UNITED STATES PATENT AND TRADEMARK OFFICE

CERTIFICATE OF CORRECTION

PATENT NO. : 4,959,810

DATED : September 25, 1990

INVENTOR(S) : Darbee et al

It is certified that error appears in the above-indentified patent and that said Letters Patent is hereby corrected as shown below:

Column 21, Line 65, "claim 19" should be --claim 14--.

Signed and Sealed this

Fifth Day of October, 1993

Attest:

Attesting Officer

BRUCE LEHMAN

Commissioner of Patents and Trademarks

NOTICE RE: CERTIFICATES OF CORRECTION

Paper No. 22

DATE : 17 Aug. 1993

TO : Supervisor, Art Unit 2503

SUBJECT : Certificate of Correction Request in Patent No. 4,959,810

A response to the following question(s) is requested with respect to the accompanying request for a certificate of correction.

☒ 1. Would the change(s) requested under 37 CFR 1.323 constitute new matter or require reexamination of the application?

☐ 2. Would the change(s) requested under 37 CFR 1.323 materially affect the scope or meaning of the claims allowed by the examiner in the patent?

☐ 3. Applicant disagrees with change(s) initialed and dated by Examiner in lieu of an Examiner's Amendment. Should the change request be granted?

☐ 4. With respect to the change(s) requested, correcting Office errors, should the patent read as shown in the certificate of correction?

☐ 5. If the amendment filed _____ had been considered by the Examiner, would the amendment have been entered?

PLEASE RESPOND WITHIN 7 DAYS AND RETURN THE FILE TO ROOM 809, PKI

Seth M. Cheatham
Patent Assistant

TO: CERTIFICATES OF CORRECTION BRANCH | DATE: 8/19/93

The decision regarding the change(s) requested in the certificate of correction is shown below.

1.	☐ YES	☒ NO	☐ Comments below
2.	☐ YES	☐ NO	☐ Comments below
3.	☐ YES	☐ NO	☐ Comments below
4.	☐ YES	☐ NO	☐ Comments below
5.	☐ YES	☐ NO	☐ Comments below

☐ Comments _____

EUGENE R. LaROCHE
SUPERVISORY PATENT EXAMINER
GROUP 2500

2511
Art Unit

PTOL-306 (REV. 10/87)

U.S. DEPARTMENT OF COMMERCE Patent and Trademark

UNITED S. TES DEPARTMENT OF COMMERCE
Patent and Trademark Office
ASSISTANT SECRETARY AND COMMISSIONER
OF PATENTS AND TRADEMARKS
Washington, D.C. 20231

DEC 7 199[illegible]

Thomas Vigil
VIGIL & HANRATH
836 S. Northwest Hwy
Barrington, IL 60010

Re: Status Regarding Certificate of Correction for
U.S. Patent No. 4,959,810

Dear Thomas Vigil

On September 17, 19, we received a request for a Certificate of Correction for the above-referenced patent. We are currently experiencing a backlog of approximately 6-8 months. We appreciate your patience while we work through our backlog.

Should expedited services be required, please contact me at (703) 305-8127.

Sincerely,

Mary Allen, Manager
Certificates of Correction Branch
Office of Publication and Dissemination

CofC

LAW OFFICES
VIGIL & HANRATH
836 SOUTH NORTHWEST HIGHWAY
BARRINGTON, ILLINOIS 60010-4683

PATENT, TRADEMARK, COPYRIGHT
LICENSING AND RELATED
INTELLECTUAL PROPERTY LAW MATTERS

TELEPHONE (708) 382-6500
TELECOPIER (708) 382-6895
TELEX 28-3415
CABLE USPATLAW

THOMAS R. VIGIL
JAMES P. HANRATH, P.C.
GARY J. CUNNINGHAM

OF COUNSEL
CHARLES W. RYAN

CHICAGO OFFICE
SUITE 2100
203 NORTH LASALLE STREET
CHICAGO, ILLINOIS 60601-1210
(312) 368-0202

#21

September 10, 1992

Honorable Commissioner of
Patents and Trademarks
Washington, D.C. 20231

Re: Our File Ref: 87290
U.S. Application Serial No: 07/127,999
Filed: December 2, 1987
Now U.S. Patent No: 4,959,810
Granted: September 25, 1990
For: UNIVERSAL REMOTE CONTROL DEVICE

Dear Sir:

While proofreading the above identified patent for accuracy in the printing thereof, a number of errors were noted. Since some of these errors are significant and/or appear in the claims, we are enclosing duplicate copies of a Certificate of Correction to effect correction of these errors in the printing of the patent.

Please send the Certificate of Correction to:

Thomas R. Vigil
VIGIL & HANRATH
836 South Northwest Highway
Barrington, IL 60010

If any of the errors noted in the Certificate of Correction were errors, such as typographical errors, that appeared in the record and were not the fault of the Office, please effect the corrections pursuant to 37 CFR §1.323 and charge any fee required under ~~37 CFR ss 1.20 (a).~~ to our Deposit Account No. 22-0355.

APPROVED
SEP 8 1993
FOR THE COMMISSIONER OF PAT. & T.M.

Sincerely,

VIGIL & HANRATH

T. R. Vigil

Thomas R. Vigil

TRV:mt

DS20038 08/09/93 4959810 22-0355 020 145 70.00CH

Staple Here Only !

PRINTER'S TRIM LI

UNITED STATES PATENT AND TRADEMARK OFFICE
CERTIFICATE OF CORRECTION

PATENT NO. : 4,959,810

DATED : September 25, 1990

INVENTOR(S) : Darbee et al.

It is certified that error appears in the above-identified patent and that said Letters Patent is hereby corrected as shown below:

Column 1, Line 23, "infarared" should be --infrared--. P

Column 6, Line 20, "106" should be --106.-- insert period P

Column 7, Line 24, "52" should be --58--. P

Column 8, Line 40, "theefor" should be --therefor--. P

Column 8, Line 62, "etc" should be etc.---. atty

Column 9, Line 34, "dat" should be --data--. P

Column 10, Line 32, "wnhich" should be --which--. P

Column 13, Line 27, "0" should be --to--. P

Column 14, Line 15, "DØ2" should be --DO2--. atty P

Column 14, Line 17, "DØ2" should be --DO2--. atty P

Column 14, Line 22, "DØ2" should be --DO2--. atty P

Column 14, Line 24, "fhen" should be --then--. P

Column 14, Line 29, "DØ2" should be --DO2--. atty P

Column 21, Line 36, "CPu" should be --CPU--. claim P

Column 21, Line 64, "RM" should be --RAM--. P

Column 21, Line 65, "claim 19" should be --claim 14--. P

MAILING ADDRESS OF SENDER:
Vigil & Hanrath
836 S. Northwest Hwy
Barrington, IL 60010

PATENT NO. 4,959,810

No. of add'l. copies @ 30¢ per page

FORM PTO 1050 (REV. 3-82)

UNITED STATES PATENT AND TRADEMARK OFFICE

CERTIFICATE OF CORRECTION

PATENT NO. : 4,959,810

DATED : September 25, 1990

INVENTOR(S) : Darbee et al.

It is certified that error appears in the above-identified patent and that said Letters Patent is hereby corrected as shown below:

Column 1, Line 23, "infarared" should be --infrared--.

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Column 8, Line 62, "etc" should be etc.--.

Column 9, Line 34, "dat" should be --data--.

Column 10, Line 32, "wnhich" should be --which--.

Col. 10, line 27, "o" should be --to--.

Column 14, Line 15, "DØ2" should be --DO2--.

Column 14, Line 17, "DØ2" should be --DO2--.

Column 14, Line 22, "DØ2" should be --DO2--.

Column 14, Line 24, "fhen" should be --then--.

Column 14, Line 29, "DØ2" should be --DO2--.

Column 21, Line 36, "CPu" should be --CPU--.

Column 21, Line 64, "RM" should be --RAM--.

PTO UTILITY GRANT
Paper Number 20

The United States of America

The Commissioner of Patents and Trademarks

Has received an application for a patent for a new and useful invention. The title and description of the invention are enclosed. The requirements of law have been complied with, and it has been determined that a patent on the invention shall be granted under the law.

Therefore, this

United States Patent

Grants to the person or persons having title to this patent the right to exclude others from making, using or selling the invention throughout the United States of America for the term of seventeen years from the date of this patent, subject to the payment of maintenance fees as provided by law.

Harry F. Manbeck, Jr.

Commissioner of Patents and Trademarks

Sandra L. Morton

Attest

PTO-1584

PART B - ISSUE FEE TRANSMITTAL

15.00 — 501

MAILING INSTRUCTIONS: This form should be used for transmitting the ISSUE FEE. Blocks 2 through 5 should be completed where appropriate. All further correspondence including the Issue Fee Receipt, the Patent, advanced orders and notification of maintenance fees will be mailed to addressee entered in Block 1 unless you direct otherwise, by: (a) specifying a new correspondence address in Block 3 below; or (b) providing the PTO with a separate "FEE ADDRESS" for maintenance fee notifications with the payment of Issue Fee or thereafter. **See reverse for Certificate of Mailing.**

1. CORRESPONDENCE ADDRESS	2. INVENTOR(S) ADDRESS CHANGE (Complete only if there is a change)
THOMAS VIGIL & ASSOCIATES 836 SOUTH NORTHWEST HWY. BARRINGTON, IL 60010	INVENTOR'S NAME Street Address City, State and ZIP Code CO-INVENTOR'S NAME Street Address City, State and ZIP Code ☐ Check if additional changes are on reverse side

MAIL ROOM JUL 5 1990 PAT. & TRADEMARK OFF. 68

Elect

SERIES CODE/SERIAL NO.	FILING DATE	TOTAL CLAIMS	EXAMINER AND GROUP ART UNIT		DATE MAILED
07/127,999	12/02/87	038	NGUYEN, V	253	04/30/90

First Named Applicant: DARBEE, PAUL V.

TITLE OF INVENTION: UNIVERSAL REMOTE CONTROL DEVICE

	ATTY'S DOCKET NO.	CLASS-SUBCLASS	BATCH NO.	APPLN. TYPE	SMALL ENTITY	FEE DUE	DATE DUE
2	87290	364-900.000	F06	UTILITY	NO	~~$620.00~~ B310	07/30/90

050 TL 07/10/90 07127999 1 242 310.00 CK

050 TL 07/10/90 07127999 1 501 15.00 CK

small entity decl. sent mailed to Office on 6/15/90 T.R. Vigil

3. Further correspondence to be mailed to the following:

THOMAS R. VIGIL
836 South Northwest Highway
Barrington, Illinois 60010

4. For printing on the patent front page, list the names of not more than 3 registered patent attorneys or agents OR alternatively, the name of a firm having as a member a registered attorney or agent. If no name is listed, no name will be printed.

1 Thomas R. Vigil
2
3

DO NOT USE THIS SPACE

5. ASSIGNMENT DATA TO BE PRINTED ON THE PATENT (print or type)

(1) NAME OF ASSIGNEE: 02 Universal Electronics, Inc.

(2) ADDRESS: (City & State or Country) Tustin, California

(3) STATE OF INCORPORATION, IF ASSIGNEE IS A CORPORATION: Delaware

A. ☐ This application is NOT assigned.

☒ Assignment previously submitted to the Patent and Trademark Office.

☐ Assignment is being submitted under separate cover. Assignments should be directed to Box ASSIGNMENTS.

PLEASE NOTE: Unless an assignee is identified in Block 5, no assignee data will appear on the patent. Inclusion of assignee data is only appropriate when an assignment has been previously submitted to the PTO or is being submitted under separate cover. Completion of this form is NOT a substitute for filing an assignment.

6a. The following fees are enclosed:

☒ Issue Fee ☒ Advanced Order - # of Copies 10

6b. The following fees should be charged to: (Minimum of

DEPOSIT ACCOUNT NUMBER 22-0355
(Enclose Part C)

☐ Issue Fee ☐ Advanced Order - # of Copies

☒ Any Deficiencies in Enclosed Fees (Minimum

The COMMISSIONER OF PATENTS AND TRADEMARKS is requested to apply the Issue Fee to the application identified above.

(Signature of party in interest of record)	(Date)
Thomas R. Vigil	7/26

NOTE: The Issue Fee will not be accepted from anyone other than the applicant; a registered attorney or agent; or the assignee or other party in interest as shown by the records of the Patent and Trademark Office.

TRANSMIT THIS FORM WITH FEE-CERTIFICATE OF MAILING ON REVERSE

Certificate of Mailing

I hereby certify that this correspondence is being deposited with the United States Postal Service with sufficient postage as first class mail in an envelope addressed to:

Box ISSUE FEE
Commissioner of Patents and Trademarks
Washington, D.C. 20231

on May 2, 1990
(Date)

Thomas R. Vigil
(Name of person making deposit)

Thomas R. Vigil
(Signature)

July 3, 1990
(Date)

Note: If this certificate of mailing is used, it can only be used to transmit the Issue Fee. This certificate cannot be used for any other accompanying papers. Each additional paper, such as an assignment or formal drawings, must have its own certificate of mailing.

This form is estimated to take 20 minutes to complete. Time will vary depending upon the needs of the individual applicant. Any comments on the amount of time you require to complete this form should be sent to the Office of Management and Organization, Patent and Trademark Office, Washington, D.C. 20231 and to the Office of Information and Regulatory Affairs, Office of Management and Budget, Washington, D.C. 20503.

PATENT
S.N. 07/127,999
Atty Docket 87290

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Application of:

Paul V. Darbee et al.

For: UNIVERSAL REMOTE CONTROL DEVICE

Group Art Unit: 253

Examiner: V. NGUYEN

Notice of Allowance Mailed: 4/30/90

Serial No. 07/127,999

Filed: December 2, 1987

Batch No. F06

TRANSMITTAL OF FORMAL DRAWINGS

TO:
Honorable Commissioner of
Patents and Trademarks
Washington, D. C. 20231

Dear Sir:

The subject application was filed with informal drawings and applicant is now filing herewith the formal inked drawings including corrections thereto approved by the Examiner and comprising seventeen sheets of drawings on strong, smooth, non-shiny white paper containing twenty-two Figures.

Respectfully submitted,

Thomas R. Vigil

Thomas R. Vigil
Reg. No. 24,542

Dated: June 15, 1990

836 South Northwest Highway
Barrington, Illinois 60010
(708) 382-6500

CERTIFICATE OF MAILING

I, Thomas R. Vigil, the registered representative for the applicant(s), hereby certifies that this Transmittal of Formal Drawings is being deposited with the United States Postal Service as first-class mail with sufficient postage, in an envelope addressed to: Commissioner of Patents and Trademarks, Washington, D.C. 20231 on

Date June 15, 1990 Thomas R. Vigil

#19

PATENT
S.N. 07/127,999
Atty Docket JW299

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Application of:	
Paul V. Darbee et al.	Group Art Unit: 253
For: UNIVERSAL REMOTE CONTROL DEVICE	Examiner: V. NGUYEN
	Notice of Allowance Mailed: 4/30/90
Serial No. 07/127,999	
Filed: December 2, 1987	Batch No. F06

410
415

LETTER RE: SMALL ENTITY DECLARATION

TO:
Honorable Commissioner of
Patents and Trademarks
Washington, D. C. 20231

Dear Sir:

The Notice of Allowance indicates that the applicant is a large entity. This is incorrect since two small entity declaration forms signed by the inventor were filed in this application. A copy of each declaration is enclosed. Further enclosed is a small entity declaration signed by the president of the assignee company.

Respectfully submitted,

Thomas R. Vigil
Reg. No. 24,542

Dated: June 15, 1990

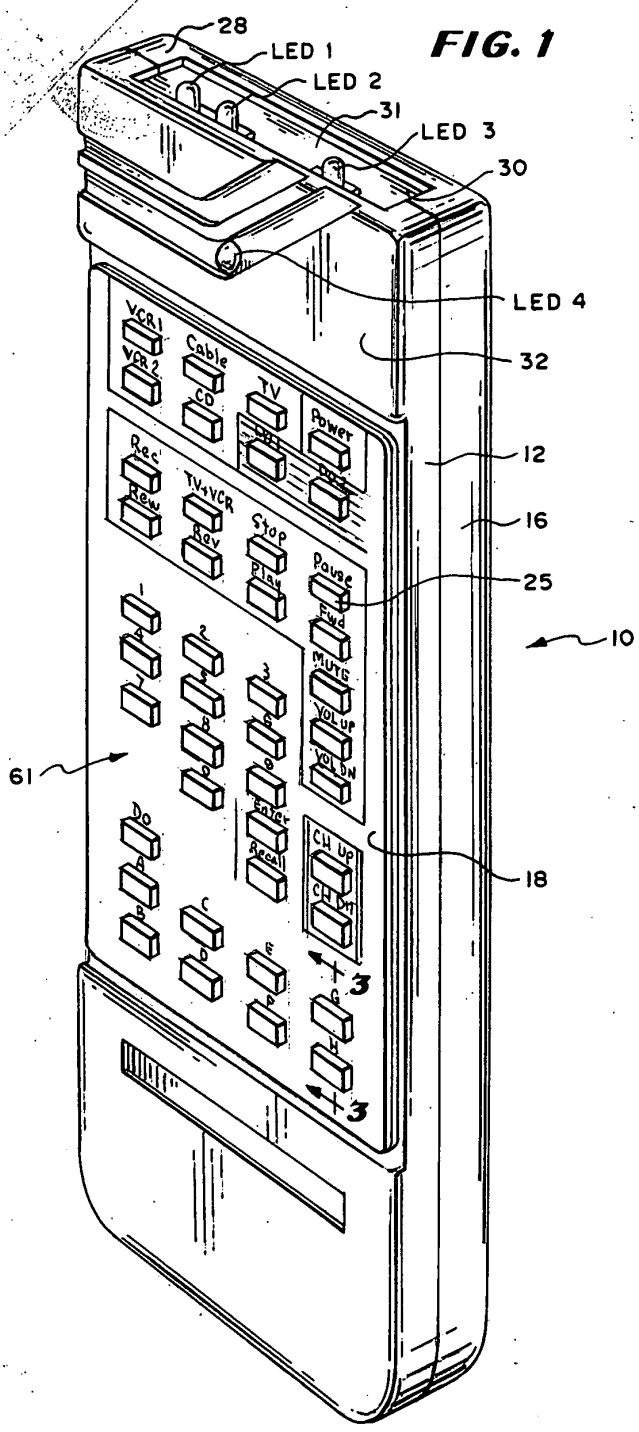
836 South Northwest Highway
Barrington, Illinois 60010
(708) 382-6500

CERTIFICATE OF MAILING

I, Thomas R. Vigil, the registered representative for the applicant(s), hereby certifies that this Letter Re: Small Entity Declaration is being deposited with the United States Postal Service as first-class mail with sufficient postage, in an envelope addressed to: Commissioner of Patents and Trademarks, Washington, D.C. 20231 on

Date June 15, 1990 Thomas R. Vigil

FIG. 1



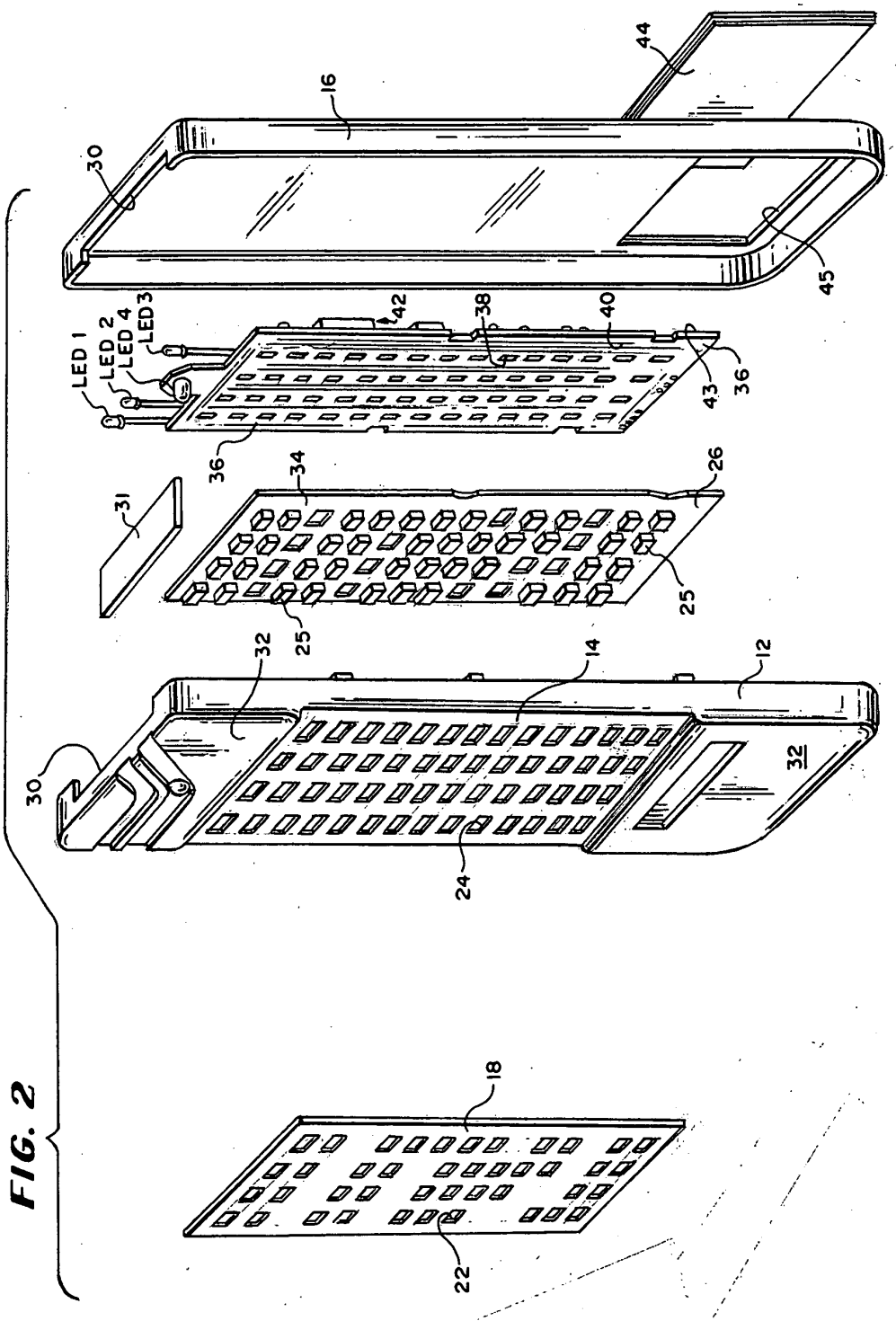


FIG. 2

FIG. 3

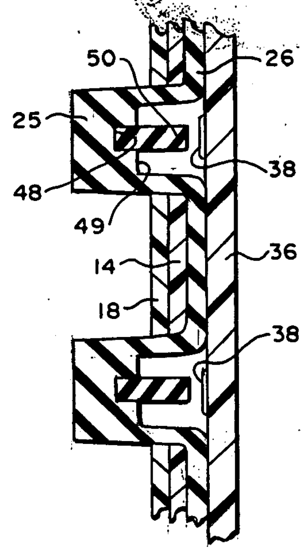


FIG. 4

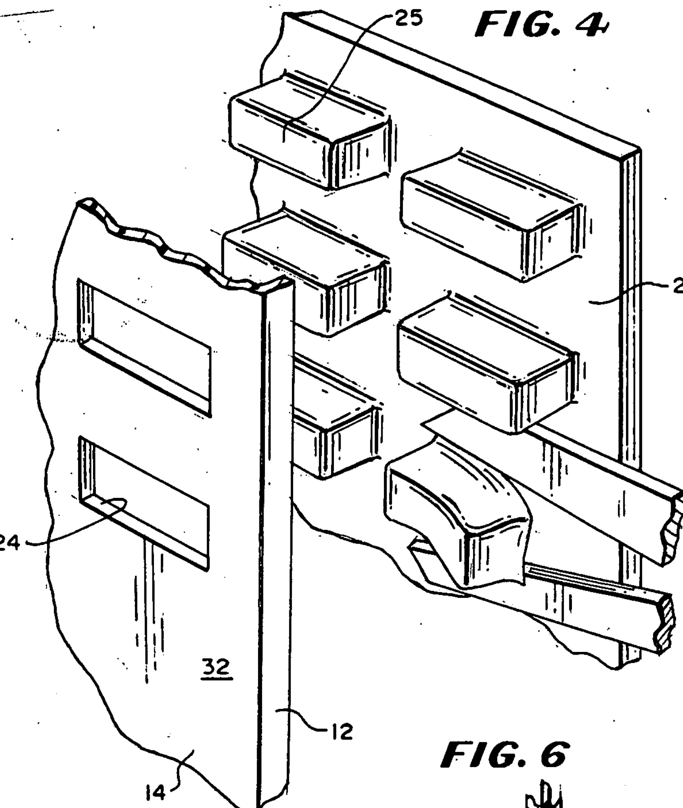


FIG. 5

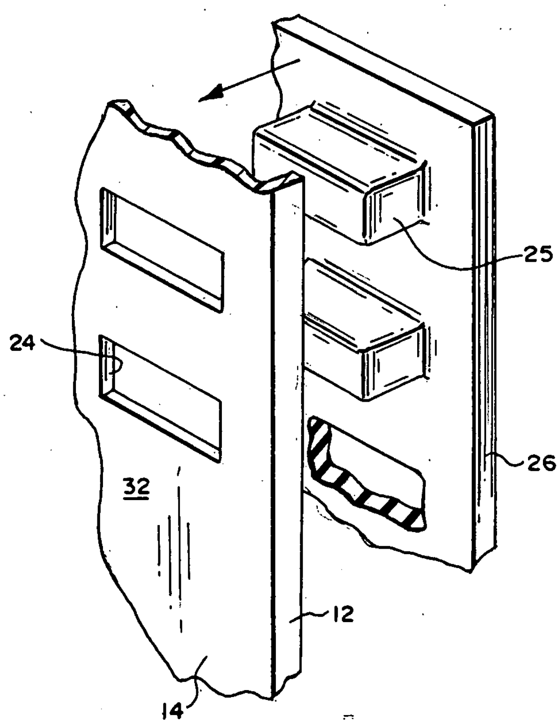


FIG. 6

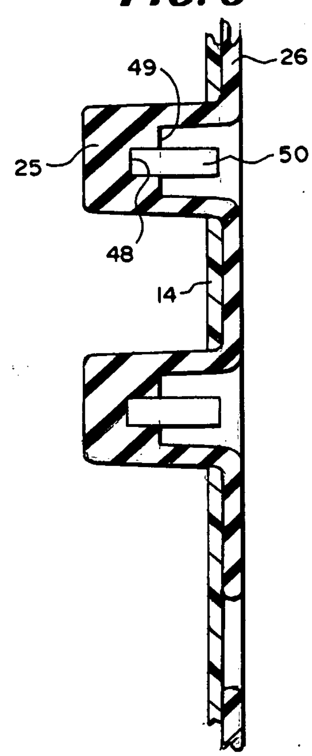


FIG. 7

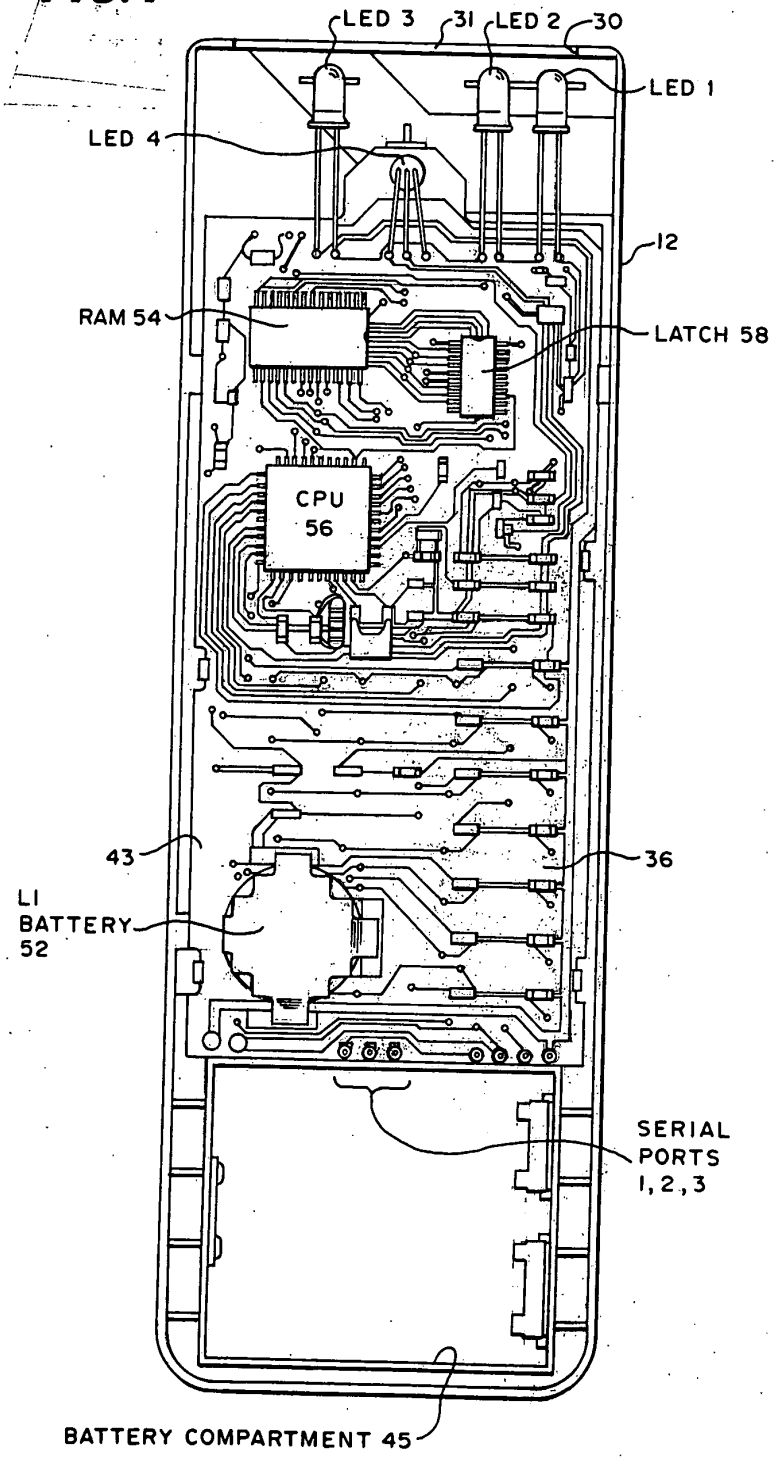


FIG. 8

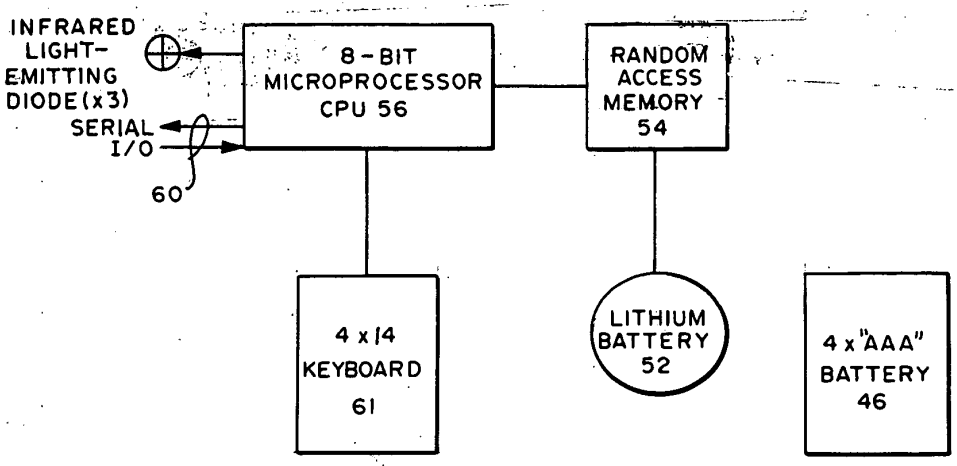
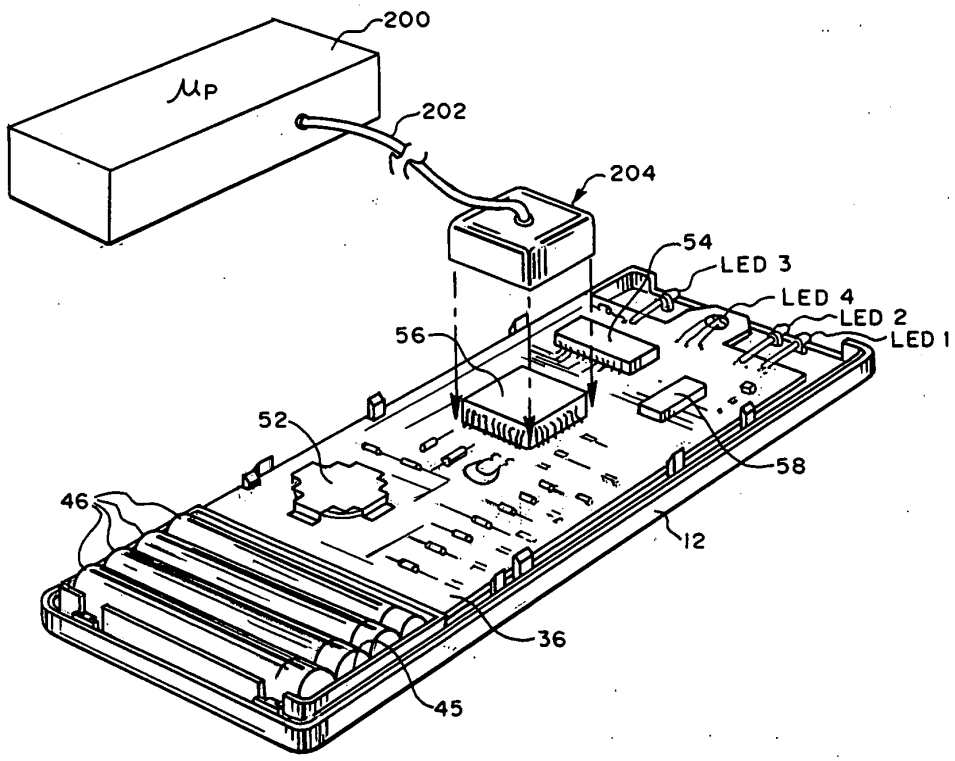

INFRARED LIGHT-EMITTING DIODE (x3)
SERIAL I/O
60
8-BIT MICROPROCESSOR CPU 56
RANDOM ACCESS MEMORY 54
4 x 14 KEYBOARD 61
LITHIUM BATTERY 52
4 x "AAA" BATTERY 46

FIG. 10


200
μP
202
204
54
LED 3
LED 4
LED 2
LED 1
56
52
58
46
12
36
45

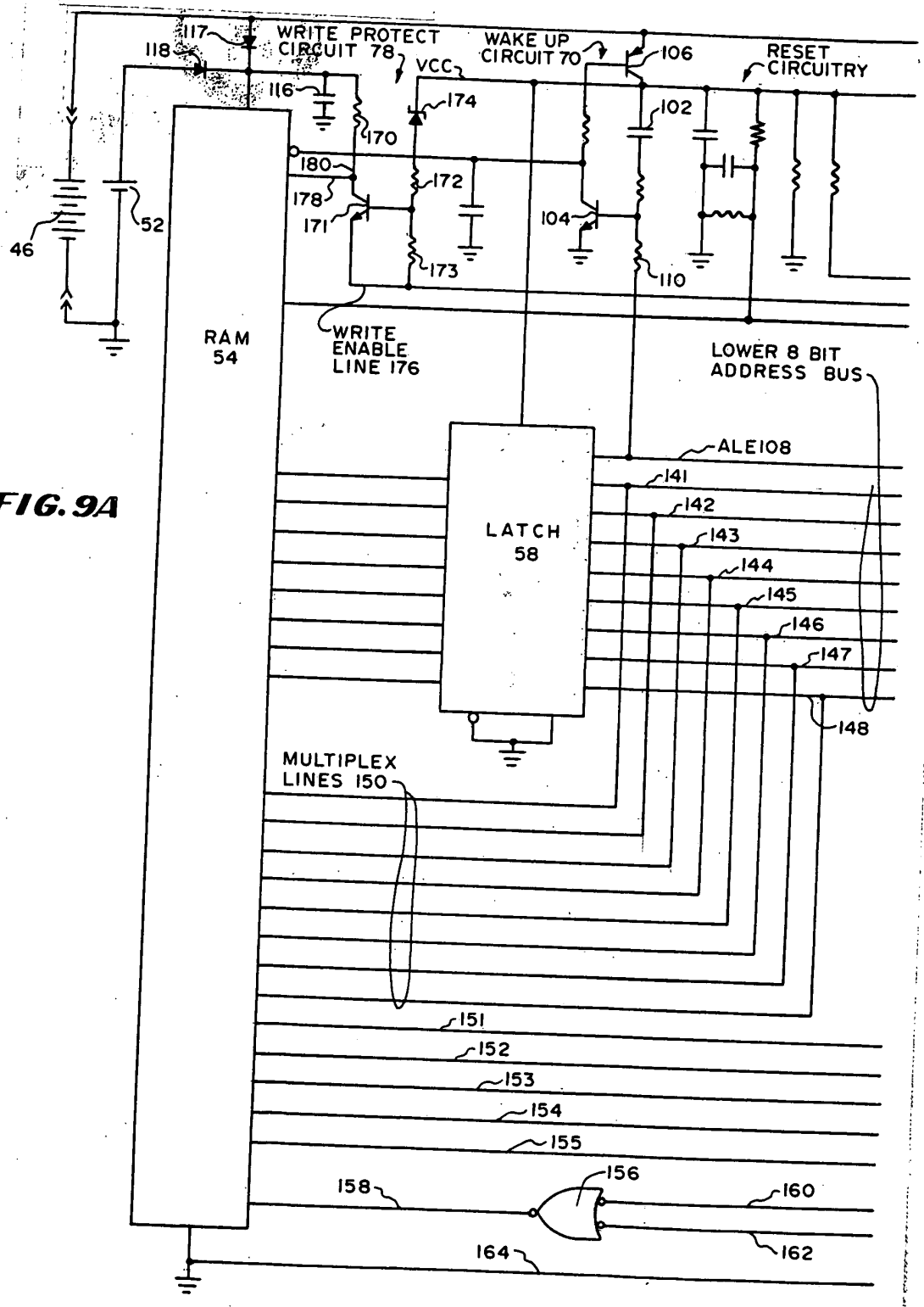

117
118
WRITE PROTECT CIRCUIT 78
VCC
WAKE UP CIRCUIT 70
106
RESET CIRCUITRY
116
174
102
170
180
172
178
171
104
52
46
173
110
RAM 54
WRITE ENABLE LINE 176
LOWER 8 BIT ADDRESS BUS
ALE108
141
LATCH 58
142
143
144
145
146
147
148
MULTIPLEX LINES 150
151
152
153
154
155
156
158
160
162
164

FIG. 9A

TITLE: UNIVERSAL REMOTE CONTROL DEVICE
ITT DOCKET 87290
FILED: DECEMBER 2, 1987

FIG. 9B

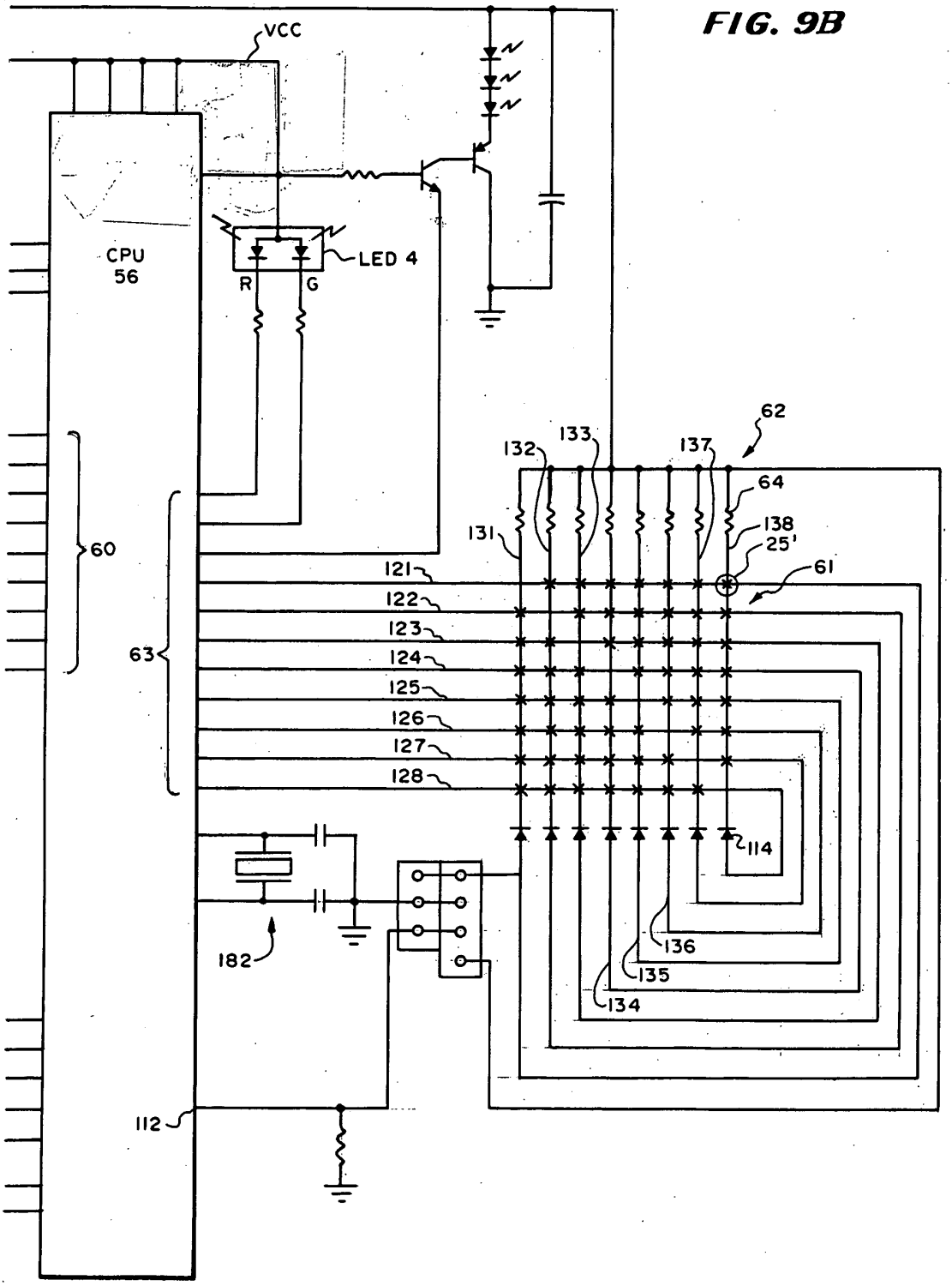


FIG. 11

MODULATION SCHEMES

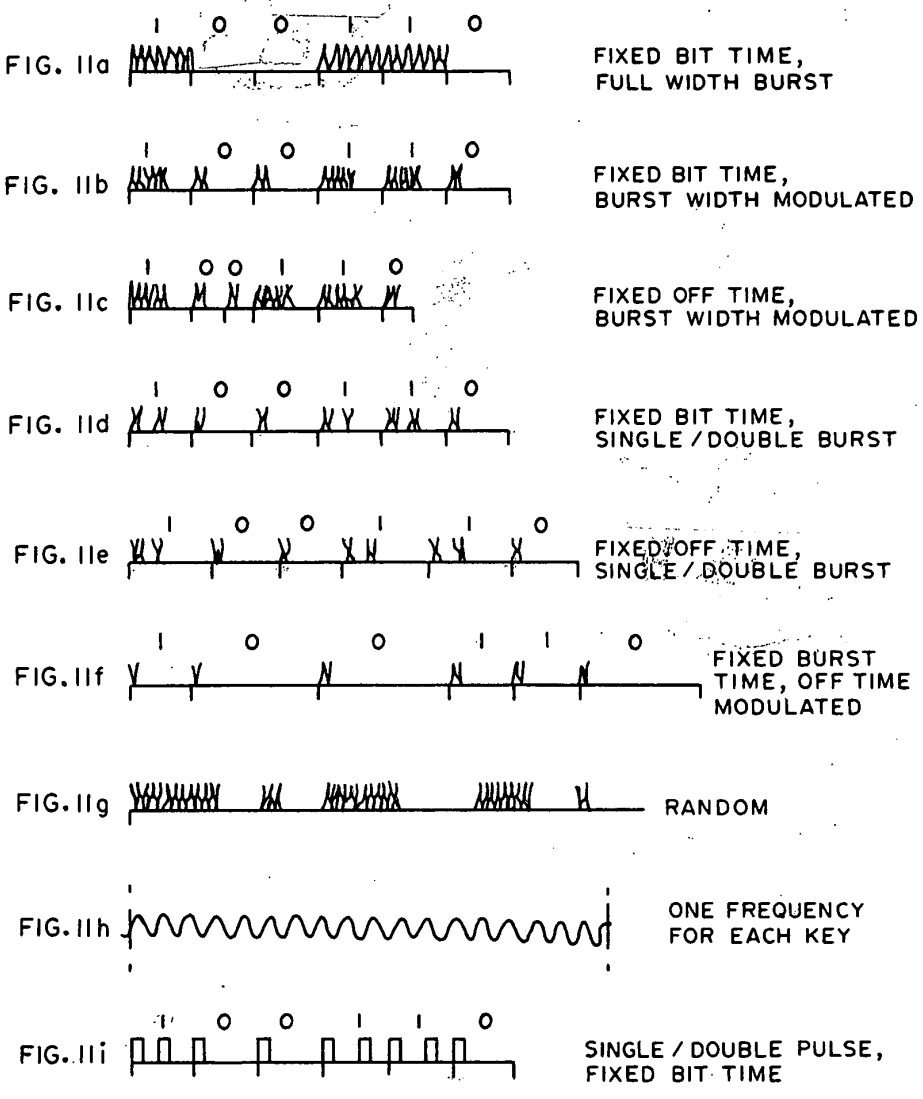


FIG. 12A
CAPTURING IR CODE

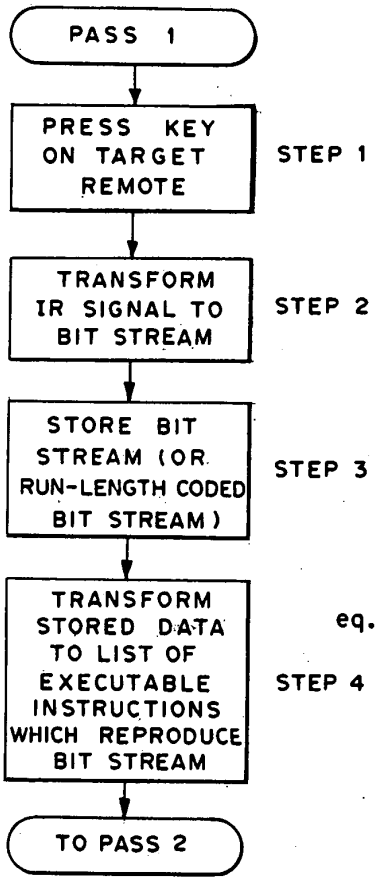


FIG. 12B

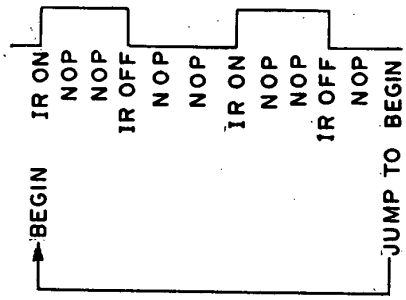


FIG. 13A

CAPTURING IR CODE

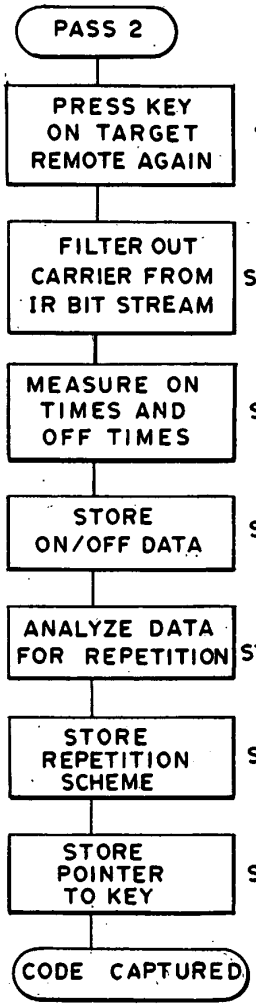


FIG. 13B

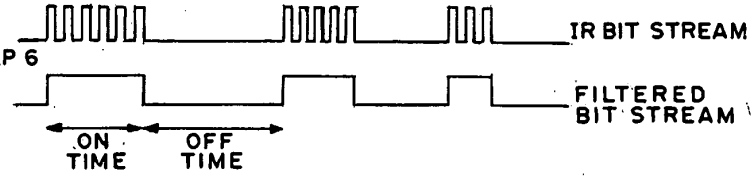


FIG. 13C

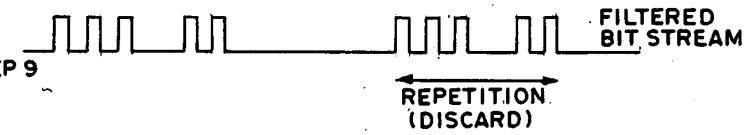


FIG. 14 GENERATING IR CODE

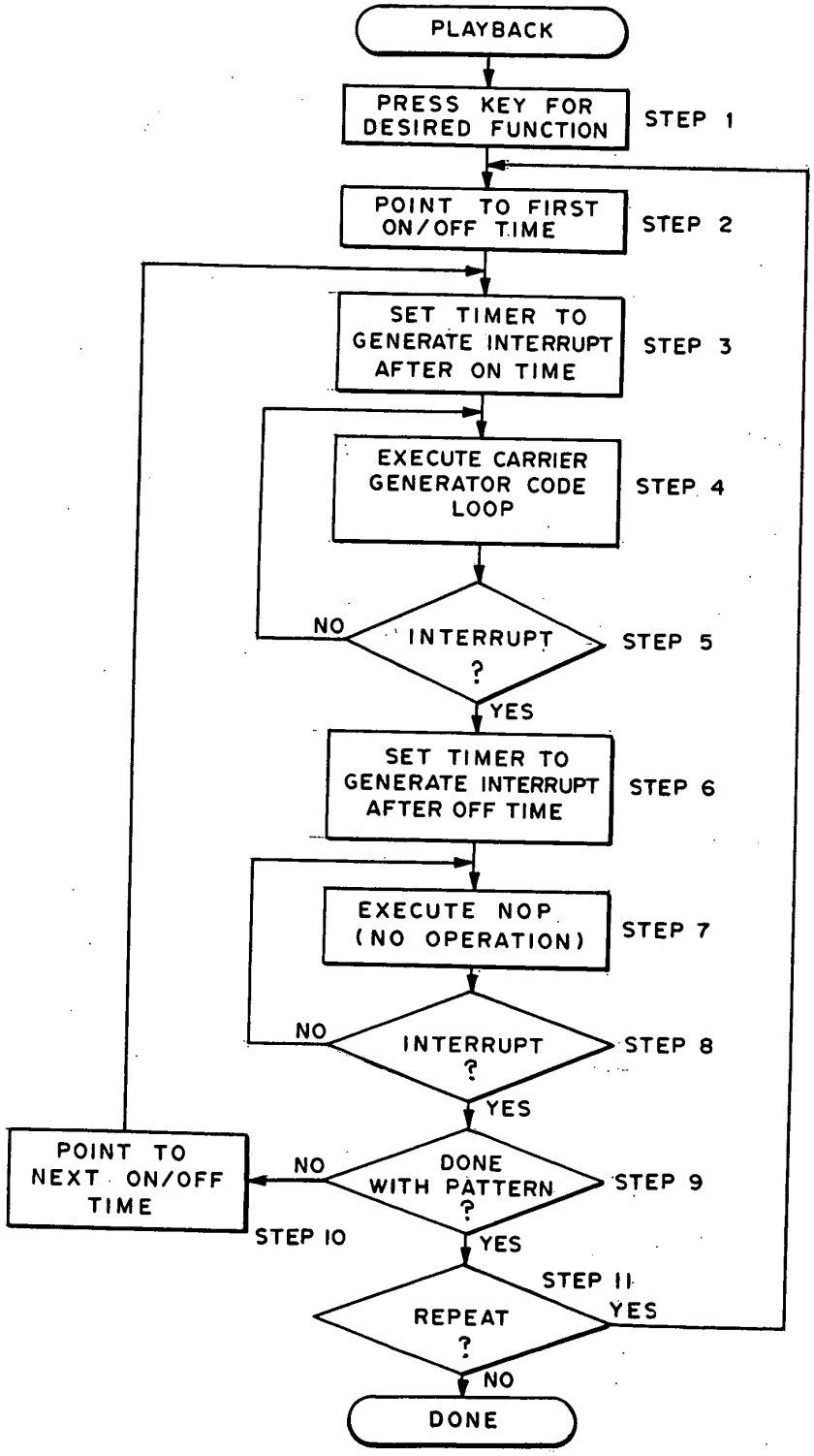


FIG. 15

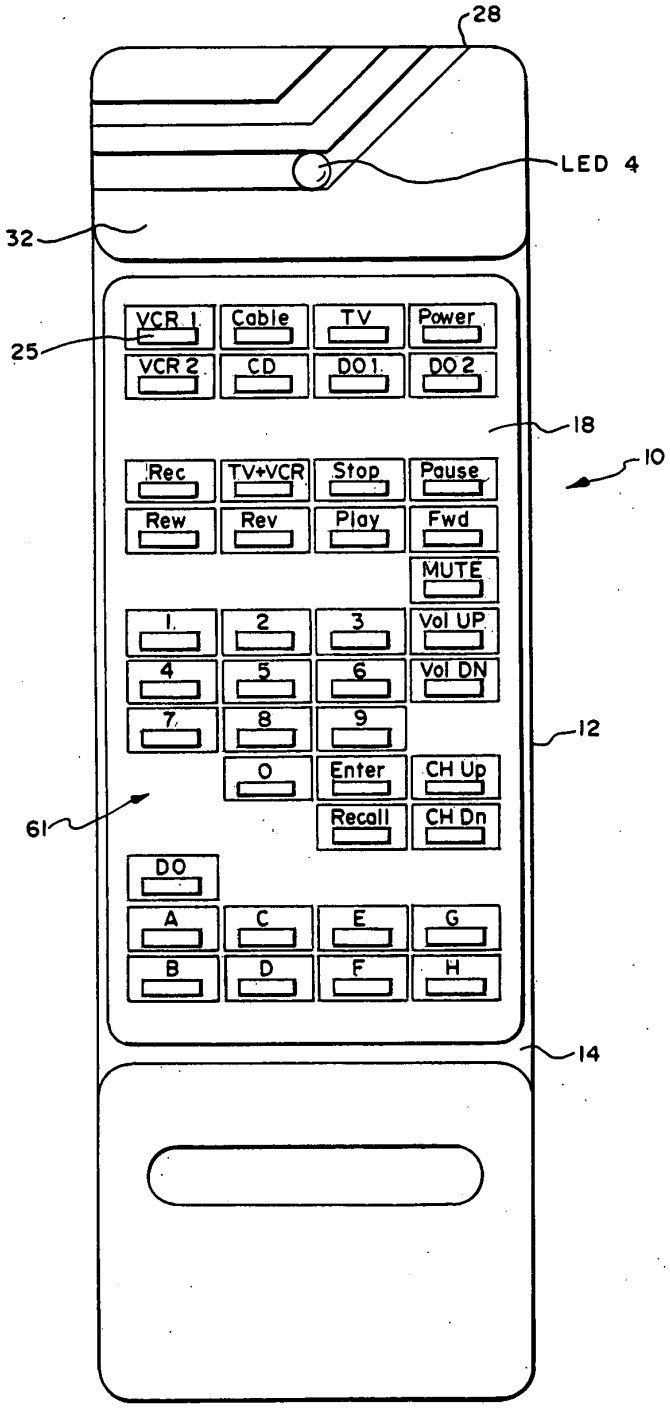

28
LED 4
32
25
VCR 1
Cable
TV
Power
VCR 2
CD
DO 1
DO 2
18
10
Rec
TV+VCR
Stop
Pause
Rew
Rev
Play
Fwd
MUTE
1
2
3
Vol UP
4
5
6
Vol DN
7
8
9
12
0
Enter
CH Up
Recall
CH Dn
61
DO
A
C
E
G
B
D
F
H
14

FIG. 16

STEP AND SET METHOD

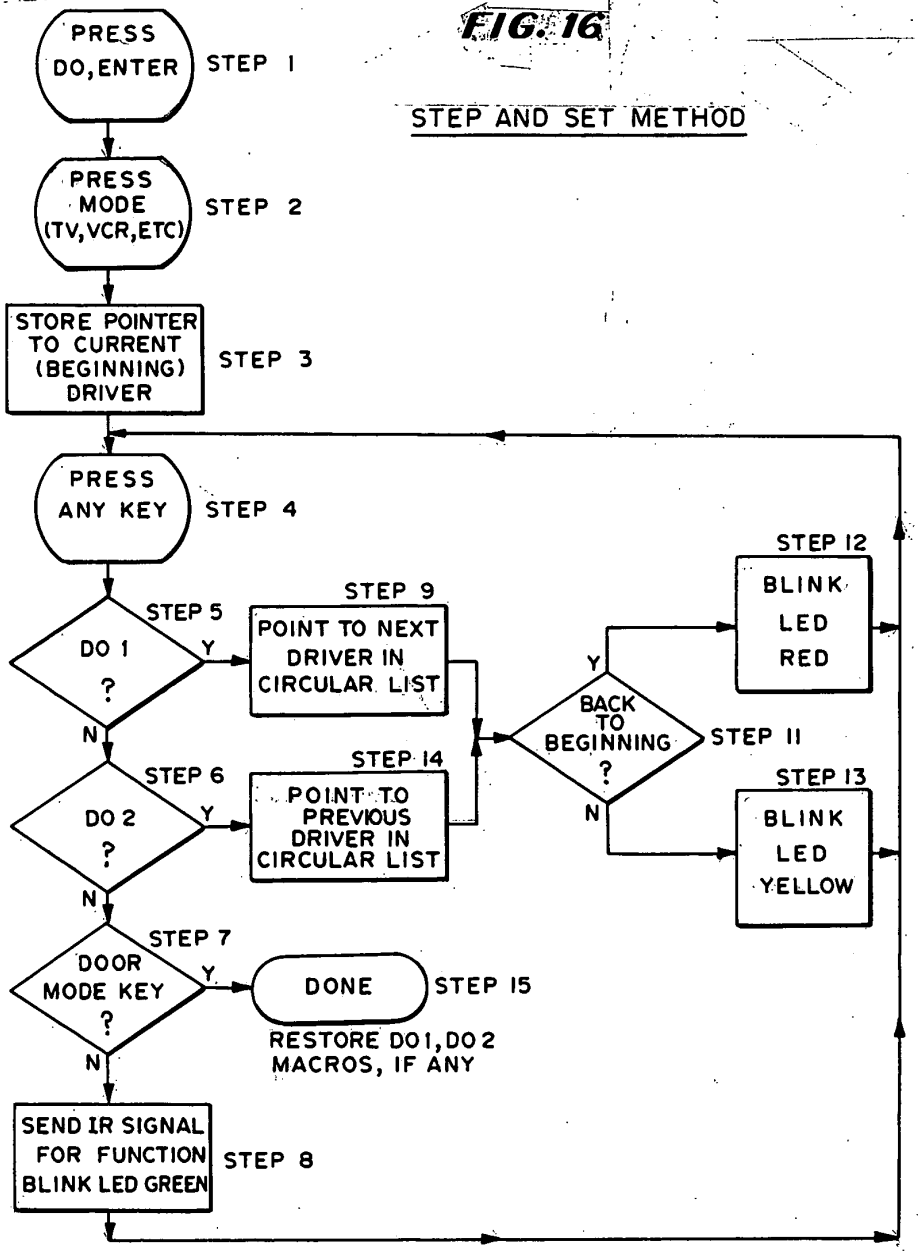


FIG. 17

DIRECT ENTRY—QUICK SET

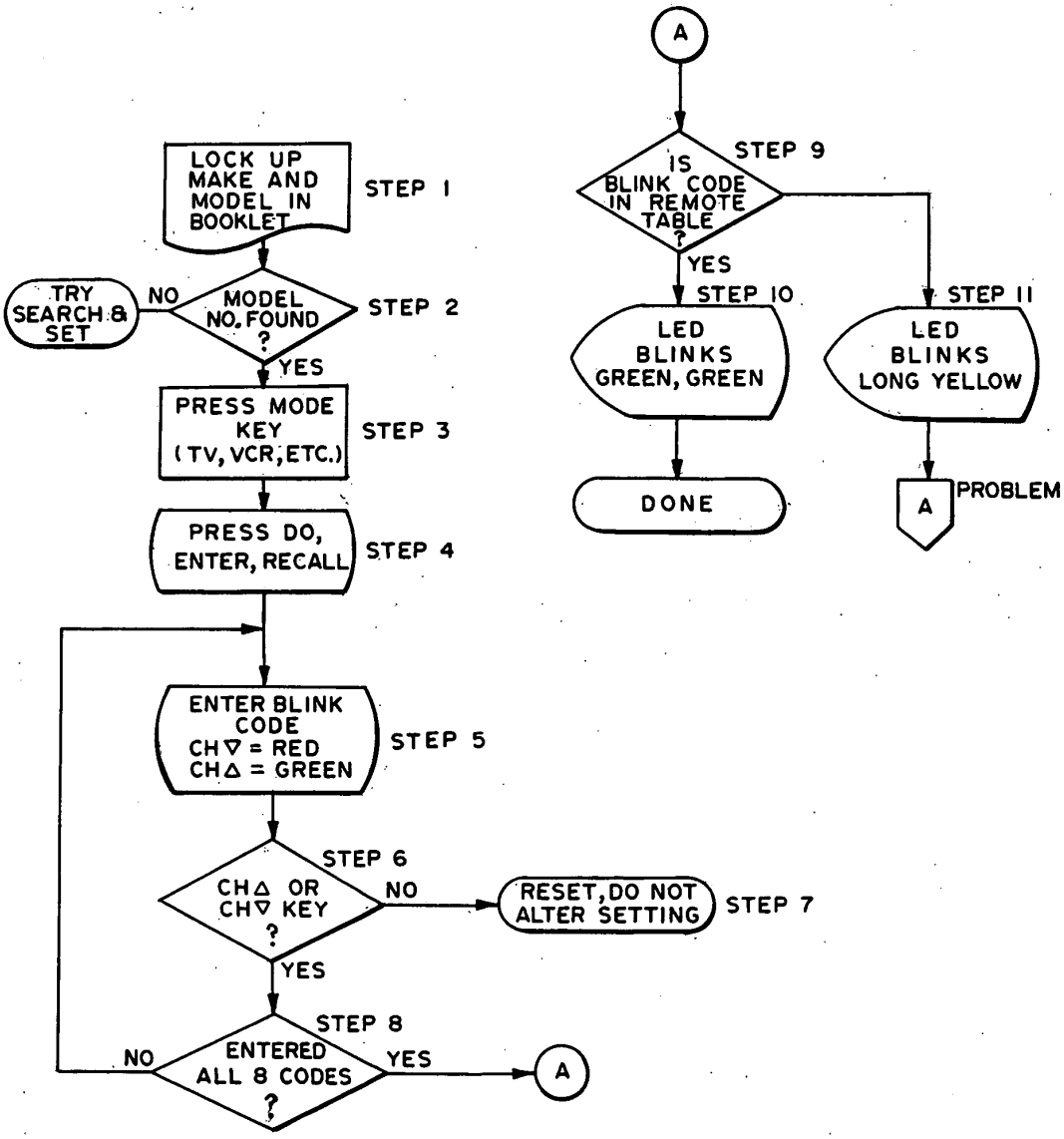


FIG. 18A

SETTING A "DO" COMMAND MACRO

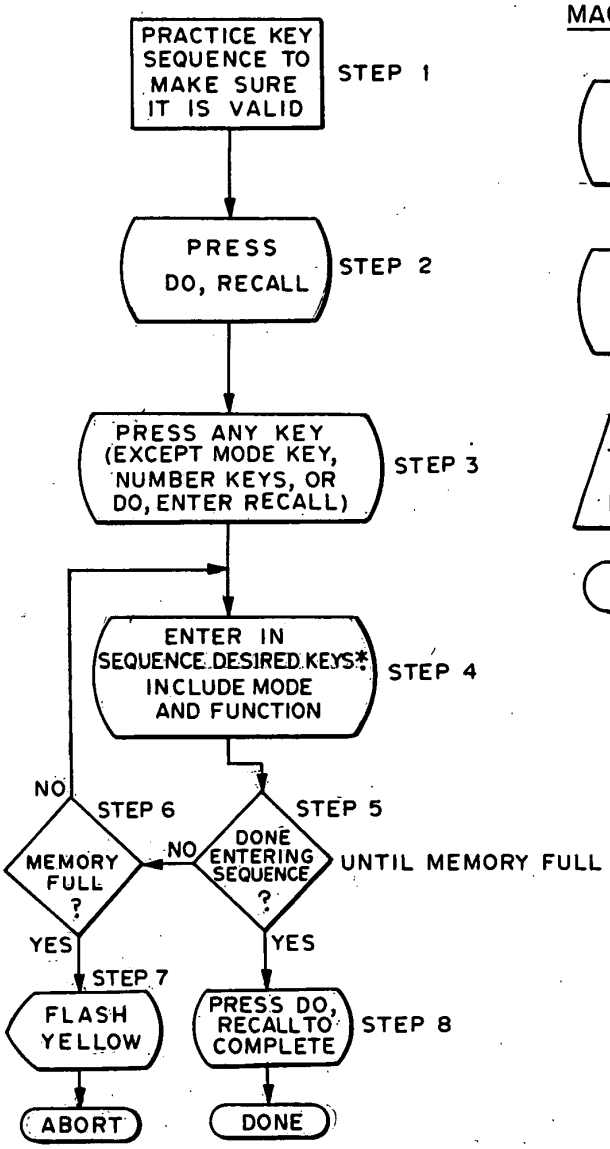
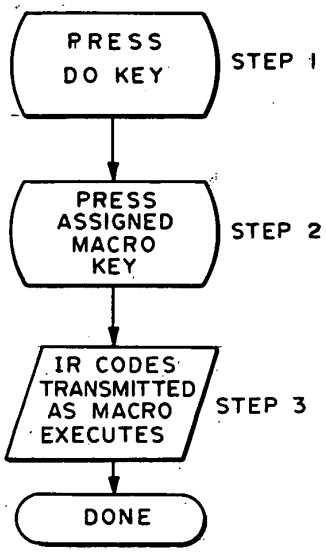


FIG. 18B

EXECUTING A MACRO "DO" COMMAND



* eq. TV, POWER, VCR 1, POWER, PLAY, TV, 3, ENTER

FIG. 19A

TO IDENTIFY WHAT DEVICE REMOTE IS SET FOR-BLINK CODE

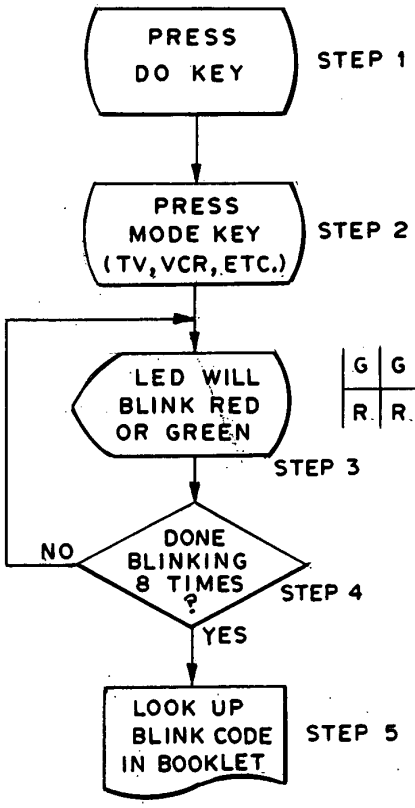


FIG. 19B

G	G	G	G	G	G	G	G
R	R	R	R	R	R	R	R

FIG. 20

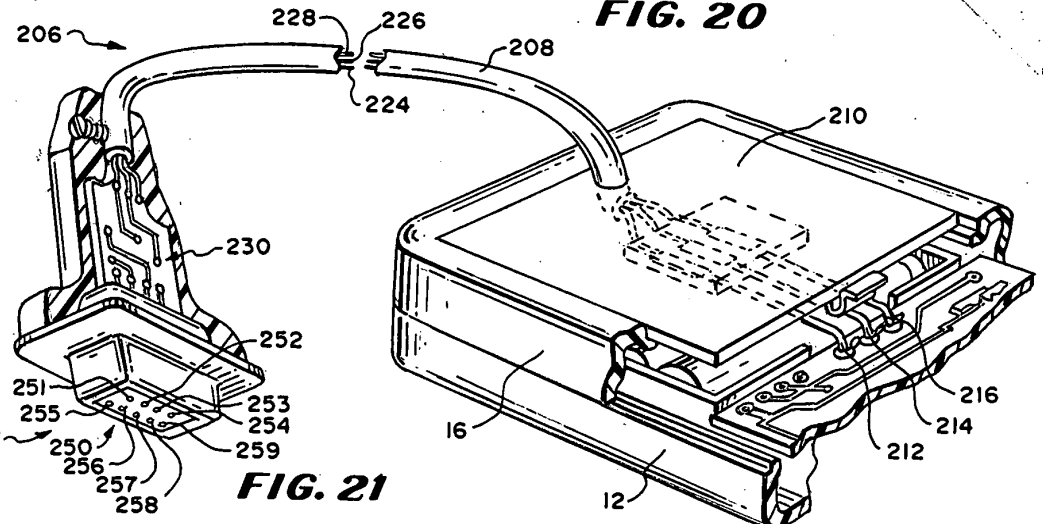


FIG. 21

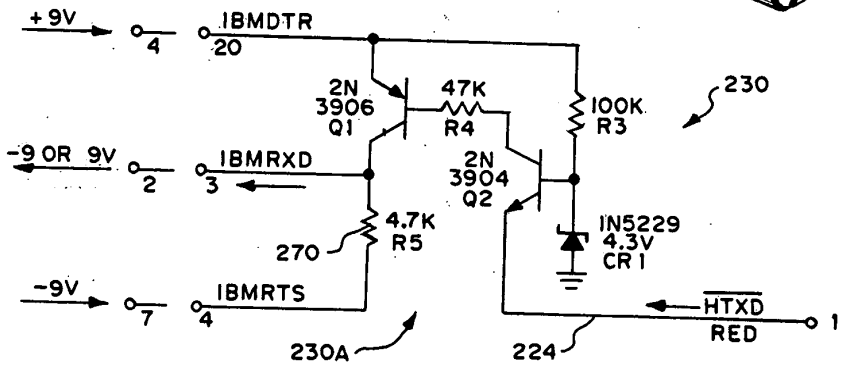
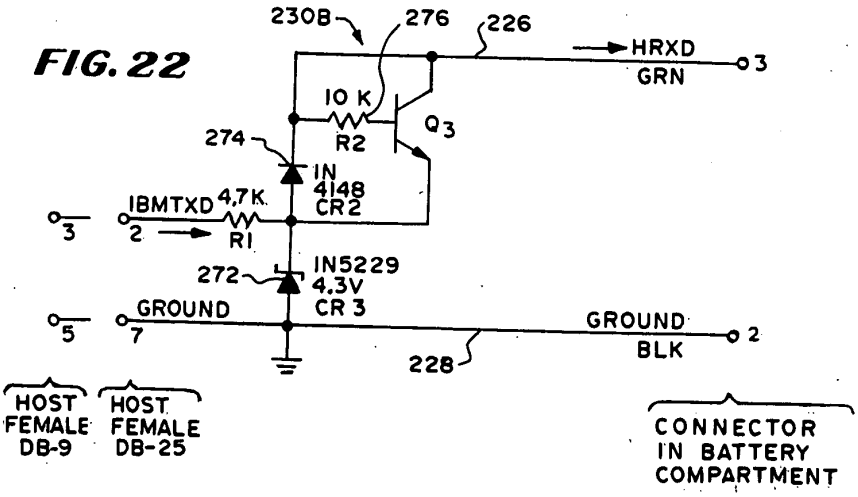


FIG. 22



Applicant or Patentee: Paul Darbee et al
Serial or Patent No.: 07/127,999
Filed or Issued: December 2, 1987
For: UNIVERSAL REMOTE CONTROL DEVICE

Attorney's Docket No.: 87290

VERIFIED STATEMENT (DECLARATION) CLAIMING SMALL ENTITY STATUS (37 CFR 1.9 (f) and 1.27 (c)) — SMALL BUSINESS CONCERN

I hereby declare that I am

[ ] the owner of the small business concern identified below:

[X] an official of the small business concern empowered to act on behalf of the concern identified below:

NAME OF CONCERN Universal Electronics, Inc.
ADDRESS OF CONCERN 14751 Plaza Drive, Suite J
Tustin, California 92680

I hereby declare that the above identified small business concern qualifies as a small business concern as defined in 13 CFR 121.3-18, and reproduced in 37 CFR 1.9 (d), for purposes of paying reduced fees under section 41(a) and (b) of Title 35, United States Code, in that the number of employees of the concern, including those of its affiliates, does not exceed 500 persons. For purposes of this statement, (1) the number of employees of the business concern is the average over the previous fiscal year of the concern of the persons employed on a full-time, part-time or temporary basis during each of the pay periods of the fiscal year, and (2) concerns are affiliates of each other when either, directly or indirectly, one concern controls or has the power to control the other, or third party or parties controls or has the power to control both.

I hereby declare that rights under contract or law have been conveyed to and remain with the small business concern identified above with regard to the invention, entitled UNIVERSAL REMOTE CONTROL DEVICE (by inventor(s)) Paul V. Darbee, Richard E. Ellis, Louis Steven Jansky and ~~described in~~ Avram S. Grossman described in

[ ] the specification filed herewith

[x] application serial no. 07/127,999, filed December 2, 1987.

[ ] patent no. _____, issued _____.

If the rights held by the above identified small business concern are not exclusive, each individual, concern or organization having rights to the invention is listed below* and no rights to the invention are held by any person, other than the inventor, who could not qualify as a small business concern under 37 CFR 1.9 (d) or by any concern which would not qualify as a small business concern under 37 CFR 1.9 (d) or a nonprofit organization under 37 CFR 1.9 (e).

*NOTE: Separate verified statements are required from each named person, concern or organization having rights to the invention averring to their status as small entities. (37 CFR 1.27).

NAME Universal Electronics, Inc.
ADDRESS 14751 Plaza Drive, Suite J, Tustin, California 92680
[ ] INDIVIDUAL [X] SMALL BUSINESS CONCERN [ ] NONPROFIT ORGANIZATION

NAME _____
ADDRESS _____
[ ] INDIVIDUAL [ ] SMALL BUSINESS CONCERN [ ] NONPROFIT ORGANIZATION

I acknowledge the duty to file, in this application or patent, notification of any change in status resulting in loss of entitlement to small entity status prior to paying, or at the time of paying, the earliest of the issue fee or any maintenance fee due after the date on which status as a small entity is no longer appropriate. (37 CFR 1.28 (b)).

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

NAME OF PERSON SIGNING Thomas C. Tyler
TITLE OF PERSON OTHER THAN OWNER President
ADDRESS OF PERSON SIGNING _____

SIGNATURE _____ DATE 6/8/98

OMB No. 0651-0011 (12/31/86)

Applicant or Patentee: Paul V. Darbee, et al
Serial or Patent No.: 127,999
Filed or Issued: December 2, 1987
For: UNIVERSAL REMOTE CONTROL DEVICE

Attorney's Docket No.: 87290

VERIFIED STATEMENT (DECLARATION) CLAIMING SMALL ENTITY STATUS (37 CFR 1.9 (f) and 1.27 (b)) — INDEPENDENT INVENTOR

As a below named inventor, I hereby declare that I qualify as an independent inventor as defined in 37 CFR 1.9 (c) for purposes of paying reduced fees under section 41 (a) and (b) of Title 35, United States Code, to the Patent and Trademark Office with regard to the invention entitled UNIVERSAL REMOTE CONTROL DEVICE described in

[ ] the specification filed herewith
[X] application serial no. 127,999, filed December 2, 1987.
[ ] patent no. _____, issued _____.

I have not assigned, granted, conveyed or licensed and am under no obligation under contract or law to assign, grant, convey or license, any rights in the invention to any person who could not be classified as an independent inventor under 37 CFR 1.9 (c) if that person had made the invention, or to any concern which would not qualify as a small business concern under 37 CFR 1.9 (d) or a nonprofit organization under 37 CFR 1.9 (e).

Each person, concern or organization to which I have assigned, granted, conveyed, or licensed or am under an obligation under contract or law to assign, grant, convey, or license any rights in the invention is listed below:

[ ] no such person, concern or organization
[X] persons, concerns or organizations listed below*

*NOTE: Separate verified statements are required from each named person, concern or organization having rights to the invention averring to their status as small entities. (37 CFR 1.27)

FULL NAME Universal Electronics, Inc.
ADDRESS 14751 Plaza Drive, Suite J, Tustin, California 92680
[ ] INDIVIDUAL [X] SMALL BUSINESS CONCERN [ ] NONPROFIT ORGANIZATION

FULL NAME _____
ADDRESS _____
[ ] INDIVIDUAL [ ] SMALL BUSINESS CONCERN [ ] NONPROFIT ORGANIZATION

FULL NAME _____
ADDRESS _____
[ ] INDIVIDUAL [ ] SMALL BUSINESS CONCERN [ ] NONPROFIT ORGANIZATION

I acknowledge the duty to file, in this application or patent, notification of any change in status resulting in loss of entitlement to small entity status prior to paying, or at the time of paying, the earliest of the issue fee or any maintenance fee due after the date on which status as a small entity is no longer appropriate. (37 CFR 1.28 (b))

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

Louis Steven Jansky	Avram S. Grossman	
NAME OF INVENTOR	NAME OF INVENTOR	NAME OF INVENTOR
Signature of Inventor	Signature of Inventor	Signature of Inventor
4-6-93	4-5-1993	
Date	Date	Date

Form PTO-FB-A410 (8—83)

OMB No. 0651-0011 (12/31/86)

Applicant or Patentee: Paul V. Darbee, et al
Serial or Patent No.: 127,999
Filed or Issued: December 2, 1987
For: UNIVERSAL REMOTE CONTROL DEVICE
Attorney's Docket No.: 87290

VERIFIED STATEMENT (DECLARATION) CLAIMING SMALL ENTITY STATUS (37 CFR 1.9 (f) and 1.27 (b)) — INDEPENDENT INVENTOR

As a below named inventor, I hereby declare that I qualify as an independent inventor as defined in 37 CFR 1.9 (c) for purposes of paying reduced fees under section 41 (a) and (b) of Title 35, United States Code, to the Patent and Trademark Office with regard to the invention entitled UNIVERSAL REMOTE CONTROL DEVICE described in

[ ] the specification filed herewith
[X] application serial no. 127,999, filed December 2, 1987
[ ] patent no. _____, issued _____.

I have not assigned, granted, conveyed or licensed and am under no obligation under contract or law to assign, grant, convey or license, any rights in the invention to any person who could not be classified as an independent inventor under 37 CFR 1.9 (c) if that person had made the invention, or to any concern which would not qualify as a small business concern under 37 CFR 1.9 (d) or a nonprofit organization under 37 CFR 1.9 (e).

Each person, concern or organization to which I have assigned, granted, conveyed, or licensed or am under an obligation under contract or law to assign, grant, convey, or license any rights in the invention is listed below:

[ ] no such person, concern or organization
[X] persons, concerns or organizations listed below*

*NOTE: Separate verified statements are required from each named person, concern or organization having rights to the invention averring to their status as small entities. (37 CFR 1.27)

FULL NAME Universal Electronics, Inc.
ADDRESS 14751 Plaza Drive, Suite J, Tustin, California 92680
[ ] INDIVIDUAL [X] SMALL BUSINESS CONCERN [ ] NONPROFIT ORGANIZATION

FULL NAME _____
ADDRESS _____
[ ] INDIVIDUAL [ ] SMALL BUSINESS CONCERN [ ] NONPROFIT ORGANIZATION

FULL NAME _____
ADDRESS _____
[ ] INDIVIDUAL [ ] SMALL BUSINESS CONCERN [ ] NONPROFIT ORGANIZATION

I acknowledge the duty to file, in this application or patent, notification of any change in status resulting in loss of entitlement to small entity status prior to paying, or at the time of paying, the earliest of the issue fee or any maintenance fee due after the date on which status as a small entity is no longer appropriate. (37 CFR 1.28 (b))

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

Paul V. Darbee	Richard E. Ellis	
NAME OF INVENTOR	NAME OF INVENTOR	NAME OF INVENTOR
Signature of Inventor	Signature of Inventor	Signature of Inventor
2-5-88	2/5/88	
Date	Date	Date

Form PTO-FB-A410 (8—83)

UNITED STATES DEPARTMENT OF COMMERCE
Patent and Trademark Office

Address: Box ISSUE FEE
COMMISSIONER OF PATENTS AND TRADEMARKS
Washington, D.C. 20231

THOMAS VIGIL & ASSOCIATES
836 SOUTH NORTHWEST HWY.
BARRINGTON, IL 60010

NOTICE OF ALLOWANCE AND ISSUE FEE DUE

☑ Note attached communication from the Examiner
☐ This notice is issued in view of applicant's communication filed _____

SERIES CODE/SERIAL NO.	FILING DATE	TOTAL CLAIMS	EXAMINER AND GROUP ART UNIT		DATE MAILED
07/127,999	12/02/87	038	NGUYEN, V	253	04/30/90

First Named Applicant: DARBEE, PAUL V.

TITLE OF INVENTION: UNIVERSAL REMOTE CONTROL DEVICE

	ATTY'S DOCKET NO.	CLASS-SUBCLASS	BATCH NO.	APPLN. TYPE	SMALL ENTITY	FEE DUE	DATE DUE
2	87290	364-900.000	F06	UTILITY	NO	$620.00	07/30/90

THE APPLICATION IDENTIFIED ABOVE HAS BEEN EXAMINED AND IS ALLOWED FOR ISSUANCE AS A PATENT. PROSECUTION ON THE MERITS IS CLOSED.

THE ISSUE FEE MUST BE PAID WITHIN THREE MONTHS FROM THE MAILING DATE OF THIS NOTICE OR THIS APPLICATION SHALL BE REGARDED AS ABANDONED. THIS STATUTORY PERIOD CANNOT BE EXTENDED.

HOW TO RESPOND TO THIS NOTICE:

I. Review the SMALL ENTITY Status shown above.

If the SMALL ENTITY is shown as YES, verify your current SMALL ENTITY status:

A. If the Status is changed, pay twice the amount of the FEE DUE shown above and notify the Patent and Trademark Office of the change in status, or
B. If the Status is the same, pay the FEE DUE shown above.

If the SMALL ENTITY is shown as NO:

A. Pay FEE DUE shown above, or
B. File verified statement of Small Entity Status before, or with, payment of 1/2 the FEE DUE shown above.

II. Part B of this notice should be completed and returned to the Patent and Trademark Office (PTO) with your ISSUE FEE. Even if the ISSUE FEE has already been paid by a charge to deposit account, Part B should be completed and returned. If you are charging the ISSUE FEE to your deposit account, Part C of this notice should also be completed and returned.

III. All communications regarding this application must give series code (or filing date), serial number and batch number. Please direct all communications prior to issuance to Box ISSUE FEE unless advised to the contrary.

IMPORTANT REMINDER: Patents issuing on applications filed on or after Dec. 12, 1980 may require payment of maintenance fees.

UNITED STATES DEPARTMENT OF COMMERCE
Patent and Trademark Office
Address: COMMISSIONER OF PATENTS AND TRADEMARKS
Washington, D.C. 20231

SERIAL NUMBER	FILING DATE	FIRST NAMED APPLICANT	ATTORNEY DOCKET NO.
07/127,999	12/02/87	DARBEE	P 87290

THOMAS VIGIL & ASSOCIATES
836 SOUTH NORTHWEST HWY.
BARRINGTON, IL 60010

EXAMINER	
NGUYEN, V	
ART UNIT	PAPER NUMBER
253	

DATE MAILED: 04/30/90

NOTICE OF ALLOWABILITY

PART I.

1. [X] This communication is responsive to Amendment filed on 4/16/90.
2. [X] All the claims being allowable, PROSECUTION ON THE MERITS IS (OR REMAINS) CLOSED in this application. If not included herewith (or previously mailed), a Notice Of Allowance And Issue Fee Due or other appropriate communication will be sent in due course.
3. [X] The allowed claims are 5-26, 32-44, 47-49.
4. [ ] The drawings filed on _____ are acceptable.
5. [ ] Acknowledgment is made of the claim for priority under 35 U.S.C. 119. The certified copy has [_] been received. [_] not been received. [_] been filed in parent application Serial No. _____, filed on _____.
6. [X] Note the attached Examiner's Amendment.
7. [X] Note the attached Examiner Interview Summary Record, PTOL-413.
8. [X] Note the attached Examiner's Statement of Reasons for Allowance.
9. [ ] Note the attached NOTICE OF REFERENCES CITED, PTO-892.
10. [X] Note the attached INFORMATION DISCLOSURE CITATION, PTO-1449.

PART II.

A SHORTENED STATUTORY PERIOD FOR RESPONSE to comply with the requirements noted below is set to EXPIRE THREE MONTHS FROM THE "DATE MAILED" indicated on this form. Failure to timely comply will result in the ABANDONMENT of this application. Extensions of time may be obtained under the provisions of 37 CFR 1.136(a).

1. [ ] Note the attached EXAMINER'S AMENDMENT or NOTICE OF INFORMAL APPLICATION, PTO-152, which discloses that the oath or declaration is deficient. A SUBSTITUTE OATH OR DECLARATION IS REQUIRED.
2. [X] APPLICANT MUST MAKE THE DRAWING CHANGES INDICATED BELOW IN THE MANNER SET FORTH ON THE REVERSE SIDE OF THIS PAPER.
   a. [X] Drawing informalities are indicated on the NOTICE RE PATENT DRAWINGS, PTO-948, attached hereto or to Paper No. 7. CORRECTION IS REQUIRED.
   b. [ ] The proposed drawing correction filed on _____ has been approved by the examiner. CORRECTION IS REQUIRED.
   c. [ ] Approved drawing corrections are described by the examiner in the attached EXAMINER'S AMENDMENT. CORRECTION IS REQUIRED.
   d. [X] Formal drawings are now REQUIRED.

Any response to this letter should include in the upper right hand corner, the following information from the NOTICE OF ALLOWANCE AND ISSUE FEE DUE: ISSUE BATCH NUMBER, DATE OF THE NOTICE OF ALLOWANCE, AND SERIAL NUMBER.

Attachments:

- [X] Examiner's Amendment
- [X] Examiner Interview Summary Record, PTOL-413
- [X] Reasons for Allowance
- [ ] Notice of References Cited, PTO-892
- [X] Information Disclosure Citation, PTO-1449
- [ ] Notice of Informal Application, PTO-152
- [ ] Notice re Patent Drawings, PTO-948
- [ ] Listing of Bonded Draftsmen
- [ ] Other

ANDREW J. JAMES
SUPERVISORY PATENT EXAMINER
GROUP ART UNIT 253

PTOL-37 (REV. 2-85) USCOMM-DC 85-3744

Examiner's Amendments

An Examiner's Amendment to the record appears below. Should the changes and/or additions be unacceptable to applicant, an amendment may be filed as provided by 37 CFR 1.312. To ensure consideration of such an amendment, it MUST be submitted no later than the payment of the Issue Fee.

In the specification, page 2, the phrase "for enabling code data" has been changed to "for enabling new code data".

In claims 5, 10, 47 and 48, line 8, the phrase "for enabling code data" has been changed to "for enabling new code date".

In claim 32, and 49 line 12, "for enabling code data" has been changed to "for enabling new code data".

In the abstract, lines 2-6 (and the previous substitution therefor) have been canceled and the following substitution:

The universal remote control system comprises data processor, input device including a keyboard and a keyboard circuit connected to the data processor, signal output device including circuitry for generating infrared light codes connected to the data processor, a memory including a battery backed, non-volatile RAM only and no ROM for storing (a) a set of instructions and (b) a library of code data for enabling the infrared light generating circuitry to generate specific infrared codes, the RAM being coupled to the data processor, and a data coupling device including terminals coupled to the cpu for enabling new code data to be supplied from outside the system to, or retrieved from, the RAM through the terminals and the cpu.

Authorization for this Examiner's Amendment was given in a telephone interview with Mr. Thomas Vigil on 4/20/90.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Viet Nguyen whose telephone number is (703) 557-8842.

Any inquiry of a general nature, or relating to the status of this application, should be directed to the Group receptionist whose telephone number is (703) 557-3311.

V. N

Nguyen/jm
4/23/90

ANDREW W. JAMES
SUPERVISORY PATENT EXAMINER
GROUP ART UNIT 253

UNITED STATES DEPARTMENT OF COMMERCE
Patent and Trademark Office
Address: COMMISSIONER OF PATENTS AND TRADEMARKS
Washington, D.C. 20231

SERIAL NUMBER	FILING DATE	FIRST NAMED APPLICANT	ATTORNEY DOCKET NO.
07/127,999	12/02/87	DARBEE	P 87290

THOMAS VIGIL & ASSOCIATES
836 SOUTH NORTHWEST HWY.
BARRINGTON, IL 60010

EXAMINER	
NGUYEN, V	
ART UNIT	PAPER NUMBER
253	17

DATE MAILED: 04/30/90

EXAMINER INTERVIEW SUMMARY RECORD

All participants (applicant, applicant's representative, PTO personnel):

(1) MR. THOMAS VIGIL (3) _____

(2) VIET NGUYEN (4) _____

Date of interview 4/20/90

Type: ☒ Telephonic ☐ Personal (copy is given to ☐ applicant ☐ applicant's representative).

Exhibit shown or demonstration conducted: ☐ Yes ☒ No. If yes, brief description: _____

N/A

Agreement ☒ was reached with respect to some or all of the claims in question. ☐ was not reached.

Claims discussed: ALL

Identification of prior art discussed: None

Description of the general nature of what was agreed to if an agreement was reached, or any other comments: Per this interview, the examiner has been authorized to amend the claims as shown in the Notice of Allowability. Also, claims 1-4, 27-31, 45 and 46 have been canceled without prejudice.

(A fuller description, if necessary, and a copy of the amendments, if available, which the examiner agreed would render the claims allowable must be attached. Also, where no copy of the amendments which would render the claims allowable is available, a summary thereof must be attached.)

Unless the paragraphs below have been checked to indicate to the contrary, A FORMAL WRITTEN RESPONSE TO THE LAST OFFICE ACTION IS NOT WAIVED AND MUST INCLUDE THE SUBSTANCE OF THE INTERVIEW (e.g., items 1-7 on the reverse side of this form). If a response to the last Office action has already been filed, then applicant is given one month from this interview date to provide a statement of the substance of the interview.

☐ It is not necessary for applicant to provide a separate record of the substance of the interview.

☒ Since the examiner's interview summary above (including any attachments) reflects a complete response to each of the objections, rejections and requirements that may be present in the last Office action, and since the claims are now allowable, this completed form is considered to fulfill the response requirements of the last Office action.

V. Nguyen
Examiner's Signature

PTOL-413 (REV. 1-84)

Corres. and Mail
BOX AF

#15

PATENT
SN 07/127,999
Atty Docket 87290

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Application of:	)	
	)	
PAUL W. DARBEE ET AL	)	Response Under
	)	37 CFR § 1.116
For: UNIVERSAL REMOTE CONTROL DEVICE	)	Expedited Procedure
	)	Examining Group 253
	)	
Serial No. 07/127,999	)	Examiner:
	)	V. Nguyen
Filed: December 2, 1987	)	

4/20/90

AMENDMENT C AFTER FINAL REJECTION
UNDER RULE 116

TO:
Honorable Commissioner of
Patents and Trademarks
Box AF
Washington, D.C. 20231

Dear Sir:

In response to the Examiner's Action mailed on January 11, 1990, applicant respectfully requests that the application be amended as follows:

OK To Enter V.N 4/20/90

IN THE SPECIFICATION:

Page 2, lines 27-32, delete in their entirety (including the previous amendment thereof) and insert in place thereof the following:

--According to the invention there is provided a universal remote control system having input means for inputting commands, signal output means for supplying infrared signals to a controlled device, a central processing unit (CPU) coupled to the input means and to the signal output means, a single non-volatile, read-write RAM (such as a battery-backed RAM) coupled to the central processing unit and data coupling means including terminal means coupled to the CPU for enabling new code data to be supplied from

V.N 4/20/90 OK.

CERTIFICATE OF MAILING

I hereby certify that this correspondence is being deposited with the United States Postal Service as first-class mail in an envelope addressed to: Commissioner of Patents and Trademarks, Washington, DC 20231 on

Date 4/12/90 [signature]

outside the system to, or retrieved from the RAM through the terminal means and the CPU.--

IN THE CLAIMS

Cancel claims 1-4, 27-31, 45 and 46 without prejudice to applicant's filing those claims in a divisional/continuation application and amend claims 5, 10, 22, 32, 36, 40, 47, 48, and 49 in the manner set forth below:

1 5. (Twice Amended) In a universal remote control system having input means for inputting commands, signal output means for supplying [a] an infrared signal to a controlled device and a central processing unit (CPU) coupled to said input means and to said signal output means, the improvement residing in said system comprising no ROM, a single non-volatile, read-write RAM coupled to said central processing unit and data coupling means including terminal means coupled to [said RAM] the CPU for enabling new code data to be [into] supplied from outside the system to, or retrieved from, said RAM through said terminal means and the CPU.

V.N 4/20/9

Claim 7, line 2, change "incudes" to --includes--.

6 10. (Amended) A microprocessor system for use in a universal remote control device having command inputs and infrared code outputs, said system comprising a central processing unit (CPU), a single non-volatile, read-write random access memory (RAM) coupled to said CPU, no read only memory (ROM), first and second coupling means for [connecting] coupling said system to the command inputs and to the code outputs, respectively, and data coupling means including terminal means coupled to said [RAM] CPU for enabling new code data to be [input into] supplied from outside the system to, or retrieved from, said RAM through said terminal means and said CPU.

Claim 22, line 2, change "data coupling" to --terminal--.

23 32. (Twice Amended) A universal remote control system comprising data processing means, input means including a keyboard

and keyboard circuit means coupled to said data processing means, signal output means including means for generating infrared light [generating means] codes coupled to said data processing means, memory means including a battery backed, non-volatile, read-write RAM coupled to said data processing [unit] means for storing (a) a set of instructions and (b) a library of code data for enabling said infrared light generating means to generate specific infrared codes, said RAM being coupled to said data processing means, and data coupling means including terminal means coupled to said [RAM] CPU for enabling new code data to be [input into] supplied from outside the system to, or retrieved from, said RAM through said terminal means and said CPU.

Claim 36, line 2, after "circuit" insert --means--.

Claim 40, line 2, change "data coupling" to --terminal--.

36 41. (Amended) In a universal remote control system having input means for inputting commands, infrared signal output means for supplying an infrared signal to a control device and a central processing unit (CPU) coupled to said input means and to said signal output means, the improvement residing in said system comprising a single, non-volatile, read-write RAM [connected] coupled to said central processing unit and data coupling means including terminal means coupled to [said RAM] the CPU for enabling new code data to be [input into] supplied from outside the system to, or retrieved from said RAM though said terminal means and said CPU.

37 48. (Amended) A microprocessor system for use in a universal remote control device having command inputs and infrared code outputs and comprising a central processing unit (CPU), a single non-volatile, read-write random access memory (RAM) coupled to said CPU, first and second coupling means for connecting said system to the command inputs and to the code outputs, respectively, and data coupling means including terminal means coupled to said [RAM] CPU for enabling new code data to be [input into] supplied from outside the

system to, or retrieved from, said RAM through said terminal means and said CPU.

38 49. (Amended) A universal remote control system comprising data processing means, input means including a keyboard and keyboard circuit means coupled to said data processing means, signal output means including means for generating infrared light [generating means] codes coupled to said data processing means, and memory means including a battery backed, non-volatile, read-write RAM only and no ROM [coupled to said data processing means] for storing (a) a set of instructions and (b) a library of code data for enabling said infrared light generating means to generate specific infrared codes, said RAM being coupled to said data processing means, and data coupling means including terminal means coupled to said [RAM] CPU for enabling new code data to be [input into] supplied from outside the system to, or retrieved from, said RAM through said terminal means and said CPU.

V.N 4/20/00 O.K

IN THE ABSTRACT:

Please cancel lines 2-6 (and the previous substitution therefor) and substitute in place thereof the following:

The universal remote control system comprises data processing ~~means~~ device, input ~~means~~ including a keyboard and a keyboard circuit ~~means~~ connected to the data ~~processing means~~ processor, signal output ~~means~~ device including ~~means~~ circuitry for generating infrared light codes connected to the data ~~processing means~~ processor, a memory ~~means~~ including a battery backed, non-volatile RAM only and no ROM for storing (a) a set of instructions and (b) a library of code data for enabling the infrared light generating ~~means~~ circuitry to generate specific infrared codes, the RAM being coupled to the data ~~processing means~~ processor, and data coupling ~~means~~ device including terminals coupled to the CPU for enabling new code data to be supplied from outside the system to, or retrieved from, the RAM through the terminals ~~means~~ and the CPU.

REMARKS

The Examiner's requirement for restriction had been discussed with the Examiner over the telephone and to expedite the prosecution of the subject application, applicant's attorney had agreed to the cancellation of the method claims without prejudice to their being pursued in a divisional application.

On page 2 of the Examiner's Action, reference is made to an Interview Summary Record. However, perhaps inadvertently, such Interview Summary Record copy was not enclosed with the Examiner's Action. Applicant requests that a copy of this Interview Summary Record be forwarded to applicant for his file.

The agreement of applicant to cancel claims 1-4 and 27-31 without prejudice to pursuing those claims in a divisional application, in order to expedite the prosecution of the subject application, may have been set forth in the Interview Summary record. However, since applicant has not yet received a copy of this Interview Summary record, applicant is specifically canceling claims 1-4 and 27-31 in this Amendment B without prejudice to pursuing those claims in a divisional application.

The Examiner has raised a number of objections to the language used in the claims and applicant first of all thanks the Examiner for his thorough analysis of the language used in the claims and his comments on same which are very well taken.

The Examiner had noted that the data coupling means is not coupled directly to the RAM, but is coupled to the CPU which is utilized in supplying code data from outside the system to the RAM or for retrieving data from the RAM. The Examiner is quite correct on this point.

However, applicant points out that the term "coupling", as applicant's attorney understands this term to be utilized in the lexicography of words for use in patent claims, includes directly or "indirectly through other circuit components". In

contradistinction, use of the term "connecting", as opposed to "coupling", excludes connecting or coupling through other elements and would mean a direct connection between the circuit elements referred to.

Nonetheless, to clarify the language in the claims, applicant has amended the independent claims to call for data coupling means including terminal means coupled to the CPU, instead of to the RAM, to make clear what structure applicant is claiming.

The Examiner had also objected to the term "non-volatile" since in the computer art, the term "random access memory" or simply RAM, usually indicates a memory whose stored data is lost when power is turned off and that the term "non-volatile RAM" indicates that data is not lost if power is turned off.

While the Examiner's concern about this possible inconsistency is understood, the point is that applicant's RAM does not lose its data and that's why it is referred to as a "non-volatile RAM". It should be clear that by using a non-volatile RAM applicant does not need a ROM, such as a non-volatile ROM.

In a sense, one could consider a non-volatile RAM as somewhat equivalent to an "electrically erasable or electrically alterable programmable read only memory", e.g., an EAPROM or an EEPROM, at least with respect to some of their respective functions.

Further, while it is true that SRAM's and DRAM's currently used in many products are volatile, there is nothing to prevent a memory, that can be both written to and read from, from retaining data without applied power. For example, magnetic and optical media commonly have this property as do EEPROM's (noted above), magnetic cores, and, as used in the remote control system of the present invention, a battery-backed RAM. Also, such a non-volatile, read-write RAM could be realized by an OTP (one-time-programmable) chip.

As disclosed in the application, applicant's RAM is "non-

volatile" by providing a battery for establishing a "battery-backed RAM".

From the foregoing remarks it will be understood that applicant considers the term "non-volatile, read-write RAM" to be an appropriate term and one which is not an inconsistent statement or a non-existent component since such component is realized by a battery backed RAM. As noted above, such component might also be realized by an EAPRON or an EEPRON. However, a battery backed RAM is a much simpler and less expensive way to realize the structure defined in the claims as "a non-volatile, read-write RAM".

Since applicant finds the term "non-volatile, read-write RAM" to be a correct and apt term, applicant has not amended this term in the claims. However, in amending claims 32 and 49, applicant specifically refers therein to a "battery backed, non-volatile, read-write RAM".

The Examiner has made reference to the fact that applicant in a preferred embodiment uses a latch 58 in coupling data received at the terminal means and passed through the CPU to the RAM. Again, applicant points out that the term "coupling", as this word is used, is a term of art in patent claims which includes a connection from one component through other components to a second component such that stating that the CPU is "coupled" to the RAM includes a direct connection to the RAM or an indirect connection to the RAM through a latch!

The embodiment shown in FIG. 9A which shows the CPU 56 connected to a latch 58 which in turn is connected to a RAM 54 is only one preferred embodiment and it should be understood that the RAM can be connected directly to the CPU instead of through a latch. Accordingly, there is no need to include reference to a latch in the independent claims.

In any event, it will be clear from the amendments being made to the independent claims that such claims call for a non-volatile

RAM that is coupled to the central processing unit and that the data coupling means include terminal means coupled to the CPU for enabling code data to be supplied from outside the system to, or retrieved from, the RAM through the terminal means and the CPU.

By the present amendments to the claims, applicant is not only correcting and clarifying the language in the claims to properly define the subject matter claimed, such as the fact that the output signals are infrared signals, but also to emphasize the novel, important and inventive features of applicant's claimed system.

Applicant has compared the amendments being made to the claims with the specification and drawings and finds there is antecedent basis in the application for the amendments and no new matter is being added by these amendments.

As previously pointed out in Amendment A, the important features of applicant's universal remote control system are the elimination of the need for a ROM, the use of a non-volatile, read-write RAM, such as a battery-backed RAM, and the provision of data coupling means including terminal means coupled to the CPU for enabling code data to be supplied from outside the system to, or retrieved from, the RAM through the terminal means and the CPU whereby the system can be easily updated with new codes simply by connecting a separate computer or processor to the terminal means (serial ports) and without requiring the user to go through a learn code routine and for outputting infrared code signals!

These are important features of applicant's claimed universal remote control system which are not suggested or taught by the references cited. In particular, it is to be noted that the prior art universal remote control systems focus on systems that are constructed and arranged to learn IR codes and then store such codes in a memory such as a RAM. Such prior systems provide a ROM for storing the instructions whereby the system can be operated to learn IR codes.

Applicant, on the other hand, teaches in a different direction by teaching that one does not need to have a ROM with instructions therein that enable the CPU of the universal remote control system to learn codes and then store code data for generating those codes in a RAM.

Instead, applicant provides data coupling means including terminal means whereby the unit can be connected to a source, outside of the system, having code data for generating infrared codes which is then supplied to the terminal means and through the CPU to a non-volatile, read-write (battery-backed) RAM which stores the code data which can be retrieved from the RAM by the CPU for operating various types of remotely controlled devices. This universal remote control system and the features thereof just described above provide an advance over the prior art since it is simpler to operate than the prior art universal remote control devices, one does not have to manipulate the universal remote control device to learn IR codes, and the system can be easily updated with new code data for generating IR codes for operating new remotely controlled apparatus that come on the market simply by connecting the terminal means (which can be realized by serial ports) to a source of new IR code data.

The Examiner's objection to the specification under 35 USC § 112, 1st paragraph, is respectfully traversed.

In support of this traverse, it is noted that the claims have been amended to be consistent with the specification and drawings whereby the specification and drawings provide an enabling disclosure for the claims.

The Examiner's rejection of claims 5, 10, 32 and 47-49 under 35 USC § 112, 1st paragraph, for being indefinite for not being supported by an enabling disclosure is respectfully traversed.

In support of this traverse, applicant points out that the claims have been amended to be consistent with the specification

and drawings whereby the disclosure therein is enabling for the claims as now amended to define therein now even more clearly applicant's remote control system.

The Examiner's rejection of claims 5-26 and 32-49 under 35 USC § 112, 2nd paragraph, for being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention, as this rejection may be attempted to be applied to the amended claims, is traversed.

In support of this traverse, applicant has already explained above the appropriateness and aptness of the term "non-volatile, read-write RAM".

Further, applicant has amended the claims to call for the data coupling means as including terminal means that are coupled to the CPU instead of "data coupling means coupled to the RAM" to make it clear that what is referred to here is the provision of terminal means (which can be in the form of serial ports) whereby IR code data can be easily and simply installed into the RAM through the terminal means and the CPU at any time.

Further in support of this traverse, the claims have been amended to clearly state that the RAM is coupled to the data processing means, it being understood that the term "coupling" includes a direct connection or a connection through other circuit elements, such as a latch.

Further in support of this traverse, applicants have corrected the minor errors, including misspellings, in the amended claims.

Also, applicant has noted the inconsistency in claims 32 and 49 with respect to the language stating that infrared codes are coupled to the data coupling means and applicant has amended this language to make it clear what is being claimed and what is connected to what.

The Examiner's rejection of claims 5-26 and 32-49 under 35 USC § 103 for being unpatentable over Evans et al U.S. Patent No. 4,825,200, as this rejection may be attempted to be applied to the amended claims, is respectfully traversed.

First of all, in support of this traverse, applicant repeats, iterates and incorporates herein by reference, the remarks set forth in Amendment A regarding the non-pertinency of the Evans et al patent.

In this respect, applicant first of all points out that the Evans et al U.S. Patent No. 4,825,200 issued on April 25, 1989 on Application Serial No. 66,853 filed on June 25, 1987. Applicants had constructed or reduced to practice the universal remote control device disclosed and claimed in the subject application prior to June 25, 1987 and can swear behind this patent if it is further applied by the Examiner, to remove it as a reference citeable against the claims of the subject application. If the Examiner would like applicant to submit such a declaration, applicant will be happy to do so.

In any event, Evans et. al. teaches a reconfigurable remote control transmitter which includes a learn mode and a run mode. In this respect, it is similar to the remote control systems disclosed in the Ehlers, Sogame and Imoto patents referred to in Amendment A.

Since Evans et al teaches a learning remote control transmitter which learns a code sequence one at a time, it does not teach or suggest the provision of data coupling means including terminal means (such as serial ports) coupled to a CPU for enabling new code data to be supplied from outside the system to, or

retrieved from, the RAM through the CPU and the terminal means, as defined now even more clearly in the amended claims.

Clearly, Evans, et. al. does not disclose or suggest the data coupling means including terminal means coupled to the CPU for the purpose defined in the claims.

Moreover, there is no incentive, direction, motivation or suggestion in Evans et al to modify Evans et al to come up with applicant's claimed universal remote control system having no ROM, the non-volatile, read-write RAM and the data coupling means including the terminal means coupled to the CPU for enabling code data to be supplied from outside the system to the RAM through the terminal means and the CPU. Accordingly, the Examiner's rejection is improper and should be withdrawn. See Ex parte Chicago Rawhide, 226 USPQ 438, where an Examiner attempted to sustain a Section 103 rejection on the basis of the teachings of one prior patent. In this decision, the Board stated:

> "The mere fact that a worker in the art could rearrange the parts of the reference device to meet the terms of the claims on appeal is not by itself sufficient to support a finding of obviousness. The prior art must provide a motivation or reason for the worker in the art, without the benefit of the appellant's specification, to make the necessary changes in the reference device. The Examiner has not presented any evidence to support the conclusion that a worker in this art would have had any motivation to make the necessary changes in the Baney device to render the here claimed device unpatentable."

It should be clear from the foregoing analysis that the Examiner's contention that applicant's "data coupling means" is equivalent to the latch 322 of Evans et al is clearly incorrect, particularly since, as now defined even more clearly in the amended claims, the alleged data coupling means of Evans et al does not include terminal means coupled to the CPU for enabling code data to be supplied from outside the system to, or retrieved from, the RAM.

While some of the claimed features such as "wake up switch means" or "write protect circuit means" may be found in the prior art, such as, perhaps, in Evans et. al., the combination defined in

each of applicant's claims directed to these circuit components in combination with the circuit elements defined in the base claim from which each dependent claim depends, e.g., base claim 5, is not disclosed or suggested by any of the references cited and particularly not the Evans et al patent.

The Examiner's rejection of claims 5, 10, 32 and 47-49 under 35 USC § 103 for being unpatentable over Imoto U.S. Patent No. 4,771,283 as this rejection may be attempted to be applied to the amended claims, is respectfully traversed.

In support of this traverse, it is first of all pointed out that the Examiner is incorrect in stating that element 101a of Imoto is an output means. To the contrary, it is an input means to a common remote control device which is coupled by cables to remote devices to be controlled.

Note that Imoto's common remote control device does not have means for outputting infrared code signals. To provide Imoto with infrared signal output means is incomprehensible and would defeat the teachings of Imoto.

What Imoto teaches is taking a remote control code transmitter 102 (which, it is to be noted, is the element in Imoto that is analogous to applicant's universal remote control device), and aiming it at Imoto's so-called common remote control device 101 and particularly to the input means 101a thereof.

Then, Imoto teaches collecting the operating signal codes from the various remote control transmitters 102 by inputting the code data therefrom via infrared code signals to the infrared receiving diode 11 at the input 101a, deciphering those code signals, storing them in a RAM and then, upon operation of keys 101b-d supplying outputs via one of several cables 103 from outputs 101f of the common remote control device to the devices to be controlled.

If the Examiner is contending that applicant's universal remote control device claimed in the previously presented claims

reads on the Imoto common remote control device, this is incorrect since, while Imoto teaches infrared code input means and cable output means he does not teach data coupling means (now defined in the amended claim as including terminal means) coupled to the CPU for enabling code data to be supplied from outside the system to the RAM through (terminal means and) the CPU. Clearly, the Imoto device cannot be construed to include this construction of a universal remote control device as defined now even more clearly in the amended claims.

Again, this rejection by the Examiner is also improper on the basis of the legal reasoning and rational set forth in the case of Ex parte Chicago Rawhide, Supra., since there is no motivation, direction, incentive or suggestion in Imoto to modify same to come up with applicant's universal remote control device as defined now even more clearly in the amended claims.

A brief summary of applicant's analysis of the other references cited is set forth below:

Morishita, Toyko Shibaura, U.S. Patent No. 4,517,564.
Conventional (dumb) remote control, but with feed-back confirmation signal that command was received. No CPU or memory. Irrelevant.

Yamamoto, Fuji Electric, U.S. Patent No. 4,794,371.
Time-division-multiplexing circuit. No CPU or memory. Irrelevant.

Amano, Sony, U.S. Patent No. 4,807,052.
A controlled device that responds not only to codes form its own native remote controller, but that can recognize codes from a foreign remote and respond to them as if they were native. Irrelevant.

Rumbolt, NAP, U.S. Patent No. 4,841,368.
Incorporates a universal remote into a controlled device so that when commands are sent to the controlled device,

they can also be translated into commands to control associated equipment. Irrelevant.

Stacy, Zenith, U.S. Patent No. 4,855,746.

Discloses movable covers on a remote control that also activate switches. Irrelevant.

Smith, NAP, U.S. Patent No. 4,856,081.

Teaches an algorithm for compressing learned codes in a learning remote. As with all other learners so far, codes are learned one at a time and there is no serial port.

Mengel, GE, U.S. Patent No. 4,860, 380.

Standby memory for a TV tuner. Irrelevant.

Keenan, Thomson, U.S. Patent No. 4,866,434.

Another algorithm for compressing codes, either for a learning or preprogrammed remote.

Further, if the Examiner attempted to reject the claims on the basis of the teaching of Evans, et. al., in view of Imoto (or in view of, or combined with any of the references cited) under 35 USC § such rejection would be improper since again there is no motivation, direction, incentive or suggestion in any one of the references that the teachings thereof can be, or should be, combined with the teachings of any of the other references to some how come up with applicant's claimed universal remote control system. Here, the Examiner's attention is directed to the recent decisions by the CAFC to wit, In re Laskowski, 10 USPQ 2d, 1397, where the Court stated that:

> "The prior art dose not suggest Laskowski's modification of the Hoffman band saw wheel, or provide any reason or motivation to make that modification."

and, In re Newell, 13 USPQ 2d, 1248, where the Court stated that:

> "..., there is no teaching or suggestion in the prior art that the best drive of Weiss should be applied to the capstan of an ANSI type of tape cartridge in the manner done by Newell, in order to achieve the significant advantageous property obtained by Newell."

The amendments to the claims presented herein were not presented earlier because it was believed that the amendments previously made and the strong and that the cogent arguments previously presented clearly established that the claims as previously amended patentably distinguished the claimed universal remote control system over the teachings of the prior art.

The present amendments to the claims set forth herein are necessary to define now even more clearly applicant's claimed universal remote control system over the prior art references cited and to provide applicants with adequate claim coverage to which they are entitled over their universal remote control system.

In summary, applicant submits that upon reconsideration of the amended claims, in conjunction with the above remarks, it will be clear that the amended claims are clear of the art, that the claims patentably distinguish the subject matter defined herein over the teachings of the prior art, and that the application is otherwise in condition for allowance. An early and favorable action to that end is requested.

Respectfully submitted,

Thomas R. Vigil

THOMAS VIGIL
Reg. No. 24,542

Dated:
April 12, 1990.

836 S. Northwest Highway
Barrington, Illinois 60010
(708) 382-6500

Comm. and Mail BOX AF

31.00 215 GR253

Atty. Docket No. 87290

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Application of: Paul W. Darbee et al

For: Universal Remote Control Device

Group Art Unit: 253

Examiner: V. Nguyen

Serial No. 07/127,999

Filed: December 2, 1987

PETITION FOR EXTENSION OF TIME

TO:
Honorable Commissioner of
Patents and Trademarks
Washington, D.C. 20231

Dear Sir:

Applicant, through the undersigned attorney, hereby petitions for a one (1) month extension of time to May 11, 1990, for responding to the outstanding Examiner's Action mailed on January 11, 1990, the original term for responding to which expired on April 11, 1990.

☐ A previous petition for a _____ month extension was mailed to the office on _____.

In support of this Petition:

☒ Enclosed is a check in the amount of $ 31.00.

☐ Please charge Deposit Account No. 22-0355 in the amount of $_____. A duplicate copy of this Petition is enclosed.

☐ Enclosed is Response _____.

☒ Enclosed is Amendment C After Final Rejection Under Rule 116

☐ Enclosed is a Continuation Application.

☐ Enclosed is a Continuation-In-Part Application.

☐ Enclosed is a Notice of Appeal.

☐ Enclosed is an Appeal Brief.

☒ A Small Entity Declaration form has been previously filed in this application.

☒ Please charge any additional fees or credit any overpayments to Deposit Account No. 22-0355.

Respectfully submitted,

Thomas R. Vigil

Reg. No. 24,542

Dated: April 12, 1990.

836 South Northwest Highway
Barrington, Illinois 60010
(312) 382-6500

140 04/18/90 07127999 1 215 31.00 CK

CERTIFICATE OF MAILING

I hereby certify that this correspondence is being deposited with the United States Postal Service as First Class Mail in an envelope addressed to: Commissioner of Patents and Trademarks, Washington, D.C. 20231, on April 12, 1990.

Thomas R. Vigil

Thomas R. Vigil

UNITED STATES DEPARTMENT OF COMMERCE
Patent and Trademark Office

Address: COMMISSIONER OF PATENTS AND TRADEMARKS
Washington, D.C. 20231

SERIAL NUMBER	FILING DATE	FIRST NAMED APPLICANT	ATTORNEY DOCKET NO.
127,999	12/02/87	DARBEE	P 87290

THOMAS VIGIL & ASSOCIATES
836 SOUTH NORTHWEST HWY.
BARRINGTON, IL 60010

EXAMINER	
NGUYEN, V	
ART UNIT	PAPER NUMBER
253	13

DATE MAILED: 04/06/90

Below is a communication from the EXAMINER in charge of this application
COMMISSIONER OF PATENTS AND TRADEMARKS

ADVISORY ACTION

☑ THE PERIOD FOR RESPONSE:

☐ is extended to run _____ from the date of the Final Rejection

☑ continues to run 3 mos from the date of the Final Rejection

☐ expires three months from the date of the final rejection or as of the mailing date of this Advisory Action, whichever is later. In no event however, will the statutory period for response expire later than six months from the date of the final rejection.

Any extension of time must be obtained by filing a petition under 37 CFR 1.136(a), the proposed response and the appropriate fee. The date on which the response, the petition, and the fee have been filed is the date of the response and also the date for the purposes of determining the period of extension and the corresponding amount of the fee. Any extension fee pursuant to 37 CFR 1.17 will be calculated from the date that the shortened statutory period for response expires as set forth above.

☐ Appellant's Brief is due in accordance with 37 CFR 1.192(a).

☑ Applicant's response to the final rejection, filed 3/19/90 has been considered with the following affect, but it is not deemed to place the application in condition for allowance:

1. ☑ The proposed amendments to the claim and/or specification will not be entered and the final rejection stands because:

   a. ☐ There is no convincing showing under 37 CFR 1.116(b) why the proposed amendment is necessary and was not earlier presented.

   b. ☑ They raise new issues that would require further consideration and/or search. (See Note).

   c. ☐ They raise the issue of new matter. (See Note).

   d. ☐ They are not deemed to place the application in better form for appeal by materially reducing or simplifying the issues for appeal.

   e. ☐ They present additional claims without cancelling a corresponding number of finally rejected claims.

NOTE: In claim 45, the added matter of "means including a connector which makes contact with the I/O terminals" if "means associated with said connector", and "the central processing unit being reenabled upon removal of said connector ..." requires further →

2. ☐ Newly proposed or amended claims _____ would be allowed if submitted in a separately filed amendment cancelling the non-allowable claims.

3. ☑ Upon the filing of an appeal, the proposed amendment ☐ will be ☑ will not be, entered and the status of the claims in this application would be as follows:

   Allowed claims: None
   Claims objected to: _____
   Claims rejected: 5-26 and 32-49

   However;

   a. ☐ The rejection of claims _____ on references is deemed to be overcome by applicant's response.
   b. ☐ The rejection of claims _____ on non-reference grounds only is deemed to be overcome by applicant's response.

4. ☐ The affidavit, exhibit or request for reconsideration has been considered but does not overcome the rejection.

5. ☐ The affidavit or exhibit will not be considered because applicant has not shown good and sufficient reasons why it was not earlier presented.

☐ The proposed drawing correction ☐ has ☐ has not been approved by the examiner.

☑ Other → consideration and search

William D Larkins

WILLIAM D. LARKINS
EXAMINER
GROUP ART UNIT 253

Corres. and Mail
BOX AF

12

PATENT
SN 07/127,999
Atty Docket 87290

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Application of:	)	
	)	
PAUL V. DARBEE ET AL	)	Response Under 37 CFR § 1.116
	)	Expedited Procedure
For: UNIVERSAL REMOTE CONTROL DEVICE	)	Examining Group 253
	)	
Serial No. 07/127,999	)	Examiner: V. Nguyen
Filed: December 2, 1987	)	

AMENDMENT B AFTER FINAL REJECTION
UNDER RULE 116

TO:
Honorable Commissioner of
Patents and Trademarks
Box AF
Washington, D.C. 20231

RECEIVED
MAR 21 1990
GROUP 250

Dear Sir:

In response to the Examiner's Action mailed on January 11, 1990, applicant respectfully requests that the application be amended as follows:

IN THE SPECIFICATION:

Page 2, lines 27-32, delete in their entirety (including the previous amendment thereof) and insert in place thereof the following:

--According to the invention there is provided a universal remote control system having input means for inputting commands, signal output means for supplying infrared signals to a controlled device, a central processing unit (CPU) coupled to the input means and to the signal output means, a single non-volatile, read-write RAM (such as a battery-backed RAM) coupled to the central processing unit and data coupling means including terminal means

CERTIFICATE OF MAILING

I hereby certify that this correspondence is being deposited with the United States Postal Service as first-class mail in an envelope addressed to: Commissioner of Patents and Trademarks, Washington, DC 20231 on

Date 3/14/90 [signature]

coupled to the CPU for enabling code data to be supplied from outside the system to, or retrieved from the RAM through the terminal means and the CPU.--

IN THE CLAIMS

Cancel claims 1-4, 27-31 and 46 without prejudice to applicant's filing those claims in a divisional application and amend claims 5, 10, 22, 32, 36, 40, 45, 47, 48, and 49 in the manner set forth below:

5. (Twice Amended) In a universal remote control system having input means for inputting commands, signal output means for supplying a signal to a controlled device and a central processing unit (CPU) coupled to said input means and to said signal output means, the improvement residing in said system comprising no ROM, a single non-volatile, read-write RAM coupled to said central processing unit and data coupling means including terminal means coupled to [said RAM] the CPU for enabling code data to be [into] supplied from outside the system to, or retrieved from, said RAM through said terminal means and the CPU.

Claim 7, line 2, change "incudes" to --includes--.

10. (Amended) A microprocessor system for use in a universal remote control device having command inputs and code outputs, said system comprising a central processing unit (CPU), a single non-volatile, read-write random access memory (RAM) coupled to said CPU, no read only memory (ROM), first and second coupling means for [connecting] coupling said system to the command inputs and to the code outputs, respectively, and data coupling means including terminal means coupled to said [RAM] CPU for enabling code data to be [input into] supplied from outside the system to, or retrieved from, said RAM through said terminal means and said CPU.

Claim 22, line 2, change "data coupling" to --terminal--.

32. (Twice Amended) A universal remote control system comprising data processing means, input means including a keyboard

and keyboard circuit means coupled to said data processing means, signal output means including means for generating infrared light [generating means] codes coupled to said data processing means, memory means including a non-volatile, read-write RAM coupled to said data processing [unit] means for storing (a) a set of instructions and (b) a library of code data for enabling said infrared light generating means to generate specific infrared codes, said RAM being coupled to said data processing means, and data coupling means including terminal means coupled to said [RAM] CPU for enabling code data to be [input into] supplied from outside the system to, or retrieved from, said RAM through said terminal means and said CPU.

Claim 36, line 2, after "circuit" insert --means--.

Claim 40, line 2, change "data coupling" to --terminal--.

45. (Amended) An apparatus for loading a RAM in a ROM-less microprocessor system used in a universal remote control system comprising a central processing unit having I/O terminals, a non-volatile, read-write RAM, input means, output means, first, second and third means for coupling said central processing unit to said RAM, to said input means, and to said output means, respectively, said apparatus including means including a connector which makes contact with the I/O terminals for disabling the central processing unit, means associated with said connector for connecting a separate microprocessor system to said RAM via the I/O terminals, means associated with said connector for transferring instructions and/or data to said RAM, and [means associated with said block connector for re-enabling] the central processing unit being re-enabled upon removal of said connector to enable the central processing unit to execute the instructions so transferred.

47. (Amended) In a universal remote control system having input means for inputting commands, signal output means for supplying a signal to a control device and a central processing

unit (CPU) coupled to said input means and to said signal output means, the improvement residing in said system comprising a single, non-volatile, read-write RAM [connected] coupled to said central processing unit and data coupling means including terminal means coupled to [said RAM] the CPU for enabling code data to be [input into] supplied from outside the system to, or retrieved from said RAM though said terminal means and said CPU.

48. (Amended) A microprocessor system for use in a universal remote control device having command inputs and code outputs and comprising a central processing unit (CPU), a single non-volatile, read-write random access memory (RAM) coupled to said CPU, first and second coupling means for connecting said system to the command inputs and to the code outputs, respectively, and data coupling means including terminal means coupled to said [RAM] CPU for enabling data to be [input into] supplied from outside the system to, or retrieved from, said RAM through said terminal means and said CPU.

49. (Amended) A universal remote control system comprising data processing means, input means including a keyboard and keyboard circuit means coupled to said data processing means, signal output means including means for generating infrared light [generating means] codes coupled to said data processing means, and memory means including a non-volatile, read-write RAM only and no ROM [coupled to said data processing means] for storing (a) a set of instructions and (b) a library of code data for enabling said infrared light generating means to generate specific infrared codes, said RAM being coupled to said data processing means, and data coupling means including terminal means coupled to said [RAM] CPU for enabling code data to be [input into] supplied from outside the system to, or retrieved from, said RAM through said terminal means and said CPU.

IN THE ABSTRACT:

Please cancel lines 2-6 (and the previous substitution therefor) and substitute in place thereof the following:

--The universal remote control system comprises data processing means, input means including a keyboard and keyboard circuit means connected to the data processing means, signal output means including means for generating infrared light codes connected to the data processing means, memory means including a non-volatile RAM only and no ROM for storing (a) a set of instructions and (b) a library of code data for enabling the infrared light generating means to generate specific infrared codes, the RAM being coupled to the data processing means, and data coupling means coupled to the CPU for enabling code data to be supplied from outside the system to, or retrieved from, the RAM through the terminal means and the CPU.--

REMARKS

The Examiner's requirement for restriction had been discussed with the Examiner over the telephone and to expedite the prosecution of the subject application, applicant's attorney had agreed to the cancellation of the method claims without prejudice to their being pursued in a divisional application.

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The agreement of applicant to cancel claims 1-4 and 27-31 without prejudice to pursuing those claims in a divisional application, in order to expedite the prosecution of the subject application, may have been set forth in the Interview Summary record. However, since applicant has not yet received a copy of this Interview Summary record, applicant is specifically canceling

claims 1-4 and 27-31 in this Amendment B without prejudice to pursuing those claims in a divisional application.

The Examiner has raised a number of objections to the language used in the claims and applicant first of all thanks the Examiner for his thorough analysis of the language used in the claims and his comments on same which are very well taken.

The Examiner had noted that the data coupling means is not coupled directly to the RAM, but is coupled to the CPU which is utilized in supplying code data from outside the system to the RAM or for retrieving data from the RAM. The Examiner is quite correct on this point.

However, applicant points out that the term "coupling", as applicant's attorney understands this term to be utilized in the lexicography of words for use in patent claims, includes directly or "indirectly through other circuit components". In contradistinction, use of the term "connecting", as opposed to "coupling", excludes connecting or coupling through other elements and would mean a direct connection between the circuit elements referred to.

Nonetheless, to clarify the language in the claims, applicant has amended the independent claims to call for data coupling means including terminal means coupled to the CPU, instead of to the RAM, to make clear what structure applicant is claiming.

The Examiner had also objected to the term "non-volatile" since in the computer art, the term "random access memory" or simply RAM, usually indicates a memory whose stored data is lost when power is turned off and that the term "non-volatile RAM" indicates that data is not lost if power is turned off.

While the Examiner's concern about this possible inconsistency is understood, the point is that applicant's RAM does <u>not</u> lose its data and that's why it is referred to as a "non-volatile RAM". It should be clear that by using a non-volatile RAM applicant does not

need a ROM.

In a sense, one could consider a non-volatile RAM as somewhat equivalent to an "electrically erasable or electrically alterable programmable read only memory", e.g., an EAPROM or an EEPROM, at least with respect to some of their respective functions.

Further, while it is true that SRAM's and DRAM's currently used in many products are volatile, there is nothing to prevent a memory, that can be both written to and read from, from retaining data without applied power. For example, magnetic and optical media commonly have this property as do EEPROM's (noted above), magnetic cores, and, as used in the remote control system of the present invention, a battery-backed RAM. Also, such a non-volatile, read-write RAM could be realized by an OTP (one-time-programmable) chip.

As disclosed in the application, applicant's RAM is "non-volatile" by providing a battery for establishing a "battery-backed RAM".

From the foregoing remarks it will be understood that applicant considers the term "non-volatile, read-write RAM" to be an appropriate term and one which is not an inconsistent statement or a non-existent component since such component is realized by a battery backed RAM. As noted above, such component might also be realized by an EAPROM or an EEPROM. However, a battery backed RAM is a much simpler and less expensive way to realize the structure defined in the claims as "a non-volatile, read-write RAM".

Since applicant finds the term "non-volatile, read-write RAM" to be a correct and apt term, applicant has not amended this term in the claims.

The Examiner has made reference to the fact that applicant in a preferred embodiment uses a latch 58 in coupling data received at the terminal means and passed through the CPU to the RAM. Again, applicant points out that the term "coupling", as this word is

used, is a term of art in patent claims which includes a connection from one component through other components to a second component such that stating that the CPU is "coupled" to the RAM includes a direct connection to the RAM or an indirect connection to the RAM through a latch!

The embodiment shown in FIG. 9A which shows the CPU 56 connected to a latch 58 which in turn is connected to a RAM 54 is only one preferred embodiment and it should be understood that the RAM can be connected directly to the CPU instead of through a latch. Accordingly, there is no need to include reference to a latch in the independent claims.

In any event, it will be clear from the amendments being made to the independent claims that such claims call for a non-volatile RAM that is coupled to the central processing unit and that the data coupling means include terminal means coupled to the CPU for enabling code data to be supplied from outside the system to, or retrieved from, the RAM through the terminal means and the CPU.

By the present amendments to the claims, applicant is not only correcting and clarifying the language in the claims to properly define the subject matter claimed, but also to emphasize the novel, important and inventive features of applicant's claimed system.

Applicant has compared the amendments being made to the claims with the specifications and drawings and finds there is antecedent basis in the application for the amendments and no new matter is being added by these amendments.

As previously pointed out in Amendment A, the important features of applicant's universal remote control system are the elimination of the need for a ROM, the use of a non-volatile, read-write RAM, such as a battery-backed RAM, and the provision of data coupling means including terminal means coupled to the CPU for enabling code data to be supplied from outside the system to, or retrieved from, the RAM through the terminal means and the CPU

whereby the system can be easily updated with new codes simply by connecting a separate computer or processor to the terminal means (serial ports) and without requiring the user to go through a learn code routine!

These are important features of applicant's claimed universal remote control system which are not suggested or taught by the references cited. In particular, it is to be noted that the prior art universal remote control systems focus on systems that are constructed and arranged to learn IR codes and then store such codes in a memory such as a RAM. Such prior systems provide a ROM for storing the instructions whereby the system can be operated to learn IR codes.

Applicant, on the other hand, teaches in a different direction by teaching that one does not need to have a ROM with instructions therein that enable the CPU of the universal remote control system to learn codes and then store code data for generating those codes in a RAM.

Instead, applicant provides data coupling means including terminal means whereby the unit can be connected to a source, outside of the system, having code data for generating infrared codes which is then supplied to the terminal means and through the CPU to a non-volatile, read-write (battery-backed) RAM which stores the code data which can be retrieved from the RAM by the CPU for operating various types of remotely controlled devices. This universal remote control system and the features thereof just described above provide an advance over the prior art since it is simpler to operate than the prior art universal remote control devices, one does not have to manipulate the universal remote control device to learn IR codes, and the system can be easily updated with new code data for generating IR codes for operating new remotely controlled apparatus that come on the market simply by connecting the terminal means (which can be realized by serial

ports) to a source of new IR code data.

The Examiner's objection to the specification under 35 USC § 112, 1st paragraph, is respectfully traversed.

In support of this traverse, it is noted that the claims have been amended to be consistent with the specification and drawings whereby the specification and drawings provide an enabling disclosure for the claims.

The Examiner's rejection of claims 5, 10, 32 and 47-49 under 35 USC § 112, 1st paragraph, for being indefinite for not being supported by an enabling disclosure is respectfully traversed.

In support of this traverse, applicant points out that the claims have been amended to be consistent with the specification and drawings whereby the disclosure therein is enabling for the claims as now amended to define therein now even more clearly applicant's remote control system.

The Examiner's rejection of claims 5-26 and 32-49 under 35 USC § 112, 2nd paragraph, for being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention, as this rejection may be attempted to be applied to the amended claims, is traversed.

In support of this traverse, applicant has already explained above the appropriateness and aptness of the term "non-volatile, read-write RAM".

Further, applicant has amended the claims to call for the data coupling means as including terminal means that are coupled to the CPU instead of "data coupling means coupled to the RAM" to make it clear that what is referred to here is the provision of terminal means (which can be in the form of serial ports) whereby IR code data can be easily and simply installed into the RAM through the terminal means and the CPU at any time.

Further in support of this traverse, the claims have been amended to clearly state that the RAM is coupled to the data

processing means, it being understood that the term "coupling" includes a direct connection or a connection through other circuit elements, such as a latch.

Further in support of this traverse, applicants have corrected the minor errors, including misspellings, in the amended claims.

Still further, it is noted that claim 45 has been amended herein to make it clear that the means for connecting a separate microprocessor system to the RAM includes a connector which is received over the CPU and is adapted to connect to the I/O terminals at the periphery of the CPU and in this way provide a connection from the separate microprocessor to the output terminals from the CPU to the RAM.

Also, applicant has noted the inconsistency in claims 32 and 49 with respect to the language stating that infrared codes are coupled to the data coupling means and applicant has amended this language to make it clear what is being claimed and what is connected to what.

The Examiner's rejection of claims 5-26 and 32-49 under 35 USC § 103 for being unpatentable over Evans et al U.S. Patent No. 4,825,200, as this rejection may be attempted to be applied to the amended claims, is respectfully traversed.

First of all, in support of this traverse, applicant repeats, iterates and incorporates herein by reference, the remarks set forth in Amendment A regarding the non-pertinency of the Evans et al patent.

In this respect, applicant first of all points out that the Evans et al U.S. Patent No. 4,825,200 issued on April 25, 1989 on Application Serial No. 66,853 filed on June 25, 1987. Applicants had constructed or reduced to practice the universal remote control device disclosed and claimed in the subject application prior to June 25, 1987 and can swear behind this patent if it is further applied by the Examiner, to remove it as a reference citeable

against the claims of the subject application. If the Examiner would like applicant to submit such a declaration, applicant will be happy to do so.

In any event, Evans et. al. teaches a reconfigurable remote control transmitter which includes a learn mode and a run mode. In this respect, it is similar to the remote control systems disclosed in the Ehlers, Sogame and Imoto patents referred to in Amendment A.

Since Evans et al teaches a learning remote control transmitter which learns a code sequence one at a time, it does not teach or suggest the provision of data coupling means including terminal means (such as serial ports) coupled to a CPU for enabling new code data to be supplied from outside the system to, or retrieved from, the RAM through the CPU and the terminal means, as defined now even more clearly in the amended claims.

Clearly, Evans, et. al. does not disclose or suggest the data coupling means including terminal means coupled to the CPU for the purpose defined in the claims.

Moreover, there is no incentive, direction, motivation or suggestion in Evans et al to modify Evans et al to come up with applicant's claimed universal remote control system having no ROM, the non-volatile, read-write RAM and the data coupling means including the terminal means coupled to the CPU for enabling code data to be supplied from outside the system to the RAM through the terminal means and the CPU. Accordingly, the Examiner's rejection is improper and should be withdrawn. See Ex parte Chicago Rawhide, 226 USPQ 438, where an Examiner attempted to sustain a Section 103 rejection on the basis of the teachings of one prior patent. In this decision, the Board stated:

> "The mere fact that a worker in the art could rearrange the parts of the reference device to meet the terms of the claims on appeal is not by itself sufficient to support a finding of obviousness. The prior art must provide a motivation or reason for the worker in the art, without the benefit of the appellant's specification, to make the necessary changes in the reference device. The Examiner has not presented any evidence to support the

> conclusion that a worker in this art would have had any motivation to make the necessary changes in the Baney device to render the here claimed device unpatentable."

It should be clear from the foregoing analysis that the Examiner's contention that applicant's "data coupling means" is equivalent to the latch 322 of Evans et al is clearly incorrect, particularly since, as now defined even more clearly in the amended claims, the alleged data coupling means of Evans et al does not include terminal means coupled to the CPU for enabling code data to be supplied from outside the system to, or retrieved from, the RAM.

While some of the claimed features such as "wake up switch means" or "write protect circuit means" may be found in the prior art, such as, perhaps, in Evans et. al., the combination defined in each of applicant's claims directed to these circuit components in combination with the circuit elements defined in the base claim from which each dependent claim depends, e.g., base claim 5, is not disclosed or suggested by any of the references cited and particularly not the Evans et al patent.

The Examiner's rejection of claims 5, 10, 32 and 47-49 under 35 USC § 103 for being unpatentable over Imoto U.S. Patent No. 4,771,283 as this rejection may be attempted to be applied to the amended claims, is respectfully traversed.

In support of this traverse, it is first of all pointed out that the Examiner is incorrect in stating that element 101a of Imoto is an output means. To the contrary, it is an input means to a common remote control device which is coupled by cables to remote devices to be controlled.

What Imoto teaches is taking a remote control code transmitter 102 (which, it is to be noted, is the element in Imoto that is analogous to applicant's universal remote control device), and aiming it at Imoto's so-called common remote control device 101 and particularly to the input means 101a thereof.

Then, Imoto teaches collecting the operating signal codes from

the various remote control transmitters 102 by inputting the code data therefrom via infrared code signals to the infrared receiving diode 11 at the input 101a, deciphering those code signals, storing them in a RAM and then, upon operation of keys 101b-d supplying outputs via one of several cables 103 from outputs 101f of the common remote control device to the devices to be controlled.

If the Examiner is contending that applicant's universal remote control device claimed in the previously presented claims reads on the Imoto common remote control device, this is incorrect since, while Imoto teaches infrared code input means and cable output means he does not teach data coupling means (now defined in the amended claim as including terminal means) coupled to the CPU for enabling code data to be supplied from outside the system to the RAM through (terminal means) and the CPU. Clearly, the Imoto device cannot be construed to include this construction of a universal remote control device as defined now even more clearly in the amended claims.

Again, this rejection by the Examiner is also improper on the basis of the legal reasoning and rational set forth in the case of Ex parte Chicago Rawhide, Supra., since there is no motivation, direction, incentive or suggestion in Imoto to modify same to come up with applicant's universal remote control device as defined now even more clearly in the amended claims.

A brief summary of applicant's analysis of the other references cited is set forth below:

Morishita, Toyko Shibaura, U.S. Patent No. 4,517,564.
Conventional (dumb) remote control, but with feed-back confirmation signal that command was received. No CPU or memory. Irrelevant.

Yamamoto, Fuji Electric, U.S. Patent No. 4,794,371.
Time-division-multiplexing circuit. No CPU or memory. Irrelevant.

Amano, Sony, U.S. Patent No. 4,807,052.

A controlled device that responds not only to codes from its own native remote controller, but that can recognize codes from a foreign remote and respond to them as if they were native. Irrelevant.

Rumbolt, NAP, U.S. Patent No. 4,841,368.

Incorporates a universal remote into a controlled device so that when commands are sent to the controlled device, they can also be translated into commands to control associated equipment. Irrelevant.

Stacy, Zenith, U.S. Patent No. 4,855,746.

Discloses movable covers on a remote control that also activate switches. Irrelevant.

Smith, NAP, U.S. Patent No. 4,856,081.

Teaches an algorithm for compressing learned codes in a learning remote. As with all other learners so far, codes are learned one at a time and there is no serial port.

Mengel, GE, U.S. Patent No. 4,860, 380.

Standby memory for a TV tuner. Irrelevant.

Keenan, Thomson, U.S. Patent No. 4,866,434.

Another algorithm for compressing codes, either for a learning or preprogrammed remote.

Further, if the Examiner attempted to reject the claims on the basis of the teaching of Evans, et. al., in view of Imoto (or in view of, or combined with any of the references cited) under 35 USC §103 such rejection would be improper since again there is no motivation, direction, incentive or suggestion in any one of the references that the teachings thereof can be, or should be, combined with the teachings of any of the other references to some how come up with applicant's claimed universal remote control system. Here, the Examiner's attention is directed to the recent

decisions by the CAFC, to-wit, In re Laskowski, 10 USPQ 2d, 1397, where the Court stated that:

> "The prior art does not suggest Laskowski's modification of the Hoffman band saw wheel, or provide any reason or motivation to make that modification."

and, In re Newell, 13 USPQ 2d, 1248, where the Court stated that:

> "..., there is no teaching or suggestion in the prior art that the best drive of Weiss should be applied to the capstan of an ANSI type of tape cartridge in the manner done by Newell, in order to achieve the significant advantageous property obtained by Newell."

The amendments to the claims presented herein were not presented earlier because it was believed that the amendments previously made, and the strong cogent arguments previously presented, clearly established that the claims as previously amended patentably distinguished the claimed universal remote control system over the teachings of the prior art.

The present amendments to the claims set forth herein are necessary to define now even more clearly applicant's claimed universal remote control system over the prior art references cited and to provide applicants with adequate claim coverage to which they are entitled over their universal remote control system.

In summary, applicant submits that upon reconsideration of the amended claims, in conjunction with the above remarks, it will be clear that the amended claims are clear of the art, that the claims patentably distinguish the subject matter defined herein over the teachings of the prior art, and that the application is otherwise in condition for allowance. An early and favorable action to that end is requested.

Respectfully submitted,

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Dated: March 13, 1990

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07/127,999 12/02/87 DARBEE P 87290

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NGUYEN, V

253

01/11/90

☑ This application has been examined ☑ Responsive to communication filed on 10/4/89 ☑ This action is made final.

A shortened statutory period for response to this action is set to expire 3 month(s), ——— days from the date of this letter.
Failure to respond within the period for response will cause the application to become abandoned. 35 U.S.C. 133

Part I THE FOLLOWING ATTACHMENT(S) ARE PART OF THIS ACTION:

1. ☑ Notice of References Cited by Examiner, PTO-892.
2. ☐ Notice re Patent Drawing, PTO-948.
3. ☑ Notice of Art Cited by Applicant, PTO-1449.
4. ☐ Notice of Informal Patent Application, Form PTO-152.
5. ☐ Information on How to Effect Drawing Changes, PTO-1474.
6. ☐ _____

Part II SUMMARY OF ACTION

1. ☑ Claims 1-49 are pending in the application.
   Of the above, claims 1-4, 27-31 are withdrawn from consideration.
2. ☑ Claims 1-4, 27-31 have been cancelled.
3. ☐ Claims _____ are allowed.
4. ☑ Claims 5-26, 32-49 are rejected.
5. ☐ Claims _____ are objected to.
6. ☑ Claims 1-4, 27-31 are subject to restriction or election requirement.
7. ☐ This application has been filed with informal drawings under 37 C.F.R. 1.85 which are acceptable for examination purposes.
8. ☐ Formal drawings are required in response to this Office action.
9. ☐ The corrected or substitute drawings have been received on _____. Under 37 C.F.R. 1.84 these drawings are ☐ acceptable. ☐ not acceptable (see explanation or Notice re Patent Drawing, PTO-948).
10. ☐ The proposed additional or substitute sheet(s) of drawings, filed on _____ has (have) been ☐ approved by the examiner. ☐ disapproved by the examiner (see explanation).
11. ☐ The proposed drawing correction, filed on _____, has been ☐ approved. ☐ disapproved (see explanation).
12. ☐ Acknowledgment is made of the claim for priority under U.S.C. 119. The certified copy has ☐ been received ☐ not been received ☐ been filed in parent application, serial no. _____; filed on _____.
13. ☐ Since this application appears to be in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under Ex parte Quayle, 1935 C.D. 11; 453 O.G. 213.
14. ☐ Other

EXAMINER'S ACTION

PTOL-326 (Rev. 6-88)

The Amendment filed on 10/4/89 has been entered and considered. However, the application is not in condition for allowance. The reasons are as follows:

Claims 5-26 and 32-49 are pending in the application (see the attached Summary Interview).

The following is a quotation of the first paragraph of 35 U.S.C. 112:

> The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

The specification is objected to under 35 U.S.C. 112, first paragraph, as failing to provide an enabling disclosure since both the specification and the drawings do not disclose that "the data coupling means coupled to said RAM for enabling code data to be input into said RAM." For example, Fig. 9A of the present application only shows that the data is read/written from/to RAM (54) through the latch (58) and there is no data coupling means as recited in claim 5 that couples to the RAM (54). Also, Fig. 20 of the present application does not show that the data coupling means (206) directly couples to the RAM (54) as recited in claims 5, 10, 32, and 47-49).

Claims 5, 10, 32 and 47-49 are rejected under 35 U.S.C. 112, first paragraph, for the reasons set forth in the above objection to the specification.

Claims 5-26, 32-49 are rejected under 35 U.S.C.

112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

In claim 5, the term "non-volatile" does not make sense since it might indicate the RAM data contents are not lost if power is off. However, the RAM can only maintain data when the power is on as this fact is inherently understood by a person skilled in this art. The phrase "data coupling means coupled to said RAM for enabling code data to be input into said RAM" is vague and confusing since the drawings (see Fig. 9A) shows that only the cpu (56) can actually enabling code data to be input into RAM (54) through the data latch (58). Thus, does the latch (58) or cpu(56) constitute the "data coupling means" to be claimed? How can the "data coupling means" couples to the RAM as claimed?

In claim 7, "includes" is mis-spelled.

Claims 10, 32 and 47-49 contain similar errors as claim 5.

In claim 32, "said data processing unit" lacks proper antecedent basis.

In claim 36, "said wake up circuit" should be "said wakeup circuit means" for sake of clarity.

In claim 45, the phrase "means for connecting a separate microprocessor system to said RAM" is vague and indefinite since Fig. 10 only shows that the separate microprocessor system (200) directly connect to the cpu (56) but not to the RAM (54).

In claim 49, what is being claimed by "infrared codes coupled to said data processing means"? How can the codes be connected to the hardware as claimed?

Claims 5-26 and 32-49 insofar as understood are rejected under 35 U.S.C. 103 as being unpatentable over Evans et al (U.S. 4,825,200).

Insofar as the claims call for a universal remote control system having a single, non-volatile, read-write RAM and no ROM which directs to the similar system disclosed by Evans et al (RAM 112, see Fig. 2), the following claimed features are taught by Evans et al:

- A remote control system (see Fig.2) having input command means (108), signal output means (12,16,138), cpu (100), and a RAM (112) coupled to cpu (100);

In regard to the claimed "data coupling means coupled to said RAM for enabling code data to be input", Fig. 3c shows the latch (322) and multiplex data lines as a means for interfacing and coupling various data signals written into the RAM (112) from the cpu (100). The cpu can also retrieve or read data from RAM (112) through this interface means since this means coupled to the RAM (112). Thus, it would be obvious that the latch (322) and address/data lines (A_0 - A_7 , D_0 - D_7) act as the claimed "data coupling means" recited in claims 5, 10, 32 and 47-49 insofar as the claim language is understood. Therefore, the applicants' arguments concerning the subject matter of "loading data from outside into the RAM by a data coupling means" is not found to

be persuasive. Other claimed features such as "wakeup switch means" and "write protect circuit means" for the RAM also read on the circuits illustrated on Fig. 3A - 3C. See the entire teachings on col. 1-14.

Claims 5, 10, 32 and 47-49 insofar as definite are rejected under 35 U.S.C. 103 as being unpatentable over Imoto (U.S. 4,771,283).

Fig. 1 of Imoto teaches a common remote control device which includes an input means (key select 101b), an output means (101a, 101f), a cpu (control 18), and a single memory (19). Col. 4, line 10 mentions about the memory (19) as RAM (19) and since Fig. 1 does not show any other ROM memory, the system of Imoto must contain a single non-volatile, read-write RAM coupled to the cpu (18) as claimed. Also, it would have been obvious to a person having ordinary skill in the art that Fig. 1 shows a bi-directional bus (line) connects the cpu to the RAM (19) which would act as the claimed "data coupling means" for enabling code data to be input from the cpu to RAM (19). Therefore, claims 5, 10, 32 and 47-49 clearly meet the teachings of Imoto (See col. 1-6).

Applicant's amendment necessitated the new grounds of rejection. Accordingly, THIS ACTION IS MADE FINAL. See MPEP 706.07(a). Applicant is reminded of the extension of time policy set forth in 37 CFR 1.136(a). The practice of automatically extending the shortened statutory period an additional month upon the filing of a timely first response to a final rejection has been discontinued by the Office. See 1021 TMOG 35.

be persuasive. Other claimed features such as "wakeup switch means" and "write protect circuit means" for the RAM also read on the circuits illustrated on Fig. 3A - 3C. See the entire teachings on col. 1-14.

Claims 5, 10, 32 and 47-49 insofar as definite are rejected under 35 U.S.C. 103 as being unpatentable over Imoto (U.S. 4,771,283).

Fig. 1 of Imoto teaches a common remote control device which includes an input means (key select 101b), an output means (101a, 101f), a cpu (control 18), and a single memory (19). Col. 4, line 10 mentions about the memory (19) as RAM (19) and since Fig. 1 does not show any other ROM memory, the system of Imoto must contain a single non-volatile, read-write RAM coupled to the cpu (18) as claimed. Also, it would have been obvious to a person having ordinary skill in the art that Fig. 1 shows a bi-directional bus (line) connects the cpu to the RAM (19) which would act as the claimed "data coupling means" for enabling code data to be input from the cpu to RAM (19). Therefore, claims 5, 10, 32 and 47-49 clearly meet the teachings of Imoto (See col. 1-6).

Applicant's amendment necessitated the new grounds of rejection. Accordingly, THIS ACTION IS MADE FINAL. See MPEP 706.07(a). Applicant is reminded of the extension of time policy set forth in 37 CFR 1.136(a). The practice of automatically extending the shortened statutory period an additional month upon the filing of a timely first response to a final rejection has been discontinued by the Office. See 1021 TMOG 35.

A SHORTENED STATUTORY PERIOD FOR RESPONSE TO THIS FINAL ACTION IS SET TO EXPIRE THREE (3) MONTHS FROM THE DATE OF THIS ACTION. IN THE EVENT A FIRST RESPONSE IS FILED WITHIN TWO (2) MONTHS OF THE MAILING DATE OF THIS FINAL ACTION AND THE ADVISORY ACTION IS NOT MAILED UNTIL AFTER THE END OF THE THREE (3) MONTH SHORTENED STATUTORY PERIOD, THEN THE SHORTENED STATUTORY PERIOD WILL EXPIRE ON THE DATE THE ADVISORY ACTION IS MAILED, AND ANY EXTENSION FEE PURSUANT TO 37 CFR 1.136(a) WILL BE CALCULATED FROM THE MAILING DATE OF THE ADVISORY ACTION. IN NO EVENT WILL THE STATUTORY PERIOD FOR RESPONSE EXPIRE LATER THAN SIX (6) MONTHS FROM THE DATE OF THIS FINAL ACTION.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Viet Nguyen whose telephone number is (703) 557-8842.

Any inquiry of a general nature, or relating to the status of this application, should be directed to the Group receptionist whose telephone number is (703) 557-3311.

V.N
Nguyen/Km
1/8/90

ANDREW T. JAMES
SUPERVISORY PATENT EXAMINER
GROUP ART UNIT 253

TO SEPARATE, HOLD TOP AND BOTTOM EDGES, SNAP–APART AND REMOVE CARBON

FORM PTO-892 (REV. 3-78) U.S. DEPARTMENT OF COMMERCE PATENT AND TRADEMARK OFFICE

NOTICE OF REFERENCES CITED

SERIAL NO.	GROUP ART UNIT	ATTACHMENT TO PAPER NUMBER
127999	253	11

APPLICANT(S): DARBEE et al

U.S. PATENT DOCUMENTS

*		DOCUMENT NO.	DATE	NAME	CLASS	SUB-CLASS	FILING DATE IF APPROPRIATE
	A	4771283	9/13/88	Imoto	455	603	11/16/86
*	B	4535333	8/13/85	Twardowski	455	151	9/23/82
*	C	4566034	1/21/86	Harger et al.	455	151	5/2/83
	D	4841368	6/20/89	Rumbolt et al.	455	352	1/21/88
	E	4807052	2/21/89	Amano	455	355	10/5/87
	F	4856081	8/8/89	Smith	455	151	12/9/87
	G	4860380	8/22/89	Mengel	455	185	1/19/89
	H	4794371	12/27/88	Yamamoto	340	825.69	1/6/87
	I	4517564	5/14/85	Morishita et al.	340	825.69	9/15/82
	J	4866434	9/12/89	Keenan	340	825.69	12/22/88
	K	4855746	8/8/89	Stacy	358	194.1	7/30/84

FOREIGN PATENT DOCUMENTS

*		DOCUMENT NO.	DATE	COUNTRY	NAME	CLASS	SUB-CLASS	PERTINENT SHTS. DWG	PERTINENT PP. SPEC.
	L								
	M								
	N								
	O								
	P								
	Q								

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

R	
S	
T	
U	

EXAMINER	DATE
V. Nguyen	12/26/89

* A copy of this reference is not being furnished with this office action.
(See Manual of Patent Examining Procedure, section 707.05 (a).)

8 8/C 3/89

Sheet 9 of 18

FORM PTO-1449 (REV. 8-83) U.S. DEPARTMENT OF COMMERCE PATENT AND TRADEMARK OFFICE

ATTY. DOCKET NO.	SERIAL NO.
87290	07/127,999
APPLICANT	
PAUL V. DARBEE ET AL	
FILING DATE	GROUP
December 2, 1987	253

INFORMATION DISCLOSURE CITATION

(Use several sheets if necessary)

U.S. PATENT DOCUMENTS

★EXAMINER INITIAL		DOCUMENT NUMBER	DATE	NAME	CLASS	SUBCLASS	FILING DATE IF APPROPRIATE
V.N	AA	4 8 2 5 2 0 0	4/25/89	EVANS ET AL.	341	23	6/25/87
V.N	AB	4 2 0 0 8 6 2	4/29/80	CAMPBELL ET AL.	340	310	12/28/77
	AC						
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FOREIGN PATENT DOCUMENTS

		DOCUMENT NUMBER	DATE	COUNTRY	CLASS	SUBCLASS	TRANSLATION YES	TRANSLATION NO
	AL							
	AM							
	AN							
	AO							
	AP							

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

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EXAMINER	DATE CONSIDERED
V. Nguyen	4/20/90

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

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                (FILE JPOABS)

                DEL HIS Y
L1            Ø S UNIVERSAL(W)REMOTE(W)CONTROL(W)DEVICE
L2          427 S REMOTE(W)CONTROL(W)DEVICE

L3            5 S L2 AND (PROGRAMMABLE OR VERSATILE OR UNIVERSA

=> d cit ab 2

2.  62-130099, Jun. 12, 1987, REMOTE CONTROL DEVICE; SHUNICHI
SHOJI, H04Q 9*00; G05B 24*02

62-130099                                                L3: 2 of 5

ABSTRACT:

 PURPOSE:To transmit plural command to plural independent equipments and to
process the respective equipments without providing a remote control
device for each of the equipment having different functions by providing
an operating button or the like for transmitting a selection code signal and
a data signal.



62-130099                                                L3: 2 of 5

 CONSTITUTION:In the remote control device 6, an air conditioning
power source on and off button 7, a TV receiver power source on and off
button 8, a channel change over button 9, a main/secondary change over button
10, a channel call button 11, a video power source on and off button 12, a
frame feed button 13, a picture recording button 14 or the like are provided.
A keyboard 17 on which these operating buttons 7.approx.16 are disposed and a
programmable microcom puter 18 are connected by an input and output port
to mutually exchange data. According to the operation of these operating
buttons, the equipment selecting code signal and the data signal for
commanding the operating of the equipment are outputted. Thereby, even when
the remote control device is not provided in each of the
equipments having the different functions, the plural commands can be
transmitted to the plural independent equipments and the respective
equipments can be processed.


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COST IN U.S. DOLLARS                          SINCE FILE      TOTAL
                                                 ENTRY     SESSION
FULL ESTIMATED COST                              18.00       30.00

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   *                  W E L C O M E   T O   T H E                  *
   *          U. S.   P A T E N T   T E X T   F I L E              *
   * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * *

=> s universal(w)remote(w)control(w)device
         25057 UNIVERSAL
TE      102412 REMO

L       472533 CONTRO
        441650 DEVICE
L4           1 UNIVERSAL(W)REMOTE(W)CONTROL(W)DEVICE

=> d cit

1.  4,570,217, Feb. 11, 1986, Man machine interface; Bruce S. Allen, et al.,
364*188, 191, 900, 919, 921.4, 921.8, 921.9, 926, 926.9, 927.3, 927.4, 928,
929.2, 929.3, 949, 949.3, 959.1, 968 [IMAGE AVAILABLE]

=> s remote(w)control(w)device
        102412 REMOTE
L       472533 CONTRO
```

ENTER ANSWER NUMBER OR RANGE (1):.

1. 4,878,050, Oct. 31, 1989, Motor vehicle remote control system; William L. Kelley, 340*825.06; 180*167; 307*10.6; 340*426

=> d 18 cit 560,583,584,585,605,621,643,665,666,669,672,691,696,699,730,733,739,806,839

560. 4,818,993, Apr. 4, 1989, Electronic control system for controlling several remote devices; Gunter Stockel, 340*825.06, 825.22

583. D 300,432, Mar. 28, 1989, Remote control holder; Richard Zuehsow, D14*218

584. 4,817,203, Mar. 28, 1989, Remote control system; Takashi Tsurumoto, et al., 455*603; 358*194.1; 455*617

585. 4,817,195, Mar. 28, 1989, Channel selection apparatus having automatic frequency compensation for transmission frequency error; Kazuhiko Kubo, et al., 455*192; 358*195.1; 455*182, 260

605. 4,815,683, Mar. 28, 1989, Holder for remote control units for TV,VCR and the like; Laureen Ferrante, 248*205.2, 309.1, 314

621. 4,814,741, Mar. 21, 1989, Digital remote control device; Katsunobu Hongo, et al., 340*825.65, 825.72; 341*29

643. RE 32,882, Mar. 7, 1989, Remote control system circuit breaker; Youichi Yokoyama, et al., 335*14, 20

665. 4,809,360, Feb. 28, 1989, Electronic equipment remote control unit chassis; James L. Kraft, * ; 341*176; 358*194.1; 361*391, 394, 395; 455*126, 151, 618

666. 4,809,359, Feb. 28, 1989, System for extending the effective operational range of an infrared remote control system; Devan T. Dockery, 455*603, 601, 617

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672. 4,808,992, Feb. 28, 1989, Component audio/video system with automatic turn-off of peripheral devices; Billy W. Beyers, Jr., et al., 340*825.24; 358*181, 335

691. 4,807,052, Feb. 21, 1989, Remotely controllable electronic apparatus; Toshio Amano, 358*194.1; 340*825.22, 825.72; 455*352, 355, 603

696. 4,806,929, Feb. 21, 1989, Remote monitor control system; Kazuo Nishijima, et al., 340*825.06, 310R, 825.65

699. 4,806,784, Feb. 21, 1989, Remote control system for a display apparatus; Shigeru Goda, 307*125, 126; 340*811

730. 4,802,114, Jan. 31, 1989, Programmable remote control transmitter; Akira Sogame, 364*900; 340*825.72; 455*603

733. 4,801,959, Jan. 31, 1989, Cordless remote control shutter activation device; Ming J. Chern, 354*266, 295

739. 4,801,282, Jan. 31, 1989, Remote control apparatus; Toshimitsu Ogawa, et al., 440*84; 74*480B; 440*86, 87

806. 4,794,371, Dec. 27, 1988, Remote control apparatus; Hitoshi Yamamoto, 340*825.64, 825.69

839. D 298,941, Dec. 13, 1988, Remote control; Brion Ennio, D14*218

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COST IN U.S. DOLLARS	SINCE FILE ENTRY	TOTAL SESSION
FULL ESTIMATED COST	38.40	68.40

U.S. Patent & Trademark Office LOGOFF AT 12:35:21 ON 06 DEC 89

d cit 1-300
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ENTER ANSWER NUMBER OR RANGE (1):1-205

1. 4,878,050, Oct. 31, 1989, Motor vehicle remote control system; William L. Kelley, 340*825.06; 180*167; 307*10.6; 340*426

2. 4,876,736, Oct. 24, 1989, Method and apparatus for determining channel reception of a receiver; David A. Kiewit, 455*2; 358*84; 379*92; 455*151 [IMAGE AVAILABLE]

3. 4,876,719, Oct. 24, 1989, Synchronizing system for digital apparatus; Taro Nakagami, et al., 381*1; 369*1, 4, 47; 370*103, 112

4. 4,876,571, Oct. 24, 1989, Copying machine having a bar code reader; Yoko Nakamura, et al., 355*210, 326

5. 4,866,542, Sep. 12, 1989, Remote-controlling commander with multi-function rotary dial; Keiichiro Shimada, et al., 360*10.3; 358*335; 360*33.1, 71, 73.08

6. 4,859,342, Aug. 22, 1989, Process for industrially separating biopolymers; Honai Shirasawa, et al., 210*656, 635, 659

7. 4,857,898, Aug. 15, 1989, Data compression technique for reconfigurable remote control apparatus; Bobby J. Smith, 341*22; 340*825.69; 341*175, 176 [IMAGE AVAILABLE]

8. 4,856,081, Aug. 8, 1989, Reconfigurable remote control apparatus and method of using the same; Bobby J. Smith, 455*151; 340*825.57, 825.69; 358*194.1; 455*603 [IMAGE AVAILABLE]

455/608, 352, 151 825.72 825.39

9. 4,856,053, Aug. 8, 1989, Telephone terminal equipment having means for preventing malicious and nuisance transmission; Kazuo Hashimoto, 379*96; 358*434; 379*100

10. 4,855,838, Aug. 8, 1989, Remotely controlled pan and tilt television camera; David P. Jones, et al., 358*229, 100, 210

11. 4,852,680, Aug. 1, 1989, Vehicle anti-theft system with remote security module; Thomas R. Brown, et al., 180*287; 307*10.2 , 307/10AT 340/63, 70/293

12. 4,849,832, Jul. 18, 1989, Reproducing apparatus with erasing device and erasing function based on frequency multiplexed and/or DPSK coded signal; Shigeo Yamagata, et al., 360*66, 33.1, 57

13. 4,848,509, Jul. 18, 1989, Central locking system for door and lid fastenings of a motor vehicle; Ulrich Bruhnke, et al., 180*287; 70*237; 123*198B; 307*10.2

14. 4,844,476, Jul. 4, 1989, Video target response apparatus and method employing a standard video tape player and television receiver; James F. Becker, 273*312, 1E, 313, DIG.28; 340*707; 434*20, 22 382/559 340/323,327,20,21,22,93

15. 4,843,386, Jun. 27, 1989, Remote control unit with hierarchical selection; Johann Wolf, 340*825.69, 825.06, 825.72 235/491

16. 4,841,562, Jun. 20, 1989, Telephone VCR control; Steven Lem, 379*104; 358*194.1; 379*77, 105; 455*603, clear

17. 4,841,368, Jun. 20, 1989, Television customer control functions restorer; Robin B. Rumbolt, et al., 358*194.1; 340*825.69, 825.72; 455*352, clear 455/352

18. 4,837,627, Jun. 6, 1989, Programmable operating-parameter control appatatus for a television receiver; William H. Mengel, 358*191.1, 181, 190, 194.1, 198; 455*151, 185, 186, 343, 355 358/190, 198

20. 4,835,692, May 30, 1989, Remote controlled travel apparatus; Jack L. Kinney, et al., 364*424.01; 180*169

21. 4,835,614, May 30, 1989, Control method for limiting watching distance in television; Sang W. Ryu, 358*194.1; 340*555; 358*108, 113, 188, 245; 360*93, 95; 455*603, 604 [IMAGE AVAILABLE]

22. 4,835,563, May 30, 1989, Electronic recording camera with front projector; John J. Larish, 354*412, 76, 290, 291; 358*909

23. 4,834,531, May 30, 1989, Dead reckoning optoelectronic intelligent docking system; Steven M. Ward, 356*5; 244*161; 358*107 [IMAGE AVAILABLE]

24. 4,831,565, May 16, 1989, Process control equipment for adverse environments; Steven J. Woodward, 364*571.01; 73*620; 364*561, 571.05; 367*99 [IMAGE AVAILABLE]

25. 4,831,467, May 16, 1989, Apparatus for recording and reproducing a signal; Hisashi Asano, 360*72.2, 69

26. 4,831,438, May 16, 1989, Electronic surveillance system; Alfred H. Bellman, Jr., et al., 358*108; 89*41.05; 358*210 [IMAGE AVAILABLE]

27. 4,828,501, May 9, 1989, Compact interactive training manikin system; Michael Ingenito, et al., 434*265, 262

28. 4,825,200, Apr. 25, 1989, Reconfigurable remote control transmitter; Benjamin F. Evans, et al., 341*23; 340*825.56, 825.72; 341*176; 358*194.1; 455*151, 353, 603

29. 4,823,391, Apr. 18, 1989, Sound reproduction system; David M. Schwartz, 381*103

30. 4,821,215, Apr. 11, 1989, Monitoring equipment for adverse environments; Steven J. Woodward, 364*550; 73*620; 340*815.31; 364*561, 571.03; 367*908 [IMAGE AVAILABLE]

31. 4,816,908, Mar. 28, 1989, Color video projector with a convergence adjustment device which imposes an automatic sequence of multi-zone convergence adjustment steps; Joseph Colineau, et al., 358*60; 315*368; 358*64 [IMAGE AVAILABLE]

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33. 4,815,657, Mar. 28, 1989, Room temperature controlling apparatus used an air conditioner; Hiroshi Tsukuda, 236*47; 165*11.1

34. 4,807,052, Feb. 21, 1989, Remotely controllable electronic apparatus; Toshio Amano, 358*194.1; 340*825.22, 825.72; 455*352, 355, 603

35. 4,807,031, Feb. 21, 1989, Interactive video method and apparatus; Robert S. Broughton, et al., 358*142; 273*DIG.28; 340*707; 358*93, 146, 147; 364*513

36. 4,805,087, Feb. 14, 1989, Selective microfiche display equipment; Hugh Frankel, et al., 364*474.22; 235*462; 353*25, 27A, 27R; 364*167.01, 518

37. 4,803,412, Feb. 7, 1989, Programmable electronic antenna rotator; Larry W. Burton, 318*567, 565, 600

38. 4,802,114, Jan. 31, 1989, Programmable remote control transmitter; Akira Sogame, 364*900; 340*825.72; 455*603, 608

39. 4,801,935, Jan. 31, 1989, Apparatus and method for security of electric and electronic devices; John P. Cairns, 340*825.34, 825.31; 379*62

40. 4,796,032, Jan. 3, 1989, Satellite broadcasting receiving system; Masaru Sakurai, et al., 342*359, 352, 356 [IMAGE AVAILABLE]

41. 4,796,019, Jan. 3, 1989, Input device for a display system; Victor Auerbach, 340*709, 706, 712

42. 4,795,113, Jan. 3, 1989, Electromagnetic transportation system for manned space travel; Michael A. Minovitch, 244*63; 104*138.1, 282, 292; 244*158R, 172; 335*219

13. 4,712,239, Dec. 8, 1987, Security arrangement for downloadable cable television converters; William Frezza, et al., 380*20; 358*86, 349; 380*13, 49; 455*4 [IMAGE AVAILABLE]

14. 4,712,105, Dec. 8, 1987, Remote control hand apparatus for operating different modules; Hans E. P. Kohler, 340*825.69, 365S, 825.72; 358*194.1

15. 4,709,412, Nov. 24, 1987, Remote control unit integrator console; Herbert E. Seymour, et al., 455*603; 340*696; 455*151, 352

16. 4,691,801, Sep. 8, 1987, Vehicle protection device; Yale Mann, et al., 180*287; 307*10AT; 340*63

17. 4,656,398, Apr. 7, 1987, Lighting assembly; Anthony J. Michael, et al.,

315*293, 76, 133, 326; 362*285, 404, 800

18. 4,655,324, Apr. 7, 1987, Method for privately controlling an elevator; Gary M. Meguerdichian, et al., 187*121, 126

19. 4,647,220, Mar. 3, 1987, Method of and apparatus for detecting corrosion utilizing infrared analysis; Mark J. Adams, et al., 374*5, 57, 124, 137

20. 4,633,522, Dec. 30, 1986, Apparatus for emitting and receiving light signals, more particularly infrared signals; Koichi Yamamoto, et al., 455*603; 250*227, 237R; 455*606

21. 4,626,848, Dec. 2, 1986, Programmable functions for reconfigurable Remote control; Raymond G. Ehlers, 340*825.69, 825.57, 825.72; 358*194.1; 455*603, 608

22. 4,623,887, Nov. 18, 1986, Reconfigurable Remote control; Kenneth B. Welles, II, 340*825.57, 825.69, 825.72; 358*194.1, 335; 360*33.1; 455*603

23. 4,618,804, Oct. 21, 1986, Remote control apparatus for opening and shutting a blind; Masashi Iwasaki, 318*16, 480

24. 4,617,677, Oct. 14, 1986, Data signal reading device; Toshihiko Chiba, 375*94; 328*112, 165; 329*106; 375*104

25. 4,598,237, Jul. 1, 1986, Power window control apparatus; Kiyoshi Wada, et al., 318*16, 293, 480

26. 4,591,914, May 27, 1986, Apparatus for controlling power supply to electronic circuitry; Kunio Hakamada, et al., 358*190; 307*64; 358*194.1; 455*343, 352

27. 4,578,674, Mar. 25, 1986, Method and apparatus for wireless cursor position control; David C. Baker, et al., 340*710; 178*18; 273*148B; 340*365P; 455*603

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29. 4,500,211, Feb. 19, 1985, Audibly announcing apparatus with power saving feature; Shintaro Hashimoto, et al., 368*63, 204

30. 4,471,353, Sep. 11, [illegible], Push-button switch fo[illegible] electrical power source; George Cernik, 340*825.72; 331*155, 156; 340*543; 455*613

31. 4,433,647, Jan. 10, 1984, IR Remote control system; Johnny Collins, et al., 27:*70; 455*603

32. 4,418,335, Oct. 25, 1983, Push-button operated electrical power source for an optical communication link; William M. Tenbrack, et al., 455*603, 310*25; 323-4; 455*137, 617

33. 4,394,691, Jul. 19, 1983, Remote control system; Toshio Amano, et al., 358*194.1; 455*603

34. 4,377,006, Mar. 15, 1983, IR Remote control system; Johnny Collins, et al., 455*603; 307*234; 329*104, 107; 371*70; 375*21, 80, 94; 455-466

35. 4,338,062, May 18, 1982, Method and apparatus for measuring the surface color of an article; Tim D. Conway, et al., 209*582; 250*226; 356*407

36. 4,324,335, Apr. 13, 1982, Method and apparatus for measuring the surface size of an article; Tim D. Conway, et al., 209*586, 587, 914; 250*560;

330*107, 257, 294; 356*380

37. 4,313,227, Jan. 26, 1982, Light energy information transmission system; Kenneth C. Eder, 455*617; 340*709, 711; 455*608

38. 4,291,411, Sep. 22, 1981, Remote control for radiotelephones; Horst Muller, et al., 455*88; 367*197; 455*151, 352, 603

39. 4,275,365, Jun. 23, 1981, Infrared personnel locator system; Lester L. White, 340*825.49; 250*338.1; 340*525, 379*104, 211

40. 4,246,098, Jan. 20, 1981, Method and apparatus for detecting blemishes on the surface of an article; Tim D. Conway, et al., 209*558, 582, 587, 912; 250*223R; 356*51, 407

41. 4,241,456, Dec. 23, 1980, Remote-controlled receiver; Harushige

Nakagaki, et al., 455*603; 358*194.1

42. 4,186,345, Jan. 29, 1980, Remote control system; Kouji Marita, et al., 340*825.64, 825.65; 367*197; 375*22, 23

43. 4,151,407, Apr. 24, 1979, Low-power, infrared information transmission system; Lyle E. McBride, et al., 455*608, 617

44. 4,150,284, Apr. 17, 1979, Medical patient condition monitoring system; George Trenkler, et al., 455*608; 364*413.02, 413.06; 455*617

45. 4,143,368, Mar. 6, 1979, Vehicle operator security system; William D. Roulé, et al., 340*543, 63; 455*603

46. 3,924,120, Dec. 2, 1975, Heater remote control system; Charles H. Cox, III, 455*603, 340*625.77

47. 3,876,960, Apr. 8, 1975, Shocked plate metal atom oxidation laser; Jon G. De Koker, et al., 372*89, 102*506, 330*4.3; 372*56, 77 [IMAGE AVAILABLE]

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                (FILE USPAT)

                SET PAGELENGTH 19
                SET LINELENGTH 78
L1          477 S REMOTE(W)CONTROL(W)DEVICE
L2           10 S L1 AND VCR
L3           47 S INFRARED(W)SIGNAL AND REMOTE(W)CONTROL

=> d cit 1-47

1.  4,799,683, Jan. 24, 1989, Interactive video game of chance and player
controlled subsystem therefor; George M. Bruner, Jr., 273*138A, 1E, 85CP,
DIG.28

2.  4,792,972, Dec. 20, 1988, Remote programming of CATV channel
authorization unit; Alex M. Cook, Jr., 380*20; 358*349; 380*10; 455*4 [IMAGE
01 FEB 89 11:53:31            U.S. Patent & Trademark Office            P0005

AVAILABLE]

3.  4,788,542, Nov. 29, 1988, Remote control device for vehicle
locks; Ritsushi Tanabe, 340*825.31; 307*10AT; 340*825.69; 365*100; 455*603

4.  4,777,802, Oct. 18, 1988, Blanket assembly and selectively adjustable
apparatus for providing heated or cooled air thereto; Steve Feher, 62*3;
5*482; 62*261

5.  4,771,344, Sep. 13, 1988, System for enhancing audio and/or visual
presentation; James Fallacaro, et al., 358*335, 83, 93; 360*55, 137

6.  4,769,708, Sep. 6, 1988, Manual and automatic ambient light sensitive
picture control for a television receiver; John W. Stoughton, 358*161, 169

7.  4,757,304, Jul. 12, 1988, Vehicle security system; Ki-Ick Rho, 340*522,
01 FEB 89 11:53:40            U.S. Patent & Trademark Office            P0006

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8.  4,754,133, Jun. 28, 1988, Transceiver circuit for modulated infrared
signals; Charles R. Bleich, 250*221; 273*31; 455*603

9.  4,730,184, Mar. 8, 1988, Neighborhood audio-visual alarm system; Arthur
Bach, 340*691, 539, 574

10.  4,727,600, Feb. 23, 1988, Infrared data communication system; Emik
Avakian, 455*601, 607

11.  4,718,599, Jan. 12, 1988, Control systems; Alan R. W. Brown, 236*46R;
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     set; Eui D. Kim, et al., 358*245; 340*557; 358*194.1; 455*603
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441650 DEVICE

L5 529 REMOTE(W)CONTROL(W)DEVICE

=> s l5 and program?
89455 PROGRAM?
L6 159 L5 AND PROGRAM?

=> s l6 and instruction?
33266 INSTRUCTION?
L7 69 L6 AND INSTRUCTION?

=> d cit 1-69

=> d l7 cit 2,4,6,7,9,11,13,17,18,20,21,24,38,50,58,62

2. 4,872,054, Oct. 3, 1989, Video interface for capturing an incoming video signal and reformatting the video signal; Michael J. Gray, et al., 358*140, 148; 364*413.13 [IMAGE AVAILABLE]

4. 4,866,787, Sep. 12, 1989, Channel strip for use in a satellite/hybrid television system; Lykke Olesen, 455*3; 358*86; 455*4, 6, 12, 349 [IMAGE AVAILABLE]

6. 4,857,898, Aug. 15, 1989, Data compression technique for reconfigurable remote control apparatus; Bobby J. Smith, 341*22; 340*825.69; 341*175, 176 [IMAGE AVAILABLE]

7. 4,856,081, Aug. 8, 1989, Reconfigurable remote control apparatus and method of using the same; Bobby J. Smith, 455*151; 340*825.57, 825.69; 358*194.1; 455*603 [IMAGE AVAILABLE]

9. 4,829,779, May 16, 1989, Interface adapter for interfacing a remote controller with commercial refrigeration and environmental control systems; Arden L. Munson, et al., 62*175; 236*51; 340*870.17

11. 4,817,466, Apr. 4, 1989, Remote control system for marine engine; Minoru Kawamura, et al., 74*858, 872, 875; 440*75

13. 4,803,412, Feb. 7, 1989, Programmable electronic antenna rotator; Larry W. Burton, 318*567, 565, 600

17. 4,751,578, Jun. 14, 1988, System for electronically controllably viewing on a television updateable television programming information; Eli Reiter, et al., 358*183, 22, 142, 194.1, 903

18. 4,745,397, May 17, 1988, Remote control devices; Norbert Lagerbauer, et al., 341*23; 358*194.1

20. 4,728,949, Mar. 1, 1988, Remote control device for controlling various functions of one or more appliances; Hans-Joachim Platte, et al., 340*825.37, 825.69

21. 4,724,539, Feb. 9, 1988, Call forwarding reprogramming device; Edward V. Hiskes, 379*205, 387

24. 4,674,115, Jun. 16, 1987, Programmable telephone switcher; David L. Kaleita, et al., 379*201, 199, 211, 216, 353, 386, 387, 397

38. 4,535,333, Aug. 13, 1985, Transmitter and receiver for controlling remote elements; Joseph W. Twardowski, 340*825.69, 539, 825.22, 825.31, 825.72; 455*151

50. 4,398,193, Aug. 9, 1983, Control apparatus; Yasunobu Kuniyoshi, et al., 340*825.76, 825.68; 358*194.1; 455*186

58. 4,214,229, Jul. 22, 1980, Remote control apparatus; William J. Warner, 367*198; 340*825.37, 825.72; 379*52

62. 4,035,707, Jul. 12, 1977, Reversible mechanical remote control device; Guy Debrie, et al., 318*628, 562, 603, 676

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MAIL ROOM OCT 4 1989 PAT. & TRADEMARK OFC.

#10

PATB Atty Docket 87290

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Application of: PAUL V. DARBEE ET AL For: UNIVERSAL REMOTE CONTROL DEVICE Serial No. 07/127,999 Filed: December 2, 1987	Group Art Unit: 253 Examiner: V. Nguyen

RECEIVED OCT 13 1989

AMENDMENT A

TO:
Honorable Commissioner of
Patents and Trademarks
Washington, D. C. 20231

Dear Sir:

In response to the Examiner's Action mailed March 31, 1989, applicants request that the subject application be amended as follows:

IN THE SPECIFICATION:

Page 2, lines 27-32, delete in their entirety and insert in place thereof the following:

--According to the invention there is provided a universal remote control system having input means for inputting commands, signal output means for supplying a signal to a controlled device a central processing unit (CPU) coupled to the input means and to the signal output means, a single non-volatile, read-write RAM

P 30482 10/20/89 07127999 22-0355 030 103 144.00CH
P 30483 10/20/89 07127999 22-0355 030 102 60.00CH

CERTIFICATE OF MAILING

I hereby certify that this correspondence is being deposited with the United States Postal Service as first-class mail in an envelope addressed to: Commissioner of Patents and Trademarks, Washington, DC 20231 on

Date 9/30/89

coupled to the central processing unit and data coupling means coupled to the RAM for enabling code data to be input into the RAM.--

IN THE CLAIMS:

Please amend claims 3, 5, 7, 10, 12, 15, 17, 19, 20, 22, 24, 32, 36, 38 and 40 in the manner set forth below and add new claims 45, 47, 48 and 49 set forth below:

3. (Amended) A method of loading a RAM in a ROM-less microprocessor system used in a universal remote control system comprising a central processing unit, a non-volatile, read-write RAM, input means, output means, [and] first, second and third means for coupling said central processing unit[,] to said RAM, to said input means, and to said output means [together], respectively, said method including the steps of:

(a) disabling the central processing unit;

(b) connecting a separate microprocessor system to said RAM;

(c) transferring instructions and/or data to said RAM; and

(d) re-enabling the central processing unit to enable the central processing unit to execute the instructions so transferred.

5. (Amended) In a universal remote control system having input means [and] for inputting commands, signal output means for supplying a signal to a controlled device and a central processing unit (CPU) coupled to said input means and to said signal output means, the improvement residing in said system comprising no ROM [and], a single non-volatile, read-write RAM coupled to said central processing [means] unit and data coupling means coupled to said RAM for enabling code data to be input into said RAM.

7. (Amended) The system of claim 5 [further including] wherein said input means ~~includes~~ includes a keyboard having a set of keys coupled to said CPU and CPU wake-up circuit means coupled to said CPU and including circuit means in said keyboard for causing, by depression of any key on said keyboard, operation of said wake-up circuit to

wake up (power up) said CPU.

6 10. (Amended) A microprocessor system for use in a universal remote control device having command inputs and code outputs, said system comprising a central processing unit (CPU), a single non-volatile, read-write random access memory (RAM), no read only memory (ROM), [and] first and second coupling means for connecting said system to the command inputs and to the code outputs, respectively, and data coupling means coupled to said RAM for enabling code data to be input into said RAM.

8 12. (Amended) The system of claim 11 including a plurality of lower bit address lines coupled between said latch and said CPU and a plurality of [equal numbered] multiplex lines equal in number to said address lines coupled, respectively, between said address lines and said RAM.

11 15. (Amended) The system of claim 10 [further including] wherein said command inputs include a keyboard having a set of keys coupled to said CPU and CPU wake-up circuit means coupled to said CPU and including circuit means in said keyboard for causing, by depression of any key on said keyboard, operation of said wake-up circuit to wake up (power up) said CPU.

13 17. (Amended) The system of claim 15 wherein said wakeup circuit includes wakeup electronic switch means which are turned on when a key is depressed [ro] to supply power to said CPU and circuit means coupled between said wakeup electronic switch means and said CPU for maintaining said wakeup electronic switch means turned on until a HALT signal is generated by said CPU.

15 19. (Amended) The system of claim 18 wherein said write protect circuit includes write protect electronic switch means for coupling a write enable input to said RAM with a write enable line coupled to said CPU, said write protect electronic switch means being turned on when voltage is supplied to said CPU and such voltage is above a predetermined value so that said write protect

circuit also serves as a low battery indicating circuit.

16 20. (Amended) The system of claim 10 [including] wherein said code outputs include output means comprising infrared light generating means and driver circuit means coupled between said CPU and said light generating means.

18 22. (Amended) The system of claim 10 [including] wherein said ~~data coupling~~ terminal means include three serial ports coupled to said CPU, one port being coupled to ground, one port being coupled to an input to said CPU and one port being coupled to an output of said CPU.

20 24. (Amended) The system of claim 10 [including] wherein said command inputs include input means comprising keyboard circuit means coupled to said CPU and including a keyboard including a plurality of keys comprising mode keys, function keys, and at least one key for making a command.

23 32. (Amended) A universal remote control system comprising data processing means, input means including a keyboard and keyboard circuit means coupled to said data processing means, signal output means including infrared light generating means coupled to said data processing means, [and] memory means including a RAM coupled to said data processing unit for storing (a) a set of instructions and (b) a library of code data for generating infrared codes [coupled to said data processing means], and data coupling means coupled to said RAM for enabling code data to be input into said RAM.

27 36. (Amended) The system of claim 26 wherein said wakeup means circuit includes wakeup electronic switch means which are turned on when a key is depressed to supply power to said data processing means and circuit means coupled between said wakeup electronic switch means and said data processing means for maintaining said wakeup electronic switch means turned on until a HALT signal is generated by said data processing means.

29 38. (Amended) The system of claim 37 wherein said write-protect circuit includes write protect electronic switch means for coupling a write enable input to said memory means with a write enable line coupled to said data processing means, said write protect electronic switch means being turned on when voltage is supplied to said data processing means and such voltage is above a predetermined value so that said write protect circuit also serves as a low battery indicating circuit.

31 46. (Amended) The system of claim 37 [including] wherein said terminal ~~data coupling~~ means include three serial ports coupled to said data processing means, one port being coupled to ground, one port being coupled to an input to said data processing means and one port being coupled to an output of said data processing means.

[New Claims:]

--45. An apparatus for loading a RAM in a ROM-less microprocessor system used in a universal remote control system comprising a central processing unit, a non-volatile, read-write RAM, input means, output means, first, second and third means for coupling said central processing unit to said RAM, to said input means, and to said output means, respectively, said apparatus including means for disabling the central processing unit, means for connecting a separate microprocessor system to said RAM, means for transferring instructions ~~and/or~~ data to said RAM, and means for re-enabling the central processing unit to enable the central processing unit to execute the instructions so transferred.

--46. The apparatus of claim 45 wherein said connecting means include a serial port.

--47. In a universal remote control system having input means for inputting commands, signal output means for supplying a signal to a control device and a central processing unit (CPU) coupled to said input means and to said signal output means, the improvement residing in said system comprising a single non-volatile, read-

~~write RAM connected to said central processing unit and data~~ coupling means coupled to said RAM for enabling code data to be input into said RAM.

--48. A microprocessor system for use in a universal remote control device having command inputs and code outputs and comprising a central processing unit (CPU), a single non-volatile, read-write random access memory (RAM), first and second coupling means for connecting said system to the command inputs and to the code outputs, respectively, and data coupling means coupled to said RAM for enabling data to be input into said RAM.

a16 cont'd

--49. A universal remote control system comprising data processing means, input means including a keyboard and keyboard circuit means coupled to said data processing means, signal output means including infrared light generating means coupled to said data processing means, and memory means including a RAM only and no ROM coupled to said data processing means for storing (a) a set of instructions and (b) a library of code data for generating infrared codes coupled to said data processing means, and data coupling means coupled to said RAM for enabling code data to be input into said RAM.--

IN THE ABSTRACT:

Please cancel lines 2-6 and substitute in place thereof the following:

Sub C6

--The universal remote control system comprises data processing means, input means including a keyboard and keyboard circuit means connected to the data processing means, signal output means including infrared light generating means connected to the data processing means, memory means including a RAM only and no ROM connected to the data processing means for storing (a) a set of instructions and (b) a library of code data for generating infrared codes and data connecting means connected to the RAM for enabling code data to be input into RAM.--

a17

line 7, change "microprocessor system" to --data processing means--;

line 11, before "(d)", insert --and--;

lines 14-30, cancel in their entirety.

REMARKS

The Examiner's requirement for restriction is respectfully traversed.

In support of this traverse, applicants point out that all the claims are directed to some aspect of a universal remote control unit or a method for operating same including a method for acquiring data to be stored in such a unit.

As noted by the Examiner, claims 1 and 2 are directed to a process of learning the infrared code data for operating a controlled device, such as a television set, and such methods are classified in Class 340, Subclass 825.57.

Amended claims 3-4 are drawn to a method of loading a RAM in a microprocessor system used in a universal remote control device. While the Examiner contends that such method is classified in Class 364, Subclass 200, applicants submit that as amended these claims are classified in Class 340, Subclass 825.

Claims 5-26 and 32-44 are drawn to a universal remote control device. The Examiner contends that these claims are classified in Class 364, Subclass 900. Applicants respectfully traverse this contention by the Examiner and submit that the claims are classified in either Class 340, Subclass 825 or Class 358, Subclass 194.1.

Claims 27-31 are drawn to a method for operating a universal remote control device. The Examiner contends that such method is classified in Class 364, Subclass 900. Applicants respectfully traverse this contention by the Examiner and submits that such methods are classified in Class 340, Subclass 825 or Class 358, Subclass 194.1.

Applicants agree with the Examiner that all the inventions in Groups I, II, III and IV are related as subcombinations disclosed and useable together in a single combination.

Since all of these claims are limited to or used with a remote control device or transmitter, applicants submit that they are all related and not distinct as claimed.

Accordingly, applicants submit that the restriction requirement should be withdrawn and all the claims should be examined.

Applicants confirm that for the purposes of examination, applicants elect the claims of Group III, namely claims 5-26 and 32-44 for examination purposes, the requirement for restriction otherwise being traversed.

The Examiner's objection to the Abstract of the Disclosure is believed to be overcome by the amendments being made herein to the Abstract of the Disclosure.

The Examiner's rejection of claims 10-26, 36 and 38 under 35 U.S.C. 112, second paragraph, for being indefinite, as this rejection may be attempted to be applied to the amended and new claims submitted herewith, is respectfully traversed.

In support of this traverse, it is to be noted that applicants have amended claims 5, 10 and 32 to make it clear that applicants' invention defined in these claims resides in the provision in a universal remote control system of a single non-volatile, read-write RAM coupled to a CPU or central processing means and data coupling means coupled to the RAM for enabling code data to be input into the RAM.

Also, the input means have been more clearly defined as command input means and the output means have been defined as data ~~output means to~~ code or signal output means.

Note that the language in claims 12, 17, 19, 36 and 38 have been amended along the lines suggested by the Examiner to clarify

the language in those claims.

Applicants submit that the use of the term "ROM-less" or "no ROM" does make sense and limits applicants' claims directed to a universal remote control unit or device without a ROM to one that does not include a ROM. This seems clear to applicants and applicants' attorney and should be clear in the claims.

In any event, applicants submit that the amended claims submitted herewith are now clear of the Section 112 rejection by the Examiner.

The Examiner's rejection of claims 5-26 and 32-44 under 35 U.S.C. 103 for being unpatentable over the Ehlers U.S. Patent No. 4,626,848, as this rejection may be attempted to be applied to the amended and new claims, is respectfully traversed.

In support of this traverse, it is first of all pointed out that Ehlers does not disclose, suggest or teach a universal remote control device which only utilizes a RAM and which has data coupling means, such as a serial port, for coupling the RAM directly to a source of data to enable a large amount of data to be input into the RAM as desired.

It is important to note that applicants' claimed universal remote control system or unit which does not have a ROM, cannot function as a learning remote control device and therefore is not a learning remote control device. This is an important distinction that the Examiner has failed to note. In this respect, note that Ehlers teaches a learning remote control device which analyzes infrared inputs one at a time and stores them in a RAM one at a time.

In contradistinction, applicants' universal remote control system or unit is only a playback remote control device which has thousands of previously analyzed codes stored in a RAM. Because it uses a RAM and not a ROM, the codes can be changed later by inputting into the RAM via the data coupling means, updated code

data.

Nowhere does Ehlers teach a playback only remote control device and Ehlers does not teach data coupling means, such as a serial port, coupled to a RAM for enabling updated data to be input into the RAM.

What applicants teach and claim in the claims pending in this application is the storing of codes in a changeable memory, namely a random access memory (RAM) and the provision of data coupling means, such as a serial port, whereby the data in the RAM can be updated as desired. Preferably, the universal remote control system does not utilize a ROM to simplify the construction and operation of the universal remote control system or unit. However, applicants unit, of course, will also work with a ROM therein.

Further, applicants submit that there is no incentive, direction, motivation or suggestion in Ehlers to modify Ehlers to somehow come up with applicants' claimed universal remote control system. In this respect, there is no incentive, direction, motivation or suggestion in Ehlers to provide a RAM only or to provide data coupling means, such as a serial port, coupled to the RAM for enabling the RAM to be updated directly. Accordingly, the Examiner's rejection is improper and should be withdrawn. See Ex parte Chicago Rawhide, 226 USPQ 438, where an Examiner attempted to sustain a Section 103 rejection on the basis of the teachings of one prior patent. In this decision the Board stated:

> "The mere fact that a worker in the art could rearrange the parts of the reference device to meet the terms of the claims on appeal is not by itself sufficient to support a finding of obviousness. The prior art must provide a motivation or reason for the worker in the art, without the benefit of the appellant's specification, to make the necessary changes in the reference device. The Examiner has not presented any evidence to support the

conclusion that a worker in this art would have had any motivation to make the necessary changes in the Baney device to render the here claimed device unpatentable."

Applicants have noted the other references cited by the Examiner and do not find any of them to teach or suggest the universal remote control device or system defined now even more clearly in the amended and new claims submitted herewith.

The Welles II U.S. Patent No. 4,623,887 is almost identical to the Ehlers patent applied by the Examiner to the claims and teaches a learning remote where one code at a time is learned. It does not provide any data coupling means, such as a serial port, to enable the data in the memory in Welles II to be upgraded. It suffers the same deficiencies as the Ehlers universal remote control device, explained above.

The Collins et al U.S. Patent No. 4,425,647 merely teaches a signaling method and does not disclose a microprocessor or RAM or data coupling means, such as a serial port.

The Shinoda U.S. Patent No. 4,718,112 discloses a ROM-based remote control apparatus including a timer but does not teach any way to change the codes in the apparatus and does not disclose or suggest data coupling means, such as a serial port.

The Reitmeier U.S. Patent No. 4,746,919 discloses a remote control system in which fixed control codes are transmitted and interpreted by a receiver. No means are provided for changing the codes and no data coupling means, such as a serial port, are disclosed or suggested.

The Rumbolt et al U.S. Patent No. 4,703,359 teaches a search and set method for finding a set of coded signals for operating a controlled device, such as a television set. It does not teach or suggest applicants' step and set method for locating in the memory of the remote control device the coded signals for operating a particular apparatus. In this patent, the codes are stored in a

ROM and no provision is made for upgrading the totality of data stored in the ROM. Also, no data coupling means, such as a serial port, is suggested or disclosed.

The Rumbolt et al U.S. Patent No. 4,774,511 also discloses a universal remote control unit which includes a search and set method of operation. The unit has setable dip switches and sliding labels connected to a mode switch. This unit is ROM-based and has no data coupling means, such as a serial port, for upgrading data in the unit.

The Sogame U.S. Patent No. 4,769,643 teaches a transmitter driver for programmable remote control transmitter which is a learning remote control device that learns one code at a time and provides control over the infrared output power. This remote control transmitter does not suggest or disclose data coupling means, such as a serial port, whereby a large amount of data can be input into the memory of the transmitter.

The Zato U.S. Patent No. 4,626,847 discloses a remote control transmitter system which utilizes dip stick key switches for selecting code pages in a ROM. There is no suggestion or disclosure in this patent of data coupling means, such as a serial port.

The Kohler U.S. Patent No. 4,712,105 discloses a remote control hand apparatus for operating different modules and includes mode keys and LCD key labels. This patent suggests applying software via an external carrier, such as a magnetic card, to a storage means, such as a RAM. It does not teach or suggest data coupling means, such as a serial port, in a remote control device for upgrading data in a RAM of the device.

The Imoto U.S. Patent No. 4,771,283 teaches a remote control device which is a learning remote control device operable to learn one code at a time. This patent does not disclose or suggest data coupling means, such as a serial port, for enabling updating of

data in the memory of the device.

Applicants have become aware of other universal remote control devices which comprise background art or which are not citeable against the subject application. However, in keeping with applicants' duty of disclosure under Rule 1.56, applicants are listing below each of these references, submitting a copy of each of these references, and submitting a PTO Form 1449 listing the references. These references are as follows:

U.S. Patent No.	Patentee
4,200,862	Campbell et al
4,825,200	Evans et al

The Campbell et al U.S. Patent No. 4,200,862 discloses an appliance control system including a data transmitter and a plurality of slave units plugged into outlet sockets of a power main of a building.

The Evans et al U.S. Patent No. 4,825,200 issued on April 25, 1989 on Application Serial No. 66,853 filed on June 25, 1987. Applicants had constructed or reduced to practice the universal remote control device disclosed and claimed in the subject application prior to June 25, 1987 and can swear behind this patent if it is cited by the Examiner, so it can be removed or withdrawn as a reference citeable against the claims of the subject application.

In any event, Evans et al teaches a reconfigurable remote control transmitter which includes a learn mode and a run mode. In this respect, it is similar to the Ehlers, Sogame and Imoto patents referred to above.

Since Evans et al teaches a learning remote control transmitter which learns a code sequence one at a time, it does not teach or suggest the provision of data coupling means coupled to a RAM, such as a serial port, for enabling new code data to be input directly into the RAM.

Accordingly, the citeability of the Evans et al patent is also overcome and obviated by the fact that it does not teach or suggest a universal remote control system including data coupling means as defined now even more clearly in the amended and new claims.

Applicants submit that upon reconsideration of the amended and new claims, in conjunction with the above remarks, it will be apparent that applicants' claimed universal remote control system or device and the methods for utilizing same are clear of the art, patentably distinguish applicants' claimed method, system and apparatus over the teachings of the prior art and are otherwise in condition for allowance. An early and favorable action to that end is requested.

Respectfully submitted,

Thomas R. Vigil

THOMAS R. VIGIL
Reg. No. 24,542

Dated: Sept. 30, 1989.

836 South Northwest Highway
Barrington, Illinois 60010
(312) 382-6500

GP 253

Atty. Docket No. 87290

#9

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Application of:

PAUL V. DARBEE ET AL

For:

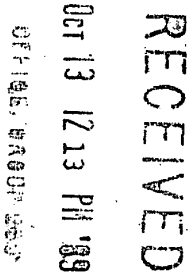
UNIVERSAL REMOTE CONTROL DEVICE

Serial No. 07/127,999

Filed: December 2, 1987

Group Art Unit: 253

Examiner: V. Nguyen



PETITION FOR EXTENSION OF TIME

TO:
Honorable Commissioner of
Patents and Trademarks
Washington, D.C. 20231

Dear Sir:

Applicant, through the undersigned attorney, hereby petitions for a three (3) month extension of time to September 30, 1989, for responding to the outstanding Examiner's Action mailed on March 31, 1989, the original term for responding to which expired on June 30, 1989

☐ A previous petition for a _____ month extension was mailed to the office on _____.

In support of this Petition:

☐ Enclosed is a check in the amount of $_____.

☒ Please charge Deposit Account No. 22-0355 in the amount of $ 215.00. A duplicate copy of this Petition is enclosed.

☐ Enclosed is Response _____.

☒ Enclosed is Amendment A.

☐ Enclosed is a Continuation Application.

☐ Enclosed is a Continuation-In-Part Application.

☐ Enclosed is a Notice of Appeal.

☐ Enclosed is an Appeal Brief.

☒ A Small Entity Declaration form has been previously filed in this application.

P 30294 10/10/89 07127999 22-0355 030 217 215.00CH

☒ Please charge any additional fees or credit any overpayments to Deposit Account No. 22-0355.

Respectfully submitted,

Thomas k. Vigil

Dated: September 30, 1989

Reg. No. 24,542

836 South Northwest Highway
Barrington, Illinois 60010
(312) 382-6500

CERTIFICATE OF MAILING

I hereby certify that this correspondence is being deposited with the United States Postal Service as First Class Mail in an envelope addressed to: Commissioner of Patents and Trademarks, Washington, D.C. 20231, on September 30, 1989

Thomas k. Vigil

UNITED STATES DEPARTMENT OF COMMERCE
Patent and Trademark Office
Address: COMMISSIONER OF PATENTS AND TRADEMARKS
Washington, D.C. 20231

SERIAL NUMBER	FILING DATE	FIRST NAMED APPLICANT	ATTORNEY DOCKET NO.
07/127,999	12/02/87	DARBEE P	87290

THOMAS VIGIL & ASSOCIATES
836 SOUTH NORTHWEST HWY.
BARRINGTON, IL 60010

EXAMINER	
NGUYEN, V	
ART UNIT	PAPER NUMBER
253	9

DATE MAILED: 03/31/89

This is a communication from the examiner in charge of your application.
COMMISSIONER OF PATENTS AND TRADEMARKS

☑ This application has been examined ☐ Responsive to communication filed on _____ ☐ This action is made final.

A shortened statutory period for response to this action is set to expire 3 month(s), _____ days from the date of this letter.
Failure to respond within the period for response will cause the application to become abandoned. 35 U.S.C. 133

Part I THE FOLLOWING ATTACHMENT(S) ARE PART OF THIS ACTION:

1. ☑ Notice of References Cited by Examiner, PTO-892.
2. ☑ Notice re Patent Drawing, PTO-948.
3. ☑ Notice of Art Cited by Applicant, PTO-1449
4. ☐ Notice of informal Patent Application, Form PTO-152
5. ☐ Information on How to Effect Drawing Changes, PTO-1474
6. ☐ _____

Part II SUMMARY OF ACTION

1. ☑ Claims 1-44 are pending in the application.
   Of the above, claims _____ are withdrawn from consideration.
2. ☐ Claims _____ have been cancelled.
3. ☐ Claims _____ are allowed.
4. ☑ Claims 1-44 are rejected.
5. ☐ Claims _____ are objected to.
6. ☐ Claims _____ are subject to restriction or election requirement.
7. ☑ This application has been filed with informal drawings which are acceptable for examination purposes until such time as allowable subject matter is indicated.
8. ☐ Allowable subject matter having been indicated, formal drawings are required in response to this Office action.
9. ☐ The corrected or substitute drawings have been received on _____. These drawings are ☐ acceptable; ☐ not acceptable (see explanation).
10. ☐ The ☐ proposed drawing correction and/or the ☐ proposed additional or substitute sheet(s) of drawings, filed on _____. has (have) been ☐ approved by the examiner. ☐ disapproved by the examiner (see explanation).
11. ☐ The proposed drawing correction, filed _____, has been ☐ approved. ☐ disapproved (see explanation). However, the Patent and Trademark Office no longer makes drawing changes. It is now applicant's responsibility to ensure that the drawings are corrected. Corrections MUST be effected in accordance with the instructions set forth on the attached letter "INFORMATION ON HOW TO EFFECT DRAWING CHANGES", PTO-1474.
12. ☐ Acknowledgment is made of the claim for priority under 35 U.S.C. 119. The certified copy has ☐ been received ☐ not been received ☐ been filed in parent application, serial no. _____; filed on _____.
13. ☐ Since this application appears to be in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under Ex parte Quayle, 1935 C.D. 11; 453 O.G. 213.
14. ☐ Other

1. Restriction to one of the following inventions is required under 35 U.S.C. 121:

I. Claims 1-2 are, drawn to a process of learning, storing, and reproducing remote control tramsmitters, classified in Class 340, subclass 825.57.

II. Claims 3-4, drawn to a method of loading a RAM in a microprocessor system, classified in Class 364, subclass 200.

3. III. Claims 5-26, and 32-44 are, drawn to a remote control device structure, classified in Class 364, subclass 900.

4. IV. Claims 27-31 are, drawn to a method for operating a remote control device, classified in Class 364, subclass 900.

5. Inventions in groups #1, #2, #3, and #4 are related as subcombinations disclosed as useable together in a single combination. The subcombinations are distinct from each other if they are shown to be separately useable. In the instant case, invention #1 has separate utility such as a process of receiving, transforming, and timing the train pulses. Invention #2 has separate utility such as a method of loading and transferring instructions into computer memory. Invention #3 has separate utility such as a circuit structure of a remote control device. Invention #4 has separate utility such as a method for pressing keys and operating the control device. See MPEP 806.05(d).

6. Because these inventions are distinct for the reasons given above and have acquired a separate status

in he art because of their recognized divergent subject matter, and the searches for each inventions in groups #1-#4 are separate and separate examination for each group would be required, restriction for examination purposes as indicated is proper.

The number references classified in class 364/200 is over 5000 and a computer aided search system (CASPIR) plus automated patent system (APS) are used to search these references based on their separate classifications and distinct status in the art. The search system uses approximately 400 term codes, each one representing a specific topic, each of the 5000 references being coded in accordance with the term codes.

The same searching method applies to class 364/900 which contains around 4500 patents, approximately 400 term codes being used to further separate class 364/900.

7. During a telephone conversation with Mr. Thomas R. Vigil on 2/28/89 a provisional election was made with traverse to prosecute the invention of group #3, claims 5-26 and 32-44. Affirmation of this election must be made by applicant in responding to this Office action. Claims 1-4, and 27-31 are withdrawn from further consideration by the examiner as being drawn to a nonelected invention. See 37 CFR 1.142(b).

8. Applicant is reminded that upon the cancellation of claims to a non-elected invention, the inventorship must be amended in compliance with 37 CFR

1.48(b) if one or more of the currently named inventors is no longer an inventor of at least one claim remaining in the application. Any amendment of inventorship must be accompanied by a diligently-filed petition under 37 CFR 1.48(b) and by the fee required under 37 CFR 1.17(h).

9. Applicant is reminded of the proper language and format of an Abstract of the Disclosure.

The abstract should be in narrative form and generally limited to a single paragraph on a separate sheet within the range of 50 to 250 words. It is important that the abstract not exceed 250 words in length since the space provided for the abstract on the computer tape used by the printer is limited. The form and legal phraseology often used in patent claims, such as "means" and "said", should be avoided. The abstract should describe the disclosure sufficiently to assist readers in deciding whether there is a need for consulting the full patent text for details.

The language should be clear and concise and should not repeat information given in the title. It should avoid using phrases which can be implied, such as, "The disclosure concerns," "The disclosure defined by this invention," "The disclosure describes," etc.

10. Claims 10-26, 36, and 38 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

In regard to claim 10, please further revise the preamble to indicate the purpose of using the microprocessor system in the claimed "universal remote control device" as in claim 32. On line 2, the term "no ROM" does not make any sense. Similar rejection holds for the phrase "to inputs and outputs".

In claim 12, what is meant by "equal numbered multiplex lines"? Does this imply that the address lines are equal?

In claim 17, line 3, "ro" is mis-spelled.

In claim 19, does the claimed "electronic switch means" imply the same "switch means" of claim 17?

Claims 36 and 38 contain similar errors as claims 17 and 19.

11. The following is a quotation of 35 U.S.C. 103 which forms the basis for all obviousness rejections set forth in this Office action:

> A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.
>
> Subject matter developed by another person, which qualifies as prior art only under subsection (f) and (g) of section 102 of this title, shall not preclude patentability under this section where the subject matter and the claimed invention were, at the time the invention was made, owned by the same person or subject to an obligation of assignment to the same person.

Claims 5-26 and 32-44 are rejected under 35 U.S.C. 103 as being unpatentable over Ehlers.

In regard to the claims, it is believed that Ehlers patent teaches a reconfigurable remote control transmitter which further includes the claimed "process of learning, storing, and reproducing the remote control codes", (see abstract). In the learning process, the reconfigurable remote control transmitter receives and decodes the transmissions of a train of pulses from

another remote control transmitter. Also, Ehlers patent teaches the following claimed:

- microcomputer (24) as the claimed CPU (see Fig. 4b);

- CMOS RAM (38, 40) as shown on Fig. 4d;

- LCD display (Fig. 4c) and transmitter as claimed output means;

- Input means as various function buttons on the keypad device (See Fig. 3);

Col. 5-6 further teach the claimed steps of "recording the point-in-time of an edge of each pulse as well as timing the duration of a train of said pulses". It also teaches in the learn mode and storing mode, the codes are stored in the RAM of the ROM-less microprocessor system and the steps are repeated for different transmitters from different remote control devices until the reconfigurable remote control device is ready to use.

- Fig. 4c further teaches the claimed latch (42) coupled between RAM (40) and CPU (24);

- Fig. 4a shows the claimed "wake-up circuit" and the claimed keyboard including row lines and column lines, etc;

- Fig. 4c shows the claimed "light indicating means" and "light blinks";

Cols. 9-22 also shows the claimed steps of "pressing the key for making a command, and one or more preselected additional command keys". The other claimed

keys such as "mode keys", "stepping keys", and "function key" are also obvious shown by Ehlers on Fig. 3 as these keys are inherent features of any modern remote control devices.

The applicant is advised to read cols. 3-22 for further details.

12. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Viet Nguyen whose telephone number is (703) 557-8067.

Any inquiry of a general nature or relating to the status of this application should be directed to the Group receptionist whose telephone number is (703) 557-2878.

V.N

VN/jrm

3/6/89

ANDREW J. JAMES
SUPERVISORY PATENT EXAMINER
GROUP ART UNIT 253

TO SEPARATE, ... TOP AND BOTTOM EDGES, SNAP-APART AN... CARD CARBON

n.m

FORM PTO-892 (REV. 3-78) U.S. DEPARTMENT OF COMMERCE PATENT AND TRADEMARK OFFICE

NOTICE OF REFERENCES CITED

SERIAL NO.	GROUP ART UNIT	ATTACHMENT TO PAPER NUMBER
127999	237	7

APPLICANT(S): DARBEE, etal

U.S. PATENT DOCUMENTS

*		DOCUMENT NO.	DATE	NAME	CLASS	SUB-CLASS	FILING DATE IF APPROPRIATE
	A	4626848	12/2/86	Ehlers	340	825.69	5/15/84
	B	4718112	11/5/88	Shinoda	455	151	10/1/85
	C	4425647	1/10/84	Collins etal	371	70	5/17/82
	D	4746919	5/24/88	Reitmeier	340	825.56	3/28/86
	E	4703359	10/27/87	Rumbolt et al	358	194.1	11/20/85
	F	4626847	12/2/86	Zato	340	825.56	12/27/83
	G	4769643	9/6/88	Sogame	340	825.69	12/15/86
	H	4712105	12/8/87	Kohler	340	825.69	4/30/85
	I	4774511	9/27/88	Rumbolt et al	340	825.69	5/30/85
	J	4771283	9/13/88	Imoto	340	825.71	1/16/86
	K	4623887	11/18/86	Welles, II	340	825.57	5/15/84

FOREIGN PATENT DOCUMENTS

*		DOCUMENT NO.	DATE	COUNTRY	NAME	CLASS	SUB-CLASS	PERTINENT SHTS. DWG	PERTINENT PP. SPEC.
	L								
	M								
	N								
	O								
	P								
	Q								

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

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EXAMINER	DATE
V. Nguyen	2/1/89

* A copy of this reference is not being furnished with this office action.
(See Manual of Patent Examining Procedure, section 707.05 (a).)

#6 Part of

Sheet 1 of

FORM PTO-1449 (REV. 8-83) | U.S. DEPARTMENT OF COMMERCE PATENT AND TRADEMARK OFFICE

ATTY. DOCKET NO.	SERIAL NO.
87290	127,999
APPLICANT	
Paul V. Darbee et al	
FILING DATE	**GROUP**
December 2, 1987	Unknown

INFORMATION DISCLOSURE CITATION

(Use several sheets if necessary)

MAR 16 TRADE MARK OFF

U.S. PATENT DOCUMENTS

★EXAMINER INITIAL		DOCUMENT NUMBER	DATE	NAME	CLASS	SUBCLASS	FILING DATE IF APPROPRIATE
V.N		3,956,745	5/11/76	Ellis	340	337	
V.N	AB	4,356,509	10/26/82	Skerlos et al.	358	85	
V.N	AC	4,386,436	5/31/83	Kocher et al.	455	151	
V.N	AD	4,509,211	4/2/85	Robbins	455	603	
V.N	AE	4,566,034	1/21/86	Harger et al.	358	194.1	
V.N	AF	4,623,887	11/18/86	Welles, II	340	825.57	5/15/84
V.N	AG	4,626,848	12/2/86	Ehlers	340	825.69	5/15/84
V.N	AH	4,703,359	10/27/87	Rumbolt et al.	358	194.1	11/20/85
V.N	AI	4,712,105	12/8/87	Kohler	340	825.69	4/30/85
	AJ						
	AK						

FOREIGN PATENT DOCUMENTS

		DOCUMENT NUMBER	DATE	COUNTRY	CLASS	SUBCLASS	TRANSLATION YES	TRANSLATION NO
EPX V.N	AL	0203668	12/3/86	EP				
	AM							
	AN							
	AO							
	AP							

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

	AR	
	AS	
	AT	

EXAMINER	DATE CONSIDERED
V. Nguyen	2/24/89

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

PTO - 948
(Rev. 8-82)

U.S. DEPARTMENT OF COMMERCE
PATENT AND TRADEMARK OFFICE

ATTACHMENT TO PAPER NUMBER 7

GROUP 230

S.N. 127999

NOTICE OF PATENT DRAWINGS OBJECTION

Drawing Corrections and/or new drawings may only be submitted in the manner set forth in the attached letter, "Information on How to Effect Drawing Changes" PTO-1474.

A. ☑ The drawings, filed on 12/2/87, are objected to as informal for reason(s) checked below:

1. ☐ Lines Pale.
2. ☐ Paper Poor.
3. ☑ Numerals Poor. lettering
4. ☑ Lines Rough and Blurred.
5. ☐ Shade Lines Required.
6. ☐ Figures Must be Numbered.
7. ☐ Heading Space Required.
8. ☐ Figures Must Not be Connected.
9. ☐ Criss-Cross Hatching Objectionable.
10. ☐ Double-Line Hatching Objectionable.
11. ☐ Parts in Section Must Be Hatched.
12. ☐ Solid Black Objectionable.
13. ☐ Figure Legends Placed Incorrectly.
14. ☐ Mounted Photographs.
15. ☐ Extraneous Matter Objectionable. [37 CFR 1.84 (1)]
16. ☐ Paper Undersized; either 8½" x 14", or 21.0 cm. x 29.7 cm. required.
17. ☐ Proper A4 Margins Required:
    ☐ TOP 2.5 cm. ☐ RIGHT 1.5 cm.
    ☐ LEFT 2.5 cm. ☐ BOTTOM 1.0 cm.
18. ☐ Other:

B. ☑ The drawings, submitted on 12/2/87, are so informal they cannot be corrected. New drawings are required. Submission of the new drawings MUST be made in accordance with the attached letter.

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=> file jpo
FILE 'JPOABS' ENTERED AT 11:35:00 ON 01 FEB 89

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=> s remote(w)control
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=> s l4 and learn?
           868 LEARN?
L6           3 L4 AND LEARN?

=> d cit ab l-3

1.  59-121405, Jul. 13, 1984, CONTROLLER OF MOBILE ROBOT; TSUNEO TAKAHASHI,
et al., G05D 1*02; B25J 13*00
01 FEB 89 11:56:11              U.S. Patent & Trademark Office              P0016

59-121405                                                    L6: 1 of 3

ABSTRACT:

 PURPOSE:To improve the flexibility of a robot by providing a learning
function to the robot itself for its traveling path and performing the
prescribed unmanned traveling of the robot in accordance with said
learning function.

 CONSTITUTION:The system is set in a learning traveling mode by a control
part 7, and a robot is guided to its start position S on an expected course
by means of remote control transmitting and receiving devices 8 and
9. Then the start point (x.sub.0, y.sub.0) on the two-dimentional coordinates
and the standard .theta..sub.0 of the traveling direction are set at an
01 FEB 89 11:56:20              U.S. Patent & Trademark Office              P0017

59-121405                                                    L6: 1 of 3
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authorization unit; Alex ". Cook, Jr., 380*20; 358*349; 380*10; 455*4 [IMAGE AVAILABLE]

44. 4,787,063, Nov. 22, 1988, Acquisition and transmission system for a recorder and a computer center; Francis Muguet, 364*900; 358*335; 360*33.1; 360*19

45. 4,786,966, Nov. 22, 1988, Head mounted video display and remote camera system; Charles M. Hanson, et al., 358*108; 224*181; 358*113; 455*617 [IMAGE AVAILABLE]

46. 4,779,198, Oct. 18, 1988, Audience monitoring system; Oscar M. Lurie, 364*419; 358*84; 455*2 [IMAGE AVAILABLE]

47. 4,779,134, Oct. 18, 1988, Apparatus and method for viewing of multiple television stations and switching among them; Stephen M. Mak, 358*181, 108, 185

48. 4,777,785, Oct. 18, 1988, Method of guiding a robotic lawnmower; Raymond J. Rafaels, 56*10.2, DIG.15

49. 4,777,329, Oct. 11, 1988, Graphic input system; Samuel W. Mallicoat, 178*18; 340*706; 434*408

50. 4,775,865, Oct. 4, 1988, Emergency vehicle warning and traffic control system; Michael R. Smith, et al., 340*906

51. 4,774,679, Sep. 27, 1988, Stride evaluation system; John A. Carlin, 364*550; 73*379, 862.27, 862.62; 119*29; 272*129, DIG.9; 273*1GE, DIG.28; 340*323R; 364*508

52. 4,774,511, Sep. 27, 1988, Universal remote control unit; Robin B. Rumbolt, et al., 340*825.69; 358*194.1

53. 4,772,877, Sep. 20, 1988, Security indicating attachment for safe-type apparatus; Thomas J. Rice, Jr., et al., 340*543; 70*434, DIG.49; 109*38; 340*540, 545

54. 4,771,456, Sep. 13, 1988, Cable television channel selector/descrambler for use with cable-ready video applicances; Thomas F. Martin, et al., 380*10; 358*86; 380*13 [IMAGE AVAILABLE]

55. 4,771,283, Sep. 13, 1988, Remote control device; Shin'ichi Imoto, 340*825.71, 825.72, 825.73; 358*194.1; 455*352, 603 [IMAGE AVAILABLE]

56. 4,763,104, Aug. 9, 1988, Gateway for use in load control system; Masahiro Inoue, et al., 340*310R; 333*14; 340*310A, 538, 825.03, 827; 375*37; 379*221

57. 4,757,304, Jul. 12, 1988, Vehicle security system; Ki-Ick Rho, 340*522, 426, 539, 565, 666; 341*176

58. 4,755,978, Jul. 5, 1988, Disc player; Kazuyuki Takizawa, et al., 369*37, 75.2, 194

59. 4,754,426, Jun. 28, 1988, System for controlling communications on a cable television network; Robert M. Rast, et al., 358*86; 455*5 [IMAGE AVAILABLE]

60. 4,754,255, Jun. 28, 1988, User identifying vehicle control and security device; Rudy T. Sanders, et al., 307*10.4; 180*287; 340*426, 430, 528, 539, 825.31, 825.69; 341*176

61. 4,752,954, Jun. 21, 1988, Upstream signal control apparatus in bidirectional CATV system; Akinori Masuko, 380*20; 358*84, 86; 455*2, 5 [IMAGE AVAILABLE]

62. 4,752,226, Jun. 21, 1988, Chemical warfare simulator; Charles K. Akers, et al. 434*11; 364*806

63. 4,751,578, Jun. 14, 1988, System for electronically controllably viewing on a television updateable television programming information; Eli Reiter, et al., 358*183, 22, 142, 194.1, 903

stored 5 after the learning traveling of the robot. The robot is set at the position 3 after the learning traveling is over, and the system is switched to an unmanned [illegible]ling mode. Thus the rob[illegible] driven so as to perform the copying traveling on the expected course.

2. 59-121403, Jul. 13, 1984, CONTROLLER OF MOBILE ROBOT; TSUNEO TAKAHASHI, et al., G05D 1/02; B25J 13/00

59-121403 L6: 2 of 3

ABSTRACT:

01 FEB 89 11:56:29 U.S. Patent & Trademark Office P0019

59-121403 L6: 2 of 3

PURPOSE:To control the guidance for traveling of a robot with high accuracy by stopping temporarily the robot for each prescribed time or distance traveled and correcting the drift of a direction sensor when the robot is stopped.

CONSTITUTION:A control part 7 sets a system in a learning traveling mode and guides a robot to its start position 3 on an expected course by means of a remote control transmitting and receiving devices 8 and 9. Then the part 7 pushes a set button to set the start point (x.sub.0, y.sub.0) and the standard .theta..sub.0 of traveling direction at an arithmetic control part 4. Then the system is switched to an unmanned traveling mode through the part 7 after the learning traveling is through with the robot. Thus the part 4 makes the robot have the copying traveling on a course C on the basis of the data stored in a memory part 5. In this case, the part 4 stops the robot
01 FEB 89 11:56:40 U.S. Patent & Trademark Office P0019

59-121403 L6: 2 of 3

temporarily for each time or distance traveled and corrects the drift of a direction sensor at that time point.

3. 59-121402, Jul. 13, 1984, MOBILE ROBOT; TSUNEO TAKAHASHI, et al., G05D 1/02; B25J 5/00

59-121402 L6: 3 of 3

ABSTRACT:

PURPOSE:To guide the traveling of a robot with high accuracy by providing a learning function to a robot itself for its traveling path and traveling region to ensure freely the unmanned traveling of the robot on the basis of
01 FEB 89 11:56:49 U.S. Patent & Trademark Office P0020

59-121402 L6: 3 of 3

said learning function and at the same time monitoring the traveling state of the robot through a display part.

CONSTITUTION:The learning traveling of a robot is started in accordance with an expected course by means of a remote control transmitting and receiving devices 8 and 9. Then an arithmetic control part 4 calculates momentarily the present position (x, y) and the traveling direction .theta. of the robot on the two-dimentional coordinates on the basis of the signals sent from a distance sensor 1 and a direction sensor 2 respectively. The results of these calculations are held successively at a memory part 5. The robot is set at its start position 3 after the learning traveling is through with the robot. Then the devices 8 and 9 are switched to an unmanned mode by a control part 7, and the part 4 gives a driving command to make the

stereo audio signal; Michael E. Long, 358*86, 194.1, 198 [IMAGE AVAILABLE]

65. 4,745,402, May 17, 1988, Input device for a display system using phase-encoded signals; Victor Auerbach, 340*709, 706, 712; 455*603 [IMAGE AVAILABLE]

66. 4,741,275, May 3, 1988, Device for controlling accesses of the security chamber; Jacques Lewiner, et al., 109*7; 70*278; 109*59R

67. 4,740,912, Apr. 26, 1988, Quinews-electronic replacement for the newspaper; Ranald O. Whitaker, 364*900 [IMAGE AVAILABLE]

68. 4,738,526, Apr. 19, 1988, Auto-portrait photo studio; John J. Larish, 354*412, 76, 290

69. 4,732,438, Mar. 22, 1988, Split-image optical viewing instrument; Zvi Orbach, et al., 350*1.1, 172; 358*108 [IMAGE AVAILABLE]

70. 4,730,797, Mar. 15, 1988, Inflatable core orbital construction method and space station; Michael A. Minovitch, 244*159, 158R; 522*2

71. 4,728,949, Mar. 1, 1988, Remote control device for controlling various functions of one or more appliances; Hans-Joachim Platte, et al., 340*825.37, 825.69

72. 4,718,759, Jan. 12, 1988, Apparatus for the alignment and balance of the wheels of a motor vehicle; Louis L. Butler, 356*152; 33*203.18, 288 [IMAGE AVAILABLE]

73. 4,718,112, Jan. 5, 1988, Remote control apparatus; Hatsuhiko Shimada, 455*151; 358*194.1; 360*33.1; 455*89, 171, 231, 603 [IMAGE AVAILABLE]

74. 4,713,535, Dec. 15, 1987, Optical keyboard; Randy L. Rhoades, 250*221; 340*707, 825.19; 341*21, 27

75. 4,712,239, Dec. 8, 1987, Security arrangement for downloadable cable television converters; William Frezza, et al., 380*20; 358*86, 349; 380*13, 49; 455*4 [IMAGE AVAILABLE]

76. 4,710,956, Dec. 1, 1987, Cable television system; Robert M. Rast, 380*20; 358*86, 349; 380*10, 12 [IMAGE AVAILABLE]

77. 4,710,955, Dec. 1, 1987, Cable television system with two-way telephone communication path; Marc W. Kauffman, 380*10; 235*382, 382.5; 358*84; 379*91, 92, 209; 380*20; 455*2 [IMAGE AVAILABLE]

78. 4,704,610, Nov. 3, 1987, Emergency vehicle warning and traffic control system; Michel R. Smith, et al., 340*906

79. 4,703,450, Oct. 27, 1987, Interface device; Susumu Sueyoshi, et al., 364*900; 358*903; 455*603

80. 4,703,359, Oct. 27, 1987, Universal remote control unit with model identification capability; Robin B. Rumbolt, et al., 358*194.1; 340*825.69, 825.72; 455*603 [IMAGE AVAILABLE]

81. 4,703,306, Oct. 27, 1987, Appliance system; William D. Barritt, 340*310CP, 310A, 310R, 538, 825.06, 825.22

82. 4,701,794, Oct. 20, 1987, Television receiver comprising a teletext decoding circuit and a page number memory; Melchert H. Froling, et al., 358*147, 141, 146

83. 4,698,670, Oct. 6, 1987, Cable stereo apparatus; Thomas C. Matty, 358*86, 189; 455*4 [IMAGE AVAILABLE]

84. 4,695,880, Sep. 22, 1987, Electronic information dissemination system; Terry W. Johnson, et al., 358*86; 340*825.47; 358*425; 455*5 [IMAGE AVAILABLE]

85. 4,691,783, Sep. 8, 1987, Automatic modular fire extinguisher system for computer rooms; Geoffrey S. Stern, et al., 169*61, 19, 26, 70

86. 4,691,340, Sep. 1, 1987, Image information accessing user terminal; Satoru Maeda, et al., 379*96, 98, 102

87. 4,689,761, Aug. 25, 87, Multiple independent . put peripherals; James

379*61; 368*85; 379*110, 339, 345

154. 4,460,676, Jul. 17, 1984, Non-impact single and multi-ply printing method and apparatus; Warren M. Fabel, 430*333; 281*2; 282*11.5R; 355*18; 400*118; 427*148; 428*913; 430*332, 338, 339, 346, 348, 495, 964

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=> d 18 cit 4,18,20,31,47,68,72,119,134,137,138,141,159,179,186,200,201,205,210,218,274

4. 4,879,541, Nov. 7, 1989, Supervisory control system; Marian Stefaniu, et al., 340*825.07, 825.06

18. 4,878,055, Oct. 31, 1989, Remote control device; Yoshiki Kashihara, 341*23; 340*825.72; 358*194.1; 455*603 [IMAGE AVAILABLE]

20. 4,878,052, Oct. 31, 1989, Hand-held transmitter for the emission of coded electromagnetic pulses, and a receiver for receiving pulses emitted by the transmitter; Matthias Schulze, 340*825.69, 825.57, 825.72; 341*176; 455*91

31. 4,876,736, Oct. 24, 1989, Method and apparatus for determining channel reception of a receiver; David A. Kiewit, 455*2; 358*84; 379*92; 455*151 [IMAGE AVAILABLE]

47. 4,875,040, Oct. 17, 1989, Device for remote control of electrical apparatus; Vitaly S. Dzjuban, et al., 340*825.06, 825.16, 825.71, 825.77; 361*139

68. 4,872,195, Oct. 3, 1989, Remote control unit for radio/television transmitter station; John E. Leonard, 379*40, 41, 104, 105

72. 4,872,054, Oct. 3, 1989, Video interface for capturing an incoming video signal and reformatting the video signal; Michael J. Gray, et al., 358*140, 148; 364*413.13 [IMAGE AVAILABLE]

119. 4,866,434, Sep. 12, 1989, Multi-brand universal remote control; Douglas M. Keenan, 340*825.72, 825.44, 825.57, 825.69; 341*176; 370*109; 375*112 [IMAGE AVAILABLE]

134. 4,864,647, Sep. 5, 1989, Wireless infrared remote control extender; Christopher C. Harrington, 455*603, 601, 606, 617 [IMAGE AVAILABLE]

137. 4,864,588, Sep. 5, 1989, Remote control system, components and methods; Raymond W. Simpson, et al., 375*1, 114, 115, 116 [IMAGE AVAILABLE]

138. 4,864,550, Sep. 5, 1989, Remote control equipment for use with an audio system; Yoshikazu Kawanaka, 369*6, 2, 24; 455*352, 353

141. 4,864,406, Sep. 5, 1989, Television receiver with a synchronized external-power stage; Uwe Hartmann, et al., 358*194.1; 315*411; 358*190 [IMAGE AVAILABLE]

159. 4,862,151, Aug. 29, 1989, Remote control device for a computer associated with a video screen; Daniel Grauz, et al., 340*706; 178*18; 340*709, 712 [IMAGE AVAILABLE]

179. 4,860,380, Aug. 22, 1989, Autoprogramming tuner apparatus; William H. Mengel, 455*185; 358*190; 455*186, 343 [IMAGE AVAILABLE]

186. 4,859,922, Aug. 22, 1989, System for controlling the operating mode of a controlled apparatus; Harald Tauchenitz, et al., 318*628; 310*93; 360*10.3; 364*190

200. 4,857,917, Aug. 15, 1989, Remote control apparatus providing leader pulse followed by data pulses; Kazuo Sato, 340*825.57, 825.69; 455*343 [IMAGE AVAILABLE]

201. 4,857,898, Aug. 15, 1989, Data compression technique for reconfigurable remote control apparatus; Bobby J. Smith, 341*22; 340*825.69; 341*175, 176 [IMAGE AVAILABLE]

205. 4,856,658, Aug. 15, 1989, Remote control unit holder assembly; Miloslav Novak, 211*13, 43

210. 4,856,081, Aug. 8, 1989, Reconfigurable remote control apparatus and method of using the same; Bobby J. Smith, 455*151; 340*825.57,

88. 4,689,022, Aug. 25, 37, System for control of video storage means by a programmed Processor; John Peers, et al., 434*307

89. 4,684,980, Aug. 4, 1987, System for controlling communications on a cable television network; Robert M. Rast, et al., 358*86, 349; 455*5 [IMAGE AVAILABLE]

90. 4,683,789, Aug. 4, 1987, Method and apparatus for separating printed circuit boards from multi-board panels; Gilbert T. Lopez, 83*35, 76.8, 277, 415

91. 4,682,218, Jul. 21, 1987, Surveying instrument with image display unit; Atsumi Kaneko, 358*93, 108, 225, 229

92. 4,680,511, Jul. 14, 1987, Video apparatus for generating a conductively isolated control signal; William V. Fitzgerald, et al., 315*411; 358*190, 194.1 [IMAGE AVAILABLE]

93. 4,673,921, Jun. 16, 1987, Apparatus for finding the location of a car within a vast area; Muneo Saito, et al., 340*539; 180*287; 307*10.5; 340*991

94. 4,672,195, Jun. 9, 1987, Radiant beam coordinate detector system; Carlos E. Golborne, et al., 250*221, 222.1

95. 4,669,042, May 26, 1987, Stepless pulse count switching; Alan R. Henderson, et al., 364*181; 318*591, 594, 603; 364*167.01; 377*55

96. 4,665,928, May 19, 1987, Range of motion measuring and displaying device; Andrew V. Linial, et al., 128*782; 272*DIG.5

97. 4,656,655, Apr. 7, 1987, Remote control adapter of electric equipment using telephone lines; Kazuo Hashimoto, 379*105; 360*69; 379*74, 77; 455*603 [IMAGE AVAILABLE]

98. 4,652,741, Mar. 24, 1987, Radiant beam coordinate detector; Carlos E. Golborne, 250*221, 222.1

99. 4,651,558, Mar. 24, 1987, Method and apparatus for inspecting lateral lines; James R. Martin, et al., 73*40.5R; 358*100

100. 4,649,264, Mar. 10, 1987, Electronic voting machine; William H. Carson, 235*54R, 50B

101. 4,646,084, Feb. 24, 1987, Meter reading methods and apparatus; David E. Burrowes, et al., 340*870.03; 250*231SE; 340*310A, 870.29

102. 4,644,393, Feb. 17, 1987, Means for monitoring people who are watching a television set; Peter E. Smith, et al., 358*84 [IMAGE AVAILABLE]

103. 4,641,205, Feb. 3, 1987, Television system scheduler with on-screen menu type programming prompting apparatus; Billy W. Beyers, Jr., 360*33.1; 358*335; 434*323

104. 4,633,313, Dec. 30, 1986, Method and apparatus for transferring data for digitally controlling video equipment; Takao Mogi, et al., 358*160, 21R, 148, 181, 903

105. 4,626,892, Dec. 2, 1986, Television system with menu like function control selection; Kevin E. Nortrup, et al., 358*21R, 22, 188

106. 4,626,848, Dec. 2, 1986, Programmable functions for reconfigurable remote control; Raymond G. Ehlers, 340*825.69, 825.57, 825.72; 358*194.1; 455*603, 608 [IMAGE AVAILABLE]

107. 4,625,276, Nov. 25, 1986, Data logging and transfer system using portable and resident units; William M. Benton, et al., 364*408; 235*379, 380; 364*401, 406, 413.26; 379*91, 144, 148, 357; 902*26, 39 [IMAGE AVAILABLE]

108. 4,623,887, Nov. 18, 1986, Reconfigurable remote control; Kenneth B. Welles, II, 340*825.57, 825.69, 825.72; 358*194.1, 335; 360*33.1; 455*603 [IMAGE AVAILABLE]

109. 4,622,681, Nov. 11, 1986, Apparatus for transmitting digital data; Stephen C. Snell, et al., 375*48; 250*551; 455*602, 608 [IMAGE AVAILABLE]

110. 4,621,552, Nov. 11, 1986, Method and apparatus for separating printed-circuit boards from multi-board panels; Gilbert T. Lopez, 83*27, 33, 35, 62, 76.8, 104, 206, 250, 277, 360

111. 4,620,229, Oct. 28, 1986, Picture display device; Toshio Amano, et al., 358*349, 181, 183, 192.1, 194.1 [IMAGE AVAILABLE]

112. 4,618,895, Oct. 21, 1986, Video editing system; Bruce R. Wright, 358*311, 27, 908; 360*14.2, 15, 31

113. 4,616,224, Oct. 7, 1986, Multifunction steering wheel; Robert P. Reighard, 340*825.69; 307*10.1; 455*603 [IMAGE AVAILABLE]

114. 4,614,274, Sep. 30, 1986, Control system for automatic material handling crane; Dean R. LaValle, et al., 212*160; 340*825.74

115. 4,603,438, Jul. 29, 1986, Tuning system with provisions for skipping nonpreferred tuning positions; Paul D. Filliman, 455*166, 184, 186

116. 4,600,918, Jul. 15, 1986, Equipment for reproduction of alphanumerical data; Pietro Belisomi, et al., 340*711, 286.13, 721; 368*10, 28

117. 4,596,049, Jun. 17, 1986, Electrical control system; Alfred E. Rizzotti, III, 455*603; 340*825.72; 455*606, 612, 617 [IMAGE AVAILABLE]

118. 4,591,914, May 27, 1986, Apparatus for controlling power supply to electronic circuitry; Kunio Hakamada, et al., 358*190; 307*64; 358*194.1; 455*343, 352 [IMAGE AVAILABLE]

119. 4,586,905, May 6, 1986, Computer-assisted audio/visual teaching system; James W. Groff, 434*307, 308

120. 4,580,291, Apr. 1, 1986, Method for Processing digital signals, and subscriber station for telecommunication and teledistribution; Charles H. G. ab der Halden, 455*606, 612 [IMAGE AVAILABLE]

121. 4,578,674, Mar. 25, 1986, Method and apparatus for wireless cursor position control; David C. Baker, et al., 340*710; 178*18; 273*148B; 341*31; 455*603 [IMAGE AVAILABLE]

122. 4,578,665, Mar. 25, 1986, Remote controlled surveillance train car; Tai-Her Yang, 246*166.1; 73*636; 246*121, 167D; 340*539, 566; 358*108; 364*551.01; 381*56 [IMAGE AVAILABLE]

123. 4,578,575, Mar. 25, 1986, Operating theatre lamp; Eberhard Roos, 250*203R; 362*286, 804 [IMAGE AVAILABLE]

124. 4,577,220, Mar. 18, 1986, Arrangement for detecting to which channel a television set is tuned; Raymond Laxton, et al., 358*84; 455*2 [IMAGE AVAILABLE]

125. 4,569,026, Feb. 4, 1986, TV Movies that talk back; Robert M. Best, 364*521; 340*725; 352*5; 358*102, 903; 364*410; 367*198; 381*43, 110; 434*323

126. 4,566,034, Jan. 21, 1986, Remote control transmitter arrangement for one or more television devices; Mark A. Harger, et al., 358*194.1; 340*825.22; 455*151, 353

127. 4,560,873, Dec. 24, 1985, Situ multi-channel combustion gas analyzer; Gerald F. McGowan, et al., 250*339, 343, 351; 356*439

128. 4,559,561, Dec. 17, 1985, Television receiver; Toshio Amano, et al., 358*192.1; 455*186

129. 4,559,037, Dec. 17, 1985, Device for the pre-programmable infusion of liquids; Manfred Franetzki, et al., 604*151, 891.1

130. 4,551,832, Nov. 5, 1985, Telephone based control system; Richard T. Carll, et al., 370*58.3, 62; 379*94, 104

131. 4,550,407, Oct. 29, 1985, Method of analyzing broadcast data, a network analyzer implementing such a method, and receiver equipment using such an analyzer; Tristan de Couasnon, et al., 371*15.1; 358*10, 147; 371*29.1

132. 4,539,711, Sep. 3, 1985, Tuning control system for a pair of tuners employing a common channel skip memory; Mark A. Harger, 455*166, 358*191.1

194.1, 335; 360*33.1; 455*155, 186

133. 4,535,333, Aug. 13, 1985, Transmitter and receiver for controlling remote elements; Joseph W. Twardowski, 340*825.69, 539, 825.22, 825.31, 825.72; 455*151

134. 4,529,980, Jul. 16, 1985, Transmitter and receiver for controlling the coding in a transmitter and receiver; Frank J. Liotine, et al., 340*825.52, 825.22; 341*176; 455*151

135. 4,527,204, Jul. 2, 1985, Remote control system; Daisuke Kozakai, et al., 360*33.1; 358*194.1; 360*79; 455*4, 151, 353 [IMAGE AVAILABLE]

136. 4,527,194, Jul. 2, 1985, Channel assignment for CATV system; Semir Sirazi, 358*86, 192.1; 455*3, 186 [IMAGE AVAILABLE]

137. 4,525,820, Jun. 25, 1985, Function selecting method and system for an audio/video recording and reproducing system; Takashi Enoki, et al., 369*2; 358*335; 360*33.1; 369*6; 381*81, 123

138. 4,519,193, May 28, 1985, Fruit harvesting apparatus with television camera and monitor; Jituo Yoshida, et al., 56*328.1, 10.2; 358*107; 901*6

139. 4,519,002, May 21, 1985, Controlling the operations of at least two devices; Toshio Amano, 358*335; 340*825.63; 358*188, 194.1; 369*29

140. 4,517,564, May 14, 1985, Cordless remote control apparatus; Katsuo Morishita, et al., 340*825.69; 341*22; 358*194.1; 455*151

141. 4,514,732, Apr. 30, 1985, Technique for increasing battery life in remote control transmitters; John J. Hayes, Jr., 340*825.57; 358*194.1; 455*603 [IMAGE AVAILABLE]

142. 4,509,210, Apr. 2, 1985, Television receiver adaptable for descrambler module; Elliott S. Kohn, 455*349; 358*194.1, 254; 380*13, 19; 455*355, 603 [IMAGE AVAILABLE]

143. 4,509,130, Apr. 2, 1985, Digital control of diode laser for atmospheric spectroscopy; Robert T. Menzies, et al., 364*556; 250*338.5, 339

144. 4,506,300, Mar. 19, 1985, Film video player with zoom, scan, and automatic border control; William T. Fearnside, 358*225, 102, 209, 214

145. 4,502,318, Mar. 5, 1985, Method and apparatus for calibrating flow meters; Vernon G. Converse, III, et al., 73*3

146. 4,501,972, Feb. 26, 1985, Float detection system; Charles E. Foerster, Jr., et al., 250*577; 73*3, 314

147. 4,501,002, Feb. 19, 1985, Offset QPSK demodulator and receiver; Richard C. Auchterlonie, 375*86; 329*309; 375*77

148. 4,500,211, Feb. 19, 1985, Audibly announcing apparatus with power saving feature; Shintaro Hashimoto, et al., 368*63, 204

149. 4,497,027, Jan. 29, 1985, Method and apparatus for automatic warp prevention of corrugated board; Richard McGuire, et al., 364*471; 156*64; 364*568

150. 4,495,654, Jan. 22, 1985, Remote controlled receiver with provisions for automatically programming a channel skip list; Michael S. Deiss, 455*151; 358*194.1; 455*166, 186, 353

151. 4,495,516, Jan. 22, 1985, Film video player having flash illuminated area image sensor and single frame CCD image sensor for use therewith; Leslie G. Moore, et al., 358*54, 44

152. 4,470,675, Sep. 11, 1984, Random access control apparatus and method for slide projector; Dominic J. Di Gianfilippo, et al., 353*15; 340*825.56; 353*25, 103, 117; 360*80; 434*314, 316

153. 4,465,902, Aug. 14, 1984, Digital space phone system; Thomas J. Zato.

825.07; 358*174.1; 455*603 [IMAGE AVAILABLE]

218. 4,855,746, Aug. 8, 1989, Multiple device remote control transmitter; Carl W. Stacy, 341*176, 23; 358*194.1

274. 4,850,040, Jul. 18, 1989, Infrared remote control system for activating and deactivating one or more devices in a single enclosed space; Rudd M. Teich, et al., 455*603

=> d 18 cit 283,299,330,334,336 ,348,353,354,370,380 ,453,456,479,482,483,487,509,543,553

283. 4,848,609, Jul. 18, 1989, Adjustable holder for TV, stereo and VCR remote control units; Rupert L. A. Meghnot, 211*13, 175; 248*309.1, 316.1

299. 4,847,601, Jul. 11, 1989, Remote transmitter kit; William S. Conti, 341*176; 340*825.69

330. 4,843,635, Jun. 27, 1989, Channel selecting panel holder for television set; Masanori Okazaki, 455*151; 358*194.1, 254; 455*128, 348, 352, 603

334. 4,843,386, Jun. 27, 1989, Remote control unit with hierarchical selection; Johann Wolf, 340*825.69, 825.06, 825.72

336. 4,843,384, Jun. 27, 1989, Wireless remote control system; Yuichi Ide, et al., 340*825.69, 825.06, 825.72; 358*194.1; 455*603

348. 4,841,562, Jun. 20, 1989, Telephone VCR control; Steven Lem, 379*104;

358*194.1; 379*77, 105; 455*603

353. 4,841,368, Jun. 20, 1989, Television customer control functions restorer; Robin B. Rumbolt, et al., 358*194.1; 340*825.69, 825.72; 455*352, 603

354. 4,841,367, Jun. 20, 1989, Video source selecting system; Norihito Ichikawa, et al., 358*181

370. 4,838,505, Jun. 13, 1989, Remote control holder; Terry J. Lowe, 248*176

380. 4,837,627, Jun. 6, 1989, Programmable operating-parameter control appatatus for a television receiver; William H. Mengel, 358*191.1, 181, 190, 194.1, 198; 455*151, 185

453. D 301,037, May 9, 1989, Hand-held remote control; Hari Matsuda,

D14*218, 191

456. 4,829,555, May 9, 1989, TAD incorporated with VCR; Kazuo Hashimoto, 379*70; 358*335; 379*102

479. D 300,831, Apr. 25, 1989, Remote control; Henry C. Jenkins, et al., D14*218

482. 4,825,209, Apr. 25, 1989, Remote control apparatus; Hiroaki Sasaki, et al., 340*825.72, 825.37; 341*23; 358*194.1; 455*127, 151

483. 4,825,200, Apr. 25, 1989, Reconfigurable remote control transmitter; Benjamin F. Evans, et al., 341*23; 340*825.56, 825.72; 341*176; 358*194.1; 455*151, 353, 603

487. 4,825,096, Apr. 25, 1989, Remote control apparatus for tripping off switches; Fabrizio Fabrizi, et al., 307*112, 114; 335*6, 13, 14

509. 4,823,387, Apr. 18, 1989, Television tuning system with provisions for tuning RF signals with scrambled video information; Juri Tults, 380*13; 358*193.1; 380*15; 455*164, 182 [IMAGE AVAILABLE]

543. 4,820,319, Apr. 11, 1989, Remote control and monitor means; Steven C. Griffis, 55*213, 274, 385.2, 471

553. D 300,530, Apr. 4, 1989, Remote control device; Alexander N. Stagnitta, D14*218

=> d cit 560,583,584,585,605,621,643,665,666,669,672,691,696,699,731,733,739,806,839

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Atty Docket 87290

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Application of:

PAUL V. DARBEE ET AL

For: UNIVERSAL REMOTE CONTROL DEVICE

Serial No. 127,999

Filed: December 2, 1987

Group Art Unit: Unknown

Examiner: Unknown

LETTER IN RESPONSE TO NOTICE TO FILE MISSING PARTS OF APPLICATION UNDER 37 CFR 1.53(d)

TO:
Honorable Commissioner of
Patents and Trademarks
Washington, D. C. 20231

Dear Sir:

In response to the Notice to File Missing Parts of Application (copy enclosed) mailed on January 13, 1988, applicant is hereby filing the enclosed documents and submitting the enclosed checks to complete the above identified application.

1. A Declaration signed by all of the inventors listed on the title page of the application attached to a copy of the application as filed.

P 30301 04/12/88 127999 22-0355 030 215 28.00CR

2. A check in the amount of $170.00 in payment of the statutory filing fee.

3. A check in the amount of $55.00 in payment of the surcharge for the late filing of the above identified and enclosed documents under 37 CFR 1.16(e).

4. A check in the amount of $246.00 for extra claims.

1 103 246.00 CK

060 03/25/88 127999

060 03/25/88 127999 1 201 170.00 CK

060 03/25/88 127999 55.00 CK

CERTIFICATE OF MAILING

I hereby certify that this correspondence is being deposited with the United States Postal Service as first-class mail in an envelope addressed to: Commissioner of Patents and Trademarks, Washington, D.C. 20231 on

Date 3/13/88

5.A check in the amount of $28.00 for a one (1) month extension of time.

6. Applicant is submitting two (2) executed Small Entity Declarations to verify small entity status of the applicants and the assignee.

The Commissioner is hereby authorized to charge any additional fees required or credit any overpayments to our Deposit Account No. 22-0355.

Respectfully submitted,

Thomas R. Vigil

THOMAS R. VIGIL
Reg. No. 24,542

Dated:

March 13, 1988.

836 South Northwest Highway
Barrington, Illinois 60010
(312) 382-6500

THOMAS VIGIL & ASSOCIATES
ATTORNEYS AT LAW
836 SOUTH NORTHWEST HIGHWAY
BARRINGTON, ILLINOIS 60010
TELEPHONE 312-382-6500

2226

70-1946/719

March 13 19 88

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SERIAL NUMBER	FILING DATE	FIRST NAMED APPLICANT	ATTY. DOCKET NO.
07/127,999	12/02/87	DARBEE	P 87290

THOMAS VIGIL & ASSOCIATES
836 SOUTH NORTHWEST HWY.
BARRINGTON, IL 60010

000

DATE MAILED: 01/13/88

NOTICE TO FILE MISSING PARTS OF APPLICATION— FILING DATE GRANTED

A filing date has been granted to this application. However, the following parts are missing.

If all missing parts are filed within the period set below, the total amount owed by applicant as a ☐ large entity, ☐ small entity (verified statement filed), is $ 740.

1. ☒ The statutory basic filing fee is: ☐ missing. ☐ insufficient. Applicant as a ☐ large entity, ☐ small entity, must submit $ 340 to complete the basic filing fee and MUST ALSO SUBMIT THE SURCHARGE AS INDICATED BELOW.
2. ☒ Additional claim fees of $ 210 as a ☐ large entity, ☐ small entity, including any required multiple dependent claim fee, are required. Applicant must submit the additional claim fees or cancel the additional claims for which fees are due. NO SURCHARGE IS REQUIRED FOR THIS ITEM.
3. ☒ The oath or declaration:
   ☐ is missing.
   ☐ does not cover items omitted at the time of execution.

   An oath or declaration in compliance with 37 CFR 1.63, identifying the application by the above Serial Number and Filing Date is required. A SURCHARGE MUST ALSO BE SUBMITTED AS INDICATED BELOW.
4. ☐ The oath or declaration does not identify the application to which it applies. An oath or declaration in compliance with 37 CFR 1.63 identifying the application by the above Serial Number and Filing Date is required. A SURCHARGE MUST ALSO BE SUBMITTED AS INDICATED BELOW.
5. ☐ The signature to the oath or declaration is: ☐ missing; ☐ a reproduction; ☐ by a person other than the inventor or a person qualified under 37 CFR 1.42, 1.43, or 1.47. A properly signed oath or declaration in compliance with 37 CFR 1.63, identifying the application by the above Serial Number and Filing Date is required. A SURCHARGE MUST ALSO BE SUBMITTED AS INDICATED BELOW.
6. ☐ The signature of the following joint inventor(s) is missing from the oath or declaration: _____. Applicant(s) should provide, if possible an oath or declaration signed by the omitted inventor(s), identifying this application by the above Serial Number and Filing Date. A SURCHARGE MUST ALSO BE SUBMITTED AS INDICATED BELOW.
7. ☐ The application was filed in a language other than English. Applicant must file a verified English translation of the application and a fee of $26.00 under 37 CFR 1.17(k), unless this fee has already been paid NO SURCHARGE UNDER 37 CFR 1.16(e) IS REQUIRED FOR THIS ITEM.
8. ☐ A $20.00 processing fee is required for returned checks. (37 CFR 1.21(m)).
9. ☐ Your filing receipt was mailed in error because check was returned.
10. ☐ Other:

A Serial Number and Filing Date have been assigned to this application. However, to avoid abandonment under 37 CFR 1.53(d), the missing parts and fees identified above in items 1 and 3-6 must be timely provided ALONG WITH THE PAYMENT OF A SURCHARGE OF $110.00 for large entities or $55.00 for small entities who have filed a verified statement claiming such status. The surcharge is set forth in 37 CFR 1.16(e). Applicant is given ONE MONTH FROM THE DATE OF THIS LETTER, OR TWO MONTHS FROM THE FILING DATE of this application, WHICHEVER IS LATER, within which to file all missing parts and pay any fees. Extensions of time may be obtained by filing a petition accompanied by the extension fee under the provisions of 37 CFR 1.136(a).

Direct the response to, and any questions about, this notice to the undersigned, Attention: Application Branch.

A copy of this notice MUST be returned with response.

For: Manager, Application Branch
(703) 557-3254

FORM PTO-1439 (REV. 7-87)

For Office Use Only	
☐ 102	☐ 202
☐ 103	☐ 203
☐ 104	☐ 204
☐ 105	☐ 205

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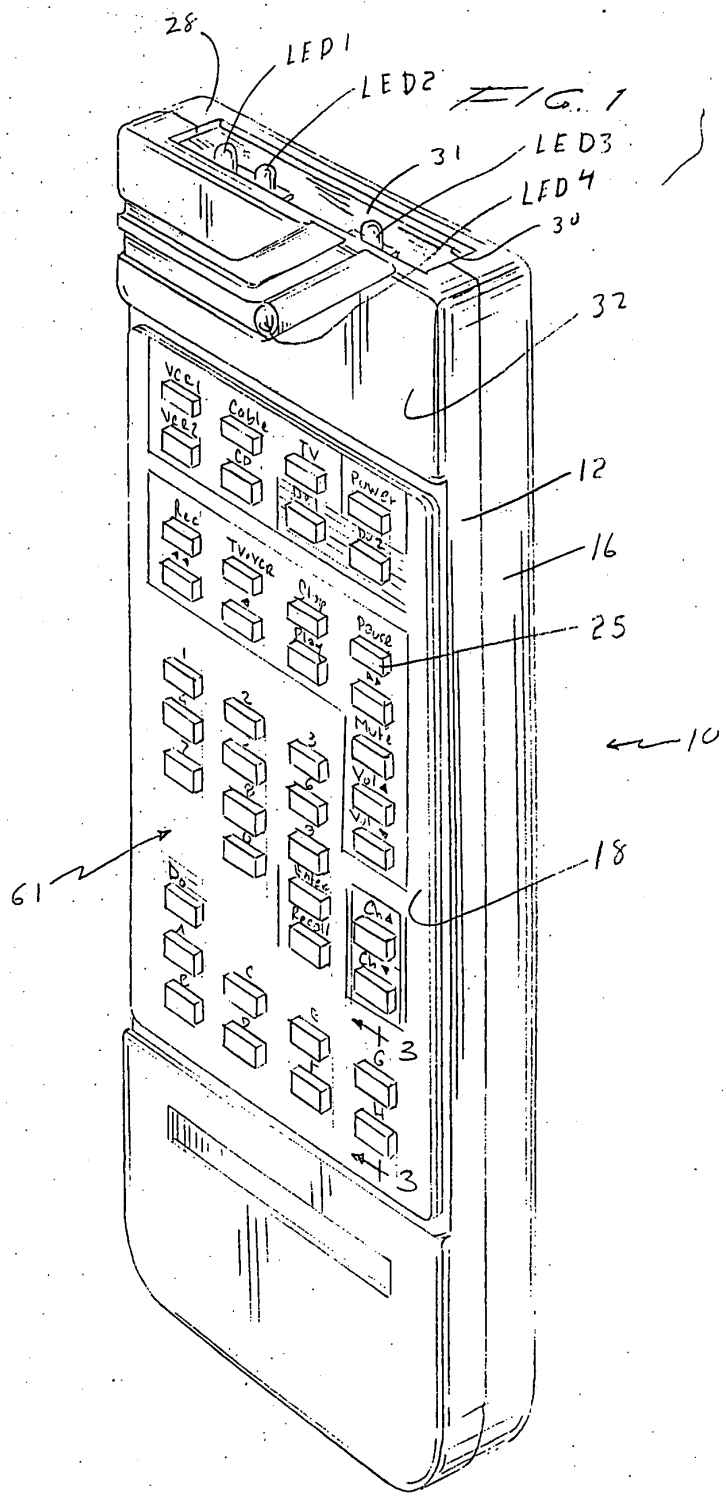

FIG. 1

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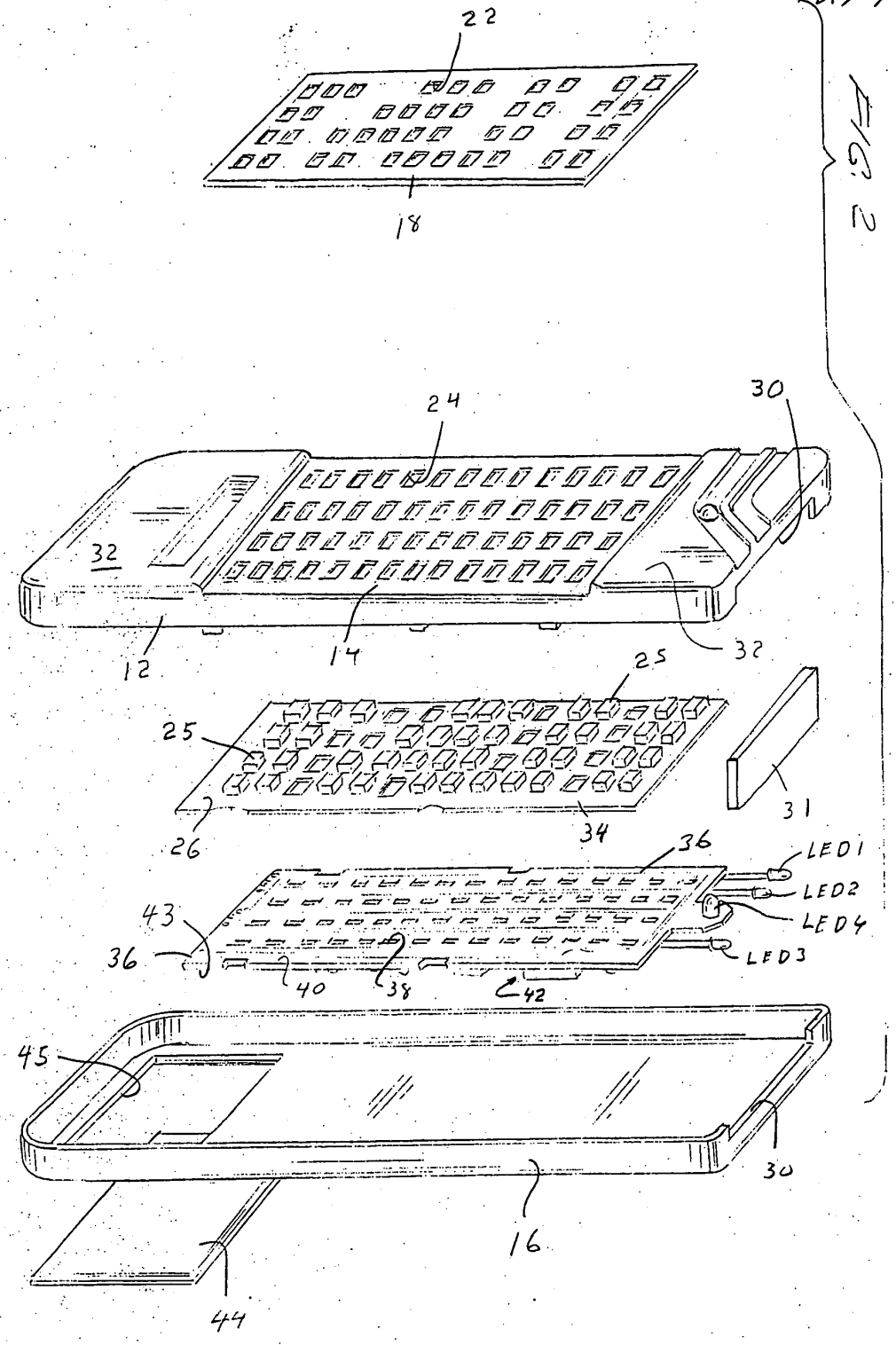

Fig. 2

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FIG. 3

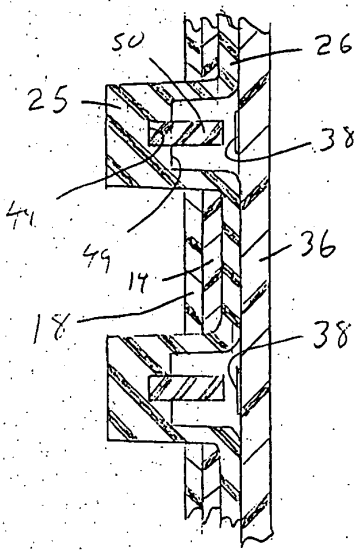

FIG. 4

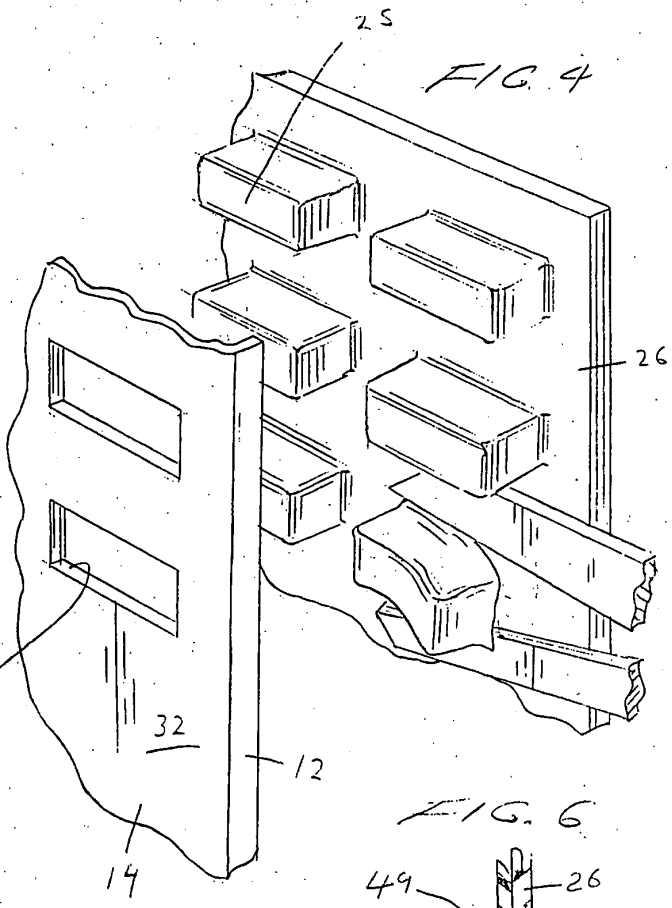

FIG. 5

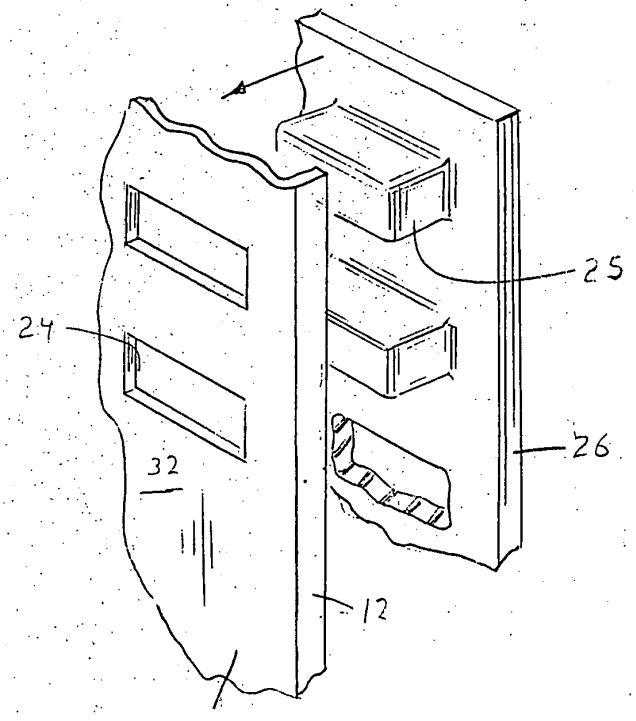

FIG. 6

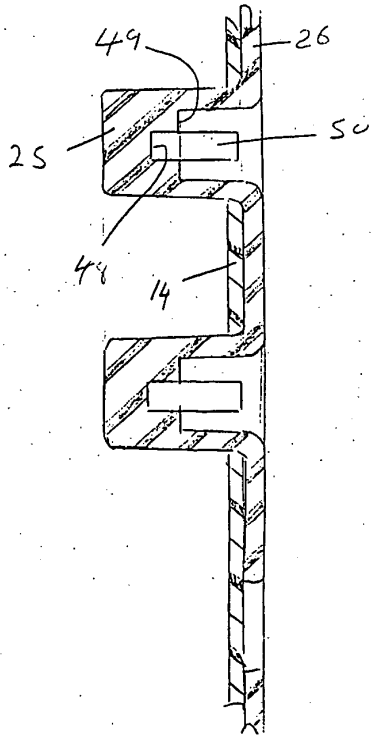

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FIG 7

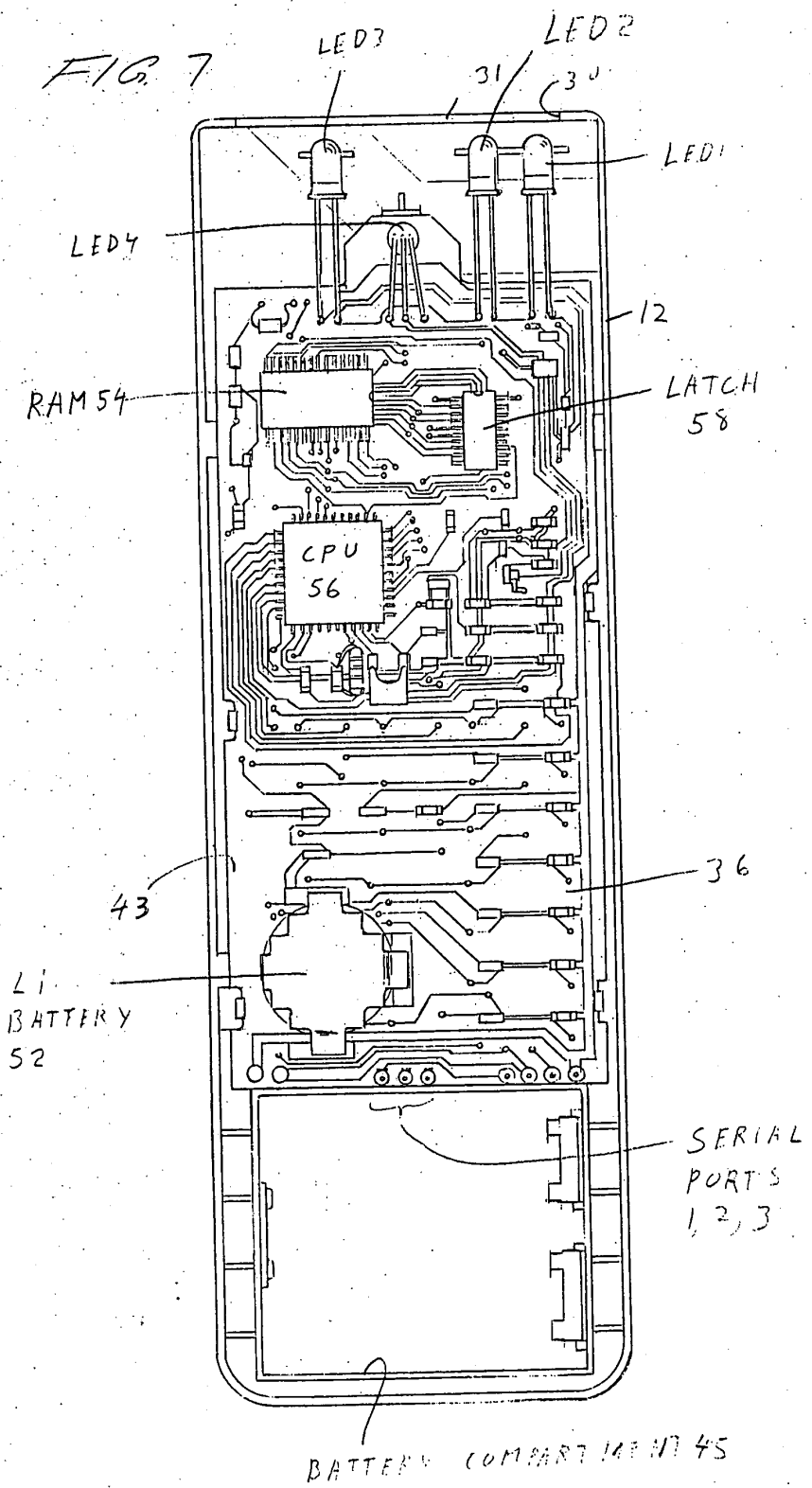


FIG. 8

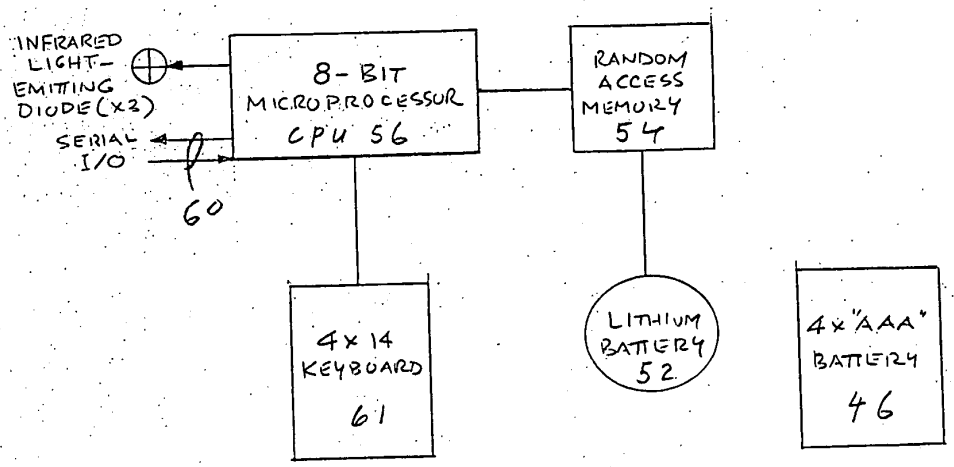
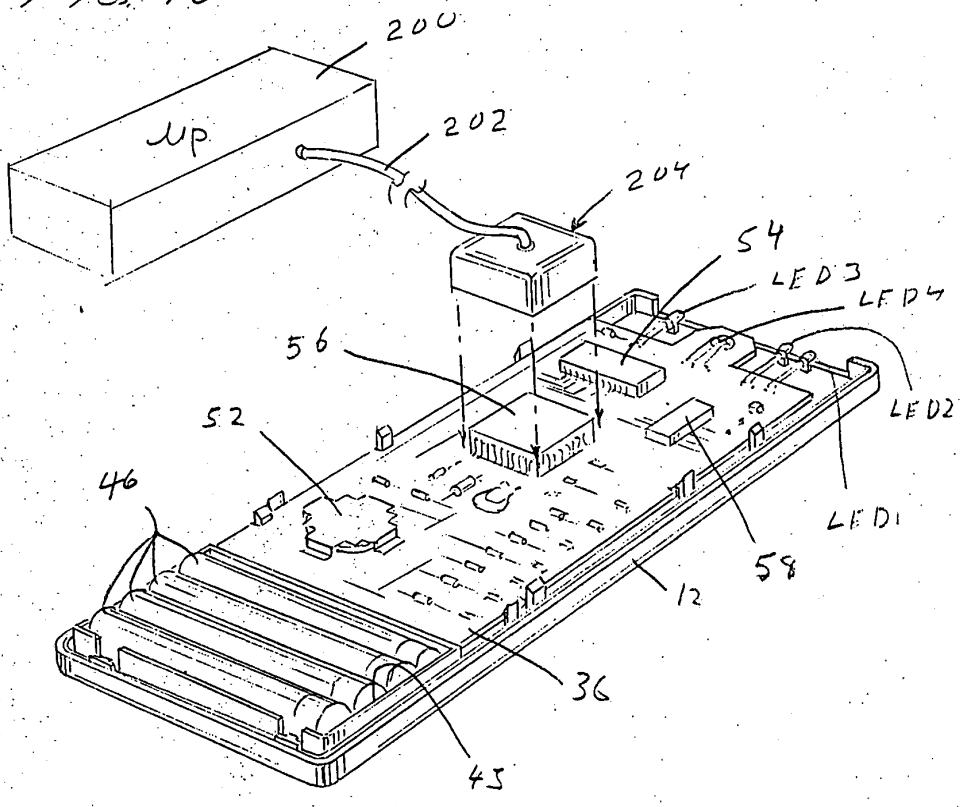

INFRARED LIGHT-EMITTING DIODE (x3)
SERIAL I/O
60
8-BIT MICROPROCESSOR CPU 56
RANDOM ACCESS MEMORY 54
4x14 KEYBOARD 61
LITHIUM BATTERY 52
4x "AAA" BATTERY 46

FIG. 10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UP
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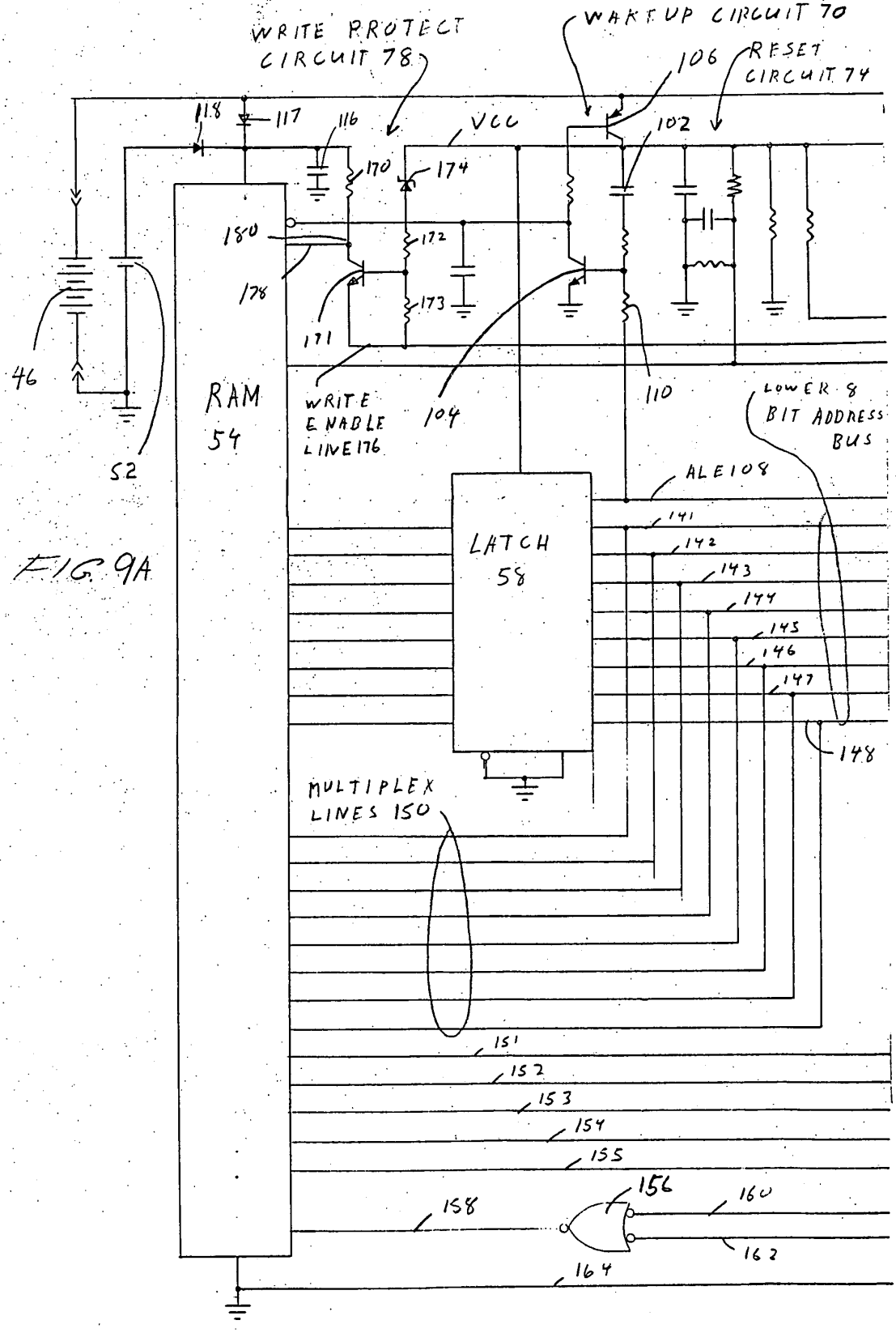
204
54
LED 3
LED 4
56
LED 2
52
46
LED 1
58
12
36
43


WRITE PROTECT CIRCUIT 78
WAKE UP CIRCUIT 70
RESET CIRCUIT 74
106
102
VCC
118
117
116
170
174
180
172
178
173
171
46
52
RAM 54
WRITE ENABLE LINE 176
104
110
LOWER 8 BIT ADDRESS BUS
ALE 108
LATCH 58
141
142
143
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148
MULTIPLEX LINES 150
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FIG. 9A

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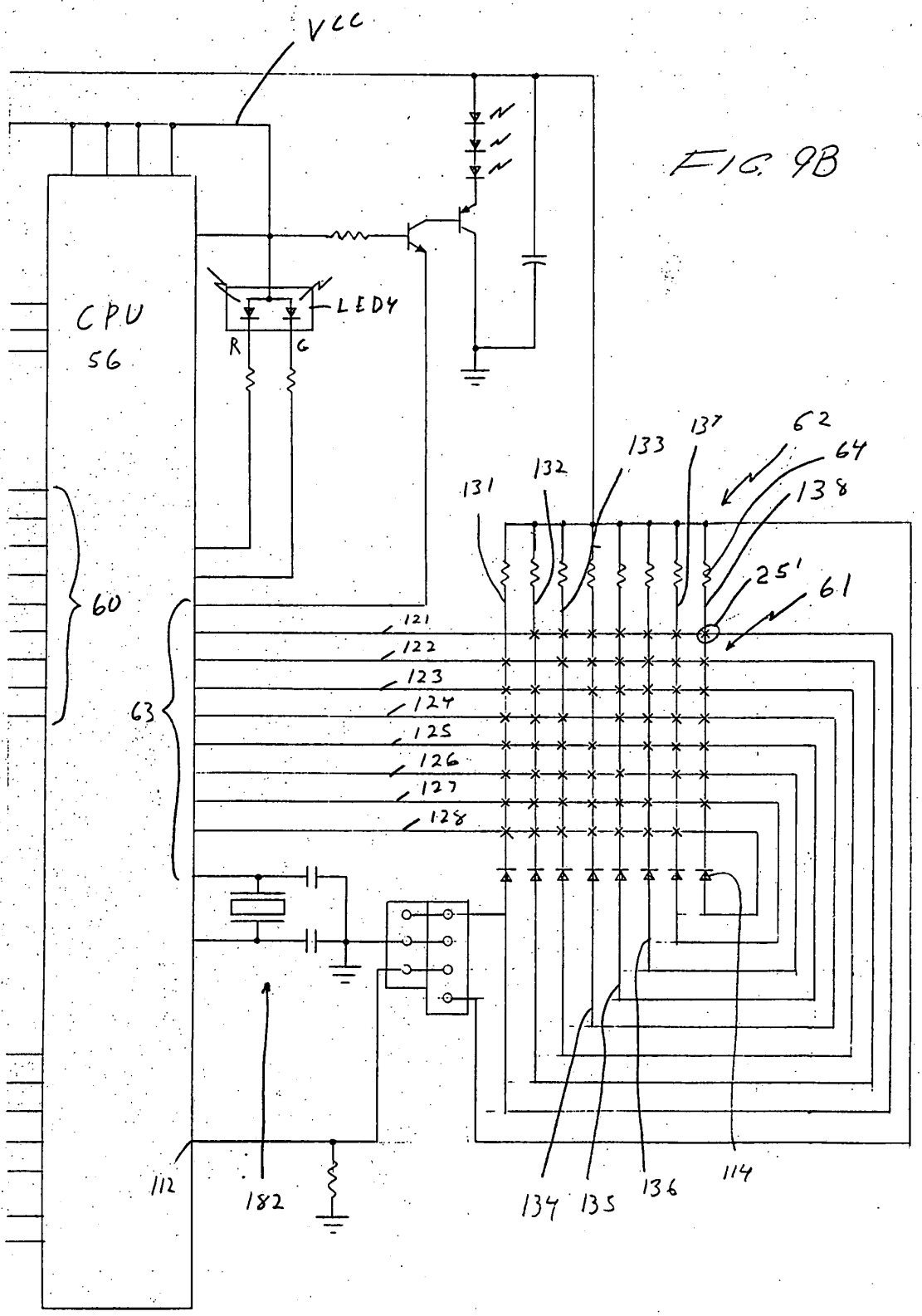

FIG 9B

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FIG. 11

MODULATION SCHEMES

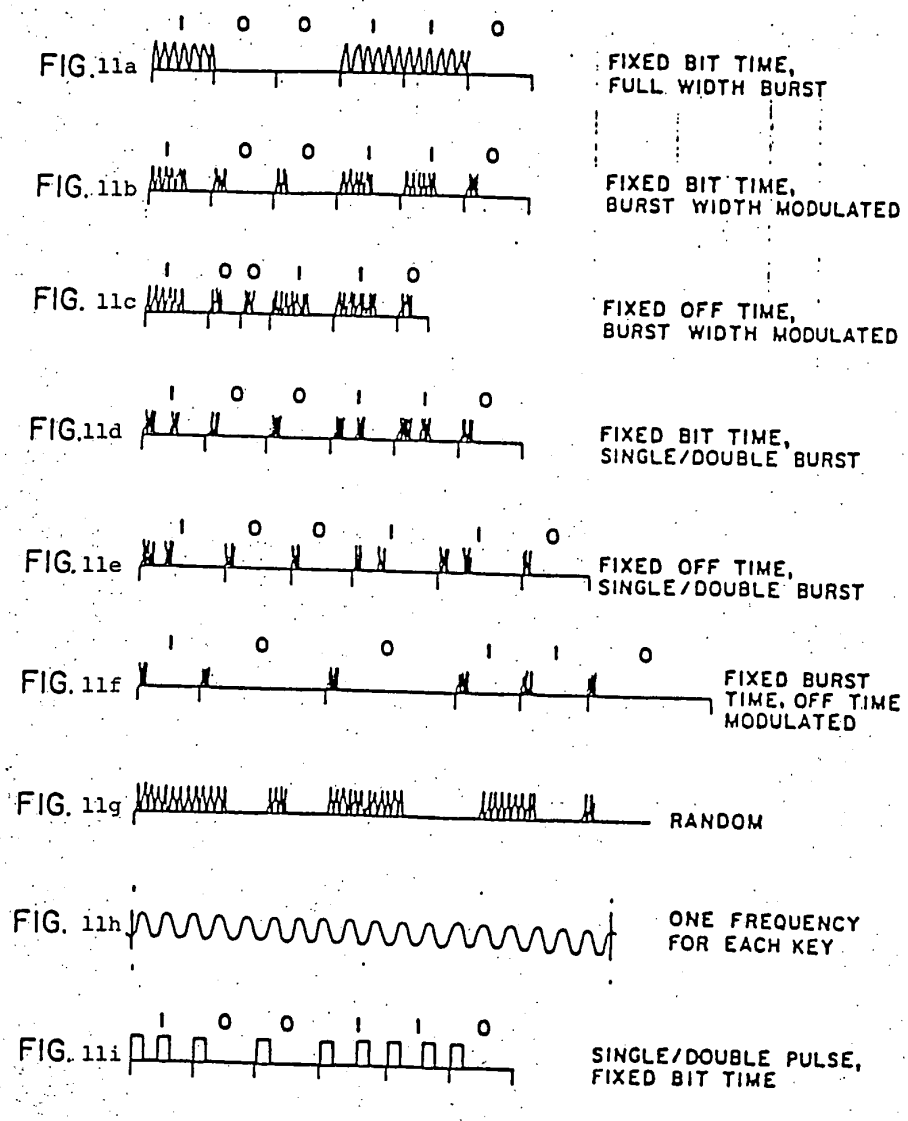


FIG. 12A

CAPTURING IR CODE

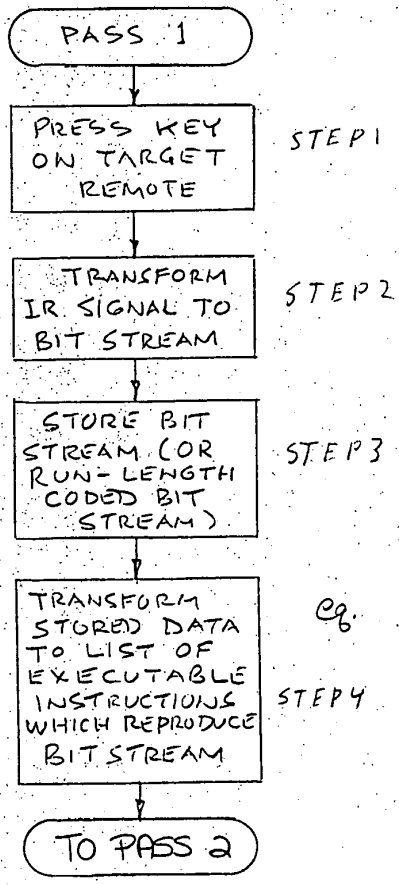


FIG. 12B

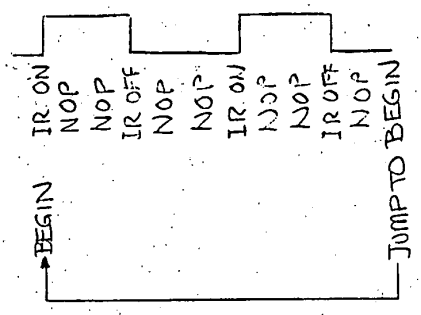


FIG. 13A

CAPTURING IR CODE

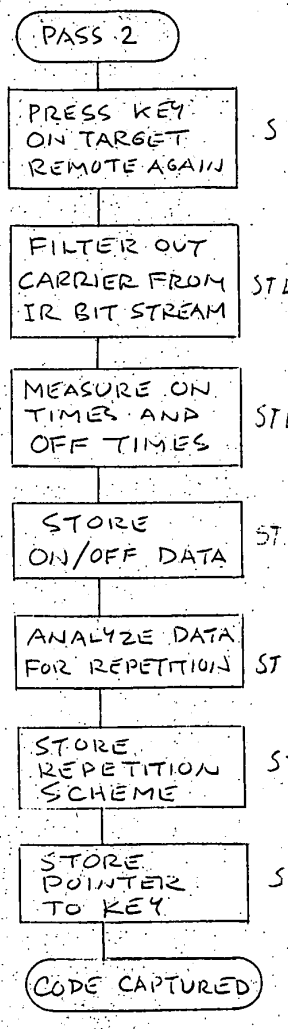


FIG. 13B

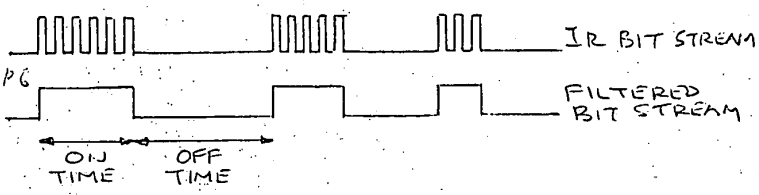


FIG. 13C

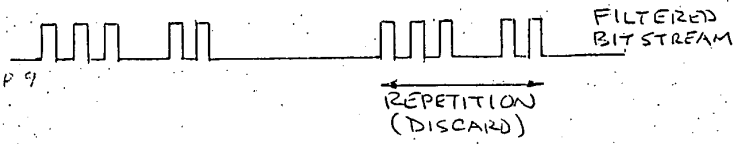
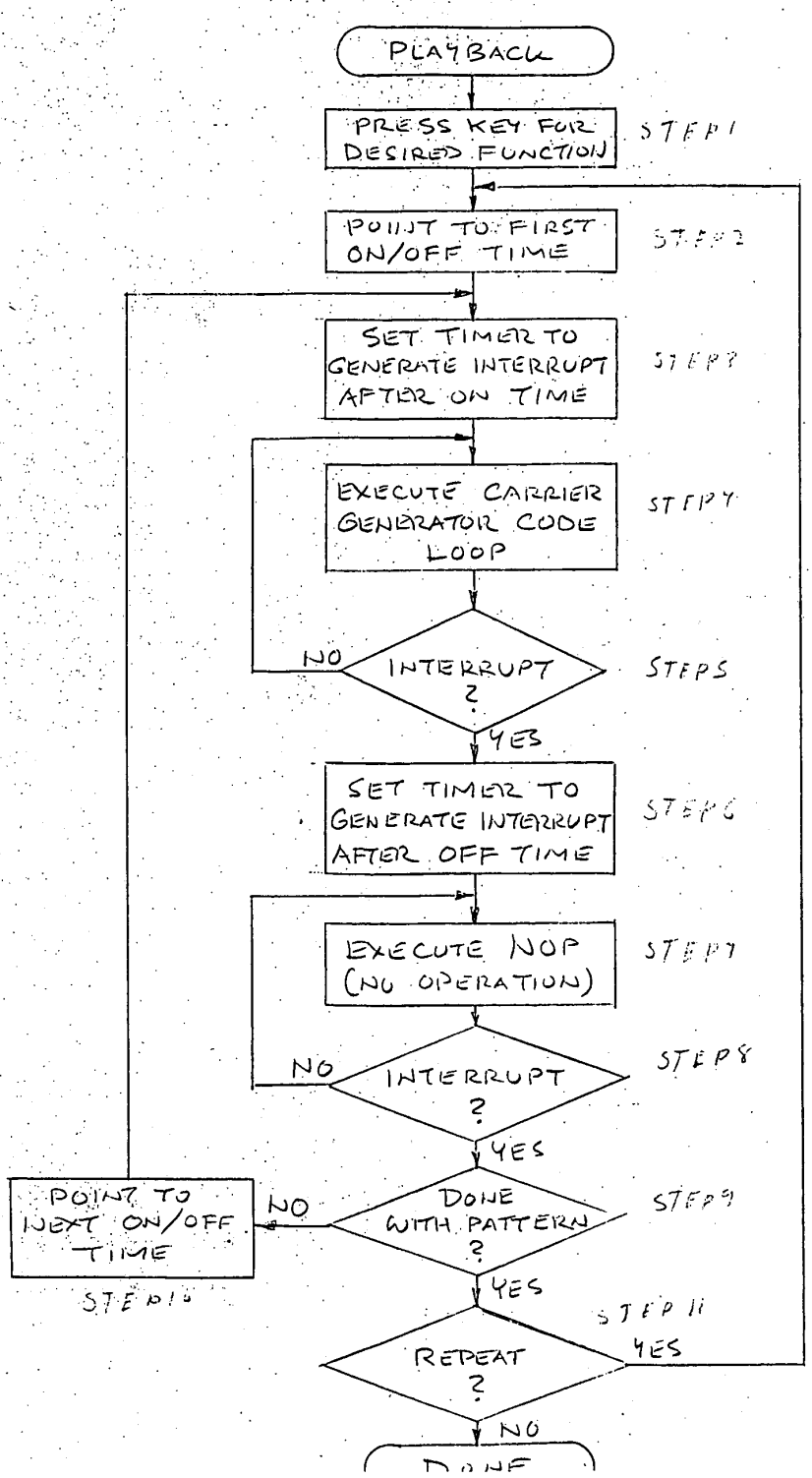


FIG. 14 GENERATING IR CODE



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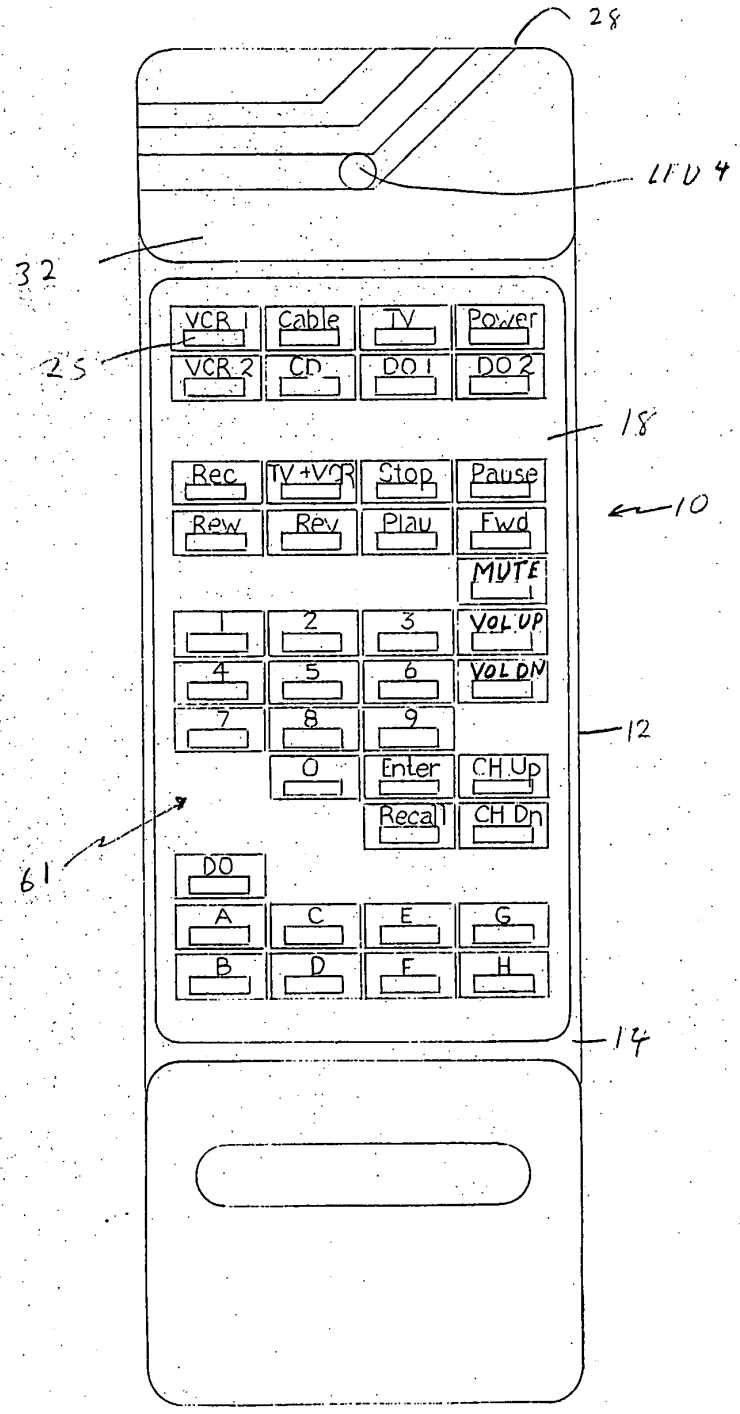
127999

FIG. 15



13 of 17
250
08/127999

FIG. 16

STEP AND SET METHOD

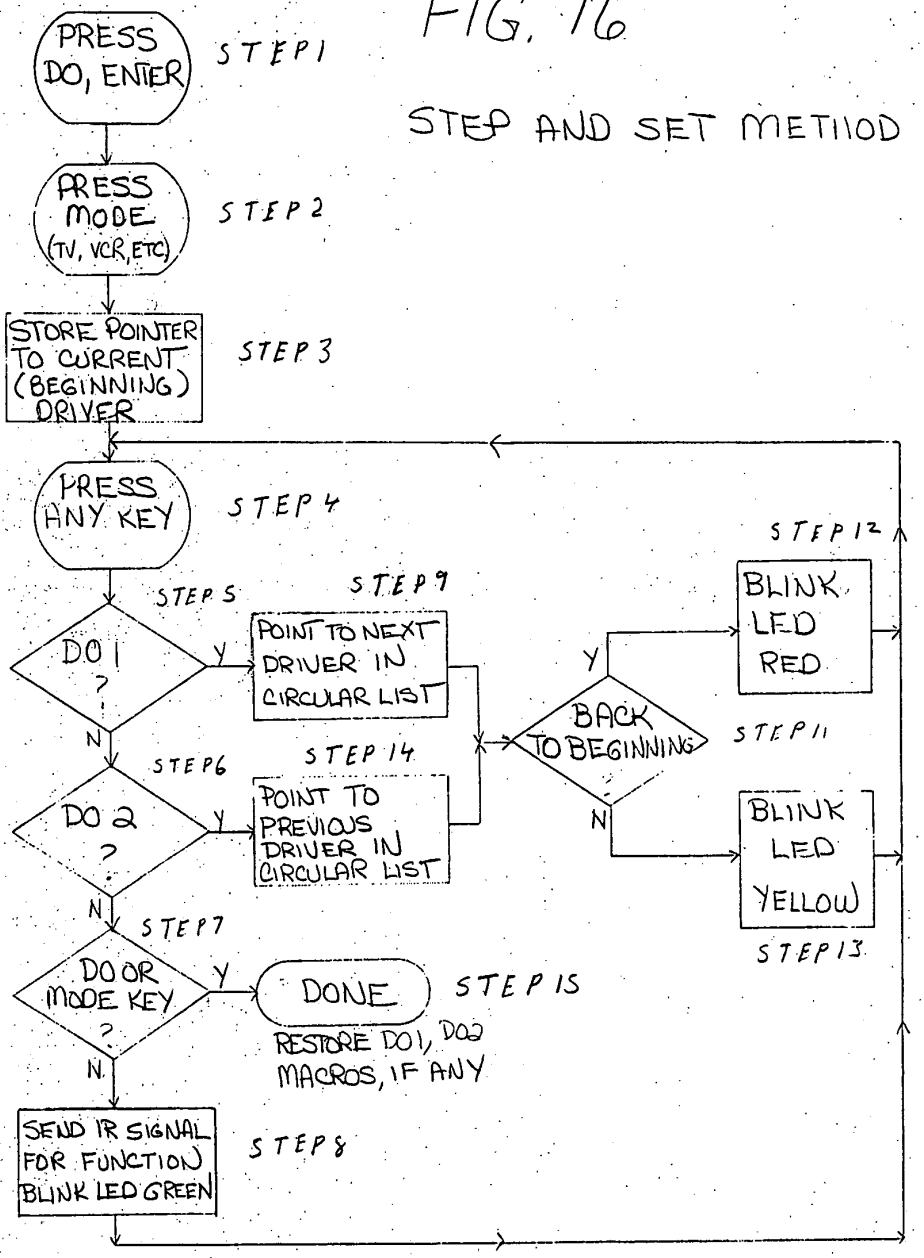


FIG. 17
DIRECT ENTRY-QUICK SET

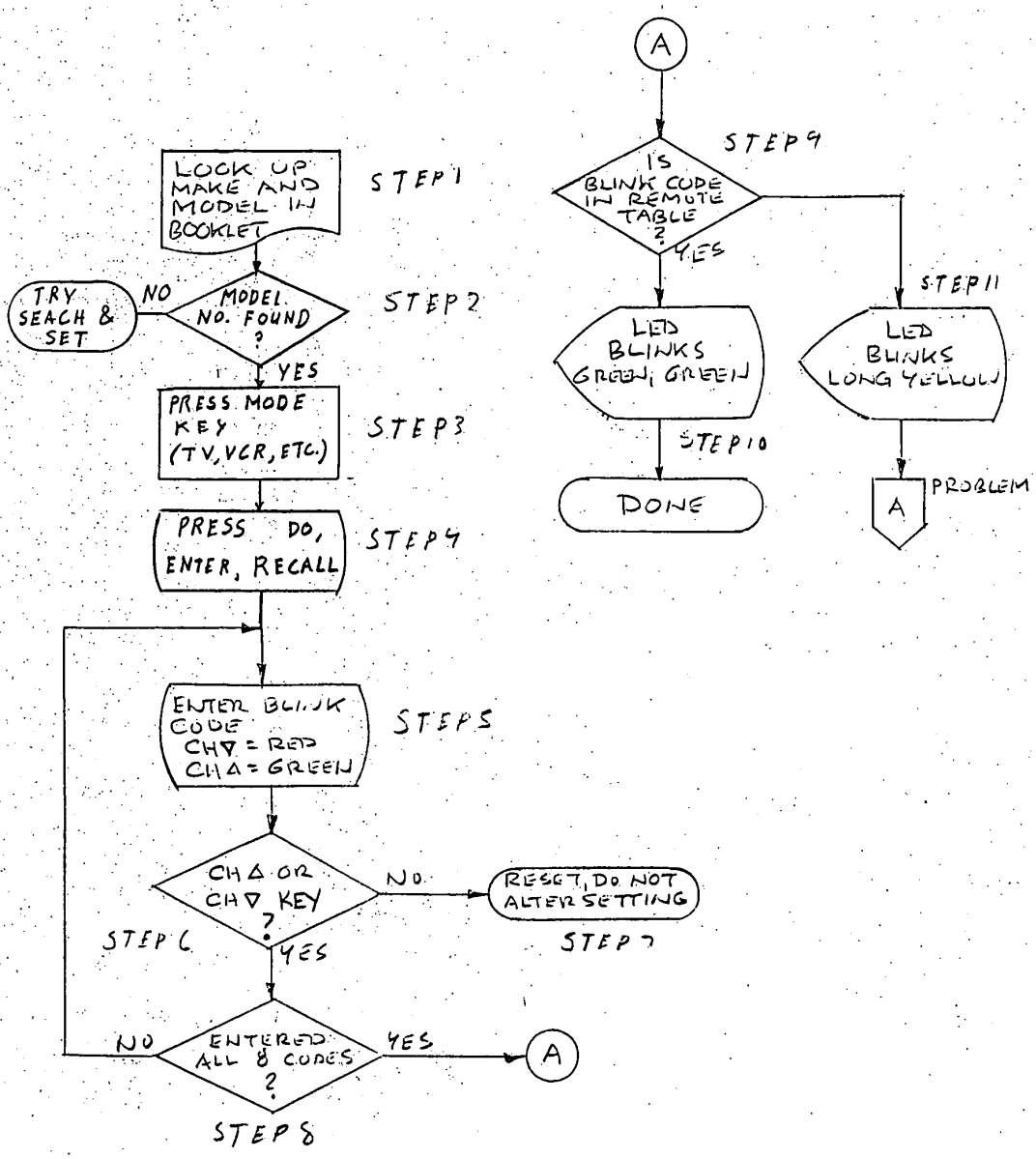


FIG. 18A

SETTING A "DO" COMMAND MACRO

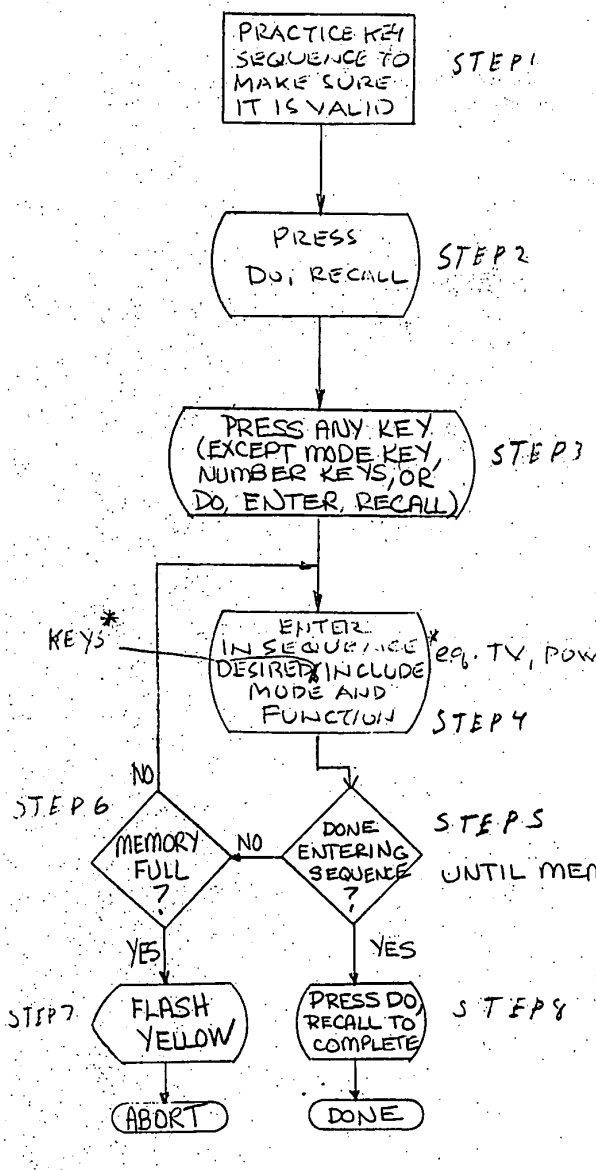
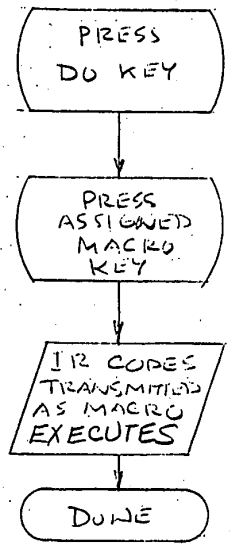


FIG. 18B

EXECUTING A MACRO "DO" COMMAND



*eg. TV, POWER, VCR 1, POWER, PLAY, TV, 3, ENTER

160f17
250
67/127999

FIG. 19A

TO IDENTIFY WHAT DEVICE REMOTE IS SET FOR - BLINK CODE

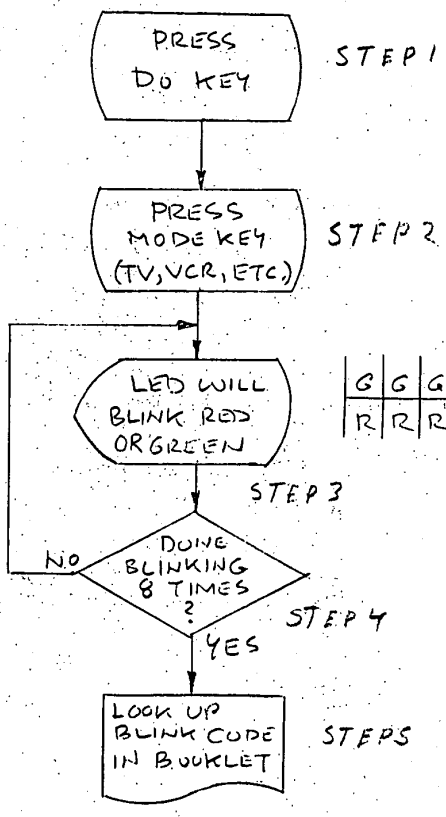


FIG. 19B

G	G	G	G	G	G	G	G
R	R	R	R	R	R	R	R

17 of 17
250
127999

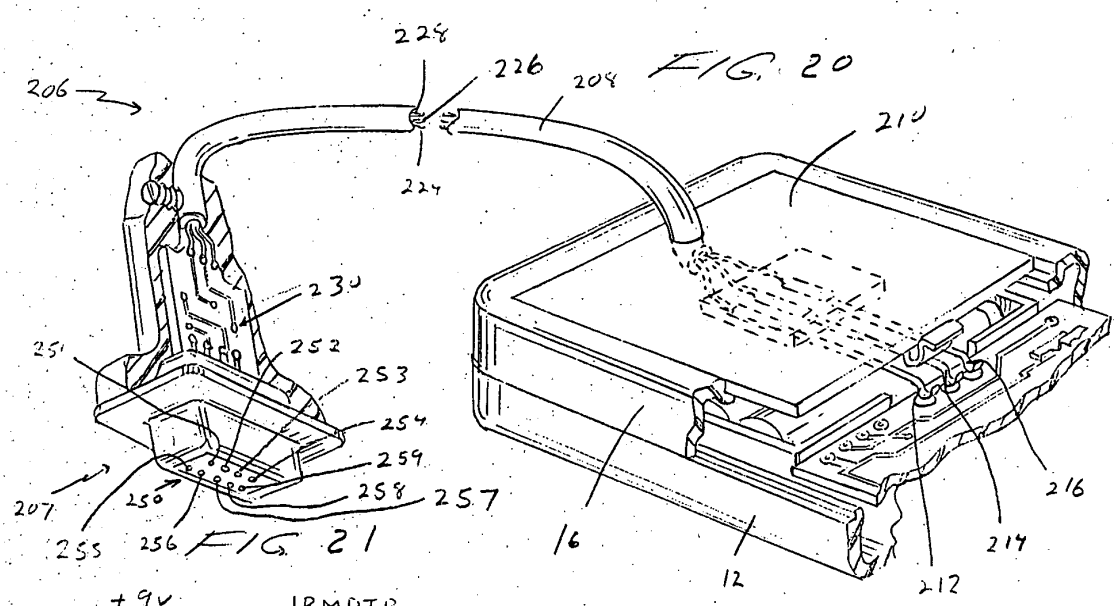


FIG. 20

FIG. 21

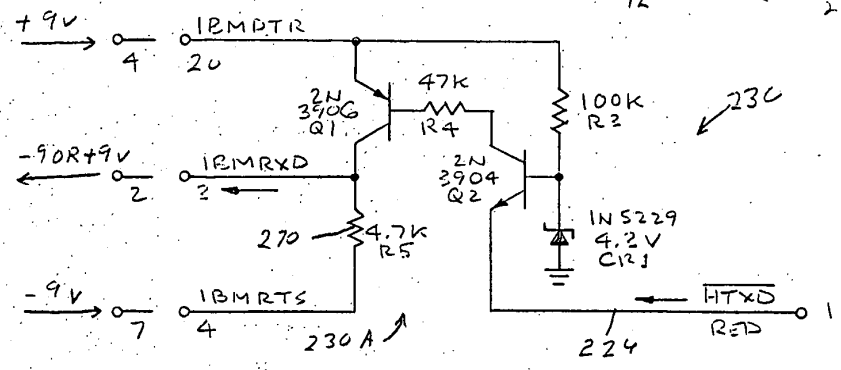
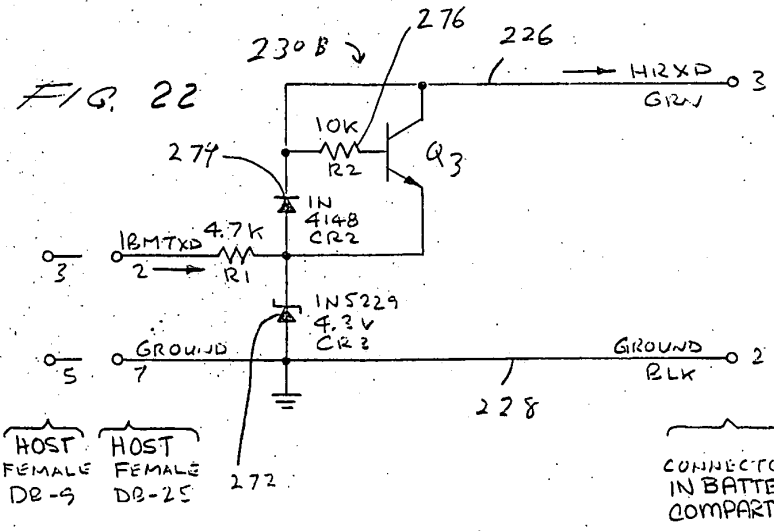


FIG. 22



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For:

UNIVERSAL REMOTE CONTROL DEVICE

CROSS-REFERENCE TO RELATED APPLICATION

This application is a Continuation-in-Part of U.S. Application Serial No. 109,336 filed October 14, 1987 for: UNIVERSAL REMOTE CONTROL DEVICE.

"Express Mail" mailing label number B 11784237

Date of Deposit December 2, 1987

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(Signature of person mailing paper or fee)

UNIVERSAL REMOTE CONTROL DEVICE

BACKGROUND OF THE INVENTION

Field of the Invention

The present invention relates to a universal remote control device of the type which is hand held and which can be coupled via coded infrared signals with a remote control receiver built into a television or other remotely controlled electrical apparatus to turn on the apparatus, such as the television, at a distance, to adjust the volume, tone and brightness, to change channels, and to turn the television off.

Additionally, the present invention relates to a method for acquiring the infrared codes for a controlled apparatus, such as a television, generating code data related to these infrared codes for storage in a remote control device and methods for using the remote control device for finding, in a library or table of code data for generating infarared codes for operating different electrical apparatus manufactured by different manufacturers stored in a RAM of the remote control device, the code data for generating infrared coded signals for operating a particular apparatus, such as a television, and then for using the stored code data for generating the coded infrared signals for operating the controlled apparatus.

Description of the Prior Art

Heretofore it has been proposed to provide a reconfigurable remote control device and programmable functions for such a remote control device which will enable one to learn, store and retransmit infrared codes that are emitted from the controller for a remotely controlled apparatus, such as a television.

For example, in the Welles II U.S. Patent No. 4,623,887 and the Ehlers U.S. Patent No. 4,626,848, there is disclosed a reconfigurable remote control device which has the ability to learn, store and repeat remote control codes from any other infrared transmitter. Such a reconfigurable remote control

transmitter device includes an infrared receiver, a microprocessor, a non-volatile random access memory, a scratch pad random access memory, and an infrared transmitter.

According to the teachings of the Ehlers patent, the infrared signals received by the remote control device are in bursts of pulses and the device counts the number of pulses in each burst as well as the time duration of each pause in a transmission between bursts.

As will be described in greater detail hereinafter, the universal remote control device of the present invention utilizes a single non-volatile RAM and does not provide a separate scratch pad RAM or, more importantly, a ROM.

In learning the infrared code and transforming same to code data which is then stored in a RAM of the control device and later used to generate infrared codes, a novel method is utilized wherein no counting of pulses takes place, and only the time duration of the pulses in a burst of pulses from the leading edge of the first pulse in a burst of pulses to the trailing edge of the last pulse in the burst as well as the time duration of the pause between bursts are sensed and used to learn and later to generate the infrared codes.

Additionally, unique methods for use of the remote control device are provided so that a number of infrared operation code sequences can be generated by the remote control device for operating various types of electronic apparatus.

SUMMARY OF THE INVENTION

According to the invention, there is provided in a universal remote control system having input means and signal output means for supplying a signal to a controlled device and a central processing unit coupled to said input means and said signal output means, no ROM and a single, non-volatile, read-write RAM coupled to said central processing unit.

Further according to the invention, there is provided a method of loading a RAM in a ROM-less microprocessor system comprising a central processing unit, a single non-volatile, read-write RAM, input means, output means, and means for coupling said central processing unit, said RAM, said input means, and said output means together, said method including the steps of:

(a) disabling the central processing unit;

(b) connecting a separate microprocessor system to said RAM;

(c) transferring instructions and/or data to said RAM;

(d) re-enabling the central processing unit to enable the central processing unit to execute the instructions so transferred.

Still further according to the present invention, there is provided a process of learning, storing and reproducing the remote control codes of any of a diverse plurality of remote control transmitters, comprising the steps of:

(a) receiving a transmission of a train of pulses from a remote control transmitter;

(b) recording the point-in-time of an edge of each pulse in a train of said pulses;

(c) transforming the recorded point-in-time data into a list of instructions for generating a replica of said train of pulses;

(d) timing the duration of a train of said pulses;

(e) timing the period between trains of pulses;

(f) associating a function key of a universal remote control device with said time duration of said train of pulses and said list of instructions for generating a replica of said train of pulses;

(g) determining whether or not repetitions of the transmission of train of pulses is present;

(h) ignoring repetitions of the train of pulses;

(i) noting that repetitions are present; and

(j) storing for use in a universal remote control device, the information acquired in steps (c), (d), (e), (f) and (i).

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a front perspective view of the universal remote control device constructed according to the teachings of the present invention.

FIG. 2 is an exploded perspective view of the control device shown in FIG. 1.

FIG. 3 is an enlarged fragmentary sectional view through two of the push buttons of the control device shown in FIGS. 1 and 2.

FIG. 4 is a fragmentary corner view of a push button containing panel and a base panel.

FIG. 5 is a fragmentary corner view similar to FIG. 4 as the panels are brought together and shows one of the push buttons cut away from the push button containing panel.

FIG. 6 is a fragmentary sectional view of the assembly 15 formed by bringing the push button containing panel into engagement with the base panel.

FIG. 7 is a plan view of the circuit board assembly mounted inside the control device viewing the control device from the back side thereof with a back cover panel removed.

FIG. 8 is a block diagram of the operating circuitry in the control device.

FIGS. 9A & 9B are a detailed schematic circuit diagram of the operating circuitry shown in FIG. 8.

FIG. 10 is a perspective view showing the connection of a programming connector over the central processing unit of the operating circuitry in the control device, the programming connector being connected to a microprocessor, being operable to disable the central processing unit, and being used to program the random access memory (RAM) of the operating circuitry.

FIGS. 11a to 11i are graphical representations of several

modulation schemes which are used in infrared remote control transmitters.

FIG. 12A is a flow chart of a first part of a method for capturing an IR code and FIG. 12B is a graph of the envelope of the code.

FIG. 13A is a flow chart of a second part of a method for capturing an IR code; FIG. 13B is a waveform of the IR bit stream and filtered bit stream; and FIG. 13C is a graph of the waveform of a filtered repetition of a filtered bit stream.

FIG. 14 is a flow chart of the method used for generating an infrared code.

FIG. 15 is a front plan view of the control device shown in FIG. 1 and shows the various pushbuttons of the device.

FIG. 16 is a flow chart of the search and set procedure followed in using the control device of the present invention.

FIG. 17 is a flow chart of a direct-entry/quick-set procedure followed in using the remote control device.

FIG. 18A is a flow chart of the procedure followed in setting a "DO" command and FIG. 18B is a flow chart of the method for executing a "DO" command.

FIG. 19A is a flow chart of the method used to identify what type of unit the remote control device is set for and FIG. 19B is a table of the identifying blink code.

FIG. 20 is a fragmentary perspective view with portions broken away of a connector with conversion circuitry therein and a special battery case cover for the control device by which new data can be inputed into the RAM of the operating circuitry of the control device.

FIG. 21 is a schematic circuit diagram of part of the conversion circuitry in the connector shown in FIG. 20.

FIG. 22 is a schematic circuit diagram of another part of the conversion circuitry in the connector shown in FIG. 20.

DESCRIPTION OF THE PREFERRED EMBODIMENT

Referring now to FIG. 1 in greater detail, there is illustrated therein a universal remote control device 10 constructed according to the teachings of the present invention.

As shown, the device 10 includes a housing 11 including an upper housing member 12 having a base panel 14, and a lower housing member 16. An overlay face panel 18 is positioned over the base panel 14.

The two panels 14 and 18 have openings 22 and 24 (FIG. 2) therethrough for receiving elastomeric pushbuttons 25, all of which extend from and are fixed to or integral with an elastomeric body panel 26 as shown in FIG. 2.

The pushbuttons 25 are arranged in rows and columns and are identified as follows on the overlay face panel 18:

VCR 1	Cable	TV	Power
VCR 2	CD	DO 1	DO 2
Rec	TV . VCR	Stop	Pause
Rew	Reverse	Play	Fast Fwd
			Mute
1	2	3	Vol Up
4	5	6	Vol Dn
7	8	9	
	0	Enter	CH Up
		Recall	CH Dn
DO			
A	C	E	G
B	D	F	H

This arrangement is shown in FIG. 15 and the manner in which these pushbuttons 25 are utilized in operating the control device 10 will be described in greater detail in connection with the description of FIGS. 15-19B.

At a top or forward end 28 of the device 10, there is

provided an opening 30 for three light emitting diodes, LED 1, LED 2 and LED 3. The opening 30 is covered by an infrared-transport lens 31. Also, provided on a top surface 32 of the upper housing member 12 of the control device 10 is a light emitting diode, LED 4, by which information, in the form of red and green blink codes, is communicated to the user of the device 10.

FIG. 2 is an exploded view of the components of the device 10. As shown, the device 10 includes the overlay face panel 18 with pushbutton-receiving, generally rectangular openings 22, the upper housing member 12 with base panel 14 having a plurality of generally rectangular, pushbutton receiving openings 24, the elastomeric body panel 26 having pushbuttons 25 extending from an upper surface 34 thereof, a printed circuit board 36 having conductive switches 38 on an upper surface 40 thereof and operating circuitry 42 (FIG. 7) mounted on the underside 43 thereof, the lower housing member 16, a cover 44 for a battery compartment 45 (FIG. 7) for receiving batteries 46 (FIG. 10) for the circuitry 42 of the control device 10, and the infrared-transport lens 31.

It will be noted that the base panel 14 of the upper housing member 12 has pushbutton openings 24 completely across each one of fourteen (14) rows across and four (4) columns down. However, not all of these openings or holes 24 have pushbuttons 25 extending therethrough, as noted by the lesser number of pushbutton-receiving openings 22, in the overlay face panel 18. Likewise, the body panel 26 initially has pushbuttons 25 arranged completely across the upper surface 34 thereof in fourteen (14) rows across and fourteen (14) columns down.

The printed circuit board 36 has conductive switches 38 aligned with each one of the pushbuttons 25 so that more switches 38 are provided than may be necessary for this particular control

device 10.

The availability of additional pushbutton openings 24 in the base panel 14 will enable the control device 10 to be modified as necessary by the addition of further pushbuttons 25 to perform numerous other functions as called for.

This mechanical construction of the upper and lower housing members 12 and 16 and the panels 14 and 18 and circuit board 36 enable the control device 10 to be modified to include additional circuits in the operating circuitry 42 and pushbutton switches 25 for performing additional functions, if desired. In this respect, overlay face panel 18 is easily replaceable to modify the device 10 to include more or less pushbuttons 25 and associated switches 38.

The simplicity of the construction of the pushbuttons 25, the base panel 14 and the overlay panel 18 is shown in FIGS. 3-6. As shown in FIG. 3, the body panel 26 has a plurality of raised pushbuttons 25 formed thereon. Each raised rectangular button 25 has a recessed area or hollow 48 on the underside 49 of each button 25 in which is mounted a conductive plunger or puck 50 adapted to engage one of the conductive switches 38 on the circuit board 36. With the pushbuttons 25 and the panel 26 being formed from a sheet of elastomeric material it is an easy matter to remove the buttons 25 that are not necessary with a scissors or other cutting element, as shown in FIG. 4.

Then, the pushbutton body panel 26 is moved into engagement with the base panel 14, as shown in FIG. 5, to form the assembly shown in FIG. 6.

After the pushbutton body panel 26 and the base panel portion 14 have been assembled as shown in FIG. 6, the overlay face panel 18 is mounted on top of the base panel 14 and the circuit board 36 is mounted within the housing member 12.

Referring now to FIG. 7, there is illustrated therein the

operating circuitry 42 of the control device 10 which includes batteries 46 (FIG. 10) mounted in the compartment 45 for providing power for the circuitry 42 and a lithium battery 52, which backs up a statuc RAM 54. A central processing unit (CPU) 56, is coupled through a latch 58 to the RAM 54. Three LEDs, LED 1, LED 2, and LED 3 are coupled to the circuitry 42 for communication with the apparatus to be controlled. All elements of the circuitry 42 are mounted on the circuit board 36 mounted in the upper housing member 12. A further LED, LED 4 is coupled to CPU 56 for communication with the user of the device 10 as will be described in greater detail below.

A block schematic circuit diagram of the operating circuitry 42 is shown in FIG. 8 and includes CPU 56, the infrared light emitting diodes, LED 1, LED 2, and LED 3 coupled to the CPU 56, serial input/output ports 60 of CPU 56, the RAM 54 coupled to CPU 56 and backed up by lithium battery 52 and a 4 x 14 keyboard 61 coupled to CPU 56. The four AAA batteries 46 are also shown.

FIGS. 9A and 9B are a detailed schematic circuit diagram of the operating circuitry 42. The operating circuit 42 includes the central processing unit 56, the latch 58, the random access memory 54 and LED 1, LED 2, LED 3 and LED 4.

The operating circuitry also includes several subcircuits. One of those subcircuits 62 (FIG. 9B) includes the keyboard 61 having pushbuttons 25, each of which is connected to a port 63 of the CPU 56 shown in FIG. 9B and can be referred to as the keyboard circuit 62. The X's in FIG. 9B indicate the pushbuttons 25 and when one of those pushbuttons X is pressed, current flows through a resistor in a column line, e.g., when button 25' is pressed current flows through resistor 64 in column line 138 going to the button or key 25'. That raises the voltage on a supply line VCC to the CPU 56 of the microprocessor.

Accordingly, whenever a button 25 is pressed, it will

increase the voltage on line VCC which initiates a switiching process in a wake up circuit 70 for "waking up" or energizing the CPU 56 in the manner described below.

In addition to the keyboard circuit 62 and the wakeup circuit 70, the subcircuits include a reset circuit 74, and a write protect circuit 78.

When the voltage on line VCC goes up, a signal is passed through capacitor 102, to the base of a transistor 104 in the wake up ciruit 70. This turns on the transistor 104 which in turn turns on transistor 106 This turning on of the transistors 104 and 106 will bring voltage on line VCC to the full DC voltage of about 5 1/2 volts. When the voltage on line VCC reaches 5 1/2 volts, the CPU 56 begins to operate.

When operating, the CPU 56 establishes a signal on line ALE 108 which is passed through a resistor 110 and filtered by capacitor 102. Once the ALE signal is established, it causes a voltage to be generated at the base of transistor 104, maintaining transistor 104 turned on, which in turn maintains transistor 106 turned on, thus enabling the CPU 56 to continue to run. The CPU 56 can turn itself off by executing a HALT instruction which causes the ALE signal to cease, thus turning off transistors 104 and 106 and removing power via line VCC to the CPU 56.

It is to be noted that the wake up circuit 70 can be activated by depression of a key or button 25 or by an input signal at serial port 3 coupled to an input port 112 of the CPU 56.

The circuit elements described above form the wakeup circuit 70 for activating the operating circuitry 42 of the device 10. This circuit uses substrate static-protection diodes 114 in a CMOS chip coupled to the keyboard 61. With this arrangement, source current is supplied to transmitter 104 via line VCC when a

key or pushbutton 25 is depressed.

The RAM 54 is connected to the lithium battery 52 and, when the device 10 is not being used, draws about 20 nanoamps from the battery 52, which gives the device 10 a shelf life between 5 and 10 years. A backup capacitor 116 is coupled to the RAM 54 and has (at 20 nanoamps) a discharge time of about 10 minutes, providing ample time to change (if necessary) the battery 52 without losing the instructions and data stored in the RAM 54. Capacitor 116 is kept charged by battery 46 through diode 117 when the device 10 is operating and, at other times, by battery 52 through diode 118.

After the CPU 56 has been powered up, or awakened, the CPU 56 makes a scan of row lines 121-128 to the keyboard 61 by sequentially forcing each line 121-128 low and then polling the other lines to find out which button 25, such as button 25', has been pressed. As a result of pushbutton 25' being pressed, a low impressed upon row line 121 will cause a low on column line 128 and that will result in the row line 128 being low.

The CPU 56 first sets row line 121 low and then begins scanning, starting with the row line 122, for another row line having a low voltage thereon and by finding the row line with the low voltage, in the above example, row line 128, the CPU 56 knows that button 25' at the intersection of row line 128 and column line 138 has been depressed.

If the CPU 56 had not found a low on another row line, such as row line 128, after having set line row 121 low, line 121 is returned to its previous value and row line 122 is then set low, and the scan continued until a low row line is found to identify which button 25 has been depressed.

When the CPU 56 determines which pushbutton 25 has been depressed the CPU 56 will then know what function is to be carried out.

It is to be noted that the keyboard circuit 62 is uniquely designed to include only eight (8) row lines 121-128 and eight (8) column lines 131-138 each having a resistor 64 and a current directing diode 114 therein and each being arranged across the row lines 131-138 so that 56 switch positions are provided with only eight (8) lines.

All memory cycles exercised must involve the latch 58 because the CPU 56 has its data bus multiplexed with the lower 8 bits of the address bus on lines 141-148.

Coming out of the CPU 56 to the latch 58, is a group of nine (9) lines 108 and 141-148. One of the lines, line 108, carries the ALE signal. The eight (8) lines 141-148 between the latch 58 and the CPU 56 are the multiplexed data and address bus lines. These lines comprise the lower 8 bits of the address bus. A group of multiplex lines are identified with reference numeral 150. Five more lines 151-155 comprise the upper five bits of the address bus, making a total of 13 bits of address.

An inverting OR gate 156 having an output line 158 and two input lines 160 and 162 together with ground line 164 are coupled between the CPU 56 and the RAM 54. The line 158 defines an output enable for the RAM 54.

Accordingly, when the CPU 56 wants to do a read, it actuates either of the two input lines 160 or 162 going into the OR gate 156. Line 160 is a PSEN line for telling the RAM 54 that it is to be enabled to receive data and line 162 is a Read Output line to tell the RAM 54 that the CPU is going to read the information stored in the RAM 54. With OR gate 156 the two lines and functions are combined on one line 158. In other words, the CPU 56 tells the RAM 54, through the OR gate 156, that it wants to read information stored in the RAM 54.

The circuitry 42 also includes the write protect circuit 78 which has the double duty of being a low battery indicating

circuit. The circuit 78 includes a resistor 170, a transistor 171, two resistors 172, 173 and a Zener diode 174 connected as shown.

A write enable line 176 is connected between the transistor 171 and the CPU 56.

When the CPU 56 desires to write information into the RAM 54, it places the address on the address bus lines 141-148 and 151-155, strokes the lower 8 bits of the address bus on lines 141-148 into the latch 58 using ALE line 108, places the information on the data bus lines 141-148, and then brings the write enable line 176 low.

When the write enable line 176 goes low, unless the transistor 171 is turned on by virtue of the battery voltage being more than 4.3 volts, a line 178 going into the RAM 54 at the collector 180 of the transistor 171 (which is the "write enable" for the RAM 54), is prevented from going low, maintaining the RAM "Write Protected". This condition also is created when the battery 48 is low. The "write enable" line 176 also functions as a low battery detector because, during execution of the program, a check is made to see whether writing to the RAM 54 is enabled. If it is not, this shows that the batteries are weak and a signal is sent to the user by flashing the red LED, of LED 4, 5 times.

Note that LED 4 includes a red LED and a green LED incorporated into one package so that when both LEDs are turned on, a yellow light is emitted, making LED 4 a tricolor LED. Such tricolor LED 4 enables the device 10 easily to communicate to the user by way of the color, number and sequence of light blinks.

A clock circuit 182 including a crystal resonator is coupled to the CPU 56.

Three serial ports 1-3 are coupled to the CPU 56 and include port 1 which is a transmitting port, port 2 which is ground and

port 3 which is a receiving port. Serial port 1 is connected to row line 121 so that data can be serially transmitted in the form of highs and lows by CPU 56 from the RAM 54 over row line 121 to serial port 1. Incoming data is received serially at serial port 3 and conveyed to input port 112, when it is desired to update the code data and/or instructions in the RAM 54.

The three infrared-emitting LEDs, LED 1, LED 2, and LED 3 are connected in the circuitry 42 as shown.

The reset circuit 74 includes two resistors and a capacitor connected as shown and coupled between line VCC and a reset line 184.

As will be described in greater detail in connection with the description of FIGS. 11-14, the manufacturer of the device 10, using known methods or the method described herein with reference to FIGS. 12A-13C, will decipher the infrared codes for operating various pieces of equipment, such as a TV, a VCR, a CD, a Cable Converter or other equipment which is controlled by a remote infrared transmitting device.

After the infrared code is deciphered, the code data therefor and instructions for generating such code (see the flow chart in FIG. 14) are stored in a programming computer 200 (FIG. 10) and the device 10 is programmed as explained below.

It is to be noted that the circuitry 42 has no ROM and all instruction codes and code data are loaded directly into the RAM 54. This allows for infinite upgradability in the field via the serial ports 1, 2, 3.

FIG. 10 is a perspective view of a programming computer 200 coupled by a cable 202 to a special connector 204 which is adapted to be received over the CPU 56 in the operating circuitry 42 for disabling the CPU 56 and for enabling the RAM 54 to be programmed by the programming computer 200. Essentially this is done by tri-stating the CPU 56 and placing the RAM 54 into the

address space of the computer 200 which writes initial instruction code including code for the serial port driver, and subsequently serially, other instruction code and code data into the RAM 54. For this purpose the programming computer 200 has instruction codes such as serial port driver instructions and data relative to the infrared codes for operating a multiple number of electronic apparatus, such as televisions, VCR's, etc stored therein. Signals from the programming computer 200, via the connector 204 cause the inputs and outputs 60 of the CPU to be disabled so that instruction codes and data can be input into the RAM 54 quickly and efficiently from the programming computer after the operating circuitry 42 is mounted in the control device 10.

Later, after the device 10 has been in use for some time and the RAM 54 needs to be updated with instruction codes and data relative to new equipment on the market, the control device 10 can be simply and easily updated at a service outlet having an ordinary personal computer with a serial port using a novel nine pin to three pin, 9 volt to 5 volt, signal coupling and converting assembly 206 (FIG. 20). The updating can be done by adding to the data in RAM 54 or by rewriting (writing over) the data in RAM 54. The assembly 206 is described in greater detail hereinafter in connection with the description of FIGS. 20-22.

The infrared codes to be learned include a wide range of different codes for operating different electrical apparatus manufactured by the same or different manufacturers. In FIG. 11, which is identical to FIG. 1 in US Patent No. 4,623,887, there are illustrated several modulation schemes for infrared codes. FIGS. 11a-11g illustrate different types of gated carrier frequencies. Typical carrier frequencies for infrared remote transmitters are 20 Khz to 45 Khz, with the majority being at 38 Khz and 40 Khz. The gating schemes illustrated include both

fixed and variable bit periods, non-return to zero (NRZ), variable burst widths, single/double burst modulation schemes, and a final catch-all category called random because there is no readily distinguishable pattern of ones and zeros.

In addition to these schemes, there is also a transmitter which puts out a different continuous frequency (CW) for each key as represented in FIG. 11h.

Finally, several new types of transmitters do not use a carrier frequency at all but instead send a stream of pulses where the data is encoded in the spaces between the infrared pulses as shown in FIG. 11i.

Data modulation schemes for most transmitters have a higher level of data organization which may be called a keyboard encoding scheme which causes different data to be sent depending upon the transmitter and the key pressed. This will be described in greater detail hereinafter in connection with FIGS. 15-19.

The code data for the infrared codes may be obtained from vendor information sheets and specifications, can be determined using the methods disclosed in U.S. Patents Nos. 4,623,887 and 4,626,848, or by the method disclosed herein.

In the method for learning or acquiring code data for infrared codes disclosed herein, no counting of pulses is carried out. Instead the method involves the following steps:

(a) receiving a transmission of a train of pulses from a remote control transmitter;

(b) recording the point-in-time of an edge of each pulse in a train of the pulses;

(c) transforming the recorded point-in-time data into a list of instructions for generating a replica of the train of pulses;

(d) timing the duration of a train of the pulses;

(e) timing the period between trains of pulses;

(f) associating a function key of the universal remote

control device 10 with the time duration of the train of pulses and the list of instructions for generating a replica of the train of pulses;

(g) determining whether or not repetitions of the transmission of train of pulses is present;

(h) ignoring repetitions of the train of pulses;

(i) noting that repetitions are present; and

(j) storing for use in a universal remote control device, the information acquired in steps (c), (d), (e), (f) and (i).

Typically, each pulse has a fixed duty cycle and in carrying out the above described method it can be assumed that each pulse has a fixed duty cycle.

The manual and computer steps followed in practicing this method are set forth in Figs. 12A and 13A.

FIG. 12A is a flow chart of the first part of this method for capturing an IR code and FIG. 12B is a graph of a pulse train comprising a portion of the code.

There is shown in FIG. 12B, adjacent the transforming step in FIG. 12A, a graph of the waveform of the captured, and later recreated, infrared codes, showing when the infrared signal is on and when it is off. When the CPU 56 executes the instructions set forth below the waveform in FIG. 12B, infrared-emitting LEDs, LED 1, LED 2, and LED 3 are turned on when the instruction IR-ON is executed and turned off when the instruction IR-OFF is executed. No operation is performed when the instruction NOP is called for. In this way the infrared codes are transformed into a bit stream of 0's and 1's.

FIG. 13A is a flow chart of a second part of the method for capturing an IR code.

FIG. 13B shows the IR infrared bitstream and an envelope of the filtered bitstream.

FIG. 13C shows the filtered waveform that is analyzed for

repetition. The repetition scheme and a pointer to indicate, upon regeneration of the infrared code, which key will generate that code are stored in a memory for later inputting into the RAM 54.

FIG. 14 is a flow chart of a sequence of eleven (11) steps that a user initiates to generate a specific IR code for performing a specific function, namely, for generating a captured IR code stored in the remote control device 10. The code data is stored in the RAM 54 of the remote control device 10 and the sequence of steps the circuitry 42 goes through to take the code data in the RAM 54 and generate the infrared code therefrom is set forth in this Figure.

FIG. 15 is a plan view of the keyboard 61 and shows the different keys or pushbuttons 25 of the control device 10 extending through the base panel 14 of upper housing member 12 and the face panel 18 where the label or identification for each pushbutton or key 25 is shown. The light emitting diode, LED 4, is also indicated.

FIG. 16 is a flowchart of the steps initiated by a user of the device 10 in a step and set procedure for searching for code data in the device 10 for the infrared code needed to operate the user's specific apparatus and to set the device 10 for that code data.

FIG. 17 is a flow chart of the steps initiated by a user in carrying out a direct-entry/quick-set procedure for matching the user's equipment or apparatus to the device 10.

The steps of this procedure include:

STEP 1. Look up make and model number of the controlled apparatus in a table provided to the user in an instruction booklet.

STEP 2. Model number is found and matched with a series of 8 "R"s and "G"s.

STEP 3. Here the operator presses the desired mode button or

key.

STEP 4. Press DO, Enter, Recall. This tells the device 10 to do a Quick-Match.

STEP 5. Next enter the sequence of eight red and green blinks found in TABLE I (set forth below) provided in the instruction booklet. This is done by pressing Channel Down for "R" and Channel Up for "G".

STEP 6. Here a determination is made if a key other than Channel Up or Channel Down, was pressed.

STEP 7. The device 10 tricolor LED 4 will flash red or green depending on what button is pushed.

STEP 8. When all eight codes are entered, the program goes on to STEP 9.

STEP 9. Here a check is made to see if the blink code is in the table in the RAM 54 of the remote control device 10.

STEP 10. If the device 10 has successfully Quick-Matched to the controlled apparatus, the LED 4 will flash green twice.

STEP 11. If it did not match, it will flash yellow indicating that codes for that controlled apparatus are not loaded into the RAM 54.

TABLE I is set forth below:

TABLE I

DEVICE BLINK CODES AND SPECIAL FEATURE BUTTONS

TELEVISION SETS

Blink Code	A	B	C	D	E	F	G	H
RRRR RRRR	Display	MTS	Pict +	Pict -	Sleep	TV/Video	Ant	Tone
RRRG RRRG	25-Col Up	26-Col Dn	27-Brt Up	28-Brt Dn	29-Hue Up	30-Hue Dn	31-Htx	32-Reset
	Screen Dn	Sp Phne/ Prnt Ctl	AutoOn/ Data Ent	AutoOff/ Data Clr	Ant	Stereo		
RRRG RGRG	Add	Clear						
RRRG GRRR	A Ch	1|4 F1						
RRRG GRGR	Ant/Aux	Time/Ch	Program	TV/VCR				
RRRG GGRR	Ant/Aux	Time/Ch						
RRRG GGGG	Pwr On	Pwr Off	Display	Ant				
GRRG RRRG	Aux	Last Ch	Timer					
GRRG RRGG	Fine Up	Fine Dn	L Ctl	R Ctl	OBC	Func	Reviev	BiLinR
	25-Stereo	26-TimeFo	27-Timer	28-TimeS1	29-TV/AV			
GRRG RGRR	Fine Up	Fine Dn	L Ctl	R Ctl	OBC	Func	Reviev	BiLinR
	25-Stereo	26-TimeFo	27-Timer	28-TimeS1	29-TV/AV			
GRRG RGGR	Tint R	Tint L	Color R	Color L	Contr R	Contr L	Timer	Stereo
	24-SAP	25-Reset	26-Q/V	27-EXP	28-Disp	29-Mono	30-Lock	31-TV
	32-Ext 1	33-Ext 2	34-Ant					
GRRG GRRG	TV/Video	Time						
GRRG GRGR	TV/Video	Wide	Lvl Up	Lvl Dn	Memory	Func	NTC	Stereo
	25-Timer	26-100	27-BiLinR	13				
GRRG GRGG	10	11	12					
GRRG GGRR	RF12	Ch Rtn	Str SAP	Mono	Timer	T Set	TV/CATV	TV/Vid
	26-100	27-Audio	28-CCC1	29-CCC2	30-CCC3	31-CCC4	32-ContDn	33-ContUp
	34-Pict	35-Reset						
GRGG RRRR	Sleep	Reviev						
GRGG RRRG	K	L						
GRGG RRGR	SAP	Sleep	TV/Video					
GRGG RRGG	Program	Q Rev	SAP	Sleep	TV/Video	Add	Delete	
GRGG RGRG	Sleep	St/SAP	TV/Video					
GRGG RGGR	11	12	13	14	15	16		
GRGG RGGG	K	L						
GRGG GRRR	K	L						

TABLE I
(continued)

VIDEO CASSETTE RECORDERS

Blink Code	A	B	C	D	E	F	G	H
RRRR RRRR	Nse Cncl							
RRGR RRRG	Ant							
RRGR RRGR	Ant							
RRGR RRGG	Frm Adv	Slow	Slow Up	Slow Dn	Srch Fwd	Srch Rev		
RRGR RGRR	A	B	C	D	E	F	Slow	
RRGR GGGR	Slow							
RRGR RGGR	Slow +	Slow -	Eject	CM Skip	Program	Input	Mode	AM/PM
	28=Shift	29=Reset	30=Mem/PS	31=SR				
RRGR RGGG	Forward	FlshBack	Ant	Vol +	Vol -	Reverse	Sp Phne	PC
RRGR GRRR	Ant/Aux							
RRGR GRRG	11	12	13	14	15	16		
RRGR GRGR	Frm Adv	Memory	Reset	Chg Time				
RRGR GGRR	Pwr On	Pwr Off						
RRGR GGGG	Slow	Slow Up	Slow Dn	Set Up	Set Dn	Timer	Clear	Display
	29=Frame	30=Memory	31=Prog	32=Qtr	33=QtrStr	34=Quick	35=Remain	36=Rst
	37=Clock	38=APS	39=100					
GGRG RRRR	K	L						
GGRG RRRG	CFM	Slow						
GGRG RRGR	Slow	OSP	Shift L	Shift R	Slow Dn	Slow Up	St +	St -
	28=Timer							
GGRG RRGG	11	12	13	14	15	16	Slow	
GGRG RGRR	Slow Dn	Slow Up	Slow					

CABLE CONVERTERS

Blink Code	A	B	C	D	E	F	G	H
RRRR RRGR	A/B	Add	Delete	Set	Lock	Last Ch		
RRRR RRGG	A	B	Event(*)	#	Arrow Up	Arrow Dn	AP	Delete
	25=F	26=K	27=Learn	28=PGM	29=TCP	30=Enter		
RRRR RGRR	Skew L	Skew R	Audio	SAT	Ant East	Ant West		
RRRR RGRG	Plus	Minus	Dot	Box	Str	Clear	Time	Auth
	22=C/R	23=#						
RRRR RGGR	Prog	Auth						
RRRR RGGG	Auth							
RRRR GRRR	Auth	Prog						
RRRR GRRG	Plus	Minus	Rcp	*	M1	M2	M3	M4
RRRR GRGR	A-B	Dot 1	Dot 2	*	Am	Dm	F	
RRRR GRGG	Arrow Up	Arrow Dn						

COMPACT DISK PLAYERS

Blink Code	A	B	C	D	E	F	G	H
RRRR RRRR	CD Fwd	CD BckUp						
GRRG GRGG	Fwd Indx	Rev Indx	Repeat	Memory				

• For numbered functions, press "DO" then the two-digit number.

FIG. 18A is a flow chart of the steps for setting a "DO" command macro, for achieving a function that normally requires the actuation of several buttons, by programming one particular button to perform the functions required of the several buttons to achieve a specific function.

FIG. 18B is a flowchart of the simple two pushbutton steps required for executing the "DO" macro command created in FIG. 18A.

FIG. 19A sets forth the steps initiated by a user to determine the various blink codes which identify what equipment or apparatus the remote control device 10 is set for.

FIG. 19B illustrates a sample blinking grid of eight red and green blinks which will be presented to the user. Once a particular pattern of eight red or green blinks has taken place, the user of the device 10 will look up the blink pattern or code in TABLE I included in a user handbook. This table shows the user which pushbuttons 25 labelled A-H are associated with additional functions stored which may be stored in the RAM 54. Additional functions beyond the eight supported by pushbuttons A-H are performed by pushing "DO", and then the two-digit sequence shown in TABLE I.

The instructions for using the control device 10 which are supplied to a purchaser thereof in an instruction booklet are set forth below.

Matching the Device to Your Equipment

The device 10 can control most remote controlled TV's, VCR's, cable converters, and CD players, but it needs the user's input to match it to your particular equipment. The easiest way to do this is to STEP-and-SET your device 10. You will only need to do this once for each different type of device you have.

1. To STEP-and-SET your device 10, first press DO, Enter.

2. Press one of the following equipment selection buttons to tell the device 10 what kind of equipment to match.

VCR1	Cable	TV
VCR2	CD	

3. Aim the device 10 at the equipment and try various function buttons to see if the equipment responds correctly. Make sure you are reasonably close to the equipment and that nothing is blocking the path. The light (LED 4) at the top of the device 10 will shine green whenever it is sending an infrared code, or it will not light at all if it does not send a code for a particular button.

4. If your equipment did not respond correctly or did not respond at all, press DO1 to change the device 10 so that it will send the next set of infrared codes in its library, or press DO2 to change it so it will send the previous set of codes.

5. When you use DO1 or DO2 to step the device 10 setting forward or back, its light will blink yellow each time you step it. The settings step around in a circle. Whenever you get back to the setting where you started the device 10 light will blink red to notify you.

6. Use DO1 and DO2 to step through the sets of codes and keep trying out functions until your equipment responds correctly. The device 10 will then be set to send the proper infrared codes for operating your particular equipment.

7. When you are satisfied that the device 10 is properly matched, press D0, or any of the equipment selection buttons to restore the D01 and D02 buttons to their normal functions.

8. If your equipment is responding to your device 10 but some buttons are causing the wrong thing to happen, keep going. Some equipment responds to the infrared codes of other brands of equipment.

9. If you try out all of the codes in the device 10 library and your equipment still does not respond, it is probably because the code data for generating the infrared codes for operating your equipment is not in the library of your control device 10.

The Keyboard 61

Take a look at the keyboard. There are four groups of buttons:

1. Equipment Selection Buttons tell the device 10 which equipment is to be controlled:

VCR1	Cable	TV
VCR2	CD	

2. Basic Function Buttons are used to control your TV, VCR, CABLE and CD. They work in much the same way as in older remotes which typically have the following buttons.

			Power
Rec.	TV.VCR	Stop	Pause
Rewind	Reverse	Play	Fast Fwd
			Mute
1	2	3	Vol.Up
4	5	6	Vol.Dn
7	8	9	
	0	Enter	Chan.Up
		Recall	Chan.Dn

3. Extended Function Buttons perform any special functions your equipment may have, such as color control, picture control,

tint control, etc. These buttons are identified with the following alphabet letters.

A	C	E	G
B	D	F	H

4. DO Buttons are used to perform very powerful DO Commands which are explained below.

Special Features

Besides the basic functions such as channel up/down and volume up/down that most TV remote controls have, there could be special features as well, for example:

Color up/down.

Picture up/down.

Tint up/down.

Sleep.

Your VCR's remote control can also have special features such as:

Frame advance

Channel up/down

Your cable converter remote control can also have additional features such as:

Channel recall

Delete

Your CD player remote control can have special features such as:

Repeat

Track programming

Once you have matched the device 10 to your TV, VCR, Cable Converter and CD player, all functions that were controlled by your old remote control devices can now be controlled by the device 10. You may even notice some extra features that weren't controlled by your old remote.

Since the device 10 can control such a wide range of

equipment, there is not enough room on it for buttons for every possible feature of every remote control. Instead, there are eight extended function buttons at the bottom labelled A through H. To find out what these eight buttons control for your particular TV, VCR, cable converter and CD player:

1. Get your pen and paper ready.

2. Press DO and then the button (TV VCR1 VCR2 Cable CD) of the device you want to know the special features of.

3. The device 10 will blink "red" or "green" 8 times. Every time it blinks "red" write down an "R". Every time it blinks "green" write down a "G". When you're finished writing it should look something like this:

R R R G R R R G

This is the "Blink Code" for your device. If you miss it the first time around, just press DO and the device button a second time.

4. Look at TABLE I and find the sequence of "R"s and "G"s that matches the one you wrote down.

5. Read the special features chart next to your Blink Code sequence which tells you what functions the A through H buttons control for your particular device.

For example, the feature chart of your TV might read:

A: Color Up	C: Picture Up
B: Color Down	D: Picture Down

6. To turn the color up in this example, you would press TV (of course if the device 10 is already set to control your TV, you do not have to press TV again but it doesn't hurt if you do so), then A.

7. To turn the color back down, you would just press B.

8. Write down what special functions are controlled by the A through H buttons on the handy stick-on labels enclosed with the control device 10.

9. After writing down the special functions on the labels, stick them on to the back of the control device 10 for quick and easy reference.

If The Controlled Equipment Has More Than 8 Extended Functions

Usually, the eight A through H buttons are enough for most controlled equipment. If they're not, don't worry. If your controlled equipment has more than eight special features these too are controlled by the device 10.

Beyond the A through H function buttons, any additional functions are performed by pressing DO then two of the 0-9 number buttons. For example, your TV's feature chart may show additional functions like these:

25: SAP	26: Reset	27: Q/V
28: Display	29: Mono	30: Stereo

If you did have these features and wanted to use them, you would press DO and then the two-digit number for that feature. For example, you might:

Press DO,3,0. This would turn your TV's stereo broadcast feature on.

If you use a feature like this frequently you may want to assign it to a DO command, our next topic of discussion.

Setting DO Commands

DO Commands give you the power to perform a multitude of different functions with the push of just one or two buttons. DO Commands let you assign any of the following buttons to tell the device 10 to automatically perform a series of keystrokes you use often:

			D01	D02
	Rec	TV.VCR	Stop	Pause
	Rewind	Reverse	Play	Fast Fwd.
				Mute
				Vol. Up

Vol. Dn

Enter Chan. Up

Chan. Dn

A C E G

B D F H

To tell the device 10 to do what you want, you must teach it. As an example, you can teach the device 10 to turn your whole system on and set the TV to channel 4 by doing the following:

1. Press DO, Recall. This tells the device 10 that you want to teach it something to do.

2. Next, you must assign a button 25 you will use to DO whatever you teach it. You can use any of the device 10's buttons 25 set forth above. For example, let's use DO1 at the top of the keyboard: Press DO1.

3. Now, you must tell the device 10 what button sequence you would press to turn your whole system on and set the TV to channel 4.

4. Press TV Power. This tells the device 10 to turn your TV on.

5. Press 4, Enter (pressing Enter may not be required for your TV). This tells the device 10 to set your TV to channel 4.

6. Press VCR, Power. This tells the device 10 to turn your VCR on.

7. Press Cable, Power. This tells the device 10 to turn your cable converter on.

Now you have pressed all the buttons you want the device 10 to learn for this example.

8. Press DO, Recall. This tells the device 10 that you are finished teaching it and to remember what you have taught it.

Now the device 10 knows how to turn your TV, VCR, and cable converter on and set the TV to channel 4, just by pressing one button.

9. Aim the device 10 at your equipment and press DO1. Make sure you keep the device 10 pointed at your equipment while the light is flashing.

Now that you know how DO Commands work, you can teach the device 10 to "DO" practically any sequence of keystrokes. Just remember to keep the following in mind:

To perform a DO Command, press DO then the button you assigned to remember the DO Command. However, if you assigned the DO1 or DO2 buttons to remember a DO Command, you do not have to press DO first, just press DO1 or DO2.

If the device 10 light (LED4) starts blinking green, yellow, red while you are trying to teach it, it is telling you that RAM 54 is full. The DO command you are teaching is automatically erased. You can teach the device 10 a shorter DO command, or erase some other DO command you have already taught the device 10 to obtain more memory space.

After the DO Command is finished, the last apparatus 10 selected within the DO Command will be the apparatus the device 10 will work with next.

Erasing a DO command

If you just want to change a DO Command, you do not have to erase it first - just set up the new DO Command in its place. However, to get rid of a DO Command without replacing it with a new one:

1. Press DO Recall.

2. Press the button you have assigned to the DO command that you want to erase. For example, to erase the DO command you taught the device 10 in the above example:

Press DO1.

3. Press DO, Recall again. The old DO Command is now erased.

QUICK-MATCHING To Your Equipment

There is a quicker way to match your equipment to the device 10 by Quick-Matching. Quick-Matching is a way to set the device 10 directly to match any controlled equipment in its library. Follow the steps below to do a Quick-Match:

1. Match the device 10 to your equipment using STEP-and-SET.

2. Press DO, then the desired device button (TV, VCR1, VCR2, Cable or CD). The device 10 light will blink red or green eight times.

3. Write down the sequence of red and green blinks. This is the "Blink Code" for the particular device.

4. Press DO Enter Recall. This tells the device 10 to do a Quick-Match.

5. Enter the correct sequence by pressing Ch Dn for "R" and Ch Up for "G". The device 10 light (LED 4) will flash "red" or "green" depending on what button you push. The Ch Dn and Ch Up buttons 25 are labelled with the correct color for each.

6. When the device 10 has successfully Quick-Matched your equipment it will automatically flash green twice. If it did not match, it will flash yellow. If it fails to Quick-Match, it is probably because the requisite code data is not stored in the library in your device 10.

QUICK-MATCHING Between Controlled Equipment

One of the great benefits of Quick-Matching is that you can switch the device 10 functions between the remote controlled TVs, VCRs and cable converters you may own. This is done by using "Quick-Match" within a "DO command".

Let's suppose you have two TVs in your house and only one device 10. Here's how to switch between them:

1. Press DO Recall, the button you want to use to switch to

your other TV set.

For example, press D02. This tells the device 10 that you want to teach it a DO Command.

2. Press DO Enter Recall. This tells the device 10 that you want to do a Quick-Match.

3. Enter the R and G blink sequence of the second TV you want to control by pressing Ch Dn for "R" and Ch Up for "G".

4. Press DO, Recall. This tells the device 10 that you are finished teaching it a "DO command".

Now, to set the device 10 to control your second TV, press D02. This tells the device 10 that you will be controlling your second TV.

To go back to controlling your first TV, simply teach device 10 another "DO command". Just repeat the steps above, except use a different button and the correct R and G sequence for your first TV.

The device 10 can easily be taught to control a whole houseful of infrared remote controlled equipment - just teach the device 10 a DO Command to QUICK-MATCH each additional piece of equipment.

In FIG. 20 is shown a unique signal coupling and converting assembly 206 which includes a connector assembly 207, a cable 208 and a special cover plate 210 for the battery compartment 45. The cover plate 210 has on the underside thereof three pins 212, 214 and 216 which are positioned to connect with the three serial ports 1, 2 and 3. The pins 212, 214 and 216 mounted to the cover plate 210 are connected by three wire conductors 224, 226 and 228 in cable 208 to connector assembly 207 which has conversion circuitry 230 therein. The connector assembly 207 has a nine pin array 250 of sockets 251-259 for receiving nine pins and the conversion circuitry 230 which enables one to use some of the nine sockets 250 of the connector assembly 207 for

communication with the three pins 212, 214, 216 that are connected to the serial ports 1, 2 and 3 as shown in FIGS. 21 and 22.

FIGS. 21 and 22 are a schematic diagram of the conversion circuitry 230.

In FIG. 21 is shown circuit portion 230A. In this circuit portion, plus nine volts goes into pin 4 of connector DB-9 or pin 20 of connector DB-25 and minus 9 volts goes into pin 7 of DB-9 or pin 4 of connector DB-25, which are connected to the circuit portion 230A of the conversion circuitry 230. This provides a constant source of positive and negative voltage and is used as the power supply for the circuit. Note that two different types of personal computer host female connectors can be used, namely, female connector DB-9 or female connector DB-25 in the connector assembly 207.

Serial information is transmitted by the hand held control device 10 via line HTXD at serial port 1 and is level translated by the operating circuitry 42 from a range of from plus 5 volts to zero volts to a range of from minus 9 volts to plus 9 volts.

In this respect, when 0 volts is present at serial port 1, transistors Q1 and Q2 are turned on such that +9 volts is supplied from pin 4 of connector DB-9 or pin 20 of connector DB25 through transistor Q1 to pin 2 of connector DB-9 or pin 3 of connector DB-25.

Then, when +5 volts is present at serial port 1, the emitter-base of transistor Q2 is reverse biased, turning off transistor Q2 which turns off transistor Q1. As a result, the9 volts at pin 7 of connector DB-9 or pin 4 of connector DB-25 is supplied through resistor 270 to pin 2 of connector DB-9 or pin 3 of connector DB-25.

The circuit portion 230B is shown in FIG. 22 and performs a receiving function for the control device 10. When pin 3 of

connector DB-9 or pin 2 of connector DB-25 is at -9 volts, its normal resting state, then HTXD at serial port 3 is at 0 volts. When pin 3 of connector DB-9 or pin 2 of connector DB-25 goes to +9 volts, HTXD at serial port 3 goes to plus 5 volts. Pin 5 of connector DB-9 or pin 7 of connector DB-25 is directly connected to serial port 2 and always stays at ground.

In transmitting data to the control device 10, the programming computer supplies +9v or -9v to pin 3 of connector DB-9 or pin 2 of connector DB-25. When +9v is present on IBMTXD, 4.3 volts established by Zener diode 272 is passed through diode 274 to serial port 3.

When -9v is present on IBMTXD, the Zener diode 272 clamps to -0.6 volts resulting in conduction through transistor Q3 pulling serial port 3 to 0 volts.

The diode 274, the transistor Q3 and a resistor 276 connected as shown are provided to allow pressing a key 25 on keyboard 26 to "wake up" CPU 56 (actuate the wake up circuit 70) even though circuit portion 230B is connected to the control device 10.

From the foregoing description, it will be apparent that the universal remote control device 10, the signal coupling and converting assembly 206, the disclosed methods of learning and storing infrared codes, and the methods for operating the control device 10 of the present invention have a number of advantages, some of which have been described above and others of which are inherent in the device 10, assembly 206 and the methods of the invention disclosed herein. For example:

1) With no ROM in the circuitry 42, the instruction codes and code data in the RAM 54 can be upgraded at any time via the serial ports 1, 2 and 3.

2) By loading the instruction codes and initial code directly into the RAM 54 by tri-stating the CPU 56, the circuitry

42 is enabled to function without a ROM.

3) The serial ports 1, 2 and 3 together with the signal coupling and converting assembly 206 enable new data to be input into the circuitry 42 from an RS-232 interface device to the serial ports 1, 2 and 3.

4) The visible LED 4 providing red/green/yellow/off blink code provides a means for communicating to the user where the device 10 has "landed" after searching for codes to control a specific apparatus. The user can then look up in the instruction booklet what extended functions are available via the letter keys A-H or number keys, plus the DO key for that particular apparatus or equipment.

5) The write-protect circuit 78 prevents corruption of the operating program or data in the RAM 54 during transient states when the microprocessor is being turned on or turned off.

6) The multiplexing of the address and data lines between the RAM 54 and the CPU 56 enables scrambling of the instruction codes and the code data so that the memory image in the RAM 54 is encrypted.

7) The construction of the keyboard 61 enables one to have 56 keys which can be decoded using only 8 bidirectional input (and output) ports 63.

8) The keyboard 61 including the keyboard circuitry 62 plus the wakeup circuit 70 provides a system whereby pressing any key turns on power to the CPU 56.

9) The provision of three infrared LEDs 1, 2 and 3 with no current-limiting resistors enables the device 10 to use maximum energy to create the infrared control pulses with a minimum amount of energy wasted.

10) The DO keys together with the numeral and letter keys allow a number of DO functions to be performed with the device 10 by a user.

11) Any combination of products can be controlled with the universal remote control device 10.

12) The step-and-set method for locating the code data for generating the infrared code necessary to operate the user's equipment or for the user to learn that such code data is not present in the library in the RAM 54.

Also modifications can be made to the device 10, the assembly 206 and the described methods of the present invention without departing from the teachings of the present invention. Accordingly, the scope of the invention is only to be limited as necessitated by the accompanying claims.

CLAIMS

We Claim:

1. A process of learning, storing and reproducing the remote control codes of any of a diverse plurality of remote control transmitters, comprising the steps of:

(a) receiving a transmission of a train of pulses from a remote control transmitter;

(b) recording the point-in-time of an edge of each pulse in a train of said pulses;

(c) transforming the recorded point-in-time data into a list of instructions for generating a replica of said train of pulses;

(d) timing the duration of a train of said pulses;

(e) timing the period between trains of pulses;

(f) associating a function key of a universal remote control device with said time duration of said train of pulses and said list of instructions for generating a replica of said train of pulses;

(g) determining whether or not repetitions of the transmission of train of pulses is present;

(h) ignoring repetitions of the train of pulses;

(i) noting that repetitions are present; and

(j) storing for use in a universal remote control device, the information acquired in steps (c), (d), (e), (f) and (i).

2. The process of claim 1 including the step of assuming a fixed duty cycle for each pulse.

3. A method of loading a RAM in a ROM-less microprocessor system comprising a central processing unit, a non-volatile, read-write RAM, input means, output means, and means for coupling said central processing unit, said RAM, said input means, and said output means together, said method including the steps of:

(a) disabling the central processing unit;

(b) connecting a separate microprocessor system to said RAM;

(c) transferring instructions and/or data to said RAM;

(d) re-enabling the central processing unit to enable the central processing unit to execute the instructions so transferred.

4. The method of claim 3 wherein said instructions include serial port driver instructions.

5. In a universal remote control system having input means and signal output means for supplying a signal to a controlled device and a central processing unit (CPU) coupled to said input means and said signal output means, the improvement comprising no ROM and a single non-volatile, read-write RAM coupled to said central processing means.

6. The system of claim 5 further including a latch coupled between said RAM and said CPU.

7. The system of claim 5 further including a keyboard having a set of keys coupled to said CPU and CPU wake-up circuit means coupled to said CPU and including circuit means in said keyboard for causing, by depression of any key on said keyboard, operation of said wake-up circuit to wake up (power up) said CPU.

8. The system of claim 5 further including RAM writeprotect circuit means coupled between said RAM and said CPU and having means for enabling writing in said RAM only when certain conditions have been met.

9. The system of claim 5 including a multicolor light indicating means for presenting codes to a user comprising light blinks of different colors, number of blinks, and sequence of blinks.

10. A microprocessor system comprising a central processing unit (CPU), a single non-volatile, read-write RAM, no ROM, and means for connecting said system to inputs and outputs.

11. The system of claim 10 further including a latch coupled between said RAM and said CPU.

12. The system of claim 11 including a plurality of lower bit address lines coupled between said latch and said CPU and a plurality of equal numbered multiplex lines coupled respectively between said address lines and said RAM.

13. The system of claim 12 including a plurality of upper bit address lines coupled between said CPU and said RAM.

14. The system of claim 10 including an OR gate having an output coupled to said RAM, an instruction fetch enable line coupled between said CPU and an input of said OR gate and a RAM data read enable line coupled between said CPU and an input of said OR gate.

15. The system of claim 10 further including a keyboard having a set of keys coupled to said CPU and CPU wake-up circuit means coupled to said CPU and including circuit means in said keyboard for causing, by depression of any key on said keyboard, operation of said wake-up circuit to wake up (power up) said CPU.

16. The system of claim 15 wherein said keyboard includes a plurality of conductor row lines coupled to inputs of said CPU, a plurality of conductor column lines extending across said row lines, each row line being connected through a current directing diode to one of said column lines and said column lines being coupled through impedance means to a power source, and a plurality of conductive members each connected to one of said keys and positioned adjacent an intersection of a row line with a column line and operable on depression of a key to electrically connect a row line to a column line.

17. The system of claim 15 wherein said wakeup circuit includes electronic switch means which are turned on when a key is depressed ro supply power to said CPU and circuit means coupled between said switch means and said CPU for maintaining

said switch means turned on until a HALT signal is generated by said CPU.

18. The system of claim 10 further including RAM write-protect circuit means coupled between said RAM and said CPU and having means for enabling writing in said RAM only when certain conditions have been met.

19. The system of claim 18 wherein said write protect circuit includes electronic switch means for coupling a write enable input to said RAM with a write enable line coupled to said CPU, said switch means being turned on when voltage is supplied to said CPU and such voltage is above a predetermined value so that said write protect circuit also serves as a low battery indicating circuit.

20. The system of claim 10 including output means comprising infrared light generating means and driver circuit means coupled between said CPU and said light generating means.

21. The system of claim 10 including a multicolor light indicating means for presenting codes to a user comprising light blinks of different colors, number of blinks, and sequence of blinks.

22. The system of claim 10 including three serial ports coupled to said CPU, one port being coupled to ground, one port being coupled to an input to said CPU and one port being coupled to an output of said CPU.

23. The system of claim 22 including signal conversion and coupling means for coupling interface means of a computer operating at a given voltage to said three serial ports operating at a different voltage, said signal conversion and coupling means including signal receiving circuit means and signal transmitting circuit means.

24. The system of claim 10 including input means comprising keyboard circuit means coupled to said CPU and including a

keyboard including a plurality of keys comprising mode keys, function keys, and at least one key for making a command.

25. The system of claim 24 wherein said plurality of keys further includes a set of number keys and a set of auxiliary function keys.

26. The system of claim 25 wherein said set of auxiliary keys include keys lettered A to H.

27. A method for operating a universal remote control device having a library of sets of code data for generating infrared codes for operating a plurality of different, remotely controlled, electrical apparatus manufactured by different manufacturers, stored in a memory of the device, the device including data processing means, infrared light generating means and keyboard circuit means, including mode keys, function keys, and a key for making a command, said method comprising the steps of:

pressing the key for making a command, one or more preselected additional keys and the mode key for the controlled apparatus;

pressing at least one preselected stepping key to cause the data processing means to be set to retrieve a different set of code data from said library in order to generate infrared codes;

pressing randomly selected function keys and noting if the controlled device responds to the generated set of infrared codes by executing the function selected,

if so, pressing one of a designated set of keys to restore said at least one preselected stepping key to its normal function; and if not,

repeating the step of pressing said at least one preselected stepping key and then randomly selected function keys until the controlled apparatus starts executing the selected functions or the device indicates to the user that all sets of codes in the

library have been tried and the requisite code data for operating the controlled device has not been found.

28. The method of claim 27 wherein said step of indicating to the user that all sets of codes in the library have been tried and the requisite code data has not been found includes the step of presenting a light blink code to the user.

29. A method for operating a universal remote control device having a library of sets of code data for generating infrared codes for operating a plurality of different, remotely manufactured by different controlled, electrical apparatus manufacturers, stored in a memory of the device, the device including data processing means, infrared light generating means and keyboard circuit means, including mode keys, function keys, a key for making a command, and a key for retrieving code data, means for presenting a light blink code to the user and means, including two of the selected function keys, for inputting a light blink code into the device, said method comprising the steps of:

selecting a controlled apparatus to be controlled;

pressing the key for making a command, and one or more preselected additional keys to set the device for making a quick set for operating the selected controlled device;

looking up in a table, the blink code for operating the selected controlled device; and

inputting the blink code into the device by pressing said two selected function keys in a predetermined sequence thereby to quickly set the device for operating the selected controlled apparatus.

30. A method for operating a universal remote control device having a library of sets of code data for generating infrared codes for operating a plurality of different, remotely controlled, electrical apparatus manufactured by different

manufacturers, stored in a memory of the device, the device including data processing means, infrared light generating means and keyboard circuit means, including mode keys, function keys, and a key for making a command, said method comprising the steps of:

pressing the key for making a command and one or more preselected additional keys;

pressing a key to assign that key to a macro command;

recording a desired sequence by pressing desired mode and function keys;and

pressing the key for making a command and one or more preselected additional keys to set the device for performing a sequence of operations merely by pressing the key for making a command and the assigned macro command key.

31. A method for operating a universal remote control device having a library of sets of code data for generating infrared codes for operating a plurality of different, remotely controlled, electrical apparatus manufactured by different manufacturers, stored in a memory of the device, the device including data processing means, infrared light generating means, keyboard circuit means, including mode keys, function keys, and a key for making a command, and light emitting means for identifying the controlled apparatus to a user including the steps of:

pressing the key for making a command;

pressing the mode key for the controlled apparatus;

recording a light blink code emitted by said light emitting means and presented by the device to the user; and

looking up the light blink code in a table to determine what controlled apparatus the device is set for.

32. A universal remote control system comprising data processing means, input means including a keyboard and keyboard

circuit means coupled to said data processing means, signal output means including infrared light generating means coupled to said data processing means, and memory means for storing a set of instructions and a library of code data for generating infrared codes coupled to said data processing means.

33. The system of claim 32 including an OR gate having an output coupled to said memory means, an instruction fetch enable line coupled between said data processing means and an input of said OR gate and a data read enable line coupled between said data processing means and another input of said OR gate.

34. The system of claim 32 wherein said keyboard includes a set of keys coupled to said data processing means and system wake-up circuit means coupled to said data processing means and including circuit means in said keyboard for causing, by depression of any key on said keyboard, operation of said wakeup circuit to wake up (power up) said system.

35. The system of claim 34 wherein said keyboard includes a plurality of conductor row lines coupled to inputs of said data processing means, a plurality of conductor column lines extending across said row lines, each row line being connected through a current directing diode to one of said column lines and said column lines being coupled through impedance means to a power source, and a plurality of conductive members each connected to one of said keys and positioned adjacent an intersection of a row line with a column line and operable on depression of a key to electrically connect a row line to a column line.

36. The system of claim 35 wherein said wakeup circuit includes electronic switch means which are turned on when a key is depressed to supply power to said data processing means and circuit means coupled between said switch means and said data processing means for maintaining said switch means turned on

until a HALT signal is generated by said data processing means.

37. The system of claim 32 further including write-protect circuit means coupled between said memory means and said data processing means and having means for enabling writing in said memory means only when certain conditions have been met.

38. The system of claim 37 wherein said write-protect circuit includes electronic switch means for coupling a write enable input to said memory means with a write enable line coupled to said data processing means, said switch means being turned on when voltage is supplied to said data processing means and such voltage is above a predetermined value so that said write protect circuit also serves as a low battery indicating circuit.

39. The system of claim 32 including a multicolor light indicating means for presenting codes to a user comprising light blinks of different colors, number of blinks, and sequence of blinks.

40. The system of claim 32 including three serial ports coupled to said data processing means, one port being coupled to ground, one port being coupled to an input to said data processing means and one port being coupled to an output of said data processing means.

41. The system of claim 40 including signal conversion and coupling means for coupling interface means of a computer operating at a given voltage to said three serial ports operating at a different voltage, said signal conversion and coupling means including signal receiving circuit means and signal transmitting circuit means.

42. The system of claim 32 wherein said keyboard includes a plurality of keys comprising mode keys, function keys, and at least one key for making a command.

43. The system of claim 42 wherein said plurality of keys

further includes a set of number keys and a set of auxiliary function keys.

44. The system of claim 43 wherein said set of auxiliary keys include keys lettered A to H.

ABSTRACT OF THE DISCLOSURE

The universal remote control system includes input means, signal output means for supplying a signal to a controlled device and a central processing unit coupled to the input means and the signal output means, no ROM, and a single non-volatile, read-write RAM coupled to said central processing unit.

The RAM in the ROM-less microprocessor system is loaded by carrying out the following steps: (a) disabling the central processing unit; (b) connecting a separate microprocessor system to said RAM; (c) transferring instructions and/or data to said RAM; (d) re-enabling the central processing unit to enable the central processing unit to execute the instructions so transferred.

The control codes of any of a diverse plurality of remote control transmitters are learned, stored and reproduced by carrying out the following steps: (a) receiving a transmission of a train of pulses from a remote control transmitter; (b) recording the point-in-time of an edge of each pulse in a train of said pulses; (c) transforming the recorded point-in-time data into a list of instructions for generating a replica of said train of pulses; (d) timing the duration of a train of said pulses; (e) timing the period between trains of pulses; (f) associating a function key of a universal remote control device with said time duration of said train of pulses and said list of instructions for generating a replica of said train of pulses; (g) determining whether or not repetitions of the transmission of train of pulses is present; (h) ignoring repetitions of the train of pulses; (i) noting that repetitions are present; and (j) storing for use in a universal remote control device, the information acquired in steps (c), (d), (e), (f) and (i).

Part of #3

COMBINED DECLARATION FOR PATENT APPLICATION AND POWER OF ATTORNEY
(Includes Reference to PCT International Applications)

ATTORNEY'S DOCKET NUMBER: 87290

As a below named inventor, I hereby declare that:

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

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

UNIVERSAL REMOTE CONTROL DEVICE

the specification of which (check only one item below):

☒ is attached hereto.

☒ was filed as United States application

Serial No. _____

on _____,

and was amended

on _____ (if applicable).

☐ was filed as PCT international application

Number _____

on _____,

and was amended under PCT Article 19

on _____ (if applicable).

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

I acknowlege the duty to disclose information which is material to the examination of this application in accordance with Title 37, Code of Federal Regulations, §1.56(a).

I hereby claim foreign priority benefits under Title 35, United States Code, §119 of any foreign application(s) for patent or inventor's certificate or of any PCT international application(s) designating at least one country other than the United States of America listed below and have also identified below any foreign application(s) for patent or inventor's certificate or any PCT international application(s) designating at least one country other than the United States of America filed by me on the same subject matter having a filing date before that of the application(s) of which priority is claimed:

PRIOR FOREIGN/PCT APPLICATION(S) AND ANY PRIORITY CLAIMS UNDER 35 U.S.C. 119:

COUNTRY (if PCT, indicate "PCT")	APPLICATION NUMBER	DATE OF FILING (day, month, year)	PRIORITY CLAIMED UNDER 35 USC 119
			☐ YES ☐ NO
			☐ YES ☐ NO
			☐ YES ☐ NO
			☐ YES ☐ NO
			☐ YES ☐ NO

PTO-1391 (REV. 10-83)

Combined Declaration For Patent Application and Power of Attorney (Continued)
(Includes Reference to PCT International Applications)

ATTORNEY'S DOCKET NUMBER: 87290

I hereby claim the benefit under Title 35, United States Code, §120 of any United States application(s) or PCT international application(s) designating the United States of America that is/are listed below and, insofar as the subject matter of each of the claims of this application is not disclosed in that/those prior application(s) in the manner provided by the first paragraph of Title 35, United States Code, §112, I acknowlege the duty to disclose material information as defined in Title 37, Code of Federal Regulations, §1.56(a) which occurred between the filing date of the prior application(s) and the national or PCT international filing date of this application:

PRIOR U.S. APPLICATIONS OR PCT INTERNATIONAL APPLICATIONS DESIGNATING THE U.S. FOR BENEFIT UNDER 35 U.S.C. 120:

U.S. APPLICATIONS		STATUS (Check one)		
U.S. APPLICATION NUMBER	U.S. FILING DATE	PATENTED	PENDING	ABANDONED
Serial No. 109,336	October 14, 1987		x	

PCT APPLICATIONS DESIGNATING THE U.S.					
PCT APPLICATION NO.	PCT FILING DATE	U.S. SERIAL NUMBERS ASSIGNED (if any)			

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

30 Thomas R. Vigil, Reg. No. 24,542
Kajane McManus, Reg. No. 31,642

Send Correspondence to:

60 Thomas R. Vigil
60 836 South Northwest Highway
70 Barrington, Illinois 60010

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

Thomas R. Vigil
(312) 382-6500

201	FULL NAME OF INVENTOR: FAMILY NAME: DARBEE 40100	FIRST GIVEN NAME: PAUL	SECOND GIVEN NAME: V	
	RESIDENCE & CITIZENSHIP: CITY: Santa Ana	STATE OR FOREIGN COUNTRY: California	COUNTRY OF CITIZENSHIP: U.S.A.	
	POST OFFICE ADDRESS: POST OFFICE ADDRESS: 9852 Brentwood	CITY: Santa Ana	STATE & ZIP CODE/COUNTRY: California 92705	
202	FULL NAME OF INVENTOR: FAMILY NAME: ELLIS 40200	FIRST GIVEN NAME: RICHARD	SECOND GIVEN NAME: E	
	RESIDENCE & CITIZENSHIP: CITY: Garden Grove	STATE OR FOREIGN COUNTRY: California	COUNTRY OF CITIZENSHIP: U.S.A.	
	POST OFFICE ADDRESS: POST OFFICE ADDRESS: 8915 Mays, Apt. 25	CITY: Garden Grove	STATE & ZIP CODE/COUNTRY: California 92644	
203	FULL NAME OF INVENTOR: FAMILY NAME: JANSKY 40300	FIRST GIVEN NAME: LOUIS	SECOND GIVEN NAME: STEVEN	
	RESIDENCE & CITIZENSHIP: CITY: Long Beach	STATE OR FOREIGN COUNTRY: California	COUNTRY OF CITIZENSHIP: U.S.A.	
	POST OFFICE ADDRESS: POST OFFICE ADDRESS: 4226 Chestnut Avenue	CITY: Long Beach	STATE & ZIP CODE/COUNTRY: California 92705	

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

SIGNATURE OF INVENTOR 201	SIGNATURE OF INVENTOR 202	SIGNATURE OF INVENTOR 203
XXXXXXXXXXXXXXXXXXXXX	XXXXXXXXXXXXXXXXXXXXX	XXXXXXXXXXXXXXXXXXXXX
DATE	DATE	DATE
XXXXXXXXXXXXXXXXXXXXX	XXXXXXXXXXXXXXXXXXXXX	XXXXXXXXXXXXXXXXXXXXX

PTO-1391 (REV. 10-83)

Use this form as a continuation page for forms PTO-1294 – 1297

DECLARATION
(PAGE 2)

ATTORNEY'S DOCKET NO. (IF ANY)
87290

COUNTRY	APPLICATION NUMBER	DATE OF FILING (Day, month, year)	PRIORITY CLAIMED UNDER 35 U.S.C. 119	
			YES	NO

204	FULL NAME OF INVENTOR	LAST NAME GROSSMAN	FIRST NAME AVRAM	MIDDLE NAME M.
	RESIDENCE & CITIZENSHIP	CITY OR OTHER LOCATION Santa Ana	STATE OR FOREIGN COUNTRY California	COUNTRY OF CITIZENSHIP U.S.A.
	POST OFFICE ADDRESS	POST OFFICE ADDRESS 3301 S. Bear St.,#B60	CITY Santa Ana	STATE OR COUNTRY California / ZIP CODE 92705
205	FULL NAME OF INVENTOR	LAST NAME	FIRST NAME	MIDDLE NAME
	RESIDENCE & CITIZENSHIP	CITY OR OTHER LOCATION	STATE OR FOREIGN COUNTRY	COUNTRY OF CITIZENSHIP
	POST OFFICE ADDRESS	POST OFFICE ADDRESS	CITY	STATE OR COUNTRY / ZIP CODE
206	FULL NAME OF INVENTOR	LAST NAME	FIRST NAME	MIDDLE NAME
	RESIDENCE & CITIZENSHIP	CITY OR OTHER LOCATION	STATE OR FOREIGN COUNTRY	COUNTRY OF CITIZENSHIP
	POST OFFICE ADDRESS	POST OFFICE ADDRESS	CITY	STATE OR COUNTRY / ZIP CODE

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

SIGNATURE OF INVENTOR 201	SIGNATURE OF INVENTOR 202	SIGNATURE OF INVENTOR 203
DATE 12-14-87	DATE Dec 14, 1987	DATE Dec 14, 1987
SIGNATURE OF INVENTOR 204	SIGNATURE OF INVENTOR 205	SIGNATURE OF INVENTOR 206
DATE Dec 14, 1987	DATE	DATE

FORM PTO-1298 (2-76)

U.S. DEPARTMENT OF COMMERCE

OMB No. 0651-0011 (12/31/86)

#4

Applicant or Patentee: Paul V. Darbee, et al
Serial or Patent No.: 127,999
Filed or Issued: December 2, 1987
For: UNIVERSAL REMOTE CONTROL DEVICE
Attorney's Docket No.: 87290

V

VERIFIED STATEMENT (DECLARATION) CLAIMING SMALL ENTITY STATUS (37 CFR 1.9 (f) and 1.27 (b)) — INDEPENDENT INVENTOR

As a below named inventor, I hereby declare that I qualify as an independent inventor as defined in 37 CFR 1.9 (c) for purposes of paying reduced fees under section 41 (a) and (b) of Title 35, United States Code, to the Patent and Trademark Office with regard to the invention entitled UNIVERSAL REMOTE CONTROL DEVICE described in

[ ] the specification filed herewith
[X] application serial no. 127,999, filed December 2, 1987.
[ ] patent no. _____, issued _____.

I have not assigned, granted, conveyed or licensed and am under no obligation under contract or law to assign, grant, convey or license, any rights in the invention to any person who could not be classified as an independent inventor under 37 CFR 1.9 (c) if that person had made the invention, or to any concern which would not qualify as a small business concern under 37 CFR 1.9 (d) or a nonprofit organization under 37 CFR 1.9 (e).

Each person, concern or organization to which I have assigned, granted, conveyed, or licensed or am under an obligation under contract or law to assign, grant, convey, or license any rights in the invention is listed below:

[ ] no such person, concern or organization
[X] persons, concerns or organizations listed below*

*NOTE: Separate verified statements are required from each named person, concern or organization having rights to the invention averring to their status as small entities. (37 CFR 1.27)

FULL NAME Universal Electronics, Inc.
ADDRESS 14751 Plaza Drive, Suite J, Tustin, California 92680
[ ] INDIVIDUAL [X] SMALL BUSINESS CONCERN [ ] NONPROFIT ORGANIZATION

FULL NAME _____
ADDRESS _____
[ ] INDIVIDUAL [ ] SMALL BUSINESS CONCERN [ ] NONPROFIT ORGANIZATION

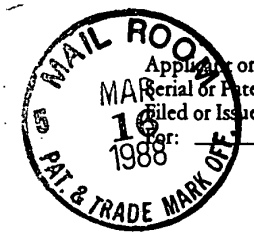
FULL NAME _____
ADDRESS _____
[ ] INDIVIDUAL [ ] SMALL BUSINESS CONCERN [ ] NONPROFIT ORGANIZATION

I acknowledge the duty to file, in this application or patent, notification of any change in status resulting in loss of entitlement to small entity status prior to paying, or at the time of paying, the earliest of the issue fee or any maintenance fee due after the date on which status as a small entity is no longer appropriate. (37 CFR 1.28 (b))

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

Paul V. Darbee	Richard E. Ellis	
NAME OF INVENTOR	NAME OF INVENTOR	NAME OF INVENTOR
Signature of Inventor	Signature of Inventor	Signature of Inventor
2-5-88	2/5/88	
Date	Date	Date

Form PTO-FB-A410 (8—83)



OMB No. 0651-0011 (12/31/86)

Applicant or Patentee: Paul V. Darbee, et al
Serial or Patent No.: 127,999
Filed or Issued: December 2, 1987
For: UNIVERSAL REMOTE CONTROL DEVICE
Attorney's Docket No.: 87290

VERIFIED STATEMENT (DECLARATION) CLAIMING SMALL ENTITY STATUS (37 CFR 1.9 (f) and 1.27 (b)) — INDEPENDENT INVENTOR

As a below named inventor, I hereby declare that I qualify as an independent inventor as defined in 37 CFR 1.9 (c) for purposes of paying reduced fees under section 41 (a) and (b) of Title 35, United States Code, to the Patent and Trademark Office with regard to the invention entitled UNIVERSAL REMOTE CONTROL DEVICE described in

[ ] the specification filed herewith
[X] application serial no. 127,999, filed December 2, 1987.
[ ] patent no. _____, issued _____.

I have not assigned, granted, conveyed or licensed and am under no obligation under contract or law to assign, grant, convey or license, any rights in the invention to any person who could not be classified as an independent inventor under 37 CFR 1.9 (c) if that person had made the invention, or to any concern which would not qualify as a small business concern under 37 CFR 1.9 (d) or a nonprofit organization under 37 CFR 1.9 (e).

Each person, concern or organization to which I have assigned, granted, conveyed, or licensed or am under an obligation under contract or law to assign, grant, convey, or license any rights in the invention is listed below:

[ ] no such person, concern or organization
[X] persons, concerns or organizations listed below*

*NOTE: Separate verified statements are required from each named person, concern or organization having rights to the invention averring to their status as small entities. (37 CFR 1.27)

FULL NAME Universal Electronics, Inc.
ADDRESS 14751 Plaza Drive, Suite J, Tustin, California 92680
[ ] INDIVIDUAL [X] SMALL BUSINESS CONCERN [ ] NONPROFIT ORGANIZATION

FULL NAME _____
ADDRESS _____
[ ] INDIVIDUAL [ ] SMALL BUSINESS CONCERN [ ] NONPROFIT ORGANIZATION

FULL NAME _____
ADDRESS _____
[ ] INDIVIDUAL [ ] SMALL BUSINESS CONCERN [ ] NONPROFIT ORGANIZATION

I acknowledge the duty to file, in this application or patent, notification of any change in status resulting in loss of entitlement to small entity status prior to paying, or at the time of paying, the earliest of the issue fee or any maintenance fee due after the date on which status as a small entity is no longer appropriate. (37 CFR 1.28 (b))

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

Louis Steven Jansky	Avram S. Grossman	
NAME OF INVENTOR	NAME OF INVENTOR	NAME OF INVENTOR
Louis Steven Jansky	Avram S. Grossman	
Signature of Inventor	Signature of Inventor	Signature of Inventor
Feb 5, 1988	Feb 5, 1988	
Date	Date	Date

Form PTO-FB-A410 (8—83)

28.00 215

Atty. Docket No. 87290

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Application of:
Paul V. Darbee et al

For: UNIVERSAL REMOTE CONTROL DEVICE

Serial No. 127,999

Filed: December 2, 1987

Group Art Unit:

Examiner:

PETITION FOR EXTENSION OF TIME

TO:
Honorable Commissioner of
Patents and Trademarks
Washington, D.C. 20231

Dear Sir:

Applicant, through the undersigned attorney, hereby petitions for a one (1) month extension of time to March 13, 1988, for responding to the outstanding ~~Examiner's Action~~ Notice to File Missing Parts mailed on January 13, 1988, the original term for responding to which expired on February 13, 1988.

☐ A previous petition for a _____ month extension was mailed to the office on _____.

In support of this Petition:

☒ Enclosed is a check in the amount of $28.00.

☐ Please charge Deposit Account No. 22-0355 in the amount of $_____. A duplicate copy of this Petition is enclosed.

☒ Enclosed is ~~Response~~ Letter in Response to Missing Parts of Application Under 37CFR1.53(d)

☐ Enclosed is Amendment _____.

☐ Enclosed is a Continuation Application.

☐ Enclosed is a Continuation-In-Part Application.

☐ Enclosed is a Notice of Appeal.

☐ Enclosed is an Appeal Brief.

☒ Two (2) forms are now being filed in this application.

☒ ~~A~~ Small Entity Declaration ~~has been previously filed in this application~~

☒ Please charge any additional fees or credit any overpayments to Deposit Account No. 22-0355.

Respectfully submitted,

Thomas R Vigil

Dated: March 13, 1988.

Reg. No. 24,542

836 South Northwest Highway
Barrington, Illinois 60010
(312) 382-6500

CERTIFICATE OF MAILING

I hereby certify that this correspondence is being deposited with the United States Postal Service as First Class Mail in an envelope addressed to: Commissioner of Patents and Trademarks, Washington, D.C. 20231, on March 13, 1988.

060 03/25/88 127999 T215 28.00 CK

Thomas R. Vigil

PAT

#6

Atty Docket 87290

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Application of:	)	
	)	
PAUL V. DARBEE ET AL	)	Group Art Unit:
	)	Unknown
For: UNIVERSAL REMOTE CONTROL DEVICE	)	
	)	
	)	Examiner:
Serial No. 127,999	)	Unknown
	)	
Filed: December 2, 1987	)	

DISCLOSURE STATEMENT

TO:
Honorable Commissioner of
Patents and Trademarks
Washington, D. C. 20231

Dear Sir:

Applicants, in compliance with the provisions of Section 609 of the M.P.E.P. and in accordance with the provisions of Chapter 2000 of the M.P.E.P. hereby submits (a) a PTO Form 1449 listing prior art patents known to applicants to have some relevancy to the invention claimed in the subject application and (b) a copy of each one of the prior art patents listed therein.

These patents are as follows:

U.S. Patent No.	Patentee
3,956,745	Ellis
4,356,509	Skerlos et al.
4,386,436	Kocher et al.
4,509,211	Robbins
4,566,034	Harger et al.
4,623,887	Welles, II
4,626,848	Ehlers
4,703,359	Rumbolt et al.
4,712,105	Kohler

CERTIFICATE OF MAILING

I hereby certify that this correspondence is being deposited with the United States Postal Service as first-class mail in an envelope addressed to: Commissioner of Patents and Trademarks, Washington, DC 20231 on

Date 3/13/88

Foreign Patents

European Patent Application No. 86200905.7 - Publication No. 0 2 0 3 6 6 8 — Robin B. Rumbolt

The above prior art references disclose various techniques for acquiring infrared (IR) codes, storing code data for generating the infrared codes, retrieving the code data and generating the IR codes and for otherwise controlling a controlled apparatus.

Applicants submit that these references do not teach, disclose or suggest the method claimed herein or the universal remote control device claimed herein and that upon examination the amended claims of the subject application will be found to be clear of the art and otherwise in condition for allowance.

Respectfully submitted,

Dated:

March 11, 1988.

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(54) **Universal remote control unit**

(57) The remote control unit has a selection mechanism for selecting any one of a number of categories of equipment to be controlled. The commands available for keyboard input in any given category are automatically displayed to the user upon selection of the category. Switches are provided for user selection of the model number of any one of a number of manufacturers of the equipment within the category to be controlled. Operation of the switches allows program controlled read-outs of formats stored in memory. An infra-red LED is then energized in accordance with the format to transmit the signal to the unit to be controlled.

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Universal remote control unit

1. Field of the Invention

The present invention relates to remote control units and, particularly, to remote control units for controlling home appliances to carry out selected operations.

Background of the Invention

At present, many home appliances are available which can be remotely controlled by the user. For example, a television set can be turned on and off, a channel can be selected, a video cassette recorder controlled to play or record, etc. However, each manufacturer uses a different signal format to effect his control. Not only do different operations require different control signals, but the basic format, such as the bit timing, the number of bits per word, the width of the pulses, the modulating frequency, if any, applied to each pulse, the presence of, length of, and format of start, lead, or trailer pulses and the number of correct receptions of a particular command required to activate the appliance to carry out the selected operation varies from manufacturer to manufacturer. The basic format may also be different for different model numbers of the same manufacturer.

Many homes have appliances which can be remotely controlled, but which are manufactured by different manufacturers. Further, control of, for example, a video cassette recorder frequently requires the ability to control a related appliance, e.g. a television set, in conjunction therewith. At present, viewing a recorded program requires use of two individual remote control units, particularly if the recorder and the television set are not made by the same manufacturer.

Summary of the Invention

It is an object of the present invention to furnish a universal remote control unit which allows control of different types of appliances as well as appliances manufactured by different manufacturers.

The remote control unit is to be simple to operate, light, reliable, and relatively inexpensive.

In accordance with the invention, the user selects a particular category of appliance and its model number and/or manufacturer. Selecting the category automatically causes a display of commands available in the category, again for user selection. After the relevant selections have been made, the selection elements are automatically scanned under control of a microprocessor and an address signal is generated. This address signal allows readout from a storage of a product code signifying the required parameters, i.e. frequency, pulse width, pulse repetition rate, word length, etc. and the application of product code signals signals to a formatter unit. The latter energizes a transmitter section which transmits signals corresponding thereto to the controlled appliance, thereby causing the appliance to execute the command selected by the user.

According to the invention, use of the remote control unit can further be facilitated by permanent association of operation commands of one appliance with related operation commands of another. Thus, in a preferred embodiment, user selection of a VCR "play" command will automatically trigger the command switching the associated television set to the empty channel to be used for display, followed by the command setting the VCR to the "play" mode. This concept is referred to as command chaining herein.

In a further preferred embodiment, the user selectable operation commands for some appliance categories also automatically include commands associated with a related category. For example, television volume controls are available upon selection of the VCR categorie.

The present invention, as well as additional objects thereof, will be better understood upon reference to the following description taken in connection with the accompanying drawing.

Brief description of the drawing

Figure 1 is a block diagram of the remote control unit according to the present invention;

Figure 2 is a schematic diagram of the stand-by circuit;

Figure 3 is a flow chart for the microprocessor of Figure 1;

Figure 4 is a schematic diagram illustrating the keyboard mechanism of the present invention; and

Figure 5 is a schematic diagram of an infrared drive circuit.

Description of the preferred embodiments

In the schematic diagram of Figure 1, a microprocessor which is the central control unit for the system is denoted by reference numeral 10. The timing of microprocessor 10 is controlled by crystal time base 12. The basic microprocessor function is to receive data from three user-controlled selecting devices and to energize an infrared transmitting system to transmit signals with a format selected in accordance with this information. The transmitted infrared radiation is then received by the appliance and causes it to operate as desired by the user.

In the preferred embodiment, the microprocessor is Hitachi HD6301 operated in mode 6 with an oscillator frequency of 4 MHz and an instruction cycle time of 1 microsecond. This speed is necessary in order to generate the carrier output frequencies of up to 55 KHz required by some IR control systems.

The first of the user-operated selection devices is a category selector switch 14, by which the user selects the category of the appliance which is to be controlled. Its output is connected to microprocessor 10 through five lines 16. In the example illustrated in Figure 1, the following categories are provided: a television receiver (TV), a video cassette recorder (VCR) a disc player (disc), an audio system (audio), and an auxiliary input (aux) suitable, for example, for controlling a cable converter.

The second selection device is a keyboard 18. As will be described in greater detail with reference to Figure 4, category selector switch 14 is mechanically coupled to an escutcheon slider which moves in conjunction with the movement of the category selection switch to "illuminate" legends indicating specific commands associated with the selected categories in display windows or areas 20. Additional areas indicated by dashed lines and designated by reference numbers 20a display operation commands available for controlling an appliance operationally associated with the appliance of the category selected by selector switch 12. For example, a television receiver is operationally associated with a video cassette recorder when the latter is in the "play" mode.

In the preferred embodiment, keyboard 18 is a 3x11 matrix, addressable by 11 address lines of a bus 22. Bus 22 is constituted by an eight line bus 24 activated by an address latch 26 and a four line bus 28 activated by microprocessor 10. Keyboard output is furnished on a three line bus 29.

Finally, two sets of dip switches, 30A and 30B, allow the user to identify the model number and/or manufacturer of the appliance to be controlled. The switches are addressed by a twelve line bus 30 also connected by busses 24 and 28.

Within each category, a number of appliance models is individually selectable in accordance with the following table which, however, is illustrative only:

Table I

1) TV	up to 64 formats	(6 dipswitches)
2) VCR	up to 8 formats	(3 dipswitches)
3) DISC	up to 4 formats	(2 dipswitches)
4) AUDIO	up to 8 formats	(3 dipswitches)
5) AUX	up to 4 formats	(2 dipswitches)
	88 formats	16 dipswitches

Also shown in Figure 1 is an electrically programmable read only memory (EPROM) 32. This memory contains look-up tables indexed by the category selector, the dipswitches, and the particular key pressed on the keyboard. Indexing takes place via addresses on a twelve line address bus 34 similar to bus 22. The data read out from the tables, including a product code and a command code, is then passed to the appropriate IR transmitter routine called a "formatter" also stored in EPROM 32. Each formatter is a device-specific program designed to generate the precise carrier frequency, pulse width, pulse modulation and overall timing format required by the particular device. EPROM 32 is also controlled by an address decoder 36 through a "selector" line and an "output enable" line. The output of EPROM 32 is furnished

on an eight line data bus 38 which connects to a bidirectional bus lines 42. Bus 42 interconnects microprocessor 10. address latch 26 and a tri-state buffer 44.

The input to address decoder 36 is a 4 bit address furnished by four lines from microprocessor 10. A latch enable line connects microprocessor 10 to address latch 26. Address decoder 24 also has an output connected via an "enable" line to buffer 44.

The data output lines from keyboard 16 are also connected to the inputs of a stand-by controller 30. A first and a second output of stand-by controller 30 is connected to a reset and stand-by input of microprocessor 10, respectively.

Finally, an output port 38 of microprocessor 10 is connected to IR driver circuit 40 which in turn drives infrared light emitting diodes (LED's) 42.

Address latch 26, when enabled, latches the address applied to it via bus 42 so that the latter may be used to transmit data to microprocessor 10.

Stand-by circuit 46 is shown in greater detail in Figure 2, wherein corresponding elements have the same reference numerals as in Figure 1. Specifically, it consists of an OR gate 210 having a three line input from bus 29. A timing circuit consisting of a resistor 512 and a capacitor 514 is connected to the output of OR gate 510. The common point of resistor 512 and capacitor 514 is connected to one input of an OR gate 516 whose second input is connected to a latch output of microprocessor 10. The output of OR gate 516 is connected to the reset and stand-by terminals of microprocessor 10.

Operation of the above-described equipment will now be described with reference to the flow chart of Figures 3A-D.

Referring to Figure 3A, upon inserion of the battery, microprocessor initialization takes place. A random access memory (RAM) in the microprocessor, the input-output ports, and a flag in the internal memory of the microprocessor are set to initial conditions. The microprocessor then enters the sleep mode. In this mode, stand-by circuit 46 grounds the reset and stand-by pins of the microprocessor. A circuit internal to the microprocessor shuts down all internal circuitry except for memory and the circuitry monitoring the "stand-by" and "reset" lines. This state continues until a key of keyboard 18 is pressed.

Upon pressing of a key, OR circuit 510 receives an input, causing it to generate an output, charging capacitor 514. This, in turn, causes an output to appear at OR gate 516, energizing the "reset" and "stand-by" circuits in the microprocessor, and also energizing the output enable of latch 26. Monitoring of the stand-by and reset lines as well as the previously set flag causes the microprocessor to energize the latch for stand-by circuit 46 and to enable address latch 26.

The microprocessor then executes the keyboard scan. Specifically, the eleven rows of keyboard 18 and interrogated by bus 22 in a predetermined sequence. If a key on keyboard 18 is pressed, one of these rows is connected to its column, causing one of the lines of bus 29 to be at a high level at a specific step in the program. Buffer 44 is enabled by address decoder 36 to allow the information from keyboard 18 to be passed onto microprocessor 10.

The microprocessor then enters the subroutine shown in Figure 3B to determine which key (or keys) was pressed. Specifically, it is first determined whether the number of keys pressed is equal to 1 or greater than 1. If the number is greater than 1, it is determined whether the number is equal to 2. If the number is not equal to 2 .e. if more than 2 keys have been pressed an unacceptable condition prevails and the program is aborted, a new scanning of the keyboard being initiated.

If two keys had been pressed, it is determined whether these are the record and play keys. It must be remembered that to activate the VCR to "record" both of these keys must be pressed. The category switch is then interrogated. This is an internal interrogation, since the outputs of switch 14 have been applied to the microprocessor. If the category is not either VCR or audio tape, the program is again aborted with resumption of keyboard scan. However, if the category switch does read either VCR or audio tape, the keyboard command is interpreted as a record command. Referring again to Figure 3A, the keyboard position number of the pressed key is then stored in an an internal random access memory (RAM) in the microprocessor. On the other hand, if the number of keys pressed is equal to 1 and the so-pressed key is the record key, the program aborts as mentioned above. If it is not the record key and not the play key, the main program is resumed and the keyboard position number of the pressed key is stored in internal RAM. If it is the play key, the category switch is scanned. If the category is a category other than the VCR, the keyboard position number is again stored.

If, however, the category is VCR, the command chain illustrated in figure 3C commences. First, the category number in the RAM is set to the number signifying "television". The dipswitches are then scanned in the same manner as described previously with respect to the keyboard scan. Data

readout on bus 31 is applied to the microprocessor through bus 42, latch 26 again again carrying out its latching function. The dipswitch data is stored in RAM.

At this point, the microprocessor sends signals to the IR driver 40 causing it to send a command to the TV to switch it to the output channel of the VCR, e.g. channel 3. First, the key data in the RAM is set to zero. The "send" function is then executed. This is described in subroutine A, Figure 3D, which will be discussed in detail below.

After the command "0" has been sent, the key data in the RAM is set to "3". The send function is again executed. At the end of this particular send operation, the television has been switched to channel 3.

At this point, the category number in RAM is set to the VCR value. The key data is set to "play".

The system then returns to the main program illustrated in Figure 3A. The category switch is scanned and the result of the scan is stored in internal RAM. The scanning is controlled by a program in internal ROM. After the category switch data has been entered into RAM, the dipswitches are scanned, also under control of a program in internal ROM. The result of the scan is stored in the RAM of the microprocessor.

At this point, the microprocessor RAM contains data specifying the manufacture and model number of the device being controlled, the type of device it is and the key data, i.e. the data indicating the desired command.

The program then goes into the "send" mode illustrated in Figure 3D.

The program enters a "decode" routine located in internal ROM. The stored category switch data, key data and dipswitch data is used to calculate the address of the command table in EPROM 32. The command table stores the following data for each associated key:

1. the command word bit pattern;

2. the formatter starting address;

3. the associated category type; and

4. a repeating or nonrepeating flag, i.e. a flag signifying whether or not the command is to continue to be transmitted until the key is no longer depressed.

The category type found in the table is then checked against the currently selected category. A test is carried out whether they match. If not, the category data in RAM is replaced with the category data found in the table. For example, if the selected category is either disc or VCR, a TV command such as "volume up" will cause the "television" category to be stored in RAM.

If the two categories do match, the program jumps to the formatter starting address. The IR code is sent to the IR driver, i.e., the microprocessor acts in response to formatter instruction stored in EPROM to send the proper carrier frequency, type of code, timing, etc. to the IR driver. The keyboard is then scanned again. If the key is no longer pressed, the stand-by circuit is unlatched. If the same key is still pressed, a test is carried out as to whether the repeat flag is on. If the repeat flag is not on, no code is output; however, keyboard scan continues until the key is released. If the repeat flag is not on, the program loops back to the formatter starting address so that the IR code continues to be sent to the IR driver.

It should be noted that after the stand-by circuit is unlatched by microprocessor 10, the timing circuit consisting of resistor 512 and capacitor 514 of Figure 2 continues to hold the output of OR gate 56 high for a relatively short time since only a high impedance discharge path is available for the capacitor. Alternatively, latching and unlatching of the microprocessor control could be dispensed with, a timing circuit being provided which maintains the microprocessor in stand-by for a time period adequate to assure that the command has been carried out. For greater reliability, and because of the presence of chain commands, i.e. an automatic command sequence initiated for depression of a single button, a positive latch and unlatch by the microprocessor is preferable.

Referring now to Figure 4, the construction of the keyboard-category selector switch combination will be described in detail. An opaque keyaboard cover 210 has translucent areas 212, 214 formed in the shape of letters or labels. One or more label is associated with each button or key. In the illustration, the labels associated with a button 216 are "on" and "off". In operation, the keyboard cover is positioned parallel to and in close proximity of the sliding escutcheon 218. The slider mechanism which moves the escutcheon relative to the opaque top layer of the keyboard is operated by a thumb wheel 220. The sliding escutcheon carries a first and second contrasting color, i.e. contrasting to the color of the top layer, and, inbetween the two contrasting colors, a color which is the same as that of the top layer. In the position illustrated, the first contrasting color is underneath the "off" label. This label would thus be "lit".

Thumbwheel mechanism 220 is activated by the user to select the category of appliance to be controlled, i.e. thumbwheel 220 controls the position of category selector switch 14 of Figure 1. The same button can thus be used for different commands, depending upon the selected category. For example, pressing a given button may turn a VCR off, or turn a television set on.

The IR driver circuit illustrated in Figure 5 is a standard driver circuit illustrated her for completeness only. It consists of a first amplifier stage including a transistor 610 having an emitter resistor 620 and a collector resistor 630. Three diodes 640 are connected in parallel with resistor 630. The collector of transistor 610 is connected to the base of a second transistor 650 connected as an emitter follower. Two light emitting diodes 660 are connected in the emitter circuit of transistor 650. The light emitting diodes emit infrared radiation under control of signals applied to the base circuit of transistor 610 by microprocessor 10.

Although the invention has been illustrated in a particular preferred embodiment, it is not intended to be limited thereto. Many variations in operation and construction will readily occur to one skilled in the art and are intended to be encompassed in the invention as set forth in the following claims.

Appendix to Figures 3A, 3B, 3C, 3D

Reference number	Inscription
300	insert battery
301	µp initializes set flag
302	enter sleep mode
303	standby circuit checks for any keyboard key pressed
304	any key pressed
305	standby circuit activates "reset" and "standby" lines on µp. µp reinitializes
306	µp executes keyboard scan program in internal ROM
307	determine which key(s) was pressed
308	store keyboard position number of key pressed in internal RAM
309	read category switch store result in internal RAM
310	read dipswitch store result in internal RAM
311	multi key patch (Figure 3B)
312	# of keys pressed
313	# = 2?
314	are they record + play?
315	read category switch
316	category = VCR or audio tape?
317	set keyboard data = record
318	is it record key?
319	is it play?
320	read category switch
321	category = VCR?
322	set category number in RAM = TV value
323	read dipswitch + store in RAM
324	set key data = "0"
325	execute "send" functions
326	set key data = "3"
327	execute "send" functions
328	set category number in RAM = VCR value

```
329     set key data = "play"
330     using stored category switch data and dipswitch
        data calculate address of command table in
        external EPROM
331     using command table address and key position
        number get formatter address and data  out of
        command table
332     check currently selected category against
        category type found in table
333     do they match?
334     replace category data in RAM with category data
        found in table
335     jump to formatter starting address. Execute
        instructions to send IR code to IR driver
336     scan keyboard
337     same key still pressed?
338     unlatch standby circuit
339     repeat flag on?
```

Claims

1. Unit for remotely controlling a plurality of appliances each belonging to a one of a plurality of categories, each having a model number signifying a given model of a given manufacturer, each adapted to carry out a predetermined function upon receipt of a remote control signal having a predetermined format, comprising:

transmitter means for transmitting remote control signals having formats corresponding to transmit control signals applied thereto;

first user-operable selector means for generating a first selector signal signifying the selected one of said plurality of model numbers;

second user-operable selector means for generating a second selector signal signifying the user-selected one of said appliance categories;

command display and select means for displaying user selectable commands associated with the selected one of said appliance categories, and for generating a command signal signifying one of said commands in response to user's selection thereof;

means for scanning said first and second user-operable selector means and said command and select means and generating an address signal corresponding to the user selected category, model number and operation command;

memory means storing a plurality of command tables in individually addressable storage locations;

and a readout means for receiving said address signal and reading out command table data in said storage locations under control thereof, and applying the so-read out command data to said transmitter means, whereby said transmitter means transmits a remote control signal having the correct format to control the user-selected appliance to perform the user-selected operation.

2. A remote control unit as set forth in claim 1, wherein said command display and select means comprises an array of command display elements, and third means operable in dependence upon operation of said second user-operable selector means for displaying commands associated with the user-selected appliance category in corresponding ones of said command display elements.

3. A remote control unit as set forth in claim 2, wherein said command display and select means is a keyboard having a plurality of keys and at least a first and second command respectively associated with a first and second one of said categories associated with at least one of said keys;

wherein said command display element associated with said at least one of said keys comprises a first and second symbol respectively signifying said first and second command positioned in proximity of said button;

wherein said third means comprises a slider carrying means for making said first or said second symbol legible depending on the relative position of said slider means to said symbols; and

wherein said third means comprises means coupled to said second user of operable selector means for moving said slider means in correspondence to movement of said second user-operable selector means.

4. A remote control unit as set forth in claim 3, wherein said second user-operable selector means comprises a rotary selector mechanism.

5. A remote control unit as set forth in claim 2, wherein said third means is mechanically coupled to said second user operable selector means.

6. A remote control unit as set forth in claim 1, wherein at least one additional command is associated with a predetermined one of said selected commands for transmission in a predetermined time relationship to the latter;

wherein said readout means is operative under control of program means; and

wherein said program means automatically controls said readout means to read out command table data associated with said selected and said associated commands in said predetermined time relationship upon receipts of an address signal associated with said predetermined one of said commands.

7. A remote control unit as set forth in claim 6, wherein said at least one of said predetermined selected commands is a VCR "play" command and said associated command is a TV channel switch command generated prior to said VCR "play" command.

8. A remote control unit as set forth in claim 1, wherein said user-selectable commands further comprise commands associated with an additional appliance category operationally associated with said selected one of said appliance categories.

9. A remote control unit as set forth in claim 8, wherin said selected one of said appliance categories is the "VCR" category and said additional category is the "television" category, whereby user control of a television set can take place when said remote control unit is set for controlling a VCR.

10. Apparatus for remotely controlling a first and a second appliance respectively responsive to command signals having a first format and a second format different from said first format, comprising

memory means for storing format defining data for each of said appliances in addressable memory locations;

user controllable means for selectively addressing said memory locations and reading out said format defining data stored therein;

user controllable means for generating command signals signifying a desired operation of said appliance;

means connected to said command signal generating means and said memory means for formatting said command signal in accordance with said read out format defining data, thereby creating a formatted command signal, and

transmitting means connected to said formatted command signalling generating means for transmitting said signals to said appliance to be controlled.

11. A remote control unit as set forth in claim 10, wherein operation of said first appliance in response to a first command requires transmission of a second command to said second appliance;

further comprising means responsive to said first command signal for automatically generating said second command signal, formatting said second command signal and said first command signal in accordance with read out format defining data corresponding to said second and first appliance, respectively, and means for applying the so formatted first and second command signals to said transmitting means in a predetermined sequence for transmission to said first and second appliance, respectively.

12. A remote control unit as set forth in claim 11, wherein said first appliance is a video cassette recorder and said second appliance is a television receiver;

wherein said first command is a "play" command and said second command is a "switch to predetermined channel" command; and wherein said transmitting means to transmit said second command prior to transmission of said first command.

FIG. 1

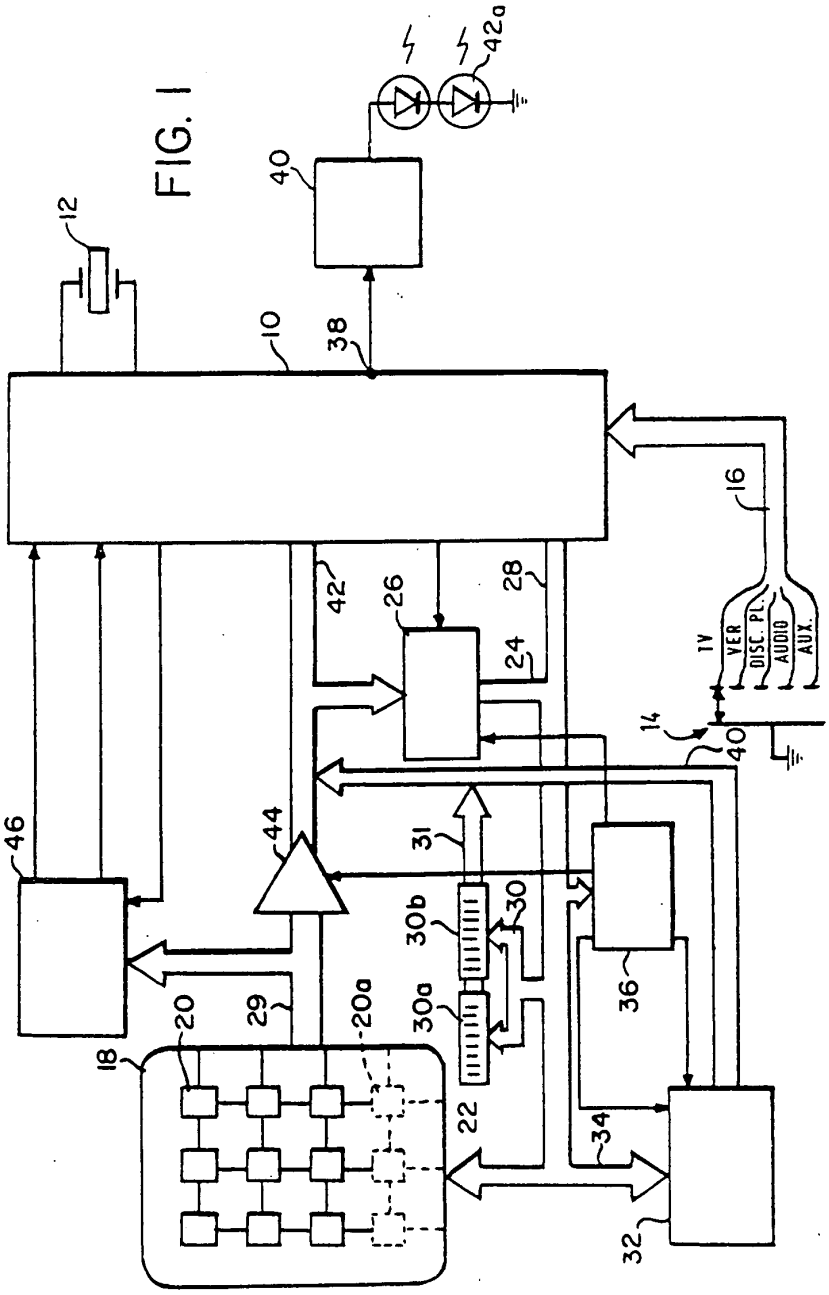

42a
40
12
10
38
16
42
26
28
24
1V
VER
DISC. PL.
AUDIO
AUX.
14
40
46
44
31
30b
30
30a
20
29
20a
18
22
36
34
32

FIG. 2

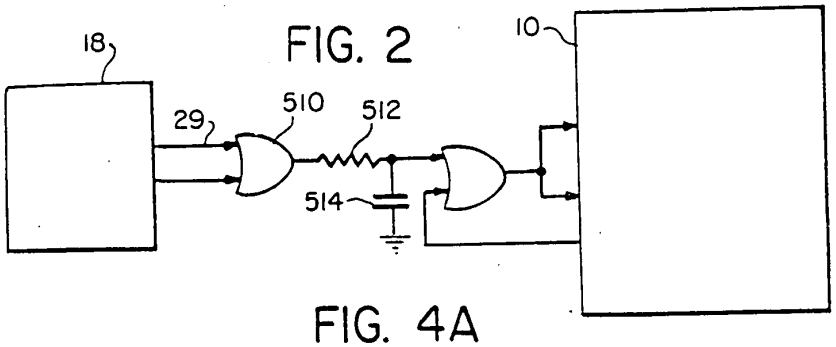


FIG. 4A

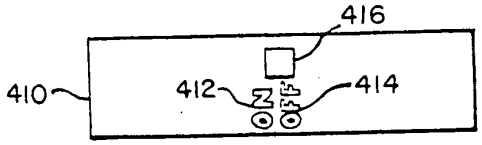


FIG. 4B

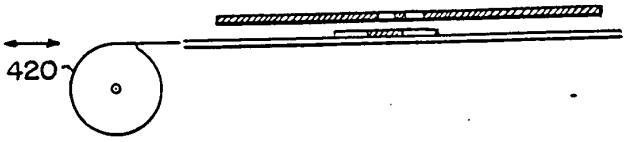


FIG. 5

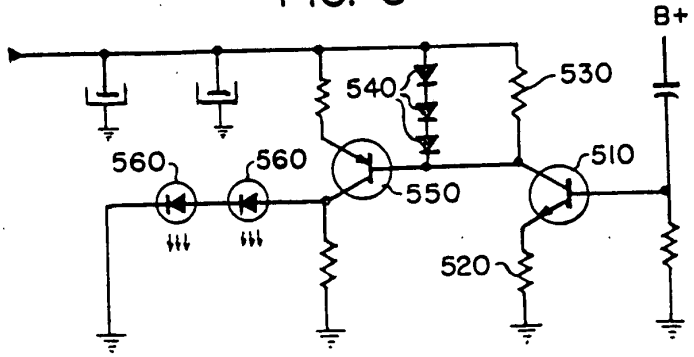


FIG. 3A

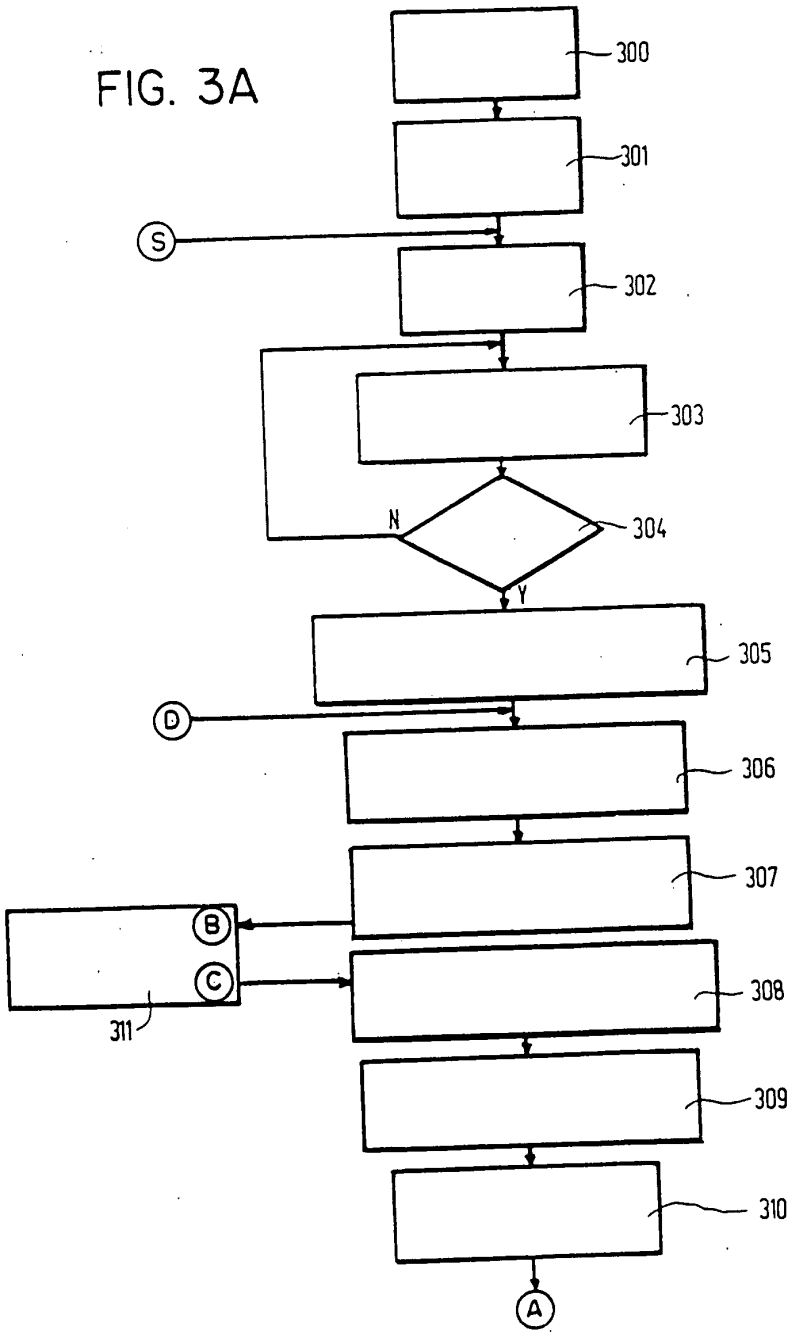


FIG. 3B

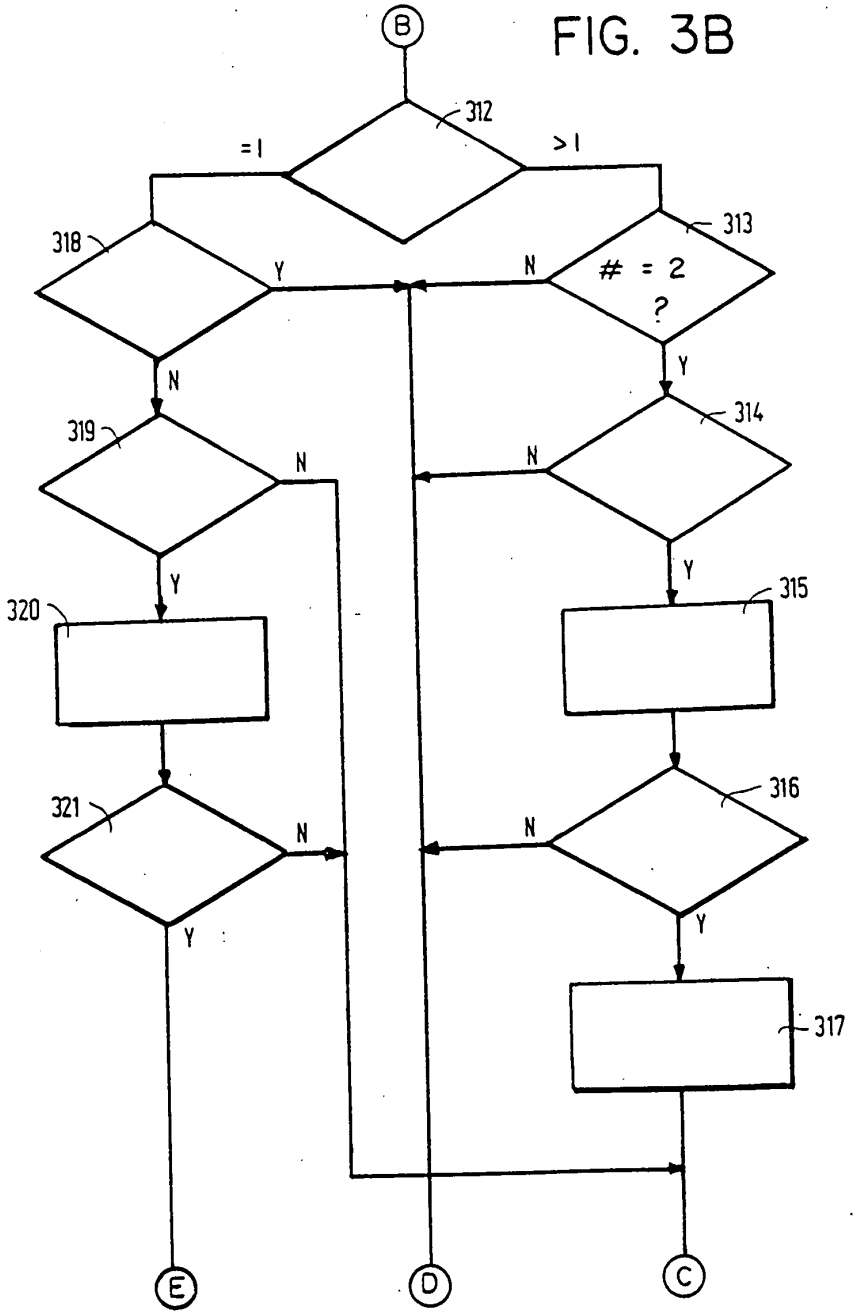


FIG. 3C

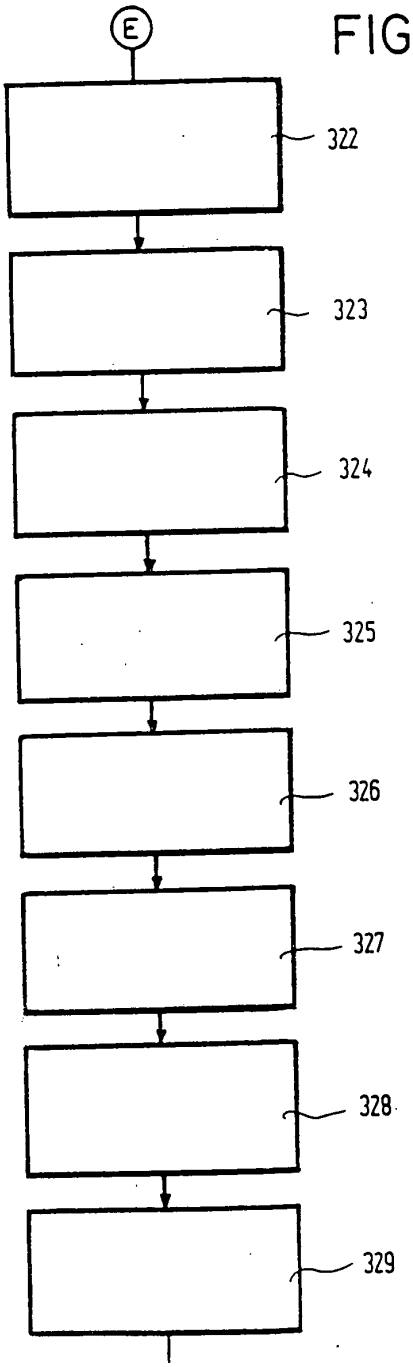
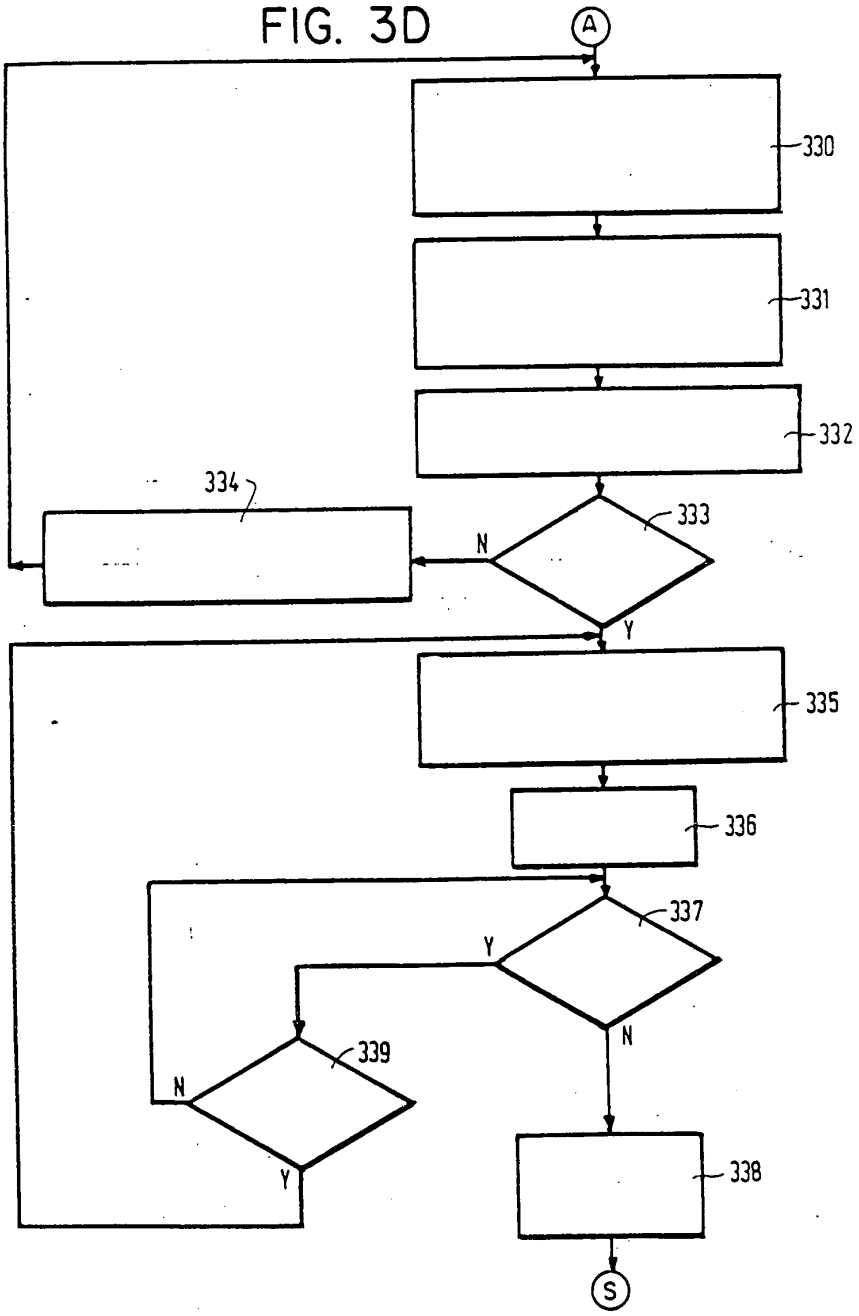


FIG. 3D



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DATE MAILED: 01/13/88

NOTICE TO FILE MISSING PARTS OF APPLICATION— FILING DATE GRANTED

A filing date has been granted to this application. However, the following parts are missing.

If all missing parts are filed within the period set below, the total amount owed by applicant as a ☐ large entity ☐ small entity (verified statement filed), is $ 770.00

1. ☐ The statutory basic filing fee is ☐ missing. ☐ insufficient. Applicant as a ☐ large entity, ☐ small entity, must submit $ 340 to complete the basic filing fee and MUST ALSO SUBMIT THE SURCHARGE AS INDICATED BELOW.
2. ☐ Additional claim fees of $ 492 as a ☐ large entity, ☐ small entity, including any required multiple dependent claim fee, are required. Applicant must submit the additional claim fees or cancel the additional claims for which fees are due. NO SURCHARGE IS REQUIRED FOR THIS ITEM.
3. ☐ The oath or declaration:
   ☐ is missing.
   ☐ does not cover items omitted at the time of execution.

   An oath or declaration in compliance with 37 CFR 1.63, identifying the application by the above Serial Number and Filing Date is required. A SURCHARGE MUST ALSO BE SUBMITTED AS INDICATED BELOW.
4. ☐ The oath or declaration does not identify the application to which it applies. An oath or declaration in compliance with 37 CFR 1.63 identifying the application by the above Serial Number and Filing Date is required. A SURCHARGE MUST ALSO BE SUBMITTED AS INDICATED BELOW.
5. ☐ The signature to the oath or declaration is: ☐ missing; ☐ a reproduction; ☐ by a person other than the inventor or a person qualified under 37 CFR 1.42, 1.43, or 1.47. A properly signed oath or declaration in compliance with 37 CFR 1.63, identifying the application by the above Serial Number and Filing Date is required. A SURCHARGE MUST ALSO BE SUBMITTED AS INDICATED BELOW.
6. ☐ The signature of the following joint inventor(s) is missing from the oath or declaration: _____. Applicant(s) should provide, if possible an oath or declaration signed by the omitted inventor(s), identifying this application by the above Serial Number and Filing Date. A SURCHARGE MUST ALSO BE SUBMITTED AS INDICATED BELOW.
7. ☐ The application was filed in a language other than English. Applicant must file a verified English translation of the application and a fee of $26.00 under 37 CFR 1.17(k), unless this fee has already been paid NO SURCHARGE UNDER 37 CFR 1.16(e) IS REQUIRED FOR THIS ITEM,
8. ☐ A $20.00 processing fee is required for returned checks. (37 CFR 1.21(m)).
9. ☐ Your filing receipt was mailed in error because check was returned.
10. ☐ Other:

A Serial Number and Filing Date have been assigned to this application. However, to avoid abandonment under 37 CFR 1.53(d), the missing parts and fees identified above in items 1 and 3-6 must be timely provided ALONG WITH THE PAYMENT OF A SURCHARGE OF $110.00 for large entities or $55.00 for small entities who have filed a verified statement claiming such status. The surcharge is set forth in 37 CFR 1.16(e). Applicant is given ONE MONTH FROM THE DATE OF THIS LETTER, OR TWO MONTHS FROM THE FILING DATE of this application, WHICHEVER IS LATER, within which to file all missing parts and pay any fees. Extensions of time may be obtained by filing a petition accompanied by the extension fee under the provisions of 37 CFR 1.136(a).

Direct the response to, and any questions about, this notice to the undersigned, Attention: Application Branch.

A copy of this notice MUST be returned with response.

For: Manager, Application Branch
(703) 557-3254

FORM PTO-1533 (REV. 7-87)

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☐ 103	☐ 203
☐ 104	☐ 204
☐ 105	☐ 205

4959810

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SEP 2 5 1990

FILING DATE	CLASS	SUBCLASS	GR
12/02/87	~~340~~ 364	~~200~~ 900	~~264~~

PATENT NUMBER

RBEE, SANTA ANA, CA; RICHARD E. ELLIS, GARDEN GROVE, CA;
NSKY, LONG BEACH, CA; AVRAM S. GROSSMAN, SANTA ANA, CA.

2303

G DATA**********
THIS APPLN IS A CIP OF 07/109,336 10/14/87
ABANDONED ON 6/7/89

V.N 8/13/92

JMC

T APPLICATIONS**********

FILING LICENSE GRANTED 04/25/88

ed	met	Examiner's Initials	AS FILED	STATE OR COUNTRY	SHEETS DRWGS.	TOTAL CLAIMS	INDEP. CLAIMS	FILING FEE RECEIVED	ATTORNEY'S DOCKET NO.
☐yes	☒no	VN							
☐yes	☐no			CA	17	44	9	$ 471.00	87290

IGL & ~~ASSOCIATES~~
NORTHWEST HWY.
N, IL 60010

MOTE CONTROL DEVICE

U.S. DEPT. of COMM.-Pat. & TM Office — PTO-436L (rev. 10-78)

CERTIFICATE

OCT 0 5 1993

OF CORRECTION

PREPARED FOR ISSUE

VIET Q. NGUYEN
Assistant Examiner

ANDREW J. JAMES
SUPERVISORY PATENT EXAMINER
GROUP ART UNIT 253
Primary Examiner

CLAIMS ALLOWED

Total Claims	Print Claim
39	1 (AT Final)

DRAWING

Sheets Drwg.	Figs. Drwg.	Print Fig.
17	2	10

ISSUE CLASSIFICATION

Class	Subclass
364	900

ISSUE BATCH NUMBER

FOG

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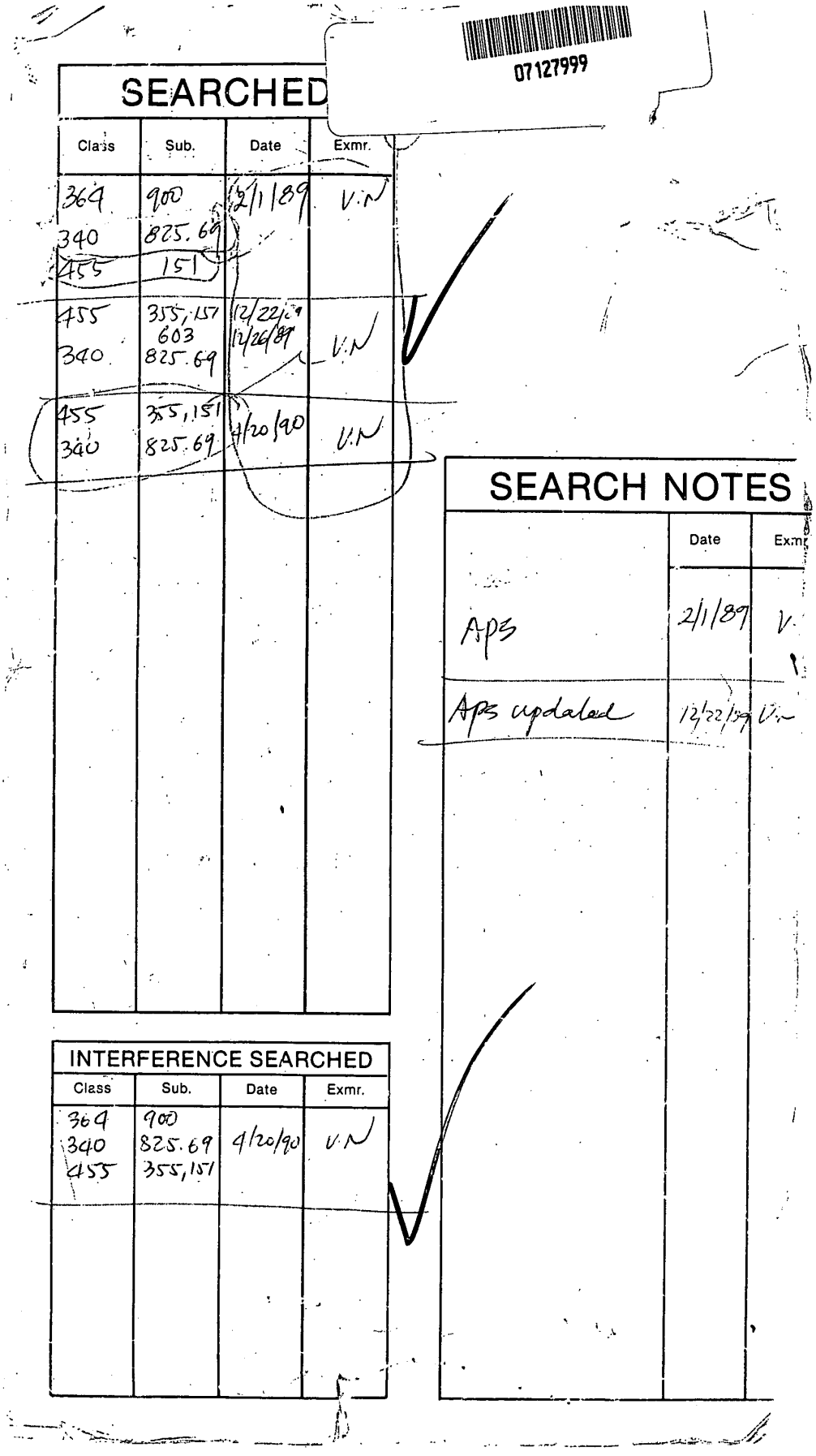

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SEARCHED

Class	Sub.	Date	Exmr.
364	900	12/1/89	V.N
340	825.69		
455	151		
455	355, 157	12/22/89	
	603	12/26/89	
340	825.69		V.N
455	355, 151	4/20/90	
340	825.69		V.N

SEARCH NOTES

	Date	Exmr
APS	2/1/89	V.
APS updated	12/22/89	V.N

INTERFERENCE SEARCHED

Class	Sub.	Date	Exmr.
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340	825.69	4/20/90	V.N
455	355, 157		

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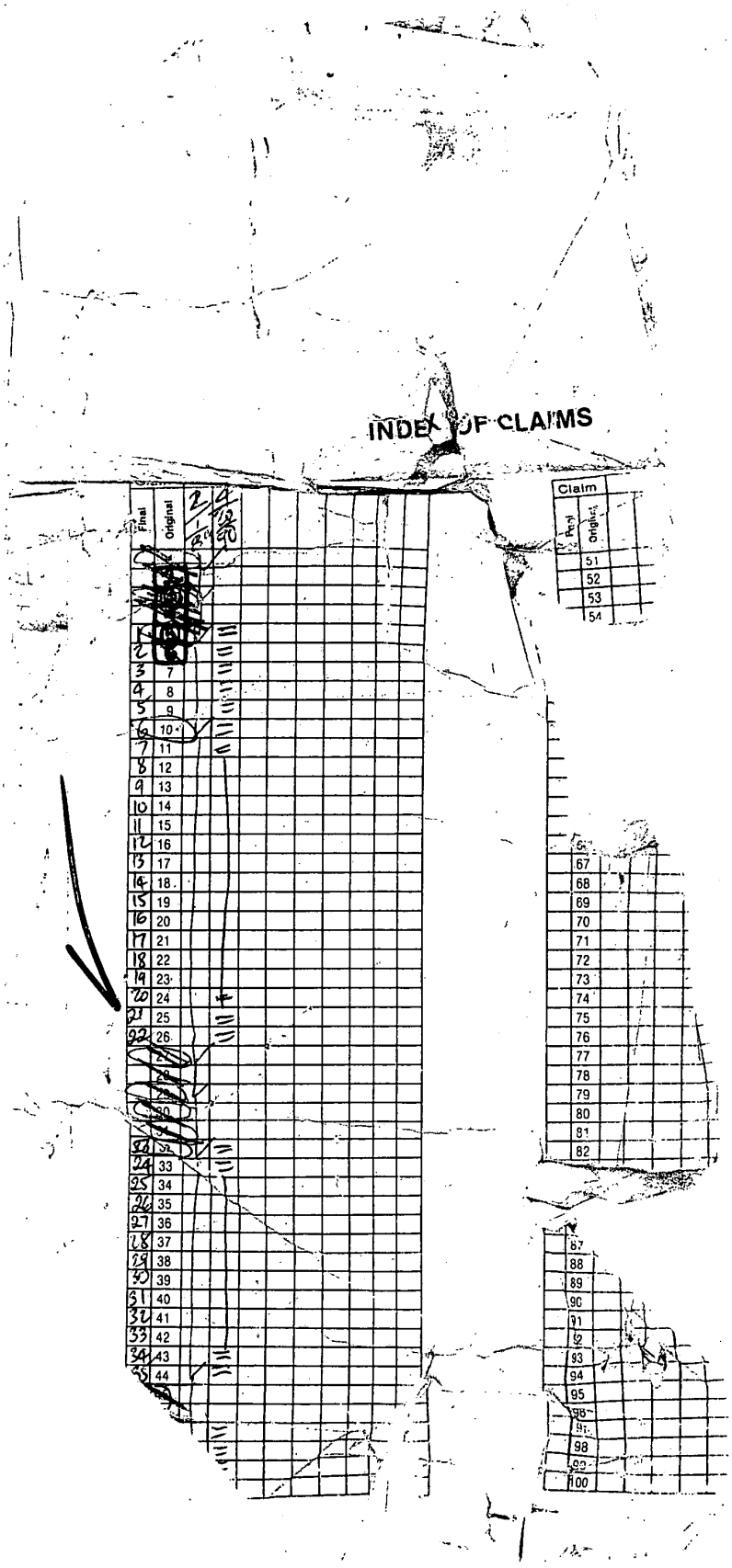

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THOMAS VIGIL & ASSOCIATES
1326 SOUTH NORTHWEST HIGHWAY
BARRINGTON, ILLINOIS 60010

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THOMAS R. VIGIL

HUGH M. GILROY

KAJANE McMANUS
PATENT AGENT

OF COUNSEL
DOUGLAS B. WHITE

CHICAGO OFFICE
39 SOUTH LA SALLE STREET
CHICAGO, ILLINOIS 60603
(312) 443-1997

December 1, 1987

Commissioner of Patents
and Trademarks
Washington, D. C. 20231

Re: Our File Ref. 87290
New U.S. CIP Patent Application
For: UNIVERSAL REMOTE CONTROL DEVICE

Dear Sir:

The enclosed application is being filed under Rule 1.16(e) and Rule 1.10 with no executed Declaration and without any filing fee.

Please be advised that we will file the executed Declaration and appropriate filing fee upon receipt of your Notice to File Missing Parts.

Very truly yours,

THOMAS VIGIL & ASSOCIATES

Thomas R. Vigil

TRV/st
Enclosures

ORNEY'S DOCKET NO. 87290

PATENT APPLICATION TRANSMITTAL LETTER

TO THE COMMISSIONER OF PATENTS AND TRADEMARKS:

Transmitted herewith for filing is the patent application of Paul V. Darbee et al

for UNIVERSAL REMOTE CONTROL DEVICE

Enclosed are:

- ☒ 17 informal sheets of drawing.
- ☐ an assignment of the invention to _____
- ☐ a certified copy of a _____ application.
- ☐ associate power of attorney.
- ☐ verified statement to establish small entity status under 37 CFR 1.9 and 1.27.

CLAIMS AS FILED

FOR	NO. FILED	NO. EXTRA	SMALL ENTITY RATE	SMALL ENTITY FEE		OTHER THAN A SMALL ENTITY RATE	OTHER THAN A SMALL ENTITY FEE
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TOTAL CLAIMS	44 - 20=	* 24	× $6 =	$	OR	×$12 =	$
INDEP. CLAIMS	9 - 3=	* 6	× $17 =	$	OR	×$34 =	$
MULTIPLE DEPENDENT CLAIM PRESENT			+ $55 =	$	OR	+$110 =	$
			TOTAL	$	OR	TOTAL	$

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- ☐ A duplicate copy of this sheet is enclosed.
- ☐ A check in the amount of $ _____ to cover the filing fee is enclosed.
- ☐ The Commissioner is hereby authorized to charge payment of the following fees associated with this communication or credit any overpayment to Deposit Account No. _____. A Duplicate copy of this sheet is enclosed.
  - ☐ Any additional filing fees required under 37 CFR 1.16.
  - ☐ Any patent application processing fees under 37 CFR 1.17.
- ☐ The Commissioner is hereby authorized to charge payment of the following fees during the pendency of this application or credit any overpayment to Deposit Account No. _____. A duplicate copy of this sheet is enclosed.
  - ☐ Any filing fees under 37 CFR 1.16 for presentation of extra claims.
  - ☐ Any patent application processing fees under 37 CFR 1.17.
  - ☐ The issue fee set in 37 CFR 1.18 at or before mailing of the Notice of Allowance, pursuant to 37 CFR 1.311(b).

December 2, 1987.
date

Thomas R. Vigil
signature Thomas R. Vigil, Reg. 24,542

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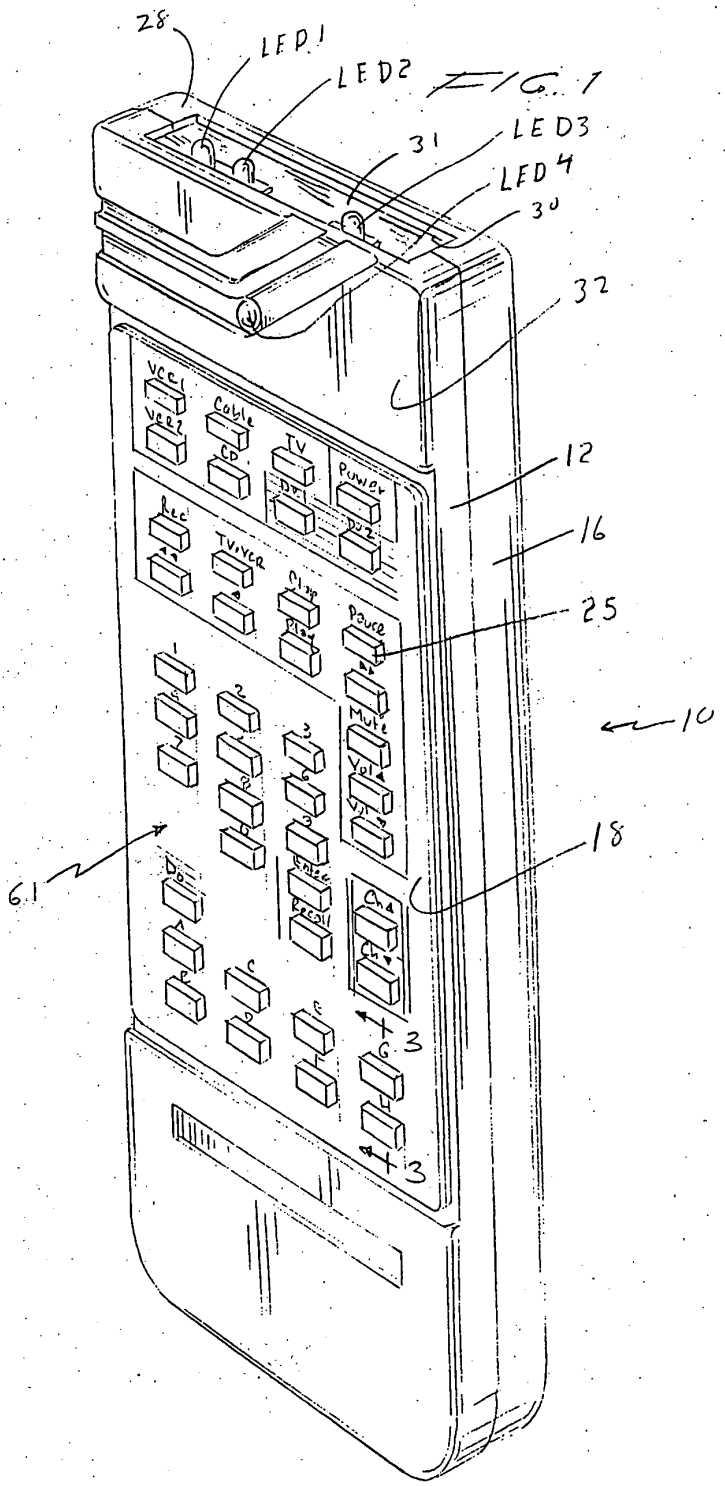
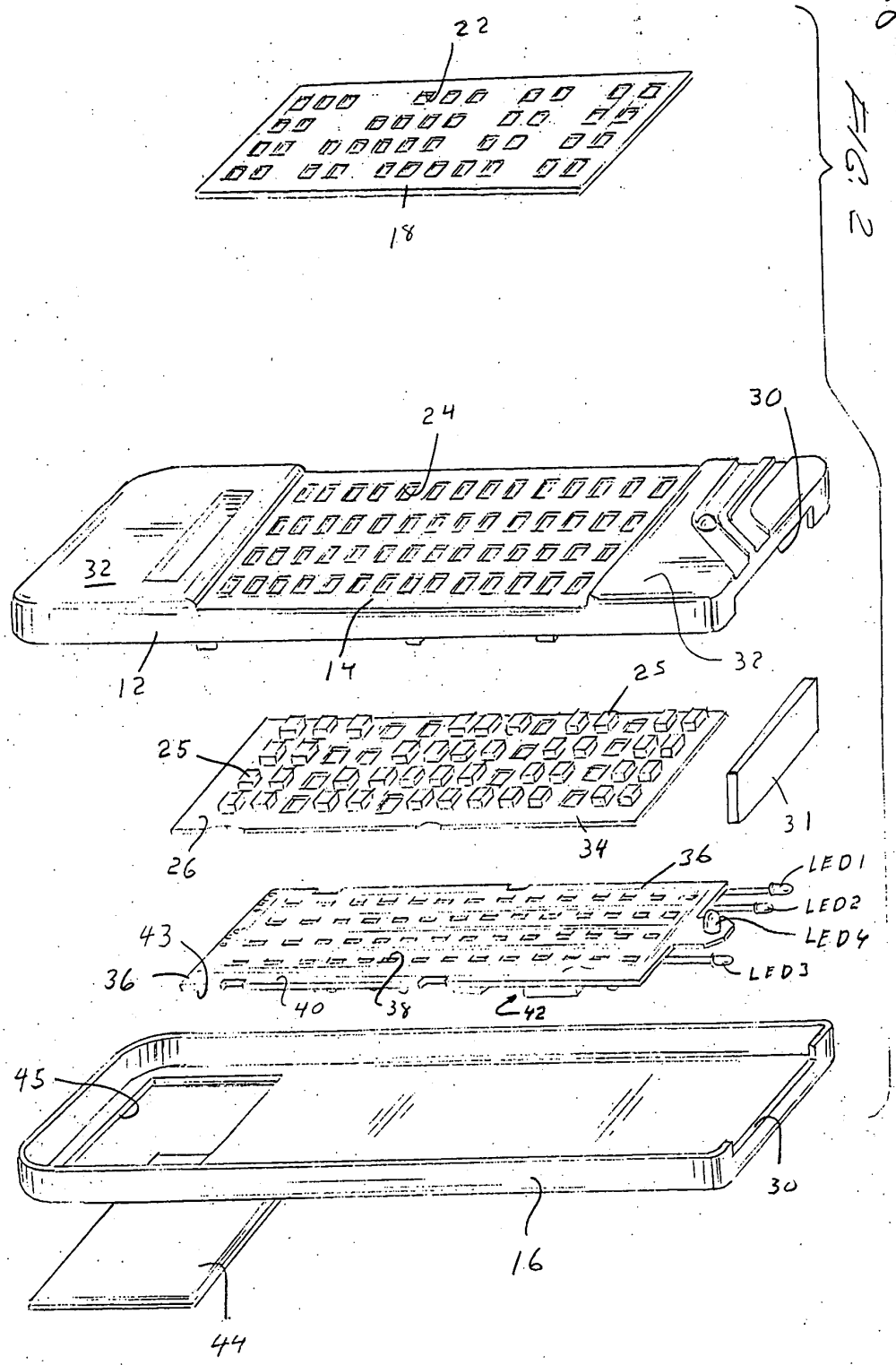


FIG. 1

28 Figures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LED1
LED2
LED4
LED3
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FIG 2

250

FIG. 3

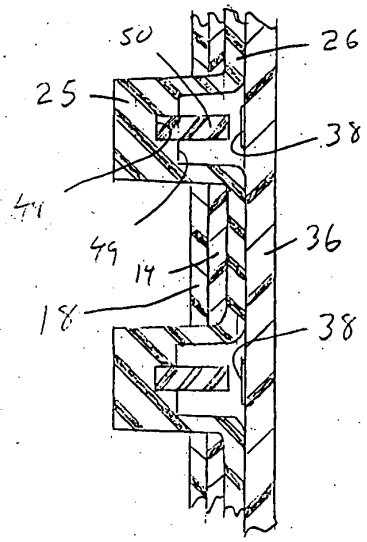


FIG. 4

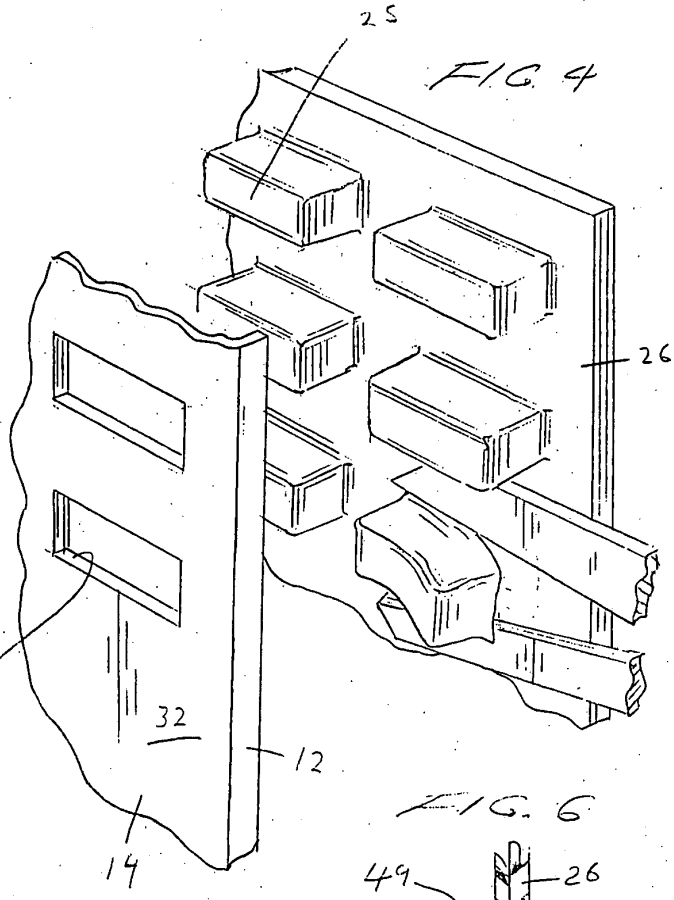


FIG. 5

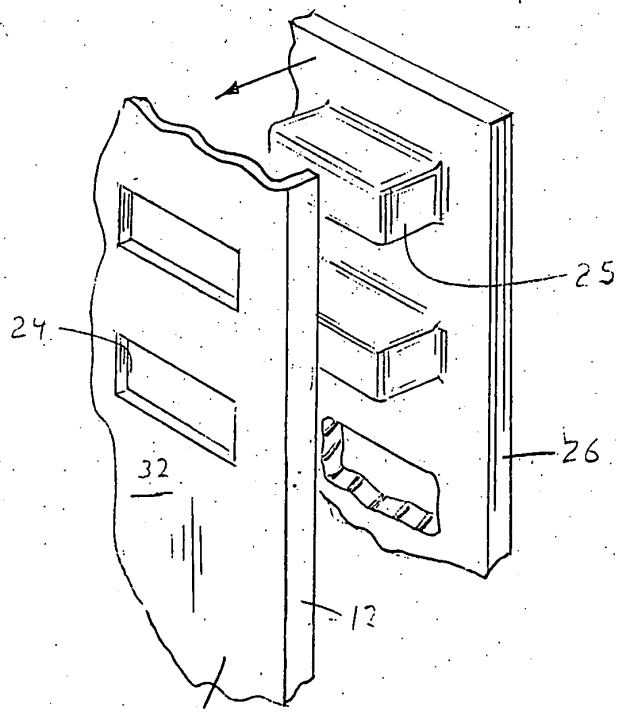


FIG. 6

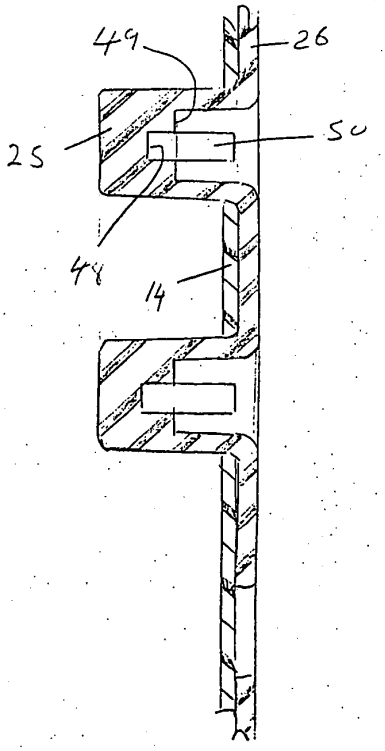
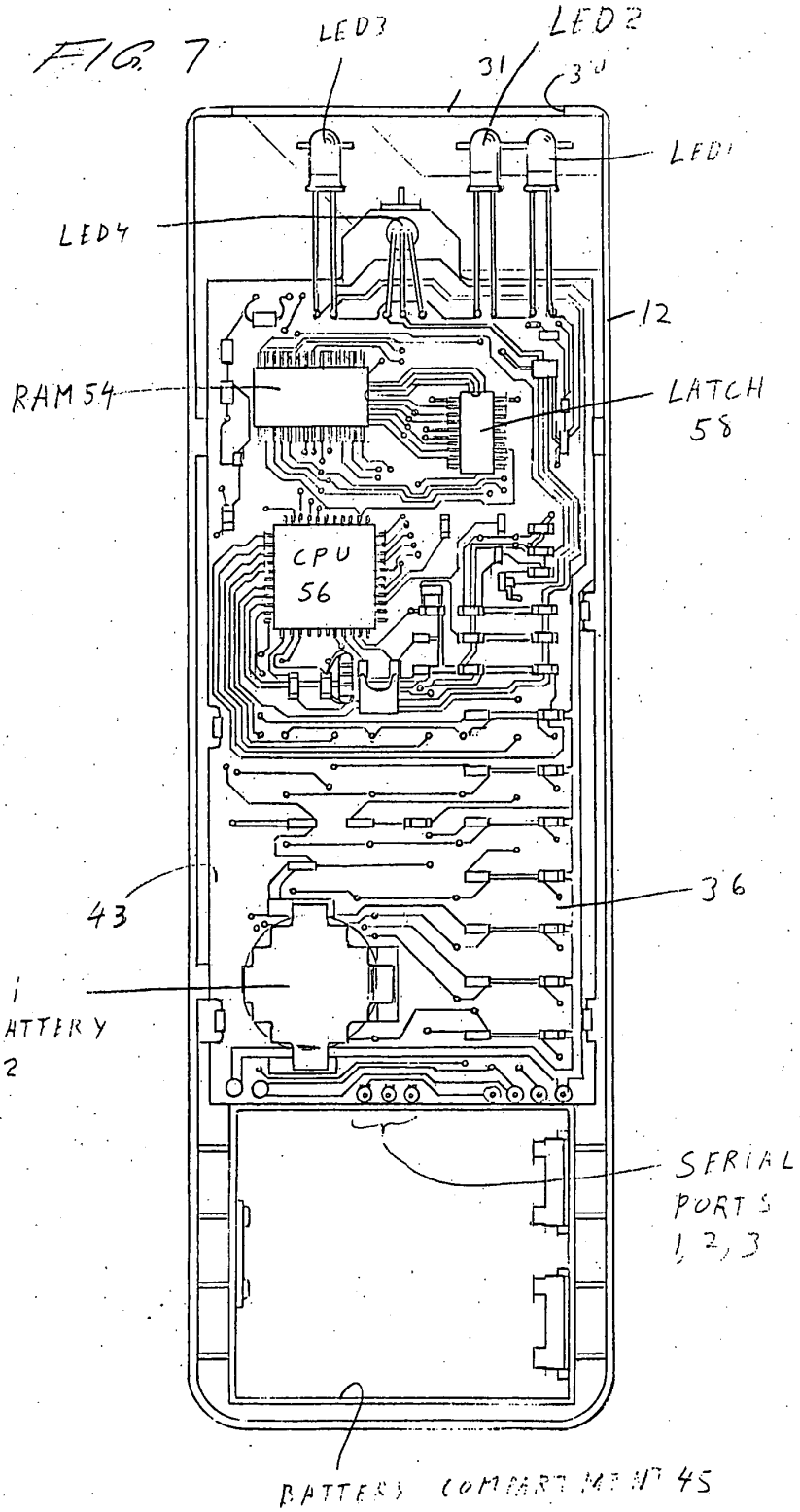


FIG. 7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LED2
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30
LED1
LED4
12
RAM 54
LATCH
58
CPU
56
43
36
L1
BATTERY
52
SERIAL
PORTS
1, 2, 3
BATTERY COMPARTMENT 45

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FIG. 8

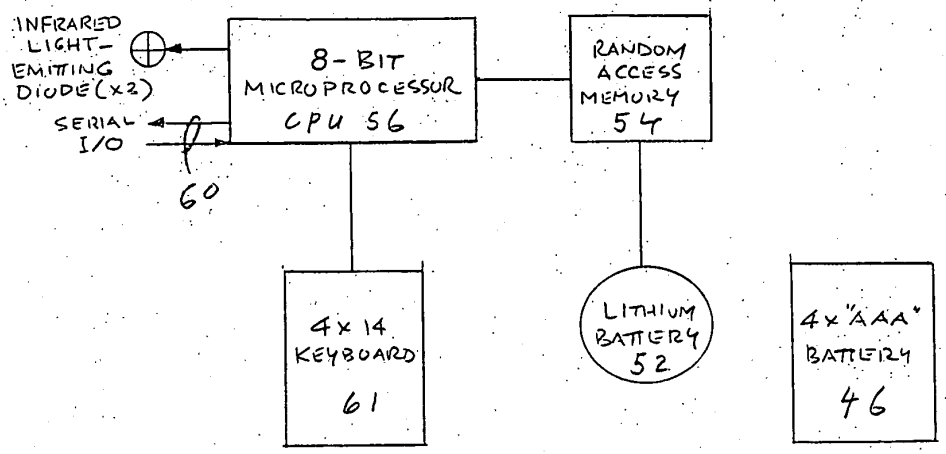
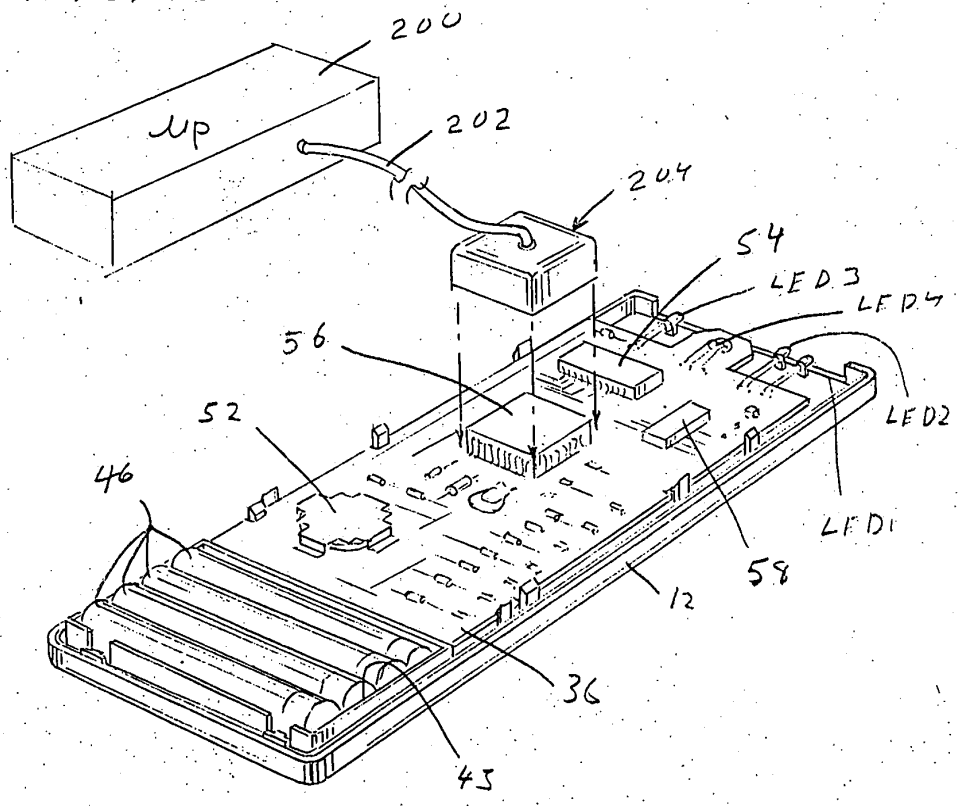


FIG. 10



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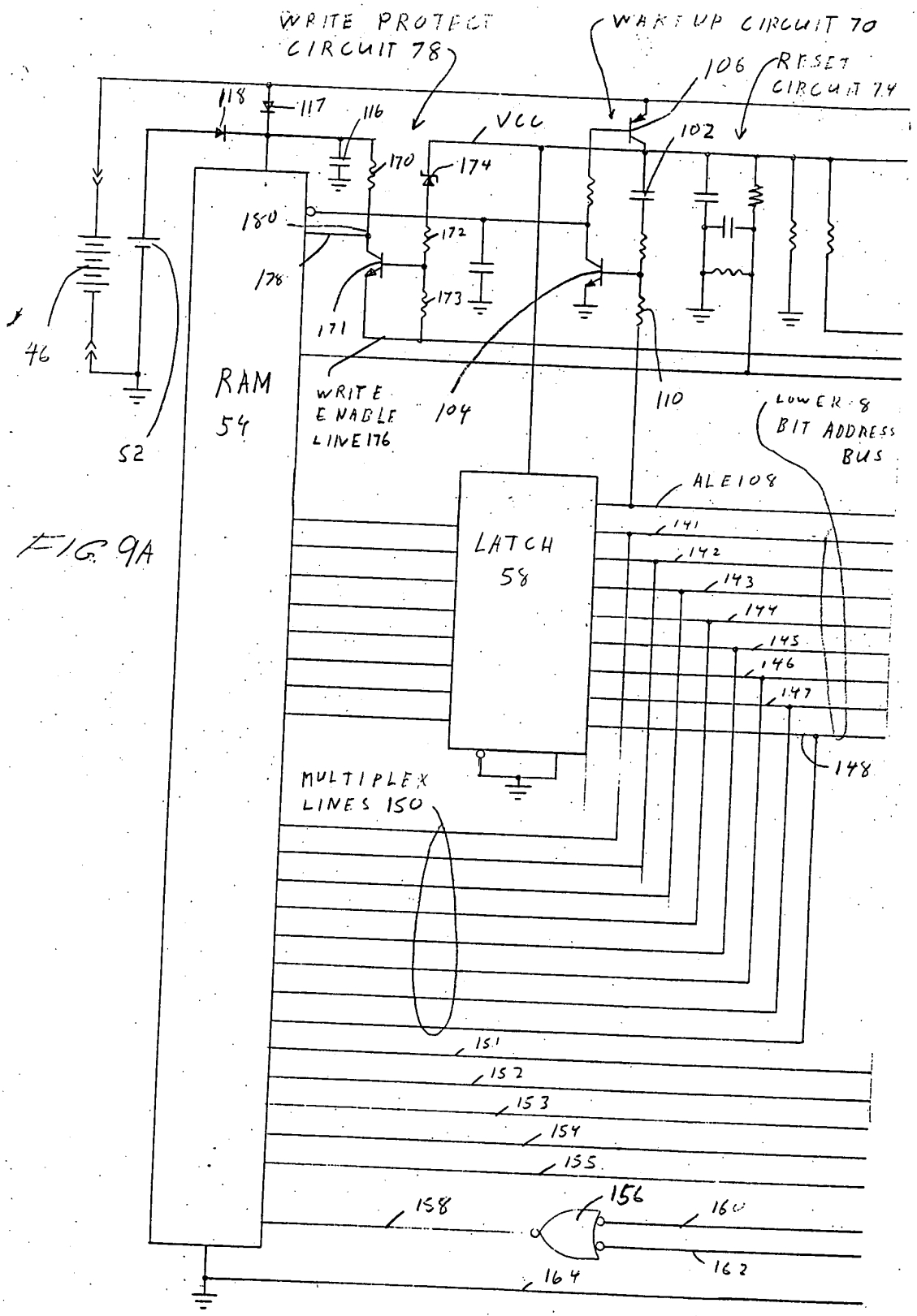

FIG 9A

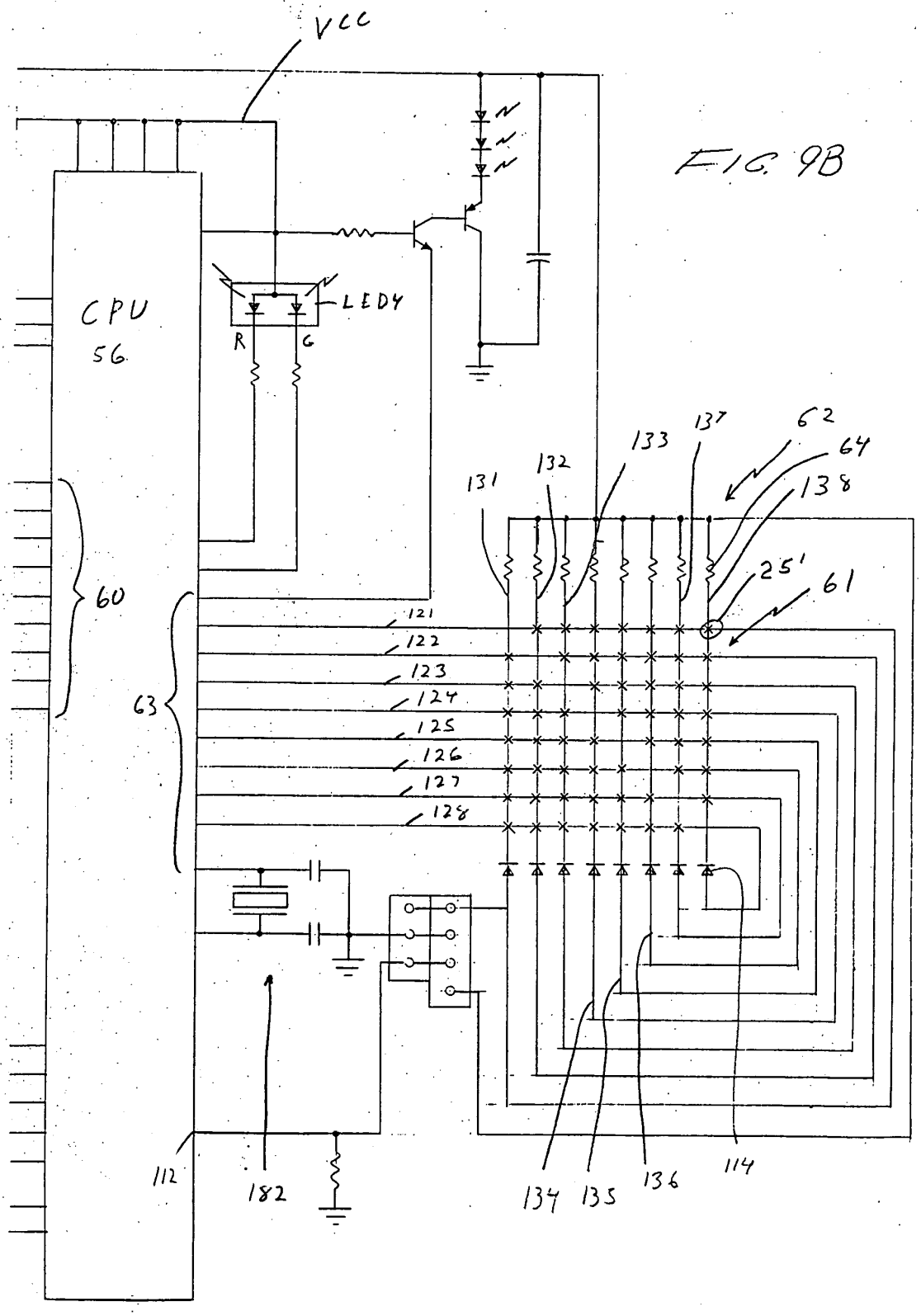
Vcc
CPU
56
LED4
R
G
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FIG. 9B

8417
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256

FIG. 11

MODULATION SCHEMES

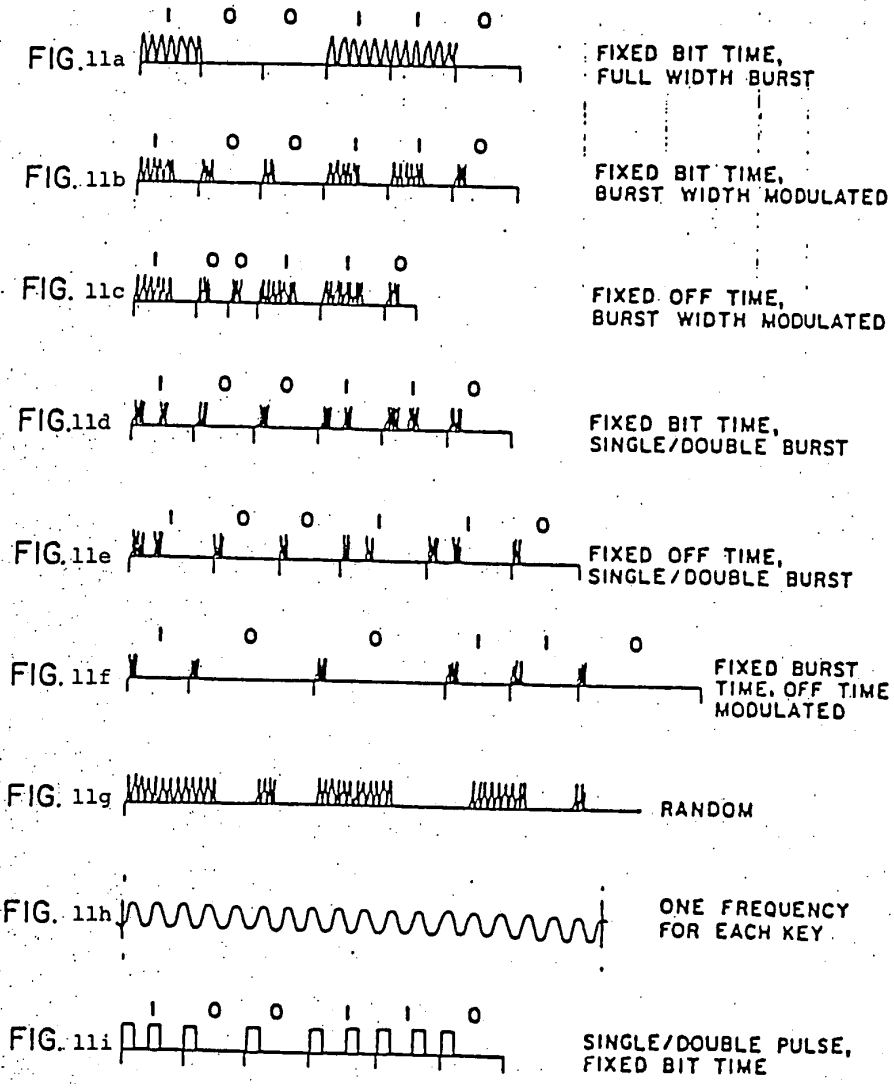

FIG. 12A
CAPTURING IR CODE

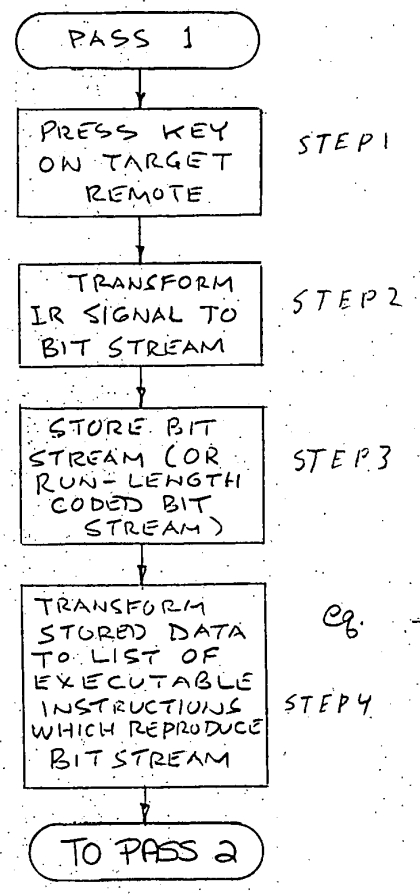

FIG. 12B

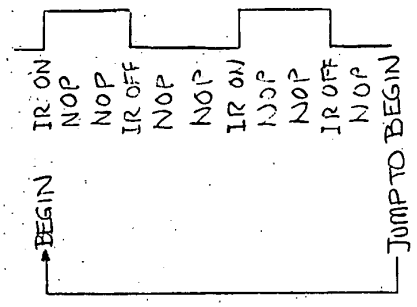

FIG 13A

CAPTURING IR CODE

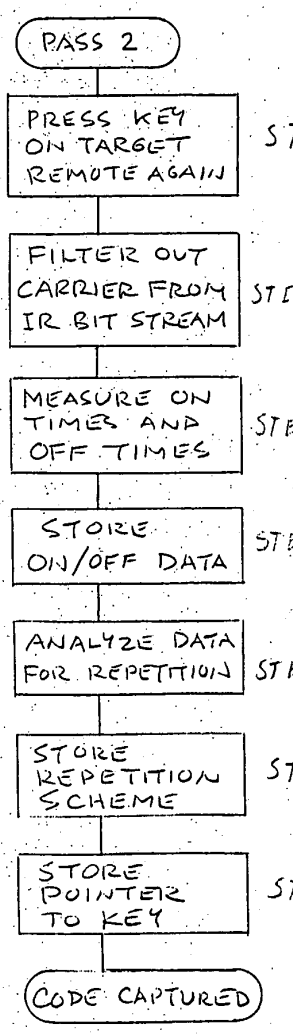

FIG. 13B

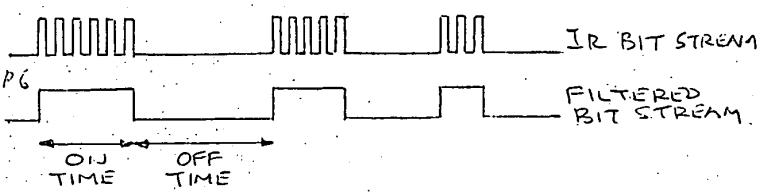

FIG. 13C

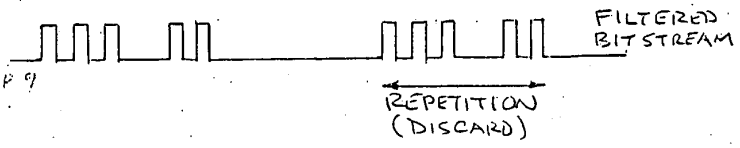

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FIG. 14 GENERATING IR CODE

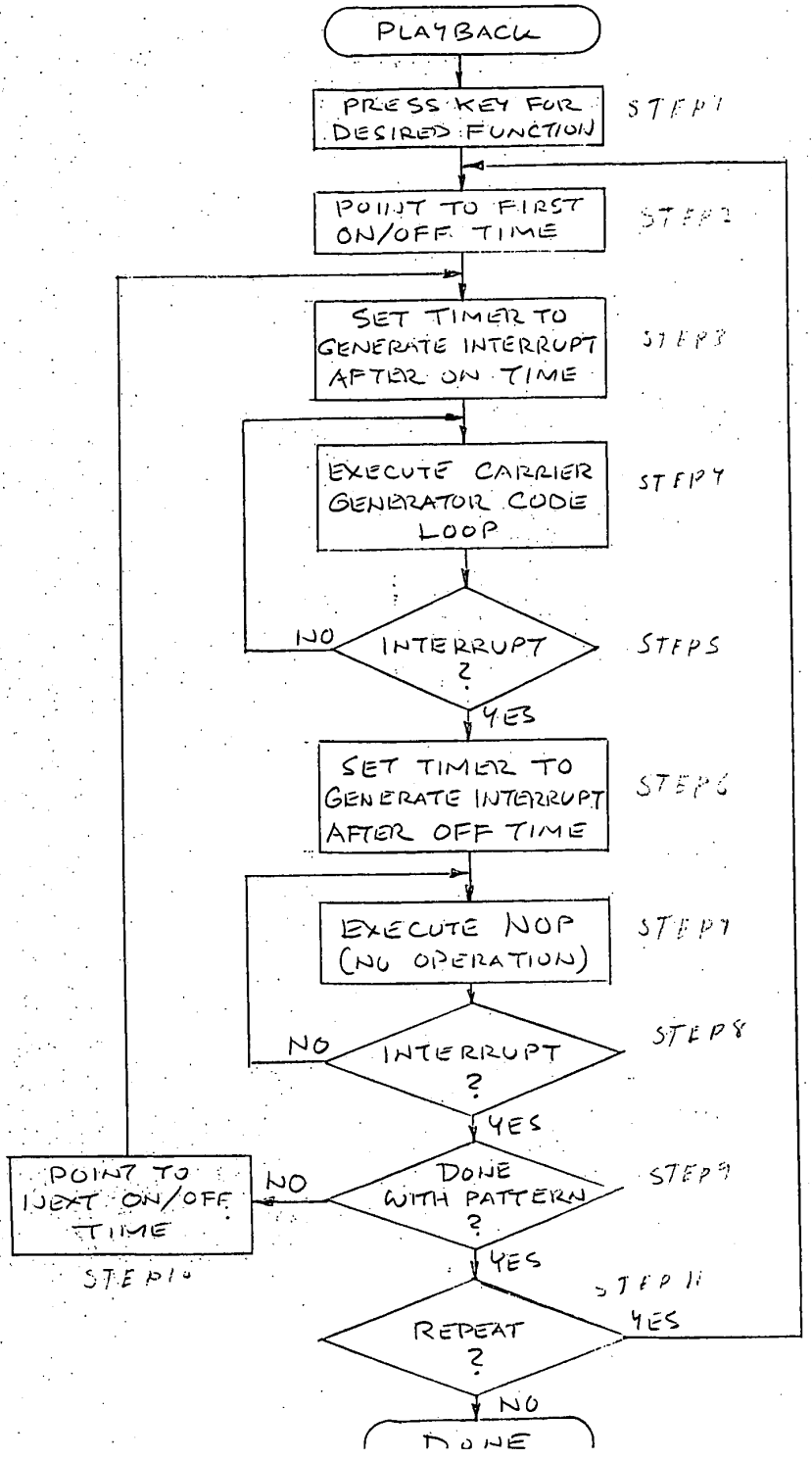

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FIG. 15

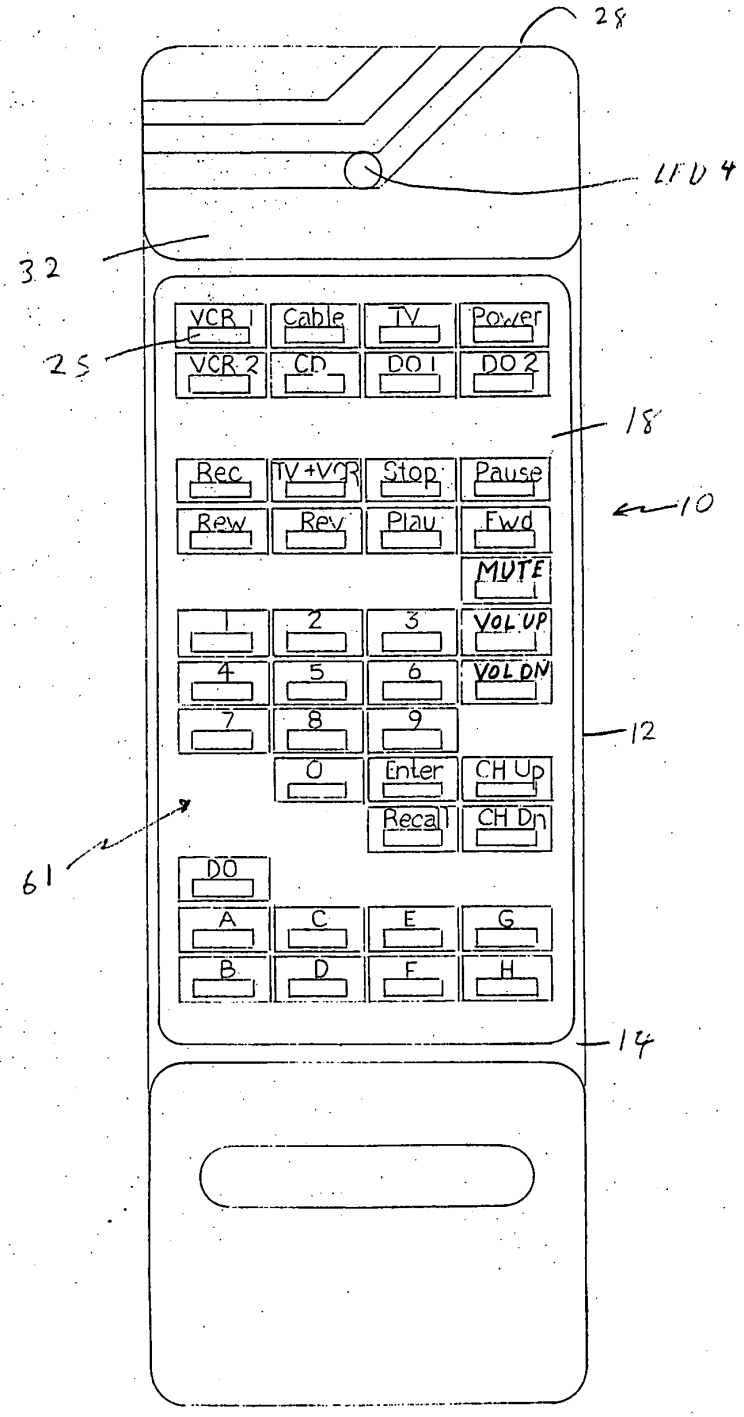

FIG. 16

STEP AND SET METHOD

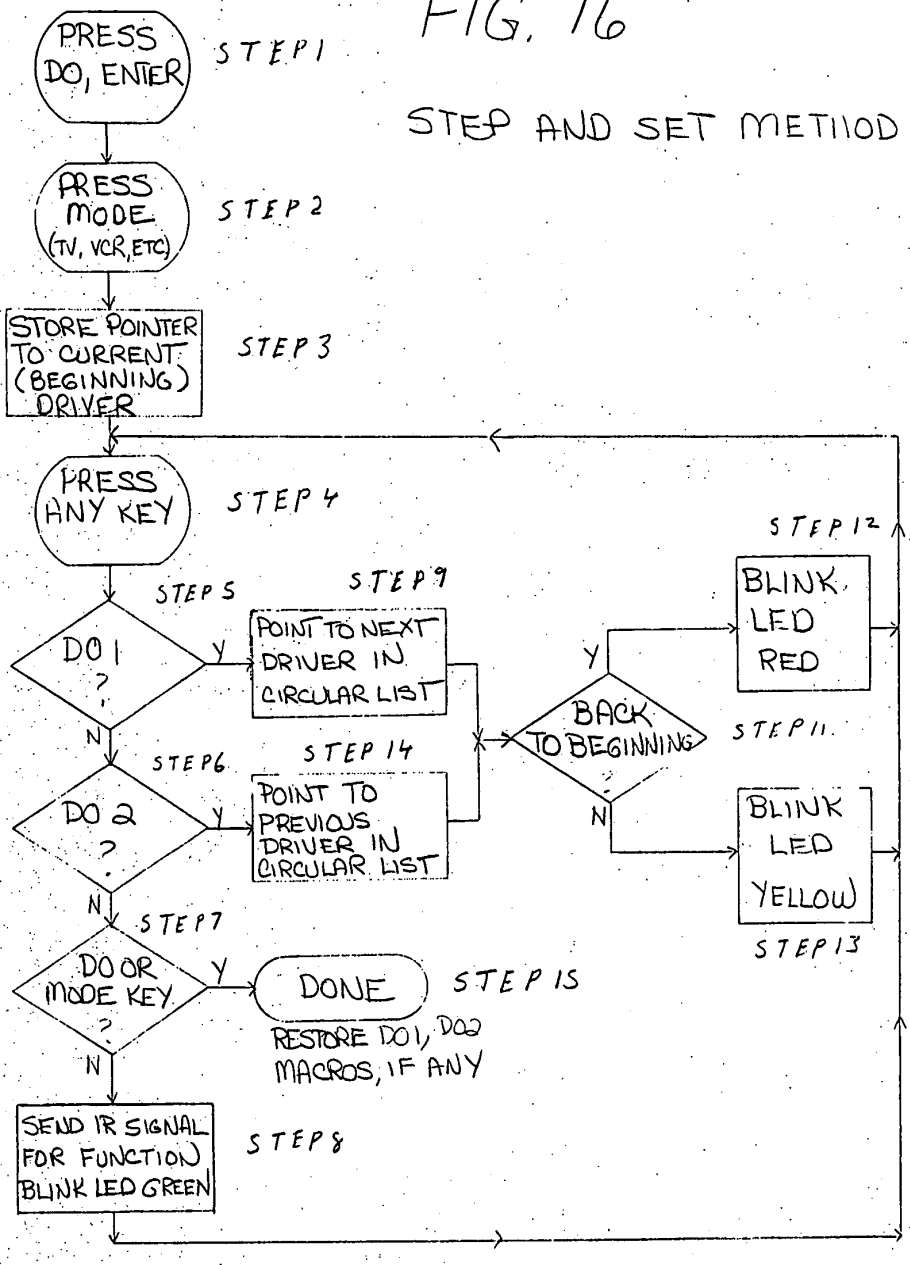

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FIG. 17
DIRECT ENTRY-QUICK SET

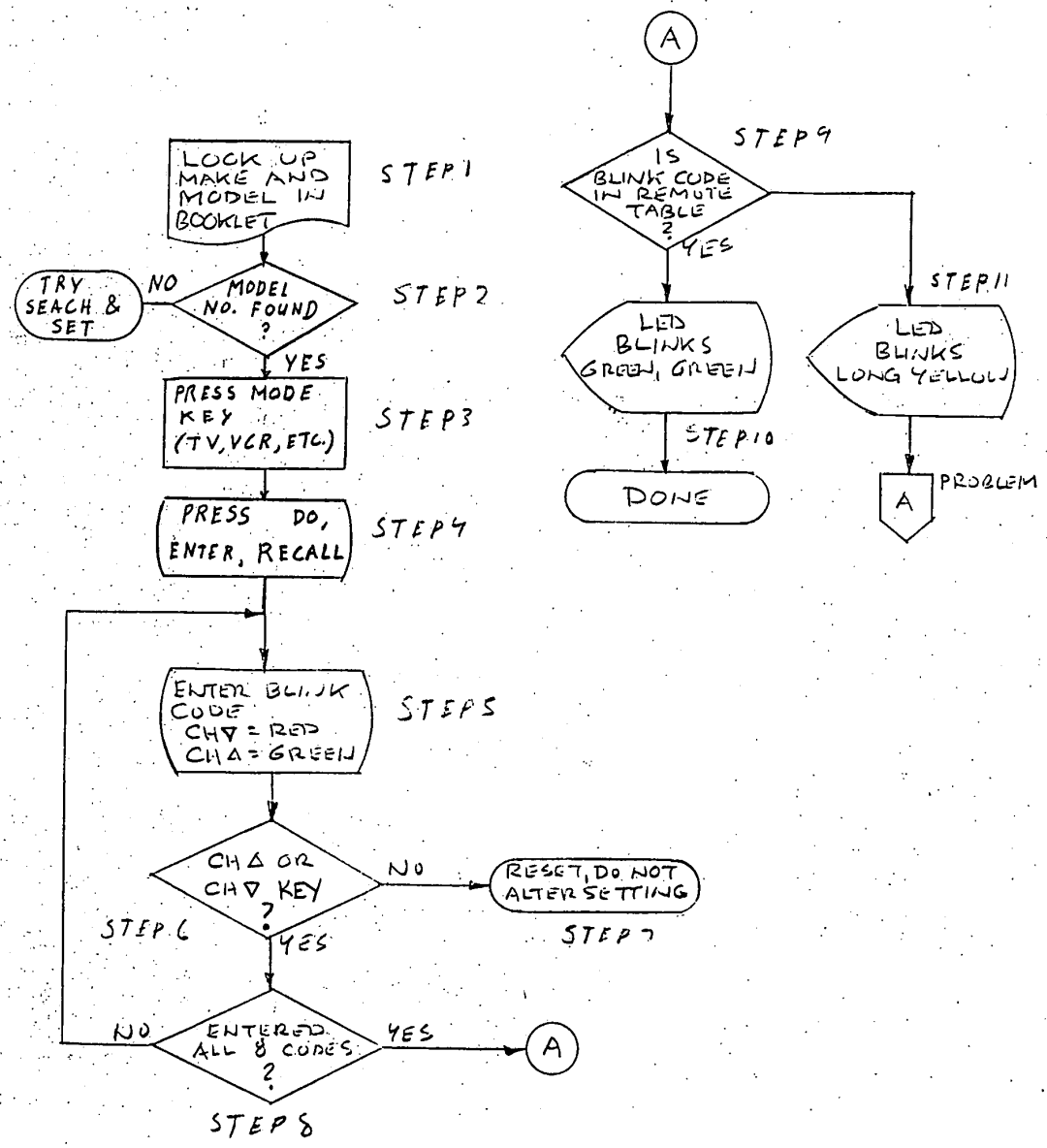


FIG. 18A

SETTING A "DO" COMMAND MACRO

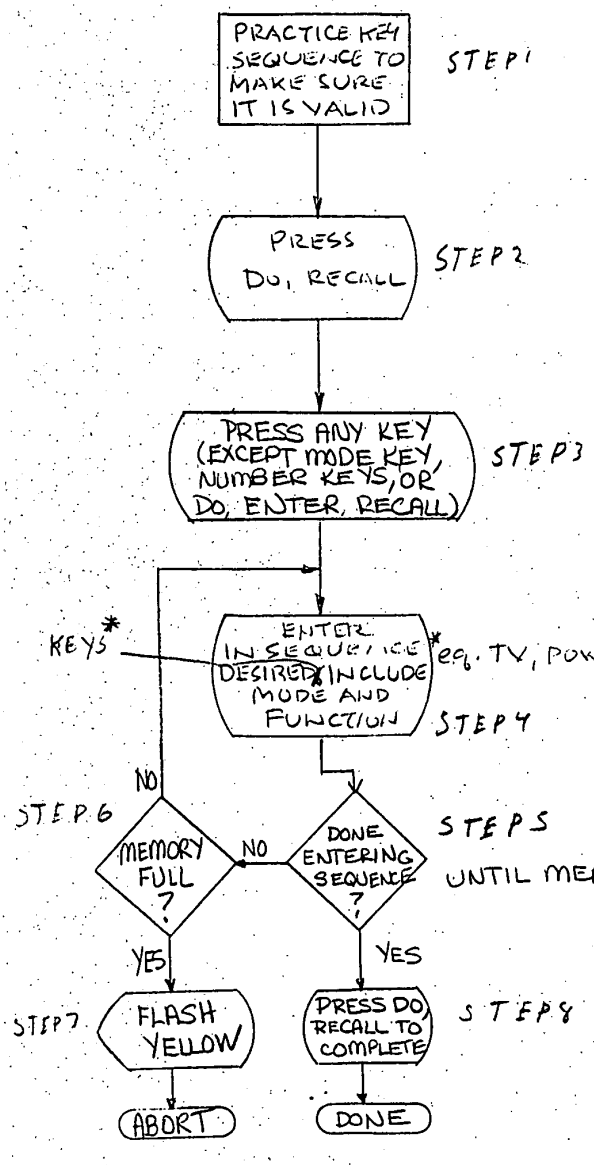


FIG. 18B

EXECUTING A MACRO "DO" COMMAND

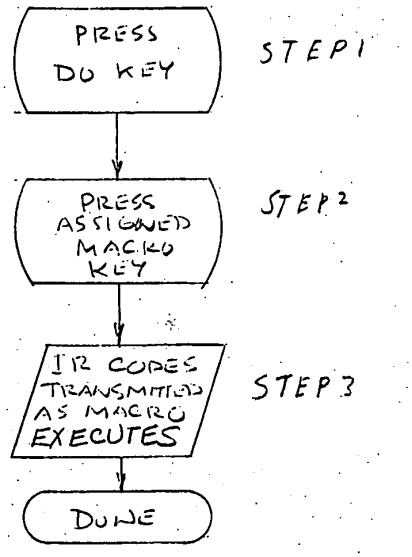


FIG. 19A

TO IDENTIFY WHAT DEVICE REMOTE IS SET FOR-BLINK CODE

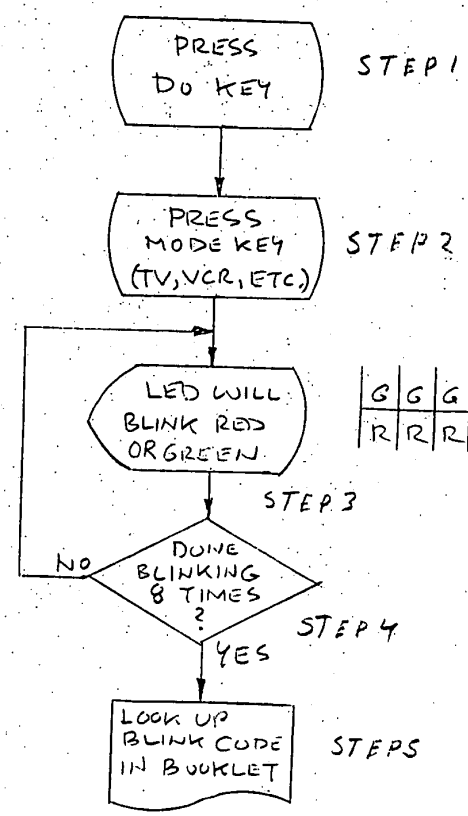
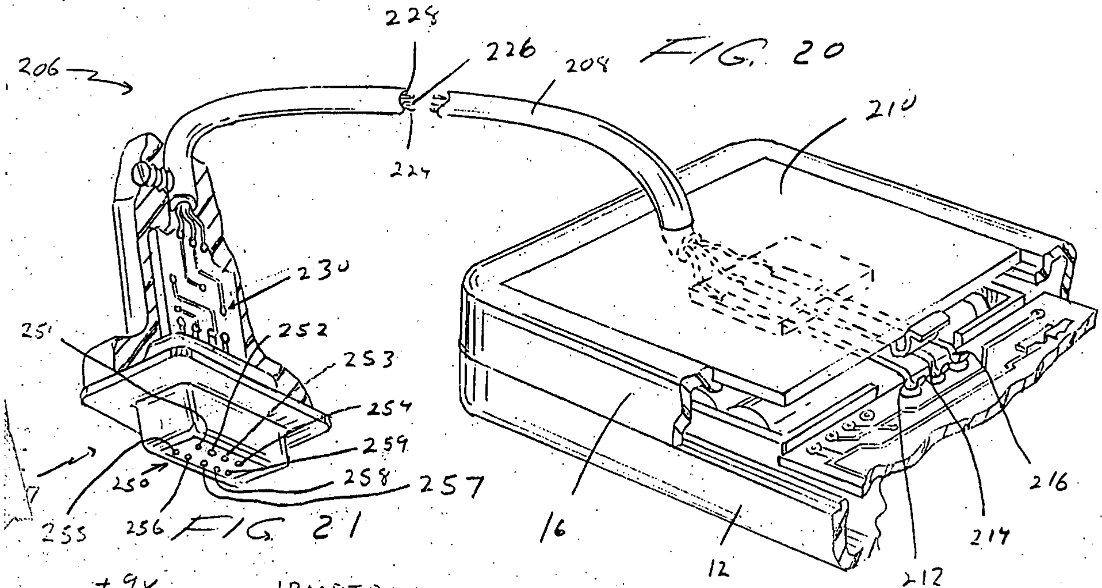


FIG. 19B

G	G	G	G	G	G	G	G
R	R	R	R	R	R	R	R

FIG. 20

FIG. 21



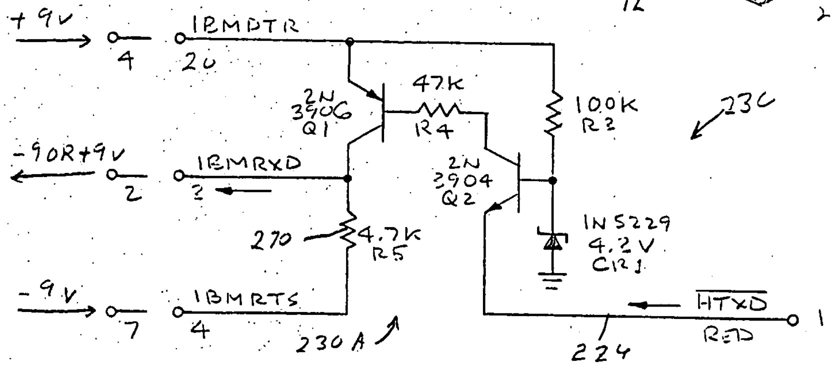
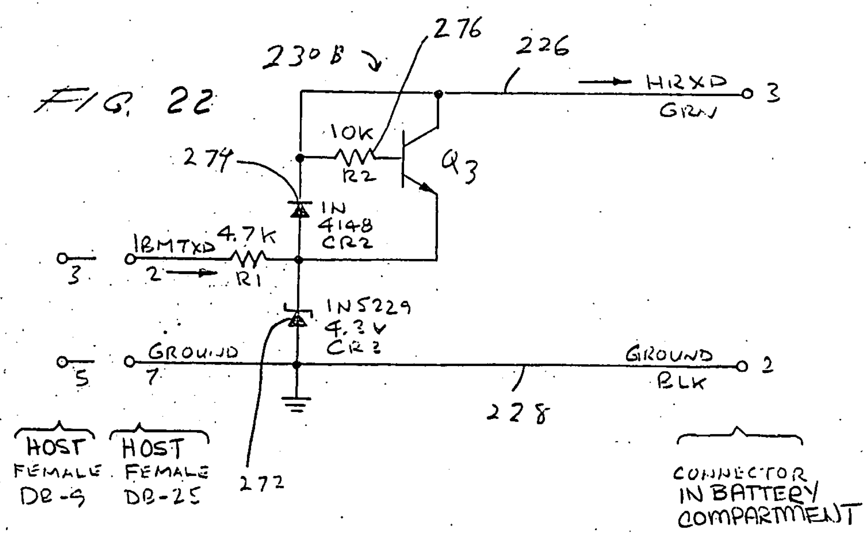


FIG. 22



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No fee

Application for Letters Patent of

the United States of America by:

PAUL V. DARBEE
9852 Brentwood
Santa Ana, California 92705

RICHARD E. ELLIS
8915 Mays
Apartment No. 25
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LOUIS STEVEN JANSKY
4226 Chestnut Avenue
Long Beach, California 90807

AVRAM S. GROSSMAN
3301 South Bear Street, #B60
Santa Ana, California 92705

all four (4) being citizens of the United States of America

For:

UNIVERSAL REMOTE CONTROL DEVICE

CROSS-REFERENCE TO RELATED APPLICATION

This application is a Continuation-in-Part of U.S. Application Serial No. 109,336 filed October 14, 1987 for: UNIVERSAL REMOTE CONTROL DEVICE.

"Express Mail" mailing label number B 11784237

Date of Deposit December 2, 1987

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TRACY JORDAN
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Tracy Jordan
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07/127999

501

UNIVERSAL REMOTE CONTROL DEVICE

BACKGROUND OF THE INVENTION

This is a continuation-in-part of application Serial No. 07/109336 now abandoned on 6/7/89.

1. Field of the Invention

The present invention relates to a universal remote control device of the type which is hand held and which can be coupled via coded infrared signals with a remote control receiver built into a television or other remotely controlled electrical apparatus to turn on the apparatus, such as the television, at a distance, to adjust the volume, tone and brightness, to change channels, and to turn the television off.

Additionally, the present invention relates to a method for acquiring the infrared codes for a controlled apparatus, such as a television, generating code data related to these infrared codes for storage in a remote control device and methods for using the remote control device for finding, in a library or table of code data for generating infarared codes for operating different electrical apparatus manufactured by different manufacturers stored in a RAM of the remote control device, the code data for generating infrared coded signals for operating a particular apparatus, such as a television, and then for using the stored code data for generating the coded infrared signals for operating the controlled apparatus.

Description of the Prior Art

Heretofore it has been proposed to provide a reconfigurable remote control device and programmable functions for such a remote control device which will enable one to learn, store and retransmit infrared codes that are emitted from the controller for a remotely controlled apparatus, such as a television.

For example, in the Welles II U.S. Patent No. 4,623,887 and the Ehlers U.S. Patent No. 4,626,848, there is disclosed a reconfigurable remote control device which has the ability to learn, store and repeat remote control codes from any other infrared transmitter. Such a reconfigurable remote control

transmitter device includes an infrared receiver, a microprocessor, a non-volatile random access memory, a scratch pad random access memory, and an infrared transmitter.

According to the teachings of the Ehlers patent, the infrared signals received by the remote control device are in bursts of pulses and the device counts the number of pulses in each burst as well as the time duration of each pause in a transmission between bursts.

As will be described in greater detail hereinafter, the universal remote control device of the present invention utilizes a single non-volatile RAM and does not provide a separate scratch pad RAM or, more importantly, a ROM.

In learning the infrared code and transforming same to code data which is then stored in a RAM of the control device and later used to generate infrared codes, a novel method is utilized wherein no counting of pulses takes place, and only the time duration of the pulses in a burst of pulses from the leading edge of the first pulse in a burst of pulses to the trailing edge of the last pulse in the burst as well as the time duration of the pause between bursts are sensed and used to learn and later to generate the infrared codes.

Additionally, unique methods for use of the remote control device are provided so that a number of infrared operation code sequences can be generated by the remote control device for operating various types of electronic apparatus.

SUMMARY OF THE INVENTION

According to the invention, there is provided in a universal remote control system having input means and signal output means for supplying a signal to a controlled device and a central processing unit coupled to said input means and said signal output means, no ROM and a single, non-volatile, read-write RAM coupled to said central processing unit.

Further according to the invention, there is provided a method of loading a RAM in a ROM-less microprocessor system comprising a central processing unit, a single non-volatile, read-write RAM, input means, output means, and means for coupling said central processing unit, said RAM, said input means, and said output means together, said method including the steps of:

(a) disabling the central processing unit;

(b) connecting a separate microprocessor system to said RAM;

(c) transferring instructions and/or data to said RAM;

(d) re-enabling the central processing unit to enable the central processing unit to execute the instructions so transferred.

Still further according to the present invention, there is provided a process of learning, storing and reproducing the remote control codes of any of a diverse plurality of remote control transmitters, comprising the steps of:

(a) receiving a transmission of a train of pulses from a remote control transmitter;

(b) recording the point-in-time of an edge of each pulse in a train of said pulses;

(c) transforming the recorded point-in-time data into a list of instructions for generating a replica of said train of pulses;

(d) timing the duration of a train of said pulses;

(e) timing the period between trains of pulses;

(f) associating a function key of a universal remote control device with said time duration of said train of pulses and said list of instructions for generating a replica of said train of pulses;

(g) determining whether or not repetitions of the transmission of train of pulses is present;

(h) ignoring repetitions of the train of pulses;

(i) noting that repetitions are present; and

(j) storing for use in a universal remote control device, the information acquired in steps (c), (d), (e), (f) and (i).

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a front perspective view of the universal remote control device constructed according to the teachings of the present invention.

FIG. 2 is an exploded perspective view of the control device shown in FIG. 1.

FIG. 3 is an enlarged fragmentary sectional view through two of the push buttons of the control device shown in FIGS. 1 and 2.

FIG. 4 is a fragmentary corner view of a push button containing panel and a base panel.

FIG. 5 is a fragmentary corner view similar to FIG. 4 as the panels are brought together and shows one of the push buttons cut away from the push button containing panel.

FIG. 6 is a fragmentary sectional view of the assembly 15 formed by bringing the push button containing panel into engagement with the base panel.

FIG. 7 is a plan view of the circuit board assembly mounted inside the control device viewing the control device from the back side thereof with a back cover panel removed.

FIG. 8 is a block diagram of the operating circuitry in the control device.

FIGS. 9A & 9B are a detailed schematic circuit diagram of the operating circuitry shown in FIG. 8.

FIG. 10 is a perspective view showing the connection of a programming connector over the central processing unit of the operating circuitry in the control device, the programming connector being connected to a microprocessor, being operable to disable the central processing unit, and being used to program the random access memory (RAM) of the operating circuitry.

FIGS. 11a to 11i are graphical representations of several

modulation schemes which are used in infrared remote control transmitters.

FIG. 12A is a flow chart of a first part of a method for capturing an IR code and FIG. 12B is a graph of the envelope of the code.

FIG. 13A is a flow chart of a second part of a method for capturing an IR code; FIG. 13B is a waveform of the IR bit stream and filtered bit stream; and FIG. 13C is a graph of the waveform of a filtered repetition of a filtered bit stream.

FIG. 14 is a flow chart of the method used for generating an infrared code.

FIG. 15 is a front plan view of the control device shown in FIG. 1 and shows the various pushbuttons of the device.

FIG. 16 is a flow chart of the search and set procedure followed in using the control device of the present invention.

FIG. 17 is a flow chart of a direct-entry/quick-set procedure followed in using the remote control device.

FIG. 18A is a flow chart of the procedure followed in setting a "DO" command and FIG. 18B is a flow chart of the method for executing a "DO" command.

FIG. 19A is a flow chart of the method used to identify what type of unit the remote control device is set for and FIG. 19B is a table of the identifying blink code.

FIG. 20 is a fragmentary perspective view with portions broken away of a connector with conversion circuitry therein and a special battery case cover for the control device by which new data can be inputed into the RAM of the operating circuitry of the control device.

FIG. 21 is a schematic circuit diagram of part of the conversion circuitry in the connector shown in FIG. 20.

FIG. 22 is a schematic circuit diagram of another part of the conversion circuitry in the connector shown in FIG. 20.

DESCRIPTION OF THE PREFERRED EMBODIMENT

Referring now to FIG. 1 in greater detail, there is illustrated therein a universal remote control device 10 constructed according to the teachings of the present invention.

As shown, the device 10 includes a housing 11 including an upper housing member 12 having a base panel 14, and a lower housing member 16. An overlay face panel 18 is positioned over the base panel 14.

The two panels 14 and 18 have openings 22 and 24 (FIG. 2) therethrough for receiving elastomeric pushbuttons 25, all of which extend from and are fixed to or integral with an elastomeric body panel 26 as shown in FIG. 2.

The pushbuttons 25 are arranged in rows and columns and are identified as follows on the overlay face panel 18:

VCR 1	Cable	TV	Power
VCR 2	CD	DO 1	DO 2
Rec	TV . VCR	Stop	Pause
Rew	Reverse	Play	Fast Fwd
			Mute
1	2	3	Vol Up
4	5	6	Vol Dn
7	8	9	
	0	Enter	CH Up
		Recall	CH Dn
DO			
A	C	E	G
B	D	F	H

This arrangement is shown in FIG. 15 and the manner in which these pushbuttons 25 are utilized in operating the control device 10 will be described in greater detail in connection with the description of FIGS. 15-19B.

At a top or forward end 28 of the device 10, there is

provided an opening 30 for three light emitting diodes, LED 1, LED 2 and LED 3. The opening 30 is covered by an infrared-transport lens 31. Also, provided on a top surface 32 of the upper housing member 12 of the control device 10 is a light emitting diode, LED 4, by which information, in the form of red and green blink codes, is communicated to the user of the device 10.

FIG. 2 is an exploded view of the components of the device 10. As shown, the device 10 includes the overlay face panel 18 with pushbutton-receiving, generally rectangular openings 22, the upper housing member 12 with base panel 14 having a plurality of generally rectangular, pushbutton receiving openings 24, the elastomeric body panel 26 having pushbuttons 25 extending from an upper surface 34 thereof, a printed circuit board 36 having conductive switches 38 on an upper surface 40 thereof and operating circuitry 42 (FIG. 7) mounted on the underside 43 thereof, the lower housing member 16, a cover 44 for a battery compartment 45 (FIG. 7) for receiving batteries 46 (FIG. 10) for the circuitry 42 of the control device 10, and the infrared-transport lens 31.

It will be noted that the base panel 14 of the upper housing member 12 has pushbutton openings 24 completely across each one of fourteen (14) rows across and four (4) columns down. However, not all of these openings or holes 24 have pushbuttons 25 extending therethrough, as noted by the lesser number of pushbutton-receiving openings 22, in the overlay face panel 18. Likewise, the body panel 26 initially has pushbuttons 25 arranged completely across the upper surface 34 thereof in fourteen (14) rows across and fourteen (14) columns down.

The printed circuit board 36 has conductive switches 38 aligned with each one of the pushbuttons 25 so that more switches 38 are provided than may be necessary for this particular control

device 10.

The availability of additional pushbutton openings 24 in the base panel 14 will enable the control device 10 to be modified as necessary by the addition of further pushbuttons 25 to perform numerous other functions as called for.

This mechanical construction of the upper and lower housing members 12 and 16 and the panels 14 and 18 and circuit board 36 enable the control device 10 to be modified to include additional circuits in the operating circuitry 42 and pushbutton switches 25 for performing additional functions, if desired. In this respect, overlay face panel 18 is easily replaceable to modify the device 10 to include more or less pushbuttons 25 and associated switches 38.

The simplicity of the construction of the pushbuttons 25, the base panel 14 and the overlay panel 18 is shown in FIGS. 3-6. As shown in FIG. 3, the body panel 26 has a plurality of raised pushbuttons 25 formed thereon. Each raised rectangular button 25 has a recessed area or hollow 48 on the underside 49 of each button 25 in which is mounted a conductive plunger or puck 50 adapted to engage one of the conductive switches 38 on the circuit board 36. With the pushbuttons 25 and the panel 26 being formed from a sheet of elastomeric material it is an easy matter to remove the buttons 25 that are not necessary with a scissors or other cutting element, as shown in FIG. 4.

Then, the pushbutton body panel 26 is moved into engagement with the base panel 14, as shown in FIG. 5, to form the assembly shown in FIG. 6.

After the pushbutton body panel 26 and the base panel portion 14 have been assembled as shown in FIG. 6, the overlay face panel 18 is mounted on top of the base panel 14 and the circuit board 36 is mounted within the housing member 12.

Referring now to FIG. 7, there is illustrated therein the

operating circuitry 42 of the control device 10 which includes batteries 46 (FIG. 10) mounted in the compartment 45 for providing power for the circuitry 42 and a lithium battery 52, which backs up a statuc RAM 54. A central processing unit (CPU) 56, is coupled through a latch 58 to the RAM 54. Three LEDs, LED 1, LED 2, and LED 3 are coupled to the circuitry 42 for communication with the apparatus to be controlled. All elements of the circuitry 42 are mounted on the circuit board 36 mounted in the upper housing member 12. A further LED, LED 4 is coupled to CPU 56 for communication with the user of the device 10 as will be described in greater detail below.

A block schematic circuit diagram of the operating circuitry 42 is shown in FIG. 8 and includes CPU 56, the infrared light emitting diodes, LED 1, LED 2, and LED 3 coupled to the CPU 56, serial input/output ports 60 of CPU 56, the RAM 54 coupled to CPU 56 and backed up by lithium battery 52 and a 4 x 14 keyboard 61 coupled to CPU 56. The four AAA batteries 46 are also shown.

FIGS. 9A and 9B are a detailed schematic circuit diagram of the operating circuitry 42. The operating circuit 42 includes the central processing unit 56, the latch 58, the random access memory 54 and LED 1, LED 2, LED 3 and LED 4.

The operating circuitry also includes several subcircuits. One of those subcircuits 62 (FIG. 9B) includes the keyboard 61 having pushbuttons 25, each of which is connected to a port 63 of the CPU 56 shown in FIG. 9B and can be referred to as the keyboard circuit 62. The X's in FIG. 9B indicate the pushbuttons 25 and when one of those pushbuttons X is pressed, current flows through a resistor in a column line, e.g., when button 25' is pressed current flows through resistor 64 in column line 138 going to the button or key 25'. That raises the voltage on a supply line VCC to the CPU 56 of the microprocessor.

Accordingly, whenever a button 25 is pressed, it will

increase the voltage on line VCC which initiates a switiching process in a wake up circuit 70 for "waking up" or energizing the CPU 56 in the manner described below.

In addition to the keyboard circuit 62 and the wakeup circuit 70, the subcircuits include a reset circuit 74, and a write protect circuit 78.

When the voltage on line VCC goes up, a signal is passed through capacitor 102, to the base of a transistor 104 in the wake up ciruit 70. This turns on the transistor 104 which in turn turns on transistor 106. This turning on of the transistors 104 and 106 will bring voltage on line VCC to the full DC voltage of about 5 1/2 volts. When the voltage on line VCC reaches 5 1/2 volts, the CPU 56 begins to operate.

When operating, the CPU 56 establishes a signal on line ALE 108 which is passed through a resistor 110 and filtered by capacitor 102. Once the ALE signal is established, it causes a voltage to be generated at the base of transistor 104, maintaining transistor 104 turned on, which in turn maintains transistor 106 turned on, thus enabling the CPU 56 to continue to run. The CPU 56 can turn itself off by executing a HALT instruction which causes the ALE signal to cease, thus turning off transistors 104 and 106 and removing power via line VCC to the CPU 56.

It is to be noted that the wake up circuit 70 can be activated by depression of a key or button 25 or by an input signal at serial port 3 coupled to an input port 112 of the CPU 56.

The circuit elements described above form the wakeup circuit 70 for activating the operating circuitry 42 of the device 10. This circuit uses substrate static-protection diodes 114 in a CMOS chip coupled to the keyboard 61. With this arrangement, source current is supplied to transmitter 104 via line VCC when a

key or pushbutton 25 is depressed.

The RAM 54 is connected to the lithium battery 52 and, when the device 10 is not being used, draws about 20 nanoamps from the battery 52, which gives the device 10 a shelf life between 5 and 10 years. A backup capacitor 116 is coupled to the RAM 54 and has (at 20 nanoamps) a discharge time of about 10 minutes, providing ample time to change (if necessary) the battery 52 without losing the instructions and data stored in the RAM 54. Capacitor 116 is kept charged by battery 46 through diode 117 when the device 10 is operating and, at other times, by battery 52 through diode 118.

After the CPU 56 has been powered up, or awakened, the CPU 56 makes a scan of row lines 121-128 to the keyboard 61 by sequentially forcing each line 121-128 low and then polling the other lines to find out which button 25, such as button 25', has been pressed. As a result of pushbutton 25' being pressed, a low impressed upon row line 121 will cause a low on column line 128 and that will result in the row line 128 being low.

The CPU 56 first sets row line 121 low and then begins scanning, starting with the row line 122, for another row line having a low voltage thereon and by finding the row line with the low voltage, in the above example, row line 128, the CPU 56 knows that button 25' at the intersection of row line 128 and column line 138 has been depressed.

If the CPU 56 had not found a low on another row line, such as row line 128, after having set line row 121 low, line 121 is returned to its previous value and row line 122 is then set low, and the scan continued until a low row line is found to identify which button 25 has been depressed.

When the CPU 56 determines which pushbutton 25 has been depressed the CPU 56 will then know what function is to be carried out.

It is to be noted that the keyboard circuit 62 is uniquely designed to include only eight (8) row lines 121-128 and eight (8) column lines 131-138 each having a resistor 64 and a current directing diode 114 therein and each being arranged across the row lines 131-138 so that 56 switch positions are provided with only eight (8) lines.

All memory cycles exercised must involve the latch 58 because the CPU 56 has its data bus multiplexed with the lower 8 bits of the address bus on lines 141-148.

Coming out of the CPU 56 to the latch 58, is a group of nine (9) lines 108 and 141-148. One of the lines, line 108, carries the ALE signal. The eight (8) lines 141-148 between the latch 58 and the CPU 56 are the multiplexed data and address bus lines. These lines comprise the lower 8 bits of the address bus. A group of multiplex lines are identified with reference numeral 150. Five more lines 151-155 comprise the upper five bits of the address bus, making a total of 13 bits of address.

An inverting OR gate 156 having an output line 158 and two input lines 160 and 162 together with ground line 164 are coupled between the CPU 56 and the RAM 54. The line 158 defines an output enable for the RAM 54.

Accordingly, when the CPU 56 wants to do a read, it actuates either of the two input lines 160 or 162 going into the OR gate 156. Line 160 is a PSEN line for telling the RAM 54 that it is to be enabled to receive data and line 162 is a Read Output line to tell the RAM 54 that the CPU is going to read the information stored in the RAM 54. With OR gate 156 the two lines and functions are combined on one line 158. In other words, the CPU 56 tells the RAM 54, through the OR gate 156, that it wants to read information stored in the RAM 54.

The circuitry 42 also includes the write protect circuit 78 which has the double duty of being a low battery indicating

circuit. The circuit 78 includes a resistor 170, a transistor 171, two resistors 172, 173 and a Zener diode 174 connected as shown.

A write enable line 176 is connected between the transistor 171 and the CPU 56.

When the CPU 56 desires to write information into the RAM 54, it places the address on the address bus lines 141-148 and 151-155, strokes the lower 8 bits of the address bus on lines 141-148 into the latch 58 using ALE line 108, places the information on the data bus lines 141-148, and then brings the write enable line 176 low.

When the write enable line 176 goes low, unless the transistor 171 is turned on by virtue of the battery voltage being more than 4.3 volts, a line 178 going into the RAM 54 at the collector 180 of the transistor 171 (which is the "write enable" for the RAM 54), is prevented from going low, maintaining the RAM "Write Protected". This condition also is created when the battery 48 is low. The "write enable" line 176 also functions as a low battery detector because, during execution of the program, a check is made to see whether writing to the RAM 54 is enabled. If it is not, this shows that the batteries are weak and a signal is sent to the user by flashing the red LED, of LED 4, 5 times.

Note that LED 4 includes a red LED and a green LED incorporated into one package so that when both LEDs are turned on, a yellow light is emitted, making LED 4 a tricolor LED. Such tricolor LED 4 enables the device 10 easily to communicate to the user by way of the color, number and sequence of light blinks.

A clock circuit 182 including a crystal resonator is coupled to the CPU 56.

Three serial ports 1-3 are coupled to the CPU 56 and include port 1 which is a transmitting port, port 2 which is ground and

port 3 which is a receiving port. Serial port 1 is connected to row line 121 so that data can be serially transmitted in the form of highs and lows by CPU 56 from the RAM 54 over row line 121 to serial port 1. Incoming data is received serially at serial port 3 and conveyed to input port 112, when it is desired to update the code data and/or instructions in the RAM 54.

The three infrared-emitting LEDs, LED 1, LED 2, and LED 3 are connected in the circuitry 42 as shown.

The reset circuit 74 includes two resistors and a capacitor connected as shown and coupled between line VCC and a reset line 184.

As will be described in greater detail in connection with the description of FIGS. 11-14, the manufacturer of the device 10, using known methods or the method described herein with reference to FIGS. 12A-13C, will decipher the infrared codes for operating various pieces of equipment, such as a TV, a VCR, a CD, a Cable Converter or other equipment which is controlled by a remote infrared transmitting device.

After the infrared code is deciphered, the code data therefor and instructions for generating such code (see the flow chart in FIG. 14) are stored in a programming computer 200 (FIG. 10) and the device 10 is programmed as explained below.

It is to be noted that the circuitry 42 has no ROM and all instruction codes and code data are loaded directly into the RAM 54. This allows for infinite upgradability in the field via the serial ports 1, 2, 3.

FIG. 10 is a perspective view of a programming computer 200 coupled by a cable 202 to a special connector 204 which is adapted to be received over the CPU 56 in the operating circuitry 42 for disabling the CPU 56 and for enabling the RAM 54 to be programmed by the programming computer 200. Essentially this is done by tri-stating the CPU 56 and placing the RAM 54 into the

address space of the computer 200 which writes initial instruction code including code for the serial port driver, and subsequently serially, other instruction code and code data into the RAM 54. For this purpose the programming computer 200 has instruction codes such as serial port driver instructions and data relative to the infrared codes for operating a multiple number of electronic apparatus, such as televisions, VCR's, etc stored therein. Signals from the programming computer 200, via the connector 204 cause the inputs and outputs 60 of the CPU to be disabled so that instruction codes and data can be input into the RAM 54 quickly and efficiently from the programming computer after the operating circuitry 42 is mounted in the control device 10.

Later, after the device 10 has been in use for some time and the RAM 54 needs to be updated with instruction codes and data relative to new equipment on the market, the control device 10 can be simply and easily updated at a service outlet having an ordinary personal computer with a serial port using a novel nine pin to three pin, 9 volt to 5 volt, signal coupling and converting assembly 206 (FIG. 20). The updating can be done by adding to the data in RAM 54 or by rewriting (writing over) the data in RAM 54. The assembly 206 is described in greater detail hereinafter in connection with the description of FIGS. 20-22.

The infrared codes to be learned include a wide range of different codes for operating different electrical apparatus manufactured by the same or different manufacturers. In FIG. 11, which is identical to FIG. 1 in US Patent No. 4,623,887, there are illustrated several modulation schemes for infrared codes. FIGS. 11a-11g illustrate different types of gated carrier frequencies. Typical carrier frequencies for infrared remote transmitters are 20 Khz to 45 Khz, with the majority being at 38 Khz and 40 Khz. The gating schemes illustrated include both

fixed and variable bit periods, non-return to zero (NRZ), variable burst widths, single/double burst modulation schemes, and a final catch-all category called random because there is no readily distinguishable pattern of ones and zeros.

In addition to these schemes, there is also a transmitter which puts out a different continuous frequency (CW) for each key as represented in FIG. 11h.

Finally, several new types of transmitters do not use a carrier frequency at all but instead send a stream of pulses where the data is encoded in the spaces between the infrared pulses as shown in FIG. 11i.

Data modulation schemes for most transmitters have a higher level of data organization which may be called a keyboard encoding scheme which causes different data to be sent depending upon the transmitter and the key pressed. This will be described in greater detail hereinafter in connection with FIGS. 15-19.

The code data for the infrared codes may be obtained from vendor information sheets and specifications, can be determined using the methods disclosed in U.S. Patents Nos. 4,623,887 and 4,626,848, or by the method disclosed herein.

In the method for learning or acquiring code data for infrared codes disclosed herein, no counting of pulses is carried out. Instead the method involves the following steps:

(a) receiving a transmission of a train of pulses from a remote control transmitter;

(b) recording the point-in-time of an edge of each pulse in a train of the pulses;

(c) transforming the recorded point-in-time data into a list of instructions for generating a replica of the train of pulses;

(d) timing the duration of a train of the pulses;

(e) timing the period between trains of pulses;

(f) associating a function key of the universal remote

control device 10 with the time duration of the train of pulses and the list of instructions for generating a replica of the train of pulses;

(g) determining whether or not repetitions of the transmission of train of pulses is present;

(h) ignoring repetitions of the train of pulses;

(i) noting that repetitions are present; and

(j) storing for use in a universal remote control device, the information acquired in steps (c), (d), (e), (f) and (i).

Typically, each pulse has a fixed duty cycle and in carrying out the above described method it can be assumed that each pulse has a fixed duty cycle.

The manual and computer steps followed in practicing this method are set forth in Figs. 12A and 13A.

FIG. 12A is a flow chart of the first part of this method for capturing an IR code and FIG. 12B is a graph of a pulse train comprising a portion of the code.

There is shown in FIG. 12B, adjacent the transforming step in FIG. 12A, a graph of the waveform of the captured, and later recreated, infrared codes, showing when the infrared signal is on and when it is off. When the CPU 56 executes the instructions set forth below the waveform in FIG. 12B, infrared-emitting LEDs, LED 1, LED 2, and LED 3 are turned on when the instruction IR-ON is executed and turned off when the instruction IR-OFF is executed. No operation is performed when the instruction NOP is called for. In this way the infrared codes are transformed into a bit stream of 0's and 1's.

FIG. 13A is a flow chart of a second part of the method for capturing an IR code.

FIG. 13B shows the IR infrared bitstream and an envelope of the filtered bitstream.

FIG. 13C shows the filtered waveform that is analyzed for

repetition. The repetition scheme and a pointer to indicate, upon regeneration of the infrared code, which key will generate that code are stored in a memory for later inputting into the RAM 54.

FIG. 14 is a flow chart of a sequence of eleven (11) steps that a user initiates to generate a specific IR code for performing a specific function, namely, for generating a captured IR code stored in the remote control device 10. The code data is stored in the RAM 54 of the remote control device 10 and the sequence of steps the circuitry 42 goes through to take the code data in the RAM 54 and generate the infrared code therefrom is set forth in this Figure.

FIG. 15 is a plan view of the keyboard 61 and shows the different keys or pushbuttons 25 of the control device 10 extending through the base panel 14 of upper housing member 12 and the face panel 18 where the label or identification for each pushbutton or key 25 is shown. The light emitting diode, LED 4, is also indicated.

FIG. 16 is a flowchart of the steps initiated by a user of the device 10 in a step and set procedure for searching for code data in the device 10 for the infrared code needed to operate the user's specific apparatus and to set the device 10 for that code data.

FIG. 17 is a flow chart of the steps initiated by a user in carrying out a direct-entry/quick-set procedure for matching the user's equipment or apparatus to the device 10.

The steps of this procedure include:

STEP 1. Look up make and model number of the controlled apparatus in a table provided to the user in an instruction booklet.

STEP 2. Model number is found and matched with a series of 8 "R"s and "G"s.

STEP 3. Here the operator presses the desired mode button or

key.

STEP 4. Press DO, Enter, Recall. This tells the device 10 to do a Quick-Match.

STEP 5. Next enter the sequence of eight red and green blinks found in TABLE I (set forth below) provided in the instruction booklet. This is done by pressing Channel Down for "R" and Channel Up for "G".

STEP 6. Here a determination is made if a key other than Channel Up or Channel Down, was pressed.

STEP 7. The device 10 tricolor LED 4 will flash red or green depending on what button is pushed.

STEP 8. When all eight codes are entered, the program goes on to STEP 9.

STEP 9. Here a check is made to see if the blink code is in the table in the RAM 54 of the remote control device 10.

STEP 10. If the device 10 has successfully Quick-Matched to the controlled apparatus, the LED 4 will flash green twice.

STEP 11. If it did not match, it will flash yellow indicating that codes for that controlled apparatus are not loaded into the RAM 54.

TABLE I is set forth below:

TABLE I

DEVICE BLINK CODES AND SPECIAL FEATURE BUTTONS

Blink Code	A	B	C	D	E	F	G	H
			TELEVISION SETS					
RRRR RRRR	Display	MTS	Pict +	Pict -	Sleep	TV/Video	Ant	Tone
	25=Col Up	26=Col Dn	27=Brt Up	28=Brt Dn	29=Hue Up	30=Hue Dn	31=Htx	32=Reset
RRRG RRRG	Screen Dn	Sp Phne/ Prnt Ctl	AutoOn/ Data Ent	AutoOff/ Data Clr	Ant	Stereo		
RRRG RGRG	Add	Clear						
RRRG GRRR	A Ch	Hi Fi						
RRRG GRGR	Ant/Aux	Time/Ch	Program	TV/VCR				
RRRG GGGR	Ant/Aux	Time/Ch						
RRRG GGGG	Pwr On	Pwr Off	Display	Ant				
GRRG RRRG	Aux	Last Ch	Timer					
GRRG RRGG	Fine Up	Fine Dn	L Ctl	R Ctl	OBC	Func	Review	BiLinR
	25=Stereo	26=TimeFa	27=Timer	28=TimeS1	29=TV/AV		Review	BiLinR
GRRG RGRR	Fine Up	Fine Dn	L Ctl	R Ctl	OBC	Func		
	25=Stereo	26=TimeFa	27=Timer	28=TimeS1	29=TV/AV			
GRRG RGGR	Tint R	Tint L	Color R	Color L	Contr R	Contr L	Timer	Stereo
	24=SAP	25=Reset	26=Q/V	27=EXP	28=Disp	29=Mono	30=Lock	31=TV
	32=Ext 1	33=Ext 2	34=Ant					
GRRG GRRG	TV/Video	Time						
GRRG GRGR	TV/Video	Wide	Lvl Up	Lvl Dn	Memory	Func	NTC	Stereo
	25=Timer	26=100	27=BiLinR					
GRRG GRGG	10	11	12	13				
GRRG GGRR	RF12	Ch Rtn	Str SAP	Mono	Timer	T Set	TV/CATV	TV/Vid
	26=100	27=Audio	28=CCC1	29=CCC2	30=CCC3	31=CCC4	32=ContDn	33=ContUp
	34=Pict	35=Reset						
GRGG RRRR	Sleep	Review						
GRGG RRRG	K	L						
GRGG RRGR	SAP	Sleep	TV/Video					
GRGG RRGG	Prgrm	Q Rev	SAP	Sleep	TV/Video	Add	Delete	
GRGG RGRG	Sleep	St/SAP	TV/Video					
GRGG RGGR	11	12	13	14	15	16		
GRGG RGGG	K	L						
GRGG GRRR	K	L						

TABLE I
(continued)

VIDEO CASSETTE RECORDERS

Blink Code	A	B	C	D	E	F	G	H
RRRR RRRR	Nse Cncl							
RRGR RRRG	Ant							
RRGR RRGR	Ant							
RRGR RRGG	Frm Adv	Slow	Slow Up	Slow Dn	Srch Fwd	Srch Rev		
RRGR RGRR	A	B	C	D	E	F	Slow	
RRGR GGGR	Slow							
RRGR RGGR	Slow +	Slow -	Eject	CM Skip	Program	Input	Mode	AM/PM
	28=Shift	29=Reset	30=Mem/PS	31=SR				
RRGR RGGG	Forward	FlshBack	Ant	Vol +	Vol -	Reverse	Sp Phne	PC
RRGR GRRR	Ant/Aux							
RRGR GRRG	11	12	13	14	15	16		
RRGR GRGR	Frm Adv	Memory	Reset	Chg Time				
RRGR GGRR	Pwr On	Pwr Off						
RRGR GGGG	Slow	Slow Up	Slow Dn	Set Up	Set Dn	Timer	Clear	Display
	29=Frame	30=Memory	31=Prog	32=Qtr	33=QtrStr	34=Quick	35=Remain	36=Rst
	37=Clock	38=APS	39=100					
GGRG RRRR	K	L						
GGRG RRRG	CFM	Slow						
GGRG RRGR	Slow	OSP	Shift L	Shift R	Slow Dn	Slow Up	St +	St -
	28=Timer							
GGRG RRGG	11	12	13	14	15	16	Slow	
GGRG RGRR	Slow Dn	Slow Up	Slow					

CABLE CONVERTERS

Blink Code	A	B	C	D	E	F	G	H
RRRR RRGR	A/B	Add	Delete	Set	Lock	Last Ch		
RRRR RRGG	A	B	Event(*)	#	Arrow Up	Arrow Dn	AP	Delete
	25=F	26=K	27=Learn	28=PGM	29=TCP	30=Enter		
RRRR RGRR	Skew L	Skew R	Audio	SAT	Ant East	Ant West		
RRRR RGRG	Plus	Minus	Dot	Box	Str	Clear	Time	Auth
	22=C/R	23=#						
RRRR RGGR	Prog	Auth						
RRRR RGGG	Auth							
RRRR GRRR	Auth	Prog						
RRRR GRRG	Plus	Minus	Rcp	*	M1	M2	M3	M4
RRRR GRGR	A-B	Dot 1	Dot 2	*	Am	Dm	F	
RRRR GRGG	Arrow Up	Arrow Dn						

COMPACT DISK PLAYERS

Blink Code	A	B	C	D	E	F	G	H
RRRR RRRR	CD Fwd	CD BckUp						
GRRG GRGG	Fwd Indx	Rev Indx	Repeat	Memory				

• For numbered functions, press "DO" then the two-digit number.

FIG. 18A is a flow chart of the steps for setting a "DO" command macro, for achieving a function that normally requires the actuation of several buttons, by programming one particular button to perform the functions required of the several buttons to achieve a specific function.

FIG. 18B is a flowchart of the simple two pushbutton steps required for executing the "DO" macro command created in FIG. 18A.

FIG. 19A sets forth the steps initiated by a user to determine the various blink codes which identify what equipment or apparatus the remote control device 10 is set for.

FIG. 19B illustrates a sample blinking grid of eight red and green blinks which will be presented to the user. Once a particular pattern of eight red or green blinks has taken place, the user of the device 10 will look up the blink pattern or code in TABLE I included in a user handbook. This table shows the user which pushbuttons 25 labelled A-H are associated with additional functions stored which may be stored in the RAM 54. Additional functions beyond the eight supported by pushbuttons A-H are performed by pushing "DO", and then the two-digit sequence shown in TABLE I.

The instructions for using the control device 10 which are supplied to a purchaser thereof in an instruction booklet are set forth below.

Matching the Device to Your Equipment

The device 10 can control most remote controlled TV's, VCR's, cable converters, and CD players, but it needs the user's input to match it to your particular equipment. The easiest way to do this is to STEP-and-SET your device 10. You will only need to do this once for each different type of device you have.

1. To STEP-and-SET your device 10, first press DO, Enter.

2. Press one of the following equipment selection buttons to tell the device 10 what kind of equipment to match.

VCR1	Cable	TV
VCR2	CD	

3. Aim the device 10 at the equipment and try various function buttons to see if the equipment responds correctly. Make sure you are reasonably close to the equipment and that nothing is blocking the path. The light (LED 4) at the top of the device 10 will shine green whenever it is sending an infrared code, or it will not light at all if it does not send a code for a particular button.

4. If your equipment did not respond correctly or did not respond at all, press DO1 to change the device 10 so that it will send the next set of infrared codes in its library, or press DO2 to change it so it will send the previous set of codes.

5. When you use DO1 or DO2 to step the device 10 setting forward or back, its light will blink yellow each time you step it. The settings step around in a circle. Whenever you get back to the setting where you started the device 10 light will blink red to notify you.

6. Use DO1 and DO2 to step through the sets of codes and keep trying out functions until your equipment responds correctly. The device 10 will then be set to send the proper infrared codes for operating your particular equipment.

7. When you are satisfied that the device 10 is properly matched, press DO, or any of the equipment selection buttons to restore the DO1 and D02 buttons to their normal functions.

8. If your equipment is responding to your device 10 but some buttons are causing the wrong thing to happen, keep going. Some equipment responds to the infrared codes of other brands of equipment.

9. If you try out all of the codes in the device 10 library and your equipment still does not respond, it is probably because the code data for generating the infrared codes for operating your equipment is not in the library of your control device 10.

The Keyboard 61

Take a look at the keyboard. There are four groups of buttons:

1. Equipment Selection Buttons tell the device 10 which equipment is to be controlled:

VCR1	Cable	TV
VCR2	CD	

2. Basic Function Buttons are used to control your TV, VCR, CABLE and CD. They work in much the same way as in older remotes which typically have the following buttons.

			Power
Rec.	TV.VCR	Stop	Pause
Rewind	Reverse	Play	Fast Fwd
			Mute
1	2	3	Vol.Up
4	5	6	Vol.Dn
7	8	9	
	0	Enter	Chan.Up
		Recall	Chan.Dn

3. Extended Function Buttons perform any special functions your equipment may have, such as color control, picture control,

tint control, etc. These buttons are identified with the following alphabet letters.

A	C	E	G
B	D	F	H

4. DO Buttons are used to perform very powerful DO Commands which are explained below.

Special Features

Besides the basic functions such as channel up/down and volume up/down that most TV remote controls have, there could be special features as well, for example:

Color up/down.

Picture up/down.

Tint up/down.

Sleep.

Your VCR's remote control can also have special features such as:

Frame advance

Channel up/down

Your cable converter remote control can also have additional features such as:

Channel recall

Delete

Your CD player remote control can have special features such as:

Repeat

Track programming

Once you have matched the device 10 to your TV, VCR, Cable Converter and CD player, all functions that were controlled by your old remote control devices can now be controlled by the device 10. You may even notice some extra features that weren't controlled by your old remote.

Since the device 10 can control such a wide range of

equipment, there is not enough room on it for buttons for every possible feature of every remote control. Instead, there are eight extended function buttons at the bottom labelled A through H. To find out what these eight buttons control for your particular TV, VCR, cable converter and CD player:

1. Get your pen and paper ready.

2. Press DO and then the button (TV VCR1 VCR2 Cable CD) of the device you want to know the special features of.

3. The device 10 will blink "red" or "green" 8 times. Every time it blinks "red" write down an "R". Every time it blinks "green" write down a "G". When you're finished writing it should look something like this:

R R R G R R R G

This is the "Blink Code" for your device. If you miss it the first time around, just press DO and the device button a second time.

4. Look at TABLE I and find the sequence of "R"s and "G"s that matches the one you wrote down.

5. Read the special features chart next to your Blink Code sequence which tells you what functions the A through H buttons control for your particular device.

For example, the feature chart of your TV might read:

A: Color Up	C: Picture Up
B: Color Down	D: Picture Down

6. To turn the color up in this example, you would press TV (of course if the device 10 is already set to control your TV, you do not have to press TV again but it doesn't hurt if you do so), then A.

7. To turn the color back down, you would just press B.

8. Write down what special functions are controlled by the A through H buttons on the handy stick-on labels enclosed with the control device 10.

9. After writing down the special functions on the labels, stick them on to the back of the control device 10 for quick and easy reference.

If The Controlled Equipment Has More Than 8 Extended Functions

Usually, the eight A through H buttons are enough for most controlled equipment. If they're not, don't worry. If your controlled equipment has more than eight special features these too are controlled by the device 10.

Beyond the A through H function buttons, any additional functions are performed by pressing DO then two of the 0-9 number buttons. For example, your TV's feature chart may show additional functions like these:

25: SAP	26: Reset	27: Q/V
28: Display	29: Mono	30: Stereo

If you did have these features and wanted to use them, you would press DO and then the two-digit number for that feature. For example, you might:

Press DO,3,0. This would turn your TV's stereo broadcast feature on.

If you use a feature like this frequently you may want to assign it to a DO command, our next topic of discussion.

Setting DO Commands

DO Commands give you the power to perform a multitude of different functions with the push of just one or two buttons. DO Commands let you assign any of the following buttons to tell the device 10 to automatically perform a series of keystrokes you use often:

		D01	D02
Rec	TV.VCR	Stop	Pause
Rewind	Reverse	Play	Fast Fwd.
			Mute
			Vol. Up

Vol. Dn

Enter Chan. Up

Chan. Dn

A C E G

B D F H

To tell the device 10 to do what you want, you must teach it. As an example, you can teach the device 10 to turn your whole system on and set the TV to channel 4 by doing the following:

1. Press DO, Recall. This tells the device 10 that you want to teach it something to do.

2. Next, you must assign a button 25 you will use to DO whatever you teach it. You can use any of the device 10's buttons 25 set forth above. For example, let's use DO1 at the top of the keyboard: Press DO1.

3. Now, you must tell the device 10 what button sequence you would press to turn your whole system on and set the TV to channel 4.

4. Press TV Power. This tells the device 10 to turn your TV on.

5. Press 4, Enter (pressing Enter may not be required for your TV). This tells the device 10 to set your TV to channel 4.

6. Press VCR, Power. This tells the device 10 to turn your VCR on.

7. Press Cable, Power. This tells the device 10 to turn your cable converter on.

Now you have pressed all the buttons you want the device 10 to learn for this example.

8. Press DO, Recall. This tells the device 10 that you are finished teaching it and to remember what you have taught it.

Now the device 10 knows how to turn your TV, VCR, and cable converter on and set the TV to channel 4, just by pressing one button.

9. Aim the device 10 at your equipment and press DO1. Make sure you keep the device 10 pointed at your equipment while the light is flashing.

Now that you know how DO Commands work, you can teach the device 10 to "DO" practically any sequence of keystrokes. Just remember to keep the following in mind:

To perform a DO Command, press DO then the button you assigned to remember the DO Command. However, if you assigned the DO1 or DO2 buttons to remember a DO Command, you do not have to press DO first, just press DO1 or DO2.

If the device 10 light (LED4) starts blinking green, yellow, red while you are trying to teach it, it is telling you that RAM 54 is full. The DO command you are teaching is automatically erased. You can teach the device 10 a shorter DO command, or erase some other DO command you have already taught the device 10 to obtain more memory space.

After the DO Command is finished, the last apparatus 10 selected within the DO Command will be the apparatus the device 10 will work with next.

Erasing a DO command

If you just want to change a DO Command, you do not have to erase it first - just set up the new DO Command in its place. However, to get rid of a DO Command without replacing it with a new one:

1. Press DO Recall.

2. Press the button you have assigned to the DO command that you want to erase. For example, to erase the DO command you taught the device 10 in the above example:

Press DO1.

3. Press DO, Recall again. The old DO Command is now erased.

QUICK-MATCHING To Your Equipment

There is a quicker way to match your equipment to the device 10 by Quick-Matching. Quick-Matching is a way to set the device 10 directly to match any controlled equipment in its library. Follow the steps below to do a Quick-Match:

1. Match the device 10 to your equipment using STEP-and-SET.

2. Press DO, then the desired device button (TV, VCR1, VCR2, Cable or CD). The device 10 light will blink red or green eight times.

3. Write down the sequence of red and green blinks. This is the "Blink Code" for the particular device.

4. Press DO Enter Recall. This tells the device 10 to do a Quick-Match.

5. Enter the correct sequence by pressing Ch Dn for "R" and Ch Up for "G". The device 10 light (LED 4) will flash "red" or "green" depending on what button you push. The Ch Dn and Ch Up buttons 25 are labelled with the correct color for each.

6. When the device 10 has successfully Quick-Matched your equipment it will automatically flash green twice. If it did not match, it will flash yellow. If it fails to Quick-Match, it is probably because the requisite code data is not stored in the library in your device 10.

QUICK-MATCHING Between Controlled Equipment

One of the great benefits of Quick-Matching is that you can switch the device 10 functions between the remote controlled TVs, VCRs and cable converters you may own. This is done by using "Quick-Match" within a "DO command".

Let's suppose you have two TVs in your house and only one device 10. Here's how to switch between them:

1. Press DO Recall. the button you want to use to switch to

your other TV set.

For example, press D02. This tells the device 10 that you want to teach it a DO Command.

2. Press DO Enter Recall. This tells the device 10 that you want to do a Quick-Match.

3. Enter the R and G blink sequence of the second TV you want to control by pressing Ch Dn for "R" and Ch Up for "G".

4. Press DO, Recall. This tells the device 10 that you are finished teaching it a "DO command".

Now, to set the device 10 to control your second TV, press D02. This tells the device 10 that you will be controlling your second TV.

To go back to controlling your first TV, simply teach device 10 another "DO command". Just repeat the steps above, except use a different button and the correct R and G sequence for your first TV.

The device 10 can easily be taught to control a whole houseful of infrared remote controlled equipment - just teach the device 10 a DO Command to QUICK-MATCH each additional piece of equipment.

In FIG. 20 is shown a unique signal coupling and converting assembly 206 which includes a connector assembly 207, a cable 208 and a special cover plate 210 for the battery compartment 45. The cover plate 210 has on the underside thereof three pins 212, 214 and 216 which are positioned to connect with the three serial ports 1, 2 and 3. The pins 212, 214 and 216 mounted to the cover plate 210 are connected by three wire conductors 224, 226 and 228 in cable 208 to connector assembly 207 which has conversion circuitry 230 therein. The connector assembly 207 has a nine pin array 250 of sockets 251-259 for receiving nine pins and the conversion circuitry 230 which enables one to use some of the nine sockets 250 of the connector assembly 207 for

communication with the three pins 212, 214, 216 that are connected to the serial ports 1, 2 and 3 as shown in FIGS. 21 and 22.

FIGS. 21 and 22 are a schematic diagram of the conversion circuitry 230.

In FIG. 21 is shown circuit portion 230A. In this circuit portion, plus nine volts goes into pin 4 of connector DB-9 or pin 20 of connector DB-25 and minus 9 volts goes into pin 7 of DB-9 or pin 4 of connector DB-25, which are connected to the circuit portion 230A of the conversion circuitry 230. This provides a constant source of positive and negative voltage and is used as the power supply for the circuit. Note that two different types of personal computer host female connectors can be used, namely, female connector DB-9 or female connector DB-25 in the connector assembly 207.

Serial information is transmitted by the hand held control device 10 via line HTXD at serial port 1 and is level translated by the operating circuitry 42 from a range of from plus 5 volts to zero volts to a range of from minus 9 volts to plus 9 volts.

In this respect, when 0 volts is present at serial port 1, transistors Q1 and Q2 are turned on such that +9 volts is supplied from pin 4 of connector DB-9 or pin 20 of connector DB25 through transistor Q1 to pin 2 of connector DB-9 or pin 3 of connector DB-25.

Then, when +5 volts is present at serial port 1, the emitter-base of transistor Q2 is reverse biased, turning off transistor Q2 which turns off transistor Q1. As a result, the9 volts at pin 7 of connector DB-9 or pin 4 of connector DB-25 is supplied through resistor 270 to pin 2 of connector DB-9 or pin 3 of connector DB-25.

The circuit portion 230B is shown in FIG. 22 and performs a receiving function for the control device 10. When pin 3 of

connector DB-9 or pin 2 of connector DB-25 is at -9 volts, its normal resting state, then HTXD at serial port 3 is at 0 volts. When pin 3 of connector DB-9 or pin 2 of connector DB-25 goes to +9 volts, HTXD at serial port 3 goes to plus 5 volts. Pin 5 of connector DB-9 or pin 7 of connector DB-25 is directly connected to serial port 2 and always stays at ground.

In transmitting data to the control device 10, the programming computer supplies +9v or -9v to pin 3 of connector DB-9 or pin 2 of connector DB-25. When +9v is present on IBMTXD, 4.3 volts established by Zener diode 272 is passed through diode 274 to serial port 3.

When -9v is present on IBMTXD, the Zener diode 272 clamps to -0.6 volts resulting in conduction through transistor Q3 pulling serial port 3 to 0 volts.

The diode 274, the transistor Q3 and a resistor 276 connected as shown are provided to allow pressing a key 25 on keyboard 26 to "wake up" CPU 56 (actuate the wake up circuit 70) even though circuit portion 230B is connected to the control device 10.

From the foregoing description, it will be apparent that the universal remote control device 10, the signal coupling and converting assembly 206, the disclosed methods of learning and storing infrared codes, and the methods for operating the control device 10 of the present invention have a number of advantages, some of which have been described above and others of which are inherent in the device 10, assembly 206 and the methods of the invention disclosed herein. For example:

1) With no ROM in the circuitry 42, the instruction codes and code data in the RAM 54 can be upgraded at any time via the serial ports 1, 2 and 3.

2) By loading the instruction codes and initial code directly into the RAM 54 by tri-stating the CPU 56, the circuitry

42 is enabled to function without a ROM.

3) The serial ports 1, 2 and 3 together with the signal coupling and converting assembly 206 enable new data to be input into the circuitry 42 from an RS-232 interface device to the serial ports 1, 2 and 3.

4) The visible LED 4 providing red/green/yellow/off blink code provides a means for communicating to the user where the device 10 has "landed" after searching for codes to control a specific apparatus. The user can then look up in the instruction booklet what extended functions are available via the letter keys A-H or number keys, plus the DO key for that particular apparatus or equipment.

5) The write-protect circuit 78 prevents corruption of the operating program or data in the RAM 54 during transient states when the microprocessor is being turned on or turned off.

6) The multiplexing of the address and data lines between the RAM 54 and the CPU 56 enables scrambling of the instruction codes and the code data so that the memory image in the RAM 54 is encrypted.

7) The construction of the keyboard 61 enables one to have 56 keys which can be decoded using only 8 bidirectional input (and output) ports 63.

8) The keyboard 61 including the keyboard circuitry 62 plus the wakeup circuit 70 provides a system whereby pressing any key turns on power to the CPU 56.

9) The provision of three infrared LEDs 1, 2 and 3 with no current-limiting resistors enables the device 10 to use maximum energy to create the infrared control pulses with a minimum amount of energy wasted.

10) The DO keys together with the numeral and letter keys allow a number of DO functions to be performed with the device 10 by a user.

11) Any combination of products can be controlled with the universal remote control device 10.

12) The step-and-set method for locating the code data for generating the infrared code necessary to operate the user's equipment or for the user to learn that such code data is not present in the library in the RAM 54.

Also modifications can be made to the device 10, the assembly 206 and the described methods of the present invention without departing from the teachings of the present invention. Accordingly, the scope of the invention is only to be limited as necessitated by the accompanying claims.

CLAIMS

We claim:

1. A process of learning, storing and reproducing the remote control codes of any of a diverse plurality of remote control transmitters, comprising the steps of:

(a) receiving a transmission of a train of pulses from a remote control transmitter;

(b) recording the point-in-time of an edge of each pulse in a train of said pulses;

(c) transforming the recorded point-in-time data into a list of instructions for generating a replica of said train of pulses;

(d) timing the duration of a train of said pulses;

(e) timing the period between trains of pulses;

(f) associating a function key of a universal remote control device with said time duration of said train of pulses and said list of instructions for generating a replica of said train of pulses;

(g) determining whether or not repetitions of the transmission of train of pulses is present;

(h) ignoring repetitions of the train of pulses;

(i) noting that repetitions are present; and

(j) storing for use in a universal remote control device, the information acquired in steps (c), (d), (e), (f) and (i).

2. The process of claim 1 including the step of assuming a fixed duty cycle for each pulse.

3. A method of loading a RAM in a ROM-less microprocessor system comprising a central processing unit, a non-volatile, read-write RAM, input means, output means, and means for coupling said central processing unit, said RAM, said input means, and said output means together, said method including the steps of:

(a) disabling the central processing unit;

(b) connecting a separate microprocessor system to said RAM;

(c) transferring instructions and/or data to said RAM;

(d) re-enabling the central processing unit to enable the central processing unit to execute the instructions so transferred.

4. The method of claim 3 wherein said instructions include serial port driver instructions.

5. In a universal remote control system having input means and signal output means for supplying a signal to a controlled device and a central processing unit (CPU) coupled to said input means and said signal output means, the improvement comprising no ROM and a single non-volatile, read-write RAM coupled to said central processing means.

6. The system of claim 5 further including a latch coupled between said RAM and said CPU.

7. The system of claim 5 further including a keyboard having a set of keys coupled to said CPU and CPU wake-up circuit means coupled to said CPU and including circuit means in said keyboard for causing, by depression of any key on said keyboard, operation of said wake-up circuit to wake up (power up) said CPU.

8. The system of claim 5 further including RAM writeprotect circuit means coupled between said RAM and said CPU and having means for enabling writing in said RAM only when certain conditions have been met.

9. The system of claim 8 including a multicolor light indicating means for presenting codes to a user comprising light blinks of different colors, number of blinks, and sequence of blinks.

10. A microprocessor system comprising a central processing unit (CPU), a single non-volatile, read-write RAM, no ROM, and means for connecting said system to inputs and outputs.

11. The system of claim 10 further including a latch coupled between said RAM and said CPU.

12. The system of claim 11 including a plurality of lower bit address lines coupled between said latch and said CPU and a plurality of equal numbered multiplex lines coupled respectively between said address lines and said RAM.

13. The system of claim 12 including a plurality of upper bit address lines coupled between said CPU and said RAM.

14. The system of claim 10 including an OR gate having an output coupled to said RAM, an instruction fetch enable line coupled between said CPU and an input of said OR gate and a RAM data read enable line coupled between said CPU and an input of said OR gate.

15. The system of claim 10 further including a keyboard having a set of keys coupled to said CPU and CPU wake-up circuit means coupled to said CPU and including circuit means in said keyboard for causing, by depression of any key on said keyboard, operation of said wake-up circuit to wake up (power up) said CPU.

16. The system of claim 15 wherein said keyboard includes a plurality of conductor row lines coupled to inputs of said CPU, a plurality of conductor column lines extending across said row lines, each row line being connected through a current directing diode to one of said column lines and said column lines being coupled through impedance means to a power source, and a plurality of conductive members each connected to one of said keys and positioned adjacent an intersection of a row line with a column line and operable on depression of a key to electrically connect a row line to a column line.

17. The system of claim 15 wherein said wakeup circuit includes electronic switch means which are turned on when a key is depressed ro supply power to said CPU and circuit means coupled between said switch means and said CPU for maintaining

said switch means turned on until a HALT signal is generated by said CPU.

14 18. The system of claim 6 10 further including RAM write-protect circuit means coupled between said RAM and said CPU and having means for enabling writing in said RAM only when certain conditions have been met.

Claims 16-20

19. The system of claim 18 wherein said write protect circuit includes electronic switch means for coupling a write enable input to said RAM with a write enable line coupled to said CPU, said switch means being turned on when voltage is supplied to said CPU and such voltage is above a predetermined value so that said write protect circuit also serves as a low battery indicating circuit.

20. The system of claim 10 including output means comprising infrared light generating means and driver circuit means coupled between said CPU and said light generating means.

17 21. The system of claim 6 10 including a multicolor light indicating means for presenting codes to a user comprising light blinks of different colors, number of blinks, and sequence of blinks.

22. The system of claim 10 including three serial ports coupled to said CPU, one port being coupled to ground, one port being coupled to an input to said CPU and one port being coupled to an output of said CPU.

19 23. The system of claim 18 22 including signal conversion and coupling means for coupling interface means of a computer operating at a given voltage to said three serial ports operating at a different voltage, said signal conversion and coupling means including signal receiving circuit means and signal transmitting circuit means.

24. The system of claim 10 including input means comprising keyboard circuit means coupled to said CPU and including a

keyboard including a plurality of keys comprising mode keys, function keys, and at least one key for making a command.

25. The system of claim 24 wherein said plurality of keys further includes a set of number keys and a set of auxiliary function keys.

26. The system of claim 25 wherein said set of auxiliary keys include keys lettered A to H.

27. A method for operating a universal remote control device having a library of sets of code data for generating infrared codes for operating a plurality of different, remotely controlled, electrical apparatus manufactured by different manufacturers, stored in a memory of the device, the device including data processing means, infrared light generating means and keyboard circuit means, including mode keys, function keys, and a key for making a command, said method comprising the steps of:

pressing the key for making a command, one or more preselected additional keys and the mode key for the controlled apparatus;

pressing at least one preselected stepping key to cause the data processing means to be set to retrieve a different set of code data from said library in order to generate infrared codes;

pressing randomly selected function keys and noting if the controlled device responds to the generated set of infrared codes by executing the function selected,

if so, pressing one of a designated set of keys to restore said at least one preselected stepping key to its normal function; and if not,

repeating the step of pressing said at least one preselected stepping key and then randomly selected function keys until the controlled apparatus starts executing the selected functions or the device indicates to the user that all sets of codes in the

library have been tried and the requisite code data for operating the controlled device has not been found.

28. The method of claim 27 wherein said step of indicating to the user that all sets of codes in the library have been tried and the requisite code data has not been found includes the step of presenting a light blink code to the user.

29. A method for operating a universal remote control device having a library of sets of code data for generating infrared codes for operating a plurality of different, remotely manufactured by different controlled, electrical apparatus manufacturers, stored in a memory of the device, the device including data processing means, infrared light generating means and keyboard circuit means, including mode keys, function keys, a key for making a command, and a key for retrieving code data, means for presenting a light blink code to the user and means, including two of the selected function keys, for inputting a light blink code into the device, said method comprising the steps of:

selecting a controlled apparatus to be controlled;

pressing the key for making a command, and one or more preselected additional keys to set the device for making a quick set for operating the selected controlled device;

looking up in a table, the blink code for operating the selected controlled device; and

inputting the blink code into the device by pressing said two selected function keys in a predetermined sequence thereby to quickly set the device for operating the selected controlled apparatus.

30. A method for operating a universal remote control device having a library of sets of code data for generating infrared codes for operating a plurality of different, remotely controlled, electrical apparatus manufactured by different

manufacturers, stored in a memory of the device, the device including data processing means, infrared light generating means and keyboard circuit means, including mode keys, function keys, and a key for making a command, said method comprising the steps of:

pressing the key for making a command and one or more preselected additional keys;

pressing a key to assign that key to a macro command;

recording a desired sequence by pressing desired mode and function keys;and

pressing the key for making a command and one or more preselected additional keys to set the device for performing a sequence of operations merely by pressing the key for making a command and the assigned macro command key.

31. A method for operating a universal remote control device having a library of sets of code data for generating infrared codes for operating a plurality of different, remotely controlled, electrical apparatus manufactured by different manufacturers, stored in a memory of the device, the device including data processing means, infrared light generating means, keyboard circuit means, including mode keys, function keys, and a key for making a command, and light emitting means for identifying the controlled apparatus to a user including the steps of:

pressing the key for making a command;

pressing the mode key for the controlled apparatus;

recording a light blink code emitted by said light emitting means and presented by the device to the user; and

looking up the light blink code in a table to determine what controlled apparatus the device is set for.

12 cont'd

32. A universal remote control system comprising data processing means, input means including a keyboard and keyboard

circuit means coupled to said data processing means, signal output means including infrared light generating means coupled to said data processing means, and memory means for storing a set of instructions and a library of code data for generating infrared codes coupled to said data processing means.

33. The system of claim 32 including an OR gate having an output coupled to said memory means, an instruction fetch enable line coupled between said data processing means and an input of said OR gate and a data read enable line coupled between said data processing means and another input of said OR gate.

34. The system of claim 32 wherein said keyboard includes a set of keys coupled to said data processing means and system wake-up circuit means coupled to said data processing means and including circuit means in said keyboard for causing, by depression of any key on said keyboard, operation of said wakeup circuit to wake up (power up) said system.

35. The system of claim 34 wherein said keyboard includes a plurality of conductor row lines coupled to inputs of said data processing means, a plurality of conductor column lines extending across said row lines, each row line being connected through a current directing diode to one of said column lines and said column lines being coupled through impedance means to a power source, and a plurality of conductive members each connected to one of said keys and positioned adjacent an intersection of a row line with a column line and operable on depression of a key to electrically connect a row line to a column line.

36. The system of claim 35 wherein said wakeup circuit includes electronic switch means which are turned on when a key is depressed to supply power to said data processing means and circuit means coupled between said switch means and said data processing means for maintaining said switch means turned on

until a HALT signal is generated by said data processing means.

37. The system of claim 32 further including write-protect circuit means coupled between said memory means and said data processing means and having means for enabling writing in said memory means only when certain conditions have been met.

38. The system of claim 37 wherein said write-protect circuit includes electronic switch means for coupling a write enable input to said memory means with a write enable line coupled to said data processing means, said switch means being turned on when voltage is supplied to said data processing means and such voltage is above a predetermined value so that said write protect circuit also serves as a low battery indicating circuit.

39. The system of claim 32 including a multicolor light indicating means for presenting codes to a user comprising light blinks of different colors, number of blinks, and sequence of blinks.

40. The system of claim 32 including three serial ports coupled to said data processing means, one port being coupled to ground, one port being coupled to an input to said data processing means and one port being coupled to an output of said data processing means.

41. The system of claim 40 including signal conversion and coupling means for coupling interface means of a computer operating at a given voltage to said three serial ports operating at a different voltage, said signal conversion and coupling means including signal receiving circuit means and signal transmitting circuit means.

42. The system of claim 32 wherein said keyboard includes a plurality of keys comprising mode keys, function keys, and at least one key for making a command.

43. The system of claim 42 wherein said plurality of keys

further includes a set of number keys and a set of auxiliary function keys.

~~44~~ 34. The system of claim ~~43~~ 34 wherein said set of auxiliary keys include keys lettered A to H.

add a 16

ABSTRACT OF THE DISCLOSURE

The universal remote control system includes input means, signal output means for supplying a signal to a controlled device and a central processing unit coupled to the input means and the signal output means, no ROM, and a single non-volatile, read-write RAM coupled to said central processing unit.

The RAM in the ROM-less ~~microprocessor system~~ data processing means is loaded by carrying out the following steps: (a) disabling the central processing unit; (b) connecting a separate microprocessor system to said RAM; (c) transferring instructions and/or data to said RAM; and (d) re-enabling the central processing unit to enable the central processing unit to execute the instructions so transferred.

The control codes of any of a diverse plurality of remote control transmitters are learned, stored and reproduced by carrying out the following steps: (a) receiving a transmission of a train of pulses from a remote control transmitter; (b) recording the point-in-time of an edge of each pulse in a train of said pulses; (c) transforming the recorded point-in-time data into a list of instructions for generating a replica of said train of pulses; (d) timing the duration of a train of said pulses; (e) timing the period between trains of pulses; (f) associating a function key of a universal remote control device with said time duration of said train of pulses and said list of instructions for generating a replica of said train of pulses; (g) determining whether or not repetitions of the transmission of train of pulses is present; (h) ignoring repetitions of the train of pulses; (i) noting that repetitions are present; and (j) storing for use in a universal remote control device, the information acquired in steps (c), (d), (e), (f) and (i).

127999

PATENT APPLICATION SERIAL NO. _____

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

FORM PTO-875 (REV. 1-86)

U.S. DEPARTMENT OF COMMERCE
PATENT AND TRADEMARK OFFICE

PATENT APPLICATION FEE DETERMINATION RECORD

SERIAL NO.	FILING DATE
127,999	Dec. 2, 1987
APPLICANT (FIRST NAMED)	

CLAIMS AS FILED - PART I

FOR:	NO. FILED	NO. EXTRA
BASIC FEE		
TOTAL CLAIMS	44 -20=	* 24
INDEP. CLAIMS	9 -3=	* 6
☐ MULTIPLE DEPENDENT CLAIM PRESENT		

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

SMALL ENTITY RATE	SMALL ENTITY FEE		OTHER THAN A SMALL ENTITY RATE	OTHER THAN A SMALL ENTITY FEE
	$170	OR		$340
X6=	$ 44	OR	X12=	$
X17=	$ 102	OR	X34=	$
X55=	$	OR	X110=	$
TOTAL	$ 146	OR	TOTAL	$

55
471

A

CLAIMS AS AMENDED - PART II

	(1) CLAIMS REMAINING AFTER AMENDMENT		(2) HIGHEST NO. PREVIOUSLY PAID FOR	(3) PRESENT EXTRA
AMENDMENT A				
TOTAL	* 49	MINUS	** 44	= 5
INDEP.	* 13	MINUS	*** 9	= 4
☐ FIRST PRESENTATION OF MULTIPLE DEP. CLAIM				

SMALL ENTITY RATE	SMALL ENTITY ADDIT. FEE		OTHER THAN A SMALL ENTITY RATE	OTHER THAN A SMALL ENTITY ADDIT. FEE
X5=	$		X10=	$ 60.00
X15=	$		X30=	$ 44
+50=	$		+100=	$
TOTAL ADDIT. FEE	$	OR	TOTAL	$ 204.00

B

	(1) CLAIMS REMAINING AFTER AMENDMENT		(2) HIGHEST NO. PREVIOUSLY PAID FOR	(3) PRESENT EXTRA
AMENDMENT B				
TOTAL	* 39	MINUS	** 49	= 1
INDEP.	* 7	MINUS	*** 13	= 1
☐ FIRST PRESENTATION OF MULTIPLE DEP. CLAIM				

SMALL ENTITY RATE	SMALL ENTITY ADDIT. FEE		OTHER THAN A SMALL ENTITY RATE	OTHER THAN A SMALL ENTITY ADDIT. FEE
X5=			X10=	$
X15=	$		X30=	$
+50=	$		+100=	$
TOTAL ADDIT. FEE	$	OR	TOTAL	$

C

	(1) CLAIMS REMAINING AFTER AMENDMENT		(2) HIGHEST NO. PREVIOUSLY PAID FOR	(3) PRESENT EXTRA
AMENDMENT C				
TOTAL	* 37	MINUS	** 49	=
INDEP.	* 6	MINUS	*** 13	=
☐ FIRST PRESENTATION OF MULTIPLE DEP. CLAIM				

SMALL ENTITY RATE	SMALL ENTITY ADDIT. FEE		OTHER THAN A SMALL ENTITY RATE	OTHER THAN A SMALL ENTITY ADDIT. FEE
X5=	$		X10=	$
X15=	$		X30=	$
+50=	$		+100=	$
TOTAL ADDIT. FEE	$	OR	TOTAL	$

* If the entry in Col. 1 is less than the entry in Col. 2, write "0" in Col. 3.

** If the "Highest No. Previously Paid For" IN THIS SPACE is less than 20, enter "20".

*** If the "Highest No. Previously Paid For" IN THIS SPACE is less than 3, enter "3".

The "Highest No. Previously Paid For" (Total or Indep.) is the highest number found in the appropriate box in Col. 1.