

11. The apparatus of claim 1 wherein the transmitting means (292, 294, 296) includes means for transmitting the signal to a plurality of selectable satellite transponders and wherein the apparatus is further characterized by means for  
5 grouping television programs into separate groups for transmission over selected transponders.

12. The apparatus of claim 1 wherein the transmitting means (292, 294, 296) includes means for transmitting the signal to a plurality of selectable satellites and  
10 the apparatus is further characterized by means for grouping television programs into separate groups for transmission to different geographical regions.

13. The apparatus as claimed in claim 1 wherein the database means (268) includes a plurality of databases and wherein the apparatus is further  
15 characterized by processing means for accessing the databases and processing the information therein to provide the requisite program control information signal, the databases including information concerning each scheduled Program, records representing the source from which each television program was obtained,  
optional display services available, available previews of television programs,  
20 program categories for each television program to be transmitted and price categories for each television program to be transmitted.

14. The apparatus as claimed in claim 1 wherein the database means (268) includes a plurality of databases, each database composed of multiple related sets  
25 of data, and wherein the apparatus is further characterized by processing means for accessing the databases and processing the information therein and management means for determining how to operate the apparatus so that it provides the requisite control information signal, the databases including:

30 means for storing information about each destination to which the apparatus transmits;

means for storing information about rights in or ownership in each program source;

means for storing information about price, promotion and packaging of each program broadcast;

5 means for storing information about the storage location of each internally stored program; and

means for storing information about marketing and customer.

15. The apparatus of claim 1 modified in that:

10 the apparatus is further characterized by an internal collection means, connected to the receiving means (272), for gathering television programs from internal sources and feeding the television programs from internal sources to the reception port;

15 the generation means (264) and the input means (262) are part of a packaging means for creating program control information and for packaging television programs using the program control information, the packaging means including:

the central processing unit (264);

20 the input means (262) which includes an interface, connected to the central processing unit (264), to enable the program packager to enter program line-up information, wherein the interface is operably connected to the central processing unit (264);

25 a storage means, connected to the central processing unit (264), for storing the entered program line-up information;

logic means (264), connected to the central processing unit (264), for arranging the stored program line-up information and for creating program control information; and

30 means (264), connected to the logic means (264), for generating a program control information signal (276) from the program control information;

the combining means (270) combines the set of television programs identified in the program control information signal (276) with the program control information signal(276) to create a combined signal, wherein the combining means includes a delivery control processor (270);

5 the multiplexing means (290) multiplexes the combined signal; and

the transmission means (292, 294, 296), transmits the combined signal.

10 16. The apparatus of claim 15, wherein  
the packaging means includes means for generating menu configurations (324); and  
the packaging means generates the program control information using the menu configurations.

15 17. The apparatus of claim 15 further characterized by:  
means (264) for receiving unique cable franchise control information from cable franchises;  
means (269, 328), connected to the receiving means (264), for  
20 storing the unique cable franchise control information, the storing means includes the cable franchise configuration database (328); and  
wherein the generating means (264), connected to the storing means (328) comprises means for including the unique cable franchise control information signal in the generated program control information  
25 signal.

18. A method for delivering televisions programs in a television program delivery system characterized by the steps of:  
(a) receiving (272) a plurality of television programs in analog or  
30 digital format, each having video and audio components;

(b) supplying (262) information about the received television programs, including information on the identities of the received television programs;

5 (c) storing (268) information supplied about the received television programs for use in the steps of delivering the received television programs;

(d) creating (400, 316, 318, 342) a plurality of program line-ups that identify received television programs using the stored information about the received television programs;

10 (e) generating (326, 442) a program control information signal (276) using one or more of the created program line-ups;

(f) preparing (332, 334) the program control information signal (276) and a plurality of the television programs identified in the program control information signal for transmission; and

15 (g) transmitting (292, 294, 296) the prepared program control information signal (276) and the prepared television programs for redistribution to subscriber locations, whereby, the prepared and transmitted television programs may be viewed by a subscriber.

19. The method of claim 18 wherein the preparing step includes a method of  
20 transmitting a plurality of programs to a cable headend (208), each of the plurality of programs corresponding to one of a plurality of genre categories, the transmitting including the steps of:

25 prioritizing (400) each of the programs by assigning to each of the programs one of a plurality of priority levels, the plurality of priority levels including a high priority level and progressively lower priority levels;

forming (400) a plurality of signals, each of the signals including programs corresponding to a single priority level;

30 appending (320) a header to each of the signals, wherein the header identifies the priority level for a corresponding signal, thereby enabling recognition by the cable headend; and

transmitting (292, 294, 296) each of the headers and the corresponding signals to the cable headend (208).

5 20. The method of claim 18, wherein the preparing step includes a method of transmitting programs to a plurality of transponders, the method including the steps of:

10 prioritizing (400) each of the programs by assigning to each of the programs one of a plurality of priority levels, the plurality of priority levels including a high priority level and progressively lower priority levels;

forming (400) a plurality of signals, each of the signals including programs corresponding to a single priority level; and

15 transmitting (292, 294, 296) the plurality of signals to the plurality of transponders so that none of the transponders receives more than one of the signals.

21. The method of claim 20 further including the step of dynamically changing bandwidth allocation for at least one of the plurality of categories.

20 22. The method of claim 18 wherein the preparing step includes a method of transmitting a plurality of programs in a first amount of bandwidth for reception by a first cable headend (208), and in a second amount of bandwidth which is less than the first amount of bandwidth for a second cable headend (208), the method including the steps of:

25 prioritizing (400) each of the programs by assigning to each of the programs one of a plurality of priority levels, the plurality of priority levels including a high priority level and progressively lower priority levels;

30 dividing (320) the first amount of bandwidth so that each program category receives a portion of the first amount of bandwidth;

forming (320) a first allocation of bandwidth by allocating the first amount of bandwidth to high priority programs in each category;

continuing the forming (400) a first allocation step with the progressively lower priority levels until at least one of the following conditions occurs:

all programs are allocated;

all of the first amount of bandwidth is allocated;

dividing the second amount of bandwidth so that each program category receives a portion of the second amount of bandwidth;

forming (320) a second allocation of bandwidth by allocating the second amount of bandwidth to high priority programs in each category;

continuing the forming a second allocation step with the progressively lower priority levels until at least one of the following conditions occurs:

all programs are allocated;

all of the second amount of bandwidth is allocated;

transmitting the first allocation of bandwidth to the first cable headend (208); and

transmitting the second allocation of bandwidth to the second cable headend (208).

23. The method of claim 18 wherein the step of generating a program control information signal (276) for use by viewers using menus of available programming based on program line-up information includes the steps of:

obtaining and storing (400) program line-up information for each program, the program line-up information comprising, program name, program start time, program duration, program category and program price;

arranging (432) the program line-up information for all programs in a menu configuration;

creating (430) program control information using the program line-up information;

generating (442) a digital program control information data signal using the program control information; and

5 continuously transmitting (292, 294, 296) the digital program control information data signal simultaneously with the programs.

24. The method of claim 18 wherein the step of generating a program control information signal includes generating a program control information signal for  
10 transmission to viewers of a simultaneously transmitted plurality of television programs so that variable video displays of current and future programming can be generated and so that the downstream displays of the television programs can be selected and controlled by the viewers, the method including:

receiving (400) as input data entry, program names, start times  
15 (412), program duration and program category (302, 304, 306, 308, 310, 312) and price (414);

combining (402) the input data with stored marketing data (420, 422) including the frequency with which programs are watched by viewers and the demographics of viewers;

20 weighing (424) the data according to algorithms which assign a weight of importance to each type of data;

generating (430, 432) from the data a program line-up, and program position on menu formats;

displaying (434) the resulting draft menu for editing;

25 editing (436, 400) the menu; and

processing (438) the edited menu to generate (442) the program control information signal for transmission to viewers.

25. The method of claim 24 wherein digital program control information  
30 signal is transmitted to cable franchises and wherein the method further includes:

means (404) for receiving specific information relating to each cable franchise that receives the signal; and

means (404) for creating a customized signal (428) for each cable franchise.

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26. The method of claim 24 wherein the program control information signal also contains information for identifying virtual channels for interactive services (304) and data services (312) available to viewers using service information (503), the method further including the steps of:

10 collecting service information (503) on the data services (312) available; inventorying the interactive services (304) to be made available to the viewer;

assigning a virtual channel for the data services (312) and the interactive services (304);

15 determining method of upstream transmissions for interactive services (304); and

creating a menu for interactive services (304) and data services (312) for later processing.

20 27. The method of claim 18 wherein the step of creating a program line-up includes a method to assist a program packager to create a transmissible data information signal which organizes stored information on television programs available for viewing into program line-ups and generates (442) a program control information signal (276) from the program line-ups to enable selection of television programs for viewing by viewers, the method including the steps of:

25 receiving (400) information on television programs available for viewing;

organizing (430) the information on television programs available for viewing into program line-up information using stored computer instructions including a set of computer instructions for utilizing the stored data to optimize

30 the selection of television programs to be watched by each viewer;

editing (436) the program line-up information;



generating (442) the program control information signal (276) using the program line-up information; and

transmitting (292, 294, 296) the program control information signal (276) as a digital data signal so that the television programs from which a viewer can choose will be displayed for selection by a viewer.

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28. The method of claim 27 further including the steps of gathering of program watched information from viewers, and wherein the organizing step further includes:

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targeting (402) a television program; and

managing (402) the yield of the programs watched information for the targeted program so that the targeted program yields higher programs watched information.

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29. The method of claim 27 wherein at least one of the television programs is a program service including a time limited series of programming offered for a defined time each day for a limited number of calendar days and wherein the program control information signal (276) includes information providing an identification and description of the service, the starting and stopping dates and the times each day that the service can be viewed by the viewers.

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30. The method of claim 18 wherein the step of creating a program line-up includes a method to create program services containing at least one program and an interstitial audio/video for transmission, the method, including the following steps:

25

obtaining (461) one or more programs and interstitial audio/video;

creating (460) events including:

combining (462) one or more programs with one or more interstitial audio/video so that an event is longer than the one or more combined programs; and

30

creating (464) an event identification for recalling the event;

generating program services including:

integrating one or more events using the event identification so that there are no disruptions to the programs or interstitial audio/video;

5 determining (318) calendar days that the program service will be transmitted;

defining (400) time of day that the program service will be transmitted; and

10 transmitting (292, 294, 296) the program service containing the integrated events on the determined calendar days at the defined time.

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31. The method of claim 30 wherein program services are paid for by viewers, the method further including the steps of:

creating a mini-pay consisting of one or more program services; and  
assigning a price to the mini-pay.

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32. The method of claim 18 characterized in that the step of creating a program line-up includes a method for creating near video on demand service using programs wherein the near video on demand service is transmitted from a central location for distribution to subscribers, including:

20 designating (400) a program to be available to subscribers more than once during a day;

evaluating (400) the length of the designated program;

creating (400) program start times using the evaluated length of the program;

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organizing (430) a program line-up with the designated program and the program start times so that the program appears in the program line-up more than once and wherein more than one designated programs is in the program line-up; and

30 wherein the step of generating (442) a program control information signal (276) uses the organized program line-ups.

33. The method of claim 32 wherein programs may be demanded within fifteen minutes, the step of creating program start times includes:

dividing the evaluated program length into multiple fifteen minutes segments and one last segment; and

5 identifying interstitial audio/video to be added to the last segment.

34. The method of claim 32 wherein a monitor is used, the method further characterized by:

10 graphically (438) reorganizing the program line up using a monitor before generating the program control information signal.

35. The method of claim 18 characterized in that the step of creating a program line-up includes a method for creating near video on demand service using programs wherein the near video on demand service is transmitted from a central location for distribution to subscribers, including:

15 designating (400) a program to be available to subscribers more than once;

evaluating (400) the length of the designated program;

20 creating (400) program start times using the evaluated length of the program;

organizing (430) a program line-up using the program start times (412) so that the program appears in the program line-up more than once;

generating (434) a program control information signal using the organized program line-up; and

25 transmitting (292, 294, 296) the program control information signal (276) and the designated program to subscribers, wherein the designated program is transmitted to subscribers at the designated programs start times (412).

36. The method of claim 18 further including method for compiling and using program watched data (420) containing information on programs wherein

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program watched data is received from one or more remote locations, the method further characterized by the steps of:

receiving (402) program watched data;

designating (402) a program for analysis;

5 compiling (402) the received program watched data (420) for the designated program; and

using the compiled program watched data (420) in the formation of a program line-up including:

determining (430) whether the compiled data is favorable for

10 placing the designated program in a particular time slot; and

allotting (430) a time slot for the designated program in the program line up.

37. The method of claim 35 wherein menus having menu space are filled using the program watched data, further characterized by the step of:

15 allocating menu space for the designated program using the program line-up.

38. The method of claim 18 wherein the packaging step includes a method for allocating a given amount of bandwidth for a plurality of television programs from the programs received by the receiving means (272), each of the programs corresponding to one of a plurality of genre categories, the allocation method including the steps of:

25 prioritizing (400) each of the programs by assigning to each of the programs one of a plurality of priority levels, the plurality of priority levels including a high priority level and progressively lower priority levels, whereby programs having a higher priority level will be accepted by systems having a limited bandwidth;

30 dividing the given amount of bandwidth so that each program category receives a portion of the given amount of bandwidth;

allocating (326) the given amount of bandwidth to high priority programs in each category; and

continuing the allocating step with the progressively lower priority levels until at least one of the following conditions occurs:

- 5 all programs are allocated,
- all of the given amount of bandwidth is allocated.

39. An operations center for use by a program packager to provide a television program delivery system, said operations center comprising:

10 a reception port for receiving television programs;  
external collection means for gathering television programs from external sources and feeding television programs from external sources to said reception port;

15 internal collection means, connected to said reception port, for gathering television programs from internal sources and feeding said television programs from internal sources to said reception port;

a converter for converting any of said television programs that are in non-digital format to digital format;

20 packaging means for creating program control information and for packaging said digital format television programs using said program control information, said packaging means comprising:

a central processing unit;

25 an interface, connected to the central processing unit, to enable a program packager to enter program line-up information, wherein said interface is operably connected to said central processing unit;

storage means, connected to the central processing unit, for storing said entered program line-up information;

30 logic means, connected to the central processing unit, for arranging said stored program line-up information and for creating the program control information; and

means, connected to the logic means, for generating a digital program control information signal from the program control information;

5 combining means for creating a combined signal, said combined signal comprising the packaged digital format programs and the digital program control information signal; and

transmission means, operably connected to said packaging means, for transmitting said combined signal.

10 40. The operations center of claim 39, wherein said packaging means comprises means for generating menu configurations; and

said packaging means generates said program control information using said menu configurations.

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41. The operations center of claim 39, said operations center further comprising:

means for receiving unique cable franchise control information from cable franchises;

20 means, connected to the receiving means, for storing said unique cable franchise control information; and

wherein said generating means is connected to the storing means and comprises means for including said unique cable franchise control information in said generated digital program control information signal.

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42. A method for remotely generating a program control information signal for use by viewers using menus of available programming based on program line-up information, said method comprising the steps of:

30 obtaining and storing program line-up information for programs, the program line-up information comprising, program name, program start time, program duration, program category and program price;

arranging said program line-up information for said programs in a menu configuration;

creating program control information using said program line-up information;

5           generating a digital program control information data signal using said program control information; and

continuously transmitting said digital program control information data signal simultaneously with said programs.

10   43.    A method of generating a digital program control data information signal for transmission to viewers receiving a simultaneously transmitted plurality of television programs so that variable video displays of current and future programming can be generated and so that the downstream displays of the television programs can be selected and controlled by the  
15   viewers, the method uses stored marketing data, algorithms, and menus, the method comprising:

receiving input data, including program names, start times, program duration or program category and price;

20           combining the input data with the stored marketing data comprising the frequency with which programs are watched by viewers and the demographics of viewers;

weighing the combined data according to algorithms which assign a weight of importance to each type of data;

25           generating from the weighted data a program line-up and program positions on menu formats resulting in a draft menu;

displaying the resulting draft menu for editing;

editing the draft menu; and

processing the edited menu to generate the digital program control data information signal for transmission to viewers.

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44. The method of claim 43 wherein the digital program control data information signal is transmitted to cable franchises and wherein the method further comprises:

- receiving specific information relating to each cable franchise that  
5 receives the signal; and
- creating a customized signal for each cable franchise.

45. The method of claim 43 wherein the digital program control data information signal also contains information for identifying virtual  
10 channels for interactive services and data services available to viewers using service information, the method further comprising:

- collecting service information on the data services available;
- inventorying the interactive services to be made available to the  
viewer:
- 15 assigning a virtual channel for the data services and the interactive services;
- determining method of upstream transmissions for interactive services; and
- creating a menu for interactive services and data services for later  
20 processing.

46. A method to assist a program packager to create a transmissible data information signal which organizes stored information on television programs available for viewing into program line-ups and generates a  
25 program control information signal from the program line-ups to enable selection of television programs for viewing by viewers, the method comprising:

- receiving information on television programs available for  
viewing;
- 30 organizing the information on television programs available for viewing into program line-up information using stored computer instructions including a set of computer instructions for utilizing stored



data to optimize the selection of television programs to be watched by each viewer;

editing the program line-up information;

5 generating the program control information signal using the program line-up information; and

transmitting the program control information signal as a digital data signal so that the television programs from which a viewer can choose will be displayed for selection by a viewer.

10 47. The method of claim 46 further comprising gathering of program watched information from viewers, and wherein the organizing step further comprises:

targeting a television program; and

15 managing the yield of the programs watched information for the targeted program so that the targeted program yields higher programs watched information.

48. The method of claim 46 wherein at least one of the television programs is a program service comprising a time limited series of programming offered for a defined time each day for a limited number of calendar days and wherein the program control information signal comprises information providing an identification and description of the service, the starting and stopping dates and the times each day that the service can be viewed by the viewers.

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49. A method to create program services containing at least one program and an interstitial audio/video for transmission, comprising:

obtaining one or more programs and interstitial audio/video;

creating events comprising:

30 combining one or more programs with one or more interstitial audio/video so that an event is longer than the one or more combined programs; and

creating an event identification for recalling the event;  
generating program services comprising:

integrating one or more events using the event  
identification so that there are no disruptions to the  
programs or interstitial audio/video;

determining calendar days that the program services  
will be transmitted;

defining time of day that the program  
services will be transmitted; and

transmitting the program services containing  
the integrated events on the determined calendar  
days at the defined time.

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50. The method of claim 49 wherein program services are paid for by  
viewers, the method further comprising:

creating a mini-pay consisting of one or more program services;

and

assigning a price to the mini-pay.

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51. A method for generating a program control information signal for  
near video on demand service using programs wherein the near video on  
demand service is transmitted from a central location for distribution to  
subscribers, comprising:

designating a program to be available to subscribers more than  
once during a day;

evaluating the length of the designated program;

creating program start times using the evaluated length of the  
program;

organizing a program line-up with the designated program and the  
program start times so that the program appears in the program line-up  
more than once and wherein more than one designated program is in the  
program line-up;

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generating the program control information signal using the organized program line up for transmission.

52. The method of claim 51 wherein designated programs may be demanded within fifteen minutes, the step of creating program start times comprises:

dividing the evaluated program length into multiple fifteen minutes segments and one last segment; and

identifying interstitial audio/video to be added to the last segment.

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53. The method of claim 51 wherein a monitor is used further comprising:

graphically reorganizing the program line up using a monitor before generating the program control information signal.

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54. A method for creating near video on demand service using programs wherein the near video on demand service is transmitted from a central location for distribution to subscribers, comprising the steps of:

designating a program to be available to subscribers more than once;

evaluating the length of the designated program;

creating program start times using the evaluated length of the program;

organizing a program line-up using the program start times so that the program appears in the program line-up more than once;

generating a program control information signal using the organized program line-up;

transmitting the program control information signal and the designated program to subscribers, wherein the designated program is transmitted to subscribers at the designated program's start times.

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55. A method for compiling and using program watched data containing information on programs wherein the program watched data is received from one or more remote locations, comprising the steps of:
- receiving the program watched data;
  - 5 designating a program for analysis;
  - compiling the received program watched data for the designated program; and
  - using the compiled program watched data in the formation of a program line-up comprising:
- 10 determining whether the compiled data is favorable for placing the designated program in a particular time slot; and
- allotting a time slot for the designated program in the program line up.
- 15 56. The method of claim 55, wherein menus having menu space are filled using the received program watched data, further comprising the step of:
- allocating menu space for the designated program using the program line-up.
- 20
57. A centralized operating center for packaging a large number of diverse television programs for selective remote display by viewers, the operating center comprising:
- means for receiving television programs in analog or digital
  - 25 format, each having video and audio components;
  - means, connected to the receiving means, for coordinating the receipt of the television programs;
  - input means for receiving input commands and specific information about each of the television programs;
  - 30 database means, connected to the input means, for storing and supplying information about the television programs, comprising:

a central processing unit that analyzes information from the database means and the input means to generate a program control information signal, the signal contains specific identification concerning each television program received by the receiving means, including the date and time of display and the category into which the television program falls;

means, connected to the database means and receiving means, for combining the subset of television programs identified in the program control information signal in preparation for transmission;

multiplexing means, connected to the combining means, for multiplexing the combined television programs and the program control information signal for transmission; and

transmitting means, connected to the multiplexing means, for simultaneously transmitting the multiplexed program control information signal along with the multiplexed television programs so that video displays can be generated from the program control information signal and so that the downstream displays of the television programs can be selected and controlled by the viewers.

58. A centralized operating center for packaging a large number of diverse television programs for selective remote display by viewers using information about television programs, the operating center comprising:

a receiver, wherein television programs are received in analog or digital format, each having video and audio components;

a keyboard, wherein input commands are entered;

a memory, wherein the information about the television programs is stored;

a processor, operably connected to the memory and keyboard, wherein a program control information signal is generated using information stored in the memory and commands entered on the keyboard, the program control information signal containing specific identification

concerning each television program in a subset of television programs received by the receiver, including the date and time of display comprising:

5           a combiner, operably connected to the processor and receiver, wherein the subset of television programs identified in the program control information signal are combined in preparation for transmission;

10           a multiplexer, connected to the combiner, wherein the combined television programs and the program control information signal are multiplexed for transmission; and

15           a transmitter, connected to the multiplexer, wherein the multiplexed program control information signal is simultaneously transmitted along with the multiplexed television programs so that video displays can be generated using the program control information signal and so that the downstream displays of the television programs can be selected and controlled by the viewers.

59.    An operations center for use by a program packager in a television program delivery system, said operations center comprising:

20           a reception port, wherein television programs are received;

          a local video storage database, operably connected to the reception port, wherein television programs are stored;

25           a converter, operably connected to the reception port, wherein television programs that are in not in digital format are converted to digital format;

          a computer assisted packaging system, operably connected to the local storage, wherein program control information is created and digital format television programs are packaged using the program control information, said packaging system comprising:

30           a central processing unit;

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an interface, operably connected to the central processing unit, wherein a program packager may enter program line-up information;

5 a database, operably connected to the central processing unit, wherein the entered program line-up information is stored; and

10 wherein the central processing unit arranges the stored program line-up information and creates the program control information and generates a program control information signal from the program control information;

a combiner, connected to the computer assisted packaging system, wherein a combined signal is created, the combined signal comprising the packaged digital format programs and the program control information signal; and

15 a transmitter, operably connected to the combiner, for transmitting said combined signal.

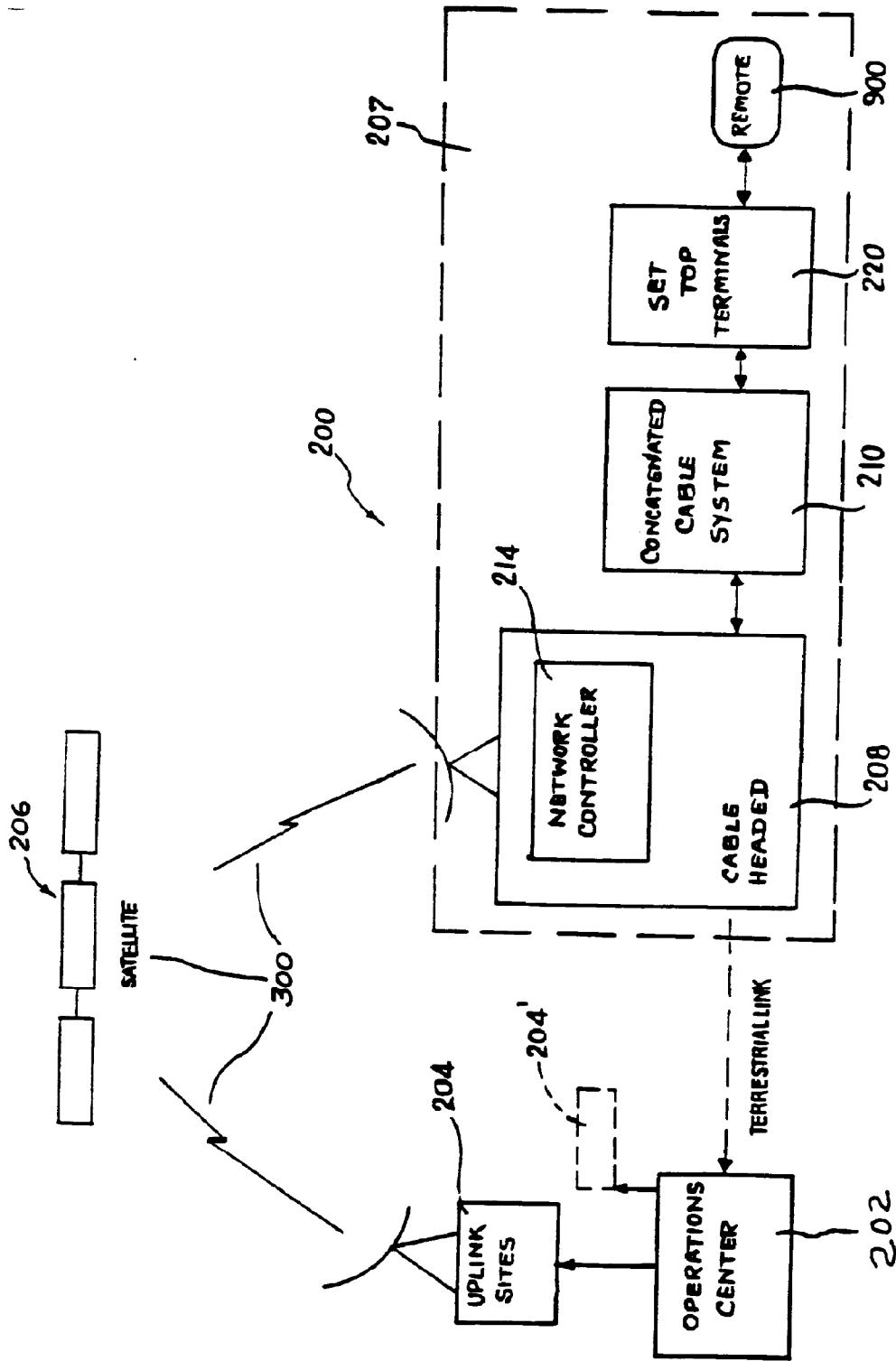


Fig. 1

SUBSTITUTE SHEET (RULE 26)



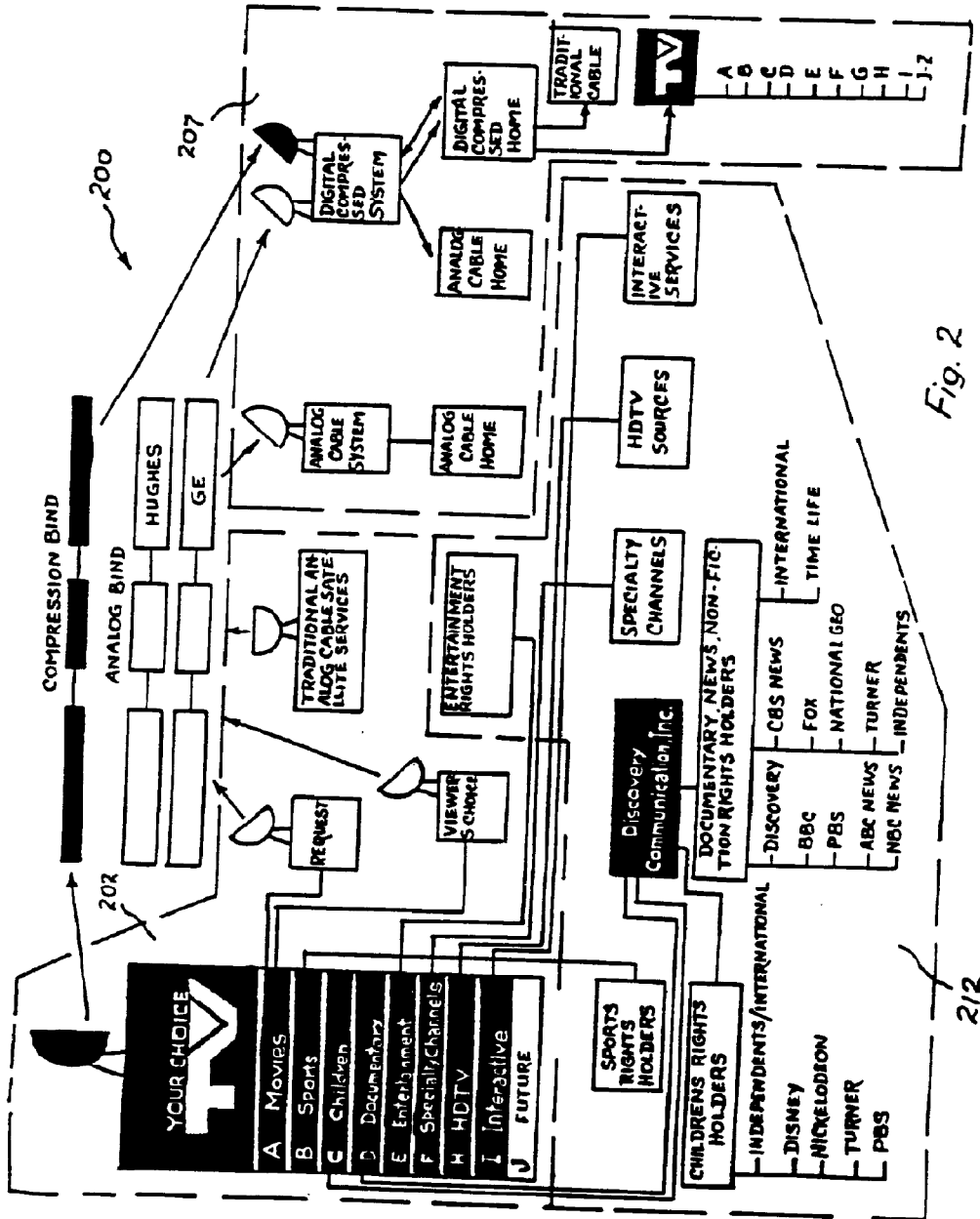


Fig. 2

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SUBSTITUTE SHEET (RULE 26)

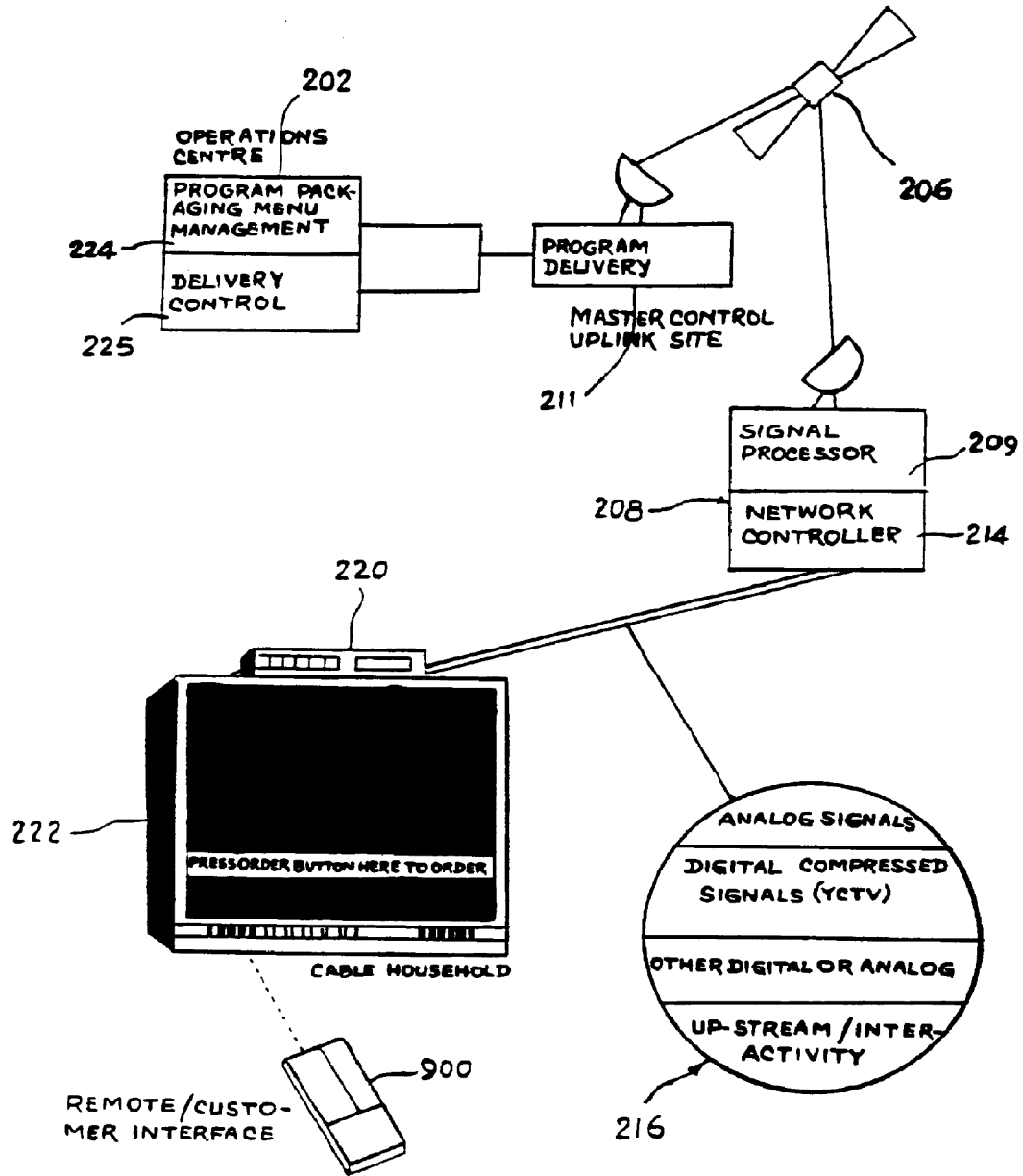


Fig. 3

SUBSTITUTE SHEET (RULE 26)

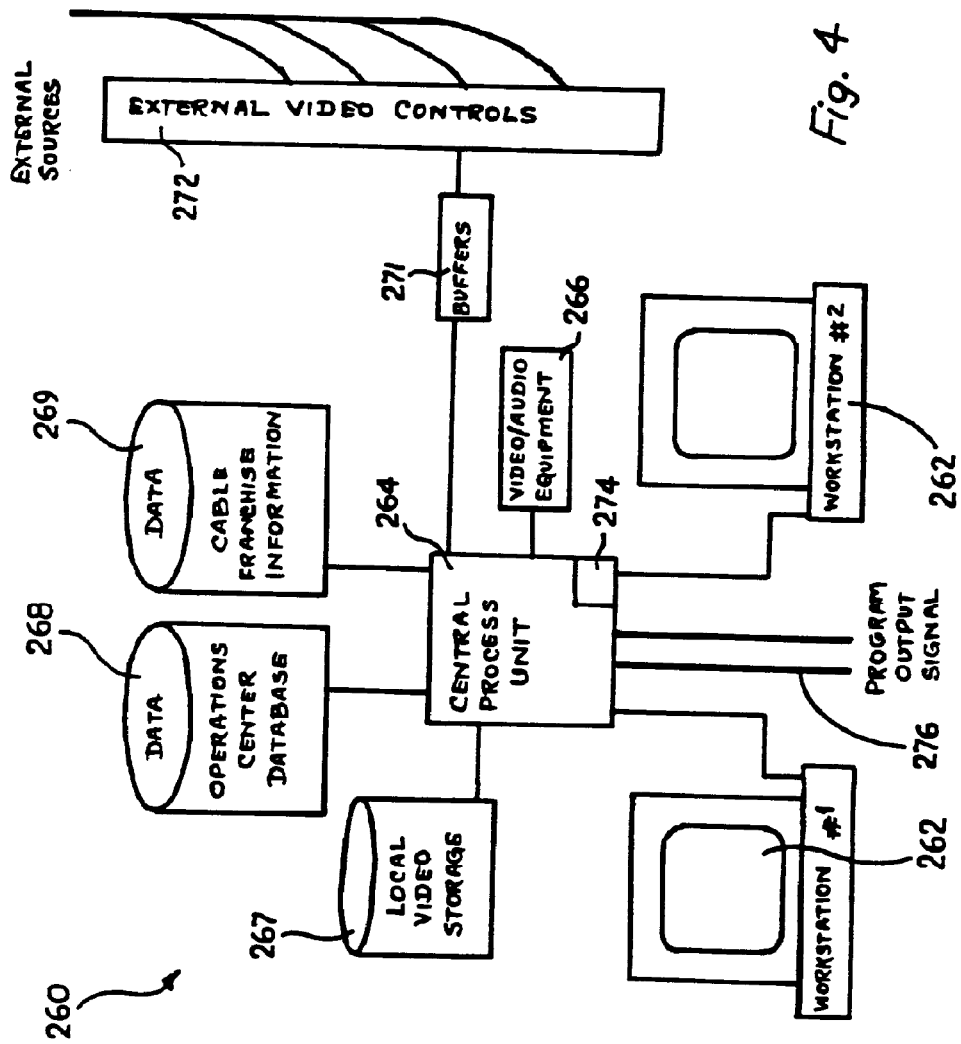
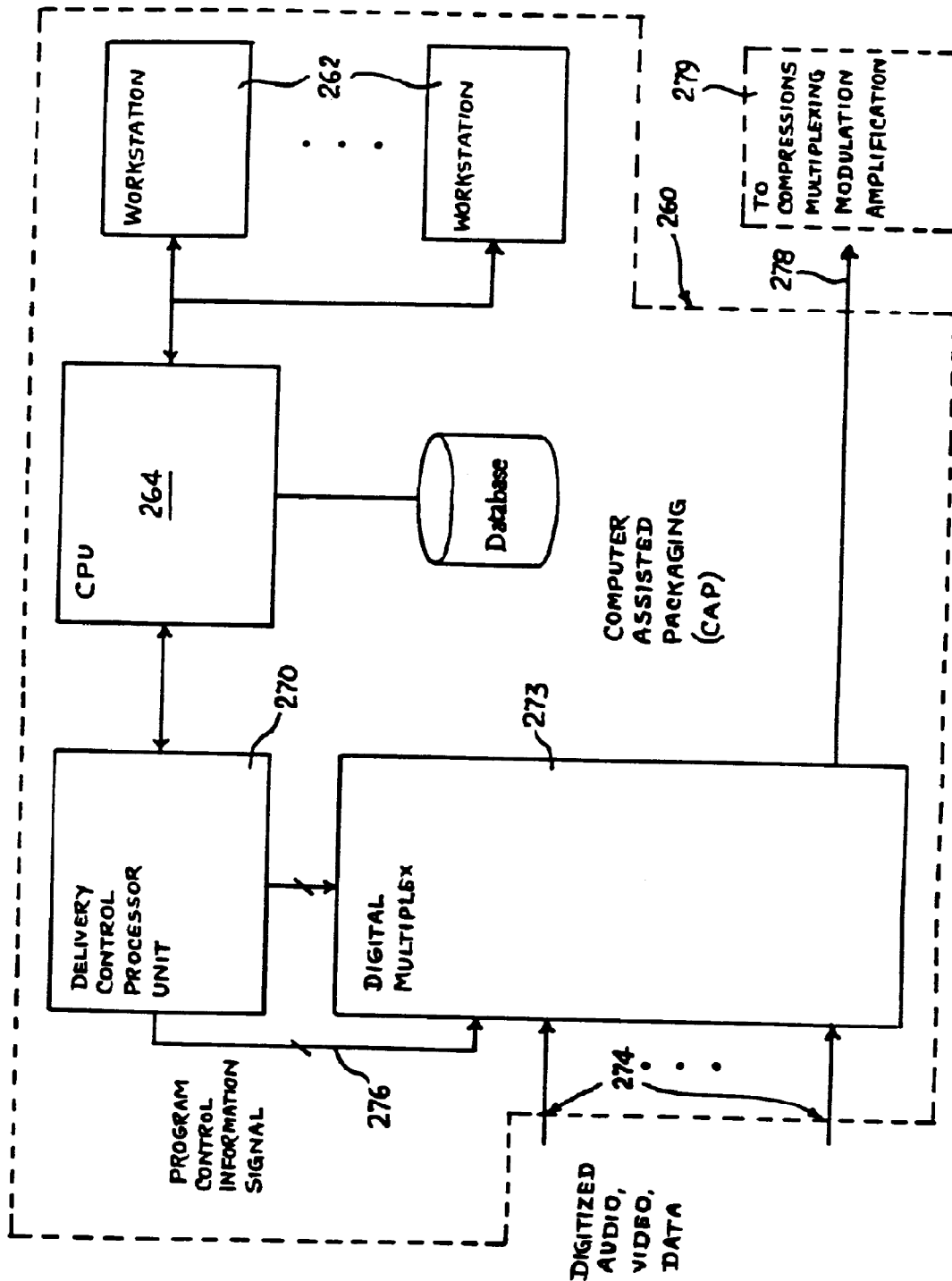
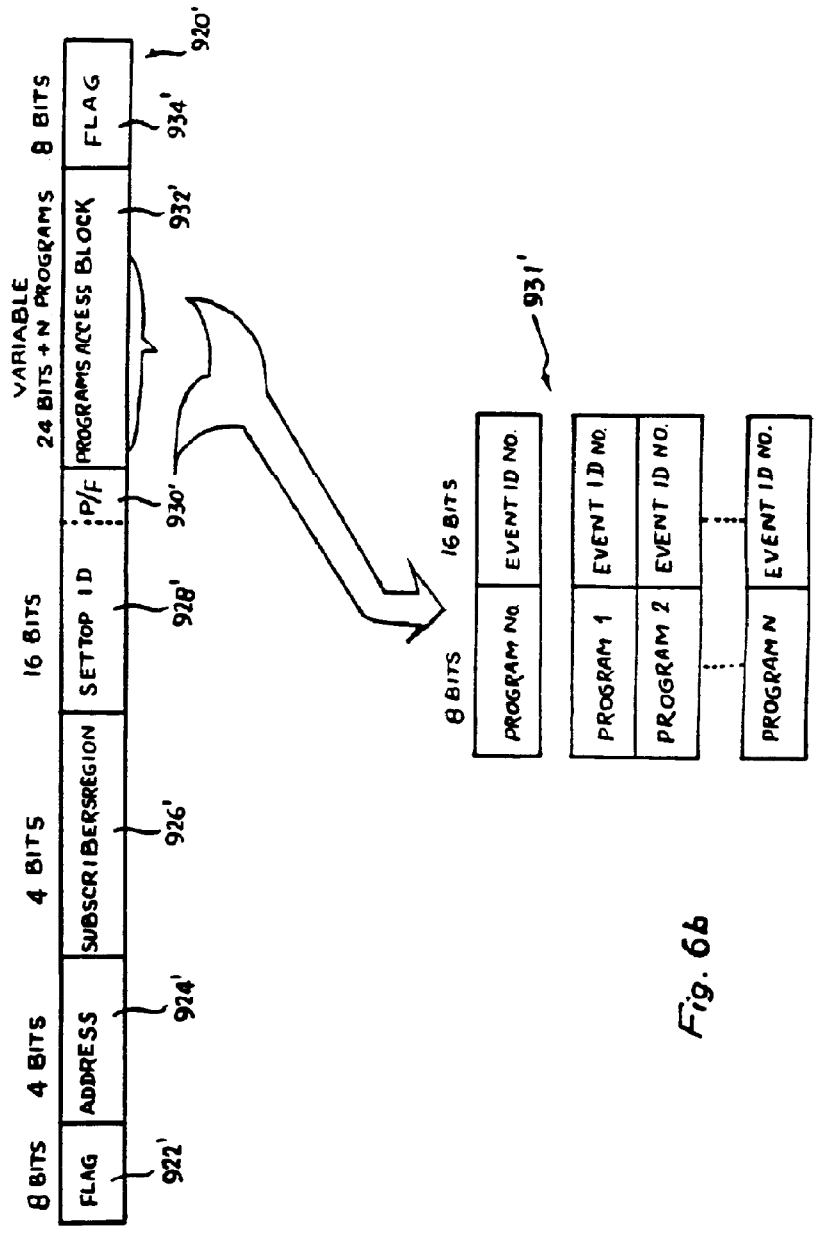
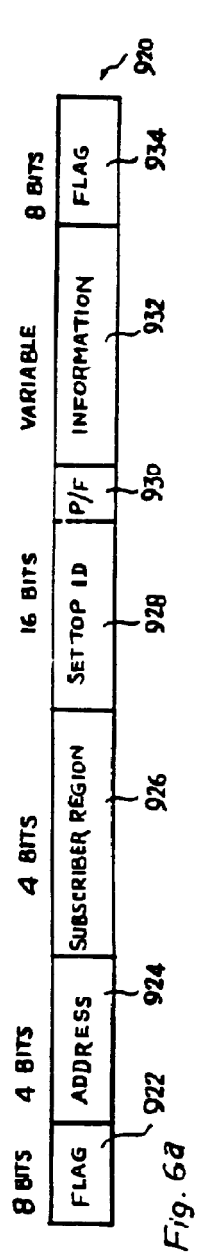


Fig. 4

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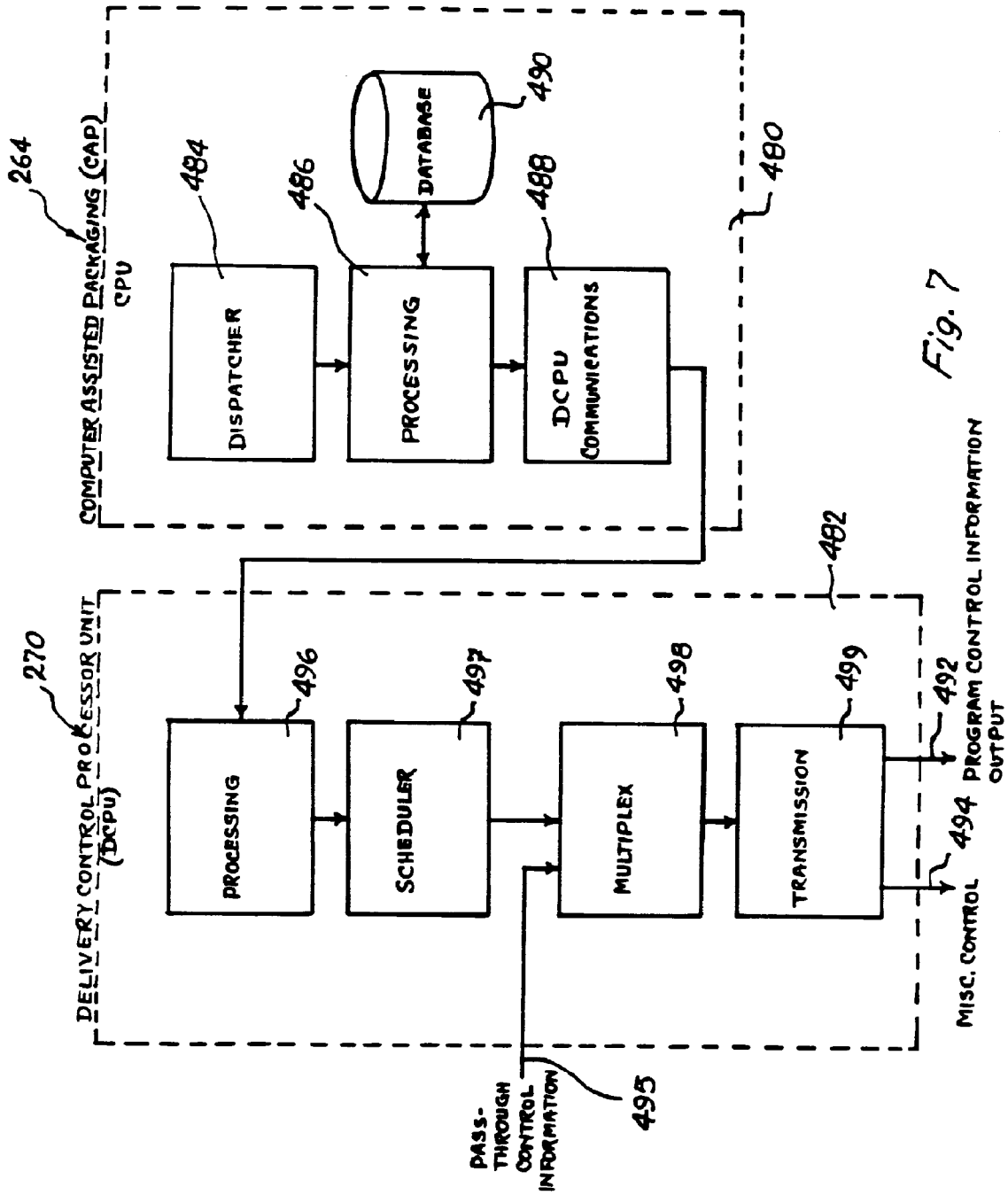


Fig. 7

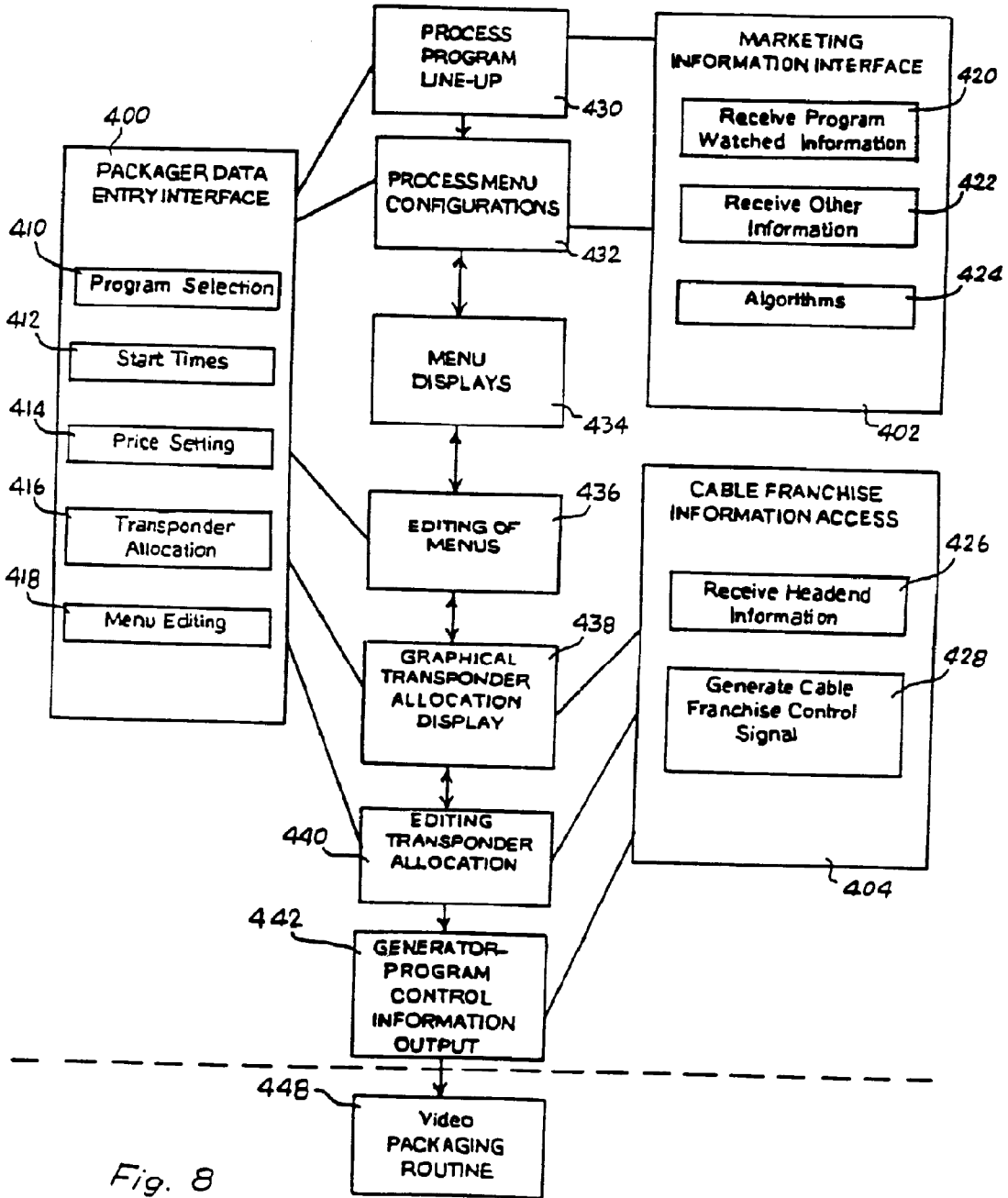


Fig. 8

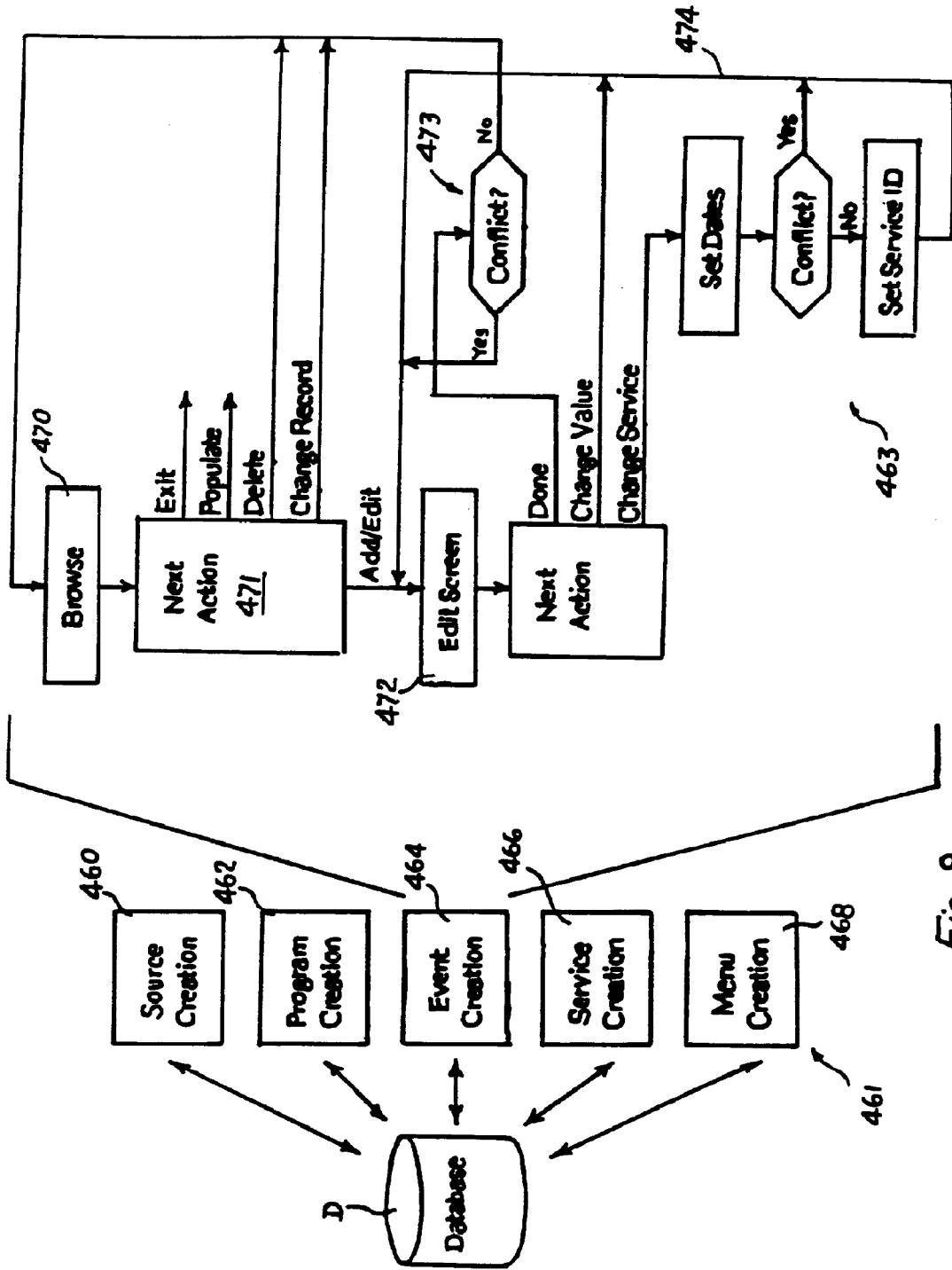


Fig. 9

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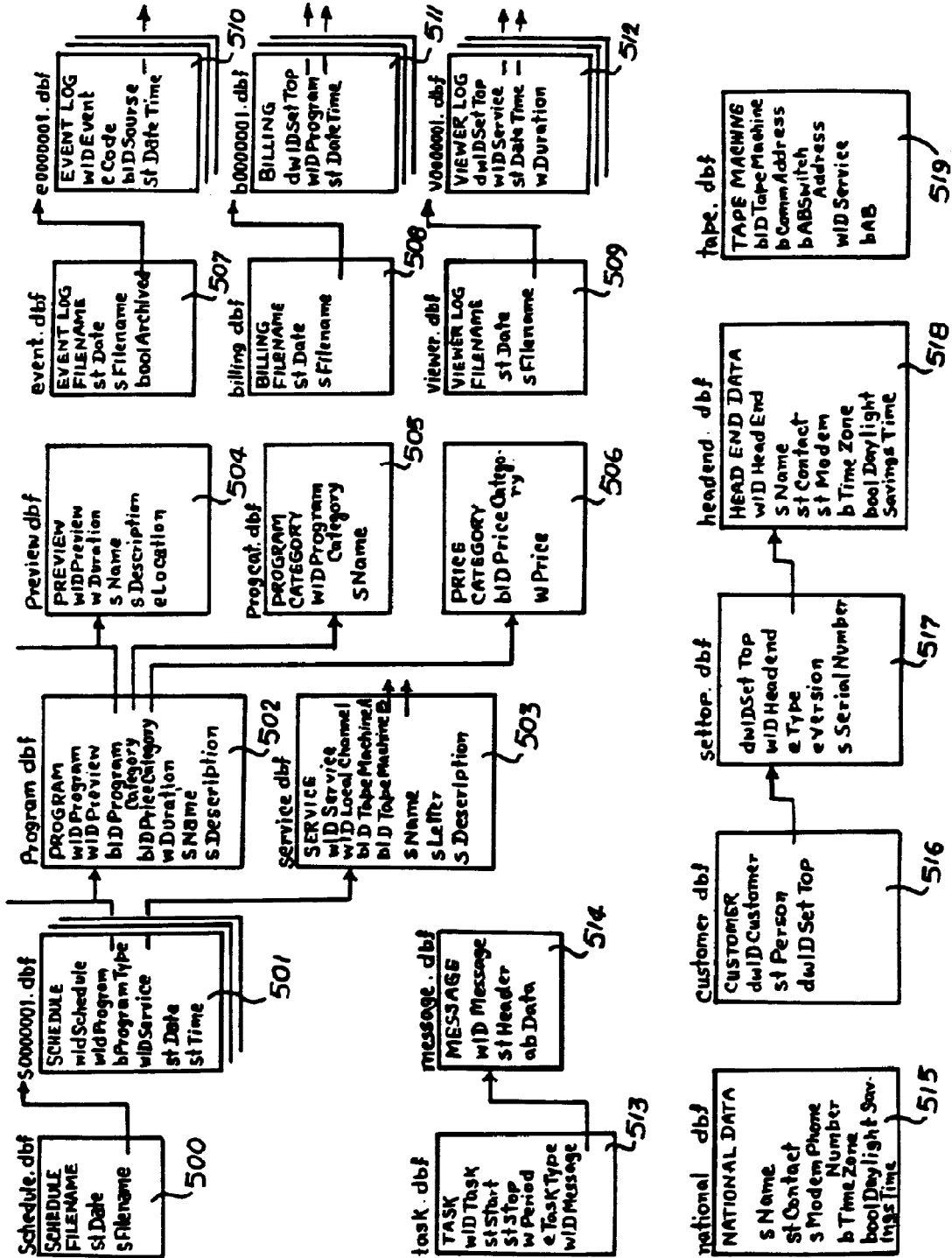


Fig. 10

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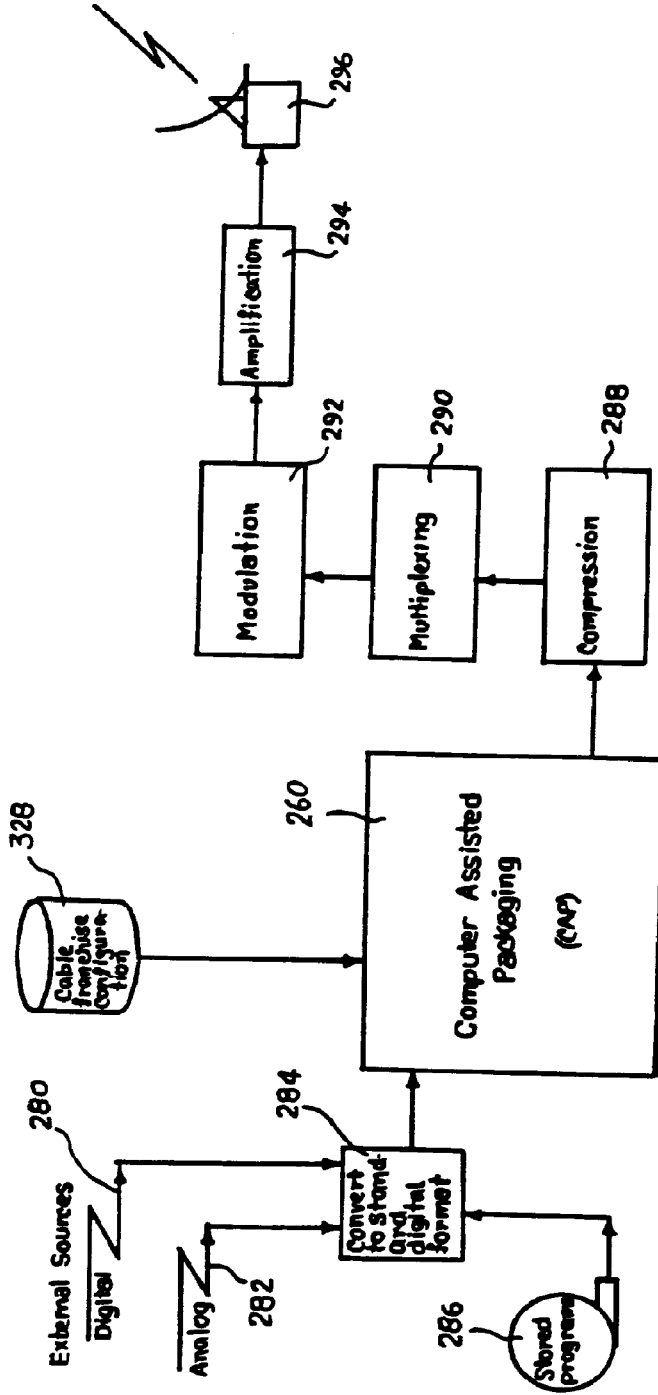


Fig. 11

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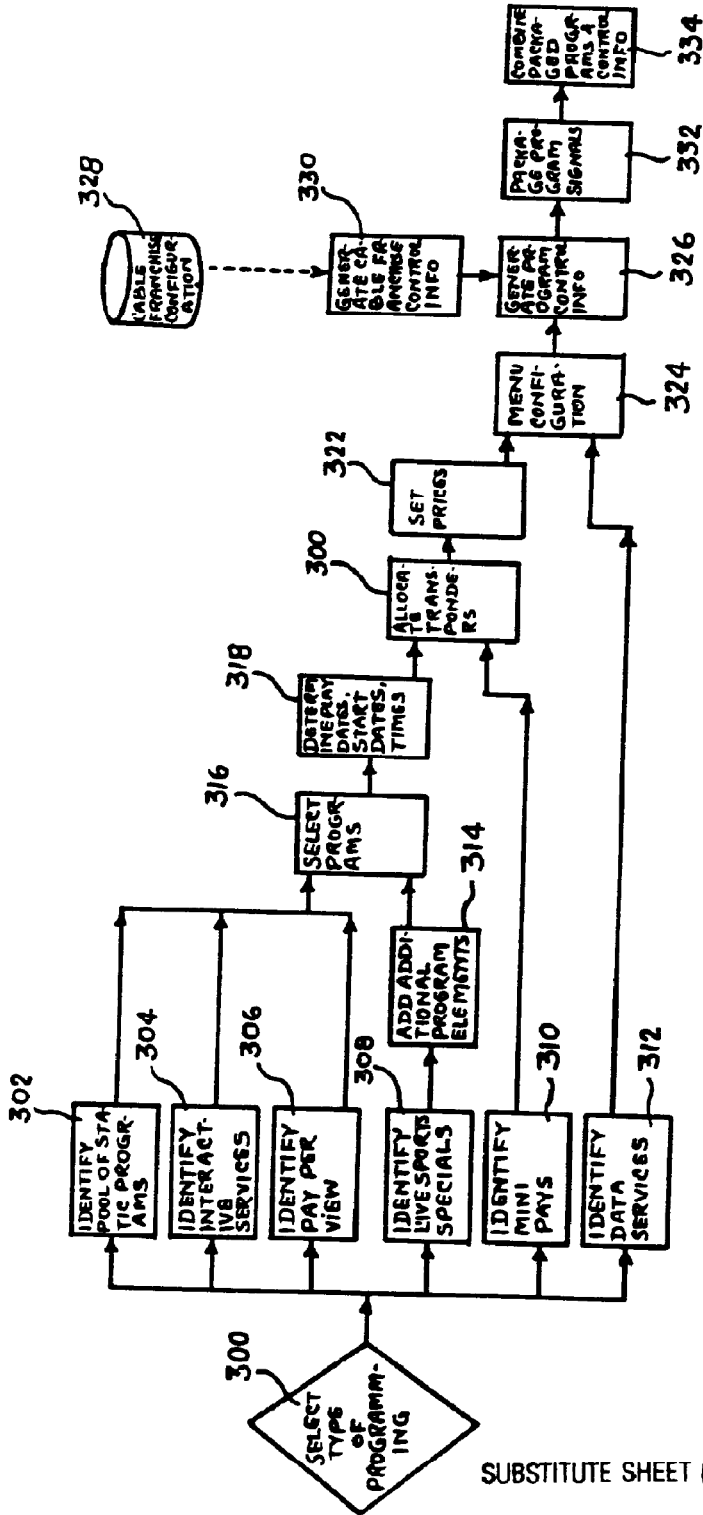


Fig. 12

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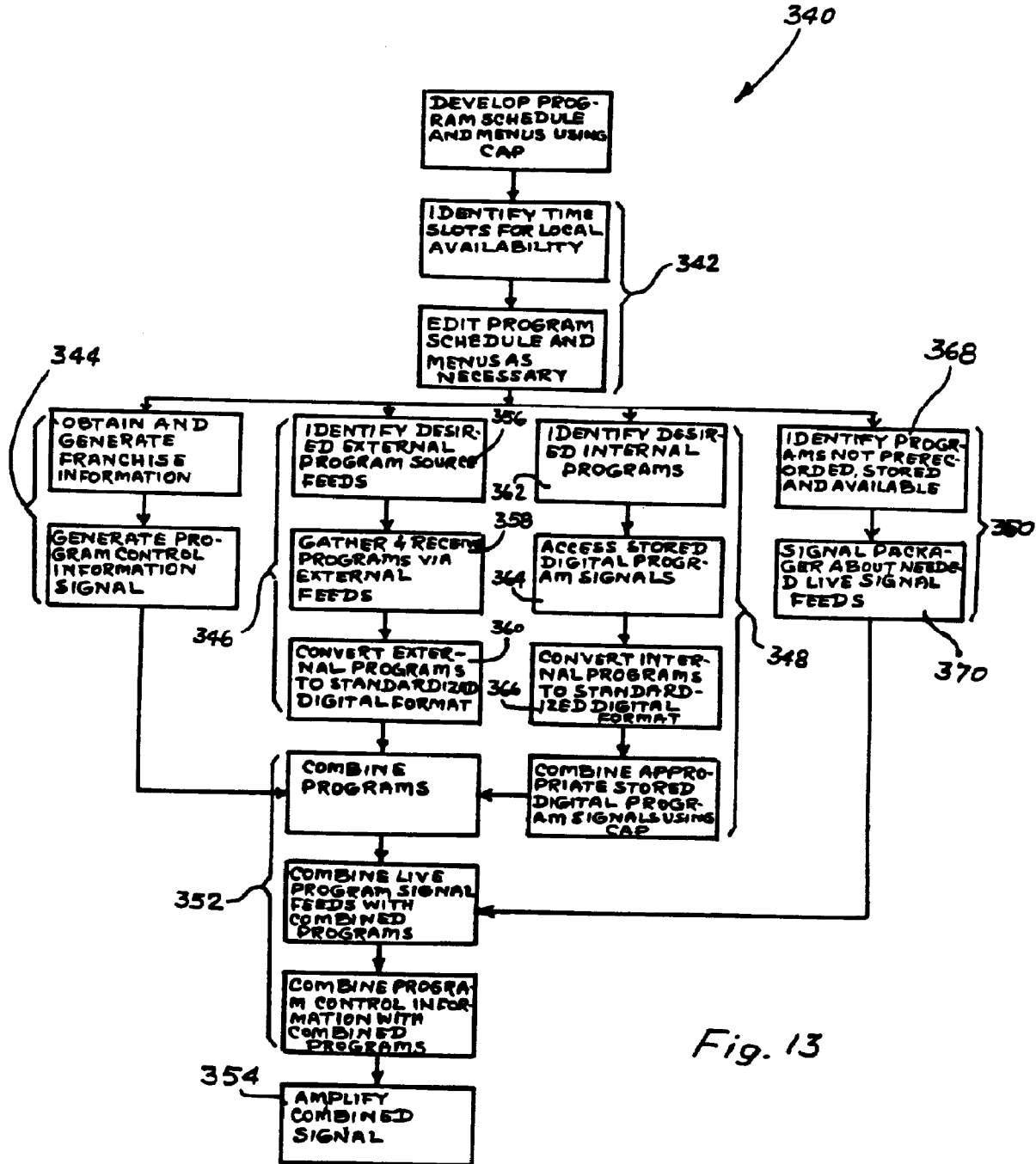


Fig. 13

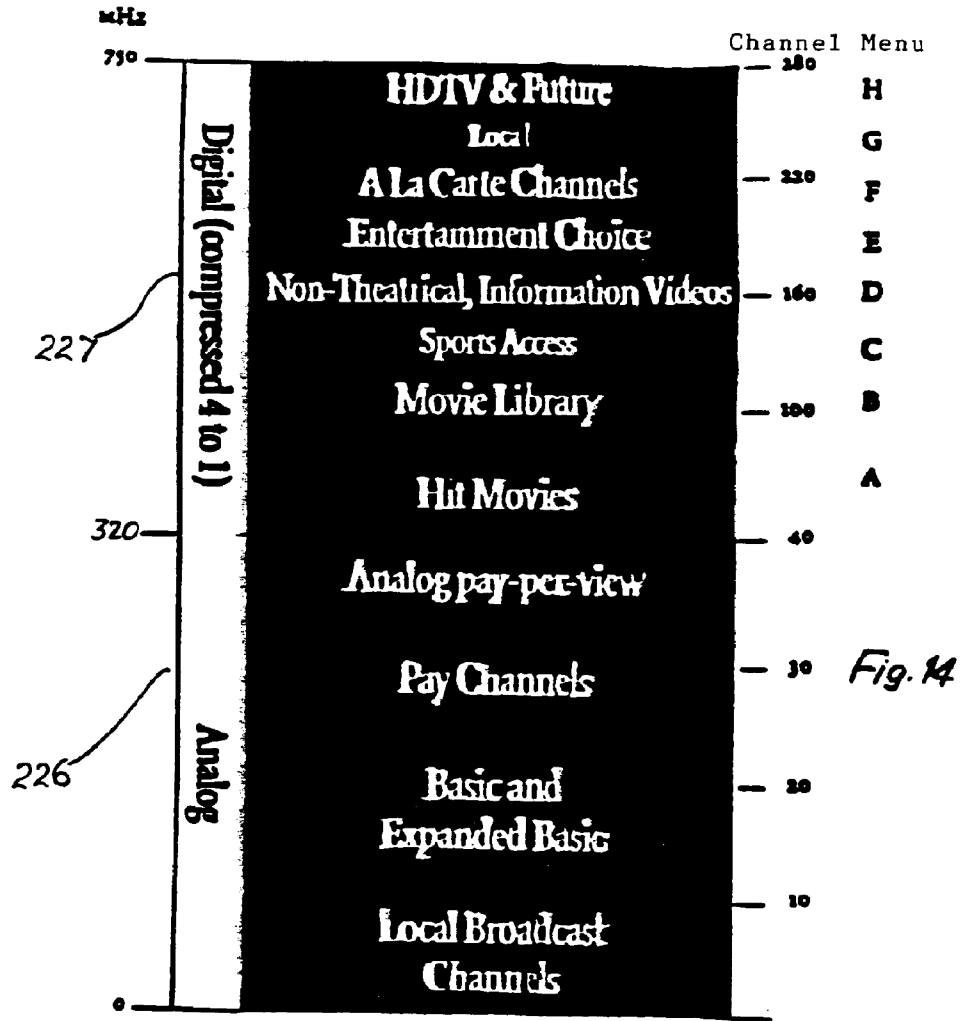


Fig. 14

CHANNEL MENU	PROGRAMMING CATEGORY	CHANNEL ALLOCATED
A	Movies	50
B	Sports	2
C	Childrens	3
D	Documentary	14
E	Entertainment	10
F	Specialty Channels	15
G	Local	N/A
H	HDTV	4
I	Interactive	2
	COMBINED	100

Fig. 15

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SATELLITE MOVIE OPTIONS

VCTV Combo	Comp. Ratio	AVAILABLE MENUS (1, 2, & 3)	PRIORITY ONE MENUS	PRIORITY ONE PLUS TWO MENUS
1	8:1	HIT MOVIES 8 movie Selections with start times every 15 minut	HIT MOVIES 6 movie Selections with start times every 30 minutes	HIT MOVIES 6 movie Selections with start times every 15 minutes
2	8:1			
3	8:1			
4	8:1			
5	8:1			
6	8:1			
7	8:1			
8	8:1			
9	4:1	SPORTS 8 Selections	SPORTS 4 Selections	SPORTS 4 Selections
10	4:1			
11	8:1	CHILDRENS 8 Selections	CHILDRENS 4 Selections	CHILDRENS 4 Selections
12	8:1	DOCS/NEWS 8 Selections	DOCS/NEWS 4 Selections	DOCS/NEWS 4 Selections
13	8:1	ENTERTAINMENT 8 Selections	ENTERTAINMENT 6 Selections	ENTERTAINMENT 6 Selections
14	8:1	SPECIAL INTEREST CHANNELS 16 Selections	SPECIAL INTEREST CHANNELS 8 Selections	SPECIAL INTEREST CHANNELS 8 Selections
15	8:1			
16	8:1	Promos (1/6 Screen) 48	Promos (1/6 Screen) 48	Promos (1/6 Screen) 48
17	8:1 or max	Data Stream	Data Stream	Data Stream
18	8:1 or max	MUSIC 32 digitized Station	MUSIC 32 digitized Station	MUSIC 32 digitized Station

Fig. 16

244

240

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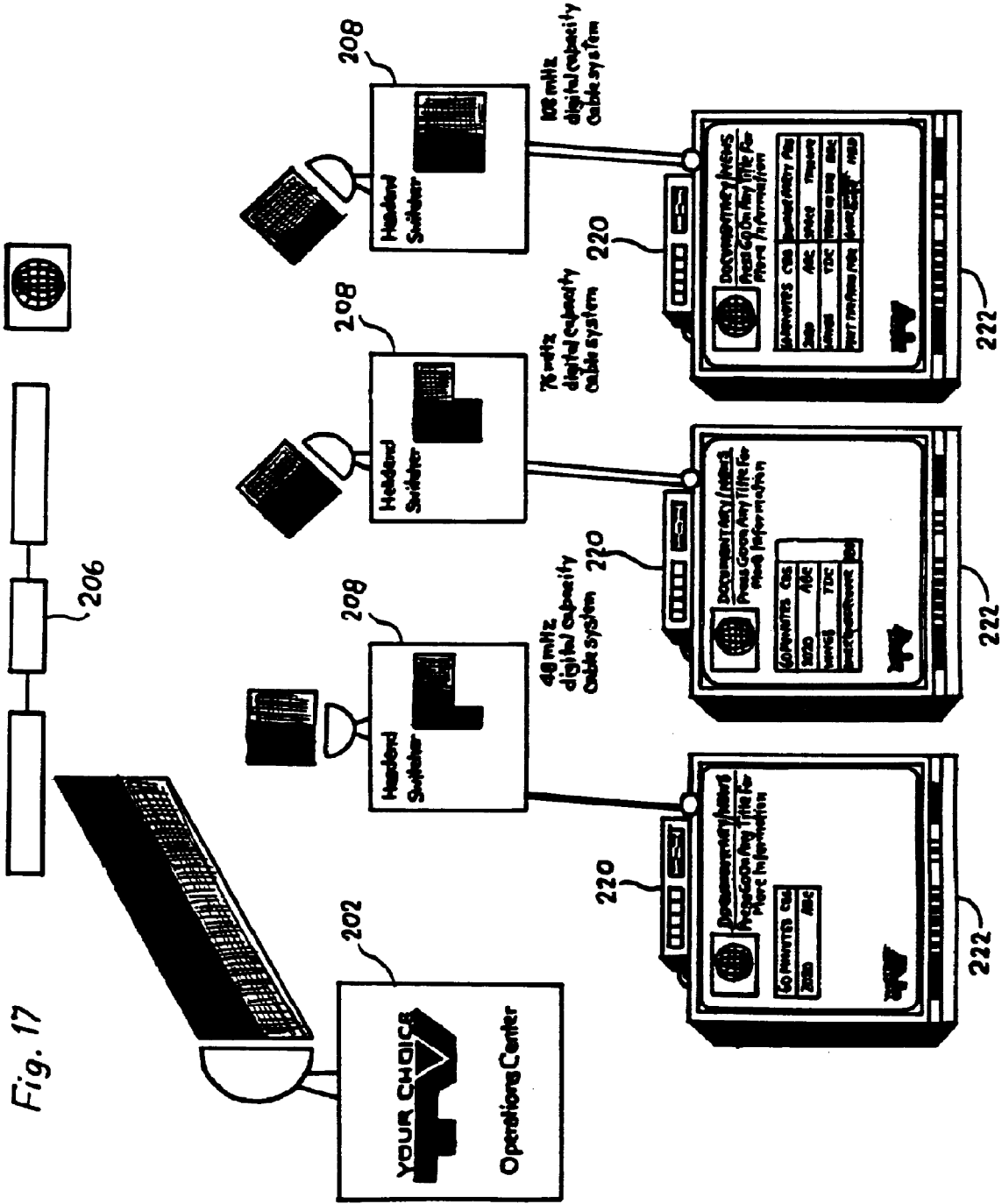


Fig. 17

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VCTV Combo	Comp. Ratio	TYPICAL WEEKDAY PRIME	SATURDAY AFTERNOON IN OCTOBER
1	8:1	Hit Movies 8 movies	Hit Movies 8 movies
2	8:1	Selections with start	Selections with start
3	8:1	Times every 15 minutes	Times every 15 minutes
4	8:1		
5	8:1		
6	8:1		
7	8:1		
8	8:1		
9	4:1	Sports 8 Selections	Sports 16 Selections
10	4:1		
11	8:1	Children's 8 Selections	Children's 8 Selections
12	8:1	Doc/News 8 Selections	Doc/News 8 Selections
13	8:1	Entertainment 8 Selections	Entertainment 8 Selections
14	8:1	Special Interest Channels 16 Selections	Special Interest Channels 8 Selections
15	8:1		
16	8:1	Premier CDS every 45	Premier CDS every 45
17	8:1 or max.	Data Stream	Data Stream
18	8:1 or max.	Music 24 Digital Albums	Music 24 Digital Albums

251

253

250

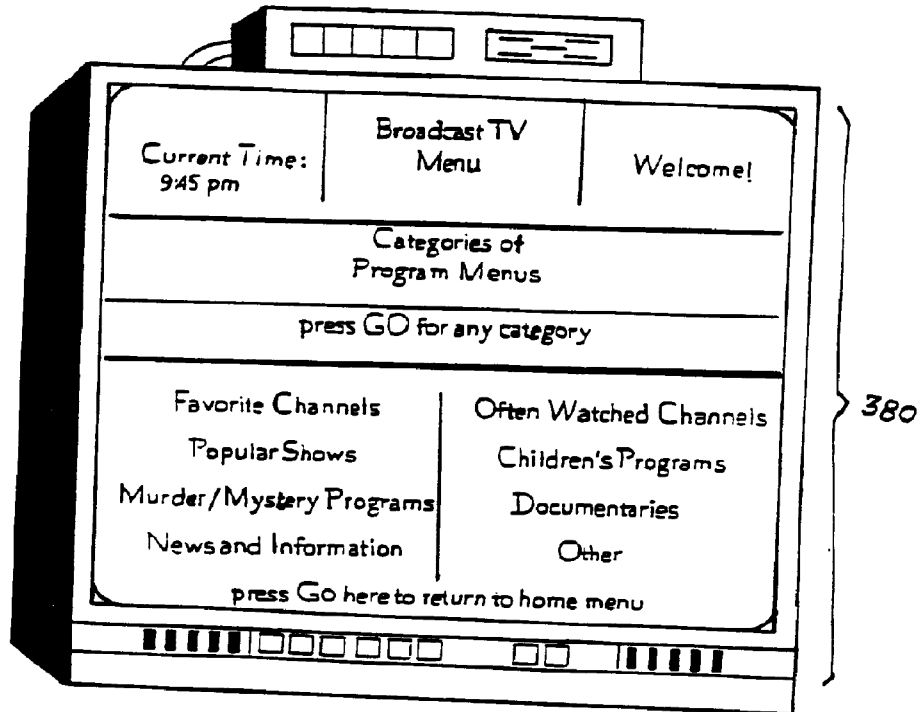
252

Fig 18

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Fig. 19



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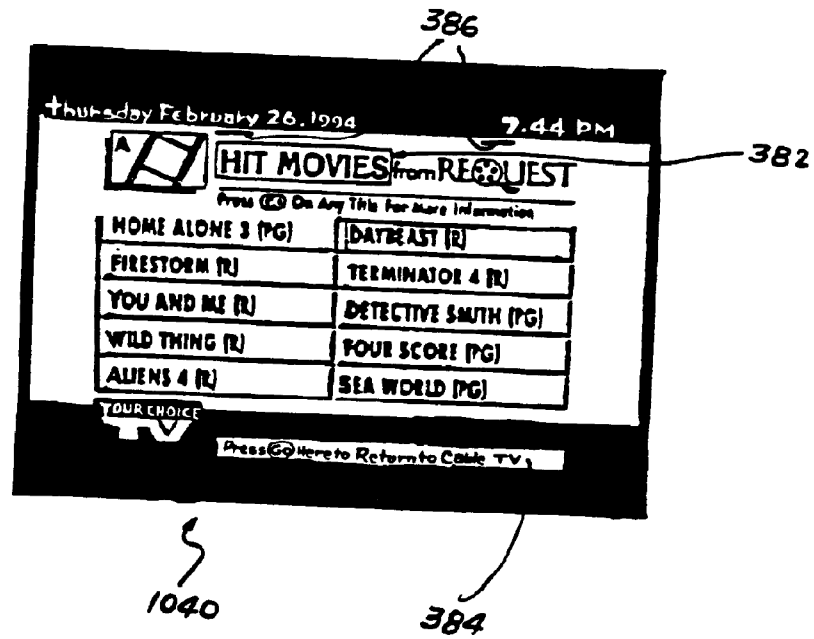
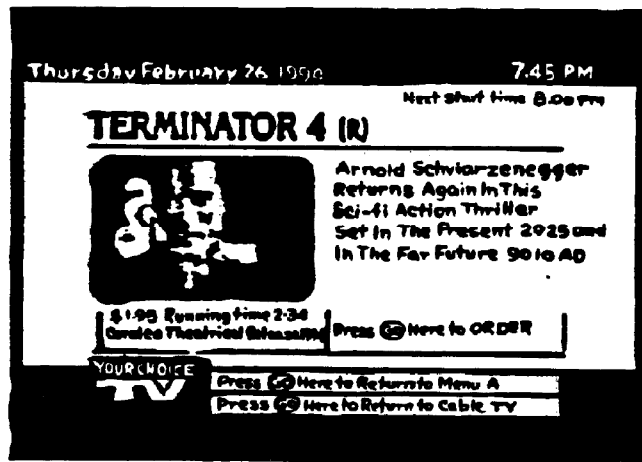


Fig. 20

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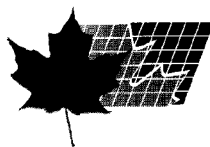
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↑  
1120

Fig. 21

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(19) (CA) **APPLICATION FOR CANADIAN PATENT** (12)

(54) **Electronic Program Guide and Text Channel Data  
Controller**

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(30) (US) 08/072,911 1993/06/07

(57) 34 Claims

**Notice:** This application is as filed and may therefore contain an  
incomplete specification.

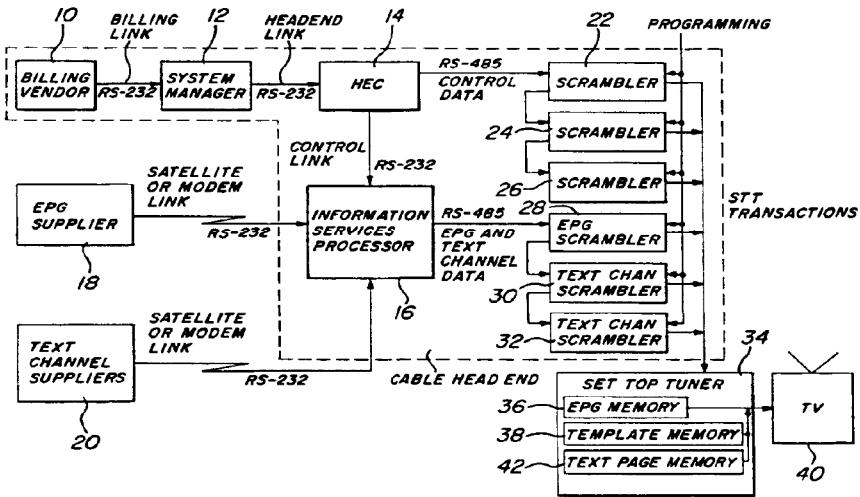




INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

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<p>(21) International Application Number: PCT/US94/06361 (22) International Filing Date: 6 June 1994 (06.06.94) (30) Priority Data: 08/072,911 7 June 1993 (07.06.93) US (71) Applicant: SCIENTIFIC-ATLANTA, INC. [US/US]; One Technology Park, P.O. Box 105600, Atlanta, GA 30348 (US). (72) Inventors: HAMILTON, Scott; 3069 Mill Run Court, Duluth, GA 30136 (US). HAMAN, Ray, Thomas; 3937 Whitney Place, Duluth, GA 30136 (US). DURDEN, Gregory, Steven; 9407 Terri Lane, Jonesboro, GA 30236 (US). CHRISTENSEN, Jan, L.; 4872 NW 8th Court, Plantation, FL 33317 (US). PAULICK, Melvin; 1751 SW 44th Avenue, Gainesville, FL 32608-4061 (US). (74) Agents: ROCCL, Steven, J. et al.; Woodcock Washburn Kurtz Mackiewicz &amp; Norris, 46th floor, One Liberty Place, Philadelphia, PA 19103 (US).</p>	<p>(81) Designated States: AU, BB, BG, BR, BY, CA, CN, CZ, FL, HU, JP, KP, KR, KZ, LK, LV, MG, MN, MW, NO, NZ, PL, RO, RU, SD, SI, SK, TT, UA, UZ, VN, European patent (AT, BE, CH, DE, DK, ES, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, ML, MR, NE, SN, TD, TG).  <b>Published</b> With international search report.</p>	

(54) Title: ELECTRONIC PROGRAM GUIDE AND TEXT CHANNEL DATA CONTROLLER



(57) Abstract

A data controller (16) which manages the flow of text and electronic program guide (EPG) information to a cable television viewer. The data controller (16) receives text and EPG information from one or a plurality of authorized data sources (20) via a communications link, processes the received data in its internal database manager to perform data compression and the like, and then transmits this text information to the viewer under control of the head end controller (34). In a preferred embodiment, the text data is formatted on a screen basis into transactions of a predetermined length and the EPG data is formatted on a program basis into transactions of the same length. The transactions are then inserted into the vertical blanking interval of a channel to which the corresponding text or electronic program data has been assigned.

**ELECTRONIC PROGRAM GUIDE AND TEXT CHANNEL DATA CONTROLLER****BACKGROUND OF THE INVENTION****Field of the Invention**

The present invention relates to a data controller  
5 which manages the flow of text and electronic program guide  
data from the data supplier to the viewer's television tuner.  
In particular, the data controller of the invention accepts  
electronic program guide and text data from one or more local  
or remote sources, processes the data in its internal  
10 database manager, and formats the data for transmission to  
the viewer's television tuner preferably via the vertical  
blanking intervals of existing cable television channels.

**Description of the Prior Art**

Television text data services are readily  
15 available. Such services provide sports, weather, stock  
market, news, advertising and other information to the  
viewer's television for display to the viewer. Typically,  
the text data is provided to the cable head end by the text  
data service providers and then provided to the viewer via  
20 dedicated cable channels provided at the cable head end. At  
the cable head end, the text data from the different text  
data service providers is assigned to respective cable  
television channels available to the viewers, converted into  
a video signal, and then transmitted to the viewer's  
25 television via the assigned cable television channel in place  
of other programming. The viewer then tunes to the assigned  
cable television channel to receive the transmitted text  
data. Unfortunately, this technique wastes valuable video  
bandwidth for the transmission of the text data and is thus

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generally undesirable. Also, since the cable head end operator must create a video signal from the text data provided by the service providers prior to transmission of the text data to the viewer, the existing technique for  
5 providing text data to a viewer is quite tedious and expensive. A more efficient text data service is desired.

Other techniques for providing text data to viewers are known in the art. For example, closed captioned encoding techniques are used to transmit text data in synchronization  
10 with its associated video data by inserting the closed captioned text data into the vertical blanking interval of the video signal. In this manner, not only can synchronization be preserved, but also, additional bandwidth is not necessary for the transmission of the text data.  
15 However, the closed captioned text data must be inserted into the vertical blanking interval of the video signal by the producer of the video programming. As a result, the vertical blanking interval of the video signal cannot be used by the head end operator to insert other text data such as sports,  
20 weather, stock market, news, advertising and the like. An improved text data transmission technique is desired whereby such general text data may be inserted into the video signal at the cable head end for transmission to the viewer.

It is also known in the art to provide an  
25 electronic program guide (EPG) which provides the viewer with an on-screen listing of the upcoming television programs on the cable television channels available to the viewer. Typically, the EPG is provided by an EPG data service and the EPG data is converted into a video signal at the cable head  
30 end and transmitted to the viewer's television via a dedicated cable television channel. After tuning to the dedicated cable television channel, the viewer then must passively wait until the programming for the desired time period is displayed. In other words, this technique provides  
35 no mechanism for allowing the viewer to scroll through the EPG to the desired listing. Moreover, this technique also requires the cable head end operator to dedicate a separate

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cable television channel to the EPG data and to create video signals from the EPG data provided by the EPG service providers.

These problems with the transmission of EPG data  
5 have been addressed in the prior art by modulating the EPG data onto an FM carrier and transmitting that FM carrier with a video signal on one of the cable television channels. A dedicated peripheral device provided at the viewer's television tuner demodulates the EPG data from the FM carrier  
10 and stores the EPG data until the viewer requests presentation of the EPG data on the viewer's television. Upon selection of the EPG data, the EPG is displayed on the viewer's television in place of the other video programming. Since the EPG data is stored locally at the viewer's  
15 television, the viewer may scroll through the listings in the EPG until the desired listing is reached. While this technique does not require a separate dedicated cable television channel for the transmission of the EPG and allows the user to scroll through the EPG, an improved EPG  
20 transmission technique is desired which can be integrated with the viewer's normal cable television tuner so that a separate peripheral device dedicated to reception of the EPG is not necessary. Also, it is desired that the EPG data transmission be combined with the text data transmission to  
25 maximize efficiency.

In addition, it is also known to amplitude modulate the audio carrier or to frequency modulate an out-of-band carrier with control and authorization information from the head end controller for transmission to the viewers' cable  
30 television tuners. However, it is desired that the transmission of the control and authorization information also be integrated with the text data and EPG data transmission so that a single common data transmission/reception scheme may be used.

35 The present invention has been designed to meet these needs in the art.



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**SUMMARY OF THE INVENTION**

The present invention relates to a data controller which manages the flow of text data and electronic program guide (EPG) data to a cable television viewer. The data controller of the invention receives text data and EPG data from one or a plurality of local or remote data sources via a communications link, processes the received data in its internal database manager to perform data compression and the like, and then provides this text data and EPG data to the viewer under control of the head end controller. In a preferred embodiment, the text data and EPG data are inserted into the vertical blanking intervals of cable television channels to which the corresponding text data or EPG data has been assigned, and upon receipt at the viewer's television tuner, the text data and EPG data are extracted from the vertical blanking interval and displayed on the viewer's television. Hence, text channels and one or more EPG channels may be provided as "virtual channels" which do not require extra video bandwidth.

Preferably, the viewer's cable television tuner includes an EPG memory for storing the EPG data at the viewer's television tuner to allow the viewer to scroll through the stored EPG data to the desired listings. Also, a template memory is preferably provided at the tuner to provide a framework in which to display the EPG data. Also, the EPG data is formatted into transactions including display commands and the like so that the EPG data may be transmitted directly to the viewer's television tuner as data rather than video, thereby saving a substantial amount of bandwidth.

In addition, the text data is also formatted into transactions including display commands and the like and transmitted to the viewer's television tuner on a screen by screen basis with an appropriate delay between the presentation of each page as designated by the system controller. Such auto-pagination makes it unnecessary for the user to request the pages to scroll; however, manual

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pagination may be provided by using memory at the set top tuner for storing successive pages of text data.

#### **BRIEF DESCRIPTION OF THE DRAWINGS**

The above and other objects and advantages of the invention will become more apparent and more readily appreciated from the following detailed description of the presently preferred exemplary embodiment of the invention taken in conjunction with the accompanying drawings, of which:

FIGURE 1 is a block diagram of a system for providing EPG data and text data to a viewer in accordance with the invention.

FIGURE 2 illustrates a data controller for receiving the EPG data and text data from the data providers, appropriately formatting that data for display, and inserting the data into the vertical blanking interval of a cable television channel to which the data is assigned for transmission to the viewer.

FIGURE 3 illustrates the information field of the EPG data read from the EPG database of Figure 2.

FIGURE 4 illustrates the data format of data read from the database for insertion into the assigned cable television channel.

FIGURE 5 is a flow chart illustrating the operation of the EPG transaction formatter of Figure 2.

FIGURE 6 is a flow chart illustrating the operation of the text transaction formatters of Figure 2.

FIGURE 7 illustrates a set top tuner for use in receiving text data and EPG data in accordance with the invention.

#### **DETAILED DESCRIPTION OF THE PRESENTLY PREFERRED EMBODIMENT**

An electronic program guide (EPG) and text channel data controller which affords the above-mentioned and other beneficial features in accordance with a presently preferred exemplary embodiment of the invention will be described below with reference to Figures 1-7. Those skilled in the art will readily appreciate that the description given herein with

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respect to those figures is for explanatory purposes only and is not intended in any way to limit the scope of the invention. For example, while a cable television system is shown and described, the present invention may also be used  
5 in a satellite, over-the-air broadcast, subscription television system or other television system known in the art. Also, while the present invention is described for use in the provision of sports and weather text channels, those skilled in the art will appreciate that these text channels  
10 are only examples of the limitless types of text channels which may be provided to a viewer in accordance with the invention. Accordingly, any questions regarding the scope of the invention should be resolved by referring to the appended claims.

15           Figure 1 illustrates an EPG and text information service in accordance with the invention. As shown, the local cable television company's billing vendor 10 communicates via a billing link to an RS-232 port of a system manager 12 located at the cable head end. Billing vendor 10  
20 includes a subscriber database and generates a monthly bill for the subscribers in the system based on the level of service and any pay-per-view purchases. Billing vendor 10 may comprise a personal computer or other data processing device known in the art. Billing vendor 10 informs system  
25 manager 12 as to which cable television subscribers are authorized to receive the available cable television channels. System manager 12 is also a personal computer or other processing device which receives viewer authorization transactions from billing vendor 10 and generates  
30 transactions for delivery to the distribution apparatus or the subscribers. Such transactions include text channel definition transactions which instruct the subscriber's tuner which group of channels it is entitled to receive, which frequency to tune for a particular text data channel, whether  
35 to mute the audio for that text channel, the pagination delay between pages, and the like.

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System manager 12 also communicates via a head end link to an RS-232 port of a head end controller (HEC) 14 which controls the transmission of television programming to the subscribers. As will be described in more detail with respect to Figure 2, HEC 14 communicates via a control link to an RS-232 port of an information services processor (or data controller) 16 which manages the flow of EPG and text data in accordance with the invention. As shown by dotted line in Figure 1, information services processor (ISP) 16 is preferably located at the cable head end with system manager 12, HEC 14 and the signal scramblers. However, those skilled in the art will appreciate that all of the head end equipment need not be located at one site.

As shown in Figure 1, EPG data is supplied from one or more local or remote EPG suppliers 18 via a satellite link, modem link or other communication link to an RS-232 port of ISP 16. Similarly, text data from one or more text channel suppliers 20 is provided via a satellite link, modem link, or other communication link to another RS-232 port of ISP 16. In preferred embodiments, ISP 16 has a plurality of identical RS-232 ports for accepting data from a plurality of EPG suppliers 18 and text channel suppliers 20. Also, as shown, one of these RS-232 ports is preferably used for a control link to HEC 14 as well. As will be described in more detail below with respect to Figure 2, ISP 16 manages EPG and text source databases in response to control signals from HEC 14 in order to provide EPG data and/or text channel data to selected viewers.

As shown in Figure 1, HEC 14 also provides control data directly to the viewer's television tuner via an RS-485 output port. Preferably, the control data from HEC 14 includes the aforementioned text channel definition transactions as well as EPG definition transactions for instructing the tuner at which frequency to tune for the EPG data and the like. The control data may also include software for downloading into the viewer's tuner for reprogramming the viewer's tuner as necessary. In a

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preferred embodiment, the control data from HEC 14 is inserted into the vertical blanking interval of the selected cable television signal by daisy-chained scramblers 22, 24 and 26 using known in-band techniques, although the control data from HEC 14 may also be modulated on an out-of-band carrier or an in-band audio carrier for transmission as described in related U.S. Patent Application Serial No. 07/983,766, filed December 1, 1992 and assigned to the present assignee, the contents of which are hereby incorporated by reference. Preferably, scramblers 22-26 are daisy-chained so that the scramblers may be addressed individually or globally. Similarly, EPG data and text channel data from ISP 16 are provided to the viewer's television tuner via an RS-485 output port of ISP 16. EPG data and text channel data are similarly inserted into the vertical blanking intervals of selected cable television signals by EPG scrambler 28 and text channel scramblers 30 and 32, respectively, using, for example, the in-band vertical blanking interval insertion techniques described in the aforementioned patent application serial no. 07/983,766 filed December 1, 1992. Of course, if desired, scramblers 22-32 may insert the control data, EPG data, and text channel data into other portions of the video signals such as the horizontal blanking intervals or else replace the video entirely. Those skilled in the art will also appreciate that a number of scramblers may be provided in accordance with the volume of data received from HEC 14 and ISP 16. Typically, however, the number of scramblers depends on the number of premium channels for which scrambling is used.

Preferably, EPG scrambler 28 and text channel scramblers 30 and 32 are identical to control data scramblers 22-26 and are similarly daisy-chained for individual or global addressing. As shown in Figure 1, scramblers 28-32 receive a single serial data channel which carries the combined EPG data and text data and display control transactions (to be described in more detail with respect to Figure 2) for all data streams in use. Each scrambler is

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also equipped with memory for storing a predetermined amount of this data in an internal memory so as to minimize the number of database accesses. Preferably, scramblers 28-32 have internal memory sufficient to store a significant number of transactions. For example, scrambler 30 may have enough internal memory to store a day's sports scores for display on a sports text channel. The data received and stored in scramblers 28-32 is preferably in RS-485 format, and the protocol in a preferred embodiment is SDLC. All data transactions to scramblers 28-32 are sent on individual data streams specifying the target scrambler (station addresses in SDLC protocol), and the control data is sent on a global data stream which is filtered in the scramblers 28-32 based on the address of the scrambler so that the data streams can be configured by a transaction from ISP 16. The individual EPG data and text data streams are preferably generic in the scramblers so that they can be allocated as desired. Preferably, scramblers 28-32 have baud rates of at least 9600.

Preferably, the subscriber's tuner is a set top tuner 34 which comprises an EPG memory 36 for storing the EPG data from ISP 16. For example, EPG memory 36 may store one or two weeks of EPG data for selective access by the viewer via a menu of the set top tuner 34. This menu preferably allows the viewer to scroll through the EPG data stored in EPG memory 36 using the key pads of the viewer's television remote control device. Set top tuner 34 may also comprise a nonvolatile template memory 38 for storing the template in which the EPG data is to be inserted for display to the viewer on the viewer's television 40. In this manner, a video signal containing the template display data need not be continuously retransmitted to the set top tuner 34, thereby saving more bandwidth. Instead, the EPG data only needs to be updated every 30 minutes or when there is a program change. Of course, different set top tuners 34 may have a varied amounts of memory and processing capabilities for such

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purposes in accordance with the acceptable memory costs during manufacture of the set top tuner 34.

As shown in Figure 1, set top tuner 34 may also comprise a text data memory 42 for storing a page of text data for presentation to the screen. Thus, while one page of text data is displayed to the subscriber, the next page of text data may be loaded into the text data memory 42.

As noted above, ISP 16 of the invention manages the flow of text data and EPG data from the data service provider to the viewer's set top tuner 34. ISP 16 manages this data by accepting data only from one or more authorized text data and/or EPG data sources, processing the text data and EPG data in its internal database manager, and formatting the processed data into a common data transaction format for output to the scramblers for transmission to the set top tuner 34. Provision of EPG data and text data to the subscribers is controlled by the head end controller 14 via the control link as will be described in more detail below.

In a preferred embodiment, ISP 16 comprises an IBM PS2 model 7546 personal computer having a plurality of RS-232 serial input ports for EPG data and/or text data inputs and at least one RS-485 HDLC serial link at its output of the type used by HEC 14. As shown in Figure 1, the control link will be a single RS-232 serial port. The hardware and software components of ISP 16 are then configured as illustrated in Figure 2.

As shown in Figure 2, ISP 16 preferably comprises a plurality of RS-232 ports which provide a common interface for the EPG data and text channel data asynchronously provided by the EPG supplier(s) 18 and text channel suppliers 20. The EPG data and text channel data is transmitted to ISP 16 via a satellite link (when the interface is operated in simplex mode) or by modem (when the interface is operated in half duplex mode). Preferably, the data is transmitted at a baud rate of at least 1200.

ISP 16 functions as a "gate keeper" which only allows access by authorized data sources. Accordingly, when

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ISP 16 receives a message from an EPG supplier 18 or a text channel supplier 20, it first checks the data for authorization. If that supplier is not authorized, the data is ignored. On the other hand, if the supplier is authorized  
5 to access ISP 16, ISP 16 performs the requested action and returns a command response message. If the communications link is simplex, the response is ignored. Hence, access to ISP 16 is limited by authorization codes, but as will be described below, access is also limited by whether the data  
10 provider provides the EPG data or text data in the transmission protocol expected by ISP 16.

In particular, messages sent between an EPG supplier 18 or a text channel supplier 20 and ISP 16 are preferably formatted to include a start of text byte, a data  
15 block of ASCII characters, checksum bytes and an ASCII carriage return. This format is used in commands sent to ISP 16 from the data suppliers as well as in responses sent to the data suppliers. As known by those skilled in the art, the checksum verifies proper message transmission by comparing  
20 the checksum in the message with an internally computed checksum. Preferably, the checksum is a two byte CRC of all bytes in the message field beginning with the first character following the start of text character up to but not including the checksum field. The checksum is transmitted in the  
25 message as the hexadecimal ASCII representation (four bytes) of the CRC computation. The data blocks, on the other hand, are configured differently depending upon whether the input data is EPG data or text data.

EPG data from the EPG supplier 18 is formatted in  
30 accordance with an EPG command set including, for example, a Define Program Command which is used to identify all data relating to a single program, a Define Category Command which is used to establish a category for identifying different types of programs, and a Delete Category Command which is  
35 used to delete an unused category to make room in the database of ISP 16 for new programming categories. The EPG data is formatted on a "per program" basis by these commands.



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An example of a presently preferred format for a Define Program Command is as follows:

**Define Program Command**

Byte	Description
5 1-2	Command Code
3-4	Service Provider
	02 - EPG Supplier No. 1
	03 - EPG Supplier No. 2
	04 - EPG Supplier No. 3
10	10 - System Manager
	20 - Local Origination
5-7	Type of Service
	001 - EPG
	(001-099 National Services)
15	(100-199 System Manager Services)
	(200-299 Local Origination Services)
	(300-399 Other Services)
8-13	Authorization Code From Supplier
14-19	Starting Date (e.g., 112292 = 11/22/92)
20 20-25	Starting Time (e.g., 123045 = 12:30:45)
26-29	Program Identifier (e.g. WTBS)
30-32	Duration (e.g., 135 = 1 hour and 35 minutes)
33	MPAA Rating (0=No Rating, 1=G, 2=NR, 3=PG, 4=PG13, 5=R, 6=X, 7=NC17)
25 34	Critique Number of * given by movie critic)
35-36	Category Identification
37-38	Attribute Bit Map
	0-1 = Stereo
	1-1 = Black and White
30	2-1 = Closed Captioned
	3-1 = Bilingual
	4-1 = Spanish
39-40	Traits Bit Map
	0-1 = Profanity
35	1-1 = Nudity
	2-1 = Violence
	3-1 = Adult Situations

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4-1 = Adult Theme

5-1 = Adult Language

41- Title and Program Description blocks

5 Delimiter characters are used for variable length fields such as the title and program description blocks to identify the length of the field. For example, a NUL (0 hexadecimal) means the field is null, SOH (1 hexadecimal) means the field is valid, and ETX (3 hexadecimal) means the end of the current record.

10 In a preferred embodiment, each program's record includes two lines of characters with up to 9 characters per line for a half hour program title block (the EPG display area is 9 characters by 2 lines for a half hour program), two lines of characters with up to 19 characters per line for a  
15 one or more hour title block (the EPG display area is 19 characters by 2 lines for a 1 hour program), and three lines of characters with up to 40 characters per line for a program description describing the program corresponding to the current record. Those skilled in the art will appreciate  
20 that half hour shows need not have a one hour program title block but that shows having a duration of one hour or more should have a short and long title block since the EPG data is scrolled on the screen and does not always permit the display of an entire long title for a program at the edge of  
25 the time frame of the EPG on the display. Of course, these blocks may have different sizes and may be filled by the appropriate delimiter if no text is available.

Once data transmitted with a Define Program Command is stored in an EPG database of ISP 16, the EPG data is  
30 formatted into transactions for transmission to the set top tuner 34 as will be described in more detail below. This command may also be used to update a program definition since it will overwrite a corresponding entry in the EPG database of ISP 16. As noted above, the EPG data is preferably  
35 updated at least every 30 minutes on the half hour and also when changes are made to the data.

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The Define Category Command also is formatted to have a command code, service provider, and type of service in bytes 1-7. However, the Define Category Command preferably has category identification data in bytes 8-9 and a category name having up to 21 bytes starting at byte 10. Once again, a delimiter is preferably used to mark the end of the field. In a preferred embodiment, up to 99 different categories may be defined using this command. Any categories beyond 99 will be ignored. Categories should thus be deleted to make room for new ones. The Delete Category Command is similarly formatted except that it is not necessary to specify the category name - the category ID is sufficient to specify a category to be deleted.

ISP 16 may respond to such commands from the EPG supplier 18 by sending an appropriate response such as: no error (normal response), service provider not found (not authorized), type of service not found (not authorized), category ID not found, unrecognized command, checksum error, insufficient disk space, and the like. Of course, other EPG commands and command responses may be provided as desired. The above commands were merely described by way of example. However, it is important that any commands have a format known only to the authorized service providers in order to maintain system security.

The text channel data, on the other hand, may originate from many different text channel suppliers and may arrive at the ISP 16 via many different communications links such as satellite, dial up modem, direct connect modem or via direct connect to the system manager 12. Preferably, the text data is also supplied to the ISP 16 via an RS-232 port identical to that used for receiving the EPG data and messages between the text channel supplier 20 and ISP 16 have the same general format and transmission characteristics as described above with respect to the EPG data except that the data blocks are formatted differently.

In particular, in a preferred embodiment each text channel consists of one or more text screens, where each text

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screen is comprised of 16 lines by either 24 or 45 characters per line depending upon the size of each character. Unlike the EPG data, the text data is not provided on a program basis. Rather, the text data is provided for each line of text on a text screen basis where one line of text is transmitted in each text data block. Preferably, the text channel suppliers provide the text data by defining text screens using a command formatted as follows:

**Define Text Screen**

10	Byte	Description
	1-2	Command Code
	3-4	Service Provider
		02 - Text Supplier No. 1
		03 - Text Supplier No. 2
15		04 - Text Supplier No. 3
		10 - System Manager
		20 - Local Origination
	5-7	Type of Service
		001 - EPG
20		002 - Sports
		003 - Weather
		004-099 Other Text Service
		(001-099 National Services)
		(100-199 System Manager Services)
25		(200-299 Local Origination Services)
		(300-399 Other Services)
	8-13	Authorization Code From Supplier
	14-15	Page #
	16-17	Line # (1-16)
30	18	Justification
		0 - Centered
		1 - Right
		2 - Left
	19-20	Color
35	21	Character Size
		0 - Normal (45 Characters per line)
		1 - Large (24 Characters per line)

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22-?? Text 45 or 24 Bytes Max depending on Character Size  
 ?? SOH (01 Hex) End of Line Delimiter

All bytes after byte 16 are repeated for each line of text until a complete page has been sent. The page number is then updated in bytes 14-15 and the next page sent to ISP 16 for storage in the appropriate text database. As with the EPG data, the above-mentioned response codes may also be provided to the text channel supplier 20 which transmitted the text data to ISP 16. The structure of ISP 16 will now be described with respect to Figure 2.

ISP 16 primarily comprises a plurality of databases and database managers. As shown in Figure 2, there are essentially two types of databases maintained in ISP 16 - one type for EPG data and one type for text channel data. The EPG database is designed to collect data from each EPG supplier and to sort each EPG program record by channel and time of day. A separate database is created for each text channel for collecting text data from the associated text channel supplier 20 and formatting that the received text data for transmission on individual text channels using the techniques to be described below. Each database that is created is identified by the service provider and type of service codes listed in the Define Program Command for use in the control link commands provided to ISP 16 from HEC 14.

As shown in Figure 2, a received command is checked for its command code, the service provider, type of service and authorization code, as appropriate, by router and formatter 43. If the command is from an unauthorized data source, the subsequent data is ignored. However, if the received data is from an authorized supplier, router and formatter 43 routes the data to the appropriate database within ISP 16. For example, if EPG data is received, it is routed via EPG database manager 44 to EPG database 46. On the other hand, if the received data is text data from a weather service, the weather data is routed via weather database manager 48 to weather database 50. Similarly, if

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the received data is text data from a sports service, the sports data is routed via sports database manager 52 to sports database 54. Those skilled in the art will appreciate that a single database manager may perform the function of  
5 the separate database managers as indicated by dotted line in Figure 2. Also, those skilled in the art will appreciate that the separate databases may be implemented on the hard disk of the storage means of ISP 16 as also indicated by dotted line in Figure 2.

10 In a preferred embodiment, EPG database manager 44 sorts the received EPG data by channel and time of day and stores the received EPG data in the appropriate location in EPG database 46 for later recall. EPG database manager 44 may also perform garbage collection on the EPG database 46 as  
15 records are deleted. EPG database manager 44 may also call a data compression software routine such as the Huffman Compression Algorithm which, as known to those skilled in the art, maps more frequently used characters to fewer bits than the usual eight bits used in normal ASCII, while giving the  
20 less frequently used characters more bits. The number of bits used for a character is based on its probability of appearing in the data stream. Huffman encoding is described in detail in an article entitled "Lossless Data Compression", Byte, March, 1991, pp. 309-314. Such a routine is desired to  
25 maximize storage efficiency at EPG database 46. Similarly, each text database manager stores the text information in the associated text database and performs data compression.

Router and formatter 43 and database managers 44, 48 and 52 are all controlled by configurator 56, which is, in  
30 turn, responsive to control data from HEC 14. Configurator 56 responds to control commands from HEC 14 to provide updated authorization information to router and formatter 43 for comparison with the incoming data and for  
adding/subtracting database managers and databases and the  
35 like as EPG suppliers 18 and text channel suppliers 20 are added and subtracted from the system.

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As noted above, access to ISP 16 is carefully controlled through the use of authorization codes. In addition, ISP 16 maintains control over the information services provided to the viewer by storing the EPG data and text data in a particular format in the appropriate database within ISP 16. For example, the EPG database may store the data in a particular binary tree format. Since the speed of the EPG database is not an issue in accordance with the invention (because the EPG database only needs to be able to read and write a number of records equal to the total number of channels in the cable system once every half an hour), a simple binary tree database has been used in a preferred embodiment. Such an EPG database will be stored on a hard disk drive of ISP 16. Preferably, the first 4 bytes stored on the hard disk drive will contain the file offset of the root node and the database records will follow. Each database record will contain, in addition to the required data, a left branch file offset and a right branch file offset. The left branch file offset points to the records with keys less than the current record, while the right branch file offset points to the records with keys greater than the current record. The database will use the program data and time and channel number as their key. For fastest access, those skilled in the art will appreciate that it is important to keep the database tree balanced.

In a preferred embodiment, the EPG database records are formatted such that the left branch appears first, then the right branch, the record key data and then the non-key record data. As shown in Figure 3, the EPG database key is a combination of the date and time field and the channel number from the EPG data. Following these fields are the duration field, the repeat field, the program rating field, the program category field, the critique field, the attributes flag field, the program traits flag field, the text data compressed flag and lastly the text data. Preferably, the text data field further consists of several optional subfields with a delimiter between each field. As noted

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above, the subfields preferably include the short program title line 1, the short program title line 2, the long program title line 1, the long program title line 2, and three lines of program description.

5 EPG database manager 44 accesses the EPG database 46 through shared library routines such as add a record, delete a record, read a record, and the like. In other words, an application program does not access the EPG database 46 directly. In a preferred embodiment, the EPG  
10 database 46 also uses a semaphore to disallow more than one process thread (EPG database manager 44 and EPG transaction formatter 58) from changing at any given time. As the EPG database 46 is used, it is fragmented as records are added and deleted, and as a result, EPG database manager 44  
15 preferably further includes garbage collection routines for periodically performing the garbage collection function on the EPG database 46. The text databases are similarly configured except that garbage collection is not necessary.

EPG transaction formatter 58 reads the database  
20 records of EPG database 46 and formats them into program-based transactions having a predetermined number of bytes which are transmitted to the EPG scrambler 28 for insertion into the vertical blanking interval of a video signal and transmission to the set top tuner 34. These transactions are  
25 then sent via a transaction arbitrator 64 to the EPG scrambler 28 shown in Figure 1 for insertion into the appropriate video channel. Similarly, weather transaction formatter 60 and sports transaction formatter 62 read the database records of weather database 50 and sports database  
30 54, respectively, and formats the text data into text screen-based transactions which may inserted into the vertical blanking interval of a video signal. Preferably, at least one transaction is inserted into a vertical blanking interval of each field of a video signal. It has been found that 22  
35 bytes per transaction is a convenient transaction size to allow a transaction to fit into a vertical blanking interval of a field in this manner. In addition, the current time and



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date may be obtained from ISP system clock 63 to assure that the appropriate EPG programs are sent in the appropriate time slots.

The transactions from transaction arbitrator 64 are  
5 output to a single RS-485 output port of ISP 16 which is  
connected to multiple scramblers of the type used to scramble  
premium cable channels. The transactions are segmented into  
EPG data and text data streams for transmission to the EPG  
scrambler 28 (if the transaction includes EPG data) or to the  
10 text channel scramblers 30 and 32 (if the transaction  
includes text data). In a preferred embodiment, EPG  
transaction formatter 58 also tags the EPG transactions as  
Long Term or Short Term as they are transmitted to the EPG  
scrambler 28. EPG Short Term and Long Term data differ only  
15 in the timeliness of the information they provide to the set  
top tuner 34. Short Term data can be specified by HEC 14 via  
the control link to be anywhere from 1 to 255 hours of EPG  
data. The function of this Short Term data stream is to  
provide a quick refresh of the most immediate portion of the  
20 EPG data stored in EPG memory 36 of the set top tuner 34.  
Long Term data, on the other hand, consists of the remaining  
EPG data. The maximum time for the Long Term EPG data may  
also be specified by HEC 14 via the control link to be  
anywhere from 1 to 4096 hours, for example.

25 The EPG transactions generated by EPG transaction  
formatter 58 are formatted into SDLC frames as noted above.  
A sample SDLC format for the EPG transaction data is shown in  
Figure 4. In Figure 4, the beginning flag delineates the  
beginning of the SDLC frame, the station address delineates  
30 the scrambler to be addressed, the control byte is a command  
code that defines what is to be processed, the information  
field contains the EPG data formatted as in Figure 3, the  
frame check contains the CRC for all data between the  
beginning and ending flags, and the ending flag delineates  
35 the end of the SDLC frame. A transmission from EPG  
transaction formatter 58 will address a specific data stream  
and a response from the EPG scrambler 28 will identify its

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data stream in the station address location. As noted above, such transmissions may or may not require a response from the EPG scrambler 28.

The EPG transactions typically include an Add EPG  
5 Block command including a byte specifying that the following data is from the EPG data stream, a control code byte specifying, for example, whether a reply from the scrambler is expected, two bytes setting forth the EPG data block number, a flag setting forth whether the EPG data is Short  
10 Term or Long Term data, the number of transactions which make up the EPG data block, and the actual transactions. EPG transaction formatter 58 may also generate a Delete EPG Block command which specifies that the data is to be deleted from the EPG data stream, the control code byte, and the EPG block  
15 number to be deleted. These two transaction type for Long Term and Short Term EPG data may be used together to form a block of EPG data for insertion into the vertical blanking interval of a video signal. As noted above, the EPG data block preferably defines all of the information for a single  
20 program at a specific time, such as short and long titles and three lines of program description.

Figure 5 illustrates a flow chart for the software embodied in EPG transaction formatter 58. As shown, the software starts at step 500 and gets the system time and date  
25 from the ISP system clock 63 at step 502. An expired EPG data block is then deleted from the memory of the EPG scrambler 28 at step 504. An expired EPG data block is defined as a data block representing a program which has been completely aired prior to the current system time or a  
30 program which was aired before the time window used for the EPG. At step 506, current EPG data blocks having a time and date within the EPG time window are read from the EPG database 46. The current EPG data blocks are then formatted into Add EPG Block commands and associated transactions at  
35 step 508. A block/time map of EPG transaction formatter 58 is then updated at step 510. The block/time map preferably stores the time that each EPG data block was sent to EPG

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scrambler 28. The transactions representing the EPG data are then transmitted to the EPG scrambler 28 at step 512. EPG transaction formatter 58 then waits at step 514 for the next EPG update (which should occur when the system time enters a new half hour) or the next EPG change (which may occur at any time). Upon receipt of such an update or change, control returns to step 502.

Text transaction formatters 60 and 62 similarly generate text transactions for the text data, which as noted above, is defined on a per screen (rather than per program) basis. Hence, an Add Text Screen command is similar to an Add EPG Block command except that the text channel number and screen number are provided in place of the EPG block number and Short Term/Long Term data bytes. The text transaction formatters 60 and 62 may also request the time from the scrambler so that proper pagination may be maintained.

Figure 6 illustrates a flow chart for the software embodied in text channel transaction formatters 60, 62. As shown, the software starts at step 600 and reads a text screen record from the text database 50 or 54 at step 602. At step 604, the text screen is formatted into Add Text Screen transactions for transmission to the text channel scramblers 30, 32 at step 606. Preferably, such transactions are formatted such that the display characters are sent as display commands rather than as separate characters for every display coordinate of the text display screen. Then, at step 608, text transaction formatter 60, 62 waits a period of time specified by system manager 12 (if auto-pagination is used) before the next text page is formatted and transmitted to the text channel scramblers 30, 32. At the end of this period of time, control returns to step 604 and the next text screen record in the text database 50, 54 is formatted for transmission to text scramblers 30, 32 for insertion in the vertical blanking interval of a particular video signal.

Typically, text data is passed to the screen by sending a separate character for each display location of a page. In other words, if a text screen comprises 16 lines

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and 24 characters per line, a text screen is represented by sending 384 (24x16) characters, one for each display location for that display screen. A blank space character is sent to indicate that no character is present in a particular text  
5 screen location. Hence, even if a single word is displayed for a text screen, 384 characters are transmitted for display. This results in a great waste of bandwidth and transmission time, and accordingly, the present inventors send the text data to the screen as display transactions  
10 including display commands which generate the text data at the set top tuners 34. In this manner, it is unnecessary to send a byte for every address of the text screen of the display.

In particular, the text data is transmitted to the  
15 screen along with appropriate commands for controlling the display of the text data. For example, a first display command in a sequence identifies the following data as text data and instructs the set top tuner 34 to fill the television screen with a blue background or some other  
20 background or template over which the text will be displayed. The text data is then converted into a series of commands which together identify the separate screens of text. As noted above, the text data is grouped on a per screen basis, which allows the appropriate delay mechanism to be  
25 incorporated into the display commands to provide the necessary delay between the presentation of respective text screens.

For this purpose, transaction formatters 60 and 62 preferably include software for scanning the text data for  
30 actual characters, skipping extra spaces in the text data, and grouping the actual text for transmission in transactions of a designated size which will fit in the vertical blanking interval of a field of a video signal. Since spaces are eliminated, the display commands include a coordinate  
35 specifying the row and column address of the first display character on the screen and a number of contiguous characters follow that character in the same transaction until the

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transaction is filled or a number of successive spaces are encountered. Attribute information such as underline, blinking, or luminance inversion associated with the characters may also be transmitted using these display  
5 commands. These display commands are used to read the text data for a text screen from the appropriate database, and at the end of the text data for a text screen, a display command is transmitted to indicate that all data for that text screen has been transmitted. The transaction formatter 60, 62 also  
10 includes a wait loop or "timeout" command at the end of the transmission which builds in a delay (on the order of 7 seconds) which gives the viewer sufficient time to view text screen before the text data for the next text screen is displayed, thereby providing auto-pagination of the text  
15 screen.

Auto-pagination permits the viewer to automatically advance from one text screen to the next without any intervention by the viewer. In accordance with the auto-pagination scheme of the invention, the cable operator can  
20 specify the time duration between screens and forward this information to the transaction formatters 60, 62. Then, during operation, when the viewer selects a text channel, the current page of text data is displayed by extracting the selected text channel data from the vertical blanking  
25 interval of the video signal in which it is inserted and mapping that text data to a channel of the viewer's television which is designated for display of that text channel. The next screen of text data will be displayed after a predetermined delay which gives the viewer sufficient  
30 time to read the displayed text data for the current screen (approximately 7 seconds). This technique could replace the commonly used "barker" channel which uses a computer to generate text data which is then transmitted as a complete video channel over the cable television system.

35 As noted above, configurator 56 responds to control commands from HEC 14 to provide updated authorization information to router and formatter 43 for comparison with

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the incoming data and to add/subtract database managers and databases and the like as EPG suppliers 18 and text channel suppliers 20 are added and subtracted from the system. The control link between HEC 14 and configurator 56 is also used  
5 to report the status of the ISP 16 to system manager 12. Also, if desired, the control link may accept text data from system manager 12 for displaying system messages and the like.

The interface between the configurator 56 and HEC  
10 14 is an RS-232 port with a data format fixed at, for example, 9600 baud. All control data is preferably transmitted as ASCII characters. Upon receipt of a message from HEC 14, configurator 56 checks the data, performs the requested action, and returns a command response message in a  
15 message format of the type described above for communications between router and formatter 43 and the EPG and text channel suppliers. Sample commands sent from HEC 14 to configurator 56 over the control link include a Set Date and Time command (for synchronization purposes), Request Configuration  
20 commands, Request Status commands, Get Category Record commands, Scrambler Control commands, and Database Control commands.

During operation, ISP 16 monitors all input ports for data from the EPG and text data service providers and  
25 builds a list of all available EPG and text data services. This list is sent to the system manager 12 using a Request Configuration command. This command specifies the available service providers, the type of service (EPG or text data) from each provider, the communications port associated with  
30 each service, the scrambler address or data stream (EPG or text data) for each service, the authorization code from the supplier for each service, the time and date of the last update from the service provider, the time and date of the last update to the scramblers, the time and date of the  
35 latest EPG data in the EPG database, and the like. Such information is provided to the system manager 12 for each service provider when this command is given.

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The Request Status command contains flags indicating whether there are errors present in the error log and if the category list has changed since the last Request Status command was received. Get Error Record and Get  
5 Category Record commands may then be used to extract the error and category information.

The configuration commands are separated into EPG and text service configuration commands. A Configure EPG Service  
10 command specifies the service provider, the type of service, whether the service is to be enabled or disabled, the authorization code from the EPG supplier 18, the scrambler data stream for Short Term data, the scrambler data stream for Long Term data, the length of the Short Term data in  
15 hours (1-255), and the length of the Long Term data in hours (1-4096). The Configure Text Service command, on the other hand, specifies the service provider, the type of service (weather, sports, etc.), whether this service is to be  
20 enabled or disabled, the authorization code from the text channel supplier 20, the scrambler address or data stream for the text data, the channel number, and the pagination delay time (in seconds) before the next page of text data is to  
replace the current page of text data on the screen for auto-pagination.

25 The scrambler control commands include, for example, a Rebuild Scrambler Memory command which is used when a scrambler is replaced and needs data to be reloaded in its memory and a Scrambler Configuration command for specifying the amount of scrambler memory in kbytes. As  
30 noted above, a scrambler preferably contains enough memory to store a day's worth of sports scores or a complete weather forecast and the like so that repeated accesses to weather database 50 and sports database 54 are not necessary.

35 The database control commands include, for example, a Clear Database command which is used to clear the database associated with a particular service and a Delete Database command which is used to delete the database associated with

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a particular service. Other database control commands such as a Download Category Map command may also be provided for establishing a list of the specified categories of program data in the EPG data.

5           Figure 7 illustrates a preferred embodiment of a set top tuner 34. As shown, set top tuner 34 comprises EPG memory 36, template memory 38, text page memory 42, a tuner 700, and a set top processor 702 which reads commands from the vertical blanking interval of the incoming video signal  
10 and performs the appropriate action. For example, if the incoming command is a text channel definition or EPG definition command from HEC 14, the appropriate update of bit map 704 is performed. Similarly, if the incoming command is a display command including EPG data, that data is stored in  
15 EPG memory 36 and is displayed with the template stored in template memory 38 when the user makes a menu selection via television remote control unit 706 and remote receiver 708 requesting display of the EPG data. Of course, the template data may be sent as part of EPG display commands if no  
20 template memory is provided. On the other hand, if the incoming command is a display command including text data, a page of that data is stored in text page memory 42 for presentation to the display a page at a time. The text page memory is either automatically updated every few seconds by  
25 virtue of the delay built into the display commands from the text formatters 60, 62 (if auto-pagination is enabled), or else the user is allowed to manually access the text data in the memory. If manual access is provided, it is preferred that the text page memory hold at least the currently  
30 displayed text page, the previous text page and the subsequent text page in order to give the user the ability to scroll through the text data. In either case, set top processor 702 preferably has the ability to request the next text page while the current page is being displayed so that  
35 the next text page is already loaded for display at the end of the screen delay time. The selected text, EPG or video



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signal is then modulated at modulator 710 for display on television screen 40 at the channel specified in bit map 704.

Bit map 704 of set top processor 702 of the set top tuner 34 maps the received text information to the designated cable channel for display by designating the frequency that must be tuned by tuner 700 to receive the desired text data. This information is received in the aforementioned text channel definition transactions from HEC 14. For example, the viewer may specify via television remote 706 that she wishes to view a sports text data channel which her program guide indicates to be available by tuning the set top tuner 34 to channel 181. Set top processor 702 then checks bit map 704 for channel 181 to determine that it must tune the frequency for channel 29 in order to extract the sports text data for the viewer's channel 181 from the vertical blanking interval of channel 29. Set top processor 702 then sets tuner 700 to tune channel 29 but the video signal for channel 29 is not displayed. Instead, the video screen is blanked by set top processor 702 and the text data extracted from the vertical blanking interval by set top processor 702 is displayed. Any necessary descrambling of the received video is performed by set top processor 702. The viewer thus perceives that many more "virtual" channels are available even though a separate video channel was not used to transmit the text data.

Applications for the text channels of the invention include the provision of a help or user's guide channel, a channel for alerting subscribers on cable system status, a stock market ticker, and the like using text provided by the system manager 12 or another text channel supplier. This text data is preferably displayed on a designated channel of the viewer's set top tuner 34. User's guide data, help data and the like is preferably scrolled through by the user using the keys on the television remote control device (auto-pagination is not particularly desirable for a text channel of this type). In addition, text channels can be grouped for display whereby related subjects are displayed on

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adjacent channels of the set top tuner 34. For example, channel 181 could be used for football scores, 182 for hockey scores, 183 for baseball scores, 184 for basketball scores, and the like.

5           Although the present invention has been described with respect to particular embodiments, those skilled in the art will appreciate that the present invention may be modified without departing from the scope of the invention. For example, certain text channel data provided in accordance  
10 with the invention may be placed in premium or pay-per-view channels so that access to such text data may be restricted. Restricted text data could include personals and other adult oriented text data which parents may wish to restrict from  
15 their children or certain text data for which the cable operator may wish to charge an access fee. In addition, the EPG data and text data may also be transmitted in the horizontal blanking intervals of the video signals, on the audio carriers for each video channel, or even in place of  
20 some of the active video, if such is desired. Moreover, an interactive EPG may be designed whereby the user selects a program ID from the EPG and the processor of the set top tuner automatically tunes the frequency for the channel corresponding to that program ID. Accordingly, all such  
25 modifications are intended to be included within the scope of the invention as defined by the following claims.

**WE CLAIM:**

1. A data controller for controlling the presentation of text data to a television display, comprising:  
a database for storing text data from a plurality of sources of text data;

means for formatting text data stored in said database and display commands into transactions having a predetermined number of bytes, and for assigning each of said sources of text data to a unique video program channel;

means for inserting said transactions into predetermined intervals of the unique video program channel to which text data in said transactions is assigned; and

a tuner which extracts said transactions from their unique video program channel and presents text data in said transactions to said television display in accordance with a display command in said transactions for display to a viewer.

2. A data controller as in claim 1, wherein at least one of said sources of text data provides electronic program guide (EPG) data representing the video programs available for display on said television display.

3. A data controller as in claim 1, wherein said sources of text data communicate with said database via a communications link.

4. A data controller as in claim 3, wherein said communications link comprises at least one of a satellite link and a modem link to said database.

5. A data controller as in claim 4, further comprising a data interface for providing common input ports for each of said sources of text data and for routing text data from each of said sources to said database.

6. A data controller as in claim 5, wherein said data interface operates in a simplex mode for transmissions

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from said satellite link and in a duplex mode for transmissions from said modem link.

7. A data controller as in claim 5, wherein said database is divided into a plurality of source databases, one source database for each source of text data.

8. A data controller as in claim 1, further comprising means for compressing data from said sources prior to storage in said database.

9. A data controller as in claim 2, further comprising a database manager for authorizing access to said database, sorting received EPG data by assigned video program channel and time of day, and performing garbage collection on said database.

10. A data controller as in claim 7, wherein said formatting and assigning means assigns a source database to each new source of text data, controls said data interface to route text data from said new source to its source database, and updates access authorization to said source database for said new source of text data.

11. A data controller as in claim 1, wherein said predetermined intervals are vertical blanking intervals of the unique video program channel to which that text data is assigned and said inserting means inserts said transactions into said vertical blanking intervals of said unique video program channel.

12. A data controller as in claim 11, wherein said inserting means stores a number of transactions for creating a screen of text data on said television display and inserts said transactions into said vertical blanking intervals of said unique video program channel to which the source which

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produced the text data in said number of transactions is assigned.

13. A data controller as in claim 2, wherein said tuner comprises an EPG memory for storing EPG data representing the video programs available for display on said television display over a predetermined interval of time.

14. A data controller as in claim 13, wherein said tuner further comprises a template memory for storing a video display template into which said EPG data is inserted for display on said television display, said video display template representing a time grid for each authorized video programming channel in said EPG data which may be tuned by said tuner.

15. A data controller as in claim 14, wherein said tuner selectively accesses said EPG data in said EPG memory so as to allow a viewer to scan through said EPG data.

16. A data controller as in claim 1, wherein said tuner comprises a text memory for storing at least a page of text data for presentation to said television display.

17. A data controller as in claim 1, wherein said tuner comprises a bit map for correlating a designated channel on the television display to a frequency which must be tuned to get the text data for the designated channel from a vertical blanking interval of the video program channel containing the text data for the designated channel.

18. A method of controlling presentation of text data to a television display, comprising the steps of:  
authorizing one of a plurality of sources of text data to access a source database for storage of text data from said one source;

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transmitting said text data from said one source to said source database for storage;

assigning said text data from said one source to a unique video program channel;

reading said text data from said one source from said source database and formatting display commands and said text data stored in said source database into transactions having a predetermined number of bytes;

inserting each transaction into a predetermined interval of the unique video program channel to which the text data in that transaction is assigned;

at a viewer's television tuner, extracting said transactions from their unique video program channel;

processing said transactions at said viewer's television tuner to extract said text data and said display commands; and

presenting said text data in said transactions to said television display in accordance with a display command in said transactions for display to said viewer.

19. A method as in claim 18, wherein said one source of text data authorized in said authorizing step for access to said source database provides electronic program guide (EPG) data representing the video programs available for display on said television display.

20. A method as in claim 18, wherein said transmitting step includes the step of transmitting said text data to said source database via a communications link comprising at least one of a satellite link and a modem link to said source database.

21. A method as in claim 20, wherein said transmitting step includes the steps of receiving said text data at an interface device of said source database which comprises common input ports for each of said sources of text

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data and routing the received text data to said source database.

22. A method as in claim 21, wherein said transmitting step includes the further step of sending a command response message to said one source upon receipt of a command from said one source including said text data.

23. A method as in claim 18, comprising the further step of compressing said text data prior to storage in said source database.

24. A method as in claim 19, comprising the further steps of sorting received EPG data by video program channel and time of day.

25. A method as in claim 18, wherein said assigning step includes the steps of assigning said source database to said one source of text data, routing text data from said one source to said source database, and updating access authorization to said source database for said one source of text data.

26. A method as in claim 18, wherein said reading and formatting step comprises the steps of forming said transactions as display commands for a predetermined number of characters of said text data and of instructing said viewer's television tuner regarding where and how to display said text data in said transactions on said television display.

27. A method as in claim 26, wherein said predetermined interval is a vertical blanking interval of the unique video program channel to which that text data is assigned and said inserting step includes the step of inserting said transactions into said vertical blanking interval of said unique video program channel.

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28. A method as in claim 27, wherein said inserting step includes the further step of storing a number of transactions for creating a screen of text data on said television display and inserting said transactions into said vertical blanking interval of said unique video program channel to which the source which produced the text data in said number of transactions is assigned.

29. A method as in claim 19, comprising the further step of storing EPG data in said viewer's television tuner representing the video programs available for display on said television display over a predetermined interval of time.

30. A method as in claim 29, comprising the further step of storing a video display template in said viewer's television tuner for insertion of said EPG data for display, said template representing a time grid for each authorized video programming channel in said EPG data which may be tuned by said viewer's television tuner.

31. A method as in claim 30, comprising the further step of scrolling through said EPG data stored in said EPG memory of said viewer's television tuner.

32. A method as in claim 18, comprising the further step of storing at least a page of text data in a text memory of said viewer's television tuner for presentation to said television display.

33. A method as in claim 18, wherein said presenting step includes the steps of tuning said viewer's television tuner to a frequency of a video program channel containing in its vertical blanking interval the text data for a text channel designated by the viewer and presenting said text data to said television display when said viewer selects said designated text channel.

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34. A method as in claim 18, comprising the further step of delaying a predetermined amount of time after a page of text data has been presented to said television display before presenting a next page of text data to said television display.

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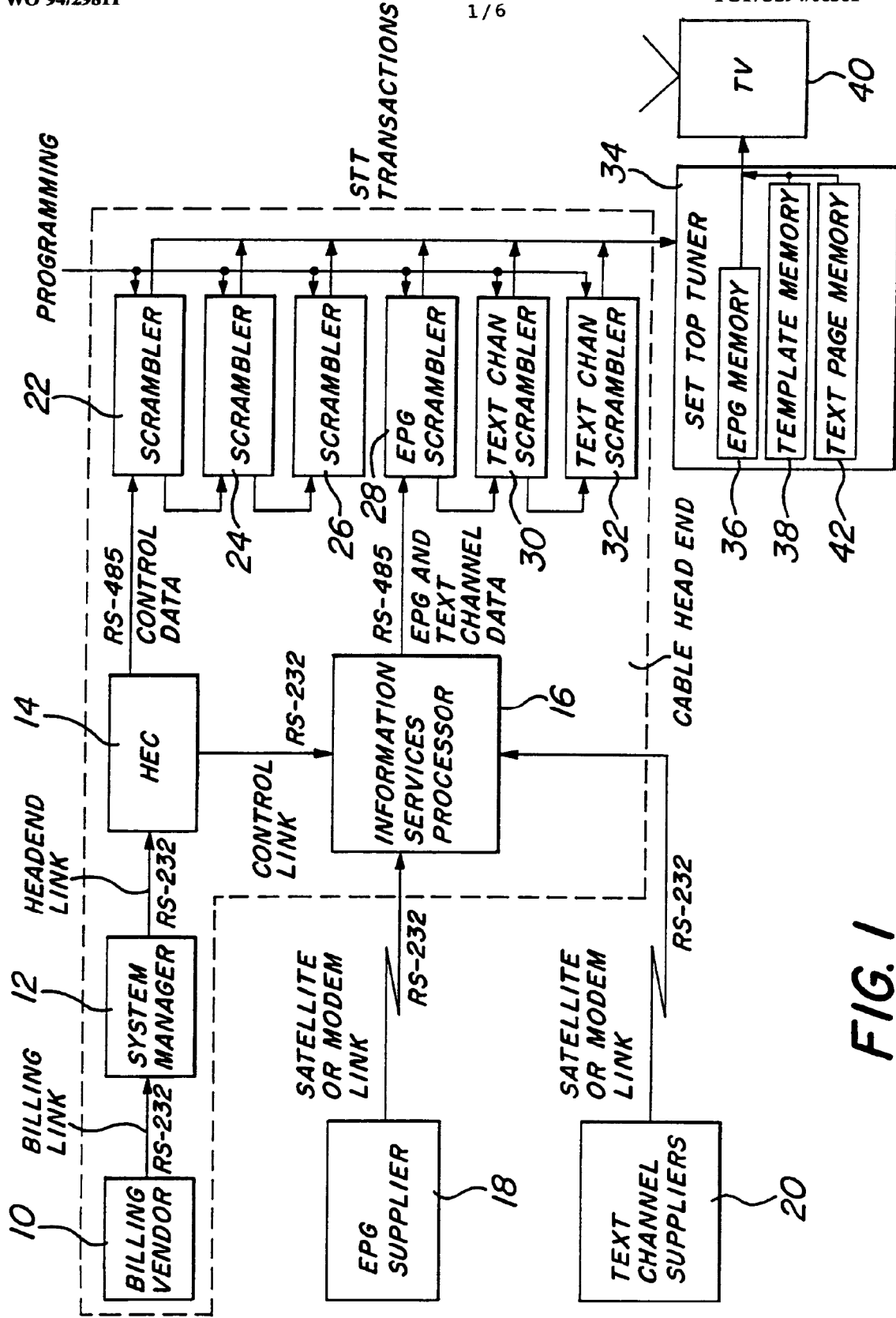


FIG. 1

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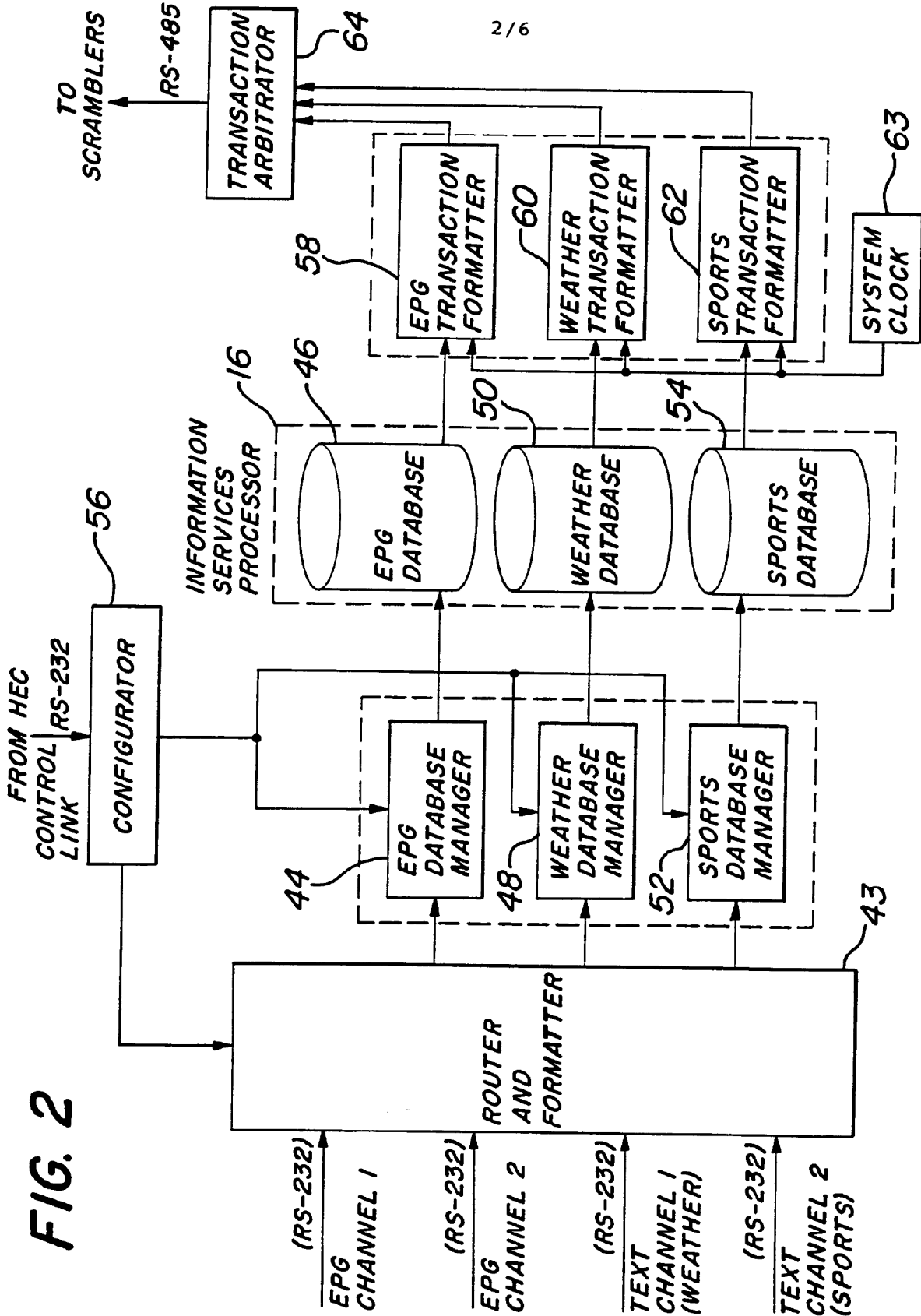
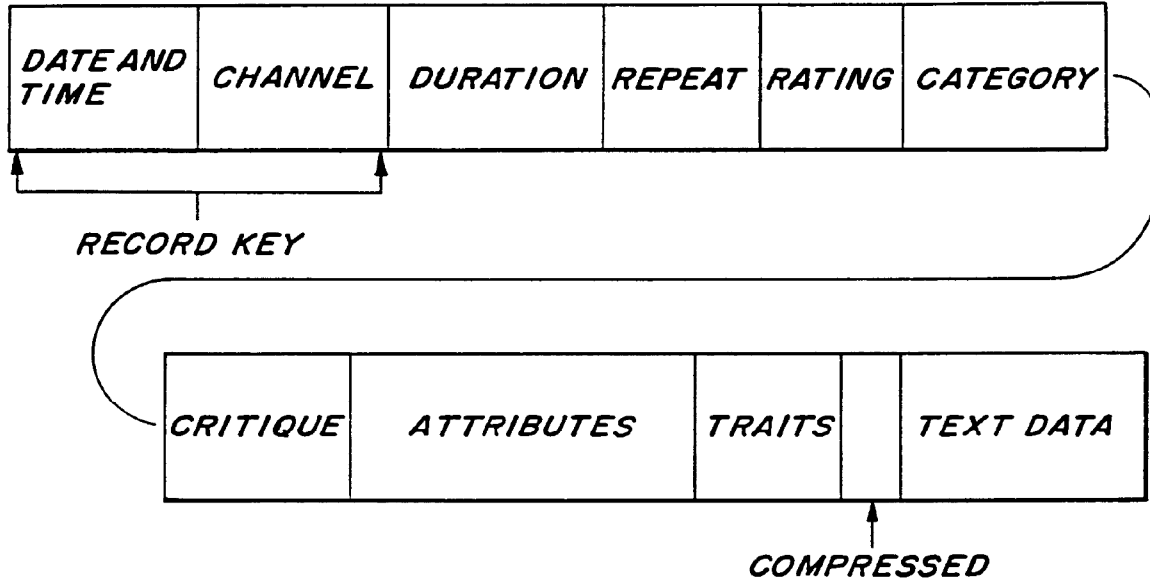


FIG. 2

**FIG. 3** (INFORMATION FIELD)

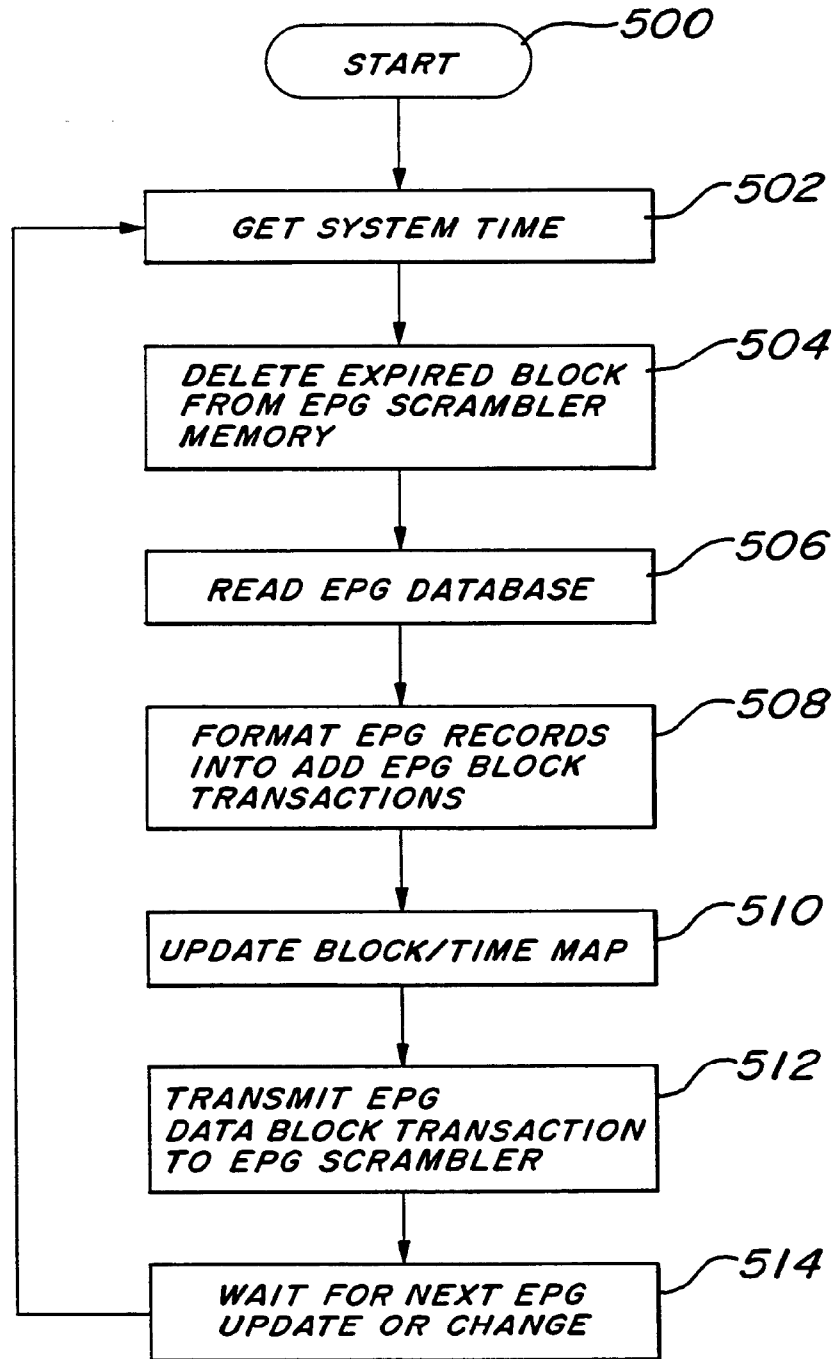


**FIG. 4** (TO SCRAMBLERS)

<i>BEGINNING FLAG</i> <i>1 BYTE</i>	<i>STATION ADDRESS</i> <i>1 BYTE</i>	<i>CONTROL</i> <i>1 BYTE</i>	<i>INFORMATION FIELD</i> <i>n BYTES</i>	<i>FRAME CHECK</i> <i>2 BYTES</i>	<i>ENDING</i>
--	---	---------------------------------	--	--------------------------------------	---------------

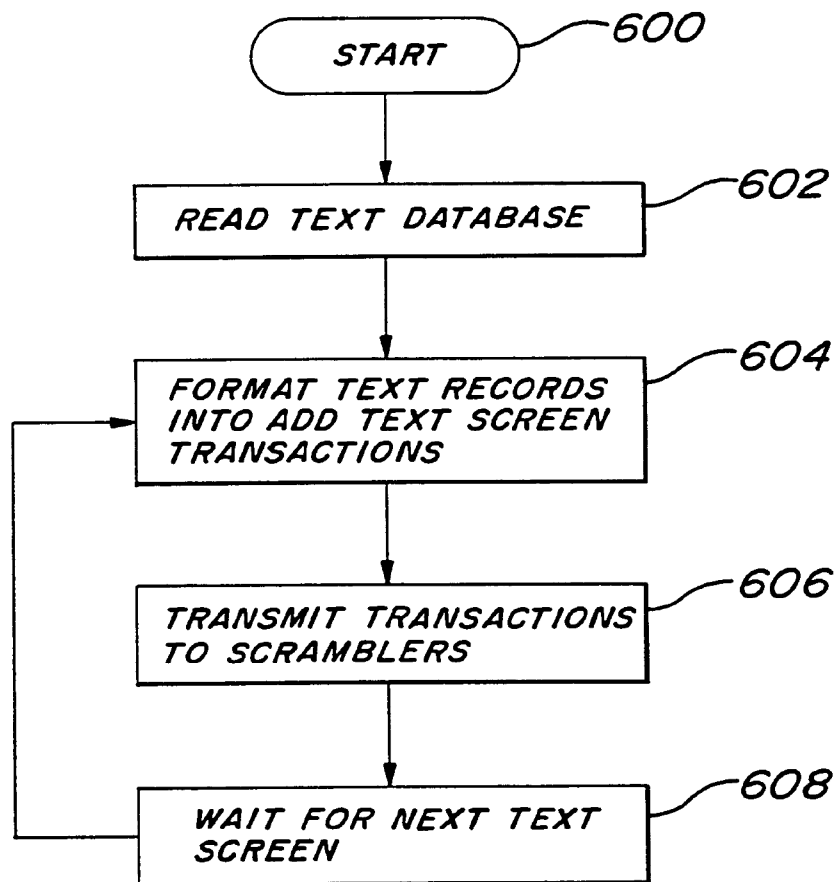
# FIG. 5

## EPG TRANSACTION FORMATTER 58



# FIG. 6

## TEXT CHANNEL TRANSACTION FORMATTER 60,62



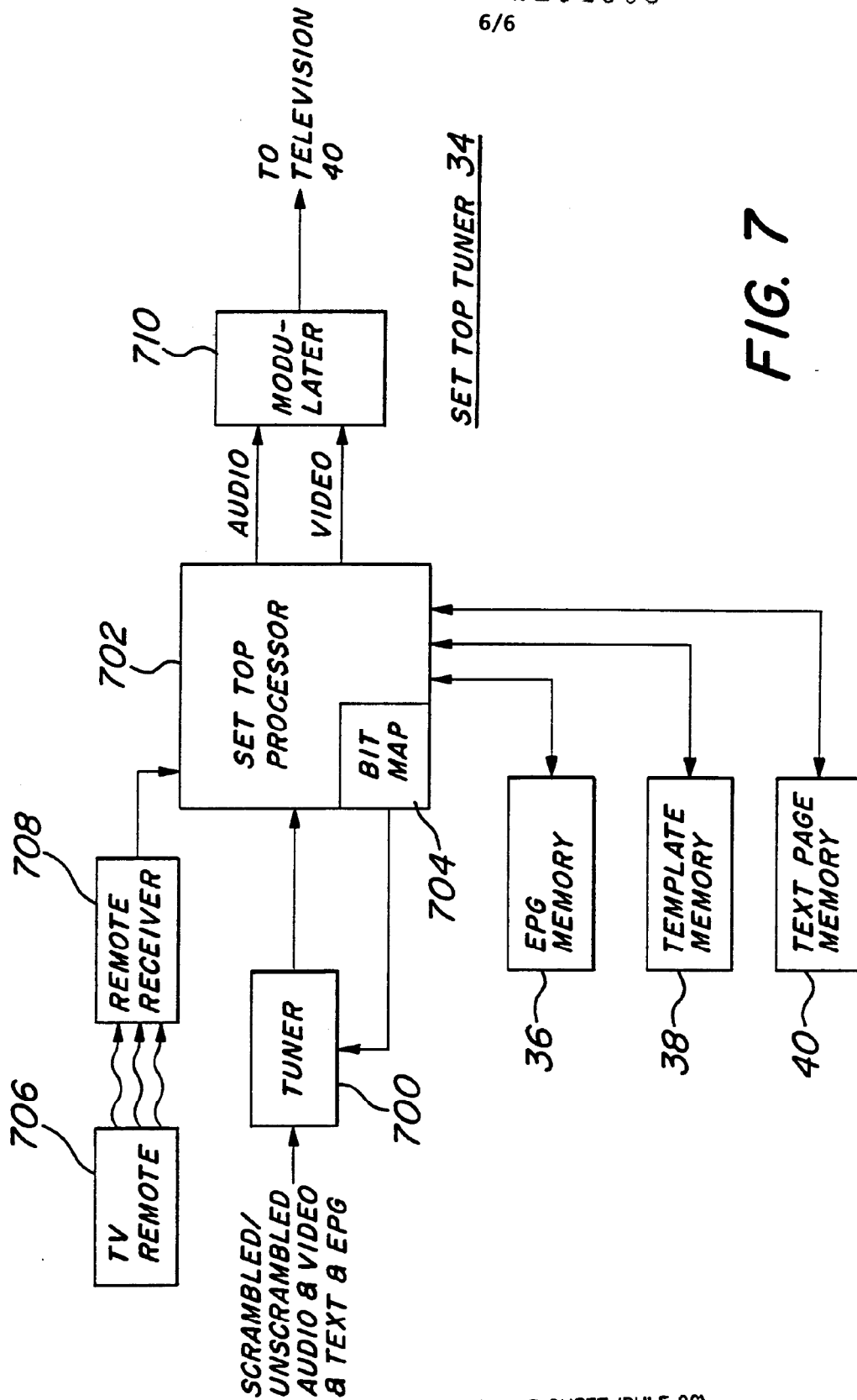


FIG. 7

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(19)  **Canadian  
Intellectual Property  
Office**

An Agency of  
Industry Canada

**Office de la Propriété  
Intellectuelle  
du Canada**

Un organisme  
d'Industrie Canada

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(54) **SYSTEME DE CONTROLE DE VEHICULES AUTOMOBILES SERVANT A DETERMINER LES FRAIS  
D'ASSURANCE**

(54) **MOTOR VEHICLE MONITORING SYSTEM FOR DETERMINING A COST OF INSURANCE**

(57)

A method and system of determining a cost of automobile insurance based upon monitoring, recording and communicating data representative of operator and vehicle driving characteristics. The cost is adjustable retrospectively and can be prospectively set by relating the driving characteristics to predetermined safety standards. The method comprises steps of monitoring a plurality of raw data elements representative of an operating state of the vehicle or an action of the operator. Selected ones of the raw data elements are recorded when the ones are determined to have an identified relationship to safety standards. The selected ones are consolidated for processing against an insurer profile and for identifying a surcharge or discount to be applied to a base cost of automobile insurance. A final cost is produced from the base costs and the surcharges or discounts.





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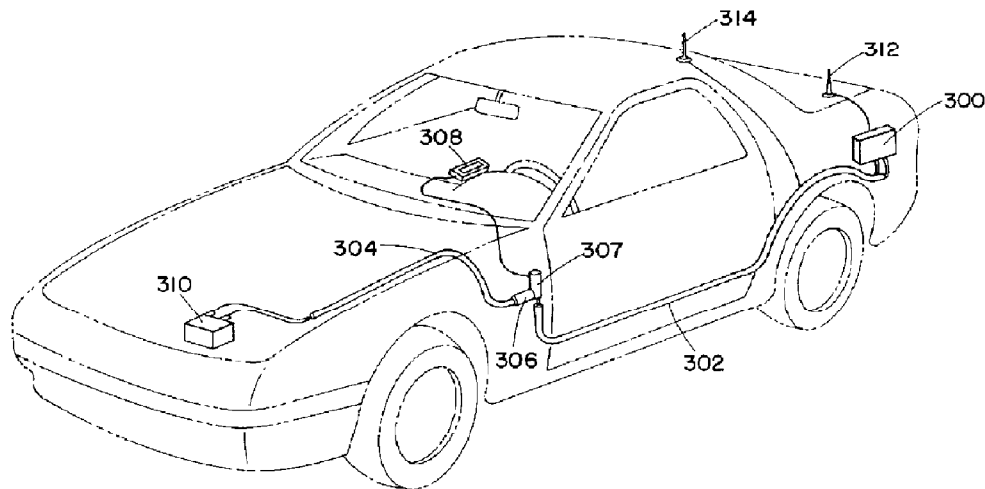
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(51) Int.Cl.<sup>6</sup> G06F 17/60, G06F 17/40

(54) **SYSTEME DE CONTROLE DE VEHICULES AUTOMOBILES  
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**MOTOR VEHICLE MONITORING SYSTEM FOR  
DETERMINING A COST OF INSURANCE**

**Abstract of the Disclosure**

A method and system of determining a cost of automobile insurance based upon monitoring, recording and communicating data representative of operator and vehicle driving characteristics. The cost is adjustable retrospectively and can be prospectively set by relating the driving characteristics to predetermined safety standards. The method comprises steps of monitoring a plurality of raw data elements representative of an operating state of the vehicle or an action of the operator. Selected ones of the raw data elements are recorded when the ones are determined to have an identified relationship to safety standards. The selected ones are consolidated for processing against an insurer profile and for identifying a surcharge or discount to be applied to a base cost of automobile insurance. A final cost is produced from the base costs and the surcharges or discounts.

**MOTOR VEHICLE MONITORING SYSTEM FOR  
DETERMINING A COST OF INSURANCE**

**Background of the Invention**

The present invention relates to data acquisition and processing systems, and particularly to a system for monitoring motor vehicle operational characteristics and driver behavior to obtain increased amounts of data relating to the safety of use for purposes of providing a more accurate determination of a  
5 cost of insurance for the vehicle.

Conventional methods for determining costs of motor vehicle insurance involve gathering relevant historical data from a personal interview with the applicant for the insurance and by referencing the applicant's public  
10 motor vehicle driving record that is maintained by a governmental agency, such as a Bureau of Motor Vehicles. Such data results in a classification of the applicant to a broad actuarial class for which insurance rates are assigned based upon the empirical experience of the insurer. Many factors are relevant to such classification in a particular actuarial class, such as age, sex, marital status,  
15 location of residence and driving record.

The current system of insurance creates groupings of vehicles and drivers (actuarial classes) based on the following types of classifications.

**Vehicle:**

20 Age;  
manufacturer, model; and  
value.

**Driver:**

25 Age;  
sex;  
marital status;  
driving record (based on government reports),  
violations (citations);

at fault accidents; and  
place of residence.

**Coverage:**

5                                   Types of losses covered,  
  liability,  
  uninsured motorist,  
  comprehensive, and  
  collision;  
10                                  liability limits; and  
  deductibles.

15                                  The classifications, such as age, are further broken into actuarial  
  classes, such as 21 to 24, to develop a unique vehicle insurance cost based on  
  the specific combination of actuarial classes for a particular risk. For example,  
  the following information would produce a unique vehicle insurance cost.

**Vehicle:**

Age	1993 (three years old)
manufacturer, model	Ford, Explorer XLT
value	\$ 18,000.

**Driver:**

Age	38 years old
sex	male
marital status	single
driving record (based on government reports)	
violations	1 point (speeding)
at fault accidents	3 points (one at fault accident)
place of residence	33619 (zip code)

**Coverage:**

Types of losses covered

	liability	yes
	uninsured motorist	no
	comprehensive	yes
	collision	yes
5	liability limits	\$100,000./\$300,000./\$50,000.
	deductibles	\$500./\$500.

10 A change to any of this information would result in a different premium being charged, if the change resulted in a different actuarial class for that variable. For instance, a change in the drivers' age from 38 to 39 may not result in a different actuarial class, because 38 and 39 year old people may be in the same actuarial class. However, a change in driver age from 38 to 45 may result in a different premium because of the change in actuarial class.

15 Current insurance rating systems also provide discounts and surcharges for some types of use of the vehicle, equipment on the vehicle and type of driver. Common surcharges and discounts include:

**Surcharges:**

Business use.

20 **Discounts:**

Safety equipment on the vehicle  
airbags, and  
antilock brakes;  
theft control devices

25 passive systems (e.g. "The Club"), and  
alarm system; and

driver type  
good student, and  
safe driver (accident free).

A principal problem with such conventional insurance determination systems is that much of the data gathered from the applicant in the interview is not verifiable, and even existing public records contain only minimal information, much of which has little relevance towards an assessment of the likelihood of a claim subsequently occurring. In other words, current rating systems are primarily based on past realized losses. None of the data obtained through conventional systems necessarily reliably predicts the manner or safety of future operation of the vehicle. Accordingly, the limited amount of accumulated relevant data and its minimal evidential value towards computation of a fair cost of insurance has generated a long-felt need for an improved system for more reliably and accurately accumulating data having a highly relevant evidential value towards predicting the actual manner of a vehicle's future operation.

Many types of vehicle operating data recording systems have heretofore been suggested for purposes of maintaining an accurate record of certain elements of vehicle operation. Some are suggested for identifying the cause for an accident, others are for more accurately assessing the efficiency of operation. Such systems disclose a variety of conventional techniques for recording vehicle operation data elements in a variety of data recording systems. In addition, it has also been suggested to provide a radio communication link for such information via systems such as a cellular telephone to provide immediate communication of certain types of data elements or to allow a more immediate response in cases such as theft, accident, break-down or emergency. It has even been suggested to detect and record seatbelt usage to assist in determination of the vehicle insurance costs (U.S. Patent No. 4,667,336).

The various forms and types of vehicle operating data acquisition and recordal systems that have heretofore been suggested and employed have met with varying degrees of success for their express limited purposes. All possess substantial defects such that they have only limited economical and

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practical value for a system intended to provide an enhanced acquisition,  
recordal and communication system of data which would be both comprehensive  
and reliable in predicting an accurate and adequate cost of insurance for the  
vehicle. Since the type of operating information acquired and recorded in prior  
5 art systems was generally never intended to be used for determining the cost of  
vehicle insurance, the data elements that were monitored and recorded therein  
were not directly related to predetermined safety standards or the determining of  
an actuarial class for the vehicle operator. For example, recording data  
10 characteristics relevant to the vehicle's operating efficiency may be completely  
unrelated to the safety of operation of the vehicle. Further, there is the problem  
of recording and subsequently compiling the relevant data for an accurate  
determination of an actuarial profile and an appropriate insurance cost therefor.

Current motor vehicle control and operating systems comprise  
15 electronic systems readily adaptable for modification to obtain the desired types  
of information relevant to determination of the cost of insurance. Vehicle  
tracking systems have been suggested which use communication links with  
satellite navigation systems for providing information describing a vehicle's  
location based upon navigation signals. When such positioning information is  
combined with roadmaps in an expert system, vehicle location is ascertainable.  
20 Mere vehicle location, though, will not provide data particularly relevant to  
safety of operation unless the data is combined with other relevant data in an  
expert system which is capable of assessing whether the roads being driven are  
high-risk or low-risk with regard to vehicle safety.

The present invention contemplates a new and improved motor  
25 vehicle monitoring, recording and communication system, which primarily  
overcomes the problem of determining cost of vehicle insurance based upon data  
which does not take into consideration how a specific vehicle is operated. The  
subject invention will base insurance charges with regard to current material data  
representative of actual driving characteristics of the vehicle and driver operation

to provide a classification rating of the operator and the vehicle in an actuarial class which has a vastly reduced rating error over conventional insurance cost systems. Additionally, the present invention allows for frequent (monthly) adjustment to the cost of coverage because of the changes in operator behavior and driving patterns. This can result in automobile insurance charges that are readily controllable by individual operators. The system is adaptable to current electronic operating systems, tracking systems and communication systems for the improved extraction of selected insurance related data.

#### Brief Summary of the Invention

In accordance with the present invention, there is disclosed a method of determining a cost of automobile insurance based upon monitoring, recording and communicating data representative of operator and vehicle driving characteristics, whereby the cost is adjustable by relating the driving characteristics to predetermined safety standards. The method is comprised of steps of monitoring a plurality of raw data elements representative of an operating state of a vehicle or an action of the operator. Selected ones of the plurality of raw data elements are recorded when they are determined to have an identified relationship to the safety standards. The recorded elements are consolidated for processing against an insured profile and for identifying a surcharge or discount to be applied to a base cost of automobile insurance. The total cost of insurance obtained from combining the base cost and surcharges or discounts is produced as a final cost to the operator.

In accordance with another aspect of the present invention, the recording comprises identifying a trigger event associated with the raw data elements which has an identified relationship to the safety standards so that trigger information representative of the event is recorded.

In accordance with a more limited aspect of the present invention, the method comprises a step of immediately communicating to a central control