

399C-1 EXTERNAL VFO UNIT

1.1 DESCRIPTION.

The 399C-1 External VFO Unit includes a 70K-2 Oscillator and a permanent magnet speaker. It operates with the KWM-2 Transceiver to provide separate receive and transmit frequencies within the same 200-kc band when desired. A switch on the front panel provides selection of either oscillator as single frequency control for the station in transceiver service, or selection of one oscillator to control the receiver frequency and the other to control the transmitter frequency. This allows tuning the receiver into the foreign DX bands to listen for DX stations while keeping the transmitter within the legal amateur band. The vfo in the 399C-1 is a 70K-2 Oscillator and is identical to the 70K-2 Oscillator included in the KWM-2.

2.1 INSTALLATION.

a. Remove the jumper plug P17 from J17 on the KWM-2 chassis and plug P17 of the 399C-1 power cable into J17. Plug the other end of the cable (P401) into J401 of the 399C-1.

b. Plug P403 (the phono plug attached to the speaker lead) into J10 on the rear of the KWM-2. This jack is marked 4 Ω .

c. Connect J402 of the 399C-1 to J18 on the KWM-2 with the shielded coaxial cable furnished with the 399C-1. This is the 399C-1 vfo output connection to the KWM-2.

3.1 OPERATION.

In the following operation procedures, the KWM-2 vfo is described as number 1 and the 399C-1 vfo, as number 2.

a. With the VFO selector switch in the REC 1 - XMIT 2 position, the receiver frequency is controlled by the dial setting of KWM-2 and the transmitter frequency is controlled by the dial setting of 399C-1.

b. With the VFO selector switch in the REC 1 - XMIT 1 position, both the receiver and transmitter frequencies are the same and are controlled by the VFO in KWM-2.

c. With the VFO selector switch in the REC 2 - XMIT 2 position, both the receiver and transmitter frequencies are the same and are controlled by the VFO in 399C-1.

4.1 CIRCUIT DESCRIPTION.

The oscillator tube of the 399C-1 is a type 6AU6 pentode connected in a high-C electron-coupled oscillator circuit. The tuned circuit consists of C301, C302, C303, C305, L301, L302, and L303. Variable inductor L303 is the front panel frequency control and L302 is an inductive trimmer adjustment. The value of capacitor C301 is factory-selected for oscillator temperature compensation. The vfo frequency shifting circuit, consisting of L304, C108, and diode switch CR301, shifts the oscillator frequency as part of the sideband selection circuits. This allows sideband selection without changing the vfo dial indication. For example, when the KWM-2 is switched from LSB to USB, a positive voltage is applied through R303 to the anode of CR301, causing it to conduct. Forward conduction of the diode lowers its impedance and effectively connects C308 to ground across the cathode choke L304. The added capacitance across L304 lowers the oscillator frequency by the amount of the KWM-2 mechanical filter pass band. When the KWM-2 is operated on lower sideband, the d-c voltage applied across R303 is negative, cutting off conduction of CR301 and raising its impedance to such a high value that C308 is switched out of the oscillator cathode circuit.

Vfo output is taken from an autotransformer in the plate circuit of V301 through coupling capacitor C307.

5.1 MAINTENANCE AND ADJUSTMENT.

5.1.1 TUBE REPLACEMENT.

Tube V301 can be replaced without upsetting the calibration accuracy of the unit.

5.1.2 VFO SIDEBAND FREQUENCY SHIFT ADJUSTMENT.



Do not make this adjustment unless switching from one sideband to the other makes readjustment of the tuning dial necessary to keep the output signal from shifting.



- a. Set controls of 399C-1 as follows: VFO selector to REC 2 - XMIT 2, FUNCTION selector to NORM.
- b. Set controls of KWM-2 as follows: BAND switch to 3.6, EXCITER TUNING to approximately 1.9 on logging scale, EMISSION switch to LSB, and OFF-ON-NB-CAL switch to CAL position. Tune dial near 100 until calibrate signal is zero beat. Do not touch dial for following procedure.
- c. Switch to USB, and adjust trimmer C308 (top of vfo can in 399C-1) for zero beat.

NOTE

Make no adjustments to the 70K-2 oscillator except the above frequency shift adjustment.

6.1 SPECIFICATIONS.

- Frequency Range . . . 2.5 to 2.7 mc.
 Calibration Accuracy . . 1 kc.
 Drift Not more than 100 cps after warmup.
 Dial Backlash Less than 50 cps.
 Power Supplied by KWM-2 Transceiver.
 Speaker voice coil impedance 4 ohms.

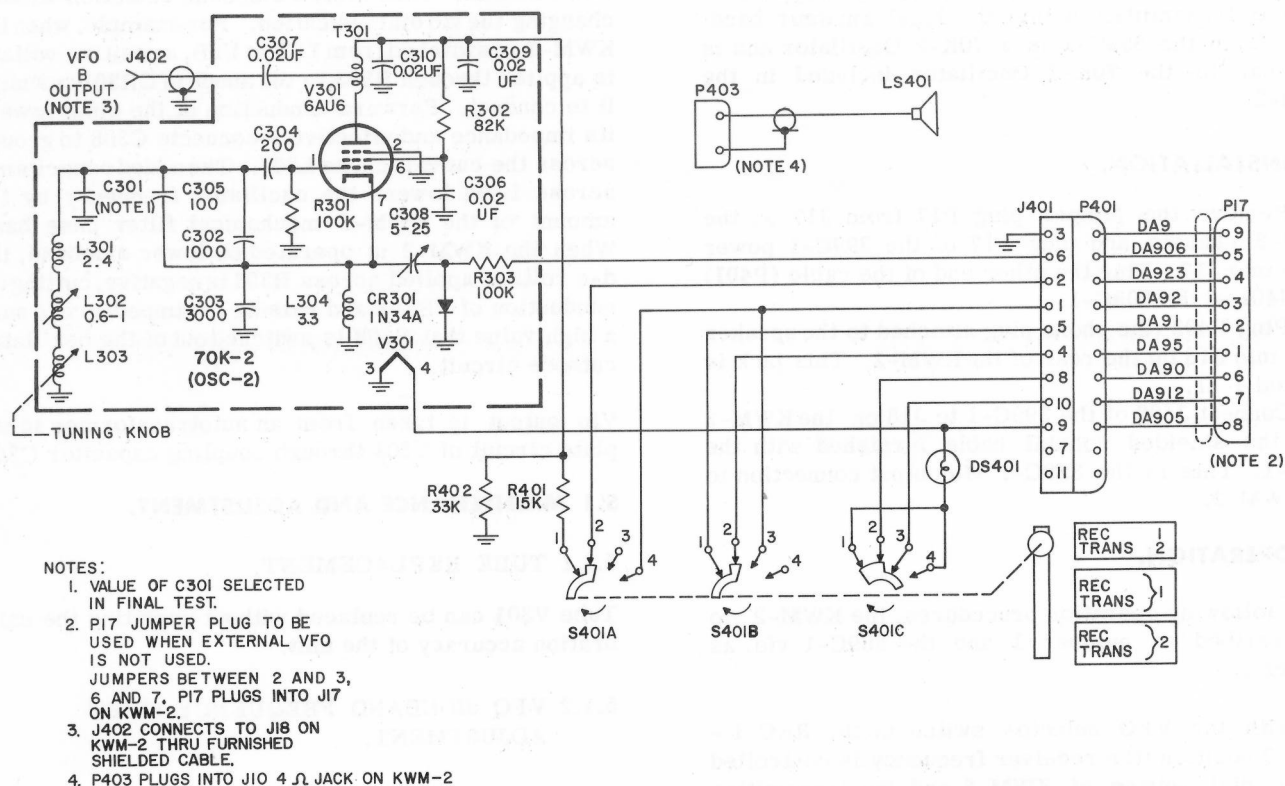


Figure 1. 399C-1 External VFO Unit, Schematic Diagram

C539-01-4

PARTS LIST

399C-1 External VFO Unit

ITEM	DESCRIPTION	COLLINS PART NUMBER
70K-2 OSCILLATOR		522 1093 00
	70K-2 Oscillator consists of the following. This equipment should be returned to Collins Radio Company for repair.	
* C301	CAPACITOR, CERAMIC: 20 uuf $\pm 5\%$, 500 vdcw	913 0053 00
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* C301	CAPACITOR, CERAMIC: 20 uuf $\pm 5\%$, 500 vdcw	913 0055 00
* C301	CAPACITOR, CERAMIC: 20 uuf $\pm 5\%$, 500 vdcw	913 0056 00
* C301	CAPACITOR, CERAMIC: 20 uuf $\pm 5\%$, 500 vdcw	913 0057 00
* C301	CAPACITOR, CERAMIC: 20 uuf $\pm 5\%$, 500 vdcw	913 0058 00
* C301	CAPACITOR, CERAMIC: 20 uuf $\pm 5\%$, 500 vdcw	913 0232 00
* C301	CAPACITOR, CERAMIC: 20 uuf $\pm 5\%$, 500 vdcw	913 0233 00
* C301	CAPACITOR, CERAMIC: 20 uuf $\pm 5\%$, 500 vdcw	913 0234 00
* C301	CAPACITOR, CERAMIC: 20 uuf $\pm 5\%$, 500 vdcw	913 0234 00
C302	CAPACITOR, MICA: 1000 uuf $\pm 2\%$, 500 vdcw	912 1737 00
C303	CAPACITOR, MICA: 3000 uuf $\pm 1\%$, 500 vdcw	912 1748 00
C304	CAPACITOR, MICA: 470 uuf $\pm 2\%$, 300 vdcw	912 0541 00
**C305	CAPACITOR, CERAMIC: 100 uuf $\pm 2\%$, 500 vdcw	913 0074 00
**C305	CAPACITOR, CERAMIC: 100 uuf $\pm 2\%$, 500 vdcw	913 0246 00
C306, C307, C309	CAPACITOR, CERAMIC: 0.02 uf $\pm 60\%$ -40%, 250 vdcw	913 2097 00
C308	CAPACITOR, VARIABLE, CERAMIC: 5 uuf min to 37.5 uuf max, 350 vdcw	917 1073 00
CR301	SEMICONDUCTOR DEVICE, DIODE: germanium; Sylvania part no. 1N34A	353 0103 00
L301	COIL, RADIO FREQUENCY: 22 turns #28 AWG double formvar, 2.4 uh inductance	240 0652 00
L302	TRIMMER ASSEMBLY: 9 turns #28 AWG wire, 1 toroid coil and hardware	543 7323 00
L303	INDUCTOR, TUNING: 10 turns #30 AWG wire	543 7333 003
L304	COIL, RADIO FREQUENCY: single layer wound, magnet wire, 3.30 uh	240 0695 00
R301, R303	RESISTOR, COMPOSITION: 0.10 megohms $\pm 10\%$, 1/2 w	745 1436 00
R302	RESISTOR, COMPOSITION: 82,000 ohms $\pm 5\%$, 1/2 w	745 1432 00
T301	TRANSFORMER, RADIO FREQUENCY: pri 380 uh nom 790 kc; sec 2.7 uh nom., 2.6 mc	240 0665 00
* Chosen per operational requirement. ** Selected in final test.		

ITEM	DESCRIPTION	COLLINS PART NUMBER
V301	ELECTRON TUBE: pentode; General Electric type 6AU6	255 0202 00
399C-1 EXTERNAL VFO		522 1597 00
J401	CONNECTOR, RECEPTACLE, ELECTRICAL: 11 pin male, phenolic insulation, 5 amp, straight shape	372 1757 00
J402	JACK, TIP: accommodates 1/8 in. plug; ceramic insulation, brass contacts	360 0088 00
LS401	LOUDSPEAKER, PERMANENT MAGNET: 4-9 w nominal power, 3-4 ohms; 5 in. by 7 in. overall	271 0215 00
R401	RESISTOR, FIXED, COMPOSITION: 15,000 ohms $\pm 10\%$; 1 w	745 3401 00
R402	RESISTOR, FIXED, COMPOSITION: 33,000 ohms $\pm 10\%$; 2 w	745 5715 00
S401	ROTARY, SWITCH: 3 circuit (3 pole), 3 position, 1 section; 3 moving and 12 fixed contacts	259 1108 00
	CABLE ASSEMBLY, SPECIAL PURPOSE, ELECTRICAL: 8 strands #36 AWG, 2 strands #31 AWG; 0.155 in. min od, 0.160 in. max od; 36 in. lg; terminated both ends in phono plug	426 2026 00
	CABLE ASSEMBLY, SPECIAL PURPOSE, ELECTRICAL: 8 strands #36 AWG, 2 strands #31 AWG; 0.155 in. min. od, 0.160 in. max od; terminated one end phone plug, other stripped and tinned	426 1808 00
CABLE ASSEMBLY		545 6105 00
P301	CONNECTOR, RECEPTACLE, ELECTRICAL: 11 female socket contacts	372 1759 00
P17	CONNECTOR, PLUG, ELECTRICAL: 9 male contacts; for u/w miniature tube socket	372 1822 00
	CAP, ELECTRICAL: steel, black Japan finish; 1-7/16 in. lg by 1-3/16 in. dia. o/a; snap-on type; metal clamp to accommodate 5/8 in. dia. cable	372 1762 00