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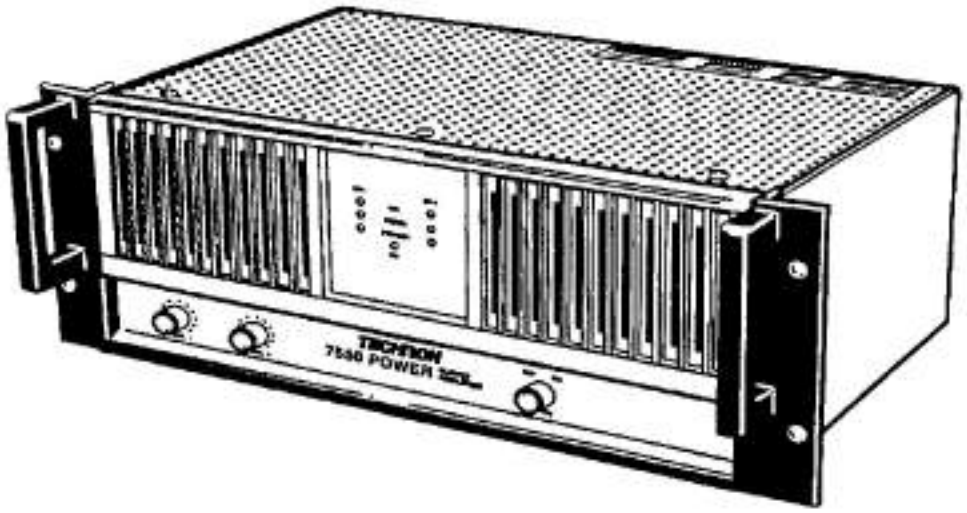
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TECHRON®

TECHNICAL MANUAL



7550
POWER SUPPLY AMPLIFIER

Techron Division of Crown International, Inc., 1718 W. Mishawaka Road, Elkhart, IN 46517-4095

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K80509-5
11/92

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TECHRON
LIMITED ONE-YEAR WARRANTY

SUMMARY OF WARRANTY

CROWN INTERNATIONAL, INC., 1718 W. Mishawaka Road, Elkhart, Indiana 46517 (Warrantor) warrants to the ORIGINAL COMMERCIAL PURCHASER ONLY of each NEW TECHRON product, for a period of one (1) year from the date of purchase by the original purchaser (warranty period) that the product is free of defects in materials or workmanship and will meet or exceed all advertised specifications for such a product. This warranty does not extend to any subsequent purchaser or user, and automatically terminates upon your sale or other disposition of our product.

ITEMS EXCLUDED FROM WARRANTY

We are not responsible for product failure caused by misuse, accident or neglect. This warranty does not extend to any product on which the serial number has been defaced, altered or removed. It does not cover damage to loads or any other products or accessories resulting from Techron product failure. It does not cover defects or damage caused by your use of unauthorized modifications, accessories, parts, or service.

WHAT WE WILL DO

We will remedy any defect in materials or workmanship by repair, replacement, or refunds. If a refund is elected, then you must make the defective or malfunctioning component available to us free and clear of all liens or other encumbrances. The refund will be equal to the actual purchase price, not including interest, insurance, closing costs, and other finance charges less a reasonable depreciation on the product from the date of original purchase. Warranty work can only be performed at our authorized service centers or at our factory. Expenses in remedying the defect will be borne by Crown, including one way surface freight shipping costs within the United States. (Purchaser must bear the expense of shipping the product between any foreign country and the port of entry in the United States and all taxes, duties, and other custom's fee for such foreign shipments.)

HOW TO OBTAIN WARRANTY SERVICE

You must notify us of your need for warranty service not later than ninety (90) days after expiration of the warranty period. We will give you an authorization to return it to us for service. All components must be shipped in a factory pack or equivalent which, if needed, may be obtained from us for a nominal charge. Corrective actions will be taken within a reasonable time of the date of receipt of the defective product by us. If the repairs made by us are not satisfactory, notify us immediately.

DISCLAIMER OF CONSEQUENTIAL AND INCIDENTAL DAMAGES

YOU ARE NOT ENTITLED TO RECOVER FROM US ANY CONSEQUENTIAL OR INCIDENTAL DAMAGES RESULTING FROM ANY DEFECT IN OUR PRODUCT. THIS INCLUDES ANY DAMAGE TO ANOTHER PRODUCT OR PRODUCTS RESULTING FROM SUCH A DEFECT.

WARRANTY ALTERATIONS

NO PERSON HAS THE AUTHORITY TO ENLARGE, AMEND, OR MODIFY THIS WARRANTY. THE WARRANTY IS NOT EXTENDED BY THE LENGTH OF TIME WHICH YOU ARE DEPRIVED OF THE USE OF THE PRODUCT. REPAIRS AND REPLACEMENT PARTS PROVIDED UNDER THE TERMS OF THIS WARRANTY SHALL CARRY ONLY THE UNEXPIRED PORTION OF THIS WARRANTY.

DESIGN CHANGES

We reserve the right to change the design of any product from time to time without notice and with no obligation to make corresponding changes in products previously manufactured.

LEGAL REMEDIES OF PURCHASER

There is no warranty which extends beyond the terms hereof. This written warranty is given in lieu of any oral or implied warranties not contained herein. WE DISCLAIM ALL IMPLIED WARRANTIES, INCLUDING WITHOUT LIMITATION ANY WARRANTIES OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE. No action to enforce this Warranty shall be commenced later than ninety (90) days after expiration of the warranty period.

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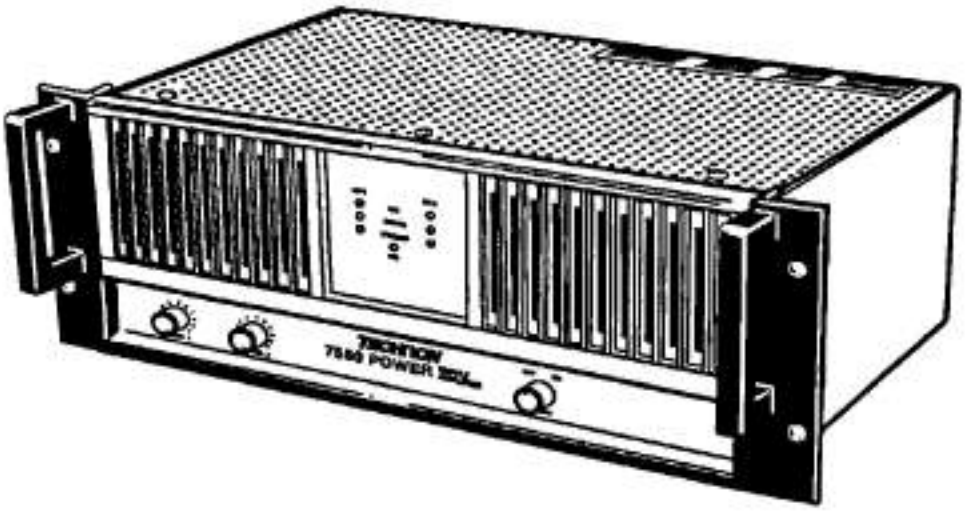


Illustration 1–1 Model 7550

Section 1. Introduction

1.1. General Description

The *TECHRON*® 7550 (shown above) is a high-powered, industrial power supply amplifier, single or dual channel. Read this manual completely to familiarize yourself with the details of this amplifier.

Model 7550 provides precision amplification of electrical signals with frequencies from zero (dc) to 20 kHz. It accomplishes this with extremely low harmonic and intermodulation distortion and low noise.

The continuous average power output is 90 watts minimum per channel into an 8 ohm load. Bridge the amplifier and operate it as a mono unit with 180 watts minimum power output into a 16 ohm load.

The rugged aluminum chassis measures five and a quarter inches high, nineteen inches wide, and almost twelve inches deep.

1.2. Mechanics

On the front panel, the push button power switch activates an amber ON indicator. Green SIGNAL PRESENCE indicators confirm signal path from input to output. Directly above these are red *IOC*® indicators which indicate clipping and STANDBY conditions.

Use the front panel output monitor jack with a high impedance load to monitor the output. Adjust the output level with the two controls on the front panel.

On the back panel are alternate means of input and output connection. Connect an unbalanced input to either BNC jacks or barrier strip screws, and a balanced input to an optional input module. Connect output to banana jack binding posts or barrier strip screws.

Other features on the back panel include a mono/dual switch, a grounding barrier strip, and a three-wire AC line cord with fuse.

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1.3. Circuitry

The output transistors operate in the Techron-designed *Multi-Mode®* AB + B configuration in which quiescent current is carried by the driver stages until the output transistors are summoned by a large current demand.

Techron tests each of the 16 rugged 150 watt output transistors to verify the safe operating area of each device which enhances the amplifier's overall reliability.

Massive black-anodized heat sinks thermally joined with the chassis enable the entire amplifier to function as a heat sink. In the event of overheating, the thermal sensing circuit will place the amplifier in the STANDBY mode. After cooling, the unit will return to normal operation. Frequent overheating may indicate the need for the optional forced air cooling system. See Section NO TAG

V-I current limiting provides protection against damage from shorted and low impedance loads, overloaded power supplies, input overload, and high frequency overloads. A four-second turn-on delay provides initial load protection.

1.4. Service Policies

Due to the sophisticated circuitry of Model 7550, have only qualified and fully trained technicians perform service work. Return to the factory in original packing for service. Replacement packing is available from Techron.

When returning Model 7550, enclose a brief letter explaining as completely as possible all problems. Include your address and telephone number. Ship "UPS™ ground" to:

TECHRON
Customer Service Department
57620 C.R. 105
Elkhart, Indiana 46517

Phone: (219) 294-8300
FAX: (219) 294-8329

1.5. About this Manual

Special instructions (Danger, Warning, Caution, and Note) appear throughout this manual. Examples of each follow:

⚠ DANGER

Danger is used before instructions that expose the reader to a hazard that *will* cause injury or death. The hazard will be explained and instructions to avoid the hazard will be included in the warning.

⚠ WARNING

A Warning is used before instructions that expose the reader to a hazard that *may* cause injury or death. The hazard will be explained and instructions to avoid the hazard will be included in the warning.

⚠ CAUTION

A Caution is used before instructions that if not performed properly, could cause equipment damage. The condition will be explained and instructions to avoid the condition will be included in the warning.

Note: A note is used when information needs special emphasis that does not call attention to a hazard.

The rest of this manual contains complete information on installation, operation, specifications, performance, theory, and applications.

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Section 2. Installation

⚠ WARNING

To reduce the risk of *ELECTRIC SHOCK* or FIRE HAZARD, do NOT expose Model 7550 to rain or moisture.

⚠ CAUTION

Do not install Model 7550 into a small sealed chamber of any kind. Improper operation and overheating will result.

2.1. Unpacking

Every Techron Model 7550 is thoroughly inspected and tested prior to leaving the factory. Carefully unpack and inspect the unit for damage in shipment. If damage is found, notify the transportation company immediately. Save the shipping carton and packing materials as evidence of damage for the shipper's inspection. Techron will cooperate fully in the case of any shipping damage investigation. In any event, save the packing materials for later use in transporting or shipping the unit. Replacement packing materials are available from Techron. Always ship this amplifier in proper and appropriate packing material.

2.2. Mounting

The PSA–2X amplifier is designed for standard 19–inch (48.3 cm) rack mounting as well as stack mounting without a cabinet. When rack mounting, take care to support the heavy amplifier from behind. Use end supporting angles joined to the sides of the rack to support the amplifier from beneath.

If chassis slides are used, care should be taken to avoid toppling the rack when the slides are extended. The center of gravity of the amplifier is approximately 5.4 inches (13.7 cm) behind the front panel.

If a number of units are being racked on electrically common rails, remove the strap from the rear-panel ground-terminal strip to maintain a very high signal/noise ratio. This will reduce the possibility of ground loop hum.

Provide a source of cooling air for the fan intake. A vent tube to the outside of the rack may be necessary if the rack ventilation is poor and/or the amplifier heat output is high. NEVER block the air vents in the sides, front, and back of the amplifier. Allow a clearance of 1.75 inches (4.5 cm) above the unit for hot air discharge, if at all possible.

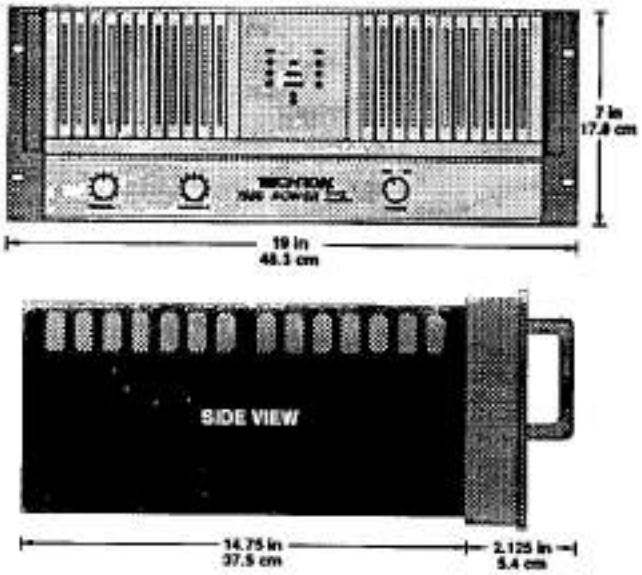


Illustration 2–1 Mounting Dimensions

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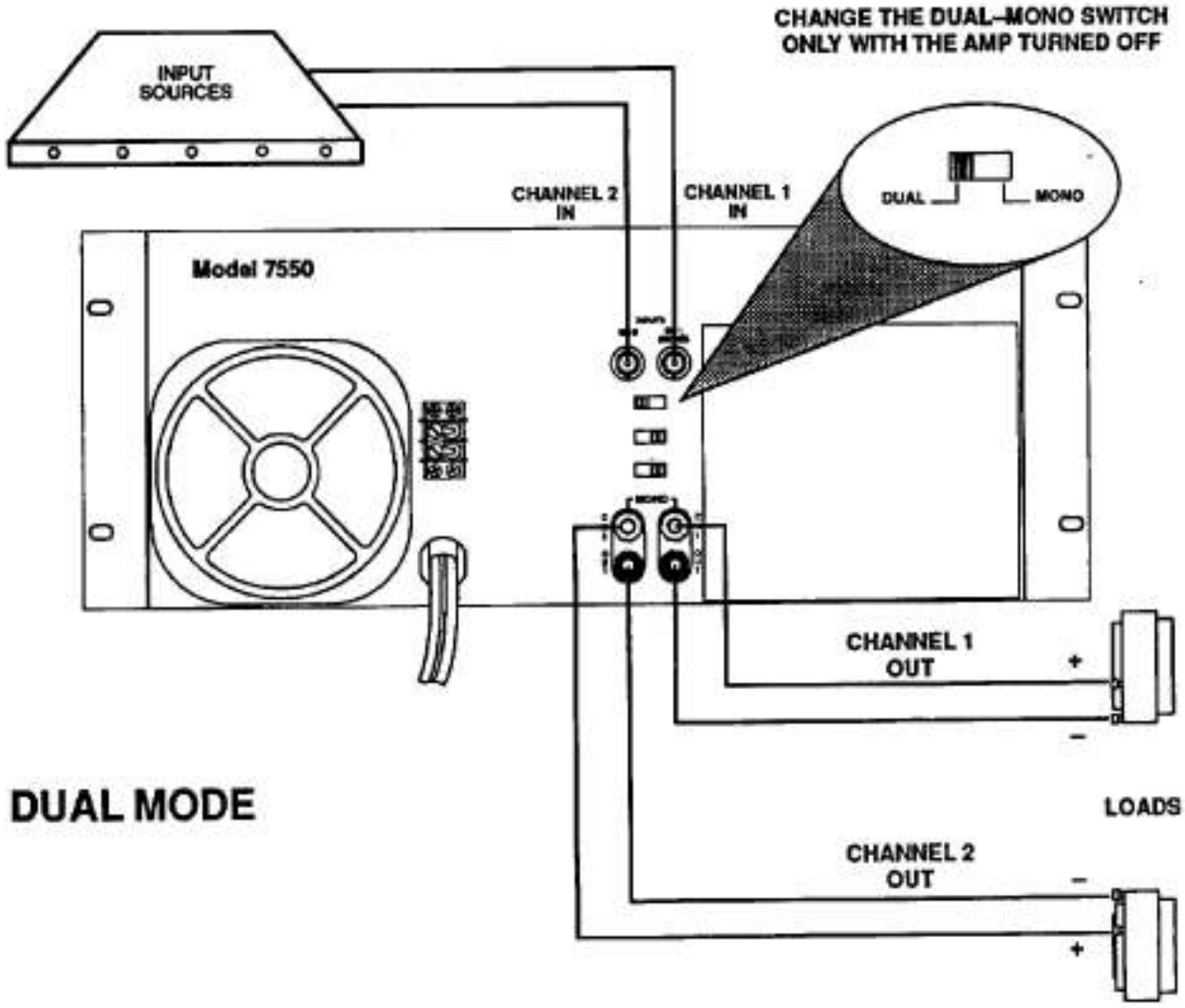


Illustration 2–2 Dual Channel Hookup

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2.3. Hookup

Before beginning the installation of your amplifier, please note the following:

- Remove all power from the unit. Do not have the AC cord plugged in.
- Turn input level controls down (fully counter clockwise).

The input and output jacks are located on the rear panel. Use care in making connections, selecting signal sources, and matching loads. During hookup take the following precautions:

1. Use only shielded cable on inputs. The higher the density of the shield (the outer conductor), the better the cable. Spiral wrapped shield is not recommended.
2. The output wire and connectors should be heavy enough to carry the intended current to the load.
3. Use good quality connectors with proper strain relief.
   - Do not use connectors that have any tendency to short circuit.
   - Do not use connectors that can be plugged into AC power receptacles.
   - Do not use 1/4–inch phone plugs that short the high level outputs.
4. Keep unbalanced input cables as short as possible—avoid lengths greater than 10 feet.
5. Do not run signal (input) cables together with high level wiring such as load (output) wires or AC cords (this helps avoid most hum and noise).
6. Do not short the ground lead of an output cable to the input signal ground. Oscillations may result.

For important considerations about hooking up Inputs, Outputs, and AC power, see sections 2.3.3., 2.3.4., and 2.3.5.

The Model 7550 may be operated in either DUAL (two-channel) or MONO (single-channel) mode. Your hookup will depend on which mode you decide to use. There are very important wiring differences between these two modes.

2.3.1. Dual Channel Hookup

To put the amplifier in Dual mode, slide the Dual-Mono switch at the back of the amplifier (See Illustration 2–2) to the DUAL position. Be very careful not to short the two outputs together while in Dual mode and observe correct polarity.

The installation is very intuitive in DUAL mode. The input of Channel 1 feeds the output of the same channel as does the input of Channel 2.

⚠ CAUTION

Never parallel the two outputs together or parallel them with the output of any other amplifier without Techron approved modifications. See Section 6.2.2.

Paralleling the outputs does not safely increase power output and can cause the unit to prematurely go into Standby mode to prevent overheating.

Note: The two channels of Model 7550 may be operated in parallel under certain specific conditions. See Section 6.2.2. "Paralleling Channels for Increased Current".

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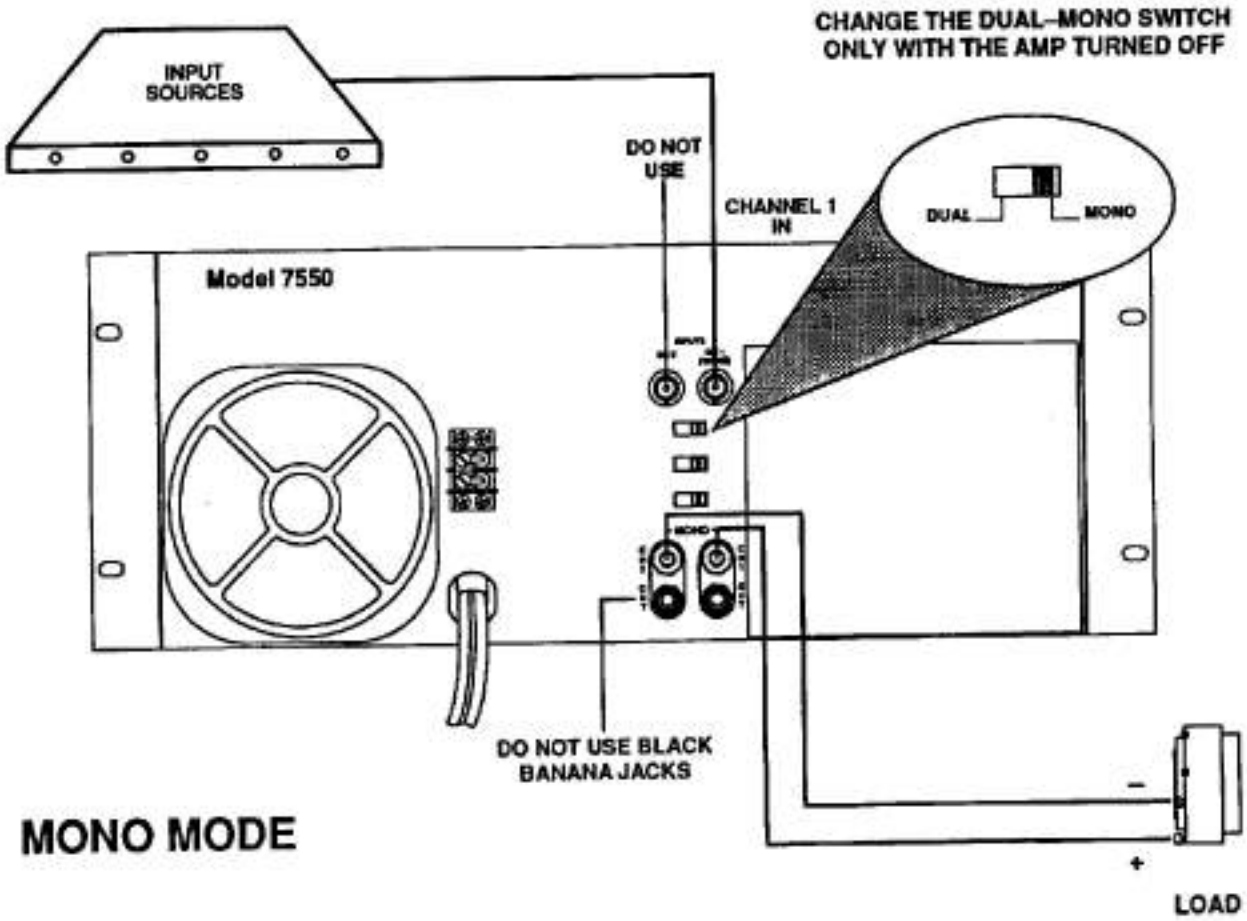


Illustration 2-3 Mono Hookup

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2.3.2. Mono Hookup

To put the amplifier in Mono mode, slide the Dual-Mono switch at the back of the amplifier (see Illustration 2–3) to the MONO position.

Mono mode is quite different from Dual mode. Switching to the Mono position alters input circuitry of Model 7550 so that the two internal amplifiers work as a push-pull team for single channel output.

In this mode use *only* the Channel 1 input. DO NOT USE THE CHANNEL 2 INPUT. Signal level and quality may be greatly degraded. Keep the level control of Channel 2 turned completely down (counter clockwise).

Note: The input jack and level control of Channel 2 are not defeated in MONO mode. Any signal fed into Channel 2 will combine with the signal in Channel 1 and result in distortion. Channel 2 input alone will result in low power output.

The output wiring is very different too. The polarity of the output of Channel 2 is inverted so it can be bridged with the output of Channel 1. The outputs of both channels receive the same signal from the input of Channel 1.

The most common hookup (see Illustration 2–3) connects the positive lead from the load to the red post or positive terminal of Channel 1 and the negative lead to the red post or positive terminal of Channel 2. The inner black posts are not used.

Note: Mono output is balanced and is isolated from the chassis and from the input grounds. Thus, both output leads are connected to the red or "hot" connectors only.

⚠ CAUTION

Be certain that all equipment (meters, switches, etc.) connected to the MONO OUTPUT LINES is not grounded. Both sides of the line must be totally isolated from the input grounds to Model 7550. Failure to observe this precaution will result in severe oscillation.

Note: Use of ungrounded test equipment may violate local codes.

2.3.3. Inputs

The inputs are unbalanced, have a nominal impedance of 25 k ohms and will accept most line-level outputs. There are three precautions to take when connecting to the inputs: 1) Keep undesirable signals off the inputs; 2) Avoid ground loops, and; 3) Avoid feedback between an output and an input.

Low frequencies are sometimes present in the input signal and can overload, overheat or otherwise damage loads. To remove such frequencies as well as any DC that may also be present, place a capacitor in series with the input signal line. The graph in Illustration 2–4 shows how the value of the capacitor affects the frequency response. Use only a low-leakage paper, mylar or tantalum capacitor.

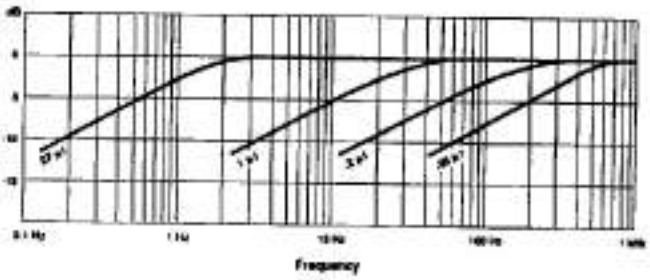


Illustration 2–4 Input Capacitor Chart

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If large amounts of ultrasonic or RF (radio frequency) are found on the input, place a low-pass filter on the input. While high RF levels may not damage the amplifier, they can burn out sensitive loads, and activate the amplifier's protection system. The following filters are recommended for such situations:

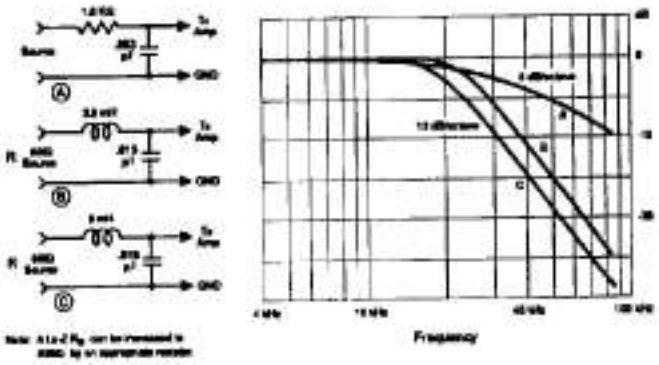


Illustration 2–5 RFI Input Filters

Improper grounding allows feedback oscillation to occur. DO NOT CONNECT INPUT & OUTPUT GROUNDS TOGETHER. In some cases, even the AC power line may provide this feedback path. Isolation of input grounds and common AC-line devices may be necessary.

2.3.4. Outputs

⚠ WARNING

ELECTRIC SHOCK HAZARD. Output potentials can be lethal. Make connections only with AC power OFF and input signals removed.

When connecting outputs, consider the following precautions:

- Use quality output connectors.
- If banana plugs are used, be sure to keep connectors snug fitting. Frequent misuse damages and loosens these connectors.
- Use proper output wire gauge and length. See nomograph, Illustration 2–6 for proper wire selection.
- To prevent spurious oscillations and undesired feedback, carefully lace output cables together. Never route output cables with input cables.
- Do not join amplifier input and output grounds externally to the unit.
- Never connect the output to a power supply output, battery, or AC power main.
- Consider the power handling capacity of your load before connecting it to the amplifier.

⚠ CAUTION

Techron is not liable for damage to any Load due to overpowering.

- The use of load protection fuses is highly recommended (see section 2.3.4.2.).

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2.3.4.1. Load Wires

Use cables of sufficient gauge (thickness) for the length used. Otherwise, power is lost through cable heating and resistance. Refer to the nomograph (Illustration 2–6) below for recommended wire sizes.

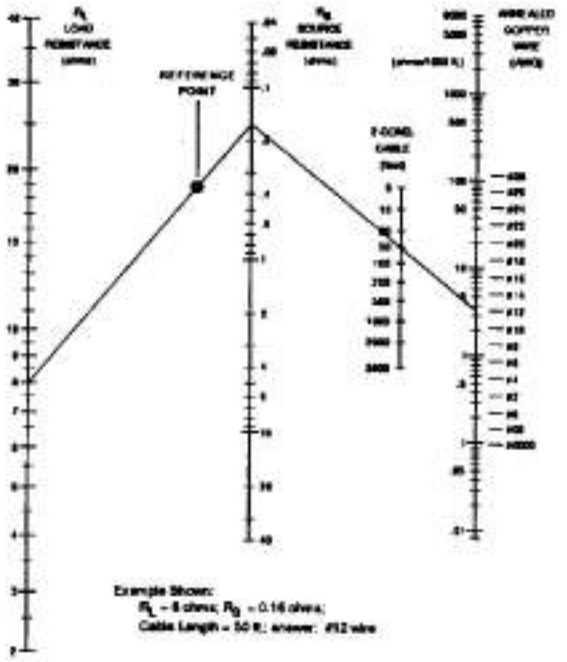


Illustration 2–6 Wire Size Nomograph

Use the nomograph as follows:

1. Note the load resistance connected to each channel of the amplifier. Mark this value on the nomograph "Load Resistance" line.
2. Note the "Reference Point" on the nomograph.
3. Draw a pencil line through these two points, intersecting the "Source Resistance" line.
4. On the "2–Cond. Cable" line, mark the length of cable run.
5. Draw a pencil line from the intersection point on the "Source Resistance" line through the mark on the "2–Cond. Cable" line.
6. Where the pencil line intersects the "Annealed Copper Wire" line indicates the wire gauge required.

2.3.4.2. Load Protection

Loads that are primarily inductive such as transformers require special attention. To prevent large low-frequency currents from damaging the transformer (and prevent the Model 7550 from unnecessarily activating its protection system) it may be necessary to install a capacitor in series with the load. If you are unsure whether this is necessary, measure the DC resistance across the terminals of each load with an ohmmeter. If the resistance you measure is less than 3 ohms either add the following parts as shown in Illustration 2–7 or add an appropriate high-pass filter or contact Techron Engineering for further information.

Place an external non-polarized capacitor of 590 to 708 mfd and a 4 ohm power resistor in series with the positive (+) lead as shown below:

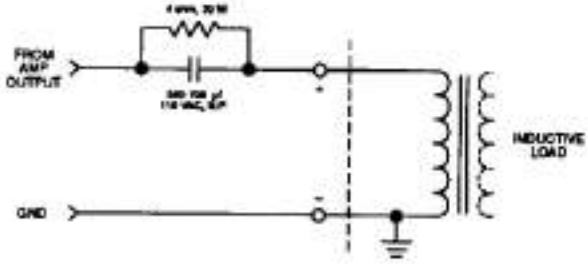


Illustration 2–7 Inductive Load Protection

We recommend that you protect your loads from damage resulting from excessive power. A common way to do this is to put a fuse in series with the load.

Fuses help prevent damage due to prolonged overload, but provide essentially no protection against damage from large transients. To minimize this problem, use high-speed instrument fuses such as the Littlefuse™ 361000 series.

If, on the other hand, the load is only susceptible to damage caused by overheating, use a fuse or circuit breaker having the same slow thermal response as the load itself such as a slow-blow fuse.

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Illustration 2–8 is a nomograph showing what size fuse to use according to the impedance and peak power rating of the load.

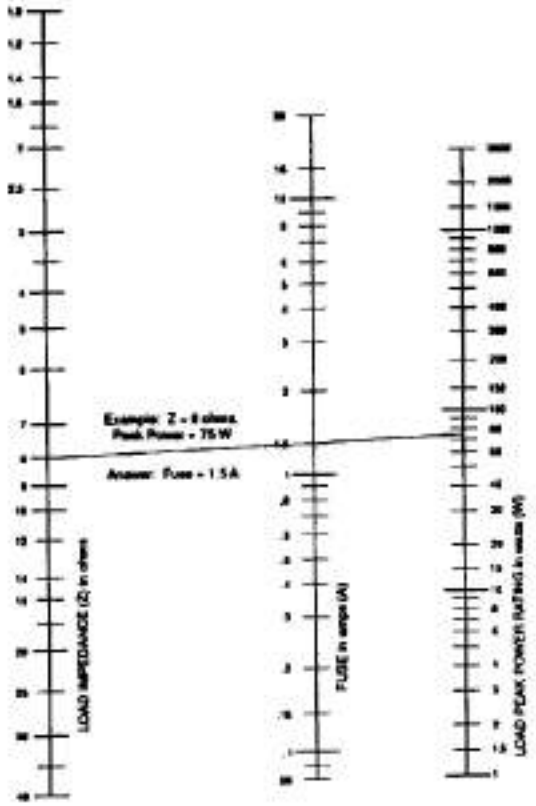


Illustration 2–8 Fuse Selector Nomograph

2.3.5. AC Power

Connect Model 7550 to proper AC current. Supply voltage must be 50 to 60Hz and no more than 10% above or below the selected line voltage. Failure to comply with these frequency limits may damage the unit and will result in unreliable operation.

Model 7550 may be operated at various line voltages. The serial plate indicates factory voltage wiring. The tag attached to the line cord also indicates the voltage for which the amplifier is connected.

Five standard line-voltage connections are offered: 100, 120, 200, 220 and 240 VAC. To convert from one voltage to another, see Section 6.5. Only a competent technician should attempt to convert from one voltage to another.

Replace the FUSES whenever AC voltage conversion is made or when they have blown. See Section 3.4. for fuse values and replacement procedure.

The amplifier is furnished with a standard three-wire (grounded) AC plug. Use third wire ground with caution, as this may introduce a ground loop into the system. If a ground loop is present, remove ground shorting strap on the back panel. See Illustration 3–2.

Three-to-two wire AC plug adapters are commercially available for adapting to a two-wire system if necessary.

⚠ CAUTION

Techron assumes no liability whatsoever for ungrounded operation which may violate UL or local electrical codes.

At this point, installation is complete. Read the next section to familiarize yourself with the operation and functions of Model 7550.

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Section 3. Operation

⚠ WARNING

Never operate Model 7550 with cover panels removed because you could be *ELECTROCUTED*. Refer servicing to qualified personnel.

⚠ CAUTION

Do not operate Model 7550 in a small sealed chamber of any kind. Improper operation and overheating will result.

3.1. Operating Precautions

Although your amplifier is well protected from any external faults, we recommend the following precautions be taken for safe operation:

1. Operate the amplifier from AC mains of not more than 10% above or below the selected line voltage and within the specified line frequency (50–60 Hz). Failure to comply with these limits will invalidate the warranty.
2. When using input sources of uncertain level or any components which have not previously been used with your amplifier, always begin with the level controls at a minimum and gradually increase them while monitoring the output.
3. Operate the amplifier with the correct fuses (F1&F2 = 20 A, F3 = 1/2 A for 100 or 120 VAC; F1&F2 = 10 A, F3 = 1/4 A for 200, 220 or 240 VAC). Turn the amplifier off and unplug it from the AC line before replacing the fuses.
4. Do not expose the amplifier to corrosive chemicals such as soft drinks, lye, salt water, etc.
5. Do not tamper with the circuitry. Circuit changes made by unauthorized personnel, or unauthorized circuit modifications, will invalidate the warranty.

3.2. Functions

The operating functions of Model 7550 are shown and explained with captioned call-outs on the following two pages (Illustrations 3–1 and 3–2).

A two-position power switch and an amber LED power-on indicator are located on the front panel.

Independent level controls are located on the front panel. Both level controls are used in DUAL mode, but only the Channel 1 control should be used in MONO mode. They are used to adjust the desired output level.

There are red *IOC* (Input/Output Comparator) indicator LEDs located in the middle of the front panel. They will illuminate whenever the distortion specifications of the amplifier are being exceeded.

The green Signal Presence LEDs are located on the front panel just below the *IOC* LEDs. They illuminate any time there is more than 0.6 Vrms at the output of the amplifier.

There are yellow LEDs just below the green LEDs. They illuminate anytime either channel is in the standby state.

(Continued on page 3–4)

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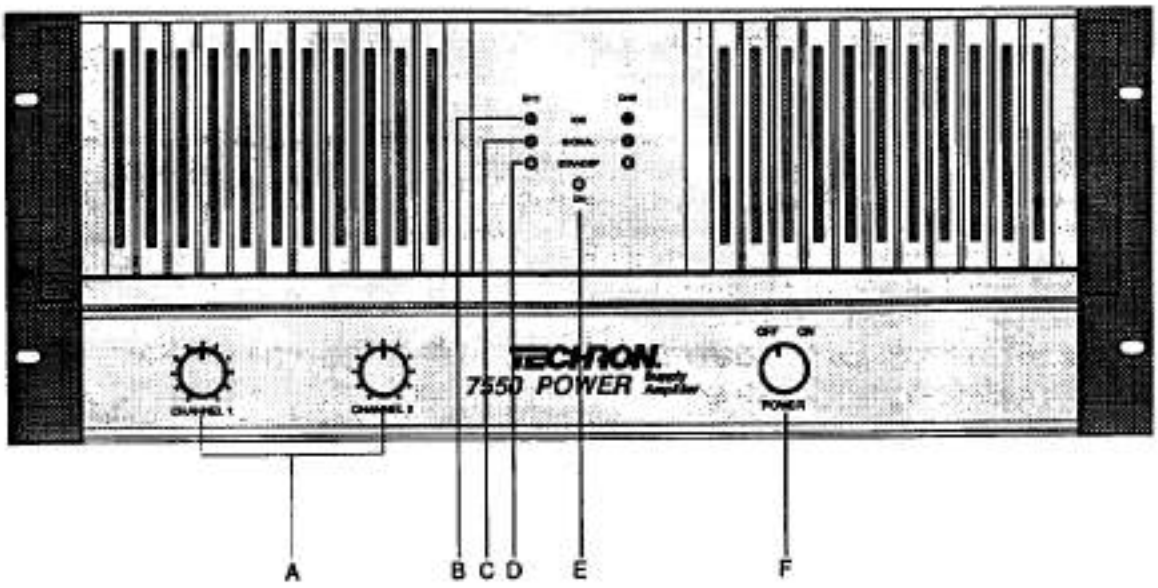


Illustration 3–1 Front Panel Functions

A. Level

The volume of each channel is independently controlled by these level controls. Each control has thirty-one detents for accurate incrementation. The control for Channel 2 should be turned down (fully counter clockwise) and not used when operating in MONO mode.

B. *IOC*®

A red Input/Output Comparator LED is provided for each channel. It illuminates when distortion of any kind exceeds 0.05%. It also acts as a standby indicator, illuminating when in STANDBY mode. It is normal for the *IOC* indicators to illuminate briefly when the amplifier is turned on or off.

C. Signal Presence

A green LED is provided for each channel to indicate when a signal is present. Normally they will either flash or stay illuminated (depending on the signal level). If the level is very low they may not illuminate at all.

D. Standby Indicators

Yellow LEDs illuminate when either channel is in the standby state. This will occur when using the DELAY feature.

E. Power Indicator

An amber LED will illuminate whenever the Model 7550 is switched on.

F. Power

This two-position switch turns the amplifier ON or OFF. At turn-on, the output is muted (placed in STANDBY mode) for about four seconds to protect your load from start-up transients. (This feature can be disabled with the Delay Switch on the back panel.)

G. Fan Intake

The 7550 has a dust filter on the air intake to the cooling system. The filter may be removed for cleaning.

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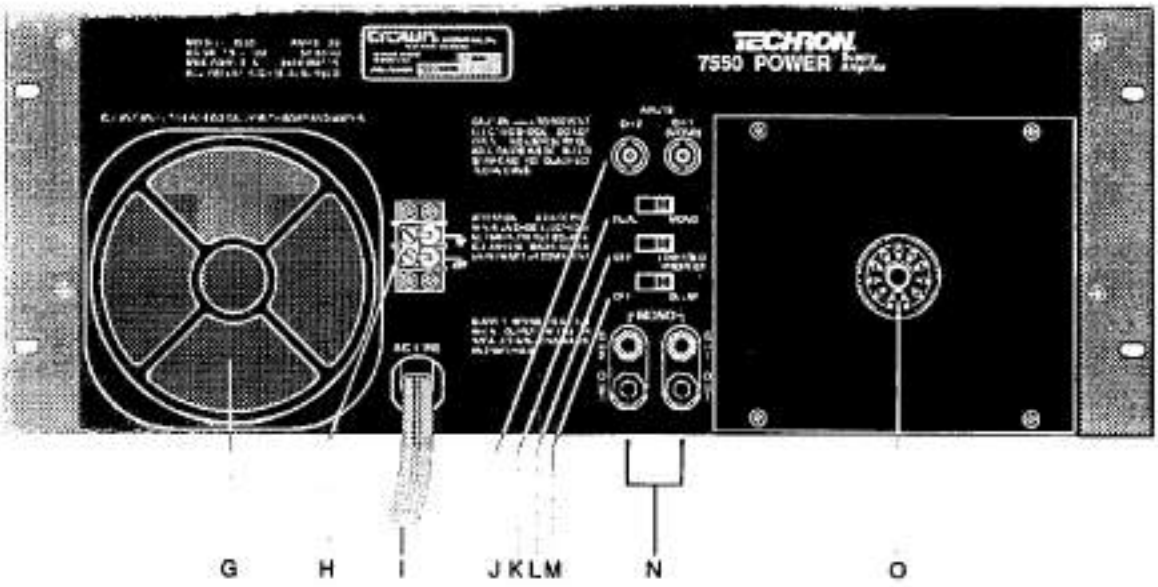


Illustration 3–2 Back Panel Functions

H. Ground Barrier Strip

Isolation of chassis ground from signal ground is easily accomplished by removing the shorting strap from this terminal strip. This may help remove any hum problems caused by "ground loops." (The grounds are always connected internally with a resistance of 2.7 ohms.)

I. Power Cord

A standard three-wire (grounded) AC cord is provided. Plug into the specified AC power (see Section 2.3.5.).

J. Input BNC Jacks

An unbalanced BNC jack is provided at the input of each channel. Do not use the input jack for Channel 2 when in MONO mode.

K. Dual-Mono Switch

Slide this switch left for DUAL mode and right for MONO mode. In MONO mode the input and level control for Channel 2 should not be used. Only balanced (ungrounded) loads should be connected to the output jacks. (See Section 2.3.)

L. Low Frequency Protect Switch

Engaging this switch causes the unit to cycle through the "STANDBY" mode if low frequency (DC–10 Hz) appears at the output.

M. Delay Switch

This switch activates a four-second delay in the transition state from "turn-on" to high-voltage power supplies on.

N. Output Connectors

Banana jacks are provided at the output of each channel. Only the two top jacks (red) are used in MONO mode since both channels are bridged.

O. Balanced Input Module Socket

This 11–pin radial socket is provided for one of two optional balanced input modules (75A06 or 75A07). The 75A07 uses a transformer to balance the inputs while the 75A06 uses active circuitry. If one of these modules is used, the unbalanced inputs should not be used.

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On the back panel the Model 7550 has a dust filter on the air intake to the cooling system. The filter may be removed for cleaning.

To isolate chassis ground from signal ground, you can use the back panel Ground Barrier Strip by removing the shorting strap. Grounds are always connected internally with the resistance of 2.7 ohms.

The two BNC connectors on the back panel provide for easy connection and disconnection of input signals.

Switch between DUAL and MONO mode with the Dual/Mono switch located on the back panel.

Below this switch, is the Low Frequency Protect Switch. Engaging it causes the unit to cycle through the "STANDBY" mode when low frequency (DC–10 Hz) appears at the output.

The next switch is the Delay Switch. This switch activates a four-second delay in the transition state from "turn-on" to high-voltage power supplies on.

Model 7550 includes two standard MDP "dual banana" type output jacks on the back panel. In DUAL channel operation, use two dual banana plugs connected vertically. Use one dual banana plug connected horizontally to both "hot" (+) terminals in MONO operation.

The back panel also includes an 11–pin accessory socket. Some accessories are described in Section 6. Contact Techron engineering for any other accessories available. Each accessory comes with its own documentation for installation and use.

Also located on the back panel is a heavy duty three-wire (grounded) AC line cord.

3.3. Protection

Techron power amplifiers are widely known for their quality construction, high reliability and extensive internal protection circuitry. The Model 7550 is no exception. It is protected against all the common hazards which plague high-powered amplifiers such as:

- input overload damage;
- shorted, open and mismatched loads (load impedance too low);
- chain destruction phenomena;
- high frequency overload blowups;
- excessive temperature; and,
- overloaded power supplies.

The input stage is protected against excessive input signal level (overdrive) by a series-limiting resistor.

Protection against shorted and low impedance loads is provided by a fast-acting limiter circuit which instantaneously limits the output power to a maximum safe stress value.

It functions automatically as a current limiter at audio frequencies whose current limiting threshold is dependent on the history of the output signal.

Increased output current causes the threshold to increase, however, the no-signal threshold is high enough to allow tone bursting (even into 4 ohms) without premature limiting.

Since the limiter has no instantaneous response to output voltage, "flyback" transients do not appear in the output when limiting occurs on inductive loads. ("Flyback" transients are a normal by-product of VI limiting with an inductive load.)

Because the current limiter of the Model 7550 will not yield to the constant current demands of an inductive load, it is immune to "flyback" distortion.

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The Model 7550 uses a basic output-protection mechanism that represents a dramatic departure from conventional designs. Computer analysis of transistor stress-test data, leading to design of appropriate dynamic transistor environment analog circuits, forms the heart of the system.

A continuous flow of operating data produces an analog output proportional to the changing Safe Operating Area (SOA) of the transistor. This output controls the limits imposed by a current gain stage ahead of the output section. The output limits this change along with actual operating conditions. The maximum advantage may then be taken of the transistor's SOA, without risk of destroying the device when conditions are less than ideal.

⚠ CAUTION

Whenever an OVERLOAD condition persists (*IOC* stays ON), take the following steps as applicable to protect amplifier and load:

1. **Reduce or limit input level.**
2. **Disconnect load from amplifier.**

As described earlier, there is a Low Frequency Interrupt circuit. When activated, if it senses any DC at the output, it places the unit into the STANDBY mode. Every four seconds, the unit will sample the output signal for DC and return to normal operation when the problem signal has been removed.

The amplifier features a controlled slew rate which, coupled with the protection circuits, guards the amplifier from blowups when fed large RF input signals.

Each power transformer has a thermal switch embedded in the windings, to protect against overheating. If the transformers overheat, the thermal switch shuts off automatically, waits until the unit has cooled to a safe temperature and then resets itself.

In addition to all other protection, Model 7550 is protected with AC line fuses. The high-voltage power supply is fused with a 20 A fuse for 100 & 120 VAC, and a 10 A fuse for 200, 220, 240 VAC. The low-voltage power supply and cooling fan are fused with a 0.5 A fuse for 100 & 120 VAC, and a 0.25 A fuse for 200, 220, 240 VAC. The use of any other fuse sizes will invalidate the warranty.

3.4. Fuse Replacement

In the rare event that an internal fuse blows, refer the amplifier to a qualified technician.

⚠ DANGER

Always disconnect AC POWER (unplug line cord) before replacing fuses. The fuse holders still have power even when the power switch is turned off.

The AC line fuses are located inside the amplifier on the relay board . To replace the fuses:

1. Turn the Power Switch OFF.
2. Unplug the AC power cord.
3. Remove the bottom cover.
4. Replace fuses F1, F2, & F3 according to the table below then reassemble unit.

Fuse / Voltage	F1	F2	F3
100–120 VAC	20 A	20 A	1/2 A
200–240 VAC	10 A	10 A	1/4 A

Illustration 3–3 Fuse Selection Table

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Section 4. Specifications and Performance

4.1. General Specifications

Hum and Noise (20 Hz–20 kHz): <0.130 mV. See Illustration 4–8.

Phase Response: +0, –15 degrees DC–20 kHz at 1 watt. See Illustration 4–3.

Input Impedance: 25 kohm ± 30%.

Amplifier Output Protection: Short, mismatch, and open circuit proof. Limiting is instantaneous with no flyback pulses, thumps, cutouts, or other spurious signals. No premature limiting transients.

Overall Protection: AC line fused. Thermal switch in control logic protects against overheating caused by insufficient ventilation. Transformer overheating results in shutdown (STANDBY) of that particular channel. Controlled slewing rate voltage amplifiers protect overall amplifier against RF burnouts. Input overload protection is furnished by internal resistance at inputs of amplifier.

Low Frequency Interrupt: *(This feature is switchable from the back panel.)* Interrupts output drive (goes into STANDBY) when DC greater than 10 volts or low frequency greater than 26 volts to 10 Hz is detected at the output. It samples the output every four seconds. See Illustration 4–6.

Turn-On Delay: *(This feature is switchable from the back panel.)* Zero or four seconds with minimum thumps and no dangerous transients.

DC Output Offset (shorted input): 10 mV or less, internally adjustable to zero.

Power Supply: High Voltage: Two 800 VA transformers with computer grade capacitors powered through 10 A relays.
Low Voltage: ± 15 VDC supplies are provided by current-limited short-proof regulated supplies for complete isolation and stability.

Power Requirements: Requires 50–400 Hz AC at 100, 120, 200, 220, or 240 V ± 10% operation. It is extremely important to have adequate AC power available to the amplifier. Power amplifiers can not create energy—they must have the required voltage and current to deliver the undistorted rated wattages you expect.

Cooling: Forced-air with high-efficiency coolers. A two-speed fan with an intake filter (washable) mounted on the back panel forces air through the coolers and out the top, front and side panels.

Chassis: All-aluminum construction for maximum heat conduction and minimum weight.

Controls: Round knob On/Off power switch. Independent Input Level control knobs. Rear panel Dual/Mono, Low Frequency Protect, and Delay slide switchs.

Displays: A pair of green LEDs indicate Signal Presence. A pair of red LEDs indicate the action of the *IOC®* circuitry. A pair of yellow LEDs indicate whether or not STANDBY mode is active. An amber LED is used as a Power indicator.

Connectors: Input is made to BNC connectors. Output is made to color-coded dual binding posts on 3/4 in. centers. Ground selectivity is made with a 2–lug terminal block with removable shorting strap. Accessories connect to an 11–pin radial socket. And the AC line uses a 3–wire grounded plug.

Dimensions: 19 in. wide (standard rack mount) x 7 in. high x 14.75 in. deep from front panel mounting surface. Handles extend 2.38 in. from front surface. (48.3 cm x 17.8 cm x 37.5 cm, handles 6 cm additional.)

Weight: Approximately 57 pounds (25.9 kg) net weight.

Finish: Polyester vinyl coated aluminum front panel and zinc die cast handles.

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4.2. Dual Channel Specifications

Output Power: 265 watts per channel minimum continuous average power (both channels operating) into an 8 ohm load over a bandwidth of 20 Hz–20 kHz at a rated RMS sum total harmonic distortion of 0.1% of the fundamental output voltage. 380 watts per channel minimum continuous average power (both channels operating) into a 4 ohm load over a bandwidth of 20 Hz–20 kHz at a rated RMS sum total harmonic distortion of 0.1% of the fundamental output voltage. See Illustration 4–1.

Frequency Response: ± 0.1 dB 20Hz–20 kHz at 1 watt into 8 ohms; ± 1.5 dB DC–80 kHz. See Illustration 4–2.

1 KHz Power: 260 watts continuous average power into 8 ohms, per channel, both channels operating, 0.1% total harmonic distortion.

Harmonic Distortion: Less than .002% from 20 Hz–1 kHz, and increasing linearly to .05% at 20 kHz at 220 watts continuous average power per channel into 8 ohms.

I.M. Distortion: (S.M.P.T.E. 60 Hz to 7 kHz 4:1) Less than 0.01% from 0.25 watts to 220 watts per channel into 8 ohms.

Slewing Rate: 30 volts per microsecond.

Output Impedance: Less than 12 milliohms in series with less than 1.2 microhenries. See Illustration 4–7.

Load Impedance: Rated for 4, 8 and 16 ohm usage. Safely drives any load even totally reactive ones without harming the amplifier.

Crosstalk: See Illustration 4–5.

Voltage Gain: 20:1 ± 2% or 26 dB ± 0.2 dB at maximum gain.

Input Sensitivity: 2.1 volts ± 2% for 220 watts into 8 ohms per channel.

Output Signal: Unbalanced, dual channel.

4.3. Mono Specifications

Output Power: 520 watts minimum continuous average power into a 16 ohm load over a bandwidth of 20 Hz–20 kHz at a rated RMS sum total harmonic distortion of 0.1% of the fundamental output voltage. 760 watts minimum continuous average power into an 8 ohm load over a bandwidth of 20 Hz–20 kHz at a rated RMS sum total harmonic distortion of 0.1% of the fundamental output voltage. See Illustration 4–1.

Frequency Response: ± 0.2 dB, 20 Hz–20 kHz at 1 watt into 16 ohms, ± 1 dB, DC–60 kHz at 1 watt into 16 ohms.

1 KHz Power: 520 watts continuous average power into 16 ohms; 0.1% total harmonic distortion.

Harmonic Distortion: Less than .003% from 20 Hz–1kHz and increasing linearly to 0.08% at 20 kHz at 500 watts continuous average powe into 16 ohms. Less than .005% from 20 Hz–1kHz and increasing linearly to 0.12% at 20 kHz at 800 watts into 16 ohms.

I.M. Distortion: (S.M.P.T.E. 60 Hz to 7 kHz 4:1) Less than 0.015% from 0.25 watts to 500 watts into 16 ohms. Less than 0.015% from 0.25 watts to 700 watts into 8 ohms.

Slewing Rate: 60 volts per microsecond.

Output Impedance: Less than 24 milliohms in series with less than 2.4 microhenries.

Load Impedance: Rated for 8 and 16 ohm usage; drives any load including totally reactive loads without harm to amplifier.

Voltage Gain: 40:1 ± 2% or 32 dB ± 0.2 dB at maximum gain.

Input Sensitivity: 2.2 volts for 500 watts into 16 ohms.

Output Signal: Balanced, single channel.

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4.4. Performance

The chart and graphs on the following pages show the performance of Model 7550.

Model 7550							
Configuration & Load (ohms)		FTC Continuous Average Power at 0.1% THD (See note 1)		Max Average Power at 0.1% THD (See note 2)	1 Cycle Tone Burst Watts at <0.05% THD (See note 3)	40 mS Tone Burst Watts at <0.05% THD (See note 4)	EIA Watts at 1% THD (See note 5)
		20Hz-20kHz	1 kHz	1 kHz	1 kHz	1 kHz	1 kHz
Dual (both channels powered)	2		580	700	840	740	650
	4	380	425	460	640	470	470
	8	265	280	275	335	280	285
	16	150	150	150	170	155	160
Bridged Mono (balanced output)	4		1,210				
	8	760	850	915	1,260	950	920
	16	520	520	545	670	565	565

Illustration 4–1 Power Matrix

Power Specifications:

Many manufacturers publish power specifications with a tolerance of ± 1 dB or worse. That means their amplifier can deviate more than 20% in output! A 100 watt amplifier would meet their spec if it only produced 79.4 watts. Other manufacturers qualify their specs by saying they are "typical" or "subject to manufacturing tolerances," thereby removing any performance guarantee. We take a different approach at Techron—because our "in-house" specs are more stringent than our published specs, *every* Techron amplifier will *exceed* its published specs, and they are *guaranteed* for one year.

Notes:

1. Continuous power in the context of Federal Trade Commission testing is understood to be a minimum of five minutes of operation. Harmonic distortion is measured at the RMS sum total as a percentage of the fundamental output voltage. This applies for all wattages greater than 0.25 watts.
2. A 1 kHz sine wave is presented to the amplifier and the output monitored for non-linear distortion. The level is increased until the THD reaches 0.1%. At this level the average power per channel is reported.
3. A single cycle of sine wave is presented to the amplifier and monitored for non-linear distortion. The average power during the burst is reported. Loads must be able to withstand this level if they are to be safely used with this amplifier.
4. A 40 millisecond burst or two cycles of sine wave (whichever is of greater duration) is used and the power computed as the average power during the burst. The duty cycle of this test is 10 percent.
5. EIA standard RS–490 (both channels driven).

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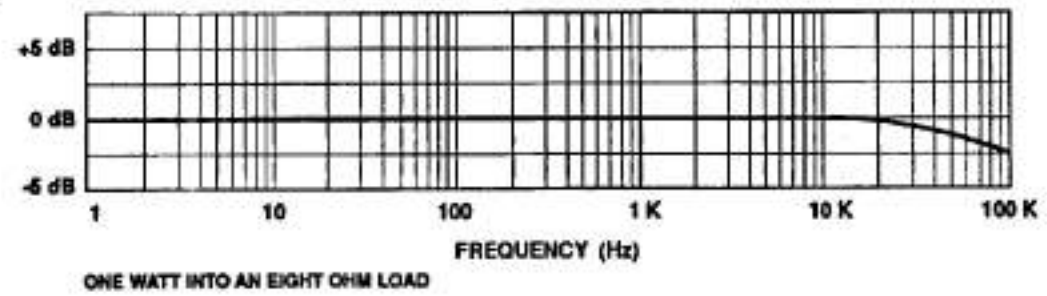


Illustration 4–2 Nominal Frequency Response

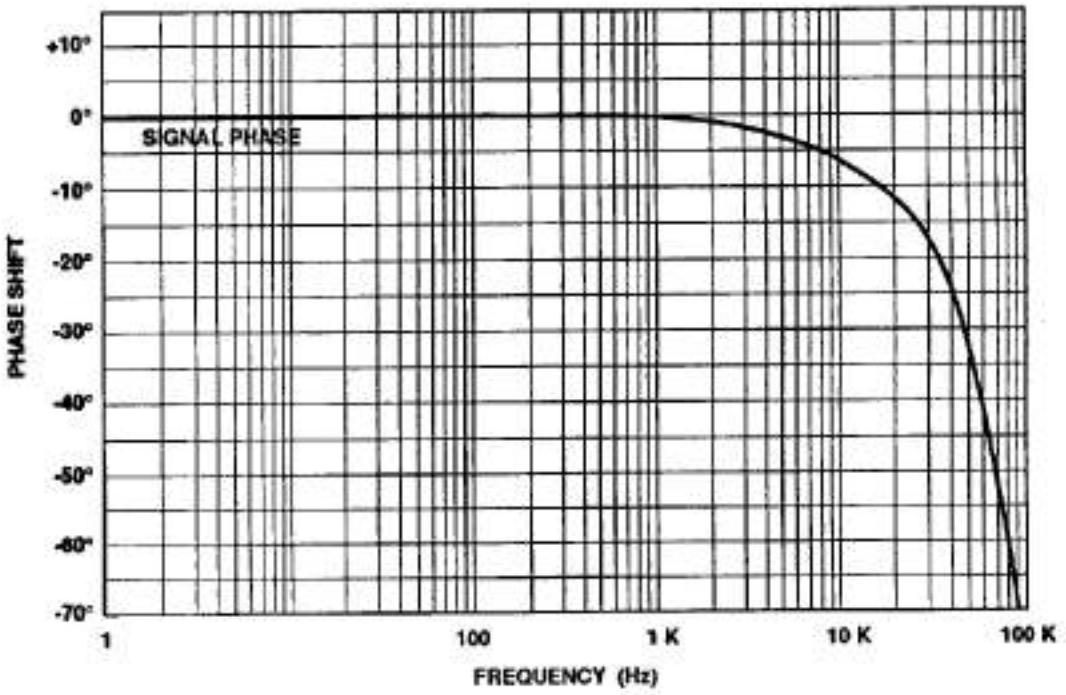


Illustration 4–3 Nominal Phase Response

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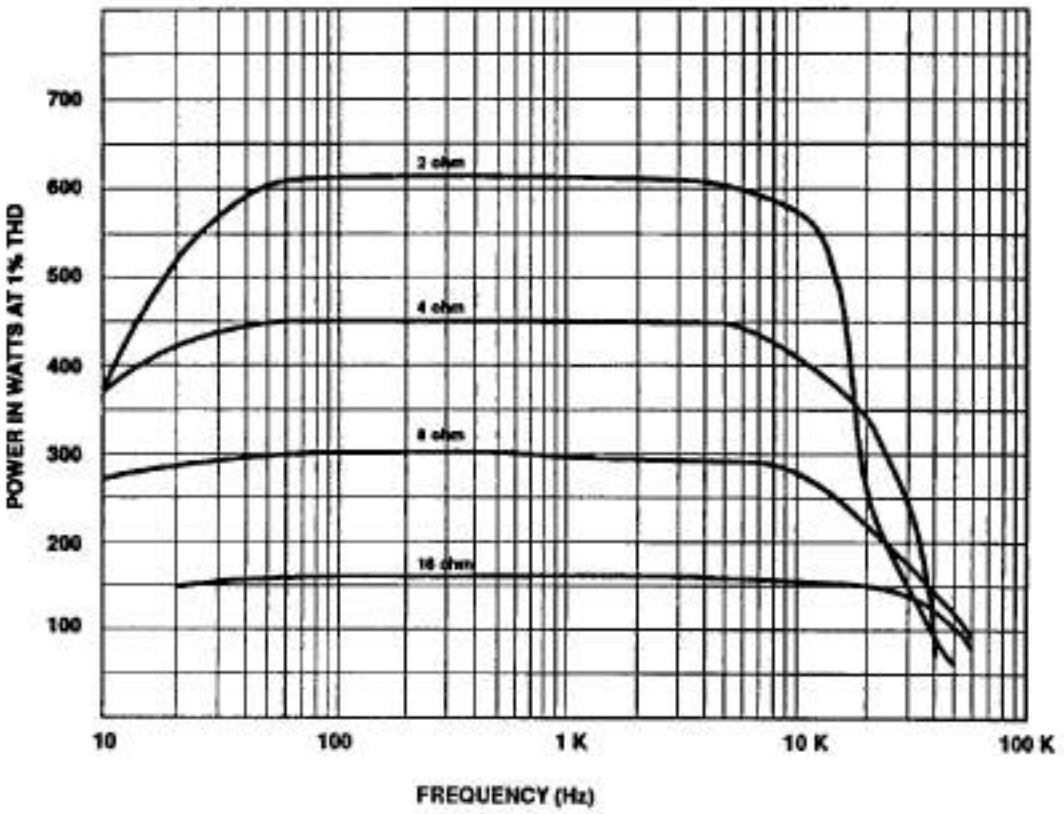


Illustration 4–4 Power Output Response

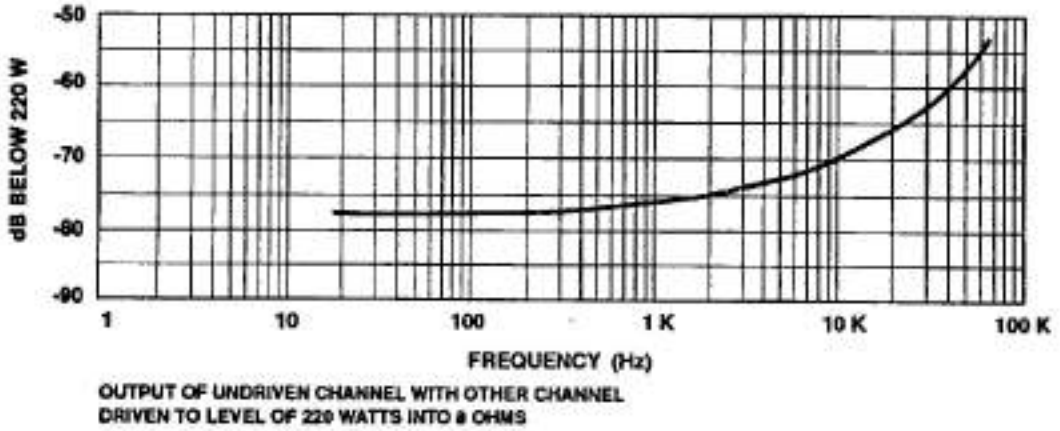


Illustration 4–5 Nominal Crosstalk

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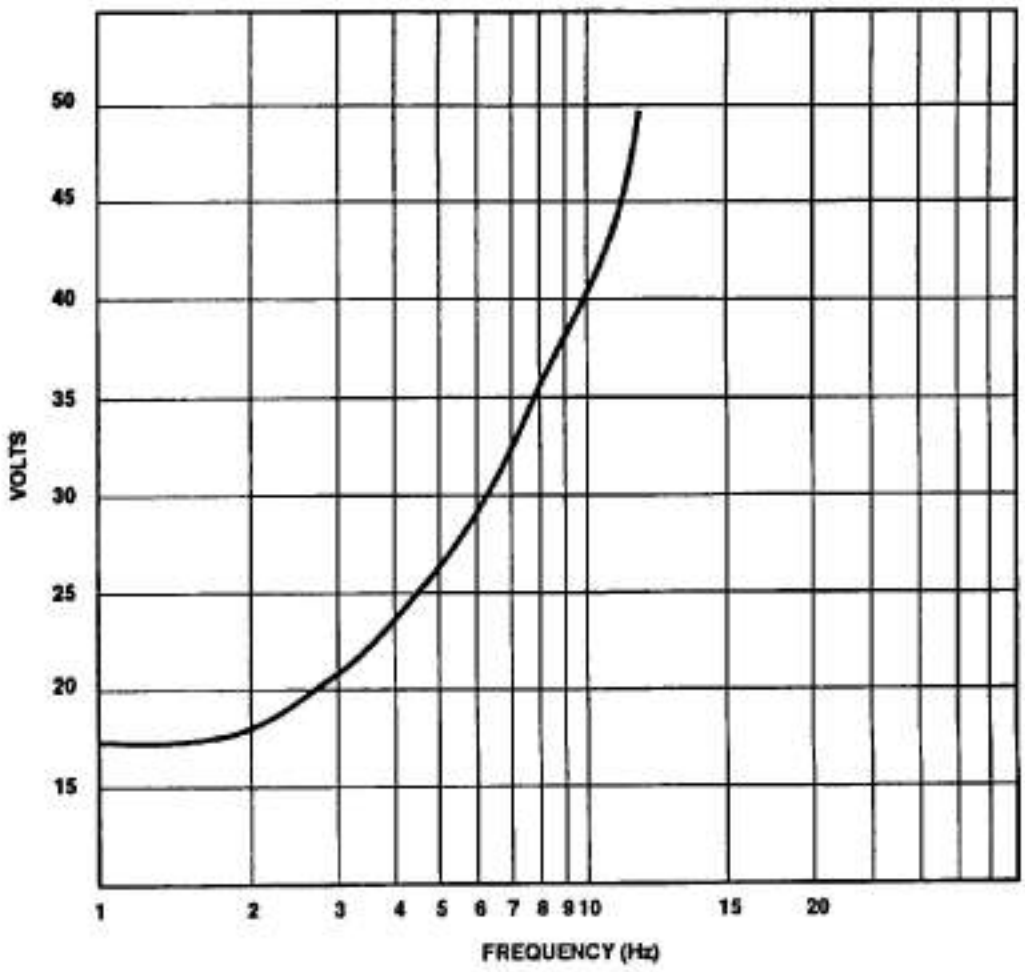


Illustration 4–6 Low-Frequency Interrupt Action

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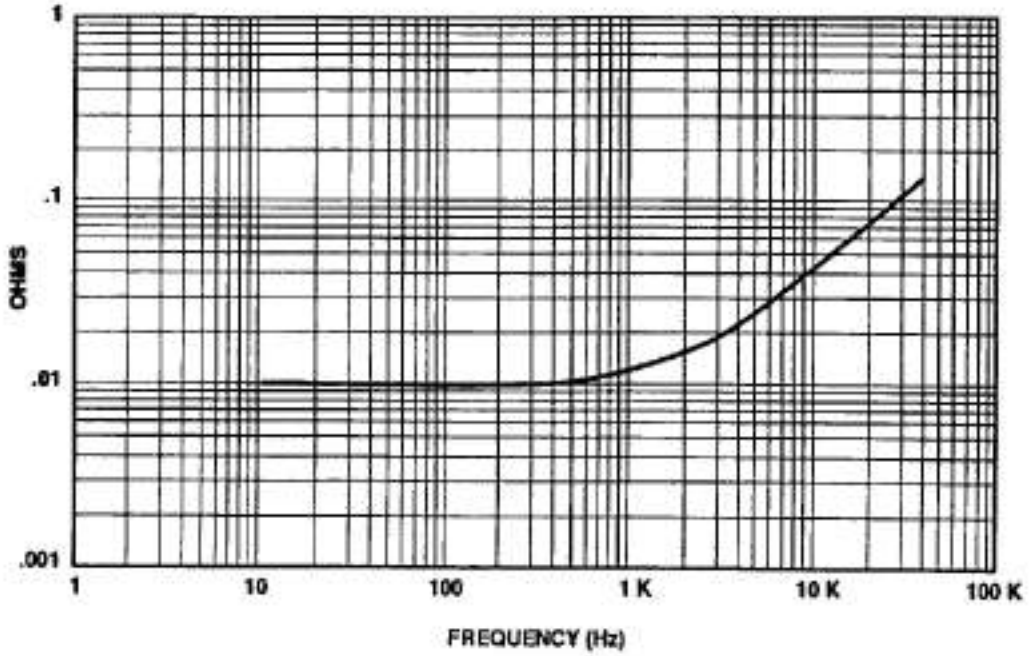


Illustration 4–7 Nominal Output Impedance
(Measurements taken at binding posts)

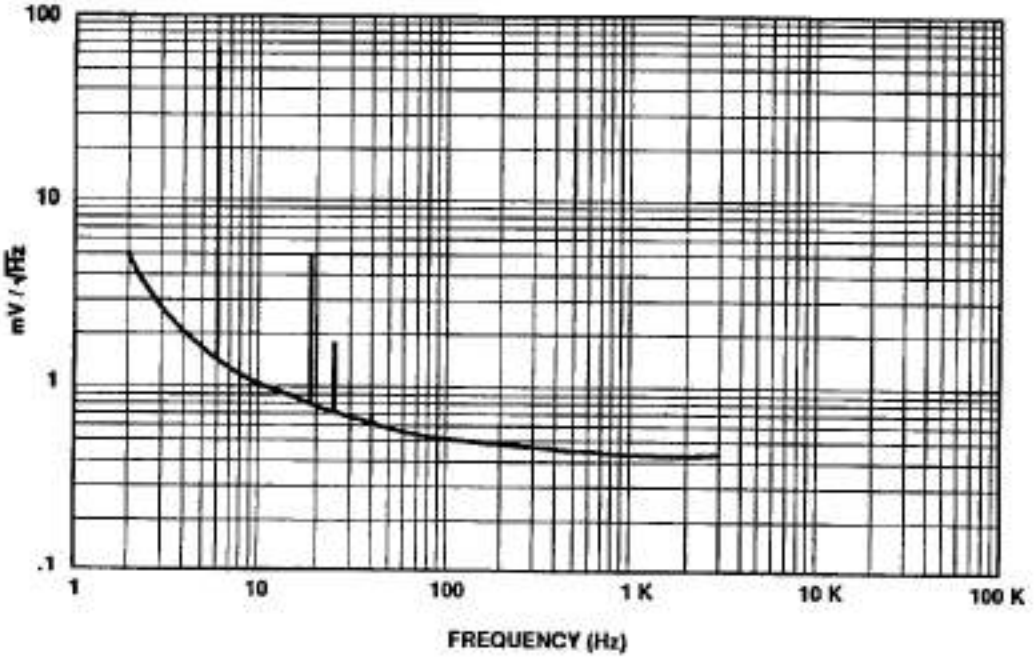


Illustration 4–8 Nominal Noise Spectrum
(Line frequency harmonics plotted to 10th order)

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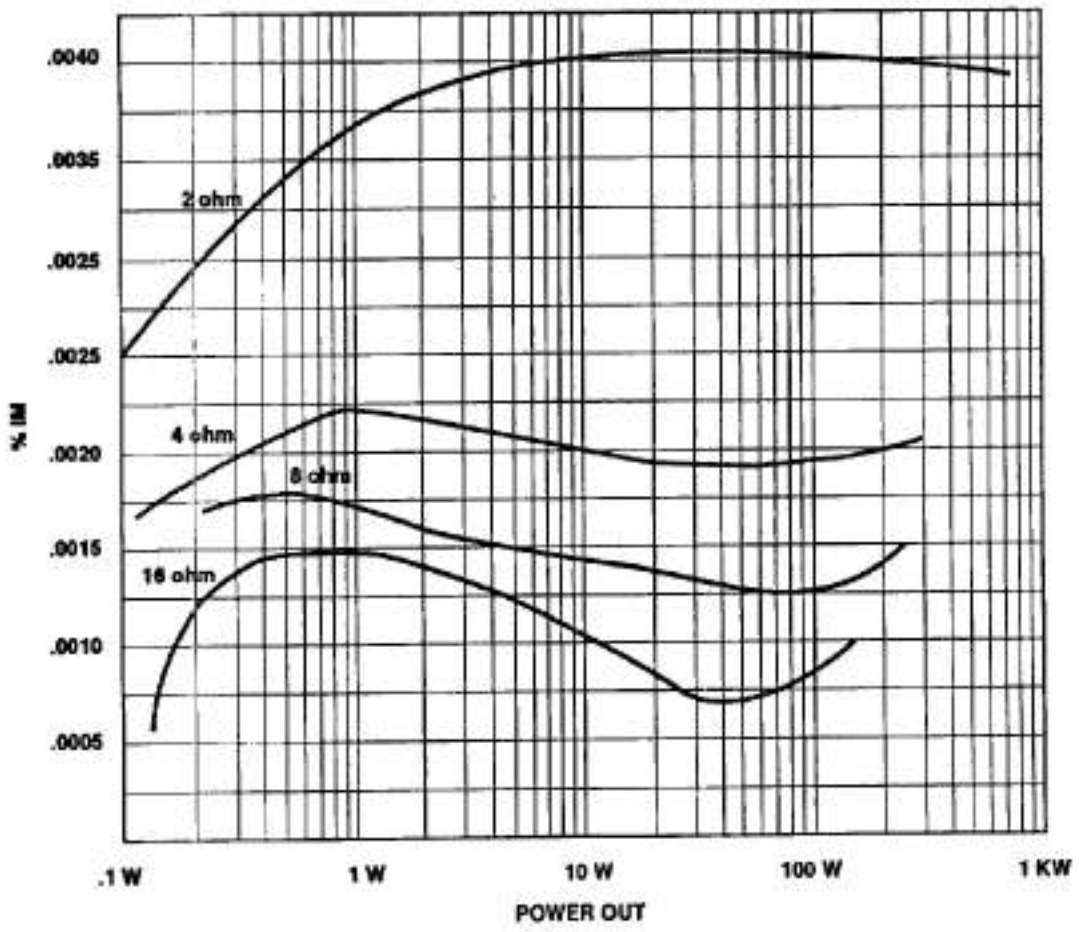


Illustration 4–9 Typical IM Distortion

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Section 5. Theory of Operation

5.1. General Concepts

The Model 7550 is a high-power direct-coupled amplifier. It automatically and continuously analyzes its own dynamic environment and thus is able to control the output level relative to the output transistors' Safe Operating Area. The result: maximum output with maximum safety.

The output circuitry employs 16 rugged 150-watt transistors (2400 W dissipation), each tested on the Crown SOA III Transistor Analyzer. This testing verifies the safe operating area of each output device, which in turn helps improve the amplifier's overall circuit performance.

The output transistors operate in the AB mode of operation where quiescent current is carried by both the driver stages and the output stages. The output is a quasi-complementary design in which the common point between positive and negative output stages is returned to ground. Therefore, the power supplies are allowed to float with the signal output terminal common to the center tap of the high voltage power transformer.

The high-voltage power supply contains two transformers (one per channel) for driving the output stages. Because of this independence, a single channel output stage problem (very unlikely) will not affect the performance of the other. The single low-voltage power supply is responsible for pre-output signals and low power components (LEDs, fan, etc.).

All heat-sinking is internal, eliminating handling problems when the unit is hot as well as providing a shorter and more efficient path for air flow than standard convection cooling.

5.2. Circuit Analysis

Refer to the block diagram (Illustration 5–1). The diagram does not show all circuit connections or feedback loops due to circuit complexity, but there is sufficient data to grasp the function of each circuit. Note that only channel one is shown for simplicity.

An input signal is fed to the initial stages via the standard unbalanced input or the optional balanced input. Both cannot be used simultaneously due to the "interrupt" function of the unbalanced input jacks.

The input amplifier receives the signal next and sends any necessary error-correcting into the Compressor Control circuitry as well as sending the main signal on to the Balanced Stage. Essentially, this feedback path (from the output of the input amp through the Compressor Control circuitry) adjusts the amount of compression needed at that particular instant to provide distortion-free output.

In order to drive the Positive and Negative Output Stages, a Balanced Stage is necessary. Should a situation be encountered where protection of the Output Stages is needed, the Protection Circuitry will automatically reduce the drive available to the Balanced Stage and thus remove the stress on the output devices.

Both the Positive and Negative Output Stages consist of four SOA-analyzed and VBE-matched output transistors plus a predriver/driver combination that also aid in carrying the quiescent power load. Together they help form the quasicomplementary Class AB method of operation used in the Model 7550.

Feeding positive current to the POSITIVE OUTPUT STAGE, and negative current to the NEGATIVE OUTPUT STAGE, are the POS and NEG Vcc (High Voltage) Supplies. The common point between the two Output Stages is ground. A departure from previous smaller Techron amps, this method allows sophisticated information to be fed to the protection Circuitry from the Output Stages with reference to ground. Both channels' High Voltage supplies work independently of one another.

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The point Common to the Neg and Pos Vcc supplies is the "hot" signal of the output terminal which also feed the front panel Display, the Mono switch (for selectable dual-mono output) and several of the main feedback paths.

The Control Logic is responsible for the action of the Lo Freq Protect, Delay, Standby and thermal protection of the unit. When signaled by the Lo Freq Protect, Standby and/or Delay feature, the Control Logic will remove the power from the Vcc supplies. In the case of Low Freq Protect, when the output has subsided it will place the high-voltage supplies back into operation from Standby or cycle through the same procedure again depending upon the existence of the problem.

Thermal protection may involve the same procedure as mentioned above but only in extreme cases. A thermal switch imbedded in the high-voltage transformer's windings will activate the Control Logic when potentially damaging current demands are being placed on it.

The Low Voltage supply drives all low-power signal path circuitry including the Control Logic, Display and Fan speed logic. At an internal temperature of 47° C (117° F), the unit will automatically shift to high fan-speed operation for additional cooling.

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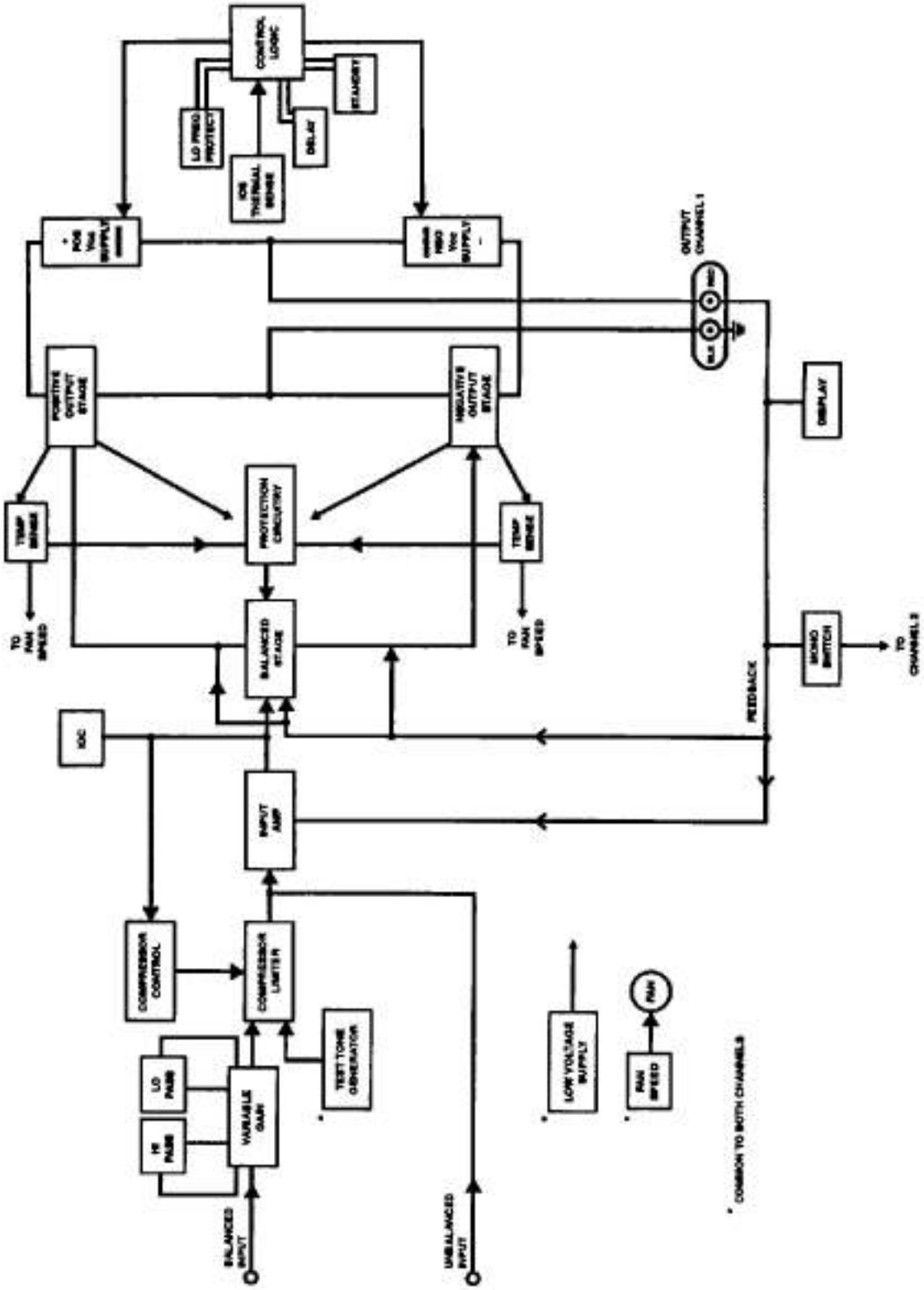


Illustration 5–1 Circuit Block Diagram

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Section 6. Applications

6.1. Introduction to the Applications Section

Typically, Model 7550 Amplifiers are manufactured and shipped in specific configurations for a particular user requirement. This section provides guidance for customers who may subsequently need to change the settings or circuitry of the Model 7550 amplifier for a new application.

This section assumes significant competence on the part of the reader in terms of amplifier systems, electronic components, and generally sound electronic working practices. Readers are urged to contact Techron Engineering for assistance with any of this information.

⚠ WARNING

Except as recommended in this manual, attempts to change the settings and/or circuitry of Model 7550 could invalidate the Techron product warranty. In addition to possible damage to equipment, users face a safety hazard in the event such procedures are improperly performed. Only qualified personnel should make any component or circuitry changes from factory settings.

6.2. Special Operation Modes for Increased Output

Model 7550 may be operated in the usual, dual-channel mode, or in one of two special modes—Push-Pull or Parallel.

6.2.1. Push-Pull Operation for Increased Voltage

Switching the "Dual-Mono" switch to the "Mono" position automatically places Model 7550 in the Push-Pull configuration. The load will be balanced in reference to ground. Connect the Load across both red ("hot") terminals when using the Mono mode. See Section 2.3.2. for complete instructions on Mono operation.

6.2.2. Paralleling Channels for Increased Current

Ordinarily, the two channels of dual-channel amplifiers may not be operated in parallel. Parallel operation of Model 7550 is possible if the following steps are taken:

1. Connect a .1 to .25 ohm, 50 watt, 1% resistor to the (+) output of each channel.
2. Connect (+) outputs together beyond resistors, and then to (+) terminal of load.
3. Connect (–) outputs together, and then to (–) terminal of load.
4. Connect input in parallel to both inputs.
5. Adjust channel 1 input knob to the "9 o'clock" position.
6. Carefully adjust channel 2 input knob to achieve equal output from each channel, using channel 1 as the reference value.

Note: This adjustment will be very fine and may be quite difficult to achieve. It is possible, however, with care and patience.

7. Note changes in value:
   - V (voltage) remains the same as with one amplifier;
   - I (current) is multiplied by two;
   - Z (impedance) equals the number of amplifiers times the R value of the Load, plus the numerical value of the added resistor.

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⚠ CAUTION

Never attempt to operate more than ONE dual-channel amplifier in parallel. The absence of an interlock exposes amplifiers to severe damage from this operation.

Note: Recommended resistor for outputs as described above: Dale brand, model NH50. Other resistors of equal value and precision are perfectly acceptable.

6.3. Input Modifications

6.3.1. Low Frequency Interrupt

Model 7550 includes a Low Frequency protection circuit which interrupts power (standby and turn-on delay modes) when low frequencies are present at the input. To activate this circuit, use the switch on the back panel.

6.3.2. Balanced Active Input (Module 75A06)

This option plugs into the 11–pin accessory socket on the back panel. Its active circuitry provides two channel balanced input with a frequency response of DC to 25 kHz.

6.3.3. Balanced Transformer Input (75A07)

This module provides a frequency response of 20 Hz to 20 kHz, along with complete isolation from power supply. Transformer balanced input provides complete electrical isolation of input signals. This option also plugs into the accessory socket on Model 7550 back panel.

Note: Use a balanced input when input lines are over 20 ft. long, or when the other advantages (isolation, etc.) are needed.

6.4. Constant Current Operation for Special Needs (75A08)

Constant Current Mode provides current correction via current sampling at the output for installations in which current must be maintained at specific levels. Constant Current is a factory-installed modification.

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6.5. AC Power Conversion

Because there is a risk of electric shock, only a competent technician should attempt to convert from one voltage to another.

⚠ DANGER

Disconnect AC mains at the source (unplug Model 7550) before converting AC voltage. Death or serious injury can result from contact with AC mains. Only a competent technician should attempt voltage conversion.

Five standard line-voltage connections are offered: 100, 120, 200, 220, and 240 VAC.

The tag attached to the line cord and/or the serial tag on the back panel indicates the voltage for which the amplifier is connected. For operation from a different line voltage, the unit must be converted in the following manner:

1. Turn the Model 7550 off and disconnect it from any power source.
2. Remove the bottom cover from the unit (13 screws).
3. If the unit has been in recent use, discharge the large power capacitors by placing a 10 ohm, 5 watt resistor across each capacitor terminal to ground. USE EXTREME CAUTION while handling the resistor.
4. Determine the correct connections from Illustration 6–1 and move the necessary wires using the push-on connectors and terminal strips. Three sets of wires must be changed. One set on each of the two large power transformers and one set on the relay board.
5. Carefully check all connections and reinstall the bottom cover on the amplifier.
6. Make all necessary fuse changes.

Note: When selecting 100 or 120 volts, fuses (located on the relay board) F1 and F2 should be 20 ampere and F3 should be 1/2 ampere. For 200, 220 and 240 volts, fuses F1 and F2 should be 10 ampere and F3 should be 1/4 ampere.

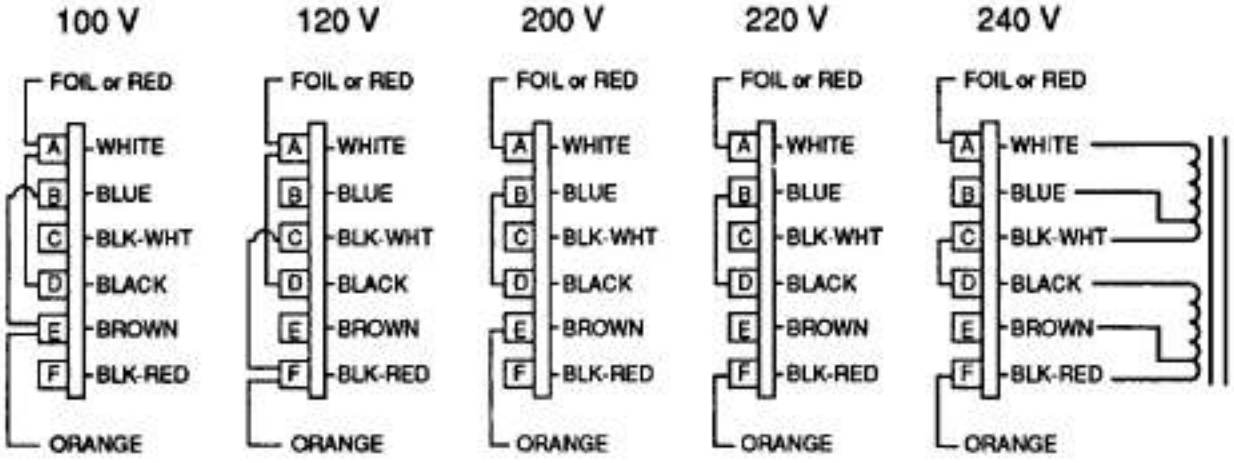


Illustration 6–1 Internal AC Connections

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