INSTALLATION

LOCATION

The Amplifier should not be operated in excessively warm locations or near heating vents or radiators. Air should circulate freely around and through the amplifier cabinet, and unobstructed air circulation should be provided around the heat sink. No books, magazines, or equipment should be placed on top of the cabinet to impede the free flow of air. No curtains, draperies, or combustible material should touch the heat sink.

If the Amplifier is to be placed on a piece of furniture with a fine finish and operated in a continuous duty mode, such as RTTY or SSTV, a protective covering should be placed under the amplifier heat sink and rear feet to prevent any heat damage.

POWER CONSIDERATIONS

Because of the power involved, this Amplifier should preferably be served by its own 240 VAC electric service line. The power cord furnished is designed for a standard 120 VAC electrical outlet. If you have a 240 VAC outlet, the plug must be changed. If you will install a new 240 VAC outlet, check your local electrical code, as it is essential that you use an outlet and plug designed for this service. Keep in mind that the green line cord wire is connected to the amplifier chassis.

If only 120 VAC can be provided, a separate line to the Amplifier is desirable.

NOTE: If you operate your amplifier from a 120 VAC line, the power surge may cause the POWER switch to open whenever it is pushed to the ON position. If this happens, push the POWER switch ON again. However, if the switch opens a second time, this is abnormal and you should refer to the "In Case of Difficulty" section of this Manual.

DO NOT use this Amplifier at its full ratings on a regular house wiring circuit, to which other loads are connected, as the ratings of the wire will almost certainly be exceeded.

Avoid excessively long runs of wire from your service entrance. A heavy flow of current in such a line results in a voltage drop which can affect the performance of your equipment.

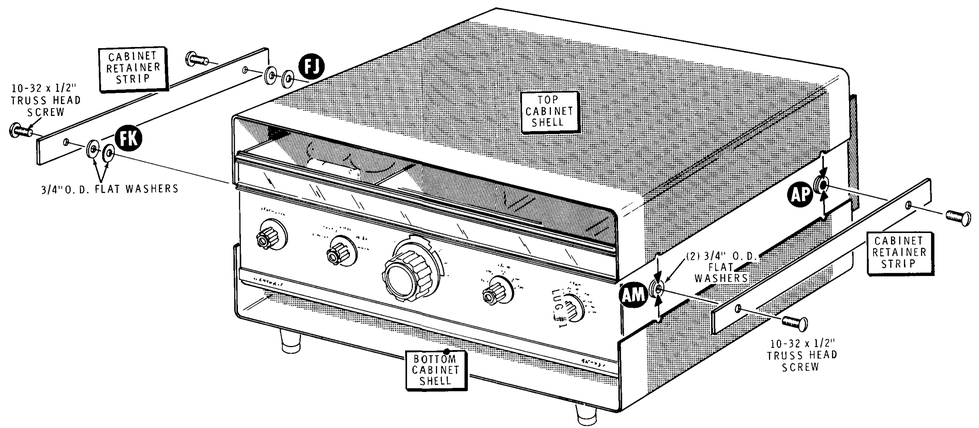
The POWER switch and circuit breaker are connected to the black (hot) line cord wire. The green (neutral) line cord wire is connected to the amplifier chassis.

ANTENNA

The output circuit of the Amplifier is designed for connection to an unbalanced transmission line of 50 Ω characteristic impedance. Lines of other characteristic impedance may be used providing the SWR (standing wave ratio) does not exceed 2:1.

The antenna connector is a UHF type SO-239. A mating PL-259 plug is furnished for your transmission line. RG-8/U or RG-11/U, coaxial cables or similar types, are recommended for the transmission line. The smaller types, RG-58/U and RG-59/U, are not recommended because of the power level. An adapter for these smaller cables is included in your kit if the recommended cables are not used.

The "ARRL Antenna Book" is commonly available and includes comprehensive reference work on transmission lines and antennas. Other similar handbooks for the amateur are offered for sale and can often be found in a public library.



PICTORIAL 39

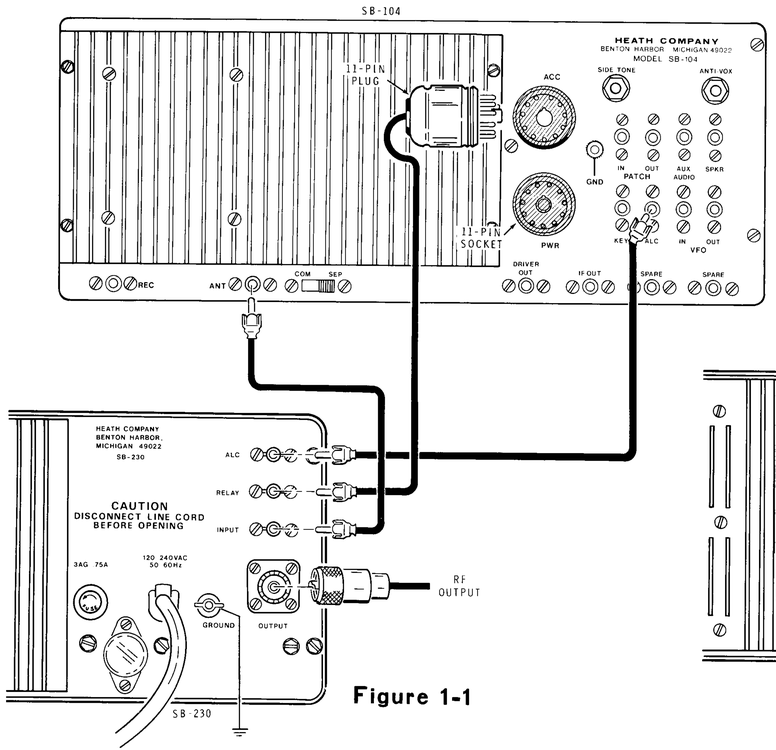


Figure 1-1

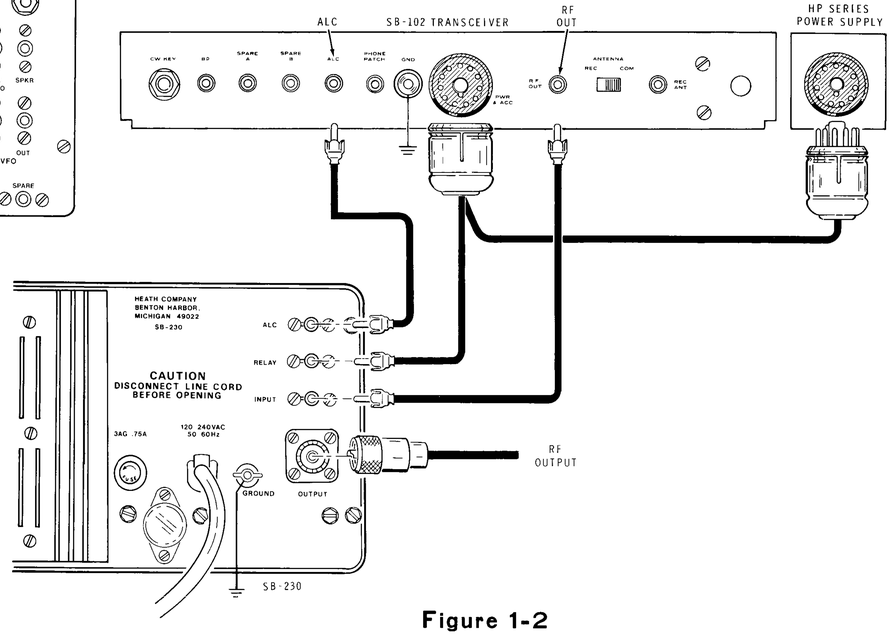


Figure 1-2

GROUNDING

A good earth or water pipe ground should be connected to the ground post on the rear apron of the Amplifier. Use the heaviest and shortest connection possible.

Before using a water pipe ground, inspect the connections around your water meter and make sure that no plastic or rubber hose connections are used which interrupt electrical continuity to the water supply line. Install a jumper around any insulating water connectors found. Use heavy copper wire and pipe clamps. It is best to ground all equipment to one point at the operating position and then ground this point as discussed above.

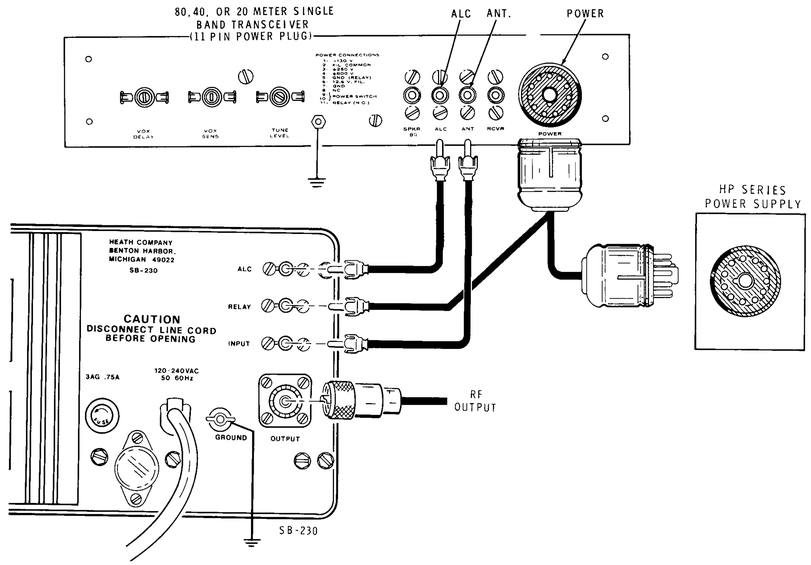


Figure 1-4

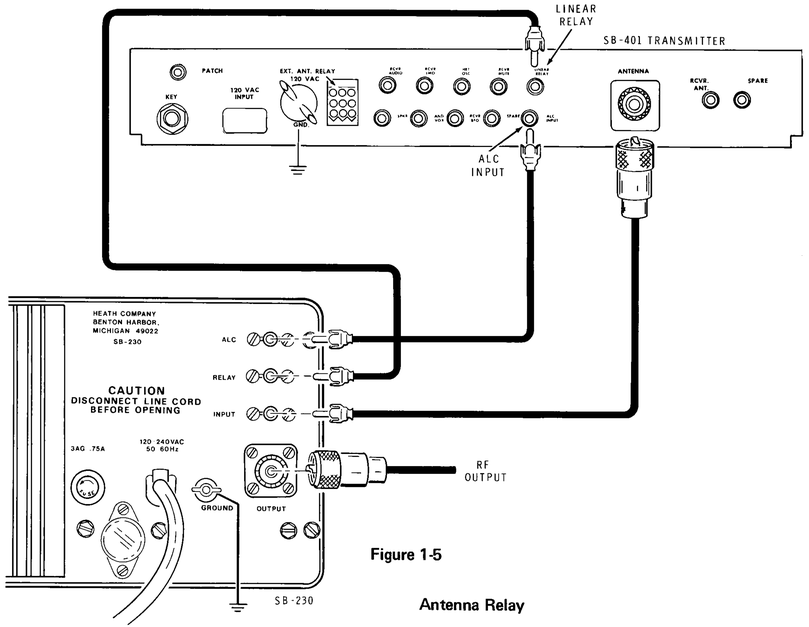


Figure 1-5

EQUIPMENT INTERCONNECTIONS

Interconnections between this Amplifier and other Heath equipment are shown in the Figure 1 series of illustrations on fold-outs from Pages 90 and 91. Other makes of equipment will usually follow the same general pattern.

Antenna Relay

OPERATION

The RELAY socket on the rear panel of the Amplifier must be connected to ground in the transmit mode. Heath exciters contain a provision to accomplish this action. If a relay terminal, or other switching provision is not available, this function must be provided by other means. If a separate coaxial send-receive relay is used in your station, it may have external contacts available (see Figure 1-6). A separate switch can also be used.

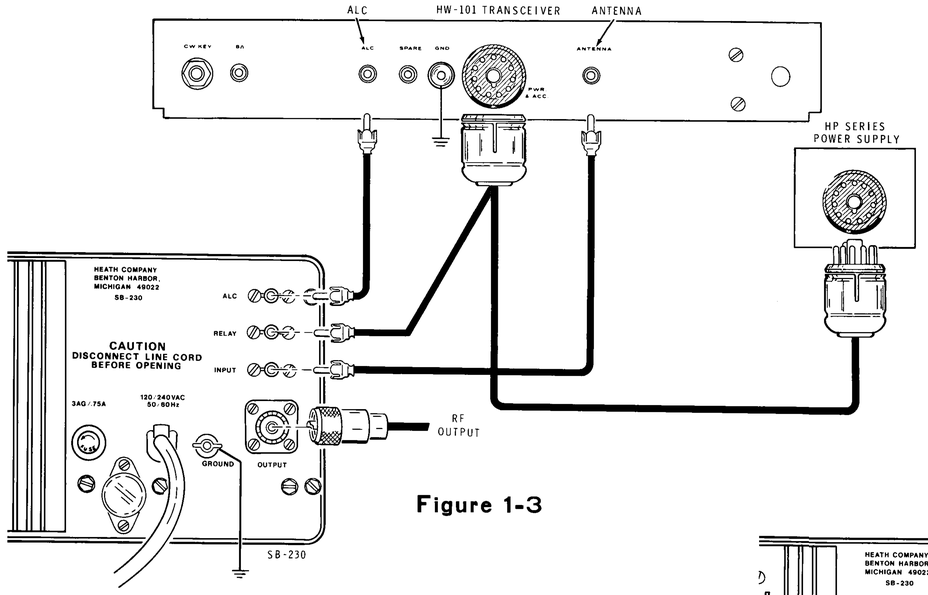


Figure 1-3

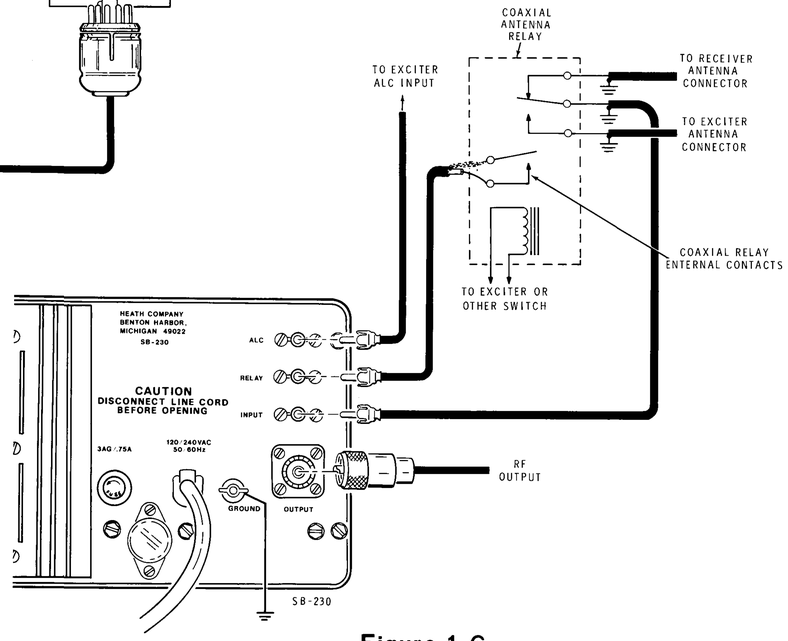


Figure 1-6

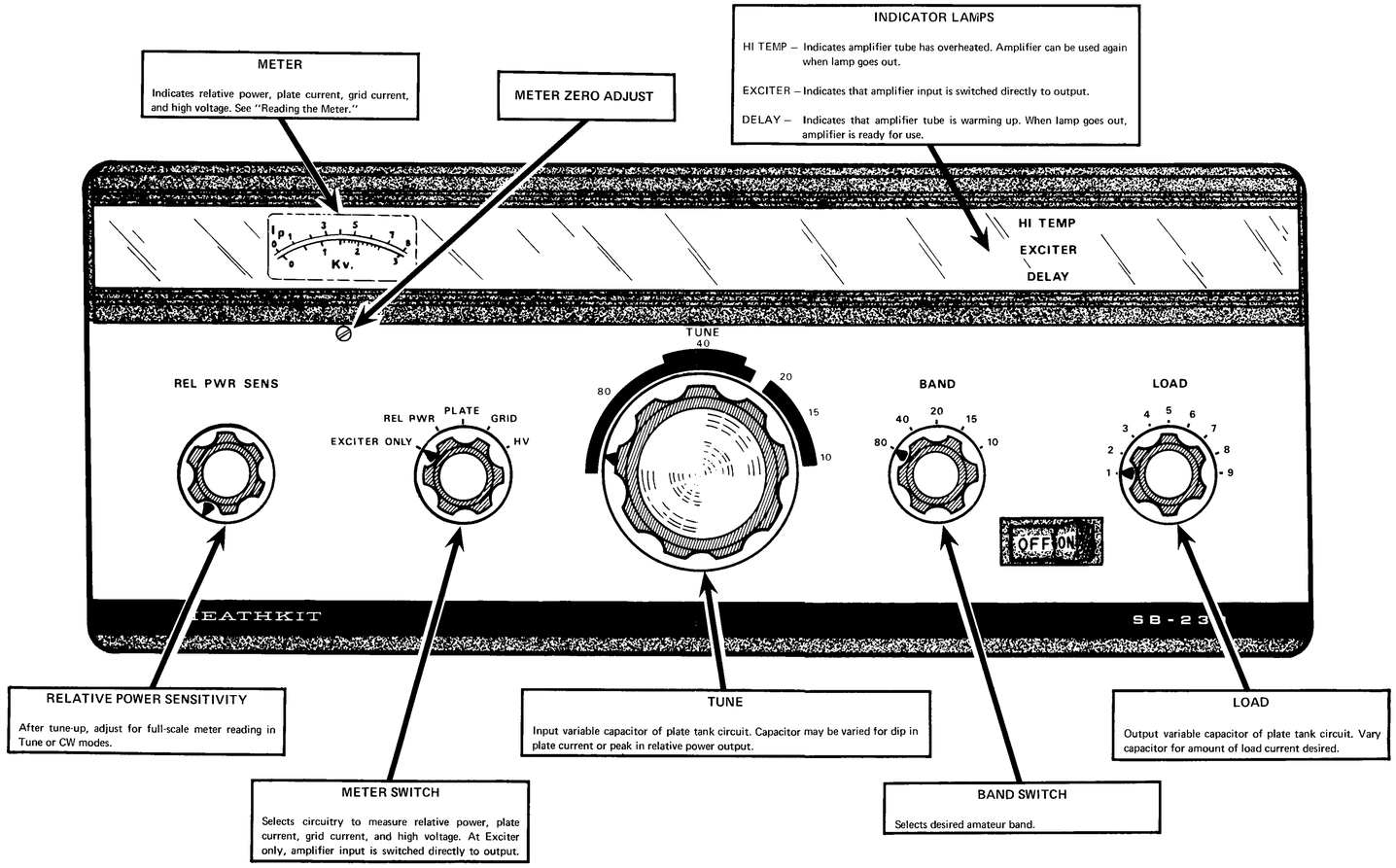


Figure 3

HEATH TRANSCEIVERS WITH 11-PIN POWER PLUGS

The following three paragraphs do not apply to the SB-104 Transceiver.

If you will use your Amplifier with a Heath transceiver which has an 11-pin power plug on the rear panel, you must modify the power cable socket which fits this plug (if this was not previously done) so the transceiver relay can ground the amplifier relay coil to provide automatic transmit-receive action. The phono plug and wire to make the modification should be procured locally.

Refer to Figure 2 for instructions on how to modify the cable socket on the end of the power supply line. First, install a phono plug on the end of an appropriate length of ordinary two-conductor lamp cord, as shown in Part A of Figure 2. Then remove the Amplifier's power cable socket cover and slide it back on the cable. Push the other end of the lamp cord through the hole in the socket cover and connect the wires as shown in Part B. Solder all connections and replace the cable socket cover.

IMPORTANT: Be sure to connect the wire coming from the tip of the phono plug to lug 11 of the cable socket. If the wires to lugs 11 and 5 should be interchanged, the amplifier relay will be grounded to the transceiver chassis and will hold the Amplifier in the transmit mode.

ALC

If it is overdriven, your Amplifier will generate a negative voltage which is available at the ALC socket on the rear panel to reduce the gain of your exciter. Use a phono plug and a two-conductor wire to connect the amplifier ALC socket to a fitting for the ALC connector on your exciter. Connect phono plugs as shown in Figure 2, Part A.

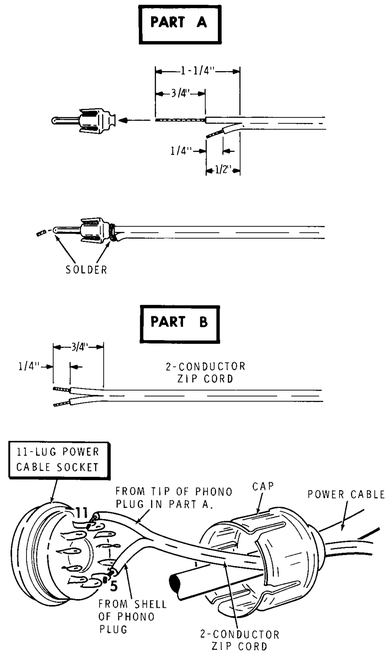


Figure 2

OPERATION

CONTROL FUNCTIONS

Refer to Figure 3 (fold-out from Page 92) to identify the front panel controls and to Figure 4 (fold-out from Page 97) for rear panel connectors.

RELATIVE POWER SENSITIVITY (R34):

When the METER switch is at EXCITER ONLY or at REL PWR (relative power), this control should be adjusted for full-scale meter deflection with single tone input (exciter at Tune or key-down CW). The meter will thereafter indicate output power relative to the power level used to establish the full-scale setting.

When this switch is at EXCITER ONLY, the meter will show the relative output power of the exciter; when it is at REL PWR, the meter will show the total amplifier relative power output.

METER (M1):

Indicates Relative Power, Plate current, Grid current, or High Voltage. See "Reading the Meter."

TUNE (C12):

The input variable capacitor for the pi network tank circuit. When the METER switch is at REL PWR, this control can be adjusted for maximum meter deflection; when the METER switch is at PLATE, it can be adjusted for the dip in plate current.

BAND (SW3):

The BAND switch. Selects the amateur band desired.

LOAD (C15):

Adjusts the output of the pi network plate tank circuit for best impedance match and maximum power transfer to the output line.

POWER SWITCH and CIRCUIT BREAKER (SW1):

The rocker POWER switch turns your Amplifier ON and OFF. It also contains a built-in circuit breaker to protect the power transformer from overloads.

After the POWER switch has been pushed ON, if you hear a click and the panel lights are extinguished, the circuit breaker has probably opened due to an overload. Wait a few seconds and push the switch to ON. If the circuit breaker will not permit the POWER switch to remain ON, it is probable that a continuing overload or a short circuit exists. This condition must be cleared before normal operation can proceed.

LAMP INDICATORS

Meter Lamp (PL1):

This lamp illuminates the meter scale whenever the amplifier is ON.

Hi Temp (PL4):

If the amplifier tube causes the heat sink to exceed a predetermined temperature, the thermal circuit breaker (TC1 on the schematic) will open and cause the HI TEMP lamp to turn on. When this occurs, the amplifier tube will be biased to cut-off and the transmit-receive relay will open to return the input and output circuits to the exciter only mode. The Amplifier can be used again when the heat sink cools down; at which time the HI TEMP lamp will turn off.

In normal operation, you probably will never see this lamp turned on.

Exciter (PL2):

This lamp is turned on when the METER switch is at EXCITER ONLY. It indicates that the Amplifier's input is connected directly to its output and that the Amplifier is out of the circuit. This mode is useful when you want to operate with your exciter only, but you also want the Amplifier warmed up so it can be switched on instantaneously.

Should you wish to change bands after the Amplifier has been warmed up, switch to EXCITER ONLY while you tune up your exciter on the new band; then you can switch to REL PWR and follow the amplifier tune-up procedure for the new band.

When your Amplifier is not turned on, it is automatically in the EXCITER ONLY mode.

Delay (PL3):

This lamp is lighted when the Amplifier is initially turned ON. It is controlled by the time delay relay (RY2) and will remain ON for 60 to 90 seconds, during which time the tube warms up and the Amplifier cannot be operated (except in EXCITER ONLY mode).

If the Amplifier has been turned OFF only momentarily (as during a temporary overload), the delay lamp may not turn on when the POWER switch is pushed ON. This indicates that you can resume normal Amplifier operation without delay.

RELAY (RY1):

When this connection is grounded, the transmit-receive relay in the Amplifier operates and places the Amplifier in the transmit mode. Connect this socket to your exciter antenna relay input or to a pair of spare relay contacts (or a separate switch) which will ground this circuit when your exciter is in the Transmit mode. This connection will not function when the METER switch is at EXCITER ONLY.

INPUT:

Connect to the output of your exciter with coaxial cable (RG-58/U or RG-8/U recommended).

OUTPUT:

Connect to your transmission line, antenna coupler, monitorscope, or other device, with coaxial cable (RG-8/U) or RG-11/U recommended).

FUSE (F1):

Fuse in the drive line to the cathode of the amplifier tube. Where required, replace with a type 3AG, .75 ampere, slow-blow fuse.

GROUND POST:

Connect to your station ground system.

READING THE METER

Refer to Figure 5 for an illustration of the panel meter scale. The upper scale of the meter reads from 0 to 8 and the lower scale from 0 to 3. The METER switch on the front panel selects the circuit function to be measured as detailed in Figure 6.

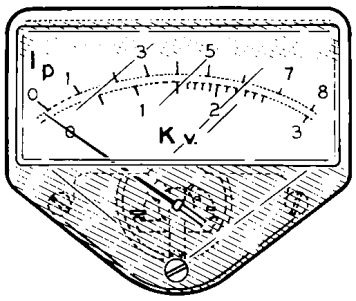


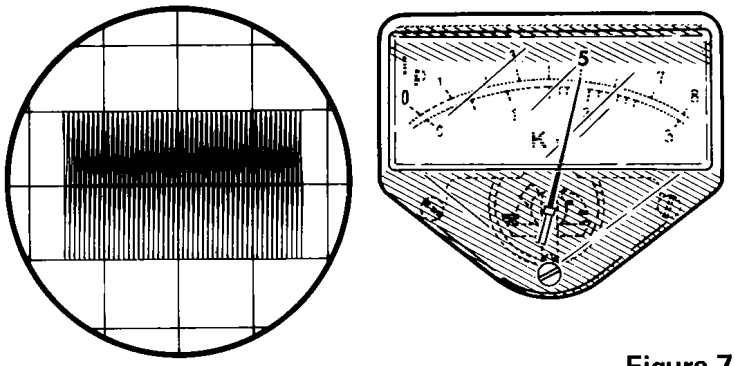
Figure 5

METER SWITCH POSITION	MEASURES	SCALE READING
EXCITER ONLY	Relative power output of exciter.	0 – 8 (upper scale). Adjust needle deflection to full scale with REL PWR SENS control after tune-up.
REL PWR	Relative power output of amplifier.	
PLATE	Plate current	0 – 800 mA (upper scale).
GRID	Grid current	0 – 80 mA (upper scale).
HV	High voltage	0 – 3 (3000 volts lower scale).

Figure 6

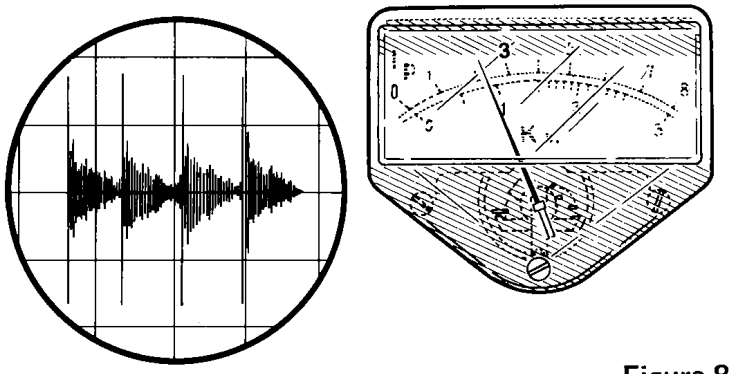
DRIVING POWER

This Amplifier is designed to operate at full ratings when it is used with the usual "100 watt" exciter, which will drive it to the currents specified in the tune-up procedures. An exciter of lower power output may be used as a driver, but the amplifier's output will be less. If you use an exciter capable of higher power, carefully adjust the exciter gain control (driving power) to avoid "overdrive" and the creation of spurious signals which create needless interference to others. The use of the Heathkit Monitor Scope is highly recommended for continuous output monitoring (see Figures 7, 8 and 9). The display on an oscilloscope is the best readily available way of determining the amplitude of the voice peaks which, if excessive, can cause "flat topping" and the radiation of distortion products.



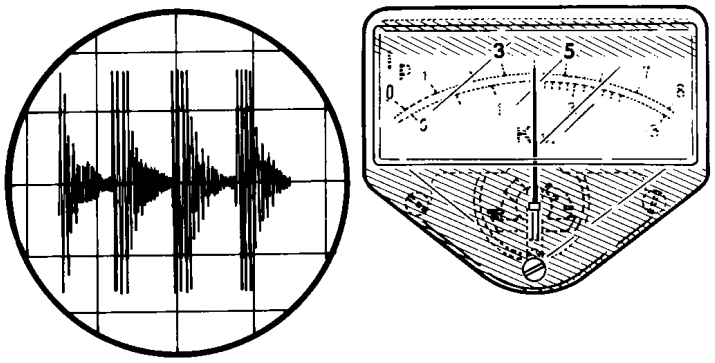
Oscilloscope pattern and plate meter reading resulting from carrier or "single tone" modulation. The meter indicates CW plate current input.

Figure 7



Oscilloscope pattern and plate meter reading in 1000 watt SSB mode. Notice the peaks on the oscilloscope pattern. They are sharp, indicating a clean signal, and they will attain a height greater than the "single tone" pattern of Figure 7, indicating maximum power input.

Figure 8



Oscilloscope pattern and plate meter reading resulting from overdrive. The meter reads higher, but the scope indicates peak flattening. Operation in this manner causes distortion and severe interference on adjacent frequencies.

Figure 9

IMPORTANT: In no case should the gain control of your exciter be advanced beyond the point where the amplifier relative power indication ceases to increase. If the level control is turned past this point, nonlinear operation may be produced.

ALC (Automatic Level Control)

When the Amplifier is overdriven, the ALC circuitry creates a negative voltage which is fed back to the exciter to reduce its gain and help prevent "flat topping". Protective circuitry of this nature is a valuable aid, but it is NOT a substitute for proper adjustment of the exciter drive.

DC INPUT POWER

In grounded grid amplifier operation, a considerable portion of the driving power is fed through the amplifier tube. The amplifier output is the approximate sum of the driver output and the power added by the Amplifier. Both the driver and amplifier input powers must therefore be considered when calculating DC input power.

TUNE-UP

MAXIMUM CURRENT RATINGS			NO LOAD VOLTS
MODE	PLATE	GRID	PLATE
CW, SSB	500 mA*	30 to 40 mA	2500 (120 VAC line)
RTTY, SSTV	200 mA	5 mA	

*In SSB mode, with voice modulation, the plate current meter indication on voice peaks will be 175 mA to 250 mA, depending upon the voice characteristics of the operator. This current indication is due to the inability of a meter to follow instantaneous voice peaks.

Figure 10

The current and voltage figures given in Figure 10 are approximations. Actual readings will vary at each installation with such factors as line voltage, exciter drive, and load impedance.

The following procedure for tuning the Amplifier should take only a few seconds after you go through it a few times. Note the LOAD control position so it can be preset the next time a particular band is used.

Before proceeding, make sure that:

1. OUTPUT on the rear panel is connected to an antenna for the band to be used, or to a dummy load.
2. Your exciter output is connected to the amplifier INPUT.
3. Provision has been made to ground the RELAY connector in the transmit mode so the amplifier transmit-receive relay will operate.
4. The ALC socket has been connected back to your exciter's ALC input.
5. The Amplifier has been connected to your station's ground system.
6. The Amplifier's line cord is plugged in.

IMPORTANT:

1. During the tune-up procedure, DO NOT furnish excitation to the Amplifier for more than 30 seconds continuously. This requirement is fulfilled by turning your exciter's gain control fully counterclockwise between adjustments.
2. During tune-up, be SURE to observe the duty cycle limitations, if any, of your exciter.

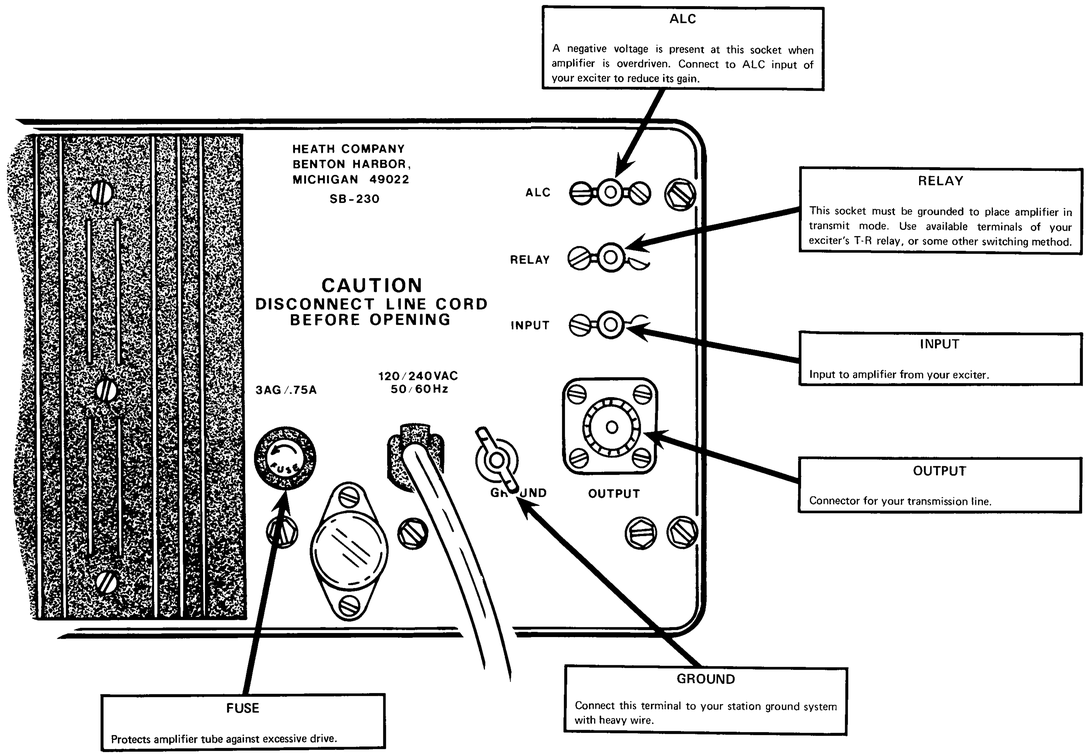


Figure 4

CW or SSB PROCEDURE

NOTE: For this explanation, a Heathkit Model SB-104 Transceiver is used as a driver. Other exciters should follow the same principles.

( ) Preset your amplifier controls as follows:

REL PWR SENS:	12 o'clock (straight up)
METER switch:	EXCITER ONLY
TUNE:	Appropriate band segment
BAND:	Amateur band desired
LOAD:	9 o'clock (1 on scale)
POWER:	OFF

( ) Push the POWER switch to ON. The meter, DELAY, and EXCITER lamps should turn on.

( ) Tune your exciter for maximum output in the desired mode while the Amplifier warms up.

( ) With the exciter at full output in either the tune or CW mode, adjust the REL PWR SENS control on the Amplifier so the meter reads 2 on its upper scale. Then turn the exciter gain down.

( ) When the DELAY lamp turns off (after 60 to 90 seconds), turn the METER switch to PLATE and advance the exciter gain until the Amplifier's meter reads 100 mA (1 on the upper scale).

( ) Quickly turn the METER switch to REL PWR and adjust the amplifier's TUNE control for maximum meter deflection. Then release the exciter's TUNE button.

( ) After a few seconds, turn the METER switch to PLATE and depress the exciter's TUNE button. Advance the exciter's gain for a meter reading of 200 mA (2 on the upper scale).

( ) Quickly turn the METER switch to REL PWR and adjust the LOAD control for maximum meter deflection. Then release the exciter's TUNE button.

( ) After a few seconds, turn the METER switch to PLATE and depress the exciter's TUNE button. Advance the exciter's gain for a meter reading of 400 mA.

( ) Quickly turn the METER switch to REL PWR and touch up the TUNE and LOAD controls for maximum meter deflection.

( ) Turn the METER switch back to PLATE and adjust the exciter's gain for a meter reading of 500 mA (or less). Then release the exciter's TUNE button.

( ) After a few seconds (at the same drive level) check your plate and grid currents. If the plate current is higher than 500 mA (maximum rated input), reduce your exciter's gain. The grid current should be 40 mA or less. If it is higher, go through the tuning procedure again to make sure the Amplifier is properly tuned and loaded. If the grid current is still over 40 mA, reduce the exciter's gain until that reading is reached. Then

return your exciter to the standby mode, without changing the gain control.

( ) At the same gain control setting as in the preceding step, and with the METER switch at REL PWR, return your exciter to the tune or CW mode. Then adjust the REL PWR SENS control for a full-scale amplifier meter deflection.

( ) Return the exciter to the receive mode.

This completes the SSB or CW tune-up procedure.

RTTY or SSTV PROCEDURE

( ) Preset your amplifier controls as follows:

REL PWR SENS:	12 o'clock (straight up)
METER switch:	EXCITER ONLY
TUNE:	Appropriate band segment
BAND:	Amateur band desired
LOAD:	9 o'clock (1 on scale)
POWER:	OFF

( ) Push the POWER switch to ON. The meter, DELAY and EXCITER lamps should turn on.

( ) Tune your exciter for maximum output in the desired mode while the Amplifier warms up.

( ) With the exciter at full output in either the tune or CW mode, adjust the REL PWR SENS control on the Amplifier so the meter reads 2 on its upper scale. Then turn the exciter gain down.

( ) When the DELAY lamp turns off (after 60 to 90 seconds), turn the METER switch to PLATE and advance the exciter gain until the Amplifier's meter reads 100 mA (1 on the upper scale).

( ) Quickly turn the METER switch to REL PWR and adjust the TUNE control for full scale meter deflection. Then reduce your exciter's gain.

( ) After a few seconds, turn the METER switch to PLATE and advance the exciter's gain for a meter reading of 200 mA (2 on the upper scale).

( ) Quickly turn the METER switch to REL PWR and adjust the LOAD control for maximum meter deflection. Then reduce the exciter's gain.

( ) After a few seconds (at the same drive level as in the preceding step) check your plate and grid currents. If the plate current is higher than 200 mA, reduce your exciter gain. The grid current should be 5 mA or less. If it is higher, go through the tuning procedure again to make sure the Amplifier is properly tuned and loaded. If the grid current is still over 5 mA, reduce the exciter gain until that reading is secured. Then return your exciter to the receive mode.

This completes the RTTY or SSTV tuning procedure.

IN CASE OF DIFFICULTY

CAUTIONS:

1. If you have occasion to remove the amplifier tube from its socket during your search for difficulty, be SURE to first read the paragraph in this section entitled "Beryllium Oxide Ceramic Block."

2. Before touching any part of the amplifier interior, ALWAYS:

   A. DISCONNECT the line cord.

   B. Wait one minute and then DISCHARGE the power supply filter capacitors by touching a screwdriver simultaneously to the chassis and to the foil at B on the rectifier circuit board (to which the large blue wire is connected).

1. Be sure you have performed "Tests and Final Assembly" on Page 87.

2. Recheck the wiring. Trace each lead in colored pencil on the Pictorial as it is checked. It is frequently helpful to have a friend check your work. Someone who is not familiar with the unit may notice something consistently overlooked by the constructor.

3. The majority of the kits that are returned for repair, do not function properly due to poor connections and soldering. Many troubles can be eliminated by carefully reheating all connections to make sure that they are soldered as described in the Soldering section of the "Kit Builders Guide."

4. Check the values of the parts. Be sure that the proper part has been wired into the circuit as shown in the Pictorial Diagrams and as called for in the wiring instructions.

5. Check for bits of solder, wire ends, or other foreign matter which may be lodged in the wiring.

6. Check for continuity between amplifier tube pins 5 and 6 with an ohmmeter. An infinite resistance will indicate a faulty tube filament. Also check from the grid (pins 4, 7, 11) to the cathode (pins 1, 2, 3, 8, 9, 10) and to the tube plate for a short circuit. If you feel the tube is faulty, refer to "Technical Consultation" on the inside, rear cover of your Manual.

7. A review of the "Circuit Description" may also help you locate the trouble.

NOTE: In an extreme case where you are unable to resolve a difficulty, refer to the "Customer Service" information inside the rear cover of this Manual.

BERYLLIUM OXIDE CERAMIC BLOCK

CAUTION:

Dust and fumes of Beryllium Oxide are DEADLY POISONOUS and should not be inhaled or brought into contact with the skin or eyes.

Do not perform any dust-producing operations (drilling, chipping, crushing, sawing, or filing) on the block.

Do not heat it over 1,000°C (unit operation will not exceed 400°C).

Wash hands after handling.

If it is dropped, remove any chips and dust with a wet towel, which should be discarded in a sealed plastic bag — do not sweep or vacuum.

For hygiene information, consult Page 4 of this Manual or write to the Heath Company.

TROUBLESHOOTING CHART

DIFFICULTY	POSSIBLE CAUSE
1. No meter light.	A. PL1. B. SW1. C. Open connection. D. Lamp burned out.
2. No Delay light.	A. PL3. B. V1 grid circuit shorted. C. Q1. D. RY2. E. TC open. F. D16.
3. No Exciter Only light.	A. PL2. B. SW2. C. D16.
4. HI Temp light on improperly.	A. TC. B. Q2.
5. No plate current.	A. F1. B. ZD1.
6. High plate current.	A. Short in cathode line. B. ZD1 terminals shorted. C. ZD1 internally shorted.
7. SW1 circuit breaker opens.	A. Internal short in T1. B. High voltage B+ line shorted. C. Primary circuit shorted. D. Secondary circuits overloaded.
8. Send-receive relay operates improperly.	A. Relay circuit shorted. B. Switch wiring error. C. Exciter relay line grounded. D. D17 open, shorted, or installed backward. E. Grid strap shorted.
9. High voltage low.	A. Rectifier diode open. B. Filter capacitor open or shorted. C. Low voltage circuit shorted. D. Low line voltage.
10. No relative power output indicated.	A. No power output. B. D18. C. R34.
11. High uncontrollable plate and grid current.	A. Grid circuit shorted. B. Feedthrough capacitor open, shorted, damaged, or poorly soldered to chassis. C. Poor ground (tighten all hardware in the RF enclosure).

SPECIFICATIONS

Band Coverage	80, 40, 20, 15, and 10 meter amateur bands.
Maximum Power Input	SSB: 1200 watts P.E.P. CW: 1000 watts @ 50% duty cycle.
Duty Cycle	SSB: Continuous voice modulation. CW: Continuous (maximum key-down time, 30 seconds). RTTY/SSTV: 50% maximum transmit time.
Driving Power Required	Less than 100 watts.
Third Order Distortion	–30 dB or better
Output Impedance	50 – 75 ohms at SWR 2:1 or less.
Input	52 Ω at less than 1.5:1 SWR.
Meter Switch	Exciter only. Relative power. Plate current. Grid current. High voltage.
Front Panel	Load. Tune. Band. Relative power sensitivity. Power switch. Meter switch.
Rear Panel	ALC output. Exciter relay. RF input. RF output. Ground lug. Fuse. Line cord.

Tube	Type 8873.
Zero-Signal Plate Current	22 mA at approximately 2400 volts.
Power Requirements	120 volts AC, 50/60 Hz, at 14 amperes (peak). 240 volts AC, 50/60 Hz, at 7 amperes (peak).
Cabinet Size	14-3/4" wide, 16" deep, 7" high maximum.
Net Weight	33.5 lbs.

The Heath Company reserves the right to discontinue products and to change specifications at any time without incurring any obligation to incorporate new features in products previously sold.

CIRCUIT DESCRIPTION

POWER SUPPLY

The power supply transformer has dual primary windings and may be connected for either 120 or 240 volt AC operation. The pilot lamp is connected across one-half of the primary winding so it will always have a 120 volt AC source. The transformer is protected against overload by a circuit breaker which is part of the Power switch SW1.

One secondary winding of the power transformer is used with silicon diodes D1 through D15 and electrolytic capacitors C3 through C8 in a full-wave, voltage-doubler circuit to provide plate voltage for the amplifier tube. Resistors R3 through R8 equalize the voltage across the electrolytic filter capacitors. These resistors also serve as a bleeder for the high voltage supply. Resistor R9 provides a means of measuring plate current independently of bleeder current.

Another secondary winding of the power transformer supplies 6.3 volts AC for the tube filament and for RY2, the time delay relay. A third secondary winding uses a half-wave rectifier circuit composed of diode D16 and a filter formed by resistor R22 and capacitor C16. This circuit provides operating voltage for RY1, the transmit-receive relay, and cutoff bias voltage for the grid of the amplifier tube.

INPUT CIRCUIT

Amplifier tube V1 is connected in a cathode-driven (grounded grid), Class AB_2 configuration. The tube filament is isolated for RF from the transformer filament winding by a bifilar-wound choke, RFC3. Driving power is coupled through capacitor C32 to the cathode of the amplifier tube. Part of this driving power is fed through the Amplifier to the output circuit.

One of the functions of R21 is to act as an impedance matching device. It is composed of fifteen 1500 ohm, 2-watt resistors in parallel, which form a 100 ohm, 30 watt resistance. This resistance, in parallel with the tube driving impedance, causes the exciter to look into the desired 50 ohm load. Another function of R21 is to dissipate a portion of any excess driving power. The amplifier tube is easy to drive and does not require the full output of most "100 watt" exciters.

Grid-derived ALC is used. C22 and C24 form an RF voltage divider in the grid circuit. Whenever the positive peaks of this voltage exceed the threshold of diode D19, it conducts and shunts these voltages to ground. The negative voltages are filtered by R18, R19, C24, and C25 and are connected to the ALC Out socket, where they are available to reduce the gain of an exciter.

The .75 ampere fuse protects the tube from being overdriven.

OUTPUT CIRCUIT

High voltage is applied to the plate of the amplifier tube through RF choke RFC2. The inductance of the ferrite beads in the plate circuit act as parasitic chokes.

The output circuit is a pi network. C12 is the input (tuning) capacitor, L1 and L2 are the tapped inductors, and C15 is the output (loading) capacitor. Padding capacitors C13 and C14 are switched in parallel with the tuning and loading capacitors to provide and adequate amount of capacity on the 80 meter band. The output power is applied through the transmit-receive relay to the Output connector when RY1 is closed. In the receive, or Exciter Only mode, the amplifier Input connector is connected directly to the Output connector and the amplifier circuits are bypassed.

When the Meter switch is in the Exciter Only or REL PWR positions, a portion of the output signal is coupled through resistor R36, rectified by diode D18, filtered by capacitor C21, adjusted by control R34, and measured as relative power output.

The amplifier tube is in series with the driving power, so the amplifier power is added to the driving power.

RELAY AND LIGHT CIRCUITS

Available contacts on the exciter's VOX relay are connected to the Relay phono socket on the Amplifier's rear panel. When you are transmitting, the VOX relay grounds and closes RY1, the transmit-receive relay, through TC1 (the thermal circuit breaker) and RY2 (the time delay relay). It also grounds the grid of amplifier tube V1, permitting it to operate. When you are receiving, the ground for the transmit-receive relay is removed and the relay opens. The ground for the grid of tube V1 is therefore removed, which biases the tube into cut-off.

When the Amplifier is first turned on, the contacts of the time delay relay are open. These contacts will close when the filament of the relay reaches a predetermined temperature 60 to 90 seconds after turn-on, which allows ample time for the tube filament to reach operating temperature. While these contacts are still open, a voltage differential exists across RY2. This voltage is applied across transistor Q1, which turns on and furnishes a ground to the Delay lamp, PL3, which turns on. When the contacts of RY2 close, the voltage differential no longer exists and Q1 turns off. This removes the ground from the Delay lamp, which also turns off.

When the Meter switch is in the Exciter Only position, the Exciter lamp, PL2, is turned on by voltage applied through the Meter switch contacts. The tube grid is biased off and remains in the receive mode because contacts 8 and 10 of the Meter switch are open.

If the heat sink on the Amplifier should overheat, the thermal circuit breaker will open, breaking the ground circuits of RY1 and the grid of the amplifier tube, so these components return to the receive mode. Also, when the thermal circuit breaker contacts open, a voltage differential is created across transistor Q2 which therefore turns on and furnishes a ground to HI TEMP lamp PL4, which lights. When the heat sink cools, the contacts of the thermal circuit breaker will close, the voltage differential across Q2 will be removed, and Q2 and PL4 will turn off.

METERING CIRCUITS

Simplified metering circuits are shown in Figure 11. Detailed circuit tracing can be done on the schematic diagram. Switch SW2R establishes the connections for each metering circuit.

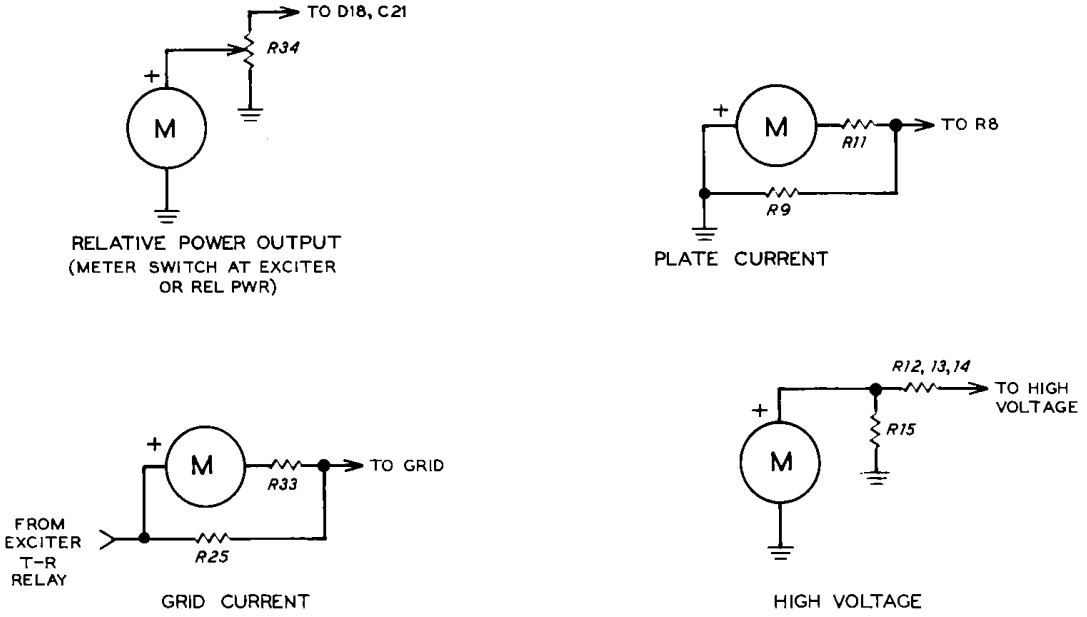


Figure 11

CHASSIS PHOTOGRAPHS