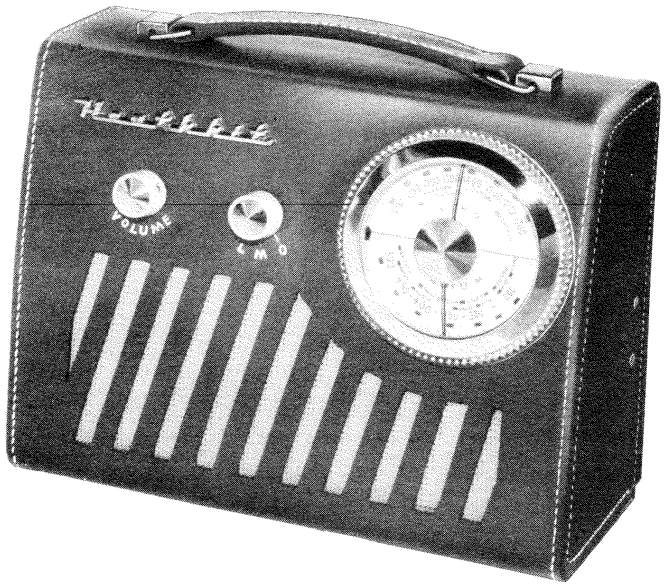
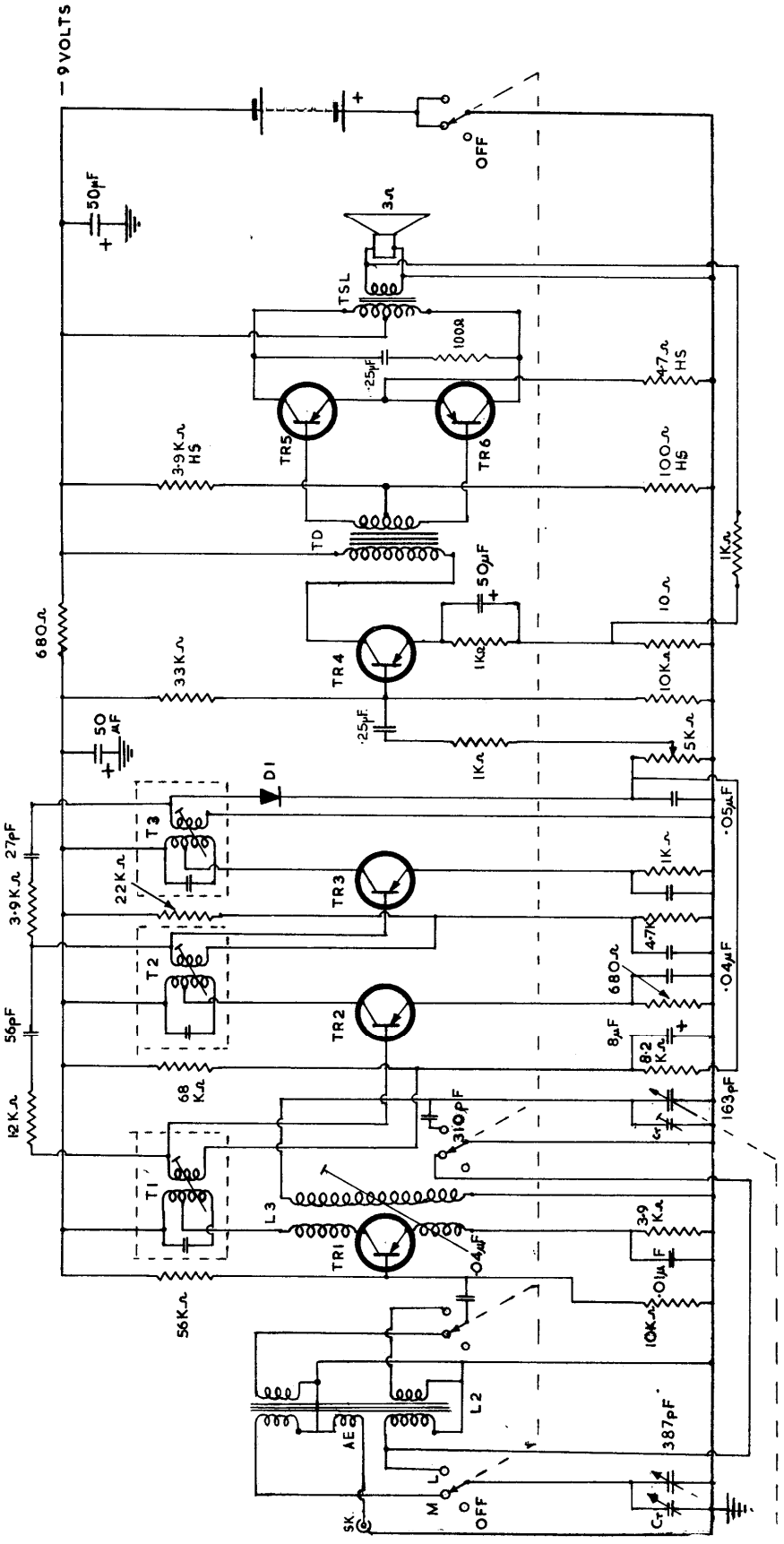


INTRODUCTION

The Model UXR-1 is a six transistor superheterodyne receiver of advanced design using the latest printed circuit techniques to ensure the utmost reliability, consistency and ease of assembly. Both the medium and long wave bands are covered and the extra large 7" x 4" high flux speaker will give excellent tone and volume. The extremely attractive case is made of first grade hard wearing leather which will give many years of service and the controls are gold trimmed matching the elegant speaker fabric.

SPECIFICATIONS

Tuning Range	200-550 metres (1500-535 kc/s.) 1000-1875 metres (300-160 kc/s.)
Sensitivity	15 μV for 50 mW output.
Loudspeaker	7" x 4" High flux, wide angle diffusion.
Battery	Drydex DT9, Ever Ready PP9.
Battery life	300-400 hours average use.
Transistors	Mullard 1 - OC44, 2 - OC45, 1 - OC81D and 2 - OC81 plus 1 - OA81 Diode.
Printed Board	Standard E. 17148 High Grade Electrical laminate with .0015 copper foil.
Case	Solid cowhide leather throughout.
Weight with battery	5 lbs.
Shipping weight	5 lbs. 8 ozs.



CIRCUIT FOR TRANSISTOR RECEIVER. MODEL UXR-1.

PRELIMINARY NOTES AND INSTRUCTIONS

The Step-by-Step instructions given in this manual should be followed implicitly to ensure a minimum of difficulty during construction and a completely satisfactory result, including many years of accurate, trouble-free service from the finished instrument.

UNPACK THE KIT CAREFULLY, EXAMINE EACH PART AND CHECK IT AGAINST THE PARTS LIST. In so doing, you will become acquainted with the parts. If a shortage is found, attach the inspection slip to your claim and notify us promptly. Screws, nuts and washers are counted mechanically and if a few are missing, please obtain them locally if at all possible.

Lay out all the parts so that they are readily available in convenient categories. Refer to the general information inside the covers of this manual for instructions on how to identify components.

Moulded egg containers make handy trays for holding small parts. Resistors and capacitors may be placed in the edge of a corrugated cardboard box until they are needed.

Use lockwashers under all screws and nuts, and also between controls and the chassis. When solder lugs are mounted under nuts, the use of lockwashers is unnecessary.

Resistors and capacitors have a tolerance rating of ± 10% unless otherwise stated. Therefore a 100K ohm resistor may test anywhere between 90 and 110K ohms. Frequently capacitors show an even greater variation such as -50% to +100%. This Heathkit accommodates such variations.

Unless otherwise stated all wire used is insulated. Bare wire is only used where lead lengths are short and there is no possibility of a short-circuit. Wherever there is a possibility of the bare wire leads of resistors or capacitors, etc., shorting to other parts or to chassis, such leads must be covered with insulated sleeving.

To facilitate describing the location of parts, all valveholders, controls, tag strips, etc., have been lettered or numbered. Where necessary all such coding is clearly shown in the illustrations. When instructions say, for example, "wire to socket G3". refer to the proper figure and connect a wire to tag 3 of socket G.

All rotary switch tags are numbered clockwise when viewed from the rear of the wafer, i.e. the end remote from the knob.

All resistors may be wired either way round.

All capacitors, excepting electrolytic capacitors, may be wired either way round.

Carefully letter and number tag strips, valveholders, transformers, etc. A wax pencil is ideal for this purpose.

When mounting resistors and capacitors make sure that the value can be read when in position.

Observe polarity on all alectrolytic capacitors, i.e. RED = POSITIVE.

Where connections to the "Busbar" are referred to in the Step-by-Step instructions, the connections should be made to the nearest point.

A circuit description is included in this manual so that those with some knowledge of electronics will be able to obtain a clearer picture of the actual functioning of this instrument. It is not expected that those with little experience will understand the description completely, but it should be of help in the event that they desire to become more familiar with the circuit operation and thus learn more from

building the kit than just the placing of parts and the wiring.

Read this manual right through before starting actual construction. In this way, you will become familiar with the general step-by-step procedure used. Study the pictorials and diagrams to get acquainted with the circuit layout and location of parts. When actually assembling and wiring, READ THROUGH THE WHOLE OF EACH STEP so that no point will be missed.

A tick (✓) should be made in the space provided at the beginning of each instruction immediately it has been completed. This is most important as it will avoid omissions or errors, especially whenever work is interrupted in the course of construction. Some Kit-builders have found it helpful in addition to mark each lead in the pictorial in coloured pencil as it is completed.

Successful instrument construction requires close observance of the step-by-step procedure outlined in this manual. For your convenience, some illustrations may appear in large size folded sheets. It is suggested that these sheets be fastened to the wall over your work area for reference purposes during instrument construction.

The Company reserves the right to make such circuit modifications and/or component substitutions as may be found desirable, indication being by "Advice of Change" included in the Kit.

NOTE: Daystrom Ltd. will not accept any responsibility or liability for any damage or personal injury sustained during the building, testing, or operation of this instrument.

ALL GUARANTEES ARE VOIDED AND WE WILL NOT REPAIR OR SERVICE INSTRUMENTS IN WHICH ACID CORE SOLDER OR PASTE FLUXES HAVE BEEN USED. WHEN IN DOUBT ABOUT SOLDER, IT IS RECOMMENDED THAT ONLY "60/40" RESIN CORE RADIO SOLDER BE PURCHASED.

PROPER SOLDERING PROCEDURE

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

Correct soldering technique is extremely important. Good soldered joints are essential if the performance engineered into the kit is to be fully realised. If you are a beginner with no experience in soldering, half an hour's practice with odd lengths of wire and a valveholder, etc., will be invaluable.

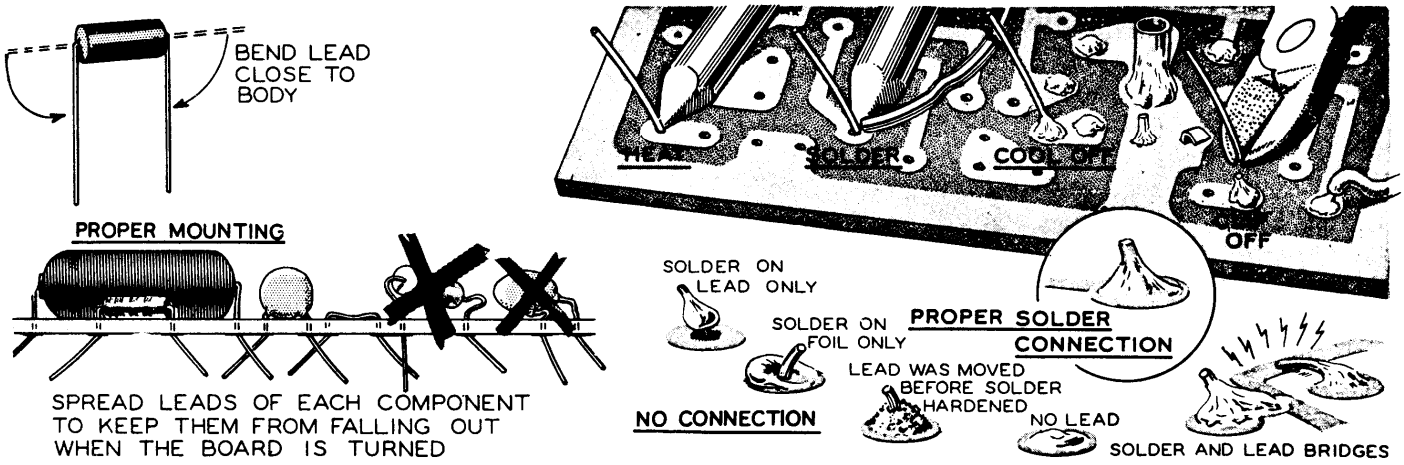
Highest quality resin-cored solder is essential for efficiently securing this kit's wiring and components. The resin core acts as a flux or cleaning agent during the soldering operation.

NO SEPARATE FLUX OR PASTE OF ANY KIND SHOULD BE USED. We specifically caution against the use of so-called "non-corrosive" pastes or liquids. Such compounds, although not corrosive at room temperatures, will form residues when heated. These residues are deposited on surrounding surfaces and attract moisture. The resulting compounds are not only corrosive but actually destroy the insulation value of non-conductors. Dust and dirt will tend to accumulate on these "bridges" and eventually will cause erratic or degraded performance of the instrument.

IMPORTANT

IN THE "STEP-BY-STEP" PROCEDURE the abbreviation "NS" indicates that the connection should not yet be soldered, for other wires will be added. At a later stage the letter "S" indicates that the connection must now be soldered. Note that a number appears after each solder (S) instruction. This number indicates the number of leads connected to the terminal in question. For example, if the instructions read, "Connect one lead of a 47 K ohm resistor to tag 1 (S-2)", it will be understood that there should be two leads connected to the terminal at the time it is soldered. This additional check will help to avoid errors.

When two or more connections are made to the same solder tag a common mistake is to neglect to solder the connections on the bottom. Make sure all the wires are soldered.



CIRCUIT BOARD WIRING AND SOLDERING

Before attempting any work on the circuit board, read the following instructions carefully and study the figures shown. It is only necessary to observe a few basic precautions which will ensure proper operation of the unit the first time it is turned on.

Proper mounting of components on the board is essential for good performance. A good general rule to follow is that all components on the board should be mounted tightly to the board, unless instructions state otherwise. All leads should be kept as short as possible to minimize the effects of stray capacity in the wiring. Proper and improper methods of mounting are illustrated in the accompanying Figures.

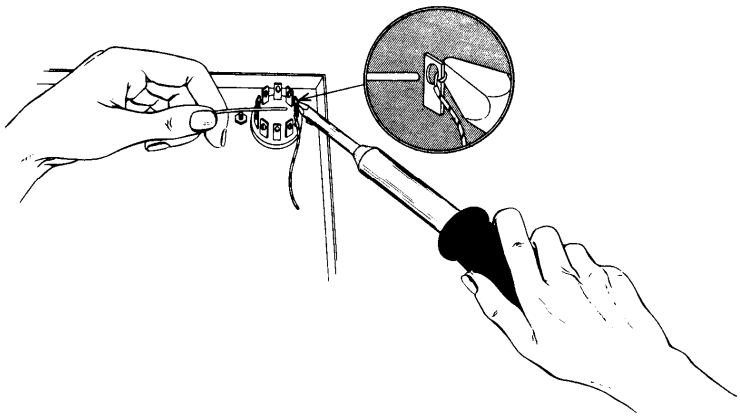
Tubular capacitors and resistors will fit properly if the leads are bent, as shown. Disc capacitors will generally fit in place with no lead preparation other than determining that the leads are straight. Components with tags normally require no preparation unless the tags appear to be bent, in which case they can be straightened with a pair of pliers. Parts should be inserted as instructed, and the leads bent outward slightly, as illustrated, to lock them in place.

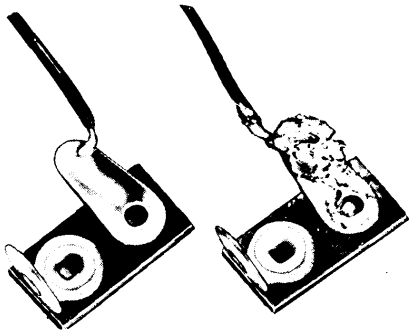
Components will be soldered in groups: after a group of components have been installed, instructions will be given to solder them. When the components have been soldered, diagonal cutters may be used to cut off the excess leads close to the board.

The actual technique of soldering leads to a circuit board is quite simple. Position the tip of the soldering iron so that it firmly contacts both the circuit board foil and the wire or tag to be soldered, as shown. Then the solder should immediately be placed between the iron and the joint to be soldered. Remove the solder as soon as it begins to melt and flow on to the lead and foil. Hold the tip of the iron in place only until the solder begins to flow outward over the foil. Then remove the iron quickly. USE THE SMALL GAUGE SOLDER FOR THE PRINTED BOARD.

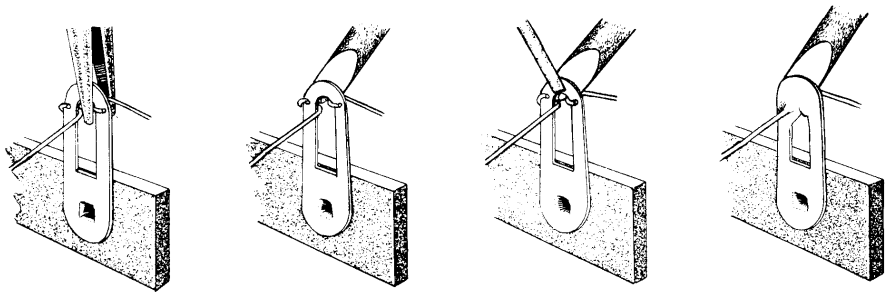
Avoid overheating the connection. A soldering pencil or small iron (approximately 30 watts) is ideal for use in circuit board work. If a higher wattage iron or soldering gun must be used, precautions must be taken to avoid circuit board damage due to overheating.

The use of excessive amounts of solder will increase the possibility of bridging between foil conductors or plugging holes which are to be left open for wires which may be added later on. If solder is accidentally bridged across insulating areas between conductors, it can be cleaned off by heating the connection carefully and quickly wiping the solder away with a soft cloth. Holes which become plugged can be cleared by heating the area immediately over the hole while gently pushing the lead of a resistor through the hole from the opposite side, and withdrawing the lead before the solder rehardens. Do not force the wire through: too much pressure before the solder has time to soften may separate the foil from the board. In cases where foil does become damaged, repairs can usually be made with little difficulty. A break in the foil can be rejoined with a small piece of bare wire soldered across the gap, or between the foil and the lead of a component.

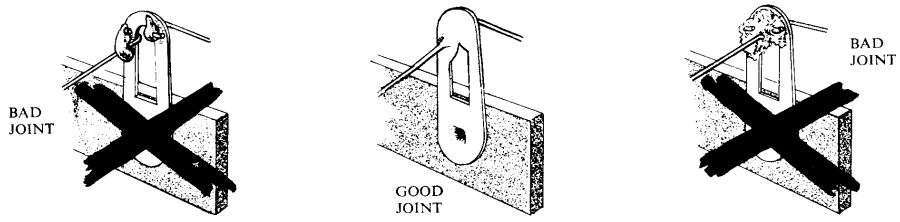




If the tags are bright and clean and wires free of wax, frayed insulation and other foreign substances, no difficulty will be experienced in soldering. Crimp or otherwise secure the wire (or wires) to the terminal, so a good mechanical joint is made without relying on solder for physical strength.



1. CRIMP WIRES
2. HEAT CONNECTION
3. APPLY SOLDER
ALLOW SOLDER TO FLOW



COLD SOLDER JOINT
CONNECTION INSUFFICIENTLY HEATED

PROPER SOLDERED CONNECTION

COLD SOLDER JOINT
CONNECTION MOVED WHILE COOLING

Typical good and bad soldered joints are shown above.

A poor soldered joint will usually be indicated by its appearance. The solder will stand up in a blob on top of the connection, with no evidence of flowing out caused by actual "wetting" of the contact. A crystalline or grainy texture on the solder surface caused by movement of the joint before it solidifies is another evidence of a "cold" connection and possible "dry joint". In either event, reheat the joint until the solder flows smoothly over the entire junction, cooling to a smooth, bright appearance.

To make a good soldered joint, the clean tip of the hot soldering iron should be placed against the joint to be soldered so that the flat tag is heated sufficiently to melt the solder. Resin core solder is then placed against both the tag and the tip of the iron and should immediately flow over the joint. See illustrations. Use only enough solder to cover the wires at the junction; it is not necessary to fill the entire hole in the tag with solder. Don't allow excess solder to flow into valveholder contacts, ruining the sockets, or to creep into switch sockets and destroy their spring action. Position the work so that

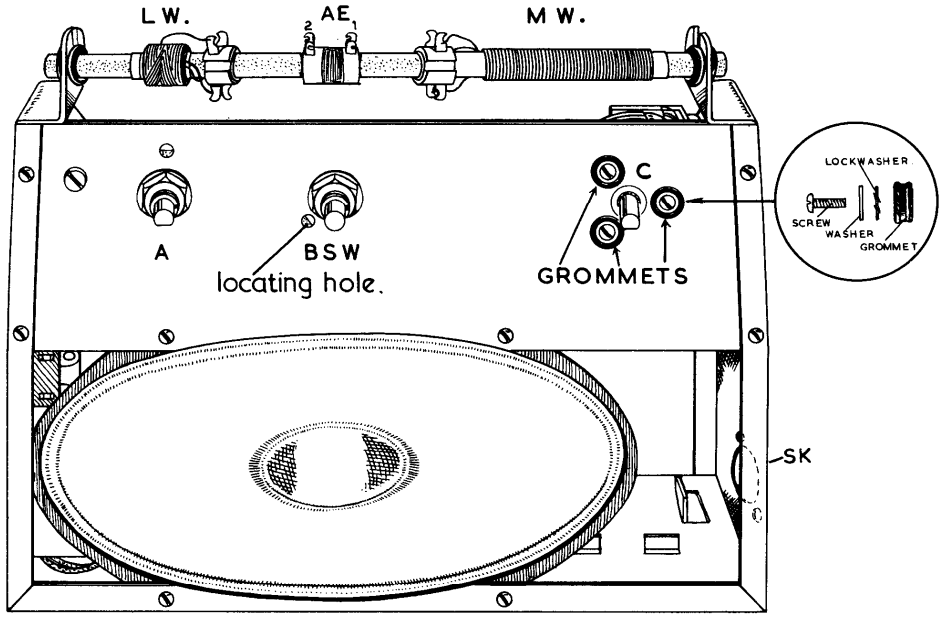
gravity tends to keep the solder where you want it.

A clean, well-tinned soldering iron is also important to obtain consistently perfect connections. For most wiring, a 30 to 50 watt iron, or the equivalent in a soldering gun, is very satisfactory. Keep the iron hot and its tip and the connections to be soldered bright and clean. Always place the solder on the heated "work" and then place the bit on top of the solder until it flows readily and "wets" the joint being made. Don't take the solder on to the bit and then try to bring it to the work directly from the soldering iron. Whenever possible a joint should be secured mechanically by squeezing tight with pliers prior to soldering it. The hot soldering bit should frequently be scraped clean with a knife, steel wool or a file, or wiped clean quickly by means of a rag or steel wool.

Don't apply too much solder to the soldered joint. Don't apply the solder to the iron only, expecting that it will roll down onto the connection. Try to follow the instructions and illustrations as closely as possible.

Don't bend a lead more than once around a connecting point before soldering, so that if it should have to come off due to a mistake or for maintenance it will be much easier to remove.

Follow these instructions and use reasonable care during assembly of the kit. This will ensure the deserved satisfaction of having the instrument operate perfectly the first time it is switched on.



CHASSIS - FRONT VIEW - SHOWING MOUNTING OF SPEAKER AND GROMMETS.

PICTORIAL. I.

MOUNTING OF COMPONENTS TO METAL CHASSIS
SEE PICTORIAL 2A

( ) Place chassis (Part No. 200-102B) on your workbench as shown in Pictorial 2A.

( ) Mount the aerial socket to chassis at position SK using 2 - 6BA x $\frac{1}{4}$" screws with lockwashers and nuts.

( ) Mount the control panel (Part No. 200-501B) to chassis using 4 - 6BA x $\frac{1}{4}$" screws with lockwashers and nuts.

( ) Mount the volume control at location A.

( ) Insert 3 small grommets in the holes around the large hole at location C. See Pictorial 1.

( ) Mount the two-gang capacitors at location C using 3 - 4BA x 3/8" screws, flat and lockwashers. Tighten these screws so that the ends just appear through the tapped holes. See Pictorial 1.

( ) Mount the wave-change switch at location BSW using the location hole as shown.

( ) Bend all tags outward as shown in Pictorial 2A. This is to allow clearance for components on circuit board to be added later.

( ) Mount a 4BA solder tag at location H2 using 1 - 4BA x 3/8" screw with lockwasher and nut.

( ) Mount a 1-way tagstrip (with one earth tag) at location J using 1 - 4BA x 3/8" screw with lockwasher and nut.

( ) Mount the large transformer at location TLS using 2 - 4BA x 3/8" screws with lockwashers and nuts.

( ) Mount the eliptical loudspeaker using 4 - 4BA x 3/8" screws with lockwashers and nuts. See Pictorial 1.

( ) Mount a 2-way tagstrip at location M using 1 - 4BA x 3/8" screw with lockwasher and nut.

( ) Mount a 3-way tagstrip at location Y using 1 - 4BA x 3/8" screw with lockwasher and nut.

( ) Insert the two large grommets at locations DF and EF.

( ) Mount the ferrite rod aerial through grommets DF and EF. First inserting the LW end through grommet DF for approximately 1". Then partly withdraw and insert the other end through grom- EF.

( ) Finally adjust the ferrite rod centrally with the BLACK tags facing the chassis rear.

CHASSIS WIRING - SEE PICTORIAL 2B

Note: Where coloured insulated wire is used, strip back the insulation $\frac{1}{4}$" at each end before connecting.

( ) Connect a 2" length of BLACK wire between tag 2 of the AE coil (S-1) to the BLACK tag LW (NS).

( ) Connect a 10" length of BLACK wire between tag 1 of the AE coil (S-1) to the aerial socket SK (S-1). Route as shown.

( ) Connect a 3" length of BLACK wire between BSW2 (NS) and BSW7 (S-1). Dress against panel as shown.

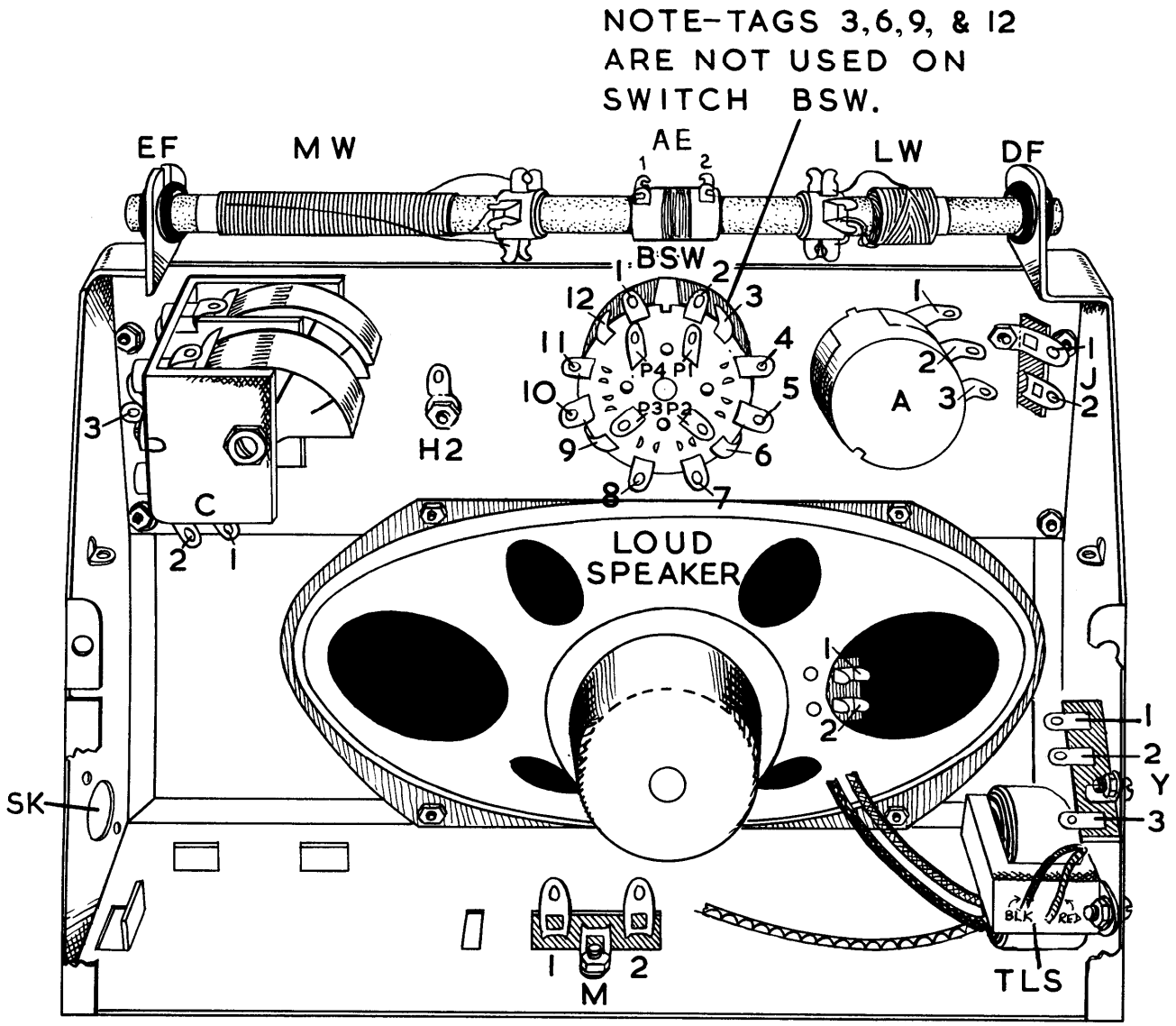
( ) Connect a bare wire link between BSW5 (NS), BSW4 (S-1) and BSW-P1 (S-1).

( ) Connect a 6" length of RED wire between BSW-P2 (S-1) and M1 (NS).

( ) Connect a $3\frac{1}{2}$" length of ORANGE wire between BSW10 (S-1) and the ORANGE tag LW. (Right-hand) coil on ferrite rod.) (S-1).

( ) Connect a $3\frac{1}{2}$" length of RED wire between BSW2 (S-2) and the RED tag LW. (Right-hand coil on ferrite rod.) (S-1).

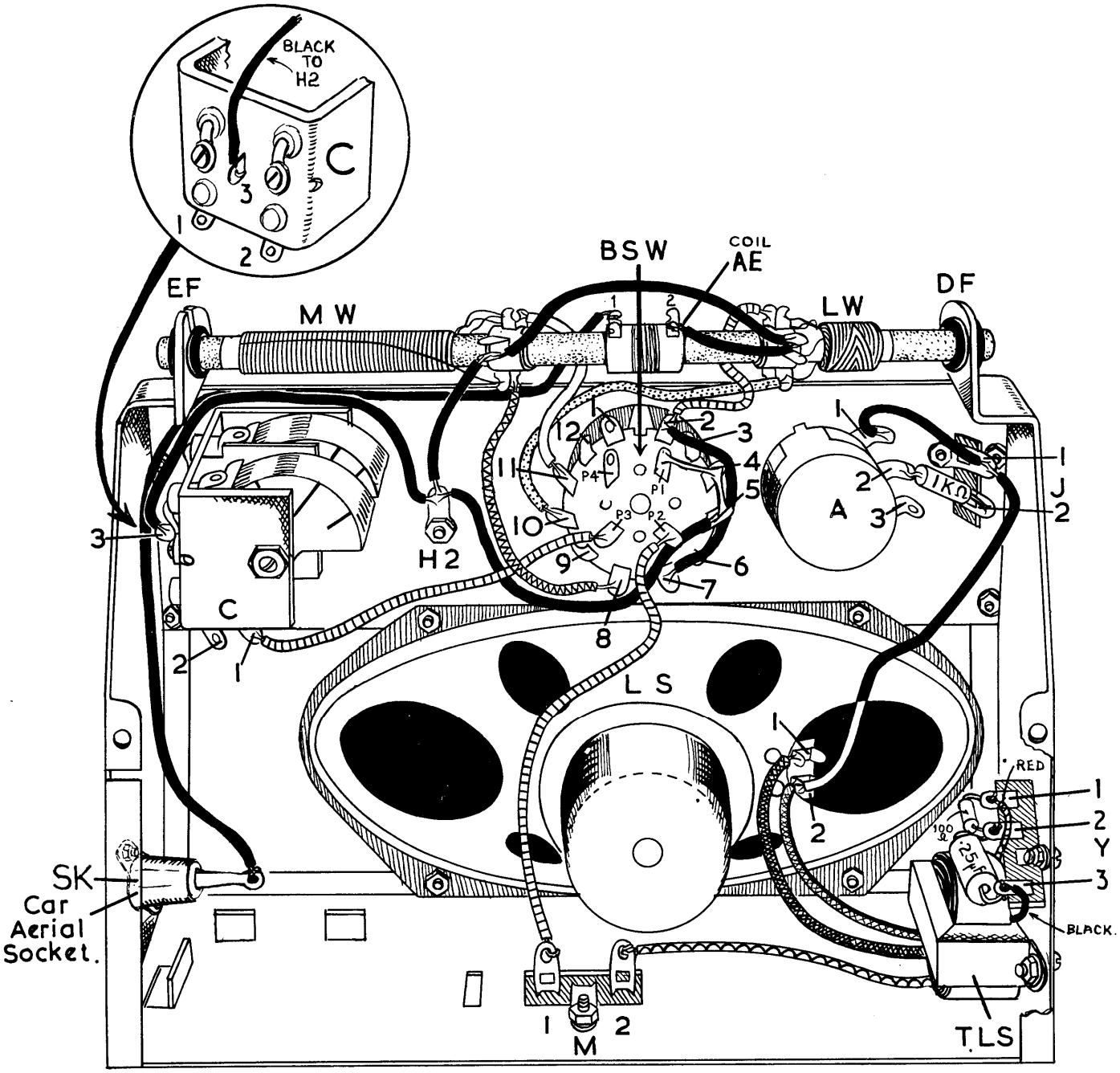
( ) Connect a $3\frac{1}{2}$" length of GREEN wire between BSW8 (S-1) and the GREEN tag MW. (Left-hand coil on ferrite rod.) (S-1).



MOUNTING OF COMPONENTS

TO METAL CHASSIS.

PICTORIAL 2A.



CHASSIS WIRING

PICTORIAL 2B.

( ) Connect a $3\frac{1}{2}$" length of YELLOW wire between BSW11 (S-1) and the YELLOW tag MW. (Left-hand coil on ferrite rod.) (S-1).

( ) Connect a 5" length of RED wire between C1 (S-1) and BSW-P3 (S-1).

( ) Connect a $3\frac{1}{2}$" length of BLACK wire between BLACK tag LW (S-1) and BLACK tag MW (NS).

( ) Connect a 3" length of BLACK wire between H2 (NS) and BSW5 (S-2). Route as shown.

( ) Connect a 3" length of BLACK wire between H2 (NS) and the BLACK tag MW (S-2).

( ) Connect a 4" length of BLACK wire between C3 (S-1) and H2 (S-3).

( ) Connect a $1\frac{1}{2}$" length of BLACK wire between A1 (S-1) and J1 (NS).

( ) Connect a 1 KΩ resistor (BROWN, BLACK, RED) between A2 (S-1) and J2 (NS).

( ) Connect the GREEN wire from transformer TLS to the loudspeaker tag 2 (NS).

( ) Connect a $5\frac{1}{2}$" length of BLACK wire between the loudspeaker tag 2 (S-2) and tagstrip J1 (S-2).

( ) Connect the YELLOW wire from transformer TLS to the loudspeaker tag 1 (NS).

( ) Connect the BROWN wire from transformer TLS to tagstrip M2 (NS).

( ) Connect the RED wire from transformer TLS to 3-way tagstrip Y1 (NS).

( ) Connect the BLACK wire from transformer TLS to Y3 (NS).

( ) Connect a .25 μF capacitor between Y3 (NS) and the centre tag and a 100Ω resistor (BROWN, BLACK, BROWN) between Y1 (NS) and the centre tag (S-2).

MOUNTING OF COMPONENTS TO CIRCUIT BOARD
SEE PICTORIAL 3

Resistors and other components:
IMPORTANT: When mounting components to the circuit board MAKE SURE THAT THE WIRE LEADS ARE REALLY CLEAN and that each component sits as closely as possible to the board before soldering. Bend wires to suit location holes. Carefully examine each joint after soldering referring to Figure 1 and Page 6 for examples of good and bad soldering.

Do not solder any resistors until told to do so.

( ) Connect a 10 KΩ resistor (BROWN, BLACK, ORANGE) on the left-hand side of circuit board.

( ) Connect a 56 KΩ resistor (GREEN, BLUE, ORANGE).

( ) Connect a 68 KΩ resistor (BLUE, GREY, ORANGE).

( ) Connect an 8.2 KΩ resistor (GREY, RED, RED).

( ) Connect a 1.2 KΩ resistor (BROWN, RED, RED).

( ) Connect a 680Ω resistor (BLUE, GREY, BROWN).

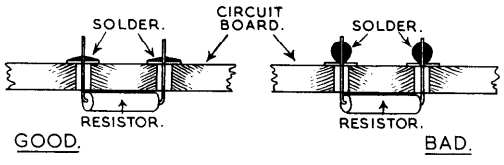
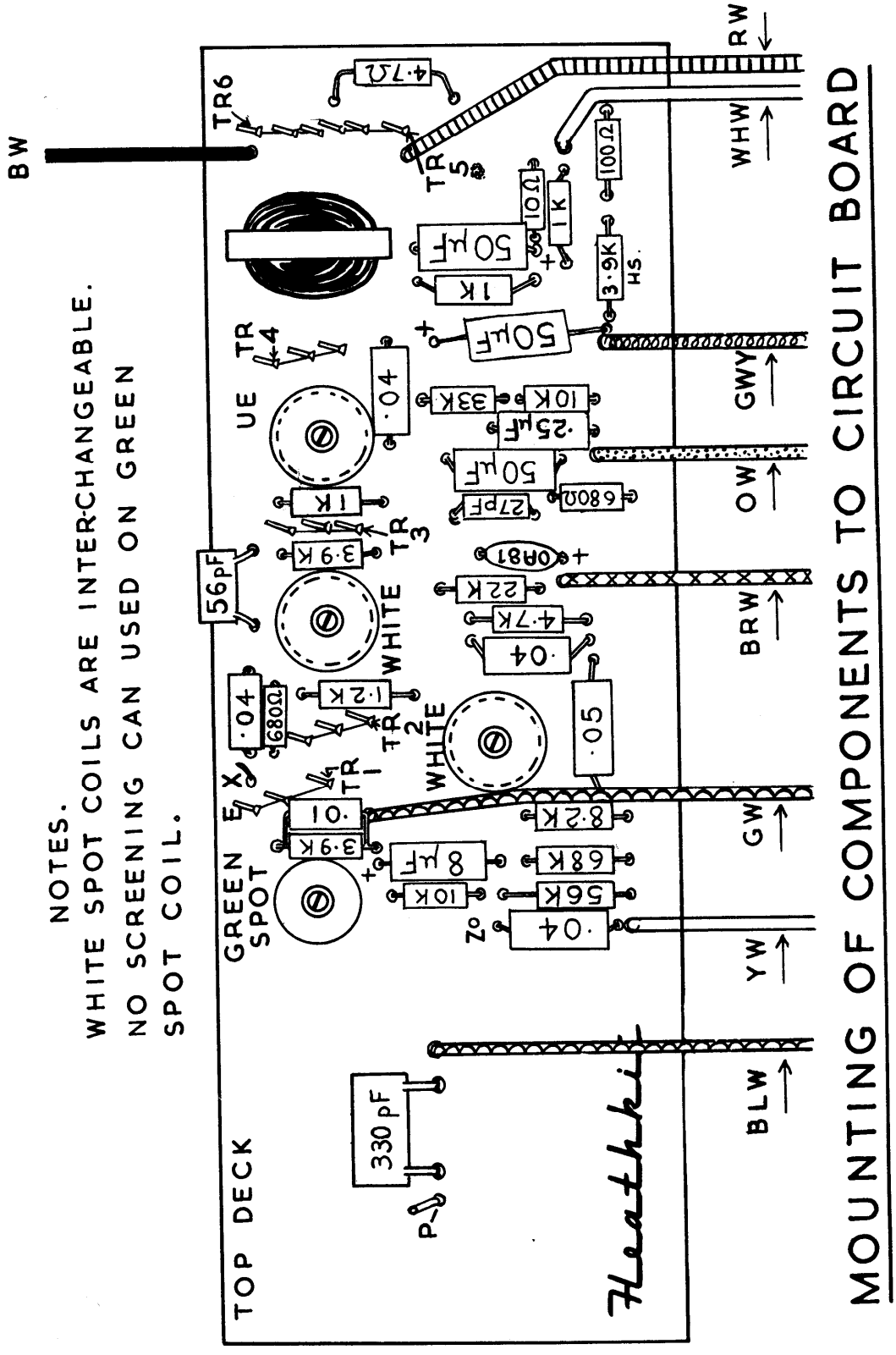


FIGURE - 1.

( ) Connect a 4.7 KΩ resistor (YELLOW, VIOLET, RED).

( ) Connect a 22 KΩ resistor (RED, RED, ORANGE).

( ) Connect a 3.9 KΩ resistor (ORANGE, WHITE, RED).


NOTES.
WHITE SPOT COILS ARE INTER-CHANGEABLE.
NO SCREENING CAN USED ON GREEN SPOT COIL.
MOUNTING OF COMPONENTS TO CIRCUIT BOARD
TOP DECK
BW
RW
WHW
GWY
OW
BRW
GW
YW
BLW
TR6
TR5
TR4
TR3
TR2
TR1
UE
WHITE
WHITE
GREEN SPOT
4·7Ω
100Ω
10Ω
1K
50µF
1K
3·9K
HS
50µF
·04
33K
10K
·25µF
50µF
27pF
680Ω
1K
3·9K
56pF
OA81
22K
4·7K
·04
·04
680Ω
1·2K
·05
·10
3·9K
8·2K
8µF
68K
10K
56K
·04
330pF
P
Heathkit

PICTORIAL 3.

( ) Connect a 1 KΩ resistor (BROWN, BLACK, RED).

( ) Connect a 680Ω resistor (BLUE, GREY, BROWN).

( ) Connect a 33 KΩ resistor (ORANGE, ORANGE, ORANGE).

( ) Connect a 10 KΩ resistor (BROWN, BLACK, ORANGE).

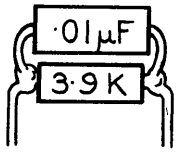
( ) Connect a 1 KΩ resistor (BROWN, BLACK, RED).

( ) Connect a 10Ω resistor (BROWN, BLACK, BLACK).

( ) Connect a 3.9 KΩ HIGH STABILITY resistor (value marked on body). Location marked HS on circuit board.

( ) Connect a 100Ω HIGH STABILITY resistor (value marked on body).

( ) Connect a 4.7Ω HIGH STABILITY resistor (value marked on body).



RESISTOR AND CAPACITOR ASSEMBLY FIG.3

( ) Connect a 1 KΩ resistor (BROWN, BLACK, RED).

( ) Select a 3.9 KΩ resistor (ORANGE, WHITE, RED) and a .01 uF capacitor. Then solder together as shown in Figure 3.

( ) Connect the 3.9 KΩ resistor and .01 μF capacitor to the circuit board.

( ) Now check all resistors now mounted on the circuit board for correct value in the correct position.

( ) Solder all resistor wire ends to the circuit board. Cut off all protruding wires as close as possible.

Electrolytic Capacitors:

Note: The mounting of all electrolytic capacitors will now be described. OBSERVE POLARITY, i.e. RED end to position indicated +.

( ) Connect a 50 μF capacitor.

( ) Connect a 50 μF capacitor.

( ) Connect a 50 μF capacitor.

( ) Connect an 8 μF capacitor.

Paper Capacitors:

( ) Connect the 4 - .04 μF capacitors to the positions shown.

( ) Connect the .05 μF capacitor to the position shown.

( ) Connect the .25 μF capacitor to the position shown.

Silver Mica Capacitors:

( ) Connect a 330 pF capacitor.

( ) Connect a 56 pF capacitor.

( ) Connect a 27 pF capacitor.

( ) Solder all capacitor wire ends the the circuit board. Cut off all protruding wires as close as possible.

MOUNTING OF SPILLS

( ) Insert the 19 soldering spills (short ends) at locations E, B, C and P and squeeze them to retain until soldered.

( ) Now solder each of the 19 spills.

MOUNTING OF COIL AND TRANSFORMERS

( ) Mount an IF transformer (WHITE spot) (solder each tag).

( ) Mount an IF transformer (WHITE spot) (solder each tag).

( ) Mount an IF transformer (BLUE spot) (solder each tag).

( ) Mount the oscillator coil (GREEN spot). The GREEN spot on the coil BASE must face the GREEN spot on the top of the circuit board (solder each tag). See Figure 4.

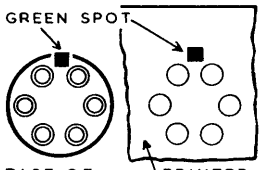


FIG. 4

( ) Mount the driver transformer TD, solder and cut off surplus wire from all transformers.

( ) Mount the crystal detector D1, position RED end + as shown. Now solder and trim wire ends.

( ) Strip back the insulation $\frac{1}{4}$" at each end of a $2\frac{1}{2}$" and $1\frac{1}{2}$" length of BLACK wire.

( ) Refer to Pictorial 4 and an unoccupied hole will be found near each IF transformer can.

( ) From the hole near the blue transformer take the $2\frac{1}{2}$" long insulated wire link to the hole near the adjacent white transformer.

( ) Take the $1\frac{1}{2}$" long insulated wire link from the same white transformer to the other white transformer.

( ) Solder all three points.

EXTERNAL WIRING FROM CIRCUIT BOARD

( ) Connect one end of a 5" length of GREEN wire to location GW (S-1). Remove 1" of insulation from other end.

( ) Connect one end of a 5" length of BLUE wire to location BLW (S-1).

( ) Connect one end of a 4" length of YELLOW wire to location YW (S-1).

( ) Connect one end of a 4" length of RED wire to location RW (S-1).

( ) Connect one end of a $4\frac{1}{2}$" length of WHITE wire to location WHW (S-1).

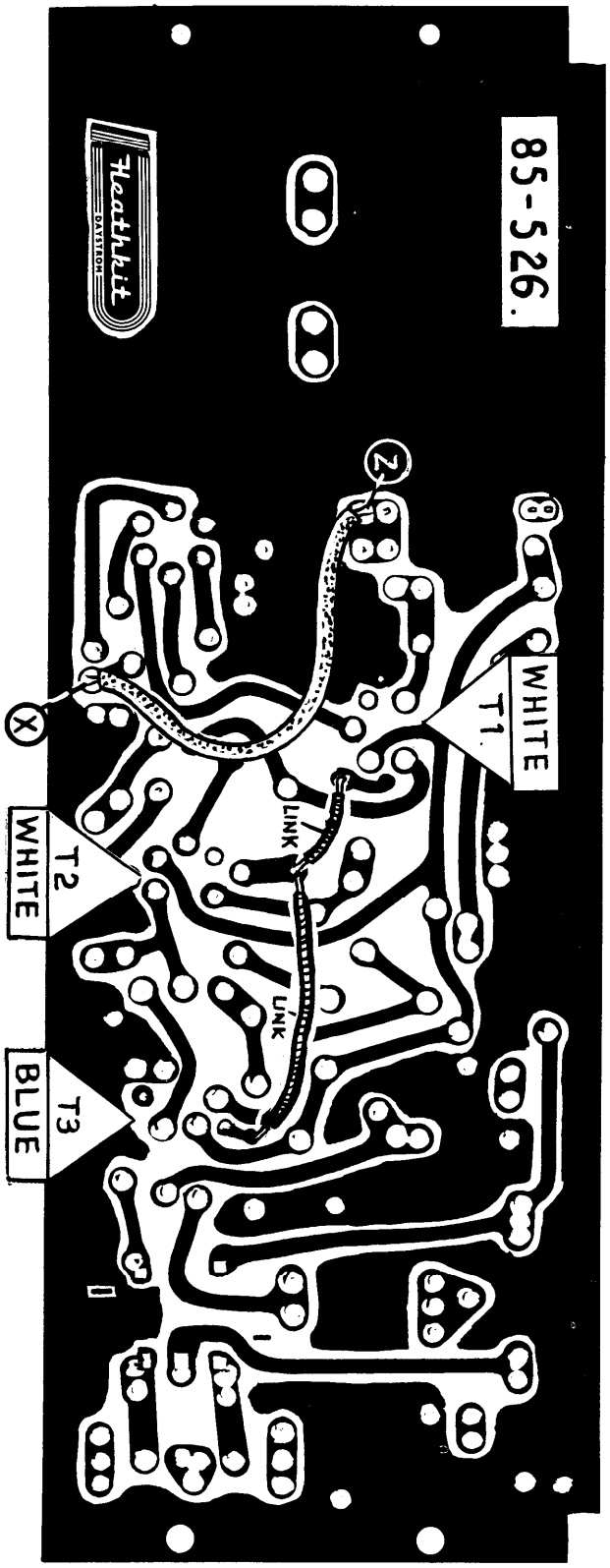
( ) Connect one end of a 5" length of BLACK wire to location BW (S-1).

( ) Connect one end of a 5" length of ORANGE wire to location OW (S-1).

( ) Connect one end of a 4" length of BROWN wire to location BRW (S-1).

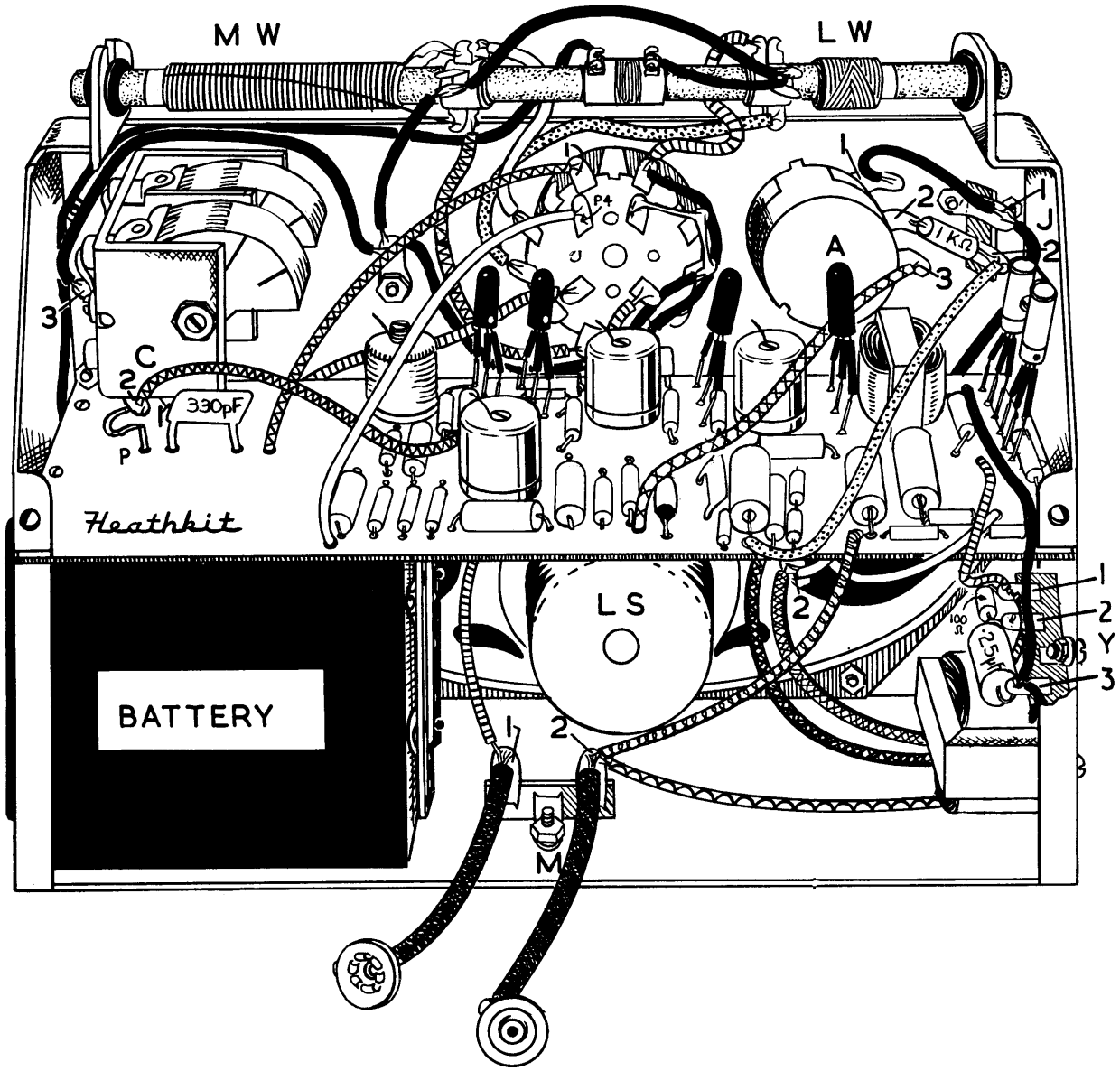
( ) Connect one end of a 6" length of GREY wire to location GWY (S-1).

( ) Connect a YELLOW wire link between location X and Z on the metal foil side of the circuit board. (See Pictorial 4.)



PICTORIAL 4

SHOWING METAL SIDE OF CIRCUIT BOARD WITH WIRE LINK.



WIRING AND FIXING OF
CIRCUIT BOARD TO CHASSIS.

PICTORIAL. 2C.

WIRING OF TRANSISTORS TO CIRCUIT BOARD

Note: Important. Refer to the block diagram for transistor type reference. A RED or WHITE spot is marked at the wire end of each transistor. The wire nearest this spot must be connected to C indicated on the circuit board. Connect the other two wires to B and E. As TR5 and TR6 will subsequently be clamped to the chassis, ensure that no more than 3/16" of each lead is inserted into the spill before soldering. This will avoid undue strain on the leads when securing the heat sink clips.

( ) Select the 6 transistors and cut each wire lead to 7/8".

( ) Cut the length of sleeving into 18 - 3/8" lengths.

( ) Place a 3/8" length of sleeving over each transistor lead.

( ) Bend the wires of each transistor to form a hook at the ends, see Figure 5.

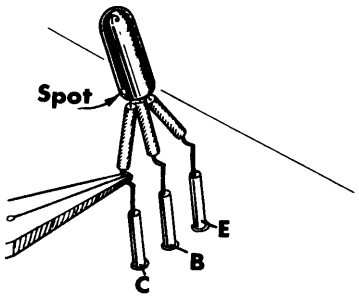


FIG.5

( ) Connect the 3 wires of TR1 to the spills C, B and E (solder each wire).

( ) Connect the 3 wires of TR2 to the spills C, B and E (solder each wire).

( ) Connect the 3 wires of TR3 to the spills C, B and E (solder each wire).

( ) Connect the 3 wires of TR4 to the spills C, B and E (solder each wire).

( ) Connect the 3 wires of TR5 to the spills C, B and E (solder each wire).

( ) Connect the 3 wires of TR6 to the spills C, B and E (solder each wire).

( ) Select the P shaped clips and slide one on each transistor TR5 and TR6, position as shown.

WIRING OF CIRCUIT BOARD TO CHASSIS
SEE PICTORIAL 2C

( ) Position circuit board to chassis. Do not fix into position yet.

Now connect the coloured wires in the following order:

( ) Pass the GREEN wire through tag C2 (tuning capacitor) and solder at spill P. Now solder at C2.

( ) Connect the BLUE wire to BSW1 (S-1).

( ) Connect the YELLOW wire to BSW-P4 (S-1).

( ) Connect the BLACK wire to Y3 (S-3).

( ) Connect the RED wire to Y1 (S-3).

( ) Connect the ORANGE wire to J2 (S-2).

( ) Connect the BROWN wire to A3 (S-1).

( ) Connect the GREY wire to M2 (NS).

( ) Connect the WHITE wire to the loudspeaker, tag 1 (S-2).

( ) Now secure circuit board to chassis using 4 - 6BA x $\frac{1}{4}$" screws and washers.

( ) Select the two lengths of BLACK and RED flexible wire.

( ) Connect the RED wire, one end to the copper coloured battery connector (S-1) as shown on detail below and the other end to M1 (S-2).

( ) In a similar manner connect the BLACK wire, one end to the other battery connector (S-1) and the other end to M2 (S-3).

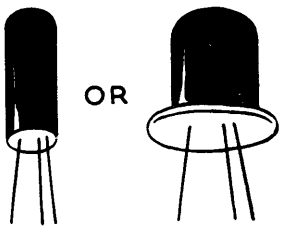
( ) Using a 6BA x $\frac{1}{4}$" screw, nut and lockwasher, secure the heat sink clips on the OC81 transistors to chassis, with the nut on the inside.

( ) Check the position of all transistors against the block diagram.

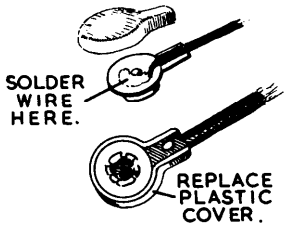
( ) Finally insert the battery, then thread the positioning strap and lock tight, using the studs provided.

Do not connect the RED and BLACK leads to the battery yet.

TRANSISTOR TYPES				
Circuit Ref.	Transistor Type	Spot Colour Collector	Spot Colour Top	Make
TR1	OC44	RED	YELLOW	Mullard
TR2	OC45	RED	ORANGE	Mullard
TR3	OC45	RED	BLUE	Mullard
TR4	OC81D	RED	-	Mullard
TR5	OC81	RED	-	Mullard
TR6	OC81	RED	-	Mullard
D1	OA81	-	-	Mullard



TRANSISTOR.



TRANSISTOR VOLTAGES			
	EMITTER	BASE	COLLECTOR
TR1	1.1	0.85	7.2
TR2	0.5	0.5	7.2
TR3	1.0	1.2	7.2
TR4	1.2	1.3	8.0
TR5/6	0.02	0.1	8.9

Important: Before connecting the supply leads to the battery and switching on, re-check the connections of all transistors, also the BLACK and RED leads to the battery. If the battery connections are reversed, permanent damage to the transistors may result.

If a transistor has to be removed or replaced, a heat shunt, such as a pair of pliers, must be used as shown in Fig. 5.

ADJUSTMENT PROCEDURE

Temporarily fit station name dial over variable capacitor spindle and align centrally to front panel. Secure with adhesive tape.

Now slide tuning knob with pointer attached over the spindle. Adjust pointer to the horizontal position, with the variable capacitor spindle fully anti-clockwise.

Double check the installation of battery and transistors before attempting to operate your UXR-1 Transistor Receiver. Errors could cause non-operation or damage to the components in the receiver. When reasonably sure that no errors exist, plug in the battery leads and switch to the Medium waveband. Turn the volume control fully clockwise, and a slight rushing sound should be heard. If no sound is heard, switch the receiver off and refer to the section "Fault Finding". If operation appears normal, you may proceed with the adjustments required to obtain maximum performance.

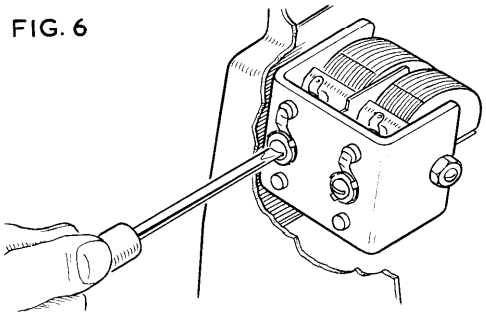
Read each step completely before performing the operation described.

STEP ONE

A. Turn BOTH adjusting screws on the variable capacitor down tightly without forcing.

B. Loosen EACH screw half a turn.

FIG. 6



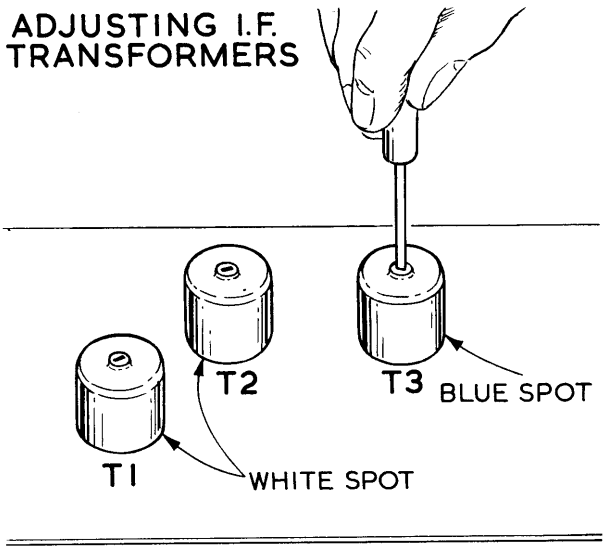


FIG.7

STEP TWO

This procedure will adjust the IF amplifiers.

A. Tune in any weak station.

B. Using the alignment tool provided, carefully adjust the core of T3 (BLUE spot) left or right to obtain maximum volume.

Now adjust the T2 (WHITE spot) and T1 (WHITE spot) in a similar manner. Repeat the procedure.

The I. F. transformers are aligned approximately when supplied and only small adjustments should be necessary.

Normal positions for the cores are: blue spot, about 1/8" below the top of the formers and both white spot transformer cores about 1/16" above the top of the former.

STEP THREE

This step will adjust the oscillator circuit so that the dial will indicate correctly the station wavelengths.

A. Set the dial to any station of known wavelength below 300 metres.

B. Adjust the screw on the rear section of the tuning capacitor until you receive the required station.

Another radio may prove helpful in identifying the chosen station, as several stations will probably be heard whilst making this adjustment.

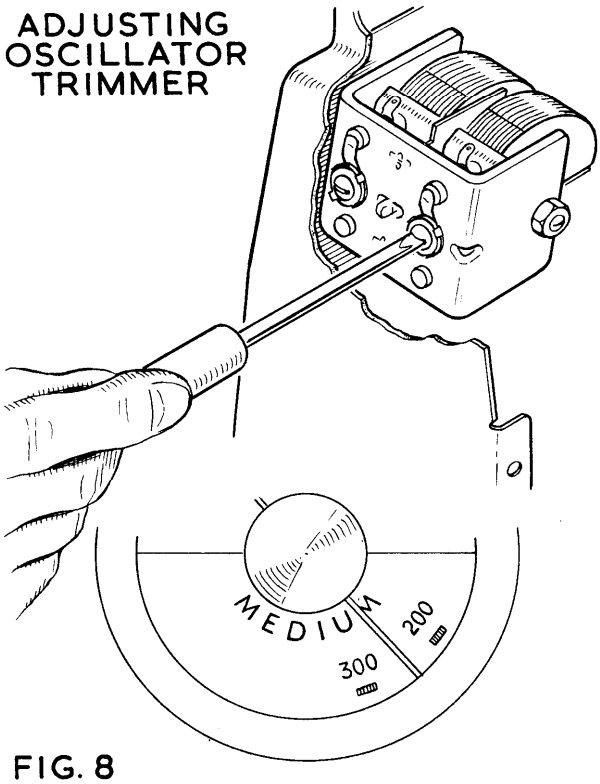


FIG. 8

STEP FOUR

This will adjust the aerial circuit to the required 470 kc/s separation at the low wavelength end of the dial.

A. Tune in a weak station in the vicinity of 200 metres.

B. Adjust the screw on the front section of the tuning capacitor for maximum volume.

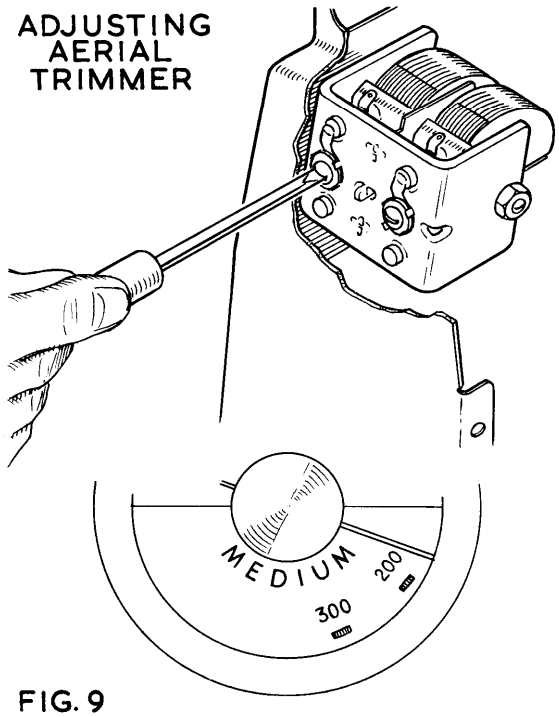
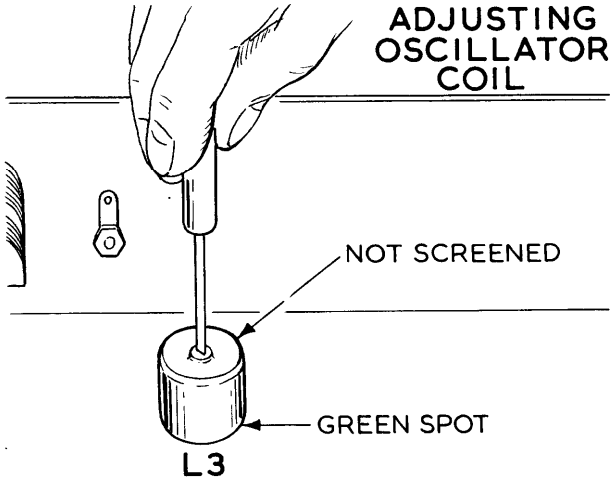


FIG. 9



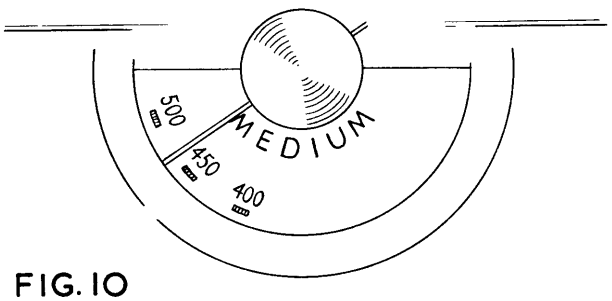


FIG. 10

STEP FIVE

This step will adjust the oscillator circuit to the required 470 kc/s separation at the high wavelength end of the dial.

A. Tune to any point on the dial between 400 and 500 metres, where no station is received.

B. Adjust the oscillator coil L3 for maximum noise output.

If a station is received during this adjustment, it will be necessary to again select a point where no station is heard.

An alternative method to the above is as follows:-

A. Tune to any weak signal from a station between 400 and 500 metres.

B. Adjust the oscillator core L3 for maximum whilst manipulating the tuning capacitor through optimum volume. Repeat until no further improvement in volume is obtained, if necessary selecting a different station.

C. A normal position for the medium wave aerial coil is tight against grommet EF. If, however, the dial readings on a known station between 400 and 500 metres are incorrect try re-positioning the coil and repeat steps 3, 4 and 5.

STEP SIX

Since the adjustments tend to interact slightly, repeat steps 3, 4 and 5 to obtain the best results.

STEP SEVEN

The alignment carried out on the medium waveband will be correct for the long waveband. However, a slight improvement may be obtained by sliding L2 along the ferrite rod.

Adjust for maximum volume on any Long wave station by sliding L2 along the ferrite rod in either direction.

Remove Knob and Dial; the receiver is now ready for fitting to case.

ALIGNMENT WITH SIGNAL GENERATOR

If a signal generator is available, the following procedure should be substituted for steps 2 to 7.

Set the generator to 470 kc/s.

Place the output lead near to the ferrite aerial, with the volume control fully clockwise, and the tuning condenser fully enmeshed, adjust the output so that a weak signal is heard.

Adjust the IF transformer cores, T3, T2 and T1 for maximum volume, reducing the generator output as necessary.

Repeat until no further improvement is obtained.

Re-tune generator to 1500 kc/s (200 m) and tune receiver to 200 metres on dial.

Adjust oscillator trimmer (rear section of tuning condenser) for maximum volume, again reducing output as necessary.

Without altering signal generator or receiver, adjust aerial trimmer (front section).

Re-tune generator and receiver to 600 kc/s and adjust oscillator coil L3 for maximum, whilst rocking the tuning condenser.

Repeat both 1500 kc/s and 600 kc/s operations.

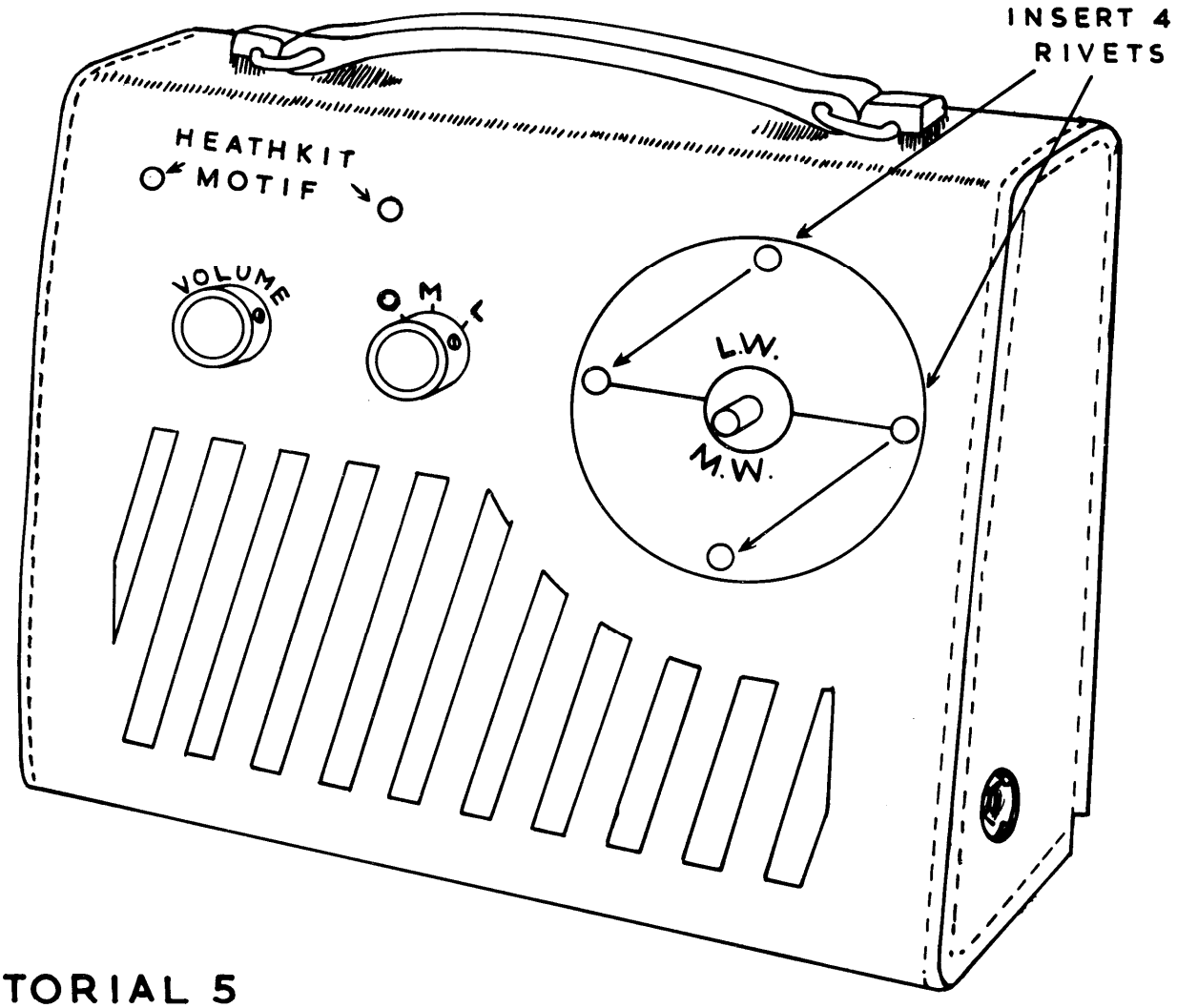
SPECIAL NOTE: When aligning the UXR-1 with a signal generator, it is most important that the receiver output be kept at a low listening level so that the A.G.C. is inoperative; (below 50 milliwatts) otherwise inaccuracies will be introduced.

IN CASE OF DIFFICULTY

Recheck the wiring. Trace each lead in coloured pencil on the pictorial as it is followed in the receiver. Many cases of difficulty result from wrong connections. Having a friend check the wiring will often reveal a mistake consistently overlooked. Do not neglect checking the colour coding of resistors, the diode, and transformer leads.

Examine all soldered connections for evidence of "dry" joints. Re-solder any connection that appears suspicious - a good connection should appear shiny.

Examine all connections carefully for excessive solder or loose bits of solder and wire clippings that may be causing short circuit between adjacent terminals. Transistor leads are especially vulnerable because of their close spacing. If necessary, carefully bend the leads away from each other to avoid possibility of any short-circuit.



PICTORIAL 5

Make sure that all transistors are properly installed.

Check to see that the battery is positioned correctly and connections making good electrical contact. If the battery shows signs of electrolite leakage or corrosion it must be replaced immediately.

Compare voltages at each transistor spill with those indicated on the chart. Wide discrepancies indicate improper wiring or a defective component.

Examine the variable tuning capacitor carefully for bent plates. These should pass freely between each other without touching the spindle as it is rotated. Bent plates may be straightened by carefully inserting a thin knife blade between them and pushing them back into position.

Low volume and sensitivity may be due to improper alignment. Repeat the steps outlined in the ADJUSTMENT and OPERATION sections.

If a defective component is discovered or if trouble persists, refer to the REPLACEMENT or SERVICE sections of this manual.

FAULT FINDING

DISTORTION:

1. TR5 and TR6. These transistors may be checked by removing each one in turn. If the receiver ceases to operate, it can be assumed that the remaining transistor (TR5 or TR6) is faulty. If the receiver continues to operate, the procedure should be reversed. That is, replace the transistor first removed and take out the other one.

2. Defective Speaker. This may be checked by substituting with any other 3 to 4 ohm speaker. Connect externally.

3. Check both the audio driver transformer, TD, and the audio output transformer, TLS, for open circuit connections.

DAMAGED CRYSTAL DIODE: Check by substitution with one of the same or similar type.

SHORT BATTERY LIFE: This may be caused by a leaky electrolytic capacitor. Have each one checked.

POOR RECEPTION:

1. If each station is easily tuned, but with low volume, first check battery volts.

2. Check TR4, 5 and 6.

3. Check the associated components of TR4, 5 and 6.

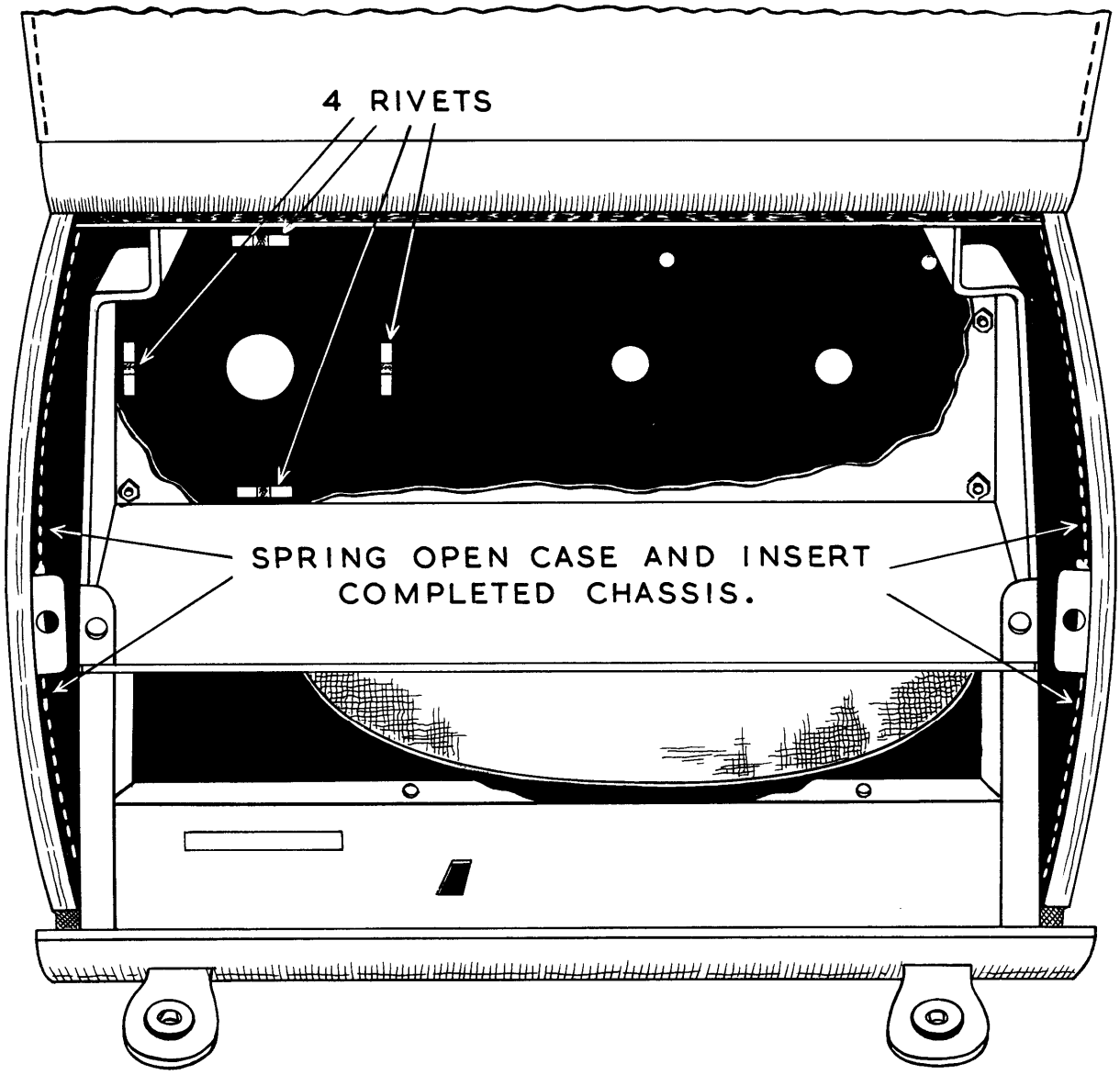
4. A wiring error can be made and yet the receiver will still operate to some degree. Check coil connections on L1 and L2, also BSW switch connections.

FITTING OF TUNING DIAL AND EMBLEM
SEE PICTORIAL 5

( ) Place tuning dial as shown and insert the 4 rivets in the holes provided.

( ) Now spread the ends of each rivet, see Fig. 11.

( ) Insert the Heathkit emblem in the holes provided and secure with speednuts.



PICTORIAL 6.

MOUNTING CHASSIS TO CABINET SEE PICTORIAL 6

( ) Place cabinet on workbench and spring sides of cabinet outwards slightly. This allows the entry of the chassis past the fixing brackets.

( ) Slide in chassis, then secure using 2 - 4BA x 3/8" screws.

( ) Place in position the two small knobs and tighten the grub-screw. NOTE: Do not over tighten as the knob may be damaged.

( ) Slide the large tuning knob over the variable capacitor spindle. Do not disturb the setting of the pointer.

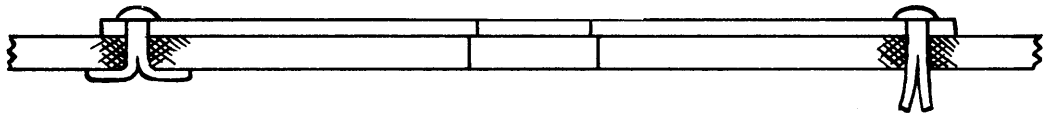


FIG 11. SECTION OF CABINET AND DIAL SHOWING METHOD OF FIXING USING 4 RIVETS.

INTRODUCTION TO TRANSISTORS

Transistors have been one of the most important recent developments in the field of electronics. Although they have been available commercially for only a few years, they have already found application in every branch of the art. They can assume the duties of radio valves in many applications, and in such capacity they are employed in the Model UXR-1 Receiver.

Transistors possess many advantages over valves. Probably the one most apparent is their extremely small size, making possible the miniaturization of equipment in which they are used. The Model UXR-1 Receiver does not take full advantage of this fact, however, for several reasons. Firstly, the average kit constructor probably does not have the necessary facilities or experience to construct in confined spaces. Secondly, the size of the loudspeaker and space requirements of the battery, both desirable features as explained in the "Instrument Description" section, limit the minimum size of the cabinet. Thirdly, miniaturization of all the components would only result in increased cost with no increase, and likely only a decrease, in the performance and economy of operation. Other advantages, however, make the use of transistors desirable as will be explained in the following paragraph.

Because of their small size, transistors possess very little mass or inertia. As a result they are not subject to the shock, vibration and microphonic faults of valves. Transistors do not contain a heater or filament, require no warmup and consume no power which contributes nothing to useful audio output. Because no heat is generated within the cabinet, longer life can be expected from other components subject to deterioration from heat. Transistors operate on very low potential or voltage, measured in volts rather than tens or hundreds of volts as with valves. This makes battery operation very feasible and eliminates completely the shock hazard found in most valve equipment. Transistors have a very long life expectancy. Average life of transistors has not yet been definitely established simply due to lack of time to arrive at representative figures. Transistors have been in continuous operation for years without failure. Most failures are caused by improper use rather than by deficiencies in the basic design.

As with any good thing, there are also limitations to the capabilities of transistors. Primarily, these limitations involve power handling capabilities, high frequency limitations and extreme temperature limitations. None of these limitations are approached in their application in the UXR-1 receiver. One precaution must be observed, however, The battery must be installed exactly as instructed or damage to the transistors may result. Also, it is essential never to remove or insert a transistor with the receiver turned "ON".

It might be of interest to note here some of the production problems connected with the making of a transistor. The germanium must first be refined to an extremely high degree of purity. The rigid requirements would compare to allowing no more than one kernel of corn in several tons of wheat. The pure germanium is then "doped" with precisely controlled amounts of other elements to obtain the proper alloy necessary for transistor action. More will be said about the doping process later. The centre layer of "meat" of the sandwich may be only 1/1000 inch thick. This layer must be precisely located, and a wire attached. The entire process must be performed under "operating-room" clean conditions. Any contamination of the transistor may be cause for failure. The assembly is then hermetically sealed in a protective case, often with an inert compound to assist in conducting heat away from the assembly. The drawing shows a typical transistor assembly.

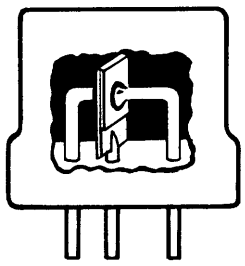
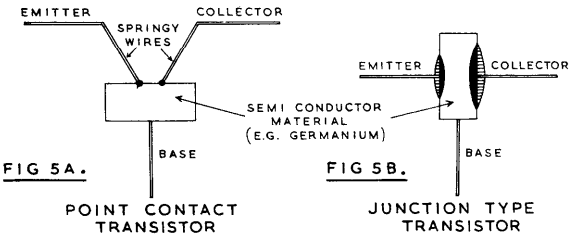


FIG 12

As mentioned before, the germanium must be doped to obtain the characteristics needed for transistor action. Different materials are used to produce a "P" or an "N" type germanium. "P" type germanium means that the pure metal has been modified so that there is an electron deficiency in the natural crystal structure, often referred to as "hole". "N" type germanium means that an electron excess is created in the natural germanium crystal. Transistors are produced in both NPN and PNP configurations, the letters indicating the type of germanium in each of the layers. Symbols for P-N-P and N-P-N transistors are shown in the chart on page 3 of the cover. All the transistors used in the UXR-1 are of the P-N-P type.

The middle layer of the sandwich is called the base. One outside layer is called the emitter and the other one the collector. The junction formed between the emitter and base and between the collector and base have a characteristic similar to that of a diode rectifier, in that the junction will conduct current much more readily in one direction than the other. When a voltage is applied across a junction with positive voltage applied to the "P" type region and negative voltage to the "N" type region a current consisting of two components will flow. Electrons will flow from the "N" region across the junction to the "P" region and holes will flow or migrate from the "P" region across the junction to the "N" region. If the polarity of the applied voltage is reversed, the electrons and holes move away from the junction and for practical purposes, no current will flow. The drawings illustrate this effect.



In most applications, transistors have operating voltages applied so that the base-emitting junction is "biased" in the forward or conducting direction and the base-collector junction is "biased" in the reverse or non-conducting direction. When connected in this manner, most of the current carriers flowing in the emitter circuit will diffuse across the base region and appear as current in the collector circuit. Since the emitter bias is usually a very low voltage, (being in the forward direction) and the collector bias is relatively high, (being in the reverse direction) the transistor is able to produce a power gain. This can readily be seen when you consider that power is the product of voltage and current. Because the current flow is across a junction of a very small area, the power handling capabilities of a transistor are limited due to heating caused by the current flowing through the junction resistance.

Before a discussion of their application in the UXR-1 receiver, it might be well to consider briefly the nature and construction of transistors.

The material used in the fabrication of a transistor is a so-called semi-conductor. Germanium and silicon are two basic materials in commcn use today. All the transistors in the UXR-1 receiver are of the germanium type although silicon transistors could be made to perform satisfactorily also. Stated

simply, a transistor consists of a "sandwich" of various alloys of germanium. Three layers of the alloys form this sandwich. A connecting lead is attached to each of the layers and brought out for external connections.

OPERATION

Operation of the UXR-1 Transistor Receiver is simple and conventional. Turn on the receiver, select the desired station and adjust the volume.

Because the antenna coil tends to give directional results, the receiver should be rotated to provide maximum volume of the desired station. In some instances this may prove helpful in reducing unwanted interference by careful positioning of the receiver. No pilot light is provided to indicate when the receiver is turned on because the light would consume about 10 times the power required by the receiver and severely reduce battery life. Make it a habit to turn off the receiver after use to obtain maximum battery economy.

Reception in cars, trains and aeroplanes is possible in most locations. It may be necessary to place the receiver near a window of the vehicle for best reception because the metal body will act as a shield against the reception of radio signal. In general, much better results will be obtained by using a car aerial and a socket is provided for this purpose.

The batteries will normally provide 300 hours or more reception before requiring replacement. Signs of weak batteries are low volume, excessive distortion and failure to operate at some section of the dial.

ALWAYS REMOVE EXHAUSTED BATTERIES IMMEDIATELY, OLD BATTERIES MAY SWELL AND MAKE REMOVAL DIFFICULT, OR THEY MAY LEAK CHEMICAL COMPOUNDS THAT WOULD CORRODE THE CHASSIS. DO NOT STORE FOR EXTENDED PERIODS WITHOUT REMOVING THE BATTERIES. BE SURE TO OBSERVE BATTERY POLARITY WHEN REPLACING THE BATTERIES.

THE BATTERIES MUST BE INSTALLED EXACTLY AS SHOWN IN THE DIAGRAM. THE RECEIVER WILL NOT OPERATE AND POSSIBLE DAMAGE MAY RESULT THROUGH IMPROPER BATTERY POLARITY.

CIRCUIT DESCRIPTION

The model UXR-1 is a six transistor portable receiver very similar in most respects to a valve type receiver. Those of you who are familiar with the circuitry used in superhetrodyne receivers will recognise the similarities and quickly understand the difference in the circuit required for transistor operation. Those of you who are not familiar with component and circuit terminology, or the nature and function, should refer to the glossary at the end of this section to gain a better understanding of the circuit. Refer to the circuit diagram on page 2 as you read.

Signals picked up by the ferrite aerial coil are tuned or selected by the large section of the variable condenser and fed to the base of the TR1 transistor by the small low impedance coupling coil wound on the rod. The small section of the variable condenser tunes the oscillator coil connected to the TR1 transistor and the base voltage is provided by the 10K and 56K resistors. The 3.9K resistor provides emitter bias voltage. The 470 kc/s. output from the TR1 converter or frequency changer is transformer coupled to the base of the first I.F. amplifier TR2. The amplified output from this stage is transformer coupled to the second I.F. amplifier using a similar transistor, TR3. Both amplifier stages use voltage divider networks to supply bias voltage to the transistor, Base and Emitter bias resistors are also employed. Output from the second I.F. amplifier is transformer coupled to the diode detector which is followed by a volume control.

Now, since the DC voltage at the output of the detector is a function of signal strength, this voltage is applied through the 8.2K resistor to the base of first I.F. transistor to provide A.V.C. Because the transistors require bias in the conducting direction, the input resistance or impedance is low. Consequently, transformers designed for use with valves are not suitable. The transformers used in the UXR-1 are specially designed to provide the appropriate match between stages. Adjustable powdered iron cores are provided for tuning. These permit 'peaking' at the I.F. amplifier for maximum gain and selectivity at 470 kc/s.

Audio output from the detector is coupled by means of the condenser to the first audio or driver transistor TR4 whose base bias voltage is obtained from the 33K and 10K resistors. The amplified output is transformer coupled to the output stage which consists of two transistors working in a 'Class B' push-pull arrangement (TR5 and TR6). Base and Emitter provisions are similar to those of the first audio stage and the 4.7 ohm resistor in the collector circuit acts as a stabiliser. Negative feed-back is applied to the base of the driver transistor from the output transformer through the 1K resistor - the 680 pF condenser providing phase correction. Because of the use of a printed board, stray capacities are reduced to a minimum and will not vary appreciably from set to set. Thus, not only is construction greatly simplified but the results are consistent and can be very accurately pre-determined.

GLOSSARY OF RADIO TERMS

While by no means complete, this glossary should assist those who are not familiar with radio terminology. The definitions apply to all radios in general but in many cases refer to the UXR-1 receiver specifically. Further information may be obtained from books available at most public libraries.

AC	Alternating Current. An electrical current that reverses its direction of flow at regular intervals. House current makes 100 reversals every second. Two reversals are necessary to complete one cycle, hence 50 cycles. Much higher frequencies appear in radio circuitry, up to many millions of cycles per second.
AF	Audio Frequency. Those frequencies that fall within the range of the human ear, approximately 20 to 20,000 cycles per second. Remember that the ear can only hear mechanical vibrations in the air, not electrical currents.
AVC	Automatic Volume Control. Circuitry employed in a receiver to adjust the gain in opposite proportion to the strength of the received signal. Used to reduce the effects of fading signals, or "blasting" when tuning from a weak to a strong signal.
Amplifier	A circuit designed to increase the strength or amplitude of weak signals. Ideally the output signal is an exact magnified reproduction of the input signal.
Ampere	The unit of measurement of current flow. The number of electrons passing a point in one second.
Antenna (Aerial)	A system of conductors used to radiate or intercept radio signals.
Capacitor	A component consisting of conducting plates separated by an insulating material. Various materials and construction are used in capacitors. Deposited silver plates on ceramic for the disc capacitors, aluminium foil plates separated by a chemical oxide for the electrolytic capacitors and sheet aluminium separated by air for the variable tuning capacitor. Capacitors are used to pass AC while blocking DC and also to tune or "resonate" electrical circuits to a desired frequency.
Coil	A component consisting of wire or some other conductor wound in turns on a suitable former. The number of turns and the size, shape, and material used for the former are determined by the application. Coils are often used with capacitors to form "tuned" circuits.
Condenser	See Capacitor.

Conductor	Any material that permits easy passage of an electrical current.
Converter (Frequency Changer)	Circuitry designed to combine the signal from the radio station with a self-generated signal to produce a new signal at a different frequency. See heterodyne.
Current	Generally the movement of electrons through a conductor. In valves electron flow occurs in the vacuum. Movement of "holes" can constitute current flow in transistors.
DC	Direct Current. An electrical current that flows in one direction only.
Detector	A component used to extract the intelligence or desired information from a radio signal. In the UXR-1 this intelligence consists of the speech or music transmitted by the radio station.
Diode	A two element or two terminal device capable of passing an electrical current in one direction only. Used as a detector and also for reducing strong signal overload in the UXR-1.
Earth	An electrical connection to the earth. Also the reference point for signals and operating voltages in electronic equipment, usually the chassis.
Frequency	Repetition rate of an alternating current or of the vibration of the loudspeaker cone. Measured in cycles per second.
Frequency Changer	See Converter.
Heterodyne	The result of combining signals of different frequencies in order to obtain a signal of new frequency. Either the sum or the difference frequency of the two is generally the desired resulting frequency. Also known as "beat".
I.F.	Intermediate Frequency. The heterodyne or beat frequency produced by the converter in a superheterodyne receiver. Most of the amplification and selectivity of the radio signals is accomplished at this frequency. An I.F. of 470 kc. is employed by the UXR-1.
Inductance	The property of a coil to oppose any change in the magnitude of an electrical current flowing in it.
Insulator	Any material that does not permit an easy passage of an electrical current.
KC	Kilocycle - 1,000 cycles.
MC	Megacycle - 1,000,000 cycles, 1,000 kilocycles.
Megohm	1,000,000 ohms.
Microfard	A unit of capacity. Refers to the electrical "size" of a capacitor.
Ohm	The unit of electrical resistance.
Oscillator	Circuitry designed to generate AC at some desired frequency when operated from a DC source. Usually some circuit element or elements are adjustable so that a desired frequency may be obtained.
R.F.	Radio Frequency. Those frequencies employed for transmission of radio signals, from 10 kilocycles to 100,000 megacycles by government regulation.

Resistor — A component designed to oppose the flow of current. The degree of opposition or resistance is measured in units called "ohms". Resistors are used to reduce current or voltage to a desired value, to provide isolation between circuits or to provide a load across which a useful signal may be developed. Resistors used in the UXR-1 are made of a carbon compound housed in an insulating protective sleeve. Wire leads sealed in each end provide electrical connection to the resistance material.

Selectivity — The ability of a receiver to separate radio stations operating on adjacent channels.

Sensitivity — A figure that expresses the signal strength required at the receiver antenna to produce a specified amount of sound from the loudspeaker.

Superheterodyne — A radio circuit that heterodynes or converts an incoming signal of any frequency in its tuning range to a signal of constant frequency before amplification and detection. This is accomplished by combining the incoming signal with one from a self-contained oscillator that is automatically tuned by the station selector. In the UXR-1 the oscillator signal is always 470 kilocycles higher in frequency than the incoming signal. The resultant signal therefore is 470 kilocycles, the intermediate frequency. Amplification of the radio signals may then be accomplished at a fixed frequency. This makes it possible to design maximum efficiency into the I. F. amplifiers. Improved selectivity and sensitivity are advantages of the superheterodyne circuit.

Transformer — A component designed to couple AC signals or energy from one circuit to another. Construction can vary widely depending on the application but generally consists of insulated coils of wire wound on a common core. The core may be of sheet iron for power or audio transformers, or powdered iron or air for I. F. and R. F. transformers. Transformers are employed for one or more of several reasons; they provide coupling of signals while isolating the DC operating voltages of the coupled circuits; they are capable of producing AC voltage "step-up" or "step-down"; they may be tuned to provide selective coupling of signals as the case of the I. F. transformers used in the UXR-1; they provide proper impedance matching between coupled circuits. The last application can be compared to the function of the transmission of your car. The transmission is designed to provide the most efficient match or coupling between the source of power, the engine, and the load, the rear wheels. In the UXR-1 a good example of this application is the audio output transformer which provides the proper match or coupling between the source of power - the output transistors, and the load, the loudspeaker.

REPLACEMENTS

Material supplied with Heathkits has been carefully selected to meet design requirements and ordinarily will fulfill its function without difficulty. Occasionally, however, improper instrument operation can be traced to a faulty valve or component. Should inspection reveal the necessity for replacement, write to Daystrom Ltd. and please 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 the kit in which it is used.
C. Mention the order number and date of purchase.
D. Describe the nature of defect or reason for requesting replacement.

Daystrom Ltd. will promptly supply the necessary replacements. 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. If valves are to be returned, pack them carefully to prevent breakage in shipment, as broken valves are not eligible for replacement. 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.

SERVICE

If the completed instrument should fail to function properly and attempts to find and cure the trouble prove ineffective, the facilities of Daystrom's Service Dept. are at your disposal. Your instrument may be returned carriage paid to Daystrom Ltd., Gloucester, and the Company will advise you of the service charge where not covered within the terms of the guarantee (i.e. a faulty component supplied by us). THIS SERVICE POLICY APPLIES ONLY TO COMPLETED INSTRUMENTS CONSTRUCTED IN ACCORDANCE WITH THE INSTRUCTIONS AS STATED IN THE MANUAL. Instruments that are modified in design will not be accepted for repair. Instruments showing evidence of acid core solder or paste fluxes will be returned not repaired.

Daystrom Ltd. is willing to offer its full co-operation to assist you in obtaining the specified performance level of your instrument. Factory repair service is available or you may contact the Engineering Consultation Department by mail. For information regarding possible modification of existing kits, it is suggested that you refer to any one or more of the many publications that are available on all phases of electronics. Although Daystrom Ltd. sincerely welcomes all comments and suggestions, it would be impossible to design, test, evaluate and assume responsibility for proposed circuit and layout changes for specific purposes. Therefore, such modifications must be made at the discretion of the kit builder according to information which will be much more readily available from some local source.

SHIPPING INSTRUCTIONS

Before returning a unit for service, be sure that all parts are securely mounted.

ATTACH A LABEL TO THE INSTRUMENT GIVING NAME, ADDRESS AND TROUBLE EXPERIENCED

Pack in a rugged container, preferably wood, using at least three inches of shredded newspaper, wood wool or plastic cushioning material on all sides. DO NOT DESPATCH IN THE ORIGINAL KIT CARTON AS THIS CARTON IS NOT CONSIDERED ADEQUATE FOR SAFE SHIPMENT OF THE COMPLETED INSTRUMENT. Note that a carrier cannot be held liable for damage in transit if packing, in HIS OPINION, is insufficient.

PRICES: All prices are subject to change without notice.

MODIFICATIONS TO SPECIFICATIONS: Daystrom Ltd. 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.

PARTS LIST

PART No.	PARTS Per Kit	DESCRIPTION
Resistors, Grade 2 (carbon) ½ watt		
H-100C10	1	10Ω (Brown, Black, Black)
H-101C10	1	100Ω (Brown, Black, Brown)
H-681C10	2	680Ω (Blue, Grey, Brown)
H-102C10	4	1 KΩ (Brown, Black, Red)
H-392C10	2	3.9 KΩ (Orange, White, Red)
H-472C10	1	4.7 KΩ (Yellow, Violet, Red)
H-822C10	1	8.2 KΩ (Grey, Red, Red)
H-103C10	2	10 KΩ (Brown, Black, Orange)
H-122C10	1	1.2 KΩ (Brown, Red, Red)
H-223C10	1	22 KΩ (Red, Red, Orange)
H-333C10	1	33 KΩ (Orange, Orange, Orange)
H-563C10	1	56 KΩ (Green, Blue, Orange)
H-683C10	1	68 KΩ (Blue, Grey, Orange)
Resistors, Grade 1 (high stability) ¼ watt		
2-510	1	4.7Ω
Q-111HS5	1	100Ω
Q-392HS5	1	3.9 KΩ
Controls and Switches		
10-504	1	Volume control, 5 KΩ, log law
63-503	1	On/Off - wavechange switch
Capacitors		
20-507	1	27 pF silver mica
20-506	1	56 pF silver mica
20-534	1	330 pF silver mica 2%
22-502	1	.01 µF tubular, moulded, paper
22-501	4	.04 µF tubular, moulded, paper
23-503	1	.05 µF tubular, paper
23-525	2	.25 µF tubular, paper
25-504	1	8 µF electrolytic, 12 volt working
25-505	3	50 µF electrolytic, 12 volt working
Tuning Capacitor		
26-501	1	387 pF aerial section 163 pF oscillator section
Coils and Transformers		
40-583	1	Ferrite aerial
40-503	1	Oscillator coil (Green spot)
52-501	2	First and second I.F. transformer (White spot)
52-502	1	Third I.F. transformer (Blue spot)
51-502	1	Driver transformer (TD)
51-503	1	Output transformer (TLS)
Speaker		
401-501	1	Speaker 7" x 4", 9,500 lines

PARTS LIST (cont'd.)

PART No.	PARTS Per Kit	DESCRIPTION
Transistors		
417-501	1	Frequency changer, TR1
417-502	2	I.F. amplifiers, TR2 and TR3
417-503	1	Driver, TR4
417-504	2	Output (matched pair), TR5 and TR6
Detector Diode		
56-501	1	Crystal diode, D1
Chassis Parts		
200-102B	1	Chassis, cadmium plated steel
200-501B	1	Control panel, cadmium plated steel
Miscellaneous		
93-503	1	Leather case
85-526	1	Printed circuit board
432-501	1	Battery connector, positive
432-502	1	Battery connector, negative
464-501	1	Station name dial
463-501	1	Dial pointer
462-503	1	Knob, large
462-504	2	Knob, small
72-501	1 length	Battery strapping
72-502	2	Battery strapping studs
391-501	1	Heathkit emblem, gold
431-32	1	2-way tagstrip
431-16	1	1-way, plus earth, tagstrip
431-508	1	3-way tagstrip
73-503	2	Rubber grommet, large
73-504	3	Rubber grommet, small
490-501	1	Alignment tool
434-534	1	Co-ax socket
595-502	1	Instruction Manual
Wires		
340-501	1 length	Bare wire, 22 swg.
344-510	1 length	Black insulated
344-511	1 length	Brown insulated
344-512	1 length	Red insulated
344-513	1 length	Orange insulated
344-514	1 length	Yellow insulated
344-515	1 length	Green insulated
344-516	1 length	Blue insulated
344-518	1 length	Grey insulated
344-519	1 length	White insulated
341-1	1 length	Black insulated flexible
341-2	1 length	Red insulated flexible
RCS-22	1 length	Solder, resin cored 22 swg.
346-1	1 length	Insulated sleeving

PARTS LIST (Continued)

PART No.	PARTS Per Kit	DESCRIPTION
Hardware		
250-9U	15	4BA x 3/8" screw
250-501	11	6BA x $\frac{1}{4}$" screw
252-3U	10	4BA nut
252-501	7	6BA nut
253-502	3	4BA flat washer
254-1U	13	4BA lockwasher
254-501	11	6BA lockwasher
256-501	4	3/8" x 3/32" bifurcated rivet
252-502	2	Speednut
258-501	1	Knob spring (part of large knob)
208-501	2	Clip, transistor, heat sink
432-503	19	Soldering spill
259-503	1	4BA solder tag