P 3800
PREAMPLIFIER
OWNER'S MANUAL

phase linear™

THE PROFESSIONAL CONNECTION

INTRODUCTION

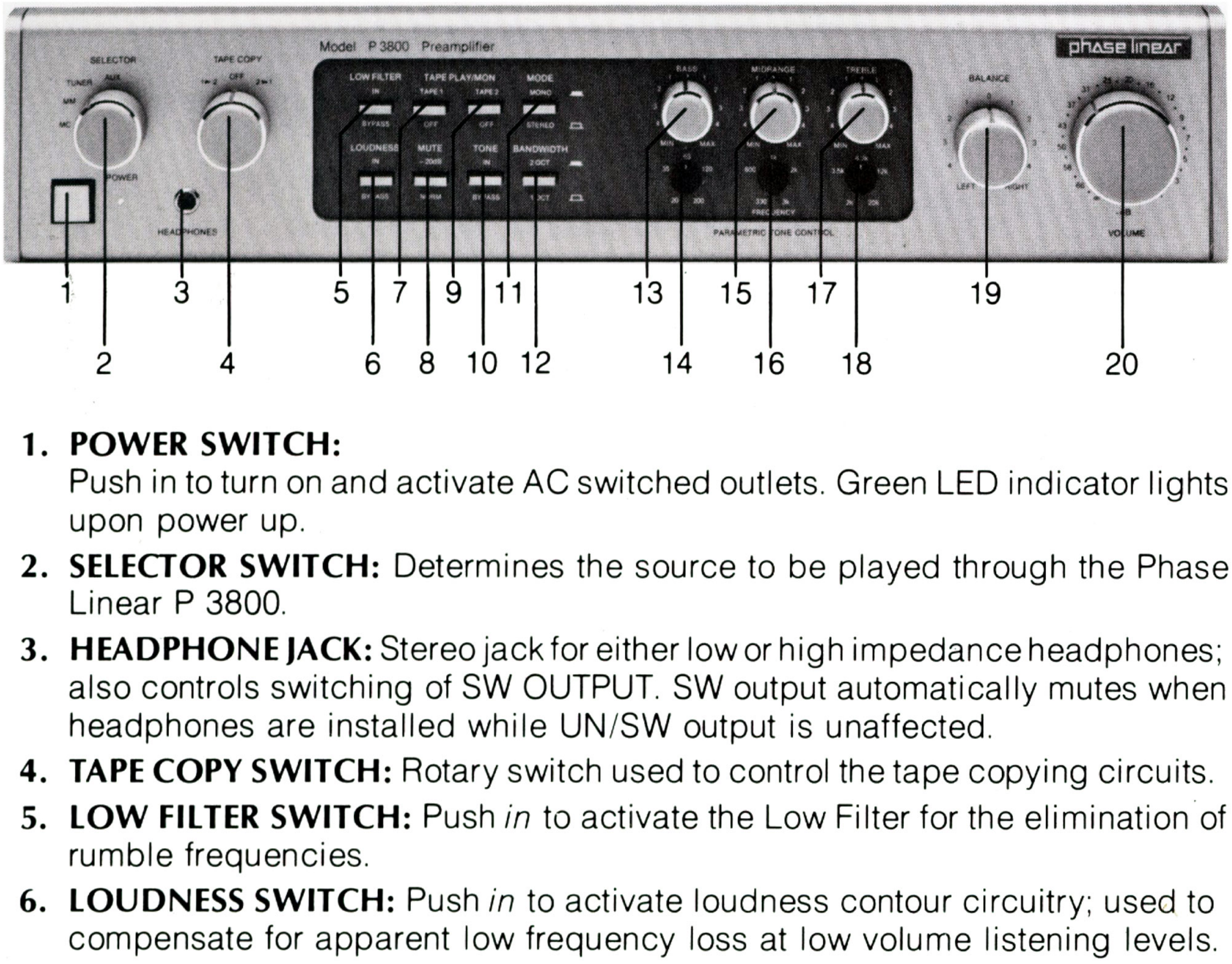
Phase Linear congratulates you on purchasing the P 3800 Preamplifier. The P 3800 is a high technology preamplifier using modern solid-state circuitry. From its fully shielded, tightly regulated power supply to its unique parametric tone controls, the creativity and craftsmanship of the P 3800 are evident. Touching a pushbutton or turning a knob will convince you of the precision and quality of the components used to make your P 3800 not only elegant to look at, but a pleasure to operate.

Considerable design effort has been put into the P 3800 to separate fact from aural fantasy, with regard to audio reproduction. Use of third-generation integrated circuits creates virtual immunity from overloading caused by either steady-state or transient effects, whether amplitude, frequency or slew induced. Absolute minimizing of non-linearities and noise allows a clarity and accuracy of sound reproduction that is unsurpassed.

You are encouraged to read the following manual in order to understand and be able to use the P 3800. Before leaving the factory your P 3800 was tested and certified to be in perfect operating condition. This manual will help you operate the P 3800 as well as keep it in excellent condition and should be put away for future reference. With care befitting all fine instruments, your Phase Linear P 3800 will provide years of musical enjoyment.

FRONT PANEL CONTROLS

Illustration 1

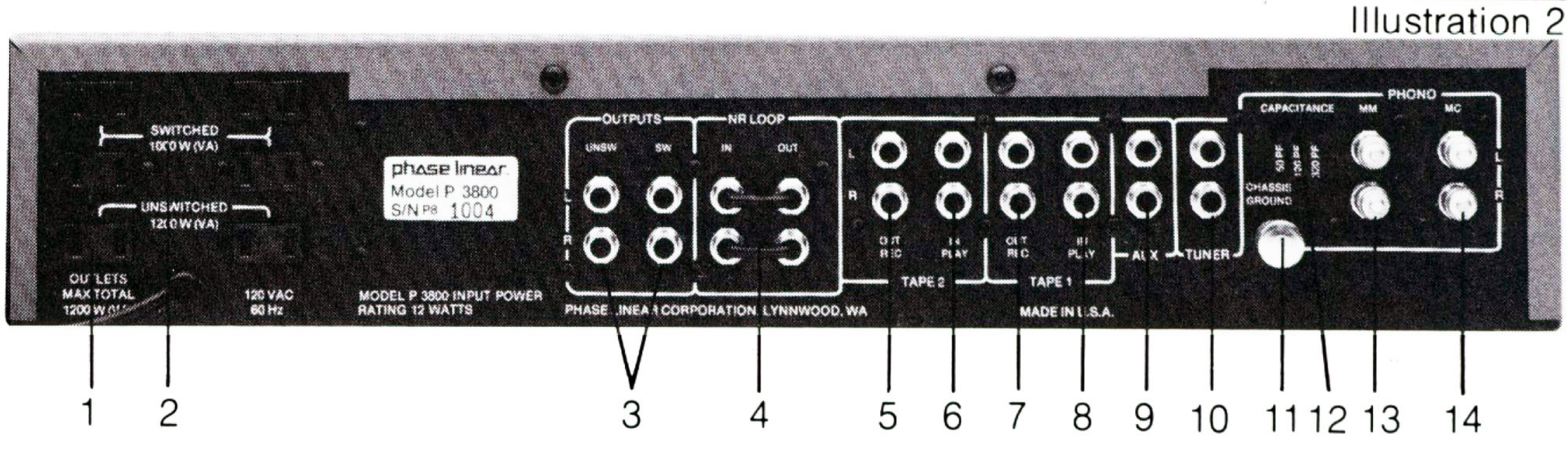


1. **POWER SWITCH:**
   Push in to turn on and activate AC switched outlets. Green LED indicator lights upon power up.
2. **SELECTOR SWITCH:** Determines the source to be played through the Phase Linear P 3800.
3. **HEADPHONE JACK:** Stereo jack for either low or high impedance headphones; also controls switching of SW OUTPUT. SW output automatically mutes when headphones are installed while UN/SW output is unaffected.
4. **TAPE COPY SWITCH:** Rotary switch used to control the tape copying circuits.
5. **LOW FILTER SWITCH:** Push *in* to activate the Low Filter for the elimination of rumble frequencies.
6. **LOUDNESS SWITCH:** Push *in* to activate loudness contour circuitry; used to compensate for apparent low frequency loss at low volume listening levels.
7. **TAPE 1 PLAY/MONITOR SWITCH:** Out for source; in for monitor or playback of Tape 1.

8. **MUTE SWITCH:** Push in to engage the — 20dB attenuator network. Used to expand the range of the Volume Control at low listening levels and for quick reductions of overall sound level.
9. **TAPE 2 PLAY/MONITOR SWITCH:** Out for source; in for monitor or playback of Tape 2.
10. **TONE SWITCH:** Push in to activate Tone circuits. With button out, Tone circuits are bypassed, providing flat frequency response.
11. **MODE SWITCH:** Push in to switch from stereo to mono operation.
12. **BANDWIDTH SWITCH:** Push in to change the Midrange Parametric Tone Control effect from 1 octave to 2 octaves.
13. **BASS AMPLITUDE CONTROL:** Clockwise rotation boosts Bass, counterclockwise cuts Bass.
14. **BASS FREQUENCY CONTROL:** Use to continuously vary the Bass turnover frequency between 20Hz and 200Hz.
15. **MIDRANGE AMPLITUDE CONTROL:** Clockwise rotation boosts Midrange, counterclockwise cuts Midrange.
16. **MIDRANGE FREQUENCY CONTROL:** Use to continuously vary the Midrange center frequency between 330Hz and 3kHz.
17. **TREBLE AMPLITUDE CONTROL:** Clockwise rotation boosts Treble, counterclockwise cuts Treble.
18. **TREBLE FREQUENCY CONTROL:** Use to continuously vary the Treble turnover frequency between 2kHz and 20kHz.
19. **BALANCE CONTROL:** Use to shift stereo image to the right (CW), or to the left (CCW). The center position is identified by a positive detent.
20. **VOLUME CONTROL:** Stepped attenuator featuring 32 positive detented positions. Clockwise rotation increases volume. Control is accurately calibrated in dB attenuation as shown.

REAR PANEL DESCRIPTION

Illustration 2



1. **AC UNSWITCHED OUTLETS:** Accessory outlets for turntables, fans and other equipment totalling not more than 1200 watts.
2. **AC SWITCHED OUTLETS:**
   Four outlets allowing remote equipment (not totalling more than 1000 watts) to be switched by the preamp's power switch. Maximum combined power of all outlets is 1200 watts (VA).
3. **OUTPUTS:**
   Two pair of main output jacks used to connect preamplifier via audio cables to the power amplifier inputs. Output SW is switched off whenever headphones are plugged into the front panel socket; Output UNSW is unaffected by the headphones. Both outputs may be used at once, if desired.

4. **NR LOOP:**
   Noise Reduction Loop used to patch-in a noise reduction unit or other auxiliary equipment. The links are removed and then audio cables connect the NR Loop out-jacks to the inputs of the noise reduction unit; additional cables then tie the noise reduction unit's outputs to the NR Loop in-jacks. IMPORTANT: THE JUMPER LINKS MUST BE INSTALLED IF AN OUTBOARD PROCESSOR IS NOT USED.
5. **TAPE 2 REC:**
   Record output for connection to tape record (REC) or line input jacks on Tapedeck 2.
6. **TAPE 2 PLAY:**
   Input for tape playback (PLAY) or line output from Tapedeck 2.
7. **TAPE 1 REC:**
   Record output for connection to tape record (REC) or line input jacks on Tapedeck 1.
8. **TAPE 1 PLAY:**
   Inputs for tape playback (PLAY) or line output from Tapedeck 1.
9. **AUX:**
   Inputs for auxiliary equipment (other tape decks, TVs, etc.).
10. **TUNER:**
    Inputs for AM/FM tuner.
11. **CHASSIS GROUND:**
    Used to ground turntables and other equipment.
12. **CAPACITANCE SWITCH:**
    Selection of the recommended loading capacitance. (See Operating instructions)
13. **PHONO: MM**
    For conventional moving-magnet phono cartridges with nominal outputs of 2.5mV.
14. **PHONO: MC**
    Inputs for turntable to be used with moving-coil phono cartridge or other very low output cartridges; provides 28dB more gain than moving magnet phono stage.

INSTALLATION INSTRUCTIONS

Please follow these instructions when installing the P 3800 preamplifier:

PREAMPLIFIER CONNECTIONS

1. Initial Settings:
   a. AC Line cord *not* plugged in.
   b. Power switch in *out* position.
   c. Volume control fully counterclockwise.
   d. All pushbuttons in *out* position.
   e. Balance control in center detent position.
2. External Equipment:
   a. Plug the shielded phono leads from turntable into either Phono MM (moving magnet cartridge) or Phono MC (moving coil cartridge) inputs (whichever is appropriate), first removing the factory installed shorting plugs. Always use these shorting plugs in the unused phono stage. Put the shorting plugs away for possible future use. DO NOT INSTALL THEM ANYWHERE ELSE OTHER THAN PHONO INPUTS! Plug the AC line cord from the turntable into an *un*switched AC outlet on the rear of the P 3800. Connect the ground wire from the turntable to the Chassis Ground lug. Refer to Operating Instructions

section of this manual for proper setting of the cartridge loading Capacitance switch.

b. Plug the shielded leads from tuner into the Tuner inputs and connect all other equipment such as tape decks into the appropriate inputs.
c. For proper hook-up of auxiliary equipment into the tape monitor loop refer to the manufacturer's instruction manual.
d. The bussing links connecting the NR (noise reduction) Loop outputs to inputs *must* be installed for proper operation if an outboard noise processor is not used. When using a noise reduction unit, first remove both factory installed bussing links and set aside for possible future use. Connect shielded leads from the NR Loop "Out" jacks to the noise reduction unit's input points; next plug another pair of shielded leads from the noise reduction unit's output points to the P 3800 NR Loop "In" jacks. Plug the AC line cord from the outboard noise processor into a switched outlet on the rear of the P 3800. Turn on the noise reduction unit and set all controls for normal operation.
e. Connect the P 3800's main outputs (either switched or unswitched depending on headphone listening preference - see Operating Instructions for details) to the power amplifier's inputs using shielded leads. The power amplifier may be plugged into a switched outlet on the P 3800, provided it does no exceed the maximum total of 1000 watts.

3. Power-On:
   a. Plug in the AC line cord. Leave the preamplifier turned off.
   b. Make sure the input level controls (if present) on the power amplifier are turned down and the unit is off (if controllable).
   c. Re-check all connections and turn on the P 3800 preamplifier. Wait approximately 10 seconds for the output relay to energize before continuing. The time delay-on/instantaneous-off output relay controls undesired turn-on/turn-off transients.
   d. Turn on the program source (turntable, tuner, tape, etc.).
   e. Select the desired source by rotating the Selector switch to the appropriate position.
   f. Turn on the power amplifier and, if applicable, advance its level controls. When using a power amplifier without level controls, the P 3800 Volume knob will provide sole control of the output level.
   g. Advance the P 3800 volume control until the desired level is obtained. If no sound is heard through the system, turn everything off and recheck all connections and settings.
   h. Refer to the Operating Instructions portion of this manual for correct operation of the P 3800 preamplifier.

OPERATING INSTRUCTIONS

VOLUME CONTROL AND MUTE SWITCH

The volume control in the P 3800 is a true stepped-attenuator consisting of 32 precise positions made by vapor depositing thick film resistors onto a substrate. Calibrated 1dB steps are available through the −10dB position, at which point each successive step becomes larger. If normal listening levels puts the volume control into the larger step segments, increased control will be gained by pressing the mute switch. This engages a −20dB pad and will now allow the volume control to be advanced back into the finer control zone.

LOUDNESS SWITCH Apparent loss of low frequencies at low volume listening levels may be overcome by activation of the loudness switch. Doing so engages a

volume sensitive loudness compensation circuit. Further flexibility of this function is afforded by using the mute switch in conjunction with the loudness switch. It should be noted that the amount of compensation is based upon listening tests and psychoacoustics rather than strict adherence to the famous Fletcher-Munson curves. The result is a more pleasing, natural sounding bass response at low listening levels.

HEADPHONES

The Model P 3800 incorporates a true high-fidelity headphone amplifier that powers the panel mounted jack. Use of headphones involves nothing more than plugging the headphones into the jack. All control functions remain active for use with the headphones. No circuitry is bypassed.

Headphone listeners seem to fall into two categories: Those who wish the main speakers muted while using headphones, and those who do not. For this reason, the P 3800 provides two sets of main outputs. Output SW is controlled by the headphone jack and disconnects whenever headphones are plugged in; Output UNSW is unaffected by headphone operation.

PHONO MM (MOVING-MAGNET):

For purposes of simplicity, any cartridge that is not moving-coil technology will be considered moving-magnet technology and should be connected to Phono MM for reproduction. The critical loading elements are resistance and capacitance. Resistance is fixed at 47k ohms (±1%, 20-20kHz — guaranteeing no cartridge interaction at any audio frequency) and complies with virtually every cartridge manufacturer's requirements.

PHONO CARTRIDGE LOADING

The P 3800 preamplifier is equipped with a three position selector switch for selection of the optimum loading capacitance for the phono cartridge. The switch is located on the rear of the P 3800, directly adjacent to the phono input jacks, reducing signal path travel to a minimum and preventing accidental tampering, possible if they were front panel mounted.

Three values of capacitance are available via the selector switch. Selection of the correct capacitance is done by subtracting the amount of capacitance contributed by the turntable and the input cables from the capacitance of the cartridge. If the capacitance of the turntable and cables are unknown, a reasonable value to use is 150pF. The procedure is to take the recommended value, subtract 150pF (or the exact value if known) and then position the selector switch to the nearest value. For example, most Empire, AKG and Shure cartridges require a value around 470pF. So, take 470pF minus 150pF for turntable and cables and the desired position would be 320pF.

Another example would be for ADC, Stanton and Pickering cartridges, all of which require 270pF loading capacitance. Subtracting the typical 150pF figure leaves 120pF as the correct setting for the Capacitance selector switch.

PHONO MC (MOVING-COIL): Dedicated to low output (less than 0.5 mV) moving-coil cartridge applications requiring a head amp (or pre-preamplifier) for reproduction. A transformer is not necessary for moving-coil cartridges played through the P 3800. (If a transformer is already owned and operation with it is desired, then use Phono MM inputs.) High output (greater than 0.5 mV) moving-coil cartridges should use Phono MM inputs.

TAPING OPERATIONS

Considerable thought and effort has been put into the Phase Linear P 3800 taping facilities to make them easy and flexible to use. The design of the rear panel allows for unambiguous connection of two tape decks.

The Phase Linear P 3800 preamplifier is equipped with two complete tape recording/playback circuits which provide for a great deal of flexibility. In addition to the usual record and playback facilities for two tape decks it is also possible to copy from Tape 1 onto Tape 2 or vice-versa, independent of source, thereby

allowing total use of the P 3800 during the copying process.

PLAYBACK OF TAPE 1: Press in the Tape 1 Play/Monitor switch and set the tape machine for playback operation. The position of the Selector switch is irrelevant.

RECORD ON TAPE 1: Set Selector Switch to the desired source. With the Tape 1 pushbutton in the *out* position, the source being recorded will be heard. With the Tape 1 button pressed *in,* the recording being made is monitored (assuming a 3-head machine).

PLAYBACK OF TAPE 2: Same as procedure for Tape 1.

RECORD ON TAPE 2: Same as procedure for Tape 1.

COPY TAPE 1 ONTO TAPE 2: Rotate the Tape Copy Switch to the 1-2 position and set Tapedeck 1 for play back and Tapedeck 2 for recording. Make sure the Tape 1 pushbutton is in the *out* position. With the Tape 2 button *in*, the new recording being made on Tapedeck 2 is monitored. To hear the original source (Tapedeck 1) the Tape 2 button must be in the *out* or source position.

COPY TAPE 2 ONTO TAPE 1: Rotate the Tape Copy Switch to the 2-1 position and set Tapedeck 2 for playback and Tapedeck 1 for recording. Make sure the Tape 2 pushbutton is in the *out* position. When the Tape 1 button is *in,* the new recording being made on Tapedeck 1 is monitored. To hear the original source (Tapedeck 2) the Tape 1 button should be out.

NOTE: For the correct connection and operation of auxiliary equipment normally used in the tape path, such as equalizers, refer to the respective manufacturer's instruction manual.

PARAMETRIC TONE CONTROLS The Phase Linear P 3800 has three bands of parametric tone control — Bass, Midrange and Treble. Each band has separate controls for Amplitude and Frequency. There is a Bandwidth control pushbutton for Midrange and an overall Tone bypass switch which defeats all tone control circuitry.

Illustration 3 shows the maximum Amplitude control range of each band. The maximum boost or cut for Bass and Treble is 12dB, while for the critical Midrange it is 6dB, thus allowing finer control over the audio region where a little bit goes a long way.

MIDRANGE CONTROL

The Midrange Control is a true parametric bandpass filter, whose characteristic shape may be seen in Illustration 3. The center frequency of the Amplitude control may be continuously varied between 330Hz and 3kHz, covering the entire mid-frequency area of audio.

In addition to the Amplitude and Frequency controls, there is a Bandwidth control pushbutton located in the front panel cut-out just to the left of the Bass frequency control. Pushing this switch in extends the bandwidth from one octave to two octaves, greatly expanding the area over which boost and cut will take place. (See Illustration 4).

BASS AND TREBLE CONTROL

The Bass & Treble circuits are of the "shelving" type as opposed to the bandpass shape of the Midrange control. (See Illustration 3.) The corner, or turnover, frequency points of each are continuously variable over a full decade, from 20Hz to 200Hz for the Bass frequencies, and from 2kHz to 20kHz for the Treble frequencies. (See Illustration 5). The slopes are a gentle 3dB/octave yielding the smoothest response possible. Shelving response are preferred over a bandpass shape because of the nature of system anomalies at each frequency extreme. Typically, at the low end, systems suffer from a lack of bass and what is desired is a moderate boost of the *whole* bottom octave — something that can only be accomplished with shelving controls. Likewise, at the extreme upper end, a similar requirement exists. With shelving controls there is no definition of "bandwidth", hence, no controls are necessary.

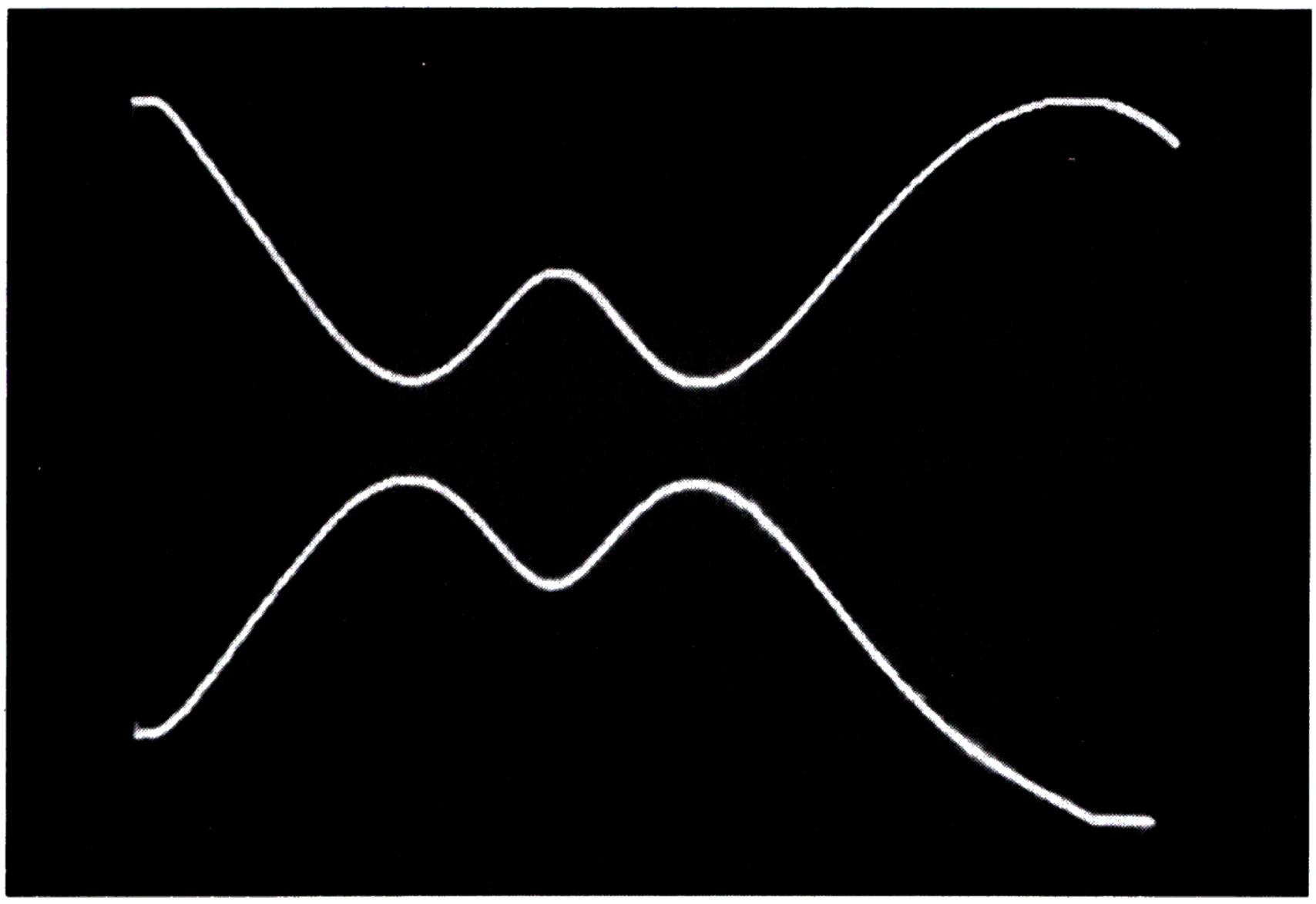
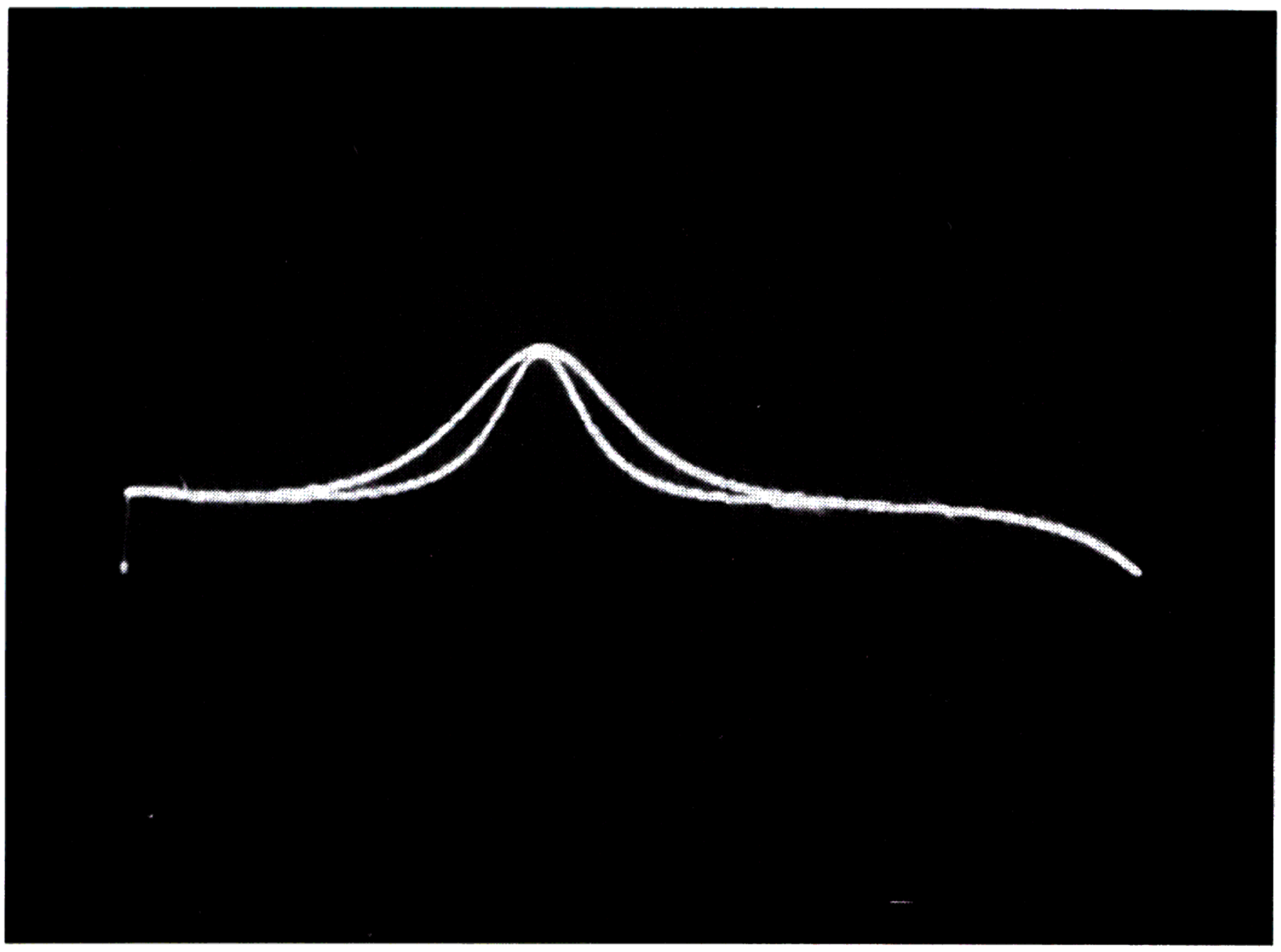


Illustration 3

Illustration 4



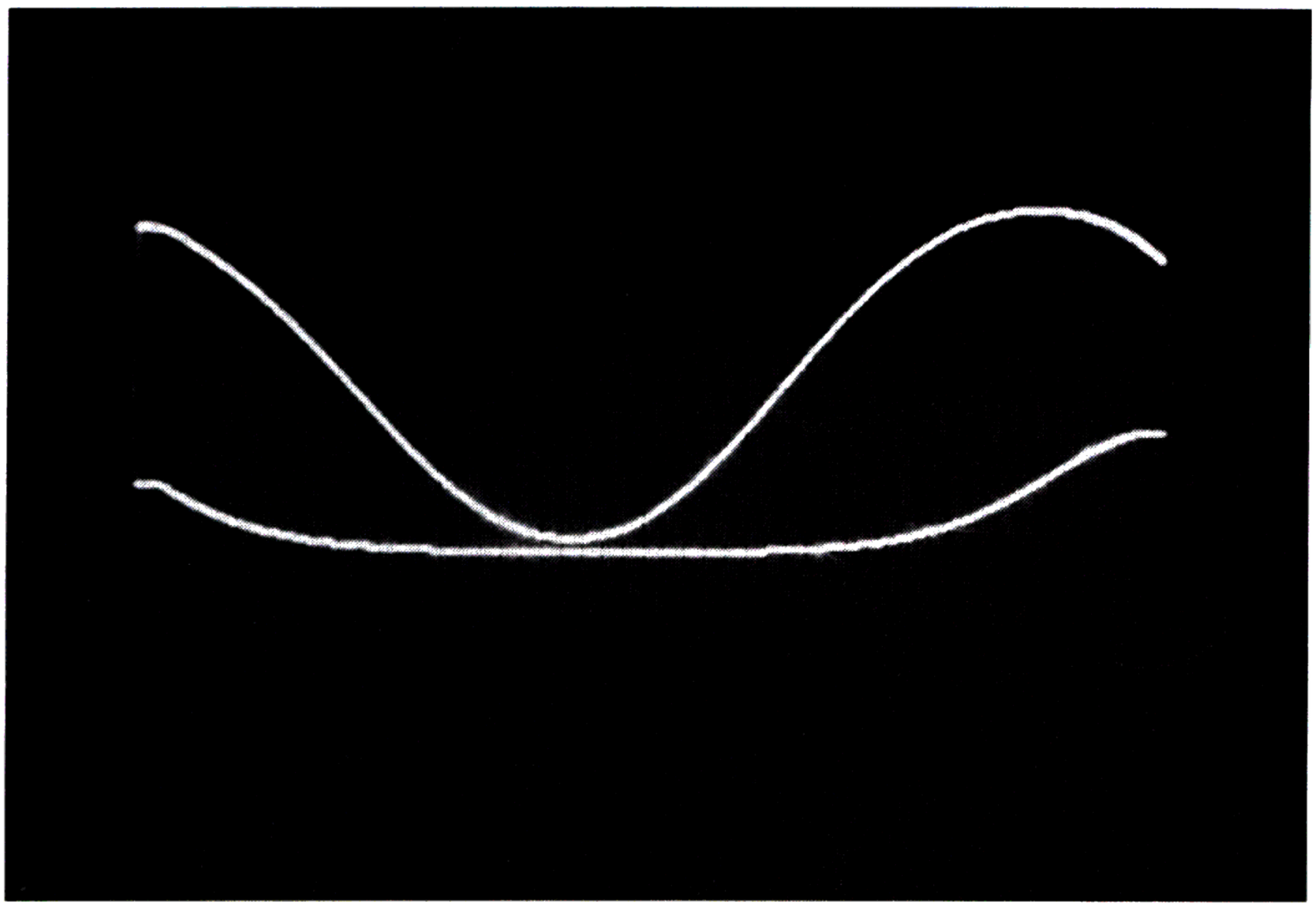


Illustration 5

TECHNICAL DESCRIPTION

The block diagram of the signal path of the P 3800 appears in Illustration 6 and is provided as a quick reference for hook-up and operation purposes.

The Aux and Tuner inputs go directly to the main Selector switch. Rated input level for all line level inputs is 150mV which produces 2.0V output with the Volume control at maximum.

Phono MM (Moving-Magnet) input goes through the Capacitance switch to the first RIAA stage where it is amplified 35.5dB (@ 1kHz) and routed to the Selector switch. Rated input level is 2.5mV.

Phono MC (Moving-Coil) input goes through the head amp (Pre-preamplifier) stage where it is amplified 28dB and passed on to the second RIAA stage where an additional gain of 35.5dB (1kHz) is added. This output then goes to the Selector switch. Rated input level is 100uV.

The output of the Selector switch is presented to the Low Filter stage for selection via its pushbutton. The Low Filter is a high-pass active filter of the multiple-feedback, infinite-gain variety giving a maximally flat Butterworth, three-pole response of 18dB/octave (60dB/decade), with a fixed corner frequency of 15Hz.

The output of the Low Filter pushbutton goes to the Tape Play/Monitor switches, as do the two Tape inputs. The Tape Copy selector switch is located between the two Tape inputs and outputs thus allowing direct copying without tying up the rest of the preamp.

The output of the Tape Play/Monitor switches are fed to the NR loop jacks and connecting link. Note that the position of the NR Loop is *after* the tape output lines, thus any outboard noise reduction devices installed must be of the single-pass variety.

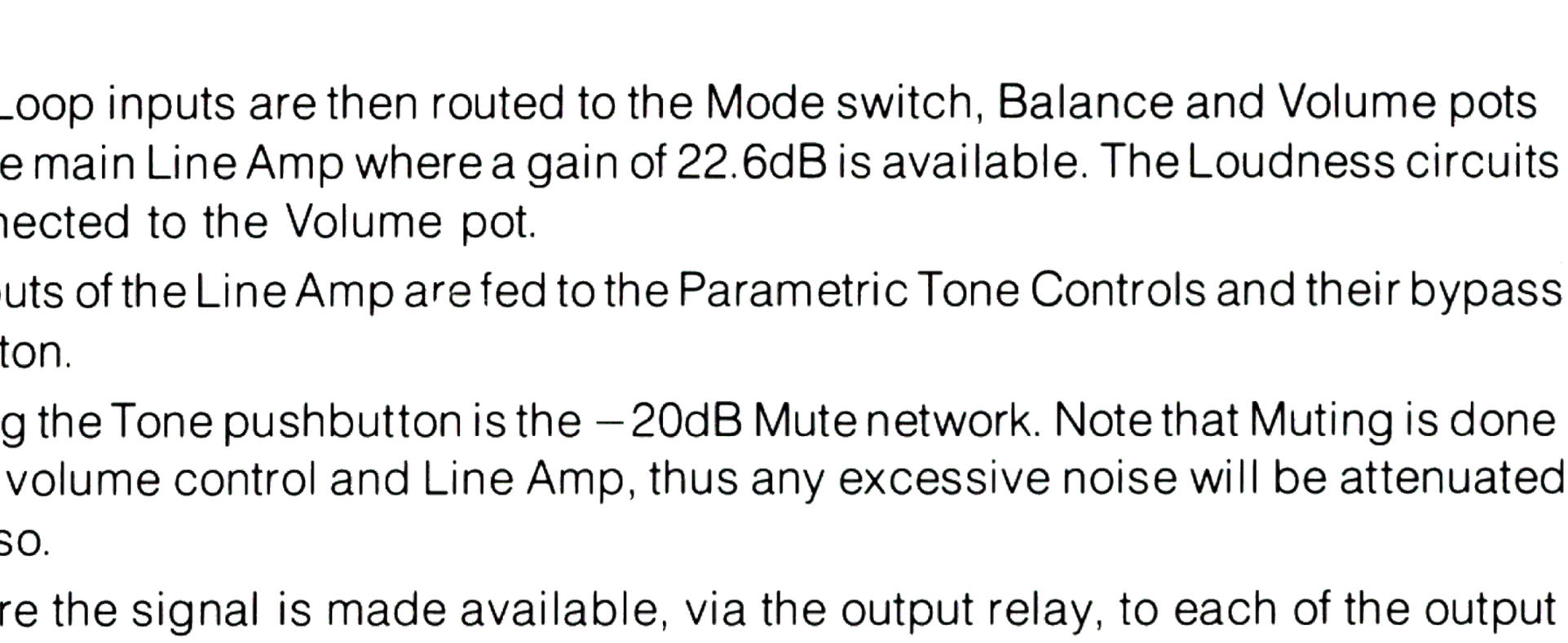
The NR Loop inputs are then routed to the Mode switch, Balance and Volume pots and to the main Line Amp where a gain of 22.6dB is available. The Loudness circuits are connected to the Volume pot.

The outputs of the Line Amp are fed to the Parametric Tone Controls and their bypass pushbutton.

Following the Tone pushbutton is the −20dB Mute network. Note that Muting is done *after* the volume control and Line Amp, thus any excessive noise will be attenuated 20dB also.

From here the signal is made available, via the output relay, to each of the output jacks, as well as the Headphone Amplifier circuits and jack.

Illustration 6



MAINTENANCE AND SERVICING

CLEANING

To maintain the luster of the front panel, occasionally clean it with a soft paper towel and diluted ammonia. This will remove dulling films which have a tendency to build up on the painted finish.

REPAIR FACILITIES

Only qualified technicians should be allowed to repair your Phase Linear equipment. Phase Linear Corporation and its authorized warranty stations have the personnel and equipment to repair this unit. Should any problems occur with the unit, BE SURE to consult the dealer nearest you, or call or write the Factory Service Department BEFORE sending it anywhere for repairs. This will help you to identify and locate any specific malfunctions and possibly avoid needless shipment.

Please include the serial number of the unit in any correspondence.

If the unit is in need of service, either send it to the factory or take it to the nearest warranty station described on the enclosed list.

Be sure to enclose a complete description of any problem, serial number, copy of sales slip, warranty card, name and return address with returned unit. If assistance of any kind is required, please feel free to contact the Factory Service Department, 20121-48th Avenue West, Lynnwood, WA 98036. Phone (206) 774-8848.

SHIPPING

Never ship in any shipping carton other than the original or a replacement supplied by Phase Linear. Ship only via a reputable carrier. DO NOT USE PARCEL POST! Insure the unit for the full value and double check to ensure the unit is properly packaged.

SPECIFICATIONS

RATED OUTPUT VOLTAGE: 2.0 Volts RMS (0.5 Volts RMS, EIA)

THD @ RATED OUTPUT: less than 0.003% (20Hz-20kHz)

FREQUENCY RESPONSE: Phono MM & MC RIAA Deviation: ±0.1dB
High Level: 10Hz-100kHz −0, −3dB

SIGNAL-TO-NOISE RATIO (A-weighted):
Phono MM: 97 dB below 2.0V (−85dB, EIA)
Phono MC: 94dB below 2.0V (−82dB, EIA)
High Level: 100dB below 2.0V (−88dB, EIA)

INTERMODULATION DISTORTION: SMPTE (60Hz, 7kHz @ 4:1): less than 0.002%
EIA (Two frequencies 200Hz apart sweep from 200Hz-200kHz): less than 0.008%

INPUT IMPEDANCE: Phono MM: 47k, ±1% shunted by switch selectable 50pF, 120pF or 320pF
Phono MC: 100 ohms, ±1% shunted by less than 20pF
High Level: 20k ohms

INPUT SENSITIVITY FOR RATED OUTPUT: Phono MM: 2.5mV (0.625mV, EIA)
Phono MC: 100uV (25uV, EIA)
High Level: 150mV (37.5mV, EIA)

MAXIMUM OUTPUT AT CLIPPING: Greater than 10 volts into 10k ohms

PHONO OVERLOAD LEVEL (1kHz): MM: 200mV; MC: 9mV

VOLUME CONTROL TRACKING: ±0.25dB

SLEW FACTOR (EIA) 60

SLEW RATE: 10 Volts per microsecond

CHANNEL SEPARATION: 70dB @ 1kHz; 40dB @ 20kHz

TONE CONTROLS: Type: Parametric bandpass & shelving
Amplitude Adjustment Range: Bass & Treble ±12dB Midrange ±6dB
Frequency Adjustment Range: Bass 20Hz-200Hz; Midrange 330Hz-3kHz Treble 2kHz-20kHz
Midrange Bandwidth: 1 or 2 octaves

HEADPHONE AMPLIFIER: Rated Power Output: 100mW into 8 ohms with less than 0.05% THD from 20Hz-20kHz, both channels driven
S/N: greater than 90dB re 100mW output
Frequency Response: 20Hz-20kHz, +0, −1dB
Load Impedance: 8-2000 ohms

LOW FILTER: 3 pole Butterworth with −18dB/octave (−60dB/decade) slope and corner frequency at 15Hz.
Attenuation: 20Hz:0.5dB; 15Hz:3.0dB; 4Hz:35dB

GENERAL
Power Requirements: a. 120 VAC ± 10%, 60Hz (USA & Canadian Models and selected export markets) b. 220/240 VAC ± 10%, 50/60Hz (General Export Models) Input Power Rating: 12 watts
AC Outlets: 4 switched, rated 1000 watts (VA) maximum each. 2 unswitched rated 1200 watts (VA) maximum. (Maximum combined power of all outlets cannot exceed 1200 watts (VA).)

UNIT
Dimensions: 17½"w×3½"h×13"d(44.5cm×8.9cm×29.2cm
Weight: 14 lbs (6.4 kg)

SHIPPING:
Dimensions: 20-1/8"w×6½"h×17-3/8"d(51.1cm×16.5cm×44.1cm)
Weight: 17 lbs (7.7kg)

NOTE:
Specifications subject to change without notice.

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THE PROFESSIONAL CONNECTION

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