WJ-861X RECEIVER

APPENDIX B

WJ-861XB FREQUENCY EXTENDER (FE AND FEX) OPTIONS

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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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APPENDIX B

FREQUENCY EXTENDER (FE AND FEX) OPTIONS

B.1 GENERAL

The 500-1100 MHz Frequency Extender (FE) is comprised of the Type 796414-1 UHF Preselector (A3A1), Type 796415-1 UHF Preamplifier/Mixer (A3A2) and the Type 798079-2 UHF LO Synthesizer (A3A22). These subassemblies install into existing slots on the RF/IF Motherboard and extend the receivers operating range to 1100 MHz. The 500-1200 MHz Frequency Extender (FEX) is comprised of the Type 796414-3 UHF Preselector (A3A1), Type 796415-3 UHF Preamplifier/Mixer (A3A2), and the Type 798079-2 UHF LO Synthesizer (A3A22). These subassemblies install into existing slots on the RF/IF Motherboard and extend the receiver's operating range to 1200 MHz. When the receiver is tuned to frequencies in the 500 to 1100 MHz range with the FE or to frequencies in the 500 to 1200 MHz range with the FEX, the incoming signal is mixed with one of four fixed LO frequencies down converting the signal to a difference frequency within the VHF tuning range of the receiver. The receiver is then tuned to this difference frequency.

B.2 INSTALLATION

Installation of the FE or FEX Option consists of inserting the three FE subassemblies into the appropriate slots on the RF/IF Motherboard and interconnecting the subassemblies with the receiver circuitry, utilizing the supplied cables. When the option components are properly installed, switch S1 on the Synthesizer Interface (A5A2) must also be reconfigured permitting the receiver software to recognize the presence of the 500-1100 MHz Frequency Extender or the 500- 1200 MHz Frequency Extender. This is accomplished by placing switch position #6 of A5A2S1 into the open position.

The cable connections required for the installation of the FE or FEX Option are as follows:

1) Connect P1 of cable A3A1W1 from the UHF Preselector to J4 of the receiver Antenna Switch (A8).

2) Connect P2 of cable A3A1W2 from the UHF Preselector to J1 of the UHF Preamplifier/Mixer (A3A2).

3) Remove cable A3W1 which is presently installed between J3 of Antenna Switch (A8) and J3 of the VHF High-Band Preselector (A3A3). Locate cable A3W7 (supplied) and install P15 of this cable at J3 of the Antenna Switch. Install P16 of A3W7 at J2 of the UHF Preamplifier/Mixer (A3A2).

4) Locate cable A3W1 and connect P2 of this cable at J4 of the UHF Preamplifier/Mixer (A3A2) and connect P3 at J3 of the VHF High-Band Preselector (A3A3).

5) Locate cable A3W6 and connect P14 at J3 of the UHF Preamplifier/Mixer (A3A2). Connect P13 of A3W6 at U1J1 of the UHF LO Synthesizer (A3A22).

6) Locate cable W25 and connect R55 of this cable at feed-thru connector J9 (on dividing wall of the receiver chassis). Connect P56 of W25 at J2 of the UHF LO Synthesizer (A3A22).

7) Recheck the installation to verify that all connections are correct. Refer to the RF/IF Motherboard (**Figure 6-1**) and the Receiver Main Chassis (**Figure 6-32**) schematic diagrams as a reference.

CAUTION

When installing the Frequency Extender (FE) Option, special precautions should be taken to prevent the possibility of damaging the UHF Preselector and UHF Preamp/Mixer subassemblies. Two different versions of the FE Option exist. Subassemblies from one version type MUST NOT be mixed with the other version type. Use only Type 794111-1 UHF Preselector (A3A1) with Type 798075-1 UHF Preamp/Mixer (A3A2) or Type 796414-1 UHF Preselector (A3A1) with Type 796415-1 Preamp/Mixer (A3A2) or Type 796414-3 UHF Preselector (A3A1) with Type 796415-3 Preamp/Mixer (A3A2). Interchanging the different version types could result in physical damage to the subassemblies.

B.3 CIRCUIT DESCRIPTION

B.3.1 FE OPTION FUNCTIONAL DESCRIPTION

With the FE Option installed, the 20-500 MHz output from the Antenna Switch (A8) is applied to a VHF/UHF select switch in the Type 796415-1 UHF Preamplifier/Mixer (A3A2), and the 500-1100 MHz Antenna Switch output is applied to the input of the UHF Preselector (A3A1).

When the receiver is tuned to frequencies above 500 MHz, the incoming signals are applied from the 500-1100 MHz output of the Antenna Switch to the input of the UHF Preselector (A3A1). The UHF Preselector divides the 500 to 1100 MHz RF frequency range into 3 bands of 500 to 700, 700 to 900 and 900 to 1100 MHz. Switching between bands is accomplished by a PIN diode switching network which applies the signal through the appropriate bandpass filter, in accordance with the tuned frequency. The control signals from the UHF LO Synthesizer (A3A22) provide bias current to the PIN diode switching network to accomplish switching between the preselector bands as the UHF LO Synthesizer is tuned.

From the UHF Preselector, the RF signal is applied to the UHF Preamplifier/Mixer (A3A2), where the signal is amplified and mixed with a LO signal provided by the UHF LO Synthesizer (A3A22) producing an output frequency within the VHF frequency range. A voltage controlled attenuator (U2) within UHF Preamplifier/Mixer provides automatic gain control (AGC) for this subassembly. U2 receives a dc bias voltage from the AGC subassembly (A3A8) which

varies with respect to the strength of the received signal, thus controlling the overall gain of the FE Option. The amount of attenuation introduced by U2 varies directly with the strength of the tuned signal providing a relatively constant signal to the mixer (U3). From the mixer, the down converted signal is applied to the receiver via the UHF/VHF select switch in the output circuitry of the UHF Preamplifier/Mixer.

When the receiver is tuned to 500 MHz or less, the UHF/VHF switch, at the output of the UHF Preamplifier, switches to provide a signal path from the 20-500 MHz Antenna Switch output to the VHF section of the receiver. At this time, the output from the UHF section is cut off.

B.3.2 FEX OPTION FUNCTIONAL DESCRIPTION

With the FEX Option installed, the 20-500 MHz output from the Antenna Switch (A8) is applied to a VHF/UHF select switch in the Type 796415-3 UHF Preamplifier/Mixer (A3A2), and the 500-1200 MHz Antenna Switch output is applied to the input of the UHF Preselector (A3A1).

When the receiver is tuned to frequencies above 500 MHz, the incoming signals are applied from the 500-1200 MHz output of the Antenna Switch to the input of the UHF Preselector (A3A1). The UHF Preselector divides the 500 to 1200 MHz RF frequency range into 3 bands of 500 to 700, 700 to 900 and 900 to 1200 MHz. Switching between bands is accomplished by a PIN diode switching network which applies the signal through the appropriate bandpass filter, in accordance with the tuned frequency. The control signals from the UHF LO Synthesizer (A3A22) provide bias current to the PIN diode switching network to accomplish switching between the preselector bands as the UHF LO Synthesizer is tuned.

From the UHF Preselector, the RF signal is applied to the UHF Preamplifier/Mixer (A3A2), where the signal is amplified and mixed with a LO signal provided by the UHF LO Synthesizer (A3A22) producing an output frequency within the VHF frequency range. A voltage controlled attenuator (U2) within UHF Preamplifier/Mixer provides automatic gain control (AGC) for this subassembly. U2 receives a dc bias voltage from the AGC subassembly (A3A8) which varies with respect to the strength of the received signal, thus controlling the overall gain of the FEX Option. The amount of attenuation introduced by U2 varies directly with the strength of the tuned signal providing a relatively constant signal to the mixer (U3). From the mixer, the down converted signal is applied to the receiver via the UHF/VHF select switch in the output circuitry of the UHF Preamplifier/Mixer.

When the receiver is tuned to 500 MHz or less, the UHF/VHF switch, at the output of the UHF Preamplifier, switches to provide a signal path from the 20-500 MHz Antenna Switch output to the VHF section of the receiver. At this time, the output from the UHF section is cut off.

B.3.2.1 Type 796414-1 and 796414-3 UHF Preselector (A3A1)

The reference designation for this subassembly is A3A1. Refer to **Figure B-1** for the Type 796414-1 and 796414-3 UHF Preselector schematic diagram.

The Type 796414-1 or 796414-3 UHF Preselector (A3A1) provides the first stage of RF preselection for the 500-1100 MHz or 500-1200 MHz UHF signals. Either subassembly utilizes three bandpass filters (FL1 through FL3) dividing the UHF spectrum into bands of 500-700,

700-900 and 900-1100 or 900-1200 MHz. Each bandpass filter is flat over its specified frequency and passes these frequencies with little attenuation (0.5 dB). Frequencies out of the filter bandpass are attenuated, thus improving image frequency and IF rejection. The RF signal enters the UHF preselector via P1 of cable W1 and is coupled by C1 to a PIN diode switching network comprised of CR1 through CR14. This switching network applies the signal of interest through the appropriate bandpass filter in accordance with the tuned frequency of the receiver. From the filter, the RF signal is coupled through C12 to the output (P2 of W2).

Switching of the RF signal through the proper filter is controlled by the UHF/VHF and the Band A*, B*, and C* select inputs. During UHF operation, the UHF/VHF select input is at +5 Vdc, placing a positive potential at the anodes of series input (CR1, CR5 and CR9) and series output (CR4, CR8 and CR12) diodes. Dependent on the frequency tuned, the Band A*, B*, or C* select is placed at -10 Vdc providing a current-sink through its respective series input and output PIN diodes. When conducting, the diodes provide a minimum impedance path for the RF signal through the filter installed in that branch. The remaining select inputs are held at +5 Vdc which provides a current source for the shunt diodes in their switch branch. The series diodes in these branches are cut off, thus blocking the RF signal path. The select inputs required to activate each filter branch is illustrated in the UHF Preselector Bandpass Selection Table (**Table B-1**). Each of the select inputs are provided by the Digital Control Section automatically selecting the proper filter for the frequency tuned.

Table B-1. UHF Preselector Bandpass Selection Table

Select UHF/VHF	C*	B*	A*	Active Filter	Bandpass (MHz)
0	1	1	1	---	---
1	1	1	0	FL1	500 - 700
1	1	0	1	FL2	600 - 900
1	0	1	1	FL3	900 - 1100
OR					
1	0	1	1	FL3	900 - 1200

0 = -10 Vdc
1 = +5 Vdc

Inductors L1 through L8, ferrite beads FB1 through FB12, resistors R1 through R13 and capacitors C2 through C11 and C13 through C18 function as decoupling components. These components prevent RF signals from exiting the UHF Preselector via the select inputs of the subassembly.

B.3.2.2 Type 796415-1 and 796415-3 UHF Preamplifier/Mixer (A3A2)

The reference designation for this subassembly is A3A2. Refer to **Figure B-2** for the Type 796415-1 or 796415-3 UHF Preamplifier/Mixer schematic diagram.

The RF signal from the UHF Preselector (A3A1) enters the UHF Preamplifier/Mixer (A3A2) via RF input connector J1 and is applied to the input of preamplifier U1. U1, a broadband amplifier, provides +15.5 dB of gain to the RF signal increasing the signal to a sufficient level to drive the mixer. Decoupling of the +15 Vdc input to U1 (pin 1) is accomplished by L3 and C5. The

output of U1 (pin 4) is then applied to PIN diode attenuator U2 via FL1. FL1 in the FE Option is a 1100 MHz low-pass filter, installed in the signal path to attenuate frequencies above 1100 MHz thus reducing image noise from U1. FL1 in the FEX Option is a 1200 MHz low-pass filter, installed in the signal path to attenuate frequencies above 1200 MHz, thus reducing image noise from U1. The voltage controlled attenuator U2, presents a constant impedance at the output of FL1 and provides a means of limiting the signal level to the mixer under strong signal conditions. The amount of attenuation presented by U2 is dependent on the AGC voltage provided by the AGC Amplifier (A3A8) at terminal 49 of the UHF Preamplifier/Mixer subassembly. This voltage varies from +10 Vdc with weak signals present to +2 Vdc under strong signal conditions. The attenuation presented by U2 varies between -20 dB, with an AGC voltage of +2 Vdc, to -1.75 dB, with an AGC voltage of +10 Vdc. Operating bias is supplied by +15 Vdc applied to pin 1 via the decoupling network comprised of L4 and C6. Control is supplied by the AGC voltage applied to pin 5. L9, C16 and C17 provide decoupling of the AGC input line.

Double balanced mixer U3 receives the RF signal from U2 and mixes it with an LO signal provided by the UHF LO Synthesizer (A3A22) providing a difference frequency within the VHF range. The UHF LO Synthesizer applies four different fixed frequencies to the mixer to divide the UHF frequency range into four frequency bands as illustrated in the UHF Tuning Table **(Table B-2)**. The Digital Control Section then tunes the VHF section of the receiver to the mixer output frequency, thus permitting the signal of interest to be further processed. The mixer output from pin 1 of U3 is coupled across dc blocking capacitor C22 and is then applied through a low-pass filter comprised of L10, C26 and C27. This filter suppresses high order harmonics of the UHF LO preventing their radiation from the VHF input (J2). From the low-pass filter the RF signal is applied to the UHF branch of the UHF/VHF switch.

Table B-2. UHF Tuning Table

RF Tuned Freq. (MHz)	LO FREQ. (MHz)	Mixer Output Freq. (MHz)
500 - 599	848	348 - 249
600 - 699	944	344 - 240
700 - 899	1144	444 - 245
900 - 1100*	1344	444 - 244
900 - 1200**	1344	444 - 144

* FE option
** FEX option

The UHF/VHF switch, comprised of CR3 through CR6, selects the converted UHF signal from the UHF mixer or the VHF signal from the Antenna Switch (A8), entering at J2. Switching is controlled by the UHF/VHF input (terminal 53) provided by the Digital Control Section. This switching input is at logic "1" (+5 Vdc) when the receiver is tuned to 500 MHz or above and at logic "0" (0 Vdc) when tuned below 500 MHz. The UHF/VHF select signal from terminal 53 is applied, via R11, to the inverting input of switch driver U8B and to the non-inverting input of U8A. These switch drivers switch between +15 Vdc and -10 Vdc providing bias current for the PIN diodes in the UHF/VHF switch. When a frequency of 500 MHz or higher is tuned, the +5 Vdc level causes the output of U8A to switch to +15 Vdc. This provides a current-source for CR4, causing it to conduct and provide a current path for the converted UHF signal to the output of the subassembly (J4). At this time the output of U8B is at -10 Vdc, providing a current-sink for CR6. This causes CR6 to conduct and series diode CR5 to be cut off, preventing the VHF signal from passing through the switch. When frequencies below 500 MHz are tuned, the outputs of U8A and U8B are reversed, causing a signal path for the VHF signal through CR5 and

blocking the UHF path by cutting off CR4. The voltage divider formed by R5 and R3 provides a switching reference level of approximately 1.5 Vdc.

Integrated circuits U6 and U7 function as switch drivers for the band select circuitry of the UHF Preselector (A3A1). These switch drivers receive the UHF/VHF and the 2^0 and 2^1 UHF select inputs from the Digital Control Section and decode these inputs to select the proper preselector filter as the UHF LO Synthesizer is tuned. The UHF select inputs are applied to the A, B and C inputs of decoder U4, which in turn provides a logic "1" level to the inverting input of appropriate switch driver (U7B, U6A or U6B). The UHF/VHF input is also applied directly to the non-inverting input of U7A causing the output of U7A to be held at +15 Vdc whenever UHF is selected by the UHF/VHF select input. The remaining drivers switch according to the logic levels provided at the 2^0 and 2^1 UHF select inputs.

When the receiver is tuned between 500 and 599 MHz, 2^0 and 2^1 are both at logic "0," causing the Q4 output of U4 to be placed at a logic "1." This level is applied at pin 6 of U6B, via CR2, causing the A select output to be switched to -15 Vdc. At frequencies of from 500 to 699 MHz, 2^0 is at logic "1" and 2^1 is at logic "0." This condition causes the Q5 output of U4 to be placed at a logic "1" level. This level is applied at pin 6 of U6B, via CR1, causing the A select output to be switched to -15 Vdc. At tuned frequencies of from 700 to 899 MHz, 2^0 is at logic "0" and 2^1 is at logic "1," causing the Q6 output of U4 to be placed at logic "1." The Q6 output level is applied to the inverting input of U6A, causing the B output to be switched to -15 Vdc. When frequencies between 900 and 1200 MHz are tuned, both the 2^0 and 2^1 select inputs are at a logic "1" state. This causes the Q7 output of U4 to be placed at a logic "1" state. The Q7 output is applied to the inverting input of U7B, causing the C output to be switched to -15 Vdc.

The LO signal provided by the UHF LO Synthesizer is applied to the mixer (U3) via J3 and buffer amplifier U5. U5 receives the LO signal at a level of -3 dBm and provides amplification of +10 dB increasing the signal to a sufficient level to drive mixer U3. L5 and C7 function as decoupling components maintaining a signal ground potential on the +9 Vdc source.

B.3.2.3 Type 798079-2 UHF LO Synthesizer (A3A22)

The reference designation for this subassembly is A3A22. Refer to **Figure B-3** for the Type 798079-2 UHF LO Synthesizer schematic diagram.

This subassembly consists of the UHF Variable Divider (A3A22A1) and the UHF VCO (A3A22U1) which together comprise the phase locked loop of the UHF LO Synthesizer. The inputs consists of the 1 MHz reference, provided by the Synthesizer Section at J2 and the UHF and UHF SEL (2^1, 2^0) select inputs provided by the Digital Control Section. The output provided consists of a fixed LO frequency of 848, 944, 1144 or 1344 MHz at J1 of the 848-1344 MHz Oscillator (U1).

B.3.2.3.1 Part 390421-1 UHF Variable Divider (A3A22A1)

The Part 390421-1 UHF Variable Divider (A3A22A1) provides the tuning control for the 848-1134 MHz Oscillator, (U1). This subassembly decodes the UHF, 2^0 and 2^1 select lines, provided by the Digital Control Section, and utilizes the decoded data to select the oscillator frequency band and to preset the divide-by-n counters in the phase-locked-loop circuitry.

Control inputs to the Part 390421-1 UHF Variable Divider consist of the UHF 2^0 and 2^1 select input, provided at terminals E1, E2 and E3. The UHF input line, which is set to logic "1" whenever the receiver is tuned above 500 MHz, is applied to the G input of U8 and to the cathode of CR1 enabling the Variable Divider circuitry. The 2^0 and 2^1 inputs are applied to the A and B inputs of U8 and to gates A and B of U9. U8 and U9 then decode the select inputs selecting the oscillator frequency band and to preset binary counters U7 and U6. Comparator U5 monitors the output lines of U8 and compares the logic level at each line with a +2.5 Vdc reference, provided by the voltage divider formed by R1 and R2. Each comparator in U5 provides +15 Vdc to the appropriate band select input of oscillator U1 when its respective input (from U8) goes low, causing the desired oscillator band to be selected. The remaining outputs of U5 are held at -15 Vdc, due to the logic "1" at their inverting inputs.

A sample of the output frequency of A3A22U1 enters the Variable Divider at E9 and is applied to the input of amplifier U4 via the pad formed by R9, R10 and R11. U4 amplifies the oscillator frequency and applies the signal to the input of U3, via C12. Integrated circuits U3 and U2 provide divide factors of 4 and 2, respectively, providing a total prescaling factor of 8. The prescaled output is then applied to the input of a two modulus counter which further divides the signal by a factor of 10 or 11, as determine by the CRY output of counter U6. When the CRY output is at logic "0", U1 divides by 11 and when the output is at logic "1," U1 divides by 10. The output of U1 is then applied as a TTL clock to counters U7 and U6.

Presettable binary counters U7 and U6 function with the two modulus counter U1 providing division factors of 106, 118, 143 or 168. U7 and U6 are preset by the decoded outputs of U8 and U9 and count up from the preset until the maximum count is reached. When the maximum count is reached, a pulse is provided to the phase detector U10 and the CRY output of U7 reloads the counters restarting the count sequence. U7 determines the total number of counts in each count sequence and U6 determines the number of times U1 divides by 11 or 10.

For example, when a LO frequency of 848 MHz is selected, U7 is preset to "6" and U6 is preset to "9." The total count sequence continues until U7 counts up from "6" to its maximum of "15" and then resets (10 counts). Simultaneous with the count of U7, U6 counts up from its preset of "9" to its maximum of "15" (6 counts). When U6 reaches "15" the CRY output is set to 1 and U6 counting halts until the preset is reloaded. During the first 6 counts (while U6 is counting) U1 divides by a factor of 11. For the remaining 4 counts (until U7 reaches its maximum count) U1 divides by a factor of 10. The total count sequence provides a divide factor of 106 (11x6) + (10x4) . This combined with the division factor of 8 by the prescaler divides the oscillator output frequency by a factor of 848.

The output of U7 is applied to the phase detector (U10), where the divided signal is compared with the 1 MHz reference signal, provided by the Synthesizer Section of the receiver. The phase detector compares the frequency and phase of the two signals and generates an output representing the difference between the signals. This output is integrated by the loop filter, comprised of Q1, Q2 and associated components to produce a tuning voltage which retunes the oscillator until the divided signal and the reference are equal in frequency and phase. R18 and C22 determine the bandwidth of the loop filter, and C21 and R19 permit bandwidth adjustment.

B.4 PARTS LIST

B.4.1 TYPE 796414-X UHF PRESELECTOR

REF DESIG PREFIX A3A1

REF DESIG	DESCRIPTION	QTY PER ASSY	MANUFACTURER'S PART NO.	MFR. CODE	RECM VENDOR
	Revision D				
C1	Capacitor, Ceramic, Chip: 470 pF, 10%, 100 V	2	C1210C471K1GAC	31433	
C2 Thru C5	Not Used				
C6	Capacitor, Ceramic, Monolithic: 220 pF, 5% 100 V	6	8121-100-C0G0-221J	72982	
C7 Thru C11	Same as C6				
C12	Same as C1				
C13	Capacitor, Ceramic, Disc: 0.1 µF, 20%, 50 V	3	34475-1	14632	
C14	Capacitor, Ceramic, Disc: 1000 pF, 500 V	3	59Z5U102P	91984	
C15	Same as C13				
C16	Same as C14				
C17	Same as C13				
C18	Same as C14				
C19	Capcitor, Variable, Air: 1-4.5 pF, 250 V	2	9410-0	91293	
C20	Same as C19				
CR1	Diode	12	841320	14632	
CR2 Thru CR9	Same as CR1				
CR10	Diode	2	MA47201	96341	
CR11	Same as CR10				
CR12 Thru CR14	Same as CR1				
E1	Connector, Terminal	2	55-039-3875-91	98291	
E2	Same as E1				
E3	Terminal, Forked	6	140-1941-02-01	71279	
E4 Thru E8	Same as E3				
E9	Not Used				
E10	Not Used				
FB1	Not Used				
FB2	Not Used				
FB3	Ferrite Bead	10	56-590-65-4A	02114	
FB4 Thru FB12	Same as FB3				
FL1	Filter Band-pass: 600 MHz CF	1	92222	50140	
FL2	Filter Band-pass: 800 MHz CF	1	92223	50140	
FL3	See Table B-3				
L1	Coil, Fixed	8	170134-1	14632	

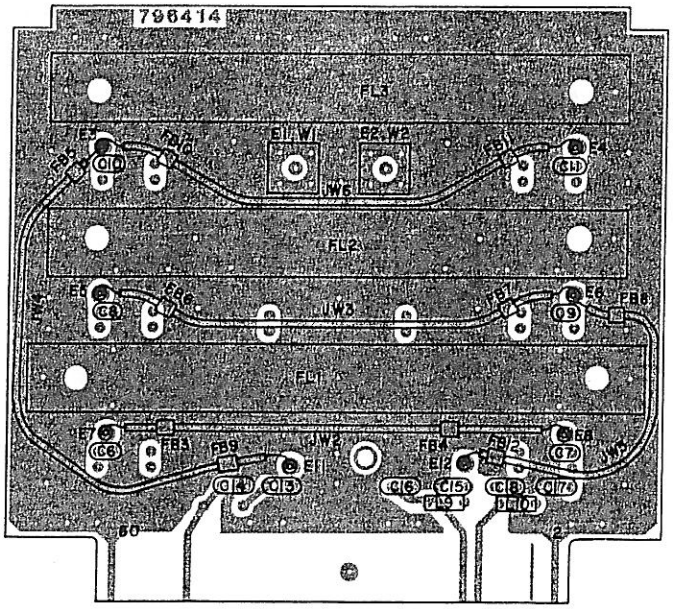

Figure B-1. Type 796414-1 UHF or 796414-3 Preselector (A3A1), Component Side, Location of Components

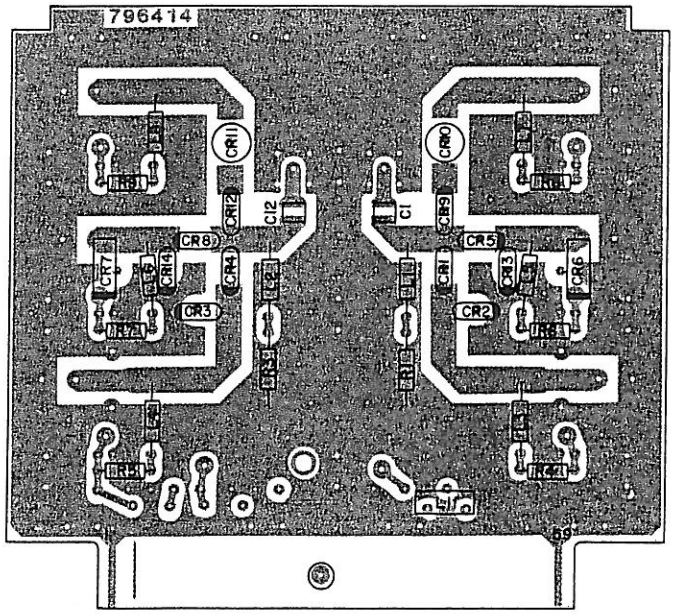

Figure B-2. Type 796414-1 or 796414-3 UHF Preselector (A3A1), Circuit Side, Location of Components

REF DESIG PREFIX **A3A1**

REF DESIG	DESCRIPTION	QTY PER ASSY	MANUFACTURER'S PART NO.	MFR. CODE	RECM VENDOR
L2 Thru L8	Same as L1				
L9	Coil, Fixed	3	190187-1	14632	
L10	Same as L9				
L11	Same as L9				
P1	Connector, Plug	1	50-024-3875-91	98291	
P2	Connector, Plug	1	50-328-3875-91	98291	
R1	See Table B-3				
R2	Not Used				
R3	See Table B-3				
R4	Resistor, Fixed, Composition: 470Ω, 5%, 1/8 W	6	RCR05G471JS	81349	
R5 Thru R9	Same as R4				
W1	Cable Assembly	1	17300-188-3	14632	
W2	Cable Assembly	1	17300-188-4	14632	

Table B-3. Type 796414-X Component Differences

Option	Type	FL3	R1, R3
FE	796414-1	Filter 92225	Resistor, Fixed, Film 1.2 kΩ, 5%, 1/4 W CF1/4-1.2K/J
FEX	796414-3	Filter 92390	Resistor, Fixed, Film 1.2 kΩ, 5%, 1/4 W CF1/4-1.2K/J

B.4.2 TYPE 796415-X UHF PREAMPLIFIER/MIXER REF DESIG PREFIX A3A2

REF DESIG	DESCRIPTION	QTY PER ASSY	MANUFACTURER'S PART NO.	MFR. CODE	RECM VENDOR
	Revision G				
C1	Capacitor, Electrolytic, Tantalum: 4.7 µF, 20%, 35 V	2	196D475X0035JE3	56289	
C2	Capacitor, Ceramic, Disc: 0.1 µF, 20%, 50 V	15	34475-1	14632	
C3	Same as C1				
C4 Thru C15	Same as C2				
C16	Capacitor, Ceramic, Monolithic: 470 pF, 5%, 100 V	3	8121-100C0G0-471J	72982	
C17	Same as C16				
C18	Same as C2				
C19	Same as C2				
C20	Capacitor, Ceramic, Disc: 1000 pF, 10%, 100 V	2	8121-100X7R0-102K	72982	
C21	Same as C20				
C22	Capacitor, Ceramic, Chip: 220 pF, 10%, 50 V	1	C1210C221K5GAH	05397	
C23	Capacitor, Ceramic, Chip: .05 pF, 10%, 50 V	2	1210-050-X7R-503KS	55969	
C24	Same as C23				
C25	Same as C16				
C26	Capacitor, Ceramic, Chip: 4.3 pF, ±0.5 pF, 500 V	2	ATC700B4R3DP500X	29990	
C27	Same as C26				
C28	Capacitor, Ceramic, Chip: 470 pF, 10%, 100 V	1	C1210E471K1GAH	31433	
C29	Capacitor, Variable, Air: 0.6-4.5 pF, 500 V	1	M5F	18736	
CR1	Diode	2	1N4446	80131	
CR2	Same as CR1				
CR3	Diode	4	841320	14632	
CR4	Same as CR3				
CR5	Same as CR3				
CR6	Diode	1	5082-3040	28480	
CR7	Not Used				
CR8	Same as CR3				
FL1	Filter, LP (See Table B-4)				
J1	Connector, Receptacle, Connector	4	1009-7511 000	19505	
J2 Thru J4	Same as J1				
L1	Coil, Fixed	6	16209-12	14632	
L2 Thru L5	Same as L1				
L6	Coil, Fixed	2	170134-1	14632	
L7	Coil, Fixed	2	190187-1	14632	
L8	Same as L6				
L9	Same as L1				
L10	Coil, Fixed	1	170189-1	14632	
L11	Same as L7				

REF DESIG PREFIX **A3A2**

REF DESIG	DESCRIPTION	QTY PER ASSY	MANUFACTURER'S PART NO.	MFR. CODE	RECM VENDOR
R1	Not Used				
R2	Not Used				
R3	See **Table B-1**				
R4	Resistor, Fixed, Film: 47 kΩ, 5%, 1/8 W	1	CF1/8-47K/J	09021	
R5 Thru R8	See **Table B-1**				
R9	Resistor, Fixed, Film: 18 kΩ, 5%, 1/8 W	4	CF1/8-18K/J	09021	
R10 Thru R12	Same as R9				
R13	See **Table B-1**				
U1	Amplifier	1	A12	14482	
U2	Attenuator	1	G1	27956	
U3	Mixer, Balanced	1	M2A	27956	
U4	Integrated Circuit	1	CD4028AE	02735	
U5	See **Table B-1**				
U6	Integrated Circuit	3	LM358N	27014	
U7	Same as U6				
U8	Same as U6				
VR1	See **Table B-1**				

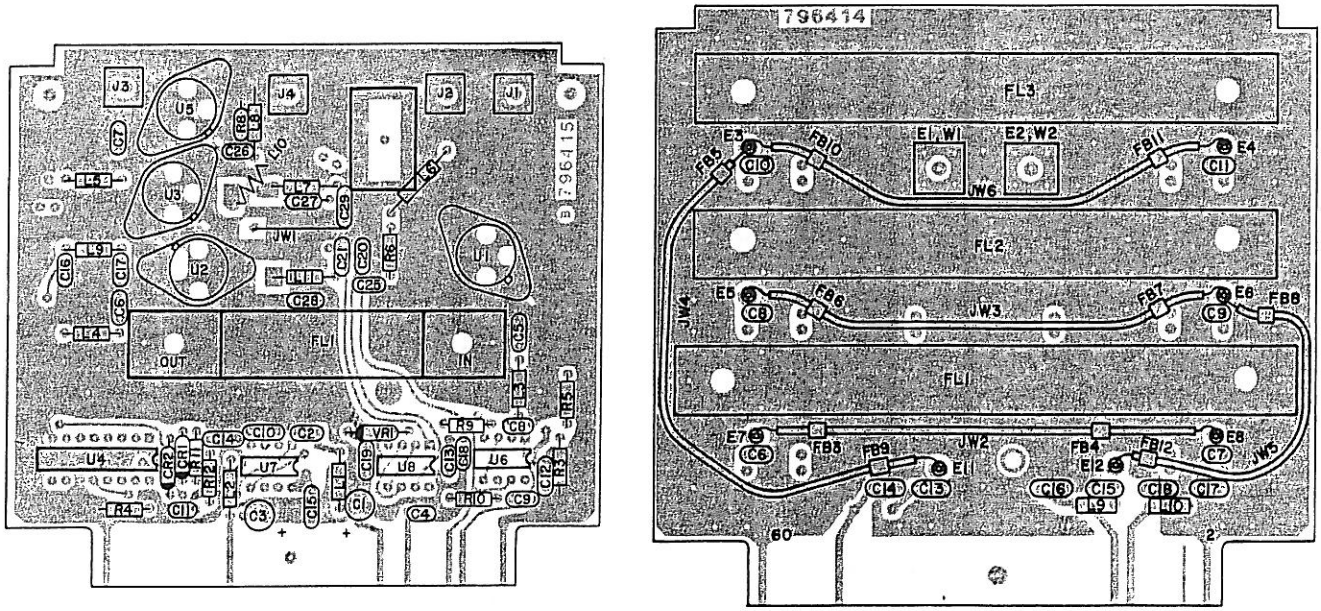

Figure B-3. Type 796415-1, UHF Preamplifier Mixer (A3A2), Location of Components

Table B-4. Type 796415-X Component Differences

	FL1	R3	R5	R6	R7	R8	R13	U5	VR1
796415-1	Filter 92225 50140	Res/Fixed/Film 1.8k, 5%, 1/8 W CF1/8-1.8K/J 09021	Res/Fixed/Film 12k, 5%, 1/8 W CF1/8-12K/J 09021	Res/Fixed/Film 680Ω, 5%, 1/8 W CF1/8-680 Ohms/J 09021	Same as R6	Res/Fixed/Film 1.2k, 5%, 1/8 W CF1/8-1.2K/J 09021	Same as R3	Amp. 10-1500 MHz A28 27956	Diode 5.1 V IN751A 80131
796415-2	Filter 92225 50140	Res/Fixed/Film 1.5k, 5%, 1/8 W CF1/8-1.5K/J 09021	Res/Fixed/Film 10k, 5%, 1/8 W CF1/8-10K/J 09021	Res/Fixed/Film 560Ω, 5%, 1/8 W CF1/8-560 Ohms/J 09021	Same as R6	Res/Fixed/Film 1.0k, 5%, 1/8 W CF1/8-1.0K/J 09021	Res/Fixed/Film 1.2k, 5%, 1/8 W CF1/8-1.2K/J 09021	Amp. 10-1500 MHz A28-2 14482	Diode 3.3 V IN746A 80131
796415-3	Low pass 92389 14632	Res/Fixed/Film 1.8k, 5%, 1/8 W CF1/8-1.8K/J 09021	Res/Fixed/Film 12k, 5%, 1/8 W CF1/8-12K/J 09021	Res/Fixed/Film 680Ω, 5%, 1/8 W CF1/8-680 Ohms/J 09021	Same as R6	Res/Fixed/Film 1.2k, 5%, 1/8 W CF1/8-1.2K/J 09021	Same as R3	Amp. 10-1500 MHz A28 27956	Diode 5.1 V IN751A 80131

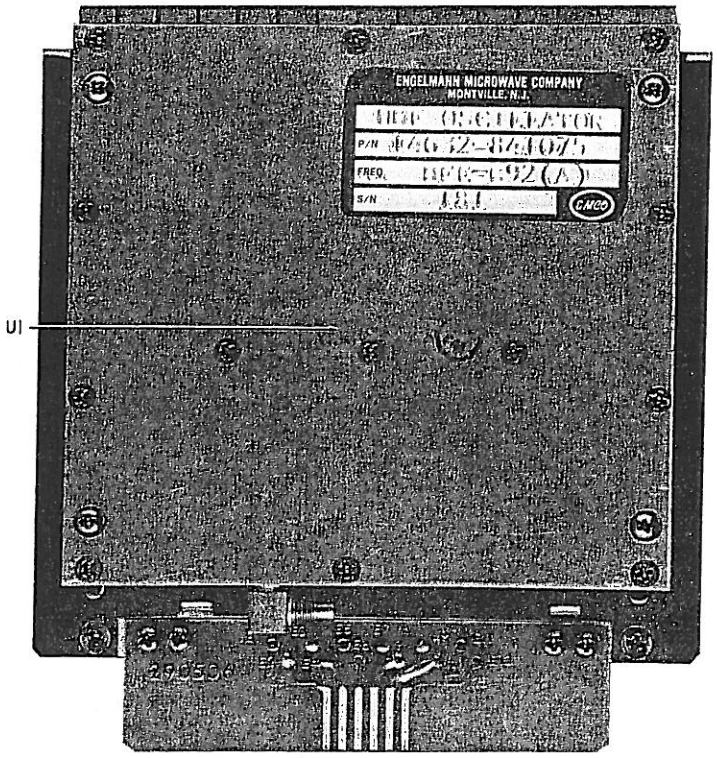

Figure B-4. Type 798079-2, UHF LO Synthesizer (A3A22), Location of Components

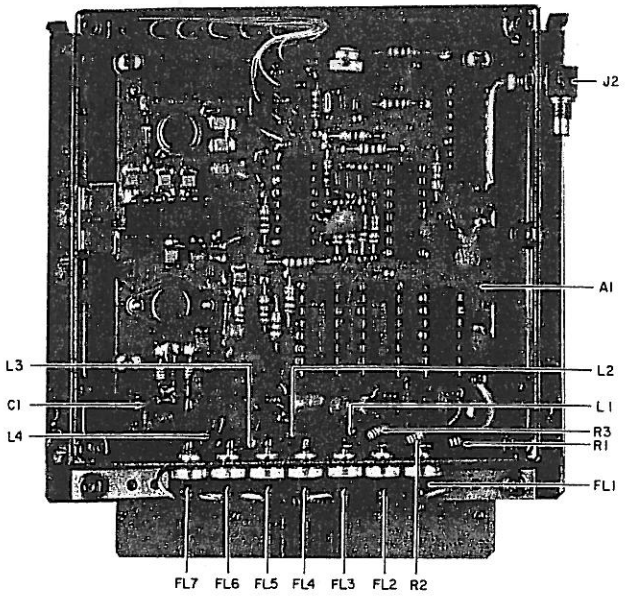

Figure B-5. Type 798079-2 UHF LO Synthesizer (A3A22), Location of Components

B.4.3 TYPE 798079-2 UHF LO SYNTHESIZER

REF DESIG PREFIX **A3A22**

REF DESIG	DESCRIPTION	QTY PER ASSY	MANUFACTURER'S PART NO.	MFR. CODE	RECM VENDOR
	Revision E				
A1	UHF Variable Divider	1	390421-1	14632	
A2	UHF Variable Divider	1	796719-1	14632	
C1	Capacitor, Ceramic, Monolithic: 1.0 pF, ±.1, 100 V	1	100-100-NPO-109B	51642	
FB1	Ferrite Bead	12	56-590-65/4A	02114	
FB2 Thru FB12	Same as FB1				
FL1	Filter, Modified	7	33728-18	14632	
FL2 Thru FL7	Same as FL1				
J1	Not Used				
J2	Connector, Receptacle	1	1012-1511-000	19505	
L1	Coil, Fixed	4	16209-4	14632	
L2 Thru L3	Same as L1				
L4	Same as L1				
R1	Resistor, Fixed, Film: 270Ω, 5%, 1/8 W	3	CF1/8-270 OHMS/J	09021	
R2	Same as R1				
R3	Same as R1				
R4	Resistor, Fixed, Film: 100Ω, 5%, 1/8 W	1	CF1/8-100 OHMS/J	09021	

B.4.3.1 **Part 390421-1 UHF Variable Divider** REF DESIG PREFIX **A3A22A1**

REF DESIG	DESCRIPTION	QTY PER ASSY	MANUFACTURER'S PART NO.	MFR. CODE	RECM VENDOR
	Revision R				
C1	Capacitor, Ceramic, Disc: 470 pF, 20%, 200 V	7	CK05BX471K	81349	
C2	Same as C1				
C3	Same as C1				
C4	Capacitor, Ceramic, Disc: .01 µF, 20%, 50 V	6	34453-1	14632	
C5 Thru C7	Same as C4				
C8	Capacitor, Electrolytic, Tantalum: 4.7 µF, 20%, 35 V	5	196D475X0035JE3	56289	
C9	Same as C8				
C10	Capacitor, Ceramic, Disc: .1 µF, 20%, 50 V	1	34475-1	14632	
C11	Capacitor, Ceramic, Chip: 470 pF, 10%, 100 V	9	C1210E471K1GAH	31433	
C12 Thru C18	Same as C11				
C19	Capacitor, Ceramic, Disc: .47 µF, 20%, 50 V	2	34452-1	14632	
C20	Same as C8				
C21	Same as C19				
C22	Same as C4				
C23	Same as C1				
C24	Capacitor, Electrolytic, Tantalum: 22 µF, 20%, 10 V	1	196D226X0010JE3	56289	
C25	Same as C1				
C26	Same as C8				
C27	Same as C8				
C28	Same as C1				
C29	Same as C1				
C30	Same as C4				
C31	Same as C11				
CR1	Diode	1	GC4211-15	50101	
L1	Inductor, Air Core	1	22292-170	14632	
Q1	Transistor	2	2N3904	80131	
Q2	Same as Q1				
R1	Resistor, Fixed, Film: 10 kΩ, 5%, 1/4 W	7	CF1/4-10K/J	09021	
R2 Thru R6	Same as R1				
R7	Resistor, Fixed, Film: 27Ω, 5%, 1/4 W	1	CF1/4-27 OHMS/J	09021	
R8	Resistor, Fixed, Film: 100Ω, 5%, 1/4 W	2	CF1/4-100 OHMS/J	09021	
R9	Resistor, Fixed, Film: 68Ω, 5%, 1/8 W	1	CF1/8-68 OHMS/J	09021	
R10	Resistor, Fixed, Film: 47Ω, 5%, 1/8 W	1	CF1/8-47 OHMS/J	09021	
R11	Resistor, Fixed, Film: 100Ω, 5%, 1/8 W	1	CF1/8-100 OHMS/J	09021	
R12	Resistor, Fixed, Film: 1.0 kΩ, 5%, 1/4 W	2	CF1/4-1K/J	09021	
R13	Resistor, Fixed, Film: 15 kΩ, 5%, 1/4 W	1	CF1/4-15K/J	09021	

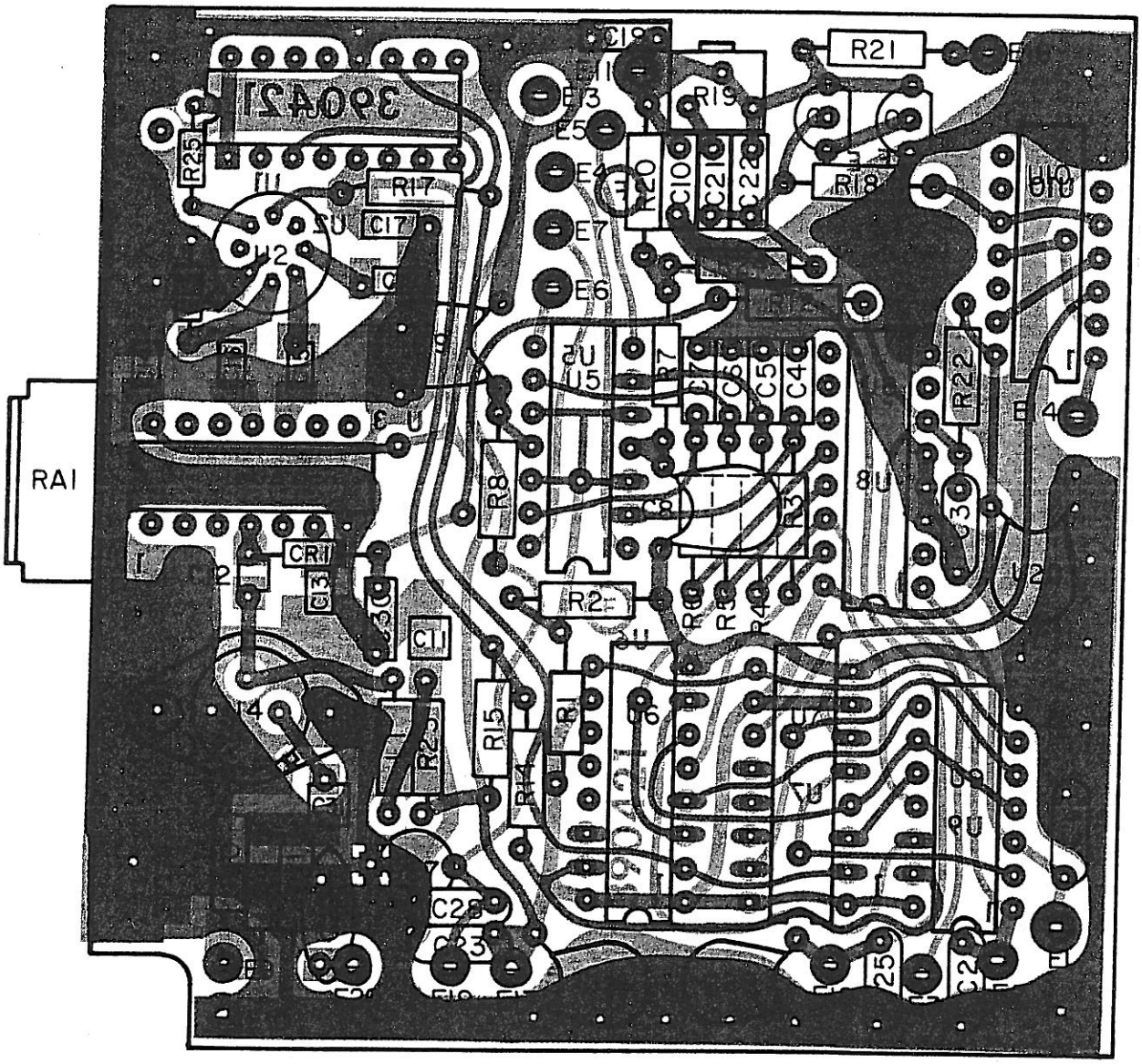

Figure B-6. Type 390421-UHF Variable (A3A22A1), Location of Components

REF DESIG PREFIX **A3A22A1**

REF DESIG	DESCRIPTION	QTY PER ASSY	MANUFACTURER'S PART NO.	MFR. CODE	RECM VENDOR
R14	Resistor, Fixed, Film: 3.6 kΩ, 5%, 1/4 W	1	CF1/4-3.6K/J	09021	
R15	Resistor, Fixed, Film: 1.5 kΩ, 5%, 1/4 W	1	CF1/4-1.5K/J	09021	
R16	Not Used				
R17	Resistor, Fixed, Film: 330Ω, 5%, 1/4 W	1	CF1/4-330 OHMS/J	09021	
R18	Same as R12				
R19	Resistor, Trimmer, Film: 2 kΩ, 10%, 1/2 W	1	62PAR2K	09021	
R20	Resistor, Fixed, Film: 3.3 kΩ, 5%, 1/4 W	1	CF1/4-3.3K/J	09021	
R21	Same as R1				
R22	Resistor, Fixed, Film: 4.7 kΩ, 5%, 1/4 W	1	CF1/4-4.7K/J	09021	
R23	Same as R8				
R24	Resistor, Fixed, Film: 4.7 MΩ, 5%, 1/4 W	1	CF1/4-4.7M/J	09021	
RA1	Heat Sink, Integrated Circuit	1	290509-1	14632	
R25	Resistor, Fixed, Film: 180Ω, 5%, 1/8 W	1	CF1/8-180 OHMS/J	09021	
U1	Integrated Circuit	1	SP8695B/DG	52648	
U2	Integrated Circuit	1	SP8602B/CM	52648	
U3	Integrated Circuit	1	SP8611B/DG	52648	
U4	Amplifier	1	GPD-410	24539	
U5	Integrated Circuit	1	HA1-4741-5	34371	
U6	Integrated Circuit	2	SN74LS161AN	01295	
U7	Same as U6				
U8	Integrated Circuit	1	SN74LS138N	01295	
U9	Integrated Circuit	1	SN74LS04N	01295	
U10	Integrated Circuit	1	MC4044P	04713	

B.4.3.2 **Type 796719-1 UHF Variable Divider** REF DESIG PREFIX **A3A22A2**

REF DESIG	DESCRIPTION	QTY PER ASSY	MANUFACTURER'S PART NO.	MFR. CODE	RECM VENDOR
	Revision A				
A1	UHF Oscillator PC Assembly	1	381473-1	14632	
C1	Capacitor, Feedthru, EMI: 1000 pF, 100 V, 10A	6	54-790-018	33095	
C2 Thru C6	Same as C1				
E1	Terminal, Feedthru	1	001-1007-000-479	98291	
J1	Connector, Receptacle	1	1012-1511-000	19505	
R1	Resistor, Fixed, Film: 22 kΩ, 5%, 1/8 W	4	CF1/8-22K/J	09021	
R2 Thru R4	Same as R1				

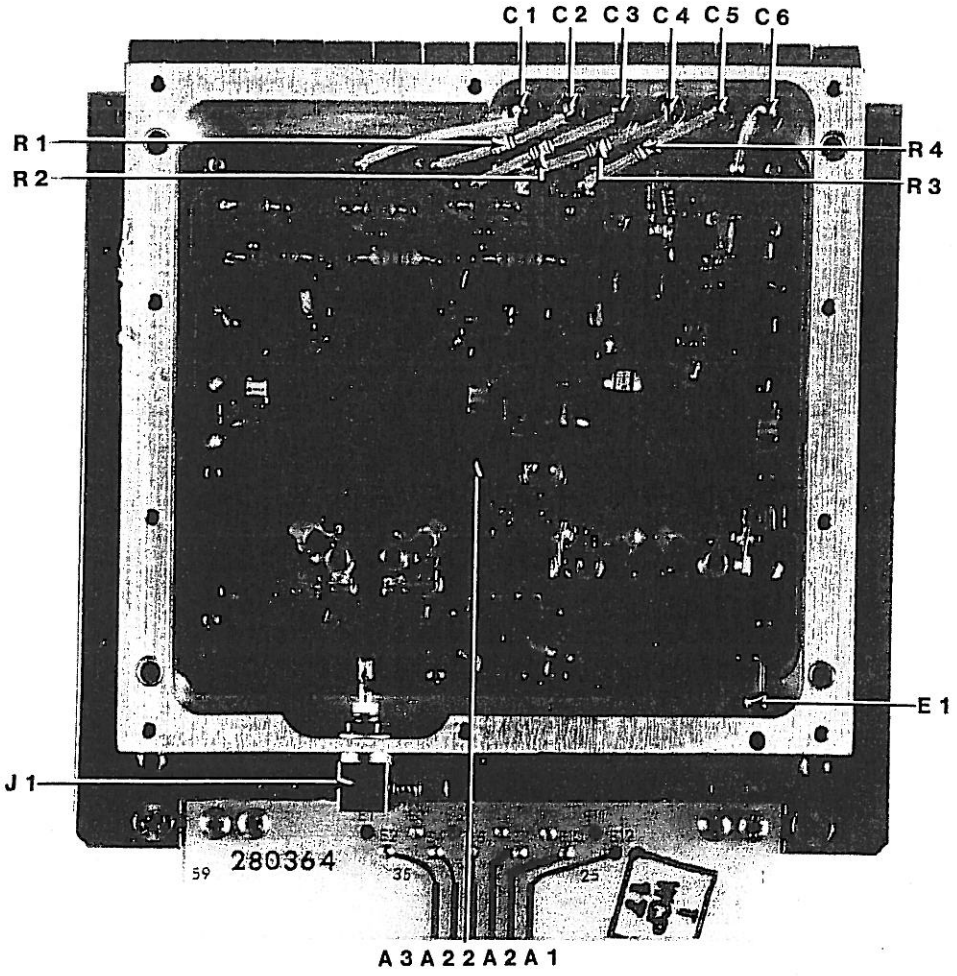

Figure B-7A. Type 796719-1 UHF Variable Divider (A3A22A2) Location of Components

B.4.3.2.1 **Type 381473-1 UHF Oscillator Assembly** REF DESIG PREFIX **A3A22A2A1**

REF DESIG	DESCRIPTION	QTY PER ASSY	MANUFACTURER'S PART NO.	MFR. CODE	RECM VENDOR
	Revision A				
C1	Capacitor Pad (P/O PC Artwork)	4			
C2	Capacitor, Ceramic: 1.5 pF, ±.1 pF, 500 V	3	ATC175B1R5BP500X	29990	
C3	Capacitor, Variable, Air: .4-2.5 pF, 500 V	4	27283	91293	
C4	Capacitor, Ceramic: 5.6 pF, ±.1 pF, 500 V	2	ATC175B5R6BP500X	29990	
C5	Same as C1				
C6	Same as C2				
C7	Same as C3				
C8	Same as C4				
C9	Same as C1				
C10	Same as C2				
C11	Same as C3				
C12	Capacitor, Ceramic: 4.7 pF, ±.1 pF, 500 V	1	ATC175B4R7BP500X	29990	
C13	Same as C1				
C14	Capacitor, Ceramic: 1 pF, ±.1 pF, 500 V	1	ATC175B1R0BP500X	29990	
C15	Same as C3				
C16	Capacitor, Ceramic: 3.9 pF, ±.1 pF, 500 V	1	ATC175B3R9BP500X	29990	
C17	Capacitor, Electrolytic, Tantalum: 22 µF, 20%, 15 V	1	TMM-S-226M-015R	04222	
C18	Capacitor, Ceramic, Monolithic: 2.0 pF, ±.1 pF, 100 V	2	100-100-NPO-209B	51642	
C19	Capacitor, Ceramic, Monolithic: 2.4 pF, ±.1 pF, 100 V	1	100-100-NPO-249B	51642	
C20	Capacitor, Ceramic, Monolithic: 1.0 pF, ±.1 pF, 100 V	2	100-100-NPO-109B	51642	
C21	Same as C20				
C22	Same as C18				
C23	Capacitor, Ceramic, Disc: .01 µF, 20%, 50 V	1	34453-1	14632	
CR1	Tuning Varactor	4	MA-45240-31	96341	
CR2 Thru CR4	Same as CR1				
CR5	Diode	1	1N4449	80131	
L1	Coil, Fixed	9	190187-1	14632	
L2 Thru L9	Same as L1				
L10	Coil, Fixed	3	180683-1	14632	
L11	Same as L10				
L12	Same as L10				
Q1	Transistor	4	MMBT2222ALT1	04713	
Q2	Transistor	4	841269	14632	
Q3	Same as Q2				
Q4	Same as Q1				
Q5	Same as Q2				
Q6	Same as Q1				

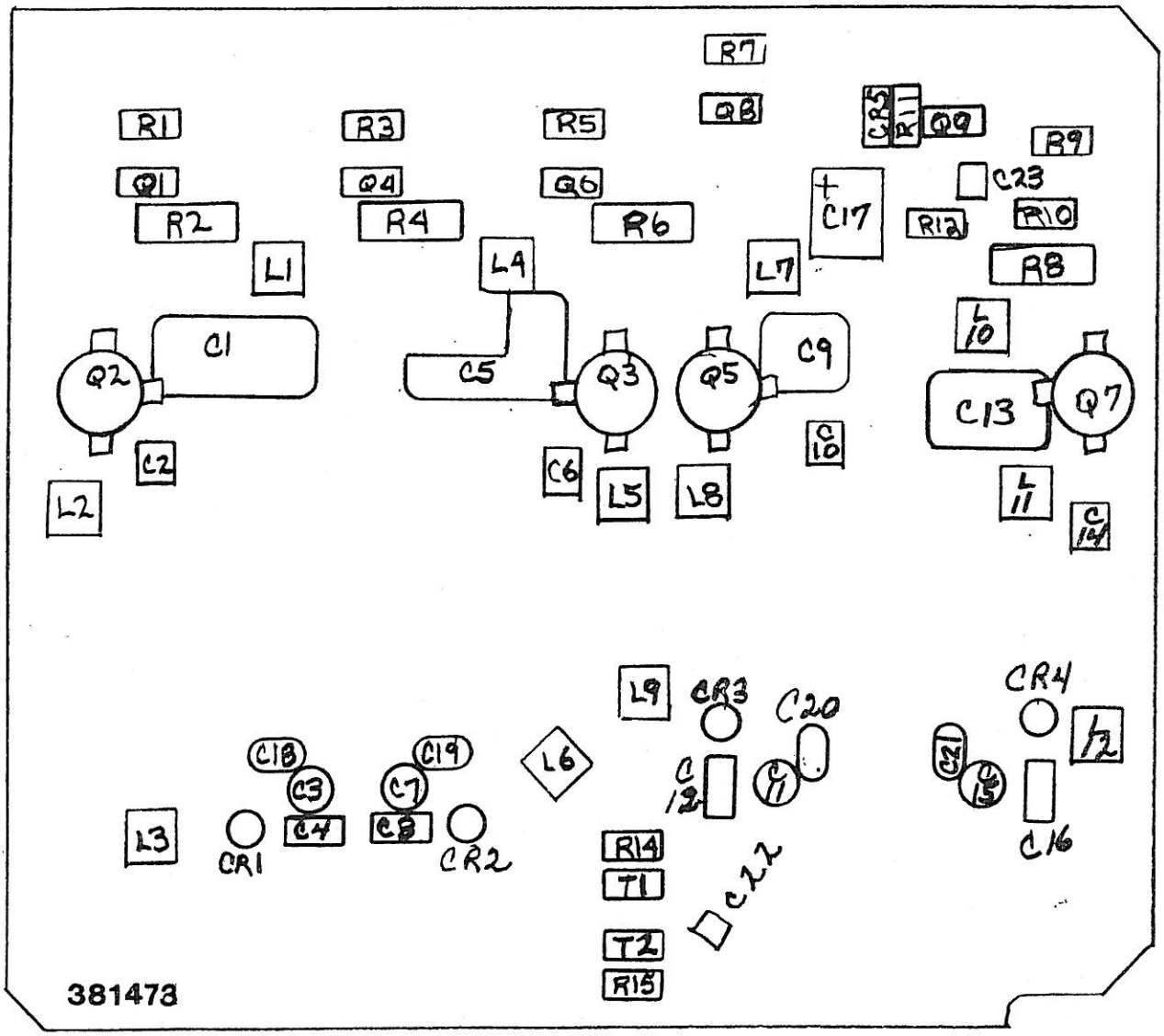

Figure B-7B. Type 381473-1 UHF Oscillator Assembly (A3A22A2A1) Location of Components

REF DESIG PREFIX **A3A22A2A1**

REF DESIG	DESCRIPTION	QTY PER ASSY	MANUFACTURER'S PART NO.	MFR. CODE	RECM VENDOR
Q7	Same as Q2				
Q8	Same as Q1				
Q9	Transistor	1	MMBT-3906	04713	
R1	Resistor, Fixed, Film: 1.8 kΩ, 5%, 1/8 W	6	C3-1.8K-5PCT	24546	
R2	Resistor, Fixed, Film: 130Ω, 5%, 1/4 W	1	CF1/4-130 OHMS/J	09021	
R3	Same as R1				
R4	Resistor, Fixed, Film: 150Ω, 5%, 1/4 W	1	CF1/4-150 OHMS/J	09021	
R5	Same as R1				
R6	Resistor, Fixed, Film: 180Ω, 5%, 1/4 W	1	CF1/4-180 OHMS/J	09021	
R7	Same as R1				
R8	Resistor, Fixed, Film: 110Ω, 5%, 1/4 W	1	CF1/4-110 OHMS/J	09021	
R9	Same as R1				
R10	Resistor, Fixed, Film: 3.3 kΩ, 5%, 1/8 W	1	C3-3.3K-5PCT	24546	
R11	Same as R1				
R12	Resistor, Fixed, Film: 18 kΩ, 5%, 1/8 W	1	C3-18K-5PCT	24546	
R13	Not Used				
R14	Resistor, Fixed, Film: 10Ω, 5%, 1/8 W	2	C3-100R-5PCT	24546	
R15	Same as R14				
T1	Power Divider	2	281926-1	14632	
T2	Same as T1				