WJ-861X RECEIVER

APPENDIX E

WJ-861X AUDIO SCAN OUTPUT (ASO) OPTION

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WARNING

This equipment utilizes voltages which are potentially dangerous and may be fatal if contacted. Exercise extreme caution when working with the equipment with any protective cover removed.

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WJ-861X AUDIO SCAN OUTPUT (ASO) OPTION

E.1 GENERAL DESCRIPTION

The Audio Scan Output (ASO) option provides a choice of audio frequency output or dc voltage output representative of the receiver's tuned frequency. In the Manual or Step mode the frequency output is 10-5 of the tuned RF frequency: 200 Hz is output when the receiver is tuned for 20 MHz, and 5 kHz when the receiver is tuned to 500 MHz. The dc voltage outputs are from 0 Vdc corresponding to 20 MHz to 5 Vdc corresponding to 500 MHz. In the Scan mode, the ASO provides an output relative to the selected start and stop frequencies. For example, a start frequency of 30 MHz is represented as 200 Hz (0 V) and a stop frequency of 30.2 MHz is represented as 11 kHz (10 V open circuit, source impedance is 10 kΩ) and all other frequencies and voltage level outputs are scaled to this relationship.

E.2 INSTALLATION

The ASO option is a plug-in module that inserts into receiver option slot 5.

E.3 OPERATION

Switch S1 on the ASO option board selects audio or dc level output. The Receiver rear panel connection SCAN OUT J5 provides ASO data output.

E.4 FUNCTIONAL DESCRIPTION

With the ASO option board enabled, digital frequency data is connected to latches U1, U2, and U3 via the data bus. Frequency data is input as 8-bit and 5-bit data words and converted by the logic to a 12-bit frequency data word and input to digital-to-analog converter U5. The voltage level output of U5 provides the dc voltage level output of the board when selected by S1. When S1 selects audio output, the signal is applied through amplifiers U6 and U7 to waveform generator U8 which converts the voltage levels to a sine wave. The sweep output of U8 is applied through amplifier U9 and connected to S1.

E.5 DETAILED CIRCUIT DESCRIPTION

Refer to **Figure E-2,** the schematic diagram for the ASO when reading the circuit descriptions.

E.5.1 LATCHES U1, U2, U3

Digital frequency data from the data bus is input to latches U1 and U2. When the Option Enable input OPT to pin 4 is low, decoder U3 is enabled. With the decoder enabled, the digital input from A3 sets either U1 or U2. If the input to U3 pin 1 is low, a low output at pin 15 applies a clock pulse to U1 and pin 11 setting the frequency until it receives another clock pulse.

U1 applies the stored frequency data through logic gates U4A and U4B to make a 12-bit input to digital-to-analog converter U5.

E.5.2 DIGITAL-TO-ANALOG CONVERTER, U5

Digital frequency data is input to digital-to-analog converter U5 at pins 1 through 12. U5 converts the digital logic to analog voltages output at pin 15. The voltage at E1 is 0 to 10 Vdc depending on the digital frequency input from the data bus. The dc voltage output is routed through R15 to S1. With dc level selected on S1, this dc voltage level is output from the board at pin 6. S1 can also be switched to select an audio output.

E.5.3 AMPLIFIERS U6 AND U7

The output voltages from U5 through E1 enter amplifier U6 at the inverting terminal. Offset adjust resistor R2 forms a feedback loop. U6 output voltages at E2 range from 0 through -2.0 V. The output of U6 is input to unity gain amplifier U7. The output of U7 is applied to waveform generator U8.

E.5.4 WAVEFORM GENERATOR, U8

Waveform generator U8 with its associated circuitry forms a linear voltage controlled oscillator. Pin 8, connected with 6.2 V zener diode VR1 is the sweep input. Resistor R9 adjusts the frequency range (200 Hz to 11 kHz) and duty cycle inputs at pins 5 and 4 respectively. Timing capacitor C13 is connected to pin 10. Adjustable resistor R12 adjusts the LF symmetry and R13 adjusts for sine wave distortion. The sine wave output is applied through amplifier U9 to E3 and S1. With audio output selected on S1, the 200 Hz to 11 kHz signal is output to pin 6.

E.6 MAINTENANCE

The ASO has been designed to operate with little or no routine maintenance. An occasional cleaning and inspection are the only preventive maintenance operations recommended. Should trouble occur, repair time is minimized if the maintenance technician is familiar with **Section E.5** of this manual and with the schematic diagram (**Figure E-2**).

E.6.1 TEST EQUIPMENT REQUIRED

The following test equipment is recommended:

a. Digital Multimeter: Fluke Model 8100A

b. Frequency Counter: Hewlett-Packard Model 5381A

c. Oscilloscope: Tektronix 5403 Mainframe Display Unit

E.6.2 ALIGNMENT

The ASO contains five adjustable resistors that require alignment. The alignment procedures are as follows:

E.6.2.1 R2, Offset Adjustment; R4, Gain Adjustment

1. Set adjustable resistors R9, R12, and R13 to mid-position.
2. Tune the receiver to 20 MHz in the Manual mode.
3. Adjust R4 to obtain a 200 Hz output on the frequency counter.
4. Tune the receiver to 500 MHz (1100 MHz with the 500-1100 MHz Frequency Extender installed).
5. Adjust R2 to obtain a 5 kHz output on the frequency counter (11 kHz with the 500-100 MHz Frequency Extender installed).
6. Repeat steps 2 through 5 ensuring interaction effects have not disturbed high and low frequency limits.

E.6.2.2 Symmetry & Distortion Alignment, R9, R12 and R13

1. Tune the receiver to 20 MHz in the Manual mode.
2. With the output connected to an oscilloscope adjust R12 so that the sine wave is symmetrical on the positive and negative sides of the curve.
3. Tune the receiver to 500 MHz (1100 MHz with the 500-1100 MHz Frequency Extender installed).
4. Adjust R13 so that the sine wave is symmetrical on the positive and negative sides of the curve.
5. Adjust R13 so that the sine wave is free of distortion, ensuring that the positive and negative portions of the sine wave are identical. Vary the input frequency and ensure that the sine wave is distortion free at all frequencies.

E.6.3 PERFORMANCE TESTS

The ASO board contains three test points to ensure proper voltage and frequency level throughout the board.

a. Test Point E1

1. Connect the voltmeter to E1.

2. Observe a voltage of 0 V when the receiver is tuned to 20 MHz. Observe a voltage of 5 V when the receiver is tuned to 500 MHz. If the 500-1100 MHz Frequency Extender is installed in the receiver, observe a voltage of 10 V when the receiver is tuned to 1100 MHz.

b. Test Point E2

1. Connect the voltmeter to E2

2. Observe a voltage of 0 V when the receiver is tuned to 20 MHz. Observe a voltage of -1.0 V when the receiver is tuned to 500 MHz. If the 500-1100 MHz Frequency Extender is installed in the receiver, observe a voltage of -2.0 V when the receiver is tuned to 1100 MHz.

c. Test Point E3

1, Connect the frequency counter to E3.

2. Observe a frequency of 200 Hz when the receiver is tuned to 20 MHz. Observe a frequency of 5 kHz when the receiver is tuned to 500 MHz. If the 500-1100 MHz Frequency Extender is installed, observe a frequency of 11 kHz when the receiver is tuned to 1100 MHz.

E.7 PARTS LIST

E.7.1 TYPE 794150-1 AUDIO SCAN OUTPUT REF DESIG PREFIX OPT 5

REF DESIG	DESCRIPTION	QTY PER ASSY	MANUFACTURER'S PART NO.	MFR. CODE	RECM VENDOR
	Revision H				
C1	Capacitor, Electrolytic, Tantalum: 1 µF, 20%, 35 V	3	196D105X0035HE3	56289	
C2	Capacitor, Ceramic, Disc: 0.01 µF, 20%, 50 V	4	34453-1	14632	
C3	Same as C1				
C4	Same as C2				
C5	Same as C1				
C6	Same as C2				
C7	Same as C2				
C8	Capacitor, Ceramic, Disc: 0.1 µF, 20%, 50 V	7	34475-1	14632	
C9 Thru C11	Same as C8				
C12	Capacitor, Ceramic, Disc: 1000 pF, 500 V	1	59Z5U102P	91418	
C13	Capacitor, Mica, Dipped: 3900 pF, 20%, 500 V	1	CM06FD392G03	81349	
C14	Same as C8				
C15	Capacitor, Electrolytic, Tantalum: 47 µF, 20%, 20 V	4	196D476X0020PE4	56289	
C16	Same as C8				
C17	Same as C8				
C18 Thru C20	Same as C15				
CR1	Diode	2	1N4449	80131	
CR2	Same as CR1				
R1	Resistor, Fixed, Film: 10 kΩ, 5%, 1/4 W	2	CF1/4-10K/J	09021	
R2	Resistor, Trimmer, Film: 10 kΩ, 10%, 3/4 W	1	89PR10K	73138	
R3	Resistor, Fixed, Film: 1 kΩ, 5%, 1/4 W	4	CF1/4-1K/J	09021	
R4	Resistor, Trimmer, Film: 1 kΩ, 10%, 3/4 W	1	89PR1K	73138	
R5 Thru R7	Same as R3				
R8	Resistor, Fixed, Film: 4.7 kΩ, 5%, 1/4 W	2	CF1/4-4.7K/J	09021	
R9	Resistor, Trimmer, Film: 500Ω, 10 %, 1/2 W	1	62PAR500	73138	
R10	Same as R8				
R11	Resistor, Fixed, Film: 1 MΩ, 5%, 1/4 W	1	CF1/4-1M/J	09021	
R12	Resistor, Trimmer, Film: 100 kΩ, 10%, 1/2 W	2	62PAR100K	73138	
R13	Same as R12				
R14	Resistor, Fixed, Film: 100 kΩ, 5%, 1/4 W	1	CF1/4-100K/J	09021	
R15	Same as R1				
S1	Switch	1	TSS11DG-1-PC	76854	
U1	Integrated Circuit	1	MM74C174N	27014	
U2	Integrated Circuit	1	MM74C374N	27014	
U3	Integrated Circuit	1	SN74LS138N	01295	
U4	Integrated Circuit	1	SN74LS08N	01295	
U5	Integrated Circuit	1	ADDAC80-CCD-V	27014	

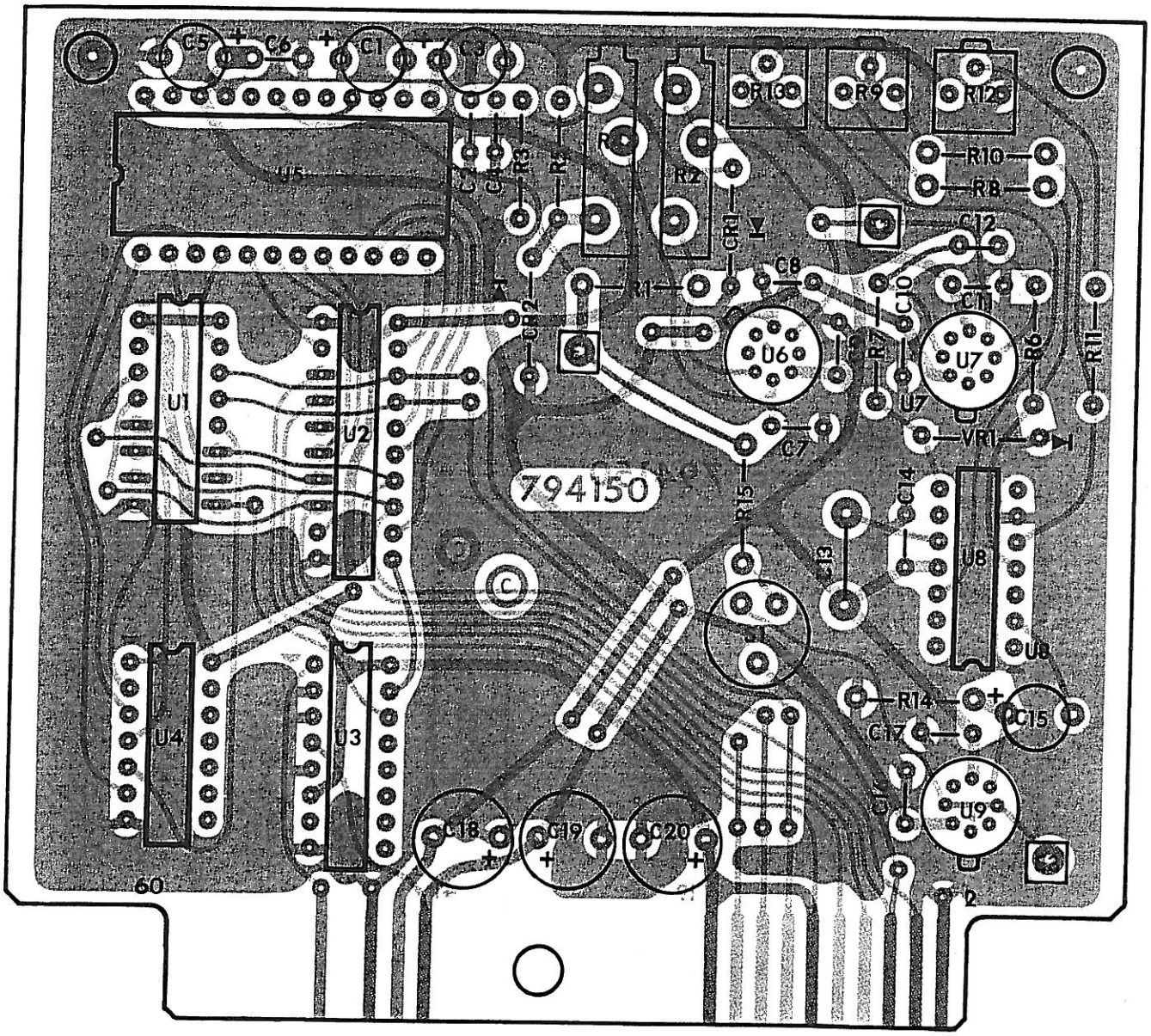

Figure E-1. Type 794150-1 Audio Scan Output (Option 2), Location of Components

REF DESIG PREFIX **OPT 5**

REF DESIG	DESCRIPTION	QTY PER ASSY	MANUFACTURER'S PART NO.	MFR. CODE	RECM VENDOR
U6	Integrated Circuit	3	741HC	07263	
U7	Same as U6				
U8	Integrated Circuit	1	ICL8038CCPD	32293	
U9	Same as U6				
VR1	Voltage Regulator: 6.2 V	1	1N753A	80131	