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5807A/5808 MANUAL

Operation and Owners Manual for the 5807A and 5808 Amplifiers

5000 Modular Sound System

Printed in U.S.A.

INTRODUCTION

As part of the Ivie 5000 modular sound system, the model 5807A High Impedance Master Amplifier introduces a new concept in power amplification. The 5807A is a self contained, 100 watt, 70.7 volt power amplifier.

The 5808 is a companion amplifier to the 5807A. This slave amplifier is actually a 100 watt booster amplifier that can be paralleled with the 5807A to provide a high powered 70.7 volt amplifier. The 5808 cannot be used alone and must be used in conjunction with a 5807A. One 5807A master can be paralleled with up to eight 5808 slaves, thus providing a 900 watt, 70.7 volt amplifier.

Two 5807A's may be bridged together to make a 200 watt, 140 volt amplifier. Up to six 5808 slaves may be added to the bridged masters to provide a 800 watt 140 volt amplifier.

The 5807A has many innovative features including the ability to drive a companion slave amplifier in parallel or another master in a bridge configuration. The bridge and parallel configurations allow the amplifiers to be combined to drive a wide variety of impedance loads at various power levels. Other innovative features include front panel LED status indicators, audio test point, stepped attenuator, and an I/O port that allows remote monitoring of the amplifier's operational status.

The 5807A exhibits excellent frequency response, slew rate, low noise, and low distortion; all typical of a state-of-the-art design. A major design goal for the 5807A was reliability. Special attention was given to the design of the safe operating area protection (SOA) circuitry. This circuitry protects the amplifier from problems caused by extreme variations in load impedance. The 5807A can operate into loads from a dead short to no load at all. Reliability is further enhanced by thermal overload protection. This is provided by a two speed, thermostatically controlled, forced-air cooling system. As a final precaution, in the unlikely event that a 5807A should fail, a DC crowbar protection circuit prevents the loudspeaker from being damaged.

Another strength of the 5807A is its on-board AC power supply. Unlike other modular amplifier systems that share one large common DC supply, all 5000 modules have their own independent power supply. This provides redundancy and prevents failure of the entire system should one supply fail.

AMPLIFIER INPUT

The input impedance of the 5807A amplifier is 10,000 Ω. The 5807A will provide a 70.7 volt output when a signal level of .775 volts is applied to the input. The amplifier has two signal input paths. One path is via the 10 position, Bus Assign Switch, and the other is the direct input via the TB-40. There are two terminals on the TB-40 that are paralleled together for convenience. Terminals M and 11 are the direct input terminals. Terminals N and 12 are audio grounds. The direct input is always connected to the amplifier, but the input from the Bus Assign Switch may be isolated by cutting the wire jumper W3, as shown in Figure 1 below:

AMPLIFIER INPUT BLOCK DIAGRAM

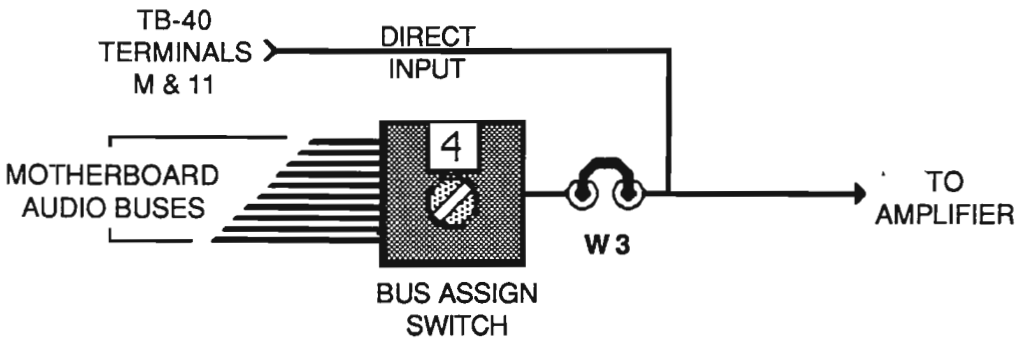


Figure 1

BALANCED INPUT

If a balanced input is required, a TBT-600 Input Transformer and Terminal Block should be used. See the 5001 Mainframe and TBT-600 manuals for more detailed information.

AMPLIFIER OUTPUT

There are nine sets of two-position terminal blocks located on the rear of the 5001 Mainframe. There is one terminal block per Mainframe slot. Each terminal block is connected to the output of the amplifier plugged into that slot. These terminal blocks are the output connections for the amplifiers.

AMPLIFIER OUTPUT CONNECTIONS

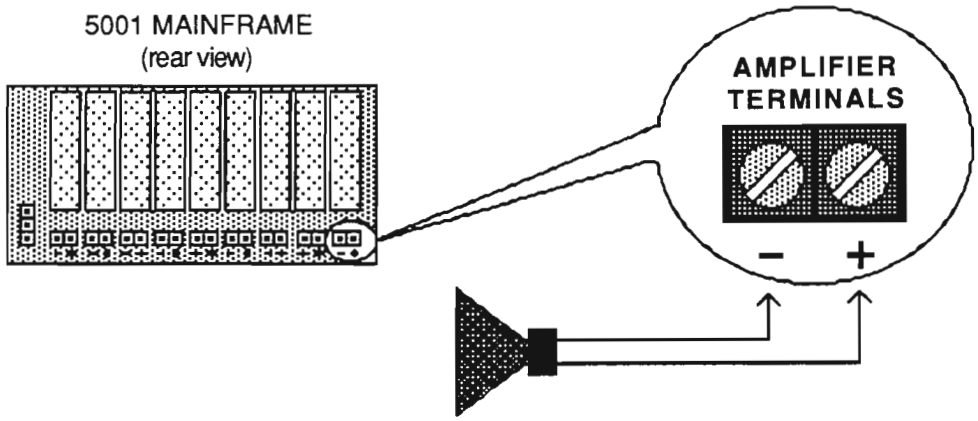


Figure 2

INSTALLATION INSTRUCTIONS

If the terms motherboard, bus assignment, or TB-40 are unfamiliar, please review the 5001 Mainframe manual before proceeding any further.

There are four different modes of operation for the 5807A. These are, *single master, bridged masters, paralleled masters and slaves*, and *bridged-paralleled masters and slaves*. Don't worry, the two most commonly used configurations are very easy to understand and implement.

SINGLE MASTER

A single master 5807A can provide 100 watts (70.7 volts into a 50 Ω load). In this application, a single 5807A is connected to the load. This is the most common mode of operation.

There are only three controls that need to be set before inserting the 5807A into the 5001 Mainframe. These controls are: the Bus Assign Switch, the Bridge/Normal Switch and the Stepped Attenuator (volume control). Set these controls in the following order:

1. Set the input Bus Assign Switch to the predetermined bus.

SINGLE MASTER SETUP

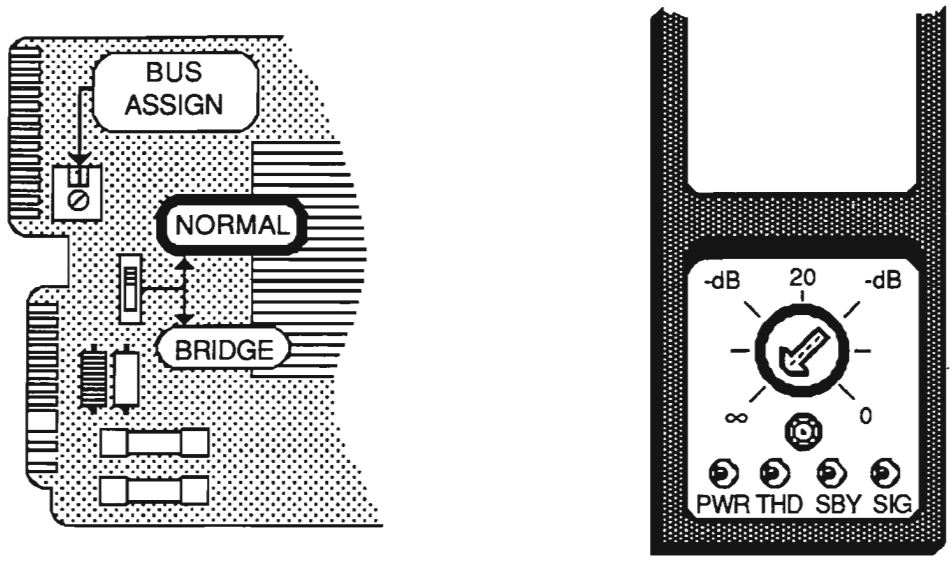


Figure 3

2. Check to make certain that the BRIDGE/NORMAL Switch is in the " Normal" position.

3. Set the STEPPED ATTENUATOR to - ∞.

4. Insert the amplifier into the Mainframe.

5. Connect load to the amplifier's terminal block on 5001.

6. Adjust the STEPPED ATTENUATOR for proper volume at the speaker.

PARALLELED MASTER and SLAVES

A master 5807A may be paralleled with up to eight 5808 slaves to provide up to 900 watts of power (70.7 volts into 5.56 ohms). A 70.7 volt amplifier can be configured with a power output that ranges from 100 watts to 900 watts, in 100 watt increments. Each master or slave provides 100 watts.

Lower impedance loads can be driven when slaves are paralleled with a master. To calculate the lowest impedance that can be driven, use the following formula.

Load impedance = 50 Ω / n where n = total number of slaves + the master.

Example: 1 master + 8 slaves = 9 amplifiers 50 Ω / 9 = 5.56 Ω

The procedure for configuring a 5001 Mainframe for paralleled master and slave amplifiers is as follows:

1. Set the controls of the 5807A just as you would for a single master setup.

2. Connect together two adjacent terminal blocks (or more, depending on how many slaves are being used) on the rear of the Mainframe (plus [+] to plus, minus [-] to minus).

3. Insert the two (or more) modules into these two adjacent Mainframe slots, with the master module to the **left** of the slave module, as you face the front of the Mainframe. The resulting electrical configuration is show in Figure 4 below:

PARALLEL CONFIGURATION - Master and Slave

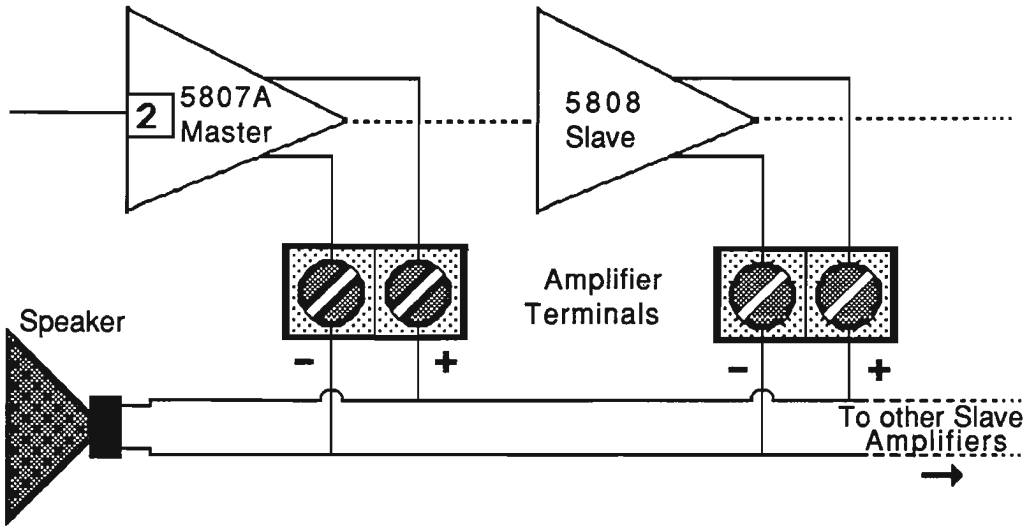


Figure 4

4. Notice that there are no controls on the slave module. None are needed because the controls on the master amplifier control the slave as well. Just insert the slave into the Mainframe. Nothing else is required.

BRIDGED MASTERS

Two masters may be placed in a bridged, or push-pull, configuration to provide a 140 volt output at 200 watts (into a 100 Ω load) . This may be desirable to minimize wire losses when very long runs are used. Although two masters are used, only one of them will act as the master. The other master's stepped attenuator and bus assign switch will be disabled. Set up is as follows:

1. Set up one of the two masters as outlined in the preceding examples. Hereafter, this module shall be designated as the MASTER - master.

2. Set up the second master with it's BRIDGE/NORMAL Switch in the "Bridge" position. This module now becomes the SLAVE - master.

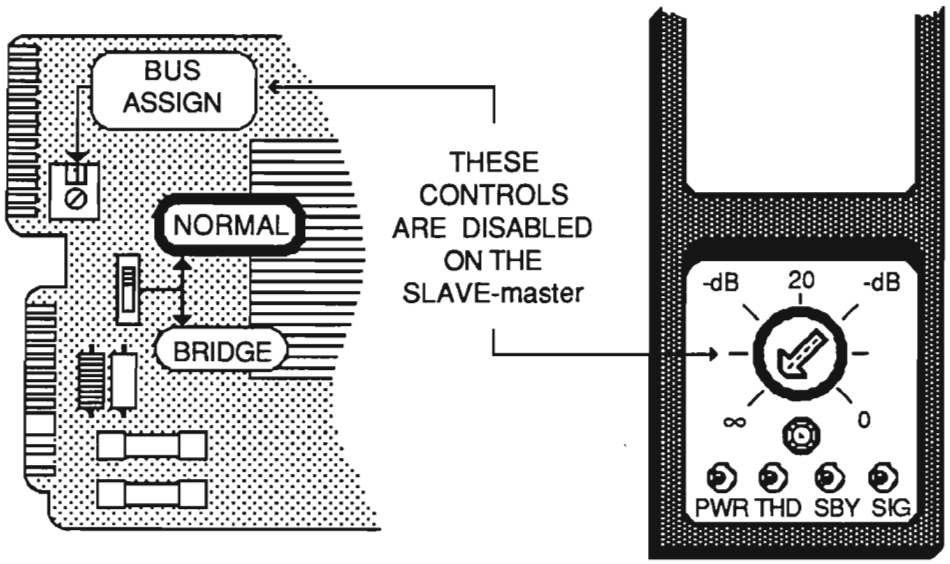


Figure 5

3. Insert the two amplifiers into the Mainframe. They must be in adjacent slots with the MASTER - master to the left of the SLAVE - master.

4. Connect the load across the two plus (+) terminals of the two amplifiers. **Do not** connect anything to the two minus (-) terminals. Figures 6 and 7 on the following page detail these steps.

AMPLIFIER POSITION IN MAINFRAME FOR BRIDGED CONFIGURATION

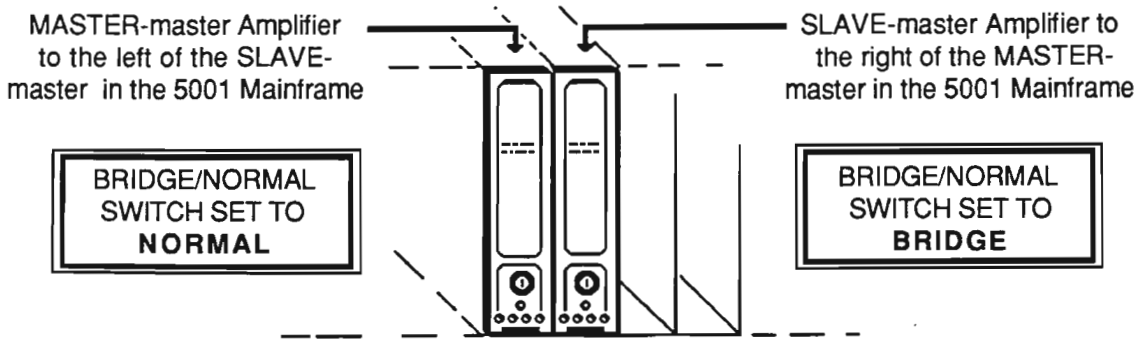


Figure 6

BRIDGED CONFIGURATION - Master and Master

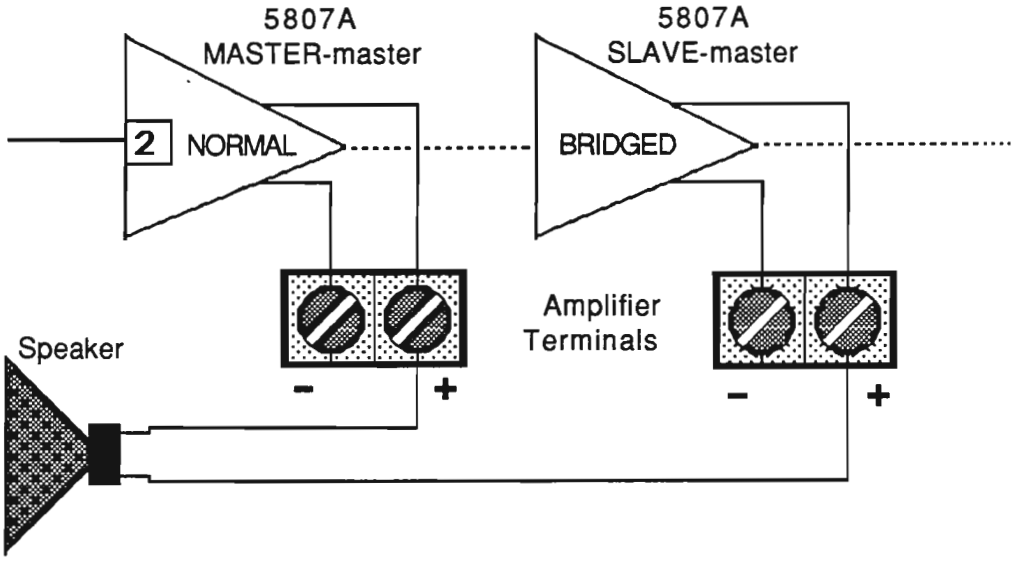


Figure 7

5. The status LEDs on both amplifiers will be operational. You may notice that one THD LED may come on slightly before the other. This is normal and indicates the clip point of the bridged pair.

BRIDGE/PARALLEL CONFIGURATION

If the terms bridge and parallel are not familiar, review the two preceding sections of this manual titled "BRIDGED MASTERS" and "PARALLELED MASTERS AND SLAVES."

Masters and slaves may be paralleled together to provide more current to a lower impedance load. Two masters may be bridged together to provide more voltage to a higher impedance load. Amplifiers may also be placed in a bridged and paralleled configuration to provide more current and voltage to a load. This technique of combining amplifiers allows tailoring of the amplifier to the load. An 800 watt, 140 volt amplifier can be configured using the bridge/parallel technique.

For additional information on amplifier combinations, refer to page 21 this manual, the section tilted "POWER AMPLIFIER COMBINATIONS FOR BOTH LOW AND HIGH IMPEDANCE AMPLIFIERS."

1. When using amplifiers in the bridge/parallel configuration, everything must be done in pairs. *There must be two and only two masters and there will be either 2, 4, or 6 slaves.* As an example we will show the set up procedure for a 400 watt, 140 volt amplifier.

2. Set up two master amplifiers as described in the "BRIDGED MASTERS" section of this manual, but do not insert them into the Mainframe at this time.

3. Insert the the four amplifiers into the mainframe in the following order: MASTER - master, slave, SLAVE - master and then the other slave. *Note that four adjacent slots must be used.*

BRIDGED/PARALLEL CONFIGURATION
Masters and Slaves in 5001 Mainframe

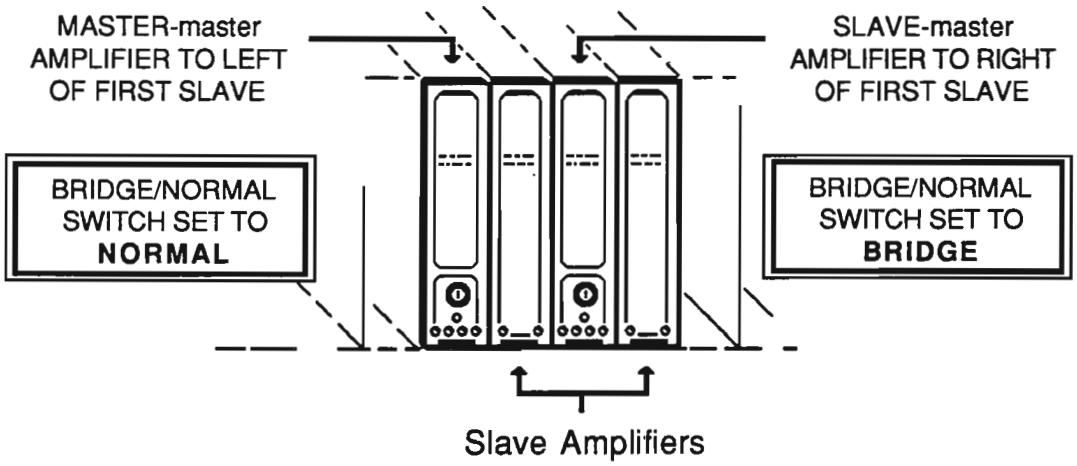


Figure 8

4. The amplifiers are combined in two sets of two. The output terminals of the four amplifiers are connected together as shown in Figure 9 below. Notice that two pairs of paralleled master/slave combinations are simply bridged together.

BRIDGE/PARALLEL CONFIGURATION

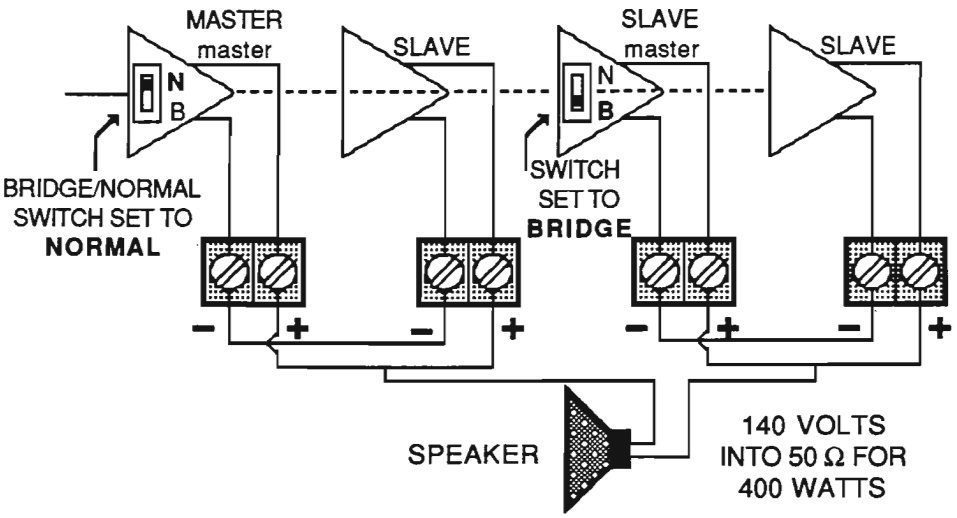


Figure 9

5. Only the volume control and bus select switch on the MASTER - master is operational, but all LED status indicators remain operational.

LED STATUS INDICATORS

All amplifier modules have LED status indicators to provide front panel indication of the operational status of the amplifier. The master modules have four indicators, while the slaves have only two.

Additionally, the status of the amplifiers may be remotely monitored, either as individual amplifiers or as a Mainframe group. This is covered in detail in the section of this manual titled "REMOTE STATUS MONITORING, found on page 11.

PWR (POWER) **LED**

This green LED indicates that the module is receiving AC power, and that its power supply is operating properly. If this LED fails to light, check the 5101 power module to see that it is turned on. Also check the 1.5 amp fuses inside the amplifier to see if they are blown.

THD (TOTAL HARMONIC DISTORTION) **LED**

This red LED is illuminated when the total harmonic distortion in the amplifier exceeds one percent (1%). Essentially, this LED functions as a clip indicator. The input level to the amplifier should be set so that the THD LED flashes "on" only momentarily during peaks in the program material.

SBY (STANDBY) **LED**

This red LED is illuminated only when the amplifier is placed in the standby mode. The amplifier will automatically switch into standby if the temperature of the heatsink exceeds 180 degrees Fahrenheit. This prevents destruction of the amplifier due to thermal runaway. The amplifier can also be manually placed in the standby mode from a remote location, if desired. This will illuminate the LED as well.

SIG (SIGNAL PRESENCE) **LED**

This yellow LED is illuminated whenever there is voltage present at the amplifier's output. This indicates the presence of a signal at the output of the amplifier. The brightness of the LED should vary in intensity with the level of the program material.

This LED can also indicate the presence of signals other than program material. This would include noise and oscillations. Oscillations that may be inaudible to the human ear will still be indicated by the SIG LED.

Often the THD LED will be lit in conjunction with SIG LED if the signal is, in fact, a high frequency oscillation. *The SIG LED should **not** be lit when there is no signal input to the amplifier.*

TEST POINT

All master amplifiers have a test point located on the front panel. This test point is connected to the output of the amplifier via a divide-by-10 voltage divider. This divider reduces the voltage at the test point to a level that is consistent with other 5000 modules. A 70.7 volt signal at the output of the amplifier will be 7.07 volts at the test point. The signal at the test point is 20dB below the output of the amplifier.

AMPLIFIER STANDBY MODE

As heretofore mentioned, a 5807A Amplifier can be placed in the standby mode two ways. The first occurs automatically if the amplifier becomes overheated. A thermal sensor on the heatsink initiates this function, and turns the amplifier back on when it has cooled. The 5807A can also be placed in the standby mode by choice through remote switching.

In the standby mode the DC bias voltage is turned off, and the amplifier will not pass an audio signal. This mode is not intended for use in paging systems where the amplifier is constantly being turned on and off. However, it may be used to mute an undesired channel.

To manually place an amplifier in standby, connect terminal number 13 of the TB-40, or TBT-600 terminal block (located directly behind the amplifier) to CT (chassis ground). This is a low voltage DC control line.

More than one amplifier can be connected to a common standby switch. The terminal number 13 of all involved amplifiers would be paralleled together and connected to a SPST switch, which would be tied to chassis ground (See Figure 10 below).

REMOTE CONTROL FOR THE STANDBY MODE

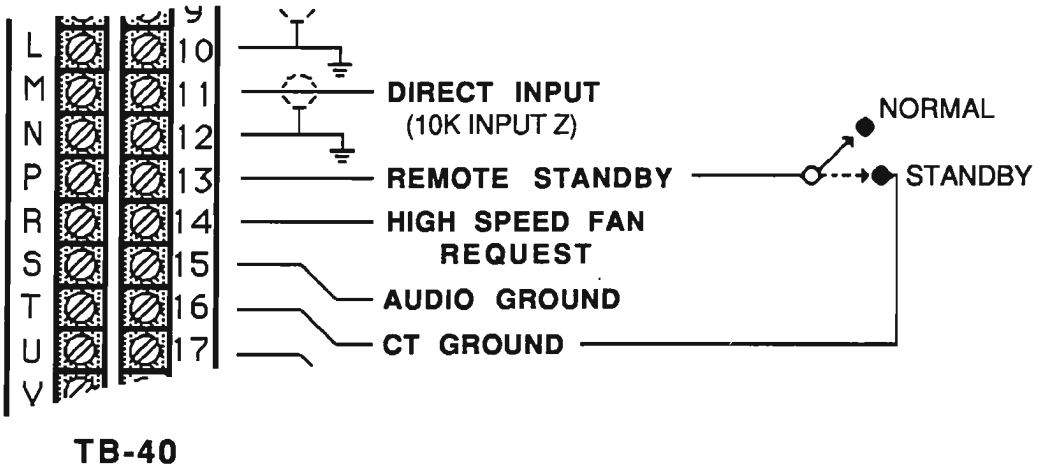


Figure 10

REMOTE STATUS MONITORING

With the addition of a TB-40, the operational status of each individual master amplifier may be remotely monitored. The functions that may be monitored are the same as those displayed by the amplifier's front panel LEDs: power fault, total harmonic distortion, standby/thermal status, and signal presence. The high speed fan request may also be monitored.

All amplifiers within a Mainframe may be monitored as a group via the summary status buses that appear at the AUX PWR connector on the rear of the 5001 Mainframe. There are three summary status buses that appear at this connector. They are: summary fault, summary THD, and fan speed status. If desired, the contribution of any amplifier to the summary status buses may be disabled by cutting a wire jumper. For details refer to the section of this manual tilted "INTERNAL WIRE JUMPERS" on pages 16.

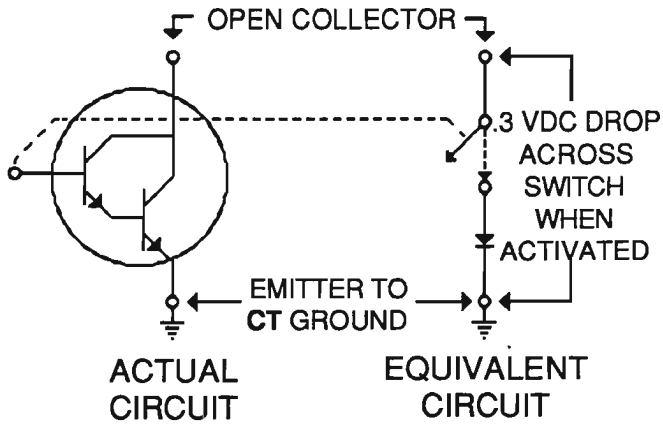
The summary fault will provide indication if any amplifier in the Mainframe experiences a power, thermal, or sustained THD fault. Therefore, this bus provides an indication of a serious or complete malfunction of any amplifier in the Mainframe.

The summary THD bus will provide an indication whenever the THD LED of any amplifier in the Mainframe comes on. With this bus remoted to the mixing location, the system operator can "push" the system to the point just below clipping.

The fan speed status may be monitored and switched at the AUX PWR connector.

The status bus indicators, both individual and summary, are of the "open collector" type. This can be visualized as a SPST switch with one side connected to CT (center-tap or power) ground. This "switch" will handle approximately 200 mA @ 30 VDC. There is a .3 VDC drop across its contacts when it is closed. Typically, a Darlington transistor is used with the emitter connected to CT ground, and the collector connected to the indicator. The remote indicator is activated when the base of the darlington is biased on by the amplifier, thus connecting the collector to the CT ground. This completes the signal path. An illustration of this circuit is shown in Figure 11 on the following page.

EQUIVALENT CIRCUIT FOR REMOTE STATUS PORTS



SWITCH RATING
Maximum current: 200 mA
Maximum voltage: 30 VDC

Figure 11

There are many different ways to interface to the remote status ports on the TB-40 and the 5001 AUX PWR connector. Depending upon the power requirements of the interface, an external power supply may be needed. *If an external supply is used, its negative side must be connected to CT ground.*

The 5101 Power Module can supply a nominal 12 VDC at up to 1 amp. This voltage appears at the **LED** terminal of the three pin (remote on/off SW, GND, LED) terminal block on the rear of the 5001 Mainframe. This is very convenient to use because the negative side of its supply is already connected to CT ground.

When using the 12 VDC supply provided by the 5101, it should be remembered that any power drawn from this source must be accounted for when calculating total power consumption of signal processors from the 5101 Power Module. The maximum that the 5101 will provide is 100 watts, whether it is used to power signal processing modules in a Mainframe, or additionally used as a 12 VDC power supply to be used for remote monitoring functions.

On the following page, Figures 12 and 13 show several examples of remote status indicators. The connectors on the rear of the 5001 Mainframe are illustrated.

REMOTE STATUS INDICATION

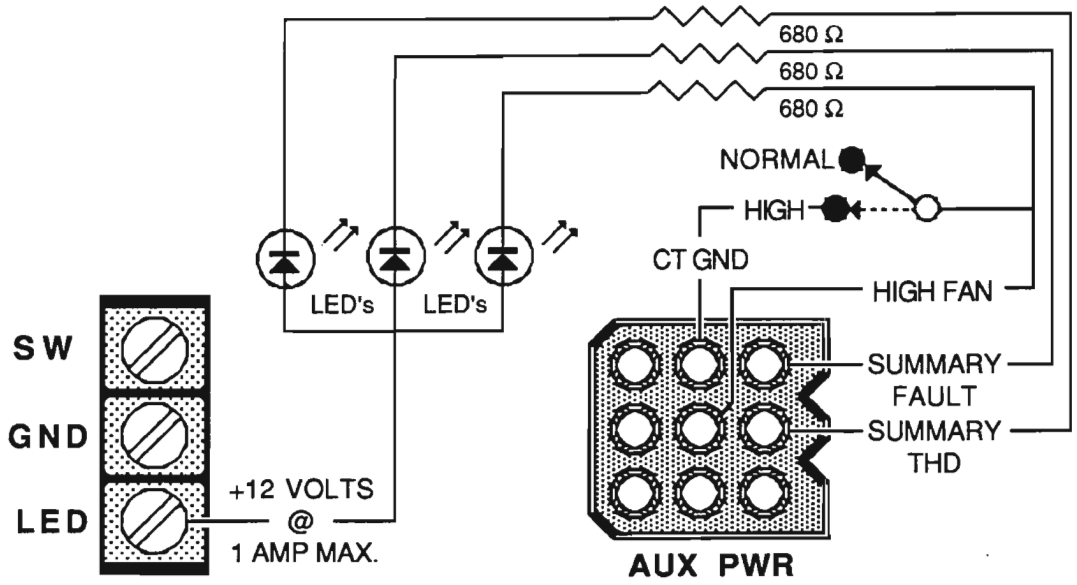


Figure 12

Illustrated above is a simple circuit utilizing the existing 12 VDC supply of the 5101 Power Supply Module, and three resistors and three LED's. Illustrated below is a circuit showing the various combinations of power sources and monitoring devices that can be used for remote status monitoring.

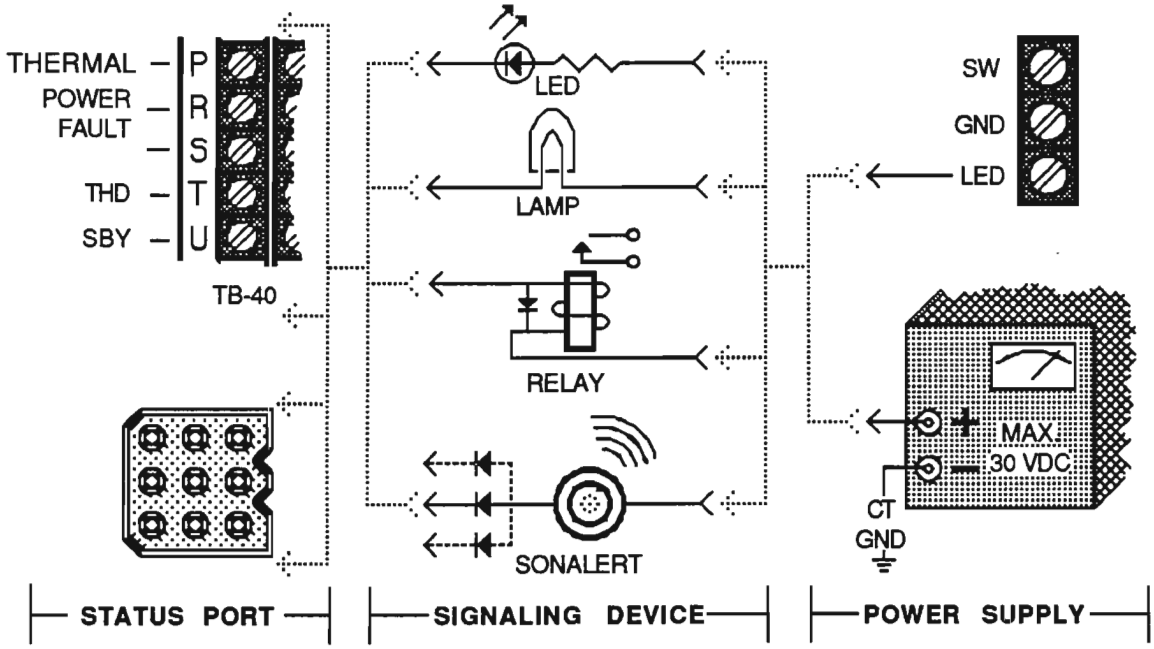


Figure 13

FUSES

All amplifiers are protected by two 1.5 amp slow-blow fuses. Should these need replacing, fuses with higher ratings must not be be substituted. *Substituting fuses with higher ratings can cause extensive damage to the amplifier and will* ***void the warranty.***

In master/slave combinations, a defective slave may cause the fuses in the slave and the master to fail. The green PWR LED on the defective slave will not be lit, indicating blown fuses. The defective slave should be removed and the fuses in the master checked and, if necessary, replaced with 1.5 amp slow-blow fuses before it is placed back into service. If the fuses fail again when the amplifier is turned on, there may also be a problem with the master.

Sometimes the fuses in the amplifier may fail for reasons other than circuitry failure. Protection is part of their function. Before returning an amplifier for service, the fuses should be replaced and the amplifier tested in the Mainframe. Should the fuses fail a second time, the unit should be returned for service.

FAN COOLING

It is vital for proper operation and product longevity that adequate forced air cooling be maintained for all amplifiers. The 5001 Mainframe and the 5101 Power Module have been designed to provide the proper cooling. The cooling features of the Mainframe and Power Module may be greatly retarded, or altogether defeated by improper installation techniques.

As you face the front of the Mainframe the air flow is from left to right. Cool air is drawn in from the left and exhausted at the right. The Mainframe cabinet is not pressurized by the fan forcing air into the enclosure, but rather, cooling is effected by the fan evacuating air from the enclosure. By using the evacuation method, cool air from outside the enclosure is drawn in through the various openings in the enclosure. This provides a constant intake of cool air flowing over the modules. Listed below are some cooling guidelines.

1. Never block any ventilation holes on the Mainframe.
2. Provide minimum 1.75 inch clearance above and below Mainframe.

3. Do not mount Mainframes as to allow the exhaust from one to flow directly into the intake of another.
4. Cover all unused slots between amplifier modules and the 5101 Power Module to retain the integrity of the air flow.

INTERNAL WIRE JUMPERS

The 5807A Master Amplifier has four internal wire jumpers. These jumpers may be cut by the installer to disable certain features or functions of the amplifier. *In 99% of all installations these jumpers should* ***not*** *be cut .*

Jumper W3 is similar to jumpers found on other modules. This jumper allows isolation of the input to the amplifier from the Input Bus Assign Switch. When this jumper is cut, the input to the amplifier can only come from the direct input on the amplifier's TB-40 (terminals M and 11). The Input Bus Assign Switch is disabled, so the switch setting does not matter.

Jumpers W1 and W2 are involved with the summary THD and FAULT status buses in the Mainframe. All amplifiers contribute to these two summary status buses, unless their jumpers are cut. There should rarely occur a situation wherein an amplifier would need to be isolated from these buses.

INTERNAL WIRE JUMPERS

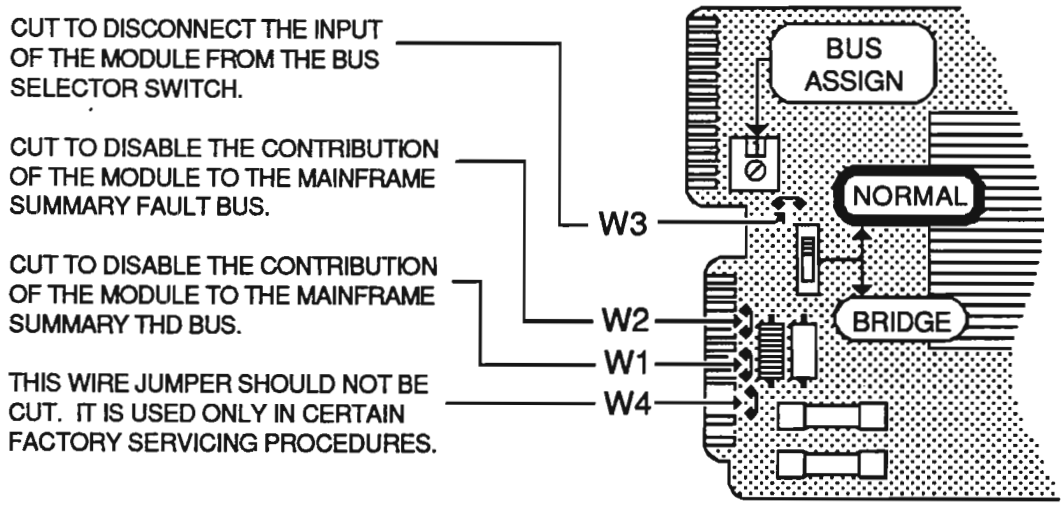


Figure 14

As shown by Figure 14 on the preceding page, wire jumper W1 connects the amplifier to the Mainframe summary THD status bus. Wire jumper W2 connects the amplifier to the Mainframe summary fault status bus. Wire jumper W4 should never be cut. This jumper connects the output of the 5807A to the output terminals and is used only during factory servicing procedures.

5808 SLAVES

The 5808 Slave is a 100 watt booster amplifier for use with the 5807A Master Amplifier. *The slave amplifier cannot be used alone. It must be used in conjunction with a master amplifier.*

The slaves contain no protection circuitry for the amplifier or the load. All protection circuitry is contained in the master. Therefore, in order for the master to sense the output of the slave and afford it protection, ***the output terminals of the slave must be connected to the output terminals of the master.*** *The individual outputs of the slaves must not be connected to different loads.* All combined masters and slaves must be connected to a common load.

A total of eight 5808 Slaves may be paralleled with a 5807A Master Amplifier. This would provide 900 watts at 70.7 volts into a 5.56 Ω load.

SLAVE LED's

Each slave has PWR and SIG LED. The PWR (power) LED indicates the status of the slave's power supply. It should be lit if the power supply is functioning properly.

The SIG (signal presence) LED operates somewhat differently than the SIG LEDs on other modules. In normal SIG LED operation, the LED illuminates whenever there is a signal on output of the module. *On the slave module, the LED comes on only when the master amplifier cannot handle the load by itself.* For example, in a master/slave combination, the SIG LED on the master will come on when there is signal on its output. *The SIG LED on the slave will come on only during the last 3 dB of the combined power output.* This means that the slave SIG LED will come on whenever the combined pair of amplifiers produces between 100 and 200 watts.

Although it appears that the slave is contributing to the load only after the master can no longer meet the demand, this is not the case. The slave is in parallel with the

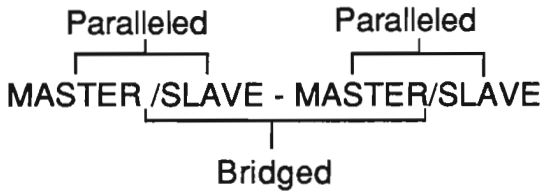
master and does contribute to the load on an equal basis.

The slave may be tested by placing a short across the output terminals of the paralleled master/slave combination while program material is present. The slave signal presence LED should be fully illuminated. The THD LED on the master should also be lit.

POWER AMPLIFIER COMBINATIONS FOR BOTH LOW AND HIGH IMPEDANCE AMPLIFIERS

Example:

LZMSMS = LOW IMPEDANCE



KEY to Abbreviations	LZ = Low Impedance (5805A) M = Master HZ = High Impedance (5807A) S = Slave

P / Ω	100	140	200	280	300	400	500	560	600	700	800	900
2				LZMS								
4		LZM	LZMS				LZMSMS					
5.5												HZM8S
6.2											HZM7S	
7										HZM7S		
8	LZM			LZMM		LZMSMS						
8.3									HZM5S			
10							HZM4S					
12.5						HZM3S						
16			LZMM									
16.6					HZM2S							
25.5			HZMS					(140 VOLTS) HZM3S + HZM3S				
33.3						(140 VOLTS) HZM2S + HZM2S						
50	HZM			(140 VOLTS) HZMS + HZMS								
100	(140 VOLTS) HZMM											

Figure 15

Figure 15 on the preceding page shows all possible combinations of low and high impedance master and slave amplifiers. The chart shows the load impedance and power output for the various amplifier combinations.

IMPORTANT NOTE: *Only amplifiers of the same impedance (low or high) may be paralleled or bridged one with another. Slaves cannot be used independently. They must be used in conjunction with a Master.*

SPECIFICATIONS FOR THE 5807A AND 5808 POWER AMPLIFIERS

Power Requirements ---------- 117 Volts AC, 50-60 Hz 170 Watts

Power Output ---------- 100 Watts Continuous Average Sine Wave Power Into 50 Ω @ 70.7 Volts

Frequency Response ---------- +0,-1dB 20 Hz to 20kHz

Total Harmonic Distortion ---------- 100 Watts @ 1 kHz=.025% Typical (.05%) Maximum
100 Watts @ 20 kHz=.09% Typical

Hum and Noise ---------- 105 dBa Below Rated Output

Input Impedance ---------- 10,000 Ω

Input Sensitivity ---------- .775 Volts for 100 Watts Output

Damping Factor ---------- Greater Than 200

Slew Rate ---------- 20 Volts per Microsecond

DC Offset ---------- 0 Millivolts, ± 50 mv

Output Load Impedance ---------- 50 Ω

Amplifier Protection -- Protected Against Short Circuit, Open Circuit or Mismatch

Load Protection ---------- DC Crowbar

Turn On ---------- The 5807A has Delayed Turn On for Load Protection

SPECIFICATIONS CONTINUED

Size ---------- 8.5 X 4.2 X 1.7 Inches

Weight ---------- 8 lbs. 6 oz.

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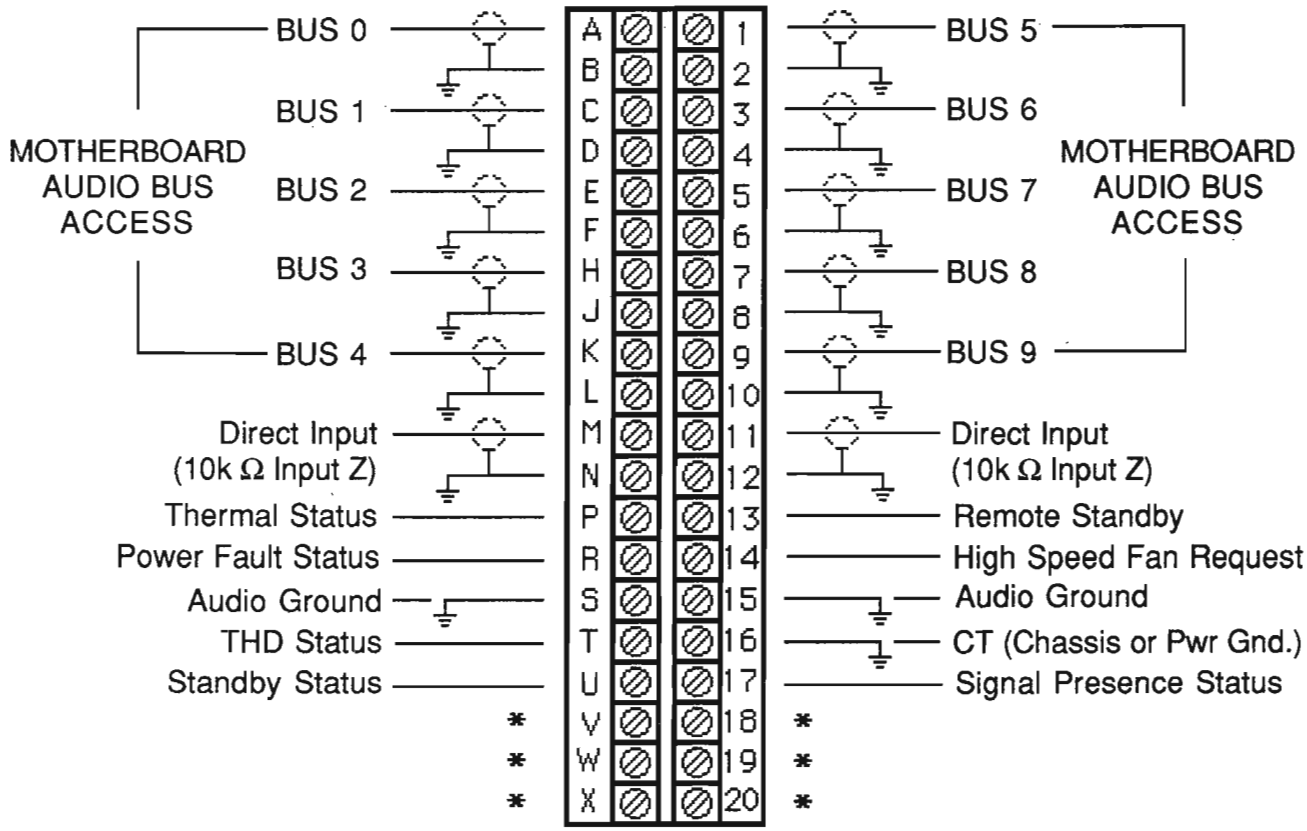

* No Connection

5805A and 5807A TB-40 Connections