

IMPROVED KEYING FOR THE DX-100

The original keying circuit of the DX-100 involved simultaneous keying of the VFO and buffer stages in the cathode circuit. The two remaining stages were biased to cutoff and remained idle until excited by the buffer. This method of keying is simple, fool-proof, and allows break-in operation. However as the VFO is started and stopped very suddenly there is a tendency toward chirps or frequency shift, particularly on the higher frequencies. Also, there may be key clicks as there is no provision for wave shaping.

The sudden starting of an oscillator produces a sharp wave front with a possibility of over-shoot and the following stages running class C further sharpen the wave front. This transient response results in harmonics which splatter over adjacent frequencies causing key clicks. See Figure 1.

From the above discussion you will see that there are two problems which must be solved before good keying is possible. One is to eliminate the chirp caused by a small, but instantaneous frequency shift of the VFO when power is applied suddenly. Two is to eliminate the extremely sharp wave front which produces harmonics causing clicks



Figure 1

A good solution to the chirp problem is to allow the VFO to run continuously and key a following stage. This might preclude the possibility of operating break-in on one's own frequency; however, the VFO in the DX-100 is well shielded in it's own case and again shielded by the transmitter cabinet. Tests performed with a good receiver using coax antenna feed gave a reading of only S1 for the VFO signal. This would readily allow break-in on any frequency.



Figure 2

The solution to the click problem is to round off the corners of the transmitted wave and thus prevent the higher order harmonics. See Figure 2. This may be done by using a keying system that allows the introduction of a time constant in the circuit. The time constant slows the starting and stopping time and eliminates the sharp wave front and over-shoot.

Grid block keying is one method in which it is quite simple to introduce a time constant. In grid block keying a relatively high negative potential is applied to the grid of the keyed stage, cutting off the tube's conduction. When the key is depressed this negative voltage is shunted to ground and the tube allowed to operate.

OPERATION

In the following modification the key lead is removed from the phone-CW switch and connected to a separate tie point. Then pin 9 of the phone-CW switch is tied to pin 7. This results in the plate switch turning on the VFO and buffer stages whenever the high voltage is on, in the CW as well as the Phone position. However, the buffer stage is rendered inoperative by a negative bias and only the VFO operates.

As it would not be practical to tune up the low power stages with high voltage on the final, a push-button switch is installed which duplicates the effect of both the plate switch and the key without applying high voltage.

Approximately -60 volts is obtained from the bias supply and passed through two 27 K and one 100 KΩ resistors to the grid of the 12BY7 buffer cutting the tube off. See Figure 3. When the key is depressed the point between the two 27 K resistors is grounded. The first 27 KΩ resistor isolates the bias supply so that it is not shorted, the second 27 K resistor in conjunction

with the .15 μ fd capacitor provides the time constant for the "make" side of the wave. The .15 μ fd capacitor has to discharge through the 27 K resistor to ground by way of the key contacts. Thus, the negative voltage on the grid of the 12BY7 does not instantaneously fall to zero and a slope is introduced on the wave front. With the key down, the 12BY7 is self-biased through the 27 K and 100 K resistors. When the key is released the .15 μ fd capacitor has to charge through both 27 K resistors, and the tube grid voltage rises at a relatively slow rate to cut off. This produces a slope on the "break" and again eliminates the click.

INSTALLATION

The installation is extremely simple with the possible exception of boring the hole for the push-button switch. Using Figure 4, lay out the hole on the panel, then mark the spot with a center punch. Drill the hole first with a small drill to insure accuracy; it would be well to hold a plate or block behind the panel to protect the filter capacitors. Now drill the hole with progressively larger drills and if necessary use a reamer until a 3/8" hole is obtained.

Wire the push-button switch in the following manner before it is mounted: With a blade-type push-button switch such as the Switchcraft (1004), connect the two moving blades together and connect a wire approximately 7 inches long to this point. This wire should carry some means of identification such as a different color from others used. Connect two wires about the same length to the two stationary contacts of the switch. These wires need not be distinguished from each other. Mount the push-button switch on the panel and feed the three wires through the chassis hole between the filter capacitors. See Figure 5 for the following wiring. The identified wire is connected to terminal 1 of the key jack (ground); the other two wires are connected as shown. (green)

Mount a one-lug terminal strip near the key jack using the corner screw holding the filter capacitor. Mount a three-lug terminal strip behind the 12BY7 stage using the screw which holds the octagonal loading capacitor.

The key jack line choke is removed from terminal 9 of the phone-CW switch and connected to the one-lug terminal strip. Terminal 9 is then connected to terminal 7 with a jumper. The 100 K Ω resistor from pin 2 of the 12BY7 oscillator socket to ground is removed. The rest of the wiring is easily accomplished by following Figure 5.

ADJUSTMENT

After the modification has been completed, turn on the transmitter and readjust the clamp circuit. With plate power applied to the final and no excitation (VFO-xtal switch in an unused xtal position), set the clamp (screw driver adjustment) until the final plate current just returns to zero. Do not pass this setting.

Turn off the high voltage, set switch for VFO operation and while holding the push-button switch tune VFO and buffer for desired operating frequency. Now release push-button, turn on HV and tune final and loading for normal operation.

The push-button switch is used for frequency spotting or tune-up and the final tuned as before.

This modification is strictly optional on the part of the builder. It will work equally well for crystal or VFO operation and produces a far superior signal on both.

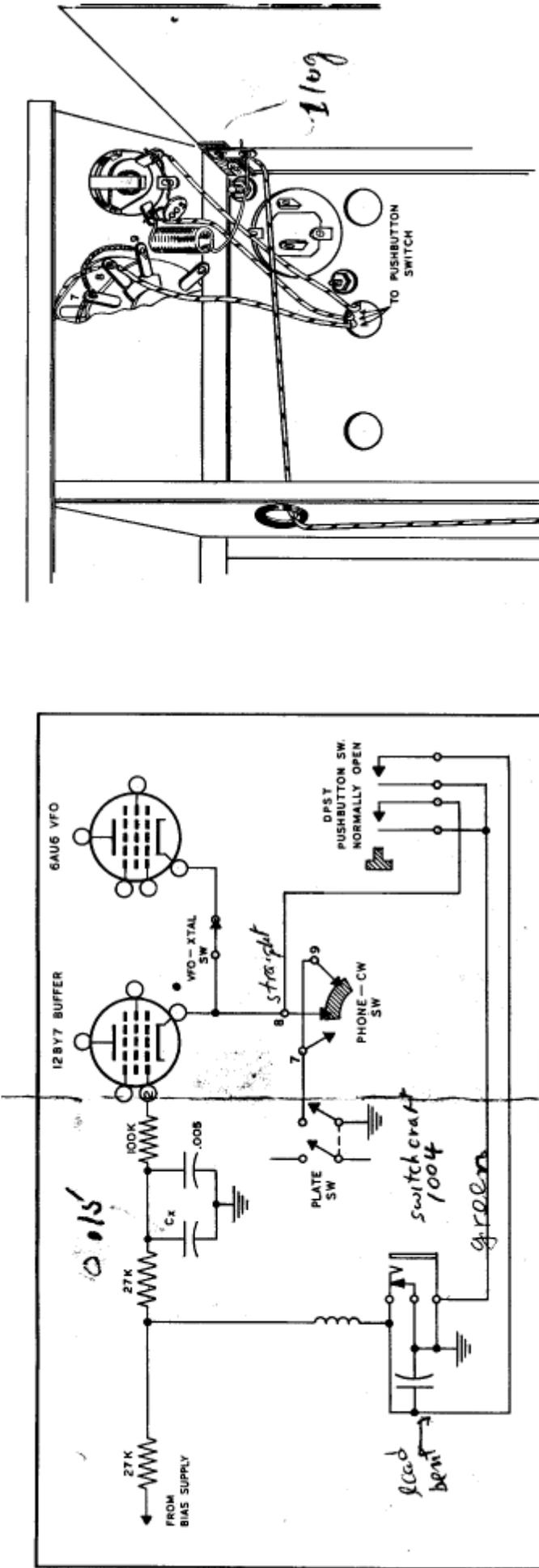


FIG. 3

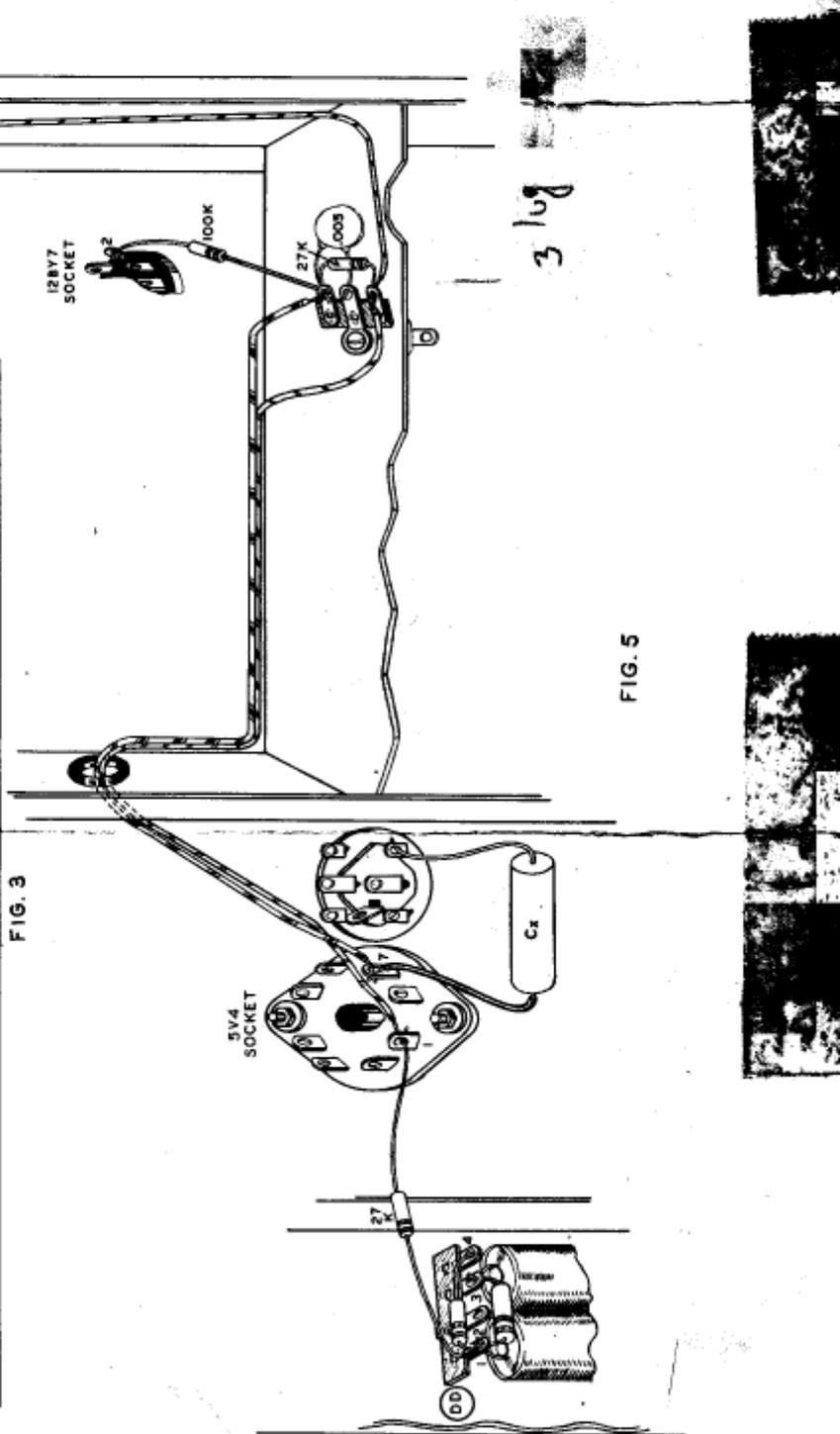


FIG. 5

- 1 ea switchcraft 1004
- 2 ea 27K resistors
- 1 ea 100K
- 1 ea .005
- 1 ea 0.015
- 1 ea 1 lug strip
- 1 ea 3 lug strip

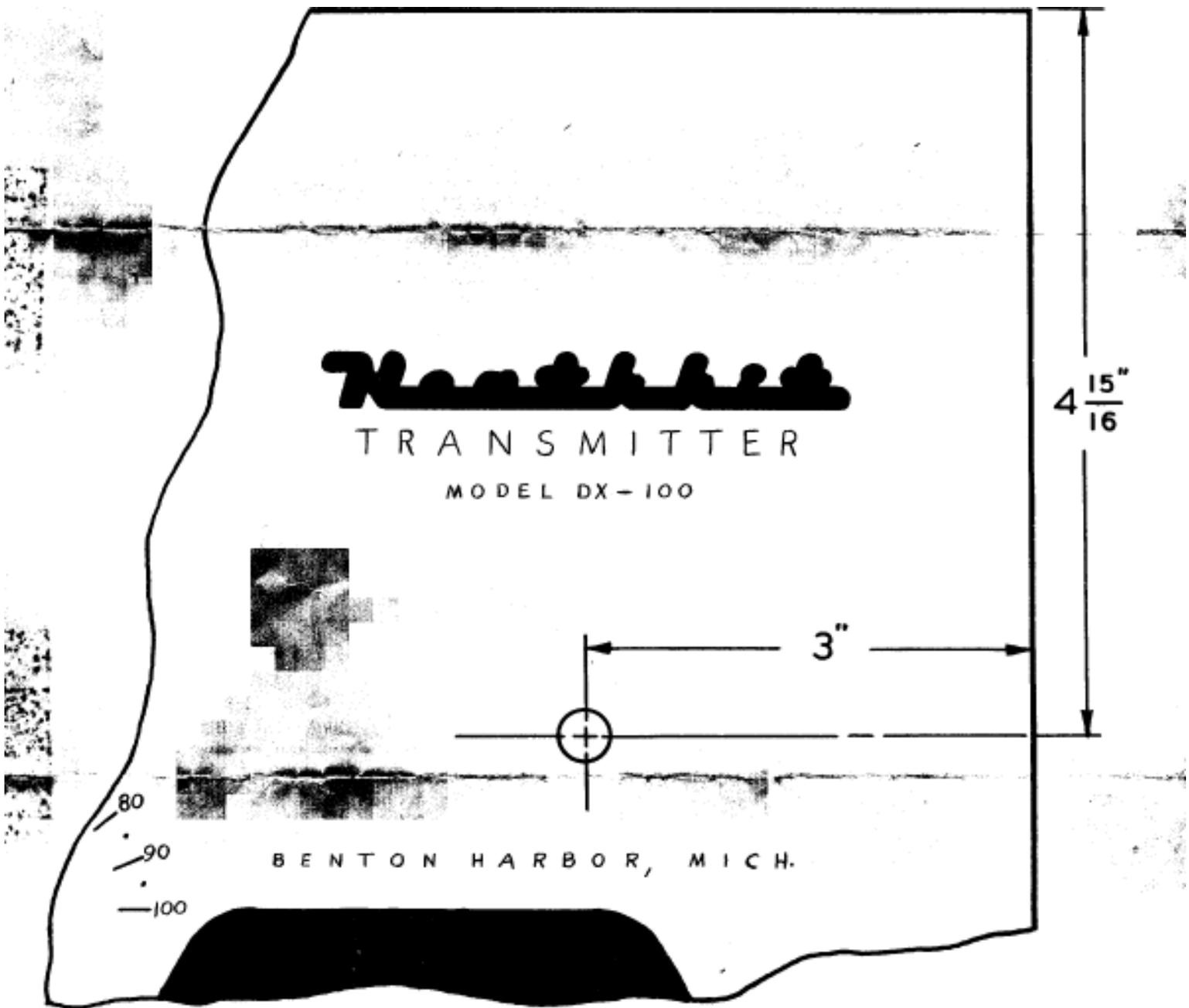
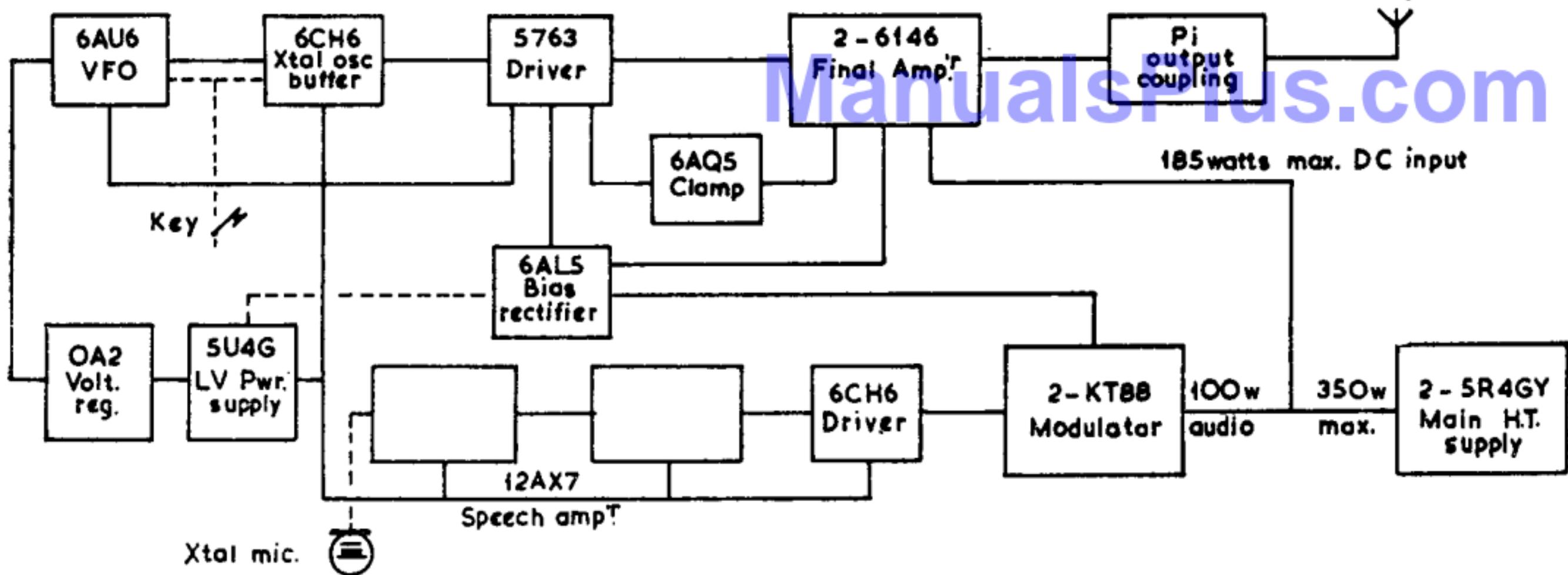


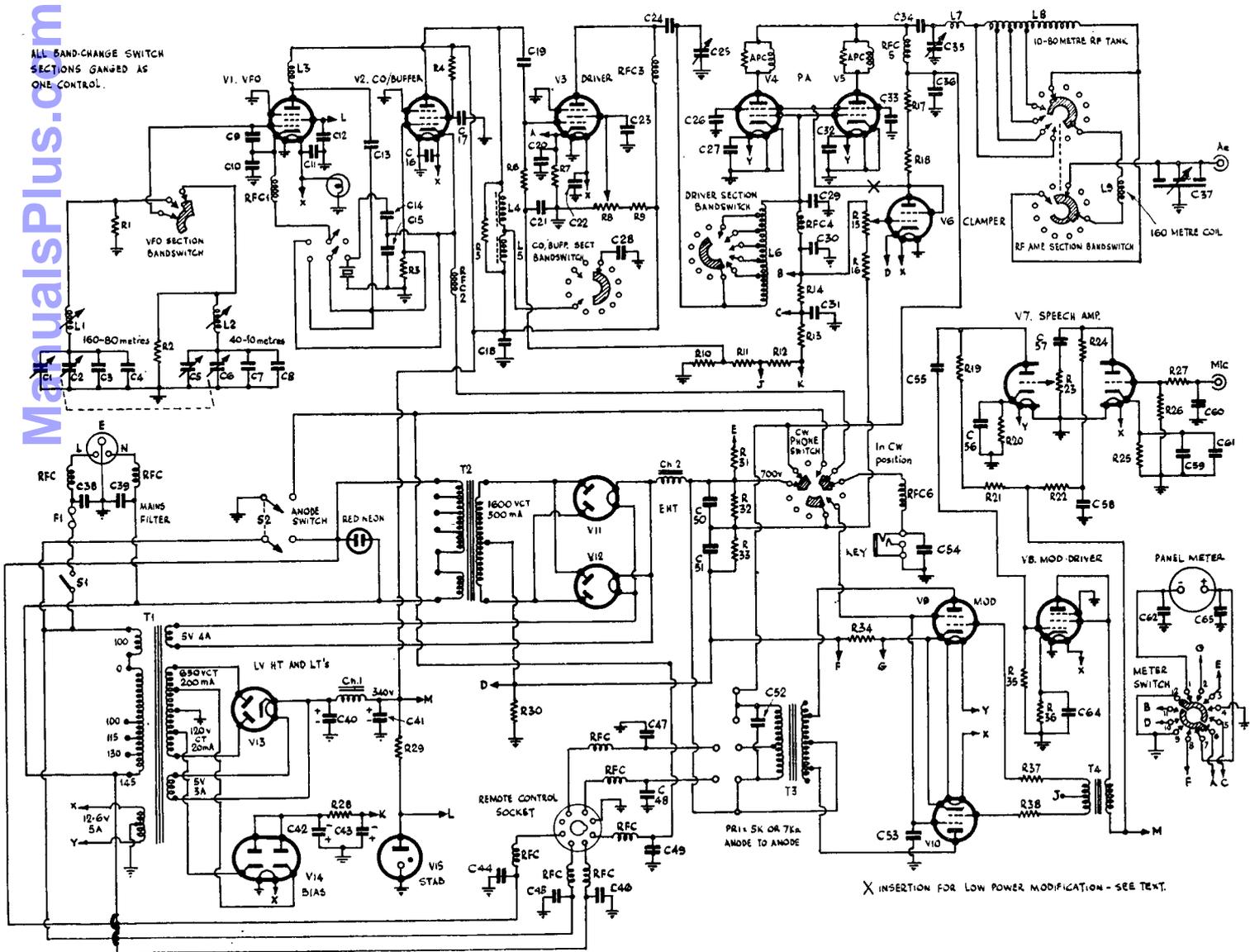
FIG. 4

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ALL BAND-CHANGE SWITCH
SECTIONS GANGED AS
ONE CONTROL.



X INSERTION FOR LOW POWER MODIFICATION - SEE TEXT.

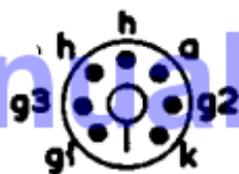
Table of Values

Circuit of the DX-100U CW/AM Phone Transmitter

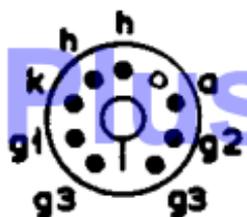
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C1, C5 = 20 $\mu\mu\text{F}$	- C26, C28,	R9 = 6,500 ohms	Ch2 = 6 Hy 500 mA	V4, V5 = 6146 (QVO6/20)
C2 = 35 $\mu\mu\text{F}$	C33 = .001 μF	R11 = 470 ohms	L1 = 114.5 μH	V6 = 6AQ5
C3, C7,	C34, C36 = .001 μF , 2 kV	R14 = 5.55 ohms	L2 = 9.3 μH	V7 = 12AX7
C19, C29 - 47 $\mu\mu\text{F}$	wkng.	R15, R23 $\frac{1}{2}$ -megohm	L3 = 28.0 μH	V9, V10 = KT88
C4 - 10 $\mu\mu\text{F}$	C35 = 300 $\mu\mu\text{F}$	potentiometer	L4 = 6.5 μH	V11, V12 5R4GY
C6 - 11 $\mu\mu\text{F}$	C37 - 500 $\mu\mu\text{F}$ 500 : 500	R16, R24,	L5 = 15 μH	V13 5U4G
C8 - 4.7 $\mu\mu\text{F}$	$\mu\mu\text{F}$	R26, R35 470,000 ohms	L6 - 10-160m. driver	V14 - 6AL5
C9, C10,	C40, C41 - 40 μF , elect.	R17, R18 - 10,000 ohms	L7, L8 10-80m. PA tank	V15 OA2
C55, C57 - 510 $\mu\mu\text{F}$	C42, C43 - 20 μF , elect.	R20, R25,	L9 - 160m. PA coil	
C11, C12,	C50, C51 = 125 μF , elect.	R27 4,700 ohms	S1 = SPST toggle	
C16, C17,	C52 = .02 μF , 2 kV	R28, R37,	S2 = DPDT toggle	
C18, C20,	wkng.	R38 = 1,000 ohms	APC = Anti-parasitic	
C21, C22,	C53, C58 - 0.1 μF	R29 = 15,000 ohms, 5w.	chokes on	
C23, C27,	C56, C59,	R30, R34 = 0.1 ohm	resistor forms, 4t.	
C30, C31,	C64 2 μF	R31 = 1 megohm	on 47 ohms	
C32, C38,	C60 - 220 $\mu\mu\text{F}$	R32, R33 - 15,000 ohms	T1 650-120-0v./200	
C39, C44,	R1 - 22,000 ohms	R36 = 680 ohms	mA	
C45, C46,	R2, R10,	RFC = Filter chokes	T2 800-0v./500 mA	
C47, C48,	R12, R13 - 2,200 ohms	RFC1,	T3 Mod xformer,	
C49, C54,	R3, R19,	RFC2,	2,800-ohm sec./	
C61, C62,	R22 = 100,000 ohms	RFC3 - 1.1 mH choke	5,000-ohm pri.,	
C63 = .005 μF	R4, R5,	RFC4 - 2.5 mH choke	A-A.	
C13 - 100 $\mu\mu\text{F}$	R21 47,000 ohms	RFC5 - 1 mH 500 mA	T4 - Driver xformer,	
C14 - 22 $\mu\mu\text{F}$	R6 27,000 ohms	choke	2 : 1.	
C15 - 150 $\mu\mu\text{F}$	R7 - 1.02 ohms	Ch1 7 Hy 200 mA	V1 - 6AU6 (EF84)	
C24 - 68 $\mu\mu\text{F}$	R8 25,000-ohm		V2, V8 - 6CH6	
C25 75 $\mu\mu\text{F}$	potentiometer		V3 = 5763	

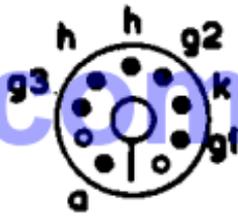
Fig. 2. Circuit complete of the DX-100U, for which all values are given here. Input up to 150 watts is easily obtainable on any HF band, with ample modulation capability.



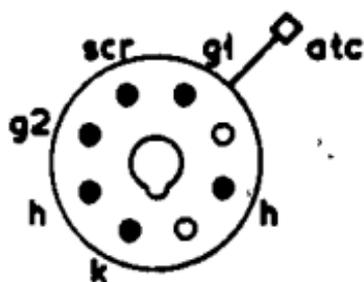
V1-6AU6



V2:VB-6CH6



V3-5763



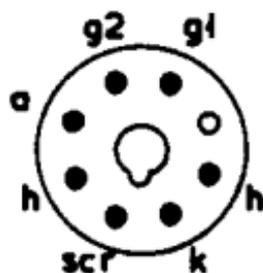
V4:V5-6146



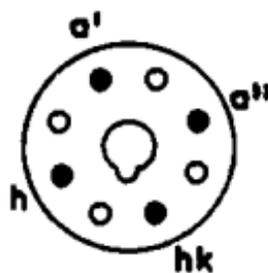
V6-6AQ5



V7-12AT7

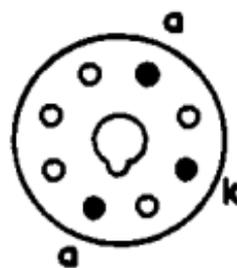


V9:V10-KT88



V11:V12-5R4GY

V13-5U4G



V15-OA2



V14-6AL5

HEATH MODIFICATION KIT ManualsPlus.com

MODEL MK-1

INTRODUCTION

The MK-1 Modification Kit is specifically designed for converting the Heathkit Model DX-100 and DX-100B transmitters to SSB operation in conjunction with the Heathkit Model SB-10 Single Sideband Adapter. The normal AM-CW capability of the DX-100 or DX-100B is not impaired by the modification, and the change from one mode of operation to the other requires changing only two coaxial cable connections and throwing one switch. The entire changeover can be made in less than one minute.

Three basic changes are made in the DX-100 and DX-100B during the MK-1 modification for SSB operation. First, the RF signal path is broken between the output circuit of the driver stage and the grids of the final amplifier. The RF drive is brought out to a coaxial connector on the rear of the chassis. The final amplifier grid lead is also brought out to another coaxial connector on the rear of the chassis. Second, the final amplifier is placed in class AB₁, for linear operation. The 6146 screen voltage is regulated at 210 volts with two OB2 regulator tubes in series. The grid bias is then adjusted to give 50 ma of resting plate current. Third, a provision is made for lifting the ground end of the fixed bias resistor string during standby periods to cut off the final amplifier without removing plate voltage. This eliminates excessive switching of the plate transformer primary power.

CIRCUIT DESCRIPTION

Referring to the schematic diagram, the circuit changes are self-evident when compared to the DX-100 or DX-100B schematics. A 3 pole-2 position rotary switch mounted on the front panel of the transmitter performs two mandatory switching functions plus one optional function. One switch section switches the clamp tube in and the VR tubes out of the final screen circuit for Class C operation or the clamp tube out and the VR tubes into the circuit for Class AB₁ operation. The 6146 screen dropping resistor becomes the VR tube load resistor in linear operation. While the regulator tubes are not physically disconnected from the 6146 screen during Class C operation, they will not conduct since the Class C screen voltage is below the firing voltage of the tubes. A second switch section grounds the end of the fixed bias resistor string in the normal manner for AM-CW operation (Class C) but allows this function to be performed remotely in the SB-10 during SSB operation (Class AB₁) by routing the lead to pin 5 of the accessory socket.

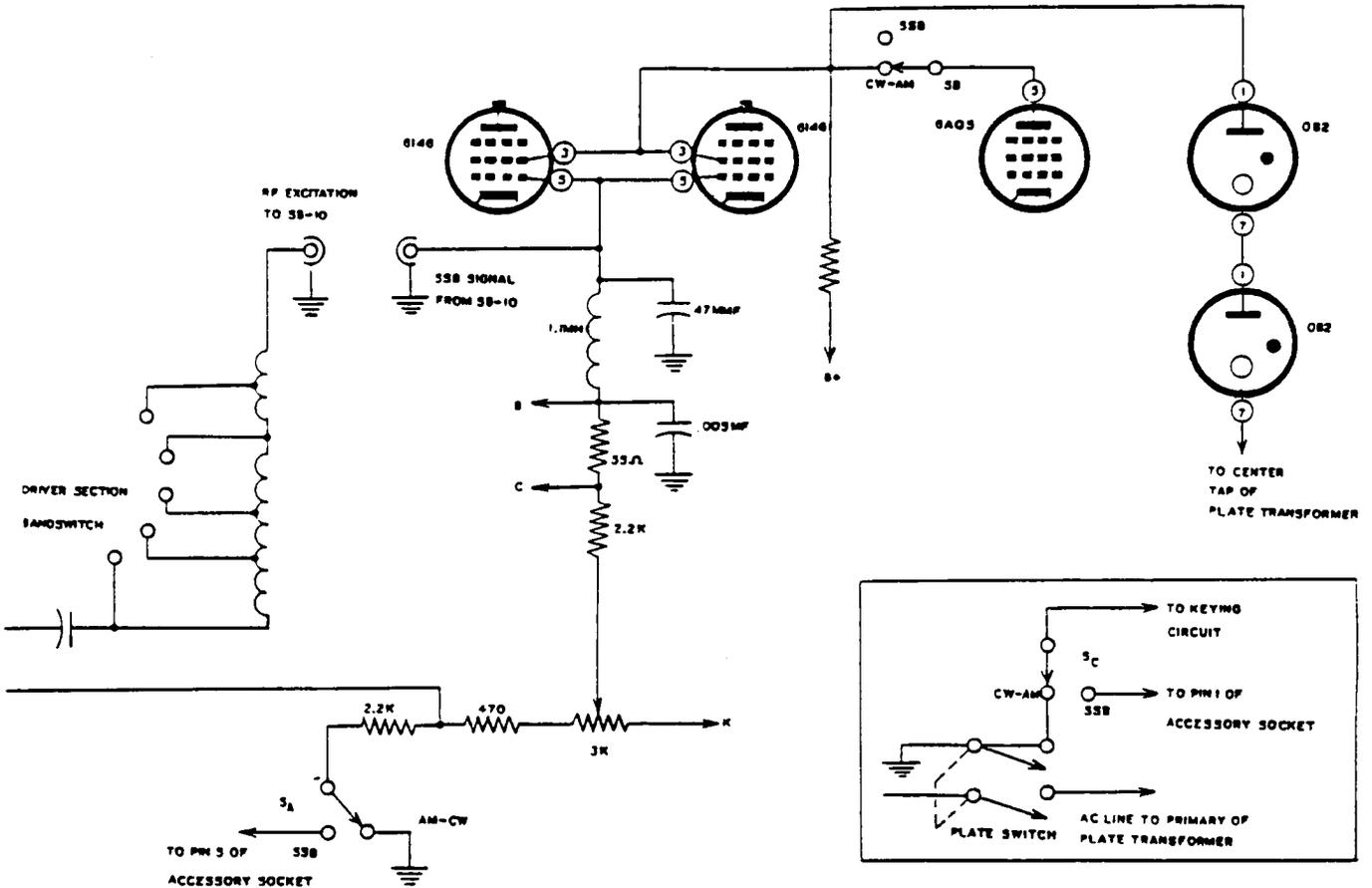
If the DX-100 or DX-100B being modified has been previously modified to employ grid block keying of the buffer stage, the fact that the VFO is on at all times may cause objectionable interference during standby periods. If SSB and AM are the modes of operation most frequently employed, a return to the original cathode keying circuit is recommended. To retain the grid block keying modification but render the VFO inoperative during SSB standby periods, the third switch section can be employed to route the VFO and buffer cathode return directly to pin 1 of the accessory socket when in Class AB₁ operation for external grounding during SSB transmitting periods. Thus, the plate switch, which is on continuously during SSB operation and normally grounds this cathode return, is bypassed.

A 3 K ohm control replaces the 2.2 K ohm resistor in the bias string to provide a means of varying the fixed bias on the final grids to obtain the proper value for Class AB₁ operation. Once set, this control needs no further adjustment since the rest of the bias required for Class C operation is developed by grid current flowing through the grid resistor.

Power for the SB-10 is brought out through the accessory socket using existing transmitter harness leads. Filament voltage is brought out through pin 7 and B+ through pin 6. The SB-10 requires 300-350 VDC at an average 85 ma and 6.3 VAC at 3.5 amps. The ratings of the DX-100

and DX-100B transformers are conservative enough to allow this extra load. If extended operation on SSB is contemplated, it is suggested that the modulator and speech amplifier tubes (1625, 12BY7, 12AX7) be removed to reduce the filament current drain.

NOTE: Refer to your DX-100 or DX-100B manual to review proper soldering and wiring procedures. Notice that the MK-1 pictorials are based on the DX-100B manual. However, in the areas to be modified, the DX-100 and DX-100B are identical in physical and electrical characteristics and no difficulty will be experienced.



SCHEMATIC HEATH MODIFICATION KIT MODEL MK-1

STEP-BY-STEP ASSEMBLY

- () Remove the transmitter from its cabinet and place on the work bench. Remove the 6AU6 tube from its socket on top of the VFO.
- () Referring to Figure 1, drill a 3/8" diameter hole in the front panel at the location indicated. If the transmitter has previously been modified for gridblock keying per Heath instructions, then drill this hole at a convenient location near the pushbutton switch already installed at this point. Be sure to allow enough distance between the two switches for clearance behind the panel. Drill a 1/4" hole first and use either successively larger drills, a taper reamer, or a rat-tail file to enlarge this pilot hole to 3/8" diameter. Be careful not to damage this filter capacitor directly behind the panel.

NOTE: The holes described in the next two steps are already punched in the DX-100B chassis.

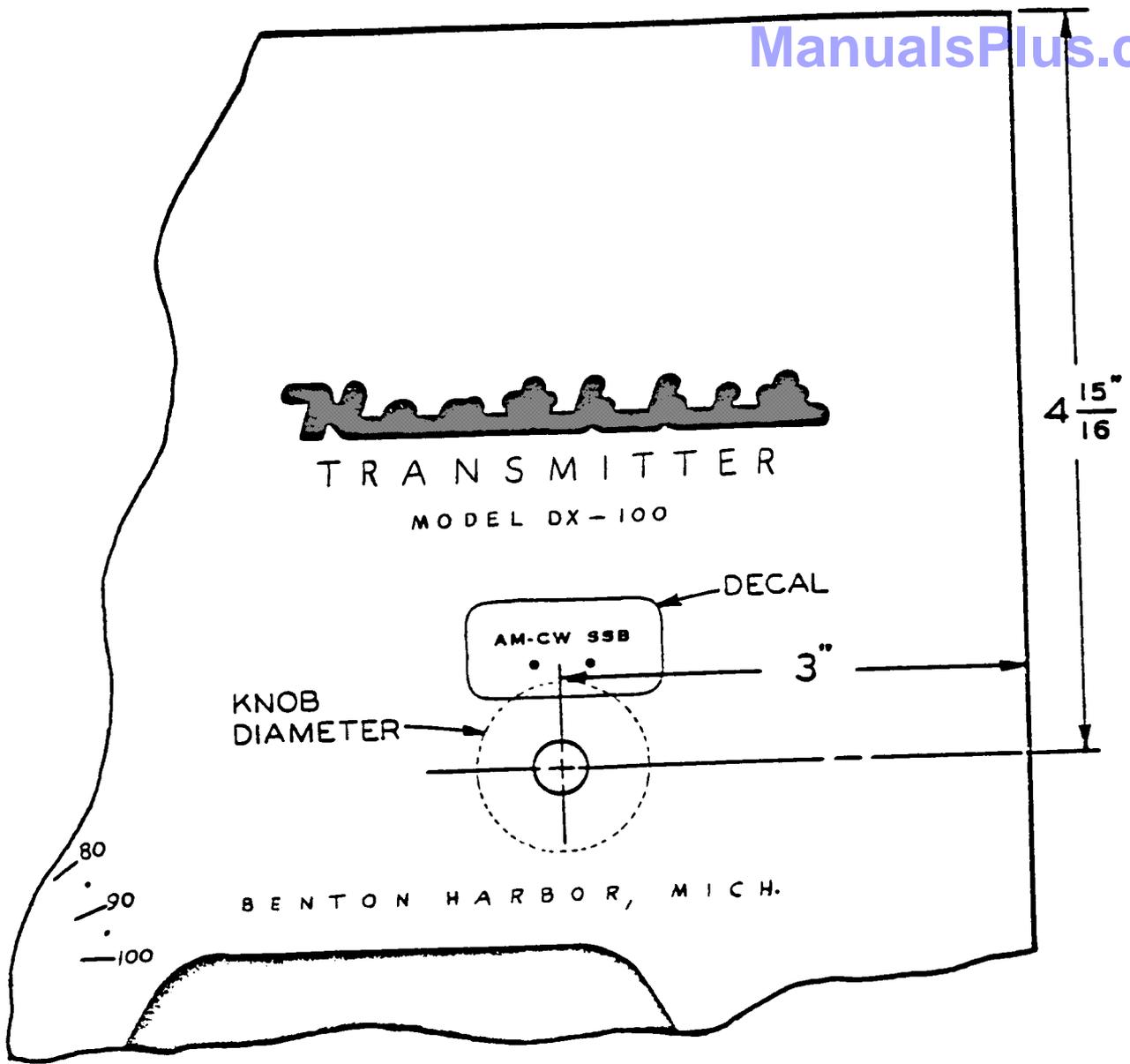


Figure 1

() Referring to Figure 2, drill the mounting holes for the two coax connectors in the rear apron at the locations indicated. Use a chassis-punch or a rat-tail file to enlarge a pilot hole to 5/8" diameter. Use care to prevent damage to components under the chassis.

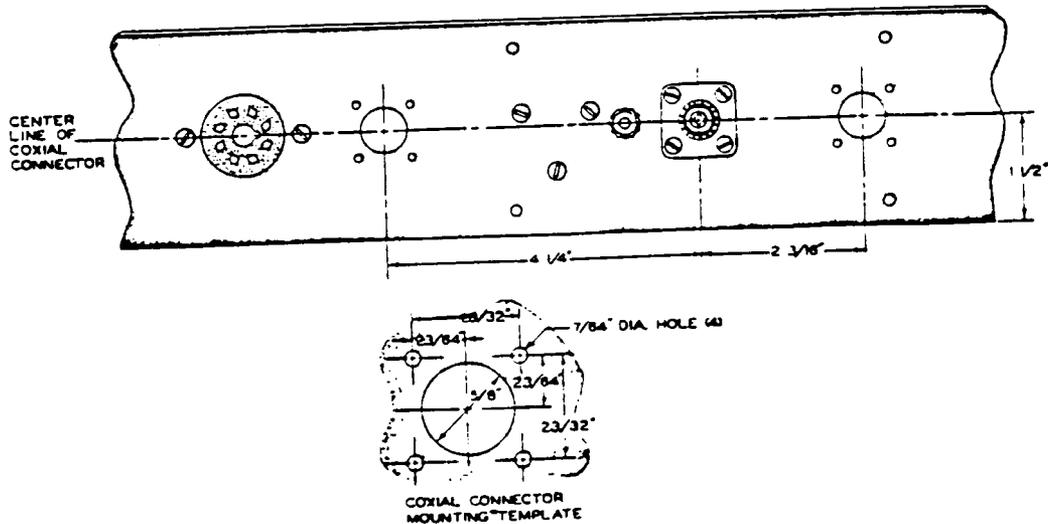
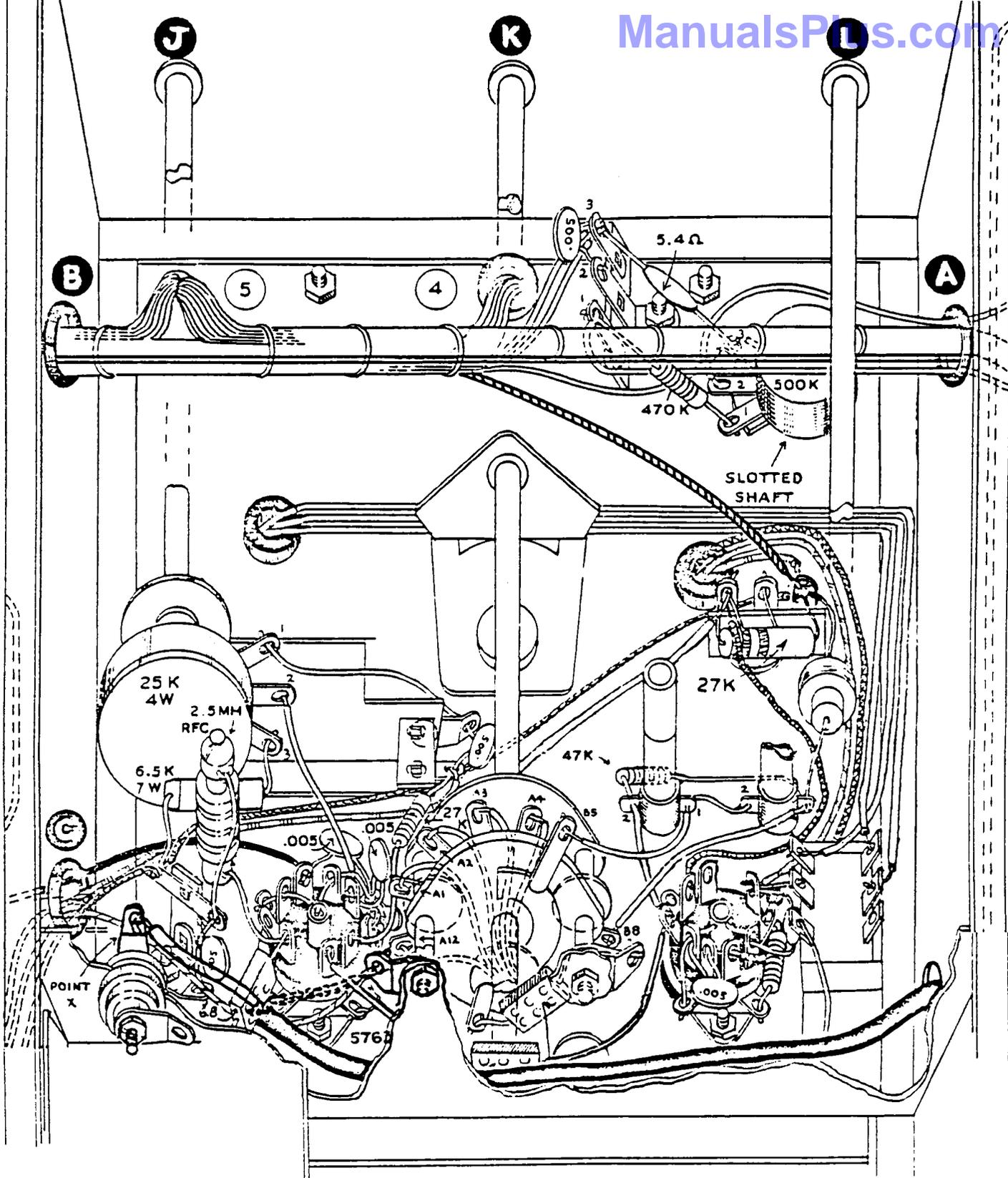


Figure 2



PICTORIAL 1

- () Turn the transmitter over and, referring to Pictorial 1, drill a $\frac{3}{8}$ " diameter hole in the right center partition in the approximate location shown, near the top plate and just in front of the driver shield. The location and size of this hole is not critical since it serves only to allow passage of a length of coaxial cable. A rat-tail file and a little patience is the most practical method for enlarging the pilot hole in this location.

- () Mount the two coaxial connectors in the two holes drilled in the rear apron. Secure with #3-48 x 1/4" PHMS, using #3 lockwashers under the nuts.
- () Replace the lockwasher under left mounting screw on the driver band switch on the front side of the driver shield with a #6 solder lug as shown in Pictorial 1. This can be accomplished by removing the rear nut and unscrewing the mounting bolt just far enough to allow substitution of the solder lug. This solder lug mounts in the same manner as the one already under the right switch mounting screw.
- () Cut a 14" length of the RG-62/U coaxial cable. Strip the outer jacket from one end for a distance of 1 1/2". Unbraid the shield, then twist and tin into a pigtail. Now strip 1/2" from the end of the exposed center. Now feed the still unprepared end of the cable under the driver band switch from the feedthrough insulator side and insert it through the hole drilled in the right center partition. Pull the cable through the hole until enough cable remains to connect the center conductor to the solder lug on the feedthrough insulator supporting one end of the 10-15 M driver plate coil. Solder this connection and then solder the shield pigtail to the solder lug installed under the driver band switch mounting screw. Refer to Pictorial 1.
- () Strip 1" of the outer sheath from the other end of the coaxial cable. Unbraid, twist, and tin the shield and strip 1/2" from the exposed center conductor. Connect the center conductor of the cable to the center pin of the coax connector (S1) and solder the shield to the solder lug under the rear terminal strip mounting screw. Refer to Pictorial 2.
- () Remove the lead between the rear terminal of the feedthrough insulator on the driver shield and the rear 3 lug terminal strip. This breaks the RF signal path between the driver and the final amplifier to allow re-routing the signal through the SB-10 SSB adapter. Refer to Pictorial 3.
- () Referring again to Pictorial 3, using #16 bare wire, connect the center pin of the remaining coax connector to pin 5 of the rearmost 6146 socket. Solder both connections.

- () Mount the two 7 pin miniature sockets on the tube and control mounting bracket at locations MQ and MR, as shown in Figure 3, with the lugs on the flanged side of the bracket. Orient the tubes with the gap between pins 1 and 7 away from the flanged edge. Secure with #3-48 x 1/4" PHMS using #3 lockwashers under the nuts.

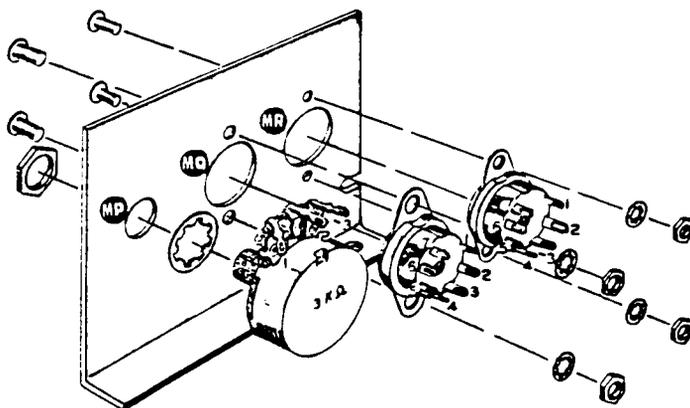
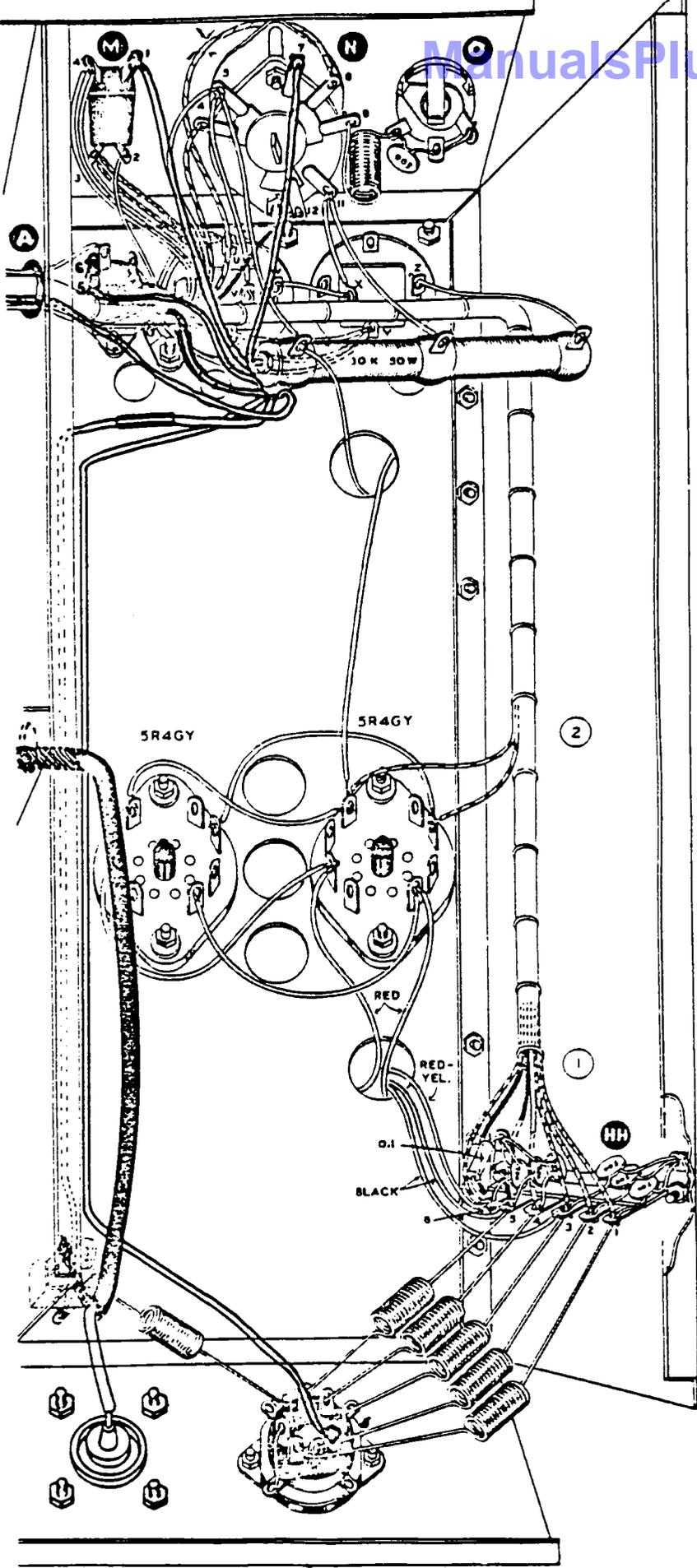
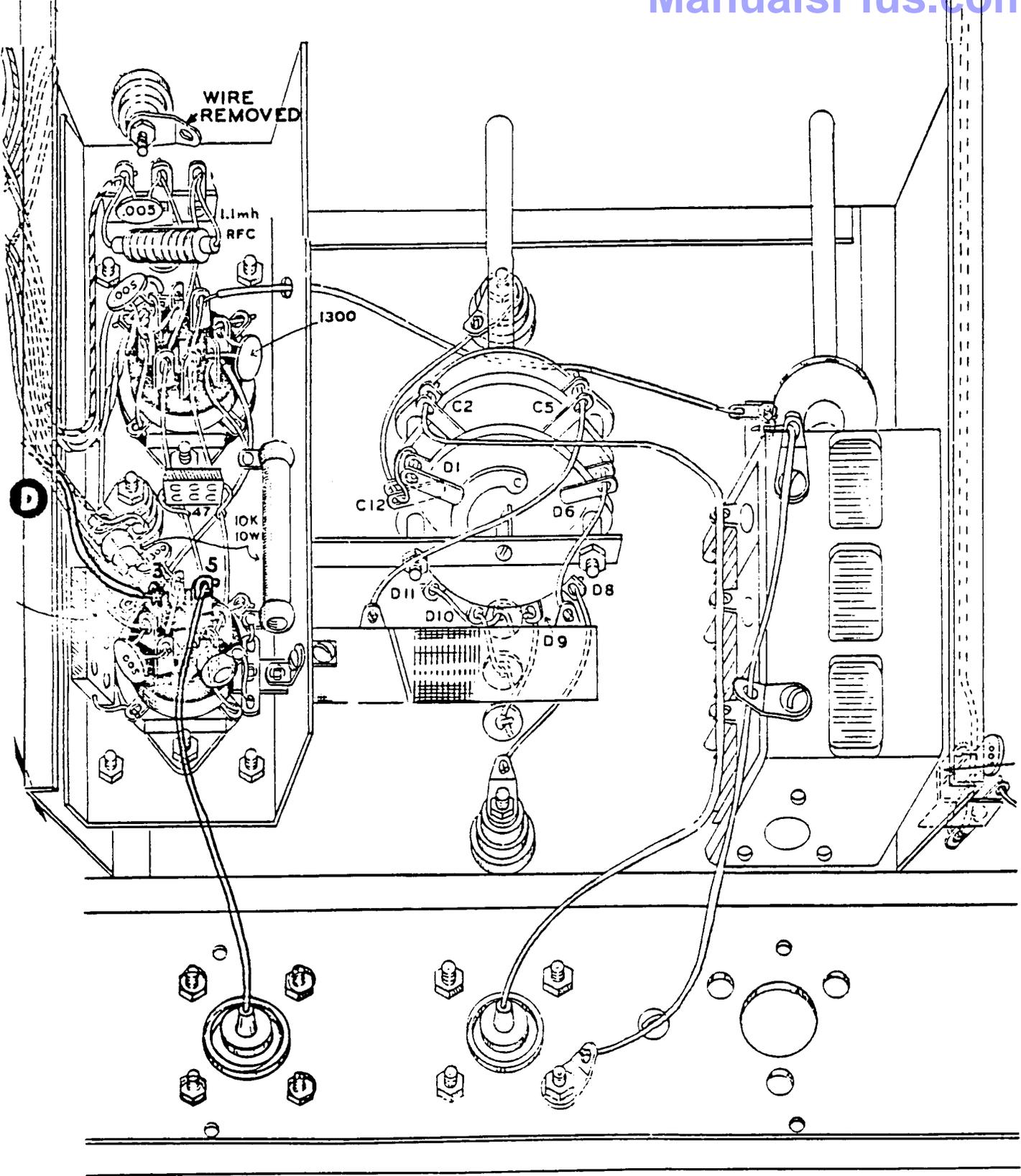


Figure 3

- () Mount the 3 KΩ control on the bracket at location MP, orienting with the lugs away from the flanged edge. Place a 3/8" lockwasher over the control bushing, insert the control from the flanged side of the bracket, and secure with a 3/8" nut. Refer to Figure 3.
- () Strip the insulation from a short length of hookup wire and connect MQ-1 (S1) to MR-7 (S1). Refer to Figure 3.



PICTORIAL 2

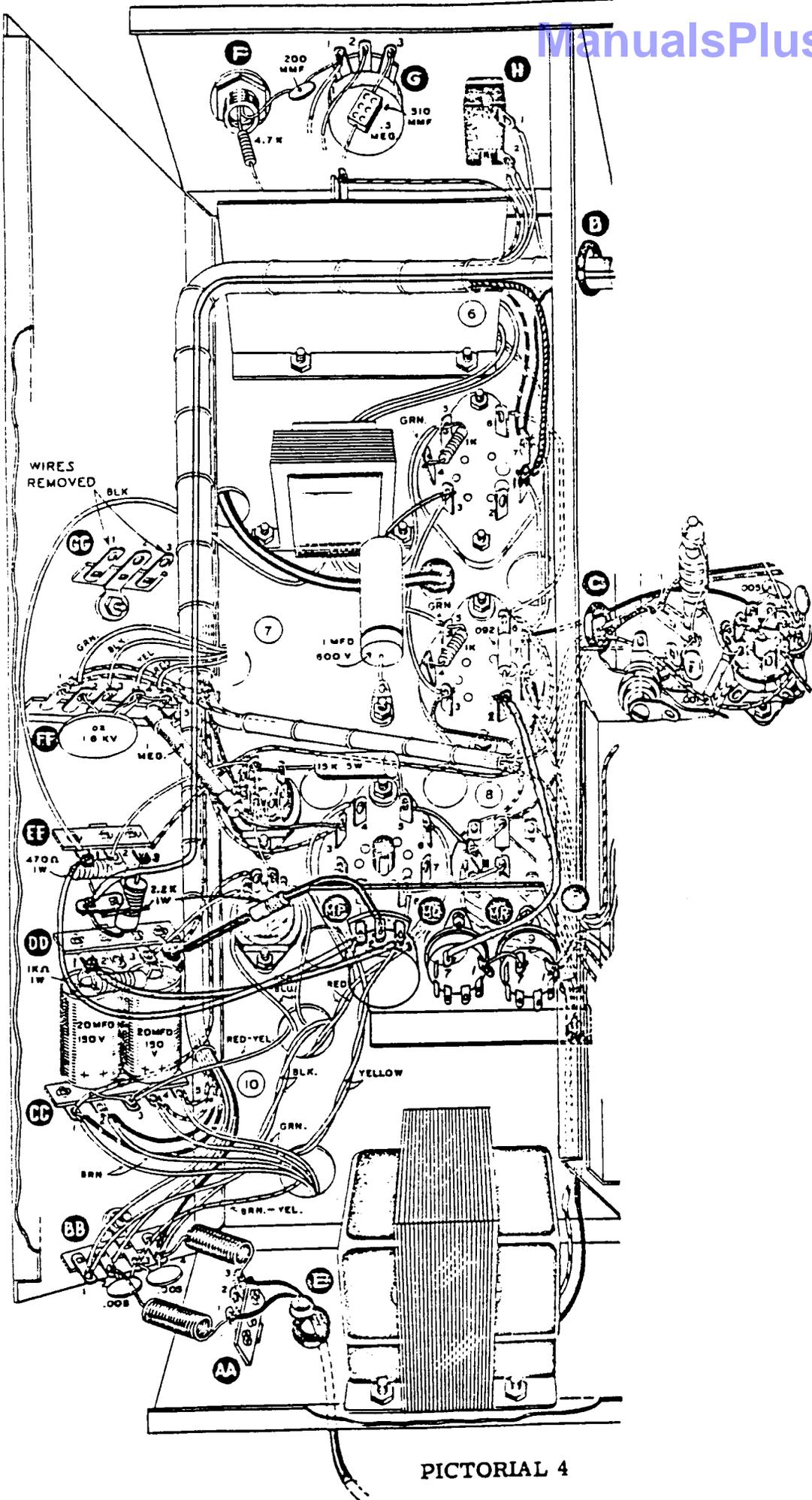


PICTORIAL 3

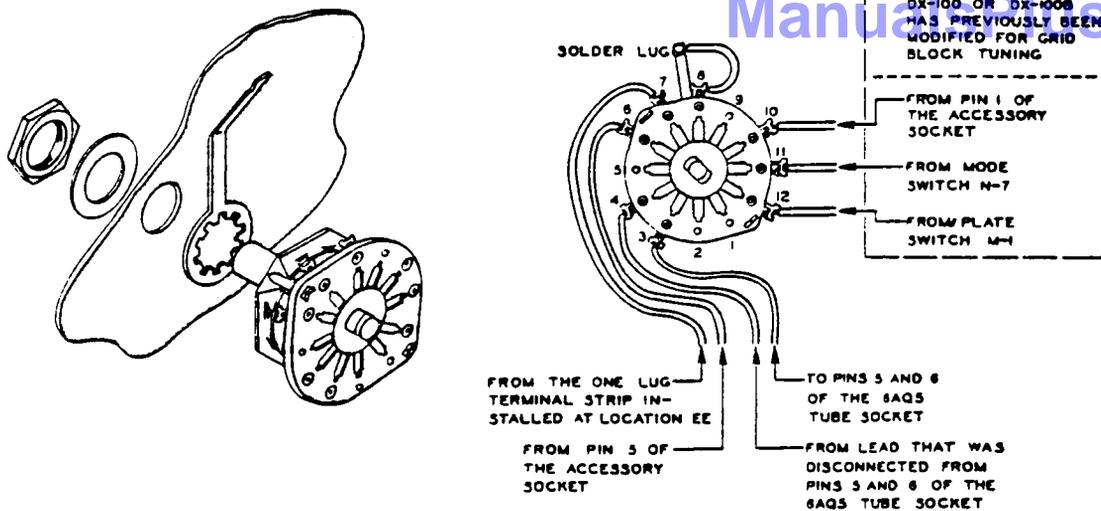
- () Mount the bracket, as shown in Pictorial 4, under the mounting screw nut on the low voltage power transformer which is nearest the chassis center. Redress any wires in the area into the notch provided and secure the bracket firmly using the single mounting hole in the flange.
- () With hookup wire, connect MR-1 (S1) to pin 3 of the rear 6146 socket. Route the wire through the grommet in the intervening partition and solder the pin 3 connection. See Pictorials 3 and 4.
- () With hookup wire, connect MQ-7 (S1) to pin 2 of the nearest 1625 socket and solder. Pin 2 of the 1625 socket has a brown lead, a white lead and one lead of a $.1\Omega$ precision resistor connected to it. Refer to Pictorial 4 for this and the following steps.
- () Remove the $2.2\text{ K}\Omega$ $1/2$ watt resistor between DD-1 and DD-4 and remove the $2.2\text{ K}\Omega$ 1 watt resistor between DD-1 and EE-1.
- () Mount the 1 lug, no ground, terminal strip on the EE mounting screw and position as shown. Secure.
- () Disconnect the lead of the $2.2\text{ K}\Omega$, 1 watt resistor connected to DD-2 and reconnect to the one lug terminal strip just installed on EE (NS).
- () Using hookup wire, connect EE-1, solder, to control MP-1 (S1).
- () Using hookup wire, connect DD-1, solder, to control MP-3 (S1).
- () Connect the $2.2\text{ K}\Omega$, 1 watt resistor supplied between DD-4, solder, and MP-2 (S1). Use sleeving.

NOTE: If the DX-100 or DX-100B being modified has been supplying its audio to a higher powered modulator, per the instructions on page 59 or 57 (respectively) of the transmitter manual, a return to the original circuit is suggested so as to free pins 6 and 7 of the accessory socket for the following steps. The audio voltage may be brought out of the transmitter with separate leads, if necessary.

- () Disconnect the blue lead from GG which shows continuity to pin 7 of the accessory socket (as checked with an ohmmeter). Connect this lead to pin 1 of either 1625 socket and solder. See Pictorial 4.
- () Disconnect the blue lead from GG which shows continuity to pin 6 of the accessory socket. Pull this wire out of the harness back as far as the band switch shaft in the exciter compartment and connect to lug 1 of the 3 lug terminal strip near the slug tuned coils, as shown in Pictorial 1. Cut to length and solder.
- () Cut a length of hookup wire 27" long and strip both ends $1/2$ ". Connect one end to the one lug, no ground, terminal strip installed at EE (S2). Route the other end along the harness, through the grommets, into the power supply compartment and insert through the hole in the chassis top plate between the two large filter capacitors. Leave this end free temporarily. Refer to Pictorials 2 and 4.
- () Temporarily remove the filter capacitor wafer mounting nuts from the wafer nearest the chassis edge so the capacitor may be moved to allow clearance for mounting the function switch. See Pictorial 2.



PICTORIAL 4



MOUNTING AND WIRING OF THE FUNCTION SWITCH

MR-1

Figure 4

- () Place a control solder lug over the function switch bushing, and insert it in the hole previously drilled in the front panel. Place a 3/8" washer and nut on the bushing but do not tighten yet. The switch will be designated FS. See Figure 4.
- () Connect the free wire from the hole in the top plate to FS-7 (S1). See Figure 4.
- () Cut an 18" length of hookup wire and strip each end 1/2". Connect one end to pin 5 of the accessory socket (S1). Run the lead along the underside of the chassis top plate to the hole between the filter capacitor, then up and connect to FS-6 (S1). Refer to Pictorial 2 and Figure 4 for this and the following steps.
- () Connect a short length of hookup wire between FS-8 (S1) and the control solder lug under the switch (S1).
- () Disconnect the orange wire from pins 5 and 6 of the 6AQ5 clamp tube socket. Splice one end of a 7" length of hookup wire to the end of the orange lead and cover with insulated sleeving. Pass the other end of the wire up through the top plate hole and connect to FS-4 (S1).
- () Pass one end of another 7" length of hookup wire through pin 5 of the 6AQ5 socket to pin 6 (S1). Now solder pin 5 (S1). Pass the other end through the top plate hole and connect to FS-3 (S1).

NOTE: The following steps need only be performed if the DX-100 or DX-100B has been previously modified for grid block keying, as discussed in the introduction to this manual.

- () Remove the lead between plate switch M-1 and mode switch N-7.
- () Disconnect the lead from M-1 that comes from pin 1 of the accessory socket. Splice a 5" length of hookup wire to this lead, cover with insulated sleeving, pass through the top plate hole, and connect to FS-10 (S1).
- () Solder one end of a 7" length of hookup wire to N-7. Pass the other end through the top plate hole and connect to FS-11 (S1).
- () Solder one end of a 7" length of hookup wire to M-1. Pass the other end through the top plate hole and connect to FS-12 (S1).
- () Now secure the filter capacitor mounting screws previously loosened and also secure the function switch.
- () Install the OB2 voltage regulators in sockets MQ and MR.

This completes modification of your DX-100 or DX-100B for SSB operation in conjunction with the Heathkit Model SB-10 SSB Adapter.

Before proceeding with the Testing and Adjustment of the modified transmitter, using the remaining length of RG-62/U coaxial cable, prepare the coaxial cable jumper by placing connectors on each end of the cable as shown in Figure 5.

Referring to Figure 1, place the decal provided at the function switch location, as shown, and install the plastic knob supplied on the function switch shaft. Orient the knob with the pointer at "AM-CW" with the switch full CCW.

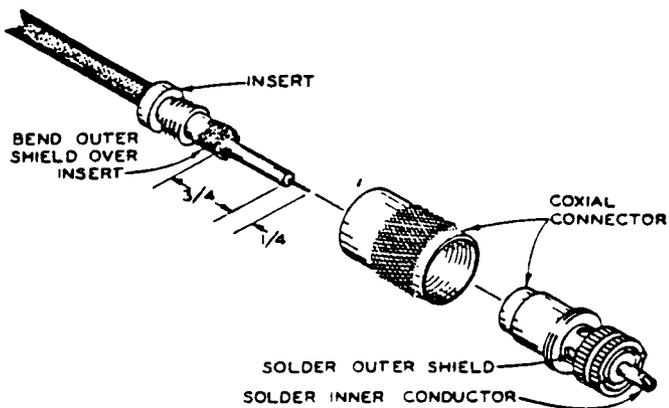


Figure 5

TESTING AND ADJUSTMENT

- () Before applying power to the modified transmitter, recheck the wiring once again, paying particular attention to the switch wiring and checking closely for short circuits. Replace the 6AU6 tube in the VFO tube socket.
- () Connect a temporary jumper between pin 5 and pin 8 of the accessory socket. A short length of solder or jumpered octal plug will do nicely.
- () Place the bias adjust control full CW, the transmitter drive control full CCW, the "CW-Phone" switch in "CW" position, the "AM-CW, SSB" function switch in "SSB" position, and the meter switch in "Plate" position. The position of the remaining transmitter controls is not critical.

NOTE: Neither the SB-10, the coaxial jumper, nor a dummy load should be connected to the transmitter for this portion of the testing procedure.

- () Turn the transmitter power "ON" and allow the transmitter to warm up for about one minute.
- () Turn the plate voltage on, watching the plate current closely. Adjust the bias control until 55 ma of plate current is indicated. Use caution when making this adjustment, due to the high voltage present under the chassis. If the plate current is excessive (250 ma or more) or cannot be brought to 55 ma with the bias control, turn off the plate power and check your work once again.
- () Once 55 ma of plate current is obtained, check the OB2 regulator tubes which should be showing a soft glow.
- () If a VOM or VTVM is available, the final amplifier grids (pin 5) should show approximately -50 volts DC and the screens of the 6146's (pin 3) should show 210 VDC.
- () Turn the plate power off. Return the function switch to "AM-CW" position and connect the coaxial jumper between the "RF excitation output" and "SSB input" connectors on the rear apron of the transmitter.
- () Now, connect a dummy load to the RF output connector of the transmitter and check for normal CW and AM operation of the transmitter. A slight decrease in available grid drive can be attributed to the length of coax added to the RF signal path.

- () Replace the transmitter in its cabinet after cutting clearance holes in the back panel for the two new coax connectors. A 2" chassis hole punch, if available, will do the job nicely. Slide the transmitter into the cabinet as far as it will go to mark the hole locations.

After testing and adjustment, connect the SB-10 to the transmitter as described in the SB-10 manual. If required, as outlined in the Circuit Description and in the SB-10 manual, provide a ground-when-transmitting connection for the VFO and buffer cathode return., Now proceed with testing and adjustment of, or operation with, the SB-10 adapter.

IN CASE OF DIFFICULTY

Mistakes in wiring are the most common cause of difficulty. Consequently, the first step is to recheck all wiring against the pictorials and schematic diagram. Often having a friend check the wiring will locate an error consistently overlooked.

Also, with miniature sockets there is a possibility of shorts between adjacent socket terminals, due to the close spacing. Check the VR tube sockets for any indication of this condition.

Sometimes apparently good solder connections will have an insulating coating of rosin between the wire, the terminal, and the solder. This is often the case when insufficient heat was applied in soldering. Check any questionable connections that will test for this condition.

Check the DC voltage on the 6146 grids (pin 5). The bias control should give a voltage variation from -35 to -65 volts, with approximately -50 volts indicated with 55 ma of resting plate current. Remember to jumper pins 5 and 8 of the accessory socket during this test or place the function switch in AM-CW position temporarily.

With the function switch in SSB and the plate voltage on, the 6146 screens (pin 3) should show 210 VDC. With the function switch in AM-CW and the plate voltage on (remember to tune the transmitter up and load into a dummy antenna before applying plate voltage in Class C operation), the screens should show 160 VDC, providing the clamp control is properly set. Check the transmitter manual and reset the clamp control, if necessary.

NOTE: The instructions in your DX-100 or DX-100B manual regarding replacements, specifications, and shipping will apply to the MK-1 and the modified transmitter.

SERVICE

If, after applying the information contained in this manual and your best efforts on the transmitter modification, the SB-10 or your transmitter still does not function properly, it is suggested that you take full advantage of the technical facilities which the Heath Company makes available to its customers.

The Technical Consultation Department is maintained for the purpose of providing Heath customers with a personalized technical consultation service; it is available to you without charge. The technical consultants are thoroughly familiar with all details of the kit and its mechanism, and can usually localize the trouble from a suitable description of the difficulty encountered. It is, of course, necessary that you provide full and complete information concerning your problem when writing to the Technical Consultation Department for assistance. For instance, clearly identify the equipment involved, giving the purchase date and, if possible, the invoice number; describe in detail the difficulty that you have encountered; state what you have attempted to do to rectify the trouble, what results have been achieved, and include any information or clues that you feel could possibly be of value to the consultant who handles your problem. Quite frequently, when the information given the consultant is complete, concise and reliable, a diagnosis of the difficulty can be made with confidence and specific instructions given for its correction.

If replacement of a component is involved in the correction, the component will be shipped to you, subject to the terms and conditions of the Warranty. It is further suggested to customers who may use the adaptor kit to modify transmitters other than Heathkits, that they should write to the transmitter manufacturer for technical information regarding his equipment.

The Factory Service Department is also available to you for the repair of the Heath Equipment in the event that you prefer to have the difficulty corrected in this manner. Only the complete Heathkit transmitter, as modified per MK-1 instructions, can be satisfactorily serviced, and the charges for service and replacement parts will be governed by the terms of the applicable sections of the Transmitter Manual. The Heath Company will not service or inspect transmitters other than Heathkits.

Local Service by Authorized Heathkit Dealers is available and often will be your fastest, most efficient method of obtaining service for your Heathkits. Although you may find charges for local service somewhat higher than those listed in Heathkit manuals (for factory service), the amount of increase is usually offset by the transportation charges you would pay if you elected to return your kit to Heath Company.

Heathkit dealers will honor the regular 90 day Heathkit Warranty on all kits, whether purchased through a dealer or directly from Heath Company. It will be necessary that you verify the purchase date of your kit by presenting your copy of the Heath Company invoice to the authorized dealer involved.

Under the conditions specified in the Warranty, replacement parts are supplied without charge; however, if your local dealer assists you in locating a defective part (or parts) in your Heathkit, or installs a replacement part for you, he may charge you for this service.

Heathkits purchased locally and returned to Heath Company for warranty service must be accompanied by your copy of the dated sales receipt from the authorized Heathkit dealer from whom you purchased the kit.

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.

They can be obtained at or through your local library, as well as at any electronic outlet store. 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 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.

WARRANTY

Heath Company warrants that for a period of three months from the date of shipment, all Heathkit parts shall be free of defects in materials and workmanship under normal use and service and that in fulfillment of any breach of such warranty, Heath Company shall replace such defective parts upon the return of the same to its factory. 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.

NOTE: The foregoing warranty is completely void and we will not replace, repair or service instruments or parts thereof in which acid core solder or paste fluxes have been used.

HEATH COMPANY

<u>PART</u> <u>No.</u>	<u>PARTS</u> <u>Per Kit</u>	<u>DESCRIPTION</u>
Resistors		
1-23A	1	2.2 K Ω 1 watt
Controls		
10-87	1	3 K Ω linear control
Switches		
63-188	1	3 pole 2 position rotary
Tubes		
411-46	2	OB2 voltage regulator
Sockets-Terminal Strips		
431-15	1	1-lug terminal strip/no ground
434-34	2	7 pin miniature socket
Hardware		
250-49	12	#3-48 x 1/4" PHMS
252-1	12	#3-48 nut
252-7	2	3/8" -32 nut
253-10	1	3/8" flat washer
254-4	1	3/8" lockwasher
254-7	12	#3 lockwasher
259-1	1	#6 solder lug
259-10	1	Control solder lug
Sheet Metal Parts		
204-M212	1	Mounting bracket
Miscellaneous		
340-3	1	#16 bare wire
343-5	1	RG-62/U coaxial cable
344-1	1	#22 hookup wire
346-4	1	Insulated sleeving
390-55	1	Decal
436-5	2	Female coaxial connector
438-9	2	Male coaxial connector
438-18	2	Coaxial connector insert
462-19	1	Knob
595-229	1	Instruction manual