

Raytheon

Instruction Manual for RAY 152 MF-HF SSB Radiotelephone



TABLE OF CONTENTS

SECTION 1	INTRODUCTION	<u>Page</u>
1.1	GENERAL	1-2
1.2	EQUIPMENT FEATURES	1-3
1.3	SPECIFICATIONS	1-5
	1.3.1 General	1-5
	1.3.2 Transmitter	1-5
	1.3.3 Receiver	1-6
	1.3.4 Radiotelephone Alarm Signal Generator	1-7
	1.3.5 AC 152 Antenna Coupler	1-7
	1.3.6 Dimensions and Weight	1-7
1.4	EQUIPMENT SUPPLIED	1-8
SECTION 2	OPERATION	
2.1	GENERAL	2-1
2.2	CONTROLS AND INDICATORS	2-2
	2.2.1 Noise Cancelling Microphone	2-3
2.3	REAR PANEL	2-11
2.4	OPERATING PROCEDURES	2-13
	2.4.1 Power Up	2-14
	2.4.2 Direct Frequency Entry	2-15
	2.4.3 Memory Station	2-16
	2.4.4 Recall Memory Station	2-17
	2.4.5 Memory Scan	2-17
	2.4.6 ITU Channel	2-17
	2.4.7 Communications	2-18
	2.4.8 Other Keypad Functions	2-19
2.5	ANTENNA COUPLER AC 152	2-22
	2.5.1 Adjustment of The AC 152 Antenna Coupler	2-22

TABLE OF CONTENTS (Cont'd)

SECTION 2	OPERATION	<u>Page</u>
2.6	BASIC RADIOTELEPHONE SERVICE	2-23
	2.6.1 Available Services	2-23
2.7	GETTING ON THE AIR	2-24
2.8	TECHNICAL REQUIREMENTS	2-25
2.9	REGISTERING WITH THE COAST STATION	2-25
2.10	MARINE RADIOTELEPHONE SERVICES	2-25
	2.10.1 VHF Service	2-26
	2.10.2 Coastal Harbor Service (SSB)	2-26
	2.10.3 High Seas Radiotelephone Service	2-26
	2.10.4 How To Place Calls on SSB	2-30
2.11	DISTRESS, URGENCY, AND SAFETY MESSAGES	2-32
	2.11.1 Distress Signal: MAYDAY	2-32
	2.11.2 Urgency Signal: PAN	2-33
	2.11.3 Safety Signal: SECURITY	2-33
2.12	WEATHER BROADCASTS	2-33
2.13	HIGH FREQUENCY PROPAGATION	2-34
2.14	KEEPING THE LOG BOOK	2-39
2.15	PHONETIC ALPHABET	2-39
2.16	SUMMARY	2-40
SECTION 3	INSTALLATION	
3.1	GENERAL	3-1
3.2	MOUNTING THE TRANSCEIVER	3-1
3.3	SELECTING THE ANTENNA LOCATION	3-1
3.4	MOUNTING THE ANTENNA COUPLER	3-16
3.5	ELECTRICAL CONNECTIONS	3-16

TABLE OF CONTENTS (Cont'd)

SECTION 3	INSTALLATION	<u>Page</u>
3.6	RF BONDING	3-17
3.7	ANTENNA LEAD-IN	3-18
3.8	POST INSTALLATION CHECKOUT	3-18
SECTION 4	THEORY OF OPERATION	
4.1	GENERAL	4-1
4.2	FREQUENCY SYNTHESIZER	4-2
4.2.1	REF/DDS Unit (CGK-81R)	4-2
4.2.2	LOOP1 Unit (CGA-145)	4-4
4.3	TRANSCEIVER	4-6
4.3.1	RF TUNE Unit (CFL-244)	4-6
4.3.2	IF FIL Unit (CFH-38R)	4-7
4.3.3	IF AMP Unit (CAE-227)	4-8
4.3.4	PA Unit (CAH-301L-2)	4-10
4.3.5	LPF Unit (CFJ-122-2)	4-10
4.3.6	AF AMP Unit (CBD-894L)	4-11
4.4	CPU UNIT (CDC-493R)	4-12
4.5	DISPLAY UNIT (CDE-617)	4-13
4.6	AC 152 ANTENNA COUPLER	4-14
SECTION 5	MAINTENANCE AND REPAIR	
5.1	GENERAL	5-1
5.2	PERIODIC MAINTENANCE	5-1
5.2.1	Test Equipment	5-1
5.2.2	Test Equipment Interconnection	5-2
5.3	RAY 152 TUNE UP PROCEDURE	5-2
5.3.1	Transmitter Adjustment	5-3

TABLE OF CONTENTS (Cont'd)

SECTION 5	MAINTENANCE AND REPAIR	<u>Page</u>
	5.3.2 Receiver Adjustment	5-6
	5.3.3 Frequency Synthesizer Adjustment	5-7
5.4	TROUBLESHOOTING	5-8
5.5	TROUBLESHOOTING PROCEDURES	5-8
	5.5.1 Power Supply Subsystem	5-9
	5.5.2 Microprocessor and Control Subsystem	5-10
	5.5.3 Synthesizer Subsystem	5-12
	5.5.4 Transmitter Subsystem	5-13
	5.5.5 Receiver Subsystem	5-13
	5.5.6 Antenna Coupler Subsystem	5-14
SECTION 6	DRAWINGS AND PARTS LISTS	
6.1	GENERAL	6-1

LIST OF ILLUSTRATIONS

<u>Figure</u>	<u>Title</u>	<u>Page</u>
1-1	RAY 152 Transceiver	1-1
2-1	Controls and Indicators	2-2
2-2	Noise Cancelling Microphone	2-3
2-3	Rear Panel	2-11
2-4	Keypad Layout	2-14
2-5	Timing of ARQ equipment	2-19
2-6	Effects of Propagation	2-36
2-7	Estimated Expected Distance Vs. Time of Day	2-37
3-1	Typical Installations	3-2
3-2	Whip and/or Backstay Antenna and Counterpoise System for a Sailboat	3-4
3-3	Triatic Backstay Antenna and Counterpoise System for a Sailboat	3-5
3-4	Antenna and Counterpoise System for a Powerboat	3-6
3-5	Antenna and Counterpoise System with a Tuna Tower on Vessel	3-7
3-6	Improper Counterpoise Systems, Workboat	3-8
3-7	Improper Counterpoise Systems, Pleasure Boat	3-9
3-8	Proper And Improper Bonding Schematics	3-10
3-9	Comparison of Antenna Beginning Position	3-11
3-10	Proper Installation with Antenna Coupler at Counterpoise	3-12
3-11	RAY 152 Outline and Mounting Dimensions	3-14
3-12	AC 152 Antenna Coupler Outline and Mounting Dimensions	3-15
3-13	Power Cable Size Versus Length	3-16
3-14	Equipment Connection	3-17
3-15	Checkout Block Diagram	3-19
4-1	DDS Waveforms	4-3
4-2	PLL IC Configuration	4-4
4-3	LOOP 1 PLL Configuration	4-5
4-4	Matching Circuit Type 1	4-14
4-5	Matching Circuit Type 2	4-14
4-6	RAY 152 SSB Radiotelephone Block Diagram	4-15
4-7	RAY 152 Frequency Synthesizer Block Diagram	4-16
5-1	Test Equipment Interconnection	5-2
5-2	Receiver Test Circuit	5-6
5-3	Transmitter Stage Levels	5-15
5-4	Receiver Stage Levels	5-16
6-1	RAY 152 Radiotelephone System Diagram	6-2
6-2	RAY 152 Radiotelephone Assembly Drawing	6-3
6-3	Mother Board (CFQ-2625R) Schematic Diagram	6-4
6-4	RAY 152 Radiotelephone Signal Nomenclature of Units	6-5
6-5	Mother Board (CFQ-2625R) Component Layout	6-6
6-6	RF TUNE Unit (CFL-244) Schematic Diagram	6-10
6-7	RF TUNE Unit (CFL-244) Component Layout	6-11
6-8	IF FIL Unit (CFH-38R) Schematic Diagram	6-19
6-9	IF FIL Unit (CFH-38R) Component Layout	6-20
6-10	IF AMP Unit (CAE-227) Schematic Diagram	6-28
6-11	IF AMP Unit (CAE-227) Component Layout	6-29
6-12	PA Unit (CAH-301L-2) Schematic Diagram	6-38
6-13	PA Unit (CAH-301L-2) Component Layout	6-39
6-14	LPF Unit (CFJ-122-2) Schematic Diagram	6-43

LIST OF ILLUSTRATIONS (Cont'd)

<u>Figure</u>	<u>Title</u>	<u>Page</u>
6-15	LPF Unit (CFJ-122-2) Component Layout	6-44
6-16	REF/DDS Unit (CGK-81R) Schematic Diagram	6-49
6-17	REF/DDS Unit (CGK-81R) Component Layout	6-50
6-18	LOOP 1 Unit (CGA-145) Schematic Diagram	6-57
6-19	LOOP 1 Unit (CGA-145) Component Layout	6-58
6-20	CPU Unit (CDC-493R) Schematic Diagram	6-62
6-21	CPU Unit (CDC-493R) Component Layout	6-63
6-22	AF AMP Unit (CBD-894L) Schematic Diagram	6-67
6-23	AF AMP Unit (CBD-894L) Component Layout	6-68
6-24	Display Unit (CDE-617) Schematic Diagram	6-71
6-25	Display Unit (CDE-617) Component Layout	6-72
6-26	Antenna Coupler (AC 152) Assembly Drawing	6-76
6-27	Antenna Coupler (AC 152) Schematic Diagram	6-77
6-28	Matching Unit (CFG-98) Component Layout	6-78
6-29	Control Cable (CFQ-2858-012) Assembly Drawing	6-84
6-30	RF Cable (CFQ-2859-012) Assembly Drawing	6-86
6-31	Noise Cancelling Microphone Assembly Drawing	6-88

LIST OF TABLES

<u>Table</u>	<u>Title</u>	<u>Page</u>
1-1	RAY 152 Equipment Supplied	1-8
1-2	AC 152 Equipment Supplied	1-8
1-3	Optional Material	1-8
2-1	Accessory Jack Signal Nomenclature and Function	2-12
2-2	Antenna Coupler Tuning Frequency or Channel	2-23
2-3	I.T.U. Channels Vs. Discrete Frequency	2-41
2-4	International Frequency Matrix	2-42
2-5	Frequencies of Interest	2-48
4-1	Band Classification in RF Tuning Circuit	4-6
4-2	BFO and Product Detection Frequencies	4-9
4-3	Filter Selection Code, LPF Unit	4-11
5-1	Transmitter Adjustment	5-3
5-2	Receiver Adjustment	5-7
5-3	Frequency Synthesizer Adjustment	5-7
5-4	RAY 152 System Troubleshooting	5-9
5-5	Power Supply Subsystem Troubleshooting	5-10
5-6	Microprocessor and Control Subsystem Troubleshooting	5-11
5-7	Synthesizer Subsystem Troubleshooting	5-12
5-8	Transmitter Subsystem Troubleshooting	5-13
5-9	Receiver Subsystem Troubleshooting	5-14
5-10	Antenna Coupler Subsystem Troubleshooting	5-14
6-1	Mother Board (CFQ-2625R) Parts List	6-7
6-2	RF TUNE Unit (CFL-244) Parts List	6-12
6-3	IF FIL Unit (CFH-38R) Parts List	6-21
6-4	IF AMP Unit (CAE-227) Parts List	6-30
6-5	PA Unit (CAH-301L-2) Parts List	6-40
6-6	LPF Unit (CFJ-122-2) Parts List	6-45
6-7	REF/DDS Unit (CGK-81R) Parts List	6-51
6-8	LOOP 1 Unit (CGA-145) Parts List	6-59
6-9	CPU Unit (CDC-493R) Parts List	6-64
6-10	AF AMP Unit (CBD-894L) Parts List	6-69
6-11	Display Unit (CDE-617) Parts List	6-73
6-12	Matching Unit (CFG-98) Parts List	6-79
6-13	Control Cable (CFQ-2858-012) Parts List	6-85
6-14	RF Cable (CFQ-2859-012) Parts List	6-87
6-15	Noise Cancelling Microphone Parts List	6-89

SECTION I

INTRODUCTION

Congratulations on your selection of the RAY 152, Raytheon Marine Company's finest low-cost HF-SSB Marine Radiotelephone. We are sure that you will be pleased with the features and reliability of this product.

This manual will provide you with guidance for a proper installation, operation of your RAY 152, and the essential basics of the long range Maritime Radio Service.

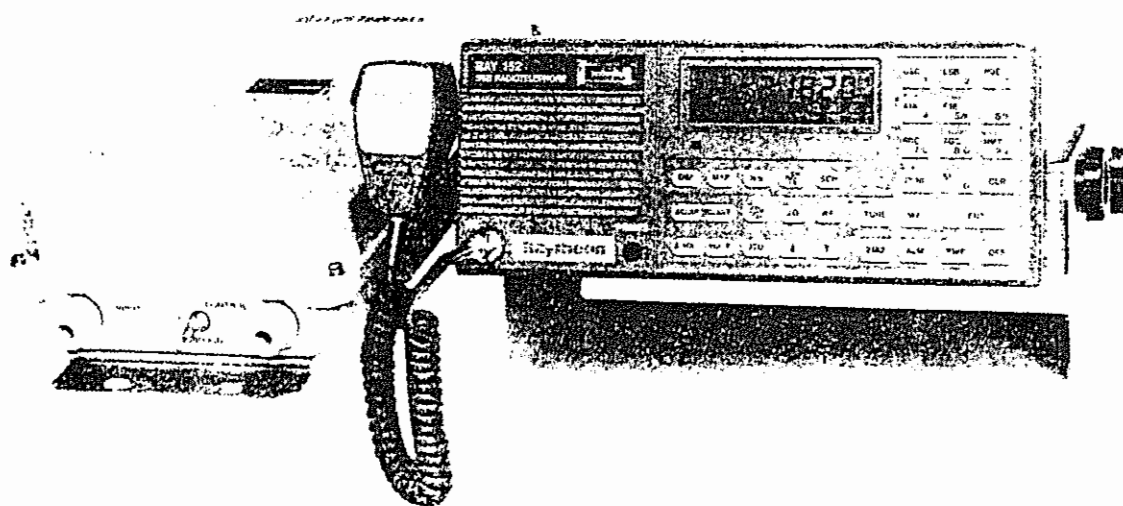


Figure I-1 RAY 152 Transceiver and AC152 Antenna Coupler

Further information on the Single Sideband (SSB) Marine Radiotelephone Service and the "High Seas" distress and emergency radio procedures is available from a variety of publications, your local Power Squadron, and your authorized Raytheon Marine Dealer.

The Marine Radiotelephone Users Handbook gives some very important information on proper procedures and available coast stations. This book is available from; Radio Technical Commission for Maritime Services, P.O. Box 19087, Washington, D.C. 20036. VHF and HF-SSB high seas services are both covered in this book. An additional item to become familiar with, and to have on board, is the Federal Communications Commission Rules and Regulations, part 80, "Stations on Shipboard in the Maritime Services". This is available from the U.S. Government Printing Office or local U.S. Government book stores and some chandlaries.

The FCC requires that an HF-SSB radiotelephone installation be certified by an FCC licensed Service Engineer. This is to ensure that the installation is efficient, providing you with the best possible transmission. Naturally, the radio and antenna system should be periodically checked by an FCC licensed engineer to maintain your best installation. Raytheon Marine recommends that this be done at the beginning of each cruising season.

Should you need accessories, further information, or assistance, please contact your local Raytheon Marine Company authorized service dealer, or Raytheon Marine Company, Product Support Facility. The address is: 1521 So. 92nd Place, Seattle, WA 98108, Tel: (206) 763-7500. We will gladly help you select one of our worldwide network of servicing dealers.

1.1 GENERAL

The RAY 152 is an all solid state 150W Peak Envelope Power (PEP) synthesized SSB radiotelephone which continuously covers the frequency range of 1.6 to 29.9999 MHz for transmission, 0.1 to 29.9999MHz for reception in 100Hz steps. Features include direct frequency entry of 200 user memory "stations", 195 International Telecommunications Union (ITU) Marine channels, and discrete frequency. The RAY 152 features the back lighted soft-touch keypad operation of all functions including volume control and clarifier adjustment.

The RAY 152 has the internationally specified Radiotelephone Alarm Signal Generator built in for operation on the distress frequency (2182 kHz). The back lighted Liquid Crystal Display (LCD) displays mode, operating parameters, frequency, ITU number, memory "station" number, and clarifier setting.

The AC 152 Antenna Coupler provides efficient coupling of the RAY 152 output to common types of antennas for best possible signal radiation. The AC 152 provides the necessary impedance matching between the RAY 152 and an unbalanced antenna (end-fed, whip, or long wire). Tuning is automatically performed within approximately 5 seconds for "learn" cycle or 50 milliseconds for preset tune. After tuning, the coupler data for each frequency is stored in the memory. The weather proof design permits most convenient installations for the RAY 152.

1.2 EQUIPMENT FEATURES

- **150W PEP Continuous Output:** The newly developed cooling system and all solid state circuitry ensure the continuous transmission, low current drain, minimum heat dissipation, and maximum reliability.
- **0.1 - 29.9999 MHz synthesized frequency range** is continuously covered in 100 Hz steps by Direct Digital Synthesizer (DDS) and Phase Locked Loop (PLL) oscillators controlled by a high stability, precision, oven compensated crystal reference oscillator.
- **Soft Touch Keypad Construction:** The RAY 152 features a back lighted soft-touch keypad. All functions, including volume control, clarifier adjustment, receiver sensitivity adjustment are operated from the keypad.
- **195 ITU Channels and 200 User Memory "Stations":** In addition to the direct frequency entry from the keypad, 200 memories, which can be freely programmed and erased by the user, and 195 ITU Marine fixed channels are available. The 200 "station" memory is retained by a battery with a 5 year design life. The 195 ITU channels are in permanent memory.
- **ARQ Communication:** The newly developed cooling system and DDS circuit enable the ARQ (SITOR) communication.
- **Remote Control:** All functions (except power on/off) can be remotely controlled by installing the optional RS-232C unit.
- **Noise Blanker:** The noise blanker circuit eliminates ignition noise or wood pecker noise for comfortable reception.
- **Scanning:** Of the 200 user memory "stations", channels number 1 through 10 can be scanned. The dwell time on each channel is set from the keypad in a time range of 0.1 to 16 seconds. (Less than 10 channels can be scanned.)
- **LCD Display:** Operating conditions, including the selected frequency, are displayed on the Liquid Crystal Display. The two step automatic back ground illumination clearly shows the LCD in the dark, and allows level selection for best viewing.
- **Check Meter:** The check meter indicates the receiving signal strength, source voltage, collector current of final transistors, and antenna current.
- **Two Microprocessors:** A main CPU controls the entire transceiver while a sub CPU control the panel functions.
- **Quick Selection of 2182 kHz:** When the 2182 button is pressed, the transceiver is immediately set to the International Distress and Calling Frequency of 2182 kHz.

- Radiotelephone Alarm Generator: The alarm signal generator function operates on the distress frequency (2182 kHz) specified by international treaties. The alarm automatically shuts off after approximately 45 seconds, or is manually turned off by activation of the PTT switch or any front panel touch key, except "PWR" and "OFF".
- Mode Select: J3E, H3E, A1A, F1B: Transmission and reception of J3E (USB), H3E (USB), A1A, and F1B is possible. J3E (LSB) can also be received. (Transmit is inhibited on U.S.A. model.)
- Simplex or Semi-Duplex operation with memory stations, direct frequency entry, and ITU channels.
- Digital Clarifier: The clarifier selection is in 10 Hz steps, indicated on the LCD during operation.
- Automatic Antenna Coupler: The AC 152 Automatic Antenna Coupler provides best possible signal radiation, automatic preset tuning on frequencies tuned.
- Rear panel accessory connector for audio, keyline, and control line.

1.3 SPECIFICATIONS

1.3.1 General

1. Operating Frequency Range: Transmit; 1.6 to 29.9999 MHz (Marine).
Receive ; 0.1 to 29.9999 MHz.
2. Number of Channels: Has ability to store and recall 200 memory stations (which can be written, recalled and erased from the keypad) and all 195 ITU Marine channels.
3. Frequency Stability: Better than ± 10 Hz (after 10 minute warm-up)
4. Transmission/Reception Switching Time: 15 ms or less.
5. Frequency Increments: 100 Hz.
6. Channel Selection: Keypad entry.
7. Modes of Emission: J3E(USB), H3E(USB), A1A, F1B
J3E(LSB) for reception only in U.S.A.
8. Scanning: Memory "station" No. 1 through 10. Dwell time keypad selectable.
9. Display: LCD.
10. Temperature Range: -30°C to $+60^{\circ}\text{C}$ (-22°F to $+140^{\circ}\text{F}$).
11. Transmitter Control: Push-To-Talk microphone, external BK.
12. Antenna Impedance: 50 ohms nominal.
13. Power Requirements: 13.6 Vdc $\pm 15\%$, Negative Ground, 30A (transmit), 2A (receive), Oven ON.
14. Magnetic Compass Distance: It is recommended that radio be located at least 1.5 meters away from a magnetic compass.

1.3.2 Transmitter

1. Power Output: 150W PEP at antenna terminal (with source input connector terminal voltage at 13.6 Vdc).
2. Duty Cycle: Continuous.

3. Carrier Suppression: J3E: 40 dB or more below PEP.
H3E: 3 to 6 dB below PEP.
4. Opposite Sideband Suppression: 60 dB or more.
5. Intermodulation: 3rd order -30 dB or less below mean power.
5th order -30 dB or less below mean power.
7th order -35 dB or less below mean power.
9th order -35 dB or less below mean power.
(at 50 ohms load and rated output).
6. Spurious Radiation: -65 dB or less below PEP.
7. Audio Response: Within 6 dB from 400-2500 Hz.
8. Microphone Input: 600 ohms, Dynamic Microphone.
9. Line Input: 0 dBm, 600 ohms.

1.3.3 Receiver

1. Receiving Type: Triple superheterodyne.
2. Intermediate Frequency: 70.455 MHz, 455 kHz, 98 kHz.
3. Sensitivity: J3E, A1A, F1B: 0.5 μ V or less.
H3E : 1.7 μ V or less.
at 10 dB S+N/N, 500 mW output.
4. Selectivity: J3E, A1A, F1B: -6 dB 2.1 kHz or more.
-60 dB within 6 kHz.
H3E : -6 dB 5.4 kHz or more.
-40 dB within 18 kHz.
Narrow band filter (1 kHz or 0.5 kHz) is available
for A1A and F1B mode. (Option)
5. Spurious Response: 70 dB or more.
6. AGC: Less than 10dB output variation for 20-110 dBu
antenna input change.
7. Maximum Output: 3W at 4 ohms load with less than 10% distortion.
8. Clarifier Range: ± 200 Hz in 10 Hz steps.
9. Squelch: AGC detecting.
10. Line Output: 600 ohms, 0 dBm.

1.3.4 Radiotelephone Alarm Signal Generator

1. Signal Frequency: 1300 Hz and 2200 Hz.
2. Frequency Deviation: Within $\pm 1.5\%$.
3. Signal length: 250 ms ± 10 ms.
4. Signal Switching Time: 4 ms or less.
5. Signal Amplitude Ratio: 1:1.2 or less.
6. Transmission Time: 30 to 60 seconds (Nominal 45 seconds).
7. Emission H3E.

1.3.5 AC 152 Antenna Coupler

1. Frequency Range: 1.6 to 30 MHz.
2. Memory Channels: Frequency range of 1.6 to 30 MHz is divided into 1972 channels.
3. Input Power: 200 Watts PEP Maximum.
4. Matching SWR: VSWR 1:1.5 or less.
5. Matching Range: Resistance: 5 ohms to 1 kohm.
Capacitance: More than 150 pF.
6. Tuning Time: 5 Seconds Typical.
50 ms for Preset Channel.
7. Power Requirement: 13.6/24 Vdc, 1.5A Maximum.
8. Temperature: -20°C to $+60^{\circ}\text{C}$.

1.3.6 Dimensions and Weight

	Width	Height	Depth	Weight
1. Radiotelephone:	13 in. (330 mm)	5.1 in. (130 mm)	14.6 in. (371 mm)	23.1 lb (10.5 kg)
2. Antenna Coupler:	9.1 in. (230 mm)	14.9 in. (380 mm)	3.5 in. (90 mm)	7.7 lb (3.5 kg)

1.4 EQUIPMENT SUPPLIED

The RAY 152 SSB Radiotelephone and AC 152 Antenna Coupler consist of the following components and accessories:

Table 1-1 RAY 152 Equipment Supplied

Equipment	Part Number	Quantity
RAY 152 SSB Radiotelephone	M56757	1
Microphone	6UMJD00019	1
Microphone Hanger	G263116-2	1
Power Cable Assembly (2m long)	6ZCJD00106A	1
Instruction Manual	6ZPJD00031	1
Bridge Card	6ZPJD00032	1
Spares: Fuse, 20A	5ZFEX00005	4
Accessories: Accessory Connector	5JJJCJ00010	1
Connector Hood	5JJJCJ00013	1
External Speaker Plug	G263056-1	1
Wood Screw	6.2 X 25	4
Washer, Flat	W6	4

Table 1-2 AC 152 Equipment Supplied

Equipment	Part Number	Quantity
AC 152 Antenna Coupler	M56760	1
Control Cable Assembly (12m long)	CFQ-2858-012	1
RF Cable Assembly (12m long)	CFQ-2859-012	1
Accessories: Terminal	1.25-3	2
Terminal	2-3	2
Terminal	5.5-3	2
Wood Screw	6.2 X 25	2
Washer, Flat	W6	2

Table 1-3 Optional Material

Equipment	Part Number	Quantity
Coupler Control Cable (Bulk, order by the foot)	2699000028	(per foot)
Coupler Control Connector	5JJJCJ00008	(ea)
Coupler Control Connector Hood	5JJJCJ00011	(ea)
Coax Cable	1037186-1	(per foot)
PL-259 Coax Connector	276-7177P1	(ea)
UG/176-U Coax Connector Adapter	276-7179P2	(ea)
RAY 152 Service Kit	NJZ-667	(ea)
Extender PCBs		
Test Cables, etc.		

SECTION 2

OPERATION

2.1 GENERAL

Your RAY 152 SSB Radiotelephone is designed to operate on marine frequencies between 1,605 and 23,000 kHz. The radio should be operated only by an operator who is completely familiar with operating procedures, frequencies, and mode selection for use on the marine bands, and thoroughly familiar with the Federal Communications Commission (FCC) Rules and Regulations, Part 80 for Maritime Radio. An updated copy of the FCC Rules and Regulations is to be on board and a valid FCC ship station license containing authorization for the MF (1600 - 4000 kHz) and HF (4000 - 23,000 kHz) SSB Radiotelephone Bands. If the station license does not include these frequencies, you must apply for a modification to your license. Your local Raytheon Marine dealer will be glad to assist you. License forms are available from the local FCC field office or from the FCC in Washington D.C.. The proper and lawful operation of the equipment is the sole responsibility of the licensee.

The Marine Radiotelephone Users Handbook, is available from Radio Technical Commission For Maritime Services, Post Office Box 19087, Washington, D.C., 20036. This publication gives the operator many helpful hints and information on both VHF and HF SSB communications. Becoming familiar with the regulations and operating procedures will enable you to obtain the maximum utility from your RAY 152 SSB Radiotelephone.

A brief explanation of HF long range communication and propagation characteristics and sample information on a public coast station are contained at the end of this section.

Please be sure to observe the 3 minute silence period on 2182 kHz at the hour and half hour. This requirement is to enable even the weakest distress call to be heard by ship and coast stations.

Please avoid radio checks on 2182 kHz. Other vessels and public coast stations will give you a radio check on other working frequencies.

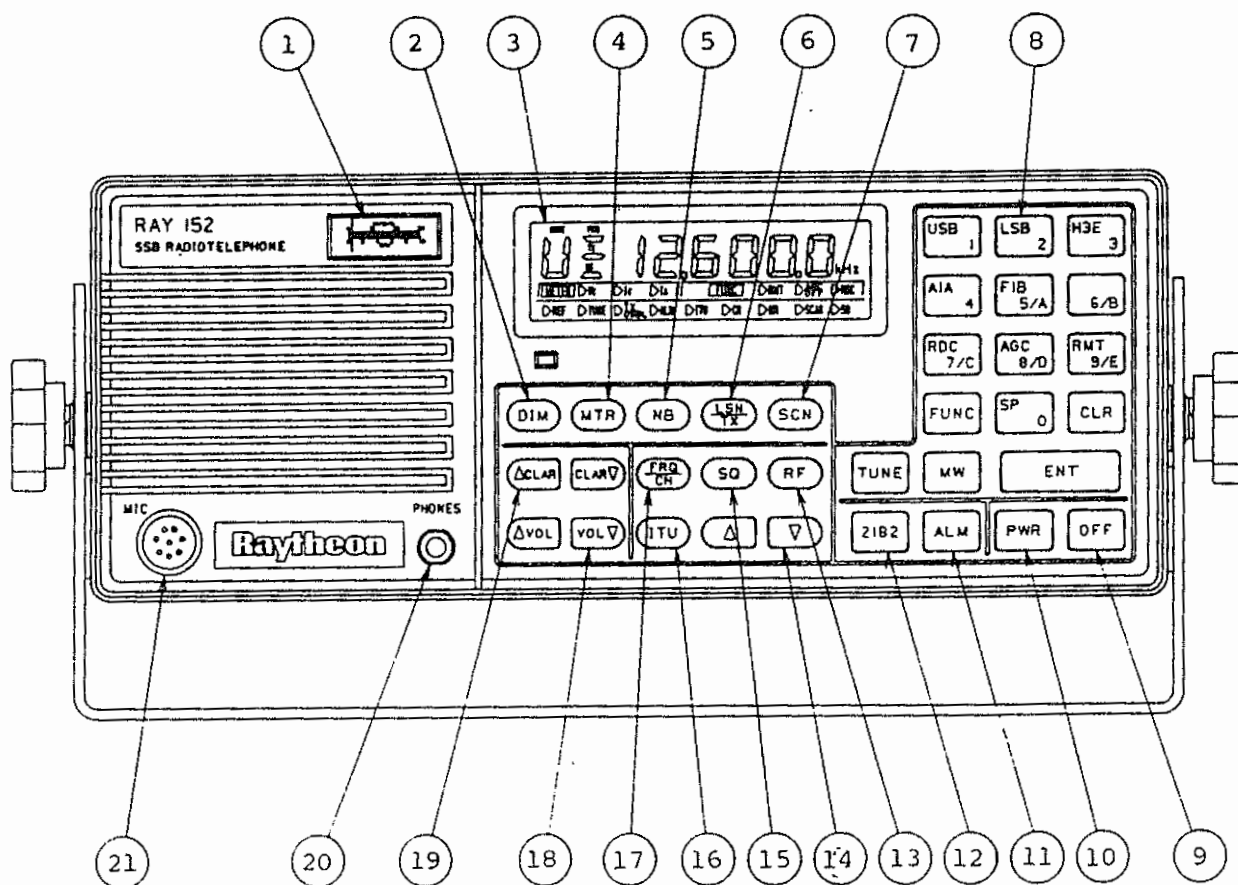


Figure 2-1 Controls and Indicators

2.2.1 Noise Cancelling Microphone

A selectable noise cancelling microphone is supplied as standard equipment with your RAY 152. This microphone is equipped with two elements; one for normal operation and the other for noise cancelling characteristics. Either the normal or noise cancelling feature can be selected by use of a slide switch on the rear of the microphone. The position marked OFF is for normal operation and ON for noise cancellation.

The noise cancelling feature is used to markedly reduce background noise (other voices, engine noise, wind, etc.). By reducing this extraneous noise, the clarity of your signal is increased. The normal mode is used in quiet surroundings and will give the best reproduction of your voice.

The best transmitted signals are obtained when you speak directly into the microphone from a distance of one to two inches from your lips. Do not shout but speak in a clear, firm, distinct voice.

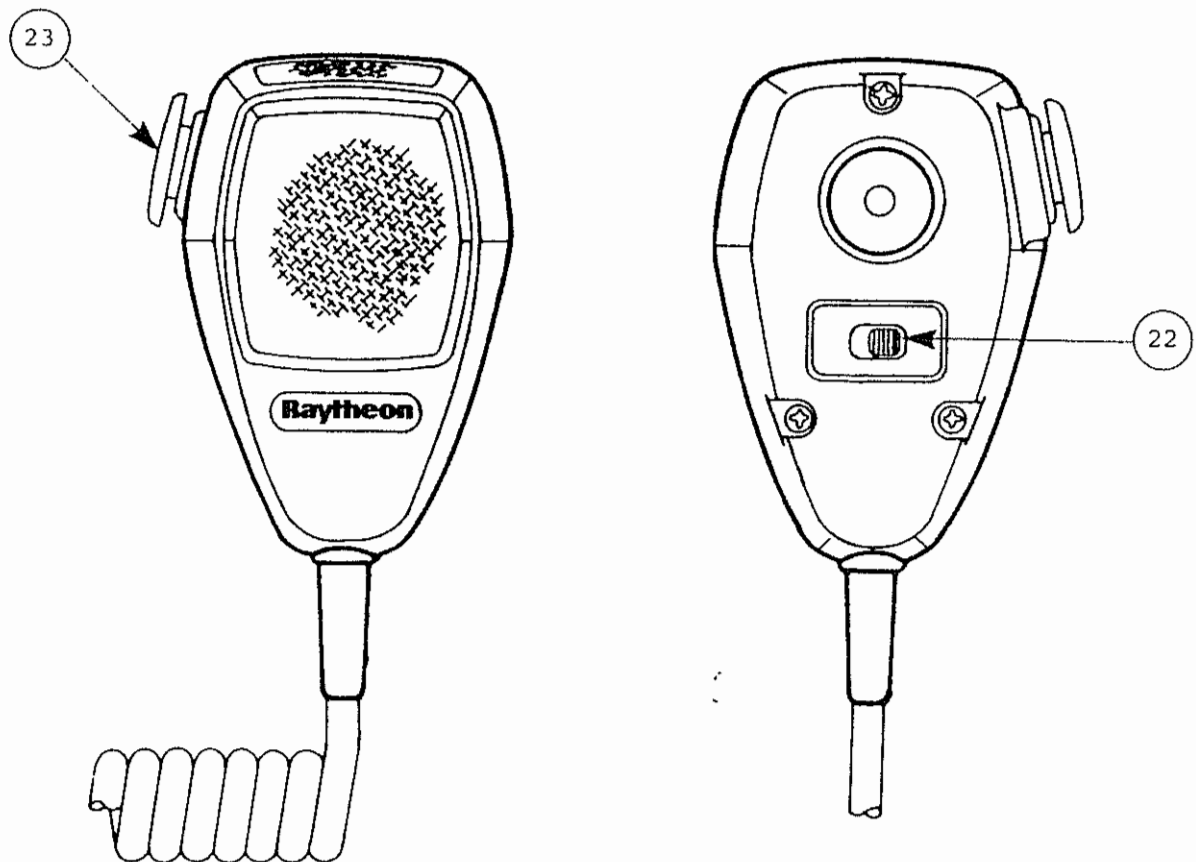


Figure 2-2 Noise Cancelling Microphone

(1) Check Meter

In reception, the meter indicates the signal strength, or S. In transmission it indicates one of the operating conditions, Vc, Ic, or Ia. The indicating parameter is shown on the LCD.

(2) DIM

Varies the brightness of the backlighting in steps. (i.e.), OFF, dim, bright, OFF. The backlighting is automatically controlled according to the environmental brightness.

(3) LCD

The LCD indicator displays the following parameters:

- a. **Digits** Indicates the frequency, ITU, or Memory "station" number selected.
- b. **FRQ** Indicates that the numbers shown in the numerical display describe the frequency.
- c. **TX** Indicates that the numbers displayed describe the transmit frequency.
- d. **RX** Indicates that the numbers displayed describe the receive frequency.
- e. **MODE** Indicates the mode of emission:
 - U = J3E-USB - SSB for U.S.A.
 - L = J3E-LSB - Receive only for U.S.A.
(Amateur Bands)
 - H = H3E - AM Compatible
 - A = A1A - Morse telegraph
The audio tone frequency demodulated is 800 Hz.
 - F = F1B - Narrow-band direct-printing.
The FSK center frequency is 1700 Hz
- f. **METER**
 - ▶ **Vc** Indicates that the check meter shows the collector-voltage of the power amplifier. Full scale is 30V.
 - ▶ **Ic** Indicates that the check meter shows the collector-current of the power amplifier. Full scale is 30A.
 - ▶ **IA** Indicates that the check meter shows the antenna current. Full scale is 10A when the antenna coupler is connected. Otherwise, full scale is 3A.
- g. **FUNC** Indicates that the **FUNC** key is pressed and the ten-key is ready to enter the second function. (i.e.), mode select, power reduction, AGC On-Off, remote control etc..
- h. **RMT** Indicates that the radio is in the remotely controlled mode. For this mode, the optional RS-232C unit is required.

- i.  AGC OFF Indicates that the receiver AGC is off.
- j.  RDC Indicates that the transmit power is reduced to approximately 50W pep.
- k.  REF Indicates that the transmit power is abnormally reflected.
- l.  TUNE Indicates that the Antenna Coupler Tuning Function has been activated and is in process.
- m.  TX DSBL Indicates that the frequency chosen and/or mode is one that is inhibited from transmission.
- n.  ALM Indicates that the Radiotelephone Alarm Generator is in operation.
- o.  ITU Indicates that the transceiver is in the ITU channel selection mode.
- p.  CH Indicates that the numbers shown describe the ITU channel number or memory "statin" number.
- q.  MR Indicates that the transceiver is operating on a memory frequency and mode.
- r.  SCAN Indicates that the radio is in scanning mode.
- s.  SQ Indicates that the squelch function is activated. Flickering indicates that the speaker is off.

(4) MTR

Cyclically selects one of the transmitter operating conditions to be indicated on the check meter: Vc, Ic, or Ia.

(5) NB

Activates the noise blanker circuit which eliminates the ignition noise or woodpecker noise. Cyclically selects the following mode.

- * NB 0 - Noise blanker Off
- * NB 1 - Noise blanker On for noise type 1
- * NB 2 - Noise blanker On for noise type 2

(6) LSN/TX

The push-on/push-off switch, used by the operator prior to calling a coast station, to listen for other ships calling on the transmit frequency of a duplex channel. This allows the operator to monitor the frequency and thus prevent his interfering with other ships in the process of calling the coast station.

(7) **SCAN**

Activates the RAY 152 scanning mode. This control is used to scan the "station" channels 1 through 10. If a channel is unprogrammed, it will be bypassed. The dwell time on each channel can be set between 0.1 to 16 seconds by entering the following keystrokes:

5 (second) **SCAN** or
0 **1** (0.1 second) **SCAN**

If a new dwell time is not entered, the dwell time will be that previously entered.

The scan function can be stopped by either of the following:

- * Press the **SCAN** key.
- * Press the **PTT** button on the microphone.
- * Press the **2182** key.

When the **LSN/TX** key is pressed during scanning, the transmit frequency of the duplex channels being scanned will be monitored.

(8) Keypad

- a. **0** - **9** Numerical entry for frequency, "station", or ITU channel number.
- b. **A** - **E** Ship-to-Ship Simplex channel entry key for ITU category. When used in conjunction with the **ITU** key, the channel letter is automatically entered. (i.e., 8b).
- c. **ENT** Enters the keypad selection.
- d. **CLR** Clears a keypad entry made in error.
- e. **MW** Memory Write stores the entered frequency in a selected memory "station" number. To erase the information in a "station", press station Number, then **MW** and **CLR** simultaneously.
- f. **FUNC** Activates the second-functions indicated on the upper left of the tenkey.

To set the emission mode, enter the following keystrokes:

- * **FUNC** **USB** - Selects USB mode
- * **FUNC** **LSB** - Selects LSB mode
- * **FUNC** **H3E** - Selects H3E mode
- * **FUNC** **A1A** - Selects A1A mode
- * **FUNC** **F1B** - Selects F1B mode

The selected mode is indicated on the LCD.

Similarly, power reduction On-Off, AGC On-Off, remote control On-Off, or speaker On-Off function is alternately controlled by entering the following keystrokes:

- * **FUNC** **RDC** - Power reduction On-Off
- * **FUNC** **AGC** - AGC On-Off
- * **FUNC** **RMT** - Remote control On-Off
- * **FUNC** **SP** - Speaker On-Off

The condition is also indicated on the LCD.

g. **TUNE** Activates automatic tuning of the AC 152 Antenna Coupler.

(9) **OFF**

When depressed simultaneously with the **PWR** button, power is turned off.

(10) **PWR**

When pressed, power is turned on.

(11) **ALM**

NOTE

The following function is to be used ONLY in the event of an emergency aboard your vessel requiring immediate attention of the USCG and other ships (per the FCC Rules and Regulations and International agreements).

Simultaneous pressing of the **ALM** and **2182** keys activates the alarm signal. The radio is automatically programmed to the 2182 kHz H3E mode and an alarm signal is transmitted for approximately 45 seconds. This tone transmission can be stopped by depressing the PTT switch on the microphone, pressing any key on the keypad except **PWR** or **OFF**, or by disconnecting the power to the radio. When **ALM** is pressed alone, the equipment is in a test mode, and the alarm signal is monitored through the speaker.

(12) **2182**

Pressing this key immediately places the transceiver on the simplex international calling and safety frequency of 2182 kHz, J3E-USB Mode.

(13) **RF**

When pressed, the receiver RF gain level (0 - 100) is displayed on the LCD.

To control the RF gain level, or receiver sensitivity, press the **▲** or **▼** key while the RF gain level is displayed.

When the key is released, the LCD display reverts to the previously displayed information.

(14) ▲ ▼ ▲Increase, ▼Decrease.

- a. Direct Frequency Mode (See 2.4.2).

Pressing this key increases or decreases the frequency indicated on the LCD in 100 Hz steps. The frequency steps continuously when the key is held.

- b. Memory "Station" Mode (See 2.4.3).

- 1) With the Memory "station" frequency displayed on the LCD:

When these keys are pressed, the radio reverts to the direct frequency Mode and the frequency is increased or decreased in 100 Hz steps while displaying the frequency on the LCD.

- 2) With the Memory "Station" number displayed on the LCD:

Pressing these keys increments or decrements the memory "stations" while displaying the memory "stations" numbers on the LCD. The "stations" step continuously when the key is held.

- c. ITU Channel Mode (See 2.4.6).

- 1) With the ITU Channel frequency displayed on the LCD:

Pressing these keys increments or decrements the ITU channels while displaying the frequency on the LCD. The channels step continuously when the key is held.

- 2) With the ITU Channel displayed on the LCD:

Pressing these keys increments or decrements the ITU channels with the channel numbers displayed on the LCD. The channels step continuously when the key is held.

NOTE

When the procedures above are performed with the receiving frequency displayed, the receive frequency is changed but the transmit frequency remains the same. Conversely, if the transmit frequency is displayed, the transmit frequency changes and the receive frequency remains unchanged.

- d. In combination with the **RF** key:

Pressing these keys increments or decrements the RF gain level while the RF gain level is displayed on the LCD.

When the key is released, the LCD reverts to the previously displayed information.

- c. In combination with the **SQ** key:

Pressing these keys increments or decrements the squelch level while the squelch level is displayed on the LCD.

When the key is released, the LCD reverts to the previously displayed information.

(15) **SQ**

When pressed, the squelch level (0 - 100) is displayed on the LCD.

To adjust the squelch threshold level, press the **▲** or **▼** key while the squelch level is displayed.

When the key is released, the LCD display reverts to the previously displayed information.

(16) **ITU**

Performs switching between the memory "station" mode and the ITU channel mode.

- a. ITU Channel Displayed: When the **ITU** key is pressed during operation in the ITU mode, the previously selected memory station channel is selected and the number is displayed.
- b. Memory "Station" is displayed: When the **ITU** key is pressed during operation in the memory "station" mode, the previously selected ITU channel is selected and the ITU channel number is displayed.
- c. Direct Frequency Mode: When the **ITU** key is pressed during operation in the direct frequency mode, the previously selected ITU channel is selected and the ITU channel number is displayed.

(17) **FRQ/CH**

Causes alternate display of frequency and ITU channel or memory "station" number on the LCD. This key is inoperative in the direct frequency mode.

(18) **▲VOL** **VOL▼**

Increases or decreases audio volume to the speaker. Adjustable to the operators preference. Press and hold for desired level.

(19) **▲CLAR** **CLAR▼**

Increases or decreases the received frequency in 10 Hz steps to a maximum of ± 200 Hz.

The clarifier is used to adjust for maximum clarity of the received SSB signal. The LCD indicates the clarifier frequency when the key is pressed. The frequency changes as long as the key is pressed. When the key is released, the frequency display reverts to the previously displayed information.

(20) PHONES

This jack is used to connect headphones to the transceiver. When the headphone plug is inserted, both the external and internal speakers are muted.

(21) MIC

Connector for attachment of the supplied microphone.

(22) Microphone Selector Switch

Allows selection of normal (OFF) or noise cancelling mode (ON) for use in noisy areas.

(23) Microphone PTT Switch

To key the transmitter, press and hold the PTT switch. Speak into the microphone to transmit a message. Release to receive a reply or to monitor.

2.3 REAR PANEL

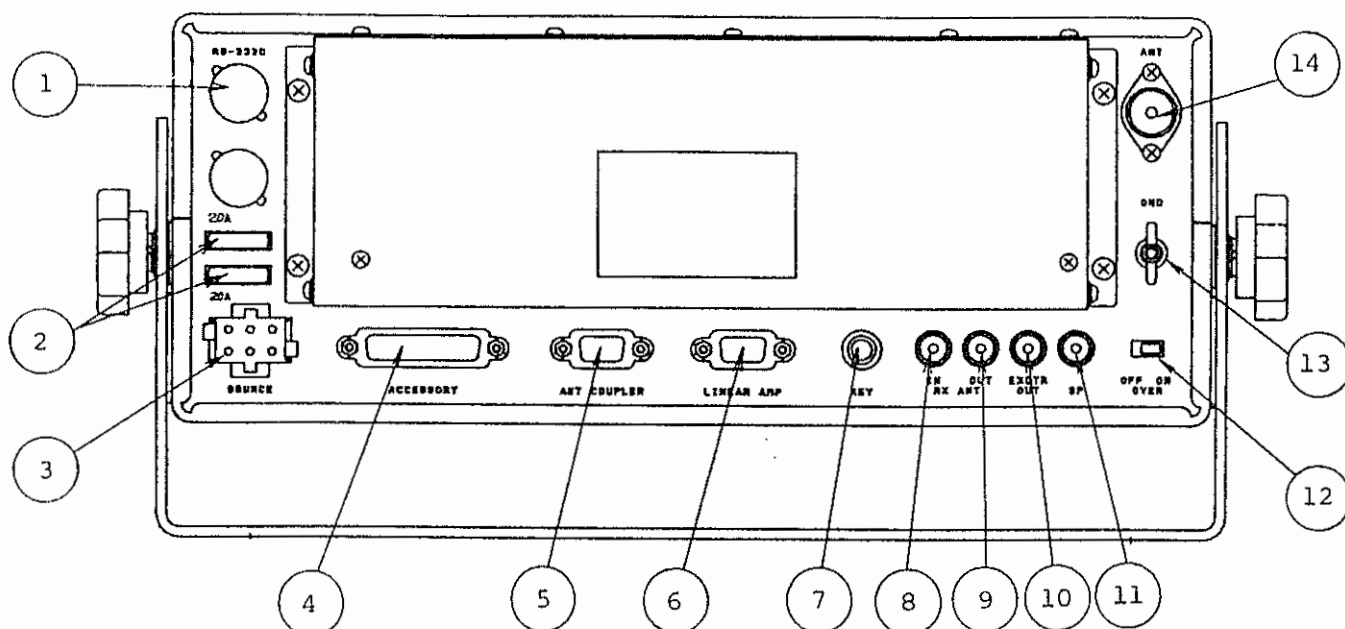


Figure 2-3 Rear Panel

1.	RS-232C	This connector is mounted when the optional RS-232C unit is installed. It is used to control the RAY 152 remotely by the RS-232C signal.
2.	Fuse	Two 20A-fuses are used in parallel.
3.	SOURCE	This is the connection to ship's power source (13.6 Vdc) using the 2 meter power cable supplied. The positive (+) terminal of the battery is connected to pins 1 and 2, and the negative (-) terminal is connected to pins 4 and 5.
4.	ACCESSORY	This connector can be used to connect an external peripheral accessory to the RAY 152. Pin numbers, Signal nomenclature, and functions are given in table 2-1.
5.	ANT COUPLER	This connector is used to connect the control cable from the AC 152 Antenna Coupler to the RAY 152.
6.	LINEAR AMP	This connector is used to connect the control cable from a linear amplifier.
7.	KEY	Morse key jack. When operating in AIA mode, connect a Morse key to this jack.

8.	RX ANT IN	Antenna input for the RAY 152 receiver. When using two antenna (for transmit and receive), connect the receiving antenna to this jack.
9.	RX ANT OUT	Antenna output for an external receiver. When connected, the RAY 152 antenna is switched to an external receiver.
10.	EXCTR OUT	Exciter output connector. A maximum of 0.5 Vrms is available to a 50 ohm load.
11.	SP	External speaker jack. When an external speaker is connected, the internal speaker is disconnected. A maximum of 3 Watts is available to a 4 ohm load.
12.	OVEN ON/OFF	This switch control the power to the internal crystal oven for the synthesizer reference oscillator. When the switch is ON, power is always supplied to the oven to ensure stable frequency operation at turn on. When OFF, at least ten minutes warm-up time should be allowed, on power-up, for the frequency to stabilize before operating the radio.
13.	GND	This stud provides a convenient method of connecting the chassis of the radio to the ship's grounding system.
14.	ANT	Provides the coaxial connection for the antenna cable. Mates to a PL-259 UHF Coax Connector.

Table 2-1 Accessory Jack Signal Nomenclature and Function

Pin No.	Signal Nomenclature	Function
1.	-BK	When this pin is grounded, the transmitter is enabled.
2.	<u>RX BK</u>	When this pin is grounded, the receiver is disabled.
3.	<u>SEL BK</u>	When this pin is grounded, the transmitter is enabled in H3E mode. It is used for selective calling system.
4.	READY	Opened when the radio is ready for transmit. Grounded when the radio is in scanning and antenna coupler tuning.
5.	E	Chassis ground.
6.	P/S SENS	Opened in the RAY 152.
7.	AF IN	Audio input to drive the speaker. It is used to monitor an external receiver signal through the RAY 152 speaker.
8.	LINE OUT 1	600 ohms, 0 dBm squelched receiver output. This is not affected by the volume control.

Table 2-1 Accessory Jack Signal Nomenclature and Function (cont'd)

Pin No.	Signal Nomenclature	Function
9.	LINE OUT 2	600 ohms, 0 dBm unsquelched receiver output. This is not affected by the volume control.
10.	E	Chassis ground.
11.	-	
12.	-	
13.	MIC MUTE	When +5 V to 13.6 V is applied, the microphone modulation is inhibited.
14.	13.6V	Power source for external accessories. Maximum of 1A.
15.	E	Chassis ground.
16.	LINE IN 1	Line input for 600 ohms, 0 dBm transmitting modulation.
17.	LINE IN 2	Line input for 600 ohms, 0 dBm transmitting modulation.
18.	CARBON MIC	Modulating input for carbon microphone.
19.	-	
20.	-	
21.	E	Chassis ground.
22.	SP	External speaker output. Maximum output of 3W at 4 ohms.
23.	SPE	External speaker return.
24.	SCAN HOLD	When this pin is grounded, the scanning is interrupted.
25.	E	Chassis ground.

2.4 OPERATING PROCEDURES

Your RAY 152 operation is described in three basic configuration categories; Direct Frequency, Memory "Station" Channel, and ITU Channel. The following procedures will walk you through the four operating categories of your RAY 152 SSB Radiotelephone.

- I. Direct Frequency Entry: Note that ITU and CH indicators are OFF, RX enabled, and a frequency is displayed. See para. 2.4.2.
- II. Memory "Station": Depress **ITU** key to extinguish the ITU indicator. Select desired memory station number (1 to 200) and press **ENT**. See para. 2.4.3.
- IIA. Memory Scan: Enter the dwell time, then press **SCAN**. See para. 2.4.5.
- III. ITU Channel: Can be entered from Direct Frequency or Memory "Station" by depressing the **ITU** key then selecting the channel number and press **ENT**. See para. 2.4.6.

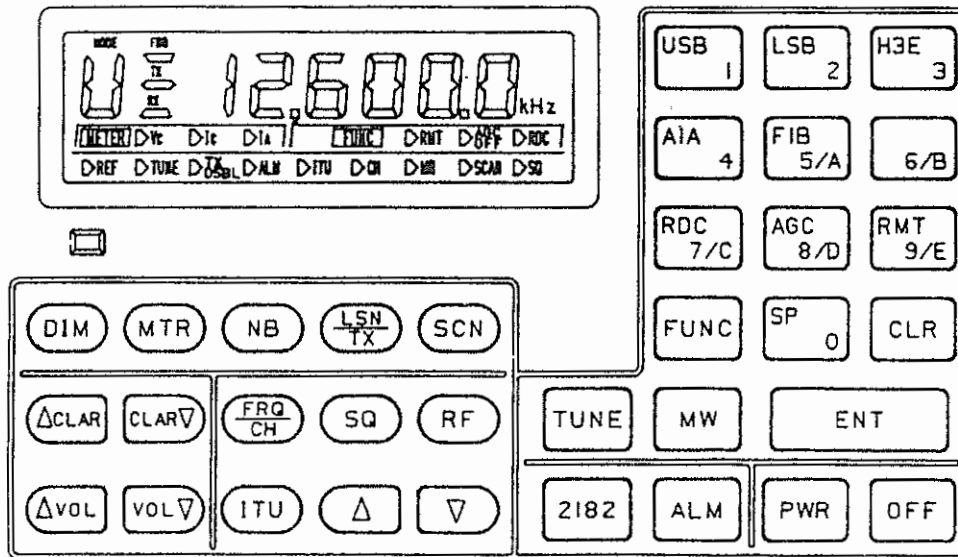


Figure 2-4 Keypad Layout

2.4.1 Power Up

The radio is turned on by pressing the **PWR** button. Adjust the **VOL** up or down for a comfortable listening level. The radio will automatically set up to the last frequency used before turn off. Adjust the **SQ** threshold level to enable the squelch circuit. This will automatically mute undesirable received background noise. After making your frequency, memory, or ITU channel selection, press **TUNE** before commencing operation. The AC 152 will automatically pretune to the frequencies previously tuned.

2.4.2 Direct Frequency Entry

In direct frequency selection, the operating frequency is set directly from the keypad, and the memory station channel frequencies are entered, changed, or deleted.

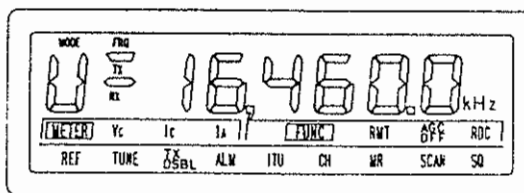
To enter frequencies, be sure that the radio is not in the ITU channel number displayed mode. If the radio is in that mode, press **ITU** or **FRQ/CH** to return to the memory "station" or frequency displayed mode. Then enter the required frequencies as in the following example:

Confirm the proper modulation mode for the frequency selected. U (Upper Sideband J3E) is the normal mode for marine communications. The displayed frequency is changed in 100 Hz steps by pressing the **▲** or **▼** button. See para. 2.2.1-(14).

Example A: The first frequency to be entered is the TX (Transmit) as called for in the LCD. Notice the indicator bar under the TX legend.

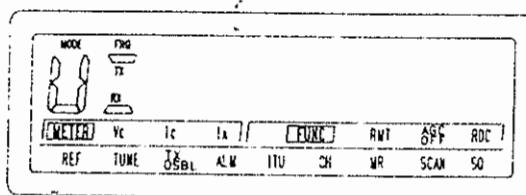
Enter the frequency desired:
e.g., 16,460.0 kHz.

Press **1** **6** **4** **6** **0** **0** **ENT**



NOTE

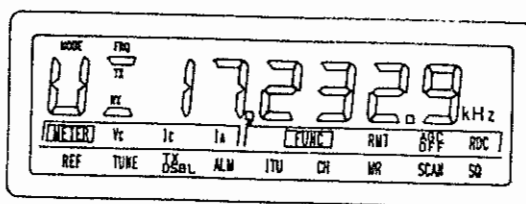
The indicator bar will now be under the RX legend. If you desire to receive on the same frequency (simplex) press **ENT** again. The LCD display shows that frequency and the radio is now ready for operation. Confirm that the proper mode of modulation (Mode) is displayed. U (USB) is the normal mode for marine communications.



The LCD readout blanks as soon as the **ENT** button is pressed to enter the TX frequency. Now the readout will call for the RX (Receive) frequency to be entered.

e.g., 17,232.9 kHz

Press **1** **7** **2** **3** **2** **9** **ENT**



Press the **FUNC** "MODE" key to select the desired mode of operation. e.g., press **FUNC** **USB** to choose the J3E mode which is the normal mode used for marine communications.

2.4.3 Memory Station

This category provides you with 200 memory locations which can be programmed with special or commonly used frequencies. In addition, the first 10 locations can be automatically scanned. For this category, be sure that the MR indicator is on and the ITU indicator is off. This is accomplished by pressing the **ITU** when the radio is in the ITU mode.

2.4.3.1 Memory Write (Station)

This function programs the selected station memory location with the current frequency selected and displayed. Enter the desired memory location then press and hold the **MW** key until the LCD returns to normal.

For example, if the station is currently on 17,232.9 kHz, and you wish to enter this in memory location 12, press **1** **2**. Then press and hold **MW** until the frequency readout reappears in the LCD.

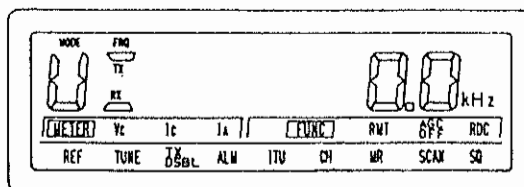
When memorizing the frequency for the RECEIVE ONLY channel, enter the desired memory location, press the **FUNC** key, then press and hold the **MW** key until the LCD returns to normal. In this case, the "TX" sign appears on the LCD.

DSBL

2.4.3.2 Memory Clear (Station)

This function allows any memory location to be erased by using the following procedure.

- Select the memory location; e.g., 11, press **1** **1**.
- Press the **CLR** and **MW** keys simultaneously.
- The memory location is cleared when "0.0 kHz" is displayed.



2.4.4 Recall Memory Station

To recall a station memory for use, select the number of the desired station, then press **[ENT]**; e.g., to recall memory station Channel 11, press **[1] [1] [ENT]**. The station frequency programmed appears on the LCD. If you desire to see the memory station number, press **[FRQ/CH]**. You can step up or down through the memory stations by pressing the appropriate **[▲]** or **[▼]** keys next to the **[FRQ/CH]** key. The memory number is shown on the LCD. See para 2.2.1-(14).

NOTE

If a frequency is being displayed and an attempt is made to step the frequency up or down, or to change the operating mode, the radio automatically reverts to the Direct Frequency Mode.

2.4.5 Memory Scan

This feature automatically scans the station memory locations 1 through 10. The scanning time on each station can be selected in the range of 0.1 to 16 seconds. Less than ten memory stations can be scanned by erasing the unwanted locations by following the Memory Clear procedures in para. 2.4.3.2.

To enable scan, press **[SCAN]**. To select the scan time, press the desired time digit, i.e., 5 for 5 seconds, 03 for 0.3 seconds, before pressing **[SCAN]**. For example, **[5] [SCAN]** or **[0] [3] [SCAN]**. If the time is not selected, the previously entered time is selected. To exit scan, Press any of **[2182]**, **[SCAN]**, or the PTT button on the microphone.

2.4.6 ITU Channel

This category permits instant recall of the 195 ITU channels permanently programmed in the RAY 152 for easy access. The valid ITU channels are:

DUPLEX

4:01 to 4:27
6:01 to 6:08
8:01 to 8:33
12:01 to 12:35
16:01 to 16:44
22:01 to 22:45

SIMPLEX (Ship-to-Ship)

4:A to 4:C
6:A to 6:C
8:A to 8:B
12:A to 12:C
16:A to 16:C
22:A to 22:E

To enter an ITU Channel:

Press the **ITU** key to enter the ITU Channel configuration. Confirm that the ITU indicator on the LCD is on.

Select the desired channel number by using the alpha-numeric keys on the keyboard.

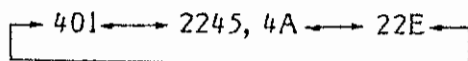
For example, **4** **I** **0** or **4** **A**

Press **ENT**

The radio will immediately be set on the selected channel with the correct modulation mode.

When an ITU channel has been entered, the LCD will display the channel number. To observe the discrete frequency of that channel, press the **FRQ/CH** key. You can monitor the ITU ship transmit frequency so that you can avoid interfering with someone else already calling. To do this, press **LSN/TX** and note the TX bar on the LCD telling you that the receiver is monitoring the transmit frequency of the selected ITU channel.

ITU channels can be stepped up or down by pressing the **▲** or **▼** key after entering the ITU channel as described above. Whichever display has been chosen at the time (ITU Channel or frequency) will continue to be displayed as the stepping takes place. The display is stepped in the following order:



An entry of an ITU Channel into any memory station Channel (1 to 200 or 1 to 10 for scanning capabilities), can easily be made by the following procedure:

- Select the desired ITU channel as outlined above.
- Press the **FRQ/CH** key to obtain the frequency display.
- Program the desired memory station by selecting the desired number, press and hold **MW**. For example, to enter information into station 26, press **2** **6** **MW** and hold. The display will show the frequency of the ITU RX channel. To see the ITU channel number, press **FRQ/CH**.

2.4.7 Communications

- Voice communication

Connect the microphone to the MIC connector on the front panel. When the button on the microphone is pressed, the transmitter operates, while it is released, the receiver operates. Such communication system is called "Press-To-Talk" system.

In the press-to-talk system, you cannot receive any signal from the partner station while transmitting. Therefore, you should release the press button immediately in order to receive the signal from the partner station when your transmission is over.

b. A1A (CW) Communication

Insert a Morse key to the KEY jack on the rear panel. By pressing the key, the transmitter automatically starts to operate. When the key is released, the receiver operates immediately. The transmitting Morse code can be monitored from the speaker.

c. F1B (ARQ) Communication

For ARQ (SITOR) communication, an external ARQ equipment is required. Connect the RAY 152 and an ARQ equipment as shown in Figure 6-1. The necessary timing of ARQ equipment is as follows:

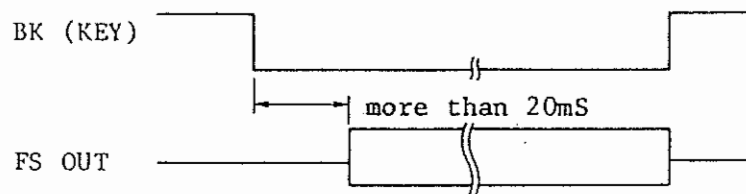


Figure 2-5 Timing of ARQ equipment

2.4.8 Other Keypad Functions

a. **[CLAR]**

The clarifier compensates for minor frequency differences between the other stations transmit frequency and the RAY 152 receive frequency. This control is used to vary the tone of the received signal for clear and easy recognition reducing the SSB communications syndrome commonly referred to as "Donald-Duck - Minnie Mouse" voice.

b. **[NB]**

The Noise Blanker circuit eliminates the impulsive noise to enable the comfortable reception. Pressing this key cyclically selects three modes; NB-0 (Off), NB-1 (for ignition noise), NB-2 (for woodpecker noise).

c. **[SQ]**

Indicates the squelch level (0 - 100) on the LCD. To activate or deactivate the squelch function, adjust the threshold level with **[▲]** or **[▼]** key while the squelch level is displayed. The larger number activates this function, the smaller number deactivates.

d. **[RF]**

Indicates the RF gain level (0-100) on the LCD. When the receiving signal is enough strong, reducing the receiver sensitivity enables the comfortable reception. In this case, press **[▼]** key to reduce the sensitivity while the RF gain level is displayed. To return the receiver full sensitivity, press **[▲]** key while the RF gain level is displayed.

e. **TUNE**

Activates the automatic sequence of the optional companion AC 152 automatic antenna coupler. This must be activated before communicating on each direct frequency entry or for the first time on 2182 kHz, Memory Stations, and ITU channels.

f. **RDC**

Pressing **FUNC** **RDC** keys alternately switches the transmitter power output reduction On-Off. When the power output is reduced, the "►RDC" sign appears on the LCD. The reduced power is approximately 50W pep.

g. **AGC**

Pressing **FUNC** **AGC** keys alternately switches the AGC function On-Off. When the AGC is Off, the "►AGC OFF" sign appears on the LCD.

h. **RMT**

Pressing **FUNC** **RMT** keys alternately switches the remotely-controlled function On-Off. When the remotely-controlled mode is On, the "►RMT" sign appears on the LCD, and the all keyboard functions except **PWR** and **OFF** keys can be externally controlled. For this function, the optional RS-232C unit CMH-741 is required. Further information is described in the instruction manual for the RS-232C unit.

i. **SP**

Pressing **FUNC** **SP** keys alternately switches the speaker On-Off. When the speaker is Off, the "►SQ" sign flickers.

j. **2182**

This key instantly sets the radio on the calling and safety frequency of 2182 kHz.

k. **ALM**

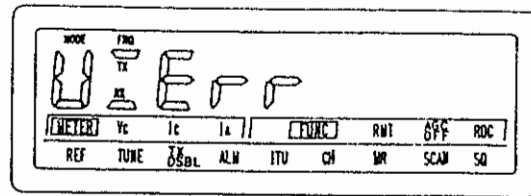
When pressed simultaneously with the **2182** key, the International Radiotelephone Alarm Signal is automatically transmitted. This attracts the attention of the local rescue agencies and large ships. THIS SHALL BE USED ONLY IN A DIRE EMERGENCY!

l. Entry Correction

If an error is made in a keypad selection of a numeral, press the **CLR** key and reenter the correct figure(s).

m. Error Display

An error display will appear for a second in the LCD if any of the following occur:



- (i) A non-existent ITU Channel Number is entered. (Err 1)
- (ii) The frequency or memory station number entered is not in the range of the RAY 152. (Err 2)
- (iii) The scan time entered is not in the range. (Err 3)
- (iv) The remote control mode is designated when the optional RS-232C unit CMH-741 is not installed. (Err 4)
- (v) The memory station number to be stored is not in the range. (Err 5)
- (vi) A non-existent user definable function is designated. (Err 6)

n. User Definable Functions

The following key operation defines the convenient functions of the RAY 152.

- (i) **[FUNC] [6] [1]** -- Beep On-Off

Alternately switches the beep function On-Off which sounds a short audio tone whenever a key entry has been accepted.

Even when the beep is On, the beep tone does not sound in the following cases:

- * **[VOL]** or **[CLAR]** level is not at the upper or lower limit.
- * **[▲]** or **[▼]** key has been pressed continuously.

Even when the beep is Off, the beep tone sounds in the following cases:

- * An Error has occurred.
- * **[VOL]** or **[CLAR]** level is at the upper or lower limit.
- * Memory write has completed.

- (ii) **[FUNC] [6] [2]** -- Receiver Initial Set

Makes the receiver initial as follows:

- * Speaker -- On
- * RF gain level -- Maximum (100)
- * Squelch level -- Minimum (0)
- * Volume level -- Center
- * AGC -- On

(iii) **[FUNC] [6] [3]** -- Frequency Follow On-Off

Alternately switches the frequency follow On-Off. When On, the pair frequencies (transmit and receive frequencies) are always the same difference even if the one of the frequencies is stepped up or down.

2.5 ANTENNA COUPLER AC 152

If the antenna to be used does not have a characteristic impedance of 50 ohms at the desired operating frequencies, it is necessary to use the AC 152 Antenna Coupler. With this coupler, a whip antenna (longer than 7 meters) or a long wire antenna (up to 20 meters) can be used.

A microprocessor in the AC 152 Antenna Coupler controls the relay switching of antenna matching elements to find the best match at the desired operating frequency. When this match has been found, the data is automatically entered in the memory allocated in certain frequency steps. The memory allocation vs frequency is as follows:

Frequency	Memory Allocation
1600 - 3001 kHz	9 kHz steps
3002 - 4002 kHz	15 kHz steps
4003 - 10003 kHz	30 kHz steps
10004 - 20004 kHz	60 kHz steps
20005 - 29999 kHz	150 kHz steps

Upon selection of any of those frequencies, the optimum match is instantly selected. If an antenna has been replaced or a previously untuned frequency range is entered, tuning must be performed. If a satisfactory match is not accomplished, transmission is permitted. Output power, however, will automatically be reduced by the APC to prevent damage to the Power Amplifier.

2.5.1 Adjustment of the AC 152 Antenna Coupler

The data describing the combination of matching elements in the coupler is recalled from a memory address corresponding to the frequency selected on the RAY 152 Radiotelephone.

During the initial set up of the equipment, automatic tuning must be accomplished for the channels shown in Table 2-2. For example, automatic tuning must be performed for 2182 kHz, all programmed Station Channels 1 through 200, ITU channels 405, 414, 424 etc.. In the Direct Frequency category, automatic tuning must be performed if the frequency is untuned.

To adjust the automatic tuning of the Antenna Coupler, press **[TUNE]**. The bar in the LCD beside "TUNE" will appear. When the bar disappears, the tuning is complete and communication can commence.

Table 2-2 Antenna Coupler Tuning Frequency or Channel

Frequency or Channel				Remarks
2182 kHz				When frequency is within the previously tuned memory allocation, tune will immediately complete.
Memory Station No. 1				
To				
Memory Station No. 200				
ITU	one of	405 -	407	
	one of	414 -	417	
	one of	424 -	426	
		4C		
	one of	602 -	605	
		6C		
	one of	804 -	806	
	one of	814 -	816	
	one of	823 -	826	
		833		
	one of	1206 -	1211	
	one of	1225 -	1231	
	one of	1603 -	1608	
	one of	1622 -	1628	
	one of	1635 -	1640	
	one of	2203 -	2218	
	one of	2235 -	2245	

2.6 BASIC RADIOTELEPHONE SERVICE

This section briefly describes some of the SSB radiotelephone services available. Those services usable by a particular radiotelephone depend on its operating characteristics and frequency coverage.

HF-SSB Radiotelephone communications capability provides the mariner with the important benefits of safety and convenience. With a HF-SSB Radiotelephone it is possible to make radio contact with a Coast Guard station or other vessel within the range of your equipment.

2.6.1 Available Services

- Safety: Emergency services, search and rescue, navigational warnings, weather reports, etc.
- Ship to Ship: Vessel activities, fleet coordination, etc.
- Ship to Shore: This category has two parts which are divided by the functions of the service:

a. Public Correspondence:

This service provides a connection to the public telephone network. This connection is made by using the services of a public coast station. The public coast station charges for the service they provide.

b. Limited Coast:

This service is only for the business and operational aspects of the vessel. Direct contact between a vessel and the shoreside operations center, or someone providing a service to the vessel is permitted. Generally this is oil companies or large shipping companies, and is used for vessel repair, maintenance, supply and provisioning, and route scheduling.

2.7 GETTING ON THE AIR

(Your authorized Raytheon Marine Dealer will be glad to assist you).

In the USA, before a vessel can lawfully transmit any message, with or without the assistance of a Marine or High Seas Telephone Operator, certain licensing requirements must be met. To use the frequencies discussed in this section, the FCC (Federal Communications Commission) requires that the following be on board:

1. A valid ship's radiotelephone station license.
2. A licensed radiotelephone operator.
3. A radiotelephone log book.
4. An operating, licensed, VHF-FM Marine Radio.
5. An updated copy of FCC Rules and Regulations, Volume IV, Part 80.
6. The licensed station must be under the direct control of the licensee or his appointed representative (Captain of the vessel).

FCC regulations prohibit the use of profane language and establish other reasonable controls. All persons aboard your vessel who will be using the licensed station equipment must be thoroughly familiar with the equipment and with proper operating and emergency procedures, and depending on the class of the vessel, may be requested to hold a valid FCC Operators License.

The radiotelephone service may be likened to a huge "party line" so keep your contacts brief so that all may have an equal opportunity to transmit and receive messages. Further instructions may be obtained from your local power squadron, your local Raytheon Marine Dealer, or from the RTCM publication referenced in para. 1.0.

2.8 TECHNICAL REQUIREMENTS

The coast public correspondence stations are operated by FCC licensed commercial carriers. They do not rent, lease or sell radiotelephone equipment for use aboard ship. Such equipment is owned or leased and maintained by the boat owner or, in some cases, by a maritime radio operating company. The selection, installation, and maintenance of a shipboard radio station is highly technical and should be entrusted only to an FCC licensed, reliable marine radio service engineering concern.

The owners operating requirements and area will determine the type of marine radiotelephone service and installation needed. Transmitters must meet the requirements set forth in the regulations applicable in the country in which the vessel is registered. Vessels of United States registry must conform to the regulations of the FCC.

2.9 REGISTERING WITH THE COAST STATION

If regular use of Public Marine Radiotelephone Service is planned, it is important to register with the owner of the coast station serving the primary area of operation. Registration with the Independent and AT&T stations is free. It provides the coast station with billing information for calls and saves the communications time it takes to pass this information for each call. Ship stations equipped for selective signaling must register in order to obtain assignment of a radiotelephone ringer number.

There is no monthly charge for maintaining an account. Billing is made for each marine call and for any long distance or overseas charges where they apply. Information on these charges is available, in advance, from the Marine or High Seas Operator. Should you need time and charges, advise the operator of this before the call is connected. Operators cannot honor requests for time and charges after the call is completed. On all Bell System and AT&T marine services, messages to or from any boat may be placed prepaid, collect, or as credit card calls.

NOTE

Keep the companies informed of any changes that affect the registration.

2.10 MARINE RADIOTELEPHONE SERVICES

AT&T and numerous independent Common Carriers maintain a network of marine radio stations strategically located along the coastal waters and major inland waterways of the United States. Stations are generally operated 24 hours a day.

There are three general types of public correspondence marine radio service available to the mariner.

1. Coastal - VHF-FM. (See para. 2.10.1).
2. Coastal Harbor --MF-HF SSB. (See para 2.10.2).
3. High Seas - HF-SSB. (See para. 2.10.3).

2.10.1 VHF Service

As this manual is specifically for a SSB radiotelephone, the VHF service is only briefly described here.

1. Public Class III-B Coast Stations.

This service offers reliable operation with good transmission quality over a distance of 20 to 50 miles, using VHF-FM with channels in the 156-162 MHz range. Antenna height and equipment quality are the primary factors that determine communication distance.

NOTE

Under FCC rules now in effect, a licensed VHF radiotelephone must be aboard before SSB equipment can be licensed. VHF must be used in preference to SSB when within range of a VHF shore station.

2.10.2 Coastal Harbor Service (SSB)

1. Public Class II-B Coast Stations.

This service provides communication distances greater than those of VHF. Operating range for Coastal/Harbor stations is typically up to 150 miles, depending on the time of day. Frequencies in the 2 MHz bands are used by stations along the East and West coasts and Gulf of Mexico. Coast stations on the Great Lakes operate on 2, 4, and 8 MHz channels, and those in the Mississippi Valley use 2, 4, 6, and 8 MHz. The distress, calling and safety frequency is 2182 kHz. Not all Public Correspondence Coast stations monitor 2182 kHz, however.

2. Helpful Facts on Coastal Harbor Service. (SSB)

- a. The FCC has ordered that only single sideband (SSB) operation will be permitted after Jan. 1, 1977.
- b. A licensed VHF radiotelephone on board is a prerequisite for obtaining a vessel station license for SSB.

2.10.3 High Seas Radiotelephone Service (Public Correspondence)

This service is primarily designed to accommodate ships and aircraft operating offshore. It provides two-way voice communication between vessels at sea, aircraft, and the land telephone system, both domestic and overseas. Worldwide coverage is maintained 24 hours a day. Regular weather broadcasts are also featured, and top priority is always given to safety communications.

There are four predominant public coast stations in the continental U.S.A: KMI in California, WOM in Florida, WOO in New York, and WLO in Mobile, Alabama, plus a number of stations in the inland rivers, Great Lakes, and numerous Coastal Harbor stations. Each station uses a large number of half-duplex frequencies in the 4 to 23 MHz bands, 2 MHz for Coastal Harbor.

1. Modes of Transmission on "High Seas"

J3E USB is the only permitted mode. This is a "U" display on your RAY 152.

2. Roll Calls

All coast stations continuously monitor their primary and working frequencies that are not busy so that ships can call at any time. At scheduled intervals, each station broadcasts a roll call (traffic list) of vessels for which there are calls waiting, and pertinent weather information.

3. High Seas Shore Stations

General Information

- a. Ships and coast stations must transmit and receive on paired frequencies (channels) as shown for each station. "CROSSBAND" operation is not permitted.
- b. Most stations monitor 24 hours daily on most frequencies.
- c. DEMAND CALLING by ships is encouraged, to distribute the calling load throughout the day.
- d. Calls will not be commenced on a frequency just prior to the scheduled time of a traffic list or weather broadcast. If a call is already in progress, the broadcast will be omitted on that busy channel.
- e. High Seas Rates.

High Seas Service is charged by the telephone company on a per-call time basis to the party initiating the call. Calls may be placed pre-paid, collect (to U.S.), with a telephone credit card, or charged to the vessels owner or agent.

Schedules of operation are readily available from AT&T for their Coast Stations KMI, WOO, and WOM. The schedule of independent station WLO in Mobile, Alabama is reproduced here as an example of a coast station schedule.

WLO - Mobile Alabama		
I.T.U. Channel Designation	Coast Station Transmit (Carrier)	Ship Station Transmit (Carrier)
419	4413.2	4118.8
414	4397.7	4103.3
405	4369.8	4075.4
830	8808.8	8284.9
829	8805.7	8281.8
824	8790.2	8266.3
1226	13,178.3	12,407.5
1225	13,175.2	12,404.4
1212	13,134.9	12,364.1
1641	17,356.9	16,584.0
1632	17,329.0	16,556.1
1607	17,251.5	16,478.6
2237	22,707.6	22,111.6
2231	22,689.0	22,093.0
2227	22,676.6	22,080.6

Traffic lists are given each hour, on the hour.

Weather reports are given at 0600, 1200 and 1800 local (Central) time.

Radiotelephone Dept. (HS - CH - VHF)

VHF - FM	203-666-3467	WLO VHF-FM Operator
WATS	800-633-1634	Ask for WLO VHF Operator
High Seas	205-666-2998	WLO High Seas Operator
WATS	800-633-1634	Ask for WLO High Seas Operator
Coastal		
Harbor	205-666-3555	WLO Coastal Harbor Operator
WATS	800-633-1634	Ask for WLO Coastal Harbor Operator

Or dial "0" and ask to be connected to the MOBILE ALABAMA MARINE OPERATOR. The routing numbers are: VHF, 205 = 11531 - High Seas or Coastal Harbor = 11362.

AT&T: Contact: AT&T Long Lines
High Seas Product Manager
201 Littleton Road
Morris Plains, NJ 07950
Call Collect: 201-631-4165

Information on the other AT&T stations may be obtained by contacting the stations directly. The RTCM books, other articles and publications, and your Raytheon dealer can provide additional assistance.

Inland River Public Correspondence Stations: WCM, WFN, WGK, WJG.

All of these share simplex channels of 2086 and 2782 kHz.

<u>CITY</u>	<u>FREQUENCY (kHz)</u>	<u>CALL SIGN</u>
Pittsburgh	4063.0 6515.7 8213.6 12333.1 16518.9*	WCM
Jeffersonville	2782.0 8725.1 4115.7 6518.8 13103.9* 17291.8*	WFN
St. Louis	4410.1 6212.4 8737.5* 13103.9* 17291.8*	WGK
Memphis	4087.8 6209.3 8201.2 12333.1* 16518.9*	WJG

* = Secondary Frequencies.

2.10.4 How to Place Calls on SSB.

Use the VHF-FM service (up to 20-40 miles) in preference to the Medium frequency or High frequency services, if within range. Select the desired channel from the station list or Table 2-4 of this manual, taking into consideration the propagation characteristics for the desired range. See para. 2.13. Listen to ensure that the channel to the desired coast station is not busy before transmitting. Use LSN/TX to monitor for other ships calling the station.

A. Public Correspondence

I. Ship to Shore Via Marine Operator (Public Correspondence).

- a. Select a channel for the desired coast station. Table 2-4 will help you. The best channel may be determined by experience, or by monitoring broadcasts from the coast station. (If channels to the nearest station are busy, contact one of the other coast stations which has channels available). When the channel is clear, call the desired station using the proper procedure as follows:

Press the push-to-talk switch and say three times: "(Name of coast station) THIS IS (your call sign)", then "OVER". Release the button. This initial call should be brief, spoken clearly, and should be about fifteen seconds. Do not be too brief, however, as many Public Coast Stations require time to recognize the call and select the proper receiver and antenna.

- b. Listen for a reply. If none is heard, repeat call after an interval of two minutes. If nothing is heard, wait 10 minutes or switch to another channel selection.
- c. When the coast station operator answers, wait for his confirmation of a proper connection, then furnish the name of the vessel, call sign, and ship's telephone or billing number, if assigned then wait until the operator asks which service you desire. Inform the operator of the type of billing desired (e.g., ship paid calls, collect calls, credit card call, or third number charge call), and the number you wish to call.

If billing information for your vessel has not been registered, the operator will ask for additional information for billing purposes.
- d. Proceed with call as directed. Each time you are finished speaking, say "OVER", so that the other person knows that you are finished and that they may respond.
- e. At completion of call say: "Name of vessel, call sign, OUT".
- f. Log time, length of call, station operated, frequency, and licensed operators name in the vessel radiotelephone log book.

II. Ship-to-Ship Via Marine Operator. (Public Correspondence).

With the assistance of the Marine Operator, it is possible to contact another vessel beyond your communication range. Place your call in the same way as "ship-to-shore" above. When the Marine Operator answers, give the name, call sign, location, and selective signaling code number (if known) of the ship being called. (Selective Signaling Codes are transmitted by the Marine Operator to operate selective call ringers in VHF and SSB sets equipped for that purpose). After your call is completed, sign off with your vessel name and call sign and enter the activity in the radiotelephone log book.

III. Shore-to-Ship Via Marine Operator. (Public Correspondence).

- a. Call the local telephone operator and ask for the Marine Operator.
- b. Give the Marine Operator the name of the ship you are calling, its call sign, location, and selective signaling code number (if known). Proceed thereafter as directed.

IV. Receiving Shore-to-Ship Calls.

To receive public coast station calls, a receiver must be in operation on the proper channel for the vessel's area of operation. You can be reached only when your receiver is tuned to an optimum frequency of the shore station. The scheduled traffic list broadcasts by the shore station list all the vessels for which the shore station is holding traffic. The best way to monitor for calls to your vessel is to monitor the traffic lists. When you hear your vessel being called, answer on an available channel for that station AFTER the traffic list is broadcast, and give your ship's name, call sign, position, and channel number on which you are transmitting.

On Coastal Harbor frequencies, Public Correspondence Coast Stations normally call on a working channel, but will call on the distress frequency (2182 kHz) when requested by the calling party. If boat owners are expecting calls on Coastal Harbor (SSB) frequencies, they should monitor a working frequency of the Public Correspondence Coast Station covering the area. High Seas stations will call on their unused channels and also will hold a traffic list transmitted at specific times during the day.

Since it is mandatory for commercial operators to maintain a watch on distress frequencies (channel 16 or 2182 kHz), many commercial vessels carry additional receivers to monitor a working frequency of their area coast station or the safety frequencies, or they utilize a Sel-Call or ringer equipment. This enables them to be more effective at receiving calls on the first attempt.

When you hear your boat called, answer as follows: "(Name of Coast Station that called), THIS IS (Name of your boat and call sign), OVER". Proceed thereafter as directed.

B. Ship-to-Ship Direct.

Most direct ship-to-ship contacts are originated on the calling and safety frequency 2182 kHz or another High Seas ship-to-ship channel, ITU 4A, 6A, 8A, 12A, 16A, etc.. Previously arranged schedules for contact times and frequencies is always a time saver and a very efficient method.

- a. On an inactive channel, monitor the frequency to avoid interfering with any communication in progress, then press the push-to-talk button and say: "(Name and call sign of the vessel you are calling), THIS IS (Name of your vessel, and your own call sign), OVER".
- b. When the called vessel answers, the caller should suggest an intership working frequency on which to complete the conversation. Calls must be limited to 3 minutes except in emergencies. See Table 2-5 for frequency suggestions.
- c. When the call is complete, sign off with the name and call sign of your vessel. You may not call the same boat again for at least ten minutes except in an emergency.
- d. Enter the activity in your radiotelephone log book. Frequency, time, station called, nature of communication and name of licensed operator.

2.11 DISTRESS, URGENCY AND SAFETY MESSAGES

2182 kHz is monitored 24 hours a day by the Coast Guard and many vessels at sea. If you need help, it can be on its way in moments from the Coast Guard and other vessels in your area. Do not hesitate to contact the Marine Operator if unable to establish contact on 2182 kHz. Additionally, the USCG has some high seas channels in the 4, 6, 8, and 12 MHz bands. Table 2-4 will give you the ITU channel numbers to contact USCG stations at Portsmouth VA, Boston, MA, Miami FL, San Francisco CA, and others. These stations also transmit weather reports.

Distress, Urgency, and Safety messages are identified by use of a code word at the beginning of each message. This word indicates the priority of the message.

2.11.1 Distress Signal: MAYDAY

Used if there is an immediate danger of loss of life or property. MAYDAY has priority over ALL other communications.

1. If you Hear a MAYDAY

Immediately discontinue any transmission. Note the details of the message in your radio log right away. DO NOT transmit to the distress caller until he has completed the distress call. You may be called upon to relay information or render assistance. Having the facts may make it possible for you to help save a life or a vessel.

Unless you are in a position to be of assistance, do not make any transmissions on this channel until the MAYDAY condition is lifted by the Coast Guard.

2. To Make a MAYDAY Call

- a. Switch to the proper channel (Channel 16 on VHF, 2182 kHz, or USCG High Seas on SSB).

NOTE

Because the primary purpose of the channel is to summon help, it is likely that you will receive an immediate response. If you do not, repeat your message. If you still do not get a reply, make a last transmission on the distress frequency and state on what other channel(s) you will attempt to make contact. Marine Operator channels are recommended.

- b. Speaking slowly and distinctly, say "MAYDAY, MAYDAY, MAYDAY, THIS IS" giving the name and call sign of your vessel three times. Continue with the distress message, as follows, still speaking slowly and distinctly.
- c. The name of your vessel.
- d. Your location.
- e. The assistance you need.
- f. A full description of your vessel, (type, color, length).
- g. Number of persons aboard, (male, female, children, elderly).
- h. Nature of your distress, (fire, medical, etc.).
- i. Repeat entire message and then indicate end by saying "OVER". Wait for reply. If none in 30 seconds, repeat procedure.

2.11.2 Urgency Signal: PAN

Used when the safety of a vessel or person is in jeopardy. "Man overboard" messages are sent with the Urgency signal. PAN has priority over all other communications with the exception of distress (MAYDAY) traffic.

2.11.3 Safety Signal: SECURITY

Used for messages concerning the safety of navigation or giving important meteorological warnings.

2.12 WEATHER BROADCASTS

Coast Guard stations transmit pertinent weather information in many areas. Check with them for local frequencies and times. USCG High Seas stations have a regular schedule of weather broadcasts. For example, 0400, 0530, 1000, 1130, 1730, 2200, 2330 UTC for Portsmouth VA.

Also the Marine Operator shore stations broadcast weather information. Check with the Marine Operator for channels used and time schedules of broadcasts. All "High Seas" shore stations make regular weather broadcasts which cover ocean areas.

NOTE

The prudent boatman never ventures out of port without the best available knowledge of weather conditions and possible changes and knowledge of his communications capability and possibilities.

2.13 HIGH FREQUENCY PROPAGATION

In these bands (4 through 22 MHz) there are two types of radio frequency propagation; ground waves and sky waves. Ground waves follow the curvature of the earth slightly beyond the horizon (20 to 75 miles). The primary propagation of radio waves in the HF range is by means of the sky wave. The sky wave travels toward the ionospheric layers surrounding the earth and is refracted back toward the earth. Because these electrically charged ionospheric layers are 50 to 250 miles above the earth, the radio wave returns to the earth's surface hundreds of miles away. Due to this phenomenon, we are able to communicate great distances with HF communications, depending upon the particular characteristics of the ionospheric layers as a function of the time of day, season and sun spot activity.

The refraction potential of the ionosphere is affected by the sun and the degree of refraction can be enhanced or degraded by solar disturbances such as flares or sunspots. Normally, the higher the number of sunspots, the better communications will be over long distances. The distance covered is also influenced by the frequency in use, by the time of day, and the season of the year. Each band is affected differently with the lower frequencies being affected less than the higher.

The information given in Figure 2-6 illustrates the various propagation areas that can be observed. The ground wave extends somewhat beyond the curvature of the earth. The absorption of the ground wave by the earth is more pronounced at higher frequencies so the ground wave is useful for longer distances at lower frequencies.

The sky wave is sent to the ionosphere at varying angles depending on the radiation characteristics of the antenna used. From the diagram it can be seen that the lower the angle of radiation, the longer the distance covered per "hop". (Vertical antennas generally have a lower angle of radiation than horizontal).

The distance from the useful portion of the ground wave to the area where the refracted sky wave returns to Earth is called the "Skip Zone". No signals from the transmitting station will be detected in this area. It is even possible for the wave, after it returns to Earth, to be reflected back to the ionosphere, refracted again and return to Earth at a more distant point. This is called a 2nd hop sky wave. This process may be repeated several times. Multihop propagation of this nature enables transmission over great distances due to the limited height of the ionospheric layers and the curvature of the Earth. On each hop, some of the energy will be absorbed so the less number of hops, the greater the signal strength at the receiver.

Signals emitted by a transmitting antenna may arrive at a given location by a number of paths simultaneously (different layers of the ionosphere, aurora, etc.). Since the RF energy is alternating current, these signals may arrive at different phase relationships. At times, the signals will be in phase, resulting in a strong signal. When the ionosphere is in motion, or unstable, the phase relationship will constantly change, causing cancellation or loss of signal for up to several seconds causing fading.

Even with all of these variables, it is possible for the radio operator to predict, with some degree of accuracy, the communication range he can expect at any given time of day, season, or portion of the 11 year sunspot cycle.

The graphs in Figure 2-7 indicate estimated expected distance. You should be aware that these are only estimates and that many factors of weather, ionization levels, sunspots, type of antenna, etc. control the actual range capability.

The 2 MHz range is not pictured as it will generally follow a standard pattern of up to 150 miles of ground wave coverage over sea water during the day. At night, the ground wave generally decreases to 50 to 100 miles but ionospheric propagation may permit operation up to 1000 miles or more, especially during the winter months. This unfortunately, may be more limiting due to the greater amount of traffic that can be heard. Be aware that skip zones of 50 to 200 miles may occur.

The 22 MHz range is generally useful only in the afternoon during sunspot cycle peaks. During low sunspot activity it may not have any worthwhile range capability.

The best method for determining your preferred path frequency is, simply, to "LISTEN". Check the scheduled traffic list broadcasts of the various shore stations and listen to them, choosing the one with the strongest signal strength. In general, if you hear the shore station well, it will be able to hear you using their more sensitive equipment and higher gain antennas available to them. As you experience which frequencies provide the best propagation paths over a period of time, the selection will become an easier task. Do not be misled by any freak propagation conditions. It is entirely possible under these unusual conditions to hear and contact stations far beyond the normal expected ranges. It is the long term, reliable, circuit that counts in effective communications at sea.

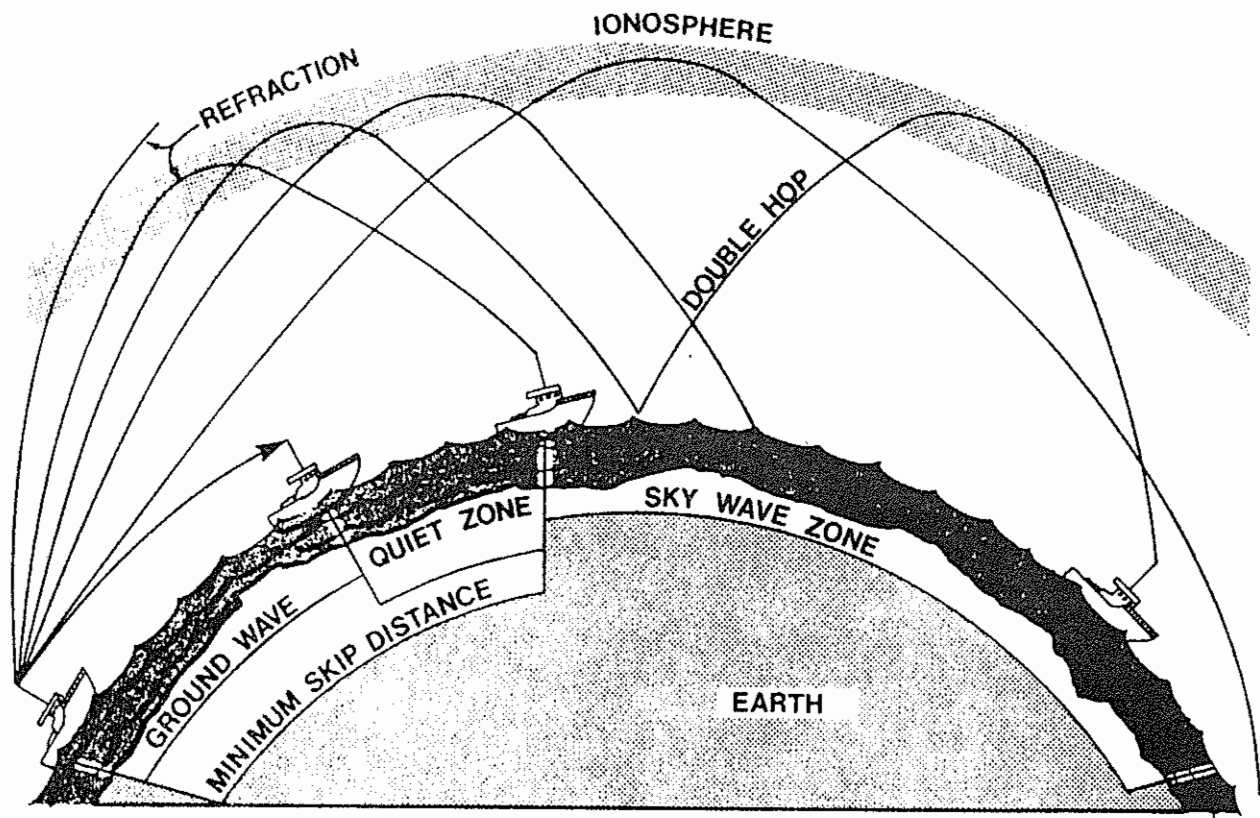


Figure 2-6 Effects of Propagation

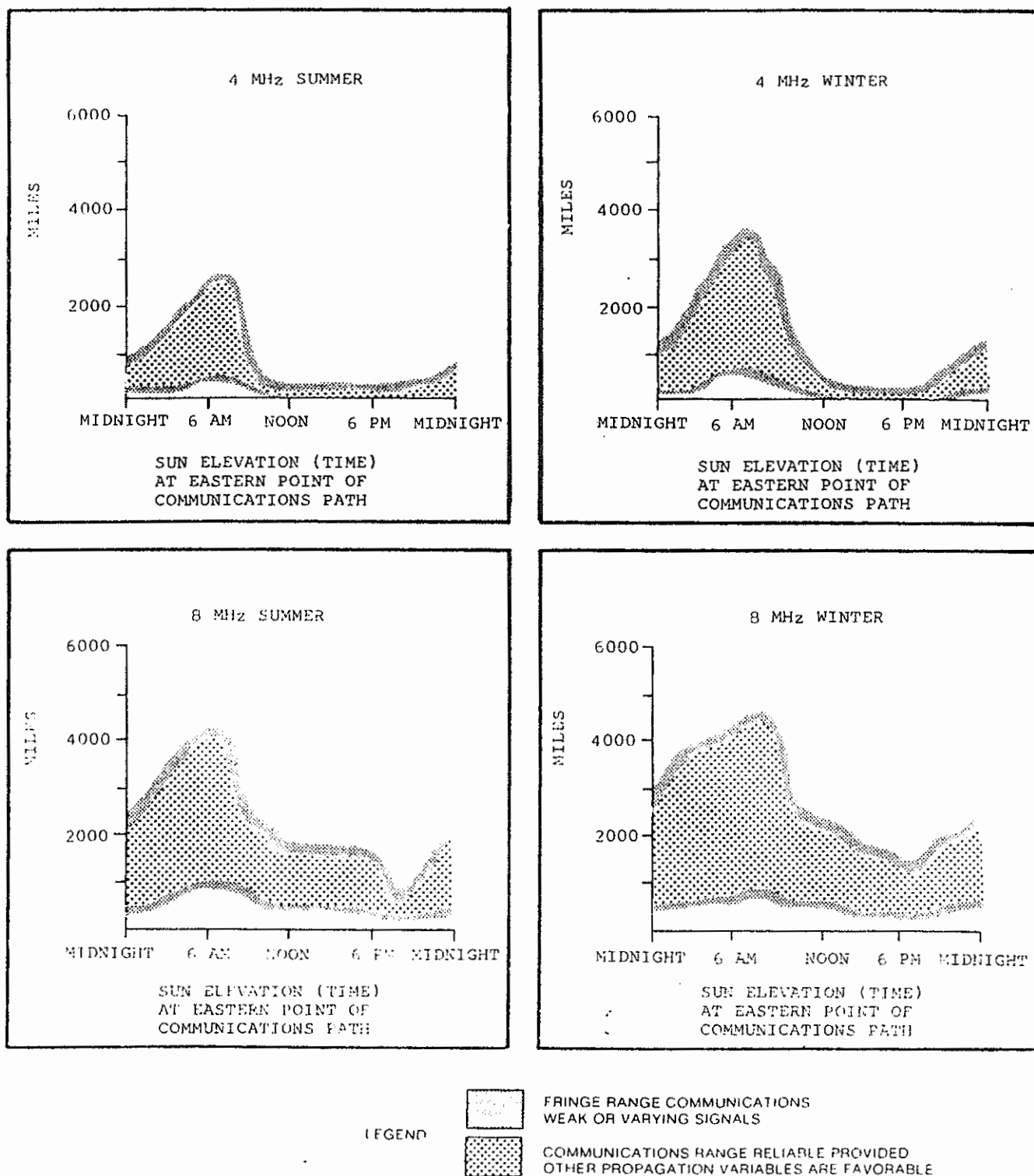


Figure 2-7 Estimated Expected Distance Vs. Time of Day (Sheet 1 of 2)

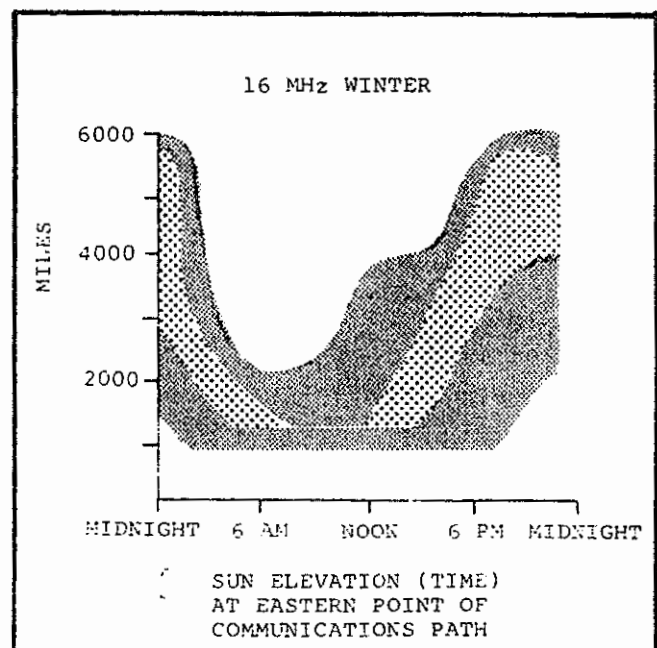
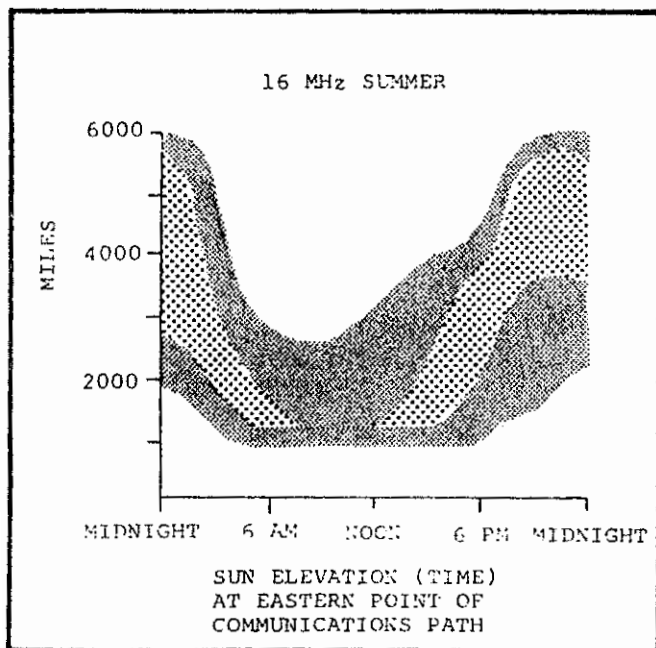
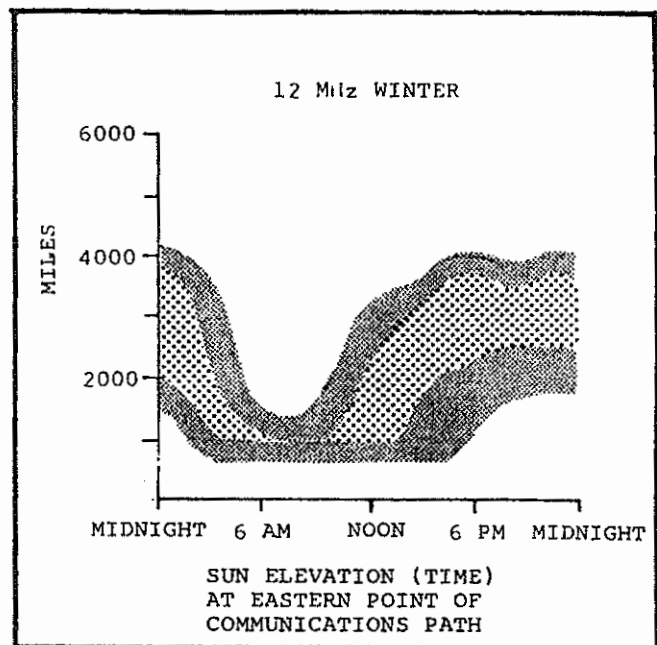
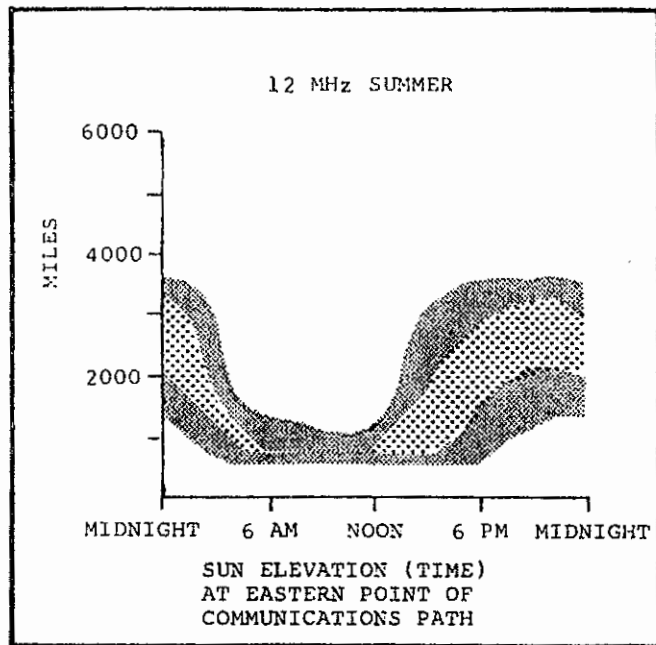


Figure 2-7 Estimated Expected Distance Vs. Time of Day (Sheet 2 of 2)

2.14 KEEPING THE LOG BOOK

The FCC requires some vessels to maintain a log book. Check the current Rules and Regulations for applicability to your vessel.

NOTE

Radio logs must be retained for at least one year, and for three years if they contain entries concerning marine disaster or distress. This period may be longer if an investigation is underway or pending.

The FCC requires the following entries in a radiotelephone log each day you are underway.

1. Name of vessel.
2. Vessel's call sign.
3. Licensed operator's signature.
4. Date and listening time on 2182 kHz or 156.8 MHz - using the 24 hour clock.
5. All distress (MAYDAY) messages heard or transmitted.
6. All urgency (PAN) and safety (SECURITY) messages transmitted.
7. Distress, urgency and safety messages should be logged in as much detail as possible, including date, time of day, operating frequencies, vessel's name and position, and nature of the emergency.
8. All installation, service, and maintenance details that affect the operation of the transmitter must be entered by the licensed operator performing the required tests, including his address and the class, serial number, and expiration date of his license.

2.15 PHONETIC ALPHABET

To help make call letters more clearly understood, and to assist in spelling out similar sounding or unfamiliar words, radiotelephone users usually employ the international phonetic alphabet.

PHONETIC ALPHABET		
A - ALFA	J - JULIET	S - SIERRA
B - BRAVO	K - KILO	T - TANGO
C - CHARLIE	L - LIMA	U - UNIFORM
D - DELTA	M - MIKE	V - VICTOR
E - ECHO	N - NOVEMBER	W - WHISKEY
F - FOXTROT	O - OSCAR	X - X-RAY
G - GOLF	P - PAPA	Y - YANKEE
H - HOTEL	Q - QUEBEC	Z - ZULU
I - INDIA	R - ROMEO	

2.16 SUMMARY

1. An accurate complete radio log is required by FCC regulations.
2. Maintain a watch on the international distress frequency - 2182 kHz or 156.8 MHz - whenever you are not engaged in other communications. Enter the date and listening time in your log.
3. If both VHF and SSB radiotelephones are installed, VHF must be used whenever you are within VHF range. This is required by FCC regulations.
4. SSB radiotelephones must be programmed for the proper emission mode on each channel.
5. Listen before transmitting on any frequency to avoid interfering with other vessel's communications.
6. Make all your messages brief and to the point. The maritime radiotelephone service is shared by all users. If your call is unsuccessful at first, wait at least two minutes before trying again.
7. If you hear a MAYDAY call, write down all the information. Respond only if you are in a position to render assistance or to relay the distress message.
8. Profanity on the air is unlawful. Violation, under the communications Act of 1934, may result in a substantial fine, and/or imprisonment.
9. False distress signals are prohibited. Violation, under FCC regulations may result in a substantial fine and/or imprisonment.
10. Keep your radiotelephone equipment in good working order. Have it checked periodically by a qualified, licensed technician. Do not stake the safety of your vessel or your passengers on a questionable radiotelephone.
11. Radiotelephone messages, like telephone conversations, are private, and are protected by the Communications Act of 1934. It is unlawful to make any use of any information heard that is not intended for you.
12. Table 2-4 is an international frequency index showing the frequency of operation of major shore stations around the world.

Table 2-3

I.T.U. Channels Vs. Discrete Frequency

Channel Designator	Ship Rx	Ship Tx	828	8802.8	8278.7	1626	17310.4	16537.5
401	4357.4	4063.0	829	8805.7	8281.8	1627	17313.5	16540.6
402	4360.5	4066.1	830	8808.8	8284.9	1628	17316.6	16543.7
403	4363.6	4069.2	831	8811.9	8288.0	1629	17319.7	16546.8
404	4366.7	4072.3	832	Ship simplex	8291.1 (8A)	1630	17322.8	16549.9
405	4369.8	4075.4	833	Ship simplex	8294.2 (8B)	1631	17325.9	16553.0
406	4372.9	4078.5	1201	13100.8	12330.0	1632	17329.0	16556.1
407	4376.0	4081.6	1202	13103.9	12333.1	1633	17332.1	16559.2
408	4379.1	4084.7	1203	13107.0	12336.2	1634	17335.2	16562.3
409	4382.2	4087.8	1204	13110.1	12339.3	1635	17338.3	16565.4
410	4385.3	4090.9	1205	13113.2	12342.4	1636	17341.4	16568.5
411	4388.4	4094.0	1206	13116.3	12345.5	1637	17344.5	16571.6
412	4391.5	4097.1	1207	13119.4	12348.6	1638	17347.6	16574.7
413	4394.6	4100.2	1208	13122.5	12351.7	1639	17350.7	16577.8
414	4397.7	4103.3	1209	13125.6	12354.8	1640	17353.8	16580.9
415	4400.8	4106.4	1210	13128.7	12357.9	1641	17356.9	16584.0
416	4403.9	4109.5	1211	13131.8	12361.0	1642	Ship simplex	16587.1 (16A)
417	4407.0	4112.6	1212	13134.9	12364.1	1643	Ship simplex	16590.2 (16B)
418	4410.1	4115.7	1213	13138.0	12367.2	1644	Ship simplex	16593.3 (16C)
419	4413.2	4118.8	1215	13144.2	12373.4	2201	22596.0	22000.0
420	4416.3	4121.9	1216	13147.3	12376.5	2202	22599.1	22003.1
421	4419.4 (4C)	4125.0 (4A)	1217	13150.4	12379.6	2203	22602.2	22006.2
	Ship simplex		1218	13153.5	12382.7	2204	22605.3	22009.3
422	4422.5	4128.1	1219	13156.6	12385.8	2205	22608.4	22012.4
423	4425.6	4131.2	1220	13159.7	12388.9	2206	22611.5	22015.5
424	4428.7	4134.3	1221	13162.8	12392.0	2207	22614.6	22018.6
425	4431.8	4137.4	1222	13165.9	12395.1	2208	22617.7	22021.7
426	4434.9	4140.5	1223	13169.0	12398.2	2209	22620.8	22024.8
427	Ship simplex	4143.6 (4B)	1224	13172.1	12401.3	2210	22623.9	22027.9
601	6506.4	6200.0	1225	13175.2	12404.4	2211	22627.0	22031.0
602	6509.5	6203.1	1226	13178.3	12407.5	2212	22630.1	22034.1
603	6512.6	6206.2	1227	13181.4	12410.6	2213	22633.2	22037.2
604	6515.7	6209.3	1228	13184.5	12413.7	2214	22636.3	22040.3
605	6518.8	6212.4	1229	13187.6	12416.8	2215	22639.4	22043.4
606	6521.9 (6C)	6215.5	1230	13190.7	12419.9	2216	22642.5	22046.5
607	Ship simplex	6218.6 (6A)	1231	13193.8	12423.0	2217	22645.6	22049.6
608	Ship simplex	6221.6 (6B)	1232	13196.9	12426.1	2218	22648.7	22052.7
801	8718.9	8195.0	1233	Ship simplex	12429.2 (12A)	2219	22651.8	22055.8
802	8722.0	8198.1	1234	Ship simplex	12432.3 (12B)	2220	22654.9	22058.9
803	8725.1	8201.2	1235	Ship simplex	12435.4 (12C)	2221	22658.0	22062.0
804	8728.2	8204.3	1601	17232.9	16460.0	2222	22661.1	22065.1
805	8731.3	8207.4	1602	17236.0	16463.1	2223	22664.2	22068.2
806	8734.4	8210.5	1603	17239.1	16466.2	2224	22667.3	22071.3
807	8737.5	8213.6	1604	17242.2	16469.3	2225	22670.4	22074.4
808	8740.6	8216.7	1605	17245.3	16472.4	2226	22673.5	22077.5
809	8743.7	8219.8	1606	17248.4	16475.5	2227	22676.6	22080.6
810	8746.8	8222.9	1607	17251.5	16478.6	2228	22679.7	22083.7
811	8749.9	8226.0	1608	17254.6	16481.7	2229	22682.8	22086.8
812	8753.0	8229.1	1609	17257.7	16484.8	2230	22685.9	22089.9
813	8756.1	8232.2	1610	17260.8	16487.9	2231	22689.0	22093.0
814	8759.2	8235.3	1611	17263.9	16491.0	2232	22692.1	22096.1
815	8762.3	8238.4	1612	17267.0	16494.1	2233	22695.2	22099.2
816	8765.4	8241.5	1613	17270.1	16497.2	2234	22698.3	22102.3
817	8768.5	8244.6	1614	17273.2	16500.3	2235	22701.4	22105.4
818	8771.6	8247.7	1615	17276.3	16503.4	2236	22704.5	22108.5
819	8774.7	8250.8	1616	17279.4	16506.5	2237	22707.6	22111.6
820	8777.8	8253.9	1617	17282.5	16509.6	2238	22710.7	22114.7
821	8780.9	8257.0	1618	17285.6	16512.7	2239	22713.8	22117.8
822	8784.0	8260.1	1619	17288.7	16515.8	2240	22716.9	22120.9
823	8787.1	8263.2	1620	17291.8	16518.9	2241	Ship simplex	22124.0 (22A)
824	8790.2	8266.3	1621	17294.9	16522.0	2242	Ship simplex	22127.1 (22B)
825	8793.3	8269.4	1622	17298.0	16525.1	2243	Ship simplex	22130.2 (22C)
826	8796.4	8272.5	1623	17301.1	16528.2	2244	Ship simplex	22133.3 (22D)
827	8799.5	8275.6	1624	17304.2	16531.3	2245	Ship simplex	22136.4 (22E)
			1625	17307.3	16534.4			

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International Frequency Matrix, 4/6 MHz

[illegible]

International Frequency Matrix, 8 MHz

[illegible]

International Frequency Matrix, 12 MHz

[illegible]

Table 2-4
International Frequency Matrix, 16 MHz

Australia-Sydney Radio-VIS																																									American Samoa-Pago Pago Radio-KUQ																																									Azores-S. Miguel Radio-CUG																																									Brazil-Rio Radio-PPR																																									Belgium-Oostende Radio-OSU																																									Bermuda- Bermuda Radio-OSU																																									Canada-Halifax Radio-VRT																																									Canada-Vancouver Radio-VCS																																									Cook Isl's-Rorotonga Radio-VAI																																									Denmark-Lyngby Radio-ZKR																																									Finland-Helsinki Radio-OXZ																																									France-St. Lys Radio-ONG																																									Germany-Norddeich-DAL,DAJ,DAM,DAK,DAP																																									Greece-Athina Radio-SVN																																									Holland-Echeveningen Radio-PCG,PCU																																									Israel-Reykjavik Radio-TFA																																									Italy-Rome Radio-4XO																																									Jamaica-Kingston Radio-IAR																																									Japan-Tokyo Radio-6VI																																									Madeira-Madeira Radio-JBO																																									Monaco-Monaco Radio-CUB																																									Martinique-Fort-De-France Radio-3AC																																									Mexico-Acapulco Radio-XFA																																									New Zealand-Wellington Radio-2LW																																									Netherlands Antilles-Curacao Radio-9VC																																									Portugal-Lisbon Radio-LUN,LFL,LFN																																									Singapore-Singapore Radio-9VG																																									South Africa-Durban Radio-9VG																																									Spain-Pozuelo Del Rey Radio-2SD																																									Sweden-Goteborg Radio-5EH																																									Switzerland-Bern Radio-HEB																																									Tahiti (Fr. Polynesia)-Mahina Radio-FJA																																									United Kingdom-Portsmouth-GKT,GKV,GKU																																									United States-New York Radio-K00																																									United States-Miami Radio-K0N																																									United States-Mobile Radio-WLO																																									United States-Oakland Radio-KHI																																									U.S. Coast Guard-USCG																																								
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Table 2-4 (Cont'd)
International Frequency Matrix, 22 MHz

Australia-Sydney Radio-VIS American Samoa-Pago Pago Radio-KUU Azores-S. Miguel Radio-CUG Brazil-Rio Radio-PPR Belgium-Oostende Radio-OSU Bermuda- Bermuda Radio-VRT Canada-Halifax Radio-VCS Canada-Vancouver Radio-VAT Cook Is. Rorotonga Radio-VAI Denmark-Lyngby Radio-0XZ Finland-Helsinki Radio-ZXR France-St. Lys Radio-OHG Germany-Norddeich-DAI,DAJ,DAM,DAK,DAP Holland-Athina Radio-SVN Iceland-Reykjavik Radio-PCG,PCU Italy-Rome Radio-TFA Jamaica-Kingston Radio-4XO Japan-Tokyo Radio-IAR Madeira-Madeira Radio-6YI Monaco-Monaco Radio-CUB Martinique-Fort-De-France Radio-FFL Mexico-Acapulco Radio-XFA New Zealand-Wellington Radio-ZLW Netherlands Antilles-Curacao Radio-PSC Portugal-Lisbon Radio-LGN,LFL,LFN Singapore-Singapore Radio-CUL South Africa-Durban Radio-9VG Spain-Pozuelo Del Rey Radio-ZSD Sweden-Goteborg Radio-EHY Switzerland-Bern Radio-SAG Tahiti (Fr. Polynesia)-Mahina Radio-FJA United Kingdom-Portsmouth-GKI,GNY,GWU United States-New York Radio-K00 United States-Miami Radio-K0M United States-Mobile Radio-WLO United States-Oakland Radio-KMI U.S. Coast Guard-USCG																									
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Table 2-4 (Cont'd)
International Frequency Matrix, 16 MHz (Cont'd)

Australia-Sydney Radio-VIS																														American Samoa-Pago Pago Radio-KUQ																														Azores-S. Miguel Radio-CUG																														Brazil-Rio Radio-PPR																														Belgium-Oostende Radio-OSU																														Bermuda- Bermuda Radio-VRT																														Canada-Halifax Radio-VCS																														Canada-Vancouver Radio-VAT																														Cook Isl's-Rorotonga Radio-ZKR																														Denmark-Lyngby Radio-OKZ																														Finland-Helsinki Radio-OKZ																														France-St. Lys Radio-OKZ																														Germany-Hordeich-DAI,DAJ,DAH,DAK,DAP																														Greece-Athina Radio-SVN																														Iceland-Reykjavik Radio-PCG,PCU																														Italy-Rome Radio-TFA																														Jamaica-Kingston Radio-4X0																														Japan-Tokyo Radio-IAR																														Madeira-Madeira Radio-6YI																														Monaco-Monaco Radio-JBO																														Martinique-Fort-De-France Radio-CUB																														Mexico-Acapulco Radio-3AC																														New Zealand-Wellington Radio-XFA																														Netherlands Antilles-Curacao Radio-ZLM																														Norway-Rogaland Radio-LGN,LFL,LFN																														Portugal-Lisbon Radio-CUL																														Singapore-Singapore Radio-9VG																														South Africa-Durban Radio-ZSD																														Spain-Pozuelo Del Rey Radio-EHY																														Sweden-Goteborg Radio-SAG																														Switzerland-Bern Radio-HEB																														United Kingdom-Portsmouth-GKT,GKY,GKU																														United States-New York Radio-FJA																														United States-Miami Radio-M00																														United States-Mobile Radio-M0H																														United States-Oakland Radio-WLO																														United States-Honolulu Radio-KMI																														U.S.Coast Guard-USCG																																																					
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International Frequency Matrix, 22 MHz (Cont'd)

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Table 2-5
Frequencies of Interest

NOTE

All Maritime communications are USB J3E.
(U mode on the RAY 152).

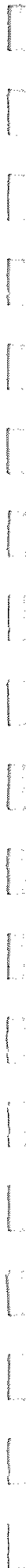
CALLING AND SAFETY FREQUENCIES (All Are Simplex)	
2182.0 kHz 2670.0 kHz 3023.0 kHz 5167.5 kHz 5680.0 kHz	International Calling and Safety USCG Liason Search and Rescur Only Alaska Emergency Search and Rescue Only
USCG HIGH SEAS OPERATIONAL CHANNELS	
ITU 424 (All Are Duplex Channels) 601 816 1205	
USCG WORKING COMMUNICATIONS STATIONS: BOSTON*, PORTSMOUTH*, MIAMI, NEW ORLEANS, SAN FRANCISCO*, KODIAK, ADAK, HONOLULU*, GUAM*.	
* Primary Stations. (These stations also provide scheduled weather broadcasts).	
SHIP TO SHIP WORKING FREQUENCIES (All Are Simplex) (Listed in Order of Popularity)	
2638.0 kHz 2738.0 kHz 2082.5 kHz 2093.0 kHz 2830.0 kHz 2303.0 kHz 2003.0 kHz 2142.0 kHz 2086.0 kHz	(All except Great Lakes and Gulf of Mexico) (Commercial Only) (Gulf of Mexico Only) (Gulf of Mexico Only) (Great Lakes Only) (California, Daytime Only) (Rivers, Except Great Lakes)
HIGH SEAS SHIP TO SHIP ITU CHANNELS (Simplex Only)	
4A, B, C 6A, B, C 8A, B	12A, B, C 16A, B, C 22A THRU E

Table 2-5 (Cont'd)

Frequencies of Interest

LIMITED COAST (Business and Operational Purposes Only)
2082.5 kHz
2086.0 kHz
2096.5 kHz
HIGH SEAS (Business and Operational Purposes)
See ITU Channels in Ship-to-Ship Listing.

Naturally, a prudent operator will verify all frequencies of usage with current FCC Rules and Regulations.



SECTION 3

INSTALLATION

3.1 GENERAL

The installation of your RAY 152 determines its efficiency and its performance. Careful planning and implementation of the installation are essential steps for the realization of maximum performance. Attention should be focused on the dc power source and the antenna ground system (counterpoise). Your radio power output is dependent upon the capability of the dc power source to supply and deliver the energy to your radio.

The antenna ground (counterpoise) is one half of your antenna system. Any skimping or short cuts reduce the capability of your antenna to radiate the signal power delivered to it by your radiotelephone. Your RAY 152 and AC 152 are designed to provide you with maximum signal radiation from your installation. Naturally, the ability to accomplish this is directly related to your installation. The dc power source and especially the counterpoise system are of paramount importance to the proper operation of your system.

In the U.S.A. and its territories and in vessels flying the US Flag, you must, by FCC law, have the installation certified by an FCC licensed engineer. He will ensure that proper procedures are followed resulting in the best possible performance for you and prevention of interference to others from a faulty installation.

3.2 MOUNTING THE TRANSCEIVER

Your RAY 152 is designed to be mounted on a table or shelf, to a bulkhead, or to the overhead. These positions are shown in Figure 3-1.

Select a convenient operating location which protects the radio from physical damage, rain, spray, dripping condensation, and direct sunlight. Using the dimensions supplied, fabricate the necessary metal work, mount the yoke, and mount your transceiver in the yoke. The yoke is designed to permit varying mounting angles for the transceiver. Since the mounting yoke and the radio are constructed of steel, the mounting in relation to the ship's compass should be considered. The recommended safe distance for the compass is 1.5 meters.

3.3 SELECTING THE ANTENNA LOCATION

The antenna is the electrical conductor which radiates the RF (Radio Frequency) energy from the transmitter and picks up radio signals from other stations for the receiver. There are many antenna types and configurations. The most common are the vertical whip (23 to 35 feet in length) and the long wire (30 to 60 feet in length). The vertical whip is most often used aboard motor vessels, yachts, tugs, crewboats, tankers, and fishing boats. The long wire is found predominantly aboard sailboats in the form of an insulated side stay or spring stay, insulated back stay, or triatic stay.

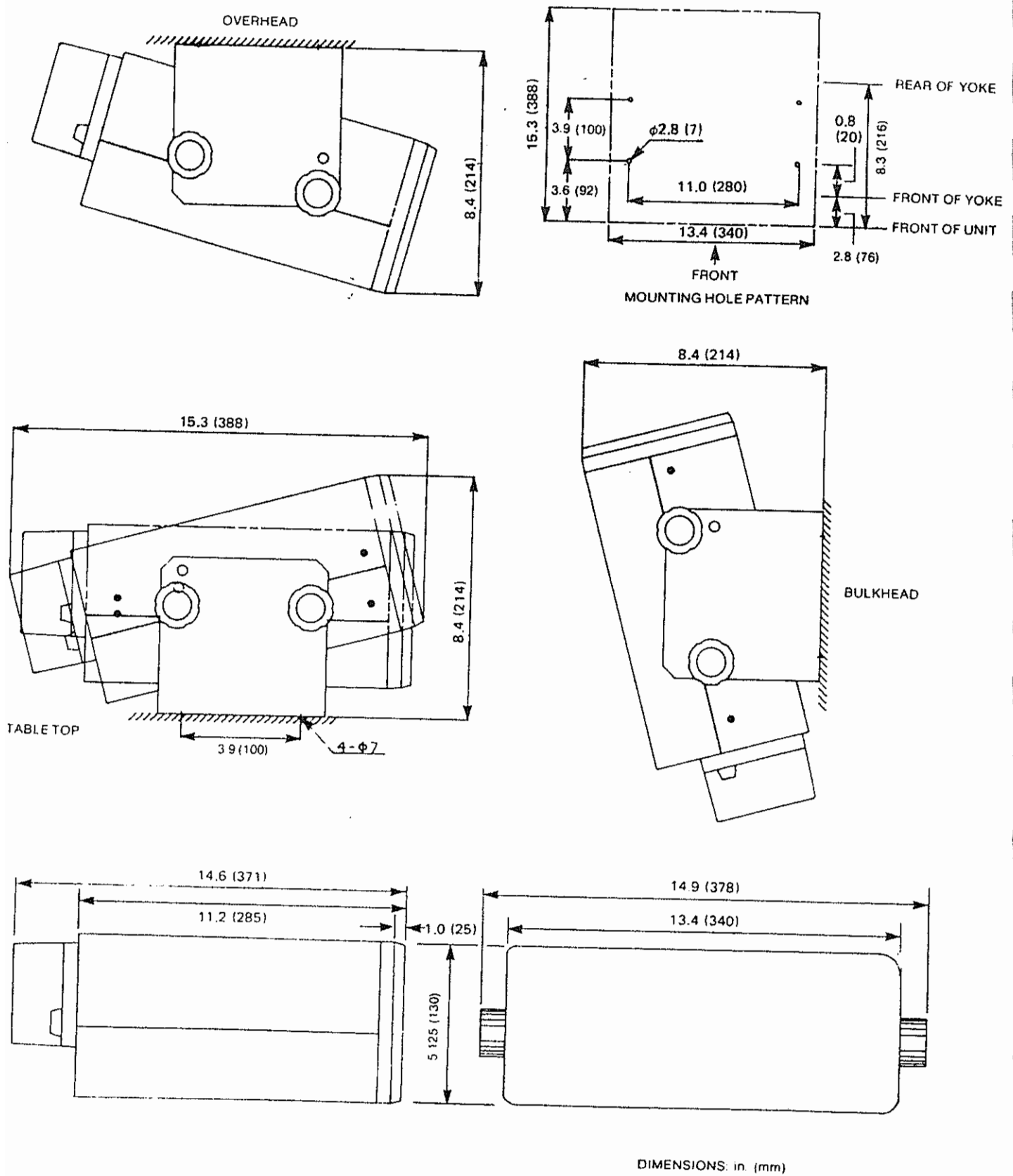


Figure 3-1 Typical Installations

There are several important factors which must be considered when installing the antenna system. The antenna must be as unobstructed as possible and the antenna must be separated from any other antenna system, structure, metal stay, or guy wire. (At least six feet (1.8 meters) is recommended). LORAN and OMEGA antennas should be as far away as possible. At least 30 feet (10 meters) is the recommended minimum distance. Even at these distances, there will be some detuning and directivity to the radiation pattern. The maximum separation possible is preferable.

Should a major portion of the antenna be secured alongside a metal superstructure, a shift in the antenna characteristics causing poor radiation efficiency and difficulty in tuning is expected.

Proper high voltage insulators must be used for the antenna and lead wire and must never be painted or sand blasted.

When planning the installation of the antenna, you must remember that the antenna itself is only a small part of the total antenna system. Of utmost importance is the grounding system (counterpoise) which forms the "other half" of the antenna. The radiation efficiency of an antenna is directly proportional to the effective area of the counterpoise. The larger the counterpoise (more area covered) the lower the radiation resistance and the higher the radiation efficiency. Counterpoise systems are no problem on large metal hulled vessels. The larger the vessel, the better the counterpoise. On small and non-metal hulled vessels, however, the counterpoise requires much more thought and planning. In general, a surface of at least 100 square feet is recommended in addition to bonding all large metal objects together as a part of the counterpoise system. See paragraph 3.6 for a detailed description of bonding. All counterpoise bonding straps should be run in as straight and direct a path as possible.

Several options are available for use on different types of vessels, such as sailboats (figures 3-2 and 3-3), powerboats (figure 3-4), vessels with tuna towers (figure 3-5), etc.. Figures 3-6 and 3-7 depict improper counterpoise installations. Figure 3-8 schematically illustrates both an improper and a proper method of connecting the large metal components to form a counterpoise. Figures 3-9 and 3-10 graphically show an improper system and a proper one for comparison.

Figures 3-2 and 3-3 show possible configurations for sailboats. In this application, the antenna can be either a vertical whip, an insulated back or triatic stay, or both. The lead or iron ballast in the keel becomes a convenient ground, capacitively coupled to the water, in conjunction with added copper screens, radials, and all large metal objects on board bonded to the system. The antenna coupler must be located at the counterpoise, as close to the feed point for the antenna as possible. See Figures 3-9 and 3-10.

It would be well to include a separate backup antenna, such as a vertical whip, in the event that a disasting should render the "stay" antenna useless.

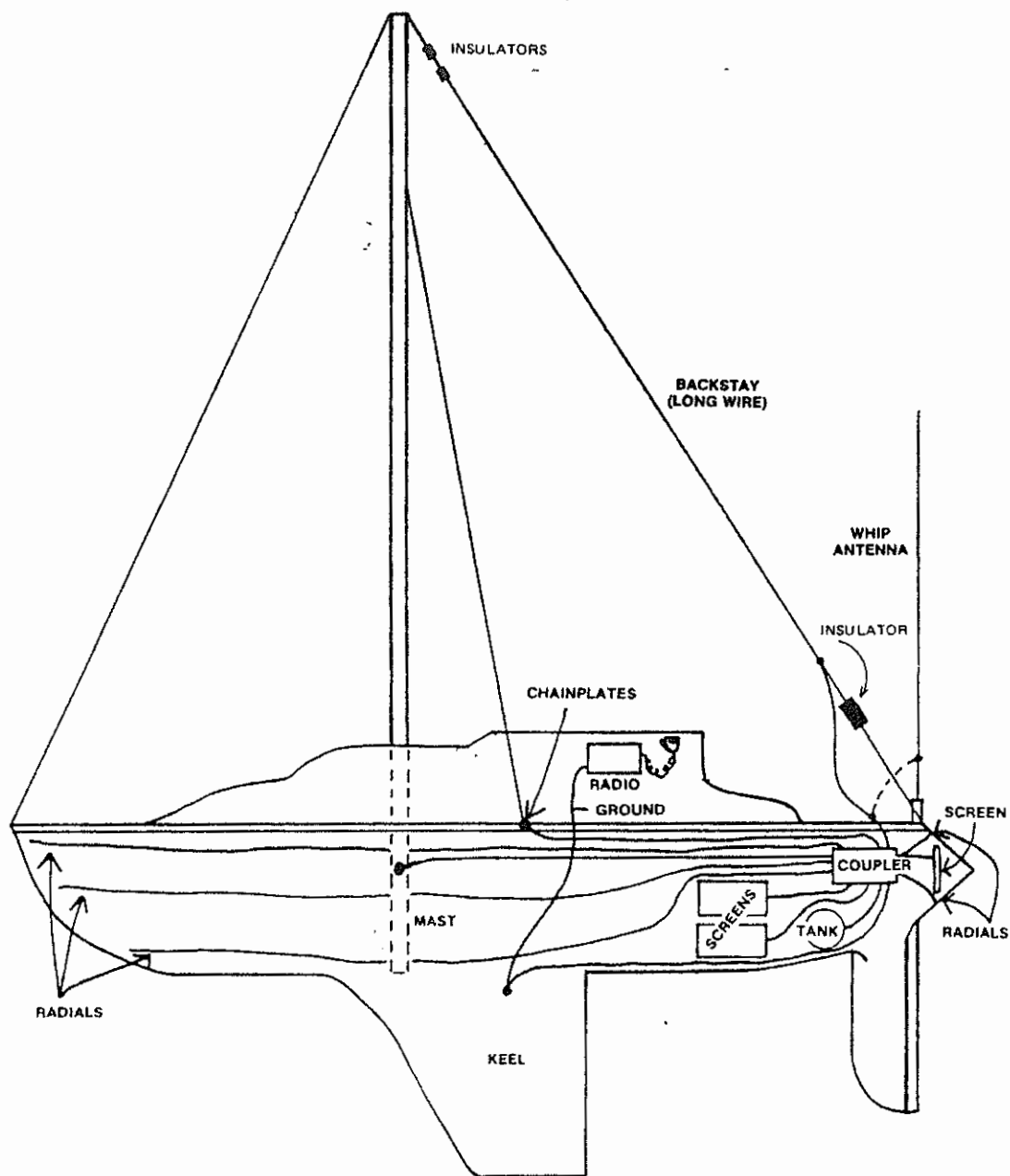


Figure 3-2 Whip and/or Backstay Antenna and Counterpoise System for a Sailboat

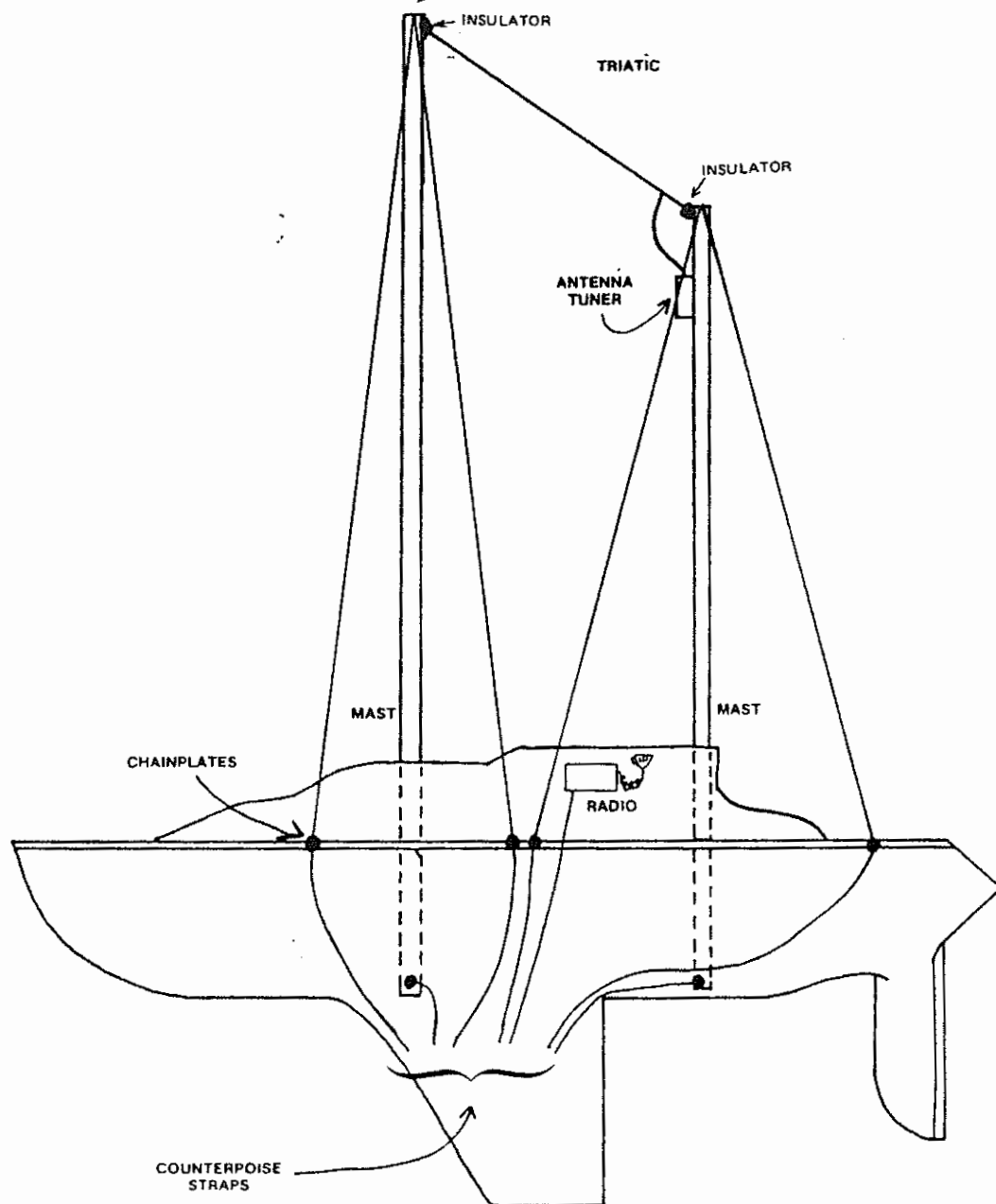


Figure 3-3 Triatic Backstay Antenna and Counterpoise System for a Sailboat

Figure 3-4 shows a possible counterpoise layout for a power boat. Whip antennas are generally used in this situation. Again, the counterpoise system is of utmost importance. As the figure shows, all large metal objects should be judiciously bonded to the antenna coupler and copper screens added to provide a better system. The coupler should be located at the counterpoise as close to the antenna as possible and securely bonded to the counterpoise system with the connection as short and the run as direct as possible.

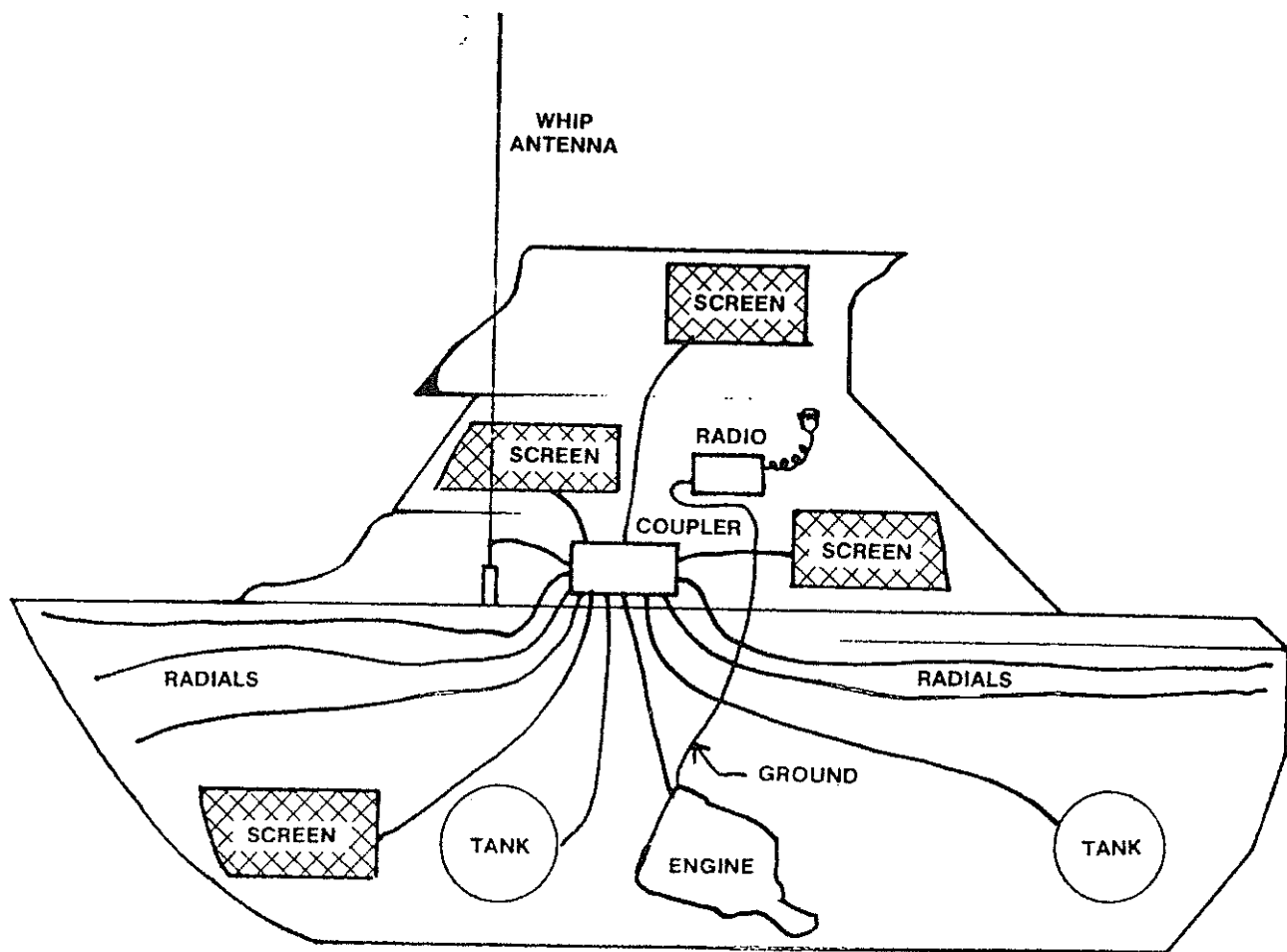


Figure 3-4 Antenna and Counterpoise System for a Power Boat

Figure 3-5 shows a vessel with a tuna tower fitted. This presents a slightly different problem, as the antenna, (to be mounted in as unobstructed a location as possible) is located at the top of the tower with the coupler as close to the antenna as possible. Electrically, the coupler is located significantly "up" the antenna, because the counterpoise is effectively the water surface.

To accomplish this installation, the tower must be connected as part of the counterpoise by being bonded to the rest of the counterpoise system as in the other configurations previously discussed. Extra copper screens and radials should be added as shown to increase the counterpoise area and effectively move the counterpoise up to the coupler.

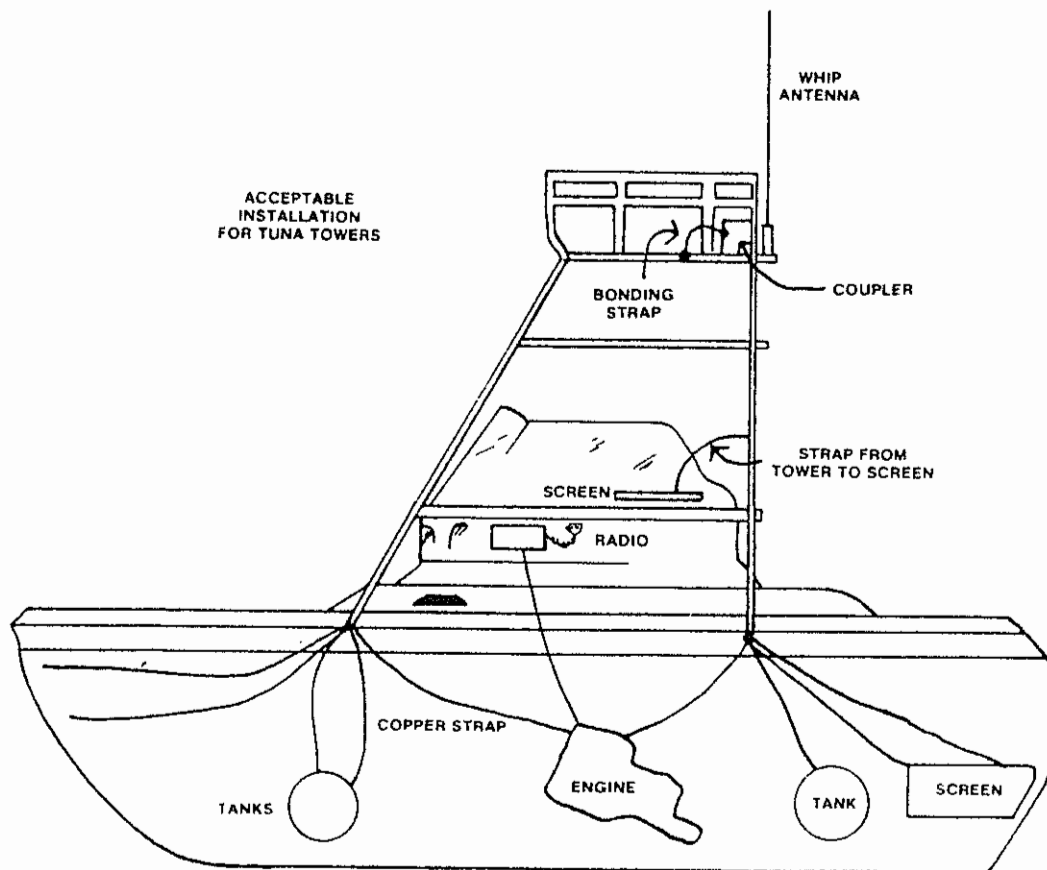


Figure 3-5 Antenna and Counterpoise System with Tuna Tower on Vessel

Figure 3-6 shows two improper methods of achieving a counterpoise system. The first figure shows a long copper strap connecting the coupler to the engine. This creates a much too long path and the grounding strap becomes part of the antenna system. The second figure shows a "daisy-chaining" hookup which also is an ineffective counterpoise.

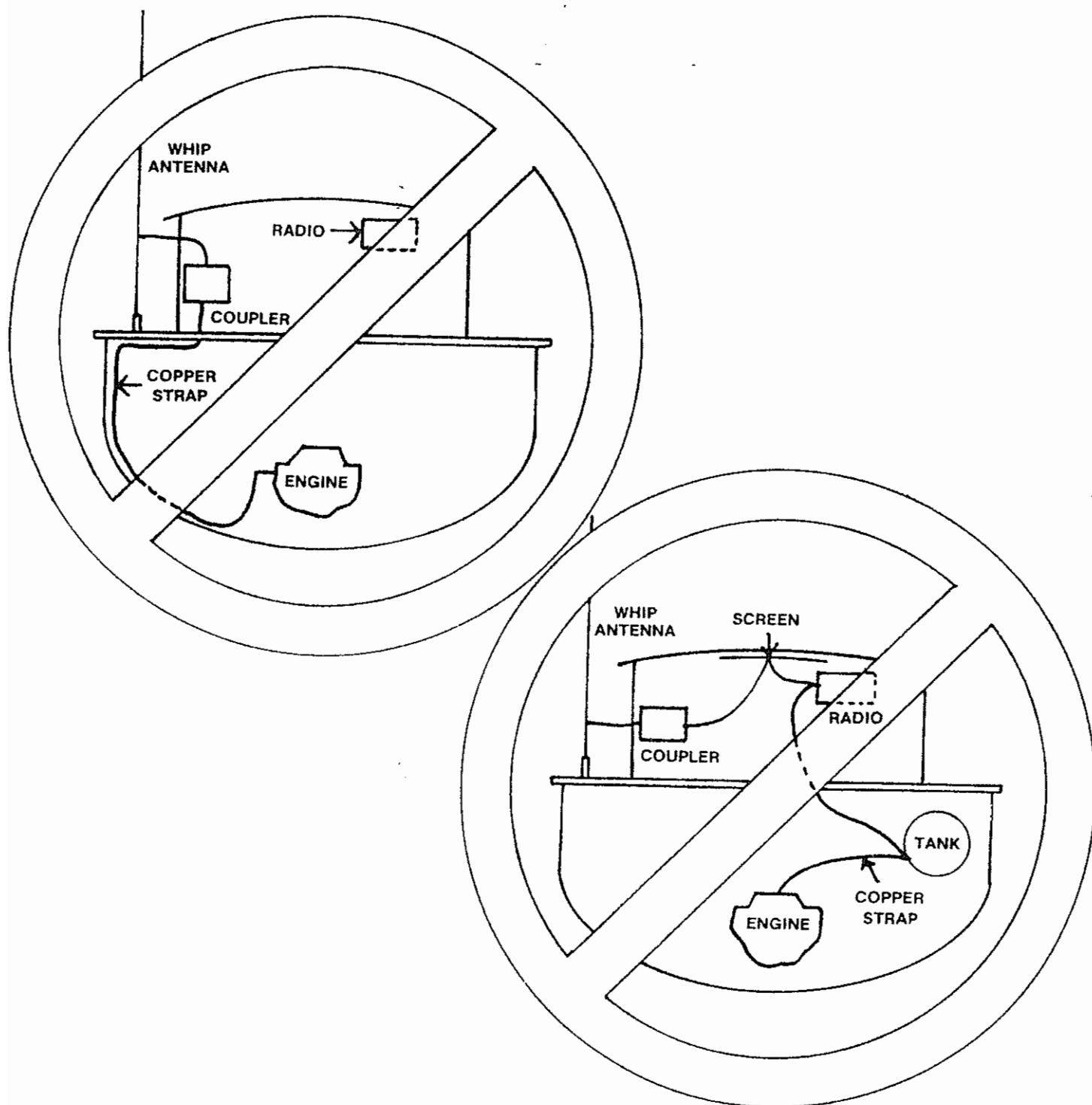


Figure 3-6 Improper Counterpoise Systems, Workboat

Figure 3-7 shows improper grounding systems from a different perspective. The first indicates a "daisy-chain" and the second shows long paths for the grounding strap to the coupler. The other straps are ineffective because they do not move the counterpoise up to the coupler. Neither of these are effective counterpoise systems.

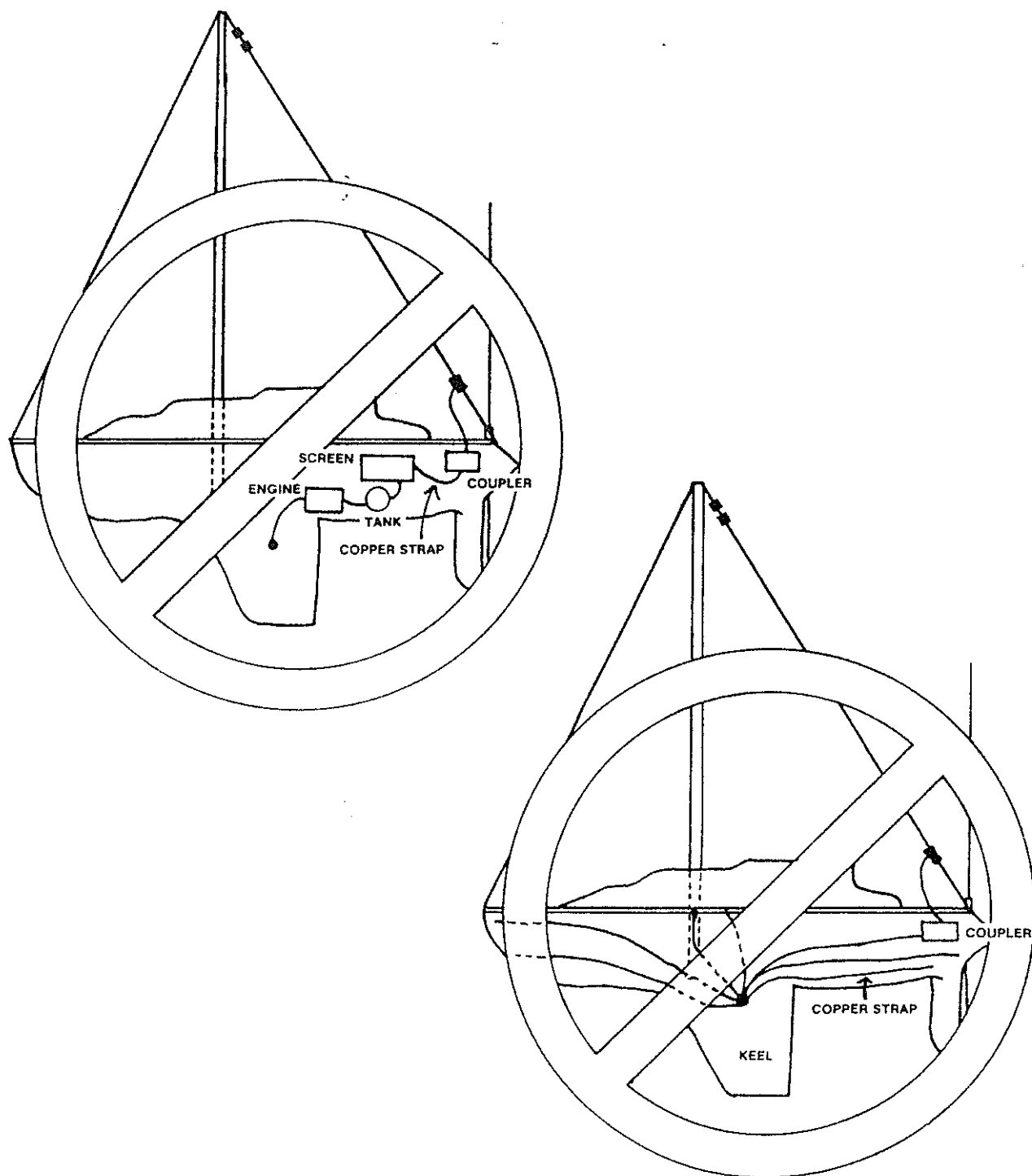


Figure 3-7 Improper Counterpoise Systems, Pleasure Boat

Figure 3-8 shows a schematic representation of the improper and proper bonding systems. This first schematically shows "daisy-chaining", while the second shows the proper method of bringing each component of the counterpoise to the antenna coupler with separate strapping, each taking a different route.

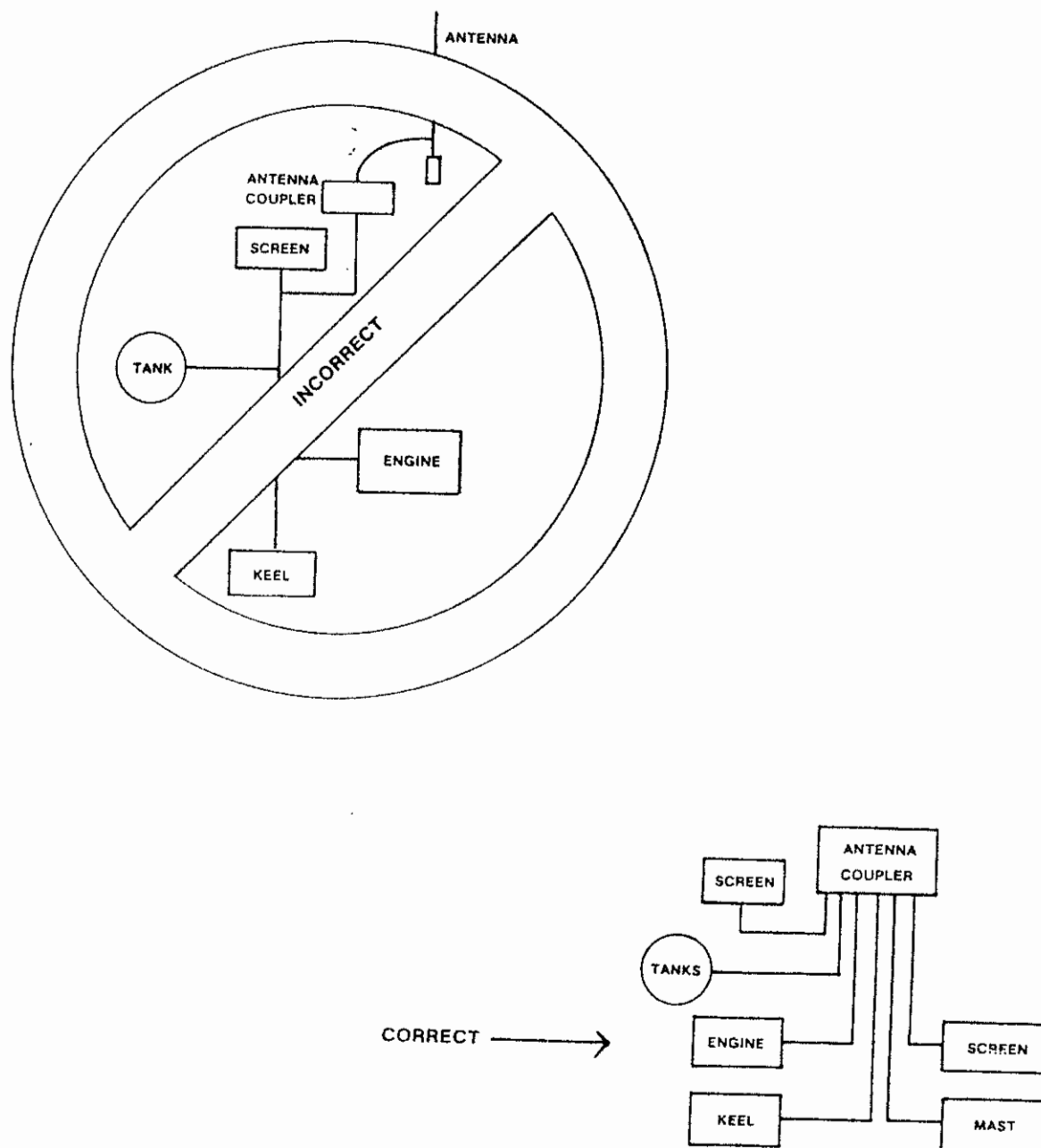


Figure 3-8 Proper and Improper Bonding Schematics

Figure 3-9 shows the effect of an improper counterpoise system with long grounding straps. This has the effect of including the radio, the antenna coupler, the microphone, and even the operator as part of the radiating system. This not only is inefficient but is potentially harmful to the operator. The microphone may be "hot" and may "sting" or burn the lips. The second illustration shows a proper system where the antenna actually begins at the counterpoise which keeps the radio (and operator) at "ground" potential.

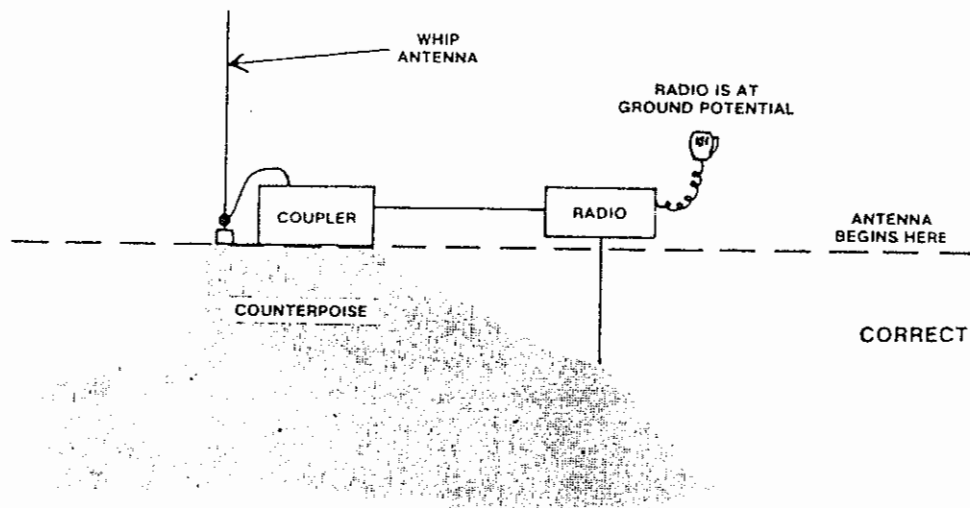
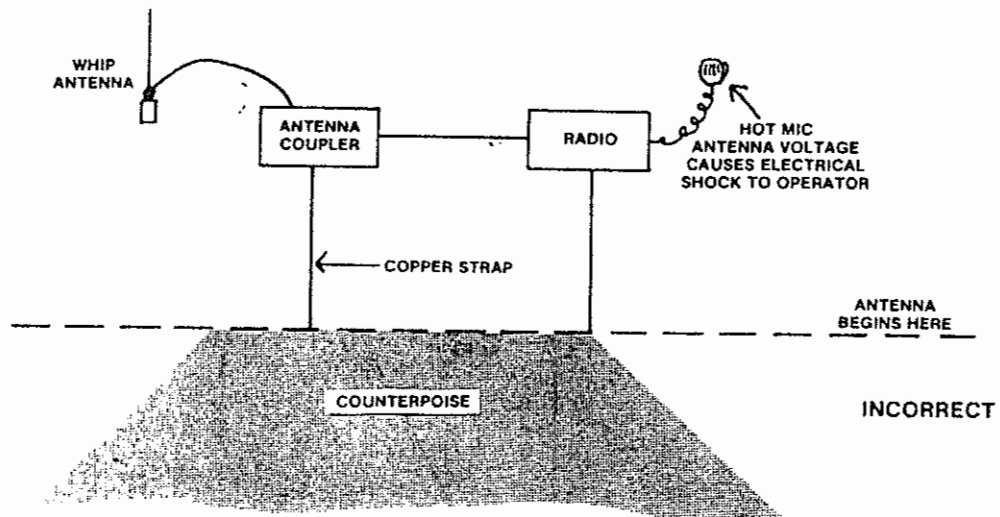


Figure 3-9 Comparison of Antenna Electrical Origin

Figure 3-10 shows a proper system setup with the antenna and radio connected to the antenna coupler and the coupler at the counterpoise level. This is a proper installation and should produce no problems.

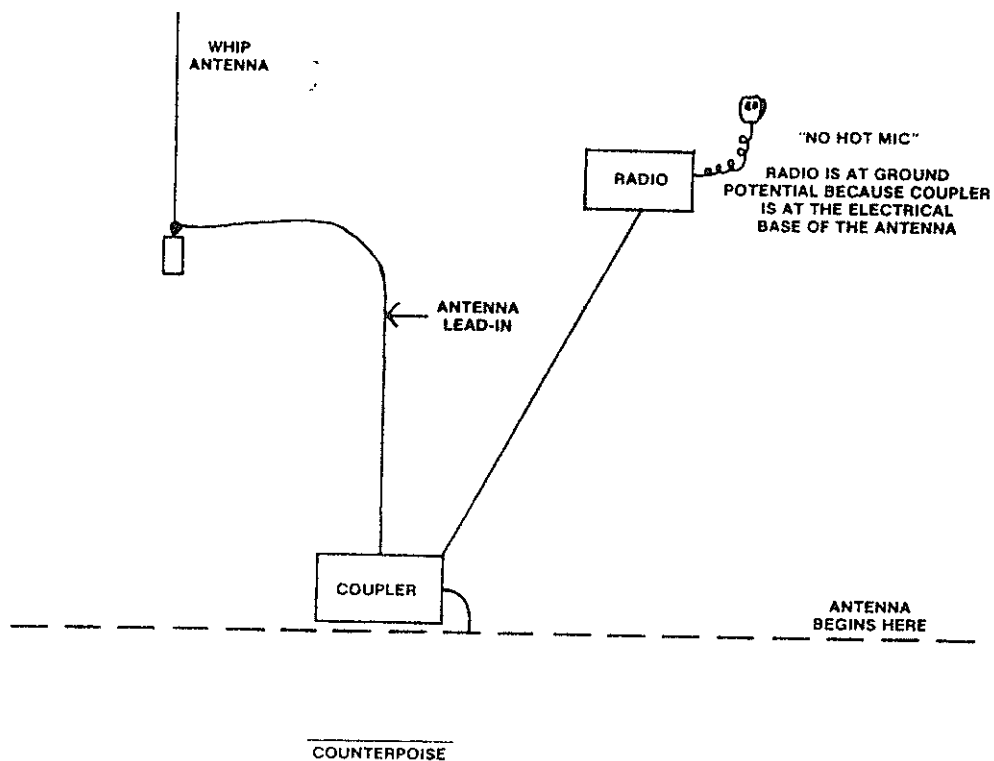
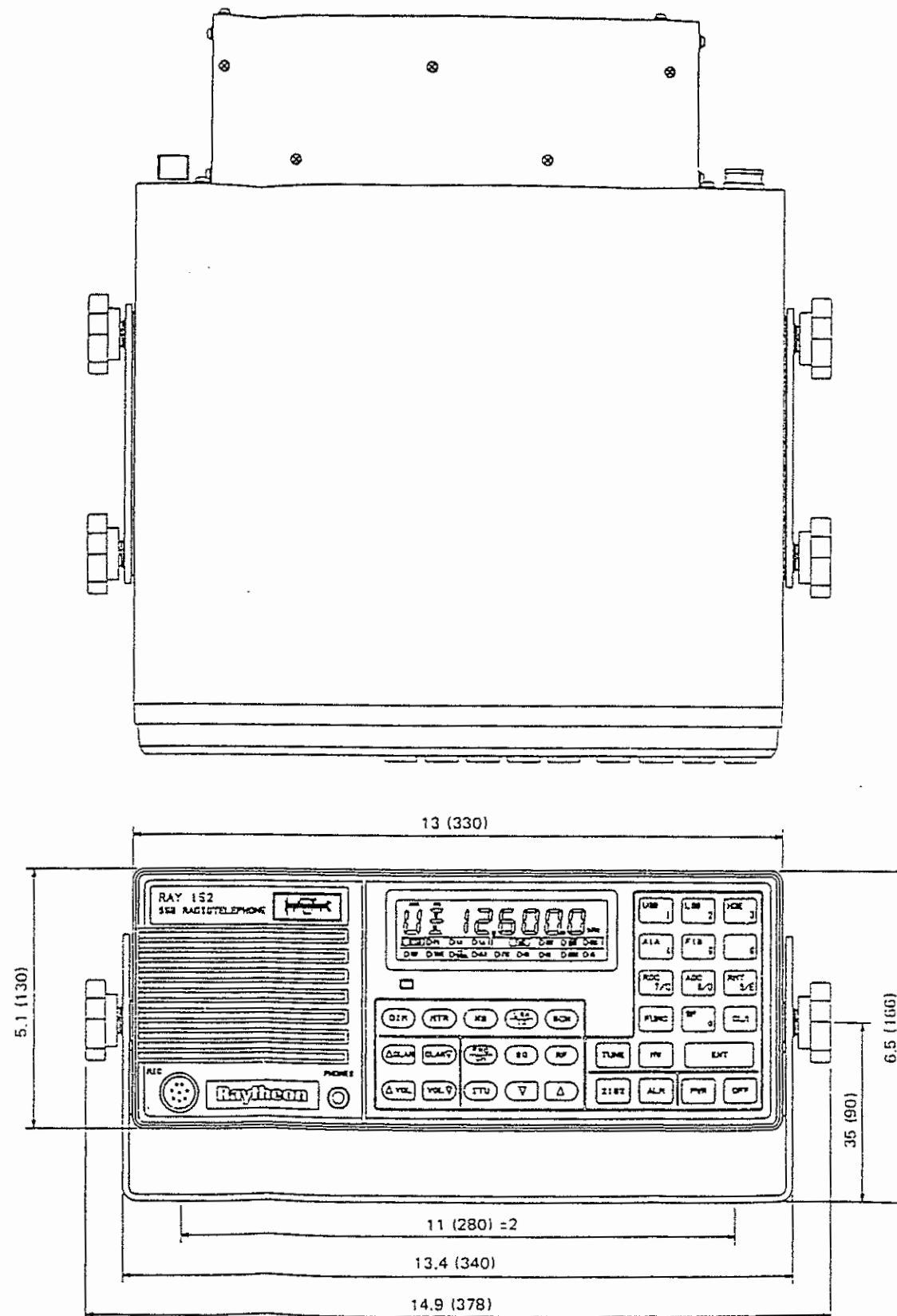


Figure 3-10 Proper Installation with Antenna Coupler at Counterpoise

These are by no means the only configurations possible. The necessary steps of each installation is governed by vessel conditions. Still, the primary purpose is to provide the best antenna system available to gain the best HF signal radiation and operation as possible.



UNLESS OTHERWISE SPECIFIED		
DIMENSION	SPECIFIED	TOLERANCE
0 to 16	in	± 1
16 to 50	in	± 2
50 to 250	in	± 4
250 to 1000	in	± 8
1000 to 3000	in	± 12

WEIGHT Approx. 23.1 lbs. (10.5kg)
 DIMENSIONS: in. (mm)

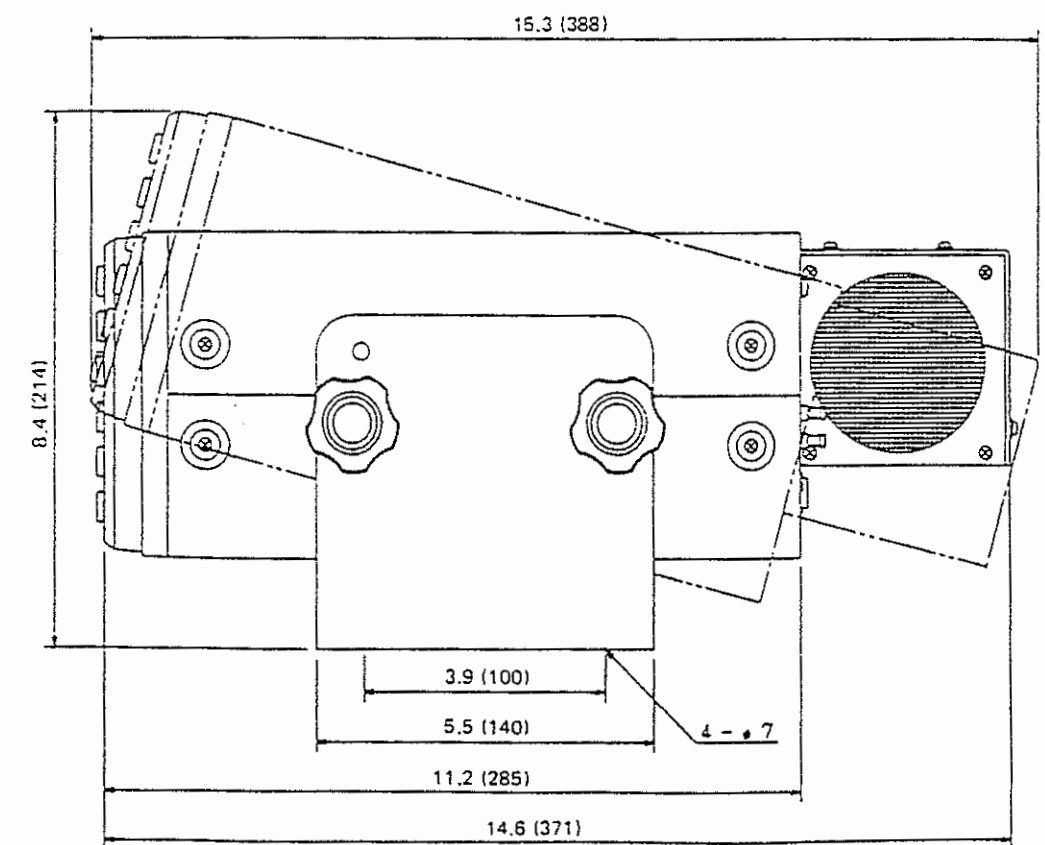
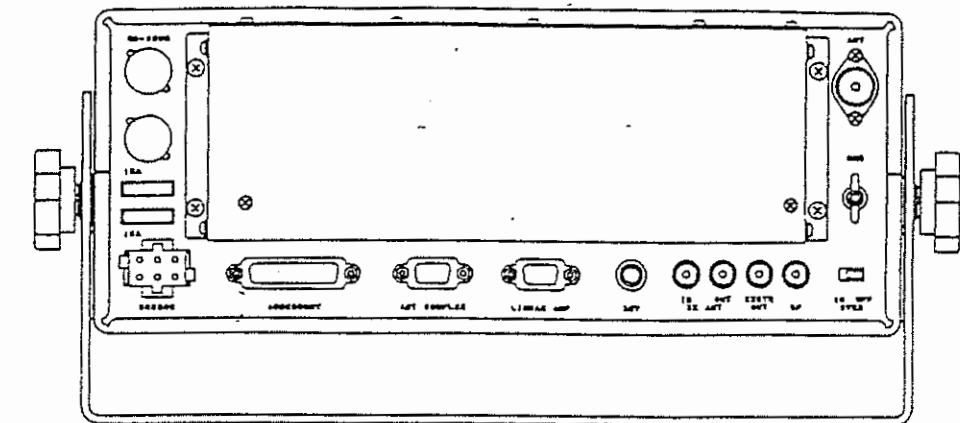


Figure 3-11 RAY 152 Outline and Mounting Dimensions

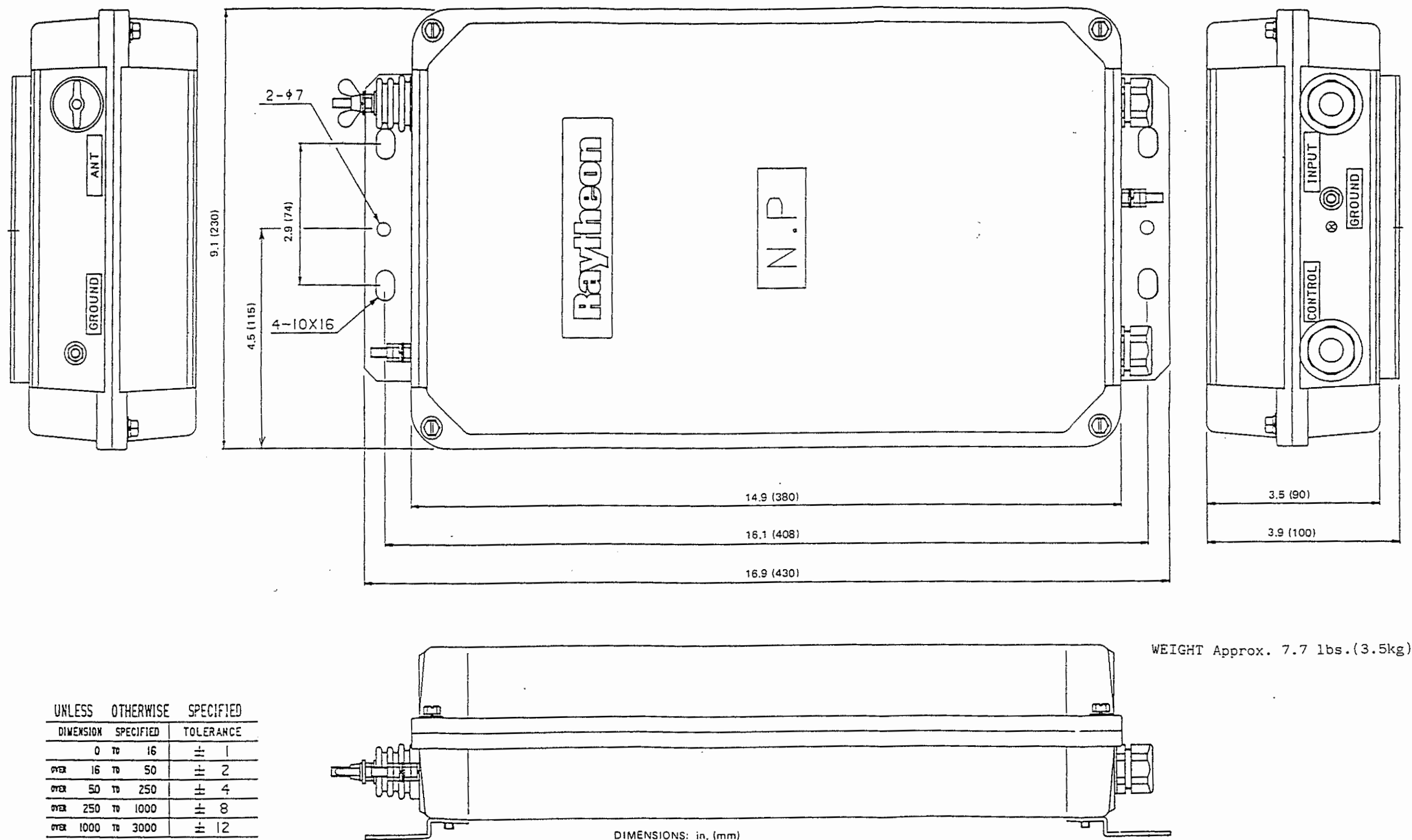


Figure 3-12 AC 152 Antenna Coupler Outline and Mounting Dimensions

3.4 MOUNTING THE ANTENNA COUPLER

The antenna coupler is of a weather proof design. It must, however, be protected from physical abuse, kept from being awash, located out of direct salt water spray, and must be located so that personnel are deterred from coming within 12 inches of contacting the output conductor, antenna lead, and the antenna itself. Very high voltages exist on the antenna during transmit, which can result in severe burns to persons coming in contact with the antenna system.

A wire with high voltage insulation (7000 volts or greater) should be used for the connection from the antenna to the coupler output. This wire should be as short as possible and be secured against movement, as needed, with high voltage standoff insulators. Wire of at least 14 AWG is recommended. Alternately, 1/4" copper pipe may be used.

3.5 ELECTRICAL CONNECTIONS

The power cable supplied with your RAY 152 has two red and two blue wires. The two blue wires are connected together and wired to the negative (-) terminal of the 13.6 Vdc source. The two red wires are connected together and wired to the positive (+) terminal of the 13.6 Vdc source. As this radio draws up to 30A on transmit peaks, #8 AWG wire should be used for runs up to ten feet (3 meters). For longer runs, even larger wire is required. (Refer to Figure 3-13). It is recommended to use an oversize wire from the power source to a terminal block located near the radio. The supplied power cable is then connected to this terminal block.

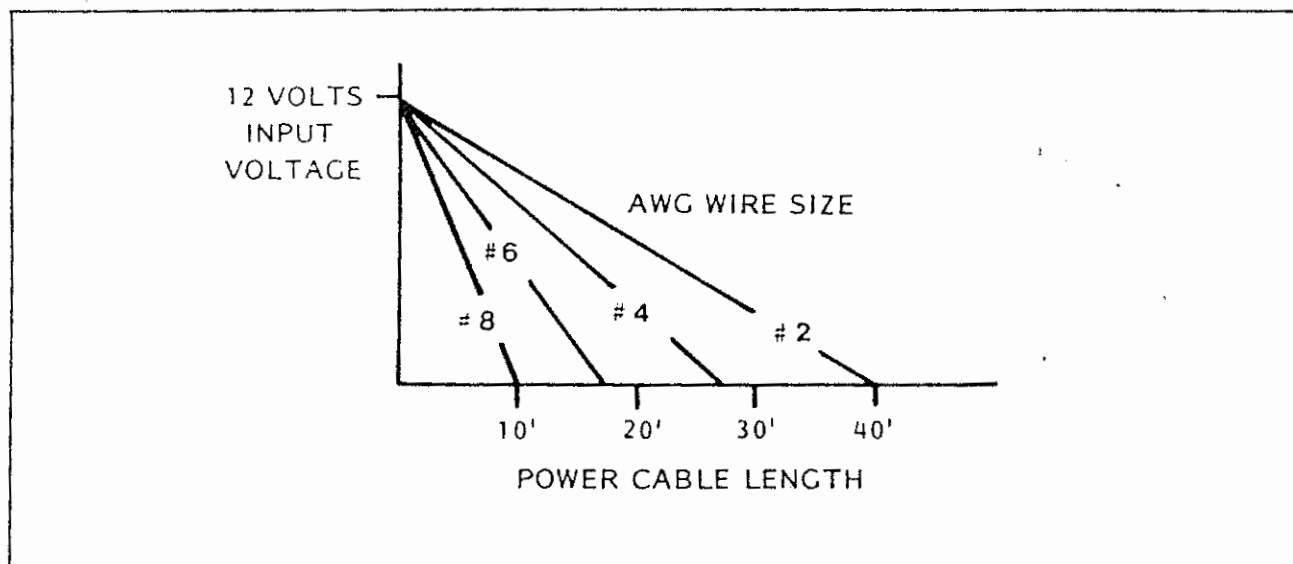


Figure 3-13 Power Cable Size Versus Length

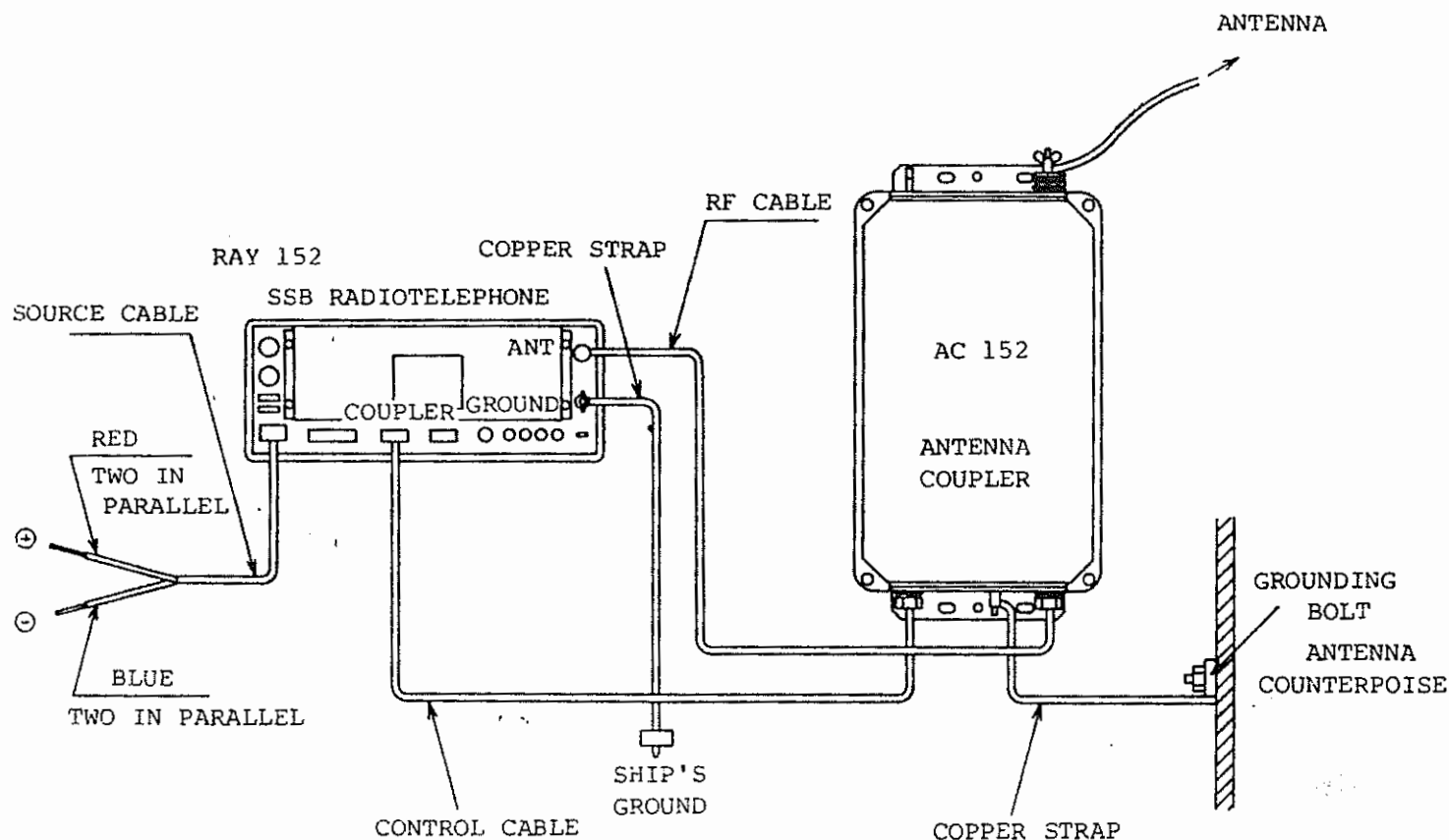


Figure 3-14 Equipment Connection

3.6 RF BONDING

The installation should be made with particular attention to RF bonding. A proper RF bonding system is an absolute requirement for an efficient radio system. A poor RF bonding system inhibits proper antenna radiation through high RF losses which reduce the amount of power for communications.

For vessels with metal hulls, a direct, clean contact should be made between the coupler ground stud and the hull. All contact areas should be thoroughly cleaned and electrical flux or some other gas and water tight sealant used to prevent corrosion. When connections are to be made between copper and a dissimilar metal, such as aluminum or steel, a compound such as NOALOX should be used to prevent contact deterioration due to a galvanic action. Avoid using RTV silicone as a sealant. During the curing process RTV releases acetic acid which enhances corrosion and galvanic action.

On vessels with wooden or fiberglass hulls, it is necessary to supply the coupler with a ground screen of at least 100 square feet, located directly at the coupler. In addition, all large metal masses, such as keel, masts, engines, stays, cables, chains, metal tanks, propellor shaft housings, etc., should be bonded together with copper straps which are at least two inches (50 mm) in width and from .040 to .060 inches (1 to 1.5 mm) thick. Individual straps should run from the coupler to the screen and to each of the large items (engine, tanks, etc.). Never "daisy chain" the bonding system. Refer to Section 3.3.

The resultant bonding system should be connected to a good external direct current ground using the same type of strap material. The connection can be through the hull. The external ground system can consist of either :

- A. Two or more porous bronze plates mounted on the outside of the hull below the waterline. The plates must be 6 X 12 X 0.5 inches (152 X 305 X 12 mm) minimum.
- B. Two 1.25 inch (31.8 mm) diameter copper tubes, each of which are at least 20 feet (6.1 meters) long. The preferred location for the tubes is on either side of the keel.

A connection from the RF bonding system of the vessel to the antenna coupler and to the radio should be made with the same type of copper strap or foil mentioned in the previous paragraphs. If necessary, the wide strap can be ended out of sight behind the radio and a three to four inch (80 to 100 mm) length of one inch (25 mm) strap used to make the connection to the ground connection on the rear of the radio.

The target of a good bonding system is to construct an antenna counterpoise which begins at the antenna coupler. A good RF bonding system is an exceedingly important part of the overall antenna system installation. Without proper RF bonding, antenna system efficiency will be poor and the tuned antenna system, of which the RF bonding is an integral part, may have some very undesirable characteristics. It is suggested, therefore, that the nearest Raytheon Service Center or your dealer be contacted in those instances where special attention is required.

3.7 ANTENNA LEAD-IN

The antenna lead-in will periodically have a high RF voltage on it. Consideration, therefore, must be given to its location and insulation. Type GTO-15 or 19 insulated, lead-in wire should be used to connect the antenna to the output insulator terminal of the antenna coupler. This lead-in should be as short as possible and held away from metal surfaces using standoff insulators. In addition, in those areas where the lead-in must run parallel to a metal surface, it may be necessary to use a non-conducting stiffener to prevent impedance changes due to swaying of the lead. Alternatively, 1/4" copper pipe may be used.

3.8 POST INSTALLATION CHECKOUT

1. Prerequisite to operation of the radio is the complete testing of the radio into a 50 ohm load. The transmitter is to be checked out on all channels covered by your license.
2. Connect the radio to ship's power.
3. Connect a peak reading wattmeter (such as a Bird Model 4314 or equivalent) and a 50 ohm load to the output connector of the radio. Each must be capable of measuring the 150 watt output of the transmitter.
4. Check the transmitter for normal power output into the 50 ohm load on all the licensed channels.

NOTE

For an average wattmeter, the reading will be 40.5% of peak envelope power with a perfect two tone output. With a whistled single tone on an J3E channel, the wattmeter will read close to true power. If the two tones are unequal, or if there is a complex wave, the wattmeter indicates only that there is power out; magnitude is unknown.

5. Check the transmitter frequency to ensure that it is within the legal tolerance.
6. Connect the AC 152 to the RAY 152 in the final installation configuration. Tune 2182 kHz, memory stations, and selected ITU channels (see Table 2-3). This will enter the coupler preset values into memory so that subsequent tuning should not be required.
7. Make appropriate log entries.

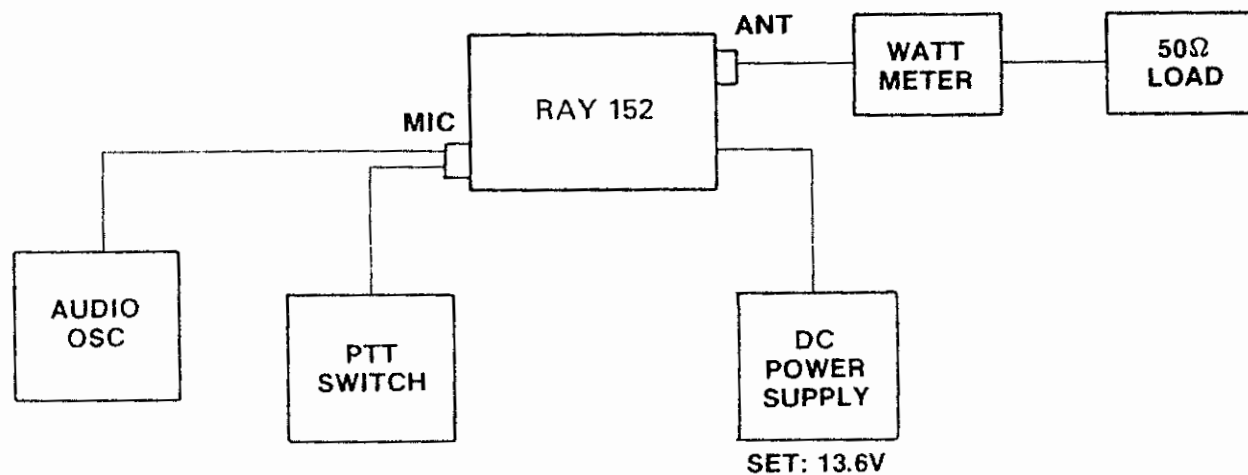


Figure 3-15 Checkout Block Diagram

SECTION 4

THEORY OF OPERATION

4.1 GENERAL

Refer to the Block Diagram (Figure 4-6).

The RAY 152 consists of the six blocks: chassis, panel, receiver, transmitter, synthesizer, and control blocks.

The chassis block includes the mother board, PA Unit, PA heat sink, and rear panel. The mother board connects each plug-in unit. The PA Unit amplifies the transmit signal from the RF TUNE Unit to the rated output, and supplies the source voltages of 5V and 9V to the individual circuits. The PA Unit employs the newly developed cooling system to enable the continuous transmission.

The panel employs the keypad to operate the radio. The operating condition, frequencies, modes, etc. is displayed on the LCD. The keypad and LCD are back lighted by the ELs (electric luminescence).

The receiver employs the triple superheterodyne configuration: 1st IF of 70.455 MHz, 2nd IF of 455 kHz, and 3rd IF of nominal 97 kHz. The input circuit employs the electronic tuning to improve the two-signal characteristic. The electronic tuning circuit is also activated for the transmitter to suppress the spurious. The circuit tunes according to the control voltage from the CPU.

The transmitter block converts the audio signal from a microphone into 455 kHz (BAL MOD), 70.455 MHz (TX MIX 1) and desired frequency (TX MIX 2) and drives the PA Unit. In A1A mode, BFO signal (455 kHz) is applied to TR2 in the IF FIL Unit. At this time, BAL MOD (IC3) deactivates.

The synthesizer block employs the highly stable reference oscillator of 20 MHz to generate 70.545-100.45499 MHz, 70 MHz, and BFO signal used in the transmitter and the receiver blocks. Of these, 70.545-100.45499 MHz and BFO signal are generated by the newly developed DDS (Direct Digital Synthesizer). The DDS has the following features:

- (1) Vibration resistant since no VCO is used.
- (2) Quick response since no feedback loop is used.
- (3) Simple circuit configuration

The control block switches and controls the circuits. The control block employs the main CPU and the sub CPU. The main CPU is located on the CPU Unit and controls the transmitter, receiver and synthesizer circuits. The sub CPU is located on the Display Unit and controls the LCD display and key entry.

4.2 FREQUENCY SYNTHESIZER

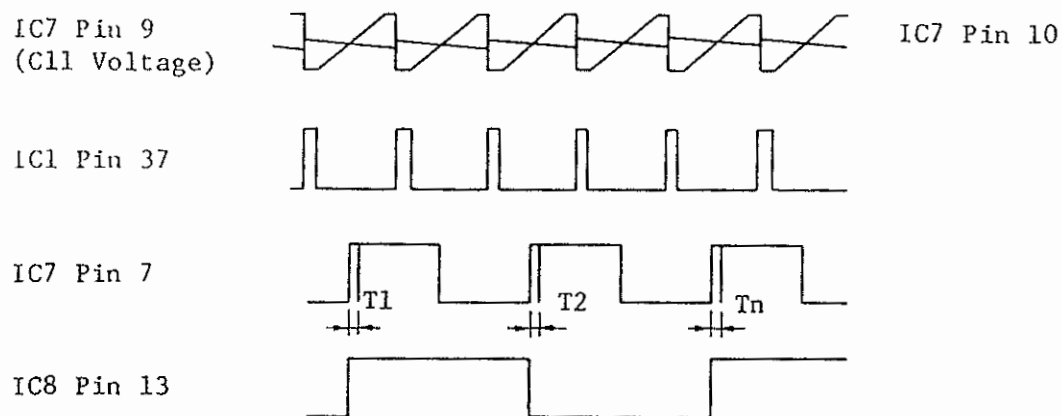
4.2.1 REF/DDS UNIT (CGK-81R)

The REF/DDS Unit includes the address decoder, 20 MHz standard oscillator (STD OSC), two Direct Digital Synthesizers (DDS), and 70 MHz PLL synthesizer.

The address decoder consists of the NAND (IC13), addressable latch (IC14), and 3 to 8 line decoders (IC15 and IC16). It transfers the data from main CPU to the individual synthesizers.

The 20 MHz STD OSC consists of the 20 MHz crystal oscillator (TR5), buffer (TR6-TR8), and 1/10 divider (IC9). The crystal oscillator assures the ± 0.5 ppm stability. The STD OSC supplies all the reference frequencies to the synthesizers. The 20 MHz output signal from TR5 is supplied to Pin 14 on IC19 and Pin 16 on IC1 and IC2. The output from IC19 (1/10 divider) is 2 MHz. The waveform of this signal is shaped by the LPF, and the signal is supplied to Pin 10 on IC12 and Pin 5 on IC17, and TR8. The signal amplified by TR8 is supplied to the Loop 1 Unit.

Two DDSes generate a part of the frequencies in the local frequency synthesizer and the BFO signal. The local frequency synthesizer consists of the PLL synthesizer and DDS. The PLL synthesizer on the Loop 1 Unit generates 70.545-100.45499 MHz in 100 kHz steps, and the DDS on the REF/DDS Unit generates 0.545-0.445 MHz in 10 Hz steps. The DDS circuit consists of the DDS IC (IC1), level converter (IC3 and IC4), D-A converter (RA1 and RA2), constant current circuit (IC5 and TR1), comparator (IC7), and flip flop (IC8). The frequency data is serially written to IC1 by the CPU. The data is supplied to Pin 18 on IC1, and the clock signal is supplied to Pin 19 on IC1. When 24-bit data is supplied to the IC, the latch signal is applied to Pin 17 on IC1, and writes the frequency data to complete one-cycle operation. IC1 converts the serial data into parallel. According to the data, IC1 directly synthesizes the frequency from the 20 MHz reference signal supplied to Pin 16 on IC1. The output frequency from Pin 37 on IC1 is equivalent to two times the written frequency data. This output signal, containing an error, drives TR2 and discharges C11. The output data with an error is fed to Pins 38 to 47 on IC1. The data is D-A converted and supplied to Pin 10 on IC7. The following figure illustrates the waveforms at some pins described above.



T1 - Tn varies in the range of 0 to 50 ns according to the error.

Figure 4-1 DDS Waveforms

The frequency data is output to Pins 26-35 on IC1, and the data is D-A converted by the ladder (RA2), and supplied to the constant current circuit of IC5. IC1 has the frequency compensatory circuit which assures the low phase jitter in the frequency range of 0.545-0.455 MHz of the DDS. The output signal (Pin 12 on IC8) from the DDS passes through the 0.545-0.445 MHz BPF and is supplied to Pin 1 on the mixer (IC12), where it is mixed with 2 MHz supplied to Pin 10 on IC12, and converted into 2.545-2.445 MHz. The unwanted components of the converted signal (at Pin 6 on IC12) are eliminated by the 2.545-2.445 MHz BPF, and the signal is supplied to the Loop 1 Unit.

The BFO signal synthesizer consists of the DDS (IC2), D-A converter (RA3), constant current circuit (TR3), comparator (IC6), and flip flop (IC20). The BFO synthesizer is the same circuit configuration as the DDS block mentioned above. This DDS covers the output frequency range of 453.5-456.7 kHz in 10 Hz steps. Because the frequency range in the BFO synthesizer is so narrow that the DDS frequency compensation is not required. For this reason, Pins 26-35 on IC2 are not used. The waveform of the BFO signal (Pin 13 on IC20) from the DDS is shaped by the LPF, and then the signal is supplied to the transceiver block as the BFO signal.

The 70 MHz PLL synthesizer consists of the VCO (TR9), buffer amplifier (TR10, TR11, and TR15), PLL IC (IC17), and active LPF (TR12-TR14). The VCO output frequency from TR9 is 70 MHz. This signal passes through the buffer amplifier (TR10 and TR11), and is supplied to Pin 11 on IC17.

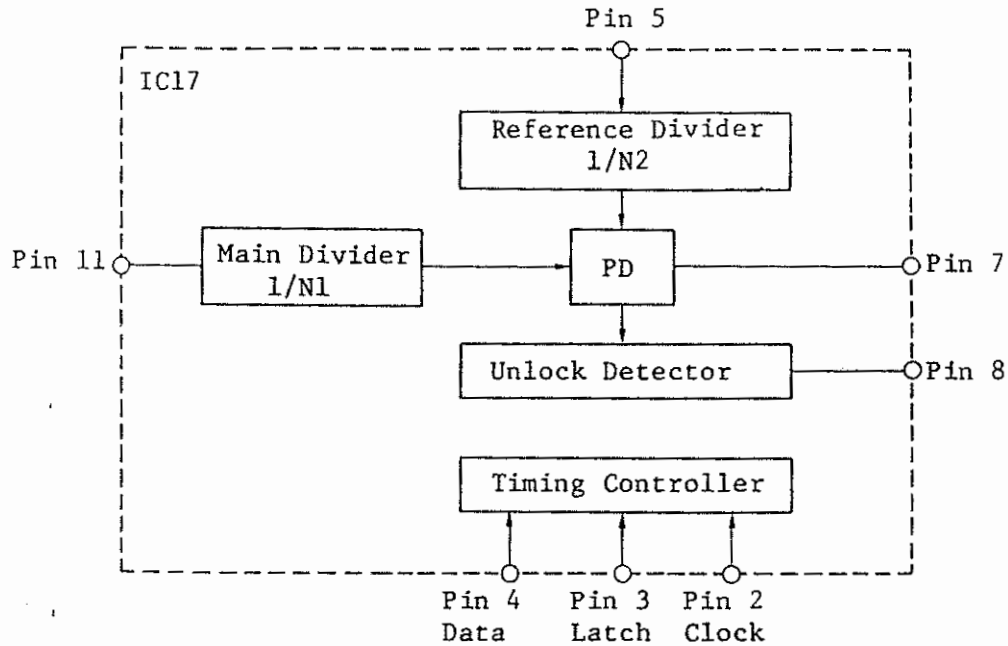


Figure 4-2 PLL IC Configuration (IC17)

Since the output frequency from this synthesizer is fixed to 70 MHz, the division number $N1$ and $N2$ are set to 70 and 2, respectively. The reference frequency of the phase detector is 1 MHz. So, 2 MHz from the 20 MHz STD OSC is supplied to Pin 5 on IC17. The data of $N1$ for the main divider and $N2$ for the reference divider is serially written to IC17 by supplying the data, latch and clock signals from the CPU to the Pins 4, 3, and 2. The phase detector output (Pin 7 on IC17) is converted into the DC signal by the active LPF to control the frequency according to the phase error. This output from Pin 8 on IC17 goes high if the PLL is unlocked, and drives TR17 to illuminate the UNLOCK indicator CD7. CD4 and IC18 constitute the FM modulator circuit, but it is not activated in the RAY152.

4.2.2 LOOP 1 UNIT (CGA-145)

The Loop 1 Unit is a PLL type synthesizer and generates 70.545-100.45499 MHz frequency in 100 kHz steps. The Loop 1 Unit consists of the frequency converter (TR12, IC6, FL3, and TR13), VCO (TR1, TR2, and TR3), and PLL IC (IC5). TR12 in the frequency converter is the multiplying circuit. It multiplies 20 MHz by 3 to produce 60 MHz, and supplies it to Pin 11 on IC6. IC6 is a mixer which converts 2.545-2.445 MHz signal from DDS into 57.455-57.555 MHz signal. The unwanted components are eliminated by the SAW filter (FL3). The signal is amplified by TR13 and supplied to Pin 11 on IC4. The three VCOs in the VCO block cover the frequency range of 70.545-100.45499 MHz as follows:

TR1	VCO1	70.545 - 80.45499MHz
TR2	VCO2	80.455 - 90.45499MHz
TR3	VCO3	90.455 - 100.45499MHz

TR9, TR10, and TR11 are the switching transistors of VCO1, VCO2, and VCO3. One of these transistors is turned on according to frequency selected. The output signal from VCO passes through the buffer amplifier (TR4), and is supplied to local amplifiers (IC1 and IC2). The output from IC1 passes through the BPF, and is supplied to the transceiver block as the 70.545-100.45499 MHz local signal. On the other hand, the output from IC2 is converted into 13-43 MHz by the mixer (IC4), passes through the LPF and buffer amplifier (IC3), and is supplied to PLL IC (IC5). The PLL IC (IC5) is the same as IC17 used in the REF/DDS Unit. The dividers has the following division range:

$$N1 = 130-430$$

$$N2 = 20$$

The division number is serially set by the CPU. The reference frequency of this PLL is 100 kHz. So, 2 MHz is supplied to Pin 5 on IC5. The relations among the transmit/receive frequency (f_{TR}), VCO frequency (f_{VCO}), frequency at IC5 Pin 11 (f_{IF}), and the division number (N1) for the main divider are as follows:

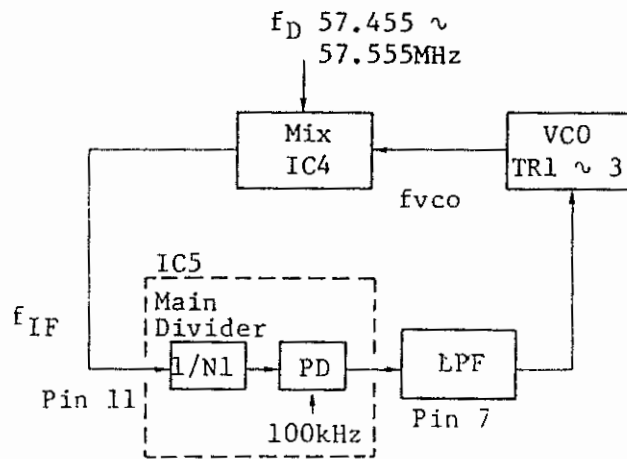


Figure 4-3 Loop 1 PLL Configuration

Assume the 100 kHz digit and more of the transmit/receive frequency (f_{TR}) as F1, and the 10 kHz digit and less as F2. For instance, when the transmit/receiver frequency is 2.154 MHz, F1 is 2.1 MHz, and F2 is 0.054 MHz.

$$f_{VCO} = 70.455 + f_{TR}$$

$$f_{VCO} = f_{IF} + f_D$$

$$N1 = 10 \times (13 + F1)$$

$$f_{IF} = N1 \times 0.1 \text{ MHz}$$

$$f_D = 57.455 \text{ MHz} + F2$$

When $f_{TR} = 12.354$ MHz, then $N1$, f_{IF} , f_D , and f_{VCO} are as follows:

$$f_{TR} = 12.354 \text{ MHz}$$



$$f_{VCO} = 70.455 \text{ MHz} + 12.345 \text{ MHz} = 82.809 \text{ MHz}$$

$$N1 = 10 \times (13 + 12.3) = 253$$

$$f_{IF} = 253 \times 0.1 \text{ MHz} = 25.3 \text{ MHz}$$

$$f_D = 57.455 \text{ MHz} + 0.054 \text{ MHz} = 57.509 \text{ MHz}$$

4.3 TRANSCEIVER

4.3.1 RF TUNE UNIT (CFL-244)

This unit includes the RF tuning circuit mainly, and is used both in transmission and reception. It consists of the circuits that receive the incoming signal through the antenna terminal and convert it into the 70.455 MHz receiver IF signal, and the circuits that convert and amplify the 70.455 MHz transmitter IF signal into the desired transmit frequency.

The RF tuning, which is the main circuit in this unit, consists of six frequency bands. One of the bands is selected according to the operating frequency by the decoder (IC2) and TR7. For each band, a variable parallel tuning circuit is formed by the variable capacitors and transformers, and the variable double tuning method is employed to assure more sharp tuning characteristic. (except for the 100 kHz-400 kHz band)

Table 4-1 Band Classification in RF Tuning Circuit

Class	Frequency	Remarks
1	100 kHz-0.4 MHz	LPF method
2	0.4 MHz-1.6 MHz	Variable double tuning method
3	1.6 MHz-4.4 MHz	
4	4.4 MHz-12.3 MHz	
5	12.3 MHz-20.5 MHz	
6	20.5 MHz-30 MHz	

The tuning frequency of the circuit is controlled by the tuning voltage from the CPU. The tuning voltage is generated in the CPU Unit according to the operating frequency in 100 kHz steps. This tuning circuit is used both in transmission and reception.

The incoming signal received through the antenna terminal passes through the 20dB attenuator switching circuit (K1), excessive input protection diodes (CD6-CD9), and enters the RF tuning circuit. The unwanted components of the incoming signal are eliminated by the RF tuning circuit, and the desired signal passes through the 35 MHz LPF and is applied to the receiver RF amplifier (TR9 and TR10). The receiver RF amplifier uses the low noise junction FETs in gate ground to amplify the wide frequency range with high reliability and low noise. The output signal of the RF amplifier is mixed with the local signal by the mixer (TR11 and TR12), and converted into the 70.455 MHz receiver IF signal. The mixer employs the balanced type circuit and assures high receiver performance with the aid of the RF tuning circuit and receiver RF amplifier. The 70.545-100.45499 MHz local signal supplied by the Loop 1 Unit is amplified to the required level by TR13, and supplied to the receiver mixer circuit (TR11 and TR12) and to the transmitter mixer circuit (IC3).

In transmission, the 70.455 MHz transmitter IF signal from the IF FIL Unit is mixed with the local signal by the double balanced mixer IC3 to convert it into the desired transmit frequency signal. This signal passes through the buffer amplifier (TR14), and the unwanted spurious components are eliminated by the 35 MHz LPF and the RF tuning circuit, which are also used for reception. The transmit signal through the RF tuning circuit is applied to the wide band amplifier IC (IC1), and fed to the step attenuator circuit (TR1 through TR4). The step attenuator circuit compensates the transmitter frequency response from the RF tuning circuit to the antenna terminal within ± 0.5 dB. The circuit can control the attenuation up to 8dB in 0.5dB steps. With the aid of the CPU, the circuit controls in 100 kHz steps. Then, the transmit signal is amplified by TR5 and TR6 to the level suitable for driving the PA Unit. The TR6 output is switched to either the PA Unit side or the rear panel EXCTR OUT side by the relay K2.

4.3.2 IF FIL UNIT (CFH-38R)

NOTE: In the following description, circuits associated with FM mode are not activated in the RAY152.

The IF filter Unit is mainly composed of the IF filters to determine the bandwidth both in transmission and reception. In reception, the received 70.455 MHz IF signal from the RF TUNE Unit is converted to the 455 kHz IF signal. The 455 kHz IF signal passes through the noise blanker (NB) and one of the IF filter selected to secure the required selectivity. In transmission, the voice signal from the DISPLAY Unit is converted into the 455 kHz SSB signal. The signal is also converted into the 70.455 MHz IF signal to drive the RF TUNE Unit. In this unit, the carrier injection circuit for H3E, A1A and FM modes is also installed.

The filter circuit consisting of FL3 through FL6 determines the IF bandwidth both in transmission and reception. IC1 decodes the IF filter selection data from the CPU Unit to select the desired filter. Only for reception in FM mode, CD8 and CD9 are activated to pass through the filter circuit. Therefore, the selectivity for FM mode is determined by the 70.455 MHz IF filter FL1 and NB circuit filter FL2.

The 70.455 MHz receiver IF signal from the RF TUNE Unit passes through the monolithic filter (MCF) FL1 and is amplified by TR17. TR17 is the dual gate MOS FET and secures the satisfied AGC characteristic. TR17 output is mixed with the local signal (70 MHz) from the REF/DDS Unit by the balanced FET mixer (TR15 and TR16), and converted into the 455 kHz receiver IF signal.

This local signal is amplified by TR18 and supplied to the receiver mixer (TR15 and TR16) and the transmitter mixer (IC4). The NB circuit consists of the gate circuit and noise amplifier circuit. The 455 kHz receiver IF signal is applied to these two circuits. The signal directed to the gate circuit side passes through FL2 and the balance type gate circuit (CD21 and CD22). On the other hand, the signal directed to the noise amplifier circuit is amplified by the noise amplifier (TR12, TR13, and TR14). The gain of this noise amplifier is automatically controlled by the AGC circuit (CD20, TR10, and TR11). The noise components contained in the IF signal are detected by the noise detector circuit (CD18, CD19, TR7, TR8, and TR9). The detected noise turns on and off the gate circuit to blank the noise components contained in the 455 kHz IF signal. The signal from the NB gate is fed to the IF filter group (FL3 through FL6) and the desired selectivity is secured. Then, the signal is sent to the IF AMP Unit.

The voice signal from the DISPLAY Unit and the line input signal from the rear panel are mixed and the level is adjusted by IC2. Then, the signal is sent to IC3, and to the REF/DDS Unit for FM modulation. IC3 is a balanced modulator which generates the 455 kHz DSB signal by mixing the BFO signal and the voice signal. The DSB signal is changed into the SSB signal as it passes through the FL4 in the filter group, and applied to the 455 kHz amplifier (TR2). To TR2 the carrier is injected for H3E, A1A and FM modes. TR2 amplifies the SSB signal and the gain is automatically controlled by the APC voltage from the LPF Unit to maintain the power output constant. The output of TR2 is mixed with the 70 MHz local signal by the double balanced mixer (IC4), and converted into 70.455 MHz transmitter IF signal. The IF signal passes through the IF amplifier (TR3) and the unwanted component is eliminated by the monolithic filter (FL1), and the signal is sent to the RF TUNE Unit.

4.3.3 IF AMP UNIT (CAE-227)

This unit includes the receiver local OSC block, IF AMP block, demodulator, AGC circuit, squelch circuit, and line out amplifiers.

The local OSC block consists of the 358 kHz oscillator (TR9), buffer amplifier (TR10), and mixer (IC4). The 358 kHz oscillator (TR9) utilizes the ceramic oscillator (X1). CD2 and CD28 are the variable capacitor diodes for adjusting the X1 oscillator frequency. The frequency is controlled by the control voltage from TR11. In the RAY152, the control voltage is fixed to oscillate the frequency of 358 kHz. The output signal from TR9 passes through the buffer amplifier (TR10), and is supplied to the gate 2 of TR3 and Pin 2 on IC4. The mixer (IC4) mixes the 358 kHz signal and the BFO signal, and its output signal is used as the carrier signal for the product detection. The frequency of the carrier signal is allocated according to the mode as follows:

Table 4-2 BFO and Product Detection Frequencies

Mode	BFO Frequency	Carrier frequency for product detection
A1A	454.2 kHz	96.2 kHz
F1B	456.7 kHz	98.7 kHz
LSB	453.5 kHz	95.5 kHz
USB	456.5 kHz	98.5 kHz

The IF AMP block consists of the 455 kHz IF amplifier (TR1 and TR2), mixer (TR3), and nominal 97 kHz IF amplifier (TR7). The 455 kHz IF signal is amplified by TR1 and TR2. The output of TR2 is mixed with the 358 kHz local signal supplied from TR10 and converted into the 97 kHz IF signal by TR3. This signal is amplified by TR7 to a level suitable for the demodulator circuit in the next stage. TR4, TR5, TR6, and T4 constitute a notch filter, but it is not activated in the RAY152. Therefore, TR5 is always on.

The demodulator consists of IC2. IC2 operates as the synchronous detector in H3E mode, and as the product detector in other modes. The carrier for synchronous detection is supplied to Pin 2 on IC2 from the limiter circuit (TR17). The carrier for product detection is supplied to Pin 2 on IC2 from IC4.

The AGC circuit consists of the rectifiers (CD5, CD6, TR19, and TR20), time constant circuit (C103, R105), analog switches (IC5 and IC6), and operational amplifier (IC7). Two AGC rectifiers are employed. One is for peak detection and the other is for average detection. The peak detection consists of CD6 and TR19, and is used in SSB, A1A, and F1B modes. The average detection consists of CD5, R98, C100, and TR20, and is used in H3E mode. These rectifiers are switched by the analog switch (IC5). IC6 switches the AGC time constant. In the RAY152, the time constant is fixed to FAST. The AGC voltage is output from Pin 7 on IC7, and controls the gate 2 of TR1 and TR2. The AGC voltage passes through R115 and also controls TR17 in the IF FIL Unit.

The squelch circuit consists of a comparator (IC9) and a muting circuit (TR35). This squelch circuit is effective in all the modes. The AGC voltage from Pin 7 on IC7 is applied to Pin 5 on IC9. The control voltage to adjust the squelch level is also applied to Pin 6 on IC7 from the DISPLAY Unit. These two voltages are compared by IC9. When the voltage at Pin 5 on IC9 is higher than the voltage at Pin 6 on IC9, TR35 is turned on to mute the AF output.

The line out amplifiers consist of IC11 1/2 and IC12 1/2. IC12 1/2 is an amplifier for LINE OUT 1. The LINE OUT 1 is off while the squelch is closed. IC11 1/2 is an amplifier for LINE OUT 2. The LINE OUT 2 is on regardless of the squelch.

In this unit, the beep sound oscillator (TR14) and the side tone oscillator (TR26) are also provided. The former generates approximately 2 kHz short sound when the key on the panel is operated. The later generates approximately 800 Hz monitoring sound when the morse key is pressed in AIA mode. The outputs from these oscillators are applied to the AF AMP Unit to drive the speaker.

IC8 is an FM demodulator, but it is not activated in the RAY152.

4.3.4 PA UNIT (CAH-301L-2)

The desired frequency transmit output signal from the CFL-244 RF TUNE Unit TR6 is amplified to 150W PEP in the PA UNIT CAH-301L-2. This unit contains three stages of amplification. First and second stages are Class A amplifiers and the third is Class AB push-pull.

Bias currents for TR1 and TR11 are supplied by TR52 while those for TR31 and TR32 are supplied by the bias circuit made up of TR53 and IC51. The idle currents of TR31 and TR32 are adjusted by RV51 to total about 300 mA. CD53 cathode is thermally coupled to the flange of TR31 which controls the bias according to the temperature of the transistors.

The PA Unit, together with the LPF Unit, is cooled with a fan to allow the semi-continuous transmission. The fan is switched on and off by the IC81 and TR81 circuit according to the heatsink temperature. When the temperature rises up to approximately 60°C, the fan is activated. If the temperature rises up to approximately 90°C, the protect signal is generated by IC81 and fed to the CPU to reduce the power output. This protection is not released until the radio is turned off and on.

Two voltage regulators are physically located on this board; IC72 and TR71, which are a 9 Vdc source for analog circuits throughout the transceiver, and IC71 which is a 5 Vdc source for digital circuits throughout the transceiver.

4.3.5 LPF UNIT (CFJ-122-2)

The LPF Unit consists of six filters to attenuate harmonics from the power amplifier to less than -65 dB below PEP. The filters are selected by relays which are driven by relay driver IC1 which is controlled by a 3 bit code through IC2. The relationship between the frequencies, coded signal, and filters is as follows:

Table 4-3 Filter Selection Code, LPF Unit

Frequency Range (MHz)	FIL SEL			Filter
	4	2	1	
1.6000 - 2.5999	0	0	1	2.5 MHz LPF
2.6000 - 4.1999	0	1	0	4.2 MHz LPF
4.2000 - 6.7999	0	1	1	6.8 MHz LPF
6.8000 - 11.0999	1	0	0	11.1 MHz LPF
11.1000 - 18.0999	1	0	1	18.1 MHz LPF
18.1000 - 29.9999	1	1	0	30 MHz LPF

The sample of the transmit forward power is rectified by CD152, which composes the SWR detector together with CD151 and T151, and amplified by IC4 and IC3 to generate the APC voltage. The APC voltage controls the gain of TR2 in the IF FIL Unit to remain the transmitter output at 150W PEP. The sample of the transmit reflected power is also rectified by CD151 and amplified by IC4. If the higher reflected power is detected, IC3 generates the APC voltage to protect the power amplifier by reducing the output.

The full power level (150W PEP) is adjusted by RV191, reduced power (50W PEP) by RV192, and coupler tuning power by RV193.

The transmit signal is fed to the antenna terminal through the antenna current detector. The antenna current is detected and rectified by T152 and CD153 to indicate it on the check meter.

The received signal from the antenna is fed to the RF TUNE Unit through the TR switching relays K1 and K2. These relays are controlled by the CPU so that they can not be activated at the same time.

4.3.6 AF AMP UNIT (CBD-894L)

This unit consists of the AF power amplifier, collector current detection circuit, and the over current detection circuit.

The AF power amplifier amplifies the demodulated signal which is level adjusted by IC15 on the DISPLAY Unit, the beep and the side tone signal from the IF AMP Unit to drive the speaker.

The collector current detection circuit detects the collector current of the final power amplifier. The collector current passes through L22 and L23, where the current is converted into magnetic flux. The magnetic flux is converted into the DC voltage by the Hall device (CD31). The DC voltage is amplified by IC31 1/2, and converted into digital signal by the A/D converter (IC10) on the DISPLAY Unit. The digital signal is processed by CPU (IC1) on the DISPLAY Unit, and again converted into analog signal by the D/A converter (IC14) to drive the meter.

The overcurrent detection circuit consists of the other IC31 1/2. The circuit detects the overcurrent of the collector current to protect the final transistors. If the overcurrent is detected by IC31 1/2, the $\overline{PTCT}$ signal goes "0" and the CPU reduces the output power to approx. 50W. This protection is not released until the radio is turned off and on.

4.4 CPU UNIT (CDC-493R)

The major part of this unit is the 8-bit CPU (IC1). The program for the CPU is stored in the 32-kilobyte EP-ROM (IC3). The frequency of the memory "station" and the various control data are stored in the 8-kilobyte CMOS RAM (IC4), and they are backed up by a lithium battery (BT1). The analog circuits are controlled by the I/O controller (IC5 and IC6) and the synthesizer circuits by IC14. IC12 is a USART for serial data communication with the antenna coupler (AC152), and operates at asynchronous 1200 bps. IC13 is a USART for serial data communication with the DISPLAY Unit, and operates at asynchronous 4800 bps. IC17 constitutes the tuning voltage generator circuit for the RF TUNE Unit.

When the 5V is supplied to the unit, IC16 release the reset of the CPU. Then, the CPU starts control according to the program stored in the ROM (IC3). The major control items are as follows: First, the CPU checks the RAM (IC4) if memory "station" frequency and the operating data of the last power off is normally backed up. To reproduce the status before power off, the CPU controls the analog circuits through the I/O controller (IC5 and IC6), and the synthesizer circuits through IC14. The CPU sends the display, volume, RF gain, and squelch data to the DISPLAY Unit through the USART (IC12). When the antenna coupler (AC152) is connected at this time, CPU sends the operating frequency data through the USART (IC13). When the CPU completes the above operations, it waits the next control request. The next control request occurs when:

- (1) The keypad is operated.
- (2) The PTT switch on the microphone is operated.
- (3) The Morse key is operated in AIA mode.

When the CPU detects any one of these control requests, it controls the analog and/or synthesizer circuits according to the request. When control is over, the CPU waits the next control request again.

The tuning voltage generator circuit consists of the DC/DC converter (IC17, diodes, and capacitors), D/A converter (IC8 and RA4), and control circuit (IC7, TR1, RV1, and RV2). The CPU outputs the proper data to the D/A converter according to the operating frequency. The output from the D/A converter is fed to the control circuit. The control circuit controls the DC/DC converter voltage (approx. 35V) to maintain it at 5.47V to 20V. Thus, the tuning voltage is generated and supplied to the RF TUNE Unit.

For others, the special functions can be definable as follows:

- (1) Removing the RJ0 modifies the transmit frequency range to 1.605-27.9999 MHz.
- (2) Removing the RJ1 modifies the initial mode of the 2182 key to H3E.
- (3) Removing the RJ3 inhibits the direct frequency entry. Therefore, the operation is limited only to recall the memory "station" or the ITU channel.
- (4) Removing the RJ4 selects the optional filter FL5 in AIA mode.
- (5) Removing the RJ5 selects the optional filter FL6 in F1B mode.

The major part of this unit is the 8-bit CPU (IC1). The program for the CPU is stored in the 8-kilobyte EP-ROM(IC3). IC5 is a USART for serial data communication with the CPU Unit. IC6 is the LCD driver to display the operating conditions in the LCD. IC7 is equipped with the I/O, RAM, and timer. The I/O is used to check the key matrix, to control the dimmer (TR5 and TR6), to select the input of the meter indication, and to control the volume IC (IC15). The RAM has the capacity of 256 bytes, and stores the key matrix data and others. IC18 is a D-type flip flop to turn on and off the source power through the relay driver (TR9). IC10 is an 8-bit A/D converter. It converts the analog signal selected by IC11 into digital signal. IC12 and IC13 constitutes a microphone amplifier and the compressor amplifier. They amplify and compress the voice signal from the microphone, and applies it to the IF FIL Unit. IC14 is the four 6-bit D/A converter. It controls the squelch level, RF gain, and meter reading. IC15 is the attenuator for volume control. It controls the attenuation in the range of 0dB to -66dB in 2dB steps.

The CPU operates as follows:

- (1) Checks the key matrix, and sends the key data to the CPU Unit through IC5.
- (2) Checks and processes the data sent from the CPU unit.
 - The display data is sent to LCD through the LCD driver (IC6).
 - The data of RF gain and squelch level is sent to the 6-bit D/A converter (IC14).
- (3) Drives the meter through IC14.
- (4) Controls the brightness of the backlighting through IC7.
- (5) Generates the alarm signal using the built-in timer in IC7.

4.6 AC 152 ANTENNA COUPLER

In the AC 152 Antenna Coupler, matching is performed by a combination of ten series inductors, six parallel capacitors at the input, five parallel capacitors at the output, a series capacitor and a parallel capacitor at the output. The inductors and capacitors are switched by relays under CPU control.

HC51 is a phase detector, which provides data on the phase at the matching input to the CPU specifying whether the phase is L-dependent or C-dependent.

IC4 and IC5 constitute an SWR detector and a Load detector, which provide the matching status to the CPU.

The Tune Start command and the operating frequency data are sent serially from the RAY 152 in 1200 b.p.s.. When the Tune Start command is received, the coupler CPU sends the Power Request command to the RAY 152. Then, the RAY 152 outputs the tuning power and the coupler starts automatic tuning.

Based on the data from HC51, IC4 and IC5, the CPU controls the automatic tuning. Automatic tuning begins with the circuit shown in Figure 4-4. This circuit is used when the antenna impedance is more than the 50 ohms required by the RAY 152. The CPU will search for the combination of L and C in a programmed sequence based on phase and SWR data. Automatic tuning is completed when the SWR falls below 1.5:1. If this is not attainable, the tuning is transferred to the circuit shown in Figure 4-5. This circuit is used when the antenna impedance is less than 50 ohms. Again, the CPU searches for the correct combination of L and C to cause the SWR to fall below 1.5:1, thereby completing the automatic tuning. This "learn" cycle is performed within five seconds (normal).

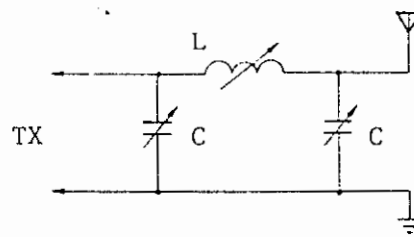
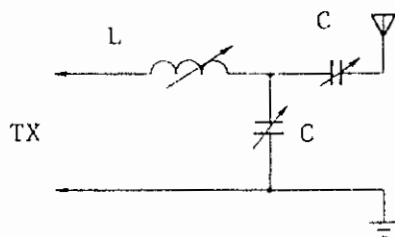


Figure 4-4 Matching Circuit Type 1 Figure 4-5 Matching Circuit Type 2

When the automatic tuning has been completed, the CPU writes the L and C combination data into IC13 (RAM) which is backed up by lithium battery BT1. Once the automatic tuning has taken place initially, the optimum match is recalled by entry of the previously tuned frequency. Set up from memory is accomplished in 50 milliseconds (nominal).

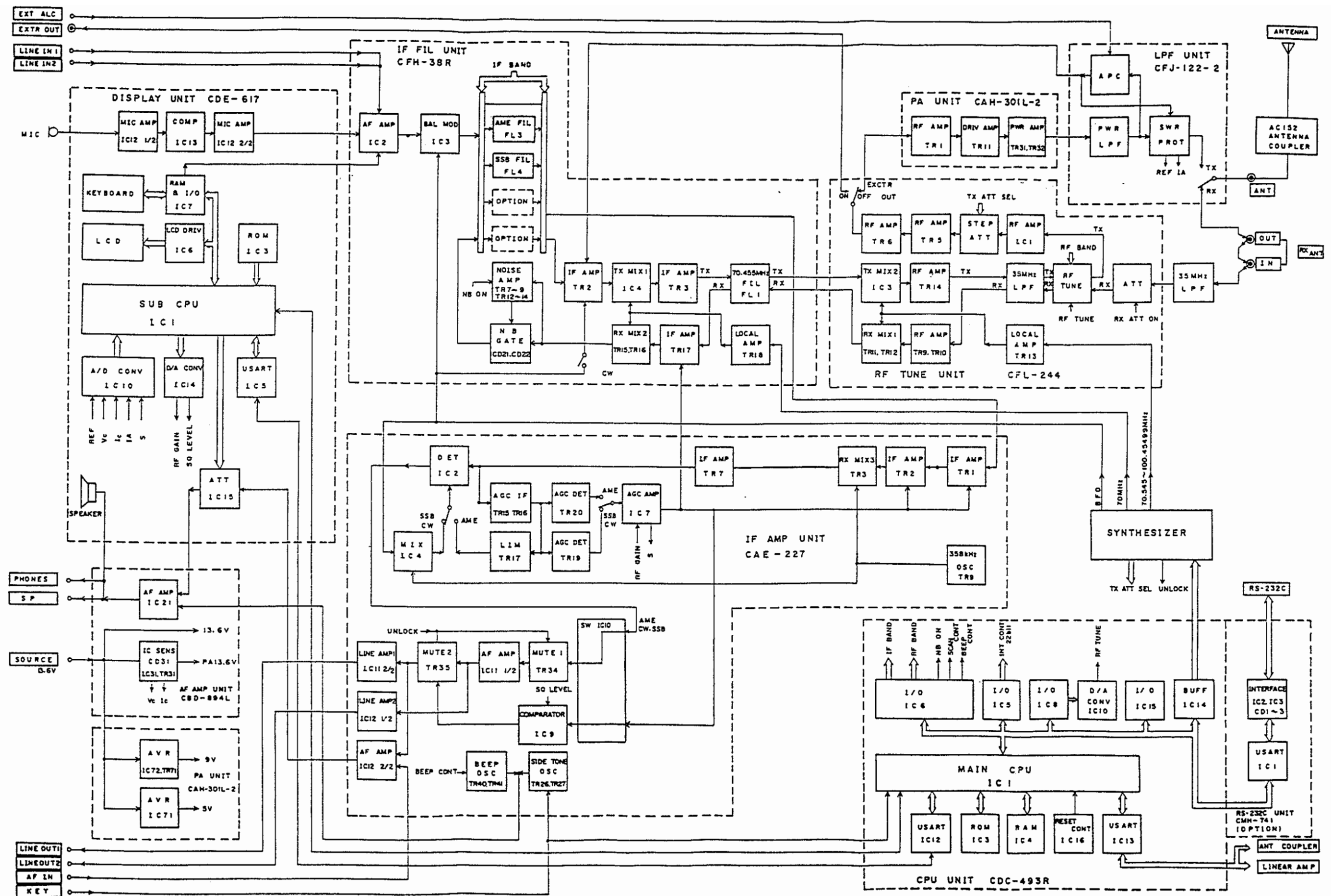


Figure 4-6 RAY 152 SSB Radiotelephone Block Diagram

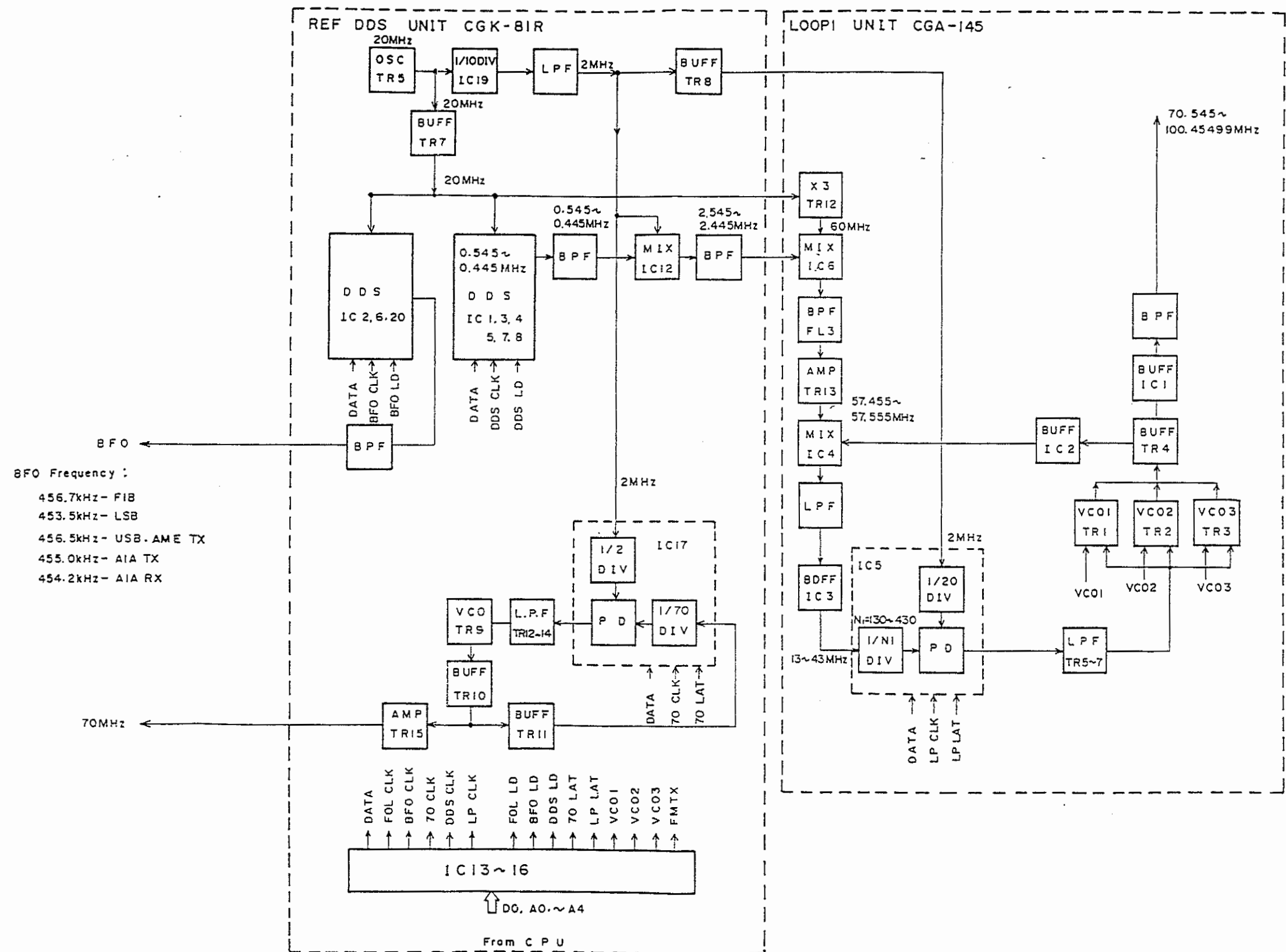


Figure 4-7 RAY 152
Frequency Synthesizer
Block Diagram

SECTION 5

MAINTENANCE AND REPAIR

5.1 GENERAL

This section provides you with servicing instructions for proper preventive maintenance, troubleshooting and servicing. The RAY 152 is designed to provide trouble free operation and adherence to recommended installation and preventive maintenance measures will help to assure this.

5.2 PERIODIC MAINTENANCE

The following procedures are recommended for performance at monthly intervals to minimize the possibility of equipment failure and to assure optimum performance.

1. Inspect the antenna system. Pay particular attention to the cleanliness of the antenna insulator(s), condition of electrical connections, coax transmission line and connectors, antenna and lead-in, and ground strap and connections.
2. Check the condition of the 13.6 Vdc power source. Make sure that all connections are clean, that the conductors have sufficient current capacity, and that the battery has sufficient capacity and high specific gravity.
3. Fuse ferrules are subject to corrosion which increases circuit resistance. Fuses should be removed from their holders, inspected, and cleaned of any accumulation of dirt or corrosion. Terminal connections should be tight and free of corrosion, batteries should be in proper condition and clean, power cabling insulation should be in proper condition to prevent short circuits or corrosion of the conductors.
4. Plastic surfaces should be cleaned with lens tissue or a soft nonabrasive cloth. Care should be exercised with any plastic surface to prevent scratching. Mild soap and water may be used in stubborn cases. DO NOT USE SOLVENTS.

5.2.1 Test Equipment

The test equipment listed below is used for the test setup shown in Figure 5-1.

- | | |
|-----------------------|--|
| 1. DC Power Supply | 13.6 Vdc, 30A Continuous Duty, Minimum. |
| 2. RF Power Meter | Bird Model 43, 50 ohms, 250W, 2-30 MHz, or equivalent. |
| 3. Audio Oscillator | HP 4204A or equivalent. |
| 4. Coaxial Dummy Load | 50 ohms, 150W minimum. |
| 5. Frequency Counter | HP 5245L, Fluke 1920A, or equivalent. |

5.2.2 Test Equipment Interconnection

Figure 5-1 is a block diagram indicating hookup of test equipment for tuneup and troubleshooting procedures as outlined in the following pages.

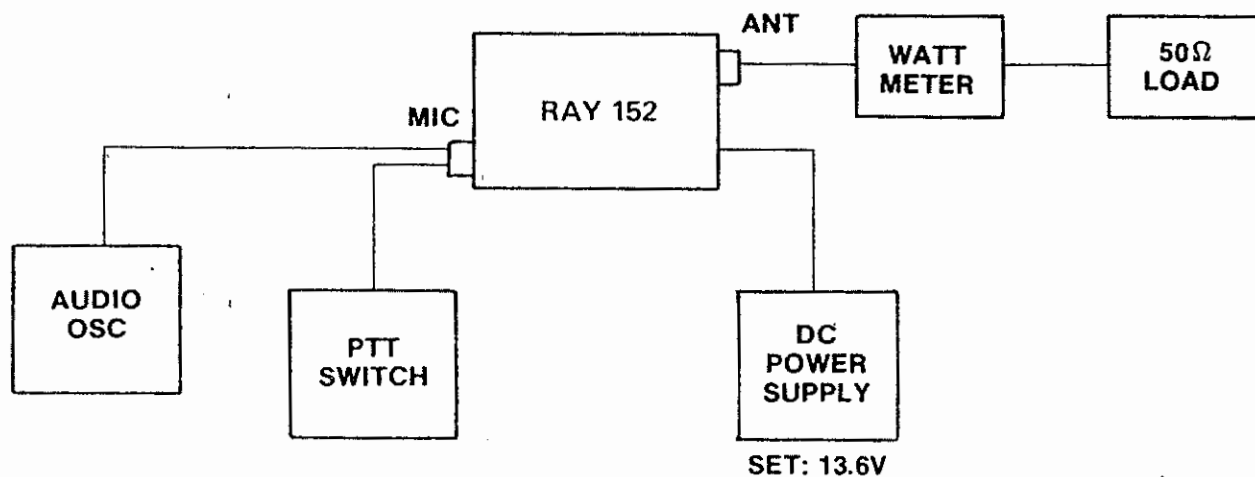


Figure 5-1 Test Equipment Interconnection

5.3 RAY 152 TUNE UP PROCEDURE

NOTE

FCC Rules require that the following procedures be performed by, or under supervision of, a person holding a General Radiotelephone Operator License.

The RAY 152 is a wide band transceiver and will not require tune up procedures after the initial installation, unless major repairs, requiring major component changes, have been performed. Upon initial installation or in the event of such changes, perform the following procedures:

5.3.1 Transmitter Adjustment

Table 5-1 Transmitter Adjustment

No.	Item	Unit name	Test circuit	Adjusting procedures	Ratings
1.	MIC LEVEL RV4	DISPLAY UNIT CDE-617	Fig. 5-1	1. Initial settings: Transmit frequency: 8000.0 kHz Mode: USB Power reduct: Off Audio frequency: 1500 Hz Audio level: -55 dBm 2. Adjustment: Adjust the transmit output by RV4.	35W-70W (50 ohm load)
2.	H3E CARRIER RV2	IF FIL UNIT CFH-38R	Fig. 5-1	1. Initial setting: Transmit frequency: 2182.0 kHz Mode: H3E Power reduct: Off Audio oscillator: Off 2. Adjustment: Adjust the carrier power by RV2.	40-75W
3.	AME LEVEL RV1	IF FIL UNIT CFH-38R	Fig. 5-1	1. Initial setting: Transmit frequency: 2182.0 kHz Mode: H3E Power reduct: Off Audio frequency: 1500 Hz Audio level: -40 dBm	

Table 5-1 Transmitter Adjustment (Cont'd)

No.	Item	Unit name	Test circuit	Adjusting procedures	Ratings
3.	AME LEVEL RV1	IF FIL UNIT CFH-38R	Fig. 5-1	2. Adjustment: Adjust the modulation level by RV1.	Modulation: 90-100%
4.	REDUCT LEVEL RV5	IF FIL UNIT CFH-38R	Fig. 5-1	1. Initial setting: Transmit frequency: 2182.0 kHz Mode: H3E Power reduct: On Audio oscillator: Off 2. Adjustment: Adjust the carrier power by RV5.	Reduct carrier 13-25 W
5.	PA BIAS RV51	PA UNIT CAH-301L-2	Fig. 5-1	1. Initial setting: Transmit frequency: 8000.0 kHz Mode: USB Audio oscillator: Off 2. Adjustment: (1) Turn On the BK switch to transmit. (2) Rotate RV51 to counterclockwise. (3) Measure the source current I_1 . (4) Adjust the source current (idle current) by RV51.	$I = I_1 + (280-320)$ mA
6.	APC RV191	LPF UNIT CFJ-122-2	Fig. 5-1	1. Initial setting: Transmit frequency: 8000.0 kHz	

Table 5-1 Transmitter Adjustment (Cont'd)

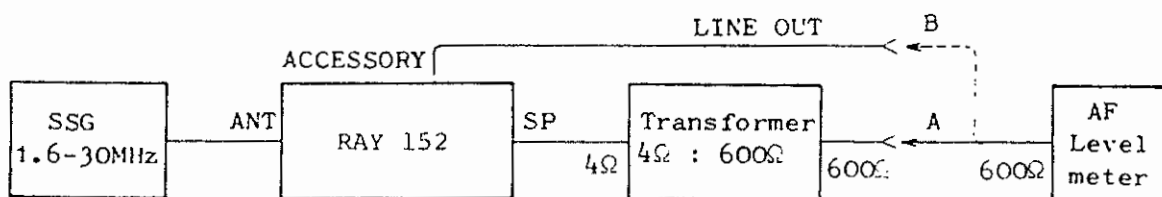
No.	Item	Unit name	Test circuit	Adjusting procedures	Ratings
6.	APC RV191	LPF UNIT CFJ-122-2	Fig. 5-1	Mode: USB Power reduct: Off Audio frequency: 1500 Hz Audio level: -40 dBm 2. Adjustment: Adjust the power output by RV191.	130-150W
7.	POWER REDUCT RV192	LPF UNIT CFJ-122-2	Fig. 5-1	1. Initial setting: Transmit frequency: 8000.0 kHz Mode: USB Power reduct: On Audio frequency: 1500 Hz Audio level: -40 dBm 2. Adjustment: Adjust the power output by RV192.	40-60W
8.	TUNING POWER RV193	LPF UNIT CFJ-122-2	Fig. 5-1	1. Initial setting: Disconnect the Antenna Coupler Transmit frequency: 8000.0 kHz Mode: USB Power reduct: Off Audio oscillator: Off 2. Adjustment: (1) Press TUNE key. (2) Adjust the coupler tuning power by RV193.	7-10W

Table 5-1 Transmitter Adjustment (Cont'd)

No.	Item	Unit name	Test circuit	Adjusting procedures	Ratings
8.	TUNING POWER RV193	LPF UNIT CFJ-122-2	Fig. 5-1	(3) Press TUNE key again to release the tuning mode.	
9.	LINE LEVEL 1 RV1 LINE LEVEL 2 RV2	MOTHER BOARD CFQ-2625R	Fig. 5-1	1. Initial setting: Transmit frequency: 8000.0 kHz Mode: USB Power reduct: Off Audio frequency: 1500 Hz Audio level: -10 dBm 2. Adjustment: Adjust the power output by RV1 and RV2 respectively.	35-70W (50 ohm load)

5.3.2 Receiver Adjustment

Figure 5-2 is a block diagram indicating hookup of test equipment for receiver test and adjustment.



- A. Normal Connection
B. Connection when making Line Out Adjustments.

Figure 5-2 Receiver Test Circuit

Table 5-2 Receiver Adjustment

No.	Item	Unit name	Test circuit	Adjusting procedure	Ratings
1.	LINE OUT 1 RV9 LINE OUT 2 RV8	IF AMP CAE-227	Fig. 5-2	1. Initial setting: Receive frequency: 8000.0 kHz Mode: USB SSG frequency: 8001.5 kHz SSG level: 100 dBu Audio frequency (Resultant): 1.5 kHz 2. Adjust the line output level by RV9 and RV8 respectively.	0 dBm (600 ohms)

5.3.3 Frequency Synthesizer Adjustment

Table 5-3 Frequency Synthesizer Adjustment

No.	Item	Unit name	Test circuit	Adjusting procedure	Ratings
1.	REF OSC Freq. CV1	REF/DDS CGK-81R		1. Adjust as follows after the unit has warmed up for at least 10 minutes from power on. 2. Connect a high impe- dance frequency counter to TP7 on CGK-81R. 3. Adjust the frequency to 20.0 MHz ± 1 Hz by CV1.	20.0 MHz ± 1 Hz

5.4 TROUBLESHOOTING

Troubleshooting is a logical, step-by-step process of isolating a faulty circuit or component. The RAY 152 has plug-in printed circuit boards with convenient test points to aid in fault analysis. A service kit, NJZ-667, is available to aid in troubleshooting. This kit contains extender PCBs and test cables.

It is advisable to isolate a problem to a printed circuit board subassembly or chassis component and replace the defective item. The circuit description, (Section 4), and troubleshooting procedures, (paragraph 5.5) are furnished to aid you. In addition, significant voltages and signals are noted in Figures 5-3 and 5-4.

5.5 TROUBLESHOOTING PROCEDURES

The RAY 152 system can be divided into six subsystems based on function: Power Supply, Microprocessor and Control, Synthesizer, Transmitter, Receiver, and Antenna Coupler. The troubleshooting is divided into two parts; System and subsystem. Table 5-4 is a troubleshooting chart for the RAY 152 system. This table should be used first when troubleshooting, to isolate a malfunction to a particular subsystem. The following sections give a brief description and a troubleshooting table for each subsystem.

Once a malfunction has been isolated to a particular subsystem, then the section for the appropriate subsystem (Tables 5-5 through 5-10), along with signal and voltage levels given in Figures 5-3 and 5-4, can be used to isolate the malfunction.

Table 5-4
RAY 152 System Troubleshooting

Symptom	Subsystem
No Display, Indicators, RX or TX	Power Supply
No Keypad Operation	Microprocessor and Control
Display on, No TX or RX	Microprocessor and Control Synthesizer Antenna Coupler
No TX, RX O.K.	Power Supply Transmitter Synthesizer
No Rx, TX O.K.	Power Supply Receiver LPF Synthesizer
No Modulation	Transmitter Microprocessor and Control
No Operation on Certain Bands	LPF (CFJ-122-2) RF TUNE (CFL-244) Synthesizer Microprocessor and Control Antenna Coupler

5.5.1 Power Supply Subsystem

The power supply subsystem provides all of the dc voltages required of the RAY 152 system. Table 5-5 gives troubleshooting procedures for malfunctions related to the Power Supply subsystem.

Table 5-5

Power Supply Subsystem Troubleshooting

Symptom	Check
No Display, Indicators, RX or TX	Defective Power Cable Connection Blown Fuse No 13.6 Vdc Power Source Positive and Negative Wires Reversed in Source Cable Power Source Relay Defective 5V, 9V AVR
No TX, RX O.K.	Loose Power Cable Connection Loose Fuse Holder Insufficient Power Available From Supply Source.

5.5.2 Microprocessor and Control Subsystem

The Microprocessor and Control Subsystem provides all the control and memory for the RAY 152 system. Table 5-6 gives troubleshooting procedures for all functions related to the Microprocessor and Control Subsystem.

Table 5-6
Microprocessor and Control Subsystem Troubleshooting

Symptom	Check
No (or improper) LCD Display	Display Unit (CDE-617) IC1: CPU IC3: ROM IC5: USART IC6: LCD Driver X1: Clock Oscillator CPU Unit (CDC-493R) IC1: CPU IC3: ROM IC4: RAM IC12: USART X1: Clock Oscillator
No Display, TX and RX O.K.	Display Unit (CDE-617) IC6: LCD Driver IC DD1: LCD
No Control From Keypad	Display Unit (CDE-617) IC7: I/O Port S1: Membrane Switch
No Control Data to TX and RX	CPU Unit (CDC-493R) IC5, IC6: I/O Ports
No Antenna Coupler Control	CPU Unit (CDC-493R) IC13: USART Mother Board (CFQ-2625R) CD8: Photo-Couplers
No Memory Data	Replace Battery, BT1 (CDC-493R)

5.5.3 Synthesizer Subsystem

The Synthesizer Sybsystem consists of two DDS (Direct Digital Synthesizers) and two PLL (Phase Locked Loops). The operating status is indicated on the unlock indicators for each PLL to enable quick and easy location of the malfunction.

Table 5-7
Synthesizer Subsystem Troubleshooting

Symptom	Check
All two loop Unlock Indicators On	20 MHz Reference Oscillator Output Frequency (CGK-81R) 13.6 and 9V Source Voltages (CAH-301L-2) CPU Control (CDC-493R, CDE-617)
LOOP1 Unlock Indicator On (CD10 on CGA-145)	2 MHz Reference Input (IC5 (5)) 20 MHz Reference Input (TR12) 2.545-2.455 MHz Input (IC6 (5)) PLL IC (IC5) All ICs and Transistors (CGA-145)
70 MHz LOOP Unlock Indicator On (CD8 on CGK-81R)	2 MHz Reference Input (IC17 (5)) 70 MHz Oscillator (TR9) PLL IC (IC17)
No BFO Output (CGK-81R)	DDS IC (IC1) All ICs and Transistors (CGK-81R)

5.5.4 Transmitter Subsystem

The Transmitter Subsystem includes the audio, modulator, SSB Filter, IF, Predriver, Power Amplifier, and Harmonic Filter functions for the RAY 152 system. Table 5-8 gives troubleshooting procedures for malfunctions related to the Transmitter Subsystem.

Table 5-8
Transmitter Subsystem Troubleshooting

Symptom	Check
No Power Out or Low Power Out	Microphone Microphone Amplifier Output (CDE-617) Microphone ALC Output (CDE-617) TX IF Amplifier Output (CFH-38R) TX RF Amplifier Output (CFL-244) TX RF Amplifier Output (CAH-301L-2) TX Driver Output (CAH-301L-2) TX PA Output (CAH-301L-2) LPF Output (CFJ-122-2) Antenna SWR APC Circuit (CFJ-122-2)
No Transmission or Reception	455 kHz Filter Output (CFH-38R) 70.455 MHz Filter Output (CFH-38R) LPF (CFJ-122-2) Antenna

5.5.5 Receiver Subsystem

The Receiver Subsystem includes the RF, Mixers, IF, IF Filter, Detector, Squelch, and Audio Amplifier functions of the RAY 152 system. Table 5-9 gives troubleshooting procedures for malfunctions relating to the Receiver Subsystem.

Table 5-9
Receiver Subsystem Troubleshooting

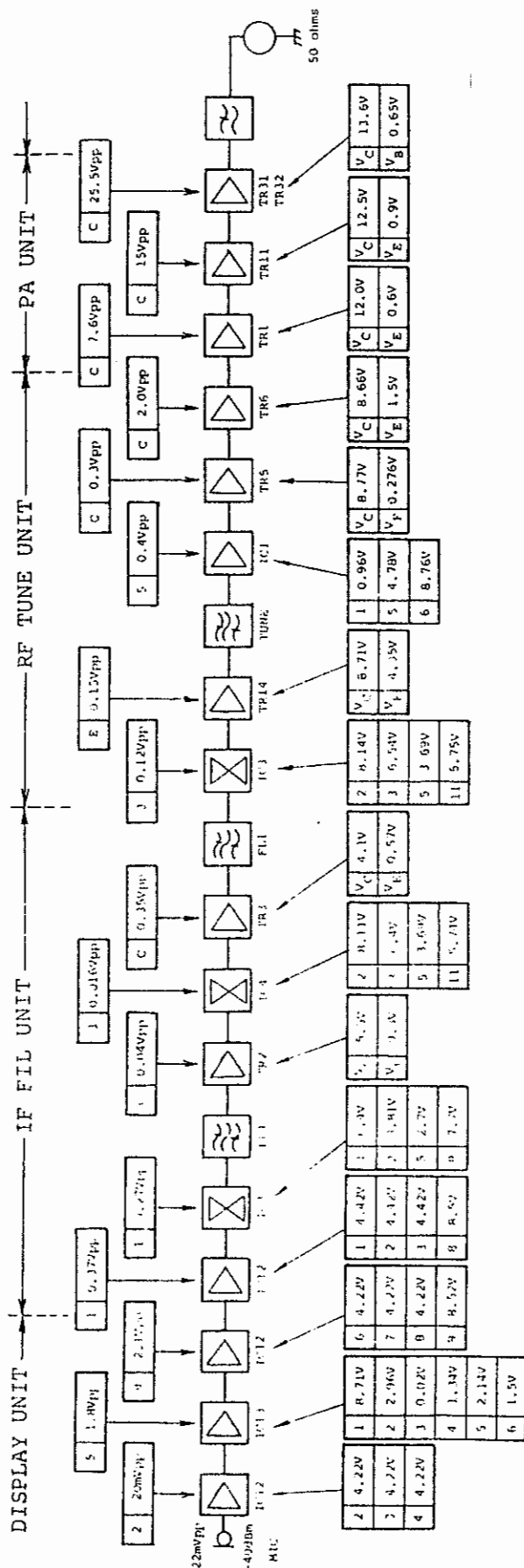
Symptom	Check
No Reception in Any Mode	LPF (CFJ-122-2) RX RF Amp (CFL-244) RX 1st Mixer (CFL-244) RX 70.455 MHz IF Amp (CFH-38R) RX 2nd Mixer (CFH-38R) RX 455 kHz IF Amp (CAE-227) RX 3rd Mixer (CAE-227) Detector (CAE-227) AF Amp (CAE-227) AF Power Amp (CBD-894L) AGC Amp (CAE-227) Speaker (CDE-617)
No Reception H3E Mode Only	Limiter Amp (CAE-227) AGC Amp (CAE-227)

5.5.6 Antenna Coupler Subsystem

The Antenna Coupler Sybssystem consists of the entire Antenna Coupler Assemble. It provides the necessary inductive and capacitive elements to match a variety of antennas to the RAY 152 system. Table 5-7 gives troubleshooting procedures for malfunctions related to the Antenna Coupler Subsystem.

Table 5-10
Antenna Coupler Subassembly Troubleshooting

Symptom	Check
Contents of memory vary or disappear during use in preset status	Backup Battery
Will not tune when TUNE button is pressed	Insufficient tuning power Insufficient Primary Power Source Capacity CPU (CFG-98)
SWR remains high even after tuning is complete	SWR Sensor (CFG-98) Phase Sensor HC (CFG-98) Relay (CFG-98)



Frequency: 8000.0 kHz

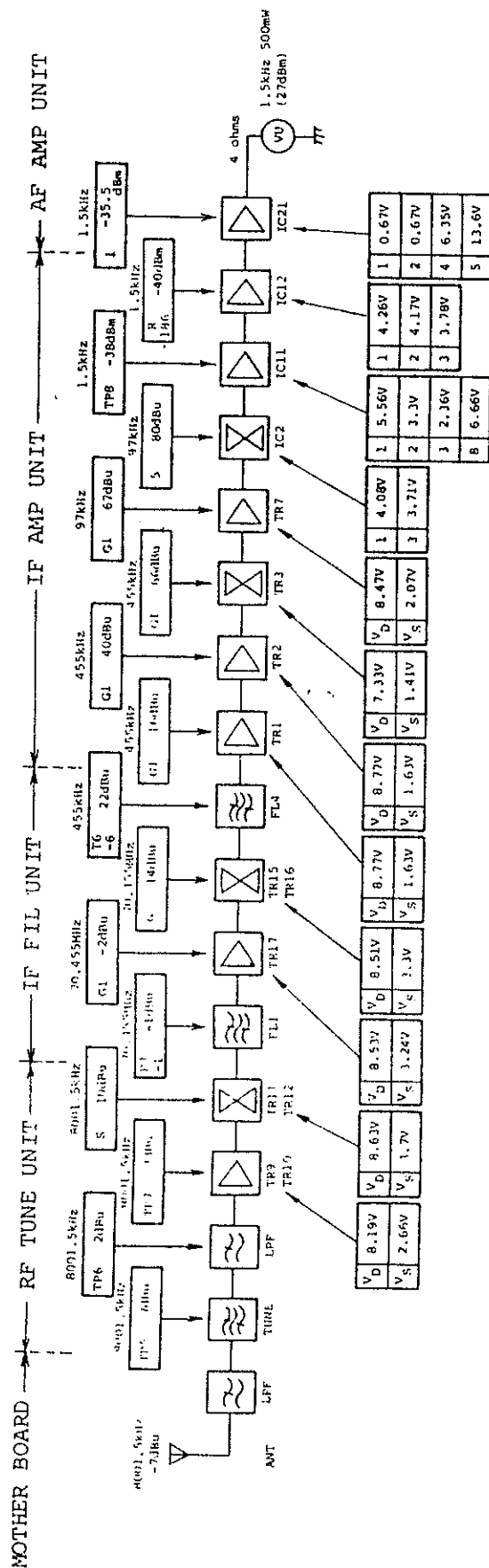
Measurement Method:

1. Connect the Antenna terminal to a 50 ohm dummy load.
2. Apply a 1500 Hz -40 dBm signal to the MIC connector and activate the transmitter.
3. Disconnect the P44-1 coaxial connector of RF TUNE Unit CFL-244 and measure the signal level at each point. Reconnect the P44-1 connector to measure the levels in the PA Unit.
4. Remove the audio signal at the MIC connector, and measure the dc voltage of the transistors and ICs.

Notes:

1. 3 = IC Pin 3
2. C = Transistor Collector
3. E = Transistor Emitter
4. VC = Collector Voltage
5. VE = Emitter Voltage
6. VB = Base Voltage

Figure 5-3 Transmitter Stage Levels



Frequency: 8000.0 kHz

Measurement Method:

1. Connect a VU meter (4 ohms) to SP jack.
2. Adjust the volume control to maximum for the measurement of the IF FIL unit, IF AMP unit, and AF AMP unit.
3. Apply the indicated frequency signal to each point and insert a signal to obtain a 27 dBm AF output signal. For the measurement of the RF TUNE unit, adjust the volume control to obtain the S/N ratio of 10 dB. Make note of input signal level and compare this to the stated values.
4. Measure the dc voltage of each point indicated on the transistors and ICs.

Notes:

1. 5 = IC Pin 5
2. G = Transistor Gate
3. GI = Transistor Gate 1
4. VD = Drain Voltage
5. VS = Source Voltage

Figure 5-4 Receiver Stage Levels

SECTION 6

DRAWINGS AND PARTS LISTS

6.1 GENERAL

This section consists of schematic diagrams, assembly and sub-assembly drawings, and replaceable parts lists.

Each assembly will be presented in the following order:

1. Schematic Diagram
2. Assembly Drawing
3. Replaceable Parts List

Should the schematic for a particular sub-assembly be presented in an earlier schematic, only the assembly drawing will be shown.

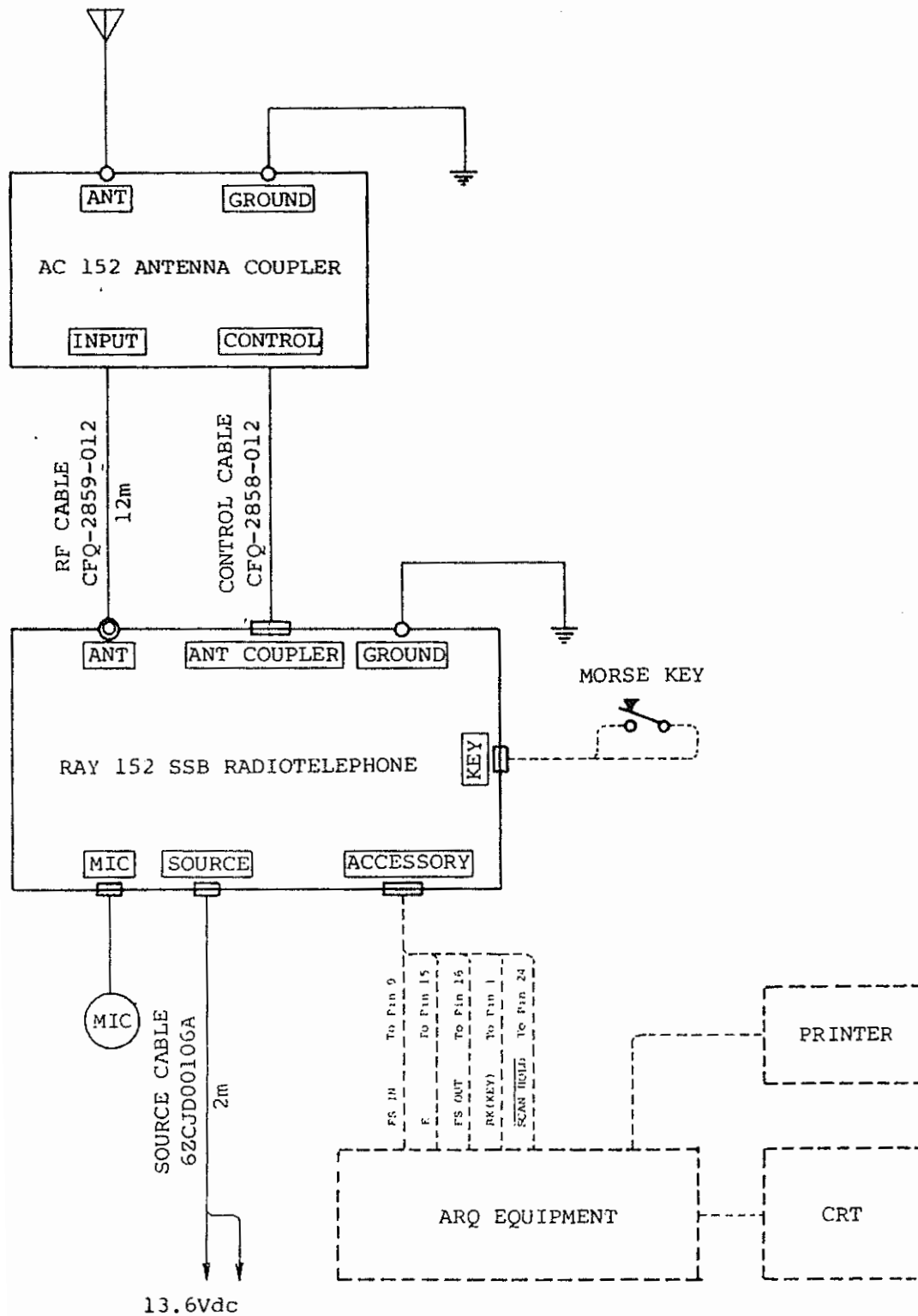
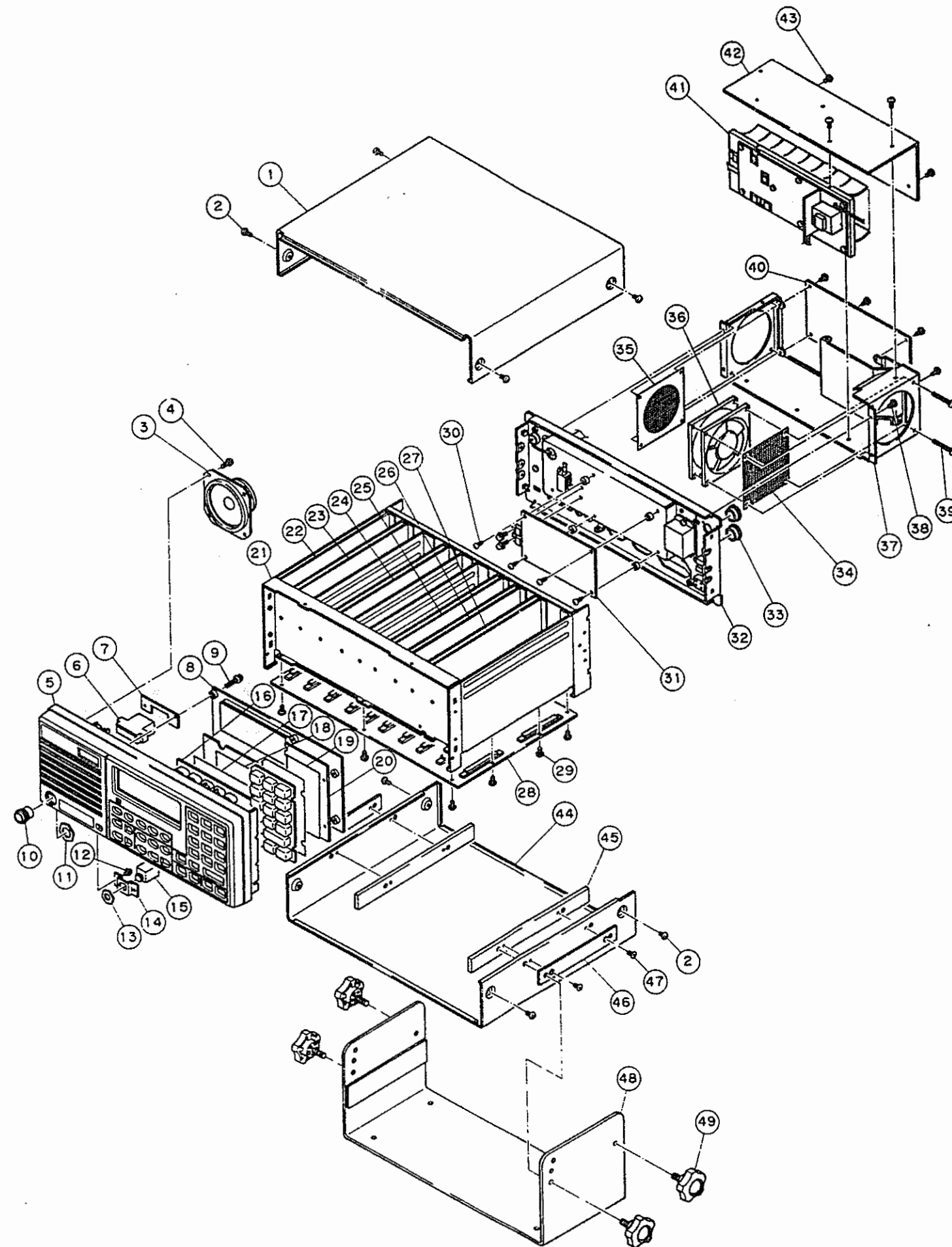


Figure 6-1 RAY 152 Radiotelephone System Diagram



LOCATION	DESCRIPTION	PART NUMBER	Q'TY	REMARKS
1	COVER (TOP)	MTD004494	1	
2	SCREW	BRTG03311	8	M3x8BS
3	SPEAKER	SUSBL00004	1	
4	SCREW	BSNC030068	4	CNK3x6BS
5	PANEL	MTV000320	1	
6	METER	SHMJ000136	1	
7	BRACKET	MTB168007	1	
8	DISPLAY UNIT	CDE-617	1	
9	SCREW	BSNC030108	5	CNK3x10BS
10	CONNECTOR	15JJB00001	1	
11	NUT		1	
12	SCREW	BSNC030068	2	CNK3x6BS
13	NUT	5JJAL00029	1	with (9)
14	BRACKET	MTB138187	1	
15	CONNECTOR	5JJAL00029	(1)	with (9)
16	BRACKET	MTB168006	1	
17	EL. LIGHT	6WEJD00005	1	
18	EL. LIGHT	6WEJD00006	1	
19	SWITCH	16SCJD00181	1	
20	CONTACT RUBBER		1	
21	CHASSIS	MPBC08110	1	
22	RF TUNE UNIT	CAL-244	1	
23	IF FIL. UNIT	CFH-38R	1	
24	IF AMP. UNIT	CAE-227	1	
25	REF. DDS. UNIT	CGK-81R	1	
26	LOQPI UNIT	CGA-145	1	
27	CPU UNIT	CDC-493R	1	
28	MOTHER BOARD	CFO-2625R	1	
29	TAPPING SCREW	BRTG00970	10	M2.6x6FE
30	TAPPING SCREW	BRTG01227	4	M3x10FE
31	AF AMP. UNIT	CBD-894L	1	
32	BACK BOARD	MTD004509	1	
33	CAP.	BRNG06179	2	
34	FILTER	MPFM00339	1	
35	FILTER	MPFM00340	1	
36	FAN	6BFJD00007	1	
37	BRACKET	MTD004505	1	
38	SCREW	BSNC040088	4	CNK4x8BS
39	SCREW	BSNK030358	2	NK3x35BS
40	L.P.F. UNIT	CFJ-122-2	1	
41	P.A. UNIT	CAH-301L-2	1	
42	COVER	MTD004507	1	
43	SCREW	BRTG02086	7	M3x6BS
44	COVER (LOWER)	MTD004491	1	
45	BRACKET	MTB167885	2	
46	BRACKET	MTB167884	2	
47	SCREW	BSSK030068	4	S3x6BS
48	BASE	MPBX177224	1	
49	SCREW	BRTG00179	4	M6x15

Figure 6-2 RAY 152 Radiotelephone Assembly Drawing

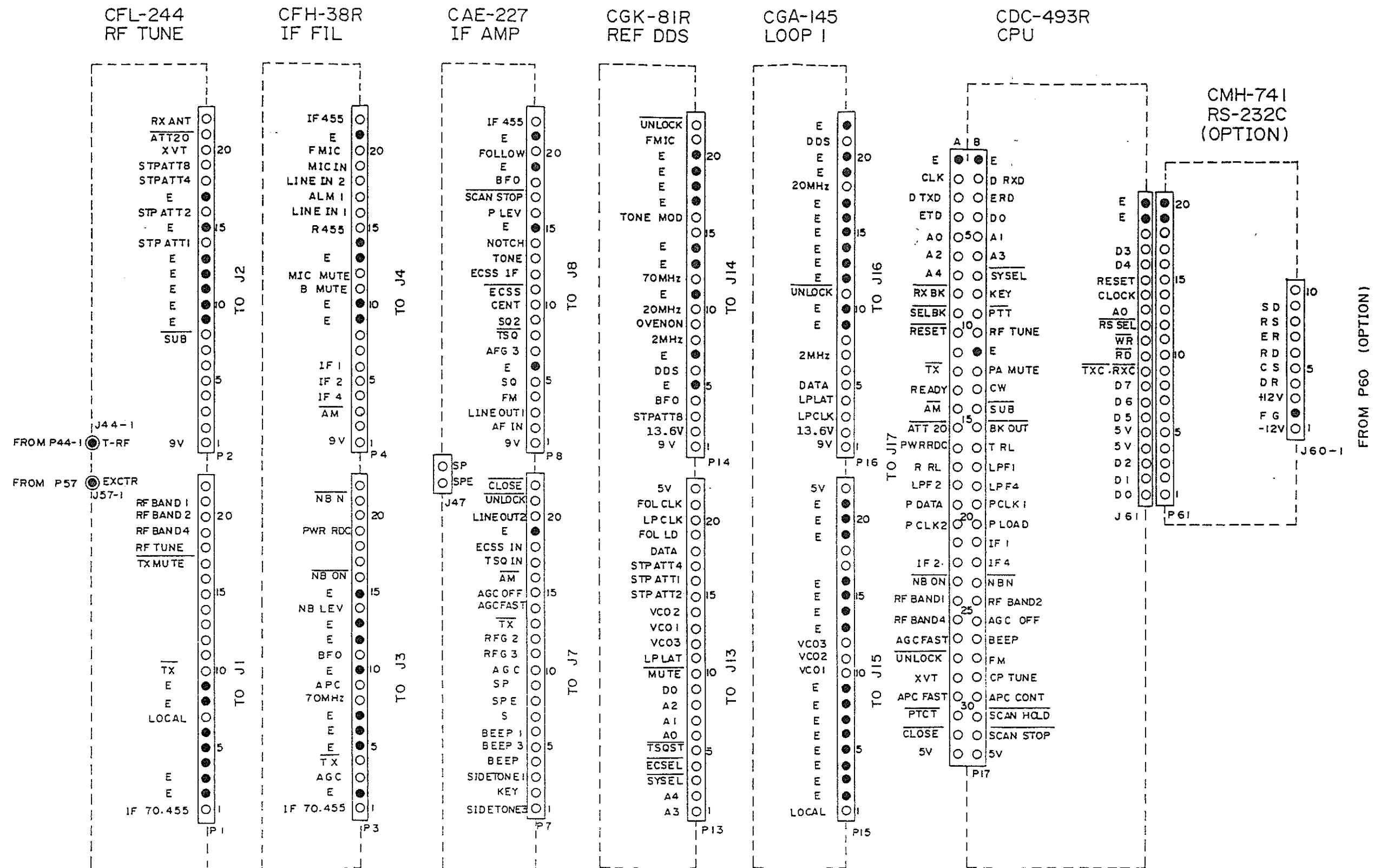


Figure 6-4 RAY 152 SSB Radiotelephone
Signal Nomenclature of Units

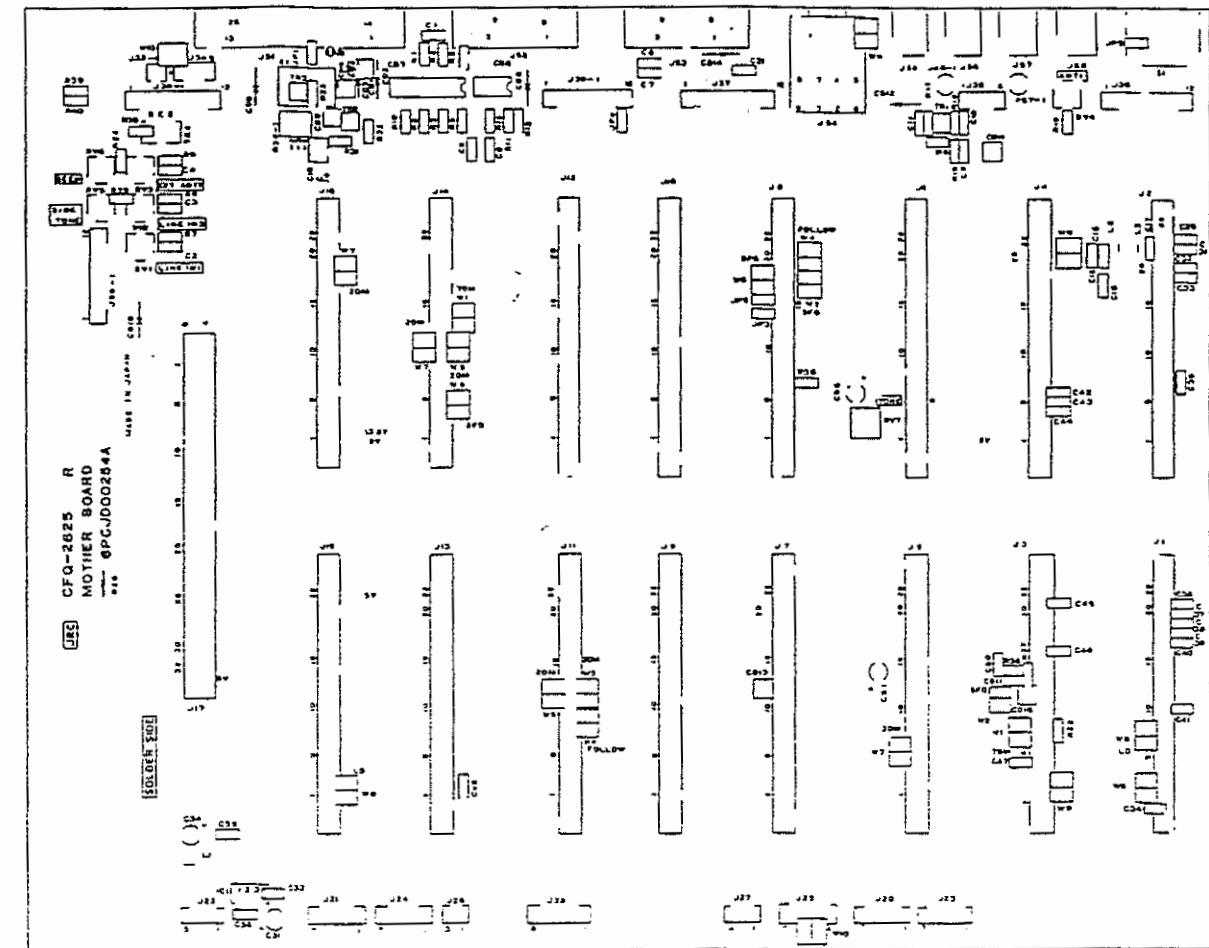


Figure 6-5 MOTHER BOARD (CFQ-2625R) Component Layout

PARTS LIST

PARTS NO		PARTS NAME		TYPE	DESCRIPTION	CODE
MOTHER BOARD						
J28	CONNECTOR	1L-5-8P-S212-EF	8PIN			SJWAD00139
J58	CONNECTOR	1781J034				SJJBL00027
JP2	RESISTOR	FXD ERJ-8GEY0R00V	0 OHM			SREAG01775
JP3	RESISTOR	FXD ERJ-8GEY0R00V	0 OHM			SREAG01775
JP4	RESISTOR	FXD ERJ-8GEY0R00V	0 OHM			SREAG01775
S1	SWITCH	SSP322				SSBAB00206
U1	MOTHERBOARD	CFQ-2625				CFQ-2625

PARTS LIST

PARTS NO		PARTS NAME		TYPE	DESCRIPTION	CODE
MOTHER BOARD						
TITLE: CPG-2825						
C1	CAP,FXD	CER	C3216JB1H103K-E-TP	0.01UF		SCAAD00789
C2	CAP,FXD	CER	C3216JB1H103K-E-TP	0.01UF		SCAAD00789
C3	CAP,FXD	CER	C3216JB1H103K-E-TP	0.01UF		SCAAD00789
C5	CAP,FXD	CER	C3216JB1H103K-E-TP	0.01UF		SCAAD00789
C6	CAP,FXD	CER	C3216JB1H103K-E-TP	0.01UF		SCAAD00789
C7	CAP,FXD	CER	C3216JB1H103K-E-TP	0.01UF		SCAAD00789
C8	CAP,FXD	CER	C3216JB1H103K-E-TP	0.01UF		SCAAD00789
C9	CAP,FXD	CER	C3216JB1H103K-E-TP	0.01UF		SCAAD00789
C10	CAP,FXD	CER	C3216JB1H103K-E-TP	0.01UF		SCAAD00789
C11	CAP,FXD	CER	C3216JB1H103K-E-TP	0.01UF		SCAAD00789
C14	CAP,FXD	CER	C3216JB1H103K-E-TP	0.01UF		SCAAD00789
C15	CAP,FXD	CER	C3216JB1H103K-E-TP	0.01UF		SCAAD00789
C16	CAP,FXD	CER	C3216CH1H100J-E-TP			SCAAD00862
C17	CAP,FXD	CER	C3216CH1H220J-E-TP	22P		SCAAD00869
C18	CAP,FXD	CER	C3216CH1H680J-E-TP	68PF		SCAAD00929
C19	CAP,FXD	CER	C3216CH1H121J-E-TP	120PF		SCAAD00931
C20	CAP,FXD	CER	C3216CH1H560J-E-TP			SCAAD00863
C21	CAP,FXD	CER	C3216B1H103K-E-TP	0.01U		SCAAD001597
C31	CAP,FXD	CER	C3216B1H102K-E-TP	1000PF		SCAAD001073
C32	CAP,FXD	CER	C3216B1H102K-E-TP	1000PF		SCAAD001073
C33	CAP,FXD	CER	C3216B1H102K-E-TP	1000PF		SCAAD001073
C34	CAP,FXD	CER	C3216B1H102K-E-TP	1000PF		SCAAD001073
C35	CAP,FXD	CER	C3216B1H102K-E-TP	1000PF		SCAAD001073
C36	CAP,FXD	CER	C3216B1H102K-E-TP	1000PF		SCAAD001073
C37	CAP,FXD	CER	C3216B1H102K-E-TP	1000PF		SCAAD001073
C38	CAP,FXD	CER	C3216B1H102K-E-TP	1000PF		SCAAD001073
C39	CAP,FXD	CER	C3216B1H102K-E-TP	1000PF		SCAAD001073
C40	CAP,FXD	CER	C3216B1H102K-E-TP	1000PF		SCAAD001073
C41	CAP,FXD	CER	C3216B1H102K-E-TP	1000PF		SCAAD001073
C42	CAP,FXD	CER	C3216B1H102K-E-TP	1000PF		SCAAD001073
C43	CAP,FXD	CER	C3216B1H102K-E-TP	1000PF		SCAAD001073
C44	CAP,FXD	CER	C3216B1H102K-E-TP	1000PF		SCAAD001073
C45	CAP,FXD	CER	C3216B1H102K-E-TP	1000PF		SCAAD001073
C46	CAP,FXD	CER	C3216B1H102K-E-TP	1000PF		SCAAD001073
C47	CAP,FXD	CER	C3216B1H102K-E-TP	1000PF		SCAAD001073

PARTS LIST

MOTHER BOARD				TITLE	CF0-2625	SHEET NO
PARTS NO	PARTS NAME	TYPE	DESCRIPTION	CODE		
C48	CAP,FXD CER	C3216B1H102K-E-TP	1000PF	SCAA001073		
C56	CAP,FXD TANTAL	202L3502 104XB		SCSAC01068		
C57	CAP,FXD TANTAL	202L3502475XB	4.7UF 35V	SCSAC00989		
C60	CAP,FXD CER	C3216X7R1H333K-E-TP	50V 0.033U	SCAAD01357		
C61	CAP,FXD CER	C3216X7R1H333K-E-TP	50V 0.033U	SCAAD01357		
C01	DIODE	1SS181 1E85L		51XAD00356		
C02	DIODE	EM17	200V 1A	51XAD00061		
C03	DIODE	EM17	200V 1A	51XAD00061		
C04	DIODE	EM17	200V 1A	51XAD00061		
C05	DIODE	EM17	200V 1A	51XAD00061		
C06	DIODE	EM17	200V 1A	51XAD00061		
C07	PHOTO COUPLER	ILP521-4-G0		51ZAB00213		
C08	PHOTO COUPLER	ILP521-2-G0		51ZAB00234		
C09	DIODE	1SS181 1E85L		51XAD00356		
C011	DIODE	R05.1MB1-11		51XAD00515		
C012	DIODE	EM12	200V 1A	51XAD00061		
C013	DIODE	1SS181 1E85L		51XAD00356		
C014	DIODE	EM17	200V 1A	51XAD00061		
C015	DIODE	1SS181 1E85L		51XAD00290		
C016	DIODE	HSM26941LC		51XAE00627		
J1	CONNECTOR	PCN6-22S-2.5DS		5JDA000082		
J2	CONNECTOR	PCN6-22S-2.5DS		5JDA000082		
J3	CONNECTOR	PCN6-22S-2.5DS		5JDA000082		
J4	CONNECTOR	PCN6-22S-2.5DS		5JDA000082		
J7	CONNECTOR	PCN6-22S-2.5DS		5JDA000082		
J8	CONNECTOR	PCN6-22S-2.5DS		5JDA000082		
J13	CONNECTOR	PCN6-22S-2.5DS		5JDA000082		
J14	CONNECTOR	PCN6-22S-2.5DS		5JDA000082		
J15	CONNECTOR	PCN6-22S-2.5DS		5JDA000082		
J16	CONNECTOR	PCN6-22S-2.5DS		5JDA000082		
J17	CONNECTOR	ME03-L64S-D412-A1		5JBAF00458		
J20	CONNECTOR	IL-S-7P-S212-EF		5JWAD00083		
J21	CONNECTOR	IL-S-7P-S212-EF		5JWAD00083		
J22	CONNECTOR	IL-S-5P-S212-EF		5JWAD00141		
J23	CONNECTOR	IL-S-7P-S212-EF		5JWAD00083		

PARTS LIST

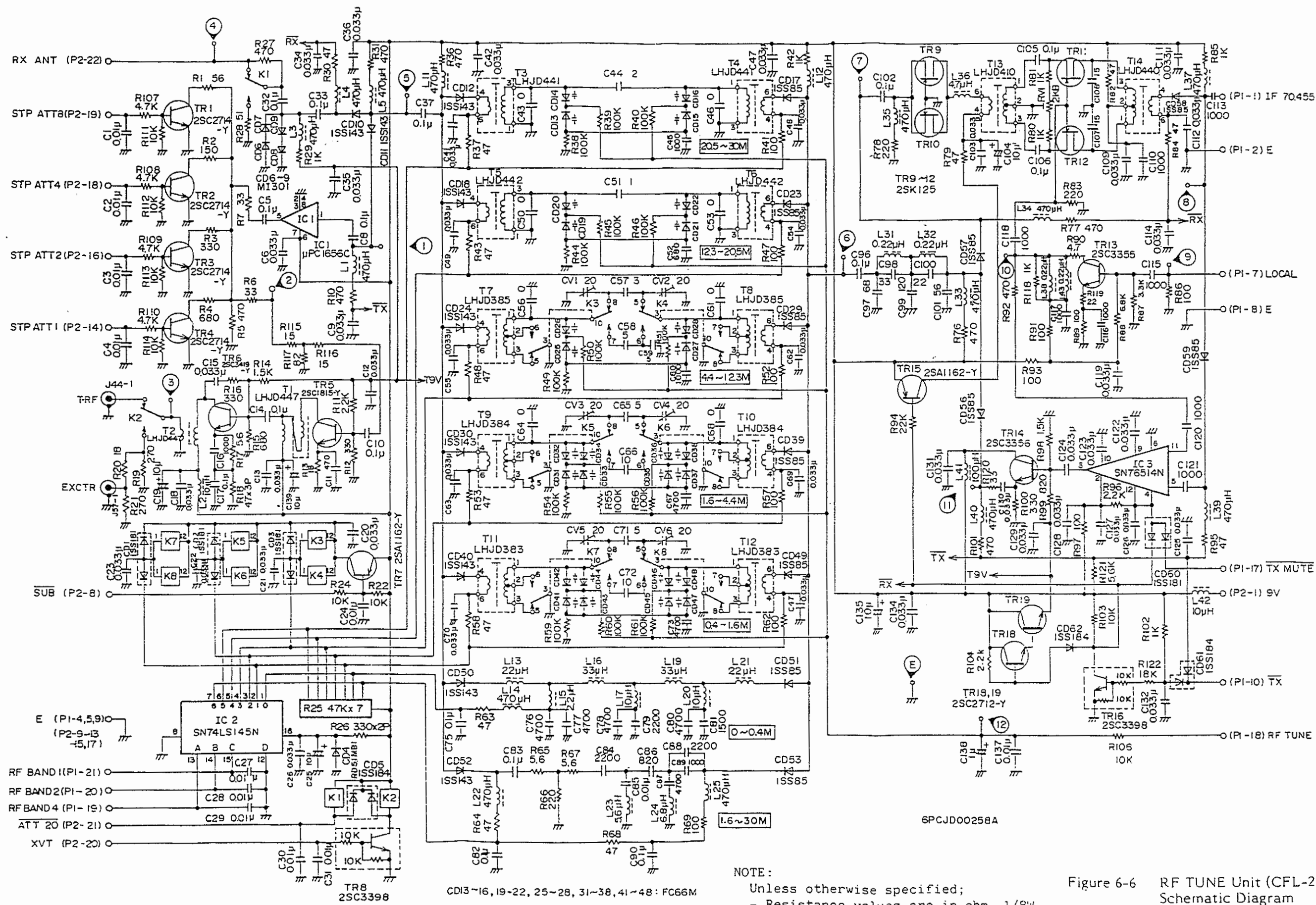
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PARTS NO	PARTS NAME	TYPE	DESCRIPTION	CODE		
J25	CONNECTOR	IL-S-7P-S212-EF		5JWAD00083		
J26	CONNECTOR	IL-S-3P-S212-EF		5JWAD00234		
J34	CONNECTOR	IL-S-5P-S212-EF		5JWAD00141		
J35	CONNECTOR	IL-S-6P-S212-EF		5JWAD00142		
J36	CONNECTOR	IL-S-12P-S212-EF		5JWAD00156		
J37	CONNECTOR	IL-S-12P-S212-EF		5JWAD00156		
J38-1	CONNECTOR	IL-S-12P-S212-EF		5JWAD00156		
J39-1	CONNECTOR	IL-S-12P-S212-EF		5JWAD00156		
J40-1	CONNECTOR	TMP-J01X-W2		5JDA000009		
J51	CONNECTOR	XH3B-2532-112	25P	5JWC000013		
J52	CONNECTOR	XH3B-0932-112	9P	5JWC000014		
J53	CONNECTOR	XH3B-0932-112	9P	5JWC000014		
J54	CONNECTOR	1806J045		5JJB000004		
J55	JACK	SQ-3099 #01		5JJAL00043		
J56	JACK	SQ-3099 #01		5JJAL00043		
J57	JACK	SQ-3099 #01		5JJAL00043		
K1	RELAY	G6E-184P	DC12V	5KLB000006		
L2	COIL	LAL03VBR22M	0.22UH	5LCAA00280		
L3	COIL	LAL03VBR22M	0.22UH	5LCAA00280		
P57	CONNECTOR	H-62CJD037030	L=300	62CJD037030		
P57-1				62ZAB10000		
PC1	PCB	H-6PCJD00254A		6PCJD00254		
R1	RESISTOR FXD	ERJ-8GEVJ103V	1/8W 10K OHM	5REAG01750		
R2	RESISTOR FXD	ERJ-8GEVJ222V	1/8W 2.2K OHM	5REAG01742		
R3	RESISTOR FXD	ERJ-8GEVJ222V	1/8W 2.2K OHM	5REAG01742		
R4	RESISTOR FXD	ERJ-8GEVJ103V	1/8W 10K OHM	5REAG01750		
R5	RESISTOR FXD	ERJ-8GEVJ222V	1/8W 2.2K OHM	5REAG01742		
R6	RESISTOR FXD	ERJ-8GEVJ103V	1/8W 10K OHM	5REAG01750		
R7	RESISTOR FXD	ERJ-8GEVJ562V	1/8W 5.6K OHM	5REAG01747		
R8	RESISTOR FXD	ERJ-8GEVJ562V	1/8W 5.6K OHM	5REAG01747		
R10	RESISTOR FXD	ERJ-8GEVJ222V	1/8W 2.2K OHM	5REAG01742		
R11	RESISTOR FXD	ERJ-8GEVJ222V	1/8W 2.2K OHM	5REAG01742		
R12	RESISTOR FXD	ERJ-8GEVJ103V	1/8W 10K OHM	5REAG01750		
R14	RESISTOR FXD	ERJ-8GEVJ102V	1/8W 1K OHM	5REAG01738		
R15	RESISTOR FXD	ERJ-8GEVJ102V	1/8W 1K OHM	5REAG01738		

PARTS LIST

MOTHER BOARD		TITLE CFQ-2625		SHEET NO. 4	
PARTS NO	PARTS NAME	TYPE	DESCRIPTION	CODE	
R16	RESISTOR FXD	ERJ-8GEYJ103V	1/8W 10K OHM	SREAG01750	
R17	RESISTOR FXD	ERJ-8GEYJ103V	1/8W 10K OHM	SREAG01750	
R18	RESISTOR FXD	ERJ-8GEYJ103V	1/8W 10K OHM	SREAG01750	
R22	RESISTOR FXD	ERJ-8GEYJ101V	1/8W 100 OHM	SREAG01726	
R24	RESISTOR FXD	ERJ-8GEYJ223V	1/8W 22K OHM	SREAG01754	
R25	RESISTOR FXD	ERJ-8GEYJ223V	1/8W 22K OHM	SREAG01754	
R26	RESISTOR	R8E400A		SRZCP00001	
R31	RESISTOR FXD	ERJ-8GEYJ103V	1/8W 10K OHM	SREAG01750	
R32	RESISTOR FXD	ERJ-8GEYJ472V		SREAG01746	
R33	RESISTOR FXD	ERJ-8GEYJ222V	1/8W 2.2K OHM	SREAG01742	
R34-1	RESISTOR FXD	ERJ-8GEYJ102V	1/8W 1K OHM	SREAG01738	
R34-2	RESISTOR FXD	ERJ-8GEYJ102V	1/8W 1K OHM	SREAG01738	
R34-3	RESISTOR FXD	ERJ-8GEYJ102V	1/8W 1K OHM	SREAG01738	
R34-4	RESISTOR FXD	ERJ-8GEYJ102V	1/8W 1K OHM	SREAG01738	
R35	RESISTOR FXD	ERJ-8GEYJ103V	1/8W 10K OHM	SREAG01750	
R36	RESISTOR FXD	ERJ-8GEYJ472V		SREAG01746	
R37	RESISTOR FXD	ERJ-8GEYJ222V	1/8W 2.2K OHM	SREAG01742	
R38	RESISTOR FXD	ERJ-8GEYJ222V	1/8W 2.2K OHM	SREAG01742	
RV1	RESISTOR VAR	EVN-D4A00B-14	10K OHM	SRVAB00279	
RV2	RESISTOR VAR	EVN-D4A00B-14	10K OHM	SRVAB00279	
RV5	RESISTOR VAR	EVN-D4A00B-14	10K OHM	SRVAB00279	
RV6	RESISTOR VAR	EVN-D4A00B-14	10K OHM	SRVAB00279	
RV7	RESISTOR VAR	EVN-D4A00B54		SRVAB00317	
TR1	TRANSISTOR	2SA1162-Y TE85L		5TAAG00182	
TR2	TRANSISTOR	2SA1162-Y TE85L		5TAAG00182	
TR3	TRANSISTOR	2SA1162-Y TE85L		5TAAG00182	
TR4	TRANSISTOR	2SC2534		5TCAF00329	
TR4Z-2	SILICON SHEET	TC-30A (10-220)		5ZKX800002	
TR4Z-1	BUSHING	YC-40B		5ZDYO00005	
Z1	NEON TUBE	NE-38		5WNAC00019	

PARTS LIST

CHASSIS		TITLE JSB-170R		SHEET NO. 1	
PARTS NO	PARTS NAME	TYPE	DESCRIPTION	CODE	
B1	FAN	H-6BFJ000007	DC12V	68FJ000007	
F1	FUSE	7127-3012	15A	5ZFEX00001	
F2	FUSE	7127-3012	15A	5ZFEX00001	
FB1	CORE	R1B 10X20X15		5MBAK00001	
FB2	CORE	R1B 10X20X15		5MBAK00001	
FB3				6ZZAB10000	
FS1	FUSE HOLDER	H0448		5ZJU200001	
FS2	FUSE HOLDER	H0448		5ZJU200001	
J32	CONNECTOR	1-480705-0		5JWAH00300	
J32Z-1	CONNECTOR	640309-3		5JWAH00673	
J41	CONNECTOR	FM-203		5JJJB00003	
K2	RELAY	VF-12HM	DC12V	5KLAC00110	
P38	CONNECTOR	H-6ZCJD41002	L=400	6ZCJD41002	
P38-1				6ZZAB10000	
P39	CONNECTOR	H-6ZCJD41001	L=330	6ZCJD41001	
P39-1				6ZZAB10000	
P40	COAX CABLE	H-6ZCJD33025	L=250	6ZCJD33025	
P40-1				6ZZAB10000	
P41	CONNECTOR	H-6ZCJD34030	L=300	6ZCJD34030	
P43				6ZZAB10000	
P44	CONNECTOR	H-6ZCJD00220		6ZCJD00220	
P44-1				6ZZAB10000	
P45	CONNECTOR	H-6ZCJD42015	L=150	6ZCJD42015	



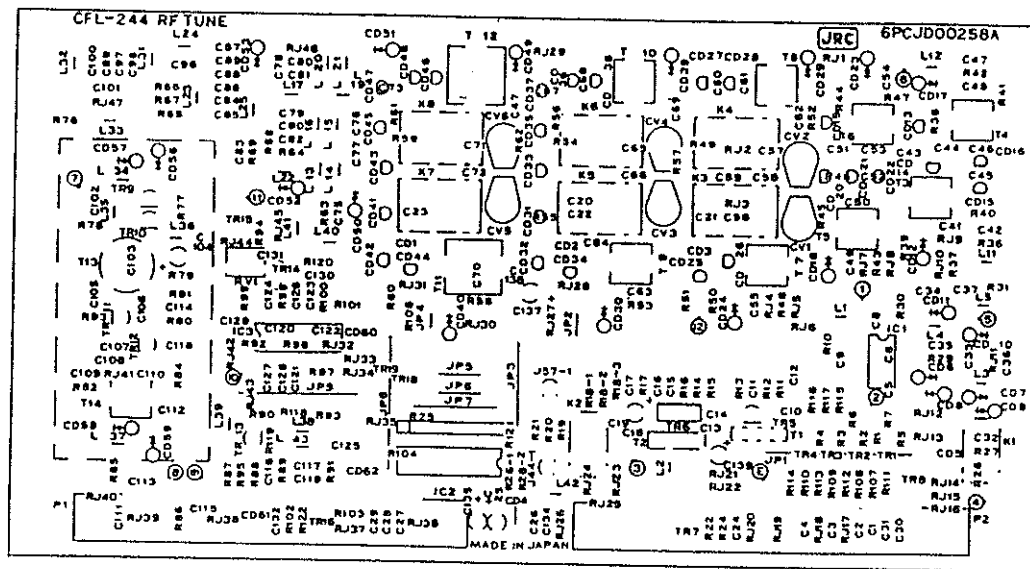


Figure 6-7 RF TUNE Unit (CFL-244) Component Layout

PARTS LIST

RF TUNE		TITLE		SHEET NO	
PARTS NO		PARTS NAME		DESCRIPTION	
C1		CAP,FXD	CER	C3216JB1H103K-E-TP	0.01UF
C2		CAP,FXD	CER	C3216JB1H103K-E-TP	0.01UF
C3		CAP,FXD	CER	C3216JB1H103K-E-TP	0.01UF
C4		CAP,FXD	CER	C3216JB1H103K-E-TP	0.01UF
C5		CAP,FXD	CER	C3216JB1H103K-E-TP	0.01UF
C6		CAP,FXD	CER	C3216X7R1E104K-E-TP	0.1U
C7		CAP,FXD	CER	C3216X7R1H333K-E-TP	50V 0.033U
C8		CAP,FXD	CER	C3216X7R1E104K-E-TP	0.1U
C9		CAP,FXD	CER	C3216X7R1H333K-E-TP	50V 0.033U
C10		CAP,FXD	CER	C3216X7R1E104K-E-TP	0.1U
C11		CAP,FXD	CER	C3216CH1H471J-E-TP	470PF
C12		CAP,FXD	CER	C3216X7R1H333K-E-TP	50V 0.033U
C13		CAP,FXD	CER	C3216X7R1H333K-E-TP	50V 0.033U
C14		CAP,FXD	CER	C3216X7R1E104K-E-TP	0.1U
C15		CAP,FXD	CER	C3216X7R1H333K-E-TP	50V 0.033U
C16		CAP,FXD	CER	C3216SL1H102J-E-TP	1000PF
C17		CAP,FXD	CER	C3216X7R1E104K-E-TP	0.1U
C18		CAP,FXD	CER	C3216X7R1E333K-E-TP	0.033U
C19		CAP,FXD	ELCT1	ECE-A1EU100B	
C20		CAP,FXD	CER	C3216X7R1H333K-E-TP	50V 0.033U
C21		CAP,FXD	CER	C3216X7R1H333K-E-TP	50V 0.033U
C22		CAP,FXD	CER	C3216X7R1H333K-E-TP	50V 0.033U
C23		CAP,FXD	CER	C3216X7R1H333K-E-TP	50V 0.033U
C24		CAP,FXD	CER	C3216JB1H103K-E-TP	0.01UF
C25		CAP,FXD	TANTAL	202L1602 106KB	
C26		CAP,FXD	CER	C3216X7R1H333K-E-TP	50V 0.033U
C27		CAP,FXD	CER	C3216JB1H103K-E-TP	0.01UF
C28		CAP,FXD	CER	C3216JB1H103K-E-TP	0.01UF
C29		CAP,FXD	CER	C3216JB1H103K-E-TP	0.01UF
C30		CAP,FXD	CER	C3216JB1H103K-E-TP	0.01UF
C31		CAP,FXD	CER	C3216JB1H103K-E-TP	0.01UF
C32		CAP,FXD	CER	C3216X7R1E104K-E-TP	0.1U
C33		CAP,FXD	CER	C3216X7R1E104K-E-TP	0.1U
C34		CAP,FXD	CER	C3216X7R1H333K-E-TP	50V 0.033U
C35		CAP,FXD	CER	C3216X7R1H333K-E-TP	50V 0.033U
C36		CAP,FXD	CER	C3216X7R1H333K-E-TP	50V 0.033U

PARTS LIST

RF TUNE		TITLE		SHEET NO	
PARTS NO		PARTS NAME		DESCRIPTION	
C37		CAP,FXD	CER	C3216X7R1E104K-E-TP	0.1U
C41		CAP,FXD	CER	C3216X7R1H333K-E-TP	50V 0.033U
C42		CAP,FXD	CER	C3216X7R1H333K-E-TP	50V 0.033U
C43		CAP,FXD	CER	C3216X7R1H333K-E-TP	50V 0.033U
C44		CAP,FXD	CER	C3216CH1H020C-E-TP	2PF
C45		CAP,FXD	CER	C3216SL1H102J-E-TP	1000PF
C46		CAP,FXD	CER	C3216X7R1E104K-E-TP	0.1U
C47		CAP,FXD	CER	C3216X7R1H333K-E-TP	50V 0.033U
C48		CAP,FXD	CER	C3216X7R1H333K-E-TP	50V 0.033U
C49		CAP,FXD	CER	C3216X7R1H333K-E-TP	50V 0.033U
C50		CAP,FXD	CER	C3216X7R1H333K-E-TP	50V 0.033U
C51		CAP,FXD	CER	C3216CH1H010C-E-TP	1PF
C52		CAP,FXD	CER	C3216CH1H681J-E-TP	680P
C53		CAP,FXD	CER	C3216X7R1H333K-E-TP	50V 0.033U
C54		CAP,FXD	CER	C3216X7R1H333K-E-TP	50V 0.033U
C55		CAP,FXD	CER	C3216X7R1H333K-E-TP	50V 0.033U
C56		CAP,FXD	CER	C3216CH1H030C-E-TP	3PF
C57		CAP,FXD	CER	C3216CH1H050C-E-TP	5PF
C58		CAP,FXD	CER	C3216CH1H050C-E-TP	5PF
C59		CAP,FXD	CER	C3216CH1H050C-E-TP	5PF
C60		CAP,FXD	CER	C3216SL1H102J-E-TP	1000PF
C61		CAP,FXD	CER	C3216X7R1H333K-E-TP	50V 0.033U
C62		CAP,FXD	CER	C3216X7R1E104K-E-TP	0.1U
C63		CAP,FXD	CER	C3216X7R1E104K-E-TP	0.1U
C64		CAP,FXD	CER	C3216X7R1E104K-E-TP	0.1U
C65		CAP,FXD	CER	C3216CH1H050C-E-TP	5PF
C66		CAP,FXD	CER	C3216CH1H100J-E-TP	4700PF
C67		CAP,FXD	CER	C3216B1H472K-E-TP	4700PF
C68		CAP,FXD	CER	C3216X7R1E104K-E-TP	0.1U
C69		CAP,FXD	CER	C3216X7R1E104K-E-TP	0.1U
C70		CAP,FXD	CER	C3216X7R1E104K-E-TP	0.1U
C71		CAP,FXD	CER	C3216CH1H050C-E-TP	5PF
C72		CAP,FXD	CER	C3216CH1H100J-E-TP	4700PF
C73		CAP,FXD	CER	C3216B1H472K-E-TP	4700PF
C74		CAP,FXD	CER	C3216X7R1H333K-E-TP	50V 0.033U

PARTS LIST

RF TUNE		TITLE		SHEET NO	
PARTS NO		PARTS NAME		DESCRIPTION	
PARTS NO		PARTS NAME		DESCRIPTION	
C75	CAP,FXD	CER	C3216X7R1E104K-E-TP	0.1U	SCAAD00782
C76	CAP,FXD	CER	C3216B1H472K-E-TP	4700PF	SCAAD00783
C77	CAP,FXD	CER	C3216B1H472K-E-TP	4700PF	SCAAD00783
C78	CAP,FXD	CER	C3216B1H472K-E-TP	4700PF	SCAAD00783
C79	CAP,FXD	CER	C3216S1H222J-E-TP	2200P	SCAAD00792
C80	CAP,FXD	CER	C3216B1H472K-E-TP	4700PF	SCAAD00783
C81	CAP,FXD	CER	C3216S1H152J-E-TP	1500PF	SCAAD00791
C82	CAP,FXD	CER	C3216X7R1E104K-E-TP	0.1U	SCAAD00783
C83	CAP,FXD	CER	C3216X7R1E104K-E-TP	0.1U	SCAAD00783
C84	CAP,FXD	CER	C3216S1H222J-E-TP	2200P	SCAAD00792
C85	CAP,FXD	CER	C3216B1H103K-E-TP	0.01UF	SCAAD00789
C86	CAP,FXD	CER	C3216S1H821J-E-TP	82PF	SCAAD01068
C87	CAP,FXD	CER	C3216B1H472K-E-TP	4700PF	SCAAD00783
C88	CAP,FXD	CER	C3216S1H222J-E-TP	2200P	SCAAD00792
C89	CAP,FXD	CER	C3216S1H102J-E-TP	1000PF	SCAAD00782
C90	CAP,FXD	CER	C3216X7R1E104K-E-TP	0.1U	SCAAD01237
C96	CAP,FXD	CER	C3216X7R1E104K-E-TP	0.1U	SCAAD01237
C97	CAP,FXD	CER	C3216CH1H680J-E-TP	68PF	SCAAD00929
C98	CAP,FXD	CER	C3216CH1H330J-E-TP	33PF	SCAAD00794
C99	CAP,FXD	CER	C3216CH1H21J-E-TP	120PF	SCAAD00931
C100	CAP,FXD	CER	C3216CH1H220J-E-TP	22P	SCAAD00869
C101	CAP,FXD	CER	C3216CH1H820J-E-TP	82P	SCAAD00930
C102	CAP,FXD	CER	C3216X7R1E104K-E-TP	0.1U	SCAAD01237
C103	CAP,FXD	CER	C3216X7R1H333K-E-TP	50V 0.033U	SCAAD01357
C104	CAP,FXD	TANTAL	202L1602 106KB		SCSAC00932
C105	CAP,FXD	CER	C3216X7R1E104K-E-TP	0.1U	SCAAD01237
C106	CAP,FXD	CER	C3216X7R1E104K-E-TP	0.1U	SCAAD01237
C107	CAP,FXD	CER	C3216CH1H150J-E-TP	15PF	SCAAD00787
C108	CAP,FXD	CER	C3216CH1H150J-E-TP	15PF	SCAAD00787
C109	CAP,FXD	CER	C3216X7R1H333K-E-TP	50V 0.033U	SCAAD01357
C110	CAP,FXD	CER	C3216S1H102J-E-TP	1000PF	SCAAD00782
C111	CAP,FXD	CER	C3216X7R1H333K-E-TP	50V 0.033U	SCAAD01357
C112	CAP,FXD	CER	C3216X7R1H333K-E-TP	50V 0.033U	SCAAD01357
C113	CAP,FXD	CER	C3216S1H102J-E-TP	1000PF	SCAAD00782
C114	CAP,FXD	CER	C3216X7R1H333K-E-TP	50V 0.033U	SCAAD01357

PARTS LIST

RF TUNE		TITLE		SHEET NO	
PARTS NO		PARTS NAME		DESCRIPTION	
PARTS NO		PARTS NAME		DESCRIPTION	
C115	CAP,FXD	CER	C3216S1H102J-E-TP	1000PF	SCAAD00782
C116	CAP,FXD	CER	C3216S1H102J-E-TP	1000PF	SCAAD00782
C117	CAP,FXD	CER	C3216S1H102J-E-TP	1000PF	SCAAD00782
C118	CAP,FXD	CER	C3216S1H102J-E-TP	1000PF	SCAAD00782
C119	CAP,FXD	CER	C3216X7R1H333K-E-TP	50V 0.033U	SCAAD01357
C120	CAP,FXD	CER	C3216S1H102J-E-TP	1000PF	SCAAD00782
C121	CAP,FXD	CER	C3216S1H102J-E-TP	1000PF	SCAAD00782
C122	CAP,FXD	CER	C3216X7R1H333K-E-TP	50V 0.033U	SCAAD01357
C123	CAP,FXD	CER	C3216X7R1H333K-E-TP	50V 0.033U	SCAAD01357
C124	CAP,FXD	CER	C3216X7R1H333K-E-TP	50V 0.033U	SCAAD01357
C125	CAP,FXD	CER	C3216X7R1H333K-E-TP	50V 0.033U	SCAAD01357
C126	CAP,FXD	CER	C3216X7R1H333K-E-TP	50V 0.033U	SCAAD01357
C127	CAP,FXD	CER	C3216X7R1H333K-E-TP	50V 0.033U	SCAAD01357
C128	CAP,FXD	CER	C3216X7R1H333K-E-TP	50V 0.033U	SCAAD01357
C129	CAP,FXD	CER	C3216X7R1H333K-E-TP	50V 0.033U	SCAAD01357
C130	CAP,FXD	CER	C3216X7R1H333K-E-TP	50V 0.033U	SCAAD01357
C131	CAP,FXD	CER	C3216X7R1H333K-E-TP	50V 0.033U	SCAAD01357
C132	CAP,FXD	CER	C3216X7R1H333K-E-TP	50V 0.033U	SCAAD01357
C134	CAP,FXD	CER	C3216X7R1H333K-E-TP	50V 0.033U	SCAAD01357
C135	CAP,FXD	TANTAL	202L1602 106KB		SCSAC00932
C137	CAP,FXD	CER	C3216J81H103K-E-TP	0.01UF	SCAAD00789
C138	CAP,FXD	TANTAL	202L3502 105KB	35V 10F	SCSAC00982
C139	CAP,FXD	ELCTLT	ECE-A1EU100B		SCSAC01864
C01	DIODE		1SS181 TE85L		STXAD00356
C02	DIODE		1SS181 TE85L		STXAD00356
C03	DIODE		1SS181 TE85L		STXAD00356
C04	DIODE		R05.1MB1-T1		STXAD00515
C05	DIODE		1SS184 TE85L		STXAD00290
C06	DIODE		M1301		STXAR00004
C07	DIODE		M1301		STXAR00004
C08	DIODE		M1301		STXAR00004
C09	DIODE		M1301		STXAR00004
C010	DIODE		1SS143T-87		STXCM00021
C011	DIODE		1SS143T-87		STXCM00021
C012	DIODE		1SS143T-87		STXCM00021

PARTS LIST

RF TUNE		TITLE C&L-244		SHEET NO 5	
PARTS NO	PARTS NAME	TYPE	DESCRIPTION	CODE	
CD13	DIODE	FC6M-010		STXAB00035	
CD14	DIODE	FC6M-010		STXAB00035	
CD15	DIODE	FC6M-010		STXAB00035	
CD16	DIODE	FC6M-010		STXAB00035	
CD17	DIODE	1SS85RE		STXAE00590	
CD18	DIODE	1SS143T-87		STXAE00590	
CD19	DIODE	FC6M-010		STXAB00035	
CD20	DIODE	FC6M-010		STXAB00035	
CD21	DIODE	FC6M-010		STXAB00035	
CD22	DIODE	FC6M-010		STXAB00035	
CD23	DIODE	1SS85RE		STXAE00590	
CD24	DIODE	1SS143T-87		STXAE00590	
CD25	DIODE	FC6M-010		STXAB00035	
CD26	DIODE	FC6M-010		STXAB00035	
CD27	DIODE	FC6M-010		STXAB00035	
CD28	DIODE	FC6M-010		STXAB00035	
CD29	DIODE	1SS85RE		STXAE00590	
CD30	DIODE	1SS143T-87		STXAE00590	
CD31	DIODE	FC6M-010		STXAB00035	
CD32	DIODE	FC6M-010		STXAB00035	
CD33	DIODE	FC6M-010		STXAB00035	
CD34	DIODE	FC6M-010		STXAB00035	
CD35	DIODE	FC6M-010		STXAB00035	
CD36	DIODE	FC6M-010		STXAB00035	
CD37	DIODE	FC6M-010		STXAB00035	
CD38	DIODE	FC6M-010		STXAB00035	
CD39	DIODE	1SS85RE		STXAE00590	
CD40	DIODE	1SS143T-87		STXAE00590	
CD41	DIODE	FC6M-010		STXAB00035	
CD42	DIODE	FC6M-010		STXAB00035	
CD43	DIODE	FC6M-010		STXAB00035	
CD44	DIODE	FC6M-010		STXAB00035	
CD45	DIODE	FC6M-010		STXAB00035	
CD46	DIODE	FC6M-010		STXAB00035	
CD47	DIODE	FC6M-010		STXAB00035	

PARTS LIST

RF TUNE		TITLE C&L-244		SHEET NO 6	
PARTS NO	PARTS NAME	TYPE	DESCRIPTION	CODE	
CD48	DIODE	FC6M-010		STXAB00035	
CD49	DIODE	1SS85RE		STXAE00590	
CD50	DIODE	1SS143T-87		STXAE00590	
CD51	DIODE	1SS85RE		STXAE00590	
CD52	DIODE	1SS143T-87		STXAE00590	
CD53	DIODE	1SS85RE		STXAE00590	
CD56	DIODE	1SS85RE		STXAE00590	
CD57	DIODE	1SS85RE		STXAE00590	
CD58	DIODE	1SS85RE		STXAE00590	
CD59	DIODE	1SS85RE		STXAE00590	
CD60	DIODE	1SS181 TE85L		STXAD00356	
CD61	DIODE	1SS184 TE85L		STXAD00290	
CD62	DIODE	1SS184 TE85L		STXAD00290	
CV1	CAPACITOR VAR	TZ03T200FR		SCVAA00166	
CV2	CAPACITOR VAR	TZ03T200FR		SCVAA00166	
CV3	CAPACITOR VAR	TZ03T200FR		SCVAA00166	
CV4	CAPACITOR VAR	TZ03T200FR		SCVAA00166	
CV5	CAPACITOR VAR	TZ03T200FR		SCVAA00166	
CV6	CAPACITOR VAR	TZ03T200FR		SCVAA00166	
IC1	IC	UPC1656C		SDAAA00183	
IC2	IC	SN74LS145N		SDDAS00138	
IC3	IC	SN76S14N		SDDAL00251	
J44-1	CONNECTOR	TMP-J01X-V2		5JDAX00009	
J57-1	CONNECTOR	TMP-J01X-V2		5JDAX00009	
JP1	TIN COATED WIRE	TA-0.6P		2717100001	
JP2	TIN COATED WIRE	TA-0.6P		2717100001	
JP3	TIN COATED WIRE	TA-0.6P		2717100001	
JP4	TIN COATED WIRE	TA-0.6P		2717100001	
JP5	TIN COATED WIRE	TA-0.6P		2717100001	
JP6	TIN COATED WIRE	TA-0.6P		2717100001	
JP7	TIN COATED WIRE	TA-0.6P		2717100001	
JP8	TIN COATED WIRE	TA-0.6P		2717100001	
JP9	TIN COATED WIRE	TA-0.6P		2717100001	
K1	RELAY	HD1-N-DC9V		5KCLAD00660	
K2	RELAY	HD1-M-DC9V		5KCLAD00660	

PARTS LIST				TITLE CF-224				SHEET 7			
PARTS LIST				TITLE CF-224				SHEET 7			
PARTS NO.	PARTS NAME	TYPE	DESCRIPTION	QTY	PARTS NO.	PARTS NAME	TYPE	DESCRIPTION	QTY	PARTS NO.	PARTS NAME

L41	RELAY	DF2-DC9V		SKLAD00578	L41	COIL	LAL03VB101K		SLCAA00331
L42	RELAY	DF2-DC9V		SKLAD00578	L42	COIL	LAL03VB100K	10UH	SLCAA00273
L43	RELAY	DF2-DC9V		SKLAD00578	L43	COIL	LAL03VB22M	0.22UH	SLCAA00280
L44	RELAY	DF2-DC9V		SKLAD00578	P1	CONNECTOR	EC1C-22P-2.5DSA	22P	SJWBS00070
L45	RELAY	DF2-DC9V		SKLAD00578	P2	CONNECTOR	EC1C-22P-2.5DSA	22P	SJWBS00070
L46	RELAY	DF2-DC9V		SKLAD00578	PC1	PCB	H-6PCJD00258A		6PCJDC0258
L47	RELAY	DF2-DC9V		SKLAD00578	R1	RESISTOR	ERJ-8GEYJ560V	1/8W 56 OHM	SREAG01723
L48	RELAY	DF2-DC9V		SKLAD00578	R2	RESISTOR	ERJ-8GEYJ151V	1/8W 150 OHM	SREAG01728
L49	RELAY	DF2-DC9V		SKLAD00578	R3	RESISTOR	ERJ-8GEYJ331V	1/8W 330 OHM	SREAG01732
L50	RELAY	DF2-DC9V		SKLAD00578	R4	RESISTOR	ERJ-8GEYJ681V	1/8W 680 OHM	SREAG01736
L51	RELAY	DF2-DC9V		SKLAD00578	R5	RESISTOR	ERJ-8GEYJ471V	1/8W 470 OHM	SREAG01734
L52	RELAY	DF2-DC9V		SKLAD00578	R6	RESISTOR	ERJ-8GEYJ330V	1/8W 33 OHM	SREAG01720
L53	RELAY	DF2-DC9V		SKLAD00578	R7	RESISTOR	ERJ-8GEYJ330V	1/8W 33 OHM	SREAG01720
L54	RELAY	DF2-DC9V		SKLAD00578	R10	RESISTOR	ERJ-8GEYJ471V	1/8W 470 OHM	SREAG01734
L55	RELAY	DF2-DC9V		SKLAD00578	R11	RESISTOR	ERJ-8GEYJ222V	1/8W 2.2K OHM	SREAG01742
L56	RELAY	DF2-DC9V		SKLAD00578	R12	RESISTOR	ERJ-8GEYJ331V	1/8W 330 OHM	SREAG01732
L57	RELAY	DF2-DC9V		SKLAD00578	R13	RESISTOR	ERJ-8GEYJ180V	1/8W 18 OHM	SREAG01717
L58	RELAY	DF2-DC9V		SKLAD00578	R14	RESISTOR	ERJ-8GEYJ152V	1/8W 1.5K OHM	SREAG01740
L59	RELAY	DF2-DC9V		SKLAD00578	R15	RESISTOR	ERJ-8GEYJ681V	1/8W 680 OHM	SREAG01736
L60	RELAY	DF2-DC9V		SKLAD00578	R16	RESISTOR	ERJ-8GEYJ331V	1/8W 330 OHM	SREAG01732
L61	RELAY	DF2-DC9V		SKLAD00578	R17	RESISTOR	ERJ-8GEYK5R6V		SREAG02027
L62	RELAY	DF2-DC9V		SKLAD00578	R18-1	RESISTOR	ERJ-8GEYJ470V	1/8W 47 OHM	SREAG01722
L63	RELAY	DF2-DC9V		SKLAD00578	R18-2	RESISTOR	ERJ-8GEYJ470V	1/8W 47 OHM	SREAG01722
L64	RELAY	DF2-DC9V		SKLAD00578	R18-3	RESISTOR	ERJ-8GEYJ470V	1/8W 47 OHM	SREAG01722
L65	RELAY	DF2-DC9V		SKLAD00578	R19	RESISTOR	ERJ-8GEYJ271V	1/8W 270 OHM	SREAG01731
L66	RELAY	DF2-DC9V		SKLAD00578	R20	RESISTOR	ERJ-8GEYJ180V	1/8W 18 OHM	SREAG01717
L67	RELAY	DF2-DC9V		SKLAD00578	R21	RESISTOR	ERJ-8GEYJ271V	1/8W 270 OHM	SREAG01731
L68	RELAY	DF2-DC9V		SKLAD00578	R22	RESISTOR	ERJ-8GEYJ103V	1/8W 10K OHM	SREAG01750
L69	RELAY	DF2-DC9V		SKLAD00578	R24	RESISTOR	ERJ-8GEYJ103V	1/8W 10K OHM	SREAG01750
L70	RELAY	DF2-DC9V		SKLAD00578	R25	RESISTOR	RKC1/887-47K OHM J		SREAG01750
L71	RELAY	DF2-DC9V		SKLAD00578	R26-1	RESISTOR	ERJ-8GEYJ331V	1/8W 330 OHM	SREAG01732
L72	RELAY	DF2-DC9V		SKLAD00578	R26-2	RESISTOR	ERJ-8GEYJ331V	1/8W 330 OHM	SREAG01732
L73	RELAY	DF2-DC9V		SKLAD00578	P27	RESISTOR	ERJ-8GEYJ471V	1/8W 470 OHM	SREAG01734
L74	RELAY	DF2-DC9V		SKLAD00578	P28	RESISTOR	ERJ-8GEYJ510V	1/8W 51 OHM	SREAG02025
L75	RELAY	DF2-DC9V		SKLAD00578	P29	RESISTOR	ERJ-8GEYJ102V	1/8W 1K OHM	SREAG01732

PARTS LIST

PARTS NO		PARTS NAME	TYPE	DESCRIPTION	CODE
RF TUNE					
TITLE CFL-244					
SHEET NO 9					
R30	RESISTOR	FXD	ERJ-8GEYJ470V	1/8W 47 OHM	SREAG01722
R31	RESISTOR	FXD	ERJ-8GEYJ471V	1/8W 470 OHM	SREAG01734
R36	RESISTOR	FXD	ERJ-8GEYJ471V	1/8W 470 OHM	SREAG01734
R37	RESISTOR	FXD	ERJ-8GEYJ470V	1/8W 47 OHM	SREAG01722
R38	RESISTOR	FXD	ERJ-8GEYJ104V	1/8W 100K OHM	SREAG01762
R39	RESISTOR	FXD	ERJ-8GEYJ104V	1/8W 100K OHM	SREAG01762
R40	RESISTOR	FXD	ERJ-8GEYJ104V	1/8W 100K OHM	SREAG01762
R41	RESISTOR	FXD	ERJ-8GEYJ101V	1/8W 100 OHM	SREAG01726
R42	RESISTOR	FXD	ERJ-8GEYJ102V	1/8W 1K OHM	SREAG01738
R43	RESISTOR	FXD	ERJ-8GEYJ470V	1/8W 47 OHM	SREAG01722
R44	RESISTOR	FXD	ERJ-8GEYJ104V	1/8W 100K OHM	SREAG01762
R45	RESISTOR	FXD	ERJ-8GEYJ104V	1/8W 100K OHM	SREAG01762
R46	RESISTOR	FXD	ERJ-8GEYJ104V	1/8W 100K OHM	SREAG01762
R47	RESISTOR	FXD	ERJ-8GEYJ101V	1/8W 100 OHM	SREAG01726
R48	RESISTOR	FXD	ERJ-8GEYJ470V	1/8W 47 OHM	SREAG01722
R49	RESISTOR	FXD	ERJ-8GEYJ104V	1/8W 100K OHM	SREAG01762
R50	RESISTOR	FXD	ERJ-8GEYJ104V	1/8W 100K OHM	SREAG01762
R51	RESISTOR	FXD	ERJ-8GEYJ104V	1/8W 100K OHM	SREAG01762
R52	RESISTOR	FXD	ERJ-8GEYJ101V	1/8W 100 OHM	SREAG01726
R53	RESISTOR	FXD	ERJ-8GEYJ470V	1/8W 47 OHM	SREAG01722
R54	RESISTOR	FXD	ERJ-8GEYJ104V	1/8W 100K OHM	SREAG01762
R55	RESISTOR	FXD	ERJ-8GEYJ104V	1/8W 100K OHM	SREAG01762
R56	RESISTOR	FXD	ERJ-8GEYJ104V	1/8W 100K OHM	SREAG01762
R57	RESISTOR	FXD	ERJ-8GEYJ101V	1/8W 100 OHM	SREAG01726
R58	RESISTOR	FXD	ERJ-8GEYJ470V	1/8W 47 OHM	SREAG01722
R59	RESISTOR	FXD	ERJ-8GEYJ104V	1/8W 100K OHM	SREAG01762
R60	RESISTOR	FXD	ERJ-8GEYJ104V	1/8W 100K OHM	SREAG01762
R61	RESISTOR	FXD	ERJ-8GEYJ104V	1/8W 100K OHM	SREAG01762
R62	RESISTOR	FXD	ERJ-8GEYJ101V	1/8W 100 OHM	SREAG01726
R63	RESISTOR	FXD	ERJ-8GEYJ470V	1/8W 47 OHM	SREAG01722
R64	RESISTOR	FXD	ERJ-8GEYJ470V	1/8W 47 OHM	SREAG01722
R65	RESISTOR	FXD	ERJ-8GEYK5R6V	1/8W 220 OHM	SREAG02207
R66	RESISTOR	FXD	ERJ-8GEYJ221V	1/8W 220 OHM	SREAG01730
R67	RESISTOR	FXD	ERJ-8GEYK5R6V	1/8W 220 OHM	SREAG02207
R68	RESISTOR	FXD	ERJ-8GEYJ470V	1/8W 47 OHM	SREAG01722

PARTS LIST

PARTS NO		PARTS NAME	TYPE	DESCRIPTION	CODE
RF TUNE					
TITLE CFL-244					
SHEET NO 10					
R69	RESISTOR	FXD	ERJ-8GEYJ101V	1/8W 100 OHM	SREAG01726
R76	RESISTOR	FXD	ERJ-8GEYJ471V	1/8W 470 OHM	SREAG01734
R77	RESISTOR	FXD	ERJ-8GEYJ471V	1/8W 470 OHM	SREAG01734
R78	RESISTOR	FXD	ERJ-8GEYJ221V	1/8W 220 OHM	SREAG01730
R79	RESISTOR	FXD	ERJ-8GEYJ470V	1/8W 47 OHM	SREAG01722
R80	RESISTOR	FXD	ERJ-8GEYJ102V	1/8W 1K OHM	SREAG01738
R81	RESISTOR	FXD	ERJ-8GEYJ102V	1/8W 1K OHM	SREAG01738
R82	RESISTOR	FXD	ERJ-8GEYJ470V	1/8W 47 OHM	SREAG01722
R83	RESISTOR	FXD	ERJ-8GEYJ221V	1/8W 220 OHM	SREAG01730
R84	RESISTOR	FXD	ERJ-8GEYJ470V	1/8W 47 OHM	SREAG01722
R85	RESISTOR	FXD	ERJ-8GEYJ102V	1/8W 1K OHM	SREAG01738
R86	RESISTOR	FXD	ERJ-8GEYJ101V	1/8W 100 OHM	SREAG01726
R87	RESISTOR	FXD	ERJ-8GEYJ332V	1/8W 3.3K OHM	SREAG01744
R88	RESISTOR	FXD	ERJ-8GEYJ682V	1/8W 680 OHM	SREAG01748
R89	RESISTOR	FXD	ERJ-8GEYJ101V	1/8W 100 OHM	SREAG01726
R90	RESISTOR	FXD	ERJ-8GEYK4R7V	1/8W 4.7 OHM	SREAG02256
R91	RESISTOR	FXD	ERJ-8GEYJ101V	1/8W 100 OHM	SREAG01726
R92	RESISTOR	FXD	ERJ-8GEYJ471V	1/8W 470 OHM	SREAG01734
R93	RESISTOR	FXD	ERJ-8GEYJ101V	1/8W 100 OHM	SREAG01726
R94	RESISTOR	FXD	ERJ-8GEYJ223V	1/8W 22K OHM	SREAG01754
R95	RESISTOR	FXD	ERJ-8GEYJ470V	1/8W 47 OHM	SREAG01722
R96	RESISTOR	FXD	ERJ-8GEYJ222V	1/8W 2.2K OHM	SREAG01742
R97	RESISTOR	FXD	ERJ-8GEYJ101V	1/8W 100 OHM	SREAG01726
R98	RESISTOR	FXD	ERJ-8GEYJ152V	1/8W 1.5K OHM	SREAG01740
R99	RESISTOR	FXD	ERJ-8GEYJ821V	1/8W 820 OHM	SREAG01737
R100	RESISTOR	FXD	ERJ-8GEYJ331V	1/8W 330 OHM	SREAG01732
R101	RESISTOR	FXD	ERJ-8GEYJ471V	1/8W 470 OHM	SREAG01734
R102	RESISTOR	FXD	ERJ-8GEYJ102V	1/8W 1K OHM	SREAG01738
R103	RESISTOR	FXD	ERJ-8GEYJ103V	1/8W 10K OHM	SREAG01750
R104	RESISTOR	FXD	ERJ-8GEYJ222V	1/8W 2.2K OHM	SREAG01742
R106	RESISTOR	FXD	ERJ-8GEYJ103V	1/8W 10K OHM	SREAG01750
R107	RESISTOR	FXD	ERJ-8GEYJ472V	1/8W 470 OHM	SREAG01746
R108	RESISTOR	FXD	ERJ-8GEYJ472V	1/8W 470 OHM	SREAG01746
R109	RESISTOR	FXD	ERJ-8GEYJ472V	1/8W 470 OHM	SREAG01746
R110	RESISTOR	FXD	ERJ-8GEYJ472V	1/8W 470 OHM	SREAG01746

PARTS LIST					SHEET NO	
RF TUNE					11	
TITLE CFL-244					12	
PARTS NO	PARTS NAME	TYPE	DESCRIPTION	CODE		

R111	RESISTOR	FXD	ERJ-8GEYJ103V	1/8W 10K OHM	SREAG01750	
R112	RESISTOR	FXD	ERJ-8GEYJ103V	1/8W 10K OHM	SREAG01750	
R113	RESISTOR	FXD	ERJ-8GEYJ103V	1/8W 10K OHM	SREAG01750	
R114	RESISTOR	FXD	ERJ-8GEYJ103V	1/8W 10K OHM	SREAG01750	
R115	RESISTOR	FXD	ERJ-8GEYJ150V	1/8W 15 OHM	SREAG01716	
R116	RESISTOR	FXD	ERJ-8GEYJ150V	1/8W 15 OHM	SREAG01716	
R117	RESISTOR	FXD	ERJ-8GEYJ820V	1/8W 82 OHM	SREAG01725	
R118	RESISTOR	FXD	ERJ-8GEYJ102V	1/8W 1K OHM	SREAG01738	
R119	RESISTOR	FXD	ERJ-8GEYJ220V	1/8W 22 OHM	SREAG01718	
R120	RESISTOR	FXD	ERJ-8GEYJ330V	1/8W 33 OHM	SREAG01720	
R121	RESISTOR	FXD	ERJ-8GEYJ562V	1/8W 5.6K OHM	SREAG01747	
R122	RESISTOR	FXD	ERJ-8GEYJ183V	1/8W 18K OHM	SREAG01753	
RJ1	RESISTOR	FXD	ERJ-8GEYOR00V	0 OHM	SREAG01775	
RJ2	RESISTOR	FXD	ERJ-8GEYOR00V	0 OHM	SREAG01775	
RJ3	RESISTOR	FXD	ERJ-8GEYOR00V	0 OHM	SREAG01775	
RJ4	RESISTOR	FXD	ERJ-8GEYOR00V	0 OHM	SREAG01775	
RJ5	RESISTOR	FXD	ERJ-8GEYOR00V	0 OHM	SREAG01775	
RJ6	RESISTOR	FXD	ERJ-8GEYOR00V	0 OHM	SREAG01775	
RJ7	RESISTOR	FXD	ERJ-8GEYOR00V	0 OHM	SREAG01775	
RJ8	RESISTOR	FXD	ERJ-8GEYOR00V	0 OHM	SREAG01775	
RJ9	RESISTOR	FXD	ERJ-8GEYOR00V	0 OHM	SREAG01775	
RJ10	RESISTOR	FXD	ERJ-8GEYOR00V	0 OHM	SREAG01775	
RJ11	RESISTOR	FXD	ERJ-8GEYOR00V	0 OHM	SREAG01775	
RJ12	RESISTOR	FXD	ERJ-8GEYOR00V	0 OHM	SREAG01775	
RJ13	RESISTOR	FXD	ERJ-8GEYOR00V	0 OHM	SREAG01775	
RJ14	RESISTOR	FXD	ERJ-8GEYOR00V	0 OHM	SREAG01775	
RJ15	RESISTOR	FXD	ERJ-8GEYOR00V	0 OHM	SREAG01775	
RJ16	RESISTOR	FXD	ERJ-8GEYOR00V	0 OHM	SREAG01775	
RJ17	RESISTOR	FXD	ERJ-8GEYOR00V	0 OHM	SREAG01775	
RJ18	RESISTOR	FXD	ERJ-8GEYOR00V	0 OHM	SREAG01775	
RJ19	RESISTOR	FXD	ERJ-8GEYOR00V	0 OHM	SREAG01775	
RJ20	RESISTOR	FXD	ERJ-8GEYOR00V	0 OHM	SREAG01775	
RJ21	RESISTOR	FXD	ERJ-8GEYOR00V	0 OHM	SREAG01775	
RJ22	RESISTOR	FXD	ERJ-8GEYOR00V	0 OHM	SREAG01775	
RJ23	RESISTOR	FXD	ERJ-8GEYOR00V	0 OHM	SREAG01775	

FABR LIST

PARTS NO		PARTS NAME	TYPE	DESCRIPTION	CODE
1		RF TUNE		REF-222	SHEET NO 13
T11	RF XFMR	H-6LHJD00383			6LHJD00383
T12	RF XFMR	H-6LHJD00383			6LHJD00383
T13	RF XFMR	H-6LHJD00410			6LHJD00410
T14	RF XFMR	H-6LHJD00440			6LHJD00440
TP1	TEST TERMINAL	PCN6-PEA			SJDA00364
TP2	TEST TERMINAL	PCN6-PEA			SJDA00364
TP3	TEST TERMINAL	PCN6-PEA			SJDA00364
TP4	TEST TERMINAL	PCN6-PEA			SJDA00364
TP5	TEST TERMINAL	PCN6-PEA			SJDA00364
TP6	TEST TERMINAL	PCN6-PEA			SJDA00364
TP7	TEST TERMINAL	PCN6-PEA			SJDA00364
TP8	TEST TERMINAL	PCN6-PEA			SJDA00364
TP9	TEST TERMINAL	PCN6-PEA			SJDA00364
TP10	TEST TERMINAL	PCN6-PEA			SJDA00364
TP11	TEST TERMINAL	PCN6-PEA			SJDA00364
TP12	TEST TERMINAL	PCN6-PEA			SJDA00364
TP13	TEST TERMINAL	PCN6-PEA			SJDA00364
TR1	TRANSISTOR	2SC2714Y TE85L			STCAF00436
TR2	TRANSISTOR	2SC2714Y TE85L			STCAF00436
TR3	TRANSISTOR	2SC2714Y TE85L			STCAF00436
TR4	TRANSISTOR	2SC2714Y TE85L			STCAF00436
TR5	TRANSISTOR	2SC1815-Y			STCAF00219
TR6	TRANSISTOR	2SC3419-Y			STCAF00536
TR7	TRANSISTOR	2SA1162-Y TE85L			STAAG00182
TR8	TRANSISTOR	2SC3398-TB			STCAZ00011
TR9	TRANSISTOR	2SK125			STKAH00002
TR10	TRANSISTOR	2SK125			STKAH00002
TR11	TRANSISTOR	2SK125			STKAH00002
TR12	TRANSISTOR	2SK125			STKAH00002
TR13	TRANSISTOR	2SC3355			STCAB01223
TR14	TRANSISTOR	2SC3356-11B			STCAB01142
TR15	TRANSISTOR	2SA1162-Y TE85L			STAAG00182
TR16	TRANSISTOR	2SC3398-TB			STCAZ00011
TR18	TRANSISTOR	2SC2712Y TE85L			STAAG00186
TR19	TRANSISTOR	2SC2712Y TE85L			STAAG00186

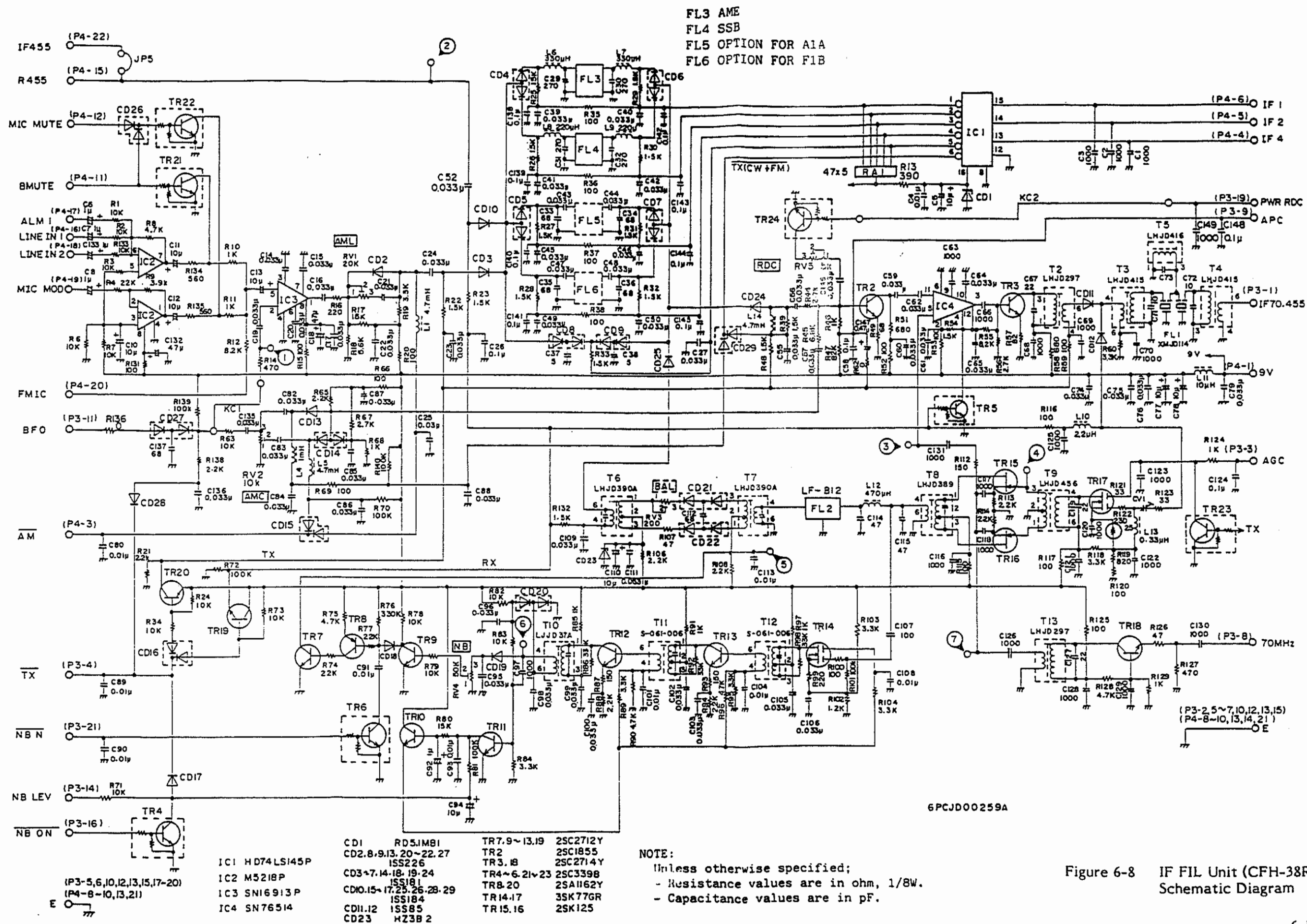


Figure 6-8 IF FIL Unit (CFH-38R)
Schematic Diagram

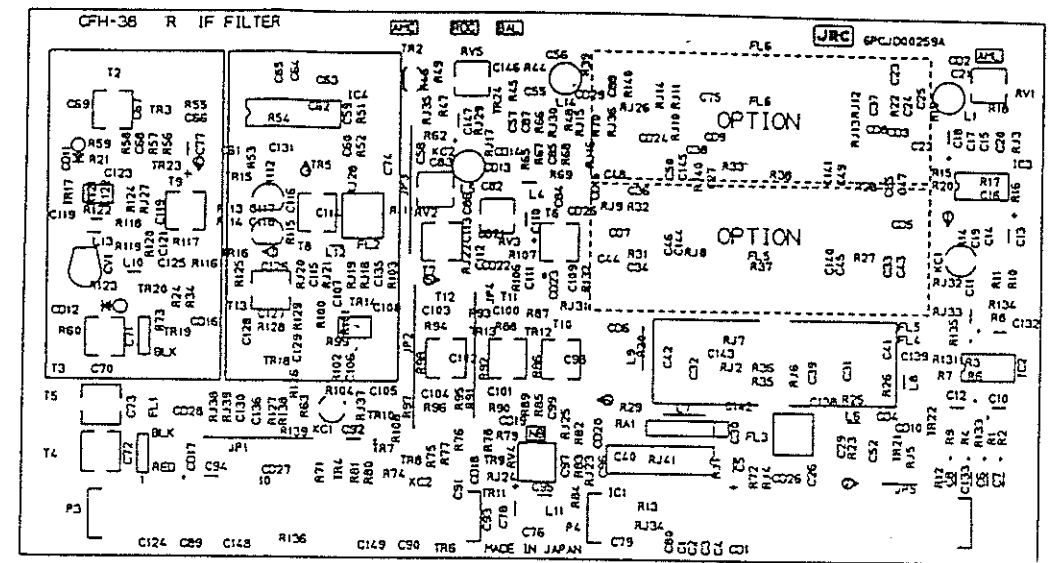


Figure 6-9 IF FIL Unit (CFH-38R) Component Layout

PARTS LIST				SHEET NO	
IF FILTER				CFH-38	
PARTS NO	PART NAME	TYPE	DESCRIPTION	CODE	
F4	FILTER	MF-455-10GZ		SNMAA00015	
U*	IF FIL UNIT	CFH-38		CFH-38	

PARTS LIST				SHEET NO	
IF FILTER				CFH-38	
PARTS NO	PARTS NAME	TYPE	DESCRIPTION	CODE	
C1	CAP,FXD CER	C3216SL1H102J-E-TP	1000PF	SCAAD00782	
C2	CAP,FXD CER	C3216SL1H102J-E-TP	1000PF	SCAAD00782	
C3	CAP,FXD CER	C3216SL1H102J-E-TP	1000PF	SCAAD00782	
C4	CAP,FXD CER	C3216JB1H103K-E-TP	0.01UF	SCAAD00789	
C5	CAP,FXD ELCTLT	ECE-A1EU100B		SCFAA01864	
C6	CAP,FXD TANTAL	202L3502 105KB	35V 1UF	SCSAC00982	
C7	CAP,FXD TANTAL	202L3502 105KB	35V 1UF	SCSAC00982	
C8	CAP,FXD TANTAL	202L3502 105KB	35V 1UF	SCSAC00982	
C10	CAP,FXD ELCTLT	ECE-A1EU100B		SCFAA01864	
C11	CAP,FXD ELCTLT	ECE-A1EU100B		SCFAA01864	
C12	CAP,FXD ELCTLT	ECE-A1EU100B		SCFAA01864	
C13	CAP,FXD ELCTLT	ECE-A1EU100B		SCFAA01864	
C14	CAP,FXD CER	C3216JB1E333K-E-TP		SCAAD01235	
C15	CAP,FXD CER	C3216JB1E333K-E-TP		SCAAD01235	
C16	CAP,FXD CER	C3216JB1E333K-E-TP		SCAAD01235	
C17	CAP,FXD CER	C3216JB1E333K-E-TP		SCAAD01235	
C18	CAP,FXD ELCTLT	ECE-A1EU470B	25V 470F	SCFAA01816	
C19	CAP,FXD CER	C3216JB1E333K-E-TP		SCAAD01235	
C20	CAP,FXD CER	C3216JB1E333K-E-TP		SCAAD01235	
C21	CAP,FXD CER	C3216JB1E333K-E-TP		SCAAD01235	
C22	CAP,FXD CER	C3216JB1E333K-E-TP		SCAAD01235	
C23	CAP,FXD CER	C3216X7R1E104K-E-TP	0.1U	SCAAD01237	
C24	CAP,FXD CER	C3216JB1E333K-E-TP		SCAAD01235	
C25	CAP,FXD CER	C3216JB1E333K-E-TP		SCAAD01235	
C26	CAP,FXD CER	C3216X7R1E104K-E-TP	0.1U	SCAAD01237	
C27	CAP,FXD CER	C3216JB1E333K-E-TP		SCAAD01235	
C29	CAP,FXD CER	C3216CH1H271J-E-TP	50V 270PF	SCAAD00883	
C30	CAP,FXD CER	C3216CH1H271J-E-TP	50V 270PF	SCAAD00883	
C31	CAP,FXD CER	C3216CH1H271J-E-TP	50V 270PF	SCAAD00883	
C32	CAP,FXD CER	C3216CH1H271J-E-TP	50V 270PF	SCAAD00883	
C33	CAP,FXD CER	C3216CH1H680J-E-TP	68PF	SCAAD00929	
C34	CAP,FXD CER	C3216CH1H680J-E-TP	68PF	SCAAD00929	
C35	CAP,FXD CER	C3216CH1H680J-E-TP	68PF	SCAAD00929	
C36	CAP,FXD CER	C3216CH1H680J-E-TP	68PF	SCAAD00929	
C37	CAP,FXD CER	C3216CH1H050C-E-TP	5PF	SCAAD00800	

PARTS LIST

IF FILTER		TITLE		SHEET NO	
IF FILTER		CFH-38		2	
PARTS NO	PARTS NAME	TYPE	DESCRIPTION	CODE	
C38	CAP,FXD CER	C3216CH1H050C-E-TP	SPF	SCAAD00800	
C39	CAP,FXD CER	C3216JB1E333K-E-TP		SCAAD01235	
C40	CAP,FXD CER	C3216JB1E333K-E-TP		SCAAD01235	
C41	CAP,FXD CER	C3216JB1E333K-E-TP		SCAAD01235	
C42	CAP,FXD CER	C3216JB1E333K-E-TP		SCAAD01235	
C43	CAP,FXD CER	C3216JB1E333K-E-TP		SCAAD01235	
C44	CAP,FXD CER	C3216JB1E333K-E-TP		SCAAD01235	
C45	CAP,FXD CER	C3216JB1E333K-E-TP		SCAAD01235	
C46	CAP,FXD CER	C3216JB1E333K-E-TP		SCAAD01235	
C47	CAP,FXD CER	C3216JB1E333K-E-TP		SCAAD01235	
C48	CAP,FXD CER	C3216JB1E333K-E-TP		SCAAD01235	
C49	CAP,FXD CER	C3216JB1E333K-E-TP		SCAAD01235	
C50	CAP,FXD CER	C3216JB1E333K-E-TP		SCAAD01235	
C52	CAP,FXD CER	C3216JB1E333K-E-TP		SCAAD01235	
C55	CAP,FXD CER	C3216JB1E333K-E-TP		SCAAD01235	
C56	CAP,FXD CER	C3216JB1E333K-E-TP		SCAAD01235	
C57	CAP,FXD CER	C3216JB1E333K-E-TP		SCAAD01235	
C58	CAP,FXD CER	C3216X7R1E104K-E-TP	0.1U	SCAAD01237	
C59	CAP,FXD CER	C3216JB1E333K-E-TP		SCAAD01235	
C60	CAP,FXD CER	C3216JB1E333K-E-TP		SCAAD01235	
C61	CAP,FXD CER	C3216JB1E333K-E-TP		SCAAD01235	
C62	CAP,FXD CER	C3216JB1E333K-E-TP		SCAAD01235	
C63	CAP,FXD CER	C3216SL1H102J-E-TP	1000PF	SCAAD00782	
C64	CAP,FXD CER	C3216JB1E333K-E-TP		SCAAD01235	
C65	CAP,FXD CER	C3216JB1E333K-E-TP		SCAAD01235	
C66	CAP,FXD CER	C3216SL1H102J-E-TP	1000PF	SCAAD00782	
C67	CAP,FXD CER	C3216CH1H20J-E-TP	22P	SCAAD00869	
C68	CAP,FXD CER	C3216SL1H102J-E-TP	1000PF	SCAAD00782	
C69	CAP,FXD CER	C3216SL1H102J-E-TP	1000PF	SCAAD00782	
C70	CAP,FXD CER	C3216SL1H102J-E-TP	1000PF	SCAAD00782	
C71	CAP,FXD CER	C3216CH1H100D-E-TP	10PF	SCAAD00785	
C72	CAP,FXD CER	C3216CH1H100D-E-TP	10PF	SCAAD00785	
C73	CAP,FXD CER	C3216CH1H20C-E-TP	2P	SCAAD00798	
C74	CAP,FXD CER	C3216JB1E333K-E-TP		SCAAD01235	
C75	CAP,FXD CER	C3216JB1E333K-E-TP		SCAAD01235	

PARTS LIST

IF FILTER		TITLE		SHEET NO	
IF FILTER		CFH-38		3	
PARTS NO	PARTS NAME	TYPE	DESCRIPTION	CODE	
C76	CAP,FXD CER	C3216JB1E333K-E-TP		SCAAD01235	
C77	CAP,FXD ELCTLT	ECE-A1EU100B		SCAAD01864	
C78	CAP,FXD ELCTLT	ECE-A1EU100B		SCAAD01864	
C79	CAP,FXD CER	C3216JB1E333K-E-TP		SCAAD01235	
C80	CAP,FXD CER	C3216B1H103K-E-TP	0.01U	SCAAD01597	
C82	CAP,FXD CER	C3216JB1E333K-E-TP		SCAAD01235	
C83	CAP,FXD CER	C3216JB1E333K-E-TP		SCAAD01235	
C84	CAP,FXD CER	C3216JB1E333K-E-TP		SCAAD01235	
C85	CAP,FXD CER	C3216JB1E333K-E-TP		SCAAD01235	
C86	CAP,FXD CER	C3216JB1E333K-E-TP		SCAAD01235	
C87	CAP,FXD CER	C3216JB1E333K-E-TP		SCAAD01235	
C88	CAP,FXD CER	C3216JB1E333K-E-TP		SCAAD01235	
C89	CAP,FXD CER	C3216B1H103K-E-TP	0.01U	SCAAD01597	
C90	CAP,FXD CER	C3216B1H103K-E-TP	0.01U	SCAAD01597	
C91	CAP,FXD CER	C3216B1H103K-E-TP	0.01U	SCAAD01597	
C92	CAP,FXD TANTAL	202L3502 105KB	35V 1UF	SCSAC00982	
C93	CAP,FXD CER	C3216B1H103K-E-TP	0.01U	SCAAD01597	
C94	CAP,FXD ELCTLT	ECE-A1EU100B		SCAAD01864	
C95	CAP,FXD CER	C3216JB1E333K-E-TP		SCAAD01235	
C96	CAP,FXD CER	C3216JB1E333K-E-TP		SCAAD01235	
C97	CAP,FXD CER	C3216SL1H102J-E-TP	1000PF	SCAAD00782	
C98	CAP,FXD CER	C3216JB1E333K-E-TP		SCAAD01235	
C99	CAP,FXD CER	C3216JB1E333K-E-TP		SCAAD01235	
C100	CAP,FXD CER	C3216JB1E333K-E-TP		SCAAD01235	
C101	CAP,FXD CER	C3216B1H103K-E-TP	0.01U	SCAAD01597	
C102	CAP,FXD CER	C3216JB1E333K-E-TP		SCAAD01235	
C103	CAP,FXD CER	C3216JB1E333K-E-TP		SCAAD01235	
C104	CAP,FXD CER	C3216B1H103K-E-TP	0.01U	SCAAD01597	
C105	CAP,FXD CER	C3216JB1E333K-E-TP		SCAAD01235	
C106	CAP,FXD CER	C3216JB1E333K-E-TP		SCAAD01235	
C107	CAP,FXD CER	C3216CH1H101J-E-TP	100PF	SCAAD00780	
C108	CAP,FXD CER	C3216B1H103K-E-TP	0.01U	SCAAD01597	
C109	CAP,FXD CER	C3216JB1E333K-E-TP		SCAAD01235	
C110	CAP,FXD ELCTLT	ECE-A1EU100B		SCAAD01864	
C111	CAP,FXD CER	C3216JB1E333K-E-TP		SCAAD01235	

PARTS LIST

IF FILTER

CFH-38

CFH-38

CFH-38

CFH-38

CFH-38

CFH-38

CFH-38

CFH-38

CFH-38

CFH-38

CFH-38

CFH-38

CFH-38

CFH-38

CFH-38

CFH-38

PART NO	PART NAME	TYPE	DESCRIPTION	CODE
C148	CAP,FXD CER	C3216X7R1E104K-E-TP	0.1U	SCAAD01237
C149	CAP,FXD CER	C3216SL1H102J-E-TP	1000PF	SCAAD00782
C01	DIODE	R05.1MB1-11		STXAD00515
C02	DIODE	1SS226 TE85L		STXAD00320
C03	DIODE	1SS181 TE85L		STXAD00356
C04	DIODE	1SS181 TE85L		STXAD00356
C05	DIODE	1SS181 TE85L		STXAD00356
C06	DIODE	1SS181 TE85L		STXAD00356
C07	DIODE	1SS181 TE85L		STXAD00356
C08	DIODE	1SS226 TE85L		STXAD00320
C09	DIODE	1SS226 TE85L		STXAD00320
C010	DIODE	1SS184 TE85L		STXAD00290
C011	DIODE	1SS85RE		STXAE00590
C012	DIODE	1SS85RE		STXAE00590
C013	DIODE	1SS226 TE85L		STXAD00320
C014	DIODE	1SS181 TE85L		STXAD00356
C015	DIODE	1SS184 TE85L		STXAD00290
C016	DIODE	1SS184 TE85L		STXAD00290
C017	DIODE	1SS184 TE85L		STXAD00290
C018	DIODE	1SS181 TE85L		STXAD00356
C019	DIODE	1SS181 TE85L		STXAD00356
C020	DIODE	1SS226 TE85L		STXAD00320
C021	DIODE	1SS226 TE85L		STXAD00320
C022	DIODE	1SS226 TE85L		STXAD00320
C023	DIODE	HZ3B2	3V	STXAE00107
C024	DIODE	1SS181 TE85L		STXAD00356
C025	DIODE	1SS184 TE85L		STXAD00290
C026	DIODE	1SS184 TE85L		STXAD00290
C027	DIODE	1SS226 TE85L		STXAD00320
C028	DIODE	1SS184 TE85L		STXAD00290
C029	DIODE	1SS184 TE85L		STXAD00290
C01	CAPACITOR VAR	T2031200FR		SCVAD00166
FL1	CRYSTAL CKT	H-6XMD00114	70.455MHZ	6XMD00114
FL2	COIL	LF-B12		5LFAE00009
FL3	COIL	LF-B6		5LFAE00015

PART NO	PART NAME	TYPE	DESCRIPTION	CODE
C112	CAP,FXD CER	C3216CH1H680J-E-TP	68PF	SCAAD00929
C113	CAP,FXD CER	C3216B1H103K-E-TP	0.01U	SCAAD01597
C114	CAP,FXD CER	C3216CH1H470J-E-TP	47PF	SCAAD00864
C115	CAP,FXD CER	C3216CH1H470J-E-TP	47PF	SCAAD00864
C116	CAP,FXD CER	C3216J01E333K-E-TP		SCAAD01235
C117	CAP,FXD CER	C3216SL1H102J-E-TP	1000PF	SCAAD00782
C118	CAP,FXD CER	C3216SL1H102J-E-TP	1000PF	SCAAD00782
C119	CAP,FXD CER	C3216CH1H270J-E-TP	22P	SCAAD00869
C120	CAP,FXD CER	C3216SL1H102J-E-TP	1000PF	SCAAD00782
C121	CAP,FXD CER	C3216SL1H102J-E-TP	1000PF	SCAAD00782
C122	CAP,FXD CER	C3216SL1H102J-E-TP	1000PF	SCAAD00782
C123	CAP,FXD CER	C3216SL1H102J-E-TP	1000PF	SCAAD00782
C124	CAP,FXD CER	C3216F1H104K-E-TP	0.1UF	SCAAD01056
C125	CAP,FXD CER	C3216SL1H102J-E-TP	1000PF	SCAAD00782
C126	CAP,FXD CER	C3216SL1H102J-E-TP	1000PF	SCAAD00782
C127	CAP,FXD CER	C3216CH1H220J-E-TP	22P	SCAAD00869
C128	CAP,FXD CER	C3216SL1H102J-E-TP	1000PF	SCAAD00782
C129	CAP,FXD CER	C3216SL1H102J-E-TP	1000PF	SCAAD00782
C130	CAP,FXD CER	C3216SL1H102J-E-TP	1000PF	SCAAD00782
C131	CAP,FXD CER	C3216SL1H102J-E-TP	1000PF	SCAAD00782
C132	CAP,FXD ELCTLT	ECE-A1EU470B	25V 470F	SCAAD01816
C133	CAP,FXD TANTAL	202L3502 105KB	35V 1UF	SCSAC00982
C135	CAP,FXD CER	C3216J01E333K-E-TP		SCAAD01235
C136	CAP,FXD CER	C3216J01E333K-E-TP		SCAAD01235
C137	CAP,FXD CER	C3216CH1H680J-E-TP	68PF	SCAAD00929
C138	CAP,FXD CER	C3216X7R1E104K-E-TP	0.1U	SCAAD01237
C139	CAP,FXD CER	C3216X7R1E104K-E-TP	0.1U	SCAAD01237
C140	CAP,FXD CER	C3216X7R1E104K-E-TP	0.1U	SCAAD01237
C141	CAP,FXD CER	C3216X7R1E104K-E-TP	0.1U	SCAAD01237
C142	CAP,FXD CER	C3216X7R1E104K-E-TP	0.1U	SCAAD01237
C143	CAP,FXD CER	C3216X7R1E104K-E-TP	0.1U	SCAAD01237
C144	CAP,FXD CER	C3216X7R1E104K-E-TP	0.1U	SCAAD01237
C145	CAP,FXD CER	C3216X7R1E104K-E-TP	0.1U	SCAAD01237
C146	CAP,FXD CER	C3216J01E333K-E-TP		SCAAD01235
C147	CAP,FXD TANTAL	202L3502 474KB		SCSAC01065

PARTS LIST

PARTS LIST		IF FILTER		TITLE CFH-38		SHEET NO 6	
PARTS NO	PARTS NAME	TYPE	DESCRIPTION	CODE			
IC1	IC	H074LS145P		5DDAF00704			
IC2	IC	MS218P		5DDAB00152			
IC3	IC	SN16913P		5DDAL00301			
IC4	IC	SN76514N		5DDAL00251			
JP1	TIN COATED WIRE	TA-0.6P		2717100001			
JP2	TIN COATED WIRE	TA-0.6P		2717100001			
JP3	TIN COATED WIRE	TA-0.6P		2717100001			
JP4	TIN COATED WIRE	TA-0.6P		2717100001			
JP5	TIN COATED WIRE	TA-0.6P		2717100001			
KC1	CABLE	H-6ZCJD35004		6ZCJD35004			
KC2	CABLE	H-6ZCJD44008		6ZCJD44008			
L1	COIL	FL-7H472J	4.7MH	5LCAA00023			
L4	COIL	LAL03VB102K	10H	5LCAA00318			
L5	COIL	FL-7H472J	4.7MH	5LCAA00023			
L6	COIL	LAL03VB331K	330UH	5LCAA00271			
L7	COIL	LAL03KH331K	330UH	5LCAA00250			
L8	COIL	LAL03VB221K	220UH	5LCAA00272			
L9	COIL	LAL03KH221K		5LCAA00441			
L10	COIL	LAL03VB2R2M	2.2UH	5LCAA00278			
L11	COIL	LAL03VB100K	10UH	5LCAA00273			
L12	COIL	LAL03VB471K	470UH	5LCAA00270			
L13	COIL	LAL03VB833M	0.33UH	5LCAA00274			
L14	COIL	FL-7H472J	4.7MH	5LCAA00023			
P3	CONNECTOR	ECTC-22P-2.5DSA	22P	5JWBS00070			
P4	CONNECTOR	ECTC-22P-2.5DSA	22P	5JWBS00070			
PC1	PCB	H-6PCJD00259A		6PCJD00259			
R1	RESISTOR	ERJ-8GEVJ103V	1/8W 10K OHM	5REAG01750			
R2	RESISTOR	ERJ-8GEVJ103V	1/8W 10K OHM	5REAG01750			
R3	RESISTOR	ERJ-8GEVJ103V	1/8W 10K OHM	5REAG01750			
R4	RESISTOR	ERJ-8GEVJ223V	1/8W 22K OHM	5REAG01754			
R6	RESISTOR	ERJ-8GEVJ103V	1/8W 10K OHM	5REAG01750			
R7	RESISTOR	ERJ-8GEVJ103V	1/8W 10K OHM	5REAG01750			
R8	RESISTOR	ERJ-8GEVJ472V		5REAG01746			
R9	RESISTOR	ERJ-8GEVJ392V	1/8W 3.9K OHM	5REAG01745			
R10	RESISTOR	ERJ-8GEVJ102V	1/8W 1K OHM	5REAG01738			

PARTS LIST

PARTS LIST		IF FILTER		TITLE CFH-38		SHEET NO 7	
PARTS NO	PARTS NAME	TYPE	DESCRIPTION	CODE			
R11	RESISTOR	FXD	ERJ-8GEVJ102V	1/8W 1K OHM	5REAG01738		
R12	RESISTOR	FXD	ERJ-8GEVJ822V		5REAG01749		
R13	RESISTOR	FXD	ERJ-8GEVJ391V	1/8W 390 OHM	5REAG01733		
R14	RESISTOR	FXD	ERJ-8GEVJ471V	1/8W 470 OHM	5REAG01734		
R15	RESISTOR	FXD	ERJ-8GEVJ101V	1/8W 100 OHM	5REAG01726		
R16	RESISTOR	FXD	ERJ-8GEVJ221V	1/8W 220 OHM	5REAG01730		
R17	RESISTOR	FXD	ERJ-8GEVJ153V		5REAG01752		
R18	RESISTOR	FXD	ERJ-8GEVJ562V	1/8W 5.6K OHM	5REAG01747		
R19	RESISTOR	FXD	ERJ-8GEVJ332V	1/8W 3.3K OHM	5REAG01744		
R20	RESISTOR	FXD	ERJ-8GEVJ101V	1/8W 100 OHM	5REAG01726		
R21	RESISTOR	FXD	ERJ-8GEVJ222V	1/8W 2.2K OHM	5REAG01742		
R22	RESISTOR	FXD	ERJ-8GEVJ152V	1/8W 1.5K OHM	5REAG01740		
R23	RESISTOR	FXD	ERJ-8GEVJ152V	1/8W 1.5K OHM	5REAG01740		
R24	RESISTOR	FXD	ERJ-8GEVJ103V	1/8W 10K OHM	5REAG01750		
R25	RESISTOR	FXD	ERJ-8GEVJ152V	1/8W 1.5K OHM	5REAG01740		
R26	RESISTOR	FXD	ERJ-8GEVJ152V	1/8W 1.5K OHM	5REAG01740		
R27	RESISTOR	FXD	ERJ-8GEVJ152V	1/8W 1.5K OHM	5REAG01740		
R28	RESISTOR	FXD	ERJ-8GEVJ152V	1/8W 1.5K OHM	5REAG01740		
R29	RESISTOR	FXD	ERJ-8GEVJ152V	1/8W 1.5K OHM	5REAG01740		
R30	RESISTOR	FXD	ERJ-8GEVJ152V	1/8W 1.5K OHM	5REAG01740		
R31	RESISTOR	FXD	ERJ-8GEVJ152V	1/8W 1.5K OHM	5REAG01740		
R32	RESISTOR	FXD	ERJ-8GEVJ152V	1/8W 1.5K OHM	5REAG01740		
R33	RESISTOR	FXD	ERJ-8GEVJ152V	1/8W 1.5K OHM	5REAG01740		
R34	RESISTOR	FXD	ERJ-8GEVJ103V	1/8W 10K OHM	5REAG01750		
R35	RESISTOR	FXD	ERJ-8GEVJ101V	1/8W 100 OHM	5REAG01726		
R36	RESISTOR	FXD	ERJ-8GEVJ101V	1/8W 100 OHM	5REAG01726		
R37	RESISTOR	FXD	ERJ-8GEVJ101V	1/8W 100 OHM	5REAG01726		
R38	RESISTOR	FXD	ERJ-8GEVJ101V	1/8W 100 OHM	5REAG01726		
R39	RESISTOR	FXD	ERJ-8GEVJ152V	1/8W 1.5K OHM	5REAG01740		
R44	RESISTOR	FXD	ERJ-8GEVJ102V	1/8W 1K OHM	5REAG01738		
R45	RESISTOR	FXD	ERJ-8GEVJ332V	1/8W 3.3K OHM	5REAG01744		
R46	RESISTOR	FXD	ERJ-8GEVJ102V	1/8W 1K OHM	5REAG01738		
R47	RESISTOR	FXD	ERJ-8GEVJ823V		5REAG01761		
R48	RESISTOR	FXD	ERJ-8GEVJ152V	1/8W 1.5K OHM	5REAG01740		
R49	RESISTOR	FXD	ERJ-8GEVJ680V	1/8W 68 OHM	5REAG01724		

PARTS LIST

IF FILTER				TYPE CPH-38		SHEET NO 8	
PARTS NO.	PARTS NAME	TYPE	DESCRIPTION	CODE			
R51	RESISTOR FXD	ERJ-8GEYJ681V	1/8W 680 OHM	SREAG01736			
R52	RESISTOR FXD	ERJ-8GEYJ101V	1/8W 100 OHM	SREAG01726			
R53	RESISTOR FXD	ERJ-8GEYJ101V	1/8W 100 OHM	SREAG01726			
R54	RESISTOR FXD	ERJ-8GEYJ152V	1/8W 1.5K OHM	SREAG01740			
R55	RESISTOR FXD	ERJ-8GEYJ822V		SREAG01749			
R56	RESISTOR FXD	ERJ-8GEYJ272V	1/8W 2.7K OHM	SREAG01743			
R57	RESISTOR FXD	ERJ-8GEYJ820V	1/8W 82 OHM	SREAG01725			
R58	RESISTOR FXD	ERJ-8GEYJ681V	1/8W 680 OHM	SREAG01736			
R59	RESISTOR FXD	ERJ-8GEYJ101V	1/8W 100 OHM	SREAG01726			
R60	RESISTOR FXD	ERJ-8GEYJ332V	1/8W 3.3K OHM	SREAG01744			
R62	RESISTOR FXD	ERJ-8GEYJ000V	0 OHM	SREAG01775			
R63	RESISTOR FXD	ERJ-8GEYJ103V	1/8W 10K OHM	SREAG01750			
R65	RESISTOR FXD	ERJ-8GEYJ222V	1/8W 2.2K OHM	SREAG01742			
R66	RESISTOR FXD	ERJ-8GEYJ101V	1/8W 100 OHM	SREAG01726			
R67	RESISTOR FXD	ERJ-8GEYJ272V	1/8W 2.7K OHM	SREAG01743			
R68	RESISTOR FXD	ERJ-8GEYJ102V	1/8W 1K OHM	SREAG01738			
R69	RESISTOR FXD	ERJ-8GEYJ101V	1/8W 100 OHM	SREAG01726			
R70	RESISTOR FXD	ERJ-8GEYJ104V	1/8W 100K OHM	SREAG01762			
R71	RESISTOR FXD	ERJ-8GEYJ103V	1/8W 10K OHM	SREAG01750			
R72	RESISTOR FXD	ERJ-8GEYJ104V	1/8W 100K OHM	SREAG01762			
R73	RESISTOR FXD	ERJ-8GEYJ103V	1/8W 10K OHM	SREAG01750			
R74	RESISTOR FXD	ERJ-8GEYJ223V	1/8W 22K OHM	SREAG01754			
R75	RESISTOR FXD	ERJ-8GEYJ472V		SREAG01746			
R76	RESISTOR FXD	ERJ-8GEYJ334V		SREAG01768			
R77	RESISTOR FXD	ERJ-8GEYJ223V	1/8W 22K OHM	SREAG01754			
R78	RESISTOR FXD	ERJ-8GEYJ103V	1/8W 10K OHM	SREAG01750			
R79	RESISTOR FXD	ERJ-8GEYJ103V	1/8W 10K OHM	SREAG01750			
R80	RESISTOR FXD	ERJ-8GEYJ133V		SREAG01752			
R81	RESISTOR FXD	ERJ-8GEYJ104V	1/8W 100K OHM	SREAG01762			
R82	RESISTOR FXD	ERJ-8GEYJ103V	1/8W 10K OHM	SREAG01750			
R83	RESISTOR FXD	ERJ-8GEYJ103V	1/8W 10K OHM	SREAG01750			
R84	RESISTOR FXD	ERJ-8GEYJ332V	1/8W 3.3K OHM	SREAG01744			
R85	RESISTOR FXD	ERJ-8GEYJ102V	1/8W 1K OHM	SREAG01738			
R86	RESISTOR FXD	ERJ-8GEYJ333V		SREAG01756			
R87	RESISTOR FXD	ERJ-8GEYJ151V	1/8W 150 OHM	SREAG01728			

PARTS LIST

IF FILTER				TYPE CPH-38		SHEET NO 9	
PARTS NO.	PARTS NAME	TYPE	DESCRIPTION	CODE			
R88	RESISTOR FXD	ERJ-8GEYJ222V	1/8W 2.2K OHM	SREAG01742			
R89	RESISTOR FXD	ERJ-8GEYJ332V	1/8W 3.3K OHM	SREAG01744			
R90	RESISTOR FXD	ERJ-8GEYJ472V		SREAG01746			
R91	RESISTOR FXD	ERJ-8GEYJ102V	1/8W 1K OHM	SREAG01738			
R92	RESISTOR FXD	ERJ-8GEYJ333V		SREAG01756			
R93	RESISTOR FXD	ERJ-8GEYJ151V	1/8W 150 OHM	SREAG01728			
R94	RESISTOR FXD	ERJ-8GEYJ222V	1/8W 2.2K OHM	SREAG01742			
R95	RESISTOR FXD	ERJ-8GEYJ332V	1/8W 3.3K OHM	SREAG01744			
R96	RESISTOR FXD	ERJ-8GEYJ472V		SREAG01746			
R97	RESISTOR FXD	ERJ-8GEYJ102V	1/8W 1K OHM	SREAG01738			
R98	RESISTOR FXD	ERJ-8GEYJ333V		SREAG01756			
R99	RESISTOR FXD	ERJ-8GEYJ221V	1/8W 220 OHM	SREAG01730			
R100	RESISTOR FXD	ERJ-8GEYJ101V	1/8W 100 OHM	SREAG01726			
R101	RESISTOR FXD	ERJ-8GEYJ104V	1/8W 100K OHM	SREAG01762			
R102	RESISTOR FXD	ERJ-8GEYJ122V	1/8W 1.2K OHM	SREAG01739			
R103	RESISTOR FXD	ERJ-8GEYJ332V	1/8W 3.3K OHM	SREAG01744			
R104	RESISTOR FXD	ERJ-8GEYJ332V	1/8W 3.3K OHM	SREAG01744			
R106	RESISTOR FXD	ERJ-8GEYJ222V	1/8W 2.2K OHM	SREAG01742			
R107	RESISTOR FXD	ERJ-8GEYJ470V	1/8W 47 OHM	SREAG01722			
R108	RESISTOR FXD	ERJ-8GEYJ222V	1/8W 2.2K OHM	SREAG01742			
R111	RESISTOR FXD	ERJ-8GEYJ000V	0 OHM	SREAG01775			
R112	RESISTOR FXD	ERJ-8GEYJ151V	1/8W 150 OHM	SREAG01728			
R113	RESISTOR FXD	ERJ-8GEYJ222V	1/8W 2.2K OHM	SREAG01742			
R114	RESISTOR FXD	ERJ-8GEYJ222V	1/8W 2.2K OHM	SREAG01742			
R115	RESISTOR FXD	ERJ-8GEYJ101V	1/8W 100 OHM	SREAG01726			
R116	RESISTOR FXD	ERJ-8GEYJ101V	1/8W 100 OHM	SREAG01726			
R117	RESISTOR FXD	ERJ-8GEYJ101V	1/8W 100 OHM	SREAG01726			
R118	RESISTOR FXD	ERJ-8GEYJ332V	1/8W 3.3K OHM	SREAG01744			
R119	RESISTOR FXD	ERJ-8GEYJ821V	1/8W 820 OHM	SREAG01737			
R120	RESISTOR FXD	ERJ-8GEYJ101V	1/8W 100 OHM	SREAG01726			
R121	RESISTOR FXD	ERJ-8GEYJ330V	1/8W 33 OHM	SREAG01720			
R122	RESISTOR FXD	ERD-25UJ221	1/4W 220 OHM	SROAA01329			
R123	RESISTOR FXD	ERJ-8GEYJ330V	1/8W 33 OHM	SREAG01720			
R124	RESISTOR FXD	ERJ-8GEYJ102V	1/8W 1K OHM	SREAG01738			
R125	RESISTOR FXD	ERJ-8GEYJ101V	1/8W 100 OHM	SREAG01726			

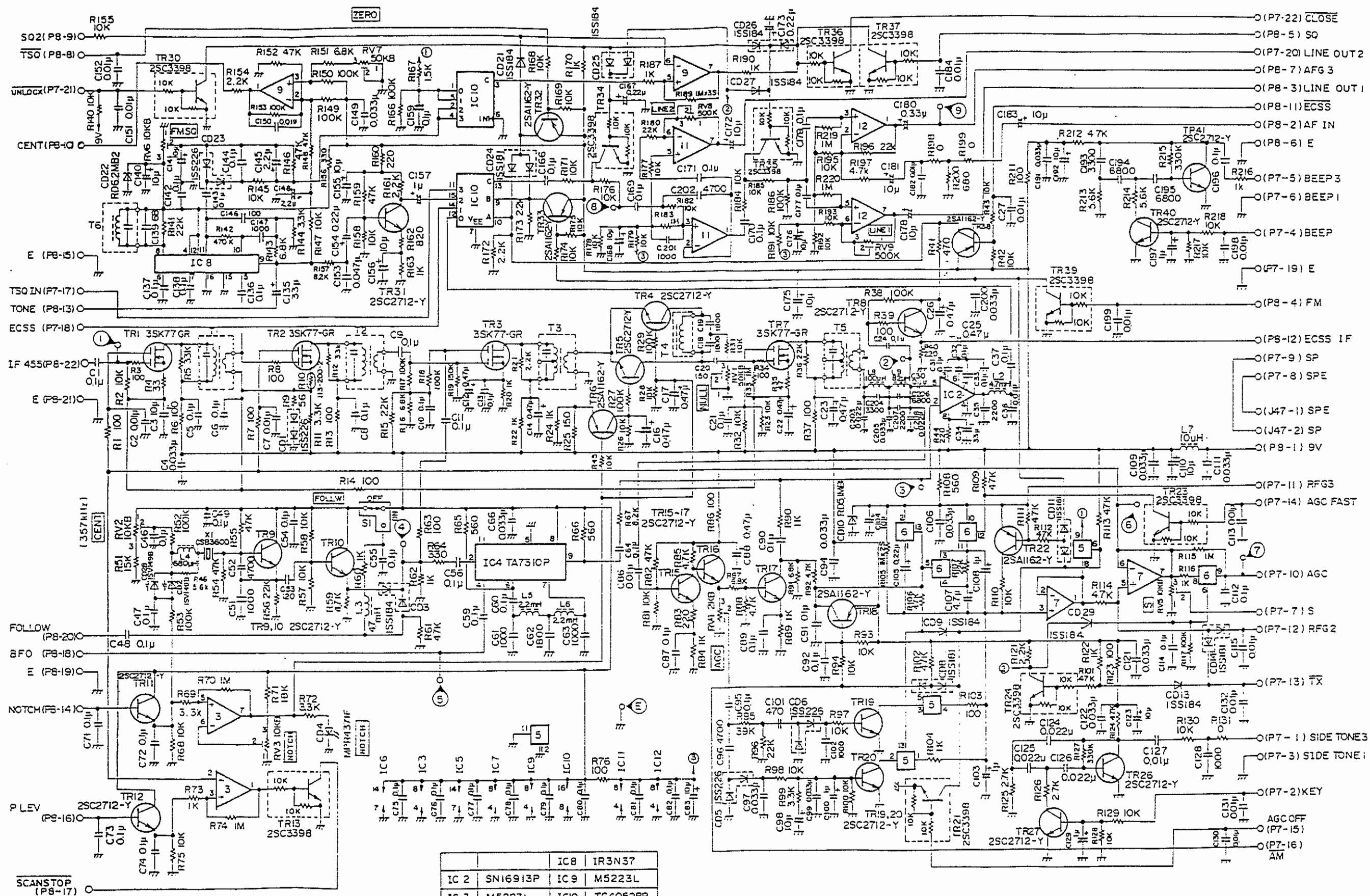
PARTS LIST

IF FILTER		TITLE		CFH-38		SHEET NO	
PARTS NO	PARTS NAME	TYPE	DESCRIPTION	CODE		10	
R126	RESISTOR FXD	ERJ-8GEYJ470V	1/8W 47 OHM	SREAG01722			
R127	RESISTOR FXD	ERJ-8GEYJ471V	1/8W 470 OHM	SREAG01734			
R128	RESISTOR FXD	ERJ-8GEYJ472V		SREAG01746			
R129	RESISTOR FXD	ERJ-8GEYJ102V	1/8W 1K OHM	SREAG01738			
R131	RESISTOR FXD	ERJ-8GEYJ101V	1/8W 100 OHM	SREAG01726			
R132	RESISTOR FXD	ERJ-8GEYJ152V	1/8W 1.5K OHM	SREAG01740			
R133	RESISTOR FXD	ERJ-8GEYJ103V	1/8W 10K OHM	SREAG01750			
R134	RESISTOR FXD	ERJ-8GEYJ561V	1/8W 560 OHM	SREAG01735			
R135	RESISTOR FXD	ERJ-8GEYJ561V	1/8W 560 OHM	SREAG01735			
R136	RESISTOR FXD	ERJ-8GEYD000V	0 OHM	SREAG01775			
R138	RESISTOR FXD	ERJ-8GEYJ222V	1/8W 2.2K OHM	SREAG01742			
R139	RESISTOR FXD	ERJ-8GEYJ104V	1/8W 100K OHM	SREAG01762			
R140	RESISTOR FXD	ERJ-8GEYJ104V	1/8W 100K OHM	SREAG01762			
RA1	RESISTOR FXD	RKC178B5-47K OHM J		SREAE00173			
RJ1	RESISTOR FXD	ERJ-8GEYD000V	0 OHM	SREAG01775			
RJ2	RESISTOR FXD	ERJ-8GEYD000V	0 OHM	SREAG01775			
RJ3	RESISTOR FXD	ERJ-8GEYD000V	0 OHM	SREAG01775			
RJ4	RESISTOR FXD	ERJ-8GEYD000V	0 OHM	SREAG01775			
RJ5	RESISTOR FXD	ERJ-8GEYD000V	0 OHM	SREAG01775			
RJ6	RESISTOR FXD	ERJ-8GEYD000V	0 OHM	SREAG01775			
RJ7	RESISTOR FXD	ERJ-8GEYD000V	0 OHM	SREAG01775			
RJ8	RESISTOR FXD	ERJ-8GEYD000V	0 OHM	SREAG01775			
RJ9	RESISTOR FXD	ERJ-8GEYD000V	0 OHM	SREAG01775			
RJ10	RESISTOR FXD	ERJ-8GEYD000V	0 OHM	SREAG01775			
RJ11	RESISTOR FXD	ERJ-8GEYD000V	0 OHM	SREAG01775			
RJ12	RESISTOR FXD	ERJ-8GEYD000V	0 OHM	SREAG01775			
RJ13	RESISTOR FXD	ERJ-8GEYD000V	0 OHM	SREAG01775			
RJ14	RESISTOR FXD	ERJ-8GEYD000V	0 OHM	SREAG01775			
RJ15	RESISTOR FXD	ERJ-8GEYD000V	0 OHM	SREAG01775			
RJ16	RESISTOR FXD	ERJ-8GEYD000V	0 OHM	SREAG01775			
RJ17	RESISTOR FXD	ERJ-8GEYD000V	0 OHM	SREAG01775			
RJ18	RESISTOR FXD	ERJ-8GEYD000V	0 OHM	SREAG01775			
RJ19	RESISTOR FXD	ERJ-8GEYD000V	0 OHM	SREAG01775			
RJ20	RESISTOR FXD	ERJ-8GEYD000V	0 OHM	SREAG01775			
RJ21	RESISTOR FXD	ERJ-8GEYD000V	0 OHM	SREAG01775			

PARTS LIST

IF FILTER		TITLE		CFH-38		SHEET NO	
PARTS NO	PARTS NAME	TYPE	DESCRIPTION	CODE		11	
RJ22	RESISTOR FXD	ERJ-8GEYD000V	0 OHM	SREAG01775			
RJ23	RESISTOR FXD	ERJ-8GEYD000V	0 OHM	SREAG01775			
RJ24	RESISTOR FXD	ERJ-8GEYD000V	0 OHM	SREAG01775			
RJ25	RESISTOR FXD	ERJ-8GEYD000V	0 OHM	SREAG01775			
RJ26	RESISTOR FXD	ERJ-8GEYD000V	0 OHM	SREAG01775			
RJ27	RESISTOR FXD	ERJ-8GEYD000V	0 OHM	SREAG01775			
RJ28	RESISTOR FXD	ERJ-8GEYD000V	0 OHM	SREAG01775			
RJ29	RESISTOR FXD	ERJ-8GEYD000V	0 OHM	SREAG01775			
RJ30	RESISTOR FXD	ERJ-8GEYD000V	0 OHM	SREAG01775			
RJ31	RESISTOR FXD	ERJ-8GEYD000V	0 OHM	SREAG01775			
RJ32	RESISTOR FXD	ERJ-8GEYD000V	0 OHM	SREAG01775			
RJ33	RESISTOR FXD	ERJ-8GEYD000V	0 OHM	SREAG01775			
RJ34	RESISTOR FXD	ERJ-8GEYD000V	0 OHM	SREAG01775			
RJ35	RESISTOR FXD	ERJ-8GEYD000V	0 OHM	SREAG01775			
RJ36	RESISTOR FXD	ERJ-8GEYD000V	0 OHM	SREAG01775			
RJ37	RESISTOR FXD	ERJ-8GEYD000V	0 OHM	SREAG01775			
RJ38	RESISTOR FXD	ERJ-8GEYD000V	0 OHM	SREAG01775			
RJ39	RESISTOR FXD	ERJ-8GEYD000V	0 OHM	SREAG01775			
RJ40	RESISTOR FXD	ERJ-8GEYD000V	0 OHM	SREAG01775			
RJ41	RESISTOR FXD	ERJ-8GEYD000V	0 OHM	SREAG01775			
RV1	RESISTOR VAR	EVN-D1AA00B24	20K	SRVAB00372			
RV2	RESISTOR VAR	EVN-D1AA00B14	10K OHM	SRVAB00324			
RV3	RESISTOR VAR	EVN-D1AA00B22		SRVAB00320			
RV4	RESISTOR VAR	EVN-D4AA00B54		SRVAB00317			
RV5	RESISTOR VAR	EVN-D1AA00B53		SRVAB00325			
T2	RF XFMR	H-6LHJD00297		6LHJD00297			
T3	RF XFMR	H-6LHJD00415	70.455MHZ	6LHJD00415			
T4	RF XFMR	H-6LHJD00415	70.455MHZ	6LHJD00415			
T5	RF XFMR	H-6LHJD00416	0.95UH	6LHJD00416			
T6	RF XFMR	H-6LHJD00390A		6LHJD00390			
T7	RF XFMR	H-6LHJD00390A		6LHJD00390			
T8	RF XFMR	H-6LHJD00389		6LHJD00389			
T9	RF XFMR	H-6LHJD00456		6LHJD00456			
T10	RF XFMR	H-6LJJD00037A	455KHZ	6LJJD00037			
T11	RF XFMR	S-061-006		5LJAA00006			

PARTS LIST					SHEET NO.	
PARTS NO		PARTS NAME		TYPE	TITLE CFH-38	
PARTS NO		PARTS NAME		TYPE	DESCRIPTION	CODE
T12	RF XFMR	S-061-006				5LJAA00006
T13	RF XFMR	H-6LHJ00297				6LHJ00297
TP1	TEST TERMINAL	PCN6-PEA				SJDA00364
TP2	TEST TERMINAL	PCN6-PEA				SJDA00364
TP3	TEST TERMINAL	PCN6-PEA				SJDA00364
TP4	TEST TERMINAL	PCN6-PEA				SJDA00364
TP5	TEST TERMINAL	PCN6-PEA				SJDA00364
TP6	TEST TERMINAL	PCN6-PEA				SJDA00364
TP7	TEST TERMINAL	PCN6-PEA				SJDA00364
TR2	TRANSISTOR	2SC1855				STCAA00134
TR3	TRANSISTOR	2SC2714Y TE85L				STCAF00436
TR4	TRANSISTOR	2SC3398-TB				STCAZ00011
TR5	TRANSISTOR	2SC3398-TB				STCAZ00011
TR6	TRANSISTOR	2SC3398-TB				STCAZ00011
TR7	TRANSISTOR	2SC2712Y TE85L				STAAG00186
TR8	TRANSISTOR	2SA1162-Y TE85L				STAAG00182
TR9	TRANSISTOR	2SC2712Y TE85L				STAAG00186
TR10	TRANSISTOR	2SC2712Y TE85L				STAAG00186
TR11	TRANSISTOR	2SC2712Y TE85L				STAAG00186
TR12	TRANSISTOR	2SC2712Y TE85L				STAAG00186
TR13	TRANSISTOR	2SC2712Y TE85L				STAAG00186
TR14	TRANSISTOR	3SK77-GR				STKAA00108
TR15	TRANSISTOR	2SK125				STKAH00002
TR16	TRANSISTOR	2SK125				STKAH00002
TR17	TRANSISTOR	3SK77-GR				STKAA00108
TR18	TRANSISTOR	2SC2714Y TE85L				STCAF00436
TR19	TRANSISTOR	2SC2712Y TE85L				STAAG00186
TR20	TRANSISTOR	2SA1162-Y TE85L				STAAG00182
TR21	TRANSISTOR	2SC3398-TB				STCAZ00011
TR22	TRANSISTOR	2SC3398-TB				STCAZ00011
TR23	TRANSISTOR	2SC3398-TB				STCAZ00011
TR24	TRANSISTOR	2SC3398-TB				STCAZ00011



NOTE:

- Unless otherwise specified;
- Resistance values are in ohm, 1/8W.
- Capacitance values are in pF.

Figure 6-10 IF AMP Unit (CAE-227) Schematic Diagram

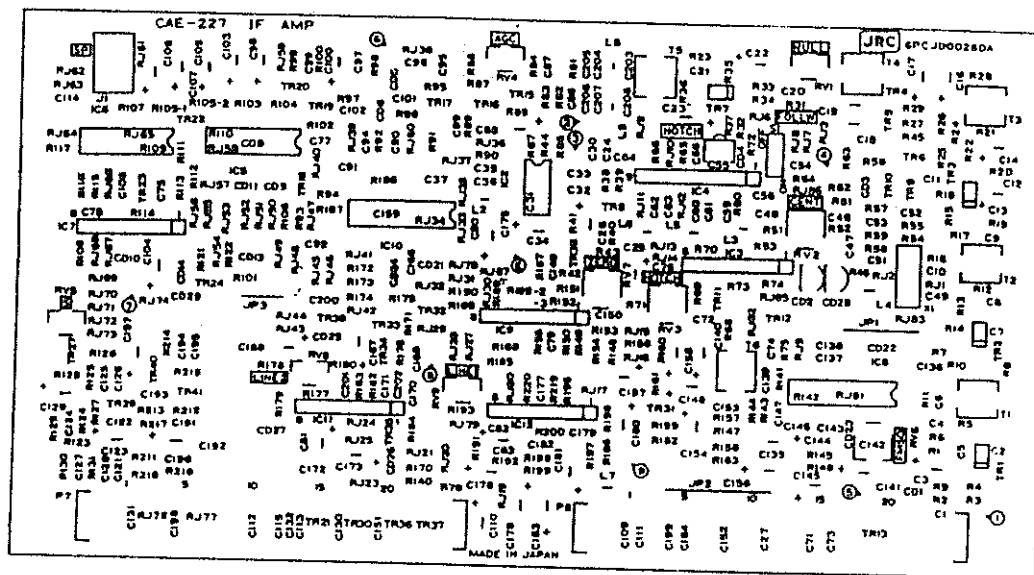


Figure 6-11 IF AMP Unit (CAE-227) Component Layout

PARTS LIST

IF AMP		TITLE CAE-227		SHEET NO 1	
PARTS NO	PARTS NAME	TYPE	DESCRIPTION	CODE	
C1	CAP,FXD CER	C3216X7R1E104K-E-TP	0.1U	SCAAD01237	
C2	CAP,FXD CER	C3216JB1H103K-E-TP	0.01UF	SCAAD00789	
C3	CAP,FXD ELCTLT	ECE-A1EU1000		SCAAD01864	
C4	CAP,FXD CER	C3216X7R1H353K-E-TP	50V 0.033U	SCAAD01357	
C5	CAP,FXD CER	C3216X7R1E104K-E-TP	0.1U	SCAAD01237	
C6	CAP,FXD CER	C3216X7R1E104K-E-TP	0.1U	SCAAD01237	
C7	CAP,FXD CER	C3216JB1H103K-E-TP	0.01UF	SCAAD00789	
C8	CAP,FXD CER	C3216X7R1E104K-E-TP	0.1U	SCAAD01237	
C9	CAP,FXD CER	C3216X7R1E104K-E-TP	0.1U	SCAAD01237	
C10	CAP,FXD CER	C3216X7R1E104K-E-TP	0.1U	SCAAD01237	
C11	CAP,FXD CER	C3216X7R1E104K-E-TP	0.1U	SCAAD01237	
C12	CAP,FXD TANTAL	202L3502 474KB		SCSAC01065	
C13	CAP,FXD CER	C3216X7R1E104K-E-TP	0.1U	SCAAD01237	
C14	CAP,FXD TANTAL	202L3502 474KB		SCSAC01065	
C16	CAP,FXD TANTAL	202L3502 474KB		SCSAC01065	
C17	CAP,FXD TANTAL	202L3502 474KB		SCSAC01065	
C18	CAP,FXD PLSTC	EC0-R1H182J23		SCBAA00875	
C19	CAP,FXD PLSTC	EC0-B1H182J23		SCBAA00875	
C20	CAP,FXD CER	C3216CH1H103J-E-TP	150P	SCAAD00870	
C21	CAP,FXD CER	C3216X7R1E104K-E-TP	0.1U	SCAAD01237	
C22	CAP,FXD TANTAL	202L3502 474KB		SCSAC01065	
C23	CAP,FXD TANTAL	202L3502 474KB		SCSAC01065	
C24	CAP,FXD CER	C3216X7R1E104K-E-TP	0.1U	SCAAD01237	
C25	CAP,FXD TANTAL	202L3502 474KB		SCSAC01065	
C26	CAP,FXD TANTAL	202L3502 474KB		SCSAC01065	
C27	CAP,FXD CER	C3216JB1H103K-E-TP	0.01UF	SCAAD00789	
C30	CAP,FXD CER	C3216X7R1E104K-E-TP	0.1U	SCAAD01237	
C31	CAP,FXD CER	C3216X7R1E104K-E-TP	0.1U	SCAAD01237	
C32	CAP,FXD CER	C3216X7R1E104K-E-TP	0.1U	SCAAD01237	
C33	CAP,FXD CER	C3216X7R1E104K-E-TP	0.1U	SCAAD01237	
C34	CAP,FXD ELCTLT	ECE-A1EU3308		SCSAC01822	
C35	CAP,FXD CER	C3216SL1H222J-E-TP	2200P	SCAAD00792	
C36	CAP,FXD CER	C3216JB1H103K-E-TP	0.01UF	SCAAD00789	
C37	CAP,FXD CER	C3216X7R1E104K-E-TP	0.1U	SCAAD01237	
C46	CAP,FXD CER	C3216X7R1E104K-E-TP	0.1U	SCAAD01237	

PARTS LIST

IF AMP		TITLE CAE-227		SHEET NO 2	
PARTS NO	PARTS NAME	TYPE	DESCRIPTION	CODE	
C47	CAP,FXD CER	C3216X7R1E104K-E-TP	0.1U	SCAAD01237	
C48	CAP,FXD CER	C3216X7R1E104K-E-TP	0.1U	SCAAD01237	
C49	CAP,FXD CER	C3216X7R1E104K-E-TP	0.1U	SCAAD01237	
C51	CAP,FXD CER	C3216SL1H102J-E-TP	1000PF	SCAAD00782	
C52	CAP,FXD CER	C3216B1H472K-E-TP	4700PF	SCAAD00783	
C53	CAP,FXD CER	C3216CH1H21J-E-TP	120PF	SCAAD00931	
C54	CAP,FXD CER	C3216X7R1E104K-E-TP	0.1U	SCAAD01237	
C55	CAP,FXD CER	C3216X7R1E104K-E-TP	0.1U	SCAAD01237	
C56	CAP,FXD CER	C3216X7R1E104K-E-TP	0.1U	SCAAD01237	
C59	CAP,FXD CER	C3216X7R1E104K-E-TP	0.1U	SCAAD01237	
C60	CAP,FXD CER	C3216X7R1E104K-E-TP	0.1U	SCAAD01237	
C61	CAP,FXD CER	C3216SL1H102J-E-TP	1000PF	SCAAD00782	
C62	CAP,FXD CER	C3216SL1H182J-E-TP		SCAAD01070	
C63	CAP,FXD CER	C3216SL1H102J-E-TP	1000PF	SCAAD00782	
C64	CAP,FXD CER	C3216X7R1E104K-E-TP	0.1U	SCAAD01237	
C66	CAP,FXD CER	C3216X7R1H333K-E-TP	50V 0.033U	SCAAD01357	
C71	CAP,FXD CER	C3216X7R1E104K-E-TP	0.1U	SCAAD01237	
C72	CAP,FXD CER	C3216X7R1E104K-E-TP	0.1U	SCAAD01237	
C73	CAP,FXD CER	C3216X7R1E104K-E-TP	0.1U	SCAAD01237	
C74	CAP,FXD CER	C3216X7R1E104K-E-TP	0.1U	SCAAD01237	
C75	CAP,FXD CER	C3216X7R1E104K-E-TP	0.1U	SCAAD01237	
C76	CAP,FXD CER	C3216X7R1E104K-E-TP	0.1U	SCAAD01237	
C77	CAP,FXD CER	C3216X7R1E104K-E-TP	0.1U	SCAAD01237	
C78	CAP,FXD CER	C3216X7R1E104K-E-TP	0.1U	SCAAD01237	
C79	CAP,FXD CER	C3216X7R1E104K-E-TP	0.1U	SCAAD01237	
C80	CAP,FXD CER	C3216X7R1E104K-E-TP	0.1U	SCAAD01237	
C81	CAP,FXD CER	C3216X7R1E104K-E-TP	0.1U	SCAAD01237	
C82	CAP,FXD CER	C3216X7R1E104K-E-TP	0.1U	SCAAD01237	
C83	CAP,FXD ELCTLT	ECE-A1EU1008		SCSAC01864	
C86	CAP,FXD CER	C3216JB1H103K-E-TP	0.01UF	SCAAD00789	
C87	CAP,FXD CER	C3216X7R1E104K-E-TP	0.1U	SCAAD01237	
C88	CAP,FXD TANTAL	202L3502 474KB		SCSAC01065	
C89	CAP,FXD CER	C3216X7R1E104K-E-TP	0.1U	SCAAD01237	
C90	CAP,FXD CER	C3216X7R1E104K-E-TP	0.1U	SCAAD01237	
C91	CAP,FXD CER	C3216X7R1E104K-E-TP	0.1U	SCAAD01237	

PARTS LIST				TITLE CAE-227				SHEET NO 4	
PARTS NO	PARTS NAME	TYPE	DESCRIPTION	CODE	IF AMP	TYPE	DESCRIPTION	CODE	IF AMP
C135	CAP,FXD ELCTLT ECE-A1EU330B			SCAA01822					
C136	CAP,FXD CER C3216X7R1E104K-E-TP		0.1U	SCAA001237					
C137	CAP,FXD CER C3216X7R1E104K-E-TP		0.1U	SCAA001237					
C138	CAP,FXD CER C3216X7R1E104K-E-TP		0.1U	SCAA001237					
C139	CAP,FXD CER C3216CH1H680J-E-TP		68PF	SCAA000929					
C140	CAP,FXD ELCTLT ECE-A1EU100B			SCAA01864					
C141	CAP,FXD ELCTLT ECE-A1EU100B			SCAA01864					
C142	CAP,FXD CER C3216X7R1E104K-E-TP		0.1U	SCAA001237					
C143	CAP,FXD CER C3216X7R1E104K-E-TP		0.1U	SCAA001237					
C144	CAP,FXD CER C3216X7R1E104K-E-TP		0.1U	SCAA001237					
C145	CAP,FXD TANTAL 202L3502 225KB		2.2UF 25V	SCSAC01129					
C146	CAP,FXD CER C3216CH1H101J-E-TP		100PF	SCAA000780					
C147	CAP,FXD CER C3216SL1H102J-E-TP		1000PF	SCAA000782					
C148	CAP,FXD TANTAL 202L3502 225KB			SCSAC01069					
C149	CAP,FXD CER C3216X7R1H333K-E-TP		50V 0.033U	SCAA001357					
C150	CAP,FXD CER C3216J81H103K-E-TP		0.01UF	SCAA000789					
C151	CAP,FXD CER C3216J81H103K-E-TP		0.01UF	SCAA000789					
C152	CAP,FXD CER C3216J81H103K-E-TP		0.01UF	SCAA000789					
C153	CAP,FXD CER C3216J81E473K-E-TP			SCAA001131					
C154	CAP,FXD TANTAL 202L3502 224KB		0.22UF 35V	SCSAC00988					
C155	CAP,FXD ELCTLT ECE-A1EU100B			SCAA01864					
C156	CAP,FXD ELCTLT ECE-A1EU100B			SCAA01864					
C157	CAP,FXD TANTAL 202L3502 105KB		35V 1UF	SCSAC00982					
C159	CAP,FXD CER C3216X7R1E104K-E-TP		0.1U	SCAA001237					
C166	CAP,FXD CER C3216X7R1E104K-E-TP		0.1U	SCAA001237					
C167	CAP,FXD TANTAL 202L3502 224KB		0.22UF 35V	SCSAC00988					
C168	CAP,FXD ELCTLT ECE-A1EU100B			SCAA01864					
C169	CAP,FXD CER C3216X7R1E104K-E-TP		0.1U	SCAA001237					
C170	CAP,FXD CER C3216X7R1E104K-E-TP		0.1U	SCAA001237					
C171	CAP,FXD CER C3216X7R1E104K-E-TP		0.1U	SCAA001237					
C172	CAP,FXD ELCTLT ECE-A1EU100B			SCAA01864					
C173	CAP,FXD TANTAL 202L3502 224KB		0.22UF 35V	SCSAC00988					
C175	CAP,FXD ELCTLT ECE-A1EU100B			SCAA01864					
C176	CAP,FXD ELCTLT ECE-A1EU100B			SCAA01864					
C177	CAP,FXD CER C3216X7R1E104K-E-TP		0.1U	SCAA001237					

PARTS LIST				TITLE CAE-227				SHEET NO 3	
PARTS NO	PARTS NAME	TYPE	DESCRIPTION	CODE	IF AMP	TYPE	DESCRIPTION	CODE	IF AMP
C92	CAP,FXD CER C3216X7R1E104K-E-TP		0.1U	SCAA001237					
C94	CAP,FXD CER C3216X7R1H333K-E-TP		50V 0.033U	SCAA001357					
C95	CAP,FXD CER C3216X7R1E104K-E-TP		0.1U	SCAA001237					
C96	CAP,FXD CER C3216B1H472K-E-TP		4700PF	SCAA000783					
C97	CAP,FXD CER C3216X7R1H333K-E-TP		50V 0.033U	SCAA001357					
C98	CAP,FXD ELCTLT ECE-A1EU100B			SCAA01864					
C99	CAP,FXD CER C3216X7R1H333K-E-TP		50V 0.033U	SCAA001357					
C100	CAP,FXD TANTAL 202L3502 105KB		35V 1UF	SCSAC00982					
C101	CAP,FXD CER C3216CH1H471J-E-TP		470PF	SCAA000777					
C102	CAP,FXD CER C3216SL1H102J-E-TP		1000PF	SCAA000782					
C103	CAP,FXD TANTAL 202L3502 105KB		35V 1UF	SCSAC00982					
C104	CAP,FXD ELCTLT ECE-A1EU100B			SCAA01864					
C105	CAP,FXD TANTAL 202L3502 224KB		0.22UF 35V	SCSAC00988					
C106	CAP,FXD CER C3216X7R1H333K-E-TP		50V 0.033U	SCAA001357					
C107	CAP,FXD TANTAL 202L3502 475KB			SCSAC00934					
C108	CAP,FXD TANTAL 202L3502 105KB		35V 1UF	SCSAC00982					
C109	CAP,FXD CER C3216X7R1H333K-E-TP		50V 0.033U	SCAA001357					
C110	CAP,FXD ELCTLT ECE-A1EU100B			SCAA01864					
C111	CAP,FXD CER C3216X7R1H333K-E-TP		50V 0.033U	SCAA001357					
C112	CAP,FXD CER C3216X7R1E104K-E-TP		0.1U	SCAA001237					
C113	CAP,FXD CER C3216J81H103K-E-TP		0.01UF	SCAA000789					
C114	CAP,FXD CER C3216X7R1E104K-E-TP		0.1U	SCAA001237					
C115	CAP,FXD CER C3216J81H103K-E-TP		0.01UF	SCAA000789					
C121	CAP,FXD CER C3216X7R1H333K-E-TP		50V 0.033U	SCAA001357					
C122	CAP,FXD CER C3216X7R1H333K-E-TP		50V 0.033U	SCAA001357					
C123	CAP,FXD ELCTLT ECE-A1EU100B			SCAA01864					
C124	CAP,FXD CER C3216B1H223K-E-TP		0.022UF	SCAA001109					
C125	CAP,FXD CER C3216B1H223K-E-TP		0.022UF	SCAA001109					
C126	CAP,FXD CER C3216B1H223K-E-TP		0.022UF	SCAA001109					
C127	CAP,FXD CER C3216J81H103K-E-TP		0.01UF	SCAA000789					
C128	CAP,FXD CER C3216SL1H102J-E-TP		1000PF	SCAA000782					
C129	CAP,FXD TANTAL 202L3502 105KB		35V 1UF	SCSAC00982					
C130	CAP,FXD CER C3216J81H103K-E-TP		0.01UF	SCAA000789					
C131	CAP,FXD CER C3216J81H103K-E-TP		0.01UF	SCAA000789					
C132	CAP,FXD CER C3216J81H103K-E-TP		0.01UF	SCAA000789					

PARTS LIST

IF AMP		TITLE CAE-227		SHEET NO 5	
PARTS NO	PARTS NAME	TYPE	DESCRIPTION	CODE	
C178	CAP,FXD ELCTLT	ECE-A1EU100B		SCAAAD01864	
C179	CAP,FXD CER	C3216X7R1E104K-E-TP	0.1U	SCAAD01237	
C180	CAP,FXD TANTAL	202L3502 334K8	35V 0.33U	SCSAC01151	
C181	CAP,FXD ELCTLT	ECE-A1EU100B		SCAAAD01864	
C182	CAP,FXD CER	C3216J81H103K-E-TP	0.01UF	SCAAD00789	
C183	CAP,FXD ELCTLT	ECE-A1EU100B		SCAAAD01864	
C184	CAP,FXD CER	C3216J81H103K-E-TP	0.01UF	SCAAD00789	
C191	CAP,FXD CER	C3216X7R1H333K-E-TP	50V 0.033U	SCAAD01357	
C192	CAP,FXD ELCTLT	ECE-A1EU100B		SCAAAD01864	
C193	CAP,FXD CER	C3216B1H333K-E-TP	3300PF	SCAAD01020	
C194	CAP,FXD CER	C3216J81H682K-E-TP		SCAAD01137	
C195	CAP,FXD CER	C3216J81H682K-E-TP		SCAAD01137	
C196	CAP,FXD CER	C3216X7R1E104K-E-TP	0.1U	SCAAD01237	
C197	CAP,FXD TANTAL	202L3502 105K8	35V 1UF	SCSAC00982	
C198	CAP,FXD CER	C3216J81H103K-E-TP	0.01UF	SCAAD00789	
C199	CAP,FXD CER	C3216J81H103K-E-TP	0.01UF	SCAAD00789	
C200	CAP,FXD CER	C3216X7R1H333K-E-TP	50V 0.033U	SCAAD01357	
C201	CAP,FXD CER	C3216SL1H102J-E-TP	1000PF	SCAAD00782	
C202	CAP,FXD CER	C3216B1H472K-E-TP	4700PF	SCAAD00783	
C203	CAP,FXD CER	C3216J81H223K-E-TP		SCAAD01645	
C204	CAP,FXD CER	C3216J81H333K-E-TP		SCAAD01599	
C205	CAP,FXD CER	C3216X7R1H333K-E-TP	50V 0.033U	SCAAD01357	
C206	CAP,FXD CER	C3216J81H682K-E-TP		SCAAD01137	
C207	CAP,FXD CER	C3216SL1H222J-E-TP	2200P	SCAAD00792	
C208	CAP,FXD CER	C3216J81H223K-E-TP		SCAAD01645	
C01	DIODE	1SS226 TE85L		STXAD00320	
C02	DIODE	1SV149B		STXAD00332	
C03	DIODE	1SS184 TE85L		STXAD00290	
C04	DIODE	MPR4371F		STXBG00037	
C05	DIODE	1SS226 TE85L		STXAD00320	
C06	DIODE	1SS226 TE85L		STXAD00320	
C08	DIODE	1SS181 TE85L		STXAD00356	
C09	DIODE	1SS184 TE85L		STXAD00290	
C010	DIODE	R05.1M81-11		STXAA00515	
C011	DIODE	1SS181 TE85L		STXAD00356	

PARTS LIST

IF AMP		TITLE CAE-227		SHEET NO 6	
PARTS NO	PARTS NAME	TYPE	DESCRIPTION	CODE	
C013	DIODE	1SS184 TE85L		STXAD00290	
C014	DIODE	1SS181 TE85L		STXAD00356	
C021	DIODE	1SS184 TE85L		STXAD00290	
C022	DIODE	R06.2M82-11		STXAA00455	
C023	DIODE	1SS226 TE85L		STXAD00320	
C024	DIODE	1SS181 TE85L		STXAD00356	
C025	DIODE	1SS184 TE85L		STXAD00290	
C026	DIODE	1SS184 TE85L		STXAD00290	
C027	DIODE	1SS184 TE85L		STXAD00290	
C028	DIODE	1SV149B		STXAD00332	
C029	DIODE	1SS184 TE85L		STXAD00290	
IC2	IC	SM16913P		S0DAL00301	
IC3	IC	M5223L		S0DAB00164	
IC4	IC	TA7310P		S0DAD00091	
IC5	IC	TC40668P		S0DAE00078	
IC6	IC	TC40668P		S0DAE00078	
IC7	IC	M5223L		S0DAB00164	
IC8	IC	IR3N37		S0DBN00049	
IC9	IC	M5223L		S0DAB00164	
IC10	IC	TC40528P		S0DAE00208	
IC11	IC	M5260L		S0DAB00312	
IC12	IC	M5260L		S0DAB00312	
J1	CONNECTOR	IL-G-2P-S3L2-E		SJWAD00094	
JP1	TIN COATED WIRE	TA-0.6P		27117100001	
JP2	TIN COATED WIRE	TA-0.6P		27117100001	
JP3	TIN COATED WIRE	TA-0.6P		27117100001	
L2	COIL	FL-7H472J	4.7MH	SLCAA00023	
L3	COIL	FL-7H472J	4.7MH	SLCAA00023	
L4	COIL	LAL03VB681K		SLCAA00442	
L5	COIL	FL7H-222J	2.2MH	SLCAA00021	
L6	COIL	FL7H-222J	2.2MH	SLCAA00021	
L7	COIL	LAL03VB100K	100UH	SLCAA00273	
L8	COIL	LAL03VB101K		SLCAA00333	
L9	COIL	LAL03VB820K		SLCAA00388	
P7	CONNECTOR	EC1C-22P-2.5DSA	22P	SJWBS00070	

PARTS LIST					PARTS LIST				
IF AMP					IF AMP				
CAE-227					CAE-227				
PARTS NO	PARTS NAME	TYPE	DESCRIPTION	CODE	PARTS NO	PARTS NAME	TYPE	DESCRIPTION	CODE
P8	CONNECTOR	EC1C-22P-2.50SA	22P	SJWBS00070	R35	RESISTOR FXD	ERJ-8GEYJ470V	1/8W 47 OHM	SREAG01722
PC1	PCB	H-6PCJ00026CA		6PCJ000260	R36	RESISTOR FXD	ERJ-8GEYJ222V	1/8W 2.2K OHM	SREAG01742
R1	RESISTOR FXD	ERJ-8GEYJ101V	1/8W 100 OHM	SREAG01726	R37	RESISTOR FXD	ERJ-8GEYJ101V	1/8W 100 OHM	SREAG01726
R2	RESISTOR FXD	ERJ-8GEYJ103V	1/8W 10K OHM	SREAG01750	R38	RESISTOR FXD	ERJ-8GEYJ104V	1/8W 100K OHM	SREAG01762
R3	RESISTOR FXD	ERJ-8GEYJ101V	1/8W 100 OHM	SREAG01726	R39	RESISTOR FXD	ERJ-8GEYJ101V	1/8W 100 OHM	SREAG01726
R4	RESISTOR FXD	ERJ-8GEYJ330V	1/8W 33 OHM	SREAG01720	R40	RESISTOR FXD	ERJ-8GEYJ221V	1/8W 220 OHM	SREAG01730
R5	RESISTOR FXD	ERJ-8GEYJ333V		SREAG01756	R41	RESISTOR FXD	ERJ-8GEYJ471V	1/8W 470 OHM	SREAG01734
R6	RESISTOR FXD	ERJ-8GEYJ101V	1/8W 100 OHM	SREAG01726	R42	RESISTOR FXD	ERJ-8GEYJ103V	1/8W 10K OHM	SREAG01750
R7	RESISTOR FXD	ERJ-8GEYJ101V	1/8W 100 OHM	SREAG01726	R43	RESISTOR FXD	ERJ-8GEYJ103V	1/8W 10K OHM	SREAG01750
R8	RESISTOR FXD	ERJ-8GEYJ101V	1/8W 100 OHM	SREAG01726	R44	RESISTOR FXD	ERJ-8GEYJ221V	1/8W 220 OHM	SREAG01730
R9	RESISTOR FXD	ERJ-8GEYJ360V	1/8W 56 OHM	SREAG01723	R45	RESISTOR FXD	ERJ-8GEYJ103V	1/8W 10K OHM	SREAG01750
R10	RESISTOR FXD	ERD-25UJ220	1/4W 22 OHM	SRDA01305	R46	RESISTOR FXD	ERJ-8GEYJ562V	1/8W 5.6K OHM	SREAG01747
R11	RESISTOR FXD	ERJ-8GEYJ332V	1/8W 3.3K OHM	SREAG01744	R51	RESISTOR FXD	ERJ-8GEYJ153V		SREAG01752
R12	RESISTOR FXD	ERJ-8GEYJ333V		SREAG01756	R52	RESISTOR FXD	ERJ-8GEYJ104V	1/8W 100K OHM	SREAG01762
R13	RESISTOR FXD	ERJ-8GEYJ101V	1/8W 100 OHM	SREAG01726	R53	RESISTOR FXD	ERJ-8GEYJ104V	1/8W 100K OHM	SREAG01762
R14	RESISTOR FXD	ERJ-8GEYJ101V	1/8W 100 OHM	SREAG01726	R54	RESISTOR FXD	ERJ-8GEYJ473V		SREAG01758
R15	RESISTOR FXD	ERJ-8GEYJ223V	1/8W 22K OHM	SREAG01754	R55	RESISTOR FXD	ERJ-8GEYJ473V		SREAG01758
R16	RESISTOR FXD	ERJ-8GEYJ682V		SREAG01748	R56	RESISTOR FXD	ERJ-8GEYJ222V	1/8W 2.2K OHM	SREAG01742
R17	RESISTOR FXD	ERJ-8GEYJ104V	1/8W 100K OHM	SREAG01762	R57	RESISTOR FXD	ERJ-8GEYJ103V	1/8W 10K OHM	SREAG01750
R18	RESISTOR FXD	ERJ-8GEYJ104V	1/8W 100K OHM	SREAG01762	R58	RESISTOR FXD	ERJ-8GEYJ103V	1/8W 10K OHM	SREAG01750
R19	RESISTOR FXD	ERJ-8GEYJ154V		SREAG01764	R59	RESISTOR FXD	ERJ-8GEYJ473V		SREAG01758
R20	RESISTOR FXD	ERJ-8GEYJ102V	1/8W 1K OHM	SREAG01738	R60	RESISTOR FXD	ERJ-8GEYJ102V	1/8W 1K OHM	SREAG01738
R21	RESISTOR FXD	ERJ-8GEYJ222V	1/8W 2.2K OHM	SREAG01742	R61	RESISTOR FXD	ERJ-8GEYJ473V		SREAG01758
R22	RESISTOR FXD	ERJ-8GEYJ102V	1/8W 1K OHM	SREAG01738	R62	RESISTOR FXD	ERJ-8GEYJ102V	1/8W 1K OHM	SREAG01738
R23	RESISTOR FXD	ERJ-8GEYJ103V	1/8W 10K OHM	SREAG01750	R63	RESISTOR FXD	ERJ-8GEYJ101V	1/8W 100 OHM	SREAG01726
R24	RESISTOR FXD	ERJ-8GEYJ102V	1/8W 1K OHM	SREAG01738	R64	RESISTOR FXD	ERJ-8GEYJ331V	1/8W 330 OHM	SREAG01732
R25	RESISTOR FXD	ERJ-8GEYJ151V	1/8W 150 OHM	SREAG01728	R65	RESISTOR FXD	ERJ-8GEYJ561V	1/8W 560 OHM	SREAG01735
R26	RESISTOR FXD	ERJ-8GEYJ103V	1/8W 10K OHM	SREAG01750	R66	RESISTOR FXD	ERJ-8GEYJ561V	1/8W 560 OHM	SREAG01735
R27	RESISTOR FXD	ERJ-8GEYJ104V	1/8W 100K OHM	SREAG01762	R67	RESISTOR FXD	ERJ-8GEYJ822V		SREAG01749
R28	RESISTOR FXD	ERJ-8GEYJ103V	1/8W 10K OHM	SREAG01750	R68	RESISTOR FXD	ERJ-8GEYJ103V	1/8W 10K OHM	SREAG01750
R29	RESISTOR FXD	ERJ-8GEYJ104V	1/8W 100K OHM	SREAG01762	R69	RESISTOR FXD	ERJ-8GEYJ332V	1/8W 3.3K OHM	SREAG01744
R31	RESISTOR FXD	ERJ-8GEYJ103V	1/8W 10K OHM	SREAG01750	R70	RESISTOR FXD	ERJ-8GEYJ105V	1/8W 1M OHM	SREAG01774
R32	RESISTOR FXD	ERJ-8GEYJ103V	1/8W 10K OHM	SREAG01750	R71	RESISTOR FXD	ERJ-8GEYJ183V	1/8W 18K OHM	SREAG01753
R33	RESISTOR FXD	ERJ-8GEYJ105V	1/8W 1M OHM	SREAG01774	R72	RESISTOR FXD	ERJ-8GEYJ332V	1/8W 3.3K OHM	SREAG01744
R34	RESISTOR FXD	ERJ-8GEYJ101V	1/8W 100 OHM	SREAG01726	R73	RESISTOR FXD	ERJ-8GEYJ102V	1/8W 1K OHM	SREAG01738

PARTS LIST

IF AMP		TITLE CAE-227		SHEET NO 9	
PARTS NO	PARTS NAME	TYPE	DESCRIPTION	CODE	
R74	RESISTOR FXD	ERJ-8GEYJ103V	1/8W 1M OHM	SREAG01774	
R75	RESISTOR FXD	ERJ-8GEYJ103V	1/8W 10K OHM	SREAG01750	
R76	RESISTOR FXD	ERJ-8GEYJ101V	1/8W 100 OHM	SREAG01726	
R81	RESISTOR FXD	ERJ-8GEYJ103V	1/8W 10K OHM	SREAG01750	
R82	RESISTOR FXD	ERJ-8GEYJ473V		SREAG01758	
R83	RESISTOR FXD	ERJ-8GEYJ223V	1/8W 220 OHM	SREAG01730	
R84	RESISTOR FXD	ERJ-8GEYJ102V	1/8W 1K OHM	SREAG01738	
R85	RESISTOR FXD	ERJ-8GEYJ472V		SREAG01746	
R86	RESISTOR FXD	ERJ-8GEYJ101V	1/8W 100 OHM	SREAG01726	
R87	RESISTOR FXD	ERJ-8GEYJ682V		SREAG01748	
R88	RESISTOR FXD	ERJ-8GEYJ472V		SREAG01746	
R89	RESISTOR FXD	ERJ-8GEYJ102V	1/8W 1K OHM	SREAG01738	
R90	RESISTOR FXD	ERJ-8GEYJ102V	1/8W 1K OHM	SREAG01738	
R91	RESISTOR FXD	ERJ-8GEYJ682V		SREAG01748	
R92	RESISTOR FXD	ERJ-8GEYJ472V		SREAG01746	
R93	RESISTOR FXD	ERJ-8GEYJ103V	1/8W 10K OHM	SREAG01750	
R94	RESISTOR FXD	ERJ-8GEYJ103V	1/8W 10K OHM	SREAG01750	
R95	RESISTOR FXD	ERJ-8GEYJ393V		SREAG01757	
R96	RESISTOR FXD	ERJ-8GEYJ223V	1/8W 22K OHM	SREAG01754	
R97	RESISTOR FXD	ERJ-8GEYJ103V	1/8W 10K OHM	SREAG01750	
R98	RESISTOR FXD	ERJ-8GEYJ103V	1/8W 10K OHM	SREAG01750	
R99	RESISTOR FXD	ERJ-8GEYJ332V	1/8W 3.3K OHM	SREAG01744	
R100	RESISTOR FXD	ERJ-8GEYJ103V	1/8W 10K OHM	SREAG01750	
R101	RESISTOR FXD	ERJ-8GEYJ473V		SREAG01758	
R102	RESISTOR FXD	ERJ-8GEYJ473V		SREAG01758	
R103	RESISTOR FXD	ERJ-8GEYJ101V	1/8W 100 OHM	SREAG01726	
R104	RESISTOR FXD	ERJ-8GEYJ102V	1/8W 1K OHM	SREAG01738	
R105-1	RESISTOR FXD	ERJ-8GEYJ105V	1/8W 1M OHM	SREAG01774	
R105-2	RESISTOR FXD	ERJ-8GEYJ105V	1/8W 1M OHM	SREAG01774	
R106	RESISTOR FXD	ERJ-8GEYJ473V		SREAG01758	
R107	RESISTOR FXD	ERJ-8GEYJ223V	1/8W 22K OHM	SREAG01754	
R108	RESISTOR FXD	ERJ-8GEYJ561V	1/8W 560 OHM	SREAG01735	
R109	RESISTOR FXD	ERJ-8GEYJ473V		SREAG01758	
P110	RESISTOR FXD	ERJ-8GEYJ103V	1/8W 10K OHM	SREAG01750	
R111	RESISTOR FXD	ERJ-8GEYJ473V		SREAG01758	

PARTS LIST

IF AMP		TITLE CAE-227		SHEET NO 10	
PARTS NO	PARTS NAME	TYPE	DESCRIPTION	CODE	
R112	RESISTOR FXD	ERJ-8GEYJ473V		SREAG01758	
R113	RESISTOR FXD	ERJ-8GEYJ472V		SREAG01746	
R114	RESISTOR FXD	ERJ-8GEYJ472V		SREAG01746	
R115	RESISTOR FXD	ERJ-8GEYJ105V	1/8W 1M OHM	SREAG01774	
R116	RESISTOR FXD	ERJ-8GEYJ102V	1/8W 1K OHM	SREAG01738	
R117	RESISTOR FXD	ERJ-8GEYJ104V	1/8W 100K OHM	SREAG01762	
P121	RESISTOR FXD	ERJ-8GEYJ222V	1/8W 2.2K OHM	SREAG01742	
R122	RESISTOR FXD	ERJ-8GEYJ102V	1/8W 1K OHM	SREAG01738	
R123	RESISTOR FXD	ERJ-8GEYJ101V	1/8W 100 OHM	SREAG01726	
R124	RESISTOR FXD	ERJ-8GEYJ472V		SREAG01746	
R125	RESISTOR FXD	ERJ-8GEYJ272V	1/8W 2.7K OHM	SREAG01743	
R126	RESISTOR FXD	ERJ-8GEYJ272V	1/8W 2.7K OHM	SREAG01743	
R127	RESISTOR FXD	ERJ-8GEYJ334V		SREAG01768	
R128	RESISTOR FXD	ERJ-8GEYJ103V	1/8W 10K OHM	SREAG01750	
R129	RESISTOR FXD	ERJ-8GEYJ103V	1/8W 10K OHM	SREAG01750	
R130	RESISTOR FXD	ERJ-8GEYJ103V	1/8W 10K OHM	SREAG01750	
R131	RESISTOR FXD	ERJ-8GEYJ000V	0 OHM	SREAG01775	
R140	RESISTOR FXD	ERJ-8GEYJ103V	1/8W 10K OHM	SREAG01750	
R141	RESISTOR FXD	ERJ-8GEYJ223V	1/8W 22K OHM	SREAG01754	
R142	RESISTOR FXD	ERJ-8GEYJ474V		SREAG01770	
R143	RESISTOR FXD	ERJ-8GEYJ682V		SREAG01748	
R144	RESISTOR FXD	ERJ-8GEYJ332V	1/8W 3.3K OHM	SREAG01744	
R145	RESISTOR FXD	ERJ-8GEYJ103V	1/8W 10K OHM	SREAG01750	
R146	RESISTOR FXD	ERJ-8GEYJ473V		SREAG01758	
R147	RESISTOR FXD	ERJ-8GEYJ103V	1/8W 10K OHM	SREAG01750	
R148	RESISTOR FXD	ERJ-8GEYJ473V		SREAG01758	
R149	RESISTOR FXD	ERJ-8GEYJ104V	1/8W 100K OHM	SREAG01762	
R150	RESISTOR FXD	ERJ-8GEYJ104V	1/8W 100K OHM	SREAG01762	
R151	RESISTOR FXD	ERJ-8GEYJ682V		SREAG01748	
R152	RESISTOR FXD	ERJ-8GEYJ473V		SREAG01758	
R153	RESISTOR FXD	ERJ-8GEYJ104V	1/8W 100K OHM	SREAG01762	
R154	RESISTOR FXD	ERJ-8GEYJ222V	1/8W 2.2K OHM	SREAG01742	
R155	RESISTOR FXD	ERJ-8GEYJ103V	1/8W 10K OHM	SREAG01750	
R156	RESISTOR FXD	ERJ-8GEYJ331V	1/8W 330 OHM	SREAG01732	
R157	RESISTOR FXD	ERJ-8GEYJ822V		SREAG01749	

PARTS LIST

IF AMP		TITLE CAE-227		SHEET NO 11	
PARTS NO	PARTS NAME	TYPE	DESCRIPTION	CODE	
R158	RESISTOR FXD	ERJ-8GEYJ103V	1/8W 10K OHM	SREAG01750	
R159	RESISTOR FXD	ERJ-8GEYJ473V		SREAG01758	
R160	RESISTOR FXD	ERJ-8GEYJ221V	1/8W 220 OHM	SREAG01730	
R161	RESISTOR FXD	ERJ-8GEYJ222V	1/8W 2.2K OHM	SREAG01742	
R162	RESISTOR FXD	ERJ-8GEYJ821V	1/8W 820 OHM	SREAG01737	
R163	RESISTOR FXD	ERJ-8GEYJ102V	1/8W 1K OHM	SREAG01738	
R166	RESISTOR FXD	ERJ-8GEYJ104V	1/8W 100K OHM	SREAG01762	
R167	RESISTOR FXD	ERJ-8GEYJ152V	1/8W 1.5K OHM	SREAG01740	
R168	RESISTOR FXD	ERJ-8GEYJ103V	1/8W 10K OHM	SREAG01750	
R169	RESISTOR FXD	ERJ-8GEYJ103V	1/8W 10K OHM	SREAG01750	
R170	RESISTOR FXD	ERJ-8GEYJ102V	1/8W 1K OHM	SREAG01738	
R171	RESISTOR FXD	ERJ-8GEYJ103V	1/8W 10K OHM	SREAG01750	
R172	RESISTOR FXD	ERJ-8GEYJ222V	1/8W 2.2K OHM	SREAG01742	
R173	RESISTOR FXD	ERJ-8GEYJ222V	1/8W 2.2K OHM	SREAG01742	
R174	RESISTOR FXD	ERJ-8GEYJ103V	1/8W 10K OHM	SREAG01750	
R175	RESISTOR FXD	ERJ-8GEYJ103V	1/8W 10K OHM	SREAG01750	
R176	RESISTOR FXD	ERJ-8GEYJ103V	1/8W 10K OHM	SREAG01750	
R177	RESISTOR FXD	ERJ-8GEYJ103V	1/8W 10K OHM	SREAG01750	
R178	RESISTOR FXD	ERJ-8GEYJ103V	1/8W 10K OHM	SREAG01750	
R179	RESISTOR FXD	ERJ-8GEYJ103V	1/8W 10K OHM	SREAG01750	
R180	RESISTOR FXD	ERJ-8GEYJ223V	1/8W 22K OHM	SREAG01754	
R182	RESISTOR FXD	ERJ-8GEYJ103V	1/8W 10K OHM	SREAG01750	
R183	RESISTOR FXD	ERJ-8GEYJ105V	1/8W 1M OHM	SREAG01774	
R184	RESISTOR FXD	ERJ-8GEYJ103V	1/8W 10K OHM	SREAG01750	
R185	RESISTOR FXD	ERJ-8GEYJ103V	1/8W 10K OHM	SREAG01750	
R186	RESISTOR FXD	ERJ-8GEYJ104V	1/8W 100K OHM	SREAG01762	
R187	RESISTOR FXD	ERJ-8GEYJ102V	1/8W 1K OHM	SREAG01738	
R189-1	RESISTOR FXD	ERJ-8GEYJ105V	1/8W 1M OHM	SREAG01774	
R189-2	RESISTOR FXD	ERJ-8GEYJ105V	1/8W 1M OHM	SREAG01774	
R189-3	RESISTOR FXD	ERJ-8GEYJ105V	1/8W 1M OHM	SREAG01774	
R190	RESISTOR FXD	ERJ-8GEYJ102V	1/8W 1K OHM	SREAG01738	
R191	RESISTOR FXD	ERJ-8GEYJ103V	1/8W 10K OHM	SREAG01750	
R192	RESISTOR FXD	ERJ-8GEYJ103V	1/8W 10K OHM	SREAG01750	
R193	RESISTOR FXD	ERJ-8GEYJ103V	1/8W 10K OHM	SREAG01750	
R195	RESISTOR FXD	ERJ-8GEYJ103V	1/8W 10K OHM	SREAG01750	

PARTS LIST

IF AMP		TITLE CAE-227		SHEET NO 12	
PARTS NO	PARTS NAME	TYPE	DESCRIPTION	CODE	
R196	RESISTOR FXD	ERJ-8GEYJ223V	1/8W 22K OHM	SREAG01754	
R197	RESISTOR FXD	ERJ-8GEYJ472V		SREAG01746	
R198	RESISTOR FXD	ERJ-8GEYJ000V	0 OHM	SREAG01775	
R199	RESISTOR FXD	ERJ-8GEYJ000V	0 OHM	SREAG01775	
R200	RESISTOR FXD	ERJ-8GEYJ681V	1/8W 680 OHM	SREAG01736	
R211	RESISTOR FXD	ERJ-8GEYJ101V	1/8W 100 OHM	SREAG01726	
R212	RESISTOR FXD	ERJ-8GEYJ472V		SREAG01746	
R213	RESISTOR FXD	ERJ-8GEYJ562V	1/8W 5.6K OHM	SREAG01747	
R214	RESISTOR FXD	ERJ-8GEYJ562V	1/8W 5.6K OHM	SREAG01747	
R215	RESISTOR FXD	ERJ-8GEYJ334V		SREAG01768	
R216	RESISTOR FXD	ERJ-8GEYJ102V	1/8W 1K OHM	SREAG01738	
R217	RESISTOR FXD	ERJ-8GEYJ103V	1/8W 10K OHM	SREAG01750	
R218	RESISTOR FXD	ERJ-8GEYJ103V	1/8W 10K OHM	SREAG01750	
R219	RESISTOR FXD	ERJ-8GEYJ105V	1/8W 1M OHM	SREAG01774	
R220	RESISTOR FXD	ERJ-8GEYJ105V	1/8W 1M OHM	SREAG01774	
RJ1	RESISTOR FXD	ERJ-8GEYJ000V	0 OHM	SREAG01775	
RJ2	RESISTOR FXD	ERJ-8GEYJ000V	0 OHM	SREAG01775	
RJ3	RESISTOR FXD	ERJ-8GEYJ000V	0 OHM	SREAG01775	
RJ4	RESISTOR FXD	ERJ-8GEYJ000V	0 OHM	SREAG01775	
RJ5	RESISTOR FXD	ERJ-8GEYJ000V	0 OHM	SREAG01775	
RJ6	RESISTOR FXD	ERJ-8GEYJ000V	0 OHM	SREAG01775	
RJ7	RESISTOR FXD	ERJ-8GEYJ000V	0 OHM	SREAG01775	
RJ8	RESISTOR FXD	ERJ-8GEYJ000V	0 OHM	SREAG01775	
RJ9	RESISTOR FXD	ERJ-8GEYJ000V	0 OHM	SREAG01775	
RJ10	RESISTOR FXD	ERJ-8GEYJ000V	0 OHM	SREAG01775	
RJ11	RESISTOR FXD	ERJ-8GEYJ000V	0 OHM	SREAG01775	
RJ12	RESISTOR FXD	ERJ-8GEYJ000V	0 OHM	SREAG01775	
RJ13	RESISTOR FXD	ERJ-8GEYJ000V	0 OHM	SREAG01775	
RJ14	RESISTOR FXD	ERJ-8GEYJ000V	0 OHM	SREAG01775	
RJ15	RESISTOR FXD	ERJ-8GEYJ000V	0 OHM	SREAG01775	
RJ16	RESISTOR FXD	ERJ-8GEYJ000V	0 OHM	SREAG01775	
RJ17	RESISTOR FXD	ERJ-8GEYJ000V	0 OHM	SREAG01775	
RJ19	RESISTOR FXD	ERJ-8GEYJ000V	0 OHM	SREAG01775	
RJ20	RESISTOR FXD	ERJ-8GEYJ000V	0 OHM	SREAG01775	
RJ21	RESISTOR FXD	ERJ-8GEYJ000V	0 OHM	SREAG01775	

PARTS LIST

IF AMP TITLE CAE-227

SHEET NO 13

PARTS NO.	PARTS NAME	TYPE	DESCRIPTION	CODE
RJ23	RESISTOR FXD	ERJ-8GEYOR00V	0 OHM	SREAG01775
RJ24	RESISTOR FXD	ERJ-8GEYOR00V	0 OHM	SREAG01775
RJ25	RESISTOR FXD	ERJ-8GEYOR00V	0 OHM	SREAG01775
RJ27	RESISTOR FXD	ERJ-8GEYOR00V	0 OHM	SREAG01775
RJ28	RESISTOR FXD	ERJ-8GEYOR00V	0 OHM	SREAG01775
RJ29	RESISTOR FXD	ERJ-8GEYOR00V	0 OHM	SREAG01775
RJ30	RESISTOR FXD	ERJ-8GEYOR00V	0 OHM	SREAG01775
RJ31	RESISTOR FXD	ERJ-8GEYOR00V	0 OHM	SREAG01775
RJ32	RESISTOR FXD	ERJ-8GEYOR00V	0 OHM	SREAG01775
RJ33	RESISTOR FXD	ERJ-8GEYOR00V	0 OHM	SREAG01775
RJ34	RESISTOR FXD	ERJ-8GEYOR00V	0 OHM	SREAG01775
RJ35	RESISTOR FXD	ERJ-8GEYOR00V	0 OHM	SREAG01775
RJ36	RESISTOR FXD	ERJ-8GEYOR00V	0 OHM	SREAG01775
RJ37	RESISTOR FXD	ERJ-8GEYOR00V	0 OHM	SREAG01775
RJ38	RESISTOR FXD	ERJ-8GEYOR00V	0 OHM	SREAG01775
RJ39	RESISTOR FXD	ERJ-8GEYOR00V	0 OHM	SREAG01775
RJ40	RESISTOR FXD	ERJ-8GEYOR00V	0 OHM	SREAG01775
RJ41	RESISTOR FXD	ERJ-8GEYOR00V	0 OHM	SREAG01775
RJ42	RESISTOR FXD	ERJ-8GEYOR00V	0 OHM	SREAG01775
RJ43	RESISTOR FXD	ERJ-8GEYOR00V	0 OHM	SREAG01775
RJ44	RESISTOR FXD	ERJ-8GEYOR00V	0 OHM	SREAG01775
RJ45	RESISTOR FXD	ERJ-8GEYOR00V	0 OHM	SREAG01775
RJ46	RESISTOR FXD	ERJ-8GEYOR00V	0 OHM	SREAG01775
RJ47	RESISTOR FXD	ERJ-8GEYOR00V	0 OHM	SREAG01775
RJ48	RESISTOR FXD	ERJ-8GEYOR00V	0 OHM	SREAG01775
RJ49	RESISTOR FXD	ERJ-8GEYOR00V	0 OHM	SREAG01775
RJ50	RESISTOR FXD	ERJ-8GEYOR00V	0 OHM	SREAG01775
RJ51	RESISTOR FXD	ERJ-8GEYOR00V	0 OHM	SREAG01775
RJ52	RESISTOR FXD	ERJ-8GEYOR00V	0 OHM	SREAG01775
RJ53	RESISTOR FXD	ERJ-8GEYOR00V	0 OHM	SREAG01775
RJ54	RESISTOR FXD	ERJ-8GEYOR00V	0 OHM	SREAG01775
RJ55	RESISTOR FXD	ERJ-8GEYOR00V	0 OHM	SREAG01775
RJ56	RESISTOR FXD	ERJ-8GEYOR00V	0 OHM	SREAG01775
RJ57	RESISTOR FXD	ERJ-8GEYOR00V	0 OHM	SREAG01775
RJ58	RESISTOR FXD	ERJ-8GEYOR00V	0 OHM	SREAG01775

PARTS LIST

IF AMP TITLE CAE-227

SHEET NO 14

PARTS NO.	PARTS NAME	TYPE	DESCRIPTION	CODE
RJ59	RESISTOR FXD	ERJ-8GEYOR00V	0 OHM	SREAG01775
RJ60	RESISTOR FXD	ERJ-8GEYOR00V	0 OHM	SREAG01775
RJ61	RESISTOR FXD	ERJ-8GEYOR00V	0 OHM	SREAG01775
RJ62	RESISTOR FXD	ERJ-8GEYOR00V	0 OHM	SREAG01775
RJ63	RESISTOR FXD	ERJ-8GEYOR00V	0 OHM	SREAG01775
RJ64	RESISTOR FXD	ERJ-8GEYOR00V	0 OHM	SREAG01775
RJ65	RESISTOR FXD	ERJ-8GEYOR00V	0 OHM	SREAG01775
RJ66	RESISTOR FXD	ERJ-8GEYOR00V	0 OHM	SREAG01775
RJ67	RESISTOR FXD	ERJ-8GEYOR00V	0 OHM	SREAG01775
RJ68	RESISTOR FXD	ERJ-8GEYOR00V	0 OHM	SREAG01775
RJ69	RESISTOR FXD	ERJ-8GEYOR00V	0 OHM	SREAG01775
RJ70	RESISTOR FXD	ERJ-8GEYOR00V	0 OHM	SREAG01775
RJ71	RESISTOR FXD	ERJ-8GEYOR00V	0 OHM	SREAG01775
RJ72	RESISTOR FXD	ERJ-8GEYOR00V	0 OHM	SREAG01775
RJ73	RESISTOR FXD	ERJ-8GEYOR00V	0 OHM	SREAG01775
RJ74	RESISTOR FXD	ERJ-8GEYOR00V	0 OHM	SREAG01775
RJ75	RESISTOR FXD	ERJ-8GEYOR00V	0 OHM	SREAG01775
RJ76	RESISTOR FXD	ERJ-8GEYOR00V	0 OHM	SREAG01775
RJ77	RESISTOR FXD	ERJ-8GEYOR00V	0 OHM	SREAG01775
RJ78	RESISTOR FXD	ERJ-8GEYOR00V	0 OHM	SREAG01775
RJ79	RESISTOR FXD	ERJ-8GEYOR00V	0 OHM	SREAG01775
RJ80	RESISTOR FXD	ERJ-8GEYOR00V	0 OHM	SREAG01775
RJ81	RESISTOR FXD	ERJ-8GEYOR00V	0 OHM	SREAG01775
RJ82	RESISTOR FXD	ERJ-8GEYOR00V	0 OHM	SREAG01775
RJ83	RESISTOR FXD	ERJ-8GEYOR00V	0 OHM	SREAG01775
RJ85	RESISTOR FXD	ERJ-8GEYOR00V	0 OHM	SREAG01775
RJ86	RESISTOR FXD	ERJ-8GEYOR00V	0 OHM	SREAG01775
RJ87	RESISTOR FXD	ERJ-8GEYOR00V	0 OHM	SREAG01775
RV1	RESISTOR VAR	EVN-D1AA00B34	50K OHM	SRVAB00380
RV2	RESISTOR VAR	EVN-D4AA00B-14	10K OHM	SRVAB00279
RV3	RESISTOR VAR	EVN-D4AA00B-14	10K OHM	SRVAB00279
RV4	RESISTOR VAR	EVN-D1AA00B23	10K OHM	SRVAB00323
RV5	RESISTOR VAR	EVN-D1AA00B14	10K OHM	SRVAB00324
RV6	RESISTOR VAR	EVN-D4AA00B-14	10K OHM	SRVAB00279
RV7	RESISTOR VAR	EVN-D4AA00B34	10K OHM	SRVAB00317

PARTS LIST					TITLE CAE-227					SHEET NO. 15				
PARTS NO		PARTS NAME		TYPE		DESCRIPTION		CODE						
RV8		RESISTOR	VAR	EVN-D1AA00B55		50K		SRVAB00389						
RV9		RESISTOR	VAR	EVN-D1AA00B55		50K		SRVAB00389						
S1		TERMINAL		A2-3PA-2.5405A(01)				SJTBX00010						
S1P		CONNECTOR		H1P3GA-2.54SP				SJAFA01151						
T1		RF XFMR		S-061-006				SLJAA00006						
T2		RF XFMR		S-061-006				SLJAA00006						
T3		RF XFMR		H-6LHJD00489		100KHZ		6LHJD00489						
T4		RF XFMR		H-6LHJD00490		100KHZ		6LHJD00490						
T5		RF XFMR		H-6LHJD00489		100KHZ		6LHJD00489						
T6		COIL		5D-ELD19A-41				6LAF000018						
TP		TEST TERMINAL		PCN6-PEA				SJDAA00364						
TR1		TRANSISTOR		3SK77-GR				STKAA00108						
TR2		TRANSISTOR		3SK77-GR				STKAA00108						
TR3		TRANSISTOR		3SK77-GR				STKAA00108						
TR4		TRANSISTOR		2SC2712Y TE85L				STAAG00186						
TR5		TRANSISTOR		2SC2712Y TE85L				STAAG00186						
TR6		TRANSISTOR		2SA1162-Y TE85L				STAAG00182						
TR7		TRANSISTOR		3SK77-GR				STKAA00108						
TR8		TRANSISTOR		2SC2712Y TE85L				STAAG00186						
TR9		TRANSISTOR		2SC2712Y TE85L				STAAG00186						
TR10		TRANSISTOR		2SC2712Y TE85L				STAAG00186						
TR11		TRANSISTOR		2SC2712Y TE85L				STAAG00186						
TR12		TRANSISTOR		2SC2712Y TE85L				STAAG00186						
TR13		TRANSISTOR		2SC3398-TB				STCAZ00011						
TR15		TRANSISTOR		2SC2712Y TE85L				STAAG00186						
TR16		TRANSISTOR		2SC2712Y TE85L				STAAG00186						
TR17		TRANSISTOR		2SC2712Y TE85L				STAAG00186						
TR18		TRANSISTOR		2SA1162-Y TE85L				STAAG00182						
TR19		TRANSISTOR		2SC2712Y TE85L				STAAG00186						
TR20		TRANSISTOR		2SC2712Y TE85L				STAAG00186						
TR21		TRANSISTOR		2SC3398-TB				STCAZ00011						
TR22		TRANSISTOR		2SA1162-Y TE85L				STAAG00182						
TR23		TRANSISTOR		2SC3398-TB				STCAZ00011						
TR24		TRANSISTOR		2SC3398-TB				STCAZ00011						
TR26		TRANSISTOR		2SC2712Y TE85L				STAAG00186						

PARTS LIST					TITLE CAE-227					SHEET NO. 16				
PARTS NO		PARTS NAME		TYPE		DESCRIPTION		CODE						
TR27		TRANSISTOR		2SC2712Y TE85L				STAAG00186						
TR30		TRANSISTOR		2SC3398-TB				STCAZ00011						
TR31		TRANSISTOR		2SC2712Y TE85L				STAAG00186						
TR32		TRANSISTOR		2SA1162-Y TE85L				STAAG00182						
TR33		TRANSISTOR		2SA1162-Y TE85L				STAAG00182						
TR34		TRANSISTOR		2SC3398-TB				STCAZ00011						
TR35		TRANSISTOR		2SC3398-TB				STCAZ00011						
TR36		TRANSISTOR		2SC3398-TB				STCAZ00011						
TR37		TRANSISTOR		2SC3398-TB				STCAZ00011						
TR38		TRANSISTOR		2SA1162-Y TE85L				STAAG00182						
TR39		TRANSISTOR		2SC3398-TB				STCAZ00011						
TR40		TRANSISTOR		2SC2712Y TE85L				STAAG00186						
TR41		TRANSISTOR		2SC2712Y TE85L				STAAG00186						
X1		FILTER		CSB3600				5MRAA00198						

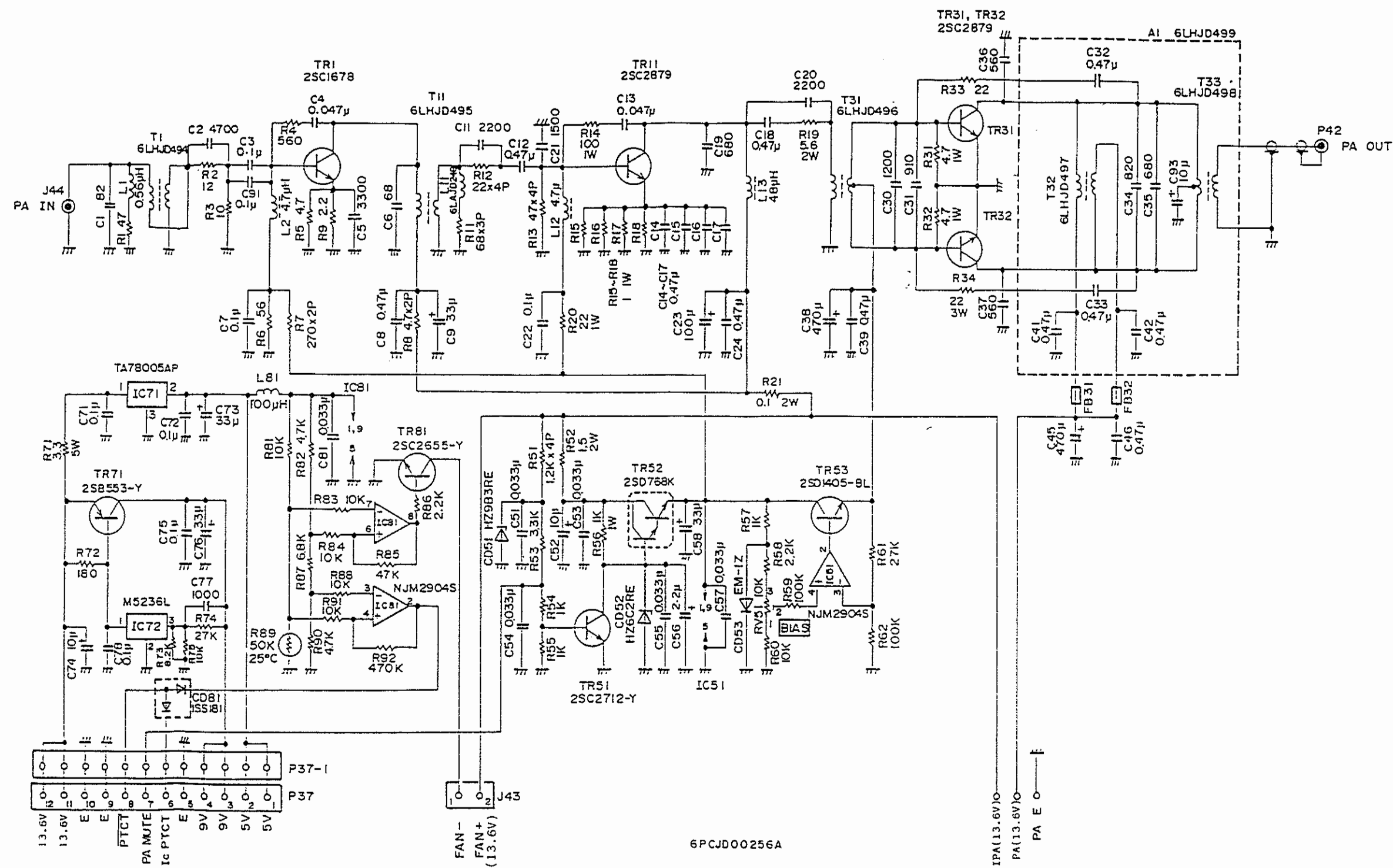


Figure 6-12 PA Unit (CAH-301L-2) Schematic Diagram

PARTS LIST

12V PA		TITLE		CAN-301L-2		SHEET NO. 1	
PARTS NO	PARTS NAME	TYPE	DESCRIPTION	CODE			
A1	RF XFMR	M-6LHJ000499		6LHJ000499			
C1	CAP,FXD	CER	C3216CH1H820J-E-1P 82P	SCAAD00930			
C2	CAP,FXD	CER	C3216B1H472K-E-1P 4700PF	SCAAD00783			
C3	CAP,FXD	CER	C3216X7R1E104K-E-1P 0.1U	SCAAD01237			
C4	CAP,FXD	CER	C3216X7R1H473K-E-1P 0.047UF 50V	SCAAD01082			
C5	CAP,FXD	CER	C3216B1H332K-E-1P 3300PF	SCAAD01020			
C6	CAP,FXD	CER	C3216CH1H680J-E-1P 68PF	SCAAD00929			
C7	CAP,FXD	CER	C3216X7R1E104K-E-1P 0.1U	SCAAD01237			
C8	CAP,FXD	CER	C5650X7R1H474K	SCAAD00588			
C9	CAP,FXD	ELCTL	ECEA1HU330B 50V 33U	SCEAA02305			
C11	CAP,FXD	MICA	DM19C222J5 500WV 2200PF	SCMAB00149			
C12	CAP,FXD	CER	C5650X7R1H474K	SCAAD00588			
C13	CAP,FXD	CER	C3216X7R1H473K-E-1P 0.047UF 50V	SCAAD01082			
C14	CAP,FXD	CER	C5650X7R1H474K	SCAAD00588			
C15	CAP,FXD	CER	C5650X7R1H474K	SCAAD00588			
C16	CAP,FXD	CER	C5650X7R1H474K	SCAAD00588			
C17	CAP,FXD	CER	C5650X7R1H474K	SCAAD00588			
C18	CAP,FXD	CER	C5650X7R1H474K	SCAAD00588			
C19	CAP,FXD	MICA	DM15C681J1 100WV 680PF	SCMAB00039			
C20	CAP,FXD	MICA	DM19C222J5 500WV 2200PF	SCMAB00149			
C21	CAP,FXD	CER	C3216SL1H152J-E-1P 1500PF	SCAAD00791			
C22	CAP,FXD	CER	C3216X7R1E104K-E-1P 0.1U	SCAAD01237			
C23	CAP,FXD	ELCTL	ECEA1HU101B 50V 100U	SCEAA02306			
C24	CAP,FXD	CER	C5650X7R1H474K	SCAAD00588			
C30	CAP,FXD	MICA	DM19C122J5 500WV 1200PF	SCMAB00146			
C31	CAP,FXD	MICA	DM19C911J5 500WV 910PF	SCMAB00277			
C32	CAP,FXD	CER	C5650X7R1H474K	SCAAD00588			
C33	CAP,FXD	CER	C5650X7R1H474K	SCAAD00588			
C34	CAP,FXD	MICA	DM19C821J5 500WV 820PF	SCMAB00144			
C35	CAP,FXD	MICA	DM19C681J5 500WV 680PF	SCMAB00143			
C36	CAP,FXD	MICA	DM19C561J5 500WV 560PF	SCMAB00142			
C37	CAP,FXD	MICA	DM19C561J5 500WV 560PF	SCMAB00142			
C38	CAP,FXD	ELCTL	ECE-A1CU471B 470UF	SCEAA01829			
C39	CAP,FXD	CER	C5650X7R1H474K	SCAAD00588			
C41	CAP,FXD	CER	C5650X7R1H474K	SCAAD00588			

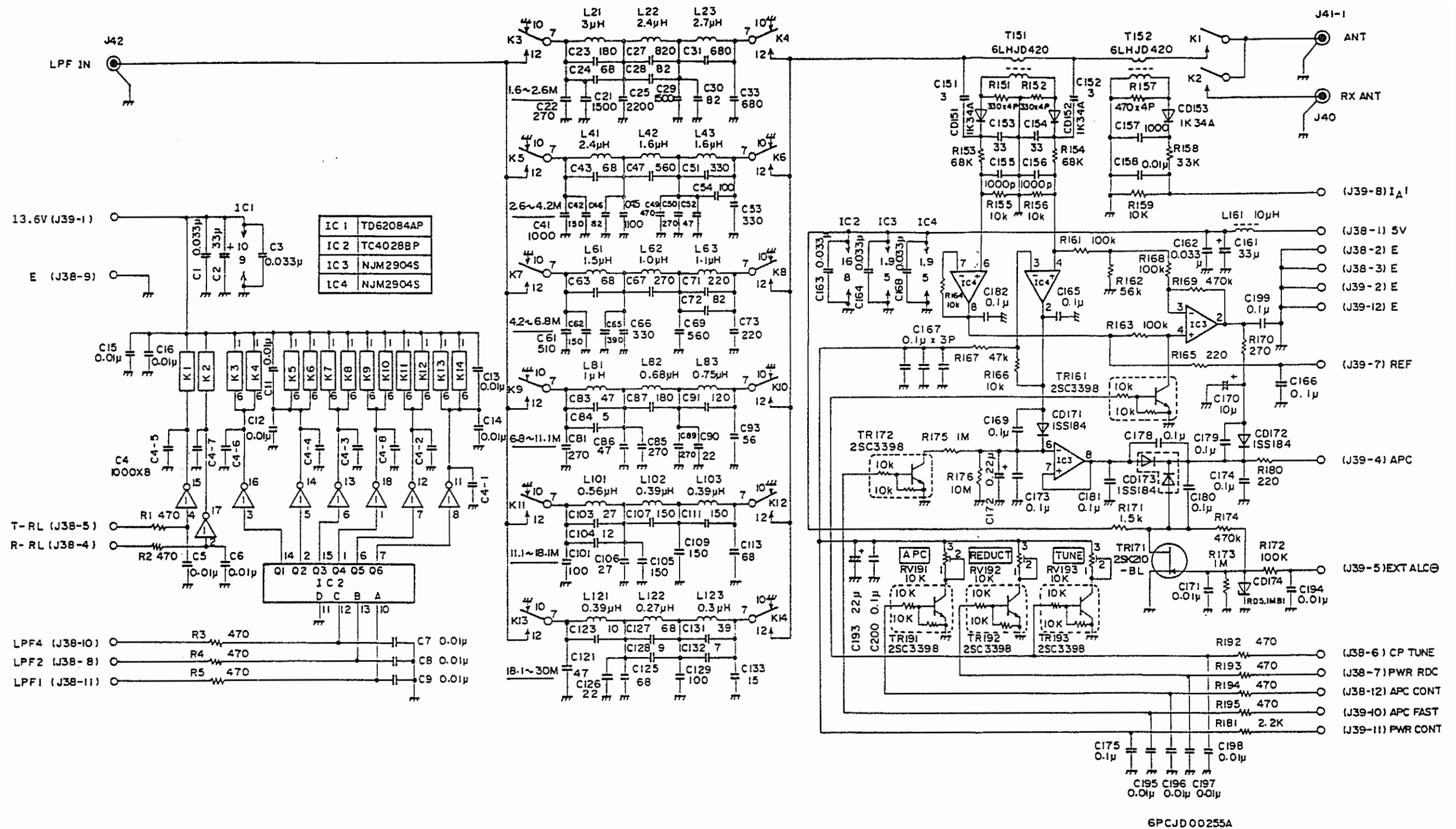
PARTS LIST

12V PA		TITLE		CAH-301L-2		SHEET NO	
PARTS NO	PARTS NAME	TYPE	DESCRIPTION	CODE			2
C42	CAP,FXD CER	C5650X7R1H474K		SCAAD00588			
C45	CAP,FXD ELCTLT	ECE-A1HU471B	470UF 50V	SCEAA01835			
C46	CAP,FXD CER	C5650X7R1H474K		SCAAD00588			
C51	CAP,FXD CER	C3216X7R1H333K-E-1P	50V 0.033U	SCAAD01357			
C52	CAP,FXD ELCTLT	ECE-A1HU100B	50V 10UF	SCEAA02184			
C53	CAP,FXD CER	C3216X7R1H333K-E-1P	50V 0.033U	SCAAD01357			
C54	CAP,FXD CER	C3216X7R1H333K-E-1P	50V 0.033U	SCAAD01357			
C55	CAP,FXD CER	C3216X7R1H333K-E-1P	50V 0.033U	SCAAD01357			
C56	CAP,FXD TANTAL	202L2502 225KB	2.2UF 25V	SCSAC01129			
C57	CAP,FXD CER	C3216X7R1H333K-E-1P	50V 0.033U	SCAAD01357			
C58	CAP,FXD ELCTLT	ECE-A1EU330B		SCEAA01822			
C71	CAP,FXD CER	C3216X7R1E104K-E-TP	0.1U	SCAAD01237			
C72	CAP,FXD CER	C3216X7R1E104K-E-TP	0.1U	SCAAD01237			
C73	CAP,FXD ELCTLT	ECE-A1EU330B		SCEAA01822			
C74	CAP,FXD ELCTLT	ECE-A1EU100B		SCEAA01864			
C75	CAP,FXD CER	C3216X7R1E104K-E-TP	0.1U	SCAAD01237			
C76	CAP,FXD ELCTLT	ECE-A1EU330B		SCEAA01822			
C77	CAP,FXD CER	C3216SL1H102J-E-TP	1000PF	SCAAD00782			
C78	CAP,FXD CER	C3216X7R1E104K-E-TP	0.1U	SCAAD01237			
C81	CAP,FXD CER	C3216X7R1H333K-E-TP	50V 0.033U	SCAAD01357			
C91	CAP,FXD CER	C3216X7R1E104K-E-TP	0.1U	SCAAD01237			
C93	CAP,FXD ELCTLT	ECE-A1HU100B	50V 10UF	SCEAA02184			
C951	DIODE	HZ9B3RE		STXAE00629			
C952	DIODE	HZ6C2RE		STXAE00630			
C953	DIODE	EM1Z	200V 1A	STXAN00061			
C981	DIODE	1SS181 TE85L		STXAD00356			
F931	CORE	FB-801		5MBAD00005			
F932	CORE	FB-801		5MBAD00005			
IC51	IC	NJM2904S		5DAAN00239			
IC71	IC	TA78005AP		5DAAD00082			
IC712	SILICON SHEET	TC-30A (TO-220)		5ZZK900002			
IC72	IC	M5236L		5DDAB00170			
IC81	IC	NJM2904S		5DAAN00239			
J43	CONNECTOR	IL-S-2P-S212-EF		5JWAD00121			
J44	CONNECTOR	IMP-J01X-V2		5JDXA00009			

PARTS LIST					PARTS LIST				
12V PA					12V PA				
PARTS NO	PARTS NAME	TYPE	DESCRIPTION	CODE	PARTS NO	PARTS NAME	TYPE	DESCRIPTION	CODE
L1					R18				
L1	COIL	LAL03KRR56M	0.56UF	5LCAA00443	R18	RESISTOR	FXD	ERX-1ANJ1R0	1 OHM 1W SREAG00030
L2	COIL	LAL03KRR4R7K	4.7UF	5LCAA00444	R19	RESISTOR	FXD	ERX-2ANJ5R6	5.6 OHM 2W SREAG00033
L11	COIL	H-6LAJ000249		6LAJ000249	R20	RESISTOR	FXD	ERG-1ANJ220	1W 22 OHM SREAG00028
L12	COIL	LAL04KB4R7K		5LCAA00317	R21	RESISTOR	FXD	2SG0.1 OHM K	SRHAA02566
L13	COIL	SK-5M-4	48UM	5LWAJ00001	R3	RESISTOR	FXD	ERX-1ANJ4R7	1W 4.7 OHM SREAG00412
L81	COIL	LAL03KH101K	100UM	5LCAA00331	R32	RESISTOR	FXD	ERX-1ANJ4R7	1W 4.7 OHM SREAG00412
P17	CONNECTOR	H-6ZCJ043030		6ZCJ043030	R33	RESISTOR	FXD	ERG-3ANJ220	SREAG01462
P42	CABLE	H-6ZCJ037015	1.50	6ZCJ037015	R34	RESISTOR	FXD	ERG-3ANJ220	SREAG01462
P41	PCB	H-6PCJ000256A		6PCJ000256	R51-1	RESISTOR	FXD	ERJ-8GEYJ122V	1/8W 1.2K OHM SREAG01739
P5	RESISTOR	ERJ-8GEYJ470V	1/8W 4.7 OHM	SREAG01722	R51-2	RESISTOR	FXD	ERJ-8GEYJ122V	1/8W 1.2K OHM SREAG01739
P2	RESISTOR	ERJ-8GEYJ120V	1/8W 12 OHM	SREAG01715	R51-3	RESISTOR	FXD	ERJ-8GEYJ122V	1/8W 1.2K OHM SREAG01739
R3	RESISTOR	ERJ-8GEYJ100V	1/8W 10 OHM	SREAG01714	R51-4	RESISTOR	FXD	ERJ-8GEYJ122V	1/8W 1.2K OHM SREAG01739
R4	RESISTOR	ERJ-8GEYJ361V	1/8W 560 OHM	SREAG01735	R52	RESISTOR	FXD	ERX-2ANJ1R5	2W 1.5 OHM SREAG00388
R5	RESISTOR	ERJ-8GEYK4R7V	1/8W 4.7 OHM	SREAG02256	R53	RESISTOR	FXD	ERJ-8GEYJ332V	1/8W 3.3K OHM SREAG01744
R6	RESISTOR	ERJ-8GEYJ560V	1/8W 56 OHM	SREAG01723	R54	RESISTOR	FXD	ERJ-8GEYJ102V	1/8W 1K OHM SREAG01738
P7-1	RESISTOR	ERJ-8GEYJ271V	1/8W 270 OHM	SREAG01731	R55	RESISTOR	FXD	ERJ-8GEYJ102V	1/8W 1K OHM SREAG01738
P7-2	RESISTOR	ERJ-8GEYJ271V	1/8W 270 OHM	SREAG01731	R56	RESISTOR	FXD	ERG-1ANJ102	1W 1K OHM SREAG00100
P8-1	RESISTOR	ERJ-8GEYK4R7V	1/8W 4.7 OHM	SREAG02256	P57	RESISTOR	FXD	ERJ-8GEYJ102V	1/8W 1K OHM SREAG01738
P8-2	RESISTOR	ERJ-8GEYK4R7V	1/8W 4.7 OHM	SREAG02256	R58	RESISTOR	FXD	ERJ-8GEYJ222V	1/8W 2.2K OHM SREAG01742
P9	RESISTOR	ERJ-8GEYK2R2V		SREAG02210	R59	RESISTOR	FXD	ERJ-8GEYJ104V	1/8W 100K OHM SREAG01762
R11-1	RESISTOR	ERJ-8GEYJ680V	1/8W 68 OHM	SREAG01724	R60	RESISTOR	FXD	ERJ-8GEYJ103V	1/8W 10K OHM SREAG01750
R11-2	RESISTOR	ERJ-8GEYJ680V	1/8W 68 OHM	SREAG01724	R61	RESISTOR	FXD	ERJ-8GEYJ273V	SREAG01755
R11-3	RESISTOR	ERJ-8GEYJ680V	1/8W 68 OHM	SREAG01724	R62	RESISTOR	FXD	ERJ-8GEYJ104V	SREAG01762
P12-1	RESISTOR	ERJ-8GEYJ220V		SREAG01718	P71	RESISTOR	FXD	5SG3.3 OHM K	SRHAA02611
P12-2	RESISTOR	ERJ-8GEYJ220V		SREAG01718	R72	RESISTOR	FXD	ERJ-8GEYJ181V	1/8W 180 OHM SREAG01729
R12-3	RESISTOR	ERJ-8GEYJ220V		SREAG01718	R73	RESISTOR	FXD	ERJ-8GEYJ822V	SREAG01749
P12-4	RESISTOR	ERJ-8GEYJ220V		SREAG01718	R74	RESISTOR	FXD	ERJ-8GEYJ273V	SREAG01755
P13-1	RESISTOR	ERJ-8GEYJ470V	1/8W 47 OHM	SREAG01722	R75	RESISTOR	FXD	ERJ-8GEYJ103V	SREAG01750
R13-2	RESISTOR	ERJ-8GEYJ470V	1/8W 47 OHM	SREAG01722	R81	RESISTOR	FXD	ERJ-8GEYJ103V	SREAG01750
P13-3	RESISTOR	ERJ-8GEYJ470V	1/8W 47 OHM	SREAG01722	R82	RESISTOR	FXD	ERJ-8GEYJ472V	SREAG01746
R13-4	RESISTOR	ERJ-8GEYJ470V	1/8W 47 OHM	SREAG01722	R83	RESISTOR	FXD	ERJ-8GEYJ103V	1/8W 10K OHM SREAG01750
P14	RESISTOR	ERG-1ANJ101	1W 100 OHM	SREAG00011	R84	RESISTOR	FXD	ERJ-8GEYJ103V	1/8W 10K OHM SREAG01750
R15	RESISTOR	ERX-1ANJ1R0	1 OHM 1W	SREAG00030	R85	RESISTOR	FXD	ERJ-8GEYJ473V	SREAG01758
P16	RESISTOR	ERX-1ANJ1R0	1 OHM 1W	SREAG00030	R86	RESISTOR	FXD	ERJ-8GEYJ222V	SREAG01742
P17	RESISTOR	ERX-1ANJ1R0	1 OHM 1W	SREAG00030	R87	RESISTOR	FXD	ERJ-8GEYJ682V	SREAG01748

PARTS LIST

PARTS NO		PARTS NAME		TYPE	DESCRIPTION	CODE
12V PA		TITLE: CAR-301L-2		SHEET NO 5		
R88	RESISTOR	FXD	ERJ-8GEYJ103V		1/8W 10K OHM	SREAG01750
R89	THERMISTOR		150-303-00(S)		50K OHM	SRXAB00091
R90	RESISTOR	FXD	ERJ-8GEYJ472V			SREAG01746
R91	RESISTOR	FXD	ERJ-8GEYJ103V		1/8W 10K OHM	SREAG01750
R92	RESISTOR	FXD	ERJ-8GEYJ474V			SREAG01770
RV51	RESISTOR	VAR	EVN-D1AAD0B14		10K OHM	SRVAB00324
T1	RF XFMR		H-6LHJD00494			6LHJD00494
T11	RF XFMR		H-6LHJD00495			6LHJD00495
T31	RF XFMR		H-6LHJD00496			6LHJD00496
T32	RF XFMR		H-6LHJD00497			6LHJD00497
T33	RF XFMR		H-6LHJD00498			6LHJD00498
TR1	TRANSISTOR		2SC1678			STCAF00173
TR12-1	SILICON SHEET		TC-30A (10-220)			SZK800002
TR12-2	BUSHING		YC-40B			SZDY00005
TR12-3	ACCESSORY		RH-14			SZKAH00006
TR11	TRANSISTOR		2SC2879			STCAF00359
TR31	TRANSISTOR		2SC2879			STCAF00359
TR32	TRANSISTOR		2SC2879			STCAF00359
TR51	TRANSISTOR		2SC2712Y 1E85L			STAAG00186
TR52	TRANSISTOR		2SD768K			STDAA00034
TR522-1	SILICON SHEET		TC-30A (10-220)			SZK800002
TR522-2	BUSHING		YC-40B			SZDY00005
TR53	TRANSISTOR		2SD1405-BL			STDAC00145
TR532	SILICON SHEET		TC-30A (10-220)			SZK800002
TR71	TRANSISTOR		2SB553-Y			STBAE00036
TR712-1	SILICON SHEET		TC-30A (10-220)			SZK800002
TR712-2	BUSHING		YC-40B			SZDY00005
TR81	TRANSISTOR		2SC2655-Y			STCAF00246



NOTE:

- Unless otherwise specified;
- Resistance values are in ohm, 1/8W.
- Capacitance values are in pF.

Figure 6-14 LPF Unit (CFJ-122-2) Schematic Diagram

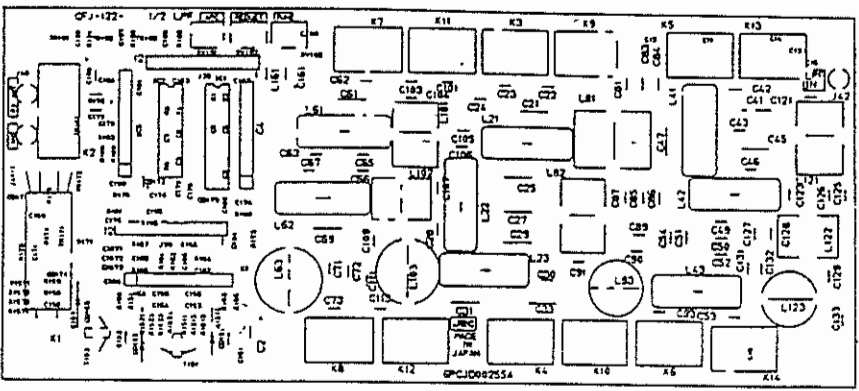


Figure 6-15 LPF Unit (CFJ-122-2) Component Layout

PARTS LIST

PARTS NO.		PARTS NAME	TYPE	DESCRIPTION	CODE
U1		LPF	CFJ-122		CFJ-122

PARTS LIST

PARTS NO.		PARTS NAME	TYPE	DESCRIPTION	CODE
C1		CAP,FXD	CER	C3216X7R1H333K-E-TP	50V 0.033U
C2		CAP,FXD	ELCTL7	ECE-A1EU3308	
C3		CAP,FXD	CER	C3216X7R1H333K-E-TP	50V 0.033U
C4		CAP,FXD	CER	EXF-P8102ZW	1000PFx8
C5		CAP,FXD	CER	C3216J81H103K-E-TP	0.01UF
C6		CAP,FXD	CER	C3216J81H103K-E-TP	0.01UF
C7		CAP,FXD	CER	C3216J81H103K-E-TP	0.01UF
C8		CAP,FXD	CER	C3216J81H103K-E-TP	0.01UF
C9		CAP,FXD	CER	C3216J81H103K-E-TP	0.01UF
C11		CAP,FXD	CER	C3216J81H103K-E-TP	0.01UF
C12		CAP,FXD	CER	C3216J81H103K-E-TP	0.01UF
C13		CAP,FXD	CER	C3216J81H103K-E-TP	0.01UF
C14		CAP,FXD	CER	C3216J81H103K-E-TP	0.01UF
C15		CAP,FXD	CER	C3216J81H103K-E-TP	0.01UF
C16		CAP,FXD	CER	C3216J81H103K-E-TP	0.01UF
C21		CAP,FXD	MICA	DM19C152J5	500WV 1500PF
C22		CAP,FXD	CER	CC45SL2H271JYP-FP	
C23		CAP,FXD	CER	CC45SL2H181JYP-FP	
C24		CAP,FXD	CER	CC45SL2H680JYP-FP	
C25		CAP,FXD	MICA	DM19C222J5	500WV 2200PF
C27		CAP,FXD	MICA	DM19C821J5	500WV 820PF
C28		CAP,FXD	CER	CC45SL2H820JYP-FP	
C29		CAP,FXD	MICA	DM19C152J5	500WV 1500PF
C30		CAP,FXD	CER	CC45SL2H820JYP-FP	
C31		CAP,FXD	MICA	DM19C681J5	500WV 680PF
C33		CAP,FXD	MICA	DM19C681J5	500WV 680PF
C41		CAP,FXD	MICA	DM19C102J5	500WV 1000PF
C42		CAP,FXD	CER	CC45SL2H151JYP-FP	
C43		CAP,FXD	CER	CC45SL2H680JYP-FP	
C45		CAP,FXD	MICA	DM19C112J5	500WV 1100PF
C46		CAP,FXD	CER	CC45SL2H820JYP-FP	
C47		CAP,FXD	MICA	DM19C561J5	500WV 560PF
C49		CAP,FXD	CER	CC45SL2H471JYP-FP	
C50		CAP,FXD	CER	CC45SL2H271JYP-FP	
C51		CAP,FXD	CER	CC45SL2H331JYP-FP	

PARTS LIST

PARTS LIST		TITLE		SHEET NO	
LPE		CFJ-122		4	
PARTS NO	PARTS NAME	TYPE	DESCRIPTION	CODE	
C194	CAP,FXD	CER	C3216JB1H103K-E-TP	0.01UF	5CAA000789
C195	CAP,FXD	CER	C3216JB1H103K-E-TP	0.01UF	5CAA000789
C196	CAP,FXD	CER	C3216JB1H103K-E-TP	0.01UF	5CAA000789
C197	CAP,FXD	CER	C3216JB1H103K-E-TP	0.01UF	5CAA000789
C198	CAP,FXD	CER	C3216JB1H103K-E-TP	0.01UF	5CAA000789
C199	CAP,FXD	CER	C3216X7R1E104K-E-TP	0.1U	5CAAD01237
C200	CAP,FXD	CER	C3216X7R1E104K-E-TP	0.1U	5CAAD01237
C1671	CAP,FXD	CER	C3216X7R1E104K-E-TP	0.1U	5CAAD01237
C1672	CAP,FXD	CER	C3216X7R1E104K-E-TP	0.1U	5CAAD01237
C1673	CAP,FXD	CER	C3216X7R1E104K-E-TP	0.1U	5CAAD01237
C0151	DIODE	1K34A	1K34A	1K34A	5TXCH00001
C0152	DIODE	1K34A	1K34A	1K34A	5TXCH00001
C0153	DIODE	1K34A	1K34A	1K34A	5TXCH00001
C0171	DIODE	1SS184	1SS184	1SS184	5TXAD00290
C0172	DIODE	1SS184	1SS184	1SS184	5TXAD00290
C0173	DIODE	1SS184	1SS184	1SS184	5TXAD00290
C0174	DIODE	R05.1MB1-T1	R05.1MB1-T1	R05.1MB1-T1	5TXAD00515
IC1	IC	T062084P	T062084P	T062084P	5DDAE00546
IC2	IC	TC40288P	TC40288P	TC40288P	5DDAE00069
IC3	IC	NJM2904S	NJM2904S	NJM2904S	5DAAN00239
IC4	IC	NJM2904S	NJM2904S	NJM2904S	5DAAN00239
J38	CONNECTOR	IL-S-12P-S2T2-EF	IL-S-12P-S2T2-EF	IL-S-12P-S2T2-EF	5JWAD00156
J39	CONNECTOR	IL-S-12P-S2T2-EF	IL-S-12P-S2T2-EF	IL-S-12P-S2T2-EF	5JWAD00156
J40	CONNECTOR	IMP-J01X-V2	IMP-J01X-V2	IMP-J01X-V2	5JDAK00009
J41-1	CONNECTOR	IMP-J01X-V2	IMP-J01X-V2	IMP-J01X-V2	5JDAK00009
J42	CONNECTOR	IMP-J01X-V2	IMP-J01X-V2	IMP-J01X-V2	5JDAK00009
K1	RELAY	UAM-22912	UAM-22912	UAM-22912	5KRAL00057
K2	RELAY	TC-112M	TC-112M	TC-112M	5KRAK00027
K3	RELAY	G6E-184P DC12V	G6E-184P DC12V	G6E-184P DC12V	5KLBH00005
K4	RELAY	G6E-184P DC12V	G6E-184P DC12V	G6E-184P DC12V	5KLBH00005
K5	RELAY	G6E-184P DC12V	G6E-184P DC12V	G6E-184P DC12V	5KLBH00005
K6	RELAY	G6E-184P DC12V	G6E-184P DC12V	G6E-184P DC12V	5KLBH00005
K7	RELAY	G6E-184P DC12V	G6E-184P DC12V	G6E-184P DC12V	5KLBH00005
K8	RELAY	G6E-184P DC12V	G6E-184P DC12V	G6E-184P DC12V	5KLBH00005
K9	RELAY	G6E-184P DC12V	G6E-184P DC12V	G6E-184P DC12V	5KLBH00005

PARTS LIST

PARTS LIST		TITLE		SHEET NO	
LPE		CFJ-122		5	
PARTS NO	PARTS NAME	TYPE	DESCRIPTION	CODE	
K10	RELAY	G6E-184P DC12V	G6E-184P DC12V	G6E-184P DC12V	5KLBH00005
K11	RELAY	G6E-184P DC12V	G6E-184P DC12V	G6E-184P DC12V	5KLBH00005
K12	RELAY	G6E-184P DC12V	G6E-184P DC12V	G6E-184P DC12V	5KLBH00005
K13	RELAY	G6E-184P DC12V	G6E-184P DC12V	G6E-184P DC12V	5KLBH00005
K14	RELAY	G6E-184P DC12V	G6E-184P DC12V	G6E-184P DC12V	5KLBH00005
L21	COIL	H-6LFJD30300	H-6LFJD30300	H-6LFJD30300	6LFJD30300
L22	COIL	H-6LFJD30240	H-6LFJD30240	H-6LFJD30240	6LFJD30240
L23	COIL	H-6LFJD30270	H-6LFJD30270	H-6LFJD30270	6LFJD30270
L41	COIL	H-6LFJD30240	H-6LFJD30240	H-6LFJD30240	6LFJD30240
L42	COIL	H-6LFJD30160	H-6LFJD30160	H-6LFJD30160	6LFJD30160
L43	COIL	H-6LFJD30160	H-6LFJD30160	H-6LFJD30160	6LFJD30160
L61	COIL	H-6LFJD30150	H-6LFJD30150	H-6LFJD30150	6LFJD30150
L62	COIL	H-6LFJD30100	H-6LFJD30100	H-6LFJD30100	6LFJD30100
L63	COIL	H-6LFJD82110	H-6LFJD82110	H-6LFJD82110	6LFJD82110
L81	COIL	H-6LFJD81100	H-6LFJD81100	H-6LFJD81100	6LFJD81100
L82	COIL	H-6LFJD81068	H-6LFJD81068	H-6LFJD81068	6LFJD81068
L83	COIL	H-6LFJD82075	H-6LFJD82075	H-6LFJD82075	6LFJD82075
L101	COIL	H-6LFJD81056	H-6LFJD81056	H-6LFJD81056	6LFJD81056
L102	COIL	H-6LFJD81039	H-6LFJD81039	H-6LFJD81039	6LFJD81039
L103	COIL	H-6LFJD82039	H-6LFJD82039	H-6LFJD82039	6LFJD82039
L121	COIL	H-6LFJD60039	H-6LFJD60039	H-6LFJD60039	6LFJD60039
L122	COIL	H-6LFJD60027	H-6LFJD60027	H-6LFJD60027	6LFJD60027
L123	COIL	H-6LFJD70030	H-6LFJD70030	H-6LFJD70030	6LFJD70030
L161	COIL	LAL03VB100K	LAL03VB100K	LAL03VB100K	5LCAAD00273
PC1	PCB	H-6PCJD00255A	H-6PCJD00255A	H-6PCJD00255A	6PCJD000255
R1	RESISTOR	FXD	ERJ-8GEYJ471V	ERJ-8GEYJ471V	5REAG01734
R2	RESISTOR	FXD	ERJ-8GEYJ471V	ERJ-8GEYJ471V	5REAG01734
R3	RESISTOR	FXD	ERJ-8GEYJ471V	ERJ-8GEYJ471V	5REAG01734
R4	RESISTOR	FXD	ERJ-8GEYJ471V	ERJ-8GEYJ471V	5REAG01734
R5	RESISTOR	FXD	ERJ-8GEYJ471V	ERJ-8GEYJ471V	5REAG01734
R153	RESISTOR	FXD	ERJ-8GEYJ683V	ERJ-8GEYJ683V	5REAG01760
R154	RESISTOR	FXD	ERJ-8GEYJ683V	ERJ-8GEYJ683V	5REAG01760
R155	RESISTOR	FXD	ERJ-8GEYJ103V	ERJ-8GEYJ103V	5REAG01750
R156	RESISTOR	FXD	ERJ-8GEYJ103V	ERJ-8GEYJ103V	5REAG01750
R158	RESISTOR	FXD	ERJ-8GEYJ333V	ERJ-8GEYJ333V	5REAG01755

PARTS LIST

LPF		TITLE CFJ-122		SHEET NO 6	
PARTS NO	PARTS NAME	TYPE	DESCRIPTION	CODE	
R159	RESISTOR FXD	ERJ-8GEYJ103V	1/8W 10K OHM	SREAG01750	
R161	RESISTOR FXD	ERJ-8GEYJ104V	1/8W 100K OHM	SREAG01762	
R162	RESISTOR FXD	ERJ-8GEYJ563V		SREAG01759	
R163	RESISTOR FXD	ERJ-8GEYJ104V	1/8W 100K OHM	SREAG01762	
R164	RESISTOR FXD	ERJ-8GEYJ103V	1/8W 10K OHM	SREAG01750	
R165	RESISTOR FXD	ERJ-8GEYJ221V	1/8W 220 OHM	SREAG01730	
R166	RESISTOR FXD	ERJ-8GEYJ473V		SREAG01758	
R167	RESISTOR FXD	ERJ-8GEYJ682V		SREAG01748	
R168	RESISTOR FXD	ERJ-8GEYJ104V	1/8W 100K OHM	SREAG01762	
R169	RESISTOR FXD	ERJ-8GEYJ474V		SREAG01770	
R170	RESISTOR FXD	ERJ-8GEYJ271V	1/8W 270 OHM	SREAG01731	
R171	RESISTOR FXD	ERJ-8GEYJ152V	1/8W 1.5K OHM	SREAG01740	
R172	RESISTOR FXD	ERJ-8GEYJ104V	1/8W 100K OHM	SREAG01762	
R173	RESISTOR FXD	ERJ-8GEYJ105V	1/8W 1M OHM	SREAG01774	
R174	RESISTOR FXD	ERJ-8GEYJ474V		SREAG01770	
R175	RESISTOR FXD	ERJ-8GEYJ105V	1/8W 1M OHM	SREAG01774	
R176	RESISTOR FXD	HMGL1/4A-10M OHM J		SREAA05607	
R180	RESISTOR FXD	ERJ-8GEYJ221V	1/8W 220 OHM	SREAG01730	
R181	RESISTOR FXD	ERJ-8GEYJ222V	1/8W 2.2K OHM	SREAG01742	
R192	RESISTOR FXD	ERJ-8GEYJ471V	1/8W 470 OHM	SREAG01734	
R193	RESISTOR FXD	ERJ-8GEYJ471V	1/8W 470 OHM	SREAG01734	
R194	RESISTOR FXD	ERJ-8GEYJ471V	1/8W 470 OHM	SREAG01734	
R195	RESISTOR FXD	ERJ-8GEYJ471V	1/8W 470 OHM	SREAG01734	
R1511	RESISTOR FXD	ERJ-8GEYJ331V	1/8W,330 OHM	SREAG01732	
R1512	RESISTOR FXD	ERJ-8GEYJ331V	1/8W,330 OHM	SREAG01732	
R1513	RESISTOR FXD	ERJ-8GEYJ331V	1/8W,330 OHM	SREAG01732	
R1514	RESISTOR FXD	ERJ-8GEYJ331V	1/8W,330 OHM	SREAG01732	
R1521	RESISTOR FXD	ERJ-8GEYJ331V	1/8W,330 OHM	SREAG01732	
R1522	RESISTOR FXD	ERJ-8GEYJ331V	1/8W,330 OHM	SREAG01732	
R1523	RESISTOR FXD	ERJ-8GEYJ331V	1/8W,330 OHM	SREAG01732	
R1524	RESISTOR FXD	ERJ-8GEYJ331V	1/8W,330 OHM	SREAG01732	
R1571	RESISTOR FXD	ERJ-8GEYJ471V	1/8W 470 OHM	SREAG01734	
R1572	RESISTOR FXD	ERJ-8GEYJ471V	1/8W 470 OHM	SREAG01734	
R1573	RESISTOR FXD	ERJ-8GEYJ471V	1/8W 470 OHM	SREAG01734	
R1574	RESISTOR FXD	ERJ-8GEYJ471V	1/8W 470 OHM	SREAG01734	

PARTS LIST

LPF		TITLE CFJ-122		SHEET NO 7	
PARTS NO	PARTS NAME	TYPE	DESCRIPTION	CODE	
RV191	RESISTOR VAR	EVN-D1AA00B14	10K OHM	SRVAB00324	
RV192	RESISTOR VAR	EVN-D1AA00B14	10K OHM	SRVAB00324	
RV193	RESISTOR VAR	EVN-D1AA00B14	10K OHM	SRVAB00324	
T151	RF XFMR	H-6LHJD00420		6LHJD00420	
T152	RF XFMR	H-6LHJD00420		6LHJD00420	
TR161	TRANSISTOR	2SC3398-TB		5TCAZ00011	
TR171	TRANSISTOR	2SK210BL-TE85L		5TKAA00189	
TR172	TRANSISTOR	2SC3398-TB		5TCAZ00011	
TR191	TRANSISTOR	2SC3398-TB		5TCAZ00011	
TR192	TRANSISTOR	2SC3398-TB		5TCAZ00011	
TR193	TRANSISTOR	2SC3398-TB		5TCAZ00011	

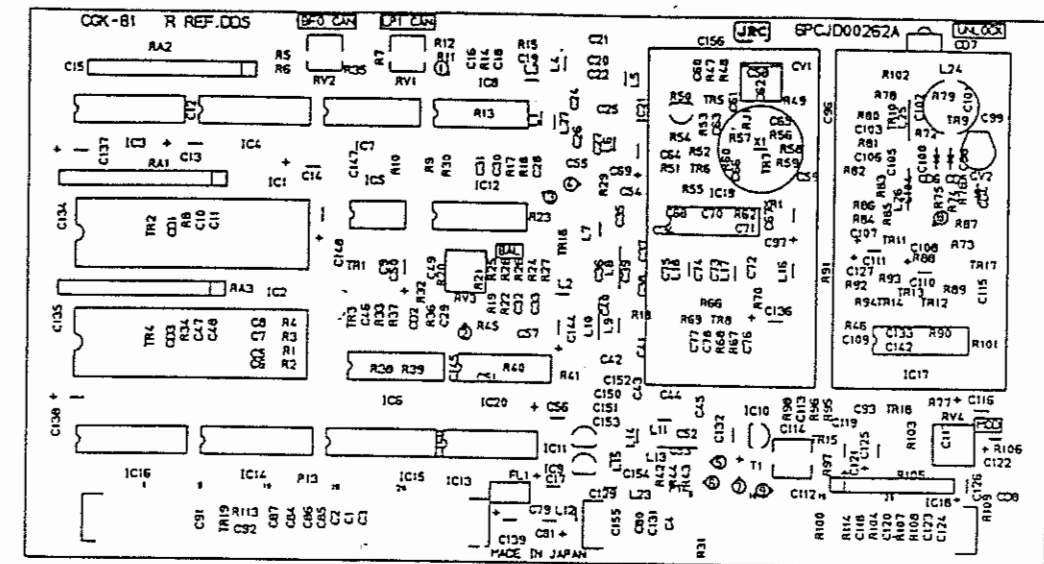


Figure 6-17 REF/DDS Unit (CGK-8IR) Component Layout

PARTS LIST

PARTS NO	REF DGS	PARTS NAME	TYPE	DESCRIPTION	CODE	SHEET NO
U1	REF DGS UNIT	CGK-81			CGK-81	1
X1	CRYSTAL	H-6XHXJ000195	20MHZ		6XHXJ000195	
XR1	XTAL OVEN	H-6ZKJ000020	70°		6ZKJ000020	

PARTS LIST

PARTS NO	REF DGS	PARTS NAME	TYPE	DESCRIPTION	CODE	SHEET NO
C1	CAP,FXD	CER	C3216SL1H102J-E-TP	1000PF	SCAAD00782	1
C2	CAP,FXD	CER	C3216SL1H102J-E-TP	1000PF	SCAAD00782	
C3	CAP,FXD	CER	C3216SL1H102J-E-TP	1000PF	SCAAD00782	
C4	CAP,FXD	CER	C3216SL1H102J-E-TP	1000PF	SCAAD00782	
C5	CAP,FXD	CER	C3216SL1H102J-E-TP	1000PF	SCAAD00782	
C6	CAP,FXD	CER	C3216SL1H102J-E-TP	1000PF	SCAAD00782	
C7	CAP,FXD	CER	C3216SL1H102J-E-TP	1000PF	SCAAD00782	
C8	CAP,FXD	CER	C3216SL1H102J-E-TP	1000PF	SCAAD00782	
C9	CAP,FXD	CER	C3216J81E333K-E-TP	1000PF	SCAAD01235	
C10	CAP,FXD	CER	C3216CH1H101J-E-TP	100PF	SCAAD00780	
C11	CAP,FXD	CER	C3216CH1H470J-E-TP	47PF	SCAAD00864	
C12	CAP,FXD	CER	C3216J81H103K-E-TP	0.01UF	SCAAD00789	
C13	CAP,FXD	ELCTLT	ECE-A1EU101B		SCAA01813	
C14	CAP,FXD	ELCTLT	ECE-A1EU101B		SCAA01813	
C15	CAP,FXD	CER	C3216J81H103K-E-TP	0.01UF	SCAAD00789	
C16	CAP,FXD	CER	C3216J81E333K-E-TP		SCAAD01235	
C17	CAP,FXD	ELCTLT	ECE-A1EU100B		SCAA01864	
C18	CAP,FXD	CER	C3216SL1H821J-E-TP		SCAAD01068	
C19	CAP,FXD	CER	C3216CH1H121J-E-TP	120PF	SCAAD00931	
C20	CAP,FXD	CER	C3216SL1H152J-E-TP	1500PF	SCAAD00791	
C21	CAP,FXD	CER	C3216CH1H331J-E-TP	330PF	SCAAD01066	
C22	CAP,FXD	CER	C3216SL1H102J-E-TP	1000PF	SCAAD00782	
C24	CAP,FXD	CER	C3216CH1H471J-E-TP	470PF	SCAAD00797	
C25	CAP,FXD	CER	C3216J81H332K-E-TP		SCAAD01599	
C26	CAP,FXD	CER	C3216CH1H331J-E-TP	330PF	SCAAD01066	
C27	CAP,FXD	CER	C3216SL1H122J-E-TP		SCAAD01069	
C28	CAP,FXD	CER	C3216SL1H102J-E-TP	1000PF	SCAAD00782	
C29	CAP,FXD	CER	C3216J81H103K-E-TP	0.01UF	SCAAD00789	
C30	CAP,FXD	CER	C3216J81E333K-E-TP		SCAAD01235	
C31	CAP,FXD	CER	C3216J81E333K-E-TP		SCAAD01235	
C32	CAP,FXD	CER	C3216J81E333K-E-TP		SCAAD01235	
C33	CAP,FXD	CER	C3216J81E333K-E-TP		SCAAD01235	
C34	CAP,FXD	CER	C3216SL1H152J-E-TP	1500PF	SCAAD00791	
C35	CAP,FXD	CER	C3216CH1H121J-E-TP	120PF	SCAAD00931	
C36	CAP,FXD	CER	C3216SL1H222J-E-TP	220P	SCAAD00792	

PARTS LIST

PARTS NO	PARTS NAME	TYPE	DESCRIPTION	CODE	SHEET NO	
					CGK-81	2
C37	CAP,FXD	CER	C3216SL1H102J-E-T	120PF	SCAAD00788	
C38	CAP,FXD	CER	C3216SL1H222J-E-T	2200P	SCAAD00792	
C39	CAP,FXD	CER	C3216CH1H561J-E-T		SCAAD01067	
C40	CAP,FXD	CER	C3216SL1H152J-E-T	1300PF	SCAAD00791	
C41	CAP,FXD	CER	C3216SL1H102J-E-T	1000PF	SCAAD00782	
C42	CAP,FXD	CER	C3216J81H153K-E-T		SCAAD01600	
C43	CAP,FXD	CER	C3216CH1H681J-E-T	680P	SCAAD00788	
C44	CAP,FXD	CER	C3216J81H682K-E-T		SCAAD01137	
C45	CAP,FXD	CER	C3216CH1H681J-E-T	980P	SCAAD00788	
C46	CAP,FXD	CER	C3216J81E333K-E-T		SCAAD01235	
C47	CAP,FXD	CER	C3216CH1H101J-E-T	100PF	SCAAD00780	
C48	CAP,FXD	CER	C3216CH1H670J-E-T	47PF	SCAAD00864	
C49	CAP,FXD	CER	C3216J81H103K-E-T	0.01UF	SCAAD00789	
C50	CAP,FXD	ELCTL	ECE-A1EU1018		SCAAD01813	
C51	CAP,FXD	CER	C3216J81E333K-E-T		SCAAD01235	
C52	CAP,FXD	CER	C3216J81H682K-E-T		SCAAD01137	
C53	CAP,FXD	CER	C3216SL1H122J-E-T		SCAAD01069	
C54	CAP,FXD	CER	C3216J81H103K-E-T	0.01UF	SCAAD00789	
C55	CAP,FXD	CER	C3216J81H103K-E-T	0.01UF	SCAAD00789	
C56	CAP,FXD	ELCTL	ECE-A1EU1008		SCAAD01864	
C57	CAP,FXD	CER	C3216J81H103K-E-T	0.01UF	SCAAD00789	
C58	CAP,FXD	CER	C3216CH1H070J-E-T	7PF	SCAAD00977	
C59	CAP,FXD	CER	C3216J81H103K-E-T	0.01UF	SCAAD00789	
C60	CAP,FXD	CER	C3216X7R1E104K-E-T	0.1U	SCAAD01237	
C61	CAP,FXD	CER	C3216CH1H221J-E-T	220PF	SCAAD00790	
C62	CAP,FXD	CER	C3216CH1H101J-E-T	100PF	SCAAD00780	
C63	CAP,FXD	CER	C3216CH1H220J-E-T	22P	SCAAD00869	
C64	CAP,FXD	CER	C3216J81H103K-E-T	0.01UF	SCAAD00789	
C65	CAP,FXD	CER	C3216CH1H220J-E-T	22P	SCAAD00869	
C66	CAP,FXD	CER	C3216J81H103K-E-T	0.01UF	SCAAD00789	
C67	CAP,FXD	CER	C3216J81H103K-E-T	0.01UF	SCAAD00789	
C68	CAP,FXD	CER	C3216J81H103K-E-T	0.01UF	SCAAD00789	
C69	CAP,FXD	ELCTL	ECE-A1EU1008		SCAAD01864	
C70	CAP,FXD	CER	C3216J81H103K-E-T	0.01UF	SCAAD00789	
C71	CAP,FXD	CER	C3216SL1H222J-E-T	2200P	SCAAD00792	

PARTS LIST

PARTS NO	PARTS NAME	TYPE	DESCRIPTION	CODE	SHEET NO	
					CGK-81	3
C72	CAP,FXD	CER	C3216CH1H121J-E-T	120PF	SCAAD00931	
C73	CAP,FXD	CER	C3216SL1H222J-E-T	2200P	SCAAD00792	
C74	CAP,FXD	CER	C3216CH1H271J-E-T	50V 270PF	SCAAD00883	
C75	CAP,FXD	CER	C3216SL1H222J-E-T	2200P	SCAAD00792	
C76	CAP,FXD	CER	C3216J81H103K-E-T	0.01UF	SCAAD00789	
C77	CAP,FXD	CER	C3216J81H103K-E-T	0.01UF	SCAAD00789	
C78	CAP,FXD	CER	C3216J81H103K-E-T	0.01UF	SCAAD00789	
C79	CAP,FXD	CER	C3216J81H103K-E-T	0.01UF	SCAAD00789	
C80	CAP,FXD	CER	C3216J81H103K-E-T	0.01UF	SCAAD00789	
C81	CAP,FXD	ELCTL	ECE-A1EU1008		SCAAD01864	
C84	CAP,FXD	CER	C3216SL1H102J-E-T	1000PF	SCAAD00782	
C85	CAP,FXD	CER	C3216SL1H102J-E-T	1000PF	SCAAD00782	
C86	CAP,FXD	CER	C3216SL1H102J-E-T	1000PF	SCAAD00782	
C87	CAP,FXD	CER	C3216SL1H102J-E-T	1000PF	SCAAD00782	
C91	CAP,FXD	CER	C3216SL1H102J-E-T	1000PF	SCAAD00782	
C92	CAP,FXD	CER	C3216SL1H102J-E-T	1000PF	SCAAD00782	
C93	CAP,FXD	CER	C3216SL1H102J-E-T	1000PF	SCAAD00782	
C96	CAP,FXD	CER	C3216SL1H102J-E-T	1000PF	SCAAD00782	
C97	CAP,FXD	ELCTL	ECE-A1EU1018		SCAAD01813	
C98	CAP,FXD	CER	C3216CH1H020C-E-T	2PF	SCAAD00798	
C99	CAP,FXD	CER	C3216CH1H270J-E-T	27P	SCAAD00793	
C100	CAP,FXD	CER	C3216CH1H030C-E-T	3PF	SCAAD00796	
C101	CAP,FXD	CER	C3216SL1H102J-E-T	1000PF	SCAAD00782	
C102	CAP,FXD	CER	C3216SL1H102J-E-T	1000PF	SCAAD00782	
C103	CAP,FXD	CER	C3216SL1H102J-E-T	1000PF	SCAAD00782	
C104	CAP,FXD	CER	C3216SL1H102J-E-T	1000PF	SCAAD00782	
C105	CAP,FXD	CER	C3216SL1H102J-E-T	1000PF	SCAAD00782	
C106	CAP,FXD	CER	C3216SL1H102J-E-T	1000PF	SCAAD00782	
C107	CAP,FXD	CER	C3216SL1H102J-E-T	1000PF	SCAAD00782	
C108	CAP,FXD	CER	C3216SL1H102J-E-T	1000PF	SCAAD00782	
C109	CAP,FXD	CER	C3216J81H103K-E-T	0.01UF	SCAAD00789	
C110	CAP,FXD	TANTAL	202L2502 106KB	25V 100F	SCSAC00950	
C111	CAP,FXD	ELCTL	ECE-A1EU1018		SCAAD01813	
C112	CAP,FXD	CER	C3216SL1H102J-E-T	1000PF	SCAAD00782	
C113	CAP,FXD	CER	C3216SL1H102J-E-T	1000PF	SCAAD00782	

PARTS LIST

REF DDS		TITLE		SHEET NO	
PARTS LIST		6K-81		6	
PARTS NO.	PARTS NAME	QTY	DESCRIPTION	CODE	
L2	COIL	LAL03VB471K	470UH	SLCAA00270	
L3	COIL	LAL03VB121K		SLCAA00440	
L4	COIL	LAL03VB101K		SLCAA00333	
L5	COIL	LAL03VB221K	220UH	SLCAA00272	
L6	COIL	LAL03VB271K		SLCAA00438	
L7	COIL	LAL03VB392K		SLCAA00338	
L8	COIL	LAL03VB2R7M		SLCAA00439	
L9	COIL	LAL03VB2R7M		SLCAA00329	
L10	COIL	LAL03VB2R7M		SLCAA00439	
L11	COIL	LAL03VB2R7M		SLCAA00329	
L12	COIL	LAL03VB100K	10UH	SLCAA00273	
L13	COIL	LAL03VB2R7M		SLCAA00439	
L14	COIL	LAL03VB150K		SLCAA00324	
L15	COIL	LAL03VB120K		SLCAA00386	
L16	COIL	LAL03VB100K	10UH	SLCAA00273	
L17	COIL	LAL03VB39K		SLCAA00338	
L18	COIL	LAL03VB39K		SLCAA00338	
L23	COIL	LAL03VB100K	10UH	SLCAA00273	
L24	COIL	SCP-45T 377J		SLZNL00002	
L25	COIL	LAL03VB2R2M	2.2UH	SLCAA00326	
L26	COIL	LAL03VB2R2M	2.2UH	SLCAA00326	
L27	COIL	LAL03VB471K	470UH	SLCAA00270	
P13	CONNECTOR	EC1C-22P-2.50SA	22P	5JWBS00070	
P14	CONNECTOR	EC1C-22P-2.50SA	22P	5JWBS00070	
P15	PCB	H-6PCJD00262A		6PCJD00262	
R1	RESISTOR FXD	ERJ-8GEYJ101V	1/8W 100 OHM	SREAG01726	
R2	RESISTOR FXD	ERJ-8GEYJ101V	1/8W 100 OHM	SREAG01726	
R3	RESISTOR FXD	ERJ-8GEYJ101V	1/8W 100 OHM	SREAG01726	
R4	RESISTOR FXD	ERJ-8GEYJ101V	1/8W 100 OHM	SREAG01726	
R5	RESISTOR FXD	ERJ-8GEYJ123V	1/8W 12K OHM	SREAG01751	
R6	RESISTOR FXD	ERJ-8GEYJ822V		SREAG01749	
R7	RESISTOR FXD	ERJ-8GEYJ122V	1/8W 1.2K OHM	SREAG01739	
R8	RESISTOR FXD	ERJ-8GEYJ103V	1/8W 10K OHM	SREAG01750	
R9	RESISTOR FXD	ERJ-8GEYJ123V	1/8W 12K OHM	SREAG01751	
R10	RESISTOR FXD	ERJ-8GEYJ101V	1/8W 100 OHM	SREAG01726	

PARTS LIST

REF DDS		TITLE		SHEET NO	
PARTS LIST		6K-81		7	
PARTS NO.	PARTS NAME	QTY	DESCRIPTION	CODE	
R11	RESISTOR FXD	ERJ-8GEYJ153V		SREAG01752	
R12	RESISTOR FXD	ERJ-8GEYJ153V		SREAG01752	
R13	RESISTOR FXD	ERJ-8GEYJ472V		SREAG01746	
R14	RESISTOR FXD	ERJ-8GEYJ471V	1/8W 470 OHM	SREAG01734	
R15	RESISTOR FXD	ERJ-8GEYJ471V	1/8W 470 OHM	SREAG01734	
R16	RESISTOR FXD	ERJ-8GEYJ221V	1/8W 220 OHM	SREAG01730	
R17	RESISTOR FXD	ERJ-8GEYJ471V	1/8W 470 OHM	SREAG01734	
R18	RESISTOR FXD	ERJ-8GEYJ221V	1/8W 220 OHM	SREAG01730	
R19	RESISTOR FXD	ERJ-8GEYJ102V	1/8W 1K OHM	SREAG01738	
R20	RESISTOR FXD	ERJ-8GEYJ101V	1/8W 100 OHM	SREAG01726	
R21	RESISTOR FXD	ERJ-8GEYJ101V	1/8W 100 OHM	SREAG01726	
R22	RESISTOR FXD	ERJ-8GEYJ821V	1/8W 820 OHM	SREAG01737	
R23	RESISTOR FXD	ERJ-8GEYJ101V	1/8W 100 OHM	SREAG01726	
R24	RESISTOR FXD	ERJ-8GEYJ122V	1/8W 1.2K OHM	SREAG01739	
R25	RESISTOR FXD	ERJ-8GEYJ103V	1/8W 10K OHM	SREAG01750	
R26	RESISTOR FXD	ERJ-8GEYJ332V	1/8W 3.3K OHM	SREAG01744	
R27	RESISTOR FXD	ERJ-8GEYJ101V	1/8W 100 OHM	SREAG01726	
R28	RESISTOR FXD	ERJ-8GEYJ332V	1/8W 3.3K OHM	SREAG01744	
R29	RESISTOR FXD	ERJ-8GEYJ102V	1/8W 1K OHM	SREAG01738	
R30	RESISTOR FXD	ERJ-8GEYJ102V	1/8W 1K OHM	SREAG01738	
R32	RESISTOR FXD	ERJ-8GEYJ221V	1/8W 220 OHM	SREAG01730	
R33	RESISTOR FXD	ERJ-8GEYJ102V	1/8W 1K OHM	SREAG01738	
R34	RESISTOR FXD	ERJ-8GEYJ103V	1/8W 10K OHM	SREAG01750	
R35	RESISTOR FXD	ERJ-8GEYJ122V	1/8W 1.2K OHM	SREAG01739	
R36	RESISTOR FXD	ERJ-8GEYJ123V	1/8W 12K OHM	SREAG01751	
R37	RESISTOR FXD	ERJ-8GEYJ101V	1/8W 100 OHM	SREAG01726	
R38	RESISTOR FXD	ERJ-8GEYJ153V		SREAG01752	
R39	RESISTOR FXD	ERJ-8GEYJ153V		SREAG01752	
R40	RESISTOR FXD	ERJ-8GEYJ472V		SREAG01746	
R41	RESISTOR FXD	ERJ-8GEYJ470V	1/8W 47 OHM	SREAG01722	
R42	RESISTOR FXD	ERJ-8GEYJ100V	1/8W 10 OHM	SREAG01714	
R43	RESISTOR FXD	ERJ-8GEYJ100V	1/8W 10 OHM	SREAG01714	
R44	RESISTOR FXD	ERJ-8GEYJ151V	1/8W 150 OHM	SREAG01728	
R45	RESISTOR FXD	ERJ-8GEYJ101V	1/8W 100 OHM	SREAG01726	
R46	RESISTOR FXD	ERJ-8GEYJ221V	1/8W 220 OHM	SREAG01730	

PARTS LIST

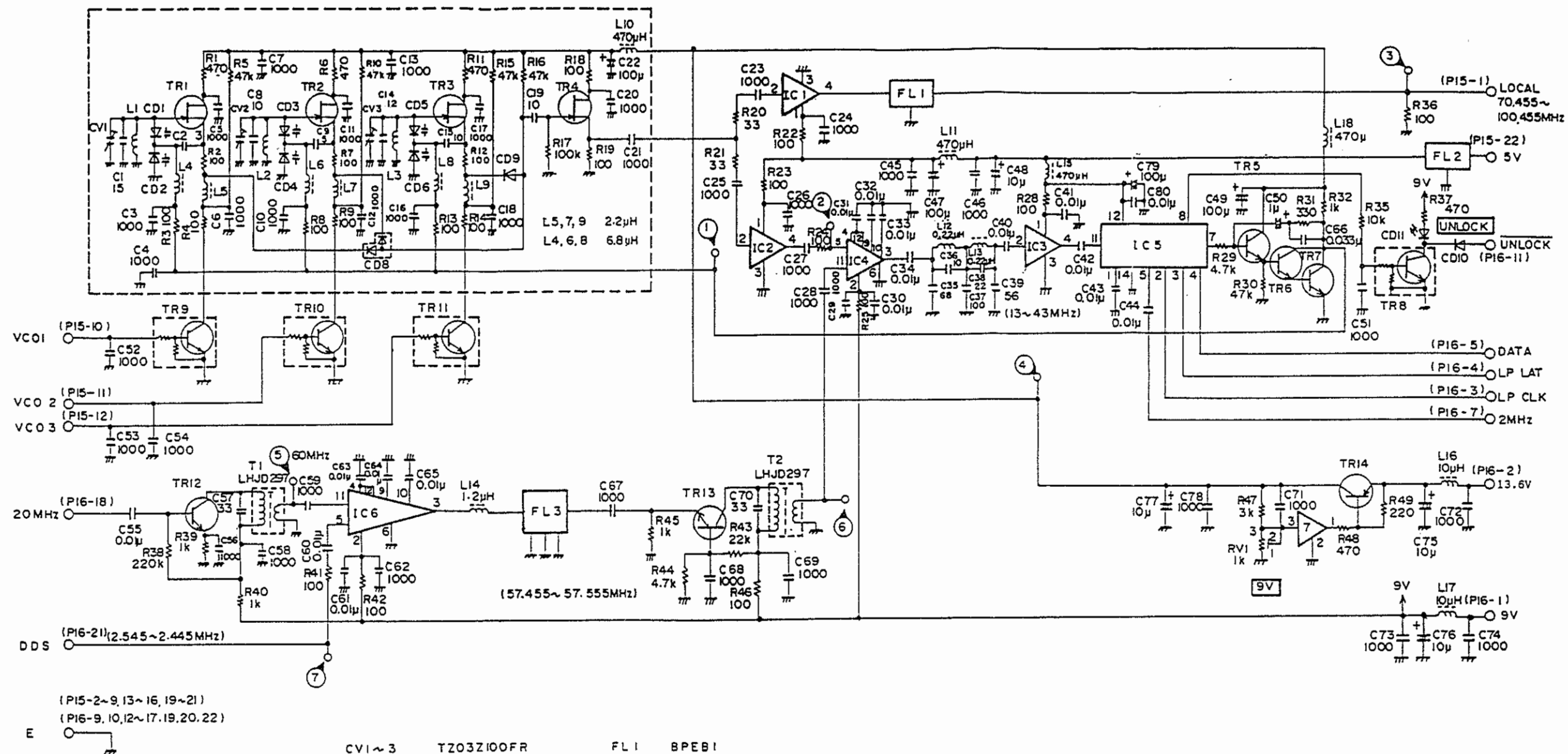
REF DDS		TITLE		SHEET NO.	
REF DDS		TITLE		SHEET NO.	
PARTS NO	PARTS NAME	TYPE	DESCRIPTION	CODE	
R47	RESISTOR FXD	ERJ-8GEYJ183V	1/8W, 18K OHM	SREAG01753	
R48	RESISTOR FXD	ERJ-8GEYJ103V	1/8W 10K OHM	SREAG01750	
R49	RESISTOR FXD	ERJ-8GEYJ471V	1/8W 470 OHM	SREAG01734	
R50	RESISTOR FXD	ERJ-8GEYJ102V	1/8W 1K OHM	SREAG01738	
R51	RESISTOR FXD	ERJ-8GEYJ221V	1/8W 220 OHM	SREAG01730	
R52	RESISTOR FXD	ERJ-8GEYJ103V	1/8W 10K OHM	SREAG01750	
R53	RESISTOR FXD	ERJ-8GEYJ080V	0 OHM	SREAG01775	
R54	RESISTOR FXD	ERJ-8GEYJ103V	1/8W 10K OHM	SREAG01755	
R55	RESISTOR FXD	ERJ-8GEYJ221V	1/8W 220 OHM	SREAG01730	
R56	RESISTOR FXD	ERJ-8GEYJ133V		SREAG01752	
R57	RESISTOR FXD	ERJ-8GEYJ223V	1/8W 22K OHM	SREAG01754	
R58	RESISTOR FXD	ERJ-8GEYJ223V	1/8W 22K OHM	SREAG01754	
R59	RESISTOR FXD	ERJ-8GEYJ331V	1/8W, 330 OHM	SREAG01732	
R60	RESISTOR FXD	ERJ-8GEYJ221V	1/8W 220 OHM	SREAG01730	
R62	RESISTOR FXD	ERJ-8GEYJ470V	1/8W 47 OHM	SREAG01722	
R66	RESISTOR FXD	ERJ-8GEYJ223V	1/8W 22K OHM	SREAG01754	
R67	RESISTOR FXD	ERJ-8GEYJ223V	1/8W 22K OHM	SREAG01754	
R68	RESISTOR FXD	ERJ-8GEYJ222V	1/8W 2.2K OHM	SREAG01742	
R69	RESISTOR FXD	ERJ-8GEYJ221V	1/8W 220 OHM	SREAG01730	
R70	RESISTOR FXD	ERJ-8GEYJ080V	0 OHM	SREAG01775	
R72	RESISTOR FXD	ERJ-8GEYJ104V	1/8W 100K OHM	SREAG01762	
R73	RESISTOR FXD	ERJ-8GEYJ103V	1/8W 10K OHM	SREAG01750	
R74	RESISTOR FXD	ERJ-8GEYJ474V		SREAG01770	
R75	RESISTOR FXD	ERJ-8GEYJ473V		SREAG01758	
R76	RESISTOR FXD	FRJ-8GEYJ474V		SREAG01770	
R77	RESISTOR FXD	ERJ-8GEYJ224V		SREAG01766	
R78	RESISTOR FXD	ERJ-8GEYJ221V	1/8W 220 OHM	SREAG01730	
R79	RESISTOR FXD	ERJ-8GEYJ471V	1/8W 470 OHM	SREAG01734	
R80	RESISTOR FXD	ERJ-8GEYJ101V	1/8W 100 OHM	SREAG01726	
R81	RESISTOR FXD	ERJ-8GEYJ221V	1/8W 220 OHM	SREAG01730	
R82	RESISTOR FXD	ERJ-8GEYJ102V	1/8W 1K OHM	SREAG01738	
R83	RESISTOR FXD	ERJ-8GEYJ102V	1/8W 1K OHM	SREAG01738	
R84	RESISTOR FXD	ERJ-8GEYJ101V	1/8W 100 OHM	SREAG01726	
R85	RESISTOR FXD	ERJ-8GEYJ223V	1/8W 22K OHM	SREAG01754	
R86	RESISTOR FXD	ERJ-8GEYJ223V	1/8W 22K OHM	SREAG01754	

PARTS LIST

REF DDS		TITLE		SHEET NO.	
REF DDS		TITLE		SHEET NO.	
PARTS NO	PARTS NAME	TYPE	DESCRIPTION	CODE	
R87	RESISTOR FXD	ERJ-8GEYJ222V	1/8W 2.2K OHM	SREAG01742	
R88	RESISTOR FXD	ERJ-8GEYJ102V	1/8W 1K OHM	SREAG01738	
R89	RESISTOR FXD	ERJ-8GEYJ153V		SREAG01752	
R90	RESISTOR FXD	ERJ-8GEYJ473V		SREAG01758	
R91	RESISTOR FXD	ERJ-8GEYJ101V	1/8W 100 OHM	SREAG01726	
R92	RESISTOR FXD	ERJ-8GEYJ102V	1/8W 1K OHM	SREAG01738	
R93	RESISTOR FXD	ERJ-8GEYJ821V	1/8W 820 OHM	SREAG01737	
R94	RESISTOR FXD	ERJ-8GEYJ101V	1/8W 100 OHM	SREAG01726	
R95	RESISTOR FXD	ERJ-8GEYJ103V	1/8W 10K OHM	SREAG01750	
R96	RESISTOR FXD	ERJ-8GEYJ223V	1/8W 22K OHM	SREAG01754	
R97	RESISTOR FXD	ERJ-8GEYJ470V	1/8W 47 OHM	SREAG01722	
R98	RESISTOR FXD	ERJ-8GEYJ101V	1/8W 100 OHM	SREAG01726	
R100	RESISTOR FXD	ERJ-8GEYJ102V	1/8W 1K OHM	SREAG01738	
R101	RESISTOR FXD	ERJ-8GEYJ103V	1/8W 10K OHM	SREAG01750	
R102	RESISTOR FXD	ERJ-8GEYJ471V	1/8W 470 OHM	SREAG01734	
R103	RESISTOR FXD	ERJ-8GEYJ472V		SREAG01746	
R104	RESISTOR FXD	ERJ-8GEYJ184V		SREAG01765	
R105	RESISTOR FXD	ERJ-8GEYJ104V	1/8W 100K OHM	SREAG01762	
R106	RESISTOR FXD	ERJ-8GEYJ184V		SREAG01765	
R107	RESISTOR FXD	ERJ-8GEYJ222V	1/8W 2.2K OHM	SREAG01742	
R108	RESISTOR FXD	ERJ-8GEYJ333V		SREAG01756	
R109	RESISTOR FXD	ERJ-8GEYJ152V	1/8W 1.5K OHM	SREAG01740	
R113	RESISTOR FXD	ERJ-8GEYJ101V	1/8W 100 OHM	SREAG01726	
R114	RESISTOR FXD	ERJ-8GEYJ105V	1/8W 1M OHM	SREAG01774	
RA1	RESISTOR FXD	20B-12X-ME1		SREAG00716	
RA2	RESISTOR FXD	20B-12X-ME1		SREAG00716	
RA3	RESISTOR FXD	20B-12X-ME1		SREAG00716	
RJ1	RESISTOR FXD	ERJ-8GEYJ080V	0 OHM	SREAG01775	
RJ2	RESISTOR FXD	ERJ-8GEYJ080V	0 OHM	SREAG01775	
RV1	RESISTOR VAR	EVN-D1A00B13	1K OHM	SREAG00313	
RV2	RESISTOR VAR	EVN-D1A00B13	1K OHM	SREAG00313	
RV3	RESISTOR VAR	EVN-D4A00B54		SREAG00317	
RV4	RESISTOR VAR	EVN-D4A00B54		SREAG00317	
T1	RF XFMR	H-6LHJ000297		6LJ000297	
TP1	TEST TERMINAL	PCN6-PEA		SREAG00364	

PARTS LIST

REF 005		TITLE C62-81		SHEET NO 10	
PARTS NO	PARTS NAME	TYPE	DESCRIPTION	CODE	
TP2	TEST TERMINAL	PCN6-PEA		SJDA00364	
TP3	TEST TERMINAL	PCN6-PEA		SJDA00364	
TP4	TEST TERMINAL	PCN6-PEA		SJDA00364	
TP5	TEST TERMINAL	PCN6-PEA		SJDA00364	
TP6	TEST TERMINAL	PCN6-PEA		SJDA00364	
TP7	TEST TERMINAL	PCN6-PEA		SJDA00364	
TP8	TEST TERMINAL	PCN6-PEA		SJDA00364	
TP9	TEST TERMINAL	PCN6-PEA		SJDA00364	
TR1	TRANSISTOR	2SA1162-Y TE85L		STAAG00182	
TR2	TRANSISTOR	2SC2714Y TE85L		STCAF00436	
TR3	TRANSISTOR	2SA1162-Y TE85L		STAAG00182	
TR4	TRANSISTOR	2SC2714Y TE85L		STCAF00436	
TR5	TRANSISTOR	2SC2714Y TE85L		STCAF00436	
TR6	TRANSISTOR	2SC2714Y TE85L		STCAF00436	
TR7	TRANSISTOR	2SC2714Y TE85L		STCAF00436	
TR8	TRANSISTOR	2SC2714Y TE85L		STCAF00436	
TR9	TRANSISTOR	2SK210BL-TE85L		STKAA00189	
TR10	TRANSISTOR	2SK210BL-TE85L		STKAA00189	
TR11	TRANSISTOR	2SC2714Y TE85L		STCAF00436	
TR12	TRANSISTOR	2SC3324GR TE85L		STCAF00711	
TR13	TRANSISTOR	2SC3324GR TE85L		STCAF00711	
TR14	TRANSISTOR	2SC3324GR TE85L		STCAF00711	
TR15	TRANSISTOR	2SC2714Y TE85L		STCAF00436	
TR16	TRANSISTOR	2SC2712Y TE85L		STAAG00186	
TR17	TRANSISTOR	2SC3398-1B		STCAZ00011	
TR18	TRANSISTOR	2SC3398-1B		STCAZ00011	
TR19	TRANSISTOR	2SC3398-1B		STCAZ00011	



CV1~3 TZ03Z100FR
CD1~6 ISV203
CD8,9 HSM2694
CD10 ISS226
CD11 MPR4371F
TR1~4 2SK210-BL
TR5~7 2SC3324-GR
TR8~11 2SC3398
TR12,13 2SC2714-Y
TR14 2SA1015-Y

FL1 BPEB1
FL2 DS310-55B222M
FL3 SAF58MH70Z
IC1~3 μ PC1651G
IC4,6 SN76514N
IC5 CX7925B
IC7 M5236L
L1 SC2-55T
L2 SC2-45T
L3 SC2-35T

NOTE:

- Unless otherwise specified;
- Resistance values are in ohm, 1/8W.
- Capacitance values are in pF.

Figure 6-18 LOOPI Unit (CGA-145)
Schematic diagram

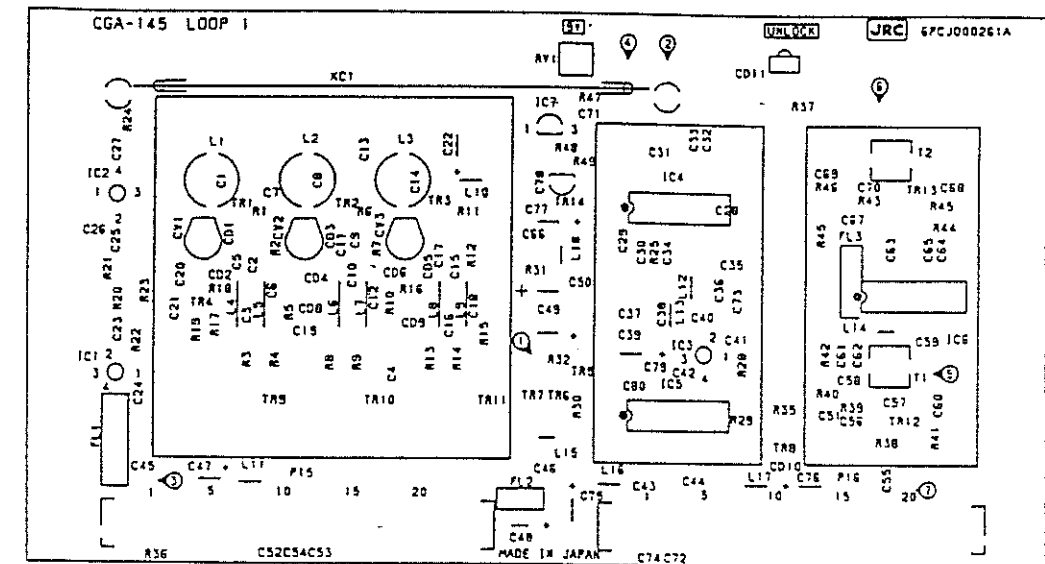


Figure 6-19 LOOP1 Unit (CGA-145) Component Layout

PARTS LIST

PARTS LIST		TITLE		SHEET NO	
PARTS LIST		CGA-125		1	
PARTS NO	PART NAME	TYPE	DESCRIPTION	CODE	
C1	CAP,FXD	CER	C3216CH1H150J-E-TP	15PF	SCAAD00787
C2	CAP,FXD	CER	C3216CH1H030C-E-TP	3PF	SCAAD00796
C3	CAP,FXD	CER	C3216SL1H102J-E-TP	1000PF	SCAAD00782
C4	CAP,FXD	CER	C3216SL1H102J-E-TP	1000PF	SCAAD00782
C5	CAP,FXD	CER	C3216SL1H102J-E-TP	1000PF	SCAAD00782
C6	CAP,FXD	CER	C3216SL1H102J-E-TP	1000PF	SCAAD00782
C7	CAP,FXD	CER	C3216SL1H102J-E-TP	1000PF	SCAAD00782
C8	CAP,FXD	CER	C3216CH1H100J-E-TP		SCAAD00862
C9	CAP,FXD	CER	C3216CH1H050C-E-TP	5PF	SCAAD00800
C10	CAP,FXD	CER	C3216SL1H102J-E-TP	1000PF	SCAAD00782
C11	CAP,FXD	CER	C3216SL1H102J-E-TP	1000PF	SCAAD00782
C12	CAP,FXD	CER	C3216SL1H102J-E-TP	1000PF	SCAAD00782
C13	CAP,FXD	CER	C3216SL1H102J-E-TP	1000PF	SCAAD00782
C14	CAP,FXD	CER	C3216CH1H20J-E-TP	12P	SCAAD00784
C15	CAP,FXD	CER	C3216CH1H100D-E-TP	10PF	SCAAD00785
C16	CAP,FXD	CER	C3216SL1H102J-E-TP	1000PF	SCAAD00782
C17	CAP,FXD	CER	C3216SL1H102J-E-TP	1000PF	SCAAD00782
C18	CAP,FXD	CER	C3216SL1H102J-E-TP	1000PF	SCAAD00782
C19	CAP,FXD	CER	C3216CH1H100D-E-TP	10PF	SCAAD00785
C20	CAP,FXD	CER	C3216SL1H102J-E-TP	1000PF	SCAAD00782
C21	CAP,FXD	CER	C3216SL1H102J-E-TP	1000PF	SCAAD00782
C22	CAP,FXD	ELCTLT	ECE-A1EU101B		SCAA01813
C23	CAP,FXD	CER	C3216SL1H102J-E-TP	1000PF	SCAAD00782
C24	CAP,FXD	CER	C3216SL1H102J-E-TP	1000PF	SCAAD00782
C25	CAP,FXD	CER	C3216SL1H102J-E-TP	1000PF	SCAAD00782
C26	CAP,FXD	CER	C3216SL1H102J-E-TP	1000PF	SCAAD00782
C27	CAP,FXD	CER	C3216SL1H102J-E-TP	1000PF	SCAAD00782
C28	CAP,FXD	CER	C3216SL1H102J-E-TP	1000PF	SCAAD00782
C29	CAP,FXD	CER	C3216SL1H102J-E-TP	1000PF	SCAAD00782
C30	CAP,FXD	CER	C3216JBIH103K-E-TP	0.01UF	SCAAD00789
C31	CAP,FXD	CER	C3216JBIH103K-E-TP	0.01UF	SCAAD00789
C32	CAP,FXD	CER	C3216JBIH103K-E-TP	0.01UF	SCAAD00789
C33	CAP,FXD	CER	C3216JBIH103K-E-TP	0.01UF	SCAAD00789
C34	CAP,FXD	CER	C3216JBIH103K-E-TP	0.01UF	SCAAD00789
C35	CAP,FXD	CER	C3216CH1H680J-E-TP	68PF	SCAAD00929

PARTS LIST

PARTS LIST		TITLE		SHEET NO	
PARTS LIST		CGA-125		2	
PARTS NO	PART NAME	TYPE	DESCRIPTION	CODE	
C36	CAP,FXD	CER	C3216CH1H100D-E-TP	10PF	SCAAD00785
C37	CAP,FXD	CER	C3216CH1H101J-E-TP	100PF	SCAAD00780
C38	CAP,FXD	CER	C3216CH1H20J-E-TP	22P	SCAAD00869
C39	CAP,FXD	CER	C3216CH1H50J-E-TP		SCAAD00863
C40	CAP,FXD	CER	C3216JBIH103K-E-TP	0.01UF	SCAAD00789
C41	CAP,FXD	CER	C3216JBIH103K-E-TP	0.01UF	SCAAD00789
C42	CAP,FXD	CER	C3216JBIH103K-E-TP	0.01UF	SCAAD00789
C43	CAP,FXD	CER	C3216JBIH103K-E-TP	0.01UF	SCAAD00789
C44	CAP,FXD	CER	C3216JBIH103K-E-TP	0.01UF	SCAAD00789
C45	CAP,FXD	CER	C3216SL1H102J-E-TP	1000PF	SCAAD00782
C46	CAP,FXD	CER	C3216SL1H102J-E-TP	1000PF	SCAAD00782
C47	CAP,FXD	ELCTLT	ECE-A1EU101B		SCAA01813
C48	CAP,FXD	ELCTLT	ECE-A1EU100B		SCAA01864
C49	CAP,FXD	ELCTLT	ECE-A1EU101B		SCAA01813
C50	CAP,FXD	TANTAL	20213502 105KB	35V 1UF	SCSAC00982
C51	CAP,FXD	CER	C3216SL1H102J-E-TP	1000PF	SCAAD00782
C52	CAP,FXD	CER	C3216SL1H102J-E-TP	1000PF	SCAAD00782
C53	CAP,FXD	CER	C3216SL1H102J-E-TP	1000PF	SCAAD00782
C54	CAP,FXD	CER	C3216SL1H102J-E-TP	1000PF	SCAAD00782
C55	CAP,FXD	CER	C3216JBIH103K-E-TP	0.01UF	SCAAD00789
C56	CAP,FXD	CER	C3216SL1H102J-E-TP	1000PF	SCAAD00782
C57	CAP,FXD	CER	C3216CH1H30J-E-TP	33PF	SCAAD00794
C58	CAP,FXD	CER	C3216SL1H102J-E-TP	1000PF	SCAAD00782
C59	CAP,FXD	CER	C3216SL1H102J-E-TP	1000PF	SCAAD00782
C60	CAP,FXD	CER	C3216JBIH103K-E-TP	0.01UF	SCAAD00789
C61	CAP,FXD	CER	C3216JBIH103K-E-TP	0.01UF	SCAAD00789
C62	CAP,FXD	CER	C3216SL1H102J-E-TP	1000PF	SCAAD00782
C63	CAP,FXD	CER	C3216JBIH103K-E-TP	0.01UF	SCAAD00789
C64	CAP,FXD	CER	C3216JBIH103K-E-TP	0.01UF	SCAAD00789
C65	CAP,FXD	CER	C3216JBIH103K-E-TP	0.01UF	SCAAD00789
C66	CAP,FXD	CER	C3216X7R1H333K-E-TP	50V 0.033U	SCAA001357
C67	CAP,FXD	CER	C3216SL1H102J-E-TP	1000PF	SCAAD00782
C68	CAP,FXD	CER	C3216SL1H102J-E-TP	1000PF	SCAAD00782
C69	CAP,FXD	CER	C3216SL1H102J-E-TP	1000PF	SCAAD00782
C70	CAP,FXD	CER	C3216CH1H30J-E-TP	33PF	SCAAD00794

PARTS LIST

PARTS NO	PARTS NAME	TYPE	DESCRIPTION	CODE
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SHEET NO 3

CGA-145

L00P1

TITLE

CGA-145

SHEET NO 3

PARTS LIST

PARTS NO	PARTS NAME	TYPE	DESCRIPTION	CODE
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SHEET NO 4

CGA-145

L00P1

TITLE

CGA-145

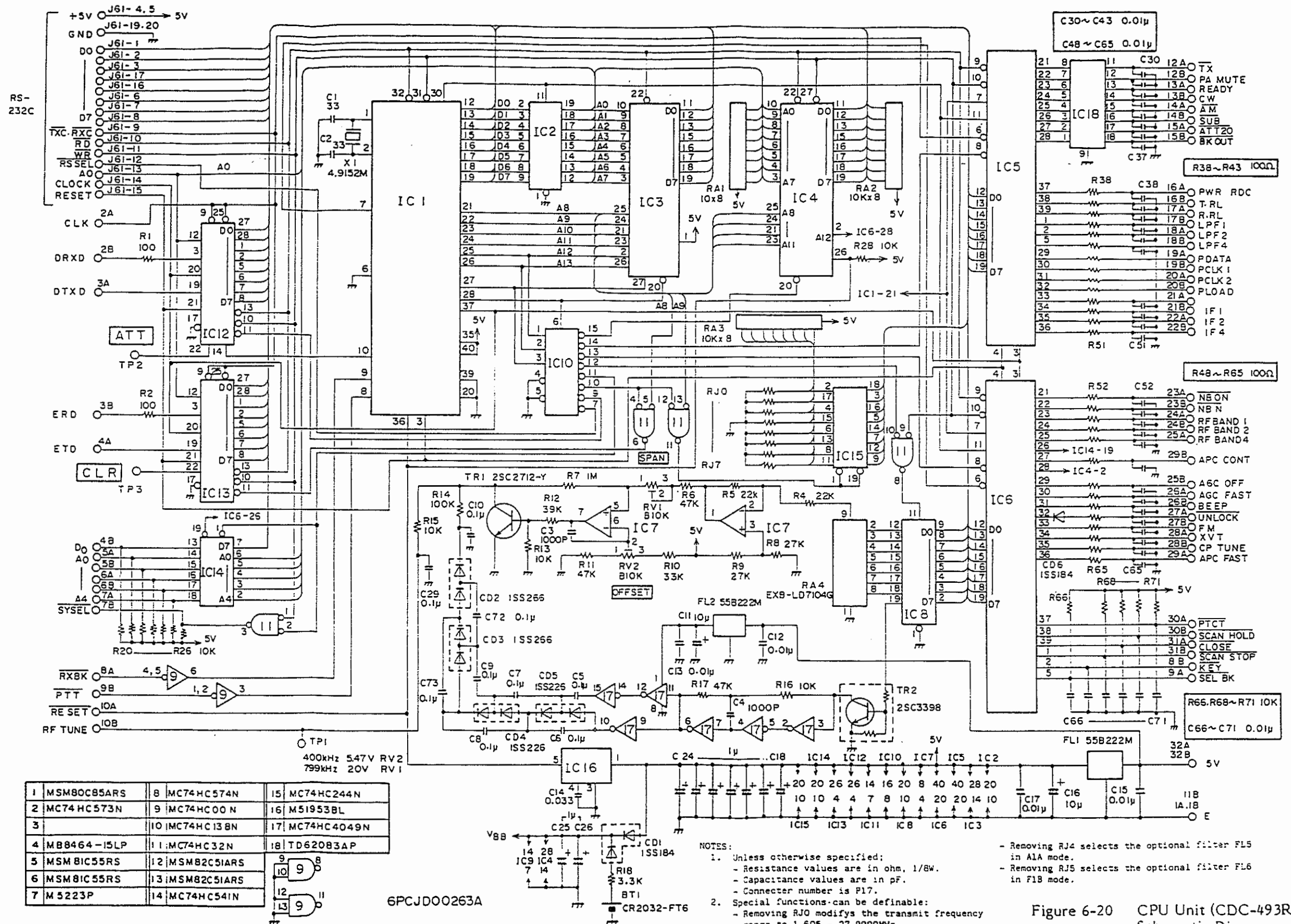
SHEET NO 4

C71	CAP.FXD	CER	C3216SL1H102J-E-TP	1000PF	SCAA000782
C72	CAP.FXD	CER	C3216SL1H102J-E-TP	1000PF	SCAA000782
C73	CAP.FXD	CER	C3216SL1H102J-E-TP	1000PF	SCAA000782
C74	CAP.FXD	CER	C3216SL1H102J-E-TP	1000PF	SCAA000782
C75	CAP.FXD	ELCTLT	ECE-A1EU100B		SCEAA01864
C76	CAP.FXD	ELCTLT	ECE-A1EU100B		SCEAA01864
C77	CAP.FXD	TANTAL	202L1602 106KB		SCSAC00932
C78	CAP.FXD	CER	C3216SL1H102J-E-TP	1000PF	SCAA000782
C79	CAP.FXD	ELCTLT	ECE-A1EU101B		SCEAA01813
C80	CAP.FXD	CER	C3216J81H103K-E-TP	0.01UF	SCAA000789
C81	DIODE		1SV203-7TLC		STXAE00678
C82	DIODE		1SV203-7TLC		STXAE00678
C83	DIODE		1SV203-7TLC		STXAE00678
C84	DIODE		1SV203-7TLC		STXAE00678
C85	DIODE		1SV203-7TLC		STXAE00678
C86	DIODE		1SV203-7TLC		STXAE00678
C88	DIODE		HSM2694TLC		STXAE00627
C89	DIODE		HSM2694TLC		STXAE00627
C90	DIODE		1S5226 TE85L		STXAD00320
C91	DIODE		MPR4371F		STXBG00037
C91	CAPACITOR VAR		T2032100FR	10PF	SCVAA00190
C92	CAPACITOR VAR		T2032100FR	10PF	SCVAA00190
C93	CAPACITOR VAR		T2032100FR	10PF	SCVAA00190
FL1	FILTER		BPEB1		SNBAG00011
FL2	FILTER		DS310-55B222M	100V 0.0022UF	SNXAA00002
FL3	FILTER		SAF58MH70Z		SNRAA00191
IC1	IC		UPC1651G		SDAAA00171
IC2	IC		UPC1651G		SDAAA00171
IC3	IC		UPC1651G		SDAAA00171
IC4	IC		SN76514N		SD0AL00251
IC5	IC		CX7925B		SDZCJ00008
IC6	IC		SN76514N		SD0AL00251
IC7	IC		M5236L		SD0AB00170
XC1	CABLE		H-6ZCJD35003		6ZCJD35003
L1	COIL		SC2-55T		SLZNL00001

L2	COIL	SC2-45T			SLZNL00002
L3	COIL	SC2-35T			SLZNL00003
L4	COIL	LAL03KH6R8K			SLCAA00437
L5	COIL	LAL03KH2R2M	2.2UH		SLCAA00326
L6	COIL	LAL03KH6R8K			SLCAA00437
L7	COIL	LAL03KH2R2M	2.2UH		SLCAA00326
L8	COIL	LAL03KH6R8K			SLCAA00437
L9	COIL	LAL03KH2R2M	2.2UH		SLCAA00326
L10	COIL	LAL03VB471K	470UH		SLCAA00270
L11	COIL	LAL03VB471K	470UH		SLCAA00270
L12	COIL	LAL03VBR22M	0.22UH		SLCAA00280
L13	COIL	LAL03VBR22M	0.22UH		SLCAA00280
L14	COIL	LAL03VB1R2M			SLCAA00334
L15	COIL	LAL03VB471K	470UH		SLCAA00270
L16	COIL	LAL03VB100K	10UH		SLCAA00273
L17	COIL	LAL03VB100K	10UH		SLCAA00273
L18	COIL	LAL03VB471K	470UH		SLCAA00270
P15	CONNECTOR	EC1C-22P-2.505A	22P		SJWBS00070
P16	CONNECTOR	EC1C-22P-2.505A	22P		SJWBS00070
PC1	PCB	H-6PCJD00261A			6PCJD00261
R1	RESISTOR	FXD	ERJ-8GEYJ471V	1/8W 470 OHM	SREAG01734
R2	RESISTOR	FXD	ERJ-8GEYJ101V	1/8W 100 OHM	SREAG01726
R3	RESISTOR	FXD	ERJ-8GEYJ101V	1/8W 100 OHM	SREAG01726
R4	RESISTOR	FXD	ERJ-8GEYJ101V	1/8W 100 OHM	SREAG01726
R5	RESISTOR	FXD	ERJ-8GEYJ473V		SREAG01758
R6	RESISTOR	FXD	ERJ-8GEYJ471V	1/8W 470 OHM	SREAG01734
R7	RESISTOR	FXD	ERJ-8GEYJ101V	1/8W 100 OHM	SREAG01726
R8	RESISTOR	FXD	ERJ-8GEYJ101V	1/8W 100 OHM	SREAG01726
R9	RESISTOR	FXD	ERJ-8GEYJ101V	1/8W 100 OHM	SREAG01726
R10	RESISTOR	FXD	ERJ-8GEYJ473V		SREAG01758
R11	RESISTOR	FXD	ERJ-8GEYJ471V	1/8W 470 OHM	SREAG01734
R12	RESISTOR	FXD	ERJ-8GEYJ101V	1/8W 100 OHM	SREAG01726
R13	RESISTOR	FXD	ERJ-8GEYJ101V	1/8W 100 OHM	SREAG01726
R14	RESISTOR	FXD	ERJ-8GEYJ101V	1/8W 100 OHM	SREAG01726
R15	RESISTOR	FXD	ERJ-8GEYJ473V		SREAG01758

PARTS LIST					TITLE CGA-145					SHEET NO 5				
PARTS NO		PARTS NAME		TYPE		DESCRIPTION		CODE						
R16	RESISTOR	FXD	ERJ-8GEYJ473V			1/8W 100K OHM		SREAG01758						
R17	RESISTOR	FXD	ERJ-8GEYJ104V			1/8W 100 OHM		SREAG01762						
R18	RESISTOR	FXD	ERJ-8GEYJ101V			1/8W 100 OHM		SREAG01726						
R19	RESISTOR	FXD	FRJ-8GEYJ101V			1/8W 100 OHM		SREAG01726						
R20	RESISTOR	FXD	ERJ-8GEYJ330V			1/8W 33 OHM		SREAG01720						
R21	RESISTOR	FXD	ERJ-8GEYJ330V			1/8W 33 OHM		SREAG01720						
R22	RESISTOR	FXD	ERJ-8GEYJ101V			1/8W 100 OHM		SREAG01726						
R23	RESISTOR	FXD	ERJ-8GEYJ101V			1/8W 100 OHM		SREAG01726						
R24	RESISTOR	FXD	ERJ-8GEYJ101V			1/8W 100 OHM		SREAG01726						
R25	RESISTOR	FXD	ERJ-8GEYJ101V			1/8W 100 OHM		SREAG01726						
R28	RESISTOR	FXD	ERJ-8GEYJ101V			1/8W 100 OHM		SREAG01726						
R29	RESISTOR	FXD	ERJ-8GEYJ472V					SREAG01746						
R30	RESISTOR	FXD	ERJ-8GEYJ473V					SREAG01758						
R31	RESISTOR	FXD	ERJ-8GEYJ331V			1/8W 330 OHM		SREAG01732						
R32	RESISTOR	FXD	ERJ-8GEYJ102V			1/8W 1K OHM		SREAG01738						
R35	RESISTOR	FXD	ERJ-8GEYJ103V			1/8W 10K OHM		SREAG01750						
R36	RESISTOR	FXD	ERJ-8GEYJ101V			1/8W 100 OHM		SREAG01726						
R37	RESISTOR	FXD	ERJ-8GEYJ471V			1/8W 470 OHM		SREAG01734						
R38	RESISTOR	FXD	ERJ-8GEYJ224V					SREAG01766						
R39	RESISTOR	FXD	ERJ-8GEYJ102V			1/8W 1K OHM		SREAG01738						
R40	RESISTOR	FXD	ERJ-8GEYJ102V			1/8W 1K OHM		SREAG01738						
R41	RESISTOR	FXD	ERJ-8GEYJ101V			1/8W 100 OHM		SREAG01726						
R42	RESISTOR	FXD	ERJ-8GEYJ101V			1/8W 100 OHM		SREAG01726						
R43	RESISTOR	FXD	ERJ-8GEYJ223V			1/8W 22K OHM		SREAG01754						
R44	RESISTOR	FXD	ERJ-8GEYJ472V					SREAG01746						
R45	RESISTOR	FXD	ERJ-8GEYJ102V			1/8W 1K OHM		SREAG01738						
R46	RESISTOR	FXD	ERJ-8GEYJ101V			1/8W 100 OHM		SREAG01726						
R47	RESISTOR	FXD	ERJ-8GEYJ302V			1/8W 3K OHM		SREAG02211						
R48	RESISTOR	FXD	ERJ-8GEYJ471V			1/8W 470 OHM		SREAG01734						
R49	RESISTOR	FXD	ERJ-8GEYJ221V			1/8W 220 OHM		SREAG01730						
RV1	RESISTOR	VAR	EVN-01AA00B13			1K OHM		SRVAB00313						
T1	RF XFMR		H-6LHJDD00297					6LHJDD00297						
T2	RF XFMR		H-6LHJDD00297					6LHJDD00297						
TP1	TEST TERMINAL		PCN6-PEA					SJDAAD00364						
TP2	TEST TERMINAL		PCN6-PEA					SJDAAD00364						

PARTS LIST					TITLE CGA-145					SHEET NO 6				
PARTS NO		PARTS NAME		TYPE		DESCRIPTION		CODE						
TP3	TEST TERMINAL		PCN6-PEA					SJDAAD00364						
TP4	TEST TERMINAL		PCN6-PEA					SJDAAD00364						
TP5	TEST TERMINAL		PCN6-PEA					SJDAAD00364						
TP6	TEST TERMINAL		PCN6-PEA					SJDAAD00364						
TP7	TEST TERMINAL		PCN6-PEA					SJDAAD00364						
TR1	TRANSISTOR		2SK210BL-TE85L					STKAA00189						
TR2	TRANSISTOR		2SK210BL-TE85L					STKAA00189						
TR3	TRANSISTOR		2SK210BL-TE85L					STKAA00189						
TR4	TRANSISTOR		2SK210BL-TE85L					STKAA00189						
TR5	TRANSISTOR		2SC3324GR TE85L					STCAF00711						
TR6	TRANSISTOR		2SC3324GR TE85L					STCAF00711						
TR7	TRANSISTOR		2SC3324GR TE85L					STCAF00711						
TR8	TRANSISTOR		2SC3398-TB					STCAZ00011						
TR9	TRANSISTOR		2SC3398-TB					STCAZ00011						
TR10	TRANSISTOR		2SC3398-TB					STCAZ00011						
TR11	TRANSISTOR		2SC3398-TB					STCAZ00011						
TR12	TRANSISTOR		2SC2714Y TE85L					STCAF00436						
TR13	TRANSISTOR		2SC2714Y TE85L					STCAF00436						
TR14	TRANSISTOR		2SA1015-Y					STAAG00070						



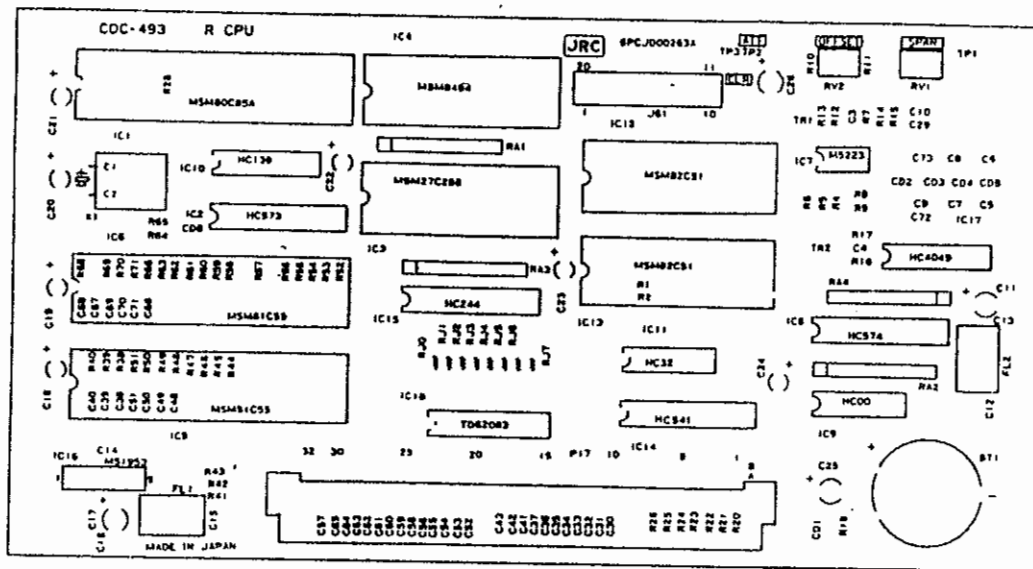


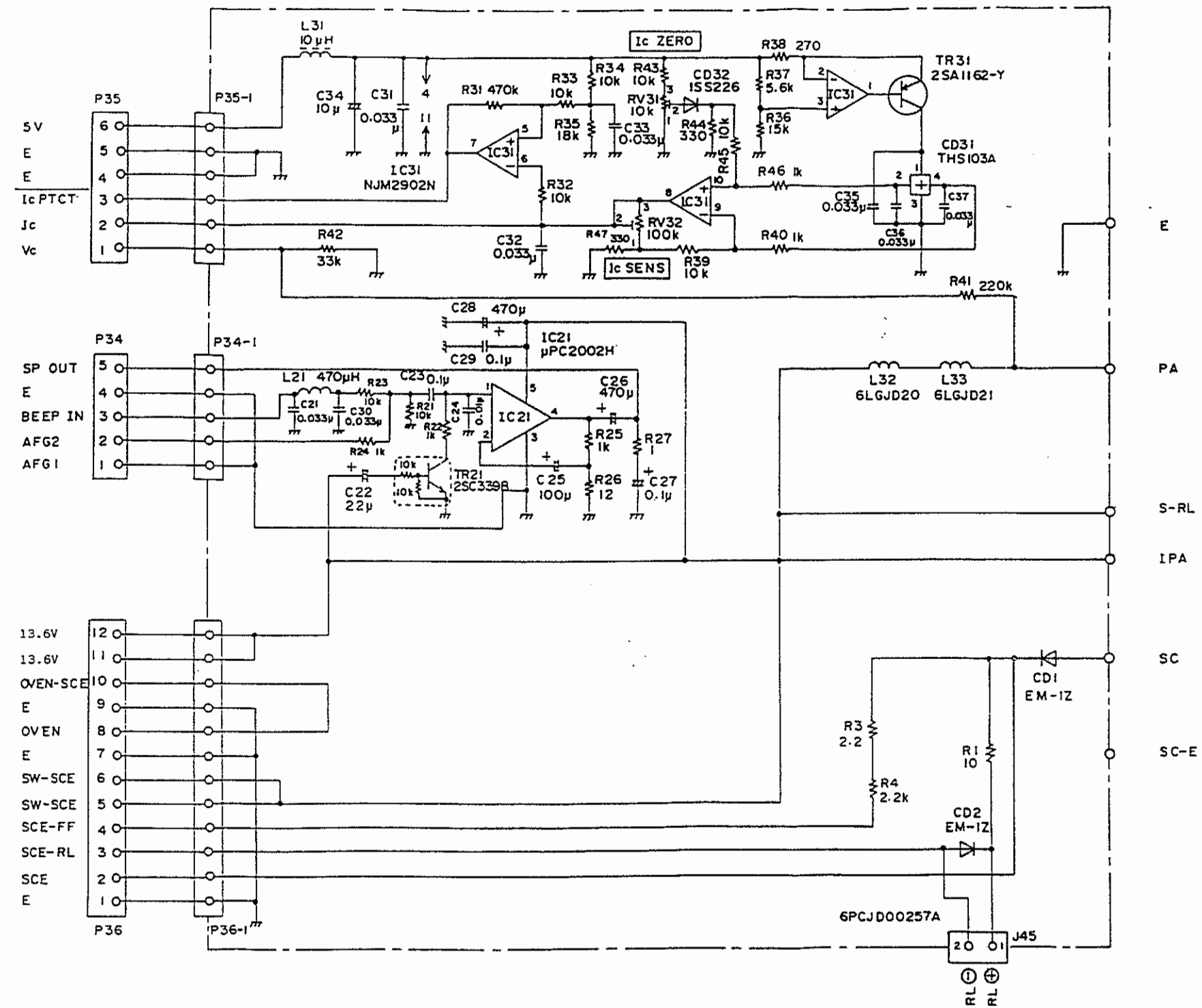
Figure 6-21 CPU Unit (CDC-493R) Component Layout

PARTS LIST		TITLE		SHEET NO	
CPU		CDC-493		4	
PARTS NO		PARTS NAME		TYPE	
DESCRIPTION		CODE			

R10	RESISTOR	FXD	ERJ-8GEYJ33V	1/8W 10K OHM	SREAG01756
R11	RESISTOR	FXD	ERJ-8GEYJ673V	1/8W 10K OHM	SREAG01757
R12	RESISTOR	FXD	ERJ-8GEYJ393V	1/8W 10K OHM	SREAG01758
R13	RESISTOR	FXD	ERJ-8GEYJ103V	1/8W 10K OHM	SREAG01759
R14	RESISTOR	FXD	ERJ-8GEYJ104V	1/8W 10K OHM	SREAG01762
R15	RESISTOR	FXD	ERJ-8GEYJ103V	1/8W 10K OHM	SREAG01750
R16	RESISTOR	FXD	ERJ-8GEYJ103V	1/8W 10K OHM	SREAG01750
R17	RESISTOR	FXD	ERJ-8GEYJ473V	1/8W 10K OHM	SREAG01758
R18	RESISTOR	FXD	ERJ-8GEYJ332V	1/8W 3.3K OHM	SREAG01744
R20	RESISTOR	FXD	ERJ-8GEYJ103V	1/8W 10K OHM	SREAG01750
R21	RESISTOR	FXD	ERJ-8GEYJ103V	1/8W 10K OHM	SREAG01750
R22	RESISTOR	FXD	ERJ-8GEYJ103V	1/8W 10K OHM	SREAG01750
R23	RESISTOR	FXD	ERJ-8GEYJ103V	1/8W 10K OHM	SREAG01750
R24	RESISTOR	FXD	ERJ-8GEYJ103V	1/8W 10K OHM	SREAG01750
R25	RESISTOR	FXD	ERJ-8GEYJ103V	1/8W 10K OHM	SREAG01750
R26	RESISTOR	FXD	ERJ-8GEYJ103V	1/8W 10K OHM	SREAG01750
R28	RESISTOR	FXD	ERJ-8GEYJ103V	1/8W 10K OHM	SREAG01750
R38	RESISTOR	FXD	ERJ-8GEYJ101V	1/8W 100 OHM	SREAG01726
R39	RESISTOR	FXD	ERJ-8GEYJ101V	1/8W 100 OHM	SREAG01726
R40	RESISTOR	FXD	ERJ-8GEYJ101V	1/8W 100 OHM	SREAG01726
R41	RESISTOR	FXD	ERJ-8GEYJ101V	1/8W 100 OHM	SREAG01726
R42	RESISTOR	FXD	ERJ-8GEYJ101V	1/8W 100 OHM	SREAG01726
R43	RESISTOR	FXD	ERJ-8GEYJ101V	1/8W 100 OHM	SREAG01726
R44	RESISTOR	FXD	ERJ-8GEYJ101V	1/8W 100 OHM	SREAG01726
R45	RESISTOR	FXD	ERJ-8GEYJ101V	1/8W 100 OHM	SREAG01726
R46	RESISTOR	FXD	ERJ-8GEYJ101V	1/8W 100 OHM	SREAG01726
R47	RESISTOR	FXD	ERJ-8GEYJ101V	1/8W 100 OHM	SREAG01726
R48	RESISTOR	FXD	ERJ-8GEYJ101V	1/8W 100 OHM	SREAG01726
R49	RESISTOR	FXD	ERJ-8GEYJ101V	1/8W 100 OHM	SREAG01726
R50	RESISTOR	FXD	ERJ-8GEYJ101V	1/8W 100 OHM	SREAG01726
R51	RESISTOR	FXD	ERJ-8GEYJ101V	1/8W 100 OHM	SREAG01726
R52	RESISTOR	FXD	ERJ-8GEYJ101V	1/8W 100 OHM	SREAG01726
R53	RESISTOR	FXD	ERJ-8GEYJ101V	1/8W 100 OHM	SREAG01726
R54	RESISTOR	FXD	ERJ-8GEYJ101V	1/8W 100 OHM	SREAG01726
R55	RESISTOR	FXD	ERJ-8GEYJ101V	1/8W 100 OHM	SREAG01726

PARTS LIST		TITLE		SHEET NO	
CPU		CDC-493		5	
PARTS NO		PARTS NAME		TYPE	
DESCRIPTION		CODE			

R56	RESISTOR	FXD	ERJ-8GEYJ101V	1/8W 100 OHM	SREAG01726
R57	RESISTOR	FXD	ERJ-8GEYJ101V	1/8W 100 OHM	SREAG01726
R58	RESISTOR	FXD	ERJ-8GEYJ101V	1/8W 100 OHM	SREAG01726
R59	RESISTOR	FXD	ERJ-8GEYJ101V	1/8W 100 OHM	SREAG01726
R60	RESISTOR	FXD	ERJ-8GEYJ101V	1/8W 100 OHM	SREAG01726
R61	RESISTOR	FXD	ERJ-8GEYJ101V	1/8W 100 OHM	SREAG01726
R62	RESISTOR	FXD	ERJ-8GEYJ101V	1/8W 100 OHM	SREAG01726
R63	RESISTOR	FXD	ERJ-8GEYJ101V	1/8W 100 OHM	SREAG01726
R64	RESISTOR	FXD	ERJ-8GEYJ101V	1/8W 100 OHM	SREAG01726
R65	RESISTOR	FXD	ERJ-8GEYJ101V	1/8W 100 OHM	SREAG01726
R66	RESISTOR	FXD	ERJ-8GEYJ103V	1/8W 10K OHM	SREAG01750
R68	RESISTOR	FXD	ERJ-8GEYJ103V	1/8W 10K OHM	SREAG01750
R69	RESISTOR	FXD	ERJ-8GEYJ103V	1/8W 10K OHM	SREAG01750
R70	RESISTOR	FXD	ERJ-8GEYJ103V	1/8W 10K OHM	SREAG01750
R71	RESISTOR	FXD	ERJ-8GEYJ103V	1/8W 10K OHM	SREAG01750
RA1	RESISTOR	EXB-F9E103JY			SRZAS00499
RA2	RESISTOR	EXB-F9E103JY			SRZAS00499
RA3	RESISTOR	EXB-F9E103JY			SRZAS00499
RA4	RESISTOR	EXB-LD7104G			SRZAS00180
RJ0	RESISTOR	FXD	ERD-25UJ1R0T	1 OHM	SRDAA01733
RJ1	RESISTOR	FXD	ERD-25UJ1R0T	1 OHM	SRDAA01733
RJ2	RESISTOR	FXD	ERD-25UJ1R0T	1 OHM	SRDAA01733
RJ3	RESISTOR	FXD	ERD-25UJ1R0T	1 OHM	SRDAA01733
RJ4	RESISTOR	FXD	ERD-25UJ1R0T	1 OHM	SRDAA01733
RJ5	RESISTOR	FXD	ERD-25UJ1R0T	1 OHM	SRDAA01733
RJ6	RESISTOR	FXD	ERD-25UJ1R0T	1 OHM	SRDAA01733
RJ7	RESISTOR	FXD	ERD-25UJ1R0T	1 OHM	SRDAA01733
RV1	RESISTOR	VAR	EVN-D1A00B14	10K OHM	SRVAB00324
RV2	RESISTOR	VAR	EVN-D1A00B14	10K OHM	SRVAB00324
TP1	TEST TERMINAL	PCN6-PEA			SJDAAD00364
TP2	TEST TERMINAL	PCN6-PEA			SJDAAD00364
TP3	TEST TERMINAL	PCN6-PEA			SJDAAD00364
TR1	TRANSISTOR	2SC2712Y TE85L			STAAG00186
TR2	TRANSISTOR	2SC3398-TB			STCAZ00011
X1	CRYSTAL	LN-X-0008 F=4.9152MH			SXHA000422



NOTE:
 Unless otherwise specified;
 - Resistance values are in ohm, 1/8W.
 - Capacitance values are in pF.

Figure 6-22 AF AMP Unit (CBD-894L) Schematic Diagram

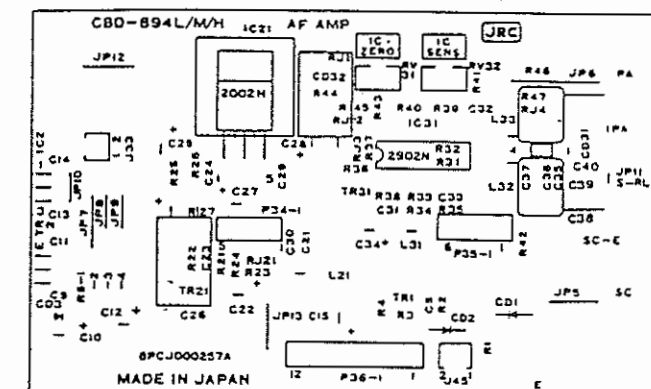


Figure 6-23 AF AMP Unit (CBD-894L) Component Layout

PARTS LIST

AP AMP

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PARTS NO.	PARTS NAME	TYPE	DESCRIPTION	QTY
C21	CAP, FND	CEP	33216X7R1H333K-E-T-P	50V 0.033U
C22	CAP, FND	ELCILT	ECEA1EU220B	50V 0.033U
C23	CAP, FND	CEP	33216X7R1E104K-E-T-P	50V 0.033U
C24	CAP, FND	CEP	33216X7R1H103K-E-T-P	50V 0.033U
C25	CAP, FND	ELCILT	ECE-A1EU101B	50V 0.033U
C26	CAP, FND	ELCILT	ECEA1EU471	50V 0.033U
C27	CAP, FND	TANTAL	202J3502 104K-E	50V 0.033U
C28	CAP, FND	ELCILT	ECEA1EU471	50V 0.033U
C29	CAP, FND	CEP	33216X7R1E104K-E-T-P	50V 0.033U
C30	CAP, FND	CEP	33216X7R1H333K-E-T-P	50V 0.033U
C31	CAP, FND	CEP	33216X7R1H333K-E-T-P	50V 0.033U
C32	CAP, FND	CEP	33216X7R1H333K-E-T-P	50V 0.033U
C33	CAP, FND	CEP	33216X7R1H333K-E-T-P	50V 0.033U
C34	CAP, FND	ELCILT	ECE-A1EU100B	50V 0.033U
C35	CAP, FND	CEP	33216X7R1H333K-E-T-P	50V 0.033U
C36	CAP, FND	CEP	33216X7R1H333K-E-T-P	50V 0.033U
C37	CAP, FND	CEP	33216X7R1H333K-E-T-P	50V 0.033U
C01	DIODE	EM12	200V 1A	200V 1A
C02	DIODE	EM12	200V 1A	200V 1A
C031	MAGNETIC SENSOR	THS103A		
C032	DIODE	1SS226	1ERSL	
IC21	IC	UPC2002W		
IC21Z-1	SILICON SHEET	1C-30A (10-22U)		
IC21Z-2	HEAT SINK	6073B		
IC31	IC	NJM2902N		
J45	CONNECTOR	1L-S-2P-S212-EF		
JP6				
JP7	TIN COATED WIRE	1A-0.6P		
JP8				
JP9				
JP10				
JP11				
JP12	TIN COATED WIRE	1A-0.6P		
JP13	TIN COATED WIRE	1A-0.6P		
L21	COIL	LAL03VB471A	470UH	
L31	COIL	LAL03VB100K	100UH	
L32	COIL	H-6L6J000020		
L33	COIL	H-6L6J000021		
P34	CONNECTOR	H-62CJD00216	5P L=200	
P35	CONNECTOR	H-62CJD43009	6P L=200	
P36	CONNECTOR	H-62CJD43011	12P L=200	
PC1	PCB	H-6PCJD00257A		
PC2	PCB	H-6PDJD000005		
R1	RESISTOR	FXD	178W 10 OHM	
R2	RESISTOR	FXD	178W 10 OHM	
R3	RESISTOR	FXD	178W 10 OHM	
R4	RESISTOR	FXD	178W 2.2K OHM	
R21	RESISTOR	FXD	178W 10K OHM	
R22	RESISTOR	FXD	178W 1K OHM	
R23	RESISTOR	FXD	178W 10K OHM	
R24	RESISTOR	FXD	178W 1K OHM	
R25	RESISTOR	FXD	178W 1K OHM	
R26	RESISTOR	FXD	178W 12 OHM	
R27	RESISTOR	FXD	178W 10K OHM	
R31	RESISTOR	FXD	178W 10K OHM	
R32	RESISTOR	FXD	178W 10K OHM	
R33	RESISTOR	FXD	178W 10K OHM	
R34	RESISTOR	FXD	178W 10K OHM	
R35	RESISTOR	FXD	178W 18K OHM	
R36	RESISTOR	FXD	178W 5.6K OHM	
R37	RESISTOR	FXD	178W 270 OHM	
R38	RESISTOR	FXD	178W 10K OHM	
R39	RESISTOR	FXD	178W 10K OHM	
R40	RESISTOR	FXD	178W 1K OHM	
R41	RESISTOR	FXD	178W 10K OHM	
R42	RESISTOR	FXD	178W 10K OHM	
R43	RESISTOR	FXD	178W 10K OHM	
R44	RESISTOR	FXD	178W 330 OHM	
R45	RESISTOR	FXD	178W 10K OHM	
R46	RESISTOR	FXD	178W 1K OHM	
R47	RESISTOR	FXD	178W 330 OHM	

PARTS LIST					SHEET NO	
AF AMF					3	
TITLE					CBD-894L	
PARTS NO	PARTS NAME	TYPE	DESCRIPTION	CODE		
RJ1	RESISTOR FXD	ERJ-8GEY0R00V	0 OHM	SREAG01775		
RJ2	RESISTOR FXD	ERJ-8GEY0R00V	0 OHM	SREAG01775		
RJ3	RESISTOR FXD	ERJ-8GEY0R00V	0 OHM	SREAG01775		
RJ4	RESISTOR FXD	ERJ-8GEY0R00V	0 OHM	SREAG01775		
RJ21	RESISTOR FXD	ERJ-8GEY0R00V	0 OHM	SREAG01775		
RV31	RESISTOR VAP	EVN-D1A00B14	10K OHM	SRVAB00324		
RV32	RESISTOR VAP	EVN-D1A00B15	100K	SRVAB00314		
TR21	TRANSISTOR	2SC3398-1B		STCAZC0011		
TR31	TRANSISTOR	2SA1162-Y TE85L		STAG00182		

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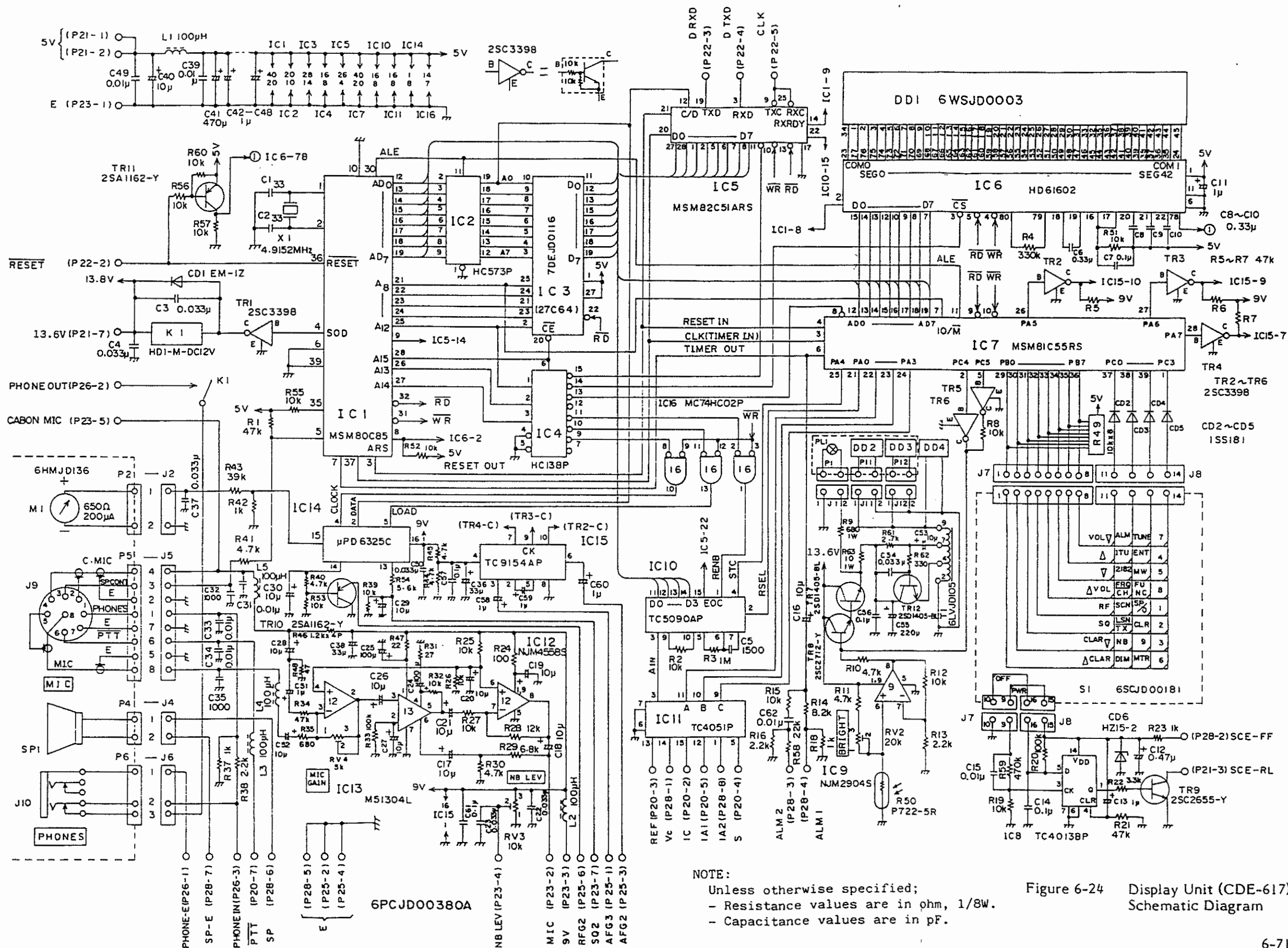


Figure 6-24 Display Unit (CDE-617) Schematic Diagram

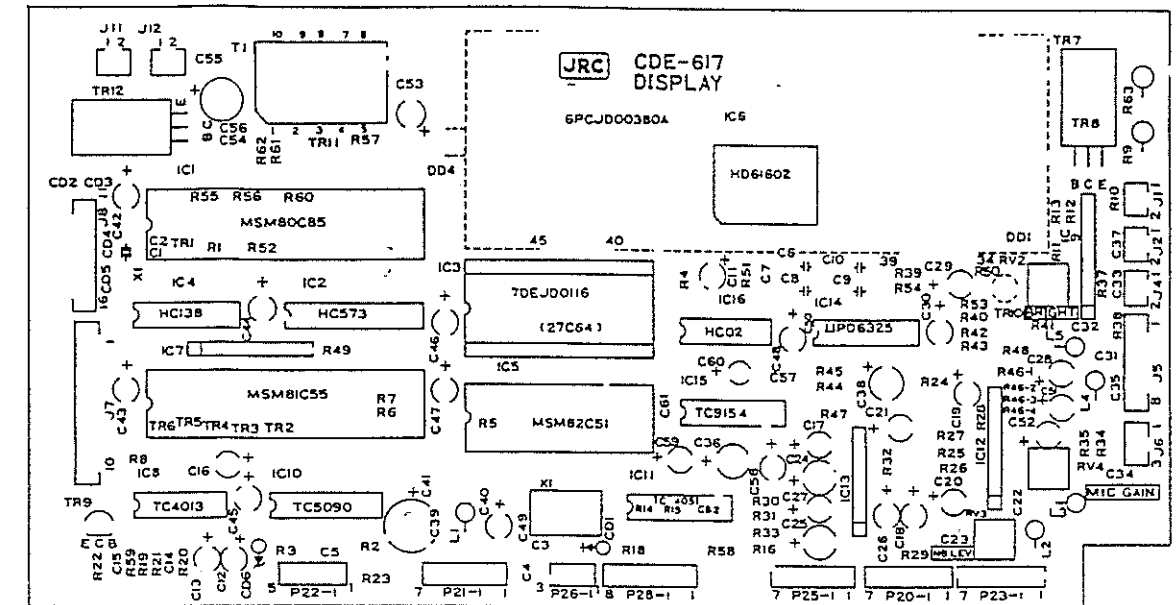


Figure 6-25 Display Unit (CDE-617) Component Layout

PARTS LIST					PARTS LIST				
TITLE CDE-617					TITLE CDE-617				
PARTS NO	PARTS NAME	TYPE	DESCRIPTION	CODE	PARTS NO	PARTS NAME	TYPE	DESCRIPTION	CODE
C1	CAP,FXD CER	C3216CH1H330J-E-TP	33PF	SCAAD00794	C36	CAP,FXD ELCTLT	ECE-A1EU330B		SCAAD01822
C2	CAP,FXD CER	C3216CH1H330J-E-TP	33PF	SCAAD00794	C37	CAP,FXD CER	C3216X7R1H333K-E-TP	50V 0.033U	SCAAD01357
C3	CAP,FXD CER	C3216X7R1H333K-E-TP	50V 0.033U	SCAAD01357	C38	CAP,FXD ELCTLT	ECE-A1EU330B		SCAAD01822
C4	CAP,FXD CER	C3216X7R1H333K-E-TP	50V 0.033U	SCAAD01357	C39	CAP,FXD CER	C3216J81H103K-E-TP	0.01UF	SCAAD00789
C5	CAP,FXD CER	C3216SL1H152J-E-TP	1500PF	SCAAD00791	C40	CAP,FXD ELCTLT	ECE-A1EU100B		SCAAD01864
C6	CAP,FXD PLSTC ECQ-V1H334J23			SCRAA00843	C41	CAP,FXD ELCTLT	ECE-A1EU471B		SCAAD01865
C7	CAP,FXD CER	C3216X7R1E104K-E-TP	0.1U	SCAAD01237	C42	CAP,FXD TANTAL	202L3502 105KB	35V 1UF	SCSAC00982
C8	CAP,FXD PLSTC ECQ-V1H334J23			SCRAA00843	C43	CAP,FXD TANTAL	202L3502 105KB	35V 1UF	SCSAC00982
C9	CAP,FXD PLSTC ECQ-V1H334J23			SCRAA00843	C44	CAP,FXD TANTAL	202L3502 105KB	35V 1UF	SCSAC00982
C10	CAP,FXD PLSTC ECQ-V1H334J23			SCRAA00843	C45	CAP,FXD TANTAL	202L3502 105KB	35V 1UF	SCSAC00982
C11	CAP,FXD TANTAL	202L3502 105KB	35V 1UF	SCSAC00982	C46	CAP,FXD TANTAL	202L3502 105KB	35V 1UF	SCSAC00982
C12	CAP,FXD TANTAL	202L3502 474KB		SCSAC01065	C47	CAP,FXD TANTAL	202L3502 105KB	35V 1UF	SCSAC00982
C13	CAP,FXD TANTAL	202L3502 105KB	35V 1UF	SCSAC00982	C48	CAP,FXD TANTAL	202L3502 105KB	35V 1UF	SCSAC00982
C14	CAP,FXD CER	C3216X7R1E104K-E-TP	0.1U	SCAAD01237	C49	CAP,FXD CER	C3216J81H103K-E-TP	0.01UF	SCAAD00789
C15	CAP,FXD CER	C3216J81H103K-E-TP	0.01UF	SCAAD00789	C50	CAP,FXD CER	C3216X7R1H333K-E-TP	50V 0.033U	SCAAD01357
C16	CAP,FXD ELCTLT	ECE-A1EU100B		SCAAD01864	C51	CAP,FXD TANTAL	202L3502 105KB	35V 1UF	SCSAC00982
C17	CAP,FXD ELCTLT	ECE-A1EU100B		SCAAD01864	C52	CAP,FXD ELCTLT	ECE-A1EU100B		SCAAD01864
C18	CAP,FXD ELCTLT	ECE-A1EU100B		SCAAD01864	C53	CAP,FXD ELCTLT	ECE-A1EU100B		SCAAD01864
C19	CAP,FXD ELCTLT	ECE-A1EU100B		SCAAD01864	C54	CAP,FXD CER	C3216X7R1H333K-E-TP	50V 0.033U	SCAAD01357
C20	CAP,FXD ELCTLT	ECE-A1EU100B		SCAAD01864	C55	CAP,FXD ELCTLT	ECE-A1EU221B	25V 220UF	SCAAD01786
C21	CAP,FXD ELCTLT	ECE-A1EU100B		SCAAD01864	C56	CAP,FXD CER	C3216X7R1E104K-E-TP	0.1U	SCAAD01237
C22	CAP,FXD CER	C3216X7R1H333K-E-TP	50V 0.033U	SCAAD01357	C57	CAP,FXD CER	C3216X7R1E104K-E-TP	0.1U	SCAAD01237
C23	CAP,FXD CER	C3216X7R1H333K-E-TP	50V 0.033U	SCAAD01357	C58	CAP,FXD TANTAL	202L3502 105KB	35V 1UF	SCSAC00982
C24	CAP,FXD ELCTLT	ECE-A1EU101B		SCAAD01813	C59	CAP,FXD TANTAL	202L3502 105KB	35V 1UF	SCSAC00982
C25	CAP,FXD ELCTLT	ECE-A1EU101B		SCAAD01813	C60	CAP,FXD TANTAL	202L3502 105KB	35V 1UF	SCSAC00982
C26	CAP,FXD ELCTLT	ECE-A1EU100B		SCAAD01864	C61	CAP,FXD CER	C3216X7R1E104K-E-TP	0.1U	SCAAD01237
C27	CAP,FXD ELCTLT	ECE-A1EU100B		SCAAD01864	C62	CAP,FXD CER	C3216J81H103K-E-TP	0.01UF	SCAAD00789
C28	CAP,FXD ELCTLT	ECE-A1EU100B		SCAAD01864	C63	DIODE	EM1Z	200V 1A	STXAN00061
C29	CAP,FXD ELCTLT	ECE-A1EU100B		SCAAD01864	C64	DIODE	1SS181 TE85L		STXAD00356
C30	CAP,FXD ELCTLT	ECE-A1EU100B		SCAAD01864	C65	DIODE	1SS181 TE85L		STXAD00356
C31	CAP,FXD CER	C3216J81H103K-E-TP	0.01UF	SCAAD00789	C66	DIODE	HZ15-2RE		STXAE00661
C32	CAP,FXD CER	C3216SL1H102J-E-TP	1000PF	SCAAD00782	D01	INDICATOR	H-6WSJD00003		6WSJD00003
C33	CAP,FXD CER	C3216J81H103K-E-TP	0.01UF	SCAAD00789	D02	LAMP	H-6WEJD00006		6WEJD00006
C34	CAP,FXD CER	C3216J81H103K-E-TP	0.01UF	SCAAD00789					
C35	CAP,FXD CER	C3216SL1H102J-E-TP	1000PF	SCAAD00782					

PARTS LIST

DISPLAY		TITLE		SHEET NO	
PARTS LIST		COE-617		3	
PARTS NO	PART NAME	TYPE	DESCRIPTION	CODE	
D03	LAMP	H-6WEJD00005		6WEJD00005	
D04	LAMP	H-6WEJD00004		6WEJD00004	
IC1	IC	MSM80C85ARS		50DAG00062	
IC2	IC	MC74HC573N		50AAJ00229	
IC3	IC	H-7DEJD0116	MBM27664-30	7DEJD0116	
IC52	ID LABEL	MPNN21186		MPNN21186	
IC6	IC	MC74HC138W		50AAJ00174	
IC5	IC	MSM82C51ARS		50DAG00110	
IC6	IC	HD61602		50DAF00935	
IC7	IC	MSM81C55RS		50DAG00081	
IC8	IC	IC4013BP(NEW)		50DAE00816	
IC9	IC	NJM2904S		50AAM00239	
IC10	IC	IC5090AP		50DAE00396	
IC11	IC	IC4051BP		50DAE00055	
IC12	IC	NJM4558S		50AAM00087	
IC13	IC	MS1304L		50AAB00144	
IC14	IC	UPC6325C		50DAC00447	
IC15	IC	IC9154AP		50DAE01137	
IC16	IC	MC74HC02N		50AAJ00139	
IC53	IC SOCKET	AXS102819	28P	SZJAH00318	
J1	CONNECTOR	IL-S-2P-S212-EF		SJWAD00121	
J2	CONNECTOR	IL-S-2P-S212-EF		SJWAD00121	
J4	CONNECTOR	IL-S-2P-S212-EF		SJWAD00121	
J5	CONNECTOR	IL-S-8P-S212-EF	8PIN	SJWAD00139	
J6	CONNECTOR	IL-S-5P-S212-EF		SJWAD00239	
J7	CONNECTOR	HBL810S-SJ		SJFAF00009	
J8	CONNECTOR	HBL86S-SJ		SJFAF00010	
J9	CONNECTOR	FN214-8S	8P	SJJB000001	
J10	CONNECTOR	S-6782S		SJJAL00029	
J11	CONNECTOR	IL-S-2P-S212-EF		SJWAD00121	
J12	CONNECTOR	IL-S-2P-S212-EF		SJWAD00121	
K1	RELAY	HO1-M-DC12V		SKLAD00574	
L1	COIL	LAL03VB101K		5LCAA00333	
L2	COIL	LAL03VB101K		5LCAA00333	
L3	COIL	LAL03VB101K		5LCAA00333	

PARTS LIST

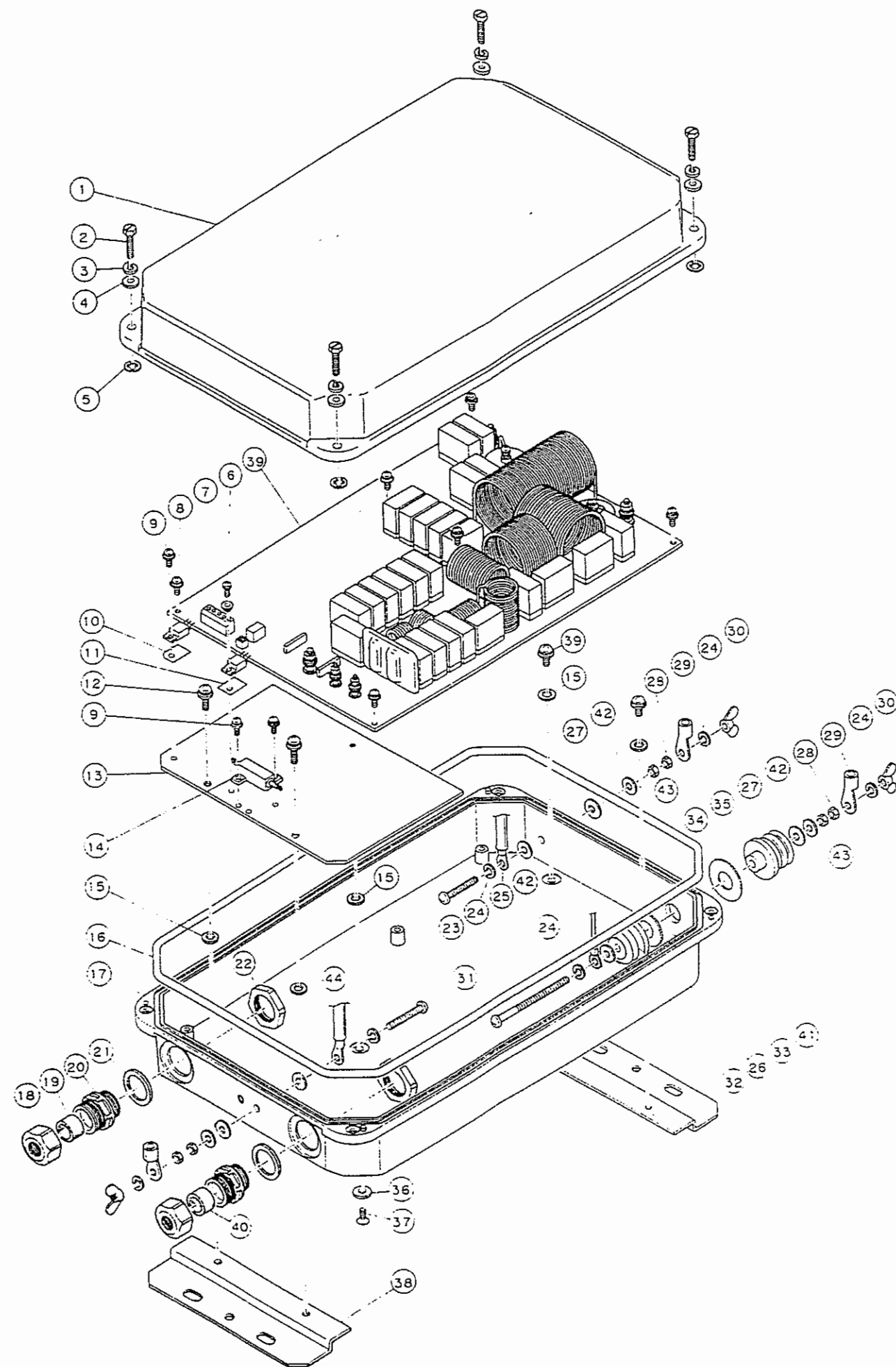
DISPLAY		TITLE		SHEET NO	
PARTS LIST		COE-617		4	
PARTS NO	PART NAME	TYPE	DESCRIPTION	CODE	
L4	COIL	LAL03VB101K		5LCAA00333	
L5	COIL	LAL03VB101K		5LCAA00333	
M1	METER	H-6HMJD00136		6HMJD00136	
P1	CONNECTOR			62ZAB02001	
P2	CONNECTOR			62ZAB02001	
P4	CONNECTOR	H-6ZCJD042008	2P L=200	6ZCJD042008	
P5	CONNECTOR	H-6ZCJD00219	8P L=300	6ZCJD00219	
P6	CONNECTOR	H-6ZCJD042004	3P L=200	6ZCJD042004	
P11	CONNECTOR	H-6ZCJD00242		6ZCJD00242	
P12	CONNECTOR	H-6ZCJD00242		6ZCJD00242	
P20	CONNECTOR	H-6ZCJD043037	7P L=100	6ZCJD043037	
P21	CONNECTOR	H-6ZCJD043037	7P L=100	6ZCJD043037	
P22	CONNECTOR	H-6ZCJD043031	5P L=100	6ZCJD043031	
P23	CONNECTOR	H-6ZCJD00222	7P L=150	6ZCJD00222	
P25	CONNECTOR	H-6ZCJD00217	7P L=100	6ZCJD00217	
P26	CONNECTOR	H-6ZCJD043014	3P L=100	6ZCJD043014	
P28	CONNECTOR	H-6ZCJD043038	8P L=100	6ZCJD043038	
PC1	PCB	H-6PCJD00380A		6PCJD00380	
PL1	LAMP			62ZAB02024	
R1	RESISTOR FXD	ERJ-86EYJ473V		SREAG01758	
R2	RESISTOR FXD	ERJ-86EYJ103V	1/8W 10K OHM	SREAG01750	
R3	RESISTOR FXD	ERJ-86EYJ105V	1/8W 1M OHM	SREAG01774	
R4	RESISTOR FXD	ERJ-86EYJ334V		SREAG01768	
R5	RESISTOR FXD	ERJ-86EYJ473V		SREAG01758	
R6	RESISTOR FXD	ERJ-86EYJ473V		SREAG01758	
R7	RESISTOR FXD	ERJ-86EYJ473V		SREAG01758	
R8	RESISTOR FXD	ERJ-86EYJ103V	1/8W 10K OHM	SREAG01750	
R9	RESISTOR FXD	ERG-1ANJ681	1W 680 OHM	SREAG00365	
R10	RESISTOR FXD	ERJ-86EYJ472V		SREAG01746	
R11	RESISTOR FXD	ERJ-86EYJ472V		SREAG01746	
R12	RESISTOR FXD	ERJ-86EYJ103V	1/8W 10K OHM	SREAG01750	
R13	RESISTOR FXD	ERJ-86EYJ222V	1/8W 2.2K OHM	SREAG01742	
R14	RESISTOR FXD	ERJ-86EYJ822V		SREAG01749	
R15	RESISTOR FXD	ERJ-86EYJ103V	1/8W 10K OHM	SREAG01750	
R16	RESISTOR FXD	ERJ-86EYJ222V	1/8W 2.2K OHM	SREAG01742	

PARTS LIST

PARTS NO		DISPLAY	TITLE		CODE-617		SHEET NO	
PARTS NO		PARTS NAME	TYPE	DESCRIPTION	CODE		5	
R18	RESISTOR	FXD	ERJ-8GEYJ102V	1/8W 1K OHM	SREAG01738			
R19	RESISTOR	FXD	ERJ-8GEYJ103V	1/8W 10K OHM	SREAG01750			
R20	RESISTOR	FXD	ERJ-8GEYJ104V	1/8W 100K OHM	SREAG01762			
R21	RESISTOR	FXD	ERJ-8GEYJ473V		SREAG01758			
R22	RESISTOR	FXD	ERJ-8GEYJ332V	1/8W 3.3K OHM	SREAG01744			
R23	RESISTOR	FXD	ERJ-8GEYJ102V	1/8W 1K OHM	SREAG01738			
R24	RESISTOR	FXD	ERJ-8GEYJ101V	1/8W 100 OHM	SREAG01726			
R25	RESISTOR	FXD	ERJ-8GEYJ103V	1/8W 10K OHM	SREAG01750			
R26	RESISTOR	FXD	ERJ-8GEYJ103V	1/8W 10K OHM	SREAG01750			
R27	RESISTOR	FXD	ERJ-8GEYJ103V	1/8W 10K OHM	SREAG01750			
R28	RESISTOR	FXD	ERJ-8GEYJ123V	1/8W 12K OHM	SREAG01751			
R29	RESISTOR	FXD	ERJ-8GEYJ682V		SREAG01748			
R30	RESISTOR	FXD	ERJ-8GEYJ472V		SREAG01746			
R31	RESISTOR	FXD	ERJ-8GEYJ270V		SREAG01719			
R32	RESISTOR	FXD	ERJ-8GEYJ103V	1/8W 10K OHM	SREAG01750			
R33	RESISTOR	FXD	ERJ-8GEYJ104V	1/8W 100K OHM	SREAG01762			
R34	RESISTOR	FXD	ERJ-8GEYJ473V		SREAG01758			
R35	RESISTOR	FXD	ERJ-8GEYJ681V	1/8W 680 OHM	SREAG01736			
R37	RESISTOR	FXD	ERJ-8GEYJ102V	1/8W 1K OHM	SREAG01738			
R38	RESISTOR	FXD	ERJ-8GEYJ222V	1/8W 2.2K OHM	SREAG01742			
R39	RESISTOR	FXD	ERJ-8GEYJ103V	1/8W 10K OHM	SREAG01750			
R40	RESISTOR	FXD	ERJ-8GEYJ472V		SREAG01746			
R41	RESISTOR	FXD	ERJ-8GEYJ472V		SREAG01746			
R42	RESISTOR	FXD	ERJ-8GEYJ102V	1/8W 1K OHM	SREAG01738			
R43	RESISTOR	FXD	ERJ-8GEYJ393V		SREAG01757			
R44	RESISTOR	FXD	ERJ-8GEYJ472V		SREAG01746			
R45	RESISTOR	FXD	ERJ-8GEYJ472V		SREAG01746			
R46-1	RESISTOR	FXD	ERJ-8GEYJ122V	1/8W 1.2K OHM	SREAG01739			
R46-2	RESISTOR	FXD	ERJ-8GEYJ122V	1/8W 1.2K OHM	SREAG01739			
R46-3	RESISTOR	FXD	ERJ-8GEYJ122V	1/8W 1.2K OHM	SREAG01739			
R46-4	RESISTOR	FXD	ERJ-8GEYJ122V	1/8W 1.2K OHM	SREAG01739			
R47	RESISTOR	FXD	ERJ-8GEYJ220V		SREAG01718			
R48	RESISTOR	FXD	ERJ-8GEYJ470V	1/8W 47 OHM	SREAG01722			
R49	RESISTOR		1HR-8-103JA(2.54)	10K OHM X8	SRZAB00136			
R50	CDS		P722-5R		52JDK00003			

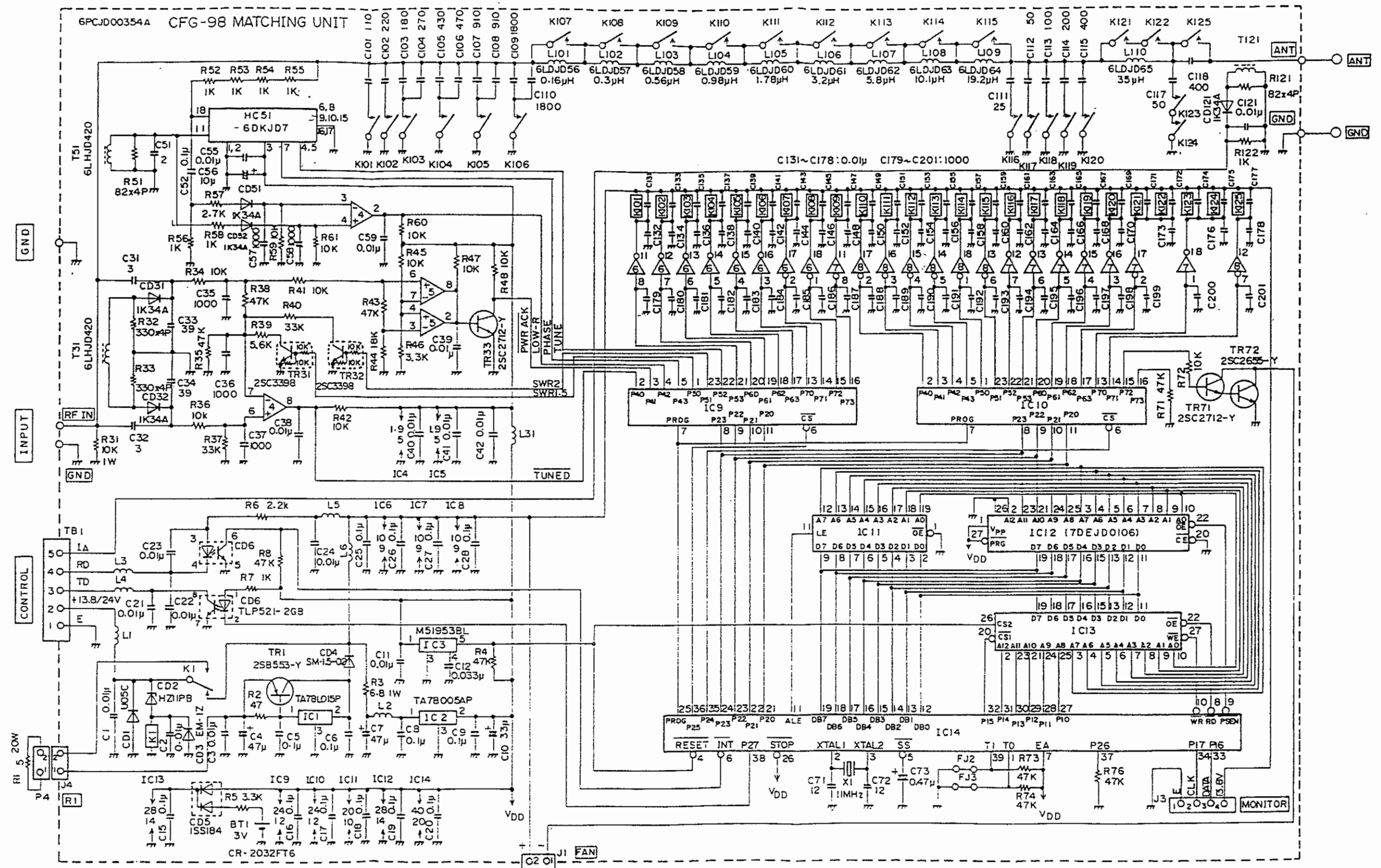
PARTS LIST

PARTS NO		DISPLAY	TITLE		CODE-617		SHEET NO	
PARTS NO		PARTS NAME	TYPE	DESCRIPTION	CODE		6	
R51	RESISTOR	FXD	ERJ-8GEYJ103V	1/8W 10K OHM	SREAG01750			
R52	RESISTOR	FXD	ERJ-8GEYJ103V	1/8W 10K OHM	SREAG01750			
R53	RESISTOR	FXD	ERJ-8GEYJ103V	1/8W 10K OHM	SREAG01750			
R54	RESISTOR	FXD	ERJ-8GEYJ392V	1/8W 3.9K OHM	SREAG01745			
R55	RESISTOR	FXD	ERJ-8GEYJ103V	1/8W 10K OHM	SREAG01750			
R56	RESISTOR	FXD	ERJ-8GEYJ103V	1/8W 10K OHM	SREAG01750			
R57	RESISTOR	FXD	ERJ-8GEYJ103V	1/8W 10K OHM	SREAG01750			
R58	RESISTOR	FXD	ERJ-8GEYJ223V	1/8W 22K OHM	SREAG01754			
R59	RESISTOR	FXD	ERJ-8GEYJ474V		SREAG01770			
R60	RESISTOR	FXD	ERJ-8GEYJ103V	1/8W 10K OHM	SREAG01750			
R61	RESISTOR	FXD	ERJ-8GEYJ272V	1/8W,2.7K OHM	SREAG01743			
R62	RESISTOR	FXD	ERJ-8GEYJ331V	1/8W,330 OHM	SREAG01732			
R63	RESISTOR	FXD	ERG-1ANJ100	1W 10 OHM	SREAG00295			
RV2	RESISTOR	VAR	EVN-D1AA00B24	20K	SRVAB00372			
RV3	RESISTOR	VAR	EVN-D1AA00B14	10K OHM	SRVAB00324			
RV4	RESISTOR	VAR	EVN-D1AA00B33		SRVAB00325			
S1	SWITCH		H-6SCJ000181		6SCJ000181			
SP1	SPEAKER		77F870729-5		SUSBL00004			
T1	TRANSFORMER		H-6LVJ000105		6LVJ000105			
TR1	TRANSISTOR		2SC3398-TB		STCAZ00011			
TR2	TRANSISTOR		2SC3398-TB		STCAZ00011			
TR3	TRANSISTOR		2SC3398-TB		STCAZ00011			
TR4	TRANSISTOR		2SC3398-TB		STCAZ00011			
TR5	TRANSISTOR		2SC3398-TB		STCAZ00011			
TR6	TRANSISTOR		2SC3398-TB		STCAZ00011			
TR7	TRANSISTOR		2SD1405-BL		STDAB00145			
TR8	TRANSISTOR		2SC2712Y TE85L		STAAG00186			
TR9	TRANSISTOR		2SC2655-Y		STCAF00246			
TR10	TRANSISTOR		2SA1162-Y TE85L		STAAG00182			
TR11	TRANSISTOR		2SA1162-Y TE85L		STAAG00182			
TR12	TRANSISTOR		2SD1405-BL		STDAB00145			
X1	CRYSTAL		LN-X-0008 F=4.9152MH		5XHAA00422			



LOCATION	DESCRIPTION	PART NUMBER	QTY	REMARKS
1	CASE (U)	MTV000334	1	
2	SCREW	BRTG032R7	4	HEX. BOLT M5X20SUS
3	SPRING WASHER	BSSW050005	4	M5SUS
4	PLAIN WASHER	BRTG00218	4	M5SUS
5	LOCK WASHER	MTD001806A	4	
6	SCREW	BRTG02776	1	ICN3X5B5
7	INSULATOR COLLAR	5Z2DY00005	1	YC-40B
8	SCREW	B5NCC00088	6	ICN3X8B5
9	SCREW	BRTG02776	1	ICN3X5B5
10	SILICON RUBBER	5Z2K800002	1	TC-30A
11	SILICON RUBBER	5Z2K800002	1	TC-30A
12	SCREW	B5N8050108	2	BNK5X10B5
13	HEAT SINK PLATE	MTB168031	1	
14	RESISTOR	5RHA01141	1	
15	GASKET	MTT010805	5	
16	GASKET	MPK01375	1	
17	CASE (L)	MTV000335	1	
18	CORD GRIP	BRJD00133	1	SCS-10A with (222) and (23)
19	GROMMET	BRNG00213	1	
20	HOUSING	BRJD00133	1	SCS-10A with (222) and (23)
21	GASKET	BRJD00133	1	SCS-10A with (222) and (23)
22	NUT	BRJD00133	1	SCS-10A with (222) and (23)
23	SCREW	B5NKC05030B	1	IN5X30B5
24	SPRING WASHER	BSSW050005	3	SW5
25	EARTH WIRE	MPK00155	1	
26	FIBER WASHER	MPFG00255	1	15X10X0.5
27	GASKET	MTT010805	3	
28	NUT	B5LN05000B	1	IN4B5
29	TERMINAL	5JWBW00005	1	COMPRESSION 14-5
30	WING NUT	B5BN05000B	2	IN5
31	SCREW	BRTG03108	1	IN5X70B5
32	WIRE	MPK00157	1	
33	BUSHING	MYNG00023	1	with (23)
34	GASKET	MTT011642	1	
35	BUSHING	MPNG00023	1	with (23)
36	PLAIN WASHER	B5FW030005	1	
37	SCREW	B5NCC00108	1	ICN3X10B5
38	MOUNTING BRACKET	MTB168032	2	
39	MATCHING UNIT	CFG-98	1	MONW06144
40	GROMMET	BRNG00214	1	For SCS-10A with (222) and (23)
41	FIBER WASHER	MPFG00255	1	15X10X0.5
42	PLAIN WASHER	B5FW05000B	2	IN5B5
43	NUT	B5BN05000B	3	IN5B5
44	EARTH WIRE	MPK00155	1	

Figure 6-26 Antenna Coupler (AC 152)
Assembly Drawing



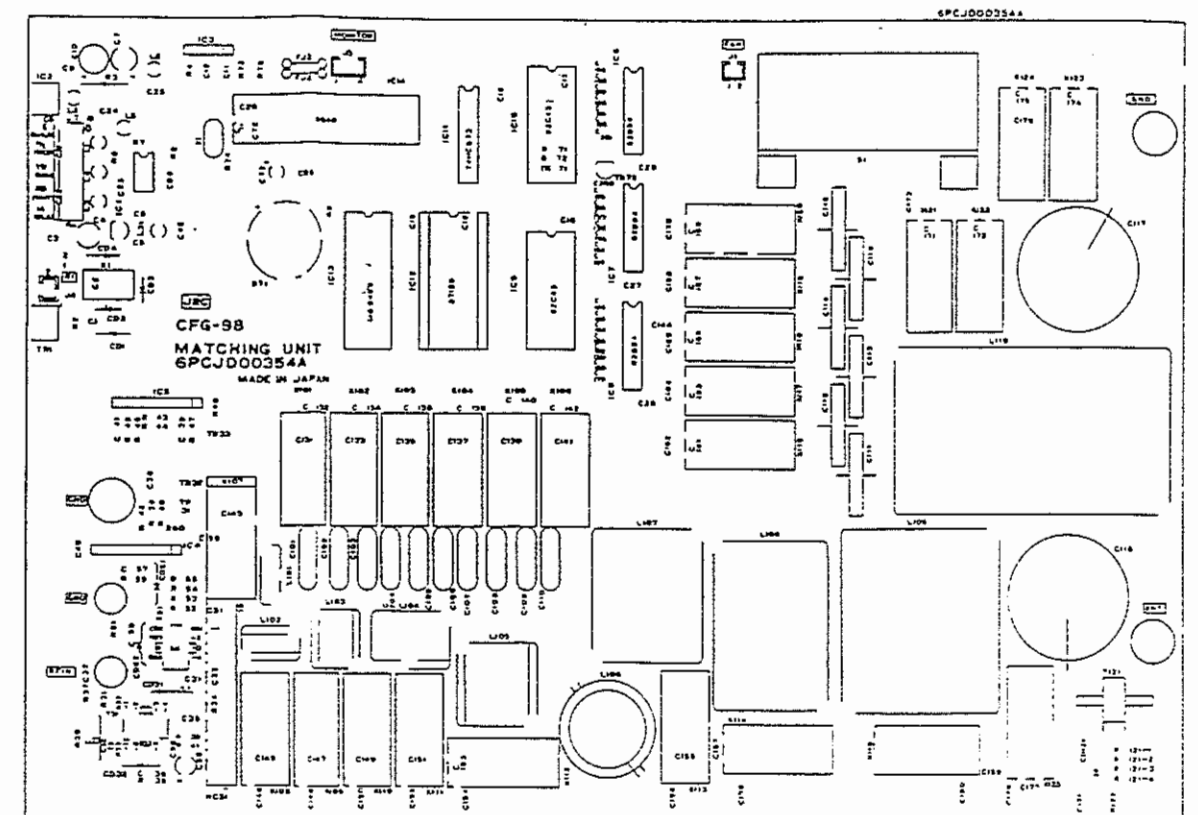


Figure 6-28 Matching Unit (CFG-98) Component Layout

PARTS LIST

MATCHING UNIT				CFG-98		SHEET NO 1	
PARTS NO	PART NAME	TYPE	DESCRIPTION	CODE			
B1	BATT	H-68FJ000006	DC12V	68FJ000006			
B11	BATT	CR-2032FT6	3V 190MAH	52B4000067			
C1	CAP,FXD	CER	C3216JB1H103K-E-TP	0.01UF	5CAAD00789		
C2	CAP,FXD	CER	C3216JB1H103K-E-TP	0.01UF	5CAAD00789		
C3	CAP,FXD	CER	C3216JB1H103K-E-TP	0.01UF	5CAAD00789		
C4	CAP,FXD	ELCILT	ECE-A1HU470B		5CEAA01817		
C5	CAP,FXD	CER	C3216X7R1E104K-E-TP	0.1U	5CAAD01237		
C6	CAP,FXD	CER	C3216X7R1E104K-E-TP	0.1U	5CAAD01237		
C7	CAP,FXD	ELCILT	ECE-A1HU470B		5CEAA01817		
C8	CAP,FXD	CER	C3216X7R1E104K-E-TP	0.1U	5CAAD01237		
C9	CAP,FXD	CER	C3216X7R1E104K-E-TP	0.1U	5CAAD01237		
C10	CAP,FXD	ELCILT	ECE-A1CU330B	33UF 16V	5CEAA01828		
C11	CAP,FXD	CER	C3216JB1H103K-E-TP	0.01UF	5CAAD00789		
C12	CAP,FXD	CER	C3216X7R1H33K-E-TP	50V 0.033U	5CAAD01357		
C15	CAP,FXD	CER	C3216X7R1E104K-E-TP	0.1U	5CAAD01237		
C16	CAP,FXD	CER	C3216X7R1E104K-E-TP	0.1U	5CAAD01237		
C17	CAP,FXD	CER	C3216X7R1E104K-E-TP	0.1U	5CAAD01237		
C18	CAP,FXD	CER	C3216X7R1E104K-E-TP	0.1U	5CAAD01237		
C19	CAP,FXD	CER	C3216X7R1E104K-E-TP	0.1U	5CAAD01237		
C20	CAP,FXD	CER	C3216X7R1E104K-E-TP	0.1U	5CAAD01237		
C23	CAP,FXD	CER	C3216JB1H103K-E-TP	0.01UF	5CAAD00789		
C24	CAP,FXD	CER	C3216JB1H103K-E-TP	0.01UF	5CAAD00789		
C25	CAP,FXD	CER	C3216X7R1E104K-E-TP	0.1U	5CAAD01237		
C26	CAP,FXD	CER	C3216X7R1E104K-E-TP	0.1U	5CAAD01237		
C27	CAP,FXD	CER	C3216X7R1E104K-E-TP	0.1U	5CAAD01237		
C28	CAP,FXD	CER	C3216X7R1E104K-E-TP	0.1U	5CAAD01237		
C31	CAP,FXD	CER	CC45SL2H030CY	500V3PF	5CAAB00843		
C32	CAP,FXD	CER	CC45SL2H030CY	500V3PF	5CAAB00843		
C33	CAP,FXD	CER	C3216CH1H390J-E-TP		5CAAD00875		
C34	CAP,FXD	CER	C3216CH1H390J-E-TP		5CAAD00875		
C35	CAP,FXD	CER	C3216JB1H102K-E-TP	1000PF	5CAAD01073		
C36	CAP,FXD	CER	C3216JB1H102K-E-TP	1000PF	5CAAD01073		
C37	CAP,FXD	CER	C3216JB1H102K-E-TP	1000PF	5CAAD01073		
C38	CAP,FXD	CER	C3216JB1H103K-E-TP	0.01UF	5CAAD00789		
C39	CAP,FXD	CER	C3216JB1H103K-E-TP	0.01UF	5CAAD00789		

PARTS LIST

MATCHING UNIT				CFG-98		SHEET NO 2	
PARTS NO	PART NAME	TYPE	DESCRIPTION	CODE			
C40	CAP,FXD	CER	C3216JB1H103K-E-TP	0.01UF	5CAAD00789		
C41	CAP,FXD	CER	C3216JB1H103K-E-TP	0.01UF	5CAAD00789		
C51	CAP,FXD	CER	C3216CH1H020C-E-TP	2PF	5CAAD00798		
C52	CAP,FXD	CER	C3216X7R1E104K-E-TP	0.1U	5CAAD01237		
C55	CAP,FXD	CER	C3216JB1H103K-E-TP	0.01UF	5CAAD00789		
C56	CAP,FXD	ELCILT	ECE-A1EU100B		5CEAA01864		
C57	CAP,FXD	CER	C3216B1H102K-E-TP	1000PF	5CAAD01073		
C58	CAP,FXD	CER	C3216B1H102K-E-TP	1000PF	5CAAD01073		
C59	CAP,FXD	CER	C3216JB1H103K-E-TP	0.01UF	5CAAD00789		
C71	CAP,FXD	CER	C3216CH1H120J-E-TP	12P	5CAAD00784		
C72	CAP,FXD	CER	C3216CH1H120J-E-TP	12P	5CAAD00784		
C73	CAP,FXD	TANTAL	202L3502 474KB		5CSAC01065		
C101	CAP,FXD	MICA	DM19C111J5	500V 110P	5CMAB01578		
C102	CAP,FXD	MICA	DM19C221J5	220PF 500V	5CMAB00182		
C103	CAP,FXD	MICA	DM19C181J5	500V 180PF	5CMAB00301		
C104	CAP,FXD	MICA	DM19C271J5	270PF 500V	5CMAB00184		
C105	CAP,FXD	MICA	DM19C431J5	430PF 500V	5CMAB00189		
C106	CAP,FXD	MICA	DM19C471J5	470PF 500V	5CMAB00190		
C107	CAP,FXD	MICA	DM19C911J5	500V 910PF	5CMAB00277		
C108	CAP,FXD	MICA	DM19C911J5	500V 910PF	5CMAB00277		
C109	CAP,FXD	MICA	DM19C182J5	500V 1800PF	5CMAB00148		
C110	CAP,FXD	MICA	DM19C182J5	500V 1800PF	5CMAB00148		
C111	CAP,FXD	CER	RDA20-25PF		5CCAG00022		
C112	CAP,FXD	CER	RDA20-50PF		5CCAG00023		
C113	CAP,FXD	CER	RDA20-100PF		5CCAG00024		
C114	CAP,FXD	CER	RDA20-200PF		5CCAG00025		
C115	CAP,FXD	CER	RDA20-400PF		5CCAG00029		
C117	CAP,FXD	CER	RDA30-50PF		5CCAG00028		
C118	CAP,FXD	CER	RDA30-400PF		5CCAG00027		
C121	CAP,FXD	CER	C3216JB1H103K-E-TP	0.01UF	5CAAD00789		
C131	CAP,FXD	CER	C3216JB1H103K-E-TP	0.01UF	5CAAD00789		
C132	CAP,FXD	CER	C3216JB1H103K-E-TP	0.01UF	5CAAD00789		
C133	CAP,FXD	CER	C3216JB1H103K-E-TP	0.01UF	5CAAD00789		
C134	CAP,FXD	CER	C3216JB1H103K-E-TP	0.01UF	5CAAD00789		
C135	CAP,FXD	CER	C3216JB1H103K-E-TP	0.01UF	5CAAD00789		

PARTS LIST

MATCHING UNIT TITLE CFG-98 SHEET NO 3

PARTS NO	PARTS NAME	TYPE	DESCRIPTION	CODE
C136	CAP,FXD	CER	C3216JB1H103K-E-TP	0.01UF
C137	CAP,FXD	CER	C3216JB1H103K-E-TP	0.01UF
C138	CAP,FXD	CER	C3216JB1H103K-E-TP	0.01UF
C139	CAP,FXD	CER	C3216JB1H103K-E-TP	0.01UF
C140	CAP,FXD	CER	C3216JB1H103K-E-TP	0.01UF
C141	CAP,FXD	CER	C3216JB1H103K-E-TP	0.01UF
C142	CAP,FXD	CER	C3216JB1H103K-E-TP	0.01UF
C143	CAP,FXD	CER	C3216JB1H103K-E-TP	0.01UF
C144	CAP,FXD	CER	C3216JB1H103K-E-TP	0.01UF
C145	CAP,FXD	CER	C3216JB1H103K-E-TP	0.01UF
C146	CAP,FXD	CER	C3216JB1H103K-E-TP	0.01UF
C147	CAP,FXD	CER	C3216JB1H103K-E-TP	0.01UF
C148	CAP,FXD	CER	C3216JB1H103K-E-TP	0.01UF
C149	CAP,FXD	CER	C3216JB1H103K-E-TP	0.01UF
C150	CAP,FXD	CER	C3216JB1H103K-E-TP	0.01UF
C151	CAP,FXD	CER	C3216JB1H103K-E-TP	0.01UF
C152	CAP,FXD	CER	C3216JB1H103K-E-TP	0.01UF
C153	CAP,FXD	CER	C3216JB1H103K-E-TP	0.01UF
C154	CAP,FXD	CER	C3216JB1H103K-E-TP	0.01UF
C155	CAP,FXD	CER	C3216JB1H103K-E-TP	0.01UF
C156	CAP,FXD	CER	C3216JB1H103K-E-TP	0.01UF
C157	CAP,FXD	CER	C3216JB1H103K-E-TP	0.01UF
C158	CAP,FXD	CER	C3216JB1H103K-E-TP	0.01UF
C159	CAP,FXD	CER	C3216JB1H103K-E-TP	0.01UF
C160	CAP,FXD	CER	C3216JB1H103K-E-TP	0.01UF
C161	CAP,FXD	CER	C3216JB1H103K-E-TP	0.01UF
C162	CAP,FXD	CER	C3216JB1H103K-E-TP	0.01UF
C163	CAP,FXD	CER	C3216JB1H103K-E-TP	0.01UF
C164	CAP,FXD	CER	C3216JB1H103K-E-TP	0.01UF
C165	CAP,FXD	CER	C3216JB1H103K-E-TP	0.01UF
C166	CAP,FXD	CER	C3216JB1H103K-E-TP	0.01UF
C167	CAP,FXD	CER	C3216JB1H103K-E-TP	0.01UF
C168	CAP,FXD	CER	C3216JB1H103K-E-TP	0.01UF
C169	CAP,FXD	CER	C3216JB1H103K-E-TP	0.01UF
C170	CAP,FXD	CER	C3216JB1H103K-E-TP	0.01UF

PARTS LIST

MATCHING UNIT TITLE CFG-98 SHEET NO 4

PARTS NO	PARTS NAME	TYPE	DESCRIPTION	CODE
C171	CAP,FXD	CER	C3216JB1H103K-E-TP	0.01UF
C172	CAP,FXD	CER	C3216JB1H103K-E-TP	0.01UF
C173	CAP,FXD	CER	C3216JB1H103K-E-TP	0.01UF
C174	CAP,FXD	CER	C3216JB1H103K-E-TP	0.01UF
C175	CAP,FXD	CER	C3216JB1H103K-E-TP	0.01UF
C176	CAP,FXD	CER	C3216JB1H103K-E-TP	0.01UF
C177	CAP,FXD	CER	C3216JB1H103K-E-TP	0.01UF
C178	CAP,FXD	CER	C3216JB1H103K-E-TP	0.01UF
C179	CAP,FXD	CER	C3216JB1H103K-E-TP	0.01UF
C180	CAP,FXD	CER	C3216JB1H103K-E-TP	0.01UF
C181	CAP,FXD	CER	C3216JB1H103K-E-TP	0.01UF
C182	CAP,FXD	CER	C3216JB1H103K-E-TP	0.01UF
C183	CAP,FXD	CER	C3216JB1H103K-E-TP	0.01UF
C184	CAP,FXD	CER	C3216JB1H103K-E-TP	0.01UF
C185	CAP,FXD	CER	C3216JB1H103K-E-TP	0.01UF
C186	CAP,FXD	CER	C3216JB1H103K-E-TP	0.01UF
C187	CAP,FXD	CER	C3216JB1H103K-E-TP	0.01UF
C188	CAP,FXD	CER	C3216JB1H103K-E-TP	0.01UF
C189	CAP,FXD	CER	C3216JB1H103K-E-TP	0.01UF
C190	CAP,FXD	CER	C3216JB1H103K-E-TP	0.01UF
C191	CAP,FXD	CER	C3216JB1H103K-E-TP	0.01UF
C192	CAP,FXD	CER	C3216JB1H103K-E-TP	0.01UF
C193	CAP,FXD	CER	C3216JB1H103K-E-TP	0.01UF
C194	CAP,FXD	CER	C3216JB1H103K-E-TP	0.01UF
C195	CAP,FXD	CER	C3216JB1H103K-E-TP	0.01UF
C196	CAP,FXD	CER	C3216JB1H103K-E-TP	0.01UF
C197	CAP,FXD	CER	C3216JB1H103K-E-TP	0.01UF
C198	CAP,FXD	CER	C3216JB1H103K-E-TP	0.01UF
C199	CAP,FXD	CER	C3216JB1H103K-E-TP	0.01UF
C200	CAP,FXD	CER	C3216JB1H103K-E-TP	0.01UF
C201	CAP,FXD	CER	C3216JB1H103K-E-TP	0.01UF
C01	DIODE	U05C		
C02	DIODE	H211PB		
C03	DIODE	EM1Z		
C04	DIODE	SM-1.5-02		

PARTS LIST

MATCHING UNIT TITLE C-6-98 SHEET NO 6

PARTS NO	PARTS NAME	TYPE	DESCRIPTION	QUANTITY
K105	RELAY	G2R-1117P-V-US DC12V		SKLAF00523
K106	RELAY	G2R-1117P-V-US DC12V		SKLAF00523
K107	RELAY	G2R-1117P-V-US DC12V		SKLAF00523
K108	RELAY	G2R-1117P-V-US DC12V		SKLAF00523
K109	RELAY	G2R-1117P-V-US DC12V		SKLAF00523
K110	RELAY	G2R-1117P-V-US DC12V		SKLAF00523
K111	RELAY	G2R-1117P-V-US DC12V		SKLAF00523
K112	RELAY	G2R-1117P-V-US DC12V		SKLAF00523
K113	RELAY	G2R-1117P-V-US DC12V		SKLAF00523
K114	RELAY	G2R-1117P-V-US DC12V		SKLAF00523
K115	RELAY	G2R-1117P-V-US DC12V		SKLAF00523
K116	RELAY	G2R-1117P-V-US DC12V		SKLAF00523
K117	RELAY	G2R-1117P-V-US DC12V		SKLAF00523
K118	RELAY	G2R-1117P-V-US DC12V		SKLAF00523
K119	RELAY	G2R-1117P-V-US DC12V		SKLAF00523
K120	RELAY	G2R-1117P-V-US DC12V		SKLAF00523
K121	RELAY	G2R-1117P-V-US DC12V		SKLAF00523
K122	RELAY	G2R-1117P-V-US DC12V		SKLAF00523
K123	RELAY	G2R-1117P-V-US DC12V		SKLAF00523
K124	RELAY	G2R-1117P-V-US DC12V		SKLAF00523
K125	RELAY	G2R-1117P-V-US DC12V		SKLAF00523
L1	COIL	FBA04VA600VB-00		SLCAA00432
L2	COIL	FBA04VA600VB-00		SLCAA00432
L3	COIL	FBA04VA600VB-00		SLCAA00432
L4	COIL	FBA04VA600VB-00		SLCAA00432
L5	COIL	FBA04VA600VB-00		SLCAA00432
L6	COIL	FBA04VA600VB-00		SLCAA00432
L31	COIL	FBA04VA600VB-00		SLCAA00432
L101	COIL	H-6LDJ000056	0.16UH	6LDJ000056
L102	COIL	H-6LDJ000057	0.3UH	6LDJ000057
L103	COIL	H-6LDJ000058	0.56UH	6LDJ000058
L104	COIL	H-6LDJ000059	0.98UH	6LDJ000059
L105	COIL	H-6LDJ000060	1.78UH	6LDJ000060
L106	COIL	H-6LDJ000061	3.2UH	6LDJ000061
L107	COIL	H-6LDJ000062	5.8UH	6LDJ000062

PARTS LIST

MATCHING UNIT TITLE C-6-98 SHEET NO 5

PARTS NO	PARTS NAME	TYPE	DESCRIPTION	QUANTITY
CD5	DIODE	1S5184 TE85L		5TYA000290
CD6	PHOTOCOUP-LER	1LPS21-2-GB		5TYA000234
CD31	DIODE	1K34A		5TYA000001
CD32	DIODE	1K34A		5TYA000001
CD51	DIODE	1K34A		5TYA000001
CD52	DIODE	1K34A		5TYA000001
CD121	DIODE	1K34A		5TYA000001
FJ2		6ZZAB10000		6ZZAB10000
FJ3		6ZZAB10000		6ZZAB10000
HCS1	HC	H-6DKJ000007		6DKJ000007
IC1	IC	TA78L01SAP	15V	5DAAD00066
IC2	IC	TA78005AP		5DAAD00082
IC22	SILICON SHEET	IC-30A (TO-220)		5ZKRB00002
IC3	IC	MS1953BL		5DAAB00150
IC4	IC	NJM2903S		5DAAN00088
IC5	IC	NJM2903S		5DAAN00088
IC6	IC	TD62084AP		5DDAE00546
IC7	IC	TD62084AP		5DDAE00546
IC8	IC	TD62084AP		5DDAE00546
IC9	IC	UPD82C43C		5DDAC00400
IC10	IC	UPD82C43C		5DDAC00400
IC11	IC	HC74HC573N		5DAAJ00229
IC12	IC	MBM2764-30		5DDAT00105
IC122	ID LABEL	MPNN21173		MPNN21173
IC13	IC	HM6264ALP-15		5DAAG00380
IC14	IC	UP880C40HC		5DDAC00635
IC512	SOCKET	IC-05-028-3601P		5ZJCK00056
J1	CONNECTOR	IL-S-2P-S212-EF		5JWAD00121
J3	CONNECTOR	IL-S-4P-S212-EF	4PIN	5JWAG00183
J4	CONNECTOR	IL-S-2P-S212-EF		5JWAD00121
K1	RELAY	HD1-M-DC12V		SKLAR00574
K101	RELAY	G2R-1117P-V-US DC12V		SKLAF00523
K102	RELAY	G2R-1117P-V-US DC12V		SKLAF00523
K103	RELAY	G2R-1117P-V-US DC12V		SKLAF00523
K104	RELAY	G2R-1117P-V-US DC12V		SKLAF00523

PARTS LIST				TITLE - CPG-98				SHEET NO			
MATCHING UNIT				TITLE - CPG-98				SHEET NO			
PARTS NO.	PARTS NAME	TYPE	DESCRIPTION	CODE	PARTS NO.	PARTS NAME	TYPE	DESCRIPTION	CODE	PARTS NO.	PARTS NAME
L108	COIL	M-6LJDJ000063	10.1UH	6LJDJ000063	R47	RESISTOR	FXD	ERJ-8GEYJ103V	1/8W 10K OHM	SREAG01750	RESISTOR
L109	COIL	M-6LJDJ000064	19.2UH	6LJDJ000064	R48	RESISTOR	FXD	ERJ-8GEYJ103V	1/8W 10K OHM	SREAG01750	RESISTOR
L110	COIL	M-6LJDJ000065	35UH	6LJDJ000065	R51-1	RESISTOR	FXD	ERJ-8GEYJ820V	1/8W 82 OHM	SREAG01725	RESISTOR
P4	CONNECTOR	M-6ZCJ840001		6ZCJ840001	R51-2	RESISTOR	FXD	ERJ-8GEYJ820V	1/8W 82 OHM	SREAG01725	RESISTOR
PC1	PCB	M-6PCJ500354		6PCJ500354	R51-3	RESISTOR	FXD	ERJ-8GEYJ820V	1/8W 82 OHM	SREAG01725	RESISTOR
R1	RESISTOR	RETDG5 OHM J		5RHA01141	R51-4	RESISTOR	FXD	ERJ-8GEYJ820V	1/8W 82 OHM	SREAG01725	RESISTOR
R2	RESISTOR	ERJ-8GEYJ470V	1/8W 47 OHM	SREAG01722	R52	RESISTOR	FXD	ERJ-8GEYJ102V	1/8W 1K OHM	SREAG01738	RESISTOR
R3	RESISTOR	ERX-1ANJ6R8	1W 6.8 OHM	SREAG00760	P53	RESISTOR	FXD	ERJ-8GEYJ102V	1/8W 1K OHM	SREAG01738	RESISTOR
R4	RESISTOR	ERJ-8GEYJ472V		SREAG01746	R54	RESISTOR	FXD	ERJ-8GEYJ102V	1/8W 1K OHM	SREAG01738	RESISTOR
R5	RESISTOR	EPJ-8GEYJ332V	1/8W 3.3K OHM	SREAG01744	R55	RESISTOR	FXD	ERJ-8GEYJ102V	1/8W 1K OHM	SREAG01738	RESISTOR
R6	RESISTOR	ERJ-8GEYJ222V	1/8W 2.2K OHM	SREAG01742	P56	RESISTOR	FXD	ERJ-8GEYJ102V	1/8W 1K OHM	SREAG01738	RESISTOR
R7	RESISTOR	ERJ-8GEYJ102V	1/8W 1K OHM	SREAG01738	R57	RESISTOR	FXD	ERJ-8GEYJ272V	1/8W 2.7K OHM	SREAG01743	RESISTOR
R8	RESISTOR	ERJ-8GEYJ472V		SREAG01746	R58	RESISTOR	FXD	ERJ-8GEYJ102V	1/8W 1K OHM	SREAG01738	RESISTOR
R31	RESISTOR	ERG-1ANJ103		SREAG00808	R59	RESISTOR	FXD	ERJ-8GEYJ103V	1/8W 10K OHM	SREAG01750	RESISTOR
R32-1	RESISTOR	ERJ-8GEYJ331V	1/8W 330 OHM	SREAG01732	R60	RESISTOR	FXD	ERJ-8GEYJ103V	1/8W 10K OHM	SREAG01750	RESISTOR
R32-2	RESISTOR	ERJ-8GEYJ331V	1/8W 330 OHM	SREAG01732	R61	RESISTOR	FXD	ERJ-8GEYJ103V	1/8W 10K OHM	SREAG01750	RESISTOR
R32-3	RESISTOR	ERJ-8GEYJ331V	1/8W 330 OHM	SREAG01732	R71	RESISTOR	FXD	ERJ-8GEYJ473V		SREAG01758	RESISTOR
R32-4	RESISTOR	ERJ-8GEYJ331V	1/8W 330 OHM	SREAG01732	R72	RESISTOR	FXD	ERJ-8GEYJ103V	1/8W 10K OHM	SREAG01750	RESISTOR
R33-1	RESISTOR	ERJ-8GEYJ331V	1/8W 330 OHM	SREAG01732	R73	RESISTOR	FXD	ERJ-8GEYJ473V		SREAG01758	RESISTOR
R33-2	RESISTOR	ERJ-8GEYJ331V	1/8W 330 OHM	SREAG01732	R74	RESISTOR	FXD	ERJ-8GEYJ473V		SREAG01758	RESISTOR
R33-3	RESISTOR	ERJ-8GEYJ331V	1/8W 330 OHM	SREAG01732	R76	RESISTOR	FXD	ERJ-8GEYJ473V		SREAG01758	RESISTOR
R33-4	RESISTOR	ERJ-8GEYJ331V	1/8W 330 OHM	SREAG01732	R121-1	RESISTOR	FXD	ERJ-8GEYJ820V	1/8W 82 OHM	SREAG01725	RESISTOR
R34	RESISTOR	ERJ-8GEYJ103V	1/8W 10K OHM	SREAG01750	R121-2	RESISTOR	FXD	ERJ-8GEYJ820V	1/8W 82 OHM	SREAG01725	RESISTOR
R35	RESISTOR	ERJ-8GEYJ473V		SREAG01758	R121-3	RESISTOR	FXD	ERJ-8GEYJ820V	1/8W 82 OHM	SREAG01725	RESISTOR
R36	RESISTOR	ERJ-8GEYJ103V	1/8W 10K OHM	SREAG01750	R121-4	RESISTOR	FXD	ERJ-8GEYJ820V	1/8W 82 OHM	SREAG01725	RESISTOR
R37	RESISTOR	ERJ-8GEYJ333V		SREAG01756	R122	RESISTOR	FXD	ERJ-8GEYJ103V	1/8W 10K OHM	SREAG01750	RESISTOR
R38	RESISTOR	ERJ-8GEYJ473V		SREAG01758	T31	RF XFMR		H-6LHJ000420		6LHJ000420	6LHJ000420
R39	RESISTOR	ERJ-8GEYJ562V	1/8W 5.6K OHM	SREAG01747	T51	RF XFMR		H-6LHJ000420		6LHJ000420	6LHJ000420
R40	RESISTOR	ERJ-8GEYJ333V		SREAG01756	T121	COIL		SK-5W-4	48UH	5LWAJ00001	5LWAJ00001
R41	RESISTOR	EPJ-8GEYJ103V	1/8W 10K OHM	SREAG01750							
R42	RESISTOR	ERJ-8GEYJ103V	1/8W 10K OHM	SREAG01750	TB1	TERMINAL		ML-35A-5P	5P	5JTAE00394	5JTAE00394
R43	RESISTOR	ERJ-8GEYJ473V		SREAG01758	TR1	TRANSISTOR		2SB553-Y		5TBAE00036	5TBAE00036
R44	RESISTOR	EPJ-8GEYJ123V	1/8W 12K OHM	SREAG01751	TR12-1	SILICON SHEET		TC-30A (TO-220)		5ZK800002	5ZK800002
R45	RESISTOR	FRJ-8GEYJ103V	1/8W 10K OHM	SREAG01750	TR12-2	BUSHING		YC-40B		5ZD800005	5ZD800005
R46	RESISTOR	ERJ-8GEYJ332V	1/8W 3.3K OHM	SREAG01744	TR31	TRANSISTOR		2SC3398-TB		5TCAZ00011	5TCAZ00011

PARTS LIST		MATCHING UNIT		TITLE		CFG-98		SHEET NO	
PARTS NO	PARTS NAME	TYPE	DESCRIPTION	CODE					
TR32	TRANSISTOR	2SC3398-TB		51CAZD0011					
TR33	TRANSISTOR	2SC2712Y TE85L		51AG00186					
TR71	TRANSISTOR	2SC2712Y TE85L		51AG00186					
TR72	TRANSISTOR	2SC2655-Y		51CAF00246					
W1	COAXIAL CABLE	RG-58/U		2661111180					
W2	EARTH WIRE	TBC-1X10		2752100002					
W3	P-E WIRE	PE-7/0.32-(CLEAR)		2284100902					
X1	CRYSTAL	LN-X-008F=11MHZ	F=11MHZ	5XHA00783					

16

15

10

14

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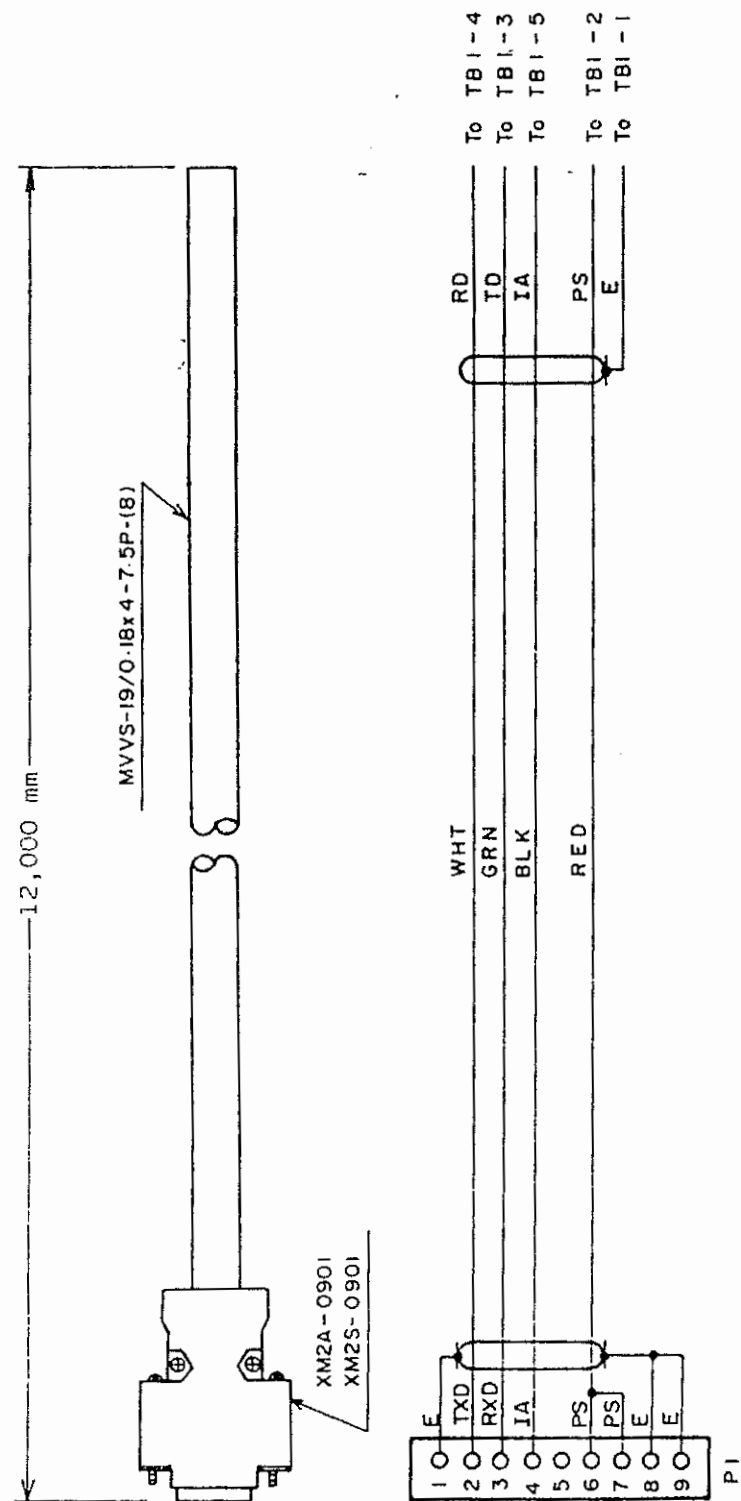


Figure 6-29 Control Cable (CFQ-2858-012) Assembly Drawing

PARTS LIST				CONTROL CABLE		CF8-2858-012		SHEET NO	
PARTS NO				PARTS NAME		QTY		DESCRIPTION	
P1				PLUG		XM2A-0901		9P	
P12				HORN		XM2S-0901		9P	
W1				CABLE		MVVS-20/0.18x4-7.8P-(8)		2237100832	

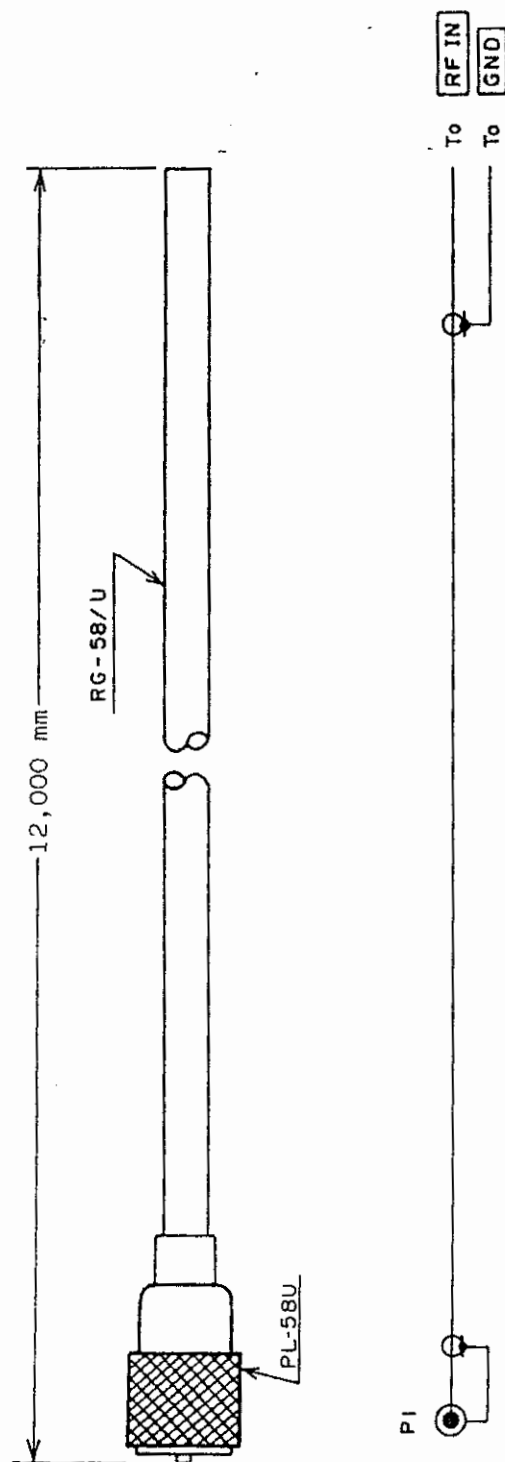


Figure 6-30 RF Cable (CFQ-2859-012) Assembly Drawing

PART LIST					
RF CABLE		TITLE CPO-2859-012		SHEET NO. 1	
PARTS NO	PARTS NAME	TYPE	DESCRIPTION	CODE	
P1	CONNECTOR	FM-102	PL-58U	SJ4BK00019	
M1	COAXIAL CABLE	RG-58/U		260111180	

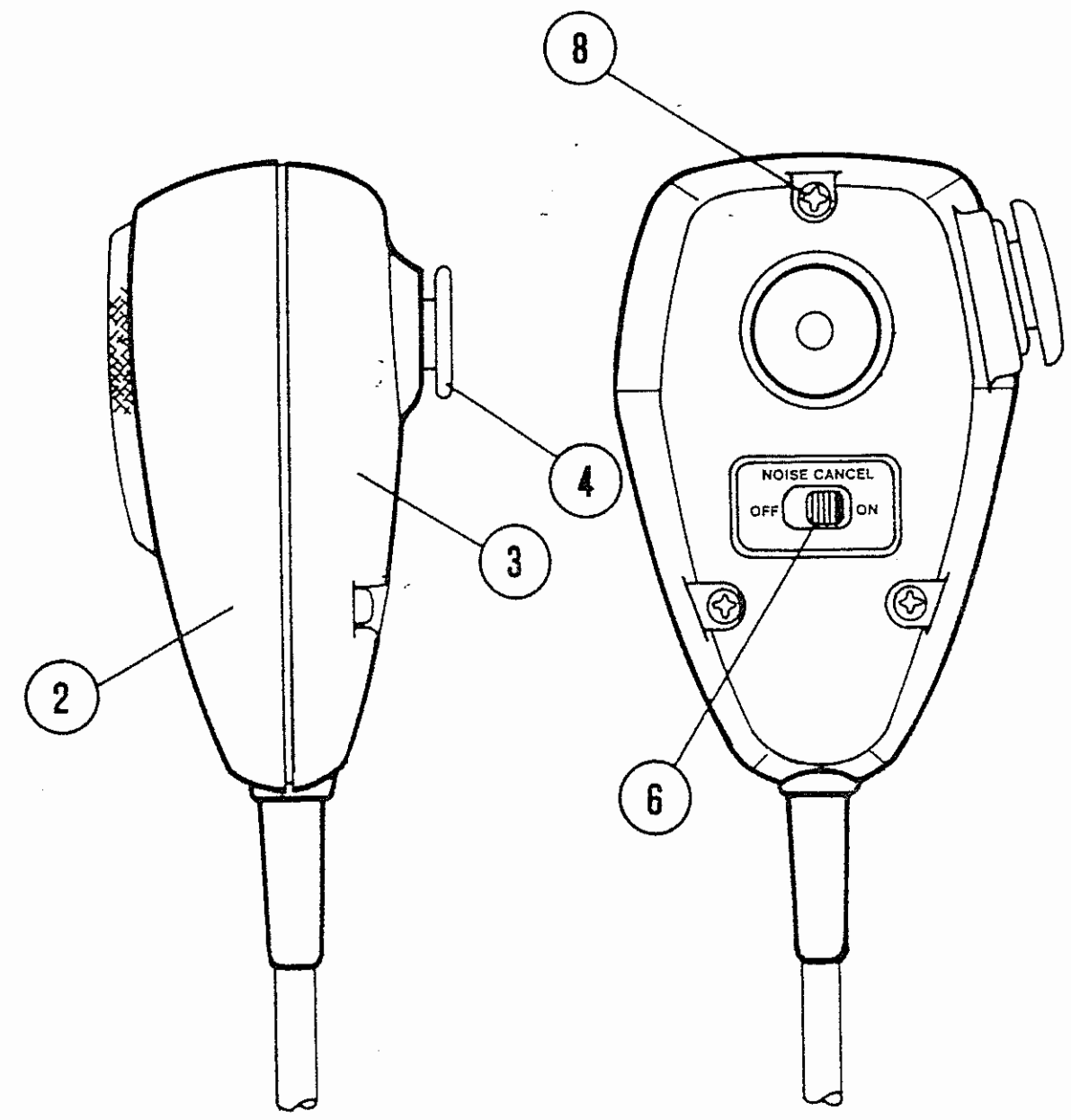
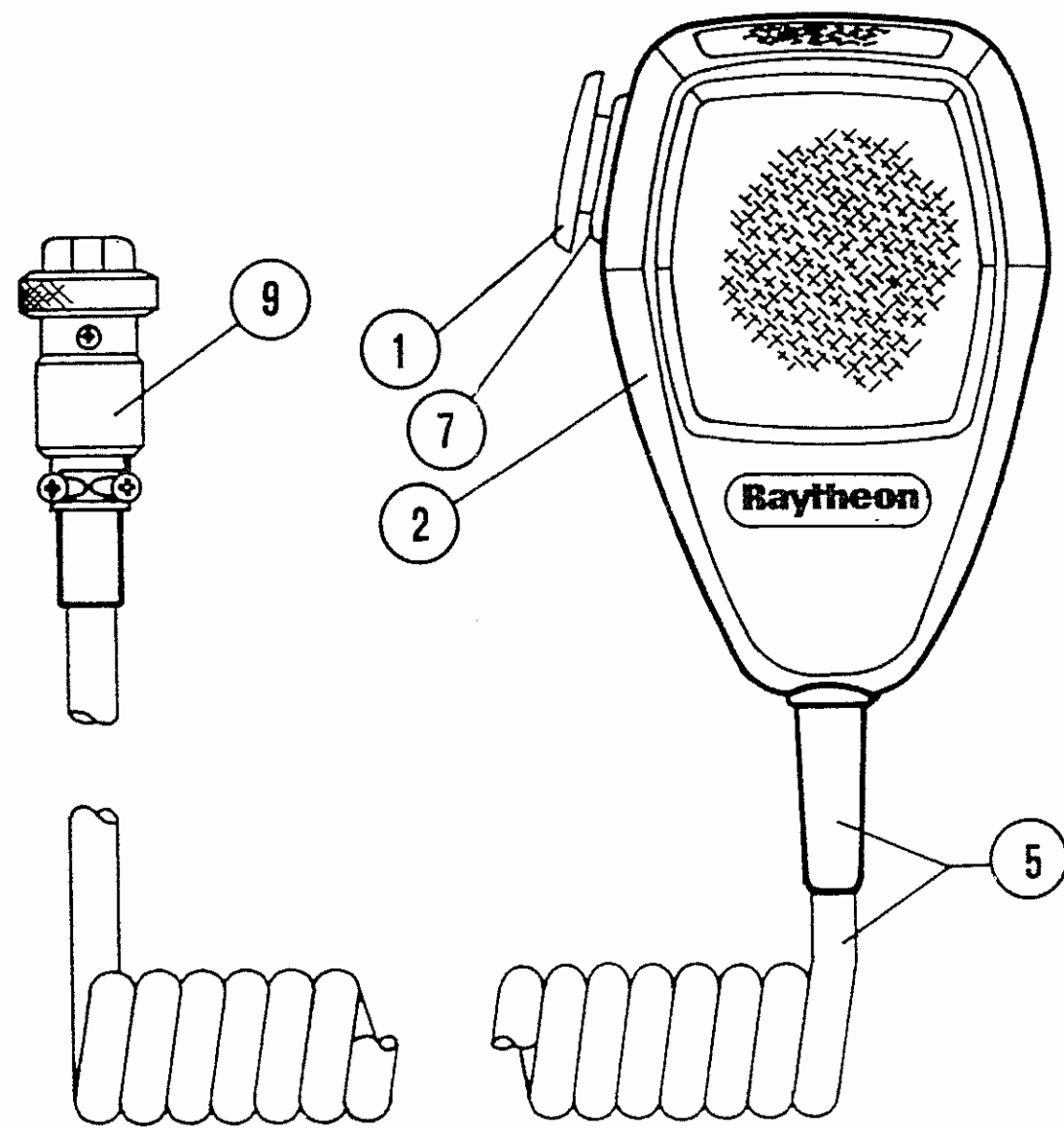
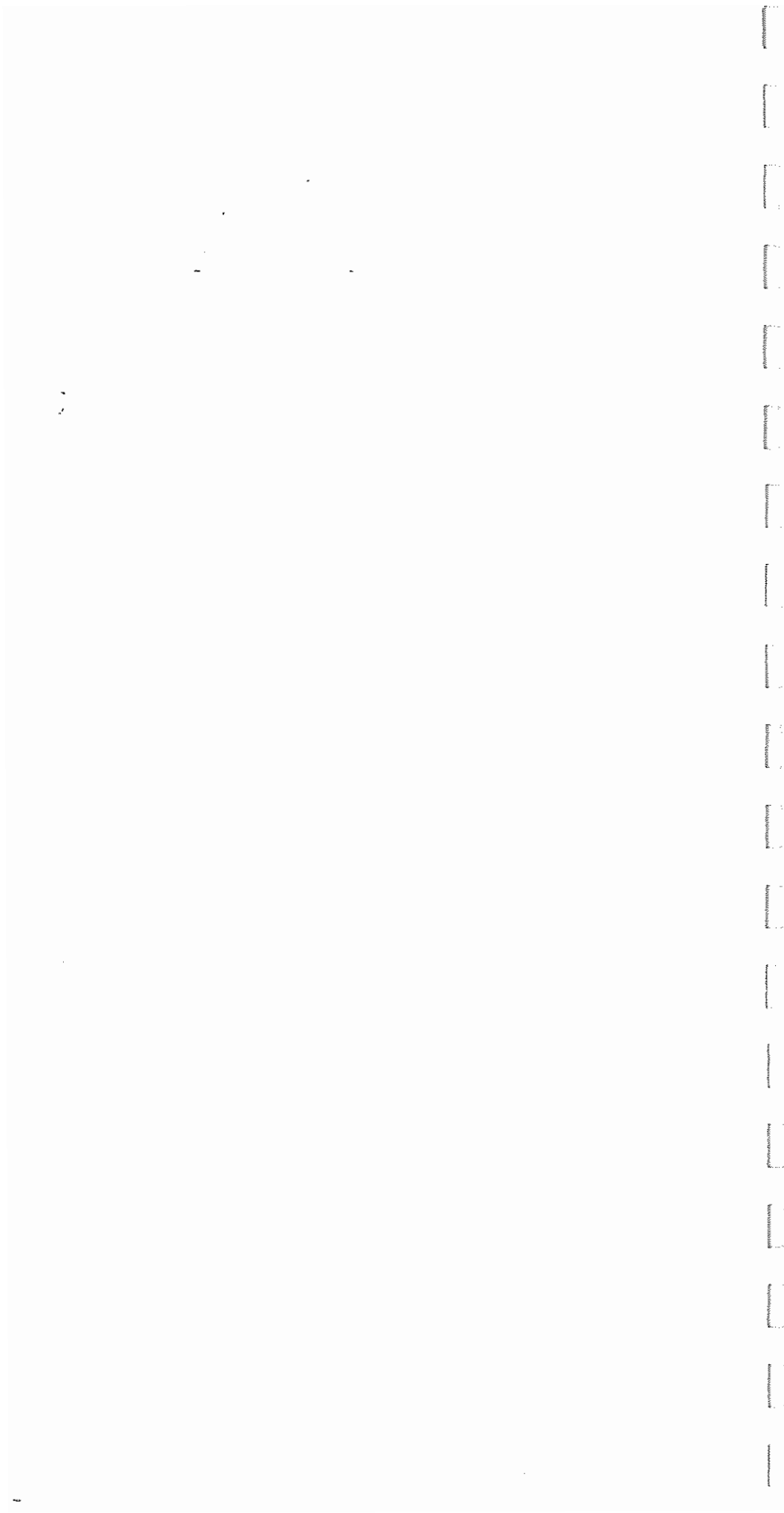


Figure 6-31 Noise Cancelling Microphone Assembly Drawing

Table 6-15
Replaceable Parts List
Noise Cancelling Microphone

<u>Symbol</u>	<u>Description</u>	<u>Part Number</u>
1	PTT Button	G263100-51
2	Front Case Assembly	
3	Rear Case Assembly	
4	Hanger Button	G263100-54
5	Cord and Bushing	
6	Selector Switch Button	G263100-56
7	PTT Button Grommet	G263100-57
8	Case Screw	G263100-58
9	Microphone Connector	G263100-59
	Omni Microphone Unit	G263100-60
	Noise Cancelling Microphone Unit	G263100-61
	Slide Switch	G263100-62
	PTT Switch	G263100-63
	Name Plate	G263100-50
	Case Seal	G263100-64



RAY 152 CHANNEL STORAGE LOCATION

Memory Station	Use	TX	RX	Notes	Memory Station	Use	TX	RX	Notes
1					26				
2					27				
3					28				
4					29				
5					30				
6					31				
7					32				
8					33				
9					34				
10					35				
11					36				
12					37				
13					38				
14					39				
15					40				
16					41				
17					42				
18					43				
19					44				
20					45				
21					46				
22					47				
23					48				
24					49				
25					50				

Channels in shaded area can be scanned.

RAY 152 CHANNEL STORAGE LOCATION

Memory Station	Use	TX	RX	Notes	Memory Station	Use	TX	RX	Notes
51					76				
52					77				
53					78				
54					79				
55					80				
56					81				
57					82				
58					83				
59					84				
60					85				
61					86				
62					87				
63					88				
64					89				
65					90				
66					91				
67					92				
68					93				
69					94				
70					95				
71					96				
72					97				
73					98				
74					99				
75					100				

RAY 152 CHANNEL STORAGE LOCATION

Memory Station	Use	TX	RX	Notes	Memory Station	Use	TX	RX	Notes
101					126				
102					127				
103					128				
104					129				
105					130				
106					131				
107					132				
108					133				
109					134				
110					135				
111					136				
112					137				
113					138				
114					139				
115					140				
116					141				
117					142				
118					143				
119					144				
120					145				
121					146				
122					147				
123					148				
124					149				
125					150				

RAY 152 CHANNEL STORAGE LOCATION

Memory Station	Use	TX	RX	Notes	Memory Station	Use	TX	RX	Notes
151					176				
152					177				
153					178				
154					179				
155					180				
156					181				
157					182				
158					183				
159					184				
160					185				
161					186				
162					187				
163					188				
164					189				
165					190				
166					191				
167					192				
168					193				
169					194				
170					195				
171					196				
172					197				
173					198				
174					199				
175					200				