DigiTech

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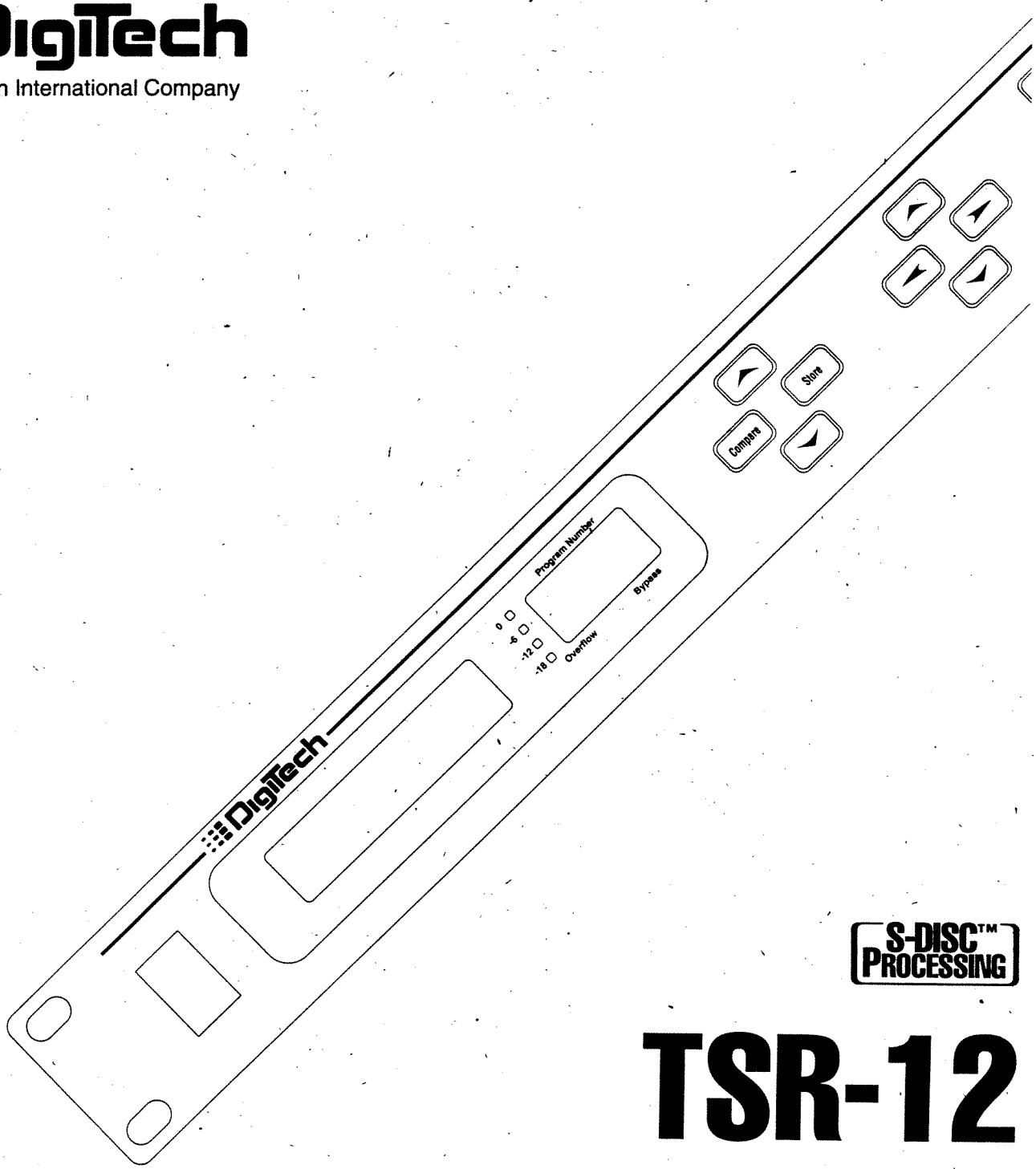

S-DISC™ PROCESSING

TSR-12

Studio Reverb / Multi-Effects Processor

Owner's Manual

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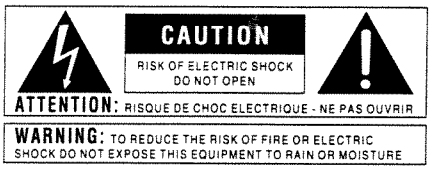
Introduction

Congratulations, and thank you for your purchase of the DigiTech TSR-12 Studio Reverb / Multi-Effects System. The TSR-12 represents the future of studio effects processing, offering total flexibility and control of the best digital effects in the industry. Special features of the TSR-12 include:

- Full bandwidth effects (20-20kHz).
- 24-bit signal path, 48-bit internal data transmission.
- Stereo processing.
- Instant Module and Parameter access.
- Integrated MIDI processor.
- Built-in MIDI merging (MIDI output can act as a standard out or as a merged out).
- MIDI input filtering.
- MIDI Transmit and Receive mapping
- All effects and parameters available for MIDI continuous control.

For the first time, all of your effects needs can be filled by a single unit with 16-bit digital clarity. This owner's manual is your key to understanding the powerful world of the TSR-12. Read it carefully. After you've had time to familiarize yourself with the unit, try experimenting with unusual effects combinations. You may achieve some interesting results.

Safety Precautions



The symbols shown at left are internationally accepted symbols that warn of potential hazards with electrical products. The lightning flash with arrowpoint in an equilateral triangle means that there are dangerous voltages present within the unit. The exclamation point in an equilateral triangle indicates that it is necessary for the user to refer to the owner's manual.

These symbols warn that there are no user serviceable parts inside the unit. Do not open the unit. Do not attempt to service the unit yourself. Refer all servicing to qualified personnel. Opening the chassis for any reason will void the manufacturer's warranty. Do not get the TSR-12 wet. If liquid is spilled on the unit, shut it off immediately and take it to a dealer for service. Disconnect the equipment during storms to prevent damage.

U.K. ONLY - A moulded mains plug that has been cut off from the cord is unsafe. Discard the mains plug at a suitable disposal facility. NEVER UNDER ANY CIRCUMSTANCES SHOULD YOU INSERT A DAMAGED OR CUT MAINS PLUG INTO A 13 AMP POWER SOCKET. **Do not** use the mains plug without the fuse cover in place. Replacement fuse covers can be obtained from your local retailer. Replacement fuses are 13 amps and MUST be ASTA approved to BS1362.

Lithium Battery Warning

CAUTION! This product contains a lithium battery. There is danger of explosion if battery is incorrectly replaced. Replace only with an Eveready CR 2032 or equivalent. Make sure the battery is installed with the correct polarity. Discard used batteries according to manufacturer's instructions.

ADVARSEL! Lithiumbatteri - Eksplosjonsfare. Ved utskifting benyttes kun batteri som anbefalt av apparatfabrikanten. Brukt batteri returneres apparatleverandøren.

ADVARSEL! Lithiumbatteri - Eksplosionsfare ved fejlagtig håndtering. Udskiftning må kun ske med batteri av samme fabrikat og type. Levér det brugte batteri tilbage til leverandøren.

VAROITUS! Paristo voi räjähtää, jos se on virheellisesti asennettu. Vaihda paristo ainoastaan laitevalmistajan suosittelemaan tyyppin. Hävitä käytetty paristo valmistajan ohjeiden mukaisesti.

VARNING! Explosionsfara vid felaktigt batteribyte. Använd samma batterityp eller en ekvivalent typ som rekommenderas av apparattillverkaren. Kassera använt batteri enligt fabrikantens instruktion.

Warranty

1. The warranty registration card must be mailed within ten days after purchase date to validate this warranty.

2. DigiTech warrants this product, when used solely within the U.S., to be free from defects in materials and workmanship under normal use and service.

3. DigiTech liability under this warranty is limited to repairing or replacing defective materials that show evidence of defect, provided the product is returned to DigiTech WITH RETURN AUTHORIZATION, where all parts and labor will be covered up to a period of one year. A Return Authorization number may be obtained from DigiTech by telephone. The company shall not be liable for any consequential damage as a result of the product's use in any circuit or assembly.

4. Proof-of-purchase is considered to be the burden of the consumer.

5. DigiTech reserves the right to make changes in design or make additions to or improvements upon this product without incurring any obligation to install the same on products previously manufactured.

6. The foregoing is in lieu of all other warranties, expressed or implied, and DigiTech neither assumes nor authorizes any person to assume for it any obligation or liability in connection with the sale of this product. In no event shall DigiTech or its dealers be liable for special or consequential damages or from any delay in the performance of this warranty due to causes beyond their control.

The information contained in this manual is subject to change at any time without notification. Some information contained in this manual may also be inaccurate due to undocumented changes in the product or operating system since this version of the manual was completed. The information contained in this version of the owner's manual supersedes all previous versions.

Section 1 - Startup

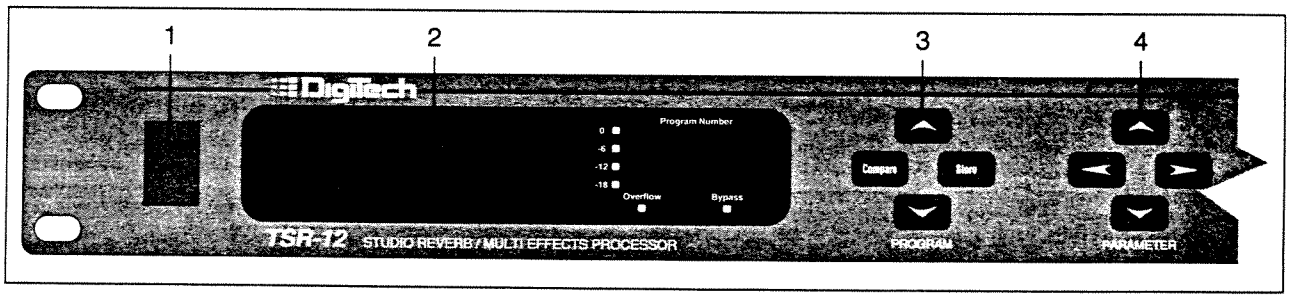
Power and Grounding Information

Line Conditioning - The TSR-12, like any piece of computer hardware, is sensitive to voltage drops, spikes, and surges. Interference such as lightning or power "brownouts" can seriously, and in extreme cases, permanently damage the circuitry inside the unit. Here are some ways to avoid this type of damage:

- Spike/Surge Suppressors - This is an inexpensive solution to all but the severest of AC line conditions. Surge protected power strips usually cost only slightly more than unprotected strips, making them a worthy investment for protection of all your valuable gear.

- AC Line Conditioners - This is the best way to go for total protection from improper line voltages, albeit the more expensive way. Line conditioners constantly monitor for excessively high or low voltages and adjust accordingly, thus delivering consistent power levels.

Front Panel Controls and Functions



The front panel controls and functions of the TSR-12 are as follows (refer to diagram above):

1) **Power Switch** - Turns the unit on or off.

2) **Display Window** - The display window shows all current operating and programming information and is comprised of several parts: the LCD display, the input level meter, the Program number indicator window, and the Bypass an Overflow indicator LEDs. The LCD display shows all Program names, Parameters and Parameter values, and is the communication interface between you and the TSR-12. The input level meter monitors the level of the incoming signal, allowing proper adjustment of each channel's input level control. In the Program number indicator window you will find the currently selected Program number. This changes as you scroll through the available Programs. The functions of the Bypass and Overflow indicator LEDs are:

   - Bypass indicator - Indicates (when lit) that all effects have been bypassed using either the Bypass button or a footswitch connected to the rear panel Footswitch jack. To exit bypass mode, simply press the Bypass button on the front panel.

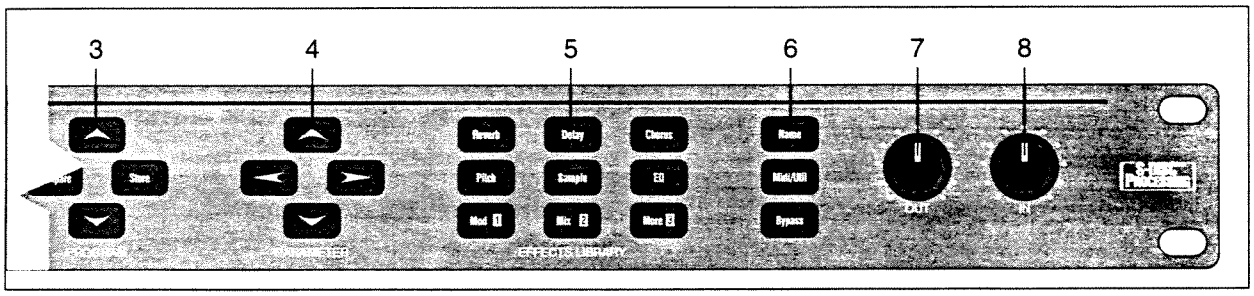
   - Overload indicator - Indicates digital information overflow in the microprocessor of the unit. When lit, distortion may be heard in the output signal. The guideline for this indicator is **let your ears be the judge**. If this indicator lights regularly and no audible distortion is present, it can be ignored. If distortion is audible in the output signal, one or more of the internal digital effects levels of the Program must be turned down to eliminate the problem.

3) **Program Buttons** - The Program <UP> and <DOWN> buttons allow you to scroll through TSR-12 effects Programs. The <STORE> button allows you to store a Program in memory for later recall. The <COMPARE> button allows comparison of an edited Program with the original unedited version.

4) **Parameter Buttons** - The <LEFT> and <RIGHT> Parameter buttons allow access to all the Parameters of the currently selected Program. When the Parameter you want to edit has been reached, use the Parameter <UP> and <DOWN> buttons to change the value of the selected Parameter.

5) **FX Library** - This group of buttons allows insertion of different effects types into an effects algorithm or jumping directly to the first Parameter of Modules in an Algorithm. The buttons in this group are: <REVERB>, <DELAY>, <CHORUS>,<PITCH shift>, <SAMPLE, <EQ>, <FLANGE>, <MODulation>, <MORE>, and <MIX>. Also included in this section are the <<> and <>> buttons, which allow you to skip directly to the first Parameter of each effect in the Algorithm.

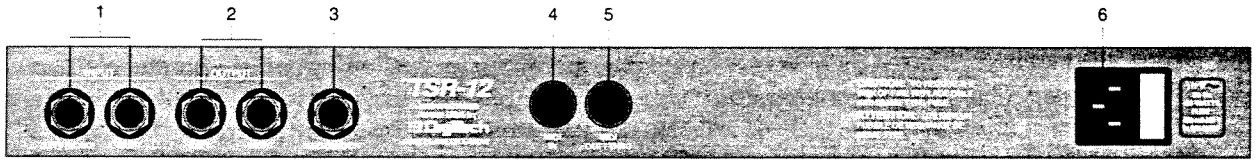
6) **Global Buttons** - These buttons perform global functions, including those required for naming Programs and Algorithms, MIDI setups (including transmit and receive maps), and utility functions such as LCD contrast and footswitch setup. Buttons in this group are: <NAME>, <MIDI/UTIL>, and <BYPASS>.



7) **Input Level Controls** - Adjusts the level of the sound source being fed into the TSR-12. For best performance, set these controls so that the "0" LED on the input meter lights occasionally. If these controls are set too high, you may hear unwanted distortion in the output signal.

8) **Output Level Controls** - Controls the overall output level of the TSR-12. The Output Level knob controls both outputs

Rear Panel Connections



The TSR-12 rear panel connectors and functions are as follows:

1) **Inputs** - These are the audio inputs to the TSR-12. For best results when using the unit in mono applications, use the Left (Mono) input.

2) **Outputs** - These are the main left and right audio outputs of the TSR-12. Use both outputs when Programs are set up to take advantage of stereo effects. For mono applications, switch the unit to mono output mode and use either output. Procedures for changing the output mode can be found on pg. 31.

3) **Footswitch Jack** - Allows connection of the optional DigiTech FS-300 footswitch or an external switching device for program changes or bypass.

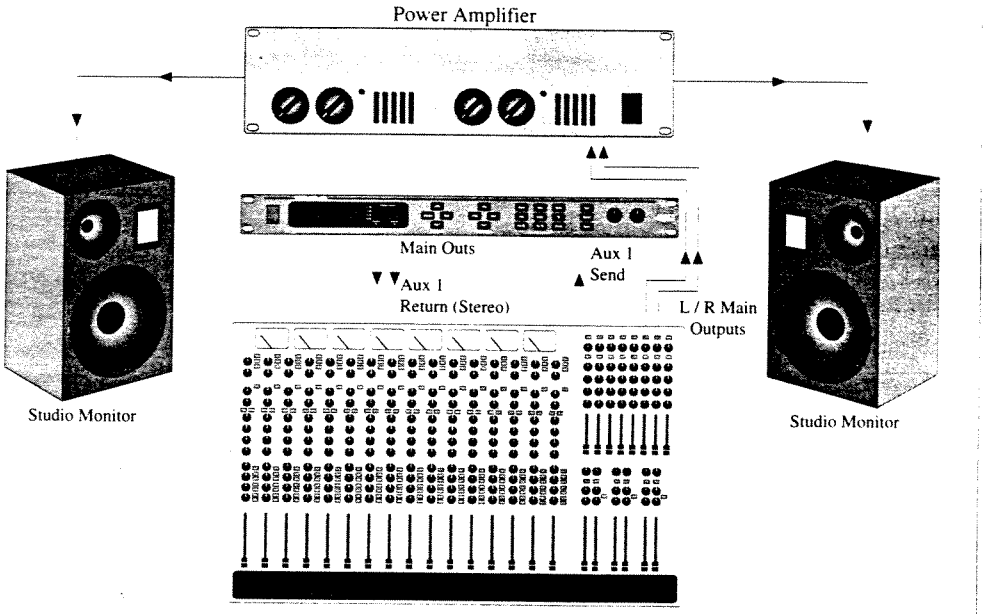
4) **MIDI In** - The MIDI In port allows the TSR-12 to respond to incoming MIDI messages, including Program Change, Continuous Control, and System Exclusive data.

5) **MIDI Out/Thru** - Sends out MIDI data generated by the TSR-12 to other devices. When MIDI Merging is on, this port also merges MIDI data generated by the TSR-12 with data being routed THRU.

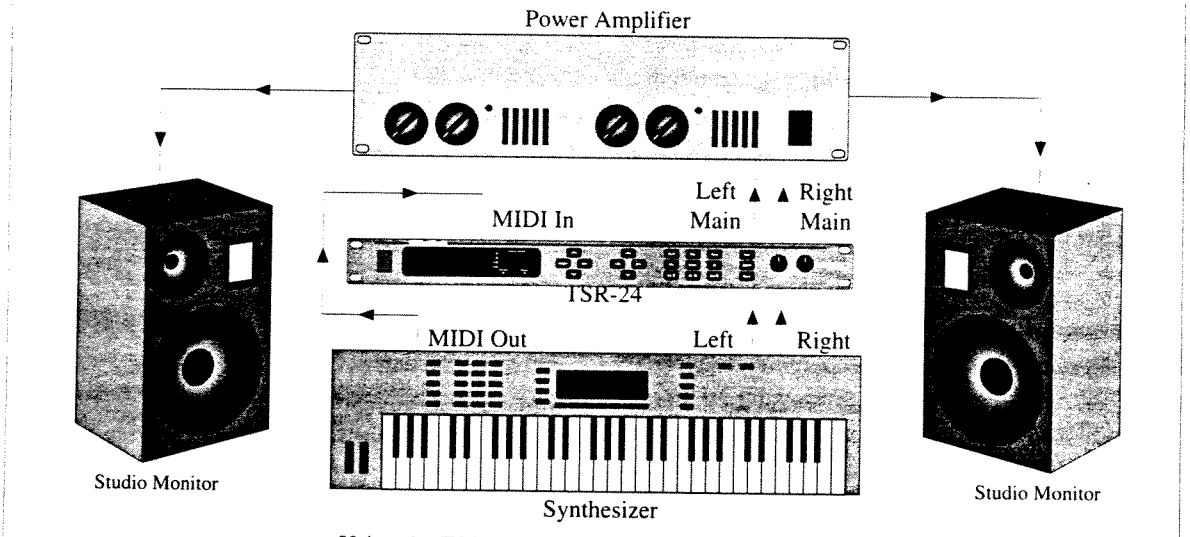
6) **AC Line Input** - This is the power cord receptacle.

MIDI and Audio Routing Setups

Following are some examples of MIDI and audio routings of which the TSR-12 is capable. Note that in each example, different Program types (mono in, st. out, etc.) must be used in order for the TSR-12 to sound right.



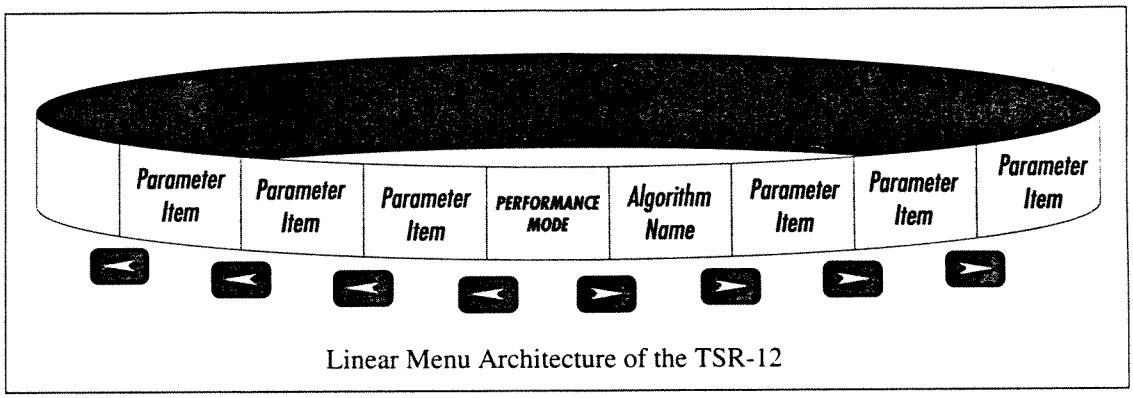
Using the TSR-12 in a studio setup



Using the TSR-12 as a single in-line effects device

Section 2 - Basic Operations

Menu Architecture



Linear Menu Architecture of the TSR-12

The menu architecture of the TSR-12 has been designed to be a linear series of items rather than a multiple-level menu (see diagram above). In other words, instead of including several submenus, or levels, under a single Parameter heading, all Parameters and functions are included in a single level, and are accessed using the Parameter <LEFT> and <RIGHT> keys. This makes access to specific Parameters of a Program quick and easy, and provides a much clearer picture of exactly where you are in the menu.

The diagram shows the linear arrangement of the menus in the TSR-12. Notice that if you press the Parameter <RIGHT> key from the last item in the list (the Parameter item to the left of Performance mode), the display jumps, or "wraps around to" the first item in the menu (in this case, Performance mode).

Likewise, if the Parameter <LEFT> button is pressed from Program mode, the display will wrap to the last Parameter in the list. This wraparound menu feature is provided so that Parameters that appear near the end of a long list of items can be just as easily reached as items near the beginning of the menu. If you press and hold either the Parameter <LEFT> key or the Parameter <RIGHT> key, the TSR-12 will begin scrolling at high speed through the available Parameters in the Parameter menu.

About Performance Mode

The TSR-12's default mode after power-up is called Performance mode. This is the main operating mode in which the TSR-12 will function under normal use. From this mode, any of the operating Parameters or modes can be easily reached.

Accessing Factory Programs

There are two methods for recalling factory Programs. The first method uses the Program <UP> and <DOWN> buttons. The procedure is as follows:

- While in Performance mode, press the Program <UP> button. Notice that the Program shown in the display changes and the number shown in the LED display increments by one each time the Program <UP> button is pressed. Pressing the Program <DOWN> button causes the reverse to occur: the TSR-12 decrements through the Programs in memory.

- To scroll at high speed through the Programs in memory, press and hold either the Program <UP> or Program <DOWN> button.

The second method for changing TSR-12 Programs is through the use of MIDI. This method will be covered later in the Utilities section of this manual, pg. 25.

Section 3 - Programming the TSR-12

Modifying Factory Programs

After you have had time to familiarize yourself with the TSR-12, you may find that there are several factory Programs that are very close to the type(s) of effect(s) that you are looking for, but that need a few small tweaks to get them perfect. Let's suppose that Program 55 is a 300 millisecond mono delay with a chorus and a reverb, and that in order to work in your application, it needs to have a 1.125 second delay. Let's use this imaginary Program as an example for Program modification. The procedure is as follows:

- From Performance mode, scroll to Program 55 using the Program <UP> and Program <DOWN> buttons. The display shows the Program title on the top line and the Algorithm title on the bottom line.

- Using the Parameter <LEFT> / <RIGHT> keys, scroll to the Delay Time Parameter. The display reads DELAY TIME 0.300 SEC. Note that a cursor appears under the 3.

  IMPORTANT: Delay Time Parameters in the TSR-12 are editable in two different ranges to give the most flexibility and accuracy in the least amount of scrolling time. In this example Parameter, the cursor appears under the 3 in 0.300. The 3 resides in the *hundred milliseconds* position. In other words, if you press the Parameter <UP> key when the cursor is in this position, you will increase the delay time by 100 milliseconds. If you press the Parameter <RIGHT> key, the cursor will move to the third position to the right of the decimal point, or *milliseconds* position. Each press of the Parameter <UP> button from this position increases the delay time in single millisecond steps. Using this method of ranging allows you to scroll rapidly to large-value delay times without having to wait for the unit to scroll to it in single millisecond steps.

- Using the Parameter <UP> key, scroll upward until both the *seconds* position (to the left of the decimal point) and the hundreds position show 1's. The delay time shown in the display reads 1.100 SEC.

- Press the Parameter <RIGHT> key once. The cursor appears in the milliseconds position.

- Using the Parameter <UP> key, scroll upward until the last two digits of the delay time read 25. The delay time is now set at 1.125 seconds.

If you change Programs at this point, either through MIDI or via the front panel, any modifications that you have made to the Program will be lost. In order for the TSR-12 to remember the changes that you have made, you must store the Program in memory. The procedure for storing Programs is covered in more detail in Section 3, pg. 12.

Using the Function Keys

The TSR-12 has three Function keys that perform several functions in different menus. They are located in the bottom row of the Effects Library keys, sharing buttons with the MOD, MIX and MORE options. Each Function key is numbered and performs several functions in the Utility mode (depending on the selected menu screen). These keys are also used in the Program naming process. See pg. 11 for Program naming procedures. See pg. 25 for more on the MIDI/Utility Menu.

 Indicates that the <MOD 1> key (Function key 1) performs the function shown in the display.

 Indicates that the <MIX 2> key (Function key 2) performs the function shown in the display.


Indicates that the <MORE 3> key (Function key 3) performs the function shown in the display.

More Special Characters

There are several special characters that the TSR-12 uses to tell you at a glance exactly what it is doing. All special characters in the TSR-12 (except CC) are in inverted type, that is, reversed out of a black background, and they usually appear in the upper right-hand corner of the display.

The CC character is used to indicate that a continuous controller is linked to a Parameter. Letters A-D are used in Algorithms where two or more effects Modules have the same name. This is an instance in which a special character will immediately follow the Module name rather than appear in the corner of the display. Following is a list of all the TSR-12 special characters and their meanings.


Indicates that a MIDI continuous controller is linked to the Parameter


Used for distinguishing between Modules of the same name in a single Algorithm.

Using the FX Library Keys

The FX Library keys are used to jump to specific places in menus. For example, if a Program contains several delays and you want to change the delay time on only one of them, you could press the <DELAY> library button from Performance mode and you would be jumped to the first Parameter of the first delay in the Algorithm. Press the button again, and you are taken to the first Parameter of the next delay in the Algorithm, and so on.

Basic Program Creation

There are several requirements for creating a Program on the TSR-12. The first is that an Algorithm needs to be assigned to the Program. Second, Parameters must be modified to your liking, and third, the Program must be stored in memory in order to be recalled for later use.

Selecting an Algorithm

The Algorithm you choose for a Program determines the basic function of the Program. It is therefore necessary to choose an Algorithm that contains all the Modules you want to use in an appropriate configuration. The Algorithm selection screen for all Programs in the TSR-12 is one screen to the right of Performance mode.

To select an Algorithm for a Program, the procedure is as follows:

- From Performance mode, press the Parameter <RIGHT> key once. This is the Algorithm selection screen. The name of the currently selected Algorithm is shown on the top line of the display, while the bottom line shows the effects in the Algorithm.

NOTE: When there are more effects in the Algorithm than will fit on a single line of the display, an arrow will appear in the first and/or last character of the bottom line of the display. These arrows indicate that there is more information about the effects that could not be displayed on a single screen. To see the remaining information, simply press the Parameter <RIGHT> or <LEFT> key (depending on the arrow direction indicated in the display).

- Use the Parameter <UP> / <DOWN> keys to select the Algorithm you want to use with the Program.

Once you have selected an Algorithm, you can begin modifying the Parameters to suit your purpose.

Comparing Programs

The <COMPARE> button allows you to compare a modified Program with the original without losing the modifications you have made. This feature makes it easy to hear the differences between the modified and stored versions of the Program. To compare a modified Program with the original:

- Press the <COMPARE> button once. The TSR-12 will temporarily switch to the original Program settings, and the display will read **COMPARING** until the <COMPARE> button is pressed again, at which time the Program will switch back to the edited version.

This operation may be performed as many times as you want, but always make sure that you are out of Compare mode after you are finished. The TSR-12 will not respond to any buttons or commands until you exit Compare mode.

Naming Programs

The TSR-12 allows you to give your Programs custom names up to 16 characters in length. The naming procedure uses the Parameter <UP> and <DOWN> keys, the Function keys, and/or the Program <UP> / <DOWN> keys to make Program naming extremely quick and easy. the <MOD 1> key (Function key 1) changes the character from upper to lower case and back. the <MIX 2> key (Function key 2) inserts a space into the Program name, and the <MORE 3> key (Function key 3) instantly jumps you to the numbers section of the character set.

Unique to the TSR-12 naming process are several *special* naming functions. The Program <COMPARE> and <STORE> buttons allow you bump an entire name or section of a name either left or right in one-space increments. If you want to move left, all characters to the right of the cursor will move. If you want to move right, all characters to the left of the cursor will move. The procedure is as follows:

- In Name mode, use the Parameter <RIGHT> / <LEFT> keys to place the name cursor underneath the character to be moved.

- Press the Program <COMPARE> or <STORE> buttons to move the characters either left or right.

The Program <UP> key copies the character under which the cursor sits into memory. This allows you to place a copy of that character (using the Program <DOWN> key) anywhere else in the name that you want. The procedure is as follows:

- In Name mode, use the Parameter <RIGHT> / <LEFT> keys to place the cursor under the character to be copied.

- Press the Program <UP> key. The selected character has now been copied into memory.

- Move the cursor to the location into which you want to place a copy of the character and press the Program <DOWN> key. Note that a copy of the character appears in the location you selected.

To give a Program a custom name, the procedure is as follows:

- Press the <NAME> button once. The top line of the display shows the current Program name with a cursor under the first character of the name. The bottom line reads 1CAPS 2SPACE 3NUM. The white on black numbers preceding each option indicate the Function key that will perform the function shown.

- Using the Parameter <UP> / <DOWN> keys, scroll to the character you want to use, or press one of the Function keys. When you have selected the character you want, press the Parameter <RIGHT> key. Note that the cursor moves to the next character. Repeat this procedure until the Program name is to your liking.

Once you have a name for the Program that you like, press the <NAME> button again. This will take you out of the Program naming mode and back to Performance mode. You must now store the changes you have made in order for your custom name to be retained in memory.

Storing / Copying Programs

For modified Programs to be available for later recall, you must store them in memory. This is accomplished using the <STORE> button. The procedure for storing a Program is as follows:

- After you have made all the necessary modifications to the Program, press the <STORE> button once. The display reads SAVE CHGS TO: ==. This screen allows you to select the location in which you want to store the new Program, and will default to the current Program number.

- Using the Program <UP> / <DOWN> buttons, scroll to the Program number location in which you want to store the new Program. Note that the name of the Program appears on the bottom line of the display.

- To store the Program, press the <STORE> button again. The display will briefly read ***STORING***, after which you will automatically be returned to the previous mode. To abort the command, press <COMPARE>.

The Store function can also be used to copy Programs from one memory location to another. If no changes have been made to the selected Program and the <STORE> button is pressed, the display will read COPY PRG TO: ==. Simply select the memory location in which you want to place a copy of the selected Program and press <STORE> again. The display will briefly read ***COPYING*** and you will automatically be returned to the previous mode. To abort the command, press <COMPARE>.

About the Effects Library

The Effects Library consists of all the effects Modules you can find in the TSR-12. Broken down into individual categories, specific Modules and their abbreviated library names are as follows:

Reverbs

Module Name	Module Abbrv.	Description
BigVerb	Big	Studio-quality reverb.
MFX Reverb	MVerb	Appears in multi-effects Algorithms.
Gated Reverb	GtRvb	Professional gated reverb

Bigverb is the flagship reverb Module of the TSR-12. It contains 14 Parameters, giving exceptional soundfield and tonal shaping control over reverberation. Bigverb is capable of producing reverberation of virtually any size, shape, depth, timbre or soundfield location.

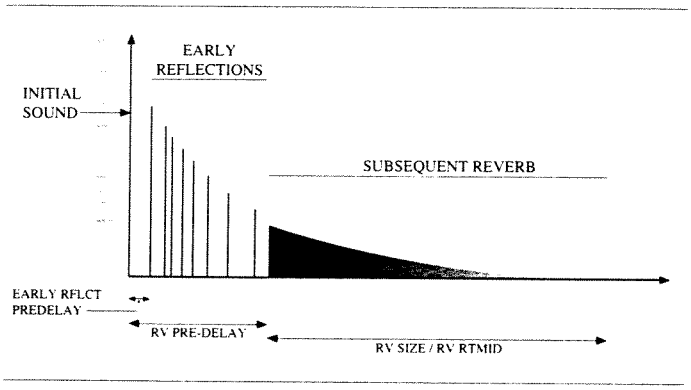
MFX Reverb is a slightly trimmed version of the Bigverb, offering much of the same flexibility and controls as Bigverb, but in less memory space. MFX Reverb allows you to achieve high-quality reverb in conjunction with other effects.

Before covering all the reverb Parameters and their definitions in detail, however, let's discuss the benefits and theory behind reverberation Algorithms.

Ambience, or reverberation, is produced when sound energy is reflected off room surfaces and objects. Using reverberation in recorded program material gives the listener a sense that the material is being performed in an actual room or hall. It is this similarity to actual acoustic spaces that makes reverberation a useful tool in recorded music.

The length of the reverberation, or reverb time, can be perceived by the listener and is useful during the course of continuous program material (reverb time is defined as "the length of time the reverberation takes to decay to inaudibility", or -60 dB). Studies have shown that the character of reverberation depends heavily upon the initial buildup and decay of the reverberation reflections. However, if the original sound remains present during the course of the reverberation (as is the case in recorded music most of the time), it needs only to decay 15 dB to become inaudible. Therefore, the amount of time it takes for the reverberation to build up and decay 15 dB determines the *perceived* reverb time, irrespective of the decay time to -60 dB (RT60).

The TSR-12 uses early reflections to better emulate the natural sound of a hall. Early reflections are short clusters of direct reflections from the closest room walls. In an average size hall, these direct reflections usually occur within the first 30 to 100 milliseconds, depending on the size of the room and the placement of the sound source within the room. Adding these early reflections to the reverberation increases the perceived reverberation time and the apparent size of the reverberant space, but adding more than small amounts tends to make the reverb sound unnatural.



The Bigverb's ER SPREAD, ER SHAPE and ER DIFFUSION controls allow you to modify the build/decay of the early portion of the reverberation envelope and the relative reverberation time of the midrange reverb frequencies. The ER SHAPE Parameter controls the shape of the early reflection envelope, and ER SPREAD sets the time over which this early reflection shape is achieved. A chart showing all 10 early reflection shapes can be found on Pg. 14.

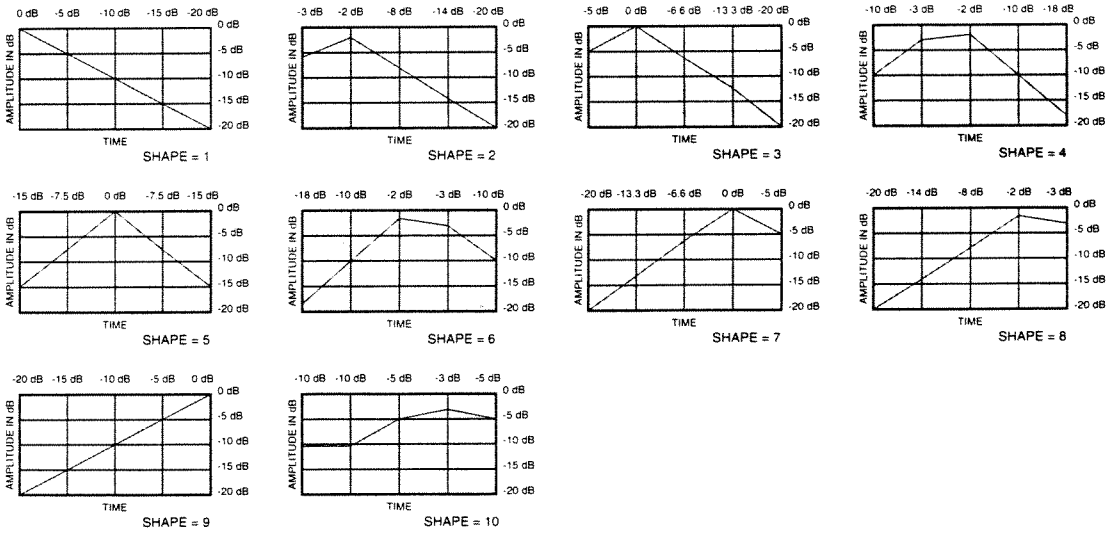
The RV SIZE control is the master control for the apparent room size. The RV RT60 Parameter varies in relation to the setting of the RV SIZE. This means that as RV SIZE is modified, the RV RT60 Parameter changes to correspond with the selected room size (the RV RT60 value is calculated automatically). The RV SIZE Parameter, on the other hand, **does not** vary when RV RT60 is modified.

These few controls, in conjunction with the RV DIFFUSION, RV HI-FREQ DECAY, and RV HI-FREQ ROLLOFF controls, give your simulated environment its reflectivity characteristics, and can be used to simulate the presence of nearly any type of large-area reflective surface in a reverberant space, such as wood, carpet, glass, metal, etc.

Reverb parameters and their functions are as follows:

Reverb On / Off .....Turns the Module on or off.
ER Predelay .....Controls the length of time before the early reflections are heard. Ranges in milliseconds from 0 to 100.
ER Spread.....Controls the length of time over which the early reflections occur. Low settings yield a dense, smooth cluster of early reflections while higher settings spread the same number of reflections out over a longer period of time. Ranges from 25 to 300 milliseconds.
ER Shape.....Controls the shape of the early reflection envelope. There are 10 different early reflection envelope shapes. See diagram.

The following diagram shows all the available early reflection envelope shapes. The numbers across the top of each envelope shape graph represent the relative level of the signal at each point in the envelope.



ER Diffusion .....Controls the smoothness of the early reflections. Ranges from 1 to 10.
ER Level .....Master level control for early reflections. Ranges from 0 - 100.
RV Predelay .....Controls the amount of time before the first room reverberations are heard. In an actual acoustic space, the amount of reverberation predelay depends largely on the shape and size of the room and the placement of both listener and sound source within the room. Long RV PREDELAY settings place the reverberation after the program material rather than in sync with it. Ranges in milliseconds from 0 to 100.
RV Spread.....Controls the dispersal and density of reverberations through the course of the early portions of RV RTMID and RV RTBASS. Varies in 20 ms increments from 20-180 ms.
RV Diffusion .....RV DIFFUSION controls the smoothness of the reverberation. In a real room, reverberation is naturally diffused by air. However, diffusion can also be affected by temperature, humidity, and the presence of absorptive or diffusive materials in the reverberant space. Ranges from 1 to 10.
RV Hi-Freq Decay .....Controls the decay length (damping) of the high frequency reverberations. Variable from 25Hz to 18 kHz
RV Hi-FrqRolloff.....This is a low-pass filter that sets the rolloff frequency of the reverberations. This is a band-limiting control, and the frequencies above the setting of this Parameter will be rolled off rapidly. Variable from 25Hz to 18 kHz.

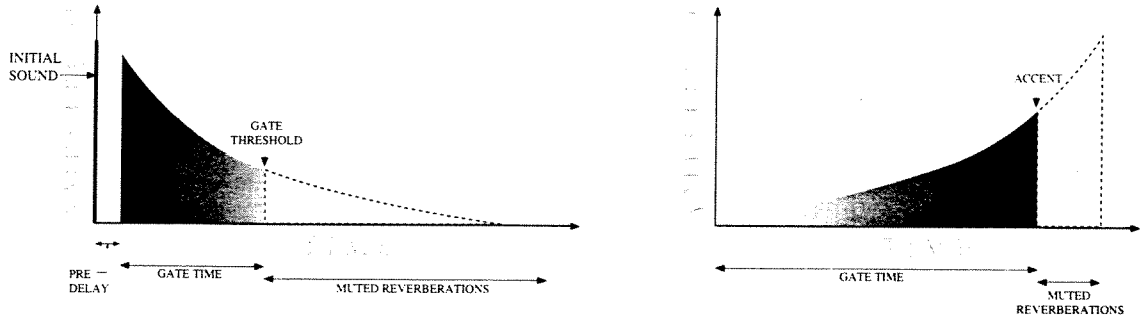
RV Size .....Sets the apparent size of the reverberant space. As the setting of RV SIZE is increased or decreased, the setting of RV RT60 changes to correspond with the new room size setting. However, changing the setting of RV RT60 **does not** affect the setting of RV SIZE. Range from 1 to 10.

RV RT60.....Controls the length (RT60) of the reverb **after the signal has stopped**. Remember that after the reverberations have decayed 15 dB in the presence of continuous program material, they are no longer audible to the listener. Ranges in seconds from 0.30 to 10.00.

RV Level .....Sets the level of the reverberations. Varies from 0 to 100.

Gated Reverbs - A gated reverb is simply a reverb followed by a gate, and in the TSR-12, this combination is included in a single Module. Gates usually include adjustable thresholds to set the point at which the reverberations will be gated (cut off). In the left-hand diagram at the top of the next page, you can see that reverberations occurring at a level below the gate threshold cutoff point are muted. This causes the reverb to decay for a specific amount of time (determined by the gate time) following which it is cut off abruptly.

Gated reverbs are most commonly used on percussion, but there are other ways to employ the unique sound they produce. For instance, using a REVERSE envelope shape, a reverse gate can be accomplished. Rather than decaying out to be cut off by the gate, a reverse gate builds for a specific amount of time, and is cut off by the gate. Reverse envelopes are similar in sound to playing a record backwards. The diagram on the right shows how it works.



The accent point shown in the diagram allows placement of the actual sound, either before or after the gate has cut off the reverberation.

The TSR-12 offers three different envelope shapes in the gated reverb Modules: DECAYING, FLAT, and REVERSE. DECAYING is a standard gated reverb envelope, with a linear decay to the cutoff point. In most applications, the DECAYING envelope doesn't need an accent point, although it can produce some interesting unnatural sounds. In instances where an accent point is not needed, simply turn down the left and right REVERB ACCENT DLY parameters.

Using a FLAT envelope shape, the reverberation neither decays nor builds, but remains at a constant level for a specified amount of time (determined by the setting of RVB DECAY TIME). This shape is particularly useful for short, percussive sounds.

REVERSE allows creation of dramatic reverse gate reverb effects, with placement of the accent point ±50 milliseconds either before or after the end of RVB DECAY TIME. Gated reverbs can be found in the <REVERB> library, and their parameters are as follows:

Gated Reverb On / Off .....Turns the Module on or off.

Reverb Pre-Delay .....Sets the amount of time before the reverberations are heard. Adjustable from 0 to 100 milliseconds.

Rvb Decay Time .....Controls the amount of time before the gate cuts off the reverberations. Variable from 20 to 1000 milliseconds.

Rvb Envelope.....Sets the shape of the reverberation envelope (DECAYING, FLAT, or REVERSE).
Rvb Diffusion.....Controls the smoothness of the reverberations. Variable from 1 to 10.
Rvb LPF Frequncy.....Reverb low-pass filter. Sets the frequency below which reverberations will be heard. Adjustable from 25Hz to 18kHz.
Rvb Accent Delay.....Allows placement (in time) of the actual sound, ±50 milliseconds from the reverb gate point.
Rvb Accent Left.....Controls the level of the accent in the left side of the stereo soundfield. Variable from 0 to 100.
Rvb Accent Right.....Controls the level of the accent in the right side of the stereo soundfield. Variable from 0 to 100.
Rvb Level Left.....Sets the output level of reverberations heard in the left channel. Variable from 0 to 100.
Rvb Level Right.....Sets the output level of reverberations heard in the right channel. Variable from 0 to 100.

Delays

Module Name	Module Abbrv.	Description
Mono Delay x.x	Dly	1-tap digital delay
2Tap Delay x.x	2TDly	2-tap digital delay
4Tap Delay x.x	4TDly	4-tap digital delay
Modulated Delay	ModDly	Digital delay with pitch modulation

All the delays in this group have the same basic Parameters for controlling the behavior of the Module. General Parameters include DELAY ON/OFF, DELAY LEVEL, DELAY TIME, DELAY FEEDBACK, AND DELAY REPEAT HOLD. The only differences between them lie in the number of taps available and the total amount of delay time. The multi-tap delays also include independent delay time controls for each tap with a feedback control on the last tap in the series.

Each delay Module has a number that immediately follows the name. These numbers represent, in seconds, the amount of delay time available to each Module. For example, if the Module name shown in the display reads MONO DELAY 1.4S, you know that the Module has a maximum of 1.4 seconds of delay time available.

The available delay time ranges are 0.4 seconds (400 milliseconds), .8 seconds (800 milliseconds), and 1.4 seconds (1400 milliseconds). Delay Parameters are as follows:

Delay On / Off.....Turns the delay Module either on or off. When Modules are turned off, their Parameters disappear from the Parameter menu. To see the Parameters, you must turn the Module on.
Delay Level .....Controls the level of the delay Module. Variable from 1 to 100.

Delay Time (Tap =) .....Controls the delay time of the tap indicated in the display. If no tap number is shown, this Parameter controls the delay time of the Module. DELAY TIME Parameters are editable in two different ranges to give the most flexibility and accuracy in the least amount of scrolling time. If you press the Parameter <UP> key when the cursor is in the *hundred milliseconds* position (one place to the right of the decimal), you will increase the delay time in increments of 100 milliseconds. Pressing the Parameter <RIGHT> key moves the cursor to the *third* position to the right of the decimal point, or *milliseconds* position. Each press of the Parameter <UP> button from this position increases the delay time in single millisecond steps. Using this method of ranging allows you to scroll rapidly to large-value delay times without having to wait for the unit to scroll to it in single millisecond steps. Variable from 0.000 sec. to 1.400 sec.

Delay Feedback (Tap =)....Controls the amount of feedback, or number of repeats, in the delay line. In multi-tap delays, this Parameter controls the feedback amount of the last tap in the series. Variable from 0 (Off) to 99%.

Delay Repeat Hold.....This is the infinite repeat Parameter. When turned on, the delay taps will repeat indefinitely until the Repeat Hold Parameter is disengaged. This Parameter is either ON or OFF.

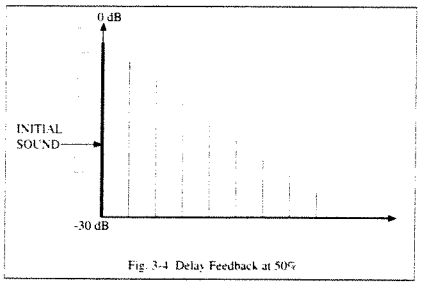


Fig. 3-4 Delay Feedback at 50%

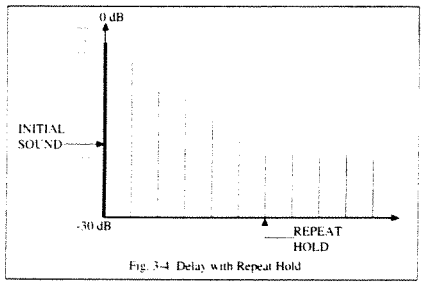


Fig. 3-4 Delay with Repeat Hold

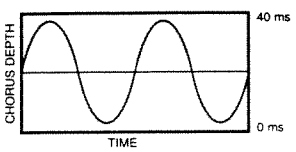
Choruses

Module Name	Module Abbrv.	Description
Mono Chorus	Cho	1-in / 1-out chorus
Dual Chorus	DCho	Chorus with 2 independent delay times (phases)
4 Phase Chorus	4PCho	Chorus with 4 independent delay times (phases)

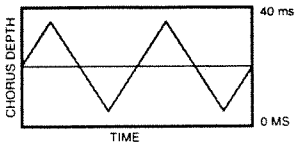
The TSR-12 offers a diverse selection of choruses, each unique in character and sound. The dual chorus and 4-phase chorus Modules offer exceptionally rich chorusing using multiple voices with different phasing characteristics. The dual chorus Modules use two choruses set 180 degrees out of phase, while the 4-phase chorus Modules include continuously variable independent phase (CHORUS DELAY) Parameters. Chorus Parameters are as follows:

Chorus On / Off .....Turns the Module either on or off.
Chorus Level .....Controls the overall level of the chorus. Variable from 0 to 100.
Chorus Speed .....Controls the speed of the chorus sweep. Variable from 00.06 to 16.00 Hz.
Chorus Depth.....This Parameter sets the sweep depth (intensity) of the chorus. Variable from 0.00 to 40.00 milliseconds.
Chorus Delay.....Sets the amount of delay present in the chorus effect. Varies from 0 to 60 milliseconds.

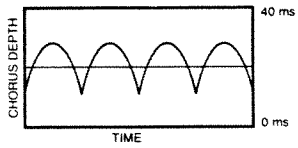
Chorus Waveform.....Controls the LFO waveform pattern of the chorus effect. SINE produces a smooth sine wave-type chorus with even transitions in and out of the turn-around points. TRIANGLE is a linear chorus effect, and ramps the pitch of the wave up and down with no slowing at turnaround points. LOGARITHMIC and EXPONENTIAL waveforms are more dramatic in their effect on the signal.



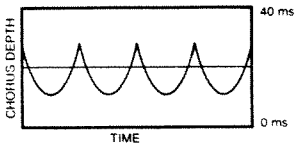
CHORUS WAVEFORM: SINE



CHORUS WAVEFORM: TRIANGLE



CHORUS WAVEFORM: LOGARITHMIC



CHORUS WAVEFORM: EXPONENTIAL

Pitch Shifters

Module Name	Module Abbrv.	Description
Pitch Shift	Pch	1-voice pitch shifter
Dual Pitch	DPch	Dual-voice pitch shifter
Dual Detune	DDtn	Mono dual detuner
Arpeggiator	Arp	Mono single arpeggiator

The <PITCH> group includes dual-voice pitch shifting, detuning, and arpeggiation. Detuning is similar in sound to a chorus, except that its pitch remains constant, rather that modulating back and forth between two points. Detuning is best visualized in terms of two guitar strings tuned to the same approximate pitch; both are tuned to the same note, but each is slightly out of tune with the other. Both notes are constant in pitch, but subtle additions in richness and overtones can be heard.

An arpeggiator is simply a pitch shifter in the feedback loop of a delay. Each time a note is fed back to the input of the pitch shifter, it is once again pitch shifted and sent to the delay, which, in turn, sends part of the signal to the output and the rest back into the pitch shifter to repeat the process. With high feedback settings and short delay times, the sound is reminiscent of early analog synthesizer. Parameters are as follows:

Pitch Shifters

Pitch On / Off.....Turns the Module on or off. When Modules are turned off, their Parameters disappear from the Parameter menu. To see the Parameters, you must turn the Module on.

Pitch Level .....Controls the overall level of the pitch shift. Variable from 0 to 100.

Pitch Shft Amount .....Sets the interval between the original note and the pitch shifted note. Variable from -24 to +24 (4 octaves).

Pitch Detune .....Determines the amount of detuning applied to the shifted note. Variable, in cents, from -100 to +100.

Pitch Tracking .....Controls the sound quality/tracking speed of the pitch shifted material. This control should be set in an inverse relationship to the amount of pitch shifting being performed. That is, as the pitch shift interval increases, PITCH TRACKING should be decreased to optimize sound quality.

Pitch Regenerate.....Controls the amount of pitch shifted material that is fed back to the input of the pitch shifter. High regeneration settings produce interesting unnatural sounds. Varies from -99% to +99%.

Detuners

Detune On / Off.....Turns the Module on or off. When Modules are turned off, their Parameters disappear from the Parameter menu. To see the Parameters, you must turn the Module on.

Detune Predelay.....Sets the amount of time, up to 100 ms, before the detuned note is heard.

Detune Amount.....Controls the amount of detuning. Variable, in cents, from -99 to +99.

Arpeggiators

Arpeggiator On / Off.....Turns the Module on or off.

Arpeggiator Level .....Controls the overall level of the arpeggiator. Variable from 0 to 100.

Arpeggio Shift.....Sets the interval between the original note and the shifted note. Variable from -24 to +24 (4 octaves).

Arpeggio Detune.....Determines the amount of detuning applied to the shifted note. Variable, in cents, from -99 to +99.

Arpeggio Speed.....Controls the sound quality/tracking speed of the pitch shifted material. This control should be set in an inverse relationship to the amount of pitch shifting being performed. That is, as the pitch shift interval increases, ARPEGGIO SPEED should be decreased to optimize sound quality.

Arpeggio Feedback.....Sets the amount of pitch shifted material that is fed back into the input of the arpeggiator. High settings of ARPEGGIO FEEDBACK produce interesting unnatural sounds.

Samplers

Module Name	Module Abbrv.	Description
Sampler 1.5 Sec	Smpl	1.5 second mono sampler Module.

The TSR-12 offers a studio-grade sampler Module for maximum flexibility and usefulness. It uses a 40 kHz sample rate for the best possible sound quality. Sample recording and playback can be triggered from an external switching device (such as the DigiTech FS300) or via MIDI (through continuous controller linkages). Sample recording can also be triggered upon detection of a sound source. Parameters of sampler Modules are as follows:

Sampler On / Off.....Turns the Module on or off.

Smpl Plybck Levl .....Determines the overall level of the sample when played back. Varies from 0 to 100.

Smpl Looping.....This Parameter has two settings: MANUAL and AUTO. When this Parameter is set to MANUAL, the following occurs: the sample must be triggered either manually or using an audio trigger. When the sample is finished playing, it resets and waits for another manual trigger. When this Parameter is set to AUTO, the following occurs: when the Parameter is switched to AUTO, the sample begins playing. When the sample is finished playing, it is automatically retriggered from the beginning of the sample, and continues retriggering until this Parameter is switched back to MANUAL.

Smpl Record/Play.....Sets the mode of operation for the sampler Module. When set to RECORD, the sampler will record a new sample into memory when triggered. When set to PLAYBACK, the sample in memory will be played back when triggered.

Manual Trigger .....This Parameter allows manual playback triggering of the sample in memory. To trigger the sample, simply press the Parameter <UP> key on this screen.

Smpl Triggr Mode.....Determines whether audio triggering or manual triggering is active. There are two audio triggering options and one manual triggering option. They behave as follows: when set to MANUAL TRIG, samples and sampling are triggered using manual methods (footswitch, front panel, etc.). When set to AUDIO TRG ONCE, the sample is triggered once using an audio source of a set level (determined by the setting of INPUT TRIG LEVEL), following which this Parameter is automatically reset to MANUAL. When set to AUDIO RE-TRIG, the sample is retriggered any time a signal over the level setting of INPUT TRIG LEVEL is detected.

Smpl Triggr Levl.....Sets the level at which the audio signal will trigger the sample. Variable from 0 to 100.

Smpl Direct Levl.....Sets the level of the dry (non-effected) sound. Variable from 1 to 100.

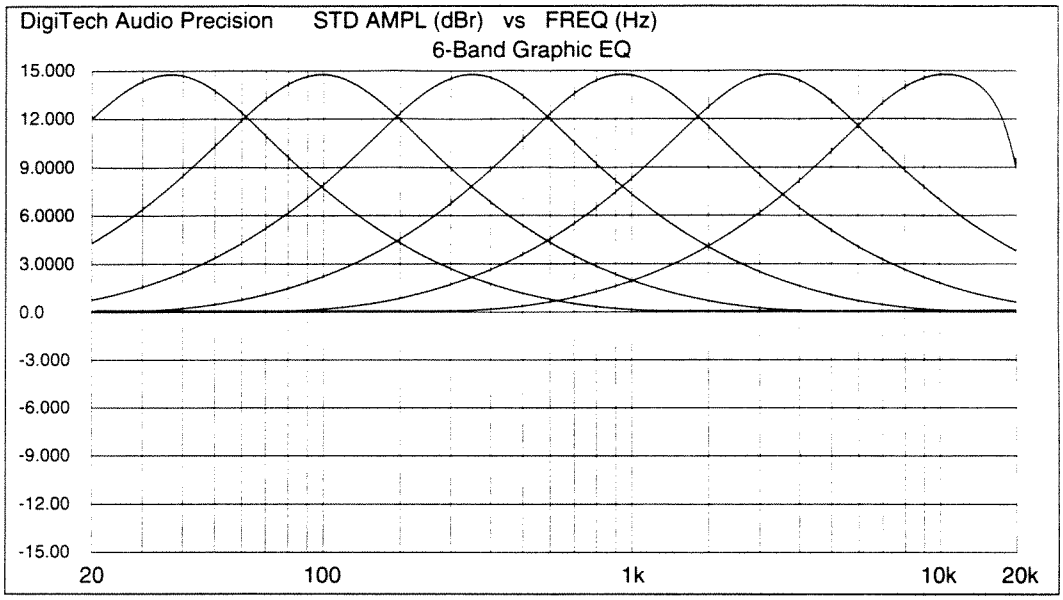
Smpl Start Point.....Determines the point at which the sample will begin playing. This Parameter can be used to eliminate unwanted sounds at the beginning of the sample, such as breath noise, empty space (silence), fret noise, amplifier buzz, wrong notes, etc. Each time this Parameter is changed, the sample is retriggered. This allows easy editing of start sample points. This control can be set at any point in the sample below the setting of SAMPLE END. Like the DELAY TIME Parameter in delay Modules, this Parameter is controlled in two ranges. Refer to the section in the owner's manual on controlling the delay time of a delay Module for explanation of the ranges.

Smpl Stop Point.....Determines the point at which the sample stops playing. This Parameter can be used to eliminate unwanted sounds from the end of the sample. This Parameter can be set at any point in the sample above the setting of SAMPLE START. Like the DELAY TIME Parameter of delay Modules, this Parameter is controlled in two ranges. Refer to the section in the owner's manual on controlling the delay time of a delay Module for explanation of the ranges.

Equalizers

Module Name	Module Abbrv.	Description
15 Band GEQ	GEQ15	Full bandwidth 15-band graphic equalizer
1Bnd ParamtrcEQ	PEQ1	1-band parametric equalizer
3Bnd ParamtrcEQ	PEQ3	3-band parametric equalizer
5Bnd ParamtrcEQ	PEQ5	5-band parametric equalizer with shelving high and low

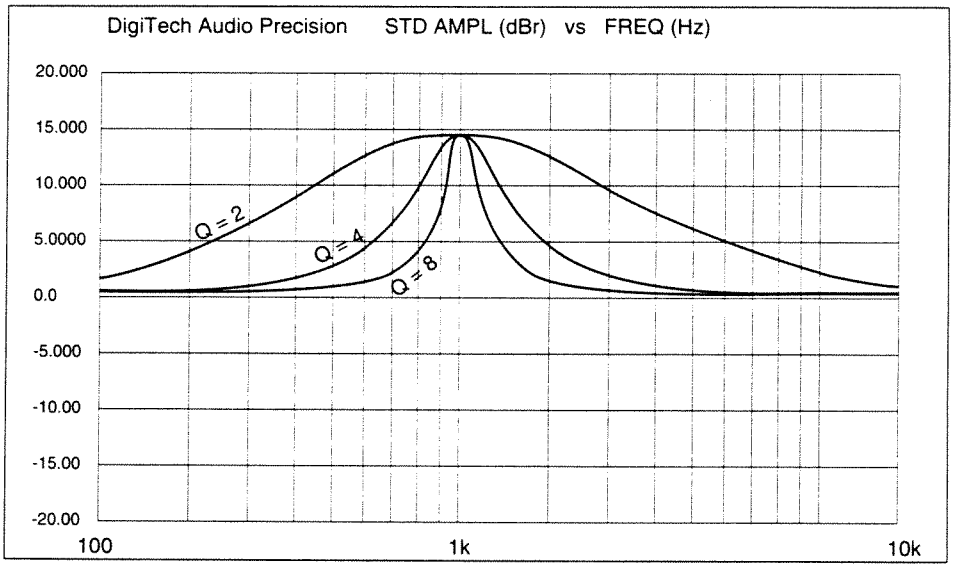
The equalizer Modules provided in the TSR-12 offer superb noise performance, and allow accurate tonal shaping of many different types of sound sources. There is a 10-band and a 15-band graphic EQ and 3 parametric EQs in 1-band, 3-band, and 5-band configurations, each with adjustable Q (see discussion of Q on next page). The 5-band parametric has shelving-type high- and low-frequency controls, each with selectable frequency. All equalizer Modules offer silent, hyper-accurate (double-precision) tonal shaping.



Adjustable Q equalizers offer the ability to control the bandwidth of the boost/cut ranges. High Q settings yield extremely narrow bandwidth, where boost and cut have minimal effect on adjacent frequencies of the program material. Low Q settings affect a wider number of frequencies when the selected band is boosted or cut. Q values are defined as: center frequency divided by the bandwidth, where bandwidth = [high frequency @ -3dB] - [low frequency @ -3dB]. In equation form, the formula would look like this:

$$Q = \frac{\text{CENTER FREQUENCY}}{[Fh\ @\ -3dB] - [Fl\ @\ -3dB]}$$

To calculate Q, you must first find the places where the response curve crosses the -3 dB points on both the high and low frequencies. For this example, let's use 1 kHz as the center frequency. As you can see in the diagram below (upper curve), the low-frequency crossing is at about 780 Hz, while the high-frequency crossing is at about 1280 Hz.



If we plug these values into the formula, it breaks down as follows:

$$\frac{1000}{[1280] - [780]} = \frac{1000}{500} = 2$$

Thus, Q = 2. With this setting, you can see that a large number of frequencies are affected by boosting the center frequency. Now take a look at the middle and lower curves in the diagram, and notice the much narrower bandwidth of the curves with a Q setting of 4 and 8 (the -3 dB points for a Q of 4 would be 882 Hz and 1132 Hz).

Mod (Modulation Effects)

Module Name	Module Abbrv.	Description
Mono Tremolo	Trm	Automatic volume modulation
Auto Panner	Pan	Automatic stereo panning modulation
Dual Flange	DFla	Flanger w/2 independent delay times
Dual Phaser	DPha	Phaser w/2 independent delay times (phases)

Tremolo was one of the first real "effects", and appeared mostly on early guitar amplifiers. Because of this, tremolo is sometimes perceived as sounding old or outdated. The TSR-12, however, breathes new life into this classic effect, providing totally transparent volume modulation of sound sources. An auto panner is a modern relative of the tremolo that, instead of modulating the volume of the entire sound, modulates the sound from left to right at a given rate. Both tremolo and auto panner Modules can be found in the <MOD> library. Parameters are as follows:

Tremolos

Tremolo On / Off .....Turns the Module on or off. When Modules are turned off, their Parameters disappear from the Parameter menu. To see the Parameters, you must turn the Module on.
Tremolo Level.....Controls the output level of the tremolo effect.
Tremolo Speed.....Controls the tremolo speed (speed of modulation). Variable from 0.00 to 16.00 Hz.
Tremolo Depth .....Adjusts the intensity of the tremolo effect. Varies from 0 to 100.

Auto Panners

Auto Panner On / Off.....Turns the Module on or off.
Panner Level .....Controls the output level of the panning effect.
Panner Speed .....Controls the panning speed (speed of modulation). Variable from 0.00 to 16.00 Hz.
Panner Depth.....Adjusts the intensity of the panning effect. Varies from 0 to 100.

Flangers

The TSR-12 also offers studio-quiet flanging. The dual flange Module offers exceptionally rich flanging using multiple voices with different phasing characteristics. The dual flange Module uses two flangers set 180 degrees out of phase. Flange Parameters are as follows:

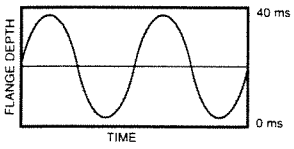
Flange On / Off .....Turns the Module either on or off. When Modules are turned off, their Parameters disappear from the Parameter menu. To see the Parameters, you must turn the Module on.
Flange Level .....Controls the overall level of the flange. Variable from 0 to 100.
Flange Delay .....Sets the amount of delay present in the flange effect. Varies from 0 to 60 milliseconds.

Flange Feedback.....Controls the amount of flanged sound fed back to the input of the Module. High regeneration settings produce dramatic and interesting unnatural sounds. Varies from -99% to +99%. This Parameter can also be turned off.

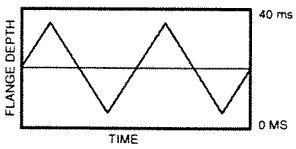
Flange Speed.....Controls the speed of the flange sweep. Variable from 00.00 to 16.00 Hz.

Flange Depth.....This Parameter sets the sweep depth (intensity) of the flange. Variable from 0.00 to 40.00 milliseconds.

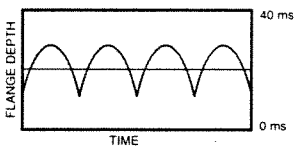
Flange Waveform.....Controls the LFO waveform pattern of the flange effect. SINE produces a smooth sine wave-type flange with even transitions in and out of the turn-around points. TRIANGLE is a linear flange effect, and ramps the pitch of the wave up and down with no slowing at turnaround points. Flangers usually sound best using LOGARITHMIC or EXPONENTIAL waveforms, but don't be afraid to experiment.



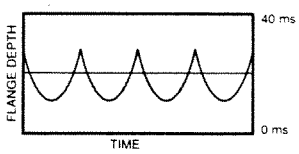
FLANGE WAVEFORM: SINE



FLANGE WAVEFORM: TRIANGLE



FLANGE WAVEFORM: LOGARITHMIC



FLANGE WAVEFORM: EXPONENTIAL

Phasers

Effect On / Off.....Turns the Module either on or off. When Modules are turned off, their Parameters disappear from the Parameter menu. To see the Parameters, you must turn the Module on.

Phaser Level.....Controls the overall level of the phaser. Variable from 0 to 100.

Phaser Regenertn.....Controls the amount of phased sound fed back to the input of the Module. High regeneration settings produce dramatic and interesting unnatural sounds. Varies from -99% to +99%. This Parameter can also be turned off.

Phaser Speed.....Controls the speed of the phase sweep. Variable from 00.00 to 16.00 Hz.

Phaser Depth.....This Parameter sets the sweep depth (intensity) of the phaser. Variable from 0 to 100.

Phaser Waveform.....Controls the LFO waveform pattern of the phasing effect. SINE produces a smooth sine wave-type phasing with even transitions in and out of the turn-around points. TRINGL is a linear phasing effect, and ramps the pitch of the wave up and down with no slowing at turnaround points. Logarithmic and exponential waveforms offer a more intense sound characteristic unique to the TSR-12. See FLANGE WAVEFORM.

Mixers (mono)		***Mixers (stereo)***		***Mixers (3-out)***	
Module Abbrv.	***Description***	***Module Abbrv.***	***Description***	***Module Abbrv.***	***Description***
2x1	*2-in / 1-out mixer*	*4x2*	*4-in / 2-out mixer*	*3x3*	*3-in / 3-out mixer*
3x1	*3-in / 1-out mixer*	*5x2*	*5 in / 2-out mixer*	*4x3*	*4-in / 3-out mixer*
5x1	*5-in / 1-out mixer*	*6x2*	*6-in / 2-out mixer*	*5x3*	*5 in / 3-out mixer*
		7x2	*7-in / 2-out mixer*		
		10x2	*10-in / 2-out mixer*		

The TSR-12's Mixer modules are used to set up effects in parallel configurations. They allow multiple Module outputs to be connected to a single input of another Module. Each mixer channel is equipped with an input level to give you maximum control over levels coming and going to and from different Modules.

Mixer Modules appear in 1-out, 2-out, and 3-out configurations. 2-out and 3-out configurations include pan controls on the inputs.

NOTE: The third output on all 3-out mixers is a mono summed version of outputs 1 and 2.

More

Module Name	Module Name	Description
Noise Gate	NGt	Mono noise gate
Stereo Noise Gate	SNGt	Stereo noise gate
Stereo Ducker	SDuc	Stereo input / output automatic ducker
Phase Inverter	Inv	Inverts signal phase

The <MORE> library contains other Module types that cannot be classified by the names of any of the other libraries. The Modules resident under <MORE> are:

Noise Gates

NGt On / Off — Turns the Module on or off.

NGt Threshold ..... Sets the level at which the gate will open. As this Parameter is modified, the off-threshold setting changes (according to the setting of NGT HYSTERESIS) to maintain the same relative distance (in dB) between the on-threshold and the off-threshold. This requires the user to set only one parameter to control both thresholds. Ranges from -INFINITY dB to +INFINITY.

NGt Hold Time ..... Controls the amount of time the signal must remain below the off-threshold before NGT RELEASE TIME begins. This control should be set long enough to prevent false triggering during long decay times. Ranges from 0 to 500 milliseconds.

NGt Attack Time ..... Controls the how fast the gate opens after detecting a signal above NGT THRESHOLD. Large numbers yield slower attack times, while small numbers give a fast attack. Varies from 0 to 2000 milliseconds (2 seconds).

NGt Release Time ..... Controls how fast the gate closes after the signal has fallen below NGT HYSTERESIS for the amount of time set by NGT HOLD TIME. Large numbers yield slow release times, while small numbers give a fast release. Varies from 0 to 2000 milliseconds (2 seconds).

NGt Attenuation ..... Sets the amount of attenuation (noise floor reduction) when the gate is closed. Varies from 100 dB (below the level of the ungated noise floor) to 0 dB (no attenuation).

NGt Delay Time ..... Allows placement of a slight delay on the source signal after the gate is triggered. This Parameter allows source material with a very fast attack time to be heard in its entirety without the lag in gate response that is common to inferior noise gates. Variable from 0 to 10 milliseconds.

Duckers

Effect On / Off..... Turns the Module on or off. When Modules are turned off, their Parameters disappear from the Parameter menu. To see the Parameters, you must turn the Module on.

Duc Threshold ..... Sets the minimum input level required to trigger the ducker (it is perhaps easier to think of this Parameter as the ducker sensitivity). Higher settings of CONTROL THRESHOLD require higher input levels to trigger the ducker. Lower settings make the ducking effect easier to trigger. Ranges in 1 dB step from -100 to 0 dB.

Duc Hold Time ..... Controls the amount of time before the ducker disengages *after the signal has*

stopped. Varies from 0.000 to 5.000 seconds.

Duc Attenuation.....Adjusts the amount of level attenuation applied to the ducked effects when the ducker is engaged (ducker is engaged when the input level exceeds the setting of CONTROL THRESHOLD). Adjustable from -100 dB to 0 dB.

Duc Attack Rate.....Sets the amount of time over which the ducker will reach full attenuation. Adjustable in milliseconds from 0.00 to14.00 seconds.

Duc Release Rate.....Sets the amount of time over which the ducker will disengage. Adjustable in milliseconds from 0.00 to 14.00 seconds.

Phase Inverter

Phase Inverter.....Flips the signal phase 180 degrees. Settings are either IN PHASE or OUT OF PHASE.

The MIDI/Utility Menu

The MIDI/Utility section of the TSR-12 contains several functions, including MIDI setup, display contrast, the footswitch setup menu, and the factory program restore menu. These menus are reached by pressing the <MIDI/UTIL> button. The procedure is as follows:

- Press the <MIDI/UTIL> button once. The display reads 1MIDI 2FOOT CNT 3CONTRAST: 6, followed by an arrow.

This is the main Utility options menu. From this selection screen, you are able to choose the option you want using the Function keys. The arrow indicates that more options can be found by pressing the Parameter <RIGHT> or <LEFT> buttons (depending on the direction of the arrow in the display). Note that each option is preceded by an inverse (white on black) number. These numbers indicate the Function button you should press to reach each option or submenu.

Also, it is important to note that when you are several submenus below the main menu (such as in the footswitch setup menu) you can press the <MIDI/UTIL> button to take you back to the main menu one level at a time, or press the Program <UP> button to return to Performance mode.

MIDI Channel

The TSR-12's MIDI Channel Parameter allows you to select the MIDI channel on which the TSR-12 will respond to MIDI control. This option can be set to channels 1 - 16, ALL CHAN, or DISABLED. If this Parameter is set to DISABLED, the TSR-12 will not recognize incoming MIDI data.

- Press the <MIDI/UTIL> button once. The display reads 1MIDI 2FOOT CNT 3CONTRAST: 6, followed by an arrow.
- Press the <MOD 1> key (Function key 1) once. The display reads 1MIDI: CH 1 2SEND PC: OFF. Note that a cursor appears under the MIDI channel number.
- Using the Parameter <UP> / <DOWN> buttons, select the channel on which you want the TSR-12 to receive MIDI data.

Send PC (Program Change)

Send PC determines whether or not corresponding Program Changes will be sent out the TSR-12 MIDI port as you scroll through the Programs. This Parameter is either ON or OFF. The procedure is as follows:

- Press the <MIDI/UTIL> button once. The display reads 1MIDI 2FOOT CNT 3CONTRAST: 6, followed by an arrow.

- Press the <MOD 1> key (Function key 1) once. The display reads 1MIDI: CH 1 2SEND PC: OFF. Note that a cursor appears under the MIDI channel number.

- Press the <MIX 2> key (Function key 2) once. The cursor appears under OFF.

- Using the Parameter <UP> / <DOWN> keys, turn the function on or off. When you're finished, press the <MIDI/UTIL> button once, and you will be returned to the main MIDI/Utility setup menu.

Prg Send Map

Device mapping allows the TSR-12 to act as a MIDI multiplexer for up to four other devices. Here's how it works: when the TSR-12 receives a Program Change message via MIDI, each device you specify can receive independent Program Change messages on an individual MIDI channels. This feature can allow you to have up to 32 MIDI channels (16 would be downline from the TSR-12, and 16 would be upline. To set up external devices:

- Press the <MIDI/UTIL> button once. The display reads 1MIDI 2FOOT CNT 3CONTRAST: 6, followed by an arrow.

- Press the <MOD 1> key (Function key 1) once. The display reads 1MIDI: CH 1 2SEND PC: OFF.

- Press the Parameter <RIGHT> button once. The display reads: 1PRG SEND MAP 2PRG RCV MAP.
- Press the <MOD 1> key (Function key 1) once. The display reads: 1DEVICE 1 2DISABLED. Note that a cursor appears under the DEVICE number.

- Using the Parameter <UP> / <DOWN> buttons, select the device number (1-4) you want to edit.

- Press <NAME> and identify the device with a custom name according to the standard naming procedures found on pg. 11. When you're finished, press the <NAME> key again, and the display again reads DEVICE = DISABLED.

- Press the <MIX 2> key (Function key 2) to move the cursor under DISABLED.

- Using the Parameter <UP> / <DOWN> keys, select the MIDI channel you want the device to respond to (if this Parameter is set to DISABLED, the TSR-12 will not send out any Program Change messages for that device). Press the Parameter <RIGHT> button once.

- The display reads 1DEVICE (=) 2MIDI CH (=). The TSR-12 will now send MIDI data to the device on the MIDI channel you have selected.

- Press the Parameter <RIGHT> key once. The display reads: 1(DEVICE NAME) SENDS 2PRG:1 3AS:1. This screen tells you that when the TSR-12 receives MIDI Program Change number 1, the selected device will be sent Program Change number 1 on its designated MIDI channel.

- Press the <MIX 2> key (Function key 2) once. The cursor appears under PRG 1.

- Using the Parameter <UP> / <DOWN> buttons, select the TSR-12 Program number (1-256) that will send the mapped Program Change to the external device.

- Press the <MORE 3> key (Function key 3) once. The cursor now appears under AS: 1. This Parameter determines the Program Change number that the external device will receive when the appropriate Program Change number is received on the TSR-12. If this parameter is set to DISABL, The selected TSR-12 Program Change number will send nothing to the external device when the PRG assigned to that device is sent. Select the Program Change number that will be sent (1-128, DISABL) using the Parameter <UP> / <DOWN> buttons.

You may map as many devices (up to four) or incoming Program Change messages as you like. These are stored in memory automatically, and are always active until you change them or until the factory presets are restored.

Prg Rcv Map

The PRG RCV MAP function allows you to map incoming Program Changes that are within MIDI range to any Program out of MIDI Program Change number range on the TSR-12. For example, suppose you want to access Program #146 using a MIDI Program Change. Since MIDI only supports Program Change numbers 1 - 128, Program Change number 146 would normally be impossible for the TSR-12 to recognize. With the TSR-12's flexible MIDI input mapping, however, you can assign a Program Change number that MIDI *will* recognize to be received as Program #146 on the TSR-12.

To illustrate, let's assign MIDI Program Change number 26 to change the TSR-12 to Program #131.

- After entering the main MIDI setup menu, scroll <RIGHT> until the display reads 1PRG SEND MAP 2PRG RCV MAP.

- Press the <MIX 2> key (Function key 2) (PRG RCV MAP) once. The display reads 1RCV MIDI PC: 1 2AS TSR-12: 1, and the cursor appears under RCV MIDI PC: 1. This display means that MIDI Program Change number 1 is currently set to activate Program number 1 on the TSR-12.
- Using the Parameter <UP> / <DOWN> keys, set the RCV MIDI PC number to 26. Note that as you change this number, the TSR number changes with it.

- Press the <MIX 2> key (Function key 2) once. The cursor appears under AS TSR-12 26.

- Change the number to 131 using the Parameter <UP> button. When you're finished, press the <MIDI/UTIL> key to exit back to the main MIDI setup menu.

Now, when the TSR-12 receives Program Change number 26 via MIDI, Program 131 will be recalled. Any number of Program Changes (up to the MIDI maximum of 128) can be mapped to recall any number of Programs on the TSR-12.

Linking Continuous Controllers

Creating MIDI continuous controller linkages on the TSR-12 has been specially designed to be extremely fast and simple. Up to 4 CCs can be linked to any Parameter in the TSR-12.

CCs are active only when the Program to which they are linked is active. To show you how it's done, let's link Local CC #1 to a Parameter item.

To link a Parameter to local MIDI continuous controller #1, the procedure is as follows:

- From Performance mode, scroll to the Parameter you want to link to a MIDI continuous controller.

- Enter the MIDI setup menu by pressing the <MIDI/UTIL> key once. The display reads: 1MIDI: CH 1 2SEND PC: OFF.

- Using the Parameter <RIGHT> key, scroll until the display reads: 1CC ASSIGNMENTS 2DISP CCs: OFF.

- Press the <MOD 1> key (Function key 1) once. The display reads: 1LOCAL CC LINK:1 2ASSIGN. Note that a cursor appears under 1LOCAL CC LINK:1.

- Using the Parameter <UP> and <DOWN> keys, select the continuous controller you want to assign to the Parameter.

- Press the <MIX 2> key (Function key 2) once. The display reads (PARAMETER NAME) on the top line and NO LINK on the bottom line, followed by a right arrow.

- Using the Parameter <UP> and <DOWN> keys, select the MIDI continuous controller number that will control the Parameter (0-127, channel pressure, or NO LINK).

- Press the Parameter <RIGHT> key once. The display reads MINIMUM CC VALUE on the top line, followed by a number on the bottom (the number shown with this Parameter automatically defaults to the minimum Parameter value).

  NOTE: The MINIMUM CC VALUE and MAXIMUM CC VALUE Parameters allow you to limit the range of the continuous controllers in the full on and full off positions. The values you select on these two screens determine the behavior of the continuous controller. For example, if a Parameter ranges from 0-100 and MINIMUM CC VALUE is set at 40, the lowest the Parameter can be set via continuous control is 40. Likewise, if MAXIMUM CC VALUE is set at 90, the CC range would run from 40 to 90. It is also possible to set MINIMUM CC VALUE higher than MAXIMUM CC VALUE to reverse the action (polarity) of the continuous controller.

- Use the Parameter <UP>/<DOWN> buttons to set the minimum Parameter value when the CC is at minimum.
- Press the Parameter <RIGHT> key once. The display reads MAXIMUM CC VALUE on the top line, followed by a number on the bottom (the (the number shown with this Parameter automatically defaults to the maximum Parameter value).

- Press the Program <UP> key once to return to Performance mode. Note that a CC symbol appears in the upper right corner of the display. This symbol simply tells you that the Parameter is linked to a continuous controller.

At this point, you have successfully linked local CC #1 to control a Parameter. When you move your CC transmitting device, the TSR-12 sweeps smoothly between the two values you selected (MINIMUM CC VALUE, MAXIMUM CC VALUE).

> **NOTE:** In order for the TSR-12 to respond to incoming CCs, the TSR-12 MIDI channel setting must match the channel designation of the incoming messages. The TSR-12 MIDI channel can be set to any one of the 16 MIDI channels, or all channels (omni).

Display CCs

This is a simple option that allows you to see the CC values change in real time. When this Parameter is set to YES, the CC response time is slowed slightly, making it useful for troubleshooting MIDI CC problems (for quickest response time, this Parameter should be set to NO). Also, when this option is enabled, any CC activity will cause the TSR-12 to automatically jump to the Parameter screen of the value being controlled.

To display CCs, the procedure is as follows:

- After entering the MIDI setup menu, press the Parameter <RIGHT> key twice. The bottom line of the display reads: 2DISP CCs: , followed by the current setting.

- To change the setting, press the <MIX 2> key (Function key 2) until the display shows the setting you want. When you're finished, press the Program <UP> button once to return to Performance mode.

Bulk Dump

This option allows you to dump a copy of the entire contents of the TSR-12 memory out the MIDI port. This is particularly useful for backing up the memory of the TSR-12, or for copying all the Programs from one TSR-12 to another. The procedure is as follows.

- Connect the MIDI Out of the TSR-12 to the MIDI in of another TSR-12, computer, or external System Exclusive recording device.

- After entering the main MIDI menu, press the Parameter <RIGHT> key three times. The display reads: 1BULK DUMP 2PROGRAM DUMP.

- Press the <MOD 1> key (Function key 1) once. The display reads: DUMP MIDI DATA? 1YES 2NO.

- To dump a copy of the entire contents of the TSR-12 memory, press the <MOD 1> key (Function key 1). To abort the operation, press the <MIX 2> key (Function key 2).

- The display briefly reads **DUMPING MIDI**, followed by the total number of bytes being dumped. When the dump is finished, the display returns to 1BULK DUMP 2PROGRAM DUMP.

- To return to Performance mode, press the Program <UP> key.

MIDI Program Dump

This option allows you to dump an individual Program from the TSR-12 out the MIDI port to another device. This function also allows you to dump the selected Program as a Program number other than its own.

- Connect the MIDI Out of the TSR-12 to the MIDI in of another TSR-12, a computer, or an external System Exclusive recording device.

- After entering the main MIDI menu, press the Parameter <RIGHT> key three times. The display reads: 1BULK DUMP 2PROGRAM DUMP.

- Press the <MIX 2> key (Function key 2) once. The display reads: DUMP 1PRG:1 2AS:1 3START. Note that a cursor appears under 1PRG:1.

- Using the Parameter <UP> and <DOWN> buttons, select the Program number you want to dump out the MIDI port.

- Press the <MIX 2> key (Function key 2) once. Note that the cursor moves under 2AS:1.

- Using the Parameter <UP>/<DOWN> keys, select the Program number location in which you want the dumped Program to appear.

- Press the <MORE 3> key (Function key 3) to start the dump. The display briefly reads **SENDING PROGRAM ==**. To abort the operation press the Program <UP> key.

Programming the Footswitch

The TSR-12's footswitch functions are equipped with automatic polarity sensing, and are designed to be used with the optional DigiTech FS-300 footswitch. The FS-300 uses a three-conductor cable for its three switches, each of which can be assigned a separate function in the Foot Controller setup menu found under <MIDI/UTIL>. Footswitches from other manufacturers (all 1-, 2-, or 3-switch models) will also work with the TSR-12's footswitch jack.

The polarization of the footswitch occurs upon power up, so when using another manufacturer's footswitch, it is important to plug in the footswitch before powering up the TSR-12. If the switch seems to be functioning in reverse (assigned functions are occurring upon release of the switch instead of upon pressing of the switch), simply leave the footswitch plugged into the back of the TSR-12 and turn the unit off and on again.
The procedure for assigning functions to switches is as follows:

- From Performance mode, press <MIDI/UTIL> once. The display reads 1MIDI 2FOOT CNT 3CONTRAST: 6.
- Press the <MIX 2> key (Function key 2) once. The display reads PUSH FOOTSWITCH TO BE PROGRAMMED.
- Press the switch to which you want to assign a function. The display reads SWITCH (A, B, C) SELECT FUNCTION: followed by the function currently assigned to that switch. If the switch has not been assigned a function, the bottom line of the display reads NOT USED.
- Using the Parameter <UP> and <DOWN> keys, select the function you want the switch to perform. Repeat the procedure for devices with more than one switch (such as the DigiTech FS300).
- To exit and return to Performance mode, press the Program <UP> button.

It is also possible in the footswitch setup menu to set up a Program List. A Program List allows you to set up a specific sequence of program changes that you can step through one by one using a single footswitch. The Programs you select for your sequence can be in any order. To set up a Program List, the procedure is as follows:

- After entering Utility mode, Press the <MIX 2> key (Function key 2) once. The display reads PUSH FOOTSWITCH TO BE PROGRAMMED.
- Press the switch to which you want to assign the Program List. The display reads SWITCH (A, B, C) SELECT FUNCTION: followed by the function currently assigned to that switch. If the switch has not been assigned a function, the bottom line of the display reads NOT USED.
- Using the Parameter <UP> and <DOWN> keys, select PROGRAM LIST UP. The arrow to the right of PROGRAM LIST UP means that there is more information in the direction the arrow is pointing.
- Press the Parameter <RIGHT> key. The display reads PROGRAM SEQUENCE STEP 1 = PRG 1. The cursor appears under STEP 1. This Parameter indicates that the first step in the sequence is Program 1.
- Press the Parameter <RIGHT> key. The cursor now appears under PRG 1.
- Using the Parameter <UP> / <DOWN> key, select the Program number you want for the first step in the sequence.
- Press the Parameter <LEFT> key. The cursor appears under STEP 1 again.
- Press the Parameter <UP> button. The bottom line of the display reads STEP 2 = PGM 2.

- Press the Parameter <RIGHT> key. The cursor now appears under PRG 2.

- Using the Parameter <UP> / <DOWN> key, select the Program number that you want for the second step in the sequence.

- Continue in this manner until you have given all the desired Programs a Step number. At the end of the sequence (the Step that follows the last Step in your sequence), use the Parameter <UP> / <DOWN> keys to set the PRG number to END. This step signals the TSR-12 that the end of the sequence has been reached. If the footswitch is pressed again, the sequence will restart from step 1.

- Press the Program <UP> key to return to Performance mode.

Each time the switch is pressed, the next Program in the Program List will be recalled. When you reach the end of the Program List, press the switch again to restart the sequence.

Adjusting the LCD Contrast

The LCD CONTRAST adjustment control is used to adjust the angle at which the display can be read most clearly. To change the LCD contrast, the procedure is as follows:

- From Performance mode, press <MIDI/UTIL> once. The display reads: 1MIDI 2FOOT CNT 3CONTRAST: 6. Note that a cursor appears under the CONTRAST value (the value indicates the current setting of the LCD contrast).

- Adjust the contrast using the Parameter <UP> and <DOWN> keys until the display is easily readable.

- To exit and return to Performance mode, press Program <UP>.

Output Mode

The output option selects whether the outputs of the TSR-12 are summed to mono or not. For best results in mono applications, this Parameter should be set to MONO. If stereo output is desired, set it to STEREO (the factory default setting of this Parameter is STEREO).

To change the output mode of the TSR-12, the procedure is as follows:

- From Performance mode, press <MIDI/UTIL> once. The display reads: 1MIDI 2FOOT CNT 3CONTRAST: 6.

- Press the Parameter <RIGHT> button once. The display reads: 1OUTPUT: STEREO 2SALES: OFF. Note that a cursor appears under STEREO.

- Press the <MOD 1> key (Function key 1) until the top line of the display show the desired output mode.

- Press the Program <UP> key to return to Performance mode.

Sales Banner

Determines whether or not the TSR-12 will show the sales banner when first powered up. This function can be turned on or off. If it is turned on when you power up, simply press any key on the front panel to exit. The procedure for turning the sales banner on or off is as follows:

- From Performance mode, press <MIDI/UTIL> once. The display reads: 1MIDI 2FOOT CNT 3CONTRAST: 6.

- Press the Parameter <RIGHT> button once. The display reads: 1OUTPUT: STEREO 2SALES: OFF. Note that a cursor appears under STEREO.

- Press the <MIX 2> key (Function key 2) to turn the sales banner on or off.

- When you are finished, press the Program <UP> key to exit to Performance mode.

Restoring Factory Programs

This option allows you to restore the contents of the TSR-12's memory to the original factory condition.

WARNING: Performing this function will destroy all user-programmed data, and all such data will be lost forever!

To restore the factory Programs, the procedure is as follows:

- From Performance mode, press <MIDI/UTIL> once. The display reads: 1MIDI 2FOOT CNT 3CONTRAST: 6.

- Press the Parameter <RIGHT> button twice. The display reads: 1REINITIALIZE.

- Press the <MOD 1> key (Function key 1). The display reads: RESTORE FACTORY PROGRAMS? 1YES 2NO.

- Press the <MOD 1> key (Function key 1). The display briefly reads: THIS WILL ERASE USER PROGRAMS, followed by ARE YOU SURE? 1YES 2CANCEL.

- This is your last chance to change your mind. To abort the operation, press the <MIX 2> key (Function key 2). To restore all Programs to original factory condition, press the <MOD 1> key (Function key 1). The display briefly reads: RESETTING. PLEASE WAIT....., after which you will be returned to Performance mode.

Factory Program List

On the following page is a list of all the Factory Programs in the TSR-12.

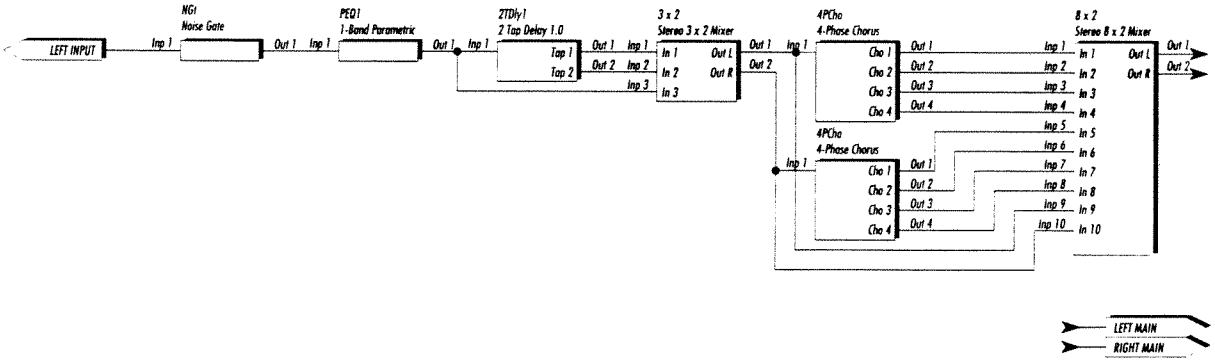
Prog #	Preset Name	Alg #	Prog #	Preset Name	Alg #	Prog #	Preset Name	Alg #
1	Big & Bright Rev	10	54	Plate-Medium	9	107	Pitch-5th Below	4
2	DoubleThikChorus	2	55	Plate-Small	9	108	Pitch-4th Above	4
3	Phaser in Space	14	56	Thin Plate-Large	10	109	Pitch-4th Below	4
4	Dream Flange	7	57	Thin Plate-Med	10	110	Delay-1Tap 300ms	4
5	Auto Swell Pad	4	58	Thin Plate-Small	10	111	Delay-2tap 300ms	4
6	Octavier	26	59	VoicePlate-Large	10	112	Delay-4tap 300ms	4
7	Random Pan Dlys	16	60	VoicePlate-Med	10	113	ModDelay-Medium	31
8	Wet Dual Detune	12	61	VoicePlate-Small	10	114	ModDelay-Deep	31
9	Sparkle 5ths	21	62	SnarePlate-Large	9	115	Tremolo-Medium	31
10	LA Guitar FX	18	63	SnarePlate-Med	9	116	Tremolo-Fast	31
11	Big & Warm Rev	9	64	SnarePlate-Small	9	117	AutoPan-Medium	16
12	4Chor & DuckDlys	30	65	StudioRoom-Large	10	118	AutoPan-Fast	16
13	Country TremPhas	20	66	StudioRoom-Med	10	119	Leslie-Slow	25
14	Leslie for Organ	20	67	StudioRoom-Small	10	120	Leslie-Fast	25
15	Arpeggiorama	3	68	WoodRoom-Large	10	121	Arpeggiate-Up	3
16	Wide Dly/Flanger	19	69	WoodRoom-Medium	10	122	Arpeggiate-Down	3
17	SpringVerb	10	70	WoodRoom-Small	10	123	Delayed Chorus	5
18	Wet Dual Chorus	11	71	Club-Large	10	124	Delayed Detune	6
19	Wide Detuning	23	72	Club-Medium	10	125	Delayed Flanger	7
20	Reverb Duck	29	73	Club-Small	10	126	Delayed Phaser	8
21	1.5 sec Sampler	28	74	SoundStage-Large	27	127	Muted	1
22	SlapBack Chorus	17	75	SoundStage-Med	27	128	Bypass (No FX)	1
23	TreMellow	31	76	SoundStage-Small	27			
24	Delays in a Pan	32	77	Garage-Large	10			
25	Utopia	16	78	Garage-Medium	10			
26	Chorus TapAround	22	79	Garage-Small	10			
27	Super Chor/Dly	2	80	Arena-Large	10			
28	Moving Chorus	16	81	Arena-Medium	10			
29	Bright Chorus	11	82	Arena-Small	10			
30	2 Oct Down	32	83	GatedRev-Long	27			
31	Panning Phaser	25	84	GatedRev-Short	27			
32	Flange in a Room	13	85	Chorus-2v Medium	5			
33	Dly w/ Room Duck	29	86	Chorus-2v Deep	5			
34	Ducked Delay	30	87	Chorus-4v Medium	30			
35	Doppler	3	88	Chorus-4v Deep	30			
36	Panning Fanger	24	89	Chorus-8v Medium	2			
37	Analog Delay	31	90	Chorus-8v Deep	2			
38	Ping-Pong Room	18	92	Flange-1v Medium	7			
39	Reverse GatedRev	27	92	Flange-1v Deep	7			
40	Reverse L/R	27	93	Flange-2v Medium	7			
41	Real GatedReverb	15	94	Flange-2v Deep	7			
42	Building Verb	15	95	Phaser-1v Deep	8			
43	Dark and Cloudy	10	96	Phaser-1v Deep	8			
44	Hall-Large	10	97	Phaser-2v Medium	8			
45	Hall-Medium	10	98	Phaser-2v Deep	8			
46	Hall-Small	10	99	Detune-1v Medium	6			
47	Church-Large	10	100	Detune-1v Deep	6			
48	Church-Medium	10	101	Detune-2v Medium	6			
49	Church-Small	10	102	Detune-2v Deep	6			
50	Chamber-Large	10	103	Pitch-OctaveUp	4			
51	Chamber-Medium	10	104	Pitch-OctaveDown	4			
52	Chamber-Small	10	105	Pitch-OctUp+Down	4			
53	Plate-Large	9	106	Pitch-5th Above	4			

Factory Algorithm Diagrams

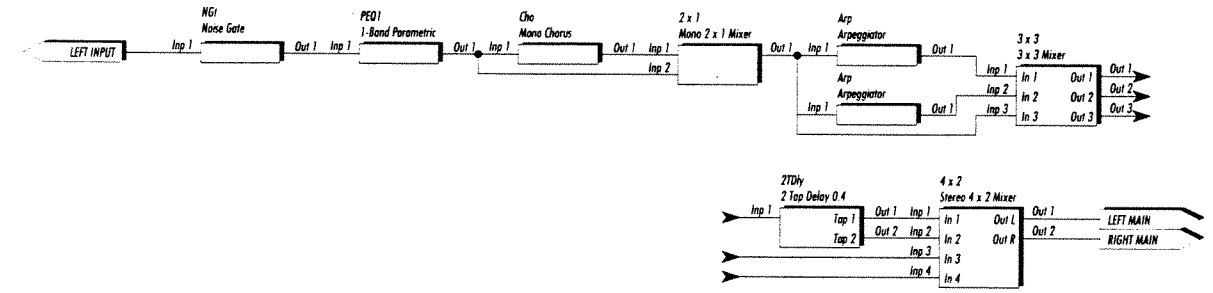
Following are routing diagrams for all the TSR-12 Algorithms.

Algorithm #1
Dry Path

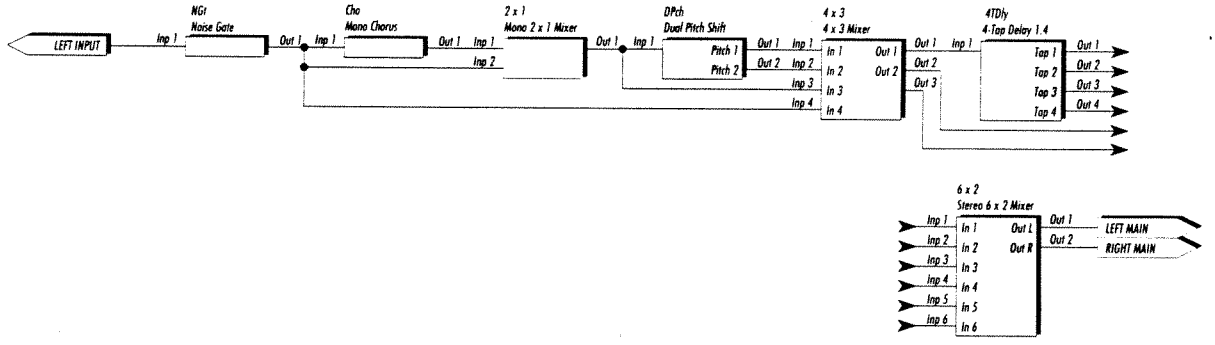
Algorithm #2
Delay > 8VoiceChorus



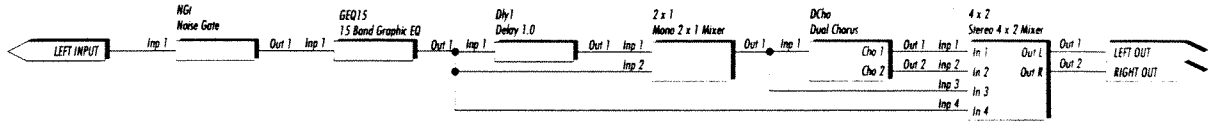
Algorithm #3
Cho > Arpegio2 > Dly



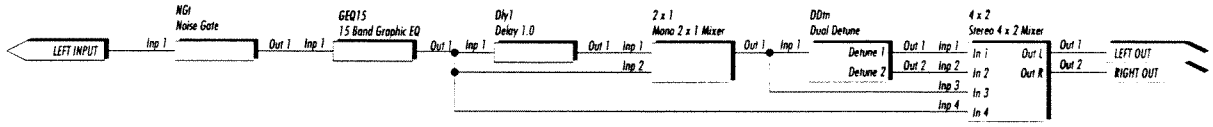
Algorithm #4
Cho > 2Pitch > 4Tap



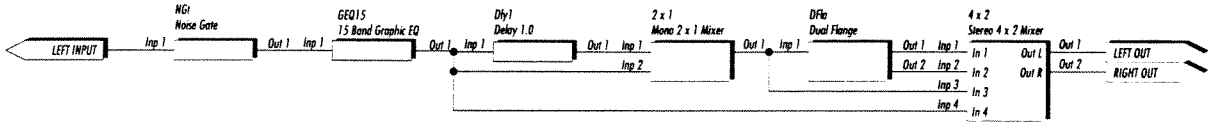
Algorithm #5
GEQ15 > Dly > Chorus



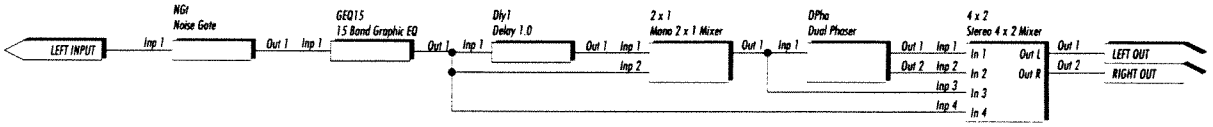
Algorithm #6
GEQ15 > Dly > Detune



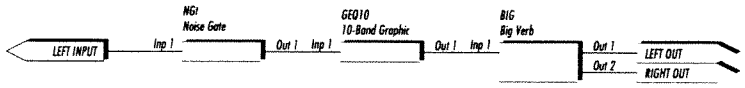
Algorithm #7
GEQ15 > Dly > Flange



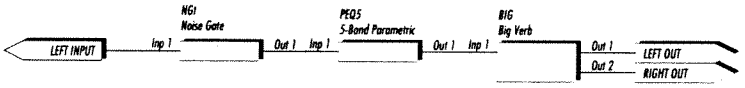
Algorithm #8
GEQ15 > Dly > Phaser



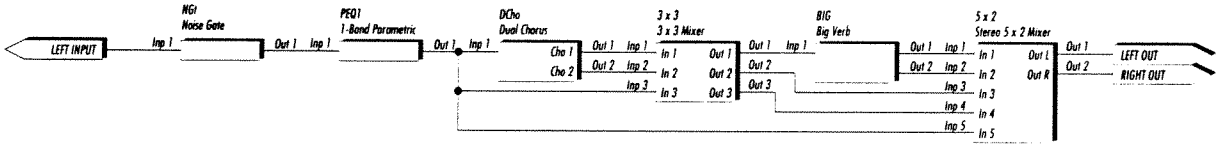
Algorithm #9
GEQ10 > Big Reverb



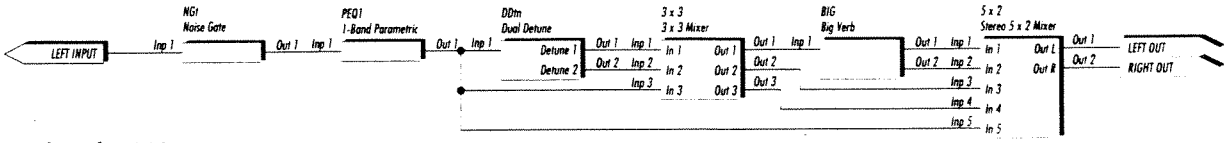
Algorithm #10
PEQ5 > Big Reverb



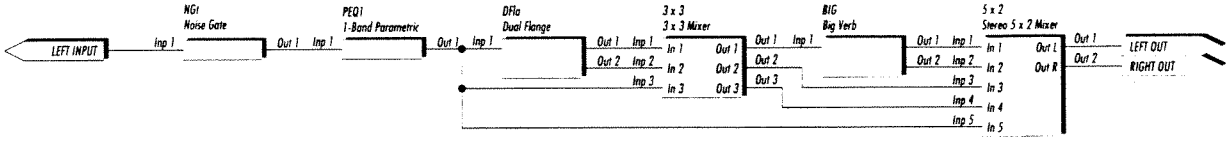
Algorithm #11
Chorus > Reverb



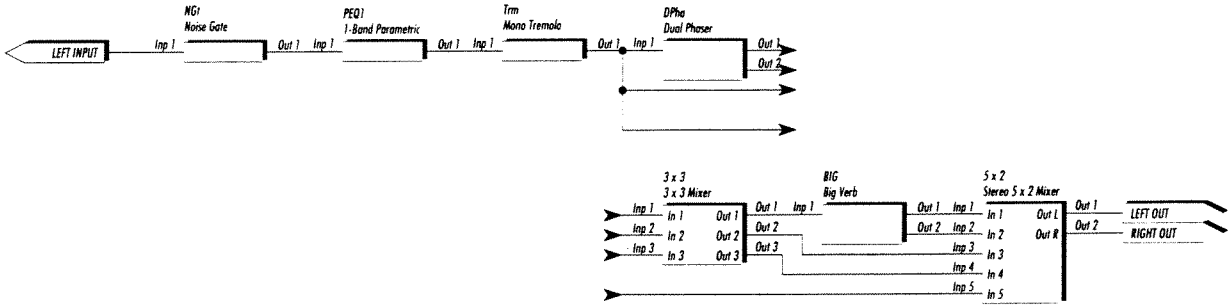
Algorithm #12
Detune > Reverb



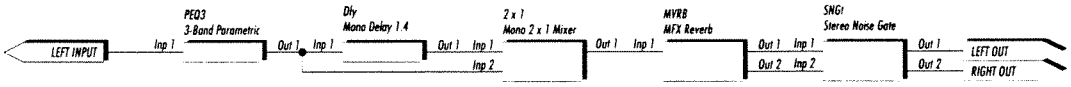
Algorithm #13
Flange > Reverb



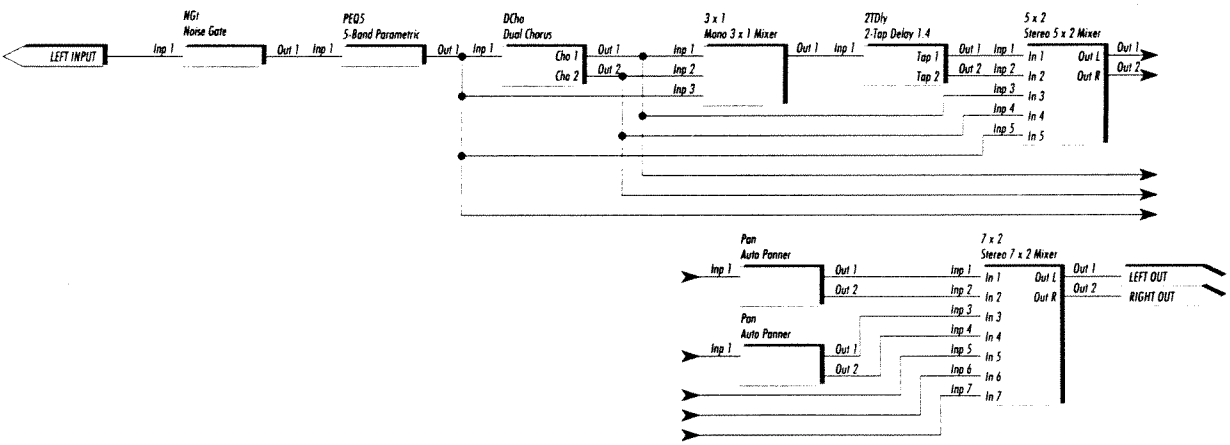
Algorithm #14
Trem > Phaser > Rev



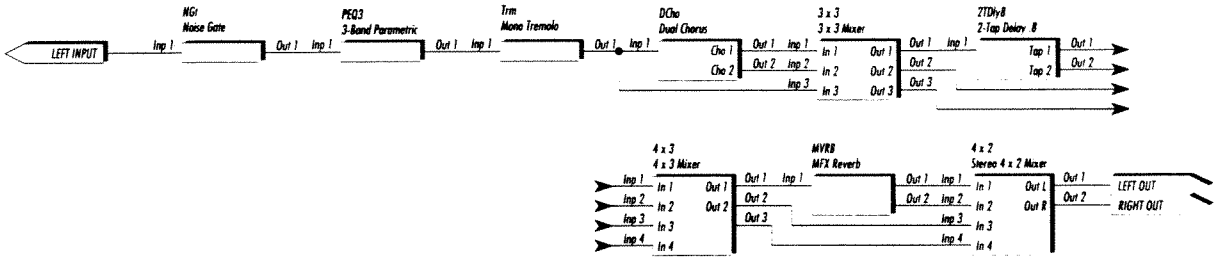
Algorithm #15
PEQ > Dly > Rev > Gate



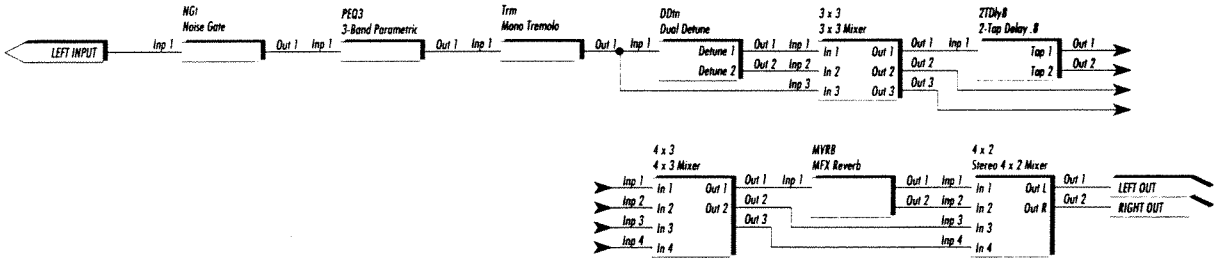
Algorithm #16
PEQ > Cho > 2TapPans



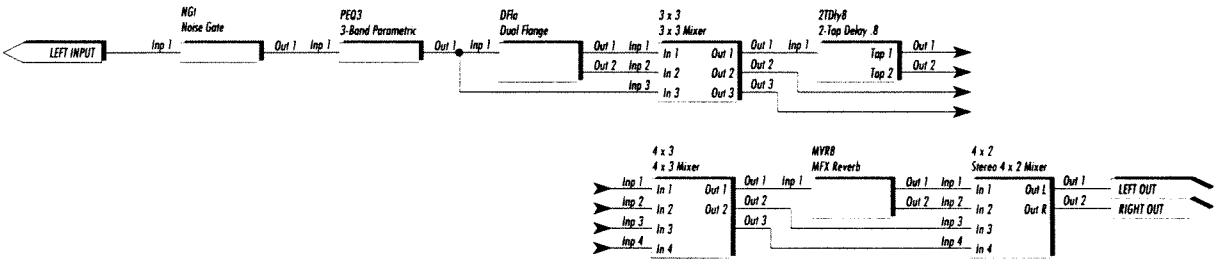
Algorithm #17
PEQ > Cho > 2Tap > Rev



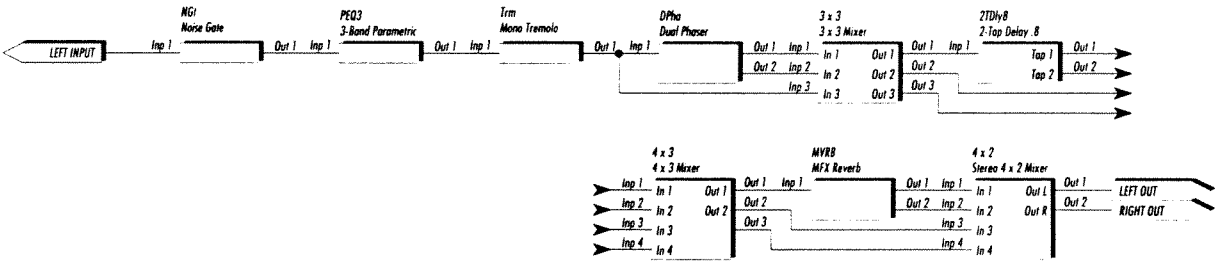
Algorithm #18
PEQ > Dtn > 2Tap > Rev



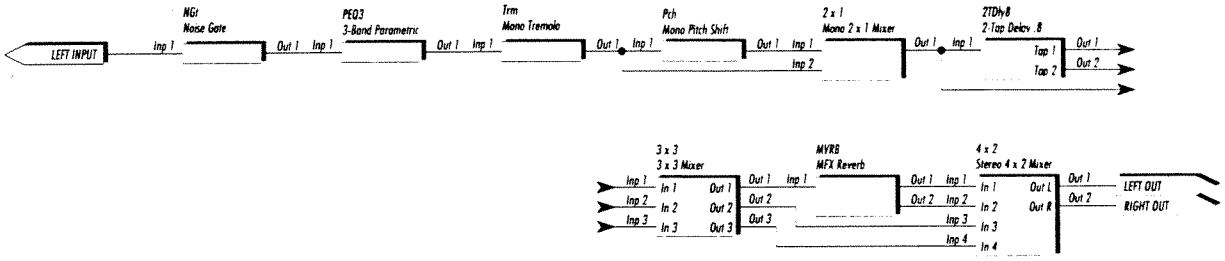
Algorithm #19
PEQ > Fla > 2Tap > Rev



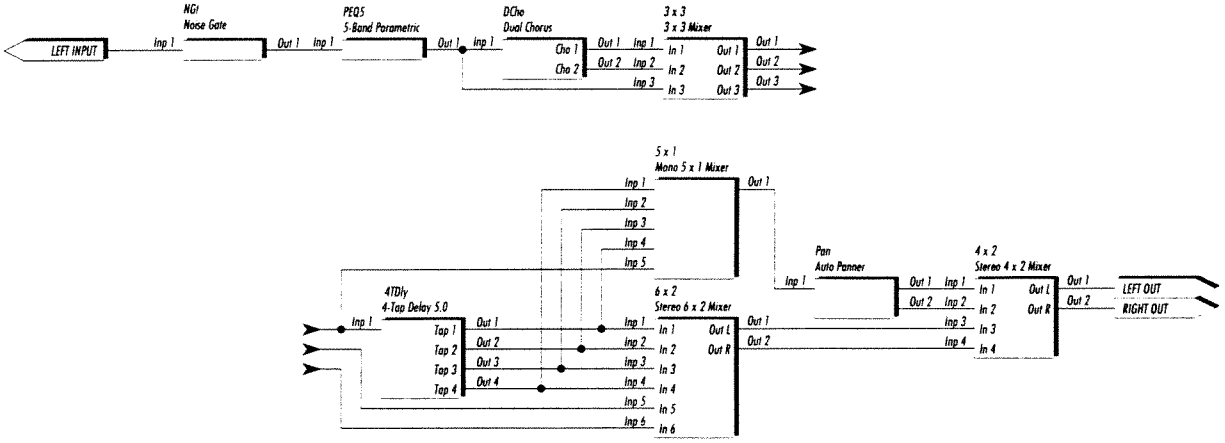
Algorithm #20
PEQ > Pha > 2Tap > Rev



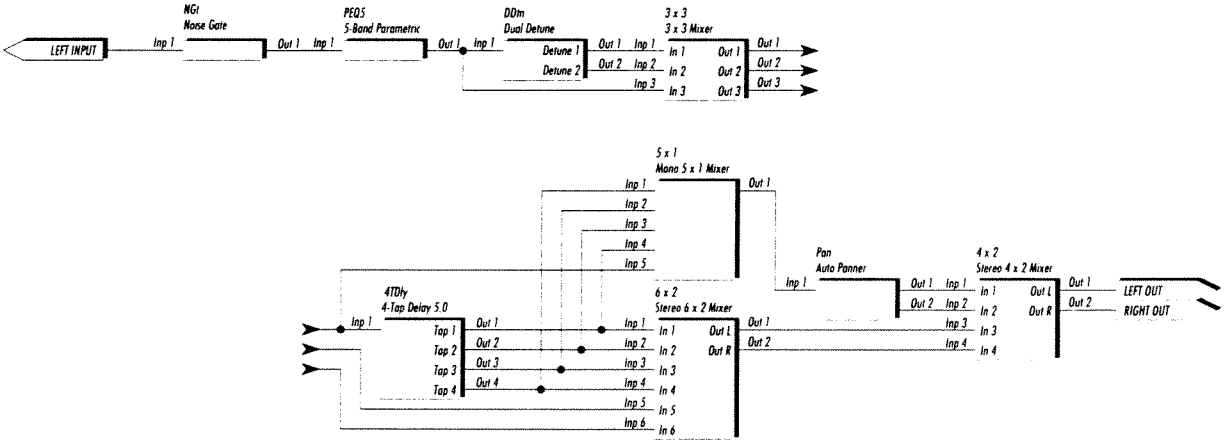
Algorithm #21
Pch > 2Tap > Rev



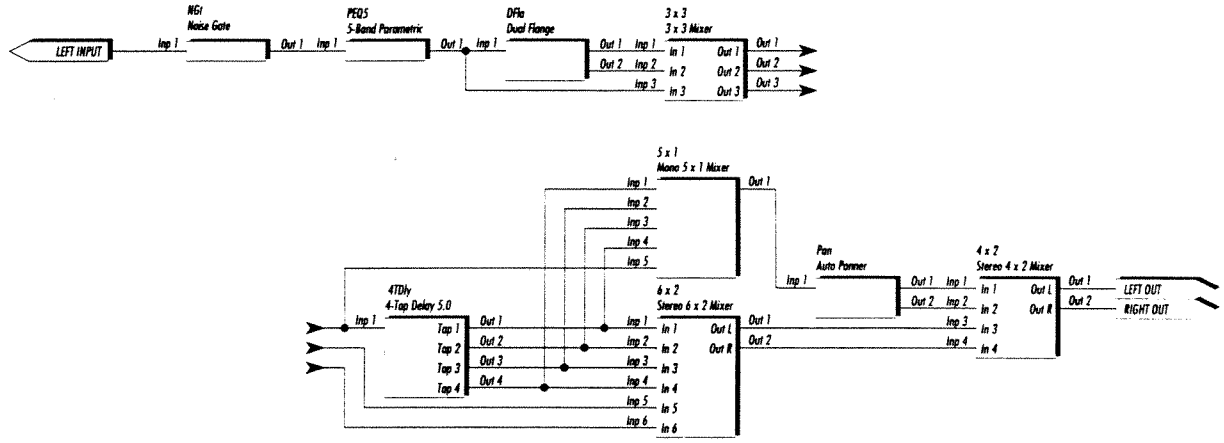
Algorithm #22
PEQ > Cho > 4Tap > Pan



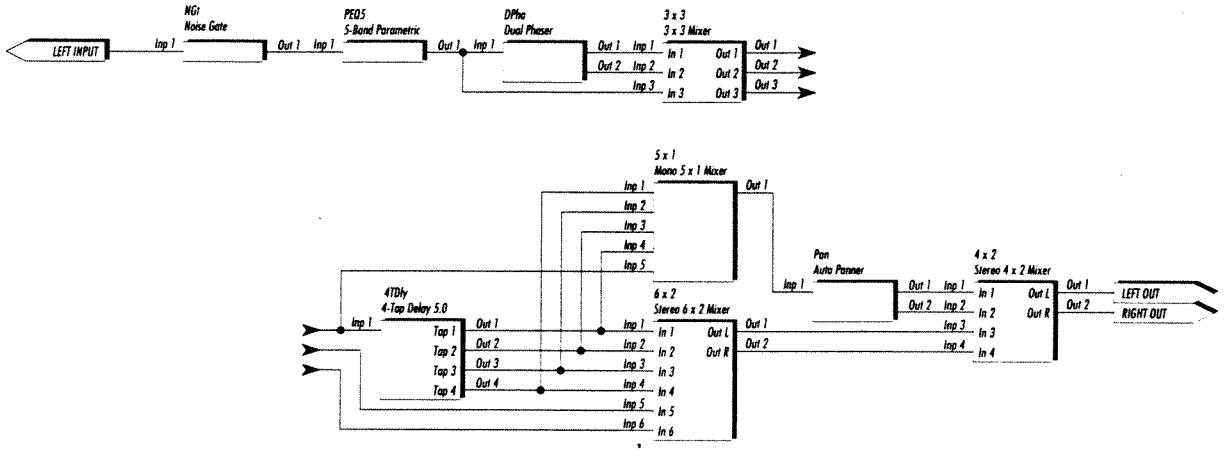
Algorithm #23
PEQ > Dtn > 4Tap > Pan



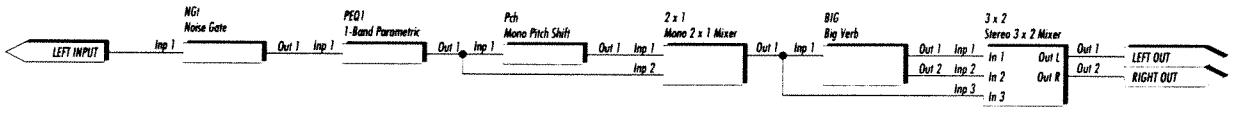
Algorithm #24
PEQ > Fla > 4Tap > Pan



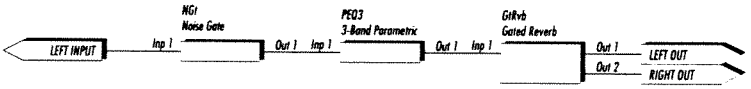
Algorithm #25
PEQ > Pha > 4Tap > Pan



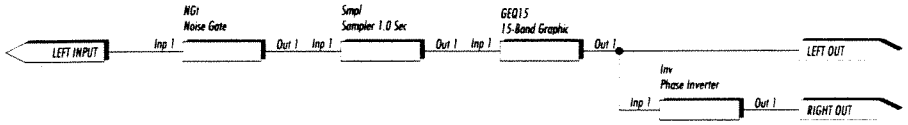
Algorithm #26
Pch > Revrb



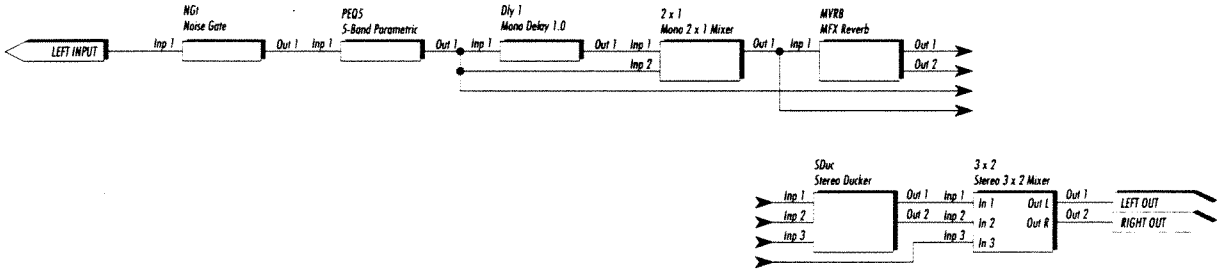
Algorithm #27
PEQ > Gated Revrb



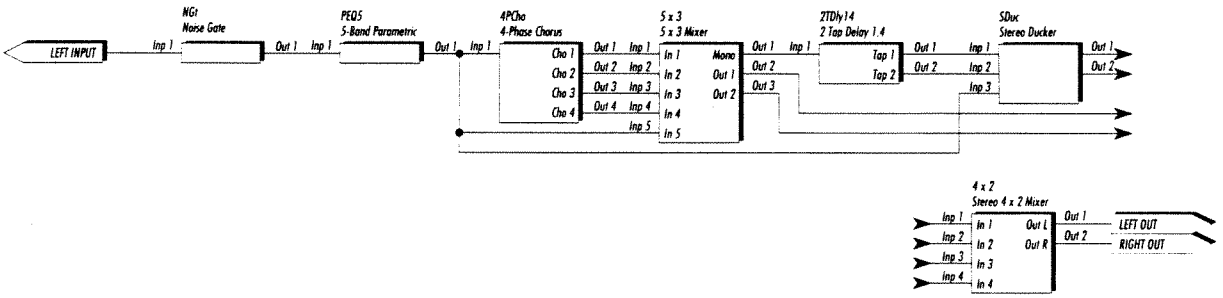
Algorithm #28
Sampler > GEQ15



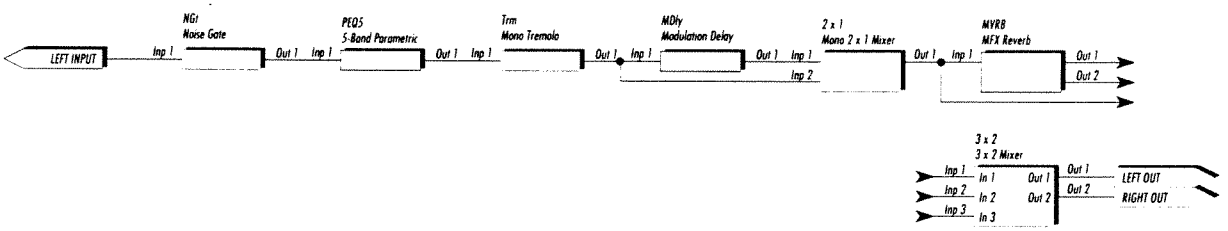
Algorithm #29
PEQ > Dly > Rev > Duck



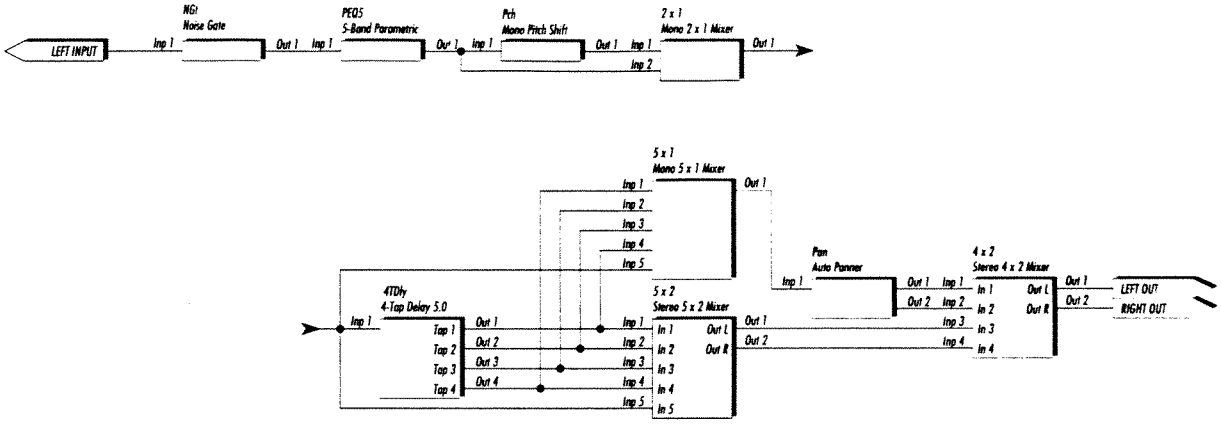
Algorithm #30
Cho > Ducked 2Tap



Algorithm #31
PEQ > ModDly > Revrb



Algorithm #32
PEQ > Pch > 4TapPan



Specifications

A/D Converter: 16 bit PCM

D/A Converter: 16 bit PCM

Sampling Frequency: 40 kHz

DSP Section:

Architecture: .....Static-Dynamic Instruction Set Computer (S_DISC™)
Digital Signal Path Width: .....24 bits (144.5 dB)
Internal Data Path Width: .....48 bits (289 dB)
Dynamic Delay Memory: .....64k x 24 bits (1.68 seconds)
Static Delay Memory: .....256 24-bit registers (6.55 milliseconds)
Data ALU Processing:.....10.0 MIPS
Address ALU Processing:.....15.0 MIPS
Multiplier Size:.....24 bits x 24 bits

Input Section:

Connector: 1/4" Unbalanced TRS
Nominal Level: +4 dBu
Maximum Level: +18 dBu
Impedance: 10 kohms unbalanced, 20 kohms balanced

Output Section:

Connector: 1/4" TRS
Nominal Level: +4 dBu
Maximum Level: +18 dBu
Impedance: 50 ohms

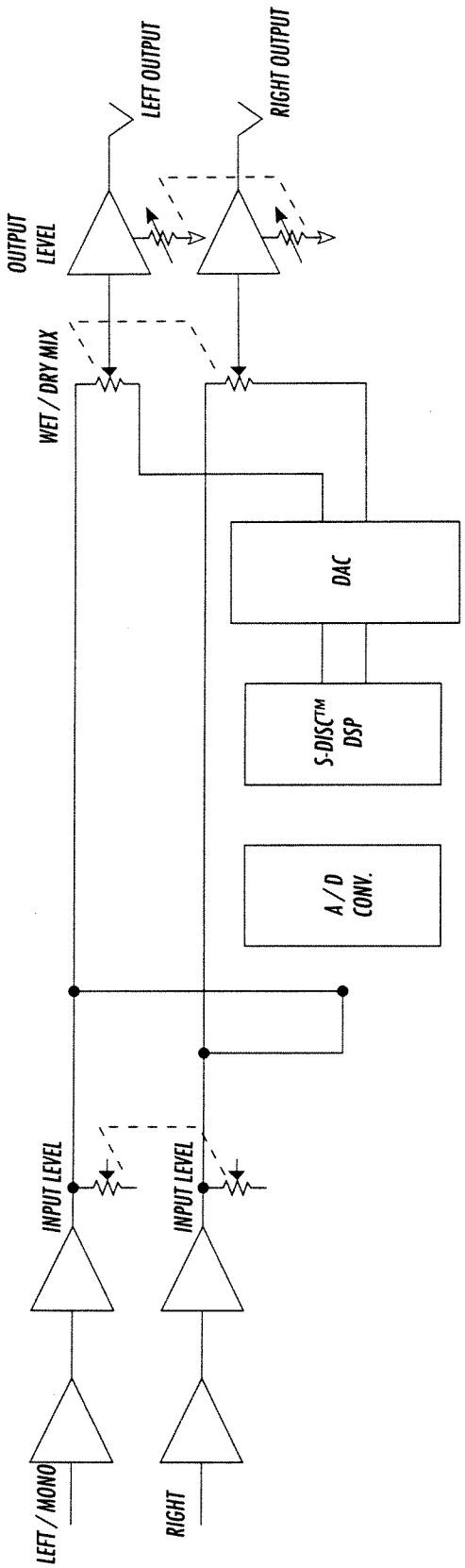
General:

Frequency Response: 20 Hz. - 20 kHz. +0, -3 dB
S/N ratio: Greater than 90 dB; ref = max signal, 22 kHz measurement bandwidth
Total Harmonic Distortion: Less than 0.03% (1 kHz.)
Memory Capacity:
Factory: 128 programs, 32 algorithms
User: 128 programs, 32 algorithms
Power Requirements:
US and Canada:.....120 V ac, 60 Hz
Japan:.....100 V ac, 50/60 Hz
Europe:.....230 V ac, 50 Hz
UK:.....240 V ac, 50 Hz
Power Consumption:.....30 watts
Dimensions: .....19"(482 mm) W x 1.75"(44 mm) H x 5.75"(147 mm) D

Function...		Transmitted	Recognized	Remarks
Basic Channel	Default Channel	1-16 1-16	1-16 1-16	Memorized
Mode	Default Messages Altered	Mode 3 X	Mode 3 X	Omni Off
Note Number	True Voice	X	X	
Velocity	Note ON Note OFF	X X	X X	Not Recognized
After Touch	Key's Ch's	X X	X X	
Pitch Bender		X	X	
Control Change		X	O	
Prog Change	True #	0-127	0-127 1-128	Internally Mapped
System Exclusive		O	O	
System Common	:Song Pos :Song Sel :Tune	X X X	X X X	
System Real Time	:Clock :Commands	X X	X X	
Aux Mes- sages	:Local ON/OFF :All Notes Off :Active Sense :Reset	X X X X	X X X X	
Notes				

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

O : Yes
X : No



User Program Sheet

Photocopy this page and record your Program parameters.

Program Number_____ Configuration_____ Title_____

Program Number_____ Configuration_____ Title_____

Program Number_____ Configuration_____ Title_____

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