Raytheon

Instruction Manual for RAY 152 MF-HF SSB Radiotelephone

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SECTION 1

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.

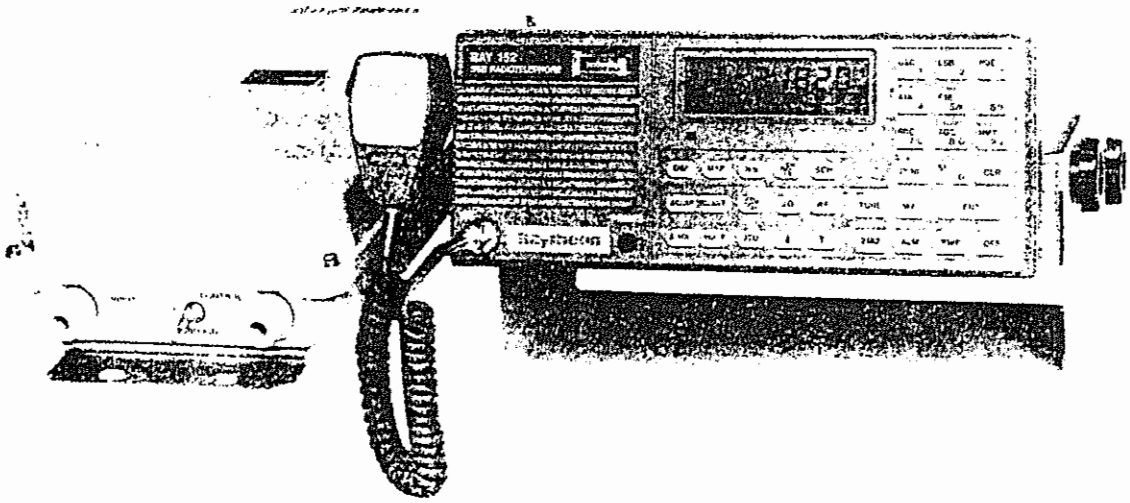


Figure 1-1 RAY 152 Transceiver and AC152 Antenna Coupler

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 chandleries.

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 internatinal 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°C (-22°F to +140°F).
11.	Transmitter Control:	Push-To-Talk microphone, external BK.
12.	Antenna Impedance:	50 ohms nominal.
13.	Power Requirements:	13.6 Vdc ±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 uV or less. H3E : 1.7 uV 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 ±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°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	5JJCJ00010	1
	Connector Hood	5JJCJ00013	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	5JJCJ00008	(ea)
Coupler Control Connector Hood	5JJCJ00011	(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 Extender PCBs Test Cables, etc.	NJZ-667	(ea)

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 Commision (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.

2.2 CONTROLS AND INDICATORS (See Figure 2-1)

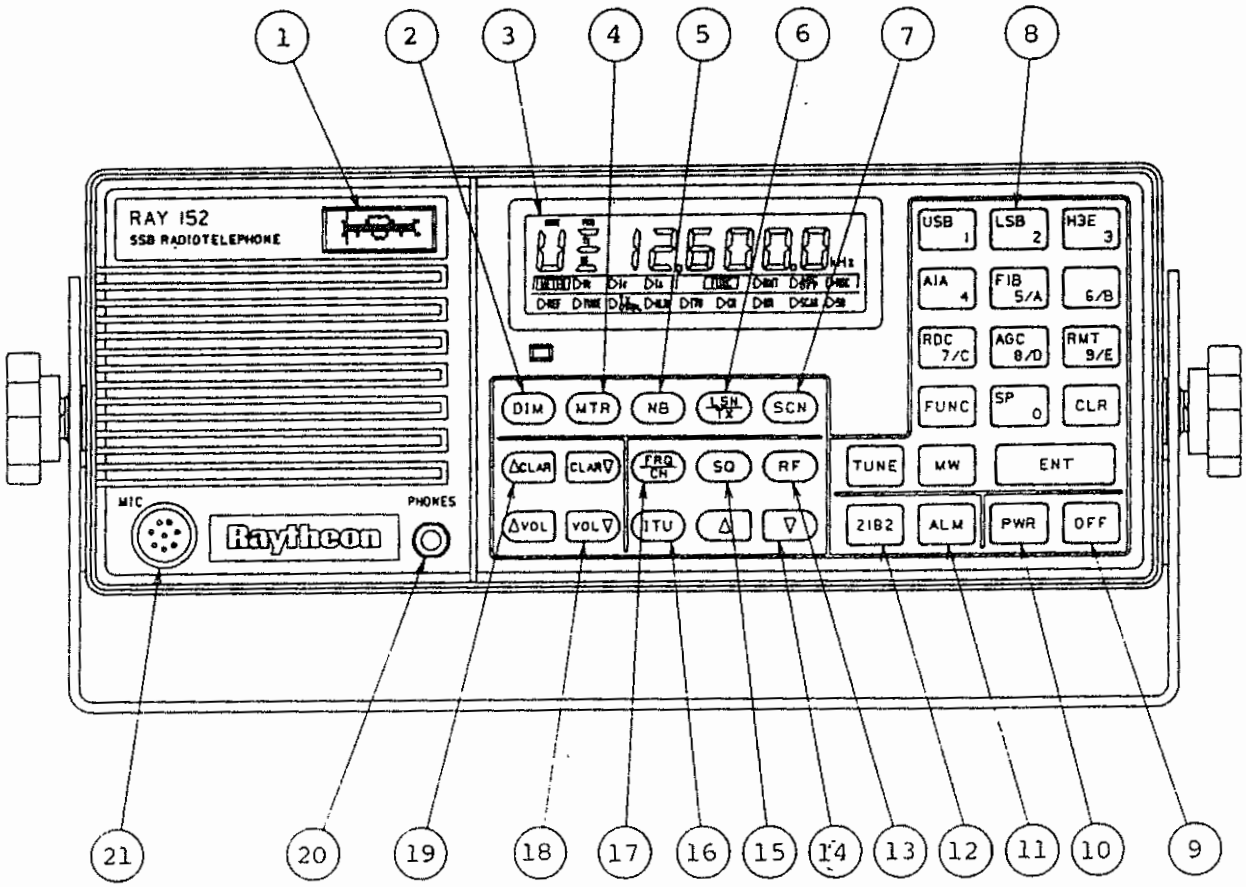


Figure 2-1 Controls and Indicators

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.

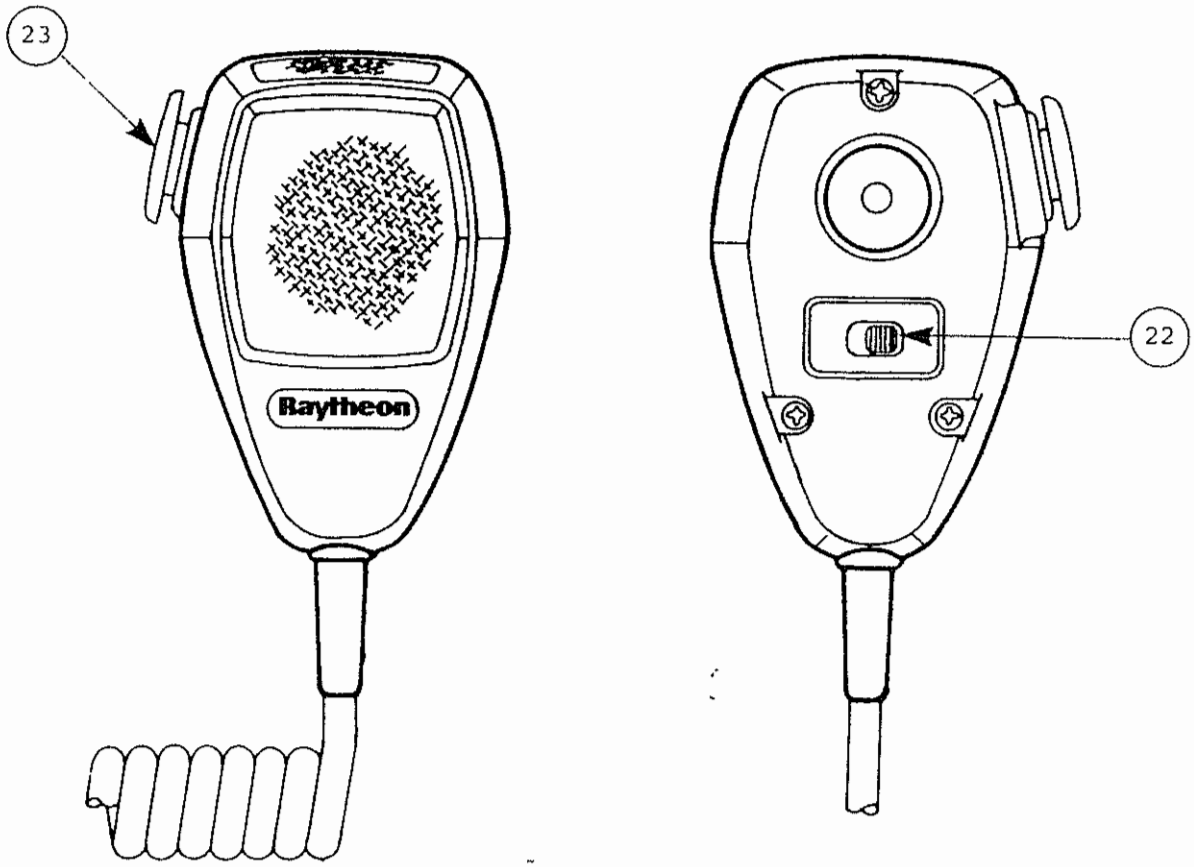


Figure 2-2 Noise Cancelling Microphone

(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.

Similary, 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

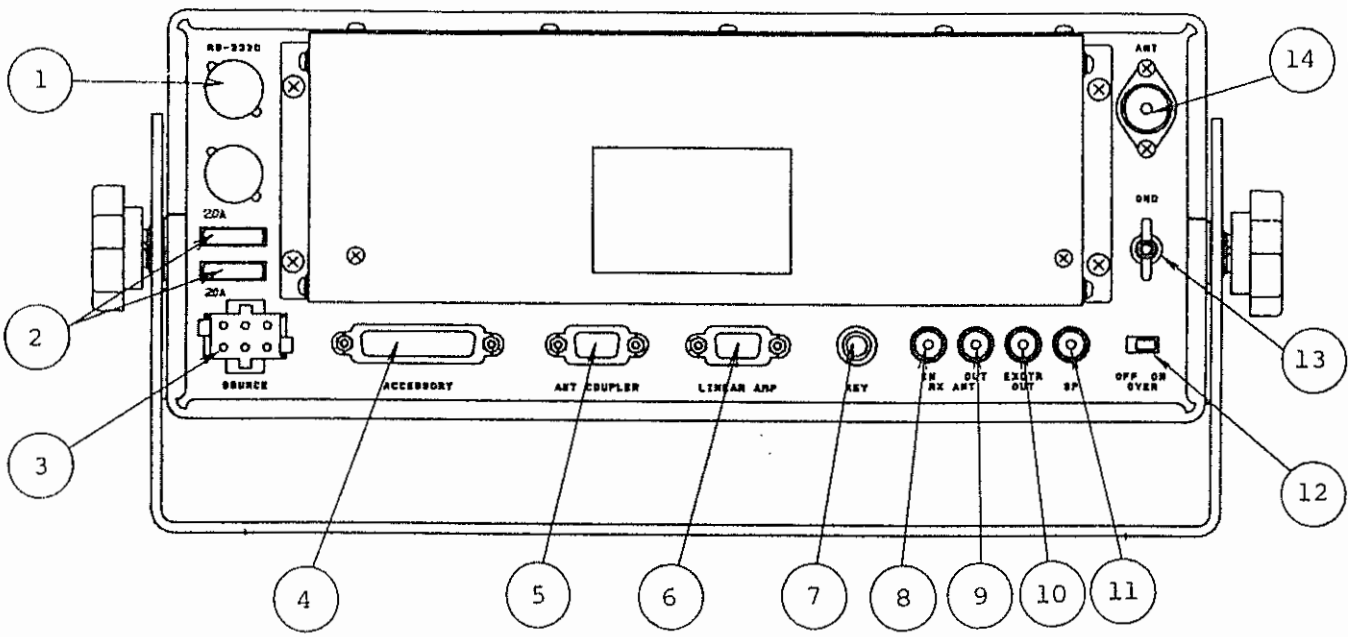


Figure 2-3 Rear Panel

1.	RS-232C	This connector is mounted when the optional RS-232C unit is installeld. 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 A1A 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.	$\overline{\text{RX BK}}$	When this pin is grounded, the receiver is disabled.
3.	$\overline{\text{SEL BK}}$	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 m 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.	$\overline{\text{SCAN HOLD}}$	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.

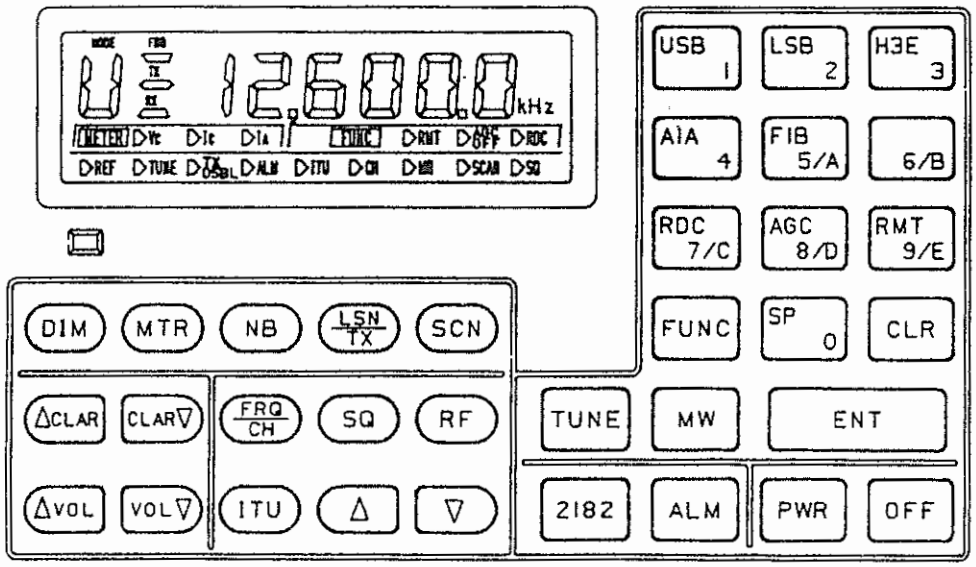


Figure 2-4 Keypad Layout

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.

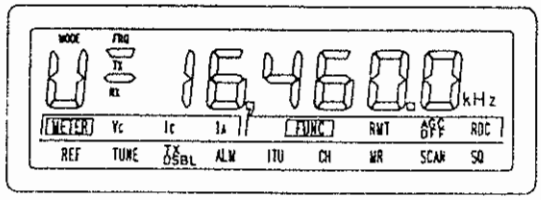
To enter frequencies, be sure that the radio is not in the ITU channel number displayed mode. If the radio is in that mode, press [ITU] or [FRQ/CH] to return to the memory "station" or frequency displayed mode. Then enter the required frequencies as in the following example:

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.

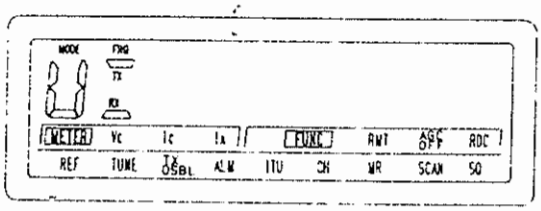
Enter the frequency desired:
e.g., 16,460.0 kHz.

Press [1] [6] [4] [6] [0] [0] [ENT]



NOTE

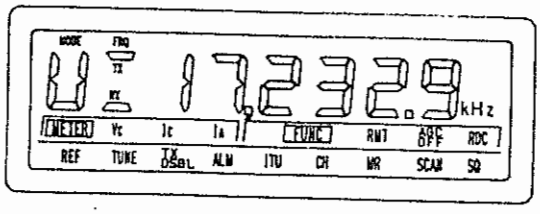
The indicator bar will now be under the RX legend. If you desire to receive on the same frequency (simplex) press [ENT] again. The LCD display shows that frequency and the radio is now ready for operation. Confirm that the proper mode of modulation (Mode) is displayed. U (USB) is the normal mode for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

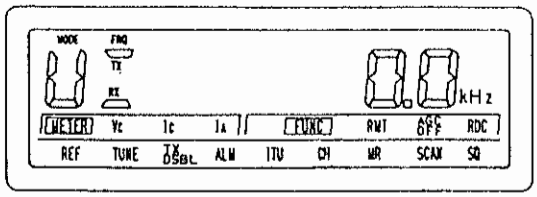
2.4.3.2 Memory Clear (Station)

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

a. Select the memory location; e.g., 11, press [1] [1].

b. Press the [CLR] and [MW] keys simultaneously.

c. 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	SIMPLEX (Ship-to-Ship)
4:01 to 4:27	4:A to 4:C
6:01 to 6:08	6:A to 6:C
8:01 to 8:33	8:A to 8:B
12:01 to 12:35	12:A to 12:C
16:01 to 16:44	16:A to 16:C
22:01 to 22:45	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.

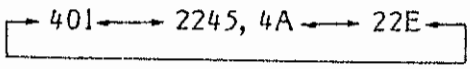
For example, [4] [1] [0] or [4] [A]

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:

a. Select the desired ITU channel as outlined above.

b. Press the [FRQ/CH] key to obtain the frequency display.

c. 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

a. Voice communication

Connect the microphone to the MIC connector on the front panel. When the button on the micriphone 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:

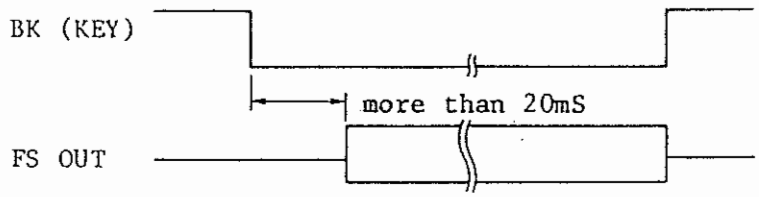


Figure 2-5 Timing of ARQ equipment

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]

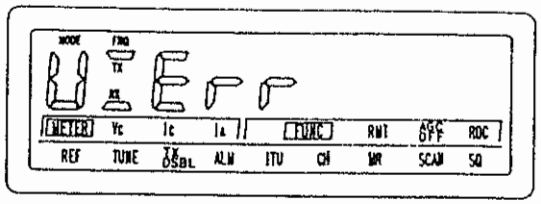
When pressed simultaneously with the [2182] key, the International Radiotelephone Alarm Signal is automatically transmitted. This attracts the attention of the local rescue agencies and large ships. THIS SHALL BE USED ONLY IN A DIRE EMERGENCY!

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			
Memory Station No. 1			When frequency is within the previously tuned memory allocation, tune will immediately complete.
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 it's 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.

CITY	FREQUENCY (kHz)	CALL SIGN
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 ships 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 Protsmouth 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.

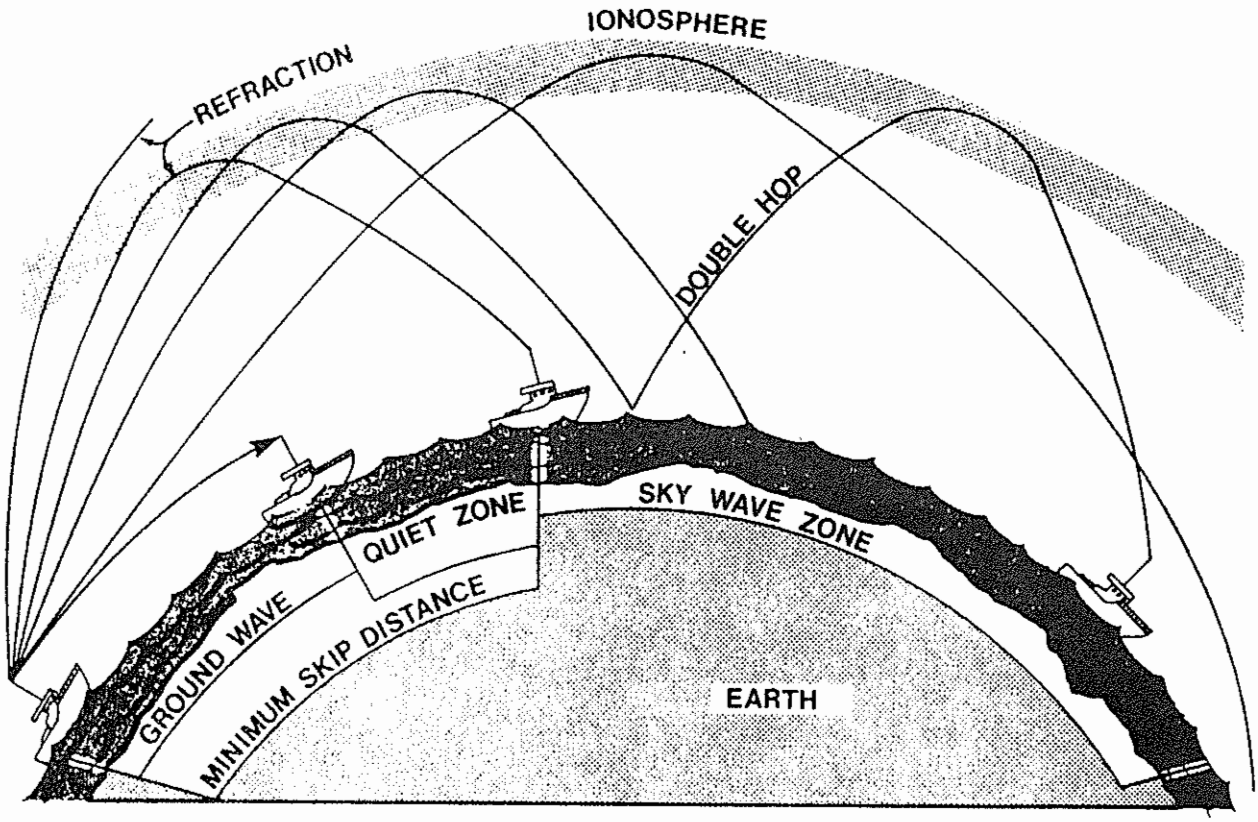


Figure 2-6 Effects of Propagation

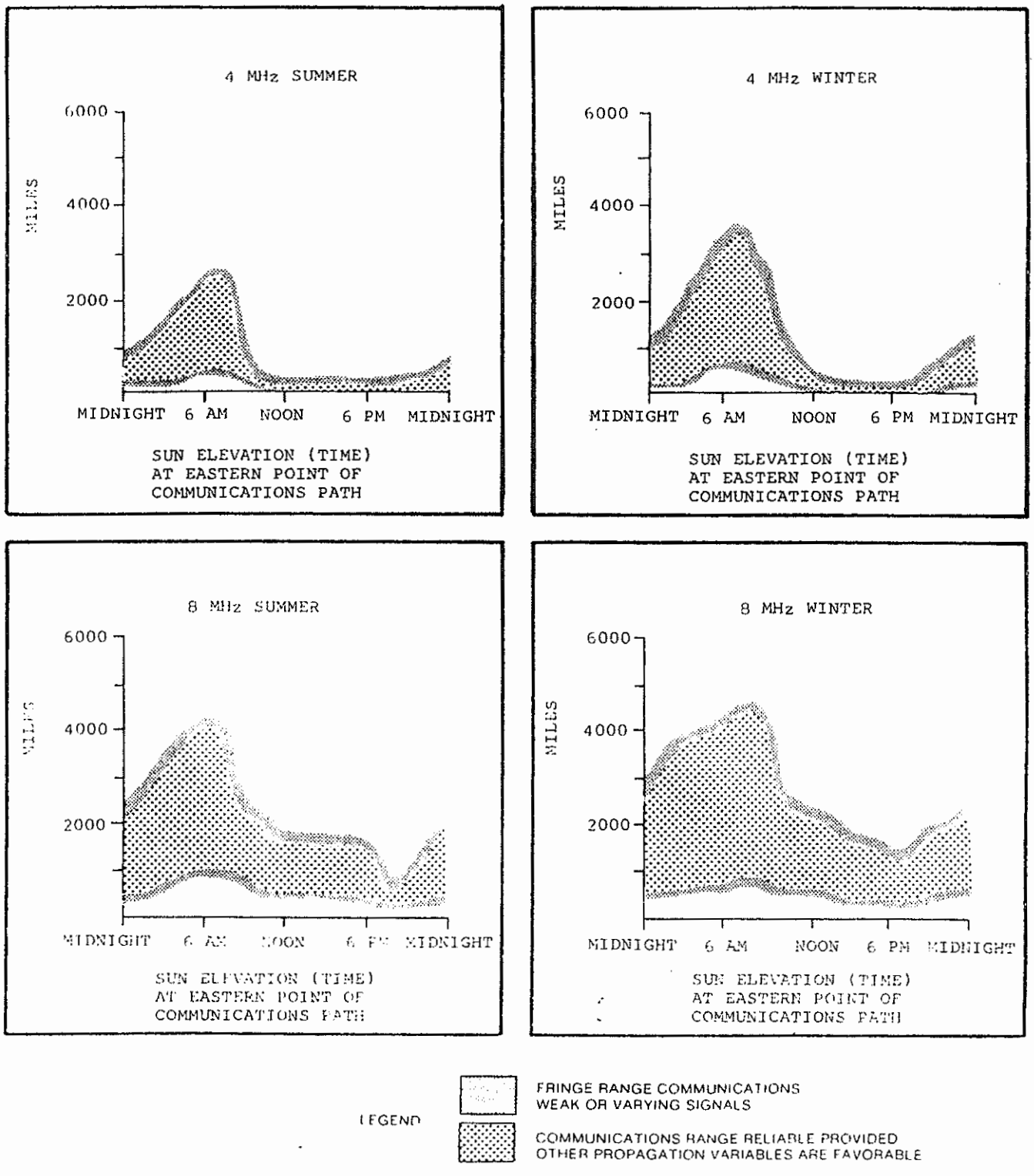


Figure 2-7 Estimated Expected Distance Vs. Time of Day (Sheet 1 of 2)

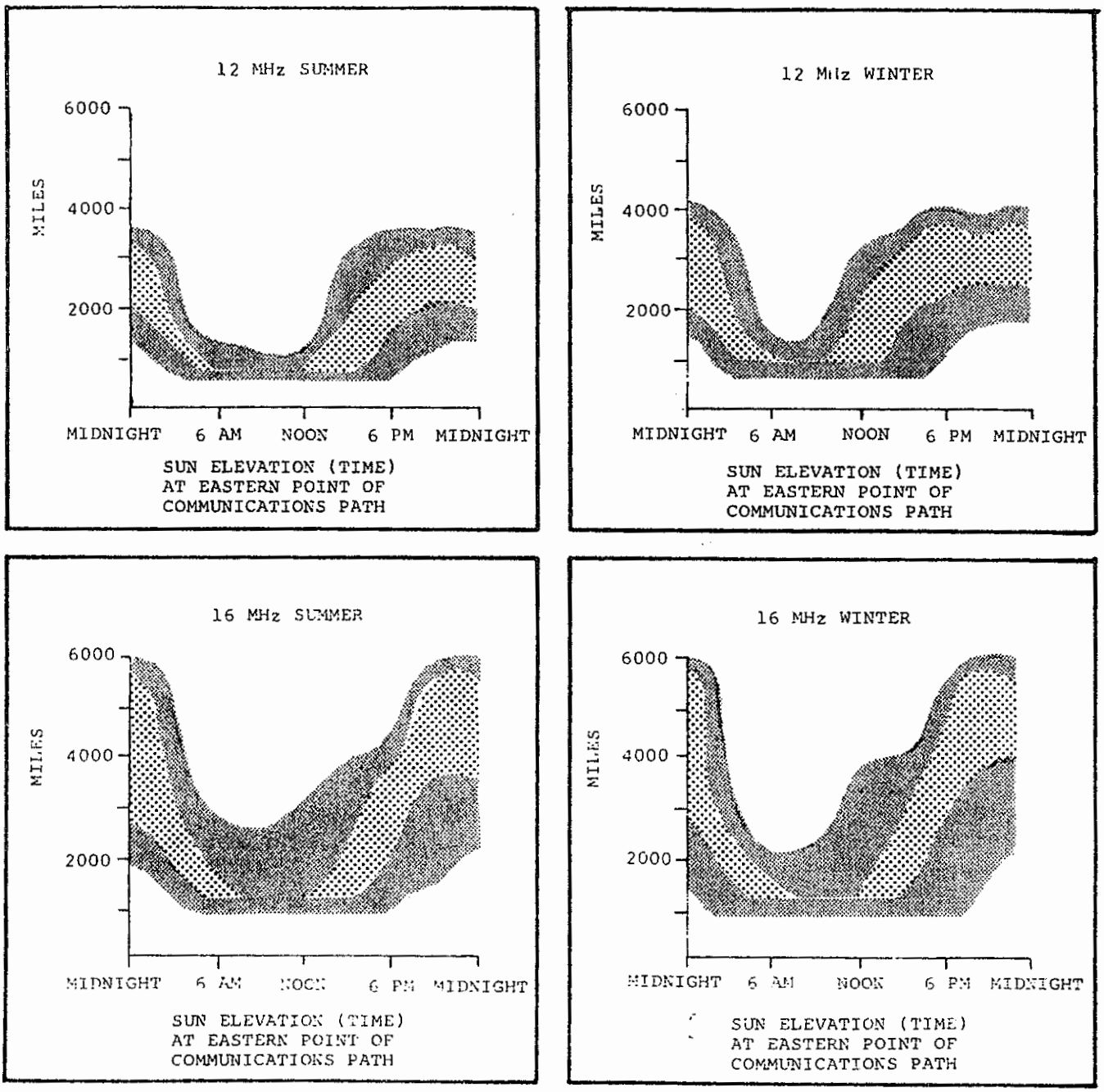


Figure 2-7 Estimated Expected Distance Vs. Time of Day (Sheet 2 of 2)

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
401	4357.4	4063.0
402	4360.5	4066.1
403	4363.6	4069.2
404	4366.7	4072.3
405	4369.8	4075.4
406	4372.9	4078.5
407	4376.0	4081.6
408	4379.1	4084.7
409	4382.2	4087.8
410	4385.3	4090.9
411	4388.4	4094.0
412	4391.5	4097.1
413	4394.6	4100.2
414	4397.7	4103.3
415	4400.8	4106.4
416	4403.9	4109.5
417	4407.0	4112.6
418	4410.1	4116.7
419	4413.2	4118.8
420	4416.3	4121.9
421	4419.4 (4C) Ship simplex	4125.0 (4A)
422	4422.5	4128.1
423	4425.6	4131.2
424	4428.7	4134.3
425	4431.8	4137.4
426	4434.9	4140.5
427	Ship simplex	4143.6 (4B)
601	6506.4	6200.0
602	6509.5	6203.1
603	6512.6	6206.2
604	6515.7	6209.3
605	6518.8	6212.4
606	6521.9 (6C)	6215.5
607	Ship simplex	6218.6 (6A)
608	Ship simplex	6221.6 (6B)
801	8718.9	8195.0
802	8722.0	8198.1
803	8725.1	8201.2
804	8728.2	8204.3
805	8731.3	8207.4
806	8734.4	8210.5
807	8737.5	8213.6
808	8740.6	8216.7
809	8743.7	8219.8
810	8746.8	8222.9
811	8749.9	8226.0
812	8753.0	8229.1
813	8756.1	8232.2
814	8759.2	8235.3
815	8762.3	8238.4
816	8765.4	8241.5
817	8768.5	8244.6
818	8771.6	8247.7
819	8774.7	8250.8
820	8777.8	8253.9
821	8780.9	8257.0
822	8784.0	8260.1
823	8787.1	8263.2
824	8790.2	8266.3
825	8793.3	8269.4
826	8796.4	8272.5
827	8799.5	8275.6
828	8802.6	8278.7
829	8805.7	8281.8
830	8808.8	8284.9
831	8811.9	8288.0
832	Ship simplex	8291.1 (8A)
833	Ship simplex	8294.2 (8B)
1201	13100.8	12330.0
1202	13103.9	12333.1
1203	13107.0	12336.2
1204	13110.1	12339.3
1205	13113.2	12342.4
1206	13116.3	12345.5
1207	13119.4	12348.6
1208	13122.5	12351.7
1209	13125.6	12354.8
1210	13128.7	12357.9
1211	13131.8	12361.0
1212	13134.9	12364.1
1213	13138.0	12367.2
1215	13144.2	12373.4
1216	13147.3	12376.5
1217	13150.4	12379.6
1218	13153.5	12382.7
1219	13156.6	12385.8
1220	13159.7	12388.9
1221	13162.8	12392.0
1222	13165.9	12395.1
1223	13169.0	12398.2
1224	13172.1	12401.3
1225	13175.2	12404.4
1226	13178.3	12407.5
1227	13181.4	12410.6
1228	13184.5	12413.7
1229	13187.6	12416.8
1230	13190.7	12419.9
1231	13193.8	12423.0
1232	13196.9	12426.1
1233	Ship simplex	12429.2 (12A)
1234	Ship simplex	12432.3 (12B)
1235	Ship simplex	12435.4 (12C)
1601	17232.9	16460.0
1602	17236.0	16463.1
1603	17239.1	16466.2
1604	17242.2	16469.3
1605	17245.3	16472.4
1606	17248.4	16475.5
1607	17251.5	16478.6
1608	17254.6	16481.7
1609	17257.7	16484.8
1610	17260.8	16487.9
1611	17263.9	16491.0
1612	17267.0	16494.1
1613	17270.1	16497.2
1614	17273.2	16500.3
1615	17276.3	16503.4
1616	17279.4	16506.5
1617	17282.5	16509.6
1618	17285.6	16512.7
1619	17288.7	16515.8
1620	17291.8	16518.9
1621	17294.9	16522.0
1622	17298.0	16525.1
1623	17301.1	16528.2
1624	17304.2	16531.3
1625	17307.3	16534.4
1626	17310.4	16537.5
1627	17313.5	16540.6
1628	17316.6	16543.7
1629	17319.7	16546.8
1630	17322.8	16549.9
1631	17325.9	16553.0
1632	17329.0	16556.1
1633	17332.1	16559.2
1634	17335.2	16562.3
1635	17338.3	16565.4
1636	17341.4	16568.5
1637	17344.5	16571.6
1638	17347.6	16574.7
1639	17350.7	16577.8
1640	17353.8	16580.9
1641	17356.9	16584.0
1642	Ship simplex	16587.1 (16A)
1643	Ship simplex	16590.2 (16B)
1644	Ship simplex	16593.3 (16C)
2201	22596.0	22000.0
2202	22599.1	22003.1
2203	22602.2	22006.2
2204	22605.3	22009.3
2205	22608.4	22012.4
2206	22611.5	22015.5
2207	22614.6	22018.6
2208	22617.7	22021.7
2209	22620.8	22024.8
2210	22623.9	22027.9
2211	22627.0	22031.0
2212	22630.1	22034.1
2213	22633.2	22037.2
2214	22636.3	22040.3
2215	22639.4	22043.4
2216	22642.5	22046.5
2217	22645.6	22049.6
2218	22648.7	22052.7
2219	22651.8	22055.8
2220	22654.9	22058.9
2221	22658.0	22062.0
2222	22661.1	22065.1
2223	22664.2	22068.2
2224	22667.3	22071.3
2225	22670.4	22074.4
2226	22673.5	22077.5
2227	22676.6	22080.6
2228	22679.7	22083.7
2229	22682.8	22086.8
2230	22685.9	22089.9
2231	22689.0	22093.0
2232	22692.1	22096.1
2233	22695.2	22099.2
2234	22698.3	22102.3
2235	22701.4	22105.4
2236	22704.5	22108.5
2237	22707.6	22111.6
2238	22710.7	22114.7
2239	22713.8	22117.8
2240	22716.9	22120.9
2241	Ship simplex	22124.0 (22A)
2242	Ship simplex	22127.1 (22B)
2243	Ship simplex	22130.2 (22C)
2244	Ship simplex	22133.3 (22D)
2245	Ship simplex	22136.4 (22E)

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Table 2-4

International Frequency Matrix, 4/6 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-VRT	Canada-Halifax Radio-VCS	Canada-Vancouver Radio-VAI	Cook Isl's-Roratonga Radio-ZKR	Denmark-Lyngby Radio-OXZ	Finland-Helsinki Radio-OHG	France-St. Lys Radio-FFL	Germany-Norddeich-DAI,DAJ,DAH,DAK,DAP	Greece-Athinai Radio-SVN	Holland-Scheveningen Radio-PCG,PCU	Iceland-Reykjavik Radio-TFA	Israel-Haifa Radio-4XO	Italy-Rome Radio-IAR	Jamaica-Kingston Radio-6YI	Japan-Tokyo Radio-JBO	Madeira-Madeira Radio-CUB	Monaco-Monaco Radio-3AC	Martinique-Fort-De-France Radio-FFP	Mexico-Acapulco Radio-XFA	New Zealand-Wellington Radio-ZLW	Netherlands Antilles-Curaco Radio-PJC	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	Tahiti (Fr. Polynesia)-Mahina Radio-FJA	United Kingdom-Portishead-GKT,GKV,GKU	United States-New York Radio-WOO	United States-Miami Radio-WOM	United States-Mobile Radio-WLO	United States-Oakland Radio-KMI	United States-Honolulu Radio-KQM	U.S.Coast Guard-USCG	
401										OXZ			DAP														LGN				SAG					KMI			401
402																	IAR															GKT							402
403																				SAC		XFA					LGN				SAG				WOM				403
404	VIS			PPR								FFL				4XO																							404
405				PPR								FFL		PCG				6YI										9VG											405
406											OHG				TFA															EHY			GKT					406
407														PCG													LGN		9VG	ZSD	EHY							407
408		KUQ			OSU															JBO			XFA	ZLW	PJC								HEB					408
409				PPR						OXZ																	LGN			EHY	SAG								409
410						VRT		VAI						PCG		4XO																	GKT	WOO					410
411					OSU																									EHY				WOO				411
412												DAK					IAR																	WOM				412
413											OHG		DAH								CUB	SAC							CUL										413
414											OHG		DAJ		TFA																				WLO				414
415	VIS									OXZ				SVN													LGN												415
416				PPR								FFL			TFA			6YI												EHY			FJA	WOO		KMI			416
417					OSU						OHG																							WOM		KMI			417
418						VCS				OXZ						4XO											LGN				SAG						KQM		418
419				PPR								FFL		PCG	TFA																			WLO				419
420										OXZ							IAR										LGN				SAG								420
421					OSU					OXZ													XFA	ZLW		LGN													421
422					OSU						OHG																							WOO					422
423												DAI				4XO	IAR																	WOM					423
424	VIS									OXZ				SVN													LGN				SAG	HEB					USCG		424
425					OSU					OXZ					PCU					JBO							LGN												425
426			CUG							OXZ										JBO	CUB							LGN						GKV					426
601													DAJ			TFA									ZLW				EHY							USCG		601
602					OSU										PCG			IAR				SAC						CUL	9VG										602
603	VIS					VRT				OXZ				SVN		TFA	4XO						XFA			LGN				SAG									603
604																	4XO	IAR					XFA						EHY									604
605										OXZ					PCU				6YI							LGN				SAG									605
606					OSU					OXZ																LGN													606

Table 2-4 (Cont'd)

International Frequency Matrix, 8 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-VRT	Canada-Halifax Radio-VCS	Canada-Vancouver Radio-VAI	Cook Isl's-Rorotonga Radio-ZKR	Denmark-Lyngby Radio-OXZ	Finland-Helsinki Radio-OHG	France-St. Lys Radio-FFL	Germany-Norddeich-DAI,DAJ,DAH,DAK,DAP	Greece-Athinai Radio-SVN	Holland-Scheveningen Radio-PCG,PCU	Iceland-Reykjavik Radio-TFA	Israel-Haifa Radio-4XO	Italy-Rome Radio-IAR	Jamaica-Kingston Radio-6YI	Japan-Tokyo Radio-JBO	Madeira-Madeira Radio-CUB	Monaco-Monaco Radio-3AC	Martinique-Fort-De-France Radio-FFP	Mexico-Acapulco Radio-XFA	New Zealand-Wellington Radio-ZLW	Netherlands Antilles-Curaco Radio-PJC	Norway-Rogaland Radio-LGH,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	Tahiti (fr. Polynesia)-Mahina Radio-FJA	United Kingdom-Portishead-GKT,GKV,GKU	United States-New York Radio-KOO	United States-Miami Radio-WOM	United States-Mobile Radio-NLO	United States-Oakland Radio-KMI	U.S.Coast Guard-USCG	
801										OXZ							4XO										LFL					SAG								801
802											OHG			SVN	PCU						CUB							CUL							GKT		WOM				802
803					OSU																				PJC	LFL				EHY	SAG								803
804											OHG											3AC						9VG		EHY							KMI		804
805					OSU						OHG				PCG	TFA	4XO																		WOM				805
806		KUQ			OSU										PCG																								806
807								VAI								TFA									ZLW														807
808										OXZ																LFL			ZSD		SAG				WOO			KOM		808
809											OHG					TFA						3AC		XFA		LFL											KMI			809
810																			JBO							LFL			EHY						WOM				810
811	VIS									OXZ																LFL				SAG				WOO					811
812					OSU												4XO		6YI	JBO																			812
813			CUG		OSU					OXZ											CUB					LFL														813
814														SVN				IAR																			KMI			814
815	VIS				OSU								DAK															9VG							WOO					815
816																													EHY				GKU				USCG	816
817						VRT						FFL	DAJ																										817
818										OXZ																LFL			EHY	SAG									818
819				PPR														IAR																GKU					819
820													DAI					IAR		JBO																			820
821					OSU				ZKR	OXZ														XFA				9VG												821
822				PPR																											HEB		GKV			KMI			822
823							VCS			OXZ				SVN												LFL				SAG									823
824				PPR									DAP															9VG			HEB					WLO			824
825									ZKR	OXZ		FFL														LFL									WOM				825
826															PCG			IAR						XFA									GKV	WOO					826
827										OXZ							4XO									LFL				SAG									827
828				PPR								FFL	DAH													LFL														828
829					OSU					OXZ	OHG															LFL				SAG		FJA				WLO			829
830				PPR								FFL																								WLO			830
831																TFA		IAR													HEB				WOM				831

Table 2-4 (Cont'd)

International Frequency Matrix, 12 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-VRT	Canada-Halifax Radio-VCS	Canada-Vancouver Radio-VAI	Cook Isl's-Rorotonga Radio-ZKR	Denmark-Lyngby Radio-OXZ	Finland-Helsinki Radio-OHG	France-St. Lys Radio-FFL	Germany-Norddeich-DAI,DAJ,DAH,DAK,DAP	Greece-Athinai Radio-SVN	Holland-Scheveningen Radio-PCG,PCU	Iceland-Reykjavik Radio-TFA	Israel-Halifa Radio-4XO	Italy-Rome Radio-IAR	Jamaica-Kingston Radio-6YI	Japan-Tokyo Radio-JBO	Madeira-Madeira Radio-CUB	Monaco-Monaco Radio-3AC	Martinique-Fort-De-France Radio-FFP	Mexico-Acapulco Radio-XFA	New Zealand-Wellington Radio-ZLW	Netherlands Antilles-Curaco Radio-PJC	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	Tahiti (Fr. Polynesia)-Mahina Radio-FJA	United Kingdom-Portishead-GKT,GKV,GKU	United States-New York Radio-WOO	United States-Miami Radio-WOM	United States-Mobile Radio-WLO	United States-Oakland Radio-KMI	U.S.Coast Guard-USCG	
1201																													EHY			GKT			KMI			1201
1202																														HEB		GKT			KMI			1202
1203									OXZ										CUB					LFL	CUL				SAG				WOO			KMI			1203
1204															4XO									LFL															1204
1205											DAP													LFL													USCG		1205
1206										OHG				TFA		IAR																GKT		WOM					1206
1207		CUG		OSU			VAI						PCG		4XO			JBO	CUB						PJC														1207
1208											DAK			TFA															EHY					WOM					1208
1209										OHG						IAR						XFA	ZLW										WOM					1209
1210									OXZ															LFL			EHY	SAG				WOO						1210
1211									OXZ															LFL				SAG				WOO						1211
1212											DAH							JBO																	WLO			1212
1213					OSU		VCS			OHG			PCG		4XO	IAR								LFL														1213
1214				PPR					OXZ															LFL				SAG										1214
1215					OSU				OXZ				PCG	TFA	4XO													SAG				WOM						1215
1216										OHG															9VG													1216
1217									OXZ															LFL				SAG										1217
1218					OSU						DAI					IAR		JBO						LFL														1218
1219				PPR	OSU				OXZ				PCG											LFL	9VG			SAG										1219
1220						VRT						SVN		TFA																									1220
1221					OSU				OXZ													XFA		LFL														1221
1222											FFL											XFA		LFL												KQM		1222
1223									OXZ															LFL				SAG				WOM						1223
1224										OHG		DAJ					6YI			SAC						ZSD					GKT							1224
1225																								LFL			EHY							WLO				1225
1226									OXZ		FFL													LFL										WLO				1226
1227										OHG																	EHY		HEB									1227
1228																								LFL						GKT	WOO						1228
1229											FFL																							KMI			1229
1230										OHG						IAR													HEB		GKT	WOO			KMI			1230
1231											FFL													LFL														1231
1232		KUQ										SVN																										1232

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-VRT	Canada-Halifax Radio-VCS	Canada-Vancouver Radio-VAI	Cook Isl's-Rorotonga Radio-ZKR	Denmark-Lyngby Radio-OXZ	Finland-Helsinki Radio-OHG	France-St. Lys Radio-FFL	Germany-Norddeich-DAI,DAJ,DAH,DAK,DAP	Greece-Athinai Radio-SVN	Holland-Scheveningen Radio-PCG,PCU	Iceland-Reykjavik Radio-TFA	Israel-Haifa Radio-4XO	Italy-Rome Radio-IAR	Jamaica-Kingston Radio-6YI	Japan-Tokyo Radio-JBO	Madeira-Madeira Radio-CUB	Monaco-Monaco Radio-3AC	Martinique-Fort-De-France Radio-FFP	Mexico-Acapulco Radio-XFA	New Zealand-Wellington Radio-ZLW	Netherlands Antilles-Curaco Radio-PJC	Norway-Rogaland Radio-LGN,LFL,LFN	Portugal-Lisbon Radio-CUL	Singapore-Singapore Radio-9WG	South Africa-Durban Radio-ZSD	Spain-Pozuelo Del Rey Radio-EHY	Sweden-Goteborg Radio-SAG	Switzerland-Bern Radio-HEB	Tahiti (fr. Polynesia)-Mahina Radio-FJA	United Kingdom-Portishead-GKT,GKV,GKU	United States-New York Radio-WOO	United States-Miami Radio-WOM	United States-Mobile Radio-WLO	United States-Oakland Radio-KMI	U.S.Coast Guard-USCG	
1601									OXZ																		LFN				SAG				WOM		KQM		1601
1602																																GKT			KMI			1602
1603									OXZ								IAR										LFN				SAG				KMI			1603
1604						VCS					FFL								JBO				XFA				LFN											1604
1605									OXZ																		LFN				SAG		FJA		WOO				1605
1606										OHG					TFA		IAR															GKT						1606
1607													SVN									3AC			PJC	LFN									WLO			1607
1608							VAI		OXZ																	LFN				SAG								1608
1609					OSU								SVN			4XO			JBO															WOM				1609
1610												DAP														LFN								WOM				1610
1611				PPR						OHG																					HEB		GKU		WOM				1611
1612																																						1612
1613				PPR	OSU											4XO										LFN		9VG										1613
1614									OXZ	OHG													XFA			LFN				SAG								1614
1615			CUG							OHG					TFA					CUB							CUL				HEB		GKU					1615
1616												DAJ					IAR																		KMI			1616
1617									OXZ							4XO										LFN				SAG								1617
1618						VRT			OXZ																	LFN				SAG			GKU					1618
1619											FFL															LFN												1619
1620																										LFN			EHY				WOO				1620
1621					OSU				OXZ														XFA			LFN												1621
1622									OXZ																	LFN				SAG								1622
1623										OHG															PCG							GKV						1623
1624												DAK					IAR																		KMI			1624
1625					OSU										TFA																								1625
1626													SVN												PCU								WOO					1626
1627					OSU																					LFN												1627
1628											FFL					4XO																							1628
1629																										LFN												1629
1630					OSU										TFA														EHY										1630
1631																														HEB			WOO					1631
1632			CUG																JBO	CUB						CUL						GKV			WLO				1632

Table 2-4 (Cont'd)

International Frequency Matrix, 22 MHz

	Australia-Sydney Radio-VIS	American Samoa-Pago Pago Radio-KUO	Azores-S.Miguel Radio-CUG	Brazil-Rio Radio-PPR	Belgium-Oostende Radio-OSU	Bermuda- Bermuda Radio-VRT	Canada-Halifax Radio-VCS	Canada-Vancouver Radio-VAI	Cook Isls-Rorotonga Radio-ZKR	Denmark-Lyngby Radio-OXZ	Finland-Helsinki Radio-OHG	France-St. Lys Radio-FFL	Germany-Norddeich-DAI,DAJ,DAH,DAK,DAP	Greece-Athinai Radio-SVN	Holland-Scheveningen Radio-PCG,PCU	Iceland-Reykjavik Radio-TFA	Israel-Haifa Radio-4XO	Italy-Rome Radio-IAR	Jamaica-Kingston Radio-6YI	Japan-Tokyo Radio-JBO	Madeira-Madeira Radio-CUB	Monaco-Monaco Radio-3AC	Martinique-Fort-De-France Radio-FFP	Mexico-Acapulco Radio-XFA	New Zealand-Wellington Radio-ZLW	Netherlands Antilles-Curaco Radio-PJC	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	Tahiti (Fr. Polynesia)-Mahina Radio-FJA	United Kingdom-Portishead-GKT,GKN,GKU	United States-New York Radio-WOO	United States-Miami Radio-WOM	United States-Mobile Radio-WLO	United States-Oakland Radio-KMI	U.S.Coast Guard-USCG	
2201																													EHY				WOO						2201
2202															IAR										LFN														2202
2203									OXZ																LFN					SAG									2203
2204										OHG	FFL			4XO																									2204
2205													PCG																					WOO					2205
2206																													ZSD										2206
2207		CUG										DAJ		4XO				CUB										CUL											2207
2208																									LFN					SAG									2208
2209				OSU																																			2209
2210										OHG			PCG																					WOO					2210
2211									OXZ						IAR										LFN					SAG									2211
2212																												9VG										2212
2213						VCS			OXZ																LFN		ZLW			SAG									2213
2214				OSU						OHG																					HEB					KMI			2214
2215																									LFN									WOM					2215
2216																									LFN									WOM					2216
2217												DAP	SVN			4XO																							2217
2218									OXZ																LFN					SAG									2218
2219				OSU																																			2219
2220							VAI																																2220
2221				OSU					OXZ																LFN		XFA													2221
2222		CUG								OHG		DAJ						CUB								CUL									WOM					2222
2223												DAJ			IAR																					KMI			2223
2224													SVN																EHY										2224
2225				OSU										TFA										XFA																2225
2226											FFL			TFA															EHY										2226
2227																	JBO																		WLO				2227
2228									OXZ																LFN					SAG						KMI			2228
2229																													EHY										2229
2230																									LFN					SAG									2230
2231										OHG			SVN																						WLO				2231
2232														PCG																	HEB								2232

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-VAI	Cook Isl's-Rorotonga Radio-ZKR	Denmark-Lyngby Radio-OXZ	Finland-Helsinki Radio-OHG	France-St. Lys Radio-FFL	Germany-Norddeich-DAI,DAJ,DAH,DAK,DAP	Greece-Athinai Radio-SVW	Holland-Scheveningen Radio-PCG,PCU	Iceland-Reykjavik Radio-TFA	Israel-Haifa Radio-4XO	Italy-Rome Radio-IAR	Jamaica-Kingston Radio-6YI	Japan-Tokyo Radio-JBO	Madeira-Madeira Radio-CUB	Monaco-Monaco Radio-3AC	Martinique-Fort-De-France Radio-FFP	Mexico-Acapulco Radio-XFA	New Zealand-Wellington Radio-ZLW	Netherlands Antilles-Curaco Radio-PJC	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	Tahiti (Fr. Polynesia)-Mahina Radio-FJA	United Kingdom-Portishead-GKT,GKY,GKU	United States-New York Radio-WOO	United States-Miami Radio-WOM	United States-Mobile Radio-WLO	United States-Oakland Radio-KMI	U.S.Coast Guard-USCG	
1633											FFL																ZSD											1633
1634												DAI																EHY											1634
1635									OXZ										CUB						LFN				SAG									1635
1636										OHG														PCG														1636
1637																												EHY				GKM						1637
1638		KUQ								OHG																												1638
1639												DAH												PCG				EHY										1639
1640																																GKM						1640
1641									OXZ																LFN		9VG			SAG						WLO			1641

International Frequency Matrix, 22 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-VAI	Cook Isl's-Rorotonga Radio-ZKR	Denmark-Lyngby Radio-OXZ	Finland-Helsinki Radio-OHG	France-St. Lys Radio-FFL	Germany-Norddeich-DAI,DAJ,DAH,DAK,DAP	Greece-Athinai Radio-SVW	Holland-Scheveningen Radio-PCG,PCU	Iceland-Reykjavik Radio-TFA	Israel-Haifa Radio-4XO	Italy-Rome Radio-IAR	Jamaica-Kingston Radio-6YI	Japan-Tokyo Radio-JBO	Madeira-Madeira Radio-CUB	Monaco-Monaco Radio-3AC	Martinique-Fort-De-France Radio-FFP	Mexico-Acapulco Radio-XFA	New Zealand-Wellington Radio-ZLW	Netherlands Antilles-Curaco Radio-PJC	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	Tahiti (Fr. Polynesia)-Mahina Radio-FJA	United Kingdom-Portishead-GKT,GKY,GKU	United States-New York Radio-WOO	United States-Miami Radio-WOM	United States-Mobile Radio-WLO	United States-Oakland Radio-KMI	U.S.Coast Guard-USCG	
2233																									LFN														2233
2234									OXZ															XFA		LFN				EHY	SAG								2234
2235											FFL																													2235
2236									OXZ											JBO						LFN									WOO			KMI		2236
2237																		IAR			CUB					LFN										WLO			2237
2238				PPR								DAK																												2238
2239					OSU																					LFN														2239
2240																				JBO						LFN														2240

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	International Calling and Safety
2670.0 kHz	USCG Liason
3023.0 kHz	Search and Rescur Only
5167.5 kHz	Alaska Emergency
5680.0 kHz	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	(All except Great Lakes and Gulf of Mexico)
2082.5 kHz	
2093.0 kHz	(Commercial Only)
2830.0 kHz	(Gulf of Mexico Only)
2303.0 kHz	(Gulf of Mexico Only)
2003.0 kHz	(Great Lakes Only)
2142.0 kHz	(California, Daytime Only)
2086.0 kHz	(Rivers, Except Great Lakes)

HIGH SEAS SHIP TO SHIP ITU CHANNELS (Simplex Only)	
4A, B, C	12A, B, C
6A, B, C	16A, B, C
8A, B	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 it's 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 ships 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.

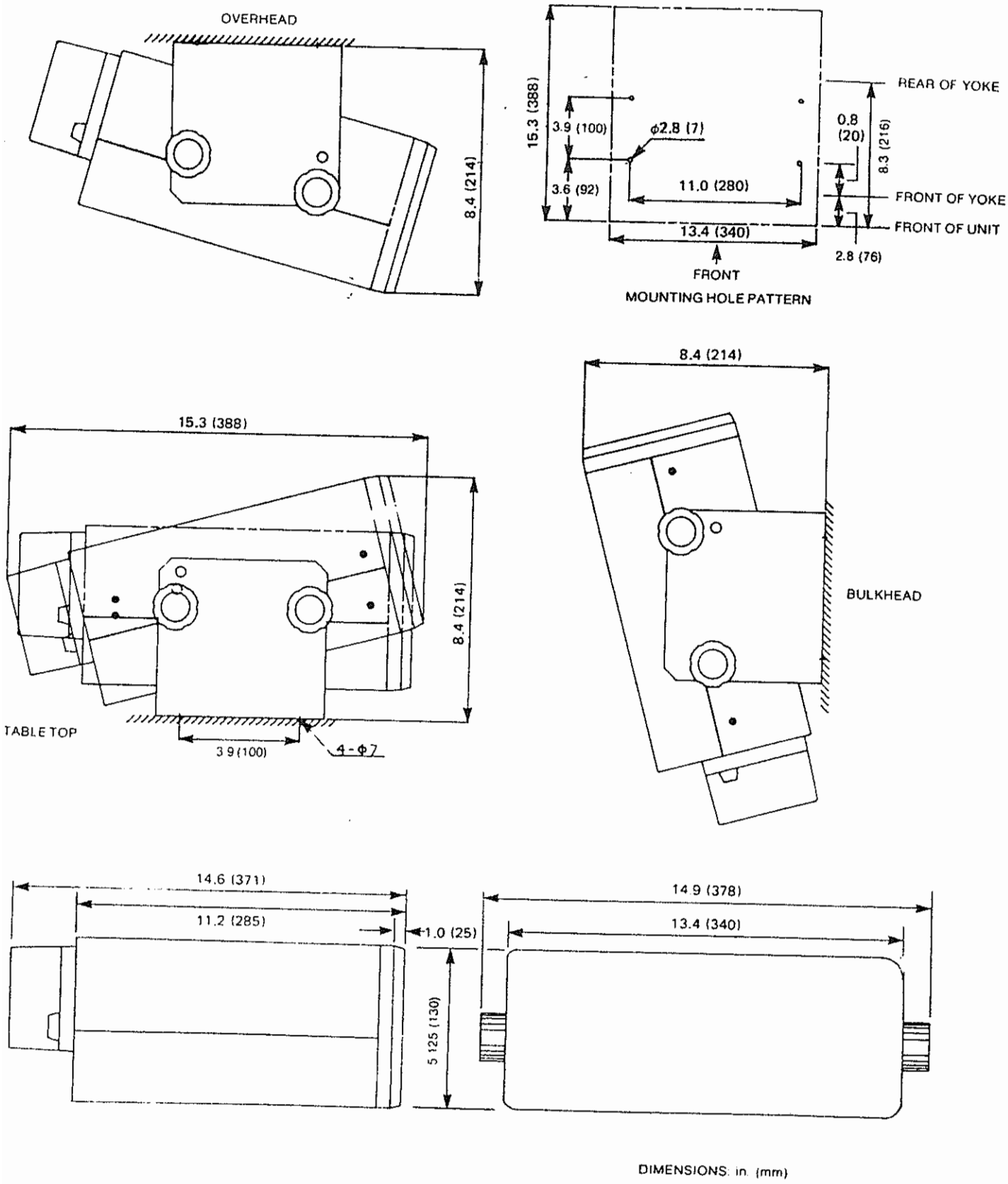


Figure 3-1 Typical Installations

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 dismasting should render the "stay" antenna useless.

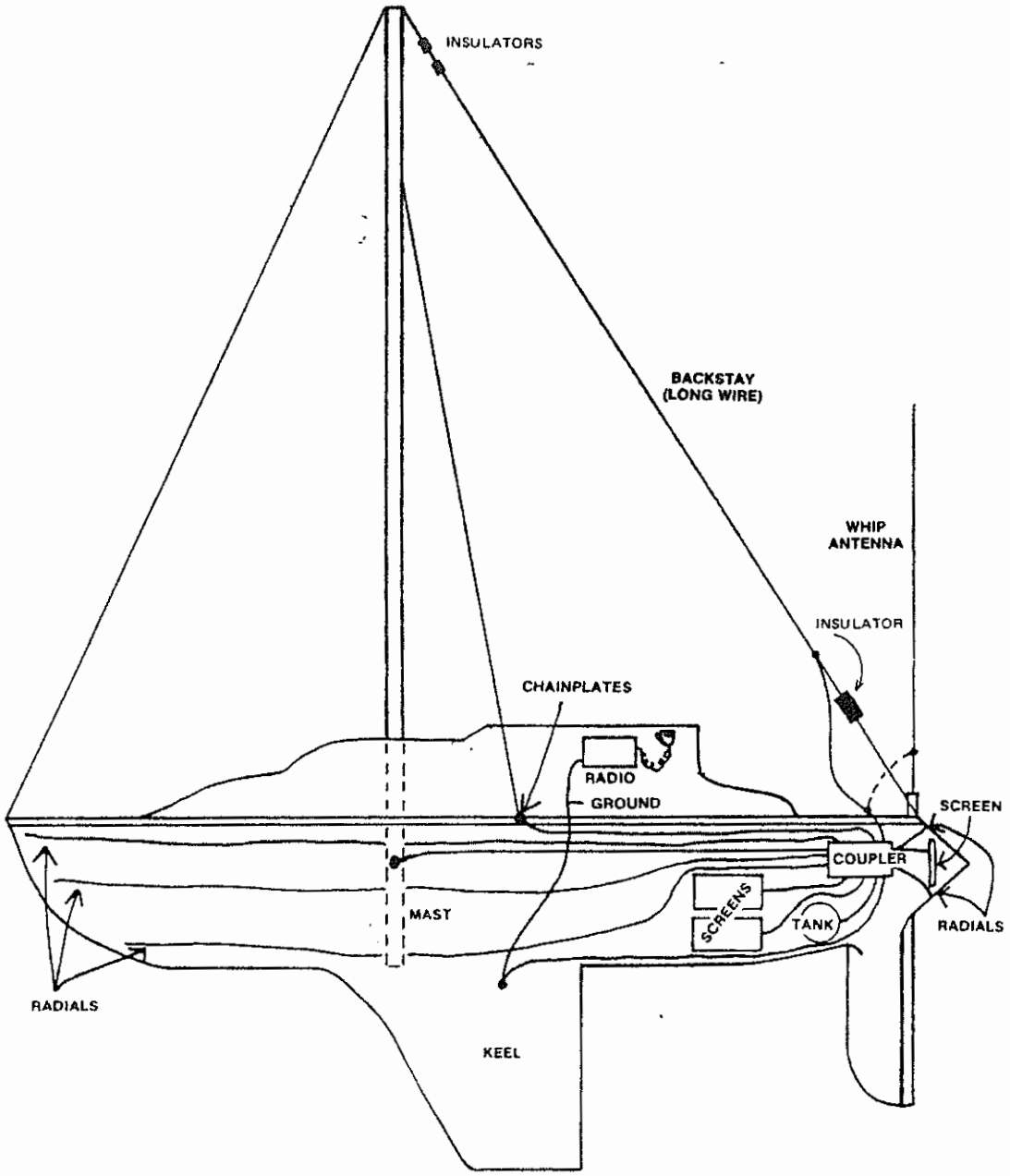


Figure 3-2 Whip and/or Backstay Antenna and Counterpoise System for a Sailboat

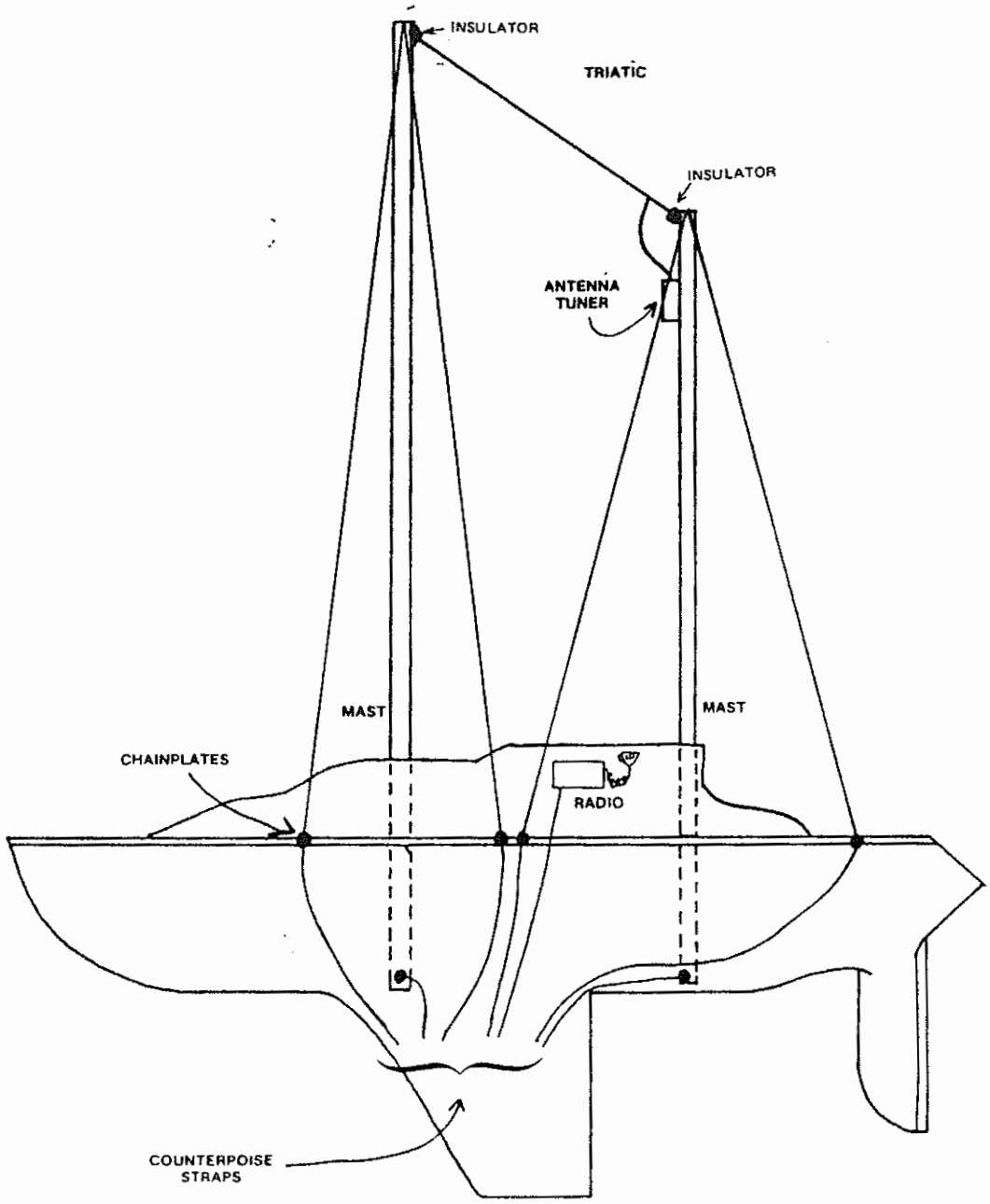


Figure 3-3 Triatic Backstay Antenna and Counterpoise System for a Sailboat

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.

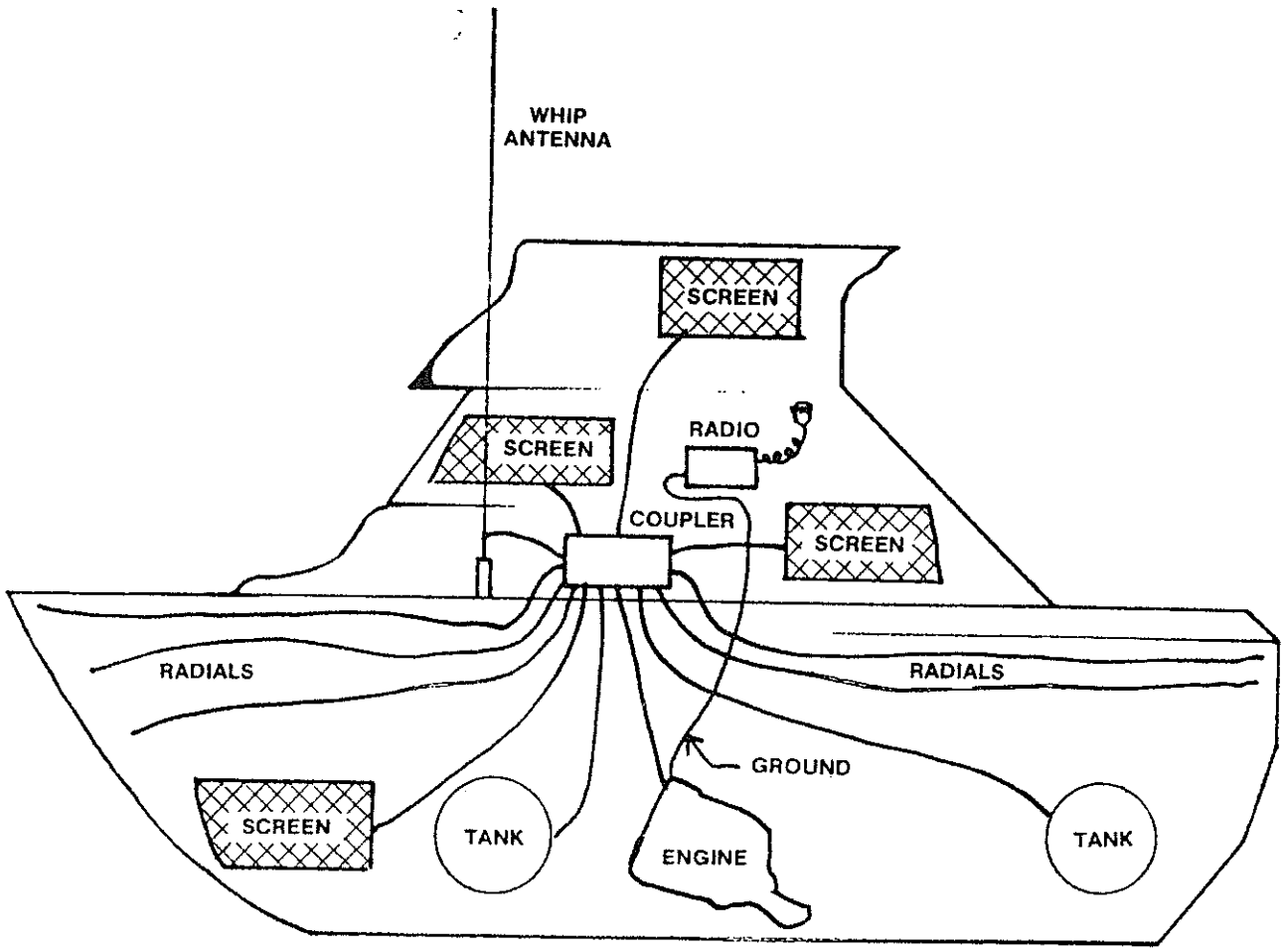


Figure 3-4 Antenna and Counterpoise System for a Power Boat

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.

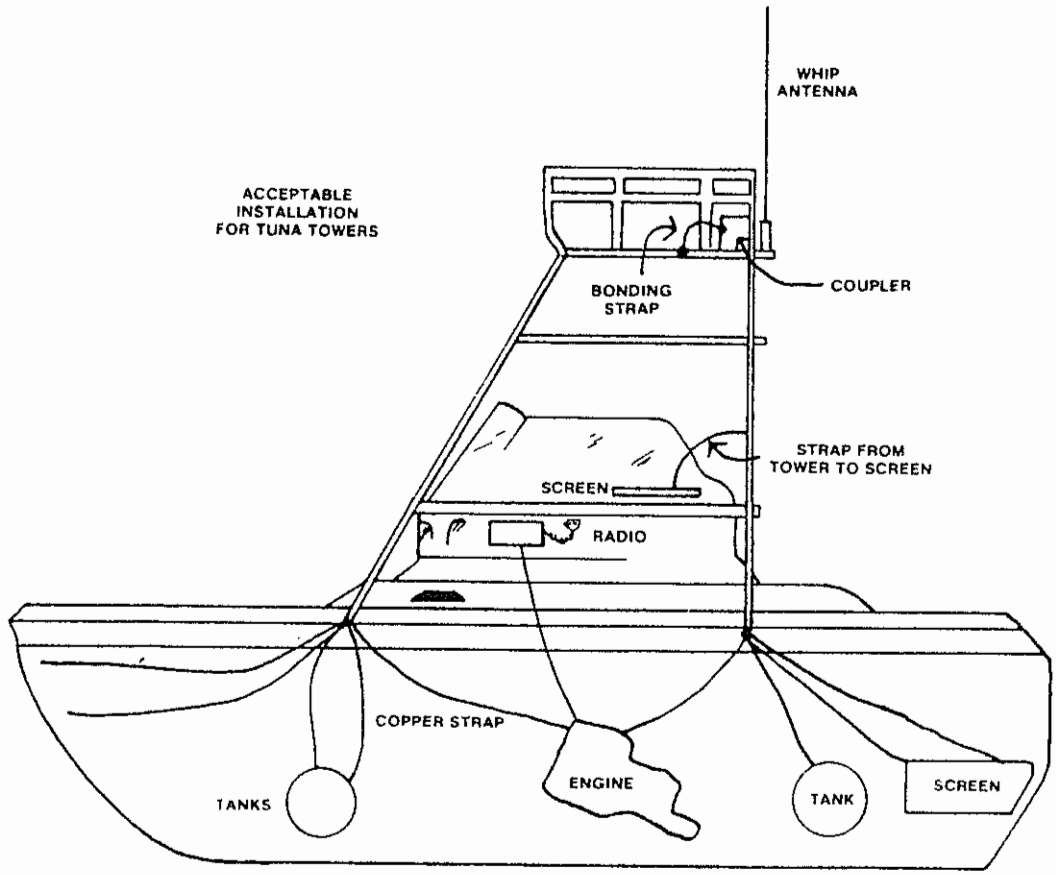


Figure 3-5 Antenna and Counterpoise System with Tuna Tower on Vessel

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.

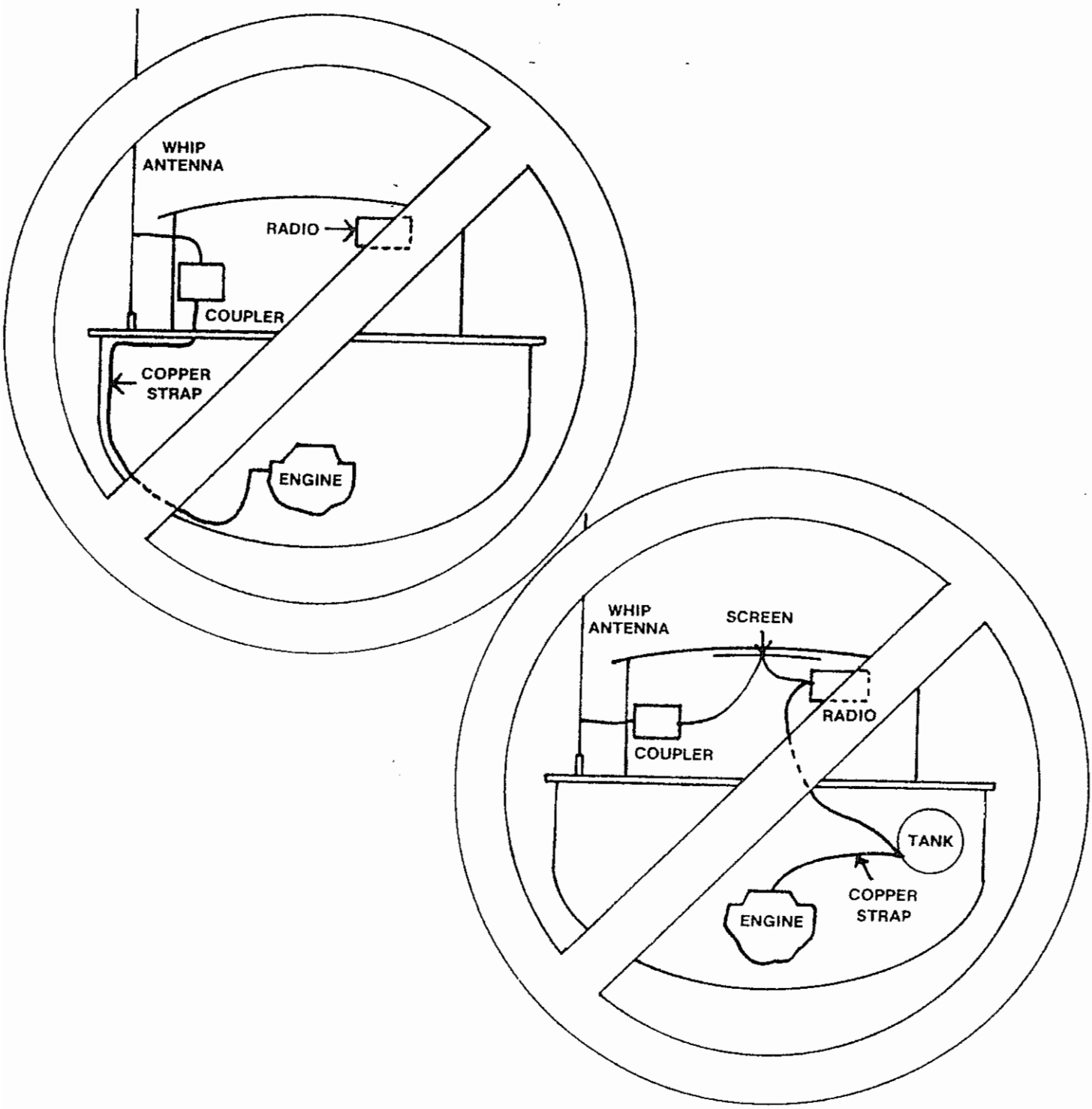


Figure 3-6 Improper Counterpoise Systems, Workboat

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.

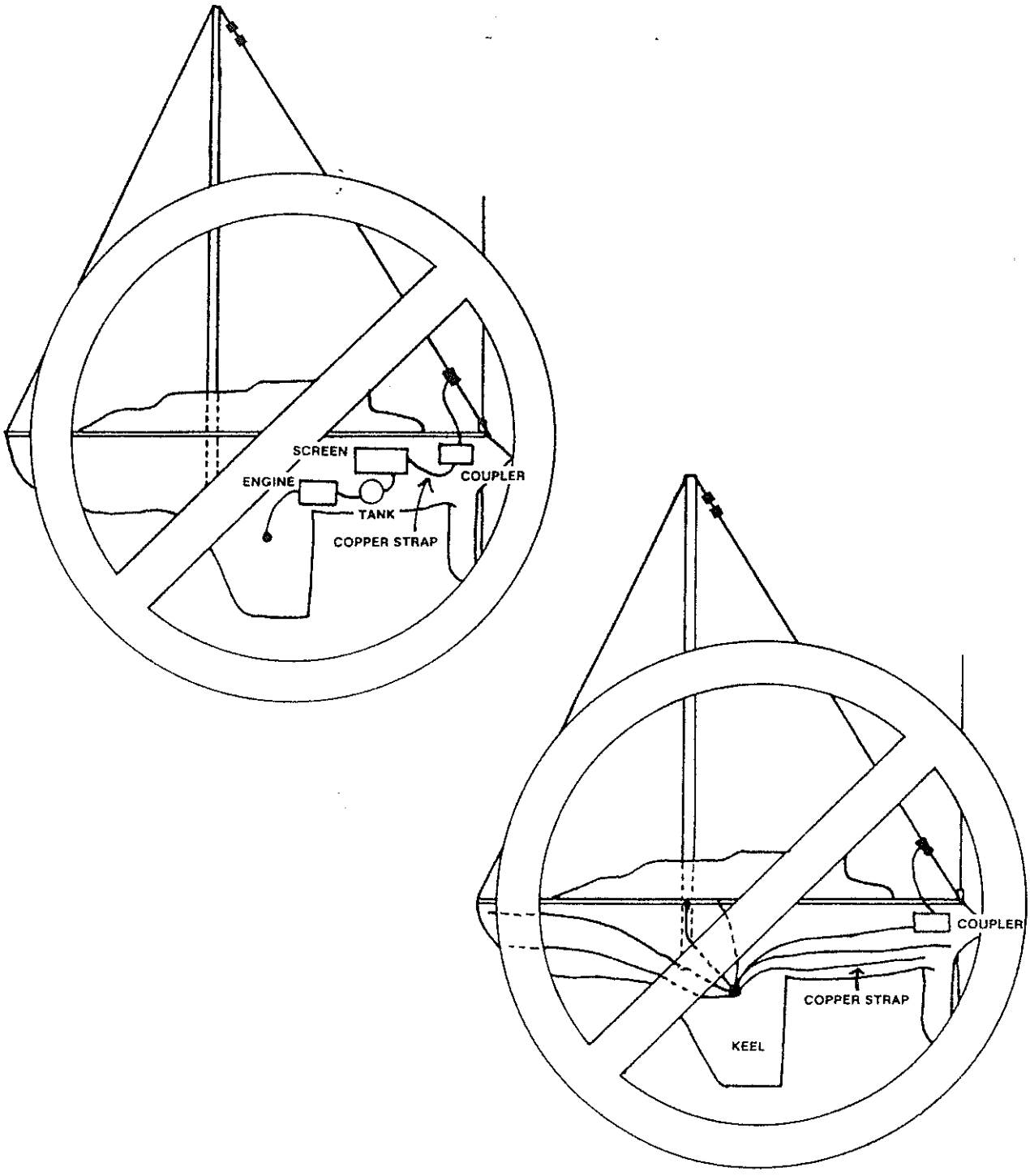


Figure 3-7 Improper Counterpoise Systems, Pleasure Boat

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.

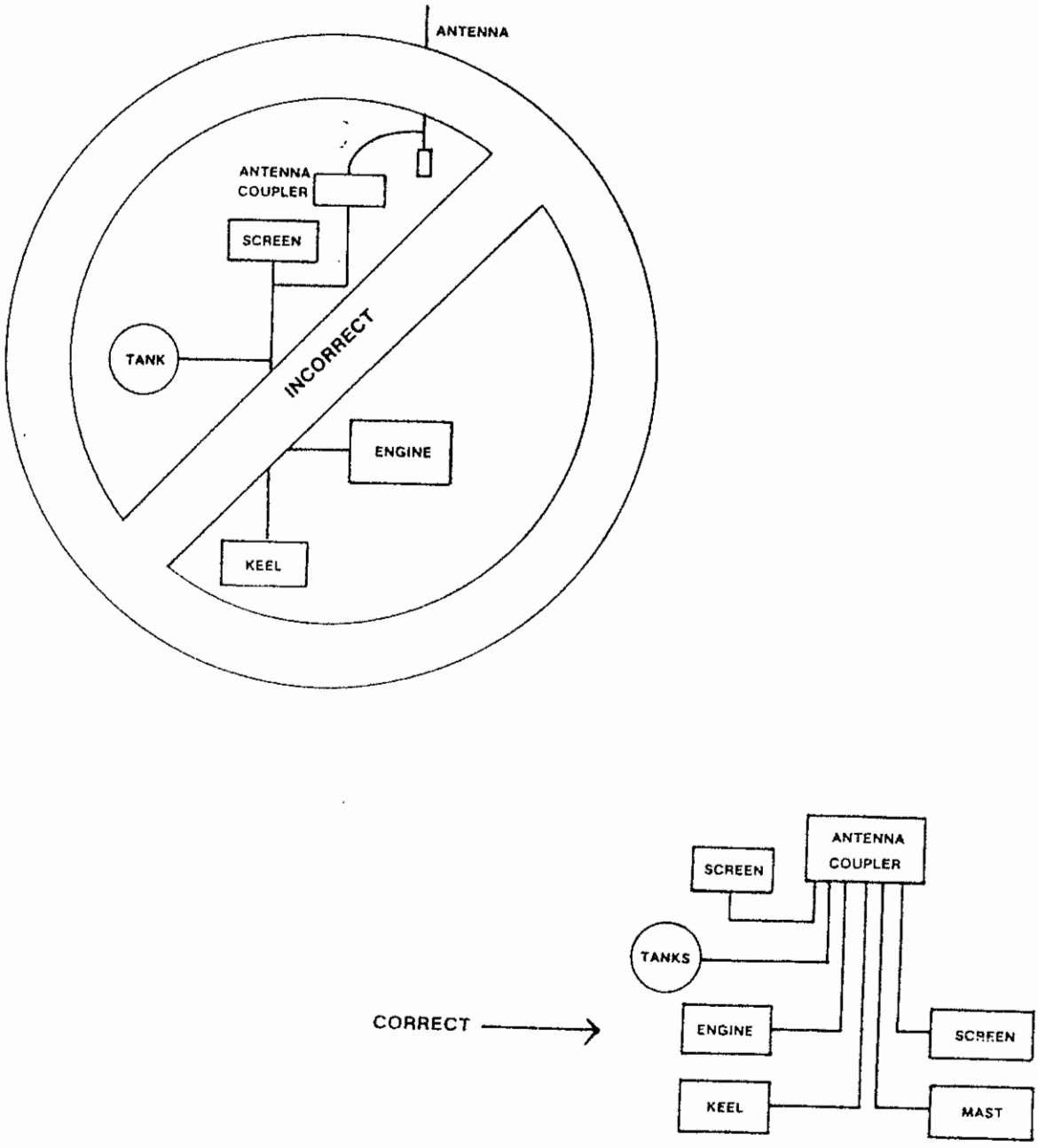


Figure 3-8 Proper and Improper Bonding Schematics

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.

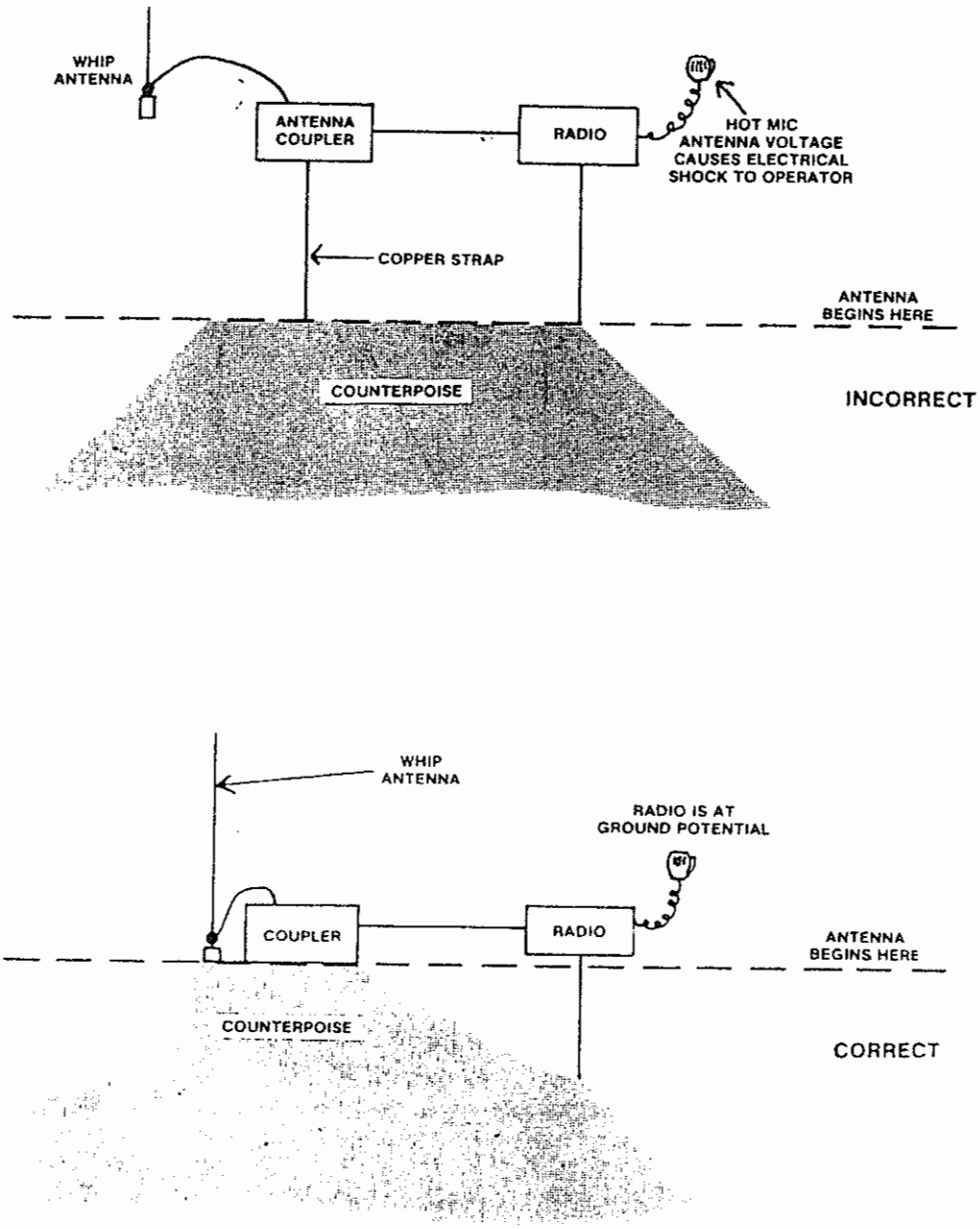


Figure 3-9 Comparison of Antenna Electrical Origin

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.

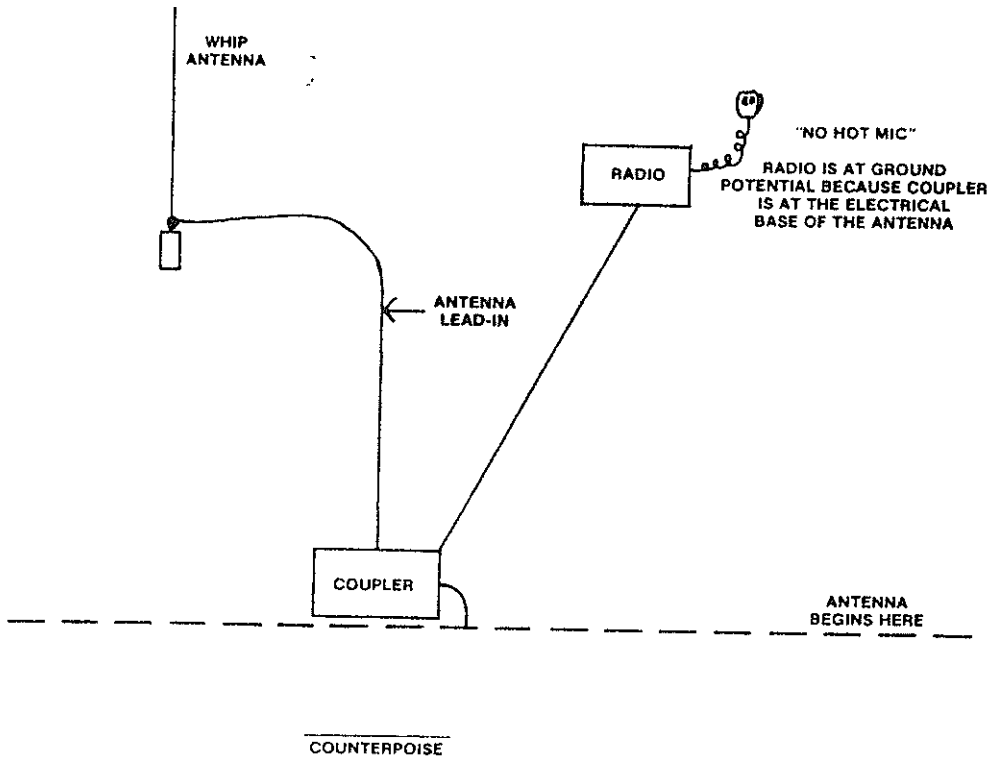
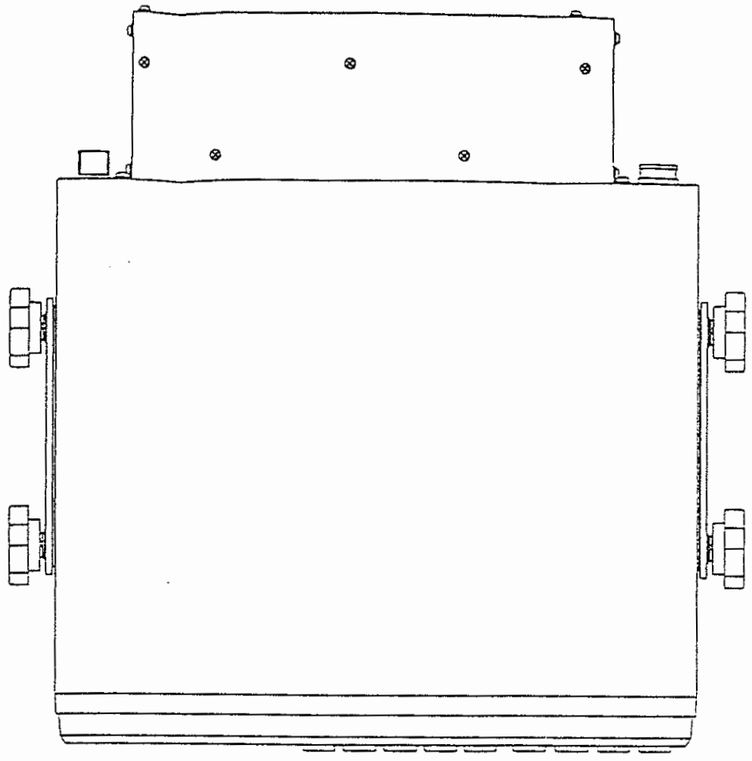
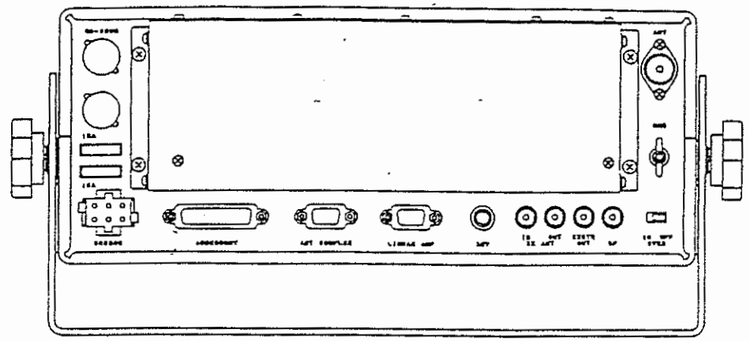


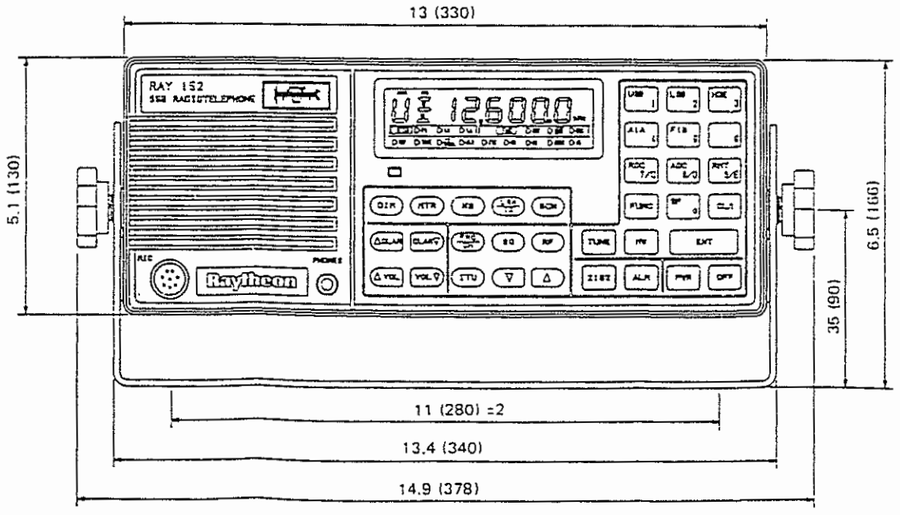
Figure 3-10 Proper Installation with Antenna Coupler at Counterpoise

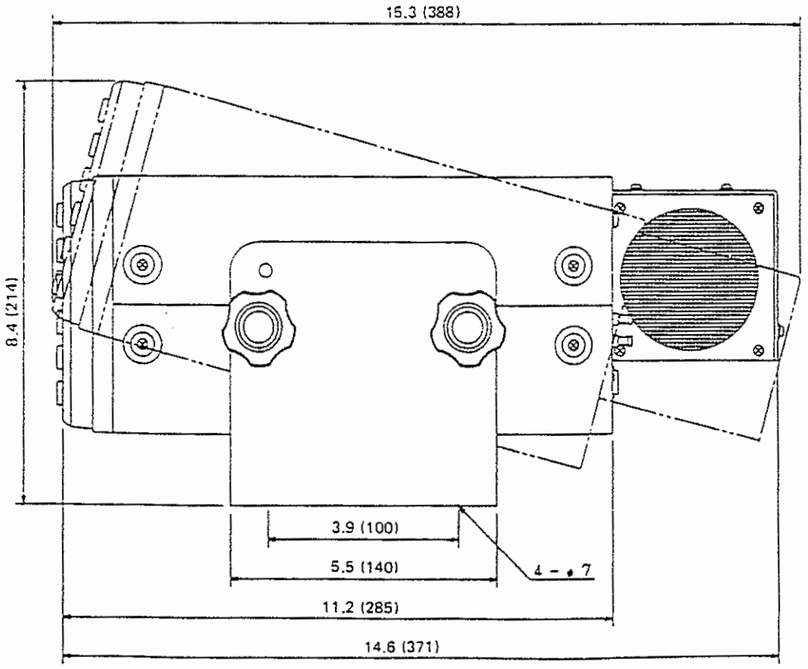
These are by no means the only configurations possible. The necessary steps of each installation is governed by vessel conditions. Still, the primary purpose is to provide the best antenna system available to gain the best HF signal radiation and operation as possible.





REAR VIEW



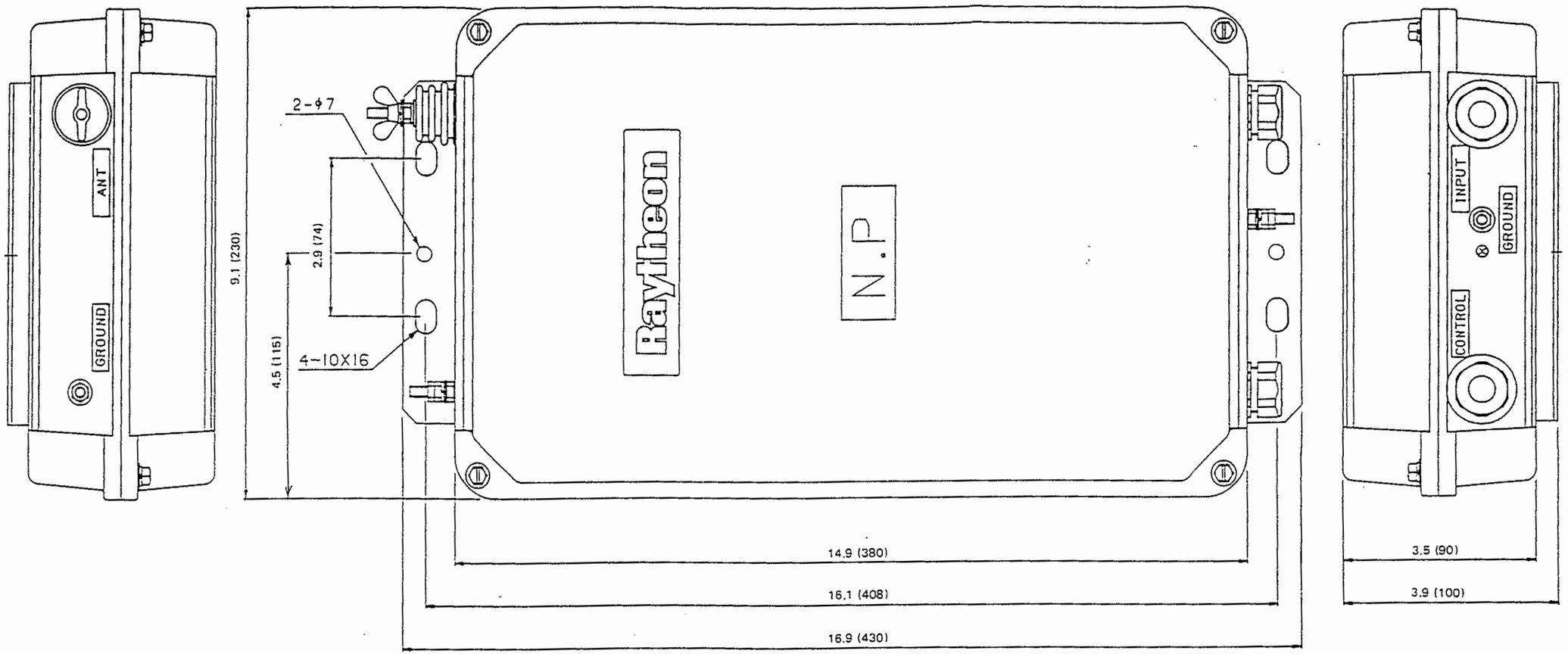


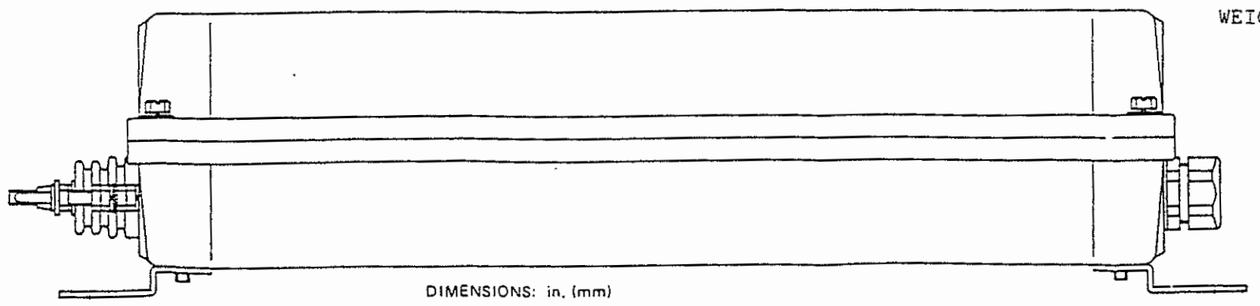
UNLESS OTHERWISE SPECIFIED					
DIMENSION		SPECIFIED		TOLERANCE	
	0	TO	16	±	1
OVER	16	TO	50	±	2
OVER	50	TO	250	±	4
OVER	250	TO	1000	±	8
OVER	1000	TO	3000	±	12

WEIGHT Approx. 23.1 lbs. (10.5kg)

DIMENSIONS: in. (mm)

Figure 3-11 RAY 152 Outline and Mounting Dimensions





WEIGHT Approx. 7.7 lbs.(3.5kg)

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

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.

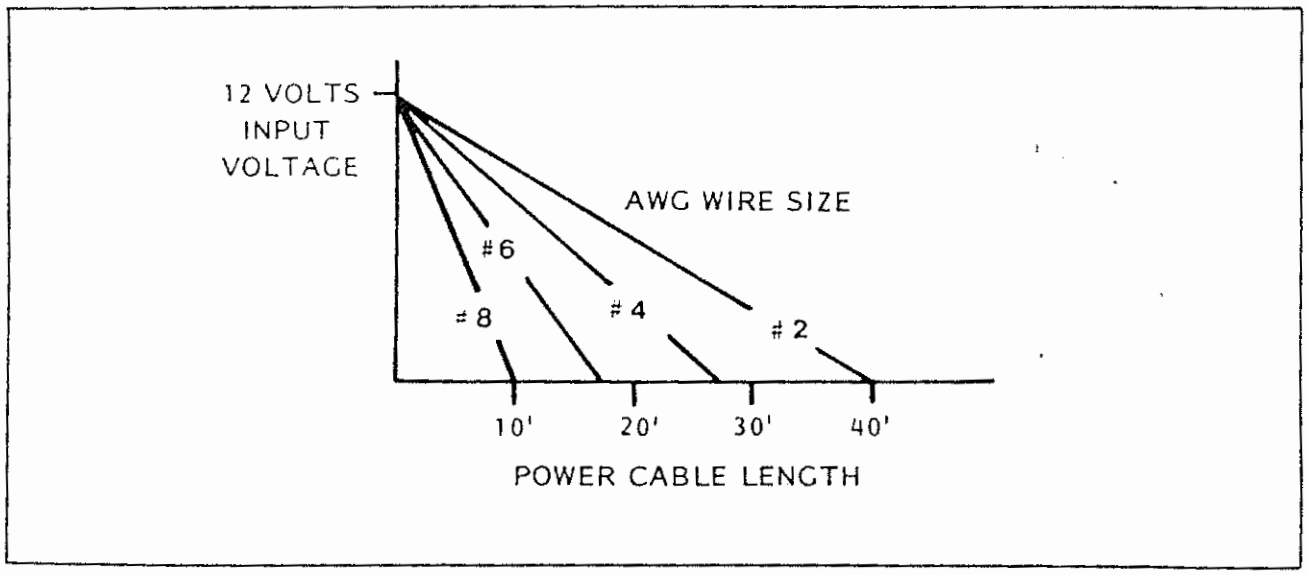


Figure 3-13 Power Cable Size Versus Length

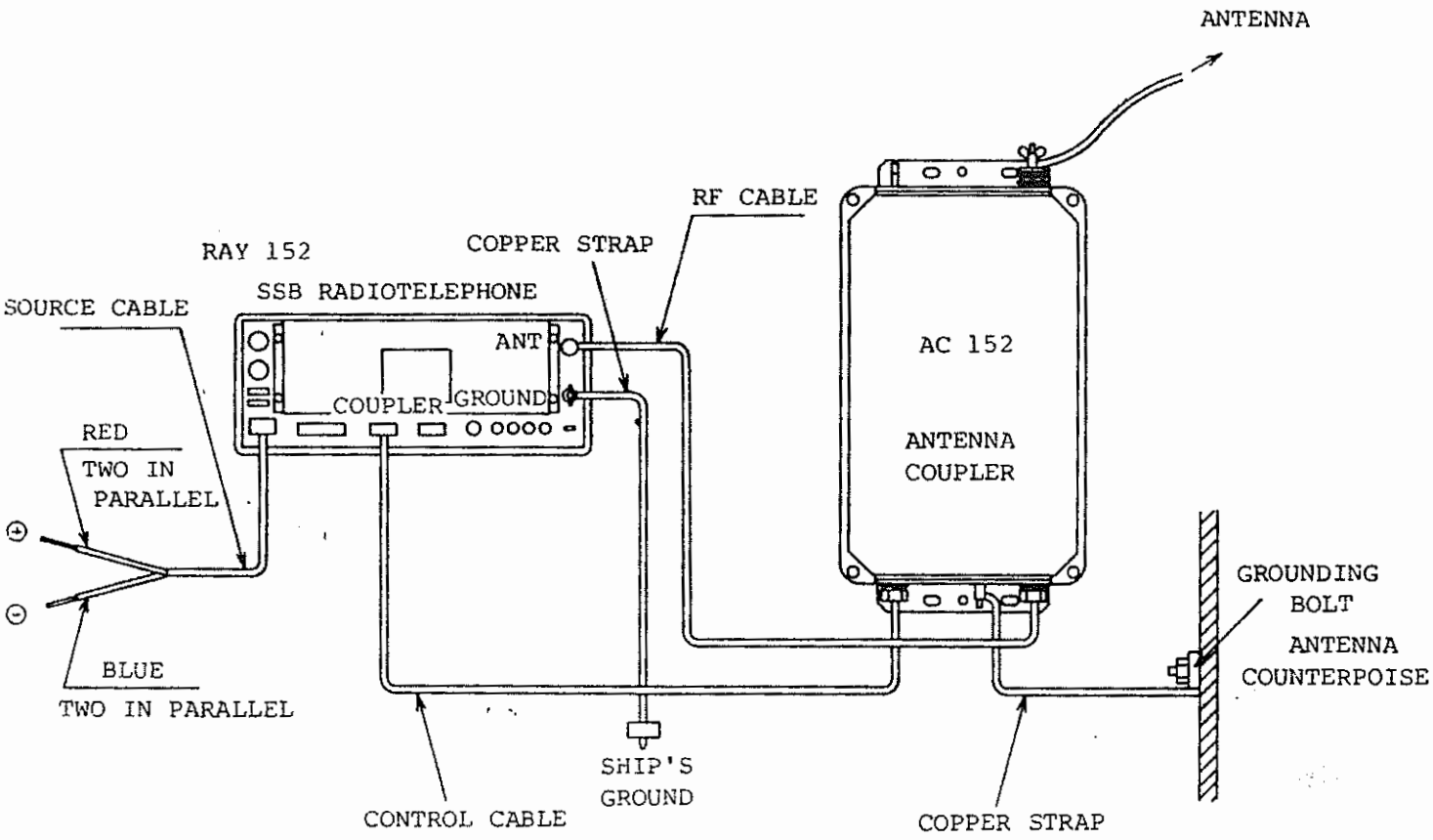


Figure 3-14 Equipment Connection

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.

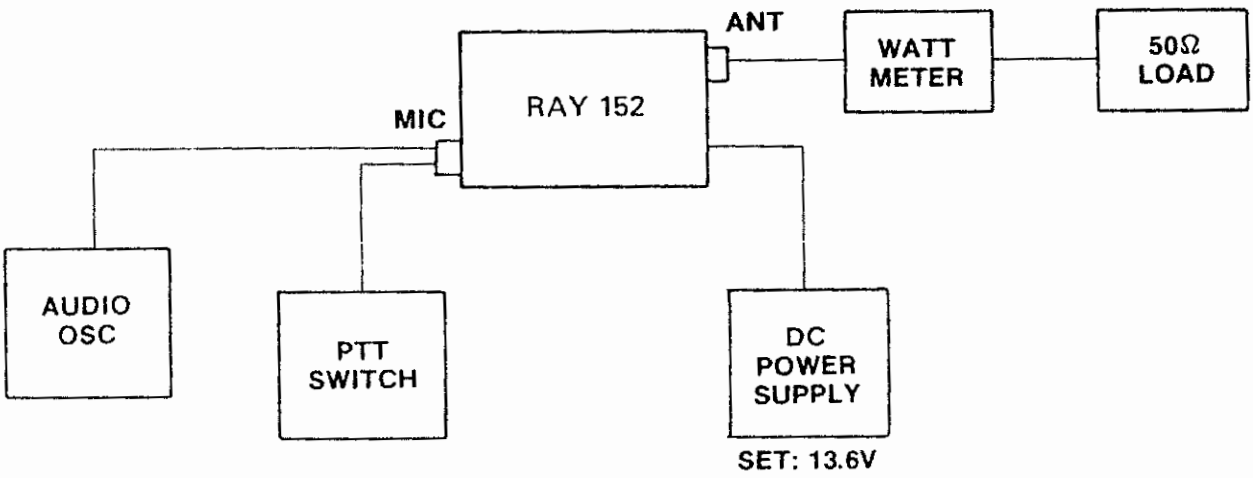


Figure 3-15 Checkout Block Diagram

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

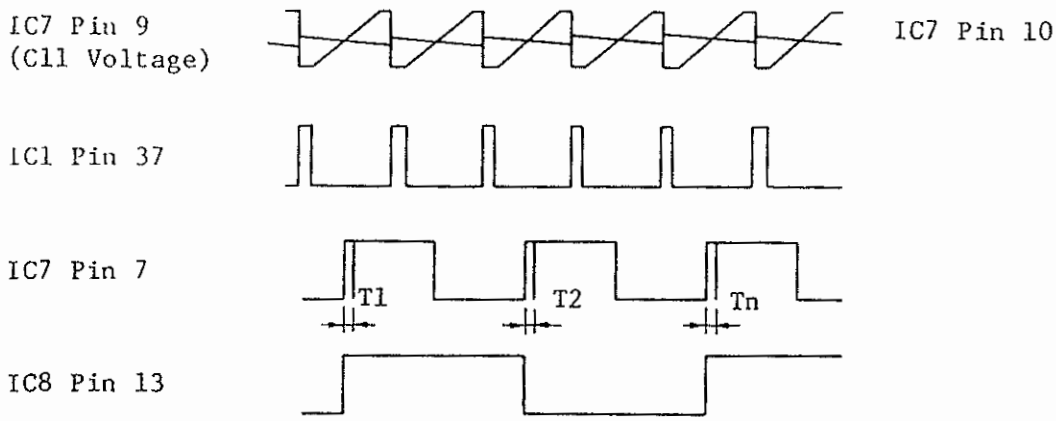
4.2.1 REF/DDS UNIT (CGK-81R)

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 ±0.5ppm 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), compartor (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.

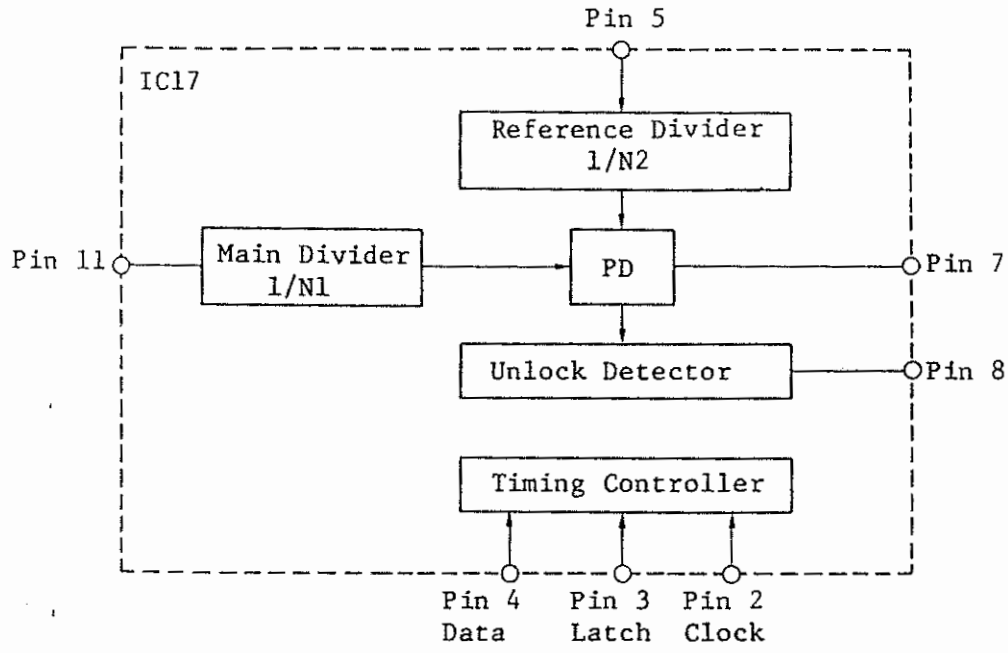


Figure 4-2 PLL IC Configuration (IC17)

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:

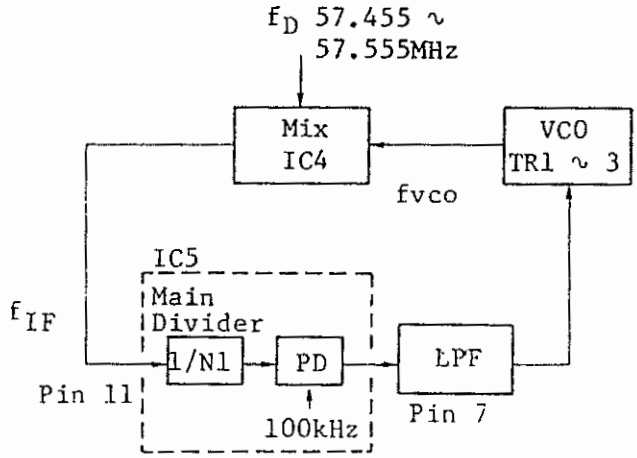


Figure 4-3 Loop I PLL Configuration

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 MHz
F1 F2

f_{VCO} = 70.455 MHz + 12.345 MHz = 82.809 MHz

N1 = 10 x (13 + 12.3) = 253

f_{IF} = 253 x 0.1 MHz = 25.3 MHz

f_D = 57.455 MHz + 0.054 MHz = 57.509 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 decorder (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 ±0.5dB. 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 A1A 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 transciever.

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 4	2	1	Filter
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 $\overline{\text{PTCT}}$ 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 A1A 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 A1A mode.
(5) Removing the RJ5 selects the optional filter FL6 in F1B mode.

4.5 DISPLAY UNIT (CDE-617)

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

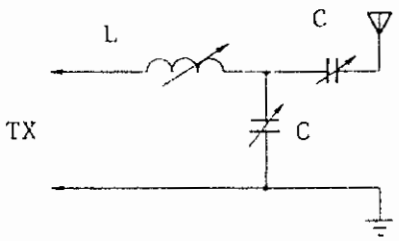
In the AC 152 Antenna Coupler, matching is performed by a combination of ten series inductors, six parallel capacitors at the input, five parallel capacitors at the output, a series capacitor and a parallel capacitor at the output. The inductors and capacitors are switched by relays under CPU control.

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).



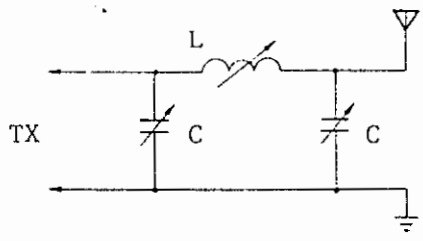


Figure 4-4 Matching Circuit Type 1 Figure 4-5 Matching Circuit Type 2

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).

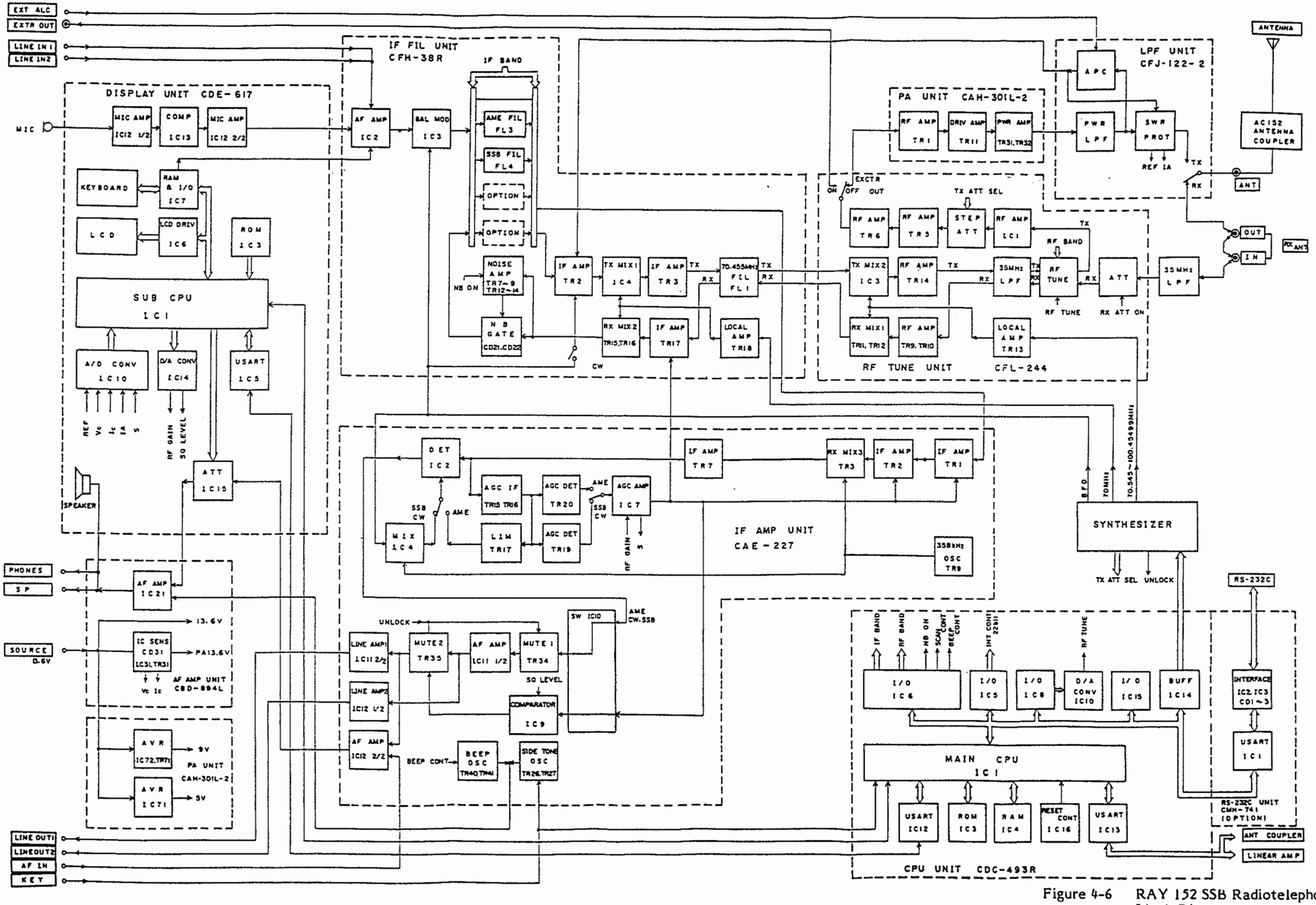


Figure 4-6 RAY 152 SSB Radiotelephone Block Diagram

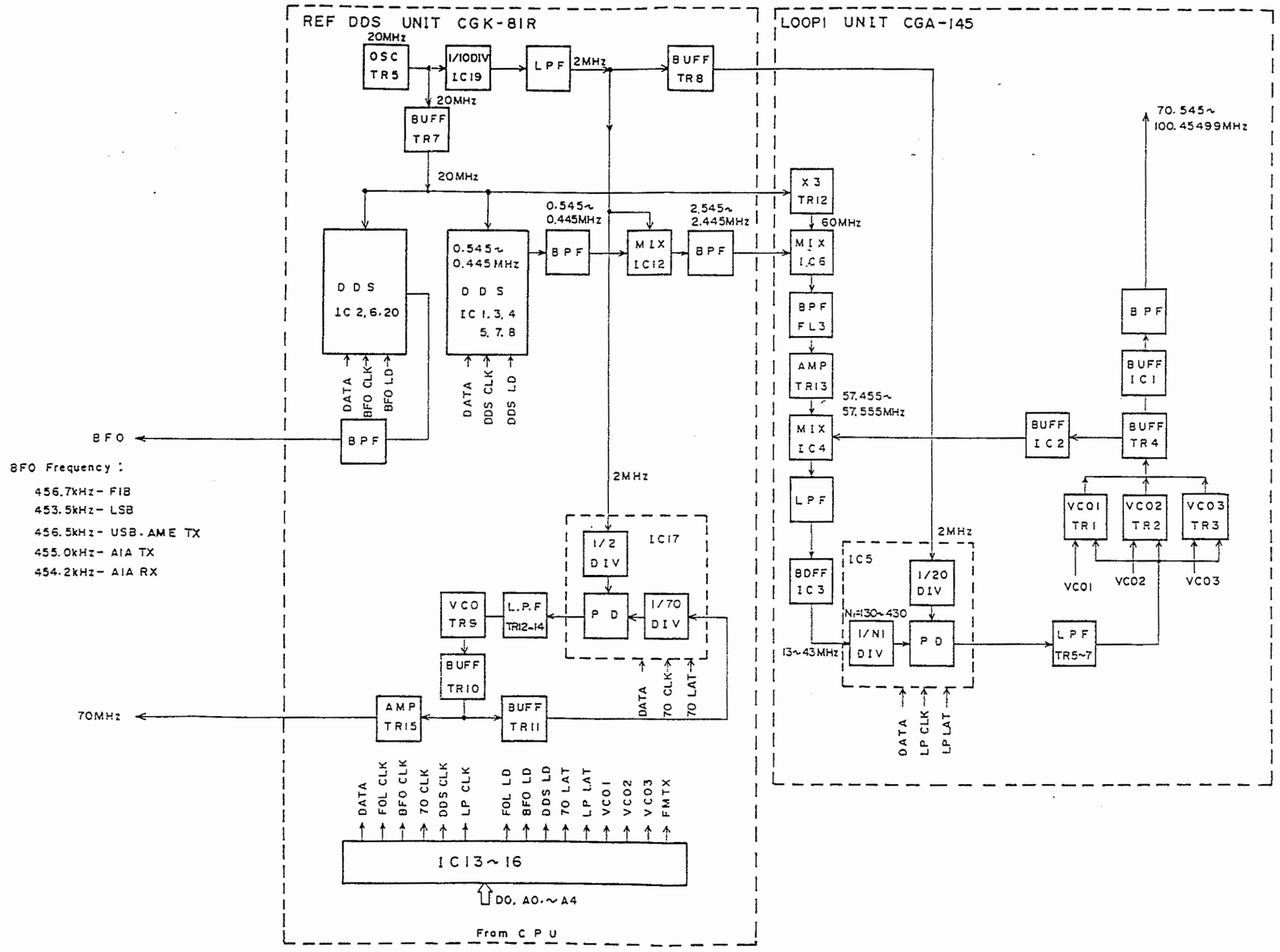


Figure 4-7 RAY 152
Frequency Synthesizer
Block Diagram

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.

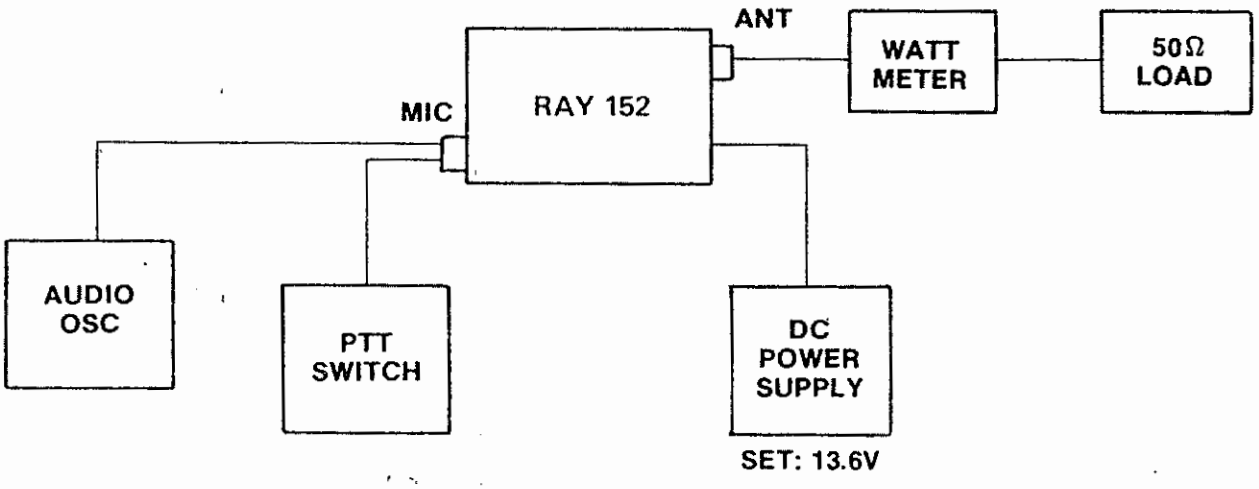


Figure 5-1 Test Equipment Interconnection

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 I1. (4) Adjust the source current (idle current) by RV51.	I=I1+(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)

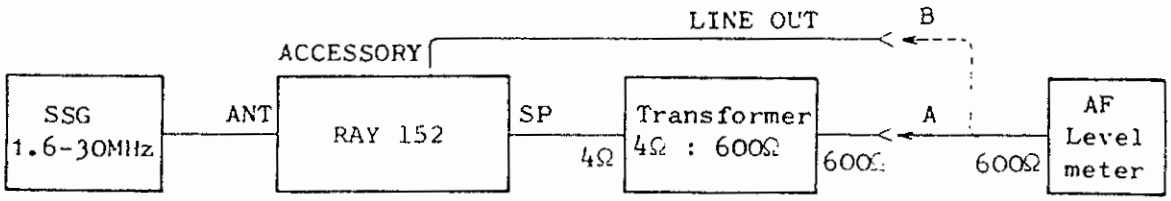
No.	Item	Unit name	Test circuit	Adjusting procedures	Ratings
6.	APC RV191	LPF UNIT CFJ-122-2	Fig. 5-1	Mode: USB Power reduct: Off Audio frequency: 1500 Hz Audio level: -40 dBm 2. Adjustment: Adjust the power output by RV191.	130-150W
7.	POWER REDUCT RV192	LPF UNIT CFJ-122-2	Fig. 5-1	1. Initial setting: 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 impedance frequency counter to TP7 on CGK-81R. 3. Adjust the frequency to 20.0 MHz ±1Hz 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 Sybsystem 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)

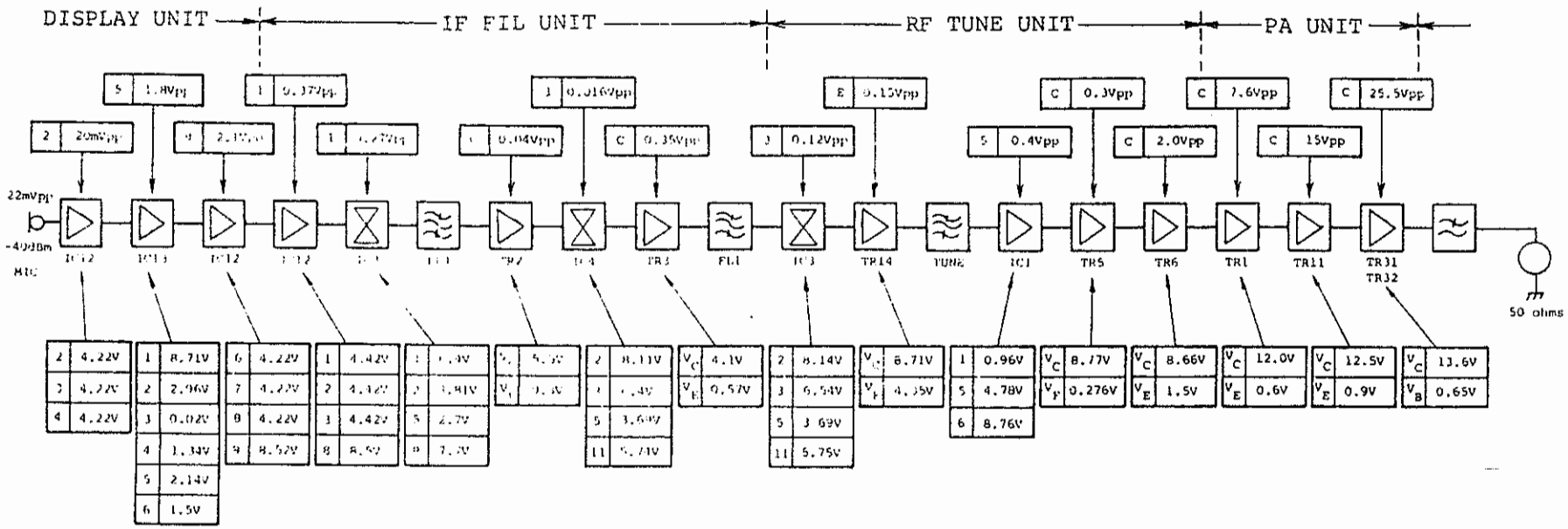


Figure 5-3 Transmitter Stage Levels

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. V_C = Collector Voltage
5. V_E = Emitter Voltage
6. V_B = Base Voltage

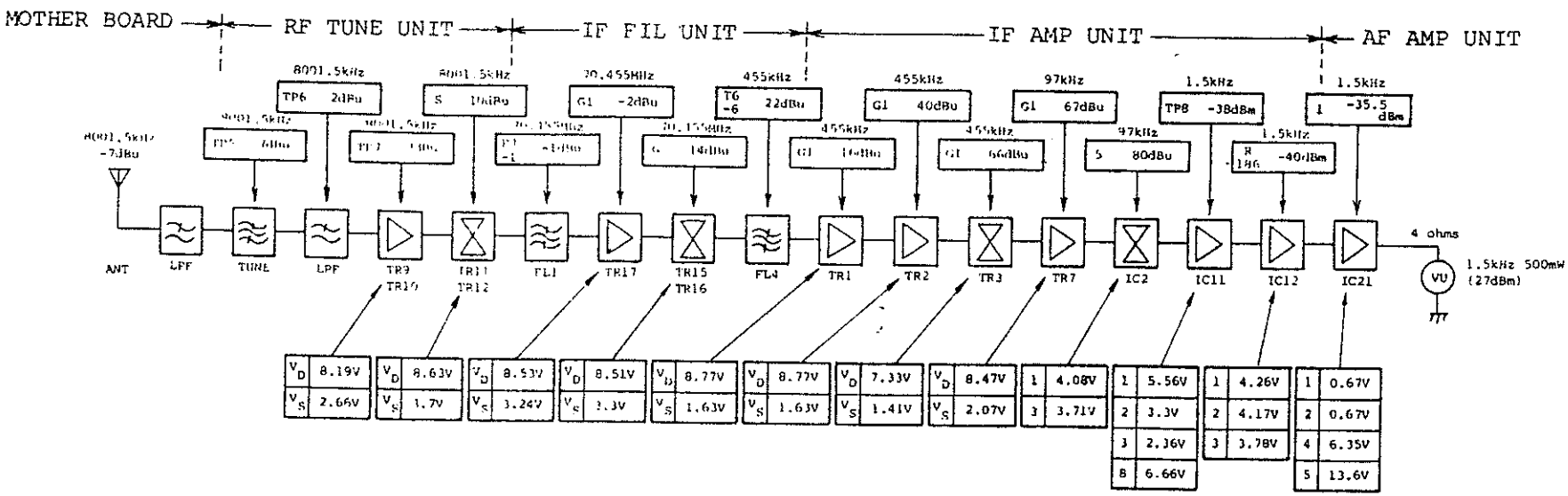


Figure 5-4 Receiver Stage Levels

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. G1 = Transistor Gate 1
4. V_D = Drain Voltage
5. V_S = Source Voltage

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.

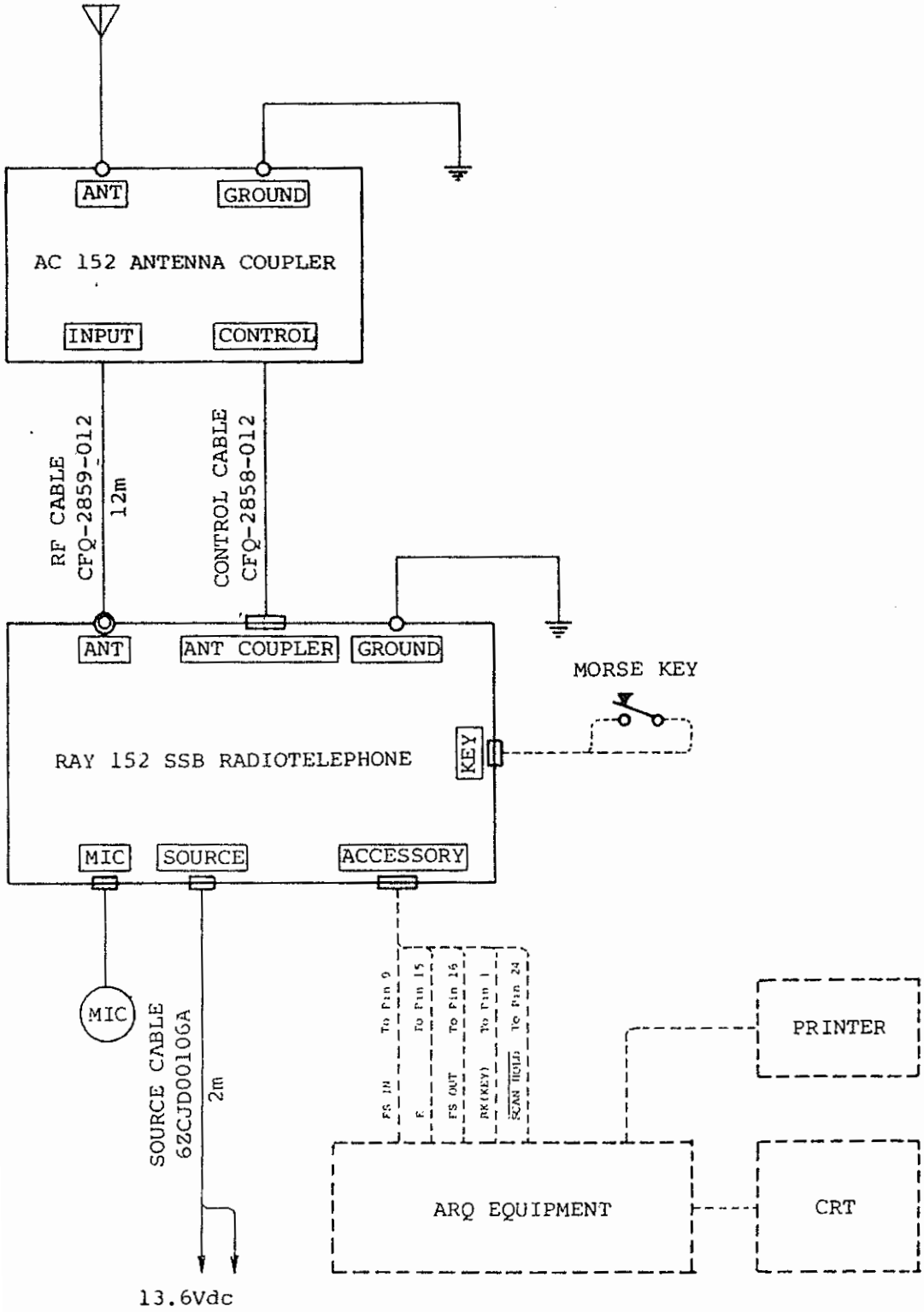
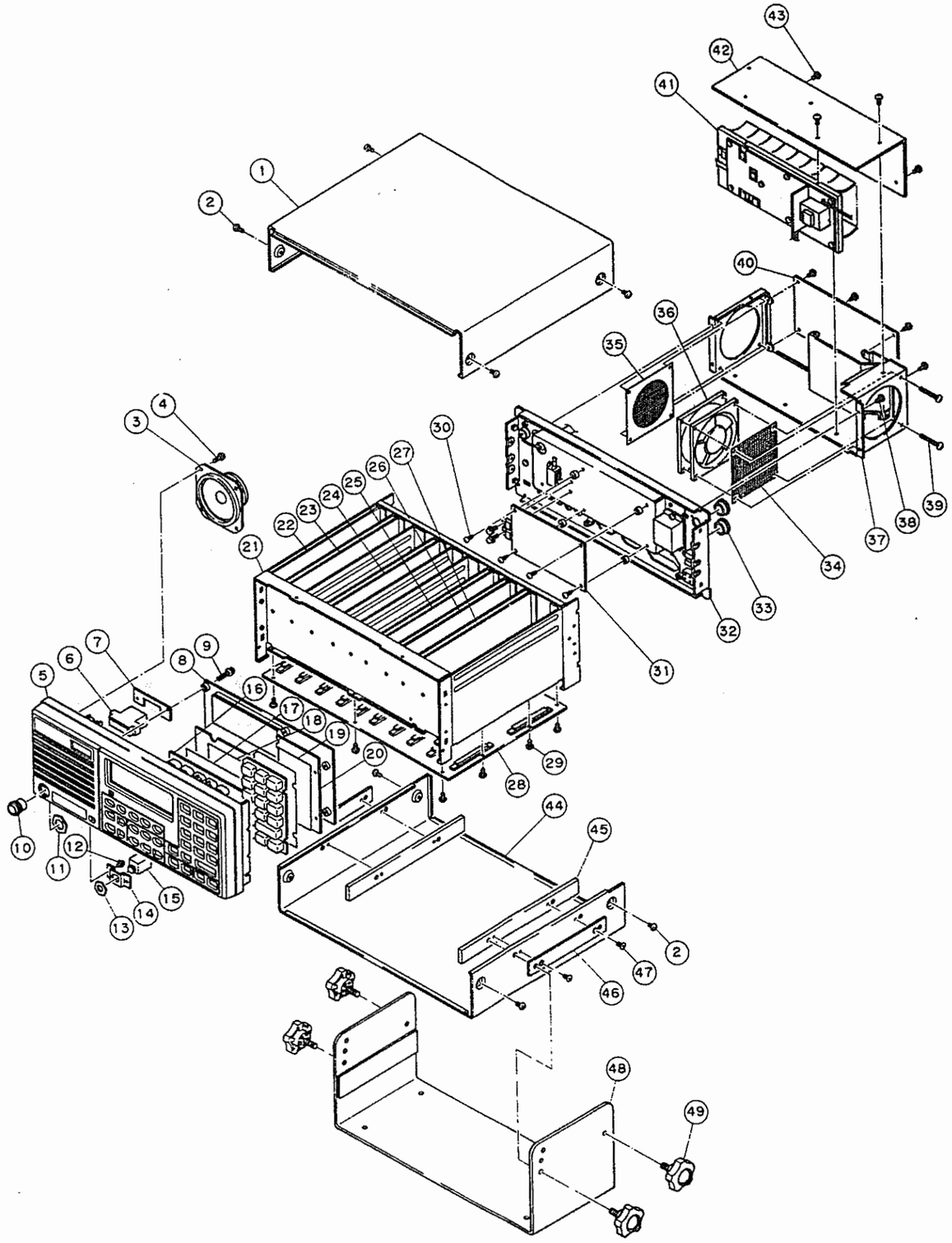
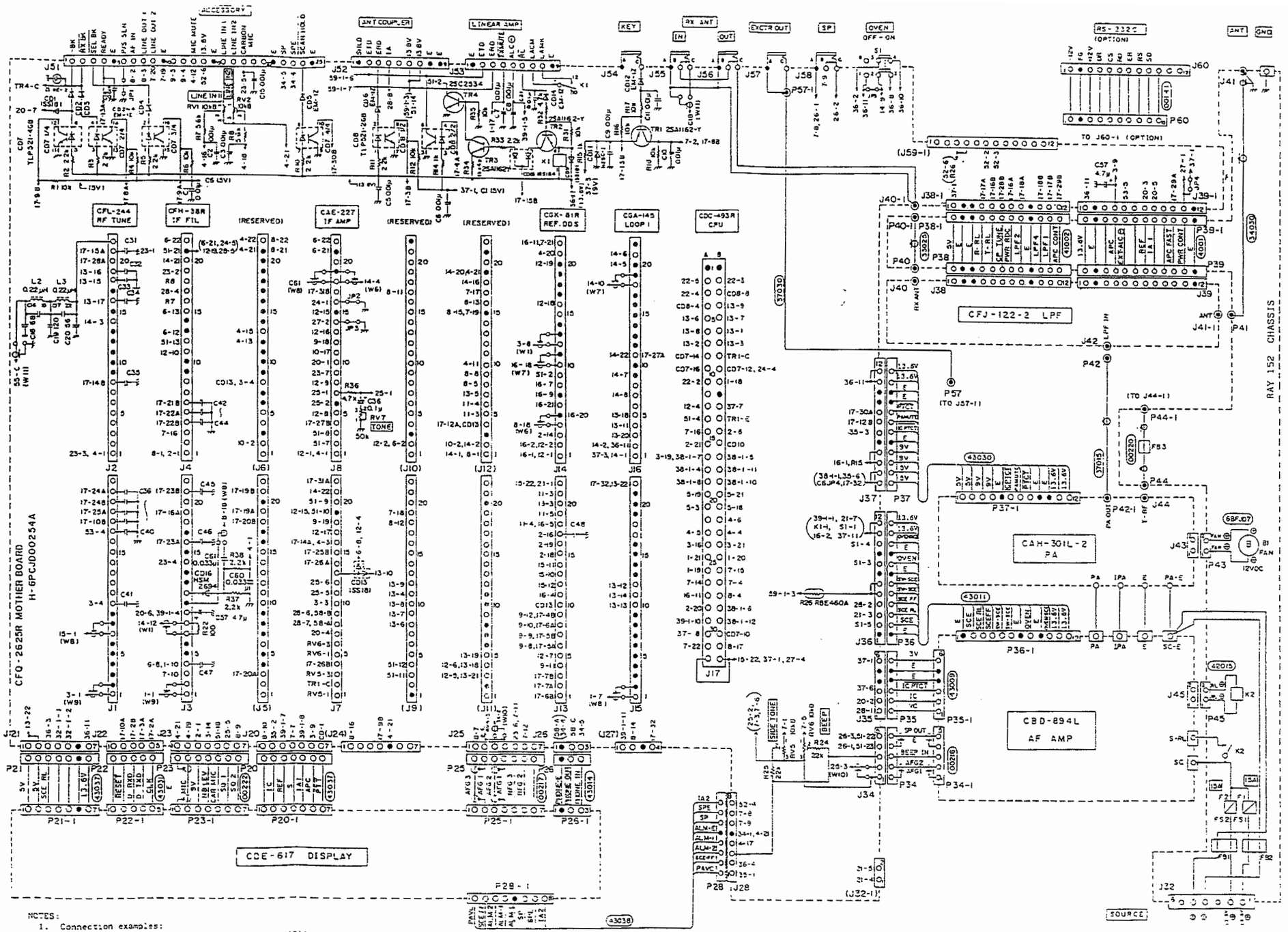


Figure 6-1 RAY 152 Radiotelephone System Diagram



LOCATION	DESCRIPTION	PART NUMBER	Q'TY	REMARKS
1	COVER(TOP)	MTD004494	1	
2	SCREW	BRTG03311	8	M3×8BS
3	SPEAKER	5USBL00004	1	
4	SCREW	BSNC03006B	4	CNK3×6BS
5	PANEL	MTV000320	1	
6	METER	6HMJD00136	1	
7	BRACKET	MTB168007	1	
8	DISPLAY UNIT	CDE-617	1	
9	SCREW	BSNC03010B	5	CNK3×10BS
10	CONNECTOR	15JJBJ00001	1	
11	NUT			
12	SCREW	BSNC03006B	2	CNK3×6BS
13	NUT	5JJAL00029		with(15)
14	BRACKET	MTB138187	1	
15	CONNECTOR	5JJAL00029	(1)	with(13)
16	BRACKET	MTB168006	1	
17	EL LIGHT	6WEJD00005	1	
18	EL LIGHT	6WEJD00006	1	
19	SWITCH	16SCJD00181	1	
20	CONTACT RUBBER			
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	LOOP1 UNIT	CGA-145	1	
27	CPU UNIT	CDC-493R	1	
28	MOTHER BOARD	CFD-2625R	1	
29	TAPPING SCREW	BRTG00970	10	M2.6×6FE
30	TAPPING SCREW	BRTG01227	4	M3×10FE
31	AF AMP UNIT	CBD-8941	1	
32	BACK BOARD	MTD004509	1	
33	CAP	SRNG00179	2	
34	FILTER	MPFM00339	1	
35	FILTER	MPFM00340	1	
36	FAN	6BFJD00007	1	
37	BRACKET	MTD004505	1	
38	SCREW	BSNC04008B	4	CNK4×8BS
39	SCREW	BSNK03035B	2	NK3×35BS
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	M3×6BS
44	COVER (LOWER)	MTD004491	1	
45	BRACKET	MTB167885	2	
46	BRACKET	MTB167884	2	
47	SCREW	BSSK03006B	4	S3×6BS
48	BASE	MPBX177224	1	
49	SCREW	BRTG00179	4	M6×15

Figure 6-2 RAY 152 Radiotelephone Assembly Drawing



NOTES:
1. Connection examples:
   - "3-1" -- connection to No.1 pin of J(P)3
   - "37-1-6" -- connection to No.6 pin of J(P)37-1
   - "R7" -- connection to R7
   - "K1-12" -- connection to No.12 pin of K1
2. Unless otherwise specified:
   - Resistance values are in ohm, 1/8W.
   - Capacitance values are in pF.
   - Capacitances are 1000pF.

Figure 6-3 Mother Board (CFQ-2625R) Schematic Diagram

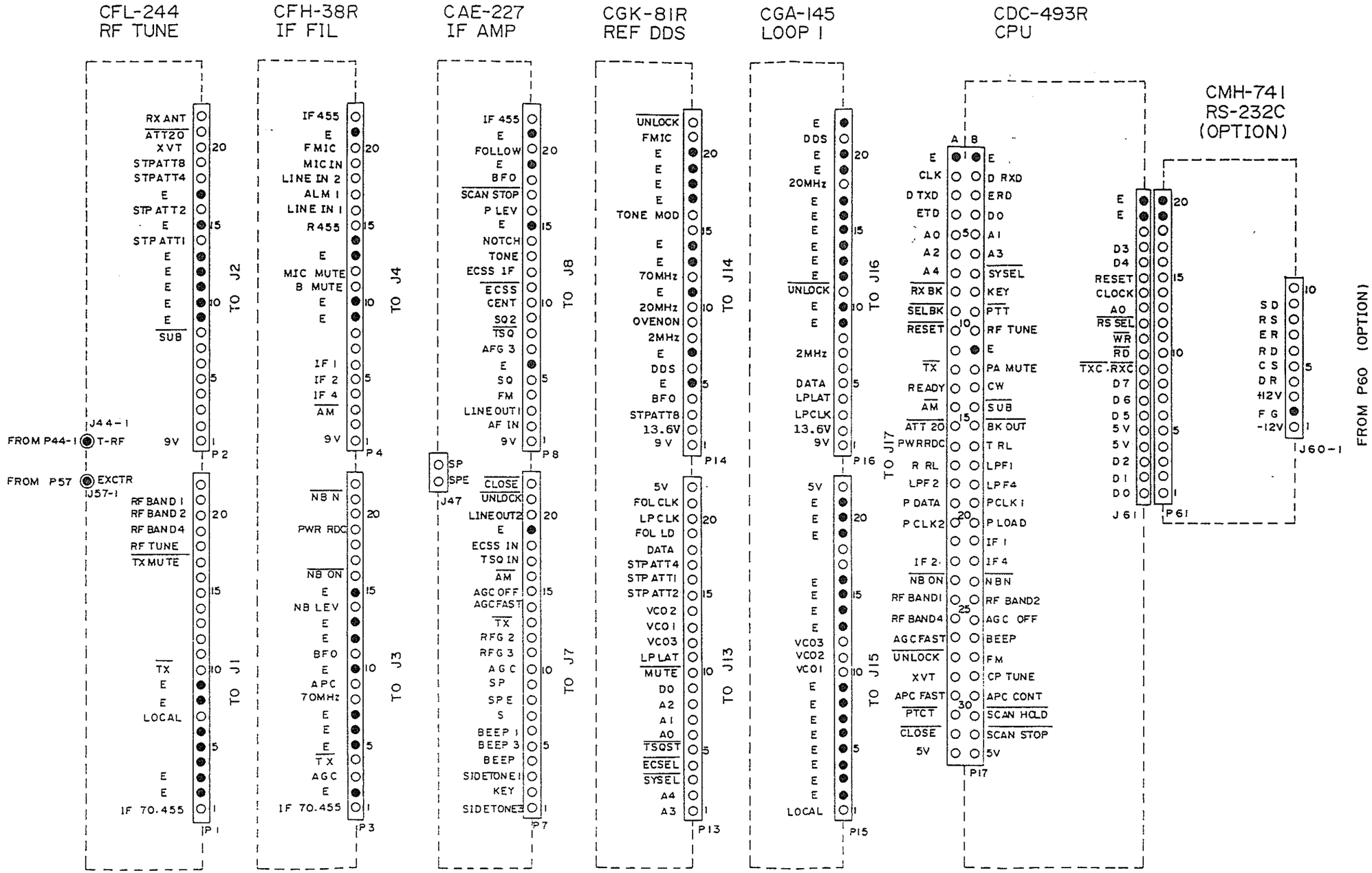


Figure 6-4 RAY 152 SSB Radiotelephone Signal Nomenclature of Units

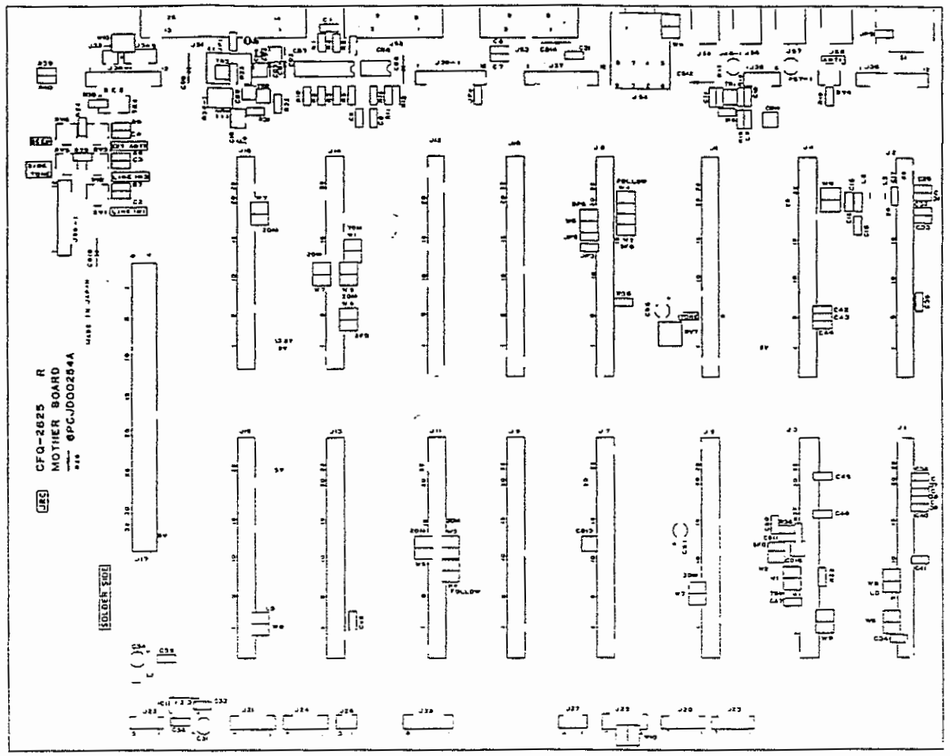


Figure 6-5 MOTHER BOARD (CFQ-2625R) Component Layout

PARTS LIST

TITLE: MOTHER BOARD	CFQ-2625R	SHEET NO 1

PARTS NO	PARTS NAME	TYPE	DESCRIPTION	CODE
J28	CONNECTOR	IL-S-8P-S2I2-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

TITLE: MOTHER BOARD	CFQ-2625	SHEET NO 1

PARTS NO	PARTS NAME		TYPE	DESCRIPTION	CODE
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	SCAAD01597
C31	CAP,FXD	CER	C3216B1H102K-E-TP	1000PF	SCAAD01073
C32	CAP,FXD	CER	C3216B1H102K-E-TP	1000PF	SCAAD01073
C33	CAP,FXD	CER	C3216B1H102K-E-TP	1000PF	SCAAD01073
C34	CAP,FXD	CER	C3216B1H102K-E-TP	1000PF	SCAAD01073
C35	CAP,FXD	CER	C3216B1H102K-E-TP	1000PF	SCAAD01073
C36	CAP,FXD	CER	C3216B1H102K-E-TP	1000PF	SCAAD01073
C37	CAP,FXD	CER	C3216B1H102K-E-TP	1000PF	SCAAD01073
C38	CAP,FXD	CER	C3216B1H102K-E-TP	1000PF	SCAAD01073
C39	CAP,FXD	CER	C3216B1H102K-E-TP	1000PF	SCAAD01073
C40	CAP,FXD	CER	C3216B1H102K-E-TP	1000PF	SCAAD01073
C41	CAP,FXD	CER	C3216B1H102K-E-TP	1000PF	SCAAD01073
C42	CAP,FXD	CER	C3216B1H102K-E-TP	1000PF	SCAAD01073
C43	CAP,FXD	CER	C3216B1H102K-E-TP	1000PF	SCAAD01073
C44	CAP,FXD	CER	C3216B1H102K-E-TP	1000PF	SCAAD01073
C45	CAP,FXD	CER	C3216B1H102K-E-TP	1000PF	SCAAD01073
C46	CAP,FXD	CER	C3216B1H102K-E-TP	1000PF	SCAAD01073
C47	CAP,FXD	CER	C3216B1H102K-E-TP	1000PF	SCAAD01073

PARTS LIST

	MOTHER BOARD	TITLE CFQ-2625		SHEET NO 2
PARTS NO	PARTS NAME	TYPE	DESCRIPTION	CODE
C48	CAP,FXD CER	C3216B1H102K-E-TP	1000PF	SCAAD01073
C56	CAP,FXD TANTAL	202L3502 104KB		SCSAC01068
C57	CAP,FXD TANTAL	202L3502475KB	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
CD1	DIODE	1SS181 TE85L		STXAD00356
CD2	DIODE	EM1Z	200V 1A	STXAN00061
CD3	DIODE	EM1Z	200V 1A	STXAN00061
CD4	DIODE	EM1Z	200V 1A	STXAN00061
CD5	DIODE	EM1Z	200V 1A	STXAN00061
CD6	DIODE	EM1Z	200V 1A	STXAN00061
CD7	PHOTO COUPLER	TLP521-4-GB		STZAD00213
CD8	PHOTOCOUP-LER	TLP521-2-GB		STZAD00234
CD9	DIODE	1SS181 TE85L		STXAD00356
CD11	DIODE	RD5.1MB1-T1		STXAA00515
CD12	DIODE	EM1Z	200V 1A	STXAN00061
CD13	DIODE	1SS181 TE85L		STXAD00356
CD14	DIODE	EM1Z	200V 1A	STXAN00061
CD15	DIODE	1SS184 TE85L		STXAD00290
CD16	DIODE	HSM2694ILC		STXAE00627
J1	CONNECTOR	PCN6-22S-2.5DS		SJDAA00082
J2	CONNECTOR	PCN6-22S-2.5DS		SJDAA00082
J3	CONNECTOR	PCN6-22S-2.5DS		SJDAA00082
J4	CONNECTOR	PCN6-22S-2.5DS		SJDAA00082
J7	CONNECTOR	PCN6-22S-2.5DS		SJDAA00082
J8	CONNECTOR	PCN6-22S-2.5DS		SJDAA00082
J13	CONNECTOR	PCN6-22S-2.5DS		SJDAA00082
J14	CONNECTOR	PCN6-22S-2.5DS		SJDAA00082
J15	CONNECTOR	PCN6-22S-2.5DS		SJDAA00082
J16	CONNECTOR	PCN6-22S-2.5DS		SJDAA00082
J17	CONNECTOR	ME03-L64S-D412-A1		SJBAF00458
J20	CONNECTOR	IL-S-7P-S2T2-EF		SJWAD00083
J21	CONNECTOR	IL-S-7P-S2T2-EF		SJWAD00083
J22	CONNECTOR	IL-S-5P-S2T2-EF		SJWAD00141
J23	CONNECTOR	IL-S-7P-S2T2-EF		SJWAD00083

PARTS LIST

	MOTHER BOARD	TITLE CFQ-2625		SHEET NO 3
PARTS NO	PARTS NAME	TYPE	DESCRIPTION	CODE
J25	CONNECTOR	IL-S-7P-S2T2-EF		SJWAD00083
J26	CONNECTOR	IL-S-3P-S2T2-EF		SJWAD00234
J34	CONNECTOR	IL-S-5P-S2T2-EF		SJWAD00141
J35	CONNECTOR	IL-S-6P-S2T2-EF		SJWAD00142
J36	CONNECTOR	IL-S-12P-S2T2-EF		SJWAD00156
J37	CONNECTOR	IL-S-12P-S2T2-EF		SJWAD00156
J38-1	CONNECTOR	IL-S-12P-S2T2-EF		SJWAD00156
J39-1	CONNECTOR	IL-S-12P-S2T2-EF		SJWAD00156
J40-1	CONNECTOR	TMP-J01X-V2		SJDAX00009
J51	CONNECTOR	XH3B-2532-112	25P	SJWCF00013
J52	CONNECTOR	XH3B-0932-112	9P	SJWCF00014
J53	CONNECTOR	XH3B-0932-112	9P	SJWCF00014
J54	CONNECTOR	1806J045		SJJBL00004
J55	JACK	SQ-3099 #01		SJJAL00043
J56	JACK	SQ-3099 #01		SJJAL00043
J57	JACK	SQ-3099 #01		SJJAL00043
K1	RELAY	G6E-184P	DC12V	SKLBM00006
L2	COIL	LAL03VBR22M	0.22UH	SLCAA00280
L3	COIL	LAL03VBR22M	0.22UH	SLCAA00280
P57	CONNECTOR	H-6ZCJD37030	L=300	6ZCJD37030
P57-1				6ZZAB10000
PC1	PCB	H-6PCJD00254A		6PCJD00254
R1	RESISTOR FXD	ERJ-8GEYJ103V	1/8W 10K OHM	SREAG01750
R2	RESISTOR FXD	ERJ-8GEYJ222V	1/8W 2.2K OHM	SREAG01742
R3	RESISTOR FXD	ERJ-8GEYJ222V	1/8W 2.2K OHM	SREAG01742
R4	RESISTOR FXD	ERJ-8GEYJ103V	1/8W 10K OHM	SREAG01750
R5	RESISTOR FXD	ERJ-8GEYJ222V	1/8W 2.2K OHM	SREAG01742
R6	RESISTOR FXD	ERJ-8GEYJ103V	1/8W 10K OHM	SREAG01750
R7	RESISTOR FXD	ERJ-8GEYJ562V	1/8W 5.6K OHM	SREAG01747
R8	RESISTOR FXD	ERJ-8GEYJ562V	1/8W 5.6K OHM	SREAG01747
R10	RESISTOR FXD	ERJ-8GEYJ222V	1/8W 2.2K OHM	SREAG01742
R11	RESISTOR FXD	ERJ-8GEYJ222V	1/8W 2.2K OHM	SREAG01742
R12	RESISTOR FXD	ERJ-8GEYJ103V	1/8W 10K OHM	SREAG01750
R14	RESISTOR FXD	ERJ-8GEYJ102V	1/8W 1K OHM	SREAG01738
R15	RESISTOR FXD	ERJ-8GEYJ102V	1/8W 1K OHM	SREAG01738

PARTS LIST

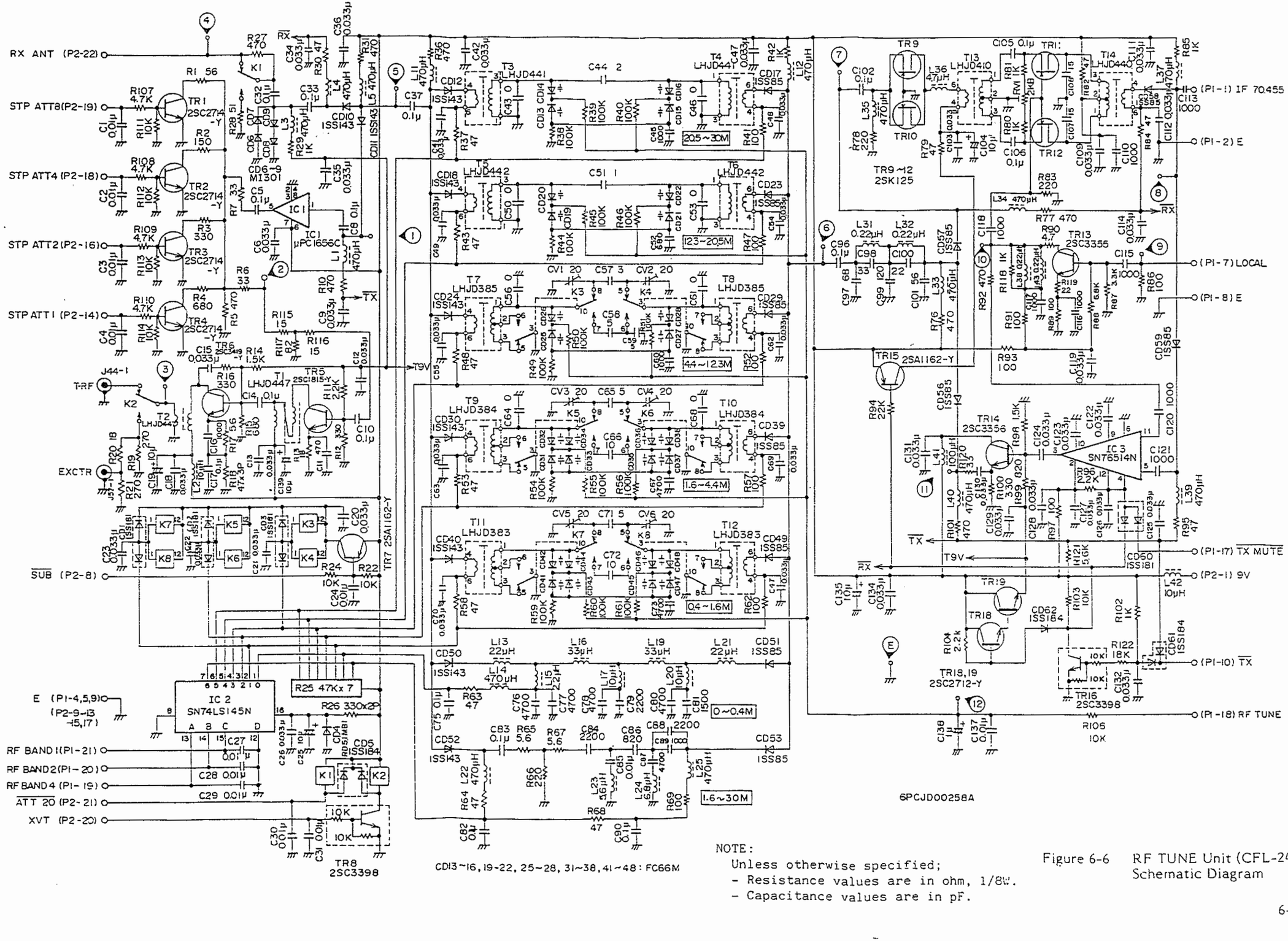
TITLE	MOTHER BOARD	CFD-2625	SHEET NO. 4

PARTS NO	PARTS NAME	TYPE	DESCRIPTION	CODE
R16	RESISTOR FXD	ERJ-8GEYJ103V	1/8W 10K OHM	5REAG01750
R17	RESISTOR FXD	ERJ-8GEYJ103V	1/8W 10K OHM	5REAG01750
R18	RESISTOR FXD	ERJ-8GEYJ103V	1/8W 10K OHM	5REAG01750
R22	RESISTOR FXD	ERJ-8GEYJ101V	1/8W 100 OHM	5REAG01726
R24	RESISTOR FXD	ERJ-8GEYJ223V	1/8W 22K OHM	5REAG01754
R25	RESISTOR FXD	ERJ-8GEYJ223V	1/8W 22K OHM	5REAG01754
R26	RESISTOR	RBE460A		5RZCP00001
R31	RESISTOR FXD	ERJ-8GEYJ103V	1/8W 10K OHM	5REAG01750
R32	RESISTOR FXD	ERJ-8GEYJ472V		5REAG01746
R33	RESISTOR FXD	ERJ-8GEYJ222V	1/8W 2.2K OHM	5REAG01742
R34-1	RESISTOR FXD	ERJ-8GEYJ102V	1/8W 1K OHM	5REAG01738
R34-2	RESISTOR FXD	ERJ-8GEYJ102V	1/8W 1K OHM	5REAG01738
R34-3	RESISTOR FXD	ERJ-8GEYJ102V	1/8W 1K OHM	5REAG01738
R34-4	RESISTOR FXD	ERJ-8GEYJ102V	1/8W 1K OHM	5REAG01738
R35	RESISTOR FXD	ERJ-8GEYJ103V	1/8W 10K OHM	5REAG01750
R36	RESISTOR FXD	ERJ-8GEYJ472V		5REAG01746
R37	RESISTOR FXD	ERJ-8GEYJ222V	1/8W 2.2K OHM	5REAG01742
R38	RESISTOR FXD	ERJ-8GEYJ222V	1/8W 2.2K OHM	5REAG01742
RV1	RESISTOR VAR	EVN-D4AA00B-14	10K OHM	5RVAB00279
RV2	RESISTOR VAR	EVN-D4AA00B-14	10K OHM	5RVAB00279
RV5	RESISTOR VAR	EVN-D4AA00B-14	10K OHM	5RVAB00279
RV6	RESISTOR VAR	EVN-D4AA00B-14	10K OHM	5RVAB00279
RV7	RESISTOR VAR	EVN-D4AA00B54		5RVAB00317
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 (TO-220)		5ZZKB00002
TRZ4Z-1	BUSHING	YC-40B		5ZZDY00005
Z1	NEON TUBE	NE-38		5WNAC00019

PARTS LIST

TITLE	CHASSIS	JSB-170R	SHEET NO 1

PARTS NO	PARTS NAME	TYPE	DESCRIPTION	CODE
B1	FAN	H-6BFJD00007	DC12V	6BFJD00007
F1	FUSE	7127-3012	15A	5ZFEX00001
F2	FUSE	7127-3012	15A	5ZFEX00001
FB1	CORE	RIB 10X20X15		5MBAK00001
FB2	CORE	RIB 10X20X15		5MBAK00001
FB3			*	6ZZAB10000
FS1	FUSE HOLDER	H0448		5ZJUZ00001
FS2	FUSE HOLDER	H0448		5ZJUZ00001
J32	CONNECTOR	1-480705-0		5JWAH00300
J32Z-1	CONNECTOR	640309-3		5JWAH00673
J41	CONNECTOR	FM-203		5JJBJ00003
K2	RELAY	VF-12HN	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



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

Figure 6-6 RF TUNE Unit (CFL-244) Schematic Diagram

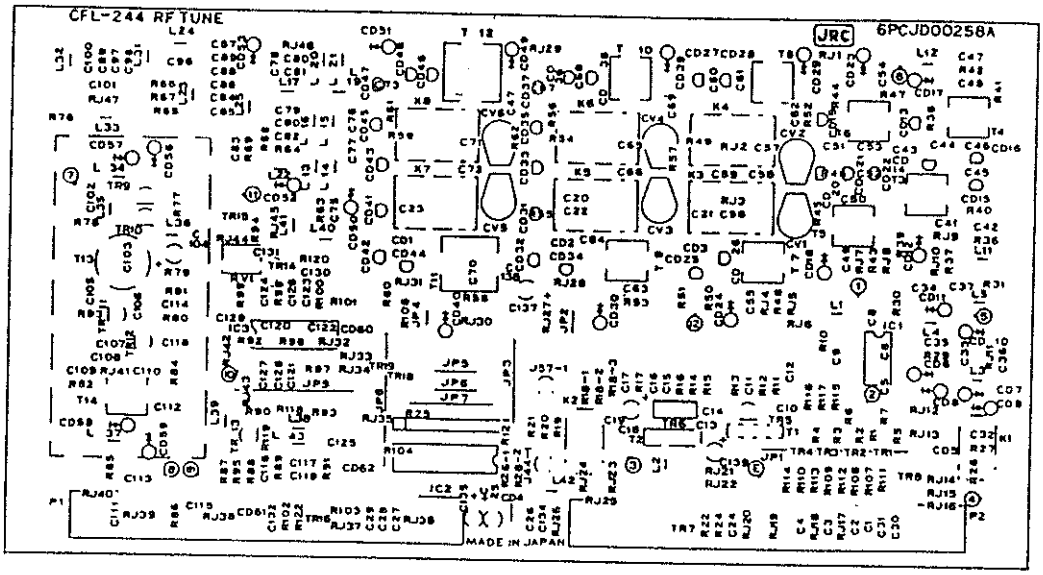


Figure 6-7 RF TUNE Unit (CFL-244) Component Layout

PARTS LIST

	RF TUNE	TITLE	CFL-244	SHEET NO 1

PARTS NO	PARTS NAME	TYPE	DESCRIPTION	CODE
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 CER	C3216JB1H103K-E-TP	0.01UF	5CAAD00789
C5	CAP,FXD CER	C3216X7R1E104K-E-TP	0.1U	5CAAD01237
C6	CAP,FXD CER	C3216X7R1H333K-E-TP	50V 0.033U	5CAAD01357
C8	CAP,FXD CER	C3216X7R1E104K-E-TP	0.1U	5CAAD01237
C9	CAP,FXD CER	C3216X7R1H333K-E-TP	50V 0.033U	5CAAD01357
C10	CAP,FXD CER	C3216X7R1E104K-E-TP	0.1U	5CAAD01237
C11	CAP,FXD CER	C3216CH1H471J-E-TP	470PF	5CAAD00797
C12	CAP,FXD CER	C3216X7R1H333K-E-TP	50V 0.033U	5CAAD01357
C13	CAP,FXD CER	C3216X7R1H333K-E-TP	50V 0.033U	5CAAD01357
C14	CAP,FXD CER	C3216X7R1E104K-E-TP	0.1U	5CAAD01237
C15	CAP,FXD CER	C3216X7R1H333K-E-TP	50V 0.033U	5CAAD01357
C16	CAP,FXD CER	C3216SL1H102J-E-TP	1000PF	5CAAD00782
C17	CAP,FXD CER	C3216X7R1E104K-E-TP	0.1U	5CAAD01237
C18	CAP,FXD CER	C3216X7R1E333K-E-TP	0.033U	5CAAD01203
C19	CAP,FXD ELCTLT	ECE-A1EU100B		5CEAA01864
C20	CAP,FXD CER	C3216X7R1H333K-E-TP	50V 0.033U	5CAAD01357
C21	CAP,FXD CER	C3216X7R1H333K-E-TP	50V 0.033U	5CAAD01357
C22	CAP,FXD CER	C3216X7R1H333K-E-TP	50V 0.033U	5CAAD01357
C23	CAP,FXD CER	C3216X7R1H333K-E-TP	50V 0.033U	5CAAD01357
C24	CAP,FXD CER	C3216JB1H103K-E-TP	0.01UF	5CAAD00789
C25	CAP,FXD TANTAL	202L1602 106KB		5CSAC00932
C26	CAP,FXD CER	C3216X7R1H333K-E-TP	50V 0.033U	5CAAD01357
C27	CAP,FXD CER	C3216JB1H103K-E-TP	0.01UF	5CAAD00789
C28	CAP,FXD CER	C3216JB1H103K-E-TP	0.01UF	5CAAD00789
C29	CAP,FXD CER	C3216JB1H103K-E-TP	0.01UF	5CAAD00789
C30	CAP,FXD CER	C3216JB1H103K-E-TP	0.01UF	5CAAD00789
C31	CAP,FXD CER	C3216JB1H103K-E-TP	0.01UF	5CAAD00789
C32	CAP,FXD CER	C3216X7R1E104K-E-TP	0.1U	5CAAD01237
C33	CAP,FXD CER	C3216X7R1E104K-E-TP	0.1U	5CAAD01237
C34	CAP,FXD CER	C3216X7R1H333K-E-TP	50V 0.033U	5CAAD01357
C35	CAP,FXD CER	C3216X7R1H333K-E-TP	50V 0.033U	5CAAD01357
C36	CAP,FXD CER	C3216X7R1H333K-E-TP	50V 0.033U	5CAAD01357

PARTS LIST

	RF TUNE	TITLE	CFL-244	SHEET NO 2

PARTS NO	PARTS NAME	TYPE	DESCRIPTION	CODE
C37	CAP,FXD CER	C3216X7R1E104K-E-TP	0.1U	5CAAD01237
C41	CAP,FXD CER	C3216X7R1H333K-E-TP	50V 0.033U	5CAAD01357
C42	CAP,FXD CER	C3216X7R1H333K-E-TP	50V 0.033U	5CAAD01357
C43			*	6ZZAB10000
C44	CAP,FXD CER	C3216CH1H020C-E-TP	2PF	5CAAD00798
C45	CAP,FXD CER	C3216SL1H102J-E-TP	1000PF	5CAAD00782
C46			*	6ZZAB10000
C47	CAP,FXD CER	C3216X7R1E104K-E-TP	0.1U	5CAAD01237
C48	CAP,FXD CER	C3216X7R1H333K-E-TP	50V 0.033U	5CAAD01357
C49	CAP,FXD CER	C3216X7R1H333K-E-TP	50V 0.033U	5CAAD01357
C50			*	6ZZAB10000
C51	CAP,FXD CER	C3216CH1H010C-E-TP	1PF	5CAAD00795
C52	CAP,FXD CER	C3216CH1H681J-E-TP	680P	5CAAD00788
C53			*	6ZZAB10000
C54	CAP,FXD CER	C3216X7R1H333K-E-TP	50V 0.033U	5CAAD01357
C55	CAP,FXD CER	C3216X7R1H333K-E-TP	50V 0.033U	5CAAD01357
C56			*	6ZZAB10000
C57	CAP,FXD CER	C3216CH1H030C-E-TP	3PF	5CAAD00796
C58	CAP,FXD CER	C3216CH1H050C-E-TP	5PF	5CAAD00800
C59	CAP,FXD CER	C3216CH1H050C-E-TP	5PF	5CAAD00800
C60	CAP,FXD CER	C3216SL1H102J-E-TP	1000PF	5CAAD00782
C61			*	6ZZAB10000
C62	CAP,FXD CER	C3216X7R1H333K-E-TP	50V 0.033U	5CAAD01357
C63	CAP,FXD CER	C3216X7R1E104K-E-TP	0.1U	5CAAD01237
C64			*	6ZZAB10000
C65	CAP,FXD CER	C3216CH1H050C-E-TP	5PF	5CAAD00800
C66	CAP,FXD CER	C3216CH1H100J-E-TP		5CAAD00862
C67	CAP,FXD CER	C3216B1H472K-E-TP	4700PF	5CAAD00783
C68			*	6ZZAB10000
C69	CAP,FXD CER	C3216X7R1E104K-E-TP	0.1U	5CAAD01237
C70	CAP,FXD CER	C3216X7R1E104K-E-TP	0.1U	5CAAD01237
C71	CAP,FXD CER	C3216CH1H050C-E-TP	5PF	5CAAD00800
C72	CAP,FXD CER	C3216CH1H100J-E-TP		5CAAD00862
C73	CAP,FXD CER	C3216B1H472K-E-TP	4700PF	5CAAD00783
C74	CAP,FXD CER	C3216X7R1H333K-E-TP	50V 0.033U	5CAAD01357

PARTS LIST

	RF TUNE	TITLE	CFL-244	SHEET NO 3

PARTS NO	PARTS NAME	TYPE	DESCRIPTION	CODE
C75	CAP,FXD CER	C3216X7R1E104K-E-TP	0.1U	5CAAD01237
C76	CAP,FXD CER	C3216B1H472K-E-TP	4700PF	5CAAD00783
C77	CAP,FXD CER	C3216B1H472K-E-TP	4700PF	5CAAD00783
C78	CAP,FXD CER	C3216B1H472K-E-TP	4700PF	5CAAD00783
C79	CAP,FXD CER	C3216SL1H222J-E-TP	2200P	5CAAD00792
C80	CAP,FXD CER	C3216B1H472K-E-TP	4700PF	5CAAD00783
C81	CAP,FXD CER	C3216SL1H152J-E-TP	1500PF	5CAAD00791
C82	CAP,FXD CER	C3216X7R1E104K-E-TP	0.1U	5CAAD01237
C83	CAP,FXD CER	C3216X7R1E104K-E-TP	0.1U	5CAAD01237
C84	CAP,FXD CER	C3216SL1H222J-E-TP	2200P	5CAAD00792
C85	CAP,FXD CER	C3216JB1H103K-E-TP	0.01UF	5CAAD00789
C86	CAP,FXD CER	C3216SL1H821J-E-TP		5CAAD01068
C87	CAP,FXD CER	C3216B1H472K-E-TP	4700PF	5CAAD00783
C88	CAP,FXD CER	C3216SL1H222J-E-TP	2200P	5CAAD00792
C89	CAP,FXD CER	C3216SL1H102J-E-TP	1000PF	5CAAD00782
C90	CAP,FXD CER	C3216X7R1E104K-E-TP	0.1U	5CAAD01237
C96	CAP,FXD CER	C3216X7R1E104K-E-TP	0.1U	5CAAD01237
C97	CAP,FXD CER	C3216CH1H680J-E-TP	68PF	5CAAD00929
C98	CAP,FXD CER	C3216CH1H330J-E-TP	33PF	5CAAD00794
C99	CAP,FXD CER	C3216CH1H121J-E-TP	120PF	5CAAD00931
C100	CAP,FXD CER	C3216CH1H220J-E-TP	22P	5CAAD00869
C101	CAP,FXD CER	C3216CH1H820J-E-TP	82P	5CAAD00930
C102	CAP,FXD CER	C3216X7R1E104K-E-TP	0.1U	5CAAD01237
C103	CAP,FXD CER	C3216X7R1H333K-E-TP	50V 0.033U	5CAAD01357
C104	CAP,FXD TANTAL	202L1602 106KB		5CSAC00932
C105	CAP,FXD CER	C3216X7R1E104K-E-TP	0.1U	5CAAD01237
C106	CAP,FXD CER	C3216X7R1E104K-E-TP	0.1U	5CAAD01237
C107	CAP,FXD CER	C3216CH1H150J-E-TP	15PF	5CAAD00787
C108	CAP,FXD CER	C3216CH1H150J-E-TP	15PF	5CAAD00787
C109	CAP,FXD CER	C3216X7R1H333K-E-TP	50V 0.033U	5CAAD01357
C110	CAP,FXD CER	C3216SL1H102J-E-TP	1000PF	5CAAD00782
C111	CAP,FXD CER	C3216X7R1H333K-E-TP	50V 0.033U	5CAAD01357
C112	CAP,FXD CER	C3216X7R1H333K-E-TP	50V 0.033U	5CAAD01357
C113	CAP,FXD CER	C3216SL1H102J-E-TP	1000PF	5CAAD00782
C114	CAP,FXD CER	C3216X7R1H333K-E-TP	50V 0.033U	5CAAD01357

PARTS LIST

	RF TUNE	TITLE	CFL-244	SHEET NO 4

PARTS NO	PARTS NAME	TYPE	DESCRIPTION	CODE
C115	CAP,FXD CER	C3216SL1H102J-E-TP	1000PF	5CAAD00782
C116	CAP,FXD CER	C3216SL1H102J-E-TP	1000PF	5CAAD00782
C117	CAP,FXD CER	C3216SL1H102J-E-TP	1000PF	5CAAD00782
C118	CAP,FXD CER	C3216SL1H102J-E-TP	1000PF	5CAAD00782
C119	CAP,FXD CER	C3216X7R1H333K-E-TP	50V 0.033U	5CAAD01357
C120	CAP,FXD CER	C3216SL1H102J-E-TP	1000PF	5CAAD00782
C121	CAP,FXD CER	C3216SL1H102J-E-TP	1000PF	5CAAD00782
C122	CAP,FXD CER	C3216X7R1H333K-E-TP	50V 0.033U	5CAAD01357
C123	CAP,FXD CER	C3216X7R1H333K-E-TP	50V 0.033U	5CAAD01357
C124	CAP,FXD CER	C3216X7R1H333K-E-TP	50V 0.033U	5CAAD01357
C125	CAP,FXD CER	C3216X7R1H333K-E-TP	50V 0.033U	5CAAD01357
C126	CAP,FXD CER	C3216X7R1H333K-E-TP	50V 0.033U	5CAAD01357
C127	CAP,FXD CER	C3216X7R1H333K-E-TP	50V 0.033U	5CAAD01357
C128	CAP,FXD CER	C3216X7R1H333K-E-TP	50V 0.033U	5CAAD01357
C129	CAP,FXD CER	C3216X7R1H333K-E-TP	50V 0.033U	5CAAD01357
C130	CAP,FXD CER	C3216X7R1H333K-E-TP	50V 0.033U	5CAAD01357
C131	CAP,FXD CER	C3216X7R1H333K-E-TP	50V 0.033U	5CAAD01357
C132	CAP,FXD CER	C3216X7R1H333K-E-TP	50V 0.033U	5CAAD01357
C134	CAP,FXD CER	C3216X7R1H333K-E-TP	50V 0.033U	5CAAD01357
C135	CAP,FXD TANTAL	202L1602 106KB		5CSAC00932
C137	CAP,FXD CER	C3216JB1H103K-E-TP	0.01UF	5CAAD00789
C138	CAP,FXD TANTAL	202L3502 105KB	35V 1UF	5CSAC00982
C139	CAP,FXD ELCTLT	ECE-A1EU100B		5CEAAD1864
CD1	DIODE	1SS181 TE85L		5TXAD00356
CD2	DIODE	1SS181 TE85L		5TXAD00356
CD3	DIODE	1SS181 TE85L		5TXAD00356
CD4	DIODE	RD5.1MB1-T1		5TXAA00515
CD5	DIODE	1SS184 TE85L		5TXAD00290
CD6	DIODE	MI301		5TXAR00004
CD7	DIODE	MI301		5TXAR00004
CD8	DIODE	MI301		5TXAR00004
CD9	DIODE	MI301		5TXAR00004
CD10	DIODE	1SS143T-87		5TXCW00021
CD11	DIODE	1SS143T-87		5TXCW00021
CD12	DIODE	1SS143T-87		5TXCW00021

PARTS LIST

TITLE			SHEET NO
RF TUNE	CFL-244		5

PARTS NO	PARTS NAME	TYPE	DESCRIPTION	CODE
CD13	DIODE	FC66M-010		STXAB00035
CD14	DIODE	FC66M-010		STXAB00035
CD15	DIODE	FC66M-010		STXAB00035
CD16	DIODE	FC66M-010		STXAB00035
CD17	DIODE	1SS85RE		STXAE00590
CD18	DIODE	1SS143T-87		STXCW00021
CD19	DIODE	FC66M-010		STXAB00035
CD20	DIODE	FC66M-010		STXAB00035
CD21	DIODE	FC66M-010		STXAB00035
CD22	DIODE	FC66M-010		STXAB00035
CD23	DIODE	1SS85RE		STXAE00590
CD24	DIODE	1SS143T-87		STXCW00021
CD25	DIODE	FC66M-010		STXAB00035
CD26	DIODE	FC66M-010		STXAB00035
CD27	DIODE	FC66M-010		STXAB00035
CD28	DIODE	FC66M-010		STXAB00035
CD29	DIODE	1SS85RE		STXAE00590
CD30	DIODE	1SS143T-87		STXCW00021
CD31	DIODE	FC66M-010		STXAB00035
CD32	DIODE	FC66M-010		STXAB00035
CD33	DIODE	FC66M-010		STXAB00035
CD34	DIODE	FC66M-010		STXAB00035
CD35	DIODE	FC66M-010		STXAB00035
CD36	DIODE	FC66M-010		STXAB00035
CD37	DIODE	FC66M-010		STXAB00035
CD38	DIODE	FC66M-010		STXAB00035
CD39	DIODE	1SS85RE		STXAE00590
CD40	DIODE	1SS143T-87		STXCW00021
CD41	DIODE	FC66M-010		STXAB00035
CD42	DIODE	FC66M-010		STXAB00035
CD43	DIODE	FC66M-010		STXAB00035
CD44	DIODE	FC66M-010		STXAB00035
CD45	DIODE	FC66M-010		STXAB00035
CD46	DIODE	FC66M-010		STXAB00035
CD47	DIODE	FC66M-010		STXAB00035

PARTS LIST

TITLE			SHEET NO.
RF TUNE	CFL-244		6

PARTS NO	PARTS NAME	TYPE	DESCRIPTION	CODE
CD48	DIODE	FC66M-010		STXAB00035
CD49	DIODE	1SS85RE		STXAE00590
CD50	DIODE	1SS143T-87		STXCW00021
CD51	DIODE	1SS85RE		STXAE00590
CD52	DIODE	1SS143T-87		STXCW00021
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	SN76514N		SDDAL00251
J44-1	CONNECTOR	TMP-J01X-V2		SJDAX00009
J57-1	CONNECTOR	TMP-J01X-V2		SJDAX00009
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-M-DC9V		SKLAD00660
K2	RELAY	HD1-M-DC9V		SKLAD00660

PARTS LIST

	RF TUNE	TITLE CFL-244		SHEET NO 7
PARTS NO	PARTS NAME	TYPE	DESCRIPTION	CODE
K3	RELAY	DF2-DC9V		SKLAD00578
K4	RELAY	DF2-DC9V		SKLAD00578
K5	RELAY	DF2-DC9V		SKLAD00578
K6	RELAY	DF2-DC9V		SKLAD00578
K7	RELAY	DF2-DC9V		SKLAD00578
K8	RELAY	DF2-DC9V		SKLAD00578
L1	COIL	LAL03VB471K	470UH	SLCAA00270
L2	COIL	LAL03VB100K	10UH	SLCAA00273
L3	COIL	LAL03VB471K	470UH	SLCAA00270
L4	COIL	LAL03VB471K	470UH	SLCAA00270
L5	COIL	LAL03VB471K	470UH	SLCAA00270
L11	COIL	LAL03VB471K	470UH	SLCAA00270
L12	COIL	LAL03VB471K	470UH	SLCAA00270
L13	COIL	LAL03VB220K	22UH	SLCAA00277
L14	COIL	LAL03VB471K	470UH	SLCAA00270
L15	COIL	LAL03VB2R2M	2.2UH	SLCAA00278
L16	COIL	LAL03VB330K	33UH	SLCAA00279
L17	COIL	LAL03VB100K	10UH	SLCAA00273
L19	COIL	LAL03VB330K	33UH	SLCAA00279
L20	COIL	LAL03VB100K	10UH	SLCAA00273
L21	COIL	LAL03VB220K	22UH	SLCAA00277
L22	COIL	LAL03VB471K	470UH	SLCAA00270
L23	COIL	LAL03VB5R6K	5.6UH	SLCAA00275
L24	COIL	LAL03VB6R8K	6.8UH	SLCAA00276
L25	COIL	LAL03VB471K	470UH	SLCAA00270
L31	COIL	LAL03VBR22M	0.22UH	SLCAA00280
L32	COIL	LAL03VBR22M	0.22UH	SLCAA00280
L33	COIL	LAL03VB471K	470UH	SLCAA00270
L34	COIL	LAL03VB471K	470UH	SLCAA00270
L35	COIL	LAL03VB471K	470UH	SLCAA00270
L36	COIL	LAL03VB4R7K		SLCAA00323
L37	COIL	LAL03VB471K	470UH	SLCAA00270
L38	COIL	LAL03VBR22M	0.22UH	SLCAA00280
L39	COIL	LAL03VB471K	470UH	SLCAA00270
L40	COIL	LAL03VB471K	470UH	SLCAA00270

PARTS LIST

	RF TUNE	TITLE CFL-244		SHEET NO 8
PARTS NO	PARTS NAME	TYPE	DESCRIPTION	CODE
L41	COIL	LAL03VB101K		SLCAA00333
L42	COIL	LAL03VB100K	10UH	SLCAA00273
L43	COIL	LAL03VBR22M	0.22UH	SLCAA00280
P1	CONNECTOR	EC1C-22P-2.5DSA	22P	SJWBS00070
P2	CONNECTOR	EC1C-22P-2.5DSA	22P	SJWBS00070
PC1	PCB	H-6PCJD00258A		6PCJD00258
R1	RESISTOR FXD	ERJ-8GEYJ560V	1/8W 56 OHM	SREAG01723
R2	RESISTOR FXD	ERJ-8GEYJ151V	1/8W 150 OHM	SREAG01728
R3	RESISTOR FXD	ERJ-8GEYJ331V	1/8W,330 OHM	SREAG01732
R4	RESISTOR FXD	ERJ-8GEYJ681V	1/8W 680 OHM	SREAG01736
R5	RESISTOR FXD	ERJ-8GEYJ471V	1/8W 470 OHM	SREAG01734
R6	RESISTOR FXD	ERJ-8GEYJ330V	1/8W 33 OHM	SREAG01720
R7	RESISTOR FXD	ERJ-8GEYJ330V	1/8W 33 OHM	SREAG01720
R10	RESISTOR FXD	ERJ-8GEYJ471V	1/8W 470 OHM	SREAG01734
R11	RESISTOR FXD	ERJ-8GEYJ222V	1/8W 2.2K OHM	SREAG01742
R12	RESISTOR FXD	ERJ-8GEYJ331V	1/8W,330 OHM	SREAG01732
R13	RESISTOR FXD	ERJ-8GEYJ180V	1/8W 18 OHM	SREAG01717
R14	RESISTOR FXD	ERJ-8GEYJ152V	1/8W 1.5K OHM	SREAG01740
R15	RESISTOR FXD	ERJ-8GEYJ681V	1/8W 680 OHM	SREAG01736
R16	RESISTOR FXD	ERJ-8GEYJ331V	1/8W,330 OHM	SREAG01732
R17	RESISTOR FXD	ERJ-8GEYK5R6V		SREAG02207
R18-1	RESISTOR FXD	ERJ-8GEYJ470V	1/8W 47 OHM	SREAG01722
R18-2	RESISTOR FXD	ERJ-8GEYJ470V	1/8W 47 OHM	SREAG01722
R18-3	RESISTOR FXD	ERJ-8GEYJ470V	1/8W 47 OHM	SREAG01722
R19	RESISTOR FXD	ERJ-8GEYJ271V	1/8W 270 OHM	SREAG01731
R20	RESISTOR FXD	ERJ-8GEYJ180V	1/8W 18 OHM	SREAG01717
R21	RESISTOR FXD	ERJ-8GEYJ271V	1/8W 270 OHM	SREAG01731
R22	RESISTOR FXD	ERJ-8GEYJ103V	1/8W 10K OHM	SREAG01750
R24	RESISTOR FXD	ERJ-8GEYJ103V	1/8W 10K OHM	SREAG01750
R25	RESISTOR FXD	RKC1/8B7-47K OHM J		SREAE00172
R26-1	RESISTOR FXD	ERJ-8GEYJ331V	1/8W,330 OHM	SREAG01732
R26-2	RESISTOR FXD	ERJ-8GEYJ331V	1/8W,330 OHM	SREAG01732
R27	RESISTOR FXD	ERJ-8GEYJ471V	1/8W 470 OHM	SREAG01734
R28	RESISTOR FXD	ERJ-8GEYJ510V	1/8W 51 OHM	SREAG02025
R29	RESISTOR FXD	ERJ-8GEYJ102V	1/8W 1K OHM	SREAG01738

PARTS LIST

	RF TUNE	TITLE CFL-244	SHEET NO 9

PARTS NO	PARTS NAME	TYPE	DESCRIPTION	CODE
R30	RESISTOR FXD	ERJ-8GEYJ470V	1/8W 47 OHM	5REAG01722
R31	RESISTOR FXD	ERJ-8GEYJ471V	1/8W 470 OHM	5REAG01734
R36	RESISTOR FXD	ERJ-8GEYJ471V	1/8W 470 OHM	5REAG01734
R37	RESISTOR FXD	ERJ-8GEYJ470V	1/8W 47 OHM	5REAG01722
R38	RESISTOR FXD	ERJ-8GEYJ104V	1/8W 100K OHM	5REAG01762
R39	RESISTOR FXD	ERJ-8GEYJ104V	1/8W 100K OHM	5REAG01762
R40	RESISTOR FXD	ERJ-8GEYJ104V	1/8W 100K OHM	5REAG01762
R41	RESISTOR FXD	ERJ-8GEYJ101V	1/8W 100 OHM	5REAG01726
R42	RESISTOR FXD	ERJ-8GEYJ102V	1/8W 1K OHM	5REAG01738
R43	RESISTOR FXD	ERJ-8GEYJ470V	1/8W 47 OHM	5REAG01722
R44	RESISTOR FXD	ERJ-8GEYJ104V	1/8W 100K OHM	5REAG01762
R45	RESISTOR FXD	ERJ-8GEYJ104V	1/8W 100K OHM	5REAG01762
R46	RESISTOR FXD	ERJ-8GEYJ104V	1/8W 100K OHM	5REAG01762
R47	RESISTOR FXD	ERJ-8GEYJ101V	1/8W 100 OHM	5REAG01726
R48	RESISTOR FXD	ERJ-8GEYJ470V	1/8W 47 OHM	5REAG01722
R49	RESISTOR FXD	ERJ-8GEYJ104V	1/8W 100k OHM	5REAG01762
R50	RESISTOR FXD	ERJ-8GEYJ104V	1/8W 100K OHM	5REAG01762
R51	RESISTOR FXD	ERJ-8GEYJ104V	1/8W 100K OHM	5REAG01762
R52	RESISTOR FXD	ERJ-8GEYJ101V	1/8W 100 OHM	5REAG01726
R53	RESISTOR FXD	ERJ-8GEYJ470V	1/8W 47 OHM	5REAG01722
R54	RESISTOR FXD	ERJ-8GEYJ104V	1/8W 100K OHM	5REAG01762
R55	RESISTOR FXD	ERJ-8GEYJ104V	1/8W 100K OHM	5REAG01762
R56	RESISTOR FXD	ERJ-8GEYJ104V	1/8W 100K OHM	5REAG01762
R57	RESISTOR FXD	ERJ-8GEYJ101V	1/8W 100 OHM	5REAG01726
R58	RESISTOR FXD	ERJ-8GEYJ470V	1/8W 47 OHM	5REAG01722
R59	RESISTOR FXD	ERJ-8GEYJ104V	1/8W 100K OHM	5REAG01762
R60	RESISTOR FXD	ERJ-8GEYJ104V	1/8W 100K OHM	5REAG01762
R61	RESISTOR FXD	ERJ-8GEYJ104V	1/8W 100K OHM	5REAG01762
R62	RESISTOR FXD	ERJ-8GEYJ101V	1/8W 100 OHM	5REAG01726
R63	RESISTOR FXD	ERJ-8GEYJ470V	1/8W 47 OHM	5REAG01722
R64	RESISTOR FXD	ERJ-8GEYJ470V	1/8W 47 OHM	5REAG01722
R65	RESISTOR FXD	ERJ-8GEYK5R6V		5REAG02207
R66	RESISTOR FXD	ERJ-8GEYJ221V	1/8W 220 OHM	5REAG01730
R67	RESISTOR FXD	ERJ-8GEYK5R6V		5REAG02207
R68	RESISTOR FXD	ERJ-8GEYJ470V	1/8W 47 OHM	5REAG01722

PARTS LIST

	RF TUNE	TITLE CFL-244	SHEET NO 10

PARTS NO	PARTS NAME	TYPE	DESCRIPTION	CODE
R69	RESISTOR FXD	ERJ-8GEYJ101V	1/8W 100 OHM	5REAG01726
R76	RESISTOR FXD	ERJ-8GEYJ471V	1/8W 470 OHM	5REAG01734
R77	RESISTOR FXD	ERJ-8GEYJ471V	1/8W 470 OHM	5REAG01734
R78	RESISTOR FXD	ERJ-8GEYJ221V	1/8W 220 OHM	5REAG01730
R79	RESISTOR FXD	ERJ-8GEYJ470V	1/8W 47 OHM	5REAG01722
R80	RESISTOR FXD	ERJ-8GEYJ102V	1/8W 1K OHM	5REAG01738
R81	RESISTOR FXD	ERJ-8GEYJ102V	1/8W 1K OHM	5REAG01738
R82	RESISTOR FXD	ERJ-8GEYJ470V	1/8W 47 OHM	5REAG01722
R83	RESISTOR FXD	ERJ-8GEYJ221V	1/8W 220 OHM	5REAG01730
R84	RESISTOR FXD	ERJ-8GEYJ470V	1/8W 47 OHM	5REAG01722
R85	RESISTOR FXD	ERJ-8GEYJ102V	1/8W 1K OHM	5REAG01738
R86	RESISTOR FXD	ERJ-8GEYJ101V	1/8W 100 OHM	5REAG01726
R87	RESISTOR FXD	ERJ-8GEYJ332V	1/8W 3.3K OHM	5REAG01744
R88	RESISTOR FXD	ERJ-8GEYJ682V		5REAG01748
R89	RESISTOR FXD	ERJ-8GEYJ101V	1/8W 100 OHM	5REAG01726
R90	RESISTOR FXD	ERJ-8GEYK4R7V	1/8W 4.7 OHM	5REAG02256
R91	RESISTOR FXD	ERJ-8GEYJ101V	1/8W 100 OHM	5REAG01726
R92	RESISTOR FXD	ERJ-8GEYJ471V	1/8W 470 OHM	5REAG01734
R93	RESISTOR FXD	ERJ-8GEYJ101V	1/8W 100 OHM	5REAG01726
R94	RESISTOR FXD	ERJ-8GEYJ223V	1/8W 22K OHM	5REAG01754
R95	RESISTOR FXD	ERJ-8GEYJ470V	1/8W 47 OHM	5REAG01722
R96	RESISTOR FXD	ERJ-8GEYJ222V	1/8W 2.2K OHM	5REAG01742
R97	RESISTOR FXD	ERJ-8GEYJ101V	1/8W 100 OHM	5REAG01726
R98	RESISTOR FXD	ERJ-8GEYJ152V	1/8W 1.5K OHM	5REAG01740
R99	RESISTOR FXD	ERJ-8GEYJ821V	1/8W 820 OHM	5REAG01737
R100	RESISTOR FXD	ERJ-8GEYJ331V	1/8W 330 OHM	5REAG01732
R101	RESISTOR FXD	ERJ-8GEYJ471V	1/8W 470 OHM	5REAG01734
R102	RESISTOR FXD	ERJ-8GEYJ102V	1/8W 1K OHM	5REAG01738
R103	RESISTOR FXD	ERJ-8GEYJ103V	1/8W 10K OHM	5REAG01750
R104	RESISTOR FXD	ERJ-8GEYJ222V	1/8W 2.2K OHM	5REAG01742
R106	RESISTOR FXD	ERJ-8GEYJ103V	1/8W 10K OHM	5REAG01750
R107	RESISTOR FXD	ERJ-8GEYJ472V		5REAG01746
R108	RESISTOR FXD	ERJ-8GEYJ472V		5REAG01746
R109	RESISTOR FXD	ERJ-8GEYJ472V		5REAG01746
R110	RESISTOR FXD	ERJ-8GEYJ472V		5REAG01746

PARTS LIST

TITLE: RF TUNE					CFL-244	SHEET NO 11
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			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-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
RJ5	RESISTOR	FXD	ERJ-8GEY0R00V	0 OHM		SREAG01775
RJ6	RESISTOR	FXD	ERJ-8GEY0R00V	0 OHM		SREAG01775
RJ7	RESISTOR	FXD	ERJ-8GEY0R00V	0 OHM		SREAG01775
RJ8	RESISTOR	FXD	ERJ-8GEY0R00V	0 OHM		SREAG01775
RJ9	RESISTOR	FXD	ERJ-8GEY0R00V	0 OHM		SREAG01775
RJ10	RESISTOR	FXD	ERJ-8GEY0R00V	0 OHM		SREAG01775
RJ11	RESISTOR	FXD	ERJ-8GEY0R00V	0 OHM		SREAG01775
RJ12	RESISTOR	FXD	ERJ-8GEY0R00V	0 OHM		SREAG01775
RJ13	RESISTOR	FXD	ERJ-8GEY0R00V	0 OHM		SREAG01775
RJ14	RESISTOR	FXD	ERJ-8GEY0R00V	0 OHM		SREAG01775
RJ15	RESISTOR	FXD	ERJ-8GEY0R00V	0 OHM		SREAG01775
RJ16	RESISTOR	FXD	ERJ-8GEY0R00V	0 OHM		SREAG01775
RJ17	RESISTOR	FXD	ERJ-8GEY0R00V	0 OHM		SREAG01775
RJ18	RESISTOR	FXD	ERJ-8GEY0R00V	0 OHM		SREAG01775
RJ19	RESISTOR	FXD	ERJ-8GEY0R00V	0 OHM		SREAG01775
RJ20	RESISTOR	FXD	ERJ-8GEY0R00V	0 OHM		SREAG01775
RJ21	RESISTOR	FXD	ERJ-8GEY0R00V	0 OHM		SREAG01775
RJ22	RESISTOR	FXD	ERJ-8GEY0R00V	0 OHM		SREAG01775
RJ23	RESISTOR	FXD	ERJ-8GEY0R00V	0 OHM		SREAG01775

PARTS LIST

TITLE: RF TUNE					CFL-244	SHEET NO 12
PARTS NO	PARTS NAME		TYPE	DESCRIPTION		CODE
RJ24	RESISTOR	FXD	ERJ-8GEY0R00V	0 OHM		SREAG01775
RJ25	RESISTOR	FXD	ERJ-8GEY0R00V	0 OHM		SREAG01775
RJ26	RESISTOR	FXD	ERJ-8GEY0R00V	0 OHM		SREAG01775
RJ27	RESISTOR	FXD	ERJ-8GEY0R00V	0 OHM		SREAG01775
RJ28	RESISTOR	FXD	ERJ-8GEY0R00V	0 OHM		SREAG01775
RJ29	RESISTOR	FXD	ERJ-8GEY0R00V	0 OHM		SREAG01775
RJ30	RESISTOR	FXD	ERJ-8GEY0R00V	0 OHM		SREAG01775
RJ31	RESISTOR	FXD	ERJ-8GEY0R00V	0 OHM		SREAG01775
RJ32	RESISTOR	FXD	ERJ-8GEY0R00V	0 OHM		SREAG01775
RJ33	RESISTOR	FXD	ERJ-8GEY0R00V	0 OHM		SREAG01775
RJ34	RESISTOR	FXD	ERJ-8GEY0R00V	0 OHM		SREAG01775
RJ35	RESISTOR	FXD	ERJ-8GEY0R00V	0 OHM		SREAG01775
RJ36	RESISTOR	FXD	ERJ-8GEY0R00V	0 OHM		SREAG01775
RJ37	RESISTOR	FXD	ERJ-8GEY0R00V	0 OHM		SREAG01775
RJ38	RESISTOR	FXD	ERJ-8GEY0R00V	0 OHM		SREAG01775
RJ39	RESISTOR	FXD	ERJ-8GEY0R00V	0 OHM		SREAG01775
RJ40	RESISTOR	FXD	ERJ-8GEY0R00V	0 OHM		SREAG01775
RJ41	RESISTOR	FXD	ERJ-8GEY0R00V	0 OHM		SREAG01775
RJ42	RESISTOR	FXD	ERJ-8GEY0R00V	0 OHM		SREAG01775
RJ43	RESISTOR	FXD	ERJ-8GEY0R00V	0 OHM		SREAG01775
RJ44	RESISTOR	FXD	ERJ-8GEY0R00V	0 OHM		SREAG01775
RJ45	RESISTOR	FXD	ERJ-8GEY0R00V	0 OHM		SREAG01775
RJ46	RESISTOR	FXD	ERJ-8GEY0R00V	0 OHM		SREAG01775
RJ47	RESISTOR	FXD	ERJ-8GEY0R00V	0 OHM		SREAG01775
RV1	RESISTOR	VAR	EVN-D1AA00B23			SRVAB00323
T1	RF XFMR		H-6LHJD00447			6LHJD00447
T2	RF XFMR		H-6LHJD00447			6LHJD00447
T3	RF XFMR		H-6LHJD00441			6LHJD00441
T4	RF XFMR		H-6LHJD00441			6LHJD00441
T5	RF XFMR		H-6LHJD00442			6LHJD00442
T6	RF XFMR		H-6LHJD00442			6LHJD00442
T7	RF XFMR		H-6LHJD00385			6LHJD00385
T8	RF XFMR		H-6LHJD00385			6LHJD00385
T9	RF XFMR		H-6LHJD00384			6LHJD00384
T10	RF XFMR		H-6LHJD00384			6LHJD00384

PARTS LIST

	RF TUNE	TITLE CFC-244		SHEET NO 13
PARTS NO	PARTS NAME	TYPE	DESCRIPTION	CODE
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		5JDAA00364
TP2	TEST TERMINAL	PCN6-PEA		5JDAA00364
TP3	TEST TERMINAL	PCN6-PEA		5JDAA00364
TP4	TEST TERMINAL	PCN6-PEA		5JDAA00364
TP5	TEST TERMINAL	PCN6-PEA		5JDAA00364
TP6	TEST TERMINAL	PCN6-PEA		5JDAA00364
TP7	TEST TERMINAL	PCN6-PEA		5JDAA00364
TP8	TEST TERMINAL	PCN6-PEA		5JDAA00364
TP9	TEST TERMINAL	PCN6-PEA		5JDAA00364
TP10	TEST TERMINAL	PCN6-PEA		5JDAA00364
TP11	TEST TERMINAL	PCN6-PEA		5JDAA00364
TP12	TEST TERMINAL	PCN6-PEA		5JDAA00364
TP13	TEST TERMINAL	PCN6-PEA		5JDAA00364
TR1	TRANSISTOR	2SC2714Y TE85L		5TCAF00436
TR2	TRANSISTOR	2SC2714Y TE85L		5TCAF00436
TR3	TRANSISTOR	2SC2714Y TE85L		5TCAF00436
TR4	TRANSISTOR	2SC2714Y TE85L		5TCAF00436
TR5	TRANSISTOR	2SC1815-Y		5TCAF00219
TR6	TRANSISTOR	2SC3419-Y		5TCAF00536
TR7	TRANSISTOR	2SA1162-Y TE85L		5TAAG00182
TR8	TRANSISTOR	2SC3398-TB		5TCAZ00011
TR9	TRANSISTOR	2SK125		5TKAH00002
TR10	TRANSISTOR	2SK125		5TKAH00002
TR11	TRANSISTOR	2SK125		5TKAH00002
TR12	TRANSISTOR	2SK125		5TKAH00002
TR13	TRANSISTOR	2SC3355		5TCAB01223
TR14	TRANSISTOR	2SC3356-T1B		5TCAB01142
TR15	TRANSISTOR	2SA1162-Y TE85L		5TAAG00182
TR16	TRANSISTOR	2SC3398-TB		5TCAZ00011
TR18	TRANSISTOR	2SC2712Y TE85L		5TAAG00186
TR19	TRANSISTOR	2SC2712Y TE85L		5TAAG00186

FL3 AME
FL4 SSB
FL5 OPTION FOR A1A
FL6 OPTION FOR F1B

IC1 HD74LS145P
IC2 M5218P
IC3 SN16913P
IC4 SN76514

CD1	RD5.1M81
CD2.8.9.13.20~22.27	1SS226
CD3~7.14~18.19.24	1SS181
CD10.15~17.25.26.28.29	1SS184
CD11.12	1SS85
CD23	HZ38 2

TR7.9~13.19	2SC2712Y
TR2	2SC1855
TR3.18	2SC2714Y
TR4~6.21~23	2SC3398
TR8.20	2SA1162Y
TR14.17	3SK77GR
TR15.16	2SK125

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

6PCJD00259A

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

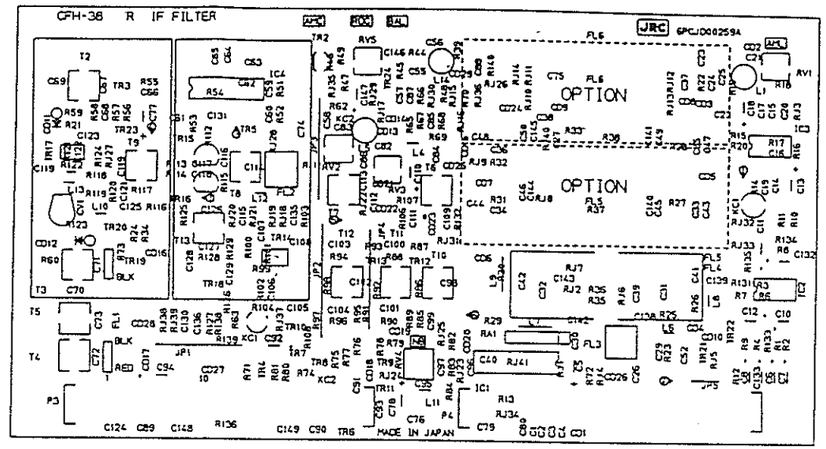


Figure 6-9 IF FIL Unit (CFH-38R) Component Layout

PARTS LIST

	IF FILTER	TITLE CFH-38R	SHEET NO 1

PARTS NO	PARTS NAME	TYPE	DESCRIPTION	CODE
FL4	FILTER	MF-455-10GZ		SNMAA00015
U*	IF FIL UNIT	CFH-38		CFH-38

PARTS LIST

	IF FILTER	TITLE CFH-38	SHEET NO 1

PARTS NO	PARTS NAME	TYPE	DESCRIPTION	CODE
C1	CAP,FXD CER	C3216SL1H102J-E-TP	1000PF	5CAAD00782
C2	CAP,FXD CER	C3216SL1H102J-E-TP	1000PF	5CAAD00782
C3	CAP,FXD CER	C3216SL1H102J-E-TP	1000PF	5CAAD00782
C4	CAP,FXD CER	C3216JB1H103K-E-TP	0.01UF	5CAAD00789
C5	CAP,FXD ELCTLT	ECE-A1EU100B		5CEAA01864
C6	CAP,FXD TANTAL	202L3502 105KB	35V 1UF	5CSAC00982
C7	CAP,FXD TANTAL	202L3502 105KB	35V 1UF	5CSAC00982
C8	CAP,FXD TANTAL	202L3502 105KB	35V 1UF	5CSAC00982
C10	CAP,FXD ELCTLT	ECE-A1EU100B		5CEAA01864
C11	CAP,FXD ELCTLT	ECE-A1EU100B		5CEAA01864
C12	CAP,FXD ELCTLT	ECE-A1EU100B		5CEAA01864
C13	CAP,FXD ELCTLT	ECE-A1EU100B		5CEAA01864
C14	CAP,FXD CER	C3216JB1E333K-E-TP		5CAAD01235
C15	CAP,FXD CER	C3216JB1E333K-E-TP		5CAAD01235
C16	CAP,FXD CER	C3216JB1E333K-E-TP		5CAAD01235
C17	CAP,FXD CER	C3216JB1E333K-E-TP		5CAAD01235
C18	CAP,FXD ELCTLT	ECE-A1EU470B	25V 47UF	5CEAA01816
C19	CAP,FXD CER	C3216JB1E333K-E-TP		5CAAD01235
C20	CAP,FXD CER	C3216JB1E333K-E-TP		5CAAD01235
C21	CAP,FXD CER	C3216JB1E333K-E-TP		5CAAD01235
C22	CAP,FXD CER	C3216JB1E333K-E-TP		5CAAD01235
C23	CAP,FXD CER	C3216X7R1E104K-E-TP	0.1U	5CAAD01237
C24	CAP,FXD CER	C3216JB1E333K-E-TP		5CAAD01235
C25	CAP,FXD CER	C3216JB1E333K-E-TP		5CAAD01235
C26	CAP,FXD CER	C3216X7R1E104K-E-TP	0.1U	5CAAD01237
C27	CAP,FXD CER	C3216JB1E333K-E-TP		5CAAD01235
C29	CAP,FXD CER	C3216CH1H271J-E-TP	50V 270PF	5CAAD00883
C30	CAP,FXD CER	C3216CH1H271J-E-TP	50V 270PF	5CAAD00883
C31	CAP,FXD CER	C3216CH1H271J-E-TP	50V 270PF	5CAAD00883
C32	CAP,FXD CER	C3216CH1H271J-E-TP	50V 270PF	5CAAD00883
C33	CAP,FXD CER	C3216CH1H680J-E-TP	68PF	5CAAD00929
C34	CAP,FXD CER	C3216CH1H680J-E-TP	68PF	5CAAD00929
C35	CAP,FXD CER	C3216CH1H680J-E-TP	68PF	5CAAD00929
C36	CAP,FXD CER	C3216CH1H680J-E-TP	68PF	5CAAD00929
C37	CAP,FXD CER	C3216CH1H050C-E-TP	5PF	5CAAD00800

PARTS LIST

	IF FILTER	TITLE CFH-38		SHEET NO 2
PARTS NO	PARTS NAME	TYPE	DESCRIPTION	CODE
C38	CAP,FXD CER	C3216CH1H050C-E-TP	5PF	5CAAD00800
C39	CAP,FXD CER	C3216JB1E333K-E-TP		5CAAD01235
C40	CAP,FXD CER	C3216JB1E333K-E-TP		5CAAD01235
C41	CAP,FXD CER	C3216JB1E333K-E-TP		5CAAD01235
C42	CAP,FXD CER	C3216JB1E333K-E-TP		5CAAD01235
C43	CAP,FXD CER	C3216JB1E333K-E-TP		5CAAD01235
C44	CAP,FXD CER	C3216JB1E333K-E-TP		5CAAD01235
C45	CAP,FXD CER	C3216JB1E333K-E-TP		5CAAD01235
C46	CAP,FXD CER	C3216JB1E333K-E-TP		5CAAD01235
C47	CAP,FXD CER	C3216JB1E333K-E-TP		5CAAD01235
C48	CAP,FXD CER	C3216JB1E333K-E-TP		5CAAD01235
C49	CAP,FXD CER	C3216JB1E333K-E-TP		5CAAD01235
C50	CAP,FXD CER	C3216JB1E333K-E-TP		5CAAD01235
C52	CAP,FXD CER	C3216JB1E333K-E-TP		5CAAD01235
C55	CAP,FXD CER	C3216JB1E333K-E-TP		5CAAD01235
C56	CAP,FXD CER	C3216JB1E333K-E-TP		5CAAD01235
C57	CAP,FXD CER	C3216JB1E333K-E-TP		5CAAD01235
C58	CAP,FXD CER	C3216X7R1E104K-E-TP	0.1U	5CAAD01237
C59	CAP,FXD CER	C3216JB1E333K-E-TP		5CAAD01235
C60	CAP,FXD CER	C3216JB1E333K-E-TP		5CAAD01235
C61	CAP,FXD CER	C3216JB1E333K-E-TP		5CAAD01235
C62	CAP,FXD CER	C3216JB1E333K-E-TP		5CAAD01235
C63	CAP,FXD CER	C3216SL1H102J-E-TP	1000PF	5CAAD00782
C64	CAP,FXD CER	C3216JB1E333K-E-TP		5CAAD01235
C65	CAP,FXD CER	C3216JB1E333K-E-TP		5CAAD01235
C66	CAP,FXD CER	C3216SL1H102J-E-TP	1000PF	5CAAD00782
C67	CAP,FXD CER	C3216CH1H220J-E-TP	22P	5CAAD00869
C68	CAP,FXD CER	C3216SL1H102J-E-TP	1000PF	5CAAD00782
C69	CAP,FXD CER	C3216SL1H102J-E-TP	1000PF	5CAAD00782
C70	CAP,FXD CER	C3216SL1H102J-E-TP	1000PF	5CAAD00782
C71	CAP,FXD CER	C3216CH1H100D-E-TP	10PF	5CAAD00785
C72	CAP,FXD CER	C3216CH1H100D-E-TP	10PF	5CAAD00785
C73	CAP,FXD CER	C3216CH1H020C-E-TP	2PF	5CAAD00798
C74	CAP,FXD CER	C3216JB1E333K-E-TP		5CAAD01235
C75	CAP,FXD CER	C3216JB1E333K-E-TP		5CAAD01235

PARTS LIST

	IF FILTER	TITLE CFH-38		SHEET NO 3
PARTS NO	PARTS NAME	TYPE	DESCRIPTION	CODE
C76	CAP,FXD CER	C3216JB1E333K-E-TP		5CAAD01235
C77	CAP,FXD ELCTLT	ECE-A1EU100B		5CEAA01864
C78	CAP,FXD ELCTLT	ECE-A1EU100B		5CEAA01864
C79	CAP,FXD CER	C3216JB1E333K-E-TP		5CAAD01235
C80	CAP,FXD CER	C3216B1H103K-E-TP	0.01U	5CAAD01597
C82	CAP,FXD CER	C3216JB1E333K-E-TP		5CAAD01235
C83	CAP,FXD CER	C3216JB1E333K-E-TP		5CAAD01235
C84	CAP,FXD CER	C3216JB1E333K-E-TP		5CAAD01235
C85	CAP,FXD CER	C3216JB1E333K-E-TP		5CAAD01235
C86	CAP,FXD CER	C3216JB1E333K-E-TP		5CAAD01235
C87	CAP,FXD CER	C3216JB1E333K-E-TP		5CAAD01235
C88	CAP,FXD CER	C3216JB1E333K-E-TP		5CAAD01235
C89	CAP,FXD CER	C3216B1H103K-E-TP	0.01U	5CAAD01597
C90	CAP,FXD CER	C3216B1H103K-E-TP	0.01U	5CAAD01597
C91	CAP,FXD CER	C3216B1H103K-E-TP	0.01U	5CAAD01597
C92	CAP,FXD TANTAL	202L35D2 105KB	35V 1UF	5CSAC00982
C93	CAP,FXD CER	C3216B1H103K-E-TP	0.01U	5CAAD01597
C94	CAP,FXD ELCTLT	ECE-A1EU100B		5CEAA01864
C95	CAP,FXD CER	C3216JB1E333K-E-TP		5CAAD01235
C96	CAP,FXD CER	C3216JB1E333K-E-TP		5CAAD01235
C97	CAP,FXD CER	C3216SL1H102J-E-TP	1000PF	5CAAD00782
C98	CAP,FXD CER	C3216JB1E333K-E-TP		5CAAD01235
C99	CAP,FXD CER	C3216JB1E333K-E-TP		5CAAD01235
C100	CAP,FXD CER	C3216JB1E333K-E-TP		5CAAD01235
C101	CAP,FXD CER	C3216B1H103K-E-TP	0.01U	5CAAD01597
C102	CAP,FXD CER	C3216JB1E333K-E-TP		5CAAD01235
C103	CAP,FXD CER	C3216JB1E333K-E-TP		5CAAD01235
C104	CAP,FXD CER	C3216B1H103K-E-TP	0.01U	5CAAD01597
C105	CAP,FXD CER	C3216JB1E333K-E-TP		5CAAD01235
C106	CAP,FXD CER	C3216JB1E333K-E-TP		5CAAD01235
C107	CAP,FXD CER	C3216CH1H101J-E-TP	100PF	5CAAD00780
C108	CAP,FXD CER	C3216B1H103K-E-TP	0.01U	5CAAD01597
C109	CAP,FXD CER	C3216JB1E333K-E-TP		5CAAD01235
C110	CAP,FXD ELCTLT	ECE-A1EU100B		5CEAA01864
C111	CAP,FXD CER	C3216JB1E333K-E-TP		5CAAD01235

PARTS LIST

TITLE: IF FILTER CFH-38 SHEET NO 4

PARTS NO	PARTS NAME	TYPE	DESCRIPTION	CODE
C112	CAP,FXD CER	C3216CH1H680J-E-TP	68PF	5CAAD00929
C113	CAP,FXD CER	C3216B1H103K-E-TP	0.01U	5CAAD01597
C114	CAP,FXD CER	C3216CH1H470J-E-TP	47PF	5CAAD00864
C115	CAP,FXD CER	C3216CH1H470J-E-TP	47PF	5CAAD00864
C116	CAP,FXD CER	C3216JB1E333K-E-TP		5CAAD01235
C117	CAP,FXD CER	C3216SL1H102J-E-TP	1000PF	5CAAD00782
C118	CAP,FXD CER	C3216SL1H102J-E-TP	1000PF	5CAAD00782
C119	CAP,FXD CER	C3216CH1H220J-E-TP	22P	5CAAD00869
C120	CAP,FXD CER	C3216SL1H102J-E-TP	1000PF	5CAAD00782
C121	CAP,FXD CER	C3216SL1H102J-E-TP	1000PF	5CAAD00782
C122	CAP,FXD CER	C3216SL1H102J-E-TP	1000PF	5CAAD00782
C123	CAP,FXD CER	C3216SL1H102J-E-TP	1000PF	5CAAD00782
C124	CAP,FXD CER	C3216F1H104Z-E-TP	0.1UF	5CAAD01056
C125	CAP,FXD CER	C3216SL1H102J-E-TP	1000PF	5CAAD00782
C126	CAP,FXD CER	C3216SL1H102J-E-TP	1000PF	5CAAD00782
C127	CAP,FXD CER	C3216CH1H220J-E-TP	22P	5CAAD00869
C128	CAP,FXD CER	C3216SL1H102J-E-TP	1000PF	5CAAD00782
C129	CAP,FXD CER	C3216SL1H102J-E-TP	1000PF	5CAAD00782
C130	CAP,FXD CER	C3216SL1H102J-E-TP	1000PF	5CAAD00782
C131	CAP,FXD CER	C3216SL1H102J-E-TP	1000PF	5CAAD00782
C132	CAP,FXD ELCTLT	ECE-A1EU470B	25V 47UF	5CEAA01816
C133	CAP,FXD TANTAL	202L35Q2 105KB	35V 1UF	5CSAC00982
C135	CAP,FXD CER	C3216JB1E333K-E-TP		5CAAD01235
C136	CAP,FXD CER	C3216JB1E333K-E-TP		5CAAD01235
C137	CAP,FXD CER	C3216CH1H680J-E-TP	68PF	5CAAD00929
C138	CAP,FXD CER	C3216X7R1E104K-E-TP	0.1U	5CAAD01237
C139	CAP,FXD CER	C3216X7R1E104K-E-TP	0.1U	5CAAD01237
C140	CAP,FXD CER	C3216X7R1E104K-E-TP	0.1U	5CAAD01237
C141	CAP,FXD CER	C3216X7R1E104K-E-TP	0.1U	5CAAD01237
C142	CAP,FXD CER	C3216X7R1E104K-E-TP	0.1U	5CAAD01237
C143	CAP,FXD CER	C3216X7R1E104K-E-TP	0.1U	5CAAD01237
C144	CAP,FXD CER	C3216X7R1E104K-E-TP	0.1U	5CAAD01237
C145	CAP,FXD CER	C3216X7R1E104K-E-TP	0.1U	5CAAD01237
C146	CAP,FXD CER	C3216JB1E333K-E-TP		5CAAD01235
C147	CAP,FXD TANTAL	202L35Q2 474KB		5CSAC01065

PARTS LIST

TITLE: IF FILTER CFH-38 SHEET NO 5

PARTS NO	PARTS NAME	TYPE	DESCRIPTION	CODE
C148	CAP,FXD CER	C3216X7R1E104K-E-TP	0.1U	5CAAD01237
C149	CAP,FXD CER	C3216SL1H102J-E-TP	1000PF	5CAAD00782
CD1	DIODE	RD5.1MB1-T1		5TXAA00515
CD2	DIODE	1SS226 TE85L		5TXAD00320
CD3	DIODE	1SS181 TE85L		5TXAD00356
CD4	DIODE	1SS181 TE85L		5TXAD00356
CD5	DIODE	1SS181 TE85L		5TXAD00356
CD6	DIODE	1SS181 TE85L		5TXAD00356
CD7	DIODE	1SS181 TE85L		5TXAD00356
CD8	DIODE	1SS226 TE85L		5TXAD00320
CD9	DIODE	1SS226 TE85L		5TXAD00320
CD10	DIODE	1SS184 TE85L		5TXAD00290
CD11	DIODE	1SS85RE		5TXAE00590
CD12	DIODE	1SS85RE		5TXAE00590
CD13	DIODE	1SS226 TE85L		5TXAD00320
CD14	DIODE	1SS181 TE85L		5TXAD00356
CD15	DIODE	1SS184 TE85L		5TXAD00290
CD16	DIODE	1SS184 TE85L		5TXAD00290
CD17	DIODE	1SS184 TE85L		5TXAD00290
CD18	DIODE	1SS181 TE85L		5TXAD00356
CD19	DIODE	1SS181 TE85L		5TXAD00356
CD20	DIODE	1SS226 TE85L		5TXAD00320
CD21	DIODE	1SS226 TE85L		5TXAD00320
CD22	DIODE	1SS226 TE85L		5TXAD00320
CD23	DIODE	HZ3B2	3V	5TXAE00107
CD24	DIODE	1SS181 TE85L		5TXAD00356
CD25	DIODE	1SS184 TE85L		5TXAD00290
CD26	DIODE	1SS184 TE85L		5TXAD00290
CD27	DIODE	1SS226 TE85L		5TXAD00320
CD28	DIODE	1SS184 TE85L		5TXAD00290
CD29	DIODE	1SS184 TE85L		5TXAD00290
CV1	CAPACITOR VAR	TZ031Z00FR		5CVAA00166
FL1	CRYSTAL CKT	H-6XMJD00114	70.455MHZ	6XMJD00114
FL2	COIL	LF-B12		5LFAE00009
FL3	COIL	LF-B6		5LFAE00015

PARTS LIST

TITLE	IF FILTER	CFH-38	SHEET NO 6

PARTS NO	PARTS NAME	TYPE	DESCRIPTION	CODE
IC1	IC	HD74LS145P		5DDAF00704
IC2	IC	M5218P		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	1UH	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	LAL03VBR33M	0.33UH	5LCAA00274
L14	COIL	FL-7H472J	4.7MH	5LCAA00023
P3	CONNECTOR	EC1C-22P-2.5DSA	22P	5JWBS00070
P4	CONNECTOR	EC1C-22P-2.5DSA	22P	5JWBS00070
PC1	PCB	H-6PCJD00259A		6PCJD00259
R1	RESISTOR FXD	ERJ-8GEYJ103V	1/8W 10K OHM	5REAG01750
R2	RESISTOR FXD	ERJ-8GEYJ103V	1/8W 10K OHM	5REAG01750
R3	RESISTOR FXD	ERJ-8GEYJ103V	1/8W 10K OHM	5REAG01750
R4	RESISTOR FXD	ERJ-8GEYJ223V	1/8W 22K OHM	5REAG01754
R6	RESISTOR FXD	ERJ-8GEYJ103V	1/8W 10K OHM	5REAG01750
R7	RESISTOR FXD	ERJ-8GEYJ103V	1/8W 10K OHM	5REAG01750
R8	RESISTOR FXD	ERJ-8GEYJ472V		5REAG01746
R9	RESISTOR FXD	ERJ-8GEYJ392V	1/8W 3.9K OHM	5REAG01745
R10	RESISTOR FXD	ERJ-8GEYJ102V	1/8W 1K OHM	5REAG01738

PARTS LIST

TITLE	IF FILTER	CFH-38	SHEET NO 7

PARTS NO	PARTS NAME	TYPE	DESCRIPTION	CODE
R11	RESISTOR FXD	ERJ-8GEYJ102V	1/8W 1K OHM	5REAG01738
R12	RESISTOR FXD	ERJ-8GEYJ822V		5REAG01749
R13	RESISTOR FXD	ERJ-8GEYJ391V	1/8W 390 OHM	5REAG01733
R14	RESISTOR FXD	ERJ-8GEYJ471V	1/8W 470 OHM	5REAG01734
R15	RESISTOR FXD	ERJ-8GEYJ101V	1/8W 100 OHM	5REAG01726
R16	RESISTOR FXD	ERJ-8GEYJ221V	1/8W 220 OHM	5REAG01730
R17	RESISTOR FXD	ERJ-8GEYJ153V		5REAG01752
R18	RESISTOR FXD	ERJ-8GEYJ562V	1/8W 5.6K OHM	5REAG01747
R19	RESISTOR FXD	ERJ-8GEYJ332V	1/8W 3.3K OHM	5REAG01744
R20	RESISTOR FXD	ERJ-8GEYJ101V	1/8W 100 OHM	5REAG01726
R21	RESISTOR FXD	ERJ-8GEYJ222V	1/8W 2.2K OHM	5REAG01742
R22	RESISTOR FXD	ERJ-8GEYJ152V	1/8W 1.5K OHM	5REAG01740
R23	RESISTOR FXD	ERJ-8GEYJ152V	1/8W 1.5K OHM	5REAG01740
R24	RESISTOR FXD	ERJ-8GEYJ103V	1/8W 10K OHM	5REAG01750
R25	RESISTOR FXD	ERJ-8GEYJ152V	1/8W 1.5K OHM	5REAG01740
R26	RESISTOR FXD	ERJ-8GEYJ152V	1/8W 1.5K OHM	5REAG01740
R27	RESISTOR FXD	ERJ-8GEYJ152V	1/8W 1.5K OHM	5REAG01740
R28	RESISTOR FXD	ERJ-8GEYJ152V	1/8W 1.5K OHM	5REAG01740
R29	RESISTOR FXD	ERJ-8GEYJ152V	1/8W 1.5K OHM	5REAG01740
R30	RESISTOR FXD	ERJ-8GEYJ152V	1/8W 1.5K OHM	5REAG01740
R31	RESISTOR FXD	ERJ-8GEYJ152V	1/8W 1.5K OHM	5REAG01740
R32	RESISTOR FXD	ERJ-8GEYJ152V	1/8W 1.5K OHM	5REAG01740
R33	RESISTOR FXD	ERJ-8GEYJ152V	1/8W 1.5K OHM	5REAG01740
R34	RESISTOR FXD	ERJ-8GEYJ103V	1/8W 10K OHM	5REAG01750
R35	RESISTOR FXD	ERJ-8GEYJ101V	1/8W 100 OHM	5REAG01726
R36	RESISTOR FXD	ERJ-8GEYJ101V	1/8W 100 OHM	5REAG01726
R37	RESISTOR FXD	ERJ-8GEYJ101V	1/8W 100 OHM	5REAG01726
R38	RESISTOR FXD	ERJ-8GEYJ101V	1/8W 100 OHM	5REAG01726
R39	RESISTOR FXD	ERJ-8GEYJ152V	1/8W 1.5K OHM	5REAG01740
R44	RESISTOR FXD	ERJ-8GEYJ102V	1/8W 1K OHM	5REAG01738
R45	RESISTOR FXD	ERJ-8GEYJ332V	1/8W 3.3K OHM	5REAG01744
R46	RESISTOR FXD	ERJ-8GEYJ102V	1/8W 1K OHM	5REAG01738
R47	RESISTOR FXD	ERJ-8GEYJ823V		5REAG01761
R48	RESISTOR FXD	ERJ-8GEYJ152V	1/8W 1.5K OHM	5REAG01740
R49	RESISTOR FXD	ERJ-8GEYJ680V	1/8W 68 OHM	5REAG01724

PARTS LIST

	IF FILTER	TITLE	CFH-38	SHEET NO 8
PARTS NO	PARTS NAME	TYPE	DESCRIPTION	CODE
R51	RESISTOR FXD	ERJ-8GEYJ681V	1/8W 680 OHM	5REAG01736
R52	RESISTOR FXD	ERJ-8GEYJ101V	1/8W 100 OHM	5REAG01726
R53	RESISTOR FXD	ERJ-8GEYJ101V	1/8W 100 OHM	5REAG01726
R54	RESISTOR FXD	ERJ-8GEYJ152V	1/8W 1.5K OHM	5REAG01740
R55	RESISTOR FXD	ERJ-8GEYJ822V		5REAG01749
R56	RESISTOR FXD	ERJ-8GEYJ272V	1/8W,2.7K OHM	5REAG01743
R57	RESISTOR FXD	ERJ-8GEYJ820V	1/8W 82 OHM	5REAG01725
R58	RESISTOR FXD	ERJ-8GEYJ681V	1/8W 680 OHM	5REAG01736
R59	RESISTOR FXD	ERJ-8GEYJ101V	1/8W 100 OHM	5REAG01726
R60	RESISTOR FXD	ERJ-8GEYJ332V	1/8W 3.3K OHM	5REAG01744
R62	RESISTOR FXD	ERJ-8GEY0R00V	0 OHM	5REAG01775
R63	RESISTOR FXD	ERJ-8GEYJ103V	1/8W 10K OHM	5REAG01750
R65	RESISTOR FXD	ERJ-8GEYJ222V	1/8W 2.2K OHM	5REAG01742
R66	RESISTOR FXD	ERJ-8GEYJ101V	1/8W 100 OHM	5REAG01726
R67	RESISTOR FXD	ERJ-8GEYJ272V	1/8W,2.7K OHM	5REAG01743
R68	RESISTOR FXD	ERJ-8GEYJ102V	1/8W 1K OHM	5REAG01738
R69	RESISTOR FXD	ERJ-8GEYJ101V	1/8W 100 OHM	5REAG01726
R70	RESISTOR FXD	ERJ-8GEYJ104V	1/8W 100K OHM	5REAG01762
R71	RESISTOR FXD	ERJ-8GEYJ103V	1/8W 10K OHM	5REAG01750
R72	RESISTOR FXD	ERJ-8GEYJ104V	1/8W 100K OHM	5REAG01762
R73	RESISTOR FXD	ERJ-8GEYJ103V	1/8W 10K OHM	5REAG01750
R74	RESISTOR FXD	ERJ-8GEYJ223V	1/8W 22K OHM	5REAG01754
R75	RESISTOR FXD	ERJ-8GEYJ472V		5REAG01746
R76	RESISTOR FXD	ERJ-8GEYJ334V		5REAG01768
R77	RESISTOR FXD	ERJ-8GEYJ223V	1/8W 22K OHM	5REAG01754
R78	RESISTOR FXD	ERJ-8GEYJ103V	1/8W 10K OHM	5REAG01750
R79	RESISTOR FXD	ERJ-8GEYJ103V	1/8W 10K OHM	5REAG01750
R80	RESISTOR FXD	ERJ-8GEYJ153V		5REAG01752
R81	RESISTOR FXD	ERJ-8GEYJ104V	1/8W 100K OHM	5REAG01762
R82	RESISTOR FXD	ERJ-8GEYJ103V	1/8W 10K OHM	5REAG01750
R83	RESISTOR FXD	ERJ-8GEYJ103V	1/8W 10K OHM	5REAG01750
R84	RESISTOR FXD	ERJ-8GEYJ332V	1/8W 3.3K OHM	5REAG01744
R85	RESISTOR FXD	ERJ-8GEYJ102V	1/8W 1K OHM	5REAG01738
R86	RESISTOR FXD	ERJ-8GEYJ333V		5REAG01756
R87	RESISTOR FXD	ERJ-8GEYJ151V	1/8W 150 OHM	5REAG01728

PARTS LIST

	IF FILTER	TITLE	CFH-38	SHEET NO 9
PARTS NO	PARTS NAME	TYPE	DESCRIPTION	CODE
R88	RESISTOR FXD	ERJ-8GEYJ222V	1/8W 2.2K OHM	5REAG01742
R89	RESISTOR FXD	ERJ-8GEYJ332V	1/8W 3.3K OHM	5REAG01744
R90	RESISTOR FXD	ERJ-8GEYJ472V		5REAG01746
R91	RESISTOR FXD	ERJ-8GEYJ102V	1/8W 1K OHM	5REAG01738
R92	RESISTOR FXD	ERJ-8GEYJ333V		5REAG01756
R93	RESISTOR FXD	ERJ-8GEYJ151V	1/8W 150 OHM	5REAG01728
R94	RESISTOR FXD	ERJ-8GEYJ222V	1/8W 2.2K OHM	5REAG01742
R95	RESISTOR FXD	ERJ-8GEYJ332V	1/8W 3.3K OHM	5REAG01744
R96	RESISTOR FXD	ERJ-8GEYJ472V		5REAG01746
R97	RESISTOR FXD	ERJ-8GEYJ102V	1/8W 1K OHM	5REAG01738
R98	RESISTOR FXD	ERJ-8GEYJ333V		5REAG01756
R99	RESISTOR FXD	ERJ-8GEYJ221V	1/8W 220 OHM	5REAG01730
R100	RESISTOR FXD	ERJ-8GEYJ101V	1/8W 100 OHM	5REAG01726
R101	RESISTOR FXD	ERJ-8GEYJ104V	1/8W 100K OHM	5REAG01762
R102	RESISTOR FXD	ERJ-8GEYJ122V	1/8W 1.2K OHM	5REAG01739
R103	RESISTOR FXD	ERJ-8GEYJ332V	1/8W 3.3K OHM	5REAG01744
R104	RESISTOR FXD	ERJ-8GEYJ332V	1/8W 3.3K OHM	5REAG01744
R106	RESISTOR FXD	ERJ-8GEYJ222V	1/8W 2.2K OHM	5REAG01742
R107	RESISTOR FXD	ERJ-8GEYJ470V	1/8W 47 OHM	5REAG01722
R108	RESISTOR FXD	ERJ-8GEYJ222V	1/8W 2.2K OHM	5REAG01742
R111	RESISTOR FXD	ERJ-8GEY0R00V	0 OHM	5REAG01775
R112	RESISTOR FXD	ERJ-8GEYJ151V	1/8W 150 OHM	5REAG01728
R113	RESISTOR FXD	ERJ-8GEYJ222V	1/8W 2.2K OHM	5REAG01742
R114	RESISTOR FXD	ERJ-8GEYJ222V	1/8W 2.2K OHM	5REAG01742
R115	RESISTOR FXD	ERJ-8GEYJ101V	1/8W 100 OHM	5REAG01726
R116	RESISTOR FXD	ERJ-8GEYJ101V	1/8W 100 OHM	5REAG01726
R117	RESISTOR FXD	ERJ-8GEYJ101V	1/8W 100 OHM	5REAG01726
R118	RESISTOR FXD	ERJ-8GEYJ332V	1/8W 3.3K OHM	5REAG01744
R119	RESISTOR FXD	ERJ-8GEYJ821V	1/8W 820 OHM	5REAG01737
R120	RESISTOR FXD	ERJ-8GEYJ101V	1/8W 100 OHM	5REAG01726
R121	RESISTOR FXD	ERJ-8GEYJ330V	1/8W 33 OHM	5REAG01720
R122	RESISTOR FXD	ERD-25UJ221	1/4W 220 OHM	5RDAA01329
R123	RESISTOR FXD	ERJ-8GEYJ330V	1/8W 33 OHM	5REAG01720
R124	RESISTOR FXD	ERJ-8GEYJ102V	1/8W 1K OHM	5REAG01738
R125	RESISTOR FXD	ERJ-8GEYJ101V	1/8W 100 OHM	5REAG01726

PARTS LIST

	IF FILTER	TITLE CFH-38		SHEET NO 10
PARTS NO	PARTS NAME	TYPE	DESCRIPTION	CODE
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-8GEY0R00V	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	RKC1/8B5-47K OHM J		SREAE00173
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
RJ5	RESISTOR FXD	ERJ-8GEY0R00V	0 OHM	SREAG01775
RJ6	RESISTOR FXD	ERJ-8GEY0R00V	0 OHM	SREAG01775
RJ7	RESISTOR FXD	ERJ-8GEY0R00V	0 OHM	SREAG01775
RJ8	RESISTOR FXD	ERJ-8GEY0R00V	0 OHM	SREAG01775
RJ9	RESISTOR FXD	ERJ-8GEY0R00V	0 OHM	SREAG01775
RJ10	RESISTOR FXD	ERJ-8GEY0R00V	0 OHM	SREAG01775
RJ11	RESISTOR FXD	ERJ-8GEY0R00V	0 OHM	SREAG01775
RJ12	RESISTOR FXD	ERJ-8GEY0R00V	0 OHM	SREAG01775
RJ13	RESISTOR FXD	ERJ-8GEY0R00V	0 OHM	SREAG01775
RJ14	RESISTOR FXD	ERJ-8GEY0R00V	0 OHM	SREAG01775
RJ15	RESISTOR FXD	ERJ-8GEY0R00V	0 OHM	SREAG01775
RJ16	RESISTOR FXD	ERJ-8GEY0R00V	0 OHM	SREAG01775
RJ17	RESISTOR FXD	ERJ-8GEY0R00V	0 OHM	SREAG01775
RJ18	RESISTOR FXD	ERJ-8GEY0R00V	0 OHM	SREAG01775
RJ19	RESISTOR FXD	ERJ-8GEY0R00V	0 OHM	SREAG01775
RJ20	RESISTOR FXD	ERJ-8GEY0R00V	0 OHM	SREAG01775
RJ21	RESISTOR FXD	ERJ-8GEY0R00V	0 OHM	SREAG01775

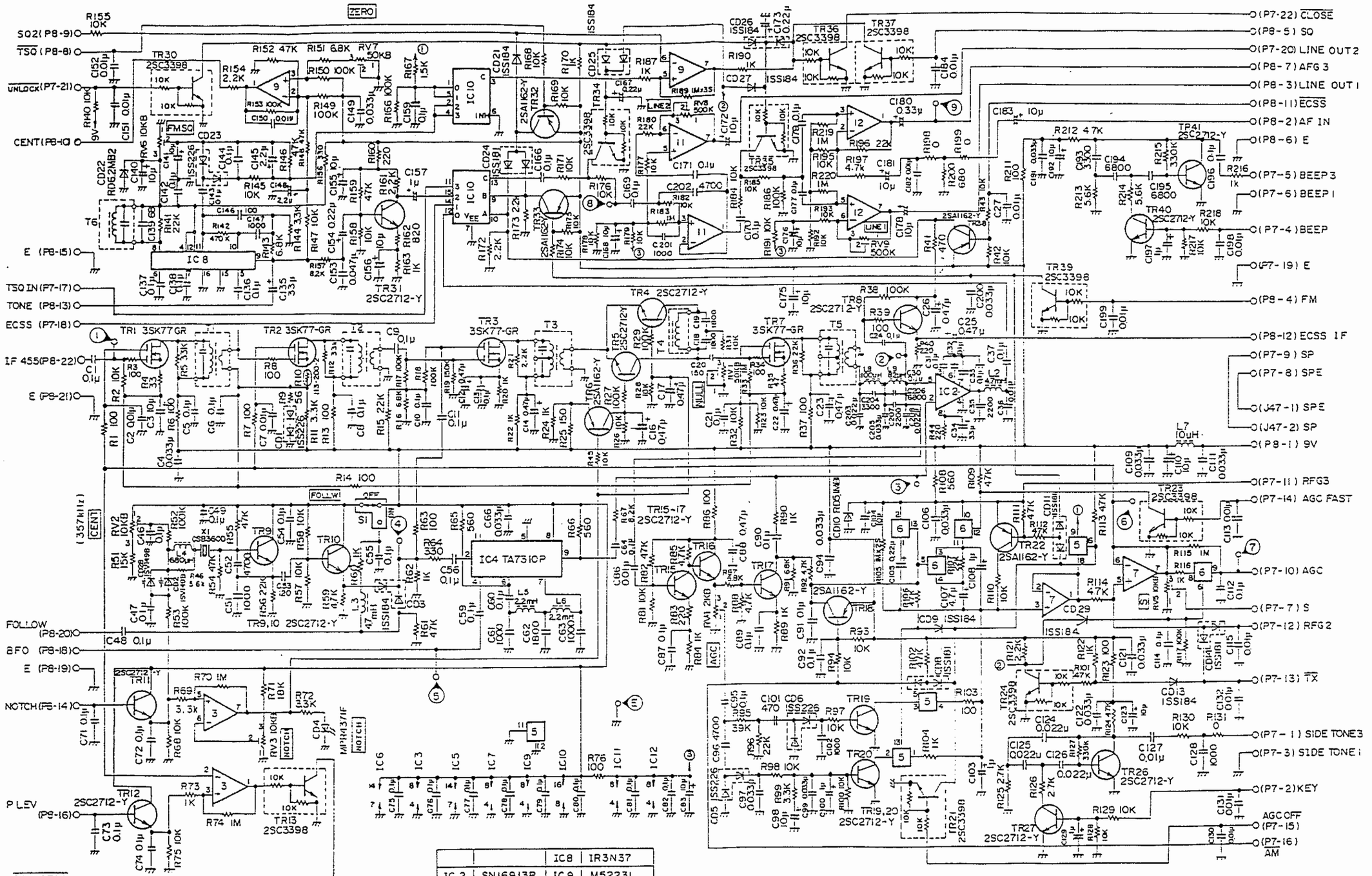
PARTS LIST

	IF FILTER	TITLE CFH-38		SHEET NO 11
PARTS NO	PARTS NAME	TYPE	DESCRIPTION	CODE
RJ22	RESISTOR FXD	ERJ-8GEY0R00V	0 OHM	SREAG01775
RJ23	RESISTOR FXD	ERJ-8GEY0R00V	0 OHM	SREAG01775
RJ24	RESISTOR FXD	ERJ-8GEY0R00V	0 OHM	SREAG01775
RJ25	RESISTOR FXD	ERJ-8GEY0R00V	0 OHM	SREAG01775
RJ26	RESISTOR FXD	ERJ-8GEY0R00V	0 OHM	SREAG01775
RJ27	RESISTOR FXD	ERJ-8GEY0R00V	0 OHM	SREAG01775
RJ28	RESISTOR FXD	ERJ-8GEY0R00V	0 OHM	SREAG01775
RJ29	RESISTOR FXD	ERJ-8GEY0R00V	0 OHM	SREAG01775
RJ30	RESISTOR FXD	ERJ-8GEY0R00V	0 OHM	SREAG01775
RJ31	RESISTOR FXD	ERJ-8GEY0R00V	0 OHM	SREAG01775
RJ32	RESISTOR FXD	ERJ-8GEY0R00V	0 OHM	SREAG01775
RJ33	RESISTOR FXD	ERJ-8GEY0R00V	0 OHM	SREAG01775
RJ34	RESISTOR FXD	ERJ-8GEY0R00V	0 OHM	SREAG01775
RJ35	RESISTOR FXD	ERJ-8GEY0R00V	0 OHM	SREAG01775
RJ36	RESISTOR FXD	ERJ-8GEY0R00V	0 OHM	SREAG01775
RJ37	RESISTOR FXD	ERJ-8GEY0R00V	0 OHM	SREAG01775
RJ38	RESISTOR FXD	ERJ-8GEY0R00V	0 OHM	SREAG01775
RJ39	RESISTOR FXD	ERJ-8GEY0R00V	0 OHM	SREAG01775
RJ40	RESISTOR FXD	ERJ-8GEY0R00V	0 OHM	SREAG01775
RJ41	RESISTOR FXD	ERJ-8GEY0R00V	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

	TITLE: IF FILTER	CFH-38	SHEET NO. 12

PARTS NO	PARTS NAME	TYPE	DESCRIPTION	CODE
T12	RF XFMR	S-061-006		5LJAA00006
T13	RF XFMR	H-6LHJD00297		6LHJD00297
TP1	TEST TERMINAL	PCN6-PEA		5JDAA00364
TP2	TEST TERMINAL	PCN6-PEA		5JDAA00364
TP3	TEST TERMINAL	PCN6-PEA		5JDAA00364
TP4	TEST TERMINAL	PCN6-PEA		5JDAA00364
TP5	TEST TERMINAL	PCN6-PEA		5JDAA00364
TP6	TEST TERMINAL	PCN6-PEA		5JDAA00364
TP7	TEST TERMINAL	PCN6-PEA		5JDAA00364
TR2	TRANSISTOR	2SC1855		5TCAA00134
TR3	TRANSISTOR	2SC2714Y TE85L		5TCAF00436
TR4	TRANSISTOR	2SC3398-TB		5TCAZ00011
TR5	TRANSISTOR	2SC3398-TB		5TCAZ00011
TR6	TRANSISTOR	2SC3398-TB		5TCAZ00011
TR7	TRANSISTOR	2SC2712Y TE85L		5TAAG00186
TR8	TRANSISTOR	2SA1162-Y TE85L		5TAAG00182
TR9	TRANSISTOR	2SC2712Y TE85L		5TAAG00186
TR10	TRANSISTOR	2SC2712Y TE85L		5TAAG00186
TR11	TRANSISTOR	2SC2712Y TE85L		5TAAG00186
TR12	TRANSISTOR	2SC2712Y TE85L		5TAAG00186
TR13	TRANSISTOR	2SC2712Y TE85L		5TAAG00186
TR14	TRANSISTOR	3SK77-GR		5TKAA00108
TR15	TRANSISTOR	2SK125		5TKAH00002
TR16	TRANSISTOR	2SK125		5TKAH00002
TR17	TRANSISTOR	3SK77-GR		5TKAA00108
TR18	TRANSISTOR	2SC2714Y TE85L		5TCAF00436
TR19	TRANSISTOR	2SC2712Y TE85L		5TAAG00186
TR20	TRANSISTOR	2SA1162-Y TE85L		5TAAG00182
TR21	TRANSISTOR	2SC3398-TB		5TCAZ00011
TR22	TRANSISTOR	2SC3398-TB		5TCAZ00011
TR23	TRANSISTOR	2SC3398-TB		5TCAZ00011
TR24	TRANSISTOR	2SC3398-TB		5TCAZ00011



		IC8	IR3N37
IC 2	SN16913P	IC9	M5223L
IC 3	M5223L	IC10	TC4052BP
IC 4	TA7310P	IC11	M5260L
IC 5	TC4066BP	IC12	M5260L
IC 6	TC4066BP		
IC 7	M5223L		

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

6PCJD00260A

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

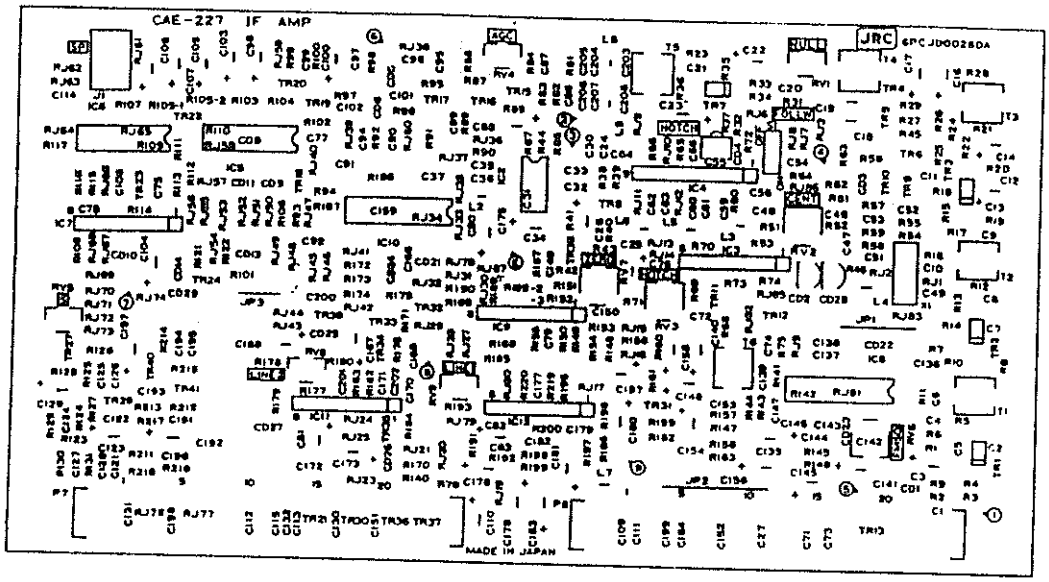


Figure 6-11 IF AMP Unit (CAE-227) Component Layout

PARTS LIST

TITLE: IF AMP	CAE-227	SHEET NO 1

PARTS NO	PARTS NAME	TYPE	DESCRIPTION	CODE
C1	CAP,FXD CER	C3216X7R1E104K-E-TP	0.1U	5CAAD01237
C2	CAP,FXD CER	C3216JB1H103K-E-TP	0.01UF	5CAAD00789
C3	CAP,FXD ELCTLT	ECE-A1EU100B		5CEAA01864
C4	CAP,FXD CER	C3216X7R1H333K-E-TP	50V 0.033U	5CAAD01357
C5	CAP,FXD CER	C3216X7R1E104K-E-TP	0.1U	5CAAD01237
C6	CAP,FXD CER	C3216X7R1E104K-E-TP	0.1U	5CAAD01237
C7	CAP,FXD CER	C3216JB1H103K-E-TP	0.01UF	5CAAD00789
C8	CAP,FXD CER	C3216X7R1E104K-E-TP	0.1U	5CAAD01237
C9	CAP,FXD CER	C3216X7R1E104K-E-TP	0.1U	5CAAD01237
C10	CAP,FXD CER	C3216X7R1E104K-E-TP	0.1U	5CAAD01237
C11	CAP,FXD CER	C3216X7R1E104K-E-TP	0.1U	5CAAD01237
C12	CAP,FXD TANTAL	202L3502 474KB		5CSAC01065
C13	CAP,FXD CER	C3216X7R1E104K-E-TP	0.1U	5CAAD01237
C14	CAP,FXD TANTAL	202L3502 474KB		5CSAC01065
C16	CAP,FXD TANTAL	202L3502 474KB		5CSAC01065
C17	CAP,FXD TANTAL	202L3502 474KB		5CSAC01065
C18	CAP,FXD PLSTC	ECQ-B1H182JZ3		5CRAA00875
C19	CAP,FXD PLSTC	ECQ-B1H182JZ3		5CRAA00875
C20	CAP,FXD CER	C3216CH1H151J-E-TP	150P	5CAAD00870
C21	CAP,FXD CER	C3216X7R1E104K-E-TP	0.1U	5CAAD01237
C22	CAP,FXD TANTAL	202L3502 474KB		5CSAC01065
C23	CAP,FXD TANTAL	202L3502 474KB		5CSAC01065
C24	CAP,FXD CER	C3216X7R1E104K-E-TP	0.1U	5CAAD01237
C25	CAP,FXD TANTAL	202L3502 474KB		5CSAC01065
C26	CAP,FXD TANTAL	202L3502 474KB		5CSAC01065
C27	CAP,FXD CER	C3216JB1H103K-E-TP	0.01UF	5CAAD00789
C30	CAP,FXD CER	C3216X7R1E104K-E-TP	0.1U	5CAAD01237
C31	CAP,FXD CER	C3216X7R1E104K-E-TP	0.1U	5CAAD01237
C32	CAP,FXD CER	C3216X7R1E104K-E-TP	0.1U	5CAAD01237
C33	CAP,FXD CER	C3216X7R1E104K-E-TP	0.1U	5CAAD01237
C34	CAP,FXD ELCTLT	ECE-A1EU330B		5CEAA01822
C35	CAP,FXD CER	C3216SL1H222J-E-TP	2200P	5CAAD00792
C36	CAP,FXD CER	C3216JB1H103K-E-TP	0.01UF	5CAAD00789
C37	CAP,FXD CER	C3216X7R1E104K-E-TP	0.1U	5CAAD01237
C46	CAP,FXD CER	C3216X7R1E104K-E-TP	0.1U	5CAAD01237

PARTS LIST

TITLE: IF AMP	CAE-227	SHEET NO 2

PARTS NO	PARTS NAME	TYPE	DESCRIPTION	CODE
C47	CAP,FXD CER	C3216X7R1E104K-E-TP	0.1U	5CAAD01237
C48	CAP,FXD CER	C3216X7R1E104K-E-TP	0.1U	5CAAD01237
C49	CAP,FXD CER	C3216X7R1E104K-E-TP	0.1U	5CAAD01237
C51	CAP,FXD CER	C3216SL1H102J-E-TP	1000PF	5CAAD00782
C52	CAP,FXD CER	C3216B1H472K-E-TP	4700PF	5CAAD00783
C53	CAP,FXD CER	C3216CH1H121J-E-TP	120PF	5CAAD00931
C54	CAP,FXD CER	C3216X7R1E104K-E-TP	0.1U	5CAAD01237
C55	CAP,FXD CER	C3216X7R1E104K-E-TP	0.1U	5CAAD01237
C56	CAP,FXD CER	C3216X7R1E104K-E-TP	0.1U	5CAAD01237
C59	CAP,FXD CER	C3216X7R1E104K-E-TP	0.1U	5CAAD01237
C60	CAP,FXD CER	C3216X7R1E104K-E-TP	0.1U	5CAAD01237
C61	CAP,FXD CER	C3216SL1H102J-E-TP	1000PF	5CAAD00782
C62	CAP,FXD CER	C3216SL1H182J-E-TP		5CAAD01070
C63	CAP,FXD CER	C3216SL1H102J-E-TP	1000PF	5CAAD00782
C64	CAP,FXD CER	C3216X7R1E104K-E-TP	0.1U	5CAAD01237
C66	CAP,FXD CER	C3216X7R1H333K-E-TP	50V 0.033U	5CAAD01357
C71	CAP,FXD CER	C3216X7R1E104K-E-TP	0.1U	5CAAD01237
C72	CAP,FXD CER	C3216X7R1E104K-E-TP	0.1U	5CAAD01237
C73	CAP,FXD CER	C3216X7R1E104K-E-TP	0.1U	5CAAD01237
C74	CAP,FXD CER	C3216X7R1E104K-E-TP	0.1U	5CAAD01237
C75	CAP,FXD CER	C3216X7R1E104K-E-TP	0.1U	5CAAD01237
C76	CAP,FXD CER	C3216X7R1E104K-E-TP	0.1U	5CAAD01237
C77	CAP,FXD CER	C3216X7R1E104K-E-TP	0.1U	5CAAD01237
C78	CAP,FXD CER	C3216X7R1E104K-E-TP	0.1U	5CAAD01237
C79	CAP,FXD CER	C3216X7R1E104K-E-TP	0.1U	5CAAD01237
C80	CAP,FXD CER	C3216X7R1E104K-E-TP	0.1U	5CAAD01237
C81	CAP,FXD CER	C3216X7R1E104K-E-TP	0.1U	5CAAD01237
C82	CAP,FXD CER	C3216X7R1E104K-E-TP	0.1U	5CAAD01237
C83	CAP,FXD ELCTLT	ECE-A1EU100B		5CEAA01864
C86	CAP,FXD CER	C3216JB1H103K-E-TP	0.01UF	5CAAD00789
C87	CAP,FXD CER	C3216X7R1E104K-E-TP	0.1U	5CAAD01237
C88	CAP,FXD TANTAL	202L3502 474KB		5CSAC01065
C89	CAP,FXD CER	C3216X7R1E104K-E-TP	0.1U	5CAAD01237
C90	CAP,FXD CER	C3216X7R1E104K-E-TP	0.1U	5CAAD01237
C91	CAP,FXD CER	C3216X7R1E104K-E-TP	0.1U	5CAAD01237

PARTS LIST

	IF AMP	TITLE CAE-227		SHEET NO 3
PARTS NO	PARTS NAME	TYPE	DESCRIPTION	CODE
C92	CAP,FXD CER	C3216X7R1E104K-E-TP	0.1U	5CAAD01237
C94	CAP,FXD CER	C3216X7R1H333K-E-TP	50V 0.033U	5CAAD01357
C95	CAP,FXD CER	C3216X7R1E104K-E-TP	0.1U	5CAAD01237
C96	CAP,FXD CER	C3216B1H472K-E-TP	4700PF	5CAAD00783
C97	CAP,FXD CER	C3216X7R1H333K-E-TP	50V 0.033U	5CAAD01357
C98	CAP,FXD ELCTLT	ECE-A1EU100B		5CEAA01864
C99	CAP,FXD CER	C3216X7R1H333K-E-TP	50V 0.033U	5CAAD01357
C100	CAP,FXD TANTAL	202L35D2 105KB	35V 1UF	5CSAC00982
C101	CAP,FXD CER	C3216CH1H471J-E-TP	470PF	5CAAD00797
C102	CAP,FXD CER	C3216SL1H102J-E-TP	1000PF	5CAAD00782
C103	CAP,FXD TANTAL	202L35D2 105KB	35V 1UF	5CSAC00982
C104	CAP,FXD ELCTLT	ECE-A1EU100B		5CEAA01864
C105	CAP,FXD TANTAL	202L35D2 224KB	0.22UF 35V	5CSAC00988
C106	CAP,FXD CER	C3216X7R1H333K-E-TP	50V 0.033U	5CAAD01357
C107	CAP,FXD TANTAL	202L25D2 475KB		5CSAC00934
C108	CAP,FXD TANTAL	202L35D2 105KB	35V 1UF	5CSAC00982
C109	CAP,FXD CER	C3216X7R1H333K-E-TP	50V 0.033U	5CAAD01357
C110	CAP,FXD ELCTLT	ECE-A1EU100B		5CEAA01864
C111	CAP,FXD CER	C3216X7R1H333K-E-TP	50V 0.033U	5CAAD01357
C112	CAP,FXD CER	C3216X7R1E104K-E-TP	0.1U	5CAAD01237
C113	CAP,FXD CER	C3216JB1H103K-E-TP	0.01UF	5CAAD00789
C114	CAP,FXD CER	C3216X7R1E104K-E-TP	0.1U	5CAAD01237
C115	CAP,FXD CER	C3216JB1H103K-E-TP	0.01UF	5CAAD00789
C121	CAP,FXD CER	C3216X7R1H333K-E-TP	50V 0.033U	5CAAD01357
C122	CAP,FXD CER	C3216X7R1H333K-E-TP	50V 0.033U	5CAAD01357
C123	CAP,FXD ELCTLT	ECE-A1EU100B		5CEAA01864
C124	CAP,FXD CER	C3216B1H223K-E-TP	0.022UF	5CAAD01109
C125	CAP,FXD CER	C3216B1H223K-E-TP	0.022UF	5CAAD01109
C126	CAP,FXD CER	C3216B1H223K-E-TP	0.022UF	5CAAD01109
C127	CAP,FXD CER	C3216JB1H103K-E-TP	0.01UF	5CAAD00789
C128	CAP,FXD CER	C3216SL1H102J-E-TP	1000PF	5CAAD00782
C129	CAP,FXD TANTAL	202L35D2 105KB	35V 1UF	5CSAC00982
C130	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

PARTS LIST

	IF AMP	TITLE CAE-227		SHEET NO 4
PARTS NO	PARTS NAME	TYPE	DESCRIPTION	CODE
C135	CAP,FXD ELCTLT	ECE-A1EU330B		5CEAA01822
C136	CAP,FXD CER	C3216X7R1E104K-E-TP	0.1U	5CAAD01237
C137	CAP,FXD CER	C3216X7R1E104K-E-TP	0.1U	5CAAD01237
C138	CAP,FXD CER	C3216X7R1E104K-E-TP	0.1U	5CAAD01237
C139	CAP,FXD CER	C3216CH1H680J-E-TP	68PF	5CAAD00929
C140	CAP,FXD ELCTLT	ECE-A1EU100B		5CEAA01864
C141	CAP,FXD ELCTLT	ECE-A1EU100B		5CEAA01864
C142	CAP,FXD CER	C3216X7R1E104K-E-TP	0.1U	5CAAD01237
C143	CAP,FXD CER	C3216X7R1E104K-E-TP	0.1U	5CAAD01237
C144	CAP,FXD CER	C3216X7R1E104K-E-TP	0.1U	5CAAD01237
C145	CAP,FXD TANTAL	202L25D2 225KB	2.2UF 25V	5CSAC01129
C146	CAP,FXD CER	C3216CH1H101J-E-TP	100PF	5CAAD00780
C147	CAP,FXD CER	C3216SL1H102J-E-TP	1000PF	5CAAD00782
C148	CAP,FXD TANTAL	202L35D2 225KB		5CSAC01069
C149	CAP,FXD CER	C3216X7R1H333K-E-TP	50V 0.033U	5CAAD01357
C150	CAP,FXD CER	C3216JB1H103K-E-TP	0.01UF	5CAAD00789
C151	CAP,FXD CER	C3216JB1H103K-E-TP	0.01UF	5CAAD00789
C152	CAP,FXD CER	C3216JB1H103K-E-TP	0.01UF	5CAAD00789
C153	CAP,FXD CER	C3216JB1E473K-E-TP		5CAAD01131
C154	CAP,FXD TANTAL	202L35D2 224KB	0.22UF 35V	5CSAC00988
C155	CAP,FXD ELCTLT	ECE-A1EU100B		5CEAA01864
C156	CAP,FXD ELCTLT	ECE-A1EU100B		5CEAA01864
C157	CAP,FXD TANTAL	202L35D2 105KB	35V 1UF	5CSAC00982
C159	CAP,FXD CER	C3216X7R1E104K-E-TP	0.1U	5CAAD01237
C166	CAP,FXD CER	C3216X7R1E104K-E-TP	0.1U	5CAAD01237
C167	CAP,FXD TANTAL	202L35D2 224KB	0.22UF 35V	5CSAC00988
C168	CAP,FXD ELCTLT	ECE-A1EU100B		5CEAA01864
C169	CAP,FXD CER	C3216X7R1E104K-E-TP	0.1U	5CAAD01237
C170	CAP,FXD CER	C3216X7R1E104K-E-TP	0.1U	5CAAD01237
C171	CAP,FXD CER	C3216X7R1E104K-E-TP	0.1U	5CAAD01237
C172	CAP,FXD ELCTLT	ECE-A1EU100B		5CEAA01864
C173	CAP,FXD TANTAL	202L35D2 224KB	0.22UF 35V	5CSAC00988
C175	CAP,FXD ELCTLT	ECE-A1EU100B		5CEAA01864
C176	CAP,FXD ELCTLT	ECE-A1EU100B		5CEAA01864
C177	CAP,FXD CER	C3216X7R1E104K-E-TP	0.1U	5CAAD01237

PARTS LIST

TITLE		SHEET NO
IF AMP	CAE-227	5

PARTS NO	PARTS NAME	TYPE	DESCRIPTION	CODE
C178	CAP,FXD ELCTLT	ECE-A1EU100B		5CEAA01864
C179	CAP,FXD CER	C3216X7R1E104K-E-TP	0.1U	5CAAD01237
C180	CAP,FXD TANTAL	202L3502 334KB	35V 0.33U	5CSAC01151
C181	CAP,FXD ELCTLT	ECE-A1EU100B		5CEAA01864
C182	CAP,FXD CER	C3216JB1H103K-E-TP	0.01UF	5CAAD00789
C183	CAP,FXD ELCTLT	ECE-A1EU100B		5CEAA01864
C184	CAP,FXD CER	C3216JB1H103K-E-TP	0.01UF	5CAAD00789
C191	CAP,FXD CER	C3216X7R1H333K-E-TP	50V 0.033U	5CAAD01357
C192	CAP,FXD ELCTLT	ECE-A1EU100B		5CEAA01864
C193	CAP,FXD CER	C3216B1H332K-E-TP	3300PF	5CAAD01020
C194	CAP,FXD CER	C3216JB1H682K-E-TP		5CAAD01137
C195	CAP,FXD CER	C3216JB1H682K-E-TP		5CAAD01137
C196	CAP,FXD CER	C3216X7R1E104K-E-TP	0.1U	5CAAD01237
C197	CAP,FXD TANTAL	202L3502 105KB	35V 1UF	5CSAC00982
C198	CAP,FXD CER	C3216JB1H103K-E-TP	0.01UF	5CAAD00789
C199	CAP,FXD CER	C3216JB1H103K-E-TP	0.01UF	5CAAD00789
C200	CAP,FXD CER	C3216X7R1H333K-E-TP	50V 0.033U	5CAAD01357
C201	CAP,FXD CER	C3216SL1H102J-E-TP	1000PF	5CAAD00782
C202	CAP,FXD CER	C3216B1H472K-E-TP	4700PF	5CAAD00783
C203	CAP,FXD CER	C3216JB1H223K-E-TP		5CAAD01645
C204	CAP,FXD CER	C3216JB1H332K-E-TP		5CAAD01599
C205	CAP,FXD CER	C3216X7R1H333K-E-TP	50V 0.033U	5CAAD01357
C206	CAP,FXD CER	C3216JB1H682K-E-TP		5CAAD01137
C207	CAP,FXD CER	C3216SL1H222J-E-TP	2200P	5CAAD00792
C208	CAP,FXD CER	C3216JB1H223K-E-TP		5CAAD01645
CD1	DIODE	1SS226 TE85L		5TXAD00320
CD2	DIODE	1SV149B		5TXAD00332
CD3	DIODE	1SS184 TE85L		5TXAD00290
CD4	DIODE	MPR4371F		5TXBG00037
CD5	DIODE	1SS226 TE85L		5TXAD00320
CD6	DIODE	1SS226 TE85L		5TXAD00320
CD8	DIODE	1SS181 TE85L		5TXAD00356
CD9	DIODE	1SS184 TE85L		5TXAD00290
CD10	DIODE	RD5.1MB1-T1		5TXAA00515
CD11	DIODE	1SS181 TE85L		5TXAD00356

PARTS LIST

TITLE		SHEET NO
IF AMP	CAE-227	6

PARTS NO	PARTS NAME	TYPE	DESCRIPTION	CODE
CD13	DIODE	1SS184 TE85L		5TXAD00290
CD14	DIODE	1SS181 TE85L		5TXAD00356
CD21	DIODE	1SS184 TE85L		5TXAD00290
CD22	DIODE	RD6.2MB2-T1		5TXAA00455
CD23	DIODE	1SS226 TE85L		5TXAD00320
CD24	DIODE	1SS181 TE85L		5TXAD00356
CD25	DIODE	1SS184 TE85L		5TXAD00290
CD26	DIODE	1SS184 TE85L		5TXAD00290
CD27	DIODE	1SS184 TE85L		5TXAD00290
CD28	DIODE	1SV149B		5TXAD00332
CD29	DIODE	1SS184 TE85L		5TXAD00290
IC2	IC	SN16913P		5DDAL00301
IC3	IC	M5223L		5DDAB00164
IC4	IC	TA7310P		5DAAD00091
IC5	IC	TC4066BP		5DDAE00078
IC6	IC	TC4066BP		5DDAE00078
IC7	IC	M5223L		5DDAB00164
IC8	IC	IR3N37		5DDBN00049
IC9	IC	M5223L		5DDAB00164
IC10	IC	TC4052BP		5DDAE00208
IC11	IC	M5260L		5DDAB00312
IC12	IC	M5260L		5DDAB00312
J1	CONNECTOR	IL-G-2P-S3L2-E		5JWAD00094
JP1	TIN COATED WIRE	TA-0.6P		2717100001
JP2	TIN COATED WIRE	TA-0.6P		2717100001
JP3	TIN COATED WIRE	TA-0.6P		2717100001
L2	COIL	FL-7H472J	4.7MH	5LCAA00023
L3	COIL	FL-7H472J	4.7MH	5LCAA00023
L4	COIL	LAL03VB681K		5LCAA00442
L5	COIL	FL7H-222J	2.2MH	5LCAA00021
L6	COIL	FL7H-222J	2.2MH	5LCAA00021
L7	COIL	LAL03VB100K	10UH	5LCAA00273
L8	COIL	LAL03VB101K		5LCAA00333
L9	COIL	LAL03VB820K		5LCAA00388
P7	CONNECTOR	EC1C-22P-2.5DSA	22P	5JWBS00070

PARTS LIST

TITLE: IF AMP / CAE-227				SHEET NO 7
PARTS NO	PARTS NAME	TYPE	DESCRIPTION	CODE
P8	CONNECTOR	EC1C-22P-2.5DSA	22P	5JWBS00070
PC1	PCB	H-6PCJD00260CA		6PCJD00260
R1	RESISTOR FXD	ERJ-8GEYJ101V	1/8W 100 OHM	5REAG01726
R2	RESISTOR FXD	ERJ-8GEYJ103V	1/8W 10K OHM	5REAG01750
R3	RESISTOR FXD	ERJ-8GEYJ101V	1/8W 100 OHM	5REAG01726
R4	RESISTOR FXD	ERJ-8GEYJ330V	1/8W 33 OHM	5REAG01720
R5	RESISTOR FXD	ERJ-8GEYJ333V		5REAG01756
R6	RESISTOR FXD	ERJ-8GEYJ101V	1/8W 100 OHM	5REAG01726
R7	RESISTOR FXD	ERJ-8GEYJ101V	1/8W 100 OHM	5REAG01726
R8	RESISTOR FXD	ERJ-8GEYJ101V	1/8W 100 OHM	5REAG01726
R9	RESISTOR FXD	ERJ-8GEYJ560V	1/8W 56 OHM	5REAG01723
R10	RESISTOR FXD	ERD-25UJ220	1/4W 22 OHM	5RDAA01305
R11	RESISTOR FXD	ERJ-8GEYJ332V	1/8W 3.3K OHM	5REAG01744
R12	RESISTOR FXD	ERJ-8GEYJ333V		5REAG01756
R13	RESISTOR FXD	ERJ-8GEYJ101V	1/8W 100 OHM	5REAG01726
R14	RESISTOR FXD	ERJ-8GEYJ101V	1/8W 100 OHM	5REAG01726
R15	RESISTOR FXD	ERJ-8GEYJ223V	1/8W 22K OHM	5REAG01754
R16	RESISTOR FXD	ERJ-8GEYJ682V		5REAG01748
R17	RESISTOR FXD	ERJ-8GEYJ104V	1/8W 100K OHM	5REAG01762
R18	RESISTOR FXD	ERJ-8GEYJ104V	1/8W 100K OHM	5REAG01762
R19	RESISTOR FXD	ERJ-8GEYJ154V		5REAG01764
R20	RESISTOR FXD	ERJ-8GEYJ102V	1/8W 1K OHM	5REAG01738
R21	RESISTOR FXD	ERJ-8GEYJ222V	1/8W 2.2K OHM	5REAG01742
R22	RESISTOR FXD	ERJ-8GEYJ102V	1/8W 1K OHM	5REAG01738
R23	RESISTOR FXD	ERJ-8GEYJ103V	1/8W 10K OHM	5REAG01750
R24	RESISTOR FXD	ERJ-8GEYJ102V	1/8W 1K OHM	5REAG01738
R25	RESISTOR FXD	ERJ-8GEYJ151V	1/8W 150 OHM	5REAG01728
R26	RESISTOR FXD	ERJ-8GEYJ103V	1/8W 10K OHM	5REAG01750
R27	RESISTOR FXD	ERJ-8GEYJ104V	1/8W 100K OHM	5REAG01762
R28	RESISTOR FXD	ERJ-8GEYJ103V	1/8W 10K OHM	5REAG01750
R29	RESISTOR FXD	ERJ-8GEYJ104V	1/8W 100K OHM	5REAG01762
R31	RESISTOR FXD	ERJ-8GEYJ103V	1/8W 10K OHM	5REAG01750
R32	RESISTOR FXD	ERJ-8GEYJ103V	1/8W 10K OHM	5REAG01750
R33	RESISTOR FXD	ERJ-8GEYJ105V	1/8W 1M OHM	5REAG01774
R34	RESISTOR FXD	ERJ-8GEYJ101V	1/8W 100 OHM	5REAG01726

PARTS LIST

TITLE: IF AMP / CAE-227				SHEET NO 8
PARTS NO	PARTS NAME	TYPE	DESCRIPTION	CODE
R35	RESISTOR FXD	ERJ-8GEYJ470V	1/8W 47 OHM	5REAG01722
R36	RESISTOR FXD	ERJ-8GEYJ222V	1/8W 2.2K OHM	5REAG01742
R37	RESISTOR FXD	ERJ-8GEYJ101V	1/8W 100 OHM	5REAG01726
R38	RESISTOR FXD	ERJ-8GEYJ104V	1/8W 100K OHM	5REAG01762
R39	RESISTOR FXD	ERJ-8GEYJ101V	1/8W 100 OHM	5REAG01726
R40	RESISTOR FXD	ERJ-8GEYJ221V	1/8W 220 OHM	5REAG01730
R41	RESISTOR FXD	ERJ-8GEYJ471V	1/8W 470 OHM	5REAG01734
R42	RESISTOR FXD	ERJ-8GEYJ103V	1/8W 10K OHM	5REAG01750
R43	RESISTOR FXD	ERJ-8GEYJ103V	1/8W 10K OHM	5REAG01750
R44	RESISTOR FXD	ERJ-8GEYJ221V	1/8W 220 OHM	5REAG01730
R45	RESISTOR FXD	ERJ-8GEYJ103V	1/8W 10K OHM	5REAG01750
R46	RESISTOR FXD	ERJ-8GEYJ562V	1/8W 5.6K OHM	5REAG01747
R51	RESISTOR FXD	ERJ-8GEYJ153V		5REAG01752
R52	RESISTOR FXD	ERJ-8GEYJ104V	1/8W 100K OHM	5REAG01762
R53	RESISTOR FXD	ERJ-8GEYJ104V	1/8W 100K OHM	5REAG01762
R54	RESISTOR FXD	ERJ-8GEYJ473V		5REAG01758
R55	RESISTOR FXD	ERJ-8GEYJ473V		5REAG01758
R56	RESISTOR FXD	ERJ-8GEYJ222V	1/8W 2.2K OHM	5REAG01742
R57	RESISTOR FXD	ERJ-8GEYJ103V	1/8W 10K OHM	5REAG01750
R58	RESISTOR FXD	ERJ-8GEYJ103V	1/8W 10K OHM	5REAG01750
R59	RESISTOR FXD	ERJ-8GEYJ473V		5REAG01758
R60	RESISTOR FXD	ERJ-8GEYJ102V	1/8W 1K OHM	5REAG01738
R61	RESISTOR FXD	ERJ-8GEYJ473V		5REAG01758
R62	RESISTOR FXD	ERJ-8GEYJ102V	1/8W 1K OHM	5REAG01738
R63	RESISTOR FXD	ERJ-8GEYJ101V	1/8W 100 OHM	5REAG01726
R64	RESISTOR FXD	ERJ-8GEYJ331V	1/8W,330 OHM	5REAG01732
R65	RESISTOR FXD	ERJ-8GEYJ561V	1/8W 560 OHM	5REAG01735
R66	RESISTOR FXD	ERJ-8GEYJ561V	1/8W 560 OHM	5REAG01735
R67	RESISTOR FXD	ERJ-8GEYJ822V		5REAG01749
R68	RESISTOR FXD	ERJ-8GEYJ103V	1/8W 10K OHM	5REAG01750
R69	RESISTOR FXD	ERJ-8GEYJ332V	1/8W 3.3K OHM	5REAG01744
R70	RESISTOR FXD	ERJ-8GEYJ105V	1/8W 1M OHM	5REAG01774
R71	RESISTOR FXD	ERJ-8GEYJ183V	1/8W,18K OHM	5REAG01753
R72	RESISTOR FXD	ERJ-8GEYJ332V	1/8W 3.3K OHM	5REAG01744
R73	RESISTOR FXD	ERJ-8GEYJ102V	1/8W 1K OHM	5REAG01738

PARTS LIST

TITLE: IF AMP	CAE-227	SHEET NO 9

PARTS NO	PARTS NAME	TYPE	DESCRIPTION	CODE
R74	RESISTOR FXD	ERJ-8GEYJ105V	1/8W 1M OHM	5REAG01774
R75	RESISTOR FXD	ERJ-8GEYJ103V	1/8W 10K OHM	5REAG01750
R76	RESISTOR FXD	ERJ-8GEYJ101V	1/8W 100 OHM	5REAG01726
R81	RESISTOR FXD	ERJ-8GEYJ103V	1/8W 10K OHM	5REAG01750
R82	RESISTOR FXD	ERJ-8GEYJ473V		5REAG01758
R83	RESISTOR FXD	ERJ-8GEYJ221V	1/8W 220 OHM	5REAG01730
R84	RESISTOR FXD	ERJ-8GEYJ102V	1/8W 1K OHM	5REAG01738
R85	RESISTOR FXD	ERJ-8GEYJ472V		5REAG01746
R86	RESISTOR FXD	ERJ-8GEYJ101V	1/8W 100 OHM	5REAG01726
R87	RESISTOR FXD	ERJ-8GEYJ682V		5REAG01748
R88	RESISTOR FXD	ERJ-8GEYJ472V		5REAG01746
R89	RESISTOR FXD	ERJ-8GEYJ102V	1/8W 1K OHM	5REAG01738
R90	RESISTOR FXD	ERJ-8GEYJ102V	1/8W 1K OHM	5REAG01738
R91	RESISTOR FXD	ERJ-8GEYJ682V		5REAG01748
R92	RESISTOR FXD	ERJ-8GEYJ472V		5REAG01746
R93	RESISTOR FXD	ERJ-8GEYJ103V	1/8W 10K OHM	5REAG01750
R94	RESISTOR FXD	ERJ-8GEYJ103V	1/8W 10K OHM	5REAG01750
R95	RESISTOR FXD	ERJ-8GEYJ393V		5REAG01757
R96	RESISTOR FXD	ERJ-8GEYJ223V	1/8W 22K OHM	5REAG01754
R97	RESISTOR FXD	ERJ-8GEYJ103V	1/8W 10K OHM	5REAG01750
R98	RESISTOR FXD	ERJ-8GEYJ103V	1/8W 10K OHM	5REAG01750
R99	RESISTOR FXD	ERJ-8GEYJ332V	1/8W 3.3K OHM	5REAG01744
R100	RESISTOR FXD	ERJ-8GEYJ103V	1/8W 10K OHM	5REAG01750
R101	RESISTOR FXD	ERJ-8GEYJ473V		5REAG01758
R102	RESISTOR FXD	ERJ-8GEYJ473V		5REAG01758
R103	RESISTOR FXD	ERJ-8GEYJ101V	1/8W 100 OHM	5REAG01726
R104	RESISTOR FXD	ERJ-8GEYJ102V	1/8W 1K OHM	5REAG01738
R105-1	RESISTOR FXD	ERJ-8GEYJ105V	1/8W 1M OHM	5REAG01774
R105-2	RESISTOR FXD	ERJ-8GEYJ105V	1/8W 1M OHM	5REAG01774
R106	RESISTOR FXD	ERJ-8GEYJ473V		5REAG01758
R107	RESISTOR FXD	ERJ-8GEYJ223V	1/8W 22K OHM	5REAG01754
R108	RESISTOR FXD	ERJ-8GEYJ561V	1/8W 560 OHM	5REAG01735
R109	RESISTOR FXD	ERJ-8GEYJ473V		5REAG01758
R110	RESISTOR FXD	ERJ-8GEYJ103V	1/8W 10K OHM	5REAG01750
R111	RESISTOR FXD	ERJ-8GEYJ473V		5REAG01758

PARTS LIST

TITLE: IF AMP	CAE-227	SHEET NO 10

PARTS NO	PARTS NAME	TYPE	DESCRIPTION	CODE
R112	RESISTOR FXD	ERJ-8GEYJ473V		5REAG01758
R113	RESISTOR FXD	ERJ-8GEYJ472V		5REAG01746
R114	RESISTOR FXD	ERJ-8GEYJ472V		5REAG01746
R115	RESISTOR FXD	ERJ-8GEYJ105V	1/8W 1M OHM	5REAG01774
R116	RESISTOR FXD	ERJ-8GEYJ102V	1/8W 1K OHM	5REAG01738
R117	RESISTOR FXD	ERJ-8GEYJ104V	1/8W 100K OHM	5REAG01762
P121	RESISTOR FXD	ERJ-8GEYJ222V	1/8W 2.2K OHM	5REAG01742
R122	RESISTOR FXD	ERJ-8GEYJ102V	1/8W 1K OHM	5REAG01738
R123	RESISTOR FXD	ERJ-8GEYJ101V	1/8W 100 OHM	5REAG01726
R124	RESISTOR FXD	ERJ-8GEYJ472V		5REAG01746
R125	RESISTOR FXD	ERJ-8GEYJ272V	1/8W,2.7K OHM	5REAG01743
R126	RESISTOR FXD	ERJ-8GEYJ272V	1/8W,2.7K OHM	5REAG01743
R127	RESISTOR FXD	ERJ-8GEYJ334V		5REAG01768
R128	RESISTOR FXD	ERJ-8GEYJ103V	1/8W 10K OHM	5REAG01750
R129	RESISTOR FXD	ERJ-8GEYJ103V	1/8W 10K OHM	5REAG01750
R130	RESISTOR FXD	ERJ-8GEYJ103V	1/8W 10K OHM	5REAG01750
R131	RESISTOR FXD	ERJ-8GEY0R00V	0 OHM	5REAG01775
R140	RESISTOR FXD	ERJ-8GEYJ103V	1/8W 10K OHM	5REAG01750
R141	RESISTOR FXD	ERJ-8GEYJ223V	1/8W 22K OHM	5REAG01754
R142	RESISTOR FXD	ERJ-8GEYJ474V		5REAG01770
R143	RESISTOR FXD	ERJ-8GEYJ682V		5REAG01748
R144	RESISTOR FXD	ERJ-8GEYJ332V	1/8W 3.3K OHM	5REAG01744
R145	RESISTOR FXD	ERJ-8GEYJ103V	1/8W 10K OHM	5REAG01750
R146	RESISTOR FXD	ERJ-8GEYJ473V		5REAG01758
R147	RESISTOR FXD	ERJ-8GEYJ103V	1/8W 10K OHM	5REAG01750
R148	RESISTOR FXD	ERJ-8GEYJ473V		5REAG01758
R149	RESISTOR FXD	ERJ-8GEYJ104V	1/8W 100K OHM	5REAG01762
R150	RESISTOR FXD	ERJ-8GEYJ104V	1/8W 100K OHM	5REAG01762
R151	RESISTOR FXD	ERJ-8GEYJ682V		5REAG01748
R152	RESISTOR FXD	ERJ-8GEYJ473V		5REAG01758
R153	RESISTOR FXD	ERJ-8GEYJ104V	1/8W 100K OHM	5REAG01762
R154	RESISTOR FXD	ERJ-8GEYJ222V	1/8W 2.2K OHM	5REAG01742
R155	RESISTOR FXD	ERJ-8GEYJ103V	1/8W 10K OHM	5REAG01750
R156	RESISTOR FXD	ERJ-8GEYJ331V	1/8W,330 OHM	5REAG01732
R157	RESISTOR FXD	ERJ-8GEYJ822V		5REAG01749

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	5REAG01750
R159	RESISTOR FXD	ERJ-8GEYJ473V		5REAG01758
R160	RESISTOR FXD	ERJ-8GEYJ221V	1/8W 220 OHM	5REAG01730
R161	RESISTOR FXD	ERJ-8GEYJ222V	1/8W 2.2K OHM	5REAG01742
R162	RESISTOR FXD	ERJ-8GEYJ821V	1/8W 820 OHM	5REAG01737
R163	RESISTOR FXD	ERJ-8GEYJ102V	1/8W 1K OHM	5REAG01738
R166	RESISTOR FXD	ERJ-8GEYJ104V	1/8W 100K OHM	5REAG01762
R167	RESISTOR FXD	ERJ-8GEYJ152V	1/8W 1.5K OHM	5REAG01740
R168	RESISTOR FXD	ERJ-8GEYJ103V	1/8W 10K OHM	5REAG01750
R169	RESISTOR FXD	ERJ-8GEYJ103V	1/8W 10K OHM	5REAG01750
R170	RESISTOR FXD	ERJ-8GEYJ102V	1/8W 1K OHM	5REAG01738
R171	RESISTOR FXD	ERJ-8GEYJ103V	1/8W 10K OHM	5REAG01750
R172	RESISTOR FXD	ERJ-8GEYJ222V	1/8W 2.2K OHM	5REAG01742
R173	RESISTOR FXD	ERJ-8GEYJ222V	1/8W 2.2K OHM	5REAG01742
R174	RESISTOR FXD	ERJ-8GEYJ103V	1/8W 10K OHM	5REAG01750
R175	RESISTOR FXD	ERJ-8GEYJ103V	1/8W 10K OHM	5REAG01750
R176	RESISTOR FXD	ERJ-8GEYJ103V	1/8W 10K OHM	5REAG01750
R177	RESISTOR FXD	ERJ-8GEYJ103V	1/8W 10K OHM	5REAG01750
R178	RESISTOR FXD	ERJ-8GEYJ103V	1/8W 10K OHM	5REAG01750
R179	RESISTOR FXD	ERJ-8GEYJ103V	1/8W 10K OHM	5REAG01750
R180	RESISTOR FXD	ERJ-8GEYJ223V	1/8W 22K OHM	5REAG01754
R182	RESISTOR FXD	ERJ-8GEYJ103V	1/8W 10K OHM	5REAG01750
R183	RESISTOR FXD	ERJ-8GEYJ105V	1/8W 1M OHM	5REAG01774
R184	RESISTOR FXD	ERJ-8GEYJ103V	1/8W 10K OHM	5REAG01750
R185	RESISTOR FXD	ERJ-8GEYJ103V	1/8W 10K OHM	5REAG01750
R186	RESISTOR FXD	ERJ-8GEYJ104V	1/8W 100K OHM	5REAG01762
R187	RESISTOR FXD	ERJ-8GEYJ102V	1/8W 1K OHM	5REAG01738
R189-1	RESISTOR FXD	ERJ-8GEYJ105V	1/8W 1M OHM	5REAG01774
R189-2	RESISTOR FXD	ERJ-8GEYJ105V	1/8W 1M OHM	5REAG01774
R189-3	RESISTOR FXD	ERJ-8GEYJ105V	1/8W 1M OHM	5REAG01774
R190	RESISTOR FXD	ERJ-8GEYJ102V	1/8W 1K OHM	5REAG01738
R191	RESISTOR FXD	ERJ-8GEYJ103V	1/8W 10K OHM	5REAG01750
R192	RESISTOR FXD	ERJ-8GEYJ103V	1/8W 10K OHM	5REAG01750
R193	RESISTOR FXD	ERJ-8GEYJ103V	1/8W 10K OHM	5REAG01750
R195	RESISTOR FXD	ERJ-8GEYJ103V	1/8W 10K OHM	5REAG01750

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	5REAG01754
R197	RESISTOR FXD	ERJ-8GEYJ472V		5REAG01746
R198	RESISTOR FXD	ERJ-8GEY0R00V	0 OHM	5REAG01775
R199	RESISTOR FXD	ERJ-8GEY0R00V	0 OHM	5REAG01775
R200	RESISTOR FXD	ERJ-8GEYJ681V	1/8W 680 OHM	5REAG01736
R211	RESISTOR FXD	ERJ-8GEYJ101V	1/8W 100 OHM	5REAG01726
R212	RESISTOR FXD	ERJ-8GEYJ472V		5REAG01746
R213	RESISTOR FXD	ERJ-8GEYJ562V	1/8W 5.6K OHM	5REAG01747
R214	RESISTOR FXD	ERJ-8GEYJ562V	1/8W 5.6K OHM	5REAG01747
R215	RESISTOR FXD	ERJ-8GEYJ334V		5REAG01768
R216	RESISTOR FXD	ERJ-8GEYJ102V	1/8W 1K OHM	5REAG01738
R217	RESISTOR FXD	ERJ-8GEYJ103V	1/8W 10K OHM	5REAG01750
R218	RESISTOR FXD	ERJ-8GEYJ103V	1/8W 10K OHM	5REAG01750
R219	RESISTOR FXD	ERJ-8GEYJ105V	1/8W 1M OHM	5REAG01774
R220	RESISTOR FXD	ERJ-8GEYJ105V	1/8W 1M OHM	5REAG01774
RJ1	RESISTOR FXD	ERJ-8GEY0R00V	0 OHM	5REAG01775
RJ2	RESISTOR FXD	ERJ-8GEY0R00V	0 OHM	5REAG01775
RJ3	RESISTOR FXD	ERJ-8GEY0R00V	0 OHM	5REAG01775
RJ4	RESISTOR FXD	ERJ-8GEY0R00V	0 OHM	5REAG01775
RJ5	RESISTOR FXD	ERJ-8GEY0R00V	0 OHM	5REAG01775
RJ6	RESISTOR FXD	ERJ-8GEY0R00V	0 OHM	5REAG01775
RJ7	RESISTOR FXD	ERJ-8GEY0R00V	0 OHM	5REAG01775
RJ8	RESISTOR FXD	ERJ-8GEY0R00V	0 OHM	5REAG01775
RJ9	RESISTOR FXD	ERJ-8GEY0R00V	0 OHM	5REAG01775
RJ10	RESISTOR FXD	ERJ-8GEY0R00V	0 OHM	5REAG01775
RJ11	RESISTOR FXD	ERJ-8GEY0R00V	0 OHM	5REAG01775
RJ12	RESISTOR FXD	ERJ-8GEY0R00V	0 OHM	5REAG01775
RJ13	RESISTOR FXD	ERJ-8GEY0R00V	0 OHM	5REAG01775
RJ14	RESISTOR FXD	ERJ-8GEY0R00V	0 OHM	5REAG01775
RJ15	RESISTOR FXD	ERJ-8GEY0R00V	0 OHM	5REAG01775
RJ16	RESISTOR FXD	ERJ-8GEY0R00V	0 OHM	5REAG01775
RJ17	RESISTOR FXD	ERJ-8GEY0R00V	0 OHM	5REAG01775
RJ19	RESISTOR FXD	ERJ-8GEY0R00V	0 OHM	5REAG01775
RJ20	RESISTOR FXD	ERJ-8GEY0R00V	0 OHM	5REAG01775
RJ21	RESISTOR FXD	ERJ-8GEY0R00V	0 OHM	5REAG01775

PARTS LIST

	IF AMP	TITLE CAE-227	SHEET NO 13	
PARTS NO	PARTS NAME	TYPE	DESCRIPTION	CODE
RJ23	RESISTOR FXD	ERJ-8GEY0R00V	0 OHM	5REAG01775
RJ24	RESISTOR FXD	ERJ-8GEY0R00V	0 OHM	5REAG01775
RJ25	RESISTOR FXD	ERJ-8GEY0R00V	0 OHM	5REAG01775
RJ27	RESISTOR FXD	ERJ-8GEY0R00V	0 OHM	5REAG01775
RJ28	RESISTOR FXD	ERJ-8GEY0R00V	0 OHM	5REAG01775
RJ29	RESISTOR FXD	ERJ-8GEY0R00V	0 OHM	5REAG01775
RJ30	RESISTOR FXD	ERJ-8GEY0R00V	0 OHM	5REAG01775
RJ31	RESISTOR FXD	ERJ-8GEY0R00V	0 OHM	5REAG01775
RJ32	RESISTOR FXD	ERJ-8GEY0R00V	0 OHM	5REAG01775
RJ33	RESISTOR FXD	ERJ-8GEY0R00V	0 OHM	5REAG01775
RJ34	RESISTOR FXD	ERJ-8GEY0R00V	0 OHM	5REAG01775
RJ35	RESISTOR FXD	ERJ-8GEY0R00V	0 OHM	5REAG01775
RJ36	RESISTOR FXD	ERJ-8GEY0R00V	0 OHM	5REAG01775
RJ37	RESISTOR FXD	ERJ-8GEY0R00V	0 OHM	5REAG01775
RJ38	RESISTOR FXD	ERJ-8GEY0R00V	0 OHM	5REAG01775
RJ39	RESISTOR FXD	ERJ-8GEY0R00V	0 OHM	5REAG01775
RJ40	RESISTOR FXD	ERJ-8GEY0R00V	0 OHM	5REAG01775
RJ41	RESISTOR FXD	ERJ-8GEY0R00V	0 OHM	5REAG01775
RJ42	RESISTOR FXD	ERJ-8GEY0R00V	0 OHM	5REAG01775
RJ43	RESISTOR FXD	ERJ-8GEY0R00V	0 OHM	5REAG01775
RJ44	RESISTOR FXD	ERJ-8GEY0R00V	0 OHM	5REAG01775
RJ45	RESISTOR FXD	ERJ-8GEY0R00V	0 OHM	5REAG01775
RJ46	RESISTOR FXD	ERJ-8GEY0R00V	0 OHM	5REAG01775
RJ47	RESISTOR FXD	ERJ-8GEY0R00V	0 OHM	5REAG01775
RJ48	RESISTOR FXD	ERJ-8GEY0R00V	0 OHM	5REAG01775
RJ49	RESISTOR FXD	ERJ-8GEY0R00V	0 OHM	5REAG01775
RJ50	RESISTOR FXD	ERJ-8GEY0R00V	0 OHM	5REAG01775
RJ51	RESISTOR FXD	ERJ-8GEY0R00V	0 OHM	5REAG01775
RJ52	RESISTOR FXD	ERJ-8GEY0R00V	0 OHM	5REAG01775
RJ53	RESISTOR FXD	ERJ-8GEY0R00V	0 OHM	5REAG01775
RJ54	RESISTOR FXD	ERJ-8GEY0R00V	0 OHM	5REAG01775
RJ55	RESISTOR FXD	ERJ-8GEY0R00V	0 OHM	5REAG01775
RJ56	RESISTOR FXD	ERJ-8GEY0R00V	0 OHM	5REAG01775
RJ57	RESISTOR FXD	ERJ-8GEY0R00V	0 OHM	5REAG01775
RJ58	RESISTOR FXD	ERJ-8GEY0R00V	0 OHM	5REAG01775

PARTS LIST

	IF AMP	TITLE CAE-227	SHEET NO 14	
PARTS NO	PARTS NAME	TYPE	DESCRIPTION	CODE
RJ59	RESISTOR FXD	ERJ-8GEY0R00V	0 OHM	5REAG01775
RJ60	RESISTOR FXD	ERJ-8GEY0R00V	0 OHM	5REAG01775
RJ61	RESISTOR FXD	ERJ-8GEY0R00V	0 OHM	5REAG01775
RJ62	RESISTOR FXD	ERJ-8GEY0R00V	0 OHM	5REAG01775
RJ63	RESISTOR FXD	ERJ-8GEY0R00V	0 OHM	5REAG01775
RJ64	RESISTOR FXD	ERJ-8GEY0R00V	0 OHM	5REAG01775
RJ65	RESISTOR FXD	ERJ-8GEY0R00V	0 OHM	5REAG01775
RJ66	RESISTOR FXD	ERJ-8GEY0R00V	0 OHM	5REAG01775
RJ67	RESISTOR FXD	ERJ-8GEY0R00V	0 OHM	5REAG01775
RJ68	RESISTOR FXD	ERJ-8GEY0R00V	0 OHM	5REAG01775
RJ69	RESISTOR FXD	ERJ-8GEY0R00V	0 OHM	5REAG01775
RJ70	RESISTOR FXD	ERJ-8GEY0R00V	0 OHM	5REAG01775
RJ71	RESISTOR FXD	ERJ-8GEY0R00V	0 OHM	5REAG01775
RJ72	RESISTOR FXD	ERJ-8GEY0R00V	0 OHM	5REAG01775
RJ73	RESISTOR FXD	ERJ-8GEY0R00V	0 OHM	5REAG01775
RJ74	RESISTOR FXD	ERJ-8GEY0R00V	0 OHM	5REAG01775
RJ75	RESISTOR FXD	ERJ-8GEY0R00V	0 OHM	5REAG01775
RJ76	RESISTOR FXD	ERJ-8GEY0R00V	0 OHM	5REAG01775
RJ77	RESISTOR FXD	ERJ-8GEY0R00V	0 OHM	5REAG01775
RJ78	RESISTOR FXD	ERJ-8GEY0R00V	0 OHM	5REAG01775
RJ79	RESISTOR FXD	ERJ-8GEY0R00V	0 OHM	5REAG01775
RJ80	RESISTOR FXD	ERJ-8GEY0R00V	0 OHM	5REAG01775
RJ81	RESISTOR FXD	ERJ-8GEY0R00V	0 OHM	5REAG01775
RJ82	RESISTOR FXD	ERJ-8GEY0R00V	0 OHM	5REAG01775
RJ83	RESISTOR FXD	ERJ-8GEY0R00V	0 OHM	5REAG01775
RJ85	RESISTOR FXD	ERJ-8GEY0R00V	0 OHM	5REAG01775
RJ86	RESISTOR FXD	ERJ-8GEY0R00V	0 OHM	5REAG01775
RJ87	RESISTOR FXD	ERJ-8GEY0R00V	0 OHM	5REAG01775
RV1	RESISTOR VAR	EVN-D1AA00B54	50K OHM	5RVAB00380
RV2	RESISTOR VAR	EVN-D4AA00B-14	10K OHM	5RVAB00279
RV3	RESISTOR VAR	EVN-D4AA00B-14	10K OHM	5RVAB00279
RV4	RESISTOR VAR	EVN-D1AA00B23		5RVAB00323
RV5	RESISTOR VAR	EVN-D1AA00B14	10K OHM	5RVAB00324
RV6	RESISTOR VAR	EVN-D4AA00B-14	10K OHM	5RVAB00279
RV7	RESISTOR VAR	EVN-D4AA00B54		5RVAB00317

PARTS LIST

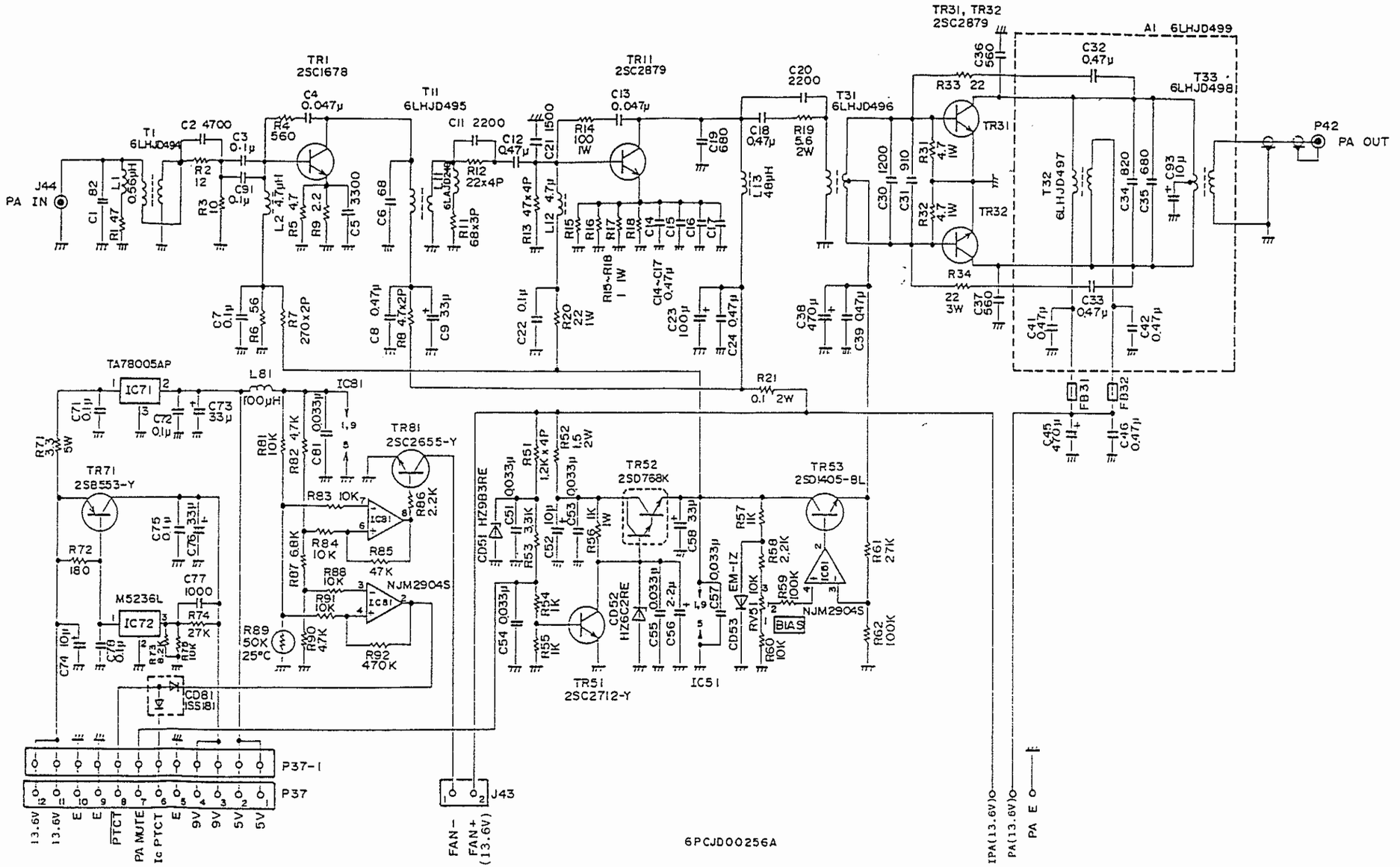
TITLE			SHEET NO.
IF AMP	CAE-227		15

PARTS NO	PARTS NAME	TYPE	DESCRIPTION	CODE
RV8	RESISTOR VAR	EVN-D1AA00B55	50K	5RVAB00389
RV9	RESISTOR VAR	EVN-D1AA00B55	50K	5RVAB00389
S1	TERMINAL	A2-3PA-2.54DSA(01)		5JTBX00010
S1P	CONNECTOR	HIF3GA-2.54SP		5JFAA01151
T1	RF XFMR	S-061-006		5LJAA00006
T2	RF XFMR	S-061-006		5LJAA00006
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		6LAFD00018
TP	TEST TERMINAL	PCN6-PEA		5JDAA00364
TR1	TRANSISTOR	3SK77-GR		5TKAA00108
TR2	TRANSISTOR	3SK77-GR		5TKAA00108
TR3	TRANSISTOR	3SK77-GR		5TKAA00108
TR4	TRANSISTOR	2SC2712Y TE85L		5TAAG00186
TR5	TRANSISTOR	2SC2712Y TE85L		5TAAG00186
TR6	TRANSISTOR	2SA1162-Y TE85L		5TAAG00182
TR7	TRANSISTOR	3SK77-GR		5TKAA00108
TR8	TRANSISTOR	2SC2712Y TE85L		5TAAG00186
TR9	TRANSISTOR	2SC2712Y TE85L		5TAAG00186
TR10	TRANSISTOR	2SC2712Y TE85L		5TAAG00186
TR11	TRANSISTOR	2SC2712Y TE85L		5TAAG00186
TR12	TRANSISTOR	2SC2712Y TE85L		5TAAG00186
TR13	TRANSISTOR	2SC3398-TB		5TCAZ00011
TR15	TRANSISTOR	2SC2712Y TE85L		5TAAG00186
TR16	TRANSISTOR	2SC2712Y TE85L		5TAAG00186
TR17	TRANSISTOR	2SC2712Y TE85L		5TAAG00186
TR18	TRANSISTOR	2SA1162-Y TE85L		5TAAG00182
TR19	TRANSISTOR	2SC2712Y TE85L		5TAAG00186
TR20	TRANSISTOR	2SC2712Y TE85L		5TAAG00186
TR21	TRANSISTOR	2SC3398-TB		5TCAZ00011
TR22	TRANSISTOR	2SA1162-Y TE85L		5TAAG00182
TR23	TRANSISTOR	2SC3398-TB		5TCAZ00011
TR24	TRANSISTOR	2SC3398-TB		5TCAZ00011
TR26	TRANSISTOR	2SC2712Y TE85L		5TAAG00186

PARTS LIST

TITLE			SHEET NO.
IF AMP	CAE-227		16

PARTS NO	PARTS NAME	TYPE	DESCRIPTION	CODE
TR27	TRANSISTOR	2SC2712Y TE85L		5TAAG00186
TR30	TRANSISTOR	2SC3398-TB		5TCAZ00011
TR31	TRANSISTOR	2SC2712Y TE85L		5TAAG00186
TR32	TRANSISTOR	2SA1162-Y TE85L		5TAAG00182
TR33	TRANSISTOR	2SA1162-Y TE85L		5TAAG00182
TR34	TRANSISTOR	2SC3398-TB		5TCAZ00011
TR35	TRANSISTOR	2SC3398-TB		5TCAZ00011
TR36	TRANSISTOR	2SC3398-TB		5TCAZ00011
TR37	TRANSISTOR	2SC3398-TB		5TCAZ00011
TR38	TRANSISTOR	2SA1162-Y TE85L		5TAAG00182
TR39	TRANSISTOR	2SC3398-TB		5TCAZ00011
TR40	TRANSISTOR	2SC2712Y TE85L		5TAAG00186
TR41	TRANSISTOR	2SC2712Y TE85L		5TAAG00186
X1	FILTER	CSB360D		5MRAA00198



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

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

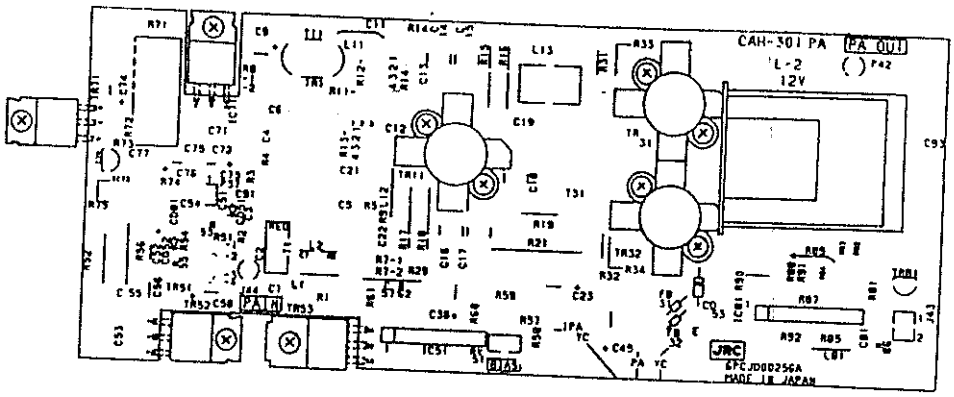


Figure 6-13 PA Unit (CAH-301L-2) Component Layout

PARTS LIST

TITLE		SHEET NO
12V PA	CAH-301L-2	1

PARTS NO	PARTS NAME	TYPE	DESCRIPTION	CODE
A1	RF XFMR	H-6LHJD00499		6LHJD00499
C1	CAP,FXD CER	C3216CH1H820J-E-TP	82P	5CAAD00930
C2	CAP,FXD CER	C3216B1H472K-E-TP	4700PF	5CAAD00783
C3	CAP,FXD CER	C3216X7R1E104K-E-TP	0.1U	5CAAD01237
C4	CAP,FXD CER	C3216X7R1H473K-E-TP	0.047UF 50V	5CAAD01082
C5	CAP,FXD CER	C3216B1H332K-E-TP	3300PF	5CAAD01020
C6	CAP,FXD CER	C3216CH1H680J-E-TP	68PF	5CAAD00929
C7	CAP,FXD CER	C3216X7R1E104K-E-TP	0.1U	5CAAD01237
C8	CAP,FXD CER	C5650X7R1H474K		5CAAD00588
C9	CAP,FXD ELCTLT	ECEA1HU330B	50V 33U	5CEAA02305
C11	CAP,FXD MICA	DM19C222J5	500WV 2200PF	5CMAB00149
C12	CAP,FXD CER	C5650X7R1H474K		5CAAD00588
C13	CAP,FXD CER	C3216X7R1H473K-E-TP	0.047UF 50V	5CAAD01082
C14	CAP,FXD CER	C5650X7R1H474K		5CAAD00588
C15	CAP,FXD CER	C5650X7R1H474K		5CAAD00588
C16	CAP,FXD CER	C5650X7R1H474K		5CAAD00588
C17	CAP,FXD CER	C5650X7R1H474K		5CAAD00588
C18	CAP,FXD CER	C5650X7R1H474K		5CAAD00588
C19	CAP,FXD MICA	DM15C681J1	100WV 680PF	5CMAB00039
C20	CAP,FXD MICA	DM19C222J5	500WV 2200PF	5CMAB00149
C21	CAP,FXD CER	C3216SL1H152J-E-TP	1500PF	5CAAD00791
C22	CAP,FXD CER	C3216X7R1E104K-E-TP	0.1U	5CAAD01237
C23	CAP,FXD ELCTLT	ECEA1HU101B	50V 100U	5CEAA02306
C24	CAP,FXD CER	C5650X7R1H474K		5CAAD00588
C30	CAP,FXD MICA	DM19C122J5	500WV 1200PF	5CMAB00146
C31	CAP,FXD MICA	DM19C911J5	500WV 910PF	5CMAB00277
C32	CAP,FXD CER	C5650X7R1H474K		5CAAD00588
C33	CAP,FXD CER	C5650X7R1H474K		5CAAD00588
C34	CAP,FXD MICA	DM19C821J5	500WV 820PF	5CMAB00144
C35	CAP,FXD MICA	DM19C681J5	500WV 680PF	5CMAB00143
C36	CAP,FXD MICA	DM19C561J5	500WV 560PF	5CMAB00142
C37	CAP,FXD MICA	DM19C561J5	500WV 560PF	5CMAB00142
C38	CAP,FXD ELCTLT	ECE-A1CU471B	470UF	5CEAA01829
C39	CAP,FXD CER	C5650X7R1H474K		5CAAD00588
C41	CAP,FXD CER	C5650X7R1H474K		5CAAD00588

PARTS LIST

TITLE		SHEET NO
12V PA	CAH-301L-2	2

PARTS NO	PARTS NAME	TYPE	DESCRIPTION	CODE
C42	CAP,FXD CER	C5650X7R1H474K		5CAAD00588
C45	CAP,FXD ELCTLT	ECE-A1HU471B	470UF 50V	5CEAA01835
C46	CAP,FXD CER	C5650X7R1H474K		5CAAD00588
C51	CAP,FXD CER	C3216X7R1H333K-E-TP	50V 0.033U	5CAAD01357
C52	CAP,FXD ELCTLT	ECE-A1HU100B	50V 10UF	5CEAA02184
C53	CAP,FXD CER	C3216X7R1H333K-E-TP	50V 0.033U	5CAAD01357
C54	CAP,FXD CER	C3216X7R1H333K-E-TP	50V 0.033U	5CAAD01357
C55	CAP,FXD CER	C3216X7R1H333K-E-TP	50V 0.033U	5CAAD01357
C56	CAP,FXD TANTAL	202L2502 225KB	2.2UF 25V	5CSAC01129
C57	CAP,FXD CER	C3216X7R1H333K-E-TP	50V 0.033U	5CAAD01357
C58	CAP,FXD ELCTLT	ECE-A1EU330B		5CEAA01822
C71	CAP,FXD CER	C3216X7R1E104K-E-TP	0.1U	5CAAD01237
C72	CAP,FXD CER	C3216X7R1E104K-E-TP	0.1U	5CAAD01237
C73	CAP,FXD ELCTLT	ECE-A1EU330B		5CEAA01822
C74	CAP,FXD ELCTLT	ECE-A1EU100B		5CEAA01864
C75	CAP,FXD CER	C3216X7R1E104K-E-TP	0.1U	5CAAD01237
C76	CAP,FXD ELCTLT	ECE-A1EU330B		5CEAA01822
C77	CAP,FXD CER	C3216SL1H102J-E-TP	1000PF	5CAAD00782
C78	CAP,FXD CER	C3216X7R1E104K-E-TP	0.1U	5CAAD01237
C81	CAP,FXD CER	C3216X7R1H333K-E-TP	50V 0.033U	5CAAD01357
C91	CAP,FXD CER	C3216X7R1E104K-E-TP	0.1U	5CAAD01237
C93	CAP,FXD ELCTLT	ECE-A1HU100B	50V 10UF	5CEAA02184
CD51	DIODE	HZ9B3RE		5TXAE00629
CD52	DIODE	HZ6C2RE		5TXAE00630
CD53	DIODE	EM1Z	200V 1A	5TXAN00061
CD81	DIODE	1SS181 TE85L		5TXAD00356
FB31	CORE	FB-801		5MBAD00005
FB32	CORE	FB-801		5MBAD00005
IC51	IC	NJM2904S		5DAAN00239
IC71	IC	TA78005AP		5DAAD00082
IC71Z	SILICON SHEET	TC-30A (TO-220)		5ZZKB00002
IC72	IC	MS236L		5DDAB00170
IC81	IC	NJM2904S		5DAAN00239
J43	CONNECTOR	IL-S-2P-S2T2-EF		5JWAD00121
J44	CONNECTOR	IMP-J01X-V2		5JDAX00009

PARTS LIST

12V PA	TITLE CAH-301L-2	SHEET NO 3

PARTS NO	PARTS NAME	TYPE	DESCRIPTION	CODE
L1	COIL	LALO3KHR56M	0.56UF	5LCAA00443
L2	COIL	LALO3KHR4R7K	4.7UF	5LCAA00444
L11	COIL	H-6LAJD00249		6LAJD00249
L12	COIL	LALO4KB4R7K		5LCAA00317
L13	COIL	SK-5M-4	48UH	5LWAJ00001
L81	COIL	LALO3KH101K	100UH	5LCAA00331
P37	CONNECTOR	H-6ZCJD43030		6ZCJD43030
P42	CABLE	H-6ZCJD37015	L=150	6ZCJD37015
PC1	PCB	H-6PCJD00256A		6PCJD00256
R1	RESISTOR FXD	ERJ-8GEYJ470V	1/8W 47 OHM	5REAG01722
R2	RESISTOR FXD	ERJ-8GEYJ120V	1/8W 12 OHM	5REAG01715
R3	RESISTOR FXD	ERJ-8GEYJ100V	1/8W 10 OHM	5REAG01714
R4	RESISTOR FXD	ERJ-8GEYJ561V	1/8W 560 OHM	5REAG01735
R5	RESISTOR FXD	ERJ-8GEYK4R7V	1/8W 4.7 OHM	5REAG02256
R6	RESISTOR FXD	ERJ-8GEYJ560V	1/8W 56 OHM	5REAG01723
R7-1	RESISTOR FXD	ERJ-8GEYJ271V	1/8W 270 OHM	5REAG01731
R7-2	RESISTOR FXD	ERJ-8GEYJ271V	1/8W 270 OHM	5REAG01731
R8-1	RESISTOR FXD	ERJ-8GEYK4R7V	1/8W 4.7 OHM	5REAG02256
R8-2	RESISTOR FXD	ERJ-8GEYK4R7V	1/8W 4.7 OHM	5REAG02256
R9	RESISTOR FXD	ERJ-8GEYK2R2V		5REAG02210
R11-1	RESISTOR FXD	ERJ-8GEYJ680V	1/8W 68 OHM	5REAG01724
R11-2	RESISTOR FXD	ERJ-8GEYJ680V	1/8W 68 OHM	5REAG01724
R11-3	RESISTOR FXD	ERJ-8GEYJ680V	1/8W 68 OHM	5REAG01724
R12-1	RESISTOR FXD	ERJ-8GEYJ220V		5REAG01718
R12-2	RESISTOR FXD	ERJ-8GEYJ220V		5REAG01718
R12-3	RESISTOR FXD	ERJ-8GEYJ220V		5REAG01718
R12-4	RESISTOR FXD	ERJ-8GEYJ220V		5REAG01718
R13-1	RESISTOR FXD	ERJ-8GEYJ470V	1/8W 47 OHM	5REAG01722
R13-2	RESISTOR FXD	ERJ-8GEYJ470V	1/8W 47 OHM	5REAG01722
R13-3	RESISTOR FXD	ERJ-8GEYJ470V	1/8W 47 OHM	5REAG01722
R13-4	RESISTOR FXD	ERJ-8GEYJ470V	1/8W 47 OHM	5REAG01722
R14	RESISTOR FXD	ERG-1ANJ101	1W 100 OHM	5REAG00011
R15	RESISTOR FXD	ERX-1ANJ1R0	1 OHM 1W	5REAG00030
R16	RESISTOR FXD	ERX-1ANJ1R0	1 OHM 1W	5REAG00030
R17	RESISTOR FXD	ERX-1ANJ1R0	1 OHM 1W	5REAG00030

PARTS LIST

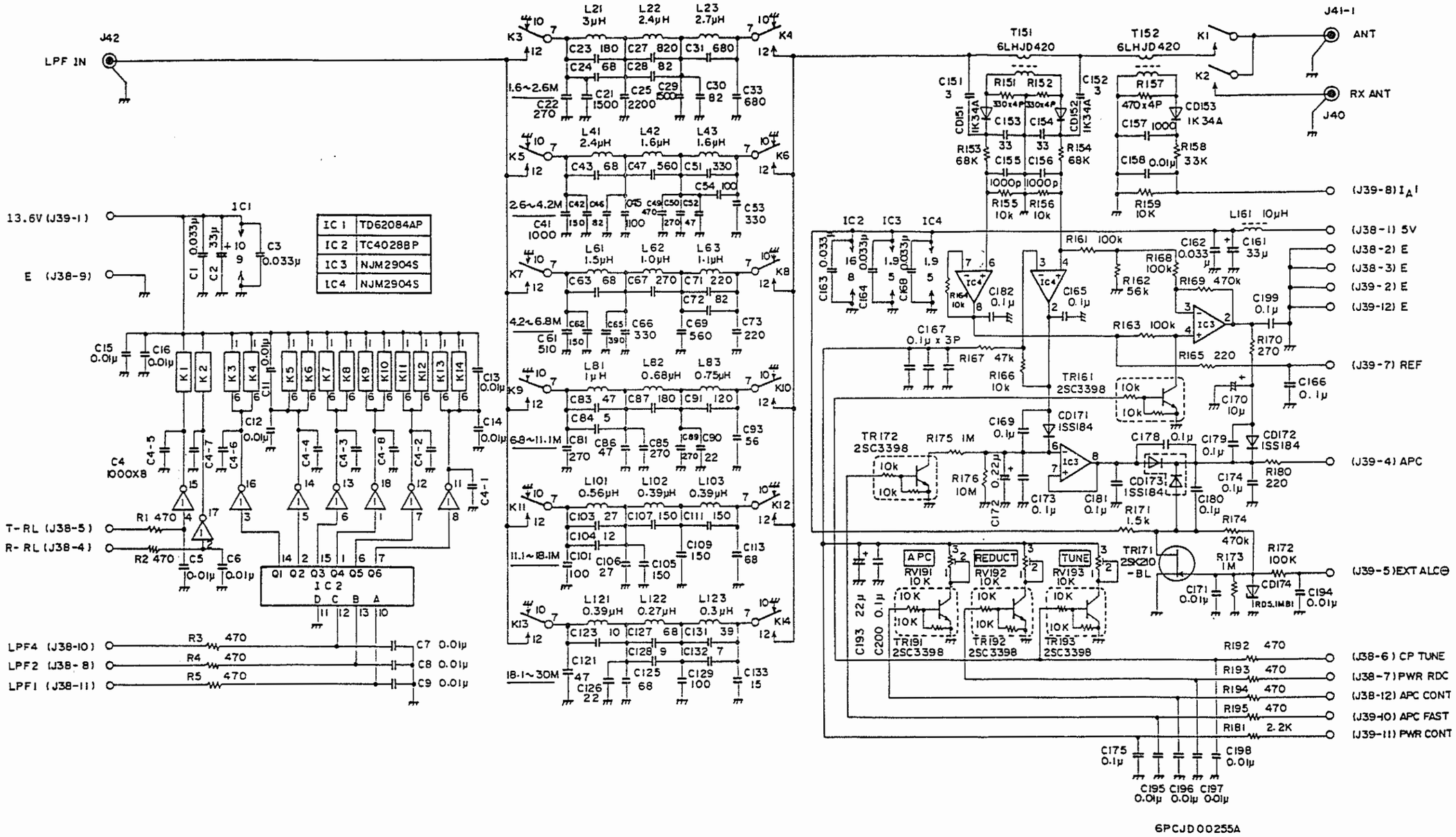
12V PA	TITLE CAH-301L-2	SHEET NO 4

PARTS NO	PARTS NAME	TYPE	DESCRIPTION	CODE
R18	RESISTOR FXD	ERX-1ANJ1R0	1 OHM 1W	5REAG00030
R19	RESISTOR FXD	ERX-2ANJ5R6	5.6 OHM 2W	5REAG00033
R20	RESISTOR FXD	ERG-1ANJ220	1W 22 OHM	5REAG00028
R21	RESISTOR FXD	2SG0.1 OHM K		5RHAA02566
R31	RESISTOR FXD	ERX-1ANJ4R7	1W 4.7 OHM	5REAG00412
R32	RESISTOR FXD	ERX-1ANJ4R7	1W 4.7 OHM	5REAG00412
R33	RESISTOR FXD	ERG-3ANJ220		5REAG01462
R34	RESISTOR FXD	ERG-3ANJ220		5REAG01462
R51-1	RESISTOR FXD	ERJ-8GEYJ122V	1/8W 1.2K OHM	5REAG01739
R51-2	RESISTOR FXD	ERJ-8GEYJ122V	1/8W 1.2K OHM	5REAG01739
R51-3	RESISTOR FXD	ERJ-8GEYJ122V	1/8W 1.2K OHM	5REAG01739
R51-4	RESISTOR FXD	ERJ-8GEYJ122V	1/8W 1.2K OHM	5REAG01739
R52	RESISTOR FXD	ERX-2ANJ1R5	2W 1.5 OHM	5REAG00388
R53	RESISTOR FXD	ERJ-8GEYJ332V	1/8W 3.3K OHM	5REAG01744
R54	RESISTOR FXD	ERJ-8GEYJ102V	1/8W 1K OHM	5REAG01738
R55	RESISTOR FXD	ERJ-8GEYJ102V	1/8W 1K OHM	5REAG01738
R56	RESISTOR FXD	ERG-1ANJ102	1W 1K OHM	5REAG00100
R57	RESISTOR FXD	ERJ-8GEYJ102V	1/8W 1K OHM	5REAG01738
R58	RESISTOR FXD	ERJ-8GEYJ222V	1/8W 2.2K OHM	5REAG01742
R59	RESISTOR FXD	ERJ-8GEYJ104V	1/8W 100K OHM	5REAG01762
R60	RESISTOR FXD	ERJ-8GEYJ103V	1/8W 10K OHM	5REAG01750
R61	RESISTOR FXD	ERJ-8GEYJ273V		5REAG01755
R62	RESISTOR FXD	ERJ-8GEYJ104V	1/8W 100K OHM	5REAG01762
R71	RESISTOR FXD	5SG3.3 OHM K		5RHAA02611
R72	RESISTOR FXD	ERJ-8GEYJ181V	1/8W 180 OHM	5REAG01729
R73	RESISTOR FXD	ERJ-8GEYJ822V		5REAG01749
R74	RESISTOR FXD	ERJ-8GEYJ273V		5REAG01755
R75	RESISTOR FXD	ERJ-8GEYJ103V	1/8W 10K OHM	5REAG01750
R81	RESISTOR FXD	ERJ-8GEYJ103V	1/8W 10K OHM	5REAG01750
R82	RESISTOR FXD	ERJ-8GEYJ472V		5REAG01746
R83	RESISTOR FXD	ERJ-8GEYJ103V	1/8W 10K OHM	5REAG01750
R84	RESISTOR FXD	ERJ-8GEYJ103V	1/8W 10K OHM	5REAG01750
R85	RESISTOR FXD	ERJ-8GEYJ473V		5REAG01758
R86	RESISTOR FXD	ERJ-8GEYJ222V	1/8W 2.2K OHM	5REAG01742
R87	RESISTOR FXD	ERJ-8GEYJ682V		5REAG01748

PARTS LIST

TITLE: 12V PA	CAH-301L-2	SHEET NO 5

PARTS NO	PARTS NAME	TYPE	DESCRIPTION	CODE
R88	RESISTOR FXD	ERJ-8GEYJ103V	1/8W 10K OHM	5REAG01750
R89	THERMISTOR	150-503-00(5)	50K OHM	5RXAB00091
R90	RESISTOR FXD	ERJ-8GEYJ472V		5REAG01746
R91	RESISTOR FXD	ERJ-8GEYJ103V	1/8W 10K OHM	5REAG01750
R92	RESISTOR FXD	ERJ-8GEYJ474V		5REAG01770
RV51	RESISTOR VAR	EVM-D1AA00B14	10K OHM	5RVAB00324
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		5TCAF00173
TR1Z-1	SILICON SHEET	TC-30A (TO-220)		5ZZKB00002
TR1Z-2	BUSHING	YC-40B		5ZZDY00005
TR1Z-3	ACCESSORY	RH-14		5ZKAH00006
TR11	TRANSISTOR	2SC2879		5TCAF00359
TR31	TRANSISTOR	2SC2879		5TCAF00359
TR32	TRANSISTOR	2SC2879		5TCAF00359
TR51	TRANSISTOR	2SC2712Y TE85L		5TAAG00186
TR52	TRANSISTOR	2SD768K		5TDAA00034
TR52Z-1	SILICON SHEET	TC-30A (TO-220)		5ZZKB00002
TR52Z-2	BUSHING	YC-40B		5ZZDY00005
TR53	TRANSISTOR	2SD1405-BL		5TDAE00145
TR53Z	SILICON SHEET	TC-30A (TO-220)		5ZZKB00002
TR71	TRANSISTOR	2SB553-Y		5TBAE00036
TR71Z-1	SILICON SHEET	TC-30A (TO-220)		5ZZKB00002
TR71Z-2	BUSHING	YC-40B		5ZZDY00005
TR81	TRANSISTOR	2SC2655-Y		5TCAF00246



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

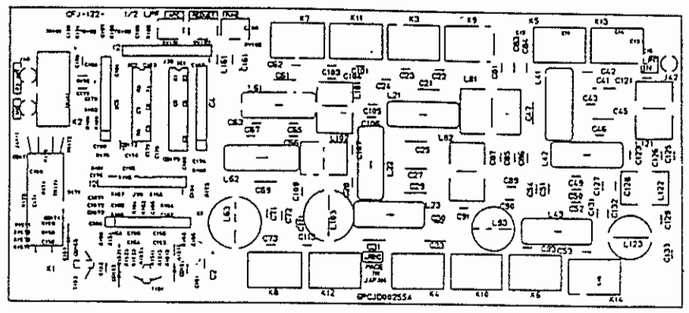


Figure 6-15 LPF Unit (CFJ-122-2) Component Layout

PARTS LIST

	LPF	TITLE CFJ-122-2		SHEET NO 1
PARTS NO	PARTS NAME	TYPE	DESCRIPTION	CODE
U1	LPF	CFJ-122		CFJ-122

PARTS LIST

	LPF	TITLE CFJ-122		SHEET NO 1
PARTS NO	PARTS NAME	TYPE	DESCRIPTION	CODE
C1	CAP,FXD CER	C3216X7R1H333K-E-TP	50V 0.033U	5CAAD01357
C2	CAP,FXD ELCTLT	ECE-A1EU330B		5CEAA01822
C3	CAP,FXD CER	C3216X7R1H333K-E-TP	50V 0.033U	5CAAD01357
C4	CAP,FXD CER	EXF-P8102ZW	1000PFX8	5CXAD00008
C5	CAP,FXD CER	C3216JB1H103K-E-TP	0.01UF	5CAAD00789
C6	CAP,FXD CER	C3216JB1H103K-E-TP	0.01UF	5CAAD00789
C7	CAP,FXD CER	C3216JB1H103K-E-TP	0.01UF	5CAAD00789
C8	CAP,FXD CER	C3216JB1H103K-E-TP	0.01UF	5CAAD00789
C9	CAP,FXD CER	C3216JB1H103K-E-TP	0.01UF	5CAAD00789
C11	CAP,FXD CER	C3216JB1H103K-E-TP	0.01UF	5CAAD00789
C12	CAP,FXD CER	C3216JB1H103K-E-TP	0.01UF	5CAAD00789
C13	CAP,FXD CER	C3216JB1H103K-E-TP	0.01UF	5CAAD00789
C14	CAP,FXD CER	C3216JB1H103K-E-TP	0.01UF	5CAAD00789
C15	CAP,FXD CER	C3216JB1H103K-E-TP	0.01UF	5CAAD00789
C16	CAP,FXD CER	C3216JB1H103K-E-TP	0.01UF	5CAAD00789
C21	CAP,FXD MICA	DM19C152J5	500WV 1500PF	5CMAB00147
C22	CAP,FXD CER	CC45SL2H271JYP-FP		5CAAB01900
C23	CAP,FXD CER	CC45SL2H181JYP-FP		5CAAB01896
C24	CAP,FXD CER	CC45SL2H680JYP-FP		5CAAB01897
C25	CAP,FXD MICA	DM19C222J5	500WV 2200PF	5CMAB00149
C27	CAP,FXD MICA	DM19C821J5	500WV 820PF	5CMAB00144
C28	CAP,FXD CER	CC45SL2H820JYP-FP		5CAAB01898
C29	CAP,FXD MICA	DM19C152J5	500WV 1500PF	5CMAB00147
C30	CAP,FXD CER	CC45SL2H820JYP-FP		5CAAB01898
C31	CAP,FXD MICA	DM19C681J5	500WV 680PF	5CMAB00143
C33	CAP,FXD MICA	DM19C681J5	500WV 680PF	5CMAB00143
C41	CAP,FXD MICA	DM19C102J5	500WV 1000PF	5CMAB00145
C42	CAP,FXD CER	CC45SL2H151JYP-FP		5CAAB01899
C43	CAP,FXD CER	CC45SL2H680JYP-FP		5CAAB01897
C45	CAP,FXD MICA	DM19C112J5	500WV 1100PF	5CMAB00256
C46	CAP,FXD CER	CC45SL2H820JYP-FP		5CAAB01898
C47	CAP,FXD MICA	DM19C561J5	500WV 560PF	5CMAB00142
C49	CAP,FXD CER	CC45SL2H471JYP-FP		5CAAB01901
C50	CAP,FXD CER	CC45SL2H271JYP-FP		5CAAB01900
C51	CAP,FXD CER	CC45SL2H331JYP-FP		5CAAB01902

PARTS LIST

TITLE: LPF CFJ-122	SHEET NO 2

PARTS NO	PARTS NAME		TYPE	DESCRIPTION	CODE
C52	CAP,FXD	CER	CC45SL2H470JYP-FP		5CAAB01903
C53	CAP,FXD	CER	CC45SL2H331JYP-FP		5CAAB01902
C54	CAP,FXD	CER	CC45SL2H101JYP-FP		5CAAB01910
C61	CAP,FXD	MICA	DM15C511JS	510PF 500WV	5CMAB00175
C62	CAP,FXD	CER	CC45SL2H151JYP-FP		5CAAB01899
C63	CAP,FXD	CER	CC45SL2H680JYP-FP		5CAAB01897
C65	CAP,FXD	CER	CC45SL2H391JYP-FP		5CAAB01904
C66	CAP,FXD	CER	CC45SL2H331JYP-FP		5CAAB01902
C67	CAP,FXD	CER	CC45SL2H271JYP-FP		5CAAB01900
C69	CAP,FXD	MICA	DM19C561JS	500WV 560PF	5CMAB00142
C71	CAP,FXD	CER	CC45SL2H221JYP-FP		5CAAB01905
C72	CAP,FXD	CER	CC45SL2H820JYP-FP		5CAAB01898
C73	CAP,FXD	CER	CC45SL2H221JYP-FP		5CAAB01905
C81	CAP,FXD	CER	CC45SL2H271JYP-FP		5CAAB01900
C83	CAP,FXD	CER	CC45SL2H470JYP-FP		5CAAB01903
C84	CAP,FXD	CER	CC45SL2H050CYP-FP		5CAAB01906
C85	CAP,FXD	CER	CC45SL2H271JYP-FP		5CAAB01900
C86	CAP,FXD	CER	CC45SL2H470JYP-FP		5CAAB01903
C87	CAP,FXD	CER	CC45SL2H181JYP-FP		5CAAB01896
C89	CAP,FXD	CER	CC45SL2H271JYP-FP		5CAAB01900
C90	CAP,FXD	CER	CC45SL2H220JYP-FP		5CAAB01907
C91	CAP,FXD	CER	CC45SL2H121JYP-FP		5CAAB01908
C93	CAP,FXD	CER	CC45SL2H560JYP-FP		5CAAB01909
C101	CAP,FXD	CER	CC45SL2H101JYP-FP		5CAAB01910
C103	CAP,FXD	CER	CC45SL2H270JYP-FP		5CAAB01911
C104	CAP,FXD	CER	CC45SL2H120JYP-FP		5CAAB01912
C105	CAP,FXD	CER	CC45SL2H151JYP-FP		5CAAB01899
C106	CAP,FXD	CER	CC45SL2H270JYP-FP		5CAAB01911
C107	CAP,FXD	CER	CC45SL2H151JYP-FP		5CAAB01899
C109	CAP,FXD	CER	CC45SL2H151JYP-FP		5CAAB01899
C111	CAP,FXD	CER	CC45SL2H151JYP-FP		5CAAB01899
C113	CAP,FXD	CER	CC45SL2H680JYP-FP		5CAAB01897
C121	CAP,FXD	CER	CC45SL2H470JYP-FP		5CAAB01903
C123	CAP,FXD	CER	CC45SL2H100DYP-FP		5CAAB01913
C125	CAP,FXD	CER	CC45SL2H680JYP-FP		5CAAB01897

PARTS LIST

TITLE: LPF CFJ-122	SHEET NO 3

PARTS NO	PARTS NAME		TYPE	DESCRIPTION	CODE
C126	CAP,FXD	CER	CC45SL2H220JYP-FP		5CAAB01907
C127	CAP,FXD	CER	CC45SL2H680JYP-FP		5CAAB01897
C128	CAP,FXD	CER	CC45SL2H090DYP-FP		5CAAB01919
C129	CAP,FXD	CER	CC45SL2H101JYP-FP		5CAAB01910
C131	CAP,FXD	CER	CC45SL2H390JYP-FP		5CAAB01915
C132	CAP,FXD	CER	CC45SL2H070DYP-FP		5CAAB01916
C133	CAP,FXD	CER	CC45SL2H150JYP-FP		5CAAB01917
C151	CAP,FXD	CER	CC45SL2H030DYP-FP		5CAAB01918
C152	CAP,FXD	CER	CC45SL2H030DYP-FP		5CAAB01918
C153	CAP,FXD	CER	C3216CH1H330J-E-TP	33PF	5CAAD00794
C154	CAP,FXD	CER	C3216CH1H330J-E-TP	33PF	5CAAD00794
C155	CAP,FXD	CER	C3216SL1H102J-E-TP	1000PF	5CAAD00782
C156	CAP,FXD	CER	C3216SL1H102J-E-TP	1000PF	5CAAD00782
C157	CAP,FXD	CER	C3216SL1H102J-E-TP	1000PF	5CAAD00782
C158	CAP,FXD	CER	C3216JB1H103K-E-TP	0.01UF	5CAAD00789
C161	CAP,FXD	ELCTLT	ECE-A1EU330B		5CEAA01822
C162	CAP,FXD	CER	C3216X7R1H333K-E-TP	50V 0.033U	5CAAD01357
C163	CAP,FXD	CER	C3216X7R1H333K-E-TP	50V 0.033U	5CAAD01357
C164	CAP,FXD	CER	C3216X7R1H333K-E-TP	50V 0.033U	5CAAD01357
C165	CAP,FXD	CER	C3216X7R1E104K-E-TP	0.1U	5CAAD01237
C166	CAP,FXD	CER	C3216X7R1E104K-E-TP	0.1U	5CAAD01237
C168	CAP,FXD	CER	C3216X7R1H333K-E-TP	50V 0.033U	5CAAD01357
C169	CAP,FXD	CER	C3216X7R1E104K-E-TP	0.1U	5CAAD01237
C170	CAP,FXD	ELCTLT	ECE-A1EU100B		5CEAA01864
C171	CAP,FXD	CER	C3216JB1H103K-E-TP	0.01UF	5CAAD00789
C172	CAP,FXD	TANTAL	202L35D2 Z24KB	0.22UF 35V	5CSAC00988
C173	CAP,FXD	CER	C3216X7R1E104K-E-TP	0.1U	5CAAD01237
C174	CAP,FXD	CER	C3216X7R1E104K-E-TP	0.1U	5CAAD01237
C175	CAP,FXD	CER	C3216X7R1E104K-E-TP	0.1U	5CAAD01237
C178	CAP,FXD	CER	C3216X7R1E104K-E-TP	0.1U	5CAAD01237
C179	CAP,FXD	CER	C3216X7R1E104K-E-TP	0.1U	5CAAD01237
C180	CAP,FXD	CER	C3216X7R1E104K-E-TP	0.1U	5CAAD01237
C181	CAP,FXD	CER	C3216X7R1E104K-E-TP	0.1U	5CAAD01237
C182	CAP,FXD	CER	C3216X7R1E104K-E-TP	0.1U	5CAAD01237
C193	CAP,FXD	TANTAL	202L1602 226KB		5CSAC00939

PARTS LIST

TITLE	LPF	CFJ-122	SHEET NO 4

PARTS NO	PARTS NAME	TYPE	DESCRIPTION	CODE
C194	CAP,FXD CER	C3216JB1H103K-E-TP	0.01UF	5CAAD00789
C195	CAP,FXD CER	C3216JB1H103K-E-TP	0.01UF	5CAAD00789
C196	CAP,FXD CER	C3216JB1H103K-E-TP	0.01UF	5CAAD00789
C197	CAP,FXD CER	C3216JB1H103K-E-TP	0.01UF	5CAAD00789
C198	CAP,FXD CER	C3216JB1H103K-E-TP	0.01UF	5CAAD00789
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
CD151	DIODE	1K34A		5TXCH00001
CD152	DIODE	1K34A		5TXCH00001
CD153	DIODE	1K34A		5TXCH00001
CD171	DIODE	1SS184 TE85L		5TXAD00290
CD172	DIODE	1SS184 TE85L		5TXAD00290
CD173	DIODE	1SS184 TE85L		5TXAD00290
CD174	DIODE	RD5.1MB1-T1		5TXAA00515
IC1	IC	TD62084AP		5DDAE00546
IC2	IC	TC4028BP		5DDAE00069
IC3	IC	NJM2904S		5DAAN00239
IC4	IC	NJM2904S		5DAAN00239
J38	CONNECTOR	IL-S-12P-S2T2-EF		5JWAD00156
J39	CONNECTOR	IL-S-12P-S2T2-EF		5JWAD00156
J40	CONNECTOR	TMP-J01X-V2		5JDAX00009
J41-1	CONNECTOR	TMP-J01X-V2		5JDAX00009
J42	CONNECTOR	TMP-J01X-V2		5JDAX00009
K1	RELAY	UAM-22912		5KRAL00057
K2	RELAY	TC-112M		5KRAK00027
K3	RELAY	G6E-184P DC12V	12V	5KLBM00005
K4	RELAY	G6E-184P DC12V	12V	5KLBM00005
K5	RELAY	G6E-184P DC12V	12V	5KLBM00005
K6	RELAY	G6E-184P DC12V	12V	5KLBM00005
K7	RELAY	G6E-184P DC12V	12V	5KLBM00005
K8	RELAY	G6E-184P DC12V	12V	5KLBM00005
K9	RELAY	G6E-184P DC12V	12V	5KLBM00005

PARTS LIST

TITLE	LPF	CFJ-122	SHEET NO 5

PARTS NO	PARTS NAME	TYPE	DESCRIPTION	CODE
K10	RELAY	G6E-184P DC12V	12V	5KLBM00005
K11	RELAY	G6E-184P DC12V	12V	5KLBM00005
K12	RELAY	G6E-184P DC12V	12V	5KLBM00005
K13	RELAY	G6E-184P DC12V	12V	5KLBM00005
K14	RELAY	G6E-184P DC12V	12V	5KLBM00005
L21	COIL	H-6LFJD30300	3.0UH	6LFJD30300
L22	COIL	H-6LFJD30240	2.4UH	6LFJD30240
L23	COIL	H-6LFJD30270	2.7UH	6LFJD30270
L41	COIL	H-6LFJD30240	2.4UH	6LFJD30240
L42	COIL	H-6LFJD30160	1.6UH	6LFJD30160
L43	COIL	H-6LFJD30160	1.6UH	6LFJD30160
L61	COIL	H-6LFJD30150		6LFJD30150
L62	COIL	H-6LFJD30100	1UH	6LFJD30100
L63	COIL	H-6LFJD82110	1.1UH	6LFJD82110
L81	COIL	H-6LFJD81100	1.0UH	6LFJD81100
L82	COIL	H-6LFJD81068	0.68UH	6LFJD81068
L83	COIL	H-6LFJD82075	0.75UH	6LFJD82075
L101	COIL	H-6LFJD81056	0.56UH	6LFJD81056
L102	COIL	H-6LFJD81039	0.39UH	6LFJD81039
L103	COIL	H-6LFJD82039	0.39UH	6LFJD82039
L121	COIL	H-6LFJD60039		6LFJD60039
L122	COIL	H-6LFJD60027	0.27UH	6LFJD60027
L123	COIL	H-6LFJD70030		6LFJD70030
L161	COIL	LAL03VB100K	10UH	5LCAA00273
PC1	PCB	H-6PCJD00255A		6PCJD00255
R1	RESISTOR FXD	ERJ-8GEYJ471V	1/8W 470 OHM	5REAG01734
R2	RESISTOR FXD	ERJ-8GEYJ471V	1/8W 470 OHM	5REAG01734
R3	RESISTOR FXD	ERJ-8GEYJ471V	1/8W 470 OHM	5REAG01734
R4	RESISTOR FXD	ERJ-8GEYJ471V	1/8W 470 OHM	5REAG01734
R5	RESISTOR FXD	ERJ-8GEYJ471V	1/8W 470 OHM	5REAG01734
R153	RESISTOR FXD	ERJ-8GEYJ683V	1/8W 68K OHM	5REAG01760
R154	RESISTOR FXD	ERJ-8GEYJ683V	1/8W 68K OHM	5REAG01760
R155	RESISTOR FXD	ERJ-8GEYJ103V	1/8W 10K OHM	5REAG01750
R156	RESISTOR FXD	ERJ-8GEYJ103V	1/8W 10K OHM	5REAG01750
R158	RESISTOR FXD	ERJ-8GEYJ333V		5REAG01756

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	5REAG01750
R161	RESISTOR FXD	ERJ-8GEYJ104V	1/8W 100K OHM	5REAG01762
R162	RESISTOR FXD	ERJ-8GEYJ563V		5REAG01759
R163	RESISTOR FXD	ERJ-8GEYJ104V	1/8W 100K OHM	5REAG01762
R164	RESISTOR FXD	ERJ-8GEYJ103V	1/8W 10K OHM	5REAG01750
R165	RESISTOR FXD	ERJ-8GEYJ221V	1/8W 220 OHM	5REAG01730
R166	RESISTOR FXD	ERJ-8GEYJ473V		5REAG01758
R167	RESISTOR FXD	ERJ-8GEYJ682V		5REAG01748
R168	RESISTOR FXD	ERJ-8GEYJ104V	1/8W 100K OHM	5REAG01762
R169	RESISTOR FXD	ERJ-8GEYJ474V		5REAG01770
R170	RESISTOR FXD	ERJ-8GEYJ271V	1/8W 270 OHM	5REAG01731
R171	RESISTOR FXD	ERJ-8GEYJ152V	1/8W 1.5K OHM	5REAG01740
R172	RESISTOR FXD	ERJ-8GEYJ104V	1/8W 100K OHM	5REAG01762
R173	RESISTOR FXD	ERJ-8GEYJ105V	1/8W 1M OHM	5REAG01774
R174	RESISTOR FXD	ERJ-8GEYJ474V		5REAG01770
R175	RESISTOR FXD	ERJ-8GEYJ105V	1/8W 1M OHM	5REAG01774
R176	RESISTOR FXD	HMGL1/4A-10M OHM J		5REAA05607
R180	RESISTOR FXD	ERJ-8GEYJ221V	1/8W 220 OHM	5REAG01730
R181	RESISTOR FXD	ERJ-8GEYJ222V	1/8W 2.2K OHM	5REAG01742
R192	RESISTOR FXD	ERJ-8GEYJ471V	1/8W 470 OHM	5REAG01734
R193	RESISTOR FXD	ERJ-8GEYJ471V	1/8W 470 OHM	5REAG01734
R194	RESISTOR FXD	ERJ-8GEYJ471V	1/8W 470 OHM	5REAG01734
R195	RESISTOR FXD	ERJ-8GEYJ471V	1/8W 470 OHM	5REAG01734
R1511	RESISTOR FXD	ERJ-8GEYJ331V	1/8W,330 OHM	5REAG01732
R1512	RESISTOR FXD	ERJ-8GEYJ331V	1/8W,330 OHM	5REAG01732
R1513	RESISTOR FXD	ERJ-8GEYJ331V	1/8W,330 OHM	5REAG01732
R1514	RESISTOR FXD	ERJ-8GEYJ331V	1/8W,330 OHM	5REAG01732
R1521	RESISTOR FXD	ERJ-8GEYJ331V	1/8W,330 OHM	5REAG01732
R1522	RESISTOR FXD	ERJ-8GEYJ331V	1/8W,330 OHM	5REAG01732
R1523	RESISTOR FXD	ERJ-8GEYJ331V	1/8W,330 OHM	5REAG01732
R1524	RESISTOR FXD	ERJ-8GEYJ331V	1/8W,330 OHM	5REAG01732
R1571	RESISTOR FXD	ERJ-8GEYJ471V	1/8W 470 OHM	5REAG01734
R1572	RESISTOR FXD	ERJ-8GEYJ471V	1/8W 470 OHM	5REAG01734
R1573	RESISTOR FXD	ERJ-8GEYJ471V	1/8W 470 OHM	5REAG01734
R1574	RESISTOR FXD	ERJ-8GEYJ471V	1/8W 470 OHM	5REAG01734

PARTS LIST

	LPF	TITLE CFJ-122		SHEET NO 7
PARTS NO	PARTS NAME	TYPE	DESCRIPTION	CODE
RV191	RESISTOR VAR	EVN-D1AA00B14	10K OHM	5RVAB00324
RV192	RESISTOR VAR	EVN-D1AA00B14	10K OHM	5RVAB00324
RV193	RESISTOR VAR	EVN-D1AA00B14	10K OHM	5RVAB00324
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

CD1, 3, 8	ISS184	TR1, 3	2SA1162Y
CD2	ISS181	TR2,4~8,11,15	2SC2714Y
CD4~6	ISV203	TR16	2SC2712Y
CD7	MPR4371F	TR9,10	2SK210BL
CV1	ECR-H8010AII	TR12~14	2SC3324GR
CV2	TZ03Z100FR	RA1~3	208-12X-ME1

(0.545~0.445MHz)

(2.545~2.445MHz)

C1~8 1000
R1~4 100

IC1, 2	MB671168	IC17	CX79258
IC3, 4	TC5020BP	IC18	AN6410
IC5	NJM3404AD	IC19	SN74LS90N
IC6, 7	NJM319D		
IC8, 20	TC4013BAP		
IC9, 10	NJM78L08A		
IC11, 21	NJM78L05A		
IC12	MC1496P		
IC13	TC74HC00P		
IC14	TC74HC259P		
IC15, 16	TC74HC138P		

IC6, 7 IC5 IC8, 20

6PCJD00262A

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

Figure 6-16 REF/DDS Unit (CGK-81R) Schematic Diagram

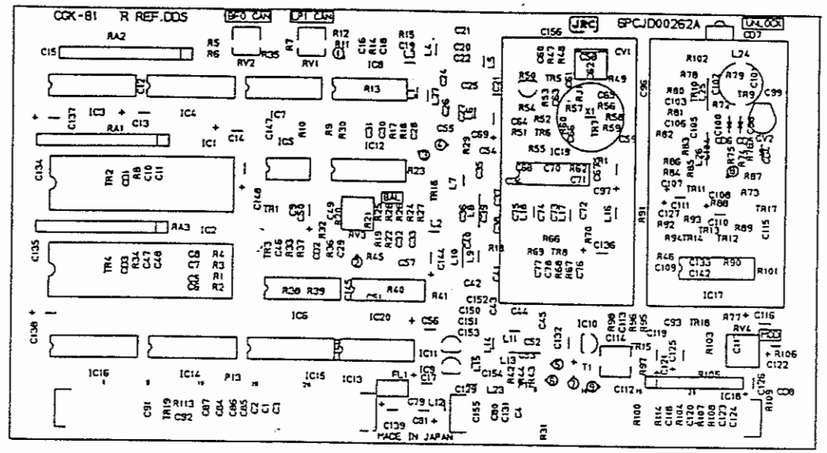


Figure 6-17 REF/DDS Unit (CGK-81R) Component Layout

PARTS LIST

	REF DDS	TITLE CGK-81R	SHEET NO 1

PARTS NO	PARTS NAME	TYPE	DESCRIPTION	CODE
U1	REF DDS UNIT	CGK-81		CGK-81
X1	CRYSTAL	H-6XHJD00195	20MHZ	6XHJD00195
XR1	XTAL OVEN	H-6ZKJD00020	70°	6ZKJD00020

PARTS LIST

	REF DDS	TITLE CGK-81	SHEET NO. 1

PARTS NO	PARTS NAME	TYPE	DESCRIPTION	CODE
C1	CAP,FXD CER	C3216SL1H102J-E-TP	1000PF	5CAAD00782
C2	CAP,FXD CER	C3216SL1H102J-E-TP	1000PF	5CAAD00782
C3	CAP,FXD CER	C3216SL1H102J-E-TP	1000PF	5CAAD00782
C4	CAP,FXD CER	C3216SL1H102J-E-TP	1000PF	5CAAD00782
C5	CAP,FXD CER	C3216SL1H102J-E-TP	1000PF	5CAAD00782
C6	CAP,FXD CER	C3216SL1H102J-E-TP	1000PF	5CAAD00782
C7	CAP,FXD CER	C3216SL1H102J-E-TP	1000PF	5CAAD00782
C8	CAP,FXD CER	C3216SL1H102J-E-TP	1000PF	5CAAD00782
C9	CAP,FXD CER	C3216JB1E333K-E-TP		5CAAD01235
C10	CAP,FXD CER	C3216CH1H101J-E-TP	100PF	5CAAD00780
C11	CAP,FXD CER	C3216CH1H470J-E-TP	47PF	5CAAD00864
C12	CAP,FXD CER	C3216JB1H103K-E-TP	0.01UF	5CAAD00789
C13	CAP,FXD ELCTLT	ECE-A1EU101B		5CEAA01813
C14	CAP,FXD ELCTLT	ECE-A1EU101B		5CEAA01813
C15	CAP,FXD CER	C3216JB1H103K-E-TP	0.01UF	5CAAD00789
C16	CAP,FXD CER	C3216JB1E333K-E-TP		5CAAD01235
C17	CAP,FXD ELCTLT	ECE-A1EU100B		5CEAA01864
C18	CAP,FXD CER	C3216SL1H821J-E-TP		5CAAD01068
C19	CAP,FXD CER	C3216CH1H121J-E-TP	120PF	5CAAD00931
C20	CAP,FXD CER	C3216SL1H152J-E-TP	1500PF	5CAAD00791
C21	CAP,FXD CER	C3216CH1H331J-E-TP	330PF	5CAAD01066
C22	CAP,FXD CER	C3216SL1H102J-E-TP	1000PF	5CAAD00782
C24	CAP,FXD CER	C3216CH1H471J-E-TP	470PF	5CAAD00797
C25	CAP,FXD CER	C3216JB1H332K-E-TP		5CAAD01599
C26	CAP,FXD CER	C3216CH1H331J-E-TP	330PF	5CAAD01066
C27	CAP,FXD CER	C3216SL1H122J-E-TP		5CAAD01069
C28	CAP,FXD CER	C3216SL1H102J-E-TP	1000PF	5CAAD00782
C29	CAP,FXD CER	C3216JB1H103K-E-TP	0.01UF	5CAAD00789
C30	CAP,FXD CER	C3216JB1E333K-E-TP		5CAAD01235
C31	CAP,FXD CER	C3216JB1E333K-E-TP		5CAAD01235
C32	CAP,FXD CER	C3216JB1E333K-E-TP		5CAAD01235
C33	CAP,FXD CER	C3216JB1E333K-E-TP		5CAAD01235
C34	CAP,FXD CER	C3216SL1H152J-E-TP	1500PF	5CAAD00791
C35	CAP,FXD CER	C3216CH1H121J-E-TP	120PF	5CAAD00931
C36	CAP,FXD CER	C3216SL1H222J-E-TP	2200P	5CAAD00792

PARTS LIST

TITLE	REF DDS	CGK-81	SHEET NO 2

PARTS NO	PARTS NAME	TYPE	DESCRIPTION	CODE
C37	CAP,FXD CER	C3216SL1H821J-E-TP		5CAAD01068
C38	CAP,FXD CER	C3216SL1H222J-E-TP	2200P	5CAAD00792
C39	CAP,FXD CER	C3216CH1H561J-E-TP		5CAAD01067
C40	CAP,FXD CER	C3216SL1H152J-E-TP	1500PF	5CAAD00791
C41	CAP,FXD CER	C3216SL1H102J-E-TP	1000PF	5CAAD00782
C42	CAP,FXD CER	C3216JB1H153K-E-TP		5CAAD01600
C43	CAP,FXD CER	C3216CH1H681J-E-TP	680P	5CAAD00788
C44	CAP,FXD CER	C3216JB1H682K-E-TP		5CAAD01137
C45	CAP,FXD CER	C3216CH1H681J-E-TP	680P	5CAAD00788
C46	CAP,FXD CER	C3216JB1E333K-E-TP		5CAAD01235
C47	CAP,FXD CER	C3216CH1H101J-E-TP	100PF	5CAAD00780
C48	CAP,FXD CER	C3216CH1H470J-E-TP	47PF	5CAAD00864
C49	CAP,FXD CER	C3216JB1H103K-E-TP	0.01UF	5CAAD00789
C50	CAP,FXD ELCTLT	ECE-A1EU101B		5CEAA01813
C51	CAP,FXD CER	C3216JB1E333K-E-TP		5CAAD01235
C52	CAP,FXD CER	C3216JB1H682K-E-TP		5CAAD01137
C53	CAP,FXD CER	C3216SL1H122J-E-TP		5CAAD01069
C54	CAP,FXD CER	C3216JB1H103K-E-TP	0.01UF	5CAAD00789
C55	CAP,FXD CER	C3216JB1H103K-E-TP	0.01UF	5CAAD00789
C56	CAP,FXD ELCTLT	ECE-A1EU100B		5CEAA01864
C57	CAP,FXD CER	C3216JB1H103K-E-TP	0.01UF	5CAAD00789
C58	CAP,FXD CER	C3216CH1H070D-E-TP	7PF	5CAAD00977
C59	CAP,FXD CER	C3216JB1H103K-E-TP	0.01UF	5CAAD00789
C60	CAP,FXD CER	C3216X7R1E104K-E-TP	0.1U	5CAAD01237
C61	CAP,FXD CER	C3216CH1H221J-E-TP	220PF	5CAAD00790
C62	CAP,FXD CER	C3216CH1H101J-E-TP	100PF	5CAAD00780
C63	CAP,FXD CER	C3216CH1H220J-E-TP	22P	5CAAD00869
C64	CAP,FXD CER	C3216JB1H103K-E-TP	0.01UF	5CAAD00789
C65	CAP,FXD CER	C3216CH1H220J-E-TP	22P	5CAAD00869
C66	CAP,FXD CER	C3216JB1H103K-E-TP	0.01UF	5CAAD00789
C67	CAP,FXD CER	C3216JB1H103K-E-TP	0.01UF	5CAAD00789
C68	CAP,FXD CER	C3216JB1H103K-E-TP	0.01UF	5CAAD00789
C69	CAP,FXD ELCTLT	ECE-A1EU100B		5CEAA01864
C70	CAP,FXD CER	C3216JB1H103K-E-TP	0.01UF	5CAAD00789
C71	CAP,FXD CER	C3216SL1H222J-E-TP	2200P	5CAAD00792

PARTS LIST

TITLE	REF DDS	CGK-81	SHEET NO 3

PARTS NO	PARTS NAME	TYPE	DESCRIPTION	CODE
C72	CAP,FXD CER	C3216CH1H121J-E-TP	120PF	5CAAD00931
C73	CAP,FXD CER	C3216SL1H222J-E-TP	2200P	5CAAD00792
C74	CAP,FXD CER	C3216CH1H271J-E-TP	50V 270PF	5CAAD00883
C75	CAP,FXD CER	C3216SL1H222J-E-TP	2200P	5CAAD00792
C76	CAP,FXD CER	C3216JB1H103K-E-TP	0.01UF	5CAAD00789
C77	CAP,FXD CER	C3216JB1H103K-E-TP	0.01UF	5CAAD00789
C78	CAP,FXD CER	C3216JB1H103K-E-TP	0.01UF	5CAAD00789
C79	CAP,FXD CER	C3216JB1H103K-E-TP	0.01UF	5CAAD00789
C80	CAP,FXD CER	C3216JB1H103K-E-TP	0.01UF	5CAAD00789
C81	CAP,FXD ELCTLT	ECE-A1EU100B		5CEAA01864
C84	CAP,FXD CER	C3216SL1H102J-E-TP	1000PF	5CAAD00782
C85	CAP,FXD CER	C3216SL1H102J-E-TP	1000PF	5CAAD00782
C86	CAP,FXD CER	C3216SL1H102J-E-TP	1000PF	5CAAD00782
C87	CAP,FXD CER	C3216SL1H102J-E-TP	1000PF	5CAAD00782
C91	CAP,FXD CER	C3216SL1H102J-E-TP	1000PF	5CAAD00782
C92	CAP,FXD CER	C3216SL1H102J-E-TP	1000PF	5CAAD00782
C93	CAP,FXD CER	C3216SL1H102J-E-TP	1000PF	5CAAD00782
C96	CAP,FXD CER	C3216SL1H102J-E-TP	1000PF	5CAAD00782
C97	CAP,FXD ELCTLT	ECE-A1EU101B		5CEAA01813
C98	CAP,FXD CER	C3216CH1H020C-E-TP	2PF	5CAAD00798
C99	CAP,FXD CER	C3216CH1H270J-E-TP	27P	5CAAD00793
C100	CAP,FXD CER	C3216CH1H030C-E-TP	3PF	5CAAD00796
C101	CAP,FXD CER	C3216SL1H102J-E-TP	1000PF	5CAAD00782
C102	CAP,FXD CER	C3216SL1H102J-E-TP	1000PF	5CAAD00782
C103	CAP,FXD CER	C3216SL1H102J-E-TP	1000PF	5CAAD00782
C104	CAP,FXD CER	C3216SL1H102J-E-TP	1000PF	5CAAD00782
C105	CAP,FXD CER	C3216SL1H102J-E-TP	1000PF	5CAAD00782
C106	CAP,FXD CER	C3216SL1H102J-E-TP	1000PF	5CAAD00782
C107	CAP,FXD CER	C3216SL1H102J-E-TP	1000PF	5CAAD00782
C108	CAP,FXD CER	C3216SL1H102J-E-TP	1000PF	5CAAD00782
C109	CAP,FXD CER	C3216JB1H103K-E-TP	0.01UF	5CAAD00789
C110	CAP,FXD TANTAL	202L2502 106KB	25V 10UF	5CSAC00950
C111	CAP,FXD ELCTLT	ECE-A1EU101B		5CEAA01813
C112	CAP,FXD CER	C3216SL1H102J-E-TP	1000PF	5CAAD00782
C113	CAP,FXD CER	C3216SL1H102J-E-TP	1000PF	5CAAD00782

PARTS LIST

REF DES	TITLE CGK-81	SHEET NO 4

PARTS NO	PARTS NAME	TYPE	DESCRIPTION	CODE
C114	CAP,FXD CER	C3216CH1H220J-E-TP	22P	5CAAD00869
C115	CAP,FXD CER	C3216SL1H102J-E-TP	1000PF	5CAAD00782
C116	CAP,FXD TANTAL	202L3502 105KB	35V 1UF	5CSAC00982
C117	CAP,FXD CER	C3216JB1H103K-E-TP	0.01UF	5CAAD00789
C118	CAP,FXD CER	C3216SL1H331J-E-TP		5CAAD00918
C119	CAP,FXD ELCTLT	ECE-A1EU100B		5CEAA01864
C120	CAP,FXD CER	C3216SL1H152J-E-TP	1500PF	5CAAD00791
C121	CAP,FXD CER	C3216CH1H101J-E-TP	100PF	5CAAD00780
C122	CAP,FXD TANTAL	202L3502 105KB	35V 1UF	5CSAC00982
C123	CAP,FXD CER	C3216JB1E333K-E-TP		5CAAD01235
C124	CAP,FXD CER	C3216CH1H151J-E-TP	150P	5CAAD00870
C125	CAP,FXD ELCTLT	ECE-A1EU100B		5CEAA01864
C126	CAP,FXD ELCTLT	ECE-A1EU100B		5CEAA01864
C127	CAP,FXD CER	C3216JB1H103K-E-TP	0.01UF	5CAAD00789
C129	CAP,FXD CER	C3216JB1H103K-E-TP	0.01UF	5CAAD00789
C131	CAP,FXD CER	C3216JB1H103K-E-TP	0.01UF	5CAAD00789
C132	CAP,FXD ELCTLT	ECE-A1EU100B		5CEAA01864
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
C136	CAP,FXD ELCTLT	ECE-A1EU100B		5CEAA01864
C137	CAP,FXD ELCTLT	ECE-A1EU100B		5CEAA01864
C138	CAP,FXD ELCTLT	ECE-A1EU100B		5CEAA01864
C139	CAP,FXD ELCTLT	ECE-A1EU100B		5CEAA01864
C140	CAP,FXD CER	C3216JB1H103K-E-TP	0.01UF	5CAAD00789
C142	CAP,FXD CER	C3216JB1H103K-E-TP	0.01UF	5CAAD00789
C144	CAP,FXD ELCTLT	ECE-A1EU101B		5CEAA01813
C145	CAP,FXD CER	C3216JB1H103K-E-TP	0.01UF	5CAAD00789
C147	CAP,FXD CER	C3216JB1H103K-E-TP	0.01UF	5CAAD00789
C148	CAP,FXD ELCTLT	ECE-A1EU101B		5CEAA01813
C150	CAP,FXD CER	C3216JB1H682K-E-TP		5CAAD01137
C151	CAP,FXD CER	C3216SL1H821J-E-TP		5CAAD01068
C152	CAP,FXD CER	C3216JB1H103K-E-TP	0.01UF	5CAAD00789
C153	CAP,FXD CER	C3216JB1H332K-E-TP		5CAAD01599
C154	CAP,FXD CER	C3216JB1H472K-E-TP		5CAAD01138

PARTS LIST

REF DES	TITLE CGK-81	SHEET NO 5

PARTS NO	PARTS NAME	TYPE	DESCRIPTION	CODE
C155	CAP,FXD CER	C3216SL1H102J-E-TP	1000PF	5CAAD00782
C156	CAP,FXD CER	DD105TH390J50		5CBAB02366
CD1	DIODE	1SS184 TE85L		5TXAD00290
CD2	DIODE	1SS181 TE85L		5TXAD00356
CD3	DIODE	1SS184 TE85L		5TXAD00290
CD4	DIODE	1SV203-7TLC		5TXAE00678
CD5	DIODE	1SV203-7TLC		5TXAE00678
CD6	DIODE	1SV203-7TLC		5TXAE00678
CD7	DIODE	MPR4371F		5TXBG00037
CD8	DIODE	1SS184 TE85L		5TXAD00290
CV1	CAPACITOR VAR	ECR-HB010A11		5CVAC00134
CV2	CAPACITOR VAR	TZ03Z100FR	10PF	5CVAA00190
FL1	FILTER	DS310-55B222M	100V 0.0022UF	5NXAA00002
IC1	IC	H-6DDJD00018 MB67116 8P		6DDJD00018
IC2	IC	H-6DDJD00018 MB67116 8P		6DDJD00018
IC3	IC	TC5020BP		5DDAE00235
IC4	IC	TC5020BP		5DDAE00235
IC5	IC	NJM3404AD		5DAAN00161
IC6	IC	NJM319D		5DAAN00206
IC7	IC	NJM319D		5DAAN00206
IC8	IC	TC4013BAP		5DDAE00817
IC9	IC	NJM78L08A	8V 100MA	5DAAN00079
IC10	IC	NJM78L08A	8V 100MA	5DAAN00079
IC11	IC	NJM78L05A		5DAAN00046
IC12	IC	MC1496P		5DAAJ00083
IC13	IC	TC74HC00P		5DDAE00439
IC14	IC	TC74HC259P		5DDAE00609
IC15	IC	TC74HC138P		5DDAE00440
IC16	IC	TC74HC138P		5DDAE00440
IC17	IC	CX7925B		5DZCJ00008
IC18	IC	AN6410		5DAAR00057
IC19	IC	SN74LS90N		5DDAL00116
IC20	IC	TC4013BAP		5DDAE00817
IC21	IC	NJM78L05A		5DAAN00046
L1	COIL	LAL03VB471K	470UH	5LCAA00270

PARTS LIST

REF DDS | TITLE CGK-81 | SHEET NO 6

PARTS NO	PARTS NAME	TYPE	DESCRIPTION	CODE
L2	COIL	LALO3VB471K	470UH	5LCAA00270
L3	COIL	LALO3VB121K		5LCAA00440
L4	COIL	LALO3VB101K		5LCAA00333
L5	COIL	LALO3VB221K	220UH	5LCAA00272
L6	COIL	LALO3VB271K		5LCAA00438
L7	COIL	LALO3VB3R9K		5LCAA00338
L8	COIL	LALO3KH2R7M		5LCAA00439
L9	COIL	LALO3VB2R7M		5LCAA00329
L10	COIL	LALO3KH2R7M		5LCAA00439
L11	COIL	LALO3VB2R7M		5LCAA00329
L12	COIL	LALO3VB100K	10UH	5LCAA00273
L13	COIL	LALO3KH2R7M		5LCAA00439
L14	COIL	LALO3VB150K		5LCAA00324
L15	COIL	LALO3VB120K		5LCAA00386
L16	COIL	LALO3VB100K	10UH	5LCAA00273
L17	COIL	LALO3VB3R9K		5LCAA00338
L18	COIL	LALO3VB3R9K		5LCAA00338
L23	COIL	LALO3VB100K	10UH	5LCAA00273
L24	COIL	SC2-45T 3P15		5LZNL00002
L25	COIL	LALO3KH2R2M	2.2UH	5LCAA00326
L26	COIL	LALO3KH2R2M	2.2UH	5LCAA00326
L27	COIL	LALO3VB471K	470UH	5LCAA00270
P13	CONNECTOR	EC1C-22P-2.5DSA	22P	5JWBS00070
P14	CONNECTOR	EC1C-22P-2.5DSA	22P	5JWBS00070
PC1	PCB	H-6PCJD00262A		6PCJD00262
R1	RESISTOR FXD	ERJ-8GEYJ101V	1/8W 100 OHM	5REAG01726
R2	RESISTOR FXD	ERJ-8GEYJ101V	1/8W 100 OHM	5REAG01726
R3	RESISTOR FXD	ERJ-8GEYJ101V	1/8W 100 OHM	5REAG01726
R4	RESISTOR FXD	ERJ-8GEYJ101V	1/8W 100 OHM	5REAG01726
R5	RESISTOR FXD	ERJ-8GEYJ123V	1/8W 12K OHM	5REAG01751
R6	RESISTOR FXD	ERJ-8GEYJ822V		5REAG01749
R7	RESISTOR FXD	ERJ-8GEYJ122V	1/8W 1.2K OHM	5REAG01739
R8	RESISTOR FXD	ERJ-8GEYJ103V	1/8W 10K OHM	5REAG01750
R9	RESISTOR FXD	ERJ-8GEYJ123V	1/8W 12K OHM	5REAG01751
R10	RESISTOR FXD	ERJ-8GEYJ101V	1/8W 100 OHM	5REAG01726

PARTS LIST

REF DDS | TITLE CGK-81 | SHEET NO 7

PARTS NO	PARTS NAME	TYPE	DESCRIPTION	CODE
R11	RESISTOR FXD	ERJ-8GEYJ153V		5REAG01752
R12	RESISTOR FXD	ERJ-8GEYJ153V		5REAG01752
R13	RESISTOR FXD	ERJ-8GEYJ472V		5REAG01746
R14	RESISTOR FXD	ERJ-8GEYJ471V	1/8W 470 OHM	5REAG01734
R15	RESISTOR FXD	ERJ-8GEYJ471V	1/8W 470 OHM	5REAG01734
R16	RESISTOR FXD	ERJ-8GEYJ221V	1/8W 220 OHM	5REAG01730
R17	RESISTOR FXD	ERJ-8GEYJ471V	1/8W 470 OHM	5REAG01734
R18	RESISTOR FXD	ERJ-8GEYJ221V	1/8W 220 OHM	5REAG01730
R19	RESISTOR FXD	ERJ-8GEYJ102V	1/8W 1K OHM	5REAG01738
R20	RESISTOR FXD	ERJ-8GEYJ101V	1/8W 100 OHM	5REAG01726
R21	RESISTOR FXD	ERJ-8GEYJ101V	1/8W 100 OHM	5REAG01726
R22	RESISTOR FXD	ERJ-8GEYJ821V	1/8W 820 OHM	5REAG01737
R23	RESISTOR FXD	ERJ-8GEYJ101V	1/8W 100 OHM	5REAG01726
R24	RESISTOR FXD	ERJ-8GEYJ122V	1/8W 1.2K OHM	5REAG01739
R25	RESISTOR FXD	ERJ-8GEYJ103V	1/8W 10K OHM	5REAG01750
R26	RESISTOR FXD	ERJ-8GEYJ332V	1/8W 3.3K OHM	5REAG01744
R27	RESISTOR FXD	ERJ-8GEYJ101V	1/8W 100 OHM	5REAG01726
R28	RESISTOR FXD	ERJ-8GEYJ332V	1/8W 3.3K OHM	5REAG01744
R29	RESISTOR FXD	ERJ-8GEYJ102V	1/8W 1K OHM	5REAG01738
R30	RESISTOR FXD	ERJ-8GEYJ102V	1/8W 1K OHM	5REAG01738
R32	RESISTOR FXD	ERJ-8GEYJ221V	1/8W 220 OHM	5REAG01730
R33	RESISTOR FXD	ERJ-8GEYJ102V	1/8W 1K OHM	5REAG01738
R34	RESISTOR FXD	ERJ-8GEYJ103V	1/8W 10K OHM	5REAG01750
R35	RESISTOR FXD	ERJ-8GEYJ122V	1/8W 1.2K OHM	5REAG01739
R36	RESISTOR FXD	ERJ-8GEYJ123V	1/8W 12K OHM	5REAG01751
R37	RESISTOR FXD	ERJ-8GEYJ101V	1/8W 100 OHM	5REAG01726
R38	RESISTOR FXD	ERJ-8GEYJ153V		5REAG01752
R39	RESISTOR FXD	ERJ-8GEYJ153V		5REAG01752
R40	RESISTOR FXD	ERJ-8GEYJ472V		5REAG01746
R41	RESISTOR FXD	ERJ-8GEYJ470V	1/8W 47 OHM	5REAG01722
R42	RESISTOR FXD	ERJ-8GEYJ100V	1/8W 10 OHM	5REAG01714
R43	RESISTOR FXD	ERJ-8GEYJ100V	1/8W 10 OHM	5REAG01714
R44	RESISTOR FXD	ERJ-8GEYJ151V	1/8W 150 OHM	5REAG01728
R45	RESISTOR FXD	ERJ-8GEYJ101V	1/8W 100 OHM	5REAG01726
R46	RESISTOR FXD	ERJ-8GEYJ221V	1/8W 220 OHM	5REAG01730

PARTS LIST

REF DDS | TITLE CGK-81 | SHEET NO 8

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-8GEY0R00V	0 OHM	SREAG01775
R54	RESISTOR FXD	ERJ-8GEYJ103V	1/8W 10K OHM	SREAG01750
R55	RESISTOR FXD	ERJ-8GEYJ221V	1/8W 220 OHM	SREAG01730
R56	RESISTOR FXD	ERJ-8GEYJ153V		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-8GEY0R00V	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	ERJ-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

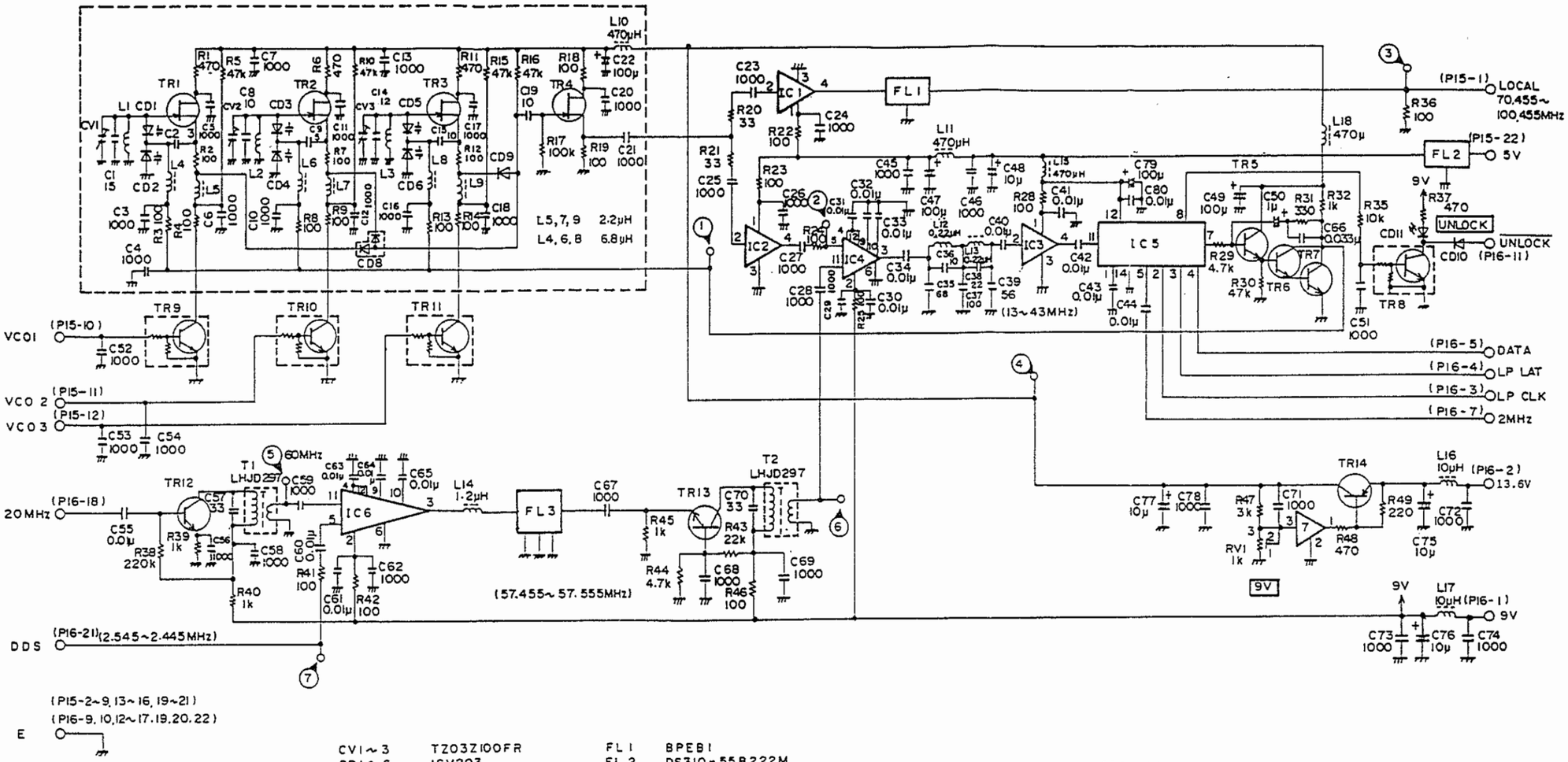
REF DDS | TITLE CGK-81 | SHEET NO. 9

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	208-12X-ME1		SREAD00716
RA2	RESISTOR FXD	208-12X-ME1		SREAD00716
RA3	RESISTOR FXD	208-12X-ME1		SREAD00716
RJ1	RESISTOR FXD	ERJ-8GEY0R00V	0 OHM	SREAG01775
RJ2	RESISTOR FXD	ERJ-8GEY0R00V	0 OHM	SREAG01775
RV1	RESISTOR VAR	EVN-D1AA00B13	1K OHM	SRVAB00313
RV2	RESISTOR VAR	EVN-D1AA00B13	1K OHM	SRVAB00313
RV3	RESISTOR VAR	EVN-D4AA00B54		SRVAB00317
RV4	RESISTOR VAR	EVN-D4AA00B54		SRVAB00317
T1	RF XFMR	H-6LHJD00297		6LHJD00297
TP1	TEST TERMINAL	PCN6-PEA		SJD4A00364

PARTS LIST

REF DDS | TITLE CGK-81 | SHEET NO 10

PARTS NO	PARTS NAME	TYPE	DESCRIPTION	CODE
TP2	TEST TERMINAL	PCN6-PEA		5JDAA00364
TP3	TEST TERMINAL	PCN6-PEA		5JDAA00364
TP4	TEST TERMINAL	PCN6-PEA		5JDAA00364
TP5	TEST TERMINAL	PCN6-PEA		5JDAA00364
TP6	TEST TERMINAL	PCN6-PEA		5JDAA00364
TP7	TEST TERMINAL	PCN6-PEA		5JDAA00364
TP8	TEST TERMINAL	PCN6-PEA		5JDAA00364
TP9	TEST TERMINAL	PCN6-PEA		5JDAA00364
TR1	TRANSISTOR	2SA1162-Y TE85L		5TAAG00182
TR2	TRANSISTOR	2SC2714Y TE85L		5TCAF00436
TR3	TRANSISTOR	2SA1162-Y TE85L		5TAAG00182
TR4	TRANSISTOR	2SC2714Y TE85L		5TCAF00436
TR5	TRANSISTOR	2SC2714Y TE85L		5TCAF00436
TR6	TRANSISTOR	2SC2714Y TE85L		5TCAF00436
TR7	TRANSISTOR	2SC2714Y TE85L		5TCAF00436
TR8	TRANSISTOR	2SC2714Y TE85L		5TCAF00436
TR9	TRANSISTOR	2SK210BL-TE85L		5TKAA00189
TR10	TRANSISTOR	2SK210BL-TE85L		5TKAA00189
TR11	TRANSISTOR	2SC2714Y TE85L		5TCAF00436
TR12	TRANSISTOR	2SC3324GR TE85L		5TCAF00711
TR13	TRANSISTOR	2SC3324GR TE85L		5TCAF00711
TR14	TRANSISTOR	2SC3324GR TE85L		5TCAF00711
TR15	TRANSISTOR	2SC2714Y TE85L		5TCAF00436
TR16	TRANSISTOR	2SC2712Y TE85L		5TAAG00186
TR17	TRANSISTOR	2SC3398-TB		5TCAZ00011
TR18	TRANSISTOR	2SC3398-TB		5TCAZ00011
TR19	TRANSISTOR	2SC3398-TB		5TCAZ00011



CV1~3	TZ03Z100FR
CD1~6	1SV203
CD8, 9	HSM2694
CD10	1SS226
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	µPC1651G
IC4, 6	SN76514N
IC5	CX7925B
IC7	M5236L
L1	SC2-55T
L2	SC2-45T
L3	SC2-35T

6PCJD00261A

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

Figure 6-18 LOOP1 Unit (CGA-145) Schematic diagram

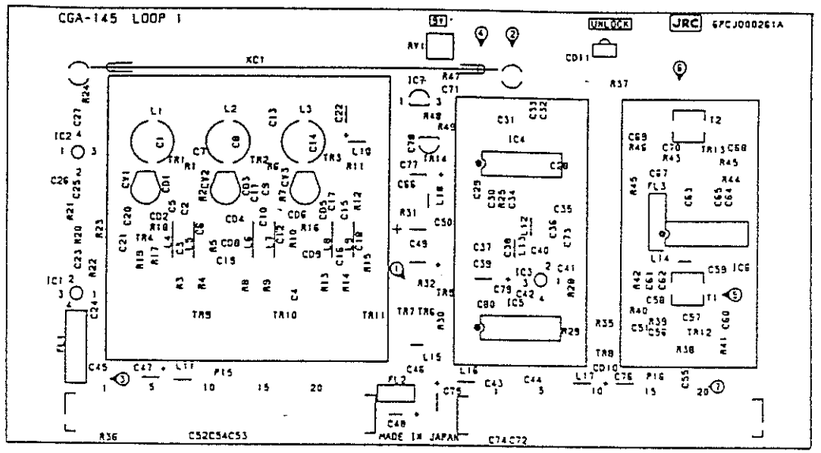


Figure 6-19 LOOP1 Unit (CGA-145) Component Layout

PARTS LIST

	LOOP1	TITLE	CGA-145		SHEET NO 1
PARTS NO	PARTS NAME	TYPE	DESCRIPTION	CODE	
C1	CAP,FXD CER	C3216CH1H150J-E-TP	15PF	5CAAD00787	
C2	CAP,FXD CER	C3216CH1H030C-E-TP	3PF	5CAAD00796	
C3	CAP,FXD CER	C3216SL1H102J-E-TP	1000PF	5CAAD00782	
C4	CAP,FXD CER	C3216SL1H102J-E-TP	1000PF	5CAAD00782	
C5	CAP,FXD CER	C3216SL1H102J-E-TP	1000PF	5CAAD00782	
C6	CAP,FXD CER	C3216SL1H102J-E-TP	1000PF	5CAAD00782	
C7	CAP,FXD CER	C3216SL1H102J-E-TP	1000PF	5CAAD00782	
C8	CAP,FXD CER	C3216CH1H100J-E-TP		5CAAD00862	
C9	CAP,FXD CER	C3216CH1H050C-E-TP	5PF	5CAAD00800	
C10	CAP,FXD CER	C3216SL1H102J-E-TP	1000PF	5CAAD00782	
C11	CAP,FXD CER	C3216SL1H102J-E-TP	1000PF	5CAAD00782	
C12	CAP,FXD CER	C3216SL1H102J-E-TP	1000PF	5CAAD00782	
C13	CAP,FXD CER	C3216SL1H102J-E-TP	1000PF	5CAAD00782	
C14	CAP,FXD CER	C3216CH1H120J-E-TP	12P	5CAAD00784	
C15	CAP,FXD CER	C3216CH1H100D-E-TP	10PF	5CAAD00785	
C16	CAP,FXD CER	C3216SL1H102J-E-TP	1000PF	5CAAD00782	
C17	CAP,FXD CER	C3216SL1H102J-E-TP	1000PF	5CAAD00782	
C18	CAP,FXD CER	C3216SL1H102J-E-TP	1000PF	5CAAD00782	
C19	CAP,FXD CER	C3216CH1H100D-E-TP	10PF	5CAAD00785	
C20	CAP,FXD CER	C3216SL1H102J-E-TP	1000PF	5CAAD00782	
C21	CAP,FXD CER	C3216SL1H102J-E-TP	1000PF	5CAAD00782	
C22	CAP,FXD ELCTLT	ECE-A1EU101B		5CEAA01813	
C23	CAP,FXD CER	C3216SL1H102J-E-TP	1000PF	5CAAD00782	
C24	CAP,FXD CER	C3216SL1H102J-E-TP	1000PF	5CAAD00782	
C25	CAP,FXD CER	C3216SL1H102J-E-TP	1000PF	5CAAD00782	
C26	CAP,FXD CER	C3216SL1H102J-E-TP	1000PF	5CAAD00782	
C27	CAP,FXD CER	C3216SL1H102J-E-TP	1000PF	5CAAD00782	
C28	CAP,FXD CER	C3216SL1H102J-E-TP	1000PF	5CAAD00782	
C29	CAP,FXD CER	C3216SL1H102J-E-TP	1000PF	5CAAD00782	
C30	CAP,FXD CER	C3216JB1H103K-E-TP	0.01UF	5CAAD00789	
C31	CAP,FXD CER	C3216JB1H103K-E-TP	0.01UF	5CAAD00789	
C32	CAP,FXD CER	C3216JB1H103K-E-TP	0.01UF	5CAAD00789	
C33	CAP,FXD CER	C3216JB1H103K-E-TP	0.01UF	5CAAD00789	
C34	CAP,FXD CER	C3216JB1H103K-E-TP	0.01UF	5CAAD00789	
C35	CAP,FXD CER	C3216CH1H680J-E-TP	68PF	5CAAD00929	

PARTS LIST

	LOOP1	TITLE	CGA-145		SHEET NO 2
PARTS NO	PARTS NAME	TYPE	DESCRIPTION	CODE	
C36	CAP,FXD CER	C3216CH1H100D-E-TP	10PF	5CAAD00785	
C37	CAP,FXD CER	C3216CH1H101J-E-TP	100PF	5CAAD00780	
C38	CAP,FXD CER	C3216CH1H220J-E-TP	22P	5CAAD00869	
C39	CAP,FXD CER	C3216CH1H560J-E-TP		5CAAD00863	
C40	CAP,FXD CER	C3216JB1H103K-E-TP	0.01UF	5CAAD00789	
C41	CAP,FXD CER	C3216JB1H103K-E-TP	0.01UF	5CAAD00789	
C42	CAP,FXD CER	C3216JB1H103K-E-TP	0.01UF	5CAAD00789	
C43	CAP,FXD CER	C3216JB1H103K-E-TP	0.01UF	5CAAD00789	
C44	CAP,FXD CER	C3216JB1H103K-E-TP	0.01UF	5CAAD00789	
C45	CAP,FXD CER	C3216SL1H102J-E-TP	1000PF	5CAAD00782	
C46	CAP,FXD CER	C3216SL1H102J-E-TP	1000PF	5CAAD00782	
C47	CAP,FXD ELCTLT	ECE-A1EU101B		5CEAA01813	
C48	CAP,FXD ELCTLT	ECE-A1EU100B		5CEAA01864	
C49	CAP,FXD ELCTLT	ECE-A1EU101B		5CEAA01813	
C50	CAP,FXD TANTAL	202L3502 105KB	35V 1UF	5CSAC00982	
C51	CAP,FXD CER	C3216SL1H102J-E-TP	1000PF	5CAAD00782	
C52	CAP,FXD CER	C3216SL1H102J-E-TP	1000PF	5CAAD00782	
C53	CAP,FXD CER	C3216SL1H102J-E-TP	1000PF	5CAAD00782	
C54	CAP,FXD CER	C3216SL1H102J-E-TP	1000PF	5CAAD00782	
C55	CAP,FXD CER	C3216JB1H103K-E-TP	0.01UF	5CAAD00789	
C56	CAP,FXD CER	C3216SL1H102J-E-TP	1000PF	5CAAD00782	
C57	CAP,FXD CER	C3216CH1H330J-E-TP	33PF	5CAAD00794	
C58	CAP,FXD CER	C3216SL1H102J-E-TP	1000PF	5CAAD00782	
C59	CAP,FXD CER	C3216SL1H102J-E-TP	1000PF	5CAAD00782	
C60	CAP,FXD CER	C3216JB1H103K-E-TP	0.01UF	5CAAD00789	
C61	CAP,FXD CER	C3216JB1H103K-E-TP	0.01UF	5CAAD00789	
C62	CAP,FXD CER	C3216SL1H102J-E-TP	1000PF	5CAAD00782	
C63	CAP,FXD CER	C3216JB1H103K-E-TP	0.01UF	5CAAD00789	
C64	CAP,FXD CER	C3216JB1H103K-E-TP	0.01UF	5CAAD00789	
C65	CAP,FXD CER	C3216JB1H103K-E-TP	0.01UF	5CAAD00789	
C66	CAP,FXD CER	C3216X7R1H333K-E-TP	50V 0.033U	5CAAD01357	
C67	CAP,FXD CER	C3216SL1H102J-E-TP	1000PF	5CAAD00782	
C68	CAP,FXD CER	C3216SL1H102J-E-TP	1000PF	5CAAD00782	
C69	CAP,FXD CER	C3216SL1H102J-E-TP	1000PF	5CAAD00782	
C70	CAP,FXD CER	C3216CH1H330J-E-TP	33PF	5CAAD00794	

PARTS LIST

	LOOP1	TITLE CGA-145		SHEET NO 3
PARTS NO	PARTS NAME	TYPE	DESCRIPTION	CODE
C71	CAP,FXD CER	C3216SL1H102J-E-TP	1000PF	5CAAD00782
C72	CAP,FXD CER	C3216SL1H102J-E-TP	1000PF	5CAAD00782
C73	CAP,FXD CER	C3216SL1H102J-E-TP	1000PF	5CAAD00782
C74	CAP,FXD CER	C3216SL1H102J-E-TP	1000PF	5CAAD00782
C75	CAP,FXD ELCTLT	ECE-A1EU100B		5CEAA01864
C76	CAP,FXD ELCTLT	ECE-A1EU100B		5CEAA01864
C77	CAP,FXD TANTAL	202L1602 106KB		5CSAC00932
C78	CAP,FXD CER	C3216SL1H102J-E-TP	1000PF	5CAAD00782
C79	CAP,FXD ELCTLT	ECE-A1EU101B		5CEAA01813
C80	CAP,FXD CER	C3216JB1H103K-E-TP	0.01UF	5CAAD00789
CD1	DIODE	1SV203-7TLC		5TXAE00678
CD2	DIODE	1SV203-7TLC		5TXAE00678
CD3	DIODE	1SV203-7TLC		5TXAE00678
CD4	DIODE	1SV203-7TLC		5TXAE00678
CD5	DIODE	1SV203-7TLC		5TXAE00678
CD6	DIODE	1SV203-7TLC		5TXAE00678
CD8	DIODE	HSM2694TLC		5TXAE00627
CD9	DIODE	HSM2694TLC		5TXAE00627
CD10	DIODE	1SS226 TE85L		5TXAD00320
CD11	DIODE	MPR4371F		5TXBG00037
CV1	CAPACITOR VAR	TZ03Z100FR	10PF	5CVAA00190
CV2	CAPACITOR VAR	TZ03Z100FR	10PF	5CVAA00190
CV3	CAPACITOR VAR	TZ03Z100FR	10PF	5CVAA00190
FL1	FILTER	BPEB1		5NBAG00011
FL2	FILTER	DS310-55B222M	100V 0.0022UF	5NXAA00002
FL3	FILTER	SAFS8MH70Z		5NRAA00191
IC1	IC	UPC1651G		5DAAA00171
IC2	IC	UPC1651G		5DAAA00171
IC3	IC	UPC1651G		5DAAA00171
IC4	IC	SN76514N		5DDAL00251
IC5	IC	CX7925B		5DZCJ00008
IC6	IC	SN76514N		5DDAL00251
IC7	IC	M5236L		5DDAB00170
KC1	CABLE	H-6ZCJD35003		6ZCJD35003
L1	COIL	SC2-55T		5LZNL00001

PARTS LIST

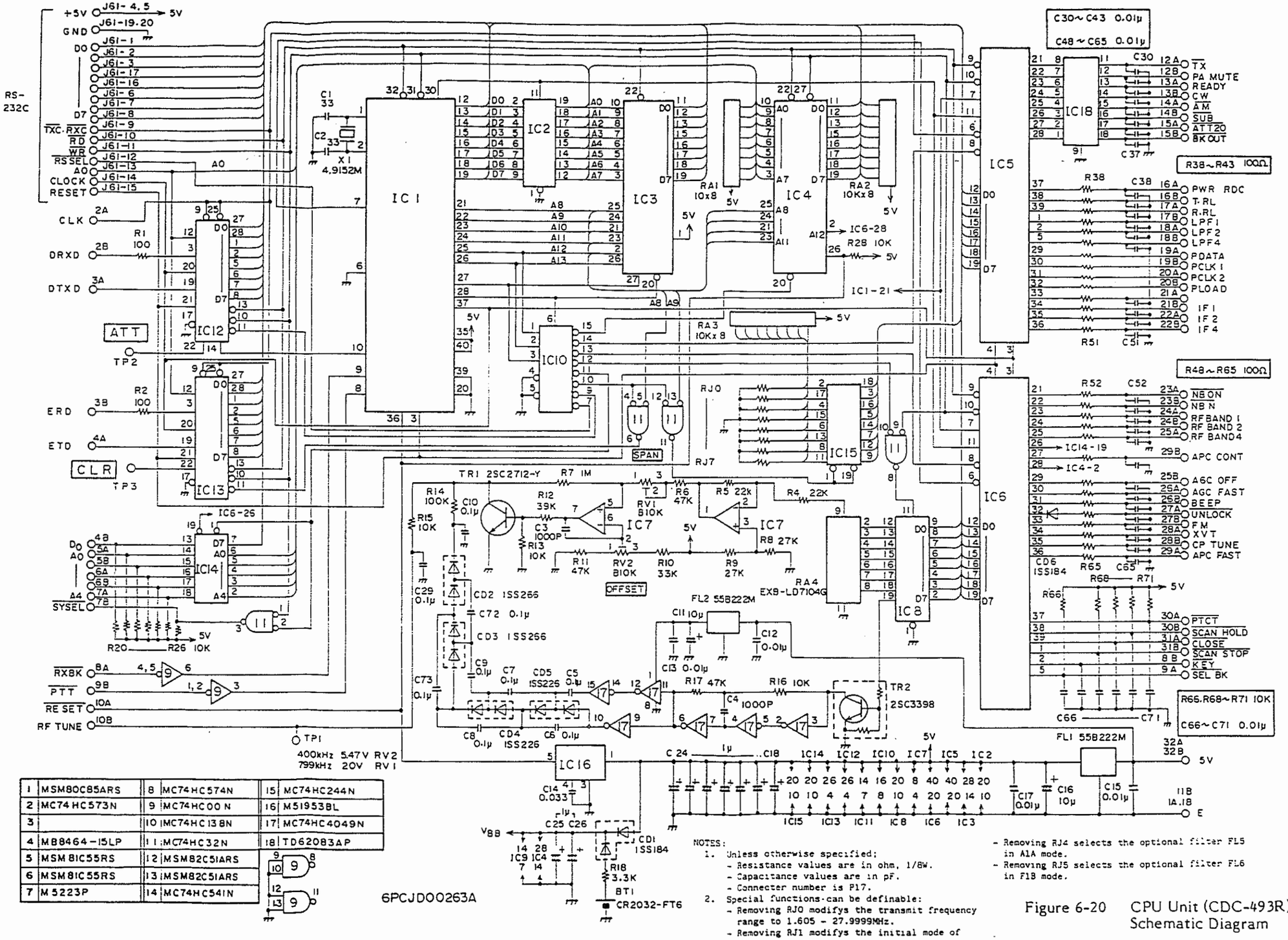
	LOOP1	TITLE CGA-145		SHEET NO 4
PARTS NO	PARTS NAME	TYPE	DESCRIPTION	CODE
L2	COIL	SC2-45T		5LZNL00002
L3	COIL	SC2-35T		5LZNL00003
L4	COIL	LALO3KH6R8K		5LCAA00437
L5	COIL	LALO3KH2R2M	2.2UH	5LCAA00326
L6	COIL	LALO3KH6R8K		5LCAA00437
L7	COIL	LALO3KH2R2M	2.2UH	5LCAA00326
L8	COIL	LALO3KH6R8K		5LCAA00437
L9	COIL	LALO3KH2R2M	2.2UH	5LCAA00326
L10	COIL	LALO3VB471K	470UH	5LCAA00270
L11	COIL	LALO3VB471K	470UH	5LCAA00270
L12	COIL	LALO3VBR22M	0.22UH	5LCAA00280
L13	COIL	LALO3VBR22M	0.22UH	5LCAA00280
L14	COIL	LALO3VB1R2M		5LCAA00334
L15	COIL	LALO3VB471K	470UH	5LCAA00270
L16	COIL	LALO3VB100K	10UH	5LCAA00273
L17	COIL	LALO3VB100K	10UH	5LCAA00273
L18	COIL	LALO3VB471K	470UH	5LCAA00270
P15	CONNECTOR	EC1C-22P-2.5DSA	22P	5JWBS00070
P16	CONNECTOR	EC1C-22P-2.5DSA	22P	5JWBS00070
PC1	PCB	H-6PCJD00261A		6PCJD00261
R1	RESISTOR FXD	ERJ-8GEYJ471V	1/8W 470 OHM	5REAG01734
R2	RESISTOR FXD	ERJ-8GEYJ101V	1/8W 100 OHM	5REAG01726
R3	RESISTOR FXD	ERJ-8GEYJ101V	1/8W 100 OHM	5REAG01726
R4	RESISTOR FXD	ERJ-8GEYJ101V	1/8W 100 OHM	5REAG01726
R5	RESISTOR FXD	ERJ-8GEYJ473V		5REAG01758
R6	RESISTOR FXD	ERJ-8GEYJ471V	1/8W 470 OHM	5REAG01734
R7	RESISTOR FXD	ERJ-8GEYJ101V	1/8W 100 OHM	5REAG01726
R8	RESISTOR FXD	ERJ-8GEYJ101V	1/8W 100 OHM	5REAG01726
R9	RESISTOR FXD	ERJ-8GEYJ101V	1/8W 100 OHM	5REAG01726
R10	RESISTOR FXD	ERJ-8GEYJ473V		5REAG01758
R11	RESISTOR FXD	ERJ-8GEYJ471V	1/8W 470 OHM	5REAG01734
R12	RESISTOR FXD	ERJ-8GEYJ101V	1/8W 100 OHM	5REAG01726
R13	RESISTOR FXD	ERJ-8GEYJ101V	1/8W 100 OHM	5REAG01726
R14	RESISTOR FXD	ERJ-8GEYJ101V	1/8W 100 OHM	5REAG01726
R15	RESISTOR FXD	ERJ-8GEYJ473V		5REAG01758

PARTS LIST

						TITLE		SHEET NO.
						LOOP1	CGA-145	5
PARTS NO	PARTS NAME		TYPE	DESCRIPTION	CODE			
R16	RESISTOR	FXD	ERJ-8GEYJ473V		5REAG01758			
R17	RESISTOR	FXD	ERJ-8GEYJ104V	1/8W 100K OHM	5REAG01762			
R18	RESISTOR	FXD	ERJ-8GEYJ101V	1/8W 100 OHM	5REAG01726			
R19	RESISTOR	FXD	ERJ-8GEYJ101V	1/8W 100 OHM	5REAG01726			
R20	RESISTOR	FXD	ERJ-8GEYJ330V	1/8W 33 OHM	5REAG01720			
R21	RESISTOR	FXD	ERJ-8GEYJ330V	1/8W 33 OHM	5REAG01720			
R22	RESISTOR	FXD	ERJ-8GEYJ101V	1/8W 100 OHM	5REAG01726			
R23	RESISTOR	FXD	ERJ-8GEYJ101V	1/8W 100 OHM	5REAG01726			
R24	RESISTOR	FXD	ERJ-8GEYJ101V	1/8W 100 OHM	5REAG01726			
R25	RESISTOR	FXD	ERJ-8GEYJ101V	1/8W 100 OHM	5REAG01726			
R28	RESISTOR	FXD	ERJ-8GEYJ101V	1/8W 100 OHM	5REAG01726			
R29	RESISTOR	FXD	ERJ-8GEYJ472V		5REAG01746			
R30	RESISTOR	FXD	ERJ-8GEYJ473V		5REAG01758			
R31	RESISTOR	FXD	ERJ-8GEYJ331V	1/8W 330 OHM	5REAG01732			
R32	RESISTOR	FXD	ERJ-8GEYJ102V	1/8W 1K OHM	5REAG01738			
R35	RESISTOR	FXD	ERJ-8GEYJ103V	1/8W 10K OHM	5REAG01750			
R36	RESISTOR	FXD	ERJ-8GEYJ101V	1/8W 100 OHM	5REAG01726			
R37	RESISTOR	FXD	ERJ-8GEYJ471V	1/8W 470 OHM	5REAG01734			
R38	RESISTOR	FXD	ERJ-8GEYJ224V		5REAG01766			
R39	RESISTOR	FXD	ERJ-8GEYJ102V	1/8W 1K OHM	5REAG01738			
R40	RESISTOR	FXD	ERJ-8GEYJ102V	1/8W 1K OHM	5REAG01738			
R41	RESISTOR	FXD	ERJ-8GEYJ101V	1/8W 100 OHM	5REAG01726			
R42	RESISTOR	FXD	ERJ-8GEYJ101V	1/8W 100 OHM	5REAG01726			
R43	RESISTOR	FXD	ERJ-8GEYJ223V	1/8W 22K OHM	5REAG01754			
R44	RESISTOR	FXD	ERJ-8GEYJ472V		5REAG01746			
R45	RESISTOR	FXD	ERJ-8GEYJ102V	1/8W 1K OHM	5REAG01738			
R46	RESISTOR	FXD	ERJ-8GEYJ101V	1/8W 100 OHM	5REAG01726			
R47	RESISTOR	FXD	ERJ-8GEYJ302V	1/8W 3K OHM	5REAG02211			
R48	RESISTOR	FXD	ERJ-8GEYJ471V	1/8W 470 OHM	5REAG01734			
R49	RESISTOR	FXD	ERJ-8GEYJ221V	1/8W 220 OHM	5REAG01730			
RV1	RESISTOR	VAR	EVM-D1AA00B13	1K OHM	5RVAB00313			
T1	RF XFMR		H-6LHJD00297		6LHJD00297			
T2	RF XFMR		H-6LHJD00297		6LHJD00297			
TP1	TEST TERMINAL		PCN6-PEA		5JDAA00364			
TP2	TEST TERMINAL		PCN6-PEA		5JDAA00364			

PARTS LIST

						TITLE		SHEET NO.
						LOOP1	CGA-145	6
PARTS NO	PARTS NAME		TYPE	DESCRIPTION	CODE			
TP3	TEST TERMINAL		PCN6-PEA		5JDAA00364			
TP4	TEST TERMINAL		PCN6-PEA		5JDAA00364			
TP5	TEST TERMINAL		PCN6-PEA		5JDAA00364			
TP6	TEST TERMINAL		PCN6-PEA		5JDAA00364			
TP7	TEST TERMINAL		PCN6-PEA		5JDAA00364			
TR1	TRANSISTOR		2SK210BL-TE85L		5TKAA00189			
TR2	TRANSISTOR		2SK210BL-TE85L		5TKAA00189			
TR3	TRANSISTOR		2SK210BL-TE85L		5TKAA00189			
TR4	TRANSISTOR		2SK210BL-TE85L		5TKAA00189			
TR5	TRANSISTOR		2SC3324GR TE85L		5TCAF00711			
TR6	TRANSISTOR		2SC3324GR TE85L		5TCAF00711			
TR7	TRANSISTOR		2SC3324GR TE85L		5TCAF00711			
TR8	TRANSISTOR		2SC3398-TB		5TCAZ00011			
TR9	TRANSISTOR		2SC3398-TB		5TCAZ00011			
TR10	TRANSISTOR		2SC3398-TB		5TCAZ00011			
TR11	TRANSISTOR		2SC3398-TB		5TCAZ00011			
TR12	TRANSISTOR		2SC2714Y TE85L		5TCAF00436			
TR13	TRANSISTOR		2SC2714Y TE85L		5TCAF00436			
TR14	TRANSISTOR		2SA1015-Y		5TAAG0007D			



1	MSM80C85ARS	8	MC74HC574N	15	MC74HC244N
2	MC74HC573N	9	MC74HC00N	16	M51953BL
3		10	MC74HC138N	17	MC74HC4049N
4	MB8464-15LP	11	MC74HC32N	18	TD62083AP
5	MSM81C55RS	12	MSM82C51ARS		
6	MSM81C55RS	13	MSM82C51ARS		
7	M5223P	14	MC74HC541N		

6PCJD00263A

NOTES:
1. Unless otherwise specified;
   - Resistance values are in ohm, 1/8W.
   - Capacitance values are in pF.
   - Connecter number is P17.
2. Special functions can be definable:
   - Removing RJ0 modifys the transmit frequency range to 1.605 - 27.9999MHz.
   - Removing RJ1 modifys the initial mode of 2182 key to H3E.
   - Removing RJ2 enables the LSB transmission.
   - Removing RJ3 inhibits the direct frequency mode.
   - Removing RJ4 selects the optional filter FL5 in A1A mode.
   - Removing RJ5 selects the optional filter FL6 in F1B mode.

Figure 6-20 CPU Unit (CDC-493R) Schematic Diagram

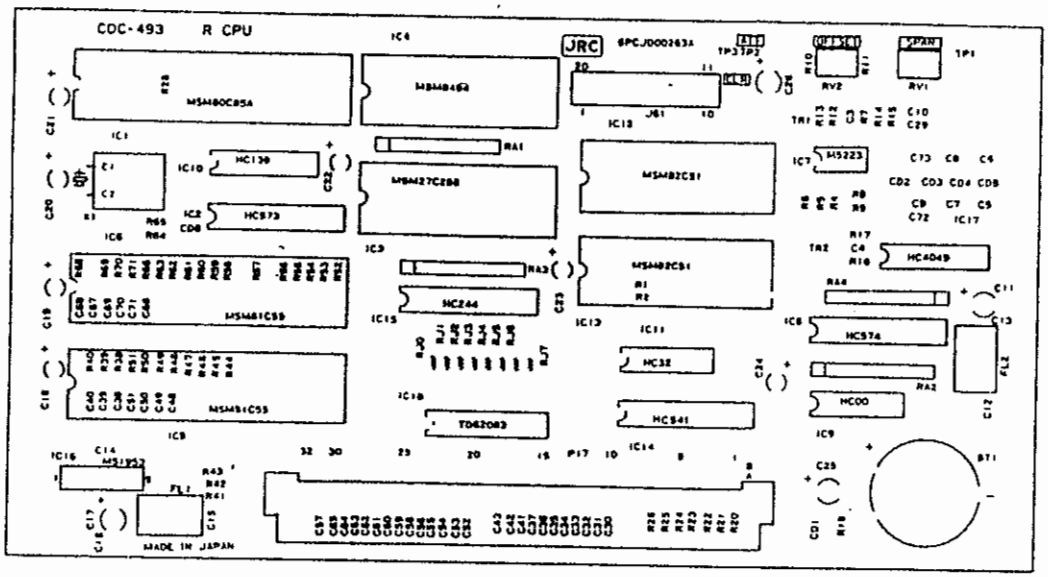


Figure 6-21 CPU Unit (CDC-493R) Component Layout

PARTS LIST

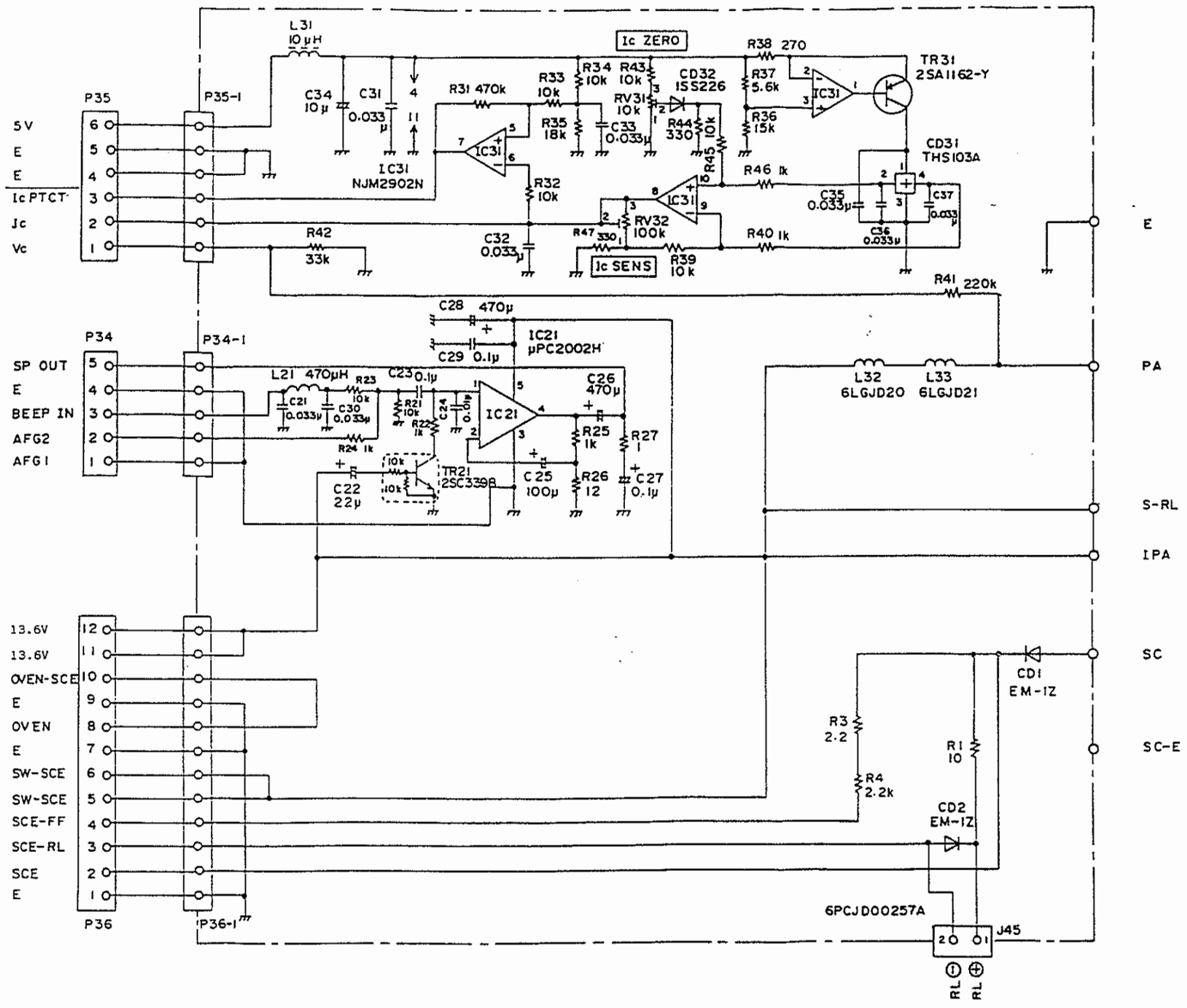
TITLE	CPU	CDC-493	SHEET NO 4

PARTS NO	PARTS NAME	TYPE	DESCRIPTION	CODE
R10	RESISTOR FXD	ERJ-8GEYJ333V		5REAG01756
R11	RESISTOR FXD	ERJ-8GEYJ473V		5REAG01758
R12	RESISTOR FXD	ERJ-8GEYJ393V		5REAG01757
R13	RESISTOR FXD	ERJ-8GEYJ103V	1/8W 10K OHM	5REAG01750
R14	RESISTOR FXD	ERJ-8GEYJ104V	1/8W 100K OHM	5REAG01762
R15	RESISTOR FXD	ERJ-8GEYJ103V	1/8W 10K OHM	5REAG01750
R16	RESISTOR FXD	ERJ-8GEYJ103V	1/8W 10K OHM	5REAG01750
R17	RESISTOR FXD	ERJ-8GEYJ473V		5REAG01758
R18	RESISTOR FXD	ERJ-8GEYJ332V	1/8W 3.3K OHM	5REAG01744
R20	RESISTOR FXD	ERJ-8GEYJ103V	1/8W 10K OHM	5REAG01750
R21	RESISTOR FXD	ERJ-8GEYJ103V	1/8W 10K OHM	5REAG01750
R22	RESISTOR FXD	ERJ-8GEYJ103V	1/8W 10K OHM	5REAG01750
R23	RESISTOR FXD	ERJ-8GEYJ103V	1/8W 10K OHM	5REAG01750
R24	RESISTOR FXD	ERJ-8GEYJ103V	1/8W 10K OHM	5REAG01750
R25	RESISTOR FXD	ERJ-8GEYJ103V	1/8W 10K OHM	5REAG01750
R26	RESISTOR FXD	ERJ-8GEYJ103V	1/8W 10K OHM	5REAG01750
R28	RESISTOR FXD	ERJ-8GEYJ103V	1/8W 10K OHM	5REAG01750
R38	RESISTOR FXD	ERJ-8GEYJ101V	1/8W 100 OHM	5REAG01726
R39	RESISTOR FXD	ERJ-8GEYJ101V	1/8W 100 OHM	5REAG01726
R40	RESISTOR FXD	ERJ-8GEYJ101V	1/8W 100 OHM	5REAG01726
R41	RESISTOR FXD	ERJ-8GEYJ101V	1/8W 100 OHM	5REAG01726
R42	RESISTOR FXD	ERJ-8GEYJ101V	1/8W 100 OHM	5REAG01726
R43	RESISTOR FXD	ERJ-8GEYJ101V	1/8W 100 OHM	5REAG01726
R44	RESISTOR FXD	ERJ-8GEYJ101V	1/8W 100 OHM	5REAG01726
R45	RESISTOR FXD	ERJ-8GEYJ101V	1/8W 100 OHM	5REAG01726
R46	RESISTOR FXD	ERJ-8GEYJ101V	1/8W 100 OHM	5REAG01726
R47	RESISTOR FXD	ERJ-8GEYJ101V	1/8W 100 OHM	5REAG01726
R48	RESISTOR FXD	ERJ-8GEYJ101V	1/8W 100 OHM	5REAG01726
R49	RESISTOR FXD	ERJ-8GEYJ101V	1/8W 100 OHM	5REAG01726
R50	RESISTOR FXD	ERJ-8GEYJ101V	1/8W 100 OHM	5REAG01726
R51	RESISTOR FXD	ERJ-8GEYJ101V	1/8W 100 OHM	5REAG01726
R52	RESISTOR FXD	ERJ-8GEYJ101V	1/8W 100 OHM	5REAG01726
R53	RESISTOR FXD	ERJ-8GEYJ101V	1/8W 100 OHM	5REAG01726
R54	RESISTOR FXD	ERJ-8GEYJ101V	1/8W 100 OHM	5REAG01726
R55	RESISTOR FXD	ERJ-8GEYJ101V	1/8W 100 OHM	5REAG01726

PARTS LIST

TITLE	CPU	CDC-493	SHEET NO 5

PARTS NO	PARTS NAME	TYPE	DESCRIPTION	CODE
R56	RESISTOR FXD	ERJ-8GEYJ101V	1/8W 100 OHM	5REAG01726
R57	RESISTOR FXD	ERJ-8GEYJ101V	1/8W 100 OHM	5REAG01726
R58	RESISTOR FXD	ERJ-8GEYJ101V	1/8W 100 OHM	5REAG01726
R59	RESISTOR FXD	ERJ-8GEYJ101V	1/8W 100 OHM	5REAG01726
R60	RESISTOR FXD	ERJ-8GEYJ101V	1/8W 100 OHM	5REAG01726
R61	RESISTOR FXD	ERJ-8GEYJ101V	1/8W 100 OHM	5REAG01726
R62	RESISTOR FXD	ERJ-8GEYJ101V	1/8W 100 OHM	5REAG01726
R63	RESISTOR FXD	ERJ-8GEYJ101V	1/8W 100 OHM	5REAG01726
R64	RESISTOR FXD	ERJ-8GEYJ101V	1/8W 100 OHM	5REAG01726
R65	RESISTOR FXD	ERJ-8GEYJ101V	1/8W 100 OHM	5REAG01726
R66	RESISTOR FXD	ERJ-8GEYJ103V	1/8W 10K OHM	5REAG01750
R68	RESISTOR FXD	ERJ-8GEYJ103V	1/8W 10K OHM	5REAG01750
R69	RESISTOR FXD	ERJ-8GEYJ103V	1/8W 10K OHM	5REAG01750
R70	RESISTOR FXD	ERJ-8GEYJ103V	1/8W 10K OHM	5REAG01750
R71	RESISTOR FXD	ERJ-8GEYJ103V	1/8W 10K OHM	5REAG01750
RA1	RESISTOR	EXB-F9E103JY		5RZAS00499
RA2	RESISTOR	EXB-F9E103JY		5RZAS00499
RA3	RESISTOR	EXB-F9E103JY		5RZAS00499
RA4	RESISTOR	EXB-LD7104G		5RZAS00180
RJ0	RESISTOR FXD	ERD-25UJ1R0T	1 OHM	5RDAA01733
RJ1	RESISTOR FXD	ERD-25UJ1R0T	1 OHM	5RDAA01733
RJ2	RESISTOR FXD	ERD-25UJ1R0T	1 OHM	5RDAA01733
RJ3	RESISTOR FXD	ERD-25UJ1R0T	1 OHM	5RDAA01733
RJ4	RESISTOR FXD	ERD-25UJ1R0T	1 OHM	5RDAA01733
RJ5	RESISTOR FXD	ERD-25UJ1R0T	1 OHM	5RDAA01733
RJ6	RESISTOR FXD	ERD-25UJ1R0T	1 OHM	5RDAA01733
RJ7	RESISTOR FXD	ERD-25UJ1R0T	1 OHM	5RDAA01733
RV1	RESISTOR VAR	EVN-D1AA00B14	10K OHM	5RVAB00324
RV2	RESISTOR VAR	EVN-D1AA00B14	10K OHM	5RVAB00324
TP1	TEST TERMINAL	PCN6-PEA		5JDAA00364
TP2	TEST TERMINAL	PCN6-PEA		5JDAA00364
TP3	TEST TERMINAL	PCN6-PEA		5JDAA00364
TR1	TRANSISTOR	2SC2712Y TE85L		5TAAG00186
TR2	TRANSISTOR	2SC3398-TB		5TCAZ00011
X1	CRYSTAL	LN-X-0008 F=4.9152MH Z		5XHAA00422



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

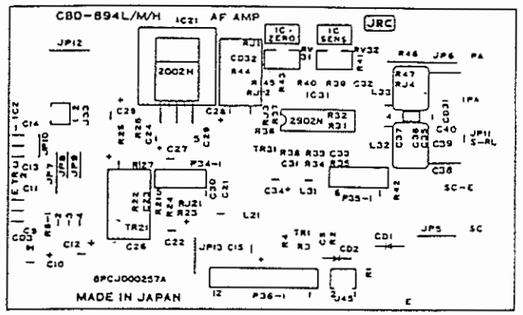


Figure 6-23 AF AMP Unit (CBD-894L) Component Layout

AF AMP CBD-894L

PARTS NO	PARTS NAME	TYPE	DESCRIPTION	CODE
C21	CAP,FXD CER	C3216X7R1H333K-E-TP	50V 0.033U	SCAAD01357
C22	CAP,FXD ELCTLT	ECEA1EU220B		SCEAA02323
C23	CAP,FXD CER	C3216X7R1E104K-E-TP	0.1U	SCAAD01237
C24	CAP,FXD CER	C3216JB1H103K-E-TP	0.01UF	SCAAD00789
C25	CAP,FXD ELCTLT	ECE-A1EU101B		SCEAA01813
C26	CAP,FXD ELCTLT	ECEA1EU471	25V 470UF	SCEAA01756
C27	CAP,FXD TANTAL	293D335D2 10K-B		SCSAC01068
C28	CAP,FXD ELCTLT	ECEA1EU471	25V 470UF	SCEAA01756
C29	CAP,FXD CER	C3216X7R1E104K-E-TP	0.1U	SCAAD01237
C30	CAP,FXD CER	C3216X7R1H333K-E-TP	50V 0.033U	SCAAD01357
C31	CAP,FXD CER	C3216X7R1H333K-E-TP	50V 0.033U	SCAAD01357
C32	CAP,FXD CER	C3216X7R1H333K-E-TP	50V 0.033U	SCAAD01357
C33	CAP,FXD CER	C3216X7R1H333K-E-TP	50V 0.033U	SCAAD01357
C34	CAP,FXD ELCTLT	ECE-A1EU100B		SCEAA01864
C35	CAP,FXD CER	C3216X7R1H333K-E-TP	50V 0.033U	SCAAD01357
C36	CAP,FXD CER	C3216X7R1H333K-E-TP	50V 0.033U	SCAAD01357
C37	CAP,FXD CER	C3216X7R1H333K-E-TP	50V 0.033U	SCAAD01357
CD1	DIODE	EM1Z	200V 1A	STXAN00061
CD2	DIODE	EM1Z	200V 1A	STXAN00061
CD31	MAGNETIC SENSOR	THS103A		SZJAR00033
CD32	DIODE	1SS226 TE85L		STXAD00320
IC21	IC	UPC2002H		SDAAA00109
IC21Z-1	SILICON SHEET	TC-30A (TO-220)		SZZKB00002
IC21Z-2	HEAT SINK	6073B		SZKAG00169
IC31	IC	NJM2902N		SDAAN00004
J45	CONNECTOR	IL-S-2P-S2T2-EF		SJWAD00121
JP6			*	6ZZAB10000
JP7	TIN COATED WIRE	TA-0.6P		2717100001
JP8			*	6ZZAB10000
JP9			*	6ZZAB10000
JP10			*	6ZZAB10000
JP11			*	6ZZAB10000
JP12	TIN COATED WIRE	TA-0.6P		2717100001
JP13	TIN COATED WIRE	TA-0.6P		2717100001
L21	COIL	LAL03VB471K	470UH	SLCAA00270

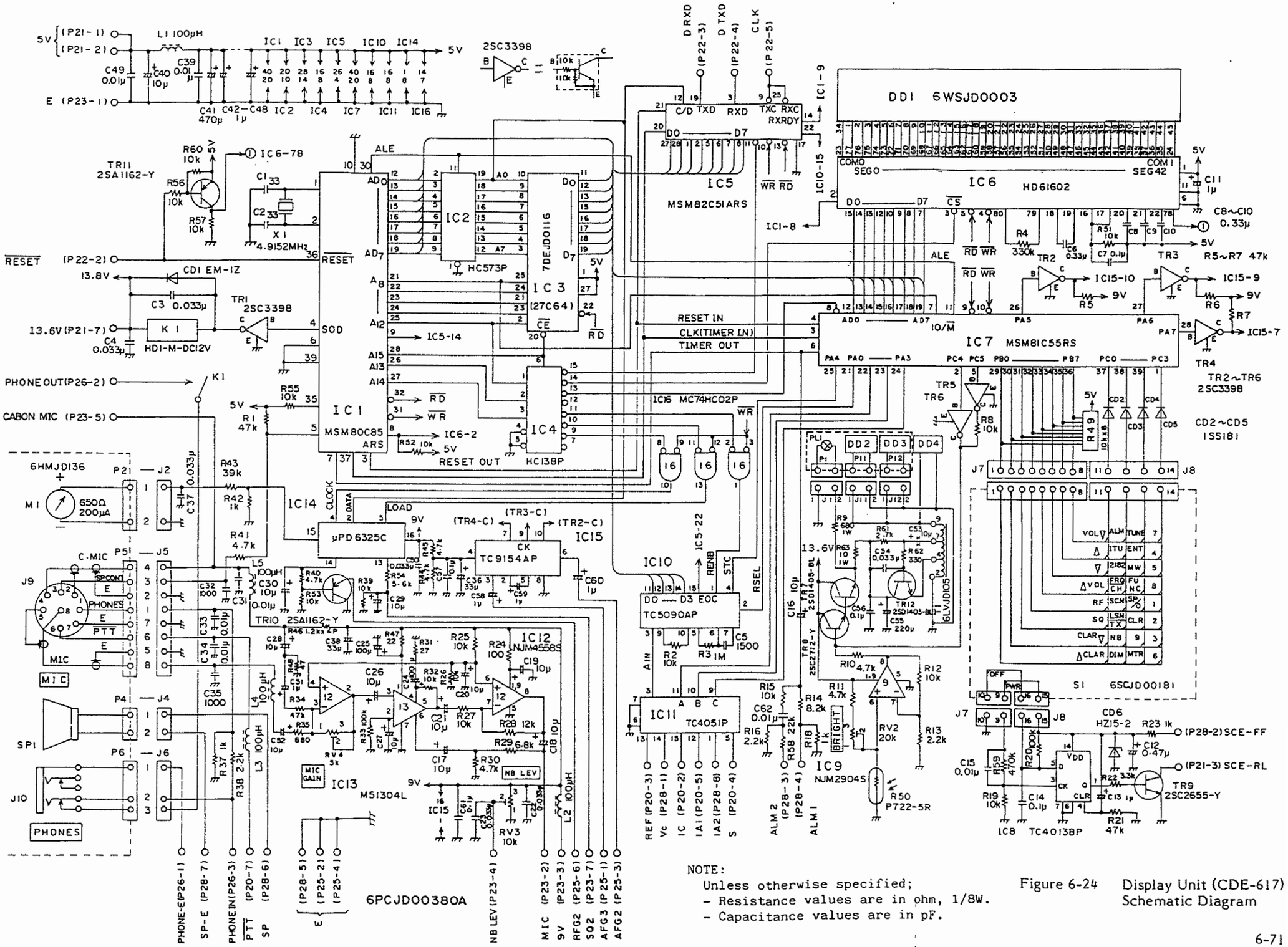
AF AMP CBD-894L

PARTS NO	PARTS NAME	TYPE	DESCRIPTION	CODE
L31	COIL	LAL03VB100K	10UH	SLCAA00273
L32	COIL	H-6LGJD00020		6LGJD00020
L33	COIL	H-6LGJD00021		6LGJD00021
P34	CONNECTOR	H-6ZCJD00216	5P L=200	6ZCJD00216
P35	CONNECTOR	H-6ZCJD43009	6P L=200	6ZCJD43009
P36	CONNECTOR	H-6ZCJD43011	12P L=200	6ZCJD43011
PC1	PCB	H-6PCJD00257A		6PCJD00257
PC2	PCB	H-6PDJD00005		6PDJD00005
R1	RESISTOR FXD	ERJ-8GEYJ100V	1/8W 10 OHM	SREAGD1?1?
R3	RESISTOR FXD	ERJ-8GEYK2R2V		SREAGD2210
R4	RESISTOR FXD	ERJ-8GEYJ222V	1/8W 2.2K OHM	SREAGD1742
R21	RESISTOR FXD	ERJ-8GEYJ103V	1/8W 10K OHM	SREAGD1750
R22	RESISTOR FXD	ERJ-8GEYJ102V	1/8W 1K OHM	SREAGD1738
R23	RESISTOR FXD	ERJ-8GEYJ103V	1/8W 10K OHM	SREAGD1750
R24	RESISTOR FXD	ERJ-8GEYJ102V	1/8W 1K OHM	SREAGD1738
R25	RESISTOR FXD	ERJ-8GEYJ102V	1/8W 1K OHM	SREAGD1738
R26	RESISTOR FXD	ERJ-8GEYJ120V	1/8W 12 OHM	SREAGD1?1?
R27	RESISTOR FXD	ERJ-8GEYK1R0V		SREAGD2208
R31	RESISTOR FXD	ERJ-8GEYJ474V		SREAGD1??0
R32	RESISTOR FXD	ERJ-8GEYJ103V	1/8W 10K OHM	SREAGD1750
R33	RESISTOR FXD	ERJ-8GEYJ103V	1/8W 10K OHM	SREAGD1750
R34	RESISTOR FXD	ERJ-8GEYJ103V	1/8W 10K OHM	SREAGD1750
R35	RESISTOR FXD	ERJ-8GEYJ183V	1/8W,18K OHM	SREAGD1753
R36	RESISTOR FXD	ERJ-8GEYJ153V		SREAGD1752
R37	RESISTOR FXD	ERJ-8GEYJ562V	1/8W 5.6K OHM	SREAGD1?47
R38	RESISTOR FXD	ERJ-8GEYJ271V	1/8W 270 OHM	SREAGD1?3?
R39	RESISTOR FXD	ERJ-8GEYJ103V	1/8W 10K OHM	SREAGD1?0?
R40	RESISTOR FXD	ERJ-8GEYJ102V	1/8W 1K OHM	SREAGD1?3?
R41	RESISTOR FXD	ERJ-8GEYJ224V		SREAGD1766
R42	RESISTOR FXD	ERJ-8GEYJ333V		SREAGD1756
R43	RESISTOR FXD	ERJ-8GEYJ103V	1/8W 10K OHM	SREAGD1750
R44	RESISTOR FXD	ERJ-8GEYJ331V	1/8W,330 OHM	SREAGD1732
R45	RESISTOR FXD	ERJ-8GEYJ103V	1/8W 10K OHM	SREAGD1750
R46	RESISTOR FXD	ERJ-8GEYJ102V	1/8W 1K OHM	SREAGD1738
R47	RESISTOR FXD	ERJ-8GEYJ331V	1/8W,330 OHM	SREAGD1732

PARTS LIST

AF AMP	TITLE CBD-894L	SHEET NO 3

PARTS NO	PARTS NAME	TYPE	DESCRIPTION	CODE
RJ1	RESISTOR FXD	ERJ-8GEY0R00V	0 OHM	5REAG01775
RJ2	RESISTOR FXD	ERJ-8GEY0R00V	0 OHM	5REAG01775
RJ3	RESISTOR FXD	ERJ-8GEY0R00V	0 OHM	5REAG01775
RJ4	RESISTOR FXD	ERJ-8GEY0R00V	0 OHM	5REAG01775
RJ21	RESISTOR FXD	ERJ-8GEY0R00V	0 OHM	5REAG01775
RV31	RESISTOR VAR	EVN-D1AA00B14	10K OHM	5RVAB00324
RV32	RESISTOR VAR	EVN-D1AA00B15	100K	5RVAB00314
TR21	TRANSISTOR	2SC3398-TB		5TCAZ00011
TR31	TRANSISTOR	2SA1162-Y TE85L		5TAAG00182



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

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

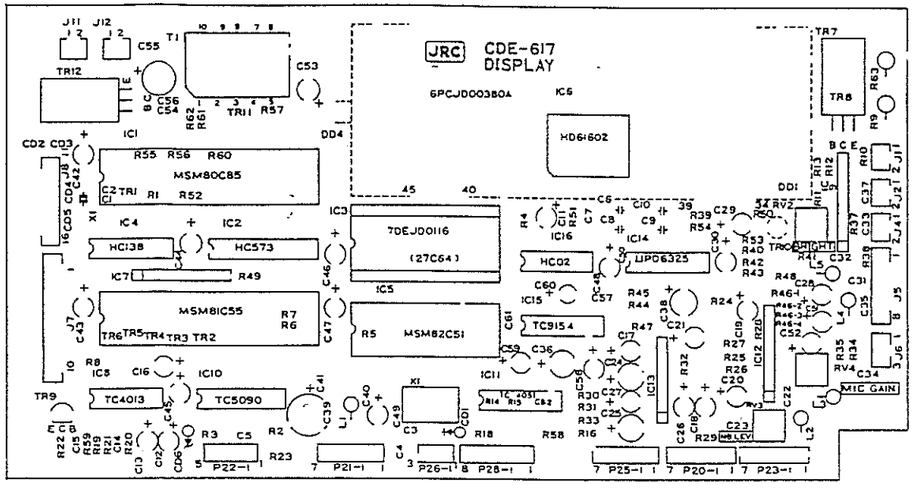


Figure 6-25 Display Unit (CDE-617) Component Layout

PARTS LIST

DISPLAY	TITLE CDE-617	SHEET NO 1

PARTS NO	PARTS NAME	TYPE	DESCRIPTION	CODE
C1	CAP,FXD CER	C3216CH1H330J-E-TP	33PF	5CAAD00794
C2	CAP,FXD CER	C3216CH1H330J-E-TP	33PF	5CAAD00794
C3	CAP,FXD CER	C3216X7R1H333K-E-TP	50V 0.033U	5CAAD01357
C4	CAP,FXD CER	C3216X7R1H333K-E-TP	50V 0.033U	5CAAD01357
C5	CAP,FXD CER	C3216SL1H152J-E-TP	1500PF	5CAAD00791
C6	CAP,FXD PLSTC	ECQ-V1H334JZ3		5CRAA00843
C7	CAP,FXD CER	C3216X7R1E104K-E-TP	0.1U	5CAAD01237
C8	CAP,FXD PLSTC	ECQ-V1H334JZ3		5CRAA00843
C9	CAP,FXD PLSTC	ECQ-V1H334JZ3		5CRAA00843
C10	CAP,FXD PLSTC	ECQ-V1H334JZ3		5CRAA00843
C11	CAP,FXD TANTAL	202L35O2 105KB	35V 1UF	5CSAC00982
C12	CAP,FXD TANTAL	202L35O2 474KB		5CSAC01065
C13	CAP,FXD TANTAL	202L35O2 105KB	35V 1UF	5CSAC00982
C14	CAP,FXD CER	C3216X7R1E104K-E-TP	0.1U	5CAAD01237
C15	CAP,FXD CER	C3216JB1H103K-E-TP	0.01UF	5CAAD00789
C16	CAP,FXD ELCTLT	ECE-A1EU100B		5CEAA01864
C17	CAP,FXD ELCTLT	ECE-A1EU100B		5CEAA01864
C18	CAP,FXD ELCTLT	ECE-A1EU100B		5CEAA01864
C19	CAP,FXD ELCTLT	ECE-A1EU100B		5CEAA01864
C20	CAP,FXD ELCTLT	ECE-A1EU100B		5CEAA01864
C21	CAP,FXD ELCTLT	ECE-A1EU100B		5CEAA01864
C22	CAP,FXD CER	C3216X7R1H333K-E-TP	50V 0.033U	5CAAD01357
C23	CAP,FXD CER	C3216X7R1H333K-E-TP	50V 0.033U	5CAAD01357
C24	CAP,FXD ELCTLT	ECE-A1EU101B		5CEAA01813
C25	CAP,FXD ELCTLT	ECE-A1EU101B		5CEAA01813
C26	CAP,FXD ELCTLT	ECE-A1EU100B		5CEAA01864
C27	CAP,FXD ELCTLT	ECE-A1EU100B		5CEAA01864
C28	CAP,FXD ELCTLT	ECE-A1EU100B		5CEAA01864
C29	CAP,FXD ELCTLT	ECE-A1EU100B		5CEAA01864
C30	CAP,FXD ELCTLT	ECE-A1EU100B		5CEAA01864
C31	CAP,FXD CER	C3216JB1H103K-E-TP	0.01UF	5CAAD00789
C32	CAP,FXD CER	C3216SL1H102J-E-TP	1000PF	5CAAD00782
C33	CAP,FXD CER	C3216JB1H103K-E-TP	0.01UF	5CAAD00789
C34	CAP,FXD CER	C3216JB1H103K-E-TP	0.01UF	5CAAD00789
C35	CAP,FXD CER	C3216SL1H102J-E-TP	1000PF	5CAAD00782

PARTS LIST

DISPLAY	TITLE CDE-617	SHEET NO 2

PARTS NO	PARTS NAME	TYPE	DESCRIPTION	CODE
C36	CAP,FXD ELCTLT	ECE-A1EU330B		5CEAA01822
C37	CAP,FXD CER	C3216X7R1H333K-E-TP	50V 0.033U	5CAAD01357
C38	CAP,FXD ELCTLT	ECE-A1EU330B		5CEAA01822
C39	CAP,FXD CER	C3216JB1H103K-E-TP	0.01UF	5CAAD00789
C40	CAP,FXD ELCTLT	ECE-A1EU100B		5CEAA01864
C41	CAP,FXD ELCTLT	ECE-A1EU471B		5CEAA01865
C42	CAP,FXD TANTAL	202L35O2 105KB	35V 1UF	5CSAC00982
C43	CAP,FXD TANTAL	202L35O2 105KB	35V 1UF	5CSAC00982
C44	CAP,FXD TANTAL	202L35O2 105KB	35V 1UF	5CSAC00982
C45	CAP,FXD TANTAL	202L35O2 105KB	35V 1UF	5CSAC00982
C46	CAP,FXD TANTAL	202L35O2 105KB	35V 1UF	5CSAC00982
C47	CAP,FXD TANTAL	202L35O2 105KB	35V 1UF	5CSAC00982
C48	CAP,FXD TANTAL	202L35O2 105KB	35V 1UF	5CSAC00982
C49	CAP,FXD CER	C3216JB1H103K-E-TP	0.01UF	5CAAD00789
C50	CAP,FXD CER	C3216X7R1H333K-E-TP	50V 0.033U	5CAAD01357
C51	CAP,FXD TANTAL	202L35O2 105KB	35V 1UF	5CSAC00982
C52	CAP,FXD ELCTLT	ECE-A1EU100B		5CEAA01864
C53	CAP,FXD ELCTLT	ECE-A1EU100B		5CEAA01864
C54	CAP,FXD CER	C3216X7R1H333K-E-TP	50V 0.033U	5CAAD01357
C55	CAP,FXD ELCTLT	ECE-A1EU221B	25V 220UF	5CEAA01786
C56	CAP,FXD CER	C3216X7R1E104K-E-TP	0.1U	5CAAD01237
C57	CAP,FXD CER	C3216X7R1E104K-E-TP	0.1U	5CAAD01237
C58	CAP,FXD TANTAL	202L35O2 105KB	35V 1UF	5CSAC00982
C59	CAP,FXD TANTAL	202L35O2 105KB	35V 1UF	5CSAC00982
C60	CAP,FXD TANTAL	202L35O2 105KB	35V 1UF	5CSAC00982
C61	CAP,FXD CER	C3216X7R1E104K-E-TP	0.1U	5CAAD01237
C62	CAP,FXD CER	C3216JB1H103K-E-TP	0.01UF	5CAAD00789
CD1	DIODE	EM1Z	200V 1A	5TXAN00061
CD2	DIODE	1SS181 TE85L		5TXAD00356
CD3	DIODE	1SS181 TE85L		5TXAD00356
CD4	DIODE	1SS181 TE85L		5TXAD00356
CD5	DIODE	1SS181 TE85L		5TXAD00356
CD6	DIODE	HZ15-2RE		5TXAE00661
DD1	INDICATOR	H-6WSJD00003		6WSJD00003
DD2	LAMP	H-6WEJD00006		6WEJD00006

PARTS LIST

TITLE	DISPLAY	CDE-617	SHEET NO 3

PARTS NO	PARTS NAME	TYPE	DESCRIPTION	CODE
DD3	LAMP	H-6WEJD00005		6WEJD00005
DD4	LAMP	H-6WEJD00004		6WEJD00004
IC1	IC	MSM80C85ARS		5DDAG00062
IC2	IC	MC74HC573N		5DAAJ00229
IC3	IC	H-7DEJD0116	MBM27C64-30	7DEJD0116
IC3Z	ID LABEL	MPNN21186		MPNN21186
IC4	IC	MC74HC13BN		5DAAJ00174
IC5	IC	MSM82C51ARS		5DDAG00110
IC6	IC	HD61602		5DDAF00935
IC7	IC	MSM81C55RS		5DDAG00081
IC8	IC	TC4013BP(NEW)		5DDAE00816
IC9	IC	NJM2904S		5DAAN00239
IC10	IC	TC5D90AP		5DDAE00396
IC11	IC	TC4051BP		5DDAE00055
IC12	IC	NJM4558S		5DAAN00087
IC13	IC	M51304L		5DAAB00144
IC14	IC	UPD6325C		5DDAC00447
IC15	IC	TC9154AP		5DDAE01137
IC16	IC	MC74HC02N		5DAAJ00139
ICS3	IC SOCKET	AXS102819	28P	5ZJAN00318
J1	CONNECTOR	IL-S-2P-S2T2-EF		5JWAD00121
J2	CONNECTOR	IL-S-2P-S2T2-EF		5JWAD00121
J4	CONNECTOR	IL-S-2P-S2T2-EF		5JWAD00121
J5	CONNECTOR	IL-S-8P-S2T2-EF	8PIN	5JWAD00139
J6	CONNECTOR	IL-S-3P-S2T2-EF		5JWAD00239
J7	CONNECTOR	HBLB10S-5J		5JFAF00009
J8	CONNECTOR	HBLB6S-5J		5JFAF00010
J9	CONNECTOR	FM214-8S	8P	5JJBJ00001
J10	CONNECTOR	S-G7825		5JJAL00029
J11	CONNECTOR	IL-S-2P-S2T2-EF		5JWAD00121
J12	CONNECTOR	IL-S-2P-S2T2-EF		5JWAD00121
K1	RELAY	HD1-M-DC12V		5KLAD00574
L1	COIL	LALO3VB101K		5LCAA00333
L2	COIL	LALO3VB101K		5LCAA00333
L3	COIL	LALO3VB101K		5LCAA00333

PARTS LIST

TITLE	DISPLAY	CDE-617	SHEET NO 4

PARTS NO	PARTS NAME	TYPE	DESCRIPTION	CODE
L4	COIL	LALO3VB101K		5LCAA00333
L5	COIL	LALO3VB101K		5LCAA00333
M1	METER	H-6HMJD00136		6HMJD00136
P1	CONNECTOR		*	6ZZAB02001
P2	CONNECTOR		*	6ZZAB02001
P4	CONNECTOR	H-6ZCJD42008	2P L=200	6ZCJD42008
P5	CONNECTOR	H-6ZCJD00219	8P L=300	6ZCJD00219
P6	CONNECTOR	H-6ZCJD42004	3P L=200	6ZCJD42004
P11	CONNECTOR	H-6ZCJD00242		6ZCJD00242
P12	CONNECTOR	H-6ZCJD00242		6ZCJD00242
P20	CONNECTOR	H-6ZCJD43037	7P L=100	6ZCJD43037
P21	CONNECTOR	H-6ZCJD43037	7P L=100	6ZCJD43037
P22	CONNECTOR	H-6ZCJD43031	5P L=100	6ZCJD43031
P23	CONNECTOR	H-6ZCJD00222	7P L=150	6ZCJD00222
P25	CONNECTOR	H-6ZCJD00217	7P L=100	6ZCJD00217
P26	CONNECTOR	H-6ZCJD43014	3P L=100	6ZCJD43014
P28	CONNECTOR	H-6ZCJD43038	8P L=100	6ZCJD43038
PC1	PCB	H-6PCJD00380A		6PCJD00380
PL1	LAMP		*	6ZZAB02024
R1	RESISTOR FXD	ERJ-8GEYJ473V		5REAG01758
R2	RESISTOR FXD	ERJ-8GEYJ103V	1/8W 10K OHM	5REAG01750
R3	RESISTOR FXD	ERJ-8GEYJ105V	1/8W 1M OHM	5REAG01774
R4	RESISTOR FXD	ERJ-8GEYJ334V		5REAG01768
R5	RESISTOR FXD	ERJ-8GEYJ473V		5REAG01758
R6	RESISTOR FXD	ERJ-8GEYJ473V		5REAG01758
R7	RESISTOR FXD	ERJ-8GEYJ473V		5REAG01758
R8	RESISTOR FXD	ERJ-8GEYJ103V	1/8W 10K OHM	5REAG01750
R9	RESISTOR FXD	ERG-1ANJ681	1W 680 OHM	5REAG00365
R10	RESISTOR FXD	ERJ-8GEYJ472V		5REAG01746
R11	RESISTOR FXD	ERJ-8GEYJ472V		5REAG01746
R12	RESISTOR FXD	ERJ-8GEYJ103V	1/8W 10K OHM	5REAG01750
R13	RESISTOR FXD	ERJ-8GEYJ222V	1/8W 2.2K OHM	5REAG01742
R14	RESISTOR FXD	ERJ-8GEYJ822V		5REAG01749
R15	RESISTOR FXD	ERJ-8GEYJ103V	1/8W 10K OHM	5REAG01750
R16	RESISTOR FXD	ERJ-8GEYJ222V	1/8W 2.2K OHM	5REAG01742

PARTS LIST

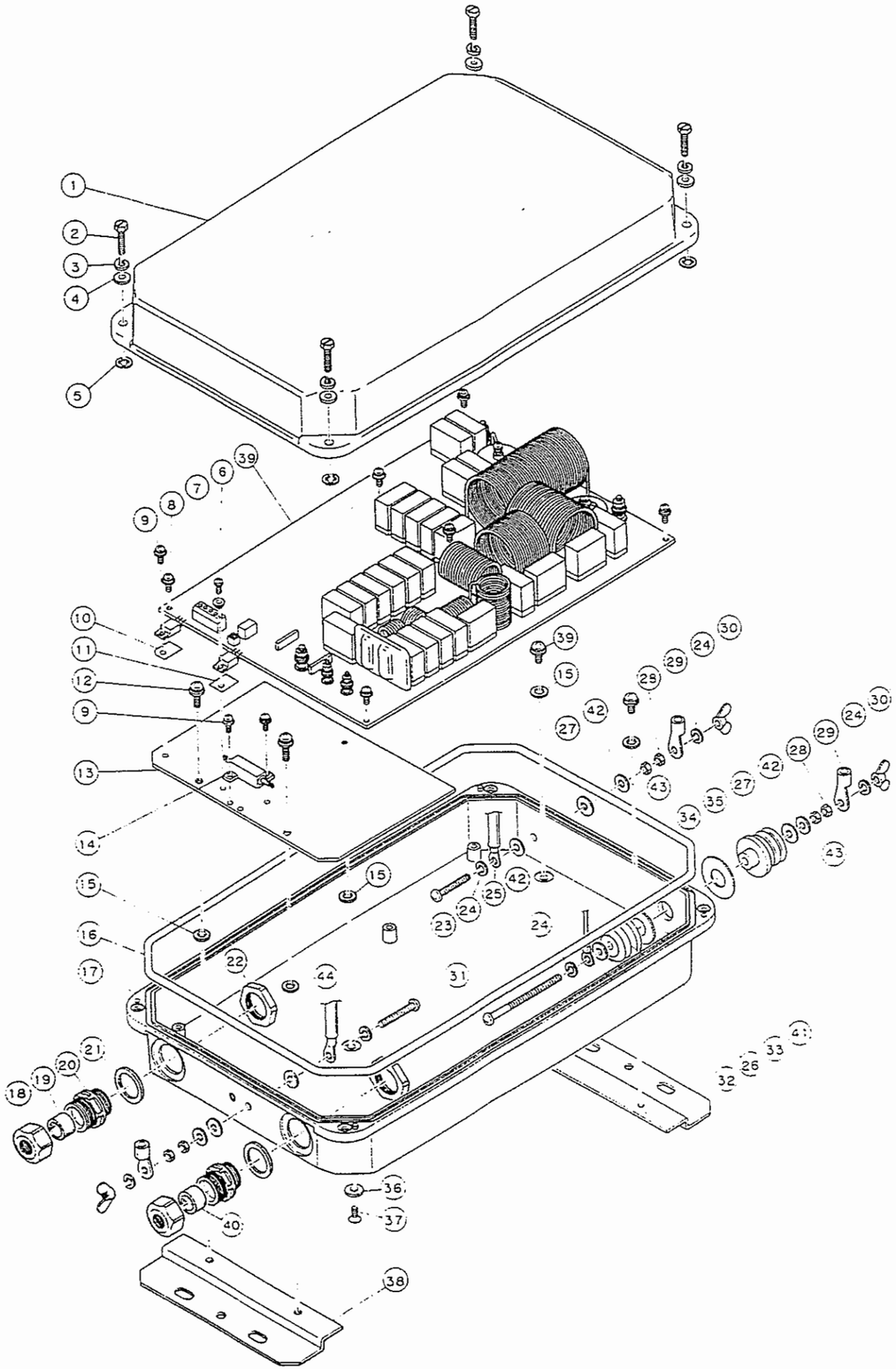
TITLE		SHEET NO.
DISPLAY	CDE-617	5

PARTS NO	PARTS NAME	TYPE	DESCRIPTION	CODE
R18	RESISTOR FXD	ERJ-8GEYJ102V	1/8W 1K OHM	5REAG01738
R19	RESISTOR FXD	ERJ-8GEYJ103V	1/8W 10K OHM	5REAG01750
R20	RESISTOR FXD	ERJ-8GEYJ104V	1/8W 100K OHM	5REAG01762
R21	RESISTOR FXD	ERJ-8GEYJ473V		5REAG01758
R22	RESISTOR FXD	ERJ-8GEYJ332V	1/8W 3.3K OHM	5REAG01744
R23	RESISTOR FXD	ERJ-8GEYJ102V	1/8W 1K OHM	5REAG01738
R24	RESISTOR FXD	ERJ-8GEYJ101V	1/8W 100 OHM	5REAG01726
R25	RESISTOR FXD	ERJ-8GEYJ103V	1/8W 10K OHM	5REAG01750
R26	RESISTOR FXD	ERJ-8GEYJ103V	1/8W 10K OHM	5REAG01750
R27	RESISTOR FXD	ERJ-8GEYJ103V	1/8W 10K OHM	5REAG01750
R28	RESISTOR FXD	ERJ-8GEYJ123V	1/8W 12K OHM	5REAG01751
R29	RESISTOR FXD	ERJ-8GEYJ682V		5REAG01748
R30	RESISTOR FXD	ERJ-8GEYJ472V		5REAG01746
R31	RESISTOR FXD	ERJ-8GEYJ270V		5REAG01719
R32	RESISTOR FXD	ERJ-8GEYJ103V	1/8W 10K OHM	5REAG01750
R33	RESISTOR FXD	ERJ-8GEYJ104V	1/8W 100K OHM	5REAG01762
R34	RESISTOR FXD	ERJ-8GEYJ473V		5REAG01758
R35	RESISTOR FXD	ERJ-8GEYJ681V	1/8W 680 OHM	5REAG01736
R37	RESISTOR FXD	ERJ-8GEYJ102V	1/8W 1K OHM	5REAG01738
R38	RESISTOR FXD	ERJ-8GEYJ222V	1/8W 2.2K OHM	5REAG01742
R39	RESISTOR FXD	ERJ-8GEYJ103V	1/8W 10K OHM	5REAG01750
R40	RESISTOR FXD	ERJ-8GEYJ472V		5REAG01746
R41	RESISTOR FXD	ERJ-8GEYJ472V		5REAG01746
R42	RESISTOR FXD	ERJ-8GEYJ102V	1/8W 1K OHM	5REAG01738
R43	RESISTOR FXD	ERJ-8GEYJ393V		5REAG01757
R44	RESISTOR FXD	ERJ-8GEYJ472V		5REAG01746
R45	RESISTOR FXD	ERJ-8GEYJ472V		5REAG01746
R46-1	RESISTOR FXD	ERJ-8GEYJ122V	1/8W 1.2K OHM	5REAG01739
R46-2	RESISTOR FXD	ERJ-8GEYJ122V	1/8W 1.2K OHM	5REAG01739
R46-3	RESISTOR FXD	ERJ-8GEYJ122V	1/8W 1.2K OHM	5REAG01739
R46-4	RESISTOR FXD	ERJ-8GEYJ122V	1/8W 1.2K OHM	5REAG01739
R47	RESISTOR FXD	ERJ-8GEYJ220V		5REAG01718
R48	RESISTOR FXD	ERJ-8GEYJ470V	1/8W 47 OHM	5REAG01722
R49	RESISTOR	IHR-8-103JA(2.54)	10K OHM X8	5RZAB00136
R50	CDS	P722-5R		5ZJDK00003

PARTS LIST

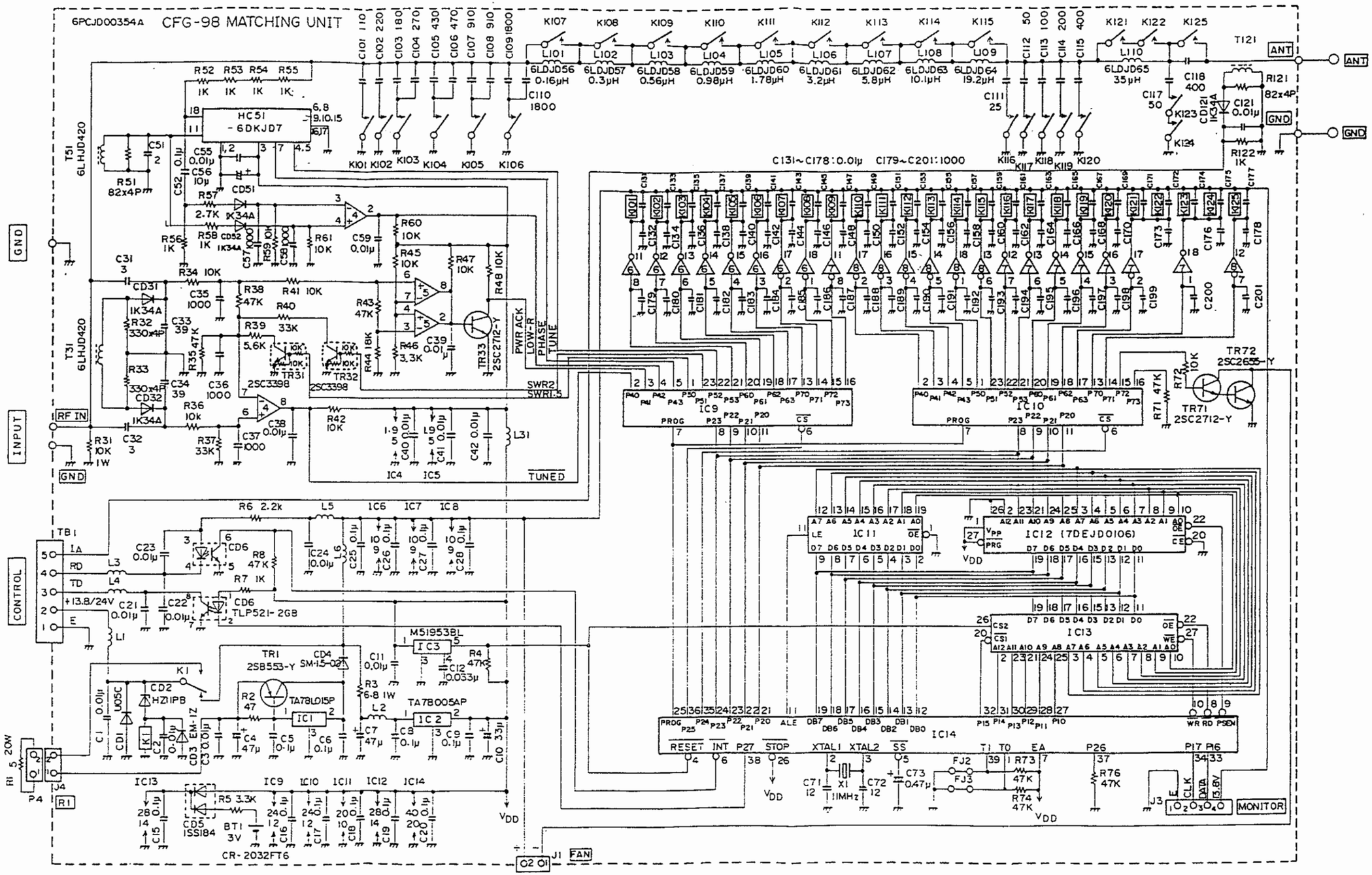
TITLE		SHEET NO
DISPLAY	CDE-617	6

PARTS NO	PARTS NAME	TYPE	DESCRIPTION	CODE
R51	RESISTOR FXD	ERJ-8GEYJ103V	1/8W 10K OHM	5REAG01750
R52	RESISTOR FXD	ERJ-8GEYJ103V	1/8W 10K OHM	5REAG01750
R53	RESISTOR FXD	ERJ-8GEYJ103V	1/8W 10K OHM	5REAG01750
R54	RESISTOR FXD	ERJ-8GEYJ392V	1/8W 3.9K OHM	5REAG01745
R55	RESISTOR FXD	ERJ-8GEYJ103V	1/8W 10K OHM	5REAG01750
R56	RESISTOR FXD	ERJ-8GEYJ103V	1/8W 10K OHM	5REAG01750
R57	RESISTOR FXD	ERJ-8GEYJ103V	1/8W 10K OHM	5REAG01750
R58	RESISTOR FXD	ERJ-8GEYJ223V	1/8W 22K OHM	5REAG01754
R59	RESISTOR FXD	ERJ-8GEYJ474V		5REAG01770
R60	RESISTOR FXD	ERJ-8GEYJ103V	1/8W 10K OHM	5REAG01750
R61	RESISTOR FXD	ERJ-8GEYJ272V	1/8W,2.7K OHM	5REAG01743
R62	RESISTOR FXD	ERJ-8GEYJ331V	1/8W,330 OHM	5REAG01732
R63	RESISTOR FXD	ERG-1ANJ100	1W 10 OHM	5REAG00295
RV2	RESISTOR VAR	EVN-D1AA00B24	20K	5RVAB00372
RV3	RESISTOR VAR	EVN-D1AA00B14	10K OHM	5RVAB00324
RV4	RESISTOR VAR	EVN-D1AA00B53		5RVAB00325
S1	SWITCH	H-6SCJD00181		6SCJD00181
SP1	SPEAKER	77F870729-5		5USBL00004
T1	TRANSFORMER	H-6LVJD00105		6LVJD00105
TR1	TRANSISTOR	2SC3398-TB		5TCAZ00011
TR2	TRANSISTOR	2SC3398-TB		5TCAZ00011
TR3	TRANSISTOR	2SC3398-TB		5TCAZ00011
TR4	TRANSISTOR	2SC3398-TB		5TCAZ00011
TR5	TRANSISTOR	2SC3398-TB		5TCAZ00011
TR6	TRANSISTOR	2SC3398-TB		5TCAZ00011
TR7	TRANSISTOR	2SD1405-BL		5TDAE00145
TR8	TRANSISTOR	2SC2712Y TE85L		5TAAG00186
TR9	TRANSISTOR	2SC2655-Y		5TCAF00246
TR10	TRANSISTOR	2SA1162-Y TE85L		5TAAG00182
TR11	TRANSISTOR	2SA1162-Y TE85L		5TAAG00182
TR12	TRANSISTOR	2SD1405-BL		5TDAE00145
X1	CRYSTAL	LN-X-0008 F=4.9152MH Z		5XHAA00422



LOCATION	DESCRIPTION	PART NUMBER	Q'TY	REMARKS
1	CASE (U)	MTV000334	1	
2	SCREW	BRTG03287	4	HEX. BOLT M5X20SUS
3	SPRING WASHER	SSSW05000S	4	M5SUS
4	PLAIN WASHER	BRTG00218	4	M5SUS
5	LOCK WASHER	MTD001806A	4	
6	SCREW	BRTG02776	1	CNK3X5BS
7	INSULATOR COLLAR	SZZDY00005	1	YC-40B
8	SCREW	BSNC030058	6	CNK3X8BS
9	SCREW	BRTG02776	1	CNK3X5BS
10	SILICON RUBBER	SZZKB00002	1	TC-30A
11	SILICON RUBBER	SZZKB00002	1	TC-30A
12	SCREW	BSNB05010B	2	BNK5X10BS
13	HEAT SINK PLATE	MTB168031	1	
14	RESISTOR	SRHAA01141	1	
15	GASKET	MTT010805	5	
16	GASKET	MPPK01378	1	
17	CASE (L)	MTV000335	1	
18	CORD GRIP	BRJD00133		SCS-10Awith(39)(9)(1) and(22)
19	GROMMET	BRNG00213		
20	HOUSING	BRJD00133		SCS-10Awith(8)(7)(6) and(23)
21	GASKET	BRJD00133		SCS-10Awith(8)(7)(6) and(23)
22	NUT	BRJD00133		SCS-10Awith(8)(7)(6) and(23)
23	SCREW	BSNKC05030B		NK5X30BS
24	SPRING WASHER	BSSW05000S	3	SW5
25	EARTH WIRE	MPKC06158	1	
26	FIBER WASHER	MPTG00255	1	φ5XφIOX-0.5
27	GASKET	MTT010805	3	
28	NUT	BSLN05000B	1	LN5BS
29	TERMINAL	SJWBW00005	1	COMPRESSION 14-5
30	WING NUT	BSBN05000B	2	BN5
31	SCREW	BRTG03108	1	NK5X70BS
32	WIRE	MPKC06157	1	
33	BUSHING	MYNG00023	1	with(28)
34	GASKET	MTT011642	1	
35	BUSHING	MPNG00023	1	with(28)
36	PLAIN WASHER	BSFW03000B	1	
37	SCREW	BSNC030108	1	CNK3X10BS
38	MOUNTING BRACKET	MTB168032	2	
39	MATCHING UNIT	CFG-98	1	MONW06144
40	GROMMET	BRNG00214	1	For SCS-10M(BRJD00134)
41	FIBER WASHER	MPTG00269	1	φ15XφI8.5X-0.5
42	PLAIN WASHER	BSFW05000B	2	W5BS
43	NUT	BSHN05000B	3	N5BS
44	EARTH WIRE	MPKC04816	1	

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



IC4	NJM2903S	IC9	μPD82C43C	IC14	μPD80C40HC
IC5	NJM2903S	IC10	μPD82C43C		
IC6	TD62084AP	IC11	MC74HC573N		
IC7	TD62084AP	IC12	MBM2764-30		
IC8	TD62084AP	IC13	MB8464-15LP		

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

Figure 6-27 Antenna Coupler (AC 152) Schematic Diagram

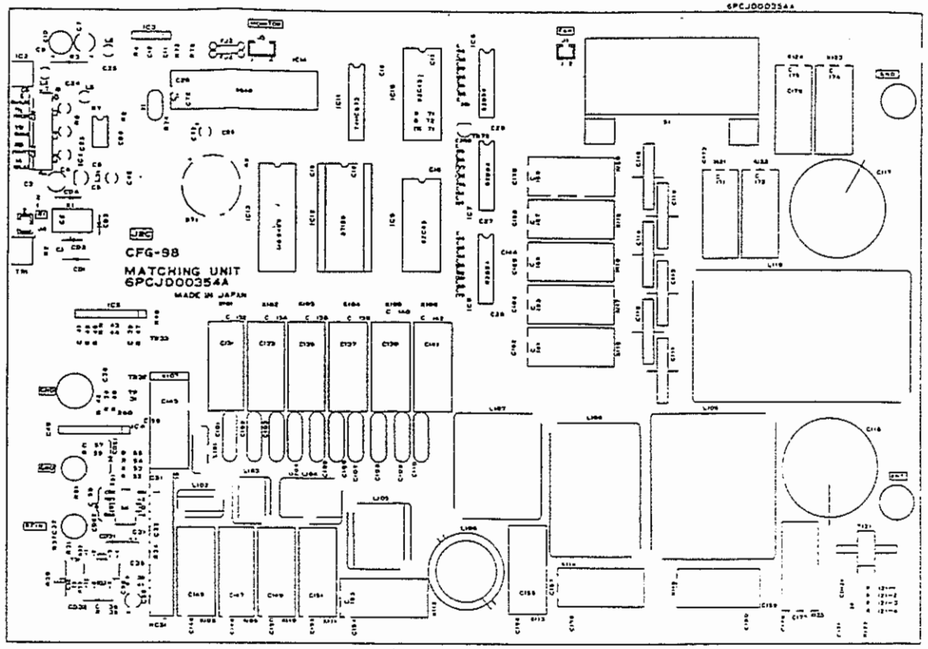


Figure 6-28 Matching Unit (CFG-98) Component Layout

PARTS LIST

			MATCHING UNIT	TITLE CFG-98	SHEET NO 1
PARTS NO	PARTS NAME	TYPE	DESCRIPTION	CODE	
B1	FAN	H-6BFJD00006	DC12V	6BFJD00006	
BT1	BATTRY	CR-2032FT6	3V 190MAH	5ZBAD00067	
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 ELCTLT	ECE-A1HU47GB		5CEAA01817	
C5	CAP,FXD CER	C3216X7R1E104K-E-TP	0.1U	5CAAD01237	
C6	CAP,FXD CER	C3216X7R1E104K-E-TP	0.1U	5CAAD01237	
C7	CAP,FXD ELCTLT	ECE-A1HU47GB		5CEAA01817	
C8	CAP,FXD CER	C3216X7R1E104K-E-TP	0.1U	5CAAD01237	
C9	CAP,FXD CER	C3216X7R1E104K-E-TP	0.1U	5CAAD01237	
C10	CAP,FXD ELCTLT	ECE-A1CU330B	33UF 16V	5CEAA01828	
C11	CAP,FXD CER	C3216JB1H103K-E-TP	0.01UF	5CAAD00789	
C12	CAP,FXD CER	C3216X7R1H333K-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	C3216B1H102K-E-TP	1000PF	5CAAD01073	
C36	CAP,FXD CER	C3216B1H102K-E-TP	1000PF	5CAAD01073	
C37	CAP,FXD CER	C3216B1H102K-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	TITLE CFG-98	SHEET NO 2
PARTS NO	PARTS 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 ELCTLT	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 500WV	5CMAB00182	
C103	CAP,FXD MICA	DM19C181J5	500WV 180PF	5CMAB00301	
C104	CAP,FXD MICA	DM19C271J5	270PF 500WV	5CMAB00184	
C105	CAP,FXD MICA	DM19C431J5	430PF 500WV	5CMAB00189	
C106	CAP,FXD MICA	DM19C471J5	470PF 500WV	5CMAB00190	
C107	CAP,FXD MICA	DM19C911J5	500WV 910PF	5CMAB00277	
C108	CAP,FXD MICA	DM19C911J5	500WV 910PF	5CMAB00277	
C109	CAP,FXD MICA	DM19C182J5	500WV 1800PF	5CMAB00148	
C110	CAP,FXD MICA	DM19C182J5	500WV 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	5CAAD00789
C137	CAP,FXD CER	C3216JB1H103K-E-TP	0.01UF	5CAAD00789
C138	CAP,FXD CER	C3216JB1H103K-E-TP	0.01UF	5CAAD00789
C139	CAP,FXD CER	C3216JB1H103K-E-TP	0.01UF	5CAAD00789
C140	CAP,FXD CER	C3216JB1H103K-E-TP	0.01UF	5CAAD00789
C141	CAP,FXD CER	C3216JB1H103K-E-TP	0.01UF	5CAAD00789
C142	CAP,FXD CER	C3216JB1H103K-E-TP	0.01UF	5CAAD00789
C143	CAP,FXD CER	C3216JB1H103K-E-TP	0.01UF	5CAAD00789
C144	CAP,FXD CER	C3216JB1H103K-E-TP	0.01UF	5CAAD00789
C145	CAP,FXD CER	C3216JB1H103K-E-TP	0.01UF	5CAAD00789
C146	CAP,FXD CER	C3216JB1H103K-E-TP	0.01UF	5CAAD00789
C147	CAP,FXD CER	C3216JB1H103K-E-TP	0.01UF	5CAAD00789
C148	CAP,FXD CER	C3216JB1H103K-E-TP	0.01UF	5CAAD00789
C149	CAP,FXD CER	C3216JB1H103K-E-TP	0.01UF	5CAAD00789
C150	CAP,FXD CER	C3216JB1H103K-E-TP	0.01UF	5CAAD00789
C151	CAP,FXD CER	C3216JB1H103K-E-TP	0.01UF	5CAAD00789
C152	CAP,FXD CER	C3216JB1H103K-E-TP	0.01UF	5CAAD00789
C153	CAP,FXD CER	C3216JB1H103K-E-TP	0.01UF	5CAAD00789
C154	CAP,FXD CER	C3216JB1H103K-E-TP	0.01UF	5CAAD00789
C155	CAP,FXD CER	C3216JB1H103K-E-TP	0.01UF	5CAAD00789
C156	CAP,FXD CER	C3216JB1H103K-E-TP	0.01UF	5CAAD00789
C157	CAP,FXD CER	C3216JB1H103K-E-TP	0.01UF	5CAAD00789
C158	CAP,FXD CER	C3216JB1H103K-E-TP	0.01UF	5CAAD00789
C159	CAP,FXD CER	C3216JB1H103K-E-TP	0.01UF	5CAAD00789
C160	CAP,FXD CER	C3216JB1H103K-E-TP	0.01UF	5CAAD00789
C161	CAP,FXD CER	C3216JB1H103K-E-TP	0.01UF	5CAAD00789
C162	CAP,FXD CER	C3216JB1H103K-E-TP	0.01UF	5CAAD00789
C163	CAP,FXD CER	C3216JB1H103K-E-TP	0.01UF	5CAAD00789
C164	CAP,FXD CER	C3216JB1H103K-E-TP	0.01UF	5CAAD00789
C165	CAP,FXD CER	C3216JB1H103K-E-TP	0.01UF	5CAAD00789
C166	CAP,FXD CER	C3216JB1H103K-E-TP	0.01UF	5CAAD00789
C167	CAP,FXD CER	C3216JB1H103K-E-TP	0.01UF	5CAAD00789
C168	CAP,FXD CER	C3216JB1H103K-E-TP	0.01UF	5CAAD00789
C169	CAP,FXD CER	C3216JB1H103K-E-TP	0.01UF	5CAAD00789
C170	CAP,FXD CER	C3216JB1H103K-E-TP	0.01UF	5CAAD00789

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	5CAAD00789
C172	CAP,FXD CER	C3216JB1H103K-E-TP	0.01UF	5CAAD00789
C173	CAP,FXD CER	C3216JB1H103K-E-TP	0.01UF	5CAAD00789
C174	CAP,FXD CER	C3216JB1H103K-E-TP	0.01UF	5CAAD00789
C175	CAP,FXD CER	C3216JB1H103K-E-TP	0.01UF	5CAAD00789
C176	CAP,FXD CER	C3216JB1H103K-E-TP	0.01UF	5CAAD00789
C177	CAP,FXD CER	C3216JB1H103K-E-TP	0.01UF	5CAAD00789
C178	CAP,FXD CER	C3216JB1H103K-E-TP	0.01UF	5CAAD00789
C179	CAP,FXD CER	C3216B1H102K-E-TP	1000PF	5CAAD01073
C180	CAP,FXD CER	C3216B1H102K-E-TP	1000PF	5CAAD01073
C181	CAP,FXD CER	C3216B1H102K-E-TP	1000PF	5CAAD01073
C182	CAP,FXD CER	C3216B1H102K-E-TP	1000PF	5CAAD01073
C183	CAP,FXD CER	C3216B1H102K-E-TP	1000PF	5CAAD01073
C184	CAP,FXD CER	C3216B1H102K-E-TP	1000PF	5CAAD01073
C185	CAP,FXD CER	C3216B1H102K-E-TP	1000PF	5CAAD01073
C186	CAP,FXD CER	C3216B1H102K-E-TP	1000PF	5CAAD01073
C187	CAP,FXD CER	C3216B1H102K-E-TP	1000PF	5CAAD01073
C188	CAP,FXD CER	C3216B1H102K-E-TP	1000PF	5CAAD01073
C189	CAP,FXD CER	C3216B1H102K-E-TP	1000PF	5CAAD01073
C190	CAP,FXD CER	C3216B1H102K-E-TP	1000PF	5CAAD01073
C191	CAP,FXD CER	C3216B1H102K-E-TP	1000PF	5CAAD01073
C192	CAP,FXD CER	C3216B1H102K-E-TP	1000PF	5CAAD01073
C193	CAP,FXD CER	C3216B1H102K-E-TP	1000PF	5CAAD01073
C194	CAP,FXD CER	C3216B1H102K-E-TP	1000PF	5CAAD01073
C195	CAP,FXD CER	C3216B1H102K-E-TP	1000PF	5CAAD01073
C196	CAP,FXD CER	C3216B1H102K-E-TP	1000PF	5CAAD01073
C197	CAP,FXD CER	C3216B1H102K-E-TP	1000PF	5CAAD01073
C198	CAP,FXD CER	C3216B1H102K-E-TP	1000PF	5CAAD01073
C199	CAP,FXD CER	C3216B1H102K-E-TP	1000PF	5CAAD01073
C200	CAP,FXD CER	C3216B1H102K-E-TP	1000PF	5CAAD01073
C201	CAP,FXD CER	C3216B1H102K-E-TP	1000PF	5CAAD01073
CD1	DIODE	U05C		5TXAE00034
CD2	DIODE	HZ11PB		5TXAE00468
CD3	DIODE	EM1Z	200V 1A	5TXAN00061
CD4	DIODE	SM-1.5-02		5TXAL00083

PARTS LIST

	MATCHING UNIT	TITLE CFG-98		SHEET NO 5
PARTS NO	PARTS NAME	TYPE	DESCRIPTION	CODE
CD5	DIODE	1SS184 TE85L		5TXAD00290
CD6	PHOTOCOUP-LER	TLP521-2-GB		5TZAD00234
CD31	DIODE	1K34A		5TXCH00001
CD32	DIODE	1K34A		5TXCH00001
CD51	DIODE	1K34A		5TXCH00001
CD52	DIODE	1K34A		5TXCH00001
CD121	DIODE	1K34A		5TXCH00001
FJ2			*	6ZZAB10000
FJ3			*	6ZZAB10000
HC51	HC	H-6DKJD00007		6DKJD00007
IC1	IC	TA78L015AP	15V	5DAAD00066
IC2	IC	TA78D05AP		5DAAD00082
IC2Z	SILICON SHEET	TC-30A (TO-220)		5ZZKB00002
IC3	IC	MS1953BL		5DAAB00150
IC4	IC	NJM2903S		5DAAN00088
IC5	IC	NJM2903S		5DAAN00088
IC6	IC	TD62D84AP		5DDAE00546
IC7	IC	TD62D84AP		5DDAE00546
IC8	IC	TD62D84AP		5DDAE00546
IC9	IC	UPD82C43C		5DDAC00400
IC10	IC	UPD82C43C		5DDAC00400
IC11	IC	MC74HC573N		5DAAJ00229
IC12	IC	MBM2764-30		5DDAT00105
IC12Z	ID LABEL	MPNN21173		MPNN21173
IC13	IC	HM6264ALP-15		5DAAG00380
IC14	IC	UPD80C40HC		5DDAC00635
ICS12	SOCKET	ICC05-028-360TP		5ZJCK00056
J1	CONNECTOR	IL-S-2P-S2T2-EF		5JWAD00121
J3	CONNECTOR	IL-S-4P-S2T2-EF	4PIN	5JWAD00183
J4	CONNECTOR	IL-S-2P-S2T2-EF		5JWAD00121
K1	RELAY	HD1-M-DC12V		5KLAD00574
K101	RELAY	G2R-1117P-V-US DC12V		5KLAF00523
K102	RELAY	G2R-1117P-V-US DC12V		5KLAF00523
K103	RELAY	G2R-1117P-V-US DC12V		5KLAF00523
K104	RELAY	G2R-1117P-V-US DC12V		5KLAF00523

PARTS LIST

	MATCHING UNIT	TITLE CFG-98		SHEET NO 6
PARTS NO	PARTS NAME	TYPE	DESCRIPTION	CODE
K105	RELAY	G2R-1117P-V-US DC12V		5KLAF00523
K106	RELAY	G2R-1117P-V-US DC12V		5KLAF00523
K107	RELAY	G2R-1117P-V-US DC12V		5KLAF00523
K108	RELAY	G2R-1117P-V-US DC12V		5KLAF00523
K109	RELAY	G2R-1117P-V-US DC12V		5KLAF00523
K110	RELAY	G2R-1117P-V-US DC12V		5KLAF00523
K111	RELAY	G2R-1117P-V-US DC12V		5KLAF00523
K112	RELAY	G2R-1117P-V-US DC12V		5KLAF00523
K113	RELAY	G2R-1117P-V-US DC12V		5KLAF00523
K114	RELAY	G2R-1117P-V-US DC12V		5KLAF00523
K115	RELAY	G2R-1117P-V-US DC12V		5KLAF00523
K116	RELAY	G2R-1117P-V-US DC12V		5KLAF00523
K117	RELAY	G2R-1117P-V-US DC12V		5KLAF00523
K118	RELAY	G2R-1117P-V-US DC12V		5KLAF00523
K119	RELAY	G2R-1117P-V-US DC12V		5KLAF00523
K120	RELAY	G2R-1117P-V-US DC12V		5KLAF00523
K121	RELAY	G2R-1117P-V-US DC12V		5KLAF00523
K122	RELAY	G2R-1117P-V-US DC12V		5KLAF00523
K123	RELAY	G2R-1117P-V-US DC12V		5KLAF00523
K124	RELAY	G2R-1117P-V-US DC12V		5KLAF00523
K125	RELAY	G2R-1117P-V-US DC12V		5KLAF00523
L1	COIL	FBA04VA600VB-00		5LCAA00432
L2	COIL	FBA04VA600VB-00		5LCAA00432
L3	COIL	FBA04VA600VB-00		5LCAA00432
L4	COIL	FBA04VA600VB-00		5LCAA00432
L5	COIL	FBA04VA600VB-00		5LCAA00432
L6	COIL	FBA04VA600VB-00		5LCAA00432
L31	COIL	FBA04VA600VB-00		5LCAA00432
L101	COIL	H-6LDJD00056	0.16UH	6LDJD00056
L102	COIL	H-6LDJD00057	0.3UH	6LDJD00057
L103	COIL	H-6LDJD00058	0.56UH	6LDJD00058
L104	COIL	H-6LDJD00059	0.98UH	6LDJD00059
L105	COIL	H-6LDJD00060	1.78UH	6LDJD00060
L106	COIL	H-6LDJD00061	3.2UH	6LDJD00061
L107	COIL	H-6LDJD00062	5.8UH	6LDJD00062

PARTS LIST

MATCHING UNIT	TITLE CFG-98	SHEET NO 7

PARTS NO	PARTS NAME	TYPE	DESCRIPTION	CODE
L108	COIL	H-6LDJD00063	10.1UH	6LDJD00063
L109	COIL	H-6LDJD00064	19.2UH	6LDJD00064
L110	COIL	H-6LDJD00065	35UH	6LDJD00065
P4	CONNECTOR	H-6ZCJD40001		6ZCJD40001
PC1	PCB	H-6PCJD00354A		6PCJD00354
R1	RESISTOR FXD	RE70G5 OHM J		5RHAA01141
R2	RESISTOR FXD	ERJ-8GEYJ470V	1/8W 47 OHM	5REAG01722
R3	RESISTOR FXD	ERX-1ANJ6R8	1W 6.8 OHM	5REAG00760
R4	RESISTOR FXD	ERJ-8GEYJ472V		5REAG01746
R5	RESISTOR FXD	ERJ-8GEYJ332V	1/8W 3.3K OHM	5REAG01744
R6	RESISTOR FXD	ERJ-8GEYJ222V	1/8W 2.2K OHM	5REAG01742
R7	RESISTOR FXD	ERJ-8GEYJ102V	1/8W 1K OHM	5REAG01738
R8	RESISTOR FXD	ERJ-8GEYJ472V		5REAG01746
R31	RESISTOR FXD	ERG-1ANJ103		5REAG00808
R32-1	RESISTOR FXD	ERJ-8GEYJ331V	1/8W,330 OHM	5REAG01732
R32-2	RESISTOR FXD	ERJ-8GEYJ331V	1/8W,330 OHM	5REAG01732
R32-3	RESISTOR FXD	ERJ-8GEYJ331V	1/8W,330 OHM	5REAG01732
R32-4	RESISTOR FXD	ERJ-8GEYJ331V	1/8W,330 OHM	5REAG01732
R33-1	RESISTOR FXD	ERJ-8GEYJ331V	1/8W,330 OHM	5REAG01732
R33-2	RESISTOR FXD	ERJ-8GEYJ331V	1/8W,330 OHM	5REAG01732
R33-3	RESISTOR FXD	ERJ-8GEYJ331V	1/8W,330 OHM	5REAG01732
R33-4	RESISTOR FXD	ERJ-8GEYJ331V	1/8W,330 OHM	5REAG01732
R34	RESISTOR FXD	ERJ-8GEYJ103V	1/8W 10K OHM	5REAG01750
R35	RESISTOR FXD	ERJ-8GEYJ473V		5REAG01758
R36	RESISTOR FXD	ERJ-8GEYJ103V	1/8W 10K OHM	5REAG01750
R37	RESISTOR FXD	ERJ-8GEYJ333V		5REAG01756
R38	RESISTOR FXD	ERJ-8GEYJ473V		5REAG01758
R39	RESISTOR FXD	ERJ-8GEYJ562V	1/8W 5.6K OHM	5REAG01747
R40	RESISTOR FXD	ERJ-8GEYJ333V		5REAG01756
R41	RESISTOR FXD	ERJ-8GEYJ103V	1/8W 10K OHM	5REAG01750
R42	RESISTOR FXD	ERJ-8GEYJ103V	1/8W 10K OHM	5REAG01750
R43	RESISTOR FXD	ERJ-8GEYJ473V		5REAG01758
R44	RESISTOR FXD	ERJ-8GEYJ123V	1/8W 12K OHM	5REAG01751
R45	RESISTOR FXD	ERJ-8GEYJ103V	1/8W 10K OHM	5REAG01750
R46	RESISTOR FXD	ERJ-8GEYJ332V	1/8W 3.3K OHM	5REAG01744

PARTS LIST

MATCHING UNIT	TITLE CFG-98	SHEET NO 8

PARTS NO	PARTS NAME	TYPE	DESCRIPTION	CODE
R47	RESISTOR FXD	ERJ-8GEYJ103V	1/8W 10K OHM	5REAG01750
R48	RESISTOR FXD	ERJ-8GEYJ103V	1/8W 10K OHM	5REAG01750
R51-1	RESISTOR FXD	ERJ-8GEYJ820V	1/8W 82 OHM	5REAG01725
R51-2	RESISTOR FXD	ERJ-8GEYJ820V	1/8W 82 OHM	5REAG01725
R51-3	RESISTOR FXD	ERJ-8GEYJ820V	1/8W 82 OHM	5REAG01725
R51-4	RESISTOR FXD	ERJ-8GEYJ820V	1/8W 82 OHM	5REAG01725
R52	RESISTOR FXD	ERJ-8GEYJ102V	1/8W 1K OHM	5REAG01738
R53	RESISTOR FXD	ERJ-8GEYJ102V	1/8W 1K OHM	5REAG01738
R54	RESISTOR FXD	ERJ-8GEYJ102V	1/8W 1K OHM	5REAG01738
R55	RESISTOR FXD	ERJ-8GEYJ102V	1/8W 1K OHM	5REAG01738
R56	RESISTOR FXD	ERJ-8GEYJ102V	1/8W 1K OHM	5REAG01738
R57	RESISTOR FXD	ERJ-8GEYJ272V	1/8W,2.7K OHM	5REAG01743
R58	RESISTOR FXD	ERJ-8GEYJ102V	1/8W 1K OHM	5REAG01738
R59	RESISTOR FXD	ERJ-8GEYJ103V	1/8W 10K OHM	5REAG01750
R60	RESISTOR FXD	ERJ-8GEYJ103V	1/8W 10K OHM	5REAG01750
R61	RESISTOR FXD	ERJ-8GEYJ103V	1/8W 10K OHM	5REAG01750
R71	RESISTOR FXD	ERJ-8GEYJ473V		5REAG01758
R72	RESISTOR FXD	ERJ-8GEYJ103V	1/8W 10K OHM	5REAG01750
R73	RESISTOR FXD	ERJ-8GEYJ473V		5REAG01758
R74	RESISTOR FXD	ERJ-8GEYJ473V		5REAG01758
R76	RESISTOR FXD	ERJ-8GEYJ473V		5REAG01758
R121-1	RESISTOR FXD	ERJ-8GEYJ820V	1/8W 82 OHM	5REAG01725
R121-2	RESISTOR FXD	ERJ-8GEYJ820V	1/8W 82 OHM	5REAG01725
R121-3	RESISTOR FXD	ERJ-8GEYJ820V	1/8W 82 OHM	5REAG01725
R121-4	RESISTOR FXD	ERJ-8GEYJ820V	1/8W 82 OHM	5REAG01725
R122	RESISTOR FXD	ERJ-8GEYJ103V	1/8W 10K OHM	5REAG01750
T31	RF XFMR	H-6LHJD00420		6LHJD00420
T51	RF XFMR	H-6LHJD00420		6LHJD00420
T121	COIL	SK-5M-4	48UH	5LWAJ00001
TB1	TERMINAL	ML-35A-5P	5P	5JTAE00394
TR1	TRANSISTOR	2SB553-Y		5TBAE00036
TR1Z-1	SILICON SHEET	TC-30A (TO-220)		5ZZKB00002
TR1Z-2	BUSHING	YC-40B		5ZZDY00005
TR31	TRANSISTOR	2SC3398-TB		5TCAZ00011

PARTS LIST

	MATCHING UNIT	TITLE CFG-98		SHEET NO 9
PARTS NO	PARTS NAME	TYPE	DESCRIPTION	CODE
TR32	TRANSISTOR	2SC3398-TB		5TCAZ00011
TR33	TRANSISTOR	2SC2712Y TE85L		5TAAG00186
TR71	TRANSISTOR	2SC2712Y TE85L		5TAAG00186
TR72	TRANSISTOR	2SC2655-Y		5TCAF00246
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	5XHAA00783

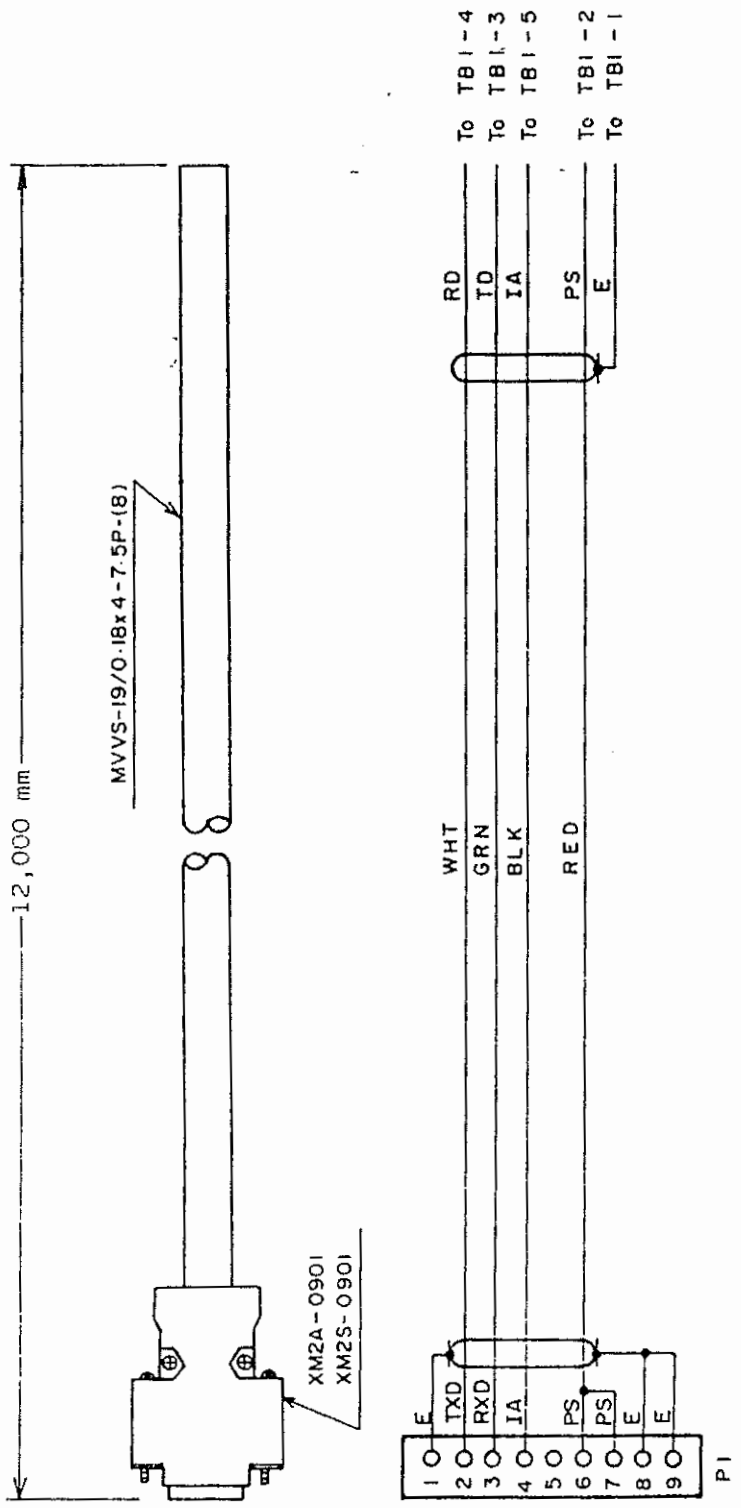


Figure 6-29 Control Cable (CFQ-2858-012) Assembly Drawing

PART LIST

	CONTROL CABLE	TYPE	CFB-2858-012	SHEET NO 1
PARTS NO	PARTS NAME	TYPE	DESCRIPTION	CODE
P1	PLUG	XM2A-0901	9P	5JJCJ00008
P12	HOOD	XM2S-0901	9P	5JJCJG0011
W1	CABLE	MVVS-20/0.18X4-7.8P-(8)		2237100832

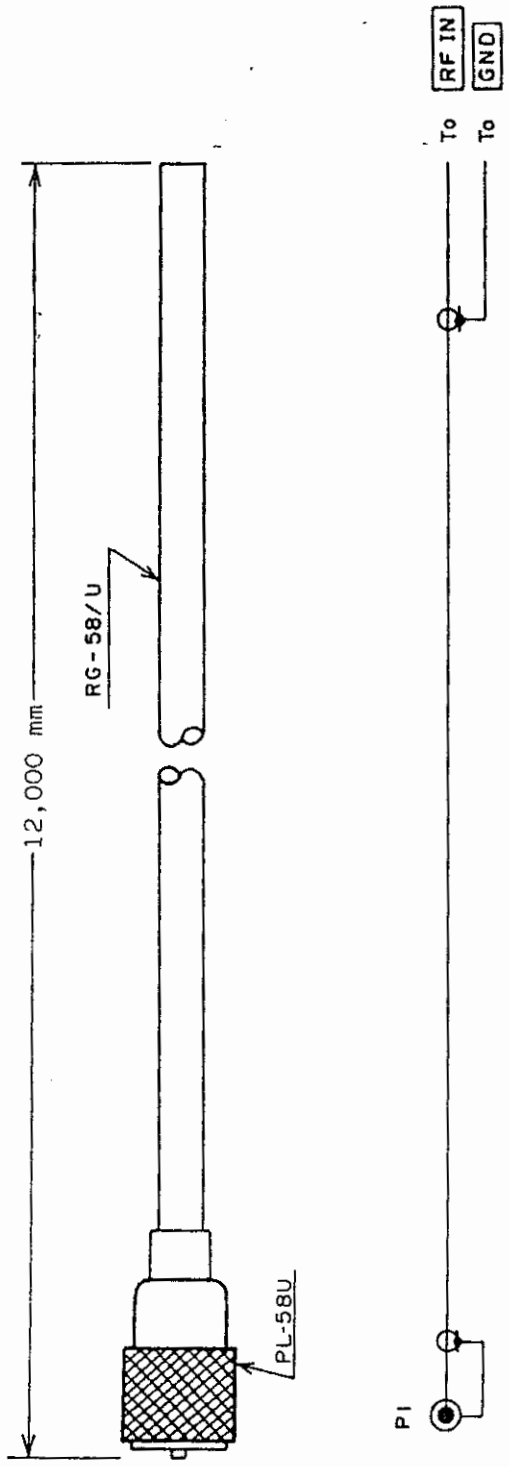
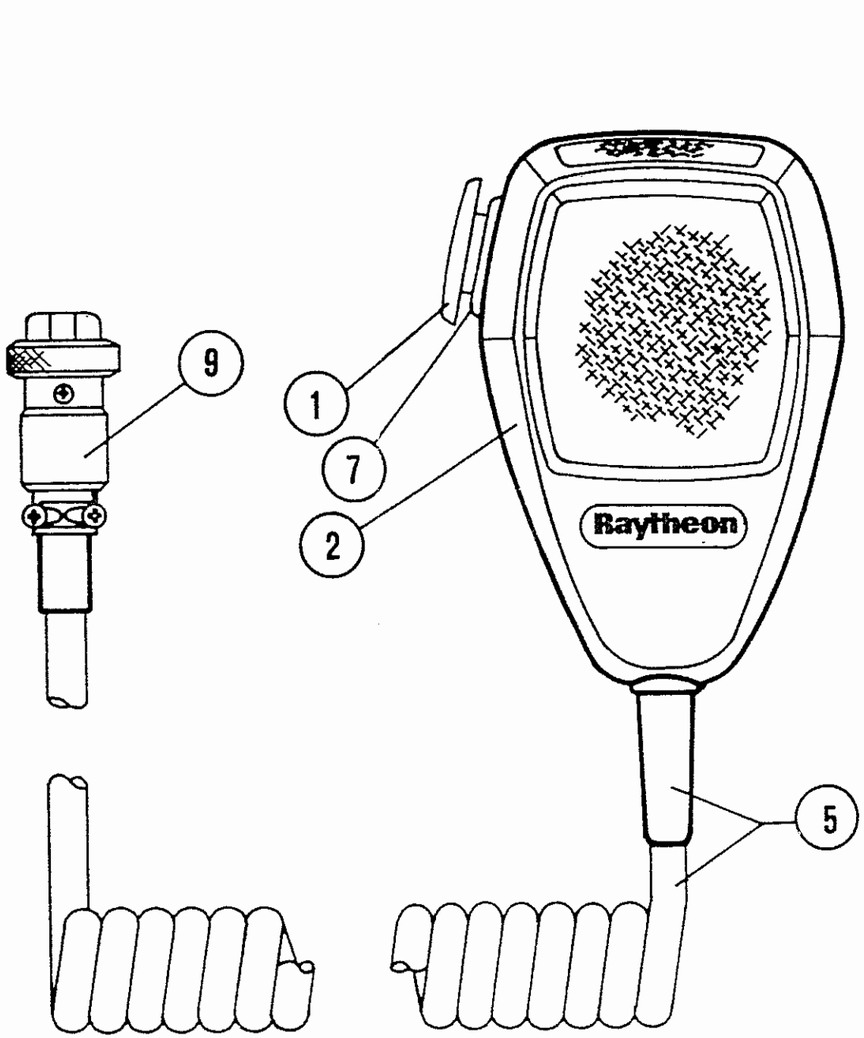


Figure 6-30 RF Cable (CFQ-2859-012) Assembly Drawing

PARTS LIST

	RF CABLE	TITLE CFQ-2859-012	SHEET NO. 1

PARTS NO	PARTS NAME	TYPE	DESCRIPTION	CODE
P1	CONNECTOR	FM-102	PL-58U	5JWBK00019
W1	COAXIAL CABLE	RG-58/U		2661111180



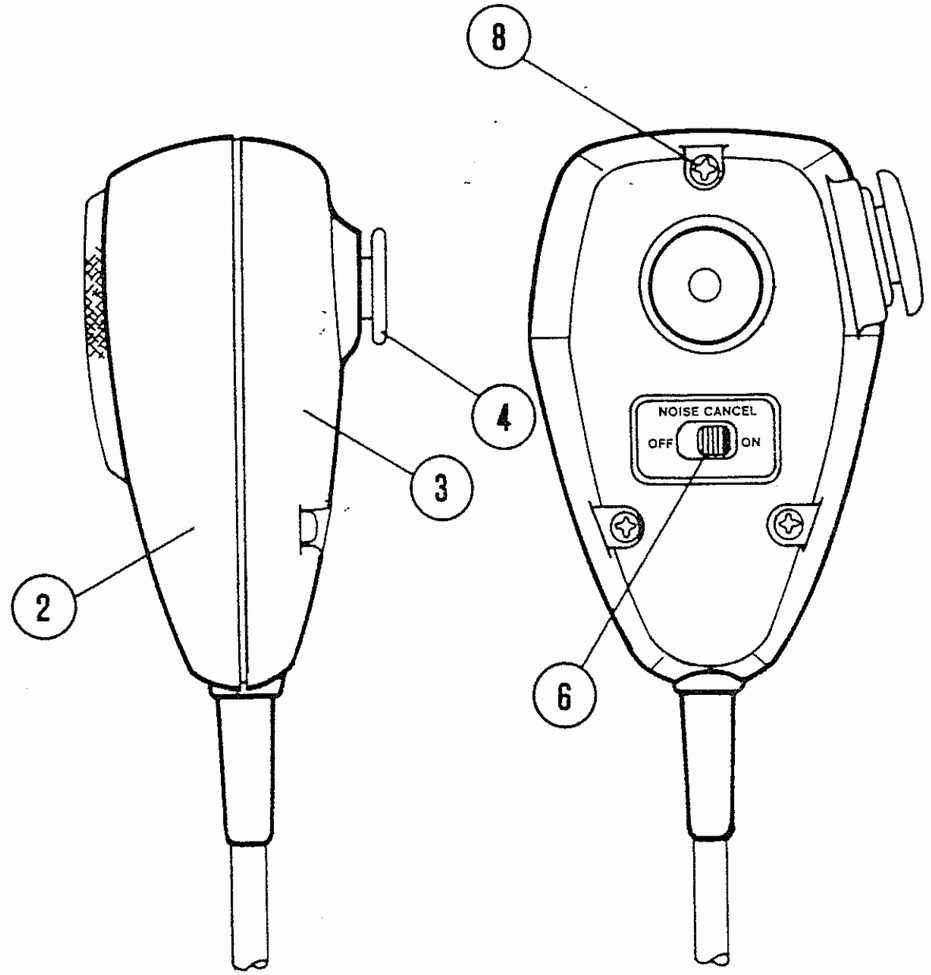


Figure 6-31 Noise Cancelling Microphone Assembly Drawing

Table 6-15
Replaceable Parts List
Noise Cancelling Microphone

Symbol	Description	Part Number
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				