

A BOUT REVERBERATION

Modern music and recording sounds may seem unnatural or harsh to the ear. That's because the close miking techniques and synthesized sounds produced have no "environment" which would make them feel natural. Reverberation is added to these sounds to help give them this natural feel or fullness, more like the ear is used to hearing in the real world. Different kinds of devices have been used to generate and add this ambience. In the beginning, recording studios used actual hard surfaced rooms with unparallel walls and put speakers and microphones in them to simulate concert halls. Other types of devices have been used as well: springs, large metal plates, and electronic "bucket brigades" are some examples.

A revolutionary new development in reverberation technology is the digital

reverb. Using computer technology, a digital reverb converts sound into ones and zeroes that a digital processor can manipulate. With the appropriate programs (algorithm) a digital reverb can be used to simulate many different kinds of environments and generate different kinds of effects which may be added to a sound making it more pleasing to the ear, or making it "fuller," or even making it "punchier" and more penetrating.

The RDS 6400 digital reverberation system uses this computer technology to give the musician or recording engineer an affordable creative tool for reverberation.

meters of room and plate size, decay time, high frequency damping, and the mix of reverb to "dry" signal can all be quickly and easily selected and adjusted from the five groups of buttons and controls on the front panel of the reverb.

The RDS 6400 accepts either instrument or line level signal inputs and balanced or unbalanced lines. There are left and right stereo outputs, a mono output, and a "dry" output to daisy chain the

I NTRODUCING THE RDS 6400 DIGITAL REVERBERATION SYSTEM

The RDS 6400 is a quality, cost effective digital reverberation system designed with the musician, home studio, and small or medium size recording studio in mind. The RDS 6400 is a completely digital signal processor that is capable of making millions of mathematical calculations each second. By generating dense reflection patterns the RDS 6400's programs simulate different natural reverberation environments or effects.

Two different programs, plate and room, can be selected and the operating para-

original input signal to other equipment. Input and output levels are controlled from pots on the front panel, and a mix pot is provided for stand alone operation. There is also a "reverb kill" connector on the back of the unit to allow for a remote disabling of the reverb.

Who can use the RDS 6400?

- Musicians — who want an affordable reverb to add that professional sound to their mono or stereo systems.

I NSTALLING THE RDS 6400

Stand Alone Operation:

Rubber feet are provided on the bottom of the RDS 6400. Place the reverb where there is enough flat space and plug in the A/C cord. If the reverb is being used with an instrument, put the input level selector switch in the "-20" position. Connect the input with a 1/4 inch male phone plug and connect the output also with a 1/4 inch male phone plug. For stand alone operation, use the left and right output jacks for a stereo system, or the mono output jack for monaural system.

For Rack Mounting:

The RDS 6400 occupies only 1-U (1 3/4 inches by 19 inches wide) rack space. Install the reverb in the rack with the screws provided. It is highly suggested that you support the rear of the reverb in the rack with strapping to avoid possible damage to the reverb when moving the rack. When prolonged operation of the reverb is expected, it is also suggested that ventilation space around the reverb be allowed for heat dissipation.

Select the input levels to be used, either -20 or +4 dBm, and route the A/C power cord to an electrical outlet away from audio lines.

- Home Recording Studios — that need the smooth sound of a quality reverb.
- Small and Medium Size Recording Studios — that need a cost effective, yet versatile reverberation and effect device for recording and mixing.

The RDS 6400 offers an excellent effect-to-dollar value for the discriminating musician or engineer.

Making Connections:

All connections to the reverb are made with 1/4 inch tip-ring-sleeve male phone plugs. (Except for the "reverb kill" jack which is a mono 1/4 inch male phone plug.)

All signal plugs are to be wired:
Tip: high.
Ring: low.
Sleeve: ground.

For unbalanced wiring of the connectors:
Tip: hot.
Sleeve: low and ground tied together.

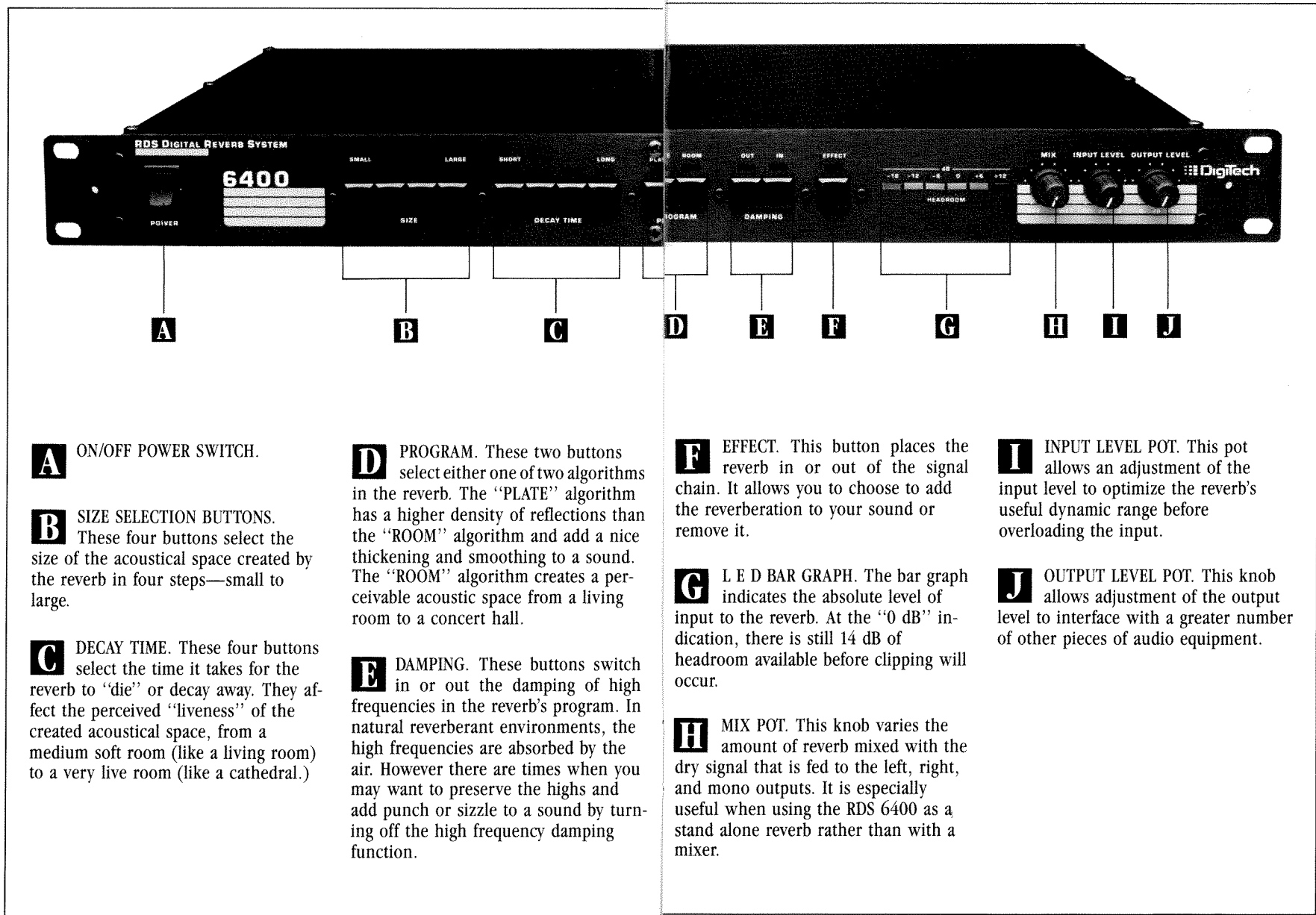
The "reverb kill" is made for a simple contact switch that to "kill" makes a connection of the tip to the ground. To make a remote switch that will kill the reverb function, put a footswitch on the end of a two conductor cable, run it to the back of the reverb and plug into the "reverb kill" jack with a mono 1/4 inch phone plug.

Inputs will accept either balanced or unbalanced connections. Input impedance is 40K Ohms balanced, or 20K Ohms unbalanced.

Output impedance is 100 Ohms balanced and 50 Ohms unbalanced. Maximum output level is +18 dBm (input level selector switch set to +4.)

F RONT PANEL OF THE RDS 6400 DIGITAL REVERBERATION SYSTEM

Using the RDS 6400 is quick and easy because of the straight forward and logical layout of the system's controls.



A ON/OFF POWER SWITCH.

B SIZE SELECTION BUTTONS. These four buttons select the size of the acoustical space created by the reverb in four steps—small to large.

C DECAY TIME. These four buttons select the time it takes for the reverb to “die” or decay away. They affect the perceived “liveness” of the created acoustical space, from a medium soft room (like a living room) to a very live room (like a cathedral.)

D PROGRAM. These two buttons select either one of two algorithms in the reverb. The “PLATE” algorithm has a higher density of reflections than the “ROOM” algorithm and add a nice thickening and smoothing to a sound. The “ROOM” algorithm creates a perceivable acoustic space from a living room to a concert hall.

E DAMPING. These buttons switch in or out the damping of high frequencies in the reverb's program. In natural reverberant environments, the high frequencies are absorbed by the air. However there are times when you may want to preserve the highs and add punch or sizzle to a sound by turning off the high frequency damping function.

F EFFECT. This button places the reverb in or out of the signal chain. It allows you to choose to add the reverberation to your sound or remove it.

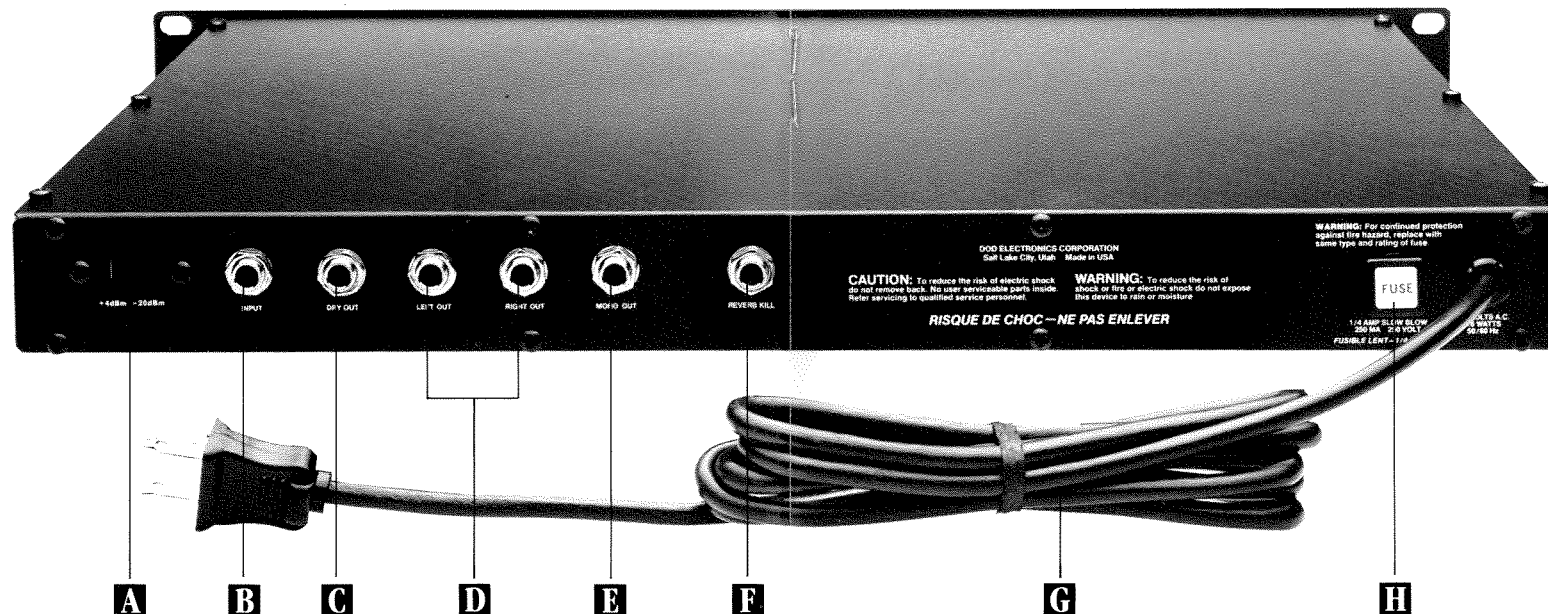
G LED BAR GRAPH. The bar graph indicates the absolute level of input to the reverb. At the “0 dB” indication, there is still 14 dB of headroom available before clipping will occur.

H MIX POT. This knob varies the amount of reverb mixed with the dry signal that is fed to the left, right, and mono outputs. It is especially useful when using the RDS 6400 as a stand alone reverb rather than with a mixer.

I INPUT LEVEL POT. This pot allows an adjustment of the input level to optimize the reverb's useful dynamic range before overloading the input.

J OUTPUT LEVEL POT. This knob allows adjustment of the output level to interface with a greater number of other pieces of audio equipment.

BACK PANEL OF THE RDS 6400 DIGITAL REVERBERATION SYSTEM



A INPUT LEVEL SELECTOR SWITCH. This switch allows you to interface the RDS 6400 with either instrument level gear (-20 dBm) or with professional high level audio gear (+4 dBm.)

B INPUT CONNECTOR. Female 1/4 inch tip-ring-sleeve phone jack connector. This is a mono input. Sum the right and left signals from a mixer before feeding them to this input.

C DRY OUTPUT CONNECTOR. Female 1/4 inch tip-ring-sleeve phone jack connector. This jack allows the original signal to be looped to other devices unaffected by the reverb.

D LEFT AND RIGHT OUTPUT CONNECTORS. Female 1/4 inch tip-ring-sleeve phone jack connector. These outputs give left and right signals for stereo applications.

E MONO OUTPUT CONNECTOR. Female 1/4 inch tip-ring-sleeve phone jack connector. This output is the sum of the left and right outputs.

F REVERB KILL CONNECTOR. Female 1/4 inch mono phone jack connector. This jack allows a remote disabling of the RDS 6400 reverb with the use of an external switch. To kill: connect tip to ground.

G POWER CORD.

H FUSE. 1/4 amp, 250 mA, 250 volt, slow blow. Should the fuse fail, remove the cause before replacing the fuse. Failure to do so may damage the reverb.

Do not replace the fuse with one of a higher current rating, doing so could result in damage to the reverb.

HOW THE RDS 6400 WORKS

Input signal level is controlled by the selection of the +4 dBm/-20 dBm selector switch and the level input pot. The signal is then converted to a 12 bit "word" by the analog-to-digital converter. This "word" is manipulated by the digital sound processor under control of proprietary software (algorithms) to perform millions of mathematical operations each second and thus generate the reflections, phase shifts, and reflection density which simulate reverberation. Stereo image is also created by the processor. The parameters of the programs are altered by the push buttons on the front panel of the RDS 6400. Selection of either the PLATE or ROOM algorithm sets up different digital building blocks for each of the two main reverb effects. Perceived room or plate SIZE is selected from SMALL to LARGE in four steps, and DECAY TIME from SHORT to LONG

is also selected in four steps. High frequency DAMPING is either active or inactive depending upon the selection of the damping IN/OUT buttons. The signal is then converted back to analog and fed to the outputs. The mix pot adds the processed reverb signal to the original dry signal and sends the mixed sound to the LEFT, RIGHT, and MONO OUTPUTS. The MONO OUTPUT is the sum of the left and the right signals. Control of the output level is accomplished with the OUTPUT LEVEL POT on the front of the RDS 6400.

APPLICATIONS

First, a caution. Any effect can be overdone, and that includes reverberation. The idea is to make things more pleasing and musical, not artificial by the use of the reverb effect. So go easy when you mix the reverb with your sound. There will be situations when you may need to mix the reverberation stronger, such as when it may be covered by audience or crowd noise, or when it may be buried by other instruments. But generally, reverberation should be a subtle addition to your sound.

As with any other creative tool, experimentation is really the only way to find out what sounds and settings suit your needs and tastes. So the following suggestions are just that, suggestions, starting points for you to help you find "your sound".

APPLICATION	ROOM/PLATE	DECAY TIME	DAMPING
DRUMS	Med Lg Plt	Med Short	No
PIANOS	Large Room	Short	Yes
LEAD VOCALS	Large Room	Med Short	No
BACKGROUND VOCALS	Large Room	Med Long	Yes
RHYTHM GUITARS	Small Plt	Med Short	No
ACOUSTICAL GUITARS	Large Room	Med Long	Yes
STRINGS	Large Room	Long	Yes
CONCERT HALL	Large Room	Long	Yes
LIVING ROOM	Med Sm Rm	Med Short	No
NARRATIONS BIG VOC	Large Plt	Med Long	Yes
NARRATION INTIMATE	Med Sm Rm	Med Long	Yes

RDS 6400 DIGITAL REVERBERATION SYSTEM SPECIFICATIONS

INPUT ATTENUATION: $-\infty$ to 0 db.

OUTPUT GAIN: -6 to +12 db.

PROGRAMS: Plate & Room.

SIZE: Small to Large in four steps.

DECAY TIMES: Short to Long in four steps.

DAMPING: Plate: 6K Hz in feedback path.
Room: 3.5K Hz in feed forward path.

EFFECT: Reverberation In or Out.

INPUT IMPEDANCE: 40K Ohms balanced—
1/4 inch T-R-S phone jack. 20K Ohms unbalanced.

OUTPUT IMPEDANCE: 100 Ohms balanced—
1/4 inch T-R-S phone jack. 50 Ohms unbalanced.

OUTPUT LEVEL: +18 dBm maximum (input selector switch at +4), (ref.: 0.775 Vrms).

INPUT LEVEL: Selectable: +4 dBv or -20 dBv nominal. Maximum +14 dBv above nominal (ref.: 0.775 Vrms).

FREQUENCY RESPONSE: 20 Hz to 10K Hz reverb. 20 Hz to 20K Hz dry.

SIGNAL TO NOISE: 95 dB dry. 80 dB reverb.

A to D to A CONVERTER: 16 bit linear.

THD @ 1K Hz: <.05% reverb.
<.01% dry.

APPROXIMATE DECAY TIMES (RT60 in seconds)

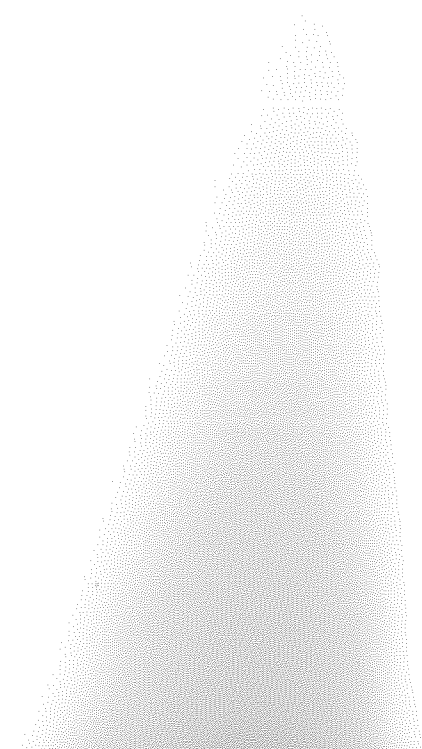
Plate	DCY/SIZ	LARGE	MED LG	MED SM	SMALL
	LONG	5.0	2.8	1.6	0.9
	MED LRG	3.5	2.0	1.1	0.6
	MED SML	2.6	1.5	0.8	0.45
	SMALL	1.8	1.0	0.6	0.3
Room	DCY/SIZ	LARGE	MED LG	MED SM	SMALL
	LONG	13.0	5.2	2.6	1.6
	MED LRG	9.0	3.5	1.8	1.1
	MED SML	6.4	2.6	1.3	0.6
	SMALL	3.6	1.4	0.7	0.3

DOD WARRANTY

1. The warranty registration card must be mailed within ten days after purchase date to validate this warranty.
2. DOD warrants this product, when used solely within the U.S., to be free from defects in material and workmanship under normal use and service.
3. DOD Electronics' liability under this warranty is limited to repairing or replacing defective materials that show evidence of defect, provided the product is returned through the original dealer, where all parts and labor will be covered up to a period of one year. 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 date of purchase is considered to be the burden of the consumer.
5. DOD 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 DOD 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 DOD or its dealers be liable for special or consequential damages or from any delay in the performances of this warranty due to causes beyond their control.

CHANGES AND UPGRADES

As we continue to research and develop new programs and products for our digital products, new programs for the RDS 6400 may become available. These will be made available through your dealer.





DigiTech

**A PRODUCT OF
DOD ELECTRONICS CORPORATION**

DOD Electronics Corporation
5639 South Riley Lane
Salt Lake City, Utah 84107
Telephone (801) 268-8400
Telex 4943178

INTERNATIONAL DISTRIBUTION:

DOD International
10 Cindy Drive
Nashua, NH 03062
U.S.A.
Telephone (603) 888-5230
Telex 501187