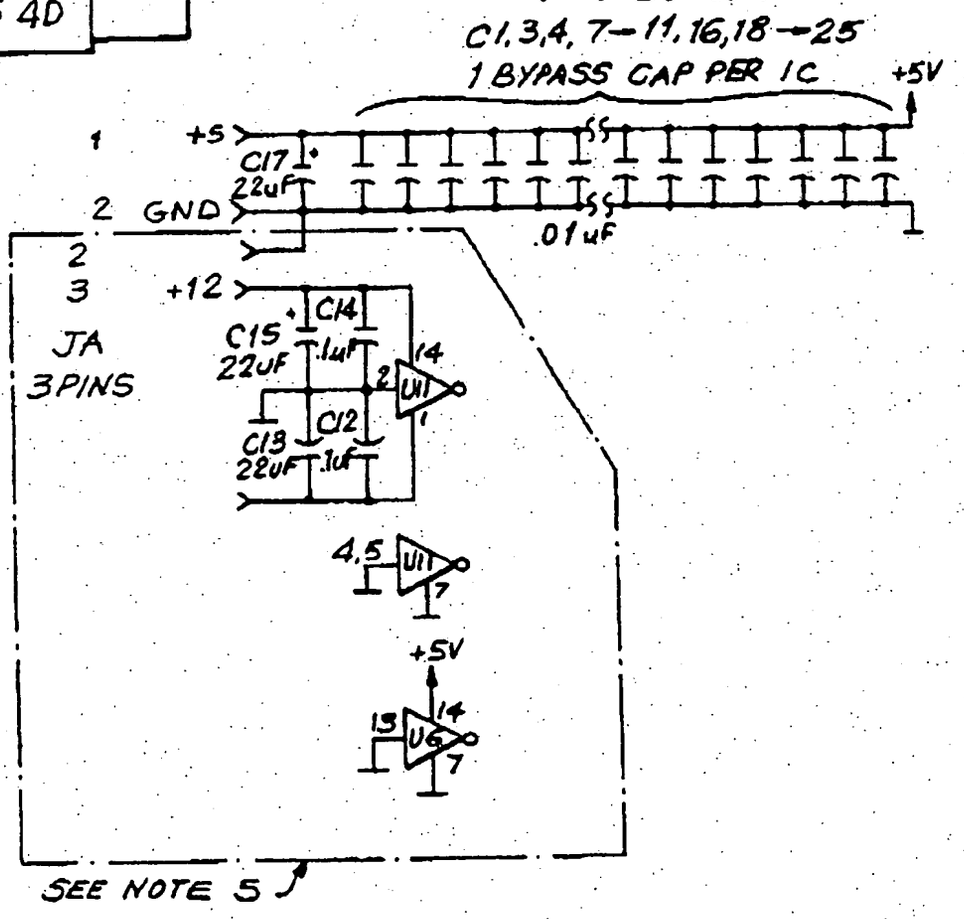

FROM TUNER A1 BD
P8
GND
+5V
+5V
37
Q6 2N2222
R40 2.2K
R41 10K
R59 2.2K
R50 10K
Q7 2N2222
D10
D11
D12
D13
D14
C32 .01
R45 4.7K
U11 LS161
C33 .01
U12 LS74
U15 LS21
C34 .01
P2
10 V.ENABLE
9 POR
8 TUNER SW
7 DATA
6 RCK
5 ODD/EVEN
4 CLR
3 SACK
2 GND
1 QH'
R39 680
C27 .1
U10 1881
R43 1K
R44 680K
C28 .01
C35 .01
U13 LS193
R46 1K
R47 1.8K
R48 1.8K
R49 2.2K
C29 220
U16 LS14
X1 4.0MHz
C36 .01
U14 LS164

FIG. 4

FIG. 4A	FIG. 4B	FIG. 4C
	FIG 4D	

FIG. 4A



U7	6809, MOTOROLA	MPU
U9	AMI S6516	16 STATIC RAM
U8	INTEL 2732 OR 2764	32K OR 64K E-PROM
U15	74LS 374	OCTAL D-LATCH
U16, U17	74LS 595	8 BIT SHIFT REG.
U14	74LS 244	OCTAL BUFFER
U3	74LS 137	3 BIT DECODER
U2	74LS 02	QUAD 2 IN NOR
U1	74LS 00	QUAD 2 IN NAND
U12, U13	74LS 74	DUAL D FLIP-FLOP
X1	4 MHZ	CRYSTAL

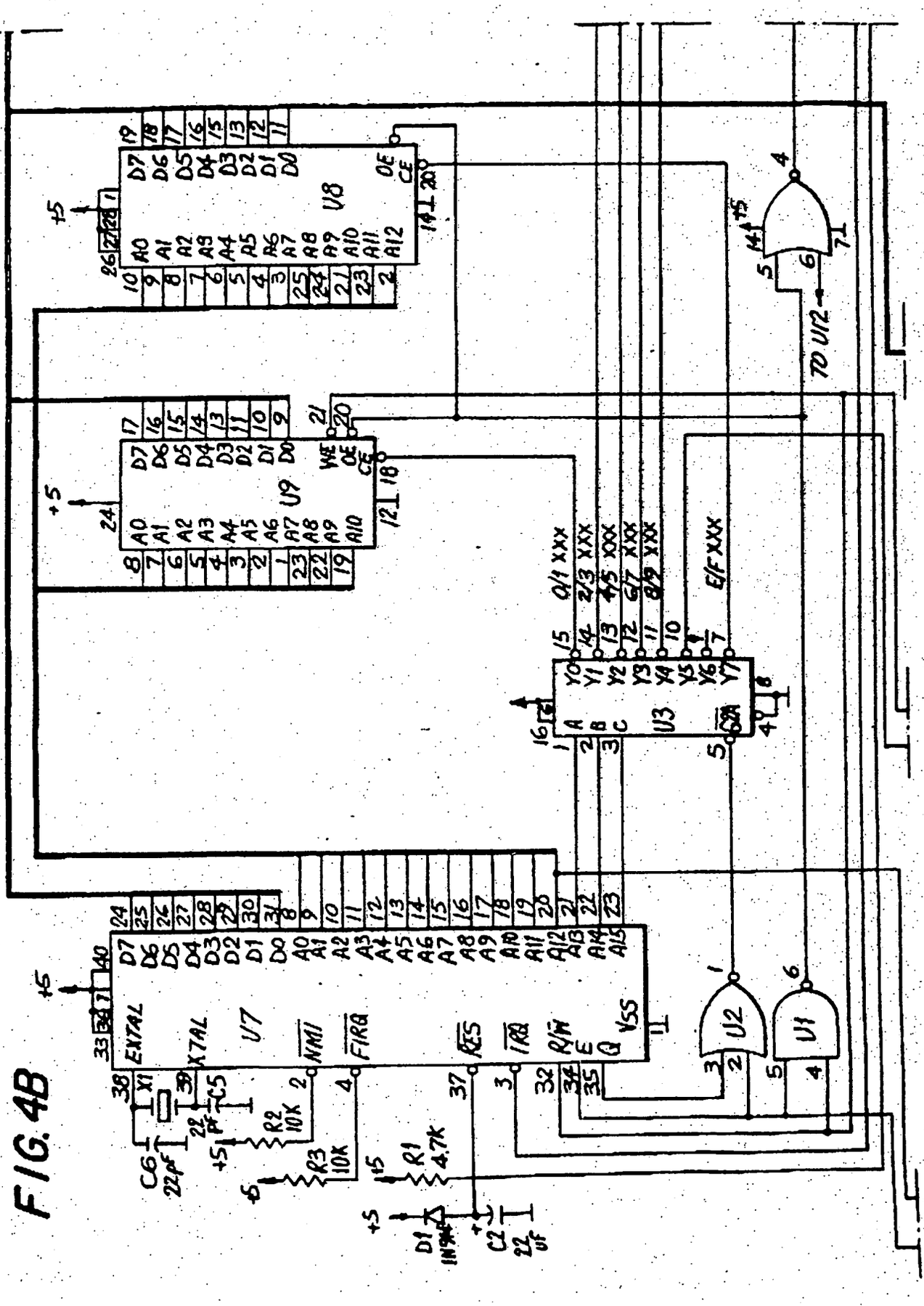

U8
U9
U7
U3
U2
U1
D7 D6 D5 D4 D3 D2 D1 D0
A0 A1 A2 A3 A4 A5 A6 A7 A8 A9 A10 A11 A12
OE
CE
WE
+5
Q1 XXX
2/3 XXX
4/5 XXX
6/7 XXX
8/9 XXX
E/F XXX
Y0 Y1 Y2 Y3 Y4 Y5 Y6 Y7
A B C
G2A
G2B
EXTAL
XTAL
NMI
FIRQ
RES
IRQ
R/W
E
Q
VSS
X1
C6 22pF
C5 28pF
R2 10K
R3 10K
R1 4.7K
D1 IN914
C2 22 uF
TO U12

FIG. 4B

FIG. 4C

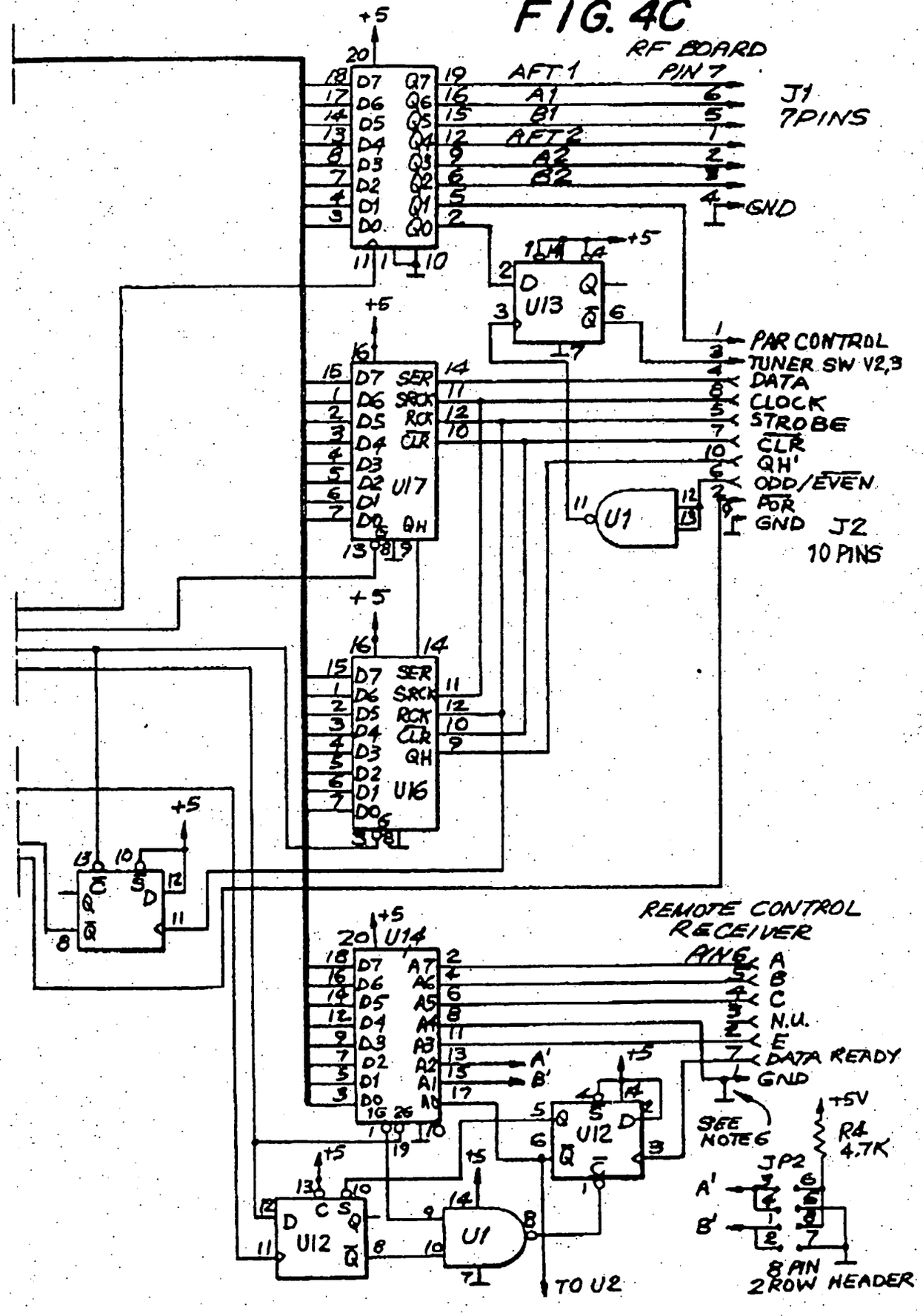
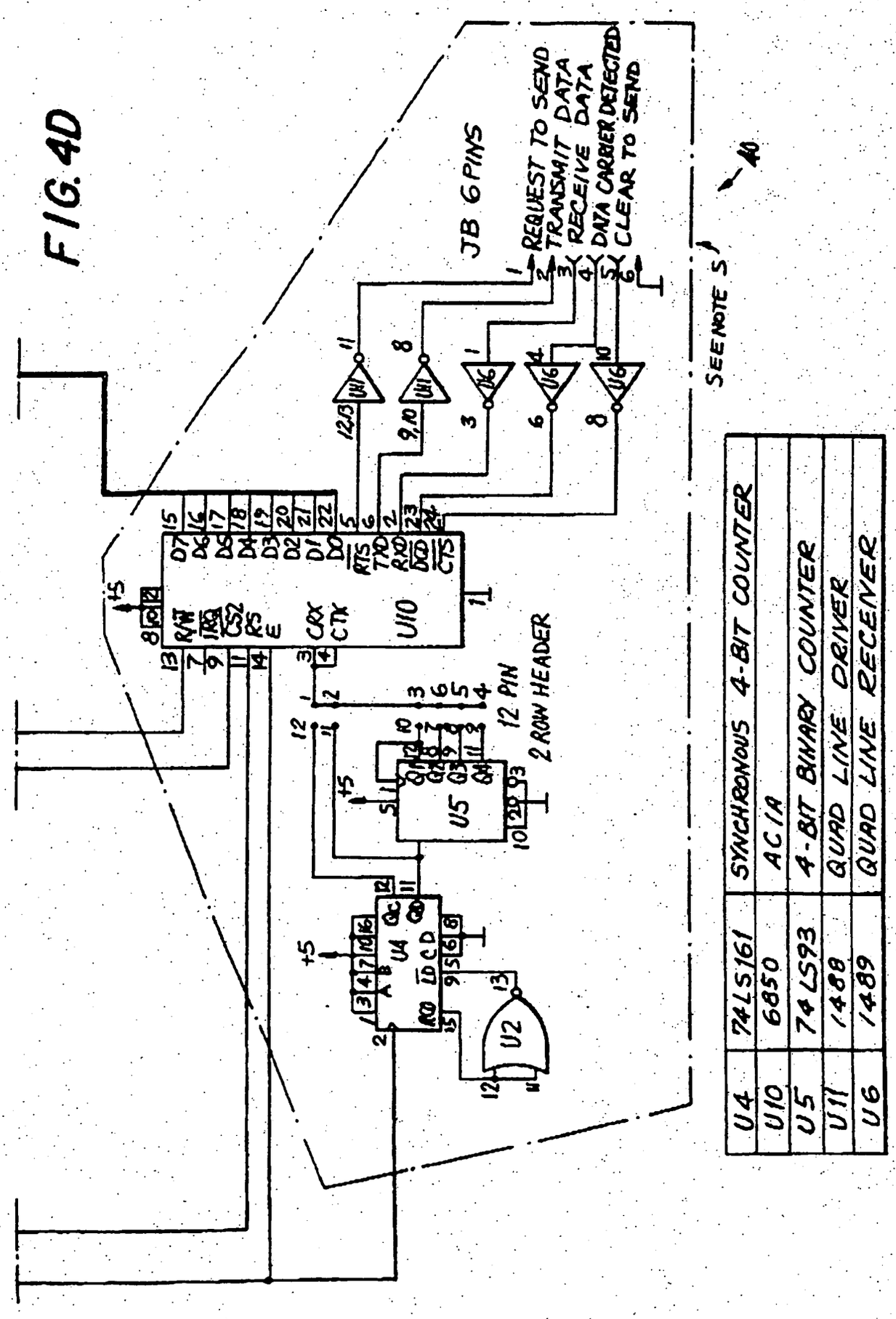

RF BOARD
AFT 1
PIN 7
A1
B1
AFT 2
A2
B2
J1
7PINS
GND
PAR CONTROL
TUNER SW V2,3
DATA
CLOCK
STROBE
CLR
QH'
ODD/EVEN
GND
J2
10 PINS
U13
U17
U16
U1
U12
U14
REMOTE CONTROL
RECEIVER
PIN 6
A
B
C
N.U.
E
DATA READY
GND
SEE NOTE 6
+5V
R4
4.7K
JP2
A'
B'
8 PIN
2 ROW HEADER
TO U2
+5

FIG. 4D



U4	74LS161	SYNCHRONOUS 4-BIT COUNTER
U10	6850	ACIA
U5	74LS93	4-BIT BINARY COUNTER
U11	1488	QUAD LINE DRIVER
U6	1489	QUAD LINE RECEIVER

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European Patent Office
Office européen des brevets

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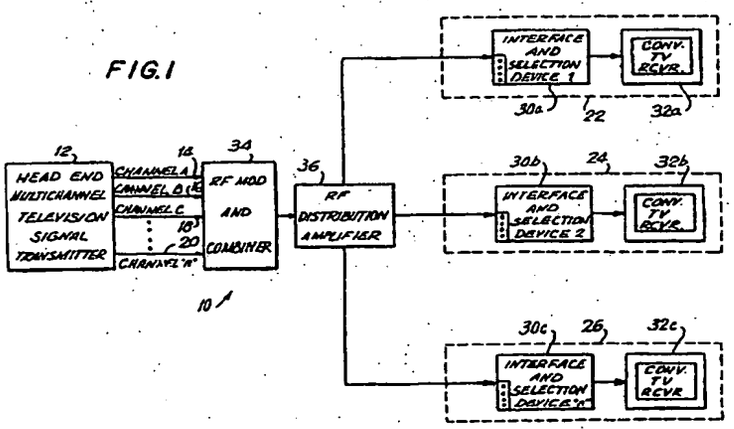
(54) Closed circuit television system having seamless interactive television programming and expandable user participation.

(57) A closed circuit interactive television system (10) provides a multichannel television signal from a localized head end (12) which is used for individualized interactive selections by a plurality of users (22, 24, 26). Each user station contains a conventional television receiver (32a, 32b, 32c) and a smart box or interface and selection device (30a, 30b, 30c). The smart box or interface and selection device (30) is disposed between the television receiver (32) and the RF distribution amplifier (36). The number of user stations (22, 24, 26) on the system (10) is virtually unlimited. The system (10) provides the audio/video television signals (14, 16, 18, 20) in at least frame accurate synchronization to enable seamless video switching between channels, which seamlessness is enhanced through the view of a pair of tuners in the interface selection box (30a, 30b, 30c) which are alternately commanded to pretune to the channel of the next actual choice made prior to the changeover under control of a microprocessor in response to command signals embedded in the television signals being received.

FIG.1



EP 0 314 572 A3

European Patent Office

EUROPEAN SEARCH REPORT

Application Number

EP 88 40 2701

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int. Cl.5)
A	GB-A-9 942 33 (SIEMENS & HALSKE) * Page 2, lines 98-112 *	1	H 04 N 7/16
A	US-A-4 199 781 (DOUMIT) * Abstract *	1	
A	US-A-4 647 980 (STEVENTON et al.) * Column 2, lines 5-34; column 5, lines 20-47 *	1	
A	US-A-4 439 784 (FURUKAWA et al.) * Column 6, lines 2-23 *	1	
A,D	US-A-4 264 924 (FREEMAN) * Column 3, line 65 - column 5, line 68 *	1	
A,D	US-A-4 573 072 (FREEMAN) * Abstract *	1,10	

TECHNICAL FIELDS SEARCHED (Int. Cl.5)

H 04 N

The present search report has been drawn up for all claims

Place of search	Date of completion of search	Examiner
The Hague	28 March 91	GREVE M.P.

CATEGORY OF CITED DOCUMENTS

X: particularly relevant if taken alone
Y: particularly relevant if combined with another document of the same catagory
A: technological background
O: non-written disclosure
P: intermediate document
T: theory or principle underlying the invention

E: earlier patent document, but published on, or after the filing date
D: document cited in the application
L: document cited for other reasons

&: member of the same patent family, corresponding document

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(54) Video decoder.

(57) A video decoder is proposed which receives packets of video information relating to moving video images from a packet switching network. In accordance with the invention a lot of hardware overhead is eliminated and much flexibility gained compared to prior art decoders in letting the decoding process, implemented via a decoding means (DEC1, DEC2), run asynchronously with respect to the display process, implemented via a display means (DIS). Moreover, and also in contrast with prior art decoders, the video decoder according to the present invention is not explicitly synchronized to its corresponding encoder by explicitly recovering the latters system clock. This is realized through buffering actions within a frame store memory (FSM) placed between the decoding means (DEC1, DEC2) and the display means (DIS). The variable length of such a buffer can be used to control the speed of the display process in order to prevent underflow or overflow of the latter buffer and corresponding image degradation. The latter is done via a control means (CON).

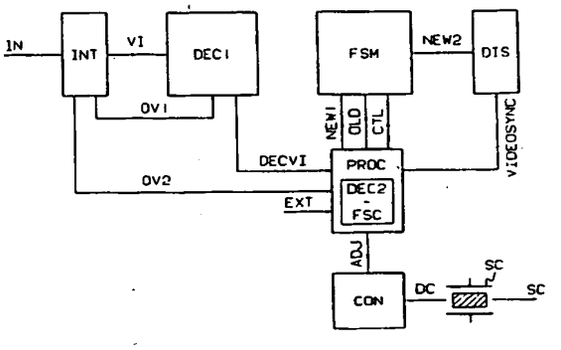

FIG. 1

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This invention relates to a video decoder, receiving packets from a packet switching network, said packets containing control information and video information, and said video decoder being able to process real time moving video images and including,

- decoding means deriving from at least said video information new units of decoded video information relating to a current video frame;
- a memory module in which said new units are stored;
- display means displaying said stored new units on a video screen.

Such a video decoder is well known in the art, e.g. from the article "Variable Bit Rate Video Codec for asynchronous transfer mode networks", by W. Verbiest and L. Pinnoo, IEEE Journal on selected areas in communications, Vol. 7, No 5, June 1989, pp. 761-770 and more particularly point II.E "VBR Decoder" and Fig. 8 thereof, the latter figure showing a block schematic of such a video decoder.

As all known video decoders of the above type, the referenced decoder works synchronously with its corresponding encoder, i.e. the clock signal controlling the latter encoder is reproduced by the decoder and used to control the decoder. This synchronous operation is up to now assumed to be mandatory for real time video processing of moving video images sent over packet switching networks. The reason therefore is given in the article "Packet Video integration into network architecture" by Karlsson and Vitterbi, which appeared in the same issue of the above Journal, and more particularly in point V on pp 745-746 "Resynchronization of video" thereof. Without this synchronous operation the decoder could indeed process the packets too fast or too slow with respect to the generation of packets by the encoder. When working too fast, as depicted in Fig. 8b of the last referenced article, the decoder would have to discard packets arriving too late to be taken into account for the reconstruction of an image. When working too slow, as depicted in Fig. 8c, an ever increasing number of packets would have to be buffered by the decoder, inevitably leading to buffer overflow and hence again to packet loss.

Apart from the above mentioned need for synchronous working of the encoder and the decoder, the latter decoder has also to take into account possible jitter inherent to asynchronous transfer mode networks and caused by a variable transmission delay of the packets over the network, which additionally complicates the structure and design of the decoder. Indeed, in order to operate synchronously with its corresponding encoder, the decoder has to perform its decoding actions at well-defined instants in time determined by the system clock of the encoder. Due to the above jitter it could however occur that a packet arrives too late to be processed at the above instant. To avoid this, the packets arriving at the decoder are stored in an input buffer, where they are delayed to achieve for every packet a fixed predetermined delay, as depicted in Fig. 7 of the last referenced article. In this way the input buffer acts as a dejittering unit which is read under control of the decoder clock, the latter clock being reconstructed by means of for instance a phase locked loop to match the encoder clock. Due to the statistical nature of the delay jitter packet loss cannot be avoided with finite input buffers and finite fixed delays as evidenced by Fig. 8a of the last referenced article and minimizing this packet loss requires relatively large input buffers.

Referring again to the first referenced article by W. Verbiest and L. Pinnoo the consequence of the above mentioned need for synchronization and dejittering is made clear.

The decodig means described in the article includes a Variable Length Code decoder (VLC Decoder) and a Differential Pulse Code Modulation Decoder (DPCM Decoder). The latter decoder is controlled by a RAM module using the control information extracted from the packet by a depacketizer and uses a memory module, called a frame store memory, to decode predictively coded video information, i.e. video informtion relating to a previous frame is stored in the memory module and used to predict corresponding video information of a new frame. The display means is schematically represented as a Digital to Analog Converter (DAC) and a monitor or video screen. The above mentioned need for synchronization results in the use of a Digital Phase Locked Loop (DPLL), whilst the need for dejittering results in the use of a dejittering unit or input buffer. The latter input buffer has to be dimensioned in order to reduce packet loss caused by the delay jitter and will typically have to be large enough to store video packets corresponding to one half of a video frame.

Summarizing, a drawback of video decoders of the type disclosed in the latter article is that the structure thereof is rather complex due to the circuitry needed for synchronization of the decoder clock with the encoder clock, e.g. by using a phase locked loop, and for elimination of the delay jitter for which a relatively large input buffer is needed. Moreover such decoders are rather inflexible due to the timing constraints resulting from the synchronous operation of the decoding means and the display means with respect to each other, as is clear from the mentioned articles.

An object of the present invention is to provide a video decoder of the above type but without the above mentioned drawbacks.

This object is achieved due to the fact that after one of said new units is derived and stored in said memory module, said display means retrieves a variable number of said stored new units from said frame store memory for display, before retrieving said one unit.

Using a prior art video decoder and processing the packets as they are received from the network and displaying the decoded units at the same rate they become available results in a display clock with variable rate, as explained hereafter, which is incompatible with existing video display standars such as CCIR 601 or PAL. The variable rate of the display clock is not only due to the delay jitter but also, if variable bit rate coding is used as in the first referenced article, of the varying information density in the received packets. Indeed, in case of variable bit rate coding, some packets carry information related to a lot of units which results in a fast decoding rate and hence also in a fast display rate, whereas other packets carry information relating to only a few units accordingly resulting in a slow display rate.

In accordance with the present invention on the contrary, the display means and the decoding means work asynchronously with respect to each other. The decoding means handles the packets as they arrive from the packet switching network, i.e. without first eliminating possible delay jitter, and stores them in the memory module, memory module at the same rate as the display means whilst the display means retrieveq the new units of decoded video information from the memory module at an even rate possibly different from the storage rate and unaffected by the delay jitter and/or by the previously mentioned varying information density in the received packets, which are in this way eliminated in the memory module through buffering. The display clock can thus be designed to have a stable rate independently of the encoder clock rate, which can be determined, if necessary, solely on the basis of local decoder information as evidenced from further features.

A characteristic feature of the present invention is that said decoding means retrieves from said memory module old units of decoded video information relating to a previous video frame to derive therefrom said new units thereby decoding predictively coded video information.

In such a video decoder the memory module is called a frame store memory. It stores the old units to realize predictive decoding of the coded video information. The earlier mentioned buffering action between the decoder means and the display means can now be realized by a buffer embedded in the larger frame store memory, the latter buffer further being called implicit buffer, and which has a length equal to the earlier mentioned variable number and which continuously alters not only its length but also its position within the frame store memory as data is stored by or retrieved from the frame store memory by respectively the decoding and the display means. Indeed, the buffer's first location corresponds to the frame store memory position where the next unit is stored by the decoding means and its end location corresponds to the position where the next unit is to be retrieved by the display means, which means that the buffer moves in the frame store memory. The variable number of units are those units stored in the frame store memory which have to be displayed from the moment a new unit is stored, until the display of the latter unit. It has to be further noted that when using predictive coding techniques the frame store memory has to be large enough to store all the units of decoded video information pertaining to one frame the latter units being used to predict the value of the units pertaining to a corresponding next frame. Due to its needed capacity for decoding predictive coded images, the frame store memory is large enough to contain the mentioned implicit buffer and no additional memory capacity has to be foreseen for the latter buffer.

Image degration of the displayed image occurs when the display means catches up with the decoding process thereby causing what is called underflow of the implicit buffer. However, as the latter buffer is embedded in the larger frame store memory the mentioned underflow results in some old units being displayed more than once. No information is lost and hence the correctness of new units of decoded video information is not affected.

Image degradation also occurs when the decoding means catches up with the display means causing overflow of the implicit buffer. The only error then incurred is that some new units will never be displayed.

Whereas for prior art synchronous decoders, under-of overflow of the input buffer resulted in loss of synchronization and in the need to reset the video decoder, for the present invention they only give rise to a temporary and local effect of the display, as following from the above, the correctness of newly decoded units not being affected by the latter under- or overflow.

An important aspect of the present invention is that said decoder further includes a control means which monitors said variable number and which increases or decreases the frequency of a system clock, included in said video decoder and controlling at least said display means, thereby preventing said variable number from becoming larger or smaller than a first and second predetermined number respectively.

In this way the above mentioned image degradation due to the over- or underflow of the buffer is in a large extent avoided, irrespective of the buffer being an implicit buffer embedded in a larger frame store

memory or not. When the variable number tends to a first predetermined number, e.g. zero for underflow, which can for instance occur when the instantaneous packet arrival rate is very low, then the display process is slowed down by the system clock to prevent underflow. In the opposite case when the variable number tends to a second predetermined number, e.g. the maximum length of the implicit buffer, the display process is speeded up to prevent overflow. Because of the statistical nature of the delay jitter the speeding up or slowing down of the display process is a low frequency process which is not visible on the display. The display process however is, with this mechanism, indirectly synchronized with the encoder clock. Indeed, the average frequency of the system clock of the display means is locked to the average arrival rate of video information and hence to the encoder clock and this without the need for complex timing information extraction and digital phase locked loop circuitry. The delay jitter only modestly influences the speed of the system clock as most of it is absorbed in the implicit buffer as explained earlier. Moreover as only a loose coupling exists between the decoding means and the display means and between the decoder and the encoder no flexibility is sacrificed. E.g. when, during blanking periods, the display means has to be inactive the decoding means does not have to stop its processing as well.

An ancillary feature of the present invention is that said system clock additionally controls at least said decoding means.

To be noted in this respect that the asynchronous nature of the video decoder according to the present invention does not stem from independent system clocks but from the fact that, irrespective of the display means, the decoding means processes the received packets as they arrive without being hampered by display requirements.

If the decoding means has no packets to process it becomes inactive allowing the display means to catch up and on the other hand, if necessary, the overall system clock of the decoder is slowed down tuning the decoder in a simple way to the output information rate of the encoder.

A further feature of the present invention is that said decoder further includes a memory module controller controlling at least a first and second pointer used by said decoding means and said display means respectively, said pointers indicating which memory location of said module memory is to be used by said respective means to respectively store or retrieve said units, and that the values of said first and of said second pointers are asynchronously updated by said memory module controller when their respective means have respectively stored or retrieved one of said units.

More concretely the memory module controller determines the variable position of the implicit buffer within the larger frame store memory since the first pointer indicates the first location of the implicit buffer whereas the second pointer indicates the end location. memory and highlights the need for a separate controller to manage the implicit buffer. The latter controller through its control action on the implicit buffer can also manage and exploit the flexibility offered by the present invention as will be clarified below.

Still another feature of the present invention is that said memory module controller performs said updates according to a memory map mapping a location of each of said units within a video frame onto a memory location of said memory module.

The memory module controller is thus specifically suited for predictive coding techniques as it knows from the memory map which unit of a frame belongs to which memory location. It can further monitor said variable number since it can, indeed from the first and second pointer, derive with the aid of this memory map which units are processed by respectively the display and the decoding means and how many units within a frame are comprised between these units. With this memory map the offered flexibility can optimally be exploited as will be clarified below.

An important aspect of the present invention is that said module memory consists of a dual port random access memory including at least one dynamic random access memory and at least one serial access memory, that said dynamic random access memory is accessed by said decoding means to store said new units on locations indicated by said first pointer and to retrieve said old units from a location indicated by a third pointer also controlled by said memory module controller, and that all of said units corresponding to one line of a to be displayed image are transferred under control of said memory module controller from said dynamic random access memory to said serial access memory and said display means retrieves said units from locations in said serial access memory indicated by said second pointer.

Dual port memories are well known in the art and commercially available, e.g. the Texas Instruments chip TMS48C121. Such memories are particularly suited for use in the present invention due to their dual port, which permits virtually simultaneous access by the decoding means and the display means. Normal RAMs could also be used but they would have to be chosen in such a way that they are fast enough to cope with simultaneous accesses. Such fast RAMs are either static, expensive RAMs, or large parallelized dynamic RAMs.

Essentially the dual port memory disconnects the display and the decoding means in hardware.

The DRAM performs the functions already performed by prior art frame store memories whilst the SAM is used by the display means when reading the decoded video information. The latter information is read image line per image line so that a simple serial access memory, such as the SAM, holding all the information pertaining to one such line indeed suffices for this purpose. A transfer operation, performed for instance during blanking periods of the display, is required to transfer the to be read information from the DRAM to the SAM thereby allowing the display means to read the frame store memory independently from the decoding means and at its own even rate without complex addressing operations.

The memory module controller also called frame store controller in case of decoding of predictive coded information, is somewhat more complex than prior art controllers but on the other hand cheaper memories can be used.

A particularly advantageous feature of the present invention is that said video information is block coded using a variable bit rate technique, and that said first predetermined number is equal to the number of units contained in one image line and that said second predetermined number is equal to the number of units contained in one image frame minus one stripe.

Block coding is well known in the art, e.g. from the first referenced article by W. Verbiest and L. Pinnoo. It results in a very efficient compression of the digital video information to be sent over the network. In case of block coding the present invention is particularly advantageous because the memory module can be used for the block to line conversion needed when decoding the block coded information. Prior art decoders for decoding of block code information indeed have to convert the data from a block format at the output of the decoding means to a line format at the input of the display means, as video is displayed line per line. Therefore these decoders include an additional memory wherein the blocks are written and, after a certain delay, read out by the display means when all new units of a line have been received. According to the present invention the latter delay can be realised by the memory module control means, the delay being at least equivalents to one image line. If this delay is maintained there is no mixing of new and old units.

To be noted that the variable number could as well be fixed and corresponding to a suitable delay. The decoder would then operate synchronously with the encoder but there would still be no need of an additional block to line conversion memory.

A further advantage of the above particular embodiment is that normally, when synchronous operation is required as in prior art systems, variable bit rate coding necessitates the extraction of time stamps from the received packets to reconstruct the encoder clock. With a video decoder according to the present invention these time stamps are superfluous as no synchronization with the encoder clock is required.

A video decoder according to the invention is thus equally well suited for decoding video information from fixed as from variable bit rate encoders and this without any additional hardware cost compared to the prior art decoders.

A further advantageous feature of the present invention is that said memory module capacity, is additionally used by said memory module controller to realize motion compensation by using a non-permanent memory map, mapping a location of each of said new units within an image frame onto memory locations of said memory module, each of said new units being stored in locations other than the location in which corresponding ones of said old units were stored.

In order to achieve motion compensation, which is used to realize efficient compression and is well known in the art, e.g. from the article "Video compression makes big gains", IEEE spectrum, October 1991, by H. Peng et al, prior art systems using a synchronous video decoder have to save part of the old units in a separate memory. This in order not to overwrite old units corresponding to an already decoded part of the image frame, with newly received units. In the present invention motion compensation can be realized by using the memory module and without significant extra hardware cost. Only some additional functionalities in the memory module controller are needed to allow use of the non-permanent memory map.

Yet another feature of the present invention is that said units are subdivided in a plurality of categories, units corresponding to different categories carrying different information relating to a same image element, and that said units of video information of different categories are processed by said decoding means regardless of their category said memory module controller demultiplexing said units according to the category they belong to by writing said units in appropriate memory locations within said memory module.

In the first referenced article by W. Verbiest and L. Pinnoo and more particularly in Fig. 2 two such categories are considered n1. the luminance and the chrominance of an image. Due to the timing constraints in synchronous decoders described in the article a decoding means has to be provided for each unit category. Thanks to the above feature of the present invention the decoding means has not to differenciate between these two types of information, demultiplexing of the different categories being done by the frame store controller by storing the units at appropriate memory locations within the frame store memory according to their type.

Further characteristic features of the present invention are that said video information corresponds to images of one of a plurality of resolutions, said one resolution being identified by said video decoder based on at least part of said control information and that said memory module controller adapts said video decoder to said one resolution by using a corresponding memory map of a plurality of memory maps, and that said video decoder can at any time change to a display of a still picture by not refreshing said memory module with new units of video information, and that (see claim 18). said memory module controller is able to control said video decoder to display images differing from those contained in said video information by controlling said decoding means to calculate intermediate new units of decoded video information and, to store at least part of said new units, including said intermediate new units, according to a memory map corresponding to a desired display, said desired display being signalled to said memory module controller by an appropriate control input signal to which said video information relates by calculating

The above features not only allow to freeze the display or to zoom according to an external control signal which is input to the frame store controller and possibly comes from a viewer, but they moreover allow the video decoder to receive and display information according to various standards of resolution, e.g. CIF and CCIR 601, by using a related part of the control information of the packet as an internal control input to the frame store controller.

An important advantage of the last mentioned feature is that, regardless of the resolution of the images contained in the incoming video information, the video decoder can be controlled to display images according to a predetermined resolution, e.g. the resolution defined in CCIR 601. The fact that the decoding means works asynchronously with regards to the display means can be used for creating alternative new units e.g. via the well known technique of upsampling. To this end the decoding process has to be speeded up by for instance deriving from the system clock a clock signal with higher frequency. With the alternative new units, a memory map for CCIR 601 can be filled up if the incoming video information relates to images having a resolution such that the number of units per image frame is less than for CCIR 601. Additionally no significant hardware change, except in the frame store controller, is needed to switch to e.g. the Joint Photographic Experts Group JPEG's impending standard for still pictures. Again such a switching operation can be controlled by the control information.

The above mentioned and other objects and features of the invention will become more apparent and the invention itself will be best understood by referring to the following description of an embodiment taken in conjunction with the accompanying drawings wherein :

FIG. 1 shows a functional block diagram of a video decoder according to the present invention;

FIGs. 2a to 2c show the principle of the operation in the frame store memory FSM of FIG. 1 in a highly simplified manner;

FIG. 3 represents a more detailed view of the decoding module DEC1 of FIG. 1;

FIG. 4 schematically shows the various inputs and outputs of the pixel processor PROC of FIG. 1;

FIG. 5 is a schematic diagram of the frame store memory FSM of FIG. 1; and

FIG. 6 represents a more detailed view of the display means DIS of FIG. 1;

FIG. 7 shows a hardware configuration of the control means CON of FIG. 1.

The video decoder shown in FIG. 1 is part of an Asynchronous Transfer Mode ATM Broadband ISDN BISDN network (not shown). Such networks and their properties, are well known in the art wherefore they are not further described.

The video decoder receives packets from the ATM network via an input line IN. The information contained in the packets is transformed and displayed on a video screen as described later.

The packets are applied to a first block of the decoder which is an interface module INT.

The interface module INT performs ATM header error control and other well known control functions and demultiplexes and unpacks the data contained in a received packet. The latter demultiplexing and unpacking functions are obvious to realize by a person skilled in the art and are therefore neither shown nor described in details. The interface module INT applies video information VI extracted from the received packet on a like named output line VI and first control information OV1 and second control information OV2 also extracted from the received packet on like named control lines OV1 and OV2 respectively.

The above mentioned line VI is connected to a decoding module DEC1, forming a first part of a decoding means, which under control of the first control information OV1 decodes the video information VI and so applies at an output DECV1, connected to a pixel processor PROC comprising a second part of the decoding means DEC2 and a frame store controller FSC, a like named signal consisting of decoded video information DECVI.

The latter frame store controller FSC stores under control of the second overhead information OV2 a binary signal consisting of new units of decoded video information NEW1 via a like named data line NEW1 in a frame store memory FSM which is at least large enough to store all the units pertaining to one video

frame. The latter signal NEW1 is derived in DEC2 from the previously mentioned signal DECVI possibly taking into account data consisting of old units of decoded video information OLD received on a like named input line OLD from the frame store memory FSM. Whether or not the latter data is to be used, i.e. whether or not interframe predictive coding is used, as will be explained later, is decided under control of the second overhead information OV2.

The pixel processor PROC has one further input line EXT on which external control signals EXT are applied and one further output ADJ at which a like named signal ADJ is generated. ADJ is used to adjust the frequency of a system clock signal SC as will again be explained later. The pixel processor PROC finally has a control output CTL connected to the frame store memory FSM on which like named control signals CTL are applied and a control output VIDEOSYNC connected to a display means DIS.

The frame store memory FSM receives the signal NEW1 via input line NEW1 and has a first output OLD via which the signal OLD is applied to the pixel processor PROC and a second output NEW2 on which like named signals NEW2 are generated, NEW2 consisting of new units of decoded video information. The frame store memory FSM further has a control input CTL connected to the line CTL and via which it receives the control signals CTL. The second output line NEW2 is connected to the display means DIS which further transforms and finally displays the video signal. This display means DIS further has a control input VIDEOSYNC on which the like named signal is applied originating from the pixel processor PROC and needed for the display function as described below.

Referring again to the output ADJ of the pixel processor PROC, this output line ADJ is connected to a control means CON which derives from the signal ADJ a low frequency signal DC generated at a control output DC. The latter signal DC controls the system clock SC which produces a like named signal SC. SC is applied to the blocks INT, DEC1, PROC, CON, FSM and DIS after appropriate clock divisions. For clarity of the figure neither the clock signals applied to the latter blocks, nor the clock divisions are shown.

As will be explained in details later, the display means DIS retrieves units of information with a rate directly proportional to the frequency from the system clock SC from the frame store memory FSM and processes the units for display purposes. The decoding means DEC1 and DEC2 store decoded units under control of a clock signal also derived from SC, but not necessarily having the same rate as the clock signal controlling DIS. This means that DIS and DEC1, DEC2 work asynchronously. FSM in a way isolates the processing of the units by the display means DIS from that of the decoding means DEC1, DEC2.

DEC1 and DEC2 can process the incoming video information without first eliminating the delay jitter inherent to asynchronous transfer networks because before the decoded video information DECVI is passed through to the display means DIS it incurs a variable delay, through buffering action later described, in the frame store memory FSM. The delay jitter thus does in this way not influence the quality of the displayed image. Although the decoding means DEC1, DEC2 is also controlled from the earlier mentioned system clock SC the asynchronous, independent processing of the units by the latter means and by the display means is not hampered as the rate at which the decoding means DEC1 and DEC2 processes units of video information is not directly proportional to SC. The decoding means DEC1, DEC2 can indeed remain inactive due to a late arrival of packets because of delay jitter or can process different units at a different speed. From the above it is clear that it is equally well possible to control the decoding means DEC1, DEC2 with a system clock totally independent from the system clock SC.

When predictive coding techniques are used the frame store memory FSM is needed to store units pertaining to a previous frame and buffering action for the display function are provided via an implicit buffer embedded in a larger frame store memory.

Turning now to FIGs. 2a to 2c the principle of such a moving implicit buffer within the larger frame store memory is shown. In an embodiment of the present invention not using the frame store memory for decoding predictively coded video information this description, relating to FIGs. 2a to 2c, is obsolete as a normal variable length FIFO buffer, the length of which is equal to a variable number, can then be used as frame store memory FSM.

It is further to be noted that the only aim of FIGs. 2a to 2c is to clarify the principle of the implicit buffer in the frame store, so that highly simplified examples of the frame store memory FSM are used.

FIG. 2a shows the content of a frame store memory which contains 9 lines of 7 positions, each position containing information of a corresponding pixel in an image frame. Pixel information in subsequent positions logically correspond to subsequent pixel positions in the to be displayed image, consequently a very simple memory map, mapping positions within an image frame to memory locations, is used.

The start location of the implicit buffer is the position in which the next pixel information to be decoded by the decoding means DEC is to be stored, e.g. in FIG. 2a which shows the frame store at time instance t0 the start location 9 is indicated by a first pointer P1. The end location is the position from which the next pixel information is to be retrieved by the display means, e.g. in FIG. 2a the end locaiton 26 is indicated by

a second pointer P2. From the above considerations it follows that position 9 and 26 of FSM respectively correspond to pixel positions 9 and 26 of the image frame. At time instant t0, after pixel information 9 is stored, the display means may start retrieving the information pertaining to 46 pixels, n1. at locations 26 to 63 and 1 to 8.

FIG. 2b shows the frame store at a secomd time instant t1. The first pointer P1 has proceeded to position 11 and the second pointer P2 has moved consideraly faster to position 60. The above mentioned number of pixels that may be retrieved is now only 14. Thus the number of pixels that may be retrieved is variable. The fact that a variable number of pixels can be retrieved is for instance applied when the decoding means receives few packets, due to e.g. delay jitter, and the display means then catches up with the work load at an even rate.

FIG. 2c shows a frame store at a third time instant t2. In this figure it is shown what happens when the variable number of to be retrieved pixels is not kept within a range between a first, e.g. zero, and a second, e.g. 63, predetermined number. In this figure the first and second pointer have crossed each other, in a way turning the implicit buffer inside out. The first pointer P1 has stayed in position 11, possibly because of the delay jitter, whilst the second pointer P2 has further moved to position 13. This means that the display means has displayed old pixels relating to a previous frame, n1. pixels 11 and 12 not yet refreshed by the decoding means DEC1 abd DEC2. In other words the pixels now in positions 11 and 12 have been displayed more than once. The above effect, depicted in FIG. 2c, corresponds to an underflow of the implicit buffer which as stated above results in some pixels being displayed more than once. The opposite effect (not shown) is equally well possible and arrises when P1 catches up with P2 which results in an overflow of the implicit buffer now leading to image degradation because some decoded pixels are never be displayed n1. those pixels located just after the memory location indicated by the second pointer.

The above mentioned image degradation relating to FIG. 2c can be acceptable because the correctness of the further decoding is not affected and the image degradation is thus both local and temporal. It can be avoided by keeping the variable number within a predetermined range, e.g. from 0 to 63. This is realized by the control means CON monitoring the variable number and adapting the processing speed of the display means DIS according to the result of this monitoring as will be described in detail with reference to FIG. 7.

To be noted that in any case, e.g. even when the control means is used but due to extreme circumstances fails to prevent the implicit buffer from under- or overflow, the under- or overflow of the implicit buffer has a much less dramatic effect than the under- or overflow of input buffers in prior art decoders. Indeed, in the latter case synchronization is lost and the decoding process has to start again from scratch resulting in severe image degradation whereas the present invention will only display same units incorrectly wherefter, and without special measures to be taken, automatically correct operation is resumed.

One case in which this crossing of both pointers is acceptable is when the video decoder is externally controlled to freeze the image whilst receiving a moving image. To freeze the image it suffices to deactivate temporarily the decoding means DEC1 and DEC2 whilst letting the display means DIS display further the now stationary content of the frame store memory FSM. To this end the eventual loose coupling between the decoding and the display rate, realized by the control means CON, has to be de-activated by the frame store controller FSC. The latter de-activation is automatically achieved in the present embodiment when no action of the control means CON takes place in the absence of received packets. The latter feature and other advantages will be described in detail with reference to FIGs. 5 to 7.

From the above follows that, there is no need to reconstruct the encoder clock, e.g. by using a phase locked loop, to synchronize the decoder with the corresponding encoder. Also a dejittering unit in the form of a large input buffer, realizing a fixed delay for the received packets is made superfluous in this embodiments since the delay jitter of the packets is eliminated in FSM. The interface module INT might however include a smaller input buffer to ensure, as will be explained later, that the decoding means does not have to stop processing in the middle of one block of video information when block coded signals are used. Such a smaller input buffer is also required for ATM interface functions such as header error control and error correction.

Summarizing, the interface module INT only provides basic functions and the decoding means DEC1 and DEC2 processes the incoming packets as they arrive without first eliminating the delay jitter.

The interface module INT provides minimal control information on the lines OV1 and OV2 to DEC1 and PROC respectively.

With reference to FIG. 3, the decoding module DEC1 is now briefly described. This decoding module DEC1 only forms a first part of the decoding means a second part DEC2 being situated in the pixel processor PROC which also includes the frame store controller FSC.

The decoding module DEC1 realizes the present state of the art coding techniques resulting in efficient compression. It receives the video information VI via terminal VI and the first control information OV1 via the

line OV1. VI is applied to a decoder JPE6 and OV1 is applied to a translation logic block TRANS transforming it into third control information OV3 which is applied via a like named terminal OV3 to the decoder JPE6.

JPE6 transforms the video information VI under control of the third control information OV3 in a first intermediary signal INT1 applied to a like named output line INT1. The signal INT1 is applied to an inverse Discrete Cosine Transform block IDCT which produces therewith a second intermediary signal INT2 again applied to a like named output line INT2. The latter signal INT2 is then shifted into a buffer FIFO. From this buffer FIFO a first and a second output, LUM and CHR respectively, together constitute the output line DECVI. The output lines LUM and CHR carry like named signals, LUM and CHR respectively, which consist of luminance and chrominance data.

The decoder JPE6 decodes VI according to an impending standard of the Joint Photographic Experts Group as for instance described in Electronic Design of May 1991, pp. 49-53, by M. Leonard and obtainable as IC L64745 from LSI Logic Corp. This decoder is specifically designed for still pictures but is here used for decoding moving images as no standards in this field are issued yet.

The decoder JPE6 is controlled by the third control information OV3 which indicates the variable length codes and quantizers were used in the corresponding encoder which has generated the received packets.

Decoders such as JPE6 and translation logics such as TRANS are welll known in the art and obvious to implement for a person skilled in the art. They are therefore not described in detail.

The first intermediate signal INT1 generated by JPE6 is transformed in a second intermediate signal INT2 in IDCT. Circuits realizing inverse direct cosine transform functions are also well known in the art. One such a circuit is for instance realized in the IC L64735 of LSI Logic Corp.

The signal INT2 consists of units of decoded video information, i.e. bytes of luminance and chrominance pertaining to a pixel.

It is to be noted that due to the asynchronous nature of the present video decoder only one decoding module DEC1 of the above type has to be provided whereas in prior art decoders the luminance and chrominance signals are decoded separately in order to meet the timing constraints without further complicating the design. Indeed, because the decoding module DEC1 can handle the incoming video information independently from the display module one decoding means suffices for both categories of information. In order to efficiently demultiplex the second intermediate signal INT2 in its chrominance and luminance part for further processing the buffer FIFO is provided.

Since the above information is sufficient for a person skilled in the art to implement the decoding module DEC1, it is not described in more detail.

It is to be noted that in order to avoid that the decoding module DEC1 would have to cope with a peak bistrate of incoming data, which is due to the statistical fluctuations of the delay jitter, the earlier mentioned buffer in the interface module INT of FIG. 1 is used to somewhat smooth out the worst case effect of peak bitrates, thus alleviating the design of the decoding module DEC1.

With reference to FIG. 4 the pixel processor PROC will now be functionally described.

FIG. 4 only details the content of the various input and output signals of PROC and the form of the like named input and output terminals.

To be noted that PROC incorporates both the second part of the decoding means DEC2 and the frame store controller FSC as mentioned earlier. The operation of the pixel processor PROC is best described functionally as done hereafter from which description the pixel processor PROC can be implemented by a person skilled in the art.

FIG. 4 shows that the decoded video information DECVI consists of luminance LUM and chrominance CHROM parts as received from the decoder DEC1 and carrying information relating the luminance and chrominance part respectively of corresponding pixels of a frame. A second input signal of old units of video information OLD is in similar manner constituted by luminance LUMO and chrominance CHROMO parts retrieved from the frame store memory FSM. Further also the output signal of new units of video information NEW1 is subdivided in luminance LUM1 and chrominance CHROM1 parts which are stored in the frame store memory FSM. How LUMO, CHROMO, LUM1 and CHROM1 are obtained by an from FSM will be explained later.

Another input OV2 to the frame store controller FSC carries the like named signal OV2 which is the second control information constituted by, as shown in FIG. 4, stripe information STRIPE, field information FIELD and mode information MODE as generated by INT. The information contained in STRIPE and FIELD is used to indicate which part of the image is currently being decoded. The mode information MODE indicates the coding mode used for the currently decoded image part and indicates e.g. intra frame coding or interframe predictive coding.

A further output ADJ carries the clock adjust signal ADJ constituted by a first line number LINE1 and a second line number LINE2 which will be described in detail below with reference to FIG. 7.

A last input is the external control input EXT and a last output is VIDEOSYNC which is connected to the display means DIS

The control signal CTL is used by the frame store controller FSC to control the frame store memory FSM and will be described in detail when the latter memory is described with reference to FIG. 5.

To be noted that coding techniques such as interframe predictive coding and motion compensation referred to hereafter are well known in the art, e.g. from the article "Video compression makes big gains", IEEE Spectrum, October 1991, by H. Peng et al.

If the mode information MODE indicates that interframe predictive coding was used then the decoding part DEC2 of the pixel processor PROC adds the decoded video information DECVI to information pertaining to old units of decoded video information OLD which it retrieves from the frame store memory FSM.

It then applies an inverse predictive coding algorithm, many of which are described in the art, and derives new units of decoded video information NEW1 which it applies to the terminal NEW1 to store these new units in the frame store memory FSM.

When, on the other hand MODE indicates that motion compensation has to be provided then the pixel processor PROC reads a specific part of the frame store memory FSM which is indicated to the frame store controller FSC by a motion vector also transmitted within the mode information. The question of motion compensation will be discussed in detail further below.

It has to be noted that the information retrieved via OLD is in fact information NEW1 previously stored when handling in DEC pixel information pertaining to a corresponding previous image part.

The signal VIDEOSYNC is constructed by PROC based on the contents of CTL and indicates the beginning of an image line to be used by the display module

The frame store memory FSM depicted in FIG. 5 is a dual port memory which is well known in the art and can for instance be realized by combining 8 TMS44C251-100 IC's from Texas Instruments. The frame store memory FSM has a first input NEW1 on which like named new units of decoded video information NEW1 are applied by PROC. They are constituted by luminance LUM1 and chrominance CHROM1 parts respectively. An output NEW2 of this memory also carries new units of decoded video information NEW2 constituted as above by parts LUM2 and CHR2. At another output OLD like named old units of decoded video information OLD are retrieved. They are constituted by a luminance part LUM0 and a chrominance part CHR0. The frame store controller FSC of PROC controls this memory via control terminal CTL.

The internal organisation of the frame store memory FSM is only schematically shown and consists of 8 dual port memories VRAM1 to VRAM8, each of these dual port memories or VRAMs being built from a dynamic random access memory or DRAM and a serial access memory SAM. The latter DRAMs and SAMs are again numbered DRAM1 to DRAM8 and SAM1 to SAM8 respectively. As also schematically shown in FIG. 5 the new units NEW1, coming from the frame store controller FSC and described above, are stored in one of the DRAMS. Also the old units OLD, to be used by the frame store controlled FSC, are retrieved from these DRAMs. The new units NEW2 to be used by the display means DIS however are retrieved from the SAMs.

The underlying principle of the present invention is to disconnect the decoding process (which ends in the decoding part DEC2 of the pixel processor PROC) from the display process realized by DIS.

By using a dual port frame store memory FSM both processes are also disconnected in hardware. Whereas the decoding process needs difficult addressing to implement predictive block coding and possibly motion compensation, for which the DRAMs are used, the display process needs very simple addressing to read the images line per line and pixel per pixel which is achieved by using the SAMs. These SAMs do not permit other than consecutive read operation of their different memory locations.

Block to line conversion is implicitly done within the frame store memory FSM. Indeed, by ensuring that predetermined bounds exist on the above mentioned variable number, n1. the amount of units contained in, respectively, one stripe and one frame minus one stripe, transfer from DRAM to SAM allows the display means DIS to read the correct data without the need for an extra memory block dedicated to this conversion as in prior art systems.

Following is a description of how FSC controls the storage of NEW1 and the retrieval of OLD via the control signal CTL. Retrieval of NEW2 by the display means DIS will be explained in detail later when describing the working of the latter means.

In the description of the control of FSM by FSC it is assumed that FSC contains a memory map which maps the location of a pixel in an image frame to a memory location of FSM where information pertaining to the latter pixel has to be stored or from where the latter information has to be retrieved. How this memory

map is obtained will be explained later.

Three possible pointer values or memory addresses can be indicated by CTL. In case information pertaining to a new pixel has to be stored, the location in FSM where this information has to be stored, i.e. the value of the earlier mentioned first pointer is passed to the FSM by the module PROC. This location is derived from the contents of OV2 using the earlier mentioned memory map. CTL can also contain the value of the earlier mentioned second pointer when NEW2 has to be passed to DIS for display of the image pixels. More details concerning the latter display are given later when describing DIS. In case of decoding predictive coded information or in case of motion compensation CTL contains the value of a third pointer which is used by PROC to retrieve OLD.

It has to be noted that in case of motion compensation the earlier mentioned motion vector determines together with the first pointer the third pointer. Indeed the motion vector indicates an offset from the new unit to be decoded, the place of which is indicated by the first pointer, to the old unit to be used for that decoding.

Whereas the second pointer simply indicates consecutive addresses in the frame store memory FSM, the first pointer may have to be updated according to stripe or field information, STRIPE and FIELD of OV2 respectively, for instance when a packet is lost or when synchronization on the variable length codes is lost due to transmission errors. Indeed in these cases a simple counting process would result in the total misinterpretation of received packets. Therefore also minimal synchronization information has to be present in the second control information OV2 at least to give the frame store controller FSC of FIG. 1 a possibility to resynchronize on the arriving image data.

The first and the third pointer, thus have to be calculated by the frame store controller FSC to indicate the memory location in the DRAM's pertaining to a particular unit of a frame. The second pointer only has to indicate which SAM has to be accessed. The second pointer can be explicitely determined by the frame store controller FSC and applied to the frame store memory FSM via terminal CTL to select the right SAM from which NEW2 is retrieved. As an alternative the VIDEOSYNC signal indicating the beginning of a line could be used by the display means DIS to simply access a next SAM.

In the above it was implicitly understood that a memory map existed in the frame store controller FSC with which it could deduce from the location of a unit within an image frame, a corresponding memory location in the frame store memory FSM. This in order to calculate the various pointers. Nothing was said however about how this memory map has to be derived in order to operate the frame store memory FSM correctly and in particular in order to fill the SAMs at the right time with all data pertaining to one line of the image. This will be now clarified.

The frame store memory organisation will be discussed while using the above type of dual port memory IC's of Texas Instruments. These memories are 4 bits wide and 256K addresses long. In order to manage units of decoded video information of 8 bits 2 IC's are taken in parallel. Luminance and chrominance parts of the various signal NEW1, NEW2, OLD, are needed in parallel so again 2 times 2 parallel chips are accessed at the same time. In order to do interframe predictive coding a further parallelization is needed : 2 banks of 2 times 2 chips will be used. In so doing the situation depicted in FIG. 5 is achieved where 8 of the above mentioned chips are used and where two chips are used to store the 8 bits of a unit. This number is doubled in order to separate luminance and chrominance data and further doubled to create two banks of chips. In this way enough memory is available to store all units of one frame.

Firstly the memory map will be discussed without taking into account motion compensation which is discussed further below.

The memory addressing space consists, for every chip, of 9 bits to indicate the row and 9 bits to indicate the column in the memory. With these 18 bits 2 chips are accessed at the same time in order to accomodate units which are 8 bits wide. One further bit selects either the luminance or the chrominance chips of a particular bank. A lost bit is needed to select in which bank, units are to be stored or retrieve, thus resulting in a total of 20 bits for the addressing space of the frame store memory FSM. In order to speed up the addressing two data busses are used for each bank separately which are physically selected in the frame store controller FSC.

As an example we will now consider specifically the memory map to be used when receiving data conform to the standard CCIR 601. Standards using other resolutions can equally well be processed by this video decoder without any hardware change. The latter will be demonstrated after completing the description regarding the CCIR 601 case.

In the CCIR 601 standard the location of a unit within a frame has to be expressed within a frame of 576 lines of 720 pixels. Each frame consists of 2 fields of 36 stripes and each stripe of 180 blocks of 64 pixels. The stripes are so organized as to contain all units of 8 consecutive lines and the corresponding blocks. 90 blocks of a stripe are dedicated to two types of chrominance data, n1. CB and CR whereas all other 90

blocks of such a stripe are used for luminance data. All of the above is well known in the art. This information results in a frame addressing space as shown in the following table :

F0	Field Number
S5-S0	Stripe Number (6 bits limited to 35)
B6-B0	Block Number (7 bits limited to 95)
P5-P0	Pixel Number (6 bits)
L/C	Luminance or Chrominance

Thus the frame addressing space is 21 bits wide whereas the memory addressing space, also counting the bank number, is 20 bits wide. Some calculation thus has to take place to determine the location of a unit in the memory map and the value of different pointers which is implemented in the frame store controller FSC. It is to be noted that stripe and field numbers can be checked by FSC based on the second control information OV2, and particularly the FIELD and STRIPE parts thereof, whereas the pixel and block number have to be derived by internally counting the decoded number of units.

To be further noted that the above memory addressing space is only relevant for the DRAMs, the access of the SAMs being described later.

Even and oneven lines of a frame will be accorded a memory place in different banks to reduce timing problems as clarified hereafter. In this way the two different data busses are maximally used because, in decoding one block, every 8 consecutive pixels will belong to alternating banks.

A second important consideration is that all the units pertaining to one display line and category, i.e. either luminance or chrominance, should be wherever possible in one chip. In this way the SAM is most effectively used as these units of one video line can be transferred, with an existing internal mechanism of the mentioned memory chip, from the DRAM to the SAM and the display means DIS can simply read this SAM serially to display this video line.

In the CCIR 601 case this is not possible because of the number of pixels on such a video line. Indeed, the amount of units contained in one such a line exceeds the capacity of one SAM. In this case as few SAM's as possible should be used to store such a long video line. By alternating the banks for even and uneven lines the display means DIS will also use alternating banks in the display means. To be noted that the block to line conversion within the one frame store memory FSM can be implemented in this way.

It can be further said that by using parallel access to 2 chips to accomodate units of 8 bits wide the one chip mentioned in this paragraph physically conforms to those 2 chips put in parallel.

Alternating the lines in two different banks can be achieved easily by letting bit P3 select the bank. It can be verified that in using an address translater table and an address matching as in the following tables the above demands are met.

	B6	B5	S5	S4	S3	S2	A4	A3	A2	A1	A0
First 512 Pixels	0	x	x	x	x	x	S5	S4	S3	S2	B5
Stripes 0-31 36-67	1	0	0	x	x	x	1	1	S3	S2	S4
Stripes 32-35 68-71	1	0	1	0	0	0	S5	S4	1	S2	S4
Stripes 36-39 72-75	1	0	1	0	0	1	S5	S4	1	S2	S4
Forbidden	1	0	1	0	1	x	-	-	-	-	-
Forbidden	1	0	1	1	x	x	-	-	-	-	-
Forbidden	1	1	x	x	x	x	-	-	-	-	-

Table 1 Address Translator

In the above table the symbols A0; ...; A4 are needed to reduce the frame addressing space with 21 bits to an intermediate addressing space with only 20 bits in order to be compatible with the memory addressing space. The translation from this intermediate addressing space to the memory addressing space is done according to the folowing table.

	Bank	Row Address
L	P3	F0 A4 A3 A2 A1 S1 S0 P5 P4
C	P3	F0 A4 A3 A2 A1 S0 P5 P4 S1

	Bank	Column Address
L	P3	A0 B4 B3 B2 B1 B0 P2 P1 P0
C	P3	A0 B4 B3 B2 B1 P2 P1 P0 B0

Table 2 Address Matching

With reference to the above address matching table it can be said that the frame store controller FSC by counting the decoded units in every new stripe can easily determine whether a new unit of decoded video information is to be stored in a luminance or a chrominance memory chip "L" for address matching, whereas in the latter case it will be the line after "C" in the same table. For chrominance data it is further important that, although two types of chrominance data, n1. CB and CR, arrive separately in separate blocks, these two types should be interleaved in the frame store memory for correct operation of the display means DIS. It can be verified that this is achieved by rotating the last four bits, with respect to the luminance case of the column address when chrominance data is received, which is shown in table 2. For simplicity's sake the same measure is taken for the row address as can also be seen in table 2. In using the above tables also the two different types of chrominance data, n1. CB and CR are automatically demultiplexed according to the CCIR 601 case. The above results in a memory map according to the following table wherein only one bank containing either the even or the uneven lines is considered.

Rows	Columns 0-255	Columns 256-512
0-15	St 0-3 Pi 0-255	St 0-3 Pi 256-511
16-31	St 4-7 Pi 0-255	St 4-7 Pi 256-511
32-127	....	....
128-143	St 32-35 Pi 0-255	St 32-35 Pi 256-511
144-159	Reserved for MC	Reserved for MC
160-175	St 32-35 Pi 512-719	Unused
176-191	Reserved for MC	Unused
192-207	St 0-3 Pi 512-719	St 16-19 Pi 512-719
208-223	St 4-7 Pi 512-719	St 20-23 Pi 512-719
224-239	St 8-11 Pi 512-719	St 24-27 Pi 512-719
240-255	St 12-15 Pi 512-719	St 28-31 Pi 512-719
256-271	St 36-39 Pi 0-255	St 36-39 Pi 256-511
272-287	St 40-43 Pi 0-255	St 40-43 Pi 256-511
288-383	....	....
384-399	St 68-71 Pi 0-255	St 68-71 Pi 256-511
400-415	Reserved for MC	Reserved for MC
416-431	St 68-71 Pi 512-719	Unused
432-447	Reserved for MC	Unused
448-463	St 36-39 Pi 512-719	St 52-55 Pi 512-719
464-479	St 40-43 Pi 512-719	St 56-59 Pi 512-719
480-495	St 44-47 Pi 512-719	St 60-63 Pi 512-719
496-511	St 48-51 Pi 512-719	St 64-67 Pi 512-719

Table 3 Memory Map

In the above table St stands for stripes and the numbers indicate the numbers of such stripes within the frame. Also in the above table Pi stands for pixels and the numbers indicate the numbers of such pixel within a video line of the frame. St 0-3 Pi 0-255 for instance denotes the first 256 pixels of the, even or uneven, video lines comprised in the first 4 stripes of the frame.

From the above memory map it follows that some overhead capacity is available in the frame store memory FSM, i.e. some parts of these memory are never used in the above case. This overhead can be used to implement motion compensation using a non permanent memory map which will be clarified

hereafter.

Allowing negative motion vectors means that the above permanent memory map is not suitable for motion compensation because old units, indicated by such a negative motion vector, are already overwritten by new units when they are needed for the motion compensation scheme. The free space of table 3 referred to as "reserved for MC" will be used to overcome these problems. Because there is no time to copy data to this free space a non permanent memory map has to be used. In so doing the memory location in which a particular unit within a frame is to be found, changes with each consecutive frame received. This is accomplished when, for instance, a new unit is written 16 columns under its corresponding old unit. With this principle a negative or positive motion vector of at most 4 stripes is allowed which is more than prior art systems allow. In the light of the above description this principle can be implemented by a person skilled in the art and it is therefore not described in more details.

With reference to FIG. 6 the block schematic of the display means DIS will now be briefly discussed. DIS has as input the signal NEW2 which consists of signals LUM2 and CHR2 retrieved from the frame store memory FSM and respectively containing the luminance and chrominance of the pixels. This input signal is first applied to a block YCTOR6B transforming it into red/green/blue format appropriate for the display. The latter block has three outputs, R1, G1, B1 respectively corresponding to respectively the amount of red, green and blue color in a particular pixel. These outputs are applied to a digital to analog conversion block DAC. The latter block also having as input the signal VIDEOSYNC from the pixel processor PROC and which indicates the beginning of a new image line as needed for the display of an image.

The block DAC has 4 outputs R2, G2 B2 and S respectively on which like named analog signals are applied. These signals drive a video screen MONITOR which displays the video signal. Display means such as DIS are well known in the art and a person skilled in the art should be able to implement it without difficulties.

To be noted that the frame store controller FSC of FIG. 1 can be so designed as to be able to change the resolution of the display or to adapt to a change of the resolution of the received information, e.g. by decoding video information according to CIF instead of CCIR 601 resolutions, and this without any hardware change. For the latter the only restriction is that the frame store memory FSM, in decoding predictively coded data, has to be large enough to contain all the units needed in such a standardized frame.

For instance the second control information OV2 could be used to send a signal indicating that, instead of receiving CCIR 601 frames, H261 frames are being decoded. The frame store controller then only has to use a different memory map for these different frames, the deriviation of such a memory map is obvious to a person skilled in the art in the light of the above.

Due to the asynchronous working of the decoder the display and the decoding means do not have to work at the same resolution and this resolution can consequently be changed during operation, e.g. it could be used to zoom, under control of signal EXT, on a particular part of a frame by adding new units by interpolation or by simply influencing the display means through the second pointer to display only some units in the frame store memory FSM.

The above features can for instance require that the overall system clock SC be divided under control of the external control signal EXT by the frame store controller FSC to achieve appropriate processing speeds for the two processes. The latter features can also be realized by the decoding means DEC1 and DEC2 by skipping skipping some packets or by the frame store controller FSC by skipping some units and use the thus gained time to implement e.g. interpolation.

When receiving for instance video information according to a coarser resolution than that specified by CCIR 601, the frame store controller FSC can control the decoding means DEC1 and DEC2 to create intermediate new units from the received new units, i.e. calculate them via upsampling. All these new units can then be stored in the frame store memory FSM in using the above specified memory map. This results in the possibility to use, e.g. a same CCIR 601 standardized, monitor whatever is the resolution of the received video information.

An important aspect of the present invention is to avoid image degradation caused by the crossing of the first and the second pointer as described in detail earlier. When block coded video information is used a somewhat more stringent demand is to be met to avoid any image degradation n1. the two pointers should not correspond to pixels within one stripe. Indeed, when the latter would happen the display means DIS would display partly old units and partly new units of the handled stripe, because the display is line or stipe oriented whereas the decoding is block oriented. Therefore, the variable number should remain within predetermined bounds, i.e. between one stripe, and one frame minus one stripe to avoid any image degradation.

The above is achieved by the control means CON depicted in FIG. 7. CON receives an input signal ADJ from the frame store controller FSC of FIG. 1 and which is constituted by a first line number LINE1 and a

second line number LINE2, respectively indicative of which line within a frame is currently processed by the decoding means DEC1 and DEC2, and the display means DIS. The second line number LINE2 is sustracted from the first line number LINE1 in a substraction module S and the result is fed into a block POS calculating from said result a number between 0 and the total number of lines contained in the frame minus one. The output of the latter block is compared in a comparator circuit C with a counter value which is the output signal of a module counter CR counting from zero to the above mentioned total number minus one. The latter module counter CR counts with a frequency determined by a clock input signal SC1 derived after division (not shown) from the system clock signal SC and which for sake of clarity is not shown in FIG. 1.

The output of the comparator C is a pulse width modulated signal PWM which is fed into a low pass filter LP the output signal DC of which is used to control the frequency of the system clock SC.

The block POS converts the result of the subtraction to a value indicative of the earlier mentioned variable number. It avoids that negative results are further used by the control means, these negative values corresponding to cases where the implicit buffer crosses the boundaries of the frame store memory FSM as already discussed with reference to FIG. 2b. The value indicative of the variable number in case of negative value is obtained by adding the negative result to the aforementioned total number.

To be noted that the difference between LINE2 and LINE1 is not exactly equal to the variable number but is indicative of that number. The first line number LINE1 control is indeed derived from the second control information OV2 by the frame store controller FSC by multiplying the stripe number STRIPE by 8 thereby indicating the last line of a stripe, whilst the second line number LINE2 is derived by the frame store controller FSC from the second pointer. An alternative would be to use the pixel locations derived from the first and second pointers but this leads to an output value changing in relatively large steps due to the fact that the first pointer indicates a pixel block of an image whereas the second pointer indicates a display line.

The output of POS, which is indicative of the variable number, is compared with a predetermined value, e.g. half of the mentioned total number as produced by the counter COUNTER. When the output signal is larger than the predetermined value which means that the number of pixels located between the locations indicated by the second and the first pointer is greater than a predetermined value, then wide pulses are produced at the output of the comparator whereas the opposite case leads to narrow pulses. Wide pulses produce, after the low pass filtering in the block LOW PASS, a larger signal DC speeding up the frequency of the system clock SC, which results in a higher retrieval rate of information from FSM by DIS. This way the display process catches up with the decoding process, thereby reducing the variable number of units between the second and the first pointer.

On the other hand when the output signal of POS is smaller than the predetermined value, smaller pulses are produced by C, which results in a smaller signal DC and a slowing down of the frequency of the system clock SC and thus a lower retrieval rate of information by DIS.

The above control means CON in so doing indirectly tunes the display process to the information rate produced by the encoder without needing dedicated phase lock loop circuitry and large input buffers in INT of FIG. 1.

To be noted that the delay jitter and the varying information density in the received packets, in case of variable bit rate coding, have little influence on the stability of the frequency of the system clock SC thus keeping the video decoder compatible with existing display standards such as CCIR 601 or PAL. The mentioned varying information density does lead to fluctuations in the variable number because some packets result in many units being decoded at a fast rate whereas other packets only carry information relating to few units hence giving rise to a slow decoding rate, but the instability of the frequency of SC can be bounded by determining a suitable cut-off frequency of the low-pass filter LP so that the variable voltage DC can at most vary with the latter frequency thereby keeping the mentioned instability within predetermined bounds. A cut-off frequency of e.g. 1 Hz suffices to achieve a sufficiently stable clock frequency. It is further required that the frequency of the pulse width modulated signal PWM is high enough, therefore the clock input signal SC1 to the module counter CR should for instance have a frequency high enough to ensure that the former frequency is for instance 1 MHz. In any case the frequency of SC1 should be such that enough samples of the output signal POS are taken within the time needed to display a frame i.e. this frequency SC1 should at least be larger than one frame period divided by the mentioned total number. The problem of achieving a sufficiently stably system clock SC can be alleviated further thanks to a small input buffer used to smooth out the delay jitter as already mentioned earlier.

It was already mentioned that at any time within the display the displayed image can be frozen by controlling the frame store controller FSC, via the external control input EXT, to skip all incoming information by simply not writing it in the frame store memory FSM. Similarly the video decoder can be used to display still pictures e.g. according to the above mentioned JPE6 standard. The wish to use such a

feature can be indicated in the second control information OV2. To this end, if the control means CON is used, its control action has to be suspended e.g. by allowing the frame store controller FSC to predefine the adjust signal ADJ.

While the principles of the invention have been described above in connection with specific apparatus, it is to be clearly understood that this description is made only by way of example and not as a limitation on the scope of the invention.

Claims

1. Video decoder, receiving packets from a packet switching network, said packets containing control information (OV1; OV2) and video information (VI), and said video decoder being able to process real time moving video images and including,
   - decoding means (DEC1, DEC2) deriving from at least said video information (VI) new units of decoded video information (NEW1) relating to a current video frame;
   - a memory module (FSM) in which said new units (NEW1) are stored;
   - display means (DIS) displaying said stored new units (NEW2) on a video screen;

   characterized in that after one of said new units (NEW1) is derived and stored in said memory module (FSM), said display means retrieves a variable number of said stored new units (NEW2) from said memory module (FSM) for display, before retrieving said one unit.

2. Video decoder according to claim 1, characterized in that said decoding means (DEC1, DEC2) retrieves from said memory module (FSM) old units of decoded video information (OLD) relating to a previous video frame to derive therefrom said new units (NEW1) thereby decoding predictively coded video information.

3. Video decoder according to claim 1 or 2, characterized in that said decoder further includes a control means (CON) which monitors said variable number and which increases or decreases the frequency of a system clock (SC), included in said video decoder and controlling at least said display means (DIS), thereby preventing said variable number from becoming larger or smaller than a first and second predetermined number respectively.

4. Video decoder according to claim 3, characterized in that said system clock (SC) additionally controls at least said decoding means (DEC1, DEC2).

5. Video decoder according to claims 2 and 3, characterized in that said control means (CON) derives from part of said control information a value indicative of said variable number and speeds up or slows down said system clock (SC) if said value is respectively higher or lower than a predetermined value thereby assuring that said display means (DIS) processes each of said units only once.

6. Video decoder according to claim 2, characterized in that said decoder further includes a memory module controller (FSC) controlling at least a first and second pointer (P1; P2) used by said decoding means (DEC1, DEC2) and said display means (DIS) respectively, said pointers (P1; P2) indicating which memory location of said memory module (FSM) is to be used by said respective means to respectively store or retrieve said units, and that the values of said first and of said second pointers (P1; P2) are asynchronously updated by said memory module controller (FSC) when their respective means (DEC1, DEC2; DIS) have respectively stored or retrieved one of said units.

7. Video decoder according to claim 6, characterized in that said memory module controller (FSC) performs said updates according to a memory map mapping a location of each of said units within a video frame onto memory locations of said memory module (FSM).

8. Video decoder according to claim 5 or 6, characterized in that said memory module (FSM) consists of a dual port random access memory including at least one dynamic random access memory (DRAM1, ..., DRAM8) and at least one serial access memory (SAM1, ..., SAM8), that said dynamic random access memory is accessed by said decoding means (DEC1, DEC2) to store said new units (NEW1) on locations indicated by said first pointer (P1) and to retrieve said old units (OLD) from a location indicated by a third pointer also controlled by said memory module controller (FSC), and that all of said units corresponding to one line in the video display are transferred under control of said memory

module controller (FSC) from said dynamic random access memory to said serial access memory and that said display means (DIS) retrieves said units from locations in said serial access memory indicated by said second pointer (P2).

9. Video decoder according to claims 5 and 6, characterized in that said value derived by said control means (CON) is equal to the difference between a number of a line (LINE2) within a frame currently processed by said display means according to said second pointer (P2) and a number of a line (LINE1) within a video frame to be processed by said decoding means (DEC1, DEC2) according to said first pointer (P1).

10. Video decoder according to claims 5 and 6, characterized in that said value is derived from said control information (OV1; OV2).

11. Video decoder according to claim 9 or 10, characterized in that said predetermined value is half the amount of said units contained in one frame and that said control means (CON) compares said value with a counter value, obtained by counting modulo said amount within one frame period, and that the DC component (DC) of a pulse width modulated signal (PWM) indicative of the result of said compariston is used to control the frequency of said system clock (SC).

12. Video decoder according to claims 2 and 3, characterized in that said video information (VI) is block coded using a variable bit rate technique, and that said first predetermined number is equal to the number of units contained in one stripe and that said second predetermined number is equal to the number of units contained in one frame minus one stripe.

13. Video decoder according to claim 12, characterized in that said memory module (FSM) capacity is additionally used by said memory module controller (FSC) to realize motion compensation by using a non-permanent memory map, mapping a location of each of said new units within a frame onto memory locations of said memory module (FSM), each of said new units (NEW1) being stored in locations other than the location in which corresponding ones of said old units (OLD) were stored.

14. Video decoder according to any of the claims 2 to 13, characterized in that said units are subdivided in a plurality of categories (LUM, CHR), units corresponding to different categories carrying different information relating to a same image element, and that said units of video information of different categories are processed by said decoding means (DEC1, DEC2) regardless of their category and that said memory module controller (FSC) demultiplexes said units according to the category they belong to by writing said units in appropriate memory locations within said memory module (FSM).

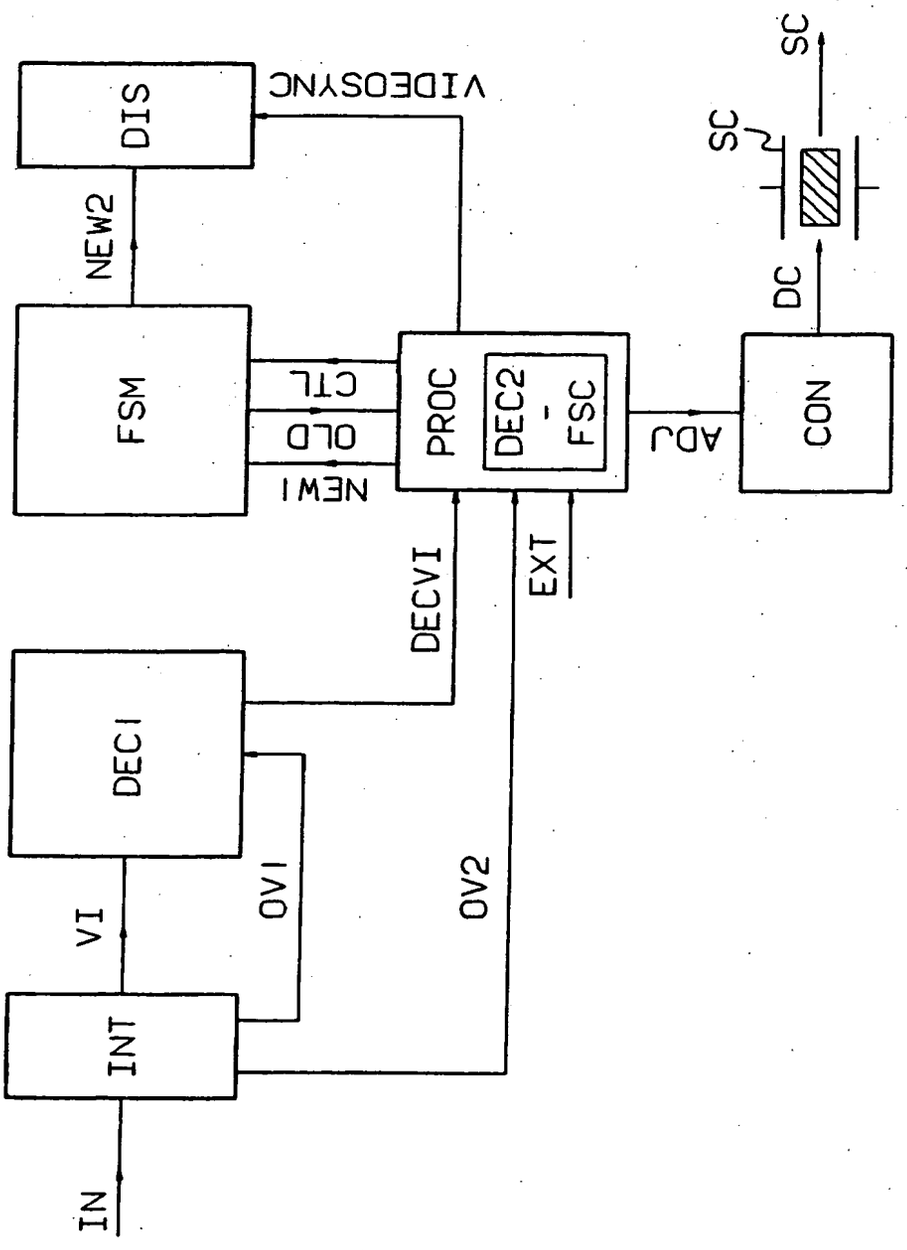
15. Video decoder according to any of the claims 7 to 14, characterized in that said video information (VI) corresponds to images of one of a plurality of resolutions, said one resolution being identified by said video decoder based on at least part of said control information (OV1, OV2) and that said memory module controller (FSC) adapts said video decoder to said one resolution by using a corresponding memory map of a plurality of memory maps.

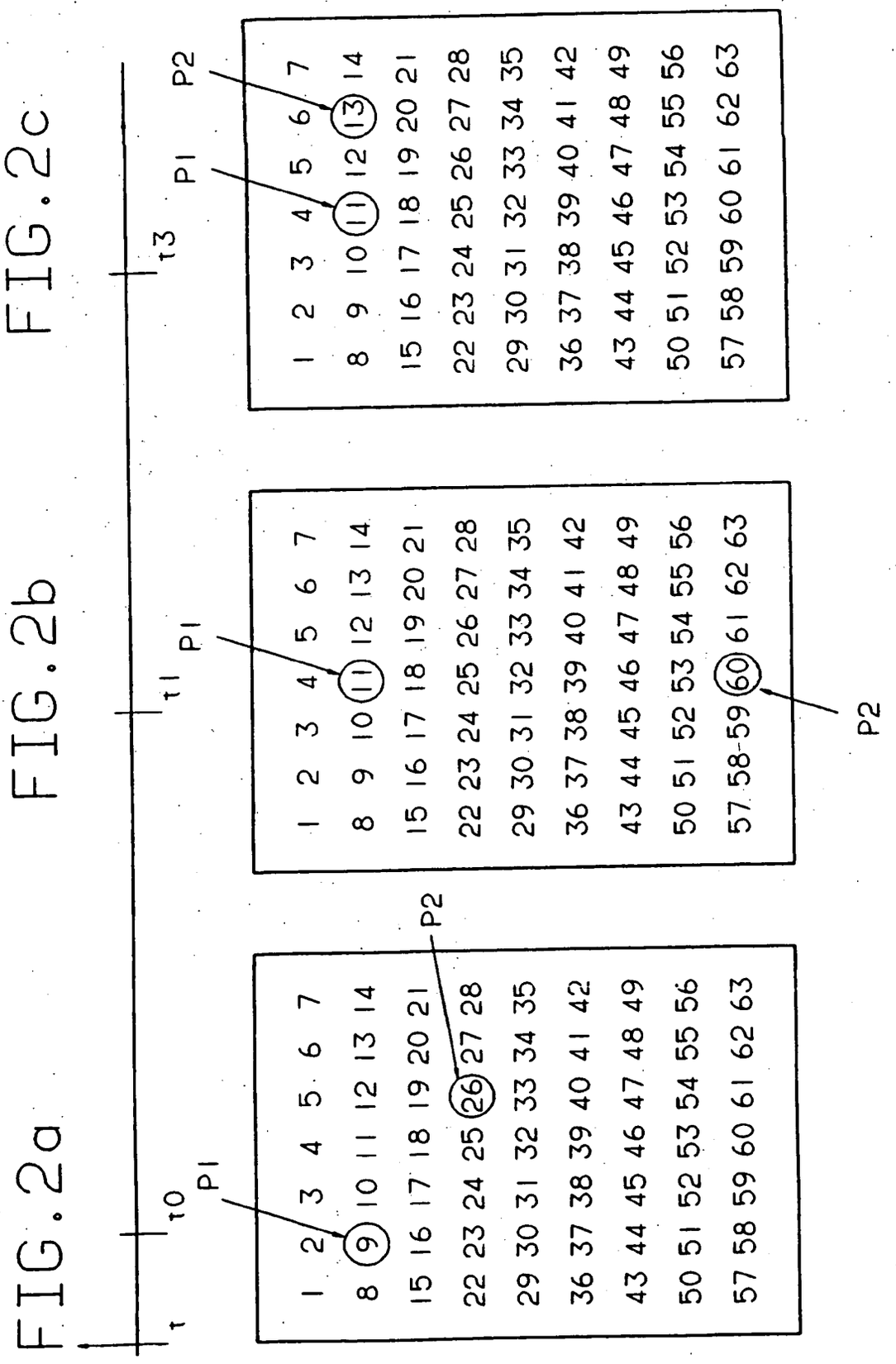
16. Video decoder according to claim 1 or 2, characterized in that said video decoder can at any time change to a display of a still picture by not refreshing said memory module (FSM) with new units of video information.

17. Video decoder according to claim 16 and any of the claims 3-15, characterized in that said control means (CON) is deactivated during said display of a still picture.

18. Video decoder according to any of the claims 2-17, characterized in that said memory module controller (FSC) is able to control said video decoder to display images differing from those contained in said video information (VI) by controlling said decoding means (DEC1, DEC2) to calculate intermediate new units of decoded video information (NEW1) and, to store at least part of said new units, including said intermediate new units, according to a memory map corresponding to a desired display, said desired display being signalled to said memory module controller (PSC) by an appropriate control input signal (EXT; OV2).

FIG. 1


DIS
VIDEOSYNC
NEW2
FSM
CTL
OLD
NEW1
PROC
DEC2
FSC
ADJ
CON
SC
SC
DC
DECVI
EXT
DEC1
VI
OV1
OV2
INT
IN



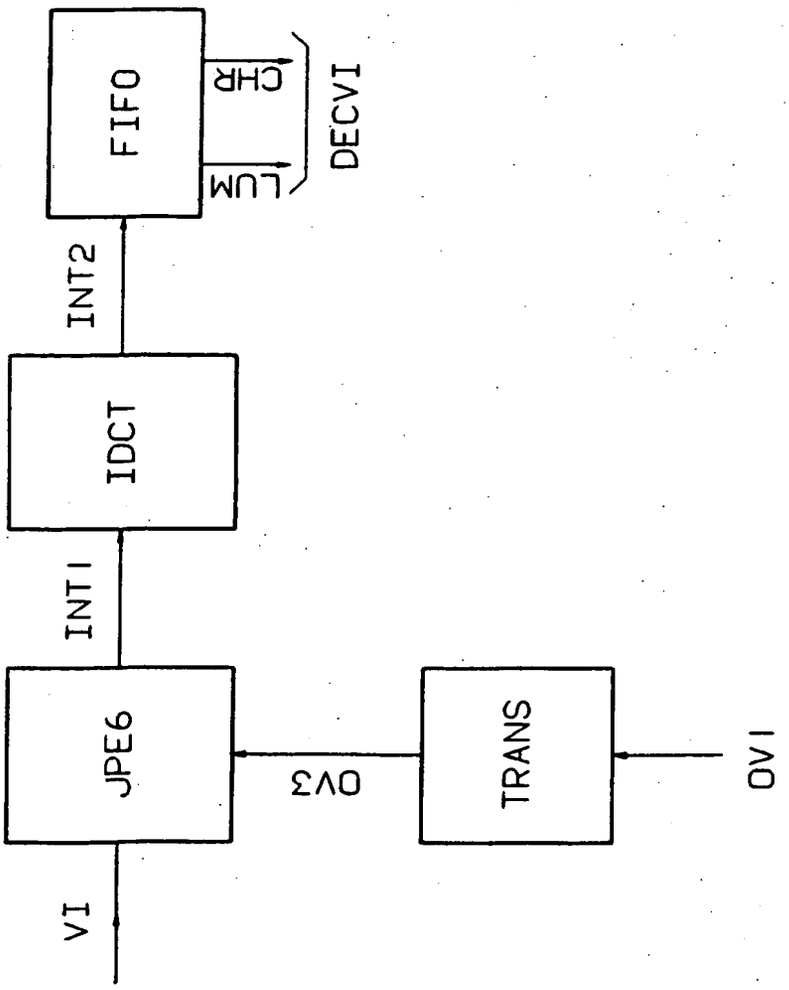


FIG.3

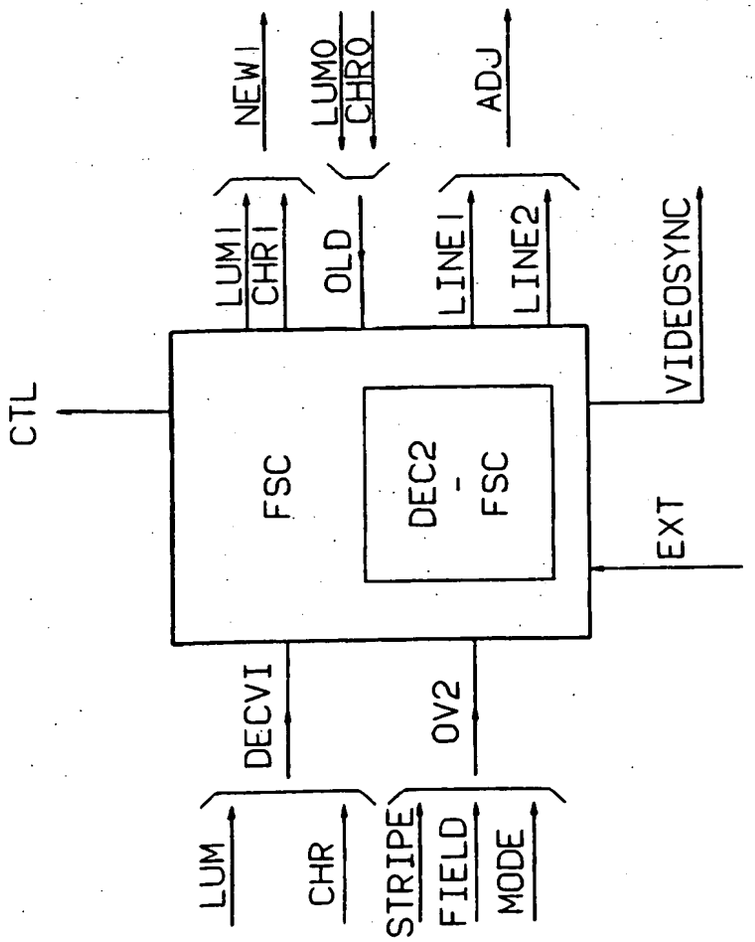


FIG. 4

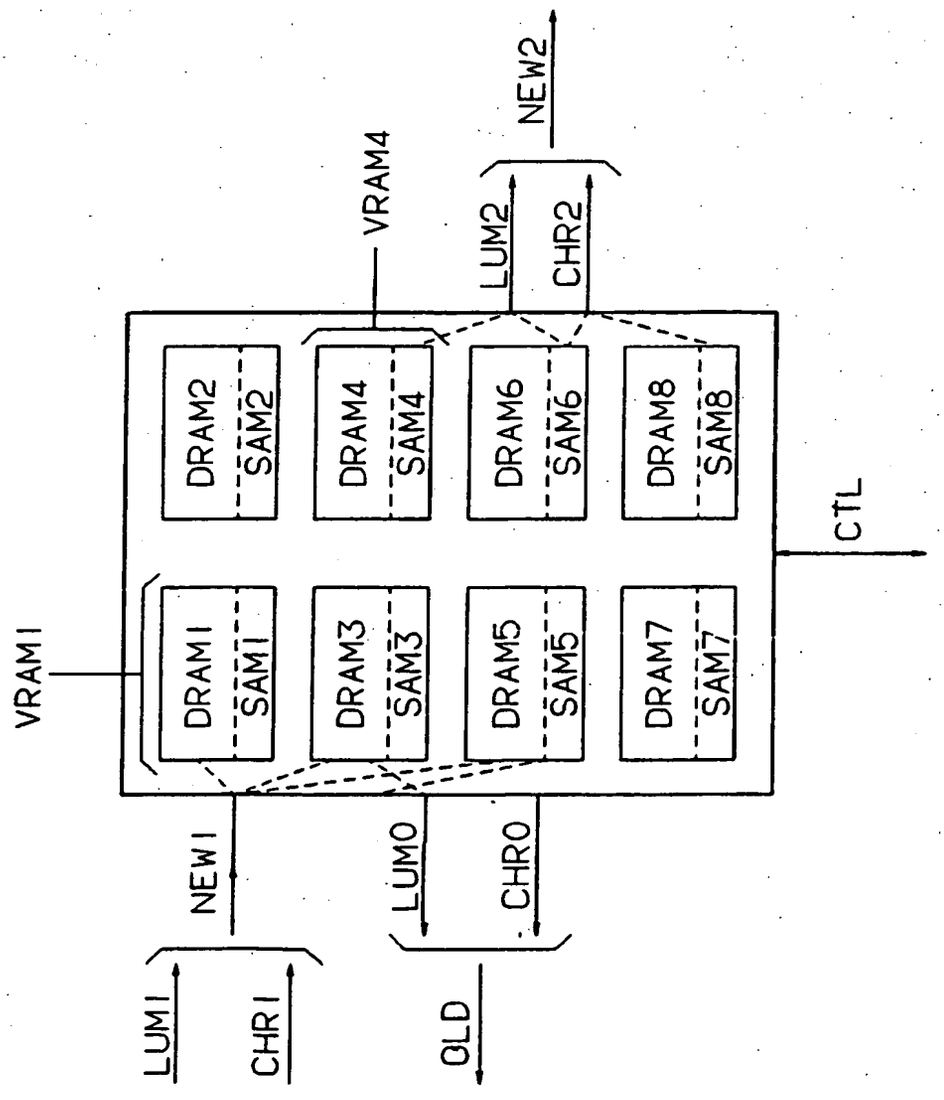
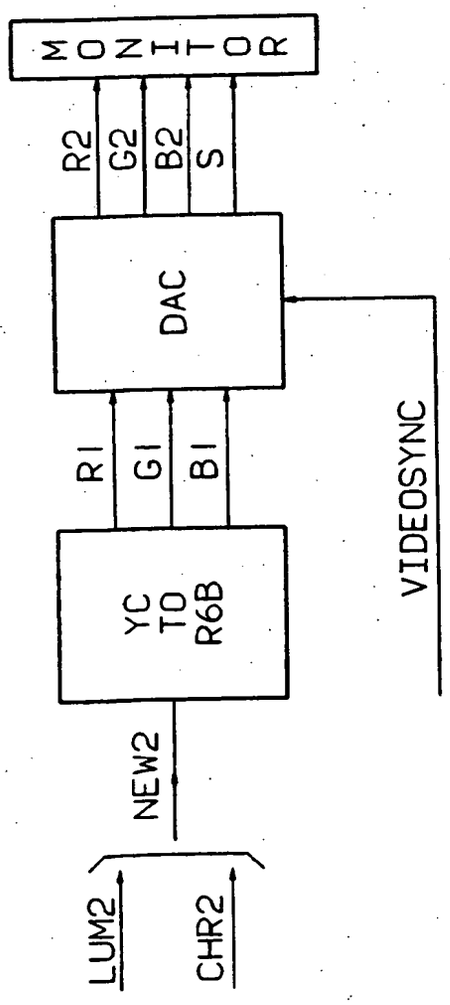
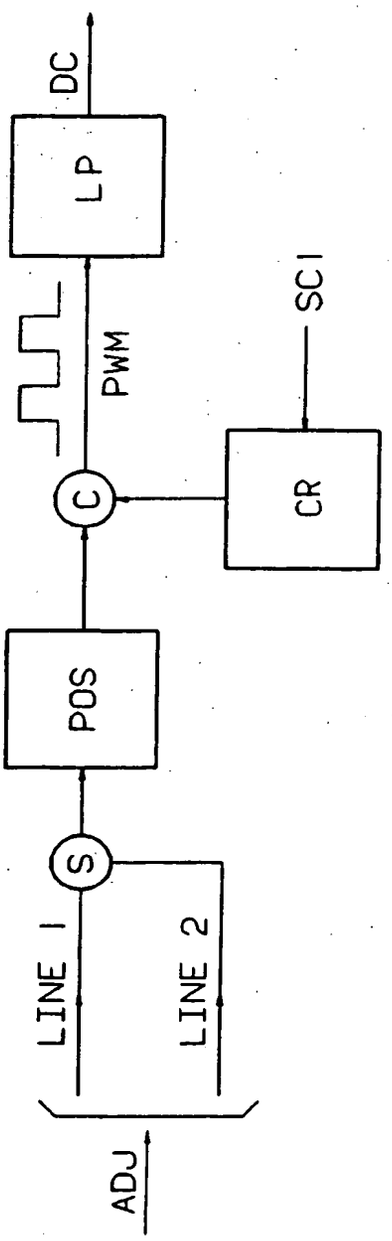

FSM
CTL
VRAM1
VRAM4
NEW2
LUM2
CHR2
DRAM1
SAM1
DRAM2
SAM2
DRAM3
SAM3
DRAM4
SAM4
DRAM5
SAM5
DRAM6
SAM6
DRAM7
SAM7
DRAM8
SAM8
NEW1
LUM0
CHR0
LUM1
CHR1
OLD

FIG.5



DIS

FIG.6



- CON

FIG. 7

European Patent Office

EUROPEAN SEARCH REPORT

Application Number
EP 92 87 0048

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int. Cl.5)
D,A	IEEE JOURNAL ON SELECTED AREAS IN COMMUNICATION. vol. 7, no. 5, June 1989, NEW YORK US pages 761 - 770 VERBIEST ET AL. 'A Variable Bit Rate Video Codec for Asynchronous Transfer Mode Networks' * page 764, column 2, line 29 - page 765, column 1, line 21; figure 8 *	1-18	H04N5/907 H04J3/06
A	ELEKTRONIK vol. 36, 20 February 1987, MUNCHEN DE pages 92 - 96 WOITOWITZ ET AL. 'Aufbereitung der Meteosat-2-Signale' * page 93, column 1, line 7 - page 96, column 1, line 45; figure 2 *	1-18	
A	EP-A-0 249 985 (SONY CORPORATION) * page 2, column 1, line 43 - line 53; figure 1 * * column 2, line 14 - line 34 * * column 6 *	1-18	

TECHNICAL FIELDS SEARCHED (Int. Cl.5)

H04N
H04L
H04J

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
BERLIN	25 NOVEMBER 1992	MATERNE A.

CATEGORY OF CITED DOCUMENTS

X : particularly relevant if taken alone
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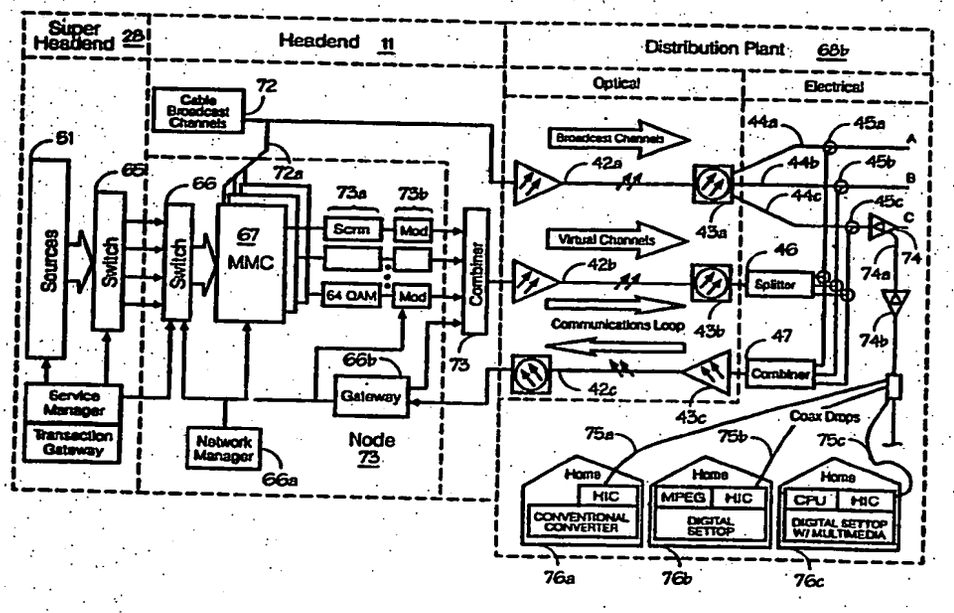

(57) Abstract

A system in some embodiments achieves distribution of conventional cable services in traditional manners while providing interactive television information services on a demand basis using a switching arrangement, and it does so while permitting both types of service to be accessed, as in the past, by the single action of channel selection. In a preferred embodiment, an interactive television information system, providing interactive cable television service when coupled to a cable television system, has (i) an information source available at a headend (11) for supplying a plurality of information services and (ii) an information service distribution (68b) network for delivering the information services to subscriber televisions. Various architectures are provided.

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INTERACTIVE HOME INFORMATION SYSTEM

Technical Field

The present invention relates to cable television systems, particularly those having two-way communications capability with the user.

Background Art

Bandwidth problems have long restricted the ability of cable television systems to provide information services to subscribers. Although a coaxial cable system may permit a cable system operator to provide, for example, 50 television channels, each 6 MHz wide, with a total bandwidth of 300 MHz, this total bandwidth is insufficient to permit an arrangement wherein each subscriber may have, in addition to these 50 channels, an interactive information service that functions independently of interactive information services to all other subscribers and provides full color video, motion typical of movies or television, and sound.

The reason for the insufficiency in bandwidth is apparent on a consideration of the demands on the system. Typically a subscriber on a cable system obtains information services over a communication path that starts at the headend, proceeds over one of typically a number of trunks, and then over one of a number of feeders, and then over one of a number of taps. Each feeder may have, for example, fifty or more subscribers, and each trunk might serve a hundred or more feeders. The result is that 5000

subscribers per trunk is not atypical. Thus merely to provide a private one-way information service, and nothing else, to each of these 5000 subscribers would require the trunk to carry 5000 different signals, each using about 6 MHz of bandwidth, and would alone require a trunk bandwidth of 30 GHz, which is nearly two orders of magnitude greater than provided by a typical coaxial cable system.

The use of fiber optic trunks can assist in providing additional bandwidth, but to the extent that coaxial cable secondary trunks and feeders are used in a hybrid fiber-cable system, bandwidth limitations may continue to pose problems. While video compression schemes may assist in bringing the bandwidth requirements within more practical limits, each subscriber would then need to be provided with his own decompression unit.

Another problem lies in how to handle the switching and computing demands on the headend to provide separate and private information service to potentially hundreds of thousands of subscribers simultaneously.

In one paper, it has been suggested that a portion of cable system bandwidth be used to provide the most popular channels universally to all subscribers and remaining services be delivered to individual busses on a demand basis only. Large, D., "Tapped Fiber Vs Fiber-Reinforced Coaxial CATV Systems: A comparison of Evolutionary Paths," Draft Paper, 8/4/89, at pages 16 et seq. A three level distributed switching system was proposed, with one switch at the headend to switch among hubs, one at each hub to switch among distribution lines, and a third level "interdiction circuit" to select the service for each dwelling. No architecture for such a scheme was proposed, and the author noted that "a significant development effort will be required". Id., at page 19. Moreover, the author notes that his scheme poses a problem for the subscriber in using the system, because most channels will be accessed in the normal way using the television tuner while switched services must be accessed by first tuning to an available

switch channel, then using an auxiliary communications device to control that channel. "Given that customers have historically resisted any complications created by cable companies in accessing services, this may be a potential problem." Id., at 20.

Summary of the Invention

The present invention provides in a preferred embodiment a system that achieves distribution of conventional cable services in traditional manners while providing interactive television information services on a demand basis using a switching arrangement, and it does so while surprisingly permitting both types of service to be accessed, as in the past, by the single action of channel selection.

In a preferred embodiment the invention provides an interactive television information system, for providing interactive cable television service when coupled to a cable television system having (i) an information source available at a headend for supplying a plurality of information services and (ii) an information service distribution network for delivering the information services to subscriber televisions. In this embodiment, the interactive television system has a plurality of home interface controllers. One such home interface controller is associated with each subscriber television and provides an output in communication with the subscriber television and has (i) a signal input for television information signals and an input selection arrangement for selecting a given one of the television information signals at the signal input, (ii) a channel selection arrangement for permitting a user to select an apparent channel, and (iii) a data transceiver operative over a data communications link. The embodiment also has a node, in television communication with the information source over a first path of the network and with a group of the home interface controllers means over a second path of the network, and in data communications with the home interface controllers over the data communications

link. The node selects and provides information services obtained from the information source to each home interface controller in the group based on data obtained over the data communications link from each such home interface controller.

In one embodiment, the node and each home interface controller are so arranged that when any of a first group of apparent channels is selected on a given one of the home interface controllers, the node provides to it different information services on different apparent channels in the group all via the same television information signal selected by the input selection arrangement of such given home interface controller at a single carrier frequency for such given home interface controller. In this way different information services may be selected by the user simply by changing the apparent channel. Furthermore, the channel selection arrangement in each home interface controller includes an arrangement for causing each selected channel in a second group of apparent channels to correspond to a different selected carrier frequency of a television information signal at the signal input. In this manner, selecting different apparent channels can also be used to cause the selection of different conventional cable channels. Thus channel selection permits the user to select any information service, regardless whether it is conventional or interactive.

In a further embodiment, the node includes an activity detection arrangement for determining whether a given home interface controller is to be placed in an interactive mode. The node also includes a signal assignment arrangement for causing, on an affirmative determination by the activity detection arrangement, the input section arrangement of the given home interface controller to select a given television information signal present at the signal input. In this embodiment, signal assignment is accomplished on a demand basis for those home interface controllers determined to be placed in an interactive mode. When the demand exceeds the

supply, the assignment is achieved with rules for resolving the contention, for example, by permitting the first home interface controller to keep its assigned frequency until the activity detection arrangement detects that the interactive mode is no longer in effect.

In related embodiments, the distribution network may include a plurality of express trunks. Each trunk has a first bandwidth portion carrying non-interactive television information services that are substantially identical in nature and in bandwidth allocation among all trunks. A second bandwidth portion of each trunk carries television information services on a demand basis established by subscriber usage of the home interface controllers utilizing the trunk for service. The data communications link may include a return path, from each home interface controller in a collection of neighboring home interface controllers, to the node in which a common trunk line is utilized for all of the home interface controllers in the collection.

This embodiment may further utilize a main trunk carrying television information signals for non-interactive information services from the headend to each of the express trunks. Also an interactive trunk may carry television information signals for information services on a demand basis from the headend to each of the express trunks. A splitter splits from the interactive trunk the television signals for information services on a demand basis for each of the express trunks. A group of couplers couples the signals from the main trunk and the splitter to feed each of the express trunks.

Brief Description of the Drawings

These and other aspects of the invention will be more readily understood by reference to the following detailed description taken with the accompanying drawings, in which:

Fig. 1 is a schematic of an interactive television information system in accordance with a preferred embodiment of the present invention, showing relations with national and regional processing centers;

Fig. 2 is a schematic showing the manner in which a multiheadend system with fiber optic interconnection may be employed to provide interactive television service in accordance with an embodiment of the invention;

Fig. 3 is a schematic showing an embodiment similar to that shown in Fig. 2, but in which a headend may have wireless communication with subscribers;

Fig. 4 is a schematic showing a mixed fiber optic coaxial cable system in accordance with a preferred embodiment of the present invention;

Fig. 5 illustrates the general architecture of outbound signal flow and two-way control in a system in accordance with a preferred embodiment of the present invention;

Fig. 6 illustrates the manner in which the architecture of a system similar to that of Fig. 5 uses controls to handle a wide range of information services in both analog and digital formats and distribution arrangements;

Fig. 7 provides further detail of the system of Fig. 6;

Fig. 8 shows the signal processing aspects of the system of Fig. 7;

Fig. 9 shows detail of the splitter and combiner of Fig. 7;

Fig. 10 shows the allocation of frequency bands in the express trunks of Fig. 9;

Figs. 11A-11D show the structure of a chassis in accordance with a preferred embodiment of the present invention for holding multimedia controllers (MMCs) and modulator cards constituting components of the system illustrated in Fig. 7;

Fig. 12 illustrates the structure of analog MMC and modulator cards for the chassis of Fig. 11;

Fig. 13 illustrates the structure of preferred embodiments of the audio subsystems for the MMCs of Figs. 12 and 14;

Fig. 14 illustrates the structure of digital MMC and modulator cards for the chassis of Fig. 11;

Fig. 15 illustrates the structure of the data

communications link at the headend (node) of the system of Fig. 7;

Fig. 16 illustrates the structure of the encoder/modulator of Fig. 12;

Fig. 17 illustrates the structure of the video processor of Fig. 16;

Fig. 18 illustrates the structure of the sync generator lock and scrambler timing section of Fig. 16;

Fig. 19 illustrates the structure of the audio processor section of Fig. 16;

Fig. 20 illustrates the structure of the rf upconverter section of Fig. 16;

Fig. 21 illustrates the structure of a scrambler for use with the modulator of Fig. 16;

Fig. 22 illustrates the seed data timing used in connection with the scrambler of Fig. 21;

Fig. 23 illustrates the structure of a descrambler suitable for use in a home interface controller in accordance with a preferred embodiment of the present invention for descramling a video signal that has been scrambled by a system in accordance with Fig. 21;

Fig. 24 illustrates an alternative scrambling system;

Fig. 25 illustrates a descrambling system for use with video that has been scrambled by the system in accordance with Fig. 24;

Fig. 26 illustrates the input and output structure of a home interface controller in accordance with a preferred embodiment of the present invention;

Fig. 27 illustrates an embodiment of the controller of Fig. 26;

Figs. 28 and 29 illustrate embodiments of digital decompression and multimedia versions of the controller of Fig. 26;

Fig. 30 illustrates an alternative embodiment to the system of Fig. 7 in which the node is disposed at a feeder;

Fig. 31 shows the bandwidth usage in a system in accordance with that of Fig. 30;

Fig. 32 shows the general architecture of outbound signal flow and two-way control in a system in accordance with the embodiment of Fig. 30;

Figs. 33 and 34 illustrate use of the channel menu system in accordance with a preferred embodiment of the invention; and

Figs. 35-41 illustrate use of the carousel menu system and of the manner in which the invention in a preferred embodiment provides interaction with the user.

Detailed Description of Specific Embodiments

For the purposes of the description herein and the claims that follow it, unless the context otherwise requires, the terms "cable television environment" and "cable television system" include all integrated systems for delivery of any information service to subscribers for use in connection with their televisions. These include conventional cable television systems utilizing coaxial cable for distribution primarily of broadcast and paid television programming, cable television systems using fiber optics and mixed fiber optic-coaxial cable, as well as other means for distribution of information services to subscribers. Similarly, unless the context otherwise requires, the term "information service" includes any service capable of being furnished to a television viewer having an interface permitting (but not necessarily requiring) interaction with a facility of the cable provider, including but not limited to an interactive information service, video on demand, local origination service, community event service, regular broadcast service, etc. "Television communication" means providing an information service via a television information signal. A "television information signal" is any signal that may be utilized by a television for video display, regardless of the form, including a standard NTSC-modulated rf carrier, an MPEG-compressed digital data stream, or any other format. "Interactive television service" means an information

service that utilizes an interface affording two-way communication with a facility of the cable provider. When a node is said to be in an "interactive mode," it means that the node is providing an information service to the home interface controller; the home interface controller may, but need not, be furnishing data to the node as to what information service to provide.

In Fig. 1 there is shown the relationship of a cable television system in accordance with the present invention to regional and national processing systems. A headend 11 is in communication with a plurality of nodes 12 that in turn communicate with set top units 13, which below are referred to as "home interface controllers". Each of these home interface controllers has a remote control 14 operable by the user. Each headend 11 may obtain items for use in providing an information service from a regional processing center 15, which in turn may obtain some information services from a national processing center 16. The information services may include a wide range of offerings, such as classified advertising services, newspapers, advertising, televised catalogue ordering, video on demand or near video on demand, etc. Information services that are conventional television network programming may also be distributed from the national and regional processing centers.

Fig. 2 is a schematic showing the manner in which a multiheadend system with fiber optic interconnection may be employed to provide interactive television service in accordance with an embodiment of the invention. A pair of fiber optic cables 21 and 22 provide information services in clockwise and counter-clockwise directions (for redundancy in the event of disruption of the cables) from super headend 28 to headend clients 24 serving a number of cities 23. The super headend in turn may obtain conventional broadcast services as well as interactive information services from satellite receiver 27, and other information services from servers 25 from regional processing centers, as well as WAN

and interexchange (IXC) facilities 26. Each headend client 24 may contain an interactive service node, here designated by the trademark ISX, a trademark of ICTV, the assignee herein.

Fig. 3 is a schematic showing an embodiment similar to that shown in Fig. 2, but in which a headend 24 may have two-way wireless communication using transceiver facilities 31 with subscribers. A transceiver facility 31 may include a high gain antenna system 31a communicating with a transceiver 36 coupled to a television 37 at each subscriber location. The antenna system 31a radiates rf signals fed by transmitter 31b; the antenna 31a also receives signals from the subscriber transceivers and feeds them to receiver 31c. The transmitter 31b and the receiver 31c are linked to fiber optic receiver 32 and fiber optic transmitter 33 respectively, which in turn communicate with the headend 24 over optical fibers 34 and 35.

Fig. 4 is a schematic showing a mixed fiber optic coaxial cable system in accordance with a preferred embodiment of the present invention. In this embodiment, main fiber trunks 42a carrying conventional cable and broadcast programming go to optical receiver 43a, from which coaxial trunks 44A (express trunk A), 44B (express trunk B), and 44C (express trunk C) derive regular cable television programming signals. Each express trunk has a first bandwidth portion carrying these non-interactive television information services that are substantially identical in nature and in bandwidth allocation among all express trunks.

An interactive fiber trunk 42b in Fig. 4 carries desired interactive information services in the outbound direction that are not provided over main fiber trunks 42a, and these information services are fed into optical receiver 43b. As will be shown in further detail in Fig. 9, the electrical output of the optical receiver 43b includes information services in separate spectral portions for each of express trunks A, B, and C. This output is provided to hub splitter 46. The information services for each of

express trunks A, B, and C are then translated into common spectral portions by hub splitter 46, and then fed to the designated trunks, where they are coupled to the conventional signals via couplers at locations 45a, 45b, and 45c on trunks 44a, 44b, and 44c respectively. It should be pointed out that although the information services for each of these trunks occupy similar spectral regions, their information content is different, since the information content of the information services on trunk A is supplied on demand to the home interface controllers served by trunk A, the content on trunk B is supplied on demand to the home interface controllers served by trunk B, and the content on trunk C is supplied on demand to the home interface controllers served by trunk C. Thus a second bandwidth portion of each express trunk carries television information services on a demand basis established by subscriber usage of the home interface controllers utilizing the trunk for service.

The path of inbound data from the each express trunk 44A, 44B, and 44C is from a splitter at each of locations 45a, 45b, and 45c respectively to hub combiner 47. The inbound data, like the outbound interactive television information services, on each of the express trunks occupy similar spectral regions, although the data on each express trunk have different information content reflecting the particular demands made by the home interface controllers using each particular express trunk. The inbound data from each trunk are frequency shifted by hub combiner 47 in the manner described in further detail in connection with Fig. 9 to cause the data from these trunks to occupy separate spectral regions, and the output of the combiner 47 feeds optical transmitter 42c. The optical transmitter 43c feeds the optical fiber trunk 42c to provide a common trunk return path, for all the home interface controllers served by express trunks 44A, 44B, and 44C, for the interactive headend 41.

Fig. 5 illustrates the general architecture of outbound

signal flow in a system in accordance with a preferred embodiment of the present invention. At the super headend, for example, item 28 in Fig. 2, a variety of sources of information services are available from satellites, antennas, servers, and gateways, and they are routed to subscribers via routing switchers 52. A portion of these information services may, but need not, be provided to all subscribers as basic non-interactive service. The routing switchers 52 feed appropriate modular multimedia controllers 53 (MMCs) which may provide appropriate processing for providing the service in question to each subscriber. Differently configured cards are used depending on the nature of the information service. Where the information service is interactive, an individual MMC 53 is assigned on a demand basis to each requesting home interface controller, which is in data communication with MMC, and the MMC provides interactive television information service. Post switchers 54 switch the MMC outputs to appropriate modulators 55, which are in turn grouped so that their outputs feed rf combiners used for each fiber optic transmitter 57 and associated optical fiber 58. As indicated by item 59, two-way control, to be discussed in further detail below, is exerted over the outbound signal flow from end to end.

Fig. 6 illustrates the manner in which the architecture of a system similar to that of Fig. 5 may handle a wide range of information services in both analog and digital formats and distribution arrangements. A super headend 28 may obtain some information services via television receive only (TVRO) system 61a and downlink 62a, as well as over line 61b using, for example, T1 or T3 bands or ATM digital protocols and gateways 62b. The super headend 28 furnishes information services 64 via switch 65 to the headend 11. These information services may include video on demand, near video on demand, and multimedia presentations. They are provided under the general control of control manager 62c over control bus 63a. A central database may be maintained

on server 64a for all subscribers as to the types of service subscribed to and terms for delivery of service, and the delivery of services to the subscribers is monitored and controlled over the control bus 63a by service manager 63. The control manager also has supervisory control on bus 63a over the input switch 66 to headend 11. This switch 66, having an input from the output switch 65 of the super headend 28, feeds the analog MMCs 67a for analog signals in conventional formats and digital MMCs 67b for signals in digital formats. The MMC outputs are then subjected to modulators for appropriate frequency translation (item 68a) and to distribution 68b over the cable network to subscribers having analog converters 69a or digital converters 69b. Interactive information service is enabled by the net manager 66a, which maintains two-way data communication over gateway 66b with each of the converter types 69a and 69b.

Fig. 7 provides further detail of a system in accordance with Figs. 4-6. The information sources 51 from the super headend 28 feed its switch 65, the output of which is directed to the headend 11, which contains, in a node 77, input switch 66 feeding a series of MMCs, usage of which is allocated on a demand basis. As described in connection with Fig. 4, conventional cable broadcast channels are routed over main fiber trunk 42a to express trunks 44A, 44B, and 44C. An interactive fiber trunk 42b carries interactive channels (here called "virtual channels" for reasons that will be described below) to splitter 46 for coupling at 45a, 45b, and 45c to express trunks 44A, 44B, and 44C. Combiner 47 takes inbound data from each of the express trunks for delivery over common data fiber trunk 42c to the node at the headend. Analog television information signals from appropriate analog MMCs are processed by scrambling at 73a and modulators at 73b, whereas digital television information signals from appropriate digital MMCs are processed by combining them into a composite QAM (quadrature amplitude modulation) signal before going to modulators at

73b. In this embodiment (as contrasted with the otherwise similar embodiment of Fig. 5), the modulators are preferably capable of modulating a carrier that is tunable by the network manager 66a, so that any given modulator may be configured to best handle demands placed on the system. (In Fig. 5, the modulators are associated with carriers at dedicated frequencies, and the inputs to the modulators are varied by switch 54.) Depending on capacity of the cable system and the information services sought to be delivered, some of the cable broadcast channels 72 may alternatively be provided, over path 72a to the MMCs, as information services on demand furnished by node 77. (Such an approach may conserve bandwidth on the cable distribution plant 68b or permit more offerings to be made to subscribers.) Additionally, the path 72a permits the MMCs operating interactively to permit a subscriber to make overlays on otherwise conventional cable television programming. The outputs of items 73b are then combined by combiner 73 and fed to the interactive trunk 42b. The cable distribution plant 68b includes bridger amplifiers 74, feeders 74a, feeder amplifiers 74b, and cable drops such as 75a, 75b, and 75c serving homes 76a, 76b, and 76c.

The information services can be provided to a subscriber over virtual channels in which the channel number changes for different interactive information services, even though the various information services may be provided over a fixed frequency input to the set top, with the control data from subscriber's set top causing the headend to supply a different information service as the subscriber appears to be changing the channel. This feature is described in further detail below.

The modular structure of the node 77 and the arrangement of the distribution plant 68b permit serving simultaneously homes such as 76a with a conventional converter, 76b with a digital set top having MPEG decompression, and 76c with a digital set top having multimedia capability achieved with a home-based central

processing unit. Each home has a home interface controller operating as part of the set top configured as described below.

Fig. 8 shows the signal processing aspects of the system of Fig. 7. This figure does not show the distribution system, and therefore applies equally to telephone or cable distribution architectures. An analog MMC 82a in the node at headend 11 will typically pick off, under control of a central processing unit (CPU), a television information signal in digital form from switch 66 and then decompress the signal, subject it to appropriate frequency translation by a modulator and provide over the distribution system to homes where a conventional set top in block 81a can permit the signal to be demodulated for display by the television. A digital MMC 82b in the node at headend 11 also operates under control of a CPU, but does not need to decompress the signal. The signal is subjected to appropriate frequency translation and then distributed to the home. At the home, in block 81b, the signal is demodulated and decompressed at the set top for display by the television. In the case of digital multimedia set tops in the home, it is primarily frequency translation that needs to be provided at the headend node, which is achieved by gateway card 82c, and the set top in block 81c includes the CPU for processing of the signal from the headend.

Fig. 9 shows detail of the splitter 46 and combiner 47 of Figs. 4 and 7. Signals fed into splitter 46 include spectral regions for television information signals 91A for information services on demand for subscribers served by express trunk 44A and for outbound data 95A for providing interactive service to these subscribers. Similarly, there are spectral regions for television information signals 91B for information services on demand for subscribers served by express trunk 44B and for outbound data 95B for providing interactive service to these subscribers; also television information signals 91C for information services on demand for subscribers served by express trunk 44C and for outbound

data 95C for providing interactive service to these subscribers. The signals in these spectral regions are subject to frequency translation so that corresponding bands 92A, 92B, and 92C in each of express trunks 44A, 44B, and 44C respectively carry television information signals for information services on demand to subscribers served by these trunks. Frequency translation is also used so that corresponding bands 94A, 94B, and 94C carry outbound (downstream) data for providing interactive service to these subscribers in each of express trunks 44A, 44B, and 44C respectively. As discussed above in connection with Fig. 4, conventional cable channels occupy corresponding bands (here shown as item 90) in each of the express trunks.

Inbound (upstream) data for interactive service are handled by the hub combiner in the reverse manner. The data initially occupy corresponding bands 93A, 93B, and 93C on trunks 44A, 44B, and 44C, and are subject to frequency translation by combiner 47 so that the inbound data from trunk 44A occupy a first spectral region 96A, the inbound data from trunk 44B occupy a second spectral region 96B, and the inbound data from trunk 44C occupy a third spectral region 96C.

Fig. 10 shows the allocation of frequency bands in the express trunks 44A, 44B, and 44C. The return data in band 93 occupy the 15-18 MHz region. The downstream data in band 94 occupy the region above channel 4 in the range 72-76 MHz. The television information signals for interactive service in band 92 are located above the allocation 90 for conventional cable broadcast channels. These frequency assignments are merely illustrative, however. Moreover, the television communications and the data communications between node and subscriber home can be achieved in a wide variety of formats. Instead of putting each television information signal on a separate carrier at a separate frequency in the express trunks 44A, 44B, and 44C, for example, the signal could be provided as a compressed digital data stream on a time-shared basis or as addressed

packets. In fact, data communications in both directions (inbound to the node and outbound to the home interface controller) in accordance with a preferred embodiment of the invention utilizes slotted ALOHA protocols, so that data communications utilizes addressed packets.

Figs. 11A-11D show the structure of a chassis in accordance with a preferred embodiment of the present invention for holding multimedia controllers (MMCs) and modulator cards constituting components of the system illustrated in Fig. 7. A rack 112 in Fig. 11A holds switch 66 of Fig. 7 along with the MMCs and encoder and modulator cards 73a and 73b of Fig. 7. The MMCs and other cards are mounted in rows 114 of the rack 112. Each row of cards is supported on a chassis 113 shown in Fig. 11D. The MMCs (called processor line cards in Fig. 11B and processors in Fig. 11D) are plugged into the left, rearward portion of the chassis 113, and the encoder and modulator cards are plugged into the right, forward portion of the chassis. The central vertical member 115 of the chassis provides on both sides buses for digital and rf communication, as well as power for the cards that are mounted on either side of the chassis. The chassis 113 is mounted in the rack 112 so that the processor line cards 67 face the reader in Fig. 11A. It can be seen, from the code letters in Fig. 11A for the card types listed in Fig. 11B, that a wide range of specialized MMCs may be employed to permit the system to provide a wide range of information services in a wide range of formats. Thus MMCs may be employed for movies only (A) (providing, for example, decompression of stored digitally compressed movies in MPEG format), for providing multimedia presentations using software utilizing the Intel 486 microprocessor (B) or the Intel Pentium microprocessor (C), or using 3DO or SGI formats (D and E). Digital MMCs (item (configured with corresponding modulator as suggested in item 82b of Fig. 8) (item F), as well as various communications cards including some with Live Sync (permitting interactive overlays on broadcast programming)

(G) and permitting Home-v-Home communications (by which subscribers in two or more homes may communicate interactively, for example, in a computer game)(H) and gateway cards (I) are also provided. (Live Sync and Home-v-Home are trademarks of ICTV Inc., the assignee herein.)

Fig. 12 illustrates the structure of an analog MMC 125 and a scrambler-modulator card 126 for the chassis of Fig. 11. The MMC includes a video sub-system 121 and audio sub-system 122 operating under control of CPU 127 and control line 128 from the net manager 66a of Fig. 7. Line 128 also is in communication with sources of information services, which receive decompression by block 121b and are mixed in the video effects and mixer module 121d. The module 121d also receives input from graphics digital-to-analog converter 121c (providing, among other things, display for subscriber interaction) utilizing data from RAM/ROM storage 121a and control/content bitstream data obtained over line 128. TV tuner 129 also provides video signals from conventional cable television channels over line 72a to the module 121d. The RGB/YUV output of the module 121d is provided to the scrambler-modulator card 126. The module 121d also receives a composite sync signal input from scrambler/encoder 123 for use in providing a system timing reference to the video overlay.

The audio sub-system 122 in Fig. 12 has a coupling to TV tuner 129 (redrawn in this sub-system for convenience in reference) to provide audio signals from conventional cable television channels over line 72a to a mixer 122e, which also receives signals from background music source 122b, tactile response source 122c (for use in connection with the subscriber's remote control 14 in interactive television service), and digital program source 122d, which obtain control and content data over line 128. MTS stereo audio output of the mixer 122e is then provided to the modulator 124 of card 126.

The scrambler-modulator card 126 takes the RGB input from the video sub-system 121 and encryption control signal

from CPU 127 to provide a scrambled video output to modulator 124. The audio output of the mixer 122e of the audio sub-system 122 is fed directly to the modulator 124. The frequency of the carrier that is modulated is determined by control of the net manager over line 128.

The structure of digital MMC and modulator cards 141 and 142 shown in Fig. 14 is similar to that of the analog cards in Fig. 12. The TV tuner and graphics digital-to-analog converter outputs are mixed as in Fig. 12. Instead of decompressing the digital video source before feeding it to the mixer module 121d, however, the compression here is maintained and sent directly to MPEG mixer 144a as MPEG source 2. The analog output of mixer 121d is compressed by compression encoder 144, which also receives the MTS audio output. The output of the compression encoder serves as source 1 input to MPEG mixer 144a. This MPEG output is then sent to encoder 143 and modulator 124. The MPEG mixing in block 144a is achieved by recognizing that the graphics overlay data from digital-to-analog converter 121c provides video content that does not change rapidly, and therefore can be implemented by causing the mixer to affect only the I-frame picture elements in the MPEG compression scheme with respect to the overlay content. (MPEG's compression scheme is described in "C-Cube CL450 Development Kit User's Guide," dated December 14, 1992, Chapter 2, available from C-Cube Microsystems, Milpitas, California, which is hereby incorporated herein by reference.) The MPEG mixer 144 includes an arrangement for providing the source 1 MPEG-encoded digital signal to a buffer; an arrangement for extracting from the source 2 digital signal I-frame picture elements to be overlayed; and an arrangement for overlaying the I-frame picture elements from the source 2 digital signal onto the corresponding regions of the I-pictures of the source 1 digital signal. The other picture types of the source 2 signal are not permitted by the mixer to modify portions of the I-picture that have resulted from the mixing.

Figs. 13A-13C illustrate the structure of preferred embodiments of the audio subsystems for the MMCs of Figs. 12 and 14. In these embodiments, there are provided mixer 122e and, controlling its operation, a CPU 131, which may, but need not, be the same as CPU 127 of Figs. 12 and 14. The CPU 131 of Fig. 13A is operated in association with synthesizer 133. The content bitstreams on line 128 may include digitally compressed audio that is decompressed by block 135. These embodiments also have an off-air tuner 132, which may, but need not, be the same as tuner 129 of Figs. 12 and 14. Other formats of digital audio, shown here coverted by digital-to-analog converter 134, are also within the scope of the use of these embodiments. In lieu of synthesizer 133 there may be provided a second decompression unit 135a (Fig. 13B), and similarly, in lieu of digital-to-analog converter 134, there may be provided a third decompression unit 135b.

Fig. 15 illustrates the structure of the data communications link at the headend (node) of the system of Fig. 7 with subscriber home interface controllers downstream. Outbound data leave gateway 66b via line 153a where they go out over the interactive fiber trunk 42b. Inbound data enter gateway 66b via line 155a from common return line 42c. The outbound data leave from rf modulators 153 utilizing frequency shift key (FSK) encoding via encoders 152, and the inbound data enter via rf demodulators 155 using FSK detectors. Communications processing of the data is handled by communications processor 151 under control of compatible PC having microprocessor 156a, ROM 156b, and RAM 156c. The control may be managed additionally via network transceiver 157. The slotted ALOHA protocol used in a preferred embodiment for inbound and outbound data communications requires that each home interface controller is assigned an address for data packets that are used in communication with the node. When a subscriber causes his home interface controller to select a virtual channel, the net manager 66a of the node is

signalled to that effect. The net manager 66a, on determining that a given home interface controller is sought to be used for interactive television service (i.e., that the given home interface controller should be placed in an interactive mode), allocates additional data communication bandwidth for data communication with the particular home interface controller, so as to establish on a demand basis the data communications bandwidth utilized by the particular home interface controller.

Depending on the nature of the information service selected by the subscriber in selecting a particular virtual channel, an appropriate MMC is assigned by the net manager 66a on a demand basis to the serve the subscriber's home interface controller while it is in the interactive mode. In the case of many types of interactive television service, the home interface controller will have exclusive use of the assigned MMC, a "private line" to it over the data communications link and the interactive trunk 42b. In the case of near video on demand, however, several home interface controllers may share the same time slot on a movie, for example, and these subscribers would have a "party line" to the MMC.

As described in further detail below, appropriate MMCs can be used to provide overlays or other graphics on the television screen when the home interface controller is appropriately equipped.

Fig. 16 illustrates the structure of the encoder/modulator 126 of Fig. 12. It incudes a video processor 164 that has an RGB/YUV input and produces a scrambled NTSC video output on line 123d. The video processor has inputs from sync genlock/scrambler timing block 163, including 3.58 MHz color subcarrier on line 163d, burst flag on line 163c, invert control on line 163b, and sandcastle pulses on line 163a. The sync genlock/scrambler timing block 163 has inputs including genlock/free run select and encryption control 123c from CPU 127, and provides composite sync output on line 123a. The sync

genlock/scrambler timing block 163 also provides MTS subcarrier reference signal over line 123e to audio processor 162. The audio processor 162 includes standard MTS stereo audio inputs for left, right, and secondary audio program. The scrambled NTSC video signal on line 123d together with the MTS composite audio output of audio processor 162 are used to modulate a carrier at a desired frequency (established by the net manager 66a of Figs. 6 and 7) by rf upconverter 161.

Fig. 18 illustrates the structure of the sync genlock/scrambler timing block 163 of Fig. 16. It is used to generate a series timing signals for both scrambling and overlay synchronization that are either genlocked to an external CATV signal or are otherwise inherently stable. The TV tuner 129 of Fig. 12 additionally includes demodulator 186 in Fig. 18 and sync separator 185. The sync separator includes stripped horizontal sync output from conventional cable television video on line 181a and frame reset signal on line 182c. The stripped horizontal sync signal on line 181a forms a reference for phase-locking a 3.58 MHz oscillator in color subcarrier lock block 181, the output of which is furnished on line 163d. The signal on line 163d is divided down to provide a horizontal reference signal on line 182d. The signal on line 182d provides a reference for phase locking the generation of sync signals by sync genlock block 182. This block provides composite sync and blanking signals on lines 182a and 182b, as well as frame sync, horizontal sync, burst flag, and MTS subcarrier reference on lines 184a, 184b, 163c, and 123e respectively. Block 182 provides frame sync and horizontal sync signals to crypto logic block 184. It also provides composite sync and composite blanking signals to mode logic block 183. The crypto logic block 184 and mode logic block 183 work in cooperation with one another to produce sandcastle pulses on line 163a in the manner described below in connection with Fig. 21. The sandcastle pulses are used to provide scrambled NTSC video in the manner also described below in

connection with Fig. 21.

Fig. 21 illustrates an implementation of scrambling by crypto logic block 184 of Fig. 18 in cooperation with mode logic 183 and video processor 164. The scrambling is achieved by removing substantially all sync pulses from the NTSC signal. Infrequent (at least once per frame, two fields per frame) and randomly spaced horizontal pulses (sandcastles) are then reinserted. The effect of such scrambling is to deprive the standard NTSC receiver from obtaining horizontal and vertical sync lock with the incoming signal. This causes rapid horizontal and vertical roll of the picture. During the intervals in which the removed sync signals were formerly present, the scrambler clamps the video to a nearly white level. As a result when the video signal tends toward levels corresponding to black, the receiver frequently interprets this video content as a sync signal, with the further effect that the horizontal rolling and the vertical rolling are aperiodic.

The sandcastles are reinserted at a pseudorandom position in each consecutive frame, determined by vertical random number generator 212 in Fig. 21. The line counter 214 is clocked by horizontal sync presented on line 184b, and is reset by frame sync pulses on line 184 each frame. The line counter 214 stores a new number from the vertical random number generator 212 each time a frame reset pulse is received. When line counter 214 has counted down to zero from the stored number, it triggers timing pulse generator 216 to send a pulse into mode logic control 183. Occasionally, on command from the load/count line 212a, the timing pulse generator 216 is caused to produce sandcastles in a plurality of successive lines. A command from the load/count line 212a also triggers the loading from buffer register 211 of a previously stored seed value (loaded from line 211a) into both the vertical random number generator 212 and the horizontal random number generator 215. The seed value and load/count numbers over lines 211a and 212a are provided by CPU 127 of Fig. 12 on command of the net

manager initially each time an MMC is assigned to serve a particular home interface controller and subsequently whenever the home interface controller reports over the data communications link that it has lost sync. Additionally the CPU 127 may be programmed to generate new seed values and load/count numbers in accordance with any desired strategy to resist efforts at rederiving sync without authorization.

Each sandcastle pulse looks like the sum of the composite blanking and composite sync signals. The shape of the sandcastle pulse is therefore such that when summed in the summer 172 of Fig. 17 with sync suppressed video, the result is a signal that has a normal NTSC blanking period once per frame, and moreover, the normal blanking period occurs at pseudorandomly located lines in successive frames. The sandcastle pulses appear on line 163a from mode logic controller 183. Composite sync signals 182a and composite blanking signals 182b are therefore summed and gated by the mode logic control 183 on receipt of pulses from the timing pulse generator 216 as described above. The width of the timing pulse generator signal over line 184c, which governs the duration of the sandcastle pulse, is equal to the horizontal blanking period.

In a manner analogous to the functioning of the vertical random number generator, the horizontal random number generator 215 issues a pulse at pseudorandom line intervals. Each pulse has the duration of the active video portion of one horizontal line, and is fed over input 163b so as to cause the video processor 164 to produce entire horizontal lines having inverted video.

Fig. 17 illustrates the structure of the video processor 164 of Figs. 16 and 21. Block 171 shows a RGB/YUV to NTSC converter that is supplied with conventional inputs (including RGB/YUV, 3.58 MHz color subcarrier, and burst flag) but, in this case, lacking any sync or blanking input signals. The converted output is standard NTSC with the exception that all sync information is suppressed. The inverter 173, under control of pulses present over line

163b, operates to invert the video on a random line-by-line basis in the manner described in connection with Fig. 21 above. The inverter output is then summed in summer 172 with the sandcastle pulses to produce the scrambled NTSC waveform described above.

Fig. 23 illustrates the structure of a descrambler suitable for use in a home interface controller in accordance with a preferred embodiment of the present invention for descrambling a video signal that has been scrambled by a system in accordance with Fig. 21. It will be recalled in connection with Fig. 21 that the seed value and load/count numbers over lines 211a and 212a are provided by CPU 127 of Fig. 12 on command of the net manager initially each time an MMC is assigned to serve a particular home interface controller. The same seed value is also provided to the particular home interface controller and is stored in the buffer register 231. Each time a new seed value is loaded into buffer register 211 of the scrambler, the same seed value is loaded into the buffer register 231 of the descrambler. The value in register 231 remains in the register until clocked into the vertical and horizontal pseudorandom number generators 232 and 235 respectively by a pulse from the timing pulse detector 238. The relative timing of the seed data, and the load/count pulses, and the occurrence of sandcastles in the scrambled NTSC video are shown as items 221, 222, and 223 of Fig. 22.

Timing pulse detector 238 monitors the incoming scrambled video over line 238a. The timing pulse detector 238 produces a clocking pulse when it detects the plurality of pulses produced in the scrambled NTSC video when the scrambler in Fig. 21 received a load/count pulse over line 212a. (In this manner the timing pulse detector causes the generation a pulse at a time with respect to the received scrambled signal corresponding generally to the occurance of the load/count pulse when the original signal was being scrambled.) The timing pulse detector clocking pulse then causes the stored seed value to be loaded into the

pseudorandom number generators 232 and 235.

The timing pulse generator 238 also detects the occurance of single sandcastle pulses, and these are used to trigger the loading of the line counter 234 and the reset of the sync generator 237. This generator is phase-locked to the color burst and therefore produces the necessary sync signals to reconstruct a descrambled NTSC signal. The composite sync and composite blank signals from the generator 237 feed sandcastle summer 2331 to produce a full series of sandcastles for every line and the entire NTSC frame structure. The output of summer 2331 goes to sandcastle complement generator 233, which gates the input every time a sandcastle occurs on the scrambled video input line 238a. The output of the sandcastle complement generator is therefore a stream of sandcastles that lacks a sandcastle at each time, and only at each time, a sandcastle is present in the scrambled video signal. This output is fed to the decoder/amplifier 236, where it is summed with the scrambled video signal to produce an output that has a sandcastle at every line and is therefore a descrambled NTSC video signal.

In a manner analogous to the function of the inverter control on line 163b of Figs. 21 and 17, there is produced an inverter control signal on line 235a by the horizontal pseudorandom number generator 235, which produces a pulse at time corresponding to the production of a pulse by horizontal pseudorandom number generator 215. This control signal on line 235a causes a second inversion (and therefore restoration) of the previously inverted line of video caused by inverter 173 of Fig. 17. The result is fully restored NTSC video on line 236a.

Fig. 19 illustrates the structure of the audio processor section 162 of Fig. 16. Left and right audio inputs from audio sub-system 122 are provided to the sum and difference matrix 191. The L + R sum output on line 191a is subjected to low-pass filter 1921 and pre-emphasis filter 1923. Similarly, the L - R difference on line 191b

is subjected to low-pass filter 1922 and dbx compressor 1924 and the compressor output is fed to a double balance mixer 193. MTS subcarrier reference signal on line 123e is subject to frequency division by divider 195, and further frequency division by halver 196. The output of the first divider 195 is bandpass filtered by item 1971, and the resulting output is furnished to the double balanced mixer, so as to produce a double sideband suppressed carrier signal on line 193a. This signal is summed by summer 194 with the pre-emphasized L + R signal on line 1923a and the SAP subcarrier signal, the latter which is provided by SAP subcarrier generator 198, to which the SAP signal from audio sub-system 122 is supplied. This produces a composite BTSC signal on line 162a, which is furnished to rf upconverter 161 described in Fig. 16.

Fig. 20 illustrates the structure of the rf upconverter section 161 of Fig. 16. The inputs include BTSC audio on line 162a and scrambled NTSC video on line 123d. The video input is provided to an a.m. modulator 2011 and the audio input is provided to an f.m. modulator 2012, and the respective modulator outputs are summed in summer 202. The output of the summer is bandpassed by filter 2031 and amplified by amplifier 2032. The amplifier output is mixed with the signal from first local oscillator 2043, and the desired upper sideband is amplified and bandpass filtered by amplifier 2042 and filter 205. This intermediate frequency signal is then run through amplifier 2051 and mixed in mixer 2052 with a signal from a second local oscillator 2053 that is frequency agile (here a phase-locked oscillator). The output is amplified (in amplifier 2053) and low-pass filtered by filter 2054, to eliminate the upper sideband, and the resulting signal is amplified by amplifier 2055 and provided as an output on line 161a. (This output is fed to combiner 73 of Fig. 7.)

Fig. 24 illustrates an alternative scrambling system. The system has an NTSC sync stripper 241 that supplies sync stripped video to a mixer 243, which masks sync signals by

supplying a chroma subcarrier at all times, including during horizontal and vertical retrace. In addition, the luminance signal is caused to be present at all times.

These results are achieved by using the vertical and horizontal sync outputs from stripper 241 to provide an output from OR gate 2461 when either of both of vertical and horizontal retrace signals are present. This output gates via switch 242 a pink noise luminance masking signal from generator 2421 into the mixer 53. This output also is affected via switch 247 by a pink noise signal from generator 2471 used in turn to modulate phase-locked loop oscillator 244 to produce a modulated chroma subcarrier masking signal. This signal is subject to an optional programmable phase delay 245 to cause different phase shift of the signal during the color burst interval on a line-by-line basis in accordance with a phase offset generated by pseudo random generator 2451. The composite sync signal output from stripper 241 is provided with an encrypted value for the current phase shift caused by generator 2451. The encrypted value is obtained from DES encoder 248, and this encrypted value, a digital signal, is placed on the signal during the vertical blanking interval as a binary pattern by vertical blanking interval data encoder 249. The composite sync signal is then subjected to an optional variable time delay by delay 2491 by a reference value that is also obtained from pseudo random generator 2451. Of course a separate generator could be used, provided that the value obtained from such a generator is also encoded on the composite sync signal. This resultant scrambled composite sync signal is then provided as an output. This system therefore provides a continuously present chroma subcarrier, a continuously present luminance signal, and shifts the color burst by a random amount. The scrambled video is therefore relatively difficult to descramble, without access to the method of scrambling.

Fig. 25 shows a video descrambler system for descrambling the video scrambled in accordance with a system

such as shown in Fig. 24. The scrambled video signal provided over line 259 is gated off during both the vertical and the horizontal retrace intervals by gate 251, thereby removing the masking signals that interfere with proper sync, and the proper sync signal, presented on line 2543, is also added to mixer 253 to provide the composite video output over line 2532. The scrambled sync present at input 258 is first used to provide the encrypted delay information (if an encrypted delay is used) which is decoded from the vertical blanking interval data by decoder 255 and deciphered by DES decoder 256. The scrambled sync signal is run through the programmable time delay 257 to provide a composite sync signal that is in phase with the video. Sync separator 254 provides separate outputs for vertical and horizontal sync as well as a gate signal for the color burst. The vertical and horizontal sync signals are run through NOR gate 2541 and OR gate 2542, so that 251 gates off the video during vertical and horizontal retrace except during color burst. Optional video decoder 252 separates the chroma subcarrier (in the event that it is phase shifted), and the separated subcarrier is run through optional programmable phase delays 2531 in an amount specified by the decrypted delay data to recover the original phase of the subcarrier. The resultant corrected subcarrier is mixed with the luminance and audio subcarrier and the composite sync signal by mixer 253 to provide a descrambled composite video signal over line 2532.

Fig. 26 illustrates the input and output structure of a home interface controller 13 in accordance with a preferred embodiment of the present invention. The controller includes input and output connections 261 for cable television rf, a video cassette recorder interface 262, an expansion interface 263 (for providing for baseband video; ports for printer, modem, and computer; and power line interface), infra-red transmitter port 264 for communication with conventional set top, video cassette recorder, and television, infra-red receiver port for communication with

remote control 14, rf output 266 for communication with a television receiver, and baseband outputs 267 for communication with a television monitor.

Fig. 27 illustrates an embodiment of the controller of Fig. 26 suitable for analog television signal inputs. The rf cable television input 2711 feeds diplex filter 271, the high pass section of which feeds television information signals and downstream data to line 2712 and splitter 2714 for division among VCR rf output at 2782, control data receiver 2751 and tuner 272. The low pass section receives upstream data communications from control data transmitter 2752 over line 2713. Tuner 272 is switched between VCR rf output 2782 and the television information signals from line 2712. The tuner's output is fed to descrambler 373, which is bypassed by switch 2731. Genlock block 2732 provides sync signals necessary for permitting overlay controller 2733 to function properly with the tuner output. The overlay controller's output is fed directly to baseband video output 267a, and the tuner's audio output is routed through volume control 2741 to baseband audio output 267b. A channel 3/channel 4 modulator 274 coupled to these baseband outputs provides rf output over line 266 to the subscriber television. Switch 2741 switches the television between the home interface controller's television information signals and the VCR's rf output. Data communications involving the data receiver 2751 and the transmitter 2752 is handled by data communications processor 275, and the information flow is via data bus 279 to and from set top processor 276, infra red interface 2761 for the remote control 14, overlay controller 2733, tuner 272, and volume control (setting) 2741.

Figs. 28 and 29 illustrate embodiments of digital decompression and multimedia versions of the controller of Fig. 26. The embodiment of Fig. 28 is similar to that of Fig. 27, except that there is also provided a high-speed data receiver 281 having an input connected to splitter 2714. The output of the high-speed receiver feeds digital

decompression module 282. This module has an audio output feeding mixer 283 along with the audio from tuner 272 and a video output that can be switched into the overlay controller 2733 by switch 285, the other position of which causes the overlay controller 2733 to obtain its video solely from the analog origin as before.

The multimedia embodiment of Fig. 29 represents a further enhancement of the embodiment of Fig. 28. In addition to the high-speed data receiver 281, there is a high-speed data transmitter 291. These communicate with data bus 279 via high-speed data interface 292. Frequency control of communication at these data rates is assisted by frequency control block 2941. Audio mixer 295 operates under control of sound microprocessor 2943. Additional effects are achieved by multimedia processor 2944, and overlay and effects block 2942.

Fig. 30 illustrates an alternative embodiment to the system of Fig. 7 in which the node 302 is disposed at a feeder 74a, typically proximate to a bridger amplifier 74. In some emobiments where a bridger amplifier may serve a plurality of feeders, the node may similarly serve home information controllers on each of these feeders. In this embodiment main trunk 301 feeds express trunks 44. Bridger amplifiers 74 are disposed at locations where the feeders 74a are connected to the trunks 44. At a tap 303 is disposed drop 75 to a subscriber home having a home interface controller 13 and remote control 14.

Fig. 31 shows the bandwidth usage in a system in accordance with that of Fig. 30. The bandwidth is limited at the node 302 by a low pass filter so that digital carrier signals 319 at the bandwidth portion above the region 315 allocated to ordinary cable channels cannot reach the home interface controllers downstream of the node on the feeder 74a. (Alternatively, the bandwidth may be limited naturally by the bridger amplifer 74, with the node in communication with the trunk 44.) The removed digital signals in the bandwidth 319 may typically carry compressed digital

television information, and those of these signals that may be needed to serve downstream home interface controllers are obtained by the node 302 and remodulated to provide interactive televsion service downstream in the same spectrum 317 utilized upstream by the digital signals 319. Decompression of the digital signals may be accomplished either at the node 302 or at the home interface controllers 13. Thus the node 302 is able to utilize, uniquely for communication to the home interface controllers 13 associated with its own group of feeders 74a, the interactive channel bandwidth 317 shown in Fig. 31. Each node may utilize this bandwidth region independently of the other nodes, because signal transfer among nodes in the frequency spectrum portion 317 is small, and in any event can be controlled between different nodes. Above the bandwidth used for delivery of non-interactive television signals, including region 315 of the system, is placed the spectrum portion 317 used for carrying interactive television information signals from the headend. Inbound return data communications is achieved utilizing lower frequency band 316, with high pass filter at each node to prevent unwanted signal transfer; fresh remodulated carrers are introduced at the node for upstream communications. Guardbands 318 are placed between bands 315 and 317 and between 316 and 315 to prevent interference. Each node 302 then achieves utilization of those interactive television information signals pertinent to the subscribers associated with such node who have obtained access to such signals.

Fig. 32 shows the general architecture of outbound signal flow and two-way control in a system in accordance with the embodiment of Fig. 30. At the feeders 74a is disposed the node 302, which may include an rf bus and tuners to demodulate television information signals (which may include conventional cable television signals as well as interactive television signals) from the headend. An MMC 53 with related modulator, as in the above embodiments, is placed in direct communication with a home interface

controller 13 on a demand basis, so that the node 302 functions in essentially the same manner as does the node 77 when it is placed in the headend.

Figs. 33 and 34 illustrate use of the channel menu system in accordance with a preferred embodiment of the invention. Figs. 33 and 34 show apparently different channels used for different information services, here TV listings (channel 31) and classified advertisements (channel 37), even though in the manner described previously, the frequency over which the home interface control unit receives information that has not changed. The term "different information service" as used in this description and in the claims following can mean any information service in a mode appearing to be different to the subscriber, including an interactive service in a different information area, or a different interactive service, or a different television broadcast signal provided by the headend, etc.

Figs. 35-41 illustrate use of the carousel menu system and of the manner in which the invention in a preferred embodiment provides interaction with the user. Fig. 35 illustrates an embodiment of the carousel menu system in accordance with the invention when an interactive information service has been selected. (In this case, the interactive service is classified advertisements.) The carousel here shows three faces, one of which is a frontal face. The frontal face shows one or more menu choices. The two side faces shown are greeked, so as to display the apparent availability of other choices if the carousel is caused to rotate so that one of the side faces is moved to the frontal position. Via operation of the overlay 2733 described in connection with Figs. 27-29, or the video effects and mixer block 121d of Figs. 12 and 14, a cursor can be moved over the television display by the remote unit 14, and when the cursor overlays the menu choice of interest, the choice may be selected by pushing the appropriate button on the remote unit 14. Depending on the choice selected (and if subchoices are required by the area

of interest in particular interactive information service), the carousel is momentarily shown to be apparently rotated in one direction or another, and thereafter another set of choices is caused to appear on the frontal face, the flanking side faces again being greeked.

Figs. 36 through 41 illustrate how interactive television service may be provided in accordance with a preferred embodiment of the invention. If TV listings (here channel 31) has been selected, there is displayed a grid portion, which can be shifted on screen for viewing the grid in the entirety. Shown in Fig. 36 is a portion of the grid display, plotting television programs as a function of channel and time for a given date and portion of the day; and the date and portion of the day can be selected by the subscriber.

The "Smart TV" selection permits the subscriber to search for programs or other information service offerings in the manner illustrated in subsequent figures. The carousel choices indicated in Fig. 37 permit the subscriber to find programs and movies by subject, by show, or by actor. Other choices permit the subscriber to program his favorite channels and find offerings on those channels, or to identify offerings on a pay per view basis, or to return to the grid of Fig. 36. If the "by actor" selection is made, the alphabetical menu of Fig. 38 is presented. To find listings for "Bogart", the top button "ABCDE" would be selected, producing the display of Fig. 39. Thereafter, the "B" button would be selected, and from the list of actors whose names beginning with "B" are displayed, one could select "Bogart", and eventually produce the listing and choices shown in Fig. 40. One could, for example, chose to record Casablanca on June 24, producing the display of Fig. 41, including the choice of being notified of other Bogart movies in the future.

What is claimed is:

1. An interactive television information system, for providing interactive cable television service when coupled to a cable television system having (i) an information source means available at a headend for supplying a plurality of information services and (ii) an information service distribution network, for delivering the information services to subscriber televisions, the interactive television system comprising:

a plurality of home interface controller means, one such home interface controller means associated with each subscriber television, for providing an output in communication with the subscriber television and having (i) a signal input for television information signals and input selection means for selecting a given one of the television information signals at the signal input, (ii) channel selection means for permitting a user to select an apparent channel, and (iii) a data transceiver operative over a data communications link;

node means, in television communication with the information source means over a first path of the network and with a group of the home interface controller means over a second path of the network, and in data communications with the home interface controller means over the data communications link, for selecting and providing information services obtained from the information source means to each home interface controller means in the group based on data obtained over the data communications link from each such home interface controller means;

wherein the node means and each home interface controller means are so arranged that when any of a first group of apparent channels is selected on a given one of the home interface controller means, the node means provides to it different information services on different apparent channels in the group all via the same television information signal selected by the input selection means of such given home interface controller means.

2. A system according to claim 1, wherein each of the television information signals provided to the signal input of the home interface controller means has a different carrier frequency, the signal input of the home interface controller means is an rf input, and the input selection means includes means for tuning to a desired information signal carrier frequency.

3. A system according to claim 1, wherein each of the television information signals is provided to the signal input of the home interface controller means on a time-shared basis and the signal input selection means includes means for selecting the time slice assigned to a desired television information signal.

4. A system according to claim 1, wherein each of the television information signals is provided to the signal input of the home interface controller means as an addressed series of packets, the signal input of each home interface controller means may be assigned a unique packet address, and the input selection means includes means for causing a television information signal to be addressed to the home interface controller means associated with such input selection means.

5. A system according to claim 2, wherein the channel selection means in each home interface controller means includes means for causing each selected channel in a second group of apparent channels to correspond to a different selected carrier frequency at the radio frequency input.

6. A system according to claim 2, wherein the node means includes frequency assignment means, operative over the data communications link, for assigning the desired carrier frequency with respect to which television communication with the given home interface controller means occurs when an apparent channel in the first group is selected.

7. A system according to claim 5, wherein the node means includes frequency assignment means, operative over the data communications link, for assigning the desired

carrier frequency with respect to which television communication with the given home interface controller means occurs when an apparent channel in the first group is selected.

8. A system according to claim 6, wherein the frequency assignment means includes activity detection means for determining whether a given home interface controller means is seeking to select an apparent channel in the first group and for causing assignment of the common carrier frequency only after a positive determination by the activity detection means, so that frequency assignment is accomplished on a demand basis for those home interface controllers determined to have selected an apparent channel in the first group.

9. A system according to claim 7, wherein the frequency assignment means includes activity detection means for determining whether a given home interface controller means is seeking to select an apparent channel in the first group and for causing assignment of the common carrier frequency only after a positive determination by the activity detection means, so that frequency assignment is accomplished on a demand basis for those home interface controllers determined to have selected an apparent channel in the first group.

10. A system according to claim 6, wherein the node means includes barker signal generator means for generating a barker signal at a fixed carrier frequency for prompting a user whose home interface controller means is tuned thereto to access an apparent channel in the first group.

11. An interactive television information system, for providing interactive cable television service when coupled to a cable television system having (i) an information source means available at a headend for supplying a plurality of information services and (ii) an information service distribution network having a given bandwidth, for delivering the information services to subscriber televisions, the interactive television system comprising:

a plurality of home interface controller means, one such home interface controller means associated with each subscriber television for providing an output in communication with the subscriber television and having (i) a signal input for television information signals and input selection means for selecting a given one of the television information signals at the signal input and (ii) a data transceiver operative over a data communications link;

node means, in television communication with the information source means over a first path of the network and with a group of the home interface controller means over a second path of the network, and in data communications with the home interface controller means over the data communications link, for selecting and providing information services obtained from the information source means to each home interface controller means in the group based on data obtained over the data communications link from each such home interface controller means;

wherein the node means includes (a) activity detection means for determining whether a given home interface controller means is to be placed in an interactive mode and (b) signal assignment means for causing, on an affirmative determination by the activity detection means, the input selection means of the given home interface controller means to select a given television information signal present at the signal input, so that signal assignment is accomplished on a demand basis for those home interface controllers determined to be placed in an interactive mode.

12. A system according to claim 11, wherein each of the television information signals provided to the signal input of the home interface controller means has a different carrier frequency, the signal input of the home interface controller means is an rf input, the input selection means includes means for tuning to a desired information signal carrier frequency, and the signal assignment means includes means for causing the input selection means to select a television information signal of a given carrier frequency.

13. A system according to claim 11, wherein each of the television information signals is provided to the signal input of the home interface controller means on a time-shared basis, the input selection means includes means for selecting the time slice assigned to a desired television information signal, and the signal assignment means includes means for causing the input selection means to select a television information signal of a given time slice.

14. A system according to claim 11, wherein each of the television information signals is provided to the signal input of the home interface controller means as an addressed series of packets, the signal input of each home interface controller means may be assigned a unique packet address, the input selection means includes means for causing the signal assignment means to address a television information signal to the home interface controller means associated with such input selection means.

15. A system according to claim 11, wherein the node means is disposed in the headend.

16. A system according to claim 12, wherein the node means is disposed in the headend.

17. A system according to claim 15, wherein the information source means includes means for obtaining information services from a regional processing center.

18. A system according to claim 11, wherein the information service distribution network includes a plurality of feeders and the system includes a plurality of node means, each node means being disposed as a feeder server connected to a feeder.

19. A system according to claim 11, wherein the node means includes:

a plurality of multimedia processing means, each such multimedia processing means being an assignable module for providing an information service to at least one home interface controller means;

network manager means for assigning an available one of the multimedia processing means to furnish an information

service, over the second path, to a subscriber's home interface controller means based on data obtained from the data communications link, so that assignment of multimedia processing means is accomplished on a demand basis.

20. A system according to claim 12, wherein the node means includes:

a plurality of multimedia processing means, each such processing means being an assignable module for providing an information service to at least one home interface controller means;

network manager means for assigning an available one of the multimedia processing means to furnish an information service, over the second path, to a subscriber's home interface controller means based on data obtained from the data communications link, so that assignment of multimedia processing means is accomplished on a demand basis.

21. A system according to claim 16, wherein the node means includes:

a plurality of multimedia processing means, each such processing means being an assignable module for providing an information service to at least one home interface controller means;

network manager means for assigning an available one of the multimedia processing means to furnish an information service, over the second path, to a subscriber's home interface controller means based on data obtained from the data communications link, so that assignment of multimedia processing means is accomplished on a demand basis.

22. A system according to claim 19, wherein each multimedia processing means is removably installable in the node means.

23. A system according to claim 20, wherein each multimedia processing means is removably installable in the node means.

24. A system according to claim 21, wherein each multimedia processing means is removably installable in the node means.

25. A system according to claim 11, wherein

with each home interface controller means there is associated a remote unit having controls for moving a cursor displayed on the subscriber television in communication with the home interface controller output and for making a selection; and

each node means further includes interactive means (i) for providing, based on information received over the data communications link, content of the given television information signal to cause a display, on the subscriber television in communication with the output of the given home interface controller, to permit the viewer thereof to move the cursor thereon and to make a selection and (ii) for processing the information constituting the selection to give effect thereto, to permit the viewer to obtain interactive television service.

26. A system according to claim 16, wherein

with each home interface controller means there is associated a remote unit having controls for moving a cursor displayed on the subscriber television in communication with the home interface controller output and for making a selection; and

each node means further includes interactive means (i) for providing, based on information received over the data communications link, content of the given television information signal to cause a display, on the subscriber television in communication with the output of the given home interface controller, to permit the viewer thereof to move the cursor thereon and to make a selection and (ii) for processing the inform action constituting the selection to give effect thereto, to permit the viewer to obtain interactive television service.

27. A system according to claim 18, wherein

with each home interface controller means there is associated a remote unit having controls for moving a cursor displayed on the subscriber television in communication with the home interface controller output and for making a

selection; and

each node means further includes interactive means (i) for providing, based on information received over the data communications link, content of the given television information signal to cause a display, on the subscriber television in communication with the output of the given home interface controller, to permit the viewer thereof to move the cursor thereon and to make a selection and (ii) for processing the information constituting the selection to give effect thereto, to permit the viewer to obtain interactive television service.

28. An interactive television information system, for providing interactive cable television service when coupled to a cable television system having (i) an information source means available at a headend for supplying a plurality of information services and (ii) an information service distribution network, for delivering the information services to subscriber televisions, the interactive television system comprising:

a plurality of home interface controller means, one such home interface controller means associated with each subscriber television, for providing an output in communication with the subscriber television and having (i) a signal input for television information signals and input selection means for selecting a given one of the television information signals at the signal input, (ii) channel selection means for permitting a user to select an apparent channel, and (iii) a data transceiver operative over a data communications link;

node means, in television communication with the information source means over a first path of the network and with a group of the home interface controller means over a second path of the network, and in data communications with the home interface controller means over the data communications link, for selecting and providing information services obtained from the information source means to each home interface controller means in the group based on data

obtained over the data communications link from each such home interface controller means;

wherein the distribution network is included in the interactive television information system and includes a plurality of express trunks, each trunk including a first bandwidth portion carrying non-interactive television information services that are substantially identical in nature and bandwidth allocation among all trunks, and a second bandwidth portion carrying television information services on a demand basis established by subscriber usage of the home interface controller means utilizing each trunk for service.

29. A system according to claim 28, including a collection of neighboring home interface controller means, wherein the data communications link includes a return path from each of the home interface controller means to the node means and the return path includes a common trunk line for the collection of neighboring home interface controller means.

30. A system according to claim 28, wherein the distribution network further includes:

a main trunk carrying television information signals for non-interactive information services from the headend to the express trunks,

an interactive trunk carrying television information signals for information services on a demand basis from the headend to each of the express trunks,

splitter means for splitting from the interactive trunk the television information signals for information services on a demand basis for each of the express trunks, and

coupling means for coupling the signals from the main trunk and the splitter means to feed each of the express trunks.

31. An interactive television information system according to claim 11,

wherein the distribution network is included in the interactive television information system and includes a

plurality of trunks, each trunk including a first bandwidth portion carrying non-interactive television information services that are substantially identical in nature and bandwidth allocation among all trunks, and a second bandwidth portion carrying television information services on a demand basis established by subscriber usage of the home interface controller means utilizing each trunk for service.

32. A system according to claim 31, including a collection of neighboring home interface controller means, wherein the data communications link includes a return path from each of the home interface controller means to the node means and the return path includes a common trunk line for the collection of neighboring home interface controller means.

33. A system according to claim 31, wherein the distribution network further includes:

a main trunk carrying television information signals for non-interactive information services from the headend to the express trunks,

an interactive trunk carrying television information signals for information services on a demand basis from the headend to each of the express trunks,

splitter means for splitting from the interactive trunk the television information signals for information services on a demand basis for each of the express trunks, and

coupling means for coupling the signals from the main trunk and the splitter means to feed each of the express trunks.

34. A system according to claim 11, wherein the signal assignment means includes means for causing, on an affirmative determination by the activity detection means, the allocation of additional data communication bandwidth for data communication with the node, so as to establish on a demand basis the data communications bandwidth utilized by the given home interface controller means.

35. A user interface for an interactive television system comprising:

carousel means for generating a television display of a carousel having a plurality of faces, including a frontal face;

choice indication means for indicating in the display at least one available choice on an established one of the faces;

cursor movement means for causing movement of a cursor over the television display;

selection means for causing selection of an available choice when indicated by the cursor in the display; and

carousel movement means for causing apparent rotation of the carousel to display different information on the established face in response to operation of the selection means.

36. A user interface according to claim 35, wherein the established face is the frontal face.

37. A user interface according to claim 36, wherein the choice indication means includes means for indicating a plurality of available choices and the carousel movement means includes means for causing apparent rotation of the carousel in either of two directions depending upon the selection of an available choice.

38. A system for providing a scrambled signal over a cable television system from a television signal source comprising:

stripper means for removing the sync signal from the source to provide a sync-stripped output signal;

subcarrier means for maintaining the chroma subcarrier on the sync-stripped output signal at all times including the period of vertical retrace;

first modulator means for supplying the resultant scrambled signal at a first carrier frequency over the cable system; and

second modulator means for supplying the sync signal stripped by the stripper means at a second carrier frequency

over the cable system.

39. A system according to claim 38, further comprising:

luminance mask generator means for providing a false luminance signal during the periods of horizontal and vertical retrace.

40. A system according to claim 38, wherein the second carrier frequency is approximately 50 MHz.

41. A system, for decoding a composite scrambled television signal that includes a first carrier, at a first frequency, modulated with a sync-stripped video signal with a continuously present chroma subcarrier and a second carrier, at a second frequency, modulated with the stripped sync signal, the system comprising:

first demodulator means for demodulating the sync-stripped signal at the first frequency and having an output;

second demodulator means for demodulating the stripped sync signal at the second frequency and having an output; and

combining means for combining the outputs of the first and second demodulator means in such a way as to restore the television signal.

42. A system according to claim 41, wherein the second frequency is approximately 50 MHz.

43. A system for scrambling a television signal, the signal having vertical and horizontal sync components, a color burst reference, a video luminance component, comprising:

(a) means for designating a horizontal line number on pseudorandom basis;

(b) means for stripping the vertical and horizontal sync components from the signal at each location of a frame except at the line corresponding to the horizontal line number.

44. A system according to claim 43, further comprising:

(c) means for clamping the luminance component of the

signal to a nearly white level during the intervals in which the removed sync signals were formerly present.

45. A system according to claim 43, further comprising:

means for designating a second horizontal line number on a pseudorandom basis;

means for inverting the luminance component during the active video portion of each second horizontal line number.

46. A system according to claim 43, further comprising:

means for permitting the occurance of the vertical and horizontal sync components of the stripped signal to be not suppressed in at least one line subsequent to the horizontal line number, the fact of non-suppression on a plurality of horizontal lines permitting the restoration of a descrambled television signal.

47. A system, for producing an overlay of first and second MPEG-encoded digital video signals, the system comprising:

means for providing the first MPEG-encoded digital signal to buffer;

means for extracting the I-pictures from the second digital signal; and

means for overlaying a desired region of the extracted I-pictures from the second digital signal on the I-pictures of the first digital signal.

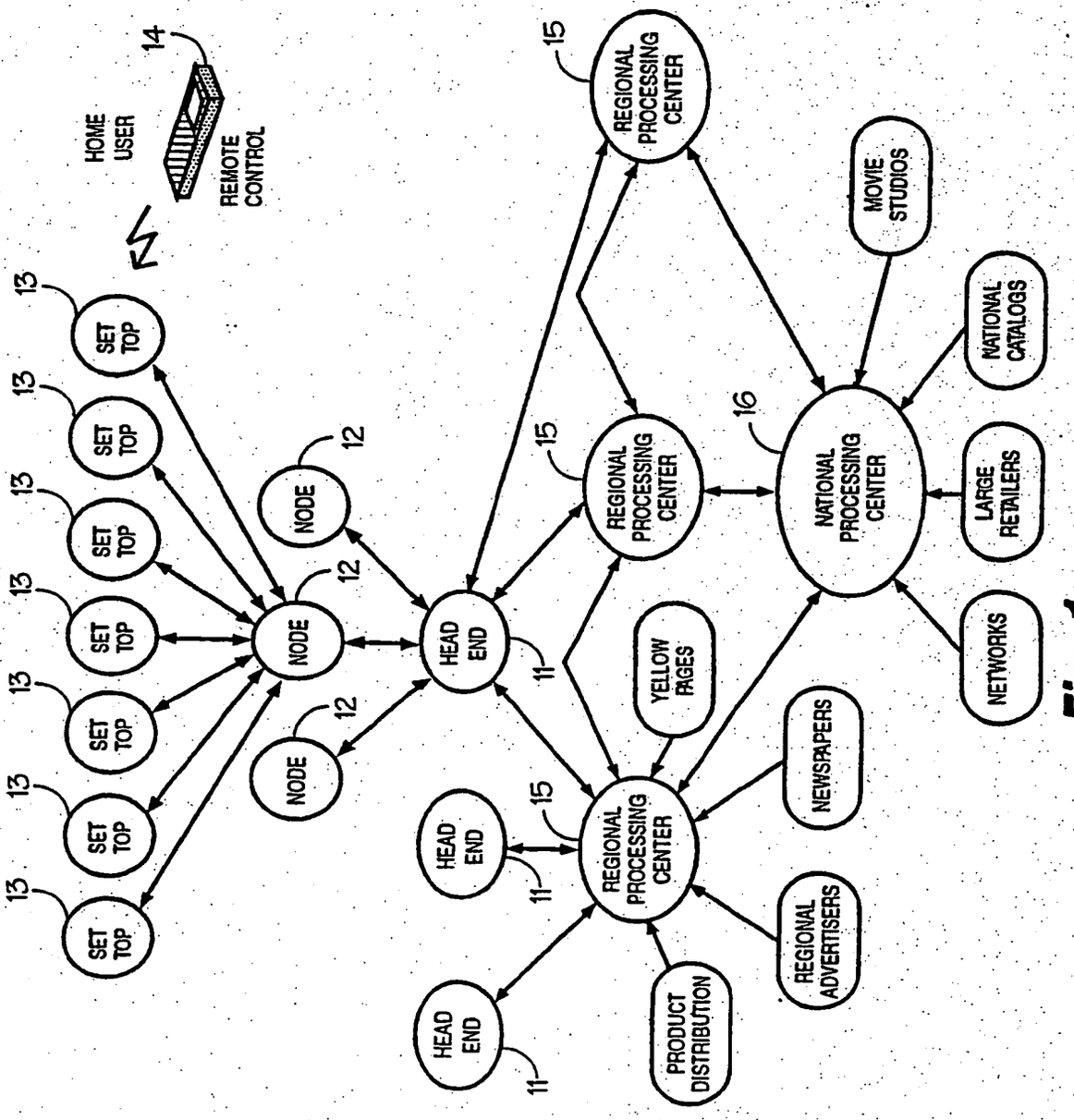

Fig. 1

SUBSTITUTE SHEET

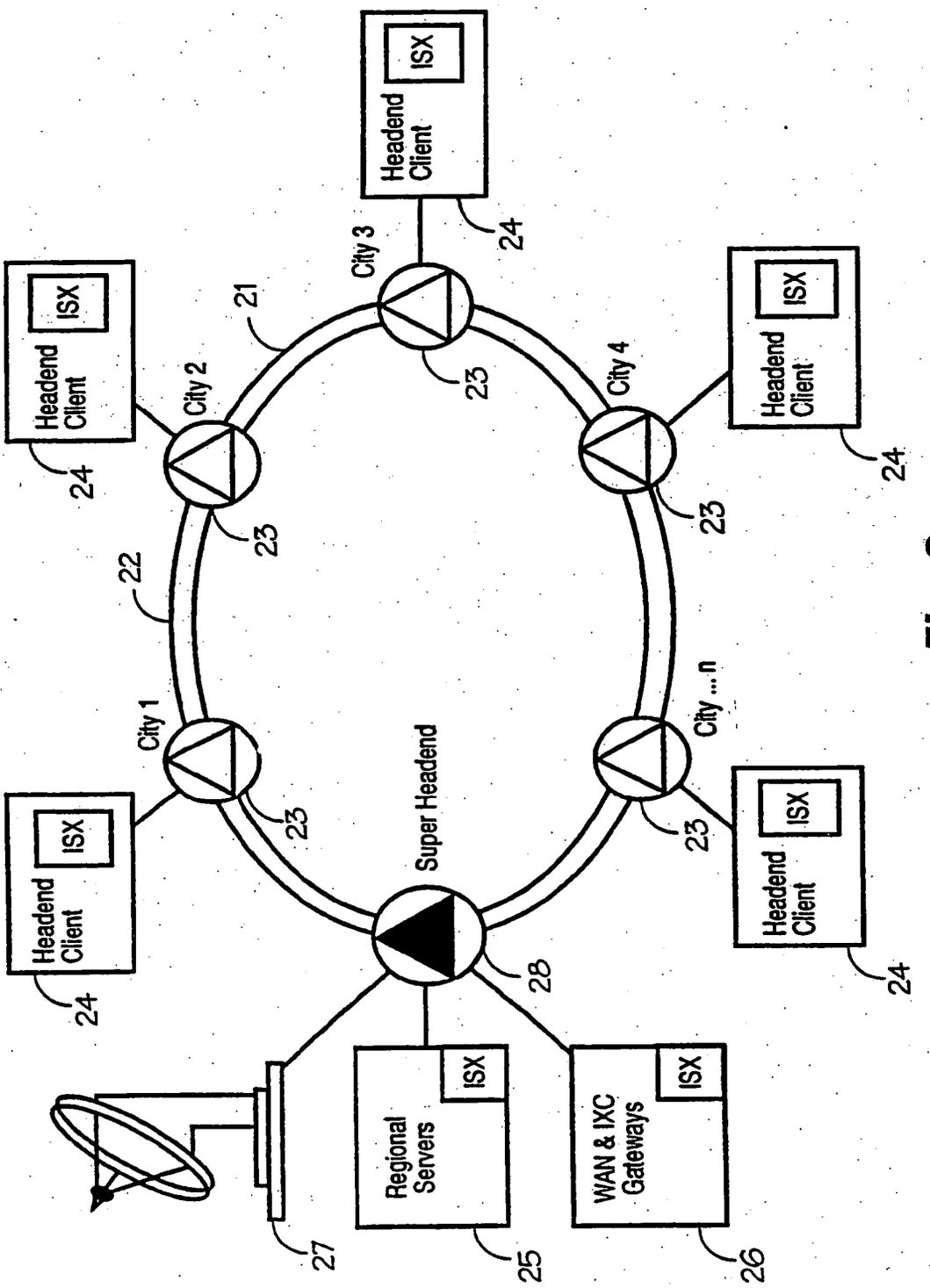
Headend Client
ISX
24
City 3
21
23
City 4
22
City 2
City 1
City ... n
Super Headend
28
Regional Servers
25
WAN & IXC Gateways
26
27

Fig. 2

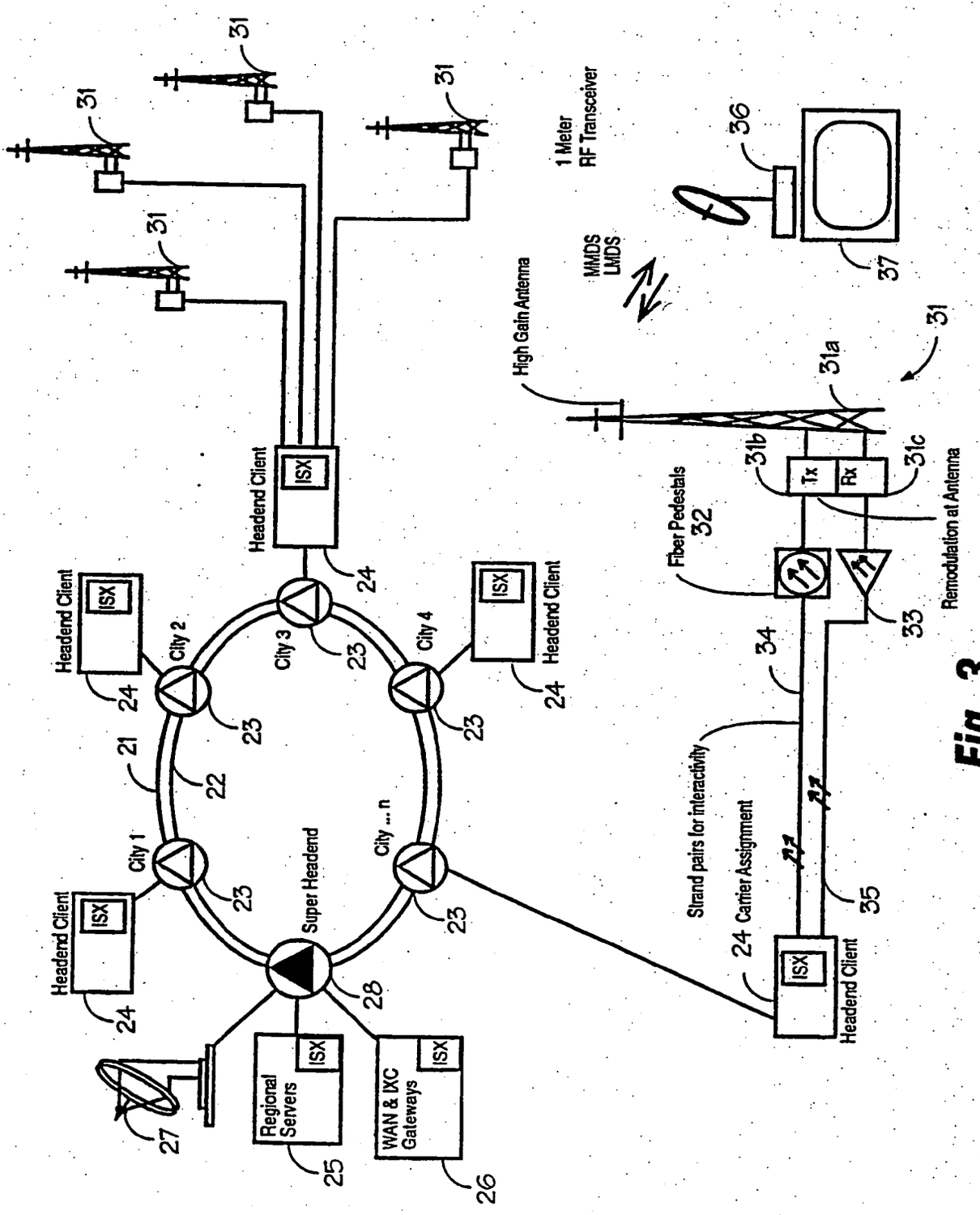

Fig. 3

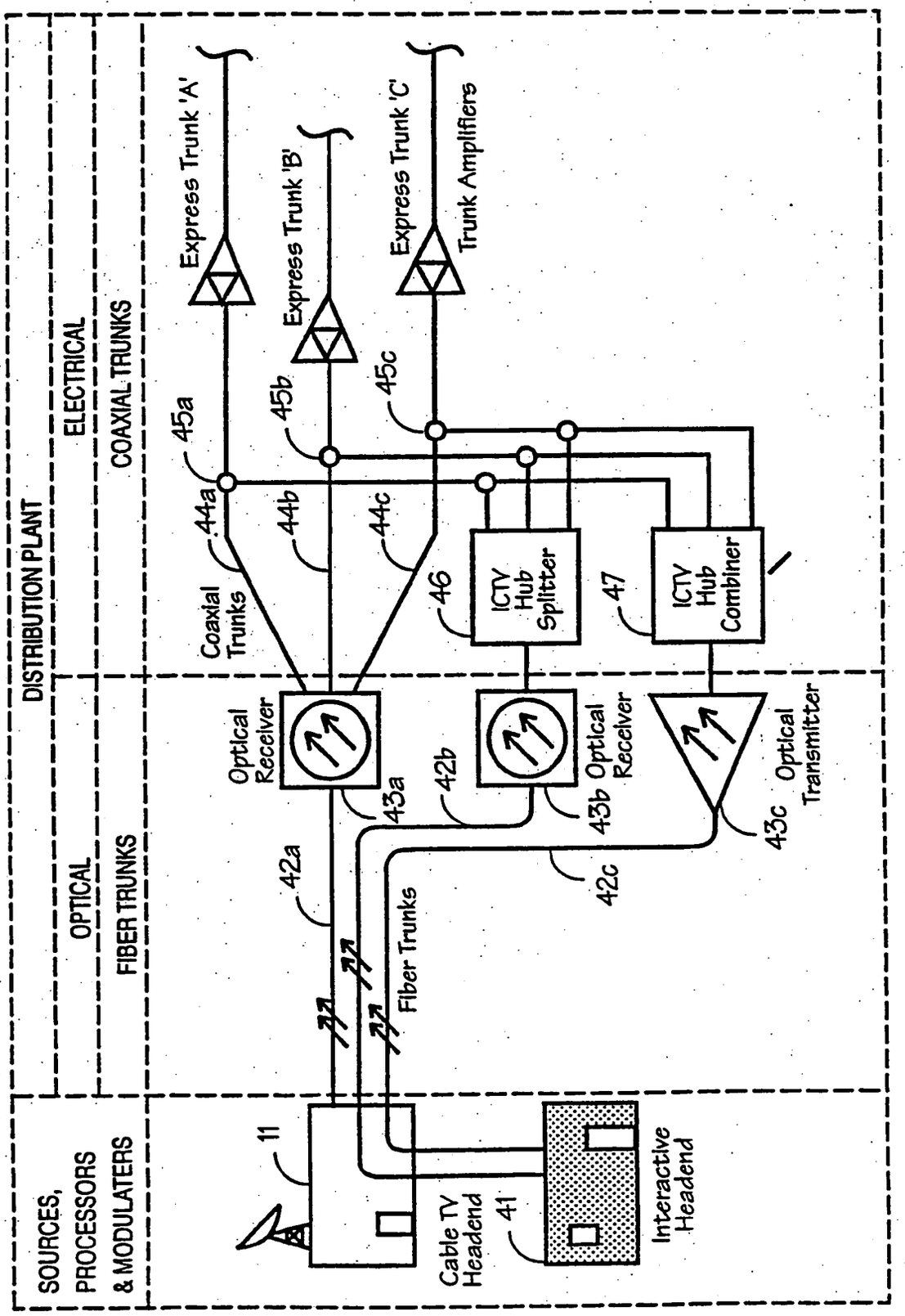
DISTRIBUTION PLANT
ELECTRICAL
COAXIAL TRUNKS
OPTICAL
FIBER TRUNKS
SOURCES, PROCESSORS & MODULATERS
Express Trunk 'A'
Express Trunk 'B'
Express Trunk 'C'
Trunk Amplifiers
45a
45b
45c
44a
44b
44c
Coaxial Trunks
46
ICTV Hub Splitter
47
ICTV Hub Combiner
Optical Receiver
42a
43a
42b
43b Optical Receiver
43c Optical Transmitter
42c
Fiber Trunks
11
Cable TV Headend
41
Interactive Headend

Fig. 4

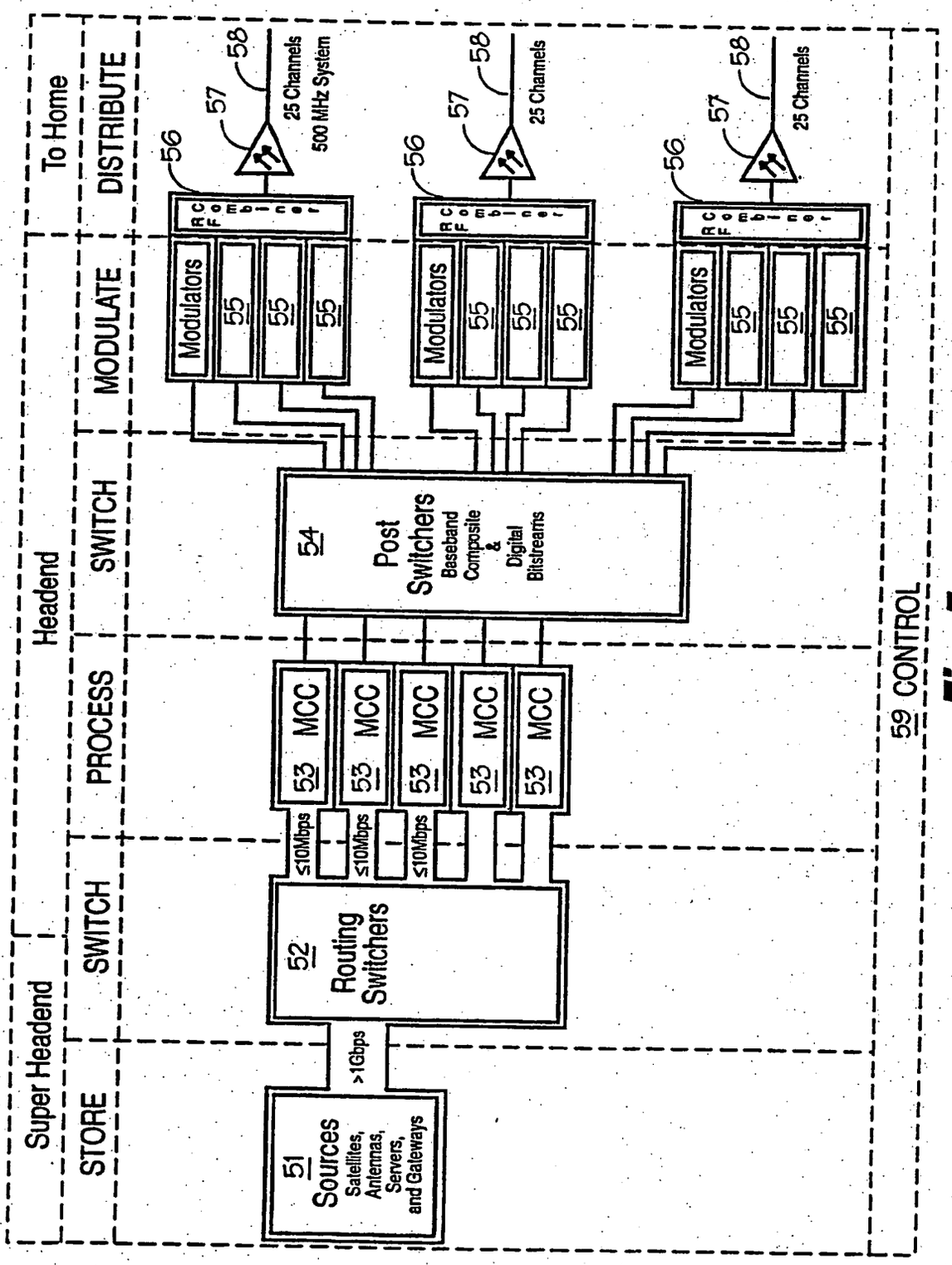

Fig. 5

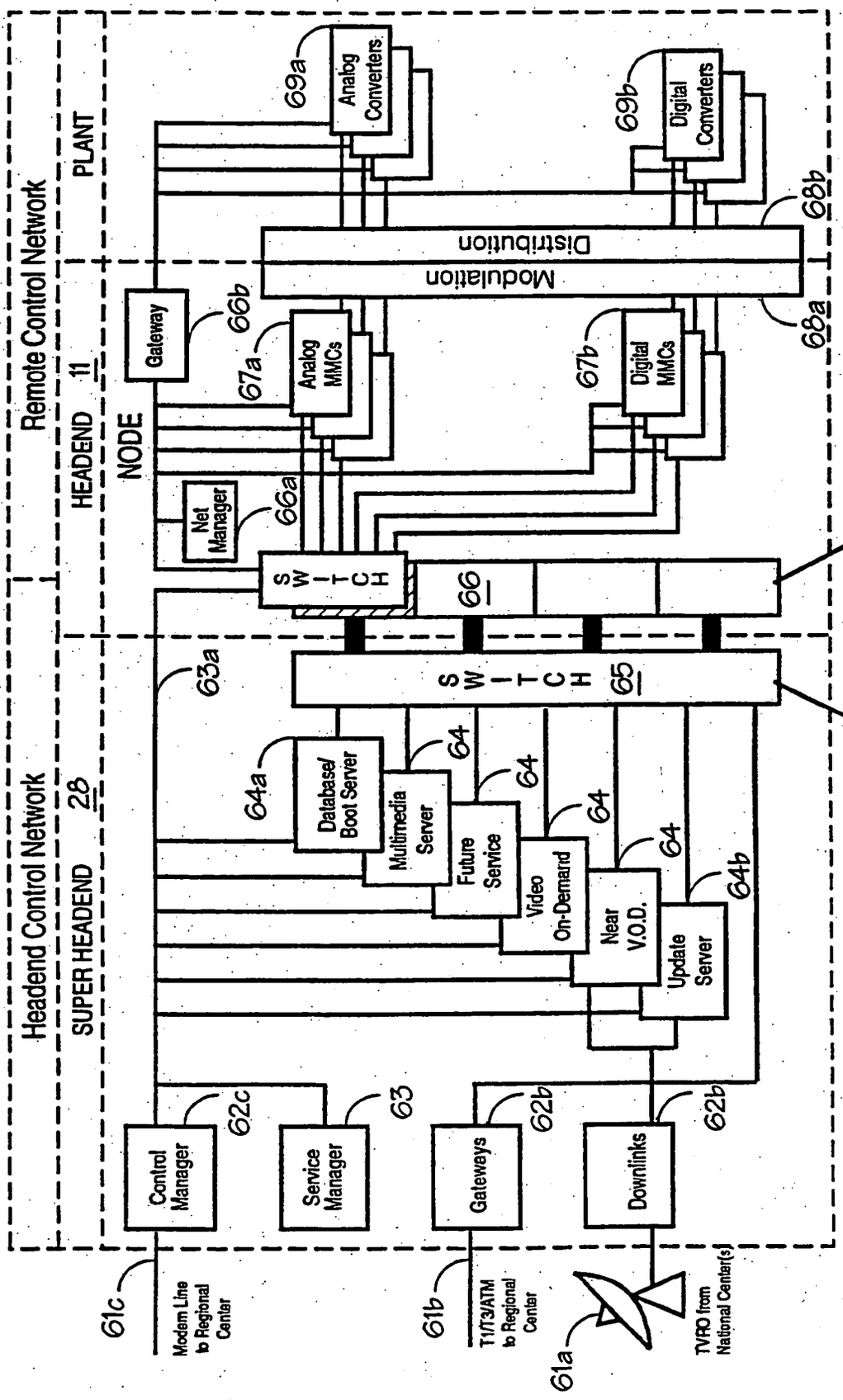
Remote Control Network
PLANT
HEADEND 11
NODE
Headend Control Network
SUPER HEADEND 28
Analog Converters
Digital Converters
69a
69b
Distribution
Modulation
68b
68a
Gateway
66b
Analog MMCs
Digital MMCs
67a
67b
Net Manager
66a
S W I T C H
66
Neighborhood Switch
63a
S W I T C H
65
Municipal Switch
Database/ Boot Server
Multimedia Server
Future Service
Video On-Demand
Near V.O.D.
Update Server
64a
64
64
64
64
64b
Control Manager
Service Manager
Gateways
Downlinks
62c
63
62b
62b
61c
Modem Line to Regional Center
61b
T1/T3/ATM to Regional Center
61a
TVRO from National Center(s)

Fig. 6

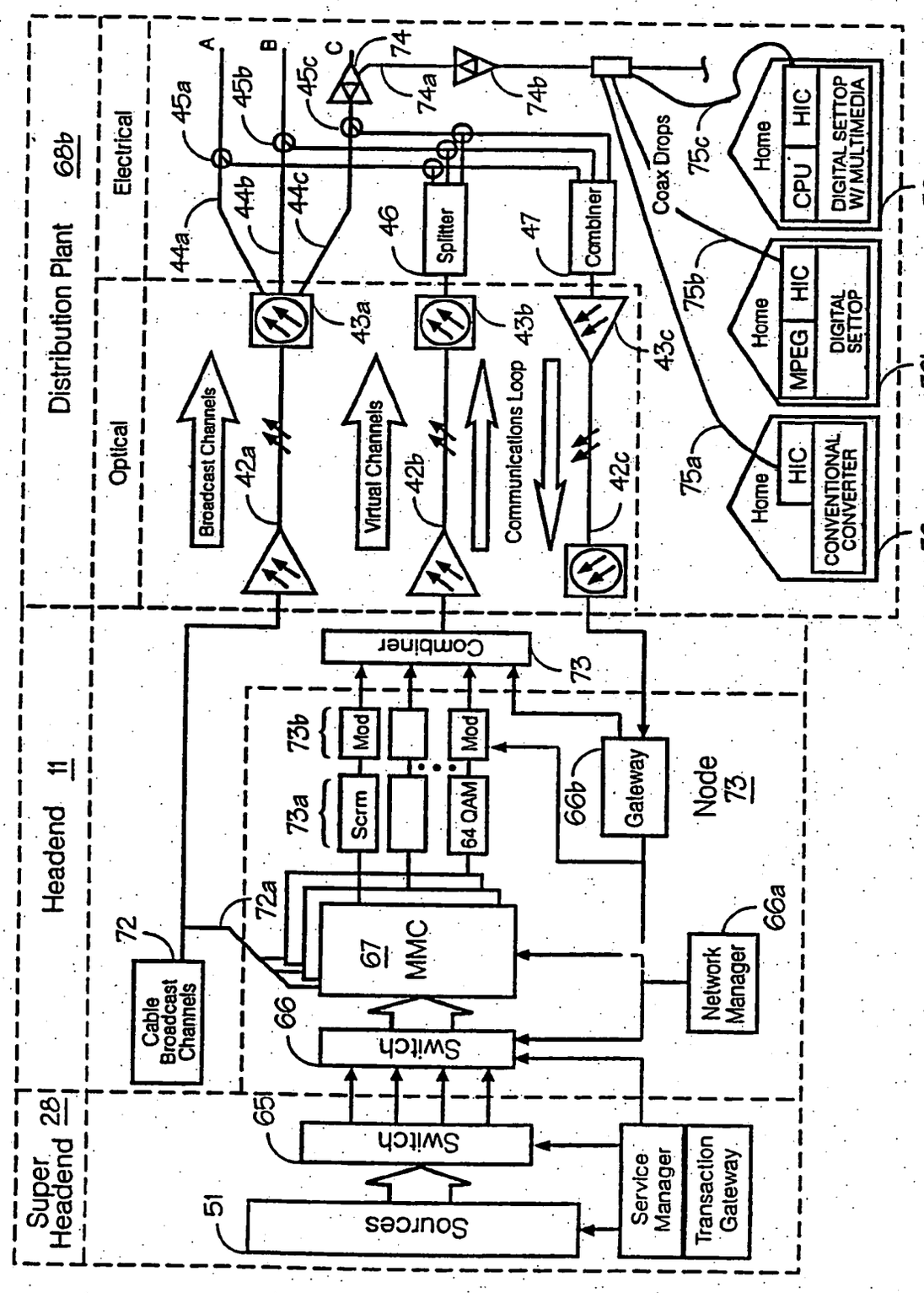

Fig. 7

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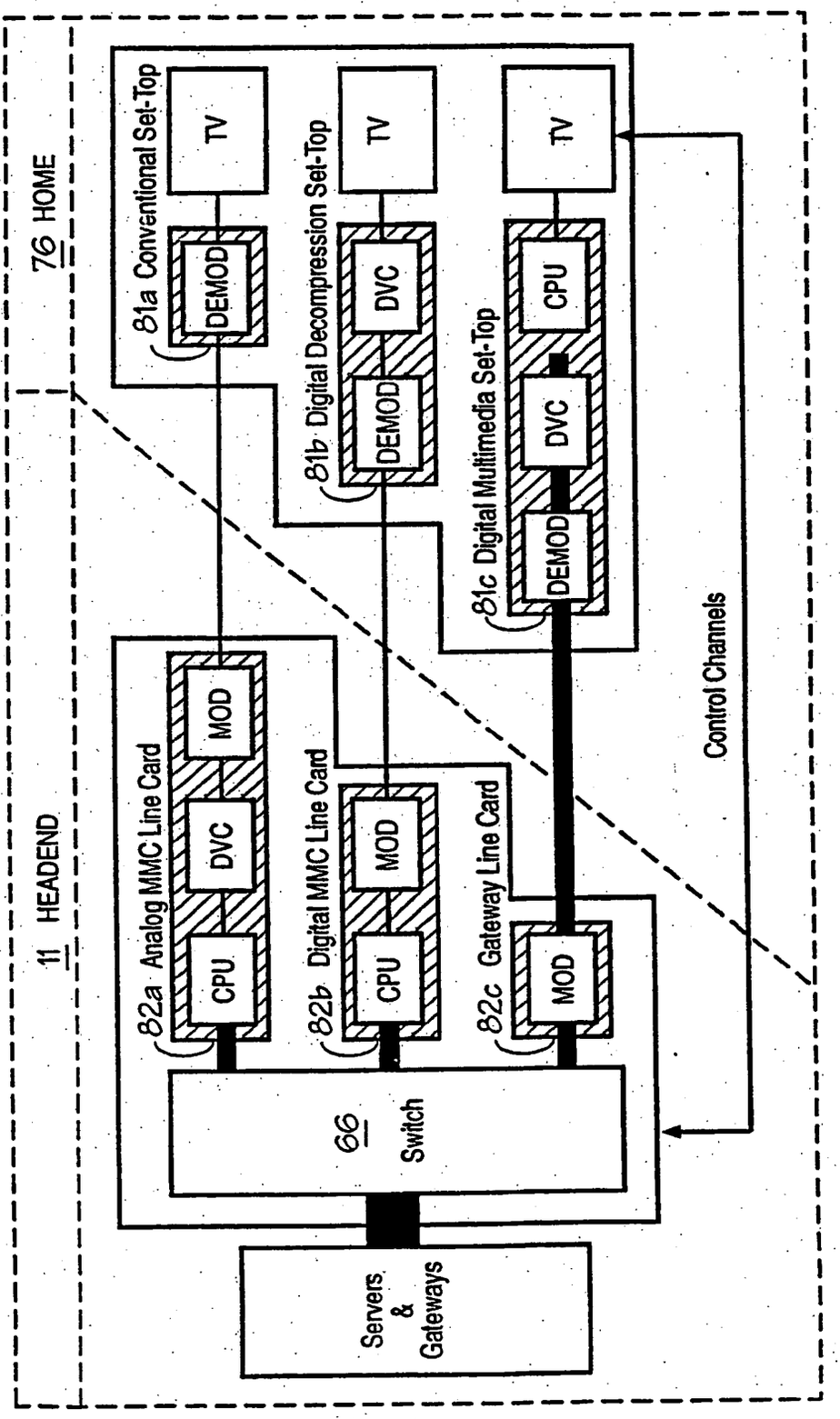
11 HEADEND
76 HOME
81a Conventional Set-Top
81b Digital Decompression Set-Top
81c Digital Multimedia Set-Top
TV
DEMOD
DVC
CPU
MOD
82a Analog MMC Line Card
82b Digital MMC Line Card
82c Gateway Line Card
66 Switch
Servers & Gateways
Control Channels

Fig. 8

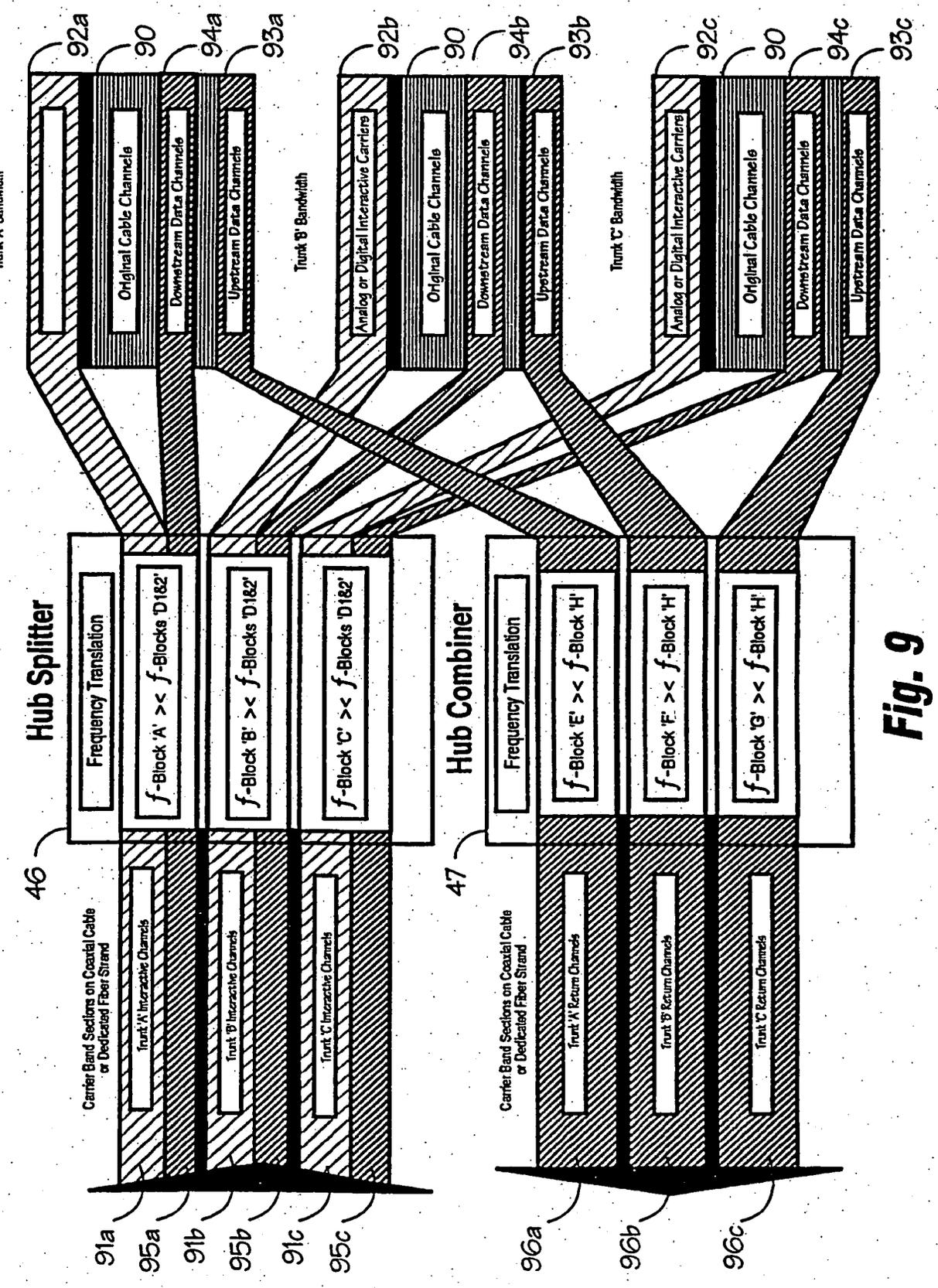
Trunk 'A' Bandwidth
Trunk 'B' Bandwidth
Trunk 'C' Bandwidth
92a
90
94a
93a
92b
90
94b
93b
92c
90
94c
93c
Analog or Digital Interactive Carriers
Original Cable Channels
Downstream Data Channels
Upstream Data Channels
Hub Splitter
Frequency Translation
f-Block 'A' >< f-Blocks 'D1&2'
f-Block 'B' >< f-Blocks 'D1&2'
f-Block 'C' >< f-Blocks 'D1&2'
46
Carrier Band Sections on Coaxial Cable or Dedicated Fiber Strand
Trunk 'A' Interactive Channels
Trunk 'B' Interactive Channels
Trunk 'C' Interactive Channels
91a
95a
91b
95b
91c
95c
Hub Combiner
Frequency Translation
f-Block 'E' >< f-Block 'H'
f-Block 'F' >< f-Block 'H'
f-Block 'G' >< f-Block 'H'
47
Carrier Band Sections on Coaxial Cable or Dedicated Fiber Strand
Trunk 'A' Return Channels
Trunk 'B' Return Channels
Trunk 'C' Return Channels
96a
96b
96c

Fig. 9

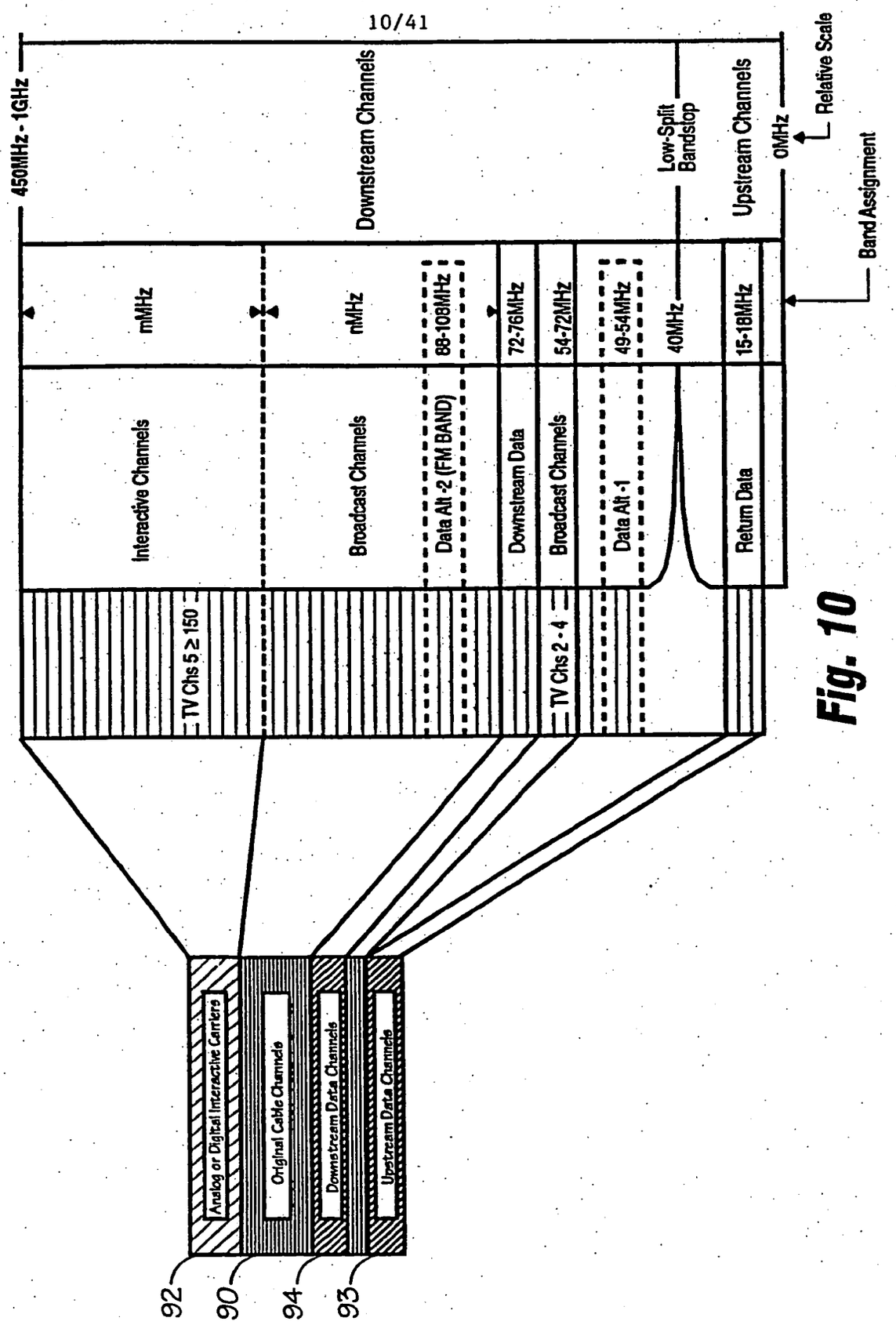
450MHz - 1GHz
Downstream Channels
Low-Split Bandstop
Upstream Channels
0MHz
Relative Scale
Band Assignment
mMHz
nMHz
88-108MHz
72-76MHz
54-72MHz
49-54MHz
40MHz
15-18MHz
Interactive Channels
Broadcast Channels
Data Alt -2 (FM BAND)
Downstream Data
Broadcast Channels
Data Alt -1
Return Data
TV Chs 5 ≥ 150
TV Chs 2 - 4
Analog or Digital Interactive Carriers
Original Cable Channels
Downstream Data Channels
Upstream Data Channels
92
90
94
93

Fig. 10

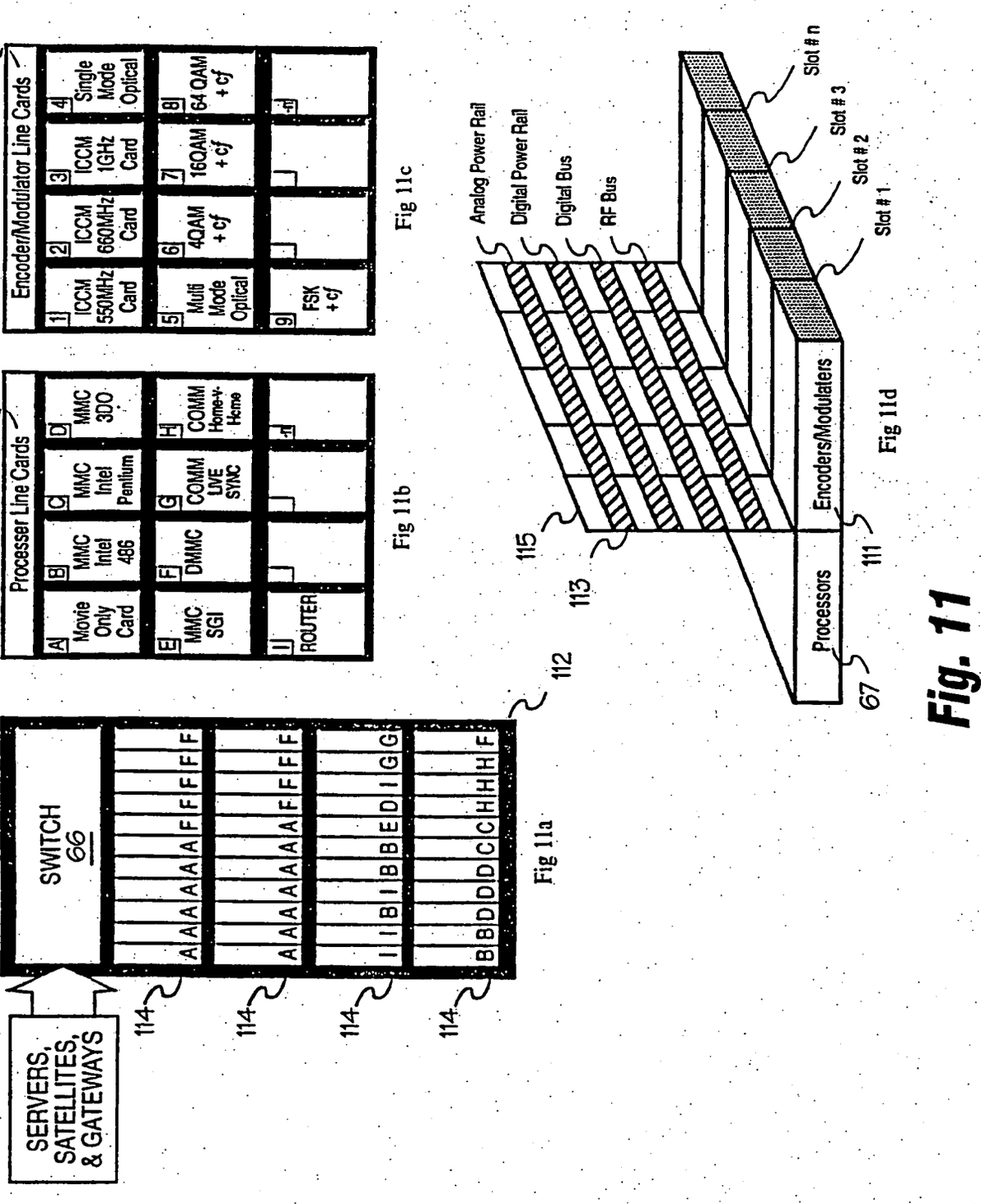

Fig. 11

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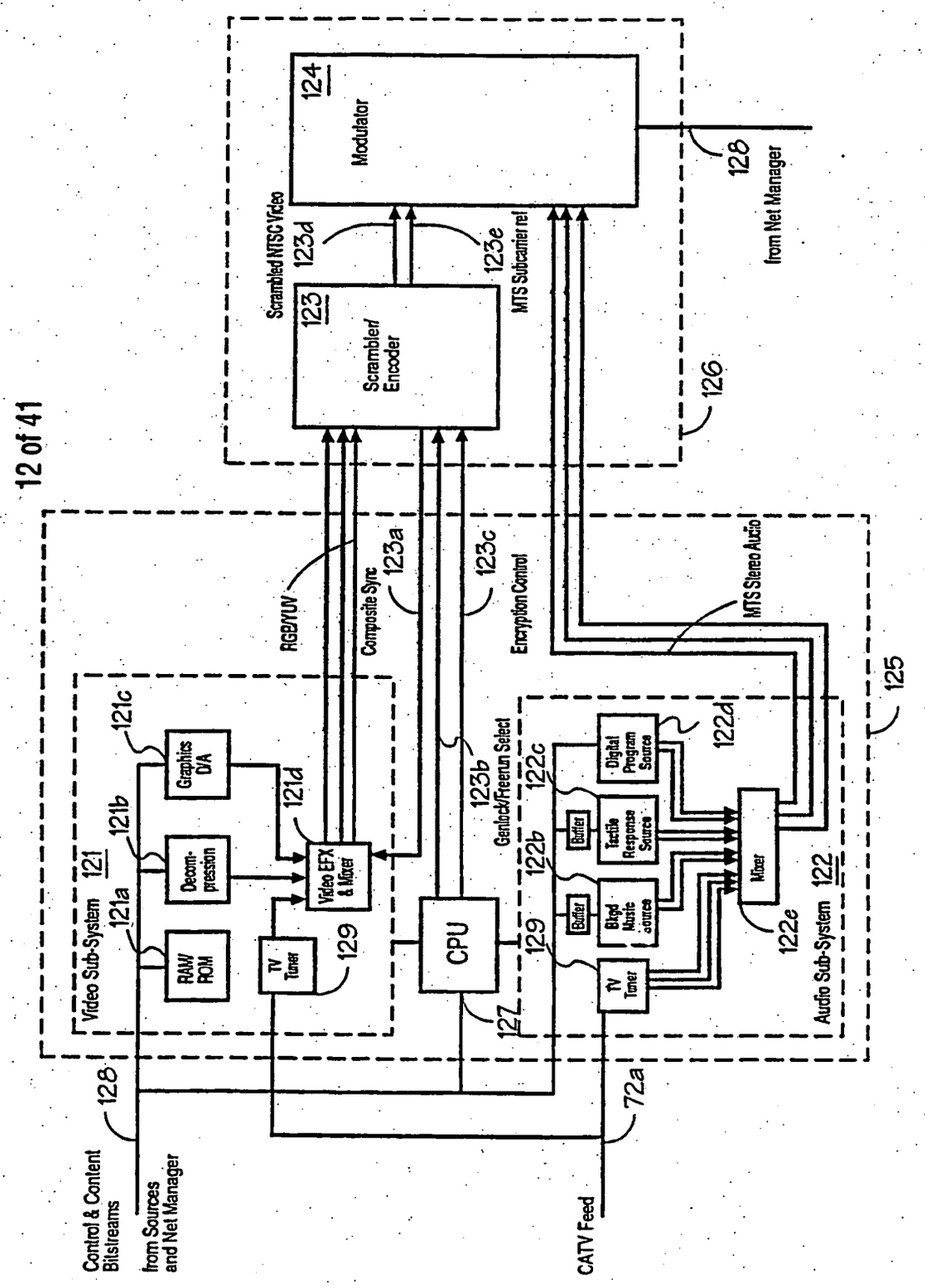
124
Modulator
128
from Net Manager
Scrambled NTSC Video
123d
123e
MTS Subcarrier ref
123
Scrambler/ Encoder
126
RGB/YUV
Composite Sync
123a
123c
Encryption Control
MTS Stereo Audio
125
Video Sub-System 121
121a
121b
121c
121d
Graphics D/A
Decom-pression
RAM/ ROM
Video EFX & Mixer
TV Tuner
129
CPU
127
123b
Genlock/Freerun Select
122b
122c
122d
Buffer
Digital Program Source
Tactile Response Source
Blkgd Music Source
TV Tuner
Mixer
122e
Audio Sub-System 122
128
Control & Content Bitstreams
from Sources and Net Manager
72a
CATV Feed

Fig. 12

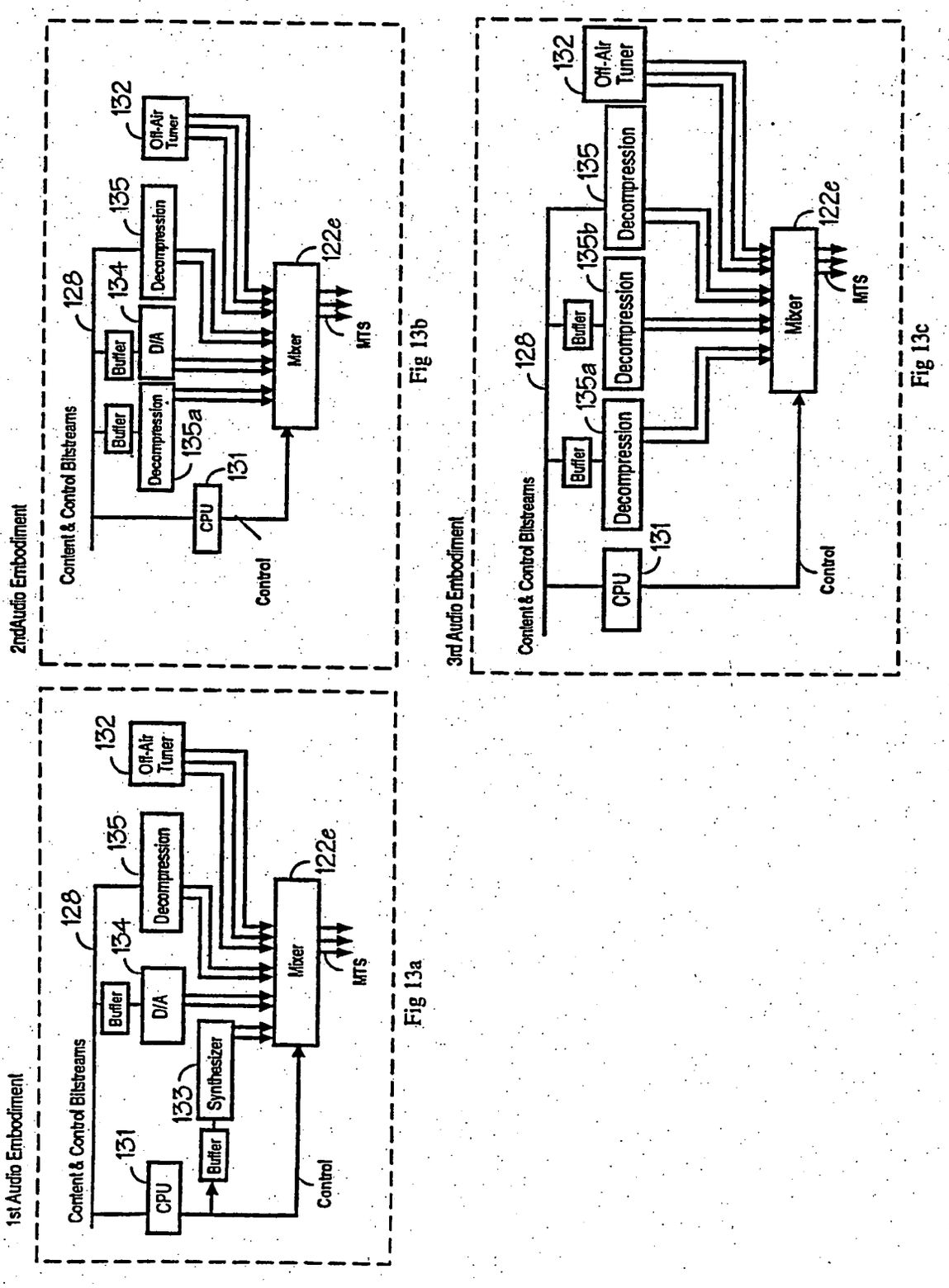

Fig. 13

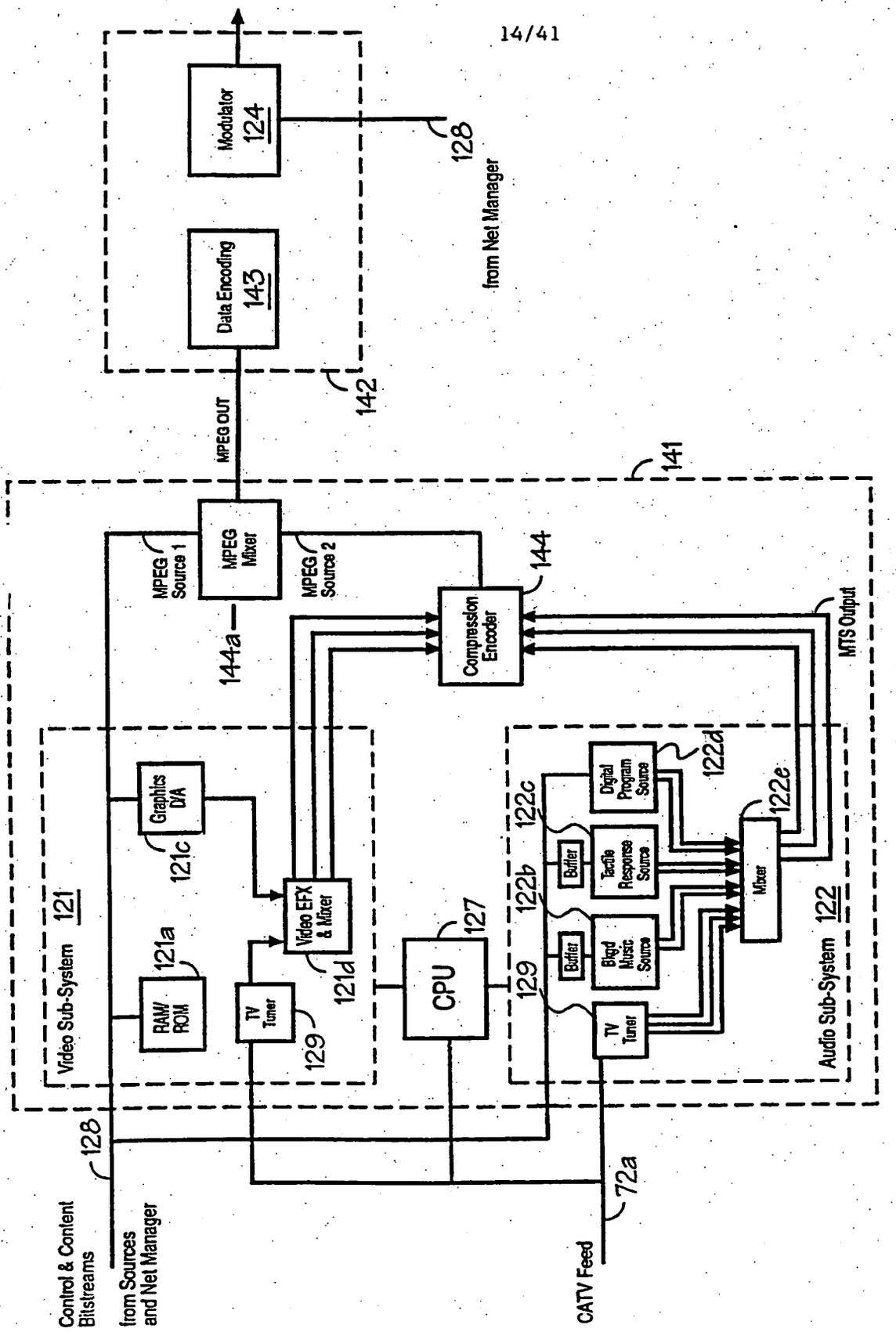
Modulator 124
128
from Net Manager
Data Encoding 143
142
MPEG OUT
141
MPEG Source 1
MPEG Mixer
MPEG Source 2
144a
144
Compression Encoder
MTS Output
Video Sub-System 121
Graphics D/A
121c
Video EFX & Mixer
121d
121a
RAW ROM
TV Tuner
129
CPU
127
129
122b
122c
Buffer
Digital Program Source
122d
Tactile Response Source
Buffer
Mixer
122e
Bkgd Music Source
TV Tuner
Audio Sub-System 122
128
Control & Content Bitstreams
from Sources and Net Manager
72a
CATV Feed

Fig. 14

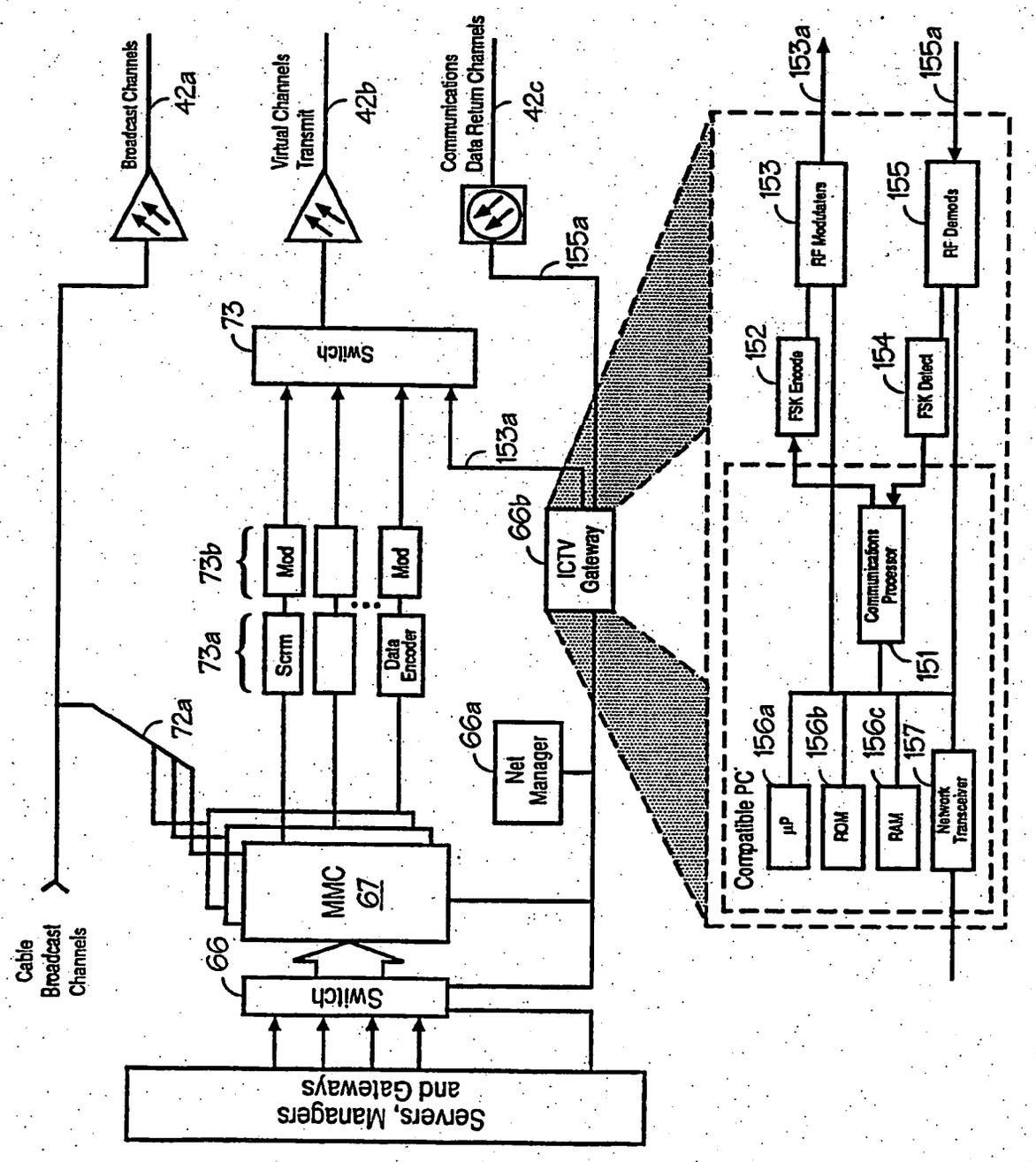

Fig. 15

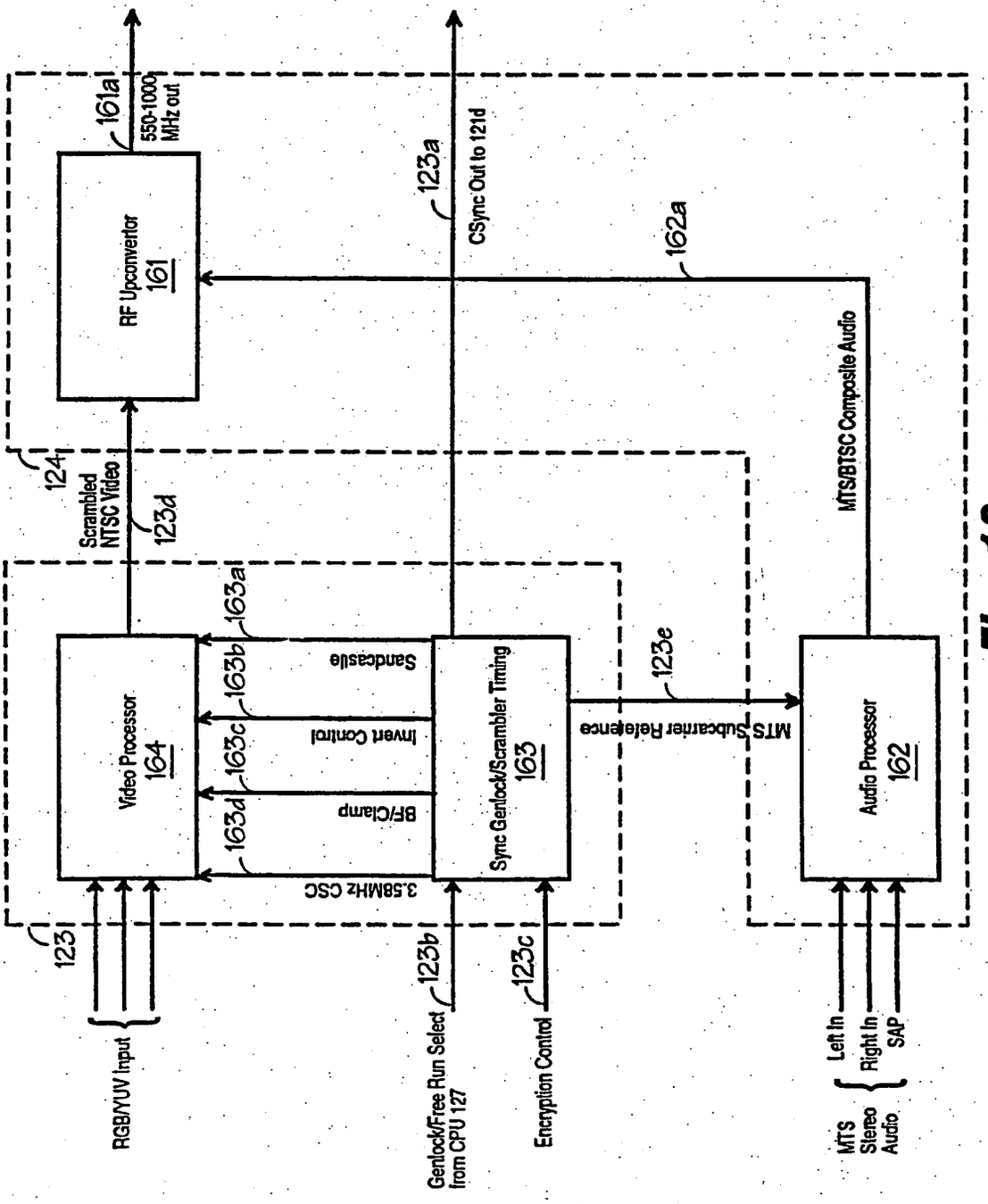

Fig. 16

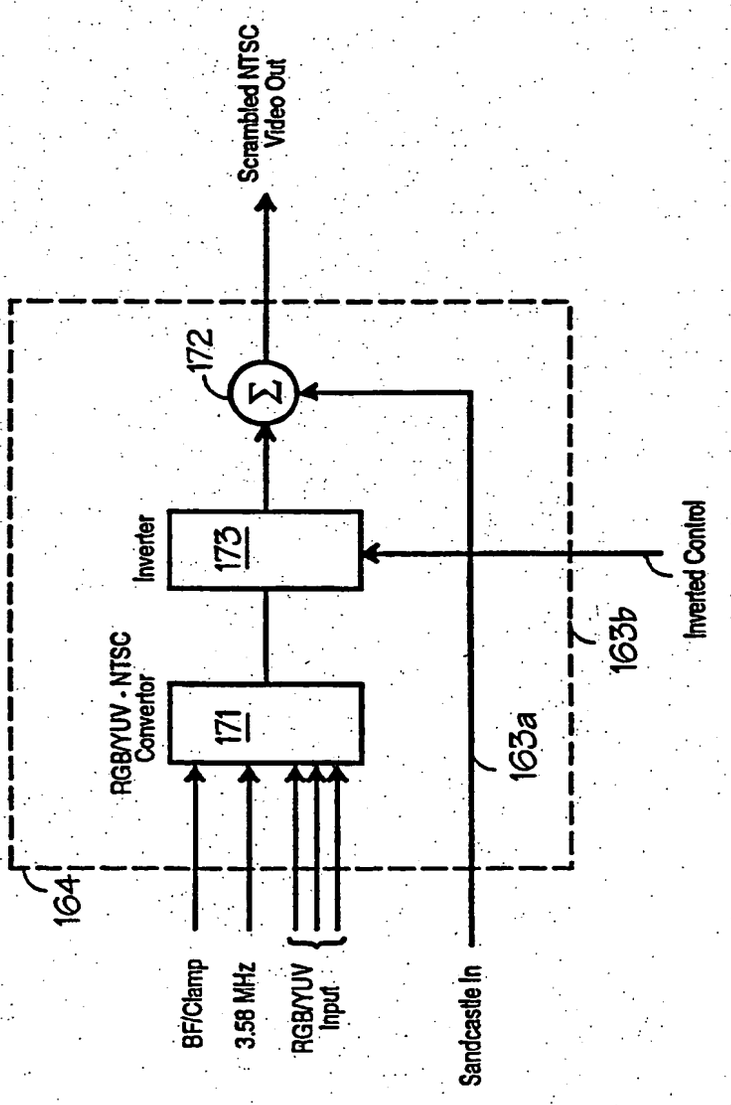
Scrambled NTSC Video Out
172
Σ
Inverter
173
RGB/YUV - NTSC Convertor
171
164
163a
163b
Inverted Control
BF/Clamp
3.58 MHz
RGB/YUV Input
Sandcastle In

Fig. 17

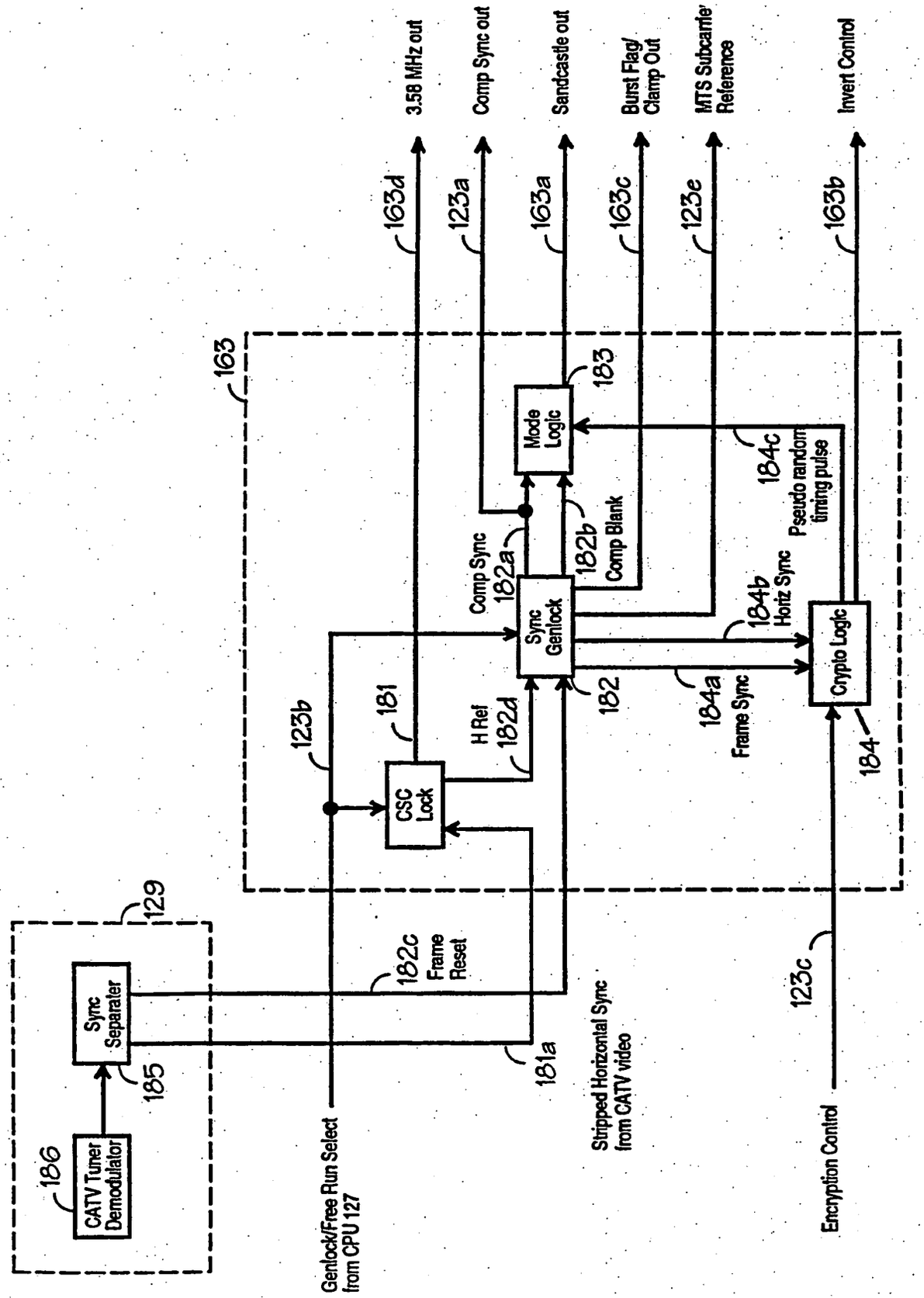

Fig. 18

SUBSTITUTE SHEET

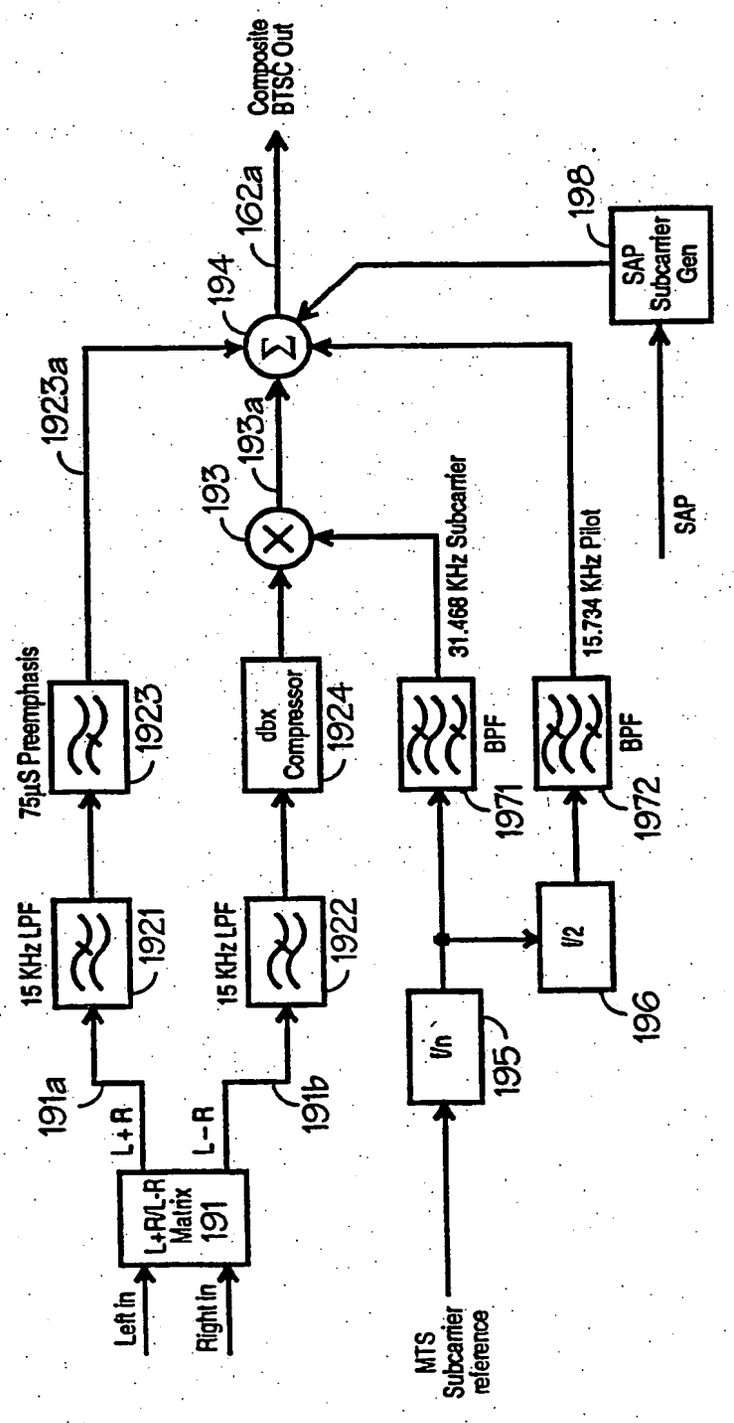
Composite BTSC Out
162a
194
198
SAP Subcarrier Gen
1923a
193a
193
SAP
75µS Preemphasis
1923
dbx Compressor
1924
31.468 KHz Subcarrier
15.734 KHz Pilot
BPF
1971
BPF
1972
15 KHz LPF
1921
15 KHz LPF
1922
191a
L+R
L-R
191b
L+R/L-R Matrix
191
Left In
Right In
1/n
195
1/2
196
MTS Subcarrier reference

Fig. 19

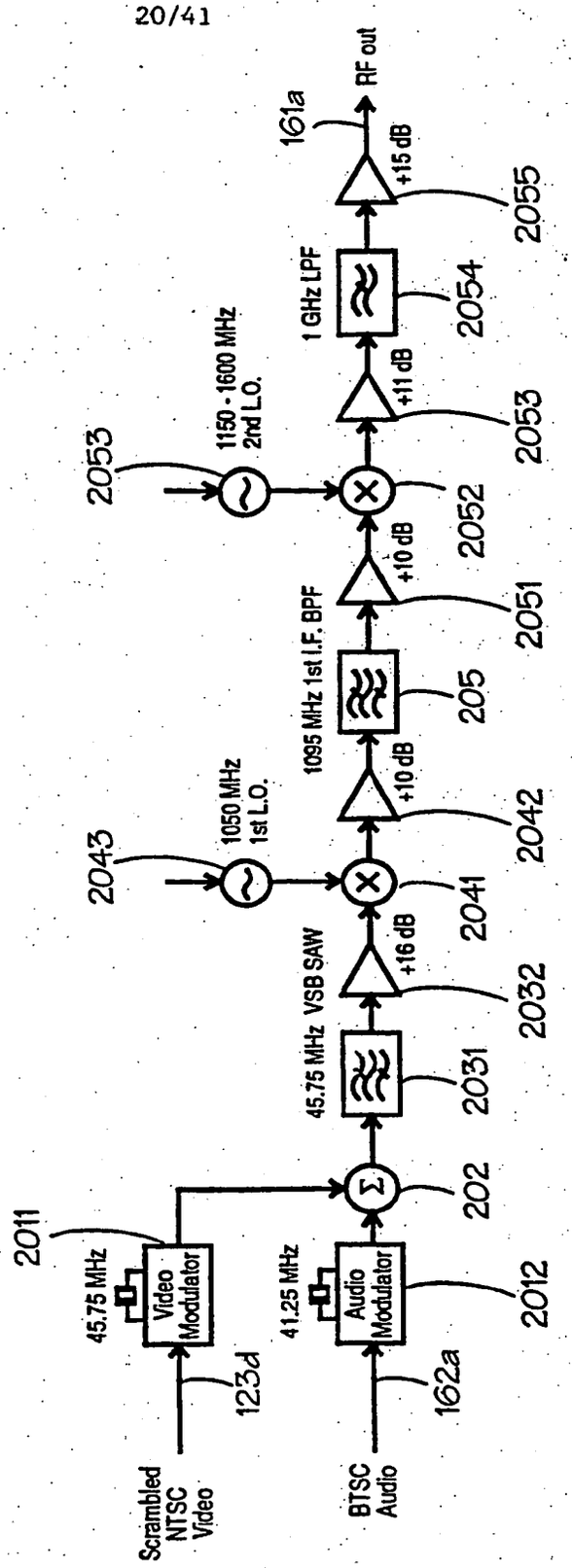
Scrambled NTSC Video
BTSC Audio
45.75 MHz
Video Modulator
41.25 MHz
Audio Modulator
123d
162a
2011
2012
202
45.75 MHz VSB SAW
2031
+16 dB
2032
1050 MHz 1st L.O.
2043
2041
1095 MHz 1st I.F. BPF
205
+10 dB
2042
1150 - 1600 MHz 2nd L.O.
2053
2052
+10 dB
2051
1 GHz LPF
2054
+11 dB
2053
+15 dB
2055
161a
RF out

Fig. 20

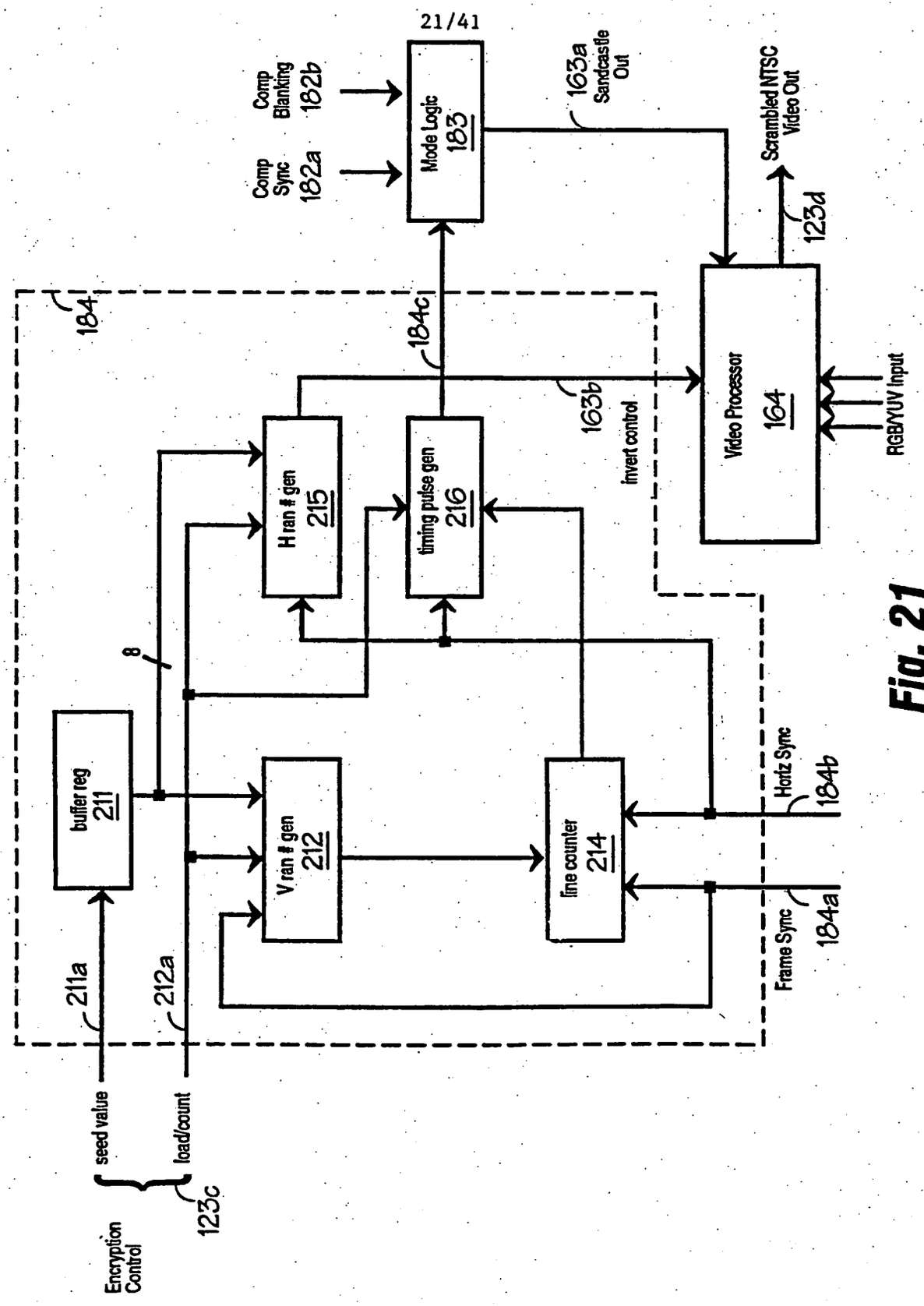
Comp Blanking 182b
Comp Sync 182a
Mode Logic 183
163a Sandcastle Out
Scrambled NTSC Video Out
123d
184
184c
163b
Invert control
Video Processor 164
RGB/YUV Input
H ran # gen 215
timing pulse gen 216
8
buffer reg 211
V ran # gen 212
line counter 214
Horiz Sync 184b
Frame Sync 184a
211a
212a
seed value
load/count
123c
Encryption Control

Fig. 21

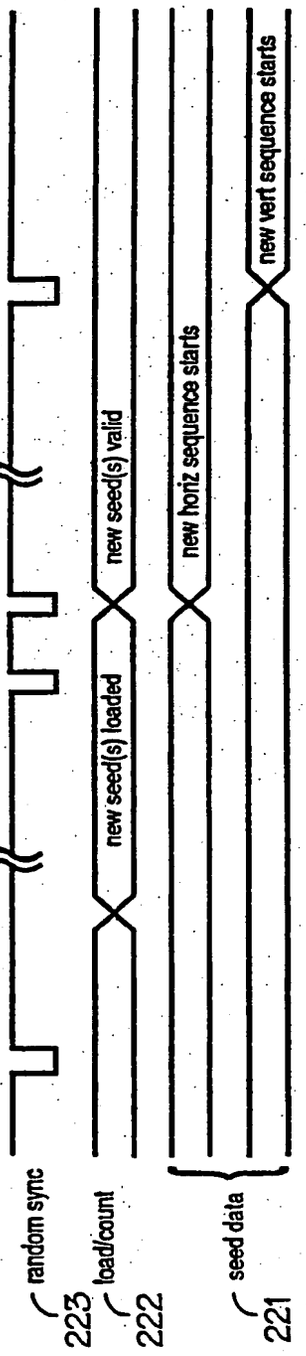
random sync
load/count
seed data
new seed(s) loaded
new seed(s) valid
new horiz sequence starts
new vert sequence starts
223
222
221

Fig. 22

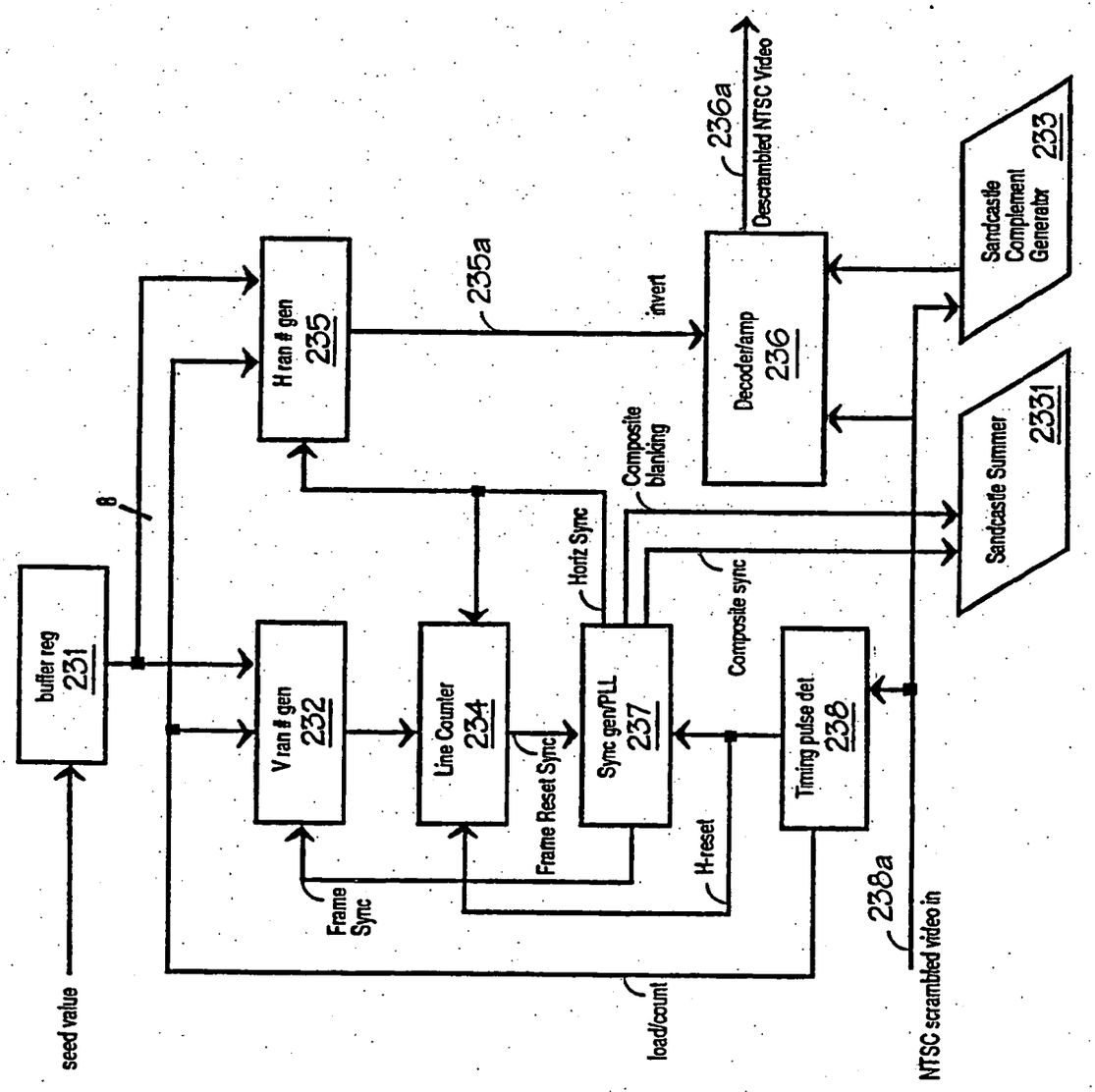
buffer reg
231
seed value
V ran # gen
232
H ran # gen
235
235a
invert
Decoder/amp
236
236a
Descrambled NTSC Video
Sandcastle
Complement
Generator
233
Sandcastle Summer
2331
Composite
blanking
Horiz Sync
Composite sync
Line Counter
234
Sync gen/PLL
237
Timing pulse det.
238
Frame
Sync
Frame Reset Sync
H-reset
load/count
238a
NTSC scrambled video in

Fig. 23

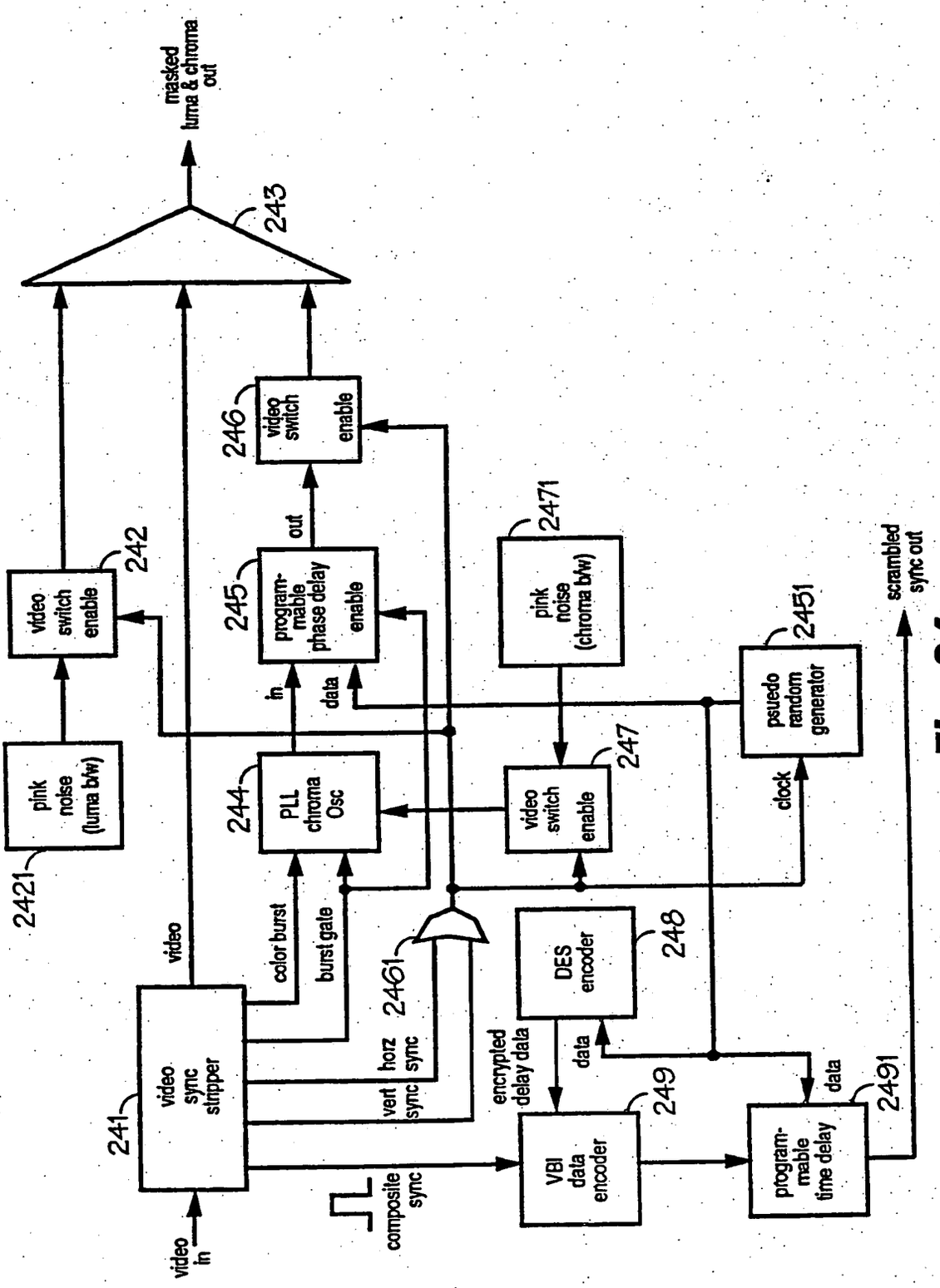
masked luma & chroma out
243
video switch enable
246
video switch enable
242
out
245
program-mable phase delay enable
in
data
2471
pink noise (chroma b/w)
2451
psuedo random generator
scrambled sync out
pink noise (luma b/w)
2421
PLL chroma Osc
244
video switch enable
247
clock
video
color burst
burst gate
2461
DES encoder
248
video sync stripper
241
horz sync
vert sync
encrypted delay data
data
249
data
2491
VBI data encoder
program-mable time delay
composite sync
video in

Fig. 24

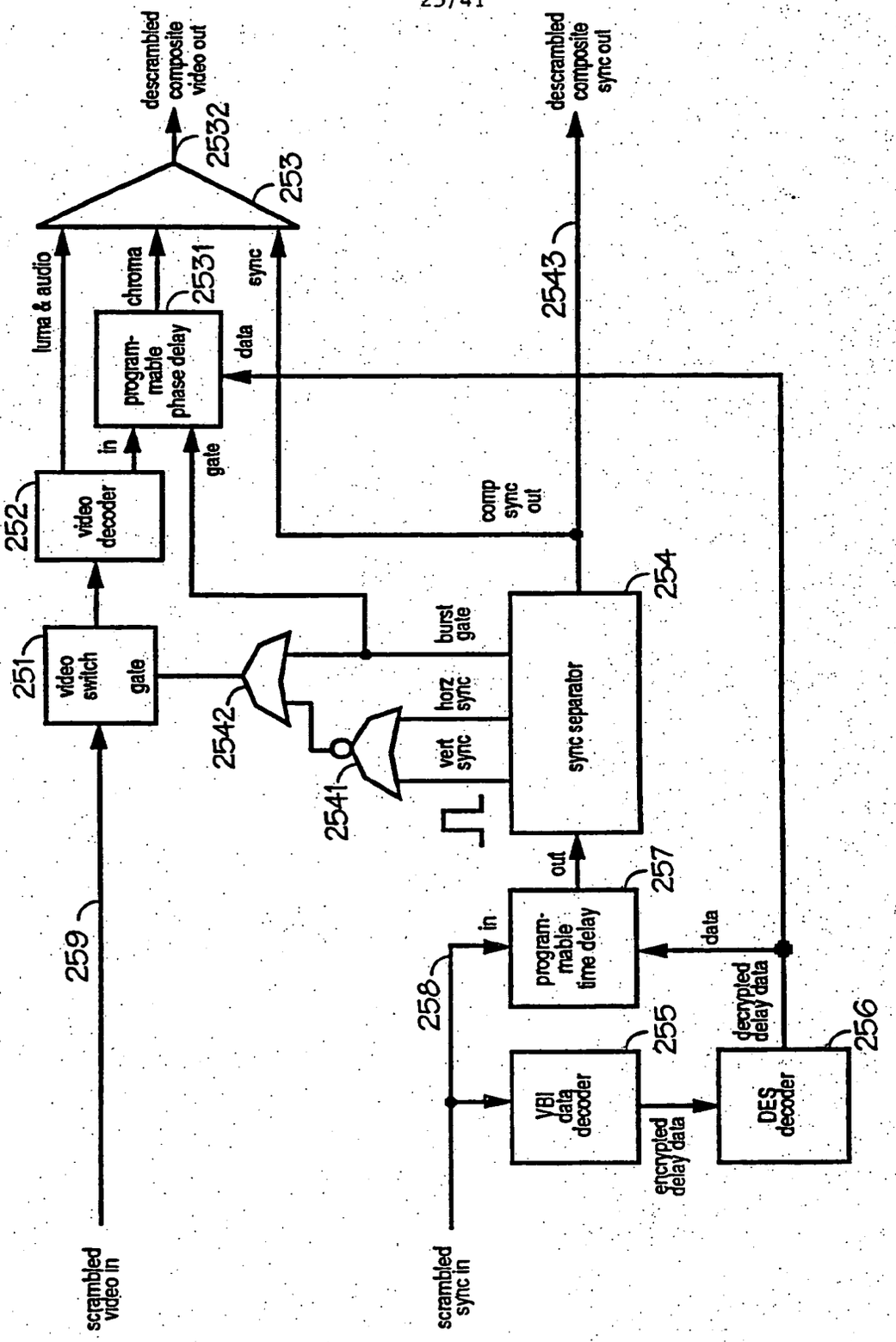
descrambled composite video out
2532
253
descrambled composite sync out
2543
luma & audio
chroma
2531
sync
program-mable phase delay
data
in
gate
252
video decoder
comp sync out
burst gate
254
251
video switch gate
horz sync
sync separator
2542
vert sync
2541
259
out
257
program-mable time delay
in
data
258
decryped delay data
255
256
VBI data decoder
DES decoder
encryped delay data
scrambled video in
scrambled sync in

Fig. 25

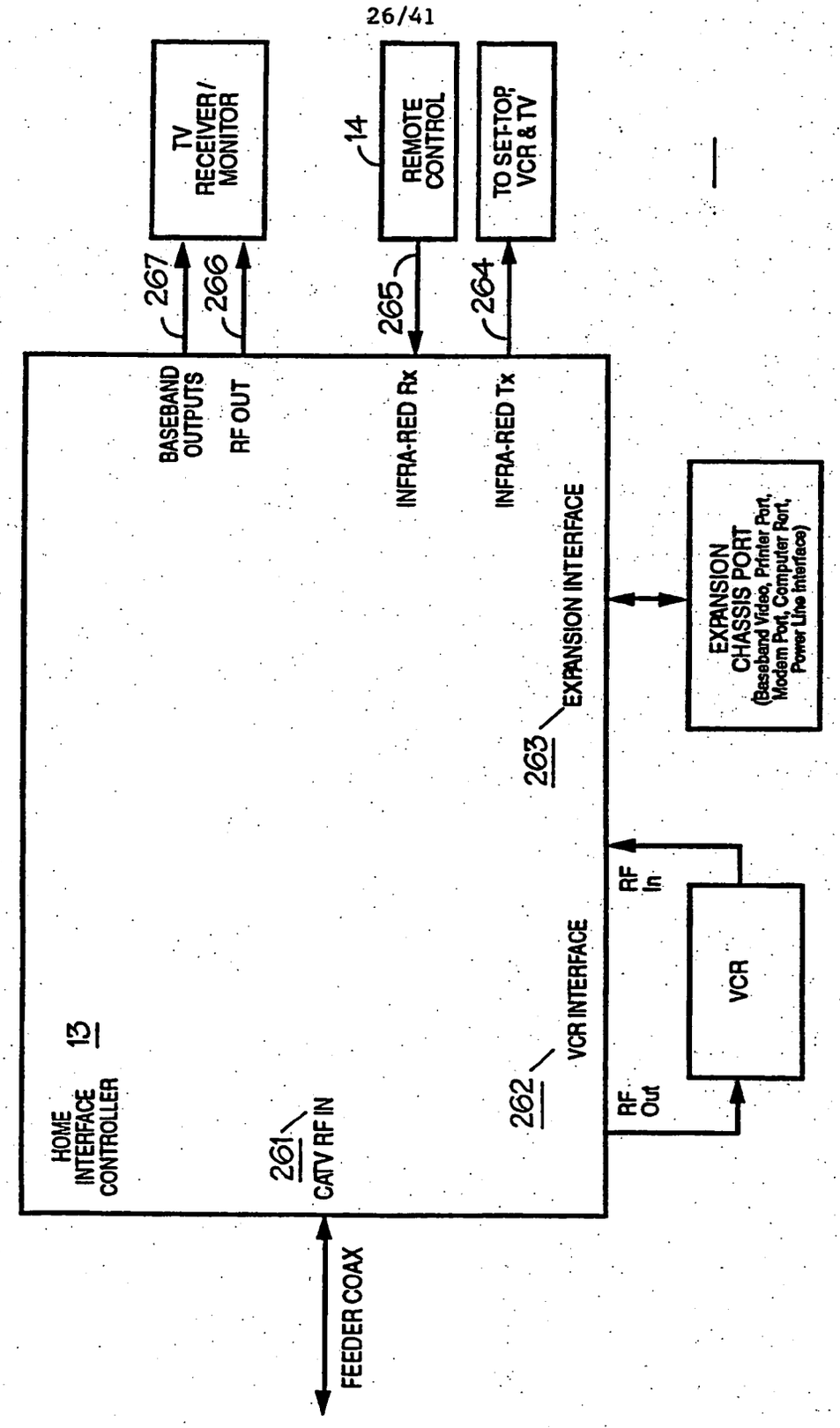
TV RECEIVER/ MONITOR
REMOTE CONTROL
14
TO SET-TOP, VCR & TV
267
266
265
264
BASEBAND OUTPUTS
RF OUT
INFRA-RED Rx
INFRA-RED Tx
EXPANSION INTERFACE
263
EXPANSION CHASSIS PORT
(Baseband Video, Printer Port, Modem Port, Computer Port, Power Line Interface)
RF In
VCR
VCR INTERFACE
262
RF Out
HOME INTERFACE CONTROLLER
13
261
CATV RF IN
FEEDER COAX

Fig. 26

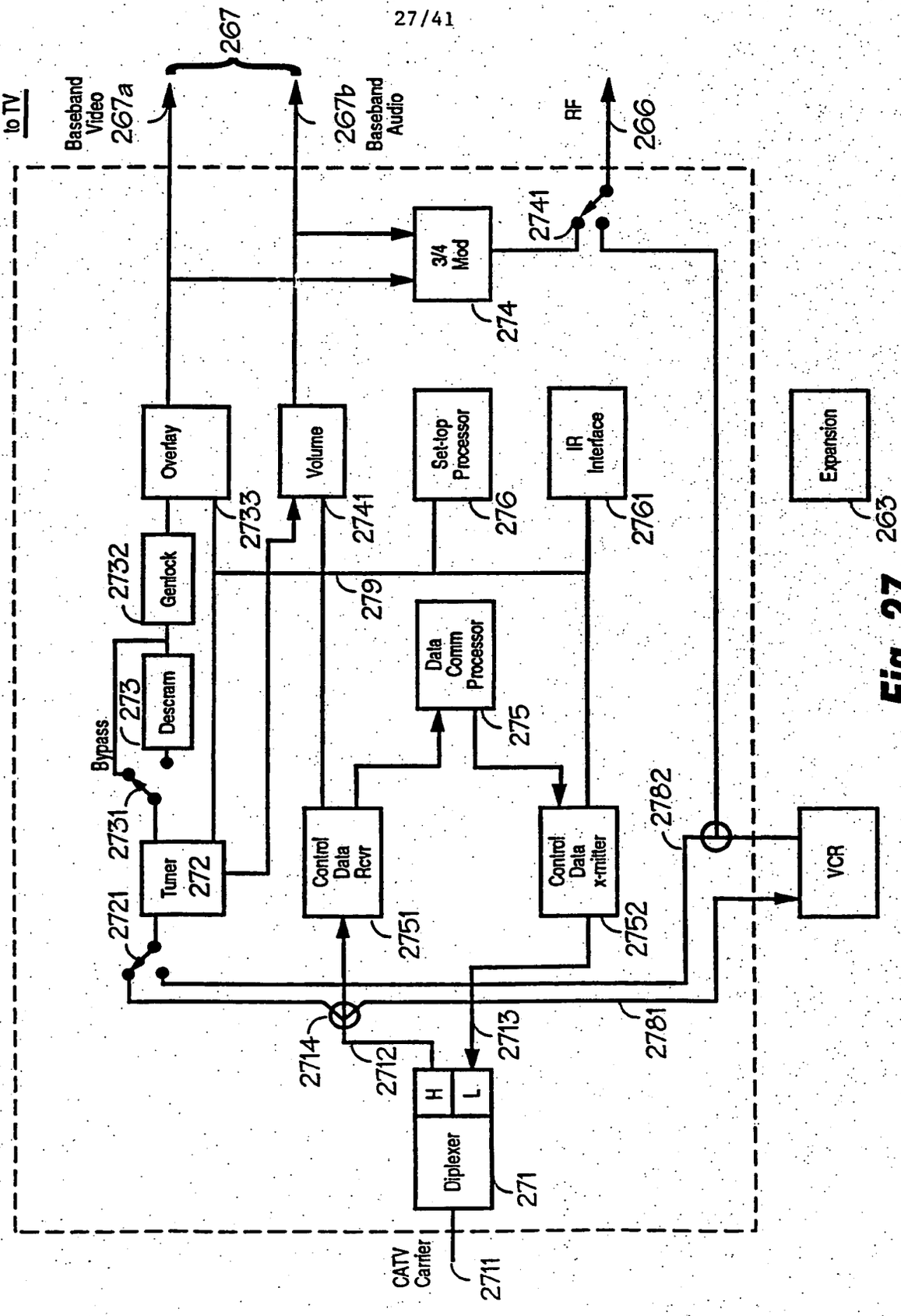
to TV
Baseband Video 267a
267
Baseband Audio 267b
RF 266
3/4 Mod
2741
274
Overlay
2733
Volume
2741
Set-top Processor
276
IR Interface
2761
Expansion
263
Genlock
2732
279
Data Comm Processor
275
Descram
273
Bypass
2731
Tuner 272
2721
Control Data Rcvr
2751
Control Data x-mitter
2752
2782
VCR
2781
2714
2712
2713
H
L
Diplexer
271
CATV Carrier
2711

Fig. 27

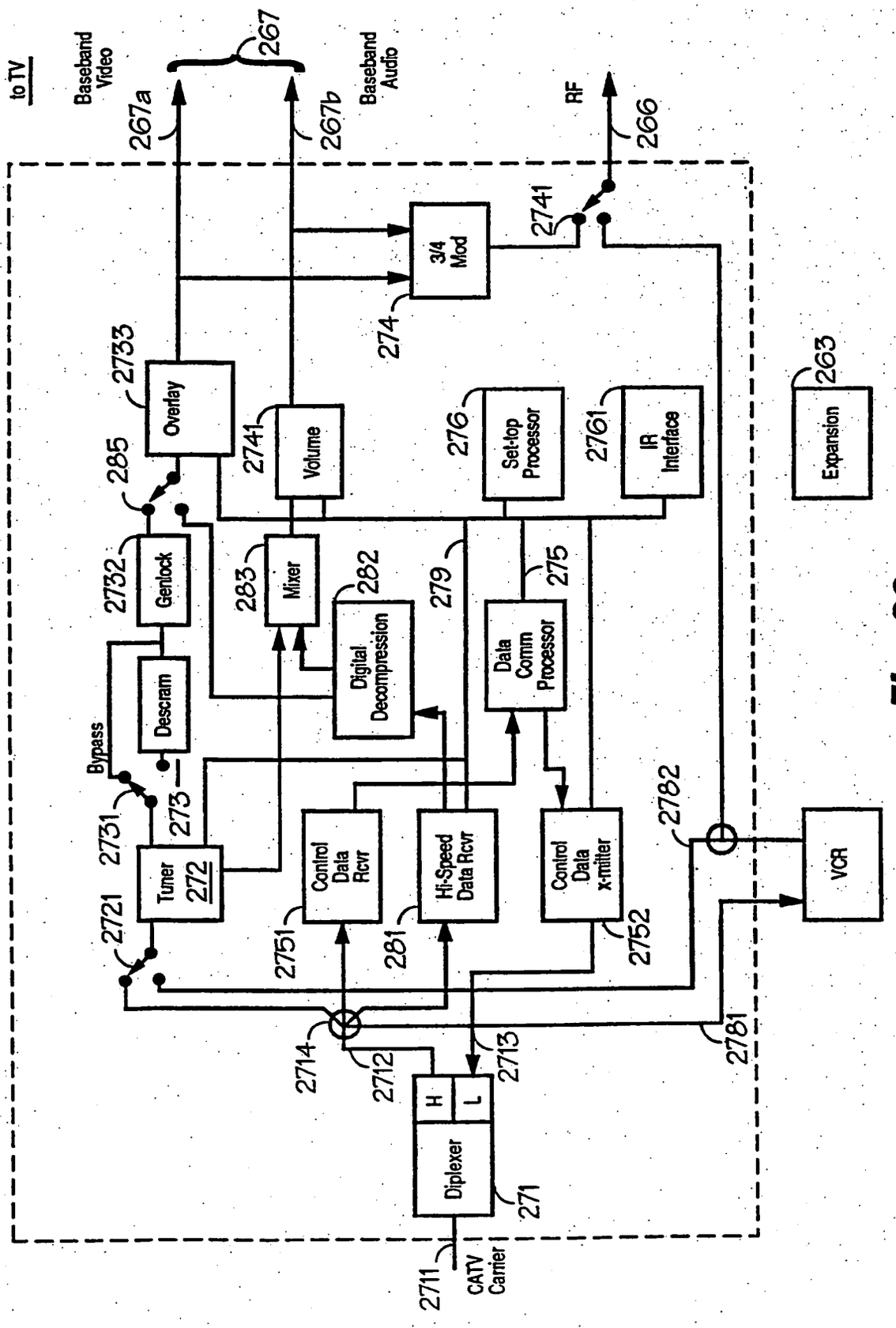
to TV
Baseband Video
267a
267
267b
Baseband Audio
RF
266
2741
3/4 Mod
274
2733
Overlay
285
2741
Volume
276
Set-top Processor
2761
IR Interface
263
Expansion
2732
Genlock
283
Mixer
282
Digital Decompression
279
275
Data Comm Processor
Descram
Bypass
2731
273
2721
Tuner 272
Control Data Rcvr
Hi-Speed Data Rcvr
Control Data x-mitter
2782
VCR
2751
281
2752
2714
2712
2713
2781
H
L
Diplexer
271
2711
CATV Carrier

Fig. 28

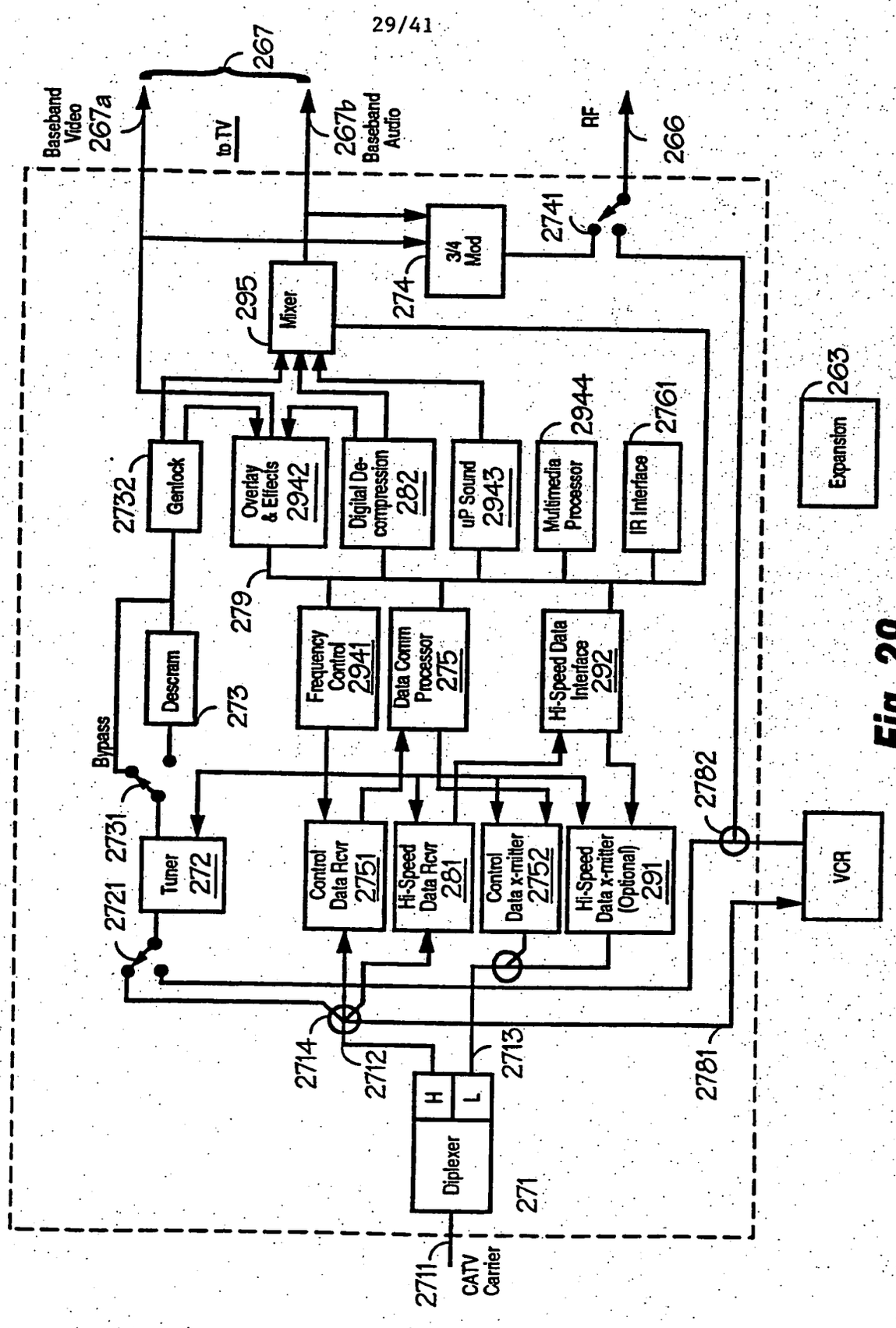
Baseband Video
267a
267
to TV
267b
Baseband Audio
RF
266
2741
3/4 Mod
274
295
Mixer
2732
Genlock
Overlay & Effects 2942
Digital De-compression 282
uP Sound 2943
Multimedia Processor
2944
IR Interface
2761
Expansion
263
279
Descram
273
Bypass
Frequency Control 2941
Data Comm Processor 275
Hi-Speed Data Interface 292
2731
2721
Tuner 272
Control Data Rcvr 2751
Hi-Speed Data Rcvr 281
Control Data x-mitter 2752
Hi-Speed Data x-mitter (Optional) 291
2782
VCR
2714
2712
2713
2781
H
L
Diplexer
271
2711
CATV Carrier

Fig. 29

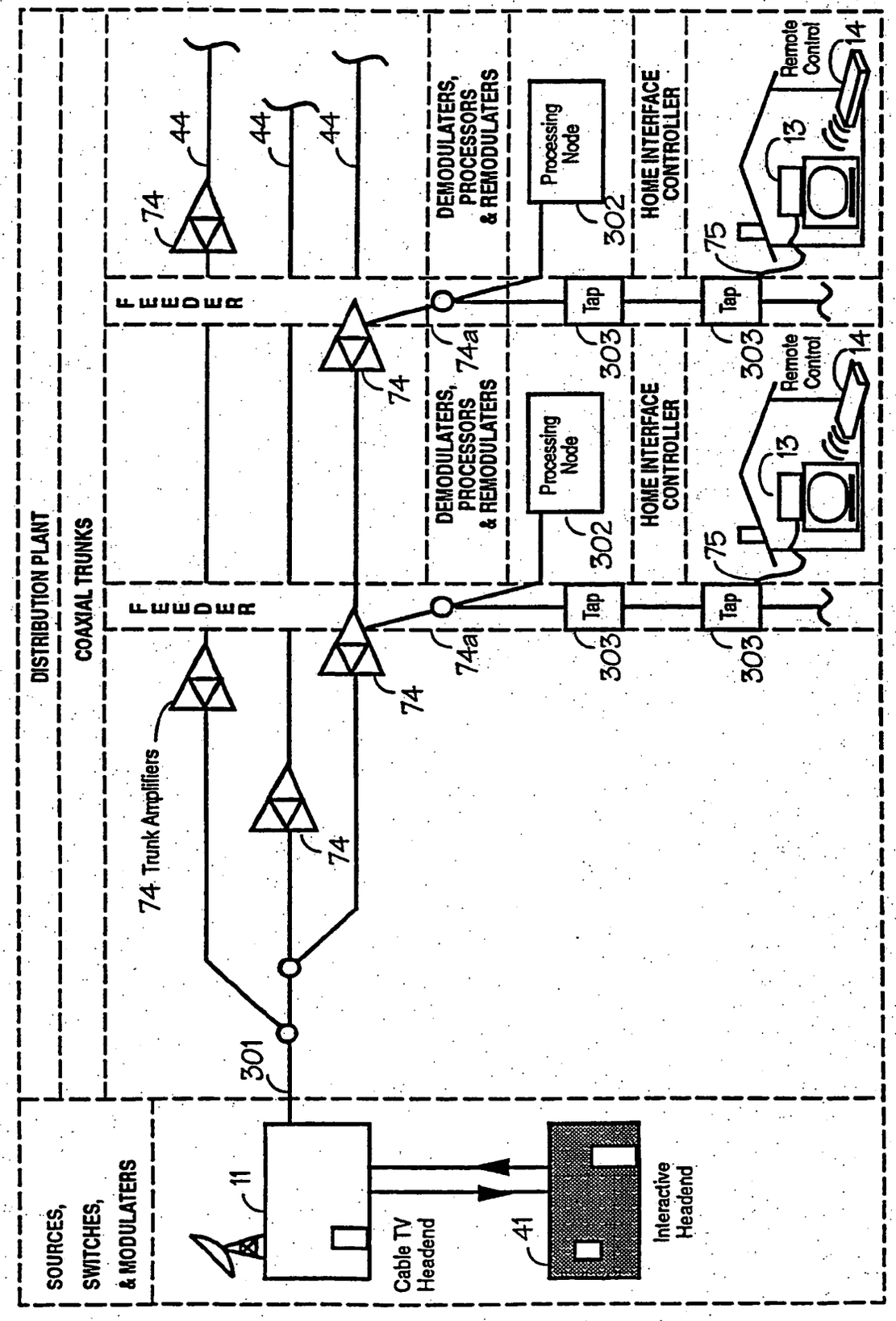

Fig. 30

SUBSTITUTE SHEET

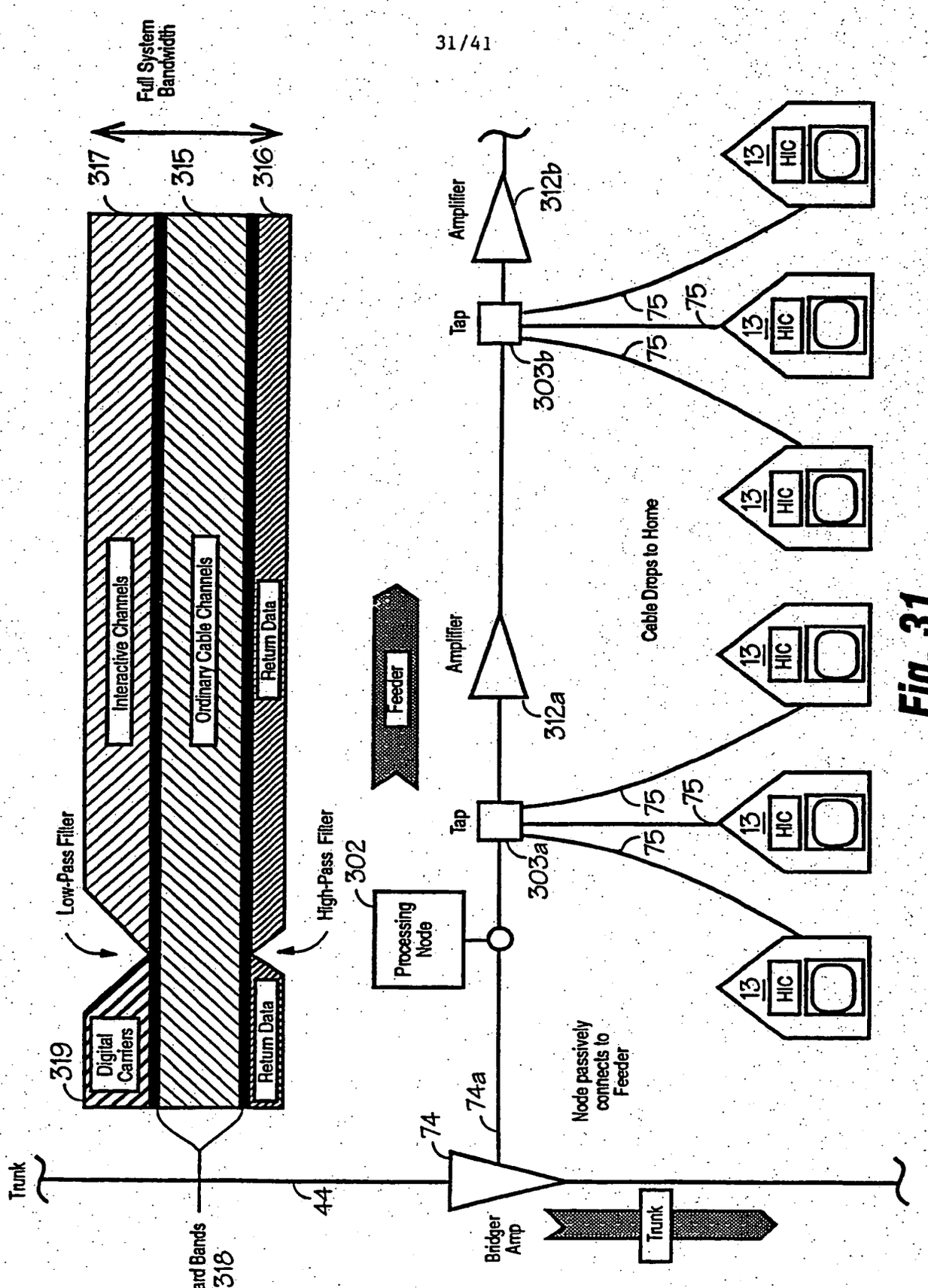

Fig. 31

SUBSTITUTE SHEET

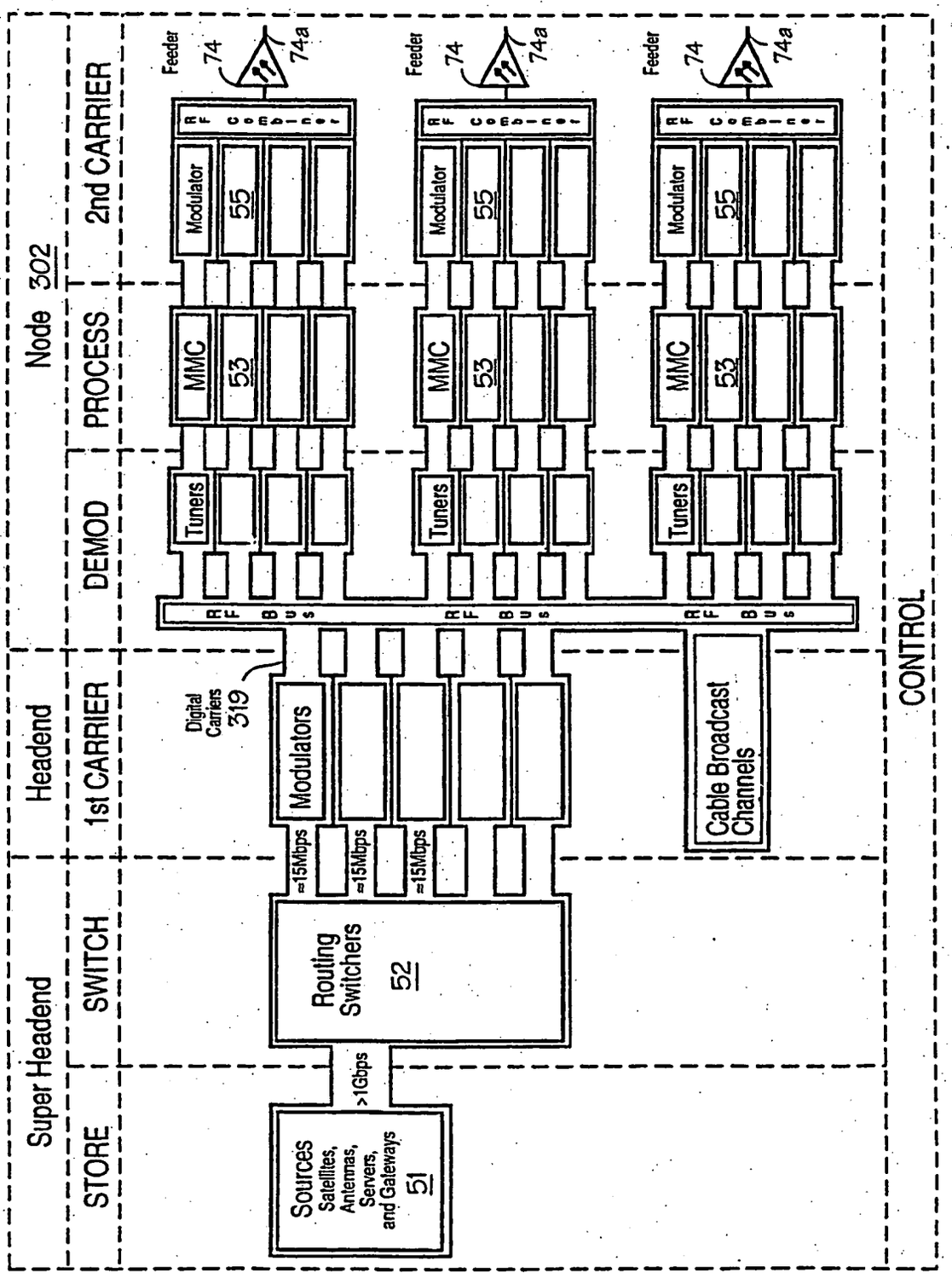

Fig. 32

SUBSTITUTE SHEET

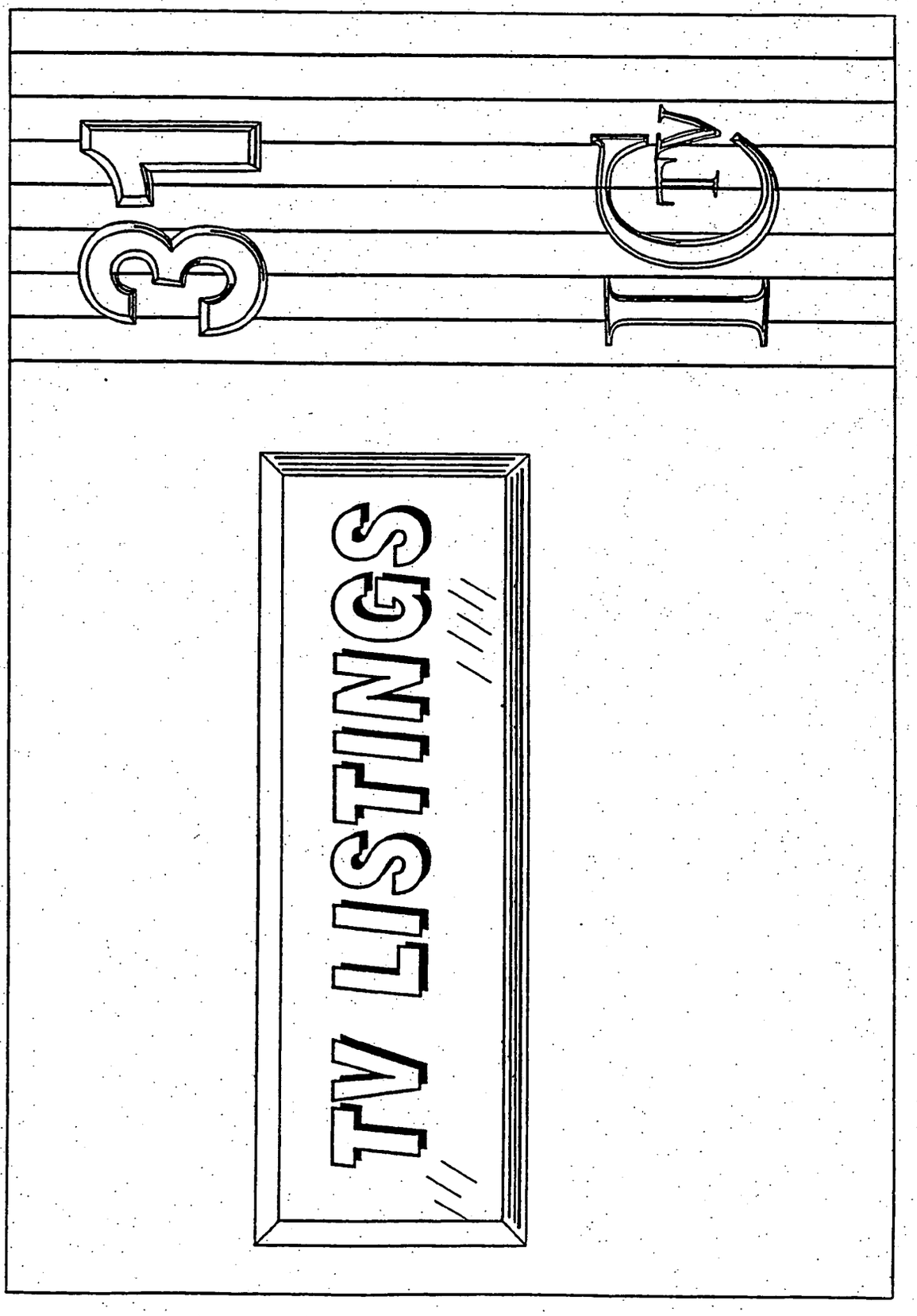

Fig. 33

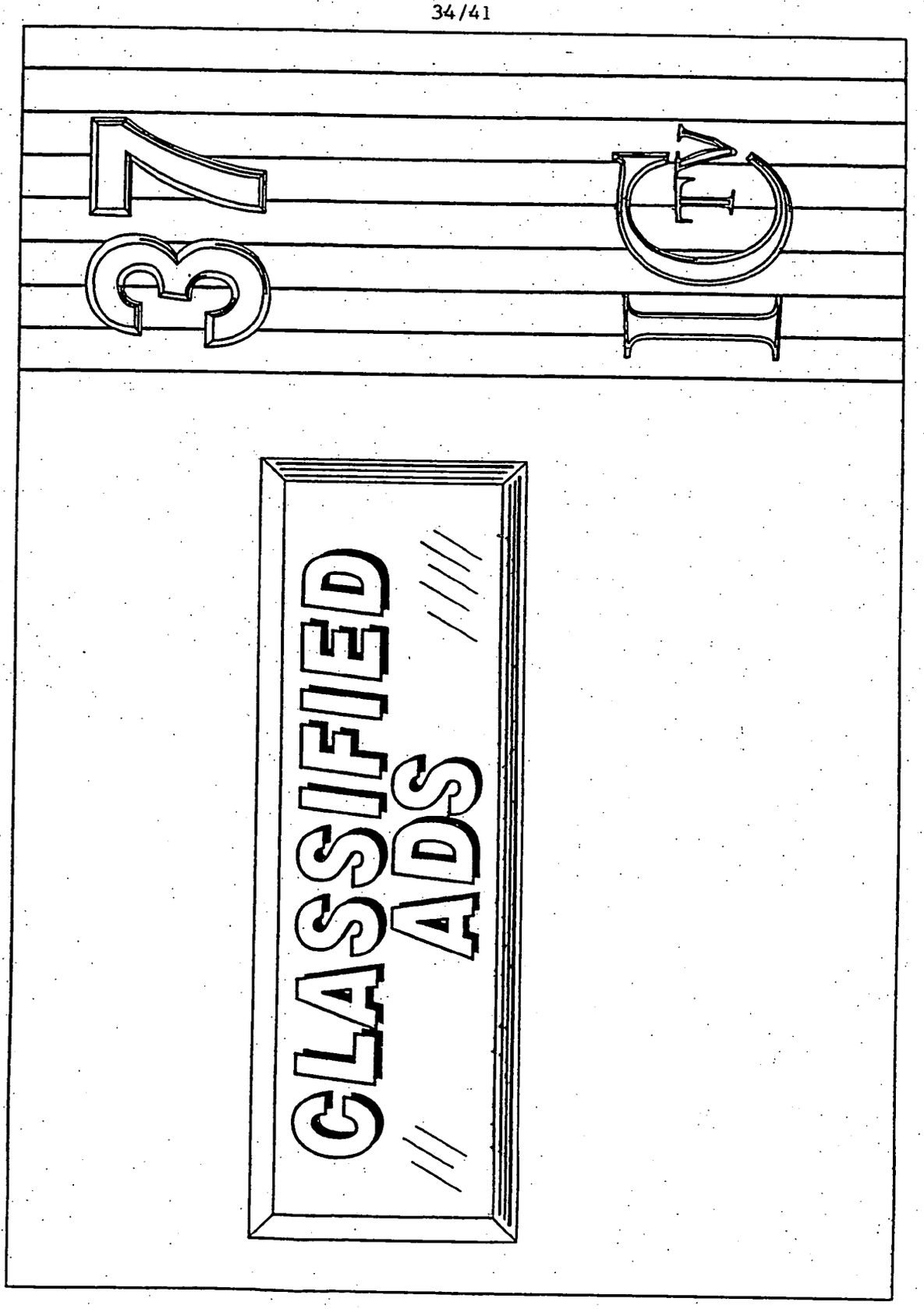

Fig. 34

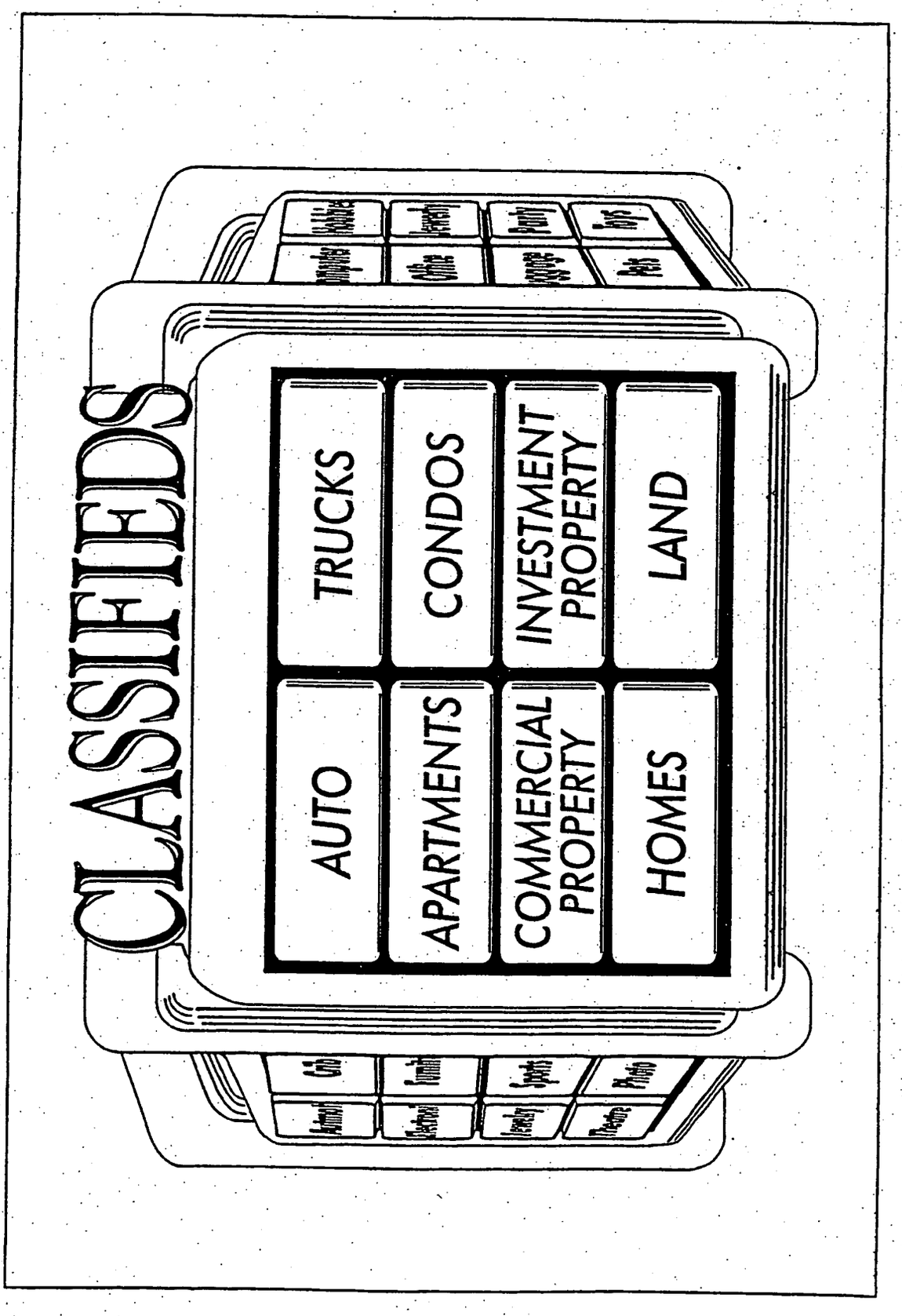
CLASSIFIEDS
TRUCKS
CONDOS
INVESTMENT PROPERTY
LAND
AUTO
APARTMENTS
COMMERCIAL PROPERTY
HOMES

Fig. 35

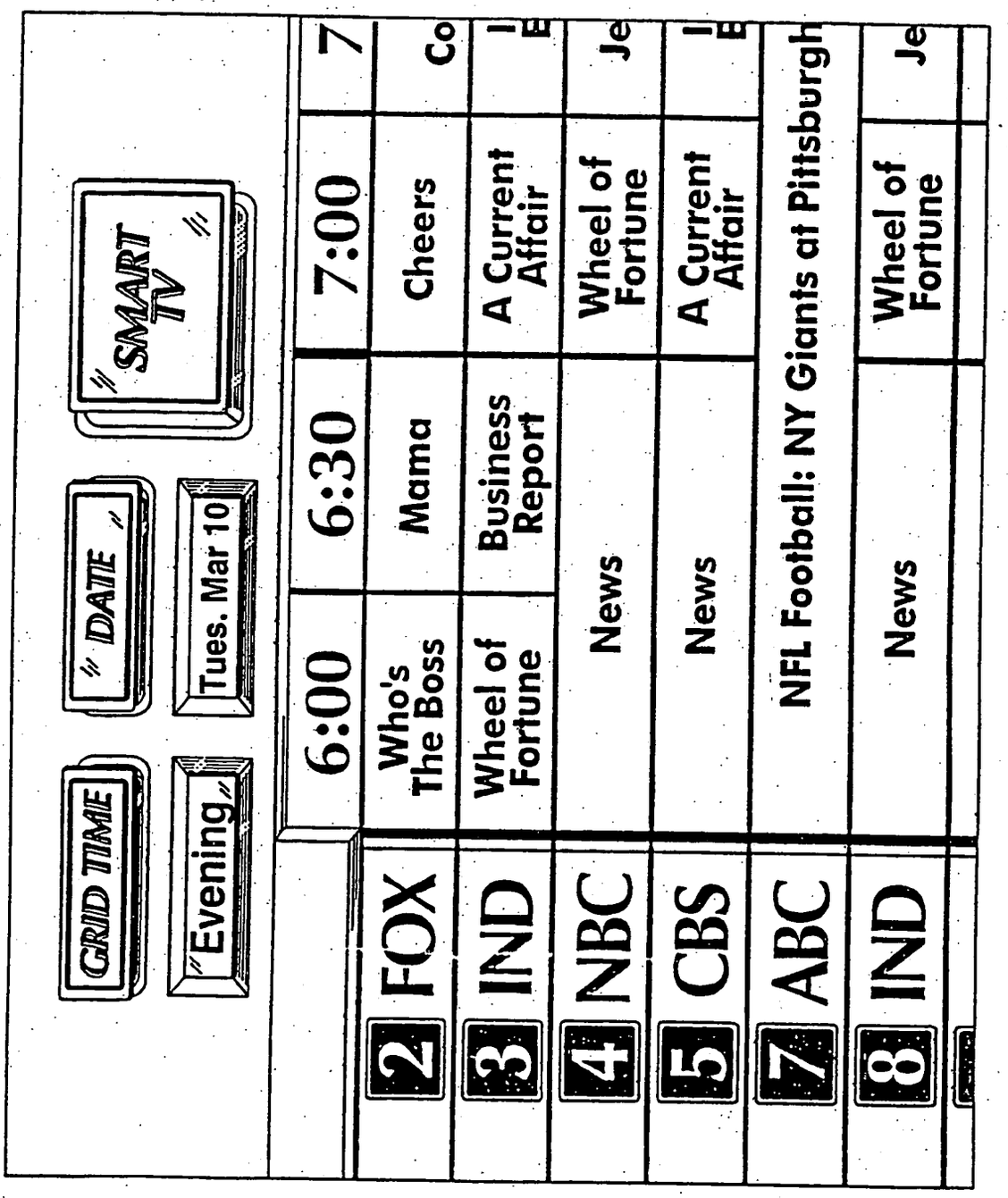

Fig. 36

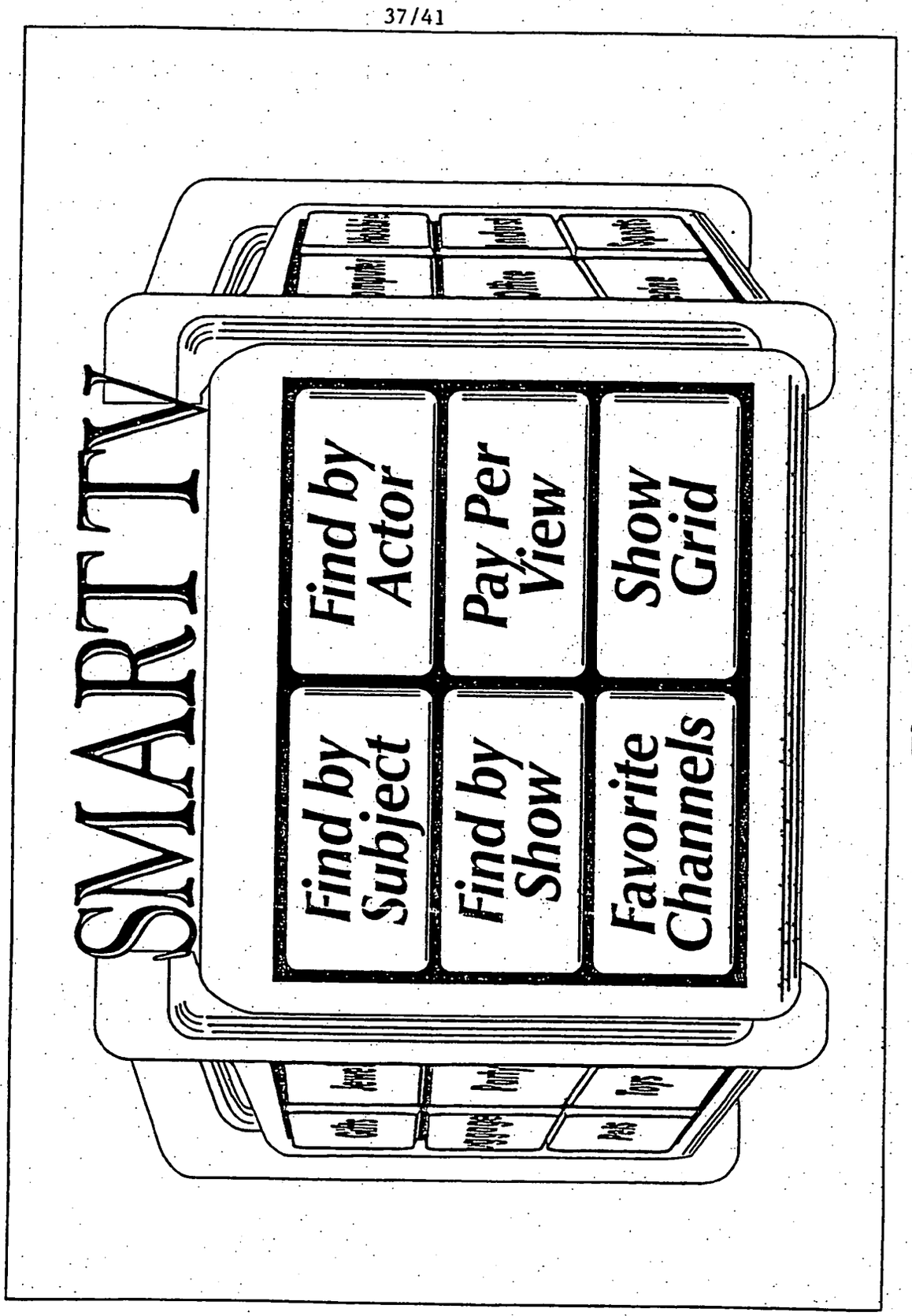
SMART TV
Find by Actor
Pay Per View
Show Grid
Find by Subject
Find by Show
Favorite Channels

Fig. 37

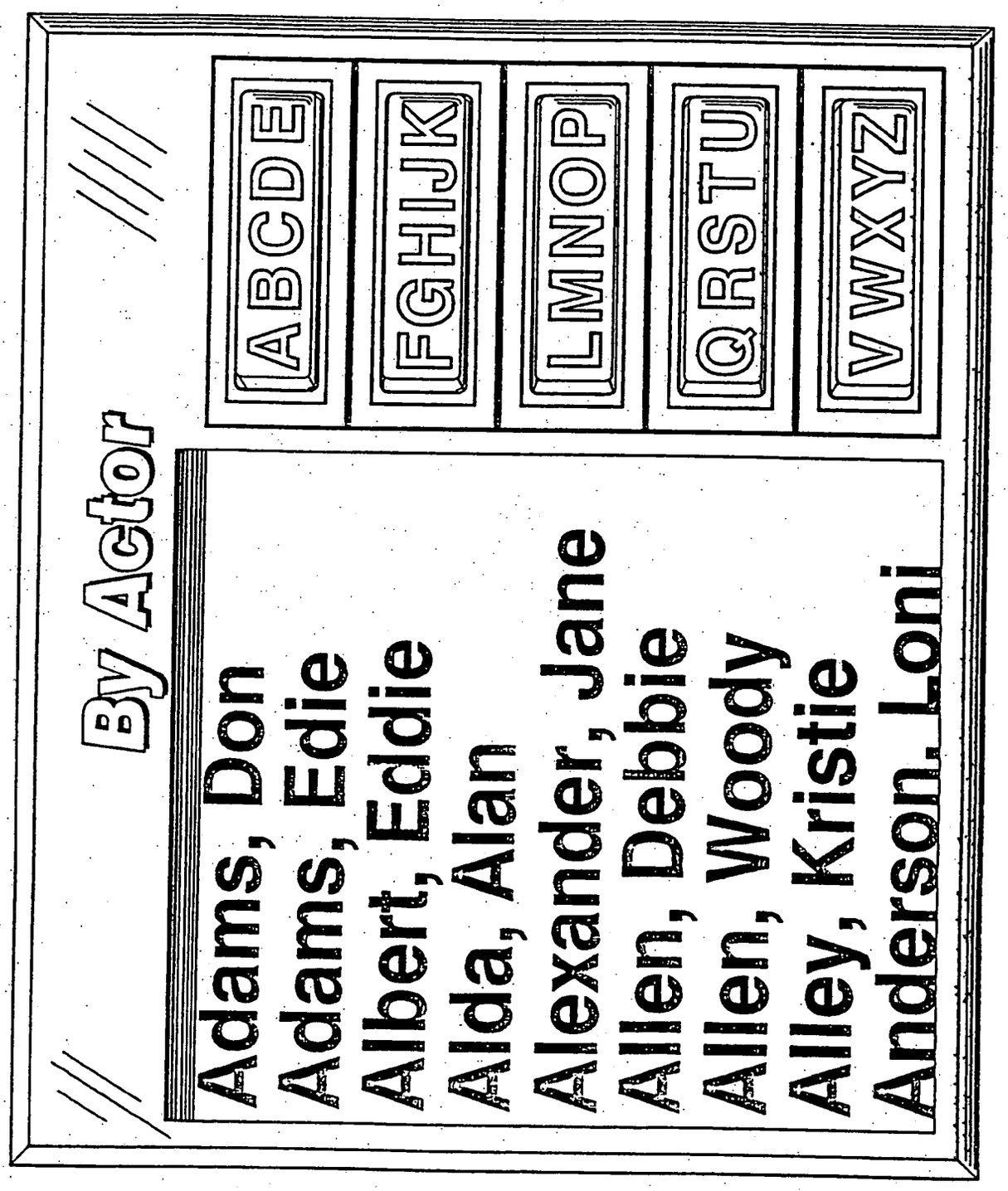
By Actor
ABCDE
FGHIJK
LMNOP
QRSTU
VWXYZ
Adams, Don
Adams, Edie
Albert, Eddie
Alda, Alan
Alexander, Jane
Allen, Debbie
Allen, Woody
Alley, Kristie
Anderson, Loni

Fig. 38

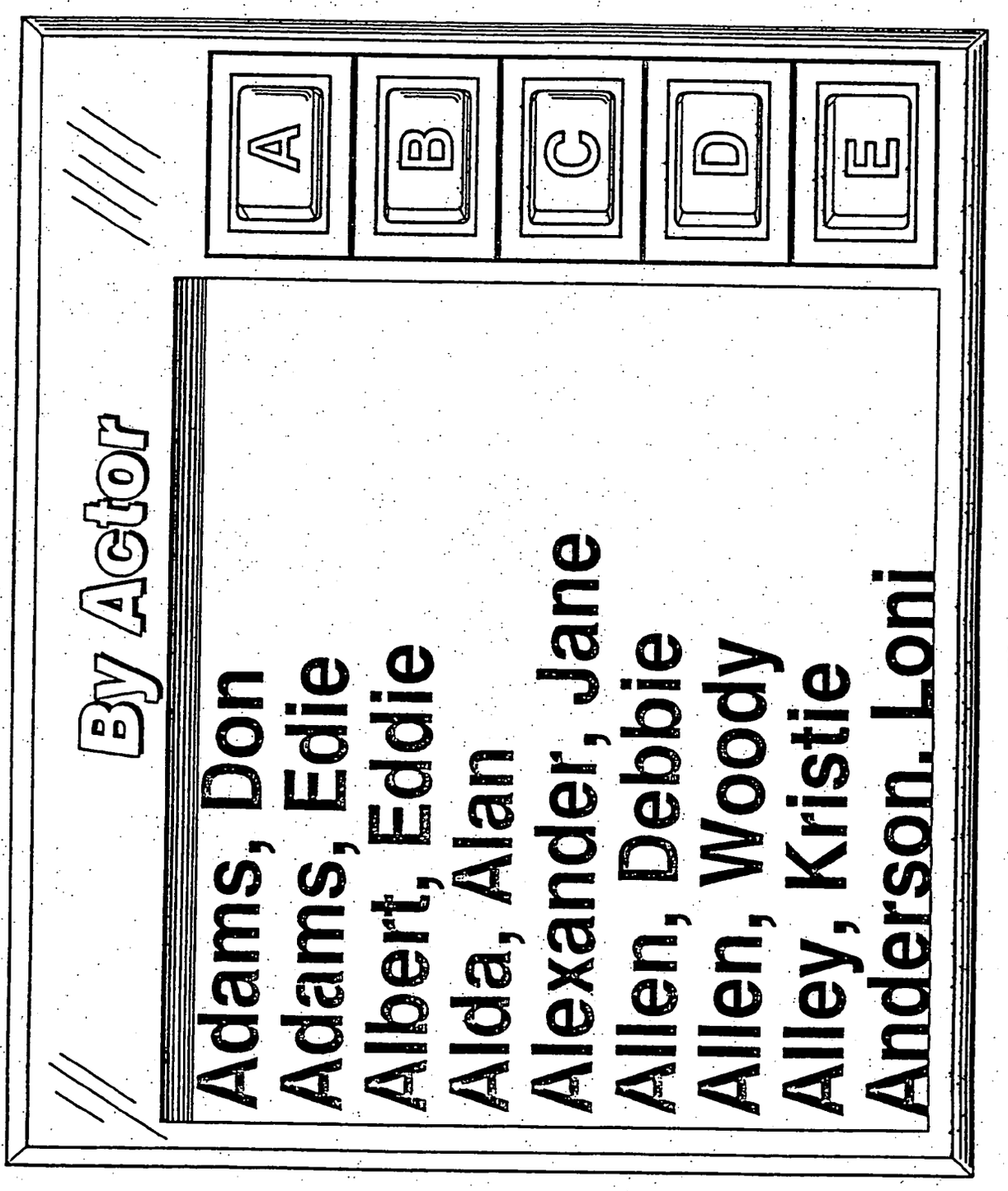
By Actor
A
B
C
D
E
Adams, Don
Adams, Edie
Albert, Eddie
Alda, Alan
Alexander, Jane
Allen, Debbie
Allen, Woody
Alley, Kristie
Anderson, Loni

Fig. 39

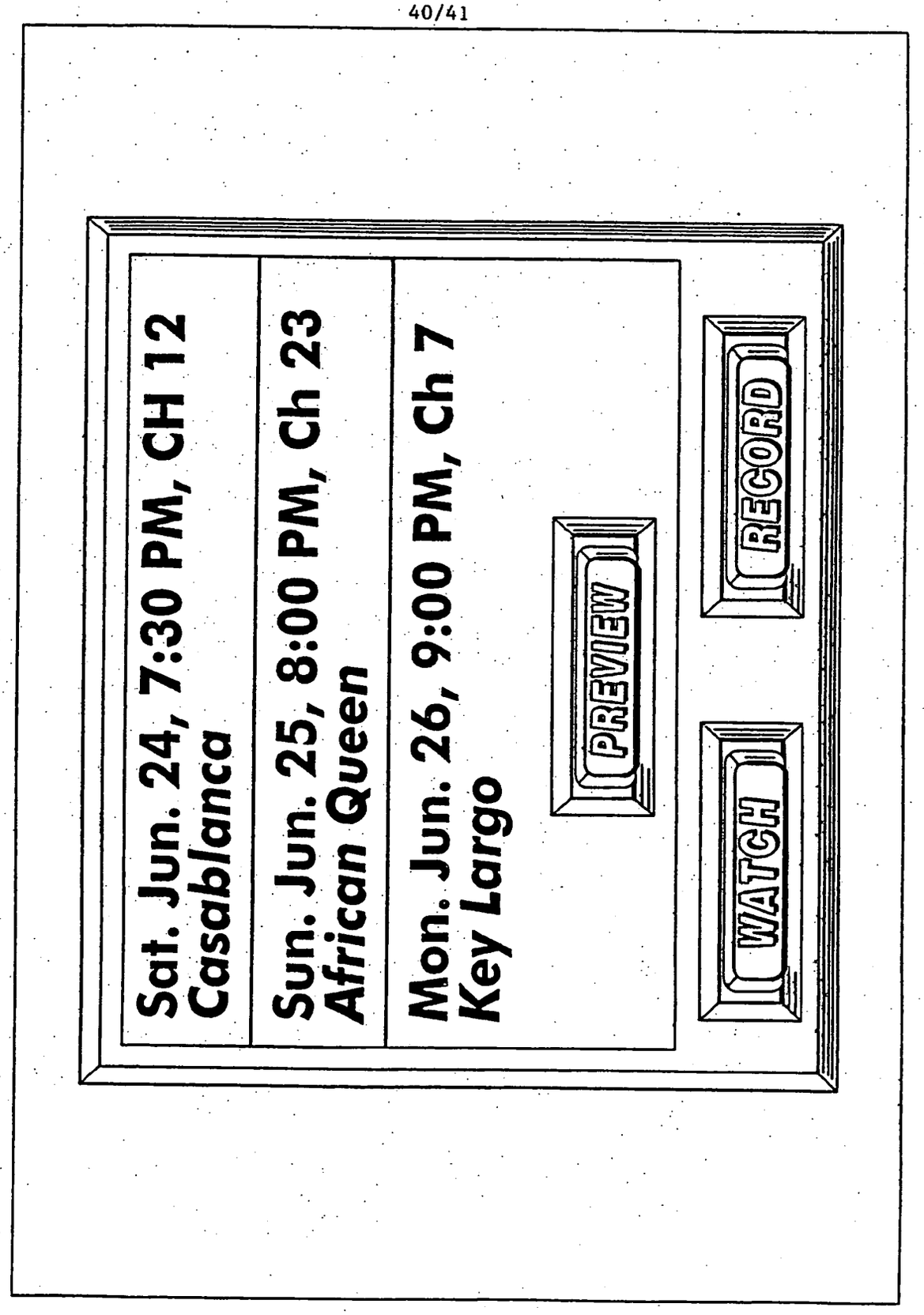
Sat. Jun. 24, 7:30 PM, CH 12
Casablanca
Sun. Jun. 25, 8:00 PM, Ch 23
African Queen
Mon. Jun. 26, 9:00 PM, Ch 7
Key Largo
PREVIEW
RECORD
WATCH

Fig. 40

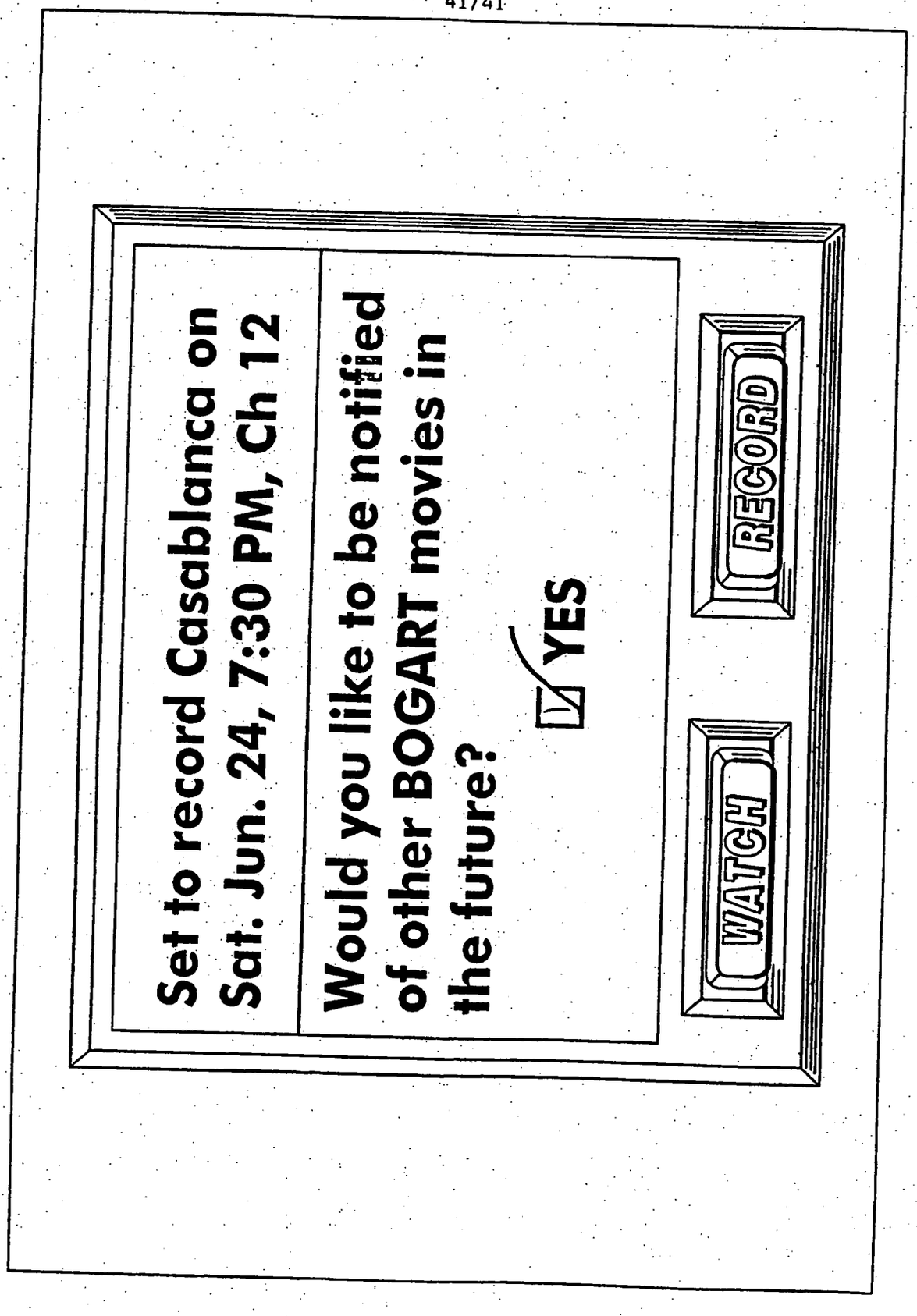
Set to record Casablanca on Sat. Jun. 24, 7:30 PM, Ch 12
Would you like to be notified of other BOGART movies in the future?
YES
RECORD
WATCH

Fig. 41

PCT WORLD INTELLECTUAL PROPERTY ORGANIZATION
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(72) Inventor: FREEMAN, Michael, J. ; ACTV, Inc., 1270 Avenue of the Americas, Suite 2401, Rockefeller Center, New York, NY 10020 (US).

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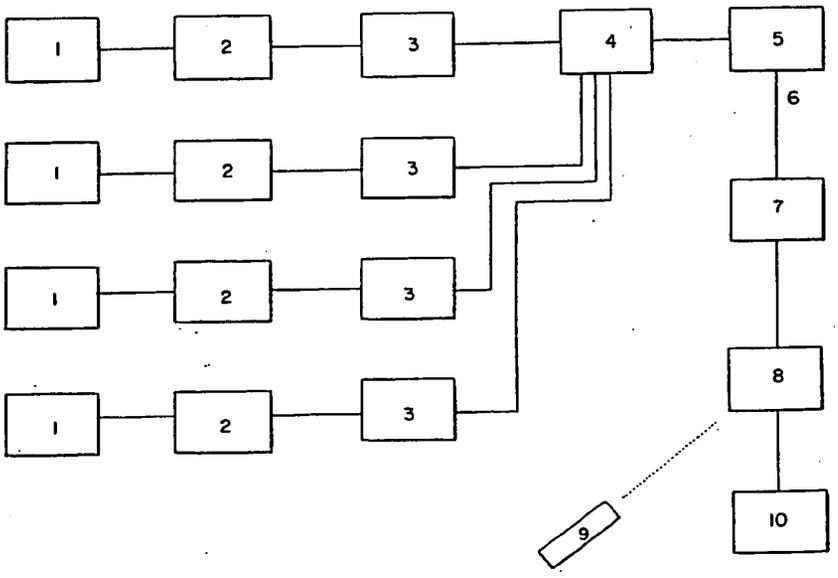
Published
With international search report.
With amended claims and statement.

(54) Title: COMPRESSED DIGITAL DATA INTERACTIVE TELEVISION SYSTEM

(57) Abstract

An interactive cable television system is disclosed which utilizes a standard television cable distribution network (6) for simultaneously providing a plurality of viewers with an interactive television program comprising a plurality of signals related in time and content. The video signals are transmitted in a digital format (2), more than one signal being multiplexed (4) into a data stream for transmission of multiple signals over a single channel. The digital video signals may be compressed (3) for transmitting more video signals per channel. A receiver (7), in conjunction with a signal selector (8), selects a particular NTSC channel for playback, then selects a particular video signal from the multiplexed signal, and uncompresses the video signal for playback to a television monitor (10). An alternative embodiment is disclosed wherein the various signals which comprise the interactive program are switched between at the head end rather than at the receiver. The multiple choice control unit (9) selects a desired signal by relaying the multiple choice selections of the user through a relay box back to a remotely located switching station (4). The switching station routes the correct video signal down the appropriate cable channel for the particular user.



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CM	Cameroon
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PL	Poland
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SK	Slovak Republic
SN	Senegal
SU	Soviet Union
TD	Chad
TG	Togo
UA	Ukraine
US	United States of America
VN	Viet Nam

COMPRESSED DIGITAL DATA INTERACTIVE TELEVISION SYSTEM

BACKGROUND OF THE INVENTION

1. Field of the Invention

The present invention relates generally to interactive response systems, and more particularly to an interactive television system which provides interactive programming using compressed, digital data having more than one video signal per broadcast channel, or a multiplexed signal within a digital format.

2. Description of the Prior Art

Interactive systems are well known in the art. By synchronizing parallel tracks of an information storage media, and relating the content of the various tracks, it was found that interactive activity could be simulated. For example, commonly owned Freeman, U.S. Patent No. 3,947,972 discloses the use of a time synchronized multi-track audio tape to store educational conversations. One track is employed to relay educational interrogatories to a user, and the remainder of the tracks, selectable by a switching mechanism, are used to convey responsive messages.

These systems progressed to interactive television, wherein multiple broadcast or cable channels were switched responsive to user selections to provide interactive operation. Commonly owned Freeman, U.S. Patent No. 4,847,700 discloses an interactive television system wherein a common video signal is synched to a plurality of audio channels to provide content related to user selectable responses.

Commonly owned Freeman, U.S. Patent No. 4,264,925 discloses the use of a conventional cable television system to develop an interactive system. Standard television channels with time synchronized content are broadcast to a plurality of users. Each user switches between channels responsive to interrogatories to provide interactivity.

These systems have been tailored to include memory functions so that the system can be more interactive, individually responsive, and so that customized messages may be given to the various categories of users responsive to informational queries. Freeman, U.S. Patent No. 4,602,279 discloses the use of a memory to store demographic profiles of television viewers. This information is stored to be recalled later for providing target specific advertising, for example.

These prior art interactive television systems were generally concerned with providing one signal (i.e. one video signal) per channel, whether the channel is on cable television, broadcast television, of VCR. Because cable and broadcast television channel capacity is becoming more limited as more and more cable channels are being utilized for conventional programming, and these systems require multiple channels, it would be desirable to reduce the channel capacity required for such systems while still providing at least the same level of interactivity. These disadvantages of the prior art are overcome by the present invention which provides an interactive television system which employs multiple, time-synchronized, content-related video signals per broadcast channel.

SUMMARY OF THE INVENTION

The present invention is an interactive cable television system which utilizes digital video signals to provide customized viewing responsive to user selections. A standard cable or direct broadcast satellite television distribution network is utilized for transmitting the interactive and other programming to users. The present invention allows plurality of viewers to be simultaneously provided with a plurality of different program information message signals related in time and content to each other. The interactive program comprises a plurality of video signals related in time and content to one another.

The video signals are converted into digital format for transmission. In a digital format, it is possible to transmit more than one video signal per cable television channel. Further, it is possible to transmit video signals via conventional telephone lines. If desired, the various digital video signals may be compressed before transmission. Compression allows an even larger number of video signal to be transmitted over a channel of the transmission media. A multiplexer combines the various digital signals into a reduced number of transmission data streams for transmission. The various NTSC television channels may be allocated in a predetermined fashion to maximize the number of simultaneously transmittable signals. The multiplexer in conjunction with the cable television transmission system multiplexes the desired video signals onto the desired channels, and transmits these signals over the NTSC channels. The number of video signals which may be multiplexed onto a single transmission channel will vary depending on the video signals to be transmitted. The television

channels containing multiplexed video signals are transmitted over a standard cable television distribution network, or direct broadcast satellite transmission system. A receiver receives the various television channels, some or all containing multiplexed or non-multiplexed digital video signals, and in conjunction with a signal selector, selects a particular channel for playback, then selects a particular video signal from the multiplexed signal, and finally expands the video signal, if necessary, for playback to a television monitor.

A multiple choice controller operates to control the receiver and signal selector to select a particular video signal for playback. The multiple choice controller may be programmed to map the different cable television channels, and the multiple signals thereon, to a serial numerical channel representation to simplify use by the user. The signal selector includes the necessary expansion apparatus corresponding with the compression scheme in use.

In practice, a user selects a desired interactive program to be viewed by selecting a cable or direct broadcast satellite television channel having multiplexed video thereon. using the multiple choice controller, the user selectably switches between the related video signals on the selected channel responsive to information displays or interrogatory messages, the signal selector de-multiplexing, expanding and displaying the selected signal.

If more signals were needed for an interactive program than were mappable to a single channel, the signal selector in conjunction with receiver may be programmed to switch between the various video signals as well as the various broadcast channels to provide the necessary level of interactivity.

The various information segments in the various video signals relate in real-time and content so that an interactive conversation can occur as the video signal is played back and the user responds to the various interrogatories on the video signals. The use of multiple signals per channel may be used for many types of interactive programs, including those disclosed in the previously mentioned U.S. Patents, for example, field synchronized multiple camera angles from a sporting event, or an interactive game show.

In a two-way embodiment, the various signals which comprise the interactive program are switched between at the head end rather than at the receiver. This embodiment may be used for example in a cable television system, a

direct broadcast satellite system, a conventional telephone system modified to receive digital video signals, or any other appropriate transmission system capable of sending digital video signals. The multiple choice control unit, rather than selecting a desired signal from the a group of incoming signals, selects a desired signal by relaying the multiple choice selections of the user through a relay box back to a remotely located switching station, preferably the cable television source. The multiple choice selections may be relayed to the switching station in any conventional means, such as two-way cable television, telephone, or FM transmission. If the interactive programming is being transmitted over a telephone line, the multiple choice selections may be relayed back over the same telephone line. The switching station receives the multiple choice selection of the user and routes the correct signal down the appropriate cable channel, telephone line, or other transmission media for the particular user. In such an arrangement, only a single link is required between the subscriber or receiver and the head end so that the one channel link can be used to receive a plurality of different channel selections dependent on the interactive choice relayed from the receiver to the video switch at the head end.

If desired, the two-way link may be used for other purposes, such as to transmit user demographic data back to the programming source for commercial reasons, or to allow an interactive game show player to win prizes, for example.

The system of the present invention allows improved performance by the compression algorithms in use. When a channel change has been requested by the user, a slight imperceptible delay is programmed to allow the expansion algorithm an opportunity to adjust to the rapid change from one video signal to another.

BRIEF DESCRIPTION OF THE DRAWINGS

FIGURE 1 is a block diagram of the Interactive Television System of the present invention.

FIGURE 2 is a block diagram of the system of the present invention in a two-way transmission configuration.

DESCRIPTION OF THE PREFERRED EMBODIMENT

The present invention is an interactive television system in which a plurality of viewers are simultaneously provided with a plurality of different program information message signals related in time and content to each other.

Preferably at a remote location from the viewer, a plurality of video signals 1 are provided, all related in time and content to one another. Video signals 1 may be, for example, various field and audio synchronized camera angles of a sporting event, or a game show having a content and host acting responsively to user selections. Alternatively, video signals 1 may be any video signals suitable for interactive conversation, such as those described in U.S. Patent Nos. 4,847,700, 3,947,972, 4,602,279, 4,264,925, 4,264,924, for example, the contents of which are incorporated specifically herein by reference. However, it is readily foreseen that various types of time and content related video signals exist which are suitable for interactive operation.

In previous systems, these various signals would be transmitted to a receiver on separate channels, each requiring for example, a separate 6 Mhz NTSC channel, assuming the system is an NTSC system although any type of television transmission, such as PAL, etc. may be employed if desired. By the present invention, video signals 1 are directed to analog-to-digital ("A/D") convertors 2 which convert the various video signals into digital format for transmission. A/D convertors 2 may be of any conventional type for converting analog signals to digital format. It is readily foreseen that an A/D convertor may not be needed for each video signal 1, but rather fewer convertors, or even a single convertor might be capable of digitizing the various video signals 1. It is further foreseen that interactive video programs might be delivered to a cable or other distribution network in pre-digitized and/or precompressed format. In a digital format, it is possible to transmit the various video signals over fewer transmission channels than if the video were in analog format.

The digital conversion results in very large amounts of data. It may therefore be desirable to reduce the amount of data to be sent, allowing thereby more signals to be sent over a single transmission channel. For example, a single frame of NTSC video represents over 350 Kbytes of data. Therefore, two hours of standard video is about 80 Gbytes. Since there are 30 frames/sec in such video, the data transfer rate is 22 Mbytes/sec. Such large amounts of data are difficult to process using current computer technology. However, it is foreseen that rapid advances in computerization will eventually permit reception of video at data rates sufficiently high to allow reception of uncompressed or expanded video in household systems.

In order to reduce the data transfer requirements, the various digital video signals may be compressed before transmission. The video may be compressed by any conventional compression algorithm, the two most common being "processor intensive" and "memory intensive."

The processor intensive approach performs compression by eliminating non-changing aspects of a picture from the processing in the frame-to-frame transfer of information, and through other manipulations of picture information involving mathematical computations that determine the degree to which a given motion or other in a picture is perceptible to the human eye. This approach depends on high-speed processing power at the transmission point.

The memory approach involves division of a picture frame into hundreds of minuscule blocks of pixels, where each block is given a code representing its set of colors and variations in luminance. The code, which is a much smaller increment of information than all the information that would describe a given block of the picture, is transmitted to the receiver. There, it calls up the identically coded block from a library of blocks stored in the memory of the receiver.

Thus, the bit stream represents a much smaller portion of the picture information in this approach. This system is generally limited by the variety of picture blocks which may be stored in the receiver, which relates directly to memory size and microprocessor power.

Data Compressors 3 are provided to reduce the data for each video signal which must be transmitted. Data compressors 3 may be of any conventional type commonly known in the art for compressing video images, such as those previously described. It is foreseen that compression of the various video signals might be done with fewer data compressors 3 than one compressor per video signal. In a conventional analog NTSC system, by way of example, it is possible to transmit one video signal per 6 MHZ channel. By digitizing the video signal, it is possible to send more than one video signal per channel. Compressing the digitized signals, allows even more video signals to be transmitted over a single transmission channel. The number of signals which may be sent over a single channel is generally related to, for example, a) the type of video being sent; b) the video compression scheme in use; and c) the current state-of-the-art in computer and memory power; and d) the bandwidth of the transmission channel.

Compression techniques exploit the fact that in moving images there is very little change from frame-to-frame. Editing out the redundancies between frames and coding just the changes allows much higher compression rates. The type of video which normally contains a great deal of high-speed movement, such as occurs at live sporting events, will, therefore, have the lowest compression rates. Movies, on the other hand, which normally have a lower frame rate and less frame-to-frame change than a line sporting event will achieve higher compression rates. Currently, compression can be varied from 2:1 to 10:1 for satellites, and 2:1 to 5:1 for cable television systems, depending on the degree of motion. However, it is readily foreseen that compression techniques will improve in the future to provide larger compression rates. It is further foreseeable that computer speeds may increase to a level of performance which will allow uncompressed or expanded video to be transmitted at more than one signal per channel.

Once the various video signals 1 have been digitized and compressed, multiplexer 4 combines the various digital signals into a reduced number of transmission data streams for transmission. For example, if 68 NTSC channels are available, and each channel is capable of transmitting either 4 digitized, compressed slow moving video signals (e.g. movies) or 2 digitized, compressed, high-speed video signals (e.g. sports) then the various NTSC channels must be allocated in a predetermined fashion to maximize the number of simultaneously transmittable signals. Multiplexer 4 receives the incoming compressed, digitized video signals and in a predetermined conventional fashion, in conjunction with transmitter 5, multiplexes the desired video signal onto the desired channels, and transmits these signals over the NTSC channels. It is readily foreseen that certain NTSC channels will contain only one video or other signal, in analog or digital form.

As indicated earlier, the number of video signals which may be multiplexed onto a single transmission channel will vary. The transmission data stream is transmitted by transmitter 4 via transmission media 6 to a receiving station 7. The transmitter 4, media 6, and receiver 7 may be any conventional means for transmitting digital video signals including broadcast television, cable television, direct broadcast satellite, fiber optic, or any other transmission means. The transmission means may even be a telephone system capable of transmitting a digital video data stream. Thus, a multiplexed data stream having several channels

may be sent directly to a user over a single telephone line. It is readily foreseen that the aforementioned digital transmission devices may include means for transmitting analog signals as well.

In a preferred embodiment, the digital transmission signal is preferably transmitted via cable television. Receiver 7, receives the various NTSC channels, some or all containing multiplexed or non-multiplexed digital video signals. Ordinarily, more than one channel will be transmitted by transmitter 5 and received by receiver 7 as in an ordinary cable television system. However, each of the different channels may have several digitized video signals thereon. Therefore, receiver 7 preferably operates in conjunction with signal selector 8 to select a particular NTSC channel for playback, to select a particular video signal from the multiplexed signa and finally to uncompress or expand the compressed video signal, if necessary for playback to monitor 10.

Multiple choice controller 9 operates to control receiver 7 and signal selector 8 to select a particular video signal for playback. In practice, a user need not know that multiple signals per channel are in use. If, for example, 68 channels with 4 signals-per-channel were in use, controller 9, in conjunction with receiver 7 and signal selector 8 might be programmed to represent these channels to the user as channels 1272. Output 10 is for example a conventional television. Signal selector 8 preferably includes a conventional de-multiplexer for selecting a particular signal from the channel currently being received by receiver 7. Signal selector 8 further includes the necessary un-compression or expansion apparatus corresponding with the compression scheme in use by compressors 3.

In practice, a user would select a desired interactive program to be viewed by selecting a cable television station or direct broadcast satellite station having multiplexed video thereon. Using multiple choice controller 9, the user selectably switches between the related video signals on the selected channel channels responsive to information displays or interrogatory messages, signal selector de-multiplexing, uncompressing or expanding and displaying the selected signal.

For example, an interactive sporting event program might be transmitted on a 6 MHZ cable television signal using a compression-multiplexing scheme which allows two sports channels to be transmitted over a single NTSC channel. It might be desired to have four video signals for the particular interactive sporting event. A

first video signal might contain the standard broadcast signal of the game; the second signal might contain a close-up view of the game action; a third signal might contain a continuously updated replay of game highlights; the fourth signal might contain statistical information. These four video signals might for example be multiplexed as follows: signals one and two multiplexed onto cable channel 34; signals three and four multiplexed onto cable channel 35. These four signals might, however, be mapped by controller 9 to playback as channels 78, 79, 80, and 81 for the user. Each video signal of this interactive program might then includes a label which reads, for example, "Full-Screen Action -- Press 78: Close-up Action --Press 79: Replay -- Press 80: Statistics -- Press 81."

As shown, if more signals were needed for an interactive program than were mappable to a single channel, signal selector 8 in conjunction with receiver 7 may be programmed to switch between the various video signals 1 as well as the various broadcast channels to provide the necessary level of interactivity.

The multiplexed interactive program might be transmitted over a single telephone line, if desired. In this embodiment, multiple choice controller 9 would be programmed to switch between the various video signals on the single telephone line. If additional channels were desired, a two-way configuration might be used as described below.

The system of the present invention may be utilized in an educational embodiment. Information is stored on each video signal in a plurality of reproducible information segments, each of which comprises a complete message reproducible by the receiver directly in response to the selection of the video signal by signal selector 8 responsive to a user selection on multiple choice controller 9. Each of the information segments in the various video signals 1 contain interrogatory messages with associated multiple choice responses, responsive messages, informational messages, or combinations thereof. The messages contained in the various video signals 1 may include responsive messages, informational messages, interrogatory messages or combination thereof whose contents are related in real-time to particular interrogatory messages, and correspond to the multiple choice selectable responses to the particular interrogatory messages.

The various information segments in the various video signals relate in real-time and content so that an interactive conversation can occur as the video signal is played back and the child responds to the various interrogatories contained in the video signals. As a child answers a particular interrogatory with a multiple choice response, the information in the video signal associated with the particular selection is played back by the signal selector 7. In the selected video signal at the time at which the selection occurred, is an information segment whose content corresponds with the selected response to the previous interrogatory, whether or not the interrogatory was in the same video signal as the information segment being output. The various interrogatories, responsive messages, and informational messages may generally be contained in any or all of the various video signals provided that they are synchronized properly so as to retain a timed relationship, and correspond properly a decision tree logic.

The use of multiple signals per channel may be used for many types of interactive programs, preferably those disclosed in the previously mentioned U.S. Patents. It is readily foreseen that other interactive programs may be developed which are within the scope of the present invention.

As shown in FIG. 2, the system of the present invention may be operated in a two-way configuration. In this mode, the various video signals 1 are processed as previously described, being digitized by A/D convertor 2 and compressed by video compressors 3. The signals are then routed to a central switching station 4. In this embodiment, the switching between the various video signals is accomplished at the head end rather than at the receiver. Multiple choice control unit 9 relays the multiple choice selections of the user through a relay box 7 back to the remotely located switching station 4. The multiple choice selections may be relayed by relay box 7 to the switching station via any conventional means, such as two-way cable television, telephone, or FM transmission, for example. Switching station 4 receives the multiple choice selection of the user and routes the desired signal to transmitter 5 which conventionally transmits the desired video signal down the appropriate cable channel for the particular user. If desired, transmitter 5 may also transfer conventional programming on the cable television channels not being used for interactive programming. Alternatively, switching station 4 may include multiplexing equipment as previously described, and thus operate multiple

interactive or noninteractive programs over a single television channel. However, a very large processing capability would be needed to operate in such a configuration.

For example, if it were desired to implement the interactive football game program as previously described, a single NTSC cable channel might be allocated for the program. However, in this instance, the four video signals would be present at the transmitting end. In response to a signal from wireless controller 9, a signal is sent by relay box 7 to the cable TV switching station which routes the desired video signal to the requesting viewer. Such a system requires very fast switching equipment, but is readily foreseeable using digital imagery.

Alternatively, it might be desirable to transmit the interactive sporting event over a single telephone line. When the user enters a selection on controller 9, a signal is sent via the telephone line to the central switching station which routes the desired signal of the interactive program over the user's telephone line so that a single link handles both the interactive choice being made at the receiver and the transmission of that choice, out of a plurality of choices, from the head end where the actual switching takes place in response to the interactive selection made at the receiver.

The two-way link between the user and the switching station may be used for other purposes. For example, demographic data may be transferred from the user to the broadcast network for commercial purposes, bills may be paid, a game show winner may be sent a prize, or other commercial or non-commercial purpose may be achieved.

As previously described, compression systems generally perform less efficiently when frame-to-frame content includes many changes in pixel content; i.e. during fast motion, or scenery changes. The system of the present invention may be advantageously programmed to ease the processing burden on the uncompression program. When a key on the controller is depressed to select a desired signal, a slight imperceptible delay might be effectuated if desired. This delay would allow the uncompression or expansion algorithm a short period of time to adjust to the rapid change from one video signal to another which ordinarily causes a degradation in its efficiency. Utilizing this delay, it may be possible to increase the number of signals which may be transmitted per channel.

Although the present invention has been described in detail with respect to certain embodiments and examples, variations and modifications exist which are within the scope of the present invention as defined in the following claims.

What is claimed is:

1. In an improved interactive television system having:

a plurality of television reception systems (7,10), each of said television reception systems (7,10) comprising a television receiver (7), each of said television receivers (7) having a plurality of different television reception channels, each of said television reception channels having a different communication frequency; and,

a television programming transmission means (5) for substantially simultaneously providing a multi-information television program signal to said television reception systems (7,10), said multi-information television program signal comprising a plurality of simultaneously provided different information signals (1) each related in real time and content to each other;

wherein the improvement comprises:

said information signals (1) being in a digital format, and

each of said plurality of information signals (1) having a communication frequency corresponding with one of said plurality of different television reception channels, more than one of said information signals (1) being capable of having the same communication frequency and being combined into a multiplexed program signal with at least one other of said more than one of said information signals (1), said more than one information signals (1) in the multiplexed program signal being substantially simultaneously transmittable;

any of said different television reception channels being capable of carrying a single information signal or a multiplexed program signal;

each of said television receivers (7) being capable of independently selectably receiving any of said plurality of information signals (1), each of said television receivers (7) comprising (i) a multichannel selection means (8) for selecting the television reception channel frequency to be received, and (ii) signal selection means (8) for selecting a particular information signal from the multiplexed program signal, each of said information signals (1) having a numerical channel representation in said multichannel selection means (8);

at least one of said information signals (1) further comprising video information displayable on said television receiver (7) corresponding to informational labels to be dynamically assigned to said numerical channel

representations for a particular multi-information television program, said television displayable informational labels being dynamically variable dependent on the content of said multi-information television program,

whereby flexible multi-information television programming may be provided with a reduced number of television channels.

2. An improved interactive cable television system according to claim 1 wherein said information signals (1) comprise a plurality of successive information segments, and at least a portion of said plurality of said information segments on said plurality of information signals (1) being content related in a decision tree relationship between successive individual segments and between information signals (1) whereby a stored accumulation program format may be received as said selectable multi-information television programming.

3. An improved interactive television according to claim 1 wherein said television programming transmission means (5) further comprising means for substantially simultaneously providing at least one regular broadcast television signal, having a communication frequency, to said television reception systems (7,10) on said frequency, said television receivers (7) being capable of receiving said at least one regular broadcast signal on a channel corresponding with said frequency.

4. An improved interactive television system according to claim 3 wherein said multiplexed program signal further comprises at least one regular broadcast television signal.

5. An improved interactive television system according to claim 1 wherein said television programming transmission means (5) provides said multi-information television program signal to said television reception system by means of a one way television signal distribution network (6).

6. An interactive television system having a plurality of television reception systems (7,10), each of said television reception systems (7,10) having a television receiver (7), each of said television receivers (7) having at least one television reception channel, each of said at least one television reception channels having a different communication frequency,

a television distribution network (6) for distributing television programming to said plurality of television reception systems, and

a television transmission means (5) operatively connected to said distribution network (6) for providing said television programming to said plurality of television reception systems (7,10), said television transmission means (5) for providing a multi-information television program signal as said television programming to said television reception systems, said interactive television system comprising:

multiplexing means (4), coupled to said transmission means (5), for providing a multiplexed multi-information television program signal;

digitizing means (2), coupled to said multiplexing means (4), for digitizing a plurality of multi-information segments, each multi-information segment comprising a plurality of simultaneously provided different information signals (1) related in real time and content to each other, multiplexed (4) at a communication frequency so as to become said multiplexed multi-information television program signal which may be substantially simultaneously reproducible;

each of said television receivers (7) being capable of independently selectably receiving information on any one of said at least one television reception channel dependent on the television reception channel selected;

said television reception systems further comprising a multi-information selection means (8,9) coupled between said distribution network (6) and said television receiver (7), said multi-information selection means (8,9) comprising signal selection means (8) coupled to said subscriber distribution network (6) for demultiplexing said multiplexed multi-information television program signal and selectively providing an output signal comprising only one of said related different information signals (1) for regenerating said output signal on said television receiver (7,10) in said one television reception system;

whereby viewers in said television system may independently selectably view any of said simultaneously provided different information signals, said multi-information television programming being received on a multiplexed reception channel.

7. An interactive television system according to claim 6 wherein said television programming further comprises a plurality of different regular television program signals along with said multiplexed multi-information television program signal, each of said different regular television program signals having a

communication frequency, more than one of said regular television program signals being capable of having the same communication frequency, each of said different regular television program signals being capable of being multiplexed with said at least a portion of said information signals (1), each of said different regular television program signals being directly selectably receivable by said signal selection means (8) and displayable on a corresponding television reception channel.

8. An interactive television system according to claim 6 wherein said distribution network (6) being selected from the group consisting of cable television, telephone, broadcast television, and direct broadcast satellite.

9. An interactive television system according to claim 6 wherein said selection means (8,9) comprises keyboard means (9) comprising a plurality of keys for selectably enabling converting of any one of said associated frequencies of said simultaneously provided different information signals (1) into said television reception channel associated frequencies dependent on the key selected.

10. An interactive television system according to claim 9 wherein said multi-information segments comprise video information displayable on said television receiver (7) corresponding to information labels to be dynamically assigned to said keys for a particular multi-information segment, said television displayable information labels being dynamically variable dependent on the content of said particular multi-informational segment.

11. An interactive television system according to claims 6 or 10 wherein at least a portion of said plurality of said information segments on said plurality of information signals (1) being content related in a decision tree relationship between successive individual segments and between information signals (1) whereby a stored accumulation program format may be received as said selectable multi-information television programming.

12. An interactive television system according to claim 6 wherein at least at least two of said simultaneously provided different information signals (1) comprise different field synchronized camera angles of the same event.

13. In an improved interactive television system having a plurality of television reception systems, each of said television reception systems comprising a television receiver (7), each of said television receivers (7) having a plurality of

different television reception channels, each of said television reception channels having a different communication frequency;

a television distribution network (6) for distributing television programming to said plurality of television reception systems; and

a television transmission means (5) operatively connected to said distribution network (6) for providing television programming to said plurality of television reception systems (7,10), said television programming transmission means (5) having means for substantially simultaneously providing a multi-information television program signal as said television programming to said television reception systems;

said multi-information television program signal comprising a plurality of simultaneously provided different information signals (1) related in real time and content to each other;

wherein the improvement comprises:

digitizing means (2), for digitizing said plurality of simultaneously provided different information signals (1);

switching means (4), coupled between said digitizing means and said transmission means (5), for selecting one of said plurality of simultaneously provided different information signals (1) responsive to a control signal corresponding to a particular television receiver for transmitting said selected signal to said particular television receiver, said control signal being received over a transmission media;

each of said television receivers (7) being capable of independently selectably receiving any of said plurality of information signals (1) dependent on the television reception channel selected,

each of said television receivers (7) comprising a selection means (8) for selecting the television reception channel associated frequency to be received, and

signal selection means (7,8) for generating and transmitting said control signal to said distribution network (6) for signalling said switching means (4) to transmit a particular information signal from said plurality of information signals (1) to said television receiver (7),

whereby flexible multi-information television programming may be provided with a reduced number of television channels.

14. An improved interactive television system according to claim 13 wherein said information signals (1) comprise a plurality of successive information segments, and at least a portion of said plurality of said information segments on said plurality of information signals (1) being content related in a decision tree relationship between successive individual segments and between information signals (1) whereby a stored accumulation program format may be received as said selectable multi-information television programming.

15. An improved interactive television according to claim 13 wherein said transmitted television programming further comprises at least one regular broadcast television signal having a communication frequency, said television programming transmission means (5) further comprising means for substantially simultaneously providing said at least one regular broadcast television signal to said distribution network (6) on said communication frequency, said television receivers (7) being capable of receiving said at least one regular broadcast signal on a channel corresponding with said frequency.

16. An improved interactive television system according to claim 13 wherein said distribution network (6) being selected from the group consisting of two-way cable television, two-way telephone, and two-way direct broadcast satellite.

17. An improved interactive television system according to claim 13 wherein said control signal transmission media being selected from the group consisting of telephone, cable television, FM transmission, and fiber-optic.

18. An improved interactive television system according to claims 13 or 14 wherein each of said information signals (1) having a numerical channel representation in said multichannel selection means;

at least one of said information signals (1) further comprising video information displayable on said multichannel television receiver (7) corresponding to informational labels to be dynamically assigned to said numerical channel representations for a particular multi-information television program, said television displayable informational labels being dynamically variable dependent on the content of a said multi-information television program.

19. An improved interactive television system according to claims 2, 11 or 14 wherein said displayable informational labels dynamically vary according to the successive decision tree selections to be made.

20. An improved interactive television system according to claims 1, 6 or 13 further comprising means (3), coupled to said transmission means, for compressing said digital information signals (1).

AMENDED CLAIMS

[received by the International Bureau on 23 April 1993(23.04.93); original claim 19 amended; other claims unchanged (1 page)]

14. An improved interactive television system according to claim 13 wherein said information signals (1) comprise a plurality of successive information segments, and at least a portion of said plurality of said information segments on said plurality of information signals (1) being content related in a decision tree relationship between successive individual segments and between information signals (1) whereby a stored accumulation program format may be received as said selectable multi-information television programming.

15. An improved interactive television according to claim 13 wherein said transmitted television programming further comprises at least one regular broadcast television signal having a communication frequency, said television programming transmission means (5) further comprising means for substantially simultaneously providing said at least one regular broadcast television signal to said distribution network (6) on said communication frequency, said television receivers (7) being capable of receiving said at least one regular broadcast signal on a channel corresponding with said frequency.

16. An improved interactive television system according to claim 13 wherein said distribution network (6) being selected from the group consisting of two-way cable television, two-way telephone, and two-way direct broadcast satellite.

17. An improved interactive television system according to claim 13 wherein said control signal transmission media being selected from the group consisting of telephone, cable television, FM transmission, and fiber-optic.

18. An improved interactive television system according to claims 13 or 14 wherein each of said information signals (1) having a numerical channel representation in said multichannel selection means;

at least one of said information signals (1) further comprising video information displayable on said multichannel television receiver (7) corresponding to informational labels to be dynamically assigned to said numerical channel representations for a particular multi-information television program, said television displayable informational labels being dynamically variable dependent on the content of a said multi-information television program.

19. An improved interactive television system according to claim 2 or 14 wherein said displayable informational labels dynamically vary according to the successive decision tree selections to be made.

STATEMENT UNDER ARTICLE 19

Claim 19 has been amended in response to "Box I" of the International Search Report. "Box I" stated that claim 19 was not drafted in accordance with the second and third sentence of Rule 6.4(a). As originally filed, Claim 19, a multiple dependent claim, depended from claim 11 another multiple dependent claim. Claim 19 has been amended so that it no longer depends from claim 11. Applicant apologizes for any inconvenience this error may have caused.

Applicant requests acceptance of claim 19 and that the International Search Report be "established in respect of claim 19."

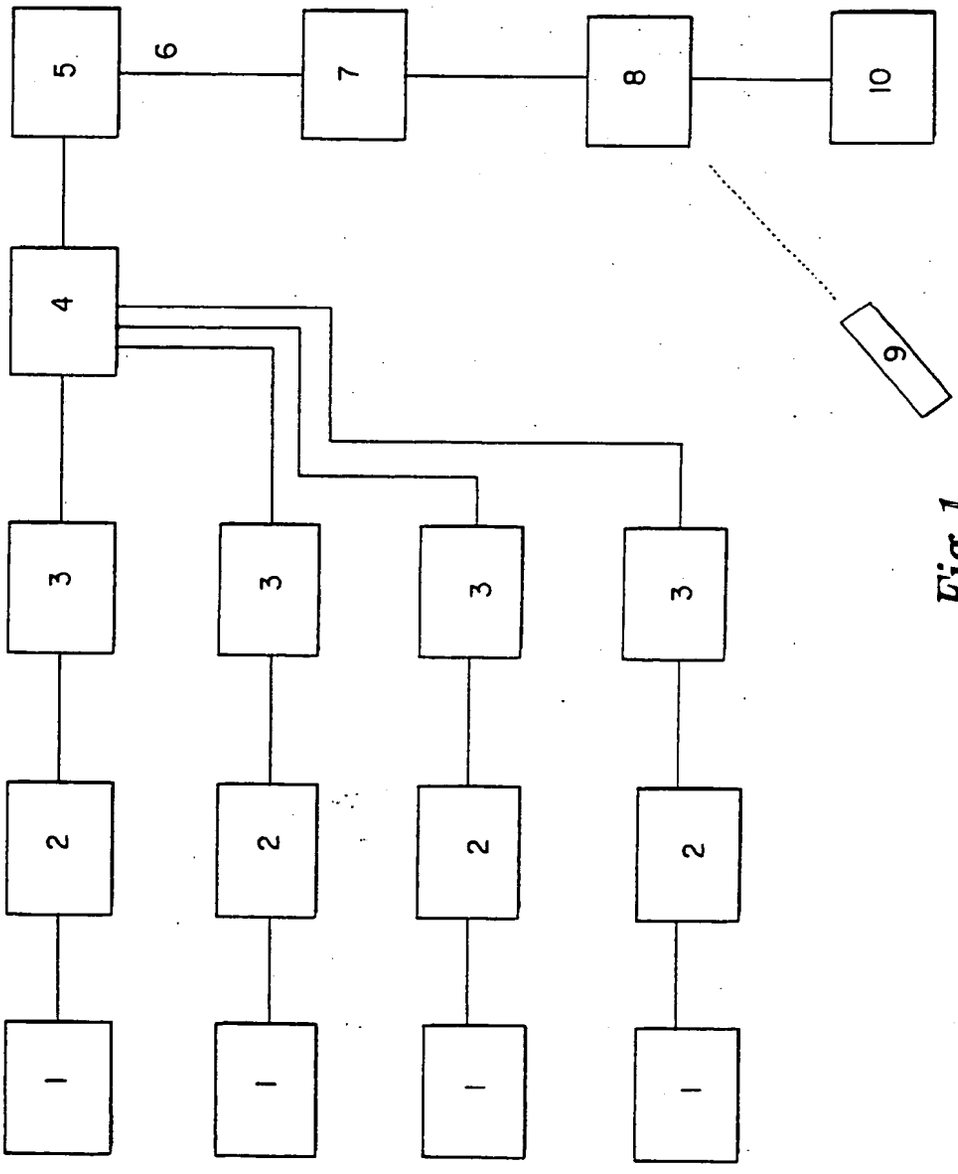

Fig. 1

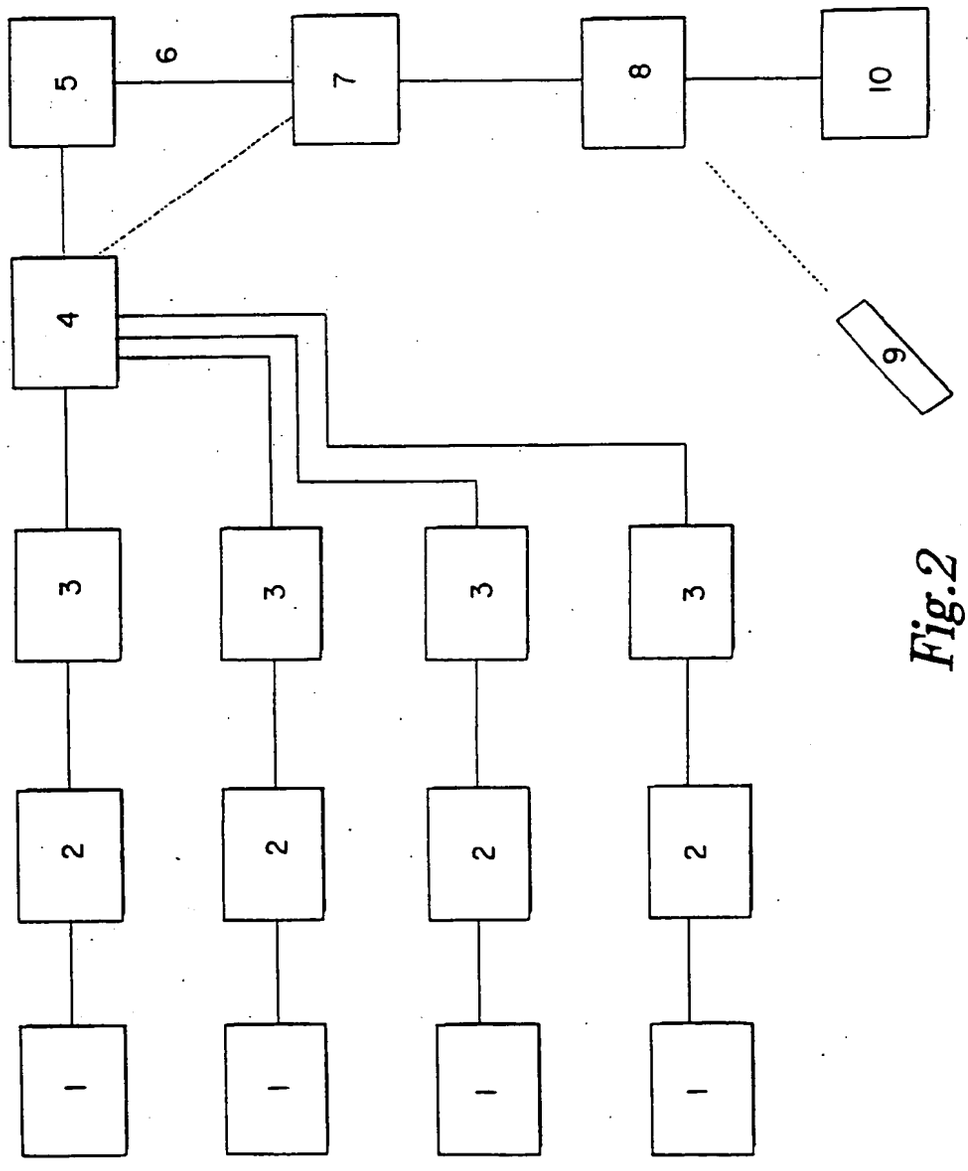

Fig.2

INTERNATIONAL SEARCH REPORT

PCT/US92/09785

A. CLASSIFICATION OF SUBJECT MATTER

IPC(5) :H04H 1/00
US CL :358/86; 455/3.1
According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

U.S. : 455/4.1,4.2,5.1,6.1,6.2,6.3

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	US, A, 4,264,925 (FREEMAN ET AL.) 28 April 1981, See columns 2-3, fig. 1.	1-18,20
Y	US, A, 4,975,771 (KASSATLY) 04 December 1990, See columns 2-8, figs. 1,3,6,8.	1-18,20
A,P	US, A, 5,133,079 (BALLANTYNE ET AL.) 21 July 1992, See columns, 1-4, fig. 1B.	1-18,20
A	US, A, 4,264,924 (FREEMAN) 28 April 1981, See columns 2-6, fig. 1.	1-18,20
A,P	US, A, 5,132,992 (YURT ET AL.) 21 July 1992, See columns 1-3, fig. 2A.	1-18,20

☐ Further documents are listed in the continuation of Box C. ☐ See patent family annex.

*	Special categories of cited documents:	"T"	later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
"A"	document defining the general state of the art which is not considered to be part of particular relevance	"X"	document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
"E"	earlier document published on or after the international filing date	"Y"	document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art
"L"	document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)	"&"	document member of the same patent family
"O"	document referring to an oral disclosure, use, exhibition or other means		
"P"	document published prior to the international filing date but later than the priority date claimed		

Date of the actual completion of the international search	Date of mailing of the international search report
07 JANUARY 1993	25 FEB 1993

Name and mailing address of the ISA/US	Authorized officer
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3/18/04

PATENT
Docket No. 559442600201

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Date: March 11, 2004

Lynn A. Lacyk

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In the application of:

Craig ULLMAN et al.

Serial No.: 10/299,335

Filing Date: November 18, 2002

For: ENHANCED VIDEO PROGRAMMING SYSTEM AND METHOD FOR INCORPORATING AND DISPLAYING RETRIEVED INTEGRATED INTERNET INFORMATION SEGMENTS

Examiner: Andrew I. Faile

Group Art Unit: 2611

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SUPPLEMENTAL INFORMATION DISCLOSURE STATEMENT UNDER 37 C.F.R. § 1.97

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Sir:

Pursuant to 37 C.F.R. § 1.97 and § 1.98, Applicants submit for consideration in the above-identified application the documents listed on the attached Form PTO-1449. Copies of the documents are also submitted herewith. The Examiner is requested to make these documents of record.

This Supplemental Information Disclosure Statement being submitted within three months of the application filing date or prior to the mailing of a first Office Action on the merits; accordingly, no fee or separate requirements are required.

Applicants would appreciate the Examiner initialing and returning the Form PTO-1449, indicating that the information has been considered and made of record herein.

The information contained in this Supplemental Information Disclosure Statement under 37 C.F.R. § 1.97 is not to be construed as a representation that: (i) a complete search has been made; (ii) additional information material to the examination of this application does not exist; (iii) the information, protocols, results and the like reported by third parties are accurate or enabling; or (iv) the above information constitutes prior art to the subject invention.

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Dated: March 11, 2004

Respectfully submitted,

By: _____

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PTO/SB/08 (2-92)
Sheet 1 of 1

Form PTO-1449

INFORMATION DISCLOSURE CITATION IN AN APPLICATION

(Use several sheets if necessary)

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Applicant: Craig D. ULLMAN et al.	
Filing Date November 18, 2002	Group Art Unit 2611
Mailing Date March 11, 2004	

U.S. PATENT DOCUMENTS

Examiner Initials	Ref. No.	Date	Document No.	Name	Class	Subclass	Filing Date If Appropriate
	1.	6/2/1998	5,761,606	WOLZIEN			
	2.	6/30/1998	5,774,664	HIDARY et al.			
	3.	7/7/1998	5,778,181	HIDARY et al.			

FOREIGN PATENT DOCUMENTS

Examiner Initials	Ref. No.	Date	Document No.	Country	Class	Subclass	Translation YES	Translation NO
	4.	6/22/2000	WO 00/36886	WIPO			N/A	
	5.	07/13/1993	05176306	JAPAN			Abstract only	
	6.	03/08/1995	0 673 164A1	EUROPE			N/A	
	7.	04/15/1993	WO 93/07713	WIPO			N/A	
	8.	01/23/1997	WO 97/02699	WIPO			N/A	
	9.	02/05/1997	EP 0 757 485A2	EUROPE			N/A	
	10.	03/31/1999	EP 0 757 485A3	EUROPE			N/A	
	11.	07/11/1984	GB 2 132 856	GREAT BRITAIN			N/A	
	12.	06/19/1997	WO 97 22207	WIPO			N/A	

OTHER DOCUMENTS

(including author, title, Date, Pertinent Pages, Etc

Examiner Initials	Ref. No.	Title

EXAMINER:

DATE CONSIDERED:

EXAMINER: Initial if citation considered, whether or not the citation conforms with MPEP 609. Draw a line through the citation if not in conformance and not considered. Include a copy of this form with next communication to applicant.

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PTO/SB/21 (08-00)
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TRANSMITTAL FORM

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First Named Inventor	Craig ULLMAN et al.
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Examiner Name	Andrew I. FAILE
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ENCLOSURES (check all that apply)

- [ ] Fee Transmittal Form
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- [ ] Amendment / Reply
  - [ ] After Final
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- [x] Other Enclosure(s) *(please identify below)*:

  1. **PTO Form 1449;**
  2. **12 references.**

Remarks

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Lynn A. Lacyk

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Patent Abstracts of Japan

PUBLICATION NUMBER : 05176306
PUBLICATION DATE : 13-07-93

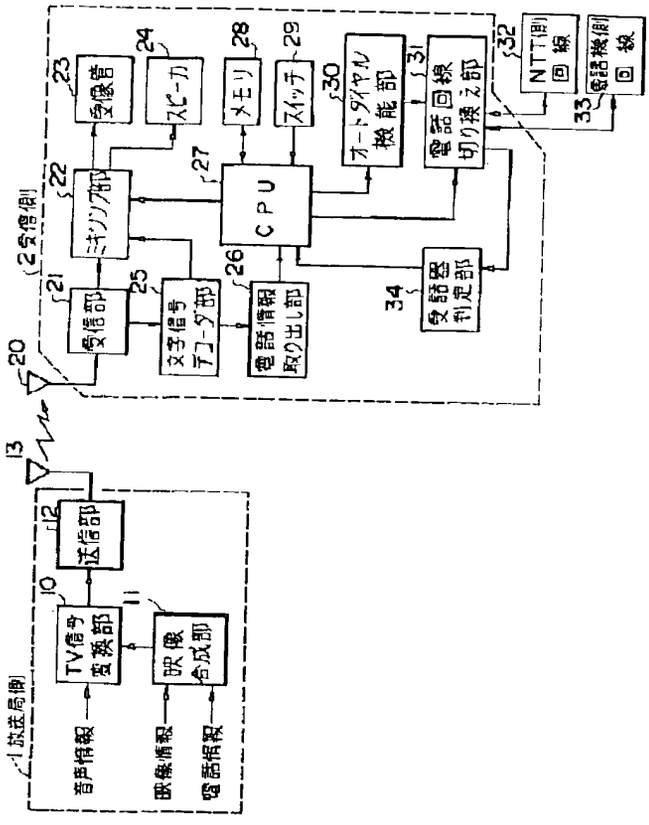
APPLICATION DATE : 24-12-91
APPLICATION NUMBER : 03341122

APPLICANT : TOSHIBA AVE CORP;

INVENTOR : WATABE KEIICHI;

INT.CL. : H04N 7/08 H04M 1/27 H04N 5/44 H04N 5/445

TITLE : TRANSMITTING EQUIPMENT AND RECEIVING EQUIPMENT FOR TELEVISION SIGNAL



ABSTRACT : PURPOSE: To obtain an autodialing control device for automatically executing dialing operation of a telephone set by means of a telephone number displayed on a TV program.

CONSTITUTION: Telephone information is superposed during the vertical blanking interval of a TV signal and transmitted by/from a broadcasting station side 1. A telephone information extracting part 26 on the receiving side 2 extracts the telephone information, a, memory 28 stores the information when it is effective information, and when a viewer turns on a switch 29, a telephone line switching part 31 is connected to an NTT side line 32. At the time of dialing the telephone number stored in the memory 28, a correct and quick calling can be attained.

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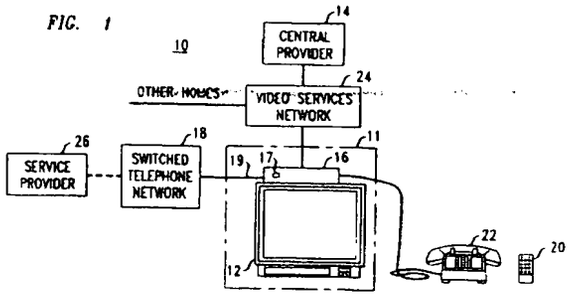
(54) System and method of capturing encoded data transmitted over a communications network in a video system.

(57) A video system (10) captures telephone number data (of 26) encoded into video signals (from 14) transmitted over a video network (24) to at least one display device (11). Video signals are received that contain an escape sequence demarcating telephone number data (of 26). The system identifies the escape sequence, and captures the telephone number data. Upon command, dialing data corresponding to the telephone number data are transmitted over a telephone network (18) to initiate a telephone call to the desired party (26).

FIG. 1



EP 0 673 164 A1

Background of the Invention

The present invention relates to video systems.

As the complexities of modern life increase, it becomes more and more desirable to simplify the way everyday tasks are accomplished. One solution has been provided by cable network providers, who provide various programs that promote consumer services. One particular consumer service that has grown in popularity is home shopping.

Specifically, many cable network providers broadcast home-shopping programs in which items for purchase are displayed on a television screen. Each item is displayed and described by a program host. The telephone number of the service provider promoting the item is also displayed. A viewer wishing to purchase a particular item can place an order by picking up a telephone handset, dialing the displayed telephone number and interacting verbally with a live operator to provide necessary ordering information. This service requires the viewer to memorize or write down the telephone number prior to accessing the service.

Other types of information services or programs have a similar format. For example, real estate programs broadcast video segments of homes for sale in a particular geographical area. Typically, each video segment includes the name of the realtor, the realtor's phone number and a brief description of the home. A viewer interested in a particular home can pick up the telephone handset, dial the displayed phone number and schedule an appointment with the listed real estate agent.

Indeed, even many ordinary commercials invite the viewer to dial the telephone number of the advertiser. For example, commercials soliciting subscription to a particular telephone billing plan invariably include the telephone number of the telephone company providing the plan. The commercials typically highlight the desirability of the billing plan and try to entice the viewer to seek additional information about the plan. A viewer interested in the billing plan can dial the displayed telephone number and speak with a company representative to obtain additional information and/or subscribe to the plan. However, the viewer must record or memorize the telephone number prior to accessing the service.

Summary of the Invention

The present invention is directed to an advantageous improvement for accessing such services. We have recognized that the ability to capture telephone number data and use the data to dial a corresponding telephone number can make it easier for the viewer to access services advertized on the system. In accordance with the present invention, data representing the telephone number of the service provider are transmitted over a communications network that carries the video signal. The data are then captured by a telephony-capable component of the viewer's video system, illustratively a set-top box, in such a way that the viewer can access the service provider by signaling the set-top box to dial the captured telephone number, and thereby initiate a telephone call from the viewer to the service provider. Advantageously, the telephone number data may be demarcated by an escape sequence that is recognized by the set-top box. The escape sequence comprises a sequence of special characters not commonly used, hence easily recognized.

The set-top box is connected to the telephone network so that information such as voice signals and data signals may be transmitted between the viewer's video system and the service provider. The set-top box may include an interface for a telephone or another communication device, such as a speaker phone, by which the viewer may communicate with the service provider. The communication device may also be directly integrated into the set-top box.

In various embodiments of the invention, one or more of the telephone numbers captured from different programs can be stored in the set-top box. A history log of the captured numbers each identified with supplementary text that was transmitted in the same way as, and contiguous with the number, can be assembled and displayed for the viewer. The viewer can then selectively signal the set-top box to dial a particular telephone number.

In accordance with one feature of the present invention, the telephone number data can be captured in the set-top box selectively, e.g., the capturing mechanism can be selectively enabled/disabled by the viewer. For example, the viewer can transmit an access code which is recognized by the set-top box, causing the capturing mechanism to be enabled and the set-top box to capture the data.

In accordance with another feature of the present invention, the escape sequence demarcating the data, and the data itself, can be encoded into the vertical blanking interval of the video signal which illustratively may be an NTSC signal. In the case of a digital broadcast, the data identified by the escape sequence may alternatively be digitally encoded into any convenient portion of the digital data bitstream of the broadcast.

In accordance with another feature of the present invention, the set-top box may be directly integrated into a viewer's display device.

Brief Description of the Drawing

FIG. 1 illustrates a schematic diagram of an interactive communications system implemented in accordance with the present invention.

FIG. 2 illustrates a block diagram of the set-top

box of the interactive communications system of FIG. 1.

FIG. 3 is an illustrative format of a video signal which includes an escape sequence demarcating telephone number data which is captured by the set-top box of FIG. 2.

FIGS. 4 and 5 illustrate a flow chart depicting a method of capturing encoded data transmitted over a communications network in accordance with the present invention.

FIG. 6 illustrates a display of a history log assembled by the set-top box of FIG. 2.

Detailed Description

Referring to FIG. 1, there is shown an interactive communication system 10 that incorporates the principles of the present invention. A video receiving device 11 receives video signals from a central provider 14 of video services over a video services network 24. The video receiving device 11 illustratively comprises a display device 12 and a set-top box 16. The set-top box 16 is also connected to a switched telephone network 18. Access to the telephone network 18 is illustratively via a separate telephone line 19, but may be over the same network 24 which provides the video signals. The set-top box 16 may receive commands from the viewer via a remote control device, illustratively an infrared remote control unit 20, a dual tone multifrequency (DTMF) generating device, illustratively telephone 22, or a special mechanism (not shown), such as a keypad which is part of the display device or set-top box control panel.

In various systems embodying the present invention, the display device 12 may be a television, personal computer, work station, broadcast receiving system, or other type of device for displaying video signals. The set-top box 16 may be an appropriately modified game playing device, video cassette recorder, cable television interface, computer network interface or satellite television receiver. The central provider 14 of video services may be a broadcast TV station, cable television (CATV) headend, satellite earth station, closed-circuit video theater, computer network, or any other video system or device for transmitting a video program to the display device 12 over the network 24. The network 24 may be an over-the-air, satellite or cabled broadcast, or switched video network. The video signals may be broadcast in either digital or analog form.

In operation, the central provider 14 broadcasts a program created, sponsored or promoted by illustratively a particular commercial service provider 26. The service provider 26 may be a company advertising a particular service or product over the network, or may be an individual or group of individuals. In accordance with the invention, telephone number data, which illustratively correspond to the telephone number of service provider 26, are encoded into the program. As a viewer watches the program on his display device 12, the telephone number data are captured by the viewer's set-top box 16. A visual indicator 17, such as an LED indicator, or screen display (not shown) located on the set-top box indicates when telephone number data has been captured. When the viewer wishes to dial the captured telephone number, the viewer transmits an access signal to the set-top box 16. The set-top box 16 dials the call, illustratively by generating DTMF tones corresponding to the telephone number data and dials the service provider 26. When the call is connected, the viewer can directly interact with the service provider 26.

FIG. 2 depicts the set-top box 16 of FIG. 1 in more detail. The video signal transmitted by the central provider 14 is received by logic/display control 32 on lead 30. The video signal containing the program is transmitted to the display device 12, by a video interface 46, illustratively an NTSC interface. The interface 46 may also be of the type required for transmitting a digital video signal, such as a high definition television (HDTV) signal, or any other protocol for transmitting full motion video, such as MPEG I or MPEG II. Detected within the video signal are telephone number data encoded into the signal which are thereupon stored in memory 34. The telephone number data are preferably demarcated by an escape sequence which is recognized by the logic/display control 32 as is described in more detail below. In accordance with one embodiment of the present invention, a capture-enable signal, illustratively an infrared signal, is transmitted via the remote control unit 20 and received as an electrical signal on lead 38 by receiver 40 which causes the logic/display control 32 to capture any available telephone number data. The capture-enable signal could also be a DTMF signal, transmitted from the viewer's telephone 22 and received locally by the set-top box 16. The set-top box need not transmit the captured DTMF signal over the telephone interface. The captured telephone number data are stored in memory 34.

Access signals, transmitted by the viewer in a manner similar to the capture-enable signal, cause the logic/display control 32 to retrieve the telephone number data from memory 34. It is to be understood that the capture-enable signal could incorporate the access signals so that- the viewer can signal the device to both capture the telephone number data and dial the corresponding telephone numbers. Once the set-top box 16 receives the access signals, the telephone interface enters an off-hook state and dials the telephone number over the switched telephone network 18. The dialing of the telephone number can be accomplished by a number of different means including pulse dialing, DTMF dialing or out of band signalling. Illustratively, DTMF generator 42 generates DTMF tones corresponding to the telephone number

data and transmits the tones via telephone interface 44. In other embodiments of the invention, the connection to the service provider 26 may be established by transmitting computer commands or network commands.

The ability to capture telephone number data and use the data to dial a corresponding telephone number can make it easier for the viewer to access services advertised on the system. For example, a viewer may be watching a home shopping program and see a product that the viewer is interested in purchasing. The viewer can initiate the capturing and dialing of the telephone number by inputting the appropriate access code, via the remote control unit 20. Illustratively, this could be a special "dial" button on the remote control unit 20 or set-top box 16. Once the viewer is connected to the service provider, the viewer can order the desired product or request additional information. Other types of services which the viewer may access include, but are not limited to, obtaining tickets to sporting or entertainment events, obtaining travel information such as airline reservations, or obtaining program transcripts and real estate listing information.

As described above, the telephone number data are preferably demarcated by an escape sequence that is encoded into the program when the program is recorded or transmitted. In the case of a live broadcast, the escape sequence and the telephone number data are encoded directly into the broadcast. The escape sequence and telephone number data are illustratively encoded into the vertical blanking interval of at least one of the video frames comprising the program. If the system broadcasting the program is a digital system, the escape sequence and telephone number data alternatively may be digitally encoded into any other convenient portion of the digital data bitstream of the broadcast. In the case of a digital telephony protocol with out of band (OOB) signalling, such as ISDN, the escape sequence can be encoded into the OOB channel.

The escape sequence may be any type of conventional escape sequence which comprises a sequence of special characters not commonly used in the encoding of the video data. For example, escape sequences similar to those used for encoding closed caption data may be used to demarcate the telephone number data. Additional data such as, for example, data indicative of the product or service being advertised, date, time and/or the name of the service provider can also be included with the telephone number data. The additional data can also be included with the telephone number data or can be sent after the connection has been placed with the service provider.

FIG. 3 is an illustrative format of a video signal 305 that is received by the set-top box 16. Video signal 305 is transmitted from the central provider 14 and comprises a program 310 or commercial advertisement. For example, the program could be a home shopping program or other type of information service program.

Encoded into the video signal 305 is escape sequence 315 that demarcates telephone number data 320 and optionally other data 325 of the type described above. Illustratively, program 310 represents a video frame and escape sequence 315 is encoded into the vertical retrace interval following the frame. Referring to FIG. 2, the video signal 305 is received by logic/display control 32, detects the escape sequence 315 and captures the subsequent data. The logic/display control also determines the destination of the data, i.e., whether it should be transmitted to the display device or captured in memory. The program 310 is received by the logic/display control 32 and transmitted to the display device on lead 35. When the logic/display control 32 detects escape sequence 315, the telephone number data 320 and other data 325 are extracted from the video signal 305 and stored in memory 34.

FIGs. 4 and 5 depict various methods of extracting telephone number data from a broadcast program. A broadcast program encoded with an escape sequence demarcating telephone number data is broadcast over a video network in the manner described above (step 405). Next, it is determined if the set-top box can automatically capture the telephone number data, i.e., without any intervention by the viewer (step 410). For example, the set-top box may automatically capture the telephone number data from any program viewed by the viewer or any program specified by the viewer. Alternatively, the viewer may have the capability to selectively enable the set-top box to capture telephone number data only from certain types of programs, such as, real estate programs. In such a case, identifying data such as, for example, data indicating the type of product advertised or the name of the service provider, is included with the telephone number data. As the video signals are received by the set-top box, the logic/display control detects escape sequences contained within the video signals and determines whether the demarcated data is of the type identified by the viewer. If so, the set-top box automatically captures the telephone number data (step 415). In other cases, it may be valuable for the service provider 26 to encode information, such as time, date, channel, etc., as "other data" 325. Such data could be automatically transmitted upon connecting a call to the service provider.

As described above with respect to FIG. 2, the viewer can affirmatively select to capture telephone number data as the viewer is watching the program. The viewer can communicate his request by transmitting a particular access code from his remote control unit or telephone (step 425). The access code is illustratively a universal access code which is the same regardless of the program being broadcast.

Once the telephone number data has been captured by the set-top box (step 430), DTMF tones can be generated from the telephone number data and a call placed to the service provider (step 440). Once the viewer is connected to the service provider (step 445), the viewer can interact directly with the service provider to, for example, order merchandise, or obtain information about a particular service. During the interactivity, the other data 325 may be automatically transmitted, e.g. via DTMF, signals, to service provider 26 to identify information such as, but not limited to, product name, commercial, time, date, channel, credit information, billing address, and shipping address.

Alternatively, the telephone number data are stored in memory for later retrieval (step 450). Referring to FIG. 5, if more than one telephone number has been stored in memory (step 460), a history log of the stored telephone numbers may be assembled and displayed on the viewer's display device (step 465) as illustrated in FIG. 6. The display 605 may include among other things, the name of the service provider, the type of service or product advertised and the telephone number. The viewer can download the history log from the set-top box to the viewer's display by transmitting an appropriate instruction from his remote control unit. The logic/display control then retrieves all of the data which are stored in memory which represents the telephone number data, and the data such as service provider name and company name. The data are transmitted to the display device via the video interface. The viewer can select one of the displayed telephone numbers to be dialed by transmitting an instruction from either his remote control unit or telephone (step 470). The logic/display control then retrieves the selected telephone number data from memory (step 475). The set-top box transmits the dialing sequence over the telephone network to connect the call (step 480). The viewer is connected to the service provider as described above (step 485).

The ability to generate a history log can make certain of the viewer's tasks easier by providing listings of telephone numbers for similar services. For example, the viewer may be in the process of purchasing a new home and may capture the telephone numbers of realtors showing homes that interest the viewer. By inputting display instructions via the remote control unit, a display of the realtors' telephone numbers is provided on the screen of the display device. Included with each telephone number may be additional information such as, the realtor's name, and the address of the home being advertised for sale. The viewer can then retrieve the telephone number of one of the realtors and have it dialed by the set-top box by inputting the appropriate access instruction via the remote control unit. Once the realtor is reached, the viewer can schedule an appointment to see the home or obtain additional information about the house.

It will be appreciated that those skilled in the art will be able to devise numerous and various alternative arrangements which, although not explicitly shown or described herein, embody the principles of the invention and are within its scope and spirit.

Claims

1. A method comprising the steps of:
   receiving video signals transmitted over a network;
   identifying an escape sequence contained within the video signals, said escape sequence demarcating telephone number data;
   capturing the demarcated telephone number data; and
   transmitting the captured telephone number data over a telephone network to initiate a telephone call.

2. The method of claim 1 wherein said step of capturing said telephone number data comprises the steps of:
   storing the captured telephone number data in memory; and
   retrieving the captured telephone number data from memory in response to a received access code.

3. The method according to claim 2 wherein the step of storing the captured telephone number data comprises:
   storing other data which defines information relating to the telephone number data.

4. The method according to claim 2 further comprising the step of:
   indicating the capture of telephone number data.

5. An interactive communication system comprising:
   means for transmitting video signals from at least one central provider to a plurality of video receiving devices, each of said video receiving devices comprising:
   means for receiving said video signals;
   means for capturing telephone number data encoded into said video signals by identifying an escape sequence within said video signals demarcating said telephone number data; and
   means for transmitting dialing information corresponding to said captured telephone number data over a telephone network to initiate a telephone call.

6. The device of claim 5 wherein said receiving means is a set-top box.

7. The device of claim 5 wherein said capturing means can be selectively enabled and disabled.

8. The device of claim 5 further comprising means for indicating the capture of telephone number data.

9. The device according to claim 8 wherein said indicating means is an LED indicator.

10. The device of claim 6 further comprising means for storing said captured telephone number data.

11. The device according to claim 5 wherein said telephone number data includes other data which defines information relating to the telephone number data.

12. A video receiving device comprising:

means for receiving video signals;

means for capturing telephone number data encoded into said video signals by identifying an escape sequence within said video signals demarcating said telephone number data, said telephone number data representing more than one telephone number, each telephone number being identified by a separate escape sequence; and

means for transmitting DTMF tones corresponding to the telephone number data for a particular telephone number over a telephone network to initiate a telephone call.

13. The device of claim 12 wherein said receiving means is a television.

14. The device of claim 12 wherein said receiving means is a computer.

15. The device of claim 12 wherein said capturing means can be selectively enabled and disabled.

16. The device of claim 12 wherein said receiving means includes a set-top box.

17. The device of claim 12 wherein said capturing means comprises storing means for storing said telephone number data.

18. The device of claim 17 further comprising

means for assembling a history log of said stored telephone number data,

means for displaying said history log; and

means for selecting telephone number data from said history log which represents a particular telephone number.

19. The device of claim 12 further comprising means for indicating the capture of telephone number data.

20. The device of claim 19 wherein said indicating means is an LED indicator.

21. The device of claim 12 wherein said telephone number data includes other data which defines information relating to the telephone number data.

22. A method comprising the steps of:

receiving video signals transmitted over a network;

capturing telephone number data encoded into said video signals by identifying an escape sequence within said video signals demarcating said telephone number data, said telephone number data representing a plurality of telephone numbers, said telephone number data representing each telephone number being identified by a separate escape sequence; and

transmitting DTMF tones corresponding to said captured telephone number data for a particular telephone number over a telephone network to initiate a telephone call.

23. The method according to claim 22 wherein said step of capturing the telephone number data comprises the steps of:

storing the captured telephone number data in memory; and

retrieving the captured telephone number data from memory in response to a received access code.

24. The method according to claim 23 wherein said step of storing said captured telephone number data comprises the step of:

assembling a history log of the telephone numbers represented by the telephone number data stored in memory.

25. The method according to claim 24 further comprising the steps of:

displaying said history log;

initiating the dialing of a particular telephone number in response to a selection of the particular telephone number from the history log.

FIG. 1

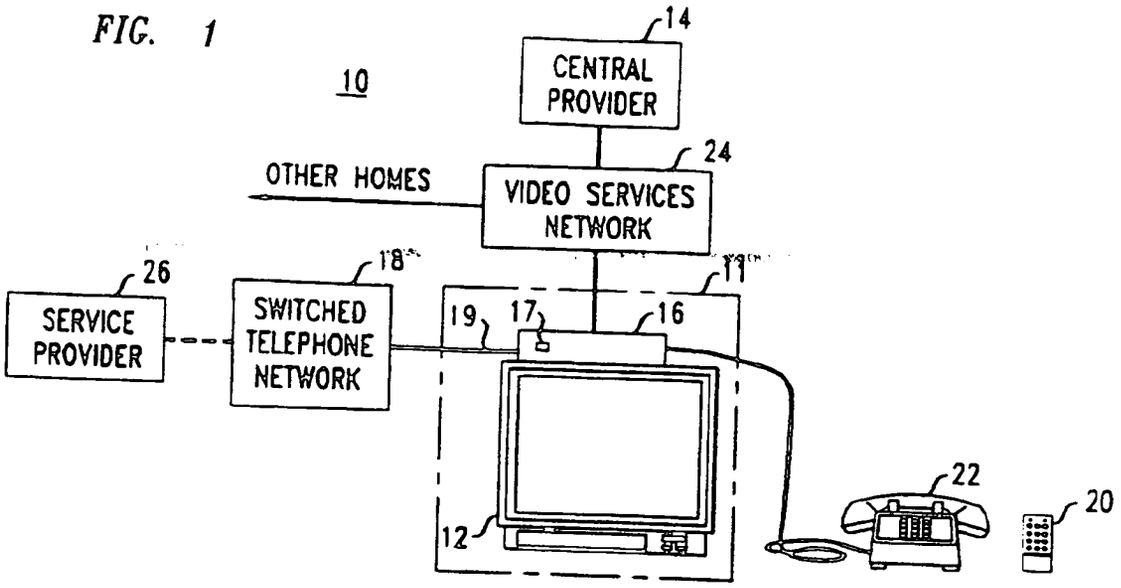


FIG. 2

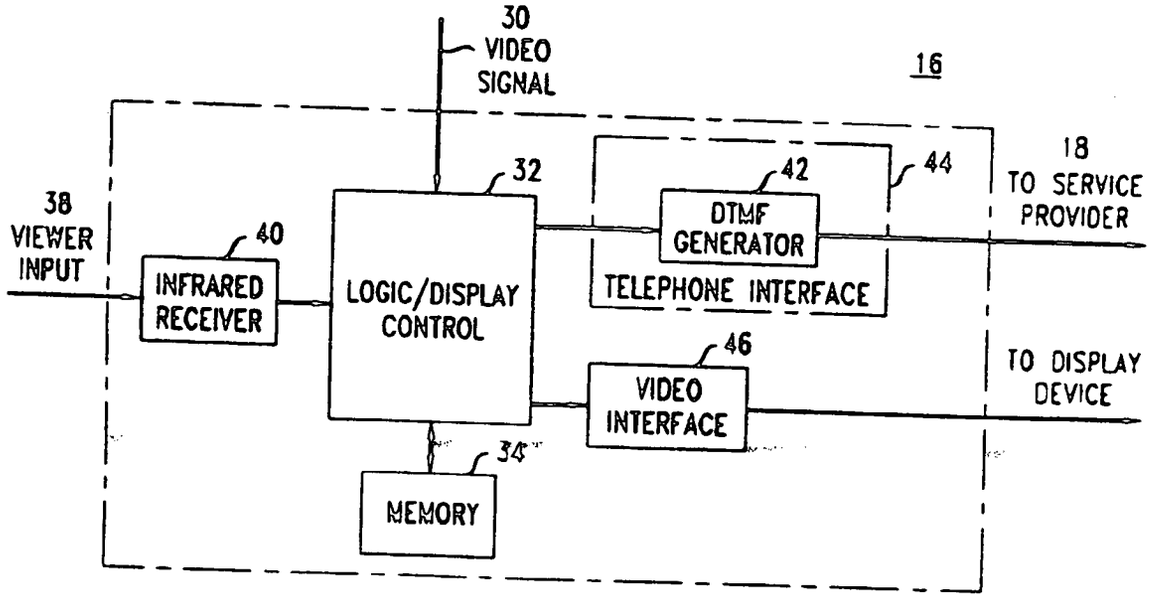


FIG. 3

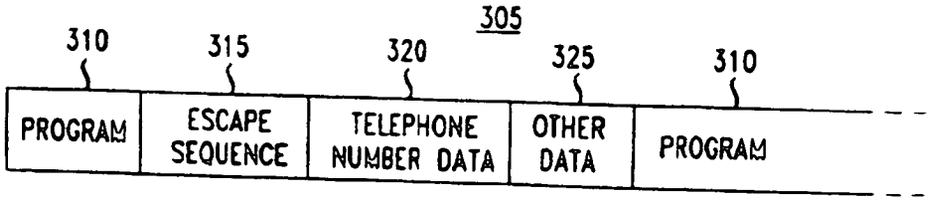


FIG. 4

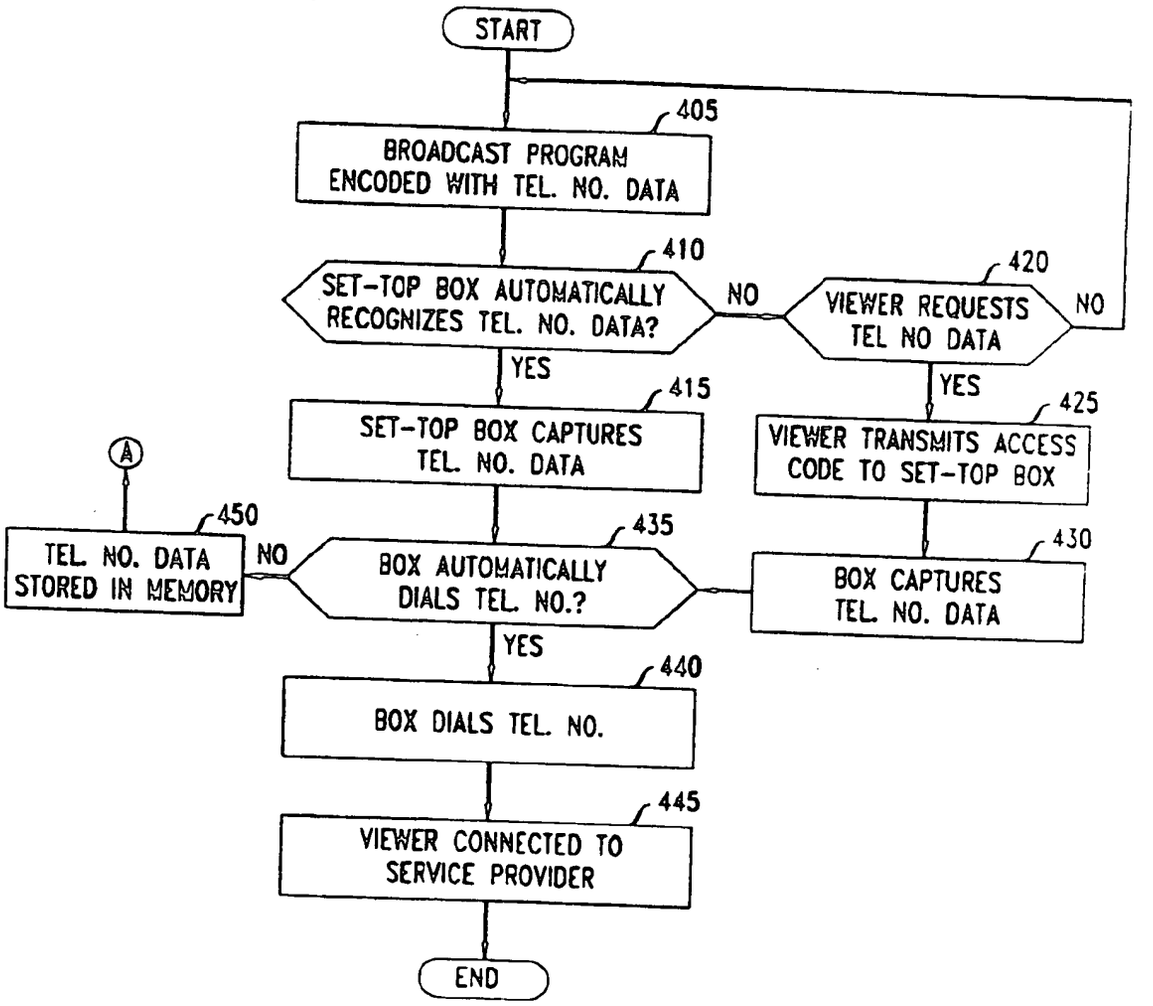


FIG. 5

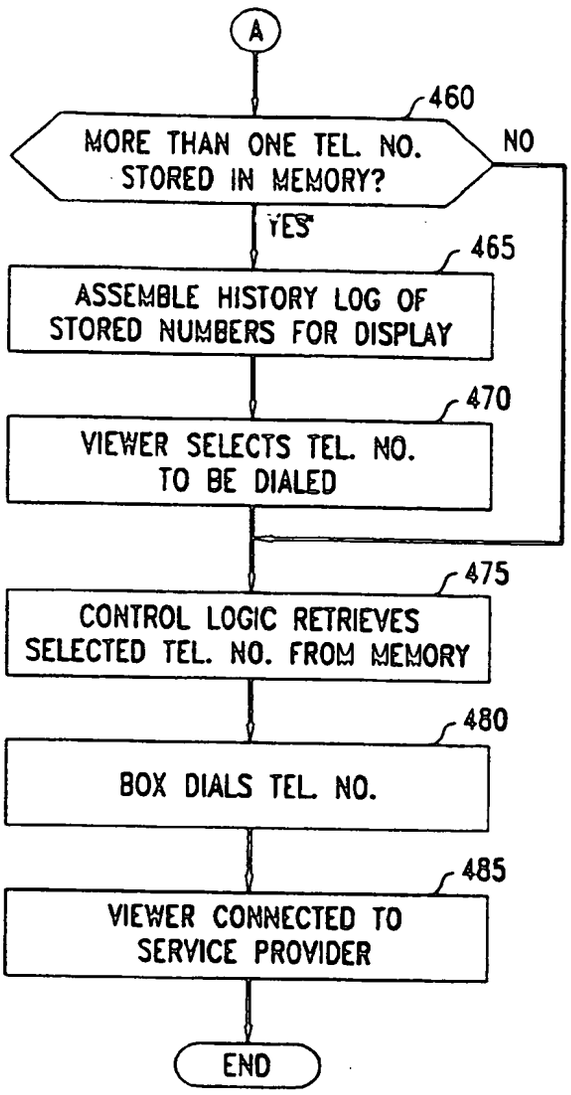


FIG. 6

605

1.	ABC CO.	XXX-XXXX	STEREOS
2.	DEF CO.	XXX-XXXX	HOUSE CLEANING
3.	FLOWER CO.	XXX-XXXX	FLOWER DELIVERY
4.	ACE TRAVEL	XXX-XXXX	TRAVEL PACKAGES

European Patent Office

EUROPEAN SEARCH REPORT

Application Number
EP 95 30 1493

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int.Cl.6)
X Y	DE-A-35 36 844 (DORNIER SYSTEM GMBH) 16 April 1987 * the whole document *	1-4 5-8, 10-19,21	H04N7/173
Y A	GB-A-2 207 838 (TELACTION CORPORATION) 8 February 1989 * page 1, line 1 - page 2, line 25 * * page 6, line 15 - page 7, line 4 * * page 8, line 14 - page 17, line 21 * * figure 1 *	5-8, 10-19,21 21-25	
P,A	WO-A-94 23537 (BELL ATLANTIC NETWORK SERVICES INC) 13 October 1994 * page 16, line 5 - page 28, line 5 * * figures 1-12 *	1-25	
A	COMMUNICATIONS OF THE ACM, vol. 36, no. 12, December 1993 NEW YORK, NY, US, pages 19-23-+140, XP 000414935 PRESS 'The Internet and Interactive Television' * page 21, right column, line 34 - page 23, middle column, line 28 *	1-25	TECHNICAL FIELDS SEARCHED (Int.Cl.6) H04N

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
THE HAGUE	28 June 1995	Van der Zaal, R

CATEGORY OF CITED DOCUMENTS

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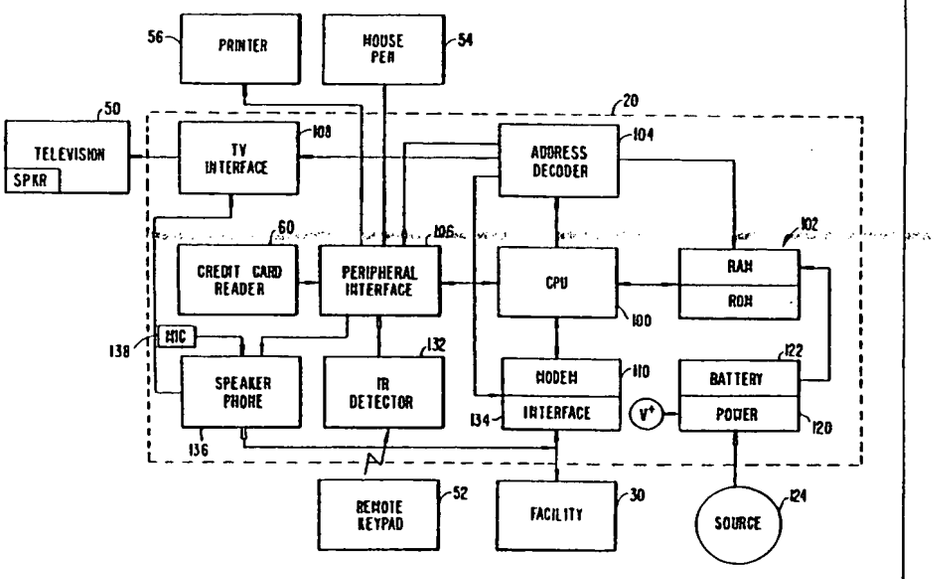
(57) Abstract

An electronic device (20) and method for accessing remote electronic facilities (30) and displaying associate information on a conventional television set (50). The electronic device (20) self-configures itself upon power-up or reset by initiating a data call to a configuring facility (30). Information related to available facilities and programming, autonomous mail checking is downloaded to the electronic device (20). The electronic device (20) displays a menu including several user selectable facilities. The user chooses one of the options from the menu by use of a remote keypad control (52). The options available include printing, electronic mail, news and information services. Interfacing the electronic device (20) wit a stylus-type pointing device (54) permits sketching and drawing on the television (50), including superposition of images on captured television images. Captured images of graphics or text are optionally stored or forwarded to a user through a mail facility accessed through operation of the system. The captured images may subsequently be sent via facsimile transmission to other facsimile transmission machines or receivers. The electronic device (20) includes a speaker phone (136) for providing audio information received over telephones to the television (50) speaker.



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APPARATUS AND METHOD FOR ELECTRONIC DEVICE FOR INFORMATION SERVICES

MICROFICHE APPENDIX

This specification includes microfiche Appendix A having 2 sheets with 114 frames, hereby expressly incorporated by reference for all purposes.

BACKGROUND OF THE INVENTION

The present invention relates generally to devices for accessing videotext. More specifically, the present invention relates to an electronic device for interfacing to independent computer systems through existing telephone systems (twisted pair or cellular) by use of remotely selected menu items displayed on conventional television sets.

Many commercial and public information and service sources are available in electronic form (electronic facilities). Electronic facilities includes databases storing latest news, weather, financial and recreational information, for example. Additionally, services such as consumer services, audiotext, electronic mail, and facsimile or telex transmission are available through some of the facilities. Telephone switching systems are included in the term facility.

Conventional equipment for accessing these facilities includes specially programmable personal computers having specialized communication software and hardware. To access the facilities, a user acquires the necessary computer components

and configures them to permit access to selected facilities. Many users forego access to desired facilities because of the complexity and time required in acquiring and configuring the computer components. Databases vary as to requirements for their various components and configuration as well as protocol used for access, further increasing the complexity and time to access desired information or services. Due to a large number of different providers of the information and services, it is sometimes difficult to ferret out particular access information for desired facilities.

The complexity of the acquisition and configuration of the necessary computer components does more than deter potential users of the facilities. Reluctance and caution on the part of the users, as well as customer premises equipment cost, also deters and impedes development of the facilities for access by others.

SUMMARY OF THE INVENTION

The present invention provides apparatus and method for simply, efficiently and economically providing facility access to any user. The invention permits access to and use of the tremendous information and services available in electronic form without knowledge of computer components or configuration requirements. Access to information and use of the various electronic services is possible by use of a conventional numeric remote keypad for selecting particular menu items from menus displayed on conventional television sets.

According to one aspect of the present invention, it includes a television set, a communications device connected to a telephone network, a remote keypad and a controller. The controller displays menu items on the television screen and controls operation of the communications device. The menu items correspond to various services available to a user. Numbers, typically 0-9, identify the individual menu items.

In operation, the controller preferably initiates an automated configuration mode upon initial power-up. The automated configuration includes initiation of a data call to a

predetermined independent computer system to acquire configuration information and operating instructions. The configuration information includes data identifying particular services desired by the individual identified user. The configuration information controls which menu choices the user may select.

The preferred embodiment of the present invention includes a built-in messaging system for the user. The system permits exchange of messages to and from other electronic device users, computer users or various facilities. In this embodiment, the operating instructions of each electronic device directs the device to autonomously initiate a messaging call to a messaging facility at predetermined times when the user is not using the telephone line. The system waits and calls later if the telephone line is in use. The controller posts any untransmitted messages at this time, and receives messages and any new configuration or operating instructions. If the controller receives new messages for the user, it lights a message indicator. This tells the user new messages are waiting, prompting the user to access them.

When the user activates the electronic device, the controller displays the selection menu which includes those options available to the user. One available menu item permits the user to read the messages. The remote keypad controls the operation of the various features of the electronic device, such as message scrolling, rereading, saving or deleting particular messages, for example.

When the user desires to access the information and services, the user selects one of the menu items by operating the remote keypad. Selection signals from the remote keypad identify a particular menu item. The controller responds to the selection signals by identifying the desired service associated with the input from the remote keypad. The controller operates the communications device to access the telephone line. Accessing the telephone line permits connection to an independent computer system providing the desired service. The controller prompts the independent

computer system to provide the desired information or service. The controller displays the desired information or service on the television, and waits for additional input from the remote keypad. Use of a printer or a video recorder connected to the controller provides the user with an ability to produce a hard copy of the information displayed on the television.

Another aspect of the invention includes a pen-type pointing, drawing and writing device for creation of particular images on the television screen. A user controls a drawing cursor's position on the television display by moving the pointing device. After creating a desired image, the controller, responsive to selection signals from the remote keypad, prints images created with the pointing device, or captures the image and transmits it to an independent computer system. One embodiment of this drawing ability is a straight-line sketching or CAD-type tool, similar to an Etch-A-Sketch®. The independent computer system, depending upon particular menu options selected, directs the captured transmitted image to another user or to storage for later access. It is possible to capture television images transmitted from the television station and superimpose user-created graphics. One embodiment of this feature includes an ability to capture handwritten notes and forward them to another user in graphics form. Alternatively, screens from this electronic device, as well as information received from an accessed facility, in file form or in an on-line viewing format, can all be stored, printed, sent and videotaped.

Some pen-type pointing devices include a click button for indicating particular user actions when operated. One feature of an embodiment including this type of pointing device includes an ability to simulate keyboard input. The controller displays a keyboard image on the television. The user subsequently identifies each desired key by clicking within the keyboard image at positions corresponding to each desired key. Positioning the cursor and selecting particular key images permits simulation of typing. The controller is able to capture and transmit these typewritten-document images just as

any other image. Many different types of pointing devices are available. It is believed that an IR responsive mouse-pen would be useful in many applications.

Still another aspect of the present invention includes an integral card reader (credit or debit card, for example) with the controller. This permits the user to conveniently purchase goods or services by use of the electronic device. The card reader permits a user to purchase products, pay-per-view programming, information services (videotext or audiotext). Further, the card reader permits screening access of the electronic device to restricted programming. In other words, to access particular features, a user must "swipe" a card through the card reader. The card may be a credit card to pay for the services or some other specially prepared and encoded card for controlling access. In addition to this screening mechanism, the electronic device may include personal identification number (PIN) password protection for access to selected services.

An additional aspect of a preferred embodiment in use of the electronic device to access audio information, such as voice mail or other audiotext facilities. A preferred embodiment provides for use of the electronic devices as a speaker phone. In the speaker phone embodiment, the electronic device includes a microphone and a displayed menu item, programmable and selectable by the remote keypad. Selection of the menu item results in the electronic device answering an incoming telephone call. Audio information is output over the television speaker. The electronic device can be used to record frequently used numbers (input from the remote keypad) and display them in a menu. Selection of a menu item initiates the desired call. Full conversation between the user and the called party is possible. In the case of audiotext for voicemail requiring DTMF signalling, the remote keypad may initiate these features.

The invention provides simple, efficient access to facilities (or limitation to particular facilities) without acquisition or configuration of computer components. Users

select desired services from among several services displayed in menu by operation of a remote keypad. Autonomous self-configuration of the electronic device allows a system operator to enhance services or operation quickly and ensure that all users have their chosen services available to them. It is one embodiment to include predefined configuration for specialized implementations, such as private networks within a company or organization, that can be preconfigured with desired options. Optimally, a central computer can automatically configure all electronic devices (and related menus) connected on a private network. One example of the private network would be hotels offering room services and checkout through use of a properly configured electronic device. Other embodiments include access to facilities offering interactive television and other real-time online services.

Reference to the remaining portions of the specification and the drawings realize a further understanding of the nature and advantages of the invention.

BRIEF DESCRIPTION OF THE DRAWINGS

Fig. 1 is a block diagram of a videotext system 10 including an electronic device interface 20 having a preferred embodiment of the present invention;

Fig. 2 is a block diagram of electronic device 20 according to a preferred embodiment;

Fig. 3 is an illustration of one configuration of the electronic device 20 including menu items;

Fig. 4 is a flow chart illustrating general operation of electronic device 20;

Fig. 5 is a top level software flow diagram illustrating a typical operation for a preferred embodiment; and

Figs. 6A through 6C are detailed sections of identified portions of the software flow diagram of Fig. 5.

DESCRIPTION OF THE PREFERRED EMBODIMENT

Fig. 1 is a block diagram of a videotext system 10 including an electronic device interface 20 having a preferred embodiment of the present invention. The videotext system 10 includes an independent computer system (host computer) 30 providing one or more facilities a user desires to access. The host computer 30 connects to the electronic device 20 through a communications medium 32. Examples of the communications medium includes public-switched telephone networks, closed-circuit coaxial cables, and cellular telephone transmission networks. The host computer 30 provides access to many facilities 31, including other electronic devices (EDs) 34, networks 36, personal computers 38, databases 40 and facsimile or telex services 42, for example. Furthermore, for a speakerphone operation detailed further below, a facility may be a telephone 44. The host computer 30 includes a plurality of facilities 31 operable on the system itself. Additionally, facilities 31 on the host computer 30 provide access to remote facilities 31 such as other EDs 34.

The electronic device 20 interfaces these facilities for access and display on a conventional television 50. The user selects and controls access to the facilities displayed on or presented by (in the case of audio information) the television 50 by use of a remote keypad control 52. The remote keypad control 52 of the preferred embodiment is similar to conventional television remote controls for selection of channel and volume, for instance. The remote keypad control 52 provides menu selection signals to the electronic device 20 for selection of a particular facility of the host computer 30.

The electronic device 20 of the preferred embodiment includes a stylus-type or pen-type pointing and writing device 54 for creation of bitmap images on the television 50. The bitmap images include graphical and textual information drawn by the user. The user is able to direct the electronic device 20 to capture images from the television 50 screen. The images include any bitmap images created by the user. The electronic device 20 is able to transmit these captured images

to the host computer 30 for storage or forwarding to any of the facilities the host computer 30 controls.

Additionally, the pointing device 54 is able to function as a text input device by interaction with an image of a conventional typewriter keyboard. Through display of the keyboard image on the television, and monitoring cursor positions associated with "clicks" of the pointing device 54, a user may "typewrite" information on the screen.

The electronic device 20 includes an interface for a printer 56. The electronic device 20 directs selected, captured images to the printer 56 for hard copy output. The printer 56 prints results of queries to the various selected facilities, the sketching or writing performed with the pointing device 54, or any other screen displayed.

Also shown in Fig. 1 is an integral card reader 60. This card reader 60 provides a ready and simple mechanism for each user to access premium facilities having a surcharge, or for purchase of items displayed by particular facilities, or even as an agent to arrange pay for view television programming.

Fig. 2 is a block diagram of the electronic device 20 according to a preferred embodiment. The electronic device 20 is a microcontroller-controlled appliance including a central-processing unit (CPU) 100 coupled to a memory 102, an address decoder 104, a peripheral interface 106, a television interface 108, for audio and video, as well as connection to a video recorder and a modulator/demodulator (modem) 110 by a data and address bus. The memory 102 includes both random read/write memory (RAM) and read-only memory. A power supply 120 generates power for the components of the electronic device 20 (V^+), as well as to keep a battery-backup 122 charged. The battery-backup 122 provides power for the RAM when the power-supply 120 is not connected to a power source 124. Additionally, the preferred embodiment of the electronic device 20 includes the credit card reader 60 and an infrared detector 132, both coupled to the peripheral interface 106.

The CPU 100 controls operation of the electronic device 20 according to instructions stored in the ROM and the RAM of the memory 102. The ROM includes an initialization sequence which the CPU 100 executes upon every reset or power-up. The initialization sequence includes a set of commands causing the electronic device 20 connect to a particular facility 30 and self-configure itself in one preferred embodiment. The self-configuration includes receipt of particularized instructions for the particular electronic device 20, depending upon an identification code stored in the ROM. The CPU 100 stores these particularized instructions in the RAM.

The CPU 100 addresses the components of the electronic device 20 through the address decoder 104. The address decoder receives addresses from the CPU 100 and asserts a select signal to an identified component in response to a particular address. Components with an asserted select signal from the address decoder 104 interact with the CPU 100, either receiving instructions or providing data.

The peripheral interface 106 includes a parallel input/output port as well-known for interfacing to the printer 56, to the credit card reader 60, and to the IR detector 132. The peripheral interface 106 includes a serial interface for the pointing device 54. The parallel interface and the serial interface are separately selectable by the address decoder 104. Additionally, the peripheral interface 106 controls a speakerphone 136 circuit. The speakerphone 136, responsive to a hook control signal from the peripheral interface 106, couples an internal microphone 138.

The television interface 108 includes a video controller for text and graphics, connected to a video memory and a video modulator to produce television-compatible output. The television interface 108 connects to a conventional television for display of menus identifying the various facilities available to a user, and for displaying the information provided from a selected facility.

The modem 110, through an modem interface 134 particularized for the communications medium used by the electronic device 20, communicates with a selected facility 31. The modem 110 permits the electronic device 20 and the facility 31 to exchange information in a well-known fashion.

The card reader 60, a conventional device, reads magnetically encoded information on credit and debit cards. The card reader 60 provides output information to the CPU 100 through the parallel input/output function of the peripheral interface 106.

The IR detector 132 receives menu selection signals from the keypad remote control 52. The IR detector 132 provides the CPU 100, through the peripheral interface 106, with particular key information selected.

Fig. 3 is an illustration of one configuration of the electronic device 20 including display of selected menu items. The electronic device 20 provides the user with a menu of available services. The sample menu in Fig. 3 includes seven items which the user selects by use of the remote keypad control 52. The remote keypad control 52 does not employ a typewriter-type keyboard to implement the selected functions. By displaying a menu having numbered entries and selecting a corresponding number for a desired entry by use of the remote keypad control 52, the user accesses the desired facility. The electronic device 20 includes a microphone 138 for a speakerphone function and a mail indicator 140 which illuminates when new unread mail is available for the user.

The electronic device retrieves mail and other information in two manners. First, if an "auto-poll" function is not enabled (an option in one of the main menus), the user selects the electronic device mail option by use of the IR remote, prompting the electronic device to dial the database and retrieve any waiting mail or other information. The information is downloaded and the telephone connection terminated, or the user can view the information "on-line". Second, if the auto-poll feature is turned on by the user (or by the database remotely in configuring or reconfiguring the