Owner's Manual

TRS-80™ Plug'n Power Controller

For Model I, Model III and Color Computer

Catalog No. 26-1182

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7-80

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Plug 'n Power Controller Owner's Manual:

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Introduction

The TRS-80 Plug 'n Power™ Controller is a convenient and easy-to-use system which connects to your TRS-80 computer and can be programmed to control lights and appliances in your home or office. There is no special wiring. Command signals are sent over the existing electrical wires.

Special Features

• Controls lights and small appliances by computer while you are home or away

• Turns lights on or off

• Dims or brightens lights

• Turns on or off such appliances as fans, coffee pots, radios, and TV sets.

Equipment Needed

This TRS-80 Plug 'n Power system includes the Plug 'n Power Controller and cassette tapes containing the necessary software. To operate this system, you will need any Model I, Model III, or Color Computer, and one or more of the following (see **Figure 1**):

Appliance Module (Radio Shack Catalog Number 61-2681)

Lamp Dimmer Module (Cat. No. 61-2682)

Wall Module (Cat. No. 61-2683)

The above items are not included in this package and must be purchased separately. (Installation of the Wall Module requires knowledge of electrical wiring practices.)

Appliance Module
Cat. No. 61-2681

Wall Module
Cat No. 26-2683

Lamp Dimmer
Module
Cat. No. 61-2682
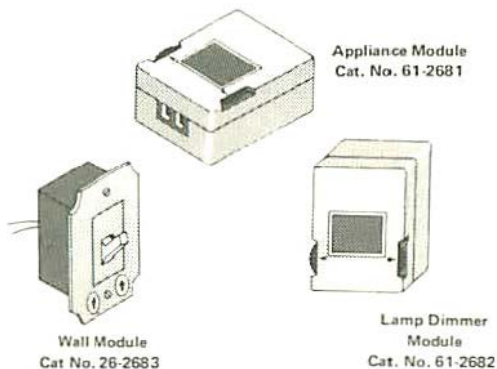
Figure 1. Plug 'n Power Control Modules

Connections (Controller to Computer)

Refer to **Figure 2**.

1. Connect the COMPUTER cable on back of the Controller to the Cassette or Tape connector on the rear of your Computer.

2. Connect a cassette player (CTR-80 or equivalent) to the CASSETTE connector on back of the Controller.

3. Connect the POWER cord from the Controller to an electrical AC outlet.

Refer to the Module Installation section for hook-up and installation notes for the control modules.

4
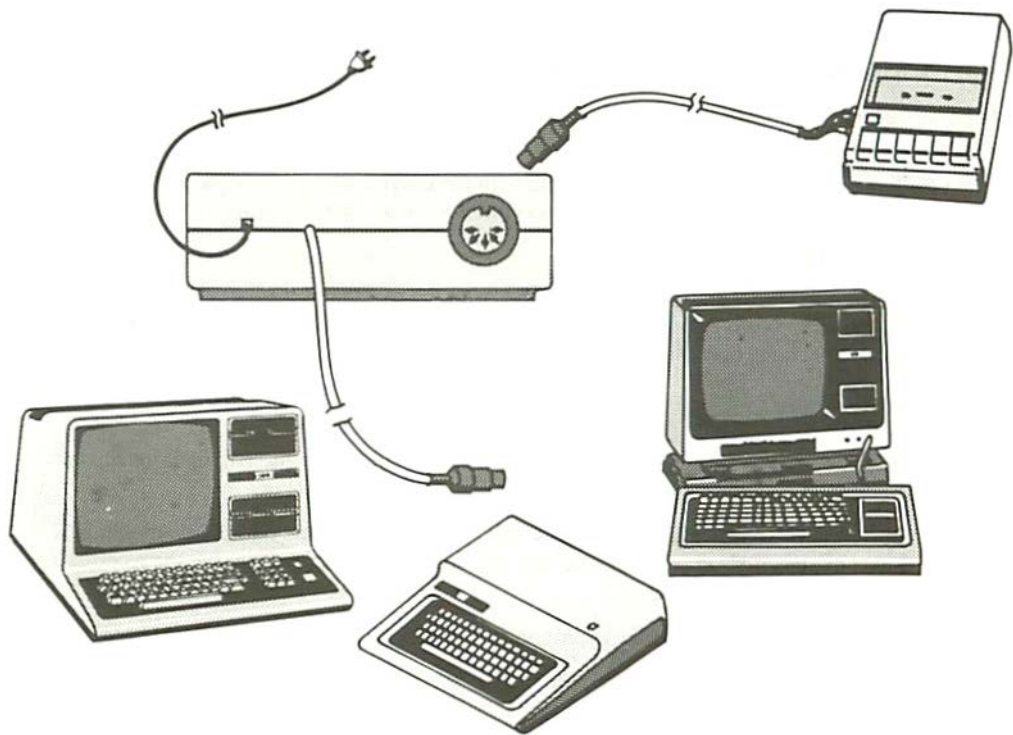
Figure 2. Controller Connections

Loading the Operating Program (Cassette Systems)

Model I/Model III, Level I Machines

1. Position the switch on top of the Controller to CASS. This allows normal use of the cassette port for loading programs from cassettes.

2. Insert the Level I/Color cassette into the recorder with the Level I side up. Rewind the tape and prepare the recorder to be played. Be sure the recorder's volume control is properly adjusted.

3. Power up or reset the system to BASIC.

4. To load the controller program type CLOAD (ENTER). After the program is loaded, place the Controller's switch to CONT. A clock format should appear on the screen: 00:00. Refer to the Operation section before continuing.

Model I/Model III, Level II Machines

1. Position the switch on top of the Controller to CASS. This will allow cassette programs to be loaded in the usual manner.

2. Insert the Level II cassette into the recorder. For 16K RAM computers, use the 16K side; with 32K or 48K of RAM use the 32K side. Rewind the tape and prepare the recorder. Be sure the recorder's volume control is properly adjusted.

3. Power up or reset the computer. Set the appropriate memory size for the program being used:

   16K RAM — 28670
   32K RAM — 45055
   48K RAM — 45055

   If using a Model III computer, type L when CASS? appears on the screen.

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4. After the system is in Level II BASIC or Model III BASIC, type SYSTEM (ENTER). *? will then be displayed. Type L (ENTER), and the tape will begin loading. When loading is complete another *? will be displayed. Position the switch on the Controller to CONT. Type / (ENTER) to execute the program.

5. A clock format should appear on the screen: 00:00. Refer to the Operation section before continuing.

Color Computers

1. Position the switch on top of the controller to CASS. This will allow normal use of the cassette port for loading cassette programs.

2. Insert the Level I/Color cassette into the recorder with the Color side up. Rewind the tape and prepare the recorder. Be sure the recorder's volume control is properly adjusted.

3. To load the Controller program;

For 4K computers type: For 16K computers type:

CLEAR 0 (ENTER)   CLOADM (ENTER)
CLOADM (ENTER)

After the program has been loaded, OK will appear on the screen.

4. Position the controller's switch to CONT and type EXEC (ENTER) to execute the program.

5. A clock format should appear on the screen: 00:00. Refer to the Operation section before continuing.

Loading the Operating Program (Disk Systems)

Model I

Use the TAPEDISK program to load the Controller program into memory and then copy it into a specified file on the disk. To use TAPEDISK, connect the recorder directly to the TRS-80 tape jack, not to the Expansion Interface jack.

1. Position the switch on top of the Controller to CASS.

2. Insert the Level II cassette tape into the recorder. For 16K RAM computers, use the 16K side of the tape; with 32K or 48K of RAM use the 32K side. Rewind the tape and prepare the recorder to be played.

3. To load and execute TAPEDISK, type TAPEDISK (ENTER). TAPEDISK will come up with the prompt: ?. To load the Controller program type C (ENTER).

4. When the tape has loaded, you are ready to copy the program from memory onto disk. Type in the following substituting the drive used for d.
   For 16K machines:

   F LIGHT/CMD:d 7100 7D10 7128 (ENTER)

   For 32K and 48K machines:

   F LIGHT/CMD:d 8100 8D10 8128 (ENTER)

   Now type E (ENTER) to return to TRSDOS. After the Controller program is loaded onto disk, the program can be executed from TRSDOS by typing:

   LIGHT (ENTER)

Model III

You will use the TAPE program to transfer information from tape to disk.

1. Position the Controller's switch to CASS.

2. Insert the diskette you wish to transfer the program to into Drive 0.

3. Type TAPE (S=T,D=D) (ENTER). The screen will display the prompt, CASS?. Answer the prompt by typing L. Do not press any other key.

4. Now insert the Level II cassette tape into the recorder. For 16K RAM computers, use the 16K side of the tape; with 32K and 48K of RAM use the 32K side. Rewind the tape and prepare the recorder. When you are ready press (ENTER).

5. As the program is being loaded, the file name, LIGHT, will be displayed on the screen. After the Controller program is loaded on the disk, the program can be executed from TRSDOS by typing LIGHT (ENTER).

Operation

Direct Command Mode

After the Controller program starts execution, a request for you to enter the present time will be made. All times should be entered in military time (24-hour clock format from 00:00 to 23:59).

Examples:

```
12:22 am = 00:22
 1:00 am = 01:00
 8:00 am = 08:00
```

```
12:00 pm  =  12:00 (noon)
 3:00 pm  =  15:00
 8:00 pm  =  20:00
12:00 am  =  00:00 (midnight)
```

After you enter the time, the program will assume the direct command mode. In this mode, devices may be controlled directly from the keyboard.

Note: If you make a mistake entering the time, the only way to correct it is to reload the program. If the clock does not start counting, make sure that the Controller's switch is in the CONT position.

The direct command display is shown in **Figure 3**.

In this mode of control, the commands which may be used are:

House Code

Letters A through P select and display the house code of the module you wish to control.

Unit Code

Numbers 1 through 16 select the individual control module whose house code was previously entered. After a unit is selected, a cursor > will appear to the left of that unit number until another unit code or a CLR command (see below) is entered.

Unit Commands

The following commands tell the selected module what to do. Press (ENTER) after each command.

ON

Completely turns on the selected module if previously "off."

OFF

Completely turns off the selected module.

10
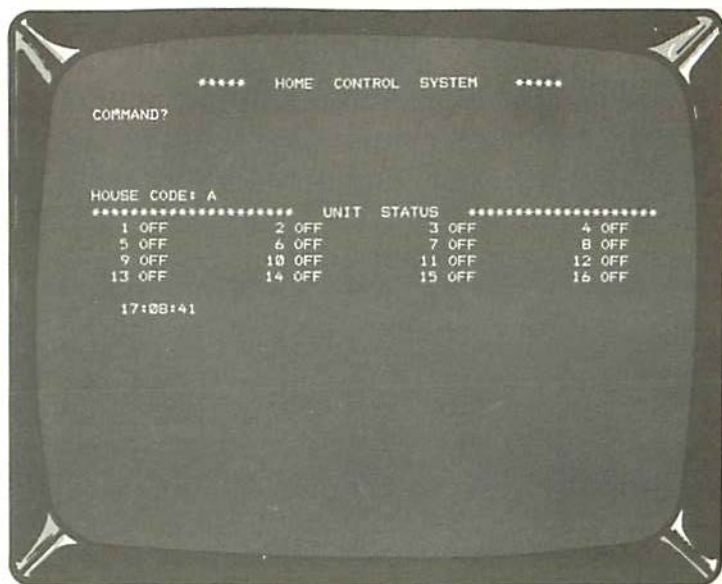
Figure 3. Direct Command Mode

DIM1 — DIM9

The level of intensity of a lamp connected to a Lamp Dimmer Module or Wall Module may be reduced from 10 (''ON'' full intensity) to (''OFF''). If the selected module is on at the time of the command, the level of intensity will be reduced by the value of the DIM command. If the light is off it will first be turned on to full intensity (10) and then reduced by the value of the DIM command. The DIM1 through DIM9 commands will not work with Appliance Modules. See **Figure 4**.

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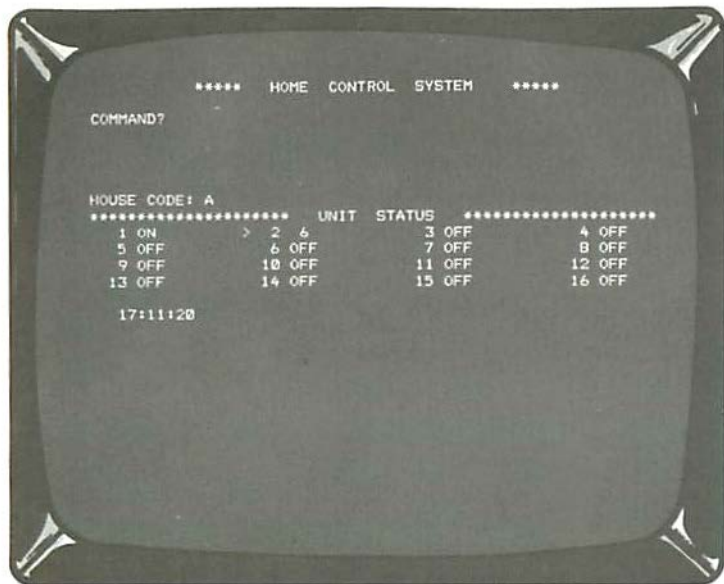
Figure 4. Typical display after the commands 2 (ENTER) DIM4 (ENTER).

BR1 — BR9

The level of intensity of a lamp connected to a Dimmer or Wall Module may be increased from 0 ("OFF") to 10 ("ON" full intensity). If the selected module is off at the time of the command, the unit will be turned on to full intensity (10) regardless of the BR value. If the selected module is on and the intensity was reduced by a DIM command, the level will be increased by the value of the BR command. See **Figure 5**.

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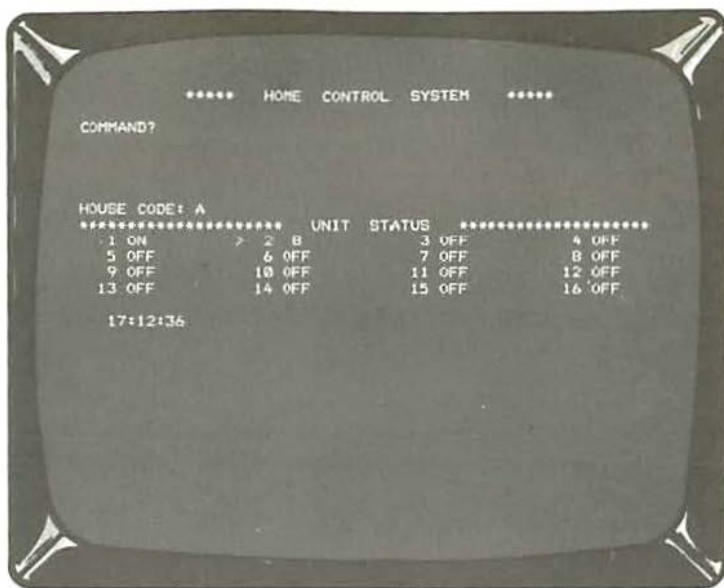
Figure 5. Typical display after the commands 2 (ENTER) BR2 (ENTER).

The BR1 through BR9 commands can only be used with Dimmer and Wall Modules. These commands will not work with Appliance Modules.

CLR

Turns off all modules in the displayed house code and removes the cursor, deselecting the previously selected control module.

ALL

Turns on all Dimmer and Wall Modules in the displayed house code which were previously "OFF."
The status of modules previously on at any intensity (i.e. ON, 1 through 9) will not be affected. The
ALL command cannot be used with Appliance Modules.

@

To enter the programming mode or go back to the direct command mode, type @ (ENTER).

Q

Type Q (ENTER) to exit from the Controller program and go back to Level II or Model III BASIC, Disk
BASIC and/or TRSDOS. This command will work with Model I/Model III, Level II computers only.
(See "Special Applications" for information on use.)

HELP

Displays a list of all unit commands. This command will work with Model I/Model III, Level I/II
computers only. A list of commands will also be displayed on these computers if an invalid command
is entered.

Programming Mode

In the programming mode, modules may be programmed to execute unit commands at a
predetermined time. Up to 32 command lines may be entered in advance on Level I computers, up to
45 command lines on Level II computers, and up to 30 lines on the Color Computer. To enter the
programming mode type @ (ENTER). The programming mode display is shown in **Figure 6**.

This display will differ slightly on the Color Computer. The commands used in the programming
mode are listed and defined as follows:
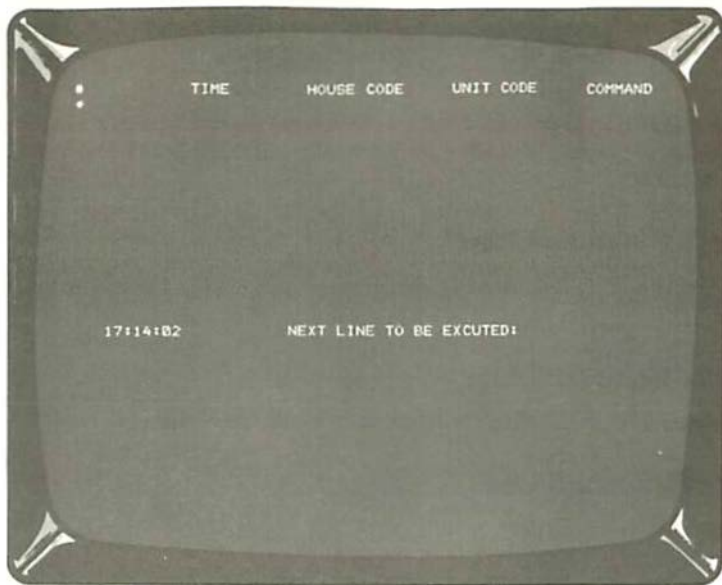
Figure 6. Programming Mode

I (Insert Command Line)

To enter a command line type I **ENTER**. A cursor > will then prompt the entry of time (*hh:mm*), house code (A-P), unit code (1-16), and command code (ON, OFF, DIM 1-9, BR 1-9, ALL, or CLR). Press **ENTER** after typing in each entry. After the last column has been entered, another cursor * will appear on the next line. Type I **ENTER** to add another command line. To insert a command line somewhere

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in the sequence other than after the last line entered, type I *line* (ENTER) (where *line* = line number at which the line is to be inserted). As before, the cursor > will prompt for the command line information.

The computer will resequence the command line numbers in the form of 1,2,3 etc. Each command in the programming mode is executed in order of its line number. After the last line number is executed the sequence will repeat.

R *line* (Replace Command Line)

This command is similar to the I *line* command except the new command line replaces the line indicated.

E *line* (Execute Command Line)

This command changes the "NEXT LINE TO BE EXECUTED" to the line indicated by *line*.

D *line* (Delete Command Line)

Will delete the indicated command line.

L (List)

Type L (ENTER) to list the command code lines at page one.

P (Page)

Type P (ENTER) to list the next page of command code lines. To return to the first page, type L (ENTER).

@

To return to the direct command mode, type @ (ENTER).

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CLEAR

Pressing (CLEAR) will cancel a command line if the line has not been completely typed and entered.

Note: If an I, I *line*, D *line*, or R *line* command is entered, the "NEXT LINE TO BE EXECUTED" will be set to 01. Use the E *line* command to change the Execution line to the desired line number.

It is important to understand that the programming mode will function only when in the program mode display. If you go back to the direct command mode, the clock will keep "ticking" but no command lines will be executed and the "NEXT LINE TO BE EXECUTED" will not change.

It is possible to execute commands for approximately 18 different modules at the same time. This number will vary, depending upon commands entered. ON, OFF, CLR and ALL execute in approximately 0.5 seconds; the DIM and BR commands, 0.5 to 2 seconds, depending upon value given. An example of three modules to be executed at the same time is shown in **Figure 7**. The program lines are executed in numerical order, therefore, the program lines to be executed at the same time must be grouped together and placed in the desired sequence.

You can program your control modules for several days at a time. (**Note:** In this case, *turn your display's brightness control all the way down*. This will prevent permanent "shadows" from forming on the screen.)

If you want the same routine at the same time everyday, just type in the order of commands once. Remember that the Controller only understands military time. See example in **Figure 8**. This routine will start every morning at 7:00 a.m. and end every night at 10:00 p.m. After line 06 is executed, the next line to be executed will be line 01.

You can program several days at a time with different routines. An example of a three-day cycle is shown in **Figure 9**. In the example, the first day starts at line 01 at 7:00 a.m. and ends at line 04 that same day at 10:30 p.m. Line 05 starts the next day at 6:00 p.m. and ends the day at 10:00 p.m. The third day starts at line 07 at 7:00 a.m. and line 08 ends the day's routine at 8:00 a.m. The routine starts over again at line 01 the next time the clock reads 07:00.

#	TIME	HOUSE CODE	UNIT CODE	COMMAND
01	12:00	B	03	OFF
02	12:30	A	06	ON
03	12:30	B	07	ON
04	12:30	B	10	ON
05	12:32	A	06	OFF

17:28:45   NEXT LINE TO BE EXCUTED: 01
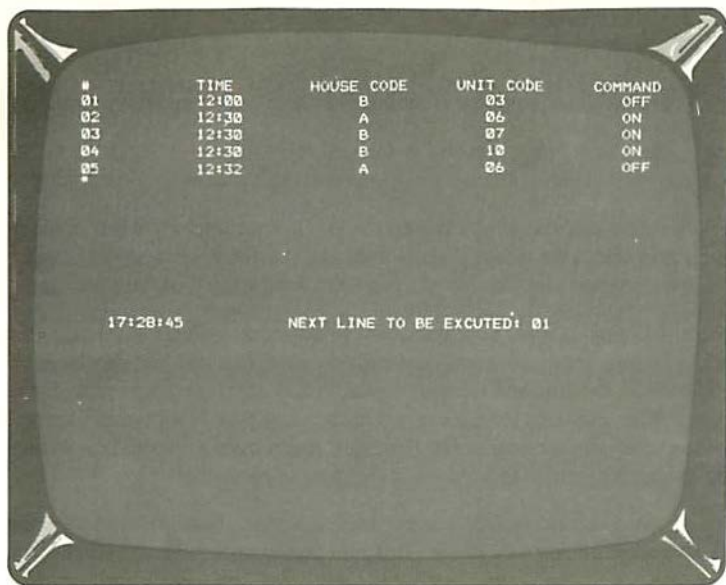
Figure 7. To Activate Three Modules Simultaneously

See **Figure 10** for one more example of a three day cycle, but this time no modules will be operated the second day. Let's say you're going out of town the morning of the first day and do not want any lights on until the third night when you arrive home. Figure 10 shows how you would do that.

The first day starts at line 01 and ends at line 03 with all modules off. The next lines to be executed are 04 and 05. Because we don't want any lights on the second day, we must put in "dummy" commands, that is, commands that don't result in any action but take up space in the controller's

#	TIME	HOUSE CODE	UNIT CODE	COMMAND
01	07:00	A	04	ON
02	08:00	A	04	OFF
03	17:30	B	02	ON
04	18:00	A	09	ON
05	21:00	B	02	OFF
06	22:00	A	09	OFF

15:22:06   NEXT LINE TO BE EXCUTED: 01

Figure 8. One-Day Routine

clock pattern. Lines 04 and 05 are these ''dummy commands.'' Line 04 is important because without it the next time the clock would see 22:00 would be 10:00 p.m. the first night. This line ''buys us time'' until the second day. Line 05 is important because without it the Controller would react at 10:00 p.m. the second night. This line ''buys us time'' until the third night when we want the module on.

#	TIME	HOUSE CODE	UNIT CODE	COMMAND
01	07:00	A	04	ON
02	08:00	A	04	OFF
03	18:00	A	09	ON
04	22:30	A	09	OFF
05	18:00	B	05	ON
06	22:00	B	05	OFF
07	07:00	A	04	ON
08	08:00	A	04	OFF

15:28:06   NEXT LINE TO BE EXCUTED: 01

Figure 9. Three-Day Routine

Special Applications

Using the Controller Program With Other BASIC Programs

The Controller program can be used as a subroutine with Level II BASIC, Model III BASIC, and DISK BASIC. Load the Controller program then reset the computer and go to BASIC. Set memory size for

#	TIME	HOUSE CODE	UNIT CODE	COMMAND
01	07:00	A	02	ON
02	07:10	A	03	ON
03	08:00	A	02	CLR
04	07:00	A	02	OFF
05	23:00	A	03	OFF
06	22:00	B	04	ON
07	01:00	B	04	OFF

15:31:54   NEXT LINE TO BE EXCUTED: 01

Figure 10. Three-Day Routine

protection as indicated. This is a very important step — if omitted it could result in loss of the program. Now POKE in the control command, then call the machine-language program with the USR function.

Note: When using BASIC, the data previously entered in the Programming mode will not be lost. However, the real-time clock for the home control system stops when the home control system program is not running.

The following short program is for Level II or Model III BASIC. The numbers used in this program are for 16K machines. For 32K and 48K machines substitute numbers listed after the program where indicated. The superior numbers [1], [2], [3], refer to notes given after the program.

```
MEMORY SIZE: 28670 [1]
RS/L2 BASIC

5 REM "ENTRY POINT OF HOME CONTROL SYSTEM"
10 POKE 16526,0 : POKE 16527,113 [2]
15 REM ---- POKE THE 3 LETTERS OF THE COMMAND "ALL" ----
20 X=32036 [3] : POKE X,3 : REM POKE IN NUMBER OF LETTERS
25 X=X+1 : POKE X,ASC ("A") : REM POKE IN COMMAND
30 X=X+1 : POKE X,ASC ("L")
35 X=X+1 : POKE X,ASC ("L")
40 REM ---- INVOKE THE USR COMMAND TO RUN THE HOME CONTROL SYSTEM ----
45 X=USR(0)
50 PRINT "THE SUBROUTINE HAS BEEN EXECUTED"
55 STOP
```

For 32K and 48K use:

[1] 45055, memory size
[2] 16527,177 in line 10
[3] -17116 in line 20

The following program is for DISK BASIC. For 32K and 48K RAM machines, substitute the numbers listed after the program where indicated.

```
MEMORY SIZE: 28670 [1]
RADIO SHACK DISK BASIC

05 REM "THE ENTRY POINT OF HOME CONTROL SYSTEM IS AT 7100H"
10 DEFUSR1=&H7100 [2]
15 REM ---- ONE LETTER HOUSE CODE "B" IS POKED IN ----
20 X=32036 [3] : POKE X,1 : REM POKE IN NUMBER OF LETTERS
```

```
25 X=X+1 : POKE X,ASC "B" : REM POKE IN COMMAND
30 X=USR1(0)
35 STOP
```

For 32K and 48K use:

[1] 45055 memory size
[2] &HB100, line 10
[3] -17116, line 20

To return to the Controller program from 16K RAM BASIC type SYSTEM (ENTER) /28949 (ENTER).

For 32K and 48K of RAM type SYSTEM (ENTER) /45333 (ENTER).

Any program generated in BASIC will not be lost if re-entry into the home control system is done in this manner. You will re-enter the Controller program in the "set clock" mode. It will be necessary to update the clock.

You may return to your BASIC program by typing Q (ENTER) while in the Direct Command Mode. Then type B to return to Level II/Model III BASIC or DISK BASIC if Disk Basic was previously entered, or type D to return to TRSDOS.

Important Note

You must return to the system from which the Controller program was loaded or your computer will "lock up"; (i.e.; if the Controller program was loaded using Level II BASIC, you must return to Level II Basic by typing B).

The Controller program may be controlled as a subroutine by another machine-language program by using the assembly-language source program listed on the next page. When loading this program be sure not to write over the Controller program which resides from 7100 (hex) to 7D3F (hex) for 16K computers and from B100 (hex) to BD3F (hex) for 32K and 48K computers. Superior numbers refer to notes given at the end of the program.

```
        LD      HL ,CMD
        LD      DE ,7D24H (1)
        LD      BC ,4
        LDIR                            ;LD(CMD)/(CMD+3)TO(7CB0H)/(7CB3H)
        CALL    7100H (2)
CMD     DEFB    03H                     ;LENGTH OF COMMAND
        DEFM    'BR5'                   ;COMMAND
        END
```

For 32K and 48K use: (1) BD24H (2) B100H

Save It On Disk

If you should desire to turn off your computer but do not wish to lose all the command lines you've typed in the programming mode, it is possible to save all that information on disk. For Model I/ Model III computers, type:

Q (ENTER)

D (ENTER)

For a Model I, 16K RAM computer type (where d is the drive number):

DUMP DATA/CMD:d (START=X'7000',END=X'7FFF',TRA=X'7115')

For a Model I, 32K or 48K RAM type:

DUMP DATA/CMD:d (START=X'B000', END=X'BFFF',TRA=X'B115')

With Model III, 16K RAM computer, type (where d is the drive number):

DUMP DATA/CMD:d (START=7000,END=7FFF,TRA=7115)

For a Model III, 32K or 48K RAM, type:

DUMP DATA/CMD:d (START=0B000,END=0BFFF,TRA=0B115)

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More Memory

More memory for your BASIC program may be made available by using a shortened version of the Controller program. Just the direct command portion of the program may be used by typing in one of the following programs. If using Level II or Model III BASIC, substitute the appropriate values where indicated. Be sure to set the memory size for protection against losing the program.

Shortened Controller Program for 16K Level II DISK BASIC (Memory Size = 32511)

```
100 DIM A(22):FOR I=1TO22:READ A(I):NEXT
110 FOR X=32512 TO 32613: READ G:POKE X,G: NEXT
120 CLS:INPUT"INPUT HOUSE CODE A-P";Z$: Z=ASC(Z$)-64: POKE 32612,A(Z)
130 PRINT" ":INPUT"INPUT UNIT CODE OF 1-16";D
140 PRINT" ":INPUT"INPUT COMMAND CODE OF ON=1 OFF=2 CLR=3 ALL=4 BR=5
    DIM=6";E
150 E=E+16: C=3: IF E<21GOTO170
160 PRINT " ":INPUT"INPUT NUMBER OF STEPS 1-10";C:C=C*2+1
170 POKE 32613,A(D):POKE 32614,3:GOSUB190
180 POKE 32613,A(E):POKE 32614,C:GOSUB 190 :GOTO 120
190 DEFUSR1=32512: X=USR1(0): RETURN
200 REM :   *****************************************************************:
210 REM : IF USING LEVEL II or MODEL III BASIC                              :
220 REM : CHANGE STATEMENT 190 TO                                           :
230 REM : POKE 16526,0 :POKE 16527,127 :X=USR(0):RETURN                     :
240 REM :   *****************************************************************:
250 DATA 96,224,32,160,16,144,80,208,112,240,48,176,0,128
260 DATA 64,192,40,56,8,24,88,72
270 DATA 243,245,197,213,58,102,127,79,205,62,127,205,62,127
290 DATA 205,62,127,205,57,127,58,100,127,6,4,205,44,127,58
300 DATA 101,127,6,5,205,44,127,13,32,225,209,193,241,251,201
```

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```
320 DATA 7,212,57,127,205,62,127,220,57,127,16,244,201
330 DATA 17,2,2,24,3,17,2,1,245,197,14,255,237,120,23,48
340 DATA 251,6,30,16,254,62,3,237,81,6,135,16,254,237,89
350 DATA 61,32,3,193,241,201,6,240,16,254,24,236,0,0
```

Shortened Controller Program for 32K DISK BASIC (Memory Size = 48895)

```
100 DIM A(22):FOR I=1TO22:READ A(I):NEXT
110 FOR X= -16640 TO -16539: READ G: POKE X,G: NEXT
120 CLS:INPUT"INPUT HOUSE CODE A-P";Z$: Z=ASC(Z$)-64: POKE -16540,A(Z)
130 PRINT" ":INPUT"INPUT UNIT CODE OF 1-16";D
140 PRINT" ":INPUT"INPUT COMMAND CODE OF ON=1 OFF=2 CLR=3 ALL=4 BR=5
    DIM=6";E
150 E=E+16: C=3 IF E<21GOTO 170
160 PRINT" ":INPUT"INPUT NUMBER OF STEPS 1-10";C:C=C*2+1
170 POKE -16539,A(D):POKE -16538,3:GOSUB190
180 POKE -16539,A(E):POKE -16538,C:GOSUB190:GOTO 120
190 DEFUSR1= -16640:X=USR1(0): RETURN
200 REM : ***************************************************:
210 REM : IF USING LEVEL II OR MODEL III BASIC              :
220 REM : CHANGE STATEMENT 190 TO                           :
230 REM : POKE 16526,0 : POKE 16527,191:X=USR(0):RETURN     :
240 REM : ***************************************************:
250 DATA 96,224,32,160,16,144,80,208,112,240,48,176,0,128
260 DATA 64,192,40,56,8,24,88,72
270 DATA 243,245,197,213,58,102,191,79,205,62,191,205,62,191
290 DATA 205,62,191,205,57,191,58,100,191,6,4,205,44,191,58
300 DATA 101,191,6,5,205,44,191,13,32,225,209,193,241,251,201
320 DATA 7,212,57,191,205,62,191,220,57,191,16,244,201
```

26

```
330 DATA 17,2,2,24,3,17,2,1,245,197,14,255,237,120,23,48
340 DATA 251,6,30,16,254,62,3,237,81,6,135,16,254,237,89
350 DATA 61,32,3,193,241,201,6,240,16,254,24,236,0,0
```

Shortened Controller Program for 48K DISK BASIC (Memory Size = 65279)

```
100 DIM A(22):FOR I=1TO22:READ A(I):NEXT
110 FOR X= -256 TO -155:READ G:POKE X,G:NEXT
120 CLS:INPUT"INPUT HOUSE CODE A-P";Z$:Z=ASC(Z$)-64:POKE -156,A(Z)
130 PRINT" ":INPUT"INPUT UNIT CODE OF 1-16";D
140 PRINT" ":INPUT"INPUT COMMAND CODE OF ON=1 OFF=2 CLR=3 ALL=4 BR=5
    DIM=6";E
150 E=E+16: C=3: IF E<21GOTO170
160 PRINT " ":INPUT"INPUT NUMBER OF STEPS 1-10";C:C=C*2+1
170 POKE -155,A(D):POKE -154,3:GOSUB190
180 POKE -155,A(E):POKE -154,C:GOSUB190:GOTO120
190 DEFUSR1= -256:X=USR1(0):RETURN
200 REM :  ************************************************************:
210 REM : IF USING LEVEL II OR MODEL III BASIC                        :
220 REM : CHANGE STATEMENT 190 TO                                     :
230 REM : POKE 16526,0:POKE 16527,255:X=USR(0):RETURN                 :
240 REM :  ************************************************************:
250 DATA 96,224,32,160,16,144,80,208,112,240,48,176,0,128
260 DATA 64,192,40,56,8,24,88,72
270 DATA 243,245,197,213,58,102,255,79,205,62,255,205,62,255
290 DATA 205,62,255,205,57,255,58,100,255,6,4,205,44,255,58
300 DATA 101,255,6,5,205,44,255,13,32,225,209,193,241,251,201
320 DATA 7,212,57,255,205,62,255,220,57,255,16,244,201
330 DATA 17,2,2,24,3,17,2,1,245,197,14,255,237,120,23,48
```

27

```
340 DATA 251,6,30,16,254,62,3,237,81,6,135,16,254,237,89
350 DATA 61,32,3,193,241,201,6,240,16,254,24,236,0,0
```

Module Installation and Operation
Lamp Dimmer and Appliance Modules

Refer to **Figure 11** and **12**.

Important

In most homes and offices wall outlets are ''polarized'' as a safety measure. If you have such outlets, one of the prong holes in the wall receptacle will be larger than the other (usually the left one is larger). The Appliance Module unit requires this type of outlet and has one prong tip larger than the other to make sure it is inserted in the wall receptacle correctly. If the wall outlet has been installed ''upside down'' or horizontally, it may be necessary to rotate the Appliance Module to fit properly. If you do not have polarized outlets you must replace the present outlet before using the Appliance Module.

1. Select one of 16 house code letters (A through P) on the red house code dial on the module. Having 16 choices for the house code enables you to set up several independent systems in one home or office without interaction among them (e.g.; all light modules in one room on house code ''A,'' all Appliance Modules on house code ''B,'' etc.). Also, you can avoid interference with/ from a neighbor's system by choosing a different code letter.

2. Set the black unit code dial to one of 16 numbers. Each number designates the particular Dimmer or Appliance Module. Do not set two modules with the same house code on the same unit code unless you desire the modules to respond simultaneously.
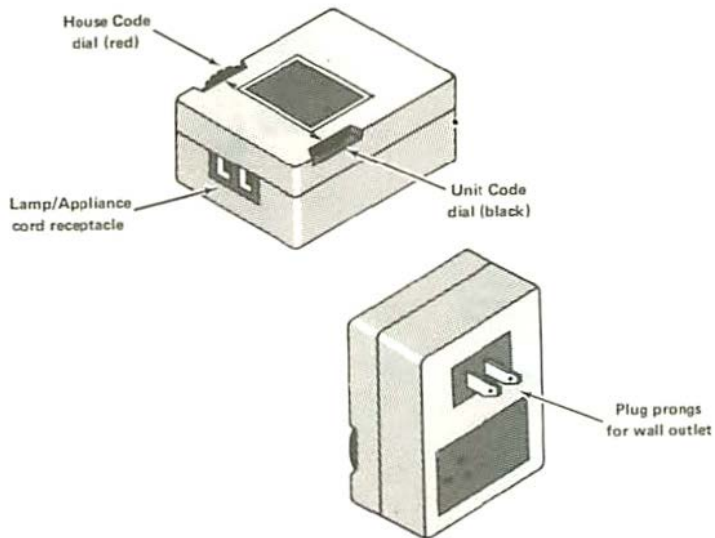
Figure 11. Appliance and Dimmer Module Details

3. Plug the power cord of an incandescent lamp or appliance into the receptacle on bottom of the module and place the on-off switch in the on position. Appliances without on-off switches need only be plugged in.

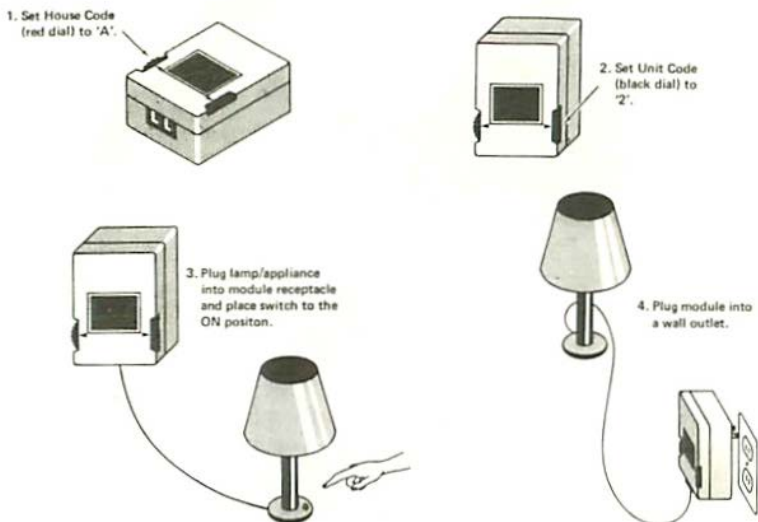**Note:** Do not connect appliances or fluorescent lamps to Dimmer modules; the appliance or lamp could be damaged.

Figure 12. Dimmer/Appliance Module Installation Example

4. Now plug the Dimmer or Appliance Module into a standard 120 volt AC outlet. Even though the switch is "on," the lamp or appliance should remain off. The Dimmer and/or Appliance Module is now ready to receive commands from the Controller.

The power limitations of the Appliance Module are listed below. Do not exceed these limitations.

Resistive Load — 15 amps
Motor Load — ⅓ HP
Incandescent Lamp — 500 watts

The Lamp Dimmer Module can only be used with incandescent lamps up to 300 watts total. For example, a floor lamp with five 60-watt bulbs in its fixtures uses 300 watts total and therefore is acceptable.

Wall Module

See **Figure 13**.

1. Set the house code dial (red arrow) to the desired setting. Use a smalll screwdriver to turn the dial slowly to the setting.

2. Set the unit code dial (black arrow) to the desired unit code.

3. Put the on-off switch lever in the on position (up, with code dials on bottom).

WARNING

TO AVOID ELECTRICAL SHOCK, TURN OFF POWER AT CIRCUIT BREAKER OR FUSE BOX BEFORE PROCEEDING.

See **Figure 14**.

4. Remove wall plate and old switch.

5. Connect leads; black lead to black wire and blue lead to white wire. Use wire nuts as illustrated. Make certain code dials are at bottom when mounting wall module.
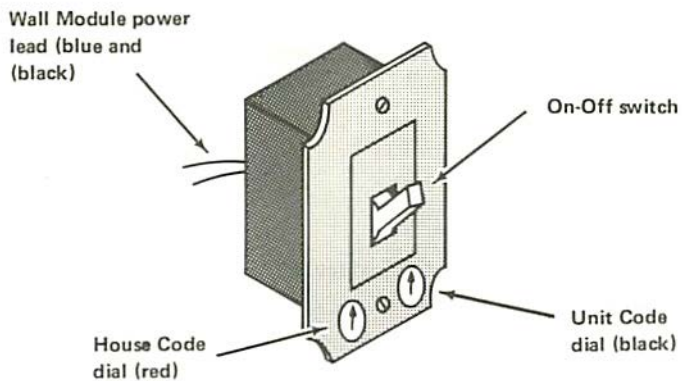
Figure 13. Wall Module Details

6. Replace the wall plate.

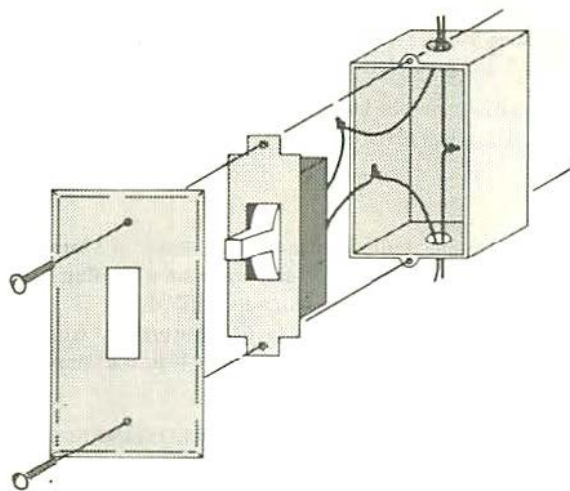7. Turn power back on at circuit breaker or fuse box.

Figure 14. Wall Module Installation

Operational Notes

1. Fluorescent lamps may be connected to an Appliance Module. Do not connect fluorescent lamps to a Dimmer or Wall Module.

2. Incandescent lamps may be connected to the Appliance Module but of course you will not have dimming control. However, using an Appliance Module for incandescent lamps permits connecting up to 500 watts (instead of 300 watts when using the Lamp Dimmer Module). The Wall Module will also handle 500 watts of incandescent light.

3. Appliances such as room air-conditioners, floor and attic fans, etc., may be controlled with Appliance Modules. Read the power rating labels on such appliances carefully to make certain they do not exceed the ratings printed on the Appliance Module label.

4. Do not use the Appliance Module with refrigerators, deep freezers, etc., as these appliances could accidently be turned off and go undetected.

5. When changing bulbs always put the lamp's on-off switch to ''off.'' When changing bulbs using the Wall Module, put the switch lever down (off).

Local Control

Sometimes it is desirable to resume temporary manual control over a lamp or appliance. For example, the Controller has turned off a lamp beside you and you want it on. Remembering that the on-off switch is actually in the on position, turn the switch to ''off'' then back ''on.'' The lamp (or appliance) should now be lit (or operating) without use of the Controller. When working with three-way lamps, it may be necessary to turn a lamp's on-off switch several times to turn it on locally.

Remember to leave the on-off switch in the ''ON'' position to resume remote control.

Common Sense Troubleshooting

If you experience any difficulty, always . . .

1. Make sure that the Controller is plugged in and the Controller's switch is in the CONT position.

2. Check that all plugs are firmly seated in their respective receptacles.

3. Check that black unit code dials on all control modules have not been accidentally changed from the numbers you originally selected.

4. Check that electric power is actually on, since a fuse or circuit breaker may have opened the circuit without your knowledge. Simply turn on a lamp or appliance to test.

Intermittent or Occasional Difficulties

Even though your system is working well, certain temporary conditions may cause apparent malfunctions. If you experience intermittent or occasional difficulties, always . . .

☐ Check which household appliances are on at the time of difficulty, especially those not being controlled. Electrical "noise" may be introduced temporarily onto the house wiring by some appliances. Such noise can interfere with signals transmitted by the Plug 'n Power Controller and frequently show up on your TV screen as well. Fortunately, "noisy" appliances (such as electric razors, food blenders, vacuum cleaners, etc.) are usually used for short periods. TV's, hi-fi's, refrigerators, freezers, and air conditioners usually do not cause interference. Some electronic equipment containing switching power supplies may cause interference. Computer printers may cause interference.

☐ Check the time of day at the time of difficulty. Electrical noise may be introduced onto your house wiring from the neighborhood electrical power system. Such interference, if any, would be noticeable in early mornings and early evenings, when electrical usage is particularly heavy.

☐ Check to see if any previously installed dimmers are in operation (other than Plug 'n Power units). Such dimmers tend to generate electrical noise. Never use a Lamp Dimmer Module or Wall Module to control a lamp or fixture having an existing dimmer.

The above checkpoints may not satisfactorily explain your intermittent or occasional difficulty. If they do not, the next time the difficulty occurs, put the system in the Direct command mode and type in all house codes used, and follow each with a CLR command. This will turn off all lights and appliances, then try controlling them one by one (using Direct command mode) until satisfactory control is achieved.

Power Interruptions

All electrical power systems are subject to voltage drops, interruptions, and failures due to power station problems, lightning, etc. These interruptions may last less than one second or many hours, and can cause appliance switches and connected appliances to turn off. If an appliance is

unexpectedly turned off, or you know of or suspect a power interruption, put the system in the direct command mode and type in all house codes used, and follow each with a CLR command. Initiate control of connected lights and appliances one by one until your system is restored to normal status.

Intercom Systems

Intercom systems which utilize existing home or office wiring may prevent proper operation of your remote control system. Such intercoms interfere with the signals transmitted from the Controller to control modules. Intercoms will interfere when in use (a temporary problem), or when plugged in and left in the "talk" position. Intercoms which employ their own separate wiring will not interfere with your Plug 'n Power system.

SERVICE POLICY

Radio Shack's nationwide network of service facilities provides quick, convenient, and reliable repair services for all of its computer products, in most instances. Warranty services will be performed in accordance with Radio Shack's Limited Warranty. Non-warranty service will be provided at reasonable parts and labor costs.

Because of the sensitivity of computer equipment, and the problems which can result from improper servicing, the following limitations also apply to the services offered by Radio Shack:

1. If any of the warranty seals on any Radio Shack computer products are broken, Radio Shack reserves the right to refuse to service the equipment or to void any remaining warranty on the equipment.

2. If any Radio Shack computer equipment has been modified so that it is not within manufacturer's specifications, including, but not limited to, the installation of any non-Radio Shack parts, components, or replacement boards, then Radio Shack reserves the right to refuse to service the equipment, void any remaining warranty, remove and replace any non-Radio Shack part found in the equipment, and perform whatever modifications are necessary to return the equipment to original factory manufacturer's specifications.

3. The cost for the labor and parts required to return the Radio Shack computer equipment to original manufacturer's specifications will be charged to the customer in addition to the normal repair charge.