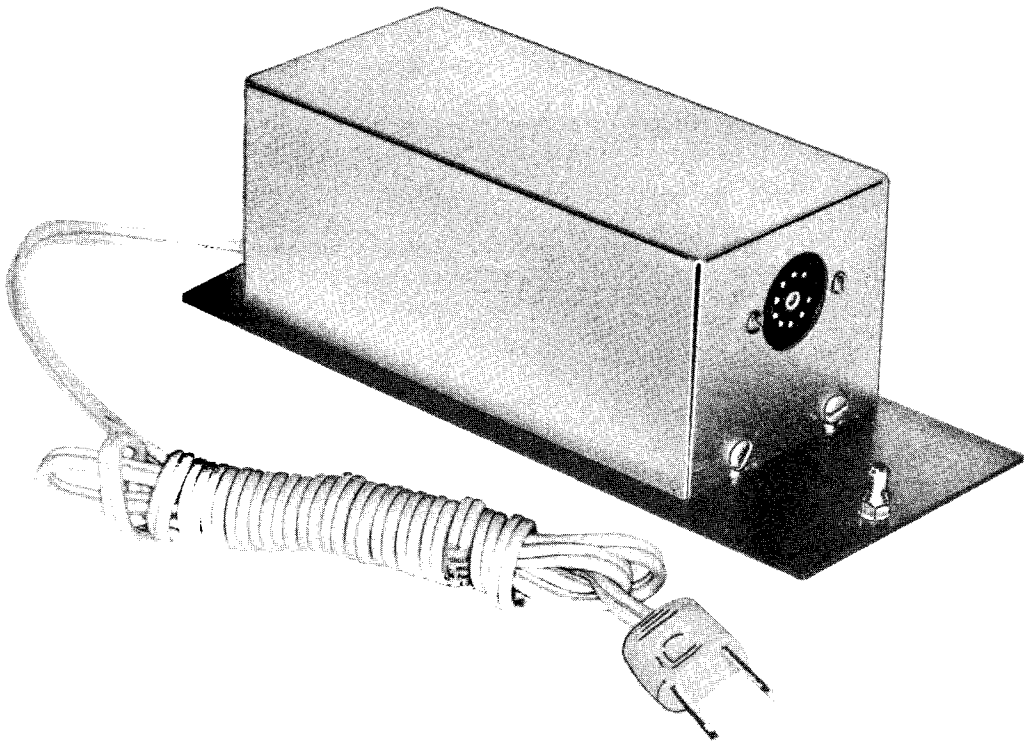
ASSEMBLY AND OPERATION OF THE HEATHKIT POWER PACK FOR GC-1A RECEIVER

MODEL XP-2



SPECIFICATIONS

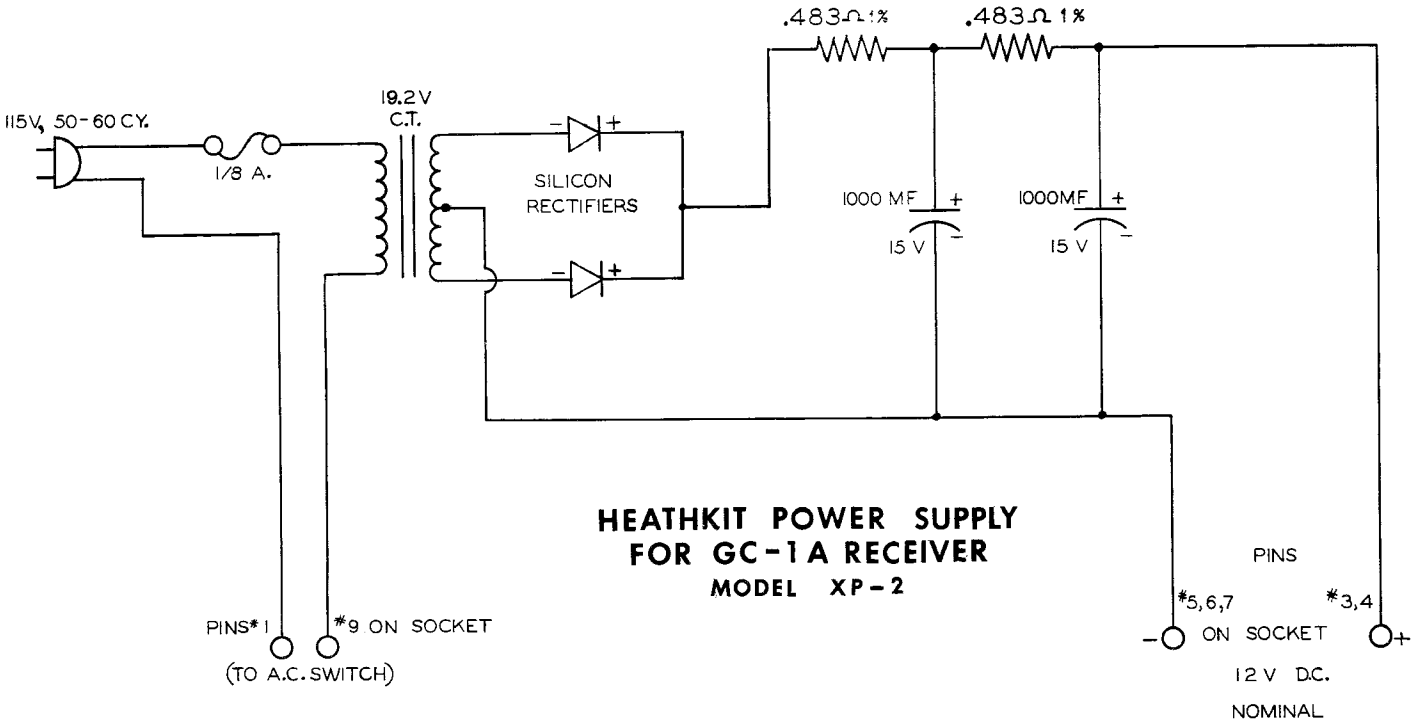
Power Input:	117 volts, 50-60 cycles, 3.5 watts.
Output:	12 volts DC nominal, 200 ma DC maximum.
Duty Cycle:	Continuous.
Ripple:	.6% at 150 ma current drain.
Overload Protection:	1/8 ampere fuse, soldered in transformer primary circuit.
Dimensions:	7 1/2" long x 2 3/4" wide x 2 1/4" high.
Net Weight:	1 lb. 4 oz.
Shipping Weight:	2 lbs.

INTRODUCTION

The HEATHKIT Model XP-2 Power Pack has been designed for use with the Model GC-1A Receiver to supply direct current at 12 volts, up to 200 milliamperes continuously. If the Receiver is to be operated from a 117 volt AC outlet socket, the Model XP-2 Power Pack should be installed in the rear of the cabinet, connecting the power plug of the receiver to the socket of the power pack.

CIRCUIT DESCRIPTION

The Model XP-2 Power Pack utilizes a full-wave rectifier circuit with a 2-section RC filter. The pilot lamps of the Model GC-1A Receiver are connected in the circuit as a bleeder resistor. The rectifiers are silicon diodes which have a peak current rating of thirty times the power pack requirement. This accounts for the low internal impedance and excellent voltage regulation of the Model XP-2. A protective fuse is included in the primary circuit of the power transformer.



CONSTRUCTION NOTES

This manual is supplied to assist you in every way to complete your kit with the least possible chance for error. The arrangement shown provides for the optimum accommodation of all components in a minimum of available space and is the result of extensive experimentation and trial. If followed carefully, you will have constructed a stable, dependable receiver power supply unit. We suggest that you retain the manual in your files for future reference, both in the use of the unit and for its maintenance.

UNPACK THE KIT CAREFULLY AND CHECK EACH PART AGAINST THE PARTS LIST. In so doing, you will become acquainted with the parts. Refer to the charts and other information on the inside covers of your manual to help you identify the components. If some shortage or parts damage is found in checking the Parts List, please read the REPLACEMENT section and supply the information called for therein, and include all inspection slips in your letter to us.

Resistors generally have a tolerance rating of 10% unless otherwise stated in the Parts List. Tolerances on capacitors are generally even greater. Limits of +100% and -20% are common for electrolytic capacitors.

PROPER SOLDERING TECHNIQUES

Only a small percentage of HEATHKIT purchasers find it necessary to return an instrument for factory service. Of these instruments, by far the largest proportion of malfunctions are due to poor or improper soldering.

If terminals are bright and clean and free of wax, frayed insulation and other foreign substances, no difficulty will be experienced in soldering. Correctly soldered connections are essential if the performance engineered into a kit is to be fully realized. If you are a beginner with no experience in soldering, a half hour's practice with some odd lengths of wire may be a worthwhile investment.

For most wiring, a 25 to 100 watt iron or its equivalent in a soldering gun is very satisfactory. A lower wattage iron than this may not heat the connection enough to flow the solder smoothly over the joint. Keep the iron tip clean and bright by wiping it from time to time with a cloth.

CHASSIS WIRING AND SOLDERING

1. Unless otherwise indicated, all wire used is the type with the colored insulation (hookup wire); the size of the conductor is the same for all colors of hookup wires furnished with your kit.

2. Leads on resistors, capacitors and transformers are generally much longer than they need to be to make the indicated connections. In these cases, the excess leads should be cut off before the part is added to the chassis. In general, the leads should be just long enough to reach their terminating points. Wherever there is a possibility of bare leads shorting to other parts or to the chassis, the leads should be covered with insulating sleeving. Where insulating sleeving is required, the phrase "use sleeving" is included in the associated construction step.

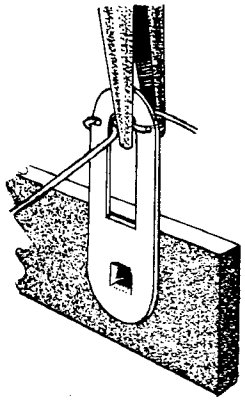
3. Crimp or bend the lead (or leads) around the terminal to form a good joint without relying on solder for physical strength. If the wire is too large to allow bending, position the wire so that a good solder connection can still be made.

4. Position the work, if possible, so that gravity will help to keep the solder where you want it.

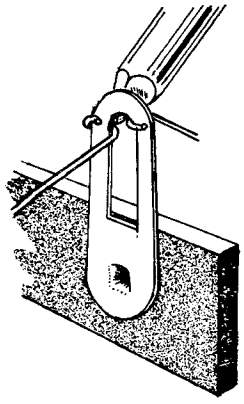
5. Place a flat side of the soldering iron tip against the joint to be soldered until it is heated sufficiently to melt the solder.

6. Then place the solder against the heated terminal and it will immediately flow over the joint; use only enough solder to thoroughly wet the junction. It is usually not necessary to fill the entire hole in the terminal with solder.

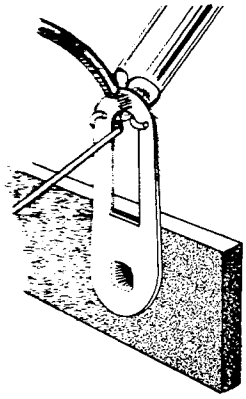
7. Remove the solder and then the iron from the completed junction. Use care not to move the leads until the solder is solidified.



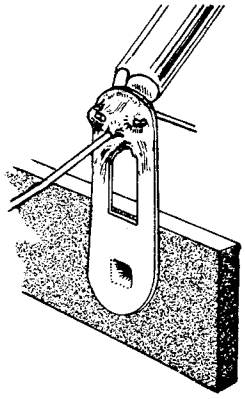
CRIMP WIRES



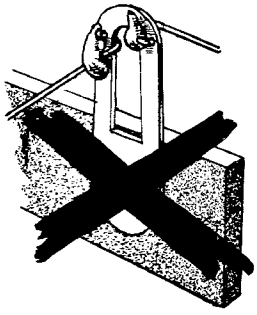
HEAT CONNECTION



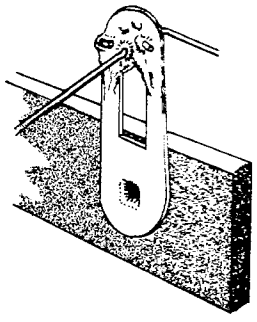
APPLY SOLDER



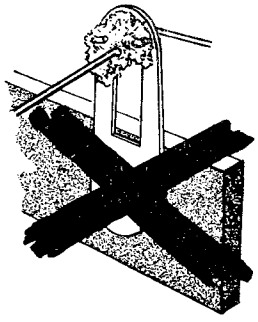
ALLOW SOLDER TO FLOW



COLD SOLDER JOINT CONNECTION INSUFFICIENTLY HEATED



PROPER SOLDER CONNECTION



COLD SOLDER JOINT CONNECTION MOVED WHILE COOLING

A poor or cold solder joint will usually look crystalline and have a grainy texture, or the solder will stand up in a blob and will not have adhered to the joint. Such joints should be reheated until the solder flows smoothly over the entire junction. In some cases, it may be necessary to add a little more solder to achieve a smooth, bright appearance.

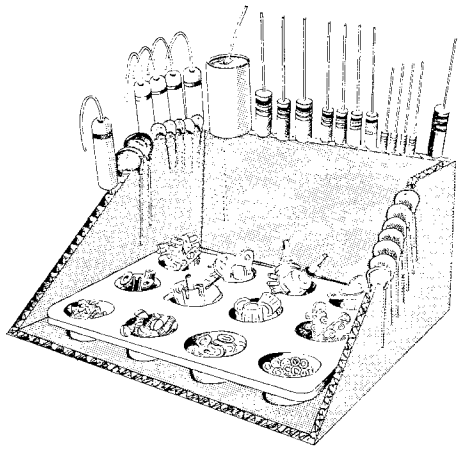
ROSIN CORE SOLDER HAS BEEN SUPPLIED WITH THIS KIT. THIS TYPE OF SOLDER MUST BE USED FOR ALL SOLDERING IN THIS KIT. ALL GUARANTEES ARE VOIDED AND WE WILL NOT REPAIR OR SERVICE EQUIPMENT IN WHICH ACID CORE SOLDER OR PASTE FLUXES HAVE BEEN USED. IF ADDITIONAL SOLDER IS NEEDED, BE SURE TO PURCHASE ROSIN CORE (60:40 or 50:50 TIN-LEAD CONTENT) RADIO TYPE SOLDER.

We suggest that you do the following before work is started;

1. Lay out all parts so that they are readily available.

2. Provide yourself with good quality tools Basic tool requirements consist of a screwdriver with a 1/4" blade; a small screw driver with a 1/8" blade; long-nose pliers wire cutters, preferably separate diagonal cutters; a pen knife or a tool for strippir insulation from wires; a soldering iron (gun) and rosin core solder. A set of n drivers and a nut starter, while not nece sary, will aid extensively in construction the kit.

Most kit builders find it helpful to separate the various parts into convenient categories. Muffin tins or molded egg cartons make convenient trays for small parts. Resistors and capacitors may be placed with their lead ends inserted in the edge of a piece of corrugated cardboard until they are needed. Values can be written on the cardboard next to each component. The illustration shows one method that may be used.



CHASSIS PLATE MOUNTING

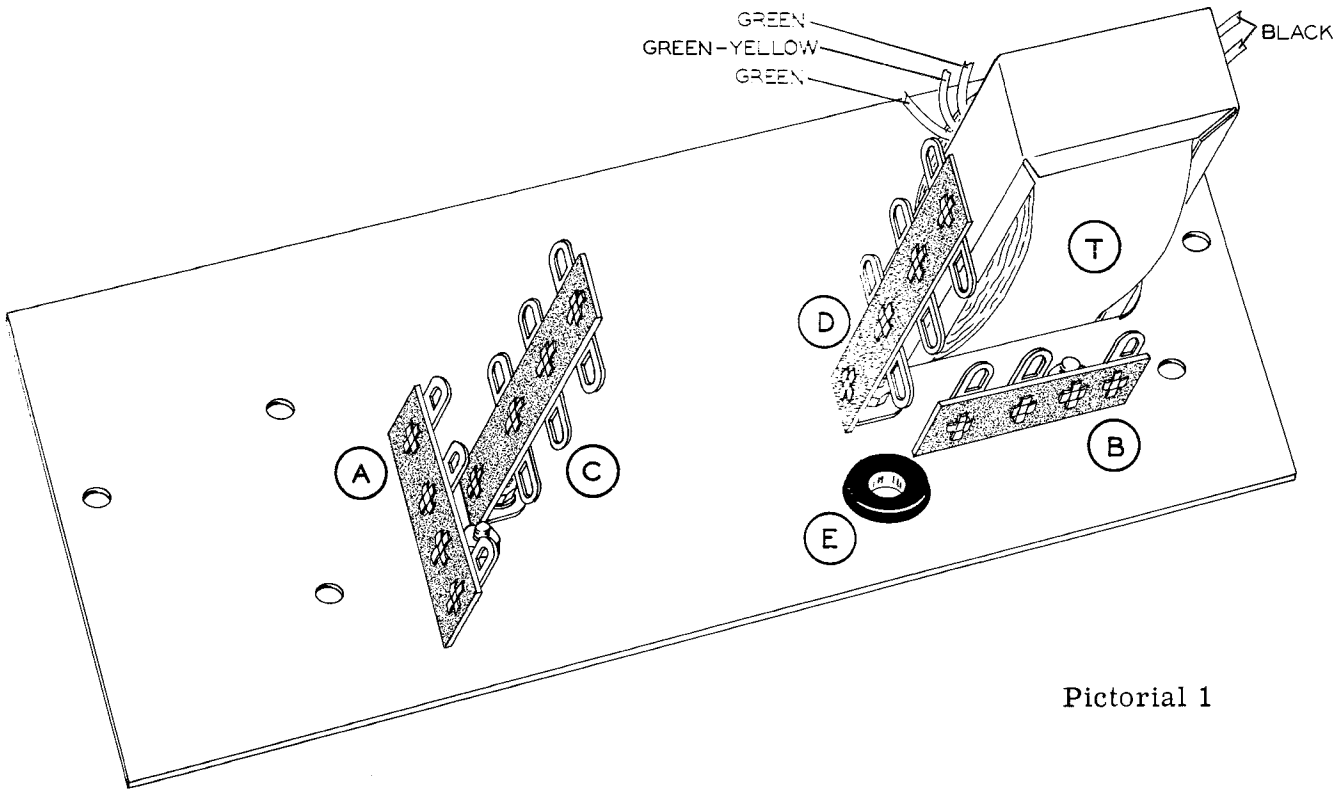
Proper mounting of components on the plate is essential for good performance and reliability. A good general rule to follow is that all components should be mounted and secured tightly.

Tubular capacitors and resistors will fit properly if the leads are bent, as shown in the illustrations.

STEP-BY-STEP PROCEDURE

The following instructions are presented in a logical step-by-step sequence to enable you to complete your kit with the least possible confusion. Be sure to read each step all the way through before beginning. Also, read several steps ahead of the actual step being performed. This will familiarize you with the relationship of the subsequent operations. When the step is completed, check it off in the space provided. This is particularly important as it may prevent errors or omissions, especially if your work is interrupted. Some kit builders have also found it helpful to mark each lead in colored pencil on the pictorial as it is added.

The abbreviation "NS" indicates that a connection should not be soldered as yet for other wires may need to be added. When the last wire is installed, the terminal should be soldered and the abbreviation "S" is used to indicate this. Note that a number will appear after each solder instruction. This number indicates the number of leads that are supposed to be connected to the terminal in question before it is soldered. For example, if the instruction reads, "Connect one lead of a 47 KΩ resistor to lug 1 (S-2)," it will be understood that there will be two leads connected to the terminal at the time it is soldered. This additional check will help avoid errors.



Pictorial 1

STEP-BY-STEP ASSEMBLY

Refer to Pictorial 1 until directed otherwise.

( ) Lay the chassis plate before you so that the large hole is nearest to you and the side with the pull ring is downward.

( ) Install the 3-lug terminal strips A and B, using 6-32 screws, nuts and #6 lockwashers.

( ) Mount the transformer T so that the leads are at the side away from you. The black leads should be to your right, the green leads to your left. Use 6-32 screws, nuts and #6 lockwashers.

( ) Install the tall 3-lug terminal strips C and D, using #6 hardware as before. The mounting brackets of all terminal strips face toward the transformer T.

( ) Install the grommet E in the large hole.

Refer to Pictorial 2 for the following steps.

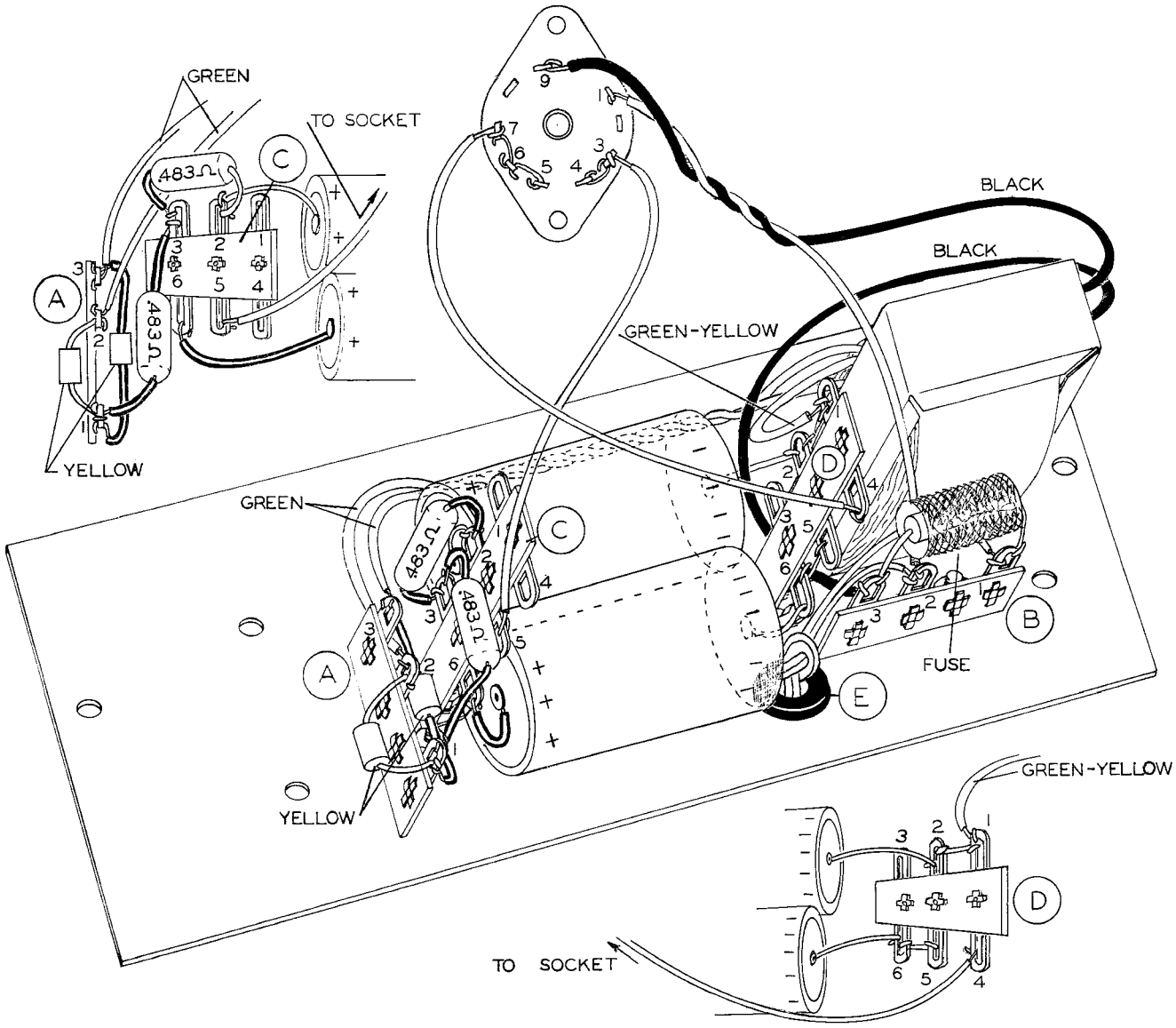
( ) Place the mounting plate with the narrow edge before you and the transformer T in the rear.

( ) Twist the two green leads from the transformer T together and route them as shown in Pictorial 2. Connect the green leads to lugs 2 (NS) and 3 (NS) of terminal strip A. Crimp the ends tightly.

NOTE: The polarity and way of soldering of silicon rectifiers is very important. If not properly connected, damage to the rectifiers and also to other components is possible. Adhere to the following instructions to avoid any possible error.

Use the diode symbol printed on the rectifier to identify the positive (+) and negative (-) ends. 

The silicon rectifiers can be damaged by excessive heat while soldering. To avoid damage, grasp the lead with pliers between the body of the rectifier and the point of soldering. The pliers will absorb the heat. Do not release the pliers until the connection has cooled. Someone else may be of assistance at this point, or a "third hand" may be improvised by wrapping the handle of your long-nose pliers with a rubber band. This will enable you to clamp the pliers on the lead.



Pictorial 2

( ) **Cut each lead of one silicon rectifier to a length of 3/4". Form hooks at the lead ends.**

( ) Connect the negative (-) end of this rectifier to lug 2 of terminal strip A (S-2) and its positive (+) end to lug 1 of terminal strip A (NS).

( ) **Cut each lead of the second silicon rectifier to a length of 1". Cut two pieces of 1/16" sleeving to a length of 1/2" and slip the sleeving over the leads. Form hooks at the lead ends.**

( ) Connect the negative (-) end of this rectifier to lug 3 of terminal strip A (S-2) and its positive (+) end to lug 1 of terminal strip A (NS).

( ) **Push both diodes down and against the terminal strip A.**

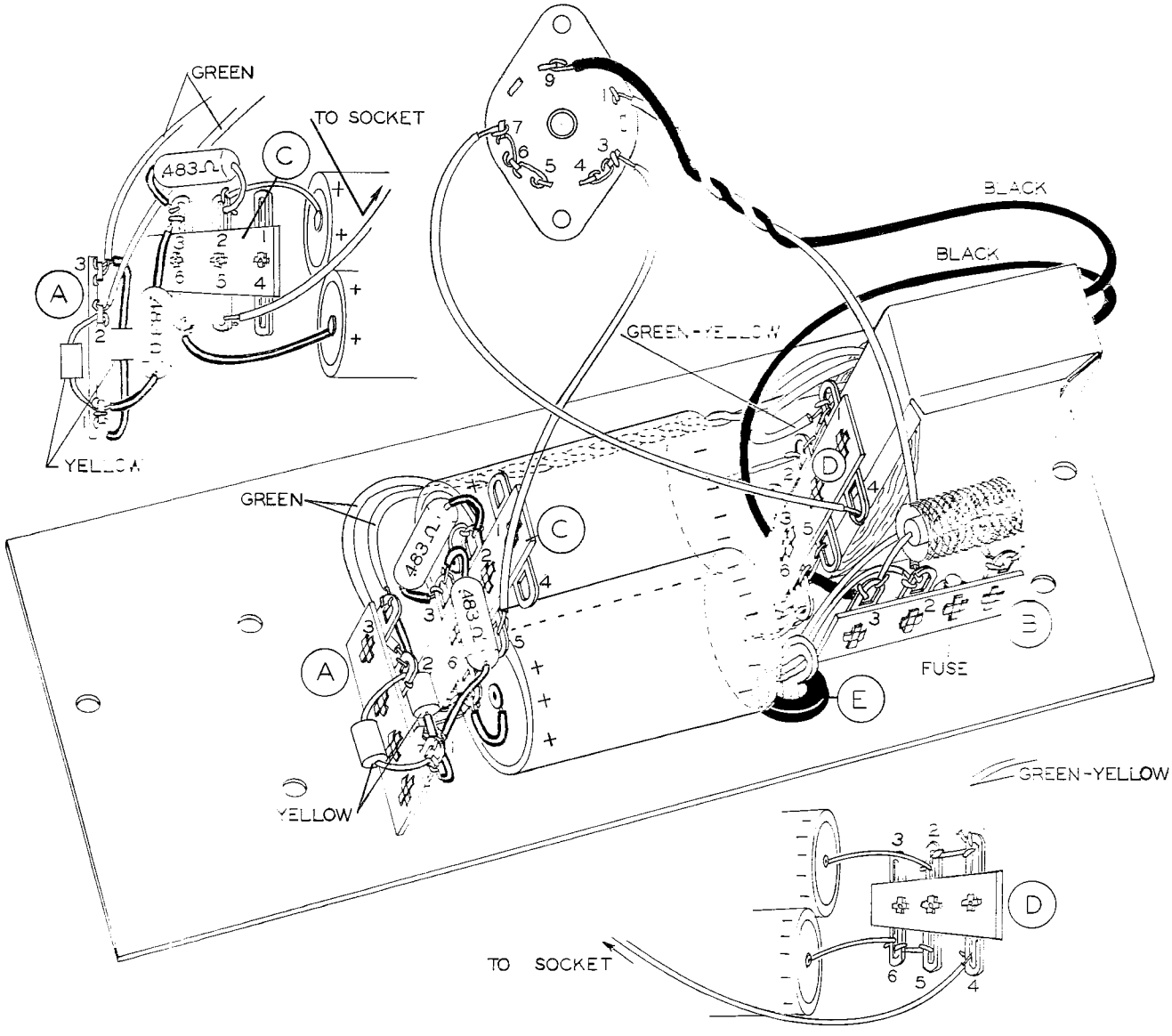
( ) **Cut each lead of both .483 Ω resistors to a length of 3/4".**

( ) Connect one .483 Ω resistor from lug 1 of terminal strip A (S-3) to lug 3 of terminal strip C (NS). Use sleeving.

( ) Connect the second .483 Ω resistor from lug 3 of terminal strip C (S-2) to lug 2 of terminal strip C (NS). Use sleeving.

( ) Place the chassis plate before you with the transformer T at your left and the grommet E in the rear.

( ) Connect a bare wire from lug 1 (NS) to lug 2 (NS) of terminal strip D.



Pictorial 2

( ) Cut the green-yellow lead from transformer T to a length of 2", strip the end 3/8" and connect it to lug 1 of terminal strip D (S-2).

( ) Cut the leads of both 1000 μfd capacitors to a length of 8".

NOTE: In the following instructions all negative (-) connections are on terminal strip D, which is next to transformer T.

( ) Connect the negative (-) end of one 1000 μfd capacitor to lug 2 of terminal strip D (S-2) and the positive (+) end to lug 2 of terminal strip C (S-2). Push the capacitor gently down on the chassis.

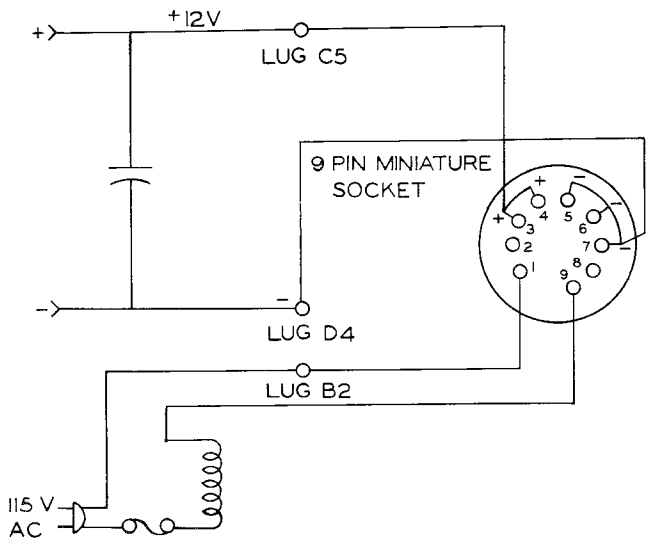
( ) Place the mounting plate before you with the transformer T at your right, and the grommet E facing you.

( ) Connect a bare wire from lug 5 (S-1) to lug 6 (NS) of terminal strip D.

( ) Connect the positive (+) end of the second 1000 μfd capacitor to lug 6 of terminal strip C (S-1). Use sleeving.

( ) Connect the negative end of this capacitor to lug 6 (S-2) of terminal strip D. Push this capacitor gently against the other capacitor.

Refer to the Socket Wiring Diagram and to Pictorial 2 for the following steps.



SOCKET WIRING DIAGRAM

( ) Connect a bare wire from lug 4 (S-1) to lug 3 (NS) of the 9-pin miniature socket. Do not mount the socket. Do not bend the lugs.

( ) Connect a bare wire from lug 5 (S-1) to lug 6 (NS) and from lug 6 (S-2) to lug 7 (NS) of the socket.

( ) Cut a piece of stranded hookup wire 4 1/2" long and strip both ends 3/8". Connect one end to lug 3 of the socket (S-2) and the other end to lug 5 of terminal strip C (S-1).

( ) Cut a piece of stranded hookup wire 7 3/4" long and strip both ends 3/8". Connect one end to lug 7 of the socket (S-2) and the other end to lug 4 of terminal strip D (S-1).

( ) Connect the top one of the two black leads from transformer T to lug 9 of the socket (S-1).

( ) Cut a piece of stranded hookup wire 9 1/2" long and strip the ends 1/4". Connect one end to lug 1 of the socket (S-1), then twist the wire with the black transformer lead which has been connected to socket lug 9. Connect the other end of the hookup wire to lug 2 of terminal strip B (NS).

Refer again to Pictorial 2 for the following steps.

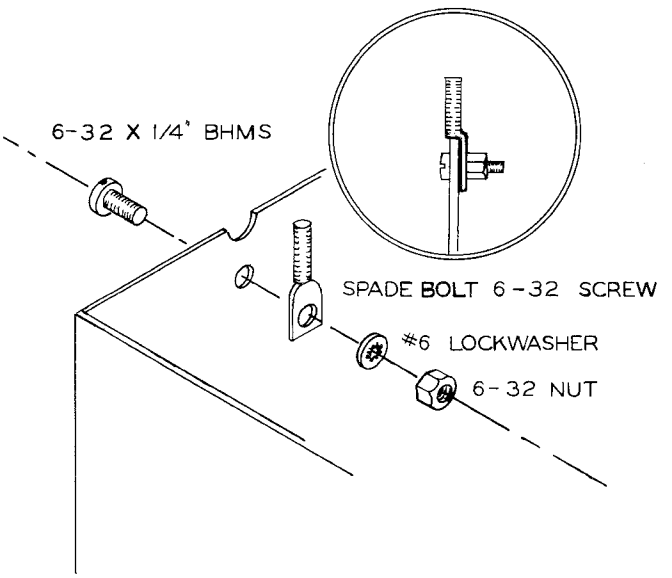
( ) Shorten one wire of the line cord by 1" and strip this wire 1/4". Enter the line cord through grommet E and tie a simple overhand knot about 2 1/2" from the cord end for strain relief. Connect the shortened end to lug 2 of terminal strip B (S-2). Connect the longer end of the line cord to lug 1 of terminal strip B (NS). Route these wires between the power transformer and terminal strip B.

( ) Cut the second black lead from transformer T to a length of 4", strip the end 3/8" and connect it to lug 3 of terminal strip B (NS). Route this black lead as shown.

( ) Cut each end of the fuse to a length of 1/2". Connect one end to lug 3 of terminal strip B (S-2). Straighten the other end of the fuse out axially, slip the Fiberglas sleeving over the fuse, then connect this other end to terminal 1 of terminal strip B (S-2).

WARNING: Do not plug in the line cord if the power supply housing is open. When replacing fuses, first disconnect the plug from the AC socket and look for a possible cause of the short circuit in the power pack or receiver.

( ) Mount the four spade bolts on the power supply housing with 6-32 screws and nuts, using #6 lockwashers. The shanks of the spade bolts and the nuts should be inside the housing. See Detail.



Detail

( ) Mount the 9-pin miniature socket inside the power supply housing, using 3-48 screws, #3 lockwashers and nuts. The socket should be oriented so that its relationship to the power plug is the same as that of the battery power supply.

( ) Put the housing over the mounting plate, seeing that the wires from the socket are clear. Push the spade bolts through their mounting holes and screw on with 6-32 nuts, using #6 lockwashers. The socket end of the housing must be at the end of the power supply opposite the power transformer.

( ) Mount the two spring catch pins with 6-32 nuts and #6 lockwashers. The nuts are on the same side as the pull ring. Leave the nuts slightly loose.

( ) Temporarily insert the Model XP-2 in the rear of the Model GC-1A cabinet. This will automatically center the two spring catch pins. Now tighten the nuts on the spring catch pins.

( ) Remove the Model XP-2 power supply from the Model GC-1A cabinet.

The Model XP-2 Power Supply is now ready for installation in the Model GC-1A Receiver.

CABINET INSTALLATION

Grasp the miniature power plug in the rear of the Model GC-1A Receiver and plug it into the socket of the Model XP-2 Power Pack. Plug the power pack in the cutout in the rear of the receiver cabinet by means of the two spring catch pins.

TEST PROCEDURE

Plug the line cord in an electric outlet carrying 117 V AC and proceed with the tests described in the Model GC-1A manual.

INSTALLATION AND OPERATION

The receiver should be placed in reach of an AC electrical outlet socket. Once the line cord has been plugged in, the power pack will supply the receiver in which it is mounted and requires no further attention.

If it is desired to have the Model GC-1A Receiver operated by the battery power supply, disconnect the line cord of the Model XP-2 Power Supply from the electric outlet, pull the unit out from the cabinet with an easy grip on the pull ring, remove the power plug of the receiver from the Model XP-2 Power Supply unit and replace it with the battery power supply unit.

IN CASE OF DIFFICULTY

WARNING: When checking with the line cord connected to the AC outlet, do not touch any connection on terminal strip B.

1. 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.

2. It is interesting to note that about 90% of the kits that are returned for repair are defective due to poor connections and soldering. Therefore, many troubles can be eliminated by reheating all connections to make sure that they are soldered as illustrated in the Figures found in the SOLDERING TECHNIQUES section of this manual.

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

4. If, after careful checks, the trouble is still not located and a voltmeter is available, check voltage readings against those found on the Schematic Diagram. NOTE: All voltage readings were taken with a HEATHKIT Vacuum Tube Voltmeter. Voltages may vary 10% due to line voltage variations.

5. A review of the CIRCUIT DESCRIPTION and Diagrams will prove helpful in indicating where to look for trouble.

6. When the fuse in the Model XP-2 Power Pack is blown, it may be replaced by the spare fuse supplied with the kit. Before replacement, check for a possible cause of the short circuit in the power pack and in the receiver.

   Remove the Fiberglas sleeving from the old fuse and slip it over the new fuse before soldering it from lug 1 to lug 3 of terminal strip B.

7. IMPORTANT NOTE: Since the pilot lights of the receiver are connected as a bleeder resistor of the power supply, the operation of the power supply may be affected when a pilot light is burned out. If the pilot lights of the receiver remain dark while the receiver is operating, the faulty pilot light should be replaced as soon as possible, following the instructions in the Model GC-1A Receiver manual. If checks of the Model XP-2 Power Pack reveal nothing wrong, then the following checks should be performed:

   ( ) Disconnect the line cord from the electric outlet.

   ( ) Replace the Model XP-2 Power Supply unit with a battery power supply unit.

Now proceed with the tests described in the chapter, IN CASE OF DIFFICULTY of the Model GC-1A manual. After the fault has been found and corrected, the Model XP-2 Power Pack may be reconnected to the Model GC-1A Receiver.

SERVICE

If, after applying the information contained in this manual and your best efforts, you are still unable to obtain proper performance, it is suggested that you take advantage of the technical facilities which the Heath Company makes available to its customers.

The Technical Consultation Department is maintained for your benefit. This service is available to you at no charge. Its primary purpose is to provide assistance for those who encounter difficulty in the construction, operation or maintenance of HEATHKIT equipment. It is not intended, and is not equipped to function as a general source of technical information involving kit modifications nor anything other than the normal and specified performance of HEATHKIT equipment.

Although the Technical Consultants are familiar with all details of this kit, the effectiveness of their advice will depend entirely upon the amount and the accuracy of the information furnished by you. In a sense, YOU MUST QUALIFY for GOOD technical advice by helping the consultants to help you. Please use this outline:

1. Before writing, fully investigate each of the hints and suggestions listed in this manual under "IN CASE OF DIFFICULTY." Possibly it will not be necessary to write.
2. When writing, clearly describe the nature of the trouble and mention all associated equipment. Specifically report operating procedures, switch positions, connections to other units and anything else that might help to isolate the cause of trouble.
3. Report fully on the results obtained when testing the unit initially and when following the suggestions under "IN CASE OF DIFFICULTY." Be as specific as possible and include voltage readings if test equipment is available.
4. Identify the kit model number and date of purchase if available. Also mention the date of the kit assembly manual. (Date at bottom of Page 1.)
5. Print or type your name and address, preferably in two places on the letter.

With the preceding information, the consultant will know exactly what kit you have, what you would like it to do for you and the difficulty you wish to correct. The date of purchase tells him whether or not engineering changes have been made since it was shipped to you. He will know what you have done in an effort to locate the cause of trouble and, thereby, avoid repetitious suggestions. In short, he will devote full

time to the problem at hand, and through his familiarity with the kit, plus your accurate report, he will be able to give you a complete and helpful answer. If replacement parts are required, they will be shipped to you, subject to the terms of the warranty.

The Factory Service facilities are also available to you, in case you are not familiar enough with electronics to provide our consultants with sufficient information on which to base a diagnosis of your difficulty, or in the event that you prefer to have the difficulty corrected in this manner. You may return the completed instrument to the Heath Company for inspection and necessary repairs and adjustments. You will be charged a minimal service fee, plus the price of any additional parts or material required. However, if the completed kit is returned within the Warranty period, parts charges will be governed by the terms of the Warranty. State the date of purchase, if possible.

Local Service by Authorized HEATHKIT Service Centers is also available in some areas and often will be your fastest, most efficient method of obtaining service for your HEATHKIT equipment. Although you may find charges for local service somewhat higher than for factory service, the amount of increase is usually offset by the transportation charge you would pay if you elected to return your kit to the Heath Company.

HEATHKIT Service Centers will honor the regular 90 day HEATHKIT Parts Warranty on all kits, whether purchased through a dealer or directly from Heath Company; however, it will be necessary that you verify the purchase date of your kit.

Under the conditions specified in the Warranty, replacement parts are supplied without charge; however, if the Service Center assists you in locating a defective part (or parts) in your kit, or installs a replacement part for you, you may be charged for this service.

HEATHKIT equipment purchased locally and returned to Heath Company for service must be accompanied by your copy of the dated sales receipt from your authorized HEATHKIT dealer in order to be eligible for parts replacement under the terms of the Warranty.

THIS SERVICE POLICY APPLIES ONLY TO COMPLETED EQUIPMENT CONSTRUCTED IN ACCORDANCE WITH THE INSTRUCTIONS AS STATED IN THE MANUAL. Equipment that has been modified in design will not be accepted for repair. If there is evidence of acid core solder or paste fluxes, the equipment will be returned NOT repaired.

For information regarding modification of HEATHKIT equipment for special applications, it is suggested that you refer to any one or more of the many publications that are available on all phases of electronics. They can be obtained at or through your local library, as well as at most electronic equipment stores. Although the Heath Company sincerely welcomes all comments and suggestions, it would be impossible to design, test, evaluate and assume responsibility for proposed circuit changes for special purposes. Therefore, such modifications must be made at the discretion of the kit builder, using information available from sources other than the Heath Company.

REPLACEMENTS

Material supplied with HEATHKIT products has been carefully selected to meet design requirements and ordinarily will fulfill its function without difficulty. Occasionally improper instrument operation can be traced to a faulty component. Should inspection reveal the necessity for replacement, write to the Heath Company and supply all of the following information.

A. Thoroughly identify the part in question by using the part number and description found in the manual Parts List.

B. Identify the type and model number of kit in which it is used.

C. Mention date of purchase.

D. Describe the nature of defect or reason for requesting replacement.

The Heath Company will promptly supply the necessary replacement. PLEASE DO NOT RETURN THE ORIGINAL COMPONENT UNTIL SPECIFICALLY REQUESTED TO DO SO. Do not dismantle the component in question as this will void the guarantee. This replacement policy does not cover the free replacement of parts that may have been broken or damaged through carelessness on the part of the kit builder.

SHIPPING INSTRUCTIONS

When you have performed the tests described under the heading IN CASE OF DIFFICULTY and have found the troublesome unit, either the Model XP-2 Power Pack or the Model GC-1A Receiver -- send the troublesome unit only. If you cannot establish which unit is the faulty one--ship both units.

In the event that your instrument must be returned for service, these instructions should be carefully followed.

ATTACH A TAG TO THE EQUIPMENT BEARING YOUR NAME, COMPLETE ADDRESS, DATE OF PURCHASE, AND A BRIEF DESCRIPTION OF THE DIFFICULTY ENCOUNTERED. Wrap the equipment in heavy paper, exercising care to prevent damage. Place the wrapped equipment in a stout carton of such size that at least three inches of shredded paper, excelsior, or other resilient packing material can be placed between all sides of the wrapped equipment and the carton. Close and seal the carton with gummed paper tape, or alternately, tie securely with stout cord. Clearly print the address on the carton as follows:

To: HEATH COMPANY
Benton Harbor, Michigan

Include your name and return address on the outside of the carton. Preferably affix one or more "Fragile" or "Handle With Care" labels to the carton, or otherwise so mark with a crayon of bright color. Ship by insured parcel post or prepaid express; note that a carrier cannot be held responsible for damage in transit, if in HIS OPINION, the article is inadequately packed for shipment. Your Model XP-2 will be returned by express collect.

SPECIFICATION CHANGES

All prices are subject to change without notice. The Heath Company reserves the right to discontinue instruments and to change specifications at any time without incurring any obligation to incorporate new features in instruments previously sold.

WARRANTY

Heath Company warrants that all Heathkit parts shall be free of all defects in materials and workmanship under normal use and service, and in fulfillment of such warranty Heath Company will, for a period of three months from the date of shipment, replace any part upon verification that it is defective.

The foregoing warranty shall apply only to the original buyer, and is and shall be in lieu of all other warranties, whether express or implied and of all other obligations or liabilities on the part of Heath Company and in no event shall Heath Company be liable for any anticipated profits, consequential damages, loss of time or other losses incurred by the buyer in connection with the purchase, assembly or operation of Heathkits or components thereof. No replacement shall be made of parts damaged by the buyer in the course of handling or assembling Heathkit equipment.

The foregoing warranty is completely void if corrosive solder or fluxes have been used in wiring the equipment. Heath Company will not replace or repair any equipment in which corrosive solder or fluxes have been used.

This warranty applies only to Heath equipment sold and shipped within the continental United States including APO and FPO shipments. Warranty replacements for Heathkit equipment outside the United States is on a f.o.b. factory basis. Contact the Heathkit authorized distributor in your country or write: Heath Company, International Division, Benton Harbor, Michigan, U.S.A.

HEATH COMPANY

PARTS LIST

PART No.	PARTS Per Kit	DESCRIPTION
Resistors-Capacitors		
2-60	2	.483 Ω 1% resistor
25-78	2	1000 mfd 15 V electrolytic capacitor
Transformer		
54-96	1	Power transformer
Rectifiers-Fuses		
57-29	2	500 milliampere 50 PIV silicon diode rectifier
421-12	1	1/8 ampere pigtail fuse
Terminal Strips		
431-4	2	3-lug vertical terminal strip
431-33	2	3-lug terminal strip
Metal Parts		
100-M254F	1	Mounting plate
214-M8	1	Housing
Hardware		
250-49	2	3-48 x 1/4" screw
250-56	10	6-32 x 1/4" binding head screw
251-1	4	6-32 spade bolt
252-1	2	3-48 nut
252-3	16	6-32 nut
254-1	16	#6 lockwasher
254-7	2	#3 lockwasher
262-4	2	Spring catch pin
Wire-Sleeving		
340-2	1	Length bare wire
344-2	1	Length #18 stranded hookup wire
346-1	1	Length 1/16" sleeving
346-6	1	Length 3/8" fiber glass sleeving
Miscellaneous		
73-1	1	Rubber grommet
89-1	1	Line cord
434-16	1	9-pin socket
331-6		Solder
595-309	1	Instruction manual