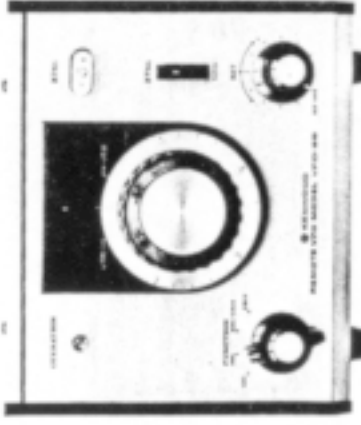


 **KENWOOD**

**VARIABLE
FREQUENCY OSCILLATOR**

Model VFO-5S

OPERATING MANUAL



FEATURES

- 1. EXTREMELY STABLE SOLID - STATE VFO**
High stability over an extended length of time is assured by field effect transistors and adequate temperature compensation employed in the oscillator section.
- 2. DIRECT 1 KHz READOUT PRECISION DOUBLE GEAR DIAL**
Smooth tuning is possible with the precision type double gear mechanism, with direct readout as accurate as 1 KHz.
- 3. BUILT - IN RIT CIRCUIT**
A RIT circuit which expands transceive flexibility is included to enhance the function of the external VFO.

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- 4. OPERATION INDICATOR**
An indicator lamp to indicate VFO operation is provided to eliminate the possibility of erroneous control.
- 5. MINIMUM HEAT GENERATION**
Stable operation is established as soon as the power switch is turned on since power is externally supplied through the VFO output cable and internal heat generation is made minimum.
- 6. CONVENIENT REMOTE SOCKET**
The relay circuit is led to the remote socket for convenience in controlling other external accessories.
- 7. FIXED - CHANNEL QSO**
Watch reception and spot transmission on a fixed-channel are possible with an independent solid-state crystal-controlled oscillator circuit.
- 8. GRADE UP TS - 515 SERIES WITH THE VFO**
Combining the VFO-5S with the TS-515 series makes possible various elaborate controls and provides the operator with more enjoyable communication.
- 9. METALLIC FINISH**
The same metallic finish employed with the TS-515 and PS-515 will adorn the shack when they are used with this VFO.

SPECIFICATIONS

FREQUENCY RANGE	80 meter band 40 meter band 20 meter band 15 meter band 10 meter A band 10 meter B band 10 meter C band	3.5 ~ 4.0 MHz 7.0 ~ 7.3 MHz 14.0 ~ 14.35 MHz 21.0 ~ 21.45 MHz 28.0 ~ 28.6 MHz 28.5 ~ 29.1 MHz 29.1 ~ 29.7 MHz
OSCILLATION FREQUENCY	4.9 ~ 5.5 MHz	
OSCILLATION SYSTEM	VFO section : Clapp OSC circuit XTAL OSC : Pierce C-B circuit	
OUTPUT VOLTAGE	1.0 V ± 3dB (with 470Ω load)	
MAIN DIAL ACCURACY	± 2 KHz	
FREQUENCY STABILITY	Within 100 Hz for 30 minute period three minutes after switching-on (at normal temperature).	
SOLID STATE COMPONENTS	6 transistors, 8 diodes	
POWER REQUIREMENT	12.6 Vac, 250 mA, 150 Vdc, 30 mA	
SIZE	7-7/8" wide x 7-9/32" high x 7-9/16" deep	
WEIGHT	7.5 lbs.	

SECTION 1. INSTALLATION

1.1 UNPACKING

Carefully unpack the VFO-5S and check that the following accessories are included.

- 1 VFO output cable
- 2 Supplementary legs

1.2 LOCATION

Select a proper operating location. It should be dry and free from direct sunlight.

1.3 CONNECTIONS TO TS - 515

Connections to TS-515 is shown in Fig. 1.

Since a VFO output cable is supplied with this, simply hooking it up between the VFO and TS-515 will complete the connection.

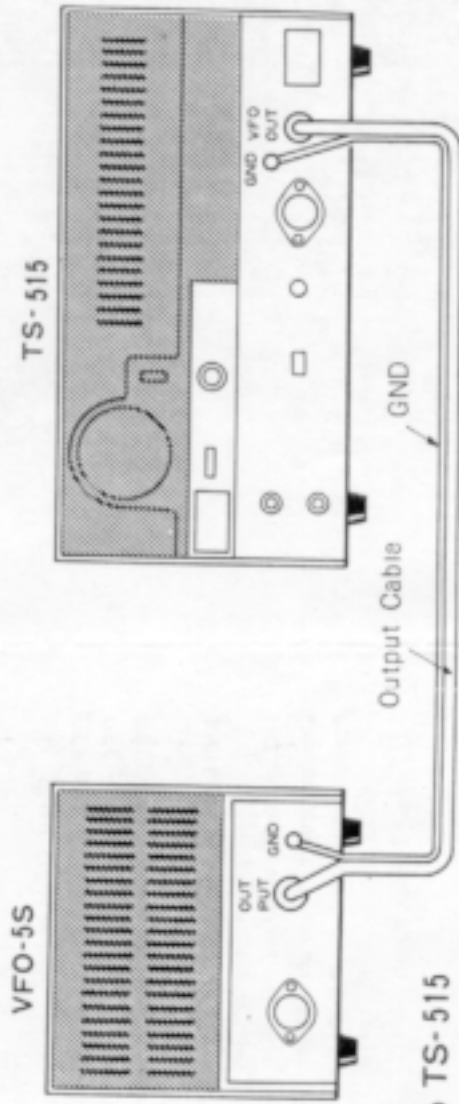


Fig 1. Connections to TS-515

SECTION 2. CONTROLS

2.1 FRONT PANEL CONTROLS

- ① Auxiliary Dial Plate
The auxiliary dial is calibrated in 25 KHz division and used in conjunction with the main tuning dial to read frequencies.
- ② OPERATION indicator
This indicator shows the VFO is on.
- ③ Dial Gauge
These dial gauges make accurate frequency readout possible in all three modes (USB, LSB and CW).
- ④ FUNCTION switch
OFF position The VFO-5S is inoperative at this position.
REC position The VFO-5S operates during reception only.
REC/XMIT position The VFO-5S operates during both reception and transmission.
XMIT position The VFO-5S operates during transmission only.
- ⑤ Main Tuning Dial
One complete revolution covers 25 KHz at 500 Hz interval, and used in conjunction with the auxiliary dial to read frequencies.
- ⑥ Main Tuning Knob

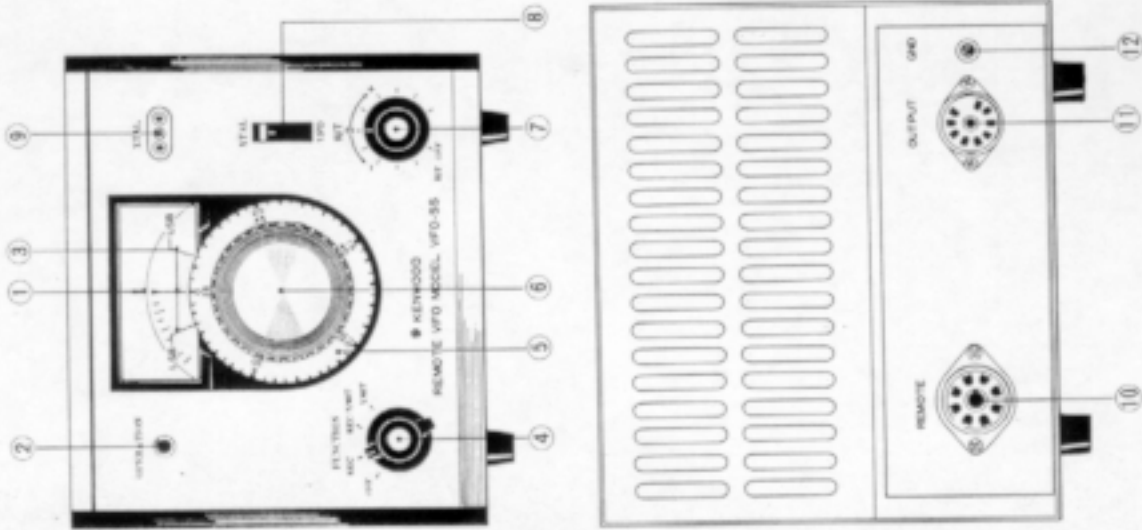


Fig2. Front Panel & Rear Panel

⑦ RIT (Receiver Incremental Tuning) Control

This control allows the operator to move the receive frequency ± 2 KHz independent of the transmit frequency.

⑧ VFO/XTAL selector switch

This switch permits selection of either the variable frequency oscillation or crystal controlled oscillation.

⑨ XTAL socket

Accepts an HC-6U type crystal, which may be of any frequency between 4.9 and 5.5 MHz.

2.2 REAR PANEL CONTROLS

⑩ REMOTE socket

The relay circuits, which permits external switching control for linear amplifier or others, are accessible through this socket.

⑪ OUTPUT outlet

This outlet is used to connect the VFO output to the VFO OUT outlet of TS-515.

⑫ GND terminal

The ground terminal should be connected to the GND terminal of the TS-515 for an adequate ground.

SECTION 3. OPERATING INSTRUCTIONS

3.1 FUNCTION AND OPERATION INDICATOR

OFF position..... The VFO-5S is inoperative at this position, permitting the TS-515 to operate independently.

REC position..... Transmission is controlled by the TS-515, and reception by the VFO-5S. The operation indicator will light up during reception, indicating that the VFO-5S is on.

REC/XMIT position..... At this position the VFO-5S controls both transmit and receive frequencies, the VFO of the TS-515 becoming inoperative. The operation indicator will remain lighting throughout transmission and reception.

XMIT position..... Receive frequency is controlled by the TS-515, and transmit frequency by the VFO-5S. The operation indicator lights up when transmitting.

3.2 RIT CONTROL

This is used when the VFO-5S is operated as a receiving VFO. This control allows the operator to move the receive frequency ± 2 KHz. This control does not move the transmit frequency. The OFF position of RIT control provides the same frequency as '0' position.

3.3 VFO / XTAL SWITCH

This should normally be set to VFO. When making a scheduled QSO at a spot channel using the crystal controlled oscillator, set this switch to XTAL, and insert a crystal into the XTAL socket. The crystal may be of any

frequency between 4.9 and 5.5 MHz. Applicable crystal frequencies are listed in Table 1 for each band. The use of FUNCTION switch remains the same for both crystal and VFO operations, whereas RIT is inoperative.

Transmit/Receive freq. (MHz)	Xtal OSC freq. (MHz)	Transmit/Receive freq. (MHz)	Xtal OSC freq. (MHz)
3.5 ~ 4.0	5.5 ~ 5.0	28.0 ~ 28.6	5.5 ~ 4.9
7.0 ~ 7.3	5.5 ~ 5.2	28.5 ~ 29.1	5.5 ~ 4.9
14.0 ~ 14.35	5.5 ~ 5.15	29.1 ~ 29.7	5.5 ~ 4.9
21.0 ~ 21.45	5.5 ~ 5.05		

Table 1

3.4 FREQUENCY READOUT

The dial mechanism of the VFO-5S is identical to that of the TS-515. It consists of the main tuning dial, auxiliary dial, dial gauge and main tuning knob. The frequency of the VFO changes 25 KHz when the main tuning dial is turned one revolution, and 24 revolutions of the dial makes an auxiliary dial scale change of from 0 to 600 KHz. Fig. 3 shows the case in which LSB is operated on the 7 MHz band. In regard to the central dial gauge in the figure,

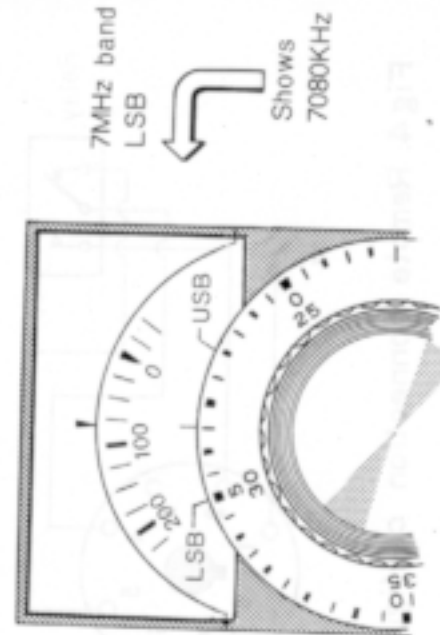


Fig.3. Frequency readout

3.6 REMOTE SOCKET

It has extra relay contacts for linear amplifier or others which require external switching control (See Fig. 4).

the auxiliary dial scale indicates a point slightly above the 50th graduation. This means that transceive operation is being performed at a frequency slightly in excess of 50 KHz of the 7 MHz band, i. e., 7050 KHz. To know how much this frequency is above 50 KHz, the main tuning dial must be used: Taking a look at the LSB dial gauge, it points the 30th graduation and, therefore, 30 KHz is added to 50 KHz to obtain 7080 KHz. It should be noted that the dial in this case indicates the suppressed carrier frequency. In taking a reading with the main tuning dial, use the LSB dial gauge for LSB and USB dial gauge for USB.

3.5 CALIBRATION

Calibration can be performed absolutely in the same way as for the VFO of the TS-515. Set FUNCTION switch to REC or REC/XMIT, and the AGC/CAL switch of the TS-515 to 25 KHz. As the main tuning knob is turned, a beat response will be heard at 25 KHz intervals. At zero beat, hold the main tuning knob and slide the '0' mark of the main tuning dial to the dial gauge on the plastic window. Use the USB gauge when the transceiver is at USB, and the LSB gauge when LSB and CW.

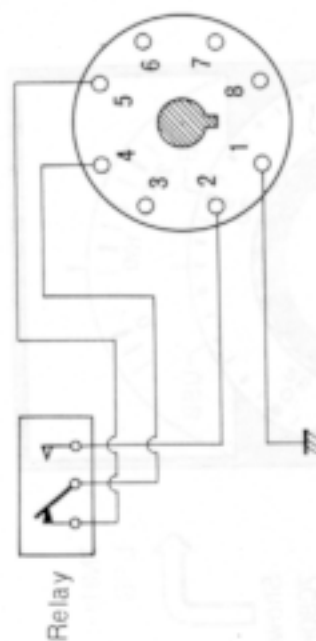


Fig.4. Remote connection configuration

SECTION 4. CIRCUIT DESCRIPTION

4.1 BLOCK DIAGRAM

A block diagram of the VFO-5S is shown in Fig. 5.

4.2 VFO SECTION

Frequency stability is made extremely high through use of FET's in the circuit as well as adequate temperature compensation. The section is also free from external influences since it is completely shielded by a metallic enclosure.

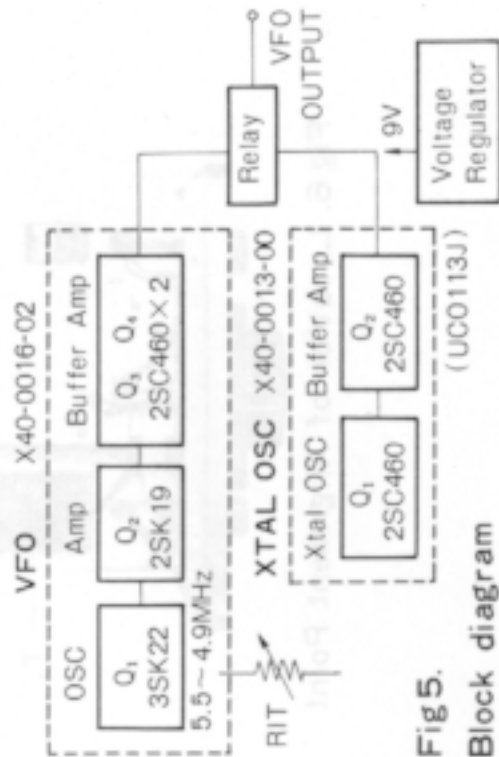


Fig. 5.
Block diagram

4.3 CRYSTAL OSCILLATOR SECTION

The crystal oscillator circuit utilizes a Pierce C-B oscillator. Crystal to be used must be one that is suited for this circuit.

4.4 OTHER CIRCUITS

Other circuits include extra relay circuit, and voltage regulator which stabilizes voltage received from the TS-515.

SECTION 5. ALIGNMENT & MAINTENANCE

The VFO-5S is a complete, factory-adjusted and requires no alignment prior to installation. For re-alignment and maintenance which may become necessary after use, consult with dealer since the VFO is a precision component.

5.1 CRYSTAL OSCILLATION ADJUSTMENT

When a 4.9 to 5.5 MHz crystal is inserted into the XTAL socket and it fails to oscillate, adjust the ceramic trimmer T1, shown in Fig. 6. Oscillation can be confirmed by switching the TS-515 to transmit mode and watching for a deflection of the RF meter. At this time, a dummy load should always be connected to ANT.

If oscillation is still unobtainable, the cause is most likely due to a defective crystal or unfitable crystal to the oscillator circuit.

5.2 ADJUSTING TO FREQUENCY

Frequency tracking is accomplished by aligning the core and the variable capacitor in the enclosure of the VFO section. This work, however, requires a high degree of experience, and it is recommended that these alignment points be left to the hand of dealer.

5.3 MAINTENANCE

Removing the chassis from the case
The chassis can be removed toward the front after unscrewing 2 screws from the top, and 4 screws from the bottom. It is unnecessary to remove the plastic legs.

A word of caution

This chassis should not be removed unless it is absolutely necessary to do so, because it may give a frequency drift and error problems.

Lubrication the gears

A drop of sewing machine oil placed on the dial double-gear system once a year will help to reduce friction and keep the mechanism operation smoothly.

Pilot lamp

A 12 V, 1.5 W Swan base lamp is used.

Supplementary legs

When VFO-5S is installed with a tilt, these supplementary legs can be put onto the frontside legs. If necessary, removal of the rear side legs can be done.

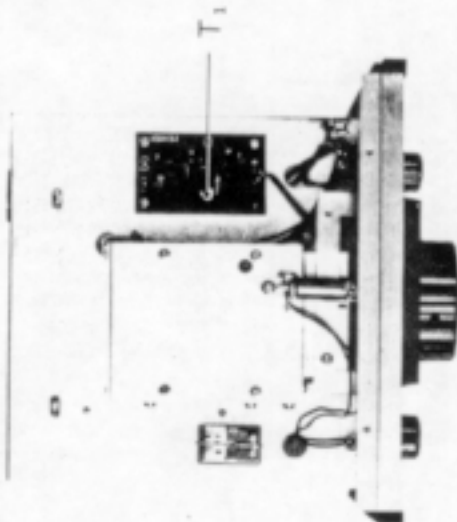
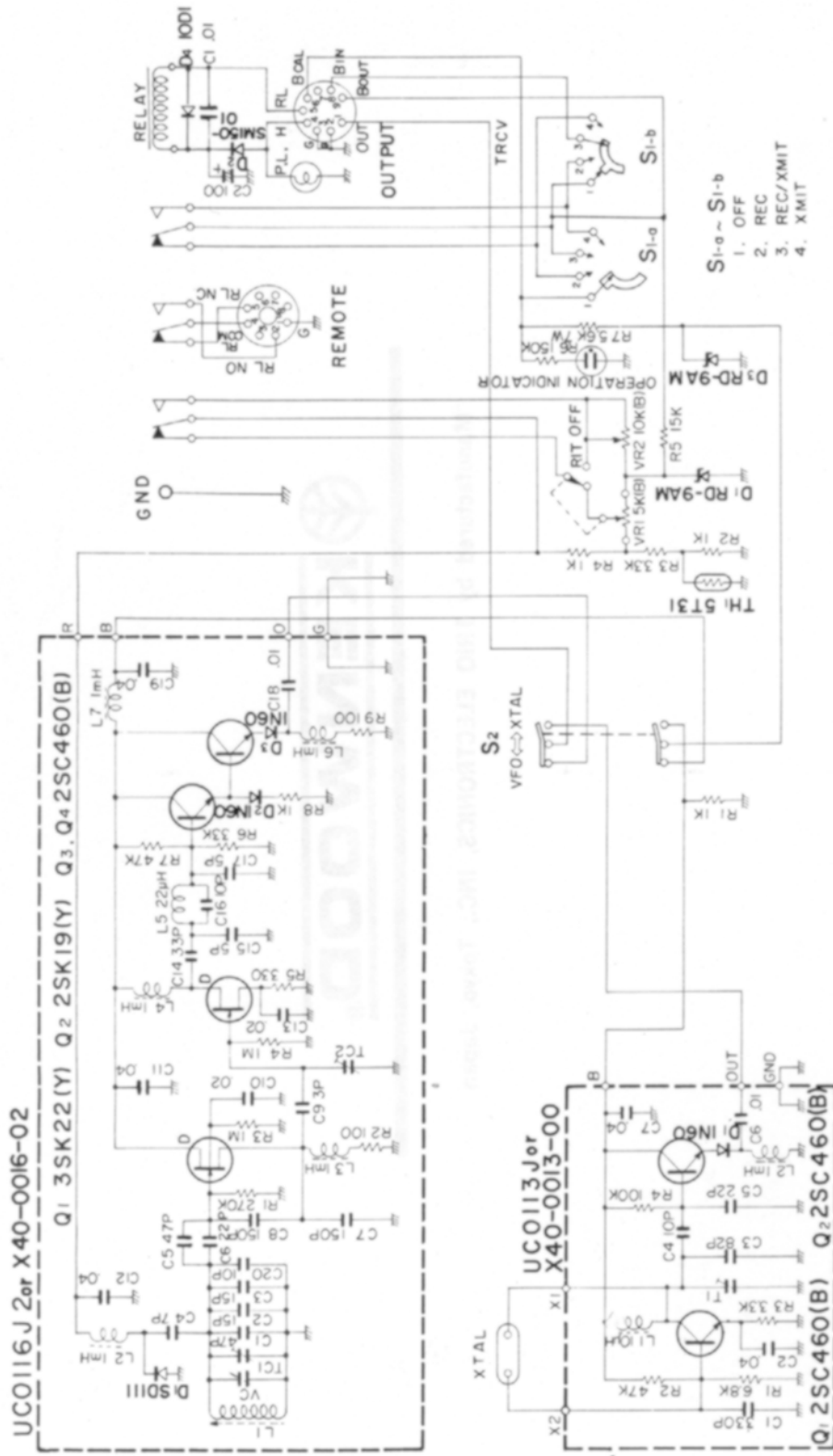


Fig 6. Location of Alignment Point

SCHEMATIC DIAGRAM



NOTE: We reserve the right to make modifications in this model in accordance with technical developments.