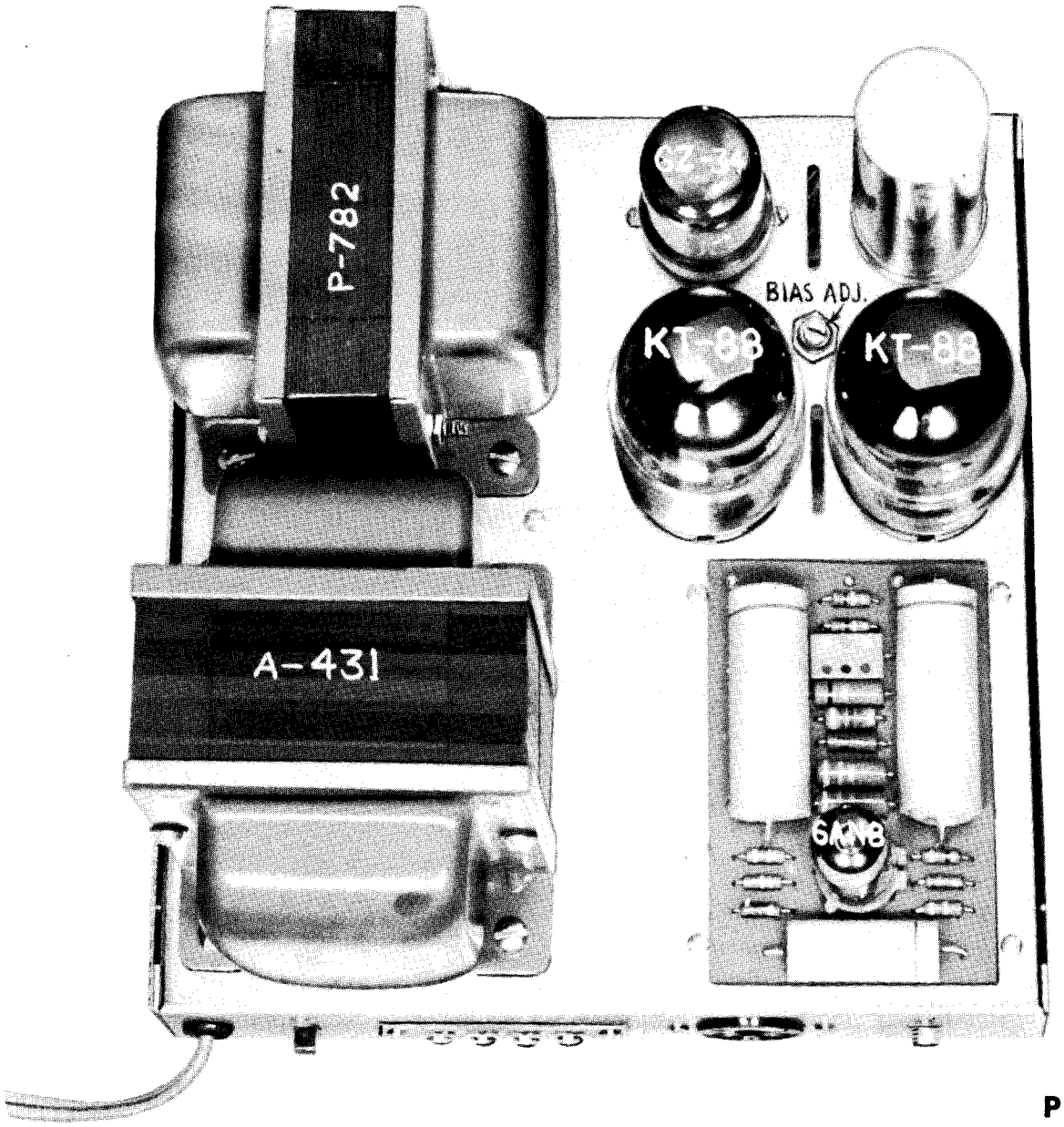
dynakit

SERIAL NUMBER

This number must be mentioned in all communications concerning Dynakit.

INSTRUCTIONS FOR ASSEMBLING THE DYNAKIT MARK III

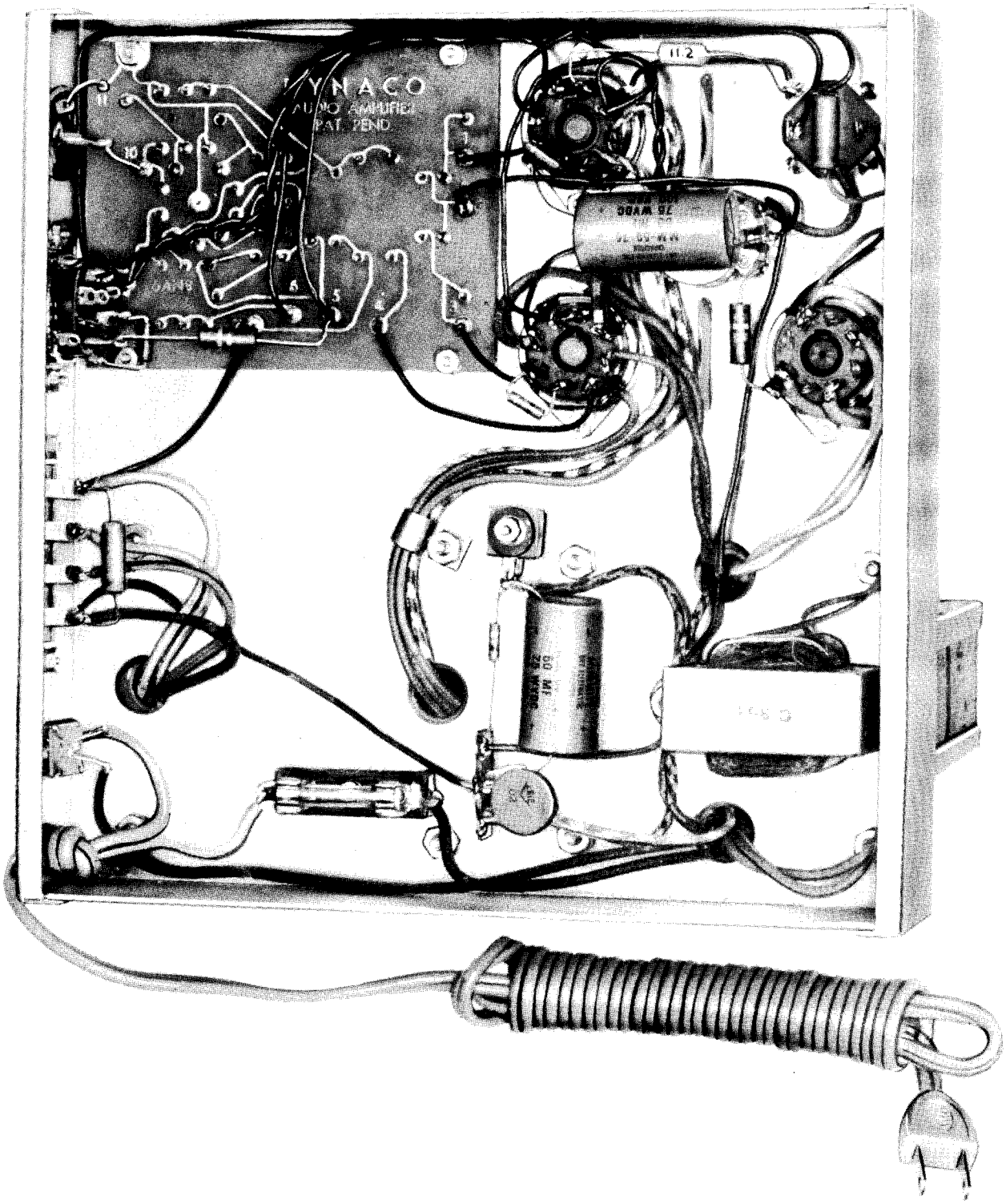


Price *$1.00*

PATENTED

11593

DYNA COMPANY DYNACO
3916 POWELTON AVE.
PHILADELPHIA 4, PA.


TYNACO
AUDIO AMPLIFIER
PAT. PEND.

INSTRUCTIONS FOR ASSEMBLING THE DYNAKIT MARK III

DESCRIPTION

Your Dynakit Mark III is a complete 60 watt power amplifier kit which offers the highest possible fidelity, at low cost and in a compact arrangement. It uses a circuit of outstanding performance characteristics, along with top quality parts, including the new Dynaco A-431 output transformer -- the finest available. The measured specifications show that the Dynakit is an amplifier of unequalled performance, and its listening quality is also unrivalled by any regardless of price.

The design features of your Dynakit which contribute to its superior listening quality do not show up in the usual steady-state laboratory specifications. For example, the Dynakit does not exhibit bounce and flutter when pulsed because of its wide margin of stability. The Dynakit, unlike other amplifiers, has been designed to provide its specified performance on a loudspeaker load, not just a resistive load as in the laboratory. In particular, the connection of a loudspeaker does not distort the high frequency square wave performance. In addition, the Dynakit's power handling capabilities are maintained over the entire audio band without the sharp rise in distortion which characterises most amplifiers at the low and high frequencies.

The Dynakit uses a unique circuit. A pentode voltage amplifier, with parameters adjusted for minimum distortion, is directly coupled to a cathodyne phase inverter. High frequency compensation is employed in a capacitive feedback loop, which corrects the inherent unbalance of this type of phase inverter. The inverter drives the output tubes which are operated with fixed bias. The connection of the output tubes includes a small percentage of screen loading which improves the regulation of the stage and makes it comparatively uncritical of load impedance. The impedance match and bias conditions utilized in the output stage provide minimum distortion operation over a very wide dynamic range. In addition, 20 db of negative voltage feedback lowers the distortion to an unmeasurable proportion at normal listening levels and to less than 1% IM at 60 watts output.

Phase compensation at both high and low frequencies is incorporated into the circuit arrangement to provide a wide margin of stability and to make construction uncritical. This feature of the design means that there is no tendency toward motorboating or oscillation under any conditions of use.

GENERAL INSTRUCTIONS

The mechanical and physical arrangement allows rapid and bug-free assembly using only soldering iron (small tip), pliers, wire cutters, and screw driver. This rapid assembly is made possible through the use of a pre-assembled printed circuit board on which most resistors and paper capacitors are mounted. Construction of your Dynakit will usually take about three hours.

Check the contents of the carton against the attached parts list. Make sure all the parts are on hand and familiarize yourself with the contents. Any shortages should be called to the attention of the dealer from whom you purchased the Dynakit, and he will supply you with the necessary components. However, if your package was received sealed, there should be no shortage of any of the items.

Read through all the instructions before starting any of the assembly. Where reference is made to a specific part, identify this part so that you will recognize it when the time comes to mount it. Note the color coding which permits you to identify resistors. Where the instructions specify resistors, they will specify the correct color combination so that you can be sure of using the correct resistor at each point. Other items are either marked or can be identified from the pictorial material.

It is recommended that these instructions be followed step-by-step to insure correct assembly with a minimum of effort.

NOTE: ALL SOLDERING MUST BE DONE WITH ROSIN CORE SOLDER.

Do not use acid core solder which is injurious to electronic parts. Dyna Company will assume no responsibility for any units in which acid core solder has been used. Use a good grade of 50-50 or 60-40 rosin core solder. Whenever a connection is to be soldered, the instructions will specify (S). Otherwise the wires should be brought to the proper points and crimped in place to hold until soldering is specified. Solder connections should be made carefully, using the minimum amount of heat necessary to get a soldered connection. If connection points are clean, all the required soldering can be done with a small pencil type iron. Leads should be crimped in place so as to make a secure mechanical connection before the solder is applied.

The iron should be applied to the joint and held there until the solder melts and flows over the joint. It is important to heat the joint to the point where solder in contact with it will melt. Otherwise solder will not properly adhere to the joint, and a poor connection will result. Test each joint after soldering by pulling gently on the associated

wires and making sure that there is no movement of wires at point of connection.

WIRING DIRECTIONS

The following components should be mounted as shown in the pictorial diagram using #4 x 1/4" screws. A lockwasher should be used under the nut, and screws should be inserted from the outside of the chassis.

( ) 1. Screw terminal strip (mount so that insulating material is outside the chassis).

( ) 2. Slide switch (note position in pictorial diagram). Use long nose pliers to hold nut in place while turning screw until thread catches.

( ) 3. Input socket.

( ) 4. Four octal sockets (note orientation of keyways in the socket center hole).

( ) 5. Lug terminal strip.

( ) 6. Mount fuse holder as shown in pictorial diagram using #4 x 3/8" screw with lockwasher and nut recessed into body of fuse holder.

( ) Mount potentiometer. Place a 3/8" lockwasher on the shaft first, then mount potentiometer on chassis followed by 3/8" nut. See pictorial diagram for correct orientation of potentiometer lugs.

( ) Mount selenium rectifier. To do this, use the #4 x 3/4" screw inserted from the outside of the chassis, add nut and screw nut up tight to the underside of the chassis. Then slip selenium rectifier on screw making sure that the positive (+) or square end is nearest the chassis. Hold the rectifier in place with lockwasher and another #4 nut. Note the direction in which the lugs should point.

( ) Mount quadruple section electrolytic capacitor in cut-out provided. Note that the orientation of the capacitor is indicated by the engraved markings at the base of each lug. The lug marked with a semicircle should be placed in the position indicated as #1 on the pictorial diagram. Insert mounting tabs fully and twist each tab 1/4 turn to lock in place. Twist tightly so that the can is held firmly against the chassis and shows no play when wiggled.

( ) Connect $2\frac{1}{2}$" wire from ground lug on VI socket (use lug nearest pin #2) (S) to mounting tab on capacitor can (see pictorial diagram).

( ) Mount C-354 choke using #8 screws, nuts, and lockwashers. Note that the two leads should be on side of choke which faces toward where the quadruple section capacitor is located.

( ) Mount A-431 output transformer using #8 screws, nuts and lockwashers. See pictorial diagram for correct orientation of transformer leads below the chassis. Use cable clamp and dress leads under it as shown in pictorial diagram.

Please note on pictorial diagram the identification of the various parts and their respective terminal numbers. These identifications will be used when specifying connections.

Make the following connections from the output transformer:

( ) 1. Connect blue wire to pin #3 of V2 (S).

( ) 2. Connect green wire to pin #4 of V2.

( ) 3. Connect blue-white wire to pin #3 of V1 (S).

( ) 4. Connect green-white wire to pin #4 of V1 (S).

( ) 5. Connect red wire to condenser lug #2.

( ) 6. Connect yellow wire to screw terminal #4.

( ) 7. Connect orange wire to screw terminal #3 (S).

( ) 8. Connect brown wire to screw terminal #2 (S).

( ) 9. Connect black wire to screw terminal #1.

( ) Mount P-782 transformer with #8 screws, nuts and lockwashers. See pictorial diagram for correct orientation of transformer leads below the chassis.

Make the following connections:

( ) 1. Connect long black wire to switch lug #1 (S).

( ) 2. Connect short black wire to closest lug on fuse holder (S).

( ) 3. Connect one red wire to pin #4 of V3 (S).

( ) 4. Connect other red wire to pin #6 of V3 (S).

( ) 5. Connect one yellow wire to pin #2 of V3 (S).

( ) 6. Connect other yellow wire to pin #8 of V3.

( ) 7. Connect red-yellow wire to lug terminal #2.

( ) 8. Connect red-black wire to positive lug on selenium rectifier (S). This is the lug nearest the chassis.

( ) 9. Twist the two green wires together and connect one to pin #2 and the other to pin #7 of V2.

( ) 10. Connect yellow-green wire to lug terminal #1.

( ) 11. Cut off two 5" pieces of insulated wire. Connect one end of one wire to pin #2 on V2 (S) and the second wire to pin #7 on V2 (S). Twist these two wires together and connect free end of one wire to pin #2 on V1 and the second wire to pin #7 on V1.

This now completes more than half the wiring. The following additional steps are required:

( ) 1. Connect .02 capacitor from lug terminal #1 (S) to lug terminal #2.

( ) 2. Use a short piece of wire to connect pin #1 on V2 to pin #8 on V2. Repeat this step on V1 socket.

( ) 3. Connect an insulated wire from pin #8 on V1 to pin #8 on V2. Solder connections at pins #1 and #8 on V2 socket.

( ) 4. Connect 11.2 ohm resistor from pin #1 on V1 (S) to the capacitor mounting tab (see pictorial) (S).

( ) 5. Connect insulated wire from pin #8 on V1 (S) to pin #8 of preamplifier power socket (S).

( ) 6. Connect a 1000 ohm resistor (brown-black-red) from pin #5 on V2 (S) to pin #6 on V2. Make resistor leads short.

( ) 7. Connect a 1000 ohm resistor (brown-black-red) from pin #5 on V1 (S) to pin #6 on V1. Make resistor leads short.

( ) 8. Connect a piece of insulated wire directly from condenser lug #1 (S) to pin #8 on V3.

( ) 9. Connect one lead from the choke to pin #8 on V3 (S) and the other lead to condenser lug #2.

( ) 10. Connect 6800 ohm resistor (blue-grey-red) from condenser lug #2 (S) to condenser lug #4.

( ) 11. Connect an 18,000 ohm resistor (brown-gray-orange) from potentiometer lug #1 (S) to ground lug on V3 socket (S).

( ) 12. Connect a 1000 ohm resistor (brown-black-red) from negative (-) lug on selenium rectifier to lug terminal #3. Negative lug on selenium rectifier is the one farthest from the chassis.

( ) 13. Connect insulated wire from lug terminal #3 (S) to potentiometer lug #3 (S).

( ) 14. Connect a 50 mfd capacitor from potentiometer lug #2 to ground lug on V1 socket (S). Make sure that the positive side of the capacitor goes to ground. The capacitor is held across the potentiometer where it is clear of other parts.

( ) 15. Connect a 50 mfd capacitor from negative (-) lug of selenium rectifier (S) to lug terminal #2. The negative side of the capacitor connects to the selenium rectifier.

CONNECTING PRINTED CIRCUIT BOARD

( ) Mount the printed circuit board from underneath the chassis as shown in pictorial diagram with the tube socket close to the input socket. Use #4 screws, nuts and lockwashers.

When soldering to the eyelets on the printed circuit board care should be exercised TO AVOID OVERHEATING THE BOARD. The following is the recommended way to solder to the printed circuit board:

1. Tin wire to be soldered to the board by holding soldering iron to wire and flowing a thin coat of solder onto tip of wire.

2. Eyelets on the board are usually filled with solder. Heat eyelet until solder melts.

3. Poke tinned wire through eyelet, see that solder flows, retract heat and hold wire until solder is firm or has lost its sheen.

Connections to the board are as follows:

( ) 1. Connect insulated wire from potentiometer lug #2 (S) to eyelet #2 (S).

( ) 2. Connect wire from pin #6 on V1 (S) to eyelet #1 (S).

( ) 3. Connect wire from pin #6 on V2 (S) to eyelet #3 (S).

( ) 4. Connect wire from screw terminal lug #4 to eyelet #7 (S).

( ) 5. Connect insulated wire from pin #4 on V2 (S) to eyelet #4 (S).

( ) 6. Connect a 9-1/2" piece of insulated wire from condenser lug #4 (S) to eyelet #5 (S). Dress wire as shown in pictorial diagram.

( ) 7. Connect a 9-1/2" piece of insulated wire from condenser lug #3 (S) to eyelet #6 (S). Dress wire as shown in pictorial diagram.

( ) 8. Cut off two 7" pieces of insulated wire. Connect one end of one wire to pin #2 on V1 (S) and the second wire to pin #7 on V1 (S). Twist wires together, connect the end of one wire to eyelet #8 (S) and the second wire to eyelet #9 (S). Dress wires as shown in pictorial diagram.

( ) 9. Connect wire from input socket center lug (S) to eyelet #10 (S).

( ) 10. Connect wire from input socket ground (side) lug (S) to eyelet #11 (S).

( ) 11. Connect an insulated wire from screw terminal lug #1 to lug terminal #2 (S).

( ) 12. Connect 680 ohm resistor (blue-grey-brown) from screw terminal #1 (S) to screw terminal #4 (S).

( ) 13. Insert grommet in 3/8" chassis hole.

( ) 14. Insert line cord through chassis from outside toward inside.

( ) 15. Tie knot in line cord about two (2) inches from the end.

( ) 16. Separate the two strands of line cord up to knot.

( ) 17. Connect one end of line cord to unused lug on fuse holder (S).

( ) 18. Connect other end of line cord to switch lug #2 (S).

( ) 19. Insert fuse in fuse holder.

The next few steps include the connections which permit furnishing power to either a Dynakit or Heathkit WA-P2 preamplifier. In the event that some other preamplifier which does not have its own power supply is to be used, refer to the section "Preamplifiers" to obtain the generalized directions for connecting any unpowered preamplifier.

( ) 1. Connect two short wires, one each to eyelets #8 (S) and #9 (S) of the Dynaco printed circuit board. These wires should be twisted together and their free ends connected to pins #1 (S) and #2 (S) of the preamplifier power socket.

( ) 2. Connect 10 ohm resistor (brown-black-black) from pin #3 (S) of the power socket to the closest ground lug on the side of the socket (S).

( ) 3. Connect 22,000 ohm resistor (red-red-orange) from eyelet #5 of the printed circuit board (S) to pin #5 (S) of the preamplifier power socket.

( ) 4. One additional connection is desirable for use of the Heathkit which is not required for the Dynakit preamplifier (although its insertion will not affect the use of the Dynakit). This is the connection which permits the amplifier to be switched on and off from the Heathkit preamplifier. This connection requires a twisted pair of wires from switch lugs #1 (S) and #2 (S) to pins #6 (S) and #7 (S) of the power socket. (When using this remote switching arrangement, the Dynakit's switch should remain in "off" position.)

INITIAL ADJUSTMENT

You have now finished all the wiring. Plug in the KT-88 tubes in V1 and V2. Also plug 6AN8 into printed circuit socket. Do not plug in GZ-34 rectifier tube. If an ohmmeter is available, measure resistance from condenser lug #1 to ground. This should be in excess of one hundred thousand ohms. Inspect wiring to make sure that all joints are soldered and that no parts are shorting together. Plug line cord into 117 volt ac line and turn on switch. While tubes are warming up, set the bias adjusting potentiometer to the center of its rotation. This is approximately its correct setting and can serve as an emergency operating adjustment if no test instruments are available. (HOWEVER, OPERATION WITHOUT CORRECT BIAS ADJUSTMENT IS NOT RECOMMENDED AS IT RESULTS IN POOR PERFORMANCE AND POSSIBLE DAMAGE TO COMPONENTS.)

Your Dynakit includes Dyna Biaset (patent pending) which greatly simplifies setting of the bias voltage. This can now be done with the most simple and inexpensive types of dc meters as long as they have a rating of 1000 ohms per volt or higher. The correct setting of the bias provides a total cathode current of the KT-88 tubes of 140 ma. This current

through the precision 11.2 ohm resistor produces a voltage drop of exactly 1.56 volts dc, and this voltage can be checked at pin #8 of the preamplifier power take-off socket. 1.56 volts is also the voltage which is furnished by a "D" type flashlight dry cell. Thus any fresh cell of this type can be used for an accurate reference standard for bias setting.

The procedure for setting the bias is to measure the voltage output of a "D" type dry cell and note the meter reading. Then insert the meter probe in the pin #8 hole of the preamplifier power socket (note that outside the chassis the pin numbers are counted counterclockwise from the keyway while inside the chassis they are counted clockwise). Plug in the GZ-34 rectifier tube, and in about 10 seconds there will be a current flow which will cause a meter deflection. As the rectifier warms up, the reading will increase. The bias control should be adjusted until the meter reading at pin #8 is the same as across the dry cell (this reading will be 1.56 volts if the meter is of sufficient accuracy). There may be some drifting of the reading as the tubes heat, but this will stabilize within 15 minutes after which no further adjustment is required. Although the setting is a semi-permanent one, at times of tube replacement or similar repair or maintenance work, resetting of the bias will preserve peak performance and keep distortion at an absolute minimum.

If in the course of bias setting it is found that the control range of the potentiometer is insufficient to obtain the correct setting, do not operate the amplifier until the cause of the difficulty has been established. Operation with incorrect bias can lead to damage to the output tubes and/or other components.

Note that the use of pin #8 as directed in the wiring instructions means that this pin cannot be used as a connection point for a preamplifier. Most preamplifiers do not require the use of this pin. However, for those which do, some other pin must be used as a bias check point. If no other pin is available, the connection from pin #8 of V1 to the preamplifier power socket must be omitted; and bias measurements should be based on voltages read directly at pin #8 of V1 or V2.

PREAMPLIFIERS

The Dynakit Mark III can be used with any conventional preamplifier. Preamplifiers which contain their own built-in power supply can be used by connecting their audio cable to the input socket. Those units which require power from the amplifier can be readily used with the Dynakit provided that the power socket on the front panel of the Dynakit is properly wired. The preceding instructions include the proper wiring for both Dynakit and Heathkit WA-P2 preamplifiers. Should others requiring different socket connections be used, the socket can be wired on the basis of the following general instructions.

Any preamplifier requires two leads for the heater connections, one lead for B+, and one ground lead. Some also require two ac leads which

are used for remote on-off switching of the amplifier from the preamplifier. These specific leads should be located on the schematic or technical description of the preamplifier and the prongs of the power plug identified as to these functions. Then the corresponding pins in the power socket of the Dynakit should be connected as follows:

The heater leads should be a twisted pair of wires, one each from eyelets #8 and #9 of the Dynaco printed circuit board. The B+ supply should be taken from eyelet #5 of the printed circuit board through a resistor which will drop it to the required value. The ground connections should be made to a convenient ground point through a small resistor (about 10 ohms). The use of this resistor reduces the possibility of having a ground loop which might cause hum through the common ground circuit of the power and audio cables. In the event that the preamplifier has facility for switching the amplifier on and off through the power cable, ac switch connections should be taken from switch lugs #1 and #2. The Dynakit's switch should be left in "Off" position when using the remote switching.

PROTECTIVE COVER

The protective cover has been designed to be both functional and good looking. The normal heat dissipation of the KT-88 output tubes is very great and because of the exposed printed circuit board, there is moderately high voltage on the top of the chassis. The cover should therefore be used at all times. Also the amplifier should be placed where there is adequate ventilation. If your Dynakit is put on a shelf, leave air space all around it so that the "chimney effect" of the protective cover can function properly. NEVER place magazines or other objects on top of the Dynakit.

The protective cover and base are affixed by first putting the base in place. Place chassis upright on the base and slip protective cover in place (screw holes in cover should be lined up with chassis and base holes). Then screw sheet metal screws through the base, cover and chassis to lock the entire assembly together.

INSTALLATION AND USE

Your Dynakit is now ready to play if a preamplifier or tuner is connected to the input and a loudspeaker is connected to the ground and 4, 8, or 16 ohm output screw terminal.

If your Dynakit is inoperative, check the wiring for incorrect connections or shorted leads. Then observe whether the tubes are lighted which indicates that the filaments are operative. Then voltages should be checked in accordance with the enclosed voltage chart. Any discrepancies of more than 10% in the voltage readings indicate possible miswiring or faulty components.

The Dynakit has more gain than many popular amplifiers as it puts out 60 watts with only 1.6 volts input. Therefore, it may provide higher than customary noise levels by the extra amplification of hum and noise from

preamplifier equipment. If noise is evident on listening, unplug the audio input cable to the Dynakit and note whether the noise decreases. If it does, the fault is in the associated equipment which should be serviced in order to correct it.

However, if hum or noise persists with the input disconnected, the wiring and all solder connections should be checked. If the kit is properly wired, hum and noise may arise from a faulty tube. An occasional 6AN8 tube is noisy, and this can only be tested by substitution of another tube procured locally. If a change in a tube improves the noise level, the factory will replace the tube if it is returned during the 90-day guarantee period.

It is recommended that the KT-88 tubes be replaced in matched pairs if a single tube fails after a period of use. Combining an old with a new tube may lead to unbalance which results in excessive hum level.

The 3 amp fuse in the Dynakit normally will not blow from on-off cycling or line voltage surges. If it blows, it generally indicates incorrect wiring of the kit or failure of some component. Since some service is generally indicated in the event of fuse failure, the fuse is located within the chassis where it is readily available during routine trouble shooting. The fuse should not be changed until there is at least a visual inspection of the wiring and components (and a check of tubes if possible).

The Dynakit is designed to operate at a line voltage of 117 volts ac. It can be used in the range of 110 to 124 volts. Operation outside this range is not recommended since lower than 110 volt operation results in increased distortion, while component failures can be expected with line voltage in excess of 124 volts. It is suggested that either a voltage adjusting device or a voltage regulator be used under conditions where line voltage falls outside the recommended range. It is also suggested that the Dynakit be operated with the tubes in vertical position only.

GUARANTEE AND FACTORY SERVICE

All components of your Dynakit are guaranteed for a period of 90 days from date of purchase. In addition, Dynaco transformers, which represent about one-half the value of the kit, are guaranteed for a period of one year provided that their leads are maintained at the original length. Therefore, if transformers are returned to the factory for checking or replacement, they should be carefully unsoldered and removed without cutting the leads.

Defective parts of the Dynakit will be replaced without charge during the guarantee period if returned to Dyna Company either directly or via the dealer from whom the kit was purchased. Many dealers carry Dynakit spare parts on hand to facilitate replacements. After the guarantee period has expired, parts are charged for at regular net prices.

In the event that the assembled kit does not function properly or breaks down after some use, Dyna Company will service the kit for a

service fee of $5.00 plus the cost of parts which have been damaged by the user or are past the guarantee period. This service facility is not available for kits which are incompletely wired, or have been wired with other than rosin core solder, or in which changes have been made without factory authorization. In addition, NO PARTS WILL BE REPLACED NOR WILL ANY SERVICE BE AVAILABLE FOR KITS WHERE THE GUARANTEE POST CARD HAS NOT BEEN RETURNED. THE SERIAL NUMBER ON THIS INSTRUCTION BOOK MUST BE MENTIONED IN CORRESPONDENCE, PARTS RETURN, OR KITS RETURNED FOR FACTORY SERVICE. It is the factory prerogative to limit the service facility to one year from date of purchase.

When shipping the amplifier for service, a note must be attached specifying the symptoms, the name and address of the sender, and the serial number. The kit should be securely packed. A suggested packing is to stuff paper inside the protective cage to prevent tubes from jarring out of the sockets; secure the chassis and cage assembly with the sheet metal screws; place the amplifier in its original packing box; then place the entire box within another carton surrounded by several inches of shredded paper or other soft packing material. Shipment should be made by prepaid Railway Express, where possible; and repaired kits will be returned by Railway Express collect. Parcel Post is not a safe method of shipment for completed kits and should not be used.

Dyna Company assumes no responsibility or liability for damages or injuries sustained in assembly or operation of the Dynakit.

Voltage Check Points

Voltages have been measured with a vacuum tube volt meter. If a meter of lower impedance is used, some of the measurements will result in lower readings than those shown.

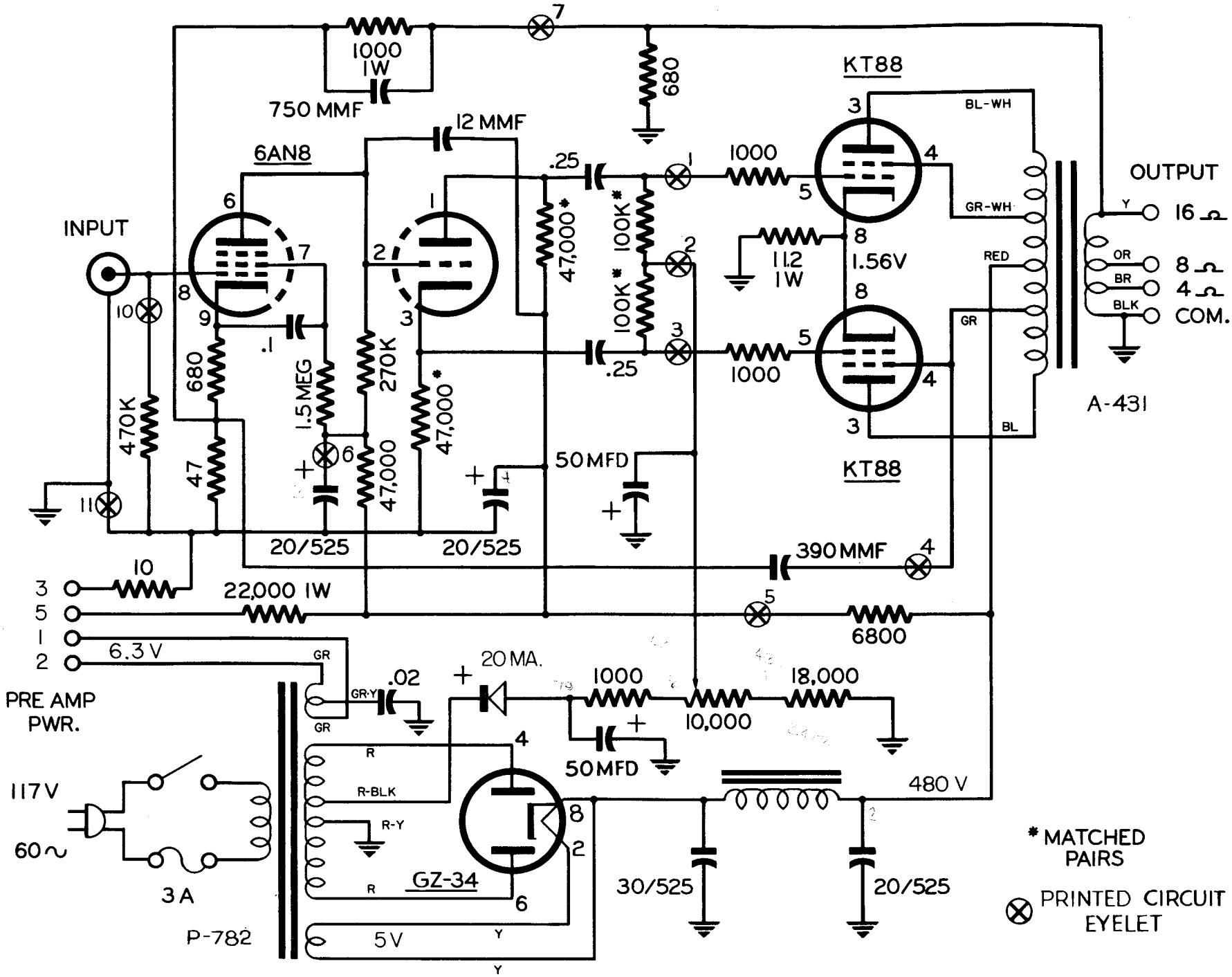
Pin #	Either KT-88	GZ-34	6AN8
1	1.56	0	*
2		490	*
3	475	0	*
4	475	430 ac	6.3 ac
5	-55 **	0	6.3 ac
6	-55 **	430 ac	*
7		0	*
8	1.56	490	0
9	--	--	1.0

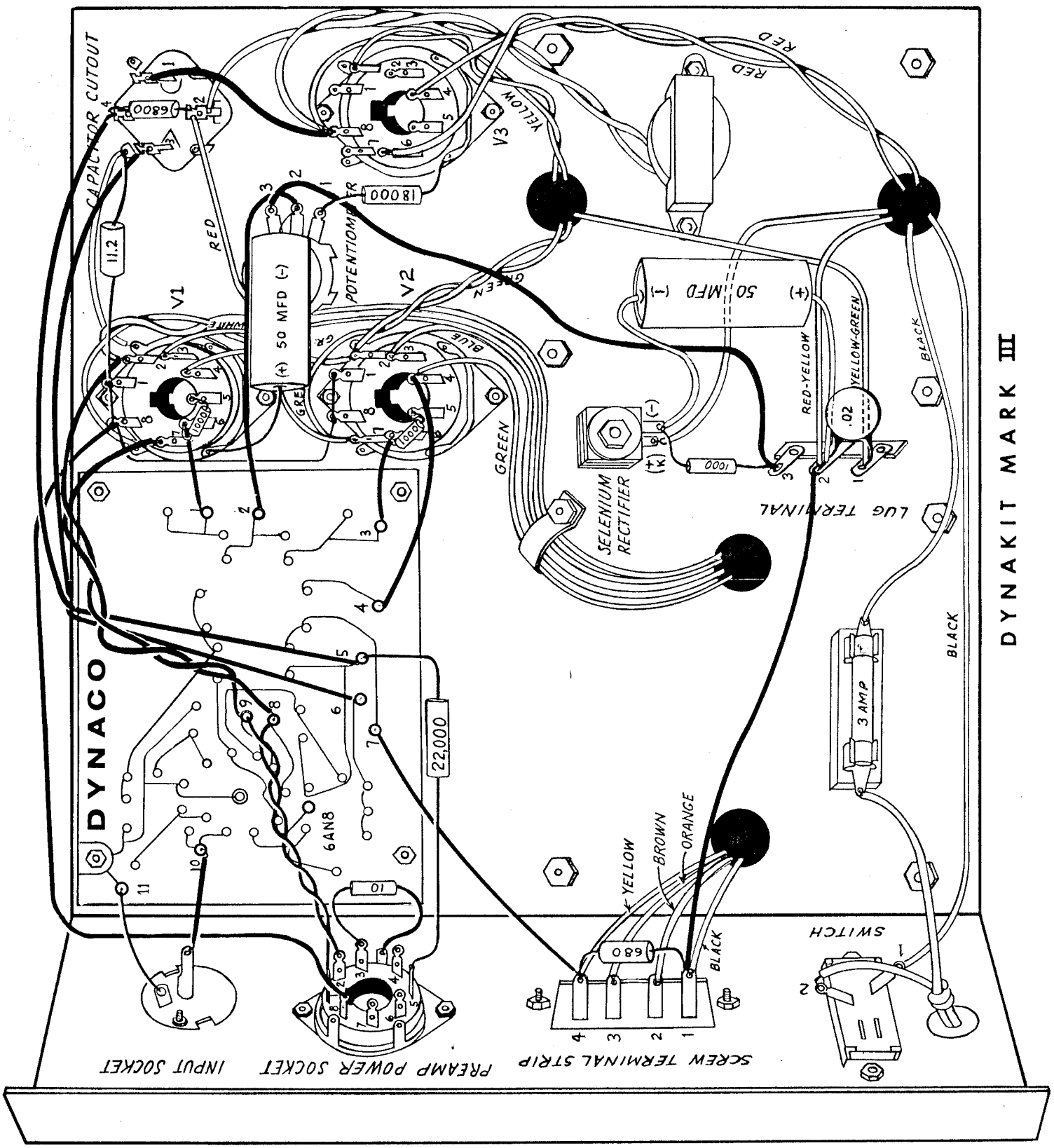
Eyelet #4 475 - Eyelet #5 445 - Eyelet #6 380

* Minor variations in current drain of the 6AN8 tube will cause large changes in electrode voltages without detrimental effect on performance. Therefore, voltage checks are not applicable at these points.

** Do not make measurements at these points with other than a vacuum tube volt meter. Variations up to 20% do not indicate malfunctioning as long as readings at both tubes are the same.

DYNAKIT MARK III 60 WATT POWER AMPLIFIER




DYNAKIT MARK III
DYNACO
CAPACITOR CUTOUT
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V2
V3
POTENTIOMETER
18000
11.2
RED
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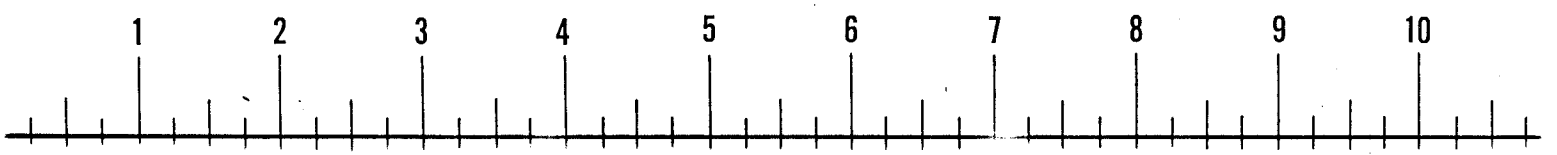
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