

**-PAL Plus-  
Preamp And Limiter  
(single channel)**

**-OPS/2-  
Outboard Power Supply  
(dual channel)**

**OWNER'S MANUAL**

serial # \_\_\_\_\_ date \_\_\_\_\_  
purchased from \_\_\_\_\_

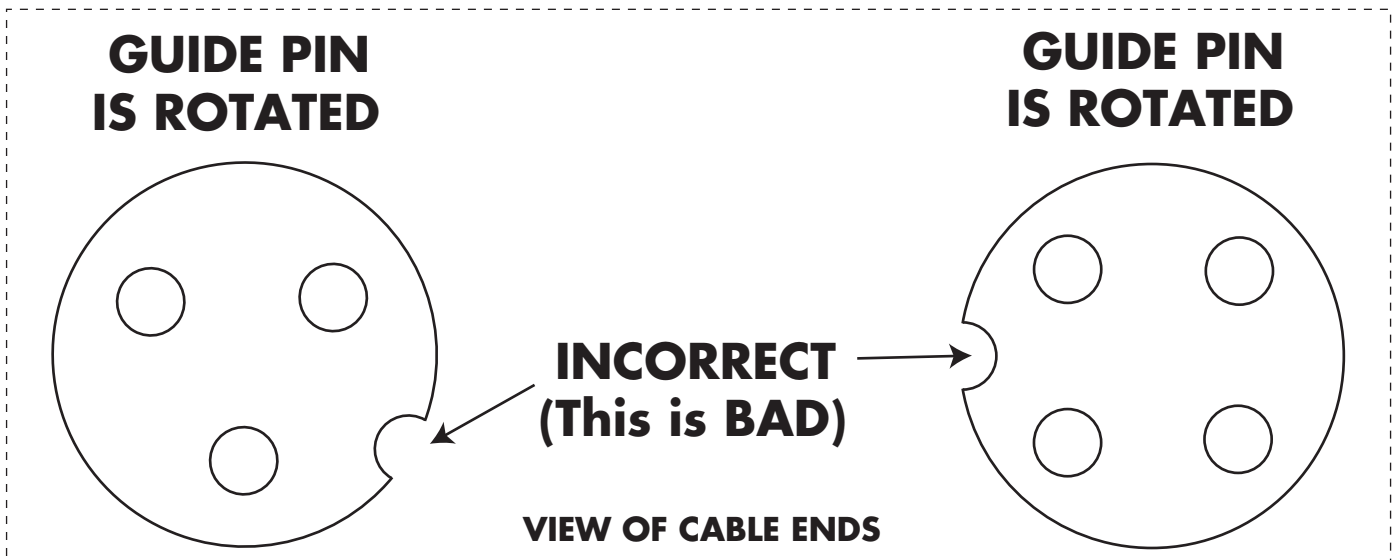
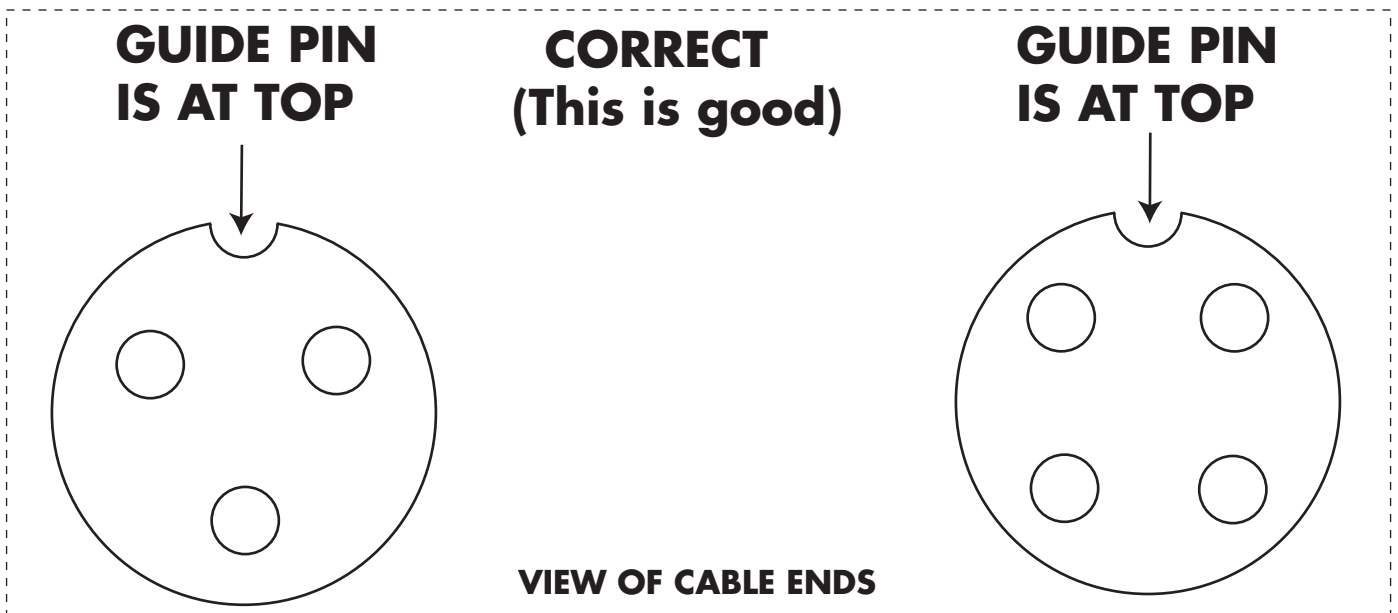
REQUISITE AUDIO ENGINEERING  
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[www.requisiteAudio.com](http://www.requisiteAudio.com)

# DO NOT CONNECT YOUR OUTBOARD POWER SUPPLY WITHOUT FIRST READING THIS:

## IT IS POSSIBLE TO MISCONNECT THE POWER SUPPLY TO THE MAIN UNIT AND CAUSE A MALFUNCTION.

SINCE THE THREE AND FOUR PIN POWER CONNECTION PLUGS HAVE A SYMETRICAL PIN SPACING, IT IS POSSIBLE TO FORCEFULLY INSERT THE CONNECTORS INCORRECTLY. INSIDE EACH SOCKET, OF THE MAIN UNIT, THERE IS A GUIDE PIN LOCATED AT THE 12:00 POSITION. THERE IS ALSO A CORROSPONDING NOTCH ON THE PLUGS AT THE END OF EACH CABLE THAT COMES FROM THE POWER SUPPLY. WHEN CONNECTING THE POWER SUPPLY TO THE MAIN CHASSIS, BE SURE THE PLUGS AND SOCKETS ARE ALIGNED WITH THE GUIDE PINS AND CORROSPONDING NOTCHES TO PREVENT HAVING A BAD DAY.



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(please complete and return to Requisite Audio)

# INTRODUCTION

THANK YOU,

for purchasing the PAL Plus, (Preamp And Limiter) by Requisite Audio Engineering.

The PAL Plus represents what a truly modern, multi-function, audio processor can be. The PAL Plus is based on a combination of our Y7 microphone pre-amplifier and our L1 optical limiter.

This design approach has yielded characteristics that include wide bandwidth, low noise, low distortion, reliability, and truly high fidelity performance, making the PAL Plus a “must have” for any rack.

All components are high quality, and point-to-point hand wired (the only circuit boards in the PAL Plus are for non-audio functions). All audio transformers are based on classic designs (upgraded wherever appropriate). Custom made polypropylene capacitors are used extensively, in the signal path. In addition, gold switches, gold and ceramic tube sockets, and special audio wire are all combined with a hi-capacity, ultra clean, outboard power supply.

Sonic excellence, versatility, and lifelong operation are handcrafted into every PAL Plus we build.

Please take a few moments to read this manual carefully as it contains information essential to the proper operation of this unit. In the unlikely event a problem should arise, please feel free to call for technical assistance at 818-837-9864.

We welcome your comments and questions, and encourage you to fill out and return the warranty registration found at the end of this manual.

Thank you again, and please enjoy!

Danny McKinney-President  
Requisite Audio Engineering

# FOR PEOPLE WHO DON'T READ MANUALS

If it is not in your nature to read manuals, at least catch the **URGENT POINTS** listed below.

## PLEASE NOTE THE FOLLOWING:

IMPORTANT SAFETY WARNING  
DO NOT OPEN THE CASE!!!  
THIS DEVICE OPERATES AT EXTREMELY HIGH VOLTAGES (350+ VOLTS INSIDE!) THAT CAN CAUSE SERIOUS PERSONAL INJURY, EVEN WHEN UNPLUGGED OR TURNED OFF!

AUDIO CONNECTIONS  
PIN 1 - GROUND  
PIN 2 - POSITIVE GOING PHASE  
PIN 3 - NEGATIVE GOING PHASE

INITIAL MIC SETTINGS  
INPUT GAIN: 9 TO 12 RANGE  
OUTPUT LEVEL: 10 TO 12 RANGE  
IF YOU ARE GETTING DISTORTION, LOWER INPUT GAIN  
IF YOU NEED HIGHER OUTPUT LEVEL, RAISE OUTPUT LEVEL

**Page 5**  
IMPORTANT NOTICE

**Page 7**  
For proper set-up and connection to the Outboard Power Supply

**Page 13**  
We want to hear from you.  
Please fill out and return your WARRANTY REGISTRATION.

# IMPORTANT NOTICE

Your Requisite shipment has been carefully inspected, checked and packaged at our company before being turned over to the carrier. We fully expect our merchandise to arrive in your hands without having been harmed.

However, at the point at which you do receive the product, it becomes your property. Therefore it is important that you carefully inspect and record any noticeable damages and report them to the transportation company within five days of the original shipment.

## **Here's what to do if the shipment has been damaged:**

Leave the product, its packing materials and box "as is". Notify the carrier's local office and request an immediate inspection of the shipment.

After said inspection has been made and you have received written notification thereof, please contact your authorized Requisite dealer or Requisite factory representative at 1-818-837-9864 for a return authorization number.

We will repair or replace any damaged merchandise as necessary.

Remember, it is your responsibility to follow the above procedures. Otherwise, the carrier will not honor your damage claim. If you have any questions regarding this notice or the shipment itself, please notify us immediately.

Thank you.

**Requisite Audio Engineering**  
**tele: (818) 837-9864**

# GENERAL NOTES

## UNPACKING AND INSPECTION

REQUISITE recommends careful examination of the shipping carton and its contents for any sign of physical damage which could have occurred in transit.

If damage is evident, do not destroy any of the packing material or the carton, and immediately notify the carrier of a possible claim for damage. Shipping claims must be made by the consignee.

This shipment should include:

- Model PAL mono pre-amp limiter
- Outboard Power Supply with attached cables
- Requisite Instruction Manual (this book)
- A.C. cable

## SERVICING

The user should not attempt to service this unit beyond that described in this manual. Refer all servicing other than tube replacement to REQUISITE AUDIO ENGINEERING. Internal voltage can exceed 350 VOLTS D.C. !!!

## ENVIRONMENTAL CONSIDERATIONS

This and all electronic equipment require adequate ventilation for safe operation and long component life. **If proper ventilation from behind the unit is provided** the PAL will only require 2 rack spaces for mounting. Do not allow the unit to become overheated. Also, while circuitry susceptible to hum pick-up is sufficiently shielded from moderate electromagnetic fields, installation should be planned to avoid mounting the system adjacent to power transformers, motors, etc.

**WARNING!**  
DO NOT OPEN THE CABINET  
RISK OF SEVERE ELECTRICAL SHOCK  
REFER SERVICE TO  
REQUISITE AUDIO ENGINEERING

# OUTBOARD POWER SUPPLY

## CONNECTION OF THE OUTBOARD POWER SUPPLY

The OPS-2 Ourboard Power Supply comes with cables for connection to either one or two PAL Plus units (3 cables each). A 4-pin connector for B+, 3-pin for Heaters and a 5-pin for connection of Meter lights and phantom power. When first connecting the power supply to a PAL unit please be sure your main power switch is turned off. Both the Power Supply and PAL Plus are clearly labeled as to which connector on the power supply goes to the mating connector of the PAL Plus. Once the connector is seated, carefully thread the ring lock of the cable to the jack on the PAL Plus. When powering only one PAL unit be sure the supplied cable caps are securely fastened to the ends of the three unused cables.

## MAINS CONNECTIONS

### GROUNDING

To comply with most Electrical Codes, the Outboard Power Supply OPS-2 is supplied with a three-wire IEC style connector, the grounding pin of which is connected to the chassis. In some installations this may create ground-loop problems. Ground loops can result in hum and buzz if a significant potential difference exists between the AC conduit ground and the grounded metal enclosure in which the chassis is installed. If hum is experienced, one may **check** for the possibility of ground-loops by using a 3-prong to 2-prong AC adapter between the power cord and the mains supply, ungrounding the AC plug **temporarily**. **This ungrounds the Model PAL, and may cure the hum or buzz, but is not a substitute for proper system grounding. A SAFETY HAZARD CAN EXIST.**

BE AWARE THAT UNLESS THE MODEL PAL LIMITER IS AC GROUNDED A SAFETY HAZARD CAN EXIST. REQUISITE AUDIO ENGINEERING ACCEPTS NO RESPONSIBILITY FOR LEGAL ACTIONS OR FOR DIRECT, INCIDENTAL OR CONSEQUENTIAL DAMAGES THAT MAY RESULT FROM VIOLATION OF ANY ELECTRICAL CODES. **DO NOT RUN THIS UNIT WITHOUT PROPER GROUNDING!!!**

### MAINS VOLTAGE

Your Model PAL was shipped from the factory ready for operation with nominal 120VAC power mains. 240VAC can be selected on the Power Supply.

### FUSE SELECTION

250volts 1 amp slo-blow (for mono unit), 2 amp slo-blow (for dual unit).

# FRONT PANEL

**MIC / LINE** (top)- This switch selects between the transformer balanced microphone input and the transformer balanced +4 line level input.

**HI-Z INPUT** (bottom) - The 1/4" jack accepts single-ended outputs ranging from guitar pick-ups to active outputs from keyboards and drum machines. It provides a high load impedance of 1.5 meg ohms and will achieve a gain of 50dB. The MIC / LINE SWITCH must be in the MIC position for the Hi-Z input to operate and be sure to unplug any mic that may still be connected.

**-20dB PAD** (top) - Applied only to the mic input before the microphone input transformer. If source volume is extremely loud and or you are using a highly sensitive microphone, the -20dB pad may be necessary to avoid distortion.

**+48V PHANTOM POWER** (bottom) - For operation of microphones requiring +48vdc phantom power.

**MIC / DI GAIN** - Provides continuously variable gain of the microphone and direct instrument inputs. When used in conjunction with the output level control the input gain can be used to create clean gain or slightly overdrive the front end. In the Line Input mode the MIC/DI control has no effect.

**MIC / DI FEEDBACK** - Provides continuously variable adjustment of the negative feedback in the Mic/DI gain stages. Set to "0" the feedback is at the factory setting of the original PAL. When set fully clockwise an additional 9dB of gain is available as well as a more "tubey" sound. In the Line mode the MIC/DI control has no effect.

**LIMITER RESPONSE** - With this control set to the "0" position the PAL Plus will provide equal compression at all frequencies. When RESPONSE CURVE is set fully clockwise, it takes 10dB more energy to initiate compression at frequencies below 1kHz. This is very useful for program material or for compressing mid to high frequencies in vocals.

**PEAK REDUCTION** - Turning this control clockwise increases the amount of gain reduction. This control should be set to the desired level of gain reduction as indicated on the VU meter in the "gain reduction" mode. A reading of -4dB to -8dB is a good range to work within, however, you are encouraged to experiment.

**OUTPUT LEVEL** - This control should be set for the desired output level (as indicated on the VU meter in the +10 mode) after the "Peak Reduction" control has been set. The PAL can provide up to 68dB of gain in the mic mode and up to 20dB of gain in the limiter mode and drive at +26dB before clipping. For use as a line amplifier be sure to turn the "Peak Reduction" control fully counter-clockwise.

**LEVELING SLOPE SWITCH** (top) - In the "down" position the PAL functions as a compressor with a ratio of 3:1. In the "up" position the PAL exhibits a mild compression until the program level reaches -30db at which point the limiting function occurs at a ratio of 10:1.

## M ADJUST

Select switch is in the Gain Reduction mode. Drift of about  $\pm 1$ dB is normal for units using photoconductive cells.

**EXTERNAL LINK** - (bottom) This switch is for whenever two PAL mono limiters are to be used as a stereo pair. In order for this switch to be effective the 1/4" link jack found on the rear panel must be interconnected (using shielded cable) to the same jack on a second PAL limiter. For best results keep the cable length to a minimum. See page 8 "Operational Notes" for instructions as to set-up and calibration for stereo use.

**METER FUNCTION SELECT** - Two types of meter readings are possible with the use of this switch. In the +4 output mode the meter shows the output level of the PAL in dB. In this position the meter is driven by a fully buffered driver circuit. In the "Gain Reduction" mode the meter will indicate 0dB until gain reduction occurs, at which time the pointer will move in a negative direction to indicate the amount of gain reduction in dB.

**METER** - Precision VU style allows for visual monitoring of the +4 output level or the amount of gain reduction achieved by the PAL limiter process. When the unit is first turned on the GR Meter mode will read slightly above 0dB. This is a normal condition. After sufficient warm-up time the meter will rest at the 0dB position. Meter illumination serves as a system pilot light.

**POWER ON / STAND-BY SWITCH** - This switch engaged UP turns the B+ power ON; engaged DOWN switches the B+power OFF (meter remains illuminated) for extended periods of none use (approx 1-2 hours).

# REAR PANEL

(left to right)

**B+ SOCKET** (top) - Accepts 4-pin connector from B+ cable on Outboard Power Supply

**Heater SOCKET** (middle) - Accepts 3-pin connector from Heater cable on Outboard Power Supply

**Meter SOCKET** (bottom) - Accepts 5-pin connector from Meter cable on Outboard Power Supply

**STEREO LINK ADJUST** (top) - Should stereo operation using two PAL mono units be desired, the gain reduction of each amplifier should be adjusted to be equal. "Calibration For Stereo Use" can be found on page 8 "Operational Notes". For mono use this control should be fully clock-wise.

**STEREO LINK JACK** (bottom) - This 1/4" jack is for interconnection between two PAL limiters. The jack can be wired full time to a second unit. Mono operation can be maintained by switching the "Stereo Link" switch (front panel) of both units to the "No Link" position. When stereo operation is desired simply place both "Stereo Link" switches to the "External Link" position. For "first-time" stereo operation follow the "Calibration For Stereo Use" instructions on page 8 of this manual.

**BALANCED XLR OUTPUT** (bottom) - This is a true, all tube, transformer balanced (+4dB) output which will easily drive any load down to 600 ohms. Pin out is as follows: PIN 1 - NO CONNECTION, PIN 2 - positive going phase (+), PIN 3 - negative going phase (-). Should unbalanced operation be required a female XLR to 1/4" (or RCA) cable can be used. Be sure pin 2 of the female XLR is wired to the tip of the 1/4" connector, and pins 1 & 3 are connected to the sleeve of the 1/4" connector.

**TUBE ACCESS CHANNEL** - This protective housing provides ventilation to the tubes and allows for easy tube replacement without the need to remove the covers of the unit, making it an important safety feature as well. Tubes run very hot and require good ventilation. Be sure when rack mounting the unit that there are no obstructions to block cool air flow.

**6072 / 12AY7 TUBE** - Microphone Amplifier (located on the lower right side of the Tube Access Channel) This circuit has been optimized around the 6072 dual triode vacuum tube which can be substituted with a 12AY7. For best performance use select high quality tubes. Replacement tubes can be obtained directly from Requisite Audio Engineering.

**12AX7 TUBE** (2ea) - Voltage Amplifier (upper right) can be substituted with a 12AY7 (lower gain will result). Control Amplifier (lower left). For best performance use select high quality tubes. Replacement tubes can be obtained from Requisite Audio Engineering.

**6AQ5A TUBE** - Optical Attenuator Driver (upper left). For best performance use select high quality tubes. Replacement tubes can be obtained from Requisite Audio Engineering.

**12BH7A TUBE** - Output Driver (upper middle) can be substituted with a 6414. For best performance use select high quality tubes. Replacement tubes can be obtained from Requisite Audio Engineering.

**BALANCED XLR MICROPHONE INPUT** (top) - Recommended for high quality balanced microphone amplification. Gain at this input is approximately 50dB and the input impedance is 150-ohm. Pin out is as follows: PIN 1 - ground, PIN 2 - positive going phase (+), PIN 3 - negative going phase (-).

**BALANCED XLR LINE INPUT** (bottom) - This is a true transformer balanced +4 input which will accept line level signals from pre-amplifiers for vocals and instruments, as well as recorded tracks for mix, sub-mix, console mix buss to tape, or any other high level source you wish to be processed through the PAL. Impedance is 10k-ohm. Pin out is as follows: PIN 1 - ground, PIN 2 - positive going phase (+), PIN 3 - negative going phase (-).

# OPERATIONAL NOTES

## CALIBRATION FOR STEREO USE

Calibration procedure is as follows:

- 1) Interconnect two PAL limiters at the 1/4" jack found on the rear panel of each unit with a shielded cable.
- 2) Connect the output of an oscillator to the line input XLR of both PAL limiters.
- 3) Set the frequency of the generator to roughly 1kHz at a level close to the average of the program material to be processed.
- 4) Set the "Peak Reduction" control (front panel) fully counter-clockwise.
- 5) Set the PAL meter select switch (front panel) on both units to +10dB output.
- 6) Adjust the PAL "Output Level" (front panel) for equal output, (0dB) as displayed on each of the units VU meters.
- 7) Set the "Stereo Adjust" control (the only pot on the rear panel) to it's fully clockwise position.
- 8) Set the "Meter Select" switch (front panel) to it's "Gain Reduction" position.
- 9) Adjust the "Peak Reduction" control (front panel) of the left channel until -7dB is indicated.
- 10) Reduce the setting of the "Stereo Adjust" control (rear panel) of the unit that shows the most gain reduction until both units show equal gain reduction.
- 11) Gain reduction will now occur equally on each unit. In operation, care should be taken to set the "Gain Reduction" control (front panel) of each channel as evenly as possible. As noted earlier in this manual, an initial setting in the -4dB to -8dB range is a good place to start.

**POWER ON** - Is use as a Stand-by mode and not a traditional power mode. For extended periods of rest (4 or more hours) be sure to turn off the power at the Outboard Power Supply.

**TUBE LIFE** - As with all tubes, their performance degrades with age. Excessive increase in noise (hiss) or microphonics can indicate the need to replace a tube.

**REPLACEMENT TUBES** - Once the need for new tubes becomes apparent REQUISITE AUDIO ENGINEERING can supply LOW NOISE TUBES for your unit.

# WARRANTY

For a period of 5 YEARS after original purchase, Requisite Audio Engineering will, free of charge, repair this product if it fails due to defective materials or workmanship. This limited warranty is subject to the following limitations:

1. Units that are discovered to have been opened or tampered with will not be covered by this warranty. We strongly discourage opening the chassis due to the risk of severe electrical shock!

2. Defects that are, in the sole judgement of Requisite Audio Engineering, the result of accident, misuse, abuse, neglect, mishandling, misapplication, faulty installation, unauthorized repair, modification, or acts of God will not be covered by this warranty.

3. In the absence of the return of the warranty registration form within 30 days of the date of original purchase, this warranty is valid for 5 YEARS from date of manufacture as determined from the units serial number and the records of Requisite Audio Engineering.

4. There are no express warranties except as listed above.

5. Tubes and light bulbs are not covered by this warranty.

6. REQUISITE AUDIO ENGINEERING SHALL NOT BE LIABLE FOR PROPERTY DAMAGE OR ANY OTHER INCIDENTAL OR CONSEQUENTIAL DAMAGE WHATSOEVER WHICH MAY RESULT FROM THE FAILURE OF THIS PRODUCT OR ARISING OUT OF THE BREACH OF THIS WARRANTY. Any and all warranties of merchantability and fitness implied by law are limited to the duration of the expressed warranty. All warranties apply only to Requisite Audio Engineering products purchased and used in the USA.

If a problem develops with this product DO NOT OPEN THIS UNIT or attempt repairing it yourself. Opening this unit will invalidate your warranty and expose you to risk of very severe electrical shock! Voltages within the chassis exceed 350 volts D.C.

REFER ALL REPAIR TO REQUISITE AUDIO ENGINEERING. Do not return the unit without authorization and instructions from us. Units must be shipped PRE-PAID both directions.

REQUISITE AUDIO ENGINEERING cannot be responsible for damage due to shipping or improper packaging. Save the original packaging.

This warranty gives you specific legal rights and you may also have other rights which vary from state to state.

# FINAL TEST

FINAL TEST SHEET (MIC @ -40dB, HI-Z @ -20dB, LINE @ 0dB)

MODEL: PAL Plus      MIC/LINE/HI-Z \_\_\_\_\_      PEAK RED \_\_\_\_\_      METER +10 \_\_\_\_\_  
SER. # \_\_\_\_\_      GAIN POT \_\_\_\_\_      OUT LEVEL \_\_\_\_\_      ST LINK \_\_\_\_\_  
DATE \_\_\_\_\_      PAD SW. \_\_\_\_\_      RATIO SW \_\_\_\_\_      ST ADJ \_\_\_\_\_  
TEST BY \_\_\_\_\_      PHANTOM \_\_\_\_\_      METER GR \_\_\_\_\_

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## FREQUENCY RESPONSE

	MIC	LINE	HI-Z
20	_____ dB	_____ dB	_____ dB
100	_____ dB	_____ dB	_____ dB
1K	_____ dB	_____ dB	_____ dB
10K	_____ dB	_____ dB	_____ dB
20K	_____ dB	_____ dB	_____ dB
40K	_____ dB	_____ dB	_____ dB
60K	_____ dB	_____ dB	_____ dB
80K	_____ dB	_____ dB	_____ dB

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## TOTAL HARMONIC DISTORTION (THD)

	MIC	LINE	HI-Z
+4dB @ 1K (-30dB)	_____ %		
+4dB @ 1K (-40dB)	_____ %	_____ %	_____ %

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## MAXIMUM GAIN

MIC	LINE	HI-Z
_____ dB	_____ dB	_____ dB

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Requisite Audio Engineering  
tel: 818-837-9864

[www.requisiteaudio.com](http://www.requisiteaudio.com)

# WARRANTY REGISTRATION

Please fill out this warranty registration form and return it to:

Requisite Audio Engineering

MODEL PAL Plus w/OPS-2 Pre-Amp Limiter

SERIAL # \_\_\_\_\_ PURCHASE DATE \_\_\_\_\_

SUPPLIER \_\_\_\_\_

YOUR NAME \_\_\_\_\_

NAME OF COMPANY \_\_\_\_\_

ADDRESS \_\_\_\_\_

CITY, STATE, ZIP \_\_\_\_\_

TELE: \_\_\_\_\_ FAX: \_\_\_\_\_

email: \_\_\_\_\_ COUNTRY \_\_\_\_\_

COMMENTS ? \_\_\_\_\_

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