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OWNER'S MANUAL
MODELS 750B & 750C
PROFESSIONAL POWER AMPLIFIER

TABLE OF CONTENTS

<u>DESCRIPTION</u>	<u>FORM NUMBER</u>
Important	00601
Description	01601
Option Page	01604
Indicator and Protection Circuits	01611
Specifications	02100
Unpacking and Set-Up	02600
Rack Mounting Hints	02650
Stereo Input Connections	03002
Balanced Line Inputs	03011
Unbalanced Line Inputs	03021
Balanced Line Input	03031
Unbalanced Line Input	03041
Terminating Resistance Chart	03051
Stereo Output Connections	03501
Damping Factor Nomograph	03510
Speaker Fuse Nomograph	03530
Mono Operation	03650

Power Mains Connection	04000
Operation	05100
750 B/C Circuit Description	06200
Chassis, Schematic	07304
Parts List, Chassis	07350
Amplifier, Schematic	07211
Parts List, Amplifier Module	07220
VU Meter, Schematic	07104
Parts List, VU Meter	07501
Relay Card, Schematic	08304
Parts List, Relay	08340
Power Mains Voltage Conversion	04601
Warranty	17000
Service Authorization Form	17020
Warranty Registration Form	17030

- IMPORTANT -

PLEASE READ THIS PAGE BEFORE OPERATING

YOUR

BGW POWER AMPLIFIER

Your new BGW amplifier is designed to provide years of trouble free performance. Observing these few precautions will insure proper operation:

Read all Instructions before connecting any AC power to your power amplifier.

Retain this Manual for future reference.

Heed all warnings on the top or rear of the power amplifier.

The amplifier should not be used near water - for example, near a bathtub, washbowl, kitchen sink, laundry tub, in a wet basement, or near a swimming pool, etc.

The amplifier should be situated so that its location or position does not interfere with its proper ventilation. For example, it should not be situated on a bed, sofa, rug, or similar surface that may block the ventilation openings; or, placed in a built-in installation, such as a bookcase or cabinet that may impede the flow of air through the ventilation openings.

The amplifier should be situated away from heat sources such as radiators, heat registers, stoves, or other appliances that produce heat.

The amplifier should be connected to a power supply only of the type described in the operating instructions or as marked on the rear panel.

Precautions should be taken so that the grounding means of the amplifier is not defeated.

The power supply cord should be routed so that it is not likely to be walked on or pinched by items placed upon or against it, paying particular attention to cord at the plug, convenience receptacles, and the point where they exit from the amplifier.

Care should be taken so that objects do not fall into, and liquids are not spilled into the amplifier through openings.

The amplifier should be serviced by qualified service personnel when:

The power supply cord or the plug has been damaged; or objects have fallen into, or liquid has been spilled into the amplifier; or has been exposed to rain; or does not appear to operate normally or exhibits a marked change in performance; or has been dropped, or the enclosure has been damaged.

All connections should be made to the power amplifier with the power OFF.

Speaker fuses should be used to afford maximum speaker protection.

Never connect the output of one channel to that of another.

Connect the power cord to the proper voltage mains as indicated on the rear of the amplifier. Conversion to another voltage requires internal rewiring.

Do not remove the amplifier's cover. Amplifiers may not be covered under warranty if they are tampered with. There are NO adjustments within. Potentially lethal voltages exist within the amplifier. Refer all service work to an authorized BGW service station.

DESCRIPTION

The BGW 750B and 750C are professional, high power, stereo amplifiers; identical except for their front panel indicator lights. Clipping indicators are used on the 750C, while the 750B uses dual solid state V.U. meters. (see section 01611).

An on/off circuit-breaker switch, gain controls, and the indicator lights are located on the front panel. Input, output, and ground connectors; as well as the stereo/mono and meter switches* are on the rear panel.

Three-pin XLR type plugs can be used for balanced and unbalanced line input connections. A jumper plug must be inserted into the transformer socket when unbalanced lines are used, and a transformer is required for balanced lines. Standard 1/4" phone jacks are provided for unbalanced line use only, and can be used directly. (see all input connection sections.)

Output connections are made to five-way binding posts that accept banana plugs, spade lugs, or bare wire. Seventy volt distribution lines can be driven directly when the amplifiers are switched to their bridged mono mode. Signal ground can be separated from chassis ground, if desired, by removing the connecting link on the rear panel barrier strip.

Features include: an error-sensing op-amp input stage, to stabilize performance; a heat sink mounted bias circuit, to provide precise temperature compensation; and a full-complementary-output stage, featuring ten 150 watt transistors in each channel (3000 watt total dissipation capability). Extensive circuitry is used to protect the amplifiers and components connected to them. (See section 01611.)

Mechanical features include: a 16 gauge welded steel chassis, wiring, massive aluminum heat sinks, and modular construction.

All active audio components are contained in two modules, one for each channel. Each consists of a glass epoxy circuit board mechanically coupled to a large aluminum heat sink. Thermostat-controlled, forced air cooling maintains the modules at a safe operating level. Removal of the modules for service is easily accomplished by removing the support screws and the plug-in electrical connectors.

*Meter switch for 750B only.

The professional audio power amplifiers models 750B or 750C are available from the factory with custom options to fit your needs.

Some of these options may require a minimum quantity of products to be purchased at one time. Please contact the factory with your requirements.

Some of the options for the 750B or 750C are listed below:

750B/C-01 Voltage gain change, 0.776 volts sens

750B/C-02 AC power switch and thermal circuit breaker

INDICATOR AND PROTECTION CIRCUITS

INDICATOR CIRCUITS

The LED's, located above the gain controls on the 750C front panel, serve as clipping indicators. They are activated when the amplifier output level (peak) equals the power supply voltage. Distortion rises significantly when this occurs because there is not enough energy available to accurately reproduce the signal. As this condition can occur at a rate too fast for the eye to follow, the LED's remain lit for $\frac{1}{2}$ second once clipping is sensed. A third red LED is employed as a "power on" indicator.

Each of the two solid-state V.U. meters on the 750B features eleven LED's arranged in an arc. The first LED position (left) is a power on indicator. The following nine LED's are calibrated in decibels below rated power, with the far right LED indicating 0 dB and the balance ranging downward to -33dB. A switch on the rear panel calibrates the meter for four or eight ohm loads. This display, accurate to ± 1 dB, has a response many times faster than the best conventional D'Arsonval meters, and is also more precise. The last LED is the same indicator used in the 750C circuit. The meter is protected by a high impact LexanTM window that resists scratching and color degradation.

PROTECTION CIRCUITS

In your unit, both the primary mains (a.c. line) overload protection and the on/off switch have been combined into a rocker-actuated, magnetic circuit breaker; whose operation, unlike fuses, is predictable and independent of temperature. Returning the switch to the on position resets the system.

Speaker protection is provided by relay circuitry that disconnects the load whenever a short-circuit or harmful d.c. current is present across the output terminals. Transients created when removing extremely large signals from the load are suppressed by magnetic-field arc-interruptors mounted on the relay case.

The relay circuit includes a time delay that allows the amplifier to stabilize before the speakers are connected. It also disconnects the speakers the instant the circuit breaker is shut off, eliminating annoying pops and clicks.

Thermal-sensing switches increase fan-speed when temperature rises significantly. Should the temperature in either output circuit rise beyond a safe level, another set of switches will disconnect the load from the amplifier, until the amplifier temperature drops to a safe operating level.

SPECIFICATIONS: BGW MODELS 750B and 750C*

OUTPUT POWER

225 watts minimum sine wave continuous average power output per channel with both channels driving 8-ohm loads over a power band from 20Hz to 20kHz. The maximum Total Harmonic Distortion at any power level from 250-milliwatts to 225 watts shall be no more than 0.1%.

1kHz Power: 240 watts into 8-ohms per channel, both channels operating,
0.1% Total Harmonic Distortion

360 watts minimum sine wave continuous average power output per channel with both channels driving 4-ohm loads over a power band from 20Hz to 20kHz. The maximum Total Harmonic Distortion at any power level from 250-milliwatts to 360 watts shall be no more than 0.2%.

1kHz Power: 400 watts into 4-ohms per channel, both channels operating,
0.2% Total Harmonic Distortion.

720 watts minimum sine wave continuous average power output monaural driving an 8-ohm load over a power band from 20Hz to 20 kHz. The maximum Total Harmonic Distortion at any power level from 250-milliwatts to 720 watts shall be no more than 0.2%.

1kHz Power: 800 watts into 8-ohms, 0.2% Total Harmonic Distortion

*All specifications apply to both, the Model 750B and Model 750C.

All specifications and features are subject to change without notice.

SPECIFICATIONS

Intermodulation Distortion:	Less than 0.02% from 250 milliwatts to rated power
Small Signal Frequency Response:	+0, -3dB, 1Hz to 90kHz +0,-0.25dB, 20Hz to 20kHz
Hum and Noise Level:	Better than 106dB below 225 watts (unweighted, 20Hz to 20kHz)
Input Sensitivity:	2.12 volts for maximum power output. Voltage gain 26dB (20 times)
Input Impedance:	Greater than 15k ohms
Damping Factor:	Greater than 230 to 1 referenced to 8-ohms @ 1kHz
Output Impedance:	Designed for any load impedance equal to or greater than 3.5 ohms
Power Requirements:	Interchangeable for either 100, 120, 200, 220, or 240 volts A.C., 50-60Hz 1500 watts
Semiconductor Complement:	750C: 2 Op Amp IC's (equivalent to 44 transistors each), 51 transistors, 8 zener diodes, 21 diodes 750B: Additional 2 LED driver IC's, 1 Quad Op-Amp IC, 4 transistors, 1 zener diode, 6 diodes, 19 LED's.
Dimensions:	7-inch by 19-inch standard rack front panel by 12 inches deep (17.78cm x 48.26cm x 30.48cm)
Weight:	57 lbs.(25.9kg), net; 63 lbs (28.6kg) shipping

*All specifications apply to both, the Model 750B and Model 750C.

All specifications and features are subject to change without notice.

UNPACKING AND SET-UP

Your BGW Power Amplifier is shipped in an advanced packing container.

SAVE THE CONTAINER AND ALL PACKING MATERIAL!

The containers should be saved in the event the unit is moved or shipped at some future date. Replacement containers are available from BGW for \$14.00, freight included.

Inspect the unit for damage in transit immediately upon receipt. If damage is found, notify the transportation company immediately. Only the consignee may institute a claim with the carrier for shipping damage. BGW will cooperate fully in such event. Be sure to save the container as evidence of damage for the shipper to inspect.

Your BGW Power Amplifier is designed for table-top or rack mounting. Since air is drawn into the amplifier at the rear and exhausted through the vents in the sides, sufficient airflow must be provided. Inadequate ventilation may cause the protective heat sensors to shut one or both channels off. The four rubber feet may be removed if units are to be stacked one above the other in a standard relay rack.

DO NOT PLUG THE AMPLIFIER IN YET!

All connections should be made before power is applied.

RACK MOUNTING HINTS

KEEPING IT COOL

A power amplifier draws energy from a primary electrical service, usually a 120 VAC outlet, to drive loudspeaker systems with an audio signal. Typically, only half of the energy can be delivered to the loudspeakers; remaining energy is converted into heat, and must be dissipated (ventilated) into the air.

Air circulating past heat-producing components absorbs the heat and carries it away. To accomplish this, low and medium power amplifiers rely on natural convection currents, while most high power amplifiers use fans. If the air flow is impeded, the resulting rise in heat may cause an amplifier to stop working or fail.

Circulating air currents must not be cut off when installing power amplifiers in racks. Power amplifiers using convection cooling require spacing between amplifiers to permit air flow between them. Power amplifiers using forced-air cooling, on the other hand, can usually be stacked closer to each other and may not need any blank panel spacing between amplifiers.

To improve natural convection currents within a rack, a chimney can be created by closing the back of the rack and venting the rack at the bottom to let in fresh air, and at the top to exhaust hot air. Vents should be large rectangular slots approximately 19" wide by 4" high.

The rack cabinet will require some type of blower if a large air-flow is required. It is best to exhaust air from the top of the rack rather than to blow it in from the bottom. There will be less dust and dirt in the rack this way, if the bottom vent is sufficiently large.

INSTALLING THE UNITS

Use care when mounting equipment in a rack. Place the heaviest units near the bottom of the rack and fill in all unused rack spaces with blank panels. Equipment cannot always be supported by front panels alone. This is especially true of amplifiers whose depth is more than twice their height. Uniform support can be insured by installing bottom or side rails.

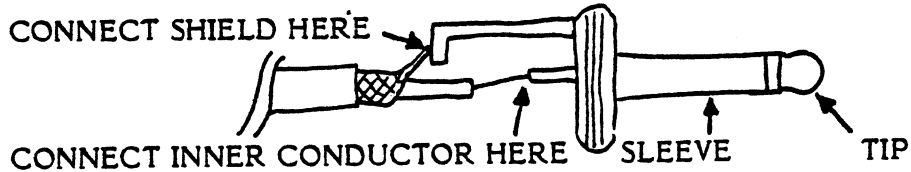
When racks are to be transported or used in a mobile installation, some means of securing the rear of the equipment are required. Angle brackets either attached to the bottom, side rails or rear panel are practical approaches.

STEREO INPUT CONNECTIONS

Three-pin XLR and 1/4 in. phone jacks are provided on the rear of the amplifier for input connections. Balanced or unbalanced lines may be used; however if input cables are longer than 8 feet, balanced lines may be necessary to maintain the signal-to-noise ratio and high frequency response.

1/4 INCH PHONE JACKS

The 1/4" phone jacks are for unbalanced lines only (single conductor, shielded) and may be used directly. Simply connect the shield to the outer sleeve of the plug and the inner conductor to the tip, or buy ready-made cables. See diagram below.



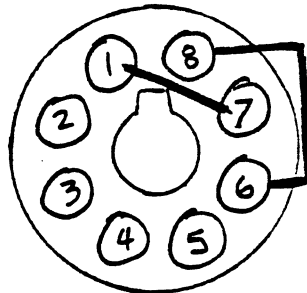
3-PIN XLR CONNECTORS

The 3-pin XLR connectors may be used with balanced (2-conductor, shielded) or unbalanced lines. They are connected to the amplifier's inputs by using the 8-pin transformer socket; they cannot be used directly.

Unbalanced Lines

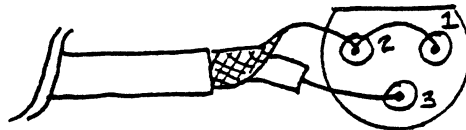
To use the 3-pin XLR connectors with unbalanced lines, a jumper plug (BGW P/N 1350-0108) must be inserted into each transformer socket. The jumper plug connects pin #1 to pin #7, and pin #6 to pin #8 as shown.

JUMPER PLUG
MUST BE USED
WITH
UNBALANCED
LINES

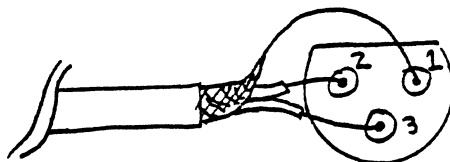


With the jumper plug in place, the 3-pin XLR connector has pin #2 connected to ground, and pin #3 to the input of the amplifier. Note: Rear of plug shown.

When using single conductor shielded cable for unbalanced lines, connect the inner conductor to pin #3 and the shield to pins #1 & #2.



When using 2-conductor shielded cable for unbalanced lines, connect the high level signal wire to pin #3, the low level signal wire to pin #2, and the shield to pin #1.



Note: Shield not connected to anything at signal source.

To achieve a true balanced input, it is necessary to use one transformer for each input. These should be plugged into the octal sockets provided. Depending on the specific application, one of several different transformers may be selected.

Forms are included in this manual to help guide you in your use and selection of transformers. Use the index below to find the appropriate form to match your needs.

CONNECTING ON SOURCE TO ONE AMPLIFIER

Using Balanced Lines: Refer to form #03031

Using Unbalanced Lines: Refer to form #03041

CONNECTING ONE SOURCE TO TWO OR MORE AMPLIFIERS OR DEVICES

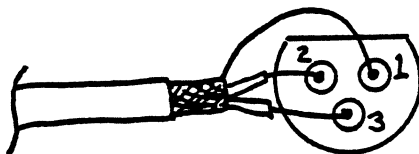
Using Balanced Lines: Refer to form #03011

Using Unbalanced Lines: Refer to form #03021

NOTE: Each amplifier input will be referred to as the "Load" in the above mentioned forms. Only one channel will be shown.

Two conductor shielded cable should be used in a balanced line system. Connect input cables as shown below.

Pin #1 Shield (Ground)
Pin #2 Signal (Minus)
Pin #3 Signal (Plus)

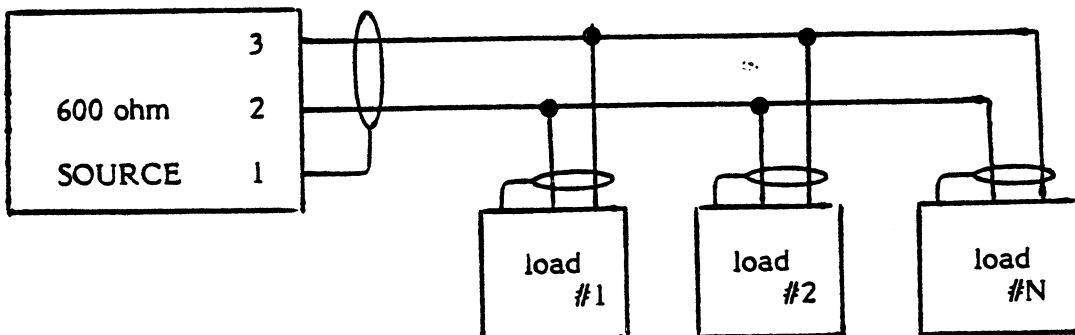


FOR MONO (BRIDGED) OPERATION

To operate the unit as a mono amplifier, use the left channel input only. DO NOT use the right channel input. Remember to place the stereo/mono switch in the mono position.

BRIDGING BALANCED LINE INPUTS

Used only when two or more devices are driven from the same input line.



MAXIMUM NUMBER OF AMPLIFIER 25ea

Input transformers for above

- A. Use 1:1 transformer 600 ohms to 600 ohms
- B. Nth load must have a terminating resistor added to the secondary of the Input transformer.

One alternative configuration is

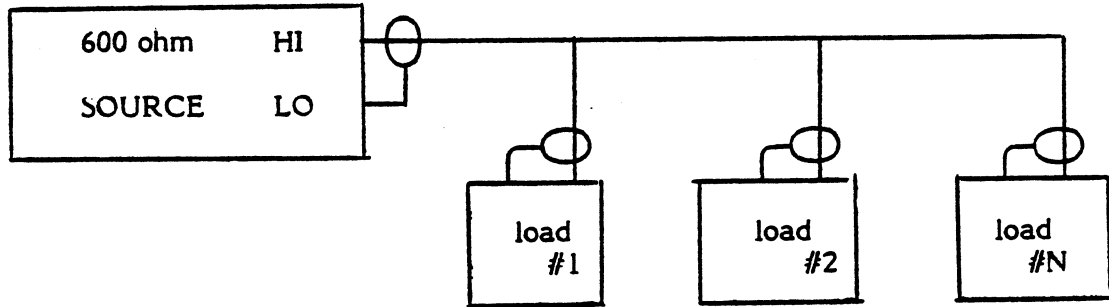
- C. 1:1 transformer 15K ohms to 15K ohms
- D. Nth load must have a terminating resistor added to the primary of the input transformer.

To find this resistance value see sheet TERMINATING RESISTANCE CHART, MFRM 03051.

NOTE: Terminating resistance is required when source is a transformer. Sources other than a transformer may not need a termination.

BRIDGING UNBALANCED LINE INPUTS

Used only when two or more devices are driven from the same Input line.



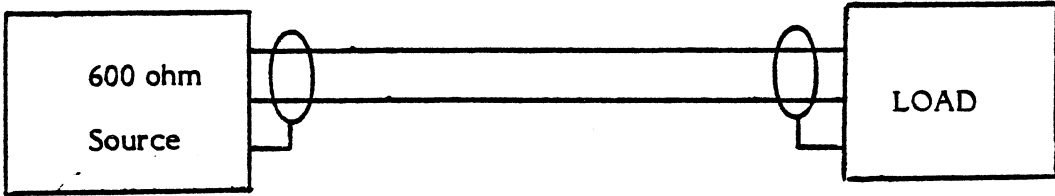
The Nth load should have a terminating resistor added to its octal plug between pin 1 and pin 6.

To find this resistor value see sheet "TERMINATING RESISTANCE CHART", MFRM 03051.

NOTE: Terminating resistance is required when source is a transformer. Sources other than a transformer may not need a termination.

BALANCED LINE INPUT:

Used only when one amplifier is driven from one source.



Input transformer for above

A. Use 1:5 transformer 600 ohms to 15K ohms

NOTE: No 600 ohm TERMINATION IS REQUIRED

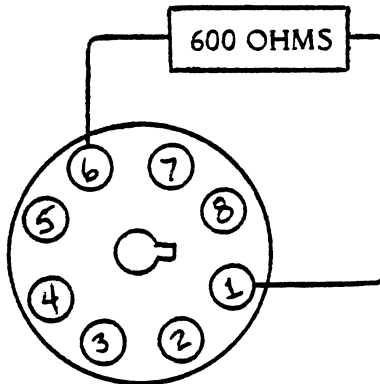
B. Alternate transformer

Use 1:1 transformer 600 ohms to 600 ohms

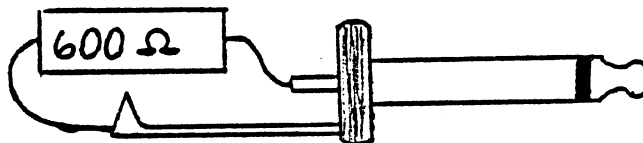
NOTE: 600 ohms termination is required on the secondary of the transformer

NOTE: Terminating resistance is required when source is a transformer: sources other than a transformer may not need a termination.

600 ohm termination, when required, can be accomplished by soldering the resistor across pins 1 and 6 of the transformer as shown below



or by installing the resistor in a 1/4" phone plug and inserting it into the unused unbalanced input jack.



UNBALANCED LINE INPUT

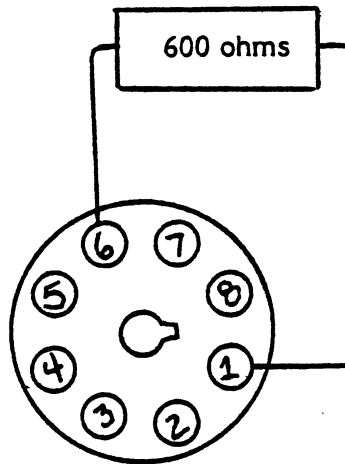
Used only when one amplifier is driven from one source



A 600 ohm terminating resistor must be added to its octal plug.

Between pin 1 and pin 6

NOTE: Terminating resistance is required when source is a transformer. Sources other than a transformer may not need a termination.



TERMINATING RESISTANCE CHART

How to find terminating resistance for balanced or unbalanced 600 ohm lines, driving more than one amplifier.

- STEP A $\frac{\text{*Input Impedance of Amplifiers}}{\text{Number of Amplifiers}} = \frac{\text{Total Load Impedance}}{\text{of Amplifiers}}$
- STEP B $\frac{\text{Total Impedance of Amplifiers} - 600}{600} = K \text{ (Impedance Factor)}$
- STEP C $(\frac{1}{K} + 1) \times 600 \text{ ohms} = \text{Load Resistor Required}$

EXAMPLE:

Input Impedance of Amplifiers = 15,000 ohms
Number of Amplifiers = 4

A $\frac{15,000}{4} = 3750 \text{ ohms}$

B $\frac{3750 - 600}{600} = 5.25$

C $\frac{1}{5.25} + 1 \times 600 = 1.19 \times 600 = 714.29 \text{ ohms}$

Closest value is 715 ohms 1% metal film resistor.

* Note all amplifiers must have the same input impedance. If not, use formula below:

$$\frac{1}{\frac{1}{Z_1} + \frac{1}{Z_2} + \frac{1}{Z_3} + \frac{1}{Z_n}} = \text{Total Load Impedance}$$

EXAMPLE:

Four (4) Amplifiers with input impedance of 15k, 30k, 30k and 7.5k

$$\frac{1}{\frac{1}{15K} + \frac{1}{30K} + \frac{1}{30K} + \frac{1}{7.5K}} = 3750 \text{ ohms}$$

STEREO OUTPUT CONNECTIONS

Two sets of five-way binding posts, on the rear panel, serve as output connectors, with one black and one red binding post for each channel. Left channel leads go to the binding posts marked LEFT; right channel, to those marked RIGHT.

Output leads are best connected, to the amplifier, with standard banana plugs; however, the five-way action of the binding posts permits the use of tinned wires or spade lugs.

Make certain that the speakers are properly phased. Connect the black or minus (-) terminal on the speaker cabinet to the appropriate black binding post on the amplifier. Connect the red or plus (+) terminal to the red binding post. Check to see that the Stereo-Mono switch on the rear of the amplifier is in the stereo position.

SPEAKER PROTECTION

All speakers can be damaged by having too much power applied to them. Fuse protection is an effective and inexpensive way of preventing this from occurring. If your speaker system does not contain a fuse or a circuit breaker, a fuse should be placed in series with each speaker and the wire going to the red terminal on the rear of the amplifier.

Maximum protection can be obtained with fast-acting fuses. Use the value recommended by the manufacturer. If no value is specified, use the chart provided to select the correct value (MFRM-03530).

To use the chart, take a straightedge, such as a ruler, and line up the speaker's impedance with its peak music power rating. The proper fuse value can then be read from the center column. Choose a fuse that is closest to, and below, the value indicated.

WIRE SIZE AND DAMPING FACTOR

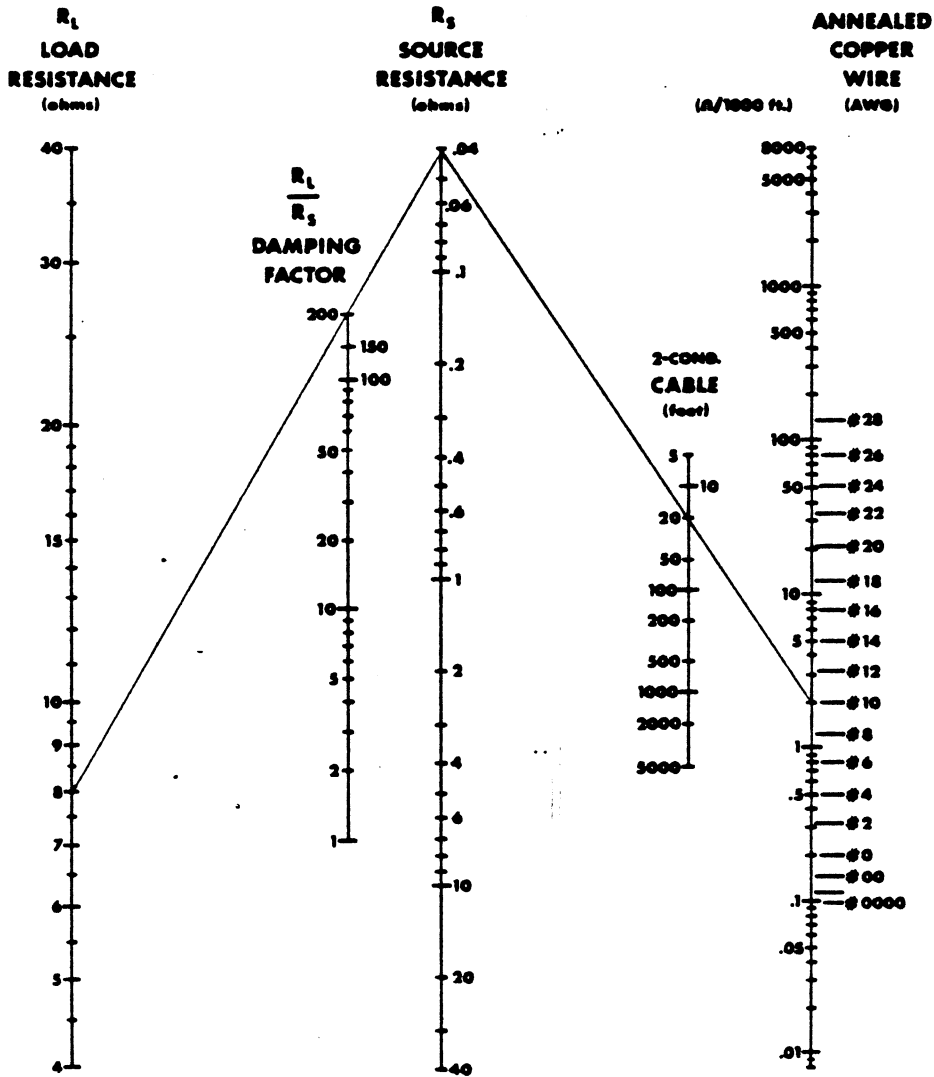
The high damping factor of BGW amplifiers results in a very clean bass response. Excessively long, and small diameter speaker wires can lower the damping factor and distort the lower frequencies. A damping factor of at least 50 should be maintained to insure good audio quality.

The relationship between wire length and diameter, and damping factor can be calculated using the chart (MFRM-03510) on the following page. Proceed as follows:

1. Using a straight-edge, line up the gauge of the speaker wire with its length. Mark off the resulting source resistance where this line crosses the center column.
2. Line up the source resistance, determined in step #1, with the manufacturer's impedance* of the speaker system. The damping factor can now be read.

*The impedance of a speaker system can be approximated by measuring the resistance across the speaker terminals, with the amplifier disconnected. Multiplying this result by 1.33, gives you the approximate impedance.

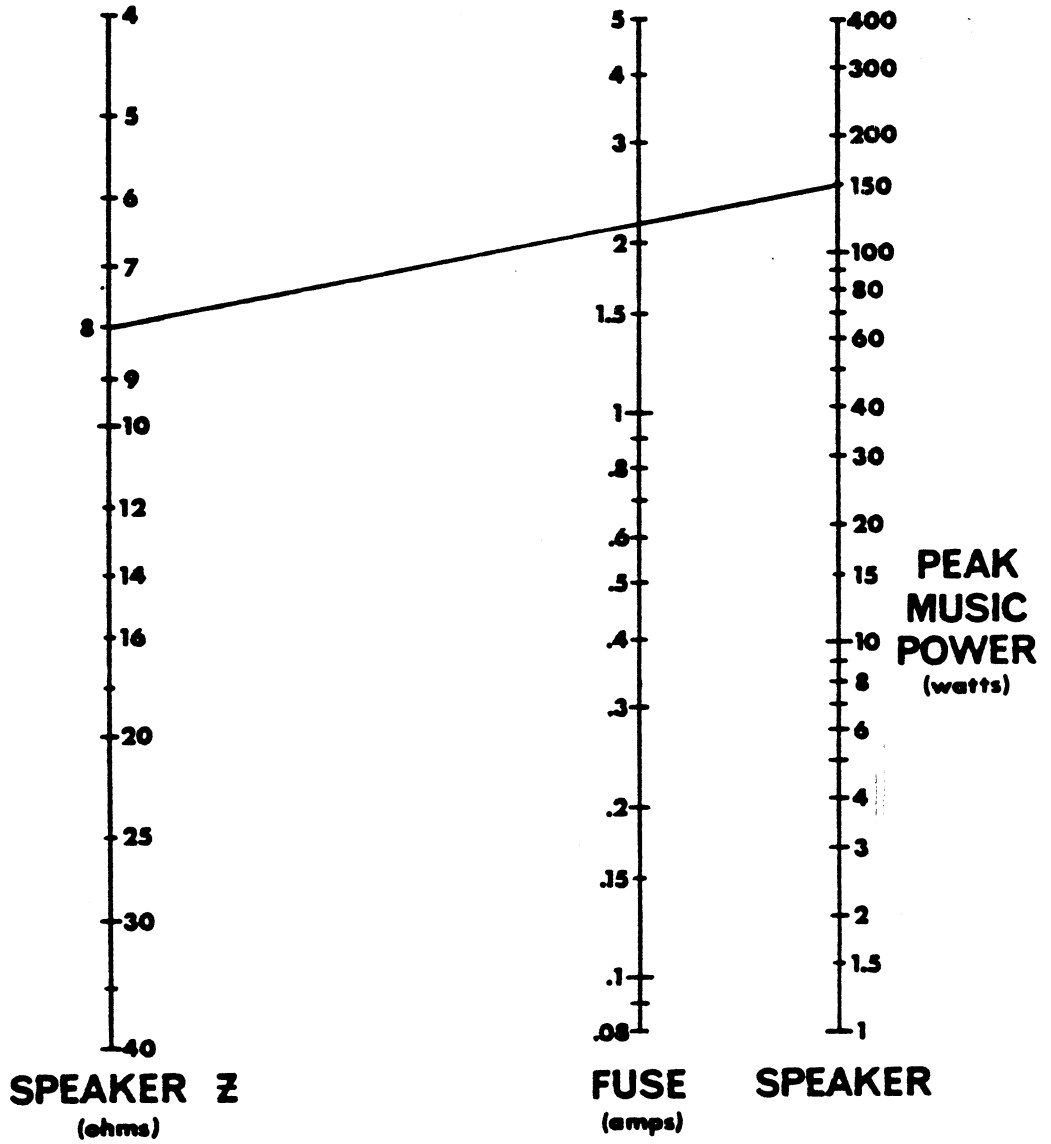
Note: This method cannot be used with electrostatic speakers.



EXAMPLE: $R_L = 8\Omega$, $R_S = .04\Omega$ OR D.F. = 200
 CABLE LENGTH OF 20 FT. ANSWER: #10 WIRE

SOURCE RESISTANCE AND DAMPING FACTOR VS. LENGTH AND SIZE OF OUTPUT LEADS

MFRM-03510



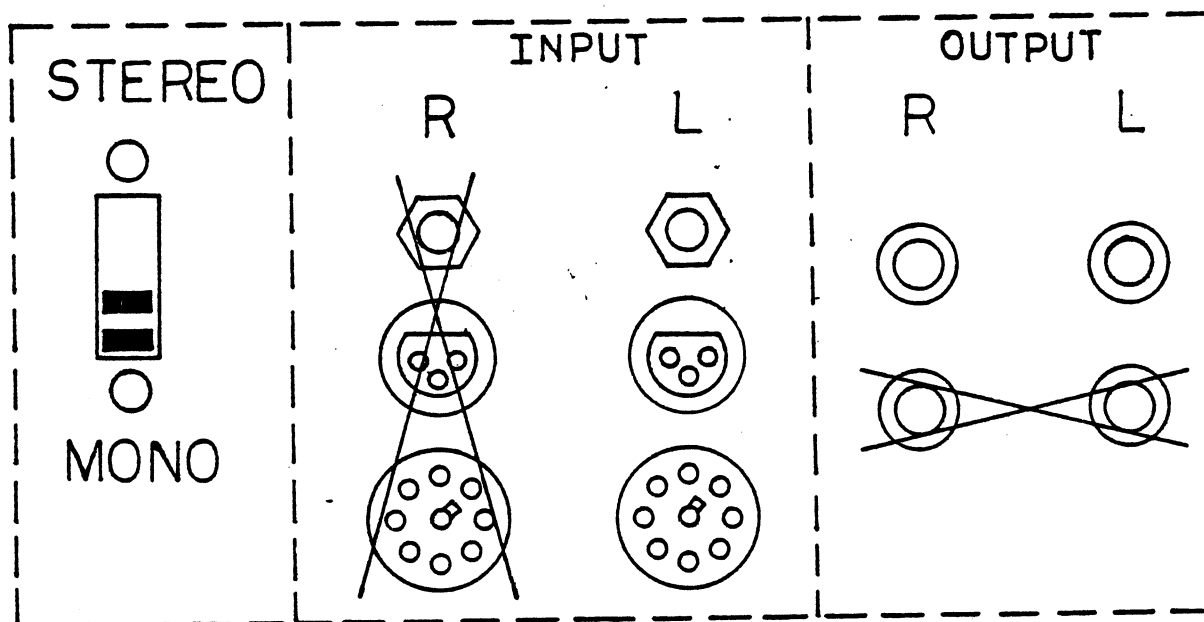
EXAMPLE: $Z = 8\Omega$, PEAK POWER = 150W. ANSWER: FUSE = 2 AMPS

FUSE SELECTOR NOMOGRAPH FOR LOUDSPEAKER PROTECTION

MONO OPERATION

The output power of the amplifier can be increased by operating it in the Mono (bridged) Mode. The correct procedure for Mono operation is as follows:

1. Set Stereo/Mono switch to Mono position.
2. Use left channel input only. DO NOT use the right channel input.
3. Connect the output across the two red binding posts. DO NOT use the black binding posts. DO NOT reference the load (speaker) to ground. Designate the left channel red binding post (+) and the right channel red binding post minus (-). Fuses, when necessary, should be placed in series with one red binding post.



NOTE: Minimum load impedance for Mono operation should be 8 ohms.

CIRCUIT DESCRIPTION

In the Mono mode, the output of the left channel is fed into the inverting input of the right channel. The two channels work opposite each other; when one goes positive, the other goes negative, thus doubling the output voltage swing. The single output is referenced between the two red binding posts.

POWER MAINS CONNECTIONS

The unit should be plugged in only when it has been established that it is wired for the correct power mains voltage and after all other connections have been made.

The mains (AC line) voltage is indicated on the serial number label on the rear of the unit. Products supplied for use in the United States and Canada are factory wired for 120 volts. Only the indicated mains voltage should be used. If the mains voltage must be changed, see POWER MAINS VOLTAGE CONVERSION.

A molded, parallel blade, U-ground plug is supplied. This connector is standard in the United States and Canada. For use elsewhere, the plug must be replaced with the correct connector. The color-code of the cord is as follows:

HI (switched Leg) - Brown (or Black)

LO (neutral Leg) - Blue (or White)

EARTH (Chassis ground) - Green with Yellow tracer (or Green)

OPERATION

PROCEDURES

After all connections have been made to the power amplifier, turn the gain controls fully counter-clockwise (off). Turn on the preamplifier, then turn on the power amplifier. The two "IDLE" L.E.D.'s on the 750B, or the pilot light on the 750C, should light. If they do not, check to see that the amplifier is plugged in to a live power outlet.

With the preamplifier gain controls fully off, advance the left and right power amplifier gain controls about half way clockwise (slot in knob facing upwards). There should be no audible hum; if hum is heard, check the connections between the power amplifier and preamplifier. Now advance the preamplifier gain controls until the desired maximum volume is achieved. Should the preamplifier gain control be in excess of the 3/4 setting, decrease it to half volume and increase the gain controls of the power amplifier to the desired level.

The meter calibration of the 750B can be adjusted to read correctly with 4 or 8 ohm loads. The calibration switch is located on the rear of the amplifier. If full power output is unobtainable, check to see that the preamplifier is capable of producing the required driving voltage as stated in the Specifications Section.

The amplifier incorporates a time delay network and a relay which connects the speakers only after the amplifier has stabilized, thus eliminating transients.

Often, turn-on transients originate in the pre-amp or tuner. This is especially true of tube-type units. If this situation arises, turn the amplifier on after the other units have had adequate time to stabilize.

750 B/C CIRCUIT DESCRIPTION

AMPLIFIER

The input signal from pin 9 of J1 is applied to the inverting input (pin 2) of op amp IC1 through the coupling network C1, C2, R1, and R3. This network provides a high input impedance to the amplifier and filters out DC and radio frequency interference.

Q1 and Q2 divide the signal into positive and negative components respectively. They are connected common emitter and provide voltage gain. Q8 and Q9 are connected common collector to provide the current gain necessary to drive the driver transistors Q10 and Q11. Q10 and Q11 drive the output stage, Q12-Q21. The output appears across flyback clipping diodes CR5 and CR6, then passes through compensation networks L1/R49 and R50/C19 to appear at pins 1 and 2 of J1.

To maintain overall amplifier stability, linearity, and low distortion, degenerative feedback is used throughout the amplifier. Voltage divider R6/R2 applies the correct amount of feedback to the non-inverting input (pin 3) of op amp IC1. Except for the input, the amplifier uses direct coupling throughout.

Q3 is a Vbe multiplier and provides bias voltage for all operating temperature changes.

Q22-Q24 comprise the clipping indicator circuit. When the amplifier is driven into clipping, a voltage of sufficient magnitude to turn on Q22 appears at pin 6 of IC1 and is coupled to the base of Q22 through R10 and C9. This voltage appears because the amplifier is trying to compensate for the fact that the clipped feedback signal does not match the unclipped input signal. When Q22 turns on, the base of Q24 is driven positive through R18, so Q24 turns on. This turns on the LED clipping indicator, and pulls the base of Q23 negative, through R30 and C21, which shuts off Q23. As long as Q23 is off, the base of Q24 is not held negative through R26 and Q23, so Q24 stays on. As C21 charges through R29, the base of Q23 becomes positive until Q23 turns on, which shuts off Q24 and the LED. Thus the length of time that the LED is held on is determined by R29 and C21.

RELAY CARD

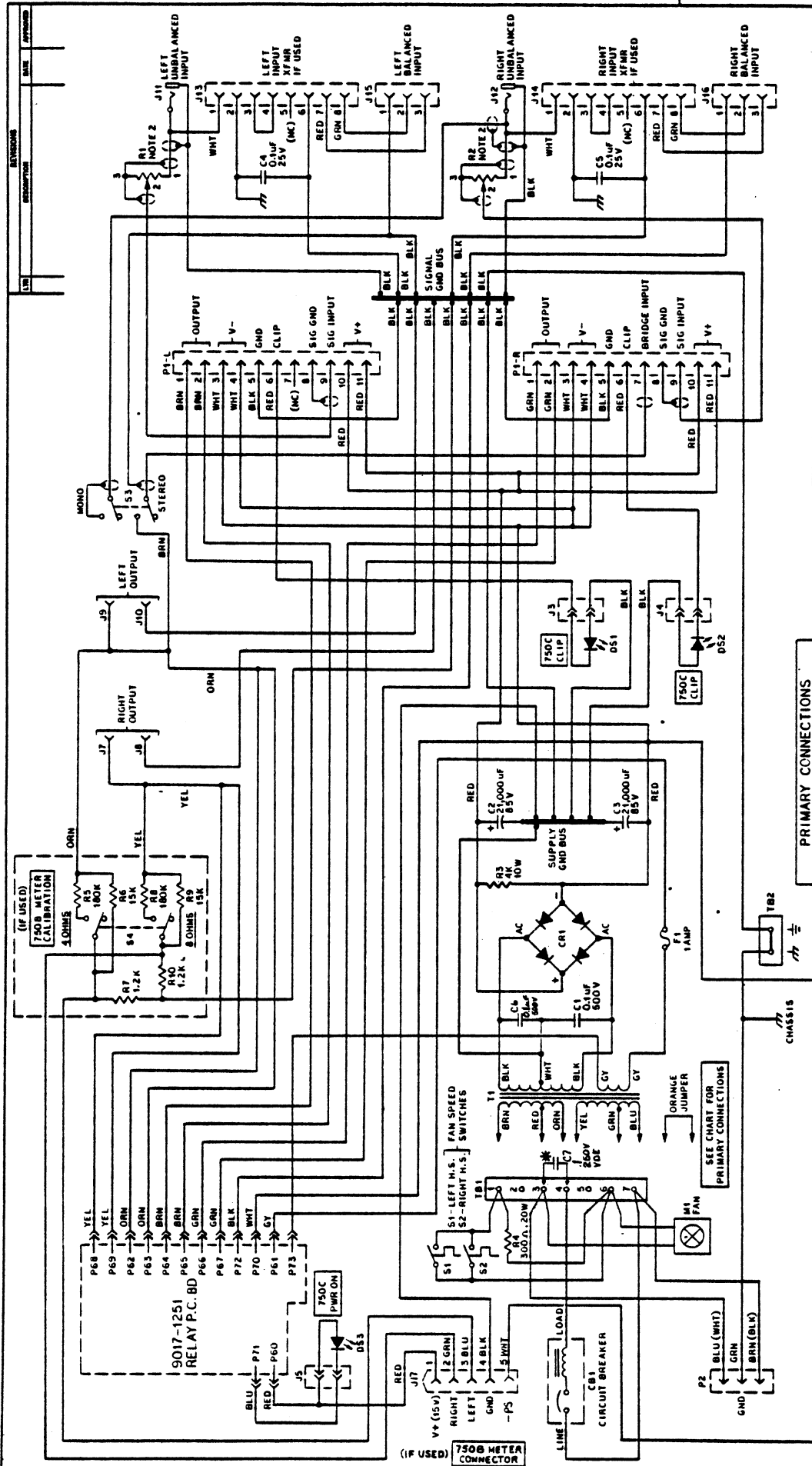
The relay card serves two purposes. It provides the initial turn-on delay and disconnects the speaker load when it detects D.C. at either output channel. See Speaker Protection Time Chart 05400.

TIME DELAY

12 VAC connected to P61, and 73 rectified by D1-D4, and filtered by C1 and C2. C5 charges through R6 and turns on Q2 about 1 second after the amplifier is turned on. Q2 turns on relay K1 which connects the loads to the amplifier outputs. When the amplifier is turned off, C5 discharges through D6 and R2 to the -77V supply.

SPEAKER PROTECTION

R7 and R9 couple the amplifier outputs through isolation network D9, 10, 11, 14. If either or both amplifier channels short to the negative supply, the base of Q2 is held negative through R5/C5 turning off Q2 and K1 and disconnecting the speaker load. If either or both amplifier channels short to the positive supply, Q3 is turned on through R10/C06 and this pulls the base of Q2 to zero, turning it off.



PRIMARY CONNECTIONS

VOLTAGE AC	100	120	200	230	240
XMPR - BRN	3	3	2	1	1
- RED	4	5	4	4	5
- ORN	5	4	5	5	4
- YEL	3	3	3	3	3
- GRN	2	2	2	2	2
XMPR - BLU	1	1	1	1	1
JUMPER - ORN	2 - 4	1 - 4	NONE	NONE	NONE

NUMBERS SHOWN ARE TERMINALS ON TB1 AND ARE READ FROM TOP TO BOTTOM AS SHOWN ON THIS DWG. TB1 IS LOCATED INSIDE UNIT ON REAR PANEL.

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES. ALL DIMENSIONS ARE TO FACE UNLESS OTHERWISE SPECIFIED. SURFACE FINISH SHALL BE AS SPECIFIED ON DRAWING.

DATE APPROVED

FORM MFRM-07304

SCHEMATIC CHASSIS WIRING, POWER AMPLIFIER

FORM MFRM-07304

* 4 - GERMAN EXPORT MODELS ONLY.
 ? - REF: MODELS 750B AND 750C.
 2 - SEE PARTS LIST.
 1 - ALL RESISTORS 1/2 W, 1/2 W, EXCEPT AS SHOWN.
 NOTES: UNLESS OTHERWISE SPECIFIED.

ENG NO	DESCRIPTION		PART NO
	*** CHASSIS ASSY	***	
	*** CAPACITORS		***
C1	.1UF 500V DISC CERAMIC		0199-0100
C2	21000UF 100V ELECTROLYTIC		0553-0021
C3	21000UF 100V ELECTROLYTIC		0553-0021
C4	.1UF 25V DISC CERAMIC		0129-0100
C5	.1UF 25V DISC CERAMIC		0129-0100
	*** CIRCUIT BREAKER		***
CB1	CIRCUIT BREAKER, 15A BLK		0650-1153
	*** DIODES		***
CR1	BRIDGE RECTIFIER		1886-2502
	*** LEDS 750C ONLY	***	
DS1	LED, RED 750C ONLY		1990-5053
DS2	LED, RED 750C ONLY		1990-5053
DS3	LED, RED 750C ONLY		1990-5053
	*** FUSES		***
F1	FUSE 3AG 1.5A		0600-1500
	*** CONNECTORS		***
P1L	PLUG, 11 PIN		1350-001
P1R	PLUG, 11 PIN		1350-0011
J3	CONNECTOR, 3 PARTS	2-1349-0114,	1- 1200-2021
J4	CONNECTOR, 3 PARTS	2-1349-0114,	1- 1200-2021
J5	CONNECTOR, 3 PARTS	2-1349-0114,	1- 1200-2021
J6	CONNECTOR, 5 PARTS	4-1200-1139,	1- 1231-1042
J7	CONNECTOR, BINDING POST, RED		1231-0008
J8	CONNECTOR, BINDING POST, BLK		1231-0009
J9	CONNECTOR, BINDING POST, RED		1231-0008
J10	CONNECTOR, BINDING POST, BLK		1231-0009
J11	JACK, INPUT, 1/4IN.		9999-0111
J12	JACK, INPUT, 1/4IN.		9999-0111
J13	SOCKET, 8 PIN FOR PLUG IN XFMR		1203-0008
J14	SOCKET, 8 PIN FOR PLUG IN XFMR		1203-0008
J15	JACK, INPUT, D3F		9999-0130
J16	JACK, INPUT, D3F		9999-0130
	*** RESISTORS		***

ENG NO	DESCRIPTION	PART NO
R1	22KOHM 1/2W POT	7006-1014
R2	22KOHM 1/2W POT	7006-1014
R3	4KOHM 10W 10%	4100-4003
R4	3000HM 20W 10%	4200-3002
R5	180KOHM 1/2W 5%	5005-1804
R6	15KOHM 1/2W 5%	5005-1503
R7	1.2KOHM 1/2W 5%	5005-1202
R8	180KOHM 1/2W 5%	5005-1804
R9	15KOHM 1/2W 5%	5005-1503
R10	1.2KOHM 1/2W 5%	5005-1202

*** SWITCHES ***

S1	SWITCH, THERMAL	0630-3441
S2	SWITCH, THERMAL	0630-3441
S3	SWITCH, SLIDE, STEREO-MONO	0620-6206
S4	SWITCH, SLIDE, METER CALIBRATION	0620-6206

*** TRANSFORMERS ***

T1	TRANSFORMER, POWER SUPPLY	0900-0751
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*** ELECTRICAL HARDWARE ***

P2	CABLE, PWR ASSY	8709-2163
3	CONNECTOR, MOLEX FEMALE PIN TYPE, CRIMP	1231-1022
1	CONNECTOR, MOLEX 4 CIRCUIT PLASTIC SHELL	1231-1042
10	LUG, MOLEX FEM PIN TYPE, CRIMP	1231-1102
3	LUG, MOLEX FEM PIN, CRIMP	1231-1105
10	LUG, MOLEX	1231-1143
1	ORANGE JUMPER FOR TB1	1231-1755
1	TERMINAL STRIP, 3 LUG	1231-3003
11	LUG, CRIMP 12-10 WIRE	1313-3457
2	LUG, CRIMP TAPED, FOR 16-14 WIRE	1313-4123
6	LUG, SLIP-ON 22-18 WIRE	1322-9600
13	LUG, SLIP-ON 16-14 WIRE	1322-9700
1	FUSE HOLDER	9999-4406
TB1	BARRIER STRIP, 7 LUG	0720-9127
TB2	BARRIER STRIP, 2 LUG	0720-3014
M1	FAN ASSY	8802-3450

*** MECHANICAL HARDWARE ***

2	KNOB, .83 DIA.	0700-1213
2	CLAMP FOR PWR SUPPLY CAPACITORS	1235-0003
2	CLIP, JAY 1/4 STUD FOR XFMR	1235-0313
4	CLIP FOR FAN	1235-0406
1	CLAMP, STRAIN RELIEF	1235-6034
1	PANEL BEARING	1261-0119
1	#6 SPACER	8652-0015
1	PANEL, FRONT 750B 750B ONLY	9000-1751

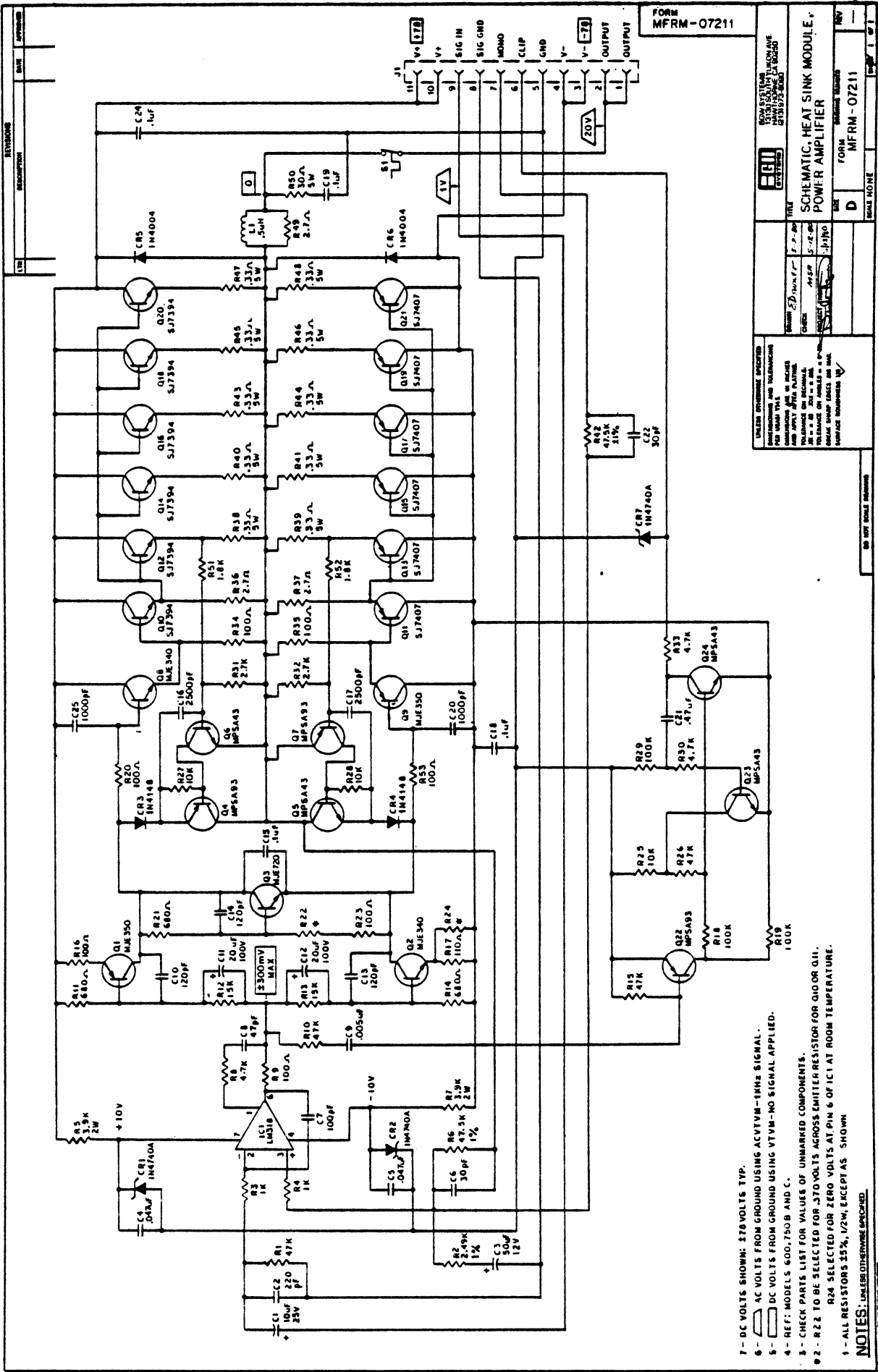
ENG NO	DESCRIPTION	PART NO
1	CHASSIS	9002-0751
1	BRACKET FOR XFMR	9004-0751
1	BRACKET, PWR SUPPLY	9004-0752
1	COVER	9005-1752
1	GUARD FOR PLUG-IN XFMR	9009-0251
1	PANEL, SUB FOR VU METER 750B ONLY	9010-0751
1	SEAL, LEAD	9999-0014
33	TIE WRAP	9999-0550
1	NAMEPLATE, SERIAL NO.	9999-1000
4	FEET, RUBBER	9999-2085
1	GRILL & ELEMENT FOR FAN	9999-8099
2	HANDLE, BLACK	9999-9152
	BRACKET, XTRANS W/PEM NUTS 750B	9004-1753
	PLATE HOLE CLOSURE 750C	9006-1752

*** NUTS, BOLTS, AND SCREWS

5	6-32 X 7/8 PH MS PHIL BLK	2111-3875
10	8-32 X 1/2 PH MS PHIL BLK	2111-4500
2	8-32 X 3/4 PH MS PHIL BLK	2111-4750
4	1/4-20 X 1/2 PH MS PHIL BLK	2111-6500
1	6-32 X 3/8 PH MS PHIL CAD	2115-3375
6	8-32 X 3/8 PH MS PHIL CAD	2115-4375
2	6-32 X 5/8 RH MS SLOT CAD	2225-3625
3	6-32 X 2 FH MS PHIL BLK	2311-3002
2	6-32 X 5/8 FH MS PHIL CAD	2315-2625
3	6-32 X 5/8 FH MS PHIL CAD	2315-3375
1	8-32 X 7/16 FH MS PHIL CAD	2315-4437
3	8-32 X 3/4 FH MS PHIL CAD	2315-4750
6	10-32 X 1/2 FH MS PHIL CAD	2315-5500
2	6-32 X 3/8 FH MS HEX SC BLK	2331-3375
2	8-32 X 5/8 FIL H MS SLOT CAD	2425-4750
4	10-32 X 3/4 HEX FH CS BLK	2451-5750
3	#6 X 3/8 PH SMS PHIL BLK	3111-3312
4	#8 X 1/2 PH SMS PHIL CAD	3115-4500
3	#6 ITL WASHER	8132-0000
2	#6 ELT WASHER	8133-0000
1	#8 ITL WASHER	8142-0000
7	#8 ETL WASHER	8143-0000
4	#10 FLAT WASHER	8151-0000
6	#10 ITL WASHER	8152-0000
20	#10 SPLIT WASHER	8154-0000
4	#10 EXT-INT TOOTH LOCKWASHER	8158-0000
2	1/4 SPLIT WASHER	8164-0000
2	6-32 X 1/4 HEX NUT	8530-0250
2	6-32 X 5/16 HEX NUT	8530-0312
8	8-32 X 5/16 HEX NUT	8540-0312
2	10-32 X 3/8 HEX NUT	8550-0375
2	1/4-20 X 7/16 HEX NUT	8560-0437
2	3/8-32 HEX NUT NICKEL	8574-0500

*** PACKING MATERIALS

ENG NO	DESCRIPTION	PART NO
1	MANUAL	
1	CARTON INNER	9700-1752
1	CARTON OUTER	9851-1750
2	RAIL BLOCK	9852-1750
8	CORNER BLOCK	9854-0150
1	BAG FOR CORD	9899-0004
1	BAG FOR AMPLIFIER	9899-2030



FORM MFRM-07211

<p>UNLESS OTHERWISE SPECIFIED DIMENSIONS AND TOLERANCES ARE IN INCHES AND SHALL APPLY TO ALL PARTS AND SHALL BE THE RESPONSIBILITY OF THE BUYER. TOLERANCE ON DIMENSIONS SHALL BE AS SHOWN ON SURFACE UNLESS OTHERWISE SPECIFIED.</p>	<p>FORM MFRM-07211</p>
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- 7 - DC VOLTS SHOWN: 278 VOLTS TYP.
- 8 - AC VOLTS FROM GROUND USING ACVTVM-1RMS SIGNAL.
- 9 - DC VOLTS FROM GROUND USING VTVM-NO SIGNAL APPLIED.
- 4 - REF: MODELS 600, 750B AND C.
- 3 - CHECK PARTS LIST FOR VALUES OF UNMARKED COMPONENTS.
- 2 - R22 TO BE SELECTED FOR .370 VOLTS ACROSS EMITTER RESISTOR FOR Q10 OR Q11. R24 SELECTED FOR ZERO VOLTS AT PIN 6 OF IC1 AT ROOM TEMPERATURE.
- 1 - ALL RESISTORS 5%, 1/2W, EXCEPT AS SHOWN.

NOTES: UNLESS OTHERWISE SPECIFIED.

ENG NO	DESCRIPTION	PART NO
***	PARTS LIST FOR	***
***	HEAT SINK MODULE POWER AMP	***
	PRINTED CIRCUIT BOARD ASSY	9007-0751
	SCHEMATIC MFRM-07211	
***	CAPACITORS	***
C1	10UF 25V DIPPED TANTALUM	0226-0010
C2	220PF 1KV DISC CERAMIC	0100-0220
C3	50UF 12V ELECTROLYTIC	0456-0050
C4	.047UF 25V DISC CERAMIC	0129-0047
C5	.047UF 25V DISC CERAMIC	0129-0047
C6	30PF 100V DIPPED MICA	0060-0030
C7	100PF 500V DIPPED MICA	0360-0100
C8	47PF 1KV DISC CERAMIC	0100-0047
C9	.005UF1KV DISC CERAMIC	0100-0005
C10	120PF 500V DIPPED MICA	0090-0120
C11	20UF 100V ELECTROLYTIC	0486-0020
C12	20UF 100V ELECTROLYTIC	0486-0020
C13	120PF 500V DIPPED MICA	0090-0120
C14	120PF 500V DIPPED MICA	0090-0120
C15	.1UF 25V DISC CERAMIC	0129-0100
C16	2500PF 500V DISC CERAMIC	0090-2500
C17	2500PF 500V DISC CERAMIC	0090-2500
C18	.1UF 100V DIPPED MYLAR	0369-0100
C19	.1UF 25V DISC CERAMIC	0369-0100
C20	1000PF 1KV DISC CERAMIC	0100-1000
C21	.47UF 100V DIPPED MYLAR 10%	0369-0471
C23	NONE	
C23	.1UF 100V DIPPED MYLAR	0369-0100
C24	.1UF 100V DIPPED MYLAR	0369-0100
C25	1000PF 1KV DISC CERAMIC	0100-1000
***	DIODES	***
CR1	IN4740A 10 VOLT ZENER	1900-4740
CR2	IN4740A 10 VOLT ZENER	1900-4740
CR3	IN4148 SI SWITCHING DIODE	1900-4148
CR4	IN4148 SI SWITCHING DIODE	1900-4148
CR5	IN4004 1 AMP 400 V	1900-4004
CR6	IN4004 1 AMP 400 V	1900-4004
CR7	IN4740A 10 VOLT ZENER	1900-4740
***	INTEGRATED CIRCUITS	***
IC1	L1318 OP AMP	1835-0318
***	TRANSISTORS	***
Q1	MJE350 PNP TRANSISTOR	1853-0350
Q2	MJE340 NPN TRANSISTOR	1854-0340

ENG NO	DESCRIPTION	PART NO
Q3	MJE720 NPN TRANSISTOR	1854-0720
Q4	MPSA93 PNP TRANSISTOR	1853-0093
Q5	MPSA43 NPN TRANSISTOR	1854-0043
Q6	MPSA43 NPN TRANSISTOR	1854-0043
Q7	MPSA93 PNP TRANSISTOR	1853-0093
Q8	MJE340 NPN TRANSISTOR	1854-0340
Q9	MJE350 PNP TRANSISTOR	1853-0350
Q10	SJ7394 NPN TRANSISTOR	1854-7394
Q11	SJ7407 PNP TRANSISTOR	1853-7407
Q12	SJ7394 NPN TRANSISTOR	1854-7394
Q13	SJ7407 PNP TRANSISTOR	1853-7407
Q14	SJ7394 NPN TRANSISTOR	1854-7394
Q15	SJ7407 PNP TRANSISTOR	1853-7407
Q16	SJ7394 NPN TRANSISTOR	1854-7394
Q17	SJ7407 PNP TRANSISTOR	1853-7407
Q18	SJ7394 NPN TRANSISTOR	1854-7394
Q19	SJ7407 PNP TRANSISTOR	1853-7407
Q20	SJ7394 NPN TRANSISTOR	1854-7394
Q21	SJ7407 PNP TRANSISTOR	1583-7407
Q22	MPSA93 NPN TRANSISTOR	1853-0093
Q23	MPSA43 NPN TRANSISTOR	1854-0043
Q24	MPSA43 NPN TRANSISTOR	1854-0043

*** RESISTORS

R1	47K OHM 1/2W 5%	5005-4703
R2	2.49K OHM 1/2W 1%	5001-2491
R3	1K OHM 1/2W 5%	5005-1003
R4	1K OHM 1/2W 5%	5005-1003
R5	3.9K OHM 2W 10%	6020-3902
R6	47.5K OHM 1/2W 1%	5001-4752
R7	3.9K OHM 2W 10%	6020-3902
R8	4.7K OHM 1/2W 5%	5005-4702
R9	100 OHM 1/2W 5%	5005-1002
R10	47K OHM 1/2W 5%	5005-4703
R11	630 OHM 1/2W 5%	5005-6301
R12	15K OHM 1/2W 5%	5005-1503
R13	15K OHM 1/2W 5%	5005-1503
R14	630 OHM 1/2W 5%	5005-6301
R15	47K 1/2W 5%	5005-4703
R16	100 OHM 1/2W 5%	5005-1002
R17	110 OHM 1/2W 5%	5005-1101
R18	100K OHM 1/2W 5%	5005-1005
R19	100K OHM 1/2W 5%	5005-1005
R20	100 OHM 1/2W 5%	5005-1002
R21	630 OHM 1/2W 5%	5005-6301
R22	SEE NOTE ON SCHEMATIC	
R23	100 OHM 1/2W 5%	5005-1002
R24	SEE NOTE ON SCHEMATIC	
R25	10K OHM 1/2W 5%	5005-1004
R26	47K OHM 1/2W 5%	5005-4703

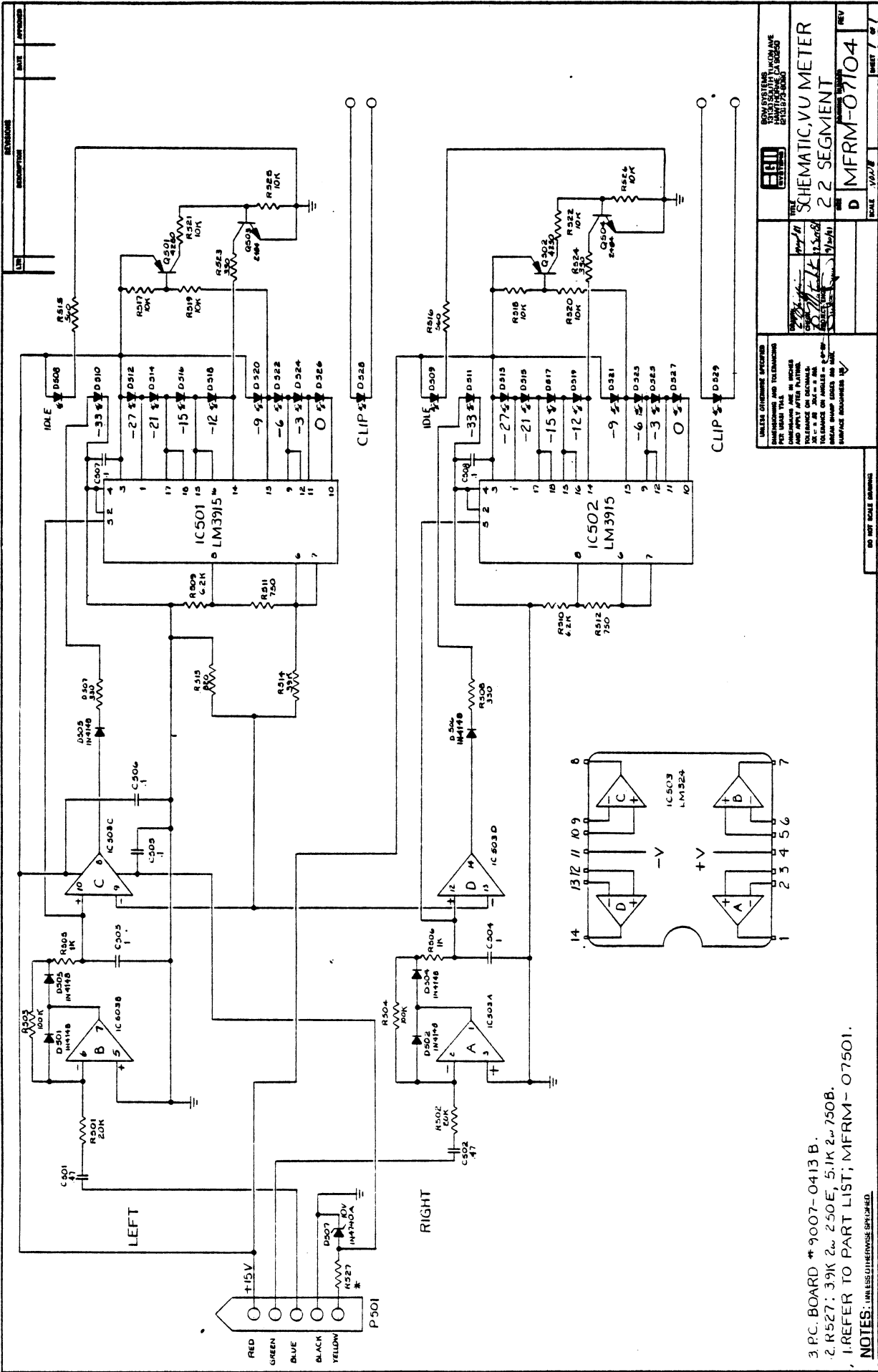
ENG NO	DESCRIPTION	PART NO
R27	10K OHM 1/2W 5%	5005-1004
R28	10K OHM 1/2W 5%	5005-1004
R29	100K OHM 1/2W 5%	5005-1005
R30	4.7K OHM 1/2W 5%	5005-1005
R31	2.7K OHM 1/2W 5%	5005-2702
R32	2.7K OHM 1/2W 5%	5005-2702
R33	4.7K OHM 1/2W 5%	5005-4702
R34	100 OHM 1/2W 5%	5005-1002
R35	100 OHM 1/2W 5%	5005-1002
R36	2.7 OHM 1/2W 5%	4025-2070
R37	2.7 OHM 2W 5%	4025-2070
R38	.33 OHM 5W 10%	4050-0330
R39	.33 OHM 5W 10%	4050-0330
R40	.33 OHM 5W 10%	4050-0330
R41	.33 OHM 5W 10%	4050-0330
R42	47.5K OHM 1/2W 1%	5001-4752
R43	.33 OHM 5W 10%	4050-0330
R44	.33 OHM 5W 10%	4050-0330
R45	.33 OHM 5W 10%	4050-0330
R46	.33 OHM 5W 10%	4050-0330
R47	.33 OHM 5W 10%	4050-0330
R48	.33 OHM 5W 10%	4050-0330
R49	2.7 OHM 2W 5%	4025-2070
R50	30 OHM 5W 10%	4050-3001
R51	1.3K OHM 1/2W 5%	5005-1302
R52	1.8K OHM 1/2W 5%	5005-1802
R53	100 OHM 1/2W 5%	5005-1002

*** SWITCHES ***

T51	SWITCH, THERMAL NC MODELS 750b/C	0630-3442
T52	SWITCH, THERMAL DCR 212F MODEL 600	0630-3444

*** HARDWARE ***

12	INSULATOR, MICA FOR TQ-3	0723-0321
24	INSULATOR, SHOULDER	0723-3347
1	HEATSINK EXTRUSION	1000-0751
2	LUG, SLIP-ON	1322-9600
5	4-40 X 3/8 PH MS PHIL CAD	2115-2375
4	6-32 X 3/4 PH MS PHIL CAD	2115-3750
20	6-32 X 5/8 RH MS SLOT CAD	2225-3625
24	#8 ITC WASHER	5132-0000
24	6-32 X 1/4 HEX NUT	6530-0250
4	SPACER .140 X .250 X .155	8605-0155



		BOARD FILES DRAWING FILES PARTS LIST FILES (MFRM-07501)	
UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES AND APPLY AFTER PLATING UNLESS NOTED OTHERWISE TOLERANCES ON ANGLES = 0°-90° SURFACE FINISHES AND MIL SPECIFICATIONS INDICATED		DATE: 12/5/88 DESIGNED BY: [Signature] CHECKED BY: [Signature]	
TITLE: SCHEMATIC, VU METER 2 2 SEGMENT		SCALE: 1/32" = 1"	
PROJECT: [Blank]		PART / OF: 1 / 1	
DRAWING NO: MFRM-07501		REV: [Blank]	

- NOTES: UNLESS OTHERWISE SPECIFIED
- 3 PC. BOARD # 9007-0413 B.
 - R527: 3.9K 2w 250E, 5.1K 2w 750B.
 - REFER TO PART LIST; MFRM-07501.

ENG NO	DESCRIPTION	PART NO
	***** PARTS LIST VU METER LED BOARD *****	07501

SCHEMATIC VU METER LED BOARD

MFRM-07104

CAPACITORS

C501	.47UF 100V METAL MYLAR CAPACITOR	0363-8000
C502	.47UF 100V METAL MYLAR CAPACITOR	0363-8000
C503	1UF 25V TANTALUM CAPACITOR	0226-0001
C504	1UF 25V TANTALUM CAPACITOR	0226-0001
C505	.1UF 25V CERAMIC DISC CAPACITOR	0129-0100
C506	.1UF 25V CERAMIC DISC CAPACITOR	0129-0100
C507	.1UF 25V CERAMIC DISC CAPACITOR	0129-0100
C508	.1UF 25V CERAMIC DISC CAPACITOR	0129-0100

DIODES

D501-	1N4148/1N914 DIODE	1900-4148
D506		
D507	1N4740A 10V ZENER	1900-4740
D508-	LED GREEN	1990-4950
D517		
D518-	LED YELLOW	1990-4550
D525		
D526-	LED RED	1990-4650
D529		

INTEGRATED CIRCUITS

IC501	LM3915 LED VU METER DRIVER	1885-3915
IC502	LM3915 LED VU METER DRIVER	1885-3915
IC503	LM324 QUAD OP AMP	1885-0324

PLUG

P501	MOLEX CONNECTOR 03-09-2052	1231-2052
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TRANSISTORS

Q501	PN4250 SILICON TRANSISTOR PNP	1853-4250
Q502	PN4250 SILICON TRANSISTOR PNP	1853-4250
Q503	PN2484 SILICON TRANSISTOR NPN	1854-2484
Q504	PN2484 SILICON TRANSISTOR NPN	1854-2484

RESISTORS

R501	20K 1/2W CARBON COMP RESISTOR	5005-2004
R502	20K 1/2W CARBON COMP RESISTOR	5005-2004
R503	100K 1/2W CARBON COMP RESISTOR	5005-1005
R504	100K 1/2W CARBON COMP RESISTOR	5005-1005

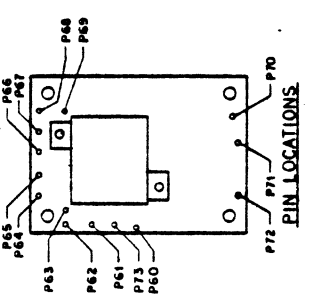
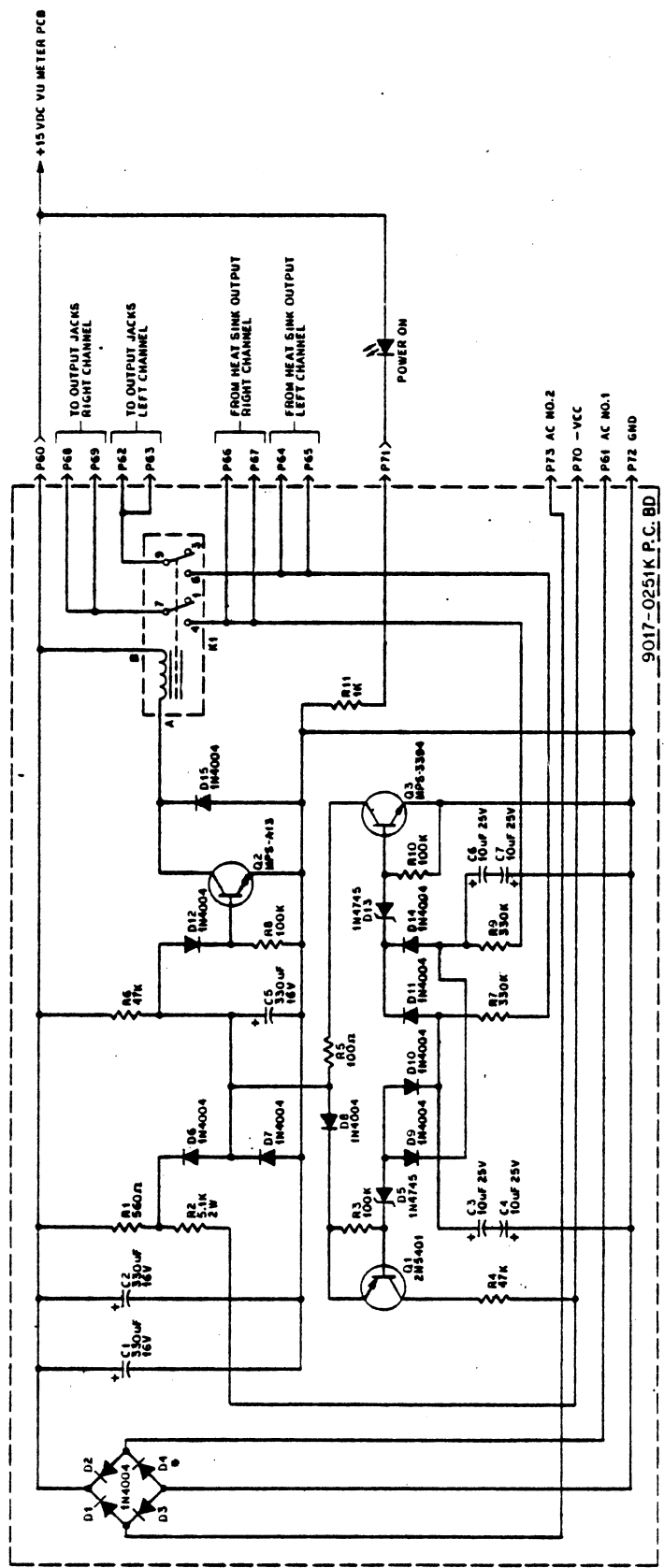
ENG NO	DESCRIPTION	PART NO
R505	1K 1/2W CARBON COMP RESISTOR	5005-1003
R506	1K 1/2W CARBON COMP RESISTOR	5005-1003
R507	330R 1/2W CARBON COMP RESISTOR	5005-3301
R508	330R 1/2W CARBON COMP RESISTOR	5005-3301
R509	6.2K 1/2W CARBON COMP RESISTOR	5005-6202
R510	6.2K 1/2W CARBON COMP RESISTOR	5005-6202
R511	750R 1/2W CARBON COMP RESISTOR	5005-7501
R512	750R 1/2W CARBON COMP RESISTOR	5005-7501
R513	820R 1/2W CARBON COMP RESISTOR	5005-8201
R514	39K 1/2W CARBON COMP RESISTOR	5005-3903
R515	560R 1/2W CARBON COMP RESISTOR	5005-5601
R516	560R 1/2W CARBON COMP RESISTOR	5005-5601
R517-	10K 1/2W CARBON COMP RESISTOR	5005-1004
R522		
R523	330R 1/2W CARBON COMP RESISTOR	5005-3301
R524	330R 1/2W CARBON COMP RESISTOR	5005-3301
R525	10K 1/2W CARBON COMP RESISTOR	5005-1004
R526	10K 1/2W CARBON COMP RESISTOR	5005-1004
R527	MODEL 250E**3.9K 2W WIRE WOUND RESISTOR	6020-3902
	MODEL 750B**5.1K 2W WIRE WOUND RESISTOR	6025-5102

MISCELLANEOUS

MOLEX PINS 02-09-2137	1349-2137
AWG 22 SOLID TINNED BUSS	8022-0500
AWG 22 19 STR PVC BLACK	8222-1100
AWG 22 19 STR PVC RED	8222-1120
AWG 22 19 STR PVC GREEN	8222-1150
AWG 22 19 STR PVC BLUE	8222-1160
AWG 22 19 STR PVC WHITE	8222-1190
ROUND SPACER 1/4 DIA 3/8 LONG	8606-0375
PC BOARD 22-LAMP VU METER	9007-0413

REV	1
DATE	11-1-60
DESIGNER	W. J. ...
CHECKER	...
APPROVED	...
TITLE	SCHEMATIC, RELAY BOARD, POWER AMPLIFIER
PROJECT	MFRM-08304
SCALE	D
SHEET	1

REV	DATE	BY	APPROVED



● 2 - WHEN REPLACING ASSEMBLIES NUMBERED 9017-0251J OR EARLIER REMOVE D4.
 1 - ALL RESISTORS ±5%, 1/2 W, EXCEPT AS SHOWN.
NOTES: UNLESS OTHERWISE SPECIFIED.

DO NOT SCALE DIMENSIONS

ENG NO	DESCRIPTION	PART NO
***	PARTS LIST RELAY PCB 9017-0251K ***	08340
	SCHMATIC RELAY BOARD MFRM-08304	
***	CAPACITORS	***
C1	330 UF 16 V RADIAL ELECTROLYTIC	0466-0330
C2	330 UF 16 V RADIAL ELECTROLYTIC	0466-0330
C3	10 UF 25 V TANTALUM	0226-0010
C4	10 UF 25 V TANTALUM	0226-0010
C5	330 UF 10 V RADIAL ELECTROLYTIC	0446-0330
C6	10 UF 25 V TANTALUM	0226-0010
C7	10 UF 25 V TANTALUM	0226-0010
***	DIODES AND ZENERS	***
D1	1N4004 1A 400V	1900-4004
D2	1N4004 1A 400V	1900-4004
D3	1N4004 1A 400V	1900-4004
D4	1N4004 1A 400V	1900-4004
D5	1N4745 16 VOLT ZENER	1900-4745
D6	1N4004 1A 400V	1900-4004
D7	1N4004 1A 400V	1900-4004
D8	1N4004 1A 400V	1900-4004
D9	1N4004 1A 400V	1900-4004
D10	1N4004 1A 400V	1900-4004
D11	1N4004 1A 400V	1900-4004
D12	1N4004 1A 400V	1900-4004
D13	1N4745 16 VOLT ZENER	1900-4745
D14	1N4004 1A 400V	1900-4004
D15	1N4004 1A 400V	1900-4004
K1	RELAY WITH MAGNETICS 12V DPDT	0800-1001
***	TRANSISTORS	***
Q1	PNP SI PLASTIC T092 2N5401	1853-5401
Q2	NPN SI DARLINGTON PLASITIC T092 MPSA13	1854-0013
Q3	NPN SI PLASTIC T092 MPS3394	1854-3394
***	RESISTORS	***
R1	550 5% 1/2W DEPOSITED CARBON	5005-5601
R2	5.1K 10% 2W CARBON COMP	6025-5102
R3	100K 5% 1/2W DEPOSITED CARBON	5005-1005
R4	47K 5% 1/2W DEPOSITED CARBON	5005-4703
R5	100 5% 1/2W DEPOSITED CARBON	5005-1002

ENG NO	DESCRIPTION	PART NO
R6	47K 5% 1/2W DEPOSITED CARBON	5005-4703
R7	33K 5% 1/2W DEPOSITED CARBON	5005-3303
R8	100K 5% 1/2W DEPOSITED CARBON	5005-1005
R9	33K 5% 1/2W DEPOSITED CARBON	5005-3303
R10	100K 5% 1/2W DEPOSITED CARBON	5005-1005
R11	1K 5% 1/2W DEPOSITED CARBON	5005-1003

*** MISC PARTS RELAY BOARD

	RELAY BOARD COMPLETE WITH PARTS	9017-1251
1	PRINTED CIRCUIT BOARD 9017-0251K	9017-0251
1	RELAY SOCKET	1204-1000
1	RELAY HOLD DOWN WIRE	9999-9002
2	6-32X3/8 PH PAM MS	2315-3375
2	#6 ITLW	8132-0000
2	6-32X1/4 HEX NUTS	8530-0250
4	6-32X1/4 STANDOFFS	0772-1437
14	MOLEX PINS ON PCB	1349-9312

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POWER CABLE CONNECTIONS AND VOLTAGE CONVERSION

CAUTION: These servicing instructions are for use by qualified personnel only. To avoid electric shock, do not perform any servicing other than that contained in the Operating Instructions, unless you are qualified to do so. Refer all servicing to qualified service personnel.

Voltage Conversion should be done by a BGW Authorized service station only.

The unit should be plugged in only when it has been established that it is wired for the correct power mains voltage and after all other connections have been made.

A molded, parallel blade, U-ground plug is supplied. This connector is standard in the United States and Canada. For use elsewhere, the plug must be replaced with the correct connector. The color-code of the cord is as follows:

HI (switched Leg) - Brown (or Black)
LO (Neutral Leg) - Blue (or White)
EARTH (Chassis ground) - Green with Yellow tracer (or Green)

The mains (AC line) voltage is indicated on the serial number label on the rear of the unit. Products for use in the United States and Canada are factory wired for 120 volts. Only the indicated mains voltage should be used. If the mains voltage must be changed, see information below.

VOLTAGE CONVERSION

To change the mains voltage, the transformer wires on terminal strip TB1 must be rearranged. TB1 is mounted inside the chassis on the rear wall. To gain access, remove the cover and the heat sink module on the same side as the power cord. The cable to the heat sink can be unplugged by exerting a constant pull on the plug while wiggling it.

Remove the other heat sink module when changing the circuit breaker. The chassis wiring schematic indicates the proper terminal strip connections and circuit breaker requirements for each voltage.

LIMITED ONE YEAR WARRANTY

BGW SYSTEMS, INC., (BGW), 13130 South Yukon Avenue, Hawthorne, California, 90250, warrants to the original owner all parts, except front panels, knobs, cases and cabinets, of every new BGW product to be free from defects in materials or workmanship, as hereinafter provided, for one (1) year from the original date of purchase.

BGW will at its option, repair or replace any equipment covered by this warranty which becomes defective, malfunctions or otherwise fails to conform with this warranty under normal use and service during the term of this warranty, at no charge for parts or labor.

In order to obtain warranty service, the equipment, together with the original or a machine reproduction of the Bill of Sale or other dates, proof-of-purchase document describing the equipment, must be delivered to an Authorized BGW Dealer/Service Center in the continental United States, or to BGW at the above address, at the owners expense. Any evidence of alteration, erasing or forgery of proof-of-purchase documents will be cause to void the warranty. Collect shipments to BGW will be refused unless previously authorized. The names and addresses of Authorized BGW Service Stations may be obtained by writing to BGW Warranty Department at the above address.

This warranty does not cover defects, malfunctions or failures resulting from shipping or transit accidents, abuse, misuse, operation contrary to furnished instructions, operation on incorrect power supplies, operation with faulty associated equipment, modification, alteration, improper servicing, tampering or normal wear and tear. Equipment on which the serial number has been defaced or removed shall not be eligible for warranty service. Should any equipment submitted for warranty service be found ineligible therefore, an estimate of repair cost will be furnished and the repair will be accomplished if requested by the owner upon receipt of payment or acceptable arrangements for payment.

ANY IMPLIED WARRANTIES INCLUDING WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE, SHALL BE LIMITED IN DURATION TO THE PERIOD OF TIME SET FORTH ABOVE. BGW SHALL NOT BE RESPONSIBLE FOR INCIDENTAL OR CONSEQUENTIAL DAMAGES. SOME STATES DO NOT ALLOW LIMITATION ON HOW LONG AN IMPLIED WARRANTY LASTS OR THE EXCLUSION OR LIMITATION OF INCIDENTAL OR CONSEQUENTIAL DAMAGES, SO THE ABOVE LIMITATIONS OR EXCLUSION MAY NOT APPLY TO YOU. This warranty gives you specific legal rights and you may also have other rights which vary from state to state. This is the only expressed warranty applicable to BGW products. BGW neither assumes nor authorizes anyone to assume for it any other expressed warranty.

Completion and return of the owner registration card enclosed with the equipment is requested, but is not a condition for obtaining warranty service.

BGW reserves the right to make changes or improvements in design or manufacturing without incurring any obligation to change or improve products manufactured prior thereto.