

SECTION 4

Optional Functions

The PM3000 is factory wired to suit what Yamaha engineers believe to be the greatest number of applications. Yamaha recognizes, however, that there are certain functions which must be altered for certain specific applications. In designing the PM3000, a number of optional functions have been built in, and can be selected by moving factory preset switches within certain modules.

WARNING: Underwriter's Laboratories (UL) requires that we inform you there are no user-serviceable parts inside the PM3000. Only qualified service personnel should attempt to open the meter bridge, to remove a module, or to gain access to the inside of the console or power supply for any purpose. Lethal voltages are present inside the power supply, and the AC line cord and console umbilical cords should be disconnected prior to opening the console.

WARNING: We at Yamaha additionally caution you never to open the console and remove or install a module for the purpose of inspection, replacement or changing the preset switches unless the power has first been turned off. If a module is removed or installed with power on, the circuitry may be damaged. Unless you are a qualified service technician, do not plug in the AC cord while the interior of the power supply is exposed; dangerous voltages may exist within the chassis, and lethal shock is possible. Yamaha neither authorizes nor encourages unqualified personnel to service modules or console internal wiring. Damage to the console, the individual, and other equipment in the sound system can result from improper service or alterations, and any such work may void the warranty.

4.1 REMOVING AND INSTALLING A MODULE

The modules in the PM3000 are designed for easy removal. It is not necessary to open the meter bridge or to remove the arm rest.

1. Turn the Power OFF first, before removing or installing a module.
2. Loosen the Philips head screws at the top and bottom of the module. These screws are retained by threaded, cylindrical fittings so they will not pull all the way out of the module.
3. Lift up on the screws (or you may also want to pull up gently on a control knob), and as you feel the module connectors release, slide the module forward toward the front of the console slightly.
4. Now lift the module the rest of the way out of the console.
5. Installation of a module should be done by reversing the order of this procedure. Work slowly to make sure that edge connectors mate properly.

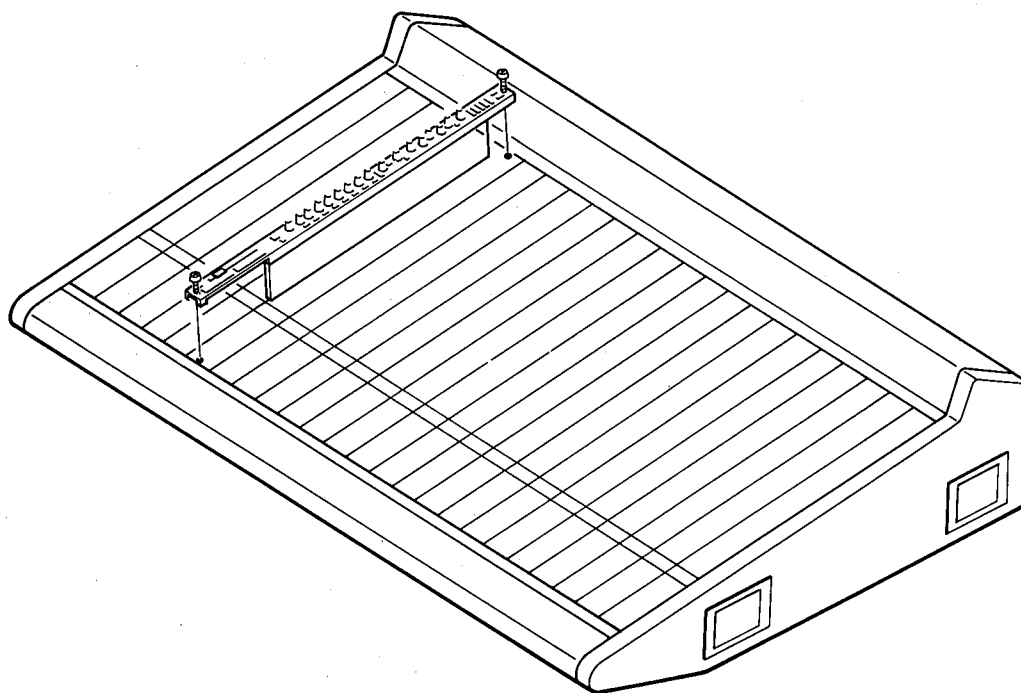


FIGURE 4-1 Removal of Module from PM3000.

4.2 INPUT CHANNEL INSERT IN/OUT JACKS: PRE-EQ OR POST-EQ

A slide switch in each input module permits the Insert In/Out point to be altered. As shipped, the console is set so that the Insert In/Out point comes ahead of the channel equalizer. This is useful, for example, when one

wishes to equalize the return from a signal processor. However, sometimes one wishes to equalize the send to the signal processor...for example, to apply the boost prior to compression. In this case, the In/Out point can be switched to come after the channel equalizer. Move the switch to the appropriate position, as illustrated.

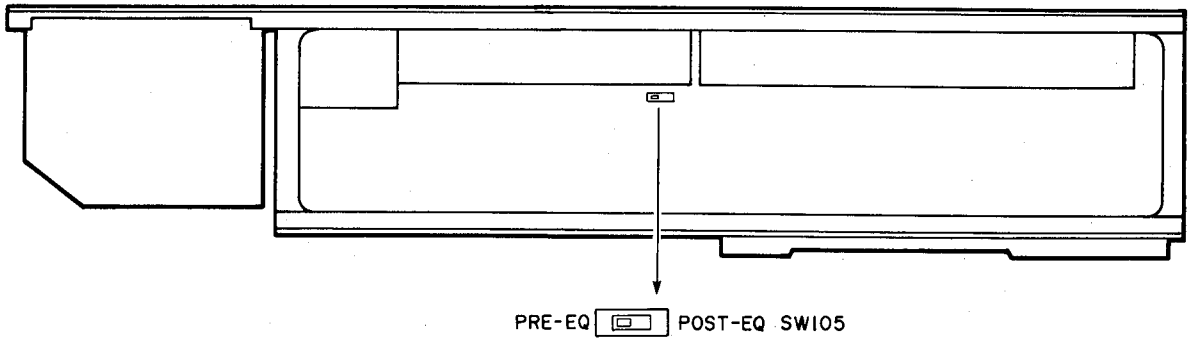
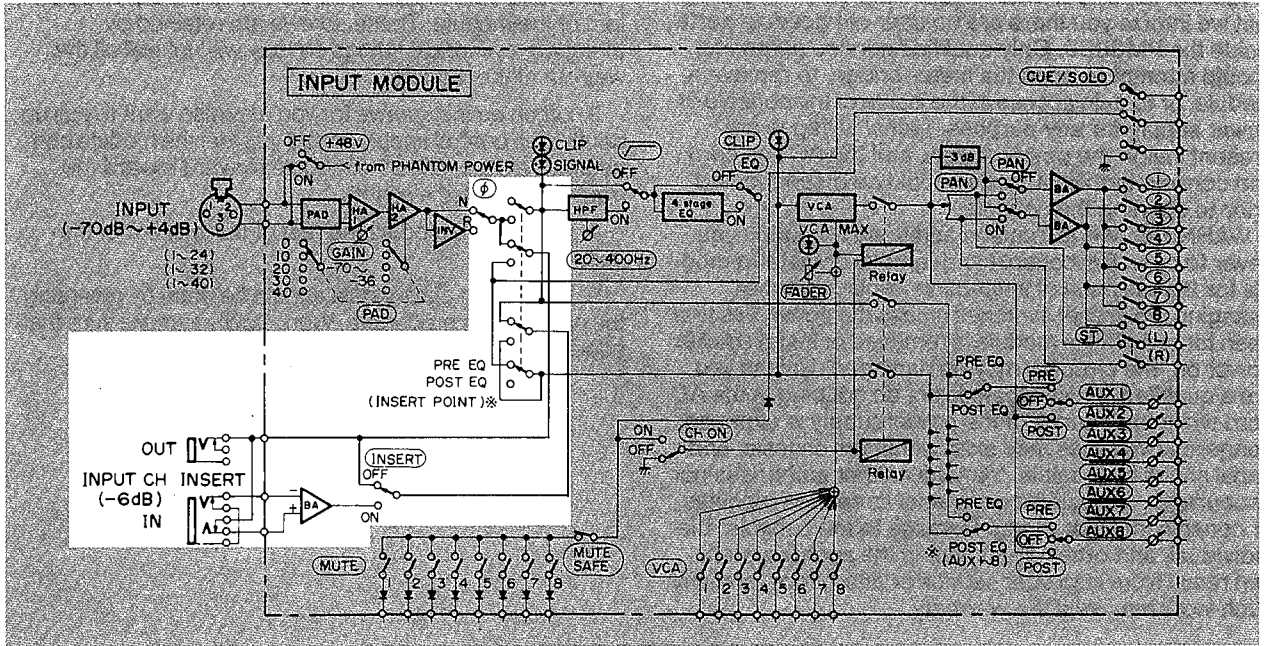
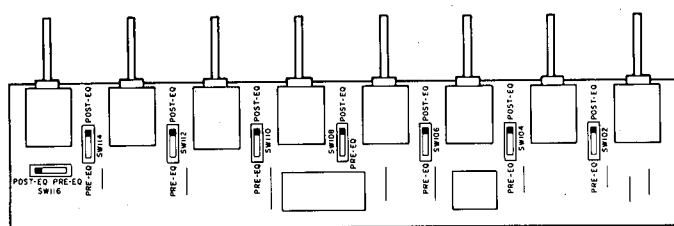
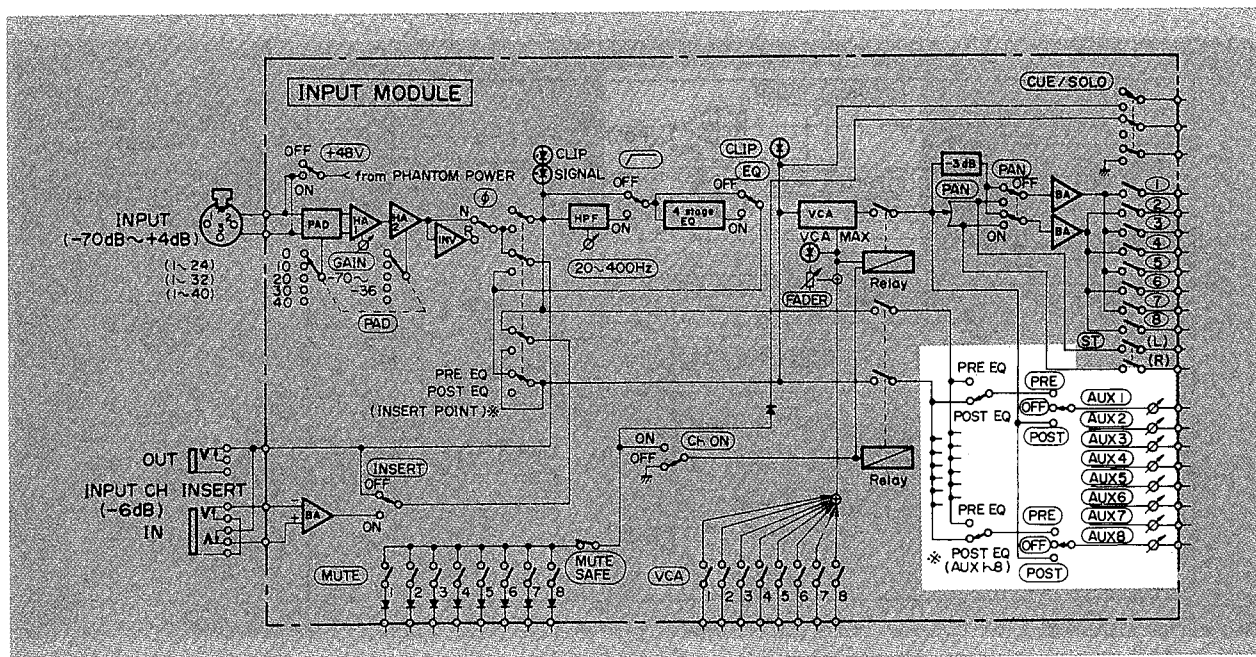


FIGURE 4-2 Internal Switch Positions for PRE-EQ and POST-EQ Insert IN/OUT Point.

4.3 INPUT CHANNEL AUX SENDS: PRE FADER & EQ OR PRE FADER/POST EQ

Eight slide switches in each input module permit each of the auxiliary sends to be altered. As shipped, the console is wired so that if front-panel aux PRE/OFF/POST switch is set to PRE position, the aux send is derived ahead of the the fader, equalizer and high pass filter. This is useful for stage monitor work, for example, where the channel EQ for the house may not be desired for the

monitors. On the other hand, suppose that one aux mix is used for a pre-fader effects send. In this case, it may be desirable to apply channel EQ and HP filter effects to the send, yet the POST position would also cause the channel fader to affect the send. To solve the problem, the switch for that aux send can be reset so that the PRE position remains pre-fader, but is taken after the EQ and HP filter.



AUX 1	= SW 102
AUX 2	= SW 104
AUX 3	= SW 106
AUX 4	= SW 108
AUX 5	= SW 110
AUX 6	= SW 112
AUX 7	= SW 114
AUX 8	= SW 116

"PRE-EQ/POST-EQ" switches when AUX Switch is in "PRE" position.

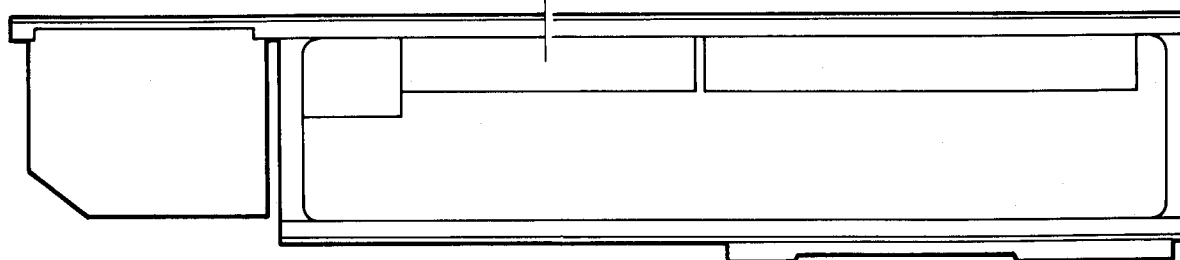


FIGURE 4-3 Internal Switch Positions for PRE-EQ and POST-EQ AUX SENDS (when pre/off/post switch is set to pre).

4.4 STEREO MASTER TO MATRIX ST BUS: PRE OR POST ST MASTER FADER

A pair of slide switches in AUX/ST module enable the signal applied to the matrix stereo bus from the AUX/ST module to be derived from two different points. As shipped, the switch is preset so the matrix is fed its signal after the STEREO MASTER fader so that adjustments in the stereo output also affect the feed to the matrix. The internal switches can be repositioned so that the matrix is

fed pre STEREO MASTER fader. In this way, the stereo output can be used for one feed, and it can be remixed in the matrix to create other stereo feeds. Since the stereo bus can actually be used as though the L and R sides of the bus were two discrete mono mix busses, this optional function is accomplished with separate L and R switches. In this way, the feed can be split, with one pre- and one post-STEREO MASTER fader; normally, however, both switches would be set the same way.

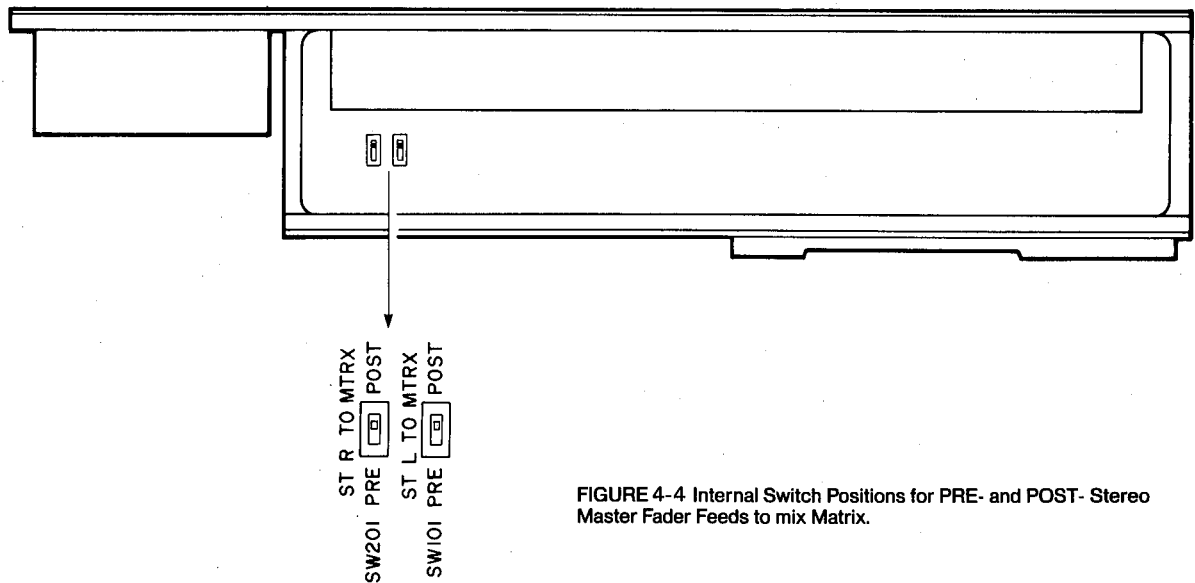
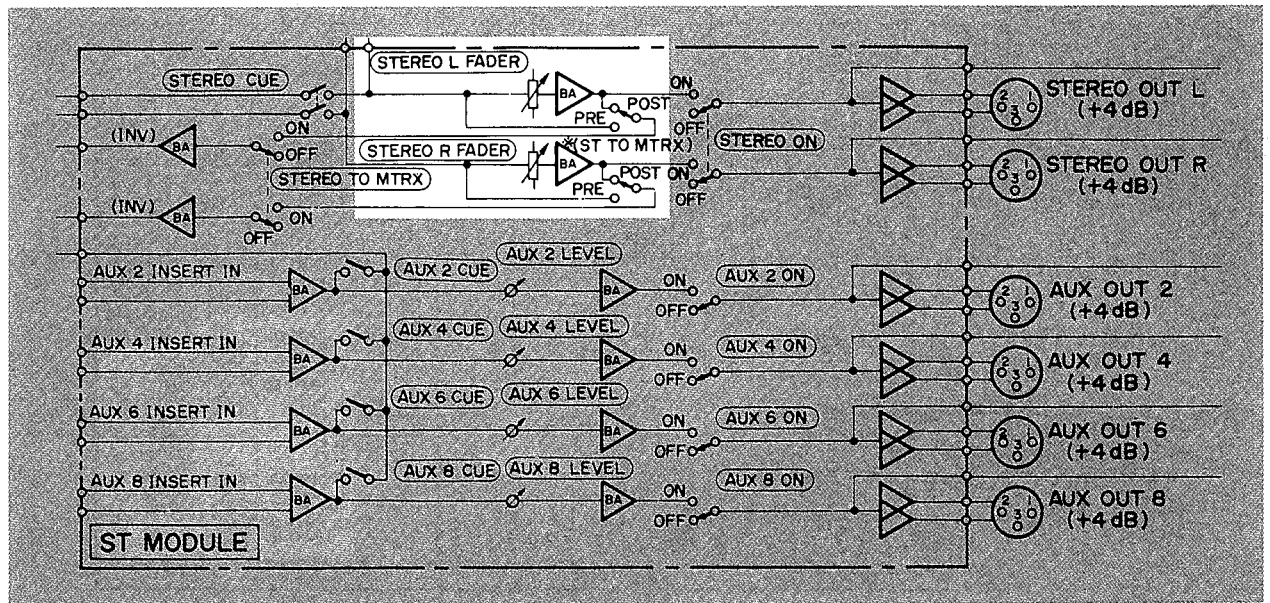


FIGURE 4-4 Internal Switch Positions for PRE- and POST- Stereo Master Fader Feeds to mix Matrix.

4. 5 GROUP-TO-MATRIX: ASSIGNED PRE OR POST GROUP MASTER-FADER

A slide switch in each master module permits the eight group sends to the mix matrix to be altered. As shipped, the console is preset so that when the GROUP-TO-MTRX switch is on, the matrix is fed signal after the Group Master Fader (but before the GROUP ON/off switch). The internal switch in each of these modules can be repositioned so that the matrix is fed before the Group Master Fader.

In the factory preset configuration, the matrix follows the group mix. If one group, for example, is used for vocals, another for keyboards, etc., then all vocals going to all matrix outputs can be adjusted with one Group Master Fader... all Keyboards going to all matrix outputs can be adjusted with another Group Master Fader, etc. Suppose, however, that you plan to feed a stereo house mix from the eight subgroups, yet you need as many as eight

additional mono or five stereo mixes.

The mix matrix alone allows for only one stereo and six mono mixes, or a total of four stereo mixes. A greater number of mixes can be obtained by selecting the alternate (pre-Group Master Fader) switch positions. In that case, you can assign the Group Outputs to the stereo bus via the ST switch [48] and the adjacent PAN pot [47]; the Group Master Faders will serve as submasters for this stereo mix, and the Stereo Master Fader will control the mixed output. At the same time, the matrix controls on each master module will provide an 8:1 mix of the same groups; that matrix channel's #1 - #8 mix controls will serve as submasters, and the MTRX MASTER will control the mixed output. (Do not turn up the L and R controls in the matrix, since these would be redundant here). In this way, you can obtain one stereo and eight mono mixes, five stereo mixes, or some combination thereof all with independent submaster and master controls.

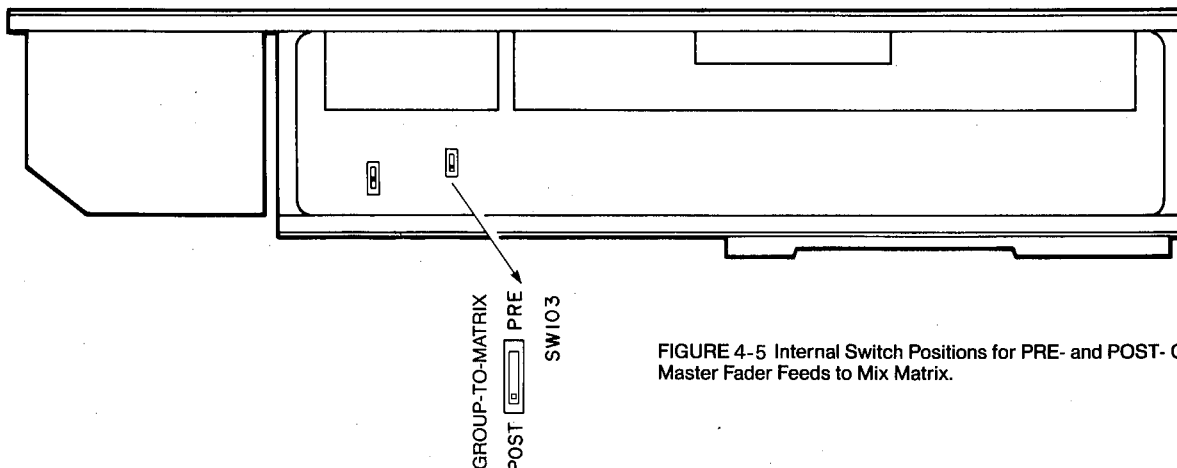
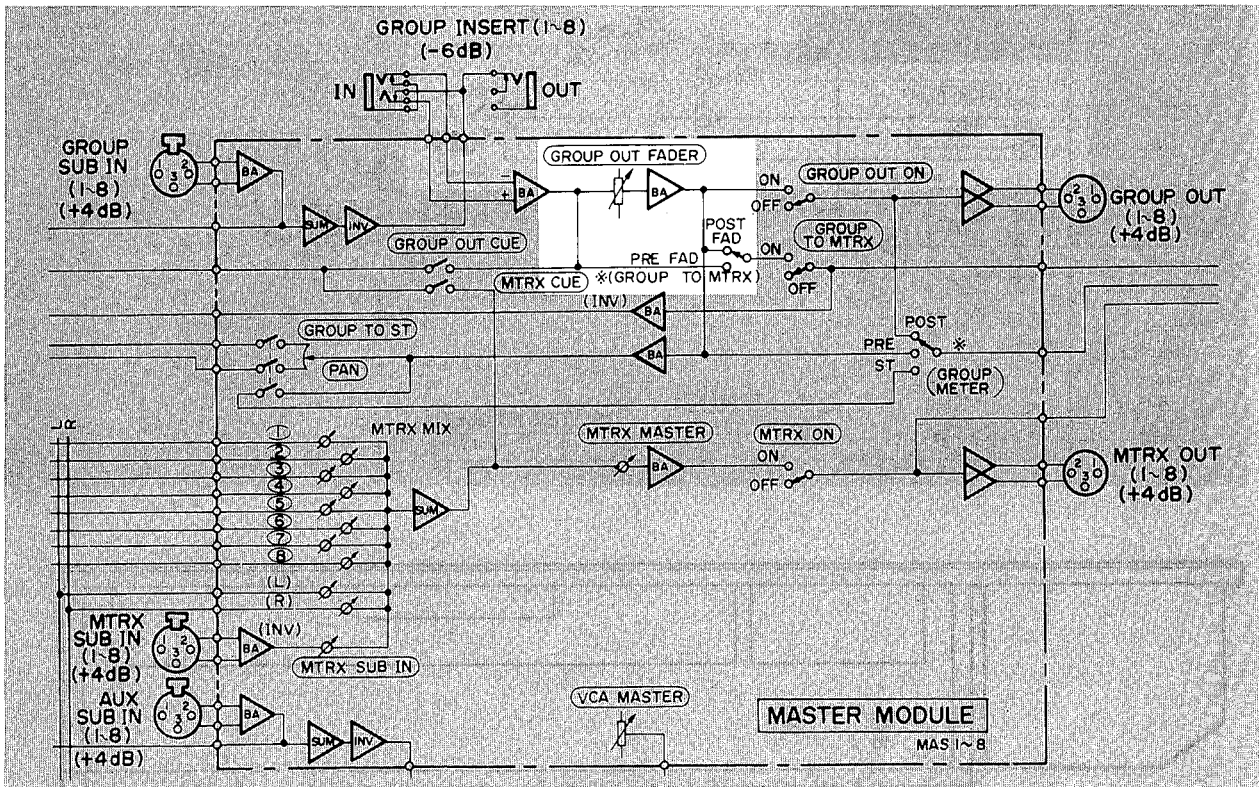


FIGURE 4-5 Internal Switch Positions for PRE- and POST- Group Master Fader Feeds to Mix Matrix.

**4.6 METER FUNCTION IN "GROUP" POSITION:
ONE OF 3 SOURCES**

There are eight VU meters which are factory wired so they can be switched to monitor the GROUP output, the GROUP-TO-MATRIX feed, or the MATRIX output. Actually, though, there are internal slide switches in each MASTER module that permit the GROUP meter switch position to derive signal from two points other than the factory preset (post GROUP OUT ON/off switch feed to the GROUP OUT XLR):

- (A) ahead of the GROUP OUT ON/off switch (pre-GROUP ON/off switch) but still post- GROUP MASTER fader,
- (B) post GROUP-TO-STEREO switch.

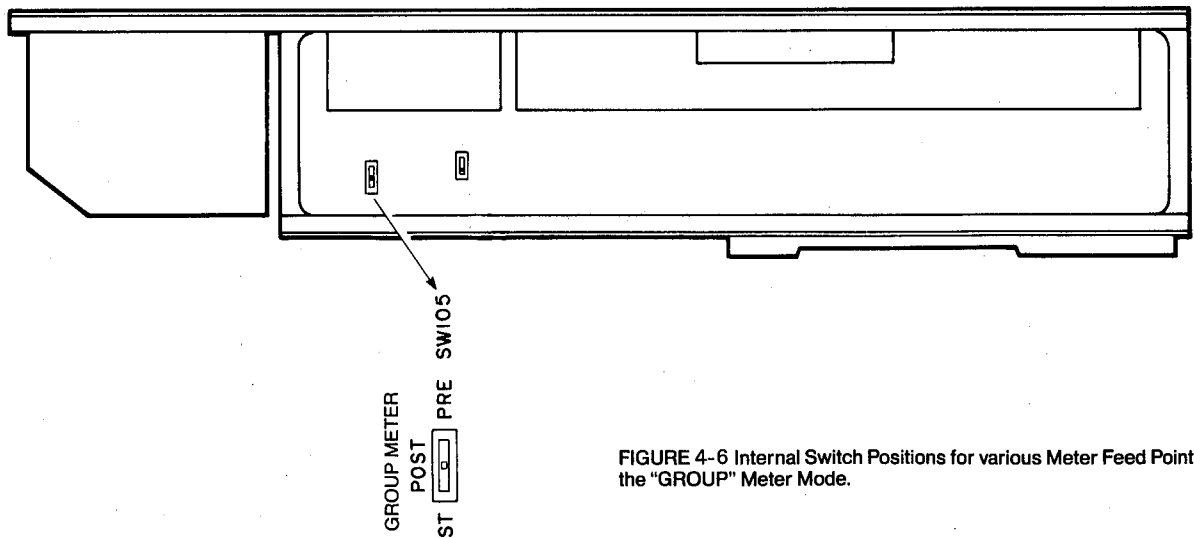
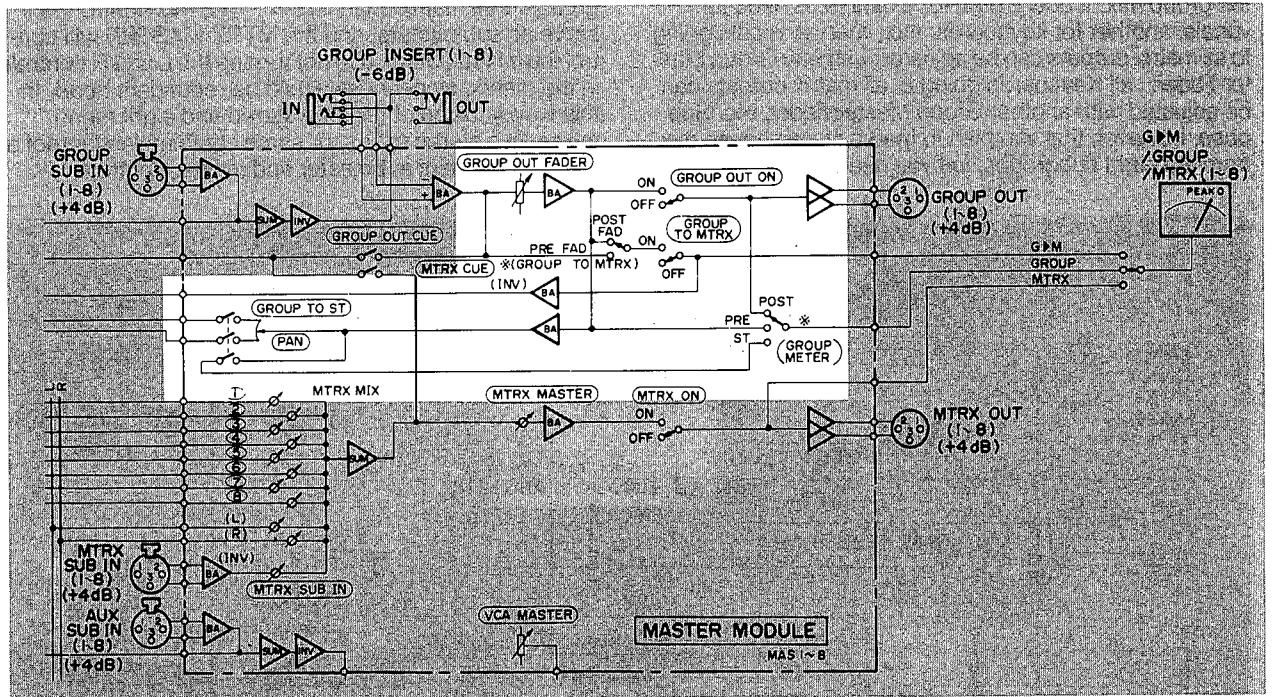


FIGURE 4-6 Internal Switch Positions for various Meter Feed Points in the "GROUP" Meter Mode.

4.7 INSTALLATION OF OPTIONAL INPUT TRANSFORMERS

The PM3000 standard input module is equipped with a balanced, differential input preamplifier for the XLR connector. That preamp, along with some circuitry for the resistive attenuation pads, is located on a small printed circuit board that "piggy back" mounts to the module's main circuit board.

An optional transformer balancing option may be installed by a Yamaha PM3000 dealer or a qualified electronic service technician. The modification kit contains a replacement circuit board for the original differential preamplifier, and a separate input transformer. In order to install the kit, the following steps must be performed.

1. Shut off the power to the console.
2. Remove any input module(s) to be converted from the console mainframe.
3. Hold the module with the fader to the left, and lay the module on its side, controls facing away from you.
4. In the upper left corner (just to the right of the fader), locate the "IN 2 3/3" board. Refer to Figure 6-7B. Remove the 2 screws that secure this board, and set it aside.
5. Locate the "IN 4" board now exposed by the "IN 2 3/3" board just removed. Remove the "IN 4" board.

6. Install the new board (that comes wired to the transformer) in place of the "IN 4" board.

7. Install the transformer by securing its bracket to the lower right edge of the module frame with the screw provided. Dress the cable that joins the transformer and its circuit board neatly. You may wish to tie it to the board so that after the module is reinstalled, the cable does not become pinched between modules or the module and mainframe.

8. Replace the "IN 2 3/3" board.
9. Reinstall the input module into the mainframe.

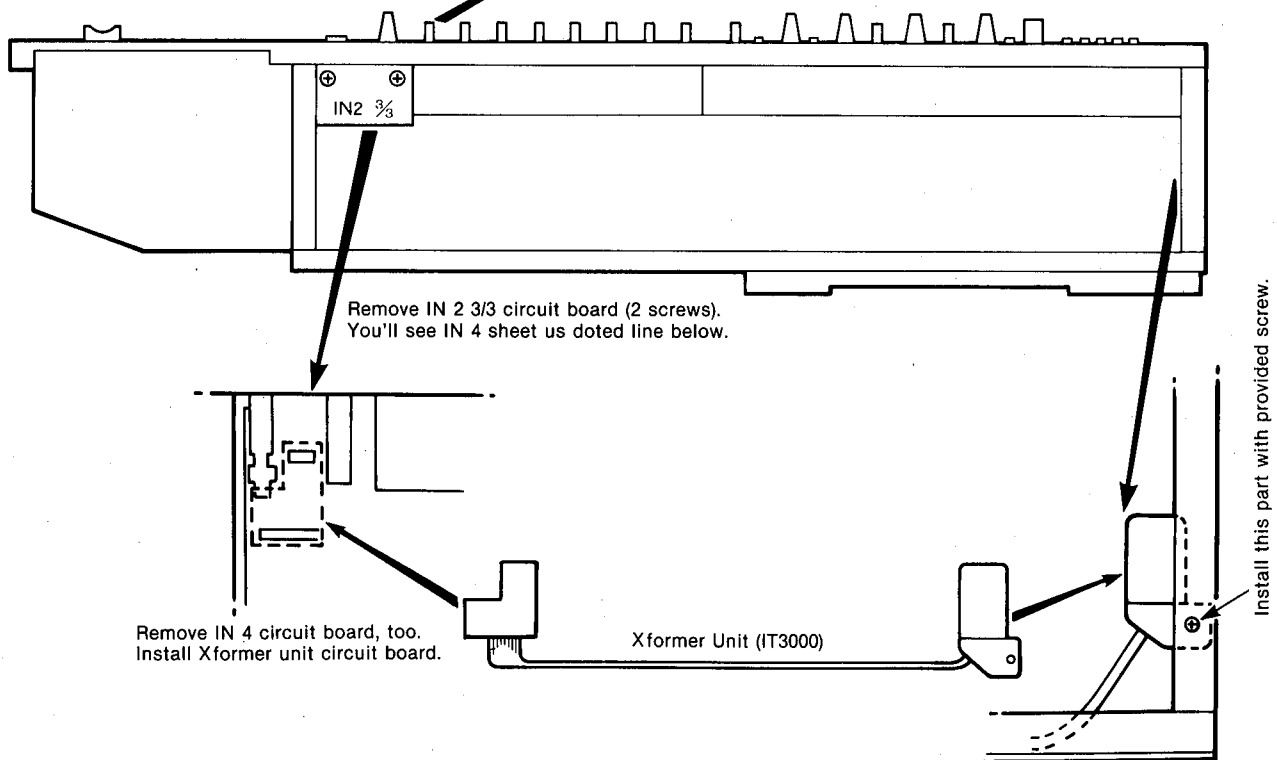
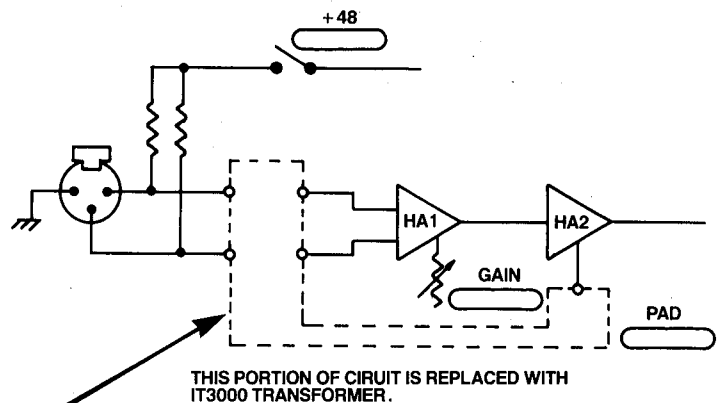


FIGURE 4-7 Optional Input Transformer Installation.

4. 8 HINTS ON CIRCUITRY FOR REMOTE CONTROL OF THE VCA MASTERS AND MUTE GROUPS

The VCA/MUTE CONTROL connector on the PM3000 rear panel is provided primarily so that two consoles may be linked, and just one console's VCA MASTER FADERS and/or MUTE MASTER switches will affect both consoles input channels. However, it is possible to create an independent controller so that these functions can be remotely controlled. One possible application would be to remotely adjust mix levels in the middle of a venue even though the console is located in a booth. Another possible application would be the creation of a limited automation system. Yamaha does not offer detailed instructions for this type of remote control. However, we do present here a schematic diagram of the VCA control fader circuit which, if constructed externally by a competent technician and interfaced via the VCA/MUTE CONTROL connector, can do the job. A graph of control voltage versus channel VCA gain is also provided.

Note that the nominal fader position delivers 0 VDC to the VCA, and the VCA operates at unity gain with that input. The control voltage scaling is approximately -20 dB per volt DC in the linear range of fader travel (above -50 dB on the fader scale). Thus, at maximum upward fader travel, a single fader will deliver about 1/2 volt negative, which drives the VCA to +10 dB of gain. If several VCA faders are set above nominal and assigned to a channel, the maximum negative voltage that will be applied to the VCA is -1.2 VDC (a DC limiter circuit prevents any more negative voltage from being passed and turns on the VCA MAX LED). This corresponds to +24 dB of gain. At minimum VCA fader setting, the output is +10 VDC, corresponding to over 100 dB of attenuation.

The VCA and MUTE connections are illustrated in Figure 2-9. In order to mute a group, simply ground the conductor corresponding to that group. Naturally, the console's VCA MASTER/SLAVE and/or MUTE MASTER/SLAVE switch(es) must be set to the SLAVE position in order for the corresponding remote control to take effect.

WARNING: Only qualified service technicians should attempt to construct and connect any circuit to interface with the PM3000 VCA/MUTE CONTROL connector. A circuit or wiring error could severely damage the console, and such damage is not covered under the terms of the PM3000 Warranty. Improper grounding could also create noise and/or safety hazards. This information is provided only to illustrate the extent of such a modification; the PM3000 Service Manual should be consulted before actually building any remote control device.

YAMAHA PART #	QUAN	SUFFIX LETTER	ITEM	VALUE OR TYPE
UA21410	2	K	MYLAR CAPACITOR	0.01 uF, 50 V
HU07543	1	F	METALIZED FILM RESISTOR	430 ohm, 1/4 W
HU07610	4	F	METALIZED FILM RESISTOR	1 kohm, 1/4 W
HU07620	1	F	METALIZED FILM RESISTOR	2 kohm, 1/4 W
HU07710	4	F	METALIZED FILM RESISTOR	10 kohm, 1/4 W
HU07712	1	F	METALIZED FILM RESISTOR	12 kohm, 1/4 W
HU07713	2	F	METALIZED FILM RESISTOR	13 kohm, 1/4 W
HK05715	1	J	CARBON RESISTOR	15 kohm, 1/4 W
HK05733	1	J	CARBON RESISTOR	33 kohm, 1/4 W
IG06920	3		IC AMP	MJM2041DD
HT56009	1	B	SEMI-FIXED VR (TRIMMER)	50 kohm
IF00004	2		DIODE	1S1555
IF00214	1		ZENER DIODE	RD5.6ED2
VA25610	1	B	SLIDER VR (FADER)	10 kohm

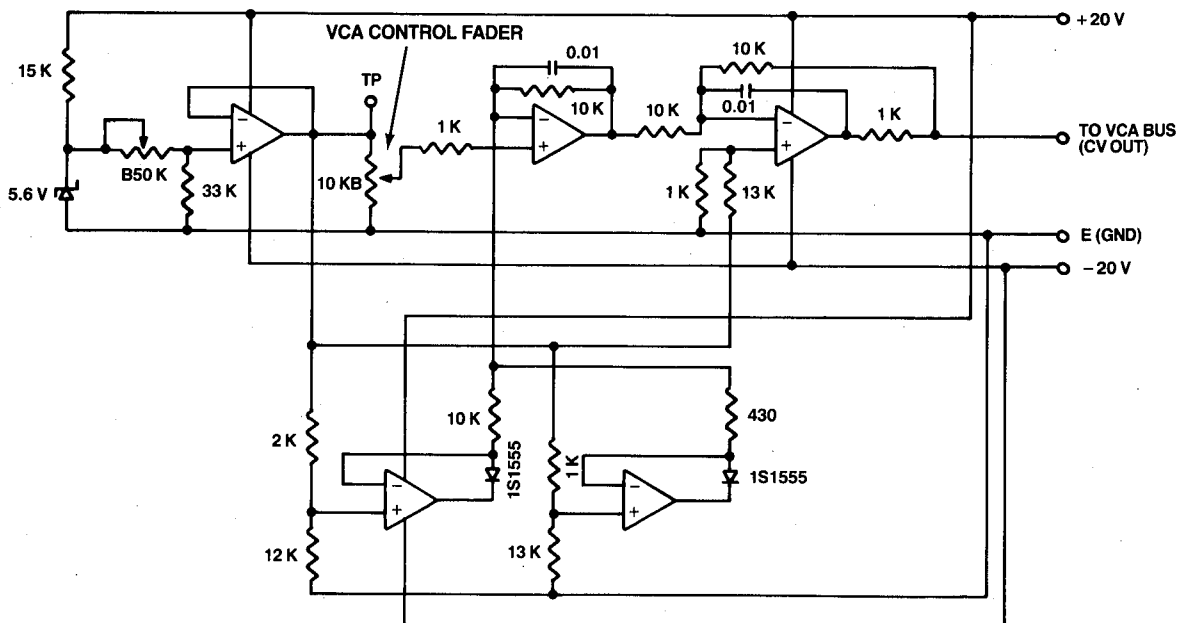
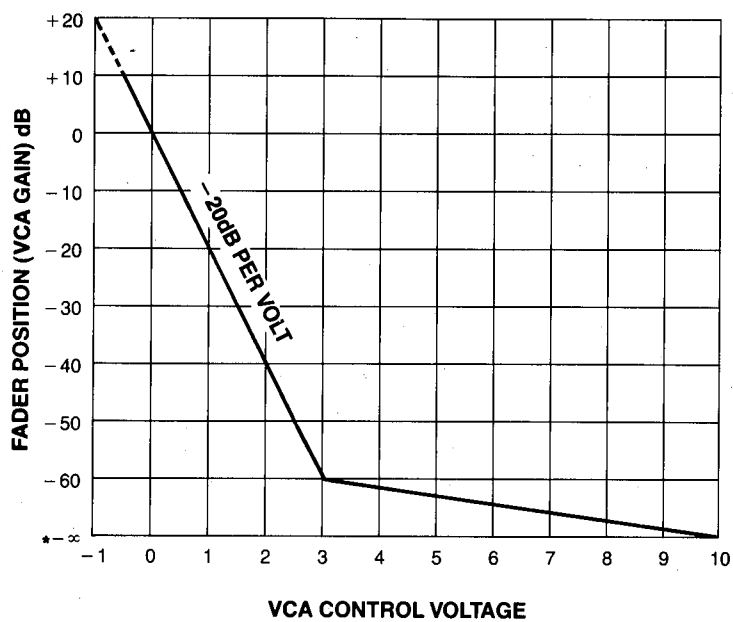


FIGURE 4-8 Suggested Circuit for Remote Control of a VCA Master Group.



*CHANNEL ON relay opens when fader is at $-\infty$ position.

FIGURE 4-9 VCA Control Voltage versus Fader Position.

SECTION 5

Maintenance**5.1 CLEANING THE CONSOLE****5.1.1 The Console and Power Supply Exterior**

The console and power supply are painted with a durable finish. To avoid damage to the paint, control knobs, switch caps and other parts, **DO NOT USE SOLVENTS**. Instead, keep the console as free of dust as practical. Cover it when not in use, and brush or vacuum it periodically. The surface may be cleaned with a soft rag moistened with a dilute solution of non-abrasive detergent and water. If sticky gum is left on the panel (from masking tape or other tape used for channel labeling), it may be necessary to use a specialized solvent. In general, rubber cement solvent will remove tape residue without harming the console; however, it is your responsibility to test any such solvent in an inconspicuous location to ensure it does not attack the console finish or mar any plastic part.

Avoid getting the inside of the console wet from excessively wet rags. **DO NOT USE AEROSOL OR SPRAY CLEANERS.**

5.1.2 Power Supply Air Filter

The reticulated foam air filter on the front of the PW3000 power supply screens cooling air as it is drawn through the unit. When the foam becomes clogged or dirty, it should be cleaned; check it periodically. Using a 3 mm allen wrench, remove the four cap screws that secure the front grille. The foam element may now be removed and rinsed in cool water. For greasy or stubborn dirt, dip the element in a mild solution of detergent and water, then rinse with clear water. Blot and/or air dry the element thoroughly before returning it to the amplifier. **DO NOT USE SOLVENTS TO CLEAN THE FOAM ELEMENT.**

5.1.3 Pots and Faders

Yamaha **DOES NOT** recommend the routine use of any contact cleaners or solvents for cleaning pots or faders. Such "preventive maintenance" can actually do more harm than good by removing the lubricating film on certain pots or faders. While treatment with such solvents or cleaners may temporarily "clean up" a noisy control, it can also quickly result in a worn element (due to lack of lubrication) and even greater, incurable noise.

When a component is to be cleaned, use a very small amount of an appropriate cleaner, solvent, or pure isopropyl alcohol. Try to get it on the element, and immediately work the pot or fader several times all the way between stops.

In general, cleaning pots and faders is not a trivial task. Some have carbon elements, some have conductive plastic elements, and others have cermet elements. What cleans one part reliably may not work on another. When in doubt, consult your authorized Yamaha PM3000 dealer or service center.

5.1.4 The Console Interior

Dust and dirt are the enemy of electronic and mechanical systems. Switches and controls may wear prematurely due to the abrasive nature of dirt. A coating of dust may, in some cases, be conductive and change the electrical properties of the circuit. Similarly, dirt accumulations can reduce the thermal dissipation from heat sinks and transistors, leading to premature failure. It is advisable to use a soft brush or a vacuum cleaner with a soft brush attachment to clean the console periodically. Depending on the environment, this may be as often as once a month, or as infrequently as once a year. Use care not to bend or dislodge any components. Always do this work with the console power OFF.

If a beverage is spilled into the console, try to blot up as much excess moisture as possible immediately. If practical, immediately turn off the power and remove any affected modules. If not, wait until it is practical, and then turn off the power and proceed. Rinse contaminated parts on the module with distilled water, shake off the excess water, blot dry with a soft cloth, and air dry or use a warm (not hot) stream of air from a hair dryer to facilitate drying. If the console interior is contaminated, wipe it clean with a water-moistened cloth.

It is best to clean a spill as soon as possible. Unsweetened black coffee is probably the least harmful. The sugar in sweetened coffee can leave a sticky film on parts, and cream or milk will leave a residue that can be very troublesome. Similarly, sweetened soft drinks and fruit juices can leave sticky residues that degrade the performance of switches, faders and pots.

5.2 METER LAMP REPLACEMENT

Two lamps illuminate the face of each VU meter.

To change a meter lamp, first open the meter bridge. This is done by removing 2 screws from the rear of the meter bridge, and several screws from the top of the meter bridge (4 on the 24-channel, 5 on the 32-channel, or 6 on the 40-channel mainframe). The meter bridge is hinged, and can be swung open for access to the meters.

Each replacement lamp (Yamaha part number VA75570) comes with a connector affixed to pigtail leads from the lamp. Withdraw the old lamp from the rear, pulling it out of its retaining grommet in the meter face, and unplug the connector from the rear of the meter assembly. Insert the new lamp in its place, and secure the connector.

NOTE: The meter assign select switches are illuminated by LEDs, which should not normally require replacement.

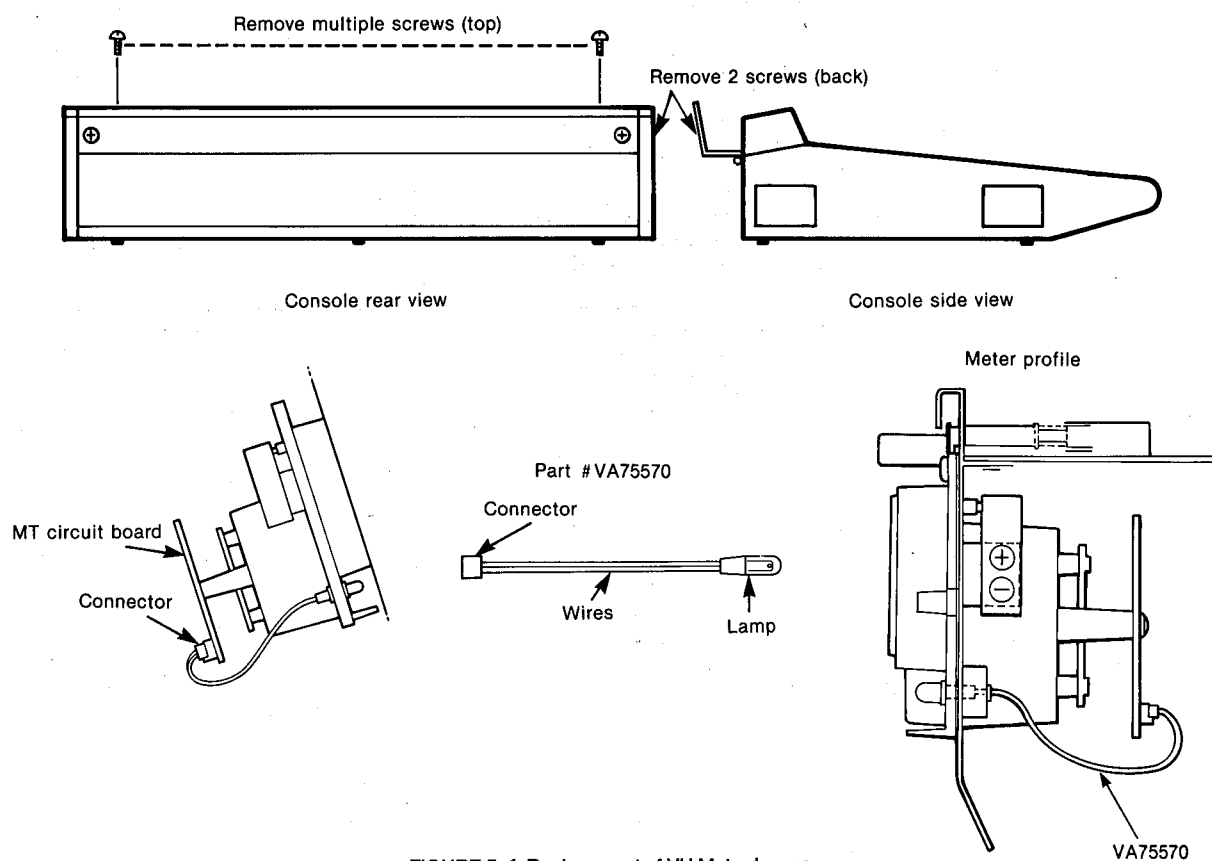


FIGURE 5-1 Replacement of VU Meter Lamps.

5.3 WHERE TO CHECK IF THERE IS NO OUTPUT

In general, when something appears not to be working properly in a sound system, it is necessary to have a clear understanding of the system block diagram. One should look for a "good" signal by patching around suspect equipment, modules or circuits. Suspected "bad" cables can be replaced or swapped to see if the problem follows the cable. These techniques should be known to most

experienced sound system operators. In the case of the PM3000 console, however, there are a number of apparent fault conditions, which the operator may inadvertently create simply by setting controls in a particular configuration, whereby no signal reaches the output. The following chart depicts the most likely errors you may encounter, and points out how to correct the problem.

"FAULT" CONDITION	POSSIBLE CAUSE	CORRECTION
Input channel signals do not appear at the Group, Stereo, Aux or Matrix outputs	Console is in SOLO mode, and an input channel to which no signal is applied has its CUE/SOLO switch engaged.	Release master SOLO MODE switch to activate all channels which should be on.
	The affected input channel(s) have MUTE assign switches engaged, and the MASTER MUTE group to which the channel(s) is assigned is set to mute mode.	Disengage the MASTER MUTE switch, or the affected input channel MUTE switch(es).
	The affected input channel(s) have MUTE assign switches engaged, and the remote VCA/MUTE connection is causing the MASTER MUTE group to be engaged.	Disconnect the VCA/MUTE connector to check theory; if output is restored, check remote circuitry.
Certain input channels or groups of channels, cannot be heard at Group, Stereo, Post-Fader Aux sends, or Matrix outputs.	The affected input channel(s) have VCA assign switches engaged, and the VCA Master Fader to which the channel(s) is assigned is set to minimum level (down).	Disengage VCA assign switch on the channel affected or raise the VCA Master Fader to a higher setting.
	The affected input channel(s) have VCA assign switches engaged, and the remote VCA/MUTE connection is causing the VCA Master level to go to minimum.	Disconnect the VCA/MUTE connector to check theory; if output is restored, check remote circuitry.
Certain input channels or groups of channels cannot be heard at Group outputs, Group-to-Stereo outputs or Group-to-Mtrx outputs.	The affected input channels are assigned to a Group Fader which is set to minimum level (down), and the G·ST and G·MTRX feeds are post Group Fader.	Raise the Group Fader setting to a higher level.
Individual input channel cannot be heard at the Group, Stereo, Aux or Matrix outputs.	Channel ON/off switch is off, or its PAD and GAIN controls are set so input sensitivity is too low.	Turn On the channel. Set the PAD for a lower value and/or GAIN at a higher value.
	Channel INSERT switch is engaged, and a plug is connected to the channel's INSERT IN jack, but no signal is applied to that plug.	Disengage INSERT switch or check the signal at the INSERT IN jack.
	A phantom powered condenser microphone or direct box is connected to the channel and is not receiving phantom power.	Check to be sure channel and master 48V switches are on.
There is no output, and no console functions work at all.	Power is not reaching the PM3000.	Verify that PW3000 is On and that its umbilical cables both are properly connected. Check fuses and AC mains voltage.
Fuses are OK and power supply turns on, but console does not turn on.	Power supply cables are misconnected (A to B and vice-versa) or not connected.	Check cables and correct as required.