

Ray430

Loudhailer

Owner's Handbook



Raymarine®

PURPOSE

THIS MANUAL CONTAINS IMPORTANT INFORMATION ON THE INSTALLATION,
OPERATION AND MAINTENANCE OF YOUR EQUIPMENT

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TABLE OF CONTENTS

SECTION 1

GENERAL

1.1	INTRODUCTION	1-1
1.2	EQUIPMENT FEATURES	1-1
1.3	SPECIFICATIONS	1-2

SECTION 2

INSTALLATION

2.1	UNPACKING AND INSPECTION	2-1
2.2	EQUIPMENT SUPPLIED	2-1
2.2.1	Optional Accessories	2-2
2.3	STORAGE	2-2
2.4	PLANNING THE INSTALLATION	2-3
2.4.1	Mounting Options	2-5
2.5	ELECTRICAL CONNECTION	2-5
2.5.1	DC Power Connections	2-5
2.5.2	Intercom Speaker(s)	2-6
2.5.3	Hailer Horn(s)	2-7
2.5.4	Connection of Burglar Alarm	2-7
2.5.5	Remote Microphone	2-7
2.5.6	Auxiliary Input	2-8
2.5.7	Connection of an External Speaker	2-8

SECTION 3

OPERATION

3.1	INTRODUCTION	3-1
3.2	CONTROLS AND LCD DISPLAY	3-1
3.2.1	Controls	3-1
3.2.2	LCD Display	3-3
3.3	OPERATING PROCEDURES	3-5
3.3.1	The Power Switch/Dimmer Control	3-5
3.3.2	Volume Control (Hail & Listen)	3-5
3.3.3	Hail Mode	3-6
3.3.4	Intercom Operation	3-6

3.3.5	Fog Horn Mode.....	3-8
3.3.6	Aux Mode	3-13

SECTION 4 TECHNICAL DESCRIPTION

4.1	BLOCK DIAGRAM.....	4-1
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SECTION 5 MAINTENANCE

5.1	GENERAL.....	5-1
5.1.1	Product and Customer Service.....	5-1
5.2	PREVENTATIVE MAINTENANCE.....	5-1
5.3	ADJUSTMENT	5-2
5.3.1	Test Equipment	5-2
5.3.2	Listen Output Adjustment.....	5-2
5.3.3	Intercom Output Adjustment	5-3
5.3.4	Level Meter Adjustment	5-3

SECTION 6 PARTS LIST & DRAWINGS

6.1	PARTS LIST.....	6-1
6.2	ASSEMBLY DRAWING.....	6-8
6.3	PARTS LIST FOR ASSEMBLY DRAWING	6-9
6.4	INTERNAL WIRING DIAGRAM.....	6-11
6.5	LINEAR A SCHEMATIC DIAGRAM.....	6-12
6.6	LINEAR B SCHEMATIC DIAGRAM.....	6-13
6.7	LINEAR A PCB PARTS LAYOUT.....	6-14
6.8	LINEAR B PCB PARTS LAYOUT.....	6-14
6.9	CPU PCB SCHEMATIC DIAGRAM.....	6-15
6.10	CPU PCB PARTS LAYOUT	6-16

SECTION 1

GENERAL DESCRIPTION

1.1 INTRODUCTION

Congratulations on your purchase of the RAY430 Multifunction Loudhailer.

The RAY430 Loudhailer is a multipurpose device that may be used as a ship-to-shore hailer, ship-to-ship hailer, foghorn, audio amplifier, intercom, and/or alarm system.

As a loudhailer, the RAY430 amplifies your voice up to a 30 watt level, for hailing through the hailing horn speaker, and when listening for replies, amplifies the incoming sounds to the desired listening level. If an additional (optional) horn is added to the system, the loudhailer output can be switched to either or both of the hailing horn positions by the front panel control.

To verify your ownership and warranty registration, you should take a few minutes and fill out your warranty registration card found just inside the front cover of this manual. It is **very important** that you take the time to fill this card out. The warranty registration card should be returned to the factory immediately after your purchase in order to receive full warranty benefits.

Section 5 in this manual provides further information on obtaining Customer Service and Product Support which is available to you as a valued customer.

1.2 EQUIPMENT FEATURES

The RAY430 is designed and manufactured to provide ease of installation and operation with excellent reliability. Some of the important built-in features of the equipment are listed below.

The loudhailer horns(s) are used as sound dispersal points when the RAY430 is used as a foghorn so that the full 30 watt output of the unit can be employed.

In the foghorn mode any of six programmed foghorn patterns can be automatically generated. They are: Underway, Stopped, Sail, Tow, Anchored, and Aground.

INTERCOM — Provides 2-way communication between the display unit and up to 4 connected remote units, which can also originate a call to the display unit.

AUXILIARY MODE — Allows the selective or simultaneous transmission of an external audio input to all stations. For entertainment, the external audio can be a cassette deck, radio, or CD player. For business, it can also be any other instrument having an external audio output, such as the output from a VHF or SSB radiotelephone.

EXTERNAL ALARM CONNECTION — For external systems or security alarm sensors.

EASY TO USE — An ideal arrangement, the RAY430 has an illuminated keyboard and LCD which clearly shows all selected stations and operating modes.

DURABLE, WATERPROOF CONSTRUCTION — With rugged gaskets and our heavy-duty microphone the RAY430 is built to survive in the toughest marine environments.

SILICONE RUBBER KEYBOARD — Has backlighting for easy night-time viewing and operation.

OPTIONAL FLUSH-MOUNT KIT — For attractive customized mounting into overhead instrument cabinets or in the console of your bridge.

1.3 SPECIFICATIONS

Dimensions:	4 3/4 x 9 3/16 x 4 1/2 inches (121 x 234 x 114 mm) Height x Width x Depth
Weight	Approximately 1.9 Kg (4.3 lbs)
Power supply	13.6 VDC nominal ($\pm 20\%$) 5 amps or less
Audio Output	Hail Spkr 30W Intercom Spkr 4.5W Ext. Spkr 4.5W Int. Spkr 2.5W
Output impedances	Hail Spkr 8 ohms Intercom Spkr 8 ohms Ext. Spkr 8 ohms
Input Impedance	Mic. Impedance 600 ohms Aux Impedance 10K ohms
Input Sensitivity	Mic. Sensitivity -40 dB 3dB (at 1KHz) Aux Sensitivity -10 dB 3dB (at 1KHz) SP/Mic Sensitivity 6mV RMS $\pm 20\%$
Frequency Response	Hail Mode 100Hz to 8KHz 5dB Listen Mode 100Hz to 8KHz 5dB Aux Mode 100Hz to 20KHz 5dB
Distortion Factor	Hail Mode 10% or less (at 1KHz 30W) Listen Mode 10% or less (at 1KHz 5W) Aux Mode 10% or less (at 1KHz 30W)
Signal to Noise Ratio	Hail Mode 60dB or more (at 1KHz) Listen Mode 60dB or more (at 1KHz) Aux Mode 60dB or more (at 1KHz)
Horn Frequency	500Hz \pm 50Hz

SECTION 2

INSTALLATION

2.1 UNPACKING AND INSPECTION

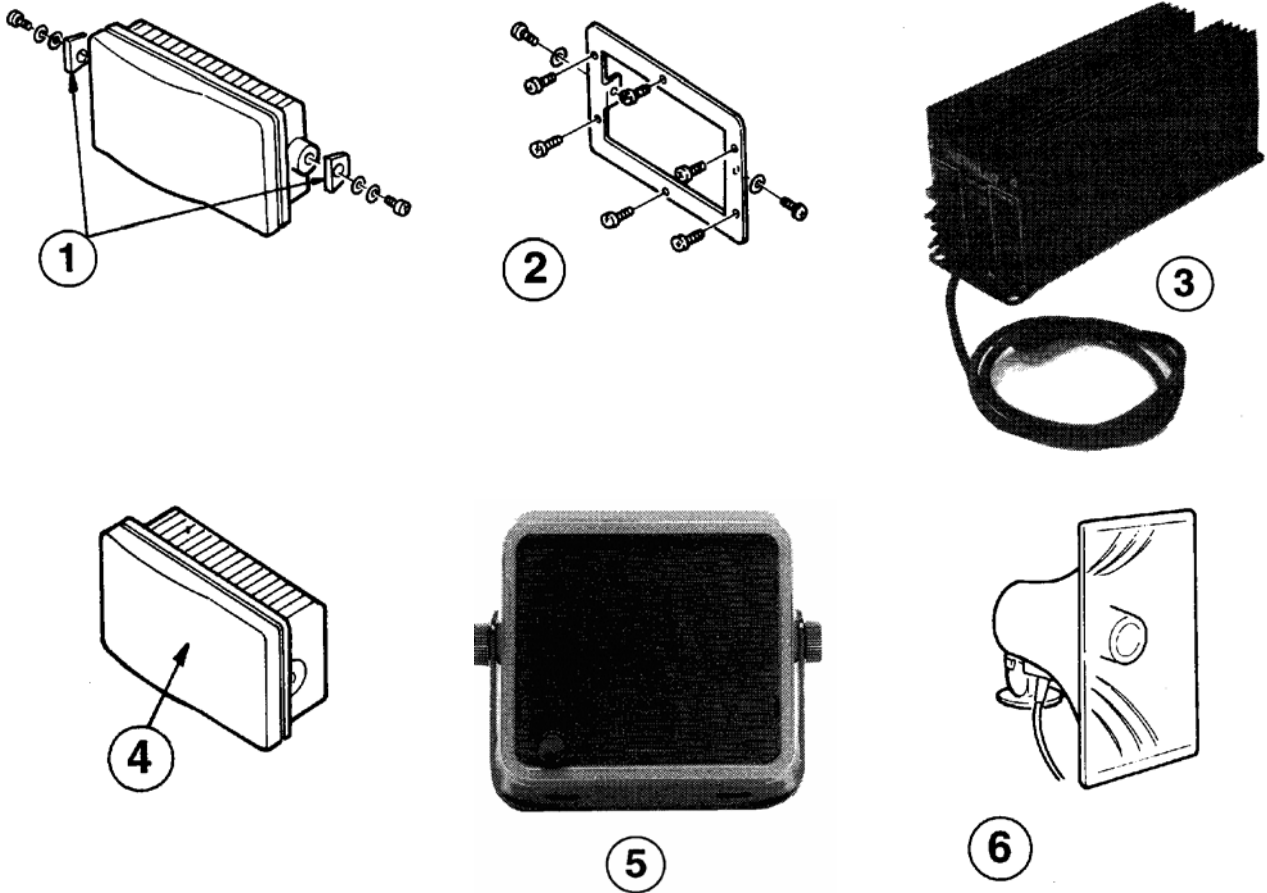
Use care when unpacking your new RAY430 from the shipping carton to prevent damage to the contents. It is also a good practice to save the carton and the interior packing material. The original packing material should be used in the unlikely event that it becomes necessary in the future to return the unit for service.

2.2 EQUIPMENT SUPPLIED

The following is a list of the standard equipment included with your RAY430 Loudhailer.

Equipment Name	Part No.
RAY430 Loudhailer Unit	M95997
Hailer Horn	M95435
Microphone	G263596-2
Microphone Mounting Bracket	G263596-3
Mounting Yoke	G263596-4
Bridge Card	G263647-4
Instruction Manual	G263647-5

2.2.1 Optional Accessories



Item #	Description	Part No.
1	Console Mounting Kit (Flush Mount)	M95990
2	Console Mounting Kit (Trim Ring Style)	M95995
3	Power Supply, 115/220 VAC to 12 VDC	M59733
4	Sun Cover	G263696- 1
5	Intercom Speaker	M95998
6	Hailer Horn	M95435

2.3 STORAGE

After all of the components have been unpacked and inspected, they should be replaced in their shipping containers and stored in a dry place until they are to be installed. The storage area should be dry, well-ventilated and not subjected to temperature extremes below -20°C or above +55 °C.

2.4 PLANNING THE INSTALLATION

When planning the location for your RAY430 to be installed, the following conditions should be considered to insure dependable and trouble-free operation.

- 1) The mounting location should be easily accessible to allow easy operation of the front panel and provide the best viewing angle of the display.
- 2) There should be adequate ventilation.
- 3) A sufficient space should be secured behind the unit to allow all cable connections to the rear panel terminal strip.
- 4) The mounting place should be located as near to the power source as possible.
- 5) The selected location should be isolated away from devices that may cause offending noise or interference, such as motors, steering cables and generators.
- 6) Generally speaking, the Loudhailer should be protected from prolonged direct exposure to rain and salt spray. It is a good practice to protect this valuable equipment as much as possible.

The unit can be conveniently mounted on a chart table, bulkhead, overhead or any other desired place. (Refer to Figure 2- 1 for typical locations and mounting configurations.)

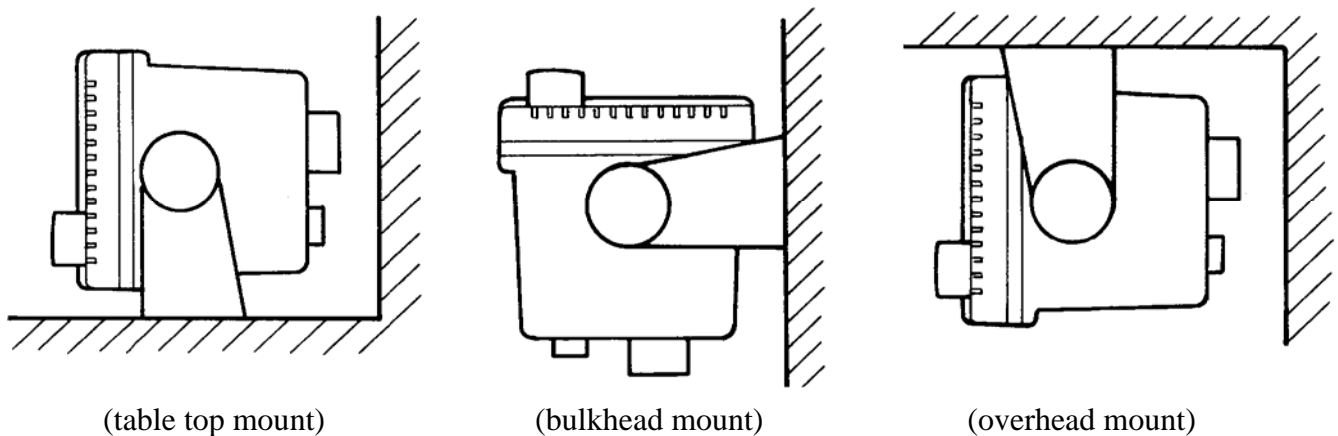


Figure 2-1 Examples of installation

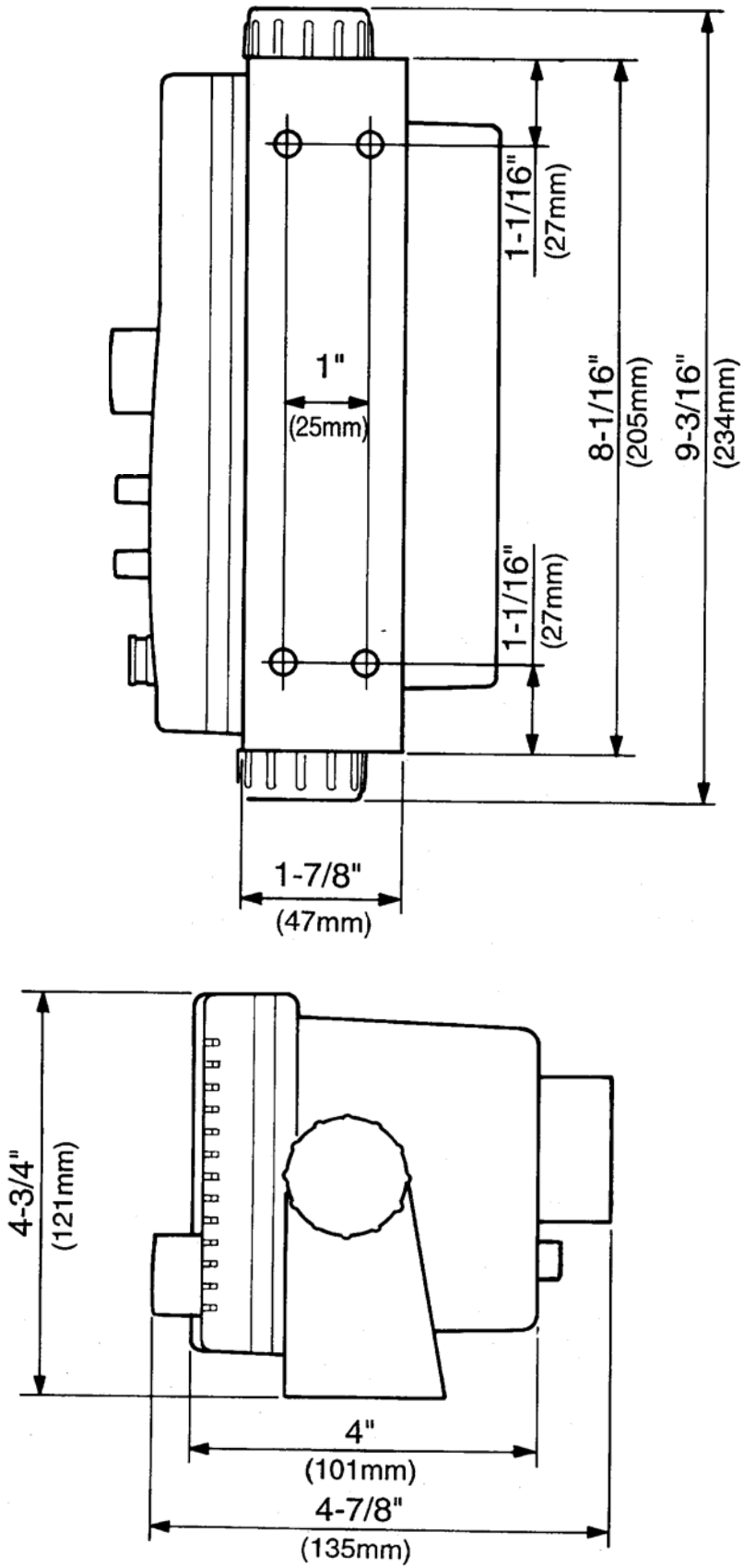


Figure 2-2 Outline and Mounting Dimensions

2.4.1 Mounting Options

Flush-mounting your RAY430 can be performed using one of the methods shown below.

Console Mounting Kit (Trim Ring Style-M95995)

Console Mounting Kit (M95990)

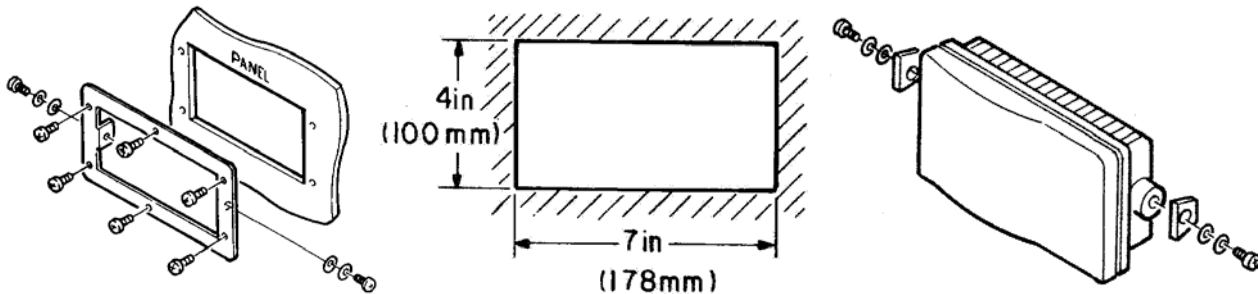


Figure 2-3

2.5 ELECTRICAL CONNECTION

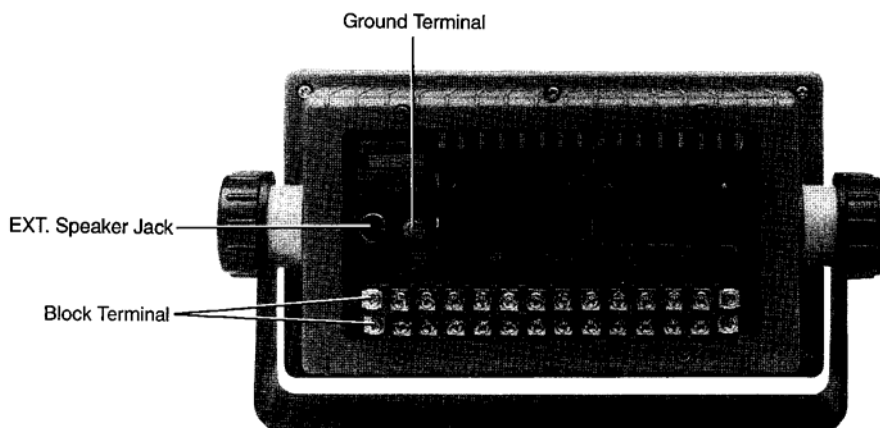


Figure 2-4 RAY430 Rear Panel

CAUTION

**DO NOT INSTALL THIS RADIO ON VESSELS WITH POSITIVE
GROUND BATTERY SYSTEMS.**

2.5.1 DC Power Connections

The RAY430 is intended for use on vessels with 12 VDC power systems and can operate as long as the DC supply is regulated between 10.8 and 16 VDC.

The input power connections are made at the terminal strip on the rear of the RAY430 unit at the terminals labeled "13.6V" "+" and "-". See Figure 2-8 on page 2-9 for the exact locations.

The power leads should normally be routed to the ship's DC power distribution panel on larger boats. The RAY430 is fused at 10 amps so connection to a 10 amp or (maximum of) 15 amp circuit breaker is recommended. On smaller vessels the power leads may be connected directly to the main battery, isolation switch, or circuit breaker. For best noise isolation from other shipboard electronics avoid grouping the loudhailer power connections with radar, radio, or echo sounder power leads together on the same circuit breaker.

Although the RAY430's power consumption is only 65 watts (maximum), if you find that the power cable leads need to be extended more than 10 feet, the wire size of the leads should be increased accordingly to minimize line losses. For runs of 20-35 feet #12 AWG is recommended, remember to always solder all connections on all your power cord additions.

Observe proper polarity! The wire connected to the positive (+) terminal must be connected to the positive point of the DC power source; The wire connected to the Negative (—) terminal of the terminal strip must be connected to the negative point of the DC power source. If the power leads are accidentally reversed, the 10 Amp fuse will blow. If this happens, recheck the polarity of the connections with a voltmeter (VOM) and, if necessary, reverse the leads for proper connection. Then replace the 10 amp fuse in the power cord.

2.5.2 Intercom Speaker

Up to four intercom station speakers (optional) can be connected to the intercom speaker terminals labeled IC1-IC4 on the terminal block. The optional intercom speakers M95998 are 8 ohms and include "CALL" buttons. Stations 1, 2, 3 and 4, should be connected to the terminal block accordingly so that they will correspond to the desired Intercom station selections.

Connect one of the speaker lines to terminal 2, the other line to the GND terminal (on the right side of the terminal block). The "call" line should be connected to the terminal 1.

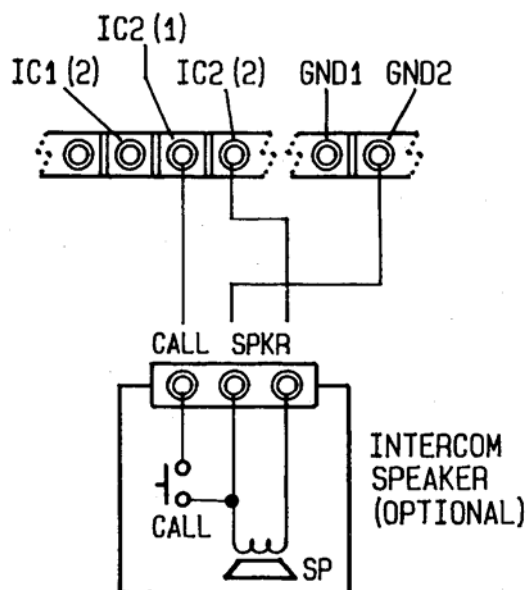


Figure 2-5

2.5.3 Hailer Horn(s)

The outside hailer horns should be mounted facing away from the display unit to prevent feedback problems using the universal swivel mount provided. High gain audio amplifier circuits “hailers” are susceptible to high frequency audio oscillations (a.k.a. feedback). It is highly recommended that before permanently mounting the hailing horn, that the HAIL feature is tested with the horn in the desired location. This should be done to ensure optimum performance. Generally speaking the horn should be mounted as far away as possible and facing away from the RAY430 base unit. It should be pointed in the opposite direction of the RAY430 microphone as you are speaking into it.

Connection to the horn(s) should be made with No. 18 or larger, stranded, twisted pair copper wire. The two-conductor cable chosen should be suitable for external all-weather use.

Electrical connections from the deck horn(s) are made on the rear panel terminal strip at either the FWD or AFT terminal point, depending on the location of the speaker you are connecting.

For connection to FWD, connect the deck horn to terminals “FWD” 1 and 2. For connection to AFT, connect the deck horn to terminals “AFT” 1 and 2.

2.5.4 Connection of Burglar Alarm

By connecting an external alarm sensor using a normally open type of switch (not supplied) to the ALM terminals, this unit can be used as a burglar alarm in the Fog ALM mode (burglar alarm).

When the sensor connected at terminals 1 and 2 (AUX) of this terminal block become shorted (closed), the alarm function becomes activated and the yelp signal will sound at the maximum volume through the forward deck hailer horn speaker.

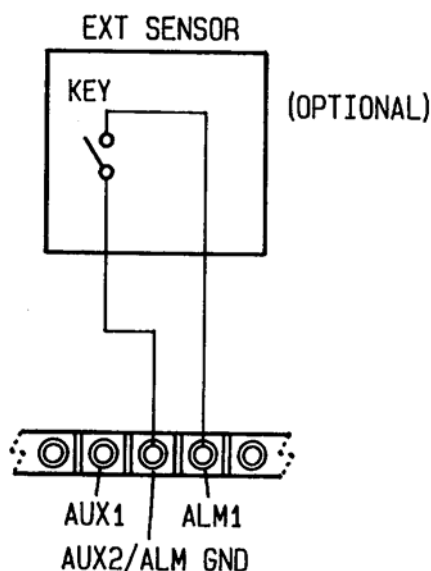
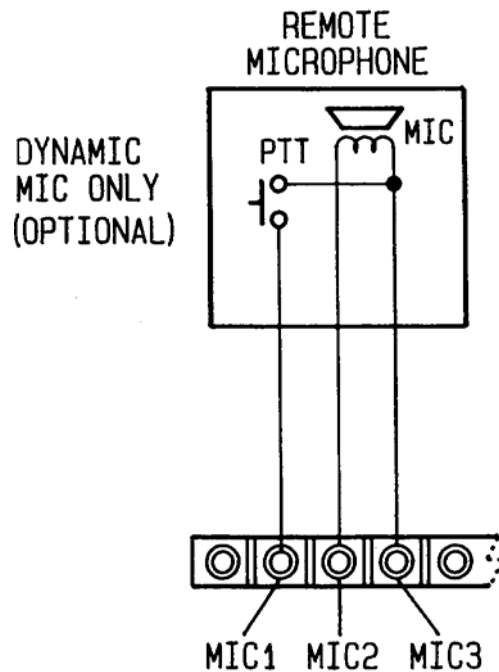


Figure 2-6

2.5.5 Remote Microphone

An external microphone connection is located on the rear panel terminal strip. This may be used if you desire to operate hailing functions from a secondary station.

Figure 2-7



2.5.6 Auxiliary Input

Your RAY430 has been designed to allow you to amplify the audio from your VHF radiotelephone or any other external audio output (i.e. AM/FM radio, CD player) through your intercom or deck speaker stations. This external audio input can be connected at the auxiliary input terminals 1 and 2.

2.5.7 Connection of an External Speaker

In situations where the main unit is distant from the operator and the noise level is very high, it may be difficult to hear your RAY430 clearly. By connecting an external (8 ohms, 5 watts or more) speaker, the sound level can be increased for improved listening capability. When an external speaker is connected at the external speaker jack, the internal speaker is automatically disconnected. The connector, a mini phone plug, for the external speaker is supplied with your RAY430 for your convenience.

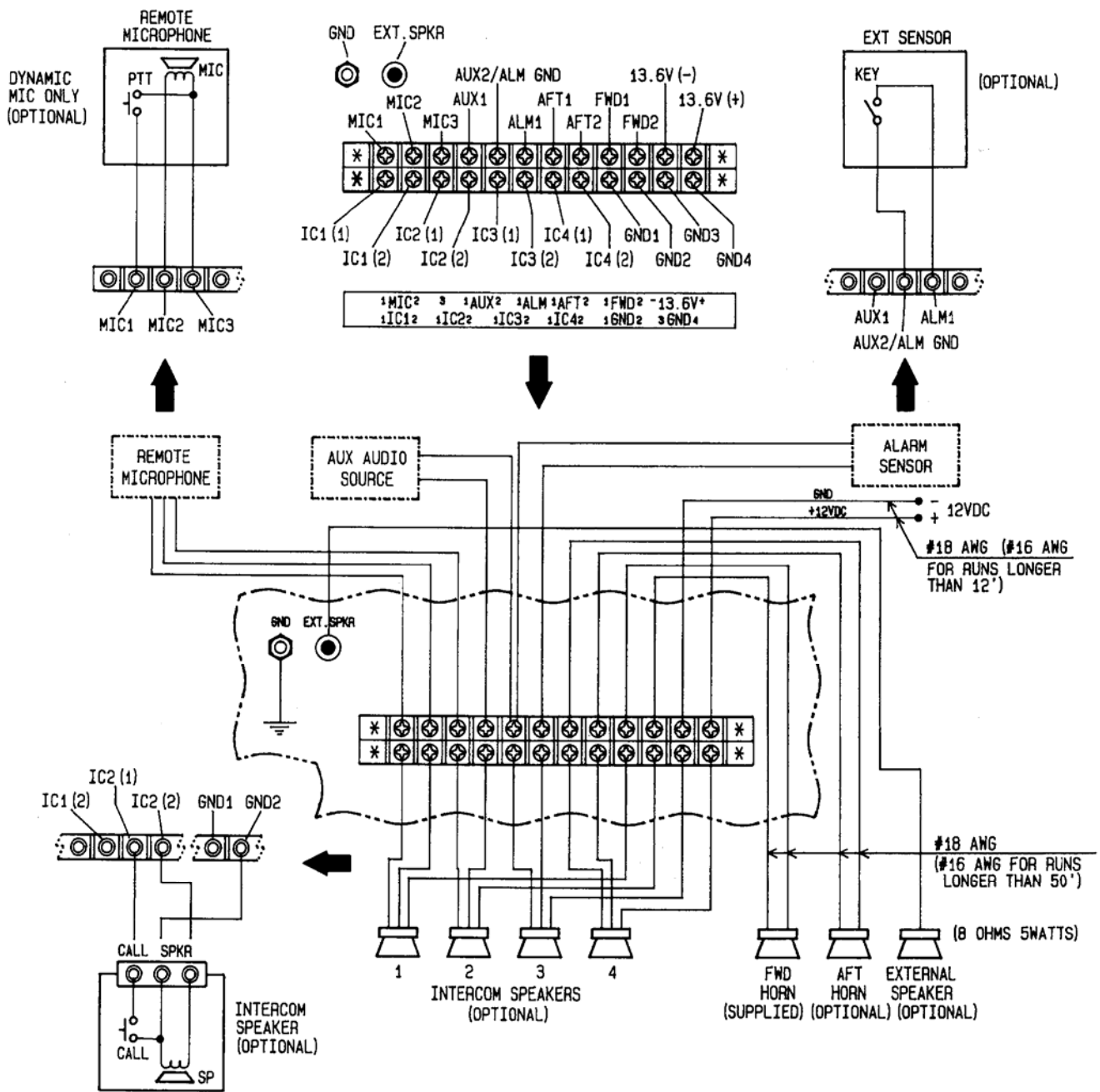


Figure 2-8 RAY430 Electrical Connections

SECTION 3

OPERATION

3.1 INTRODUCTION

While the operation of the RAY430 is easy and straight forward, the operator who is familiar with the functions and understands the layout of the front panel controls will be able to obtain the best performance from their equipment.

Following is a description of the front panel controls of the RAY430 loudhailer.

3.2 CONTROLS AND LCD DISPLAY

Refer to Figure 3-1 for familiarization with the following controls:

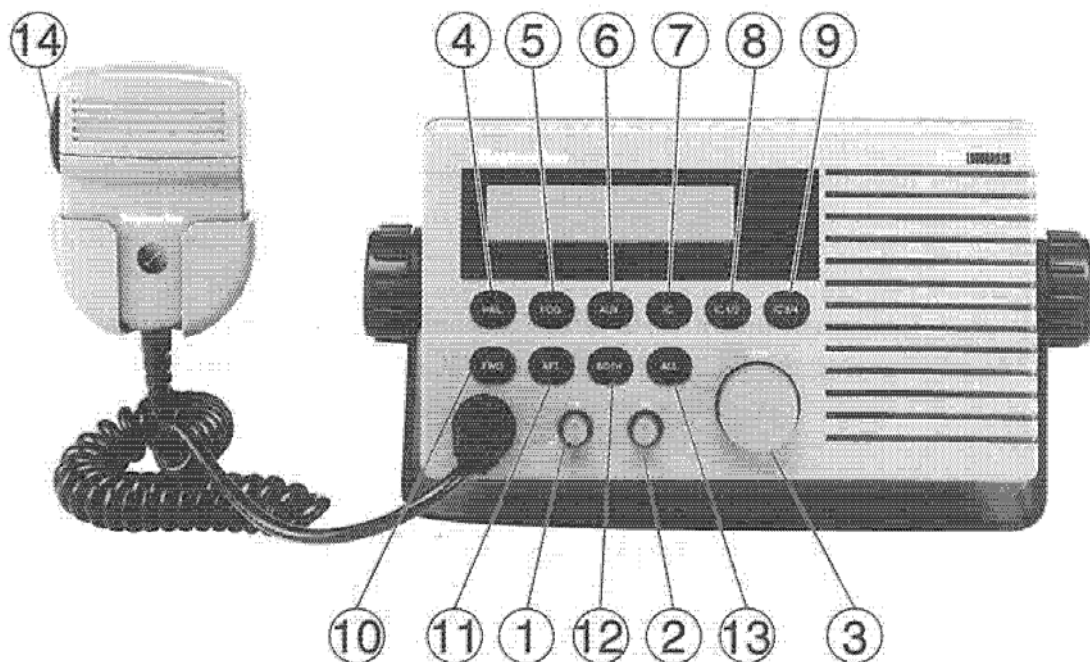


Figure 3-1 RAY430 Front Panel

3.2.1 Controls

- 1) On/Off & Dimmer Control Knob:
This control turns the RAY430 On and Off, and rotating the control clockwise increases the backlighting level of the LCD display.

2) Hail Output Control:

Rotating this control clockwise will increase the volume going to the Hailer Horns or Inter-com Speaker(s) and rotating this control counterclockwise will decrease the volume.

3) Listen Control:

Rotating this control clockwise will increase the listening volume at the internal speaker and rotating this control counterclockwise will decrease the volume.

4) Hail Key:

Pressing the [HAIL] key puts the RAY430 into the hailer mode and HAILER is displayed on the LCD.

5) FOG (Foghorn) Key:

Pressing the [FOG] key sequentially selects one of the 9 different horn or automatic fog signals for use.

6) AUX (Auxiliary) Key:

Audio signals connected to the AUX input from radiotelephone, tape player, etc. are amplified and heard at the selected external speaker location(s).

7) IC (Intercom) Key:

Pressing this key puts the RAY430 into the Intercom mode.

8) IC 1/2 Key:

Selects between Intercom Station 1 or 2 for connection to the input/output circuitry in the Intercom Mode. Pressing the [IC 1/2] key, selects IC- 1 , IC-2, in sequence, alternately.

9) IC 3/4 Key:

Selects between Intercom Station 3 or 4 for connection to the input/output circuitry in the Intercom Mode. Pressing the [IC 3/4] key selects IC-3, IC-4, in sequence, alternately.

10) FWD (Forward) Key:

Selects the Hailer horn which is normally mounted on the forward part of the vessel for use as a foghorn, hailer or public address system.

11) AFT (After) Key:

Selects the Hailer horn which is normally mounted at the rear of the vessel for use as a fog-horn, hailer or public address system.

12) BOTH Key:

Selects both Hailer horns which are mounted on the forward and rear part of the vessel for simultaneous use as foghorns, hailing or for public address.

13) ALL Key:

Connects the input/output circuitry to all speaker stations for use simultaneously during fog-horn, hailer or public address operations.

14) Microphone PTT (Push-To-Talk) Switch

The PTT switch located on the side of the RAY430 microphone is used to activate the microphone, etc.

3.2.2 LCD Display

The custom LCD display on the RAY430 is used to show the operation status of the loudhailer in bright bold characters. The display is illuminated in a blue-green color with adjustable intensity for best viewing in twilight or nighttime use. The lighting can also be turned off by use of the On/Off & Dimmer control knob.

The Ray430 has 4 operating modes. The selected mode is indicated by the message on the left side of the display. The modes messages are:

HAILER — for Hailing or public address mode

INTERCOM — for Intercom operation on up to 4 different stations

SEE TABLE — for Fog horn Signal mode. The RAY430 generates any one of 9 automatic or manual fog horn signals.

AUX — for Auxiliary audio inputs.

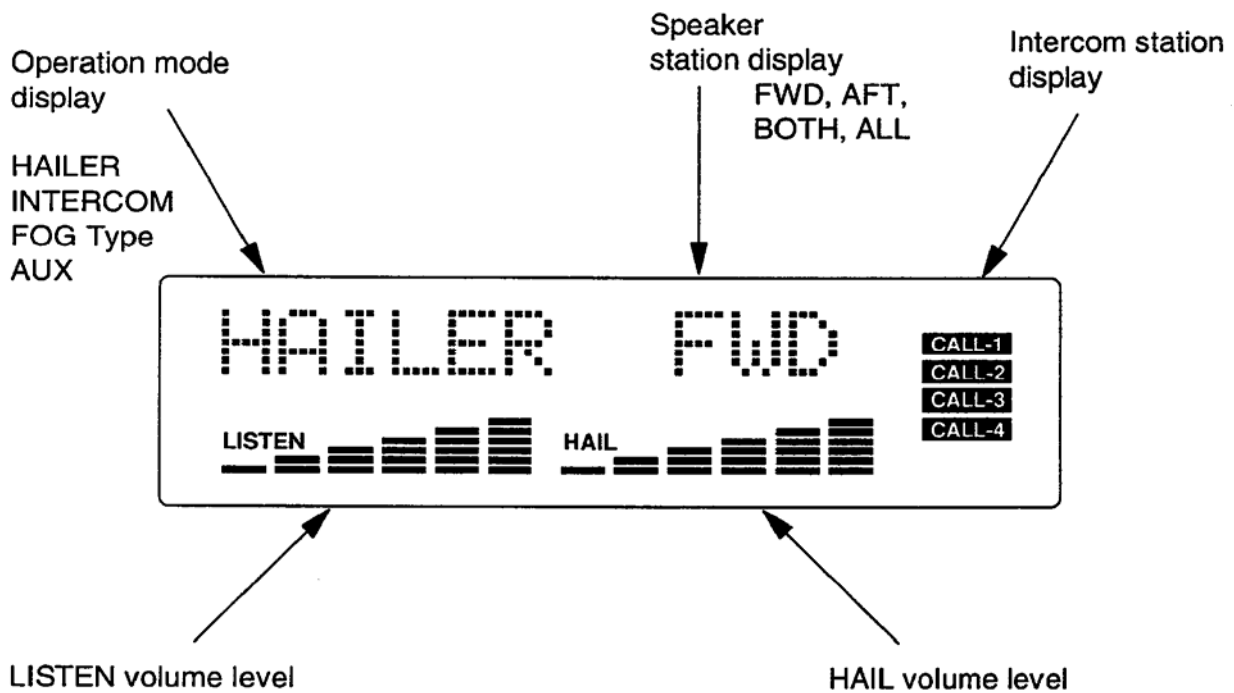


Figure 3-2 LCD Display

When the FOG mode is selected, the message area will display the selected type of signal to be emitted as follows:

	TYPE	Auto/Manual	PURPOSE
1.	MANUAL	Manual	Use as horn signal for passing, etc.
2.	UNDRWY	Automatic	Fog signal for Power Boat underway.
3.	STOP	Automatic	Fog signal for vessel that is stationary. (STOPPED)
4.	SAIL	Automatic	Fog signal for sailboat, fishboat, towboat.
5.	TOW	Automatic	Fog signal for vessels under tow.
6.	ANCHOR	Automatic	Fog signal for any vessel at anchor.
7.	AGROUND	Automatic	Fog signal for any vessel aground.
8.	YELP	Manual	Yelp type siren for police, Fish & Game, US Coast Guard.
9.	ALARM	Automatic	Burglar alarm signal when activated.

The speaker station display normally indicates the location of the speakers selected for use with each operating function. Located on the top right side of the display these messages use up to four characters. The speaker stations are: FWD, AFT, BOTH, or ALL.

In the FOG mode, the speaker station message area will temporarily indicate which FOG mode # has been selected for use when the [FOG] key is pushed. One second later the normal speaker station selection message will re-appear.

When the microphone push-to-talk [PTT] key is pressed in the Hail or Intercom modes, the message "TALK" appears in the speaker station window, confirming that transmission of your voice is now possible by speaking into the microphone.

Further information on the operating modes can be found in the sections that follow.

3.3 OPERATING PROCEDURES

Specific operating procedures for the RAY430 are explained in this section. Refer to the Controls section 3.2. 1 beginning on page 3-1 for a thorough description of all RAY430 functions.

3.3.1 The “Power Switch / Dimmer Control”

The On/Off & Dimmer control knob is used to turn on the Power, then controls backlighting levels.

TURNING THE UNIT “ON”

Rotate the On/Off & Dimmer control knob clockwise to turn the unit on. The display will appear in about 1 second. Now, set the On/Off & Dimmer Control knob to your desired backlighting level.

TO TURN THE UNIT “OFF”

Rotate the On/Off & Dimmer control knob counterclockwise to turn the unit off. The display will disappear immediately and the backlighting will be extinguished. The unit will now be OFF.

Note: You should never remove the power leads while the unit is turned on.

3.3.2 Volume Control (Hail & Listen)

1) HAIL Volume

Controls the volume level to external loudspeakers connected to the RAY430.

2) Listen Volume

This allows the user to Adjust the RAY430 to the desired listening volume level. When the control is turned clockwise, the volume level will increase. The volume level decreases when the control is turned counterclockwise.

3.3.3 Hail Mode

The mode keys are used to select one of the four operating modes. They are HAIL, FOG, AUX or INTC.

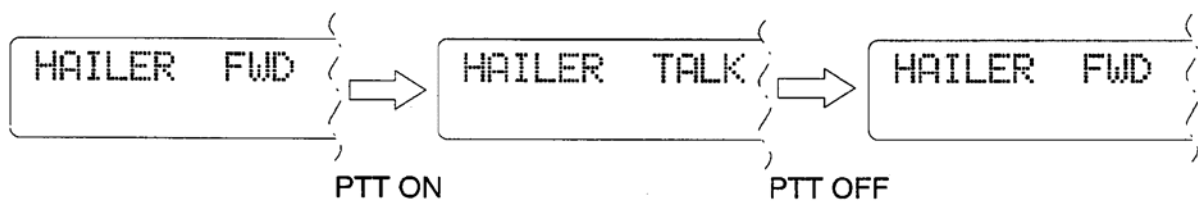
To operate the RAY430 as a loudhailer, proceed as follows:

1. Press the [HAIL] key.

After pressing the [HAIL] key, the HAIL mode is selected and “HAILER” appears on the LCD display in the operating mode window. In general, “Hailing” is normally performed using the forward hailing horn speaker. However, you can select the AFT horn speaker (if connected) or “Both” or “All” speakers (which includes intercoms) for general ships announcements.

2. Press the desired speaker key to select the FWD, AFT, BOTH or ALL positions as required for your particular application. Your selection appears in the speaker station window on the top right of the LCD display.
3. Press the microphone’s PTT button and speak into the microphone. Now, adjust the HAIL volume as required using the Hail knob.

In HAIL mode, upon pressing the microphone [PTT] button, “TALK” appears in the speaker window. Your voice signal is amplified through the microphone and is sent to the selected external speaker(s).



Releasing the microphone [PTT] button, “TALK” disappears from the speaker station display window and the speaker station name re-appears.

3.3.4 Intercom Operation

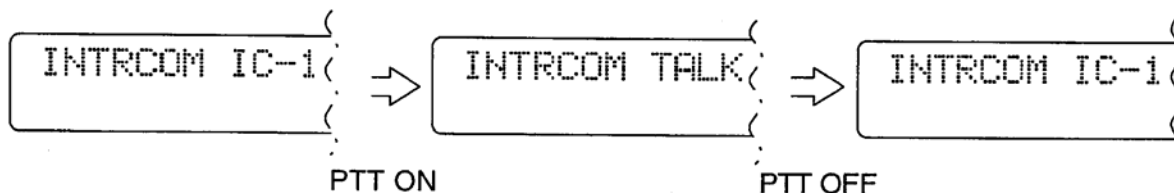
In general, the intercom mode is used to communicate with one of the intercom stations installed on the vessel. So if intercom operation is desired, you must first:

1. Press the [IC] key. “INTRCOM” will appear on the LCD display in the operating mode window.
2. Set the STATION ([IC 1/2], [IC3/4]) key to the desired intercom station.

Selection of the desired intercom station by pressing the appropriate station key is the second step in

operating the intercom mode. Once the station has been selected, communications from the master station (RAY430 unit) can be enabled.

In the intercom mode, upon pressing the microphone [PTT] button, "TALK" appears in the speaker station display window. Your voice signal through the microphone is amplified and sent to the Selected intercom speaker(s).



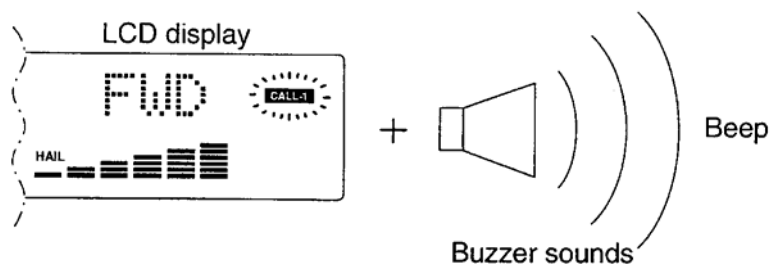
When the [PTT] button is released, the speaker at the selected station location can act as a microphone, with sounds being heard at the RAY430 internal speaker or external speaker (if connected). The RAY430 microphone takes priority over any responses from intercom sub-stations. This means that the sub-stations cannot be heard if the [PTT] key is held down.

Both the HAIL and LISTEN controls can be adjusted for desired volumes by rotating the Hail or Listen volume control knobs.

Marking calls from Remote Intercom Stations

As long as RAY430 power is on, the RAY430 master station can be called from any of the Inter-com sub-stations.

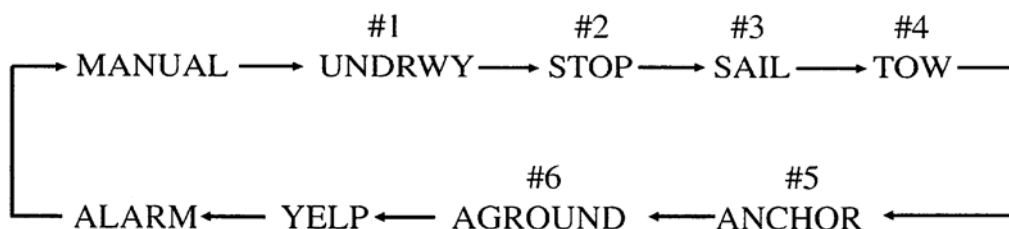
When the [CALL] switch on the sub-station speaker is pressed, both an audible beeping and an LCD display indicator tell the master station which remote station wishes to communicate with the master station. At the RAY430 master station, the operator would then select the intercom station key corresponding to the calling station and speak into the microphone to communicate.



The RAY430 allows you to connect a maximum of four intercom station speakers. The remote intercom stations cannot communicate directly with each other.

3.3.5 Fog Horn Mode

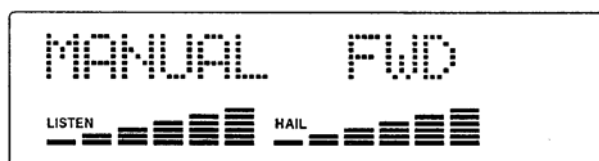
The [FOG] key allows the user to alternately select one of the automatic or manual FOG output signals. There are 9 kinds of alarms. They are: MANUAL, UNDRWY, STOP, SAIL, TOW, ANCHOR, AGROUND, YELP and ALARM. Whenever the [FOG] key is pressed, the alarm type is changed in the following order:



- A. MANUAL — This lets the hailer serve as a horn for the vessel to permit manual horn signals as described in the ‘Rules of the Road’ - Section 35.

Usage: Passing Signals, etc.

“MANUAL’ appears in the mode display window.



In this mode, the horn sounds when you press the microphone [PTT] button. The length and timing of the horn blasts are controlled by depressing the push-to-talk switch on the microphone.

Example:



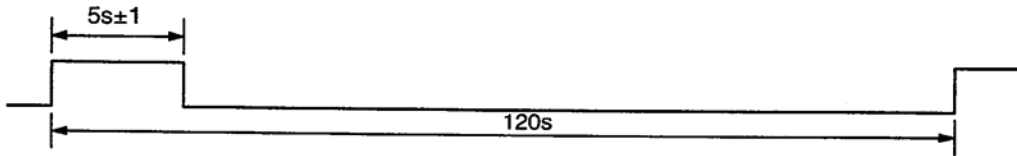
- B. UNDRWY (Fog 1) Usage: Power Boat “UNDERWAY’

This is a programmed automatic fog signal for powered vessels underway. The message “UNDRWY” appears on the mode display window. While operating the [FOG] key, “FOG 1 appears on the station display window for reference.



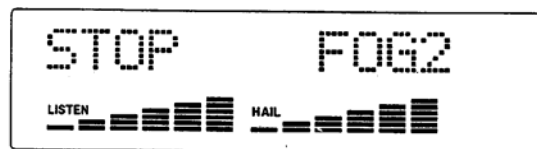
In 1 second, “FOG 1 “ disappears and the station speaker selection appears.

The Fog 1 alarm pattern is: One 5-second blast at 2 minute intervals.



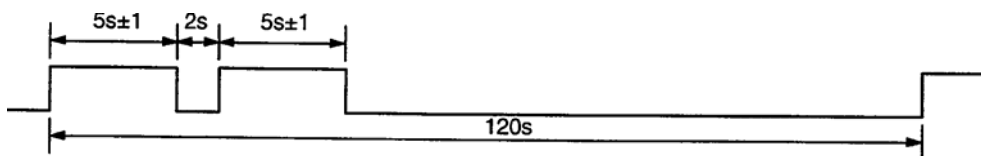
C. STOP (Fog 2) Usage: Power Boat “STOPPED”

This automatic fog signal is emitted when the vessel is stopped. The message “STOP” appears in the mode display window and “FOG 2” appears in the speaker station display window momentarily.



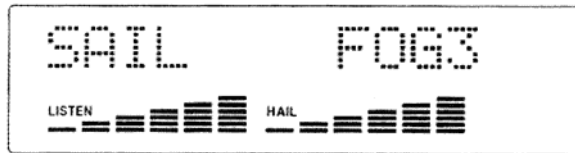
“FOG 2” disappears and the speaker station re-appears in the station display window.

The FOG 2 signal pattern is: Two 5-second blast, with a 2 second interval between each blast, this will be repeated every 2 minutes.



D. SAIL (FOG 3) Usage: Sail Boat, Fish Boat, Tow Boat

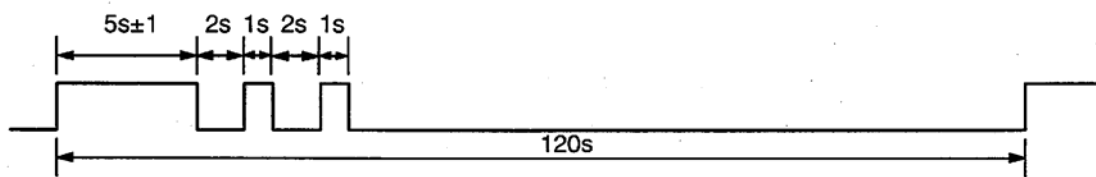
This automatic fog signal is used for sail boats, fish boats and tow boats underway. “SAIL” appears on the mode display part and “FOG 3” appears in the station display window when you press the [FOG] key.



“FOG 3” will disappear and the speaker station selection re-appears in the station display window.

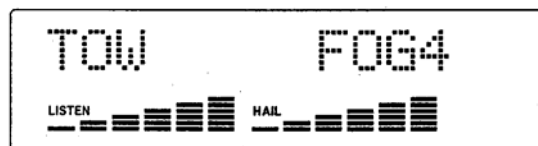
The Fog 3 signal pattern is:

One 5 second blast, followed by two 1 second blast, at 2 second intervals, this will be repeated every 2 minutes.



E. TOW (FOG 4) usage: Vessels Under Tow

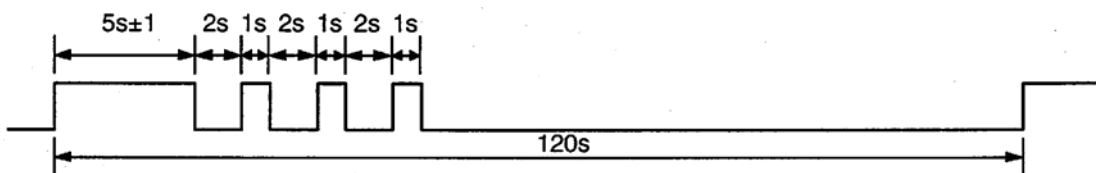
When you press the [FOG] key again this automatic fog signal is selected, the message “TOW” appears in the mode display window and “FOG 4” is temporarily displayed in the station display window.



“FOG 4” will disappear and the speaker station name re-appears in the station display window after completing the FOG 4 selection.

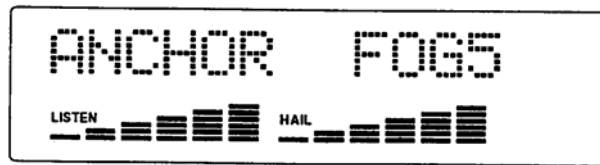
The FOG 4 signal pattern is:

One 5 second blast, followed by three 1 second blasts, at 2 second intervals, this will be repeated every 2 minutes.



F. ANCHOR (FOG 5) Usage: Any Vessel at Anchor

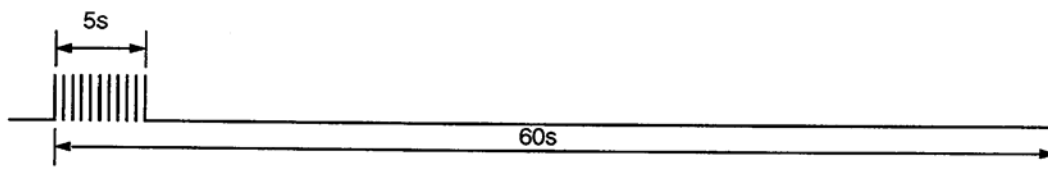
For this automatic fog signal press the [FOG] key again, the message “ANCHOR” appears on the mode display and “FOG 5” appears in the station display window.



“FOG 5” will disappear and the speaker station reappears in 1 second after FOG 5 is selected.

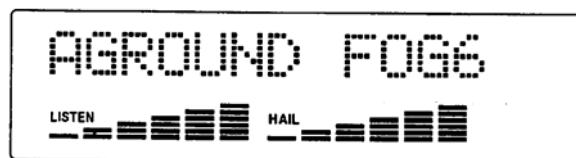
The Fog 5 signal pattern is:

A rapidly ringing bell tone will sound for a duration of at least 5 seconds, with a repetition interval which will not exceed 1 minute.



G. AGROUND (FOG 6) Usage Any Vessel Aground

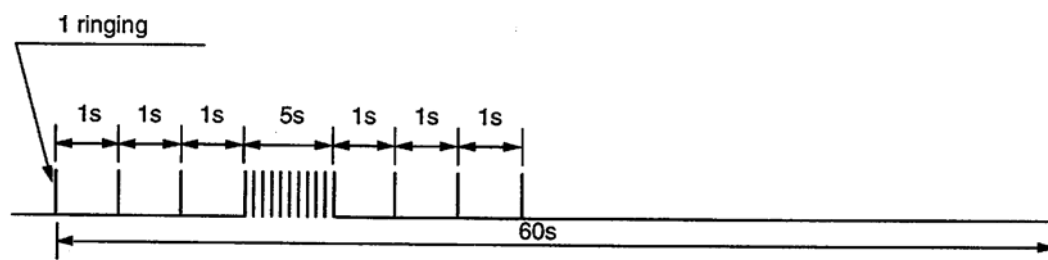
When you press the [FOG] key again this automatic fog signal is selected “AGROUND” appears in the mode display window and “FOG 6” appears in the station display window.



“FOG 6” will disappear and the station name reappears 1 second after completing the selection.

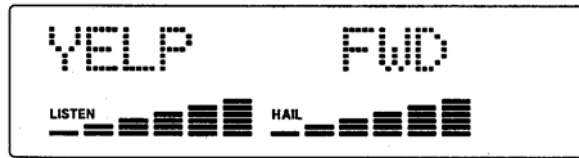
The Fog 6 signal is:

Three bell tones sound at one second intervals, followed by a rapidly ringing bell tone for a duration of 5 seconds, followed again by three bell tone sounds at one second intervals. This is repeated once every minute.



H. YELP Usage: Coast Guard, Patrol Vessels, etc.

This is a manually activated attention getting alarm signal often used by regulatory vessels. When the [FOG] key is pressed again Yelp is selected, “Yelp” appears in the mode display window.



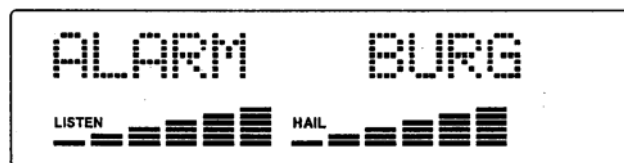
In this mode the horn yelps by pressing the microphone PTT button.



I. ALARM (Burglar alarm mode)

If an external normally open type switch sensor is attached (not supplied) to the ALM terminal on the rear panel, this unit can operate as a burglar alarm unit.

When the FOG mode key is pressed until “ALARM” appears on the mode display part and “BURG” appears on the station display window, the burglar alarm mode is enabled.



Within a few seconds “BURG” disappears and forward horn speaker station name appears.

The Burglar alarm signal is a “warble” type of signal similar to the yelp signal.



When the Burglar alarm mode is selected, the speaker station is changed to FWD, and the HAIL volume is set to the maximum level automatically.

The alarm itself is not enabled for five minutes after selection. However, in five minutes, the characters and backlighting on the LCD display window goes out and only the [FOG] key and On/Off & Dimmer Control (to Off) are operable on the RAY430. The RAY430 will appear to be OFE In this condition the burglar alarm will only sound if the ON signal from the external alarm sensor connected to the ALARM is tripped.

Clearing the ALARM mode

To disable the Burglar alarm mode, press the [FOG] key or turn off the RAY430 by rotating the On/Off & Dimmer control knob fully counterclockwise.

3.3.6 Aux Mode

If the audio output line from a radiotelephone equipment, cassette deck, or entertainment receiver is connected to the AUX terminals 1 and 2, the output signals of such units can be amplified through desired speaker stations by the RAY430.

1. Press the [AUX] mode key which will enable the auxiliary mode.
2. Press the desired speaker station key to select the specific station ([IC 1/2], [IC 3/4]).
3. Adjust the HAIL volume for the desired listening level.

SECTION 4

TECHNICAL DESCRIPTION

4.1 BLOCK DIAGRAM

Figure 4-1 is the block diagram of the RAY430. The operation of the circuitry described below is based upon this block diagram.

1. CPU

The CPU (U-203) accepts key entry from the keyboard and selects the proper input and output signals to control devices.

2. Relay

Changes input/output signals and is controlled by the CPU.

3. Relay Driver

Selects the input and output speakers

4. 5W Pre-Amp.

IC2 and IC3 amplifies low level voice signals and supplies them to the output signal selector through Listen Volume VR 1.

5. Intercom Selector

Activates the Intercom speaker with selected keyboard or Call key.

6. Output Signal Selector

Select the output signal (Foghorn Signal, Intercom, Alarm or Mic input signal) to the Power Amplifier

7. Power Amplifier

IC1 is a 30W power amplifier to active the selected speaker.

8. Interface Circuit

Senses the "CALL" or alarm sensor signals from the external unit. The photo couplers are used to reduce any external noise pickup by isolation.

9. Input Signal Selector

Selects input signal to active the FWD, AFT, INT, or EXT speaker(s).

10. 10. Tone Generator

Generates a horn and alarm sound for the RAY430. This generator is controlled by the CPU to produce correct sound patterns and signal timing for various automatic or manual signal outputs.

11. LCD Driver

U-202 Controls the LCD display.

12. 12. LCD

The LCD is a custom LCD featuring 1 2 characters on a Dot Matrix display. The bar for the volume and the intercom call numbers are displayed with 16 segment x 8 characters.

13. EL Driver

Drives the EL, controlled by On/Off & Dimmer control knob.

14. EL

Backlights the LCD display.

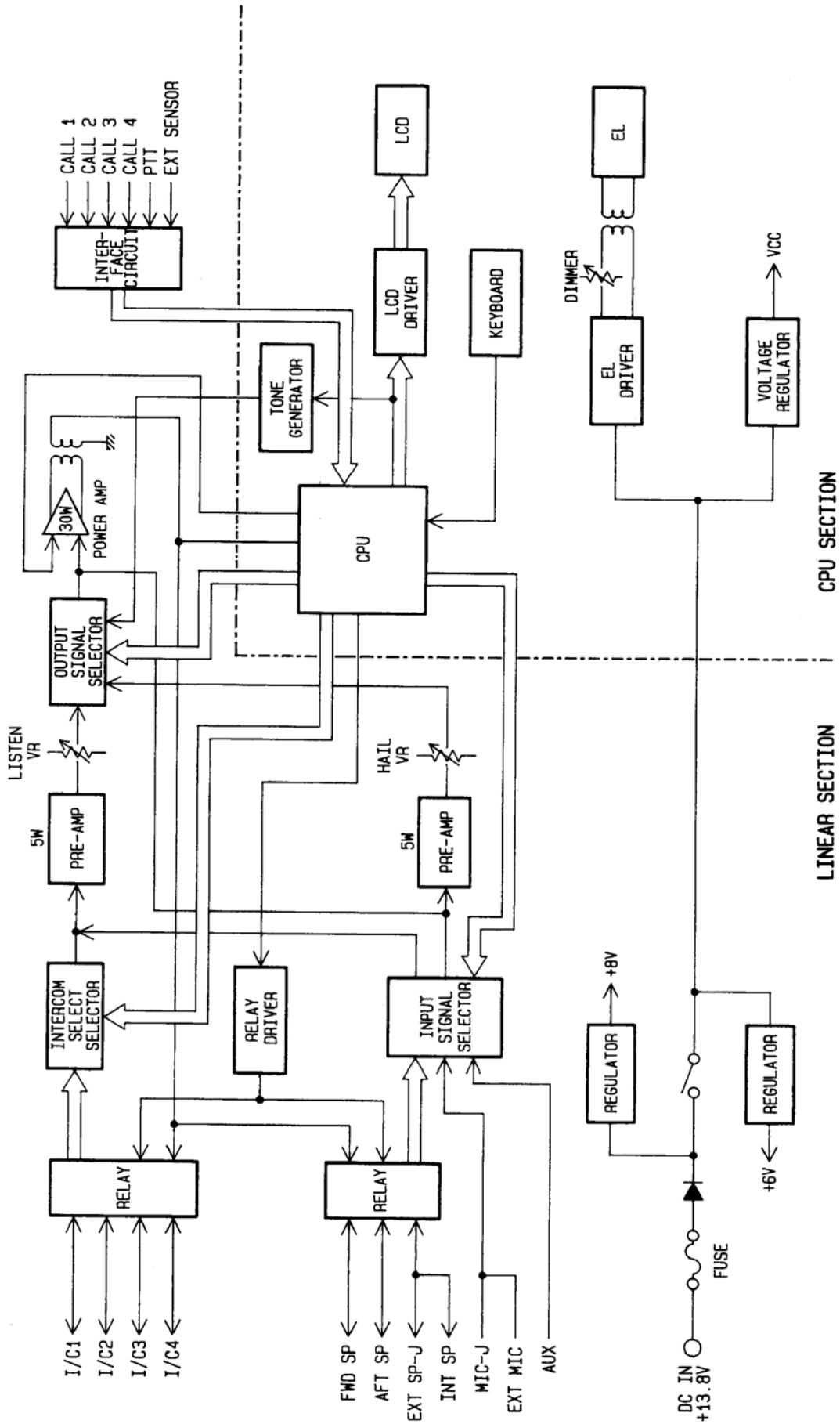


Figure 4-1 RAY430 Block Diagram

SECTION 5

MAINTENANCE

5.1 GENERAL

The purpose of this section is to provide servicing instructions to the service technician. The RAY430 is designed to provide long periods of trouble-free operation. It is recognized, however, that environmental and other factors may result in a need for occasional service.

5.1.1 Product and Customer Service

In the event that your RAY430 is in need of service, the dealer from whom the radio was purchased, or an authorized Raymarine dealer.

Our Technical Support Specialists are also available to answer installation, operation, and trouble shooting questions about your RAY430. In the US, contact our Technical Support Department Monday to Friday 8:15 AM to 5:00 PM Eastern Time at:

1-603-881-5200 ext 2444

Many Raymarine accessory items and parts are available through your authorized Raymarine dealer. However, if you are in need of an item not available through your retailer, please contact our Customer Service department Monday to Friday 8:15 AM to 5:00 PM Eastern Time at:

1-603-881-5200 ext 2333

In Europe, Raymarine support, service and accessories may be obtained from your authorized dealer, or call:

+44 (0) 9269 3611

5.2 PREVENTATIVE MAINTENANCE

The procedures listed below for the RAY430 should ideally be performed at monthly intervals to minimize the possibility of an equipment failure and assure optimum performance.

1. Fuse holders and their connections may be subject to corrosion which can increase circuit resistance. The in-line fuse should be removed from its holder, inspected and cleaned of any accumulation of dirt or corrosion.

2. The unit front panel should be cleaned with a tissue or a soft non-abrasive cloth. Care should be exercised when cleaning any plastic surface to prevent scratching, especially the LCD window area. Mild soap and water may be used in stubborn cases. The unit case should be cleaned of any salt spray or dust as often as necessary.

CAUTION

Do not use solvents or other chemicals for cleaning this equipment.

5.3 ADJUSTMENT

The RAY430 has been completely aligned at the factory and normally does not require any readjustment at installation. However, it is possible to adjust the tone level of the Hail & Intercom signal.

5.3.1 Test Equipment

- 1 Audio Oscillator
- 2 AC SSVM
- 3 8-ohm Dummy Load

5.3.2 Listen Output Adjustment

Connect Audio Oscillator, AC SSVM and 8-ohm Dummy Load as shown in Figure 5-1 (Audio Oscillator output: 6 mV).

Rotate the Listen Volume fully clockwise.

Adjust VR301 for 6 V on the AC SSVM.

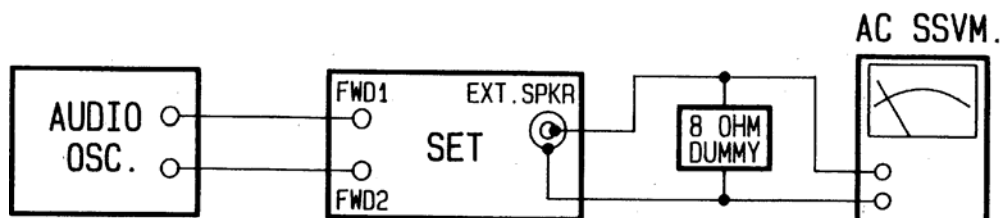


Figure 5- 1 Test connection for Listen output Adjustment

5.3.3 Intercom Output Adjustment

Connect Audio Oscillator; AC SSVM and 8-ohm Dummy Load as shown in Figure 5-2 (Audio Oscillator output: 7.5 mV).

Rotate Hail Volume fully clockwise.

Adjust VR302 for 6V on the AC SSVM.

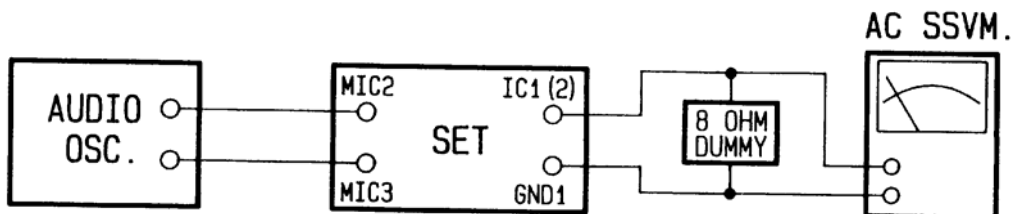


Figure 5- 2 Test connection of Intercom output Adjustment

5.3.4 Level Meter Adjustment

Connect 8-ohm Dummy Load to FWD terminal.

Rotate Hail Volume fully clockwise.

Select Manual Fog operation Mode.

Press the PTT switch and adjust VR101 to show 6 bars progressing from left to right on the LCD.

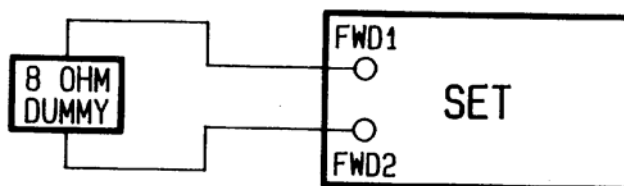


Figure 5- 3 Test connection of Intercom output Adjustment

5.3.5 Hailer Output Adjustment

Connect Audio Oscillator; AC SSVM and 8-ohm Dummy Load as shown in Figure 5-4 (Audio Oscillator output: 7.5 mV).

Rotate Hail Volume fully clockwise.

Adjust VR303 for 15.5V on the AC SSVM.

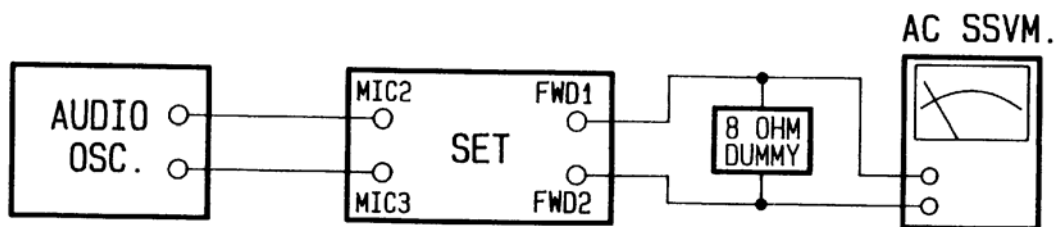


Figure 5- 4 Test connection of Hailer output Adjustment

SECTION 6

6.1 PARTS LIST

***** LINEAR A PCB ASSEMBLY SECTION *****

<u>Description</u>	<u>Qty.</u>	<u>Symbol</u>	<u>Part No.</u>
Linear A PCB Assembly	1		G263648-1
<u>Capacitors</u>			
Stacked Metallized PPS Film, 0.001 μ F	8	C301, 302, 303, 304, 313, 316, 318, 342	
Stacked Metallized PPS Film, 0.0033 μ F	2	C363, 365	
Stacked Metallized PPS Film, 0.047 μ F	2	C338, 339	
Stacked Metallized PPS Film, 0.1 μ F	2	C327, 362	
Ceramic, 100 pF	13	C349, 350, 351, 352, 353 354, 355, 356, 357, 358, 359, 360, 361	
Ceramic, 0.047 μ F	1	C328	
Elec., 1 μ F/50WV	4	C306, 312, 320, 333	
Elec., 2.2 μ F/50WV	1	C314	
Elec., 10 μ F/16WV	17	C305, 309, 310, 315, 317, 319, 323, 324, 326, 330, 331, 334, 345, 346, 347, 348, 364	
Elec., 47 μ F/16WV	4	C307, 311, 321, 325	
Elec., 47 μ F/25WV	2	C343, 344	
Elec., 100 μ F/16WV	2	C308, 322	
Elec., 100 μ F/25WV	2	C336, 341	
Elec., 220 μ F/25WV	2	C337, 340	
Elec., 1000 μ F/35WV	1	C335	
Tantalum, 1 μ F/16WV	2	C329, 368	
<u>Resistors</u>			
Jumper, 0 ohm	1	R323	
Metal Glaze, 1 ohm	2	R348, 349	
Metal Glaze, 47 ohm	2	R317, 334	
Metal Glaze, 68 ohm	2	R346, 350	
Metal Glaze, 100 ohm	8	R301, 302, 303, 305, 307,309, 324, 326	

<u>Description</u>	<u>Qty.</u>	<u>Symbol</u>	<u>Part No.</u>
<u>Resistors (cont.)</u>			
Metal Glaze, 1 kohm	1	R322	
Metal Glaze, 2.2 kohm	7	R304, 306, 308, 310, 318, 320, 321	
Metal Glaze, 3.3 kohm	2	R347, 351	
Metal Glaze, 3.9 kohm	2	R316, 333	
Metal Glaze, 4.7 kohm	8	R325, 327, 338, 352, 353, 354, 359, 360	
Metal Glaze, 10 kohm	9	R337, 338, 344, 345, 356, 357, 358, 362, 363	
Metal Glaze, 15 kohm	1	R369	
Metal Glaze, 22 kohm	4	R315, 355, 358, 370	
Metal Glaze, 47 kohm	1	R361	
Metal Glaze, 100 kohm	4	R365, 366, 367, 368	
Metal Glaze, 220 kohm	12	R311, 312, 313, 314, 328, 329, 330, 331, 340, 341, 342, 343	
Metal Glaze, 270 kohm	1	R364	
Metal Glaze, 510 kohm	2	R319, 336	
<u>Semiconductors</u>			
I.C., TC4066BF	3	IC301, 302, 303	
I.C., BA3311L	2	IC304, 305	
I.C., TA8225LQ	1	IC306	
I.C., S-80845CNNB	1	IC7	
Transistor, 2SC2712(GR)	1	Q301	
Transistor, RN1403	2	Q302, 303	
Transistor, RN1410	2	Q304, 305	
Diode, 1SS383	3	D301, 302, 303	
Diode, 02CZ6.2(X)	1	D304	
<u>Miscellaneous</u>			
Connector, TX15-30P-9ST-N1E	1	CN301	
Connector, B20B-XADSS-N(LF)(SN)	1	CN302	
Connector, B2B-XH-A(LF)(SN)	1	CN303	
Connector, B4B-XH-A(LF)(SN)	1	CN304	
Connector, B3B-XH-A(LF)(SN)	2	CN305, 306	
Connector, LPC-17FDS+C	1	J306	
Semi-Fixed Resistor, 22 kohm	3	VR301, 302, 303	

<u>Description</u>	<u>Qty.</u>	<u>Symbol</u>	<u>Part No.</u>
<u>Miscellaneous (cont.)</u>			
Fiber, PCB	1		
<u>***** LINEAR B PCB ASSEMBLY SECTION *****</u>			
Linear B PCB Assembly	1		G263648-2
<u>Capacitors</u>			
Stacked Metallized PPS Film, 0.001 μ F	2	C205, 227	
Stacked Metallized PPS Film, 0.01 μ F	1	C219	
Ceramic, 100 pF	7	C220, 221, 222, 223, 224, 225, 226	
Ceramic, 0.1 μ F	2	C207, 208	
Elec., 10 μ F/25WV	5	C214, 215, 216, 217, 218	
Elec., 47 μ F/25WV	3	C206, 209, 210	
Elec., 220 μ F/25WV	1	C204	
Elec., 1000 μ F/35WV	3	C201, 202, 203	
<u>Coil</u>			
Coil, EI-19(CZ99)	1	CH201	
<u>Resistors</u>			
Metal Glaze, 100 ohm	1	R213	
Metal Glaze, 1 kohm	7	R202, 207, 208, 209, 210, 211, 214	
Metal Glaze, 2.2 kohm	1	R212	
Metal Glaze, 4.7 kohm	1	R203	
Metal Glaze, 10 kohm	3	R215, 216, 217	
Metal Film, 4.7 ohm (3W)	1	R201	
Resistor Array, 10 kohm	1	RA201	
<u>Semiconductors</u>			
I.C., TA7805S(Q)	1	IC201	
I.C., TA7808S(Q)	1	IC202	
I.C., TD62307PG(J)	1	IC203	
I.C., TLP181GB(V4-GB-TPR,F)	6	IC204, 205, 206, 207, 208, 209	
Transistor, 2SC2712(GR)	1	Q201	
Transistor, RN1410	3	Q202, 204, 205	
Transistor, 2SA1162(Y)	1	Q203	

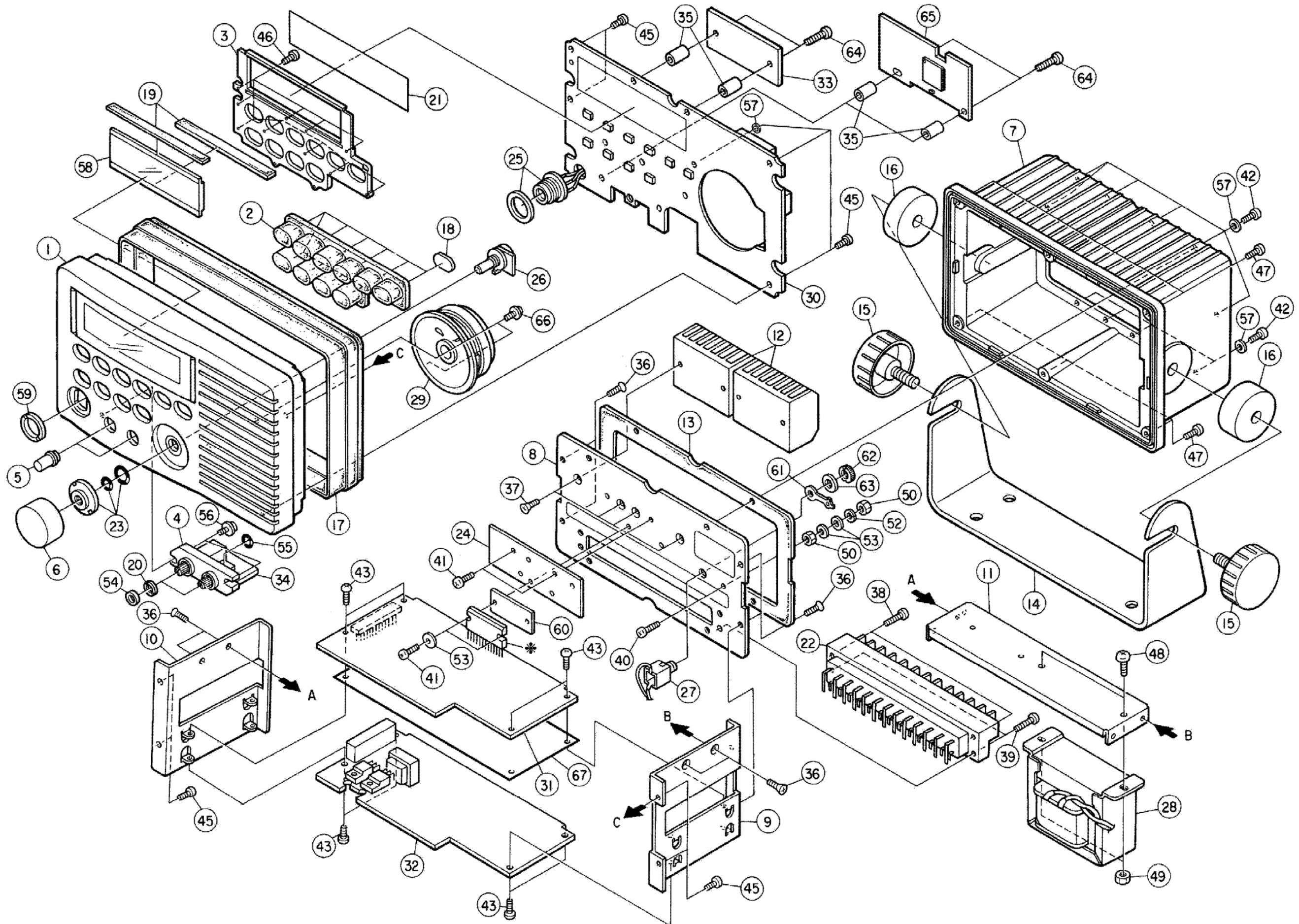
<u>Description</u>	<u>Qty.</u>	<u>Symbol</u>	<u>Part No.</u>
<u>Semiconductors (cont.)</u>			
Transistor, 2SA1298(Y)	1	Q207	
Transistor, 2SC4116(Y)	1	Q208	
Diode, 1N5401-B	1	D201	
Diode, 1S1888A	9	D202, 203, 204, 205, 206, 207, 208, 209, 210	
<u>Miscellaneous</u>			
Relay, ME-1-12P (12V DC)	7	RY201, 202, 203, 204, 205, 206, 207	
Connector, B26B-XADSS-N(LF)(SN)	1	CN201	
Connector, TX14-30R-10ST-N1E	1	CN202	
Connector, B5B-XH-A(LF)(SN)	2	CN203, 204	
Connector, B4B-XH-A(LF)(SN)	1	CN206	
Terminal Block, M116C-24	1	CN207	
<u>***** EL PCB ASSEMBLY SECTION *****</u>			
EL PCB Assembly	1		
<u>Capacitors</u>			
Stacked Metallized PPS Film, 0.0082 μ F	1	C403	
Elec., 1 μ F/50WV	1	C402	
Elec., 470 μ F/25WV	1	C401	
<u>Coil</u>			
EL Transformer, EI-19(C995R)	1	T401	
<u>Resistors</u>			
Metal Glaze, 22 ohm	1	R402	
Metal Glaze, 150 ohm	1	R403	
Metal Glaze, 6.8 kohm	1	R401	
<u>Semiconductor</u>			
Transistor, 2SC2712(GR)	1	Q401	
<u>Miscellaneous</u>			
Connector, B2B-XH-A(LF)(SN)	1	CN401	

<u>Description</u>	<u>Qty.</u>	<u>Symbol</u>	<u>Part No.</u>
<u>***** CPU PCB ASSEMBLY SECTION *****</u>			
CPU PCB Assembly	1		G263648-4
<u>Capacitors</u>			
Stacked Metallized PPS Film, 0.01 μ F	1	C114	
Ceramic, 10 pF	2	C108, 109	
Ceramic, 0.1 μ F	12	C103, 104, 105, 106, 107, 110, 112, 117, 118, 119, 120, 121	
Elec., 1 μ F/50WV	2	C111, 113	
Elec., 4.7 μ F/25WV	1	C115	
Elec., 10 μ F/16WV	1	C116	
Elec., 100 μ F/16WV	1	C101	
Elec., 100 μ F/25WV	1	C102	
<u>Resistors</u>			
Metal Glaze, 10 ohm	1	R121	
Metal Glaze, 100 ohm	29	R125, 126, 127, 128, 129, 130, 131, 132, 133, 134, 135, 136, 137, 138, 139, 140, 141, 142, 143, 144, 145, 146, 147, 148, 149, 150, 151, 152, 153	
Metal Glaze, 1 kohm	1	R120	
Metal Glaze, 2.2 kohm	17	R101, 102, 103, 104, 105, 106, 107, 108, 109, 110, 111, 113, 114, 115, 116, 117, 118	
Metal Glaze, 10 kohm	5	R119, 122, 123, 124, 156	
Metal Glaze, 91 kohm	1	R112	
Metal Glaze, 100 kohm	1	R155	
Metal Glaze, 3 Mohm	1	R154	
<u>Semiconductors</u>			
I.C., HD64F3062BF25	1	IC101	
I.C., NJU6468FC1	1	IC102	
I.C., PST600CMT	1	IC103	
I.C., TC75SS51F	1	IC104	
I.C., ADM202JRNZ	1	IC105	

<u>Description</u>	<u>Qty.</u>	<u>Symbol</u>	<u>Part No.</u>
<u>Semiconductors (cont.)</u>			
Transistor, RN1410	5	Q101, 102, 103, 104, 105	
LED, SLR-342MG3F	1	D101	
Diode, 1SS226	1	D102	
I.C., SML-210MTT86	20	D103, 104, 105, 106, 107, 108, 109, 110, 111, 112, 113, 114, 115, 116, 117, 118, 119, 120, 121, 122	
<u>Miscellaneous</u>			
EL Panel, GE-92D-9949A	1	EL101	G263597-24
Crystal, SM1984JTR (20MHz)	1	X101	
Volume, 10 kohm	1	VR101	
Switch (Push), SKRPABE010	10	SW101, 102, 103, 104, 105, 106, 107, 108, 109, 110	
Switch (Push), SMTE3-01-E-Z	1	SW111	
Switch (Slide), CFP-0202MB	1	SW112	
Connector, B26B-XADSS-N(LF)(SN)	1	CN101	
Connector, B20B-XADSS-N(LF)(SN)	1	CN102	
Connector, B2B-XH-A(LF)(SN)	1	CN103	
Connector, XG8S-0331	1	CN104	
<u>***** CHASSIS ASSEMBLY SECTION *****</u>			
Bezel Assembly W/LCD Window	1		G263648-18
Knob Dim/Hail	2		G263648-25
LCD Spacer	1		
Knob Listen	1		G263648-26
Listen Control Nut Assembly	1		
Cabinet Rear	1		G263597-27
Cabinet Top	1		
Dim/Hail Control Nut 7m/m	2		
Key Top Reflector	10		G263597-29
LCD Interconnector (A)	1		
LCD Interconnector (B)	1		
Front Gasket	1		G261808-1
Rear Chassis	1		
Side Chassis R	1		

<u>Description</u>	<u>Qty.</u>	<u>Symbol</u>	<u>Part No.</u>
Side Chassis L	1		
Transformer Bracket	1		
Yoke Bracket	1		G263596-4
Yoke Knob W/Screw	2		G263806-1
Yoke Spacer	2		G261807-1
Internal Speaker	1		G263597-13
Heat Sink Rear	2		
Gasket Rear	1		G263597-28
Terminal Block	1		G263648-21
Knob Spacer	2		
Vol Spacer	2		
Heat Sink (IC-1)	1		
PCB Spacer	2		
LCD	1	LCD101	G263648-24

6.2 ASSEMBLY DRAWING



* = Not supplied with PCB Assembly
See parts list for component part number

Figure 6-1
Assembly Drawing

6.3 PARTS LIST for ASSEMBLY DRAWING

<u>NO</u>	<u>DESCRIPTION</u>	<u>QTY.</u>	<u>PART NO.</u>	<u>NO</u>	<u>DESCRIPTION</u>	<u>QTY.</u>	<u>PART NO.</u>
1	BEZEL ASSEMBLY	1	G263648-18	39	PANHEAD 3X15	2	
2	KEY TOP (W/BEZEL ASSY)	1	G263648-19	40	PANHEAD 3X10	1	
3	LCD SPACER	1		41	PANHEAD 3X8	4	
4	LIGHT PIPE DIM/HAIL (W/BEZEL ASSY)	1		42	PANHEAD BLACK 3X8	10	
5	KNOB DIM/HAIL	2	G263597-25	43	BRAZIERHEAD TAPPING 3X8	8	
6	KNOB LISTEN	1	G263597-26	44	Not Used		
7	CABINET REAR	1	G263597-27	45	PANHEAD P TIGHT 3X8	9	
8	REAR CHASSIS	1		46	PANHEAD 2X6	12	
9	SIDE CHASSIS R	1		47	BIND STAINLESS, 2.6X8	6	
10	SIDE CHASSIS L	1		48	BINDINGHEAD 4X8	2	
11	TRANSFORMER BRACKET	1		49	NUT 4m/m FLANGE	2	
12	HEAT SINK REAR	1		50	NUT 3m/m	2	
13	GASKET REAR	1	G263597-28	51	Not Used		
14	YOKE BRACKET	1	G263596-4	52	SPRING WASHER 3m/m	1	
15	YOKE KNOB W/SCREW	2	G261806-1	53	PLAIN WASHER 3m/m	4	
16	YOKE SPACER	2	G261807-1	54	KNOB SPACER	2	
17	GASKET FRONT	1	G261808-1	55	SPACER	2	
18	KEY TOP REFLECTOR	10	G263597-29	56	PANHEAD P TIGHT W/FLANGE 3X6	2	
19	LCD INTERCONNECTOR	2	G263648-20	57	NYLON WASHER 6X3X0.5	17	
20	NUT DIM/HAIL CONTROL	2		58	LCD DISPLAY	1	G263648-24
21	EL-PANEL (W/CPU PCB ASSY)	1	G263597-24	59	MIC JACK NUT	1	
22	TERMINAL BLOCK	1	G263648-21	60	INSULATOR	1	
23	CHANNEL NUT ASSEMBLY	1		61	CAP (SPEAKER JACK)	1	
24	HEAT SINK (IC-1)	1		62	NUT (SPEAKER JACK)	1	
25	MIC JACK (W/BEZEL ASSY)	1	G263129-58	63	WASHER (SPEAKER JACK)	1	
26	LISTEN CONTROL	1	G263648-22	64	PANHEAD P TIGHT 3X12	4	
27	EXT SP JACK	1	G263014-26	65	Not used.		
28	TRANSFORMER	1	G263648-23	66	TP TAPPING 2X4	6	
29	INTERNAL SPEAKER (8 OHM 3W)	1	G263597-13	67	FIBER	1	
30	CPU PCB ASSEMBLY	1	G263648-4				
31	LINEAR A PCB ASSEMBLY	1	G263648-1				
32	LINEAR B PCB ASSEMBLY	1	G263648-2				
33	EL PCB ASSEMBLY	1					
34	DIM/HAIL PCB ASSEMBLY	1	G263648-5				
35	PCB SPACER	4					
36	COUNTERSUNKHEAD TAPPING 3X8	4					
37	COUNTERSUNKHEAD 3X8	4					
38	PANHEAD 3X25	2					

6.4 INTERNAL WIRING DRAWING

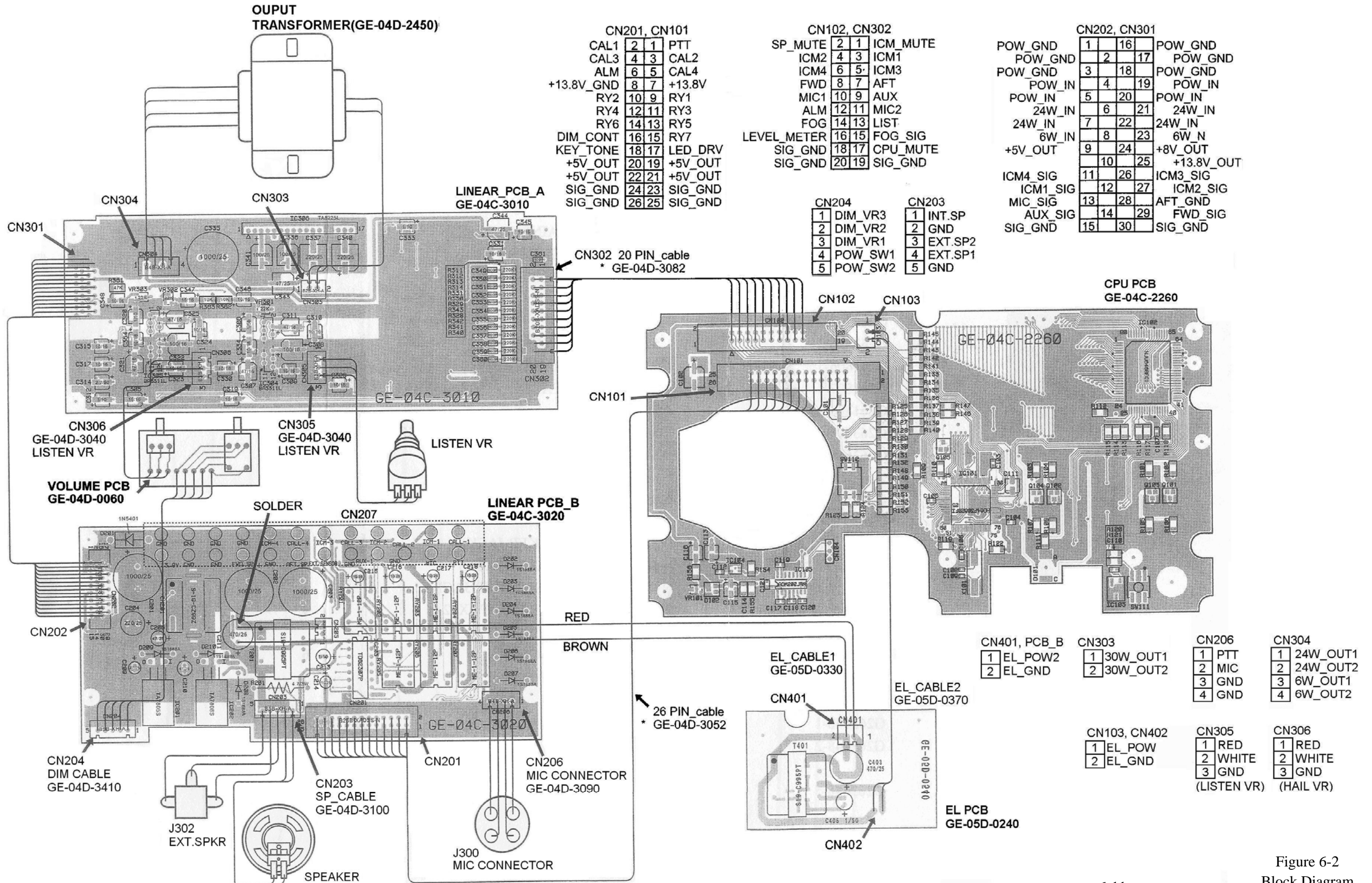


Figure 6-2
Block Diagram

6.5 LINEAR A SCHEMATIC DIAGRAM

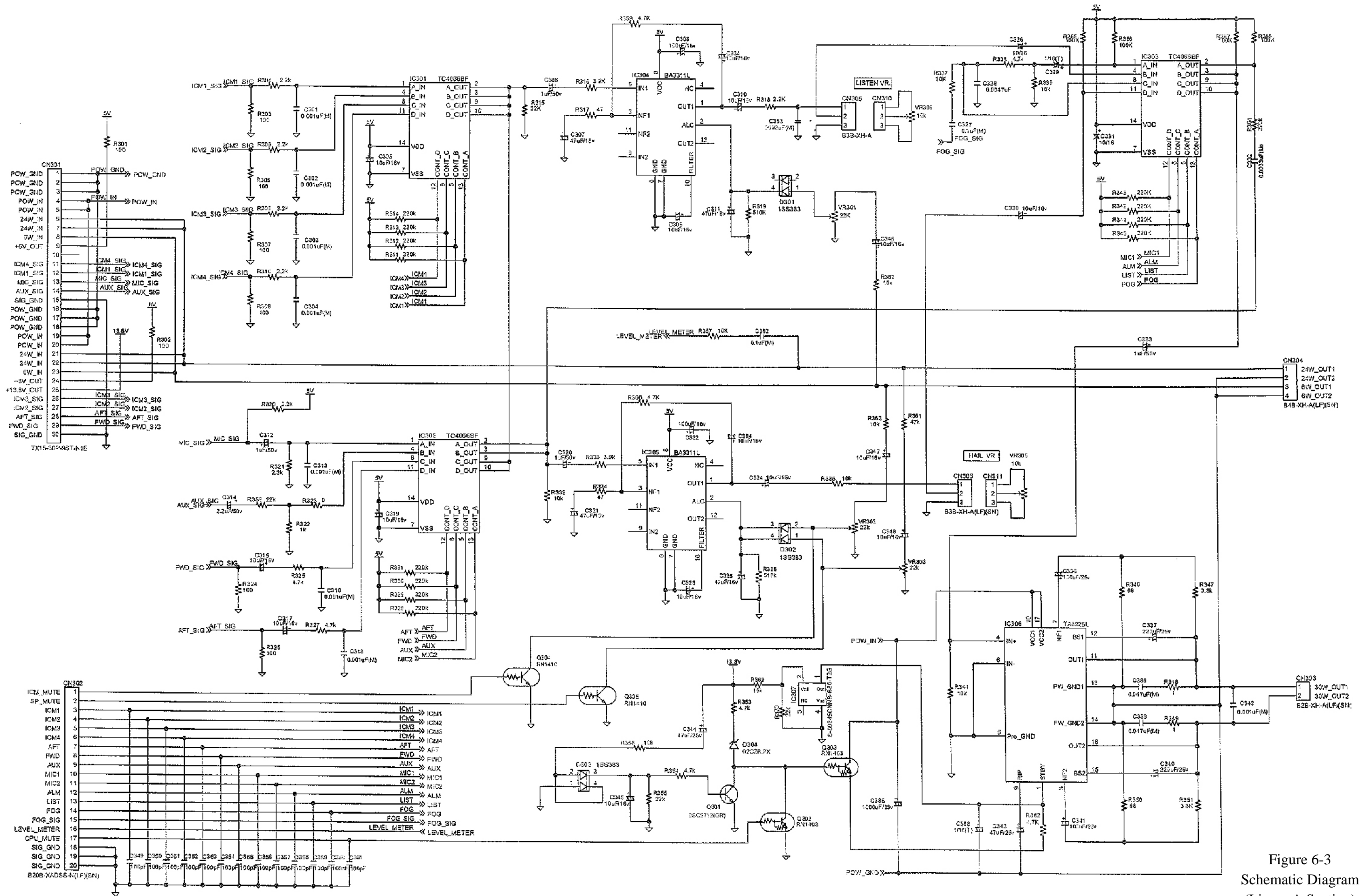


Figure 6-3
Schematic Diagram
(Linear A Section)

6.6 LINEAR B SCHEMATIC DIAGRAM

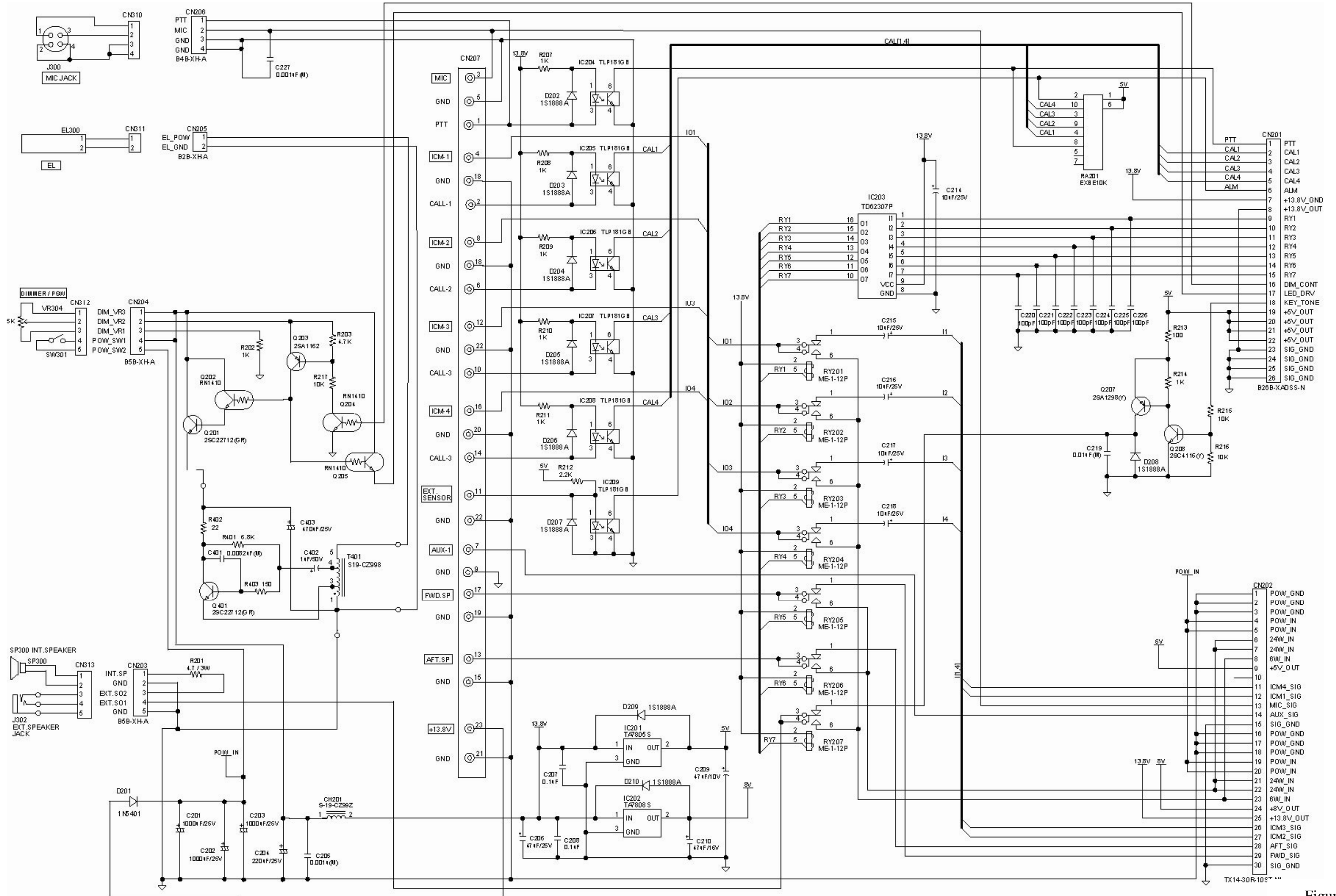
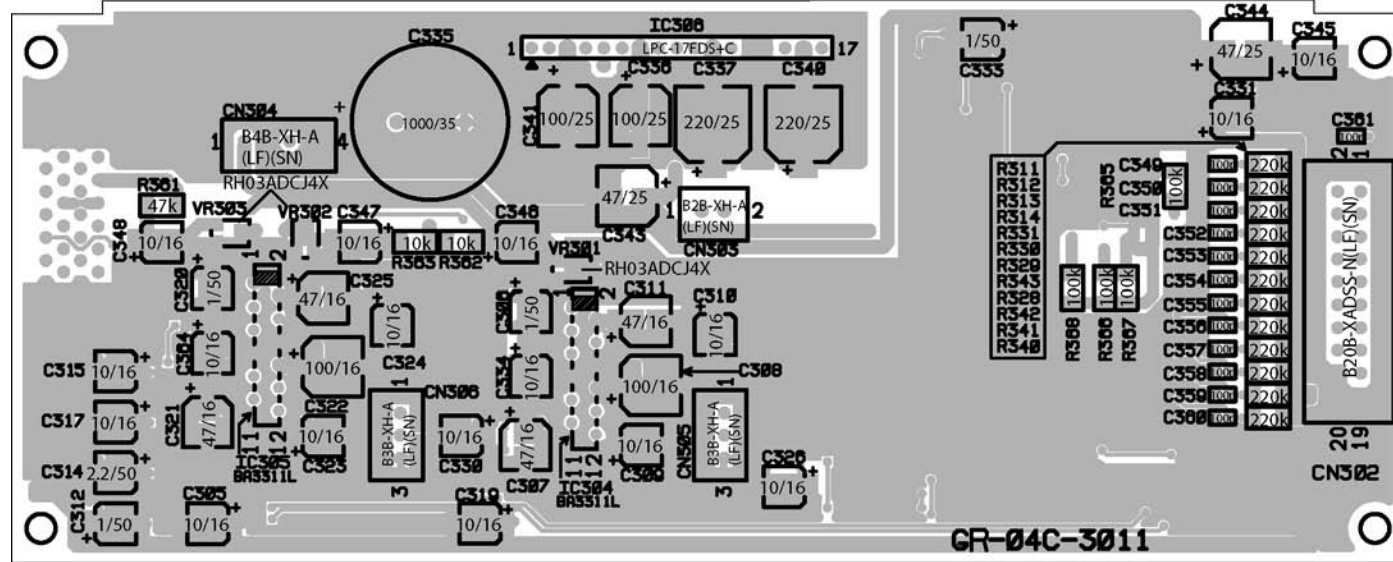
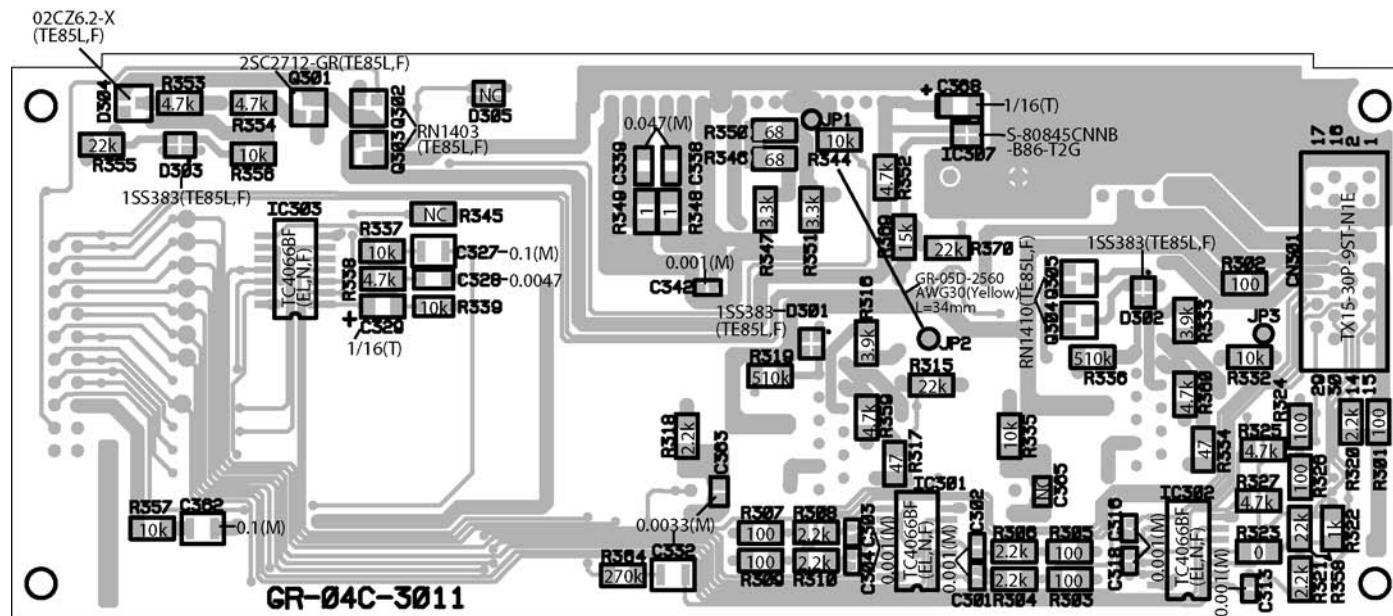


Figure 6-4
Schematic Diagram
(Linear B Section)

6.7 LINEAR A PCB PARTS LAYOUT



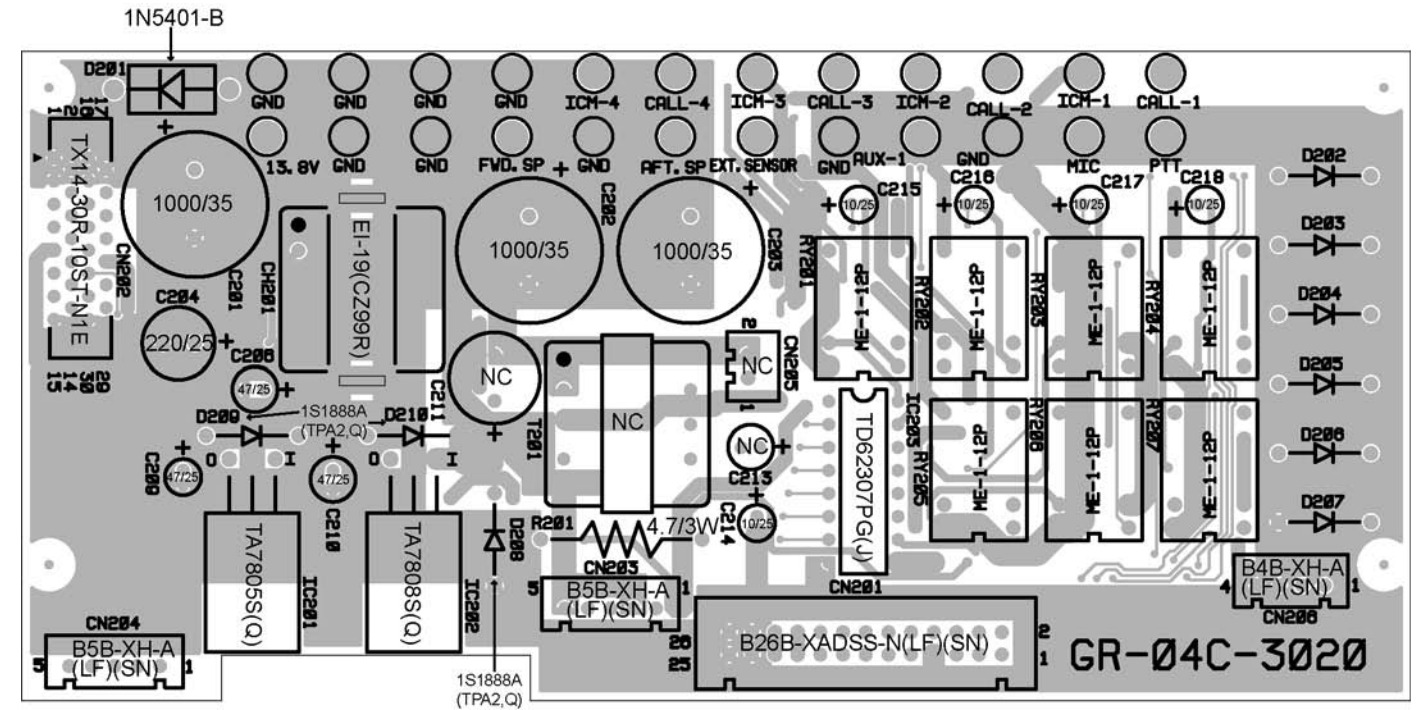
TOP VIEW



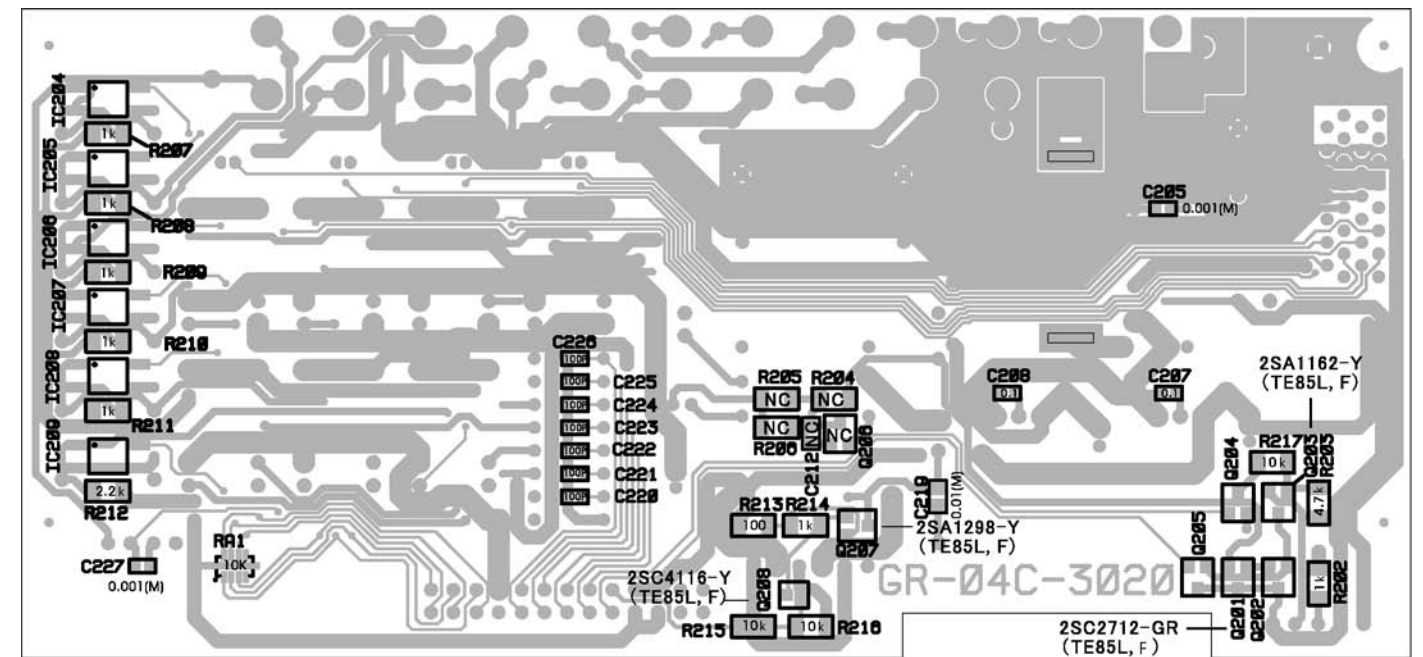
BOTTOM VIEW

Figure 6-5
Linear A PCB
Parts Layout

6.8 LINEAR B PCB PARTS LAYOUT



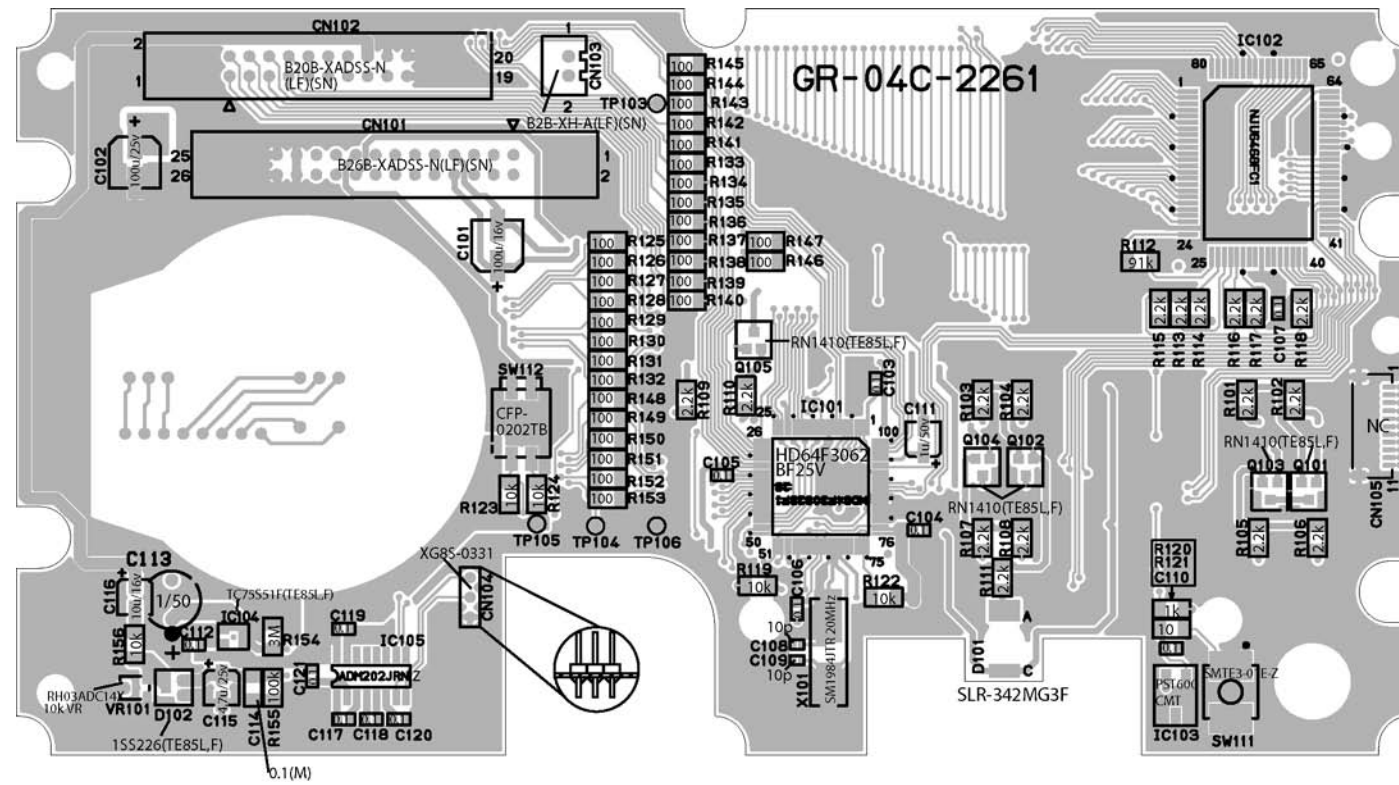
TOP VIEW



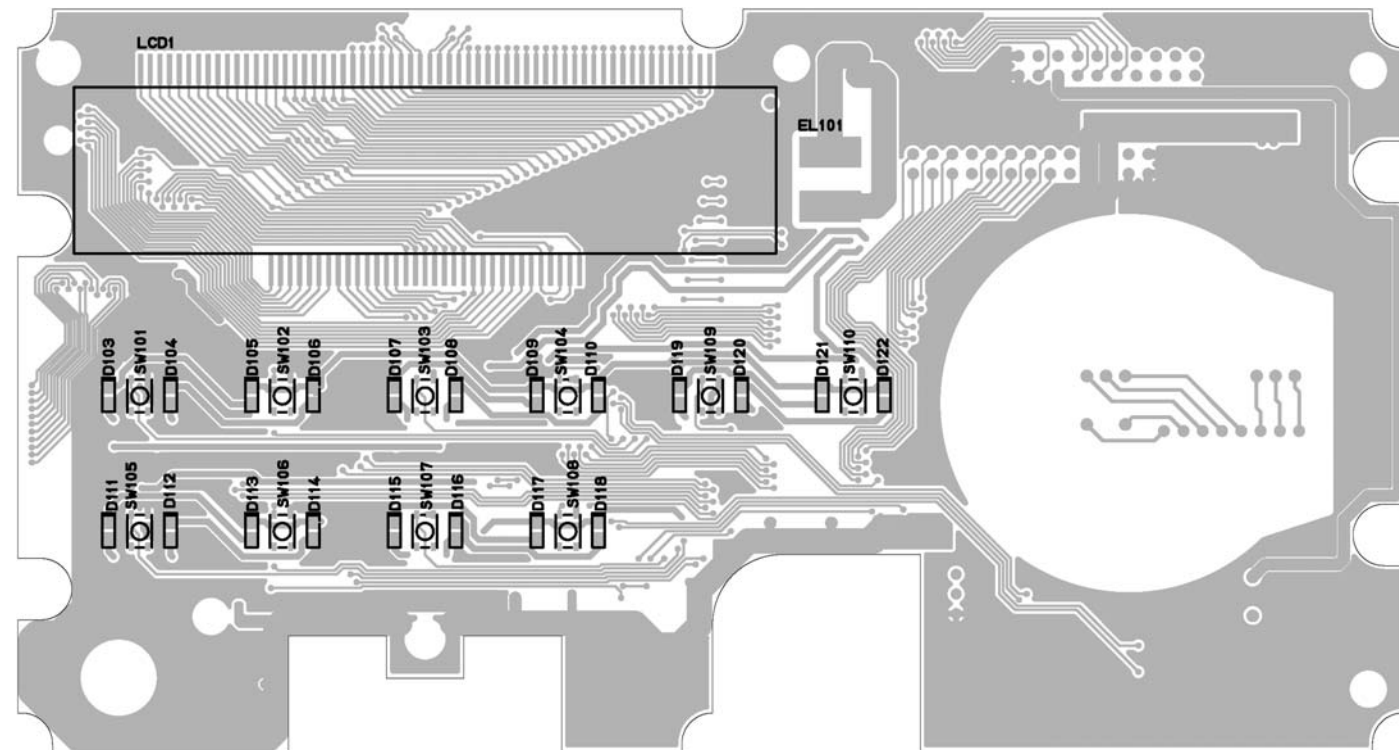
BOTTOM VIEW

Figure 6-6
Linear B PCB
Parts Layout

6.10 CPU PCB PARTS LAYOUT

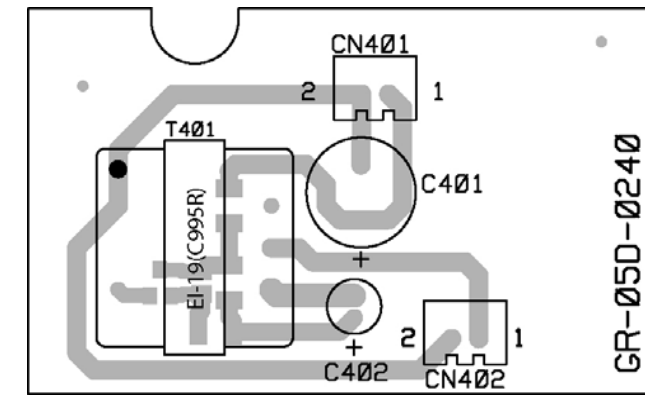


TOP VIEW

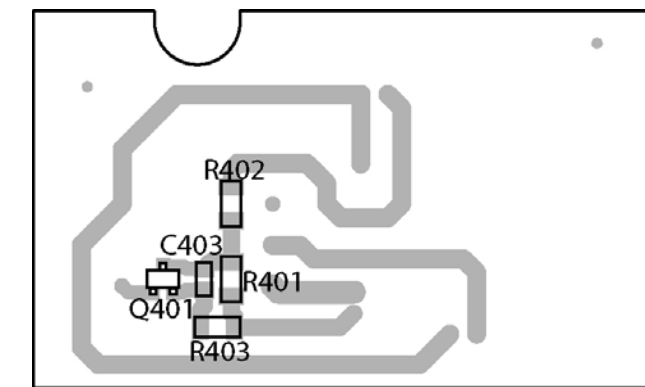


BOTTOM VIEW

Figure 6-8
CPU PCB
Parts Layout

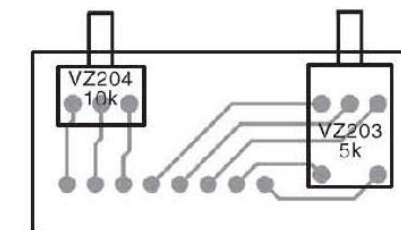


TOP VIEW

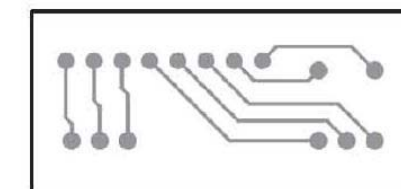


BOTTOM VIEW

Figure 6-9
EL PCB
Parts Layout



TOP VIEW



BOTTOM VIEW

Figure 6-10
Volume PCB
Parts Layout

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