SOFTWARE USER'S GUIDE

for

Updating the Harman/Kardon MasterWorks Remote Controllers

with

New Infrared Remote Control Codes

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INTRODUCTION

The Harman/Kardon MasterWorks Remote control is unique. It is NOT a learning remote, but is PREPROGRAMMED with a library of thousands of infrared control codes. This software affords you the capability to change the codes contained in the remote control to support your customers' changing needs. This Software User Guide shows you how to use PLUSH to load our reprogrammable remote controls.

About PLUSH

PLUSH updates the REMOTE CONTROL with new infrared remote control codes by communicating with the REMOTE CONTROL through an Update Cable. One end of the Update Cable attaches to the serial port of a personal computer and the other end attaches to a connector inside the battery compartment. of the REMOTE CONTROL.

Updating PLUSH Libraries

The infrared codes available in PLUSH's library are updated and expanded frequently by Harman Kardon, and new versions of PLUSH are released from time to time. The best way to be sure that you are always using our "latest and greatest" software is to log on to our electronic bulletin board system and download it directly to your computer. The phone number is 714-544-0934 for 2400, 1200, or 300 baud modems (8 data bits, 1 stop bit, no parity). We are always glad to hear from users and.

GETTING STARTED

This section tells you what computer you need, how to use a hard disk with PLUSH, how to start PLUSH up, how to use PLUSH's help screen, and how to quit from PLUSH.

Hardware Required

To use PLUSH you need an IBM PC/XT/AT or compatible with:

    512 Kbytes or more of RAM.

One serial port with a male DB-9 connector. If the connector is DB-25 or the wrong gender, you will need an adapter available from most computer stores. If you wish to build your own adapter, the pinout is given in Appendix A.

One 5 1/4" 360 Kbyte or larger floppy drive. However, PLUSH will run much faster if you have a hard drive. (PLUSH is also available on 3 1/2" diskettes).

A printer, if you wish to print documentation. Virtually all ASCII printers are supported by PLUSH.

Installing PLUSH on a Hard Drive

We recommend that you make a directory on your hard drive called PLUSH. To do so you can type:

```
cd \
md plush
cd plush
```

Then, to install PLUSH in the PLUSH directory, put the distribution floppy disk in drive A and type:

```
xcopy A:*.* C: /s
```

Note that this assumes you are using floppy drive A and that your hard drive is drive C. If you are using different drives, change the drive designator letters accordingly. For example to copy PLUSH from floppy drive B: to hard drive D:, you would type

```
xcopy B:*.* D: /s
```

Running PLUSH

If you are running PLUSH from your floppy drive, first turn on your computer and boot up DOS version 2.1 or later, then install the PLUSH diskette. If you are running PLUSH from your hard drive , turn on the computer, then type CD\PLUSH to go to the directory with PLUSH in it.

If your computer does not have a clock/calendar, set the date by typing DATE mm-dd-yy and set the time by typing TIME hh:mm.

To run PLUSH if you are using serial port 1 for the Update Cable, just type

PLUSH

If you are using serial port 2, type

PLUSH 2

PLUSH will display the title.

The "Library Version" date shows when the library of infrared remote control codes, PLUSH.LIB, was created. The "PLUSH Version" shows the edition number of PLUSH.EXE and when it was created. Note that the library can be, and often is, updated without creating a new version of PLUSH.EXE. Remember, it is the library date and NOT the PLUSH.EXE version number which tells you if you have the latest codes available.

Press the ENTER key to proceed. After the PLUSH library is loaded, the next screen will display the choices for television codes that you can put into a REMOTE CONTROL. However, if you are unfamiliar with PLUSH, notice first that at the bottom of the screen it says HELP=F1. Press the F1 key, and you will see a screen that looks like this:

                        MAKING SELECTIONS:
PgUp PgDn   Move between device types (VCR, TV, ETC).
  <>   ^   v   Move cursor to select.
       ENTER   Select/deselect entry at the cursor.

                        FUNCTIONS:
       F3   Send selected items to Remote Control.
       F4   Read memory contents of Remote Control.
       F5   Print manufacturer/model list.
       F6   Print extended function chart.
       F7   Save selections in a file on dislk.
       F8   Get selections from a file oin disk.
       F9   Clear all selections from screen.
       F10   Toggle between select by Manufacturer or ID code.

ALT F1   Display license agreement.
ALT F3   What to do if a remote is not in the library.
ALT F6   View extended functions for a selection.
     ESC   Exit this program.

You can perform the listed functions either from the help screen or the selection menus. To get back to where you were before pressing F1, press ENTER.

Exiting PLUSH

Pressing ESC from the help screen or the selection menus will get you out of PLUSH and back to DOS, but first you will be asked if you really want to exit (type Y if you do).

Pressing ESC during most other PLUSH operations will abort that operation and return you to where you started.

SELECTING THE LOAD

There are three ways to select which remote control codes to load into a REMOTE CONTROL:

1. You can manually select what to load.
2. You can re-use a load that was previously saved to disk.
3. You can read the load that is already in the REMOTE CONTROL.

Loads read from a REMOTE CONTROL or obtained from a saved file can be manually edited to add or remove selections.

Manually Selecting a Load

PLUSH 7.03 offers fourteen screens that you can select remote control codes from: TV, VCR, CD Players, Audio Amplifiers, Audio Cassette Decks, Digital Audio Tape, Phonographs, Miscellaneous Audio, Laser Disk Players, Video Accessories, Satellite Receivers, Home Automation, Cable Converters,. To go from one screen to another, press the PgUp or PgDn keys on the number pad. The top of the screen tells you what kind of product you are selecting. (Tv Group, VCR Group, CD Group, etc.)

Once you have chosen the particular product group, you can move the cursor around the screen by using the arrow keys. When you have positioned the cursor next to a selection you desire to load into the REMOTE CONTROL, press ENTER. ENTER will toggle between selecting (highlighting) a choice and deselecting (un-highlighting) a choice. That is, if a choice is not selected, ENTER will select it and if it is selected, ENTER will deselect it.

Most of the screens have more selections than will fit on the screen at one time; to access the additional selections simply use the up or down arrow keys to scroll the display.

ID Codes

You will notice that selecting one model will sometimes automatically select others, and the whole group of selections will be blinking. This is because different manufacturers or different models of equipment often make use of the same remote control codes. PLUSH knows about this and avoids redundancy by choosing the actual set of remote control codes to load by "ID Code." You can view what ID Codes will be loaded into a REMOTE CONTROL by using the F10 key. F10 toggles between the Manufacturer/Model Number selection screen and an ID Code selection screen for each of the fourteen product types.

For many manufacturers there is a "KIT" entry which will select everything PLUSH knows about for that brand name. If you are in doubt as to which models to include for a given manufacturer, choose "KIT."

While you are on an ID Code screen, you can use the cursor keys and the ENTER key to select ID Codes for a REMOTE CONTROL load just as you do on a Manufacturer/Model Number screen. As before, selected ID Codes are highlighted and unselected ones are not. Furthermore, any changes you make to the ID Code screen will be reflected on the Manufacturer/Model Number screen and vice-versa. Keep in mind that it is a group of ID Codes that is actually loaded into a REMOTE CONTROL - one ID Code may correspond to several Manufacturer/Model Numbers.

Advanced Cursor Positioning

Besides using the arrow keys, you can move the cursor around on the selection screens using the following keys:

HOME   Moves the cursor to the top of the screen.

END   Moves the cursor to the bottom of the screen.

CONTROL-HOME Moves the cursor to the top of the selection list.

CONTROL-END   Moves the cursor to the bottom of the selection list.

A through Z   Moves the cursor to the first entry beginning with that letter.
                     If there is no entry beginning with that letter, your will get a beep.

Viewing Extended Functions and Notes

Many times a selection will have Extended Functions assigned to certain keys. This information is printed in the "Product Code Book" for the REMOTE CONTROL products, and it can be printed or displayed as described further below. However, if all you want is a quick look at the Extended Functions for a single selection, just go to the Manufacturer/Model screen, point the cursor to the desired selection and press ALT-F6.

Saving on the Disk.

Once you have selected a REMOTE CONTROL load that you might want to use again later, you can save it on disk for later recall by pressing F7. You will be asked for a filename, which must have from one through eight characters. PLUSH automatically assigns the filename extension .HSW, so you do not have to type it. Press ENTER after you have typed the filename.

If there already is a file of the same name, PLUSH will ask if you really want to overwrite it.

Obtaining a Load from Disk

If you saved previously any load selections, you can recall them from disk by pressing F8. PLUSH will list the available saved load files (those with the filename extension .HSW) and will ask you for the name of the one you want to obtain. You do not have to type the .HSW extension. Press ENTER after you have typed the filename.

PLUSH will clear out any selections you may have previously had and will highlight those which were saved in the file.

Reading the Memory Contents of a REMOTE CONTROL

To find out what is already loaded into a REMOTE CONTROL, press F4. PLUSH will prompt you to attach the Update Cable to the REMOTE CONTROL, which you do by removing the REMOTE CONTROL's battery cover and inserting the end of the Update Cable in the three electrical contacts.

When the Update Cable is installed, press ENTER. PLUSH will read out the serial number of the REMOTE CONTROL, the creation date of the library it was last updated with, the version of PLUSH used to do the last update, and a list of the ID Codes it contains. The screen looks like this:

```
Remote control serial #0000000   Last update: 08/26/88 5.00c

Cable Converters ----- <CABLE Group>: 003  084  023  021  020  019  017  014
012  011  008  007  005
TVs ---------------------------<TV Group>: 000  254  178  166  156  155  150  098
096 080  078   064   056   054  053  052  038  031  030  028  020  017  014
VCRs----------------------<VCR Group>: 035  211  210  209  208  077  075  068
067 060  042  041  039  038
CD Players -----------------<CD Group>: 000  187  173  170  157  153  148  147
139   138   137   128   109   108   104  103  102  101  098  197  088  083
079   072   060   053   037   035   034  029  028  019  016  008  005  003
Audio Amplifiers ---------<AMP Group>:  106
Audio/Tuners----------<TUNER Group>:  107  110
Audio Cassette Decks-<TAPE Group>:
Digital Audio Tape--------<DAT Group>:  252
Phonographs----------------<CD Group>:
Miscellaneous Audio---<AMP Group>:  059  241
Laser Disk Players-----<CDV Group>:
Video Accessories--<CABLE Group>:
Satellite Receivers-<CABLE Group>:
Home Automation------<DAT Group>:  252
```

Retain these selections (Y/N)?

Note that at the bottom of the screen you will be asked whether you want to retain the selections you just read back. If you type Y, any selections you may previously have had will be erased and the selections read out from the REMOTE CONTROL will be highlighted. As always, the one-to-many correspondence between ID Codes and Manufacturer/Model Numbers will be taken in account by PLUSH, so that more manufacturers and model numbers than you might have expected may be highlighted.

If, after retaining the selections you read from a REMOTE CONTROL, you wish to save that load on disk for later recall, press F7 and type a filename to save the load as described previously.

If you would like a printout of the list of ID codes you read from a REMOTE CONTROL, press Shift-PrtSc to print the list before answering whether to retain the selections. (As a note inpassing, the ID codes are listed in the same order that STEP-AND-SET scans through them.)

After you have read a load from a REMOTE CONTROL, the next time you press F4 you will be asked if you want to look at the last remote read out. This gives you a chance to start over if you make mistake adding or removing selections from that REMOTE CONTROL's load.

Clearing Out Selections (Starting Over)

If for some reason you wish to erase all of the selections for all fourteen Product Categories (TV, VCR, CABLE, etc.), simply press F9. PLUSH will ask if you really want to erase your selections from the screen so you won't do it by accident.

LOADING A REMOTE CONTROL WITH SELECTIONS

After you have selected which remote control codes to load into a REMOTE CONTROL, you can actually load REMOTE CONTROLs with those codes bypressing F3. First, PLUSH will "build" the load by fetching all the files it needs to fulfill your selection and assembling them into the form needed by the REMOTE CONTROL. Next, you will be prompted o install the Update Cable in order to perform the actual load.The following sections describe the building and loading process in detail.

The Build Process

Because the amount of memory in a REMOTE CONTROL is finite and the library of possible selections is vast, it is possible for you select a load that will not fit. To give you an idea of how much of the available memory in a REMOTE CONTROL will be filled by the load you are selecting, a "Load Meter" at the bottom of the selection screens shows "Load is approx X% full." The load meter is intended as a rough guide only, since it is only accurate within about 5% either way. To tell for sure if a load will fit you must build it by pressing F3.

If a load will not fit after building, PLUSH will notify you and you will have to delete some selections. This can be tricky sometimes because of the many-to-one relationship between Manufacturer/Model Numbers and ID Codes. To make room, one or more ID Codes will have to be deleted.

Deleting a single Manufacturer/Model Number may also delete other selections you still want in the load, so you have to use some care. To see if a selection you want is grouped with others you may not want, you can get the whole group to blink on the selection screen. Just move the cursor to the selection you are curious about and press ENTER twice, to deselect it then select it. You can then scroll the screen up and down to see if anything else which may have been off-screen is also blinking.

Remember that you can edit your selections either on the Manufacturer/Model Number screen or on the ID Code screen. Any changes on one screen will be reflected on the other. To explore the relationship between ID Codes and Manufacturer/Model Numbers, you might save your attempted load that was to big (using F7), clear out all the selections (using F9), then experiment to find out which selections are safe to delete.After you have done so, recall the load that was too big (F8),delete the safe selections, then try a build again (F3).

Loading a REMOTE CONTROL

After a successful build, you will be prompted to connect the Update Cable to the REMOTE CONTROL you wish to update. As with reading the selections from a REMOTE CONTROL, you do this by removing the battery cover and installing the end of the Update Cable with the three electrical contacts.

When the cable is installed properly, press ENTER. PLUSH will display a screen which tells you how the load is proceeding -the sequence should be:

1. "Looking for Remote Control" is displayed on the screen.
2. The yellow indictor on the Remote Control goes on.
3. "Loading Remote" is displayed on the screen.
4. "Ack 0001" through "Ack 0511" is displayed on the screen and you will hear a series of beeps with a falling tone.
5. When done, the REMOTE CONTROL's light turns off and the screen you were on when you started is displayed.

The load will take 20-40 seconds, depending on the speed of your computer and whether you are using a hard disk or not.

During the load, be sure that no keys are pressed on the REMOTE CONTROL, and do not disturb the Update Cable. If for some reason the load is interrupted, try it again, but do not press any keys on the REMOTE CONTROL in the meantime.

If you wish to load more than one REMOTE CONTROL with the same build, press F3 again - this time PLUSH will skip the time-consuming build process. Builds are only performed when you change the selections.

If the "Looking for Remote Control" message persists for several seconds, or if a message like "Received fc" or "Bad character 00" appears, the Update Cable is probably not making good contact with the REMOTE CONTROL. Remove the cable, check it, reinstall it, then try the load again.

If loading is unsuccessful at any point, PLUSH will eventually time out and inform you that communication does not appear to be working. If you wish to manually abort a load attempt that is not working, press ESC and PLUSH will either prompt you to retry or go back to the screen you were on before pressing F3.

If the REMOTE CONTROL's yellow light stays on after an unsuccessful load attempt, you can reset the REMOTE CONTROL by removing one of its batteries for a few seconds, then retrying the load. The usual cause of load failure is weak batteries - if you are unsure of the batteries, install fresh ones and try the load again.

WHAT TO DO IF A REMOTE IS NOT IN THE LIBRARY

It is possible that the remote you are looking for actually is in the library but it is listed in a way you are not looking for. Of course, it is also possible that it is not in the library at all, or that it is in later versions of the library than you are using.

The Help Screen

The first thing to do if you have not been able to load a REMOTE CONTROL with codes for a certain remote is to press ALT-F3. The following screen will be displayed:

Library: 07/01/90	Universal Electronics Inc.	07/24/90
PLUSH.LIB	Adding New Remotes	Tuesday

If you can't find the remote you are looking for, it may be because it is listed under a different model number or brand name. This happens because equipment from one maker is often sold under many brand names. To search for a match, select ALL devices (TVs for example), load them into a remote, | then try them on your equipment using Step-and-Set. If you find a match, | please press ESC from here and fill out the form to notify us, we add new devices to the library all the time. To be sure you have the "latest and greatest" library, please log on to our Electronic Bulletin Board at 714 544-0934. The software is available for downloading 23 hours a day, and you can leave messages to us if you need extra help.

|| If you still can't find your remote in the library, we will be happy to add it if you send it to us for a few days. Press ESC and fill out the form so we will know who to return it to.

| You can also contact us by writing Universal Electronics, Inc., 14751 Plaza Dr., Tustin CA 92680 or calling 714 544-5113.

\Hit ESC to fill out the form or any other key to continue...

We find that many remotes that get sent to us are ones that already are in the library, so we urge you to try the remedies above before sending in your remote.

The Submission Form

If the remote is listed differently or it isn't in the library, press ESC and fill out the form to notify us. The form looks like this:

UNIVERSAL REMOTE CONTROL LIBRARY UPDATE REQUEST

SEND TO: FROM:
Universal Electronics, Inc.   Name _____
ATTN: Library Update Dept.   Company _____
14751 Plaza Dr Suite J   Address _____
Tustin CA 92680   Address _____
                                   Address _____
714 544-5113   Phone _____ Date _____

Type of equipment: TV_ VCR_ Cable_ CD_ Other _____
Manufacturer: _____
Equipment Model Number: _____
Remote Model Number: _____

I have found that device Blink Code _____ works this equipment.

This equipment is not in the library:
_I am sending the original remote for you to add. Please return it promptly.
_I am also sending you my Universal Remote for you to update for me.
_I cannot send you the original remote, but please add it if you can.
I have_ have not_ logged on to your Electronic Bulletin Board at 714 544-0934.
Comments: _____

_____
Use the arrow keys to move the cursor. Please send one form per request.
Press SHIFT-PrtSc to print out this form or ESC to exit...

            Of course, you will need a printer to print out the form. If you do not have one, please send the same information along with your remote. We will make every effort to return your original remote to you promptly and top

PRINTING OR DISPLAYING DOCUMENTATION

PLUSH is capable of printing or displaying two kinds of documentation:

1. Extended Function Charts (EFCs)
2. Manufacturer/Model Lists (MMLs)

Printing is done using standard ASCII characters only, so it will work with virtually any printer.

Printing or Displaying Extended Function Charts

Extended Function Charts show what remote control functions are performed for the various selections loaded into a REMOTE CONTROL, along with notes important to the user. You can display or print out an EFC for any selected load, whether or not the load will actually fit into a REMOTE CONTROL.

To display the EFC on your monitor, press F6, answer Y(es) to "Do you wish to view an extended function chart for your selections?", then answer N(o) to "Send output to printer?". You can pause the listing at any time by pressing Control-S and restart it by pressing any key. To abort the listing, press ESC.

To print the EFC, be sure your printer is connected, then press F6. Answer Y(es) to "Do you wish to view an extended function chart for your selections?" and "Send output to printer?".

One chart will be printed starting on a new page for each device type (TV, VCR, CABLE, CD) that has selections. Each chart is organized by "Codes." Only those selections which have extended functions or require some comment to the user are included in the chart. Others which only use the self- explanatory keys, such as PLAY, VOL^, or the number keys, are not listed.

Extended Function Charts can be used by the Customer as follows:

The customer "Matches" the Remote Control to his equipment by doing a "STEP-and-SET" procedure. He reads our the red Blink Code for whatever ID his Remote Control "landed on". He looks up the Blink Code in the Product Code Book to find out which keys need to be pressed to activate the intended functions.

Printing or Displaying Manufacturer/Model Lists (MML)

These lists, one for each Product Category (TV, VCR, CABLE, etc.), tell the user which Product Code Numbers are associated with each Manufacturer/Model Number selected for a load. This information enables the user to look up his equipment by Manufacturer and Model number, then "QUICK-MATCH" (directly set) his REMOTE CONTROL to that equipment.

The MML can also be useful if, for example, there are two or more selections which send out codes that his TV responds to, but only one of them is correctly matched to the REMOTE CONTROL's keyboard. At that point, he can look up the other Product Code Numbers for that equipment and try them out directly by QUICK-MATCHing rather than continuing on with the STEP-and-SET.

To print out or display the Manufacturer/Model list, press F5. As with the Extended Function Chart, PLUSH will ask again if you want to do the display or printout. Responding N(o) to "Send output to printer?" will display the MML on your screen, and Y(es) will send the MML to your printer. For a large load with many selections, the printout may run for many pages.

You can pause the listing at any time by pressing Control-S and restart it by pressing any key. To abort the printout or screen display, press ESC.

ADDITIONAL FEATURES OF PLUSH

Selecting Alternate PLUSH Libraries

Since REMOTE CONTROL is really a family of products, different versions of REMOTE CONTROL require different libraries. The default name of the library is PLUSH.LIB. However, if you need to load more than one version of the product with codes, you can switch between different libraries as long as each library is given a different name.

There are two ways to cause PLUSH to use a library other than PLUSH.LIB in your current directory. One is to name the library on the command line used to invoke PLUSH and the other is to set an environment variable to the name of the library. Both options are explained below.

The order in which PLUSH looks for the library to use is:

1. The library named on the command line.
2. The library named by the environment variable PLUSHLIB.
3. PLUSH.LIB in the directory you are currently in.

Naming the Library on the Command Line

Start up PLUSH by typing

PLUSH /lib=<[path\]filename>

Where the path is an optional DOS path and the filename includes the extension.

Naming the Library with an Environment Variable

From DOS before you start up PLUSH, type SET PLUSHLIB=NEW NAME.XXX, where NEW NAME.XXX is the name of the, library you want PLUSH to use. PLUSH will then use the library by that name until you SET PLUSHLIB=something else, or until you reboot your computer. To go back to the default PLUSH.LIB setting, type SET PLUSHLIB=.

HINT: If your computer gives you a message like "Out of Environment Space" when you try to SET PLUSHLIB=xxx, add the following line to your CONFIG.SYS file and reboot your computer:

shell=command.com /p /e:800

This will devote 800 bytes to environment variables instead of the default 128.

Preselecting a Load

Once you have saved a list of selections in a <savefile>.HSW file (by using the F7 function), you can run PLUSH so that it always starts out with that load selected. To do so start up PLUSH by typing

        PLUSH /hsw=<savefile>

You do not have to type the filename extension .HSW after <savefile>. If you also want PLUSH to use serial port 2, type

        PLUSH 2 /hsw=<savefile>

Changing Screen Attributes
Pressing Alt-F2 lets you change the way selections are highlighted on your screen. You can experiment with different colors and such by following the prompts on the screen. Pressing Home will return the display to the default reverse- video mode.

PLUSH saves the screen attributes in a file ATTR.DAT. If you are using PLUSH on a network and would like to override the screen attributes in the network's ATTR.DAT on your own workstation, you can do so by setting an environment variable on your system by typing (or placing in a batch file):

        set plushattr=xx

Here, xx is the decimal equivalent of the hex byte saved in ATTR.DAT for the text color and background you desire. As an example, 18 is green text on a blue background.

Using Batch Files to Run PLUSH

If you are routinely using more that one library, we recommend that you invoke PLUSH with batch files having different names depending on which REMOTE CONTROL product you are loading. Within the batch files you can set the serial port to be used, name the library, and define a previously saved selection list for PLUSH to start up with.

We furnish sample batch files for this purpose on PLUSH distribution diskettes and on the BBS. A typical example, which we call PLOFA.BAT, sets up PLUSH to load MasterWorks with a "standard" load saved in OFASTD.HSW, from a library called PLUSHOFA.LIB.

```
echo off cls
echo PLUSH for MASTERWORKS
pause
cd \plush
plush /lib=plushofa.lib /hsw=ofastd
```

Changing Product/Company Name

You can change the company name displayed at the top of the device selection screens and the product name printed at the top of the Extended Function Charts and Manufacturer/Model Lists. To do this, exit PLUSH and use a text editor to create a two- line ASCII file called PLUSH.CFG, with the company name on the first line and the product name on the second. Be sure to end each line with a carriage return. In the absence of a PLUSH.CFG file, the default names are both Universal Electronics, Inc.

Exiting to DOS

If your computer has sufficient memory, you may find it convenient from time to time to exit from PLUSH to DOS by typing ALT-D. You may then run other programs or use DOS (memory permitting), then return to PLUSH instantly and to the same place you left off by typing EXIT from the DOS prompt.