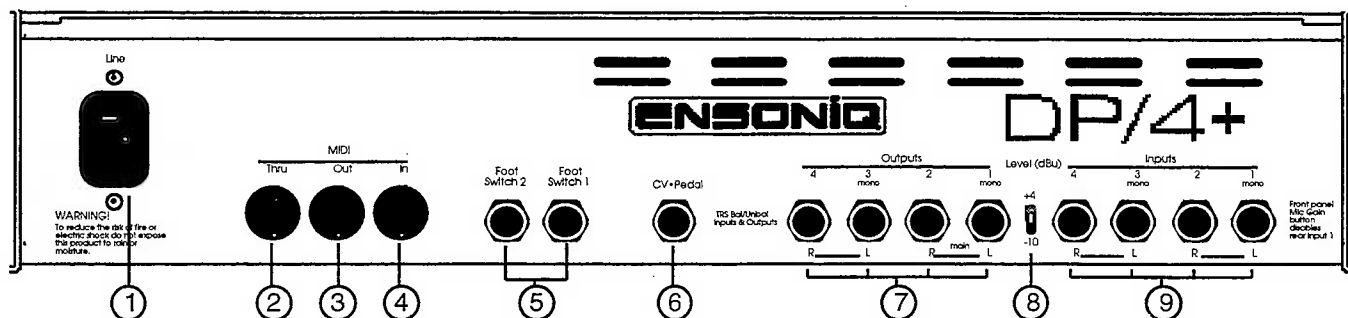


DP/4+

Service Manual





1. Line

The supplied line cord is connected here.

2. MIDI Thru

"Passes on" all MIDI (Musical Instrument Digital Interface) information received by the DP/4+ to other devices. Information generated by the DP/4+ itself does not go to this jack — the Thru jack merely echoes what comes in at the MIDI In jack.

3. MIDI Out

Sends out MIDI information to other instruments and computers when the System•MIDI parameter "63 Send MIDI PrgChg + Controllers" is set to "ON."

4. MIDI In

This jack receives MIDI information from other MIDI instruments or computers.

5. Foot Switch 1 and 2 Jacks

These two independent foot switch jacks are designed for dual (stereo) foot switches, and can be assigned to a number of different functions, allowing a total of four independent foot switch controllers (when two optional SW-10 Dual Foot Switches are connected).

⚠ Warning!

The use of single (mono) foot switches is not recommended, and can affect the operation and performance of the DP/4+.

6. CV•Pedal

This jack is for connecting an ENSONIQ Model CVP-1 Control Voltage Foot Pedal which is assignable as a modulator to parameters within the DP/4+.

Pedal/CV Specs: 3-conductor (tip = control voltage input, ring = 424. Ohm resistor to +4.25 volts, sleeve = ground). 110. KOhm input impedance, DC coupled. Input voltage range = 0 to 4. volts DC. For use with an external control voltage, use a 2-conductor cable with the voltage on the tip and the sleeve grounded.

7. Output Jacks

The four ground compensated output jacks can be configured in numerous ways. Because the DP/4+ offers fully programmable output control, you can have almost any combination ranging from a single mono output to four mixed stereo signals.

8. Level Switch

This switch toggles between +4 dBu and -10 dBV (this affects the rear panel input and output jacks only). Because this switch can accommodate a broader range, it allows an improved signal-to-noise ratio.

9. Input Jacks

These four balanced input jacks are truly independent inputs and can be used in a 1 source, 2 source, 3 source, or 4 source configuration.

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IMPORTANT THINGS TO KNOW ABOUT THE DP/4+

As with every ENSONIQ product, all DP/4+ service will be handled through the ENSONIQ Module Exchange Program. Rather than diagnose and exchange individual components, you will replace complete modules. We feel that this is the most time and cost effective method of repair, both for you and your customers.

SAFETY FIRST!



Safety instructions are prioritized in the following manner:

1. To safeguard people. Whenever there is the possibility that a person may harm themselves following instructions or procedures, you will see a warning preceded by the following icon:





2. To safeguard your equipment. Whenever there is a possibility of damage to your test equipment, you will see a warning preceded by the following icon:




3. To safeguard the unit you are working on. Whenever there is a possibility of damage to the unit you are working on, or there is an important note to the technician, you will see a warning preceded by the following icon:



 **Be careful! Do not receive an electrical shock!** Make sure the DP/4+ power cord is unplugged before disassembling or reassembling the DP/4+ or opening the case for any reason!

 The DP/4+ is made out of aluminum extrusions and steel. **There are very sharp edges inside and outside the DP/4+. Be careful not to cut yourself when working on a DP/4+.**

 The DP/4+ has certain operating characteristics you should be aware of. The output jacks have switching features that may lead an inexperienced user to believe that their DP/4+ is not operating properly. When there is a jack plugged into output 4 (and no other outputs) there will be no signal from output 4. There must be a jack connected to output 3 before output 4 will work. Also, to send a MONO signal discreetly to inputs 1 or 3, there must be a jack plugged into inputs 2 or 4. Keep this in mind when qualifying a customers DP/4+ for repair.

OPERATING SYSTEM (O.S.) VERSIONS

The DP/4+ O.S. is contained entirely on EPROM chips installed in sockets on the DP/4+ digital board. Any O.S. changes require changing the O.S. EPROMs. If an O.S. change is necessary, an update kit will be made available for you to order from ENSONIQ customer service. Always check the DP/4+ to make sure it has the current O.S.

CHECKING THE OPERATING SYSTEM VERSION

The DP/4+ displays the software version on its initial power-up screen. Call the ENSONIQ Fax Retrieval System at 1-800-257-1439 and order document number 0010 for information on current operating system versions. Outside of the US call 1-610-408-0741. You can also call ENSONIQ customer service at 1-800-441-1003 for information concerning O.S. versions.

☹ The DP/4+ O.S. EPROMs should always be justified to pin 1 on the chip and the socket (see Figure 1).

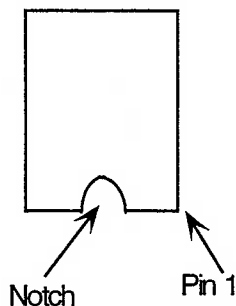


Figure 1- Locating pin 1

REINITIALIZING

The DP/4+ is essentially a computer with its own operating system, RAM, and so on. Like a computer, it can lock up (stop operating) or glitch (behave erratically) if the RAM is corrupted by bad data. Some examples of how this can happen are if the unit receives a sys-ex transfer with bad data, if the unit receives a significant static shock, or if there is a power spike at the AC input.

Since scrambled data in RAM can cause problems that at first glance appear to be hardware related, reinitialization is recommended as a first step in troubleshooting.

Reinitialization causes all internal RAM to be erased, so periodic backing up of data is required to enable the user to restore the system.

☹ **A given unit is likely to have data in RAM that is near and dear to its owner. It is highly recommended that you or the owner back up the unit's RAM before reinitializing it.**

SAVING ALL DATA TO A SYS-EX STORAGE DEVICE (backing up the DP/4+ RAM)

The DP/4+ is able to send System Exclusive (Sys-Ex) dumps containing all of the system parameters. These dumps can be directly transmitted to another DP/4+, or can be recorded by an external device which has MIDI Sys-Ex recorder capabilities (such as the ENSONIQ TS-10, TS-12 or ASR-10) to be stored and later retransmitted to the DP/4+. Connect the MIDI out from the DP/4+ to the MIDI in of the storage device and follow the steps on the following page.

⊗ The System Exclusive ID number (system parameter 52) is embedded in every message, so it must be set correctly on the transmitting and receiving units if dumps are to be recognized.

1. Press **(SYSTEM•MIDI)**.
2. Press the **(WRITE)** button at any time while in System-MIDI mode to engage the system exclusive dump utility. The display looks something like this:

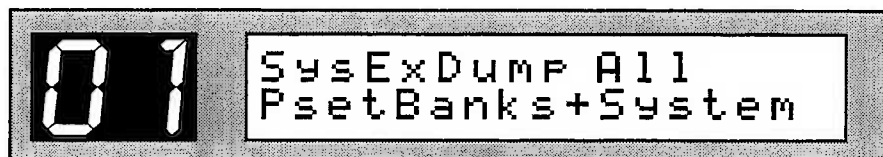


Figure 2- Sys-Ex Dump Screen

3. If the display doesn't say "All Pset Banks + System" turn the data entry knob until it does.
4. Press **(WRITE)** once more to start transmission of MIDI data.
5. When the dump is complete, the display will say "Write OK" briefly to indicate the data was saved without errors.

LOADING DATA BACK IN FROM A SYSEX STORAGE DEVICE:

1. Connect a MIDI cable from the MIDI out of the storage device to the MIDI in of the DP/4+.
2. System Exclusive message reception is "automatic". It does not have to be enabled by any actions other than making sure that System Exclusive reception is enabled and that the ID number setting matches the ID embedded in the dump to be received (System-MIDI parameters 52 and 53). The MIDI message indicator will light while the dump is being received. A confirmation message is displayed when the dump reception is complete.
3. Send the dump from the storage device.

⊗ *An error message will be displayed instead of the confirmation message if there was a problem with the incoming data. If no message appears after the MIDI LED goes off, then the dump was ignored. Make sure the Receive enable is set to "On" and the ID number is set correctly.*

It is possible that some computer interfaces can transmit Sys-Ex dumps faster than the DP/4+ can receive it. On many Macintosh applications, however, the sys-ex transfer rate can be reduced. You could also try reducing the speed of the interface (e.g., from 2x to 1x).

⚡ IMPORTANT! Unplug all audio cables before reinitializing. The audio outputs may make a loud pop when reinitializing.

There are three methods for reinitializing the DP/4+. The method you should try first is reinitializing from the front panel. If the system is so scrambled that the front panel isn't responding, try the system reset sequence. If the unit still doesn't respond, try the hard reset procedure.

TO REINITIALIZE FROM THE FRONT PANEL

1. While holding down the **(SYSTEM•MIDI)** button,
2. Press the **(B)** button.
3. Press the **(▷)** button. The display shows:



Figure 3- Reinitialization screen

- ☹ *Press the **(CANCEL)** button to quit without reinitializing the system.*
4. Press the **(WRITE)** button to reinitialize the DP/4+ . Remember that by doing this you will replace *all* of the RAM Preset data in the DP/4+, and *all* System/MIDI parameters will be reset to their default settings.

TO REINITIALIZE USING THE SYSTEM RESET SEQUENCE

1. Turn the unit off and then on 8 times. When you turn it on, it should be just long enough to see the display start to show characters. When you turn it off it should be just long enough for the display to go dim. On most units, a one second interval between on and off works well. For example, you could count “off one thousand, on one thousand, off one thousand, on one thousand...”.
Sometimes you may need to experiment with the interval between “on” and “off”
2. The eighth time you turn the unit on, the unit should automatically reinitialize itself and show the wake-up screen.

If the front panel buttons still do not respond, try the hard reset procedure.

HARD RESET

☠☹ **Make sure the power is off and the power cord is disconnected from the unit.**

Short the positive (+) side of the battery to the ground connection PEM for a few seconds.

When you turn the unit back on, it should be reinitialized.

If the reinitialization procedures do not return the DP/4+ to normal operation, there is probably a defective module present. You should proceed to the troubleshooting section of the service manual.

SOFTWARE MESSAGES

Occasional unexpected event messages are not unusual, and unless they become chronic, they are not a cause for concern. It is important to realize that these messages are diagnostic in nature and do not necessarily indicate a problem. These messages were designed to help our software engineers in the development of the software, not as hardware diagnostics.

It is possible that chronic unexpected event messages could be caused by scrambled memory. Be sure to reinitialize the system before troubleshooting any further.

System error codes:

00	system reset error	used for reset (no error occurred)
01	pool head error	pool head value illegal
02	buffer pool error	bad buffer pointer
03	no buffers error	buffer pool depleted past limit
04	bad IRQ error	spurious IRQ interrupt
05	bad button error	unidentified byte from display
06	bad ptype error	illegal parameter type
07	bad value error	routine argument out of range
08	bad unit error	unit argument out of range
09	bad dc offset error	DC offset out of range
10	bad string error	string byte count exceeded limit
11	bad display char error	attempt to display illegal byte
12	display queue error	byte count disagrees with pointers
13	bad ucode rom ver	incompatible version of UCODE EPROM
127	illegal system error	invalid system error code encountered

ESP error codes:

ESP A	ESP B	ESP C	ESP D	Error
30	31	32	33	bad ucode tag
35	36	37	38	esp not halted error
40	41	42	43	esp never ready
45	46	47	48	esp sync error
50	51	52	53	gpr verify error
60	61	62	63	inst verify error
70	71	72	73	both verify error
75	76	77	78	DRAM clear bit error
80	81	82	83	table verify error
85	86	87	88	DRAM write error
90	91	92	93	download verify error

The following messages may appear at start-up and may or may not indicate a problem with the DP/4+ . Usually if there is a problem, the message will only be one symptom. Take into account other symptoms reported by the user and troubleshoot the unit accordingly.

Warning Battery is Low -This may indicate that the RAM back-up battery is low, but it could also indicate a problem with the digital board (see page X).

Warning Bad DC Offset(s) - Out of range DC offsets were detected when calibrating the four A/D inputs. This can indicate a hardware problem which requires repair, especially if the message is persistent. This message can also appear after selecting 4 Unit or Config presets, and

will remain visible until a button is pressed to display a new page. Test the unit according to the test procedures in this manual if the message is persistent.

Units Reloaded ! Bad Unit Data=0# - This message indicates that illegal values were detected in the unit control block (UCB) of one or more of the units at start-up. This causes the loaded config preset (or preset 50) to be reloaded. The displayed error message contains a code in which # = a hex digit (01..0F) showing which unit(s) had corrupted UCB data. In the hex digit, the unit bits are assigned in reverse order (i.e. 0000dcba). Test the unit according to the test procedures in this manual if the message is persistent.

Unexpected Event Code ### - If the system becomes "stuck" in a repeating Unexpected Event loop, there are two options that can be used to handle the situation. While the Unexpected Event message is on the display you may either:

- Press **(WRITE)** to transmit a Sys-Ex All Data Dump. This allows the current contents of the RAM (presets and global parameters) to be saved to an external device; or
- Press **(SYSTEM)** to display the Hard Reset (reinitialization) prompt. Pressing write while this prompt is displayed will reinitialize the system and possibly cure the problem causing the error loop. Pressing any other key will return to the reset cycle.

FUSE RATINGS

Fuse Location	UL and IEC rated fuses
	(100V, 120V, 230 and 240V)
F1	(T)1.0A Slow Blow
F2 and F3	(F)2.0A
F4 and F5	(F)1.6A

MECHANICAL ISSUES

- **DP/4+ case** (avoid stripping screws): Care should be taken when assembling or disassembling any part of the DP/4+. **Avoid over-tightening screws when repairing a unit! Use no more than 8 inch/lb. of torque when tightening any screw.** The DP/4+ case is made of aluminum extrusions and steel. Some parts are held in place by screws that tighten into aluminum mounting rails that are part of the case. When replacing any of these screws, it is possible to over-tighten the screws and strip out a hole.
- **Headphone jack** : All but about 25 units with serial numbers before 10843 were built with the left and right leads to the headphone jacks reversed. This results in the left and right audio signals being swapped in the headphones only. To remedy this, simply swap the yellow and red leads on the headphone jack.
- **High Retention Force Connectors** (Repair Technicians Label): Inside the DP/4+ is a warning/information label just for you. We wanted to let you know that we use high retention force connectors in the DP/4+. This means it is very difficult to remove a connector by just pulling. We recommend using a scribe, screwdriver, or similar object when disconnecting cables. **Please don't pull on the wires!**

☹ We have found that some units develop further problems once a module has been replaced. This may be the result of improper handling of cables. We recommend removing cable connectors using the angled end of a scribe (see figure 4).



Figure 4 - Correct tool for removing cables

Scribes can be found in the following catalogs:

- Techni-Tool catalog 49, page 185, part number 400PR144.
- Newark catalog 112, page 1115, part number 76-1510.

HOW THE DP/4+ WORKS

The DP/4+ is a very powerful computer based on the processing power of ENSONIQ's **ESP** chip. There are 5 PCB's inside the DP/4+. There is an analog board, a digital board, a power supply board, a front panel board, and a jack board for the front panel inst/mic jack.

The analog board has all of the analog inputs and outputs connected to it. It has the analog-to-digital converters, the digital-to-analog converters and the mic/guitar input preamp. The analog board has the analog voltage regulators on it.

The digital board has 4 ENSONIQ ESP chips on it, the microprocessor, the operating system EPROMS, footswitch and MIDI jacks and the system RAM and ROM. It has the regulator circuitry to supply the regulated DC to the ESP chips.

The power supply board has the AC transformer, rectifier circuitry, and regulators for the digital DC voltages. It supplies rectified DC to the analog board and regulated DC to the digital board.

The front panel board has the display LED's, LCD, encoder knob, system switches, input and output level controls, and input/output preamps.

The front panel mic/guitar input jack resides on its own PCB that provides static discharge protection and noise filter capacitors.

Figure 5 is a block diagram that shows the DP/4+ modules.

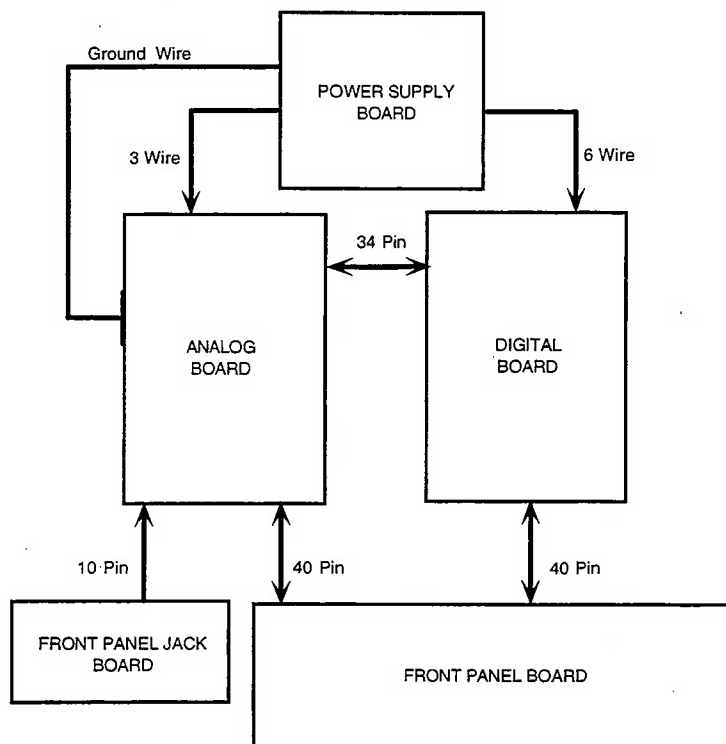


Figure 5-DP/4+ Modules

TROUBLESHOOTING

Often the faulty module in a DP/4+ can be determined through normal use. Sometimes it is difficult to isolate the problem. When troubleshooting a DP/4+, be sure no devices are connected to the MIDI ports. It is also important to be sure the DP/4+ is plugged into a properly grounded outlet.

You should always follow this sequence when troubleshooting a DP/4+:

1. Reinitialize the unit.
2. Check the power supply voltages.
3. Run system tests.

Following this sequence will often save you time and save your customer money.

Remember to always follow safety precautions to safeguard yourself, your test equipment, and the unit you are repairing.

The following chapters include troubleshooting and repair information.

CHECKING THE POWER SUPPLY

☠ Some DP/4+ problems may be related to a faulty power supply. You should check the power supply before troubleshooting the rest of the unit. **Measure continuity across all the fuses to make sure they are not blown.**

Make sure the jumpers are properly configured for your AC supply voltage. The power supply in the DP/4+ can be configured to work with either 100/115 volts or 230/240 volts by configuring jumpers R1, R2, and R3 on the power supply PCB and using the appropriate AC supply cord. For 100/115 volts R1 and R2 are installed, and R3 is removed. For 230/240 volts R3 is installed and R1 and R2 are removed.

Make sure all the cable connections are secure and correct. Plug the DP/4+ in and turn it on. After the unit has warmed up for five minutes, check the voltages at the specified points. It is normal for line voltage to vary +/- 10%. If the voltages fall outside of allowable limits, follow the procedure described under TESTING THE POWER SUPPLY UNLOADED (PAGE 10).

AC LINE VOLTAGE CHECK POINTS

The AC line voltage should be the same voltage that appears at the wall socket that the DP/4+ is plugged into.

If the AC line voltage is not correct, there could be a problem with the power supply cord or the power switch. Check the connections between the power switch and the power supply board very carefully. The power supply board is labeled as to which colored wire from the power switch connects to which lug on the power supply board.

☠ With the power switch in the **OFF** position, the proper AC line voltage should be read at the AC line input jack between the **Live** line lug and the **Neutral** line lug. These test points are labeled **L** and **N** on the power supply PCB.

☠ With the power switch in the **ON** position, the proper AC line voltage should be read at the power switch between the switch **Hot** lug (blue wire) and the switch **Neutral** lug (orange wire).

POWER SUPPLY VOLTAGE CHECK POINTS

⚠️ Below are the voltage ranges for proper operation of each fully loaded supply and the pins to read across with the voltmeter. It is normal for the voltage to vary $\pm 10\%$. The +5D, +5M and +VD voltages are read at J13 on the digital board. The +VA, -VA and -VD voltages are read at J3 on the power supply (PS) board.

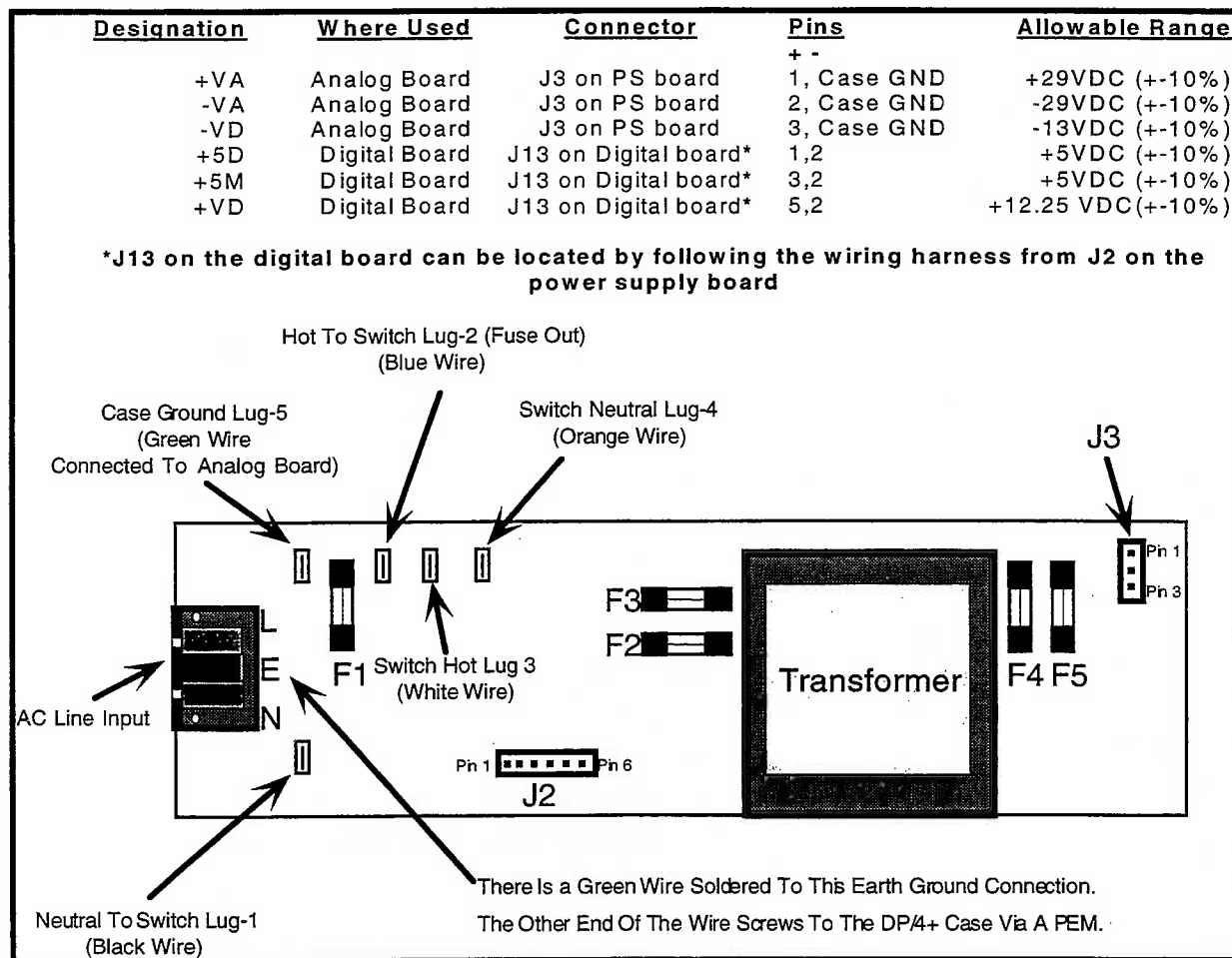


Figure 6 - Power supply voltages and test points

TESTING THE POWER SUPPLY UNLOADED

If the power supply readings exceed the specified tolerance, it is possible that a component on another board is defective and causing the problem. In this case, you should test the power supply unloaded before proceeding. This involves turning the unit **off**, unplugging circuit boards from the power supply one at a time, and measuring the power supply again to see which board might be causing the problem. Use the flow charts in figures 7 and 8 to guide you through this process.

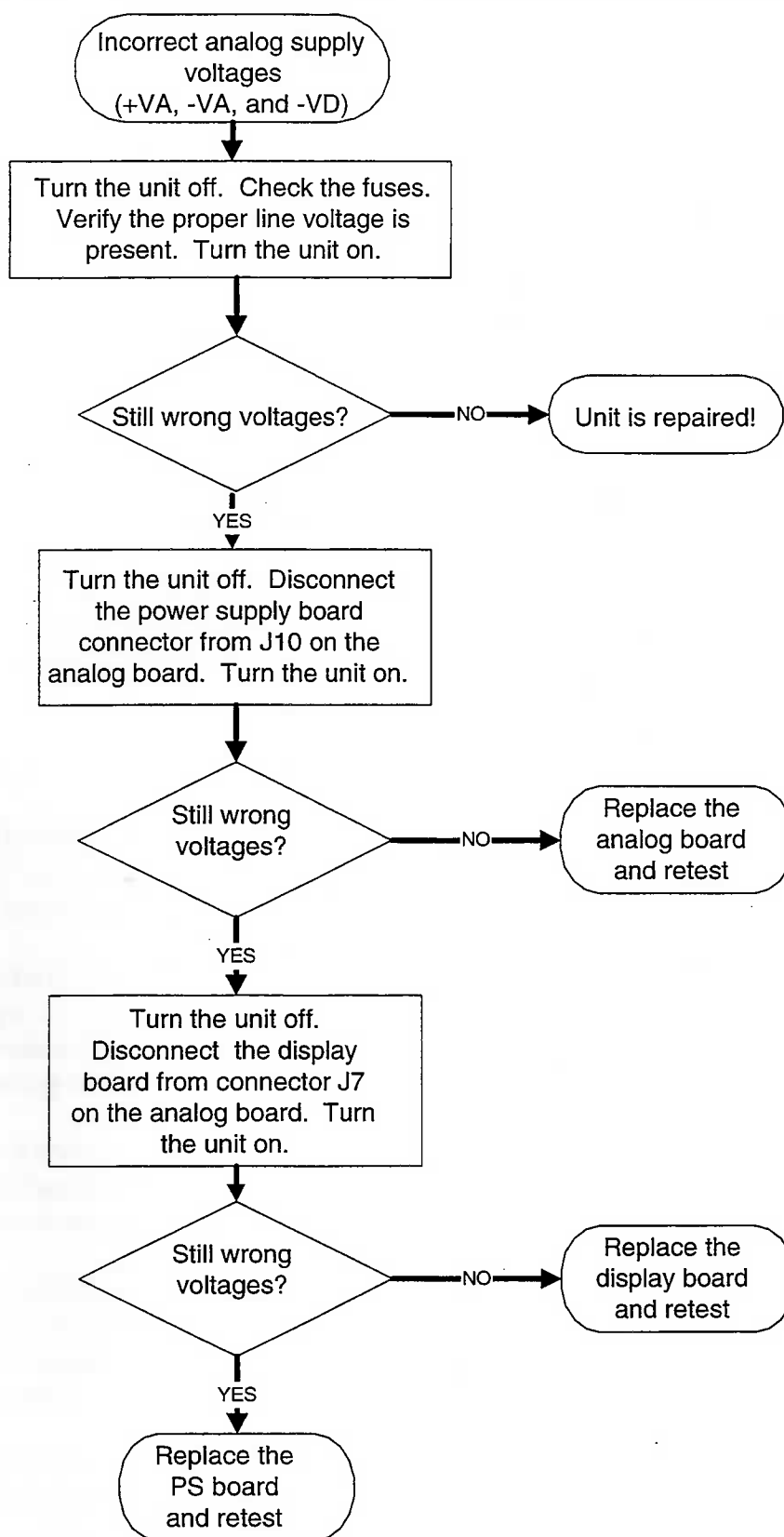


Figure 7 - Testing a unit with bad analog voltages

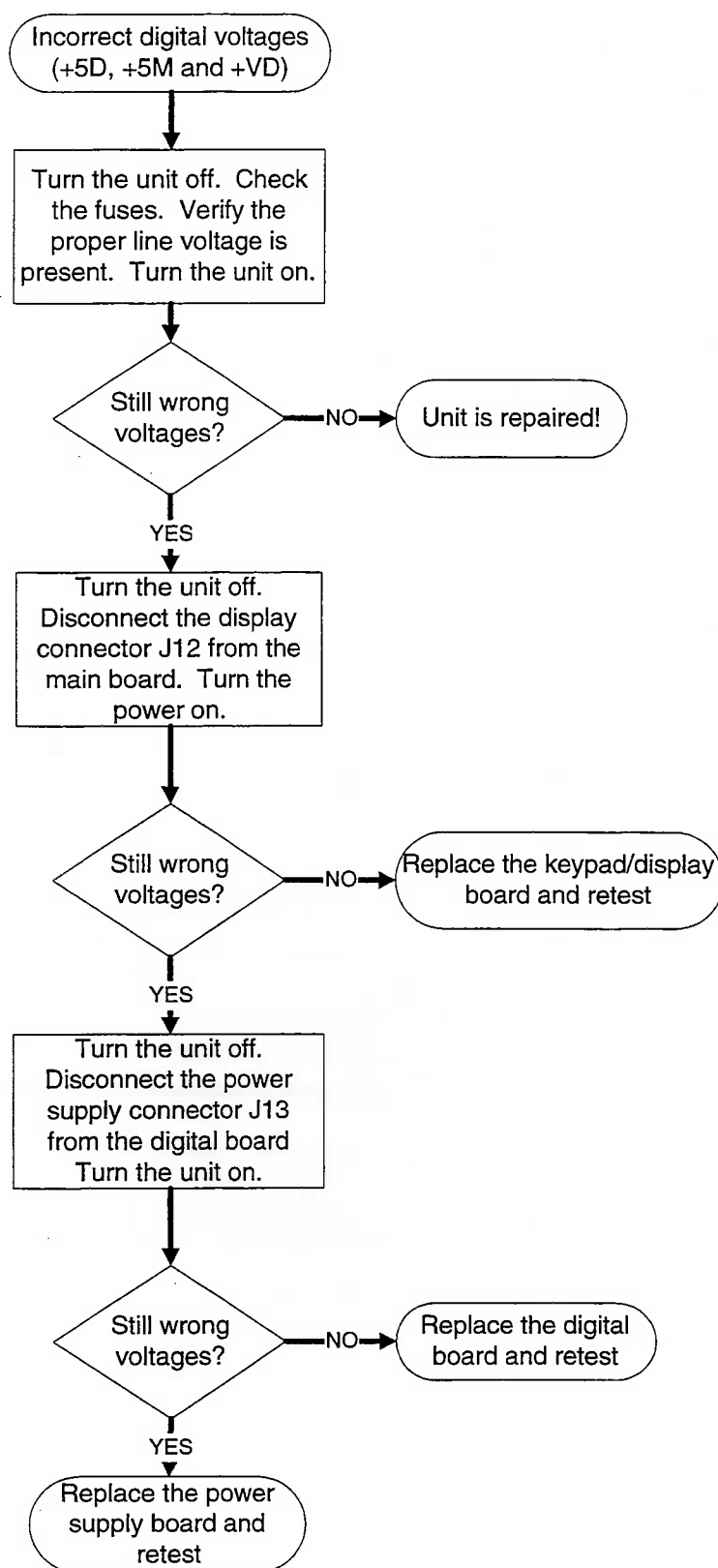


Figure 8 - Testing a unit with bad digital voltages

LOW BATTERY MESSAGE



Figure 9- A DP/4+ displaying this message needs service.

This message can mean one of the following:

1. The static RAM backup battery voltage is low and the battery should be replaced within a week to avoid possible data loss.
2. There is a problem with the digital board.

Measure the battery voltage. If it is below 2.7VDC, order a replacement battery from ENSONIQ customer service and replace it. If the battery voltage is 2.7VDC or above, order a replacement digital board from ENSONIQ customer service.

BATTERY CAUTIONS

In order to comply with safety agency requirements, translations of the warning on the battery label inside the KT are listed here.

English CAUTION!

Danger of explosion if battery is incorrectly replaced. Replace only with the same or equivalent type recommended by the equipment manufacturer. Discard used batteries according to manufacturer's instructions.

Denmark ADVARSEL!

Litiumbatteri - Eksplosionsfare ved fejlagtig håndtering. Udskiftning må kun ske med batteri af samme fabrikat og type. Lever det brugte batteri tilbage til leverandør ren.

Finland VAROITUS!

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

Sweden VARNING!

Explosionsfara vid felaktig batterityp. Använd samma batterityp eller en ekvivalent typ som rekommenderas av apparattillverkaren. Kassera använda batteri enligt fabrikantens instruksjon.

TEST PROCEDURES

The DP/4+ is heavily software-dependent, in many cases a DP/4+ that appears to be broken may simply need to be reinitialized. Please see page 2 for more information on reinitialization.


The following test procedures will insure a thorough testing of the DP/4+. This will help qualify customer complaints about: MIDI malfunctions, audio quality, controller problems, foot switch or pedal problems, and memory problems.

A failure of a particular test will indicate which module is malfunctioning. If the MIDI test failed, for example, that would indicate that the digital board needs to be replaced (see step 5 on page 14 under SELECTING TEST MODE).

To Do The Following Built-in Tests You Need:

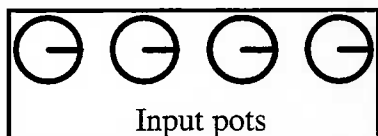
- a short MIDI cable
- 4 short mono 1/4" audio cables
- a CV pedal (ENSONIQ CVP-1)
- a dual foot switch (ENSONIQ model SW 5 or SW10)

Prepare The DP/4+ For The Built-in Tests:

 Do not leave headphones plugged into the DP/4+ during these tests. The DP/4+ may make some loud noises at the headphone jack during these tests.

1. Make sure the +4/-10 dB switch is set at +4dB (UP position).
2. Set the front panel pots as follows:

Turn the input pots to the right,



and turn the output pots to the right.



3. Plug in all test cables:
 Plug the 4 mono to mono cables as follows:
 Output 1 to Input 1.
 Output 2 to Input 2.

Output 3 to Input 3.
Output 4 to Input 4.

Plug the MIDI cable into the MIDI In and MIDI Out jacks.

4. Turn the unit on and reinitialize (make sure all of the customers data is saved before reinitializing. See page 2 for save procedures):

While holding down (SYSTEM•MIDI),
Press the (B) button.
Press the (▶) button.

5. The Display should read:



6. Press (WRITE).

SELECTING TEST MODE

1. While holding down (SYSTEM•MIDI), quickly press (CONFIG).
2. The display should read :



3. Press (WRITE). The display should read:



4. Press (WRITE).
5. Then the test software will proceed to loop through the following tests:

ROM CHECKSUMS - Failure of this test indicates a problem with the digital board

MIDI LOOPBACK. - Failure of this test indicates a problem with the digital board

ESP DRAM. - Failure of this test indicates a problem with the digital board

OS RAM. - Failure of this test indicates a problem with the digital board

AUDIO LOOP TEST - If this test fails go to page 16 and follow the procedures there for troubleshooting a DP/4+ with distorted audio.

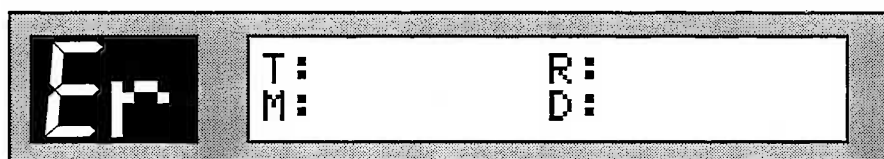
ESP MAC Test - Failure of this test indicates a problem with the digital board

TEST STATUS - See viewing test failures below

VIEWING TEST FAILURES

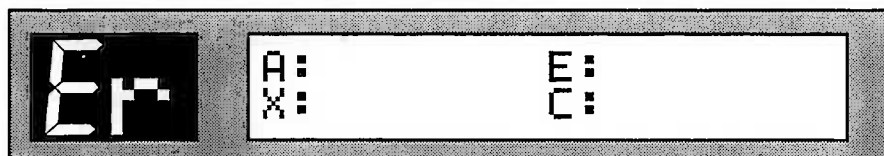
If the LED display is flashing "Er" then an error has occurred.

Press (◀) to display the primary test status screen.



T:	Total	The total number of times the test cycle has started since the test procedure was initiated.
R:	RAM	OS RAM test failures
M:	MIDI	MIDI loopback test failures
D:	DRAM	ESP DRAM failures

Press (▶) to display the 2nd test status screen.



A:	Audio	Audio loopback test failures.
E:	ESP	ESP download errors (<i>Flashing RED unit LEDs indicate which units had the responsible ESP(s).</i>)
X:	MAC	ESP MAC (multiply/accumulate) test failures (<i>Flashing AMBER unit LEDs indicate which units had the responsible ESP(s).</i>)
C:	Checksum	EPROM Checksum test failures.

Press (CANCEL•UNDO) to exit the built-in tests.

MUTE OUTPUTS AND MIC GAIN BUTTONS TEST

Run the built-in tests (see page 14).

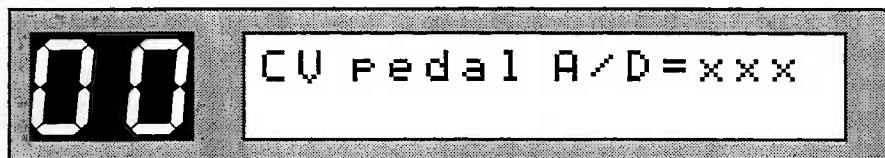
After the built-in tests have passed for at least 5 cycles, press **(MUTE•OUTPUTS)** so the button LED is on. Make sure the next cycle of the audio loopback test fails for all four channels. Press **(MUTE•OUTPUTS)** so the button LED is off. Make sure the next cycle of the audio loopback test passes for all 4 channels.

Press **(MIC•GAIN)** so the button LED is on. Make sure that the next cycle of the audio loopback test fails for channel 1 only. Press **(MIC•GAIN)** so the button LED is off. Make sure the next cycle of the audio loopback test passes for all 4 channels.

Press **(CANCEL•UNDO)** to exit the built-in tests.

CV PEDAL TEST - Failure of this test indicates a problem with the digital board

1. Plug the CV pedal into the CV pedal jack on the back of the DP/4+.
2. While holding down **(SYSTEM•MIDI)**, quickly press **(C)**.
3. The display should read:



4. With the CV pedal fully DOWN the reading should be between 152 and 225.
5. With the CV pedal UP the reading should be 000.
6. Disconnect the CV pedal. The reading should be between 234 and 255.
7. Press **(CANCEL)** to exit the CV Pedal Test.

BATTERY BACKUP TEST - Failure of this test indicates a problem with the battery or the digital board

- a. Turn power OFF to the DP/4+, then turn power back ON.
- b. Press **(WRITE•COPY)** 2 times. The display should read:



- c. Use the data entry knob to change a letter in the name. **NOTE! Remember the new name.**
- d. Press **(WRITE•COPY)**. The display should read:



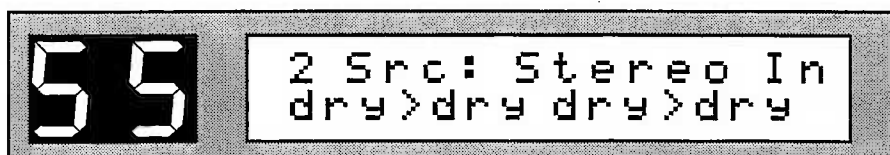
e. Power the unit OFF & ON 4 times. Then power OFF one more time and wait 10 seconds.

f. Power ON the unit. The display should read:

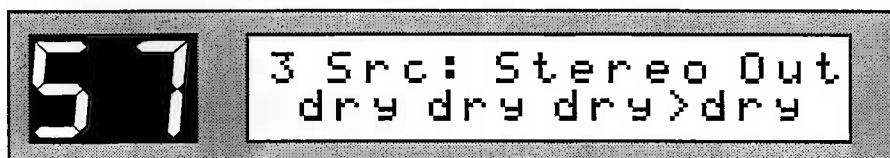


INPUT CONFIGURATION LEDS

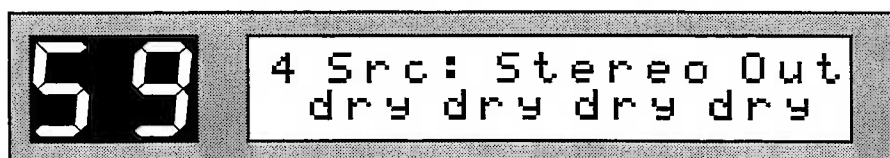
- Make sure the Input Configuration 1 source LED is ON.
- Press **(CONFIG)** and the *Config* LED should light.
- Turn the data knob until the dual 7-segment display reads 5 5. The display should read:



- Press **(SELECT)**.
- The 1 source LED should turn OFF and the 2 source LED should turn ON.
- Turn the data knob until the dual 7-segment display reads 5 7. The display should read:



- Press **(SELECT)**.
- The 2 source LED should turn OFF and the 3 source LED should turn ON.
- Turn the data knob until the dual 7-segment display reads 5 9. The display should read:



- Press **(SELECT)**.
- The 3 source LED should turn OFF and the 4 source LED should turn ON.

KEYPAD/DISPLAY TEST- Failure of this test indicates a problem with the keypad/display board or digital board, as indicated.

Plug the dual footswitch into the footswitch 1 jack on the back of the DP/4+.

While holding down the **(SYSTEM•MIDI)** button, press the **(CANCEL•UNDO)** button.

The display should be blank (the display is in self-test mode).

Test every button except **(MUTE•OUTPUTS)** and **(MIC•GAIN)** by pressing the button and verifying the correct message is displayed. Each time a button is pressed the display should read "BUTTON #XX" where XX is the button number.

<u>Button Pressed</u>	<u>Display Should Read</u>
(WRITE•COPY)	BUTTON #10
(CANCEL•UNDO)	BUTTON #8
(◀)	BUTTON #12
(▶)	BUTTON #11
(SELECT)	BUTTON #13
(EDIT•COMPARE)	BUTTON #9
(SYSTEM•MIDI)	BUTTON #5
(A)	BUTTON #4
(B)	BUTTON #3
(C)	BUTTON #2
(D)	BUTTON #1
(CONFIG)	BUTTON #0

Test Footswitch 1 by pressing the left pedal then the right pedal (a failure here indicates the digital board is at fault).

<u>Pedal Pressed</u>	<u>Display Should Read</u>
Left	BUTTON #14
Right	BUTTON #6

Remove the Dual Piano Footswitch from Footswitch 1 and plug into Footswitch 2.

Test Footswitch 2 by pressing the left pedal then the right pedal (a failure here indicates the digital board is at fault).

<u>Pedal Pressed</u>	<u>Display Should Read</u>
Left	BUTTON #15
Right	BUTTON #7

Test the front panel LEDs (excluding the signal/peak LEDs) by holding down the **(CONFIG)** button and pressing **(A)**.

The dual 7 segment display should show "8.8."

Turn power to the DP/4+ OFF, then turn it back ON

AUDIO TESTS/TROUBLESHOOTING A DP/4+ WITH DISTORTED AUDIO

To do these tests you need:

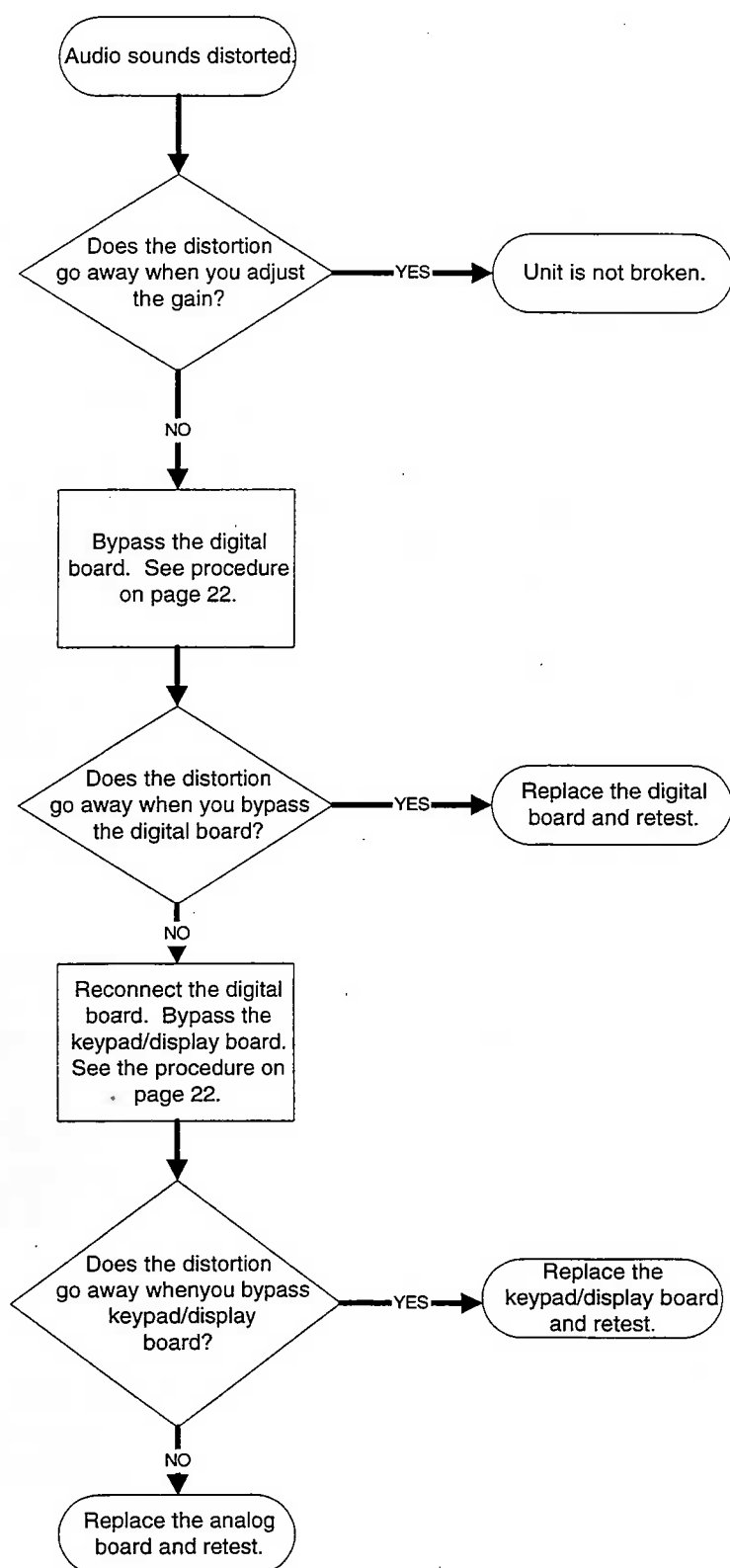
- Headphones
- An audio signal source such as a function generator or a synthesizer.

This audio test is admittedly a subjective test. If you have a customer that is complaining about certain audio problems, you should try to get the customer to demonstrate them to you. Often problems that may appear at first glance to indicate a DP/4+ problem may actually be a problem with the gain structure of the system the customer is inserting the DP/4+ into. Due to the wide range of gain provided by the front panel input and output knobs, it is very easy to overdrive the DP/4+ or whatever is following it in the signal chain.

1. Plug a microphone (or other signal source) into the front panel microphone input jack.
2. Plug a pair of headphones into the headphone output jack.
3. Reinitialize the unit from the front panel (see page 4).
4. Press **(SYSTEM•MIDI)**.
5. Use **(▷)** to select parameter 61.
6. Use the data knob to select YES.
7. Press **(SELECT)**.
8. Press **(A)**.
9. To select presets, turn the data knob until the preset name you want is displayed, then press select to load the preset.
10. Listen to the DP/4+ through the following presets:

<u>Preset</u>	<u>Preset Name</u>	<u>Algorithms Used</u>
11	Studio Vocal 2	CMP→Pit→ddl→rev
12	Crisp VocalChain	EQU→CMP→Pit→flt
20	Rockin' Lead Gtr	AMP→SPK→Pit→ddl
38	Weird Phase Gtr	CMP→Pha→ddl→rev
44	16-Band EQ	EQU→equ+equ+equ
95	Mega Flanger	FLA→fla+fla+fla
96	Mega Phaser	ROT→Pha+Pha+Pha
97	Mega Chorus	CHO→cho+cho+cho

If you hear distortion that is not part of the preset, first adjust your gain and see if the distortion goes away. If it does, there is no problem with the DP/4+. If the distortion persists, there may be a problem with the analog board, display keyboard, or the digital board. Use the flow chart on the next page to help decide which module is at fault.


**Figure 10-** Troubleshooting a DP/4+ with distorted audio

BYPASSING THE DIGITAL BOARD:

1. Unplug all cables from the DP/4+, including the power cord.
2. Remove the lid from the DP/4+.
3. Remove the ribbon cable from connector J9 on the analog board.
4. Install the bypass test board on connector J9, making sure pins 1 and 34 are aligned with pins 1 and 34 on the test board.
5. Connect the ribbon cable you removed in step 3 to the 34-pin connector on the bypass test board. The digital board is now bypassed. The signal from the analog-to-digital converter on the analog board is being sent directly to the digital-to-analog converter on the analog board.
6. Connect your audio source to the DP/4+ input 1.
7. Connect the your headphones to the front panel headphone output jack.
8. Plug the DP/4+ into the AC supply.
9. Keep your hands clear of the inside of the DP/4+. Turn the DP/4+ power on.
10. Retest the DP/4+. Keep in mind, the signal and peak lights will not function, and you will be able to select presets, but the input signal will not be altered by the effects.
11. If the distortion is gone, replace the digital board. If the distortion still persists, follow the procedure for bypassing the keypad/display board.

BYPASSING THE KEYPAD/DISPLAY BOARD:

1. Unplug all cables from the DP/4+, including the power cord.
2. Remove the lid from the DP/4+.
3. Disconnect the 40-pin cable from J7 on the analog board.
4. Install the 40-pin connector on the bypass test board on J7 making sure that pins 1 and 40 are aligned with pins 1 and 40 on J7.
5. Connect the ribbon cable you removed in step 3 to the 40-pin connector on the bypass test board. The audio path through the front panel board is now bypassed.

 **Note that there is no longer any front panel input or output control on the DP/4+. You will have to control your levels from the audio source. Start with your source level turned all the way down. Then turn it up gradually, until you have enough signal level to test the DP/4+.**

6. Connect your audio source to the DP/4+ input 1.
7. Connect the your headphones to the front panel headphone output jack.
8. Plug the DP/4+ into the AC supply.
9. Keep your hands clear of the inside of the DP/4+. Turn the DP/4+ power on.
10. Retest the DP/4+. Keep in mind, the input and output knobs will not affect the signal.
11. If the distortion is gone, replace the keypad/display board. If the distortion still persists, and you have already bypassed the digital board, replace the analog board.

REPLACING DP/4+ MODULES

For sections A-D, refer to Figure 11, inside the back cover of this manual.

SECTION
A

Replacing The DP/4+ Digital Board

Removing:

1. Remove all of the cables connected to the DP/4+ including the power cable.
2. Position the DP/4+ on the workbench with the back of the unit facing you.
3. Remove the 10 screws and their star washers from the top cover of the unit.
4. Lift the top cover from the back, then pull it straight towards yourself to remove it.
5. Remove the nuts from the CV pedal, footswitch 1, and footswitch 2 jacks.
6. Remove the following cables and connectors from the digital board:
 - 34-pin ribbon cable from J10
 - 40-pin ribbon cable from J12
 - 6 pin connector from J13.
7. Remove the 8 machine screws that attach the digital board to the bottom of the case.
8. Lift the digital board by the front edge, and lift it out of the case.

Installing:

9. Place the new digital board inside the case, aligning the jacks and screw holes on the digital board with their appropriate holes in the DP/4+ case.
10. Replace the screws removed in step 7.
11. Replace the cables removed in step 6.
12. Replace the nuts replaced in step 5.
13. Replace the top cover, and reinstall the screws and washers removed in step 3.
14. Plug the DP/4+ into the AC supply, reinitialize the DP/4+, and retest it.

SECTION

B

☠ Replacing The DP/4+ Analog Board

Removing:

1. Remove all of the cables connected to the DP/4+ including the power cable.
2. Position the DP/4+ on the workbench with the back of the unit facing you.
3. Remove the 10 screws and their star washers from the top cover of the unit.
4. Lift the top cover from the back, then pull it straight towards yourself to remove it.
5. Remove the nuts from the inputs 1, 2, 3, and 4 jacks and the outputs 1, 2, 3, and 4 jacks.
6. Remove the following cables and connectors from the analog board:
 - 34-pin ribbon cable from J9
 - 40-pin ribbon cable from J7
 - ground wire from ground lug 1
 - 10-pin ribbon cable from J16
7. Remove the 7 machine screws that attach the analog board to the bottom of the case.
8. Lift the analog board by the front edge, and lift it out of the case.

Installing:

9. Place the new analog board inside the case, aligning the jacks and screw holes on the digital board with their appropriate holes in the DP/4+ case.
10. Replace the screws removed in step 7.
11. Replace the cables removed in step 6.
12. Replace the nuts replaced in step 5.
13. Replace the top cover, and reinstall the screws and washers removed in step 3.
14. Plug the DP/4+ into the AC supply, reinitialize the DP/4+, and retest it.

SECTION**C****✖ Replacing The DP/4+ Power Supply***Removing:*

1. Remove all cables connected to the DP/4+ including the power cable.
2. Position the DP/4+ on the workbench with the back of the unit facing you.
3. Remove the 10 screws and their star washers from the top cover of the unit.
4. Remove the 2 screws from the back of the unit that secure the AC power receptacle
5. Lift the top cover from the back, then pull it straight towards yourself to remove it.
6. Remove the following cables and connectors from the power supply board:
 - green case ground wire from lug 5
 - blue switch hot wire from lug 2
 - white wire from lug 3
 - orange switch neutral wire from lug 4
 - black neutral out wire from lug 1
 - unscrew the case ground wire from the mount on the case
 - 6 wire harness from J2
 - 3 wire harness from J3.
7. Remove the 2 screws that secure the transformer bottom bracket to the bottom of the DP/4+ case.
8. Lift the power supply board out of the unit

Installing:

9. Place the power supply board in the DP/4+ case making sure the AC receptacle is aligned with its cutout in the back of the case.
10. Replace the screws removed in step 7.
11. Replace the cables and connectors removed in step 6.
12. Replace the top cover, and reinstall the screws and washers removed in step 3.
13. Plug the DP/4+ into the AC supply, reinitialize the DP/4+, and retest it.

SECTION

D

☠ Replacing The DP/4+ Keypad/Display board

Removing:

1. Remove all of the cables connected to the DP/4+ including the power cable.
2. Position the DP/4+ on the workbench with the back of the unit facing you.
3. Remove the 10 screws and their star washers from the top cover of the unit.
4. Lift the top cover from the back, then pull it straight towards yourself to remove it.
5. Turn the unit around so the front panel is facing you.
6. Remove the following cables and connectors:
 - 40-pin ribbon cable from J7 on the analog board
 - 40-pin ribbon cable from J12 on the digital board
 - 10-pin ribbon cable from J16 on the analog board
 - 4-wire headphone jack connector from J14 on the analog board.
7. Remove the front panel input and output knobs, and the data entry knob, by pulling them straight towards you. **(On some units, the knobs may be secured by a hex head set screw. Loosen the set screw before pulling the knobs towards you.)**
8. Turn the unit so the left side is facing you.
9. Remove the three screws from the side panel.
10. Turn the unit so the right side is facing you.
11. Remove the three screws from the side panel.
12. Turn the unit so the front panel is facing you.
13. There is a silver colored metal bracket across the back of the keypad/display board, running from top to bottom. Take hold of the bracket and carefully pull it out of the unit.
14. Take hold of the black metal rail that runs along the top of the unit and carefully lift it away from the unit.
15. Take hold of the black metal rail that runs along the bottom of the unit and carefully lift it away from the unit.
16. Take hold of the handles on the front panel and slide the front panel assembly towards you, tilting the assembly down and resting it on its handles.
17. Carefully lift the keypad/display board out of the front panel assembly.
18. Remove the following cables from the keypad display board:
 - 20-pin split ribbon cable from P5
 - 20-pin split ribbon cable from P6
 - 20-pin split ribbon cable from P3
 - 20-pin split ribbon cable from P4

Installing:

19. Install the cables removed in step 18.

⊗ **Pin 1 of the split ribbon cable that connects to P5 and 6 should be oriented to pin 1 on P6. Pin 1 of the split ribbon cable that connects to P3 and 4 should be oriented to pin 1 on P4.**

20. Carefully place the keypad/display board in the front panel assembly, being especially careful to align the LED's on the board with their lenses on the assembly.
21. Hold the handles on the front panel assembly and carefully slide it back into place.
22. Replace the rails removed in steps 14 and 15, making sure the keypad/display board fits in the channels on the rails.
23. Replace the bracket removed in step 13.
24. Replace the screws removed in steps 9 and 11.
25. Replace the front panel knobs removed in step 7. Some units have "D" shaped shafts on the pots and the indicator line on the knob will automatically align with the indicator line on the front panel. Other units have round shafts. **On these units it is important to turn the pots either all the way to the left or the right and align the knob and front panel indicator lines before tightening the set screw in the knob. Care should be taken to leave some space between the bottom of the knob and the surface of the front panel, to avoid friction between the knob and the front panel.**
26. Replace the cables and connectors removed in step 6.
27. Replace the top cover, and reinstall the screws and washers removed in step 3.
28. Plug the DP/4+ into the AC supply, reinitialize the DP/4+, and retest it.

DP/4+ MODULES AND THEIR PART NUMBERS

Digital Board	4090024201
Analog Board	4090025101
Keypad/Display Board	4090024101
Power Supply Board	9710004701
XLR Jack Board	4090026301
Bypass Test Board	4090029501

Prices and exchange rates for these modules are found in the ENSONIQ schedule.

SW-10 footswitches and CVP-1 volume pedals are available for purchase from ENSONIQ customer service.

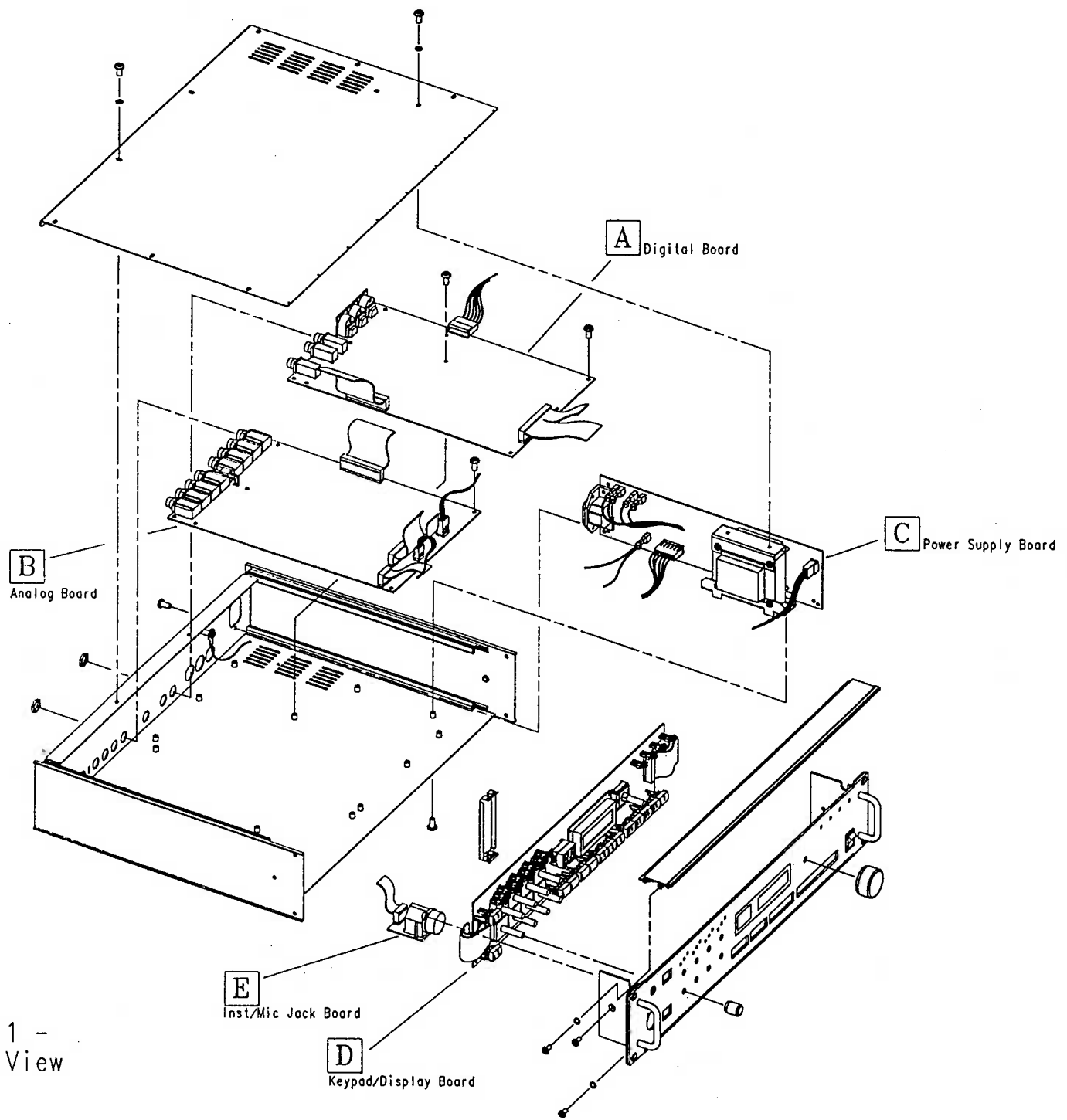


Figure 11 -
Exploded View

ENSONIQ Customer Service

Hours: Monday through Friday 9:30 AM to 6:30 PM Eastern Time
Closed for lunch 12:15 PM to 1:15 PM
Parts ordering: U.S. ☎ 1-800-441-1003 (Confidential)
Canada ☎ 1-514-633-8877
ENSONIQ Fax: 1-610-647-8908
Customer Tech Support: 1-610-647-3930*

***This is the phone number to give customers that want to contact ENSONIQ directly (U.S.A.).**

**Use the ENSONIQ Automatic Fax Retrieval System: 1-800-257-1439
or 1-610-408-0741 outside of the US**

When contacting ENSONIQ Customer Service, please have the following information ready:

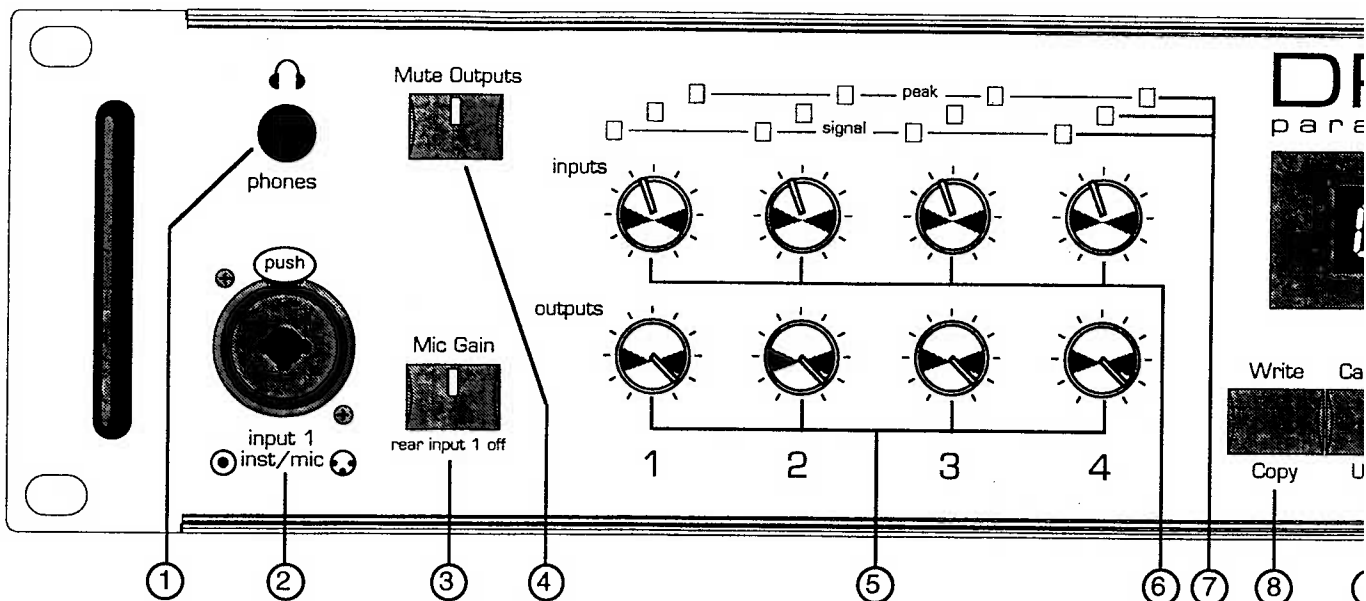
- ☞ Model Number,
- ☞ Serial Number,
- ☞ Operation System Version,
- ☞ Warranty Status, and
- ☞ Your Purchase Order Number when ordering parts.



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155 Great Valley Parkway • Malvern, Pennsylvania 19355 U.S.A.

In Canada: Kaysound Imports, Inc.
2165 46th Avenue • Lachine • Quebec, Canada H8T2P1



1. Phones

Plug headphones into this 1/4" stereo jack to listen to the DP/4+ in stereo. The signal going to this jack is from the sum of all four rear outputs, even if they are not connected. The 4 rear outputs are mapped to the stereo headphone as follows: 1 and 3 are mostly to the left; 2 and 4 are mostly to the right. Headphone volume is controlled by the **Output Knobs**. Plugging headphones into this jack does not turn off the audio in the outputs.

Warning: The headphone output circuit is designed to minimize the volume differences between low and high impedance headphones. Because some headphones are more efficient than others, set the **Output Knobs** accordingly — high output volume levels could damage your hearing.

2. Input 1 — (inst/mic)

This combination balanced XLR mic/unbalanced 1/4" mono input jack is for connecting a guitar, microphone, or any high or low impedance instrument. This jack is routed to the same input circuitry as the **Input 1** jack located on the rear panel, and is electrically equivalent.

3. Mic Gain — (rear input 1 off)

This activates the XLR Mic (microphone) input and supplies mic gain to both the Mic and Instrument inputs.

When set to Instrument (LED off):

- The XLR Mic Input is disabled.
- The 1/4" front panel Instrument input is enabled.
- Rear panel Input 1 is overridden and disabled when the 1/4" front panel Instrument input is connected.

When set to Mic (LED on):

- The XLR Mic Input is enabled.
- Mic Gain will be supplied to the XLR Mic input.
- The 1/4" front panel Instrument input is enabled.
- Mic Gain is not supplied to the 1/4" front panel Instrument input.
- Rear panel Input 1 is overridden and disabled.

4. Mute Outputs — (inst/mic)

This button is used to mute the rear panel output jacks. When the LED is on, the output jacks are muted, but the headphone output remains active.

5. Output Knobs

The four **Output Knobs** control the output level of each channel. If separate signals are being processed in the ENSONIQ DP/4+, these knobs will control the "mix-down" volumes. The maximum output level is +19 dB.

6. Input Knobs

These four input knobs control the gain applied to the input signals. The input circuitry is designed to work with signals ranging from -34.6 dBV to +22 dBu. Use these knobs to set each input to the optimal level for the signal you are feeding into it.

7. Signal/Peak LEDs

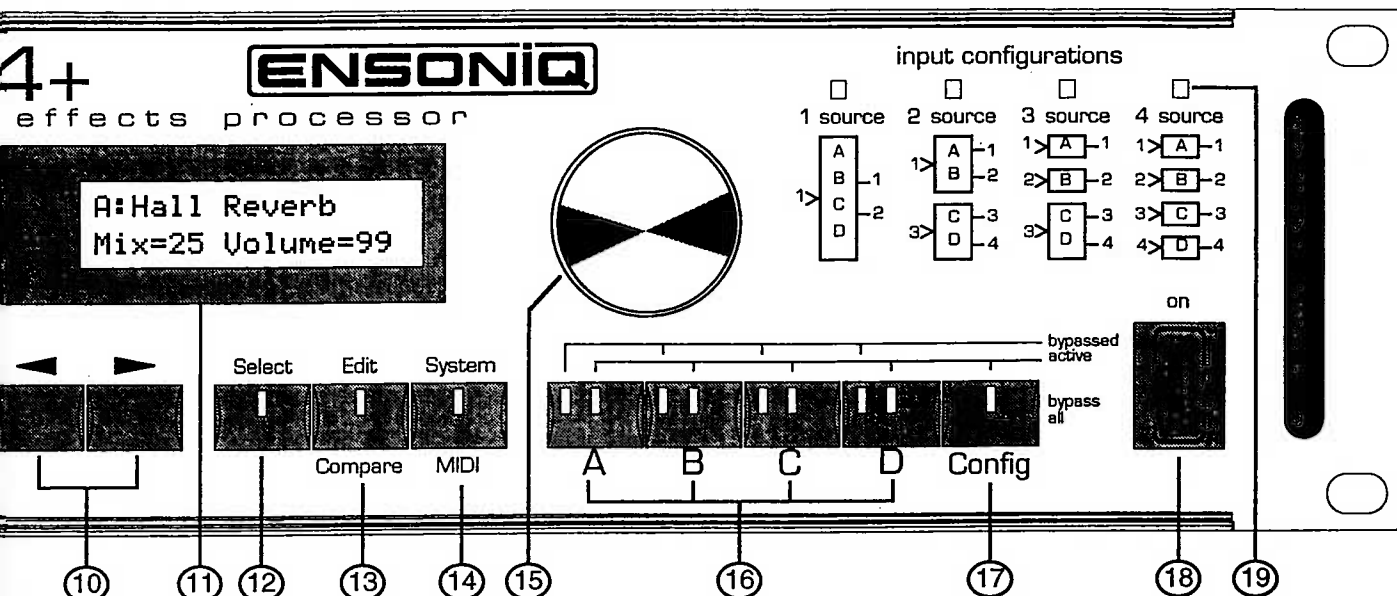
The three LEDs above each knob indicate the level of the input signal being fed into the Analog-to-Digital Converters (ADCs).

- The Signal LED (green) will light when a low level signal (-30dB) is present at the input. Extremely low level input signals may not trigger this LED.
- The middle LED (yellow) will light at -12dB.
- The Peak LED (red) will light when the incoming signal reaches -6dB below the ADC clipping point.

For optimal level, adjust the **Input Knob** so that the Peak LED flashes only occasionally. Note that the Peak LEDs indicate the levels of the input signals only and will not reflect clipping in the digital processing stages.

8. Write•Copy Button

The {WRITE•COPY} button is used to save or copy presets to the DP/4+'s internal RAM memory.



9. Cancel•Undo Button

The **Cancel•Undo** button is used to cancel command functions, return to the selected preset, or to undo your last unit or system parameter edit.

10. Left and Right Arrow Buttons

The **Left** and **Right Arrow** buttons are used to change parameters except in the Select mode, where they scroll to the next preset. Also when naming presets, they are used to change the cursor position within the name.

11. LED Numeric and LCD Display

In Select mode, the red, two-digit LED display shows the preset number. In Edit and System•MIDI modes, this display shows the currently active parameter number. This will also show a "--" when the preset number is invalid (i.e. when current settings are not saved).

The yellow, 32-character alphanumeric LCD display shows you information about parameters, presets and may also ask you for additional input.

The MIDI Message Indicator (a little red dot in the LED Display) lights when any MIDI events are received; useful for troubleshooting MIDI connections.

12. Select Button

This is used to select presets which can load effects into the units and set up signal routing parameters, depending on the type of preset selected.

13. Edit Button

This is used to edit preset parameters, edit preset titles and save presets.

14. System•MIDI Button

This is used to view and modify system (or global) and MIDI parameters.

15. Data Entry Knob

In Select mode, turning the **Data Entry Knob** will select presets. In all other modes, the knob will change value of the currently active parameter. Turning clockwise will increase and counterclockwise will decrease the values.

16. Unit Buttons

The four Unit buttons (**A**, **B**, **C**, and **D**) correspond to the four separate signal processors in the DP/4+. Use these buttons to activate a particular Unit for selecting presets or editing parameters. The yellow LED above each button will light when that Unit is active. When a Unit button is pressed a second time, it will be bypassed (the red LED will be lit). Pressing again will reactivate that Unit.

17. Config Button

This button allows you to select config presets and edit config parameters. When Config is active, the yellow LED above the button will be lit. By pressing this button a second time, you can bypass all four Units (all red Unit LEDs lit). Pressing this button a third time will reactivate the Units (no red Unit LEDs lit).

18. Power

The power switch turns the DP/4+ on and off.

19. Input Configuration LEDs

One of LEDs above the diagram will be lit, to show the currently selected input configuration.