WJ-861X RECEIVER

APPENDIX P

WJ-861XB/ISB INDEPENDENT SIDEBAND 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-861XB/ISB, INDEPENDENT SIDEBAND (ISB) OPTION

P.1. GENERAL DESCRIPTION

The Type 861XB/ISB Independent Sideband (ISB) option installs the Type 796304-1 Independent Sideband (ISB) Demodulator in place of the SSB Bypass subassembly (A3A14) on the RF/IF Motherboard of the receiver. This subassembly utilizes the 32.1 and 10.7 MHz signals provided by the ISB BFO subassembly, demodulating Upper, Lower and Both sideband signals. For optimum performance, it is recommended that IF Bandwidth #1 slot contain an IF Bandwidth of 10 kHz or 6 kHz (6 kHz is preferred).

NOTE

If an IF Bandwidth less than 6 kHz is present in position #1, the receiver automatically selects IF Bandwidth #2. For optimum performance, install a 6 kHz IF Bandwidth in position #1.

Whenever the receiver is placed in the ISB detection mode, the receiver automatically switches to IF Bandwidth #1 and the remaining bandwidth pushbuttons are deactivated.

Selection of the ISB mode of operation is accomplished by pressing the SSB pushbutton. This places the receiver into either the Upper, Lower or Both sideband modes and activates IF Bandwidth #1. Each additional press of the SSB pushbutton causes the detection mode to be switched between USB and LSB, while ISB is always present at the rear panel. A letter "U" for Upper Sideband or an "L" for Lower Sideband illuminates on the digital display indicating which ISB mode is active. Selecting any other detection mode pushbutton deactivates ISB and activates the newly selected mode.

P.2 INSTALLATION

Refer to **Figure P-2** for the Type 861XB/ISB Independent Sideband option, (Option P-ISB), schematic diagram. Installing the ISB option into the standard receiver is performed as follows:

1. Remove the top and bottom covers from the receiver by loosening the quarter-turn fasteners.

2. Remove the Type 798074-1 SSB Bypass subassembly from the A3XA14 slot on the RF/IF Motherboard and replace with the Type 796304-1 ISB Demodulator.

3. Remove the blank pushbutton from right DETECT MODE pushbutton bank on the receiver front panel by inserting a small slot-type screwdriver under the pushbutton. Gently pry upward using a slight twisting motion. Exercise care in this procedure to avoid scratching the anodized bezel. Replace this pushbutton with the supplied SSB pushbutton.

4. Reconfigure switch A5A2S1 on the Synthesizer Interface permitting the receiver software to recognize the presence of the ISB Demodulator. This is accomplished by placing switch position #2 of A5A2S1 in the open position.

5. Loosen the fifteen (15) screws holding the back panel to the chassis. (Six (6) screws holding the back panel to the side plates and nine (9) screws, three (3) each securing the back panel to each of the divider bulkheads.) Pivot the back panel loose from the chassis, being careful not to disturb any of the existing wiring.

6. Remove the spare fuse holder from the rear panel by loosening the securing nut and gently pulling the fuse holder forward. Remove connector J20 from its location and reroute it to the spare fuse hole, putting the decal 180335-1, J20 WB IF OUT, on the connector before tightening into place.

7. Gently pry off the auxiliary cap. Take cable ISB-W1 and plug connector ISB-P1 onto A3A14 of the RF/IF Motherboard. Orient cables such that ISB-P1 pin 1 mates with A3A14 pin 18 and ISB-P1 pin 2 mates with A3A14 pin 16. Route cable to the underside of the Motherboard, adjusting cable so it is seated properly. Insert the BNC connector of cable ISB-W1 into the auxiliary hole on the rear panel. Place decal 180333-1, J29 USB OUT, on the connector before tightening into place.

8. Take cable ISB-W3 and plug connector ISB-P4 onto A3A14 of the RF/IF Motherboard. Orient cables such that ISB-P4 pin 1 mates with A3A14 pin 14 and ISB-P4 pin 2 mates with A3A14 pin 12. Route cable to the underside of the Motherboard, adjusting the cable so it is seated properly. Insert the BNC connector of cable ISB-W3 into the original J20 hole on the rear panel. Place decal 180334-1, J28 LSB OUT, on the connector before tightening into place.

9. Carefully replace the back panel on the chassis. Check that none of the wiring interferes with the seating of the back panel. Tighten the fifteen (15) screws securing the back panel to the chassis.

10. Connect cable ISB-W2 to the A3A8 AGC Assembly. Orient cables such that ISB-P2 pin 1 mates with A3A8 pin 17 and ISB-P3 pin 1 mates with A3A8 pin 49.

11. Replace the top and bottom covers to the receiver and tighten the quarterturn fasteners.

P.3 CIRCUIT DESCRIPTION

P.3.1 TYPE 796304-1, ISB DEMODULATOR, (A3A14)

The reference designation for this subassembly is A3A14. Refer to **Figure P-1** for the Location of Components and to **Figure P-3** for the Type 796304-1 ISB Demodulator schematic diagram.

The 21.4 MHz sideband signal enters this subassembly at connector pin 55 and is coupled via C4 to U1. U1 splits the signal and applies it to the 21.4 MHz IF output, via the 3 dB pad formed by R3, R4 and R5 and also applies the signal to amplifier U2. The signal is coupled to the input of U2 via the RC coupling network comprised of C6 and R6. The output of U2 is applied to the primary of T1 through C8 and R11. Then the 21.4 MHz signal is applied to the input of Integrated Circuit U3.

Modulator U3 mixes the 21.4 MHz input signal with a 32.1 MHz signal from the SSB BFO providing an output that consists of the upper and lower sideband signals centered about 10.7 MHz. Resistors R7 and R17 provide bias at the input of U3, and R13 and R14 control the gain. Coils L1 and L2 provide the collector loads for the output transistors contained in U3. The lower sideband signal taken from U3 pin 6 is developed across L1 and is applied to filter FL1, via C13 and R20. The upper sideband signal taken from U3 pin 12 is developed across L2 and is applied to filter FL2, via C14 and R21.

Filter FL1 passes the lower sideband signal and directs it to the signal input of U5 via T2. R24 and R25 provide bias at the input of U5, and R26 and R27 control the gain. This circuit mixes the modulated 10.7 MHz sideband signal with a fixed 10.7 MHz signal, provided by the SSB BFO, producing the lower sideband video output. The output of U5 is developed across R45 and is applied to the output amplifier U7B via the low-pass filter comprised of R46, C30, C29 and R53. This filter strips any residual 10.7 MHz component from the audio signal and allows only signals lower than 10.7 MHz to pass. The audio signal is amplified by U7B and is applied via R67 to the LSB audio output pin 14. The gain of U7B is set by the voltage divider formed by R50, R51 and R52. The video output of U5 is also applied to the output amplifier U7A via the low-pass filter comprised of R47, C33, C32 and R57. This filter strips any residual 10.7 MHz component from the video signal. The gain of U7A is set by the voltage divider formed by R54, R55 and R56. The video signal is amplified by U7A and is applied via U9 and R68 to the switched video output subassembly (pin 11), whenever the LSB detection mode is selected at the receiver front panel.

Filter FL2 passes the upper sideband signal and directs it to the signal input of U6 via T3. R32 and R33 provide bias at the input of U6, and R34 and R35 control the gain. This circuit mixes the modulated 10.7 MHz sideband signal with a fixed 10.7 MHz signal, provided by the SSB BFO, producing the upper sideband video output. The output of U6 is developed across R42 and is applied to the output amplifier U8A via the low-pass filter comprised of R49, C39, C38 and R65. This filter strips any residual 10.7 MHz component from the audio signal and allows only signals greater than 10.7 MHz to pass. The audio signal is amplified by U8A and is applied via R69 to the USB audio output pin 18. The gain of U8A is set by the voltage divider formed by R62, R63 and R64. The video output of U6 is also applied to the output amplifier U8B via the low-pass filter comprised of R48, C36, C35 and R61. This filter strips any residual 10.7 MHz component from the video signal. The gain of U8B is set by the voltage divider formed by R58, R59 and R60. The video signal is amplified by U8B and is applied via U9 and R68 to the switched video output subassembly (pin 11), whenever the USB detection mode is selected at the receiver front panel.

Integrated Circuit U9 is an analog switch which is used to direct either the USB audio signal (U9 pin 2) or the the LSB audio signal (U9 pin 13) to the switched video output subassembly (pin 11). Selection of the USB or LSB signal is made from the front panel of the receiver. If the LSB mode is selected, a logic "0" applied by the Digital Control Section of the receiver through connector pin 15, causes the analog switch between U9 pin 13 and U9 pin 11 to close. This allows the LSB audio to pass through U9 to the switched video output subassembly pin 11. If the USB mode is selected, the control input is at a logic "1", causing the analog switch between U9 pin 2 and U9 pin 4 to close, allowing the USB audio to pass through U9 to the switched video output subassembly pin 11.

The selection of USB and LSB on the front panel only affect the signal present at the switched video output subassembly (pin 11) on the rear of the receiver. LSB Audio Output (pin 14) and USB Audio Output (pin 18) remain unchanged. These signals are directed to the rear panel connectors J28 (LSB OUT) and J29 (USB OUT) and are always present in SSB operation.

P.4 ALIGNMENT PROCEDURES

1. Connect the HP-8640B Signal Generator to the Antenna 1 input of the receiver.
2. Connect the HP-400EL AC Voltmeter and a 93 ohm load to the Switched Video Output (J4).
3. Set the receiver to 25.0000 MHz, AGC on and select LSB detection mode.
4. Set the signal generator to produce a 24.9990 MHz CW signal, at an output level of -50 dBm.
5. Adjust R60 on the ISB Demodulator, to produce an output level of .235 Vrms, as indicated on the AC voltmeter.

P.5 PARTS LIST

P.5.1 TYPE 861XB/ISB, INDEPENDENT SIDEBAND OPTION

REF DESIG	DESCRIPTION	QTY PER ASSY	MANUFACTURER'S PART NO.	MFR. CODE	RECM VENDOR
	Revision C				
ISB-A1	ISB Demodulator P.C. Assembly	1	796304-1	14632	
ISB-P1	Connector, Housing	2	87499-3	00779	
ISB-P2	Connector, Plug	2	87499-5	00779	
ISB-P3	Same as ISB-P2				
ISB-P4	Same as ISB-P1				
ISB-W1	Cable Assembly	1	280621-1	14632	
ISB-W2	Cable Assembly	1	180222-1	14632	
ISB-W3	Cable Assembly	1	280621-2	14632	
MP1	Decal (J29 USB OUT)	1	180333-1	14632	
MP2	Decal (J28 LSB OUT)	1	180334-1	14632	
MP3	Decal (J20 WB IF OUT)	1	180335-1	14632	
MP4	Switch Button Engraved (SSB)	1	370314-12	14632	

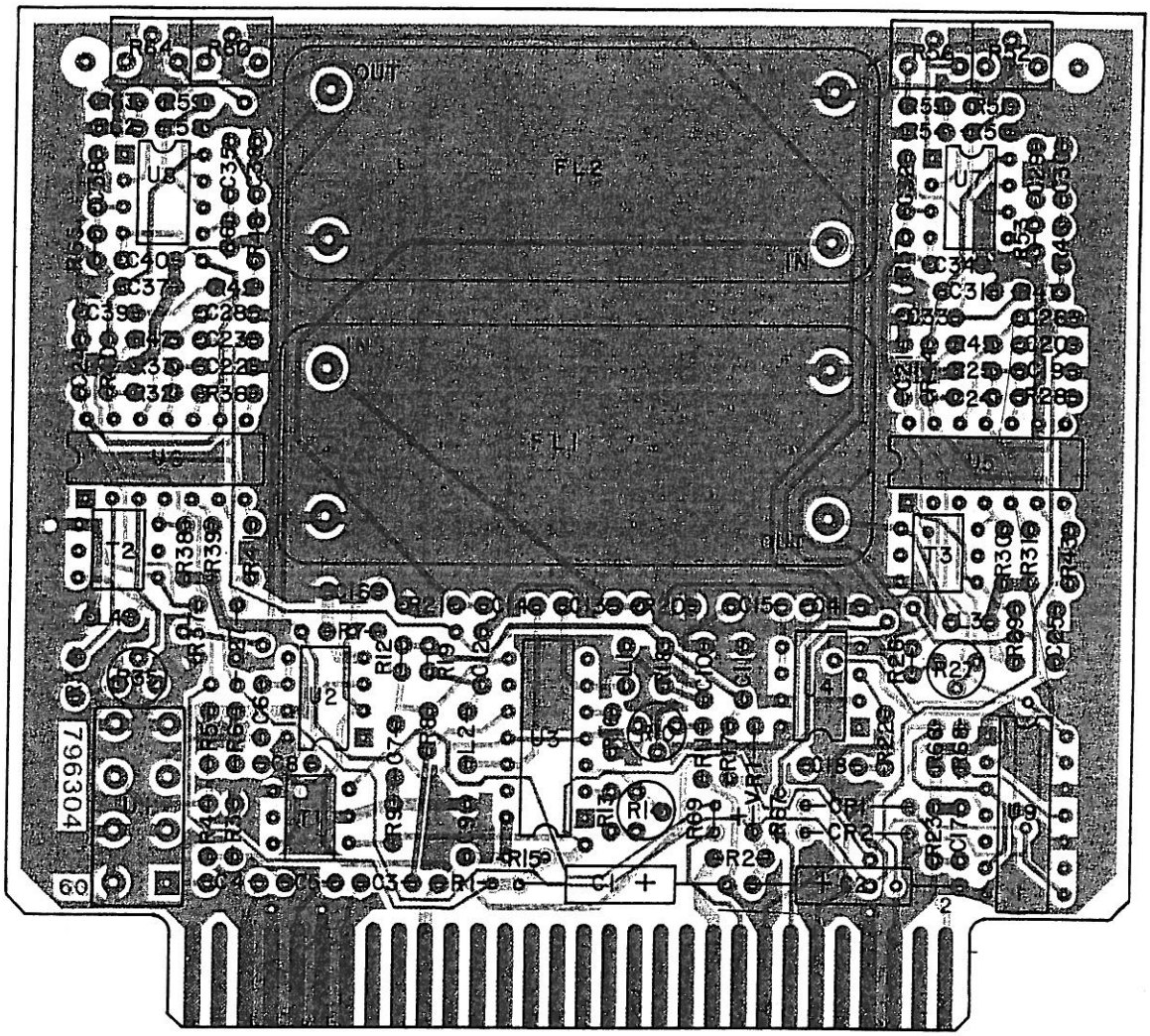

Figure P-1. Type 796304-1, ISB Demodulator (Option P-ISB)
Location of Components

P.5.1.1 Type 796304-1, ISB Demodulator REF DESIG PREFIX A3A14

REF DESIG	DESCRIPTION	QTY PER ASSY	MANUFACTURER'S PART NO.	MFR. CODE	RECM VENDOR
	Revision A				
C1	Capacitor, Electrolytic, Tantalum: 2.2 µF, 10%, 20 V	2	CS13BE225K	81349	
C2	Same as C1				
C3	Capacitor, Ceramic, Disc: .01 µF, 20%, 50 V	15	34453-1	14632	
C4	Same as C3				
C5	Same as C3				
C6	Capacitor, Ceramic, Disc: 1000 pF, 10%, 200 V	2	CK05BX102K	81349	
C7	Same as C3				
C8	Same as C6				
C9	Same as C3				
C10	Capacitor, Ceramic, Disc: 5000 pF, 20%, 100 V	11	C023B101E502M	56289	
C11	Same as C10				
C12	Same as C10				
C13	Same as C3				
C14	Same as C3				
C15	Not Used				
C16	Same as C3				
C17	Not Used				
C18	Not Used				
C19 Thru C24	Same as C3				
C25 Thru C28	Same as C10				
C29	Capacitor, Ceramic, Disc: .47 µF, 20%, 50 V	8	34452-1	14632	
C30	Same as C10				
C31	Same as C29				
C32	Same as C29				
C33	Same as C10				
C34	Same as C29				
C35	Same as C29				
C36	Same as C10				
C37	Same as C29				
C38	Same as C29				
C39	Same as C10				
C40	Same as C29				
C41	Same as C3				
FL1	Filter	1	92218	14632	
FL2	Filter	1	92217	14632	
L1	Coil, Fixed: 100 µH, 5%	2	1537-76	99800	
L2	Same as L1				
L3	Coil, Fixed: 3.9 µH, 10%	2	1537-26	99800	
L4	Same as L3				

REF DESIG PREFIX **A3A14**

REF DESIG	DESCRIPTION	QTY PER ASSY	MANUFACTURER'S PART NO.	MFR. CODE	RECM VENDOR
R1	Resistor, Fixed, Film: 10Ω, 5%, 1/8 W	2	CF1/8-10 OHMS/J	09021	
R2	Same as R1				
R3	Resistor, Fixed, Film: 300Ω, 5%, 1/8 W	2	CF1/8-300 OHMS/J	09021	
R4	Resistor, Fixed, Film: 18Ω, 5%, 1/8 W	1	CF1/8-18 OHMS/J	09021	
R5	Same as R3				
R6	Resistor, Fixed, Film: 51Ω, 5%, 1/8 W	3	CF1/8-51 OHMS/J	09021	
R7	Resistor, Fixed, Film: 1.8 kΩ, 5%, 1/8 W	6	CF1/8-1.8K/J	09021	
R8	Same as R6				
R9	Resistor, Fixed, Film: 100Ω, 5%, 1/8 W	7	CF1/8-100 OHMS/J	09021	
R10	Same as R9				
R11	Same as R6				
R12	Same as R7				
R13	Same as R9				
R14	Resistor, Trimmer, Film: 1 kΩ, 10%, 1/2 W	3	62PAR1K	73138	
R15	Resistor, Fixed, Film: 47Ω, 5%, 1/8 W	1	CF1/8-47 OHMS/J	09021	
R16	Resistor, Fixed, Film: 12 kΩ, 5%, 1/8 W	3	CF1/8-12K/J	09021	
R17	Resistor, Fixed, Film: 22Ω, 5%, 1/8 W	3	CF1/8-22 OHMS/J	09021	
R18	Resistor, Fixed, Film: 2.7 kΩ, 5%, 1/8 W	2	CF1/8-2.7K/J	09021	
R19	Same as R18				
R20	Resistor, Fixed, Film: 200Ω, 5%, 1/8 W	2	CF1/8-200 OHMS/J	09021	
R21	Same as R20				
R22	Not Used				
R23	Not Used				
R24	Same as R7				
R25	Same as R7				
R26	Same as R9				
R27	Same as R14				
R28	Same as R9				
R29	Resistor, Fixed, Film: 3.0 kΩ, 5%, 1/8 W	4	CF1/8-3.0K/J	09021	
R30	Same as R29				
R31	Same as R16				
R32	Same as R7				
R33	Same as R7				
R34	Same as R9				
R35	Same as R14				
R36	Same as R9				
R37	Same as R29				
R38	Same as R29				
R39	Same as R16				
R40	Same as R17				
R41	Resistor, Fixed, Film: 3.3 kΩ, 5%, 1/8 W	4	CF1/8-3.3K/J	09021	

REF DESIG PREFIX **A3A14**

REF DESIG	DESCRIPTION	QTY PER ASSY	MANUFACTURER'S PART NO.	MFR. CODE	RECM VENDOR
R42	Same as R41				
R43	Same as R41				
R44	Same as R17				
R45	Same as R41				
R46	Resistor, Fixed, Film: 1.0 kΩ, 5%, 1/8 W	4	CF1/8-1.0K/J	09021	
R47	Same as R46				
R48	Same as R46				
R49	Same as R46				
R50	Resistor, Fixed, Film: 6.8 kΩ, 5%, 1/8 W	2	CF1/8-6.8K/J	09021	
R51	Resistor, Fixed, Film: 51 kΩ, 5%, 1/8 W	4	CF1/8-51K/J	09021	
R52	Resistor, Trimmer, Film: 50 kΩ, 10%, 1/2 W	4	62PAR50K	73138	
R53	Resistor, Fixed, Film: 100 kΩ, 5%, 1/8 W	5	CF1/8-100K/J	09021	
R54	Resistor, Fixed, Film: 10 kΩ, 5%, 1/8 W	2	CF1/8-10K/J	09021	
R55	Same as R51				
R56	Same as R52				
R57	Same as R53				
R58	Same as R54				
R59	Same as R51				
R60	Same as R52				
R61	Same as R53				
R62	Same as R50				
R63	Same as R51				
R64	Same as R52				
R65	Same as R53				
R66	Same as R53				
R67	Resistor, Fixed, Film: 470Ω, 5%, 1/8 W	3	CF1/8-470 OHMS/J	09021	
R68	Same as R67				
R69	Same as R67				
T1	Transformer	1	T4-1	15542	
T2	Transformer	2	T9-1	15542	
T3	Same as T2				
U1	Integrated Circuit	1	PSC2-1	15542	
U2	Integrated Circuit	1	SL1611C	52648	
U3	Integrated Circuit	3	MC1496P	04713	
U4	Not Used				
U5	Same as U3				
U6	Same as U3				
U7	Integrated Circuit	2	MC1458N	18324	
U8	Same as U7				
U9	Integrated Circuit	1	DG301CJ	17856	
VR1	Diode	1	1N754A	80131	