Filter (637-2515-( ))

Rockwell International

instructions

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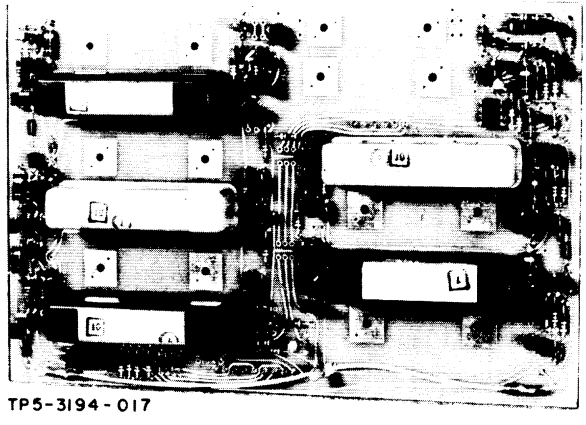
1. DESCRIPTION

Filter 637-2515-( ), shown in figure 1, is a 2-layer planar card with one 7-pin, one 6-pin, and one 5-pin blue-line connector. The filter card mates with a channel A if card and provides additional selectable filters.

The filter card consists of six filter circuits and a CW strapping circuit. Refer to table 1.



TP5-3194-017

Filter
Figure 1

Table 1. Filter Complement.

REF DES	COLLINS PART NO	FILTER 637-2515-( )						DESCRIPTION
		001	002	003	004	005	006	
FL2	526-9956-010	NA	NA	NA	X	X	NA	2.75 kHz bandwidth (LSB 250 - 3000 Hz)
FL3	526-9963-060	X	X	X	NA	X	X	6.0 kHz bandwidth (AM ±3000 Hz)
FL4	526-9963-040	X	NA	X	NA	X	X	3.0 kHz bandwidth (AM ±1500 Hz)
FL5	526-9963-030	X	NA		NA	X	X	1.0 kHz bandwidth (AM ±500 Hz)
	526-9974-030			X				1.0 kHz bandwidth (USB 500 - 1500 Hz)
FL6	526-9963-020	X	NA		NA	X	X	0.5 kHz bandwidth (AM ±250 Hz)
	526-9974-030			X				0.5 kHz bandwidth (USB 750 - 1250 Hz)
FL7	526-9963-010	X			NA	X		0.2 kHz bandwidth (AM ±100 Hz)
	526-9974-010		X	X				0.2 kHz bandwidth (USB 900 - 1100 Hz)
	293-1333-010						X	0.1 kHz bandwidth (AM ±50 Hz)
CR11	353-3644-010	NA	X	NA	NA	NA	NA	Anode to E1, cathode to E5

NOTICE: This section replaces second edition dated 1 June 1978.

2. PRINCIPLES OF OPERATION (Refer to figure 4.)

2.1 General

The filter card receives 450 kHz if from the channel A if card, makes filter selection as controlled by the FL2 through FL7, or CW mode switching inputs, and supplies 450-kHz filtered if to the channel A if card.

2.2 CW Mode Strapping

CW mode can be strapped to FL4, FL5, FL6, or FL7. To strap CW mode for the desired filter, CR11 is connected as follows:

a. For FL4(B), connect CR11 anode to E1 and cathode to E2.
b. For FL5 (C), connect CR11 anode to E1 and cathode to E3.
c. For FL6 (D), connect CR11 anode to E1 and cathode to E4.
d. For FL7 (E), connect CR11 anode to E1 and cathode to E5.

2.3 Bandpass Filter Control Circuits

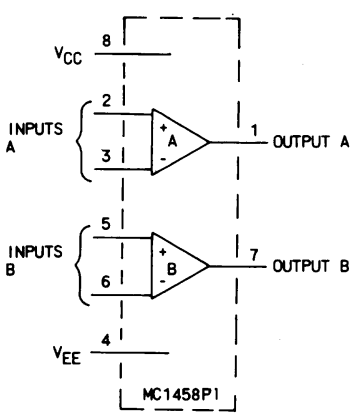
The filter card provides filter selection of 450-kHz if signals. Filter selection is initiated by the CW mode control signal or by a bandwidth control signal. This means only that these signals are applied to the filter card to initiate filter selection and does not reflect a mode of operation or selection of a bandwidth.

FL2 (LSB), FL3 (A), FL4 (B), FL5 (C), FL6 (D), and FL7 (E) are selected when the associated enable signal is applied to the filter card. FL4 (B), FL5 (C), FL6 (D), and FL7 (E) can also be selected by CW mode signal when strapped as described in paragraph 2.2. These filters are optional and the following are typical frequency bandwidths.

a. FL2 (LSB), 2.7 kHz, LSB
b. FL3 (A), 6 kHz, AM
c. FL4 (B), 3 kHz, AM
d. FL5 (C), 1 kHz, AM
e. FL6 (D), 0.5 kHz, AM
f. FL7 (E), 0.2 kHz, AM

2.4 Dual Operational Amplifier MC1458P1 (Refer to figure 2.)

The MC1458P1 consists of two operational amplifiers in one package designed for use as summing amplifiers, integrators, or amplifiers with operating characteristics as a function of the external feedback components.



CHARACTERISTICS
SUPPLY VOLTAGE: V_{CC} +18 V DC MAX
V_{EE} -18 V DC MAX
INPUT DIFF VOLTAGE: ±30 V MAX
INPUT COMMON MODE VOLTAGE:
±15 V MAX ⟨1⟩
OUTPUT SHORT CIRCUIT DURATION:
CONTINUOUS ⟨2⟩
INPUT RESISTANCE: 300 kΩ MIN, 2.0 MΩ MAX
OUTPUT RESISTANCE: 75Ω TYPICAL
VOLTAGE GAIN: 15 MIN

NOTES:
⟨1⟩ FOR SUPPLY VOLTAGE LESS THAN ±15.0 V, MAX INPUT VOLTAGE EQUAL TO SUPPLY VOLTAGE.
⟨2⟩ SUPPLY VOLTAGE EQUAL TO OR LESS THAN 15 V.

TP5-2285-013

Dual Operational Amplifier MC1458P1
Figure 2

2.5 Quad Operational Amplifier LM324N (Refer to figure 3.)

The LM324N consists of four independent, high-gain, internally frequency-compensated operational amplifiers that are designed to operate from a single power supply over a wide range of voltages. Common applications include transducer amplifiers, dc gain blocks, and all conventional operational amplifier circuits.

3. TESTING/TROUBLESHOOTING PROCEDURES

3.1 Test Equipment and Power Requirements

Test equipment and power sources required to test, troubleshoot, and repair the filter card are listed in the maintenance section of this instruction book.

3.2 Testing

The test procedures in table 2 check total performance of the filter card. These test procedures permit isolation of a fault to a specific component or circuit when the results are used with the schematic to circuit trace the fault.

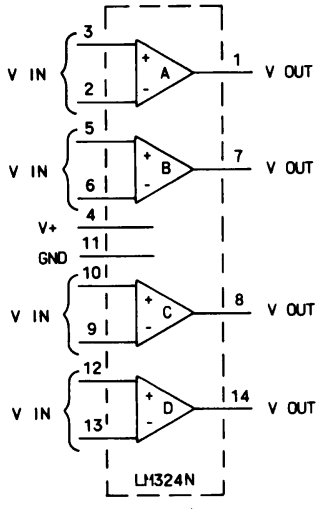
4. ALIGNMENT/ADJUSTMENT

4.1 Filter Amplifier Gain Adjustment

a. Set front-panel MODE switch to AM and BANDWIDTH switch to 16. Set AGC switch to FAST.
b. Measure signal at channel A if J1 with no receive input signal.

4.1.1 AM Filters

a. Connect receive input of 9.4500 MHz to channel A if.
b. Set receive signal to 50 μV (9.4500 MHz). Find a passband response minimum between 9.4493 and 9.4489 MHz at channel A if J4. Measure voltage gain between channel A if J1 and J4; should be 8.2 ±2.0 dB.



CHARACTERISTICS
SUPPLY VOLTAGE (V+): 32 V DC MAX
INPUT DIFF VOLTAGE: 32 V DC MAX
INPUT COMMON MODE VOLTAGE: V+ (-1.5 V DC)
OUTPUT SHORT CIRCUIT DURATION:
CONTINUOUS ⟨1⟩
VOLTAGE GAIN: 25 MIN

NOTE:
⟨1⟩ SUPPLY VOLTAGE EQUAL TO OR LESS THAN 15 V.

TP5-2289-013

Quad Operational Amplifier LM324N
Figure 3

Table 2. Filter, Testing and Troubleshooting Procedures.

TEST	PROCEDURE	NORMAL INDICATION	IF INDICATION IS ABNORMAL
1. Setup	a. Remove top cover of unit containing the control that is to be tested. b. Remove channel A if (with filter installed). c. Remove filter from channel A if. d. Test channel A if. e. When channel A if operation is verified mount filter on channel A if. Install channel A if with filter on an extender card and place it in the unit. f. Set unit LINE SELECTOR switch to 115 V. g. Connect unit to 115-V ac power source and set power on. h. Measure dc voltages between the following pins and ground (P8-6, 7; P9-5, 6; or P10-2, 5):		
	P9-4 P9-2	15 ±1.0 V dc. -10 ±1.0 V dc.	Check associated power supply.
2. 2.75-kHz LSB filter measurement	***Note*** This test applies only to 2.75-kHz LSB filter (526-9956-010). a. Set front-panel MODE switch to SSB CW and BANDWIDTH switch to LSB. b. Set AGC switch to OFF. c. Set receive input at channel A if J2 for 9.4517 MHz. d. Using an rf voltmeter, measure rf voltage at channel A if J4. Adjust receive input level and frequency for a 70-mV peak reading at channel A if J4.	Reference.	
	e. Adjust input frequency down until rf voltage at channel A if J4 is 3 dB below level of step d. Note input frequency.	NMT 9.450250 MHz.	Check FL2, Q9, Q10, and associated circuit.
	f. Adjust input frequency up until rf voltage at channel A if J4 is 3 dB below level of step d. Note input frequency.	NLT 9.453000 MHz.	Check FL2, Q9, Q10, and associated circuit.

Table 2. Filter, Testing and Troubleshooting Procedures (Cont).

TEST	PROCEDURE	NORMAL INDICATION	IF INDICATION IS ABNORMAL
3. 6-kHz AM filter measurement	**Note** This test applies only to 6-kHz AM filter (526-9963-060).		
	a. Set front-panel MODE switch to SSB/CW and BANDWIDTH switch to A.		
	Note If 6-kHz filter is in any filter slot other than A, set BANDWIDTH switch to that position.		
	b. Set AGC switch to OFF.		
	c. Set receive input at channel A if J2 for 9.4500 MHz.		
	d. Using an rf voltmeter, measure rf voltage at channel A if J4. Adjust receive input level and frequency for a 70-mV peak reading at channel A if J4.	Reference.	
	e. Adjust input frequency down until rf voltage at channel A if J4 is 3 dB below level of step d. Note input frequency.	NMT 9.447000 MHz.	Check FL3, Q11, Q12, and associated circuit.
	f. Adjust input frequency up until rf voltage at channel A if J4 is 3 dB below level of step d. Note input frequency.	NLT 9.453000 MHz	Check FL3, Q11, Q12, and associated circuit.
4. 3-kHz AM filter measurement	**Note** This test applies only to 3-kHz AM filter (526-9963-040).		
	a. Set front-panel MODE switch to SSB/CW and BANDWIDTH switch to B.		
	Note If 3-kHz filter is in any filter slot other than B, set BANDWIDTH switch to that position.		
	b. Set AGC switch to OFF.		
	c. Set receive input at channel A if J2 for 9.4500 MHz.		
	d. Using an rf voltmeter, measure rf voltage at channel A if J4. Adjust receive input level and frequency for a 70-mV peak reading at channel A if J4.	Reference.	
(Cont)			

Table 2. Filter, Testing and Troubleshooting Procedures (Cont).

TEST	PROCEDURE	NORMAL INDICATION	IF INDICATION IS ABNORMAL
4. (Cont)	e. Adjust input frequency down until rf voltage at channel A if J4 is 3 dB below level of step d. Note input frequency.	NMT 9.448500 MHz.	Check FL4, Q1, Q2, and associated circuit.
	f. Adjust input frequency up until rf voltage at channel A if J4 is 3 dB below level of step d. Note input frequency.	NLT 9.451500 MHz.	Check FL4, Q1, Q2, and associated circuit.
5. 1.0-kHz AM filter measurement	***Note*** This test applies only to 1.0-kHz AM filter (526-9963-030).		
	a. Set front-panel MODE switch to SSB/CW and BANDWIDTH switch to C.		
	Note If 1.0-kHz filter is in any filter slot other than C, set BANDWIDTH switch to that position.		
	b. Set AGC switch to OFF.		
	c. Set receive input at channel A if J2 for 9.4500 MHz.		
	d. Using an rf voltmeter, measure rf voltage at channel A if J4. Adjust receive input level and frequency for a 70-mV peak reading at channel A if J4.	Reference.	
	e. Adjust input frequency down until rf voltage at channel A if J4 is 3 dB below level of step d. Note input frequency.	NMT 9.449500 MHz.	Check FL4, Q3, Q4, and associated circuit.
	f. Adjust input frequency up until rf voltage at channel A if J4 is 3 dB below level of step d. Note input frequency.	NLT 9.450500 MHz.	Check FL5, Q3, Q4, and associated circuit.
5A. 1.0-kHz USB filter measurement	***Note*** This test applies only to 1.0-kHz USB filter (526-9974-030).		
	a. Set front-panel MODE switch to SSB/CW and BANDWIDTH switch to C.		
	Note If 1.0-kHz filter is in any filter slot other than C, set BANDWIDTH switch to that position.		
(Cont)	b. Set AGC switch to OFF.		

Table 2. Filter, Testing and Troubleshooting Procedures (Cont).

TEST	PROCEDURE	NORMAL INDICATION	IF INDICATION IS ABNORMAL
5.A (Cont)	c. Set receive input at channel A if J2 for 9.4490 MHz.		
	d. Using an rf voltmeter, measure rf voltage at channel A if J4. Adjust receive input level and frequency for a 70-mV peak reading at channel A if J4.	Reference.	
	e. Adjust input frequency down until rf voltage at channel A if J4 is 3 dB below level of step d. Note input frequency.	NMT 9.448500 MHz.	Check FL4, Q3, Q4, and associated circuit.
	f. Adjust input frequency up until rf voltage at channel A if J4 is 3 dB below level of step d. Note input frequency.	NLT 9.449500 MHz.	Check FL5, Q3, Q4, and associated circuit.
6. 0.5-kHz AM filter measurement	***Note*** This test applies only to 0.5-kHz AM filter (526-9963-020). a. Set front-panel MODE switch to SSB/CW and BANDWIDTH switch to D. ***Note*** If 0.5-kHz filter is in any filter slot other than D, set BANDWIDTH switch to that position. b. Set AGC switch to OFF. c. Set receive input at channel A if J2 for 9.4500 MHz.		
	d. Using an rf voltmeter, measure rf voltage at channel A if J4. Adjust receive input level and frequency for 70-mV peak reading at channel A if J4.	Reference.	
	e. Adjust input frequency down until rf voltage at channel A if J4 is 3 dB below level of step d. Note input frequency.	NMT 9.449750 MHz.	Check FL6, Q5, Q6, and associated circuit.
	f. Adjust input frequency up until rf voltage at channel A if J4 is 3 dB below level of step d. Note input frequency.	NLT 9.450250 MHz.	Check FL6, Q5, Q6, and associated circuit.
6A. 0.5-kHz USB filter measurement (Cont)	***Note*** This test applies only to 0.5-kHz USB filter (526-9974-020). a. Set front-panel MODE switch to SSB/CW and BANDWIDTH switch to D.		

Table 2. Filter, Testing and Troubleshooting Procedures (Cont).

TEST	PROCEDURE	NORMAL INDICATION	IF INDICATION IS ABNORMAL
6.A (Cont)	***Note***		
	If 0.5-kHz filter is in any filter slot other than D, set BANDWIDTH switch to that position.		
	b. Set AGC switch to OFF.		
	c. Set receive input at channel A if J2 for 9.4490 MHz.		
	d. Using an rf voltmeter, measure rf voltage at channel A if J4. Adjust receive input level and frequency for 70-mV peak reading at channel A if J4.	Reference.	
	e. Adjust input frequency down until rf voltage at channel A if J4 is 3 dB below level of step d. Note input frequency.	NMT 9.448750 MHz.	Check FL6, Q5, Q6, and associated circuit.
	f. Adjust input frequency up until rf voltage at channel A if J4 is 3 dB below level of step d. Note input frequency.	NLT 9.449250 MHz.	Check FL6, Q5, Q6, and associated circuit.
7. 0.2-kHz AM filter measurement	***Note***		
	This test applies only to 0.2-kHz AM filter (526-9963-010).		
	a. Set front panel MODE switch to SSB/CW and BANDWIDTH switch to E.		
	Note		
	If 0.2-kHz filter is in any filter slot other than E, set BANDWIDTH switch to that position.		
	b. Set AGC switch to OFF.		
	c. Set receive input at channel A if J2 for 9.4500 MHz.		
	d. Using an rf voltmeter, measure rf voltage at channel A if J4. Adjust receive input level and frequency for a 70-mV peak reading at channel A if J4.	Reference.	
	e. Adjust input frequency down until rf voltage at channel A if J4 is 3 dB below level of step d. Note input frequency.	NMT 9.449900 MHz.	Check FL7, Q7, Q8, and associated circuit.
	f. Adjust input frequency up until rf voltage at channel A if J4 is 3 dB below level of step d. Note input frequency.	NLT 9.450100 MHz.	Check FL7, Q7, Q8, and associated circuit.

Table 2. Filter, Testing and Troubleshooting Procedures (Cont).

TEST	PROCEDURE	NORMAL INDICATION	IF INDICATION IS ABNORMAL
7.A. 0.2-kHz USB filter measurement	**Note** This test applies only to 0.2-kHz USB filter (526-9974-010).		
	a. Set front panel MODE switch to SSB/CW and BANDWIDTH switch to E.		
	Note If 0.2-kHz filter is in any filter slot other than E, set BANDWIDTH switch to that position.		
	b. Set AGC switch to OFF.		
	c. Set receive input at channel A if J2 for 9.4490 MHz.		
	d. Using an rf voltmeter, measure rf voltage at channel A if J4. Adjust receive input level and frequency for a 70-mV peak reading at channel A if J1.	Reference	
	e. Adjust input frequency down until rf voltage at channel A if J4 is 3 dB below level of step d. Note input frequency.	NMT 9.448900 MHz.	Check FL7, Q7, Q8, and associated circuit.
	f. Adjust input frequency up until rf voltage at channel A if J4 is 3 dB below level of step d. Note input frequency.	NLT 9.449100 MHz.	Check FL7, Q7, Q8, and associated circuit.
8. 0.1-kHz AM filter measurement	**Note** This test applies only to 0.1-kHz AM filter (293-1333-010).		
	a. Set front panel MODE switch to SSB/CW and BANDWIDTH switch to E.		
	Note If 0.1-kHz filter is in any filter slot other than E, set BANDWIDTH switch to that position.		
	b. Set AGC switch to OFF.		
	c. Set receive input at channel A if J2 for 9.4500 MHz.		
	d. Using an rf voltmeter, measure rf voltage at channel A if J4. Adjust receive input level and frequency for a 70-mV peak reading at channel A if J4.	Reference.	
(Cont)	e. Adjust input frequency down until rf voltage at channel A if J4 is 3 dB below level of step d. Note input frequency.	NMT 9.449950 MHz.	Check FL7, Q7, Q8, and associated circuit.

Table 2. Filter, Testing and Troubleshooting Procedures (Cont).

TEST	PROCEDURE	NORMAL INDICATION	IF INDICATION IS ABNORMAL
8. (Cont)	f. Adjust input frequency up until rf voltage at channel A if J4 is 3 dB below level of step d. Note input frequency.	NLT 9.450050 MHz.	Check FL7, Q7, Q8, and associated circuit.

c. Set front-panel BANDWIDTH switch to position associated with filter being gain adjusted (refer to table 3).
d. Find a passband response minimum between 9.4493 and 9.4489 MHz at channel A if J4. Measure voltage gain between channel A if J1 and J4; should be 8.2 ±2.0 dB. Select value of gain adjust resistor shown in table 3. (200 through 750 Ω) to give a voltage gain of 8.2 ±2.0 dB.

4.1.2 LSB Filter

a. Connect receive input of 9.4517 MHz to channel A if.
b. Set receive signal to 50 μV (9.4517 MHz). Find a passband response minimum between 9.4507 and 9.4511 MHz at channel A if J4. Measure voltage gain between channel A if J1 and J4. Should be 8.2 ±2.0 dB.
c. Set front-panel BANDWIDTH switch to position associated with filter being gain adjusted (refer to table 3).
d. Find a passband response minimum between 9.4507 and 9.4511 MHz at channel A if J4. Measure voltage gain between channel A if J1 and J4. Should be 8.2 ±2.0 dB. Select value of gain adjust resistor shown in table 3 (330 through 1500 Ω) to give a voltage gain of 8.2 ±2.0 dB.

4.1.3 USB Filters

a. Connect receive input of 9.4490 MHz to channel A if.
b. Set receive signal to 50 μV (9.4490 MHz). Find a passband response minimum between 9.44 and 9.44 MHz at channel A if J4. Should be 8.2 ±2.0 dB. Note this level for reference.
c. Set front panel BANDWIDTH switch to position associated with filter being adjusted (refer to table 3).
d. Find a passband response minimum between 944 and 9.44 MHz at channel A if J4. Measure voltage gain between channel A if J1 and J4. This should be 8.2 ±2.0 dB. Select value of gain adjust resistor shown in table 3 (330 thru 1500 Ω) to give a voltage gain equal to 8.2 ±2.0 dB.

4.2 Filter Passband Measurement

a. Set front-panel MODE switch to SSB/CW and BANDWIDTH switch to position associated with filter having it passband measured (refer to table 3).
b. Set AGC switch to OFF.
c. Set receive input at channel A if J2 for receive if input frequency shown in table 4.

d. Using an rf voltmeter, measure voltage at channel A if J4. Adjust receive input level and frequency for a 70-mV peak reading at channel A if J4. Note this level for reference.
e. Adjust input frequency down until rf voltage at channel A if J4 is 3 dB below level of step d. Note the input frequency. If more than the lower 3 dB frequency of the applicable filter in table 4, select value of associated passband adjust capacitors (refer to table 3) until the lower 3-dB frequency is not more than that listed in table 4.
f. Adjust input frequency up until rf voltage at channel A if J4 is 3 dB below level of step d. Note the input frequency. If less than the upper 3 dB frequency of the applicable filter in table 4, select value of associated passband adjust capacitors (refer to table 3) until the upper 3-dB frequency is not less than that listed in table 4.

4.3 CW Mode Strapping

Input to enable CW mode filter is strapped as required for special applications. If FL8 (16-kHz passband) is to be used, CW mode diode strapping is not required. Refer to table 5 for strap-filter selection for CW mode.

Table 3. Filter Amplifier Gain/Passband Component Selection.

BANDWIDTH SWITCH POSITION	FILTER	GAIN ADJUST	PASSBAND TRIM CAPACITORS
LSB	FL2	R31	C31, C34, C58, C64
A	FL3	R38	C38, C41, C59, C65
B	FL4	R3	C3, C6, C54, C60
C	FL5	R10	C10, C13, C55, C61
D	FL6	R17	C17, C20, C56, C62
E	FL7	R24	C24, C27, C57, C63

Table 4. Filter Passband Frequencies.

FILTER PASSBAND	RECEIVE IF INPUT	LOWER 3 dB (NMT)	UPPER 3 dB (NLT)
LSB 2.7 kHz	9.4517 MHz	9.450250 MHz	9.453000 MHz
AM 6 kHz	9.4500 MHz	9.447000 MHz	9.453000 MHz
AM 3 kHz	9.4500 MHz	9.448500 MHz	9.451500 MHz
AM 1 kHz	9.4500 MHz	9.449500 MHz	9.450500 MHz
USB 1 kHz	9.4490 MHz	9.448500 MHz	9.449500 MHz
AM 0.5 kHz	9.4500 MHz	9.449750 MHz	9.450250 MHz
USB 0.5 kHz	9.4490 MHz	9.448750 MHz	9.449250 MHz
AM 0.2 kHz	9.4500 MHz	9.449900 MHz	9.450100 MHz
USB 0.2 kHz	9.4490 MHz	9.448900 MHz	9.449100 MHz
AM 0.1 kHz	9.4500 MHz	9.449950 MHz	9.450050 MHz

Table 5. CW Mode Strapping.

INPUT	ANODE STRAP	DIODE	CATHODE STRAP	FILTER SELECTED
P8-1	E1	CR11	E2 E3 E4 E5	FL4 FL5 FL6 FL7

5. REPAIR

Repair of the filter card is accomplished using standard maintenance and planar card repair procedures. Refer to the maintenance section of this instruction book for planar card repair procedures.

6. PARTS LIST/DIAGRAMS

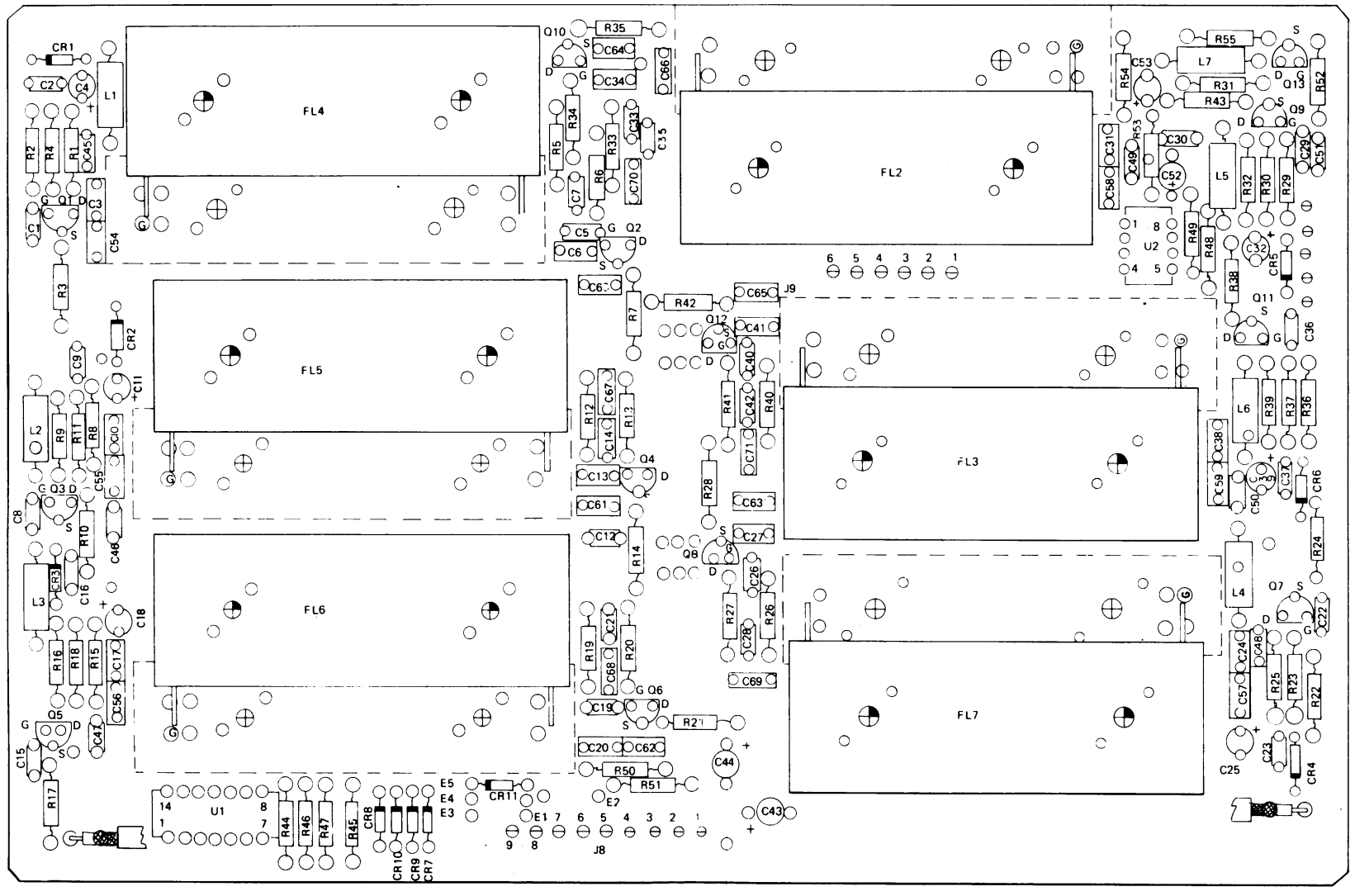
This paragraph assists in identification, requisition, and issuance of parts and in maintenance of the equipment. A parts location illustration, schematic diagram, parts list tabulation, and modification history are included in the schematic diagram (figure 4). The parts location illustration is a design engineering drawing that shows exact component placement on the circuit cards.

Use the reference designator indicated on schematic and parts location diagram to locate parts in the parts list tabulation. The Collins part number and description is listed for each reference designator.

Modifications are identified by an alphanumeric identifier assigned to each design change. These identifiers are referenced in the DESCRIPTION column of the parts list in parentheses and on the schematic diagram inside an arrow that points to the change. Each change relates to the revision identifier (REV) stamped on the circuit card/subassembly and is listed in the EFFECTIVITY column of the modification history.

Listed below are the circuit cards/subassemblies with the latest effectivity covered by these instructions

CIRCUIT CARD/ SUBASSEMBLY	COLLINS PART NUMBER	LATEST EFFECTIVITY
Filter	637-2515-001	REV B
Filter	637-2515-002	REV C
Filter	637-2515-003	REV C
Filter	637-2515-004	REV D
Filter	637-2515-005	REV E
Filter	637-2515-006	REV F
Filter board	635-0905-001	REV—
Filter board	635-0905-002	REV—



Filter, Schematic Diagram
Figure 4 (Sheet 1 of 3)

PARTS LIST

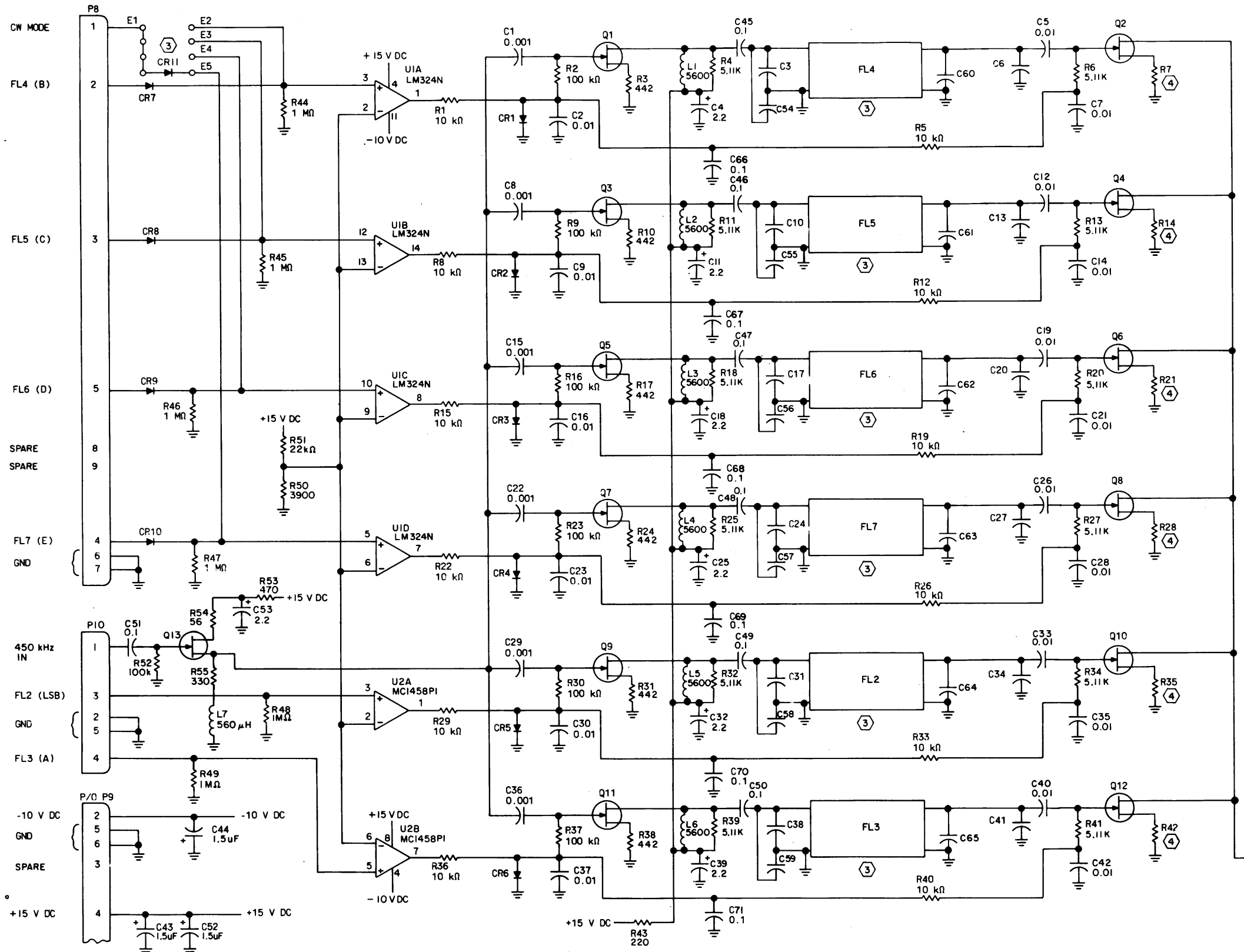
REF DES	DESCRIPTION	COLLINS PART NO	USABLE ON CODE
	FILTER 637-2515-001		A
	FILTER 637-2515-002		B
	FILTER 637-2515-003		C
	FILTER 637-2515-004		D
	FILTER 637-2515-005		E
	FILTER 637-2515-006		F
CR1-CR10	NOT USED		
CR11	SEMICOND DEVICE, 1N4454	353-3644-010	B
C1, C2	NOT USED		
C3	CAPACITOR, FXD, MICA DIEL, 360pF, 5%, 50V	912-4141-500	ACEF
C4, C5	NOT USED		
C6	CAPACITOR, FXD, MICA DIEL, 360pF, 5%, 50V	912-4141-500	ACEF
C7-C9	NOT USED		
C10	CAPACITOR, FXD, MICA DIEL, 110pF, 5%, 50V	912-4141-370	ACEF
C11, C12	NOT USED		
C13	CAPACITOR, FXD, MICA DIEL, 110pF, 5%, 50V	912-4141-370	ACEF
C14-C16	NOT USED		
C17	CAPACITOR, FXD, MICA DIEL, 270pF, 5%, 50V	912-4141-470	AEF
C17	CAPACITOR, FXD, MICA DIEL, 100pF, 5%, 50V	912-4141-050	C
C18, C19	NOT USED		
C20	CAPACITOR, FXD, MICA DIEL, 270pF, 5%, 50V	912-4141-470	AEF
C20	CAPACITOR, FXD, MICA DIEL, 100pF, 5%, 50 V	912-4141-050	C
C21-C23	NOT USED		
C24	CAPACITOR, FXD, MICA DIEL, 180pF, 5%, 50V	912-4141-430	ABCE
C25, C26	NOT USED		
C27	CAPACITOR, FXD, MICA DIEL, 180pF, 5%, 50V	912-4141-430	ABCE
C28-C30	NOT USED		
C31	CAPACITOR, FXD, MICA DIEL, 22pF, ±0.5pF, 300V	912-4141-030	DE
C32, C33	NOT USED		
C34	CAPACITOR, FXD, MICA DIEL, 22pF, ±0.5pF, 300V	912-4141-030	DE
C35-C37	NOT USED		
C38	CAPACITOR, FXD, MICA DIEL, 360 pF, 5%, 50V	912-4141-500	ABCEF
C39, C40	NOT USED		
C41	CAPACITOR, FXD, MICA DIEL, 390pF, 5%, 50V	912-4141-510	ABCEF
C42-C55	NOT USED		
C56	CAPACITOR, FXD, MICA DIEL, 150pF, 5%, 50V	912-4141-400	C
C57, C58	NOT USED		
C59	CAPACITOR, FXD, MICA DIEL, 390pF, 5%, 50V	912-4141-510	ABCEF
C60, C61	NOT USED		
C62	CAPACITOR, FXD, MICA DIEL, 150pF, 5%, 50V	912-4141-400	C
C63-C64	NOT USED		
C65	CAPACITOR, FXD, MICA DIEL, 360pF, 5%, 50V	912-4141-500	ABCEF
FL1	NOT USED		
FL2	FILTER, LSB, 2.7 kHz	526-9956-010	DE
FL3	FILTER, 6kHz AM BANDPASS	526-9963-060	ABCEF
FL4	FILTER, 3kHz AM BANDPASS	526-9963-040	ACEF
FL5	FILTER, 1kHz AM BANDPASS	526-9963-030	AEF
FL5	FILTER, 1kHz USB BANDPASS	526-9974-030	C
FL6	FILTER, 0.5kHz AM BANDPASS	526-9963-020	AEF
FL6	FILTER, 0.5kHz USB BANDPASS	526-9974-020	C
FL7	FILTER, 0.2kHz AM BANDPASS	526-9963-010	AE
FL7	FILTER, 0.2kHz USB BANDPASS	526-9974-010	BC
FL7	FILTER, 0.1kHz AM BANDPASS	293-1333-010	F
R1-R6	NOT USED		
R7	RESISTOR, FXD, CMPSN, 680Ω, 5%, 1/4W	745-0742-000	ACEF
R8-R13	NOT USED		
R14	RESISTOR, FXD, CMPSN, 560Ω, 5%, 1/4W	745-0739-000	AC
R15-R20	NOT USED		
R21	RESISTOR, FXD, CMPSN, 510Ω, 5%, 1/4W	745-0738-000	ACEF
R22-R27	NOT USED		
R28	RESISTOR, FXD, CMPSN, 470Ω, 5%, 1/4W	745-0736-000	ABCEF
R29-R34	NOT USED		
R35	RESISTOR, FXD, CMPSN, 430Ω, 5%, 1/4W	745-0735-000	D
R35	RESISTOR, FXD, CMPSN, 470Ω, 5%, 1/4W	745-0736-000	E
R36-R41	NOT USED		
R42	RESISTOR, FXD, CMPSN, 430Ω, 5%, 1/4W	745-0735-000	ABCEF
	CIRCUIT CARD ASSEMBLY	635-0905-001	ABCEF
	CIRCUIT CARD ASSEMBLY	635-0905-002	D

PARTS LIST (Cont)

REF DES	DESCRIPTION	COLLINS PART NO	USABLE ON CODE
	CIRCUIT CARD ASSEMBLY 635-0905-001		ABCEF
	CIRCUIT CARD ASSEMBLY 635-0905-002		D
CR1-CR4	SEMICOND DEVICE, 1N4454	353-3644-010	ABCEF
CR5	SEMICOND DEVICE, 1N4454	353-3644-010	
CR6-CR10	SEMICOND DEVICE, 1N4454	353-3644-010	ABCEF
C1	CAPACITOR, FXD, CER DIEL, 1000pF, 10%, 100V	913-4018-000	ABCEF
C2	CAPACITOR, FXD, CER DIEL, 0.01μF, 10%, 100V	913-5019-200	ABCEF
C3	NOT USED		
C4	CAPACITOR, FXD, ELCTLT, 2.2μF, 20%, 25V	184-9102-220	ABCEF
C5	CAPACITOR, FXD, CER DIEL, 0.01μF, 10%, 100V	913-5019-200	ABCEF
C6	NOT USED		
C7	CAPACITOR, FXD, CER DIEL, 0.01μF, 10%, 100V	913-5019-200	ABCEF
C8	CAPACITOR, FXD, CER DIEL, 1000pF, 10%, 200V	913-4018-000	ABCEF
C9	CAPACITOR, FXD, CER DIEL, 0.01μF, 10%, 100V	913-5019-200	ABCEF
C10	NOT USED		
C11	CAPACITOR, FXD, ELCTLT, 2.2 μF, 20%, 25V	184-9102-220	ABCEF
C12	CAPACITOR, FXD, CER DIEL, 0.01μF, 10%, 100V	913-5019-200	ABCEF
C13	NOT USED		
C14	CAPACITOR, FXD, CER DIEL, 0.01μF, 10%, 100V	913-5019-200	ABCEF
C15	CAPACITOR, FXD, CER DIEL, 1000pF, 10%, 200V	913-4018-000	ABCEF
C16	CAPACITOR, FXD, CER DIEL, 0.01μF, 10%, 100V	913-5019-200	ABCEF
C17	NOT USED		
C18	CAPACITOR, FXD, ELCTLT, 2.2μF, 20%, 25V	184-9102-220	ABCEF
C19	CAPACITOR, FXD, CER DIEL, 0.01μF, 10%, 100V	913-5019-200	ABCEF
C20	NOT USED		
C21	CAPACITOR, FXD, CER DIEL, 0.01μF, 10%, 100V	913-5019-200	ABCEF
C22	CAPACITOR, FXD, CER DIEL, 1000pF, 10%, 200V	913-4018-000	ABCEF
C23	CAPACITOR, FXD, CER DIEL, 0.01μF, 10%, 100V	913-5019-200	ABCEF
C24	NOT USED		
C25	CAPACITOR, FXD, ELCTLT, 2.2μF, 20%, 25V	184-9102-220	ABCEF
C26	CAPACITOR, FXD, CER DIEL, 0.01μF, 10%, 100V	913-5019-200	ABCEF
C27	NOT USED		
C28	CAPACITOR, FXD, CER DIEL, 0.01μF, 10%, 100V	913-5019-200	ABCEF
C29	CAPACITOR, FXD, CER DIEL, 1000pF, 10%, 200V	914018-000	
C30	CAPACITOR, FXD, CER DIEL, 0.01μF, 10%, 100V	913-5019-200	
C31	NOT USED		
C32	CAPACITOR, FXD, ELCTLT, 2.2μF, 20%, 25V	184-9102-220	
C33	CAPACITOR, FXD, CER DIEL, 0.01μF, 10%, 100V	913-5019-200	
C34	NOT USED		
C35	CAPACITOR, FXD, CER DIEL, 0.01μF, 10%, 100V	913-5019-200	
C36	CAPACITOR, FXD, CER DIEL, 1000pF, 10%, 200V	913-4018-000	ABCEF
C37	CAPACITOR, FXD, CER DIEL, 0.01μF, 10%, 100V	913-5019-200	ABCEF
C38	NOT USED		
C39	CAPACITOR, FXD, ELCTLT, 2.2μF, 20%, 25V	184-9102-220	ABCEF
C40	CAPACITOR, FXD, CER DIEL, 0.01μF, 10%, 100V	913-5014-200	ABCEF
C41	NOT USED		
C42	CAPACITOR, FXD, CER DIEL, 0.01μF, 10%, 100V	913-5019-200	ABCEF
C43, C44	CAPACITOR, FXD, ELCTLT, 1.5μF, 20%, 35V	184-9102-800	
C45-C48	CAPACITOR, FXD, CER DIEL, 0.01μF, 10%, 100V	913-5019-200	ABCEF
C49	CAPACITOR, FXD, CER DIEL, 0.01μF, 10%, 100V	913-5019-200	
C50	CAPACITOR, FXD, CER DIEL, 0.01μF, 10%, 100V	913-5019-200	ABCEF
C51	CAPACITOR, FXD, CER DIEL, 0.01μF, 10%, 100V	913-5019-200	
C52	CAPACITOR, FXD, ELCTLT, 1.5μF, 20%, 35V	184-9102-800	
C53	CAPACITOR, FXD, ELCTLT, 2.2μF, 20%, 25V	184-9102-220	
C54-C65	NOT USED		
C66-C69	CAPACITOR, FXD, CER DIEL, 0.1μF, 10%, 100V	913-5019-440	ABCEF
C70	CAPACITOR, FXD, CER DIEL, 0.1μF, 10%, 100V	913-5019-440	
C71	CAPACITOR, FXD, CER DIEL, 0.1μF, 10%, 100V	913-5019-440	ABCEF
L1-L3	COIL, RF, SHIELDED, 5600μH	637-3767-001	ABCEF
L4	COIL, RF, 5600μH	240-2715-580	ABCEF
L5	COIL, RF, 5600μH	240-2715-580	
L6	COIL, RF, 5600μH	240-2715-580	ABCEF
L7	COIL, RF, 560μH	240-2715-460	
Q1-Q8	TRANSISTOR, FET, SPF557	352-1068-010	ABCEF
Q9, Q10	TRANSISTOR, FET, SPF557	352-1068-010	
Q11, Q12	TRANSISTOR, FET, SPF557	352-1068-010	ABCEF
Q13	TRANSISTOR, FET, SPF557	352-1068-010	
R1	RESISTOR, FXD, CMPSN, 10kΩ, 10%, 1/4W	745-0785-000	AVCEF
R2	RESISTOR, FXD, CMPSN, 100kΩ, 10%, 1/4W	745-0821-000	ABCEF
R3	RESISTOR, FXD, FILM, 442Ω, 1%, 1/8W	705-0979-000	ABCEF
R4	RESISTOR, FXD, FILM, 5.11kΩ, 1%, 1/8W	705-1030-000	ABCEF

PARTS LIST (Cont)

REF DES	DESCRIPTION	COLLINS PART NO	USABLE ON CODE
R5	RESISTOR, FXD, CMPSN, 10kΩ, 10%, 1/4W	745-0785-000	ABCEF
R6	RESISTOR, FXD, FILM, 5.11kΩ, 1%, 1/8W	705-1030-000	ABCEF
R7	NOT USED		
R8	RESISTOR, FXD, CMPSN, 10kΩ, 10%, 1/4W	745-0785-000	ABCEF
R9	RESISTOR, FXD, CMPSN, 100kΩ, 10%, 1/4W	745-0821-000	ABCEF
R10	RESISTOR, FXD, FILM, 442Ω, 1%, 1/8W	705-0979-000	ABCEF
R11	RESISTOR, FXD, FILM, 5.11kΩ, 1%, 1/8W	705-1030-000	ABCEF
R12	RESISTOR, FXD, CMPSN, 10kΩ, 10%, 1/4W	745-0785-000	ABCEF
R13	RESISTOR, FXD, FILM, 5.11kΩ, 1%, 1/8W	705-1030-000	ABCEF
R14	NOT USED		
R15	RESISTOR, FXD, CMPSN, 10kΩ, 10%, 1/4W	745-0785-000	ABCEF
R16	RESISTOR, FXD, CMPSN, 100kΩ, 10%, 1/4W	745-0821-000	ABCEF
R17	RESISTOR, FXD, FILM, 442Ω, 1%, 1/8W	705-0979-000	ABCEF
R18	RESISTOR, FXD, FILM, 5.11kΩ, 1%, 1/8W	705-1030-000	ABCEF
R19	RESISTOR, FXD, CMPSN, 10kΩ, 10%, 1/4W	745-0785-000	ABCEF
R20	RESISTOR, FXD, FILM, 5.11kΩ, 1%, 1/8W	705-1030-000	ABCEF
R21	NOT USED		
R22	RESISTOR, FXD, CMPSN, 10kΩ, 10% 1/4W	745-0785-000	ABCEF
R23	RESISTOR, FXD, CMPSN, 100kΩ, 10%, 1/4W	745-0821-000	ABCEF
R24	RESISTOR, FXD, FILM, 442Ω, 1%, 1/8W	705-0979-000	ABCEF
R25	RESISTOR, FXD, FILM, 5.11kΩ, 1%, 1/8W	705-1030-000	ABCEF
R26	RESISTOR, FXD, CMPSN, 10kΩ, 10%, 1/4W	745-0785-000	ABCEF
R27	RESISTOR, FXD, FILM, 5.11kΩ, 1%, 1/8W	705-1030-000	ABCEF
R28	NOT USED		
R29	RESISTOR, FXD, CMPSN, 10kΩ, 10%, 1/4W	745-0785-000	
R30	RESISTOR, FXD, CMPSN, 100kΩ, 10%, 1/4W	745-0821-000	
R31	RESISTOR, FXD, FILM, 442Ω, 1%, 1/8W	705-0979-000	D
R32	RESISTOR, FXD, FILM, 5.11kΩ, 1%, 1/8W	705-1030-000	
R33	RESISTOR, FXD, CMPSN, 10kΩ, 10%, 1/4W	745-0785-000	
R34	RESISTOR, FXD, FILM, 5.11kΩ, 1%, 1/8W	745-1030-000	
R35	NOT USED		
R36	RESISTOR, FXD, CMPSN, 10kΩ, 10%, 1/4W	745-0785-000	ABCEF
R37	RESISTOR, FXD, CMPSN, 100kΩ, 10%, 1/4W	745-0821-000	ABCEF
R38	RESISTOR, FXD, FILM, 442Ω, 1%, 1/8W	705-0979-000	ABCEF
R39	RESISTOR, FXD, FILM, 5.11kΩ, 1%, 1/8W	705-1030-000	ABCEF
R40	RESISTOR, FXD, CMPSN, 10kΩ, 10%, 1/4W	745-0785-000	ABCEF
R41	RESISTOR, FXD, FILM, 5.11kΩ, 1%, 1/8W	705-1030-000	ABCEF
R42	NOT USED		
R43	RESISTOR, FXD, CMPSN, 220Ω, 10%, 1/4W	745-0725-000	
R44-R47	RESISTOR, FXD, CMPSN, 1MΩ, 10%, 1/4W	745-0857-000	ABCEF
R48, R49	RESISTOR, FXD, CMPSN, 1MΩ, 10%, 1/4W	745-0857-000	
R50	RESISTOR, FXD, CMPSN, 3.9kΩ, 10%, 1/4W	745-0770-000	
R51	RESISTOR, FXD, CMPSN, 22kΩ, 10%, 1/4W	745-0797-000	
R52	RESISTOR, FXD, CMPSN, 100kΩ, 10%, 1/4W	745-0821-000	
R53	RESISTOR, FXD, CMPSN, 470Ω, 10%, 1/4W	745-0737-000	
R54	RESISTOR, FXD, CMPSN, 56Ω, 10%, 1/4W	745-0704-000	
R55	RESISTOR, FXD, CMPSN, 330Ω, 10%, 1/4W	745-0731-000	
U1	INTEGRATED CKT, LM324N	351-1141-030	ABCEF
U2	INTEGRATED CKT, MC1458P1	351-1071-070	



NOTES:

1. UNLESS OTHERWISE SPECIFIED, RESISTANCE VALUES ARE IN OHMS, CAPACITANCE VALUES ARE IN MICROFARADS, DIODES ARE TYPE 1N4454, AND FETS ARE TYPE SPF557
2. PARTIAL REFERENCE DESIGNATORS ARE SHOWN; FOR COMPLETE DESIGNATION, PREFIX WITH UNIT AND/OR ASSEMBLY DESIGNATIONS
3. THE FOLLOWING COMPONENTS ARE PART OF ASSEMBLY 637-2515-XXX
   FL2 FL7
   C3, 6, 10, 13, 17, 20, 24, 27, 31, 34, 38, 41
   C54-65
   R7, 14, 21, 28, 35, 42
   CR11
4. TEST SELECT RESISTOR 637-1468-001 MAY BE USED AS REQUIRED BY PRODUCTION TEST METHOD

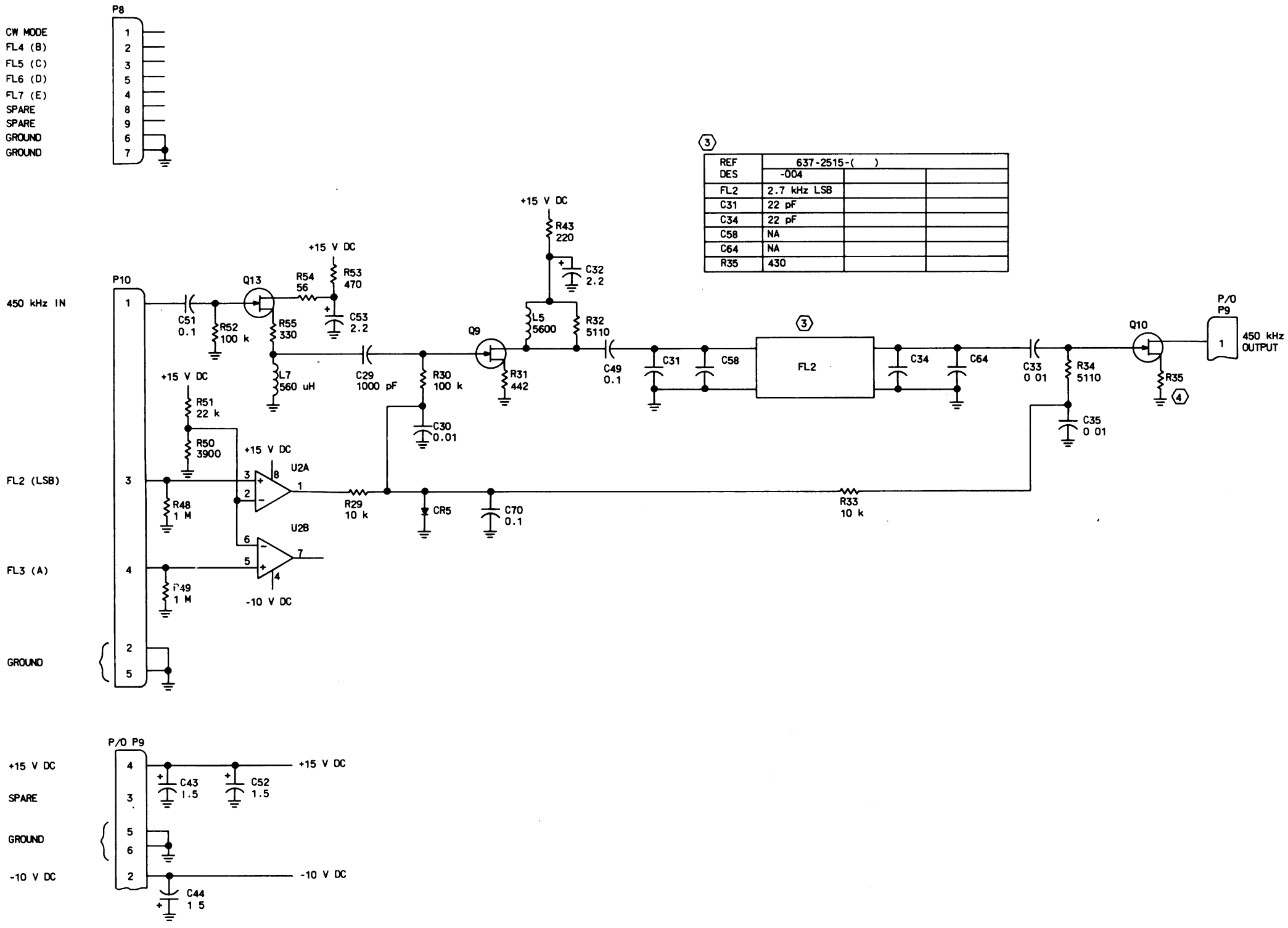
(3)

REF DES	637-2515-( )				
	-001	-002	-003	-005	-006
CR11	NA	E1-E5	NA	NA	NA
FL4	3 kHz AM	NA	3 kHz AM	3 kHz AM	3 kHz AM
C3	360 pF	NA	360 pF	360 pF	360 pF
C6	360 pF	NA	360 pF	360 pF	360 pF
C54	NA	NA	NA	NA	NA
C60	NA	NA	NA	NA	NA
R7	680	NA	680	680	680
FL5	1 kHz AM	NA	NA	1 kHz AM	1 kHz AM
C10	110 pF	NA	NA	110 pF	110 pF
C13	110 pF	NA	NA	110 pF	110 pF
C55	NA	NA	NA	NA	NA
C61	NA	NA	NA	NA	NA
R14	560	NA	NA	560	560
FL6	0.5 kHz AM	NA	NA	0.5 kHz AM	0.5 kHz AM
C17	270 pF	NA	NA	270 pF	270 pF
C20	270 pF	NA	NA	270 pF	270 pF
C56	NA	NA	NA	NA	NA
C62	NA	NA	NA	NA	NA
R21	510	NA	NA	510	510
FL7	0.2 kHz AM	0.2 kHz USB	0.2 kHz USB	0.2 kHz AM	0.1 kHz AM
C24	180 pF	180 pF	180 pF	180 pF	NA
C27	180 pF	180 pF	180 pF	180 pF	NA
C57	NA	NA	NA	NA	NA
C63	NA	NA	NA	NA	NA
R28	470	470	470	470	470
FL2	NA	NA	NA	2.75 kHz LSB	NA
C31	NA	NA	NA	22 pF	NA
C34	NA	NA	NA	22 pF	NA
C58	NA	NA	NA	NA	NA
C64	NA	NA	NA	NA	NA
R35	NA	NA	NA	470	NA
FL3	6 kHz AM	6 kHz AM	6 kHz AM	6 kHz AM	6 kHz AM
C38	360 pF	360 pF	360 pF	360 pF	360 pF
C41	390 pF	390 pF	390 pF	390 pF	390 pF
C59	390 pF	390 pF	390 pF	390 pF	390 pF
C65	360 pF	360 pF	360 pF	360 pF	360 pF
R42	430	430	430	430	430

LAST USED
R55, C71, CR11, U2, Q13, L7

635-0441

Filter, Schematic Diagram
Figure 4 (Sheet 3)



NOTES:

(1) UNLESS OTHERWISE SPECIFIED RESISTANCE VALUES ARE IN OHMS. CAPACITANCE VALUES ARE IN MICROFARADS, DIODES ARE TYPE IN4454, AND FETS ARE TYPE SPF557.

(2) PARTIAL REFERENCE DESIGNATORS ARE SHOWN; FOR COMPLETE DESIGNATION, PREFIX WITH UNIT AND/OR ASSEMBLY DESIGNATIONS

(3) THE FOLLOWING COMPONENTS ARE PART OF ASSEMBLY 637-2515-004.
FL2
C31, 34, 58, 64
R35

(4) TEST SELECT RESISTOR 637-1468-001 MAY BE USED AS REQUIRED BY PRODUCTION TEST METHOD.

(5) THIS DRAWING TO BE USED WITH 635-0905-002 AND ASSEMBLY 637-2515-004.

635-0441

Filter, Schematic Diagram
Figure 4 (Sheet 4)