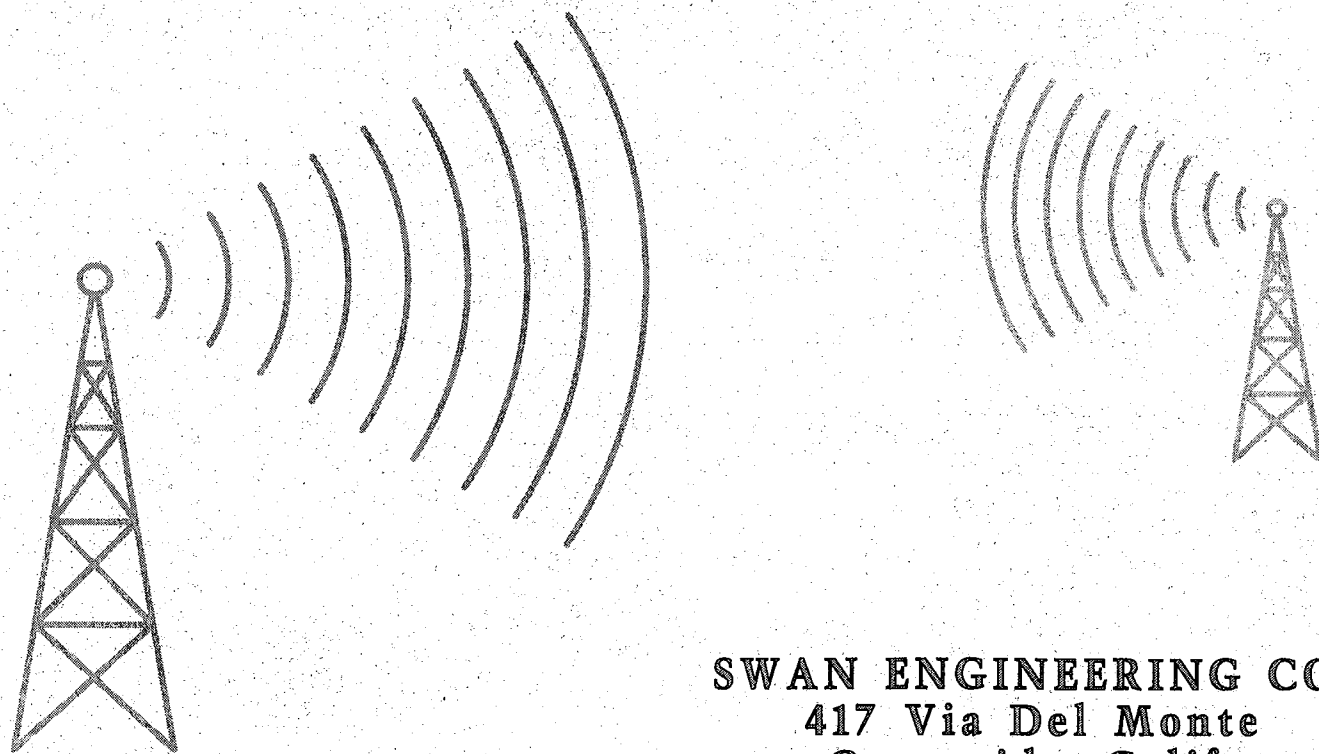


OPERATION AND MAINTENANCE

SWAN

MODEL TCU TRANSMITTER CONTROL UNIT



**SWAN ENGINEERING CO.
417 Via Del Monte
Oceanside, Calif.**

SWAN TCU
SUPPLEMENTAL INSTALLATION INSTRUCTIONS

THE MODIFICATION DESCRIBED BELOW, SHOULD BE MADE IN THE SW-240 TRANSCEIVER, TO SHORTEN THE DELAY WHEN RETURNING FROM TRANSMIT TO RECEIVE. INADVERTANTLY THIS MODIFICATION WAS NOT INCLUDED IN THE ORIGINAL INSTRUCTION SHEET.

MODIFICATION

REMOVE C908, A 100 MFD, 50 WV CAPACITOR LOCATED ON THE SW-240 RF GAIN CONTROL. REPLACE C908 WITH THE ENCLOSED 10 MFD, 50WV CAPACITOR. BE SURE TO OBSERVE PROPER POLARITY: NEGATIVE TO CHASSIS GROUND.

SUPPLEMENTARY INSTRUCTIONS

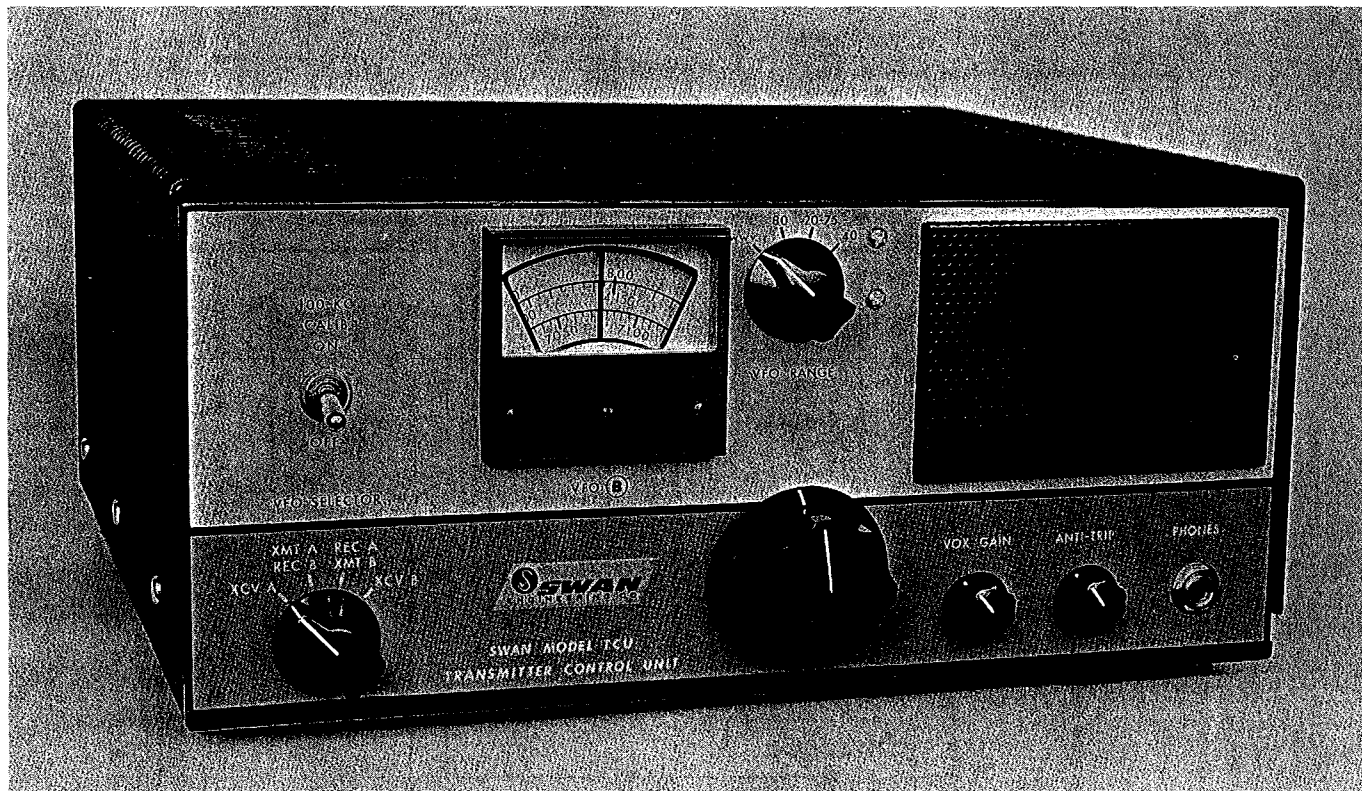
For CW operation, carrier is inserted by turning the CAR. BAL. control full clockwise or counter-clockwise. In some cases it may be found that full CW power, about 250 ma. meter reading, cannot be reached. Remove the transceiver cabinet, and check the terminal lugs on the CAR. BAL. control. If a pair of 2.2K, 1/2 watt resistors are found connected to these lugs, remove them. Simply cut the resistor leads off from the lugs. This change will increase transmitter drive power for CW operation.

FIRST SERIES SW-240

The first SW-240 Transceivers tuned from 3800 to 4000 KC. If 80 meter CW is desired, it may be found that the exciter tune control will not adjust to full CW power at the lower end of the 80 meter CW band. This condition is not indicative of any defect in either the transceiver or TCU, and would constitute a problem only if you wish to transmit at the low end of the 80 meter band. It will be necessary then to change and realign two tuned circuits. If you should wish to make this change, please write to the factory, attention Mr. Dave Howard, for further modification instructions and additional component kit at no cost.

MODEL TCU TRANSMITTER CONTROL UNIT

SWAN
ELECTRONICS CORP.
Oceanside, California



GENERAL DESCRIPTION

Swan Electronics Corporation Model TCU Transmitter Control Unit is designed to operate in conjunction with the Swan SW-240 Single Sideband Transceiver to provide:

- Separate VFO for non-transceive operation
- Extended coverage of the 80 meter CW band
- Reception of WWV or WWVH on 15 MC
- Voice Operated Transmission, (VOX)
- 100 KC Crystal Calibrator

Minor modifications to the SW-240 are necessary. All hardware, modification parts, and mounting instructions are furnished with the TCU. The complete unit is housed in a cabinet which matches the SW-240 Transceiver. Provisions have been included to mount the SW-117B AC power supply within the TCU cabinet to provide a complete, compact installation with all of the desired operating features.

SPECIFICATIONS

Frequency Coverage

1. WWV as marked on dial
2. 80 M CW 3,500 to 3,650 KC
3. 75 M 3,650 to 4,000 KC
4. 40 M 7,000 to 7,300 KC
5. 20 M 14,000 to 14,350 KC

Front Panel Controls VOX Gain, Anti-Trip, Main Tuning, VFO Selector, VFO Range, Calibrate ON-OFF.

Audio Output Audio output through built-in 3 in. by 5 in. speaker, or by phone jack on front panel.

Power Requirements All power requirements are supplied through 12 conductor cable from the transceiver

Dimensions Width 13 1/4 in. Depth 11 in. Height 5 5/8 in.

Weight 8 1/2 pounds without SW-117B power supply.

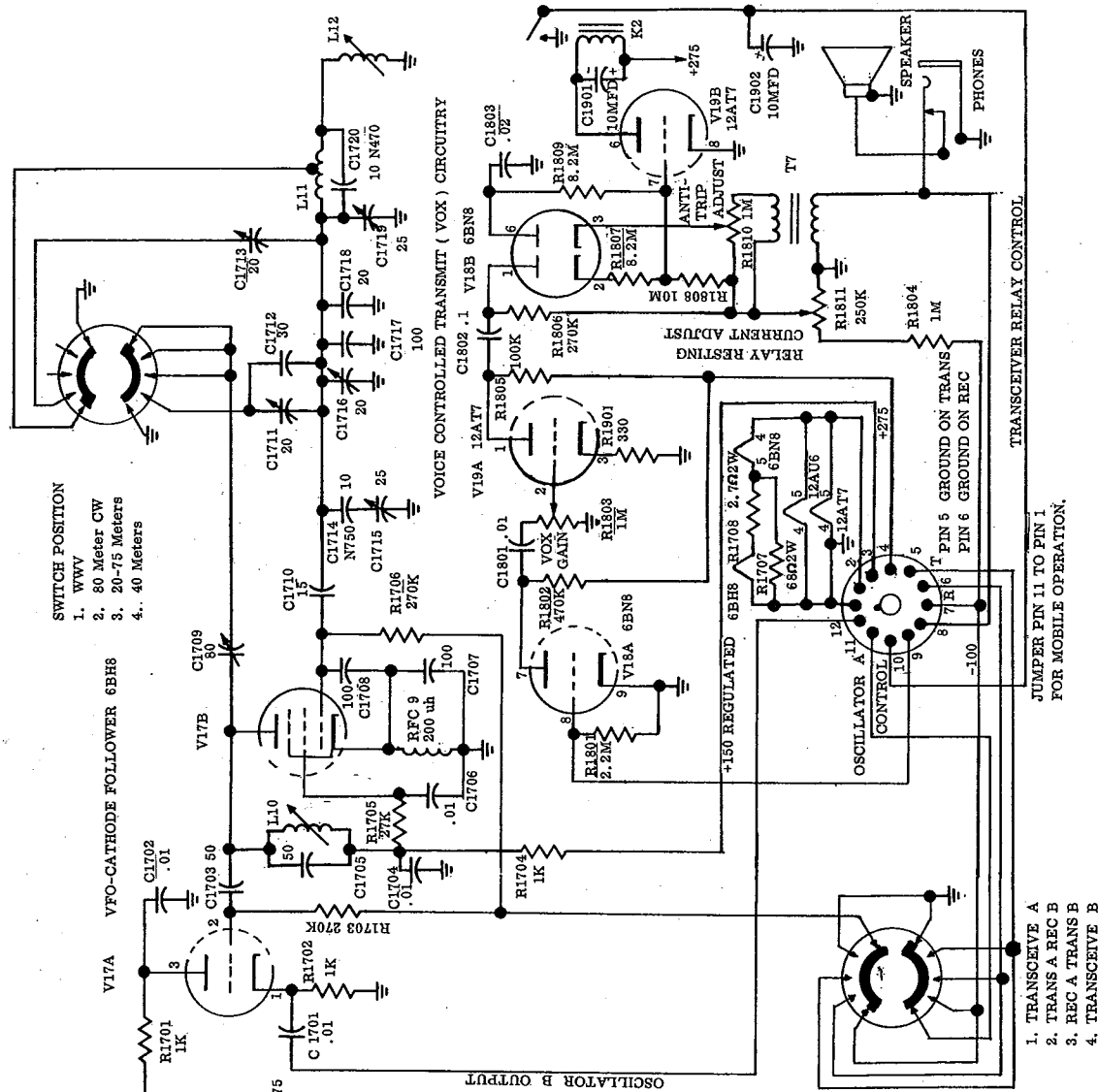


FIGURE 1 SCHEMATIC DIAGRAM--SWAN MODEL TCU TRANSMITTER CONTROL UNIT.

THEORY OF OPERATION

The Swan Model TCU provides a separate VFO for controlling the transmission or reception with the Swan SW-240 Single Sideband Transceiver. The minor modifications to the transceiver consist of moving the control point of the transceiver VFO to the TCU, and providing a common coupling point for selection of either TCU or transceiver VFO. Voice operated transmission, VOX, is also possible through the TCU, and a 100 KC Crystal Calibrator is included within the package. Provisions have been made to mount the SW-117B power supply in the cabinet.

VFO CONTROL

Control of the two VFO's is accomplished by controlling VFO grid bias. The modification to the transceiver consists of moving the ground on R403, the VFO grid leak resistor, to pin 11 of the 12-pin receptacle included in the modification kit. The TCU function switch then switches -100 volt bias and a common ground point to activate or cut off either VFO. In TRANSCEIVE A position, negative bias is applied to the grids of V17, the TCU VFO-Cathode Follower, and the 270K grid leak resistor of V4, the transceiver VFO is grounded. In TRANS A REC B position and in REC A TRANS B position, the grids of both VFO's are returned to ground through the Transmit-Receive relay contacts in the transceiver, one VFO being used in the transmit mode, and the other in receive. The TRANSCEIVE B position grounds the grid leak resistors of V17, and places -100 volt bias on the grid of the transceiver VFO. If operation of the transceiver alone is desired, pin 1 and pin 11 of the 12-pin receptacle must be jumpered with the wire provided.

100 KC CRYSTAL CALIBRATOR

The 100 KC Crystal Calibrator is controlled by switching B+ to the plate of the oscillator. Means are provided for adjusting the frequency of the crystal.

VOICE OPERATED TRANSMISSION, (VOX)

VOX operation is possible through the TCU with no change in transceiver circuitry other than those connections made in installing the 12-pin connector. For VOX operation, a microphone without push-to-talk closure on the microphone contacts is required. Many push-to-talk microphones WILL NOT WORK, unless the switch contacts on the microphone are soldered together. The purpose of the VOX circuitry is only to activate the relay closure circuit in the transceiver in response to the audio input to the microphone. The audio from the microphone is not routed through the VOX circuitry in the TCU and then back to the transceiver, but rather a sample of the audio signal is taken from the transceiver microphone amplifier and routed to the VOX circuits for control. This audio is amplified through V18A and V19A. The gain of V19A is varied through the VOX Gain control. Negative bias on V19B is adjustable through the resting relay current potentiometer, and normally the tube is cut off or plate current is insufficient to activate the relay. The audio signals from V19A are rectified in one diode of V18B to positively charge C1802, making the voltage on the grid of V19B more positive and allowing the tube to conduct and activate the relay. Loud signals through the transceiver in receive will normally activate the transmitter through the VOX, but this is prevented by the anti-trip circuit. Audio output from the transceiver is fed into the TCU speaker, and to T7, which is a voltage step-up transformer supplying audio voltage to the other diode of V18B. If the signal coming to the VOX circuit from V19A is received audio, a comparable negative signal of the same audio through the anti-trip diode will supply a cancelling signal to the relay control tube. The anti-trip voltage is adjustable on the front panel.

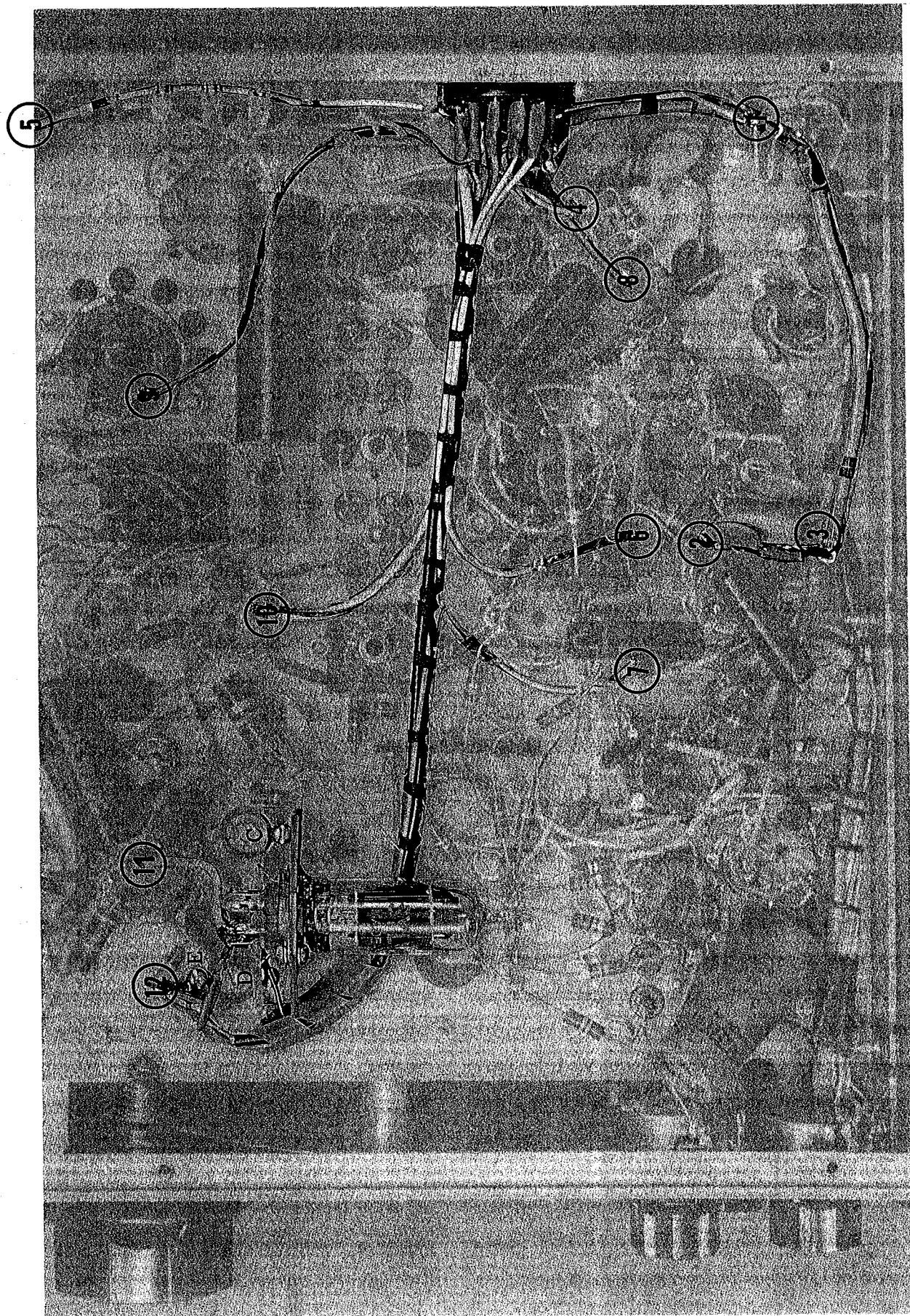


FIGURE 2 INSTALLATION OF WIRING HARNESS IN SW-240 TRANSCIEVER.

INSTALLATION INSTRUCTIONS

MODIFICATION OF SW-240 TRANSCEIVER

The SW-240 transceiver modification kit consists of the following:

12-pin receptacle with wiring harness and 7-pin tube socket and mounting.

Phono jack for mounting on transceiver rear.

10 mmf 2KV mica capacitor.

12AV6 Vacuum tube.

Attaching hardware

Hardware Installation

Tools required: Usual hand tools such as soldering iron, electric or hand drill, wire cutters, and 1/8 inch, 1/4 inch, and 3/8 inch drills. A knockout punch of 1 1/8 inch diameter is also required. Actual installation of the wiring harness is relatively simple and straightforward. Follow the instructions in the order given for best results.

1. Locate drill points A and B on rear panel of transceiver as shown in Figure 3.
2. Drill points A and B with 1/8 inch drill, using care not to damage other parts.
3. Enlarge hole A to 1/4 inch with drill.
4. Mount phono jack in hole A, and securely tighten locknut.
5. Solder 10 mmf capacitor between center conductor of antenna connector and phono jack.
6. Enlarge hole B to 3/8 inch and then again to 1 1/8 inch with knockout punch or other suitable means.
7. Loosen three screws at C, D, and E on Figure 2. Insert tube socket mount slots around C and D, and tighten screws firmly. Remove screw E and mount terminal strip under screw and tighten firmly.
8. Fit 12-pin receptacle into 1 1/8 inch hole in rear panel, mark and drill mounting bolt holes, mount receptacle in exact orientation shown in Figure 2, and bolt firmly.

Wiring Instructions

Wiring of the harness to the transceiver circuitry is not complex, providing the connections are made as shown in Figure 2. For purposes of making the wiring simple, the connections to be made are coded by step on Figure 2. The corresponding steps are identified in the instructions by identical circled numbers.

Wiring

Step

Description

- ① Violet wire from Pin 10 to the microphone jack for relay control
- ② Shielded wire from Pin 9 through capacitor to Pin 1 on V11A, for VOX audio input.
- ③ Ground the shield on step 2 above.
- ④ Red wire from Pin 8 to lug 1 on the terminal strip for audio output to the TCU.
- ⑤ White wire from Pin 7 to Pin 3 of the Jones Plug for -100 volt bias.
- ⑥ White wire-red tracer, from Pin 6 to lug 2 on the terminal strip for receive bias control.
- ⑦ White wire-black tracer, from Pin 5 to lug 5 on the terminal strip for Transmit bias control.
- ⑧ Solid red wire from Pin 4 to lug 4 of terminal strip for +275 volts.
- ⑨ Orange wire-green tracer, from Pin 3 to Pin 5 of V15 for regulated +150 volts.
- ⑩ White wire-brown tracer, from Pin 2 to Pin 3 of V6 for 12 volt filaments.
- ⑪ Green wire from pin 7 of V16 to pin 5 of V4 for Oscillator B Output.
- ⑫ Locate 270K grid leak resistor from Pin 1 of V4, the VFO, to ground, and move ground connection to grey wire lug of terminal strip for transceiver VFO control through the TCU.

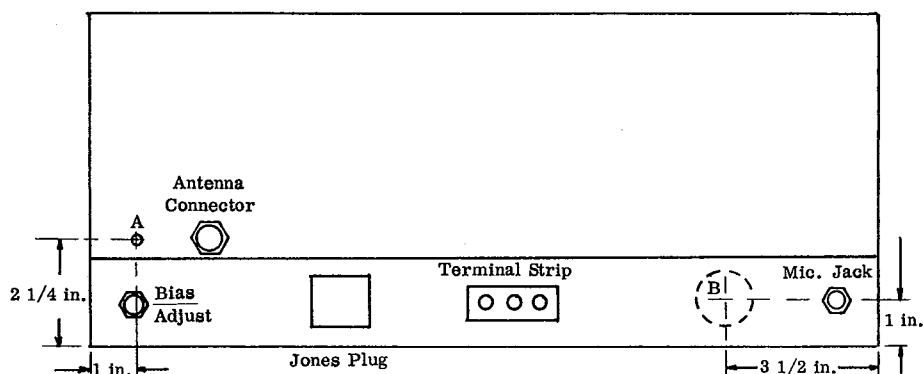


FIGURE 3 LOCATION OF DRILL POINTS ON REAR PANEL OF TRANSCEIVER.

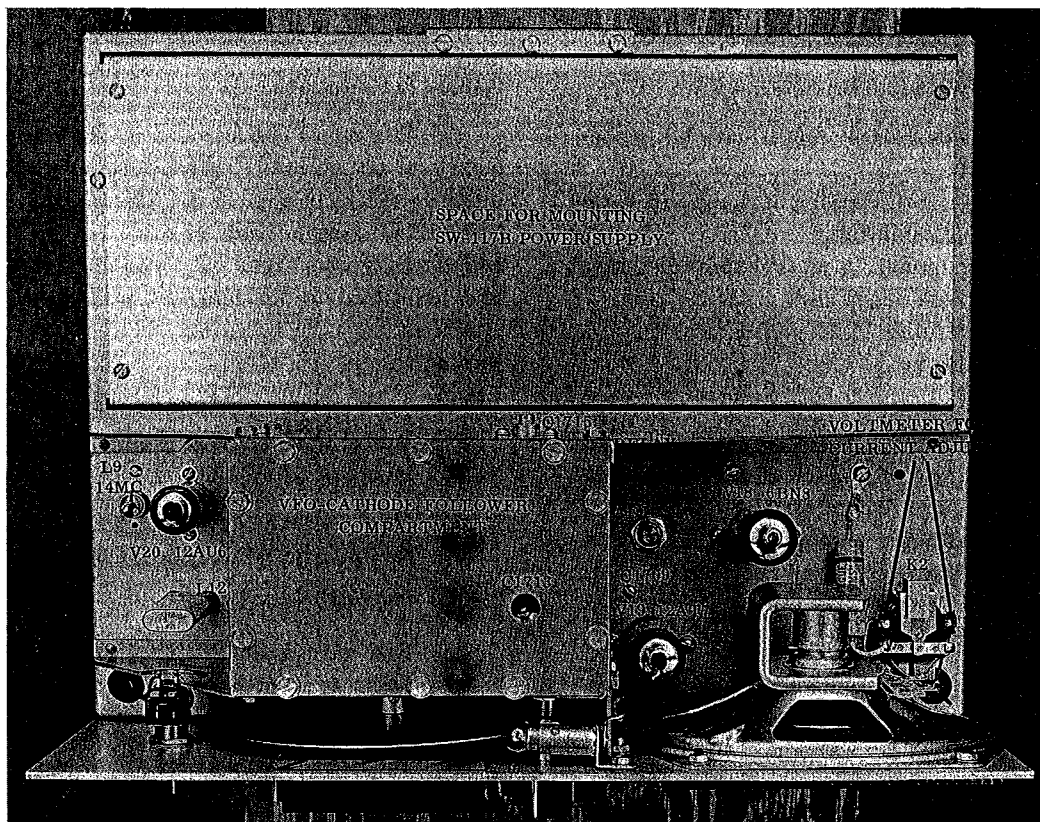


FIGURE 4 TOP VIEW--SWAN MODEL TCU TRANSMITTER CONTROL UNIT

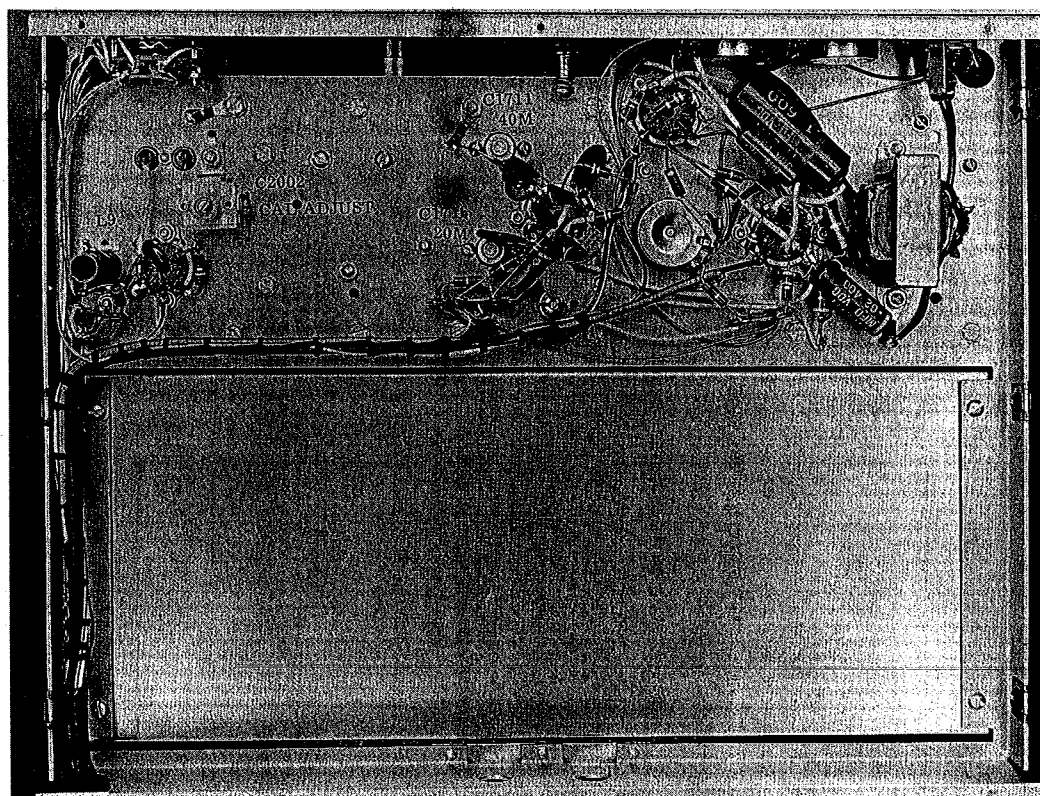


FIGURE 5 BOTTOM VIEW--SWAN MODEL TCU TRANSMITTER CONTROL UNIT

SERVICE ADJUSTMENTS

VFO CALIBRATION AND DIAL SET ADJUSTMENT

Three trimmers, C1711, 1713, and 1716 are provided for dial set and VFO calibration. Two of these, C1711 and 1713 are accessible from the bottom of the chassis, the third, C1716 is accessible on the top of the VFO compartment. In addition, a vernier coil adjustment, L12, is provided on the left side of the VFO compartment for adjusting spread.

Equipment required:

1. Calibrated signal source, or calibrated amateur band receiver.
2. Walsco 25-43 Coil Adjustment Tool.

Procedure:

This adjustment may be made either in the TRANSMIT position, connected to a dummy load, and with a calibrated receiver, or with a calibrated reference signal and in RECEIVE position. The purpose of this adjustment is to calibrate the main tuning dial and to adjust the spread of the tuning range to coincide with the calibrations on the dial.

1. With the main tuning dial set to the lowest 100 KC increment mark on 20 or 75 meters, adjust slug in vernier coil L12 with the Walsco tool to make tuning dial coincide with signal, monitoring on separate receiver, or using calibrated signal source and zero beating reference signal to proper calibration mark. Then move tuning dial to highest 100 KC increment on 20 or 75 meters, and repeat adjustment on high end, adjusting trimmer capacitor C1716. Repeat adjustments until spread and calibration are correct. Repeat for 80 meter segment of dial, adjusting C1713, but not re-adjusting L12.

2. With main tuning dial set to 7200 KC, adjust C1711 for proper calibration. Tracking on 40-meter dial will then be correct.

3. With same conditions as above, peak L10, (bottom adjustment in VFO compartment), monitoring plate current on meter. Switch to 20 or 75 meters and peak capacitor C1709 (trimmer on right side of VFO compartment). This completes VFO plate circuit and grid circuit tuning.

THERMAL STABILITY

Problems arising from thermal instability may be corrected by means of the differential trimmer capacitor, C1715. If the main tuning dial must be turned higher in frequency to retune a signal, more negative coefficient may be required, and vice versa. Negative coefficient may be introduced by turning the differential trimmer clockwise. This adjustment should be made only on 20 or 75 meters. Try just a small change then reset the dial calibration and check stability. Careful setting of this trimmer will reduce drift to as little as 200 cycles during warmup. If less negative coefficient is required, counter-clockwise rotation of the differential trimmer is necessary.

ADJUSTMENT OF VOX CIRCUITRY

Adjustment of the VOX circuitry consists of adjusting the resting relay current, the VOX Gain, and the anti-trip voltage level. Adjustments must initially be made in the following order, but subsequently may be made individually as required.

Relay Resting Current Adjustment

With no audio input to microphone, and with DC voltmeter across the relay plate coil, adjust R1811 for 0.5 volt DC across the coil. VOX Gain must be full counterclockwise.

VOX Gain Adjustment

With transceiver operating push-to-talk, adjust Mic. Gain for proper operation on microphone being used. Adjust VOX Gain so that relay de-energizes approximately one-tenth second after speech input stops. Readjust then to suit individual preference.

Anti-Trip Adjustment

With normal audio and RF gain on transceiver, tune in a signal. With Anti-Trip Control fully clockwise, turn counterclockwise until the relay activates in response to the received audio signals. Return clockwise to point where activation does not occur if normal high volume occurs.

PARTS LIST

Part No.	Description	Part No.	Description
C1601	.01 disc ceramic	R1601	1K compositoin
C1701, C1702	50 mmf disc ceramic	R1701, R1702	1K composition
C1704	.01 disc ceramic	R1703	270K composition
C1705	50 mmf disc ceramic	R1704	1K composition
C1706	.01 disc ceramic	R1705	27K composition
C1707, C1708	100 mmf NPO ceramic $\pm 5\%$	R1706	270K composition
C1709	80 mmf mica compression	R1707	68 ohm, 2 W composition
C1710	15 mmf NPO ceramic $\pm 5\%$	R1708	2.7 ohm, 2 W composition
C1711	20 mmf air variable	R1801	2.2 megohm composition
C1712	30 mmf silver mica	R1802	470K composition
C1713	20 mmf air variable	R1803	1 megohm linear taper pot.
C1714	10 mmf N750 ceramic	R1804	1 megohm composition
C1715	25 mmf air variable	R1805	100K composition
C1716	20 mmf air variable	R1806	270K composition
C1717	100 mmf NPO ceramic $\pm 5\%$	R1807	8.2 megohm composition
C1718	20 mmf NPO ceramic $\pm 5\%$	R1808	10 megohm composition
C1719	25 mmf Main Tuning air variable	R1809	8.2 megohm composition
C1720	10 mmf N470 ceramic	R1810	1 megohm potentiometer
C1801	.01 paper	R1811	250K potentiometer
C1802	.1 paper	R1901	330 ohm composition
C1803	.02 paper	R2001	100K composition
C1901, C1902	10 mfd electrolytic	R2002	270K composition
C2001	150 mmf disc ceramic	R2003	4.7K composition
C2002	3-30 mica compression	L9	14 MC coil, special
C2003	200 mmf disc ceramic	L10	40 meter plate coil, special
C2004	.01 disc ceramic	L11	Main VFO grid coil, special
C2005	10 mmf 2KV mica	L12	VFO grid vernier coil, special
NOTE	All components, except as marked, are 10% tolerance. Resistors are 1/2 watt composition, except noted.	RFC9	200 uh RF choke, 100 ma rating
		K2	SPST plate current relay, spec.
		T7	Voltage step-up transformer.

WARRANTY POLICY

SWAN ELECTRONICS CORPORATION WARRANTS THIS EQUIPMENT AGAINST DEFECTS IN MATERIAL OR WORKMANSHIP, EXCEPT FOR TUBES, UNDER NORMAL SERVICE FOR A PERIOD OF ONE YEAR FROM THE DATE OF ORIGINAL PURCHASE. THIS WARRANTY IS VALID ONLY WHEN THE ENCLOSED CARD IS PROPERLY FILLED IN AND MAILED TO THE FACTORY WITHIN TEN DAYS OF PURCHASE DATE. DO NOT SHIP EQUIPMENT TO THE FACTORY WITHOUT PRIOR AUTHORIZATION. THIS WARRANTY IS LIMITED TO REPAIRING OR REPLACING ONLY THE DEFECTIVE PARTS, AND IS NOT VALID IF THE EQUIPMENT HAS BEEN TAMPERED WITH, MISUSED, OR DAMAGED.

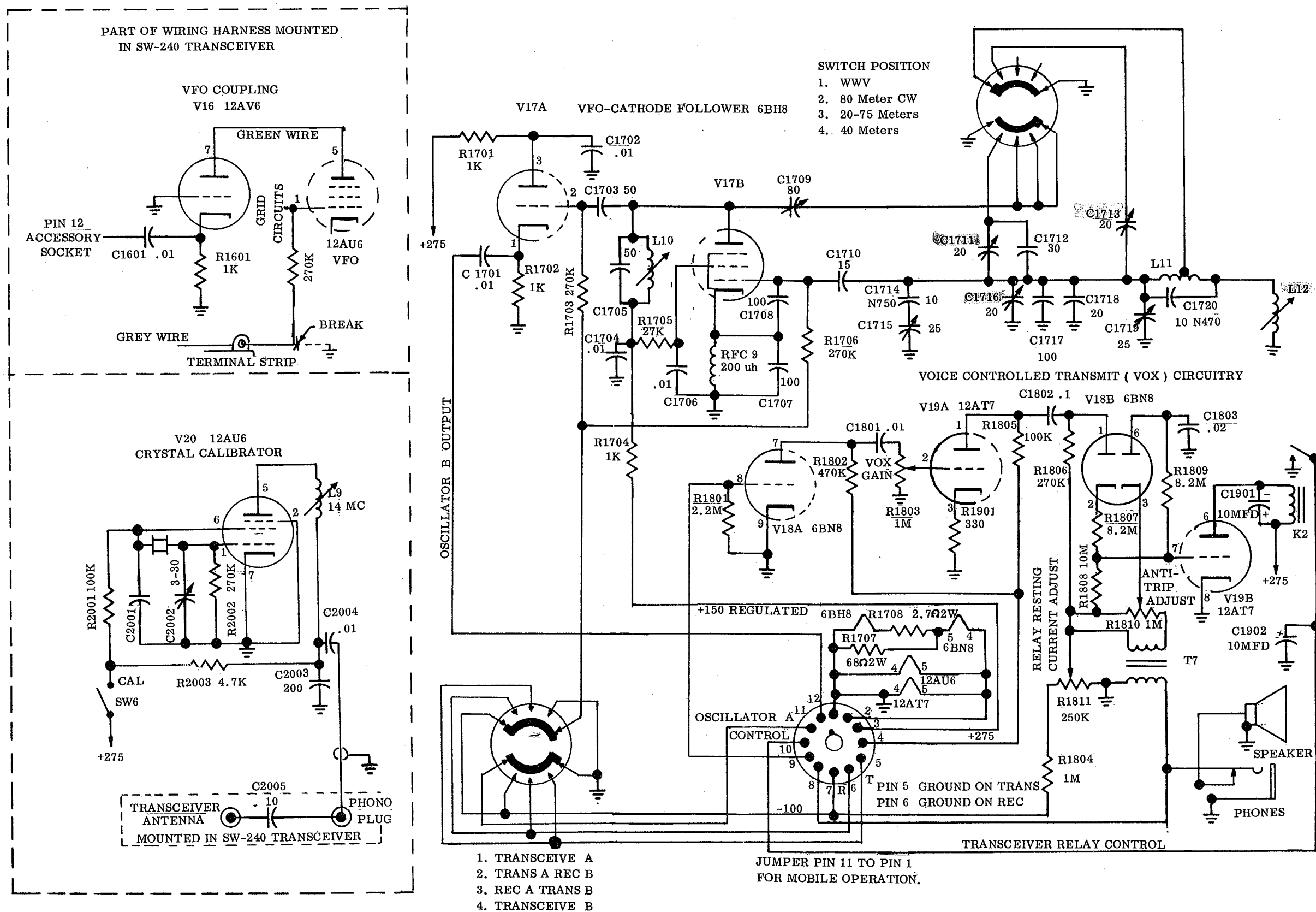


FIGURE 1 SCHEMATIC DIAGRAM--SWAN MODEL TCU TRANSMITTER CONTROL UNIT.

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