Roland

OPERATING MANUAL FOR THE

R-880 DIGITAL REVERB

with GC-8 Graphic Controller

by Paul D. Lehrman

RolandCorp US
7200 Dominion Circle
Los Angeles, CA 90040-3647
(213) 685-5141

RolandCorp US
7200 Dominion Circle
Los Angeles, CA 90040-3647

Telephone: (213) 685-5141
Facsimile: (213) 722-0911
Telex: 67-4489 RCUS LSA

Enclosed is version 2.00 for the R-880/GC-8. If you are updating your R-880/GC-8 from version 1.00, please take the following steps:

1. Copy all programs from the Internal Memory of the GC-8 to a Memory Card(M-256D/E)

2. The ROM's in the R-880 need to be changed to version 2.00. (This should be done by a qualified service technician only.) Remove the screws on the top, back, sides and bottom of the R-880 holding the rack ears and the top and bottom panel. Remove the top and bottom panel. Turn the unit over and you will see 2 ROM's idendified R-880A and R-880B. Remove these ROM's and replace them with the version 2.00 ROM's. Reassemble the R-880. When you power up the R-880/GC-8, all of the Internal programs will have been erased. Using the "Copy" function on the Memory page, copy the Internal Programs from your Memory card back into the GC-8.

Please replace the following pages in your owners manual:

- Title Page and Table of Contents (the first three pages)
- Page 7/8
- Page 9/10
- Page 21/22
- Page 25/26
- Page 27/28
- Page 29/30
- Page 31/32
- Page 33/34
- Page 51/52
- Page 63/64
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- Page 115/116
- Page 117/118
- Page 119/120
- Page 121/122

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for the

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by Paul D. Lehrman

technical assistance: Paul M. Young
graphic assistance: Chris Gill
production supervision: Nancy Kewin
production assistance: Tommy Gear

RolandCorp US
7200 Dominion Circle
Los Angeles, CA 90040-3647
(213) 685-5141

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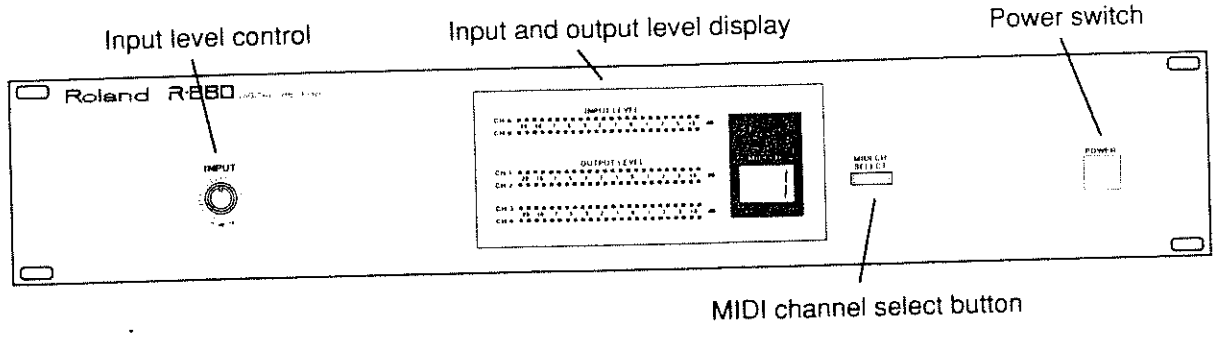
Chapter 1
Introduction

Physical description

The Roland R-880 Digital Reverb is a 19" rack-mountable (2 Units high) device. The GC-8 Graphic Controller is designed to sit on a table or desk top. The two units are connected by a single cable, with connectors that resemble MIDI connectors, but that have six pins and lock when inserted into the appropriate jacks.

The R-880 and the GC-8 are mutually dependent on each other: each does very little without the other. The R-880 serves as the "mainframe" of the system, while the GC–8 is the "control panel".

The R-880

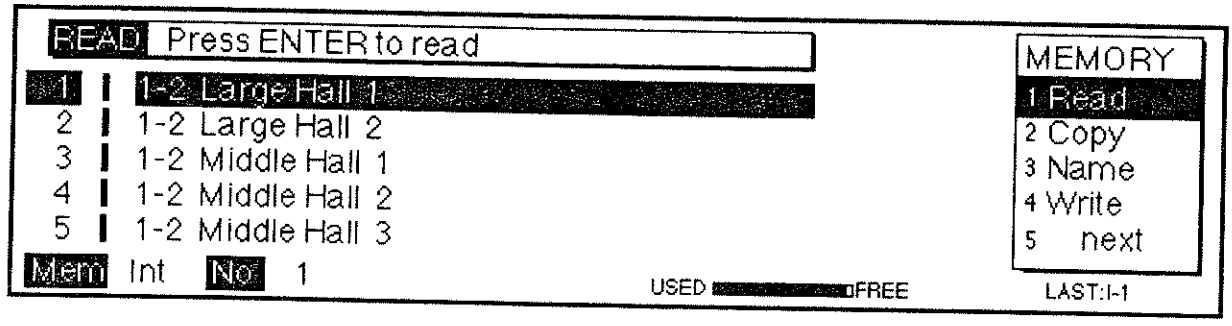


The R-880 has few controls. On the far left is an input level control and on the far right is a power switch. To the left of the power switch is a button labelled **MIDI CH SELECT**. This is used when the unit is part of a MIDI system, or when one GC-8 controller is used with several R-880s. (See Chapters 4 and 11 for more information.) A 7-segment LED showing the current MIDI channel number is to the left of this button.

In the center of the R-880's front panel is an LED display for input and output levels. The displays show the signal level for each of the two analog inputs (*not* the digital inputs), and the four outputs.

8) The **MIDI CH** LED on the R-880 should read "1". If it doesn't, press the **MIDI CH SELECT** button next to it repeatedly until it reads "1".

9) Turn on the power switch on the GC-8. An initial graphic appears, and then after a few seconds, you will get this display:

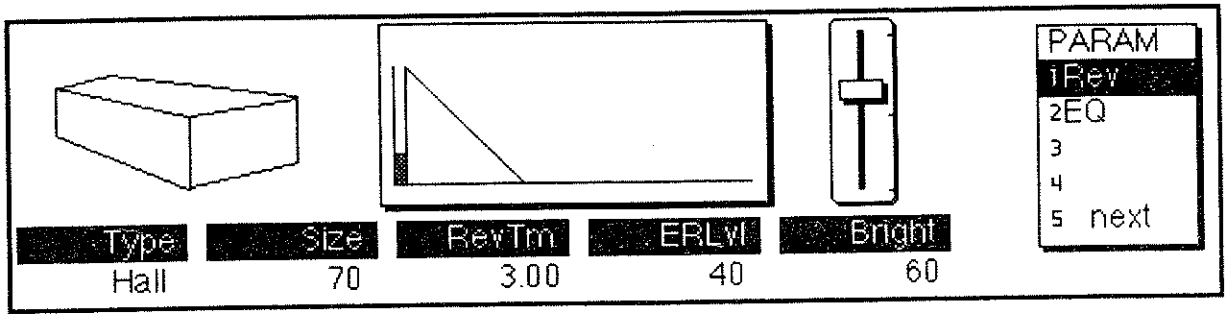


10) Send some audio to the inputs of the R-880, and adjust the **INPUT LEVEL** control until you get a reasonable level showing on the LED display. If at the maximum position the signal level is too low, either boost the signal coming from your source, or if you are using the unbalanced inputs, switch the **UNIGAIN** button on the rear of the R-880 to "-20" (if it isn't already).

11) Turning the first **EDIT KNOB** on the GC-8 will toggle between Internal and Card memories. Turning the second **EDIT KNOB** will scroll the preset locations within those memories. Set the first knob to "Int" and set the second so that the line "1 1-2 Large Hall 1" is highlighted (in reverse type). Press the **ENTER** key.

12) After a few seconds, the preset "1-2 Large Hall 1" will be loaded into memory. Send some audio into the system, and listen to the effects of the preset at the outputs.

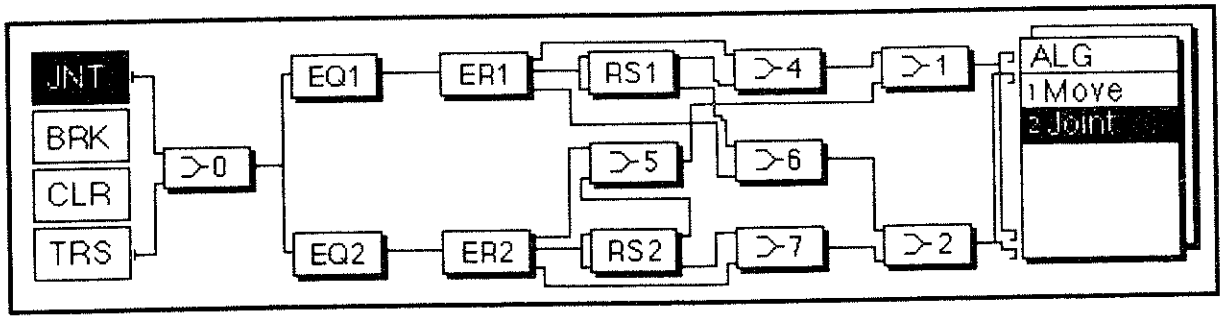
13) On the GC-8, hold down the **SHIFT** key and press the **FUNC2** button. This takes you into the Parameter mode. Turn the third **EDIT KNOB**, and look at the display immediately above it. The "RevTm" (Reverb Time) parameter will change as you turn the knob, as will the diagram on the display, showing the reverb decay slope. The sound will also change, as the reverb decay increases or decreases.



14) Turning the fourth **EDIT KNOB** changes the "ERLvl" parameter, and causes the thermometer-like portion of the display to rise. This parameter is the proportion of early reflections in the reverb sound. Changing it will have different effects depending on the nature of the signal, but generally speaking it will cause the sound to thicken at the beginning of the reverb, giving it a more "explosive" quality.

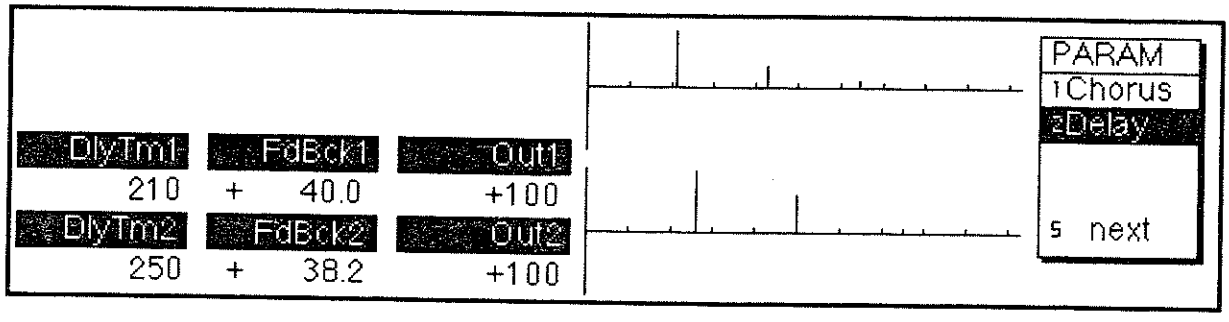
15) Turning the fifth **EDIT KNOB** changes the "Bright" parameter, and moves the fader-like object on the display. As this parameter increases, the high frequencies in the reverb sound increase, making the reverb brighter, or more metallic.

16) Press the **SHIFT** key and the **FUNC1** button. The parameters disappear, and the screen shows a block diagram of various modules, connected together in various ways, known as the "desktop". (If it doesn't, press the **DOWN-ARROW** key and then **FUNC2**.) The modules marked "EQ" are parametric equalizers; those marked "ER" are early-reflection generators, and those marked "RS" are reverb units. The other modules are mixers. Study this screen as you listen to the sound, and go back to the parameter screen if you like, by holding the **SHIFT** button and pressing **FUNC2**. Press **SHIFT-FUNC1** to return to this screen.



17) Now press **SHIFT-FUNC5**. The list of presets returns. Turn **EDIT KNOB 1** to "Card" and turn **EDIT KNOB 2** until "23 2-2 Stereo Delay" is selected. Press **ENTER** and the preset is loaded into memory in a few seconds.

18) Go to the Parameter page by pressing **SHIFT-FUNC2**. Press **FUNC5** until you see the menu consisting of "Chorus" and "Delay", and press **FUNC2**. Turn the first **EDIT KNOB**. The "DlyTm1" (delay time) parameter changes, and the first vertical line on the graph on the right side of the display moves accordingly. The repetition of the audio signal in the left channel (output channel 1) will get shorter or longer as you turn the knob. Turn **EDIT KNOB 2**, and the "FdBck1" (feedback level) parameter changes, causing the decay of the repeats over time, and the subsequent vertical lines on the display, to change. Turn **EDIT KNOB 3**, and the overall level of the repeats changes. Turn the knob past zero to negative numbers, and the repeats increase in level, but now the phase is reversed for each repeat.



19) All of these parameters have been adjusted on Delay module 1. To adjust the parameters on Delay module 2 (which is assigned to the right outputs, channels 2 and 4), use the **DOWN CURSOR** key. Now "DlyTm2" is highlighted, and the knobs will operate on all of the parameters in the same horizontal row as DlyTm2: "FdBck2" and "Out2".

20) Press **SHIFT-FUNC1** and see how this algorithm is designed.

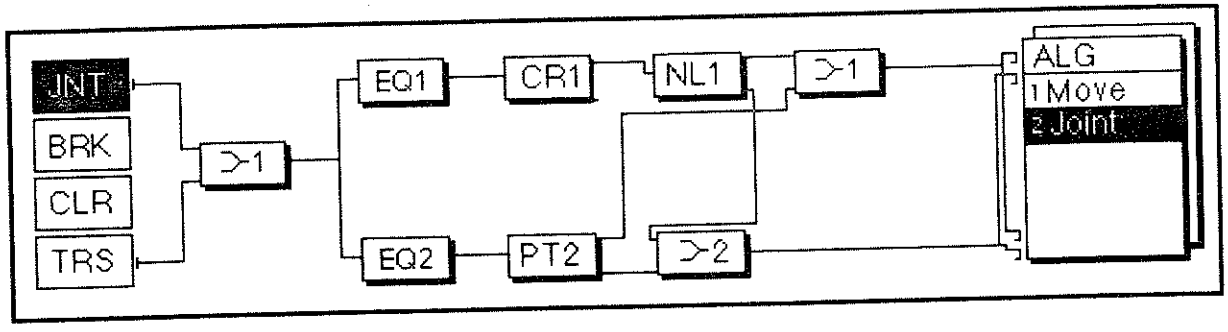
Although this demonstration has covered just about every function of the R-880, it has still been just an introductory look at the system's capabilities. Please read the next section to understand the philosophy behind the design of the R-880 before going on to the chapters that follow.

What the R-880 is all about

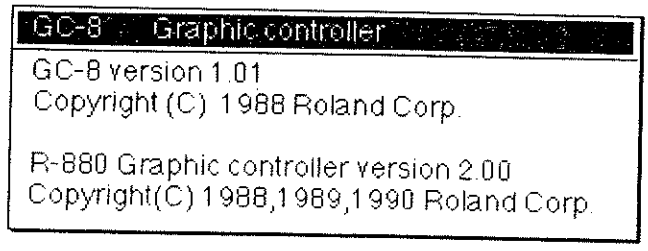
The R-880 Digital Reverb and GC-8 Graphic Controller are the first in a new generation of signal-processing devices for the professional recording, production, and post-production studio. They incorporate highest-quality sound-processing circuitry, along with state-of-the-art processing algorithms, and fully digital inputs and outputs, in a highly flexible environment controlled with an intuitive graphic interface.

The R-880 is a multi-mode device, providing a wide variety of effects in an almost unlimited range of configurations. The processing modules — reverb, early reflections, gates, delays, chorus, equalizers, and compressors — exist purely in software, and so can be configured in any imaginable order or combination. Signals from the two input channels can be processed independently, and their paths split and combined through any modules on their way to the four independent outputs. Because there is no analog/digital conversion between the modules, there is never any degradation of the sound quality no matter how many modules are in use or how complex the signal paths are.

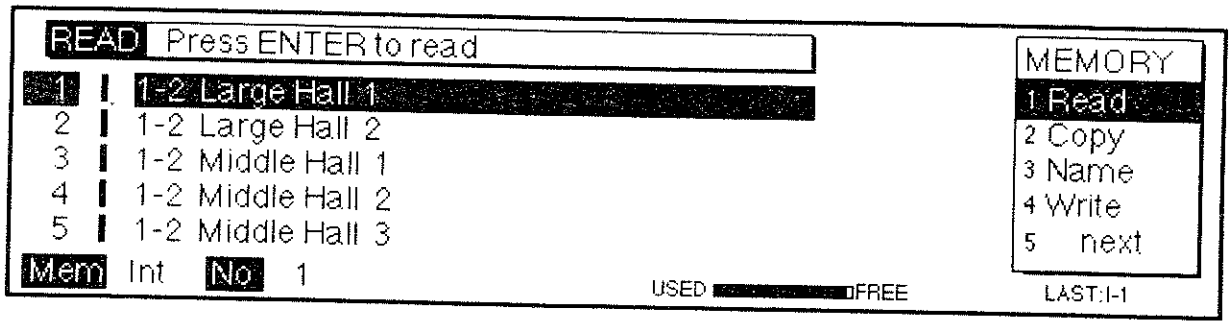
The GC-8's LCD display is designed to make the task of arranging the modules and signal paths, as well as configuring the modules themselves, simple and intuitive, using a "desktop" metaphor that will be familiar to users of modern personal computers. It uses graphics to show the processing algorithms from the most direct to the most complex, and to show all of the parameters of an individual module simultaneously. Menus are used by the software to move around the operating system.



Now turn on the power switch on the GC-8. (This switch can be left on permantly, once you have made a sucessful startup.) The display shows an initial graphic, and then scrolls to display the message that communications have been established with the R-880, and that these communications are taking place on MIDI channel 1. After a few seconds, it blanks out, and is replaced by the Memory page. (If it is not, then hold the **SHIFT** button down and press **FUNC5**, and then let go of the **SHIFT** button and press **FUNC1**.)



At this point you might want to adjust the Contrast Control knob on the back of the GC-8 with a small screwdriver (slot or Phillips-head) for maximum clarity of the display.

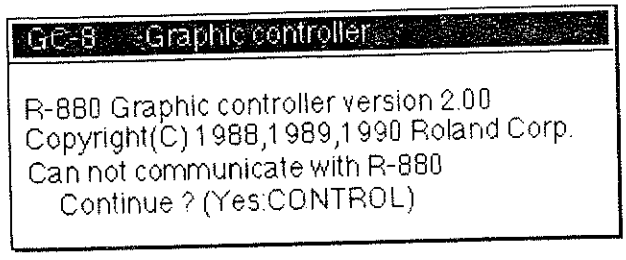


Problems

If the system ROM card is not inserted properly, the message "Insert the system card" will flash on the display. Check to see the card is inserted with the label up, and if necessary remove it and re-insert it to establish contact.

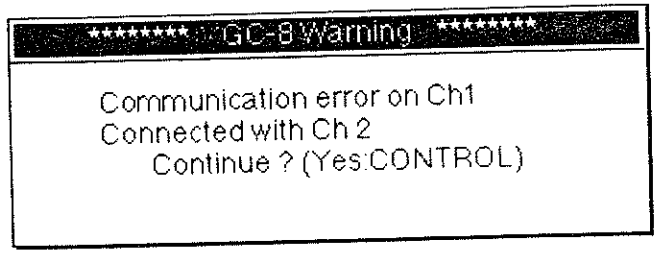
If by mistake you have inserted the wrong card (for example, a RAM card), the message "No System Program" will flash. Remove the card and insert the system ROM card.

The System ROM card can be removed as soon as the clock message appears — at that point the operating system is loaded and the card is no longer necessary.



If for some reason the GC-8 cannot communicate with the R-880, you will get a message saying so. If you press **CONTROL**, you will be able to operate the GC-8, but nothing you do will affect the R-880. To alleviate this problem, turn the power off on both units, check your connections carefully, and turn the power back on.

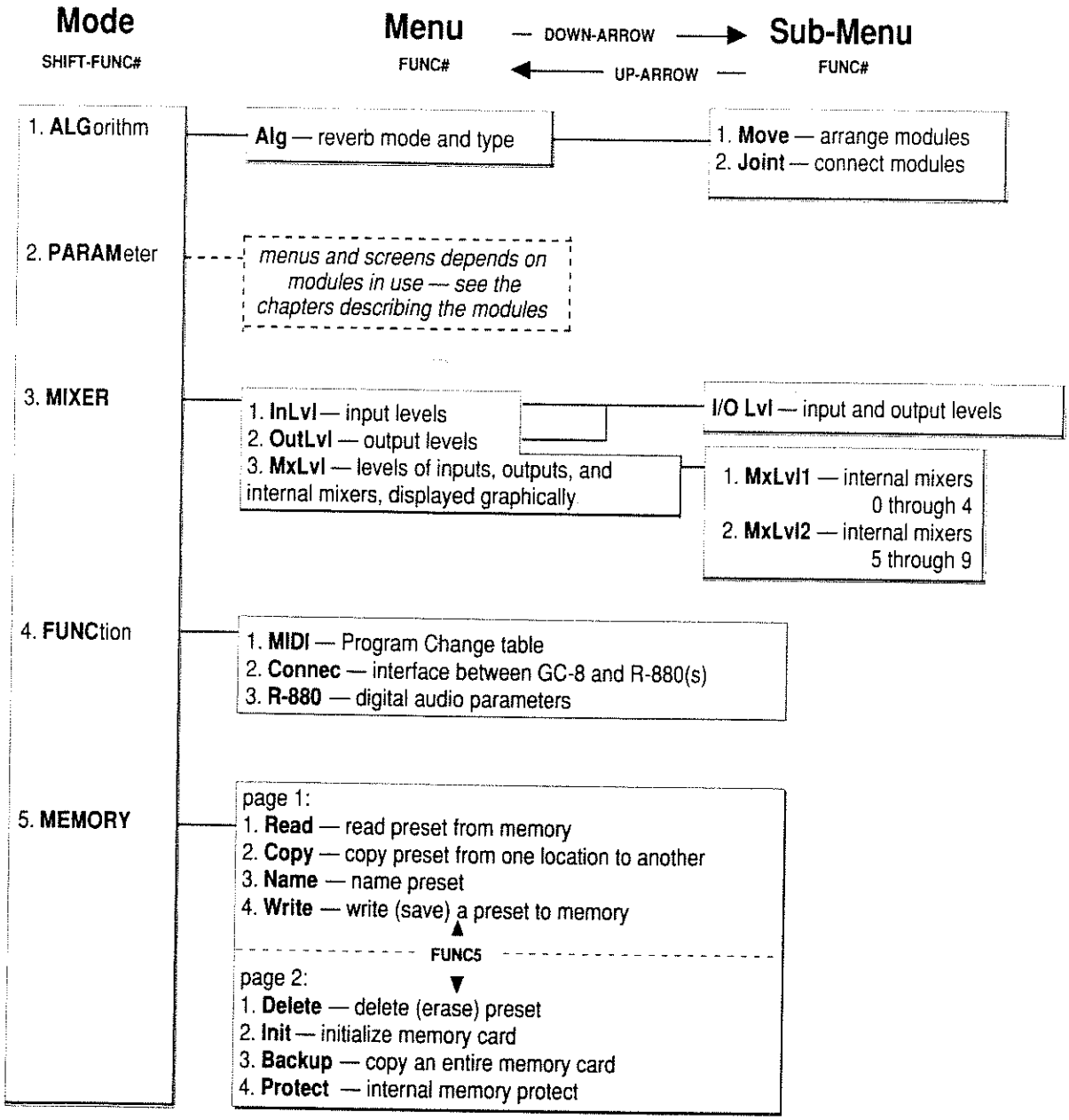
If you should happen to change MIDI channels on the R-880 while the system is running, then the next time the GC-8 tries to transmit information to the R-880, the system will stall, and after a few seconds you will get this message:



4) **FUNC**tions: for miscellaneous functions such as setting up the MIDI program change table, connecting multiple R-880s to a single GC-8, checking the status of the R-880's digital inputs, and setting the internal clock.

5) **MEMORY**: for handling the transfer of programs in and out of the internal and card memories. Also for naming programs, erasing programs, copying individual programs or whole cards, and initializing cards.

This is the organization of the modes and menus:

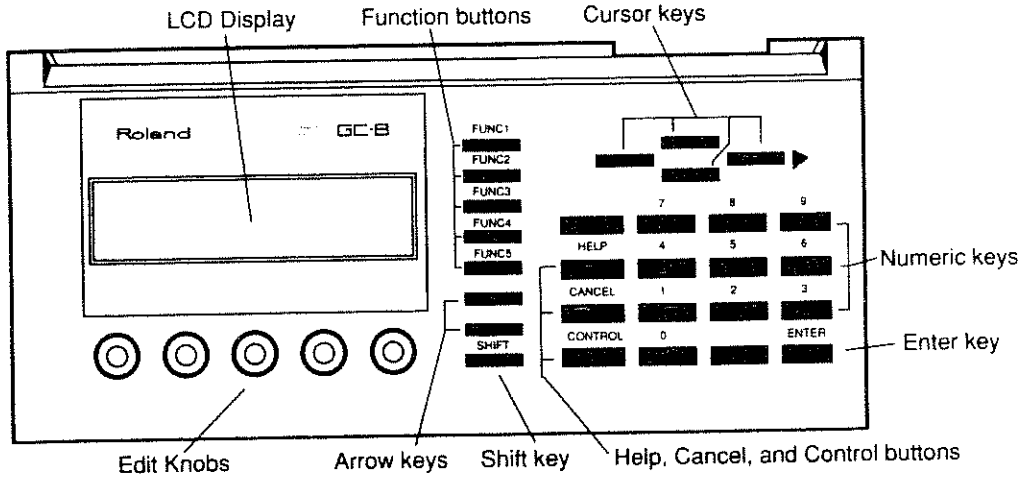


The Screens

The screens show the type of data chosen by the menus, and allow that data to be adjusted. Each item on a menu has its own screen.

All of the screens have a cursor, although the form the cursor takes varies from screen to screen. The screen cursor is moved with the four **CURSOR** keys, and in some of the screens in the Memory mode, it is moved with the **EDIT KNOB**s as well. When a cursor is on an item, it generally appears "reversed".

Adjustments of individual items on the screens are made with the **EDIT KNOB**s, and also with the **NUMERIC** keys and **ENTER** key. Generally speaking, each **EDIT KNOB** adjusts the parameter on the screen directly above it, so in many screens this allows you to edit five parameters at once. The **NUMERIC** keys adjust only the parameter that the cursor is currently on. The **CONTROL**, **CANCEL**, and **HELP** keys also have special functions in some screens.



The GC-8 can "remember" which screens have been called up, and when you leave a mode and come back to it later, the last screen you were looking at while in that mode is usually the one that appears.

Some Examples

To see these concepts at work, let's poke around the R-880's operating system a bit. We won't permanently change anything, so don't worry about saving your work yet.

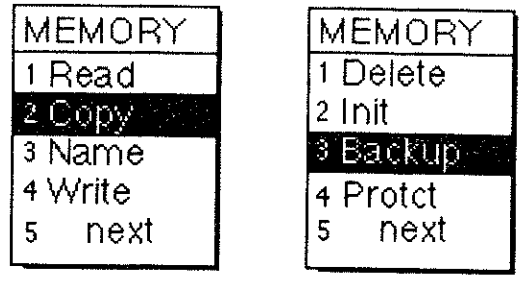
1) The Memory Mode

Press and hold the **SHIFT** button. You will see a menu listing all the modes on top of the current menu. To get to the memory mode, while holding the **SHIFT** button, press **FUNC5**. (If you have followed the procedure above, this will actually not change anything, but if you haven't, this will get you back to the right place.) Let go of the **SHIFT** button. On the right side of the screen is the Memory menu. The menu cursor should be on the word "Read" — if it isn't, press **FUNC1**. (If the word "Read" isn't on the menu, press **FUNC5** [" next"] and then **FUNC1**.)

Now you should be seeing a screen listing various programs. Turn the first **EDIT KNOB** clockwise, and then counter-clockwise, while looking at the first item in the last line of text on the screen. It changes from "Mem Int" to "Mem Card". This means that this knob toggles the Program Memory that is being addressed between the Internal memory and the memory on the card in the GC-8's slot.

Turn the second **EDIT KNOB**. You will see the screen cursor move up and down among the programs. When you reach the top or bottom of the screen, the screen takes you to the next page of programs. There are 99 program positions in each of the two memories, although not all of them have programs in them. When you scroll past position 99, you go back to the first page of programs. You can also move from one program to the next using the **UP-** and **DOWN-CURSOR** keys (not to be confused with the **UP-** and **DOWN-ARROW** keys), and from one page to the next with the **LEFT-** and **RIGHT-CURSOR** keys.

Now move among the various items on the Memory menu by pressing the **FUNC** buttons. Notice how the screens change. When you press **FUNC5** (" next") the menu itself changes — it still says "Memory" on top, so this is a second page of the Memory menu. To get back to the first page, press **FUNC5** again.



Let's go back to the Read screen and load in a program. Press **FUNC1**, then turn the first **EDIT KNOB** until the display says "Int", and the second **EDIT KNOB** until it says "2" The screen cursor should be on "Large Hall 2" Press **ENTER**, and the top of the display changes to "Now reading.. " and in a few seconds to "Completed"

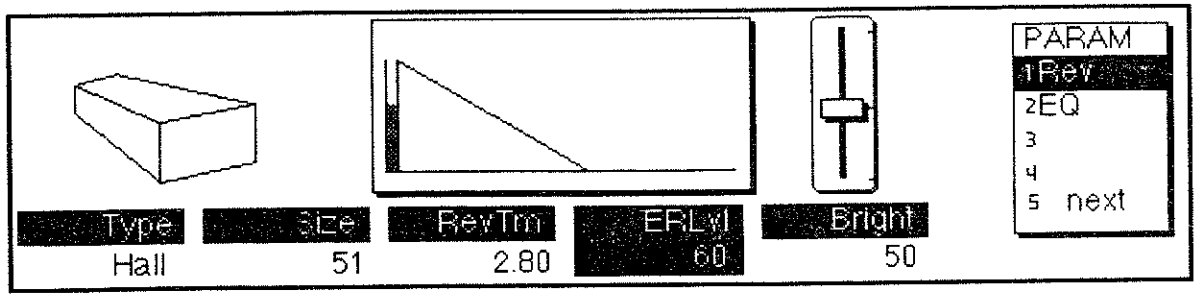
2) The Algorithm Mode

Let's look at how this program is constructed. Press **SHIFT-FUNC1** to get into the Algorithm Mode. This mode has a menu and a sub-menu. Make sure you are on the main ("upper") menu by pressing the **UP-ARROW** (not the **UP-CURSOR**) key. This screen shows the reverb algorithms that are in use, and how their inputs and outputs are arranged. Now press **DOWN-ARROW** and then **FUNC2**. This is the algorithm "desktop", which shows which modules are in use and how they are connected to each other. For now, don't try to change anything on either of these screens (if you do, the display will ask you if you really mean it, in which case press **CANCEL**).

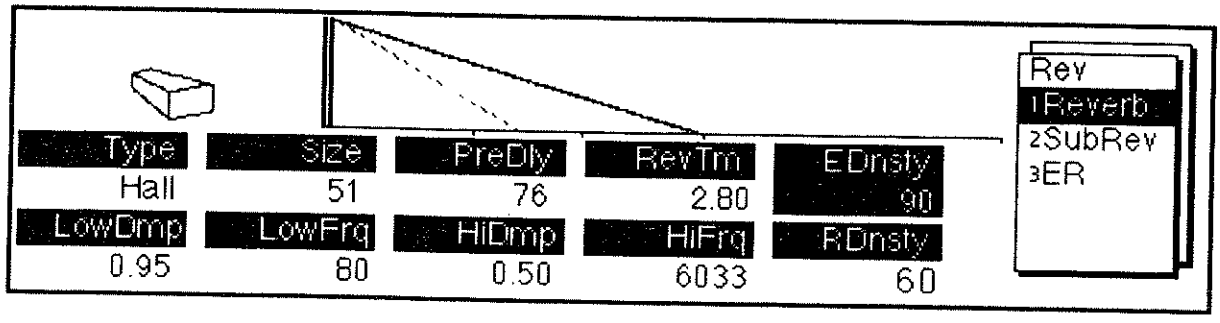
3) The Parameter Mode

Now let's look at the individual items that make up this program. Press **SHIFT-FUNC2** to get into the **PARAM**eter mode. The Parameter Menu always has two pages, which are switched between by pressing **FUNC5** (" next"). In this particular program, the parameter menu has two entries on the first page and two on the second. Each entry represents a processing module. Press the **FUNC** button that corresponds to the module you would like to examine.

From the menu page showing "1 Rev" and "2 EQ" as its choices, press **FUNC1**. Now you will see a graphic display of the main reverb parameters. Turn the **EDIT KNOB** under the word "RevTM"(the third one), and watch the numbers change as you turn. As you turn the knob, you will see the graphic showing reverb time re-draw itself as well. If you have audio going through the system, listen to the effects the change in reverb time has on the audio. Also play with the Type, Size, ERLvl and Bright **EDIT KNOBS.**



What you have just done is to use the "Macro" feature to change the settings of the reverb.The pre-delay, densitys, hi and low frequency damping, and early reflection patterns are all decided for you. You can change the settings on a much finer level by using the "Manual" editing mode. You get to this mode from the Rev screen by pressing the **DOWN-ARROW** key. This "sub-screen" of the Reverb module gives you individual control over all of the reverb parameters. Note that there are three sub-screens, Reverb, SubRev, and ER to control all parameters in the manual mode.



Note that unlike the Memory Read screen, which showed only one line of data for the **EDIT KNOB**s to work on, there are now several lines of data that can be adjusted with the **EDIT KNOB**s. Notice that one parameter is highlighted with reversed type — this is the current cursor position. Turning any **EDIT KNOB** will change the parameter located above the **EDIT KNOB** that is in *the same horizontal line as the current location of the cursor.*

For example, if the cursor is on "PreDly" in the "Upper" line, the turning **EDIT KNOB 1** will adjust the Type of reverb, and turning **EDIT KNOB 2** will adjust the Size of the space. Turning **EDIT KNOB 3**, of course, will adjust the Pre Delay, and **EDIT KNOBS 4** and **5** will adjust Reverb Time and Early Density.If the cursor is on "HiDmp" in the lower line, **EDIT KNOB 2** controls the Low Frequency of the Low Damping, **EDIT KNOB 1** controls the Low damping factor, **EDIT KNOB 4** controls the High frequency of Hi Damping, and **EDIT KNOB 5** controls Reverb Density.

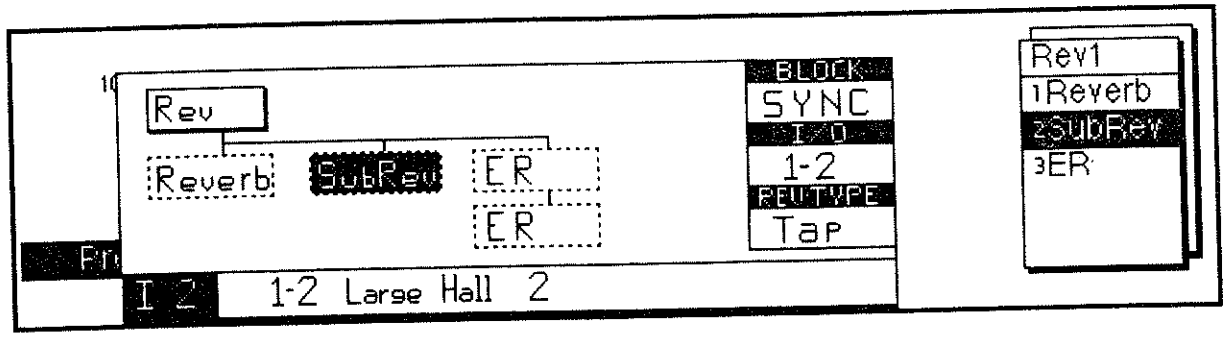
The cursor is moved around by using the **CURSOR** keys. The action of these keys "wraps": if you move the cursor off the top of the screen it immediately reappears at the bottom, and if you move it off the left, it reappears at the right. It also repeats, like a key in a word processor, if you hold it down.

Besides the **EDIT KNOB**s, you can also adjust the parameter that the cursor is on with the **NUMERIC** keys. You can type in any numerical value, and when you press **ENTER**, that value is entered. Use the minus sign for negative numbers, and the decimal point for decimals. If the number you type is out of the range of that parameter, the parameter will be assigned the maximum value of its range (or the minimum, if you typed in a negative number).

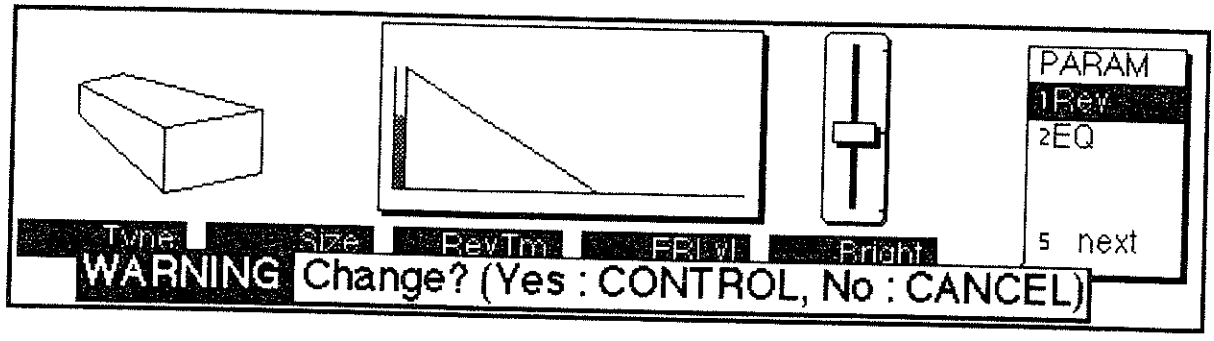
Note that when you adjust a parameter value with the edit knob, that value takes effect immediately, but if you adjust a parameter with the **NUMERIC** keypad, the value does not take effect until you press **ENTER**.

While we are on this screen, we will demonstrate the other keys. Pressing **CONTROL** brings up the graph from the original EQ screen, but it now shows the values of the equalizer as it has been set in the Manual mode sub-screen. Pressing **CONTROL** again takes you back to the edit screen.

Pressing **HELP** calls up a screen known as a "Menu Map". This screen shows the condition of the various screens within the current algorithm. It will be discussed in more detail in Chapter 6. Press **HELP** again and the screen goes back to where it was.



Go back to the main Reverb screen by pressing **UP-ARROW**. Now turn one of the edit knobs. You will see a message across the bottom of the screen that says "WARNING Change? (Yes:CONTROL, No:CANCEL)". What this message is telling you is that by changing a parameter on this screen, you have invoked the Macro function, and the settings on the Manual sub-screen will be restored to their default values. Since you have no doubt gone to a lot of trouble to get those Manual settings just right, you do not want this to happen, so you should press **CANCEL**.. The message goes away, and your most recent action is cancelled.



We have now covered every button and control on the GC-8, and seen examples of many of the menus and screens. We have also touched on all of the important operating principles of the system. The following chapters will discuss the functions of the R-880/GC-8 and the menus and screens in detail.

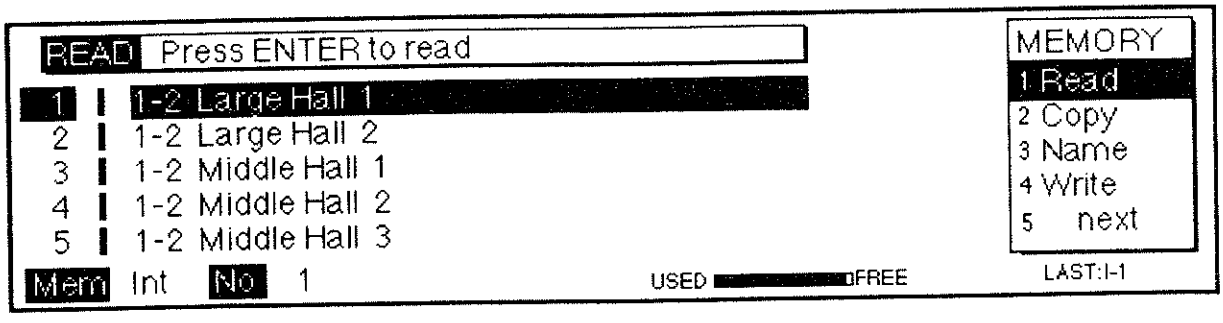
Chapter 4
Using Programs

A Program is a description of everything that happens to the signal as it passes through the R-880. It includes which processing modules are in use, the settings of their individual parameters, how they are connected to each other, and how they are connected to the inputs and outputs.

Programs are stored in the R-880's internal Random Access Memory (RAM); on the System Software ROM card that comes with the R-880 and GC-8; and on external RAM cards that are available from Roland. The programs on the System ROM card are not erasable or replaceable, but programs stored anywhere else are. Loading and storing programs is done in the Memory Mode, as is naming programs, copying programs from one location to another, and other memory-related chores.

Loading a Program ("Read")

To load a program, enter the Memory Mode by pressing **SHIFT-FUNC5**. The first item on the menu should be "Read" (if it isn't, press **FUNC5**). Select it by pressing **FUNC1**.



Choose the memory that you want to load the program in from — Internal or Card — by turning the first **EDIT KNOB**. The display shows your choice right above the knob as "Mem Int" or "Mem Card". Now scroll through the programs in that memory using **EDIT KNOB 2**. You can also scroll through the programs using the **CURSOR** keys: the **UP** and **DOWN** keys move the cursor up and down on the screen, while the **LEFT** and **RIGHT** keys change pages (there are five programs on each page).

If a memory location has a program in it, there will be a thick vertical line to the immediate right of the number of the memory location on the screen, followed by the name of the program. (However, it is possible, as we shall see in a moment, to have a program with no name.) If there is no vertical line, the memory location is empty, and no data can be read from it.

The message at the top of the display says "Press ENTER to read". (If you select a memory number that has no program in it, the message will change to "No Parameter to read".) Pressing **ENTER** loads that program into the R-880. The display changes for a few seconds to "Now reading ...", and then to "Completed". The program is now ready for use.

If you make a mistake, and Read in the wrong program, you can press **CANCEL**, and the system will revert to the program that was in use previously. You can cancel a Read while the new program is being read, or even after it has been read, as long as no changes have been made to the program, and as long as you have not left the Read screen by pressing any of the other **FUNC** buttons. (If you try, you will get the message "Can not cancel".)

Another way to Read a program, if you know its number, is to enter the number using the **NUMERIC** keys, and then press **ENTER**. The bottom line of the display will flash as you are doing this. If you call up an empty program, the display will tell you so, and no reading will take place. If you make a mistake — say you typed "6" when you wanted "7" — you can press **CANCEL**, or you can keep entering numbers. The last two digits you enter will always be the ones displayed and used. For example, if you type 12 and you wanted 34, you can just enter "3" and "4" after the "1" and "2", and the screen will show "34". (Leading zeroes are allowed, e.g. "07".)

Note that if you do any editing on a program, and then Read in a new one, the edited version of the old program *will be lost* unless you have specifically saved it.

Saving a Program ("Write")

Before saving a program, you must turn off the Internal Memory Protect. To do this, first choose "next" from the **MEMORY** menu (**FUNC 5**),then choose "Protect". Turn any of the **EDIT KNOBs** counterclockwise so the display shows the switch to off.

The procedure for saving a program is similar: choose "Write" from the **MEMORY** menu (**FUNC4**), select an internal or card memory location (with the Edit Knobs, **CURSOR** keys, or **NUMERIC** keys), and press **ENTER**. The program which is currently active — i.e., the last program loaded in, plus any modifications that have been made to it — will be saved in the designated memory location. On the screen, the memory location saved to will display a thick vertical line next to the location number and the name of the current program, showing that there is data in that location.

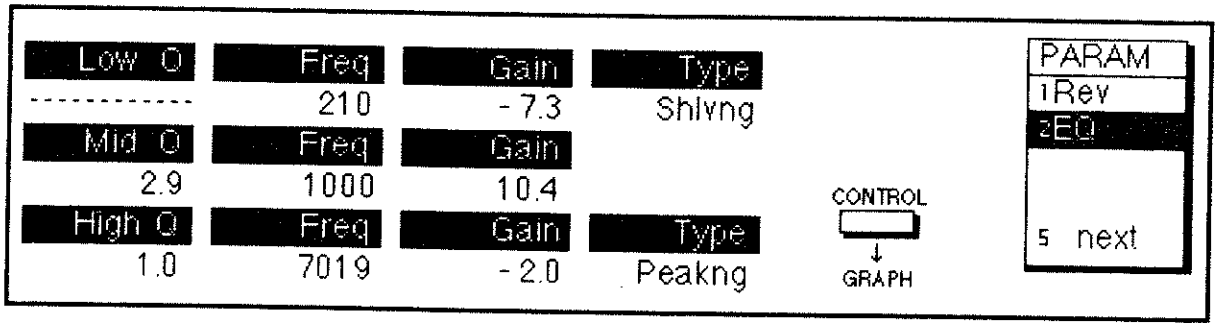
On the other hand, if you make a mistake and write a program to the wrong location, you can immediately cancel the write operation by pressing **CANCEL**. The memory location will now revert to the program that it previously held (or if it was empty, it will revert to being empty). Like a Read, you can cancel a Write while the program is being saved, or even after it has been saved, as long as no changes have been made to it after it has been saved, and as long as you have not left the Write screen.

(Note also that if you accidentally erase one of the Internal programs that was provided with the unit and wish to get it back, the parameters for all of the factory programs — both Internal and on the System Card — are detailed in the provided booklet "GC-8 Preset Data for R-880", and you can reconstruct the program by entering those parameters in by hand.)

You don't necessarily have to save a newly-created or edit program before you power down — although it is a good idea to do so. Under normal circumstances, whenever you turn on the R-880 and GC-8, the last program that was active before you turned off the power will still be active, even if that program has not been saved in any memory location.

Hearing your new algorithm: a short detour

You probably want to hear what this sounds like. However, changes made in the algorithm mode are not "real time". The operating system requires you to transmit your new algorithm to the R-880. This is done when you leave the algorithm mode. Press **SHIFT-FUNC2**. When the "Transmit?" warning appears, press **CONTROL** to put the new algorithm into effect. Press **FUNC2** ("EQ") to access the EQ parameters page.



Even though the equalizer is now connected, it actually isn't doing anything because its default setting is "flat". Therefore, in order to hear it have an effect on the sound, you have to change its settings. This will be discussed more in Chapter 6, but try this now: move the cursor to one of the three EQ bands and adjust the parameters with the **EDIT KNOBs** while listening to the effects on the audio signal.

Connection techniques

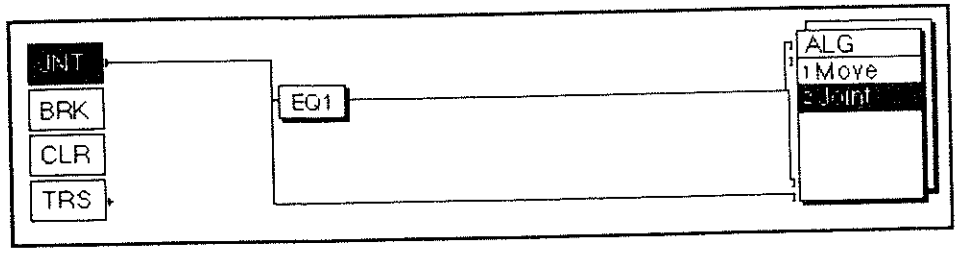
You can only connect an output to an input — the software will not let you connect two inputs together or two outputs together (except of course the *R-880* input can be connected to a module input). You do not, however, have to connect outputs and inputs in any particular order: you can start by selecting an input and then connect it to an output, or do it the other way around. Neither is it absolutely necessary for the signal path to go across the screen consistently from left to right; you can have the output from a module on the right side of the screen connected to the input of a module on the left. However, the display will be easier to follow if outputs are located to the left of the inputs they feed.

Note that while *you* select the start and end points for a connection, *the software* determines how the connection gets displayed. You may not always agree that the way the software draws the connection is the best or clearest way to draw it, but there is not much you can do about it, and of course, it doesn't really matter.

If a module is connected on the Joint screen and is then moved out of the active area on the Move screen, all of its connections will be severed. If you change its position *without* removing it from the active area, its connections will stay intact, and will simply move around with the module.

If you make a mistake and choose a starting point for a connection that you don't want, you can cancel it in one of two ways. You can press **CONTROL** twice, which will land the cursor back on Input **A** and de-select it. Or, you can put the cursor back on the starting point and press **ENTER**. The cursor will stay where it is, but will return to its normal size. (The fact that every time you enter the connection mode the cursor goes back to input **A** can be helpful if you ever lose track of the cursor: you can always find it on input **A** by pressing **CONTROL** twice).

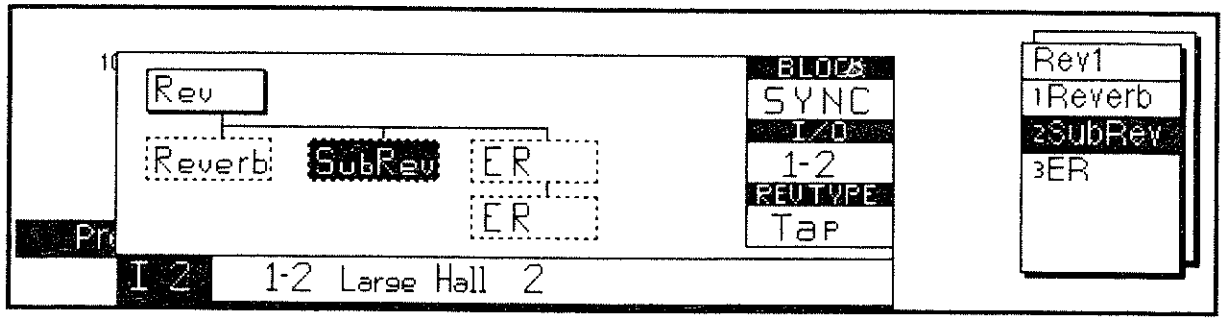
Like in a conventional audio patch bay, you can split, or "mult" any of the outputs of a module (or the R-880 inputs) to more than one destination. The procedure is the same as setting up the first connection: choose "JNT" from the function mode, move the cursor to a starting point, press **ENTER**, move the cursor to the ending point, and press **ENTER** again. You can split off as many signals from a single



The Menu Map

Moving around among the various screens and sub-screens when adjusting parameters can be confusing, and a feature known as the "Menu Map" has been included to help keep track of what has been done.

From any Reverb or EQ Parameter screen, press **HELP**. The Menu Map appears.



The Menu Map shows you all of the screens associated with the Reverb module you are working in, referred to as "Block" 1 or 2; their relationship to each other; and which screen you are currently working on (by highlighting it). At the right side are shown which Reverb Type is in use, and what Reverb Configuration is. (If they are in Tandem mode, the word "Sync" will appear in the "BLOCK" window. See Chapter 8 for more on this.)

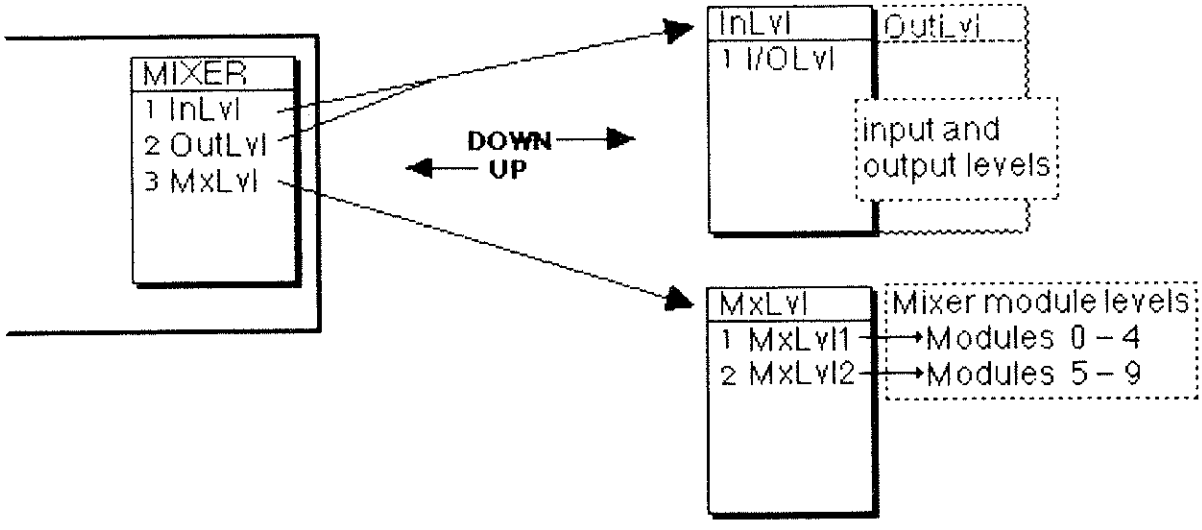
The Menu Map also shows which lower (Manual) screens associated with the current Reverb module have had parameters changed on them, and which have not. Lower screens that have been edited are shown with solid lines. For example, if you have been working on the upper (Macro) screen for REV1, then press **HELP**, the lower Reverb boxes — corresponding to the Manual Reverb screens — will be dotted. If you press **DOWN-ARROW** and start making adjustments to the lower Reverb screen, then the next time you press **HELP**, the lower Reverb box will be solid as well.

To leave the Menu Map, press **HELP** again, or any of the active **FUNC** or **ARROW** keys.

Chapter 7
Mixers

Controlling signal levels as they pass through the R-880 is the job of the Mixers. There are permanent mixers at all of the inputs and all of the outputs, and other Mixer modules can be placed anywhere in an algorithm. The input and output mixers are always active; Mixer modules must be placed onto the desktop and connected into an algorithm to become active. The R-880/GC-8 software provides ten discrete Mixer modules, each one with two inputs and one output.

The Mixer settings are accessed by calling up the Mixer mode: **SHIFT–FUNC3**. The first two screens of the Mixer menu — Input levels ("InLvl") and Output levels ("OutLvl") — have a common sub-screen, which shows both input and output levels. The third screen, "MxLvl", shows input, output, and Mixer-module levels, and it has two sub-screens showing only the Mixer-module levels



Input Mixers

From the **MIXER** menu, select "InLvl" — **FUNC1**. The top of the screen is a "live" display that shows the the input and output levels of the R-880, exactly corresponding to the LED display on the R-880's front panel (it shows incoming analog audio, but not incoming digital audio).

The Gate screens have three parameters:

Thrsh — is the Threshold Level and which the Gate will open and close. It is set in steps from -34.5dB to +7.5dB. If this is set at -34.5dB, the Gate will open at the slightest input signal, and will stay open for most, if not all, of the reverb decay. If it is set to 7.5dB, it will open only at the highest input signal levels — levels that cause the meters on the R-880 front panel to go well into the red. Generally speaking, the higher the Threshold Level, the more sudden and dramatic the opening and closing of the gate will be.

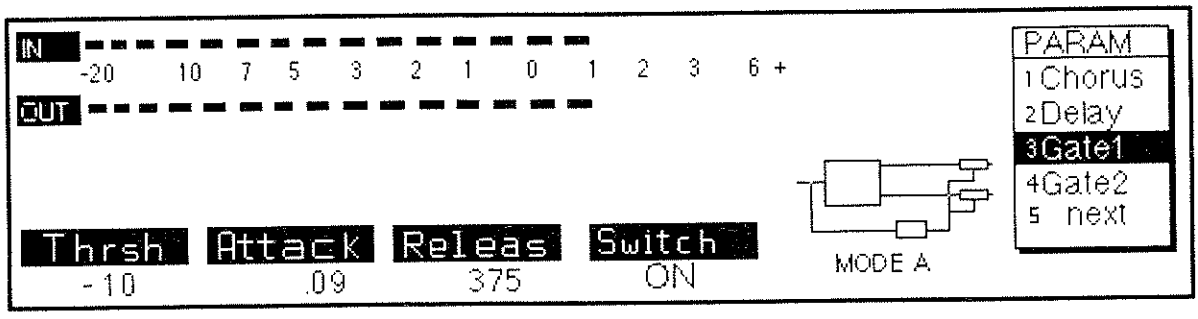
Attack — is the amount of time the signal has to be above the Threshold Level before the Gate will open. It is expressed in milliseconds from 0.7ms to 75.0ms. If this parameter is set 0.7ms , the Gate opens as soon as the signal reaches the Threshold Level. If it is set to 75.0ms, the signal has to be maintained above the Threshold Level for a period of time before the Gate will open.

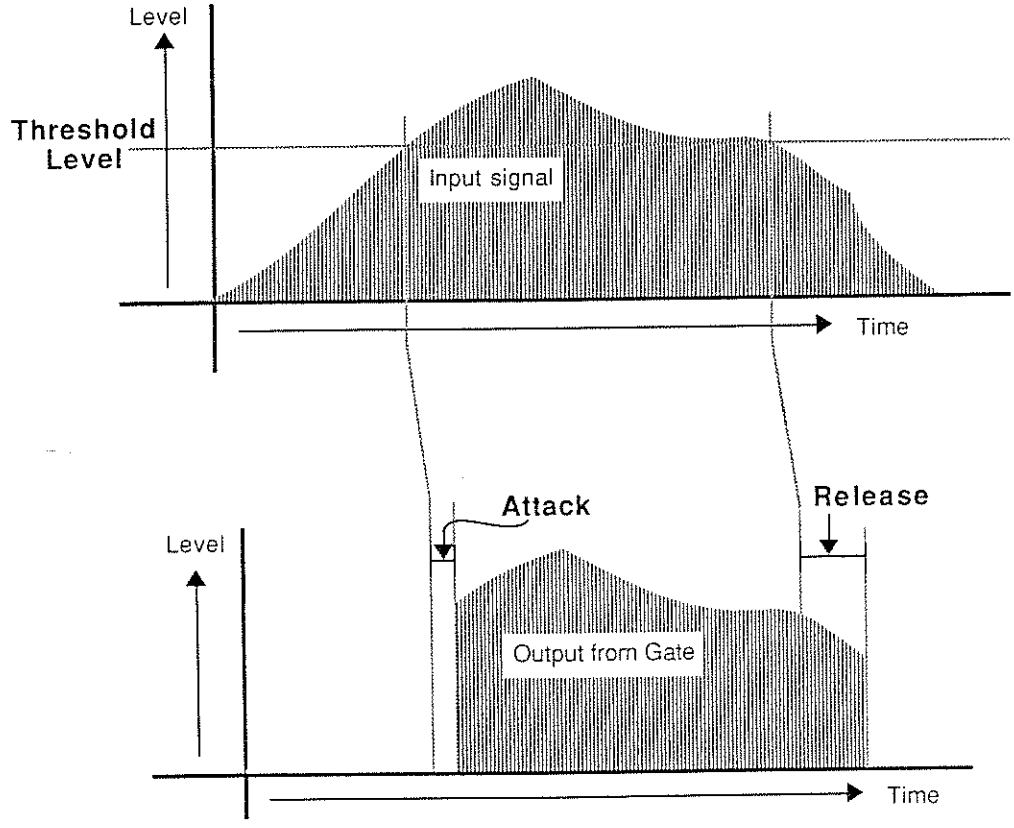
Releas — is the amount of time the Gate takes to close after the input signal drops below the Threshold Level. It is also expressed in milliseconds from 12ms to 1200ms. At 12ms, the Gate shuts down quickly when the level drops, with a setting of 1200ms giving a smooth decay of the reverb envelope.

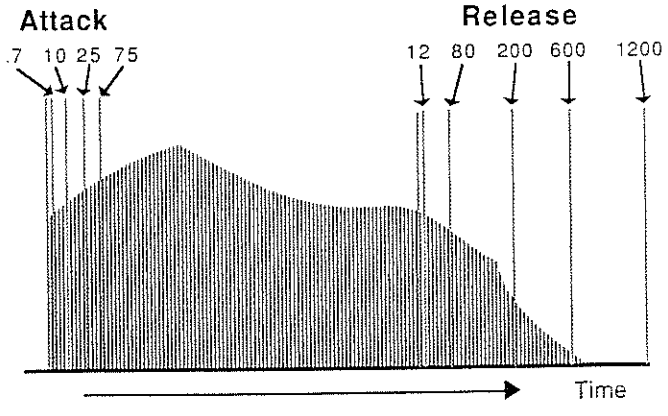
A secondary effect of this parameter is that it determines what happens if the input signal drops down below the Threshold Level and then comes back up again. If the setting is long, then the Gate will stay open, and will not re-trigger when the signal level comes back up. If it is short, then the Gate will close when the signal drops and open again when the level comes back up.

Switch — The Gate can be turned on and off from this screen with the **EDIT KNOB 4** . Turning it off does not disconnect or remove the Gate from the algorithm, it merely treats it as if it is always open.

The graphic display on the Gate screen shows both input and output lenels allowing you to monitor the input signal and the effect of the Gate on the signal.

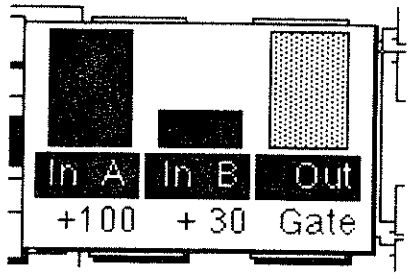

IN
-20 10 7 5 3 2 1 0 1 2 3 6 +
OUT
Thrsh
-10
Attack
.09
Releas
375
Switch
ON
MODE A
PARAM
1 Chorus
2 Delay
3 Gate1
4 Gate2
5 next


Level
Threshold Level
Input signal
Time
Attack
Release
Level
Output from Gate
Time


Attack
.7 10 25 75
Release
12 80 200 600 1200
Time

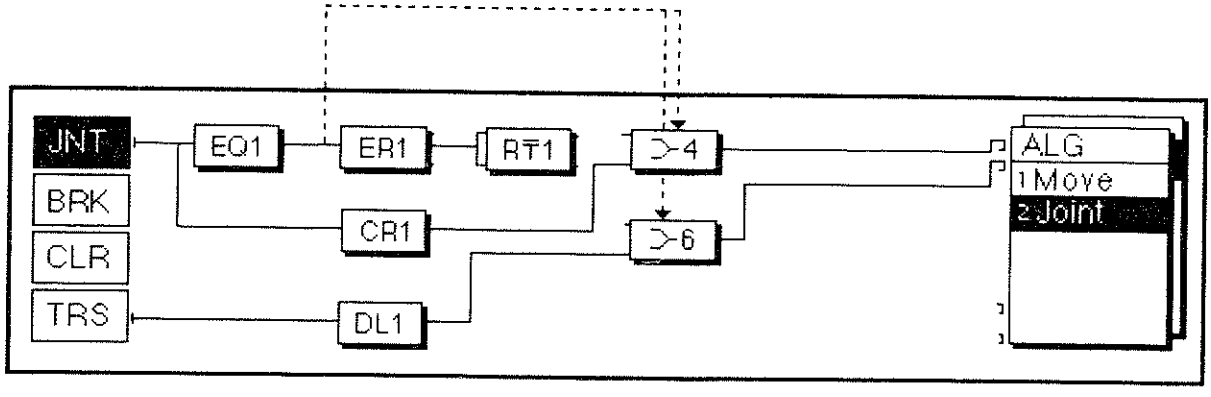
Gates, mixers, and modules

Whenever a Gate is set up on the Reverb Algorithm page, it automatically places and connects two Mixer modules. These Mixers are now under the control of the Gate — Mixers 4 and 6 are controlled by Gate 1, Mixers 5 and 7 by Gate 2. Their output levels cannot be set by you, but instead are automatically controlled by the Gate function. Their input levels, however, are still under user control.



Initially, each Mixer module is connected so that its inputs receive a signal from one of the outputs of its associated reverb module, and also (if the reverb module is in "Reverb" mode) one of its ER module's outputs. However, you can rewire the Mixers to affect other signals: a Mixer doesn't have to be *wired* to a reverb module to be *affected* by that module's Gate. You can connect other modules — Delay, Chorus, even another reverb module — to these Mixers, or even direct signal from the R-880's inputs. Signals passing through these Mixers, regardless of their origin, would then be subject to the action of the Gate.

Gates vs. compressors and mixers



The Gate functions and the Compressor modules (discussed in the next chapter) use the same processing code in the R-880, and therefore cannot be used at the same time. When Gate 1 is turned on, Compressor 1 is not available from the desktop, and when Gate 2 is turned on, Compressor 2 is not available.

In addition, when Gate 1 is operating in Mode B, Mixer module 8 is not available, and when Gate 2 is operating in Mode B, Mixer module 9 is not available.

Chapter 9
Processing Modules

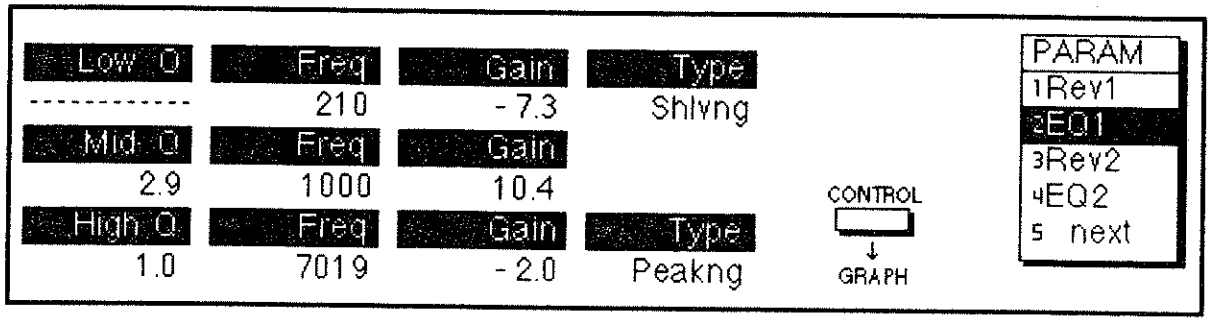
As we've already seen, the R-880 offers a host of processing options in addition to reverb. These options can be used in conjunction with reverb, by themselves, or in combination with each other. Each processing option is in the form of a module, and there are two of each module, e.g., EQ1 and EQ2. Like modules can be used on two different signal paths, or together on the same signal, or on different parts of a signal path, or in any other conceivable combination.

Equalizers

The Equalizer (EQ) modules are automatically placed in the active area of the desktop when a new reverb algorithm or configuration is selected. They are connected to the R–880 inputs, or just behind the first mixer if the configuration calls for a single input ("1–2" or "1–4"). Of course, they don't have to stay there, and using the Move and Joint screens they can be placed anywhere along any of the signal paths.

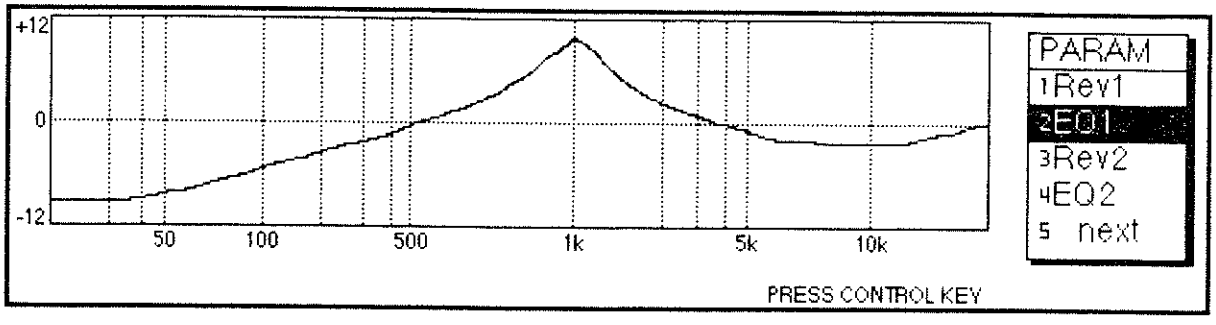
The EQ modules are fully parametric 3-band equalizers. They have two screens, a Macro and a Manual. To look at one of the EQ screens, press **SHIFT–FUNC2** to get into Parameter Mode, and then **FUNC2**.

The EQ parameter screen presents control of the three bands on the screen. The low band is on the top row. The parameters from left to right are Low Q, Freg, Gain, and Type. The Mid-band is in the next row below the low-band, and the High-band is on the bottom row. The characteristic of the High and Low bands can be set to shelving or peaking. The frequency of each band is adjustable in 1-Hz increments, and the Q of each band (in peaking mode) can be adjusted from 0.3 to 9.9 in increments of 0.1.



The range of the three bands in the parameter screen is
Low = 20-2000 Hz
Mid = 200-8000 Hz
High = 1500-20000 Hz

There is no graph visible on the EQ screen, but there is one available. Press **CONTROL**, and a graph accurately showing the curve produced by the settings on the parameter screen will be displayed. To get back to the parameter screen, press **CONTROL** again.

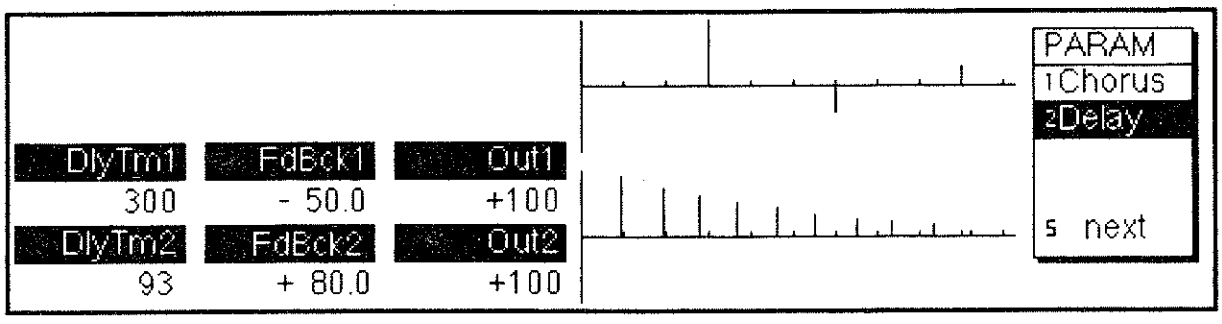


Remember that if the Reverb modules are in Tandem mode, there will be only one set of EQ screens, and the same settings will be used for *both* modules, regardless of how they are set up in the algorithm.

Delays

The two Delay modules ("DL 1" and "DL 2") are simple digital delays, with one input and one output each. They are adjusted on a single Parameter screen, which is accessed from the second page of the Parameter Menu (**SHIFT-FUNC2**, then **FUNC5** ["next"], then **FUNC2**). Parameters for both modules will be on this screen, even if one or both of them is not in use.

The first row of parameters is for DL 1, and the second is for DL 2. All parameters are adjustable with both the **EDIT KNOB**s and the **NUMERIC** keypad.



DlyTM — the delay time of the module, in milliseconds, from 0 to 400.

FdBack — the level of signal fed back from the delay module's output to its input, from 0 to 100%. Negative values mean that the first repeat is flipped 180° out of phase from the source, and each subsequent repeat is 180° out of phase from the previous one.

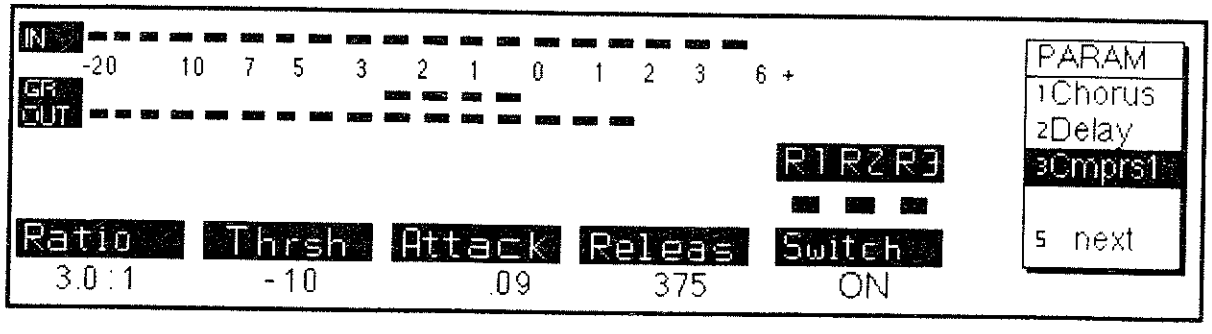
Out — the outgoing signal level of the delay module, from 0 to 100%. Negative values mean the outgoing signal is 180° out of phase with the incoming signal.

Compressors

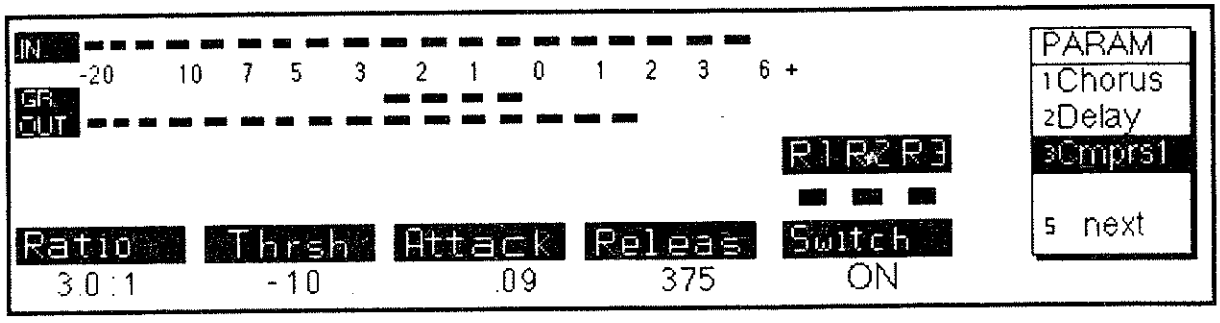
The Compressor modules (CP 1 and CP 2 on the desktop, Cmprs1 and Cmprs2 [**FUNC3** and **FUNC4**] on the second page of the Parameter menu) are used to modify the dynamics of an audio signal, by introducing varying levels of amplification or attenuation based on the input level of the signal. They are very sophisticated devices and, like everything else on the R-880, work entirely in the digital domain.

Like Delays and Chorus, Compressor modules are not automatically included in any reverb algorithm, but must be placed on the desktop manually. Unlike the other modules, however, the Compressor parameter screens are not available from the Parameter Menu unless a Compressor module is actually *in* the active area and connected. The two Compressors are completely independent of each other, and each has its own screen.

The Compressor modules have two screens, a Macro and a Manual. To look at a Compressor , go to the **MEMORY** Mode and load "2-2 Compression Reverb " from the system card. Press **SHIFT-FUNC2** to get into parameter mode, then **FUNC5** (next), and **FUNC3** (Comprs1).



The upper (Macro) Compressor screen shows a single compressor with the following controls:



Ratio — sets the amount of compression from 1.0:1 to 33.0:1

Thrsh — determines the level to affect compression. This is adjustable in steps from -39.0dB to +6.0dB.

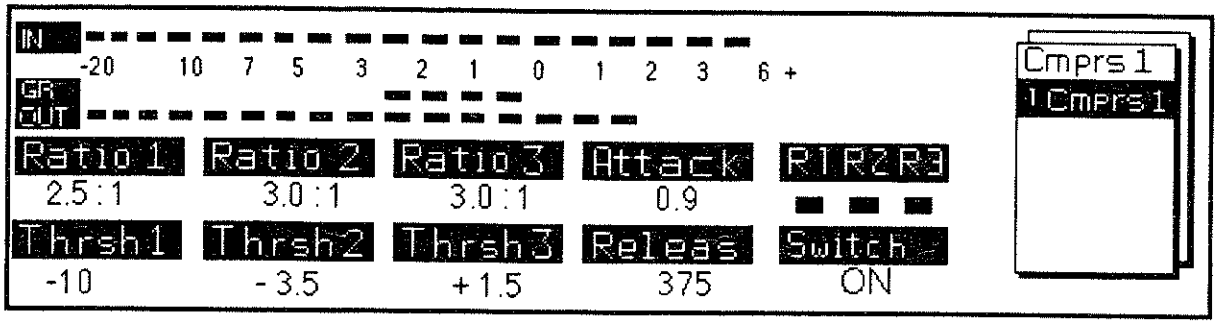
Attack — determines how quickly the compressor takes over when the signal initally excedds a Threshold Level. This is adjustable in steps from 0.7ms to 75.0ms

Releas — determines how fast the Compressor returns to no gain reduction after moving below the Threshold level. Setting longer release times will reduce pumping and breathing of the Compressor.

Switch — turns the Compressor on and off-just like the Gates

The graphic display also shows both the **IN**put and **OUT**put levels of the Compressor as well as the Gain Reduction **(GR)** . The last item on the display is labelled **"R1 R2 R3"**. This shows the action of the Compressor. The Compressor is actually three units in one. On the Macro screen, only one Ratio needs to be set to give "Soft-Knee" compression. Pressing the **DOWN-ARROW** takes us to the Manual page. All controls are the same, but now you have independent control over the Ratio and Threshold of each of the three sections of the Compressor.

On the Manual page, the Ratio and Threshold values have the same values as on the Macro page. However, there are some differences. The three seqments are cascaded, so the Threshold Level of segment 2 (**Thrsh2**) does not refer to the input signal of the R-880, but instead refers to segment 1's output signal.



When the R-880 input signal rises above Threshold Level 1 (**Thrsh1**), any further increase in gain is modified by **Ratio1**.

When the signal leaves segment 1, it then goes to segment 2. If the new level exceeds Threshold Level 2 (**Thrsh2**), it is subject to the compression ratio determined by **Ratio2**. When it leaves segment 2, if its level exceeds **Thrsh3**, it becomes subject to the compression of **Ratio3**.

The values that you set for the Threshold Levels of the three segments must be in the correct order — that is, the setting of **Thrsh3** must be higher than **Thrsh2**, which must be higher than **Thrsh1**. The software handles this automatically, and will not let you enter an incorrect setting for any of these levels.

The Attack and Release functions apply to all of the segments simultaneously, so a signal breaching the Threshold level of segment 1 will take the same amount of time to be "grabbed" by the compressor as a signal breaching the Threshold Level of segment 2.

As mentioned in the previous chapter, Reverb Gates and Compressors use the same part of the R-880's processor, and so if Gate 1 is in use, Compressor 1 will not be available, and if Gate 2 is in use, Compressor 2 will not be available. In addition, like the Gates, using the Compressor modules reduces the number of mixers available: if Compressor 1 is put in the active area, Mixer 8 is no longer available, and if Compressor 2 is active, Mixer 9 is not available.

Chapter 10
Programming Techniques — a sample

As you have seen so far, the GC-8 and R-880 are enormously complex and offer a huge range of processing possibilities. Rather than try to list all of them, which would be an impossible task, this chapter will instead walk you through the design of a number of programs, some of which are provided with the system and some of which you will have to set up. These programs are specially chosen to show you various interesting and unusual ways to use the system, and should help to point the way for you to discover your own.

Factory Programs

The algorithms and screens for the following programs can be found in the book "GC-8 Preset Data for R-880" that accompanied your system.

Int 18 — 1-2 Delay & Reverb 1

This is a complex program that uses two Reverb Stack modules and two Delay modules to create a wide, spacey stereo image from a merged input. The Reverb modules are set similarly, but are not in Tandem mode.

The Joint screen shows that the inputs are mixed, then split off to the two EQs, and also to two Delay modules. The EQs (which are set flat) feed the ER modules in the normal way, but then the ERs are split in an unusual fashion. The left output of ER1 goes to the left outputs of the R-880 (through some mixers), and the right output similarly goes to the R-880's right outputs, but the middle ("direct") output feeds only one side of Reverb module 1, not both. The other input to the Reverb module comes from DL1.

Reverb module 2 is wired in a complementary way: EQ2 feeds ER2, whose outputs go to the R-880's left and right outputs, as well as to one side of the Reverb module. The other side of the Reverb module is fed from DL2.

The Reverbs differ from each other mostly in terms of their tonal characteristics and how the Early Reflections modules are set up. ER1 uses four quick, loud reflections with a short pre-delay (edited individually on the ER sub-screen), while ER2 uses eight reflections, starting a little later, and diminishing gradually over a longer period of time. Although the Reverbs are the same subtype and have the same RT60, Reverb 1 is a thinner sound (lower Density) with a slightly damped high end, while Reverb 2 is thicker, and has more pronounced high-end damping.

The delay time on DL2 is about 1/10 of second, providing a fairly tight cluster, while DL1 is almost twice as long, providing a more pronounced repetition. Both modules use the same moderate amount of feedback.

The mixers are arranged to generate a true stereo image from the single (merged) source. The early reflections and reverb generated on the same side as the mixer predominate over those coming from the other side — e.g., the *left* input of Mixer 1, which contains the left output of ER1 and the left output of Reverb 1, and goes to the R-880's left outputs, is set more than twice as high as the *right* input of Mixer 1, which contains the left outputs of ER2 and Reverb 2.

Int 19 — 2-2 Delay & Reverb 2

This is a somewhat similar program to *Int 18*, but it has true stereo inputs. The input channels are kept substantially separate through the entire signal chain, thereby maintaining the stereo identity of the signal. Because it is not *generating* a stereo image, there is no reason for the Reverb modules to be different from each other, and so they are in Tandem mode.

The direct outputs from each Early Reflection module are mult-ed, going both to the associated Reverb module and to the opposite Reverb module. The signal going to the opposite side is delayed once for 102 ms (both delays are set the same, with no feedback), and attenuated. The outputs of the Reverb modules also cross to their opposite outputs, similar to the previous program, and the crossed signals are similarly mixed relatively low.

Int 17 — 2–2 Chorus and reverb 2

This program uses two relatively small Hall Reverb modules in Tandem, whose outputs are passed through Chorus modules for a bit of a "swimming" effect. The Choruses are very slow, with a small depth setting, but they are set 60 degrees out of phase to keep the sound moving.

The program has stereo inputs, and the mixers are set up so that the integrity of the channels is substantially maintained.

You might want to experiment with exaggerating the effect by increasing the Choruses' Depth and/or Rate.

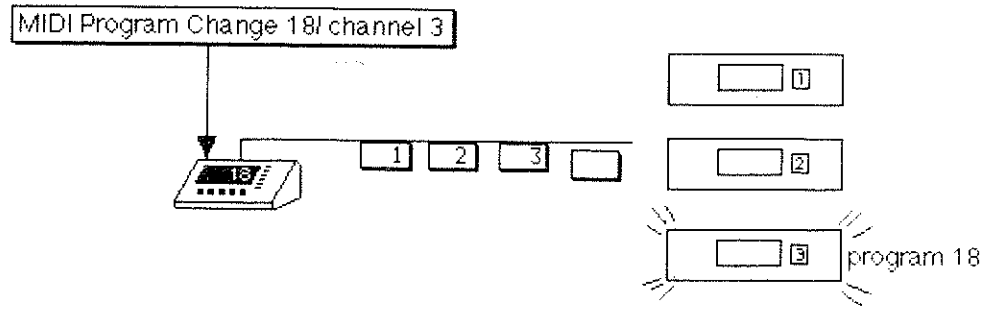
Programs for you to try

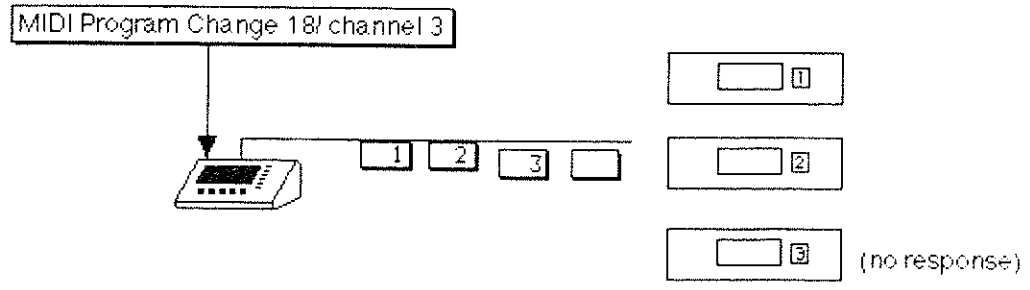
The illustrations accompanying these program descriptions show only the screens relevant to the current program. If a screen is not shown, you needn't set any parameters on it. Note that EQ screens showing "Low, Mid, Hi", should have Parameters set to the following: Low-Freq-500-Shelving, Mid-Q-1.0-Freq-1000, High-Freq-2000-Shelving.

When you have disconnected an R-880, that unit will no longer respond to program or parameter changes from the GC-8 (although it will still process the audio signals just fine). Therefore, if you want to work on only one R-880, disconnect all of the others.

Re-connecting an R-880 to the RRC bus is the same procedure: select the R-880 you wish to connect with the **CURSOR** keys, and press **CONTROL**.

While all connected R-880s will respond to GC-8 commands, they will not all respond to MIDI Program Change commands *coming into* the GC-8. If the GC-8 receives a Program Change command, *only the R-880 that is on the same channel as the program change will respond to it.* However, for that R-880 to respond, it *must be connected* to the GC-8 on this page. If a MIDI Program Change message is received on a channel that is being used by *any* currently-connected unit, the GC-8 display will change to show the program called up by that Program Change. If there is no unit connected that uses that channel, the GC-8 will not change. (Note that while multiple R-880s on a single GC-8 can be set to run different programs at any one time, they all draw on a common *memory*, and therefore use the same MIDI Program Change Table.)

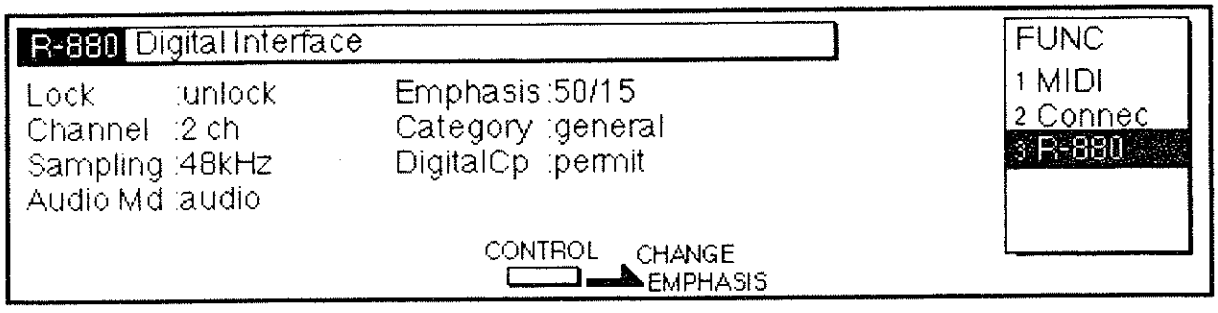




Also note, as discussed in Chapter 7, that you can monitor the inputs and outputs of individual R-880s (if they are connected) from the "InLvl" screen on the Mixer Menu by changing the MIDI channel in the special window on that screen.

Digital Parameters

You can examine the R-880's digital interface parameters (and change one of them) by going to the Function Mode (**SHIFT-FUNC4**) and pressing **FUNC4** — "R-880". You will get the following screen:



The values above are what you will see when there is no signal source connected to the *digital* inputs of the R-880. If there is a digital input signal source, the parameters will automatically change to match those of the input signal.

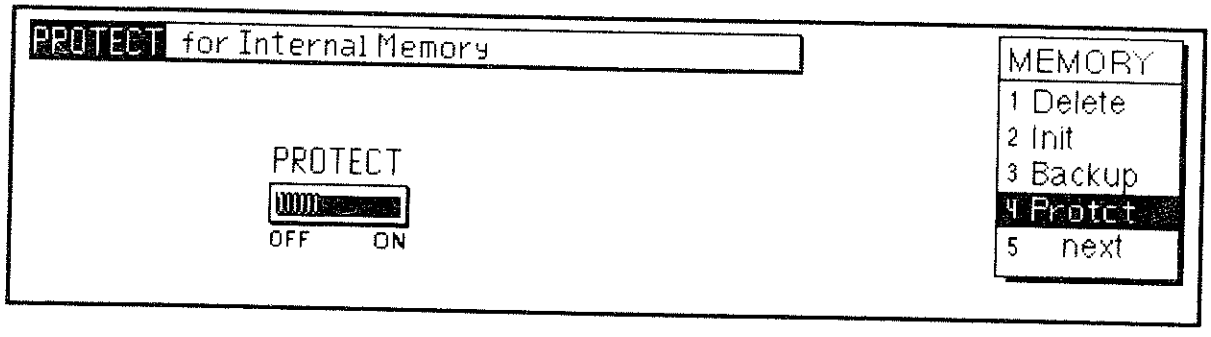
The "Change Emphasis" icon will appear only when there is no digital source. Signal pre-emphasis is normally switched On when the analog inputs are used, in order to maximize the signal-to-noise ratio of the internal analog-to-digital convertors, but it can be switched Off (with the **CONTROL** button) when a digital device that requires no pre-emphasis is connected to the digital outputs.

The parameters, their settings, and what they mean are in this table:

Parameter	explanation	settings
Lock	clock locked to digital input (digital input present)	lock unlock
Channel	input mode	2-channel 4-channel
Sampling	sampling frequency	44.1 kHz 48 kHz
Audio Md	audio mode	audio non-audio
Emphasis	pre-emphasis	none 50/15 µs
Category	data format	general CD PCM DAT
DigitalCp	digital copying	prohibited permitted

PROTECT for Internal Memory

To prevent accidental deleting or overwriting of programs in the Internal Memory, the operating system has a "Protect" function. To access the Protect Page, go to Memory Mode- **SHIFT-FUNC5** - press **FUNC5** (next), then **FUNC4** (Protect). Turning any one of the **EDIT KNOB**s counterclockwise will turn Memory Protect off. Turning one of the **EDIT KNOB**s clockwise will turn Memory Protect on. Whenever you first power on the R-880 and GC-8, Memory Protect will default to "on".



Troubleshooting

What's Wrong with My Unit?

Why don't I hear any signal?

If you can see input signal on the R-880's front panel display, then your inputs are okay. If not, check your input cables, the effects sends on your console, and the switches on the rear panel of the R-880.

If you see input signal and output signal, then check your output cables and the effects returns on your console.

If you see input signal but no output signal, the output mixers in the system software may be off, Go to the "OutLvl" screen **(SHIFT-FUNC3, FUNC2)** and turn up those output mixers you need.

I hear sound, but nothing is showing up on the input level display.

The input level display only displays signals coming in through the *analog* inputs, not the digital inputs. If you are only using the digital inputs, you will see no activity on the input display.

The input signal is too strong, or too weak, or the output signal is too weak.

Reduce the input signal using the **INPUT** level control on the front panel of the R-880. If it is still too strong (and you are using the unbalanced inputs), change the **UNIGAIN** switch on the rear panel to +4 dBm (out). You can strengthen the input signal by setting the **UNIGAIN** switch to -20 (in); if you are using the balanced inputs and the signal is too weak, try the unbalanced inputs (with the switch at -20).

If you need to strengthen the output signal, set the **UNIGAIN** switch to +4, or use the balanced outputs.

The power went off for a moment, and now the system won't respond.

Whenever you turn off *either* the R-880 or the GC-8 and turn them on again, you must make sure the System ROM card is in the GC-8 slot, even if the program you were using came from a RAM card.

I move a control but the sound doesn't change.

There could be several reasons for this. It's possible that you are working on a parameter screen of a non-functioning module, or a module whose output is mixed very low. Parameter screens are *always* available for most of the modules, even if those modules are not being used in the current algorithm. Or, if you are in the Reverb Algorithm or Joint screen, any changes you make will not be effective until you specifically transmit them, which is done in various ways, depending on the screen.

I've been working on a lower screen and I went to the upper screen just to have a look, and now when I go back to the lower screen, all my settings are gone.

If you really have gone to the upper screen just "to have a look", this shouldn't happen. However, if you change *anything* on the upper screen, the lower screen will change to its default values (and the software will warn you) — even if you "undo" the changes you make on the upper screen right away.

I constructed a complex algorithm and just wanted to change the reverb type, but now the algorithm is gone.

Any changes made on the Reverb Algorithm screen — Mode, Type, Configuration, or Gates — will result in the algorithm being totally reconstructed. The best way to keep this from getting in your way is to decide on your Reverb Mode parameters before you do any work on the lower (Move and Joint) screens.

I came up with a new program and saved it in a memory location, but that memory location still has the name of the program that used to be in it.

In the R-880/GC-8 software, you name a program *after* you write it into memory. If the location you have written to was empty, the program will be initially saved with a blank for a name. If there was some other program in there, the old program's name will be retained until you change it (from the Memory Menu, **FUNC3**).

Error Messages

Messages shown at power-up:

Insert the system card (flashing) — There is no card in the card slot of the GC-8. Locate the System ROM card and insert it in the slot.

Load error — The system software cannot be loaded from the System ROM card. Turn off the power, recheck the card for dirt or insertion error, and try again.

No System Program — The card in the slot is not the System ROM card (probably because it's a RAM card). Locate the System ROM card and insert it in the slot.

Check MIDI channel again — More than one R-880 is set to the same MIDI channel, or there is some other confusion. Check all the MIDI channel settings on the R-880s.

Change the memory backup battery — The backup battery in the GC-8 is dead. Call an authorized Roland service center to arrange for replacement.

Target software version is improper — The ROM set in the R-880 is an older version and needs to be upgraded to version 2.00.

Messages shown in the Memory Mode:

Memory full — There is no space for more programs in the memory you've selected (Internal or Card). Delete some programs or use another card.

Card is protected — The memory-protect switch on the card is On. Set it to Off. You will also get this message if you try to write to or initialize the System ROM card.

Card is not ready — The memory card is not inserted or is inserted incorrectly. Insert it or check it.

Card is not initialized — The memory card has not been initialized. Initialize it (**SHIFT-FUNC5, FUNC5 ["next"], FUNC2**).

No parameter to read — The memory location you are trying to read or edit is empty.

Illegal card! Can't initialize — The card in the slot will not work with the GC-8. Use only the correct cards supplied by Roland.

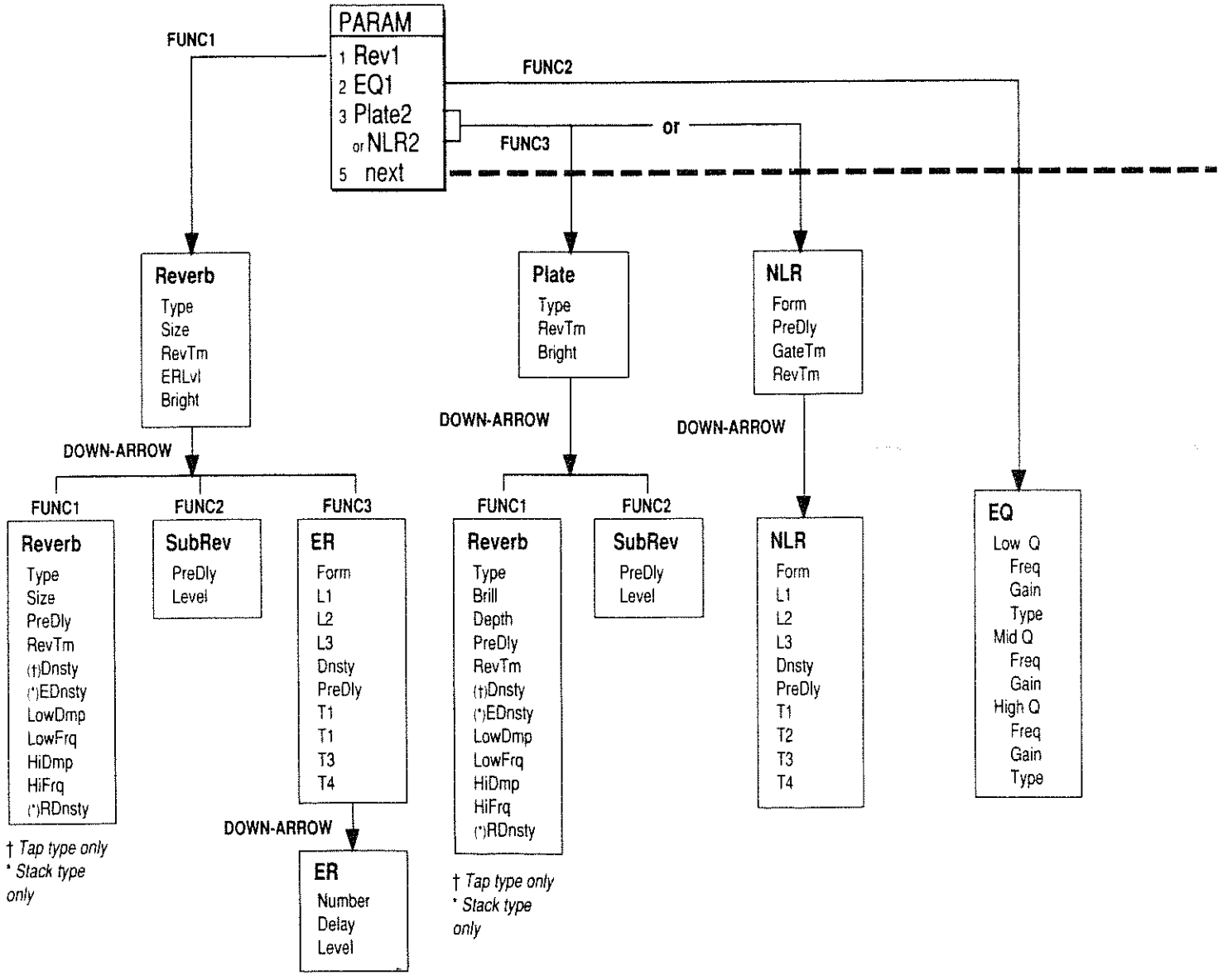
Warning: Insert the card again — There is a problem reading the card. Re-insert it and follow any other instructions that appear.

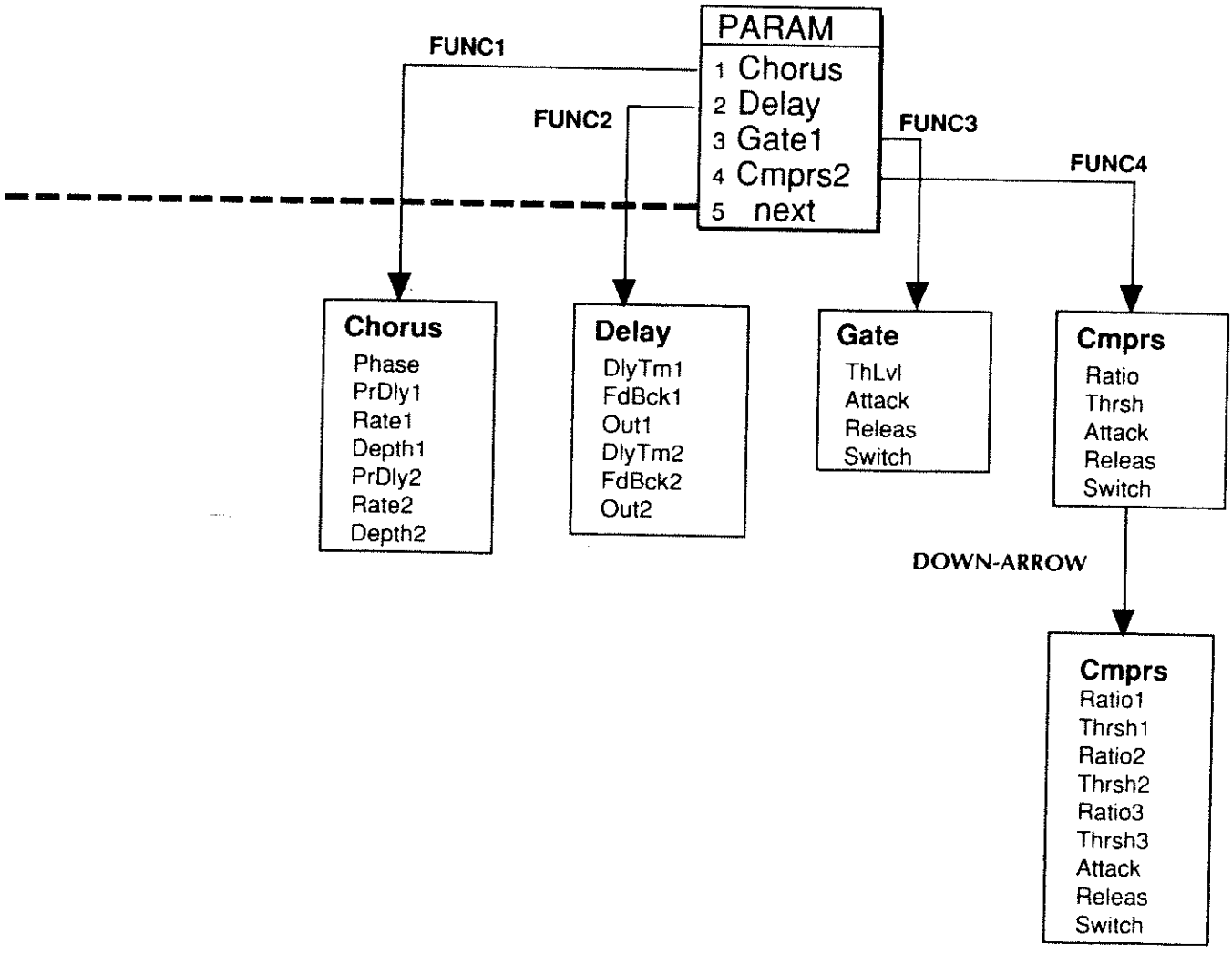
Messages that appear at other times:

Cannot communicate with R-880 — There is a problem between the GC-8 and the R-880. Check the power cable(s) and switches, the RRC cable(s), and the MIDI setting. (This message will also appear if you change the MIDI channel on the R-880 while the system is running. In this case, wait approximately 35 seconds, and the GC-8 will ask you if you want to reset the system MIDI channel. Press **CONTROL** and normal operation will resume.)

Turn off the R-880 and turn on again — The R-880 needs to be reset. Do as it says, without turning off the switch on the GC-8.

Appendix A
Parameter Map




PARAM
1 Chorus
2 Delay
3 Gate1
4 Cmprs2
5 next
FUNC1
FUNC2
FUNC3
FUNC4
Chorus
Phase
PrDly1
Rate1
Depth1
PrDly2
Rate2
Depth2
Delay
DlyTm1
FdBck1
Out1
DlyTm2
FdBck2
Out2
Gate
ThLvl
Attack
Releas
Switch
Cmprs
Ratio
Thrsh
Attack
Releas
Switch
DOWN-ARROW
Cmprs
Ratio1
Thrsh1
Ratio2
Thrsh2
Ratio3
Thrsh3
Attack
Releas
Switch

Appendix B
Specifications

Analog I/O

Input Levels
Balanced: +4 dBm (max. +18 dBm)
Unbalanced: +4 dBm (max. +18 dBm)
or –20 dBm (max. 0 dBm)

Input Impedance
Balanced: 10 kΩ
Unbalanced: 10 kΩ (+4 dBm)
or 560 kΩ (–20 dBm)

Output Levels
Balanced: +4 dBm (max. +12 dBm)
Unbalanced: +4 dBm (max. +12 dBm)
or –20 dBm (max. –12 dBm)

Output Impedance
Balanced: 100Ω
Unbalanced: 100Ω (+4 dBm)
or 680Ω (–20 dBm)

Digital I/O

Interface type: AES/EBU Consumer (CP-340 Type II) standard
Optical or Coaxial
CD and DAT compatible, 20-bit

Sampling Frequency: 44.1 or 48 kHz (switched automatically)

Convertors
Analog-to-Digital: 16-bit linear
Digital-to-Analog: 18-bit linear

General

Frequency Response: 20 Hz – 20 kHz (+0.2/–3.0 dB)

Signal-to-Noise Ratio: >80dB (IHF-A weighting at rated input)

Dynamic Range: >90 dB

Total Harmonic Distortion: <0.015% (1 kHz at rated input)

Power Consumption
R-880 with GC-8 connected: 54 watts
GC-8 alone: 90 mA @ 9V

Dimensions
R-880: 19" W x 3-9/16" H x 16-13/16" D
(483 x 91 x 421 mm)
GC-8: 13-1/8" W x 6-15/16" D x 2" H
(333 x 176 x 51\mm)

Weight
R-880: 22 lb. 1 oz. (10 kg)
GC-8: 2 lb. 10 oz. (1.2 kg)

Operating Manual

for the

Roland R-880 Digital Reverb

with GC-8 Graphic Controller

by Paul D. Lehrman

technical assistance: Paul M. Young
graphic assistance: Chris Gill
production supervision: Nancy Kewin
production assistance: Tommy Gear

RolandCorp US
7200 Dominion Circle
Los Angeles, CA 90040-3647
(213) 685-5141

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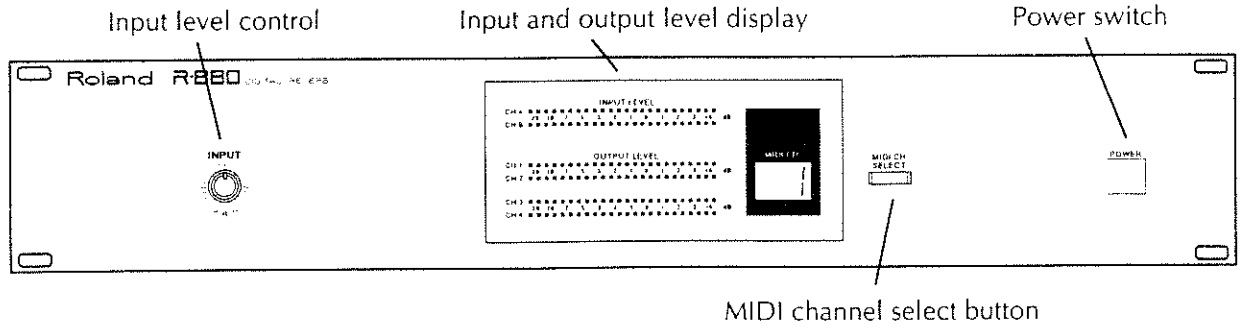
Chapter 1
Introduction

Physical description

The Roland R-880 Digital Reverb is a 19" rack-mountable (2 Units high) device. The GC-8 Graphic Controller is designed to sit on a table or desk top. The two units are connected by a single cable, with connectors that resemble MIDI connectors, but that have six pins and lock when inserted into the appropriate jacks.

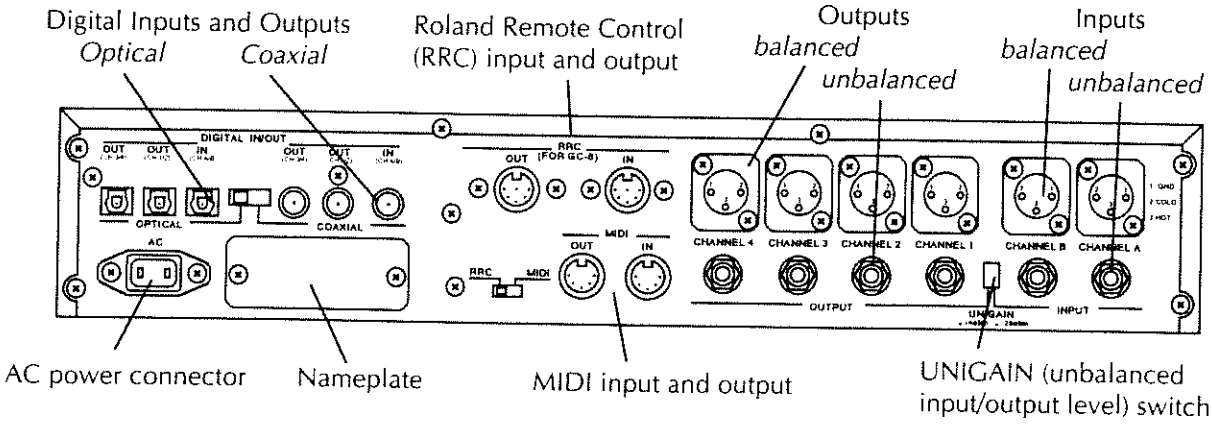
The R-880 and the GC-8 are mutually dependent on each other: each does very little without the other. The R-880 serves as the "mainframe" of the system, while the GC–8 is the "control panel".

The R-880



The R-880 has few controls. On the far left is an input level control and on the far right is a power switch. To the left of the power switch is a button labelled **MIDI CH SELECT**. This is used when the unit is part of a MIDI system, or when one GC-8 controller is used with several R-880s. (See Chapters 4 and 11 for more information.) A 7-segment LED showing the current MIDI channel number is to the left of this button.

In the center of the R-880's front panel is an LED display for input and output levels. The displays show the signal level for each of the two analog inputs (*not* the digital inputs), and the four outputs.

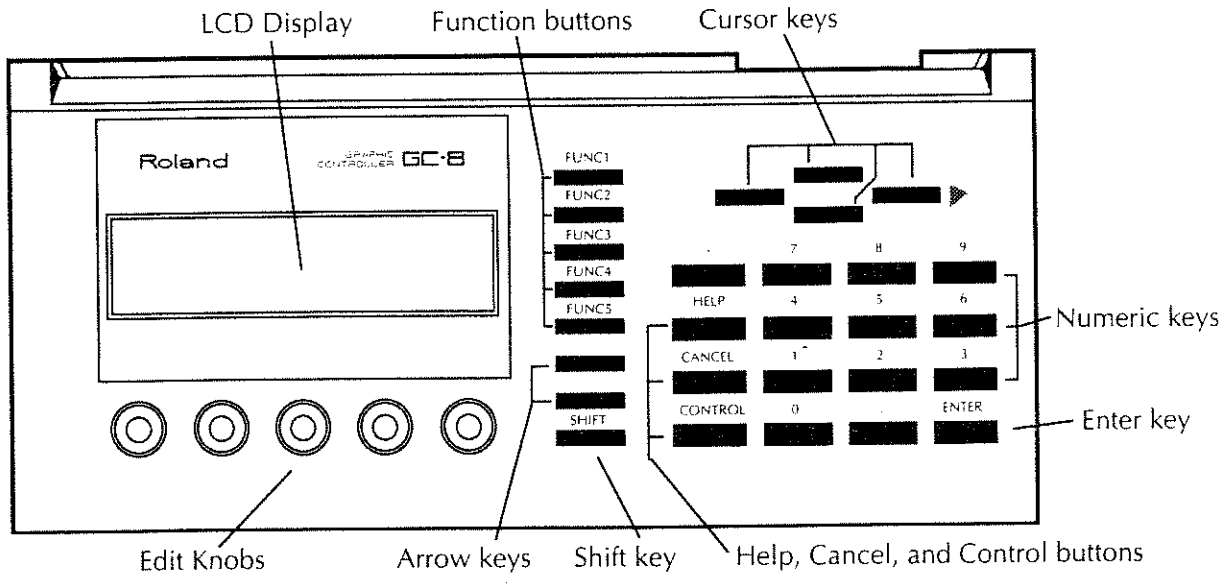


The rear of the R-880 has input and output jacks for audio and control signals. There are two input and four output channels. Audio jacks are provided for each channel in both analog and digital format. Both balanced and unbalanced analog inputs and outputs are provided. The operating levels of the unbalanced analog inputs and outputs can be set with a switch, labelled **UNIGAIN**. Digital inputs and outputs are provided in both coaxial and fiber-optic formats, and a switch is provided for choosing between them. The analog and digital inputs may be used simultaneously, and their relative levels are controlled in software. The analog and digital outputs may also be used simultaneously, and they are parallel to each other.

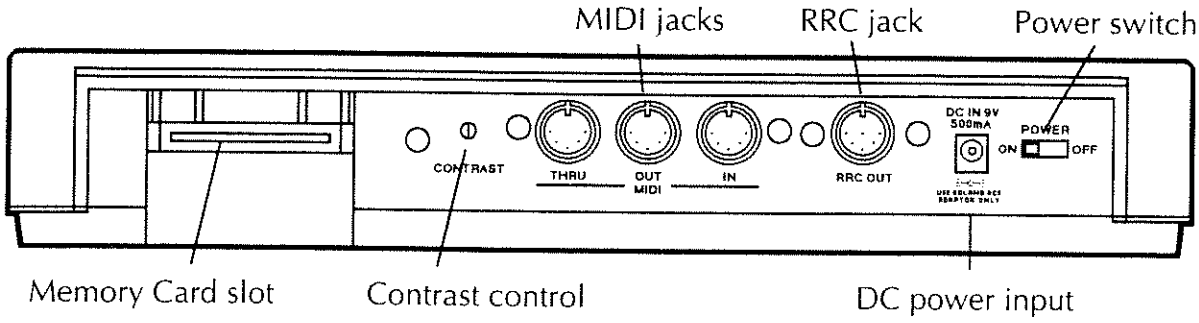
Jacks are also provided for MIDI and Roland Remote Control ("RRC") input and output, and a switch selects between them. Under normal circumstances, the system will be used in **RRC** mode. The **RRC IN** jack connects to the GC-8 through the RRC cable. The **RRC OUT** jack is used to connect to other R-880 units under the control of a single GC-8, in a daisy-chain fashion. The MIDI jacks are used only when the R-880 is under *direct* MIDI control, i.e., without a GC-8 Controller, using System-Exclusive commands.

Finally, there is a receptacle for the AC power cord. The type of power the unit is configured for is on the nameplate next to the power cord receptacle. Make sure that the available AC power matches this specification before connecting the unit to the power supply.

The GC-8



The GC-8's front panel contains a graphic LCD Display, five continuous stepped **EDIT KNOB**s (numbered 1 to 5, from left to right), and 28 buttons, also known as keys. The buttons are grouped as follows: 5 Function buttons (labelled **FUNC**); 4 **CURSOR** buttons; **UP-** and **DOWN–ARROW** buttons (below the Function buttons); a **SHIFT** key; **HELP**, **CANCEL**, and **CONTROL** keys; an **ENTER** key; and a **NUMERIC** keypad including decimal point and minus (–) sign. Although the names of these buttons are usually descriptive of their functions, they may have other functions in different contexts.



The rear panel of the GC-8 contains a single card slot to accommodate a memory card: either the ROM card which contains the system's operating software and programs (and which *must* be present on power-up), or RAM cards containing more programs. There is also a contrast control for the graphic display; MIDI In, Out, and Thru sockets; a socket for the RRC cable to the R-880; a DC power input; and a power switch.

In normal operation the RRC cable is connected from the **RRC OUT** jack on the GC-8 to the **RRC IN** jack on the R-880. When the cable is connected, power is provided to the GC-8 from the R-880, and the *external DC power input on the GC-8 is not used.* After the initial setup, the power switch on the GC-8 can be left On, and the switch on the R-880 will turn *both* units on and off.

The MIDI jacks on the GC-8 will be used far more often than those on the R-880. They are used whenever MIDI control over the *whole system* (R-880 and GC-8) — e.g., MIDI program change control of presets — is desired. The MIDI jacks are used *in conjunction* with the RRC: MIDI controls the GC-8, and the GC-8, via the RRC, controls the R-880.

Fast Installation and use: for those who can't wait

This section will give you a quick method of getting started with the R-880, and will introduce you very briefly to some of its functions. It is preferred that you skip this section and go on to the next section of this chapter, and then follow the detailed installation procedures in the next chapter. But if you can't wait, go through this section and *then* go on to the next chapter. Be sure to follow the instructions in this section and the next chapter carefully.

1) Make sure the power switches on both the R-880 and the GC-8 are turned off.

2) Connect an audio cable from a source (such as an effects send on a mixer) to analog audio input A on the R-880. Use either the balanced XLR or unbalanced 1/4-inch jacks. Connect another cable from another source to audio input B. If you are using any of the unbalanced inputs or outputs, set the **UNIGAIN** switch next to the inputs to "+4" (out) if you have a professional-level audio console, or "-20" (in) if you are using musical instrument- or consumer audio-level sources. If you are in doubt, leave the switch out, which is the least sensitive position. (The switch does not affect the balanced inputs and outputs.)

Note: Do not use the digital inputs for now. In all of the factory programs, they are disabled, and you will hear no sound. See Chapters 2 and 7 for more information on using the digital inputs.

3) Connect cables from audio outputs 1 and 2 of the R-880 to inputs or returns on your console. (Don't bother with outputs 3 and 4 for now.)

4) Connect the RRC cable from the **RRC OUT** jack on the GC-8 to the **RRC IN** jack on the R-880. Set the switch next to the MIDI jacks on the R-880 to "RRC".

5) Connect the AC power cord to the receptacle on the R-880. Confirm from the nameplate that your AC current is correct for the unit, and then plug the power cord into the wall.

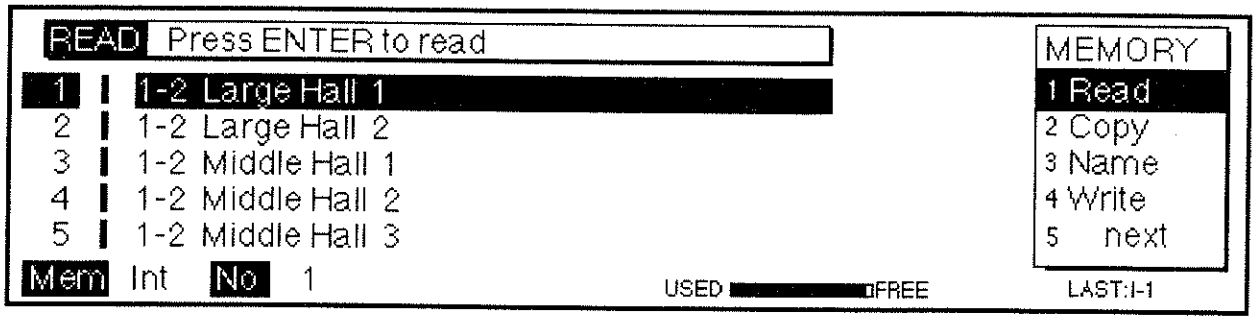
6) Insert the System Program ROM card (labelled "R88-GC8-1") into the slot at the back of the GC-8. Handle the card only by the top portion, and insert it with the Roland name facing up.

7) Double-check all your wiring, and turn on the power switch on the R-880.

8) The **MIDI CH** LED on the R-880 should read "1". If it doesn't, press the **MIDI CH SELECT** button next to it repeatedly until it reads "1".

9) Turn on the power switch on the GC-8. An initial graphic appears, and then after a few seconds, the display will read "Do you set the clock?". Press **CANCEL**.

10) After a few seconds you will get this display: (if you don't, hold down the **SHIFT** key and press **FUNC5**, then **FUNC1**.)

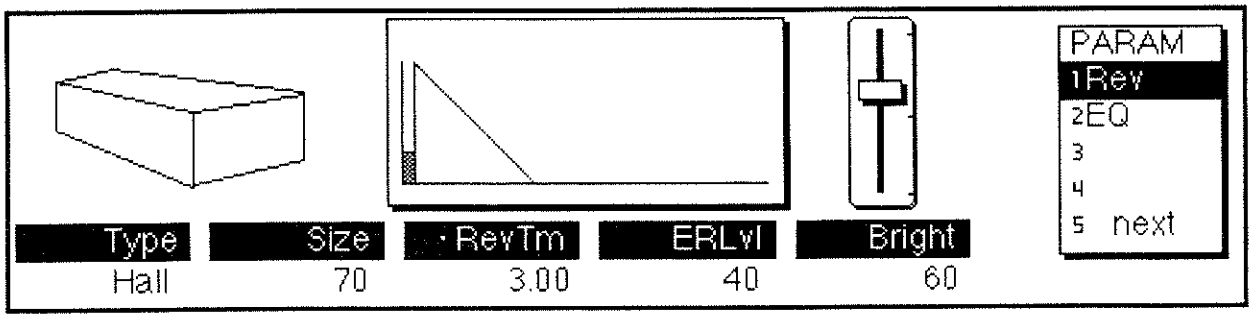


11) Send some audio to the inputs of the R-880, and adjust the **INPUT LEVEL** control until you get a reasonable level showing on the LED display. If at the maximum position the signal level is too low, either boost the signal coming from your source, or if you are using the unbalanced inputs, switch the **UNIGAIN** button on the rear of the R-880 to "-20" (if it isn't already).

12) Turning the first **EDIT KNOB** on the GC-8 will toggle between Internal and Card memories. Turning the second **EDIT KNOB** will scroll the preset locations within those memories. Set the first knob to "Int" and set the second so that the line "1 1-2 Large Hall 1" is highlighted (in reverse type). Press the **ENTER** key.

13) After a few seconds, the preset "1-2 Large Hall 1" will be loaded into memory. Send some audio into the system, and listen to the effects of the preset at the outputs.

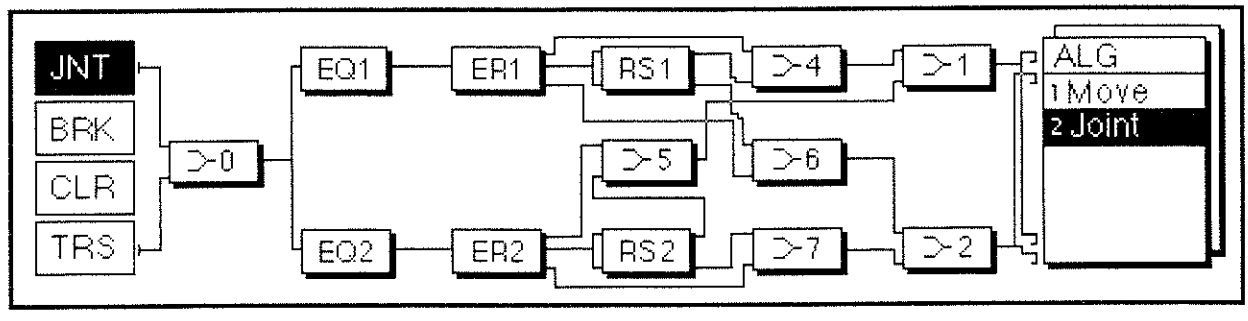
14) On the GC-8, hold down the **SHIFT** key and press the **FUNC2** button. This takes you into the Parameter mode. Turn the third **EDIT KNOB**, and look at the display immediately above it. The "RevTm" (Reverb Time) parameter will change as you turn the knob, as will the diagram on the display, showing the reverb decay slope. The sound will also change, as the reverb decay increases or decreases.



15) Turning the fourth **EDIT KNOB** changes the "ERLvl" parameter, and causes the thermometer-like portion of the display to rise. This parameter is the proportion of early reflections in the reverb sound. Changing it will have different effects depending on the nature of the signal, but generally speaking it will cause the sound to thicken at the beginning of the reverb, giving it a more "explosive" quality.

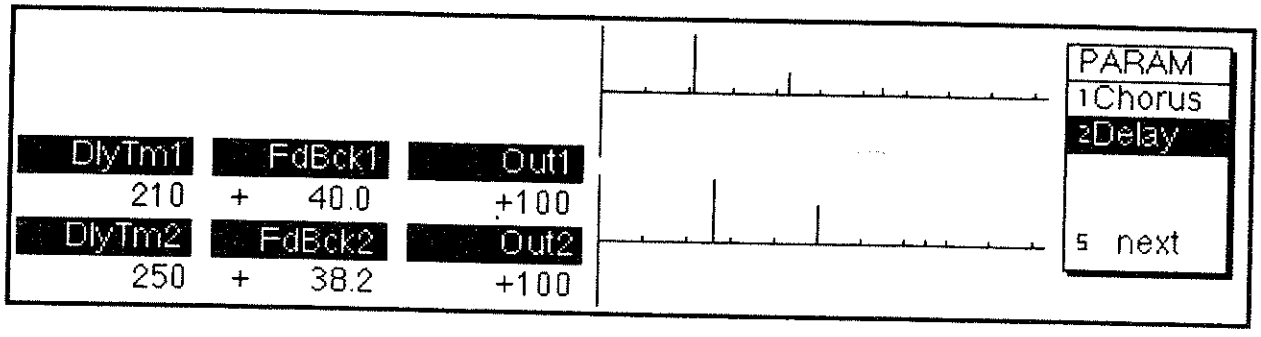
16) Turning the fifth **EDIT KNOB** changes the "Bright" parameter, and moves the fader-like object on the display. As this parameter increases, the high frequencies in the reverb sound increase, making the reverb brighter, or more metallic.

17) Press the **SHIFT** key and the **FUNC1** button. The parameters disappear, and the screen shows a block diagram of various modules, connected together in various ways, known as the "desktop". (If it doesn't, press the **DOWN-ARROW** key and then **FUNC2**.) The modules marked "EQ" are parametric equalizers; those marked "ER" are early-reflection generators, and those marked "RS" are reverb units. The other modules are mixers. Study this screen as you listen to the sound, and go back to the parameter screen if you like, by holding the **SHIFT** button and pressing **FUNC2**. Press **SHIFT-FUNC1** to return to this screen.



18) Now press **SHIFT-FUNC5**. The list of presets returns. Turn **EDIT KNOB 1** to "Card" and turn **EDIT KNOB 2** until "23 2-2 Stereo Delay" is selected. Press **ENTER** and the preset is loaded into memory in a few seconds.

19) Go to the Parameter page by pressing **SHIFT-FUNC2**. Press **FUNC5** until you see the menu consisting of "Chorus" and "Delay", and press **FUNC2**. Turn the first **EDIT KNOB**. The "DlyTm1" (delay time) parameter changes, and the first vertical line on the graph on the right side of the display moves accordingly. The repetition of the audio signal in the left channel (output channel 1) will get shorter or longer as you turn the knob. Turn **EDIT KNOB 2**, and the "FdBck1" (feedback level) parameter changes, causing the decay of the repeats over time, and the subsequent vertical lines on the display, to change. Turn **EDIT KNOB 3**, and the overall level of the repeats changes. Turn the knob past zero to negative numbers, and the repeats increase in level, but now the phase is reversed for each repeat.



20) All of these parameters have been adjusted on Delay module 1. To adjust the parameters on Delay module 2 (which is assigned to the right outputs, channels 2 and 4), use the **DOWN CURSOR** key. Now "DlyTm2" is highlighted, and the knobs will operate on all of the parameters in the same horizontal row as DlyTm2: "FdBck2" and "Out2".

21) Press **SHIFT-FUNC1** and see how this algorithm is designed.

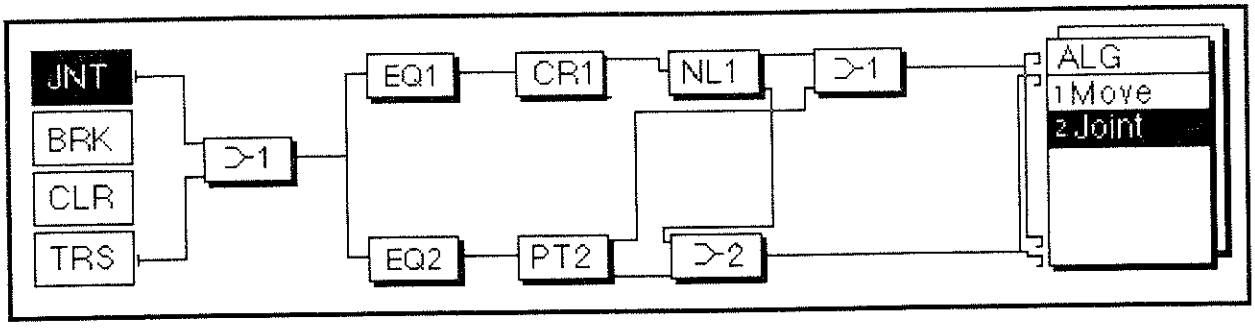
Although this demonstration has covered just about every function of the R-880, it has still been just an introductory look at the system's capabilities. Please read the next section to understand the philosophy behind the design of the R-880 before going on to the chapters that follow.

What the R-880 is all about

The R-880 Digital Reverb and GC-8 Graphic Controller are the first in a new generation of signal-processing devices for the professional recording, production, and post-production studio. They incorporate highest-quality sound-processing circuitry, along with state-of-the-art processing algorithms, and fully digital inputs and outputs, in a highly flexible environment controlled with an intuitive graphic interface.

The R-880 is a multi-mode device, providing a wide variety of effects in an almost unlimited range of configurations. The processing modules — reverb, early reflections, gates, delays, chorus, equalizers, and compressors — exist purely in software, and so can be configured in any imaginable order or combination. Signals from the two input channels can be processed independently, and their paths split and combined through any modules on their way to the four independent outputs. Because there is no analog/digital conversion between the modules, there is never any degradation of the sound quality no matter how many modules are in use or how complex the signal paths are.

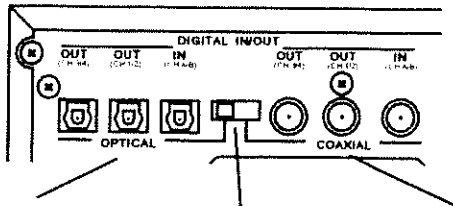
The GC-8's LCD display is designed to make the task of arranging the modules and signal paths, as well as configuring the modules themselves, simple and intuitive, using a "desktop" metaphor that will be familiar to users of modern personal computers. It uses graphics to show the processing algorithms from the most direct to the most complex, and to show all of the parameters of an individual module simultaneously. Menus are used by the software to move around the operating system.



The R-880 allows the most intricate parameters of the processing modules to be adjusted, but for users who want to work quickly or do not need such precision, a feature has been included that adjusts certain parameters in groups. This feature is called "Macro" editing, and it allows the user to adjust effects characteristics such as reverb time, early reflections levels, or equalization, without having to deal with every parameter and sub-parameter associated with these characteristics. The Macro feature is designed to take care of those adjustments in a logical, musical way with a minimum of hassle. Once it has been used to set the basic parameters for an effect, should the user want to tweak the settings further, all of the individual parameters are available, using the "Manual" editing mode.

Once an effect has been designed, it can be stored either in the R-880's large internal Random Access Memory, or on convenient and inexpensive RAM cards. An infinite number of effects can be stored on such cards, and recalled nearly instantaneously. In addition, any effect in internal memory or on a card (if it is currently in the unit) can be recalled with a MIDI Program Change command. MIDI can also be used to control individual program parameters in real time using System Exclusive commands.

To achieve the highest possible sound quality, the R-880 has been designed to accept and generate digital audio signals that conform to the AES/EBU digital transmission standard. These signals can be accessed using coaxial or fiber-optic cables and connectors, and can also be used in conjunction with conventional analog signals.



Optical Digital Input and Outputs

Coaxial Digital Input and Outputs

Optical/Coaxial switch

Finally, to ensure that the R-880 and GC-8 will remain at the forefront of signal processing technology, the operating system software is not built into the units, but instead is supplied on a ROM card. Future software upgrades, which might conceivably include new modules, new configurations, or completely new approaches to signal processing, can be loaded into the system by the simple insertion of a memory card into the GC-8.

Chapter 2
Installation

Even if you have followed the guided tour in the previous chapter, please read this chapter carefully.

***Important**: Make sure the power switches on both units are OFF (on the R-880, in the* out *position) before making any connections.*

The R-880 is designed to be mounted in a standard 19" equipment rack. When mounting the unit, use screws with washers in all four holes. The GC-8 is designed to sit on a console or table top. It can be moved about freely, as long as you are careful not to tangle, jerk, or crimp the RRC cable.

When mounting the R-880, allow as much space as possible above and below the unit for ventilation. Avoid using either the R-880 or the GC-8 in conditions of high heat or humidity; in dusty areas; in direct sunlight; in areas subject to vibration; or in areas with strong magnetic or RF fields, such as next to a fluorescent light, video monitor, or speaker. Do not place heavy objects on top of the R-880.

Power

The power receptacle for the R-880 is located on the back panel of the unit. Use the power cord that came with the unit, and connect it to the unit before plugging it into the power socket. Make sure that the power switch on the front panel of the unit is off (out) before connecting the power cord.

The GC-8, when used with the R-880, draws its power from the R-880 and *requires no external power supply.*

Important notes:

• The appropriate power supply for this unit is shown on its nameplate. Please make sure that the line voltage in your installation meets this requirement.

• Do not use the unit on the same power circuit with any device that will generate line noise, such as a motor or variable lighting system.

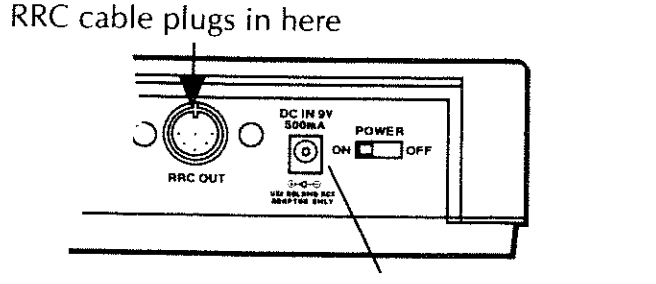
• Avoid damaging the power cord. When disconnecting the plug from the socket, do not pull the cord, but grasp the plug itself.

• If the unit is to remain unused for a long period of time, unplug the power cord.

Control

The GC-8 is the controller for the R-880. The two are connected by a single cable, known as the RRC (Roland Remote Control) cable, which is supplied. This cable resembles a MIDI cable, except it has an extra pin, and it uses locking connectors.

With the power to the R-880 off, plug one end of the RRC cable into the **RRC OUT** jack on the back of the GC-8. The connector will "click" when it is fully inserted. Now plug the other end of the RRC cable into the **RRC IN** jack on the rear panel of the R-880. Set the **RRC/MIDI** switch on the back of the R-880 to "RRC".



If you are using more than one R-880 with the GC-8, you can "daisy-chain" the units by connecting additional RRC cables from the **RRC OUT** jack of one R-880 to the **RRC IN** jack of the next. See Chapter 11 on using multiple R-880s with a single GC-8.

MIDI

When the R-880 and GC-8 are used together, which is the normal configuration, MIDI connections are made to the GC-8 *only*.

If the GC-8 is to be controlled by a MIDI keyboard, sequencer, computer, or other device, a MIDI cable should be run from the **MIDI OUT** jack of the controlling device to the **MIDI IN** jack on the GC-8. Other devices being controlled from the same source can have their **MIDI IN** jacks connected to the GC-8's **MIDI THRU** jack, if desired. Try to avoid using more than three or four MIDI devices in one "Thru chain", as there is the potential for errors or delays to result.

Normally, MIDI communication between the GC-8 and other MIDI devices will be limited to Program Change commands being received by the GC-8. However, the advanced MIDI user can take advantage of other types of MIDI communication using System Exclusive commands to perform bulk dumps and other tasks. If you plan to use the system in this manner, a cable should be connected from the GC-8's **MIDI OUT** to the **MIDI IN** jack of any device receiving data from the GC-8. Using System Exclusive data is not covered in this manual, although a complete specification of the system's System Exclusive commands is in Appendix E. For further information, please contact Roland.

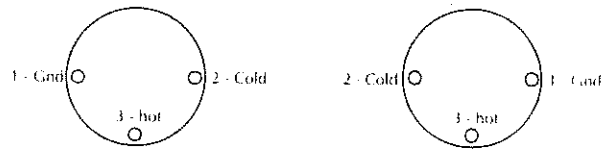
The R-880 itself also responds to MIDI, although *only* to System Exclusive commands. If a direct link to the R-880 is desired (bypassing the GC-8), MIDI cables may be connected to the R-880's **MIDI IN** and **OUT** jacks. In this case, the **RRC/MIDI** switch should be set to "MIDI". Again, this configuration is not covered in this manual, although the appropriate commands are in Appendix E.

Audio

The R-880 has two audio input channels (**A** and **B**) and four output channels (**1**, **2**, **3**, and **4**). Each input has two sub-inputs (analog and digital) and each output likewise has two sub-outputs. The recommended method of wiring the R-880 into a studio is to use two console effects sends for the inputs (either analog or digital), and four faders or four effects returns for the outputs (either analog or digital). However, other wiring methods using more or fewer connections may be used in other circumstances.

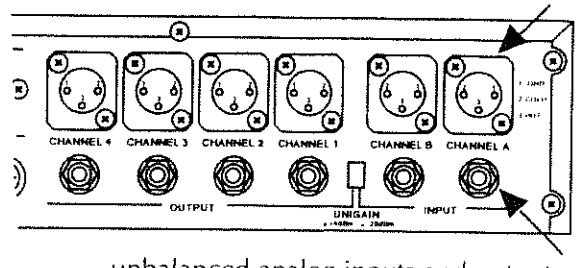
analog

For a professional installation using conventional analog wiring, the preferred method of connecting the R-880 is to use the balanced XLR jacks. The R-880's inputs are designed to accept signals with a nominal level of +4 dbm, and they have an impedance of 10 kΩ. The outputs are also rated at +4 dbm, with an impedance of 100 Ω. The inputs and outputs are wired: Pin 1–Ground, Pin 2–Cold, Pin 3–Hot.



balanced analog inputs and outputs

Alternatively, the unbalanced 1/4" jacks can be used. These have two levels of sensitivity, which are selected with the **UNIGAIN** switch on the rear panel. The switch affects all of the unbalanced inputs and outputs simultaneously, but *only* the unbalanced ones — the balanced inputs and outputs are not affected.



unbalanced analog inputs and outputs

The switch should be in the "out" ("+4") position when the unit is being used with professional studio-level audio sources. The sensitivity of the inputs and outputs with the switch in that position is +4 dbm. The input impedance is 10 kΩ, and the output impedance is 100 Ω.

The switch should be in the "in" ("-20") position when the unit is being used with sources that operate at lower signal levels, such as electronic musical instruments, consumer audio products, and "semi-pro" studio gear. The sensitivity of the inputs and outputs with the switch in that position is -20 dbm. The input impedance is 560 kΩ, and the output impedance is 680 Ω.

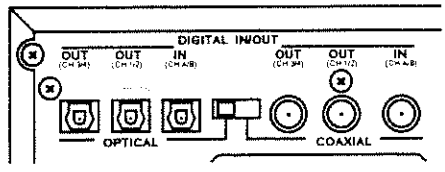
The balanced and unbalanced inputs on a channel *cannot* be used at the same time. Inserting a plug into the unbalanced jack on an input channel disables the balanced input for that channel. The balanced and unbalanced outputs, however, *can* all be used simultaneously.

digital

The R-880 allows signals to be input and output at the digital level, and conforms to the "AES-EBU Consumer" standard, also known as "CP-340 Type II". This allows direct digital interfacing with CD players, open-reel digital and DAT decks, and digital mixers and processors, such as the Roland E-660 Digital Parametric Equalizer, at a sampling rate of either 44.1 kHz or 48 kHz.

The standard specifies that stereo signals are transmitted on a single cable by multiplexing the two channels, and so the digital inputs and outputs are in pairs: outputs **1** and **2** are on one cable, and outputs **3** and **4** are on another. Similarly, the two inputs are on one cable.

Two types of digital connectors are provided, coaxial and optical. The digital input selector switch on the rear panel is used to select which type of connection to use. Connection types cannot be mixed.



The following table summarizes the connections that are made to the two devices:

	GC-8	R-880
Audio analog and/or digital		√
RRC	√	√
MIDI	√	special circumstances only
Power		√

using analog and digital together

The analog and digital inputs and outputs can be used simultaneously. The front-panel input level control affects only the analog inputs, not the digital ones. Also, the input level display represents only the level at the analog inputs, not at the digital inputs.

The analog and digital signals for a particular input channel are combined before any processing occurs, but there is a software mixer that lets you adjust the relative levels of the analog and digital inputs for each input channel before they are combined. See Chapter 7 for details.

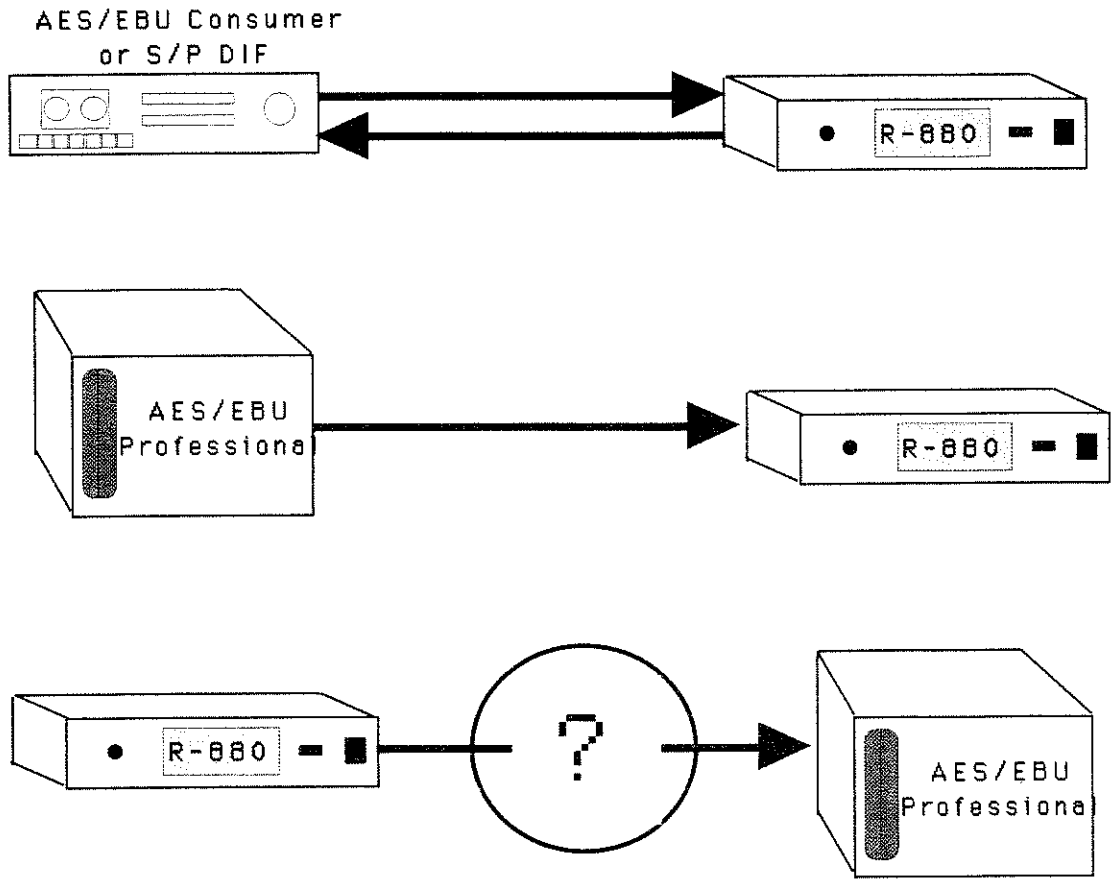
The digital outputs and analog outputs are exact copies of each other, and the output level display is accurate for both sets of outputs.

Digital Formats

On the digital level the R-880 is compatible with all other AES/EBU Consumer devices, and it also has some compatibility with devices using other formats. The inputs of the R-880 can be driven with a signal in the "AES/EBU Professional" format (also known as "CP-340 Type I"), although driving an AES/EBU Professional *input* with the R-880's *output* is a bit tricky. That's because the Professional specification calls for a signal level of 3–7 volts on balanced lines, while the Consumer specification calls for a 500-millivolt signal on unbalanced lines. Keeping cable lengths as short as possible will help in this configuration.

In addition, the R-880's inputs and outputs can be used with any device that uses the "S/P DIF" (Sony/Philips Digital Interface Format) standard. S/P DIF is a kind of "superset" of the AES/EBU Consumer format, in that extra bits are included for cueing, location, and other information. While the audio from an S/P DIF source will pass through the R-880 perfectly, and can be sent back to an S/P DIF device, these extra bits will be lost.

When a digital signal is fed to the R-880, the R-880 automatically sets itself to conform to the parameters of the incoming signal: type, sampling rate, pre-emphasis, copy prohibition, clock accuracy, etc. These parameters are displayed on a special screen in the "Func" mode. See Chapter 11 for more information.



<u>Note:</u> In all of the factory programs (both in the Internal memory and on the System ROM card), <u>the digital inputs have been turned OFF</u>. If you wish to use the digital inputs with those programs, you must go to the mixer Menu and turn those inputs on. See Chapter 7 for details.

Maintenance and Service

The GC-8 uses a battery-backed memory for maintaining programs and parameters. The battery has an estimated life of five years, although it is possible that the battery may need to be replaced before that time, if you purchased the unit a significant amount of time after it was manufactured.

When the battery is low, the display will read "Change the memory backup battery." The battery is *not* user-replaceable. You should immediately save all valuable presets to a memory card, or write down their parameters on a piece of paper, in case they get lost during battery replacement. Then contact an authorized Roland Service Center, who will then make arrangements with you to replace the battery.

If there is a problem with the R-880, the MIDI channel display will show a flashing letter 'E' on power-up. If this occurs, contact a Roland Service Center immediately.

If either unit gets dusty, clean with a new paint brush or a soft, dry cloth. To remove dirt, use a cloth slightly dampened with water. For stubborn stains, use a cloth moistened with a mild detergent, then wipe dry with another cloth. Do not use solvents like paint thinner when cleaning.

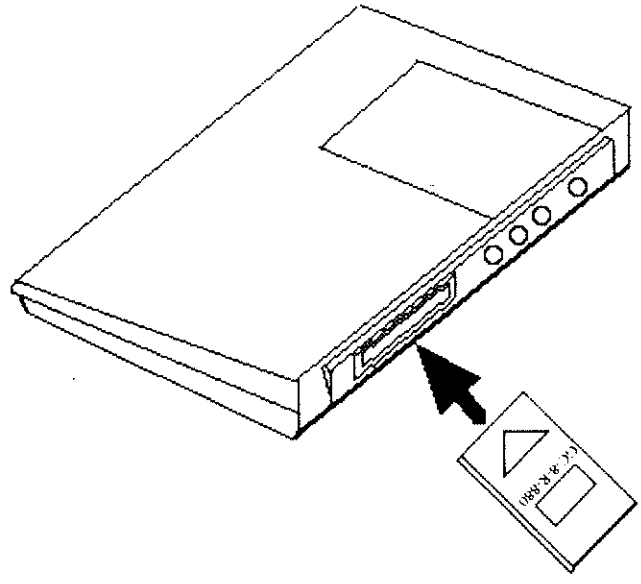
Service on either the R-880 or GC-8 should only be performed at an authorized Roland Service Center. Although every effort is made to preserve user data during service, such preservation cannot be guaranteed.

Chapter 3
Getting Started

If you went through the brief tour in Chapter 1, you already know a little bit about using the R-880. This chapter will describe the startup procedure in more detail, and also explain more about how the R-880/GC-8 software is organized.

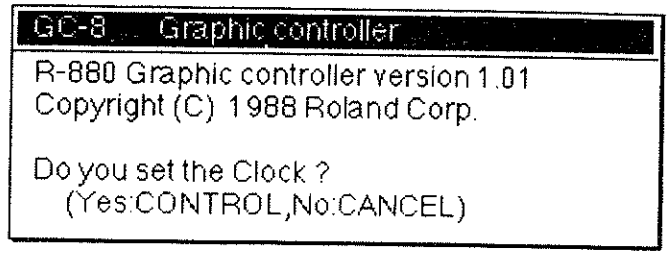
Power Up

Assuming you have followed all of the installation procedures in the previous chapter carefully, you are now almost ready to turn on the R-880. First, however, you must insert the ROM card containing the operating system into the card slot on the back of the GC-8. The card is labelled "R88-GC8-1", and it must be inserted with the side bearing that label facing up. *This card must be inserted every time you turn the power on.* Grasp the card only by the top — touching the metal strip at the bottom rear may interfere with the GC-8's ability to read the card.



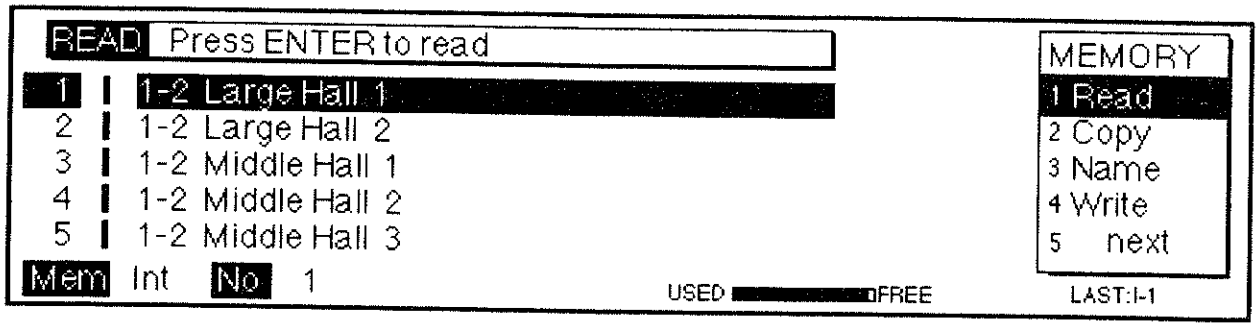
Now turn on the R-880's power switch. The **MIDI CH** display on the R-880 should read "1". If it does not, press the **MIDI CH SELECT** button repeatedly until it goes past "16", to "1".

Now turn on the power switch on the GC-8. (This switch can be left on permanently, once you have made a sucessful startup.) The display shows an initial graphic, and then asks if you want to set the unit's internal clock. The clock is not necessary for proper operation of the system, so for now you are better off pressing **CANCEL**. If you wish to use the clock, see the procedure for setting it in Chapter 11.



The screen then scrolls to display the message that communications have been established with the R-880, and that these communications are taking place on MIDI channel 1. At this point you might want to adjust the Contrast Control knob on the back of the GC-8 with a small screwdriver (slot or Phillips-head) for maximum clarity of the display.

After a few seconds, the message is replaced by the screen that was showing when the unit was last turned off — which, if you are using the unit right out of the box, should be the Memory Read screen. If it is not, then hold the **SHIFT** button down and press **FUNC5**, and then let go of the **SHIFT** button and press **FUNC1**.



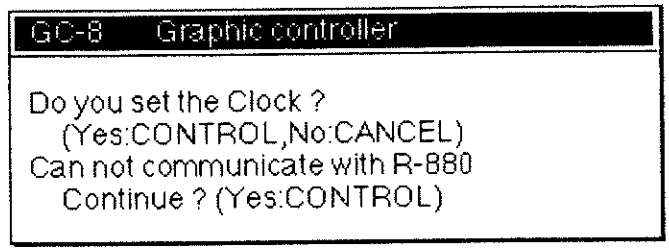
Problems

If the system ROM card is not inserted properly, the message "Insert the system card" will flash on the display. Check to see the card is inserted with the label up, and if necessary remove it and re-insert it to establish contact.

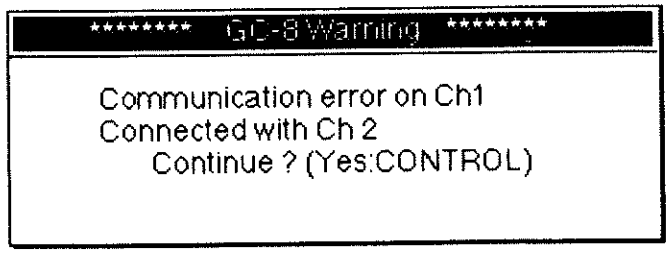
If by mistake you have inserted the wrong card (for example, a RAM card), the message "No System Program" will flash. Remove the card and insert the system ROM card.

The System ROM card can be removed as soon as the clock message appears — at that point the operating system is loaded and the card is no longer necessary.

If for some reason the GC-8 cannot communicate with the R-880, you will get a message saying so. If you press **CONTROL**, you will be able to operate the GC-8, but nothing you do will affect the R-880. To alleviate this problem, turn the power off on both units, check your connections carefully, and turn the power back on.



If you should happen to change MIDI channels on the R-880 while the system is running, then the next time the GC-8 tries to transmit information to the R-880, the system will stall, and after a few seconds you will get this message:



Press **CONTROL** and the GC-8 will set itself to the R-880's new MIDI channel.

Organization of the R-880

Terminology

The R-880 uses a variety of different "Modules" to process incoming audio signals. These modules exist within the system software, and are connected together entirely in software, in the digital domain. There are no patch cables or digital-to-analog conversion to worry about or degrade the sound. The combination of which modules are used and how they are connected together is called an "Algorithm". The construction of algorithms is under user control.

The individual settings of the modules are known as "Parameters". A parameter can be a reverb decay time, a delay feedback level, the bandwidth of an equalizer, etc. Some modules have only a couple of parameters, while others have a dozen or more.

A special type of module is known as a "Mixer". This module goes between other modules, combining signals and controlling their relative levels as they go from one processing module to another. There are also software mixers at the inputs and outputs of the R–880.

The combination of algorithm, parameter definitions, and mixer settings is called a "Program". Programs determine everything that happens to an audio signal once it enters the R-880. Once a program is defined, it can be stored, either in the R–880's internal memory or on a separate memory card, and also given a name. Programs can be called up from internal or card memory at any time using the controls on the GC-8, or by MIDI program-change commands. Programs are altered in real time using the GC-8, and can also be modified using MIDI System-Exclusive commands.

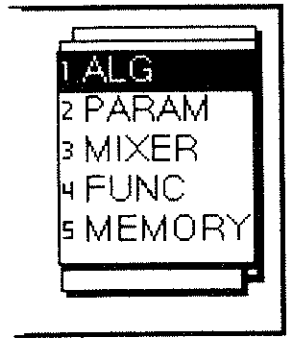
The Controls

The R-880's operating software is organized into "Modes", "Menus", and "Screens". The menus appear on the right side of the GC-8's display, and have from one to five items. The screens occupy the rest of the display, and range from very simple to very complex.

The Modes and Menus

There are five operating modes: **ALG**orithm, **PARAM**eters, **MIXER**s, **FUNC**tions, and **MEMORY**. Each mode has one or more menus associated with it. Some of these menus cover more than one page, which is indicated by the last menu item being " next". Other menus have "sub-Menus" for certain items.

You move among the modes by holding the **SHIFT** key and pressing the **FUNC** button corresponding to the mode you want. You select items on a menu by using the **FUNC** keys. The menu shows which item is selected by displaying it in reverse (white on black) type. If a menu has a sub-menu, you move to and from it by using the **UP**- and **DOWN-ARROW** keys (not to be confused with the **UP**- and **DOWN-CURSOR** keys). When a sub-menu is in use, the right-hand side of the display screen shows one menu "lying on top" of another.



You can always move to a new mode at any time, from any menu or screen, by pressing **SHIFT** and the appropriate **FUNC** key.

The purpose of each mode is as follows:

1) **ALG**orithm: for constructing the processing algorithm by placing processing modules and setting up the signal paths among them, and also for selecting the identity and function of the reverb modules.

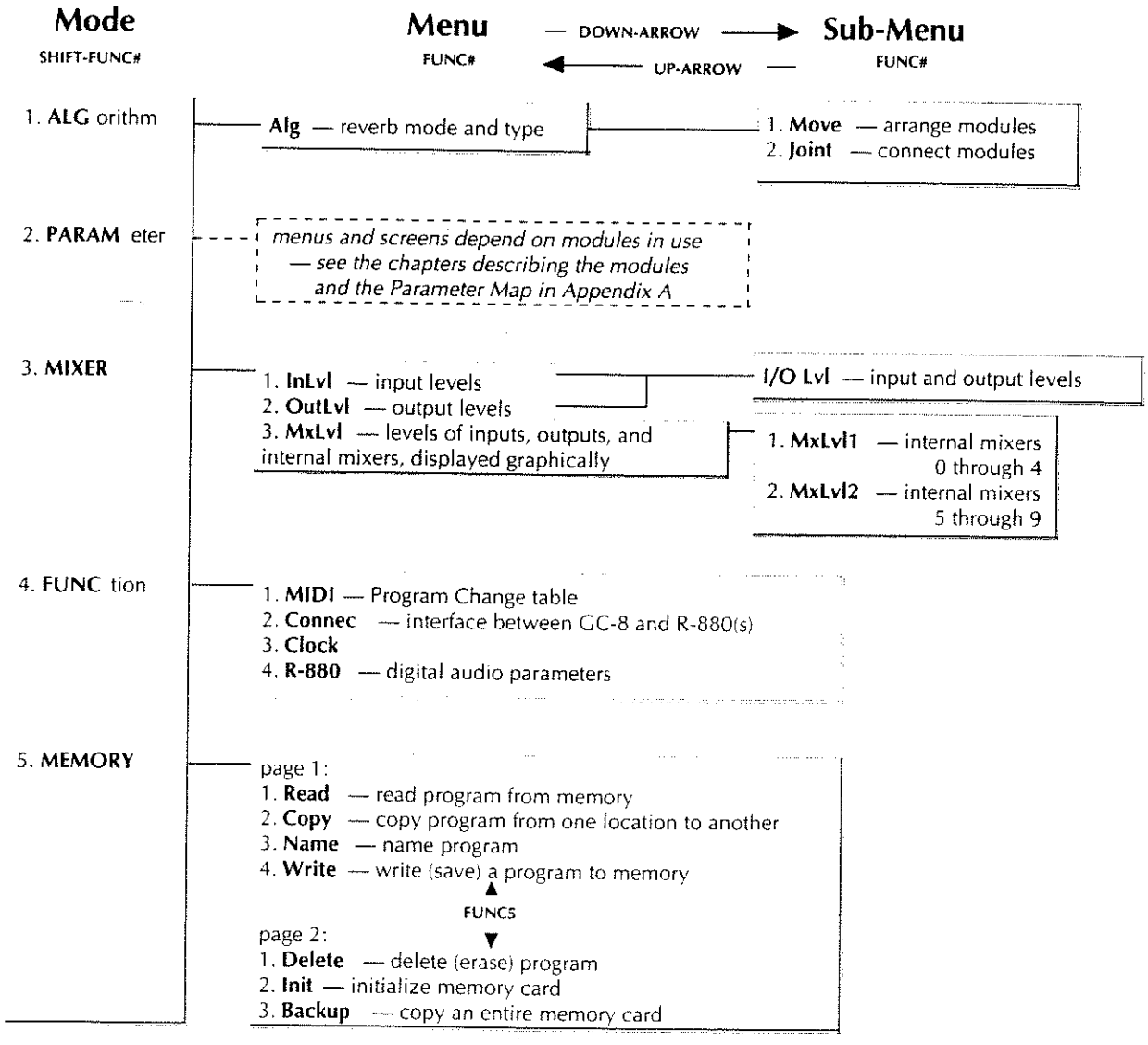
2) **PARAM**eters: for adjusting the operating parameters of each processing module.

3) **MIXER**s: for setting levels as the signal moves through the various modules, and at the R-880's inputs and outputs.

4) **FUNC**tions: for miscellaneous functions such as setting up the MIDI program change table, connecting multiple R-880s to a single GC-8, checking the status of the R-880's digital inputs, and setting the internal clock.

5) **MEMORY**: for handling the transfer of programs in and out of the internal and card memories. Also for naming programs, erasing programs, copying individual programs or whole cards, and initializing cards.

This is the organization of the modes and menus:

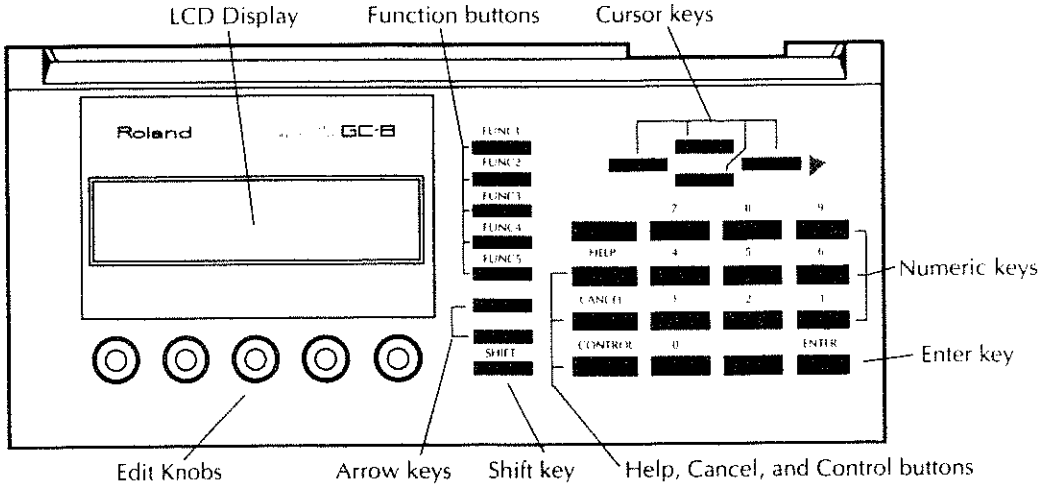


The Screens

The screens show the type of data chosen by the menus, and allow that data to be adjusted. Each item on a menu has its own screen.

All of the screens have a cursor, although the form the cursor takes varies from screen to screen. The screen cursor is moved with the four **CURSOR** keys, and in some of the screens in the Memory mode, it is moved with the **EDIT KNOB**s as well. When a cursor is on an item, it generally appears "reversed".

Adjustments of individual items on the screens are made with the **EDIT KNOB**s, and also with the **NUMERIC** keys and **ENTER** key. Generally speaking, each **EDIT KNOB** adjusts the parameter on the screen directly above it, so in many screens this allows you to edit five parameters at once. The **NUMERIC** keys adjust only the parameter that the cursor is currently on. The **CONTROL**, **CANCEL**, and **HELP** keys also have special functions in some screens.



The GC-8 can "remember" which screens have been called up, and when you leave a mode and come back to it later, the last screen you were looking at while in that mode is usually the one that appears.

Some Examples

To see these concepts at work, let's poke around the R-880's operating system a bit. We won't permanently change anything, so don't worry about saving your work yet.

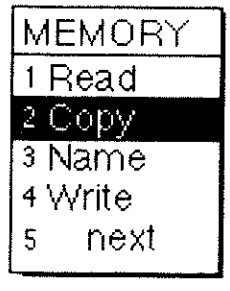
1) The Memory Mode

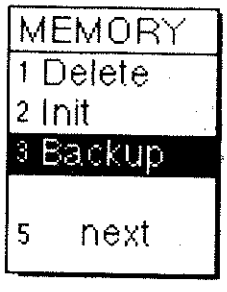
Press and hold the **SHIFT** button. You will see a menu listing all the modes on top of the current menu. To get to the memory mode, while holding the **SHIFT** button, press **FUNC5**. (If you have followed the procedure above, this will actually not change anything, but if you haven't, this will get you back to the right place.) Let go of the **SHIFT** button. On the right side of the screen is the Memory menu. The menu cursor should be on the word "Read" — if it isn't, press **FUNC1**. (If the word "Read" isn't on the menu, press **FUNC5** [" next"] and then **FUNC1**.)

Now you should be seeing a screen listing various programs. Turn the first **EDIT KNOB** clockwise, and then counter-clockwise, while looking at the first item in the last line of text on the screen. It changes from "Mem Int" to "Mem Card". This means that this knob toggles the Program Memory that is being addressed between the Internal memory and the memory on the card in the GC-8's slot.

Turn the second **EDIT KNOB**. You will see the screen cursor move up and down among the programs. When you reach the top or bottom of the screen, the screen takes you to the next page of programs. There are 99 program positions in each of the two memories, although not all of them have programs in them. When you scroll past position 99, you go back to the first page of programs. You can also move from one program to the next using the **UP-** and **DOWN-CURSOR** keys (not to be confused with the **UP-** and **DOWN-ARROW** keys), and from one page to the next with the **LEFT-** and **RIGHT-CURSOR** keys.

Now move among the various items on the Memory menu by pressing the **FUNC** buttons. Notice how the screens change. When you press **FUNC5** (" next") the menu itself changes — it still says "Memory" on top, so this is a second page of the Memory menu. To get back to the first page, press **FUNC5** again.





Let's go back to the Read screen and load in a program. Press **FUNC1**, then turn the first **EDIT KNOB** until the display says "Int", and the second **EDIT KNOB** until it says "2". The screen cursor should be on "Large Hall 2". Press **ENTER**, and the top of the display changes to "Now reading..." and in a few seconds to "Completed".

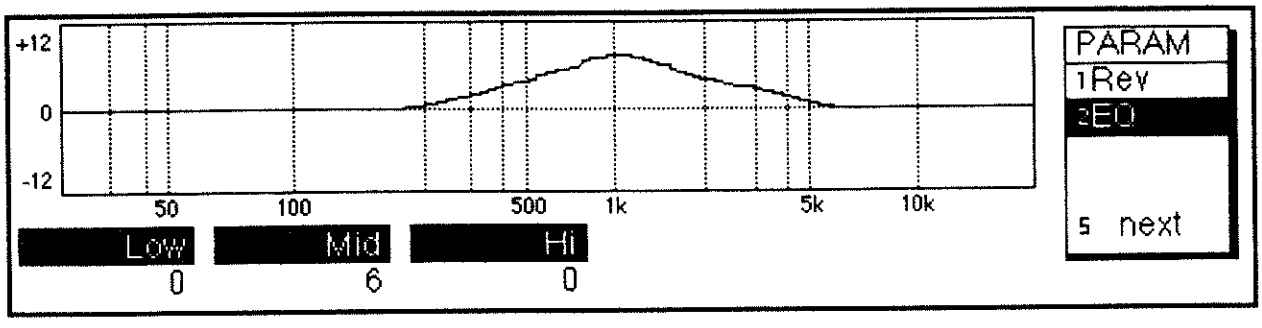
2) The Algorithm Mode

Let's look at how this program is constructed. Press **SHIFT-FUNC1** to get into the Algorithm Mode. This mode has a menu and a sub-menu. Make sure you are on the main ("upper") menu by pressing the **UP-ARROW** (not the **UP-CURSOR**) key. This screen shows the reverb algorithms that are in use, and how their inputs and outputs are arranged. Now press **DOWN-ARROW** and then **FUNC2**. This is the algorithm "desktop", which shows which modules are in use and how they are connected to each other. For now, don't try to change anything on either of these screens (if you do, the display will ask you if you really mean it, in which case press **CANCEL**).

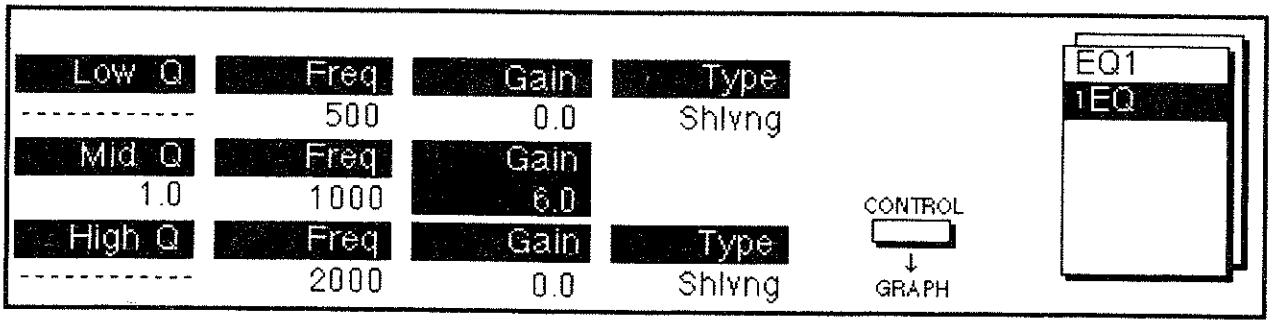
3) The Parameter Mode

Now let's look at the individual items that make up this program. Press **SHIFT-FUNC2** to get into the **PARAM**eter mode. The Parameter Menu always has two pages, which are switched between by pressing **FUNC5** (" next"). In this particular program, the parameter menu has two entries on the first page and two on the second. Each entry represents a processing module. Press the **FUNC** button that corresponds to the module you would like to examine.

From the menu page showing "1 Rev" and "2 EQ" as its choices, press **FUNC2**. Now you will see a graphic display of a parametric equalization curve. Turn the **EDIT KNOB** under the word "Mid" (the second one), and watch the numbers change as you turn. If you wait a second, you will see the curve re-draw itself as well. If you have audio going through the system, listen to the effects the change in mid-range level has on the audio. Also play with the first ("Low") and third ("Hi") **EDIT KNOBS**.



What you have just done is to use the "Macro" feature to change the settings of a three-band parametric equalizer. The center frequencies, type of curve, and bandwidth are all decided for you, but you have control over the amount of cut or boost on the three bands. You can change the settings on a much finer level by using the "Manual" editing mode. You get to this mode from the EQ screen by pressing the **DOWN-ARROW** key. This "sub-screen" of the EQ module gives you individual control over *all* of the equalization parameters: center frequency, whether the curve is peaking or shelving (high and low bands only), and bandwidth (Q), as well as cut or boost, on each of the three bands.



Note that unlike the Memory Read screen, which showed only one line of data for the **EDIT KNOB**s to work on, there are now several lines of data that can be adjusted with the **EDIT KNOB**s. Notice that one parameter is highlighted with reversed type — this is the current cursor position. Turning any **EDIT KNOB** will change the parameter located above the **EDIT KNOB** that is in *the same horizontal line as the current location of the cursor.*

For example, if the cursor is on "Gain" in the "Mid" line, then turning **EDIT KNOB 1** will adjust the Q of the middle equalizer, and turning **EDIT KNOB 2** will adjust the center frequency of that equalizer. Turning **EDIT KNOB 3**, of course, will adjust the gain. If the cursor is on "Type" in the "Low" line, **EDIT KNOB 2** adjusts the low equalizer's center frequency, **EDIT KNOB 3** the Gain, and **EDIT KNOB 4** toggles between Peaking and Shelving curves (**EDIT KNOB 1** happens to be disabled in this example, because the EQ is in the Shelving mode).

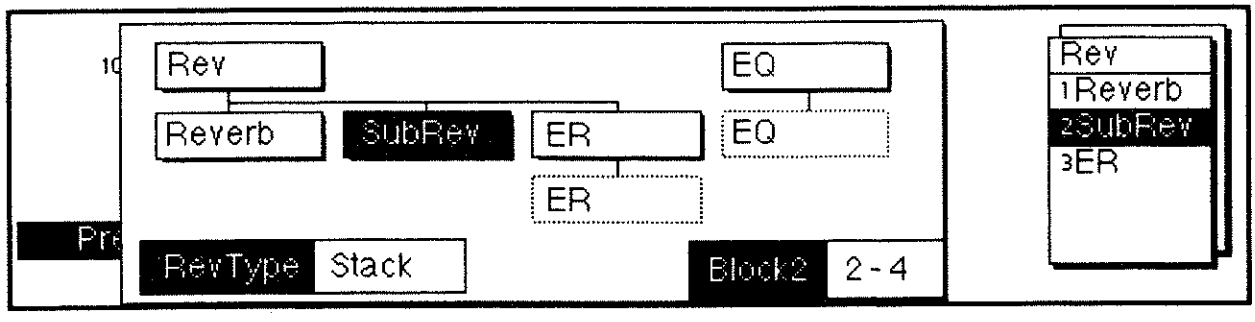
The cursor is moved around by using the **CURSOR** keys. The action of these keys "wraps": if you move the cursor off the top of the screen it immediately reappears at the bottom, and if you move it off the left, it reappears at the right. It also repeats, like a key in a word processor, if you hold it down.

Besides the **EDIT KNOB**s, you can also adjust the parameter that the cursor is on with the **NUMERIC** keys. You can type in any numerical value, and when you press **ENTER**, that value is entered. Use the minus sign for negative numbers, and the decimal point for decimals. If the number you type is out of the range of that parameter, the parameter will be assigned the maximum value of its range (or the minimum, if you typed in a negative number).

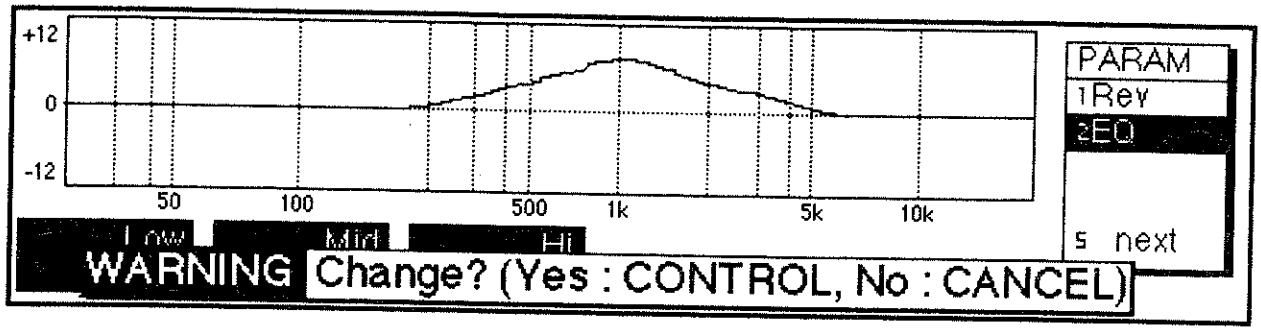
Note that when you adjust a parameter value with the edit knob, that value takes effect immediately, but if you adjust a parameter with the **NUMERIC** keypad, the value does not take effect until you press **ENTER**.

While we are on this screen, we will demonstrate the other keys. Pressing **CONTROL** brings up the graph from the original EQ screen, but it now shows the values of the equalizer as it has been set in the Manual mode sub-screen. Pressing **CONTROL** again takes you back to the edit screen.

Pressing **HELP** calls up a screen known as a "Menu Map". This screen shows the condition of the various screens within the current algorithm. It will be discussed in more detail in Chapter 6. Press **HELP** again and the screen goes back to where it was.



Go back to the main EQ screen by pressing **UP-ARROW**. Now turn one of the **EDIT KNOB**s. If you have adjusted any parameter in the lower screen, you will now see a message across the bottom of the screen that says "WARNING Change? (Yes:CONTROL, No:CANCEL)". What this message is telling you is that by changing a parameter on this screen, you have invoked the Macro function, and the settings on the Manual sub-screen will be restored to the values set by the Macro function. Since you have no doubt gone to a lot of trouble to get those Manual settings just right, you do not want this to happen, so you should press **CANCEL**. The message goes away, and your most recent action is cancelled.



We have now covered every button and control on the GC-8, and seen examples of many of the menus and screens. We have also touched on all of the important operating principles of the system. The following chapters will discuss the functions of the R-880/GC-8 and the menus and screens in detail.

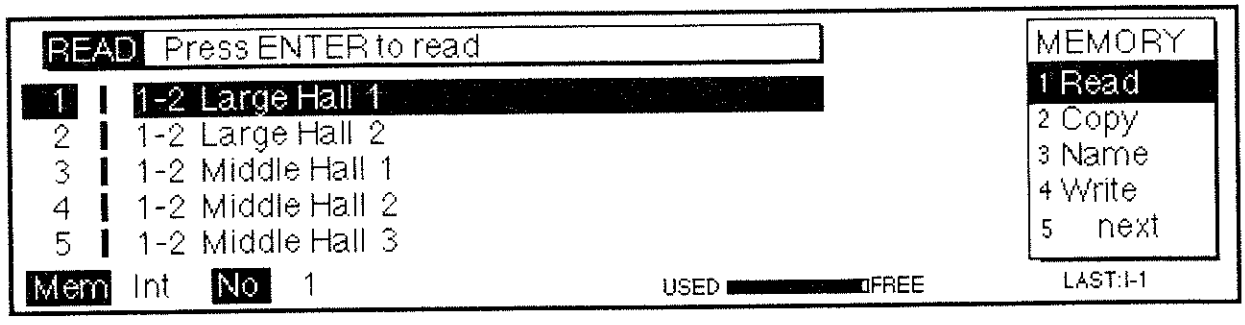
Chapter 4
Using Programs

A Program is a description of everything that happens to the signal as it passes through the R-880. It includes which processing modules are in use, the settings of their individual parameters, how they are connected to each other, and how they are connected to the inputs and outputs.

Programs are stored in the R-880's internal Random Access Memory (RAM); on the System Software ROM card that comes with the R-880 and GC-8; and on external RAM cards that are available from Roland. The programs on the System ROM card are not erasable or replaceable, but programs stored anywhere else are. Loading and storing programs is done in the Memory Mode, as is naming programs, copying programs from one location to another, and other memory-related chores.

Loading a Program ("Read")

To load a program, enter the Memory Mode by pressing **SHIFT-FUNC5**. The first item on the menu should be "Read" (if it isn't, press **FUNC5**). Select it by pressing **FUNC1**.



Choose the memory that you want to load the program in from — Internal or Card — by turning the first **EDIT KNOB**. The display shows your choice right above the knob as "Mem Int" or "Mem Card". Now scroll through the programs in that memory using **EDIT KNOB 2**. You can also scroll through the programs using the **CURSOR** keys: the **UP** and **DOWN** keys move the cursor up and down on the screen, while the **LEFT** and **RIGHT** keys change pages (there are five programs on each page).

If a memory location has a program in it, there will be a thick vertical line to the immediate right of the number of the memory location on the screen, followed by the name of the program. (However, it is possible, as we shall see in a moment, to have a program with no name.) If there is no vertical line, the memory location is empty, and no data can be read from it.

The message at the top of the display says "Press ENTER to read". (If you select a memory number that has no program in it, the message will change to "No Parameter to read".) Pressing **ENTER** loads that program into the R-880. The display changes for a few seconds to "Now reading ...", and then to "Completed". The program is now ready for use.

If you make a mistake, and Read in the wrong program, you can press **CANCEL**, and the system will revert to the program that was in use previously. You can cancel a Read while the new program is being read, or even after it has been read, as long as no changes have been made to the program, and as long as you have not left the Read screen by pressing any of the other **FUNC** buttons. (If you try, you will get the message "Can not cancel".)

Another way to Read a program, if you know its number, is to enter the number using the **NUMERIC** keys, and then press **ENTER**. The bottom line of the display will flash as you are doing this. If you call up an empty program, the display will tell you so, and no reading will take place. If you make a mistake — say you typed "6" when you wanted "7" — you can press **CANCEL**, or you can keep entering numbers. The last two digits you enter will always be the ones displayed and used. For example, if you type 12 and you wanted 34, you can just enter "3" and "4" after the "1" and "2", and the screen will show "34". (Leading zeroes are allowed, e.g. "07".)

Note that if you do any editing on a program, and then Read in a new one, the edited version of the old program *will be lost* unless you have specifically saved it.

Saving a Program ("Write")

The procedure for saving a program is similar: Choose "Write" from the **MEMORY** menu (**FUNC4**), select an internal or card memory location (with the **EDIT KNOB**s, **CURSOR** keys, or **NUMERIC** keys), and press **ENTER**. The program which is currently active — i.e., the last program loaded in, plus any modifications that have been made to it — will be saved in the designated memory location. On the screen, a thick vertical line will appear next to the number of the memory location you have saved to, showing that there is data in that location.

There is no write-protection available for the Internal memory — if you save a program to a location that is already occupied, the old program will be erased. However, and this is very important, *the old program's **name** will be retained until you change it.*

On the other hand, if you make a mistake and write a program to the wrong location, you can immediately cancel the write operation by pressing **CANCEL**. The memory location will now revert to the program that it previously held (or if it was empty, it will revert to being empty). Like a Read, you can cancel a Write while the program is being saved, or even after it has been saved, as long as no changes have been made to it after it has been saved, and as long as you have not left the Write screen.

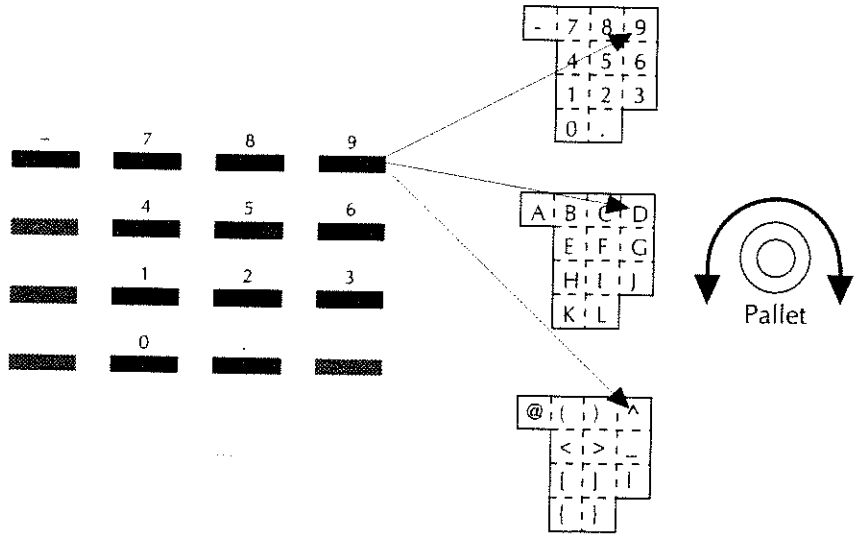
(Note also that if you accidentally erase one of the Internal programs that was provided with the unit and wish to get it back, the parameters for all of the factory programs — both Internal and on the System Card — are detailed in the provided booklet "GC-8 Preset Data for R-880", and you can reconstruct the program by entering those parameters in by hand.)

You don't necessarily have to save a newly-created or edit program before you power down — although it is a good idea to do so. Under normal circumstances, whenever you turn on the R-880 and GC-8, the last program that was active before you turned off the power will still be active, even if that program has not been saved in any memory location.

Naming a Program

The R-880/GC-8 only lets you name a program *after* it has been saved. After following the saving procedure above, choose "Name" from the **MEMORY** menu (**FUNC3**).

There is now a flashing cursor on the spot where the name for the program will begin. On the right side of the screen is a "pallet" of letters, numbers, or other characters. You choose a character to begin the name by turning **EDIT KNOB 5** (under "Pallet") until a pallet appears that contains the character you want. There are upper- and lower-case letters, numerals, punctuation marks, and Kanji characters available. Then press the button on the **NUMERIC** keypad that corresponds with the character you want to place.



As soon as you enter a character, the cursor moves one space to the right. If you want to leave a space, turn **EDIT KNOB 3** ("Space") one notch (carefully!). The Space knob works in both directions, so you can wipe out a previous letter or an entire name easily. If you make a mistake, you can move the cursor backwards or forwards with **EDIT KNOB 4** ("Cursor"), and replace any character(s) you want.

You can also use the **CURSOR** keys in the naming operation. The **LEFT-** and **RIGHT-CURSOR**s duplicate the function of the "Cursor" **EDIT KNOB**. The **UP-** and **DOWN-CURSOR**s will change which program you are naming, by selecting the previous or next program on the list for that particular memory. If you change programs in the middle of a naming operation, the name change will not take effect, and the original name of the program will be retained.

When the name is complete, press **ENTER**. If you change your mind and decide to go back to the old name, you cannot press **CANCEL**, but there are ways to cancel the operation: press any of the **FUNC** keys, or the **UP-** or **DOWN-CURSOR** keys, or turn either of the first two **EDIT KNOB**s.

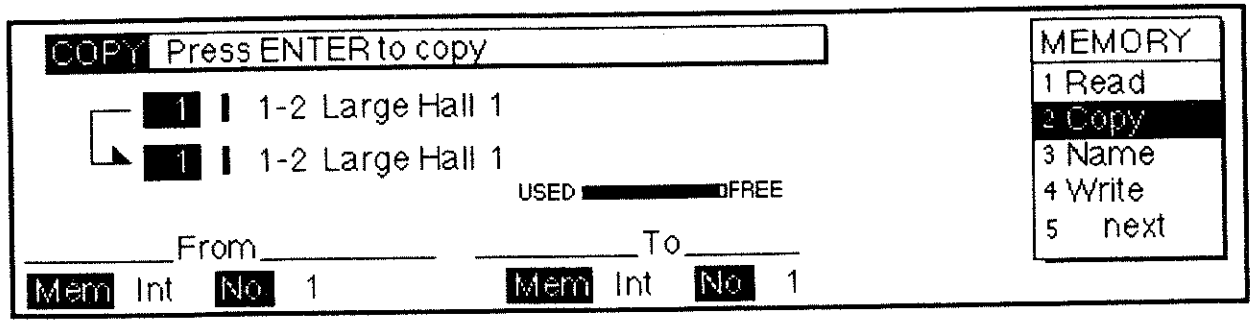
Note that you can actually name a program at *any* time, not just immediately after saving it.

Also note that the factory-provided programs (in RAM and on the System ROM card) all have names that begin with a pair of numbers like "1-2" or "2-4". These numbers reflect the input/output structure of the algorithm used by the program; e.g., one (combined) input feeding two (combined) outputs, or two separate inputs feeding four discrete outputs. Though it is by no means required that you use these figures in program names that you devise, it is a very useful convention for helping you remember the structure of a program, and is recommended. More information on the structure of algorithms is provided in the next chapter.

Deleting and Copying

Two other functions on the **MEMORY** menu are "Delete" (item 1 on page 2: press **FUNC5** [" next"], and then **FUNC1**) and "Copy" (item 2 on page 1). Choosing Delete and pressing **ENTER** erases the contents of the memory location the cursor is on. (You can also type in the number of a program with the **NUMERIC** keypad, and press **ENTER** to delete it.)

Choosing Copy gives you a screen with two lines. The top line is the memory location and program you are going to copy *from*, and the bottom line is the memory location you are going to copy *to* (with the name of any program that is currently in that location). Use the **EDIT KNOB**s to select the type (Internal or Card) and number of the source and destination memories. Press **ENTER** to execute the copy. Remember that any program in the location being copied to will be lost. You can copy from Internal to Card, Internal to Internal, Card to Card, or Card to Internal.



Using Memory Cards

The internal RAM of the R-880 can hold quite a few programs, but it is not unlimited, and in fact it is nearly full when the unit is shipped from the factory. If you don't want to erase any of the factory programs, and yet would like to store some of your own programs, you must use a memory card.

Two types of memory cards are available from Roland: catalog numbers M-128D and M-256D. Although the cards have 99 memory locations, it may happen that a card's memory will be full before all its locations are used up. That is because the amount of memory each individual program takes up varies according to its complexity, and if you store a lot of complex programs, the card memory will fill up more quickly. The M-256D has 32 kbytes of RAM, and will hold about 75 of the most complex programs. The M-128D has 16 kbytes, and will hold approximately half as many.

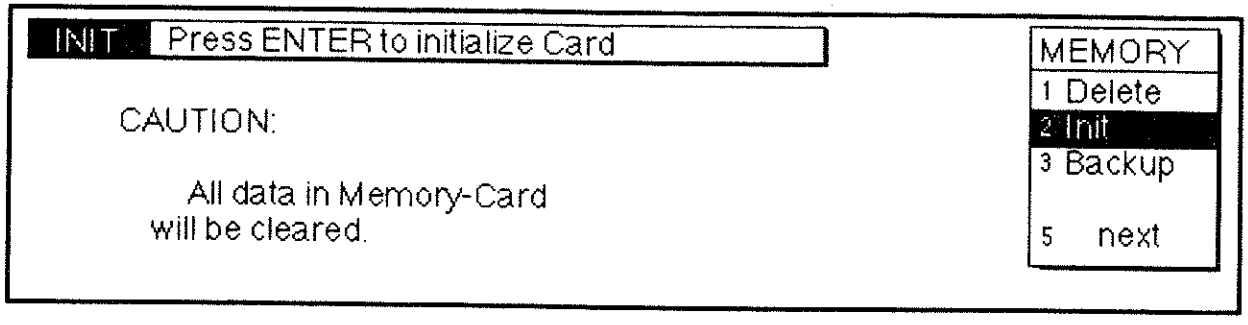
Installing the battery

When using a memory card, you must first install the battery that comes with it. Instructions for inserting the battery are included with every memory card. Also be sure that the **PROTECT** switch at the top of the card is "off", or you will not be able to store programs on the card.

After you've installed the battery, you can insert the card into the slot on the GC-8. Note that when you first power up the system, you must have the "System Program" ROM card inserted, but as soon as you see the first screen ("Do You Set The Clock?"), you can remove it and insert any other card.

Initializing the card

When you first use a brand-new RAM card, you must initialize it. After you insert the card, the display prompts you with the message "Card is not initialized". The "Init" function is item 2 on Page 2 of the **MEMORY** menu. Press **FUNC2** and then **ENTER**, and the card will be initialized. (You can also use this function to erase all of the programs on an already-initialized.)

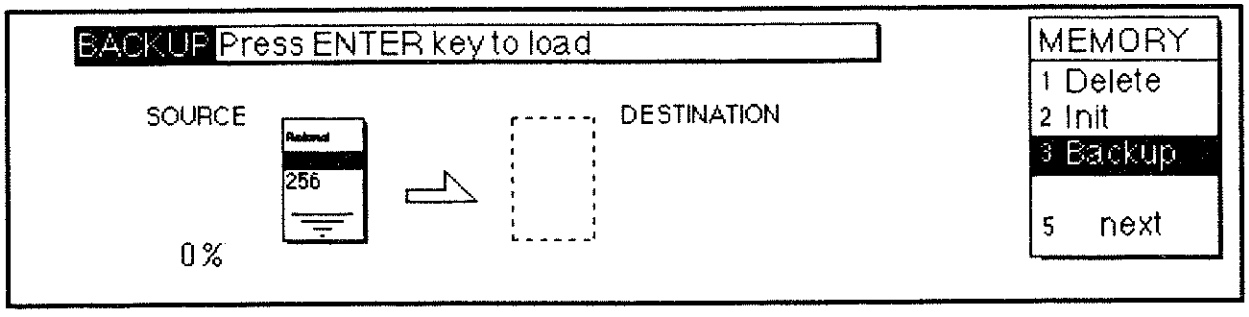


Reading and writing programs

Reading and writing programs on a card is exactly the same as reading and writing them in internal memory, except that **EDIT KNOB 1** should be set to read "Card". Once you have read a program from a card, or written a program to a card, you can remove the card without affecting the program. You can continue to edit the program after the card is removed, but obviously you cannot save it to the card without re-inserting it. (You cannot save any programs to the System ROM card.)

Backing up

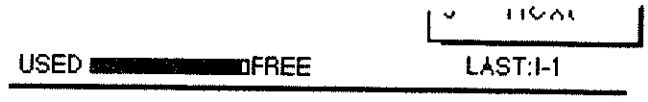
There is one operation peculiar to memory cards, and that is item 3 on page 2 of the Memory menu: "Backup". This lets you copy the entire contents of one card to another in a single operation. Insert the card you want to copy in the slot, select Backup (**FUNC3**), and press **ENTER**. Now follow the directions on the screen: remove the original card when it tells you to, then insert the card you are copying the data to, and press **ENTER**. When the operation is finished, press **FUNC1**, **2**, or **5** to resume normal operation.



There is no way to dump the entire contents of the Internal memory to a memory card in one operation, but there is a relatively painless way to back up the Internal memory. Call up the Copy function (**FUNC2** on Page 1 of the Memory menu). Set the source to Internal memory 1, and the destination to Card memory 1. Press **ENTER**. Now increment both memory numbers by moving **EDIT KNOB**s **2** and **4** one position (be careful — they are sensitive), and press **ENTER** again. Keep doing this until all of the Internal memory locations are taken care of. (This same procedure can be used to read a card's entire contents into Internal memory — just reverse the source and destination memories.)

The memory and "last" indicators

You can keep an eye on how much memory is available for programs with the memory indicator that appears on many of the Memory mode's screens. The indicator shows the amount of memory available in the Internal or current Card memory, depending on the position of the first **EDIT KNOB** (except on the Copy screen, where it shows the amount of space available in the *destination* memory). The larger the area of the indicator that is dark, the more memory you have used, and the less is available.



One other item that appears on the Read screen only is the "Last" indicator. This shows the number of the last program to be loaded in, and whether it came from the Internal memory or Card memory.

Using MIDI Program Changes

Programs can be loaded into memory under MIDI control, using Program Change commands. If you want to use the R-880 and GC-8 in this way, connect a MIDI cable from your controller or sequencer to the "MIDI In" jack of the *GC-8* ***only***. *Do not connect any MIDI cables to the R-880!*

Setting the MIDI Channel

You must first select the MIDI channel you want the system to receive the Program Changes on. If you want to receive on the channel the system is currently set to (which, if you've been following the directions thus far, should be Channel 1), you can skip the following and go on to setting up the Program Change Table.

If you want to use a different channel, follow this procedure:

1) Select the MIDI channel by pressing the **MIDI CH SELECT** button on the R-880 repeatedly until the desired channel appears in the display. (If you go past "16", the display will start over at "1".)

2) On the GC-8, go to the Read screen on the Memory menu by pressing **SHIFT-FUNC5** then **FUNC1**. Select a memory location that has a program in it and press **ENTER**.

3) Wait approximately 35 seconds. The display will then say:

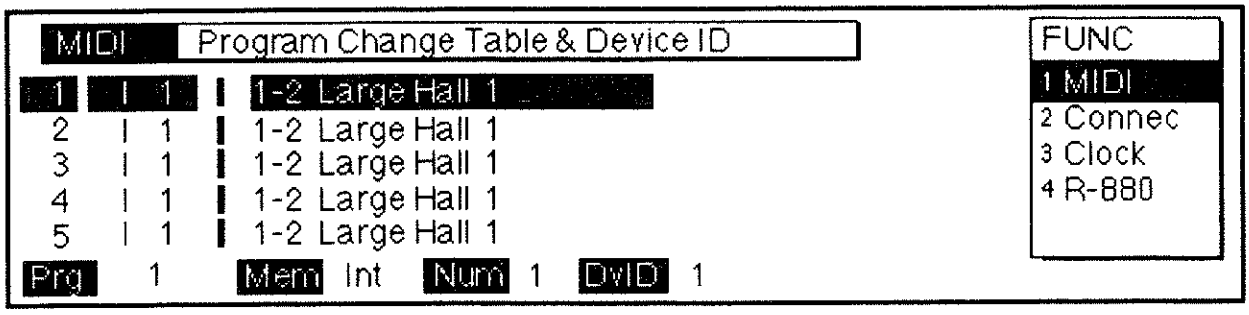
Communication error on Ch 1
Connected with Ch 2 *(or whatever channel you have chosen)*
Continue? (Yes:Control)

4) Press **CONTROL**. The system is now running on the new MIDI channel.

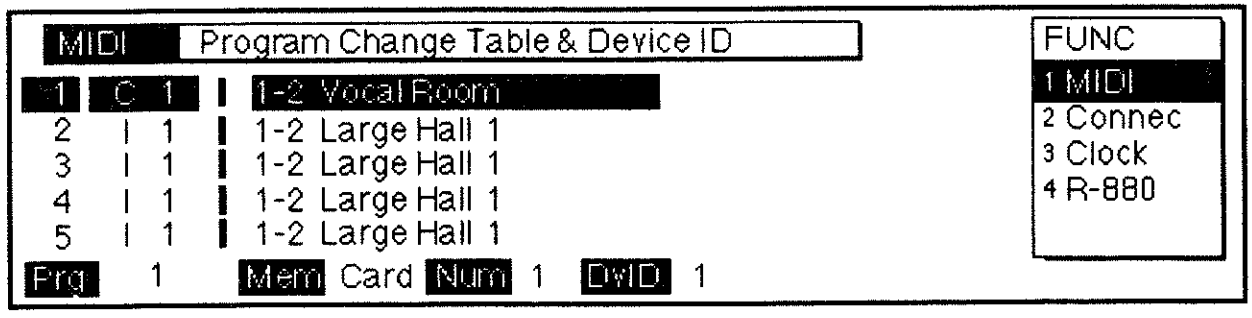
The MIDI Program Change Table

You can assign different MIDI Program Change numbers to call up different programs from memory. These assignments are made in the Program Change Table.

You get to the Program Change Table by going to the **FUNC**tion mode: **SHIFT-FUNC4**. Item 1 on this menu is "MIDI" (**FUNC1**).



The MIDI screen shows MIDI Program Change numbers in the left column, and program memory types and locations (along with names) in the right. You can scroll up or down the Program Change numbers either with **EDIT KNOB 1** or the **CURSOR** keys (the **LEFT-** and **RIGHT-CURSOR** keys change pages, just like in the **MEMORY** mode). You select the memory location assigned to a particular program number with **EDIT KNOB 2** (to choose between Internal and Card) and **EDIT KNOB 3** (to set the number).



Remember that when you are dealing with Card memory, you are assigning *memory locations* to MIDI Program Change numbers, not specific *programs*. If you assign Card memory number 4 to MIDI Program Change 1, and you remove the card and insert a different card, then sending MIDI Program Change 1 will call up memory number 4 on the *new* card.

Note that you can assign a memory location that has nothing in it to a MIDI Program Change number. If the system receives a Program Change that corresponds to an empty memory location, it will do nothing. This allows you to set up "dummy" program changes, which can be useful if you have a GC-8/R-880 system and another MIDI device reading the *same* MIDI channel. The GC-8 can be set to respond only to Program Changes 0 through 63, with Program Changes 64 through 127 assigned empty memories, while the other device is set up the other way around, so that it only responds to Program Changes 64 through 127.

Other uses of MIDI

MIDI is also used when one GC-8 controls more than one R-880. This is discussed in Chapter 11. In addition, System Exclusive commands can be used to control directly other functions of the system, including individual parameters. This is not discussed in this manual, but the list of System Exclusive commands is in the Appendix, and more information is available directly from Roland.

Device IDs

System Exclusive commands require a "Device ID" number. This is so that multiple GC-8s in a MIDI system can be addressed individually. The "Device ID" control on the MIDI screen sets this number for the GC-8. Unless you are using System Exclusive commands with multiple units, it is wisest to leave this number alone.

Chapter 5
Algorithms

In the R-880/GC-8 software, an "algorithm" is defined as a way of combining and arranging processing modules to achieve a desired effect. There are two parts to an algorithm, which are determined on the two different menus in the Algorithm Mode.

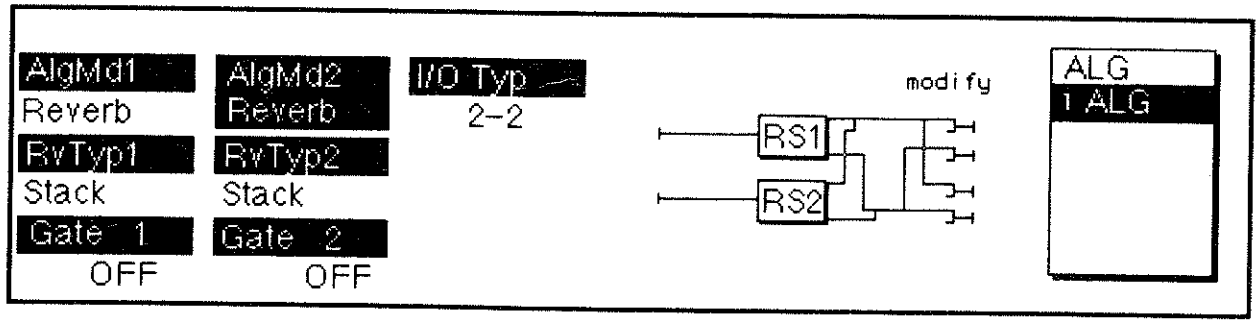
At the heart of every algorithm are two reverb modules. The first step in designing an algorithm is to set up those reverb modules, and specify their mode, their type, and their input/output configurations. When a reverb module is set up, the R-880/GC-8 software automatically calls into play other modules, and arranges and connects them in various ways that complement the reverb modules. The second step in designing an algorithm, and it is an optional step, is to change the way those modules are set up, and to add or subtract various modules from the algorithm. These modules can be used in conjunction with the reverb modules, or on their own. In fact, it is quite possible to delete one or both of the reverb modules entirely from an algorithm, and just use other processing modules.

Note that, while many individual parameters can be changed in real time — i.e., while signal is being processed through the R-880 — without interruption, algorithms cannot. When you make any change in an algorithm on the GC-8, before that change goes into effect it must first be "transmitted" to the R-880. There are various ways to achieve this transmission, which will be explained as we go along.

Reverb Mode

The first part of an algorithm is called the "Reverb Mode". This mode has two visible functions: the type of reverb produced by the two reverb modules, and how those modules are connected together. It also has an *invisible* function, which is to arrange other modules and connect them. We will leave the discussion of the types of reverb available for Chapter 8, and for now we'll discuss how the modules are connected.

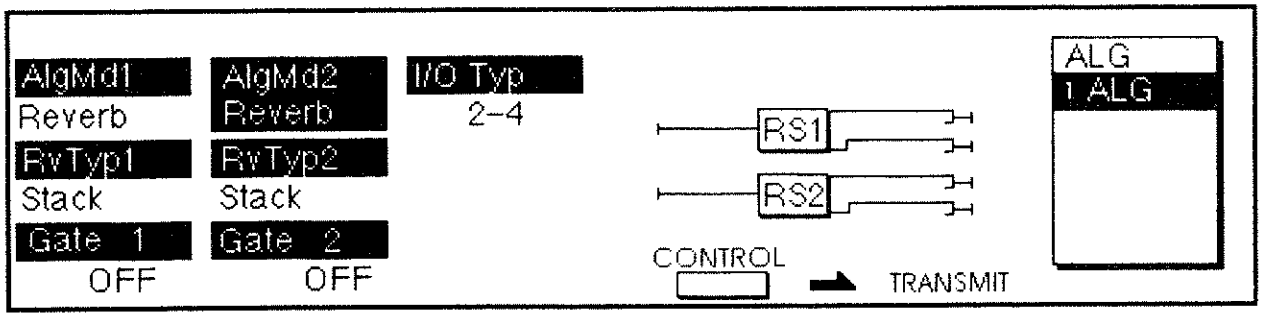
Press **SHIFT-FUNC5** to get to the **MEMORY** menu, then **FUNC1** (Read). Select Internal location 20, "2-2 Independent Reverb". Press **ENTER** to load it in. Now press **SHIFT-FUNC1**, and then the **UP-ARROW**. The screen now showing is the Reverb Mode screen (the menu says "ALG", but "Reverb Mode" is a clearer term.)



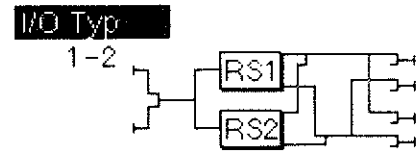
This program uses two independent reverb modules, and you see those displayed on the right side of the screen as boxes marked "RS1" and "RS2". You also see that there are input and output signal paths indicated to each of the modules. In this program, each module has its own input, but the outputs are combined in pairs: the top (left) output of the top (first) module is combined with the top output of the bottom module, and the bottom (right) outputs of the two modules are similarly combined. The figures on the far right of the diagram represent the four outputs of the reverb mode (which can be, but don't have to be, the same as the R-880's four outputs). In this program, the combined left output of the reverb modules is split to outputs 1 and 3, while the combined right output is split to outputs 2 and 4.

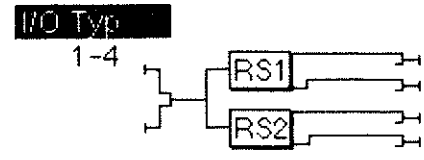
Ignore the first two columns of parameters for now, and move the **CURSOR** so that it is on "I/O Typ". It reads "2-2", which describes the input/output structure of the reverb mode that we've just described: two independent inputs, two separate outputs. Now turn **EDIT KNOB 3** one notch clockwise. A warning message appears, telling us that by moving this knob we will change the algorithm, and before we can continue, this information must be put into effect by transmitting it from the GC-8 to the R-880.

Press **CONTROL** to get rid of the warning message, and press **CONTROL** again to transmit the information. The "I/O Typ" number has changed to "2-4", and the diagram has changed as well; now each of the modules has two of its own outputs. "2-4" therefore means two independent inputs, and four separate outputs. (If you had pressed **CANCEL**, the "I/O Typ" would have remained 2-2.)



Turn the "I/O Type" knob counter-clockwise two notches, and you will see the "1-4" diagram, in which the inputs are combined before they are sent to the reverb modules. Turn it another notch to see "1-2", in which the inputs are combined before the modules, *and* the outputs are combined after the modules.





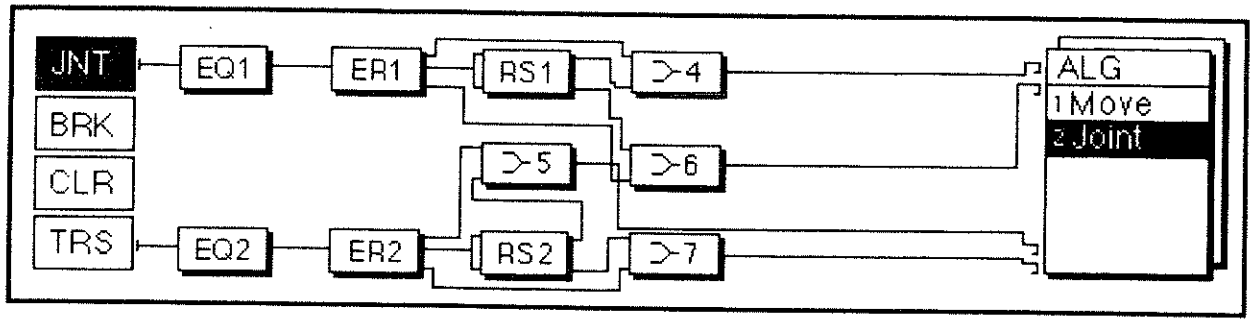
Notice a new figure has appeared on the screen as you turn the knob, which is telling you to press **CONTROL** if you want the new knob setting to be sent to the R-880. Now that you have sent one algorithm change, you can turn the knob freely, but none of the settings will be *effective* until you press **CONTROL**. If you leave this menu, either by pressing **DOWN-ARROW** or moving to another mode with the **SHIFT** and **FUNC2**, **3**, **4**, or **5** keys, you will also be asked if you want to transmit the current settings, or leave them as they were when you last transmitted.

These are the four basic reverb input/output configurations. As mentioned in the previous chapter, when you are naming a new program, it might be a good idea to put the I/O configuration at the beginning of the program name, e.g., "1-4 Gigantic Hall". All of the factory programs — RAM and ROM — do this.

When you adjust the parameters in the Reverb Mode, it actually affects more than what you see immediately — it causes changes in the way modules are arranged on the desktop as well. We will discuss the desktop first, and then come back to the relationship between these two screens.

The Desktop

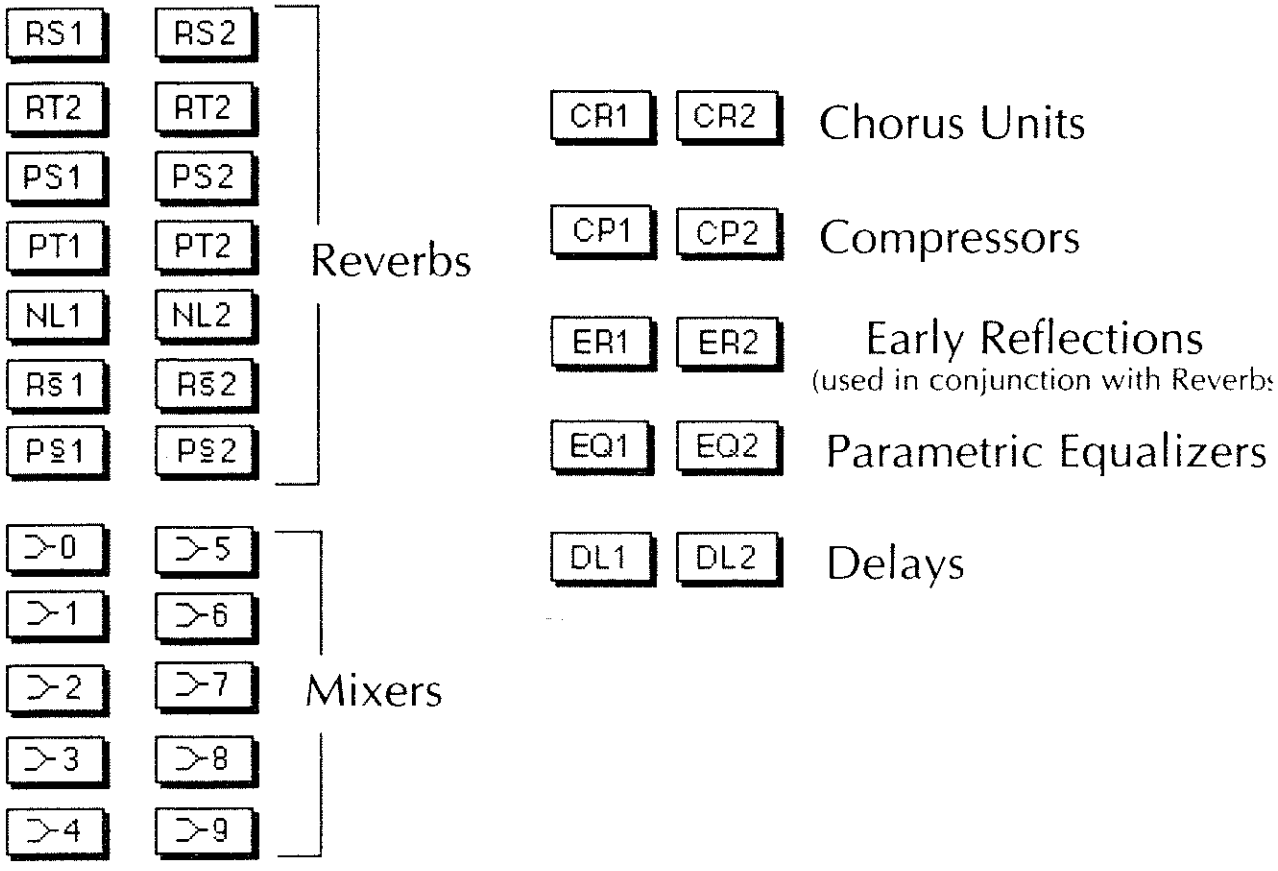
Go back to "2-4", and press the **DOWN-ARROW** key. There's the "Transmit" warning again, so press **CONTROL**, and wait a couple of seconds. Then press **FUNC2.**



Now we are looking at the second part of the algorithm, the "Desktop". The Desktop shows *all* of the modules being used in the current algorithm, and how they are connected together. With your eye — and your finger if it helps — trace the signal paths from the two inputs. Each one goes into a module marked "EQ" (equalizer), and from there into a module marked "ER" (early reflections). Some of the outputs of the ER modules go into modules marked "RS" (reverb stack), while others go to modules with a "combining" symbol, which are mixers. Finally, there are paths to all four of the outputs.

These modules were all automatically placed by the software when you adjusted the settings on the "Reverb Mode" screen. Any change that you make on the Reverb Mode screen will cause the algorithm to be re-designed. This algorithm can be used as is, or it can serve as a "starting point" for designing your own algorithm.

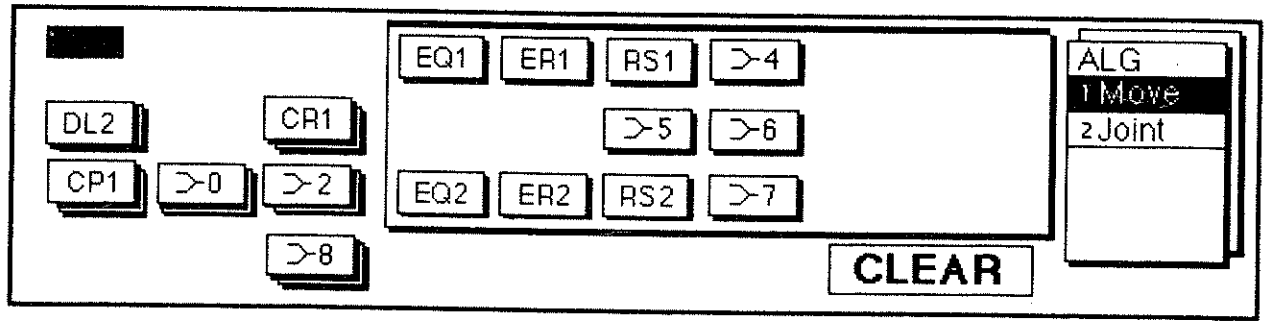
Here are all the modules you may find on the desktop:



The reverb modules will have different letters and other symbols depending on the type of reverb they represent. This is explained Chapter 8.

Putting modules on the desktop: the Move screen

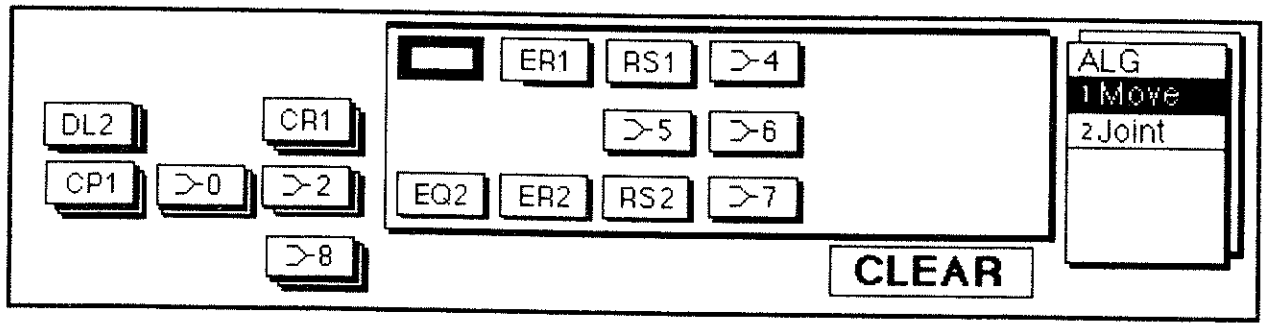
Press **FUNC1** to select "Move". The Move screen lets you bring modules in and out of the algorithm, while the "Joint" screen (**FUNC2**), which you just saw, is used for arranging their connections.



The rectangular area on this screen is known as the "active area". Modules within this area are already in use, while those outside are not, but they are available for adding on. If more than one module of a particular type is available for adding on, those modules are "stacked" on the display. The cursor is indicated by a black rectangle, and if the cursor is on a module, the name of the module is indicated in reverse type.

Assembling and moving the modules on this screen is done with the **CURSOR** and **ENTER** buttons. You select a module with the **CURSOR** buttons, "pick it up" with the **ENTER** button, move it with the **CURSOR** buttons, and "drop it" in place with the **ENTER** button.

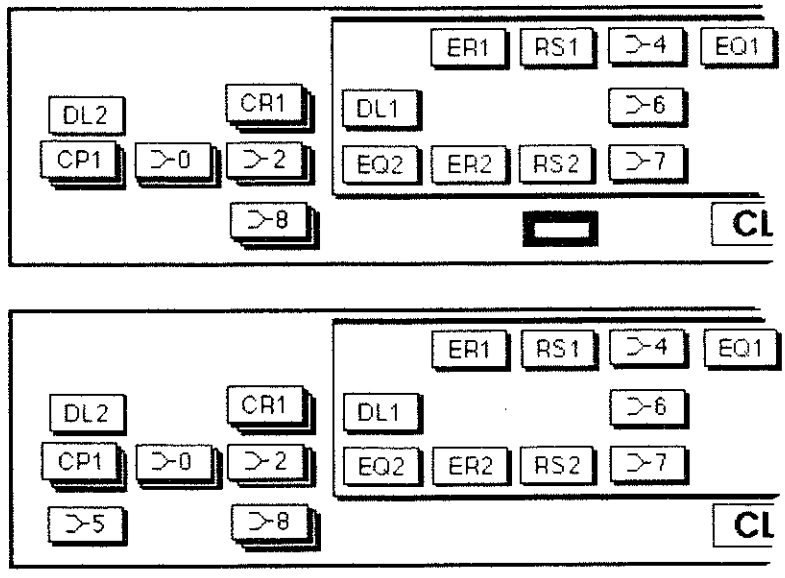
Here's an example of how to move a module from one part of the active area to another. Press the **CURSOR** buttons until the cursor is on the module marked "EQ1". Note that the cursor "wraps" at the edges of the screen — if you go above the top of the screen, it reappears at the bottom, and if you go off the left edge, it reappears at the right.



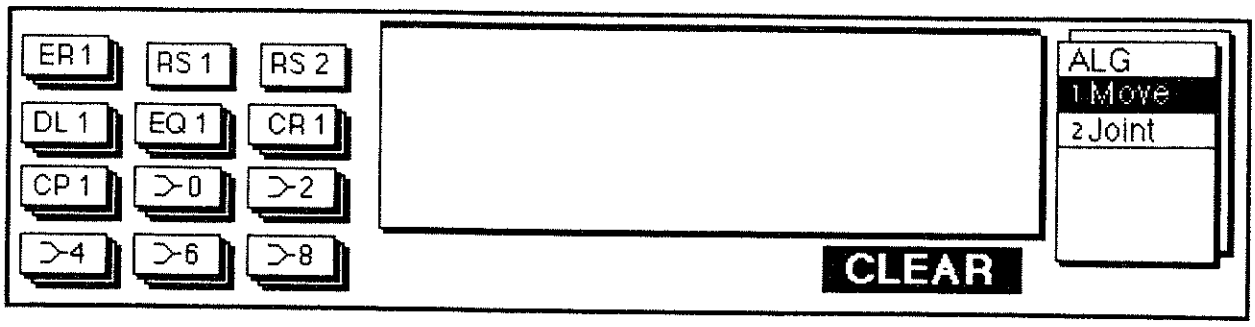
Press **ENTER**. The module is replaced with an open rectangle showing that it's been picked up. Press the **RIGHT CURSOR** button four times, and watch the rectangle move to the far right of the screen. Press **ENTER**, and the module reappears in the new location.

Let's take a module that's not active and make it active. Move the cursor to the module marked "DL1" (delay). Press **ENTER**, and press the **RIGHT CURSOR** once. Notice that another module, "DL2", which was underneath DL1, is now visible. Move the cursor into the active area, and press **ENTER**, dropping it off.

Let's remove a module. Move the cursor to mixer 5, press **ENTER**, and then press the **DOWN CURSOR** twice, so it is below the bottom edge of the active area. Press **ENTER**. Note that the module isn't just "dropped off" right there — it moves to a different place on the desktop. This demonstrates an important feature: Any module that is not active will always be found on the desktop in a *specific location* — an "assigned parking space", if you will. Once you move a module out of the active area, you can drop it off anywhere — even on top of another module (but *not* on top of the "CLEAR" box) — and it will always end up in its assigned space. This helps to minimize confusion when constructing algorithms, because you always know where your modules are. It also means that you have to assign like modules in numerical order: "DL1" has to be placed in the active area before "DL2" can.



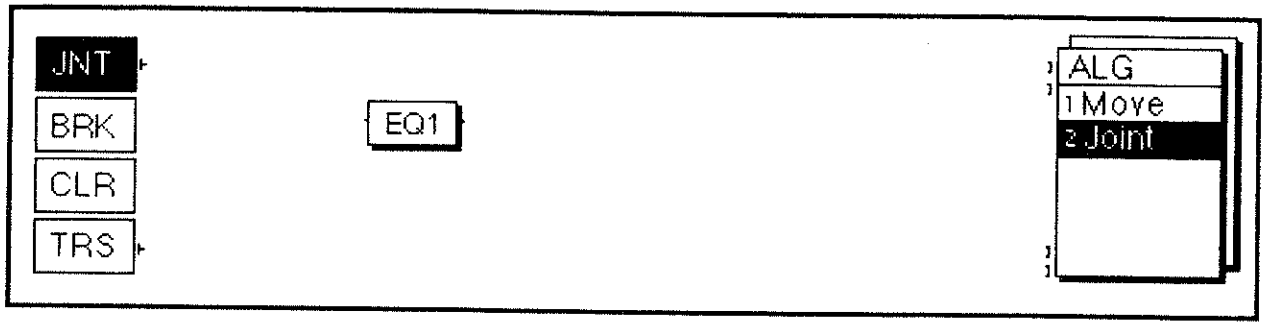
One more operation before we leave the Move screen: Move the cursor to the box with the word "CLEAR" in it. Press **ENTER**. All of the modules are moved out of the active area and back to their assigned places on the desktop. The CLEAR function works even if you are "carrying" a module with the cursor, so be careful not to drop a module on top of the CLEAR box, or the whole screen will be cleared. Should you want to build an algorithm from scratch (instead of simply modifying an algorithm created by the software in the Reverb mode), Clearing the screen first is the best way to start .



Connecting modules on the desktop: the Joint screen

Placement of the modules in the active area of the desktop is only part of the task of designing an algorithm; you also have to connect them together. The "Joint" screen (**FUNC2** on the lower menu of the Algorithm Mode) handles this task.

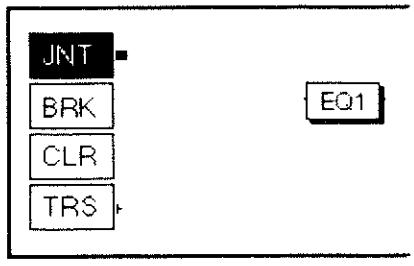
To illustrate how it works, we're going to start with a blank algorithm. Go back to the empty Move screen (**FUNC1**) that you just created with the CLEAR box. Use the **CURSOR** and **ENTER** keys to move an equalizer module ("EQ1") into the active area. Now press **FUNC2** to get to the Joint screen.



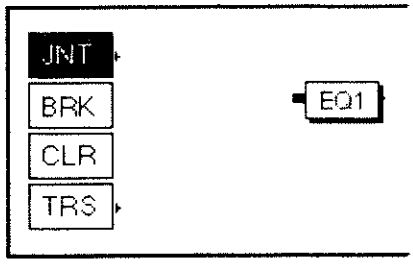
The four boxes at the far left of the screen represent the four "joining" functions: Join, Break, Clear, and Transmit. The two small triangles next to the boxes are the two inputs, **A** and **B**, of the R-880. Remember that the inputs can be either analog, or digital, or both. If you are using both, you can adjust them individually in the "Mixer" mode (see Chapter 7). The four half-squares at the right side of the screen (next to the menu) are the outputs, **1**, **2**, **3**, and **4**. Each output has two "sub–outputs", A and B, which can be connected separately and then balanced in the Mixer mode. (The analog and digital outputs are wired in parallel to each other, and can *not* be adjusted individually.)

The Joint screen has two modes of operation: *1)* selecting the function and *2)* selecting the points at which to make (or break) the connections. The two modes are toggled with the **CONTROL** button. When you first enter the screen, the "JNT" function block is flashing. Press **CONTROL**, and the "JNT" block turns black, while the icon for input **A** starts to flash (it's a little small — look closely), indicating that you are now in the "connection" mode. The **CURSOR** keys are used to move the cursor around. As always, they wrap around at the vertical and horizontal edges.

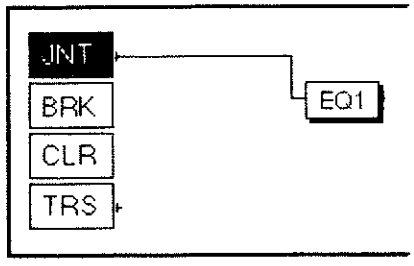
Let's connect the EQ module. Make sure the "JNT" function is selected, and the cursor is on input **A**. (If necessary, go back to the function mode by pressing **CONTROL**, move the cursor [using the **UP-** or **DOWN-CURSOR** keys] to "JNT", and press **CONTROL** again.)

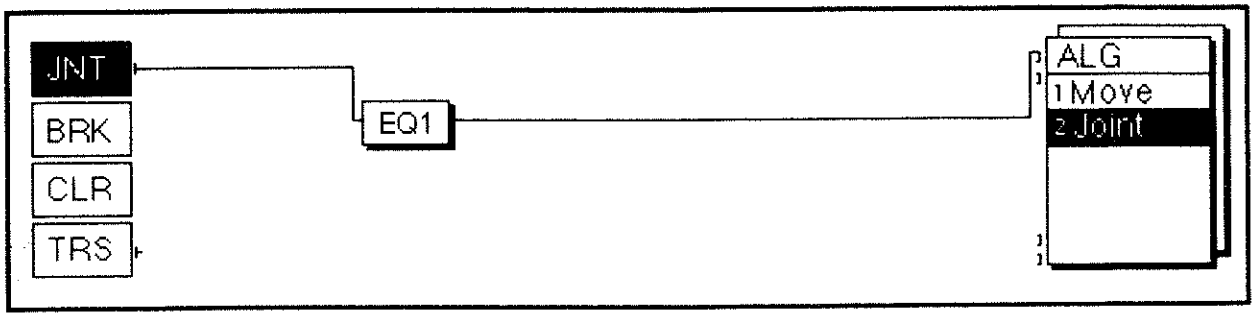


Press **ENTER**. The cursor has gotten larger, indicating that it has selected a point (input **A**) at which it will make a connection. Move the cursor over and then down until it is at the left side of the EQ module. Press **ENTER** again. A line appears, connecting the two points — you've made a connection! The cursor has resumed its normal size.



Now move the cursor to the right side of the EQ module and press **ENTER**. The cursor gets big again. Move it to the top line of the half-square representing output **1**. Press **ENTER** again. A signal path appears. You now have a complete, albeit simple, algorithm: signal from input **A** goes to equalizer 1, and from there to output **1**.

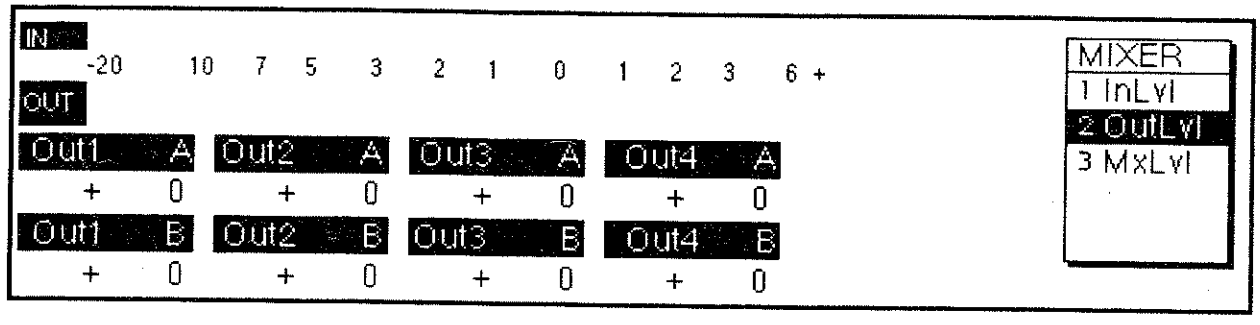




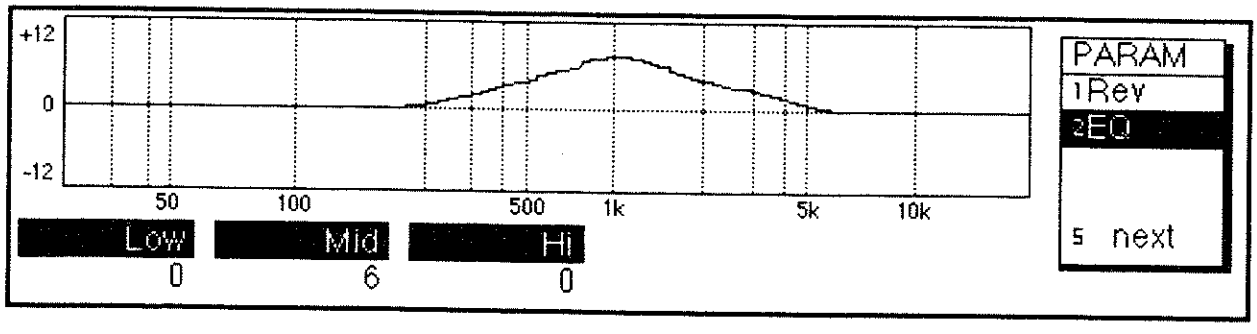
Hearing your new algorithm: a short detour

You probably want to hear what this sounds like. However, this requires a few adjustments in a different mode. Whenever you change an algorithm on the Move or Joint screen, the software automatically shuts down the outputs of the R-880, by setting the levels at all of the outputs to 0, in order to prevent signal overloads both inside the R-880 and in any equipment it is connected to. Therefore, if you want to hear any sound through the R-880, you first have to go to the Mixer Mode and turn those levels up. This will be covered in detail in Chapter 7, but for now, here's a quick way of doing it:

Press **SHIFT-FUNC3**. When the "Transmit?" warning appears, press **CONTROL** to put the new algorithm into effect. Press **FUNC2** ("OutLvl"). Move the cursor so that it is on "Out1 A". Use the **NUMERIC** keys to type in "100", and press **ENTER**.



Even though the equalizer module is now connected, it actually isn't doing anything because its default setting is "flat". Therefore, in order to hear it have an effect on the sound, you have to change its settings. This is done in the Parameter Mode. Again, this will be discussed more in Chapter 6, but try this now: press **SHIFT-FUNC2**, and then **FUNC2** (if nothing happens when you press **FUNC2**, press **UP-ARROW**, and **FUNC2** again). You are now on the EQ "Macro" screen, and the first three **EDIT KNOB**s will change the relative gain of three bands of equalization.



Connection techniques

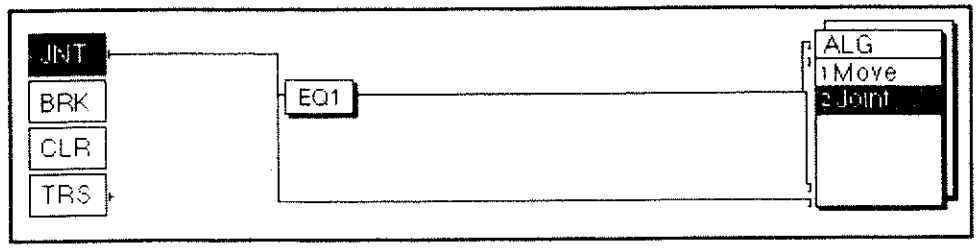
You can only connect an output to an input — the software will not let you connect two inputs together or two outputs together (except of course the *R-880* input can be connected to a module input). You do not, however, have to connect outputs and inputs in any particular order: you can start by selecting an input and then connect it to an output, or do it the other way around. Neither is it absolutely necessary for the signal path to go across the screen consistently from left to right; you can have the output from a module on the right side of the screen connected to the input of a module on the left. However, the display will be easier to follow if outputs are located to the left of the inputs they feed.

Note that while *you* select the start and end points for a connection, *the software* determines how the connection gets displayed. You may not always agree that the way the software draws the connection is the best or clearest way to draw it, but there is not much you can do about it, and of course, it doesn't really matter.

If a module is connected on the Joint screen and is then moved out of the active area on the Move screen, all of its connections will be severed. If you change its position *without* removing it from the active area, its connections will stay intact, and will simply move around with the module.

If you make a mistake and choose a starting point for a connection that you don't want, you can cancel it in one of two ways. You can press **CONTROL** twice, which will land the cursor back on Input **A** and de-select it. Or, you can put the cursor back on the starting point and press **ENTER**. The cursor will stay where it is, but will return to its normal size. (The fact that every time you enter the connection mode the cursor goes back to input **A** can be helpful if you ever lose track of the cursor: you can always find it on input **A** by pressing **CONTROL** twice).

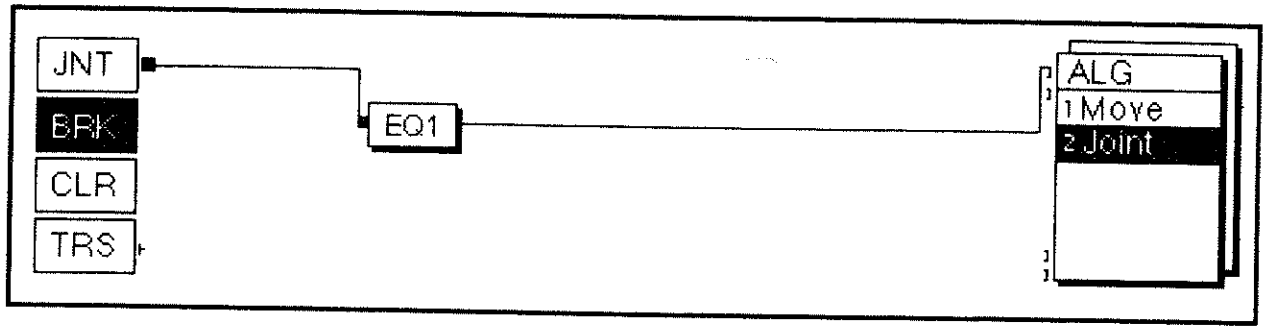
Like in a conventional audio patch bay, you can split, or "mult" any of the outputs of a module (or the R-880 inputs) to more than one destination. The procedure is the same as setting up the first connection: choose "JNT" from the function mode, move the cursor to a starting point, press **ENTER**, move the cursor to the ending point, and press **ENTER** again. You can split off as many signals from a single



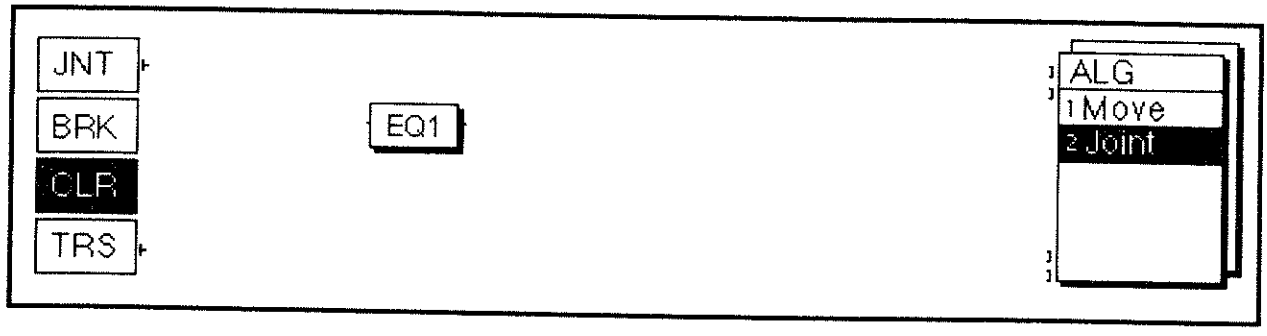
output as you like. You cannot construct two signal paths connecting the same input and output, nor can you *combine* two signals at one input — as in the real world, this can only be done through a Mixer.

Other functions of the Joint screen

If you want to remove a connection, use the "BRK" (Break) function. Go to the function mode, and use the **UP-** or **DOWN-CURSOR** keys to select BRK. Press **ENTER**, and now the procedure is exactly the same as for making a connection: move the cursor to select a starting point, press **ENTER**, move the cursor to the ending point, and press **ENTER** again. The line connecting the two modules will disappear. (It is not necessary to select the input and output whose connection you are breaking in the same order you did when you made the original connection.) If you select a single point in error, you can cancel it just the same way as you can in the "JNT" function: either exit the mode and re-enter it by pressing **CONTROL** twice, or move the cursor back to the starting point you selected, and press **ENTER**.



The third function on the Joint screen is "CLR" — Clear. Moving the cursor to this box and pressing **CONTROL** eliminates all of the signal paths on the screen, without disturbing the modules themselves. Note that in this case, **CONTROL** does not serve as a toggle between the two modes, but merely executes the Clear function.



The final function is "TRS" — Transmit. Normally, any changes in the algorithm made on the Joint screen are not put into effect — i.e., transmitted to the R-880 — until you leave the screen, either by going to the Move screen, or the upper Algorithm (Reverb Mode) screen, or to some other mode entirely. However, changes can be made effective from *within* the Joint screen by selecting "TRS" and pressing **CONTROL**. Again, **CONTROL** here is not a toggle, but simply executes the Transmit function.

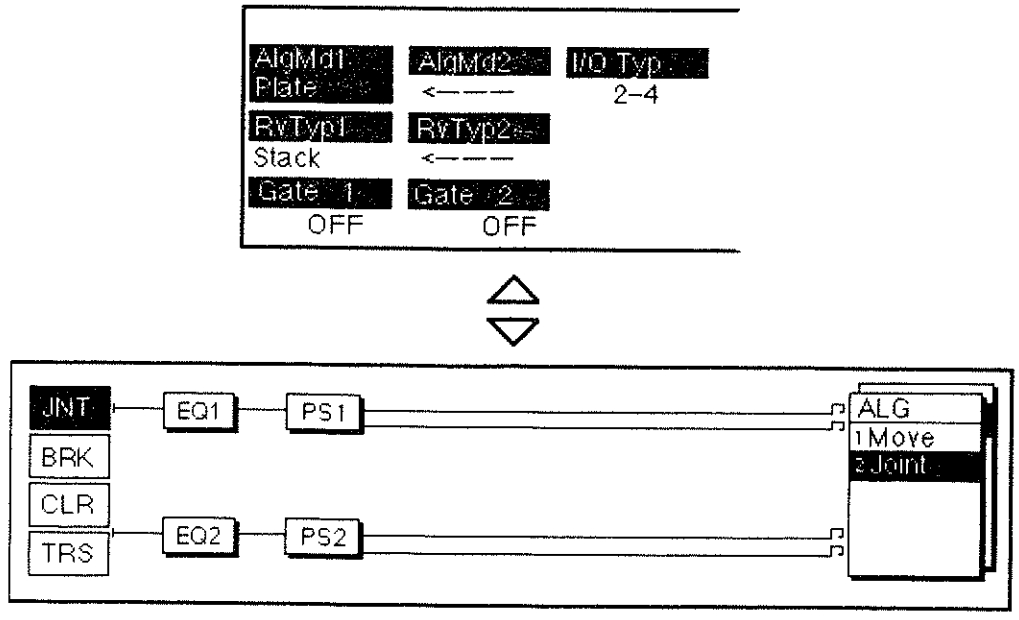
If all of this moving and joining seems like a lot of work, it is. But creating a complex algorithm from scratch is probably not something you're going to do often. Most of the activity you will be doing on the Move and Joint screens will be *modifying* algorithms that the software designs for you.

First *the Reverb,* then *the Desktop*

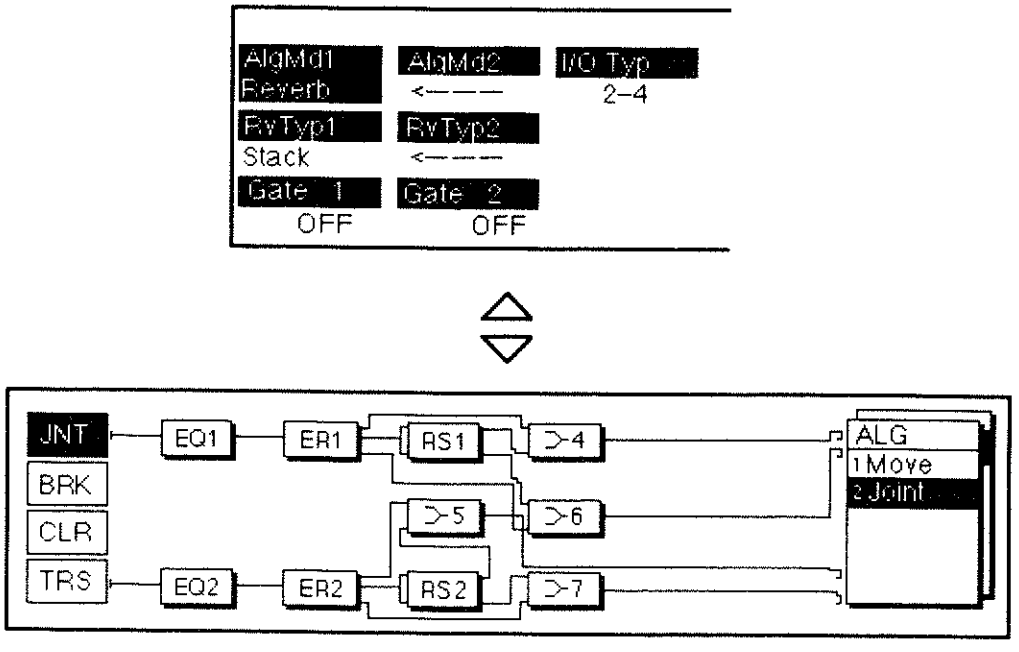
One very important principle to keep in mind is that changing anything on the Reverb Mode screen will create a *completely new* algorithm, and will therefore negate any changes made on the Joint or Move screens. That is one of the reasons the "Transmit?" message appears whenever you are working on the Reverb Mode screen — it is reminding you that you if you have made any adjustments on the Joint or Move screens, you will lose them. (To further remind you, the word "modify" will appear on the Reverb Mode screen if any Joint or Move adjustments have been made.)

Therefore, it is imperative that you work in a "top-down" fashion when you are constructing an algorithm: make your adjustments on the Reverb Mode screen first, and then work on the Move and Joint screens, and after you're done, *don't touch* anything on the Reverb Mode screen.

The relationship between the Reverb Mode and the Move and Joint screens is known as "Macro" and "Manual" editing, and it is discussed further in the next chapter.



Changing the Reverb Mode completely redesigns the desktop

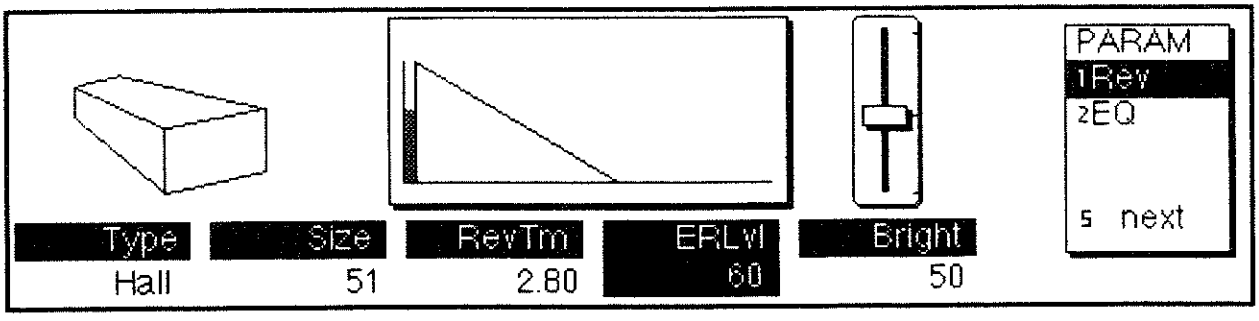


Chapter 6
Parameters

Once an algorithm has been built, how it affects a signal is determined by the parameters of the modules within it. Each module has its own particular set of parameters, which will be discussed in detail in the chapters following. This chapter will discuss the general principles behind adjusting parameters.

Parameters are adjusted in the Parameter Mode: **SHIFT-FUNC2**. The main menu for this mode has two pages, which are toggled between using **FUNC5** (" next"). The number of items that will appear on each page is determined by the algorithm. Any module that is used in an algorithm will appear on one of the pages of this menu. However, it will often happen that modules that are *not* in use will appear on a menu page as well. This is not something to worry about, and adjusting parameters in those modules will have no effect on the sound.

Let's adjust a parameter. In the **MEMORY** mode (**SHIFT-FUNC5**), select Read, and scroll to internal memory location 19: "2-2 Delay & Reverb 2". Press **ENTER** to load the program in, and press **SHIFT-FUNC2** to go to the **PARAM**eter mode. The first menu selection should be "1 Rev" — if it is not, press **FUNC5** (" next"). Press **FUNC1** to select it.



The screen now shows five parameters pertaining to the Reverb module: type of reverb, size of the "room", reverb decay time, level of early reflections, and brightness. Moving any of the five **EDIT KNOB**s will change the value of the parameter corresponding to its position. (If you're wondering why there is only one set of Reverb parameters, even though there are two Reverb modules, it is because in this program, the Reverb modules are in "Tandem" mode. More on this in Chapter 8.)

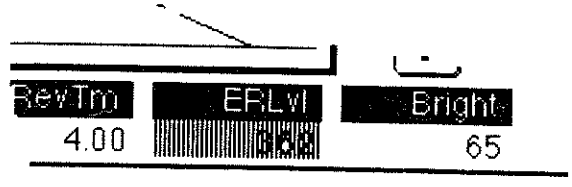
Some of the parameters have a very wide range of values that can be selected, requiring several full turns of their edit knob to cover. Different parameters also have different resolutions, so that covering the same numerical range requires varying amounts of knob turning. For example,"RevTm" can be set in this program from 0.1 to 99.9 (seconds), and the resolution is such that it takes more than 11 turns of the edit knob to cover the entire range. "Size" has almost as large a range — 0.2 to 80 (meters) — but its resolution is much lower, and it only requires 3/4 of a turn of the knob to cover the range. "Type" only has two settings, Room and Hall, so covering this range requires turning the knob only a single notch.

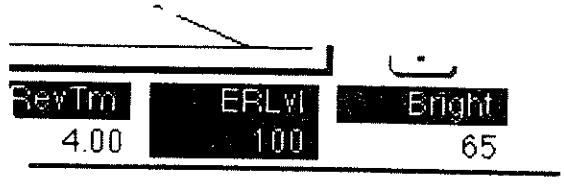
Note that the movements of the edit knob are all relative — there is no "absolute" position of a knob that corresponds to a certain parameter setting. Therefore, if you turn clockwise past the end of a parameter's range, the values will stop increasing, but if you then start to turn the knob counterclockwise, the values start to decrease immediately.

Using the NUMERIC keys

You can also use the **NUMERIC** keypad to enter most parameter values. Use the **LEFT-** and **RIGHT-CURSOR** keys to select the parameter you want to change, and then type the new value on the **NUMERIC** keypad, followed by **ENTER**. As soon as you type the first digit, the parameter will start to flash. When you press **ENTER**, it stops, and the new value takes effect.

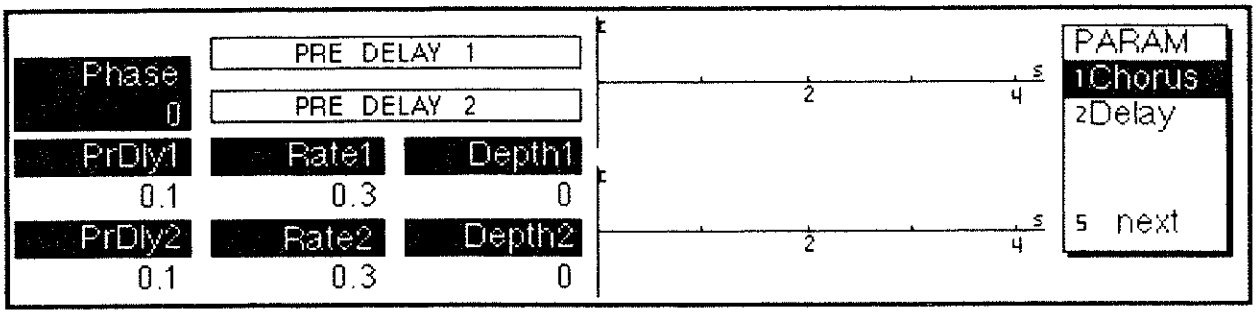
Use the minus sign (-) for negative values, and the decimal point (.) for non-integral values. (If the parameter doesn't recognize non-integral values, the decimal point will be ignored). If you mis-type a digit, press **CANCEL** and start over, or you can leave the current menu by pressing one of the **FUNC** or **SHIFT-FUNC** buttons, which leaves the parameter at its last setting. If you type a number out of the parameter's range, the highest value in the range — or the lowest, if you type a negative number — will be substituted automatically.





Multiple rows of parameters

If you have more than one horizontal row of parameters on a screen, the procedure for changing them is slightly more involved. Let's look at one such screen. From the Reverb parameter screen, type **FUNC5** and **FUNC1**. Now we are looking at the Chorus parameter screen. Press the **UP-CURSOR** key until the cursor is in the upper left-hand corner of the screen, on the parameter "Phase" . **EDIT KNOB 1** adjusts this parameter, but since there are no other parameters on this row, none of the other **EDIT KNOB**s are active. Numbers typed on the **NUMERIC** keypad will adjust this parameter as well.



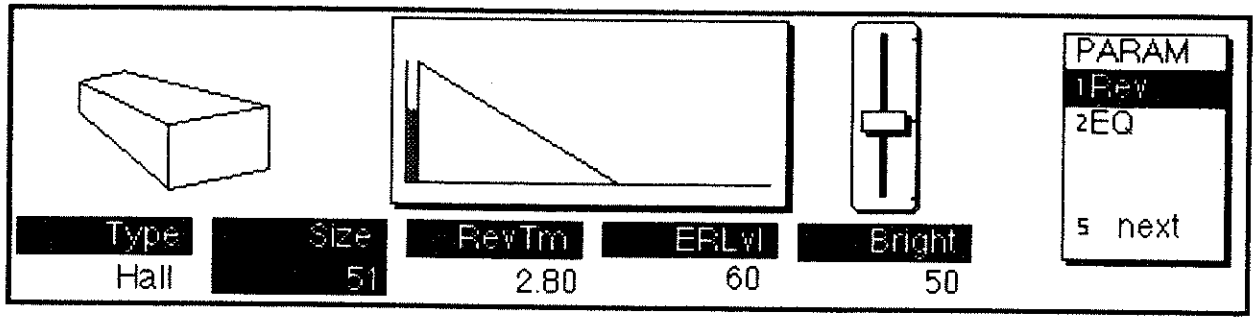
Pressing the **LEFT-** or **RIGHT-CURSOR** keys has no effect, but if you press the ***DOWN-CURSOR*** key, the cursor moves down one row. Now, because this row has three parameters, the first three **EDIT KNOB**s are active. You can move the cursor to the left or right, and wherever it is located, the **NUMERIC** keypad will be active. Move the cursor down another row, and now the **EDIT KNOB**s affect the bottom row of parameters. (As in most screens, the cursor wraps when it reaches the edge of the display, so moving down from the bottom row puts the cursor on the top row, and moving left from one of the leftmost parameters puts the cursor on the rightmost parameter in the same row.)

Macro and Manual parameter editing

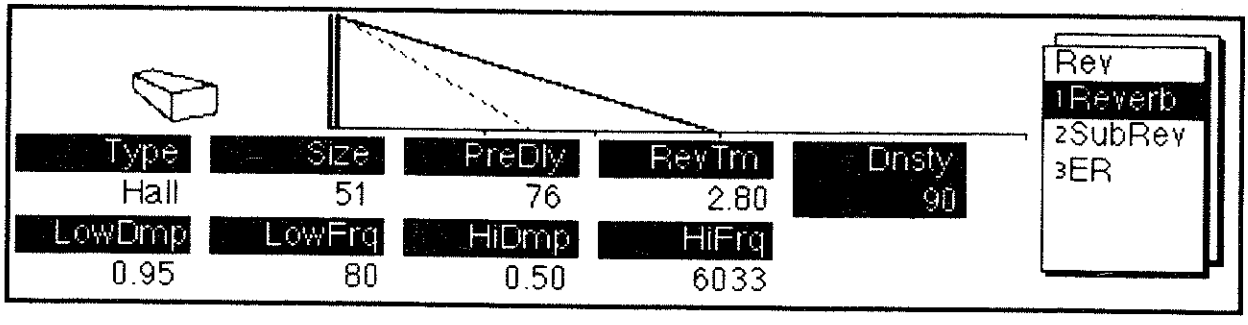
The R-880/GC-8 software includes a special feature for allowing you to set up parameters quickly within certain complex modules. This is known as "Macro editing" (it is referred to in some previous literature as "Auto-calc"). Macro editing adjusts a number of commonly-related parameters simultaneously, in usable ways. For those who want to get into the nitty-gritty of parameter editing, Macro editing can be augmented using "Manual" editing.

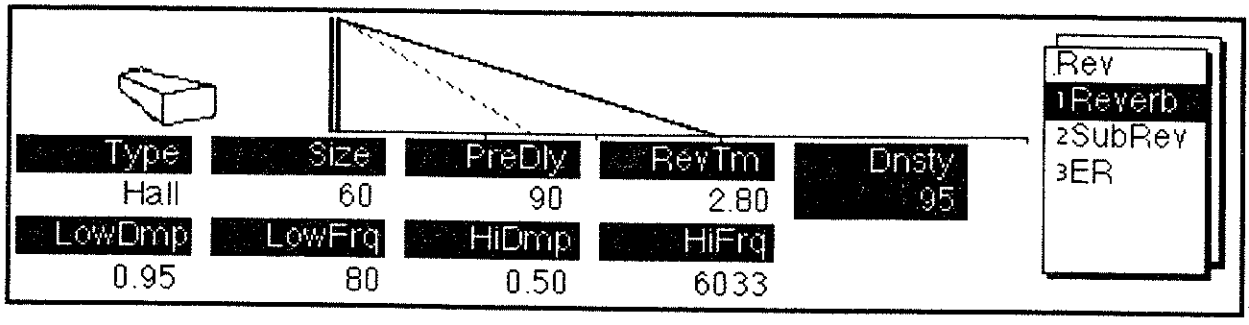
Macro editing is used only in the reverb and equalization modules. It is the "upper" screen of the parameter screens for those modules — when you select a reverb or EQ module from the Parameter menu, you may have to press **UP-ARROW** to get to it.

So that we have a known starting point for working with this idea, go back into the **MEMORY** mode and re-load program I-19, "2-2 Delay & Reverb 2". Enter the **PARAM**eter mode, and select "Rev", item 1 on the first page of the **PARAM**eter menu. Press **UP-ARROW** to make sure you are on the Macro screen.



Now press **DOWN-ARROW** and then **FUNC1**. Here is another screen that shows reverberation parameters, but quite a few more of them. *Don't change* anything on this screen yet, but look at the values for "Size", "PreDly" (pre-delay), and "Dnsty" (density): they are 51, 76, and 90 respectively. Go back to the upper screen by pressing **UP-ARROW**. Now move **EDIT KNOB 2** one notch, changing the "Size" parameter to 60. Press **DOWN-ARROW** and look at the lower screen. Not only has "Size" changed to 60, but "PreDly" has increased to 90, and "Dnsty" has increased to 95.

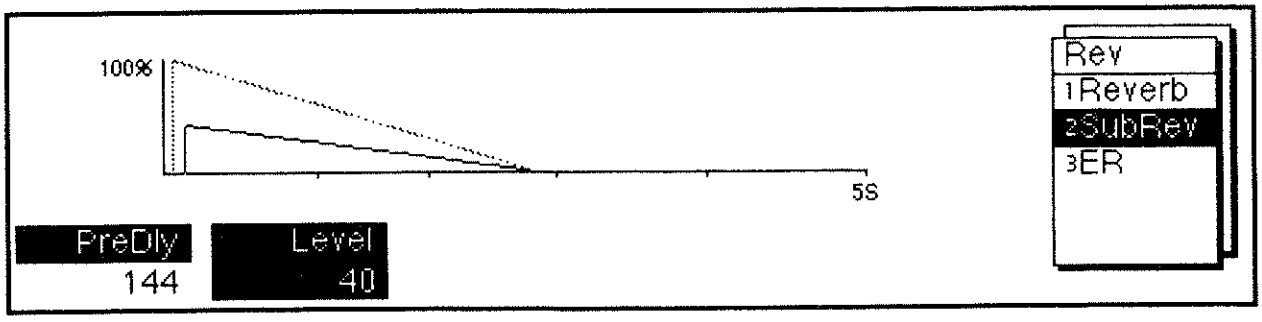


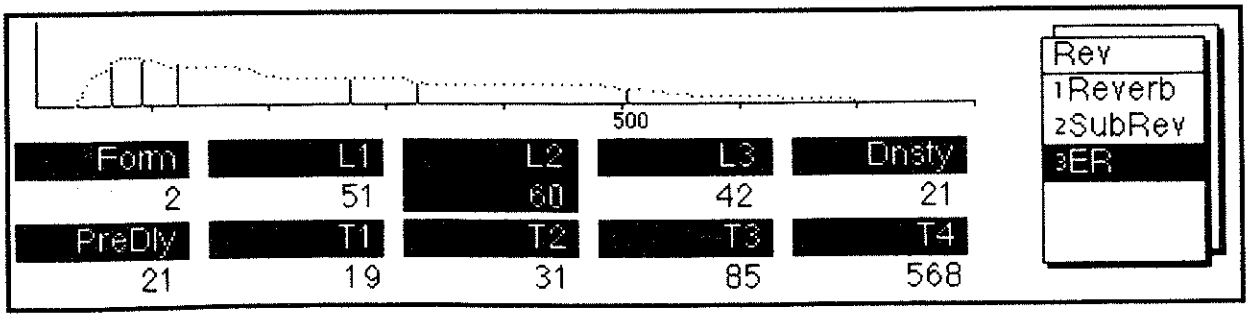


What this shows is that changing a parameter on the upper screen actually changes *several* parameters on the lower screen simultaneously. The lower-screen parameters which the upper screen changes are related to each other, and are chosen in such a way as to work together logically and musically, which is why the upper screen is the "Macro" screen. Changing the "Size" parameter on the Macro screen also changes the pre-delay and density, because in common practice, if you want to increase the apparent size of a reverberant space, you would also increase the pre-delay and density of the reverb.

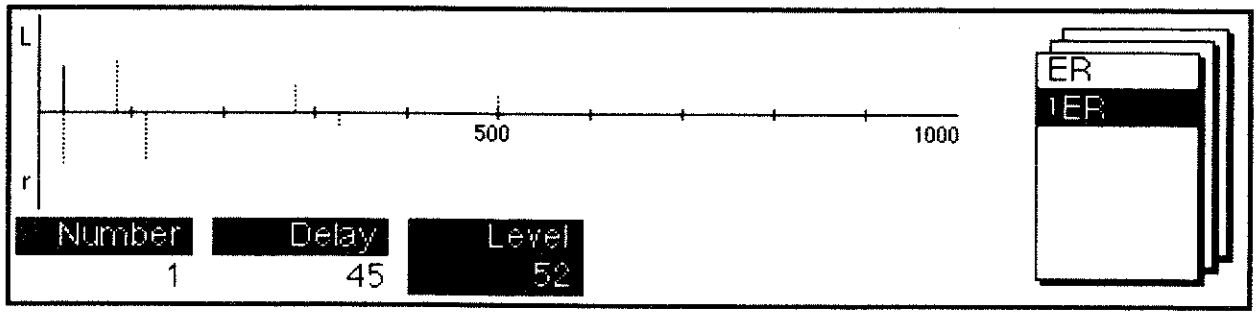
The lower screen is known as the "Manual" screen. Here you can, if you like, adjust the size *without* adjusting pre-delay and density, or adjust one of those parameters independently without altering the size. Another example is the "Bright" control on the Macro screen. If you adjust that parameter, two parameters on the Manual screen change: "HiDmp" (the damping factor of the high-frequency portion of the reverb) and HiFrq (the corner frequency of that damping.)

When you pressed **DOWN-ARROW** from the Reverb Macro screen, you got a menu with three items on it. So far, we've just looked at the first, "Reverb", but the other two are also Manual screens to the "Rev" Macro screen. Item 2, "SubRev", (**FUNC2**) has two parameters which change when the "Type" and/or "Size" parameters on the Macro screen are changed. Item 3, "ER", (**FUNC3**) has 10 parameters, all of which change in various combinations and different ways when the "Type", "Size", "RevTm", and "ERLvl" parameters on the Macro screen are changed.





The ER screen is actually both a Manual *and* a Macro screen — you can go down one *more* sub-screen from it by pressing **DOWN-ARROW**. The Upper ER screen allows you to adjust the 20 early reflections generated by the R-880 as a whole, by setting their overall level, amplitude slopes, and density, while the lower ER screen gives you timing and level control over *each individual* reflection.



When you are using a Macro screen to adjust parameters, the values of the individual parameters it sets up in the Manual screen are *fixed*, not relative. This means that you can go from a Macro to a Manual screen to tweak an individual parameter, but then if you go back to the Macro screen and change a value there, the tweaking you have done on the Manual screen *will be cancelled.*

Here's a simple example to illustrate this feature. Go to the lower ER screen (from the first page of the Parameter menu, press **FUNC1**, **DOWN-ARROW**, **FUNC3**, **DOWN-ARROW**). The value of the "Level" parameter is 52. This is the relative level of the first early reflection. Change it to 30. Press **UP-ARROW** to go to the upper ER screen. None of the values have changed here. Set the cursor on "L2" and turn **EDIT KNOB 3** one notch counterclockwise. This adjusts the slope of the levels of the early reflections as a group. A "warning" message appears; press **CONTROL**. Press **DOWN-ARROW** to go back to the lower screen. Because the Macro screen has taken over, with its set of fixed values, the value under "Level" has gone back to 52.

This is an important principle, so it bears repeating: You can move from a Macro screen to a Manual screen to adjust an individual parameter, but if you move back to the Macro screen and make ***any further adjustments on the Macro screen,*** all adjustments you made on the Manual screen ***will be lost.*** Therefore, you should use the Manual mode only in a "top-down" fashion, always setting parameters with the Macro screen, and tweaking them with the Manual screen, in that order.

In addition, if you change a parameter on a lower screen that also appears on an upper screen, when you move from the lower screen to the upper screen, the parameter value on the upper screen *will not* reflect the change. Similarly, on those screens that use graphs (e.g., EQ, NLR), a change that shows up on a graph on a lower screen *will not* show up on the graph of the upper screen.

The R-880/GC-8 software warns you if you try to adjust a Macro screen when there have been adjustments made to an underlying Manual screen. If you move an **EDIT KNOB** or press **ENTER** after entering a number with the **NUMERIC** keypad, you will get a "warning" message — you've seen it several times already. If you respond to this message by pressing **CONTROL**, all of the Manual adjustments will be wiped out and the Macro adjustment will take effect, with all of its pre-determined parameter values. If you press **CANCEL**, the Manual adjustments will be preserved and no change will occur on the Macro screen.

If all this sounds familiar, it is because the very same principle is at work between the Reverb Mode and the Joint and Move screens, as discussed in the previous chapter — *the Reverb Mode screen is actually a Macro for the Joint and Move screens.*

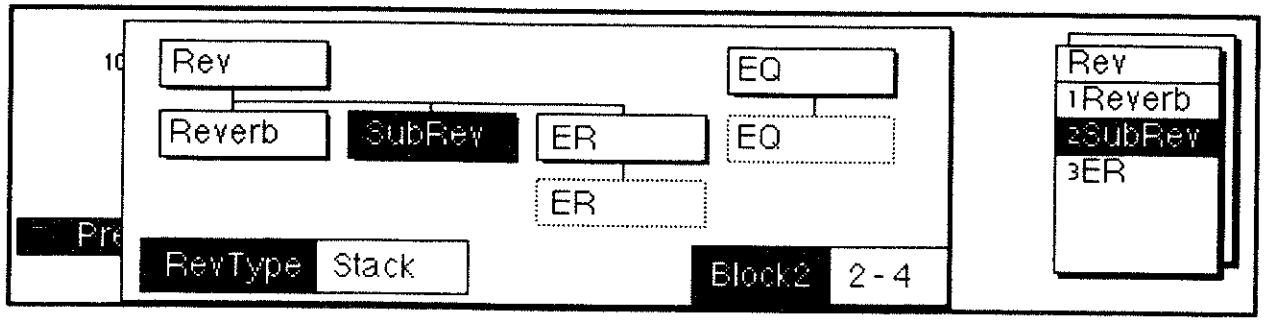
One other note: Manual parameters are not necessarily exclusive to particular Macro parameters. A parameter on a Manual screen may be affected by more than one parameter on a Macro screen. For example, "PreDly" on the lower screen is affected by both "Type" and "Size" on the upper screen. Try setting those two upper-screen parameters separately, and look at the effect each has on "PreDly".

The software "remembers", even when the power is turned off, which screens last appeared in which modes. When you leave a mode and then come back to it, most of the time the last screen you were looking at — whether it's a Macro or Manual screen — will be the one showing when you return. The software also remembers parameter values of modules, even when they are taken off the desktop, and even when an algorithm is reconstructed. This can be a great convenience feature, in that you don't necessarily have to reset all your parameters when you change an algorithm, but it also means that when you introduce a new module to an algorithm, keep in mind that it may appear in whatever state you left it when you last used it.

The Menu Map

Moving around among the various screens and sub-screens when adjusting parameters can be confusing, and a feature known as the "Menu Map" has been included to help keep track of what has been done.

From any Reverb or EQ Parameter screen, press **HELP**. The Menu Map appears.



The Menu Map shows you all of the screens associated with the Reverb module you are working in, referred to as "Block" 1 or 2; their relationship to each other; and which screen you are currently working on (by highlighting it). At the bottom are shown which Reverb Type is in use, and what the current Reverb Configuration is. (If they are in Tandem mode, the word "Sync" will appear next to the configuration. See Chapter 8 for more on this.)

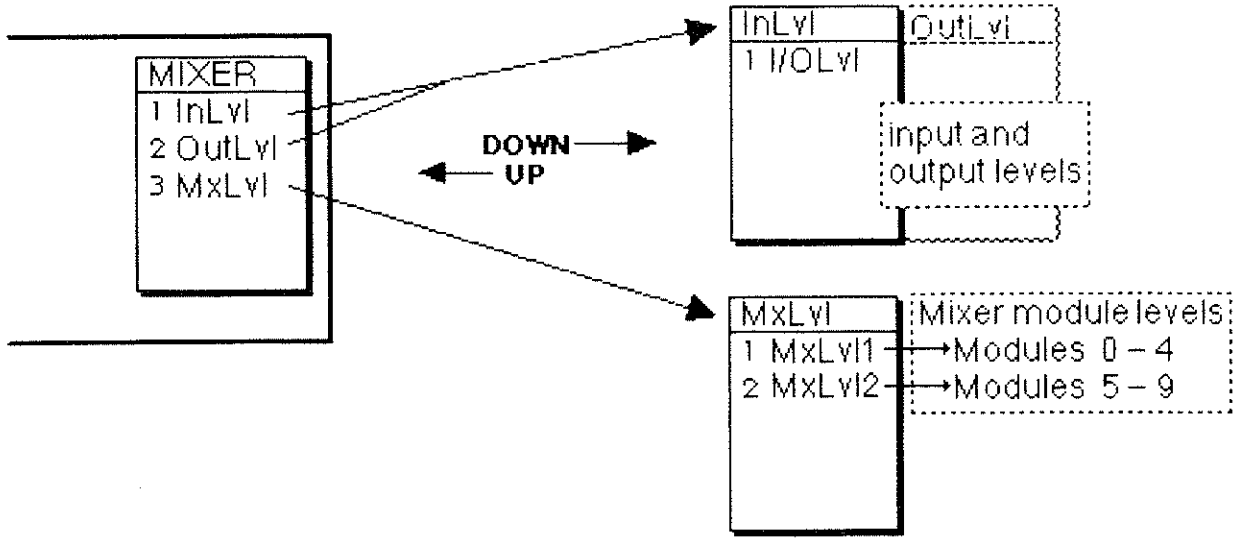
The Menu Map also shows which lower (Manual) screens associated with the current Reverb module have had parameters changed on them, and which have not. Lower screens that have been edited are shown with solid lines, while those that have not been edited are shown with dotted lines. For example, if you have been working on the upper (Macro) screen for EQ1, then when you press **HELP**, the lower EQ box — corresponding to the Manual EQ screen — will be dotted. If you press **DOWN-ARROW** and start making adjustments to the lower EQ screen, then the next time your press **HELP**, the lower EQ box will be solid as well.

To leave the Menu Map, press **HELP** again, or any of the active **FUNC** or **ARROW** keys.

Chapter 7
Mixers

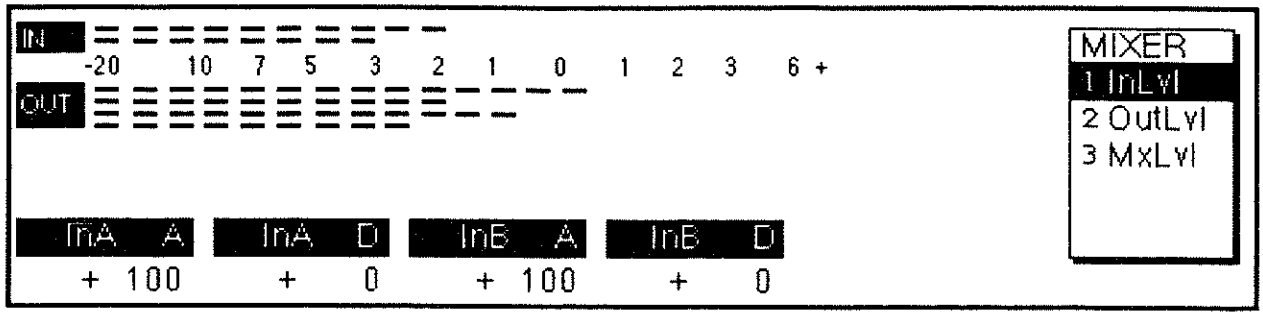
Controlling signal levels as they pass through the R-880 is the job of the Mixers. There are permanent mixers at all of the inputs and all of the outputs, and other Mixer modules can be placed anywhere in an algorithm. The input and output mixers are always active; Mixer modules must be placed onto the desktop and connected into an algorithm to become active. The R-880/GC-8 software provides ten discrete Mixer modules, each one with two inputs and one output.

The Mixer settings are accessed by calling up the Mixer mode: **SHIFT–FUNC3**. The first two screens of the Mixer menu — Input levels ("InLvl") and Output levels ("OutLvl") — have a common sub-screen, which shows both input and output levels. The third screen, "MxLvl", shows input, output, and Mixer-module levels, and it has two sub-screens showing only the Mixer-module levels



Input Mixers

From the **MIXER** menu, select "InLvl" — **FUNC1**. The top of the screen is a "live" display that shows the the input and output levels of the R-880, exactly corresponding to the LED display on the R-880's front panel (it shows incoming analog audio, but not incoming digital audio).

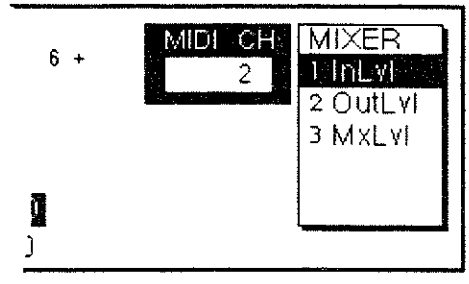


The R-880's two inputs, **A** and **B**, each have an analog and digital "sub-input", and each sub-input is adjustable on the input mixer screen. The analog sub-inputs are the parameters on the screen whose labels end in "A": "InA A" and "InB A". The digital sub–inputs' labels end in "D": "InA D" and "InB D". The minimum level for each mixer is 0, and the maximum is 100. You can adjust the values with the **EDIT KNOB**s, or by selecting an input with the cursor keys and typing the value in with the **NUMERIC** keypad. (Remember that the digital inputs on all of the factory programs have been set to 0. This is where you turn them on if you want to use the digital inputs with those programs.)

Note that you can also set the values to negative numbers. A negative number on a mixer indicates that the phase of the signal going through it has been inverted. To set a negative value with the **NUMERIC** keypad, type the minus sign (-) before typing the digits.

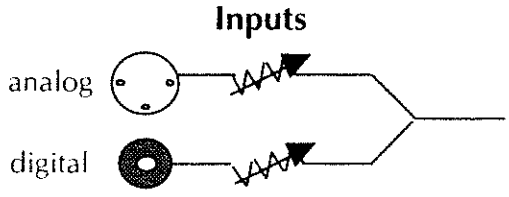
Remember that these mixers occur *after* the physical inputs to the R-880. If you turn them all to zero, there is still signal going into the unit, and the LED display (and its equivalent on this screen) will still register the incoming signal. To adjust the level of the signal coming into the R-880 (either to prevent overload or to boost a weak signal), use the **INPUT LEVEL** control on the front panel of the R-880.

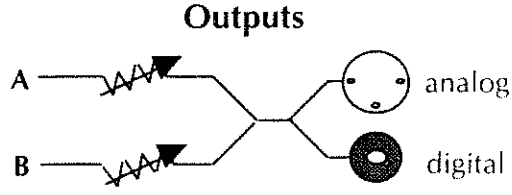
If more than one R-880 is connected to the GC-8, a box will appear on the right side of the screen showing a MIDI channel number. The GC-8's "live" display will show the input and output levels of the R-880 whose MIDI channel appears in the box. To change the MIDI channel, and therefore the unit being monitored, press **CONTROL**. Keep pressing it to cycle through all the MIDI channels currently in use. (Note that the setting of this box has nothing to do with which R-880 is being *controlled* by the GC-8. That function is handled by the "Connec" screen on the "FUNC" menu, and is discussed in Chapter 11.)

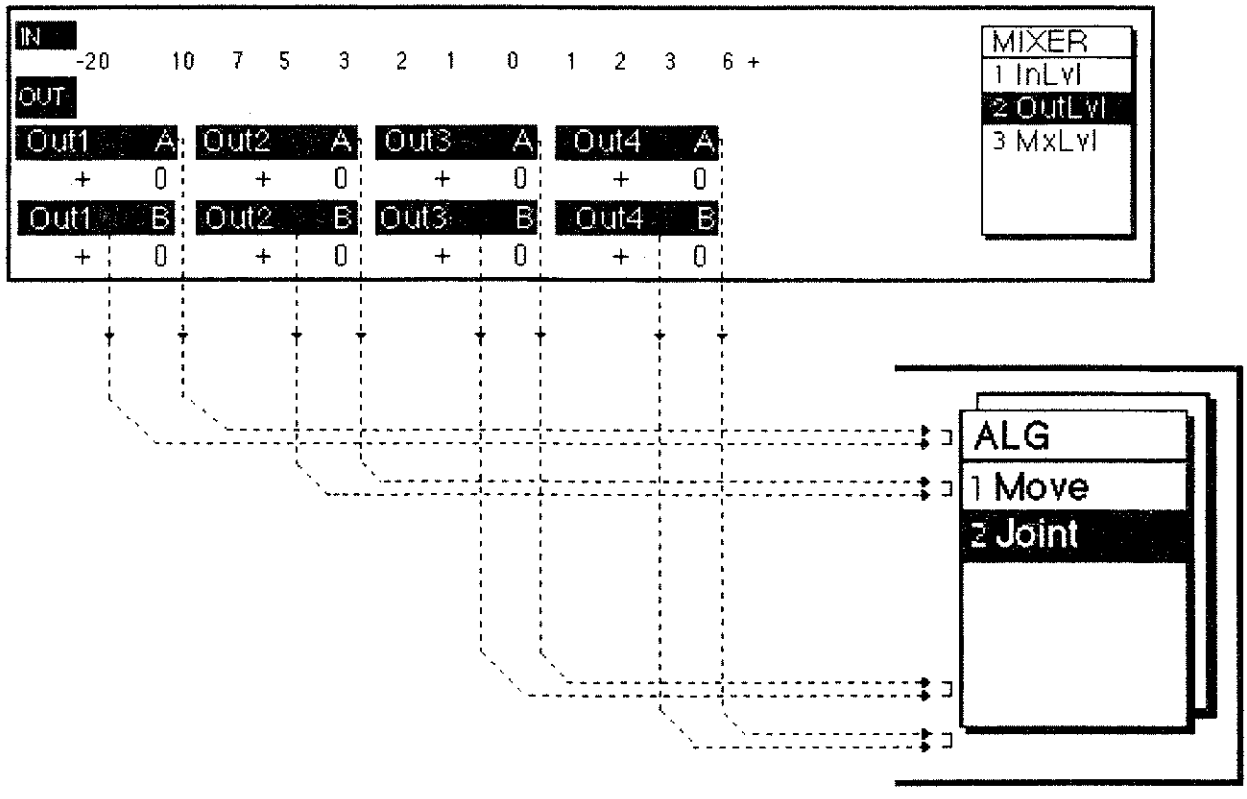


Output Mixers

Press **FUNC2** — "OutLvl". The level display remains, but now there are two rows of parameters. Like the inputs, there are two "sub-outputs" on each output, but these function quite differently from the sub-inputs: the analog and digital outputs are *paralleled,* and are *not* separately adjustable. Instead, these sub-outputs are mixers in themselves, allowing two signal paths to be routed to each output, and their relative levels set independently. "Out1 A" is the first sub-output of output number 1 — on the Joint screen in the Algorithm Mode, it is the top sub-output. "Out1 B" is the second (lower) sub-output, "Out2 A" is the first (top) sub-output of output number 2, etc.

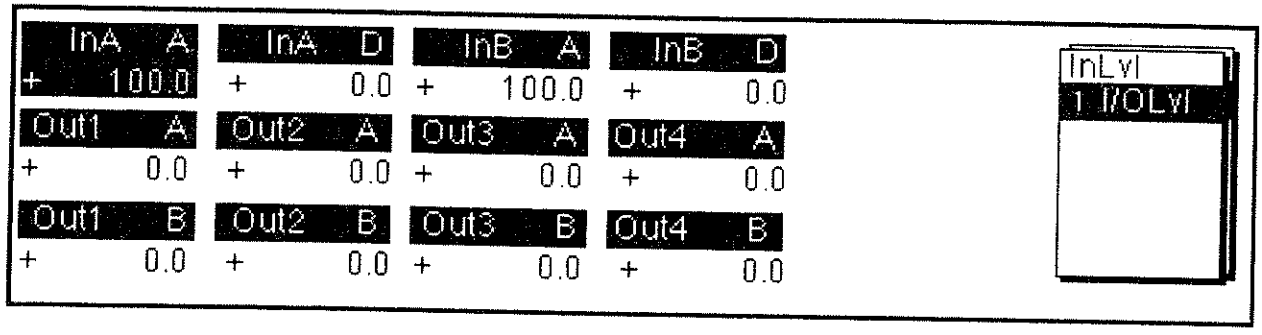






Unlike the InLvl screen, any adjustments you make on this screen *will* affect the live output-level display, because that display shows signals appearing at the R-880's outputs.

These two screens share a common sub-screen. Press **DOWN-ARROW** from either screen to get to it. The sub-screen, labelled "I/OLvl", dispenses with the live display, but shows all of the inputs and outputs simultaneously, and has an added feature: the level resolution of each mixer on this screen is in *tenths* of a step. Note that if you have accessed the I/OLvl screen from the InLvl screen, the menu header will say "InLvl", and likewise if you accessed it from the OutLvl screen the header will say "OutLvl". This is simply to remind you where you came from, and where you'll go when you press **UP-ARROW** — but regardless of how you accessed it, the I/OLvl screen is always the same.



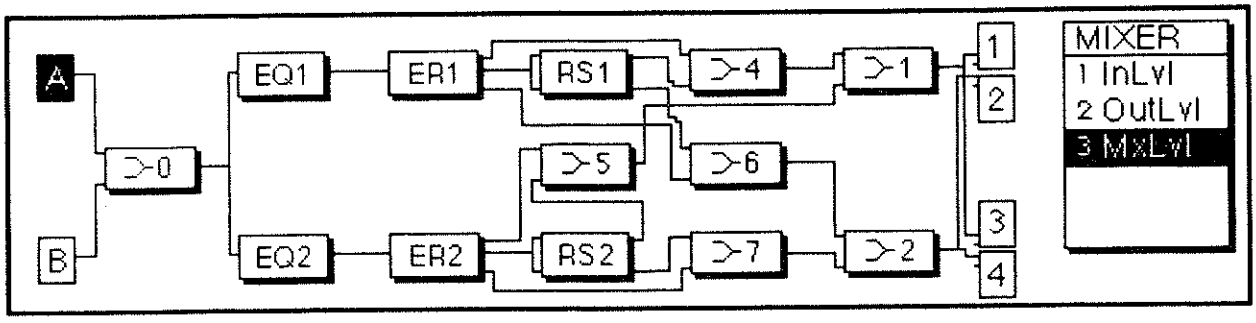
The relationship between the upper and lower Mixer screens is not the same as the Macro/Manual editing described in the previous chapter. Since the parameters are the same on the upper and lower screens, there is no cancellation of settings as you move from one to the other, and therefore there is no need for the various warnings associated with Macro editing. The true value of a level parameter will be the *last* value set for it, regardless of which screen that value is set on.

For example, to to the upper InLvl screen (**UP-ARROW**, **FUNC1**). Set "InA A" to 75. Press **DOWN-ARROW**. The same parameter on this screen reads 75.0. Set it to 76.1. Press **UP-ARROW**, and see that the change in level shows up on this screen as well, and it reads 76. Use **EDIT KNOB 1** to raise it to 77, then turn it back down to 76. Press **DOWN-ARROW**, and see in the lower screen that the value has changed to 76.0.

If you experiment further, you will find that values in the lower screen are *truncated* when they are viewed in the upper screen, not rounded off. Therefore, a value of 76.9 in the lower screen will show up as 76, not 77, in the upper screen.

Mixer Modules

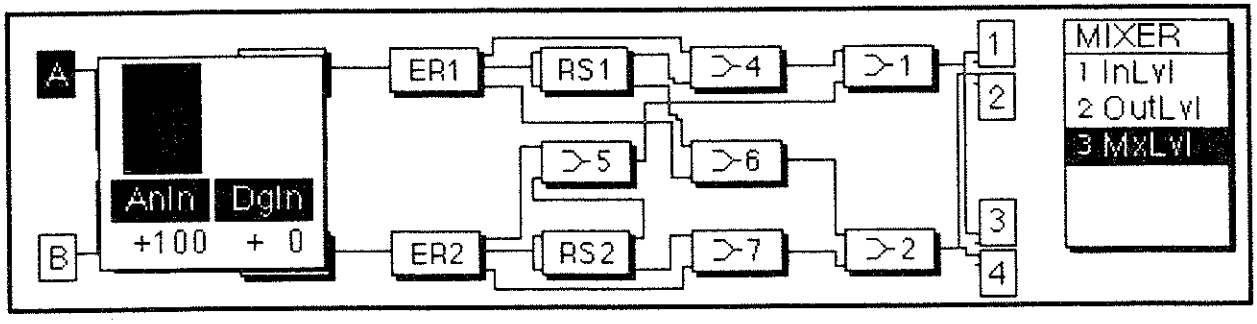
Mixer modules, as discussed in Chapter 5, are placed in an algorithm in the Algorithm Mode, both automatically by the software, and with the functions on the Move and Joint screens. Their levels are adjusted using item 3 on the Mixer Menu: "MxLvl" (**SHIFT-FUNC3**, then **FUNC3**).



The MxLvl screen lets you view the various levels graphically as they relate to each other in the algorithm. You will see it is very similar to the Joint screen in the Algorithm Mode, although the joining functions at the left aren't there. The two inputs are labelled "A" and "B", and the four outputs are labelled "1" through "4". All other modules in the current algorithm are in place on the desktop, and all of the signal paths are shown.

Like the Joint screen, there is a cursor, but here it is large: the size of whatever object it happens to be on. When you first access the screen, the cursor is always on Input A, which is indicated by Input A being shown in reverse. You move the cursor to other locations with the **CURSOR** keys.

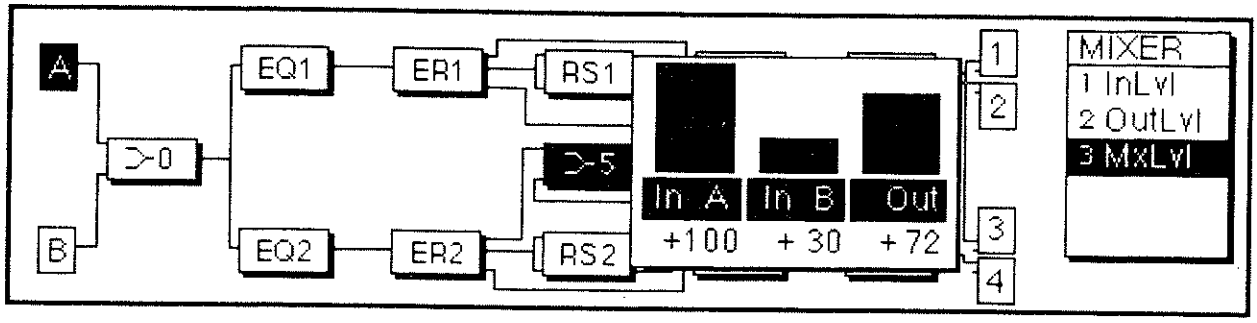
When the cursor is on an object that has a mixer — i.e., an input, an output, or a Mixer module — pressing **CONTROL** brings up a box that shows the levels for that mixer. Try it with the cursor on Input A: the box that appears shows the levels for the analog and digital inputs at Input A.



Adjustments in this box are made using **EDIT KNOB**s **1** and **2**. There is no cursor inside this box, so there is no way to use the **NUMERIC** keypad.

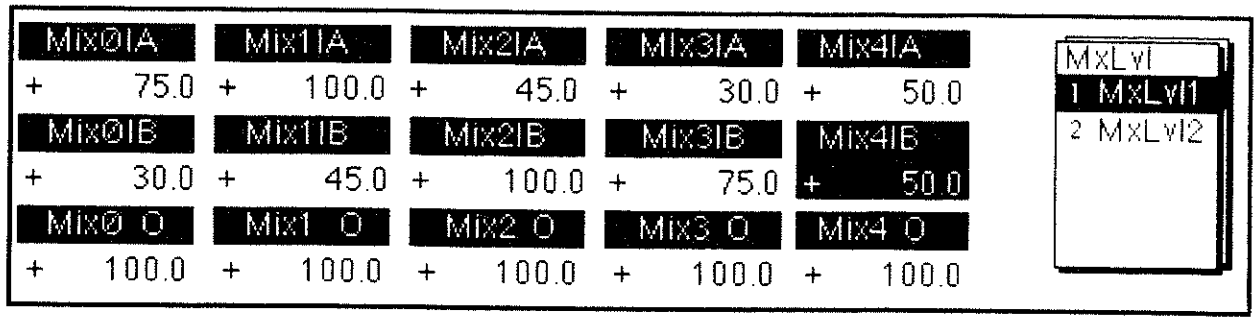
You can put the box away by pressing **CONTROL** again, or by moving the cursor off the Input. If you move the cursor without pressing **CONTROL**, however, then as soon as the cursor lands on another mixer location, another box will open up, showing the values for that particular mixer. Both of these modes are useful: sometimes you will find it faster to work with the boxes opening automatically, while other times you will find it less confusing to keep them closed while you move around the desktop.

Find a Mixer *module* and move the cursor to it. Open the box, if it isn't already, by pressing **CONTROL**. Notice that there are *three* levels to deal with here: the two inputs to the module as well as its output. To adjust these, you will use **EDIT KNOBs 1**, **2**, *and* **3**. (There is one case, using gated reverb, when **EDIT KNOB 3** will be inoperative, which we'll explain in chapter 8.)



Notice also that no matter where on the screen a box pops up, it is always the *leftmost* **EDIT KNOBs** — either the first two or the first three — that will operate on it.

The MxLvl screen has a sub-menu containing two screens which show the levels of the Mixer modules (but not the inputs and outputs). Press **DOWN-ARROW** to reach them. MxLvl1 (**FUNC1**) shows the input and output levels for Mixer modules 0 through 4, while MxLvl2 (**FUNC2**) shows the levels for modules 5 through 9. Any modules that are non-functional in the current algorithm will show "-----" in place of values.



As on the I/OLvl sub-screen, the levels on these screens are adjustable in tenths of a unit, and can be set using the **EDIT KNOBs** or the **NUMERIC** keypad. Similarly, when moving between the upper and lower MxLvl screens, the last value entered for any particular parameter will be the true value for that parameter, regardless of which screen it was entered on.

Chapter 8
Reverb

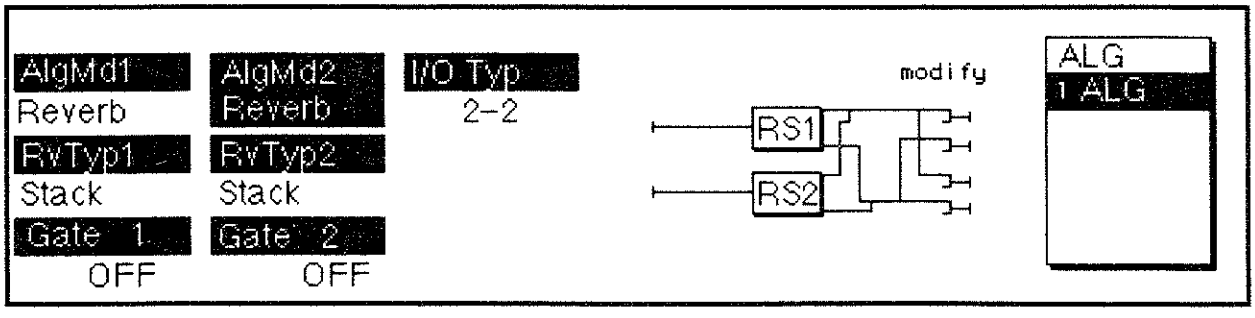
The R-880 provides a very large variety of reverb effects. Several types of reverb are available, and all of them can be adjusted through a wide range of parameters, to produce a nearly infinite palette of processing. Designing and adjusting a reverb program can be a complex process, but the R-880/GC-8 software is designed to make it relatively easy for the beginning user to achieve excellent results, and at the same time provides the advanced user with the tools to develop truly unique processing algorithms.

Two reverb modules can be used in a program at one time. These modules can be configured independently, or they can be linked together to operate in tandem. Likewise, their inputs and outputs can be combined, or treated as discrete signals.

Reverb Modes and Types

The types of reverb used in a program are determined on the Reverb Mode screen of the Algorithm mode (**SHIFT-FUNC1** and, if necessary, **UP-ARROW**). There are three main "Reverb Modes", and two of these Modes have two "Types". The Reverb Modes for the two modules are selected with the top parameters "AlgMd1" and "AlgMd2". The three modes are "Reverb", "Plate", and "NLR". ("AlgMd2" has a fourth position, which we'll get to in a moment.) The Types, which are available only in the Reverb and Plate modes, are selected in the second row of parameters. They are "Tap" and "Stack".

Input and output configurations are chosen with the "I/OType" parameter in the top row. The Gates, which are selected in the bottom row, will be discussed at the end of this chapter.



"Reverb" and "Plate"

Of the first two Reverb Modes, "Reverb" is the more complex. It is designed to simulate a true acoustic space, with height, width, and depth. Several types of room simulations are available, and an Early Reflections module is attached to every "Reverb" module to add to the effect.

"Plate" is modeled after an old-fashioned metal plate reverb, which has a more immediate impact and is less realistic than the "Reverb" mode. Of course, with the wide range of parameters available, the sounds produced by this mode go far beyond what any real plate would be capable of. Four different types of basic plate sounds are available. Many of the parameters are the same as those in the "Reverb" mode, but a "Plate" module has no Early Reflections module associated with it.

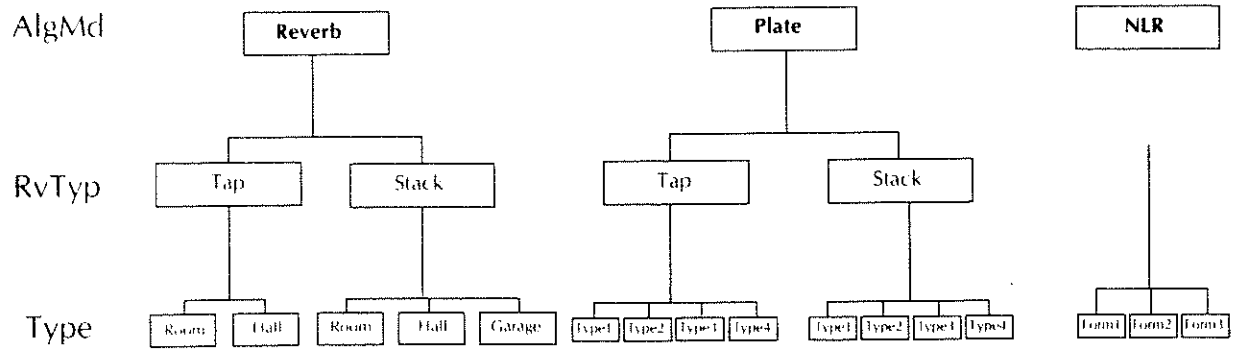
"Stack" and "Tap"

In both the "Reverb" and "Plate" modes the user has a choice of "Types": Stack or Tap. The "Stack" type is more natural-sounding, giving realistic decay envelopes. In the "Reverb" mode, it also allows for a wider range of room sizes.

"Tap" is more serial-like processing, giving you more control over the reverb, especially in terms of the relative density of the echoes within the reverb over time. While "Stack" gives you a single density ("Dnsty") parameter, which thickens or thins the sound of the reverb as a whole, "Tap" gives you separate parameters for early and late density ("EDnsty" and "RDnsty"). An example of the usefulness of this feature would be a percussive sound in which you want a very thick reverb, but you want to make sure the initial attack of the sound is distinct. To achieve this, you would increase the RDnsty and decrease the EDnsty.

"NLR"

The third Reverb Mode, Non-Linear Reverb ("NLR"), while it has relatively few parameters to determine the nature of the reverb itself, offers several features the others don't have, which are useful for generating unusual reverb-based effects. They are automatic panning of the reverb signal, reversed (rising) reverb envelope, and a timed gate (the gates in the other modes are level-dependent), which can even have its own complex envelope.

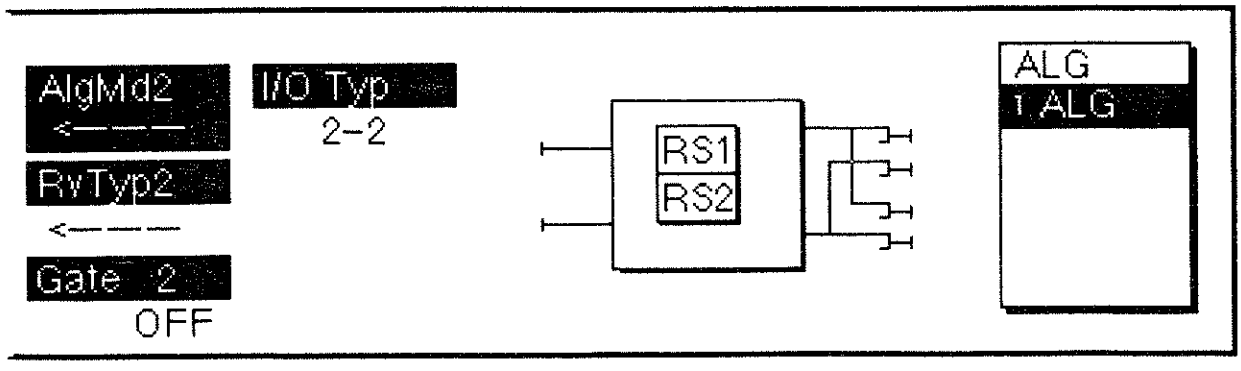


Input and Output Configuration

The configuration of the inputs and outputs of the reverb modules is handled with the "I/OTyp" parameter, which was discussed in Chapter 5. The configurations available are "1-2", in which both the inputs and the outputs are combined; "1-4", in which the inputs are combined but the outputs are discrete; "2-2", in which the inputs are discrete but the outputs are combined; and "2-4", in which the two inputs and four outputs are all independent of each other.

Tandem Mode

The two reverb modules can be placed in a special Tandem mode by setting the "AlgMd2" parameter to "<----". In this mode, Module 2 exactly duplicates the identity of Module 1, and any adjustments made in Module 1's parameters will have the same effect on Module 2. Although the modules are linked in terms of control, and they appear on the Reverb Mode screen enclosed in a single graphic block, they can still be independent of each other in terms of signal *paths*: in the "2-4" I/O configuration, for example, they behave like two separate, although identical, mono-in/stereo-out reverb units. (Note: if the reverb modules are in Tandem mode, the word "Sync" will appear next to the configuration on the Menu Map.)

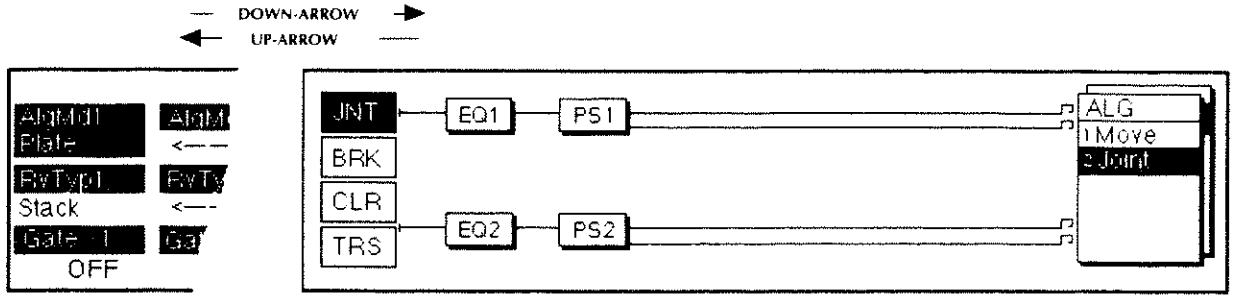


This mode is useful for two types of situations. One is when you need identical reverbs on two signal sources, but you don't want to combine the sources — for example, if you want to maintain a high degree of separation between the channels of a stereo source. The other is when you need an especially thick reverb sound, which you can get by combining the inputs and/or outputs of the two modules, using the "1-2" or "2-2" configurations.

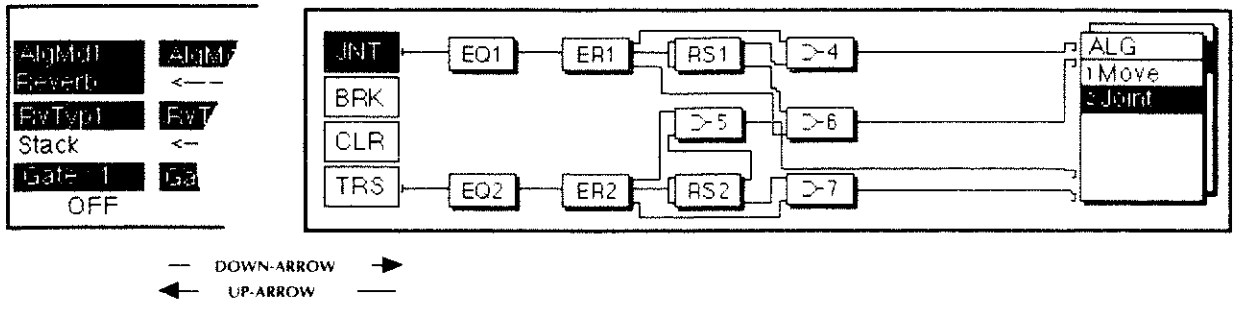
The Reverb Desktop

When you select a reverb algorithm, type, or configuration, it has an immediate effect on the algorithm desktop — it creates a new algorithm. Different modes and types have different effects. When "Reverb" is selected for a module, the software automatically places that module on the desktop and at the same time puts an Equalizer module (EQ) and an Early Reflections module (ER) in the signal path in front of the Reverb module. It also places appropriate Mixer modules on the desktop, and connects them in a configuration dictated by the "I/O Typ" parameter. The same thing happens when "Plate" or "NLR" is selected as a reverb mode, except that these modes have no ER modules.

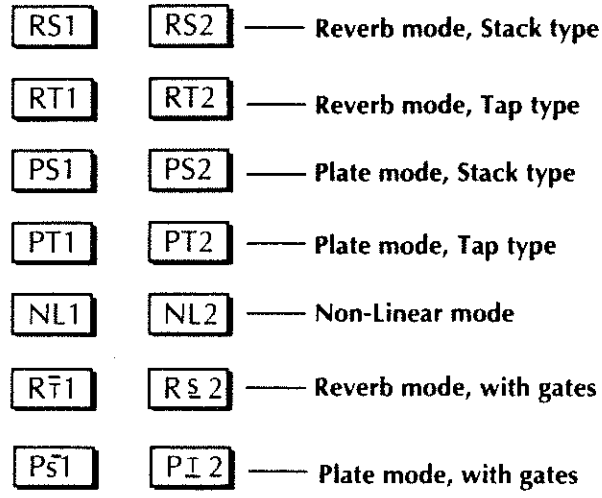
You can see this in action by looking at the Joint screen (**SHIFT-FUNC1**, **DOWN-ARROW**, **FUNC2**), then moving to the Reverb Mode screen (**UP-ARROW**), changing one or more of the settings, transmitting the new information to the R-880 (**CONTROL**), and moving back (**DOWN-ARROW**) to the Joint screen. The configuration on the Joint screen has been automatically changed to reflect the new reverb settings.



Changing the Reverb Mode completely redesigns the desktop



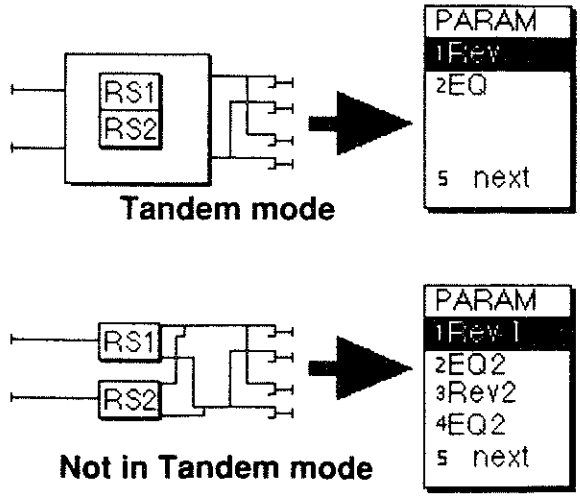
At the same time, the labels on the reverb modules on the desktop change to show the present type and mode. If a module is set to "Reverb", the first letter will be "R", and the second letter will be "S" or "T" depending on whether Stack or Tap is chosen as the Type. A "Plate" module will show "P" as its first letter, and "S" or "T" as its second letter. A "Non-Linear" module, which has no "RvTyp" parameter, will be labelled "NL". A horizontal line above or below the second letter in a Reverb or Plate module indicates the presence of a Gate, which we will discuss later in this chapter.



Remember that the Reverb Mode screen and the Joint/Move screens have a "Macro/Manual" relationship to each other. Once an algorithm is set up using the upper (Reverb Mode) screen, it can easily be changed in the lower screens, moving modules in or out of the active area and reconnecting their signal paths. For example, one of the most common uses of the lower screens is to add delay, chorus, and/or compression modules to the reverb algorithms. But also note that this relationship means that if you have made any changes on the lower screens, and then go back and change *anything* on the Reverb Mode screen, the changes you made on the lower screens will be wiped out. The screen gives you plenty of warning when it's about to do this.

Also remember that when you make any adjustments on the Joint or Move screens, the Output Mixers are all automatically reset to 0, and you must go to the OutLvl screen of the Mixer mode (**SHIFT-FUNC3**, **FUNC2**) to turn the outputs back on. (This is *not* true when you change an algorithm from the Reverb Mode screen — in that case, all mixer levels are unchanged from their previous settings.)

When the two Reverb modules are in Tandem mode, two EQ and (if AlgMd1 is set to "Reverb") two ER modules will appear on the desktop. But, like the Reverb modules themselves, these modules are adjusted *together* — i.e., if you go to the Parameter mode, you will find no adjustments for EQ2 or ER2; the adjustments for EQ1 operate on both EQ modules, and the adjustments for ER1 operate on both ER modules.

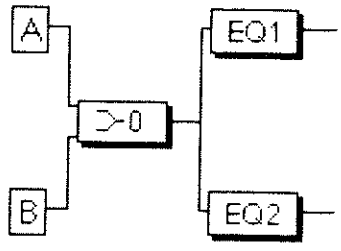


Construction of the Reverb Algorithm

We've seen that the R-880/GC-8 software automatically sets up complex algorithms whenever a reverb mode, type, or configuration is selected. However, these algorithms can be modified after the fact, by using the Move and Joint screens to re-position and re-connect the various modules.

Whenever a new algorithm or mode is chosen, two signal paths are set up, each based around a reverb module. If the "I/OTyp" parameter is set to "1-2" or "1-4", then the inputs of the R-880 will be fed first to a Mixer module (Mixer 0) where they will be combined, and then the output of the Mixer module will be "mult-ed" to the two signal paths.

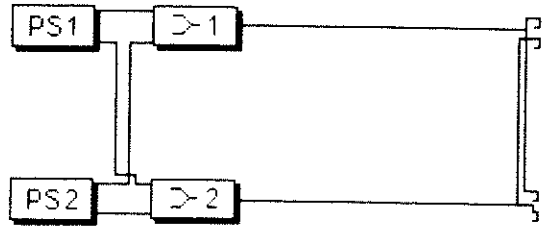
I/O Type
1-2 or 1-4



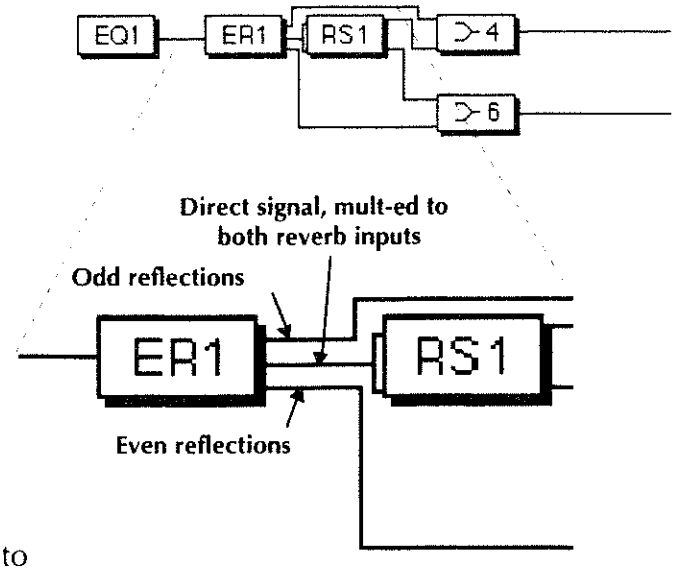
If the reverb module is a "Plate" or "NLR" module, it will have one input and two outputs. Preceding the input on the desktop (and in the signal chain) will be an EQ module with one input and one output. If the number of outputs in the "I/OTyp" is 4 (i.e., if the I/OTyp is set to "1-4" or "2-4"), the outputs of the Plate or NLR module will go *directly* to a pair of the R-880's main outputs — Outputs 1 and 2 if it we are dealing with Module 1, Outputs 3 and 4 if it is Module 2. If the number of outputs in the "I/OType" is 2, then the Plate or NLR module's outputs will first go to a set of Mixer modules (Mixers 1 and 2), to be combined with the outputs of the other reverb module, before they go to the main outputs.

I/O Typ
1-4 or 2-4

I/O Typ
1-2 or 2-2

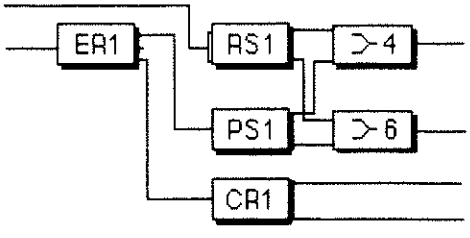


An algorithm using a "Reverb" module has a more complex setup. First there is an EQ module, with one input and one output, followed by an ER module, with one input and *three* outputs. The top (left) ER output is for the odd-numbered Early Reflections, while the bottom (right) output is for the even-numbered ones. The center output is essentially a "through" line for the direct, unreflected sound. This output normally feeds the Reverb module; note that it is mult-ed to feed *both* inputs of the Reverb module simultaneously.

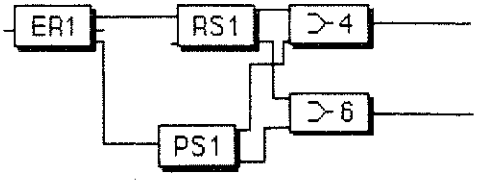


The inputs of a Reverb module are true stereo, not summed as in some reverb units, and two different signals fed to the two inputs will have some of their left-right spatial differences preserved as they emerge from the Reverb module. Although the default algorithms do not set up the signal paths to take advantage of this feature, you can experiment with it by changing the algorithm. (The factory programs generally use multiple modules in Tandem mode to create stereo reverb effects.)

Keep in mind, however, that the relationship between the ER and Reverb modules is more complex that might be immediately apparent (for example, parameter changes in one can affect the other), and so be very careful when re-arranging their connections. It is also not a good idea, should you be tempted to try it, to have only *one* input of a Reverb module connected in an algorithm, as the reverb will not sound very good.



An okay variation: dry input feeds Reverb module, left ER output feeds Plate module and right ER feeds Chorus module.



Not an okay variation: only one side of Reverb module is being fed signal .

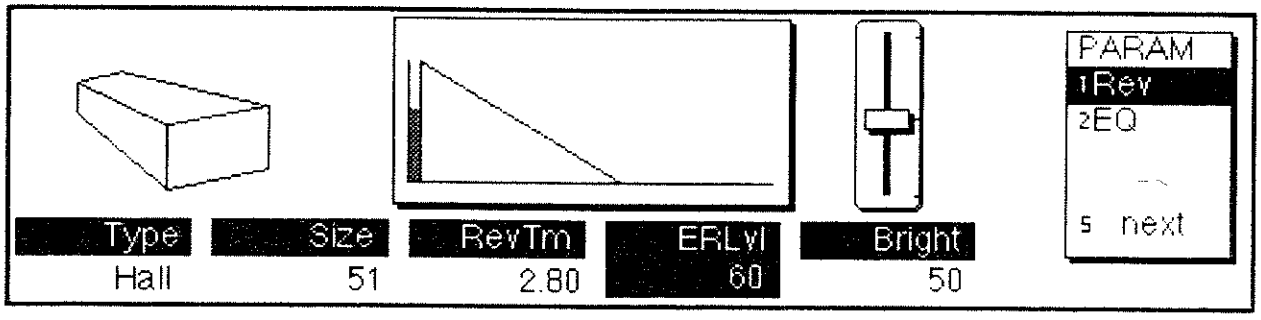
Remember that every time you change anything on the Move or Joint screens, you have to go back and reset the output mixers.

Parameters of the Reverb Modules

Each Reverb Mode and Type has its own set of parameters. The parameter screens associated with a "Reverb" module handle three different aspects of the reverb: the main reverb, "Sub Reverb", and Early Reflections. The screens associated with a "Plate" module handle the main reverb and Sub Reverb, and the screens associated with an "NLR" module handle the reverb and the gate. Remember that most of the parameters on the upper reverb screens are Macros for multiple parameters on the lower screens.

We'll start by explaining all of the parameters in the "Tap" type of the "Reverb" mode, and then cover the other modes as they differ from this one. All of the parameters can be accessed with either the **EDIT KNOB**s or the **NUMERIC** keypad, unless noted otherwise.

Main (upper) screen:



Type — selects the reverb "sub-type": Room, Hall, or Garage. "Room" simulates a space with a square floor, while "Hall" simulates an elongated space with a rectangular floor, and "Garage" a cubic space where all surfaces are square. (Not accessible from the **NUMERIC** keypad.)

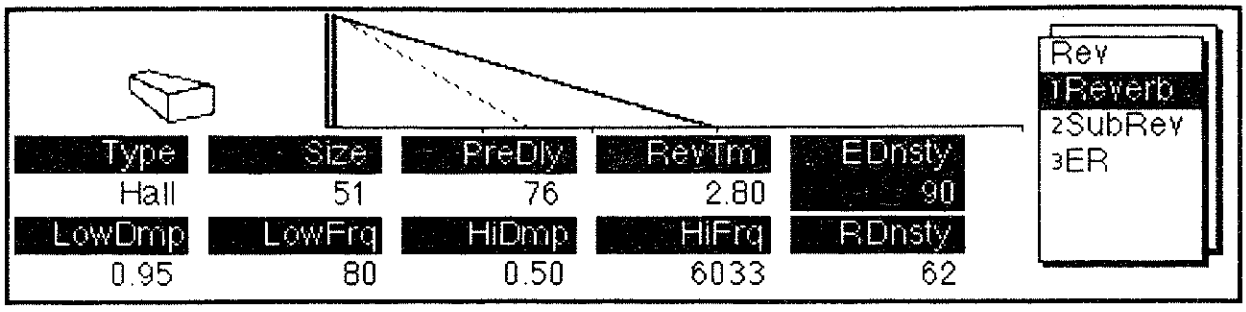
Size — the side of one dimension of the space, in meters, from 3.6 to 51, in 10 steps. (Not accessible from the **NUMERIC** keypad.)

RevTm — the RT_{60} of the reverb (the amount of time it takes to decay to a level 60 dB below the initial level), in seconds, from 0.1 to 99.9.

ERLvl — the relative level of the early reflections, from 0 to 100%.

Bright — the brightness of the reverb sound, from 0 to 100%.

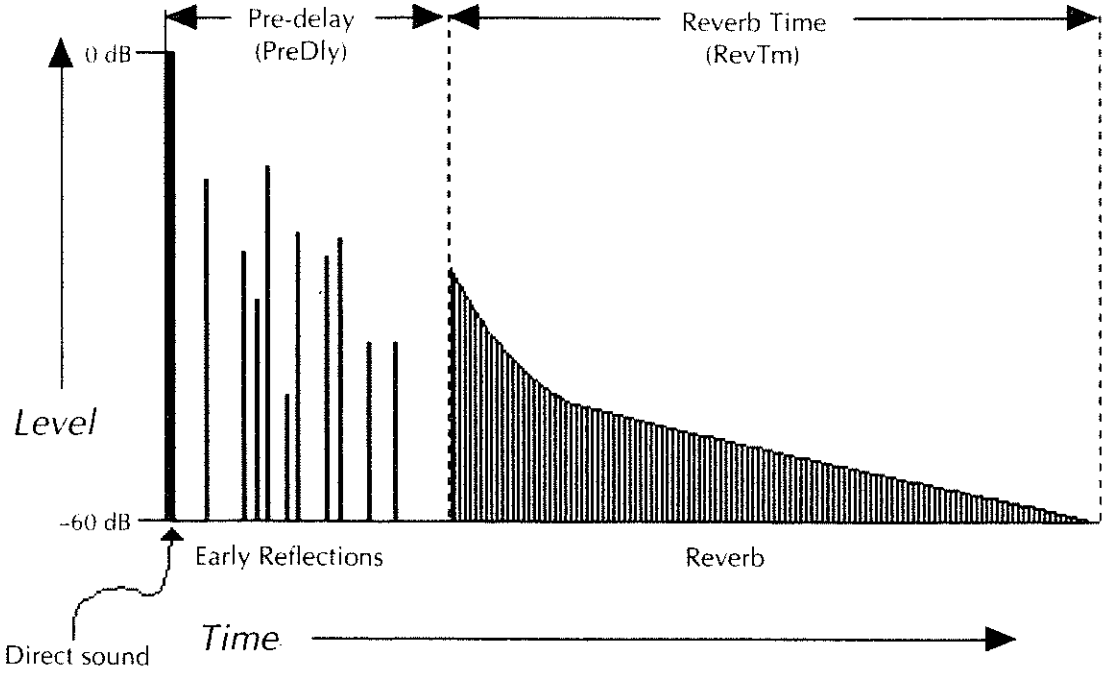
Lower screen 1 (Reverb):



Type — as above

Size — as above; but note that the Size parameter on the upper screen is a Macro, and affects multiple parameters on the lower screen, whereas here it affects no other parameters.

PreDly — the amount of time between the arrival of the direct sound and the onset of the reverberation, in milliseconds, from 0 to 800. This parameter does *not* affect the Sub-Reverb or the Early Reflections. Moreover, this parameter *only* affects the signal coming from the *center* output of the ER module associated with the Reverb module; if that output is not connected to one or more of the Reverb inputs (e.g., if the inputs are connected to the left and/or right ER outputs, or directly to the R-880 main inputs), this parameter has no effect.



RevTm — as above

EDnsty — the density of the echoes within the early part of the reverb sound, affecting the relative "thickness" of the sound, from 0 to 100%.

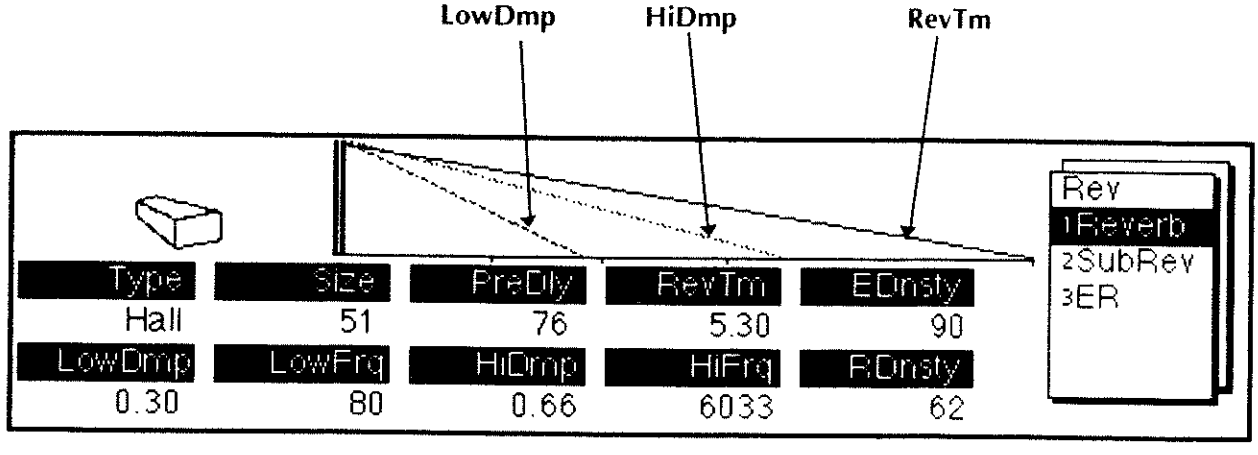
RDnsty — the density of echoes with the later part of the reverb sound, from 0 to 100%.

LowDmp — a damping factor applied to the low-frequency component of the reverb, from 0.05 to 1.00. This number, multiplied by the RevTm, gives the reverb decay time for the low-frequency reverb; e.g., If the RevTm is 3.00 and LowDmp is set to .70, then the low-frequency reverb will decay in 2.10 seconds. The graphic representation of the reverb on the screen shows the LowDmp factor as a dashed line.

LowFrq — the cutoff frequency for the low-frequency damping, in Hz, from 50 to 4000. All frequencies below this value will be affected by the LowDmp parameter, although the effect is gradual, like an equalizer: the lower the frequency, the faster the damping.

HiDmp — a damping factor applied to the high-frequency component of the reverb, from 0.05 to 1.00. The reverb graphic shows the HiDmp factor as a dotted line.

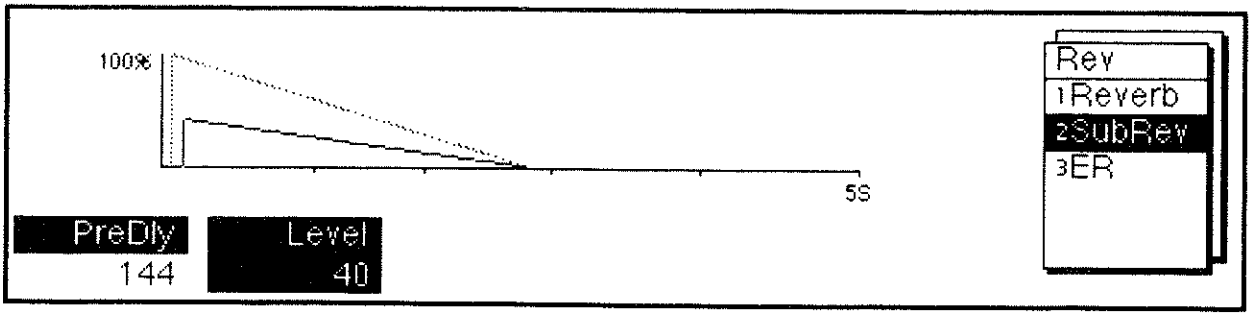
HiFrq — the cutoff frequency for the high-frequency damping, in Hz, from 4000 to 20,000. All frequencies above this value will be affected by the HiDmp parameter.



Sub Reverb screen

"Sub Reverb" is a second insertion of the input signal into the reverb algorithm, which can be set to have a different pre-delay, either longer or shorter than the main reverb, and can be reduced in level relative to the main reverb input. The screen graphic shows the level and pre-delay of the Sub Reverb (shown as a solid line) compared with the main reverb (shown as a dotted line).

The input signal used by the Sub Reverb must come from the center output of the ER module associated with the Reverb module. If that output is not connected to one of the Reverb module's inputs, the Sub Reverb will not be available.



Lower screen 2 (SubRev):

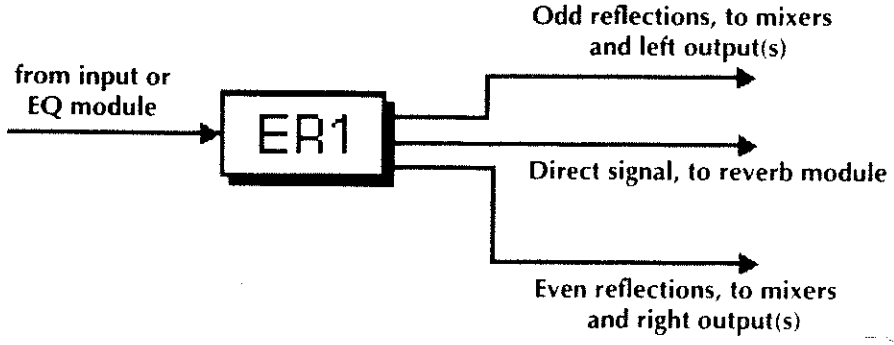
PreDly — the pre-delay of the Sub Reverb, in milliseconds, from 0 to 800. This is a separate parameter from the Pre-Delay in Lower screen 1.

Level — the relative level of the Sub Reverb, from 0 to 100% and 0 to -100%. Negative values put the Sub Reverb out of phase with the main reverb.

Early Reflections screens

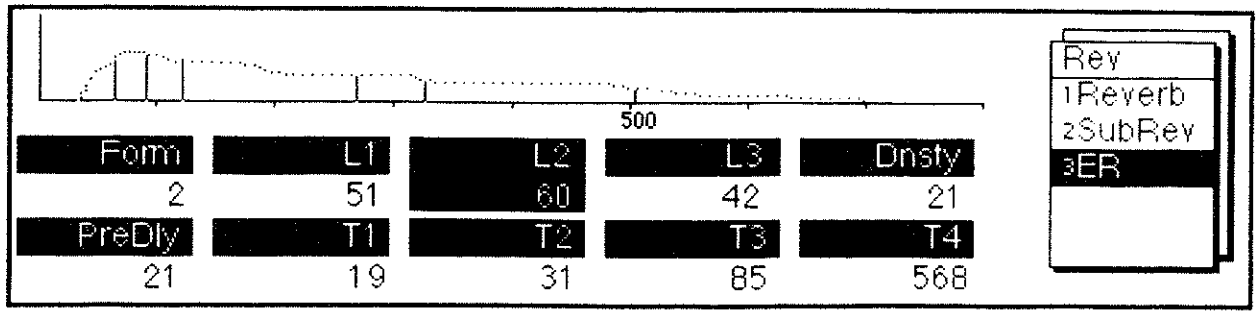
The R-880/GC-8 software provides 20 early reflections, over a period of time up to 800 milliseconds long. Early Reflection modules appear as discrete modules on the desktop whenever a "Reverb" algorithm is set up. Although an ER module can be *connected* independently of the Reverb module it is associated with (in fact, it can even be re-connected in front of a Plate module, which normally does not have an ER module), it can only be *adjusted* from within the parameters of the Reverb module it is associated with.

The early reflections appear at the outputs of the ER module alternatingly, with odd-numbered reflections appearing at the left (top) output of the module, and even-numbered ones appearing at the right (bottom). The center output of the module is essentially a "through" line for the direct sound coming into it, to allow that direct sound to be passed on to the associated Reverb module.



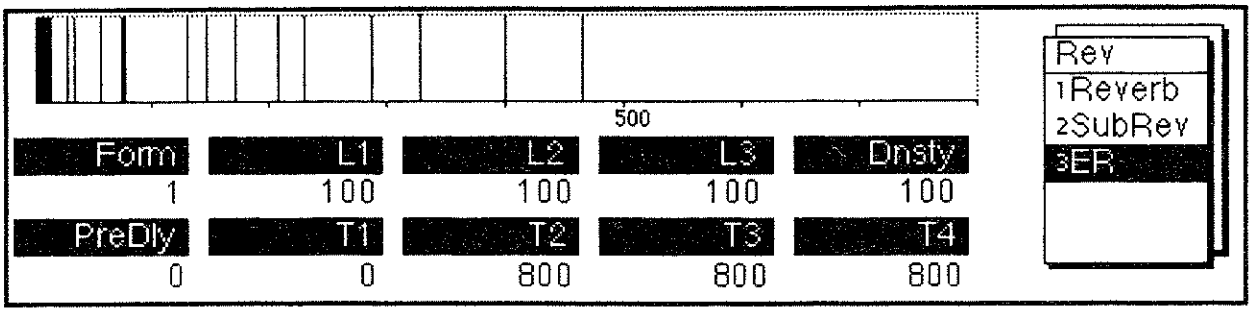
Lower screen 3 (ER):

In this screen the 20 early reflections are treated as a group. They are given an initial timing characteristic, a timing factor, and then an overall envelope, which is designed very similarly to the envelope generator in a synthesizer. The time scale of the screen adjusts itself to the length of the overall envelope: the full-scale value of the screen will be either 400 or 800 milliseconds.

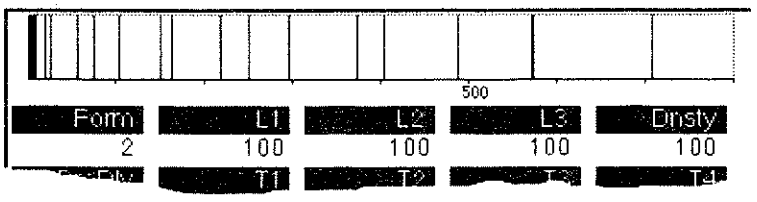


Form — lets you select one of four basic patterns.

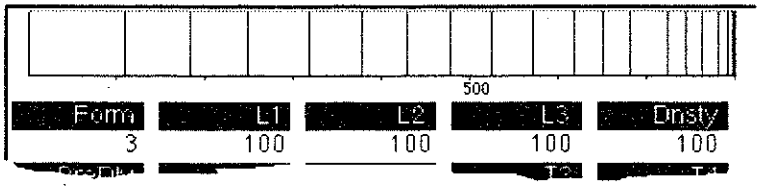
1) medium length, starting thickly, and thinning out over time (used in "Room" sub-type):



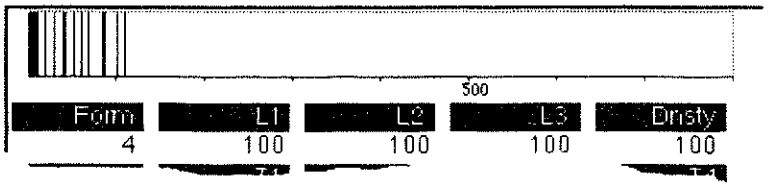
2) similar to 1, but somewhat longer length (used in "Hall" sub-type):



3) very long length, starts out thin and thickens over time:

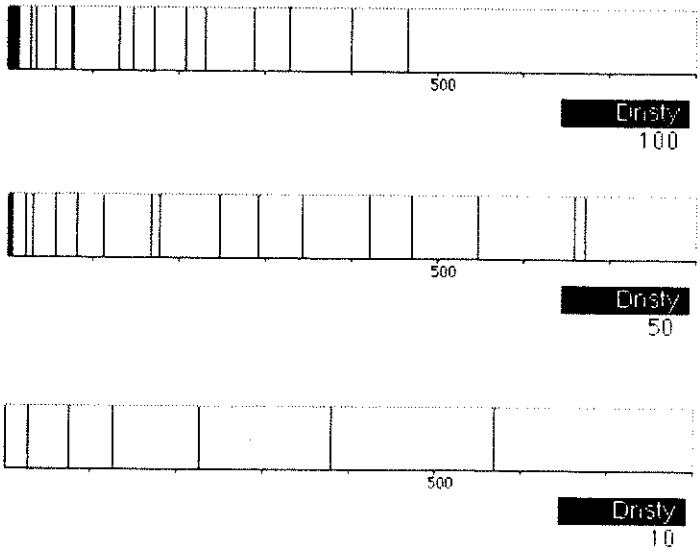


4) short and explosive, starts very thick and thins slightly (used in "Garage" sub-type):

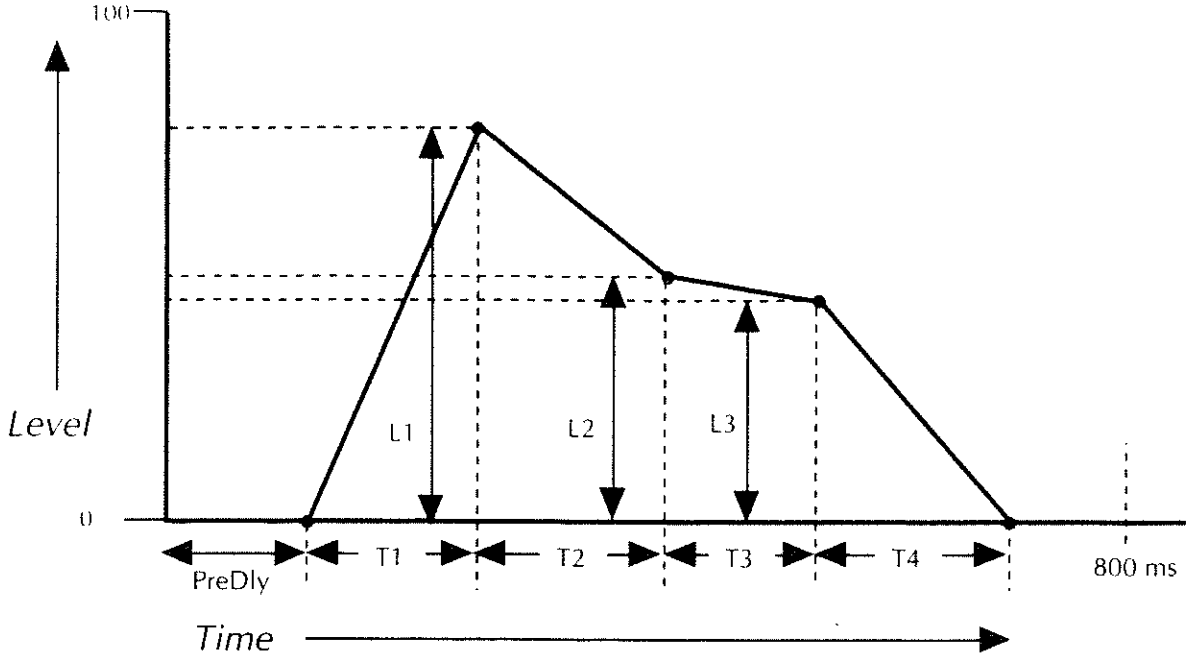


PreDly — the time between the direct sound and the first Early Reflection, in milliseconds, from 0 to 800. It can also be thought of as an offset for all of the Early Reflections. This is separate from the Pre-Delays in the other Lower screens.

Dnsty — the *relative* time the Early Reflections take to sound, in arbitrary units from 0 to 100. This parameter has the effect of shrinking or stretching the Form. Higher values mean the reflections will occur closer together and be done with more quickly. At the lowest values, the form is stretched so much that only the first few reflections are heard, because the rest are outside the 800-millisecond "window".

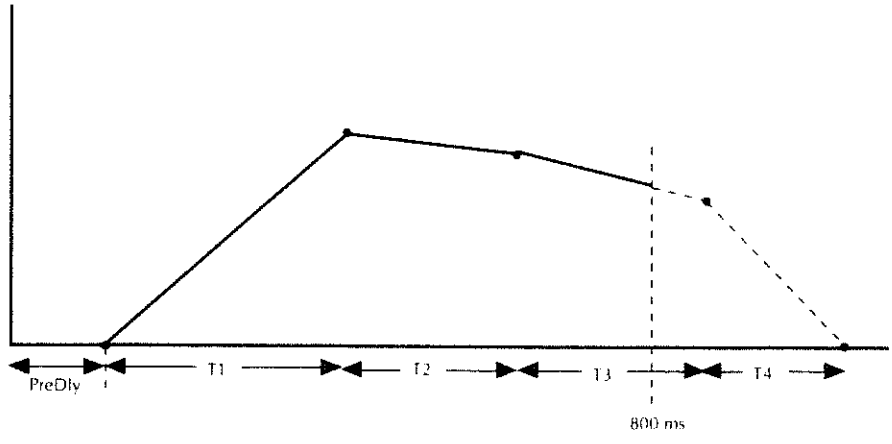


The remaining parameters are used to set the envelope for the Early Reflections. The envelope is fixed in time, and does not vary with changes in Density.



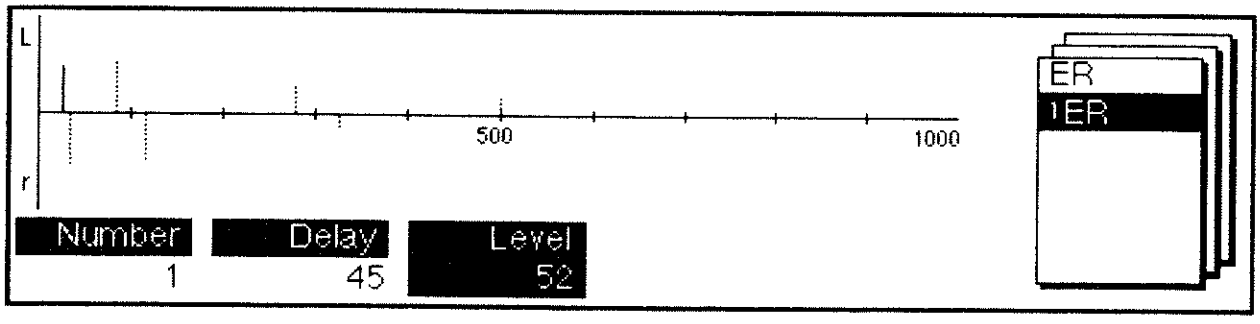
L1, **L2**, and **L3** (**Level 1**, **2**, and **3**): The relative levels of the ends of the three envelope segments (there is a fourth segment, but its end level is always 0), from 0 to 100%.

T1, **T2**, **T3**, and **T4** (**Time 1**, **2**, **3,** and **4**): The length in time of the envelope segments, in milliseconds, from 0 to 800. Remember that the overall time of the early reflections is 800 milliseconds, so if the sum of the early segments is greater than 800, the later segments will not be heard.



Sub-screen 1 (ER):

The lowest ER screen displays and lets you adjust individual early reflections. Odd-numbered reflections, which appear at the left output of the ER module, are shown as vertical lines above the middle horizontal line. Even-numbered reflections, which appear at the right output, are shown below the middle line. The individual reflection which has been selected for editing will be displayed as a solid vertical line, while other reflections will show up as dotted lines. This screen will re-scale itself according to the current values of the delay times: the full-scale value of the screen will either be 500 or 1000 milliseconds.



Number — the number of the individual reflection you wish to adjust, from 1 to 20.

Delay — the amount of time, from 0 to 800 milliseconds, from the direct sound to the occurrence of this specific reflection.

Level — the relative level, from 0 to 100% and 0 to -100%, of this reflection. Negative values mean the reflection will be out of phase.

Note that the individual delays do not have to occur *in order*: Number 2 can have a Delay time of 20 milliseconds while Number 1 has a Delay of 45 milliseconds. This can be useful when you are trying to create a sense of stereo movement with the delays.

Remember that any adjustments made in this screen will be erased if any subsequent adjustments are made in *either* of the screens above it — the upper ER screen or the main Reverb screen.

Parameters in the other modes and types

Reverb/Stack

The "Stack" type in the "Reverb" mode uses most of the same parameters as the "Tap" type. The differences are as follows:

Type (on both main screen and lower screen 1) — only two types are available, "Room" and "Hall". (Not accessible from the **NUMERIC** keypad.)

Size (on both main screen and lower screen 1) — the range is larger, from 0.2 to 80 meters, in 16 steps. (Not accessible from the **NUMERIC** keypad.)

RevTm (on both main screen and lower screen 1) — if the "Size" parameter is less than 9.4, the maximum setting for this parameter will be reduced. At the minimum Size (0.2), the maximum RevTm is 4.00.

Dnsty (on lower screen 1) — there are not separate parameters for early and late reverb densities (**EDnsty** and **RDnsty**); this parameter controls the echo density over the entire reverb.

Plate/Tap and Plate/Stack

Many of the parameters in the Plate mode are the same as in the Reverb mode, but there are some significant differences. The Plate mode has only two sub-screens, "Plate" and "SubRev". These are the parameters that are different (or whose action is different) from those in the Reverb mode:

Type — chooses among the four numbered Plate sub-types. Type 1 is a relatively dull, damped-sounding plate, while Type 4 is a very "live" plate, with a rising high-frequency characteristic over the decay period, giving the reverb a bit of "sizzle". Types 2 and 3 are intermediate settings between the two extremes. (This parameter *is* accessible from the **NUMERIC** keypad.)

RevTm — has the same range — 0.1 to 99.9 seconds — in both Tap and Stack types.

Brill — "brilliance", on the lower screen, adjusts the high-frequency content of the reverb, on an arbitrary scale of 0 to 100.

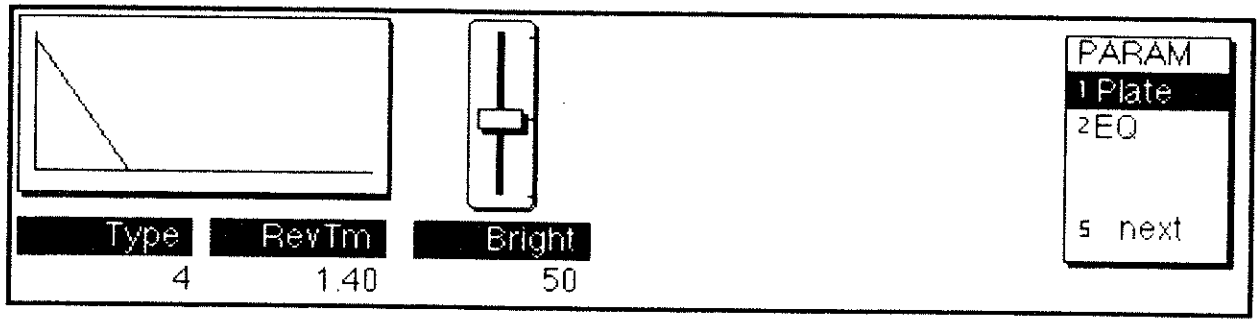
Depth — has the effect of adding an extra spatial dimension to the reverb by emphasizing low-frequency delays. It is on an arbitrary scale of 0 to 100.

As in the Reverb mode, the Stack type provides only a single density control (**Dnsty**), while the Tap type provides separate early and late density controls (**EDnsty** and **RDnsty**).

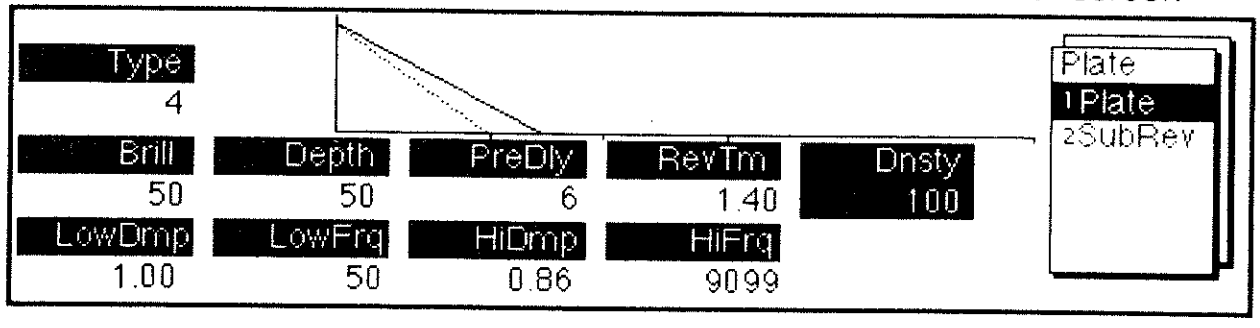
PreDly — in both the Plate and SubRev lower screens, the maximum pre-delay is 300 ms.

Note that there is no "Size" parameter and no "ER Level" parameter.

Upper screen



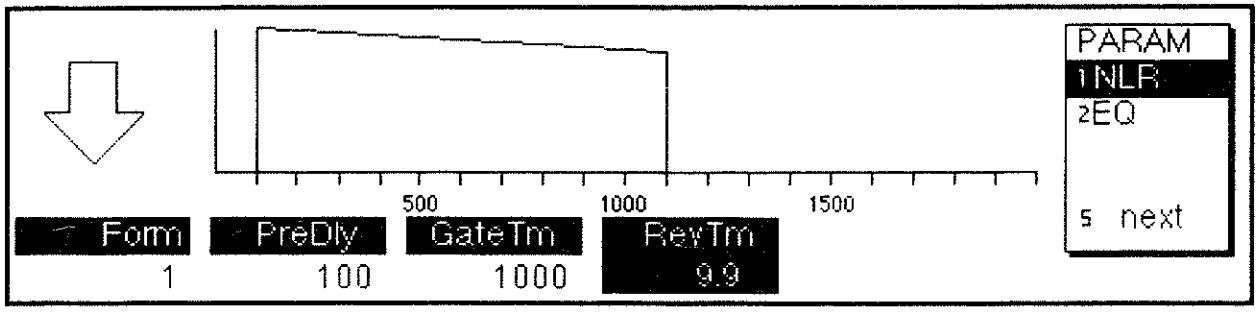
Lower screen



NLR

The Non-Linear reverb parameters differ significantly from those of the other modes, because the mode itself is used for quite different effects. There is one main screen and one sub-screen.

Main screen:

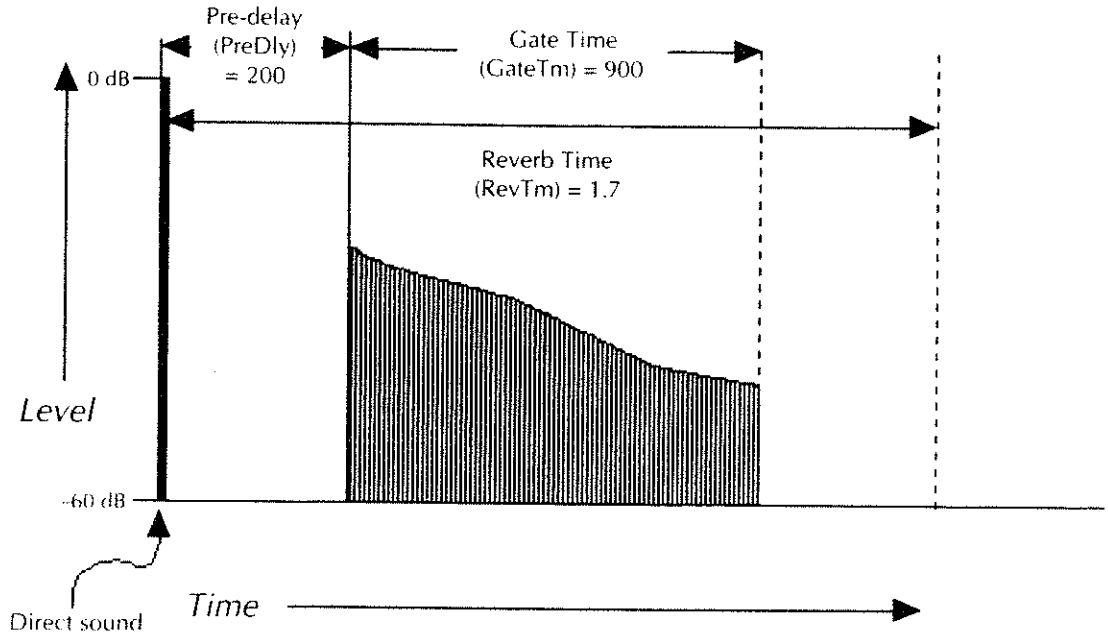


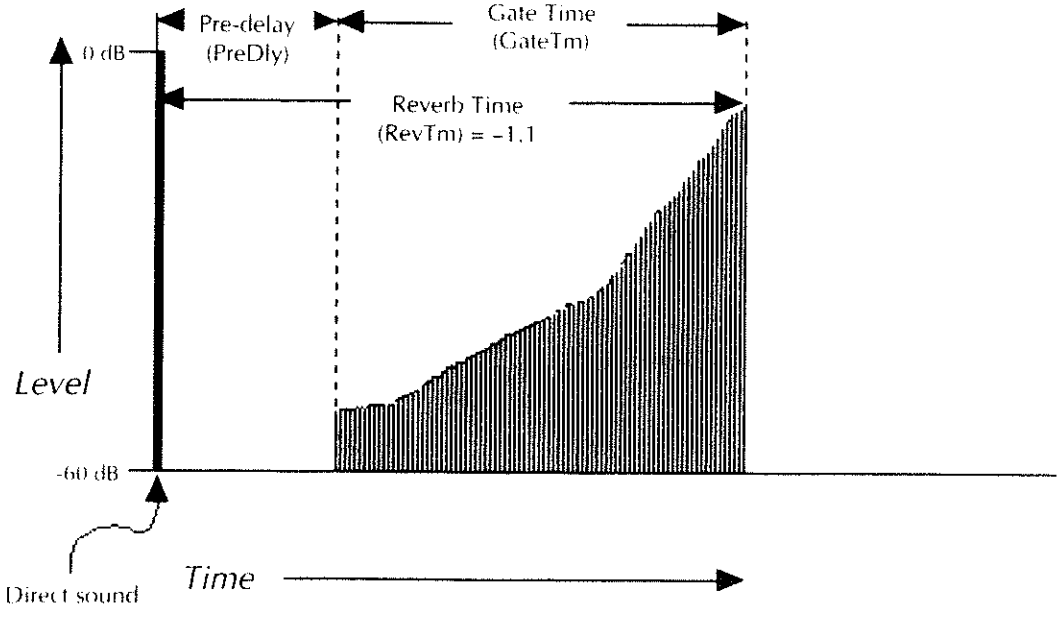
Form — determines how the sound will pan across the stereo field during the course of the reverb. **1** is no panning; **2** is left-to-right panning; and **3** is right-to-left panning. (These assume that the top output of the module as it appears on the desktop is Left and the bottom output is Right.) The position of the arrow at the upper left will change to show the setting of this parameter.

PreDly — the delay before the gate opens (but not before the reverb begins), in milliseconds, from 0 to 800.

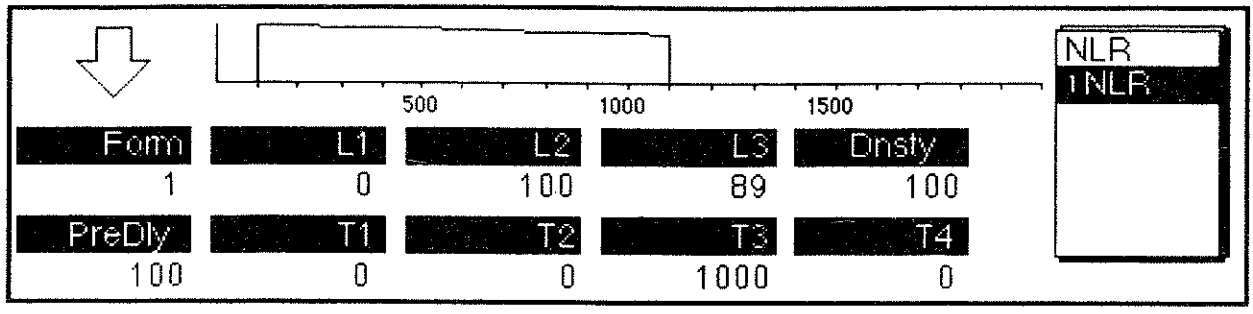
GateTm — the amount of time the gate is open (i.e., the reverb will sound), in milliseconds, from 0 to 1200.

RevTm — the overall RT_{60} of the reverb, as if it were unaffected by the gate. The total range of values is –9.9 seconds to +9.9 seconds — negative values indicate a reverb characteristic that *increases* in level over time: a "reverse" reverb. If the RevTm is shorter than the GateTm plus the PreDly, the reverb will decay naturally and the closing of the gate will have no effect on the sound.


Pre-delay
(PreDly)
= 200
Gate Time
(GateTm) = 900
0 dB
Reverb Time
(RevTm) = 1.7
Level
-60 dB
Direct sound
Time


Pre-delay
(PreDly)
Gate Time
(GateTm)
0 dB
Reverb Time
(RevTm) = -1.1
Level
-60 dB
Direct sound
Time

Lower screen:



The lower screen repeats the "Form" and "PreDly" parameters, and provides precise envelope control for the gate. The envelope is in four segments, and is constructed identically to the envelope used on the Early Reflections in the Reverb mode. The envelope begins *after* the time specified by the "PreDly" parameter, and its maximum overall length (as well as the maximum length of any one segment) is 1200 milliseconds.

L1, **L2**, and **L3** (**Level 1**, **2**, and **3**): The relative levels of the ends of the first three envelope segments (the end level of the fourth segment is always 0), from 0 to 100%.

T1, **T2**, **T3**, and **T4** (**Time 1**, **2**, **3,** and **4**): The length in time of the envelope segments, in milliseconds, from 0 to 1200. Since the maximum gate time is 1200 milliseconds, if the sum of the early segments is greater than 1200, the later segments will not be heard.

As with other Manual screens, changes in the parameters (either the values or the graph) in this screen will not be reflected in the upper screen.

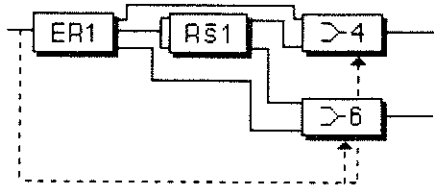
Dnsty — as in the other modes, the echo density of the reverb, in arbitrary units from 0 to 100.

Gates

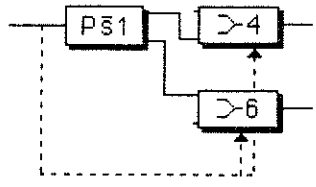
Reverb modules (in both Plate and Reverb modes) can have Gates added to them. A Gate is a simple steep-sided volume envelope imposed on the reverb sound. Its most common use is to shut the reverb sound off before it has fully decayed. It can also be used to delay the onset of the reverb on a slowly-rising input signal, and/or to make that reverb start "explosively".

When a Gate is closed, no sound will pass through it. When it is open, the reverb sound passes through it unimpeded. Controlling the opening and closing of the Gate is an audio signal. When the signal reaches a certain level, known as the "Threshold", the Gate opens. When the signal drops below the Threshold Level, the Gate closes. The Threshold Level is programmable, as is the amount of time the Gate takes to open and to close. (This differs from the Gate in the NLR mode, which is strictly time-dependent.)

There are two Gate Modes available. They differ in terms of the source of the signal that opens and closes the Gate. In Mode A, the controlling signal is derived from the *input* to the reverb. If it is a Plate module, the signal is taken from the input of the module itself. If it is a Reverb module, the signal is taken from the input to the *ER* module preceding the reverb module.

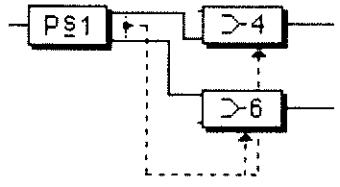


Gate Mode A — "Reverb" Mode



Gate Mode A — "Plate" Mode

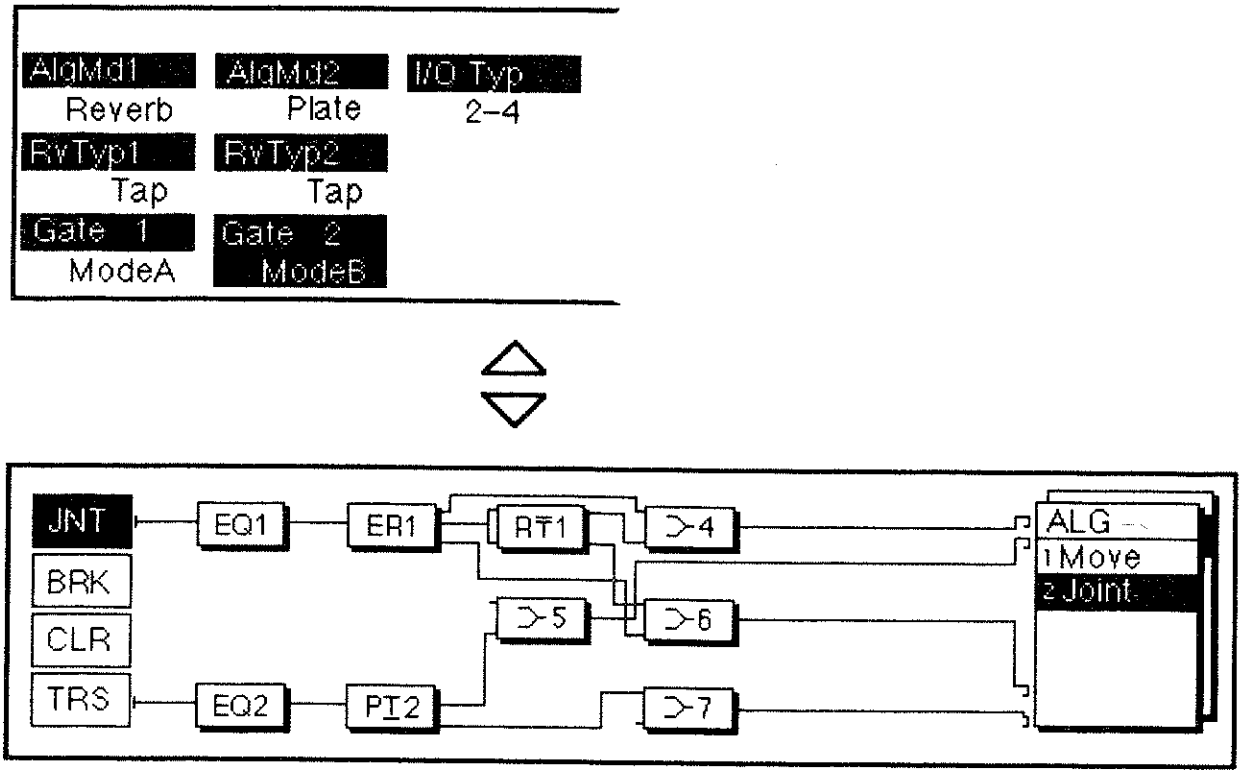
In Mode B, the controlling signal is taken from the *output* of the reverb module (Plate or Reverb). That output is stereo; the controlling signal is derived from the instantaneous highest level of the two channels.



Gate Mode B

If a reverb module has a Gate active in Mode A, its icon on the Algorithm screens will show a horizontal line above the second letter, e.g.: PS1 . If it has a Mode B Gate, a horizontal line will appear *below* the second letter, e.g.: PS1

Gate Modes are chosen on the Reverb Algorithm screen (**SHIFT-FUNC1**, **UP–ARROW**). As with other parameters on this screen, changing a Gate Mode (or turning a Gate off) will automatically construct a new algorithm and erase any changes made on the Joint or Move screens.



When a Gate is in use, "Gate1" or "Gate2" will appear on the Parameter Menu, as a separate item on the second page (**FUNC5** — " next", then **FUNC3** or **FUNC4**). If both Gates are in use, each will have its own screen available from the Parameter Menu, and will be independently adjustable and controllable, even if the reverbs are in Tandem mode.

The Gate screens have three parameters:

ThLvl — is the Threshold Level at which the Gate will open and close. It is in arbitrary units from 0 to 100. If this is set to 0, the Gate will open at the slightest input signal, and will stay open for most, if not all, of the reverb decay. If it is set to 100, it will open only at the highest input signal levels — levels that cause the meters on the R-880 front panel to go well into the red. Generally speaking, the higher the Threshold Level, the more sudden and dramatic the opening and closing of the gate will be.

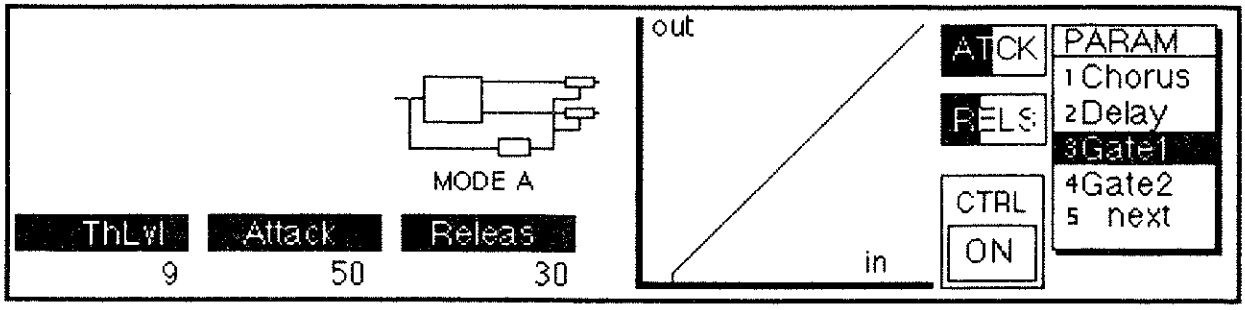
Attack — is the amount of time the signal has to be above the Threshold Level before the Gate will open. It is in arbitrary units from 0 to 100, with 100 being the shortest. If this parameter is set to the upper part of its range, the Gate opens as soon as the signal reaches the Threshold Level. If it is set to the lower part of its range, the signal has to be maintained above the Threshold Level for a period of time before the Gate will open. Typically that time required will be several hundred milliseconds, but it will vary according to the Threshold Level setting and the nature of the signal.

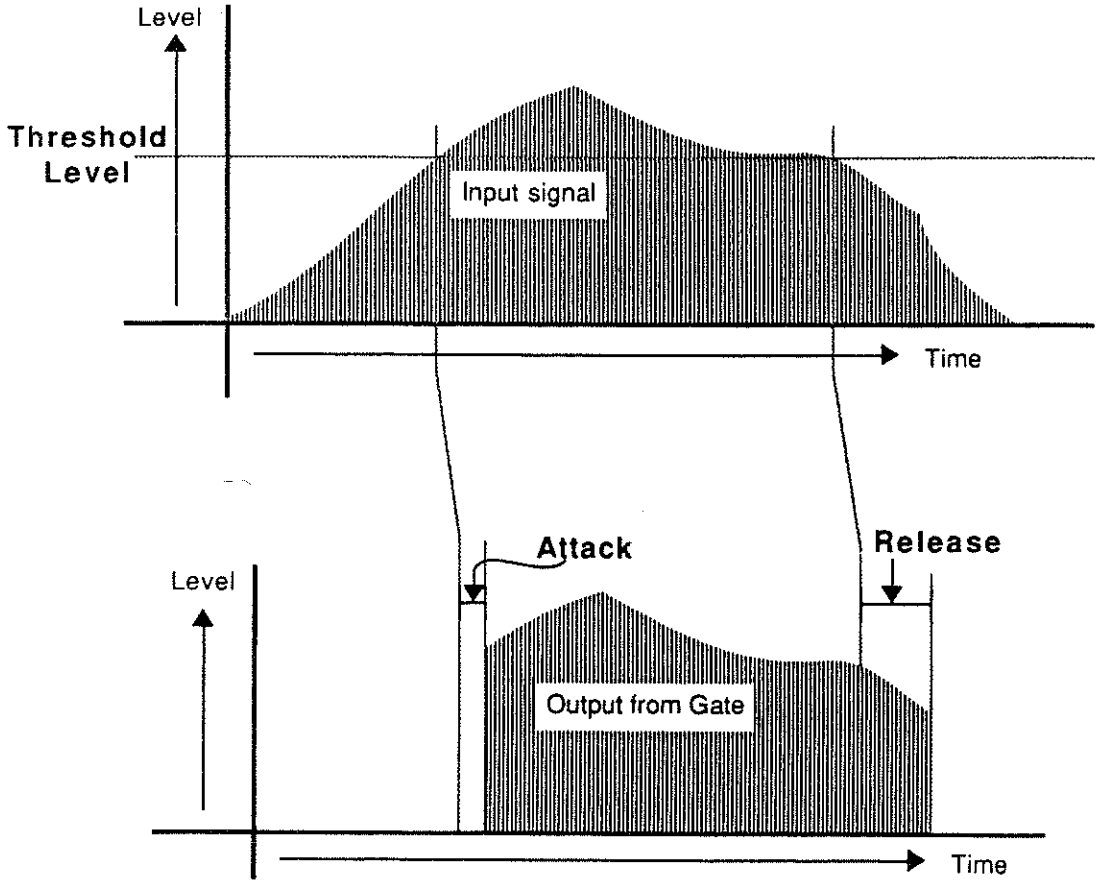
Releas (Release) — is the amount of time the Gate takes to close after the input signal drops below the Threshold Level. It is also in arbitrary units from 0 to 100. At high settings, the Gate shuts down quickly when the level drops, with a setting of 100 giving a shut-down time of about 150 milliseconds. At lower settings, the Gate takes longer to shut down, up to a maximum of about 6.8 seconds when the Parameter is set to 0.

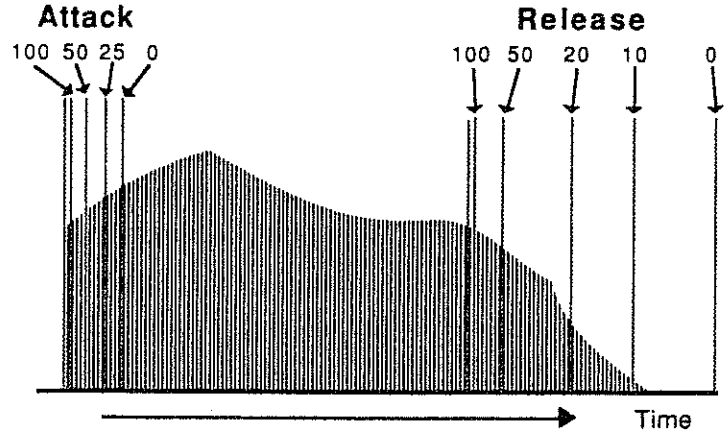
A secondary effect of this parameter is that it determines what happens if the input signal drops down below the Threshold Level and then comes back up again. If the setting is low, then the Gate will stay open, and will not re-trigger when the signal level comes back up. If it is high, then the Gate will close when the signal drops and open again when the level comes back up.

CTRL - The Gate can be turned on and off from this screen with the **CONTROL** key. Turning it off does not disconnect or remove the Gate from the algorithm, it merely treats it as if it is always open.

The graphic display on the Gate screen changes according to the Threshold Level. At low Threshold Levels, the display shows a nearly straight line, indicating that the signal going out is equal to the signal coming in. At higher levels, the line takes on a "brick-wall" characteristic, showing that input signals below the Threshold Level will produce no output, and when the Threshold Level is passed, the output rises suddenly.


MODE A
ThLvl
9
Attack
50
Releas
30
out
in
ATCK
RELS
CTRL
ON
PARAM
1 Chorus
2 Delay
3 Gate1
4 Gate2
5 next

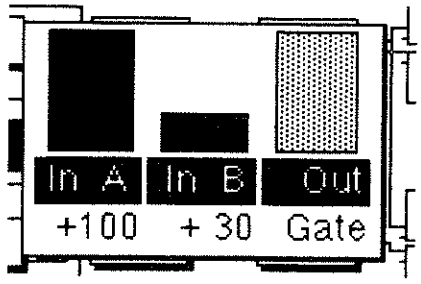

Level
Threshold Level
Input signal
Time
Attack
Release
Level
Output from Gate
Time


Attack
100 50 25 0
Release
100 50 20 10 0
Time

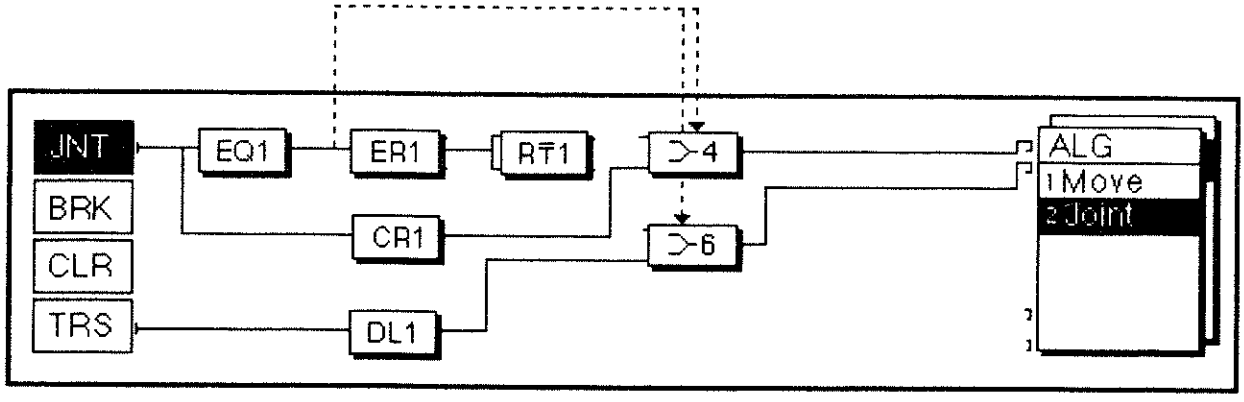
The "boxes" for Attack ("ATCK") and Release ("RELS") are filled in according to their respective settings: at 0 the boxes are all white, while at 100 they are solid black.

Gates, mixers, and modules

Whenever a Gate is set up on the Reverb Algorithm page, it automatically places and connects two Mixer modules. These Mixers are now under the control of the Gate — Mixers 4 and 6 are controlled by Gate 1, Mixers 5 and 7 by Gate 2. Their output levels cannot be set by you, but instead are automatically controlled by the Gate function. Their input levels, however, are still under user control.



Initially, each Mixer module is connected so that its inputs receive a signal from one of the outputs of its associated reverb module, and also (if the reverb module is in "Reverb" mode) one of its ER module's outputs. However, you can rewire the Mixers to affect other signals: a Mixer doesn't have to be *wired* to a reverb module to be *affected* by that module's Gate. You can connect other modules — Delay, Chorus, even another reverb module — to these Mixers, or even direct signal from the R-880's inputs. Signals passing through these Mixers, regardless of their origin, would then be subject to the action of the Gate.



Gates vs. compressors and mixers

The Gate functions and the Compressor modules (discussed in the next chapter) use the same processing code in the R-880, and therefore cannot be used at the same time. When Gate 1 is turned on, Compressor 1 is not available from the desktop, and when Gate 2 is turned on, Compressor 2 is not available.

In addition, when Gate 1 is operating in Mode B, Mixer module 8 is not available, and when Gate 2 is operating in Mode B, Mixer module 9 is not available.

Chapter 9
Processing Modules

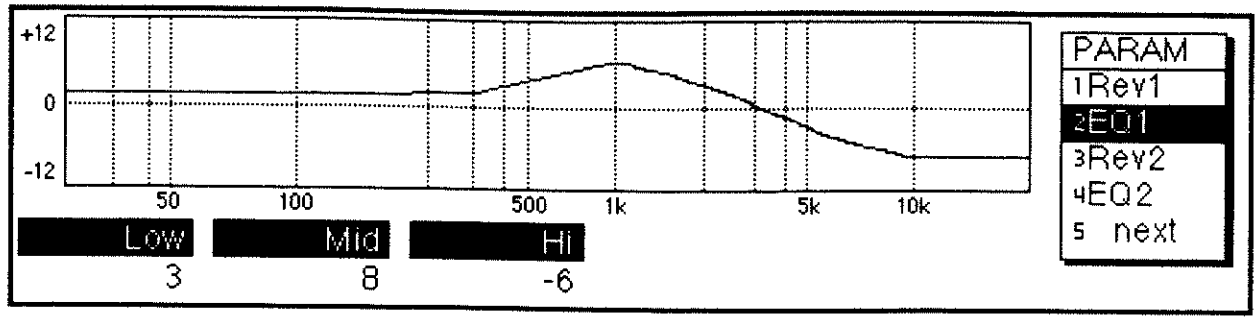
As we've already seen, the R-880 offers a host of processing options in addition to reverb. These options can be used in conjunction with reverb, by themselves, or in combination with each other. Each processing option is in the form of a module, and there are two of each module, e.g., EQ1 and EQ2. Like modules can be used on two different signal paths, or together on the same signal, or on different parts of a signal path, or in any other conceivable combination.

Equalizers

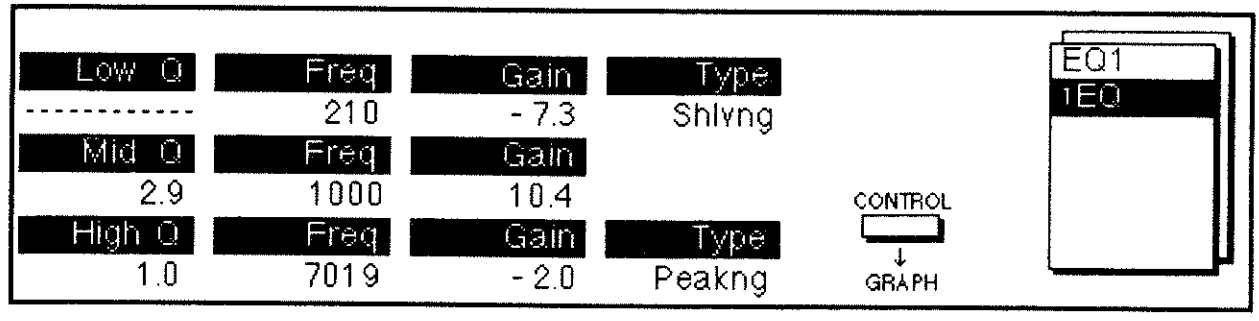
The Equalizer (EQ) modules are automatically placed in the active area of the desktop when a new reverb algorithm or configuration is selected. They are connected to the R–880 inputs, or just behind the first mixer if the configuration calls for a single input ("1–2" or "1–4"). Of course, they don't have to stay there, and using the Move and Joint screens they can be placed anywhere along any of the signal paths.

The EQ modules are fully parametric 3-band equalizers. They have two screens, a Macro and a Manual. To look at one of the EQ screens, press **SHIFT–FUNC2** to get into Parameter Mode, and then **FUNC2**.

The upper (Macro) EQ screen presents a simple three-band "tone-control" type of equalization. There are three parameters, Low, Mid, and High, each of which is adjustable (using the **EDIT KNOBs** or the **NUMERIC** keypad) from -12 to +12 dB, in 1-dB steps. Whenever you adjust one of the parameters, the graph at the top of the screen changes to show the new equalization curve. (Sometimes the action of the graph lags a few seconds behind the parameters.) The default frequency for the Low band is 500 Hz, and the curve it produces is shelving (i.e., all frequencies below 500 Hz are affected). The High band default frequency is 2000 Hz, and it too is shelving. The Mid band default frequency is 1000 Hz, and it is a peaking curve, with a default Q (bandwidth) of 1.

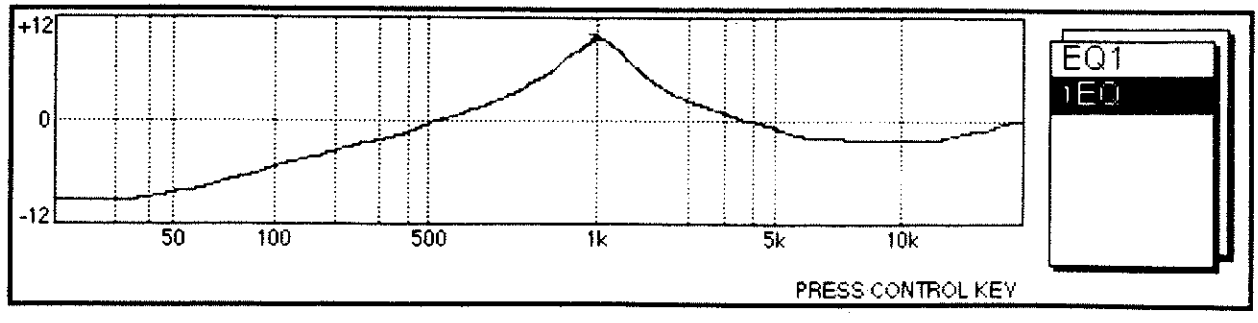


The lower EQ screen (**DOWN-ARROW**) provides much more control. The gain on each stage is now adjustable in 0.1-dB steps. The characteristic of the High and Low bands can be set to shelving or peaking. The frequency of each band is adjustable in 1-Hz increments, and the Q of each band (in peaking mode) can be adjusted from 0.3 to 9.9 in increments of 0.1.



The range of the three bands in the manual screen is
Low = 20-2000 Hz
Mid = 200-8000 Hz
High = 1500-20000 Hz

There is no graph immediately visible on the lower EQ screen, but there is one available. Press **CONTROL**, and a graph accurately showing the curve produced by the settings on the lower screen will be displayed. To get back to the lower EQ screen, press **CONTROL** again; to get back to the *upper* screen, press **UP-ARROW**.

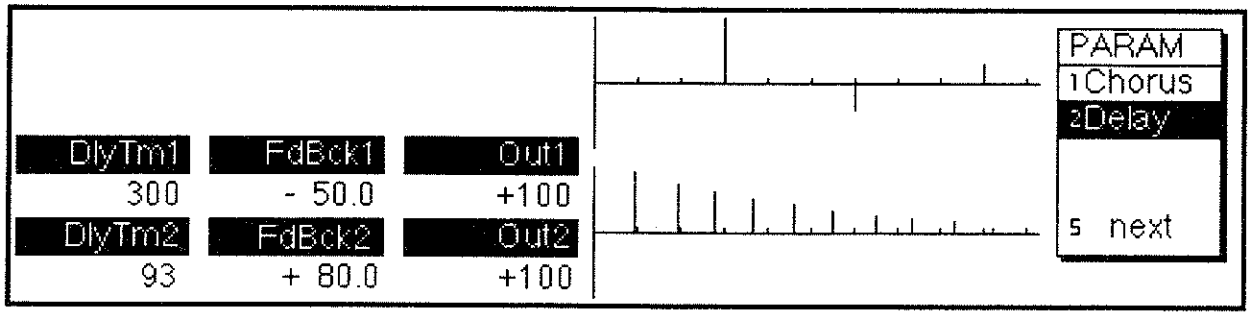


As with most Macro/Manual screen combinations, changes made in the EQ curve on the lower screen will not show up in the graph on the upper screen, and if you make any changes in *any* of the parameters on the upper screen, all changes you made on the lower screen will be erased. The software will warn you if this is about to happen.

Remember that if the Reverb modules are in Tandem mode, there will be only one set of EQ screens, and the same settings will be used for *both* modules, regardless of how they are set up in the algorithm.

Delays

The two Delay modules ("DL 1" and "DL 2") are simple digital delays, with one input and one output each. They are adjusted on a single Parameter screen, which is accessed from the second page of the Parameter Menu (**SHIFT-FUNC2**, then **FUNC5** [" next"], then **FUNC2**). Parameters for both modules will be on this screen, even if one or both of them is not in use.



The first row of parameters is for DL 1, and the second is for DL 2. All parameters are adjustable with both the **EDIT KNOB**s and the **NUMERIC** keypad.

DlyTM — the delay time of the module, in milliseconds, from 0 to 400.

FdBack — the level of signal fed back from the delay module's output to its input, from 0 to 100%. Negative values mean that the first repeat is flipped 180° out of phase from the source, and each subsequent repeat is 180° out of phase from the previous one.

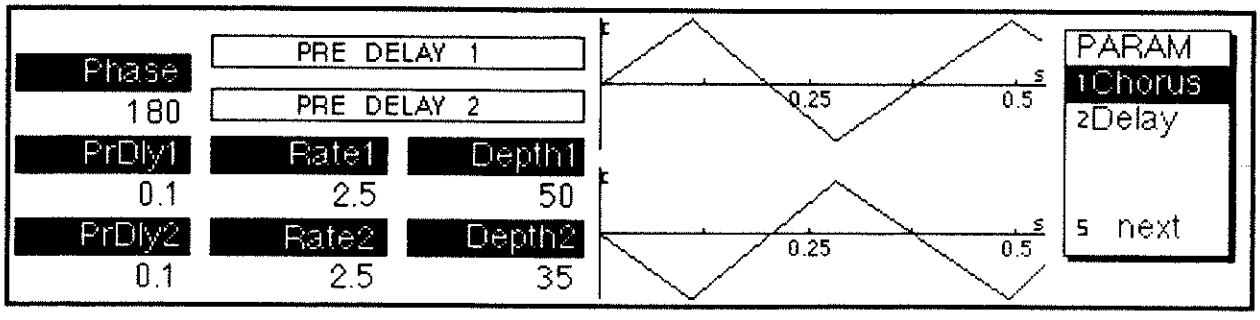
Out — the outgoing signal level of the delay module, from 0 to 100%. Negative values mean the outgoing signal is 180° out of phase with the incoming signal.

The graphs on the right side of the screen show the relative level and timing of the delays in the two modules, for the first 1000 milliseconds. Each sub-division is 100 milliseconds. Vertical lines that point above the median horizontal line in each graph represent delays that are in phase with the input; lines pointing down are delays that are out of phase.

As with any delay, very short delays and high feedback levels can be used to create comb-filtering effects. Feedback levels approaching 100, however, can cause oscillation at any delay length setting, and should be handled carefully.

Chorus

Like the delays, the two Chorus modules are accessed from the second page of the Parameter Menu (**SHIFT-FUNC2**, then **FUNC5** [" next"] if needed, then **FUNC1**), and their parameters appear on a single screen.



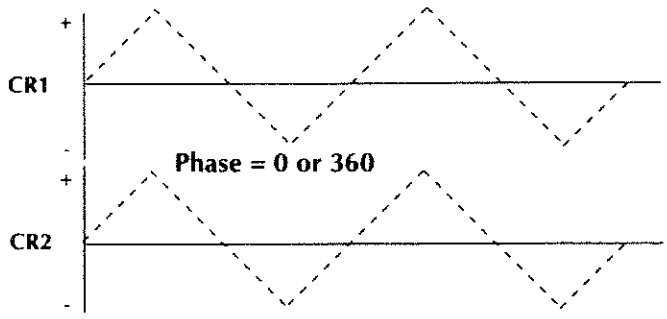
The Chorus module changes the pitch of the incoming signal and recombines it with the original, so that it generates a vibrato by beating against itself. It then varies that pitch change over time, using a wave whose speed is adjustable.

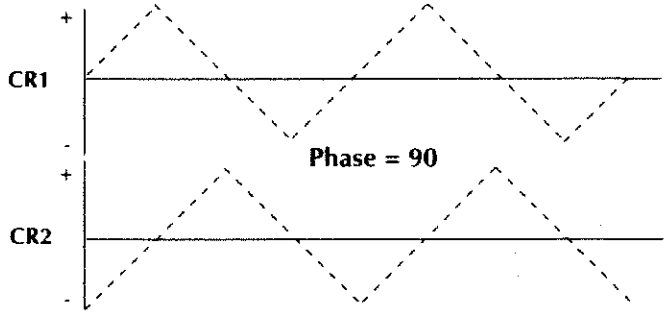
PrDly — puts a small amount of time delay at the module's input. Adjustable from 0.1 to 40 milliseconds.

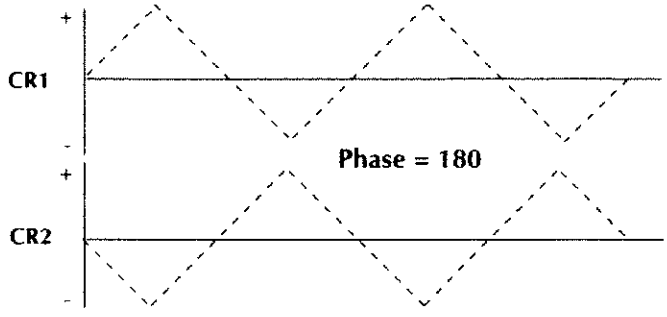
Rate — the frequency of the wave that modulates the pitch change. Adjustable from 0.3 to 10.0 Hz.

Depth — the depth of the pitch change, both the constant change *and* the change induced by the modulating wave. Adjustable in cents (100ths of a musical whole tone) from 0 to 50 — in other words, up to a half-step.

Phase — adjusts the difference in phase between the modulating waveforms of the two Chorus modules. The range is 0 to 360 degrees. If this parameter is set to 0, the waves will rise and fall together. If it is set to 180, then while the modulation in the first module is rising, the modulation in the second is falling. (This is all assuming that the waveforms are set to the same frequency, or **Rate** — if they are not, this parameter is more or less irrelevant.) Intermediate values give other relationships.







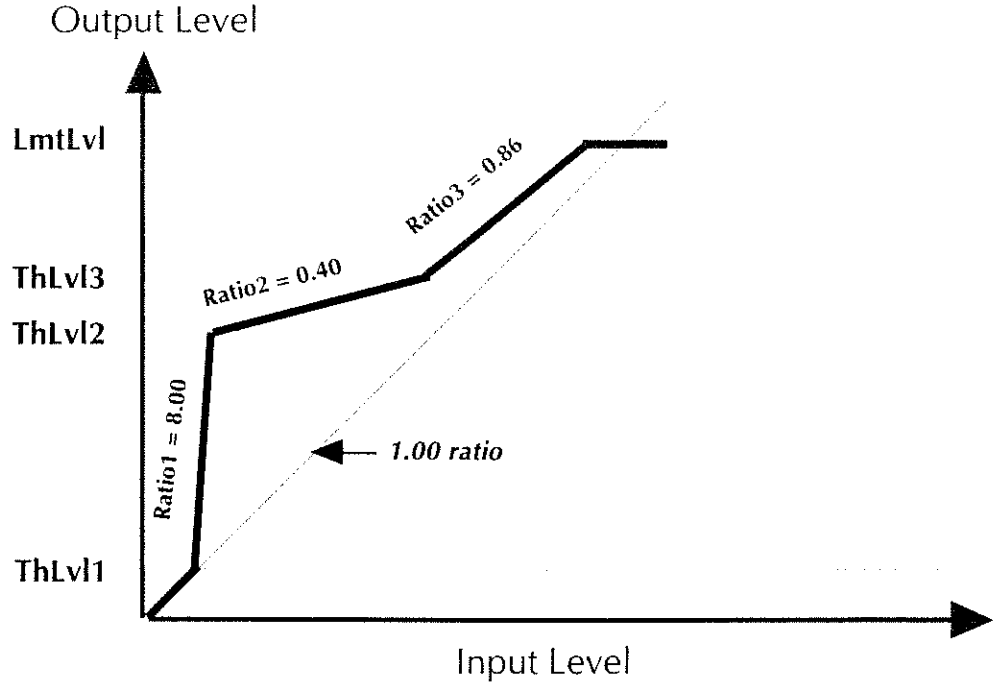
There are two graphics on the Chorus screen. The boxes labelled "PRE DELAY" are "barometric" indicators of the pre-delay settings. They are used because the settings are so short that they would not register on the graph. The graph on the right side shows the speed and depth of the modulating waveform. Note that this graph will re-scale itself depending on the setting of the Rate parameters. The smallest full-scale time value of the graph is 0.25 seconds; the longest is 4 seconds.

Compressors

The Compressor modules (CP 1 and CP 2 on the desktop, Cmprs1 and Cmprs2 [**FUNC3** and **FUNC4**] on the second page of the Parameter menu) are used to modify the dynamics of an audio signal, by introducing varying levels of amplification or attenuation based on the input level of the signal. They are very sophisticated devices and, like everything else on the R-880, work entirely in the digital domain.

Like Delays and Chorus, Compressor modules are not automatically included in any reverb algorithm, but must be placed on the desktop manually. Unlike the other modules, however, the Compressor parameter screens are not available from the Parameter Menu unless a Compressor module is actually *in* the active area and connected. The two Compressors are completely independent of each other, and each has its own screen.

Each Compressor module operates in three segments. Each segment has a Threshold Level (**ThLvl**) and compression Ratio (**Ratio**). The Threshold Level is an arbitrary value between 0 and 100 that, like the same parameter on the Gate screen, is based initially on the input signal level to the R-880. However, the segments are cascaded, and so the Threshold Level of segment 2 (**ThLvl2**) does not refer to the *input* signal of the R-880, but instead refers to segment 1's *output* signal.

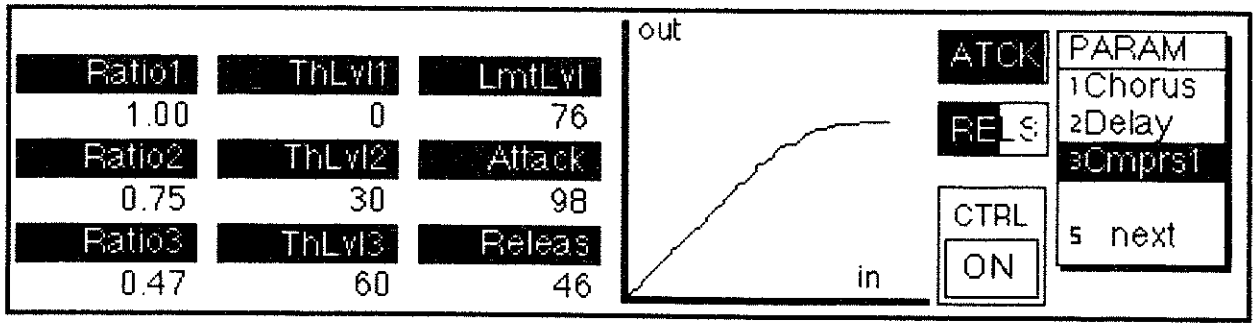


When the R-880 input signal rises above Threshold Level 1 (**ThLvl1**), any further increase in gain is modified up or down by **Ratio1**. A ratio of less than 1.00 will attenuate ("compress") the signal, while a ratio of greater than 1.00 will amplify ("expand") the signal. For example, if **ThLvl1** is 40 and **Ratio1** is 0.5, then any signal that exceeds a level of 40 will have its gain reduced by a factor equal to half (0.5) of the difference between the signal level and the level "40". If the Ratio is 3.00, then the signal will be expanded so that the difference in gain between it and the level "40" is multiplied by 3. The minimum Ratio setting is 0.03, meaning the signal will be compressed by a factor of approximately 33:1. The maximum Ratio setting is 8.00, which will expand the signal by a factor of 8:1.

When the signal leaves segment 1, either compressed, expanded, or left alone (which it would be if **Ratio1** was 1.00), it then goes to segment 2. If the new level exceeds Threshold Level 2 (**ThLvl2**), it is subject to compression or expansion determined by **Ratio2**. When it leaves segment 2, if its level exceeds **ThLvl3**, it becomes subject to the compression or expansion determined by **Ratio3**.

In addition to the three segments, there is a fourth parameter known as Limit Level (**LmtLvl**). The Limit Level sets an absolute upper limit for the signal level — in essence, it is a fourth compressor segment whose Ratio is 0 (∞:1).

The values that you set for the Threshold Levels of the three segments and the Limit Level must be in the correct order — that is, the setting of **LmtLvl** must be higher than **ThLvl3**, which must be higher than **ThLvl2**, which must be higher than **ThLvl1**. The software handles this automatically, and will not let you enter an incorrect setting for any of these levels.



Two remaining parameters on the Compressor screen are **Attack** and Release (**Releas**). Attack determines how quickly the compressor takes over when the signal initially exceeds a Threshold Level, with 0 being the slowest and 100 the fastest. Release determines how fast the level moves towards its compressed level (up or down, depending on the Ratio) once the Compressor takes hold. Again, 0 is the most gradual and 100 the fastest. The Attack and Release functions apply to all of the segments simultaneously, so a signal breaching the Threshold level of segment 1 will take the same amount of time to be "grabbed" by the compressor as a signal breaching the Threshold Level of segment 2.

The graphic display on the Compressor screen shows the action of the module: incoming signal levels are shown on the horizontal axis, and the resulting output signal is shown on the vertical axis. The graphic is to be taken as a guide, and should not be interpreted literally. As in the Gate screen, the "boxes" for Attack and Release are filled in according to their respective settings.

Finally, the Compressor function can be turned on and off from within the screen by pressing **CONTROL** — just like the Gates.

Care should be exercised with input levels to the R-880 when a Compressor is in use. Very high input levels may overload the Compressor stage, causing distortion.

As mentioned in the previous chapter, Reverb Gates and Compressors use the same part of the R-880's processor, and so if Gate 1 is in use, Compressor 1 will not be available, and if Gate 2 is in use, Compressor 2 will not be available. In addition, like the Gates, using the Compressor modules reduces the number of *mixers* available: if Compressor 1 is put in the active area, Mixer 8 is no longer available, and if Compressor 2 is active, Mixer 9 is not available.

Chapter 10
Programming Techniques — a sample

As you have seen so far, the GC-8 and R-880 are enormously complex and offer a huge range of processing possibilities. Rather than try to list all of them, which would be an impossible task, this chapter will instead walk you through the design of a number of programs, some of which are provided with the system and some of which you will have to set up. These programs are specially chosen to show you various interesting and unusual ways to use the system, and should help to point the way for you to discover your own.

Factory Programs

The algorithms and screens for the following programs can be found in the book "GC-8 Preset Data for R-880" that accompanied your system.

Int 18 — 1-2 Delay & Reverb 1

This is a complex program that uses two Reverb Stack modules and two Delay modules to create a wide, spacey stereo image from a merged input. The Reverb modules are set similarly, but are not in Tandem mode.

The Joint screen shows that the inputs are mixed, then split off to the two EQs, and also to two Delay modules. The EQs (which are set flat) feed the ER modules in the normal way, but then the ERs are split in an unusual fashion. The left output of ER1 goes to the left outputs of the R-880 (through some mixers), and the right output similarly goes to the R-880's right outputs, but the middle ("direct") output feeds only one side of Reverb module 1, not both. The other input to the Reverb module comes from DL1.

Reverb module 2 is wired in a complementary way: EQ2 feeds ER2, whose outputs go to the R-880's left and right outputs, as well as to one side of the Reverb module. The other side of the Reverb module is fed from DL2.

The Reverbs differ from each other mostly in terms of their tonal characteristics and how the Early Reflections modules are set up. ER1 uses four quick, loud reflections with a short pre-delay (edited individually on the ER sub-screen), while ER2 uses eight reflections, starting a little later, and diminishing gradually over a longer period of time. Although the Reverbs are the same subtype and have the same RT60, Reverb 1 is a thinner sound (lower Density) with a slightly damped high end, while Reverb 2 is thicker, and has more pronounced high-end damping.

The delay time on DL2 is about 1/10 of second, providing a fairly tight cluster, while DL1 is almost twice as long, providing a more pronounced repetition. Both modules use the same moderate amount of feedback.

The mixers are arranged to generate a true stereo image from the single (merged) source. The early reflections and reverb generated on the same side as the mixer predominate over those coming from the other side — e.g., the *left* input of Mixer 1, which contains the left output of ER1 and the left output of Reverb 1, and goes to the R-880's left outputs, is set more than twice as high as the *right* input of Mixer 1, which contains the left outputs of ER2 and Reverb 2.

Int 19 — 2-2 Delay & Reverb 2

This is a somewhat similar program to *Int 18*, but it has true stereo inputs. The input channels are kept substantially separate through the entire signal chain, thereby maintaining the stereo identity of the signal. Because it is not *generating* a stereo image, there is no reason for the Reverb modules to be different from each other, and so they are in Tandem mode.

The direct outputs from each Early Reflection module are mult-ed, going both to the associated Reverb module and to the opposite Reverb module. The signal going to the opposite side is delayed once for 102 ms (both delays are set the same, with no feedback), and attenuated. The outputs of the Reverb modules also cross to their opposite outputs, similar to the previous program, and the crossed signals are similarly mixed relatively low.

Int 17 — 2–2 Chorus and reverb 2

This program uses two relatively small Hall Reverb modules in Tandem, whose outputs are passed through Chorus modules for a bit of a "swimming" effect. The Choruses are very slow, with a small depth setting, but they are set 60 degrees out of phase to keep the sound moving.

The program has stereo inputs, and the mixers are set up so that the integrity of the channels is substantially maintained.

You might want to experiment with exaggerating the effect by increasing the Choruses' Depth and/or Rate.

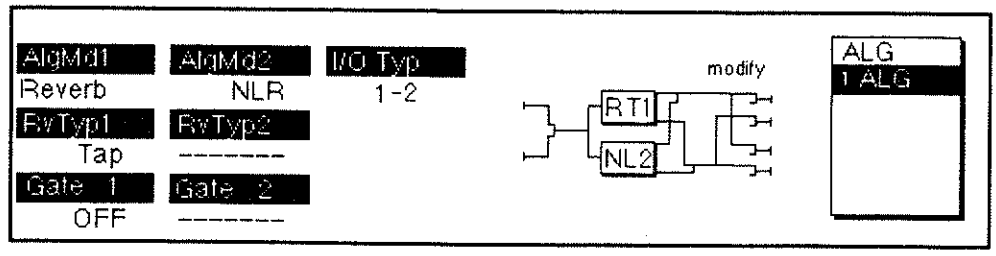
Programs for you to try

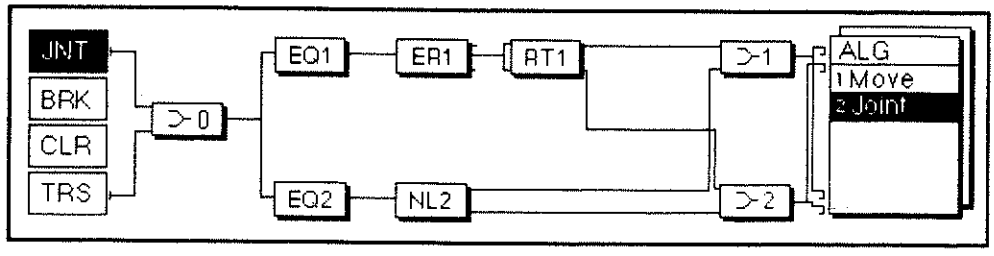
The illustrations accompanying these program descriptions show only the screens relevant to the current program. If a screen is not shown, you needn't set any parameters on it.

1-2 Back&Forth

This is a program that simulates a sound moving backwards, then forwards through time. It starts with a "Reverse Reverb" — an NLR module with a negative RevTm. The NLR gate stays open for 400 milliseconds, and then the other module, set to Reverb Tap, takes over. This module has a PreDly of 410 ms, and the Early Reflections and Sub-Reverb are shut off.

A large amount of mid-range boost is added to the NLR module to increase its impact.





PARAM
1 Rev1

Rev1
1 Reverb

Type	Size	PreDly	RevTm	EDnsty
Hall	14	410	5.00	90

LowDmp	LowFrq	HiDmp	HiFrq	RDnsty
0.57	80	0.78	4000	100

Rev1
2 SubRev

PreDly	Level
355	0

Rev1
3 ER

Form	L1	L2	L3	Dnsty
2	0	0	0	21

PreDly	T1	T2	T3	T4
0	18	31	549	800

PARAM
2 EQ1

Low	Mid	Hi
0	0	0

PARAM
3 NLR2

Form	PreDly	GateTm	RevTm
3	0	400	-0.7

PARAM
4 EQ2

Low	Mid	Hi
0	12	0

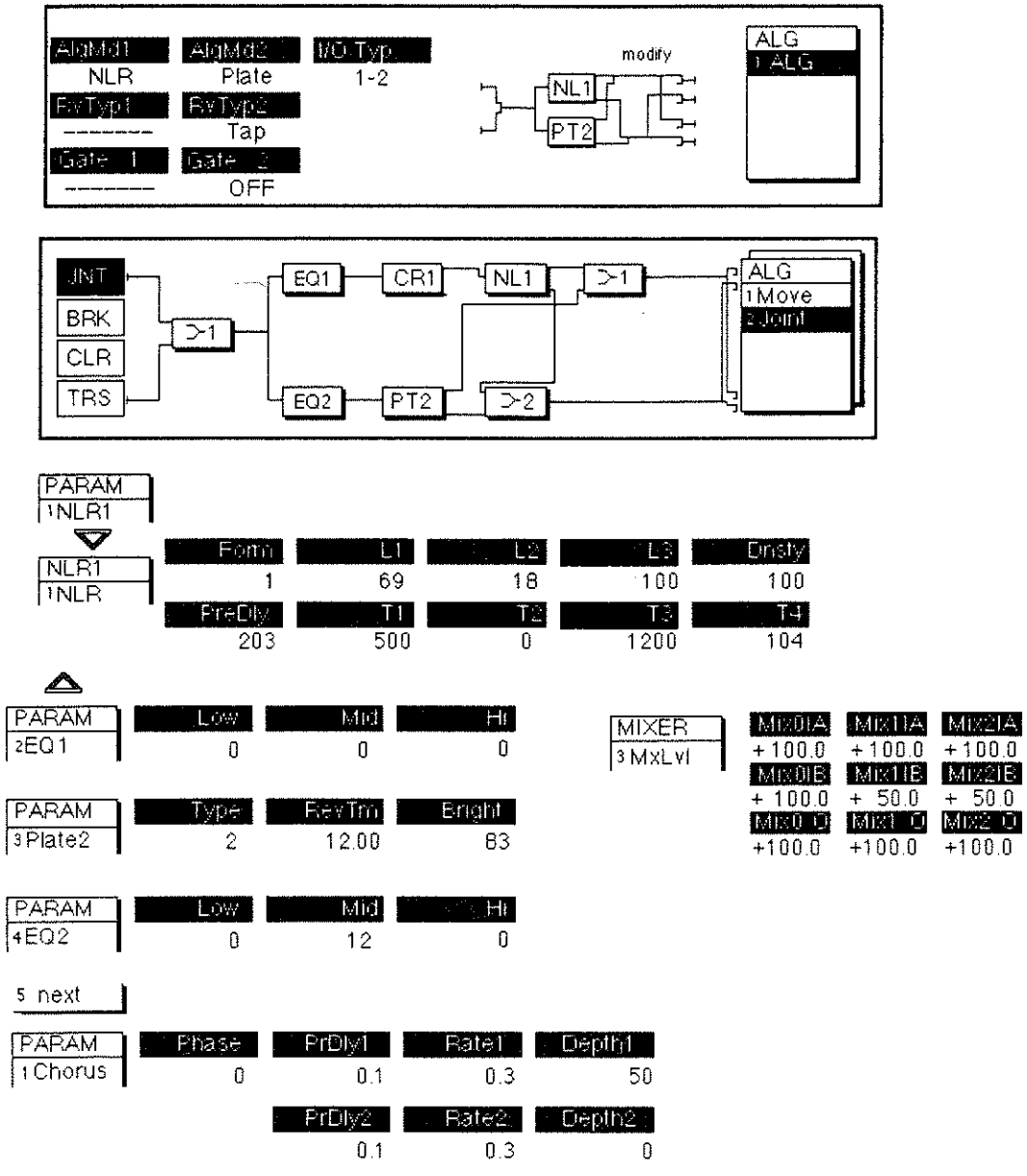
All Mixers

Mix IA
+ 50 0
Mix IB
+ 50 0
Mix O
+100 0

1-2 Doppler Cathedral

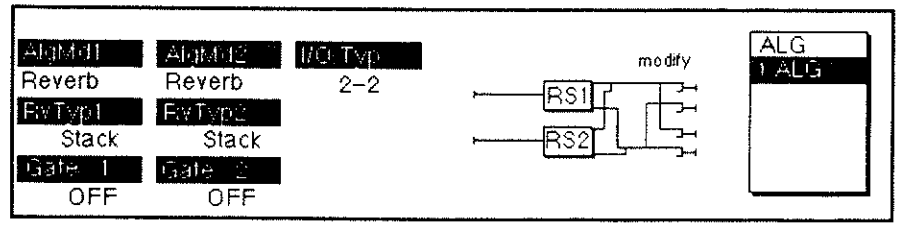
This is a very complex program that simulates a large space that is moving rapidly past you, if you can imagine such a thing. It uses an NLR module with an envelope that has two distinct attacks following a substantial pre-delay. This gives the sound a "billowing" effect. But before the signal enters the NLR, it first goes through a Chorus module, set to maximum pitch change at the slowest modulating rate. This gives the "Doppler" effect.

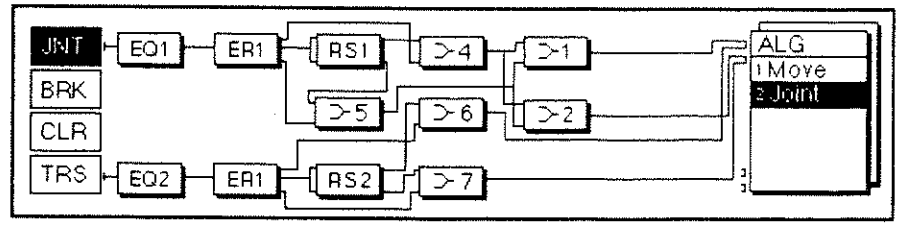
The signal also goes through a Plate module, which rounds out the sound and gives it some length. The outputs of the Plate are mixed low so that they don't overpower the NLR.



2-2 In/Out Stereo

This program uses two Reverb modules to create a sound whose stereo spread increases over time. The first Reverb module is set to a small Room, while the other is a larger Hall, with a long pre-delay. The outputs of the first module are panned fairly close to the center, while the second module's outputs are panned to the far left and right. An unusual aspect of this program is that it *each* Reverb module creates its own stereo image, and if separate signals appear at the two inputs, they will be affected differently, but both will end up in stereo. ***Note***: to keep things simple, only outputs **1** and **2** are used in this algorithm. However, *both the* **A** *and* **B** *sub-outputs* of Output Mixers **1** and **2** must be set to 100 for this program to work correctly.





PARAM 1Rev1	Type	Size	RevTm	ERLvl	Bright
	Room	9.4	1.40	27	40
Rev1 3ER	Form	L1	L2	L3	Dnsty
	1	23	27	9	100
	PreDly	T1	T2	T3	T4
	9	13	15	32	200
PARAM 2EQ1	Low	Mid	Hi		
	0	0	0		
PARAM 3Rev2	Type	Size	RevTm	ERLvl	Bright
	Hall	80	6.00	0	67
PARAM 4EQ2	Low	Mid	Hi		
	0	0	0		

MIXER 3 MxLvl	Mix1A	Mix2A	Mix3A	Mix5A	Mix6A	Mix7A	*All output mixers set to 100.0*
	+ 45.0	+ 45.0	+ 50.0	+ 50.0	+ 50.0	+ 50.0	
	Mix1B	Mix2B	Mix3B	Mix5B	Mix6B	Mix7B	
	+ 68.0	+ 68.0	+ 50.0	+ 50.0	+ 50.0	+ 50.0	
	Mix1 D	Mix2 D	Mix3 D	Mix5 D	Mix6 D	Mix7 D	
	+100.0	+100.0	+100.0	+100.0	+100.0	+100.0	

Other combinations to try

1) Put a compressor ahead of a Plate module, and set it to full expansion (ThLvl1=1, Ratio1=8.00, ThLvl2=98, ThLvl3=99, LmtLvl=100). This will cause the reverb to always be at the same level and to have the same apparent decay time, regardless of the input signal.

2) Set up two Reverb modules, not in Tandem mode. Pan the outputs of one primarily to the Left R-880 output and pan the other to the Right. Connect the Early Reflections modules so they go to both R-880 outputs, and then set up the individual reflections (in the sub-screens) so that they pan across the stereo image over time (remember, the individual delays do not have to be in order, so you can start with all the odd-numbered ones, and gradually introduce even-numbered ones). Now set the pre-delays of the two Reverb modules so that they pan as well, although in the opposite direction — i.e., if the Early Reflections are panning left to right, then the pre-delay of the Reverb module going to the Right outputs should hit first. The result is a sound that flies around the space, seemingly in two directions at once.

3) Create a "three-reverb" effect: Mult the inputs to a) a dense ER cluster; b) a gated (NLR) reverb with a pre-delay about the same length as the ERs' overall envelope; and c) a Reverb module with a pre-delay almost as long as the Gate Time + the ER envelope. Now make the sound explode outwards by panning the ERs to the center, panning the NLR outputs slightly Left and Right, and panning the Reverb all the way Left and Right.

4) Using the same idea, send the various signals to different pairs of output channels, creating a "surround" effect.

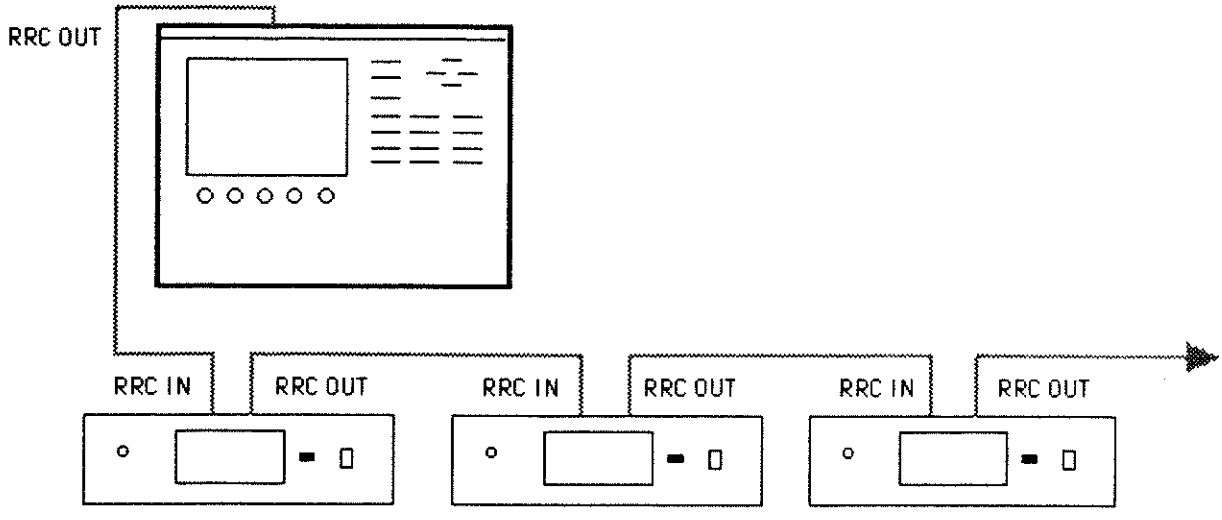
The possibilities are nearly endless. We welcome your ideas, and we at Roland would be happy to learn about any unusual programs that you come up with.

Chapter 11
Multiple Units, Miscellaneous Functions, and Troubleshooting

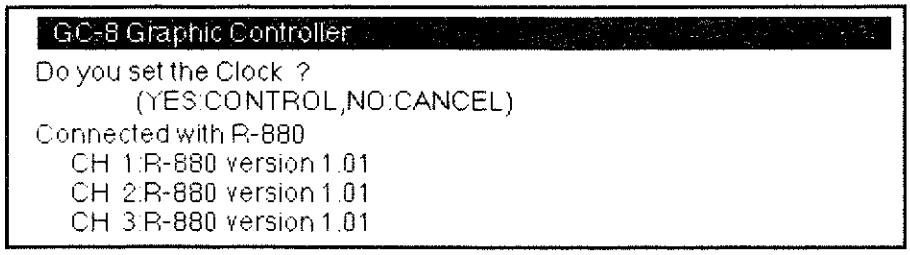
Using Multiple R-880s

The GC-8 Graphic Controller is capable of controlling up to 16 R-880 units. The R-880s can be independent of each other, or they can be controlled with varying degrees of simultaneity. The Roland Remote Control (RRC) protocol is actually a form of MIDI, and therefore independent control of devices on the RRC bus is achieved by setting them to different MIDI channels.

When you use multiple R-880s with a single GC-8, the R-880s must be "daisy-chained" together: a cable from the **RRC OUT** jack on the GC-8 goes to the **RRC IN** jack of one R-880, and another cable goes from that R-880's **RRC OUT** jack to the next R-880's **RRC IN**, etc.

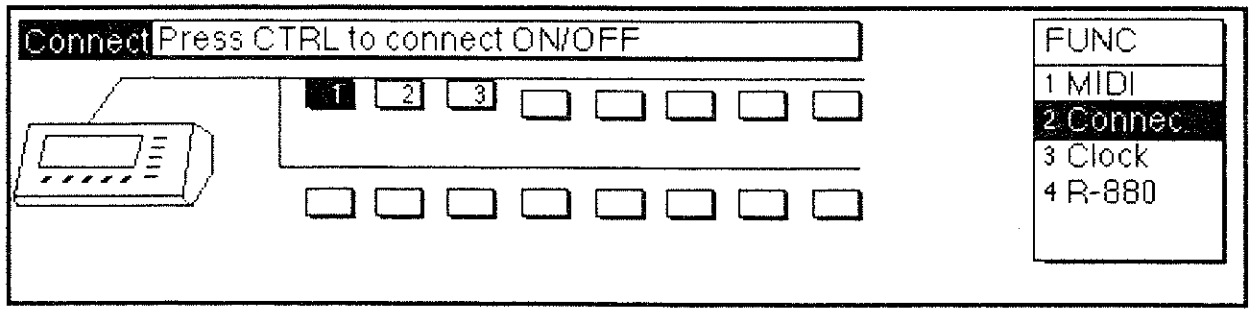


Once you have the wiring done, then *before* you turn on the GC-8, turn on all of the R-880s and set up each one so that it is on its own MIDI channel, using the **MIDI CH SELECT** button on the front panel. Now when you insert the System ROM card into the GC-8 and turn on its power, the opening display (after you bypass the clock) will show all of the R-880s that are physically connected to the GC-8:



At this point, anything you do on the GC-8 will have an effect on *all* of the R-880s on line. If you change a program, that program will be changed on all the R-880s. If you adjust a parameter, that parameter will change on all the R-880s. (If the R-880s are set to different programs, each R-880 will try to alter a parameter *similar* to the one you've adjusted on the GC-8. If the program in an R-880 is very different from that showing on the GC-8, the results may be unpredictable.)

However, you can set up the GC-8/R-880 system so that the GC-8 only controls one R-880 at a time. There is a way in software to temporarily disconnect one or more R-880s from the RRC bus. This is handled by the Connections ("Connec") screen on the Function ("FUNC") menu — **SHIFT-FUNC4**, and then **FUNC2**.

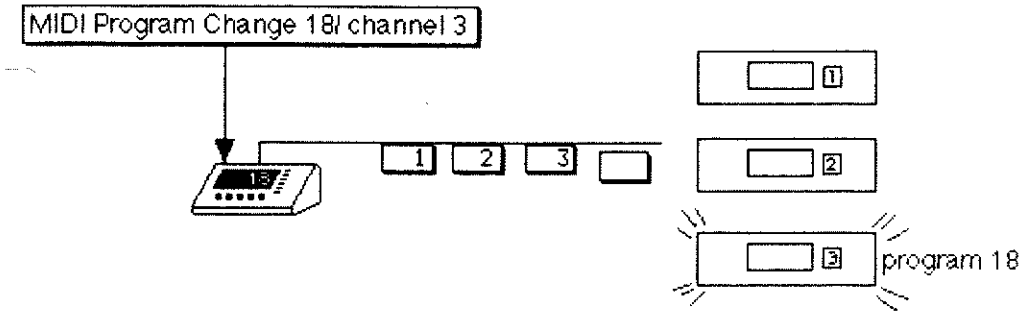


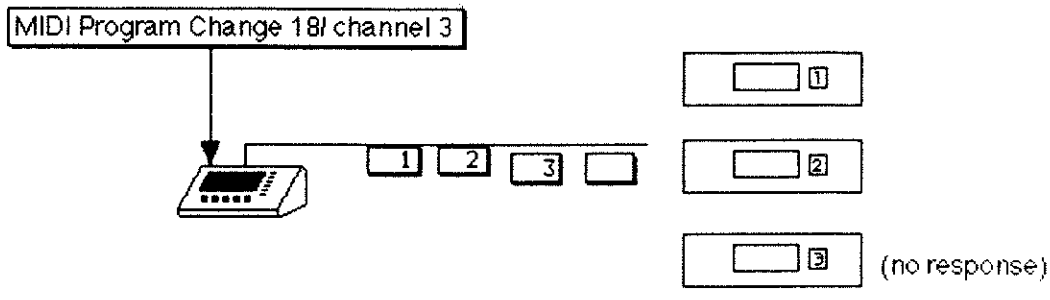
Each R-880 that is physically connected to the GC-8 is represented on this screen by a box with a number in it, corresponding to the R-880's MIDI channel (the system has no way of differentiating among R-880s that are set to the same MIDI channel, which is a very compelling reason not to do so). When you first encounter this screen after powering up, every box with a number in it will be touching one of the horizontal lines coming out of the little picture of the GC-8. This means that all of the R-880s are on line. You can disconnect an R-880 by moving the **CURSOR** keys so that the unit you want to disconnect is highlighted, and then pressing **CONTROL**.

When you have disconnected an R-880, that unit will no longer respond to program or parameter changes from the GC-8 (although it will still process the audio signals just fine). Therefore, if you want to work on only one R-880, disconnect all of the others.

Re-connecting an R-880 to the RRC bus is the same procedure: select the R-880 you wish to connect with the **CURSOR** keys, and press **CONTROL**.

While all connected R-880s will respond to GC-8 commands, they will not all respond to MIDI Program Change commands *coming into* the GC-8. If the GC-8 receives a Program Change command, *only the R-880 that is on the same channel as the program change will respond to it.* However, for that R-880 to respond, it *must be connected* to the GC-8 on this page. If a MIDI Program Change message is received on a channel that is being used by *any* currently-connected unit, the GC-8 display will change to show the program called up by that Program Change. If there is no unit connected that uses that channel, the GC-8 will not change. (Note that while multiple R-880s on a single GC-8 can be set to run different programs at any one time, they all draw on a common *memory*, and therefore use the same MIDI Program Change Table.)

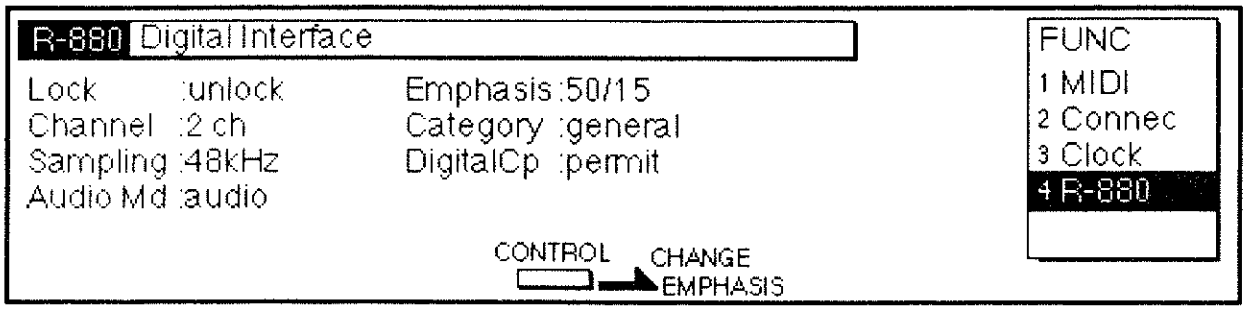




Also note, as discussed in Chapter 7, that you can monitor the inputs and outputs of individual R-880s (if they are connected) from the "InLvl" screen on the Mixer Menu by changing the MIDI channel in the special window on that screen.

Digital Parameters

You can examine the R-880's digital interface parameters (and change one of them) by going to the Function Mode (**SHIFT-FUNC4**) and pressing **FUNC4** — "R-880". You will get the following screen:



The values above are what you will see when there is no signal source connected to the *digital* inputs of the R-880. If there is a digital input signal source, the parameters will automatically change to match those of the input signal.

The "Change Emphasis" icon will appear only when there is no digital source. Signal pre-emphasis is normally switched On when the analog inputs are used, in order to maximize the signal-to-noise ratio of the internal analog-to-digital convertors, but it can be switched Off (with the **CONTROL** button) when a digital device that requires no pre-emphasis is connected to the digital outputs.

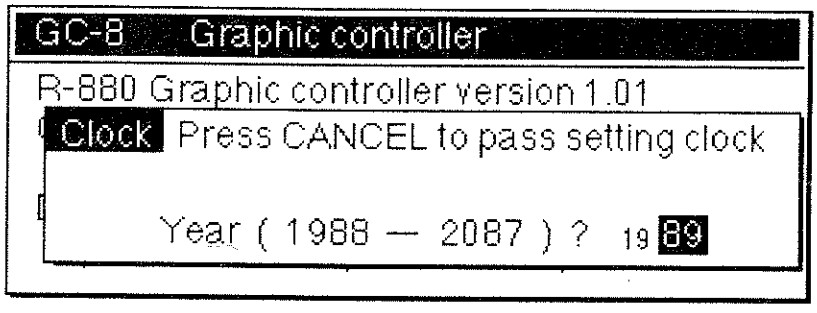
The parameters, their settings, and what they mean are in this table:

Parameter	explanation	settings
Lock	clock locked to digital input (digital input present)	lock unlock
Channel	input mode	2-channel 4-channel
Sampling	sampling frequency	44.1 kHz 48 kHz
Audio Md	audio mode	audio non-audio
Emphasis	pre-emphasis	none 50/15 µs
Category	data format	general CD PCM DAT
DigitalCp	digital copying	prohibited permitted

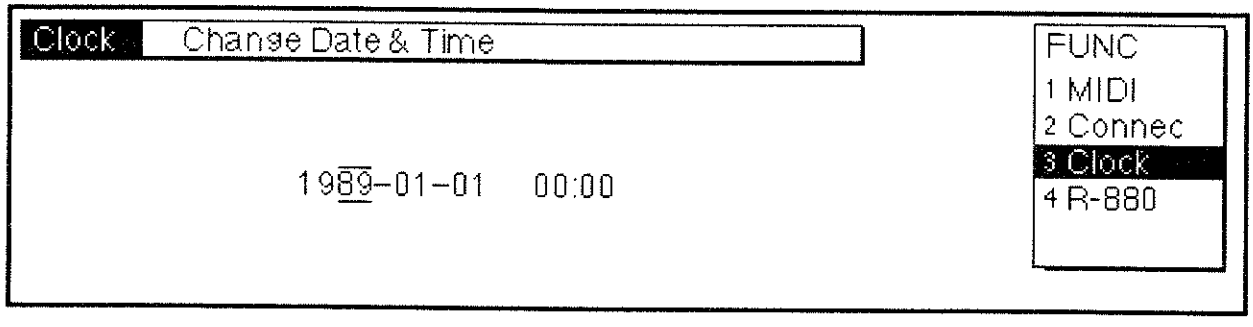
The Clock

You can set the internal clock in one of two ways:

1) During the power-up sequence ("Do You Set the Clock ?"), press **CONTROL**. The software will present you with screens for setting the year, month, date, hour, and minute. If the value presented in a screen is correct, press **ENTER**. If you want to change it, type in the new value from the **NUMERIC** keypad, and then press **ENTER**. When you've gone through all the screens, press **CONTROL** again, and the clock will be set. You can abort the process at any point by pressing **CANCEL**.



2) Go into Function Mode — **SHIFT-FUNC4** — and press **FUNC3**. Use the **LEFT-** and **RIGHT-CURSOR** keys to select which item(s) in the clock (year, month, date, hour, minute) you wish to change, and then adjust the values with the **UP-** and **DOWN-CURSOR** keys or type in new values with the **NUMERIC** keypad. When you've set all the entries to the proper values, press **CONTROL**.



Troubleshooting

What's Wrong with My Unit?

Why don't I hear any signal?

If you can see input signal on the R-880's front panel display, then your inputs are okay. If not, check your input cables, the effects sends on your console, and the switches on the rear panel of the R-880.

If you see input signal but no *output* signal, the output mixers in the system software may be off, probably because you changed the algorithm on the Joint or Move screens. Remember the software does this automatically. Go to the "OutLvl" screen (**SHIFT-FUNC3**, **FUNC2**) and turn up those output mixers you need.

If you see input signal *and* output signal, then check your output cables and the effects returns on your console.

I hear sound, but nothing is showing up on the input level display.

The input level display only displays signals coming in through the *analog* inputs, not the digital inputs. If you are only using the digital inputs, you will see no activity on the input display.

The input signal is too strong, or too weak, or the output signal is too weak.

Reduce the input signal using the **INPUT** level control on the front panel of the R-880. If it is still too strong (and you are using the unbalanced inputs), change the **UNIGAIN** switch on the rear panel to +4 dBm (out). You can strengthen the input signal by setting the **UNIGAIN** switch to -20 (in); if you are using the balanced inputs and the signal is too weak, try the unbalanced inputs (with the switch at -20).

If you need to strengthen the output signal, set the **UNIGAIN** switch to +4, or use the balanced outputs.

The power went off for a moment, and now the system won't respond.

Whenever you turn off *either* the R-880 or the GC-8 and turn them on again, you must make sure the System ROM card is in the GC-8 slot, even if the program you were using came from a RAM card. You must also bypass the clock by pressing **CANCEL** as soon as the display is ready.

I move a control but the sound doesn't change.

There could be several reasons for this. It's possible that you are working on a parameter screen of a non-functioning module, or a module whose output is mixed very low. Parameter screens are *always* available for most of the modules, even if those modules are not being used in the current algorithm. Or, if you are in the Reverb Algorithm or Joint screen, any changes you make will not be effective until you specifically transmit them, which is done in various ways, depending on the screen.

I've been working on a lower screen and I went to the upper screen just to have a look, and now when I go back to the lower screen, all my settings are gone.

If you really have gone to the upper screen just "to have a look", this shouldn't happen. However, if you change *anything* on the upper screen, the lower screen will change to its default values (and the software will warn you) — even if you "undo" the changes you make on the upper screen right away.

I constructed a complex algorithm and just wanted to change the reverb type, but now the algorithm is gone.

Any changes made on the Reverb Algorithm screen — Mode, Type, Configuration, or Gates — will result in the algorithm being totally reconstructed. The best way to keep this from getting in your way is to decide on your Reverb Mode parameters before you do any work on the lower (Move and Joint) screens.

I came up with a new program and saved it in a memory location, but that memory location still has the name of the program that used to be in it.

In the R-880/GC-8 software, you name a program *after* you write it into memory. If the location you have written to was empty, the program will be initially saved with a blank for a name. If there was some other program in there, the old program's name will be retained until you change it (from the Memory Menu, **FUNC3**).

Error Messages

Messages shown at power-up:

Insert the system card (flashing) — There is no card in the card slot of the GC-8. Locate the System ROM card and insert it in the slot.

Load error — The system software cannot be loaded from the System ROM card. Turn off the power, recheck the card for dirt or insertion error, and try again.

No System Program — The card in the slot is not the System ROM card (probably because it's a RAM card). Locate the System ROM card and insert it in the slot.

Check MIDI channel again — More than one R-880 is set to the same MIDI channel, or there is some other confusion. Check all the MIDI channel settings on the R-880s.

Change the memory backup battery — The backup battery in the GC-8 is dead. Call an authorized Roland service center to arrange for replacement.

Messages shown in the Memory Mode:

Memory full — There is no space for more programs in the memory you've selected (Internal or Card). Delete some programs or use another card.

Card is protected — The memory-protect switch on the card is On. Set it to Off. You will also get this message if you try to write to or initialize the System ROM card.

Card is not ready — The memory card is not inserted or is inserted incorrectly. Insert it or check it.

Card is not initialized — The memory card has not been initialized. Initialize it (**SHIFT-FUNC5**, **FUNC5** ["next"], **FUNC2**).

No parameter to read — The memory location you are trying to read or edit is empty.

Illegal card! Can't initialize — The card in the slot will not work with the GC-8. Use only the correct cards supplied by Roland.

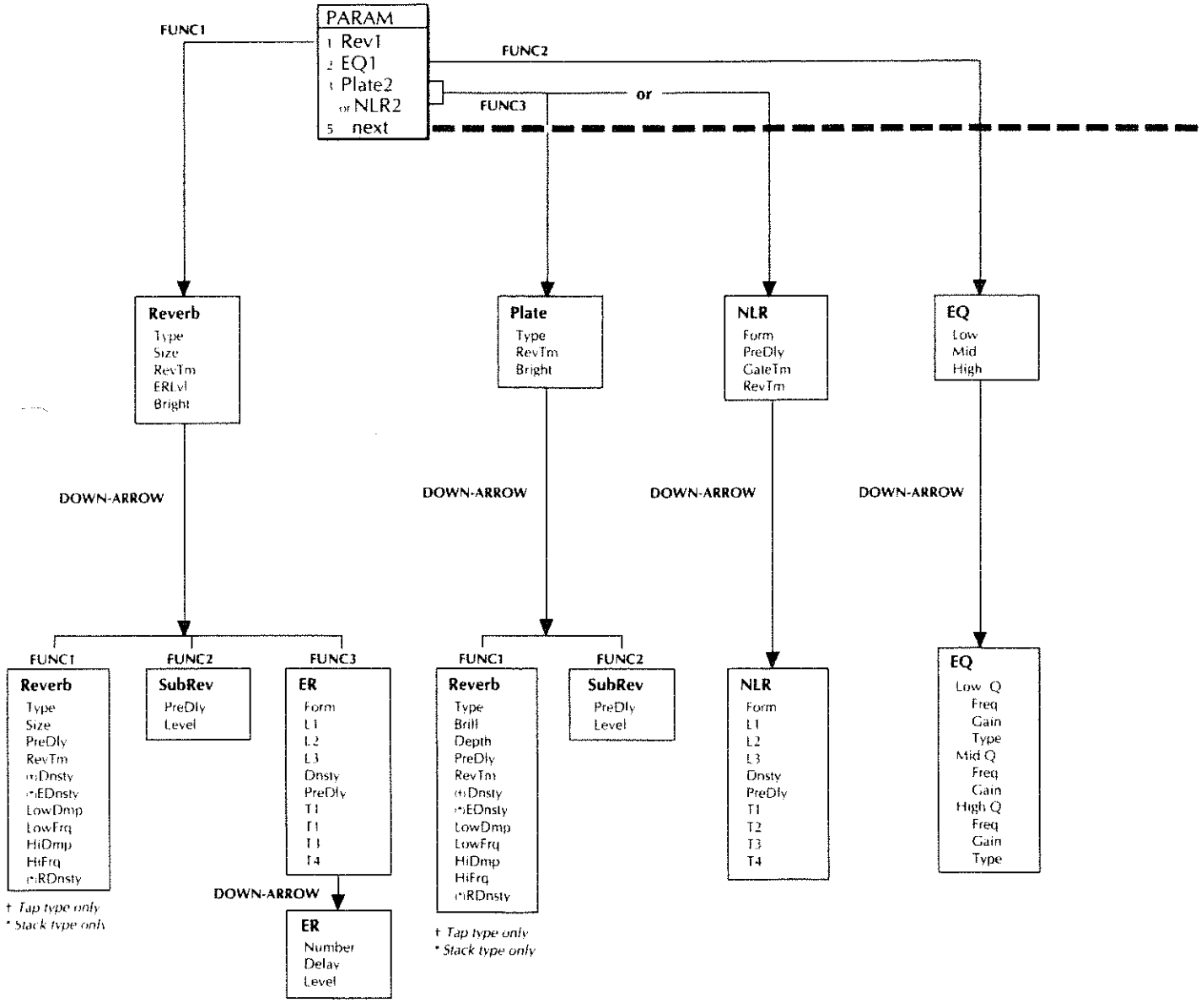
Warning: Insert the card again — There is a problem reading the card. Re-insert it and follow any other instructions that appear.

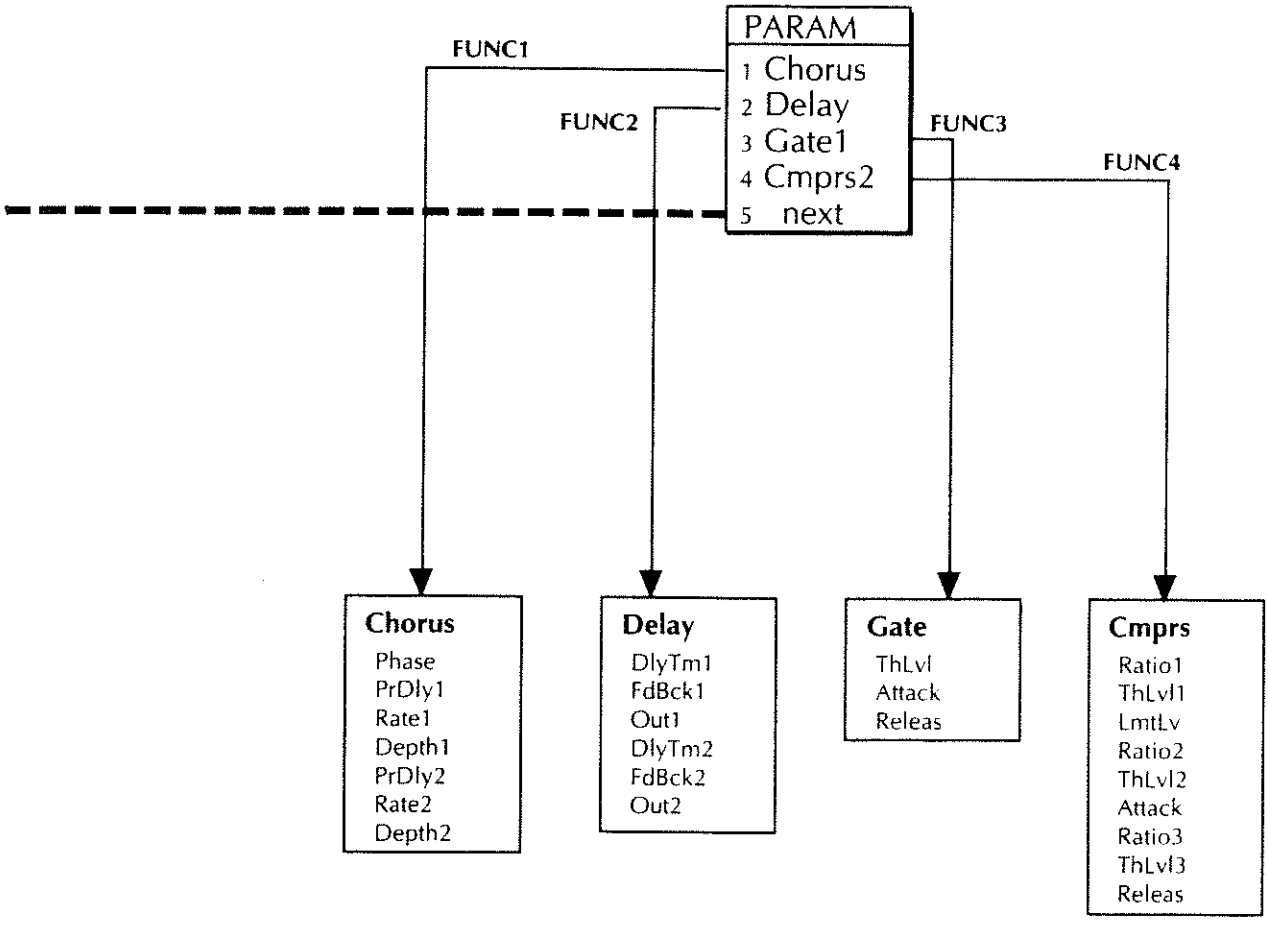
Messages that appear at other times:

Cannot communicate with R-880 — There is a problem between the GC-8 and the R-880. Check the power cable(s) and switches, the RRC cable(s), and the MIDI setting. (This message will also appear if you change the MIDI channel on the R-880 while the system is running. In this case, wait approximately 35 seconds, and the GC-8 will ask you if you want to reset the system MIDI channel. Press **CONTROL** and normal operation will resume.)

Turn off the R-880 and turn on again — The R-880 needs to be reset. Do as it says, without turning off the switch on the GC-8.

Appendix A
Parameter Map




PARAM
1 Chorus
2 Delay
3 Gate1
4 Cmprs2
5 next
FUNC1
FUNC2
FUNC3
FUNC4
Chorus
Phase
PrDly1
Rate1
Depth1
PrDly2
Rate2
Depth2
Delay
DlyTm1
FdBck1
Out1
DlyTm2
FdBck2
Out2
Gate
ThLvl
Attack
Releas
Cmprs
Ratio1
ThLvl1
LmtLv
Ratio2
ThLvl2
Attack
Ratio3
ThLvl3
Releas

Appendix B
Specifications

Analog I/O

Input Levels
Balanced: +4 dBm (max. +18 dBm)
Unbalanced: +4 dBm (max. +18 dBm)
or –20 dBm (max. 0 dBm)

Input Impedance
Balanced: 10 kΩ
Unbalanced: 10 kΩ (+4 dBm)
or 560 kΩ (–20 dBm)

Output Levels
Balanced: +4 dBm (max. +12 dBm)
Unbalanced: +4 dBm (max. +12 dBm)
or –20 dBm (max. –12 dBm)

Output Impedance
Balanced: 100Ω
Unbalanced: 100Ω (+4 dBm)
or 680Ω (–20 dBm)

Digital I/O

Interface type: AES/EBU Consumer (CP-340 Type II) standard
Optical or Coaxial
CD and DAT compatible, 20-bit

Sampling Frequency: 44.1 or 48 kHz (switched automatically)

Convertors
Analog-to-Digital: 16-bit linear
Digital-to-Analog: 18-bit linear

General

Frequency Response: 20 Hz – 20 kHz (+0.2/ –3.0 dB)

Signal-to-Noise Ratio: >80dB (IHF-A weighting at rated input)

Dynamic Range: >90 dB

Total Harmonic Distortion: <0.015% (1 kHz at rated input)

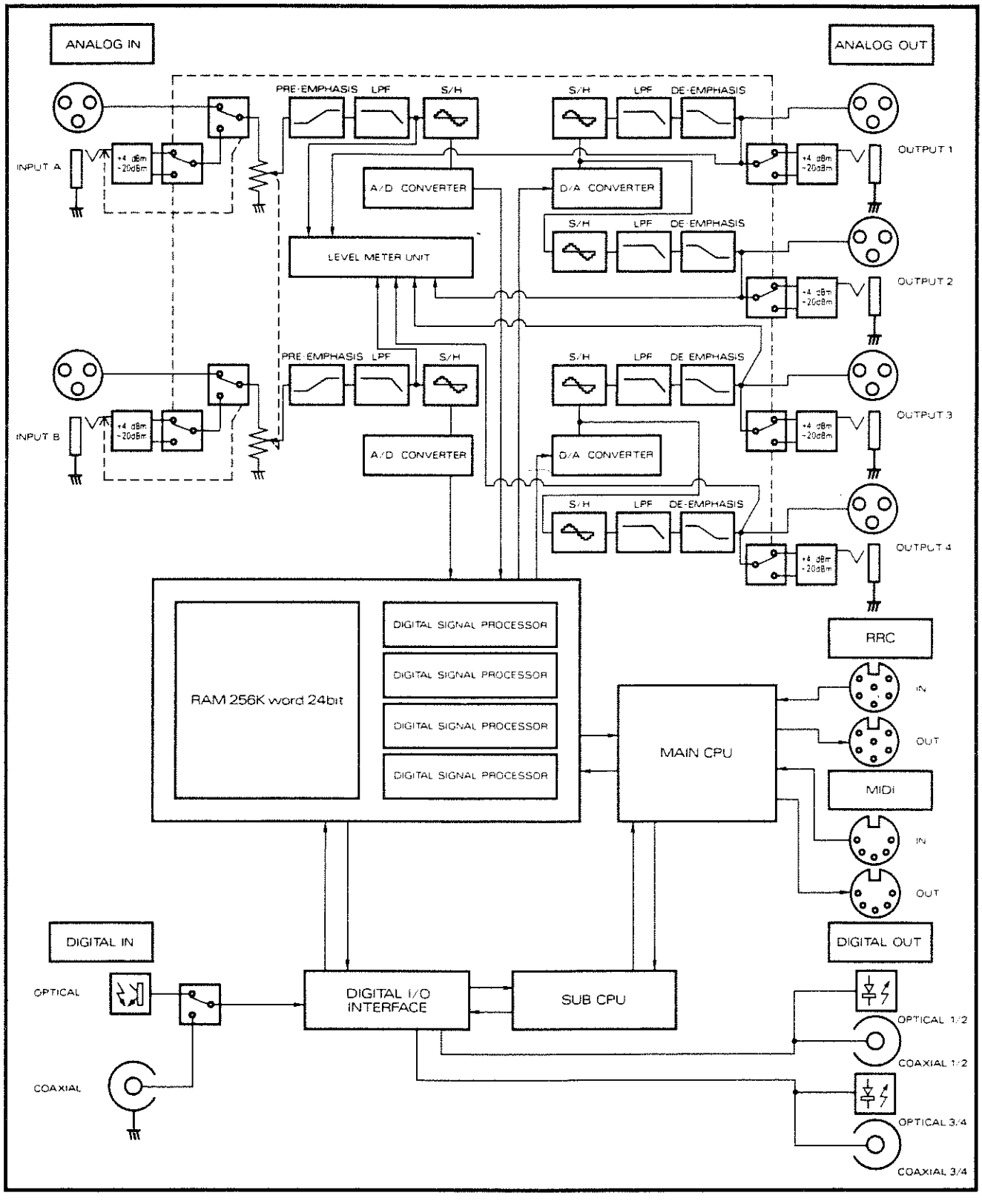
Power Consumption
R-880 with GC-8 connected: 54 watts
GC-8 alone: 90 mA @ 9V

Dimensions
R-880: 19" W x 3-9/16" H x 16-13/16" D
(483 x 91 x 421 mm)
GC-8: 13-1/8" W x 6-15/16" D x 2" H
(333 x 176 x 51\mm)

Weight
R-880: 22 lb. 1 oz. (10 kg)
GC-8: 2 lb. 10 oz. (1.2 kg)

Appendix C

R-880 Block diagram



Appendix D

MIDI Implementation Charts

Digital Reverb
Model R-880

MIDI Implementation Chart

Date : Sep. 20 1988
Version : 1.00

Function ···		Transmitted	Recognized	Remarks
Basic	Default	1 - 16	1 - 16	memorized
Channel	Changed	1 - 16	1 - 16	
Mode	Default	×	×	
	Messages	×	×	
	Alterd	*********		
Note Number		×	×	
	True Voice	*********	×	
Velocity	Note ON	×	×	
	Note OFF	×	×	
After Touch	Key's	×	×	
	Ch's	×	×	
Pitch Bender		×	×	
Control Change		×	×	
Prog Change		×	×	
	True #			
System Exclusive		○	○	parameter
System Common	Song Pos	×	×	
	Song Sel	×	×	
	Tune	×	×	
System Real Time	Clock	×	×	
	Commands	×	×	
Aux Message	Local ON/OFF	×	×	
	All Notes OFF	×	×	
	Active Sense	×	×	
	Reset	×	×	
Notes				

Mode 1 : OMNI ON, POLY
Mode 2 : OMNI ON, MONO
Mode 3 : OMNI OFF, POLY
Mode 4 : OMNI OFF, MONO

○ : Yes
× : No

R-880 Controller
Model R88-GC8-1

MIDI Implementation Chart

Date : Aug. 25 1988
Version : 1.00

Function ...		Transmitted	Recognized	Remarks
Basic Channel	Default	×	1 - 16	*1
	Changed	×	1 - 16	
Mode	Default	×	3	
	Messages	×	×	
	Alterd	**********		
Note Number		×	×	
	True Voice	**********	×	
Velocity	Note ON	×	×	
	Note OFF	×	×	
After Touch	Key's	×	×	
	Ch's	×	×	
Pitch Bender		×	×	
Control Change		×	×	
Prog Change		×	○	
	True #	**********		
System Exclusive		×	○	
System Common	Song Pos	×	×	
	Song Sel	×	×	
	Tune	×	×	
System Real Time	Clock	×	×	
	Commands	×	×	
Aux Message	Local ON/OFF	×	×	
	All Notes OFF	×	×	
	Active Sense	×	×	
	Reset	×	×	
Notes		*1 The basic channel is the MIDI channel to which the connected R-880 is being set.		

Mode 1 : OMNI ON, POLY
Mode 2 : OMNI ON, MONO
Mode 3 : OMNI OFF, POLY
Mode 4 : OMNI OFF, MONO

○ : Yes
× : No

Appendix E

MIDI System Exclusive Information

Roland Exclusive Messages

1. Data Format for Exclusive Messages

Roland's MIDI implementation uses the following data format for all exclusive messages (type IV) :

Byte	Description
F0H	Exclusive status
41H	Manufacturer ID (Roland)
DEV	Device ID
MDL	Model ID
CMD	Command ID
[BODY]	Main data
F7H	End of exclusive

 # MIDI status : F0H, F7H

An exclusive message must be flanked by a pair of status codes, starting with a Manufacturer-ID immediately after F0H (MIDI version1.0).

 # Manufacturer-ID : 41H

The Manufacturer-ID identifies the manufacturer of a MIDI instrument that triggeres an exclusive message. Value 41H represents Roland's Manufacturer-ID.

 # Device-ID : DEV

The Device-ID contains a unique value that identifies the individual device in the multiple implementation of MIDI instruments. It is usually set to 00H ~ 0FH, a value smaller by one than that of a basic channel, but value 00H ~ 1FH may be used for a device with multiple basic channels.

 # Model-ID : MDL

The Model-ID contains a value that uniquely identifies one model from another. Different models, however, may share an identical Model-ID if they handle similar data.

The Model-ID format may contain 00H in one or more places to provide an extended data field. The following are examples of valid Model-IDs, each representing a unique model :

01H
02H
03H
00H, 01H
00H, 02H
00H, 00H, 01H

 # Command-ID : CMD

The Command-ID indicates the function of an exclusive message. The Command-ID format may contain 00H in one or more places to provide an extended data field. The following are examples of valid Command-IDs, each representing a unique function :

01H
02H
03H
00H, 01H
00H, 02H
00H, 00H, 01H

 # Main data : BODY

This field contains a message to be exchanged across an interface. The exact data size and contents will vary with the Model-ID and Command-ID.

2. Address-mapped Data Transfer

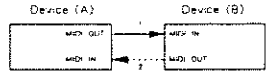
Address mapping is a technique for transferring messages conforming to the data format given in Section 1. It assigns a series of memory-resident records--waveform and tone data, switch status, and parameters, for example--to specific locations in a machine-dependent address space, thereby allowing access to data residing at the address a message specifies.

Address-mapped data transfer is therefore independent of models and data categories. This technique allows use of two different transfer procedures : one-way transfer and handshake transfer.

 # One-way transfer procedure (See Section3 for details.)

This procedure is suited for the transfer of a small amount of data. It sends out an exclusive message completely independent of a receiving device status.

Connection Diagram



Connectionat point2 is essential for "Request data" procedures. (See Section3.)

 # Handshake-transfer procedure (See Section4 for details.)

This procedure initiates a predetermined transfer sequence (handshaking) across the interface before data transfer takes place. Handshaking ensures that reliability and transfer speed are high enough to handle a large amount of data.

Connection Diagram

Connectionat points1 and 2 is essential.

Notes on the above two procedures

- *There are separate Command-IDs for different transfer procedures.
- *DevicesA and B cannot exchange data unless they use the same transfer procedure, share identical Device-ID and Model ID, and are ready for communication.

3. One-way Transfer Procedure

This procedure sends out data all the way until it stops when the messages are so short that answerbacks need not be checked.
For long messages, however, the receiving device must acquire each message in time with the transfer sequence, which inserts intervals of at least 20milliseconds in between.

Types of Messages

Message	Command ID
Request data 1	RQ1 (11H)
Data set 1	DT1 (12H)

 # Request data # 1 : RQ1 (11H)

This message is sent out when there is a need to acquire data from a device at the other end of the interface. It contains data for the address and size that specify designation and length, respectively, of data required.
On receiving an RQ1 message, the remote device checks its memory for the data address and size that satisfy the request.

If it finds them and is ready for communication, the device will transmit a "Data set 1 (DT1)" message, which contains the requested data. Otherwise, the device will send out nothing.

Byte	Description
F0H	Exclusive status
41H	Manufacturer ID (Roland)
DEV	Device ID
MDL	Model ID
11H	Command ID
aaH	Address MSB
⋮	⋮
	LSB
ssH	Size MSB
⋮	⋮
	LSB
sum	Check sum
F7H	End of exclusive

*The size of the requested data does not indicate the number of bytes that will make up a DT1 message, but represents the address fields where the requested data resides.
*Some models are subject to limitations in data format used for a single transaction. Requested data, for example, may have a limit in length or must be divided into predetermined address fields before it is exchanged across the interface.
*The same number of bytes comprises address and size data, which, however, vary with the Model-ID.
*The error checking process uses a checksum that provides a bit pattern where the least significant 7 bits are zero when values for an address, size, and that checksum are summed

Data set 1 : DT1 (12H)

This message corresponds to the actual data transfer process. Because every byte in the data is assigned a unique address, a DT1 message can convey the starting address of one or more data as well as a series of data formatted in an address - dependent order.

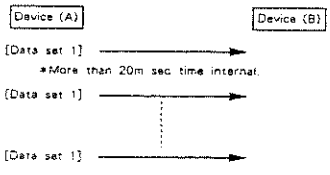
The MIDI standards inhibit non-real time messages from interrupting an exclusive one. This fact is inconvenient for the devices that support a "soft-through" mechanism. To maintain compatibility with such devices, Roland has limited the DT1 to 256 bytes so that an excessively long message is sent out in separate segments.

Byte	Description
F0H	Exclusive
41H	Manufacturer ID (Roland)
DEV	Device ID
MDL	Model ID
12H	Command ID
aaH	Address MSB
⋮	⋮
	LSB
ddH	Data
⋮	⋮
sum	Check sum
F7H	End of exclusive

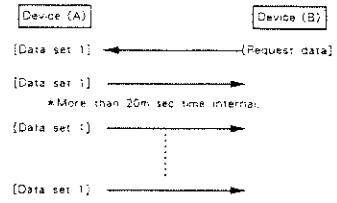
*A DT1 message is capable of providing only the valid data among those specified by an RQ1 message.
*Some models are subject to limitations in data format used for a single transaction. Requested data, for example, may have a limit in length or must be divided into predetermined address fields before it is exchanged across the interface.
*The number of bytes comprising address data varies from one Model-ID to another.
*The error checking process uses a checksum that provides a bit pattern where the least significant 7 bits are zero when values for an address, size, and that checksum are summed.

Example of Message Transactions

●Device A sending data to Device B
Transfer of a DT1 message is all that takes place.



●Device B requesting data from Device A
Device B sends an RQ1 message to Device A. Checking the message, Device A sends a DT1 message back to Device B.



4. Handshake - Transfer Procedure

Handshaking is an interactive process where two devices exchange error checking signals before a message transaction takes place, thereby increasing data reliability. Unlike one-way transfer that inserts a pause between message transactions, handshake transfer allows much speedier transactions because data transfer starts once the receiving device returns a ready signal.

When it comes to handling large amounts of data - - sampler waveforms and synthesizer tones over the entire range, for example - - across a MIDI interface, handshaking transfer is more efficient than one-way transfer.

Types of Messages

Message	Command ID
Want to send data	WSD (40H)
Request data	RQD (41H)
Data set	DAT (42H)
Acknowledge	ACK (43H)
End of data	EOD (45H)
Communication error	ERR (4EH)
Rejection	RJC (4FH)

Want to send data : WSD (40H)

This message is sent out when data must be sent to a device at the other end of the interface. It contains data for the address and size that specify designation and length, respectively, of the data to be sent.

On receiving a WSD message, the remote device checks its memory for the specified data address and size which will satisfy the request. If it finds them and is ready for communication, the device will return an "Acknowledge (ACK)" message.
Otherwise, it will return a "Rejection (RJC)" message.

Byte	Description
F0H	Exclusive status
41H	Manufacturer ID (Roland)
DEV	Device ID
MDL	Model ID
40H	Command ID
aaH	Address MSB
⋮	⋮
	LSB
ssH	Size MSB
⋮	⋮
	LSB
sum	Check sum
F7H	End of exclusive

*The size of the data to be sent does not indicate the number of bytes that make up a "Data set (DAT)" message, but represents the address fields where the data should reside.
*Some models are subject to limitations in data format used for a single transaction. Requested data, for example, may have a limit in length or must be divided into predetermined address fields before it is exchanged across the interface.
*The same number of bytes comprises address and size data, which, however, vary with the Model-ID.
*The error checking process uses a checksum that provides a bit pattern where the least significant 7 bits are zero when values for an address, size, and that checksum are summed.

Request data : RQD (41H)

This message is sent out when there is a need to acquire data from a device at the other end of the interface. It contains data for the address and size that specify designation and length, respectively, of data required.

On receiving an RQD message, the remote device checks its memory for the data address and size which satisfy the request. If it finds them and is ready for communication, the device will transmit a "Data set (DAT)" message, which contains the requested data. Otherwise, it will return a "Rejection (RJC)" message.

Byte	Description
F0H	Exclusive status
41H	Manufacturer ID (Roland)
DEV	Device ID
MDL	Model ID
41H	Command ID
aaH : :	Address MSB : : LSB
ssH : :	Size MSB : : LSB
sum	Check sum
F7H	End of exclusive

* The size of the requested data does not indicate the number of bytes that make up a "Data set (DAT)" message, but represents the address fields where the requested data resides.
* Some models are subject to limitations in data format used for a single transaction. Requested data, for example, may have a limit in length or must be divided into predetermined address fields before it is exchanged across the interface.
* The same number of bytes comprises address and size data, which, however, vary with the Model-ID.
* The error checking process uses a checksum that provides a bit pattern where the least significant 7 bits are zero when values for an address, size, and that checksum are summed.

Data set : DAT (42H)

This message corresponds to the actual data transfer process. Because every byte in the data is assigned a unique address, the message can convey the starting address of one or more data as well as a series of data formatted in an address-dependent order.

Although the MIDI standards inhibit non-real time messages from interrupting an exclusive one, some devices support a "soft-through" mechanism for such interrupts. To maintaincompatibility with such devices, Roland has limited the DAT to 256bytes so that an excessively long message is sent out in separate segments.

Byte	Description
F0H	Exclusive status
41H	Manufacturer ID (Roland)
DEV	Device ID
MDL	Model ID
42H	Command ID
aaH : :	Address MSB : : LSB
ddH : :	Data : :
sum	Check sum
F7H	End of exclusive

* A DAT message is capable of providing only the valid data among those specified by an RQD or WSD message.
* Some models are subject to limitations in data format used for a single transaction. Requested data, for example, may have a limit in length or must be divided into predetermined address fields before it is exchanged across the interface.
* The number of bytes comprising address data varies from one model ID to another.
* The error checking process uses a checksum that provides a bit pattern where the least significant 7 bits are zero when values for an address, size, and that checksum are summed.

Acknowledge : ACK (43H)

This message is sent out when no error was detected on reception of a WSD, DAT, "End of data (EOD)", or some other message and a requested setup or action is complete. Unless it receives an ACK message, the device at the other end will not proceed to the next operation.

Byte	Description
F0H	Exclusive status
41H	Manufacturer ID (Roland)
DEV	Device ID
MDL	Model ID
43H	Command ID
F7H	End of exclusive

End of data : EOD (45H)

This message is sent out to inform a remote device of the end of a message. Communication, however, will not come to an end unless the remote device returns an ACK message even though an EOD message was transmitted.

Byte	Description
F0H	Exclusive status
41H	Manufacturer ID (Roland)
DEV	Device ID
MDL	Model ID
45H	Command ID
F7H	End of exclusive

Communications error : ERR (4EH)

This message warns the remote device of a communications fault encountered during message transmission due, for example, to a checksum error. An ERR message may be replaced with a "Rejection (RJC)" one, which terminates the current message transaction in midstream.

When it receives an ERR message, the sending device may either attempt to send out the last message a second time or terminate communication by sending out an RJC message.

Byte	Description
F0H	Exclusive status
41H	Manufacturer ID (Roland)
DEV	Device ID
MDL	Model ID
4EH	Command ID
F7H	End of exclusive

 # Rejection : RJC (4FH)

This message is sent out when there is a need to terminate communication by overriding the current message. An RJC message will be triggered when :

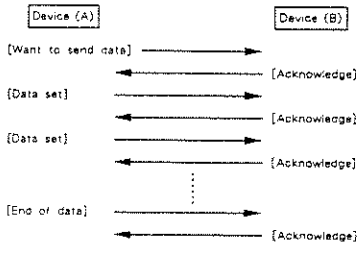
- a WSD or RQD message has specified an illegal data address or size.
- the device is not ready for communication.
- an illegal number of addresses or data has been detected.
- data transfer has been terminated by an operator.
- a communications error has occurred.

An ERR message may be sent out by a device on either side of the interface. Communication must be terminated immediately when either side triggers an ERR message.

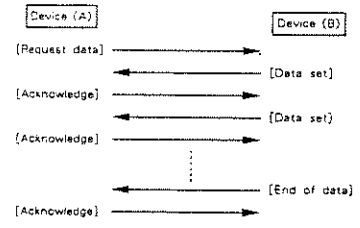
Byte	Description
F0H	Exclusive status
41H	Manufacturer ID (Roland)
DEV	Device ID
MDL	Model ID
4FH	Command ID
F7H	End of exclusive

 # Example of Message Transactions

●Data transfer from device (A) to device (B)

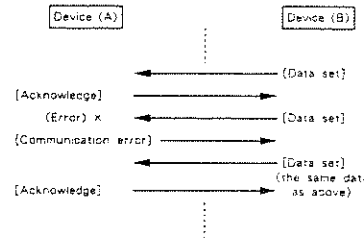


●Device (A) requests and receives data from device (B).

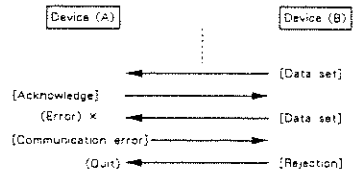


●Error occurs while device (A) is receiving data from device (B).

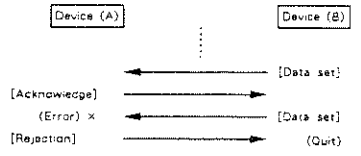
1) Data transfer from device (A) to device (B)



2) Device (B) rejects the data re-transmitted, and quits data transfer



3) Device (A) immediately quits data transfer.



GC-8/R-880 Exclusive Messages

R-880 Controller
Model R88-GC8-1

MIDI Implementation

Date : Aug. 25 1988
Version : 1.00

1. RECOGNIZED DATA

■ Program change

Status	Second
CnH	ppH

nH : MIDI channel 0H – FH (1 – 16)
ppH : Program number 0H – 7FH (1 – 128)

Parameters in the R-880 whose MIDI channel is set to "n" can be switched over. Set the memory number corresponding to the program number into the GC-8 program change table. The GC-8, upon receiving the program change, converts the program number to that memory number and sends the parametersof the memory to the R-880.

■ System exclusive

The GC-8's internal calender clock or the program change table can be set by using the exclusive message.

Status	
F0H	: System Exclusive
F7H	: EOX (End of System Exclusive)

2. EXCLUSIVE COMMUNICATIONS

■ Data set

Byte	Description	
F0H	Exclusive status	
41H	Roland ID #	
DEV	Device-ID #	*2-1
1CH	Model-ID # (GC-8)	
12H	Command-ID (DT1)	
aaH	Address MSB	*2-2
bbH	Address LSB	
ddH	Data	
:	:	
sum	Checksum	
F7H	End of System Exclusive	

Notes :

*2-1 Device ID can baset to a number anywhere from 1 to 32. Only the devices whose device ID number is the same as that of the exclusive message can recognize the message. Note that the exclusive messagecaries a device number with value 1 subtracted, i.e. device ID "1" is sent as "0".

*2-2 Addresses must be within the range shown below.

MSB	LSB	
00	00	Calender Clock
:		
00	04	
01	00	Program Change Table 1-64
:		
01	7F	
02	00	Program Change Table 65-128
:		
02	7F	

3. ADDRESS MAPPING OF PARAMETERS

● Calender clock

MSB	LSB	Description	
00	00	Year (0 – 99)	*3-1
00	01	Month (0 – 11)	*3-2
00	02	Day (0 – 30)	*3-3
00	03	Hour (0 – 23)	
00	04	Minute (0 – 59)	

● Program change table

MSB	LSB	Description	
01	00	Program #1 (Memory # 0 – 98)	*3-4
01	01	#1 (Int./Card 0 – 1)	
:			
01	7F	#64 (Int./Card 0 – 1)	
02	00	#65 (Memory # 0 – 98)	
:			
02	7F	#128 (Int./Card 0 – 1)	

Notes :

*3-1 Read "0" as 1988, "1" as 1989, "2" as 1990, etc.

*3-2 Read "0" as January, "1" as February, etc.

*3-3 Read "0" as the first day of a month, "1" as the second, etc.

*3-4 Assign a program number to a memory location with a set of 2 bytes. Even address data designates memory number (actual value less "1") and odd address data selects memory type (0 = internal, 1 = IC card).

R-880 Exclusive Messages

Digital Reverb
Model R-880

MIDI Implementation

Date : Sep. 20 1988
Version : 1.00

1. TRANSMITTED DATA

1.1 Bypassed Messages

All messages are transmitted from MIDI OUT by the software MIDI THRU.

1.2 Message whitch is created and sent out from MIDI OUT.

■ Exclusive

Thestatus of operation, and digital input and output of the R-880 can be transmitted by using the exclusive message.

Status	
F0H	: System exclusive
F7H	: EOX (End of Exclusive)

2. RECOGNIZED DATA

■ Exclusive

Parameters of the R-880 can be set through exclusive message.

Status	
F0H	: System exclusive
F7H	: EOX (End of Exclusive)

3. EXCLUSIVE COMMUNICATIONS

3.1 Exclusive messages (Handshake transfer procedure)

■ Want to send data **WSD (40H)**

Byte	Description	
F0H	Exclusive status	
41H	Manufactures ID (Roland)	
DEV	Device ID	* 3 - 1
1BH	Model ID (R-880)	
40H	Command ID (WSD)	
aaH	Address MSB	
aaH	Address	
aaH	Address LSB	
ssH	Size MSB	
ssH	Size	
ssH	Size LSB	
sum	Check sum	
F7H	End of exclusive	

■ Request data **RQD (41H)**

Byte	Description	
F0H	Exclusive status	
41H	Manufactures ID (Roland)	
DEV	Device ID	* 3 - 1
1BH	Model ID (R-880)	
41H	Command ID (RQD)	
aaH	Address MSB	
aaH	Address	
aaH	Address LSB	
ssH	Size MSB	
ssH	Size	
ssH	Size LSB	
sum	Check sum	
F7H	End of exclusive	

■ Data set **DAT (42H)**

Byte	Description	
F0H	Exclusive status	
41H	Manufactures ID (Roland)	
DEV	Device ID	* 3 - 1
1BH	Model ID (R-880)	
42H	Command ID (DAT)	
aaH	Address MSB	
aaH	Address	
aaH	Address LSB	
ddH	Data	
:		
:		
sum	Check sum	
F7H	End of exclusive	

■ Acknowledge **ACK (43H)**

Byte	Description	
F0H	Exclusive status	
41H	Manufactures ID (Roland)	
DEV	Device ID	* 3 - 1
1BH	Model ID (R-880)	
43H	Command ID (ACK)	
F7H	End of exclusive	

■ End of data **EOD (45H)**

Byte	Description	
F0H	Exclusive status	
41H	Manufactures ID (Roland)	
DEV	Device ID	* 3 - 1
1BH	Model ID (R-880)	
45H	Command ID (EOD)	
F7H	End of exclusive	

■ Communications error **ERR (4EH)**

Byte	Description	
F0H	Exclusive status	
41H	Manufactures ID (Roland)	
DEV	Device ID	* 3 - 1
1BH	Model ID (R-880)	
4EH	Command ID (ERR)	
F7H	End of exclusive	

■ Rejection **RJC (4FH)**

Byte	Description	
F0H	Exclusive status	
41H	Manufactures ID (Roland)	
DEV	Device ID	* 3 - 1
1BH	Model ID (R-880)	
4FH	Command ID (RJC)	
F7H	End of exclusive	

* 3 - 1 The R-880 accommodates the message containing a device ID whose number is 7EH, or smaller than the MIDI channel number of the R-880 by 1.
The R-880 transmits exclusive message with the device ID 1 less than the MIDI channel number.

3.2 Communication sequence (Handshake transfer procedure)

■ Requiring the data of the R-880

Controller — R-880

To read the status of operation, digital input or output of the R-880, the controller sends a "Request Data" message and enters handshaking communications.

[**Request Data**] →

Upon receiving a "Request Data" message having an address corresponding to the address designated as read-out address in the "4. Parameter Address Map", the R-880 sends the "Data Set" message containing the required size of data in the specified location.

← [**Data Set**]

If the addresses and checksum are verified on the received data, the controller reads the data and sends an "Acknowledge" message. When a failure in the data reception occur due, for example, to a checksum error, the controller sends "Communications Error" message.

[**Acknowledge**] →
({ **Communications Error** }) →

Upon receiving an "Acknowledge" message, the R-880 sends the next data in reply to this.
When receiving a "Communications Error" message, the R-880 sends the previous data again.

← [**Data Set**]

[**Acknowledge**] →

The R-880 sends an "End of Data" message, when completing required data transfer.

← [**End of Data**]

The controller sends the "Acknowledge" message in response to the "End of Data" message and terminates handshaking communication.

{ **Acknowledge** } →

When the "Acknowledge" message comes as an answer to the "End of Data" message, the R-880 ends current handshaking communication.

■ Setting parameters of the R-880

Controller — R-880

To set parameters of the R-880, the controller sends "Want to Send Data" message and enters handshaking communications.

[**Want to Send Data**] →

The R-880 sends an "Acknowledge" message and waits for parameter data.

← [**Acknowledge**]

Upon receiving an "Acknowledge" message, the controller send parameter data by using the "Data Set" message.

[**Data Set**] →

If the address in the received "Data Set" message matches that of a write-in shown in the "4. Parameter Address Map", the R-880 updates parameters according to the received data. The R-880 ignores the message including address other than write-in address, or parameters data exceeding the range.
The R-880 always sends an "Acknowledge" message, when receipt of the "Data Set" message. But when a failure in the data reception occur due, for example, to a checksum error, the R-880 sends "Communications Error" message.

← [**Acknowledge**]
← ({ **Communications Error** })

Upon receiving an "Acknowledge" message, the controller sends the next parameter data.
When receiving a "Communications Error" message, the controller sends the previous data again.

[**Data Set**] →

← [**Acknowledge**]

The controller sends an "End of Data" message at the end of the parameter data.

[**End of Data**] →

Upon receipt of an "End of Data" message, the R-880 sends an "Acknowledge" message nd ceases current handshaking communication.

← [**Acknowledge**]

Upon receiving the "Acknowledge" message in reply to the "End of Data" message, the controller ends current handshaking communication.

4 PARAMETER ADDRESS MAP

All the address are expressed in 7 bit hexadecimal.
The "R" and "W" on the MODE column in the table below show the mode of the parameter. That is, a parameter represented an address in "R" mode can be read (in the current status) through an exclusive "Request Data" message. On the contrary, the parameters accesible with "W" mode address can be over written by an exclusive "Data Set" message. The parameters in the location of "R/W"address are self – explanatory.

■ **Operation**

ADDRESS	MODE	PARAMETER	
00 00 00			
:		Reserved/Undefined	
00 00 04			
00 00 05	R/W	Muting	
00 00 06		Reserved/Undefined	
00 00 07	R	Level meter CH A	
00 00 08	R	CH B	
00 00 09	R	CH 1	
00 00 0A	R	CH 2	
00 00 0B	R	CH 3	
00 00 0C	R	CH 4	
00 00 0D		Reserved/Undefined	
00 00 0E			
00 00 0F	R/W	Emphasis	* 4-1
00 00 10	R	Digital I/O status 1	* 4-2
00 00 11	R	Digital I/O status 2	* 4-3
00 00 12	R/W	Number of message characters	* 4-4
00 00 13	R/W	Message characters	
:	:	:	
00 00 7F	R/W	Message characters	

* 4 – 1 When a digital audio data is being fed, its amount of pre – emphasis sets the emphasis parameter : either 0 (without) or 1 (50/15 μ Sec) is effective with the current scheme. Therefore, even if the parameter is set to 2 or 3 as shown below, the R – 880 remains emphasis off.
With no digital audio data being fed, each of the following emphasis parameter 0, 1, 2 and 3 will become effective when directly set to that value. Transmission of emphasis value otherthan 0 and 1 through exclusive message will automatically set the parameter to 1.

0 : without emphasis
1 : with 50/15 μ Sec emphasis
2 : with emphasis (spesifications of emphasis are undefined)
3 : with emphasis (spesifications of emphasis are undefined)

* 4 – 2 When the digital audio data is being fed, its status sets the parameter as shown below : with no audio data being fed this parameter is set to the default value, 05H, and shows the status of the digital audio data output from the R – 880.

bit0 : Channel mode (0 : 2ch / 1 : 4ch)
bit1 : Sampling frequency (0 : 44.1kHz / 1 : 48kHz)
bit2 : Data mode (0 : Non audio / 1 : Audio)
bit3 : VCO condition (0 : Unlocked / 1 : Locked)

* 4 – 3 When the digital audio data is being fed, its status sets the parameter as shown below : with no audio data being fed this parameter is set to the default value, 08H, and shows the status of the digital audio data output from the R – 880.

bit0 – 2 : Category (0 : General / 1 : CD / 2 : PCM / 3 : DAT)
bit3 : Digital copy (0 : Prohibited / 1 : Permitted)

* 4 – 4 When the R – 880 sees a defect during power – up self – diagnosis, or incorrect parameter setting during operation, it stores error message into locations beginning with the address 00 00 13, in ASCII code. The number of characters (max. 109) in the error message will be stored in the address 00 00 12.

■ **Software Inforation**

ADDRESS	MODE	PARAMETER	
00 01 00	R	Major version of software	
00 01 01	R	Minor version of software	
00 01 02	R	Date and Time of completion Year	
00 01 03	R	Month	
00 01 04	R	Day	
00 01 05	R	Time	
00 01 06	R	Minute	
00 01 07	R	Number of model name characters	* 4-5
00 01 08	R	Model name character	
:	:	:	
00 01 0C	R	Model name character	
00 01 0D			
:		Reserved/Undefined	
00 7F 7F			

* 4 – 5 The model name "R – 880" is stored in locations beginning with address 00 01 08 with the number of the name characters (5) being set into 00 01 07.

■ **Input Level/Output Level/Mixing Level**

ADDRESS	MODE	PARAMETER	
01 00 00			
:		Reserved/Undefined	
01 00 7F			
01 01 00	W	CH A Analog input level	
01 01 03	W	Digital input level	
01 01 05	W	CH B Analog input level	
01 01 09	W	Digital input level	
01 01 0C			
:		Reserved/Undefined	
01 01 7F			
01 02 00	W	CH 1 Output mixer input level a	
01 02 03	W	input level b	
01 02 06	W	CH 2 Output mixer input level a	
01 02 09	W	input level b	
01 02 0C	W	CH 3 Output mixer input level a	
01 02 0F	W	input level b	
01 02 12	W	CH 4 Output mixer input level a	
01 02 15	W	input level b	
01 02 18			
:		Reserved/Undefined	
01 02 7F			
01 03 00	W	Mixer 1 input level a	
01 03 03	W	input level b	
01 03 06	W	output level	
01 03 09	W	Mixer 2 input level a	
01 03 0C	W	input level b	
01 03 0F	W	output level	
01 03 12	W	Mixer 3 input level a	
01 03 15	W	input level b	
01 03 18	W	output level	
01 03 1B	W	Mixer 4 input level a	
01 03 1E	W	input level b	
01 03 21	W	output level	
01 03 24	W	Mixer 5 input level a	
01 03 27	W	input level b	
01 03 2A	W	output level	
01 03 2D	W	Mixer 6 input level a	
01 03 30	W	input level b	
01 03 33	W	output level	
01 03 36	W	Mixer 7 input level a	
01 03 39	W	input level b	
01 03 3C	W	output level	
01 03 3F	W	Mixer 8 input level a	
01 03 42	W	input level b	
01 03 45	W	output level	
01 03 48	W	Mixer 9 input level a	

01 03 4B	W		input level b
01 03 4E	W		output level
01 03 51	W	Mixer 10	input level a
01 03 54	W		input level b
01 03 57	W		output level
01 03 5A			
:		Reserved/Undefined	
01 0F 7F			

■ Equalizer

ADDRESS	MODE	PARAMETER	
01 10 00	W	Equalizer 1 Low band	Quality
01 10 01	W		Frequency
01 10 04	W		Level
01 10 07	W		Type
01 10 08			
:		Reserved/Undefined	
01 10 7F			
01 11 00	W	Equalizer 1 Mid band	Quality
01 11 01	W		Frequency
01 11 04	W		Level
01 11 07	W		Type
01 11 08			
:		Reserved/Undefined	
01 11 7F			
01 12 00	W	Equalizer 1 High band	Quality
01 12 01	W		Frequency
01 12 04	W		Level
01 12 07	W		Type
01 12 08			
:		Reserved/Undefined	
01 12 7F			
01 13 00	W	Equalizer 2 Low band	Quality
01 13 01	W		Frequency
01 13 04	W		Level
01 13 07	W		Type
01 13 08			
:		Reserved/Undefined	
01 13 7F			
01 14 00	W	Equalizer 2 Mid band	Quality
01 14 01	W		Frequency
01 14 04	W		Level
01 14 07	W		Type
01 14 08			
:		Reserved/Undefined	
01 14 7F			
01 15 00	W	Equalizer 2 High band	Quality
01 15 01	W		Frequency
01 15 04	W		Level
01 15 07	W		Type
01 15 08			
:		Reserved/Undefined	
01 1F 7F			

■ Pre-Delay / Early Reflection / Plate

ADDRESS	MODE	PARAMETER	
01 20 00			
:		Reserved/Undefined	
01 20 7F			
01 21 00	W	Pre-Delay 1	Delay time a
01 21 03	W		Delay time b
01 21 06	W	Pre-Delay 2	Delay time a
01 21 09	W		Delay time b
01 21 0C			
:		Reserved/Undefined	
01 21 7F			
01 22 00	W	Pre-Delay 1	Level a
01 22 02	W		Level b
01 22 04	W	Pre-Delay 2	Level a
01 22 06	W		Level b
01 22 04			
:		Reserved/Undefined	
01 22 7F			
01 23 00	W	Reverb 1	ER Diffusion delay time
01 23 03	W		ER Diffusion level
01 23 04	W	Reverb 2	ER Diffusion delay time
01 23 07	W		ER Diffusion level
01 23 08			
:		Reserved/Undefined	
01 23 7F			
01 24 00	W	Reverb 1	ER Offset time
01 24 03	W	Reverb 2	ER Offset time
01 24 06			
:		Reserved/Undefined	
01 24 7F			
01 25 00	W	Reverb 1	ER 1 Delay time
01 25 03	W		ER 2 Delay time
:	:		:
01 25 39	W		ER 20 Delay time
01 25 3C			
:		Reserved/Undefined	
01 25 7F			
01 26 00	W	Reverb 2	ER 1 Delay time
01 26 03	W		ER 2 Delay time
:	:		:
01 25 39	W		ER 20 Delay time
01 26 3C			
:		Reserved/Undefined	
01 26 7F			
01 27 00	W	Reverb 1	ER 1 Level
01 27 02	W		ER 2 Level
:	:		:
01 27 26	W		ER 20 Level
01 27 28			
:		Reserved/Undefined	
01 27 7F			
01 28 00	W	Reverb 2	ER 1 Level
01 28 02	W		ER 2 Level
:			:
01 28 26	W		ER 20 Level
01 28 28			
:		Reserved/Undefined	
01 29 7F			
01 2A 00	W	Plate 1	Type
01 2A 01	W	Plate 2	Type
01 2A 02			
:		Reserved/Undefined	

01 2A 7B		
01 2B 00	W	Plate 1 Release time
01 2B 02	W	Plate 2 Release time
01 2B 04		
:	:	Reserved/Undefined
01 2B 7F		
01 2C 00	W	Plate 1 Cutoff frequency Low
01 2C 03	W	Mid
01 2C 06	W	High
01 2C 09	W	Plate 2 Cutoff frequency Low
01 2C 0C	W	Mid
01 2C 0F	W	High
01 2C 12		
:	:	Reserved/Undefined
01 2C 7F		
01 2D 00	W	Plate 1 Bypass level
01 2D 03	W	Low band level
01 2D 06	W	Effect level
01 2D 09	W	Plate 2 Bypass level
01 2D 0C	W	Low band level
01 2D 0F	W	Effect level
01 2D 12		
:	:	Reserved/Undefined
01 2F 7F		

■ Non-Linear

ADDRESS	MODE	PARAMETER
01 30 00		
:	:	Reserved/Undefined
01 30 7F		
01 31 00	W	Non-Linear 1 Type
01 31 01	W	Non-Linear 2 Type
01 31 02		
:	:	Reserved/Undefined
01 31 7F		
01 32 00	W	Non-Linear 1 Envelop time 0
01 32 03	W	Envelop time 1
01 32 06	W	Envelop time 2
01 32 09	W	Envelop time 3
01 32 0C	W	Envelop time 4
01 32 0F	W	Non-Linear 2 Envelop time 0
01 32 12	W	Envelop time 1
01 32 15	W	Envelop time 2
01 32 18	W	Envelop time 3
01 32 1B	W	Envelop time 4
01 32 1E		
:	:	Reserved/Undefined
01 32 7F		
01 33 00	W	Non-Linear 1 Envelop level 1
01 33 02	W	Envelop level 2
01 33 04	W	Envelop level 3
01 33 06	W	Non-Linear 2 Envelop level 1
01 33 08	W	Envelop level 2
01 33 0A	W	Envelop level 3
01 33 0C		
:	:	Reserved/Undefined
01 3F 7F		

■ Allpass Filter

ADDRESS	MODE	PARAMETER
01 40 00		
:	:	Reserved/Undefined
01 40 7F		
01 41 00	W	Allpass filter 1 Type
01 41 02	W	Allpass filter 2 Type
01 41 04		
:	:	Reserved/Undefined
01 41 7F		
01 42 00	W	ALLpass filter 1 Density
01 42 01	W	Allpass filter 2 Density
01 42 02		
:	:	Reserved/Undefined
01 42 7F		
01 43 00	W	ALLpass filter 1 Tone
01 43 08	W	Allpass filter 2 TOne
01 43 02		
:	:	Reserved/Undefined
01 4F 7F		

■ Reverb

ADDRESS	MODE	PARAMETER
01 50 00		
:	:	Reserved/Undefined
01 50 7F		
01 51 00	W	Reverb 1 Mode
01 51 01	W	Type a
01 51 02	W	Type b
01 51 03	W	Reverb 2 Mode
01 51 04	W	Type a
01 51 05	W	Type b
01 51 06		
:	:	Reserved/Undefined
01 51 7F		
01 52 00	W	Reverb 1 Reverb time a
01 52 02	W	Reverb time b
01 52 04	W	Reverb 2 Reverb time a
01 52 06	W	Reverb time b
01 52 08		
:	:	Reserved/Undefined
01 52 7F		
01 53 00	W	Reverv 1 LFD Cutoff frequency a
01 53 03	W	LFD Dumping factor a
01 53 04	W	HFD Cutoff frequency a
01 53 07	W	HFD Dumping factor a
01 53 08	W	LFD Cutoff frequency b
01 53 0B	W	LFD Dumping factor b
01 53 0C	W	HFD Cutoff frequency b
01 53 0F	W	HFD Dumping factor b
01 53 10	W	Reverv 2 LFD Cutoff frequency a
01 53 13	W	LFD Dumping factor a
01 53 14	W	HFD Cutoff frequency a
01 53 17	W	HFD Dumping factor a
01 53 18	W	LFD Cutoff frequency b
01 53 1B	W	LFD Dumping factor b
01 53 1C	W	HFD Cutoff frequency b
01 53 1F	W	HFD Dumping factor b
01 53 20		
:	:	Reserved/Undefined
01 53 7F		
01 54 00	W	Reverb 1 Release density a
01 54 01	W	Release density b
01 54 02	W	Reverb 2 Release density a

01 54 03	W	Release density b
01 54 04		Reserved/Undefined
:		
01 5F 7F		

■ **Chorus / Delay**

ADDRESS	MODE	P A R A M E T E R	
01 60 00	W	Chorus 1	Rate
01 60 02	W		Depth
01 60 04	W		Pre-Delay time
01 60 06	W	Chorus 2	Rate
01 60 08	W		Depth
01 60 0A	W		Pre-Delay time
01 60 0C		Reserved/Undefined	
:			
01 60 7F			
01 61 00	W	Chorus Phase	
01 61 02		Reserved/Undefined	
:			
01 61 7F			
01 62 00	W	Delay 1	Delay time
01 62 03	W		Feedback level
01 62 06	W		Output level
01 62 09	W	Delay 2	Delay time
01 62 0C	W		Feedback level
01 62 0F	W		Output level
01 62 12		Reserved/Undefined	
:			
01 6F 7F			

■ **Compressor / Gate**

ADDRESS	MODE	P A R A M E T E R	
01 70 00	W	Operating mode 1	
01 70 01	W	Operating mode 2	
01 70 02		Reserved/Undefined	
:			
01 70 7F			
01 71 00	W	Compressor 1	Switch
01 71 01	W		Ratio 1
01 71 03	W		Threshold level 1
01 71 04	W		Ratio 2
01 71 06	W		Threshold level 2
01 71 07	W		Ratio 3
01 71 09	W		Threshold level 3
01 71 0A	W		Limit level
01 71 0B	W		Attack follow
01 71 0C	W		Release follow
01 71 0D		Reserved/Undefined	
:			
01 71 7F			
01 72 00	W	Compressor 2	Switch
01 72 01	W		Ratio 1
01 72 03	W		Threshold level 1
01 72 04	W		Ratio 2
01 72 06	W		Threshold level 2
01 72 07	W		Ratio 3
01 72 09	W		Threshold level 3
01 72 0A	W		Limit level
01 72 0B	W		Attack follow
01 72 0C	W		Release follow
01 72 0D		Reserved/Undefined	
:			
01 72 7F			

01 73 00	W	Gate 1 Switch
01 73 01	W	Threshold level
01 73 02	W	Attack follow
01 73 03	W	Release follow
01 73 04		Reserved/Undefined
:		
01 73 7F		
01 74 00	W	Gate 2 Switch
01 74 01	W	Threshold level
01 74 02	W	Attack follow
01 74 03	W	Release follow
01 74 04		Reserved/Undefined
:		
01 7F 7F		

■ **Module Connection**

ADDRESS	MODE	P A R A M E T E R
02 00 00	W	Module connection
:	:	:
02 00 5F	W	Module connection
02 00 60		Reserved/Undefined
:		
02 7F 7F		

■ **DSP Programing Mode**

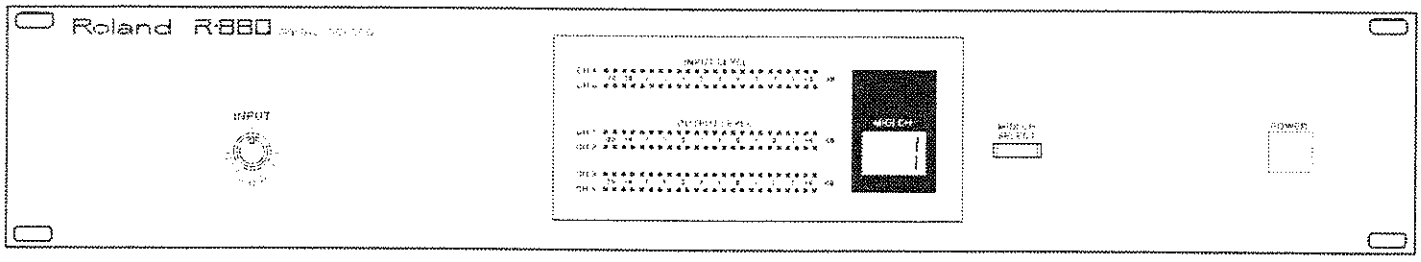
ADDRESS	MODE	P A R A M E T E R
03 00 00	W	Dsp A/C Programing mode
03 00 01	W	Dsp B/D Programing mode
03 00 02		Reserved/Undefined
:		
03 7F 7F		

■ **Others**

ADDRESS	MODE	P A R A M E T E R
04 00 00		Reserved/Undefined
:		
7F 7F 7F		

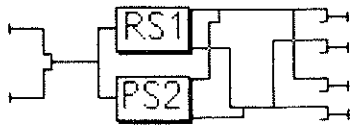
Roland R-880 Digital Reverb

Alternate Programs Data Sheet



BITCHIN ECHO

AlgMd1	AlgMd2	I/O Typ
Reverb	Plate	1-2
RvTyp1	RvTyp2	
Stack	Stack	
Gate 1	Gate 2	
OFF	OFF	



ALG
1 ALG

PARAM
1Rev1

Rev1
1Reverb

Type	Size	PreDly	RevTm	Dnsty
Room	14	51	2.20	25

LowDmp	LowFrq	HiDmp	HiFrq
0.96	60	0.90	9744

Rev1
2SubRev

PreDly	Level
210	50

Rev1
3ER

Form	L1	L2	L3	Dnsty
1	57	44	17	49

PreDly	T1	T2	T3	T4
12	110	151	22	322

PARAM
2EQ1

Low	Mid	Hi
0	4	5

PARAM
3Plate 2

Type
3

Plate 2
1Plate

Brill	Depth	PreDly	RevTm	Dnsty
50	50	16	3.00	100

LowDmp	LowFrq	HiDmp	HiFrq
0.86	50	0.91	7409

Plate 2
2SubRev

PreDly	Level
0	25

PARAM
4EQ2

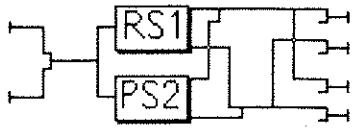
Low	Mid	Hi
0	0	0

All MIXERS:

Mix IA
+ 50.0
Mix IB
+ 50.0
Mix O
+100 0

THIN PLATE

AlgMd1	AlgMd2	I/O Typ
Reverb	Plate	1-2
RvTyp1	**RvTyp2**	
Stack	Stack	
Gate 1	**Gate 2**	
OFF	OFF	



ALG
1 ALG

PARAM
1 Rev1

Rev1
1 Reverb

Type	Size	PreDly	RevTm	Dnsty
Room	9.4	51	1.60	11
LowDmp	**LowFrq**	**HiDmp**	**HiFrq**	
0.29	244	0.93	12814	

Rev1
2 SubRev

PreDly	Level
19	74

Rev1
3 ER

Form	L1	L2	L3	Dnsty
1	53	35	12	63
PreDly	**T1**	**T2**	**T3**	**T4**
12	110	151	22	322

PARAM
2 EQ1

Low	Mid	Hi
-1	-3	5

PARAM
3 Plate2

Type	RevTm	Bright
2	1.60	46

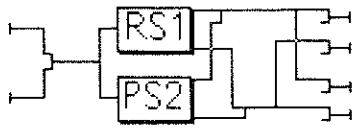
PARAM
4 EQ2

Low	Mid	Hi
0	-4	4

MIX 1,2	OTHER
Mix IA	**Mix IA**
+ 70.0	+ 50.0
Mix IB	**Mix IB**
+ 45.0	+ 50.0
Mix O	**Mix O**
+100.0	+100.0

SMALL PLATE

AlgMd1	AlgMd2	I/O Typ
Reverb	Plate	1-2
RvTyp1	RvTyp2	
Stack	Stack	
Gate 1	Gate 2	
OFF	OFF	



ALG
1 ALG

PARAM
1 Rev1

Rev1
1 Reverb

Type	Size	PreDly	RevTm	Dnsty
Room	23	8	0.50	0
LowDmp	LowFrq	HiDmp	HiFrq	
0.96	60	0.80	8792	

Rev1
2 SubRev

PreDly	Level
0	0

Rev1
3 ER

Form	L1	L2	L3	Dnsty
1	25	30	12	39
PreDly	T1	T2	T3	T4
15	17	22	13	240

PARAM
2 EQ 1

EQ 1
EQ

Low Q	Freq	Gain	Type
----------	282	6.9	Shlvng
Mid Q	Freq	Gain	
1.0	200	- 8.6	
High Q	Freq	Gain	Type
----------	2000	0.0	Shlvng

PARAM
3 Plate 2

Type
4

Plate 2
1 Plate

Brill	Depth	PreDly	RevTm	Dnsty
46	40	30	1.40	100
LowDmp	LowFrq	HiDmp	HiFrq	
0.92	50	0.84	9099	

Plate 2
2 SubRev

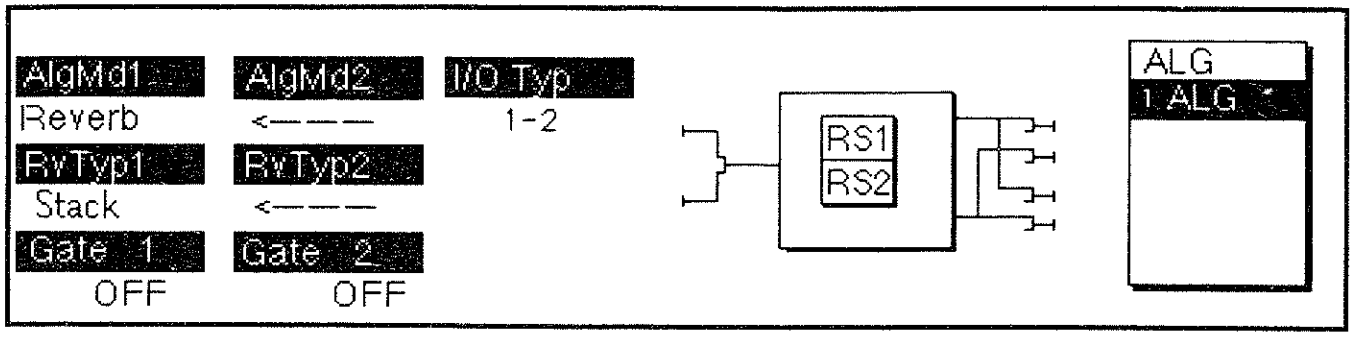
PreDly	Level
56	20

PARAM
4 EQ 2

Low	Mid	Hi
0	0	0

	MIX 1,2	OTHER
Mix IA	+ 75.0	+ 50.0
Mix IB	+ 50.0	+ 50.0
Mix O	+100.0	+100.0

FAT PLATE



PARAM
1Rev

Type	Size	RevTm	ERLvl	Bright
Hall	36	1.98	38	70

PARAM
2EQ

EQ
EQ

Low Q	Freq	Gain	Type
----------	500	4.0	Shlvng

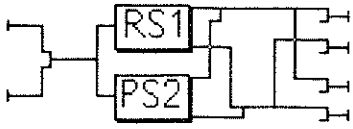
Mid Q	Freq	Gain
6.4	702	-10.0

High Q	Freq	Gain	Type
----------	2000	-1.3	Shlvng

	MIX 1,2	OTHER
Mix IA	+65.0	+50.0
Mix IB	+65.0	+50.0
Mix O	+1.00	+1.00

SNARE PLATE

AlgMd1	AlgMd2	I/O Typ
Reverb	Plate	1-2
RvTyp1	**RvTyp2**	
Stack	Stack	
Gate 1	**Gate 2**	
OFF	OFF	



ALG
1 ALG

PARAM
1 Rev1

Rev1
1 Reverb

Type	Size	PreDly	RevTm	Dnsty
Room	18	51	1.80	93
LowDmp	**LowFrq**	**HiDmp**	**HiFrq**	
0.96	60	0.90	9744	

Rev1
2 SubRev

PreDly	Level
19	30

Rev1
3 ER

Form	L1	L2	L3	Dnsty
1	57	44	17	49
PreDly	**T1**	**T2**	**T3**	**T4**
12	110	151	22	322

PARAM
2 EQ 1

Low Q	Freq	Gain	Type
----------	71	8.2	Shlvng

EQ1
EQ

Mid Q	Freq	Gain
5.8	600	- 4.0

High Q	Freq	Gain	Type
----------	17913	3.8	Shlvng

PARAM
3 Plate2

Type	RevTm	Bright
3	0.70	55

PARAM
2 EQ 2

Low Q	Freq	Gain	Type
----------	500	0.0	Shlvng

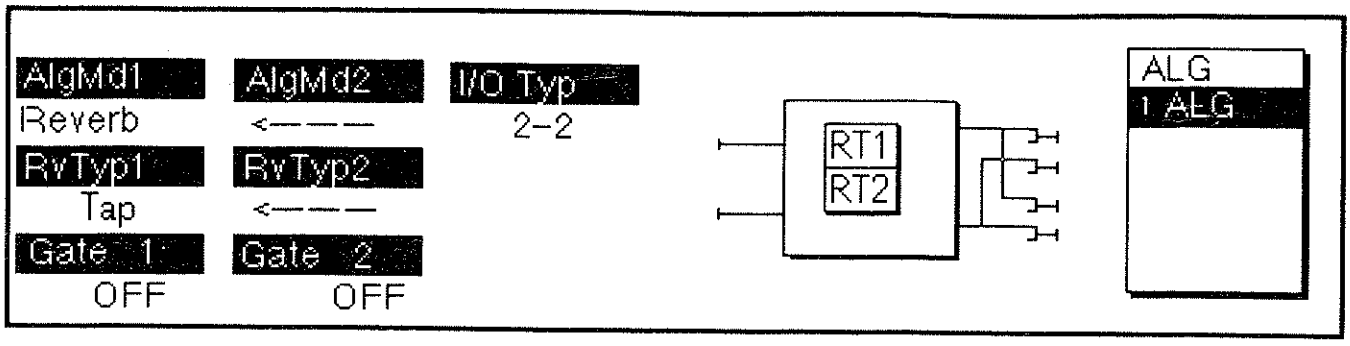
EQ2
EQ

Mid Q	Freq	Gain
1.0	253	8.6

High Q	Freq	Gain	Type
----------	9246	-4.9	Shlvng

MIX 1,2	OTHER
Mix IA	**Mix IA**
+ 70.0	+ 50.0
Mix IB	**Mix IB**
+ 70.0	+ 50.0
Mix O	**Mix O**
+100.0	+100.0

MUSIC CLUB



PARAM
1Rev

Rev
1Reverb

Type	Size	PreDly	RevTm	EDnsty
Garage	14	6	0.72	80

LowDmp	LowFrq	HiDmp	HiFrq	RDnsty
0.98	96	0.16	6033	49

Rev
2SubRev

PreDly	Level
58	22

Rev
3ER

Form	L1	L2	L3	Dnsty
4	49	35	15	77

PreDly	T1	T2	T3	T4
6	15	32	41	34

PARAM
2EQ

EQ
EQ

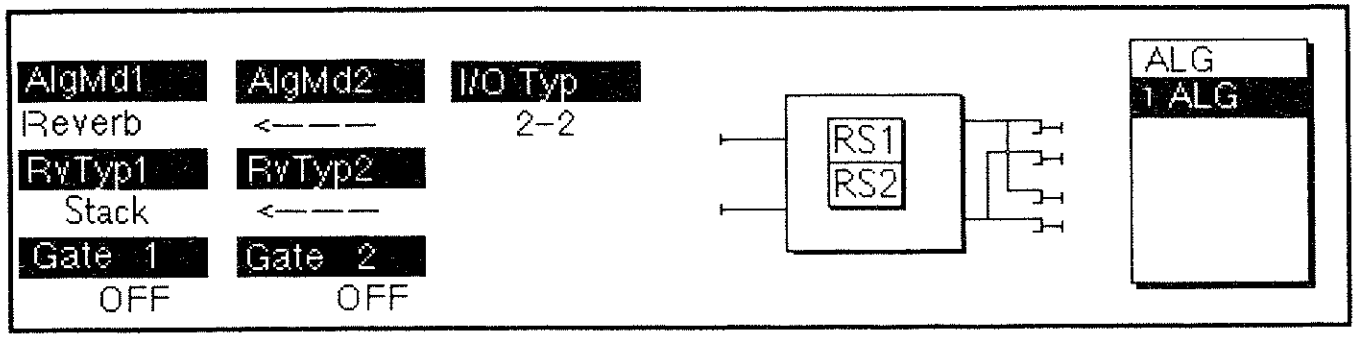
Low Q	Freq	Gain	Type
----------	500	0.0	Shlvng

Mid Q	Freq	Gain
9.9	474	-9.4

High Q	Freq	Gain	Type
----------	2000	-1.0	Shlvng

MIX 1,2	OTHER
Mix IA	Mix IA
+ 70.0	+ 50.0
Mix IB	Mix IB
+70.0	+ 50.0
Mix O	Mix O
+100.0	+100.0

LARGE HALL



PARAM
1 Rev

Rev
1 Reverb

Type	Size	PreDly	RevTm	Dnsty
Hall	36	26	4.00	99

LowDmp	LowFrq	HiDmp	HiFrq
0.98	96	0.52	4000

Rev
2 SubRev

PreDly	Level
80	32

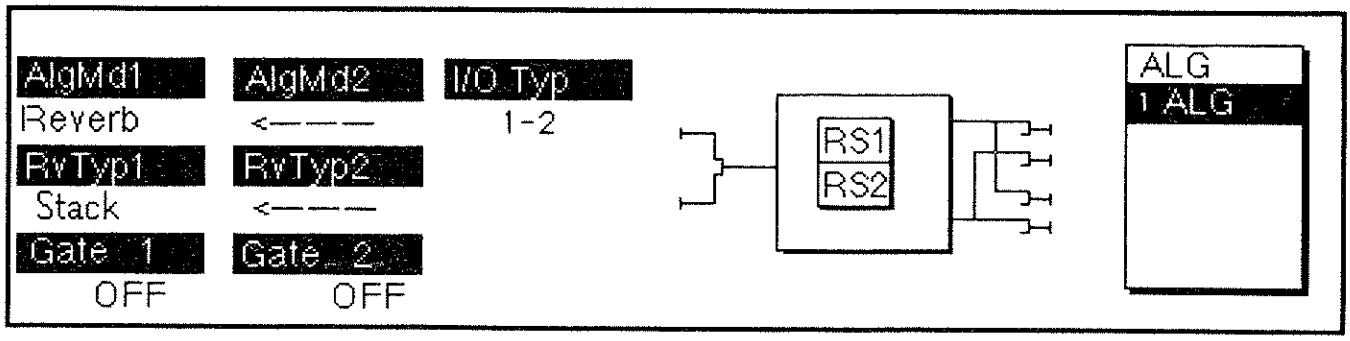
Rev
3 ER

Form	L1	L2	L3	Dnsty
4	26	12	6	77

PreDly	T1	T2	T3	T4
12	27	35	45	83

MIX 1	MIX 2	OTHER
Mix IA	Mix IA	Mix IA
+ 90.0	+ 40.0	+ 50.0
Mix IB	Mix IB	Mix IB
+40.0	+ 90.0	+ 5.0.0
Mix O	Mix O	Mix O
+100.0	+100.0	+100.0

SURFIN !



PARAM
1Rev

Rev
1Reverb

Type	Size	PreDly	RevTm	Dnsty
Room	18	84	1.20	65

LowDmp	LowFrq	HiDmp	HiFrq
1.00	50	0.70	5633

Rev
2SubRev

PreDly	Level
86	100

Rev
3ER

Form	L1	L2	L3	Dnsty
4	100	100	100	100

PreDly	T1	T2	T3	T4
4	42	80	110	125

PARAM
2EQ

EQ
EQ

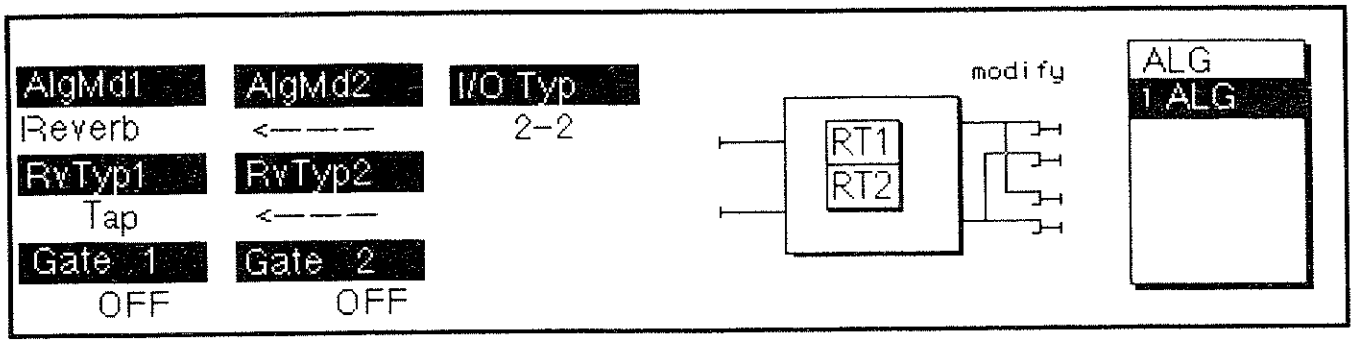
Low Q	Freq	Gain	Type
----------	311	3.0	Shlvng

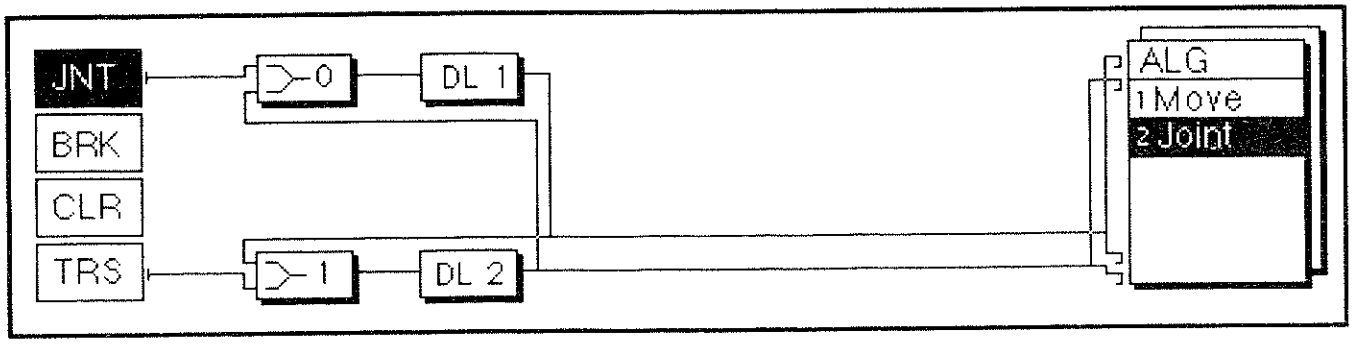
Mid Q	Freq	Gain
1.0	1000	0.0

High Q	Freq	Gain	Type
----------	5949	-5.0	Shlvng

MIX 1,2	OTHER
Mix IA	Mix IA
+ 75.0	+ 50.0
Mix IB	Mix IB
+ 75.0	+ 50.0
Mix O	Mix O
+100.0	+100.0

VOCAL WHISPERS



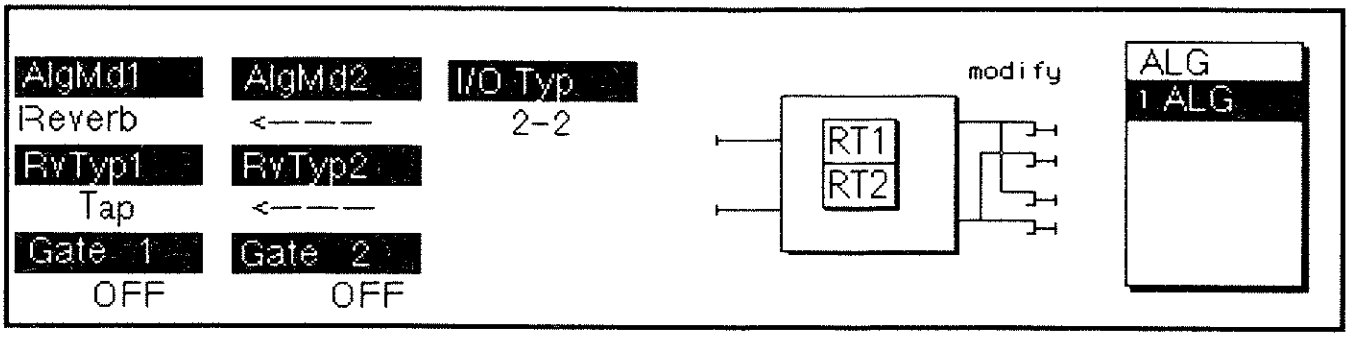


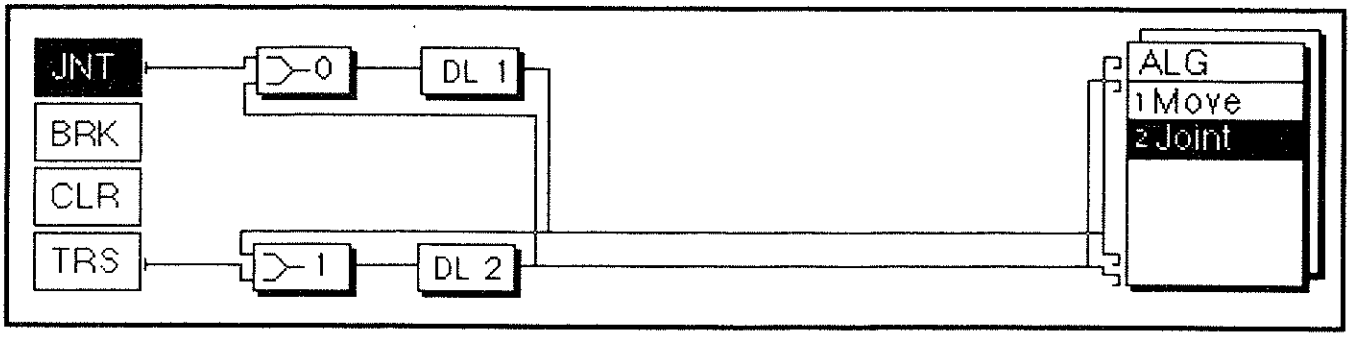
PARAM
2 Delay

DlyTm1	FdBck1	Out1
210	+6.9	+100
DlyTm2	FdBck2	Out2
250	+6.6	+100

	MIX 0	MIX 1
Mix IA	+ 100.0	+ 40.0
Mix IB	+40.0	+100.0
Mix O	+100.0	+100.0

DOUBLER



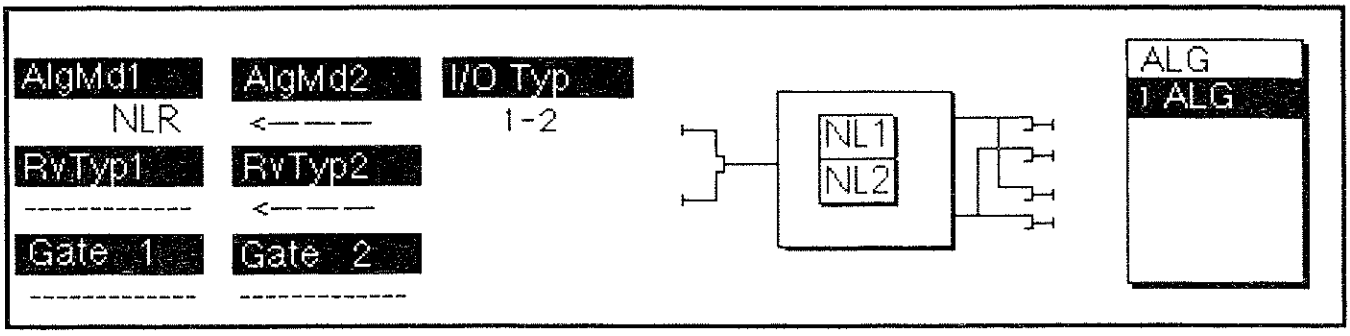


PARAM
2 Delay

DlyTm1	FdBck1	Out1
17	+27.3	+100
DlyTm2	FdBck2	Out2
41	+25.3	+100

MIX 0	MIX 1
Mix IA	Mix IA
+ 100.0	+ 40.0
Mix IB	Mix IB
+40.0	+100.0
Mix O	Mix O
+100.0	+100.0

BACK SLAP

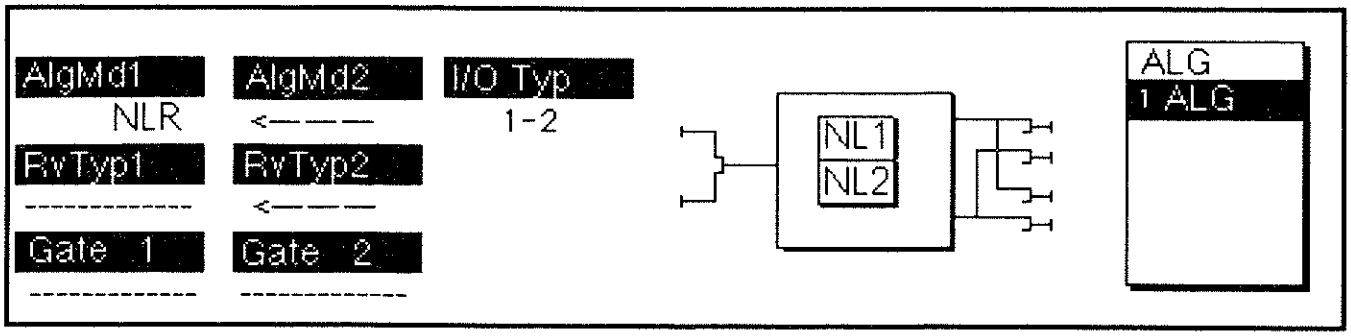


PARAM	Form	PreDly	GateTm	RevTm
1 NLR	2	0	160	2.0

PARAM	Low	Mid	Hi
2 EQ	0	2	3

	MIX 1,2	MIX 0
Mix IA	+80.0	+50.0
Mix IB	+50.0	+50.0
Mix O	+100.0	+100.0

REBOUND



PARAM
1 NLR

NLR
1 NLR

Form	L1	L2	L3	Dnsty
2	88	88	92	100

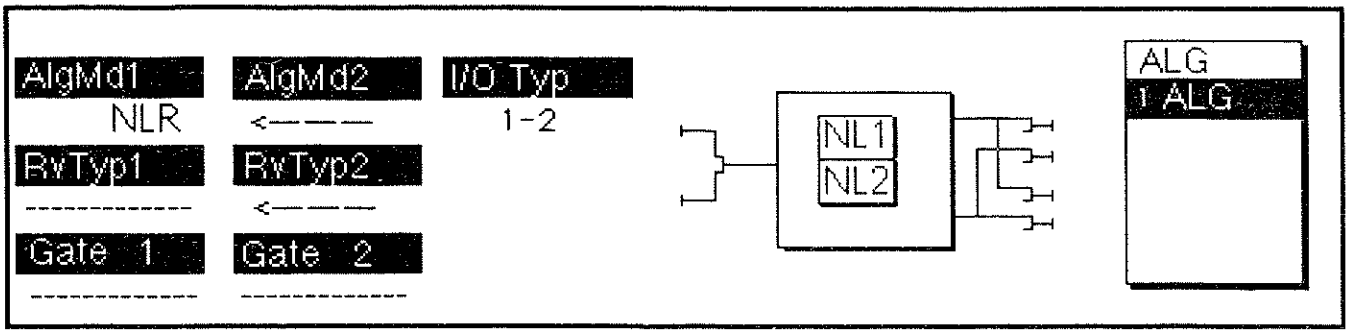
PreDly	T1	T2	T3	T4
74	88	76	167	88

PARAM
2 EQ

Low	Mid	Hi
0	2	3

MIX 1,2	MIX 0
Mix IA	Mix IA
+80.0	+50.0
Mix IB	Mix IB
+50.0	+50.0
Mix O	Mix O
+100.0	+100.0

SUDDEN STOP



PARAM
1NLR

NLR
1NLR

Form	L1	L2	L3	Dnsty
2	100	100	100	0

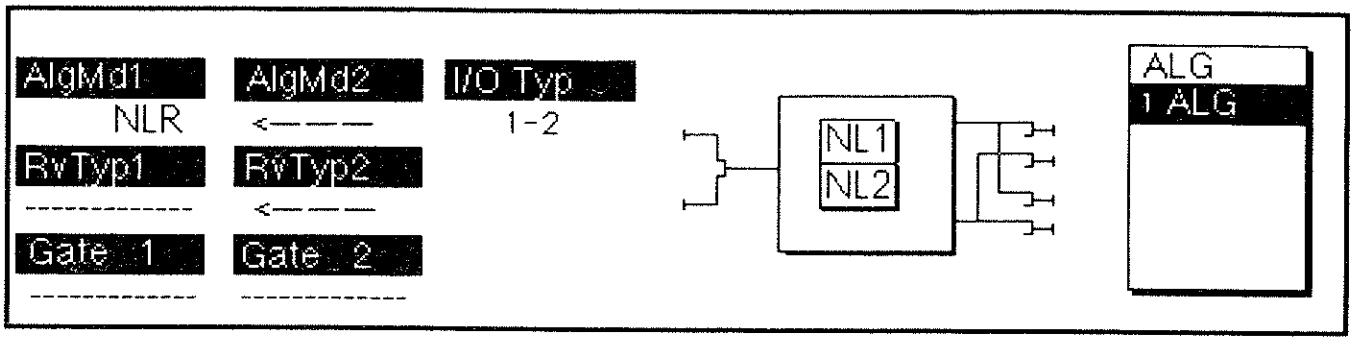
PreDly	T1	T2	T3	T4
0	55	62	136	71

PARAM
2EQ

Low	Mid	Hi
0	2	3

MIX 1,2	MIX 0
Mix IA	Mix IA
+ 80.0	+50.0
Mix IB	Mix IB
+50.0	+50.0
Mix O	Mix O
+100.0	+100.0

IN THE PAST



PARAM
1NLR

NLR
1NLR

Form	L1	L2	L3	Dnsty
1	26	72	100	0

PreDly	T1	T2	T3	T4
0	113	239	300	93

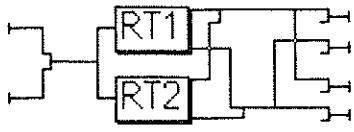
PARAM
2EQ

Low	Mid	Hi
0	2	3

MIX 1,2	MIX 0
Mix IA	Mix IA
+ 80.0	+50.0
Mix IB	Mix IB
+50.0	+50.0
Mix O	Mix O
+100.0	+100.0

LARGE + STAGE Pt. 1

AlgMd1	AlgMd2	I/O Typ
Reverb	Reverb	1-2
RvTyp1	RvTyp2	
Tap	Tap	
Gate 1	Gate 2	
OFF	OFF	



ALG
1 ALG

PARAM
1 Rev1

Rev1
1 Reverb

Type	Size	PreDly	RevTm	EDnsty
Garage	43	48	2.40	60

LowDmp	LowFrq	HiDmp	HiFrq	RDnsty
0.98	50	0.44	4000	94

Rev1
2 SubRev

PreDly	Level
262	100

Rev1
3 ER

Form	L1	L2	L3	Dnsty
4	61	83	100	24

PreDly	T1	T2	T3	T4
53	101	151	152	526

PARAM
2 EQ

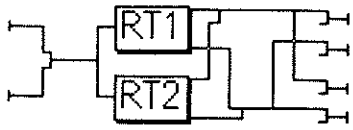
EQ 1
1 EQ

Low Q	Freq	Gain	Type
----------	500	2.0	Shlvng
Mid Q	Freq	Gain	
9.9	555	-9.4	
High Q	Freq	Gain	Type
----------	2000	-12.0	Shlvng

MIX 1,2	OTHER
Mix 1A	Mix 1A
+ 65.0	+ 50.0
Mix 1B	Mix 1B
+ 65.0	+ 50.0
Mix O	Mix O
+100.0	+100.0

LARGE + STAGE Pt. 2

AlgMd1	AlgMd2	I/O Typ
Reverb	Reverb	1-2
RvTyp1	RvTyp2	
Tap	Tap	
Gate 1	Gate 2	
OFF	OFF	



ALG
1 ALG

PARAM
3 Rev2

Rev2
1 Reverb

Type	Size	PreDly	RevTm	EDnsty
Room	29	26	1.20	62
LowDmp	LowFrq	HiDmp	HiFrq	RDnsty
1.00	2510	0.05	4000	52

Rev2
2 SubRev

PreDly	Level
197	100

Rev2
3 ER

Form	L1	L2	L3	Dnsty
1	17	20	9	34
PreDly	T1	T2	T3	T4
16	18	25	33	372

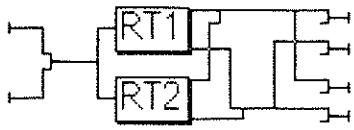
PARAM
4 EQ2

Low	Mid	Hi
0	0	0

MIX 1,2	OTHER
Mix IA	Mix IA
+ 65.0	+ 50.0
Mix IB	Mix IB
+ 65.0	+ 50.0
Mix O	Mix O
+100.0	+100.0

MEDIUM + STAGE Pt. 1

AlgMd1	AlgMd2	I/O Typ
Reverb	Reverb	1-2
RvTyp1	RvTyp2	
Tap	Tap	
Gate 1	Gate 2	
OFF	OFF	



ALG
1 ALG

PARAM
1 Rev1

Rev1
1 Reverb

Type	Size	PreDly	RevTm	EDnsty
Garage	43	48	1.70	53

LowDmp	LowFrq	HiDmp	HiFrq	RDnsty
0.98	50	0.44	4000	94

Rev1
2 SubRev

PreDly	Level
210	98

Rev1
3 ER

Form	L1	L2	L3	Dnsty
4	61	83	100	24

PreDly	T1	T2	T3	T4
53	101	151	152	526

PARAM
2 EQ

EQ 1
1 EQ

Low Q	Freq	Gain	Type
----------	500	2.0	Shlvng

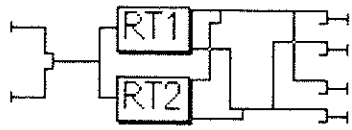
Mid Q	Freq	Gain
9.9	555	-9.4

High Q	Freq	Gain	Type
----------	2000	-12.0	Shlvng

MIX 1,2	OTHER
Mix IA	Mix IA
+ 65.0	+ 50.0
Mix IB	Mix IB
+ 65.0	+ 50.0
Mix O	Mix O
+100.0	+100.0

MEDIUM + STAGE Pt.2

AlgMd1	AlgMd2	I/O Typ
Reverb	Reverb	1-2
RvTyp1	RvTyp2	
Tap	Tap	
Gate 1	Gate 2	
OFF	OFF	



ALG
1 ALG

PARAM
3 Rev2

Rev2
1 Reverb

Type	Size	PreDly	RevTm	EDnsty
Room	29	26	1.20	62
LowDmp	**LowFrq**	**HiDmp**	**HiFrq**	**RDnsty**
1.00	2510	0.05	4000	52

Rev2
2 SubRev

PreDly	Level
172	100

Rev2
3 ER

Form	L1	L2	L3	Dnsty
1	17	20	9	34
PreDly	**T1**	**T2**	**T3**	**T4**
16	18	25	33	372

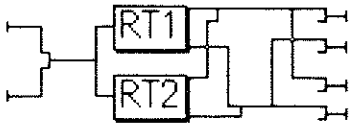
PARAM
4 EQ2

Low	Mid	Hi
0	0	0

MIX 1,2	OTHER
Mix IA	Mix IA
+ 65.0	+ 50.0
Mix IB	Mix IB
+ 65.0	+ 50.0
Mix O	Mix O
+100.0	+100.0

LARGE CHURCH Pt. 1

AlgMd1	AlgMd2	I/O Typ
Reverb	Reverb	1-2
RvTyp1	RvTyp2	
Tap	Tap	
Gate 1	Gate 2	
OFF	OFF	



ALG
1 ALG

PARAM
1Rev1

Rev1
1Reverb

Type	Size	PreDly	RevTm	EDnsty
Hall	43	48	5.30	53
LowDmp	**LowFrq**	**HiDmp**	**HiFrq**	**RDnsty**
1.00	747	0.92	20000	100

Rev1
2SubRev

PreDly	Level
210	98

Rev1
3ER

Form	L1	L2	L3	Dnsty
4	61	83	100	24
PreDly	**T1**	**T2**	**T3**	**T4**
53	101	151	152	526

PARAM
2EQ

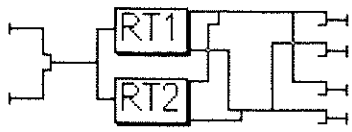
EQ 1
1 EQ

Low Q	Freq	Gain	Type
----------	282	4.9	Shlvng
Mid Q	**Freq**	**Gain**	
1.0	555	-11.8	
High Q	**Freq**	**Gain**	**Type**
----------	2000	-12.0	Shlvng

	MIX 1,2	OTHER
Mix IA	+ 65.0	+ 50.0
Mix IB	+ 65.0	+ 50.0
Mix O	+100.0	+100.0

LARGE CHURCH Pt. 2

AlgMd1	AlgMd2	I/O Typ
Reverb	Reverb	1-2
RvTyp1	RvTyp2	
Tap	Tap	
Gate 1	Gate 2	
OFF	OFF	



ALG
1 ALG

PARAM
3 Rev2

Rev2
1 Reverb

Type	Size	PreDly	RevTm	EDnsty
Room	29	26	1.20	62
LowDmp	**LowFrq**	**HiDmp**	**HiFrq**	**RDnsty**
1.00	2510	0.05	4000	52

Rev2
2 SubRev

PreDly	Level
172	100

Rev2
3 ER

Form	L1	L2	L3	Dnsty
1	17	20	9	34
PreDly	**T1**	**T2**	**T3**	**T4**
16	18	25	33	372

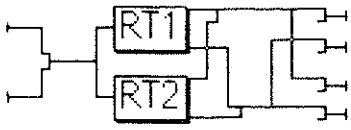
PARAM
4 EQ2

Low	Mid	Hi
2	-2	0

MIX 1,2	OTHER
Mix IA	Mix IA
+ 65.0	+ 50.0
Mix IB	Mix IB
+ 65.0	+ 50.0
Mix O	Mix O
+100.0	+100.0

SMALL CHURCH Pt. 1

AlgMd1	AlgMd2	I/O Typ
Reverb	Reverb	1-2
RvTyp1	RvTyp2	
Tap	Tap	
Gate 1	Gate 2	
OFF	OFF	



ALG
1 ALG

PARAM
1 Rev1

Rev1
1 Reverb

Type	Size	PreDly	RevTm	EDnsty
Hall	36	48	2.20	53

LowDmp	LowFrq	HiDmp	HiFrq	RDnsty
1.00	747	0.05	4000	100

Rev1
2 SubRev

PreDly	Level
210	98

Rev1
3 ER

Form	L1	L2	L3	Dnsty
4	61	83	100	24

PreDly	T1	T2	T3	T4
53	101	151	152	526

PARAM
2 EQ

EQ 1
1 EQ

Low Q	Freq	Gain	Type
----------	282	4.9	Shlvng

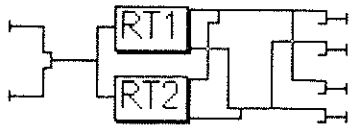
Mid Q	Freq	Gain
1.0	555	-11.8

High Q	Freq	Gain	Type
----------	2000	-12.0	Shlvng

	MIX 1,2	OTHER
Mix IA	+ 65.0	+ 50.0
Mix IB	+ 65.0	+ 50.0
Mix O	+100.0	+100.0

SMALL CHURCH Pt. 2

AlgMd1	AlgMd2	I/O Typ
Reverb	Reverb	1-2
RvTyp1	RvTyp2	
Tap	Tap	
Gate 1	Gate 2	
OFF	OFF	



ALG
1 ALG

PARAM
3Rev2

Rev2
1Reverb

Type	Size	PreDly	RevTm	EDnsty
Room	29	26	1.20	62
LowDmp	LowFrq	HiDmp	HiFrq	RDnsty
1.00	2510	0.05	4000	52

Rev2
2SubRev

PreDly	Level
172	100

Rev2
3ER

Form	L1	L2	L3	Dnsty
1	17	20	9	34
PreDly	T1	T2	T3	T4
16	18	25	33	372

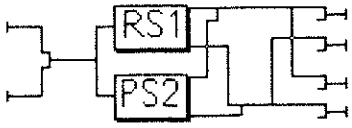
PARAM
4EQ2

Low	Mid	Hi
2	-2	0

MIX 1,2	OTHER
Mix IA	Mix IA
+ 65.0	+ 50.0
Mix IB	Mix IB
+ 65.0	+ 50.0
Mix O	Mix O
+100.0	+100.0

LARGE ROOM

AlgMd1	AlgMd2	I/O Typ
Reverb	Plate	1-2
RvTyp1	RvTyp2	
Stack	Stack	
Gate 1	Gate 2	
OFF	OFF	



ALG
1 ALG

PARAM	Type	Size	RevTm	ERLvl	Bright
1 Rev1	Room	14	0.90	44	90

PARAM	Low Q	Freq	Gain	Type
2 EQ1	----------	500	0.0	Shlvng

EQ1	Mid Q	Freq	Gain
EQ	1.0	296	7.0

High Q	Freq	Gain	Type
----------	2000	-12.0	Shlvng

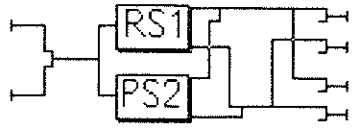
PARAM	Type	RevTm	Bright
3 Plate2	3	0.70	50

PARAM	Low	Mid	Hi
4 EQ2	0	0	0

	MIX 1,2	OTHER
Mix IA	+ 70.0	+ 50.0
Mix IB	+ 45.0	+ 50.0
Mix O	+100.0	+100.0

MEDIUM ROOM

AlgMd1	AlgMd2	I/O Typ
Reverb	Plate	1-2
RvTyp1	RvTyp2	
Stack	Stack	
Gate 1	Gate 2	
OFF	OFF	



ALG
1 ALG

PARAM
1 Rev1

Rev1
1 Reverb

Type	Size	PreDly	RevTm	Dnsty
Room	14	14	0.58	61

LowDmp	LowFrq	HiDmp	HiFrq
0.96	60	0.46	4000

Rev1
2 SubRev

PreDly	Level
19	30

Rev1
3 ER

Form	L1	L2	L3	Dnsty
1	37	44	17	49

PreDly	T1	T2	T3	T4
12	15	18	22	322

PARAM
2 EQ 1

EQ1
EQ

Low Q	Freq	Gain	Type
----------	500	0.0	Shlvng

Mid Q	Freq	Gain
1.0	296	7.0

High Q	Freq	Gain	Type
----------	2000	-12.0	Shlvng

PARAM
3 Plate2

Type	RevTm	Bright
3	0.70	50

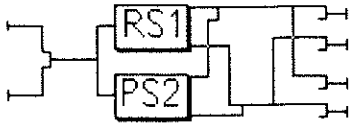
PARAM
4 EQ2

Low	Mid	Hi
0	0	0

MIX 1,2		OTHER	
Mix IA	+ 70.0	Mix IA	+ 50.0
Mix IB	+ 45.0	Mix IB	+ 50.0
Mix O	+100.0	Mix O	+100.0

SMALL ROOM

AlgMd1	AlgMd2	I/O Typ
Reverb	Plate	1-2
RvTyp1	RvTyp2	
Stack	Stack	
Gate 1	Gate 2	
OFF	OFF	



ALG
1 ALG

PARAM → 1Rev1

Rev1 → 1Reverb

Type	Size	PreDly	RevTm	Dnsty
Room	9.4	12	0.10	60

LowDmp	LowFrq	HiDmp	HiFrq
0.49	4000	0.46	4000

Rev1 → 2SubRev

PreDly	Level
19	30

Rev1 → 3ER

Form	L1	L2	L3	Dnsty
1	37	44	17	49

PreDly	T1	T2	T3	T4
12	15	18	22	322

PARAM → 2EQ1

EQ1 → EQ

Low Q	Freq	Gain	Type
----------	500	0.0	Shlvng

Mid Q	Freq	Gain
1.0	296	7.0

High Q	Freq	Gain	Type
----------	2000	-12.0	Shlvng

PARAM → 3Plate2

Type	RevTm	Bright
3	0.39	50

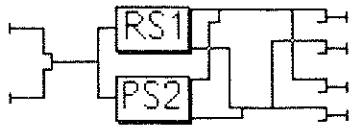
PARAM → 4EQ2

Low	Mid	Hi
0	0	0

MIX 1,2	OTHER
Mix IA	Mix IA
+ 70.0	+ 50.0
Mix IB	Mix IB
+ 45.0	+ 50.0
Mix O	Mix O
+100.0	+100.0

VERY SMALL ROOM

AlgMd1	AlgMd2	I/O Typ
Reverb	Plate	1-2
RvTyp1	RvTyp2	
Stack	Stack	
Gate 1	Gate 2	
OFF	OFF	



ALG
1 ALG

PARAM
1 Rev1

Rev1
1 Reverb

Type	Size	PreDly	RevTm	Dnsty
Room	0.2	12	0.10	53

LowDmp	LowFrq	HiDmp	HiFrq
0.49	4000	0.46	4000

Rev1
2 SubRev

PreDly	Level
19	-66

Rev1
3 ER

Form	L1	L2	L3	Dnsty
1	37	44	17	49

PreDly	T1	T2	T3	T4
12	15	18	22	322

PARAM
2 EQ1

EQ1
EQ

Low Q	Freq	Gain	Type
----------	500	0.0	Shlvng

Mid Q	Freq	Gain
1.0	296	7.0

High Q	Freq	Gain	Type
----------	2000	-12.0	Shlvng

PARAM
3 Plate2

Type	RevTm	Bright
3	0.13	50

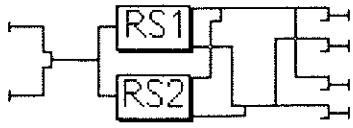
PARAM
4 EQ2

Low	Mid	Hi
0	0	0

	MIX 1,2	OTHER
Mix IA	+ 70.0	+ 50.0
Mix IB	+ 45.0	+ 50.0
Mix O	+100.0	+100.0

SMALL WOOD ROOM Pt. 1

AlgMd1	AlgMd2	I/O Typ
Reverb	Reverb	1-2
RvTyp1	RvTyp2	
Stack	Stack	
Gate 1	Gate 2	
OFF	OFF	



ALG
1 ALG

PARAM
1Rev1

Rev1
1Reverb

Type	Size	PreDly	RevTm	Dnsty
Room	14	2	0.71	0

LowDmp	LowFrq	HiDmp	HiFrq
1.00	244	0.51	4284

Rev1
2SubRev

PreDly	Level
53	23

Rev1
3ER

Form	L1	L2	L3	Dnsty
1	0	0	0	69

PreDly	T1	T2	T3	T4
6	12	14	13	263

PARAM
2EQ1

EQ1
EQ

Low Q	Freq	Gain	Type
----------	311	3.0	Shlvng

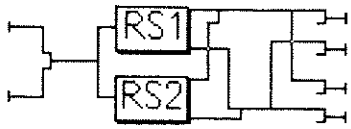
Mid Q	Freq	Gain
1.0	1000	0.0

High Q	Freq	Gain	Type
----------	5949	-5.5	Shlvng

	MIX 1,2	OTHER
Mix IA	+80.0	+ 50.0
Mix IB	+65.0	+ 50.0
Mix O	+100.0	+100.0

SMALL WOOD ROOM Pt. 2

AlgMd1	AlgMd2	I/O Typ
Reverb	Reverb	1-2
RvTyp1	**RvTyp2**	
Stack	Stack	
Gate 1	**Gate 2**	
OFF	OFF	



ALG
1 ALG

PARAM
3 Rev2

Rev2
1 Reverb

Type	Size	PreDly	RevTm	Dnsty
Room	14	63	0.71	0
LowDmp	**LowFrq**	**HiDmp**	**HiFrq**	
1.00	50	1.00	4747	

Rev2
2 SubRev

PreDly	Level
56	40

Rev2
3 ER

Form	L1	L2	L3	Dnsty
1	0	0	0	58
PreDly	**T1**	**T2**	**T3**	**T4**
9	13	15	11	240

PARAM
4 EQ 1

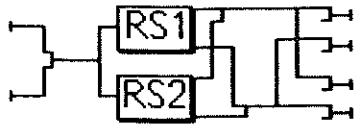
EQ2
EQ

Low Q	Freq	Gain	Type
----------	460	5.0	Shlvng
Mid Q	**Freq**	**Gain**	
1.0	1000	0.0	
High Q	**Freq**	**Gain**	**Type**
----------	5630	-3.8	Shlvng

MIX 1,2	OTHER
Mix IA	**Mix IA**
+80.0	+ 50.0
Mix IB	**Mix IB**
+ 65.0	+ 50.0
Mix O	**Mix O**
+100.0	+100 0

LARGE CHAMBER Pt. 1

AlgMd1	AlgMd2	I/O Typ
Reverb	Reverb	1-2
RvTyp1	RvTyp2	
Stack	Stack	
Gate 1	Gate 2	
OFF	OFF	



ALG
1 ALG

PARAM
1Rev1

Rev1
1Reverb

Type	Size	PreDly	RevTm	Dnsty
Room	23	2	0.91	99

LowDmp	LowFrq	HiDmp	HiFrq
1.00	244	0.93	7159

Rev1
2SubRev

PreDly	Level
53	23

Rev1
3ER

Form	L1	L2	L3	Dnsty
1	0	0	0	69

PreDly	T1	T2	T3	T4
6	12	14	13	263

PARAM
2EQ1

EQ1
EQ

Low Q	Freq	Gain	Type
----------	311	3.0	Shlvng

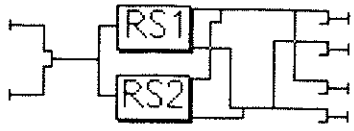
Mid Q	Freq	Gain
1.0	1000	0.0

High Q	Freq	Gain	Type
----------	5949	-5.5	Shlvng

	MIX 1,2	OTHER
[illegible]	+80.0	+ 50.0
[illegible]	+ 65.0	+ 50.0
[illegible]	+100.0	+100.0

LARGE CHAMBER Pt. 2

AlgMd1	AlgMd2	I/O Typ
Reverb	Reverb	1-2
RvTyp1	RvTyp2	
Stack	Stack	
Gate 1	Gate 2	
OFF	OFF	



ALG
1 ALG

PARAM
3 Rev2

Rev2
1 Reverb

Type	Size	PreDly	RevTm	Dnsty
Room	23	63	0.88	98

LowDmp	LowFrq	HiDmp	HiFrq
1.00	50	1.00	4747

Rev2
2 SubRev

PreDly	Level
56	40

Rev2
3 ER

Form	L1	L2	L3	Dnsty
1	0	0	0	58

PreDly	T1	T2	T3	T4
9	13	15	11	240

PARAM
4 EQ 1

EQ 2
EQ

Low Q	Freq	Gain	Type
----------	460	5.0	Shlvng

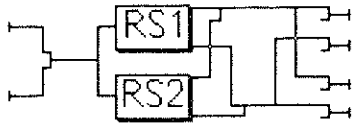
Mid Q	Freq	Gain
1.0	1000	0.0

High Q	Freq	Gain	Type
----------	5630	-3.8	Shlvng

MIX 1,2	OTHER
Mix IA	Mix IA
+80.0	+ 50.0
Mix IB	Mix IB
+65.0	+ 50.0
Mix O	Mix O
+100.0	+100.0

SMALL CHAMBER Pt. 1

AlgMd1	AlgMd2	I/O Typ
Reverb	Reverb	1-2
RvTyp1	RvTyp2	
Stack	Stack	
Gate 1	Gate 2	
OFF	OFF	



ALG
1 ALG

PARAM
1 Rev1

Rev1
1 Reverb

Type	Size	PreDly	RevTm	Dnsty
Room	9.4	3	0.36	71

LowDmp	LowFrq	HiDmp	HiFrq
1.00	244	0.48	4000

Rev1
2 SubRev

PreDly	Level
53	23

Rev1
3 ER

Form	L1	L2	L3	Dnsty
1	0	0	0	69

PreDly	T1	T2	T3	T4
6	12	14	13	263

PARAM
2 EQ 1

EQ1
EQ

Low Q	Freq	Gain	Type
----------	311	3.0	Shlvng

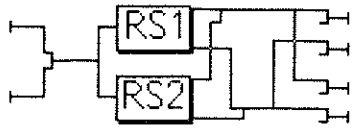
Mid Q	Freq	Gain
1.0	1000	0.0

High Q	Freq	Gain	Type
----------	5949	-5.5	Shlvng

MIX 1,2	OTHER
Mix IA	Mix IA
+80.0	+ 50.0
Mix IB	Mix IB
+65.0	+ 50.0
Mix O	Mix O
+100.0	+100.0

SMALL CHAMBER PT. 2

AlgMd1	AlgMd2	I/O Typ
Reverb	Reverb	1-2
RvTyp1	RvTyp2	
Stack	Stack	
Gate 1	Gate 2	
OFF	OFF	



ALG
1 ALG

PARAM
3 Rev2

Rev2
1 Reverb

Type	Size	PreDly	RevTm	Dnsty
Room	9.4	63	0.37	71
LowDmp	LowFrq	HiDmp	HiFrq	
1.00	50	0.73	4000	

Rev2
2 SubRev

PreDly	Level
56	40

Rev2
3 ER

Form	L1	L2	L3	Dnsty
1	0	0	0	58
PreDly	T1	T2	T3	T4
9	13	15	11	240

PARAM
4 EQ 1

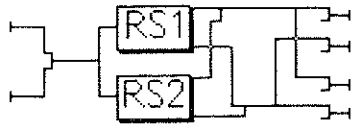
EQ2
EQ

Low Q	Freq	Gain	Type
----------	460	5.0	Shlvng
Mid Q	Freq	Gain	
1.0	1000	0.0	
High Q	Freq	Gain	Type
----------	5630	-3.8	Shlvng

	MIX 1,2	OTHER
Mix IA	+80.0	+ 50.0
Mix IB	+ 65.0	+ 50.0
Mix O	+100.0	+100.0

SMALL & BRIGHT Pt. 1

AlgMd1	AlgMd2	I/O Typ
Reverb	Reverb	1-2
RvTyp1	RvTyp2	
Stack	Stack	
Gate 1	Gate 2	
OFF	OFF	



ALG
1 ALG

PARAM
1Rev1

Rev1
1Reverb

Type	Size	PreDly	RevTm	Dnsty
Room	9.4	3	0.62	71
LowDmp	LowFrq	HiDmp	HiFrq	
1.00	244	1.00	20000	

Rev1
2SubRev

PreDly	Level
53	23

Rev1
3ER

Form	L1	L2	L3	Dnsty
1	0	0	0	69
PreDly	T1	T2	T3	T4
6	12	14	13	263

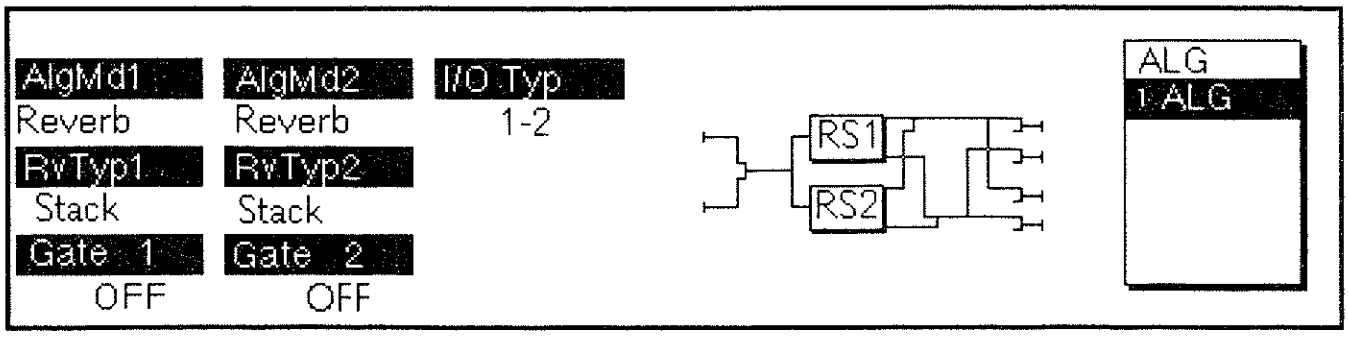
PARAM
2EQ1

EQ1
EQ

Low Q	Freq	Gain	Type
----------	311	3.0	Shlvng
Mid Q	Freq	Gain	
1.0	1000	0.0	
High Q	Freq	Gain	Type
----------	5949	-5.5	Shlvng

	MIX 1,2	OTHER
Mix IA	+80.0	+ 50.0
Mix IB	+65.0	+ 50.0
Mix O	+100.0	+100.0

SMALL & BRIGHT Pt. 2



PARAM
3 Rev2

Rev2
1 Reverb

Type	Size	PreDly	RevTm	Dnsty
Room	9.4	63	0.65	71

LowDmp	LowFrq	HiDmp	HiFrq
1.00	50	1.00	20000

Rev2
2 SubRev

PreDly	Level
56	40

Rev2
3 ER

Form	L1	L2	L3	Dnsty
1	0	0	0	58

PreDly	T1	T2	T3	T4
9	13	15	11	240

PARAM
4 EQ 1

EQ2
EQ

Low Q	Freq	Gain	Type
----------	460	5.0	Shlvng

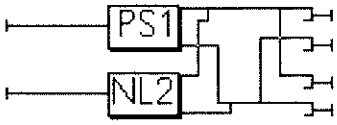
Mid Q	Freq	Gain
1.0	1000	0.0

High Q	Freq	Gain	Type
----------	5630	-3.8	Shlvng

	MIX 1,2	OTHER
Mix IA	+80.0	+50.0
Mix IB	+65.0	+50.0
Mix O	+100 0	+100 0

NON LINEAR ZOIT

AlgMd1	AlgMd2	I/O Typ
Plate	NLR	2-2
RvTyp1	**RvTyp2**	
Stack	----------	
Gate 1	**Gate 2**	
OFF	----------	



ALG
1 ALG

PARAM
1 Plate 1

Type
4

Plate 1
1 Plate

Brill	Depth	PreDly	RevTm	Dnsty
100	70	16	1.30	96

LowDmp	LowFrq	HiDmp	HiFrq
0.86	50	1.00	7409

Plate 1
2 SubRev

PreDly	Level
25	100

PARAM
3 NLR

NLR2
1 NLR

Form	L1	L2	L3	Dnsty
3	59	98	77	87

PreDly	T1	T2	T3	T4
186	43	67	132	96

MIX 1,2

Mix IA
+30.0

Mix IB
+100.0

Mix O
+100.0

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