A UNIT OF DATAMARINE INTERNATIONAL INC.

SEA 330

HF SINGLE SIDEBAND RADIOTELEPHONE

INSTRUCTION AND MAINTENANCE MANUAL

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MAN-330
REV. 8 5/96

IMPORTANT

NOTICE TO INSTALLERS

NOTE: The safe compass distance as defined in Paragraph 29 of IEC Publication 92-101, Third Edition:

3300 Controller = 2.0 meters
3301 Transceiver = 1.0 meters

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1. GENERAL INFORMATION

1.1 DESCRIPTION

The SEA 330 is a compact, all solid-state, 300 Watt PEP, HF SSB transceiver for the marine and HF radio service.

The SEA 330 covers the 1.605 to 29.999 MHz frequency range with channel restrictions which are determined only by the rules regarding the appropriate radio service. As normally programmed, the SEA 330 frequency memory contains ALL normally assigned ITU and TELEX channels and has space available for any additional channels which might be desired.

The SEA 330 is fully synthesized with 10 Hz resolution and the channel frequencies are controlled by a precision crystal housed in a proportional oven. The transceiver is designed to operate from a 24 Volt, floating ground power system. The SEA 330 makes use of a unique new SEA designed communications control buss (SEABUSS™) which supports all radiotelephone functions. This makes the radiotelephone completely compatible with an extremely wide variety of control options. In normal Marine or HF service, the radiotelephone is usually controlled with the standard SEA 330 control terminal. This terminal is actually a small dedicated computer system with a custom designed liquid crystal display and a dedicated software package which configures the system as a general purpose HF radiotelephone.

The controller is designed for shipboard mounting in a rigorous environment and is attractively styled in a modern injection molded polycarbonate case. Keypad and display are lighted with variable illumination for operator convenience.

The SEABUSS is designed as a general purpose communications system control buss and incorporates a number of unique and useful features:

1. Both audio and data are independently supported, each on its own balanced, low impedance twisted pair.

2. The SEABUSS is designed to allow direct paralleling of up to four (4) control terminals without expansion.

3. The SEABUSS allows the direct interconnection of ANY general purpose computer/controller in a mix and match system. This allows many unique options such as multiple remote control locations and direct radiotelephone to computer interfacing. The computer interface allows extreme flexibility in HF communications system design. Features such as SITOR, SELCALL and the like may be implemented without modification of the basic radiotelephone.

4. The SEABUSS may be considered an "open" buss. For details regarding buss protocol, contact the SEA Inc. factory.

1.2 EQUIPMENT FURNISHED

1.2.1 SEA 330 Transceiver

1.2.2 Transceiver mounting bracket

1.2.3 SEA 330 Controller

1.2.4 Controller gimbal bracket

1.2.5 Microphone and microphone clip

1.2.6 Power connector

1.2.7 Interconnection cable (25')

1.2.8 Instruction and maintenance manual

1.2.9 SEA 330 Operator'...s manual

1.3 MECHANICAL INFORMATION

1.4 TRANSCEIVER UNIT SPECIFICATIONS

1.4.1 DIMENSIONS

(HEIGHT-WIDTH-DEPTH)
In: 6.75 x 14.125 x 11.75
mm: 175 x 360 x 300

1.4.2 WEIGHT

Lbs: 17.6
Kgs: 8

1.5 CONTROLLER SPECIFICATIONS

1.5.1 DIMENSIONS

(HEIGHT-WIDTH-DEPTH)
In: 5.375 x 13.0 x 3.0
mm: 136.5 x 330 x 76.2

1.5.2 WEIGHT

Lbs: 3.56
Kgs: 1.6

1.6 ELECTRICAL SPECIFICATIONS

1.6.1 GENERAL

Frequency Range	1.605 - 29.999 MHz
Circuitry	Double Conversion, 70 MHz 1st I.F.,10.7 MHz 2nd I.F.
Terminal Operating Controls	21 Key Keypad
Channel Capacity	604 programmed channels, 90 field programmable.
Operating Temperature Range	-20 degrees to +55 degrees C
Frequency Stability	10 Hz
Operating Modes	J3E, R3E, HJ2B, 2182.0 KHz in H3E
Primary Voltage	24 V DC - 10% + 25%

Current Drain:

Receive Standby	1A
Receive, Full Audio	1.5A
Transmit, Average Voice	11A
Transmit, Two Tone	15.5A
RF Impedance	50 Ohms

1.6.2 TRANSMITTER

Power Output	R3E, J3E, 300 Watts PEP (150 Watts PEP Below 4 MHz)
Intermodulation	<-32 dB below PEP
Spurious Emissions	<-68 dB below PEP
Carrier Suppression	<-55 dB below PEP
Undesired Sideband Suppression	<-60 dB below PEP @ 1000 Hz
Audio Response	350 Hz to 2700 Hz (@ -6 dB)

1.6.3 RECEIVER

Sensitivity: SSB (J3E)	<1.0 uV for 12 dB SINAD
Sensitivity: AM (H3E)	<6.0 uV for 12 dB SINAD
Selectivity: SSB (J3E)	350 - 2700 Hz (@ -6 dB)
Selectivity: TELEX	500 Hz bandwidth at 1700 Hz
AGC	<6 dB audio level change from 10 uV to 100 mV
Intermodulation	At least -80 dB

Spurious Responses	At least -90 dB
Audio Power	3 Watts at <10% distortion

2. OPERATION

2.1 WARM UP CAUTION

Do not attempt to transmit until the radiotelephone is warmed up for at least 5 minutes. Transmitting before the 5 minute warm-up period has elapsed can cause a violation of FCC regulations.

2.2 FCC REQUIREMENTS

"How to Operate Your Radiotelephone Set" is a booklet available from the Radio Technical Commission for Marine Service (RTCM), 655 Fifteenth Street N.W., Ste. 300, Washington, D.C. 20005, and is highly recommended reading material.

2.3 FRONT PANEL CONTROLS AND INDICATORS

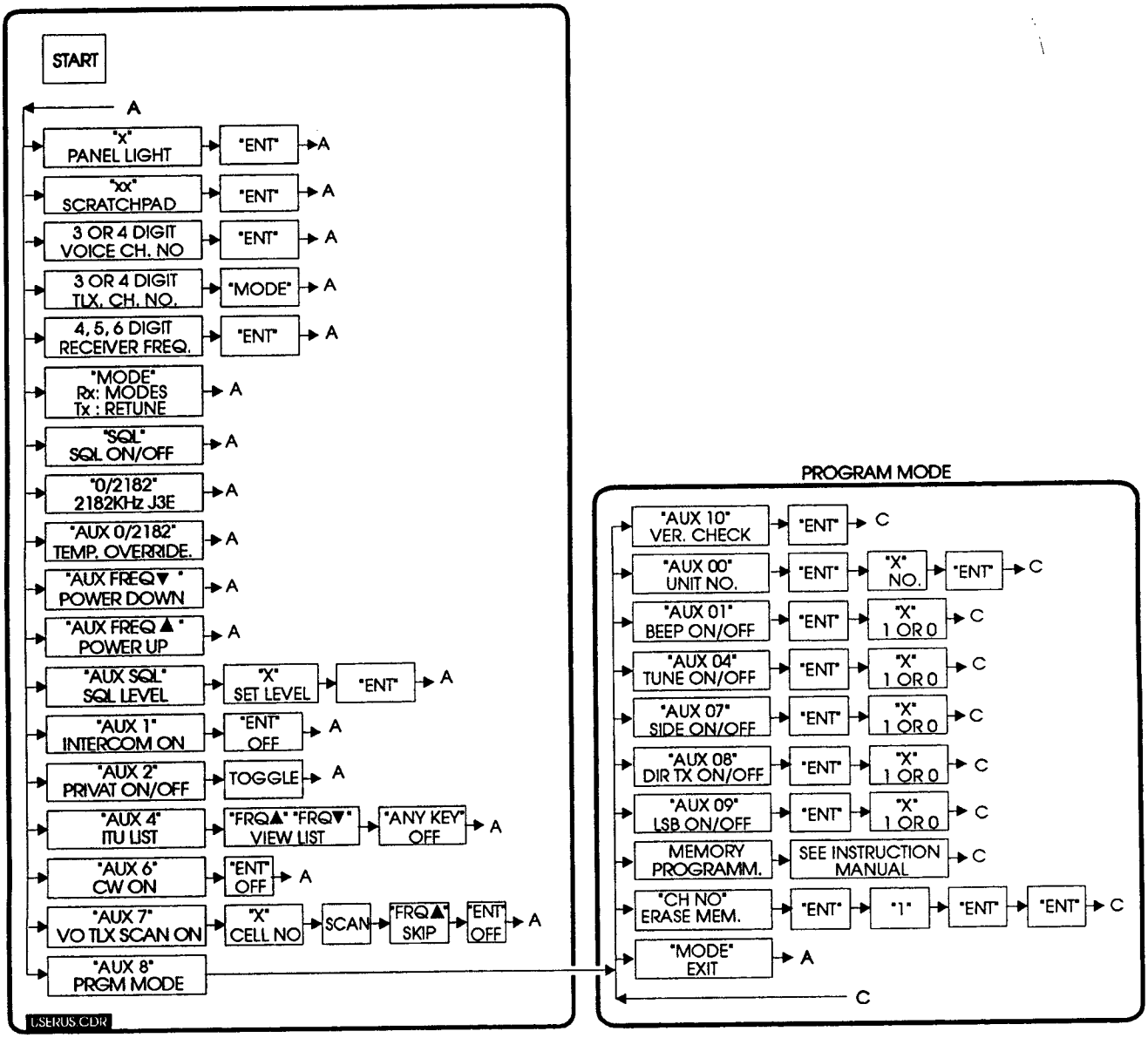
Figure 2.3 illustrates the front panel of the SEA 330 Controller. The function of the individual keys in the 21 key keypad are listed below. The LCD provides specialized annunciators for operation of the HF sideband transceiver.

PWR	Toggles main power on and off.
AUX/SEND	Activates special functions. When used with ALRM key, transmits alarm signal.
AUX/3	(European version only) Toggles the receiver AGC on/off. When the AGC is operative, the AGC annunciator is visible on the display. When AGC is off, the RF gain can be adjusted manually by pressing 9 to decrease and 6 to increase the RF gain.
ENT	Executes information entered by numeric keys.
MODE	Selects modes of operation: USB, LSB, TELEX, or AME.
CHAN/FREQ	Selects LCD numeric display mode: Channel number or frequency.

SEA 330
CONTROLLER FRONT PANEL
FIGURE 2.3

SEA 330

USER FUNCTIONS



SEA 330 US SOFTWARE
OPS/3301US/U5 V. 3.2
FUNCTION TREE
FIGURE 2.4

ALRM	Toggles alarm generator on and off.
UP/VOL	Increases receiver volume level.
DOWN/VOL	Decreases receiver volume level.
SQL	Toggles squelch on or off.
UP/FREQ	Programmed frequencies limited to 200 Hz: Increases receiver frequency in 10 Hz steps.
DOWN/FREQ	Programmed frequencies limited to 200 Hz: Decreases receiver frequency in 10 Hz steps.

NOTE: In receive only applications, the 200 Hz limit on the clarifier is removed.

KEYS 0-9 used for:

A) A three- or four-digit entry followed by the "ENT" key will recall frequency pairs stored as channels.

B) A four-, five-, or six-digit entry followed by the "ENT" key will enter a receive-only frequency.

C) Pressing "AUX" "8" will force the radiotelephone into the PROGRAM mode (See below).

D) Pressing the "0/2182" key will recall the Distress frequency of 2182.0 kHz, J3E, 150 Watts. In European mode, the Distress frequency of 2182.0 kHz, H3E, 150 Watts will be recalled.

E) Enter single digits between "1" and "4" followed by the "ENT" key to select panel illumination level ("1" = illumination OFF, "4" = illumination MAXIMUM).

INDIRECT MODE (PROGRAMMING)

AFTER ENTERING PROGRAM MODE: (SEE ITEM C ABOVE)

A) Entering the scratchpad memory location to be programmed and the frequencies to be stored (See pp. 3.3.2).

B) Digits "0" through "9" control squelch threshold setting (See pp. 3.3.3).

C) Digits "0" and "1" program the beep function ("0" = OFF, "1" = ON; See pp. 3.3.4)

D) Programming the address number of controllers (See pp. 3.3.5).

2.4 DISPLAY

The Controller makes use of a custom liquid crystal display which has a variety of special annunciator legends. These legends are listed below together with their functions.

NUMBERS	Provides numeric frequency/channel display.
CHAN	Indicates that numeric display is a CHANNEL.
FREQ	Indicates that number displayed has been entered as a FREQUENCY.
PRGM	Indicates that the system is in the PROGRAM mode.
TUNED	Antenna coupler status flag (See pp. 2.6.14).
LOW	(Steady indication) Power setting is INTERMEDIATE. (Flashing indication) Power setting is LOW.
XMIT	Indicates that transceiver is in TRANSMIT mode.
SQL	Indicates that receiver squelch is activated.
AME	Indicates AM operating mode (H3E).
LSB	Indicates that emission is on LOWER sideband.
TLX	Indicates that emission is in the TELEX mode.
AGC	Indicates that receiver AGC is activated (European verson only).

BARGRAPH Indicates relative level of transmitter output and receive audio.

2.5 PROPAGATION

HF signals propagate far beyond the horizon. MF frequencies (2 - 3 MHz) are generally usable within 300 miles, depending on the time of day, atmospheric conditions, and man-made noise level.

The High Seas frequencies (4, 6, 8, 12, 16, 18, 22 and 25 MHz) allow communications over thousands of miles, again subject to the above-mentioned limitations. Interference tends to be more of a problem than on VHF.

2.6 OPERATING YOUR SEA 330 HF/SSB RADIOTELEPHONE

2.6.1 DESCRIPTION OF MEMORY FUNCTIONS

The SEA 330 has TWO memory banks. First, the factory programmed frequency memory, which contains over 1000 frequency PAIRS, stored and recalled by CHANNEL NUMBER. Second, the internal "scratchpad" memory which allows the operator to program and recall 90 frequency pairs. See pp. 3.4 for ITU channel listing.

2.6.2 PUTTING THE SEA 330 IN THE OPERATING MODE

Depress the "PWR" key to activate the SEA 330 power control circuitry. During the initialization phase, the equipment will cycle through a self-test function, which tests all annunciators and readies the equipment for operation. When the liquid crystal display indicates "2182.0", the radiotelephone has properly initialized and is set up to operate on 2182.0 KHz in J3E (SSB) mode. Wait 5 minutes for the synthesizer frequency to stabilize, and the SEA 330 is ready to operate on 2182.0 KHz.

*Beginning with Revision 3.0 firmware, unit will default (power up) to the last channel used and last volume setting.

2.6.3 SELECTING THE EMERGENCY CHANNEL

As noted in pp. 2.6.2 above, the SEA 330 is designed to default to the international distress frequency of 2182.0 KHz. Should it be desired to select the international distress channel under normal operating conditions, simply press the "0/2182" key. The radiotelephone will revert to 2182.0 KHz, J3E (SSB) mode. To select H3E (AME) mode, press the "MODE" key until the AME annunciator toggles on.

NOTE:In European versions, H3E is standard. Press "MODE" to select J3E.

2.6.4 MAKING A DISTRESS CALL

To initiate a distress call using the radiotelephone auto-alarm system, use the following procedure:

1. Press "ENT" to clear present instruction.
2. Press "0/2182" key to select the distress channel.
3. Press the MODE key repeatedly until the AME annunciator appears.
4. To transmit, while holding the "ALRM" key down, press "AUX/SEND".
5. When the alarm signal stops (after 45 seconds), communicate normally. To stop alarm in progress, press any key.

NOTE: THE TWO-TONE ALARM SIGNAL CAN BE TRANSMITTED ON ALL OTHER AVAILABLE FREQUENCIES. IT IS NOT NECESSARY TO USE THE INTERNATIONAL DISTRESS CHANNEL OF 2182.0 KHz FOR THE ALARM GENERATOR TO FUNCTION. WHEN ANY FREQUENCY OTHER THAN 2182.0 IS USED, DO NOT PRESS THE MODE KEY AS AME IS NOT AVAILABLE.

2.6.5 SELECTING LOW-POWER OPERATION

Three power levels can be selected in both the MF and HF bands. These power levels are HIGH, INTERMEDIATE, AND LOW. HIGH power mode is defined as the maximum power available (150 Watts in the MF band and 300 Watts in the HF band). INTERMEDIATE power mode is one half the maximum power available. LOW power mode is 25W in the MF band and 50W in the HF band and is designed for in-harbor use or for very short-

range communications. To select the various power levels, proceed as follows:

1. To select INTERMEDIATE power level (from HIGH power level), press "AUX," "FREQ ▼" once. The "LOW" annunciator on the display will be activated.

2. To select LOW power level (from INTERMEDIATE power level), press "AUX" "FREQ ▼" again. The "LOW" annunciator on the display will flash on and off.

3. To return to "INTERMEDIATE" power, press "AUX" "FREQ ▲" once, twice will returm the unit to HIGH power.

2.6.6 CONTROLLING DISPLAY AND KEYPAD ILLUMINATION

Enter any desired SINGLE-digit number from 1 to 4, followed by the "ENT" command. The single-digit command will be interpreted by the operating system as a level of illumination intensity with 1 being OFF and 4 being maximum brilliance.

When display illumination is toggled off, any key entry restores brightness to minimum level for five seconds.

2.6.7 SELECTING A FREQUENCY FROM SCRATCHPAD MEMORY

Enter any desired TWO-digit number, followed by the "ENT" command. The two digit command will be interpreted by the operating system as the number of the desired location in scratchpad memory. Note that the scratchpad memory must be programmed in the field (See Section 3 for programming details).

2.6.8 SELECTING A CHANNEL BY NUMBER

Enter any desired THREE- or FOUR-digit channel number, followed by the "ENT" command. Example: "4, 0, 3, ENT". Verify that the radio has responded by examining the display, which should now have the "CHAN" annunciator activated. The numeric display should read "CH 403". Pressing the CH/FREQ key will cause the numeric display to read 4363.0 KHz, the receiver frequency associated with the ITU channel 403. Pressing the CH/FREQ key again will restore the channel

readout. Refer to section 3.4 and/or your SEA 330 Operators Manual for channel vs. frequency data.

2.6.9 SELECTING A TELEX CHANNEL BY NUMBER

Enter any desired THREE- or FOUR-digit channel number, followed by the "MODE" command. Example: "4, 0, 3, MODE". Verify that the radio has responded by examining the display which should now have the "TLX" annunciator activated. The numeric display should read "CH 403". Pressing the CH/FREQ key will cause the numeric display to read 4211.5 KHz. This is the receiver frequency associated with TELEX channel 403. Pressing the CH/FREQ key again will restore the channel readout. Refer to para. 3.4 and/or your SEA 330 Operator's Manual for channel vs. frequency data.

2.6.10 ENTERING A RECEIVE-ONLY FREQUENCY

Enter any desired frequency using FOUR, FIVE- or SIX-digits between 4900 and 300000, followed by the "ENT" command. Example: "1, 0, 0, 0, 0, 0 ENT". This will be interpreted by the operating system as a RECEIVE frequency of 10,000.0 KHz. Note that the "FREQ" annunciator will be turned on, indicating a frequency has been entered via the keypad. Note also that the "CH/FREQ" key will be inoperative when in the "RECEIVE ONLY" mode.

2.6.11 SELECTING LOWER SIDEBAND

NOTE: Lower sideband operation is NOT AUTHORIZED for equipment operating under FCC parts 80, 87 or 90. When lower sideband is legal and desired, contact SEA for information on enabling the lower sideband function.

When fitted, the lower sideband mode may be selected by pressing the "MODE" key. This key will allow the operator to switch between upper sideband and lower sideband operation. The sideband status will be indicated by the "LSB" annunciator when LSB mode is selected. Normal operation is in the USB mode, and is NOT indicated by an annunciator.

2.6.12 ACTIVATING THE SQUELCH FUNCTION

The squelch function in the SEA 330 is activated by pressing the "SQL" key on the keypad. When the squelch system is activated, the "SQL" annunciator on the liquid crystal display will be turned on. Pressing the "SQL" key a second time will de-activate the squelch function and the "SQL" annunciator will extinguish.

The SEA 330 squelch system makes use of a voice recognition algorithm on the on-board control computer. It is sensitive to the changing frequency components in the human voice and therefore requires no level control. A momentary tone will open the squelch but will not hold it open. A moving tone is required to hold the squelch open. When power is initially applied to the SEA 330, the squelch circuitry will be DEACTIVATED.

2.6.13 THE SEA 330 SCAN FUNCTIONS

The "scratchpad" channel storage area from channels 10 through 89 is broken into eight 10-channel blocks and channels 90 through 97 are a single eight channel block. These blocks are called "SCAN CELLS". The bottom four cells (channels 10-19, 20-29, 30-39, and 40-49) are designated as "VOICE" scan cells, while the upper four cells (channels 50-59, 60-69, 70-79, and 80-89) are designated as "TELEX" scan cells. The last cell (channels 90-97) is designated both as "NECODE" and "DSC" scan cell.

Scan dwell times are automatically adjusted for the desired operation mode (in order to recognize a voice or telex call, it is necessary to pause on each scannned channel for a sufficient time for the computer circuitry to check for activity. This pause is the scan dwell time). In the voice scan mode, the scan will be somewhat slow the first time the radio cycles through a cell. Subsequent cycles will sample voice channels for approximately 1 second. Telex channels always scan at a rate of approximately 4 seconds per channel.

Voice scan cells	:	10-19, 20-29, 30-39, 40-49
Telex scan cells	:	50-59, 60-69, 70-79, 80-89
Necode and DSC scan cells	:	90-97

The SEA 330 is provided with a CPU direct input connector to allow a scan stop command to be provided from an external unit. The factory setting uses an internal jumper connected between the "IN" Pin and "GND" to activate the two internal stop system:

1) In the VOICE scan mode, the STOP command is generated internally by the internal squelch system.
2) In NECODE ScanStop mode, the STOP command is generated by the radio's internal decoder.

To use the external scan stop function, the jumper between the "IN" Pin and "GND", if provided, must be removed.

Remove the jumper between "IN" and "GND" to disable all internal scan stop functions. The scan stop command can then be generated through the external unit by short circuit of the "IN" Pin to "GND".

In TELEX scan mode, the STOP command must be generated by an external modem through the CPU interface jack.

In DSC scan mode, the STOP command is generated through the CPU direct interface jack.

2.6.13.1 LOADING THE VOICE AND TELEX SCAN CELLS

Since the scan cells are just the standard scratchpad memory of the SEA 330, the cells are loaded with the desired frequencies by following the instructions set forth in Section 3.3, "FIELD PROGRAMMING THE SEA 330 SCRATCHPAD MEMORY."

It should simply be remembered that the desired frequency SETS should be placed in a specific cell, e.g.: If it is desired to scan through station KMI's calling frequencies, the desired SET of frequencies should be programmed into a selected scan cell. If voice operation is desired, select one of the lower four cells and enter the desired SET of operating frequencies in that cell, following the procedure given in Section 3.3.

NOTE: Only legal channel frequencies may be programmed in Europe.

2.6.13.2 PROGRAMMING NECODE AND DSC CHANNELS

The channels 90 through 97 are the Necode and DSC channels. Each channel can be programmed as a voice or a Telex channel. Necode frequencies are programmed as "VOICE" channels and "DSC" frequencies are programmed as telex channels.

1. Enter the program mode ("AUX" "8"). The display will blink the "PRGM" annunciator on the display. Next the numeric display will read, "CH?" prompting you to proceed.

2. Now enter the two-digit channel number you wish to program (e.g.: "91") by entering "9", "1", "ENT". If the selected channel is full, the numeric display will read "FULL". To overwrite the channel with new data, press the "1" key.

3. The display annunciators, "PRGM", "FREQ", and "XMIT" will blink. Now enter your desired transmitter frequency, including the 100 Hz digit [e.g., to enter 8294.0 KHz (channel 851), enter "8", "2", "9", "4", "0"].

4. Press "ENT" and the display will blink the "TLX" annunciator. Select "TLX" by pressing "1" if it is a "DSC" channel or press "ENT" again if it is a "NECODE" channel.

5. When prompted by "CH", enter the next desired channel number to program or press "MODE" to exit the program mode.

NOTE: Only legal channel frequencies may be programmed in Europe.

2.6.13.3 OPERATING THE NECODE SCANSTOP MODE

1. Enter the Necode Scan Stop routine by pressing "9", "9", "ENT".

2. The frequencies loaded into the Necode scan channels will continue to be scanned until:

   a. The Necode equipment decodes a response. In Necode scan, the "STOP" command is generated by

the radio detecting a tone approximately 2 KHz in frequency. This will cause the scan cycle to stop, the receiver audio to unsquelch, and the transmitter to respond with the "acknowledge" signal.

b. The operator presses ANY key to exit the Necode Scan mode.

c. If no channel is programmed into the selected bin, the display reads "EMPTY" and the radio reverts to 2182.0 KHz.

2.6.13.4 DSC SCAN

Channel 90 through 97 may be scanned at a rate determined by an external controller, such as the SEACALL 7000 DSC modem. The external controller required to operate step scan must be connected to the tip of the CPU direct interface jack.

Logic sense is 0=scan, 1=stop.

The port has internal pull up to +5V. To activate external scan stop, press "9", "8", "ENT".

2.6.13.5 ACTIVATING THE VOICE OR TELEX SCAN FUNCTION

1. Enter "AUX", "7". The display will prompt, "CELL?"

2. Enter the first digit of the lowest number of the desired scan cell (i.e., if it is desired to scan the second scan cell, consisting of channels 20-29, enter "2"). The display will show the selected cell number (in this case "2") for two seconds, and then begin the scan.

   NOTE: DO NOT press enter.

3. The desired scan cell will begin scanning at the correct rate. Only the channels in the cell which actually contain frequencies will be scanned. Scanning will continue until:

   a. A "SCAN STOP" signal is generated, either by an active voice channel, or input from an external device.

b. The operator presses any key except "FREQ up" (the "FREQ up" key is used to skip over an active channel).

c. The SEA 330 receives a PTT input and enters the transmit mode.

2.6.14 ACTIVATING THE "TUNED" INDICATOR

The "TUNED" annunciator on the liquid crystal display is used to provide the antenna coupler "tuned status" flag. Since the radiotelephone and the companion SEA 1630 antenna coupler are interconnected via the SEABUSS, the antenna coupler knows what frequency is selected at the radiotelephone. Once the antenna coupler has been allowed to tune up on each operating frequency, the internal memory in the coupler will automatically reset the coupler to the correct parameters for a given operating frequency. Thus, when a new operating frequency is selected at the radiotelephone, the "TUNED" annunciator will extinguish until the antenna coupler has selected the previously stored matching network parameters. Once this is accomplished, the "TUNED" flag will again be activated during transmit. NOTE: If a frequency is selected for which the antenna coupler has not yet determined and stored network parameters, the "TUNED" flag will not be actuated until such time as the coupler HAS successfully matched the antenna.

2.6.15 MANUAL TUNE COUPLER (European versions only)

To configure the SEA 330 for manual tune operation, first set the SEA 1630 antenna tuner for manual tune operation by following the instructions on the inside of the coupler cover. Once that is accomplished, turn off the radio and unplug the coupler SEAbuss cable. Turn on the radio and select 2182.0 KHz.

2.6.16 OPERATING THE MANUAL ITU CHANNEL REVIEW

This feature allows the operator to manually scan through the ITU channel list, starting with the selected ITU channel and moving up or down through the list.

Enter the desired ITU channel number, followed by "AUX" "4". the display will read "itU" "On", then show the selected channel number. Use the "FREQ▲/▼" keys to step through the channel list.

To exit the manual ITU channel review and restore normal radio operation, press any key other than "CHAN/FREQ", "FREQ▲" or "FREQ▼".

2.6.17 ACTIVATING THE CW CODE MODE

NOTE: Proper CW operation requires connection of a Morse key to the microphone PTT and GND terminals on the controller's cable interface board. Consult your dealer for details.

To activate the CW mode, press "AUX" "6" "ENT". The display will read "Code" "On". With "Code" toggled on and the Morse key connected, each key press will transmit a 1000 Hz tone on the selected frequency. A 1000 Hz tone is also available at the speaker for monitoring the code transmission. There is a 125 millisecond delay from the release of the PTT key before the radio switches back to the receive mode.

The transmitted frequency will be the displayed frequency. The received frequency will be the displayed frequency at a 1 KHz tone.

To exit the CW mode, press any key other than the "CHAN/FREQ", "FREQ▲" , and "FREQ▼" keys.

2.7 OPERATING THE TRANSMITTER

The operation of the transmitter is straightforward. Pressing the microphone push-to-talk button will switch the transmitter circuits on. This will be indicated by the display changing to the transmitter frequency and the activation of the "TRANS" indicator. Speak in a normal voice, with your lips approximately one eighth of an inch from the microphone. Do NOT shout into the microphone as this may reduce the intelligibility of the transmission. The bargraph indicator should modulate with voice, indicating normal power output. Note that acknowledgement of a message cannot be done by keying the microphone, since no signal is transmitted until the operator actually speaks.

2.7.1 THE OVERTEMPERATURE ALARM

Under some conditions of extended duty cycle, the temperature of the power amplifier components may exceed safe limits, triggering the overtemperature alarm circuitry. This condition will cause:

1. Progressive reduction of transmitter power. That is, the hotter the transmitter gets, the greater the power level reduction will be. This condition will be indicated by the display flashing "HOT" when the PTT line is grounded.

WARNING! Sustained operation of the transmitter under overtemperature conditions can cause damage to transmitter circuitry.

2. Normal operation will resume when the transmitter cools.

3. In an emergency, temporary restoration of full power may be accomplished by entering "AUX," "0/2182". This overrides the temperature alarm condition until the power has been cycled on/off, and should only be used in an emergency situation.

2.7.2 SELECTING SIDETONE OPERATION

The SEA 330 provides Sidetone Operation, which gives all controllers connected to the radio the ability to hear the transmitting controller. To select Sidetone Operation:

1. Enter the program mode ("AUX" "8"). The display will prompt, "CH?"

2. Press "AUX," "7," "ENT." The display will prompt, "SIDE?" for approximately two seconds, then show the current sidetone status (either "ON" or "OFF").

3. To turn Sidetone Mode ON, press "1." To turn Sidetone OFF, press "0." The display will respond "STORED."

4. Exit the Program Mode by pressing "MODE."

2.7.3 OPERATING THE SEA 330 IN THE ADDRESSABLE INTERCOM MODE

When the SEA 330 is fitted with multiple controllers, it is possible to operate the radiotelephone as an intercommunications system. To accomplish this function, proceed as follows:

1. Press "AUX," "1." The display will show "int x.0" where x is the number of the controller that entered the intercom mode. Whenever this prompt is shown, any controller may converse with ALL other controllers. If ANY controller presses a number key at this time, the display will reflect the new controller number in place of x.

2. For private station-to-station intercom operation (all other controllers locked out), enter the intercom mode as described above, and then press the number key which corresponds to the station (controller) that you wish to talk with.

3. The display will show "int x.y" where x is the calling station and y is the station being called. The controller displayed as x is now the master and has total control of the intercom mode. If the master wishes to talk with a station other than y, the operator presses the new station number key. All other controllers will be disabled EXCEPT for the "ALRM" key. ANY controller can abort the intercom mode by pressing the "ALRM" key.

4. If there is no intercom traffic for 3 minutes, the intercom mode is aborted and normal radio operation will be restored. Alternately, the controlling station can exit intercom mode by pressing the "ENT" key.

2.7.4 SELECTING THE PRIVACY MODE

1. To disable all other controllers from listening or transmitting during a private conversation, press "AUX," "2." The display on all controllers will display "PRIV X" for 2 seconds, then the current status of either on or off (X in the above prompt is the unit number of the controller which entered the PRIVACY mode).

2. To disable the PRIVACY mode, press "AUX," "2" again to toggle the PRIVACY mode off.

3. Whenever the radio transmitter is activated, all controllers will display "PRIV X" and then show the channel or frequency in use.

4. All controllers have the ability to disable the PRIVACY mode by pressing the "ALRM" key. This restores normal radiotelephone operation on 2182.0 KHz.

5. Sidetone will be turned off when in the PRIVACY mode.

2.8 EUROPE-ONLY FUNCTIONS

2.8.1 AUTOMATIC GAIN CONTROL (AGC) ON/OFF

To turn the AGC off, enter "AUX" "3". The display's "AGC" annunciator will extinguish, indicating that AGC is off. The RF gain can now be adjusted in 16 steps (0 = minimum RF gain; 15 = maximum RF gain). Pressing "9" will increase the RF gain in single steps. Pressing "6" will decrease the RF gain in single steps. The display will show the gain setting for two seconds before returning to channel/frequency information. Pressing either "Aux" "3" or "ENT" will exit manual AGC and turn automatic AGC on.

2.8.2 MAKING A DISTRESS CALL

To initiate a distress call using the radiotelephone auto-alarm system, use the following procedure.

1. Press "ENT" to clear present instruction.
2. Press "0/2182" to select the distress channel.
3. Press the MODE key repeatedly until the AME annunciator appears.
4. While holding the "ALRM" key down, press the "AUX/SEND" key to transmit the alarm signal.
5. When the alarm signal stops (after 45 seconds), press the handset key and make your distress call.

Repeat three times:

MAYDAY - NAME OF SHIP, call sign, or other identification.

followed by:

MAYDAY - NAME OF SHIP - Position, type of emergency, help required and other information which may help rescue operations.

IMPORTANT NOTE:

1. Before transmitting on 2182 KHz, it is always necessary to listen first in order not to interrrupt other possible distress or emergency calls.
2. The distress call should be repeated from time-to-time until an answer is heard.
3. Speak slowly, pronouncing each word distinctly.

If J3E (SSB) operation is desired, press "MODE" until the "AME" annunciator is off.

The two-tone alarm signal can be transmitted on all other available frequencies. It is not necessary to use the international distress channel of 2182 KHz for the alarm generator to function.

TO STOP THE ALARM IN PROGRESS, PRESS THE "ALRM" KEY AGAIN.

2.8.3 PROCEDURE DE DETRESSE "SEA 330"

Pour envoyer un appel de détresse avec le système d'alarme automatique, suivre la procèdure suivante:

1 - Appuyer sur la touche "ENT" pour sortir du mode de fonctionnement en cours.
2 - Appuyer sur la touche "0/2182" pour sélectionner le canal de détresse.
3 - Si l'anonciateur "AME" n'est pas affiché, appuyer sur la touche "MODE" pour l'afficher sur l'écran.
4 - Pour transmettre appuyer simultanément sur les touches "ALRM" et "AUX/SEND".

5 - Quand le signal d'alarme s'arrête (aprés 45 secondes) envoyer l'appel de détresse selon la procédure suivante:

Répéter 3 Fois:

"MAYDAY, nom de votre navire, toute autre forme d'idenfication de la station.

Ensuite:

"MAYDAY, nom de votre navire, position du navire, niveau d'urgence, nature du secours demandé, tout autre renseignement susceptible de faciliter les opérations de secours."

NOTES IMPORTANTES:

1 - Avant de transmettre sur 2182 KHz, il faut toujours écouter, de façon à ne pas interrompre un éventuel appel ou message de détresse.
2 - L'appel de détresse doit être répété régulièrement jusqu'à réception d'une réponse.
3 - Parler lentement, prononcer chaque mot distinctement.

Pour passer de nouveau en mode J3E (B.L.U.), appuyer sur la touche "MODE" jusqu'à ce que l'inscription "AME" ait disparu.

Les 2 sonorités du signal d'alarme peuvent être transmises sur toute autre fréquence disponible sur lémetteur. Il n'est pas nécessaire d'utiliser le canal de détresse internationnal (2182 kHz) pour que le générateur d'alarme fonctionne.

POUR ARRETER LE SIGNAL D'ALARME AVANT 45 SECONDES presser la touche "ALRM".

3. PROGRAMMING

NOTE: Channels 10-49 are designated as voice channels, channels 50-89 are designated as telex channels, and channels 90-97 are designated for Necode/DSC use.

3.1 FREQUENCY AND MODE SELECTION

As discussed above, the SEA 330 contains TWO memory systems. The factory-programmed frequencies are listed in Section 3.4 and are stored in the operating system ROM. Normal access to these frequencies is through the channel number system described above (see pp. 2.6.8). In addition to those frequencies contained in the factory-programmed memory, the operator may program up to 90 frequency pairs into the non-volatile EEPROM memory referred to as "scratchpad memory". This memory is arranged as 90 channel locations, and each is designed to hold one channel. A channel consists of TWO frequencies, a TRANSMITTER frequency and a RECEIVER frequency.

The frequencies selected for entry into the scratchpad memory must be legally authorized for use in the desired operating service.

When the SEA 330 is to be used in services other than the Marine Service, it is possible to provide a special program for the permanent memory. Contact the Factory for information.

3.2 BANDWIDTH LIMITATIONS

The only limitation imposed by the SEA 330 is that the desired frequency be inside the operating range of the equipment. Totally unrelated duplex pairs might be employed, since the computer controls the filter bandswitching. In practice, the antenna system will have a great deal to do with dictating the maximum allowable frequency separation. If a wide bandwidth antenna system such as a Conical Monopole is used, it is conceivable that the transmitter could operate in the 22 MHz band while the receiver was operating on 2000.0 KHz. If the companion SEA 1630 automatic antenna coupler is used in conjunction with the normal short whip, the allowable 2 MHz split may be reduced to a few hundred KHz.

3.3 FIELD PROGRAMMING THE SEA 330 SCRATCHPAD MEMORY

3.3.1 ENTERING THE PROGRAM MODE

The SEA 330 is forced into the PROGRAM mode by entering "AUX" "8". The operating system will immediately signal the operator that the SEA 330 has shifted to the PROGRAM mode by blinking the "PRGM" annunciator on the display. After a short delay, the operating system will signal the operator to proceed by blinking the "CHAN" annunciator and prompting "CH?" on the numeric display.

3.3.2 ENTERING SCRATCHPAD FREQUENCY AND MODE DATA

After the SEA 330 has shifted to the PROGRAM mode, the operator should select and enter the desired scratchpad channel number, such as channel 10. This is done by keying in the sequence, "1, 0, ENT". If the selected scratchpad location is full, the operating system will respond with the prompt, "FULL". If it is desired to "overwrite" the location with new data, simply press the numeral "1" key, followed by the new data to be stored. If the operator does <u>not</u> desire to overwrite the location, pressing the "ENT" key will cause the operating system to again present the "CH?" prompt. This allows the operator to choose another scratchpad memory location.

NOTE: SCRATCHPAD LOCATIONS 1-9 CANNOT BE PROGRAMMED.

Once the desired scratchpad location is selected, the operating system will blink the "PRGM", "FREQ" and "XMIT" annunciators. The operator should then enter the desired TRANSMITTER frequency down to and including the 100 Hz increment. EXAMPLE: "1, 2, 4, 2, 9, 2, ENT". This will enter the frequency of 12,429.2 KHz in the transmitter frequency memory.

NOTE: Any frequency within the 1.6 to 30.000 MHz (receive) 26999.9 KHz (transmit) bandwidth may be programmed. Transmission on unauthorized frequencies is unlawful and it is the operator's responsibility to transmit only on FCC authorized frequencies.

At this time, the "XMT" annunciator will extinguish, but the "PRGM" and "FREQ" annunciators will continue to blink,

signalling that the operator must now enter the desired RECEIVER operating frequency. If the channel being programmed is a SIMPLEX channel, it is only necessary to press the "ENT" key again. This will load the previously programmed TRANSMITTER frequency into the RECEIVER storage location. If the channel being programmed is a DUPLEX channel, it will be necessary to enter the desired RECEIVER frequency. Example: "1, 2, 3, 4, 5, 6, ENT". This will enter the frequency of 12,345.6 KHz in the receiver frequency memory. The display will show "R3E?" to prompt selection of operating mode. If standard J3E operation is desired, press "ENT". If the channel requires insertion of -16 dB carrier for R3E operation, enter "1".

At this time, the scratchpad memory location has been fully programmed. The operating system will indicate this by prompting "CH 10" (held for one second) "StorEd" (held for one second). The operating system will then be ready to program the next location and will signal the operator by again prompting "CH ?" and blinking the "PRGM" and "CHAN" annunciators. To exit the program mode, press "MODE".

3.3.3 ERASING SCRATCHPAD FREQUENCY AND MODE DATA

If the scratchpad channel is to be erased:

1. Press the "ENT" key when prompted for the transmit and receive frequency.

3.3.3 ADJUSTING THE SQUELCH THRESHOLD

The software SINAD squelch in the SEA 330 has an adjustable threshold which may be reset in the field to compensate for varying levels of noise interference. Normally, this level is set at the factory for proper operation under typical field conditions. Number 0 corresponds to a very LOW squelch threshold, while number 9 corresponds to a very HIGH squelch threshold. Should the operator desire to alter the squelch level, proceed as follows:

1. Enter "AUX" "SQL".

2. The operating system will respond "S 0-9 ?". After 2 seconds, the PRESENT squelch setting will appear in the LEAST significant digit of the display (Normal factory setting is 4).

3. Enter the desired squelch threshold as a SINGLE digit followed by the "ENT" key.

4. The operating system will respond with the prompt "StorEd".

3.3.4 PROGRAMMING THE "BEEP" FUNCTION

The audible "beep" which occurs when keys are pressed may be controlled by programming the function on or off. In order to select the desired beep mode, proceed as follows:

1. Enter PROGRAM mode ("AUX" "8").

2. In response to the "CH ?" prompt, enter "AUX, 1, ENT".

3. The operating system will respond "BEEP ?". After 2 seconds, the prompt will change to reflect the PRESENT status of the beep, either "ON" or "OFF".

4. To turn the beep ON, enter "1". To turn the beep OFF, enter "0". To leave the beep status unchanged, enter "ENT".

5. The operating system will respond with the prompt "StorEd".

6. Press "MODE" to exit PROGRAM mode (See pp. 3.3.6).

3.3.5 PROGRAMMING CONTROLLER ADDRESS

In multiple controller installations, it is necessary to assign unit numbers to the controllers in the system. The unit number is stored in the EEPROM installed in the controller CPU board. All controllers normally leave the factory assigned as unit #1.

NOTE: If more than one controller in a system has the SAME unit number, DISCONNECT all but one of the controllers to

avoid address collisions on the SEABUSS and then reassign the controller numbers as shown below.

To assign unit numbers in multiple controller installations, proceed as follows:

1. Enter PROGRAM mode ("AUX" "8").

2. In response to the "CH?" prompt, enter "AUX," "0," "ENT."

3. The operating system will respond, "UNIT?" After two seconds, the "?" will be replaced by the current unit number.

4. Enter the unit number desired (1-4), followed by the "ENT" command. If no change is desired, enter "ENT."

5. The controller will respond with the prompt, "StorEd."

6. Press "MODE" to exit PROGRAM mode (See pp. 3.3.6).

3.3.6 EXITING THE PROGRAM MODE

If, after a program entry sequence, no further entries are made for a period of 20 seconds, the operating system will exit the PROGRAM mode, and come up on the LAST channel entered while in the PROGRAM mode. If NO entry has been made while in the PROGRAM mode, the system will revert to 2182.0 KHz. Further, it is possible to exit the PROGRAM mode immediately by pressing "MODE." Operation will abort to the last channel entered or, if no channel has been entered, to the last channel used. PROGRAM mode will also be exited by cycling the main power switch OFF. When the system comes up it will be back on the last channel used.

3.4 SEA 330 FREQUENCY LISTING-ITU CHANNELS

VOICE CHANNEL	SHIP RECEIVE	SHIP TRANSMIT	USE
		2 MHz	
201 USA	2003.0	2003.0	Ship-to-Ship, Great Lakes
202 USA	2450.0	2003.0	KMI, Point Reyes, CA
203 USA	2006.0	2006.0	Alaska
205 USA	2446.0	2009.0	WLO, Mobile, AL
206 USA	2506.0	2009.0	WAH, St. Thomas
208 USA	2030.0	2030.0	Virginia, Is. Intership
209 USA	2490.0	2031.5	WOM, Ft. Lauderdale, FL
211 USA	2054.0	2054.0	British Columbia WX
212 USA	2065.0	2065.0	Ship-to-Ship
213 USA	2079.0	2079.0	Ship-to-Ship
214 USA	2082.5	2082.5	Ship-to-Ship Only
215 USA	2086.0	2086.0	Ship-to-Ship, Mississippi River Limited Coast
216 USA	2585.0	2086.0	KRV, Ponce Playa, WAH, St. Thomas, VI
217 USA	2093.0	2093.0	Ship-to-Ship Only-Commericial Fish
218 USA	2096.5	2096.5	Ship-to-Ship Ship to Limited Coast Station
219 USA	2115.0	2115.0	Alaska
220 USA	2118.0	2118.0	Alaska
221 USA	2514.0	2118.0	WOM, Ft. Lauderdale, FL WLC, Rogers City, MI
223 USA	2309.0	2131.0	WOU-23, Kodiak, AK
224 USA	2312.0	2134.0	WGG-53, Cold Bay, AK
225 USA	2530.0	2134.0	KBP, Kahuka, HI KOP, Galveston
226 USA	2134.0	2134.0	Eastern Canada Intership
227 USA	2538.0	2142.0	KCC, Corpus Christi, TX
228 USA	2142.0	2142.0	CA Intership
229 USA	2146.0	2146.0	
230 USA	2550.0	2158.0	PJC, Curacao
231 USA	2550.0	2166.0	VRT, Burmuda
232 USA	2558.0	2166.0	WOO, Manahawkin, NJ
233 USA	2582.0	2166.0	8PO, Barbados C6XZ, Marsh Harbor
234 USA	2558.0	2198.0	VPN-2, Nassau Scheduled Weather
236 USA	2203.0	2203.0	Ship-to-Ship, Gulf of Mexico
238 USA	2582.0	2206.0	WBL, Buffalo, NY VCS, Halifax, Canada
239 USA	2397.0	2237.0	WDV-26, Cordova, WGG-56, Ketchikan, AK
240 USA	2400.0	2240.0	WGG-58, Juneau, WGG-55, Nome, AK
241 USA	2735.0	2290.0	9YL, North Post, Trinidad

USA - DENOTES FREQUENCY AVAILABLE IN USA MODE ONLY
EUR - DENOTES FREQUENCY AVAILABLE IN EUROPEAN MODE ONLY
NO DESIGNATION - FREQUENCY AVAILABLE IN BOTH MODES

2 MHz (con't)

VOICE CHANNEL	SHIP RECEIVE	SHIP TRANSMIT	USE
242 USA	2450.0	2366.0	
245 USA	2566.0	2390.0	WOM, Ft. Lauderdale, FL
246 USA	2400.0	2400.0	
247 USA	2442.0	2406.0	WOM, Ft. Lauderdale, FL
248 USA	2506.0	2406.0	KMI, Point Reyes, CA
249 USA	2419.0	2419.0	Alaska
250 USA	2422.0	2422.0	Alaska
251 USA	2427.0	2427.0	Alaska
252 USA	2572.0	2430.0	WLO, Mobile, AL
254 USA	2430.0	2430.0	Alaska
255 USA	2447.0	2447.0	Alaska
256 USA	2450.0	2450.0	Alaska
257 USA	2506.0	2458.0	KGN, Del Cambre, LA
258 USA	2479.0	2479.0	Alaska
259 USA	2482.0	2482.0	Alaska
261 USA	2506.0	2506.0	Alaska
262 USA	2509.0	2509.0	Alaska
263 USA	2512.0	2512.0	FFP, Ft. Defrance, Windward Is.
264 USA	2545.0	2545.0	
265 USA	2527.0	2527.0	Alaska
266 USA	2535.0	2535.0	
267 USA	2538.0	2538.0	Alaska
268 USA	2563.0	2563.0	Alaska
269 USA	2566.0	2566.0	Alaska
270 USA	2582.0	2582.0	Alaska
271 USA	2590.0	2590.0	Alaska
273 USA	2616.0	2616.0	Alaska
275 USA	2638.0	2638.0	Ship-to-Ship
276 USA	2640.0	2640.0	
277 USA	2670.0	2670.0	USCG Working
278 USA	2704.0	2704.0	Ocean Racing
279 USA	2735.0	2735.0	9YL, North Post, Trinidad
280 USA	2738.0	2738.0	Ship-to-Ship All Except Great Lakes and Gulf
281 USA	2782.0	2782.0	Ship-to-Ship River WFN, Jeffersonville, IN WGK, St. Louis, MO WJG, Memphis, TN
282 USA	2830.0	2830.0	Ship-to-Ship, Gulf Only
283 USA	2237.0	2237.0	
284 USA	2530.0	2815.0	
285 USA	2040.0	2040.0	
286 USA	2318.0	2318.0	
287 USA	2366.0	2366.0	
288 USA	2469.0	2708.0	
289 USA	2060.0	2798.0	
290 USA	2458.0	2340.0	
291 USA	2045.0	2045.0	NORWEGIAN
292 USA	2048.0	2048.0	NORWEGIAN
293 USA	2051.0	2051.0	NORWEGIAN
294 USA	2057.0	2057.0	NORWEGIAN

VOICE CHANNEL	SHIP RECEIVE	SHIP TRANSMIT	USE
		3 MHz	
302 USA	3198.0	3198.0	Alaska Point-to-Point
303 USA	3201.0	3201.0	Alaska Point-to-Point
304 USA	3258.0	3258.0	Alaska
305 USA	3261.0	3261.0	Alaska
306 USA	3449.0	3449.0	Alaska Aero
		4 MHz - DUPLEX	
401	4357.0	4065.0	KMI, Point Reyes, CA WAH, St. Thomas, VI
402	4360.0	4068.0	
403	4363.0	4071.0	WOM, Ft. Lauderdale, FL
404	4366.0	4074.0	KGN, Delcambre, LA
405	4369.0	4077.0	WLO, Mobile, AL WLC, Roger City, MI
406	4372.0	4080.0	
407	4375.0	4083.0	
408	4378.0	4086.0	
409	4381.0	4089.0	
410	4384.0	4092.0	WOO, Manahawkin, NJ
411	4387.0	4095.0	WOO, Manahawkin, NJ
412	4390.0	4098.0	WOM, Ft. Lauderdale, FL
413	4393.0	4101.0	
414	4396.0	4104.0	WLO, Mobile, AL
415	4399.0	4107.0	
416	4402.0	4110.0	KMI, Point Reyes, CA WOO, Manahawkin, NJ
417	4405.0	4113.0	KMI, Point Reyes, CA WOM, Ft. Lauderdale, FL
418	4408.0	4116.0	
419	4411.0	4119.0	WLO, Mobile, AL
420	4414.0	4122.0	
421	4417.0	4125.0	
422	4420.0	4128.0	WOO, Manahawkin, NJ
423	4423.0	4131.0	WOM, Ft. Lauderdale, FL
424	4426.0	4134.0	NMG, New Orleans, LA NMN, Portsmouth, VA, Weather
425	4429.0	4137.0	
426	4432.0	4140.0	
427	4435.0	4143.0	
428 EUR	4351.0	TX ----	
429 EUR	4354.0	TX ----	
428 USA	4351.0	4060.0	

VOICE CHANNEL	SHIP RECEIVE	SHIP TRANSMIT	USE
		4 MHz - SIMPLEX	
450 USA	4125.0	4125.0	DISTRESS
451 USA	4146.0	4146.0	4A LTD Coast/Intership
452 USA	4149.0	4149.0	4B LTD Coast/Intership
453 USA	4417.0	4417.0	4C LTD Coast/Intership
454 USA	4366.0	4366.0	Alaska
455 USA	4369.0	4369.0	Alaska
456 USA	4396.0	4396.0	Alaska
457 USA	4402.0	4402.0	Alaska
458 USA	4420.0	4420.0	Alaska
459 USA	4423.0	4423.0	Alaska
460 USA	4065.0	4065.0	Mississippi River
461 USA	4089.0	4089.0	Mississippi River
462 USA	4116.0	4116.0	Mississippi River
463 USA	4408.0	4408.0	Mississippi River
461 EUR	4146.0	4146.0	4A LTD Coast/Intership
462 EUR	4149.0	4149.0	4B LTD Coast/Intership
		5 MHz - SIMPLEX	
501 USA	5164.5	5164.5	Alaska Public Fixed
502 USA	5167.5	5167.5	Alaska Emergency/Calling
503 USA	5680.0	5680.0	Aero Search/Rescue
504 USA	5472.0	5472.0	Aero Search/Rescue
505 USA	5490.0	5490.0	Aero
		6 MHz - DUPLEX	
601	6501.0	6200.0	NMN, Portsmouth, VA NMG, New Orleans, LA MNA, Miami, FL
602	6504.0	6203.0	
603	6507.0	6206.0	
604	6510.0	6209.0	
605	6513.0	6212.0	
606	6516.0	6215.0	
607	6519.0	6218.0	WLO, Mobile, AL
608	6522.0	6221.0	
		6 MHz - SIMPLEX	
650 USA	6215.0	6215.0	DISTRESS
651 USA	6224.0	6224.0	6A LTD Coast/Intership
652 USA	6227.0	6227.0	6B LTD Coast/Intership
653 USA	6230.0	6230.0	6C LTD Coast/Intership
654 USA	6516.0	6516.0	6D LTD Coast DAYTIME ONLY
655 USA	6209.0	6209.0	Mississippi River
656 USA	6212.0	6212.0	Mississippi River

VOICE CHANNEL	SHIP RECEIVE	SHIP TRANSMIT	USE
		6 MHz - SIMPLEX (con't)	
657 USA	6510.0	6510.0	Mississippi River
658 USA	6513.0	6513.0	Mississippi River
661 EUR	6224.0	6224.0	6A LTD Coast/Intership
662 EUR	6227.0	6227.0	6B LTD Coast/Intership
663 EUR	6230.0	6230.0	6C LTD Coast/Intership
		8 MHz - DUPLEX	
801	8719.0	8195.0	
802	8722.0	8198.0	WOM, Ft. Lauderdale, FL
803	8725.0	8201.0	
804	8728.0	8204.0	KMI, Point Reyes, CA
805	8731.0	8207.0	WOM, Ft. Lauderdale, FL
806	8734.0	8210.0	
807	8737.0	8213.0	
808	8740.0	8216.0	WOO, Manahawkin, NJ
809	8743.0	8219.0	KMI, Point Reyes, CA
810	8746.0	8222.0	WOM, Ft. Lauderdale, FL
811	8749.0	8225.0	WOO, Manahawkin, NJ
812	8752.0	8228.0	
813	8755.0	8231.0	
814	8758.0	8234.0	WOM, Ft. Lauderdale, FL
815	8761.0	8237.0	WOO, Manahawkin, NJ
816	8764.0	8240.0	
817	8767.0	8243.0	
818	8770.0	8246.0	
819	8773.0	8249.0	
820	8776.0	8252.0	
821	8779.0	8255.0	
822	8782.0	8258.0	KMI, Point Reyes, CA
823	8785.0	8261.0	
824	8788.0	8264.0	WLO, Mobile, AL
825	8791.0	8267.0	WOM, Ft. Lauderdale, FL
826	8794.0	8270.0	WOO, Manahawkin, NJ
			WLC, Rogers City, MI
827	8797.0	8273.0	
828	8800.0	8276.0	
829	8803.0	8279.0	
830	8806.0	8282.0	WLO, Mobile, AL
831	8809.0	8285.0	WOM, Ft. Lauderdale, FL
832	8812.0	8288.0	
833	8291.0	8291.0	
834 EUR	8707.0	TX ----	
835 EUR	8710.0	TX ----	
836 EUR	8713.0	TX ----	
837 EUR	8716.0	TX ----	
836 USA	8713.0	8113.0	WLO, Mobile, AL
837 USA	8716.0	8128.0	KGN, Delcambre, LA

VOICE CHANNEL	SHIP RECEIVE	SHIP TRANSMIT	USE
		8 MHz - SIMPLEX	
850 USA	8291.0	8291.0	DISTRESS
851 USA	8294.0	8294.0	8A LTD Coast/Intership
852 USA	8297.0	8297.0	8B LTD Coast/Intership
853 USA	8201.0	8201.0	WFN, Jeffersonville, Miss. River
854 USA	8213.0	8213.0	WGK, St. Louis, Miss. River
855 USA	8725.0	8725.0	Mississippi River
856 USA	8737.0	8737.0	Mississippi River
861 EUR	8294.0	8294.0	8A LTD Coast/Intership
862 EUR	8297.0	8297.0	8B LTD Coast/Intership
		12 MHz - DUPLEX	
1201	13077.0	12230.0	KMI, Point Reyes, CA
1202	13080.0	12233.0	KMI, Point Reyes, CA
1203	13083.0	12236.0	KMI, Point Reyes, CA
1204	13086.0	12239.0	
1205	13089.0	12242.0	
1206	13092.0	12245.0	WOM, Ft. Lauderdale, FL
1207	13095.0	12248.0	
1208	13098.0	12251.0	WOM, Ft. Lauderdale, FL
1209	13101.0	12254.0	WOM, Ft. Lauderdale, FL
1210	13104.0	12257.0	WOO, Manahawkin, NJ
1211	13107.0	12260.0	WOO, Manahawkin, NJ
1212	13110.0	12263.0	WLO, Mobile, AL
1213	13113.0	12266.0	
1214	13116.0	12269.0	
1215	13119.0	12272.0	WOM, Ft. Lauderdale, FL
1216	13122.0	12275.0	
1217	13125.0	12278.0	
1218	13128.0	12281.0	
1219	13131.0	12284.0	
1220	13134.0	12287.0	
1221	13137.0	12290.0	
1222	13140.0	12293.0	
1223	13143.0	12296.0	WOM, Ft. Lauderdale, FL
1224	13146.0	12299.0	
1225	13149.0	12302.0	
1226	13152.0	12305.0	
1227	13155.0	12308.0	
1228	13158.0	12311.0	WOO, Manahawkin, NJ
1229	13161.0	12314.0	KMI, Point Reyes, CA
1230	13164.0	12317.0	WOM, Ft. Lauderdale, FL
1231	13167.0	12320.0	
1232	13170.0	12323.0	
1233	13173.0	12326.0	WLO, Mobile, AL
1234	13176.0	12329.0	
1235	13179.0	12332.0	WLO, Mobile, AL
1236	13182.0	12335.0	
1233	13173.0	12326.0	WLO, Mobile, AL

VOICE CHANNEL	SHIP RECEIVE	SHIP TRANSMIT	USE
12 MHz - DUPLEX (con't)			
1234	13176.0	12329.0	
1235	13179.0	12332.0	WLO, Mobile, AL
1236	13182.0	12335.0	KGN, Delcambre, LA
1237	13185.0	12338.0	
1238	13188.0	12341.0	
1239	13191.0	12344.0	
1240	13194.0	12347.0	
1241	13197.0	12350.0	
12 MHz - SIMPLEX			
1250 USA	12290.0	12290.0	DISTRESS
1251 USA	12353.0	12353.0	12A LTD Coast/Intership
1252 USA	12356.0	12356.0	12B LTD Coast/Intership
1253 USA	12359.0	12359.0	12C LTD Coast/Intership
1254 USA	12362.0	12362.0	PUB. COAST & Miss. River
1255 USA	12365.0	12365.0	PUB. COAST & Miss. River
1261 EUR	12353.0	12353.0	12A LTD Coast/Intership
1262 EUR	12356.0	12356.0	12B LTD Coast/Intership
1263 EUR	12359.0	12359.0	12C LTD Coast/Intership
1264 EUR	12362.0	12362.0	12D LTD Coast/Intership
1265 EUR	12365.0	12365.0	12E LTD Coast/Intership
16 MHz - DUPLEX			
1601	17242.0	16360.0	WOM, Ft. Lauderdale, FL
1602	17245.0	16363.0	KMI, Point Reyes, CA
1603	17248.0	16366.0	KMI, Point Reyes, CA
1604	17251.0	16369.0	
1605	17254.0	16372.0	WOO, Manahawkin, NJ
1606	17257.0	16375.0	
1607	17260.0	16378.0	
1608	17263.0	16381.0	
1609	17266.0	16384.0	WOM, Ft. Lauderdale, FL
1610	17269.0	16387.0	WOM, Ft. Lauderdale, FL
1611	17272.0	16390.0	WOM, Ft. Lauderdale, FL
1612	17275.0	16393.0	
1613	17278.0	16396.0	
1614	17281.0	16399.0	
1615	17284.0	16402.0	
1616	17287.0	16405.0	WOM, Ft. Lauderdale, FL
1617	17290.0	16408.0	
1618	17293.0	16411.0	
1619	17296.0	16414.0	
1620	17299.0	16417.0	WOO, Manahawkin, NJ
1621	17302.0	16420.0	
1622	17305.0	16423.0	
1623	17308.0	16426.0	

VOICE CHANNEL	SHIP RECEIVE	SHIP TRANSMIT	USE
16 MHz - DUPLEX (con't)			
1624	17311.0	16429.0	KMI, Point Reyes, CA
1625	17314.0	16432.0	
1626	17317.0	16435.0	WOO, Manahawkin, NJ
1627	17320.0	16438.0	
1628	17323.0	16441.0	
1629	17326.0	16444.0	
1630	17329.0	16447.0	
1631	17332.0	16450.0	WOO, Manahawkin, NJ
1632	17335.0	16453.0	
1633	17338.0	16456.0	
1634	17341.0	16459.0	
1635	17344.0	16462.0	
1636	17347.0	16465.0	
1637	17350.0	16468.0	
1638	17353.0	16471.0	
1639	17356.0	16474.0	
1640	17359.0	16477.0	
1641	17362.0	16480.0	WLO, Mobile, AL
1642	17365.0	16483.0	
1643	17368.0	16486.0	WLO, Mobile, AL
1644	17371.0	16489.0	
1645	17374.0	16492.0	KGN, Delcambre, LA
1646	17377.0	16495.0	
1647	17380.0	16498.0	WLO, Mobile, AL
1648	17383.0	16501.0	
1649	17386.0	16504.0	
1650 EUR	17389.0	16507.0	
1651 EUR	17392.0	16510.0	
1652 EUR	17395.0	16513.0	
1653 EUR	17398.0	16516.0	
1654 EUR	17401.0	16519.0	
1655 EUR	17404.0	16522.0	
1656 EUR	17407.0	16525.0	
16 MHz - SIMPLEX			
1650 USA	16420.0	16420.0	DISTRESS
1651 USA	16528.0	16528.0	16A LTD Coast/Intership
1652 USA	16531.0	16531.0	16B LTD Coast/Intership
1653 USA	16534.0	16534.0	16C LTD Coast/Intership
1654 USA	16537.0	16537.0	
1655 USA	16540.0	16540.0	
1656 USA	16543.0	16543.0	PUB. COAST & Miss. River
1657 USA	16546.0	16546.0	PUB. COAST & Miss. River
1661 EUR	16528.0	16528.0	16A LTD Coast/Intership
1662 EUR	16531.0	16531.0	16B LTD Coast/Intership
1663 EUR	16534.0	16534.0	16C LTD Coast/Intership
1664 EUR	16537.0	16537.0	16D LTD Coast/Intership
1665 EUR	16540.0	16540.0	16E LTD Coast/Intership

VOICE CHANNEL	SHIP RECEIVE	SHIP TRANSMIT	USE
		16 MHz - SIMPLEX (con't)	
1666 EUR	16543.0	16543.0	16F LTD Coast/Intership
1667 EUR	16546.0	16546.0	16G LTD Coast/Intership
		18 MHz - DUPLEX	
1801	19755.0	18780.0	
1802	19758.0	18783.0	
1803	19761.0	18786.0	
1804	19764.0	18789.0	
1805	19767.0	18792.0	
1806	19770.0	18795.0	
1807	19773.0	18798.0	WLO, Mobile, AL
1808	19776.0	18801.0	
1809	19779.0	18804.0	
1810	19782.0	18807.0	
1811	19785.0	18810.0	
1812	19788.0	18813.0	
1813	19791.0	18816.0	
1814	19794.0	18819.0	
1815	19797.0	18822.0	
		18 MHz - SIMPLEX	
1851 USA	18840.0	18840.0	18A LTD Coast/Intership
1852 USA	18843.0	18843.0	18B LTD Coast/Intership
1853 USA	18825.0	18825.0	
1854 USA	18828.0	18828.0	
1855 USA	18831.0	18831.0	
1856 USA	18834.0	18834.0	
1857 USA	18837.0	18837.0	
1861 EUR	18825.0	18825.0	18A LTD Coast/Intership
1862 EUR	18828.0	18828.0	18B LTD Coast/Intership
1863 EUR	18831.0	18831.0	18C LTD Coast/Intership
1864 EUR	18834.0	18834.0	18D LTD Coast/Intership
1865 EUR	18837.0	18837.0	18E LTD Coast/Intership
1866 EUR	18840.0	18840.0	18F LTD Coast/Intership
1867 EUR	18843.0	18843.0	18G LTD Coast/Intership
		22 MHz - DUPLEX	
2201	22696.0	22000.0	WOO, Manahawkin, NJ
2202	22699.0	22003.0	
2203	22702.0	22006.0	
2204	22705.0	22009.0	
2205	22708.0	22012.0	WOO, Manahawkin, NJ
2206	22711.0	22015.0	

22 MHz - DUPLEX (con't)

VOICE CHANNEL	SHIP RECEIVE	SHIP TRANSMIT	USE
2207	22714.0	22018.0	
2208	22717.0	22021.0	
2209	22720.0	22024.0	
2210	22723.0	22027.0	WOO, Manahawkin, NJ
2211	22726.0	22030.0	
2212	22729.0	22033.0	
2213	22732.0	22036.0	
2214	22735.0	22039.0	KMI, Point Reyes, CA
2215	22738.0	22042.0	WOM, Ft. Lauderdale, FL
2216	22741.0	22045.0	WOM, Ft. Lauderdale, FL
2217	22744.0	22048.0	
2218	22747.0	22051.0	
2219	22750.0	22054.0	
2220	22753.0	22057.0	
2221	22756.0	22060.0	
2222	22759.0	22063.0	WOM, Ft. Lauderdale, FL
2223	22762.0	22066.0	KMI, Point Reyes, CA
2224	22765.0	22069.0	
2225	22768.0	22072.0	
2226	22771.0	22075.0	
2227	22774.0	22078.0	
2228	22777.0	22081.0	KMI, Point Reyes, CA
2229	22780.0	22084.0	
2230	22783.0	22087.0	
2231	22786.0	22090.0	
2232	22789.0	22093.0	
2233	22792.0	22096.0	
2234	22795.0	22099.0	
2235	22798.0	22102.0	
2236	22801.0	22105.0	KMI, Point Reyes, CA WOO, Manahawkin, NJ
2237	22804.0	22108.0	WLO, Mobile, AL
2238	22807.0	22111.0	
2239	22810.0	22114.0	
2240	22813.0	22117.0	
2241	22816.0	22120.0	
2242	22819.0	22123.0	WLO, Mobile, AL
2243	22822.0	22126.0	
2244	22825.0	22129.0	
2245	22828.0	22132.0	
2246	22831.0	22135.0	WLO, Mobile, AL
2247	22834.0	22138.0	
2248	22837.0	22141.0	
2249	22840.0	22144.0	
2250	22843.0	22147.0	
2251 EUR	22846.0	22150.0	
2252 EUR	22849.0	22153.0	
2253 EUR	22852.0	22156.0	

VOICE CHANNEL	SHIP RECEIVE	SHIP TRANSMIT	USE
22 MHz - SIMPLEX			
2251 USA	22159.0	22159.0	22A LTD Coast/Intership
2252 USA	22162.0	22162.0	22B LTD Coast/Intership
2253 USA	22165.0	22165.0	22C LTD Coast/Intership
2254 USA	22168.0	22168.0	22D LTD Coast/Intership
2255 USA	22171.0	22171.0	22E LTD Coast/Intership
2256 USA	22174.0	22174.0	Public Coast
2257 USA	22177.0	22177.0	Public Coast
2261 EUR	22159.0	22159.0	22A LTD Coast/Intership
2262 EUR	22162.0	22162.0	22B LTD Coast/Intership
2263 EUR	22165.0	22165.0	22C LTD Coast/Intership
2264 EUR	22168.0	22168.0	22D LTD Coast/Intership
2265 EUR	22171.0	22171.0	22E LTD Coast/Intership
2266 EUR	22174.0	22174.0	22F LTD Coast/Intership
2267 EUR	22177.0	22177.0	22G LTD Coast/Intership
25 MHz - DUPLEX			
2501	26145.0	25070.0	
2502	26148.0	25073.0	
2503	26151.0	25076.0	WLO, Mobile, AL
2504	26154.0	25079.0	
2505	26157.0	25082.0	
2506	26160.0	25085.0	
2507	26163.0	25088.0	
2508	26166.0	25091.0	
2509	26169.0	25094.0	
2510	26172.0	25097.0	
25 MHz - SIMPLEX			
2551 USA	25115.0	25115.0	25A LTD Coast/Intership
2552 USA	25118.0	25118.0	25B LTD Coast/Intership
2553 USA	25100.0	25100.0	
2554 USA	25103.0	25103.0	
2555 USA	25106.0	25106.0	
2556 USA	25109.0	25109.0	
2557 USA	25112.0	25112.0	
2561 EUR	25100.0	25100.0	25A LTD Coast/Intership
2562 EUR	25103.0	25103.0	25B LTD Coast/Intership
2563 EUR	25106.0	25106.0	25C LTD Coast/Intership
2564 EUR	25109.0	25109.0	25D LTD Coast/Intership
2565 EUR	25112.0	25112.0	25E LTD Coast/Intership
2566 EUR	25115.0	25115.0	25F LTD Coast/Intership
2567 EUR	25118.0	25118.0	25G LTD Coast/Intership

SEA 330 FREQUENCY LISTING - SITOR CHANNELS

TELEX CHANNEL	SHIP RECEIVE	SHIP TRANSMIT	USE
		4 MHz - DUPLEX	
401	4210.5	4172.5	A9M, S9M, 9VG74, EDJ2, KFS, DCN
402	4211.0	4173.0	LSD836, JCS, JCT, JCU, JDC, JMA, OXZ, ZLW, CUL, GKE2, WNU, 7TK20 4PB
403	4211.5	4173.5	OST26, OSU, LGW2, SPA25, KFS
404	4212.0	4174.0	LSD836, 9WH20, PCG, PCH25, ZLW TAH, UBN, UDC, NMO, NMN
405	4212.5	4174.5	FFS, FFT21, DCM, HZG, UDE, UFB, WLO
406	4213.0	4175.0	LSD836, VIP31, SVS2, LGW3, HEC14, WLO
407	4213.5	4175.5	VCS, DCL, DHS, Y5D, Y5M, Y5P, 9WW20, EDK2, XSX, GKL2, KBS, VCS
408	4214.0	4176.0	9WH20, HPP, ZSC61, GKP2, KLB, WPD
409	4214.5	4176.5	VAI, CBV, 9MG, KLC, VAI
410	4215.0	4177.0	VIP37, ICB, JCK, JDB, JOR, JOS, JOU, JSM, 9WW20, WLO, 4PB
411	4177.5	4177.5	
412	4215.5	4178.0	OST27, OSU, OXZ, NRV, HPP, HEC24, TAH, TAN, KBS, NMC, NMF
413	4216.0	4178.5	DCF, SVU2, 9MG13, 3AC, 3AF, SPA26, A7D, GKY2, KPH
414	4216.5	4179.0	VIS, ICB, IAR, GKQ2, WCC, JNA, VIS61
415	4217.0	4179.5	WLO
416	4217.5	4180.0	
417	4218.0	4180.5	WLO
418	4218.5	4181.0	
419	4219.0	4181.5	
471	4202.5	4202.5	
472	4203.0	4203.0	
473	4203.5	4203.5	
474	4204.0	4204.0	
475	4204.5	4204.5	
476	4205.0	4205.0	
477	4205.5	4205.5	
478	4206.0	4206.0	
479	4206.5	206.5	
480	4207.0	4207.0	
		6 MHz - DUPLEX	
601	6314.5	6263.0	9MG14, KFS
602	6315.0	6263.5	GKE3, CUL, ZLW, HPP, WNU
603	6315.5	6264.0	OST36, SPA34, UBN, UDC, KFS, LSD836
604	6316.0	6264.5	DCN, UDH, IAR, ZLW, NMO, NMN

TELEX CHANNEL	SHIP RECEIVE	SHIP TRANSMIT	USE
		6 MHz - DUPLEX (con't)	
605	6316.5	6265.0	PCH35, 7TK21
606	6317.0	6265.5	UDE, UFB, TAH, TAN, 9WH20, VIP32, LSD836, WLO
607	6317.5	6266.0	DCM, 3AC, 3AF, 4PB, JCS, JCT, JCU, JDC, JMA, VCS
608	6318.0	6266.5	LGU2, KLB
609	6318.5	6267.0	OXZ, HZG, 9MG, VAI, CBV, KLC
610	6319.0	6267.5	UAT, EDJ3, VIP38, VIS72, WLO
611	6268.0	6268.0	
612	6319.5	6268.5	GKP3, UGE, UXN, NRV, NMF
613	6320.0	6269.0	DCL, 9WW20, KPH
614	6320.5	6269.5	FFT31, 3AC, 3AF, JNA, VIS63
615	6321.0	6270.0	OXZ, LSD836, WLO
616	6321.5	6270.5	GKL3, SPB, SVU3
617	6322.0	6271.0	OST37, 7TK22, KLC
618	6322.5	6271.5	SPA35, VPS28, 9WW20
619	6323.0	6272.0	TAH, TAN, WLO
620	6323.5	6272.5	PCH36, S9M, 9VG77, NMC
621	6324.0	6273.0	LGU3, 9WH21, WCC
622	6324.5	6273.5	GKQ3, KPH, KLC
623	6325.0	6274.0	DCF, EDK3, UDE, UFB, XSX, JCK, JDB, JOR, JOS, JOU, JSM
624	6325.5	6274.5	
625	6326.0	6275.0	
626	6326.5	6275.5	
627	6327.0	6281.0	
628	6327.5	6281.5	
629	6328.0	6282.0	
671	6300.5	6300.5	
672	6301.0	6301.0	
673	6301.5	6301.5	
674	6302.0	6302.0	
675	6302.5	6302.5	
676	6303.0	6303.0	
677	6303.5	6303.5	
678	6304.0	6304.0	
679	6304.5	6304.5	
680	6305.0	6305.0	
681	6305.5	6305.5	
682	6306.0	6306.0	
683	6306.5	6306.5	
684	6307.0	6307.0	
685	6307.5	6307.5	
686	6308.0	6308.0	
687	6308.5	6308.5	
688	6309.0	6309.0	
689	6309.5	6309.5	
690	6310.0	6310.0	
691	6310.5	6310.5	
692	6311.0	6311.0	
693	6311.5	6311.5	

8 MHz - DUPLEX

TELEX CHANNEL	SHIP RECEIVE	SHIP TRANSMIT	USE
801	8376.5	8376.5	
802	8417.0	8377.0	GKE4, ZLW, WNU
803	8417.5	8377.5	OST46, SPA45, KFS
804	8418.0	8378.0	DCM, IAR, UDN, UFN, TAH, TAN, ZLW, LSD836
805	8418.5	8378.5	LGB2, J2A, HZG, WLO
806	8419.0	8379.0	UAT, 9WH21, VIP33, LSD836, WLO
807	8419.5	8379.5	XSG, JNA, LSD836, PPR, VCS
808	8420.0	8380.0	EDJ4, FFT41
809	8420.5	8380.5	HEC18, UDE, UFB, S9M, 9VG78, HPP, CBV, KLC
810	8421.0	8381.0	OXZ, CUL, A7D, 9WW20, VIP39, VIS74, WLO
811	8421.5	8381.5	SVS4, 7TK23, VPS38, XSQ, JCS,
			JCT, JCU, JDC, JMA, CBV, WLO
812	8422.0	8382.0	OST47, UAH, NRV, NMF
813	8422.5	8382.5	GKP4, UBN, UDC, 7TK24, KPH
814	8423.0	8383.0	ICB, SVT4, UDN, UFN, UGE, UXN, VIS65
815	8423.5	8383.5	DCL, 3AC, 3AF, XSG, JCK, JDB,
			JOR, JOS, JOU, JSM, WLO
816	8424.0	8384.0	SVU4, 9WH21, WCC
817	8424.5	8384.5	PCH45, 9MG, VPS39, HPP, KLC
818	8425.0	8385.0	FFT43, 4PB, KLB
819	8425.5	8385.5	GKY4, HEC28, 9PA
820	8426.0	8386.0	GKL4, EDK4, ICB, NMC
821	8426.5	8386.5	LGB3, 3AC, 3AF, 9VG79, WCC
822	8427.0	8387.0	OXZ, JYO, KPH, KLC
823	8427.5	8387.5	DCF, SPA46, YUR, A9M, 9WW20, CLA, CLT
824	8428.0	8388.0	XSX, NMN
825	8428.5	8388.5	PCH46, ZSC62, VWM, VAI
826	8429.0	8389.0	EDL4, FFT44, HEC38, TAH, TAN, WLO
827	8429.5	8389.5	GKQ4, VWB, NMO
828	8430.0	8390.0	
829	8430.5	8390.5	
830	8431.0	8391.0	
831	8431.5	8391.5	
832	8432.0	8392.0	
833	8432.5	8392.5	
834	8433.0	8393.0	
835	8433.5	8393.5	
836	8434.0	8394.0	
837	8434.5	8394.5	
838	8435.0	8395.0	
839	8435.5	8395.5	
840	8436.0	8396.0	
871	8396.5	8396.5	
872	8397.0	8397.0	
873	8397.5	8397.5	
874	8398.0	8398.0	
875	8398.5	8398.5	
876	8399.0	8399.0	
877	8399.5	8399.5	
878	8400.0	8400.0	

TELEX CHANNEL	SHIP RECEIVE	SHIP TRANSMIT	USE
		8 MHz - DUPLEX (con't)	
879	8400.5	8400.5	
880	8401.0	8401.0	
881	8401.5	8401.5	
882	8402.0	8402.0	
883	8402.5	8402.5	
884	8403.0	8403.0	
885	8403.5	8403.5	
886	8404.0	8404.0	
887	8404.5	8404.5	
888	8405.0	8405.0	
889	8405.5	8405.5	
890	8406.0	8406.0	
891	8406.5	8406.5	
892	8407.0	8407.0	
893	8407.5	8407.5	
894	8408.0	8408.0	
895	8408.5	8408.5	
896	8409.0	8409.0	
897	8409.5	8409.5	
898	8410.0	8410.0	
899	8410.5	8410.5	
900	8411.0	8411.0	
901	8411.5	8411.5	
902	8412.0	8412.0	
903	8412.5	8412.5	
904	8413.0	8413.0	
905	8413.5	8413.5	
906	8414.0	8414.0	
		12 MHz - DUPLEX	
1201	12579.5	12477.0	DCN, S9M, 9VG80, UMV
1202	12580.0	12477.5	GKE5, ZLW
1203	12580.5	12478.0	OST56, SPA64, KFS
1204	12581.0	12478.5	DCM, UDE, UFB, JCS, JCT, JCU, JDC, JMA, ZLW
1205	12581.5	12479.0	SPB, EDJ5, VWB, WLO
1206	12582.0	12479.5	VIP34
1207	12582.5	12480.0	FFT61, TAH, TAN
1208	12583.0	12480.5	HPP
1209	12583.5	12481.0	UDE, UFB, 9MG16, CBV, KLC
1210	12584.0	12481.5	OXZ, UDN, UFN, HZG, VIP40, VIS76
1211	12584.5	12482.0	3AC, 3AF, UBN, UDC, JYO, 4PB, XSQ, CBV, WLO
1212	12585.0	12482.5	PCH55, NRV
1213	12585.5	12483.0	VPS63, KPH
1214	12586.0	12483.5	LZW5, VIS67
1215	12586.5	12484.0	DCL, 9PA, VWM, WLO

12 MHz - DUPLEX (con't)

TELEX CHANNEL	SHIP RECEIVE	SHIP TRANSMIT	USE
1216	12587.0	12484.5	OST57
1217	12587.5	12485.0	SVS5, KLC
1218	12588.0	12485.5	HEC13, 9MG, HPP
1219	12588.5	12486.0	WNU
1220	12589.0	12486.5	LGJ3, XSG, NMO, NMC
1221	12589.5	12487.0	WCC
1222	12590.0	12487.5	EDK5, 9VG94, JNA, KPH, KLC
1223	12590.5	12488.0	UDH, SVT5, 4PB, KLB
1224	12591.0	12488.5	A7D, VPS64, NMF
1225	12591.5	12489.0	GKL5, WLO
1226	12592.0	12489.5	OXZ, JCK, JDB, JOR, JOS, JOU, JSM, CLA, CLT
1227	12592.5	12490.0	NMN
1228	12593.0	12490.5	GKP5
1229	12593.5	12491.0	WLO
1230	12594.0	12491.5	DCF, TAH, TAN, PPR
1231	12594.5	12492.0	A9M
1232	12595.0	12492.5	CUL
1233	12595.5	12493.0	
1234	12596.0	12493.5	3AC, 3AF, WLO
1235	12596.5	12494.0	PCH56
1236	12597.0	12494.5	SPB62, UAT, 9VG95, CLA, CLT
1237	12597.5	12495.0	UDN, UFN
1238	12598.0	12495.5	SPA65, WCC
1239	12598.5	12496.0	VCS
1240	12599.0	12496.5	EDL5, XSX, WLO
1241	12599.5	12497.0	IAR, J2A, VAI
1242	12600.0	12497.5	DHS, 7TK25, KPH
1243	12600.5	12498.0	UAH, HEC23
1244	12601.0	12498.5	ZSC63
1245	12601.5	12499.0	OXZ, LSD836
1246	12602.0	12499.5	XSG, LSD836
1247	12602.5	12500.0	LSD836
1248	12603.0	12500.5	GKY5, KLC
1249	12603.5	12501.0	HEC33, SVS
1250	12604.0	12501.5	LZW, WLO
1251	12604.5	12502.0	WLO
1252	12605.0	12502.5	LGJ4
1253	12605.5	12503.0	FFT62
1254	12606.0	12503.5	ICB, WLO
1255	12606.5	12504.0	TAH, TAN
1256	12607.0	12504.5	GKQ6
1257	12607.5	12505.0	YUR, UGE, UXN, WNU
1258	12608.0	12505.5	
1259	12608.5	12506.0	
1260	12609.0	12506.5	
1261	12609.5	12507.0	
1262	12610.0	12507.5	
1263	12610.5	12508.0	

12 MHz - DUPLEX (con't)

TELEX CHANNEL	SHIP RECEIVE	SHIP TRANSMIT	USE
1264	12611.0	12508.5	
1265	12611.5	12509.0	
1266	12612.0	12509.5	
1267	12612.5	12510.0	
1268	12613.0	12510.5	
1269	12613.5	12511.0	
1270	12614.0	12511.5	
1271	12614.5	12512.0	
1272	12615.0	12512.5	
1273	12615.5	12513.0	
1274	12616.0	12513.5	
1275	12616.5	12514.0	
1276	12617.0	12514.5	
1277	12617.5	12515.0	
1278	12618.0	12515.5	
1279	12618.5	12516.0	
1280	12619.0	12516.5	
1281	12619.5	12517.0	
1282	12620.0	12517.5	
1283	12620.5	12518.0	
1284	12621.0	12518.5	
1285	12621.5	12519.0	
1286	12622.0	12519.5	
1287	12520.0	12520.0	
1288	12622.5	12520.5	
1289	12623.0	12521.0	
1290	12623.5	12521.5	
1291	12624.0	12522.0	
1292	12624.5	12522.5	
1293	12625.0	12523.0	
1294	12625.5	12523.5	
1295	12626.0	12524.0	
1296	12626.5	12524.5	
1297	12627.0	12525.0	
1298	12627.5	12525.5	
1299	12628.0	12526.0	
1300	12628.5	12526.5	
1301	12629.0	12527.0	
1302	12629.5	12527.5	
1303	12630.0	12528.0	
1304	12630.5	12528.5	
1305	12631.0	12529.0	
1306	12631.5	12529.5	
1307	12632.0	12530.0	
1308	12632.5	12530.5	
1309	12633.0	12531.0	
1310	12633.5	12531.5	
1311	12634.0	12532.0	
1312	12634.5	12532.5	

12 MHz - DUPLEX (con't)

TELEX CHANNEL	SHIP RECEIVE	SHIP TRANSMIT	USE
1313	12635.0	12533.0	
1314	12635.5	12533.5	
1315	12636.0	12534.0	
1316	12636.5	12534.5	
1317	12637.0	12535.0	
1318	12637.5	12535.5	
1319	12638.0	12536.0	
1320	12638.5	12536.5	
1321	12639.0	12537.0	
1322	12639.5	12537.5	
1323	12640.0	12538.0	
1324	12640.5	12538.5	
1325	12641.0	12539.0	
1326	12641.5	12539.5	
1327	12642.0	12540.0	
1328	12642.5	12540.5	
1329	12643.0	12541.0	
1330	12643.5	12541.5	
1331	12644.0	12542.0	
1332	12644.5	12542.5	
1333	12645.0	12543.0	
1334	12645.5	12543.5	
1335	12646.0	12544.0	
1336	12646.5	12544.5	
1337	12647.0	12545.0	
1338	12647.5	12545.5	
1339	12648.0	12546.0	
1340	12648.5	12546.5	
1341	12649.0	12547.0	
1342	12649.5	12547.5	
1343	12650.0	12548.0	
1344	12650.5	12548.5	
1345	12651.0	12549.0	
1346	12651.5	12549.5	
1347	12652.0	12555.0	
1348	12652.5	12555.5	
1349	12653.0	12556.0	
1350	12653.5	12556.5	
1351	12654.0	12557.0	
1352	12654.5	12557.5	
1353	12655.0	12558.0	
1354	12655.5	12558.5	
1355	12656.0	12559.0	
1356	12656.5	12559.5	
1371	12560.0	12560.0	
1372	12560.5	12560.5	
1373	12561.0	12561.0	
1374	12561.5	12561.5	
1375	12562.0	12562.0	

TELEX CHANNEL	SHIP RECEIVE	SHIP TRANSMIT	USE
12 MHz - DUPLEX (con't)			
1376	12562.5	12562.5	
1377	12563.0	12563.0	
1378	12563.5	12563.5	
1379	12564.0	12564.0	
1380	12564.5	12564.5	
1381	12565.0	12565.0	
1382	12565.5	12565.5	
1383	12566.0	12566.0	
1384	12566.5	12566.5	
1385	12567.0	12567.0	
1386	12567.5	12567.5	
1387	12568.0	12568.0	
1388	12568.5	12568.5	
1389	12569.0	12569.0	
1390	12569.5	12569.5	
1391	12570.0	12570.0	
1392	12570.5	12570.5	
1393	12571.0	12571.0	
1394	12571.5	12571.5	
1395	12572.0	12572.0	
1396	12572.5	12572.5	
1397	12573.0	12573.0	
1398	12573.5	12573.5	
1399	12574.0	12574.0	
1400	12574.5	12574.5	
1401	12575.0	12575.0	
1402	12575.5	12575.5	
1403	12576.0	12576.0	
1404	12576.5	12576.5	
16 MHz - DUPLEX			
1601	16807.0	16683.5	DCN, S9M, 9VG82
1602	16807.5	16684.0	GKE6, ZLW, WNU
1603	16808.0	16684.5	OST66, SPA85, VWM, KFS
1604	16808.5	16685.0	TAH, TAN, VWB, ZLW, KLB, LSD836
1605	16809.0	16685.5	LGX2, WLO
1606	16809.5	16686.0	SPB81, EDJ6, VIP35
1607	16810.0	16686.5	JCS, JCT, JCU, JDC, JMA, HPP
1608	16810.5	16687.0	FFT81
1609	16811.0	16687.5	HZG, 9MG17, CBV, KLC
1610	16811.5	16688.0	DCM, A9M, VIP41, VIS78
1611	16812.0	16688.5	3AC, 3AF, XSQ, JNA, CBV, WLO
1612	16812.5	16689.0	OST67, NRV, NMF
1613	16813.0	16689.5	KPH
1614	16813.5	16690.0	VIS69

16 MHz - DUPLEX (con't)

TELEX CHANNEL	SHIP RECEIVE	SHIP TRANSMIT	USE
1615	16814.0	16690.5	WLO
1616	16814.5	16691.0	HEC17, JCK, JDB, JOR, JOS, JOU, JSM
1617	16815.0	16691.5	9VG83, KLC
1618	16815.5	16692.0	OXZ, 9MG
1619	16816.0	16692.5	ZSC64, WNU
1620	16816.5	16693.0	A7D, NMC
1621	16817.0	16693.5	WCC
1622	16817.5	16694.0	3AC, 3AF, KPH, KLC
1623	16818.0	16694.5	SVT6
1624	16695.0	16695.5	
1625	16818.5	16695.5	9VG96, WLO
1626	16819.0	16696.0	DHS, EDK6, CLA, CLT
1627	16819.5	16696.5	NMO, NMN
1628	16820.0	16697.0	IAR
1629	16820.5	16697.5	WLO
1630	16821.0	16698.0	TAH, TAN, VPS82
1631	16821.5	16698.5	OZX, JYO, VCS
1632	16822.0	16699.0	3AC, 3AF, VAI
1633	16822.5	16699.5	9VG97, HPP
1634	16823.0	16700.0	
1635	16823.5	16700.5	
1636	16824.0	16701.0	GKP6, CLA, CLT
1637	16824.5	16701.5	
1638	16825.0	16702.0	J2A, WCC
1639	16825.5	16702.5	
1640	16826.0	16703.0	UAH, EDL6, LSD836, WLO
1641	16826.5	16703.5	PCH65
1642	16827.0	16704.0	GKY6
1643	16827.5	16704.5	HEC37, UDE, UFB
1644	16828.0	16705.0	LSD836, WLO
1645	16828.5	16705.5	DCL
1646	16829.0	16706.0	UBN, UDC, XSG
1647	16829.5	16706.5	UGE, UXN
1648	16830.0	16707.0	HEC27, KLC
1649	16830.5	16707.5	SVU6
1650	16831.0	16708.0	VPS83, WLO
1651	16831.5	16708.5	FFT83
1652	16832.0	16709.0	LGX3, WNU
1653	16832.5	16709.5	
1654	16833.0	16710.0	WLO
1655	16833.5	16710.5	
1656	16834.0	16711.0	CUL
1657	16834.5	16711.5	WNU
1658	16835.0	16712.0	UDN, UFN
1659	16835.5	16712.5	
1660	16836.0	16713.0	DCF
1661	16836.5	16713.5	UDN, UFN, 7TK27
1662	16837.0	16714.0	UAT, 3AC, 3AF, LZW6
1663	16837.5	16714.5	

16 MHz - DUPLEX (con't)

TELEX CHANNEL	SHIP RECEIVE	SHIP TRANSMIT	USE
1664	16838.0	16715.0	XSG
1665	16838.5	16715.5	YUR
1666	16839.0	16716.0	PCH66, SPA86, TAH, TAN
1667	16839.5	16716.5	ICB
1668	16840.0	16717.0	GKQ6
1669	16840.5	16717.5	
1670	16841.0	16718.0	
1671	16841.5	16718.5	
1672	16842.0	16719.0	
1673	16842.5	16719.5	
1674	16843.0	16720.0	
1675	16843.5	16720.5	
1676	16844.0	16721.0	
1677	16844.5	16721.5	
1678	16845.0	16722.0	
1679	16845.5	16722.5	
1680	16846.0	16723.0	
1681	16846.5	16723.5	
1682	16847.0	16724.0	
1683	16847.5	16724.5	
1684	16848.0	16725.0	
1685	16848.5	16725.5	
1686	16849.0	16726.0	
1687	16849.5	16726.5	
1688	16850.0	16727.0	
1689	16850.5	16727.5	
1690	16851.0	16728.0	
1691	16851.5	16728.5	
1692	16852.0	16729.0	
1693	16852.5	16729.5	
1694	16853.0	16730.0	
1695	16853.5	16730.5	
1696	16854.0	16731.0	
1697	16854.5	16731.5	
1698	16855.0	16732.0	
1699	16855.5	16732.5	
1700	16856.0	16733.0	
1701	16856.5	16733.5	
1702	16857.0	16739.0	
1703	16857.5	16739.5	
1704	16858.0	16740.0	
1705	16858.5	16740.5	
1706	16859.0	16741.0	
1707	16859.5	16741.5	
1708	16860.0	16742.0	
1709	16860.5	16742.5	
1710	16861.0	16743.0	
1711	16861.5	16743.5	
1712	16862.0	16744.0	

16 MHz - DUPLEX (con't)

TELEX CHANNEL	SHIP RECEIVE	SHIP TRANSMIT	USE
1713	16862.5	16744.5	
1714	16863.0	16745.0	
1715	16863.5	16745.5	
1716	16864.0	16746.0	
1717	16864.5	16746.5	
1718	16865.0	16747.0	
1719	16865.5	16747.5	
1720	16866.0	16748.0	
1721	16866.5	16748.5	
1722	16867.0	16749.0	
1723	16867.5	16749.5	
1724	16868.0	16750.0	
1725	16868.5	16750.5	
1726	16869.0	16751.0	
1727	16869.5	16751.5	
1728	16870.0	16752.0	
1729	16870.5	16752.5	
1730	16871.0	16753.0	
1731	16871.5	16753.5	
1732	16872.0	16754.0	
1733	16872.5	16754.5	
1734	16873.0	16755.0	
1735	16873.5	16755.5	
1736	16874.0	16756.0	
1737	16874.5	16756.5	
1738	16875.0	16757.0	
1739	16875.5	16757.5	
1740	16876.0	16758.0	
1741	16876.5	16758.5	
1742	16877.0	16759.0	
1743	16877.5	16759.5	
1744	16878.0	16760.0	
1745	16878.5	16760.5	
1746	16879.0	16761.0	
1747	16879.5	16761.5	
1748	16880.0	16762.0	
1749	16880.5	16762.5	
1750	16881.0	16763.0	
1751	16881.5	16763.5	
1752	16882.0	16764.0	
1753	16882.5	16764.5	
1754	16883.0	16765.0	
1755	16883.5	16765.5	
1756	16884.0	16766.0	
1757	16884.5	16766.5	
1758	16885.0	16767.0	
1759	16885.5	16767.5	
1760	16886.0	16768.0	

16 MHz - DUPLEX (con't)

TELEX CHANNEL	SHIP RECEIVE	SHIP TRANSMIT	USE
1761	16886.5	16768.5	
1762	16887.0	16769.0	
1763	16887.5	16769.5	
1764	16888.0	16770.0	
1765	16888.5	16770.5	
1766	16889.0	16771.0	
1767	16889.5	16771.5	
1768	16890.0	16772.0	
1769	16890.5	16772.5	
1770	16891.0	16773.0	
1771	16891.5	16773.5	
1772	16892.0	16774.0	
1773	16892.5	16774.5	
1774	16893.0	16775.0	
1775	16893.5	16775.5	
1776	16894.0	16776.0	
1777	16894.5	16776.5	
1778	16895.0	16777.0	
1779	16895.5	16777.5	
1780	16896.0	16778.0	
1781	16896.5	16778.5	
1782	16897.0	16779.0	
1783	16897.5	16779.5	
1784	16898.0	16780.0	
1785	16898.5	16780.5	
1786	16899.0	16781.0	
1787	16899.5	16781.5	
1788	16900.0	16782.0	
1789	16900.5	16782.5	
1790	16901.0	16783.0	
1791	16901.5	16783.5	
1792	16902.0	16784.0	
1793	16902.5	16784.5	
1794	16796.5	16796.5	
1795	16797.0	16797.0	
1796	16797.5	16797.5	
1797	16798.0	16798.0	
1798	16798.5	16798.5	
1799	16799.0	16799.0	

18 MHz - DUPLEX

TELEX CHANNEL	SHIP RECEIVE	SHIP TRANSMIT	USE
1801	19681.0	18870.5	
1802	19681.5	18871.0	
1803	19682.0	18871.5	
1804	19682.5	18872.0	
1805	19683.0	18872.5	
1806	19683.5	18873.0	
1807	19684.0	18873.5	
1808	19684.5	18874.0	
1809	19685.0	18874.5	
1810	19685.5	18875.0	
1811	19686.0	18875.5	
1812	19686.5	18876.0	
1813	19687.0	18876.5	
1814	19687.5	18877.0	
1815	19688.0	18877.5	
1816	19688.5	18878.0	
1817	19689.0	18878.5	
1818	19689.5	18879.0	
1819	19690.0	18879.5	
1820	19690.5	18880.0	
1821	19691.0	18880.5	
1822	19691.5	18881.0	
1823	19692.0	18881.5	
1824	19692.5	18882.0	
1825	19693.0	18882.5	
1826	19693.5	18883.0	
1827	19694.0	18883.5	
1828	19694.5	18884.0	
1829	19695.0	18884.5	
1830	19695.5	18885.0	
1831	19696.0	18885.5	
1832	19696.5	18886.0	
1833	19697.0	18886.5	
1834	19697.5	18887.0	
1835	19698.0	18887.5	
1836	19698.5	18888.0	
1837	19699.0	18888.5	
1838	19699.5	18889.0	
1839	19700.0	18889.5	
1840	19700.5	18890.0	
1841	19701.0	18890.5	
1842	19701.5	18891.0	
1843	19702.0	18891.5	
1844	19702.5	18892.0	
1845	19703.0	18892.5	
1871	18893.0	18893.0	
1872	18893.5	18893.5	

TELEX CHANNEL	SHIP RECEIVE	SHIP TRANSMIT	USE

18 MHz - DUPLEX (con't)

1873	18894.0	18894.0	
1874	18894.5	18894.5	
1875	18895.0	18895.0	
1876	18895.5	18895.5	
1877	18896.0	18896.0	
1878	18896.5	18896.5	
1879	18897.0	18897.0	
1880	18897.5	18897.5	
1881	18898.0	18898.0	

22 MHz - DUPLEX

2201	22376.5	22284.5	DCN, 9MG18
2202	22377.0	22285.0	GKE7, ZLW, WNU
2203	22377.5	22285.5	OST76, SPA94, KFS
2204	22378.0	22286.0	FFT91, ZLW
2205	22378.5	22286.5	LGG2, VWB
2206	22379.0	22287.0	SPB91, EDJ7, LZW7, VPS97, VIP36
2207	22379.5	22287.5	JCS, JCT, JCU, JDC, JMA
2208	22380.0	22288.0	PCH75
2209	22380.5	22288.5	CBV, KLC
2210	22381.0	22289.0	S9M, J2A, 9VG84, VIP42, WLO
2211	22381.5	22289.5	HEC52, XSQ, CBV
2212	22382.0	22290.0	OST77, NRV, NMF
2213	22382.5	22290.5	UAT, KPH
2214	22383.0	22291.0	PCH76, VIS71
2215	22383.5	22291.5	DCM, 9MG, WLO
2216	22384.0	22292.0	VWM, JCK, JDB, JOR, JOS,JOU, JSM
2217	22384.5	22292.5	KLC
2218	22385.0	22293.0	OZX
2219	22385.5	22293.5	WNU
2220	22386.0	22294.0	EDK7, NMC
2221	22386.5	22294.5	WCC
2222	22387.0	22295.0	3AC, 3AF, TAH, TAN, HZG, XSG, KLC
2223	22387.5	22295.5	SVT7
2224	22388.0	22296.0	
2225	22388.5	22296.5	
2226	22389.0	22297.0	9VG98, CLA, CLT
2227	22389.5	22297.5	NMO, NMN
2228	22390.0	22298.0	
2229	22390.5	22298.5	FFT92, PPR
2230	22391.0	22299.0	DCL
2231	22391.5	22299.5	VAI, HPP
2232	22392.0	22300.0	
2233	22392.5	22300.5	
2234	22393.0	22301.0	GKP7
2235	22393.5	22301.5	UDE, UFB

22 MHz - DUPLEX (con't)

TELEX CHANNEL	SHIP RECEIVE	SHIP TRANSMIT	USE
2236	22394.0	22302.0	OZX, CLA, CLT
2237	22394.5	22302.5	
2238	22395.0	22303.0	KPH, LSD836
2239	22395.5	22303.5	7TK28
2240	22396.0	22304.0	DHS, EDL7, KLB
2241	22396.5	22304.5	LSD836
2242	22397.0	22305.0	
2243	22397.5	22305.5	HPP
2244	22398.0	22306.0	IAR, LSD836
2245	22398.5	22306.5	
2246	22399.0	22307.0	A9M
2247	22399.5	22307.5	
2248	22400.0	22308.0	KLC
2249	22400.5	22308.5	SVU7
2250	22401.0	22309.0	HEC62
2251	22401.5	22309.5	
2252	22402.0	22310.0	WNU
2253	22402.5	22310.5	
2254	22403.0	22311.0	WLO
2255	22403.5	22311.5	HEC72
2256	22404.0	22312.0	WLO
2257	22404.5	22312.5	DCF, WNU
2258	22405.0	22313.0	GKY7, VCS
2259	22405.5	22313.5	OZX
2260	22406.0	22314.0	WLO
2261	22406.5	22314.5	CUL
2262	22407.0	22315.0	ICB, WLO
2263	22407.5	22315.5	
2264	22408.0	22316.0	ZSC65, XSG
2265	22408.5	22316.5	
2266	22409.0	22317.0	GKQ7, SPA95
2267	22409.5	22317.5	
2268	22410.0	22318.0	
2269	22410.5	22318.5	
2270	22411.0	22319.0	
2271	22411.5	22319.5	
2272	22412.0	22320.0	
2273	22412.5	22320.5	
2274	22413.0	22321.0	
2275	22413.5	22321.5	
2276	22414.0	22322.0	
2277	22414.5	22322.5	
2278	22415.0	22323.0	
2279	22415.5	22323.5	
2280	22416.0	22324.0	
2281	22416.5	22324.5	
2282	22417.0	22325.0	
2283	22417.5	22325.5	

TELEX CHANNEL	SHIP RECEIVE	SHIP TRANSMIT	USE

22 MHz - DUPLEX (con't)

2284	22418.0	22326.0	
2285	22418.5	22326.5	
2286	22419.0	22327.0	
2287	22419.5	22327.5	
2288	22420.0	22328.0	
2289	22420.5	22328.5	
2290	22421.0	22329.0	
2291	22421.5	22329.5	
2292	22422.0	22330.0	
2293	22422.5	22330.5	
2294	22423.0	22331.0	
2295	22423.5	22331.5	
2296	22424.0	22332.0	
2297	22424.5	22332.5	
2298	22425.0	22333.0	
2299	22425.5	22333.5	
2300	22426.0	22334.0	
2301	22426.5	22334.5	
2302	22427.0	22335.0	
2303	22427.5	22335.5	
2304	22428.0	22336.0	
2305	22428.5	22336.5	
2306	22429.0	22337.0	
2307	22429.5	22337.5	
2308	22430.0	22338.0	
2309	22430.5	22338.5	
2310	22431.0	22339.0	
2311	22431.5	22339.5	
2312	22432.0	22340.0	
2313	22432.5	22340.5	
2314	22433.0	22341.0	
2315	22433.5	22341.5	
2316	22434.0	22342.0	
2317	22434.5	22342.5	
2318	22435.0	22343.0	
2319	22435.5	22343.5	
2320	22436.0	22344.0	
2321	22436.5	22344.5	
2322	22437.0	22345.0	
2323	22437.5	22345.5	
2324	22438.0	22346.0	
2325	22438.5	22346.5	
2326	22439.0	22347.0	
2327	22439.5	22347.5	
2328	22440.0	22348.0	
2329	22440.5	22348.5	
2330	22441.0	22349.0	
2331	22441.5	22349.5	
2332	22442.0	22350.0	
2333	22442.5	22350.5	

22 MHz - DUPLEX (con't)

TELEX CHANNEL	SHIP RECEIVE	SHIP TRANSMIT	USE
2334	22443.0	22351.0	
2335	22443.5	22351.5	
2371	22352.0	22352.0	
2372	22352.5	22352.5	
2373	22353.0	22353.0	
2374	22353.5	22353.5	
2375	22354.0	22354.0	
2376	22354.5	22354.5	
2377	22355.0	22355.0	
2378	22355.5	22355.5	
2379	22356.0	22356.0	
2380	22356.5	22356.5	
2381	22357.0	22357.0	
2382	22357.5	22357.5	
2383	22358.0	22358.0	
2384	22358.5	22358.5	
2385	22359.0	22359.0	
2386	22359.5	22359.5	
2387	22360.0	22360.0	
2388	22360.5	22360.5	
2389	22361.0	22361.0	
2390	22361.5	22361.5	
2391	22362.0	22362.0	
2392	22362.5	22362.5	
2393	22363.0	22363.0	
2394	22363.5	22363.5	
2395	22364.0	22364.0	
2396	22364.5	22364.5	
2397	22365.0	22365.0	
2398	22365.5	22365.5	
2399	22366.0	22366.0	
2400	22366.5	22366.5	
2401	22367.0	22367.0	
2402	22367.5	22367.5	
2403	22368.0	22368.0	
2404	22368.5	22368.5	
2405	22369.0	22369.0	
2406	22369.5	22369.5	
2407	22370.0	22370.0	
2408	22370.5	22370.5	
2409	22371.0	22371.0	
2410	22371.5	22371.5	
2411	22372.0	22372.0	
2412	22372.5	22372.5	
2413	22373.0	22373.0	
2414	22373.5	22373.5	
2415	22374.0	22374.0	

TELEX CHANNEL	SHIP RECEIVE	SHIP TRANSMIT	USE
		25 MHz - DUPLEX	
2501	26101.0	25173.0	WLO
2502	26101.5	25173.5	OZX
2503	26102.0	25174.0	
2504	26102.5	25174.5	
2505	26103.0	25175.0	
2506	26103.5	25175.5	
2507	26104.0	25176.0	LFZ2
2508	26104.5	25176.5	
2509	26105.0	25177.0	
2510	26105.5	25177.5	
2511	26106.0	25178.0	
2512	26106.5	25178.5	
2513	26107.0	25179.0	
2514	26107.5	25179.5	
2515	26108.0	25180.0	
2516	26108.5	25180.5	
2517	26109.0	25181.0	
2518	26109.5	25181.5	
2519	26110.0	25182.0	
2520	26110.5	25182.5	
2521	26111.0	25183.0	
2522	26111.5	25183.5	
2523	26112.0	25184.0	
2524	26112.5	25184.5	
2525	26113.0	25185.0	
2526	26113.5	25185.5	
2527	26114.0	25186.0	
2528	26114.5	25186.5	
2529	26115.0	25187.0	
2530	26115.5	25187.5	
2531	26116.0	25188.0	
2532	26116.5	25188.5	
2533	26117.0	25189.0	
2534	26117.5	25189.5	
2535	26118.0	25190.0	
2536	26118.5	25190.5	
2537	26119.0	25191.0	
2538	26119.5	25191.5	
2539	26120.0	25192.0	
2540	26120.5	25192.5	
2571	25193.0	25193.0	
2572	25193.5	25193.5	
2573	25194.0	25194.0	
2574	25194.5	25194.5	
2575	25195.0	25195.0	
2576	25195.5	25195.5	
2577	25196.0	25196.0	
2578	25196.5	25196.5	
2579	25197.0	25197.0	
2580	25197.5	25197.5	

25 MHz - DUPLEX (con't)

TELEX CHANNEL	SHIP RECEIVE	SHIP TRANSMIT	USE
2581	25198.0	25198.0	
2582	25198.5	25198.5	
2583	25199.0	25199.0	
2584	25199.5	25199.5	
2585	25200.0	25200.0	
2586	25200.5	25200.5	
2587	25201.0	25201.0	
2588	25201.5	25201.5	
2589	25202.0	25202.0	
2590	25202.5	25202.5	
2591	25203.0	25203.0	
2592	25203.5	25203.5	
2593	25204.0	25204.0	
2594	25204.5	25204.5	
2595	25205.0	25205.0	
2596	25205.5	25205.5	
2597	25206.0	25206.0	
2598	25206.5	25206.5	
2599	25207.0	25207.0	
2600	25207.5	25207.5	
2601	25208.0	25208.0	

3.5 CAUTION! FREQUENCY TOLERANCE

Under FCC Rules, the frequency tolerance for the Marine Service is ± 10 Hz. In order to achieve this accuracy, a frequency counter with a long-term accuracy of 1-2 Hertz should be used.

All work affecting the transmitter performance must be done by, or under the supervision of, a person holding at least a General Radiotelephone FCC license.

3.6 SETTING THE TRANSMITTER FREQUENCIES

3.6.1 THE MASTER CLOCK OSCILLATOR

Select the highest desired transmitter frequency (such as 25083.0 KHz). With the transmitter output connected to an appropriate dummy load and a few watts of re-inserted carrier being generated, connect an appropriate counter to the RF dummy load and adjust trimmer capacitor C2 on the transceiver main board (ASY-0330-01) for the correct carrier frequency. C2 is located next to the crystal oven (OV-1) on the -01 PC assembly.

To get carrier for adjusting the output frequency:

1. Enter the program mode by pressing "AUX" "8".
2. At the "CH?" prompt, select a channel between 10 and 49 that is not programmed with information.
3. Enter a transmit frequency of 25100.0 KHz.
4. Enter a receive frequency of 25100.0 KHz. You MUST enter the frequency, DO NOT just press the "ENT" key.
5. At the "R3E" prompt, press "1" to transmit a carrier.
6. Press the MODE key to exit the program mode after the "StorEd" prompt appears.
7. When this channel is recalled, you will transmit approx. 5 watts of carrier at the frequency of 25100.0 KHz.
8. Be sure to erase this channel when done. See section 3.3.2

4. INSTALLATION

4.1 MOUNTING THE TRANSCEIVER

The SEA 330 transceiver unit is compact enough to allow great flexibility in location, even on smaller vessels. Several options for mounting are available. The mounting bracket fits underneath or on top of the transceiver for bulkhead, overhead or shelf locations. Figure 4.1 shows the outline dimensions of the SEA 330 transceiver and mounting bracket. The bracket can be used as a template to locate the mounting holes. When choosing a location for the transceiver, take care to avoid areas directly over a heater or lacking adequate ventilation. If the transceiver is mounted in a closet, insure that it is located in a dry environment, where such items as raingear will not be hung above it or piled on it.

Take care not to block air flow over the heat sink cooling fins, since this can cause overheating and resultant thermal shutdown of the transmitter.

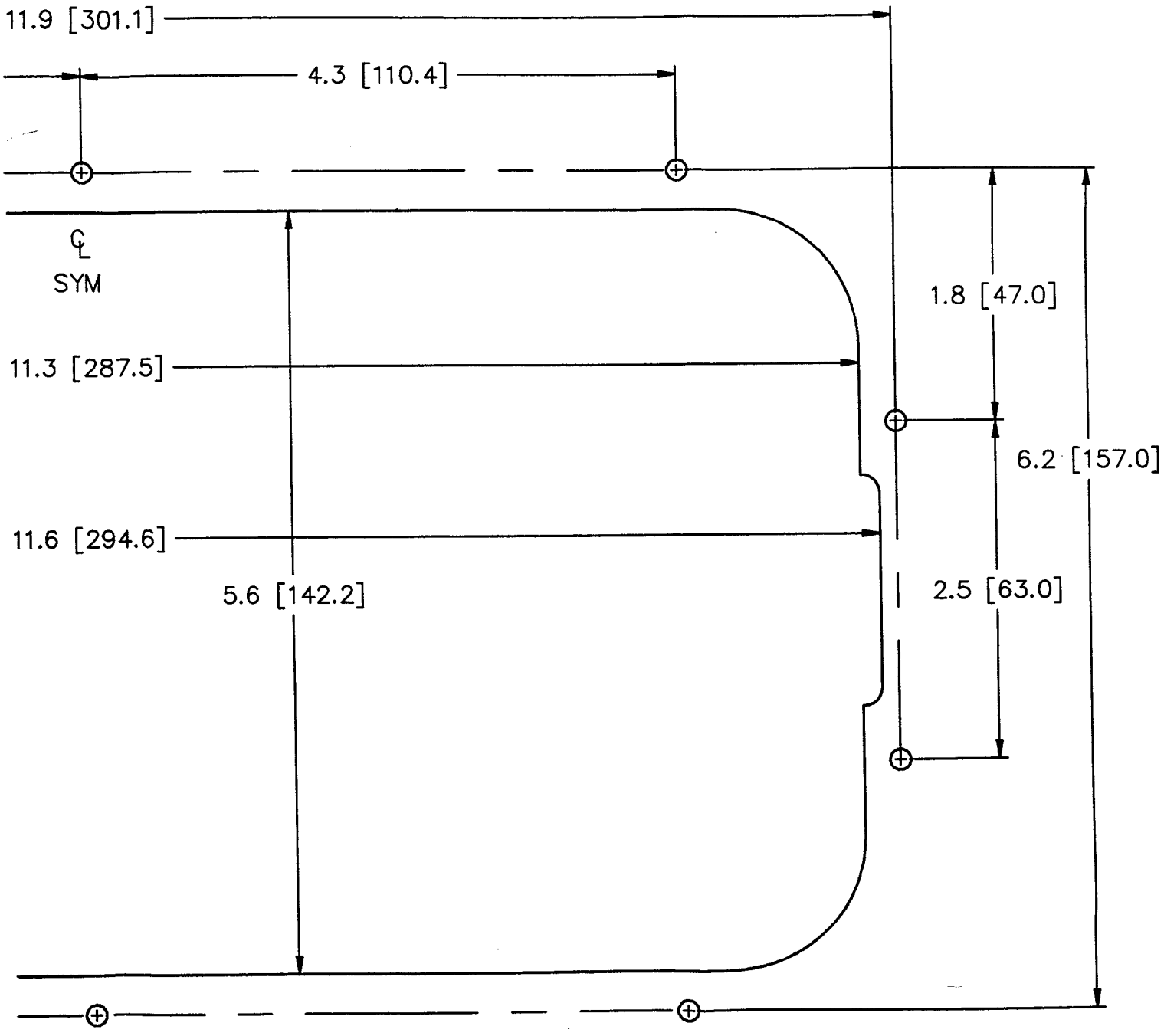
4.2 MOUNTING THE CONTROLLER

The controller may be mounted at the operator's station using either the standard gimbal mount or bulkhead mounting plates. Both are supplied with the controller. The gimbal bracket or bulkhead plates can be used as drilling and cutting templates to insure correct fit. Figure 4.1 shows the outline dimensions of the controller and bracket.

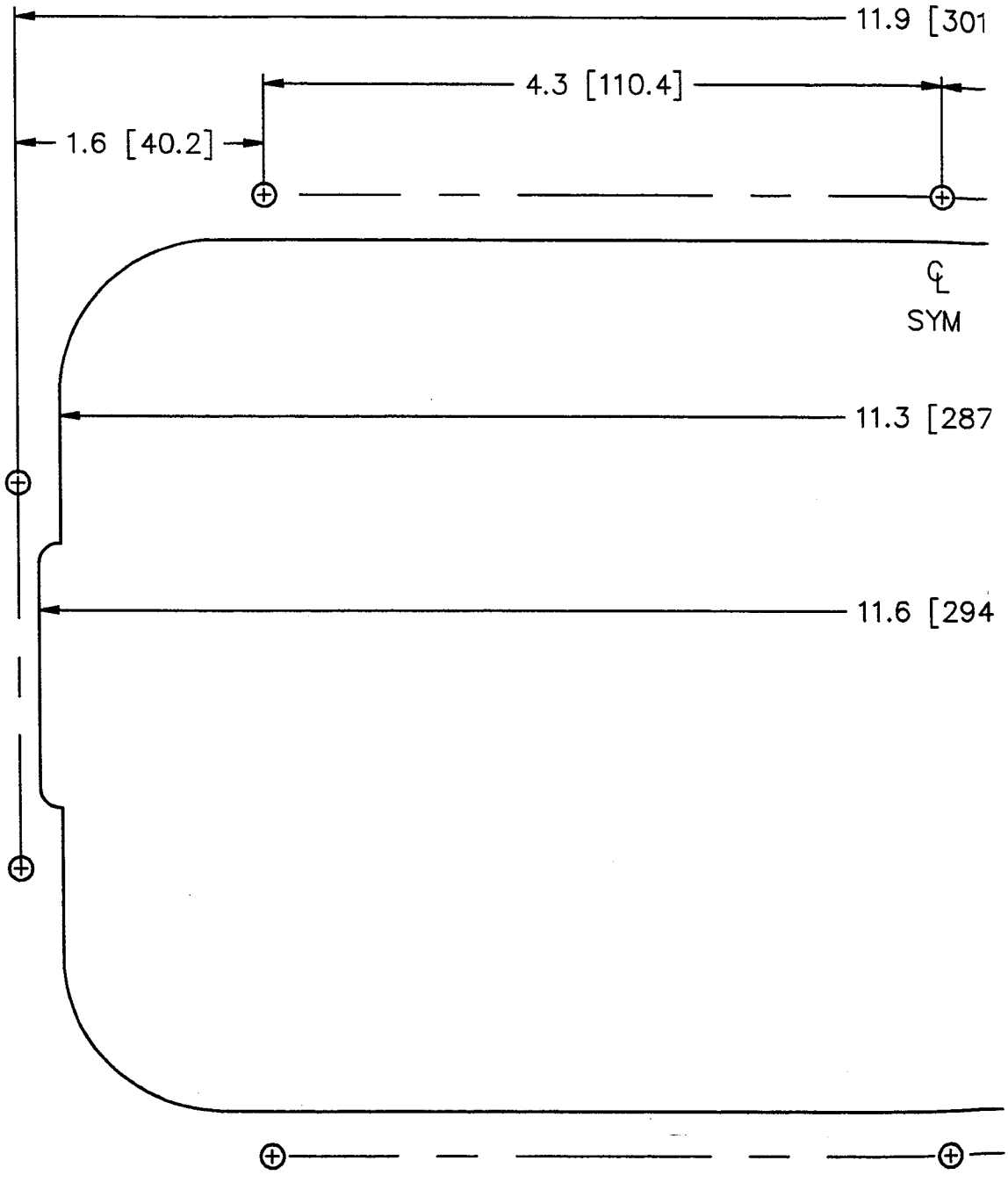
4.3 A TYPICAL INSTALLATION

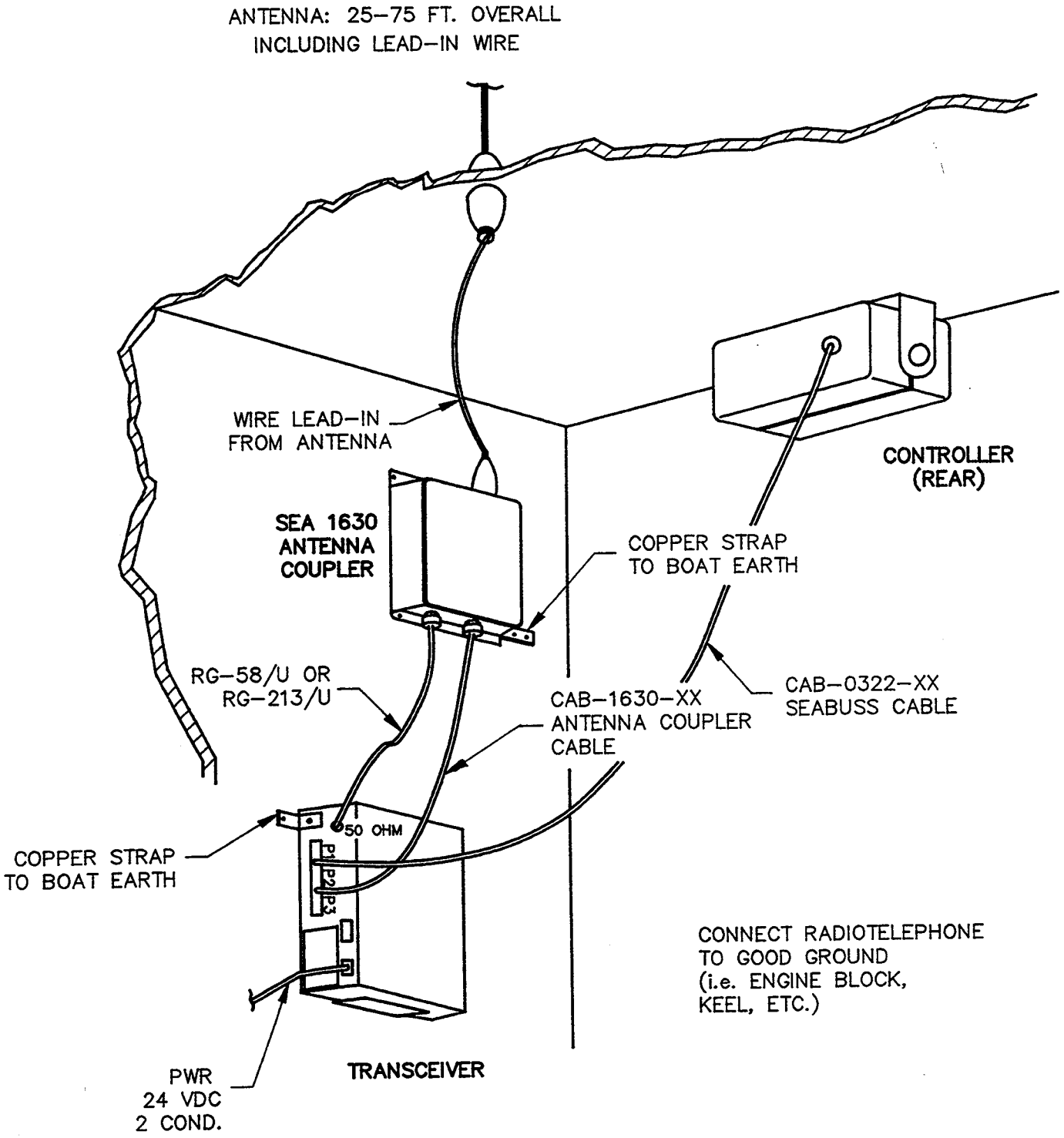
Figure 4.3 shows a typical installation consisting of five parts: (1) the transceiver unit; (2) the controller unit; (3) the antenna coupler; (4) system interconnection cables; (5) the antenna system.

Any radio communications system operating in the MF-HF spectrum MUST have an adequate ground connection, otherwise the overall efficiency of the radio installation is degraded. In extreme cases, it may be impossible to properly load the radiotelephone into the antenna.



SEA 330 CONTROLLER
CUTTING AND DRILLING DIMENSIONS
BULKHEAD MOUNTING TEMPLATE
FIGURE 4.2


11.9 [301
4.3 [110.4]
1.6 [40.2]
℄
SYM
11.3 [287
11.6 [294



SEA 330
TYPICAL INSTALLATION
FIGURE 4.3

The 50 Ohm output impedance of the SEA 330 makes it necessary to employ an antenna system of the resonant or externally matched type. The use of the SEA 1630 antenna coupler in conjunction with a whip antenna allows an efficient installation which will cover both the MF and HF bands. The SEA 1630 was designed specifically for Marine applications and will easily interface with the transceiver.

On wooden or fiberglass boats, the use of a copper ground plate may be necessary. On sailboats, the keel may perform adequately as a ground system. In any case, the ground system MUST be joined to the antenna coupler with a heavy copper strap.

4.4 TRANSCEIVER UNIT REAR PANEL CONNECTION AND FUSES

4.4.1 THE POWER CONNECTOR

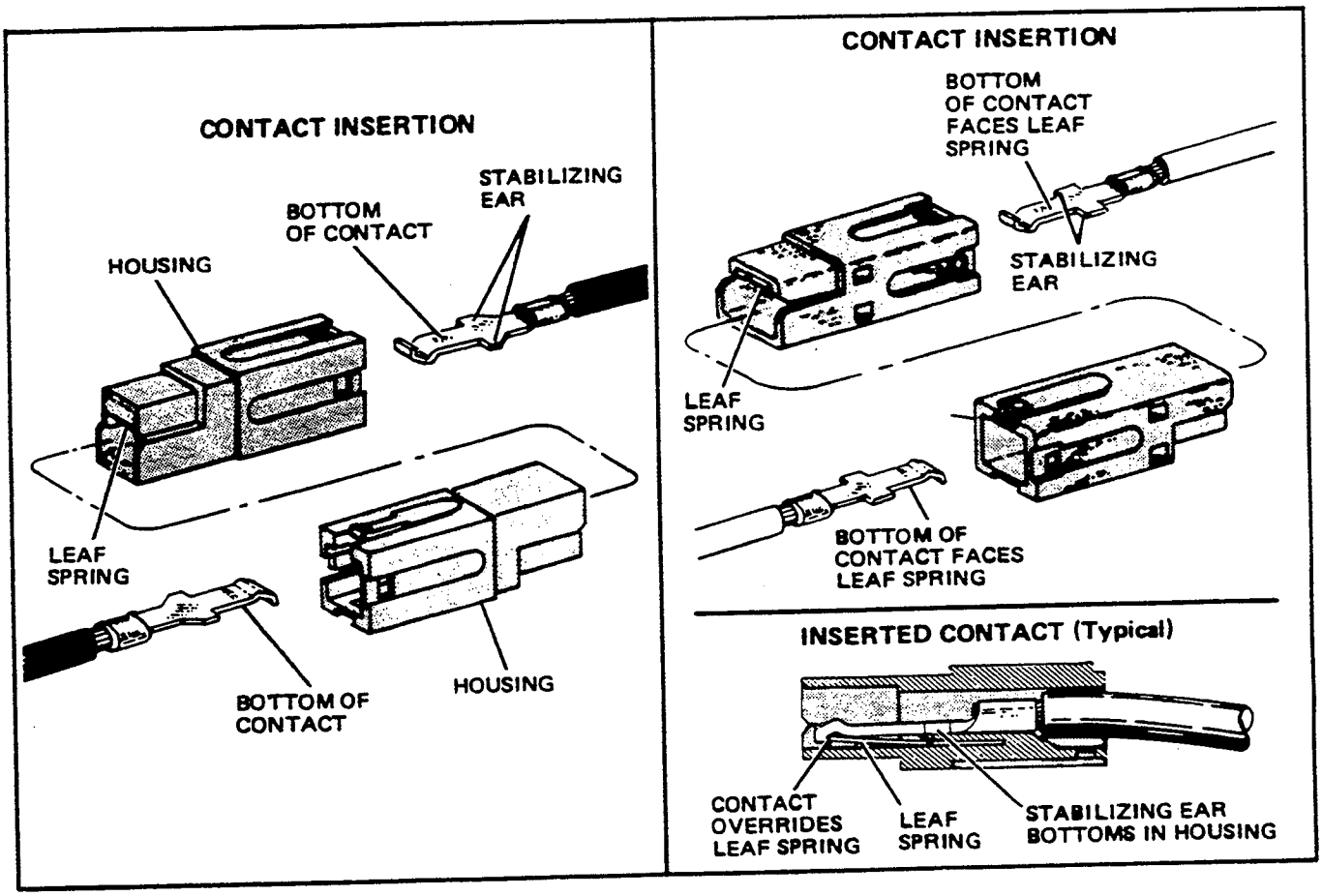
A heavy-duty power plug is used on the SEA 330 to assure minimum voltage drop in the primary power circuit. See Figure 4.4.1 for proper assembly of the power plug.

4.4.2 THE RF CONNECTOR

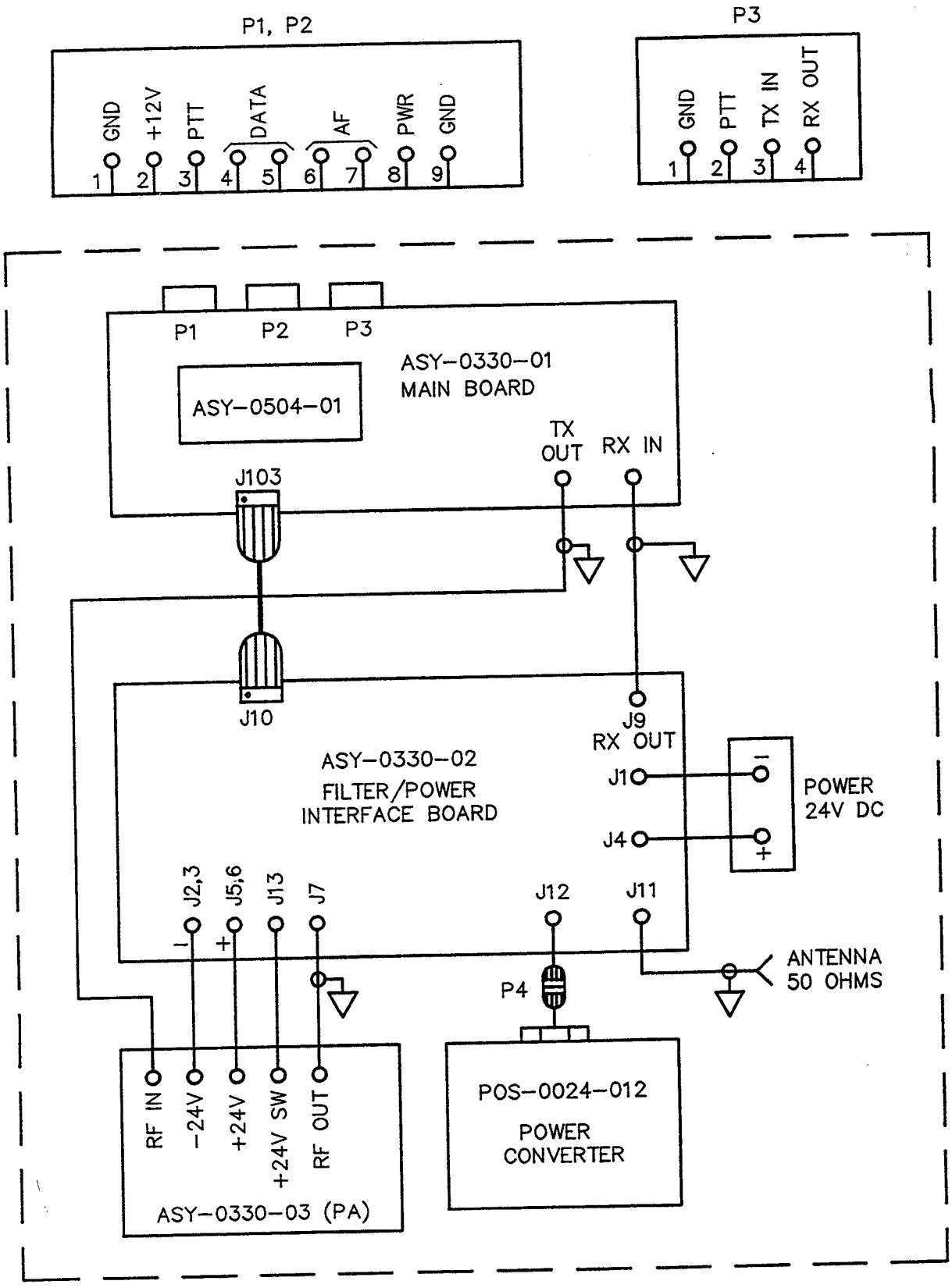
One type UHF female connector is provided on the SEA 330 rear panel. The output impedance of this transceiver is 50 Ohms. The most common types of coaxial cables used are RG-58C/U and RG-213/U. The correct mating plug is the PL-259 or Amphenol 83-1SP.

4.4.3 THE SEABUSS INTERFACE CONNECTORS

Two nine-contact screw terminal-type plugs are provided on the SEA 330 transceiver rear panel (See Figure 4.1 and the Transceiver Wiring Diagram, Figure 4.4.3). These provide interconnection with the system peripherals and are labelled P1 and P2. Either or both may be used to connect the system peripherals, since all contacts are directly in parallel. Up to a total of four peripherals and 150 feet of control cable can be supported by the system. Connection of more than one peripheral to either or both P1 and P2 is permitted, as is a "daisy chain" connection system, where peripherals are linked end to end.



POWER PLUG ASSEMBLY
FIGURE 4.4.1



SEA 330
TRANSCEIVER WIRING DIAGRAM
FIGURE 4.4.3

4.4.4 THE ANTENNA COUPLER INTERFACE CONNECTOR

In order to prevent feedback problems, the SEABUSS interconnection between the transceiver unit and the antenna coupler (SEA 1630) does NOT connect the balanced audio lines or the "PWR" line. Additionally, each conductor is isolated at both the transceiver and antenna coupler end by ferrite beads (See figure 4.4.4). Special antenna coupler cable is available from SEA. Order CAB-1630-XXX (XXX represents cable length). An installation kit of 10 ferrite beads (SEA PN# FER-0005-001) is included with the SEA 1630.

4.4.5 THE CONTROLLER INTERFACE CONNECTOR

The controller cable interface connector is located inside the plastic housing, immediately above the loudspeaker. To gain access to this connector, the 6 retaining screws must be removed, allowing the two halves of the controller enclosure to be separated. The connector is a 9-terminal screw type located on the printed circuit board immediately above the loudspeaker. See Figure 4.4.5. Cabling is connected pin to pin between the controller and the transceiver unit. That is, pin 1 on the controller connects to pin 1 on the transceiver, etc. Cable entry into the plastic housing is through the watertight stuffing gland on the rear of the housing.

4.4.5.1 INTERFACE CABLE TERMINAL FUNCTIONS

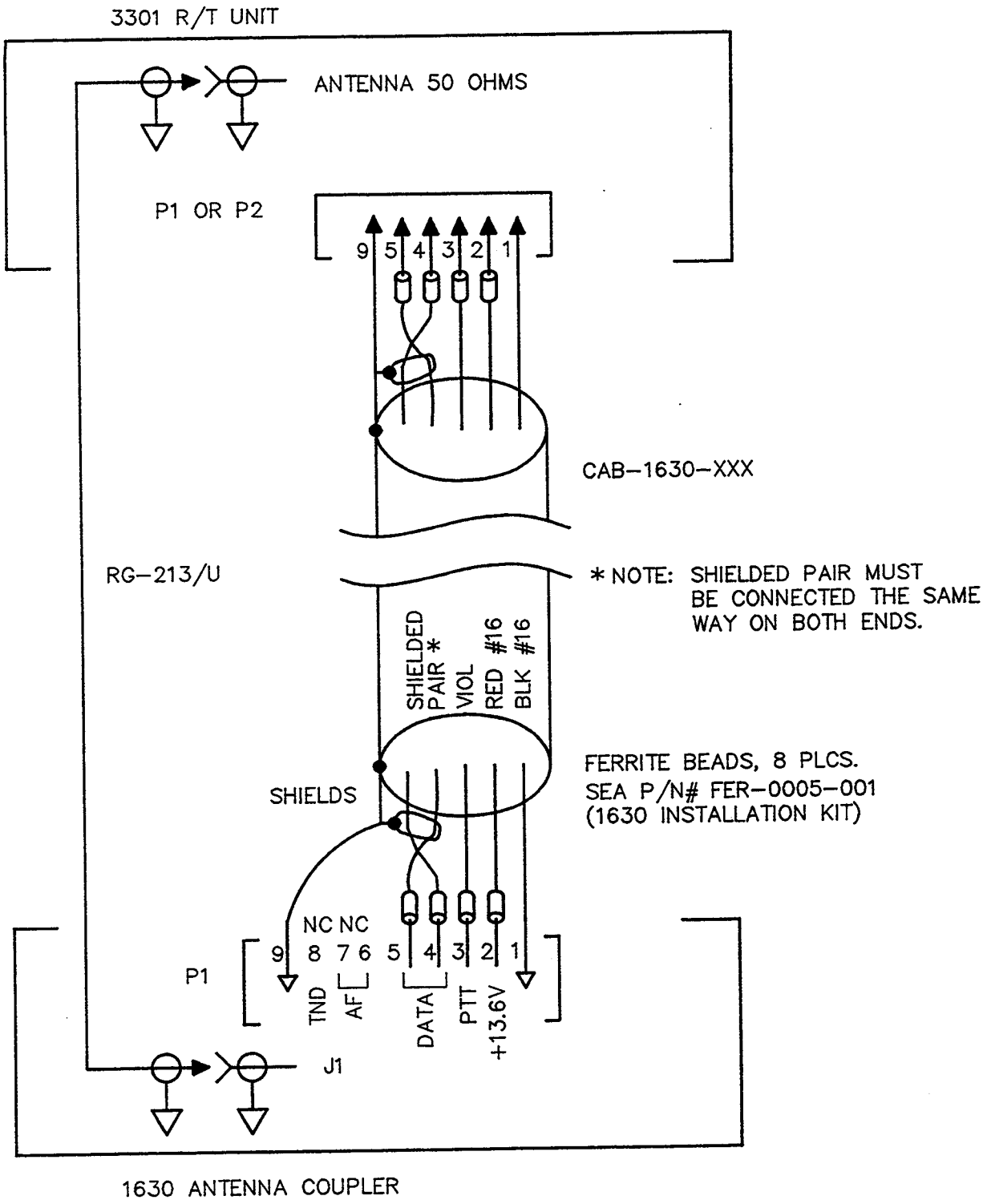
Pins 1 and 9 - System common ground. Used for D.C. Power return and termination of shield braides.

Pin 2 - 13.6 Volts switched from transceiver to controller.

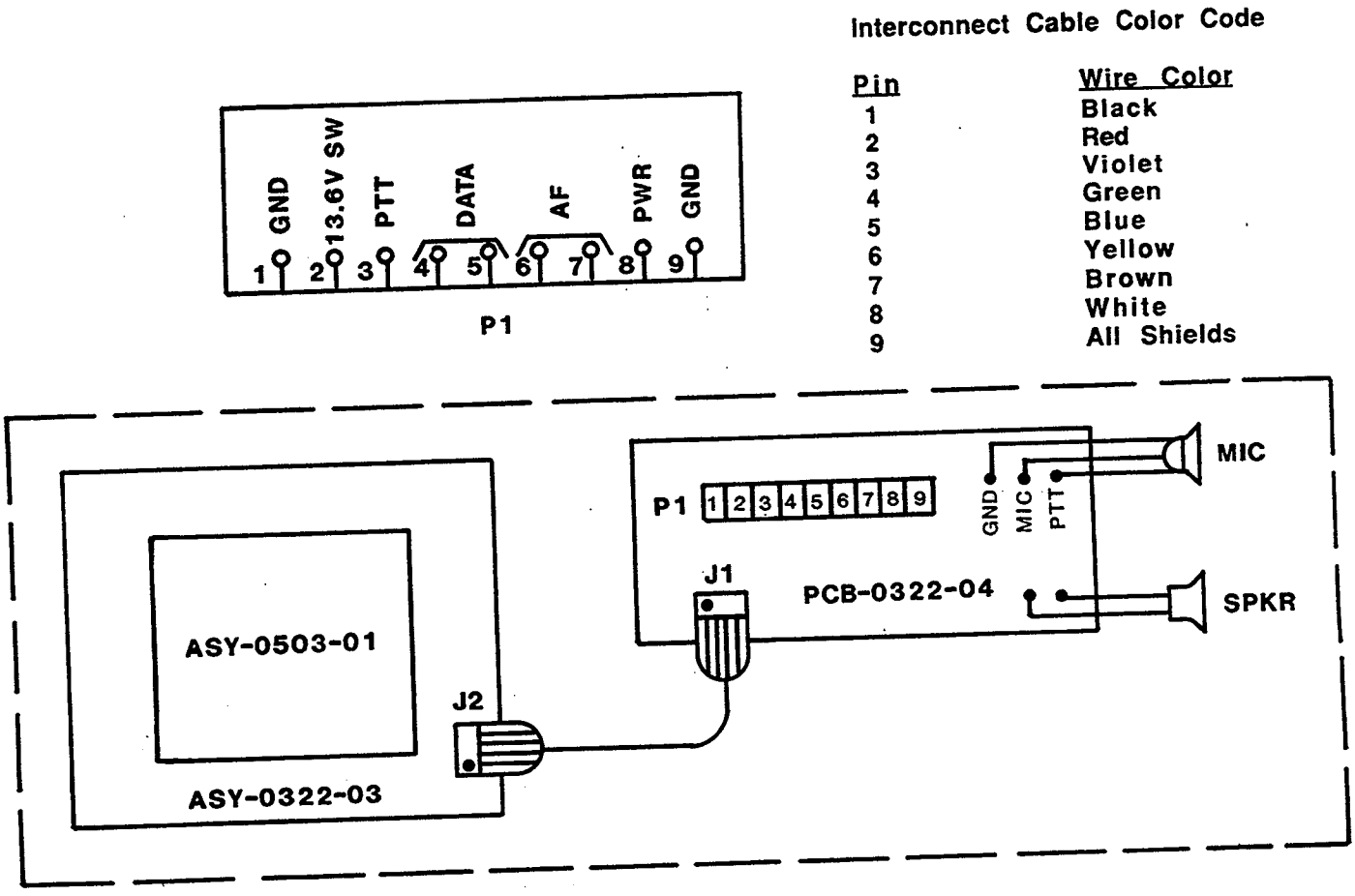
Pin 3 - PTT line for radiotelephone. Connecting this terminal to ground places the radiotelephone in the TRANSMIT mode.

Pins 4 and 5 - Balanced data lines. Approximately RS485 format, differential logic. Use a twisted pair, preferably individually shielded.

Pins 6 and 7 - Balanced, bidirectional audio lines. Nominal audio level is approximately 1 volt peak to peak. Use a twisted



SEA 330/SEA 1630
INTERCONNECT WIRING DIAGRAM
FIGURE 4.4.4



SEA 330
WIRING DIAGRAM
FIGURE 4.4.5

pair, preferably individually shielded. NOTE: This pair is not used for antenna coupler interconnection.

Pin 8 - PWR buss. This is the ON-OFF control line from the controller to the radiotelephone relay control circuitry. Momentarily grounding this line will "toggle" the power controller to its opposite state. NOTE: This conductor is not used for antenna coupler interconnection.

NOTE: THE USE OF SEA CABLE PN# CAB-0322-XXX IS RECOMMENDED FOR INTERCONNECTION OF THE SEA 330 TRANSCEIVER AND CONTROLLERS. FOR INTERCONNECTION BETWEEN THE SEA 330 TRANSCEIVER AND THE SEA 1630 ANTENNA COUPLER, THE USE OF CABLE PN# CAB-1630-XXX IS RECOMMENDED.

4.4.5.2 ACCESSORY INTERFACE PLUG

A four-contact screw terminal type plug, P3, is provided on the transceiver unit to allow interconnection with such accessories as the NECODE system. See Figure 4.4.3. P3 provides the following connections:

Pin 1 - System ground return.

Pin 2 - Radiotelephone PTT line. Grounding this terminal places the radiotelephone in the TRANSMIT mode.

Pin 3 - Tx audio input. Approximately 1 volt, peak-to-peak for full output power.

Pin 4 - Low-level receiver audio output. Single-ended at approximately .5 volt, peak-to-peak with 1uv input. Allows interconnection of accessories, such as NECODE, etc.

4.4.6 FUSING

Eight fuses are provided in the SEA 330, all mounted internally on either the Filter Board (ASY-0330-02) or the Power Amplifier Board (ASY-0330-03).

On the Filter Board, fuses F1 and F2 are 25 AMP, AGC fuses. Each fuse protects one side of the input power line. Reverse polarity protection is provided by diode CR8.

Fuse F3 is a 5 AMP, AGC fuse. This fuse protects the 24-12 Volt power converter module. Note that the power converter module (PC-1) provides up to 5 amps of regulated +12 Volt power for the low-level circuitry in the SEA 330 radiotelephone system. The power converter is internally fused and F3 is sufficiently lower in rating than the internal fuse to assure that F3 will fail first in an overload condition. If F3 fails, and replacement does not restore normal operation of the power converter, the internal fuse should be checked.

Fuse F4 is a 5 Amp, AGC fuse. This fuse protects the +24 V Tx line and Q1.

On the Power Amplifier Board, Fuse F1 is a 2 Amp, AGC fuse. This fuse protects the predriver transistor, Q3. Fuse F2 is a 5 Amp, AGC fuse which protects the driver transistors. Fuses F3 and F4 individually fuse the two power amplifier transistor pairs.

4.4.7 THE GROUND CONNECTION

A stainless steel bolt and nut are provided on the rear panel to allow a low-resistance connection between the radiotelephone chassis and the engine block, keel or similar RF ground system.

5. THEORY OF OPERATION

5.1 GENERAL

The SEA 330 is a double-conversion HF SSB transceiver. Certain circuits perform the same function in receive and transmit (bilateral design). The first intermediate frequency (IF) is 70 MHz and permits the use of low-pass filters to provide excellent image, spurious and harmonic rejection. This type of broad-band design results in a minimum of tuned circuits. The second IF of 10.7 MHz allows for good secondary image rejection and the use of relatively inexpensive crystal filters for sideband selection.

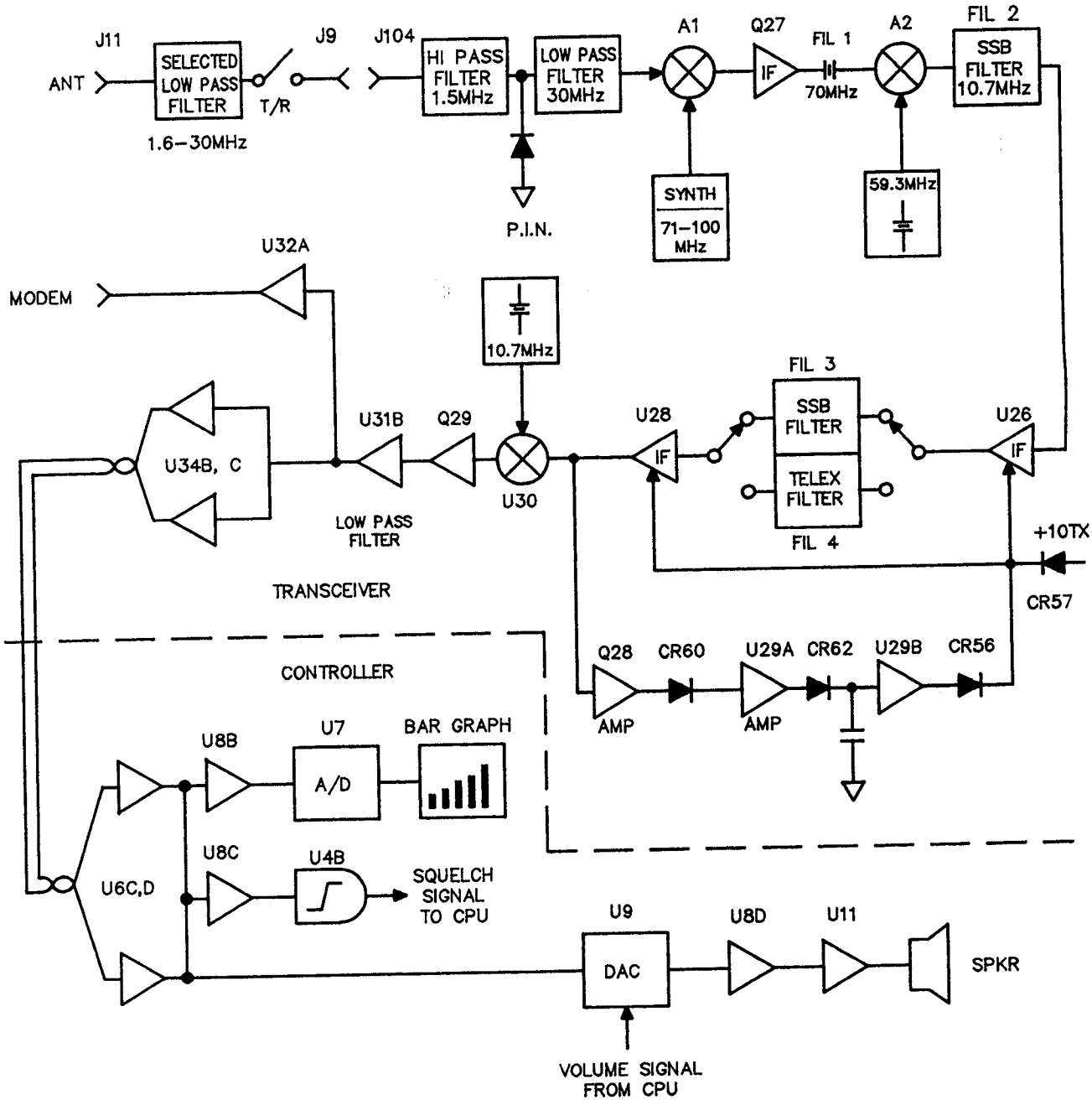
The SEA 330 uses a unique multi-loop PLL local oscillator system to allow complete frequency coverage without the addition of channel control crystals. Since the high-stability reference oscillators are all phase-locked to a high-stability reference oscillator, the frequency stability is strictly a function of the 10240.00 KHz Master Clock.

Most operating functions of the SEA 330 are controlled through the controller keyboard. The keyboard is used, along with the custom LCD display, as a control terminal. This allows the operator to communicate with the small microprocessor based computer which actually controls the various transceiver functions.

5.2 THE RECEIVER

5.2.1 BLOCK DIAGRAM

Figure 5.2.1 shows the block diagram of the receive mode. The received RF signal is routed from the rear panel antenna jack to J11 on the Filter Board. On this PC Board, the signal is routed through a relay selected set of low-pass filters and the antenna relays, K1 and K2, to J9. From J9 the signal goes to the RX input jack on the Main Board, J104. From J104, the signal passes first through a 1.5 MHz high-pass filter, and then through a P.I.N. Protector Circuit. A second low-pass filter with a cutoff frequency of 30 MHz completes the "front end" selectivity. No less than two cascaded filters are used, providing excellent image and first IF rejection.



SEA 330
RECEIVER BLOCK DIAGRAM
FIGURE 5.2.1

After filtering, the signal is applied to mixer, A1, where it is mixed with a signal from the VCO and up converted to the first IF frequency of 70 MHz. The output from A1 is then passed through Q27, a bilateral wideband amplifier and a crystal bandpass filter, FIL 1. The filter passband is approximately 15 KHz wide, and constitutes the "topping filter."

The filtered and amplified first IF signal is combined in mixer A2 with a 59.3 MHz signal from VCXO Q3 to provide the second IF signal of 10.7 MHz. The second IF signal is then passed through FL2, a six-pole single-sideband filter. Note that the 10.7 MHz filter normally selects the LOWER sideband. This is actually the UPPER sideband because of the frequency inversion which occurred at the first mixer. The filtered signal is then amplified in IF amplifier U26 and further filtered in either a four-pole SSB filter, FIL 3, or a four-pole TELEX filter, FIL 4. A second IF amplifier stage, U28, provides extra signal conditioning and enhances receiver AGC range.

The IF signal from U28 is split and sent to both the product detector and AGC IF amplifier.

The product detector, U30, converts the IF signal to audio by mixing it with a signal from the carrier oscillator VCXO, Q1. The recovered audio is buffered by emitter follower Q29, filtered by active filter U31b and then passed through analog gate U33a to the SEABUSS audio line driver, U34, and the MODEM buffer U32a.

The AGC IF amplifier, Q28, provides sufficient signal to drive the AGC detector diode, CR60. The resulting detected envelope signal from CR60 is level-shifted by biasing the secondary of T13 and the composite signal is buffered by AGC amplifier U29a.

The output of U29a is then applied to the fast-attack, slow-release AGC circuitry. This consists of diodes CR61, CR62, the charge limit resistor, R189, and capacitor C213. AGC hold time is a function of either R105 (slow) or R106 (fast). Selection is made through D/A converter U20.

The AGC signal is applied through follower U29b and CR56 to the AGC ports of the two IF amplifiers. Rapid T/R switching of

the IF amplifier system is accomplished by steering the +10 VTx buss onto the AGC buss through CR57.

At the controller, the balanced audio signal is passed through the line receiver circuitry, consisting of U6C and U6D. The resultant single-ended audio signal is then routed to the volume control circuitry, the bar graph A to D converter and the squelch limiter.

The volume control circuitry consists of U9, a DAC832. This is a D to A converter, which is used as a combination volume control and squelch gate. The attenuation level in U9 is a function of the status of the squelch routine running in the controller CPU and the volume level demanded by the operator through the volume keys on the controller keypad.

The bar graph circuitry consists of a peak detector formed by diodes CR5 and CR6. The DC output from the detector is buffered by U8B and applied to the input of U7, an A to D converter. The output from U7 is serially transmitted to the controller CPU, which uses the data to adjust the level of the bar graph on the LCD display. The resultant VU meter is approximately logarithmic with a dynamic range of approximately 40 dB.

The squelch limiter consists of amplifier U8C, which is coupled through R46 to NAND gate U4B. The output of U4B, which is heavily limited audio, is then applied to the timer input of the controller CPU board.

The squelch and volume controlled audio from U9 is then passed through buffer amplifier U8D to the input of the 5 watt power amplifier, U11. U11 provides the loudspeaker signal.

5.3 RECEIVE RF CIRCUITRY AND FIRST MIXER

As previously discussed, an incoming signal is first passed through a system of cascaded low and high pass filters, a T/R relay and a P.I.N. diode device which is designed to protect the sensitive input mixer from damage due to high RF overloads. On the RF board, switching diodes CR35 and CR36 are forward biased by the +10V Rx buss, thus passing the received signal to the double balanced mixer A1. The use of a hot carrier diode

double balanced mixer assures minimal cross-modulation and intermodulation distortion in the receiver front end. The 1.5 MHz high-pass filter provides some protection from the very large signals generated by nearby standard broadcast transmitters.

5.3.1 THE BILATERAL 70 MHz WIDEBAND IF AMPLIFIER

The output from A1 is a band of signals, which include the desired signal. A bandpass amplifier/filter is used to properly terminate the IF port of the mixer, provide a low-noise, high dynamic range 70 MHz amplifier stage and a 70 MHz topping filter. The amplifier/filter circuitry, consisting of Q27, T10, FIL 1 and the "L" network L29/C171, is operated bilaterally through the use of P.I.N. Diodes CR38 through CR43, along with CR63 and CR64. These diode switches effectively reverse the direction of signal flow in the amplifier/filter circuit when switched between receive and transmit operation. Switching is accomplished by the +10 VRx and +10 VTx busses.

5.3.2 SECOND MIXER AND 10.7 MHz SSB FILTER

Once the 70 MHz IF signal is amplified in Q27, it is applied to the second double balanced mixer, A2, along with the VCXO signal at 59.3 MHz. The DIFFERENCE frequency output, at 10.7 MHz, is then passed through FIL2, a narrow-bandwidth lower sideband filter. The LOWER sideband at this point is equivalent to a signal frequency UPPER sideband signal, since the first conversion INVERTS the information band, while the SECOND conversion to 10.7 MHz does not.

5.3.3 10.7 MHz IF AMPLIFIER AND PRODUCT DETECTOR

The twice converted, amplified and filtered signal from the 10.7 MHz filter (FIL 2) is then passed through the second IF amplifier. This stage uses the MC1350P. This device has high gain and an excellent, temperature stable AGC function which can provide approximately 50 dB of automatic gain control. The amplified IF signal is then passed through either FIL 3 (SSB) or FIL 4 (TELEX). The filter selected is a complex function of operating mode and function. Filter switching is accomplished by an array of P.I.N. Diodes, which are in turn controlled by driver chip U23.

The output from the selected filter is then further amplified by the third IF amplifier, U28. This is another MC1350P. The use of two cascaded IF stages provides an AGC range in excess of 100 dB. The output of the IF strip is transformer-coupled to both the signal detector, U30, and the AGC IF amplifier, Q28. U30 acts as both a balanced product detector during receive and a balanced modulator for transmitter operation. Q28 is a tuned IF amplifier, which provides sufficient signal to operate the AGC detector diode CR60.

5.3.4 RECEIVER AGC SYSTEM

The SEA 330 receiver AGC circuitry makes use of advanced techniques to provide both fast and slow hold time constants, together with a fast attack time, flat gain response, and minimal overshoot. A sample of the receiver IF output is taken at T12, amplified by Q28 and envelope detected by hot carrier diode CR60. The resultant baseband signal is level-shifted and amplified by U29a and then peak sampled by diode CR62. CR61 provides temperature compensation for the operating point of the peak sampler. The AGC attack time is set by C213 and R189 and is less than 10 mSec. Hold time is a function of diodes CR29 and CR30, resistors R105 and R106 and the outputs from the D/A converter, U20. The normal SSB hang time is determined by R105, while TELEX hang time is a function of R106. More sophisticated, computer-generated AGC characteristics are also possible.

The AGC voltage on C213 is applied through U29b and steering diode CR56 to the gain control buss. A sample of the AGC voltage is taken at the output of U29, which allows continuous monitoring of the AGC voltage. This sample is used for relative strength measurements and may also be used to augment the audio derived SINAD squelch system.

5.3.5 AUDIO PREAMPLIFIER/FILTER

The demodulated audio signal is obtained from pin 6 of U30. Emitter follower Q29 buffers the audio signal and provides a low-impedance signal for the active audio preamplifier/filter stage, U31b. U31b is configured as a unity gain second order Sallen-Key low-pass filter. Cutoff frequency is approximately

5.3.8 THE AUDIO T/R GATES

Since both transmitter and receiver systems in the SEA 330 utilize a common audio intercommunications channel, the audio circuitry is quite unique. Both transceiver and controller units make use of similar audio line driver/receiver circuitry. In the transceiver, however, some additional circuitry is required to properly isolate the transmitter and receiver audio channels. This is accomplished by the audio T/R gating system.

The function of receiver audio gate, U33a, is to connect receiver audio to the audio line driver, MODEM and squelch audio amplifiers. U33c is used to reduce the receiver audio line driver gain when in the transmit mode, while U33b serves the same function in the receive mode for the transmitter line receiver circuitry. U33d switches transmitter audio to the balanced modulator on when in transmit mode. In the controller, MOSFET Q4 is turned ON in the RECEIVE mode to prevent any possibility of feedback from the microphone audio line.

5.3.9 RECEIVE MODE AUDIO GATING

In the receive mode, gates U33a and U33b are in the "ON" state, while U33c and U33d are "OFF". Thus, the receiver audio is connected to the audio line driver, while the transmitter line receiver is disconnected by U33b and U33d.

5.3.9.2 TRANSMIT MODE AUDIO GATING

In the transmit mode, gate states are reversed. Now receiver audio is blocked by U33a and U33c, while transmitter audio is passed by U33b and U33d. The gain of the transmitter line receiver is restored to normal by U33b, while the receiver line transmitter gain is reduced to nearly zero by U33c.

5.3.10 VOLUME AND SQUELCH CONTROL CIRCUITRY

The volume control and squelch gate circuitry is located in the controller and makes use of U9, a monolithic digital to analog converter chip (DAC). The audio signal from the line receiver is fed into the DAC output pin and the volume controlled audio

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signal is taken from the Vref pin. The attenuation level in the chip is controlled by the controller CPU, which "talks" to the DAC on the bytewide data pins, D0 through D7. 256 Discrete audio levels are available.

5.3.11 THE AUDIO POWER AMPLIFIER

The output signal from the volume/squelch control DAC is passed through buffer U8D to the non-inverting input of power audio amplifier IC, U11. This chip boosts the audio signal to at least 4 watts into the 3.2 ohm loudspeaker. A separate speaker ground line is carried out to J2 to minimize ground loop problems.

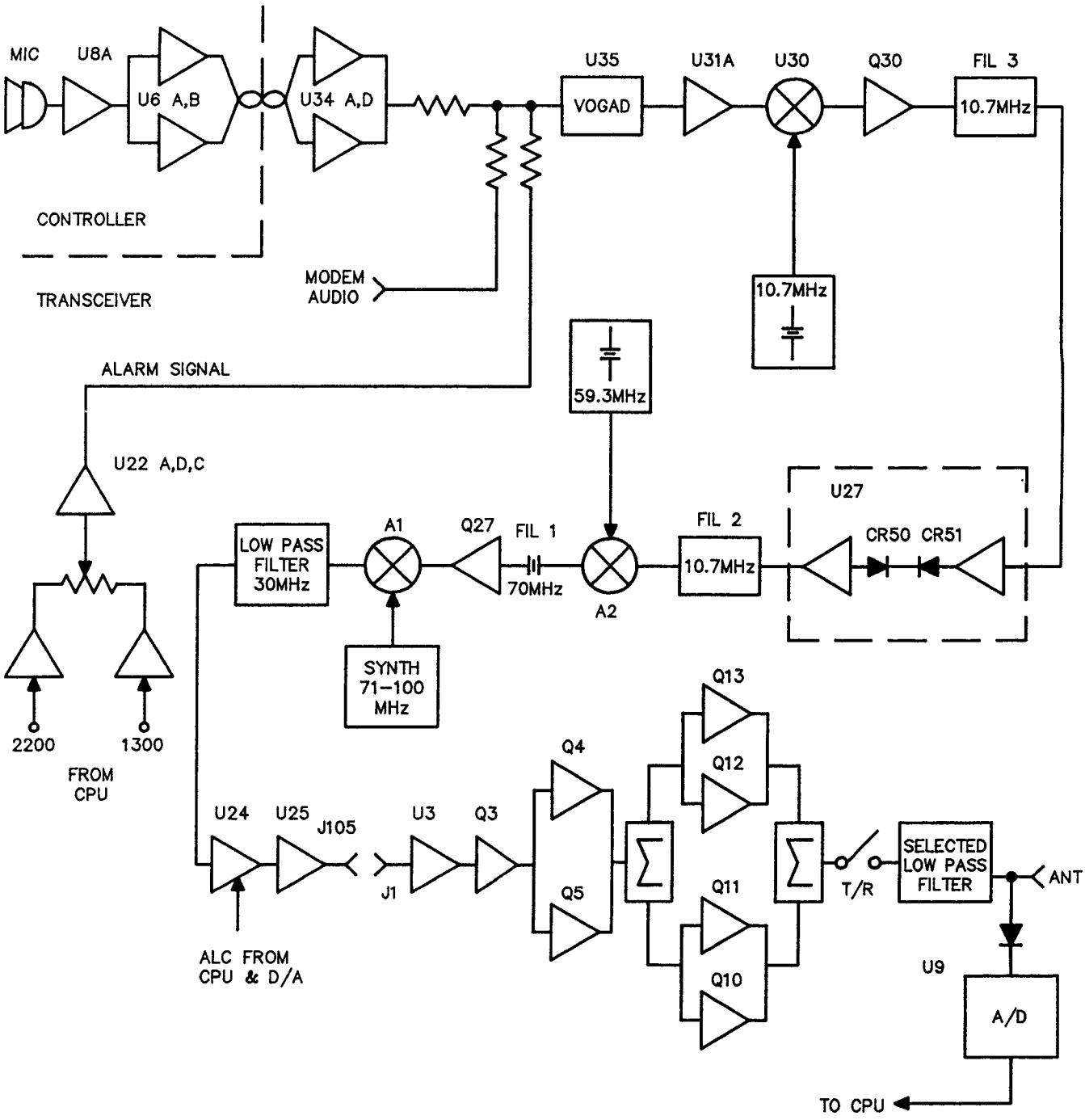
5.4 THE TRANSMITTER

5.4.1 BLOCK DIAGRAM

Figure 5.4.1 shows the block diagram of the SEA 330 in the transmit mode. In the controller, the microphone input first passes through U8A, a combination amplifier, low pass filter, which provides bandwidth limited gain for the approximately 50 mV peak to peak output signal from the microphone. The output from U8A is then sent to the transmitter line driver circuitry, U6A and U6B. The transmitter line driver circuitry converts the single-ended signal from U8A to balanced line configuration and adjusts the amplitude to approximately 1 volt peak to peak. The line signal is then routed through a twisted pair to the transceiver unit. Note also that the line signal from the microphone also passes through the controller line receiver to the controller audio circuitry. This transmitter audio signal is combined with an RF derived signal to provide a visual display of transmitter output.

At the transceiver, the transmitter line receiver, U34a and U34d, converts the balanced microphone audio signal back to a single-ended signal, which is applied to the gain-controlled audio amplifier circuitry, U35. The use of a gain leveled audio system allows a high average modulation level to be maintained without danger of overmodulation.

The leveled audio output is then passed through U33d, U31a and the secondary winding of the receiver IF output transformer to



SEA 330
TRANSMIT BLOCK DIAGRAM
FIGURE 5.4.1

the balanced modulator, U30. The output from U30 is a double sideband, suppressed carrier signal which is then passed through amplifier Q30 to FIL3. The output from FIL3 is a LOWER sideband, suppressed carrier signal, which is then amplified by Q2 of U27, clipped by CR50 and CR51, buffered by Q4 and Q5 of U27, and then refiltered by FIL2.

The output from FIL2 is combined with a signal from the 59.3 MHz VCXO in mixer A2 and the upconverted output is then amplified by the bilateral low-noise first IF amplifier, Q27, filtered by the 70 MHz monolithic filter and then downconverted in A1 by a signal from the VCO. The downconverted SSB signal is inverted, becoming the desired USB signal in the HF spectrum, where it is then passed through the low-pass filter to buffer amplifiers U24 and U25. The output level at Tx OUT is approximately 0.5 mwatt.

The Tx OUT signal is then applied to the input to the Power Amplifier board, ASY-0330-03, where it is amplified to a power level of 300 watts PEP, passed through an appropriate low-pass filter on the filter board, and output from the radiotelephone on the UHF connector.

The output from the Filter Board is sampled by a dual directional coupler, which consists of wideband transformers T1 and T2. Forward power is detected by CR14 and reflected power by CR13. These two signals are filtered, stretched and then buffered by U6B and U6d prior to application to the A/D converter, U9. U9 provides the CPU board with information on forward and reflected power, line voltage and operating temperature. This information, together with stored data tables, allows the CPU board to not only preset the transmitter gain to the proper level for nominal output, but also generates the instantaneous ALC feedback signal which prevents overmodulation. This ALC signal is combined with table data and output from the D/A converter, U20, on the Main Board Assembly. The wide band HF preamplifier, U24, is gain-controlled by the D/A output, thus closing the ALC feedback loop.

5.4.2 MICROPHONE PREAMPLIFIER

The 600 ohm dynamic microphone output is terminated by R48, filtered by R50 and C28 and then buffered by voltage follower, U8A. The buffered audio is then applied to the transmitter line driver, which consists of U6A and U6B. The line driver amplifies the buffered signal from the microphone by about 45. The output from the line driver is a balanced, low impedance signal of approximately 1 volt peak to peak. When the radiotelephone is in the RECEIVE mode, the CPU turns Q4 on, which prevents any possibility of feedback from the microphone.

5.4.3 THE TRANSMITTER LINE RECEIVER

The filtered, amplified output from the line driver is then passed over the interconnecting cable to the transceiver unit line receiver. This stage consists of U34a and U34d. Here, the balanced microphone signal is converted back to a single-ended audio signal, mixed with audio from the ALARM generator circuitry and the MODEM AF input (if any) and attenuated to a level suitable for application to the audio AGC circuitry (VOGAD).

5.4.4 AUDIO AGC AMPLIFIER (VOGAD)

U35 is the transmitter VOGAD circuit. This circuit provides a fast-operating audio AGC system, which outputs an audio signal of constant peak amplitude over a very wide range of input voltage levels.

The VOGAD system makes use of a special telecommunications IC, the LC403, originally intended for use in telephone applications. Follower U22 is used to buffer the AGC signal in the LC403 and this buffered signal is sent to the CPU board for use in the signal processor algorithm.

5.4.5 TRANSMITTER BALANCED MODULATOR

Double balanced mixer, U30, is used as the transmitter balanced modulator. The processed microphone audio is applied to non-inverting modulator input of U30, while the carrier signal at 10.7 MHz is applied to the L.O. Port. R196

serves as the carrier balance potentiometer and a double sideband suppressed carrier signal is taken from the non-inverted output pin of the balanced modulator. This signal is then applied to the buffer-filter circuitry.

5.4.6 IF BUFFER-FILTER

Q30, FIL3 and U27 form the buffer-filter circuitry. Q30 is a transistor amplifier with a gain of approximately 10. The collector signal is passed through FIL3, a four-pole crystal filter, which eliminates the upper sideband. U27 is a monolithic transistor array, which includes several transistors. Transistor Q2 inside U27 is used as a buffer amplifier to compensate for the signal loss in FIL3.

5.4.7 THE RF CLIPPER

The output from Q2 (in U27) is applied to a fixed-level RF clipper consisting of diodes CR50 and CR51. The output from the clipper is a SSB signal with approximately 6 dB of RF clipping. The bias resistors for Q3 of U27 are selected to keep the input impedance high enough to prevent undue loading of the clipper.

The use of highly-leveled audio for the balanced modulator, together with careful adjustment of the various stage gains, allows for a very consistent clipping level of approximately 6 dB. This degree of RF clipping of a single sideband filter serves to greatly increase the average peak to RMS ratio of the voice signal without adding significantly to the in-band intermodulation distortion level. Out-of-band intermodulation products are removed by the second single sideband filter, FL2.

NOTE: Only in U.S. versions.

5.4.8 CARRIER REINSERTION AMPLIFIER

Carrier is reinserted when desired through amplifier U36. This integrated circuit is a voltage-controlled attenuator, used here to control the level of reinserted carrier. In the J3E mode, the control voltage port of U36 is held at +8 volts, which cuts off any output signal. When carrier is desired, the control computer switches in a voltage level through the D/A

converter, U20, which allows the output signal from U36 to be adjusted to the desired level. The reinserted carrier signal is routed around FIL2 and inserted through R146 into mixer A2.

5.4.9 10.7 MHz IF AMPLIFIER AND SSB FILTER

From the clipper, the 10.7 MHz single-sideband suppressed carrier signal is applied to the input of buffer amplifiers Q3 and Q4 of U27. Q3 is connected to an emitter follower, and prevents undue loading of the RF clipper by the amplifier stage, Q4. The gain of Q4 is adjusted to the desired level by adjusting the emitter degeneration of the stage. This is accomplished by R/C network C196/R170. The output of Q4 is the processed signal for the main SSB filter, FIL2. FIL2 is used bilaterally and is a 6 pole filter. Adequate selectivity is provided to insure that the resultant single sideband signal is clean and without spurious products.

5.4.10 THE UP CONVERTER, 75 MHz IF AMP. AND FILTER

The up converter mixer is a double-balanced diode ring type mixer with inputs from the 59.3 MHz VCXO and the 10.7 MHz IF amplifier. The mixer output is amplified by the bilateral 70 MHz IF amplifier. This amplifier is discussed in pp. 5.3.1. The SUM of the two frequencies is selected by the 70 MHz IF filter. Selecting the sum frequency results in a LOWER sideband 70 MHz SSB signal. The 70 MHz monolithic filter is matched to the low-impedance amplifier and mixer stages by T10 and "L" network L29/C171. The filter output is applied to the input of the down converter or signal mixer.

5.4.11 SIGNAL MIXER AND LOW-PASS FILTER

A1 is another double-balanced ring diode mixer. The output from this stage is the down-converted 70 MHz SSB signal. This signal has been changed to the desired OPERATING frequency by mixing with a signal from VCO and the use of the DIFFERENCE frequency here results in a frequency inversion. Thus, the output signal is an UPPER sideband SSB signal as required. The mixer output is passed through a seven-section elliptical function low-pass filter, which provides some 50 dB of rejection for the image and IF frequencies above 30 MHz.

5.4.12 TRANSMITTER SIGNAL PREAMPLIFIER

The signal output from the low-pass filter is switched through CR37 to the input of the transmitter preamplifier. This is a two-stage wide-band amplifier. The first stage is a transformer coupled MC1350P which, together with the D/A converter U20, provides transmitter gain control. Since both gain level correction and ALC feedback are applied here in the wideband amplifier, serve loop response time is very fast. The output from U24 is connected to U25 for further amplification. This stage consists of a moderate gain MMIC, which provides adequate gain and output power together with a monotonic 50 ohm output impedance.

Preamplifier output level is nominally -3 dBm. From J105 (Tx OUT), the SSB signal goes to the PA board (ASY-0330-03) for further application.

5.4.13 TRANSMITTER PREDRIVER

The low-level transmitter signal from the Main Board (ASY-0330-01) is connected through J1 on the Power Amplifier (ASY-0330-03) to transformer T2. This wide-band transformer serves to isolate the chassis-referenced drive signal from the floating ground rail of the Power Amplifier.

The output from T2 is applied to a wide-band driver amplifier consisting of U3 and Q3. U3 is an MMIC which has approximately 12 dB gain over a very wide bandwidth and a constant 50 ohm impedance. The operating voltage for U3 is obtained from U4, a 12-volt regulator.

The amplified output from U3 is further amplified by Q3. This device is a small power transistor, designed for linear amplifier service in the HF spectrum. Operated in Class A, this device has excellent gain and stability because of multiple feedback circuits for both RF and DC bias. Bias stability is a function of emitter resistors R1, 2, 3, 4, 18, 19, 20, 21. The use of eight 4.7 ohm emitter resistors results in an effective emitter resistor of approximately 0.6 ohms with very low inductance and good power capability. R7 provides a low-impedance bias return, while bias current is derived through R12 from the 12-volt regulator.

RF negative feedback is provided by the R/L/C feedback network consisting of C7, R5 and L1 connected between collector and base. This negative voltage feedback, together with the current negative feedback derived from the emitter resistors, serves to stabilize the gain/frequency response of the predriver and to lower distortion as well.

Transformer T4 is used to match the collector impedance of Q3 to 50 ohms for connection to the driver circuitry.

5.4.14 TRANSMITTER DRIVER

Transistors Q4 and Q5 are small RF power devices, connected as a push-pull common emitter amplifier. Transformer T1 provides push-pull base drive from the predriver, while transformers T6 and T5 provide collector-to-load impedance matching and DC power isolation, respectively. Gain/bandwidth compensation is provided by the collector/base feedback networks and the various peaking capacitors and terminating resistors. Temperature tracking bias is provided for Q4 and Q5 by the circuitry associated with Q1 and Q6. Q6 is a small silicon power transistor connected as a voltage amplifier and buffered by power emitter follower Q1. The current in Q6 is proportional to temperature, which causes the collector voltage to drop as heat sink temperature rises. The collector voltage is the source of base drive for the bias buffer emitter follower, Q1. Bias current for Q4 and Q5 is adjusted to 150 milliamperes by the potentiometer in the emitter circuit of Q6, R9. Collector voltage for Q6 is derived from the 12 volt regulator, while collector voltage for Q1 is derived from the +24 V Tx buss. Voltage for the RF devices is derived directly from the +24 volt supply rail through fuse F2.

The driver output is connected through power splitter T14 and T15 to the dual power amplifiers.

5.4.15 TRANSMITTER POWER AMPLIFIER

The power amplifier in the SEA 330 is made up of two 150 Watt power amplifier modules, a power splitter and a power combiner. Each amplifier module is a push-pull common emitter design, each is independently fused, and each has its

own temperature-stabilized bias source. Each amplifier, like the push-pull driver, has the collector voltage present at all times. The amplifiers are activated by turning on the various bias supplies when in the transmit mode. The power amplifier bias is provided from the +24 Volt Tx buss. Both amplifiers are identical, so the following description is directly applicable to both. The bias for Q10 and Q11 is generated by U1, Q8 and Q2. Q8 serves as a power emitter follower to buffer the bias generated by the integrated circuit voltage regulator, U1. Temperature tracking is provided by Q2, a small power transistor which is diode connected and thermally linked to the power amplifier heat sink. Q2 is used as a temperature tracking voltage reference for U1. R32 allows adjustment of Q10 and Q11 idling current to 50 milliamperes.

At the input to the power amplifier, T15 is provided as a wide-band hybrid which splits the driver power output into two equal parts. Each of these signals is then independently amplified by a two-transistor push-pull power amplifier module. The amplifier outputs are then recombined in hybrid T13. Resistors are provided to terminate each hybrid in the event of failure of one of the power amplifier modules.

Configuring the power amplifier in this fashion has the advantage of providing for better system redundancy, better heat distribution for the output devices, and additionally provides a much wider range of useable output power devices.

5.4.16 OUTPUT LOW PASS FILTER(S)

Six low-pass filters are provided on the Filter Board (ASY-0330-02) to cover the frequency range from 1.6 - 29.999 MHz. Note that the highest frequency filter, which covers the 23-30 MHz spectrum, is a 5-pole elliptical-function design, while the lower frequency filters are 7-pole elliptical function types. This is possible because of the natural drop in spurious outputs from the power amplifier at higher frequencies. Filter selection is through small power relays which are operated by the control computer through serial relay driver, U11.

5.4.17 ALC CIRCUIT

The ALC system in the SEA 330 is unique and makes use of the control computer in an unusual fashion. Transmitter gain control is the function of U24 on the Main Board assembly. The control computer is used to preset the transmitter gain to the desired power level through D/A U20. When ALC feedback is required, a feedback signal is generated in the control computer software, and used to modify the nominal gain setting of U24. This is accomplished by the control computer by monitoring forward output power, reflected output power, power amplifier line voltage and temperature.

Forward and reflected power are sampled at the output side of the transmitter low-pass filters on the Filter Board. T1, T2 and their associated components form a dual directional coupler. A voltage proportional to forward power is developed at the output of CR14, while CR13 generates a voltage proportional to reflected power. These two detector outputs are proportional to peak output. Followers U6b and U6c buffer the forward and reflected power signals, respectively. Analog to digital converter, U9 is used to convert the forward and reflected power signals to digital data. Two additional followers, U6a and U6d, are used to buffer line voltage and temperature signals, which are also monitored by U9.

The transmitter CPU contains software which monitors the peak output, load VSWR, line voltage and transmitter temperature. When a high VSWR condition is sensed, the power level is automatically reduced to prevent damage to the power amplifier components. When low-line voltage is sensed, transmitter gain is reduced to avoid amplifier distortion. When an instantaneous overload condition is noted, as when the ALC would normally be activated, transmitter gain is instantaneously reduced proportionally. The sample time for the ALC algorithm is chosen such that the peak power level will be quickly reduced and only gradually restored when a momentary overload transient is sensed. This is equivalent to a normal "fast attack, slow release" ALC feedback circuit.

5.4.18 THE TEMPERATURE ALARM GENERATOR

In order to prevent damage to the power amplifier circuitry, an overtemperature alarm generator is provided. This circuit consists of temperature sensor U7, voltage follower U6D, and one port of the A/D converter, U9. Should an overtemperature condition be sensed, the control computer will reduce the transmitter gain and cause the "HOT" prompt to be flashed on the controller display.

5.5 THE PHASE LOCKED LOCAL OSCILLATOR SYSTEM

5.5.1 BLOCK DIAGRAM

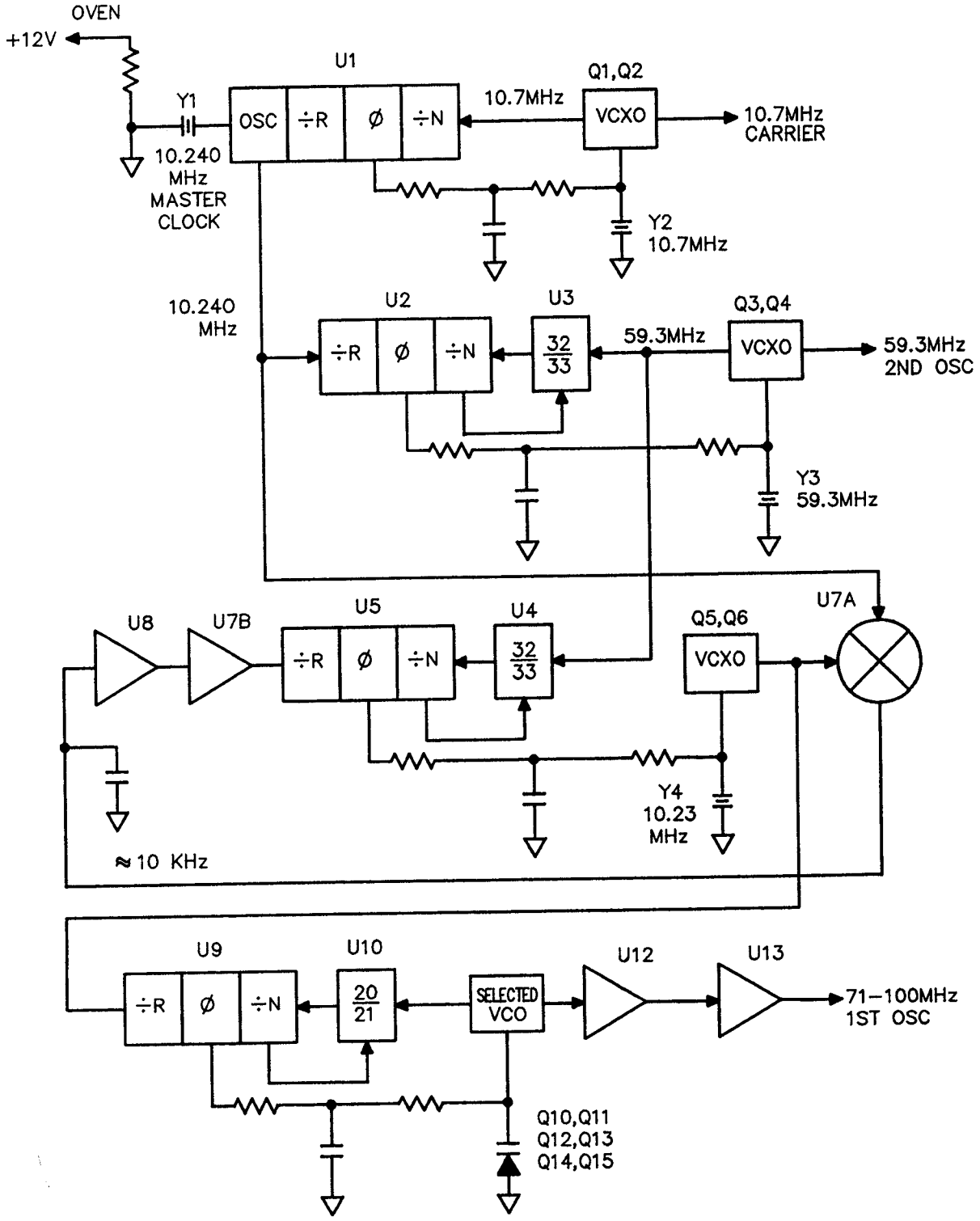
Figure 5.5.1 shows the block diagram of the phase-locked local oscillator system of the SEA 330.

A complex, multi-loop synthesizer is used in the SEA 330 to provide a fast, high-resolution local oscillator system. All tuneable oscillators are locked to a common clock crystal, Y1, which is enclosed in a proportional oven, OV-1, to provide the necessary short and long term stability.

Frequency selection is accomplished by the high-frequency VCO. This actually consists of three bandswitched voltage variable oscillators, Q10, 12, and 14. The master loop PLL components, U9 and U10 serve to lock the chosen voltage-tuned oscillator to the interpolation VCXO, Q5. The master loop operates at the relatively high-reference sampling rate of 15 KHz, which allows for rapid loop-switching and settling.

Since the frequency resolution provided by the master PLL loop would normally be a function of the 15 KHz sampling rate, the interpolation VCXO is used to provide the synthesizer with the required 10 Hz resolution. This trick is accomplished by "stacking" the main loop on the interpolation loop.

In order to visualize how this works, remember that the operating frequency of the main loop VCO is a function of the loop divider, the sample rate and THE LOOP REFERENCE FREQUENCY. Changing the loop divider by one count will cause the VCO to "step" in frequency by the sample rate, or 15 KHz. Changing the loop REFERENCE frequency will cause a



SEA 330
PLL BLOCK DIAGRAM
FIGURE 5.5.1

proportional change in the VCO frequency WITHOUT changing the loop divider count.

From the above description, it is seen that a small change in the REFERENCE frequency used for the main VCO control loop will cause an output frequency shift, which is a function of the main loop divider number AND the size of the reference frequency change. By changing the reference frequency over a narrow range in very fine steps, the main loop frequency will be altered in a similar fashion. The primary disadvantage of this technique is the fact that the actual change in frequency of the main loop is a complex function of reference frequency and main loop divider number. This type of synthesizer requires a complex series of approximations to calculate the divider numbers for a given operating frequency.

Additional phase-locked oscillators are employed in the SEA 330 synthesizer: The second conversion oscillator frequency of 59.3 MHz is generated by VCXO Q3 and locked to the 10.240 MHz master clock by the PLL consisting of U3 and U2. The 10.7 MHz carrier oscillator is a similar VCXO, which uses oscillator Q1 and PLL U1 to lock the VCXO to the master clock.

From the block diagram, it may be seen that the interpolation VCXO loop uses the 59.3 MHz conversion oscillator for its reference.

THE FOLLOWING EXAMPLE DESCRIBES THE METHOD USED TO COMPUTE THE VARIOUS FREQUENCIES AND DIVIDE-BY-N NUMBERS USED FOR A GIVEN OPERATING FREQUENCY:

1. Select an operating frequency of 4990.0 KHz. Add 4990.0 to 70,000 KHz: 70,000 + 4990.0 = 74,990.0 KHZ. (This is the MASTER VCO operating frequency.)

2. The MASTER loop reference is approximately 15 KHz. (Interpolation VCXO of approximately 10.23 MHz divided by 682 or slightly less).

3. Try dividing 74,990.0 KHz by 15 KHz.
   RESULT: 4999.33333. Round UP to 5000.
   (THIS IS THE MASTER VCO LOOP /N NUMBER).

4. Divide 74,990.0 KHz by 5000.
RESULT: 14.998 KHz. (THIS IS THE ACTUAL MASTER LOOP REFERENCE FREQUENCY.)

5. Multiply this LOOP REFERENCE by 682.
14.998 KHz X 682 = 10,228.636 KHz) (This is the approximate frequency of the interpolation VCXO).

6. Subtract this from 10,240.0 KHz.
10,240.0 - 10,228.686 = 11.364 KHz (This is the approximate frequency into pin 1 of U5).

7. The U5 reference divider has a minimum /R of 3.
Divide step 6 by 3. 11.364/3 = 3.788 KHz.
(This is the approximate reference frequency of the interpolation VCXO phase-locked loop.)

8. Divide the interpolation VCXO loop-reference (59,300.0 KHz) by some number to obtain an output equal to step 7.
(59,300.0/3.788 = 15,654.69905)

9. Round off to 15,655. (This is /N of U4, U5)
Errors will be less than 5 Hz.

10. U9, U10 /N = 5000. U4, U5 /N = 15,655. The control computer will now convert these decimals to the format for loading the synthesizer chip registers.

5.5.2 THE REFERENCE CLOCK OSCILLATOR

The master clock oscillator operates at a frequency of 10240.0 KHz. This frequency allows the use of a compact, high-stability crystal which is enclosed in a proportional oven. The combination of a high-stability crystal, capacitors of the proper temperature coefficient and crystal temperature stabilization provides excellent frequency stability over the environmental temperature range of the equipment. Warm-up time for the clock oscillator is less than 3 minutes.

The oscillator used is the oscillator portion of synthesizer chip U1. This circuit has been specially designed for use as a stable high-frequency crystal oscillator. U1 also serves as the complete PLL control circuit for the 10.7 MHz carrier

oscillator VCXO, Q1. The REF out pin of U1 also provides a reference signal for U2. U2 is the PLL chip, which controls the 59.3 MHz VCXO.

5.5.3 LOOP REFERENCE DIVIDERS

Each of the synthesizer chips, U1, U2, U5, and U9, are equipped with an internal reference divider. This divider is loaded serially from the control computer and is set to the value required to provide the chip's phase detector with the required signal.

Ultimately, all reference signals are derived from the master clock oscillator frequency of 10.240 MHz which is generated by the precision crystal oscillator in U1. Some of the derivations are somewhat indirect and require elaboration.

Synthesizer chip U1 derives the reference divider signal directly from the on board oscillator, the 10.240 MHz clock. The reference divider is initialized to count by 10240, resulting in a phase detector reference frequency of 1.0 KHz.

Synthesizer chip U2 also derives the reference divider input signal directly from the buffered output of the 10.240 MHz in clock U1. The reference divider is initialized to count by 2560, resulting in a phase detector reference frequency of 4.0 KHz.

Synthesizer chip U5 is used in a somewhat unconventional fashion and derives its reference divider input from the output of mixer U7A. This signal is a down-converted version of the 10.230 MHz VCXO signal. The reference signal used for down-conversion is the 10.240 MHz clock. The output signal from mixer U7A is in the 10-12 KHz range and varies with the setting of the divide-by-N number in U5. The input signal for the divide-by-N is the 59.3 MHz VCXO which is locked to the 10.240 MHz clock. The reference divider in U5 is initialized to count by 3, providing the phase detector with a reference signal of approximately 3.3-4.0 KHz.

Synthesizer chip U9 derives the reference divider signal from the 10.230 MHz VCXO. The reference divider is initialized to count by 682, resulting in a phase detector reference frequency of approximately 15 KHz.

5.5.4 THE HIGH-FREQUENCY DIVIDE-BY-N COUNTERS

Each of the synthesizer chips used in the SEA 330 synthesizer has a built-in divide-by-N counter. U1 is an MC145157 which contains a 14 bit divide-by-N counter capable of providing divide-by-N numbers up to 16383. U2, U5, and U9 are MC145158's. These chips are designed to support a dual modulus type divide-by-N system. They contain not only a 10-bit divide-by-N counter which provides an N count up to 1023, but a modulus control (A register) of 7 bits, which allows an A count range up to 127. Chips of this type can be used together with various dual modulus prescalers to provide almost any desired combination of resolution and divider range.

5.5.5 HIGH FREQUENCY PHASE DETECTOR/LOOP FILTERS

U1, U2, U5, and U9 each contain a high frequency tri-state phase detector whose output is proportional to the phase difference between the reference divider output frequency and a similar input derived from the divide-by-N counter for each loop. The error voltages are filtered through second order R/C filters and applied to the varactor tuning elements in the various tuneable oscillator circuits. Each chip also contains a dual phase output phase detector. These remain unused in this application except in the case of U9. When the 2182.0 KHz VCXO circuit associated with Y5 is used (as in CEPT applications) the dual phase outputs from U9 are used, together with the active filter circuitry associated with U11, to provide the necessary loop filter.

5.5.6 THE VCO SYSTEM AND ASSOCIATED BUFFERS

As discussed above, the VCO system in the SEA 330 consists of three bandswitched voltage controlled oscillators which provide the conversion signal for the first mixer. This mixer serves to upconvert an HF signal to the first IF frequency of 70 MHz. Because of the wide tuning range of the SEA 330, a bank of three VCO's is used to provide a conversion signal between approximately 70 and 100 MHz. These three oscillators are Q10, Q12, and Q14. Each oscillator is individually buffered by a source follower and the buffered output signal from the selected oscillator is then amplified to the desired output level by a wide band amplifier consisting of U12 and U13.

These MMIC's provide a high gain, low noise wide band buffer stage with sufficient output power to drive the first mixer.

In certain applications, a single frequency VCXO is provided for 2182.0 KHz. The superior phase noise of the very narrowband VCXO circuit provides extra dynamic range for AM operation on 2182.0 KHz ONLY. When fitted, Q7 and Y5 provide the local oscillator signal (72.182 MHz) when the radiotelephone is operated on 2182.0 KHz.

5.5.7 THE VCXO'S AND ASSOCIATED BUFFERS

The SEA 330 synthesizer contains three separate VCXO circuits (not including the special CEPT local oscillator described above). These oscillators provide the second conversion oscillator of 59.3 MHz, the carrier oscillator of 10.7 MHz and the interpolation oscillator of approximately 10.230 MHz.

The 10.7 MHz carrier is provided by phase locked 10.7 MHz VCXO, Q1. The use of a phase locked oscillator for the carrier has the advantage of providing the ability to offset the carrier across the filter passband to provide LSB operation and/or special carrier offsets. Buffering for the 10.7 MHz oscillator signal is provided by tuned amplifier Q2.

The second conversion oscillator in the SEA 330 is provided by VCXO Q3 and associated buffer Q4. This loop operates at 59.3 MHz and also provides the REFERENCE signal for the interpolation VCXO loop built around synthesizer chip U5. Note that this signal could be provided by any equivalent VHF oscillator of sufficient stability. The 59.3 MHz oscillator is used for convenience and simplicity.

The interpolation VCXO operates at a frequency of approximately 10.230 MHz and provides the microstepped REFERENCE frequency for the main VCO loop. The main loop operates with a phase detector reference frequency of approximately 15 KHz. Microstepping the REFERENCE source for this loop provides the ultimate resolution of less than 10 Hz which the main loop requires.

6. MODE AND FREQUENCY CONTROL

6.1 GENERAL

In the SEA 330, the frequency of operation is determined by loading a serial bit stream containing a binary number in the four synthesizer chip registers in the frequency synthesizer circuitry.

These binary numbers are calculated through an internal algorithm by the control computer. When the computer loads a desired frequency into the control computer, the computer then calculates all the required binary data streams and inputs the information into the various control registers.

Such data as filter band, VCO band, VCO A loop divide-by-N, carrier status, transmitter gain level, and antenna coupler status are all calculated by the computer, once the desired channel is entered by the operator.

6.1.1 TRANSMITTER MODE SELECTION

The primary mode of operation of the SEA 330 is in the J3E (SSB with fully suppressed carrier) mode.

Three auxiliary modes are provided:

R3E: SSB with pilot carrier re-inserted 16 dB below PEP.

H3E: SSB with pilot carrier re-inserted 6 dB below PEP (AM equivalent).

0.3F1: Narrow bandwidth teleprinting, carrier suppressed.

J3E is the basic SSB operating mode and is used for ship-to-ship, base station-to-ship, and point-to-point communications.

R3E is used primarily for 2 MHz public correspondence channel. This allows the shore station to lock on to the pilot carrier with an autotune receiver and gives "telephone quality" voice reproduction.

H3E is a secondary mode, designed to allow a degree of compatibility between old-style AM equipment and SSB systems. In this mode, the carrier is suppressed only 3 to 6 dB below PEP. Such systems are inherently wasteful of the power capability of any SSB transmitter. As required by law, the "EO" channel is provided with optional H3E carrier (See page 2-6).

In the SEA 330, the normal mode of operation is ALWAYS J3E. On public correspondence channels, the operator may, if desired, insert a -16 dB carrier, by entering the desired A3A channel into "scratchpad" memory and inserting the R3E bit (see pp. 3.3.2 for scratchpad programming information).

J3E mode operation on 2182.0 KHz (the international distress and calling frequency) is available by recalling the emergency channel by pressing 0/2182 key (In the European version, H3E operation is selected by pressing the 0/2182 key).

The two carrier reinsertion levels are programmed by the control computer via the port on D/A U20 dedicated to the carrier reinsertion amplifier, U36.

The 0.3F1 mode is available when desired by initiating the TELEX mode through the keypad. This is a narrow band teleprinting mode, which requires external equipment such as the SEA SEATOR unit.

6.1.2 RECEIVE MODE SELECTION

Since the SEA 330 as normally supplied always operates as a normal upper sideband only SSB receiver, little mention need be made of alternate modes of operation. Where allowed, the receiver is capable of lower sideband operation.

AM reception is by the "exhalted carrier" or "zero beat" method. That is, the incoming signal is simply tuned in until the carrier wave is zero beat with the internal BFO. This technique has proven completely adequate for those applications where voice fidelity is desired. For reception of music, the internal IF and AF filters sharply limit the level of fidelity which may be achieved.

When the 0.3F1 (TELEX) mode is selected, the narrow bandwidth I/F filter is inserted to improve the receiver S/N ratio.

7. THE POWER SUPPLY CIRCUIT

7.1 GENERAL

The basic supply voltage for the SEA 330 is 24 Volts DC. The equipment chassis is not connected to either supply rail. Line voltage regulation of -10% + 25% or better is required, with a current capacity of at least 35 Amperes.

From this raw source are derived the necessary regulated operating voltages for the SEA 330 circuitry.

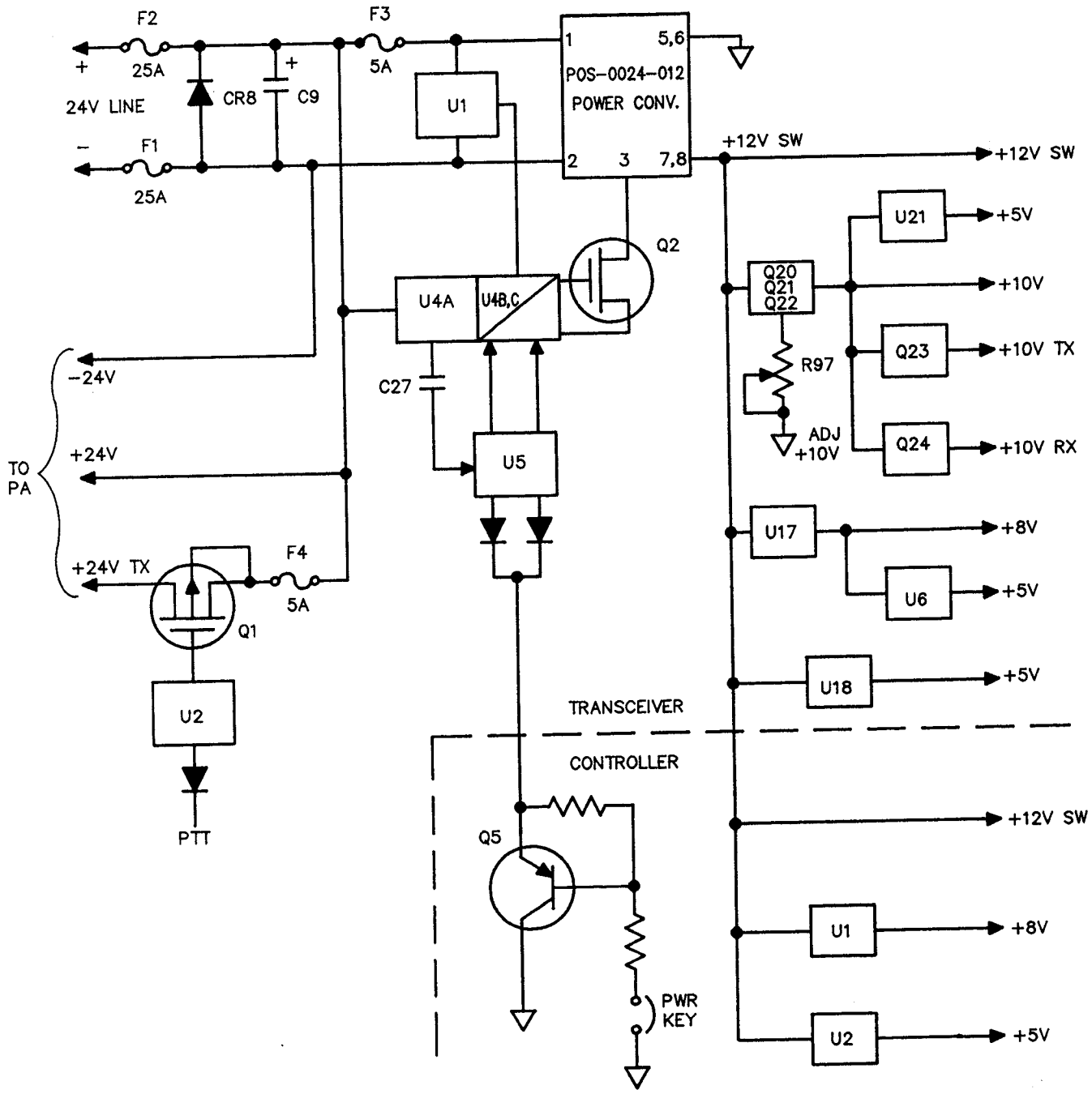
7.1.1 BLOCK DIAGRAM

Figure 7.1.1 shows a simplified schematic diagram of the power supply circuitry.

Once the basic 24 Volt power is provided, it is connected to the set through the heavy-duty power plug on the transceiver rear panel. A variety of internally-mounted fuses are provided to protect the set in the event of malfunction. The primary line fuses are equipped with a polarity protection diode which will blow the fuse in the event of reversed line polarity.

It should be noted that all circuitry in the SEA 330 radiotelephone system EXCEPT the high-power RF amplifier circuitry operates from an internally-generated +12 Volt, negative ground, regulated power buss. This voltage is generated by PC-1, a small switchmode power converter. This device converts the +24 Volt, floating ground primary power to up to 5 Amperes of well-regulated 12-Volt power, which has its negative rail connected to the transceiver chassis. This +12 Volt power source is used to provide power to the SEABUSS peripherals and all internal low-level circuitry in the SEA 330.

Most low-level circuitry operates from the +10 volt buss or the +10 Tx or +10 Rx voltage rails. +10 Volts is derived from the +12 V SW buss by a series regulator consisting of Q20, Q21 and Q22. The +10 Tx and +10 Rx rails are generated through computer control of inverted transistor switches, Q23 and Q24.



SEA 330
SIMPLIFIED DIAGRAM OF
POWER SUPPLY CIRCUITRY
FIGURE 7.1.1

The +8 and +5 volt logic buss voltages are generated from the +12 V SW rail through the use of standard three terminal regulators, U17 and U18. Throughout the radiotelephone, local regulation is used to provide good overall voltage regulated isolation. For example, U6 and U21 on the main board serve as local +5 volt regulators for various circuit functions. Similarly, each control computer board has on-board regulation. The Power Amplifier uses a 12 Volt three-terminal regulator to stabilize the voltage applied to the bias generators and predriver. In this case, the regulator is powered from the +24 V TX rail, which is isolated from the chassis ground. This use of distributed regulation allows excellent isolation from power buss noise, line drop, etc.

7.1.2 THE DC-DC CONVERTER CONTROL CIRCUITRY

The power converter status is controlled through circuitry contained on the Filter Board (ASY-0322-02). Transistor Q2 is used to control the power on line of the power converter. When Q2 is turned "OFF," the power converter is energized and delivers +12 volts to the radiotelephone +12 V SW buss. The conduction state of Q2 is controlled by a latch, which consists of U4b and U4c, cross-connected NAND gates. The latch is toggled through the dual optical isolator, U5. To understand the operation of the control toggle, start with 24 volt power applied, but with the power converter in the OFF state: Pin 11 of U4c is high, Q2 is ON, and U4a is ON, generating a 10 KHz square wave. This square wave is connected to CR12 and CR11 through capacitors, thus maintaining isolation between the 24 volt supply rails and the radiotelephone chassis. The voltage present at C28 provides power enough to operate the half of optical isolator U5, which is connected to the "PWR" line of the SEABUSS through diode CR10. When the "PWR" line is grounded, pin 7 of the optical isolator will pull pin 8 of the U4b low, causing the latch to toggle. This causes pin 11 of U4c to go low, Q2 turns "OFF" which allows the DC-DC converter to start, which in turn powers up the +12 V SW buss. Note that pin 1 of U4a also goes low, causing the oscillation of U4a to cease. When the "PWR" line is next grounded, the other half of optical isolator U5 is operated from the +12 V SW buss through CR9. This causes pin 13 of U4c to go low, which again toggles the latch and turns the power converter off.

7.1.3 +10 VOLT REGULATOR AND THE TX/RX SWITCHES

The +10 Volt regulator in the SEA 330 makes use of PNP power transistor as a series pass device. This transistor, Q20, is connected as an inverted power stage with its base drive derived from a negative feedback amplifier consisting of Q21 and Q22.

In operation, the base of the emitter follower Q22 is provided with a sample of the +10 Volt regulator output through resistor network R96, R97. This sample is supplied to the emitter of feedback amplifier Q21.

The base of Q21 is provided with a stable reference voltage from zener diode CR28. This device has a nearly "flat" temperature vs. voltage characteristic and is further stabilized by obtaining its voltage drive from the +10 Volt buss.

Since the base voltage of Q21 is stabilized by CR28, the collector current in Q21 and thus the base current of the series pass transistor Q20 is inversely proportional to the voltage at the base of Q22. That is, a RISE in the voltage at the base of Q22 causes a REDUCTION in base drive to Q20. This, in turn, causes the output voltage to be reduced. Similarly, a DROP in the voltage at the base of Q22 will result in an INCREASE in base drive to Q20 which causes the output voltage to be increased.

R93 is shunted across Q20 to provide "start up" voltage for the regulator system. Potentiometer R97 is the +10 Volt adjustment and allows the regulator to be "trimmed" to exactly +10 Volts by setting the base voltage on Q22. Resistor R98 is provided to limit the base drive to Q20. This provides a degree of short-circuit immunity for the regulator, since the base drive for Q20 tends to "starve off" at about 1 Amp of output current.

The use of the inverted PNP transistor, Q20, as the series pass device has the advantage that the regulator will remain operational under low-line voltage conditions. The low line limits are primarily a function of the E-C saturation voltage in Q20, which is normally less than 0.5 Volts. Thus, the regulator

will provide excellent 10 Volt buss stability, even when the input line voltage has dropped to approximately 10.5 Volts.

Transistors Q23 and Q24 generate the non-overlapping +10 Tx and +10 Rx busses, respectively. These devices are operated as inverted transistor switches and are controlled by the main control computer through the serial relay driver device, U19. U19 is located on the PA/Filter printed circuit board. The use of transistor switches to generate the Tx and Rx buss voltages eliminates any problems with relay contacts or T-R buss timing.

7.1.4 +8 VOLT AND +5 VOLT REGULATORS

In the SEA 330, the synthesizer circuitry operates from a regulated +8 Volt buss, while various data buffers and peripheral chips require +5 Volts. These voltages are provided by standard three-terminal voltage regulator integrated circuits, U17 and U18. U17 is a 7808 and provides the +8 Volt buss, while U18 is a 7805 and provides the +5 Volt buss.

7.1.5 +24 VOLTS Tx BUSS

The transmitter predriver circuitry and the bias systems for the transmitter driver are supplied with a relatively high current +24 Volt buss through P channel FET, Q1. This device is located on the Filter board, and is connected as an inverted switch. Gate drive is supplied from the optical isolator, U2. U2 is used to provide control circuit isolation between the serial peripheral chip, U11, and the isolated +24 V Tx circuitry. The same driver port which is used to provide drive for U2 is also used to switch the antenna relay K2 on the Filter Board. Diode steering through CR6 and CR7 prevents interaction between the relay and optical isolator circuits.

8. THE SEA 503 CPU MODULE

8.1 GENERAL

The SEA 330 radiotelephone supports up to four 3300 controllers. The 3300 controller is essentially a standard 3220 controller from the SEA 322 radiotelephone system, fitted with a different keypad, display, and software. Each of these controllers contains a complete microprocessor-based control computer in the form of the SEA 503 controller/computer assembly.

8.1.1 BLOCK DIAGRAM

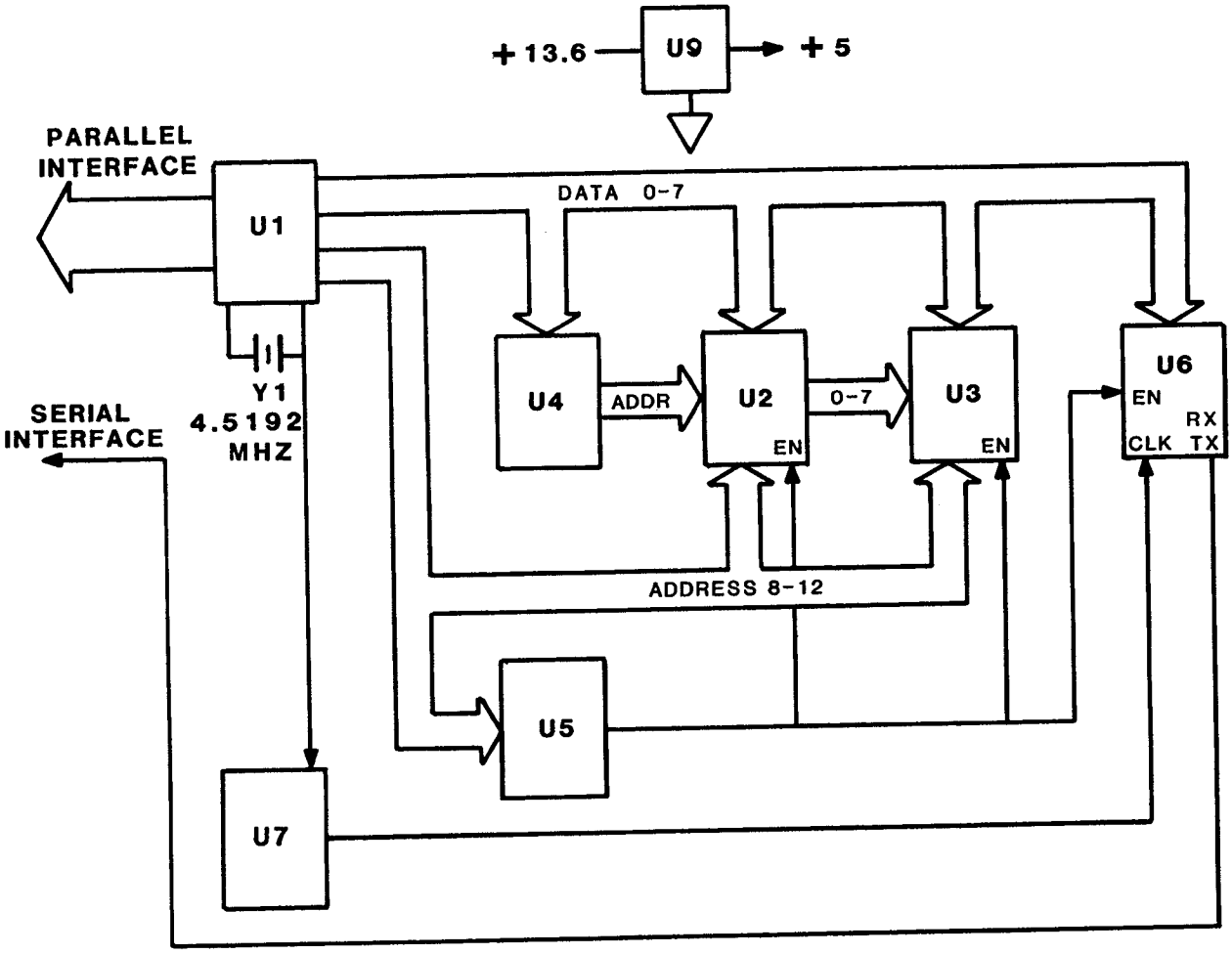
Figure 8.1.1 shows a block diagram of the SEA 503 controller/computer circuitry.

The SEA 503 uses the Motorola MC146805E2P microprocessor, U1. This is a CMOS 8-bit machine with 16 bi-directional ports, timer, on-board clock oscillator, RAM and a powerful controller-oriented instruction set. Also included on the CPU board are provisions for EPROM, EEPROM, a serial data transceiver and a baud rate generator. Although configured for 2764 EPROM (U2), paging allows the use of PROMs up to 27256 density. An EEPROM socket (U3) is provided, which supports EEPROMs up to the 2864. If the specific application requires, one or both of the ROM sockets may be populated with RAM.

The baud rate generator, U7, is driven from the CPU clock, a standard 4.9152 MHz crystal. Strapping allows the selection of baud rates from 75 baud to 19.2k baud.

On-board voltage regulation is provided by U9, so that unregulated line voltages may be used to power the CPU board. CR4, CR5 and U8B form an undervoltage reset/memory "write protect" circuit, which operates at approximately +9 volts. In the SEA 330, the +13.6 volt switched buss is used to power all the CPU boards in the system.

A serial interface is provided by U6, an ACIA chip. The serial baud rate is adjusted by selecting the proper clock jumper between the ACIA and the baud rate divider, U7.



503 CONTROLLER
COMPUTER BLOCK DIAGRAM
FIGURE 8.1.1

U4 is an octal latch, which serves to deMUX the address buss, while U5 and U8A, U8C and U8D are decoders which assign the memory map of the CPU chip, U1.

J1, the interface connector, is arranged along a wide edge of the PC board. This 30-pin interface provides access to all essential CPU pins, the necessary power input, the serial communications buss and, when the jumper is installed, a signal from the CPU clock. Pin 5 provides a spare pin for future expansion.

9. THE SEA 504 CPU MODULE

9.1 GENERAL

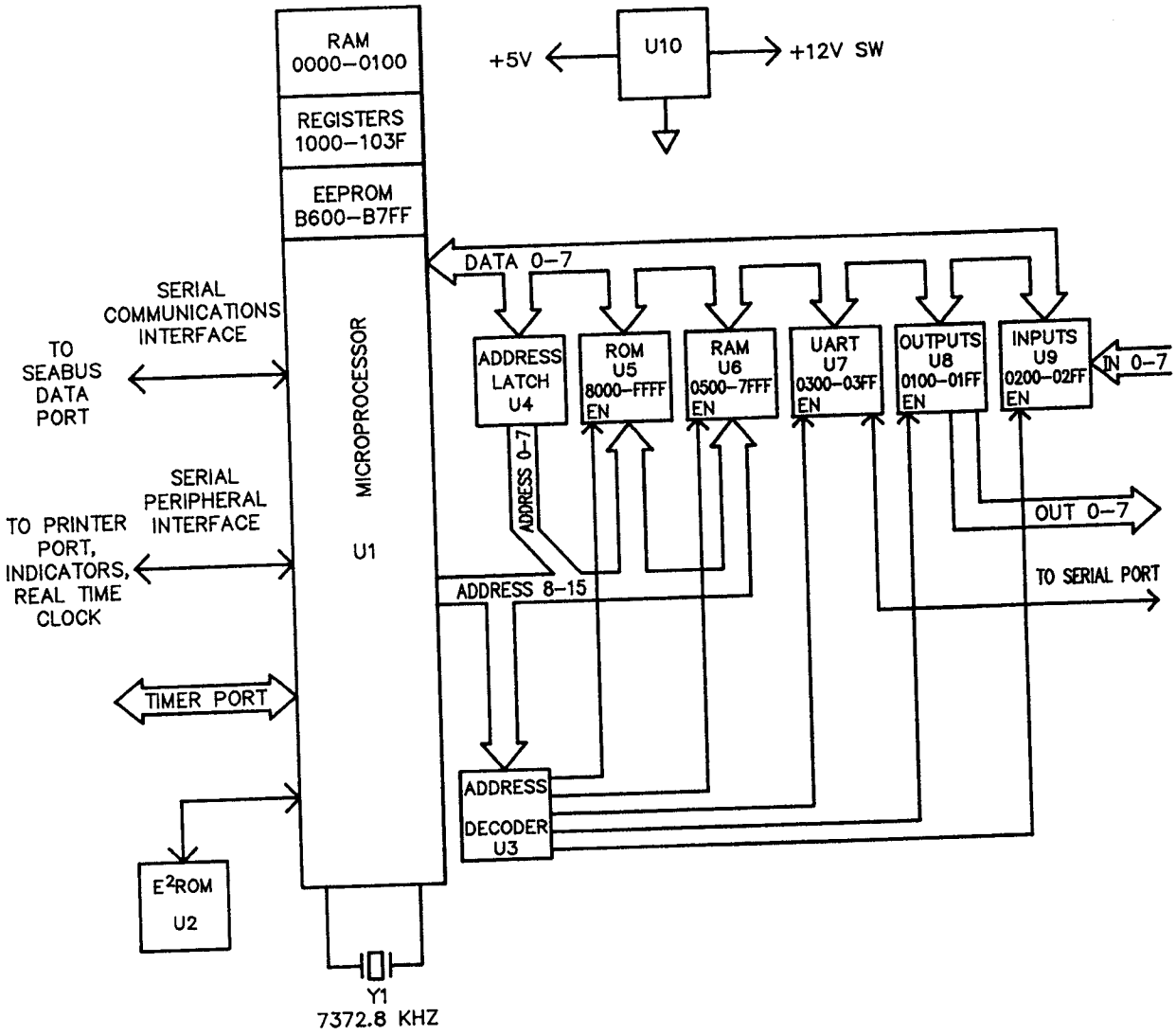
The SEA 330 radiotelephone is complex enough to require a more powerful microprocessor controller than the SEA 503 controller/computer used in the 3300 controllers. For this reason, the SEA 504 control computer module has been designed. Although the SEA 504 control computer module is identical in size to the earlier SEA 503, it is much more powerful. This power is a function of the much greater memory capacity and much more powerful MC68HC11A1F microprocessor chip. This new Motorola part contains not only the standard on-board RAM, EPROM, clock generators, and timers, but also includes a multichannel A/D converter, serial communications interface (SCI), a separate synchronous serial peripheral interface (SPI), and on-board EEPROM.

9.1.1 BLOCK DIAGRAM

Figure 9.1.1 shows a block diagram of the SEA 504 controller/computer circuitry.

The SEA 504 uses the Motorola MC68HC11A1 microprocessor, U1. This is an HCMOS, 8-bit machine with on-board clock oscillator, two serial interfaces, internal baud rate generator, timers, 256 bytes of static RAM, an eight-channel multiplexed A/D converter, and many bi-directional ports. The instruction set is controller-oriented, and similar to earlier Motorola parts. Also included on the CPU board are provisions for EPROM, EEPROM, RAM and IN and OUT latches. RAM is socketed at U6 and may be up to 32K deep. EPROMS up to 27C256 may be supported in socket U5. 512 Bytes of EEPROM are contained within the microprocessor chip, but additional non-volatile storage is provided by U2. This is a serial part, the X24C16.

The external address buss appears on ports B and C of the microprocessor. Since the low order address byte is multiplexed with the data on port C, U4 is required to latch the low order address byte. U3 is a programmable logic device, the EP320, which provides an address decode function.



504 CONTROLLER
COMPUTER BLOCK DIAGRAM
FIGURE 9.1.1

System firmware resides in U5, a 32-Kbyte EPROM which is mapped into the upper half of memory (0x8000-0xFFFF). Data storage is provided by U6, which is mapped into 0x0500-0x7FFF.

U8 and U9 are octal latches, which provide parallel output and input ports respectively. U8 latches the byte present on the data buss when it is addressed at 0x0100-0x01FF. When U9 is addressed at 0x0200-0x02FF it asserts a byte onto the data buss. These ports are used to provide parallel access to the microprocessor.

Port D of the microprocessor provides two serial interfaces. Bits 0 and 1 (transmit and receive data) provide an asynchronous serial interface used to communicate with the SEABUSS port on the Main Board. Bits 2-4 (input, output and clock) provide a synchronous serial peripheral interface used for controlling the various serial registers and drivers on the Main Board and Filter Board.

U10 provides a regulated, 5 volt supply for the CPU board. If the input voltage to the regulator drops below approximately 8.5 volts, CR3 and the associated circuitry will cause the CPU to reset before the regulator output drops.

10. THE CONTROLLER UNIT

10.1 GENERAL

Much of the controller circuitry has already been discussed in the RECEIVER and TRANSMITTER theory sections. Some of the controller system, however, is not directly in the signal path, and will be considered here.

10.2 BLOCK DIAGRAM

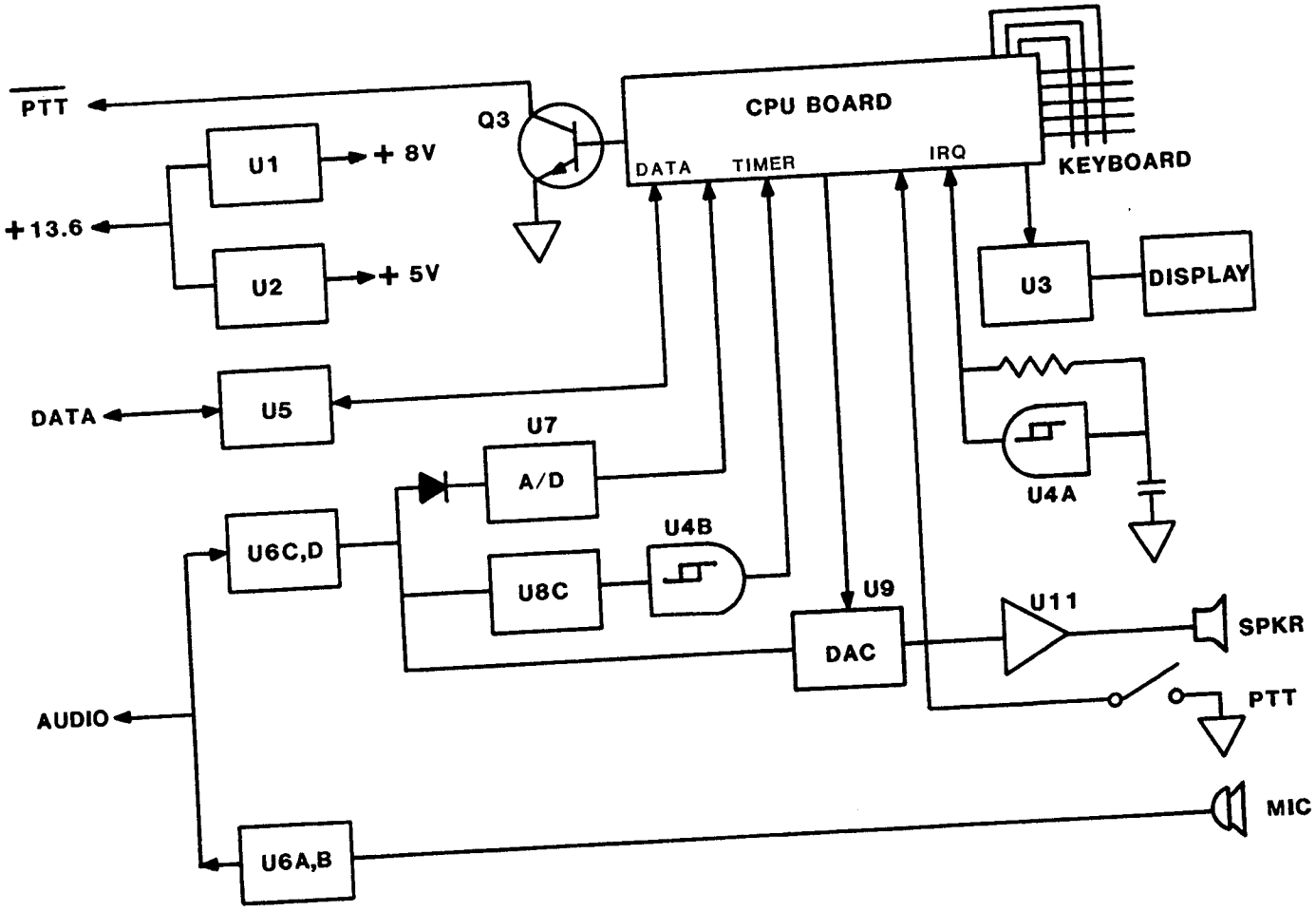
Figure 10.2 shows a block diagram of the SEA 330 controller unit.

The controller is essentially a "dumb terminal" configured specifically as the front panel of a Marine SSB transceiver. Transceiver functions are controlled by the keypad, transceiver parameters are indicated by the liquid crystal display, microphone audio is processed by the controller and sent to the transceiver, and receiver audio is received from the transceiver, processed by the controller, and routed to the loudspeaker.

The controller circuitry is contained on the terminal interface PC assembly, ASY-0330-03. This printed circuit board contains the display, keyboard interface, terminal circuitry and the controller CPU board.

Connection to the interface board from the control cable is through J2, a 16-pin DIP connector and the interface board is contained within a shielded aluminum box, which is in turn housed inside a drip-proof plastic outer enclosure.

The audio path for the controller unit has been adequately described in the RECEIVER theory of operation (see pp. 5.2) and will not be repeated here. The serial data stream, which connects the controller(s) and the transceiver unit, is passed through U5 in the controller and U16 in the transceiver. This is a bi-directional data transceiver which uses a bi-phase data format similar to RS485. On each end of the data path, the data transceivers are connected to the system CPU boards through the Sout and Sin pins provided.



SEA 330
CONTROLLER UNIT BLOCK DIAGRAM
FIGURE 10.2

The primary power source for the controller is the +13 volt switched buss from the transceiver unit. When necessary, internal regulators provide stabilized buss voltages. U1 provides +8 volts, while U2 provides +5 volts for the logic elements.

The LC display is supported by U3. This part is a serially-controlled LCD driver chip, which is capable of driving up to 64 annunciators on the LCD. The desired LCD pattern is loaded into U3 from the controller CPU board. Illumination for the keypad and display is provided by LEDs CR2, CR3, CR10 and CR11. Current for these devices is provided by Q1 and Q2. The transistors are controlled by the CPU through the deMUX chip, U10, thus allowing operator control over the illumination level.

The SQUELCH function in the SEA 330 is a software model of the SEA voice-operated "constant SINAD" squelch system. Each controller has its own squelch system, which functions by examining the audio stream to determine the presence of a voice signal. If a voice is present, the volume control DAC, U9, is set to the level selected by the operator. If no voice is present, the CPU board adjusts U9 for full audio attenuation. U8C, CR7, and U4B are used to provide the CPU board TIMER input with hard limited audio, while U4A forms an interrupted oscillator which calls the CPU squelch routine regularly.

The PTT signal from the controller to the transceiver is provided by the controller CPU through transistor Q3. The controller CPU receives a filtered, debounced PTT signal from the microphone through U4C.

The 21-key keypad is actually a 20-key keypad in a crossbar matrix, and one extra key. The extra key is the "PWR" key, and is used to cycle the input power in the transceiver. This is accomplished through inverted transistor switch, Q5. When the "PWR" key is pressed, Q5 is biased ON through R64. This, in turn, pulls the PWR line low, toggling Q2 in the transceiver. The remaining keypad functions are directly read by the CPU. The CPU firmware interprets the keystrokes and communicates via the serial interface with the CPU in the transceiver. The communications format is error-checked and handshaking is used to assure that errors are eliminated.

Simultaneously, the controller CPU handles the LCD, squelch, illumination level, volume level and monitors for a PTT signal. Interunit communication is kept to a minimum and the "intelligence" level of the controller is minimized by shifting most of the firmware burden to the transceiver. This approach allows many controller options to be realized, such as simultaneous control of the transceiver unit from several locations, an intercom function between controllers, direct control of the transceiver system with a computer equipped with an appropriate hardware interface and software, etc.

Communications between the controller(s) and the R/T unit is bi-directional and fully interactive. This means that when more than one controller is used, the status of the R/T unit is reflected at all operating stations. For example, if one controller is used to change the operating frequency of the radiotelephone, ALL controllers in the system will have the display information updated. Controller-R/T data is sent in packets and is error-checked. Collision protection is provided for all data sources.

10.3 INSTALLATION OF SEA 330 OPTIONS

10.3.1 SEA 330 FAN KIT INSTALLATION

1. To wire fan kit to SEA 330 radio, mount fan kit to heatsink as shown, with wiring harness coming out above the DC-DC converter.

2. If mounting holes are not already present in the heat sink, drill four holes using a #36 drill bit in outside heat sink fins (both sides) as dimensioned. Secure fan kit to radio with #6 self-tapping sheet metal screws.

3. Remove clear plastic cover on left side of converter.

4. The 12V wires of the fan (RED) should connect onto PIN 2 (second from top) along with the BLUE wire from the converter.

5. The ground wire (BLACK) should connect onto PIN 3 along with the GRAY wire from the converter.

6. Re-install the clear plastic cover over the converter barrier strip.

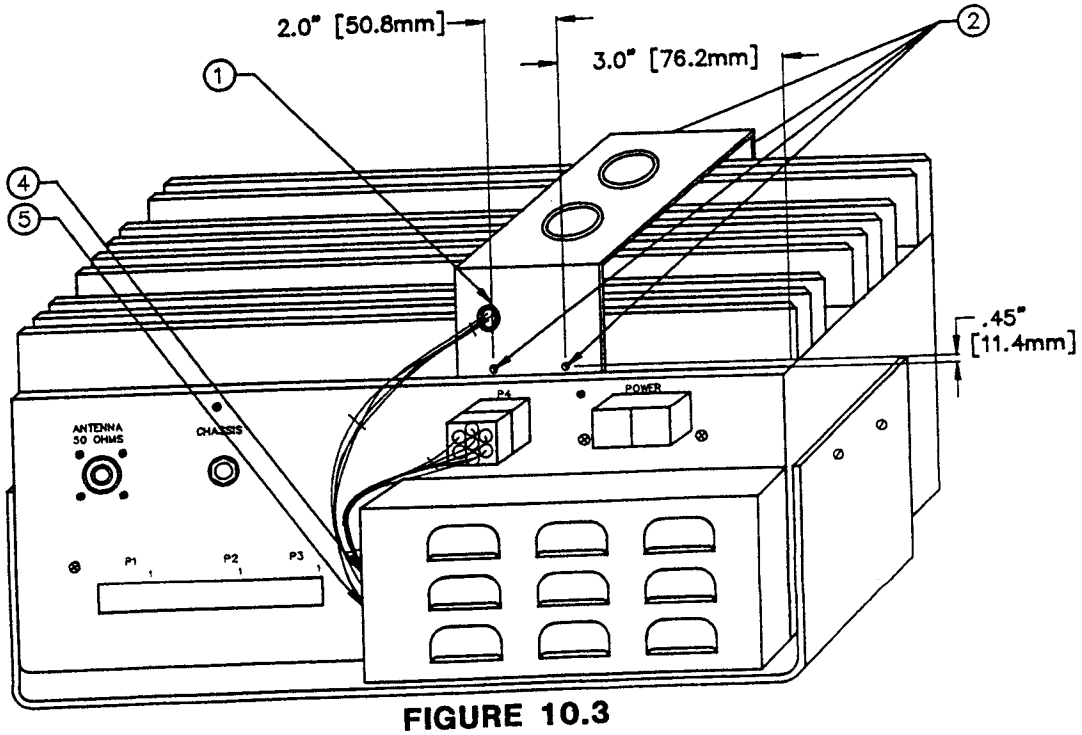


FIGURE 10.3

10.3.2 SEA 330 INTERNAL FAN INSTALLATION

1. Open 3301 Transceiver to work on power amplifier board (i.e. remove 6 heat sink screws and, if desired, mount power amplifier perpendicular to chassis).

2. Looking at the bracket so it appears as letter L (i.e. the short face is at the bottom and pointing right), install grommet strip with RTV (if not already installed) on the two facing edges to protect the power wiring harness on the board. (See Figure 10.4)

3. Remove the mounting screw holding the 03 board to the heat sink in the middle of the board near the two TO-220 power resistors, R50 and R49. Lay down C50 and C49 away from this mounting hole. They do not need to be completely flat.

4. Using a 6-32 x 5/8 screw, mount the bracket to the board over these two capacitors.

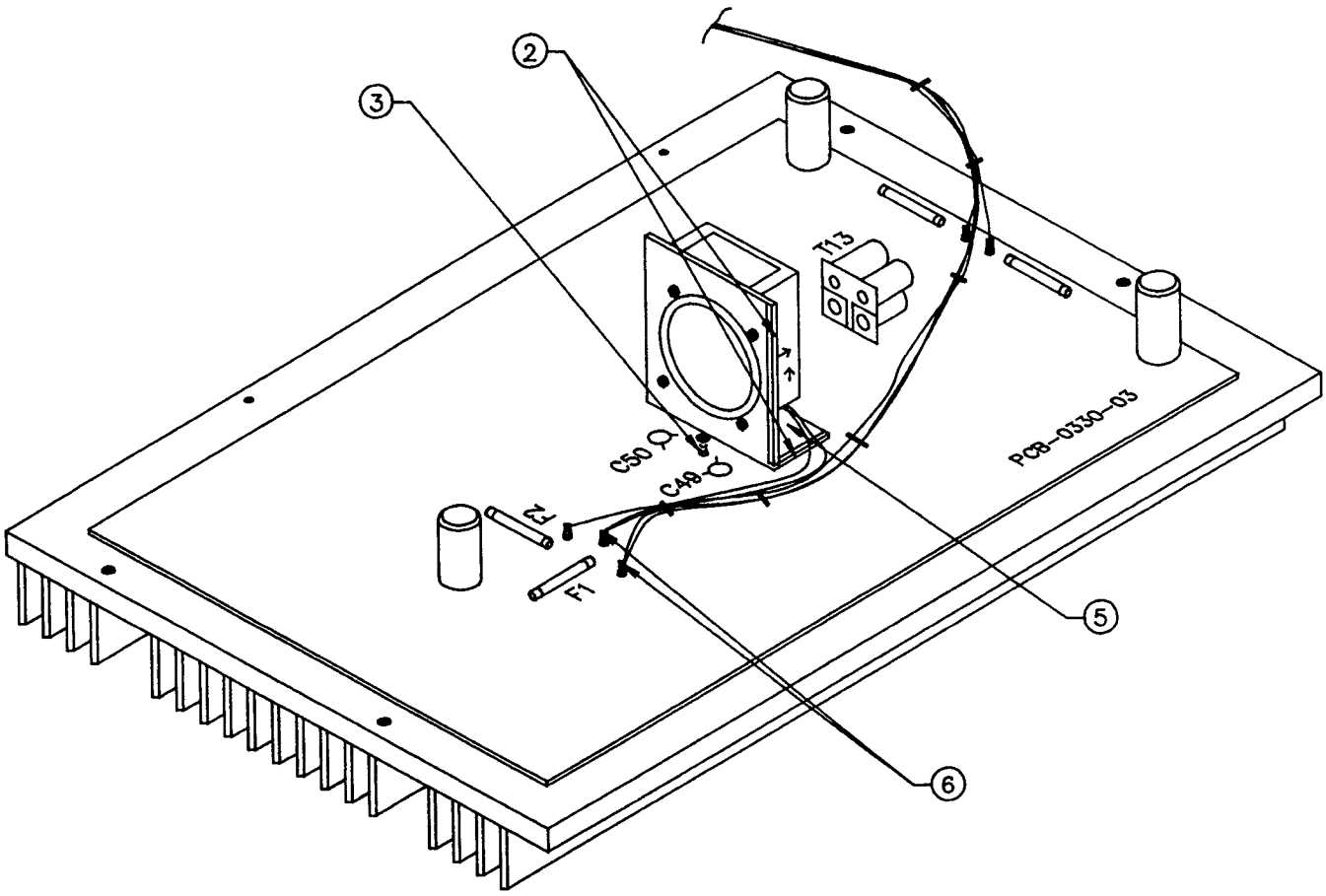
5. Using 4 6-32 x 1 inch screws with nuts and lockwashers, mount the fan to the inside of the bracket. The air flow as indicated by an arrow on the side of the fan should be towards the combiner transformer (T13), and the fan wiring should be at the bottom of the bracket.

6. Trimming the wires to reasonable lengths, solder the BLACK fan wire to the same terminal post that the BLACK wire of the power wiring harness is soldered to near F1. The RED fan wire should be similarly trimmed and soldered to the terminal post with the WHITE power wire also near F1 and C28.

7. Attach the fan wires to the wiring harness with a tie wrap.

8. Re-install the power amplifier.

   To test the fan, turn on the radio. The fan should not come on. Key the radio. The fan should come on.



SEA 330 INTERNAL FAN INSTALLATION
FIGURE 10.4

10.3.3 EXTERNAL MUTE OPTION

With the external mute board (ASY-0330-11), it is possible to mute the SEA 330 receiver external equipment, as well as mute external receiver(s) when the SEA 330 is keyed (transmitting).

The mute board must be installed in the SEABUSS line between the RX/TX unit and the controlhead. To install the mute board:

1. Connect the multicable from the controlhead to the MUTE board connector P2. Then connect the MUTE board connector P1 to the SEABUSS connector on the RX/TX unit.

2. The 3-pole connector P3 is the MUTE connector. Pin 1 is the output pin to control external equipment. Pin 2 is common ground and Pin 3 is input port to MUTE the SEA 330 receiver.

3. When the SEA 330 is keyed (transmitting), the contact in relay K1 will close and short circuit Pin1 to ground (Pin 2). Maximum ratings for the K1 relay contact is shown below.

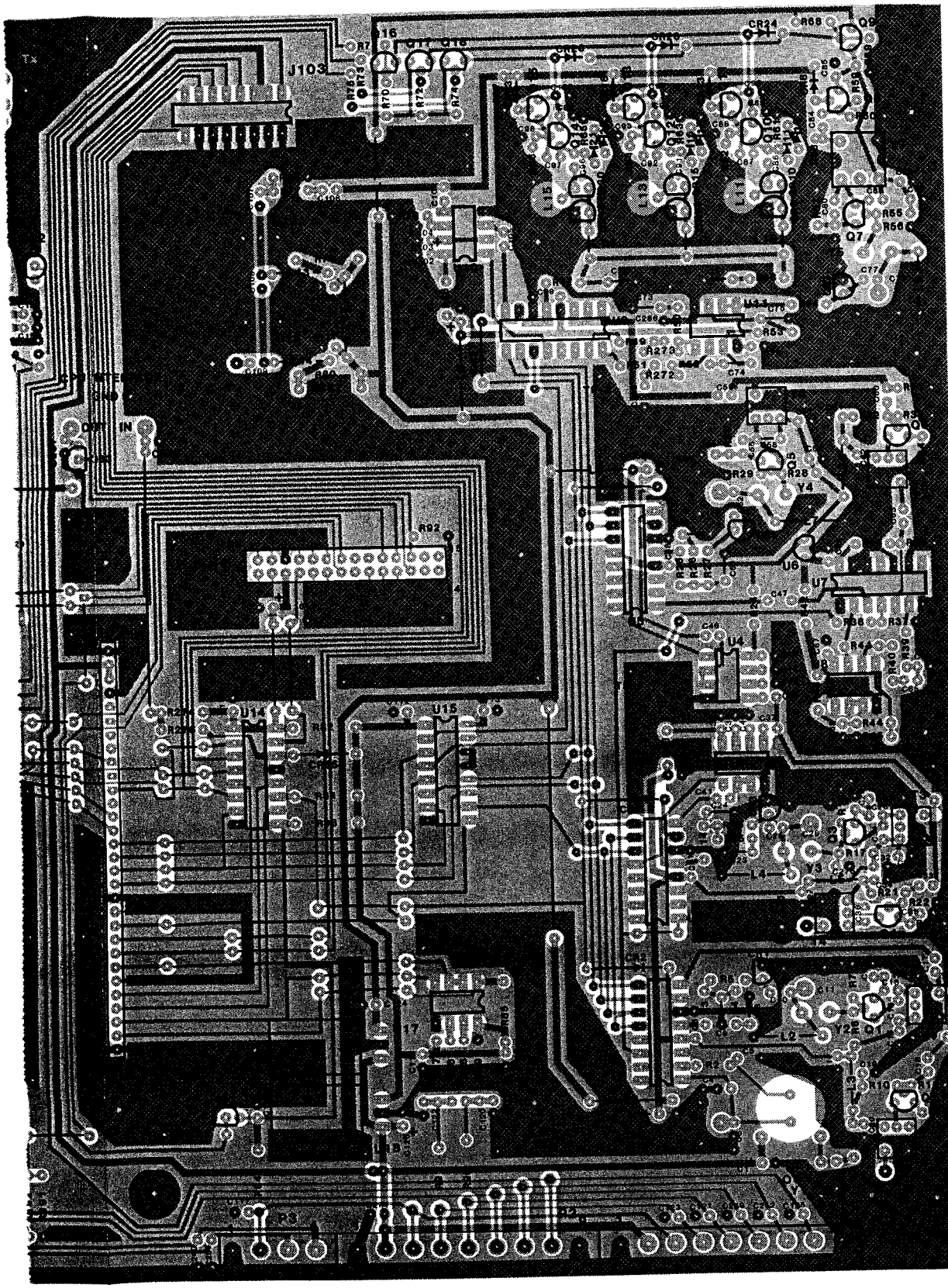
4. To MUTE the SEA 330 receiver, short circuit Pin 3 to ground (Pin 2). The contact in relay K2 and K3 will open and disconnect the SEABUSS audio lines. The receiver will be muted as long as Pin 3 is short circuit to ground.

5. Contact ratings for relay K1:

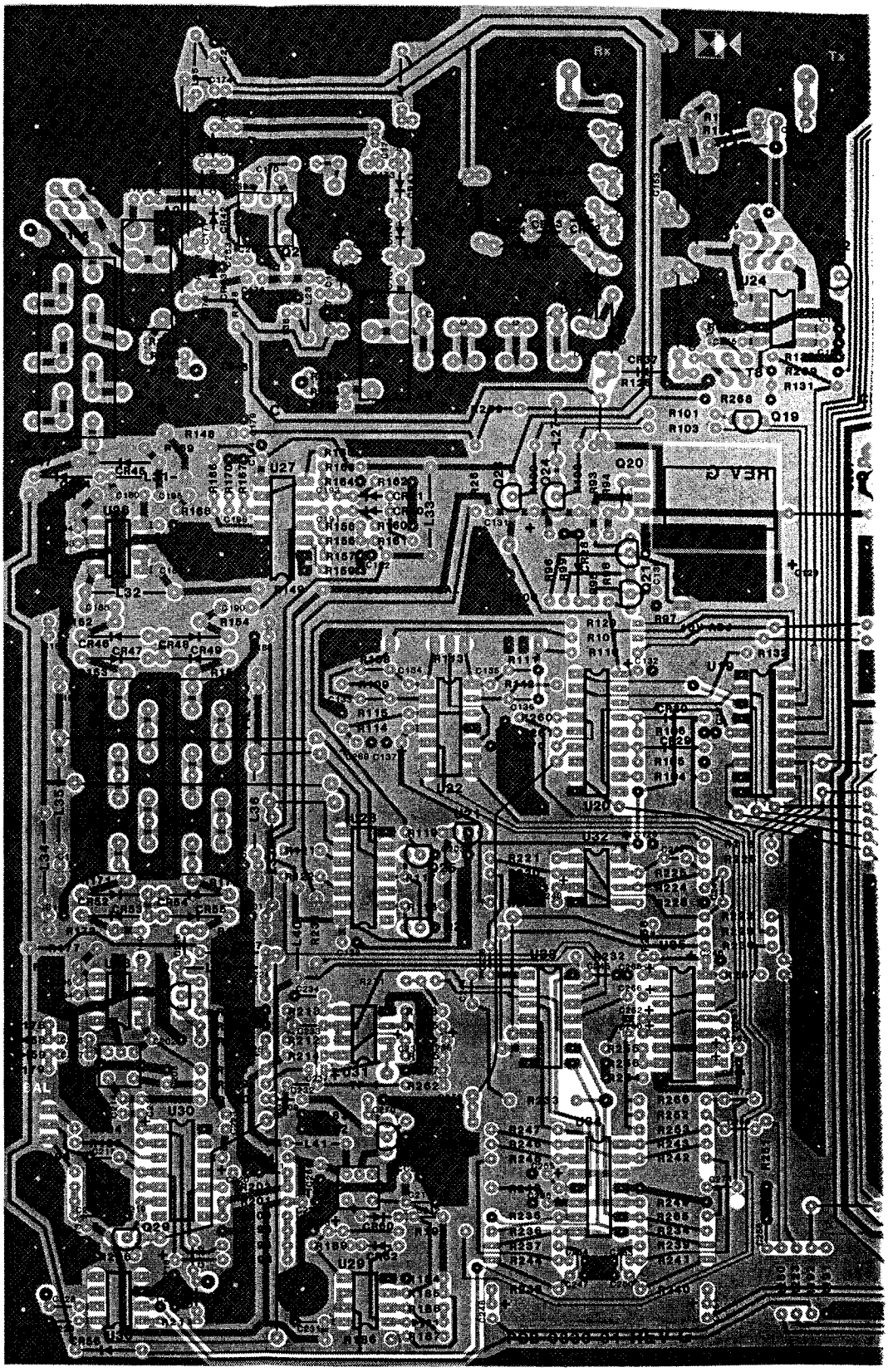
Max. switching power:	30W, 50VA
Max. switching voltage:	60V DC, 125V AC
Max. switching current:	1A DC, AC
Max. carrying current:	2A DC, AC

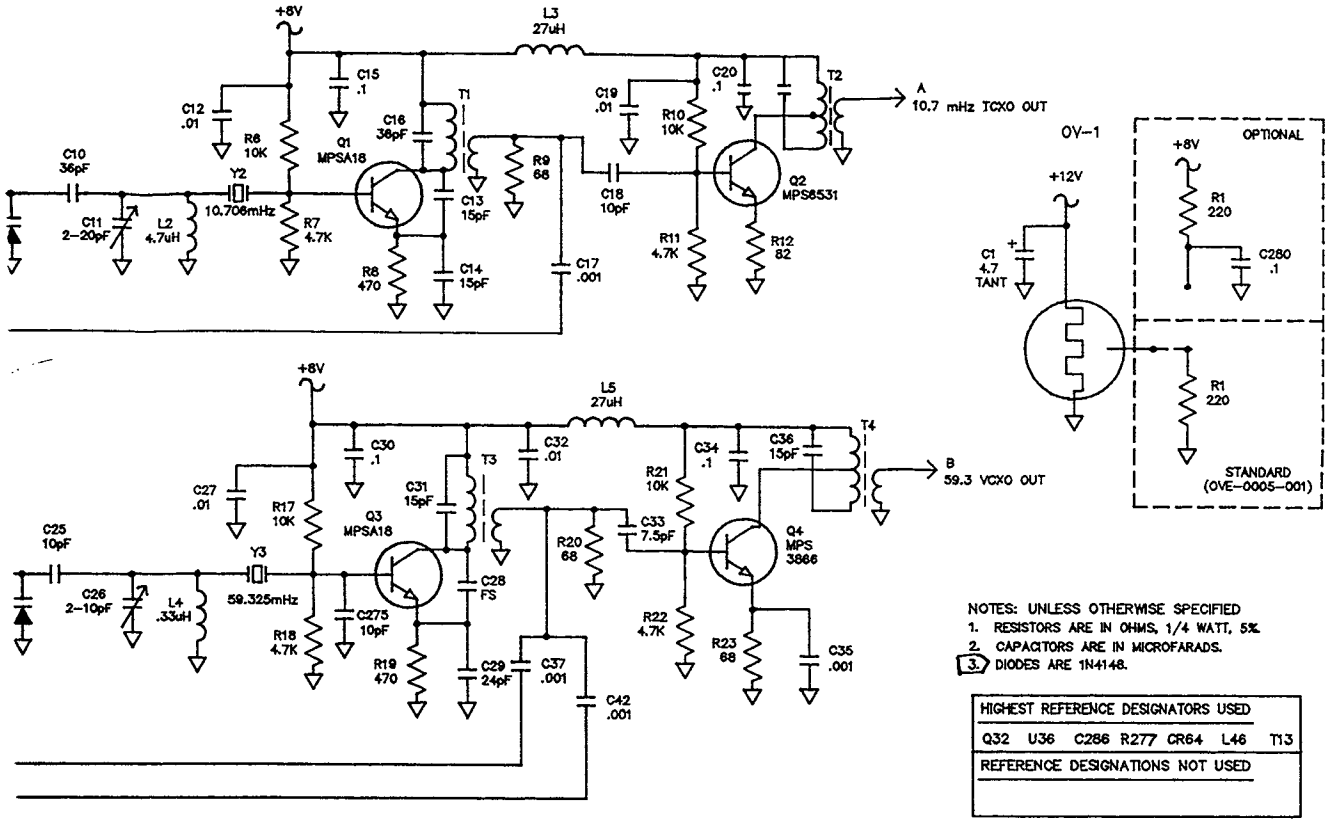
SECTION 11

SCHEMATICS AND CIRCUIT BOARD DETAILS



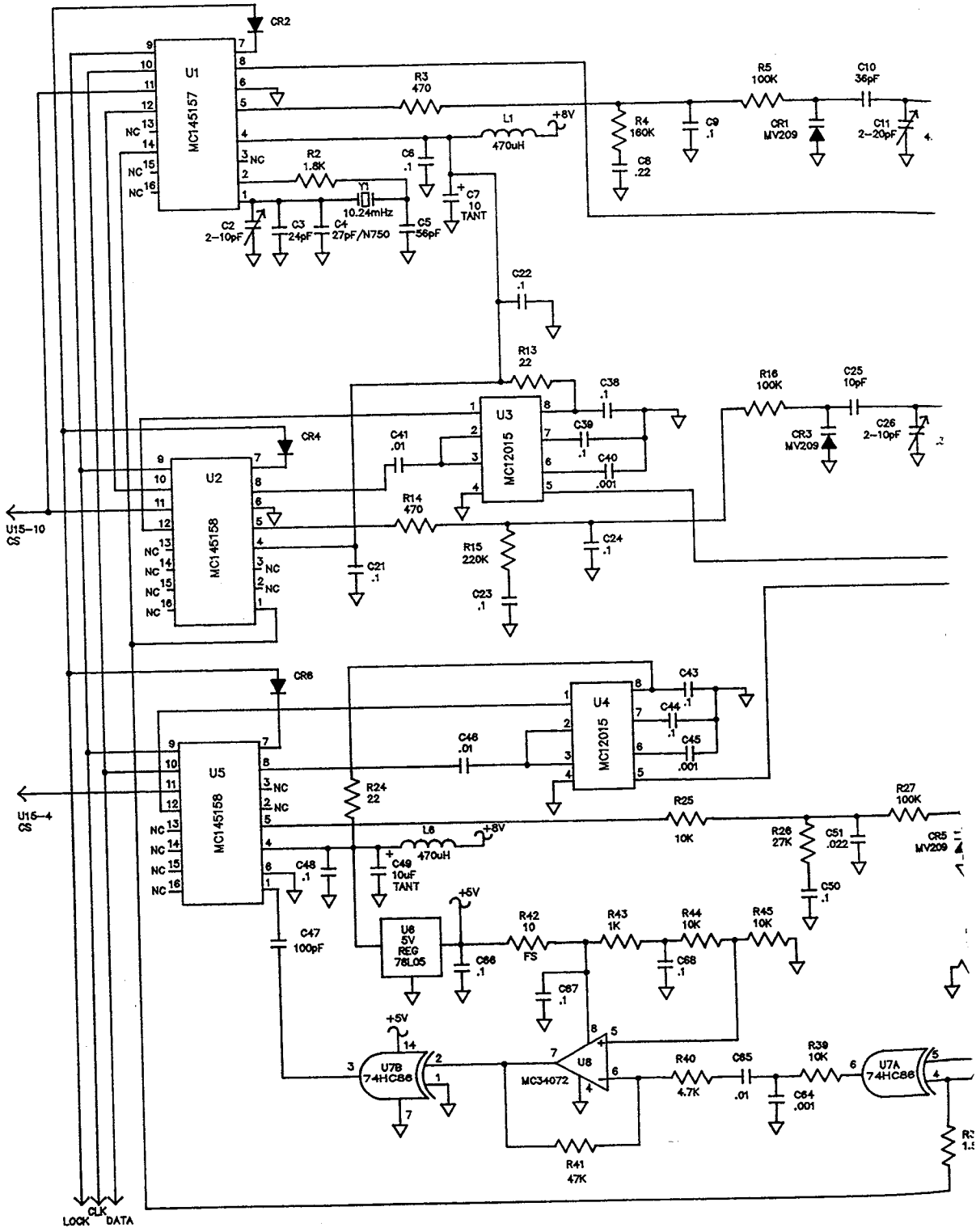
MAINBOARD
ASY-0330-01
FIGURE 11.1

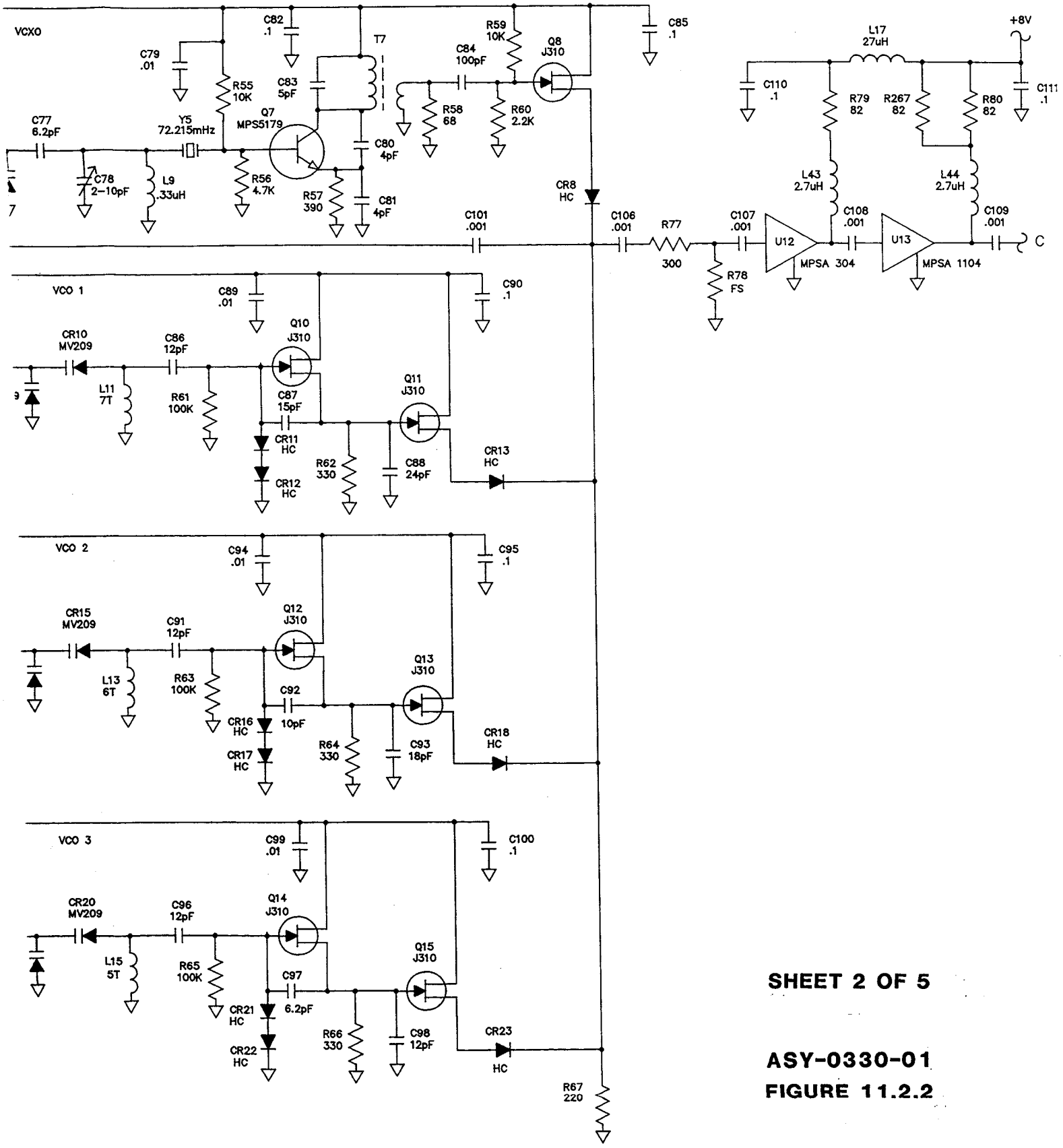

Rx
Tx
REV G



SHEET 1 OF 5

MAINBOARD
ASY-0330-01
FIGURE 11.2.1

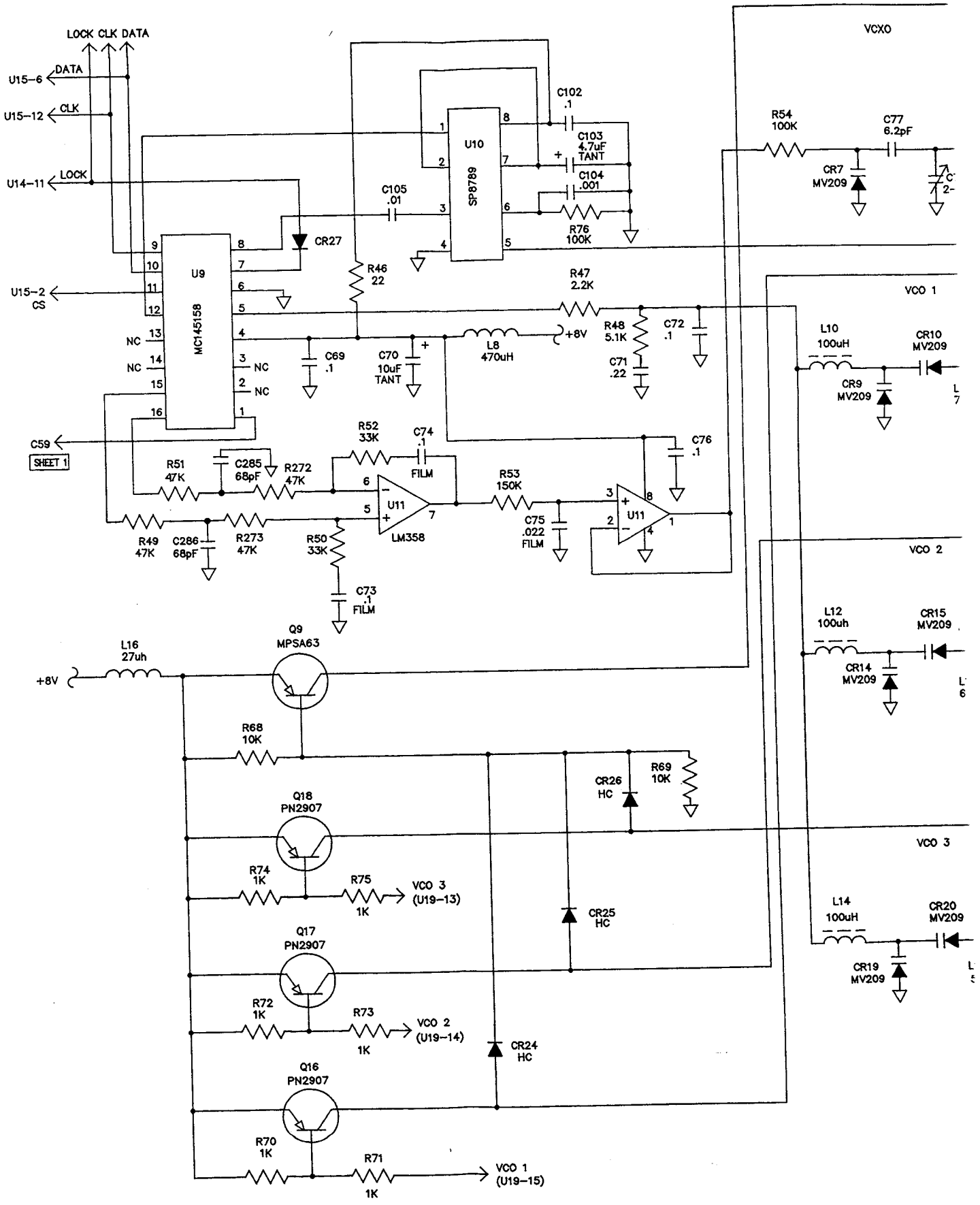

CR2
U1
MC145157
R3
470
L1
470uH
+8V
R4
160K
C8
.22
C9
.1
R5
100K
CR1
MV209
C10
36pF
C11
2-20pF
R2
1.8K
C6
.1
Y1
10.24mHz
C7
10
TANT
C2
2-10pF
C3
24pF
C4
27pF/N750
C5
56pF
C22
.1
R13
22
U3
MC12015
C38
.1
C39
.1
C40
.001
C41
.01
R16
100K
C25
10pF
CR3
MV209
C26
2-10pF
CR4
U2
MC145158
R14
470
R15
220K
C21
.1
C23
.1
C24
.1
U15-10
CR6
U4
MC12015
C43
.1
C44
.1
C45
.001
C46
.01
U5
MC145158
R24
22
R25
10K
R27
100K
R26
27K
C51
.022
C50
.1
CR5
MV209
L6
470uH
+8V
C49
10uF
TANT
C48
.1
C47
100pF
U6
5V
REG
78L05
+5V
C66
.1
R42
10
FS
R43
1K
R44
10K
R45
10K
C67
.1
C68
.1
U15-4
+5V
U7B
74HC86
U8
MC34072
R40
4.7K
C65
.01
C64
.001
R39
10K
U7A
74HC86
R41
47K
CLK
LOCK
DATA

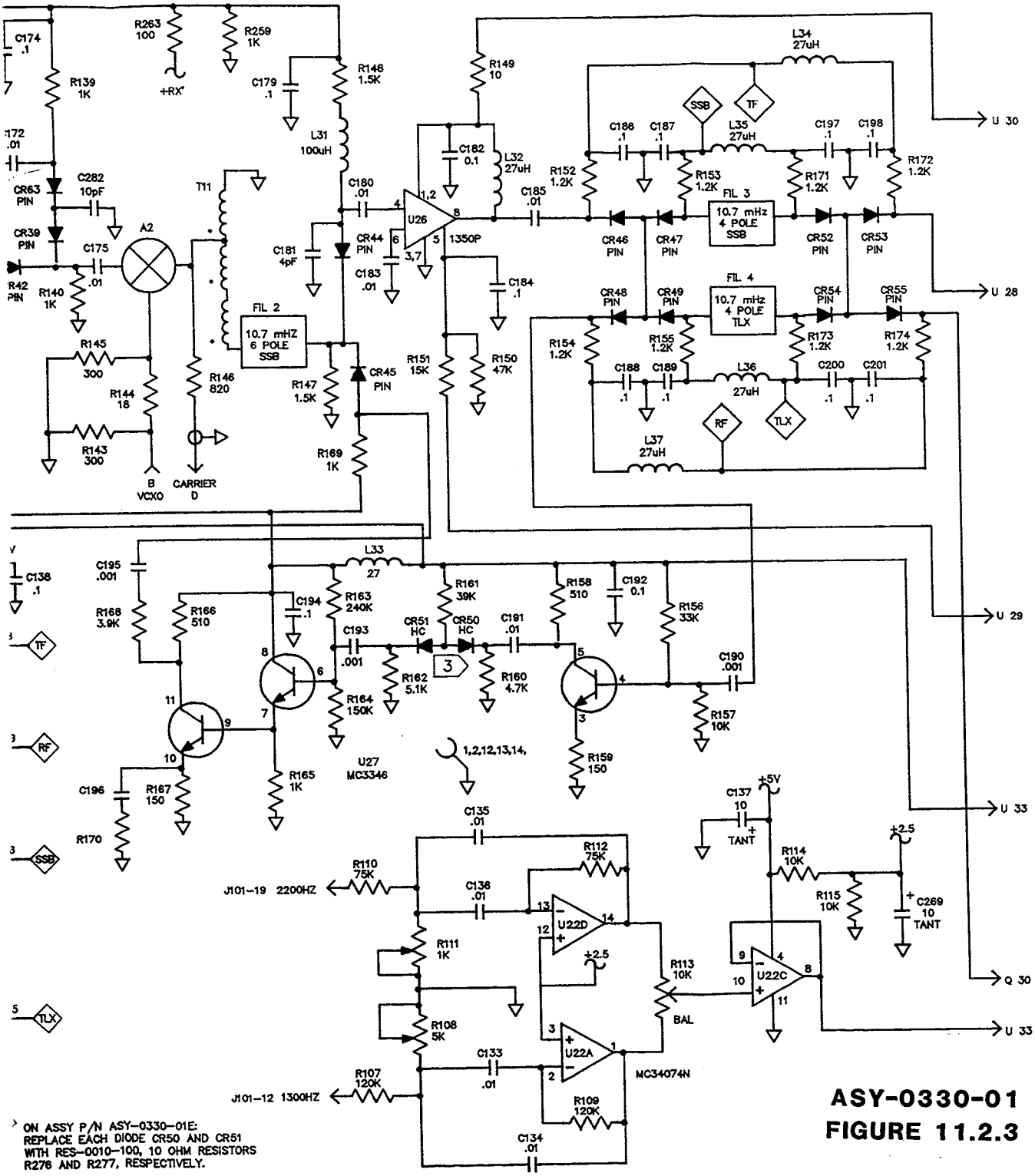


SHEET 2 OF 5

ASY-0330-01

FIGURE 11.2.2

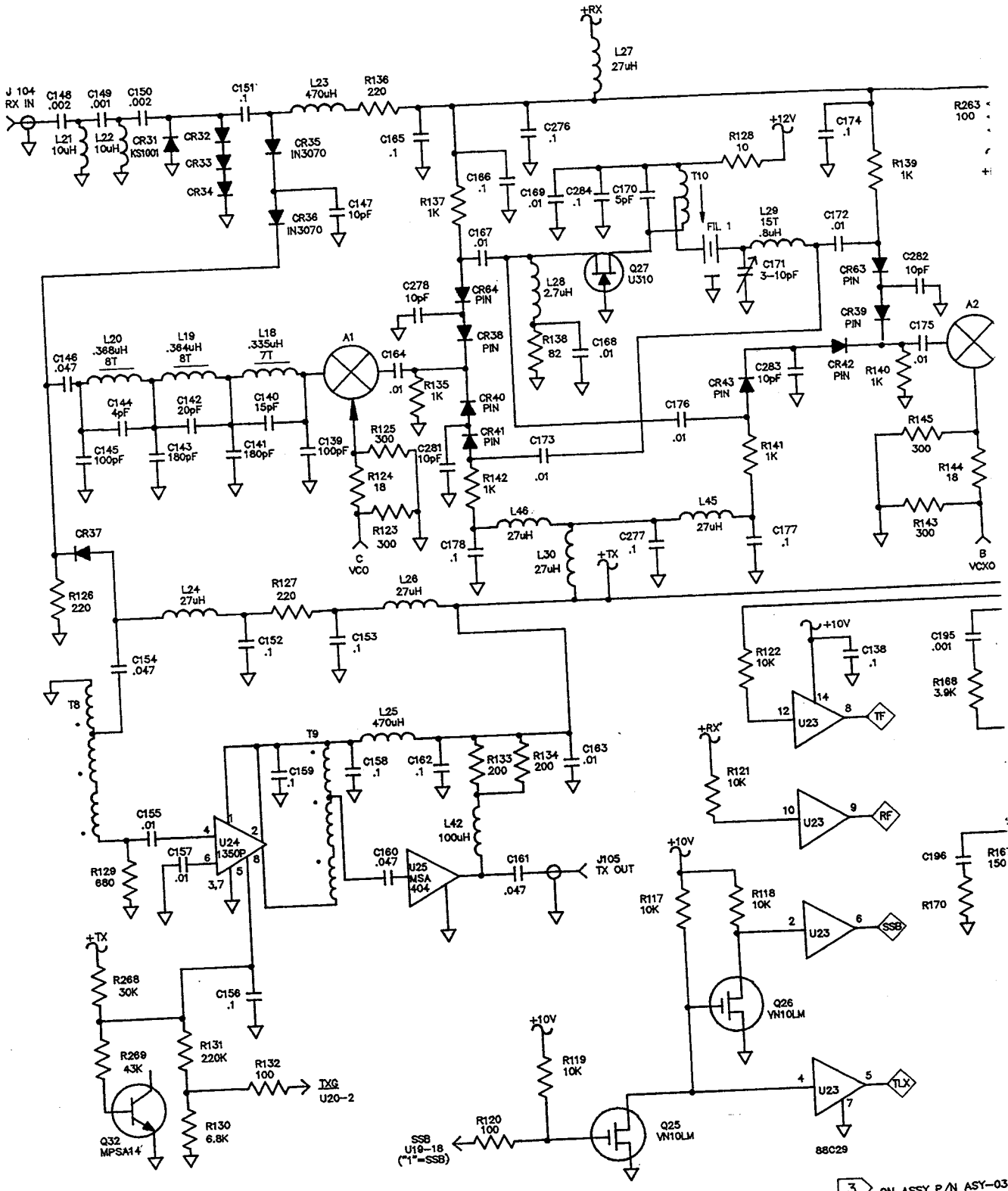

LOCK CLK DATA
U15–6 DATA
U15–12 CLK
U14–11 LOCK
U15–2 CS
C59
SHEET 1
U9
MC145158
U10
SP8789
C102 .1
C103 4.7uF TANT
C104 .001
C105 .01
R76 100K
CR27
R46 22
R47 2.2K
R48 5.1K
C72 .1
C71 .22
C69 .1
C70 10uF TANT
L8 470uH
+8V
R52 33K
C74 .1
FILM
R51 47K
C285 68pF
R272 47K
U11
LM358
R53 150K
C75 .022 FILM
C76 .1
R49 47K
C286 68pF
R273 47K
R50 33K
C73 .1 FILM
L16 27uh
Q9 MPSA63
R68 10K
CR26 HC
R69 10K
Q18 PN2907
R74 1K
R75 1K
VCO 3 (U19–13)
CR25 HC
Q17 PN2907
R72 1K
R73 1K
VCO 2 (U19–14)
CR24 HC
Q16 PN2907
R70 1K
R71 1K
VCO 1 (U19–15)
VCXO
R54 100K
C77 6.2pF
CR7 MV209
VCO 1
L10 100uH
CR10 MV209
CR9 MV209
VCO 2
L12 100uh
CR15 MV209
CR14 MV209
VCO 3
L14 100uH
CR20 MV209
CR19 MV209



ON ASSY P/N ASY-0330-01E:
REPLACE EACH DIODE CR50 AND CR51
WITH RES-0010-100, 10 OHM RESISTORS
R276 AND R277, RESPECTIVELY.

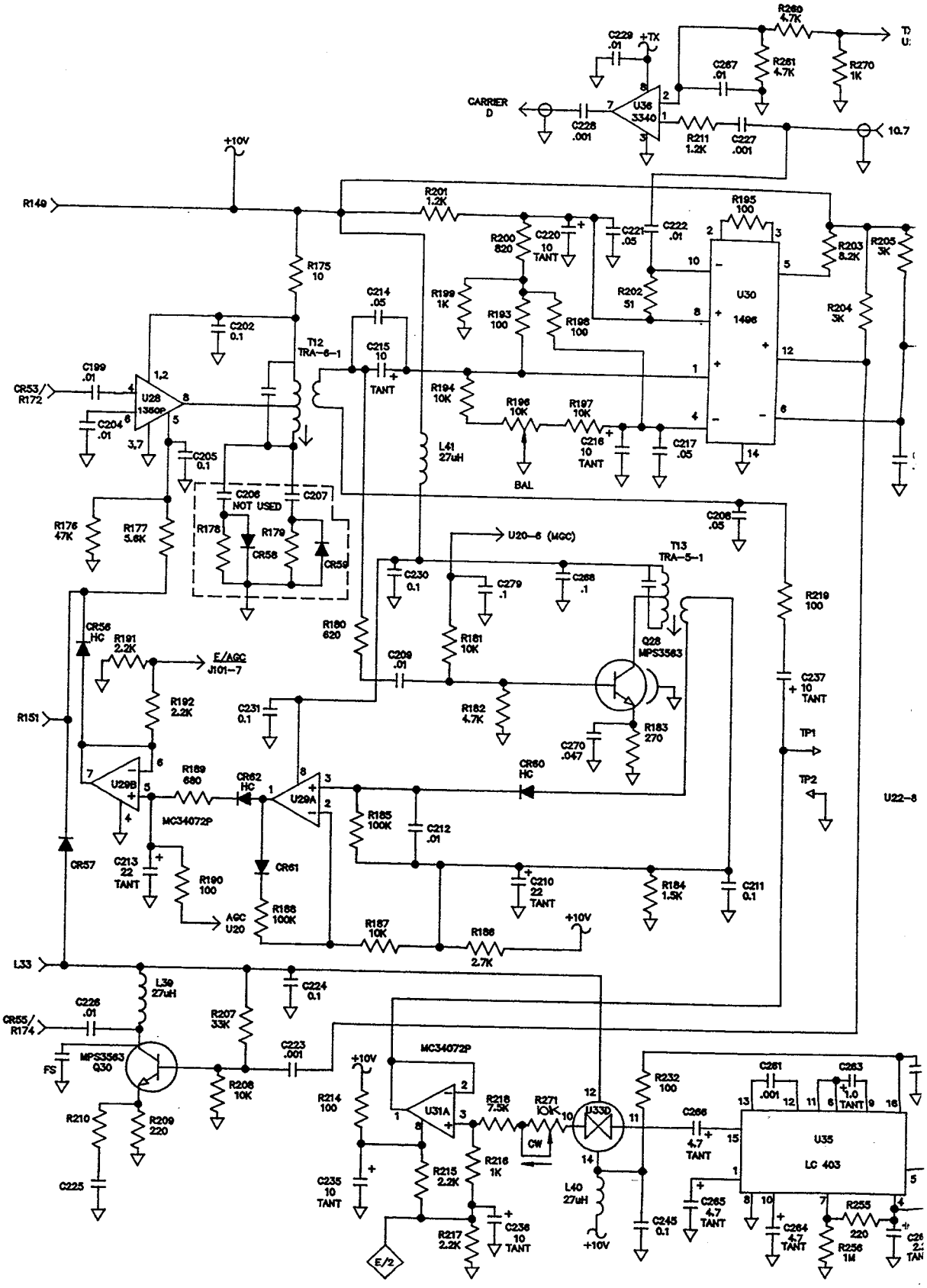
ASY-0330-01
FIGURE 11.2.3

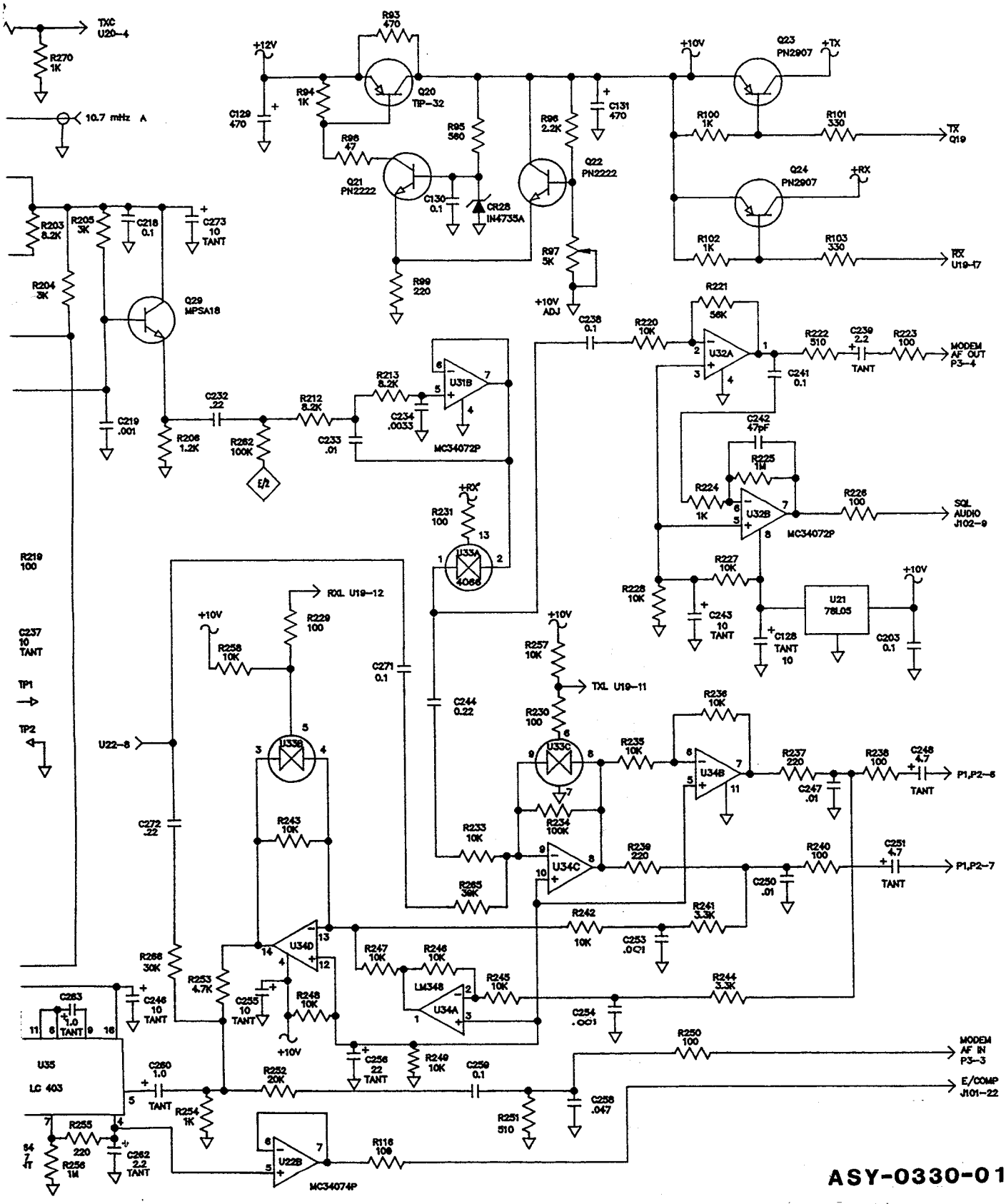
SHEET 3 OF 5



3 ON ASSY P/N ASY-033(REPLACE EACH DIODE CR WITH RES-0010-100, 10 R276 AND R277, RESPEC

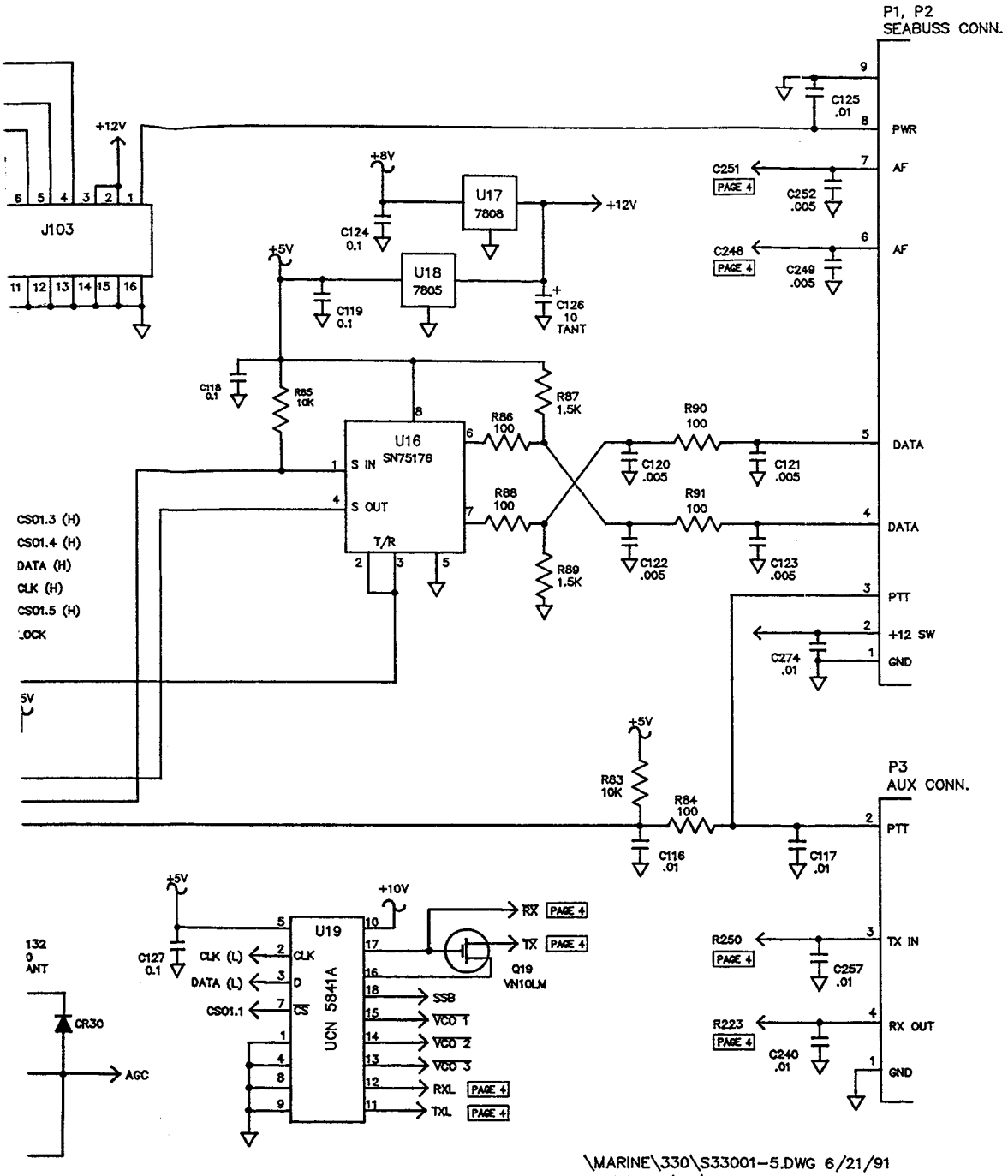
SHEET 3 C


R260 4.7K
C229 .01
+TX
C267 .01
R261 4.7K
R270 1K
CARRIER D
C228 .001
U36 3340
R211 1.2K
C227 .001
10.7
+10V
R149
R201 1.2K
R195 100
R200 820
C220 10 TANT
C221 .05
C222 .01
R203 8.2K
R205 3K
R175 10
C214 .05
R199 1K
R193 100
R198 100
R202 51
U30 1496
R204 3K
C202 0.1
T12 TRA-6-1
C215 10 TANT
C199 .01
CR53/ R172
U28 1350P
C204 .01
C205 0.1
R194 10K
R196 10K
R197 10K
C216 10 TANT
C217 .05
BAL
L41 27uH
C206 NOT USED
C207
R176 47K
R177 5.6K
R178
CR58
R179
CR59
C208 .05
U20-6 (MGC)
T13 TRA-5-1
C230 0.1
C279 .1
C268 .1
R219 100
R180 620
R181 10K
Q28 MPS3563
CR56 HC
R191 2.2K
E/AGC J101-7
C209 .01
C237 10 TANT
R192 2.2K
R151
C231 0.1
R182 4.7K
R183 270
C270 .047
TP1
TP2
CR60 HC
U22-8
U29B
R189 680
CR62 HC
U29A
MC34072P
R185 100K
C212 .01
CR57
C213 22 TANT
R190 100
CR61
C210 22 TANT
R184 1.5K
C211 0.1
AGC U20
R188 100K
R187 10K
R186 2.7K
+10V
L33
L39 27uH
C224 0.1
C226 .01
CR55/ R174
R207 33K
C223 .001
MPS3563 Q30
FS
R208 10K
MC34072P
+10V
R214 100
U31A
R218 7.5K
R271 10K
CW
U33B
R232 100
C261 .001
C263 1.0 TANT
C266 4.7 TANT
U35 LC 403
R210
R209 220
C225
C235 10 TANT
R215 2.2K
R216 1K
L40 27uH
C245 0.1
C265 4.7 TANT
C264 4.7 TANT
R255 220
R256 1M
R217 2.2K
C236 10 TANT
E/2
+10V



ASY-0330-01

SHEET 4 OF 5 **FIGURE 11.2.4**



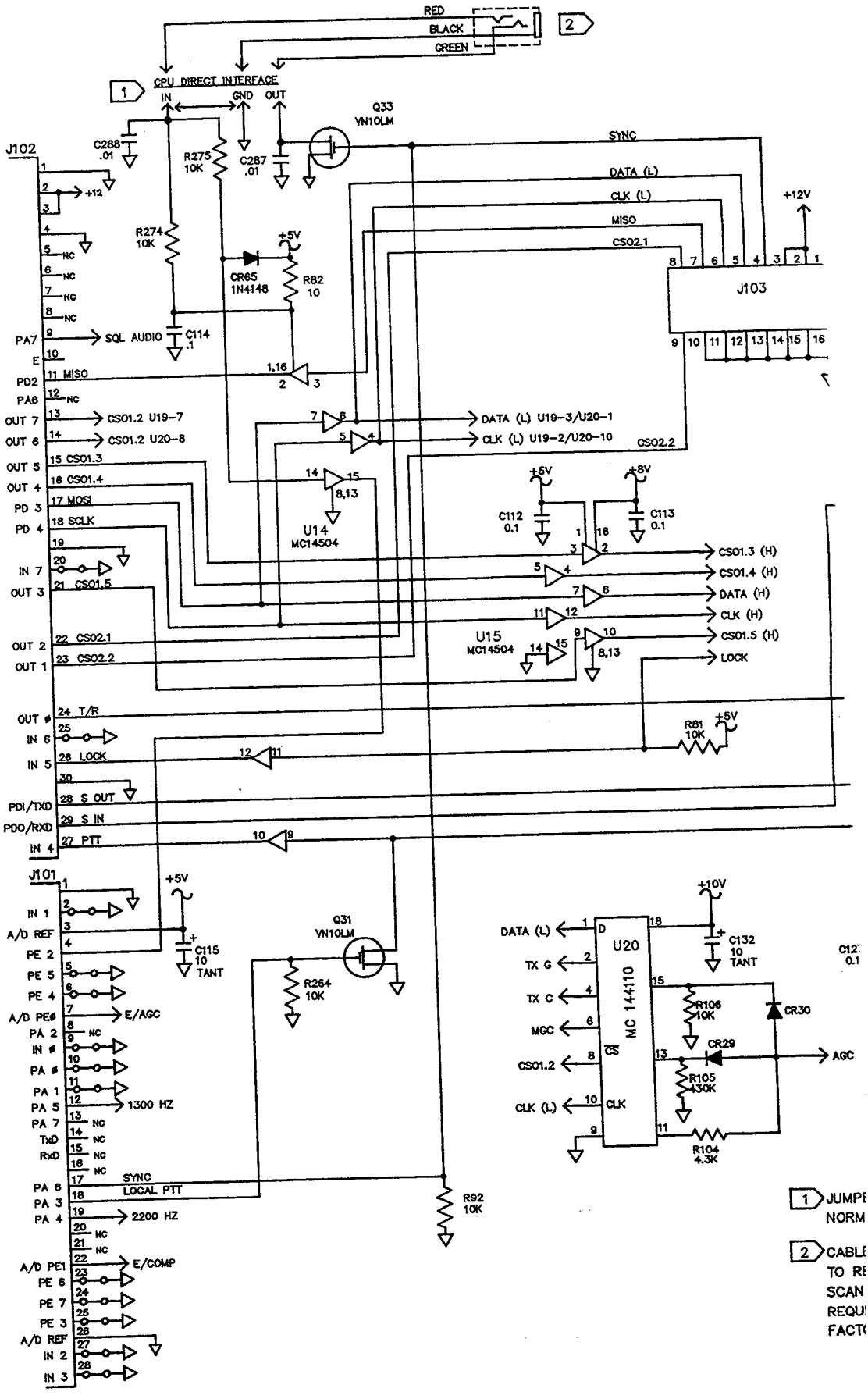
\MARINE\330\S33001-5.DWG 6/21/91
REVISED 1/13/92
ECN 5168 REV 12/28/93

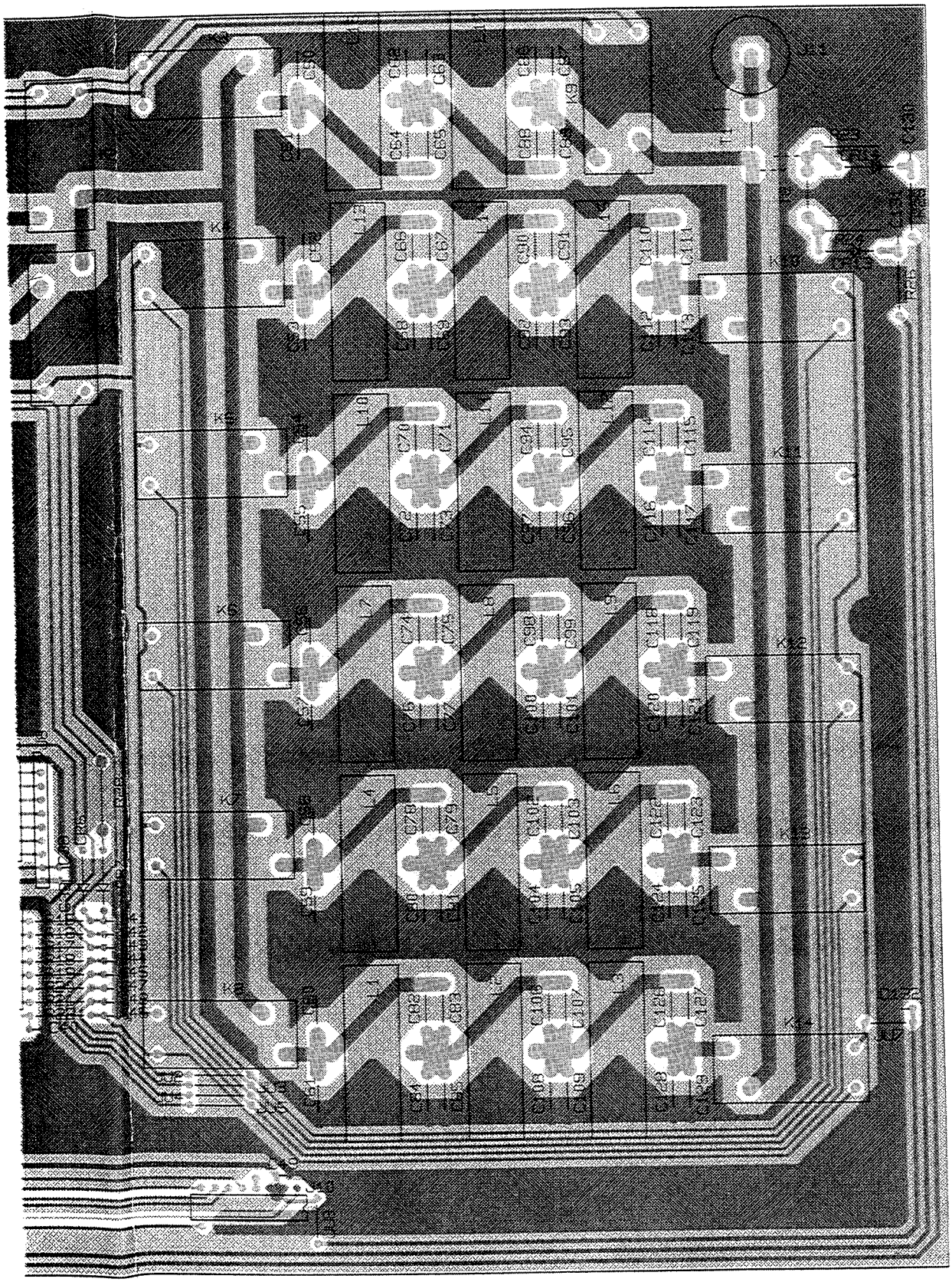
SHEET 5 OF 5

1. JUMPER FROM "IN" TO "GND" REQUIRED FOR NORMAL SCAN OPERATION (STANDARD CONFIGURATION).

2. CABLE ASSEMBLY, P/N ASY-0330-CPU, TO REAR PANEL OR CHASSIS REQUIRED FOR REMOTE SCAN CONTROL OPERATION OR OTHER OPTIONS WHICH REQUIRE DIRECT INTERFACE TO THE CPU. CONSULT FACTORY FOR DETAILS.

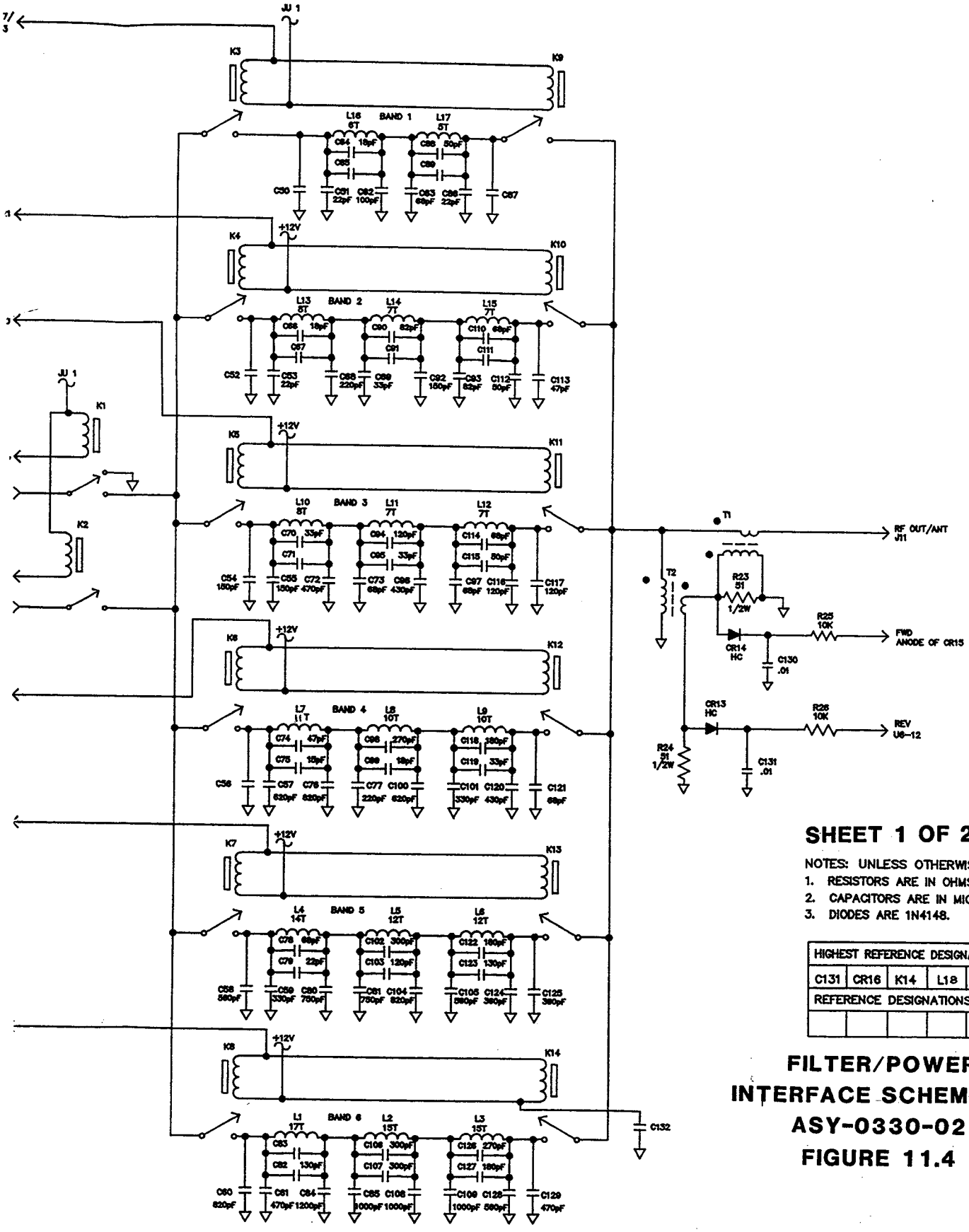
MAINBOARD/CPU INTERFACE CIRCUITRY ASY-0330-01 FIGURE 11.2.5


RED
BLACK
GREEN
2
1
CPU DIRECT INTERFACE
IN
GND
OUT
Q33
VN10LM
J102
C288
.01
R275
10K
C287
.01
SYNC
DATA (L)
CLK (L)
MISO
CS02.1
+12V
J103
+12
R274
10K
+5V
CR65
1N4148
R82
10
NC
PA7
SQL AUDIO
C114
.1
E
PD2
MISO
PA6
OUT 7
CS01.2 U19-7
OUT 6
CS01.2 U20-8
DATA (L) U19-3/U20-1
CLK (L) U19-2/U20-10
CS02.2
OUT 5
CS01.3
OUT 4
CS01.4
PD 3
MOSI
PD 4
SCLK
U14
MC14504
+5V
+8V
C112
0.1
C113
0.1
IN 7
OUT 3
CS01.5
CS01.3 (H)
CS01.4 (H)
DATA (H)
CLK (H)
CS01.5 (H)
LOCK
U15
MC14504
OUT 2
CS02.1
OUT 1
CS02.2
OUT ø
T/R
IN 6
IN 5
LOCK
R81
10K
+5V
PDI/TXD
S OUT
PDO/RXD
S IN
IN 4
PTT
J101
IN 1
A/D REF
PE 2
PE 5
PE 4
A/D PEø
E/AGC
PA 2
IN ø
PA ø
PA 1
PA 5
1300 HZ
PA 7
TxD
RxD
PA 6
SYNC
PA 3
LOCAL PTT
PA 4
2200 HZ
A/D PE1
E/COMP
PE 6
PE 7
PE 3
A/D REF
IN 2
IN 3
+5V
C115
10
TANT
Q31
VN10LM
R264
10K
R92
10K
+10V
C132
10
TANT
DATA (L)
TX G
TX C
MGC
CS01.2
CLK (L)
U20
MC 144110
CR30
CR29
AGC
R106
10K
R105
430K
R104
4.3K
1 JUMPE
NORM
2 CABLE
TO RE
SCAN
REQUI
FACTO



FILTER/POWER INTERFACE BOARD ASY-0330-02 FIGURE 11.3

PCB-0330-02 REV C
MADE IN USA



SHEET 1 OF 2

NOTES: UNLESS OTHERWISE SPECIFIED

1. RESISTORS ARE IN OHMS, 1/4 WATT, 5%.
2. CAPACITORS ARE IN MICROFARADS.
3. DIODES ARE 1N4148.

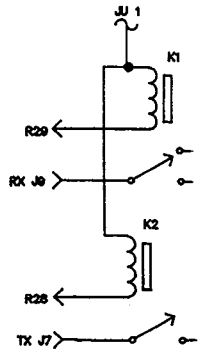
HIGHEST REFERENCE DESIGNATIONS USED					
C131	CR16	K14	L18	R31	U11
REFERENCE DESIGNATIONS NOT USED					

FILTER/POWER INTERFACE SCHEMATIC ASY-0330-02 FIGURE 11.4

R17/
C43

R21

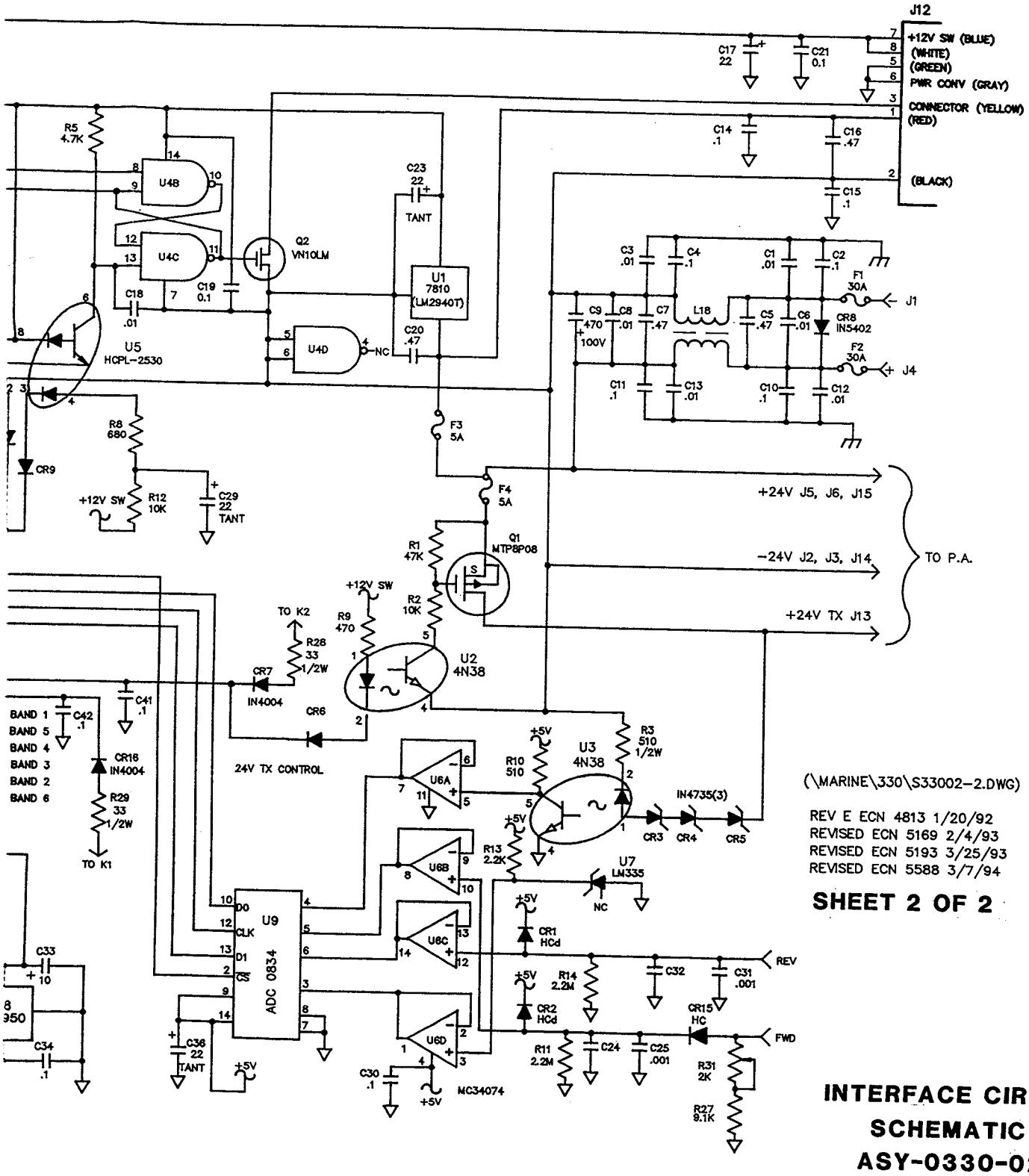
R20



R19

R18

R22



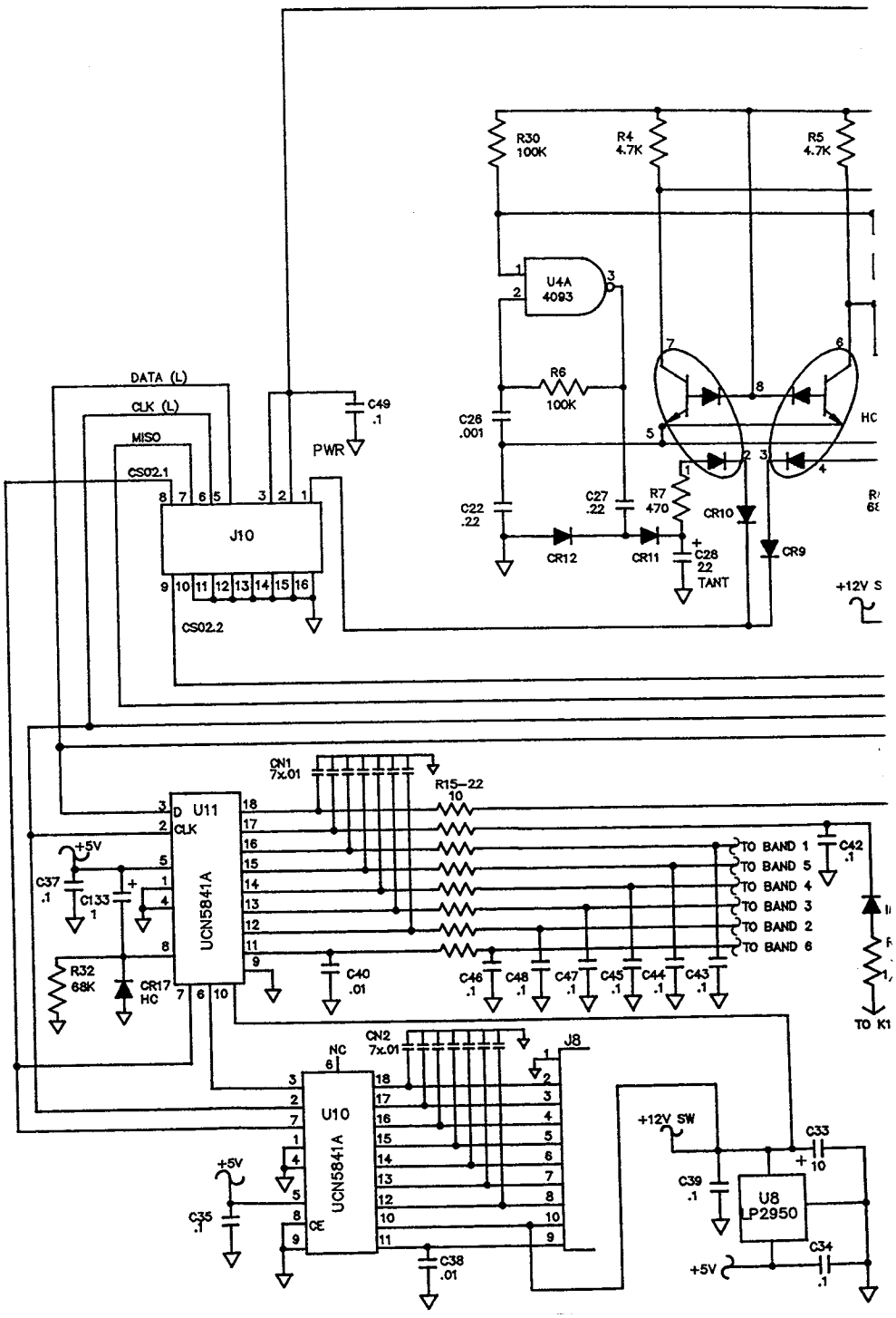
(\MARINE\330\S33002-2.DWG)

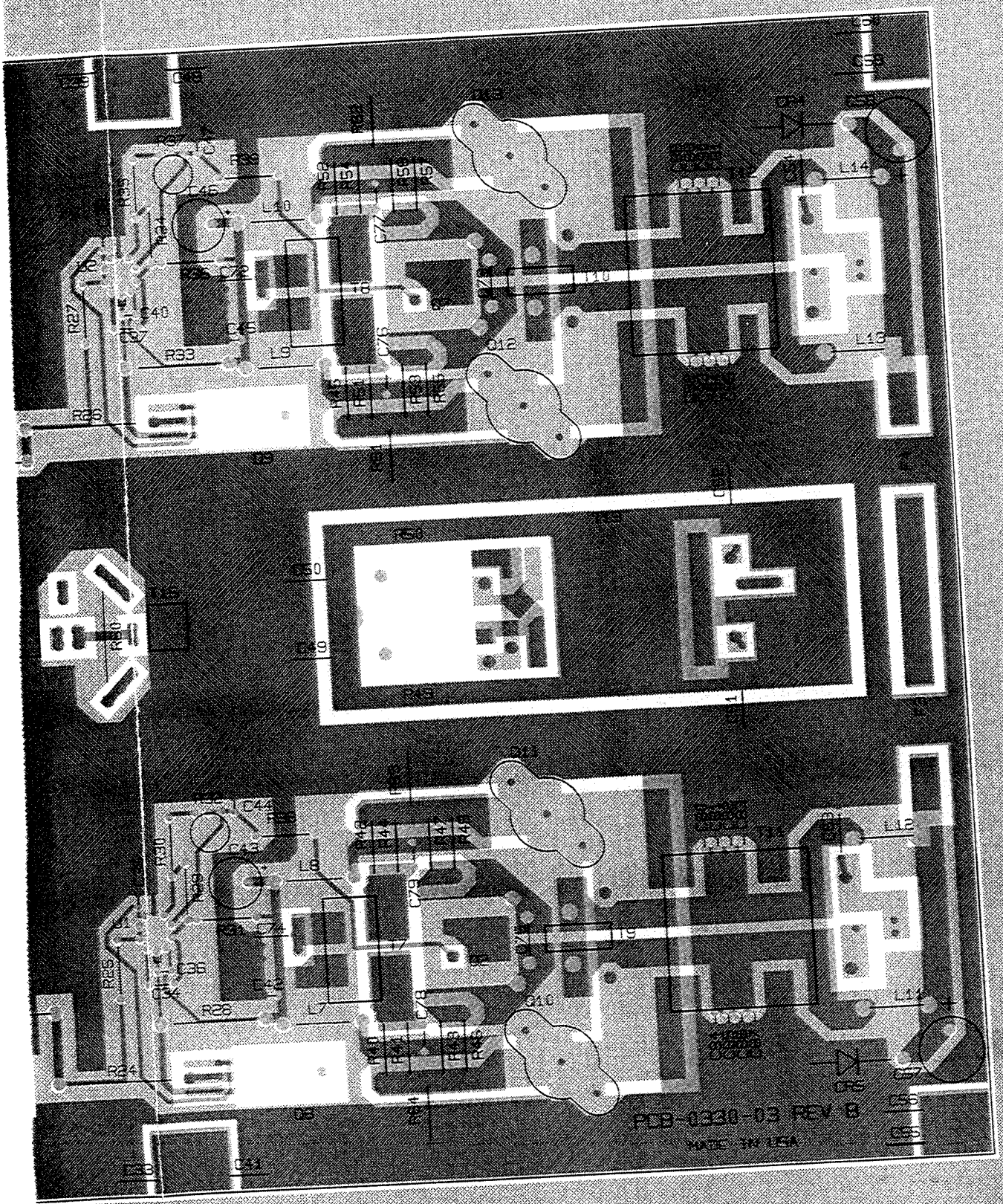
REV E ECN 4813 1/20/92
REVISED ECN 5169 2/4/93
REVISED ECN 5193 3/25/93
REVISED ECN 5588 3/7/94

SHEET 2 OF 2

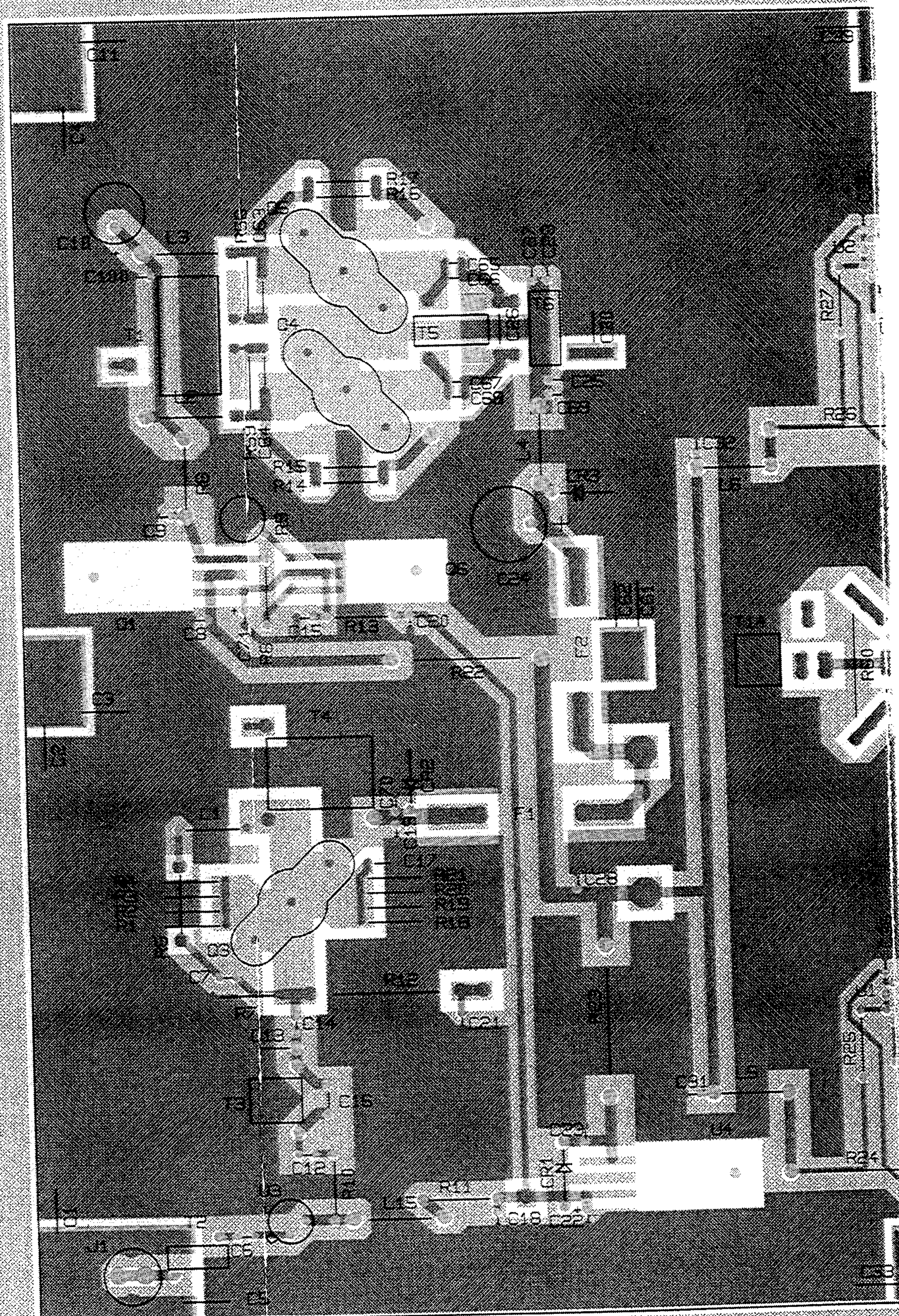
INTERFACE CIRCUITRY SCHEMATIC ASY-0330-02

FIGURE 11.5

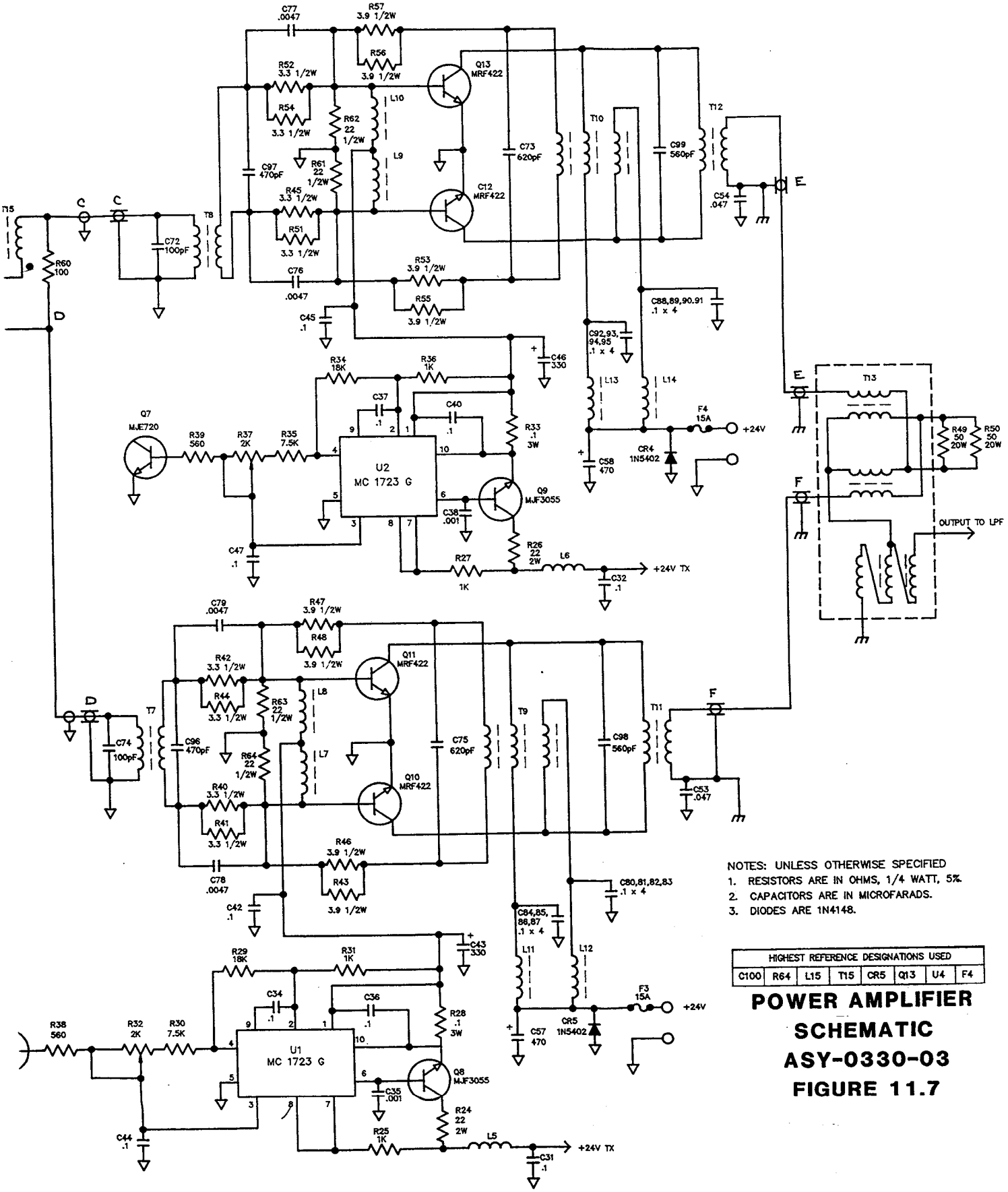

R30
100K
R4
4.7K
R5
4.7K
U4A
4093
R6
100K
C26
.001
C22
.22
C27
.22
R7
470
CR10
CR12
CR11
C28
22
TANT
CR9
DATA (L)
CLK (L)
MISO
CS02.1
J10
CS02.2
C49
.1
PWR
+12V S
CN1
7x01
R15-22
10
U11
D
CLK
UCN5841A
+5V
C37
.1
C133
1
R32
68K
CR17
HC
C40
.01
C46
.1
C48
.1
C47
.1
C45
.1
C44
.1
C43
.1
TO BAND 1
TO BAND 5
TO BAND 4
TO BAND 3
TO BAND 2
TO BAND 6
C42
.1
TO K1
CN2
7x01
J8
NC
U10
UCN5841A
OE
C35
.1
C38
.01
+12V SW
C33
10
C39
.1
U8
LP2950
C34
.1
+5V



POWER AMPL
BOARD
ASY-0330-
FIGURE 11



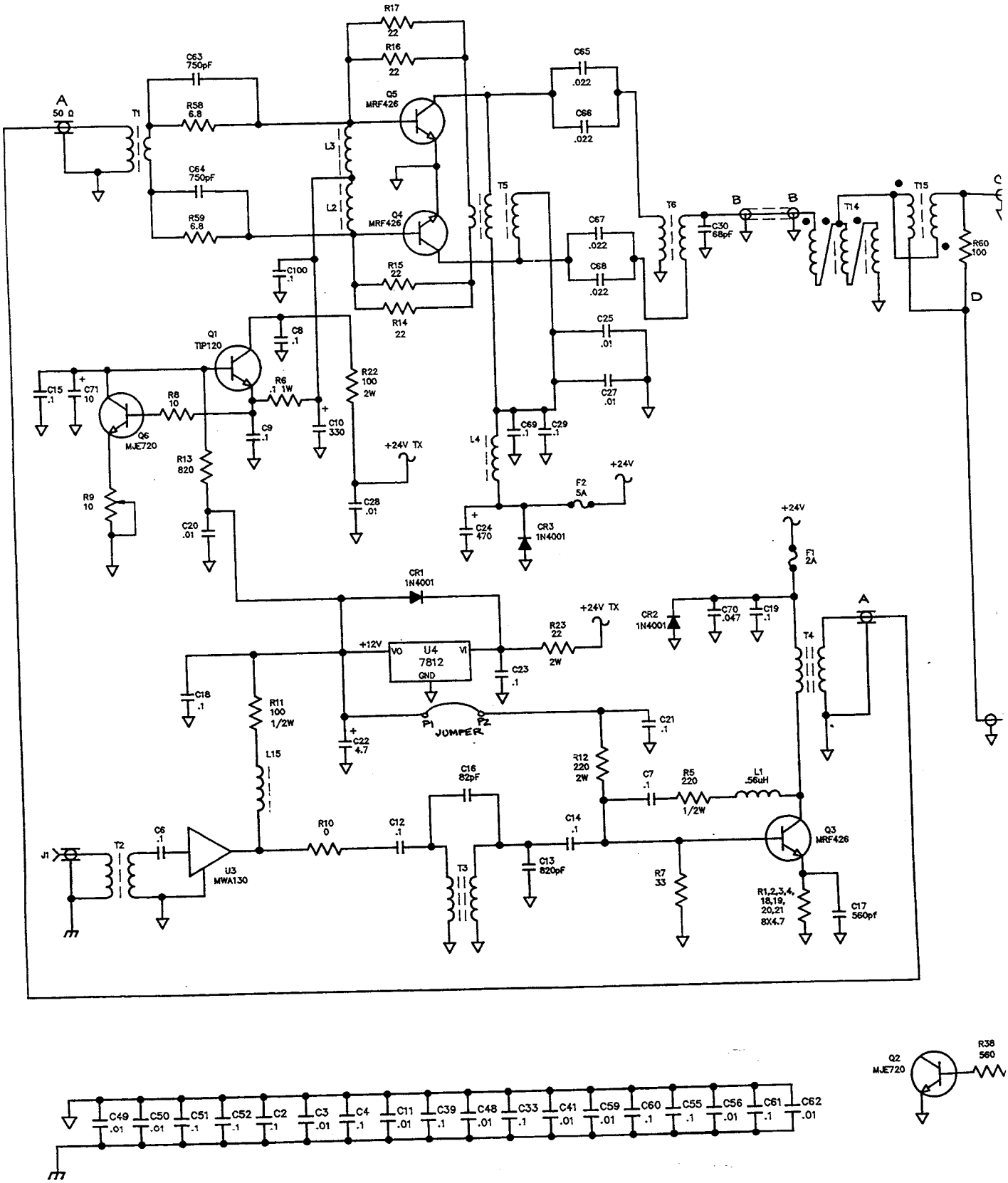
C11
C18
C100
L3
R17
R16
C4
C25
C20
R15
R14
C9
Q1
Q6
C24
CR3
L6
R26
R27
C8
R13
R22
F2
C3
T4
C1
F1
C17
R19
R18
C28
C7
R12
C21
C14
C13
C15
T3
C12
R10
L15
R11
C22
CR1
U4
C31
R24
R25
J1
C6
C5
C33



NOTES: UNLESS OTHERWISE SPECIFIED
1. RESISTORS ARE IN OHMS, 1/4 WATT, 5%.
2. CAPACITORS ARE IN MICROFARADS.
3. DIODES ARE 1N4148.

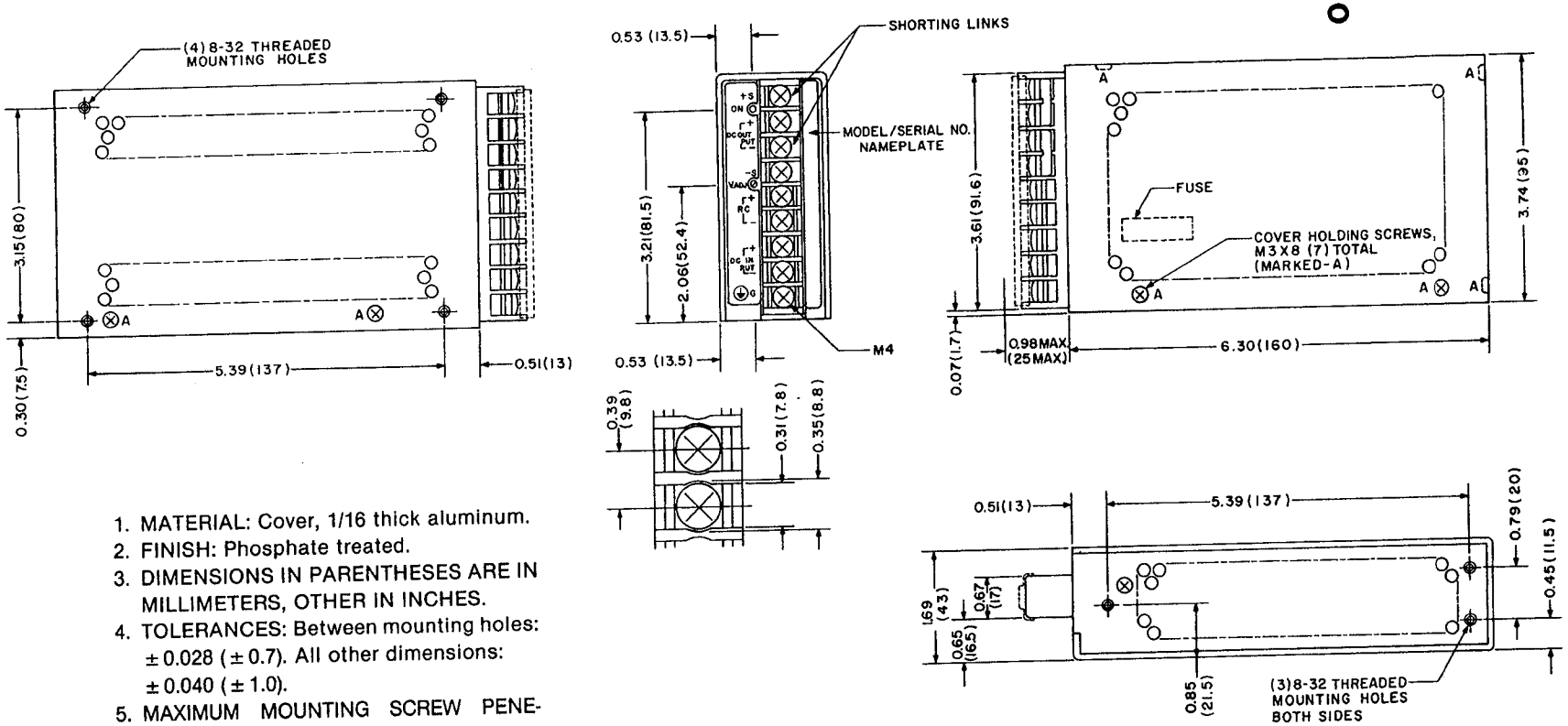
HIGHEST REFERENCE DESIGNATIONS USED							
C100	R64	L15	T15	CR5	Q13	U4	F4

POWER AMPLIFIER SCHEMATIC ASY-0330-03 FIGURE 11.7


A
50 Ω
T1
C63
750pF
R58
6.8
C64
750pF
R59
6.8
R17
22
R16
22
Q5
MRF426
Q4
MRF426
L3
L2
C65
.022
C66
.022
T5
T6
C67
.022
C68
.022
C30
68pF
B
B
T14
T15
R60
100
C
D
C100
.1
R15
22
R14
22
C8
.1
Q1
TIP120
C25
.01
C27
.01
C15
.1
C71
10
R8
10
Q6
MJE720
R6
.1 1W
R22
100
2W
C9
.1
C10
330
+24V TX
C69
.1
C29
.1
L4
+24V
F2
5A
R13
820
R9
10
C20
.01
C28
.01
C24
470
CR3
1N4001
+24V
F1
2A
CR1
1N4001
+24V TX
R23
22
2W
+12V
U4
7812
VI
VO
GND
C23
.1
CR2
1N4001
C70
.047
C19
.1
A
T4
C18
.1
R11
100
1/2W
C22
4.7
P1
JUMPER
P2
C21
.1
L15
C16
82pF
R12
220
2W
C7
.1
R5
220
1/2W
L1
.56uH
J1
T2
C6
.1
U3
MWA130
R10
0
C12
.1
T3
C13
820pF
C14
.1
Q3
MRF426
R7
33
R1,2,3,4,
18,19,
20,21
8X4.7
C17
560pf
Q2
MJE720
R38
560
C49
.01
C50
.01
C51
.1
C52
.1
C2
.1
C3
.01
C4
.1
C11
.01
C39
.1
C48
.01
C33
.1
C41
.01
C59
.01
C60
.1
C55
.1
C56
.01
C61
.1
C62
.01

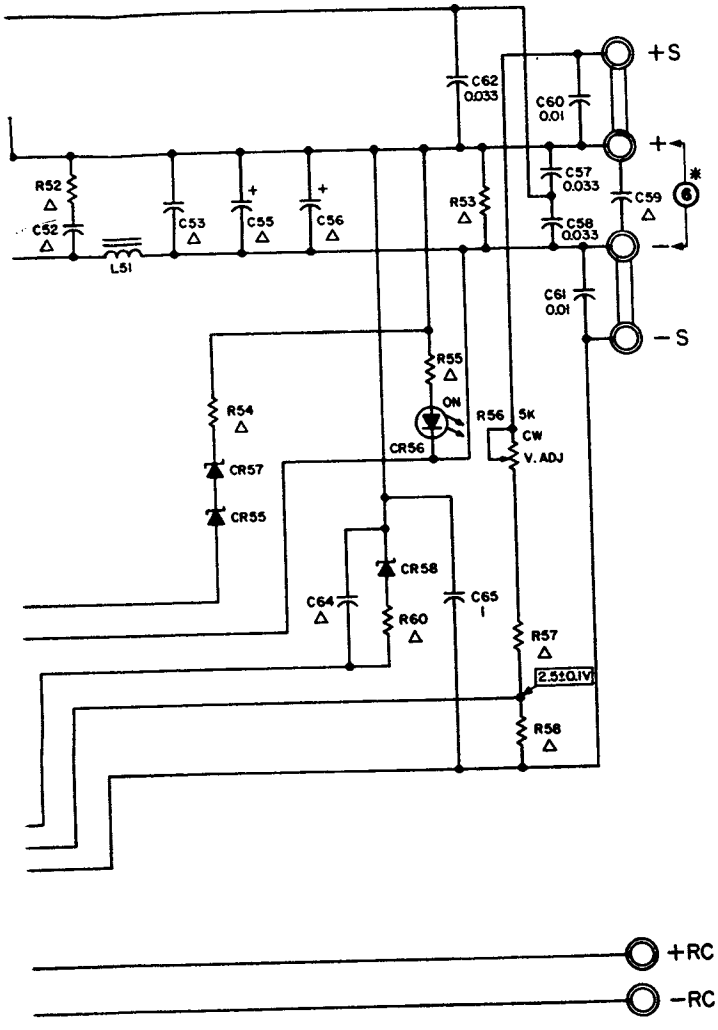
ERD60W—02-2087

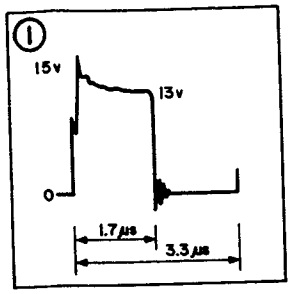
POWER SUPPLY
OUTLINE DIMENSIONS
POS-0024-012
FIGURE 11.8

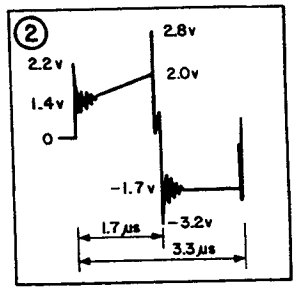


1. MATERIAL: Cover, 1/16 thick aluminum.
2. FINISH: Phosphate treated.
3. DIMENSIONS IN PARENTHESES ARE IN MILLIMETERS, OTHER IN INCHES.
4. TOLERANCES: Between mounting holes: ±0.028 (±0.7). All other dimensions: ±0.040 (±1.0).
5. MAXIMUM MOUNTING SCREW PENETRATION: 0.28 (7).

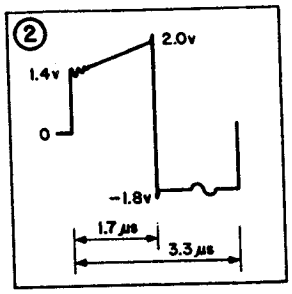
FIGURE 1-1 MECHANICAL OUTLINE DRAWING



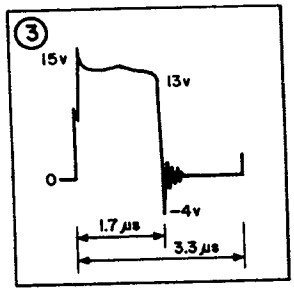


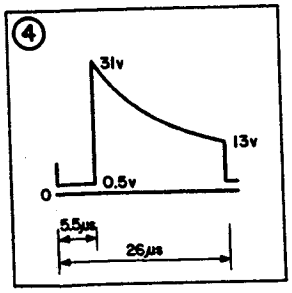


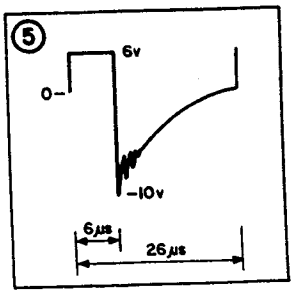
60W-48 MODELS



60W-24 MODELS







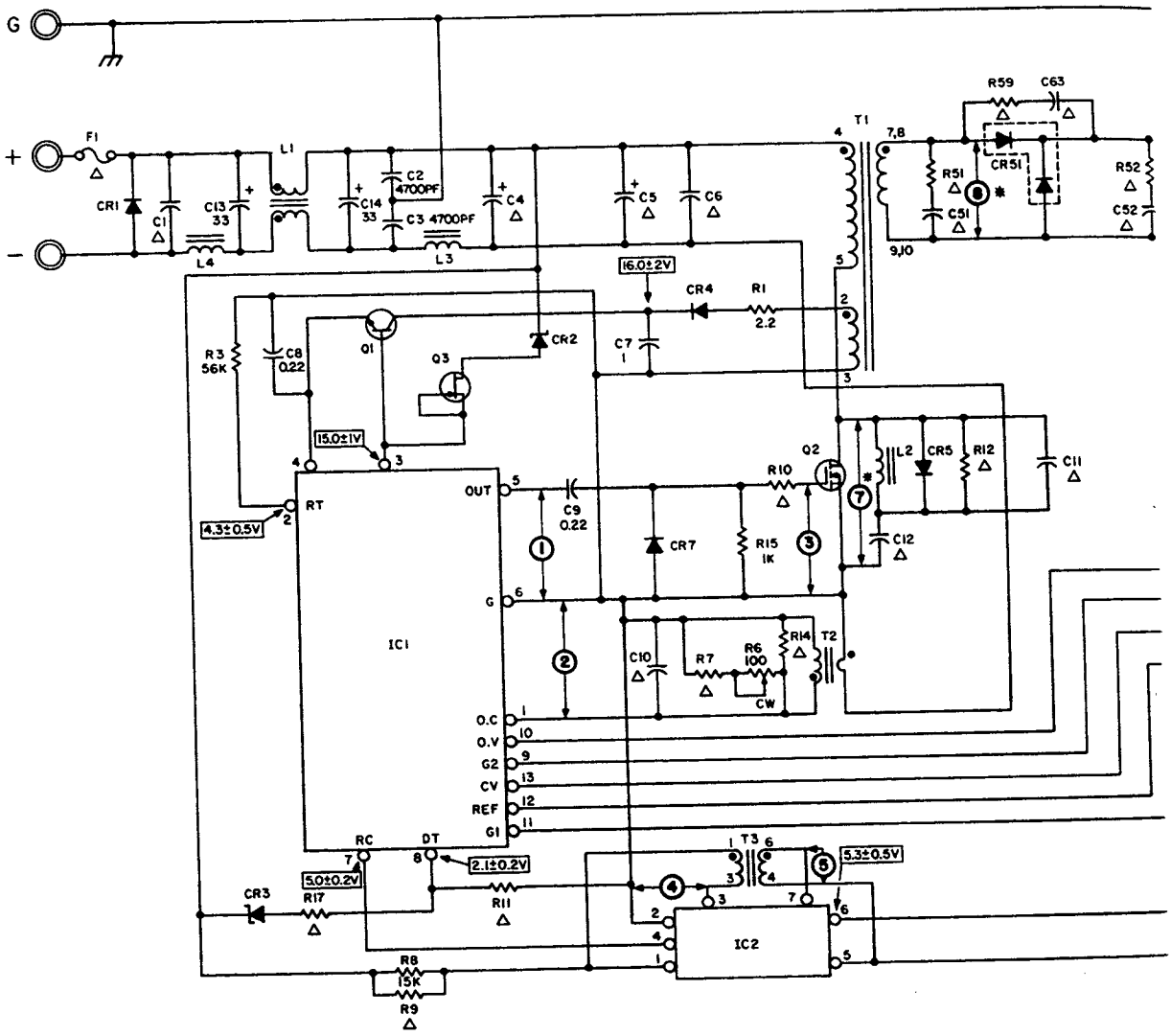
FORMS
5-3

SWITCHING POWER SUPPLY

(FIG. 6-2 SCHEMATIC DIAGRAM. ERD 60 WATT SERIES)

POS-0024-012

FIGURE 11.9



NOTES:

(1) RESISTOR VALUES IN OHMS, K=10^3, M=10^6.
(2) CAPACITOR VALUES IN MICROFARADS EXCEPT AS NOTED.
(3) VALUES FOR COMPONENTS MARKED "Δ" ARE GIVEN IN PARTS LIST FOR INDIVIDUAL MODELS.
(4) OUTPUT RATINGS DEPEND UPON INDIVIDUAL MODELS.
(5) D-C VOLTAGE VALUES ARE NOMINAL WITH NOMINAL INPUT AND LOAD, T_A = 25° C.

* TYPICAL WAVEFORMS SHOWN IN FIG. 5-3

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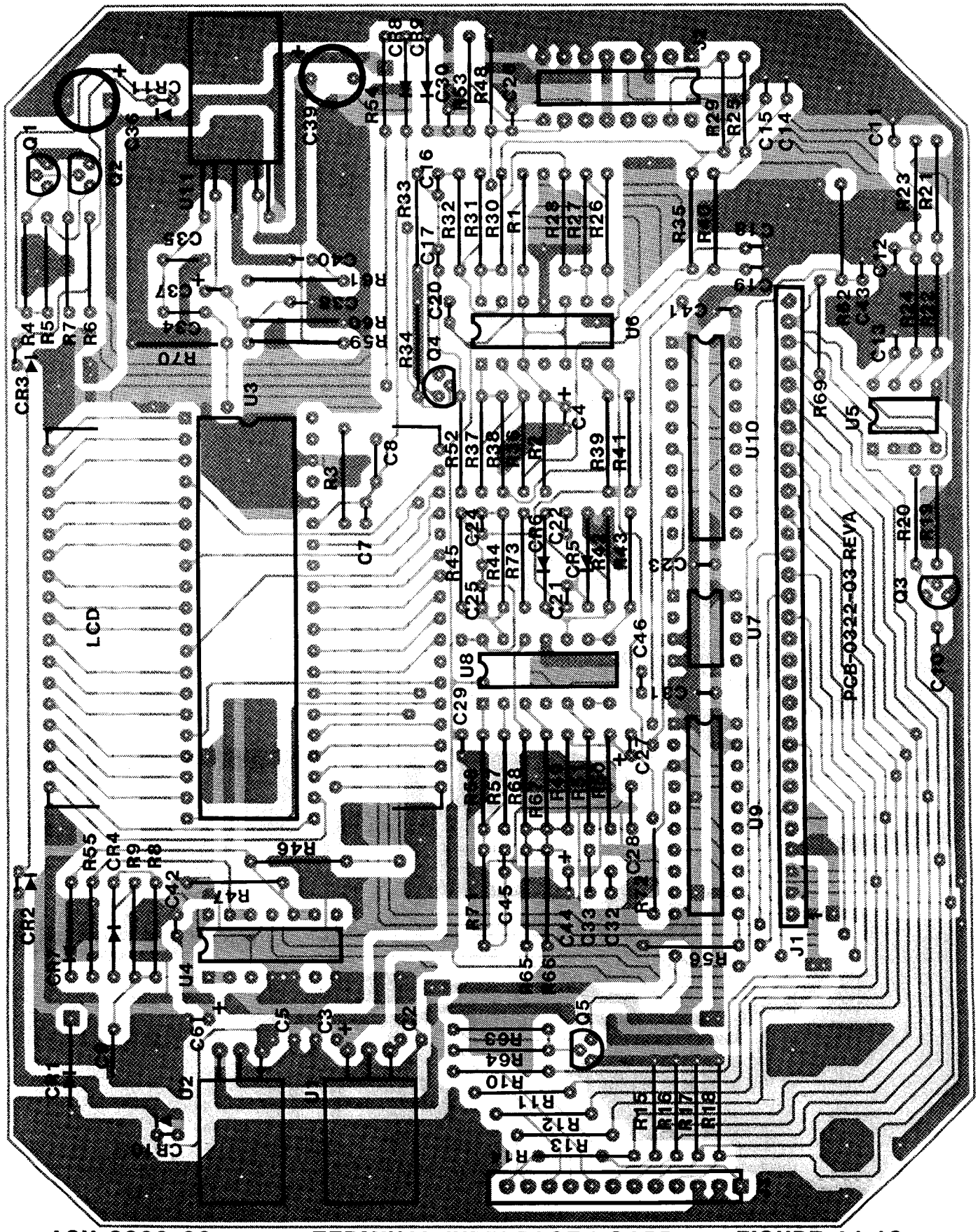
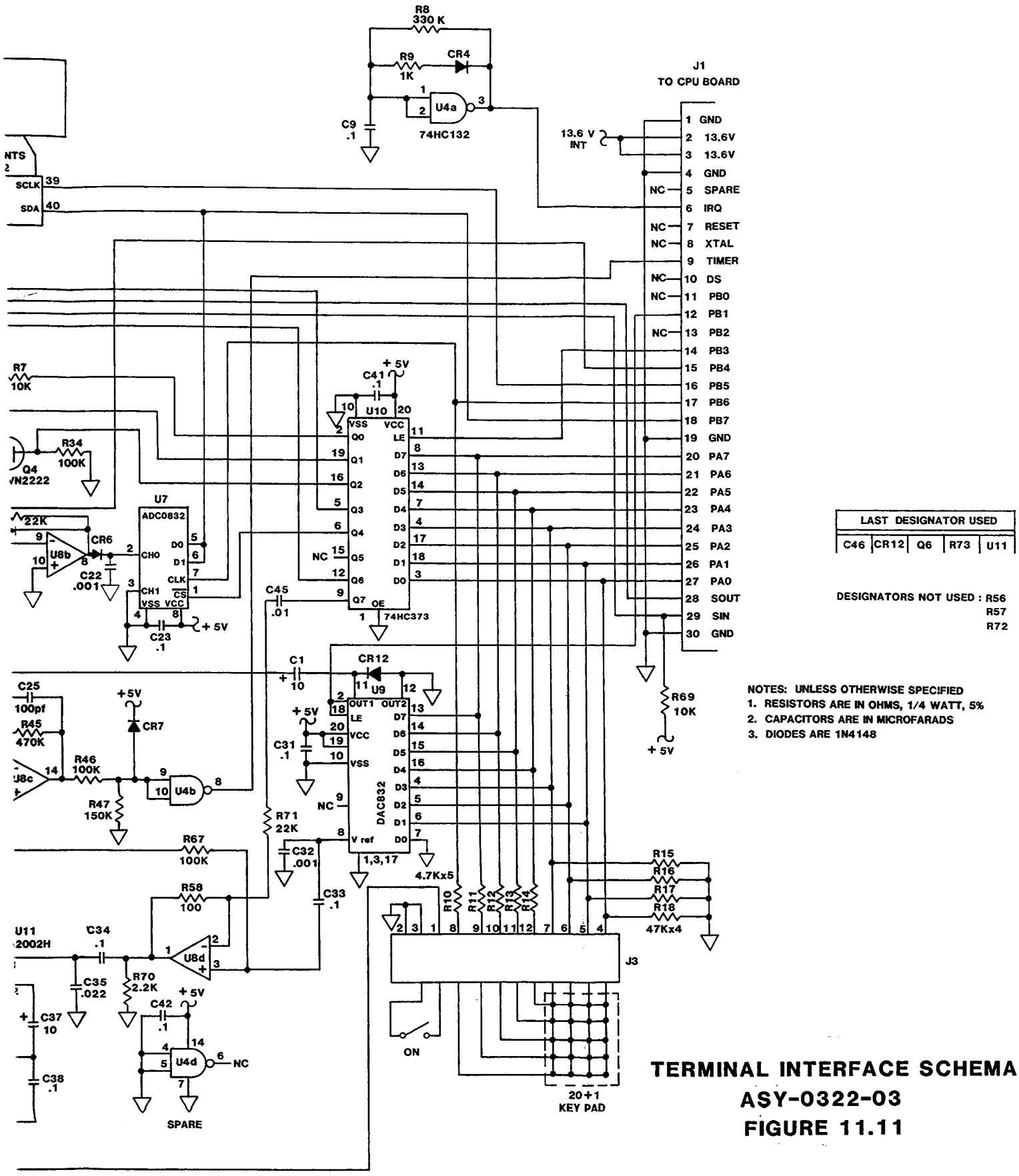
Data subject to change without notice.
PATENT NOTICE: Applicable Patent Numbers will be supplied on request.



ASY-0322-03 TERMINAL INTERFACE BOARD FIGURE 11.10

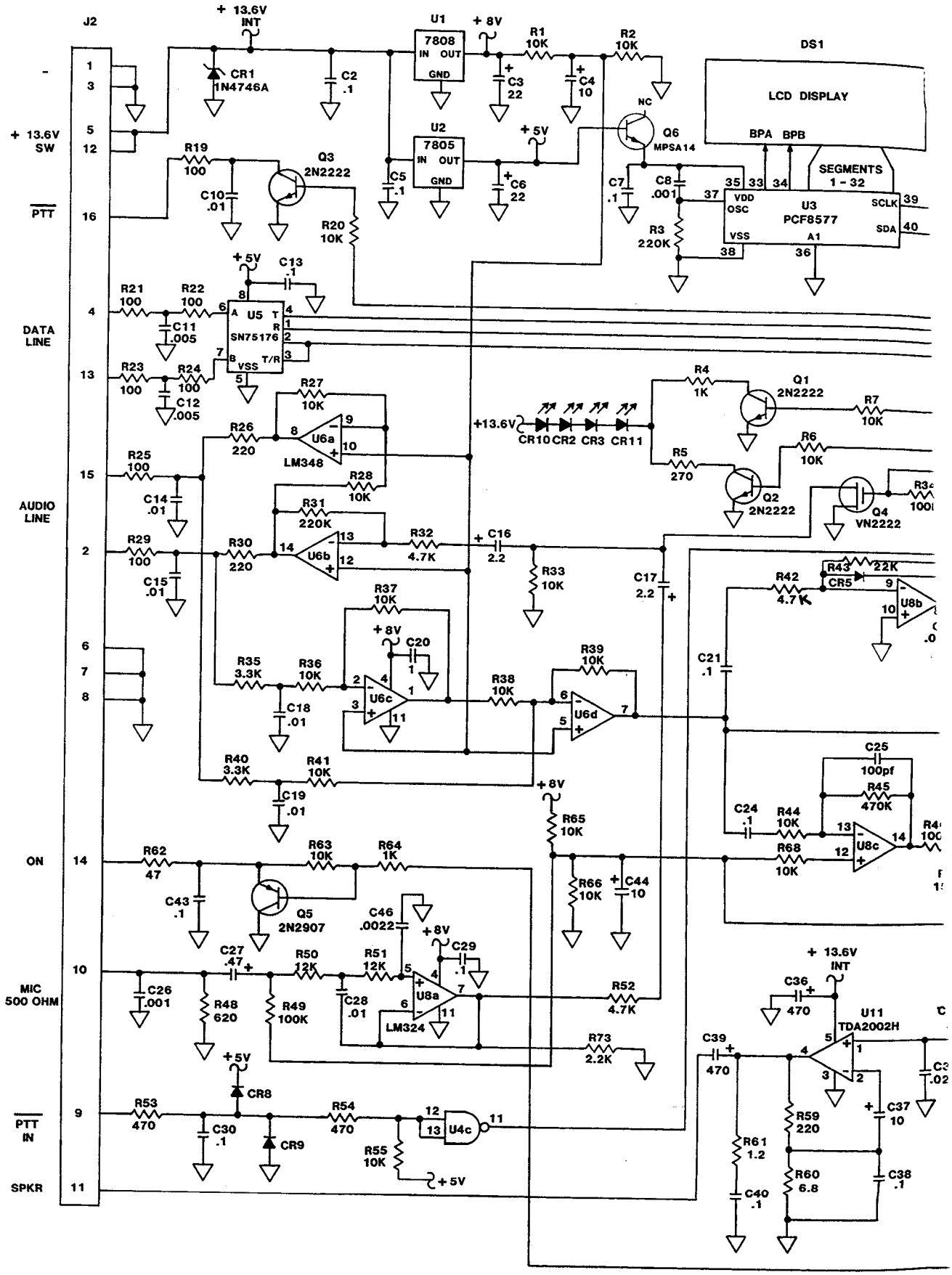


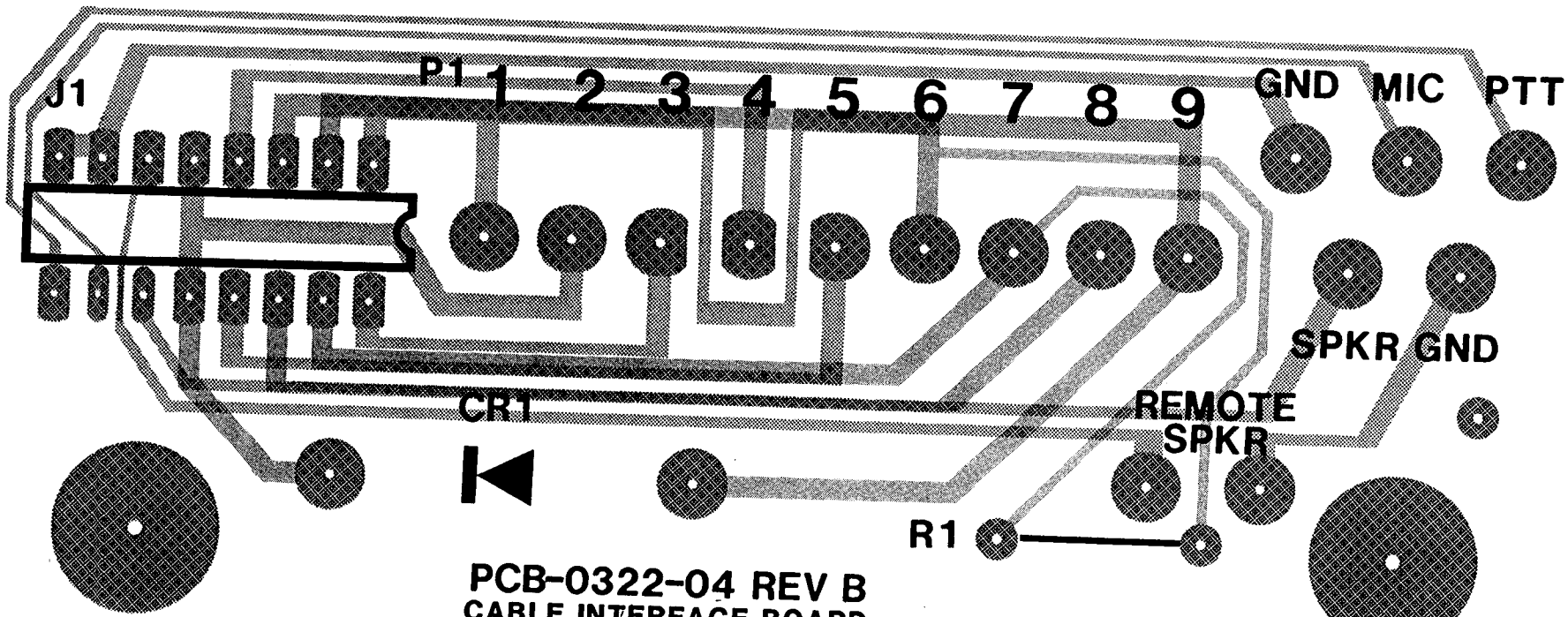
LAST DESIGNATOR USED				
C46	CR12	Q6	R73	U11

DESIGNATORS NOT USED : R56
R57
R72

NOTES: UNLESS OTHERWISE SPECIFIED
1. RESISTORS ARE IN OHMS, 1/4 WATT, 5%
2. CAPACITORS ARE IN MICROFARADS
3. DIODES ARE 1N4148

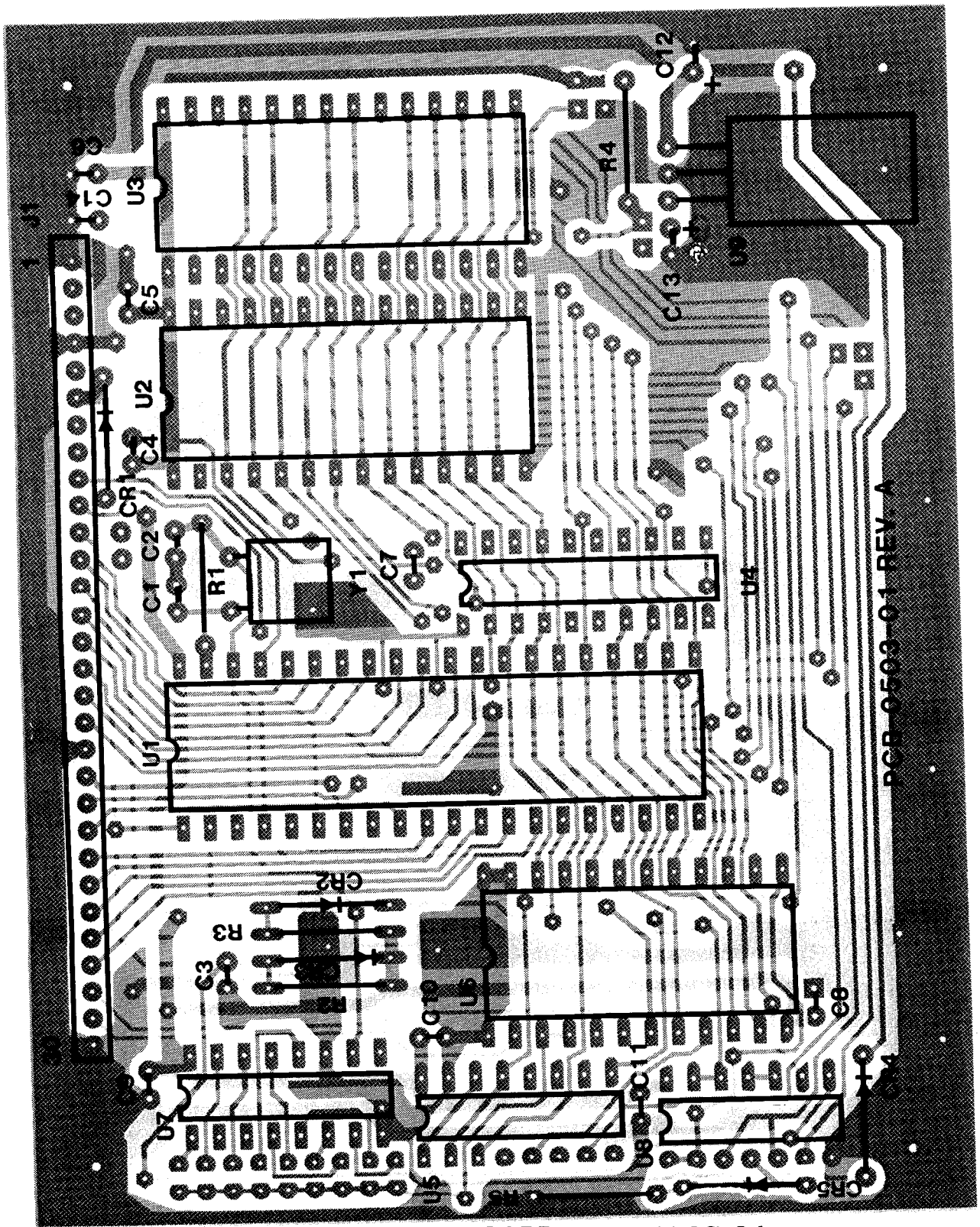
TERMINAL INTERFACE SCHEMATIC
ASY-0322-03
FIGURE 11.11


J2
+ 13.6V INT
U1
7808
+ 8V
R1 10K
R2 10K
DS1
LCD DISPLAY
BPA BPB
SEGMENTS 1 - 32
CR1 1N4746A
C2 .1
C3 22
C4 10
U2
7805
+ 5V
NC
Q6 MPSA14
+ 13.6V SW
R19 100
Q3 2N2222
C5 .1
C6 22
C7 .1
C8 .001
U3 PCF8577
SCLK
SDA
VDD
OSC
VSS
A1
R3 220K
PTT
C10 .01
R20 10K
+ 5V
C13 .1
DATA LINE
R21 100
R22 100
U5 SN75176
C11 .005
R23 100
R24 100
C12 .005
R27 10K
R26 220
U6a LM348
R28 10K
R25 100
C14 .01
AUDIO LINE
R31 220K
R29 100
R30 220
U6b
R32 4.7K
C16 2.2
R33 10K
C15 .01
R37 10K
+ 8V
C20
R35 3.3K
R36 10K
U6c
C18 .01
R38 10K
R39 10K
U6d
R40 3.3K
R41 10K
C19 .01
+13.6V
CR10 CR2 CR3 CR11
R4 1K
Q1 2N2222
R7 10K
R5 270
R6 10K
Q2 2N2222
Q4 VN2222
C17 2.2
R42 4.7K
R43 22K
CR5
U8b
C21 .1
C25 100pf
R45 470K
C24 .1
R44 10K
U8c
R68 10K
ON
R62 47
R63 10K
R64 1K
Q5 2N2907
C43 .1
C46 .0022
C29 .1
R65 10K
R66 10K
C44 10
MIC 500 OHM
C27 .47
R50 12K
R51 12K
U8a LM324
C26 .001
R48 620
R49 100K
C28 .01
R52 4.7K
R73 2.2K
+ 13.6V INT
C36 470
U11 TDA2002H
C39 470
R59 220
C37 10
R61 1.2
R60 6.8
C38 .1
C40 .1
PTT IN
R53 470
CR8
C30 .1
CR9
R54 470
U4c
R55 10K
+ 5V
SPKR



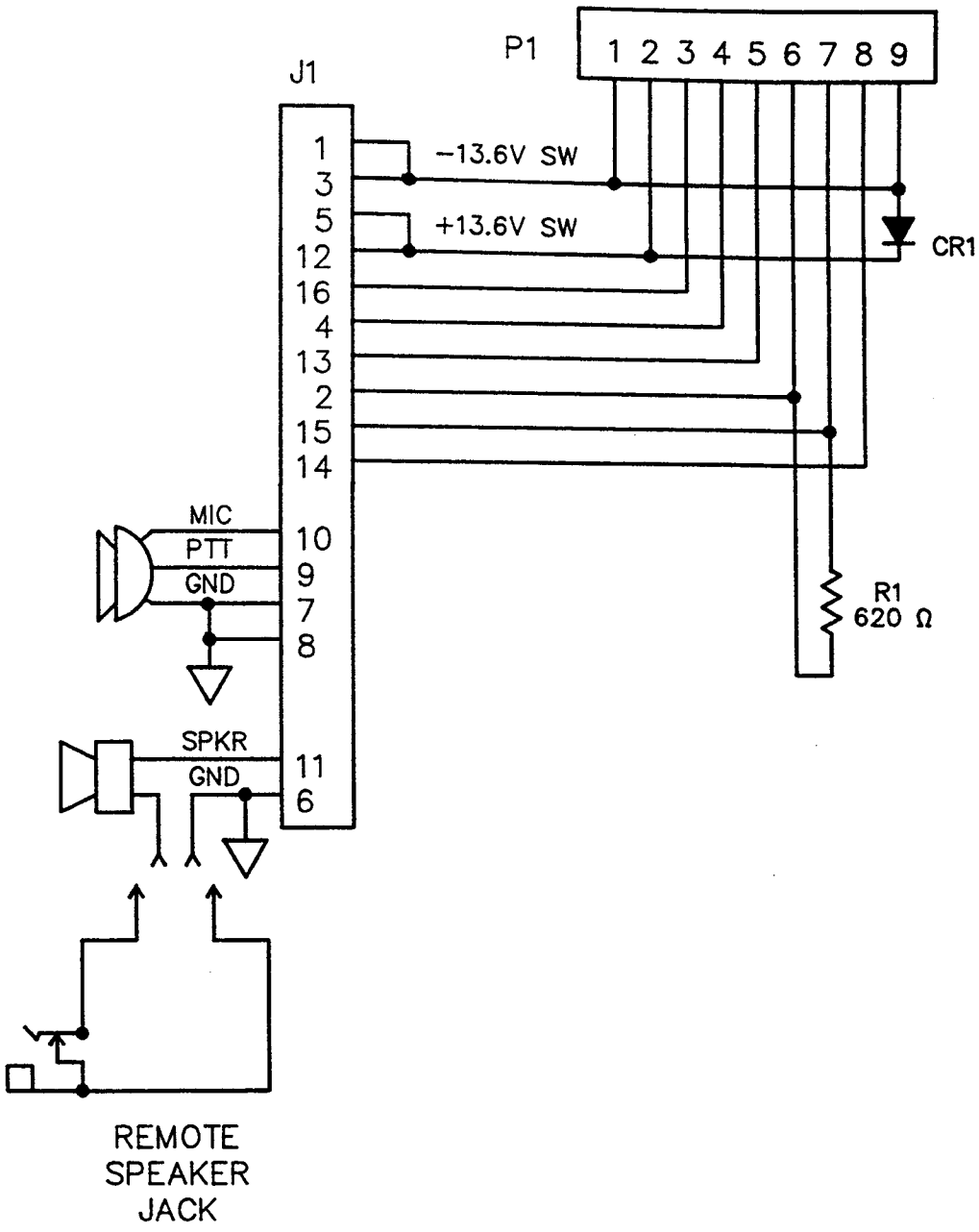
PCB-0322-04 REV B
CABLE INTERFACE BOARD

FIGURE 11.12

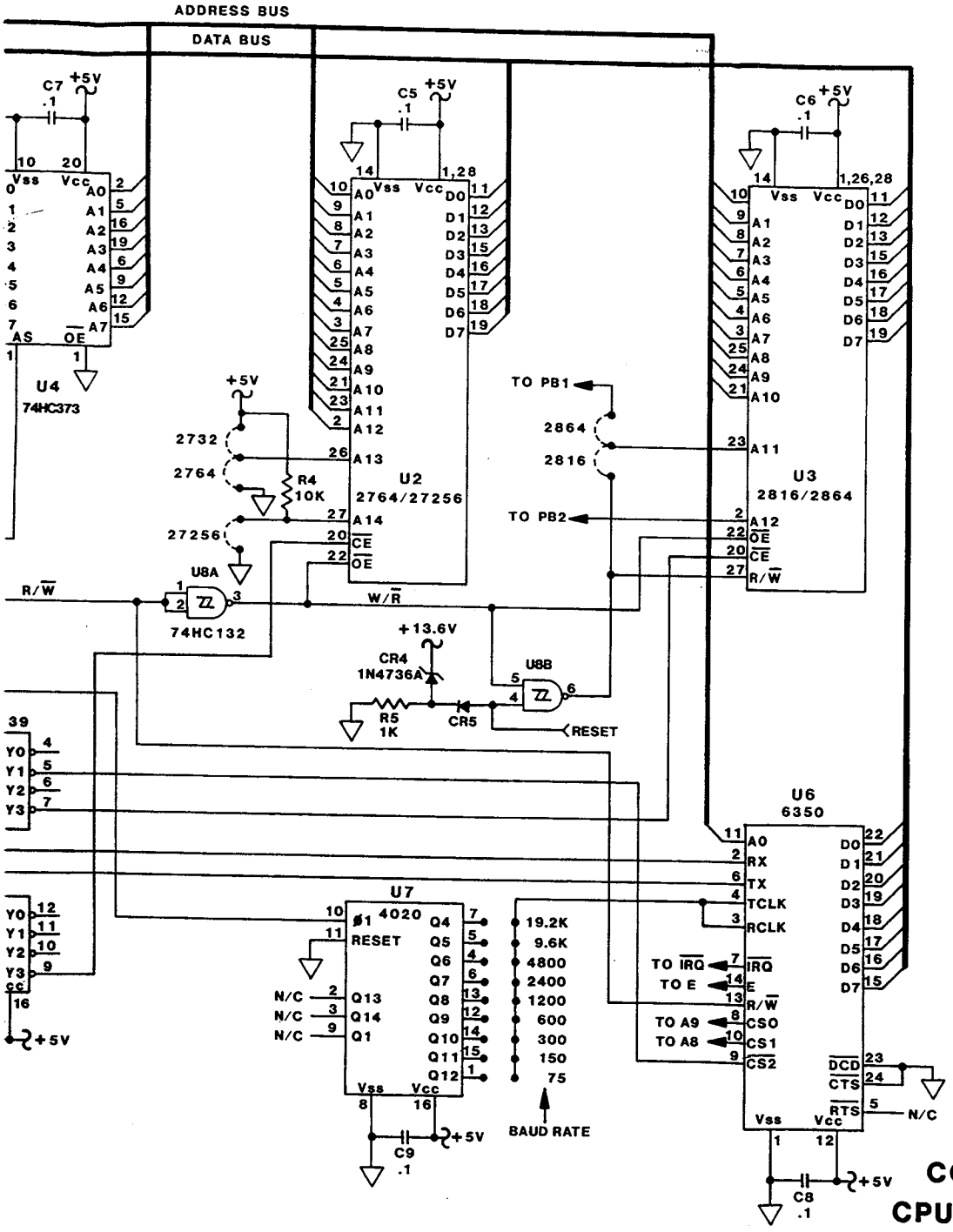


CONTROLLER CPU BOARD ASY-0503-01

FIGURE 11.14



CABLE INTERFACE SCHEMATIC
ASY-0322-04
FIGURE 11.13



LAST DESIGNATOR USED				
C14	CR5	R5	U9	Y1

DESIGNATORS NOT USED

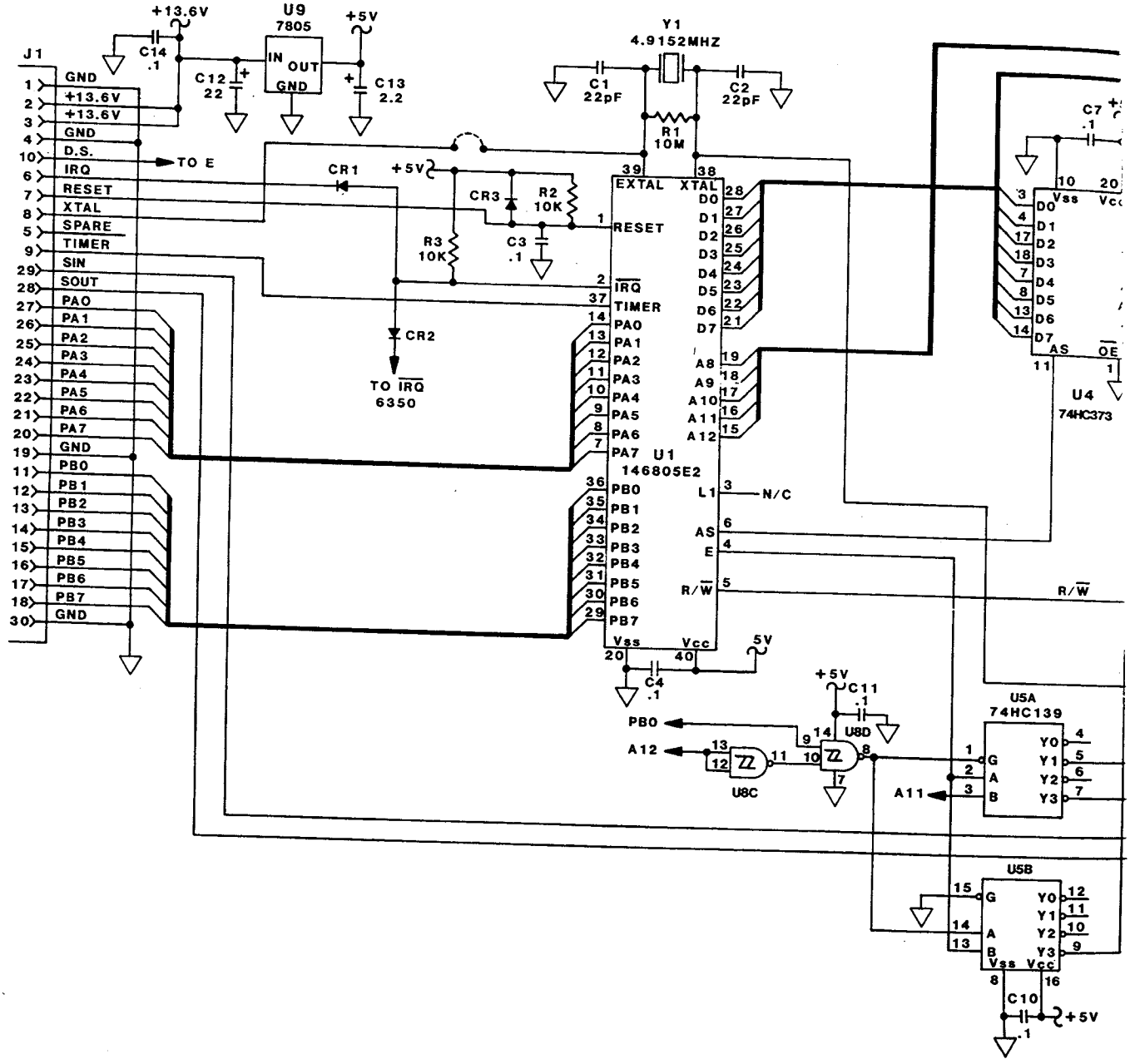
NOTES:

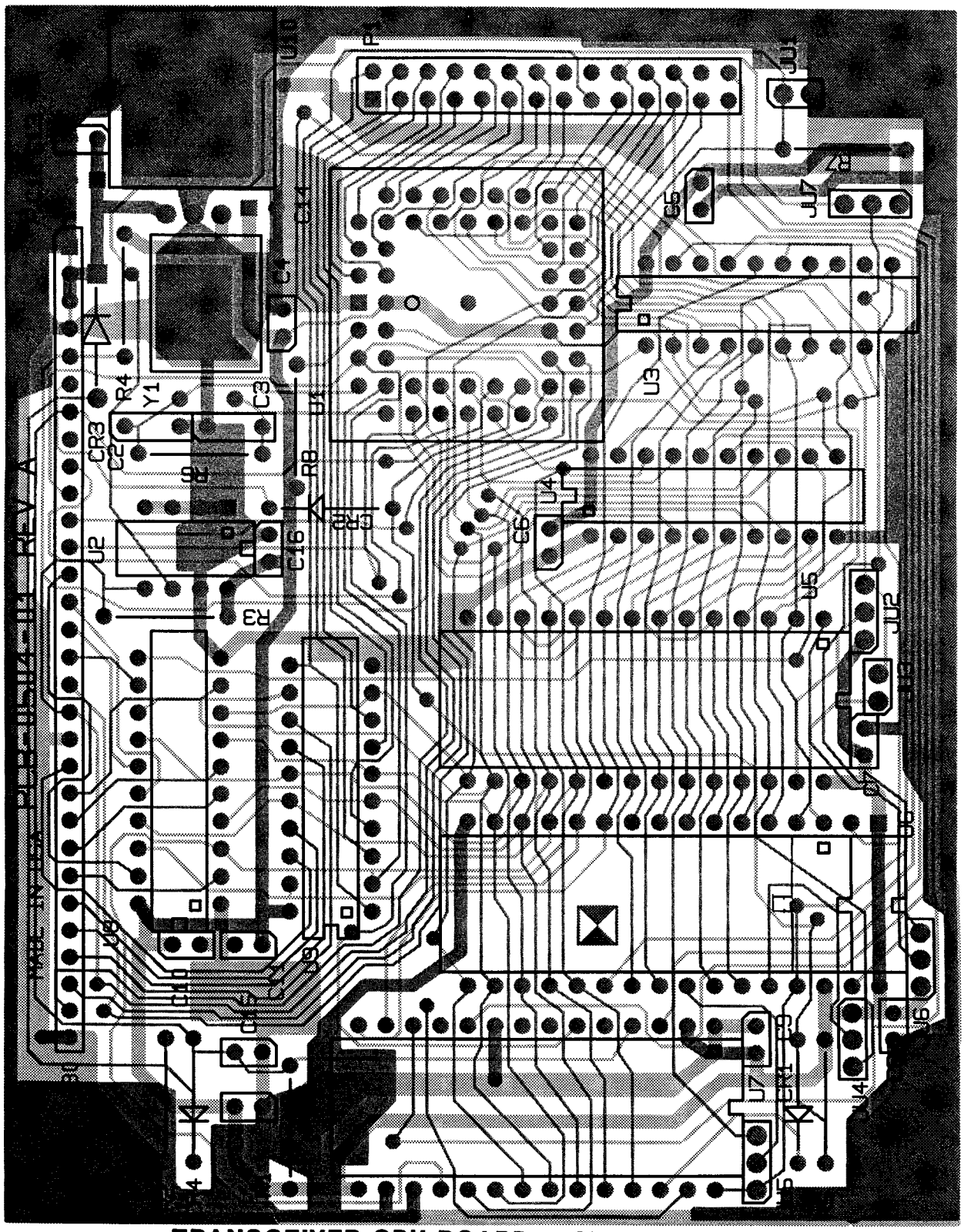
UNLESS OTHERWISE SPECIFIED

1. RESISTORS ARE IN OHMS 1/4W 5%.
2. CAPACITORS ARE IN MICROFARADS.
3. DIODES ARE IN4148.

CONTROLLER CPU SCHEMATIC ASY-0503-01

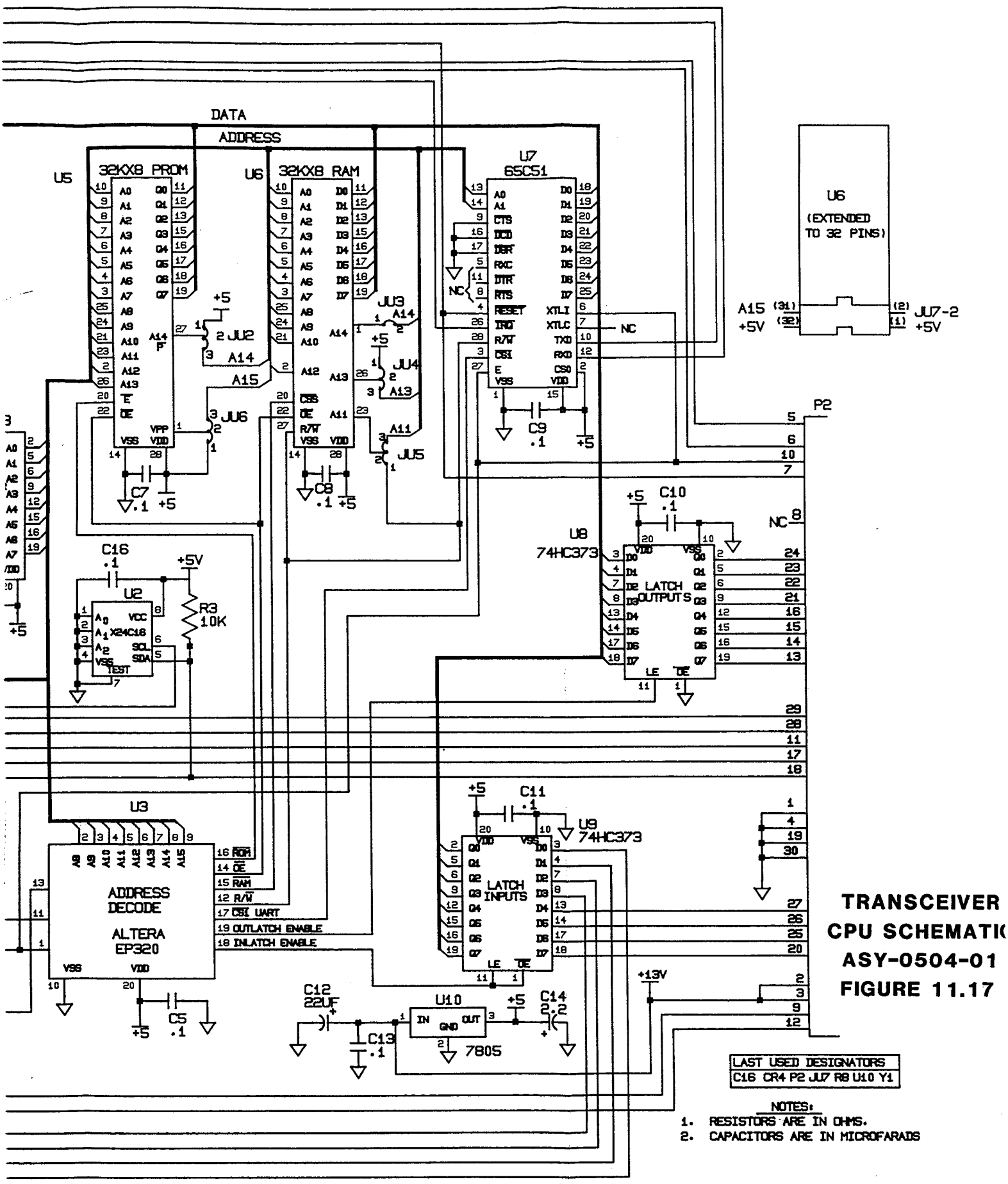
FIGURE 11.15


J1
GND
+13.6V
+13.6V
GND
D.S.
IRQ
RESET
XTAL
SPARE
TIMER
SIN
SOUT
PA0
PA1
PA2
PA3
PA4
PA5
PA6
PA7
GND
PB0
PB1
PB2
PB3
PB4
PB5
PB6
PB7
GND
TO E
+13.6V
C14 .1
C12 22
U9 7805
IN OUT GND
+5V
C13 2.2
Y1 4.9152MHZ
C1 22pF
C2 22pF
R1 10M
CR1
+5V
CR3
R2 10K
R3 10K
C3 .1
CR2
TO IRQ 6350
EXTAL XTAL
RESET
IRQ
TIMER
PA0 PA1 PA2 PA3 PA4 PA5 PA6 PA7
PB0 PB1 PB2 PB3 PB4 PB5 PB6 PB7
D0 D1 D2 D3 D4 D5 D6 D7
A8 A9 A10 A11 A12
L1 N/C
AS
E
R/W
Vss Vcc
U1 146805E2
5V
C4 .1
C7 .1
U4 74HC373
AS OE
+5V
C11 .1
U8D
U8C
PB0
A12
U5A 74HC139
G A B
Y0 Y1 Y2 Y3
A11
U5B
C10 .1
+5V



TRANSCEIVER CPU BOARD ASY-0504-01

FIGURE 11.16

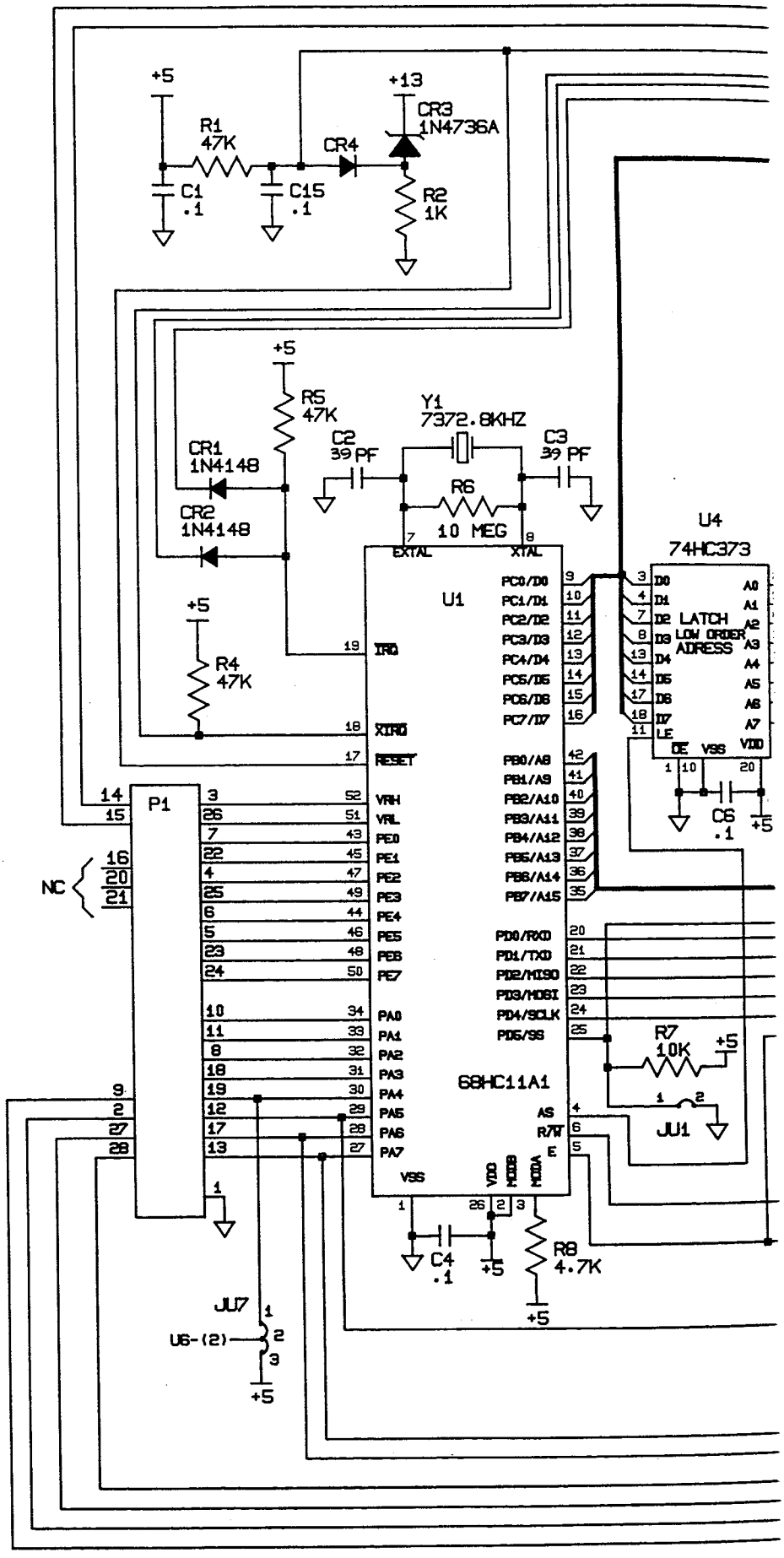


TRANSCEIVER CPU SCHEMATIC
ASY-0504-01
FIGURE 11.17

LAST USED DESIGNATORS
C16 CR4 P2 JU7 R8 U10 Y1

NOTES:

1. RESISTORS ARE IN OHMS.
2. CAPACITORS ARE IN MICROFARADS


+5
+13
R1
47K
CR4
CR3
1N4736A
C1
.1
C15
.1
R2
1K
+5
R5
47K
Y1
7372.8KHZ
C2
39 PF
C3
39 PF
CR1
1N4148
R6
10 MEG
CR2
1N4148
EXTAL
XTAL
U1
+5
R4
47K
IRQ
XIRQ
RESET
VRH
VRL
PE0
PE1
PE2
PE3
PE4
PE5
PE6
PE7
PA0
PA1
PA2
PA3
PA4
PA5
PA6
PA7
PC0/D0
PC1/D1
PC2/D2
PC3/D3
PC4/D4
PC5/D5
PC6/D6
PC7/D7
PB0/A8
PB1/A9
PB2/A10
PB3/A11
PB4/A12
PB5/A13
PB6/A14
PB7/A15
PD0/RXD
PD1/TXD
PD2/MISO
PD3/MOSI
PD4/SCLK
PD5/SS
AS
R/W
E
VSS
VDD
MODB
MODA
68HC11A1
P1
NC
U4
74HC373
LATCH
LOW ORDER
ADRESS
D0
D1
D2
D3
D4
D5
D6
D7
LE
OE
VSS
VDD
A0
A1
A2
A3
A4
A5
A6
A7
C6
.1
R7
10K
JU1
C4
.1
R8
4.7K
JU7
U6-(2)

11:13:00
FUNCTION: ASBL

SEA INC.
SINGLE LEVEL BILL OF MATERIAL

PARENT: ASY-0504-01 DESC: CPU BOARD UM: EA MB: M REV:
DRWG: EFFECTIVE REV:
EFFECTIVITY DATE: 051496

OPTION: C

PT USE	SEQN	COMPONENT	DESCRIPTION	M B N	C T I	Q REV IN	REV OUT	QUANTITY	UM	EFFECTIVITY IN	EFFECTIVITY OUT	SCRAP LTOS	SCRAP PCNT
STUFF	000	CAP-0001-037	CAPACITOR,MICA 39PF C2,C3	B	N	I		2	EA	011595	123179	0	0.0
STUFF	000	CAP-0013-001	CAPACITOR MONO .1UF C1,C4,C5,C6,C7,C8,C9,C10,C11,C13,C15,C16	B	N	I		12	EA	011595	123179	0	0.0
STUFF	000	CAP-0031-001	CAP TANT 2.2UF 16-25V C14	B	N	I		1	EA	011595	123179	0	0.0
STUFF	000	CAP-0031-007	CAPACITOR TANT 22UF 16V C12	B	N	I		1	EA	011595	123179	0	0.0
POST	000	CON-0026-001	JUMPER, POST HEADER JU2,JU3,JU4,JU5,JU6	B	N	I		5	EA	011595	123179	0	0.0
POST	000	CON-0043-004	HEADER, 1X30, 1/2 .100 SP P2	B	N	I		1	EA	011595	123179	0	0.0
POST	000	CON-0044-003	HEADER, 2X14, 1\2 .100 SP P1	B	N	I		1	EA	011595	123179	0	0.0
STUFF	000	CON-0240-020	2 PIN SINGLE ROW HEADER JU1,JU3	B	N	I		2	EA	011595	123179	0	0.0
STUFF	000	CON-0240-030	3 PIN SINGLE ROW HEADER JU2,JU4,JU5,JU6,JU7	B	N	I		5	EA	011595	123179	0	0.0
POST	000	CRY-0009-004	7.3728 MHZ CRYSTAL Y1	B	N	I		1	EA	011595	123179	0	0.0
LAB	000	LAB[R]ASSY	LABOR, ASSEMBLY	M	R	I		0.22	HR	051395		0	0.0
000	000	PCB-0504-01	CPU MODEM	B	N	I		1	EA	011595		0	0.0
STUFF	000	RES-0001-102	RESISTOR 1K 1/4W R2	B	N	I		1	EA	011595	123179	0	0.0
STUFF	000	RES-0001-103	RESISTOR 10K 1/4W R7,R3	B	N	I		2	EA	011595	123179	0	0.0

11:11:51
FUNCTION: ASBL

SEA INC.
SINGLE LEVEL BILL OF MATERIAL

PARENT: ASY-0503-01
DESC: CPU BOARD
DRWG:
EFFECTIVITY DATE: 051496
UM: EA
MB: M REV:
EFFECTIVE REV:

OPTION: C

PT USE	SEQN	COMPONENT	DESCRIPTION	M B	C T	Q REV IN	REV OUT	QUANTITY	UM	EFFECTIVITY IN	EFFECTIVITY OUT	LTOS	SCRAP PCNT
STUFF	000	SEM-0143-373	74HC373 CMOS OCTAL 3-STAT U4	B	N	I		1	EA	122094	123179	0	0.0
STUFF	000	SEM-0143-402	74HC402 CMOS BINARY RIPP U7	B	N	I		1	EA	122094	123179	0	0.0
POST	000	SEM-0157-002	6350 S.I.A. (RED) U6	B	N	I		1	EA	122094	123179	0	0.0
POST	000	SEM-0161-001	CDP6805E2E 8 BIT CPU U1	B	N	I		1	EA	122094	123179	0	0.0
STUFF	000	SEM-0170-026	IN4736A CR4	B	N	I		1	EA	122094	123179	0	0.0
STUFF	000	SM-0076-001-02A	.45 LS, 1N4148 CR1,CR2,CR3,CR5	M	N	I		4	EA	122094	123179	0	0.0
STUFF	000	SOC-0004-024	IC SOCKET, 24 PIN DIP U6SOC	B	N	I		1	EA	122094	123179	0	0.0
STUFF	000	SOC-0004-028	IC SOCKET, 28 PIN DIP	B	N	I		2	EA	122094	123179	0	0.0
STUFF	000	SOC-0004-040	IC SOCKET, 40 PIN DIP U1SOC	B	N	I		1	EA	122094	123179	0	0.0

* * * * * * * * * * * * * * * * * * * END OF REPORT * * * * * * * * * * * * * * * * * * *

11:11:51
FUNCTION: ASBL

SEA INC.
SINGLE LEVEL BILL OF MATERIAL

PARENT: ASY-0503-01 DESC: CPU BOARD UM: EA MB: M REV:
DRWG: EFFECTIVE REV:
EFFECTIVITY DATE: 051496

OPTION: C

PT USE	SEQN	COMPONENT	DESCRIPTION	M C Q REV B T T IN OUT	QUANTITY UM	EFFECTIVITY IN	EFFECTIVITY OUT	LTOS	SCRAP PCNT
STUFF	000	CAP-0013-001	CAPACITOR MONO .1UF C3,C4,C5,C6,C7,C8,C9,C10,C11,C14	B N I	10 EA	122094	123179	0	0.0
STUFF	000	CAP-0031-001	CAP TANT 2.2UF 16-25V C13	B N I	1 EA	122094	123179	0	0.0
STUFF	000	CAP-0031-007	CAPACITOR TANT 22UF 16V C12	B N I	1 EA	122094	123179	0	0.0
POST	000	CON-0026-001	JUMPER, POST HEADER	B N I	1 EA	122094	123179	0	0.0
STUFF	000	CON-0241-030	RIGHT ANGLE 3 PIN HEADER	B N I	1 EA	122094	123179	0	0.0
STUFF	000	CP-0001-003-32B	.1 LS, 22PF C1,C2	M N I	2 EA	122094		0	0.0
POST	000	CRY-0009-003	4.9152MHZ CRYSTAL Y1	B N I	1 EA	122094	123179	0	0.0
LAB	000	LAB[R]ASSY	LABOR, ASSEMBLY	M R I	0.30 HR	051395		0	0.0
LAB	000	LAB[R]TEST	LABOR, TEST	M R I	0.10 HR	050495		0	0.0
000	000	PCB-0503-01	CPU PCB	B N I	1 EA	122094		0	0.0
STUFF	000	RES-0001-102	RESISTOR 1K 1/4W R5	B N I	1 EA	122094	123179	0	0.0
STUFF	000	RES-0001-103	RESISTOR 10K 1/4W R2,R3,R4	B N I	3 EA	122094	123179	0	0.0
STUFF	000	RES-0001-106	RESISTOR 10MEG 1/4W R1	B N I	1 EA	122094	123179	0	0.0
STUFF	000	SEM-0109-001	7805 VOLTAGE REG, 5V U9	B N I	1 EA	122094	123179	0	0.0
STUFF	000	SEM-0143-132	74HC132 CMOS QUAD NAND GA U8	B N I	1 EA	122094	123179	0	0.0
STUFF	000	SEM-0143-139	74HC139 CMOS DUAL DEC/MUL U5	B N I	1 EA	122094	123179	0	0.0

11:11:07
FUNCTION: ASBL

SEA INC.
SINGLE LEVEL BILL OF MATERIAL

PARENT: ASY-0322-04 DESC: CABLE INTERFACE BOARD UM: EA MB: M REV: C
DRWG: EFFECTIVE REV:
EFFECTIVITY DATE: 051496

OPTION: C

PT USE	SEQN	COMPONENT	DESCRIPTION	M C Q REV B T T IN OUT	QUANTITY UM	EFFECTIVITY IN	EFFECTIVITY OUT	LTOS	SCRAP PCNT
REV	000	ECN 6001	ASY-0322-04	M D O	1 EA	062995		0	0.0
POST	000	JUM-0002-030	JUMPER, 0.30 LONG R2	B N I	1 EA	062195	123179	0	0.0
LAB	000	LAB[R]ASSY	LABOR, ASSEMBLY	M R I	0.30 HR	051995		0	0.0
POST	000	PCB-0322-04	CABLE INTERFACE PCB	B N I	1 EA	011595	123179	0	0.0
POST	000	RES-0001-621	RESISTOR 620 1/4W R1	B N I	1 EA	011595	123179	0	0.0
POST	000	SEM-0089-001	1N5402 DIODE 3A RECTIFIER CR1	B N I	1 EA	011595	123179	0	0.0
POST	000	SOC-0002-016	IC SOCKET, 16 PIN DIP J1	B N I	1 EA	011595	123179	0	0.0
POST	000	TER-0004-004	TERMINAL PIN	B N I	5 EA	011595	123179	0	0.0
POST	000	TER-0026-002	TERMINAL 3 POS P1	B N I	3 EA	011595	123179	0	0.0
000	000	W03220W4.000	ASY-0322-W4 COAX	M X I	0 EA	011595		0	0.0

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11:07:55
FUNCTION: ASBL

SEA INC.
SINGLE LEVEL BILL OF MATERIAL

PARENT: ASY-0322-03
DESC: TERMINAL INTERFACE PCB
UM: EA
MB: M
REV:
DRWG:
EFFECTIVITY DATE: 051496
EFFECTIVE REV:

OPTION: C

PT USE	SEQN	COMPONENT	DESCRIPTION	M B	C T	Q T	REV IN	REV OUT	QUANTITY	UM	EFFECTIVITY IN	EFFECTIVITY OUT	LTOS	SCRAP PCNT
STUFF	000	SEM-0170-027	SMALL SIGNAL SCHOTTKY DIODE,1N6263 CR12,CR6	B	N	I			2	EA	011595	123179	0	0.0
STUFF	000	SEM-0174-001	DATA XCEIVER SN75176 U5	B	N	I			1	EA	011595	123179	0	0.0
STUFF	000	SEM-0182-001	PCF8577 MULTIPLEXED LCD D U3	B	N	I			1	EA	011595	123179	0	0.0
STUFF	000	SM-0076-001-02A	.45 LS, 1N4148 CR4,CR5,CR7,CR8,CR9	M	N	I			5	EA	011595	123179	0	0.0
STUFF	000	SM-0083-005-02A	.45 LS, 1N4746A CR1	M	N	I			1	EA	011595	123179	0	0.0
STUFF	000	SOC-0002-016	IC SOCKET, 16 PIN DIP J2SOC	B	N	I			1	EA	011595	123179	0	0.0
POST	000	SOC-0005-017	.175X.260 17 POS. G.P. ST	B	N	I			2	EA	011595	123179	0	0.0

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11:07:55
FUNCTION: ASBL

SEA INC.
SINGLE LEVEL BILL OF MATERIAL

PARENT: ASY-0322-03

DESC: TERMINAL INTERFACE PCB
UM: EA
MB: M REV:
DRWG:
EFFECTIVITY DATE: 051496
EFFECTIVE REV:

OPTION: C

PT USE	SEQN	COMPONENT	DESCRIPTION	M B	C T	Q T	REV IN	REV OUT	QUANTITY	UM	EFFECTIVITY IN	EFFECTIVITY OUT	LTOS	SCRAP PCNT
STUFF	000	SEM-0004-002	2N2907, MPS2907 Q5	B	N	I			1	EA	011595	123179	0	0.0
STUFF	000	SEM-0010-001	MPS-A14 Q6	B	N	I			3	EA	011595	123179	0	0.0
STUFF	000	SEM-0021-002	PN2222A Q1,Q2,Q3	B	N	I			1	EA	011595	123179	0	0.0
STUFF	000	SEM-0021-004	VN2222LM 60V FET (RED) Q4	B	N	I			4	EA	011595	123179	0	0.0
POST	000	SEM-0085-001	LED, GREEN, T1 CR2,CR3,CR10,CR11	B	N	I			1	EA	011595	123179	0	0.0
STUFF	000	SEM-0109-001	7805 VOLTAGE REG, 5V U2	B	N	I			1	EA	011595	123179	0	0.0
STUFF	000	SEM-0109-004	LM7808 VOLTAGE REG, 8V U1	B	N	I			1	EA	011595	123179	0	0.0
STUFF	000	SEM-0143-132	74HC132 CMOS QUAD NAND GA U4	B	N	I			1	EA	011595	123179	0	0.0
STUFF	000	SEM-0143-373	74HC373 CMOS OCTAL 3-STAT U10	B	N	I			1	EA	011595	123179	0	0.0
STUFF	000	SEM-0153-003	TDA2002H OR TDA2003H U11	B	N	I			1	EA	011595	123179	0	0.0
STUFF	000	SEM-0154-010	LM348 QUAD OP AMP U6	B	N	I			1	EA	011595	123179	0	0.0
STUFF	000	SEM-0154-020	LM324 QUAD OPAMP,PHILIPS/SIGNETICS U8	B	N	I			1	EA	011595	123179	0	0.0
STUFF	000	SEM-0158-002	ADC0832 8-BIT A/D CONV U7	B	N	I			1	EA	011595	123179	0	0.0
STUFF	000	SEM-0158-003	DAC0832 8-BIT D/A CONV U9	B	N	I			1	EA	011595	123179	0	0.0

11:07:55
FUNCTION: ASBL

SEA INC.
SINGLE LEVEL BILL OF MATERIAL

PARENT: ASY-0322-03

DESC: TERMINAL INTERFACE PCB
DRWG:
EFFECTIVITY DATE: 051496

UM: EA MB: M REV:
EFFECTIVE REV:

OPTION: C

PT USE	SEQN	COMPONENT	DESCRIPTION	M C Q REV B T T IN	OUT	QUANTITY UM	EFFECTIVITY IN	OUT	LTOS	SCRAP PCNT
STUFF	000	RES-0001-154	RESISTOR 150K 1/4W R47	B N I		1 EA	011595	123179	0	0.0
STUFF	000	RES-0001-221	RESISTOR 220 1/4W R26,R30,R59	B N I		3 EA	011595	123179	0	0.0
STUFF	000	RES-0001-222	RESISTOR 2.2K 1/4W R70,R73	B N I		2 EA	011595	123179	0	0.0
STUFF	000	RES-0001-223	RESISTOR 22K 1/4W R71,R43	B N I		2 EA	011595	123179	0	0.0
STUFF	000	RES-0001-224	RESISTOR 220K 1/4W R31,R3	B N I		2 EA	011595	123179	0	0.0
STUFF	000	RES-0001-271	RESISTOR 270 1/4W R5	B N I		1 EA	011595	123179	0	0.0
STUFF	000	RES-0001-332	RESISTOR 3.3K 1/4W R35,R40	B N I		2 EA	011595	123179	0	0.0
STUFF	000	RES-0001-334	RESISTOR 330K 1/4W R8	B N I		1 EA	011595	123179	0	0.0
STUFF	000	RES-0001-470	RESISTOR 47 1/4W R62	B N I		1 EA	011595	123179	0	0.0
STUFF	000	RES-0001-471	RESISTOR 470 1/4W R53,R54	B N I		2 EA	011595	123179	0	0.0
STUFF	000	RES-0001-472	RESISTOR 4.7K 1/4W R10,R11,R12,R13,R14,R32,R52,R42	B N I		8 EA	011595	123179	0	0.0
STUFF	000	RES-0001-473	RESISTOR 47K 1/4W R15,R16,R17,R18	B N I		4 EA	011595	123179	0	0.0
STUFF	000	RES-0001-474	RESISTOR 470K 1/4W R45	B N I		1 EA	011595	123179	0	0.0
STUFF	000	RES-0001-621	RESISTOR 620 1/4W R48	B N I		1 EA	011595	123179	0	0.0

11:07:55
FUNCTION: ASBL

SEA INC.
SINGLE LEVEL BILL OF MATERIAL

PARENT: ASY-0322-03

DESC: TERMINAL INTERFACE PCB
DRWG:
EFFECTIVITY DATE: 051496

UM: EA MB: M REV:
EFFECTIVE REV:

OPTION: C

PT USE	SEQN	COMPONENT	DESCRIPTION	M C Q B T T	REV IN	REV OUT	QUANTITY	UM	EFFECTIVITY IN	EFFECTIVITY OUT	LTOS	SCRAP PCNT
STUFF	000	CAP-0037-010	CAP, ELECT. 470UF RAD C36,C39	B N I			2	EA	011595	123179	0	0.0
STUFF	000	CAP-0043-222	.0022UFX7R(NPO)100WVDC CA C46	B N I			1	EA	011595	123179	0	0.0
STUFF	000	CON-0030-030	30 PIN FLEX STRIP JUMPER J1	B N I			1	EA	011595	123179	0	0.0
STUFF	000	CON-0240-120	12 PIN SINGLE ROW HEADER J3	B N I			1	EA	011595	123179	0	0.0
MASK	000	HAR-0080-024	STDF,SW RD 1/4X4-40X.500	B N I			4	EA	011595		0	0.0
STUFF	000	JUM-0002-045	JUMPER, .45 TEFLON JU1	B N I			1	EA	011595	123179	0	0.0
LAB	000	LAB[R]ASSY	LABOR, ASSEMBLY	M R I			2.20	HR	051995		0	0.0
LAB	000	LAB[R]TEST	LABOR, TEST	M R I			0.10	HR	050495		0	0.0
MASK	000	PCB-0322-03	REMOTE HEAD	B N I			1	EA	011595		0	0.0
STUFF	000	RES-0001-012	RESISTOR 1.2 1/4W R61	B N I			1	EA	011595	123179	0	0.0
STUFF	000	RES-0001-068	RESISTOR, 6.8 1/4W R60	B N I			1	EA	011595	123179	0	0.0
STUFF	000	RES-0001-101	RESISTOR 100 1/4W R19,R21,R22,R23,R24,R25,R29,R58	B N I			8	EA	011595	123179	0	0.0
STUFF	000	RES-0001-102	RESISTOR 1K 1/4W R4,R9,R64	B N I			3	EA	011595	123179	0	0.0
STUFF	000	RES-0001-103	RESISTOR 10K 1/4W R1,R2,R6,R7,R20,R27,R28,R36,R37,R38,R39,R41,R44,R55,R63,R65, R66,R68,R69,R33	B N I			20	EA	011595	123179	0	0.0
STUFF	000	RES-0001-104	RESISTOR 100K 1/4W R46,R34,R49,R67	B N I			4	EA	011595	123179	0	0.0
STUFF	000	RES-0001-123	RESISTOR 12K 1/4W R50,R51	B N I			2	EA	011595	123179	0	0.0

11:07:55
FUNCTION: ASBL

SEA INC.
SINGLE LEVEL BILL OF MATERIAL

PARENT: ASY-0322-03 DESC: TERMINAL INTERFACE PCB UM: EA MB: M REV:
DRWG: EFFECTIVE REV:
EFFECTIVITY DATE: 051496

OPTION: C

PT USE	SEQN	COMPONENT	DESCRIPTION	M C Q REV B T T IN OUT	QUANTITY UM	EFFECTIVITY IN OUT	LTOS	SCRAP PCNT
STUFF	000	CAP-0001-015	CAPACITOR MICA 100PF C25	B N I	1 EA	011595 123179	0	0.0
STUFF	000	CAP-0013-001	CAPACITOR MONO .1UF C2,C5,C7,C13,C20,C21,C23,C24,C29,C30,C31,C38,C40,C41,C42,C43	B N I	16 EA	011595 123179	0	0.0
STUFF	000	CAP-0013-003	CAPACITOR MONO .01UF 100V C10,C14,C15,C18,C19,C45	B N I	6 EA	011595 123179	0	0.0
STUFF	000	CAP-0013-004	CAPACITOR, MONO .0047UF C11,C12	B N I	2 EA	011595 123179	0	0.0
STUFF	000	CAP-0013-005	CAPACITOR MONO .001 UF C26,C32	B N I	2 EA	011595 123179	0	0.0
STUFF	000	CAP-0027-102	CAPACITOR FILM CK05 .001 C8,C22	B N I	2 EA	011595 123179	0	0.0
STUFF	000	CAP-0027-103	CAPACITOR FILM CK05 .01 C28	B N I	1 EA	011595 123179	0	0.0
STUFF	000	CAP-0027-104	CAPACITOR FILM CK05 .1 C9,C33,C34	B N I	3 EA	011595 123179	0	0.0
STUFF	000	CAP-0027-223	CAPACITOR FILM CK05 .022 C35	B N I	1 EA	011595 123179	0	0.0
STUFF	000	CAP-0030-005	CAPACITOR TANT .47UF 35V C27	B N I	1 EA	011595 123179	0	0.0
STUFF	000	CAP-0031-001	CAP TANT 2.2UF 16-25V C16,C17	B N I	2 EA	011595 123179	0	0.0
STUFF	000	CAP-0031-005	CAPACITOR TANT 10UF 16V C37,C4,C44,C1	B N I	4 EA	011595 123179	0	0.0
STUFF	000	CAP-0031-007	CAPACITOR TANT 22UF 16V C3,C6	B N I	2 EA	011595 123179	0	0.0

11:05:20
FUNCTION: ASBL

SEA INC.
SINGLE LEVEL BILL OF MATERIAL

PARENT: ASY-0330-03
DESC: PA ASSY, 330
DRWG:
EFFECTIVITY DATE: 051496
UM: EA
MB: M
REV:
EFFECTIVE REV:

OPTION: C

PT USE	SEQN	COMPONENT	DESCRIPTION	M B	C T	Q T	REV IN	REV OUT	QUANTITY	UM	EFFECTIVITY IN	EFFECTIVITY OUT	SCRAP LTOS	SCRAP PCNT
STUFF	000	RES-0005-220	RESISTOR, 22 2W	B	N	I			3	EA	011595	123179	0	0.0
STUFF	000	RES-0005-221	RESISTOR, 220 OHM 2W	B	N	I			1	EA	011595	123179	0	0.0
POST	000	RES-0015-500	RES,50 OHM 20W TAB	B	N	I			2	EA	011595	123179	0	0.0
STUFF	000	RES-0027-100	10 OHM TRIM POT	B	N	I			1	EA	011595	123179	0	0.0
STUFF	000	RES-0027-202	RESISTOR, TRIMPOT 2K	B	N	I			2	EA	011595	123179	0	0.0
STUFF	000	RES-0036-001	RESISTOR .1 3W WIRE W.	B	N	I			2	EA	011595	123179	0	0.0
STUFF	000	RES-0037-001	RESISTOR 1W WIRE W. .1 OH	B	N	I			1	EA	011595	123179	0	0.0
POST	000	SEM-0026-001	TIP120 NPN DARL 5A, TO-22	B	N	I			1	EA	011595	123179	0	0.0
POST	000	SEM-0032-004	MJE3055T NPN PWR 10A	B	N	I			2	EA	011595	123179	0	0.0
POST	000	SEM-0058-001	MRF422MP NPN 150W COLORS D-I ONLY	B	N	I			2	PR	011595	123179	0	0.0
POST	000	SEM-0058-002	MRF426 NPN 25W 28V COLORS'D-I' ONLY	B	N	I			3	EA	011595	123179	0	0.0
POST	000	SEM-0070-001	MJE720 NPN PWR 1.5A, TO-1	B	N	I			3	EA	011595	123179	0	0.0
STUFF	000	SEM-0078-002	1N4001 DIODE GP RECTIFIER	B	N	I			3	EA	011595	123179	0	0.0
STUFF	000	SEM-0089-001	1N5402 DIODE 3A RECTIFIER	B	N	I			2	EA	011595	123179	0	0.0
POST	000	SEM-0109-003	LM340T-12 VOLTAGE REG, 12V	B	N	I			1	EA	011595	123179	0	0.0
STUFF	000	SEM-0109-006	LM723 VOLTAGE REG, ADJ	B	N	I			2	EA	011595	123179	0	0.0
STUFF	000	SEM-0165-001	MWA130 HYBRID AMP 0-400MH	B	N	I			1	EA	011595	123179	0	0.0
STUFF	000	TER-0004-004	TERMINAL PIN	B	N	I			2	EA	011595	123179	0	0.0
MASK	000	TER-0025-001	TERMINAL,CONCORD BRAND	B	N	I			7	EA	011595	123179	0	0.0

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11:05:20
FUNCTION: ASBL

SEA INC.
SINGLE LEVEL BILL OF MATERIAL

PARENT: ASY-0330-03 DESC: PA ASSY, 330 UM: EA MB: M REV:
DRWG: EFFECTIVE REV:
EFFECTIVITY DATE: 051496

OPTION: C

PT USE	SEQN	COMPONENT	DESCRIPTION	M B	C T	Q IN	REV OUT	QUANTITY	UM	EFFECTIVITY IN	EFFECTIVITY OUT	LTOS	SCRAP PCNT
STUFF	000	CAP-0037-012	CAP, ELECT. 330UF RAD	B	N	I		3	EA	011595	123179	0	0.0
STUFF	000	CAP-0037-016	CAP, ELECT. 470UF 63V RAD	B	N	I		3	EA	011595	123179	0	0.0
STUFF	000	CAP-0043-223	.022UF X7R(NPO)100WV CER	B	N	I		4	EA	011595	123179	0	0.0
STUFF	000	CAP-0043-472	CAP, .0047UF X7R(NPO)100WV	B	N	I		4	EA	011595	123179	0	0.0
STUFF	000	CON-0004-002	JACK, PHONO PCB	B	N	I		1	EA	011596	123179	0	0.0
POST	000	FAB-0330-07	HEATSINK	S	N	I		1	EA	011595	123179	0	0.0
POST	000	FAB-0330-11	SHIM, OUTPUT	B	N	I		2	EA	011595	123179	0	0.0
POST	000	FAB-0330-12	SHIM, DRIVER	B	N	I		1	EA	011595	123179	0	0.0
POST	000	FAB-0330-13	SHIM, PREDRIVER	B	N	I		1	EA	011595	123179	0	0.0
STUFF	000	FER-0022-001	TYPE 43 FERRITE BEAD-ON-A	B	N	I		7	EA	011595	123179	0	0.0
POST	000	FUS-0002-002	FUSE, 2A 125V	B	N	I		1	EA	011595	123179	0	0.0
POST	000	FUS-0002-005	FUSE, 5 AMP 3AG	B	N	I		1	EA	011595	123179	0	0.0
POST	000	FUS-0002-015	FUSE, 15 AMP 3AG	B	N	I		2	EA	011595	123179	0	0.0
PSTUF	000	FUS-0007-003	FUSE CLIP, PC MOUNT W/O E	B	N	I		8	EA	011595	123179	0	0.0
POST	000	HAR-0023-220	INSULATOR, TO220 PKG	B	N	I		4	EA	011595	123179	0	0.0
POST	000	HAR-0029-003	SIL PAD FOR TRANSISTOR	B	N	I		5	EA	011595	123179	0	0.0
POST	000	HAR-0039-003	WSHR NY SHLDR .24X4X.112	B	N	I		8	EA	011595	123179	0	0.0
POST	000	HAR-0066-001	WSHR NY .281X#4X3/64	B	N	I		1	EA	011595	123179	0	0.0
MASK	000	HAR-0080-115	UNTHREAD STANDOFF, SWAGE	B	N	I		10	EA	011595	123179	0	0.0
STUFF	000	IND-0001-568	INDUCTOR, .56UH WEE	B	N	I		1	EA	011595	123179	0	0.0
LAB	000	LAB[R]ASSY	LABOR, ASSEMBLY	M	R	I		2.07	HR	051395	123179	0	0.0
LAB	000	LAB[R]TEST	LABOR, TEST	M	R	I		0.20	HR	050495	123179	0	0.0
MASK	000	MSK-0330-03	PCB-0330-03 MASKING	M	N	I		1	EA	120195	123179	0	0.0
MASK	000	PCB-0330-03	PCB,330 PA	B	N	I		1	EA	011595	123179	0	0.0
STUFF	000	RES-0001-000	RESISTOR, 0 OHM	B	N	I		1	EA	011595	123179	0	0.0
STUFF	000	RES-0001-047	RESISTOR 4.7 1/4W	B	N	I		8	EA	011595	123179	0	0.0
STUFF	000	RES-0001-068	RESISTOR, 6.8 1/4W	B	N	I		2	EA	011595	123179	0	0.0
STUFF	000	RES-0001-100	RESISTOR 10 1/4W	B	N	I		1	EA	011595	123179	0	0.0
STUFF	000	RES-0001-102	RESISTOR 1K 1/4W	B	N	I		4	EA	011595	123179	0	0.0
STUFF	000	RES-0001-183	RESISTOR 18K 1/4W	B	N	I		2	EA	011595	123179	0	0.0
STUFF	000	RES-0001-220	RESISTOR 22 1/4W	B	N	I		4	EA	011595	123179	0	0.0
STUFF	000	RES-0001-330	RESISTOR 33 1/4W	B	N	I		1	EA	011595	123179	0	0.0
STUFF	000	RES-0001-561	RESISTOR 560 1/4W	B	N	I		2	EA	011595	123179	0	0.0
STUFF	000	RES-0001-752	RESISTOR 7.5K 1/4W	B	N	I		2	EA	011595	123179	0	0.0
STUFF	000	RES-0001-821	RESISTOR 820 1/4W	B	N	I		1	EA	011595	123179	0	0.0
STUFF	000	RES-0002-033	RESISTOR,3.3 1/2W	B	N	I		8	EA	011595	123179	0	0.0
STUFF	000	RES-0002-039	RESISTOR,3.9 1/2W	B	N	I		8	EA	011595	123179	0	0.0
STUFF	000	RES-0002-101	RESISTOR, 100 1/2W	B	N	I		1	EA	011595	123179	0	0.0
STUFF	000	RES-0002-220	RESISTOR, 22 1/2W	B	N	I		4	EA	011595	123179	0	0.0
STUFF	000	RES-0002-221	RESISTOR, 220 1/2W	B	N	I		1	EA	011595	123179	0	0.0
STUFF	000	RES-0005-101	RESISTOR, 100 2W	B	N	I		2	EA	011595	123179	0	0.0

11:05:20
FUNCTION: ASBL

SEA INC.
SINGLE LEVEL BILL OF MATERIAL

PARENT: ASY-0330-03 DESC: PA ASSY, 330 UM: EA MB: M REV:
DRWG: EFFECTIVE REV:
OPTION: C EFFECTIVITY DATE: 051496

PT USE	SEQN	COMPONENT	DESCRIPTION	M B	C T	Q T	REV IN	REV OUT	QUANTITY	UM	EFFECTIVITY IN	EFFECTIVITY OUT	SCRAP LTOS	SCRAP PCNT
POST	000	ASY-0330-RF1	CABLE ASSY,PA OUTPUT	B	N	I			1	EA	011595	123179	0	0.0
POST	000	ASY-0330-W1	3" COAX	M	P	I			1	EA	011595	123179	0	0.0
POST	000	ASY-0330-W2	4" COAX	M	P	I			3	EA	011595	123179	0	0.0
POST	000	ASY-0330-W3	4.5" COAX	M	P	I			2	EA	011595	123179	0	0.0
POST	000	ASY-3301-W2	10" POWER WIRE, RED	M	P	I			2	EA	011595	123179	0	0.0
POST	000	ASY-3301-W3	12" POWER WIRE, BLK	M	P	I			2	EA	011595	123179	0	0.0
POST	000	ASY-3301-W4	17.5" POWER WIRE, BLK	M	P	I			1	EA	011595	123179	0	0.0
POST	000	ASY-3301-W5	17.75" POWER WIRE, RED	M	P	I			1	EA	011595	123179	0	0.0
POST	000	ASY-3301-W6	18" POWER WIRE, WHT	M	P	I			1	EA	011595	123179	0	0.0
STUFF	000	ASY-3302-L2	IND,2.5T 11-24 ON 2-5	M	P	I			7	EA	011595	123179	0	0.0
PSTUF	000	ASY-3302-T1	XFORMER,INPUT 330	M	P	I			1	EA	011595	123179	0	0.0
PSTUF	000	ASY-3302-T11	XFORMER,OUTPUT 330	M	P	I			2	EA	011595	123179	0	0.0
POST	000	ASY-3302-T13	XFORMER,COMBINER 330	M	P	I			1	EA	011595	123179	0	0.0
POST	000	ASY-3302-T14	XFORMER,DRIVER 3 TO 2	M	P	I			1	EA	011595	123179	0	0.0
POST	000	ASY-3302-T15	XFORMER,DRIVER SPLITTER	M	P	I			1	EA	011595	123179	0	0.0
POST	000	ASY-3302-T2	XFORMER,PREDRIVER INPUT	M	P	I			1	EA	011595	123179	0	0.0
POST	000	ASY-3302-T3	XFORMER,PREDRIVER	M	P	I			1	EA	011595	123179	0	0.0
POST	000	ASY-3302-T4	XFORMER,PREDRIVER OUTPUT	M	P	I			2	EA	011595	123179	0	0.0
POST	000	ASY-3302-T5	XFORMER, DRIVER	M	P	I			2	EA	011595	123179	0	0.0
PSTUF	000	ASY-3302-T7	XFORMER,INPUT/FINAL 330	M	P	I			2	EA	011595	123179	0	0.0
POST	000	ASY-3302-T9	XFORMER,FEEDBACK 330	B	N	I			1	EA	011595	123179	0	0.0
STUFF	000	CAP-0001-014	CAPACITOR MICA 82PF	B	N	I			1	EA	011595	123179	0	0.0
STUFF	000	CAP-0001-024	CAPACITOR MICA 560PF	B	N	I			1	EA	011595	123179	0	0.0
STUFF	000	CAP-0001-026	CAPACITOR MICA 820PF	B	N	I			2	EA	011595	123179	0	0.0
STUFF	000	CAP-0001-029	CAPACITOR MICA 750PF	B	N	I			2	EA	011595	123179	0	0.0
STUFF	000	CAP-0003-001	CAPACITOR DM19 100PF	B	N	I			2	EA	011595	123179	0	0.0
STUFF	000	CAP-0003-014	CAPACITOR DM19 620PF	B	N	I			1	EA	011595	123179	0	0.0
STUFF	000	CAP-0003-030	CAPICITOR DM19 68PF	B	N	I			2	EA	011595	123179	0	0.0
STUFF	000	CAP-0006-001	CAP,MULTILAYER CER DIP .1	B	N	I			38	EA	011595	123179	0	0.0
STUFF	000	CAP-0013-001	CAPACITOR MONO .1UF	B	N	I			4	EA	011595	123179	0	0.0
STUFF	000	CAP-0013-003	CAPACITOR MONO .01UF 100V	B	N	I			2	EA	011595	123179	0	0.0
STUFF	000	CAP-0013-005	CAPACITOR MONO .001 UF	B	N	I			1	EA	011595	123179	0	0.0
STUFF	000	CAP-0013-006	CAP, MONO .047UF	B	N	I			9	EA	011595	123179	0	0.0
STUFF	000	CAP-0017-004	CAP, CERAMIC DISC .01UF 1	B	N	I			9	EA	011595	123179	0	0.0
STUFF	000	CAP-0028-104	CAP, FILM .1UF 250V	B	N	I			2	EA	011595	123179	0	0.0
STUFF	000	CAP-0028-473	CAP, FILM .047UF 250V	B	N	I			1	EA	011595	123179	0	0.0
STUFF	000	CAP-0031-003	CAPACITOR TANT 4.7UF 16V	B	N	I			1	EA	011595	123179	0	0.0
STUFF	000	CAP-0031-005	CAPACITOR TANT 10UF 16V											

11:43:14
FUNCTION: ASBL

SEA INC.
SINGLE LEVEL BILL OF MATERIAL

PARENT: ASY-0330-02E
DESC: 30MHZ FILTER/POWER INTERFACE
UM: EA MB: M REV:
DRWG: EFFECTIVE REV:
EFFECTIVITY DATE: 110195

OPTION: C

PT USE	SEQN	COMPONENT	DESCRIPTION	M B	C T	Q T	REV IN	REV OUT	QUANTITY	UM	EFFECTIVITY IN	EFFECTIVITY OUT	LTOS	SCRAP PCNT
STUFF	000	SM-0076-001-02A	.45 LS, 1N4148	M	N	I			5	EA	011595	123179	0	0.0
STUFF	000	SM-0083-004-02A	.45 LS, 1N4735A CR3,CR4,CR5	M	N	I			3	EA	011595	123179	0	0.0
STUFF	000	SOC-0002-008	IC SOCKET, 8 PIN DIP U5SOC	B	N	I			1	EA	011595	123179	0	0.0
STUFF	000	SOC-0002-016	IC SOCKET, 16 PIN DIP J10	B	N	I			1	EA	011595	123179	0	0.0
STUFF	000	SOC-0002-018	IC SOCKET, 18 PIN DIP U11SOC	B	N	I			1	EA	011595	123179	0	0.0
STUFF	000	TER-0019-002	TERMINAL, DISCONNECT TAB	B	N	I			11	EA	011595	123179	0	0.0

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SEA INC.
SINGLE LEVEL BILL OF MATERIAL

11:43:14
FUNCTION: ASBL

PARENT: ASY-0330-02E
DESC: 30MHZ FILTER/POWER INTERFACE
UM: EA MB: M REV:
DRWG:
EFFECTIVITY DATE: 110195 EFFECTIVE REV:

OPTION: C

PT USE	SEQN	COMPONENT	DESCRIPTION	M B	C T	Q T	REV IN	REV OUT	QUANTITY	UM	EFFECTIVITY IN	EFFECTIVITY OUT	LTOS	SCRAP PCNT
STUFF	000	SEM-0021-004	VN2222LM 60V FET (RED) Q2	B	N	I			1	EA	011595	123179	0	0.0
STUFF	000	SEM-0027-002	MTP8P08 P-CHAN TMOSFET 8A,80V Q1	B	N	I			1	EA	011595	123179	0	0.0
STUFF	000	SEM-0087-001	1N4004 DIODE GP RECTIFIER CR7,CR16	B	N	I			2	EA	011595	123179	0	0.0
STUFF	000	SEM-0089-001	1N5402 DIODE 3A RECTIFIER CR8	B	N	I			1	EA	011595	123179	0	0.0
STUFF	000	SEM-0109-002	LM2940T-10 VOLTAGE REG, 10V U1	B	N	I			1	EA	011595	123179	0	0.0
STUFF	000	SEM-0109-009	LP2950 VOLTAGE REG, 5V PRECISION U8	B	N	I			1	EA	011595	123179	0	0.0
STUFF	000	SEM-0140-093	4093 CMOS QUAD SCHMITT TR U4	B	N	I			1	EA	011595	123179	0	0.0
POST	000	SEM-0151-005	5841 8-BIT DRIVER U11	B	N	I			1	EA	011595	123179	0	0.0
STUFF	000	SEM-0154-017	MC34074 QUAD OP AMP LP U6	B	N	I			1	EA	011595	123179	0	0.0
STUFF	000	SEM-0158-004	ML2284 8-BIT A/D CONV U9	B	N	I			1	EA	011595	123179	0	0.0
STUFF	000	SEM-0159-002	LM335Z PRECISION TEMP SEN U7	B	N	I			1	EA	011595	123179	0	0.0
STUFF	000	SEM-0170-027	SMALL SIGNAL SCHOTTKY DIO CR1,CR2,CR13,CR14,CR15,CR17	B	N	I			6	EA	011595	123179	0	0.0
STUFF	000	SEM-0179-002	4N38 OPTOCPLR, NPN OUTPUT U2,U3	B	N	I			2	EA	011595	123179	0	0.0
POST	000	SEM-0179-003	HCPL-2530 OPTOCPLR DUAL H U5	B	N	I			1	EA	011595	123179	0	0.0

11:43:14
FUNCTION: ASBL

SEA INC.
SINGLE LEVEL BILL OF MATERIAL

PARENT: ASY-0330-02E
OPTION: C

DESC: 30MHZ FILTER/POWER INTERFACE
DRWG:
EFFECTIVITY DATE: 110195

UM: EA MB: M REV:
EFFECTIVE REV:

PT USE	SEQN	COMPONENT	DESCRIPTION	M B N	C T I	Q T	REV IN	REV OUT	QUANTITY	UM	EFFECTIVITY IN	EFFECTIVITY OUT	LTOS	SCRAP PCNT
STUFF	000	RES-0001-222	RESISTOR 2.2K 1/4W R13	B	N	I			1	EA	011595	123179	0	0.0
STUFF	000	RES-0001-225	RESISTOR 2.2MEG 1/4W R11,R14	B	N	I			2	EA	011595	123179	0	0.0
STUFF	000	RES-0001-471	RESISTOR 470 1/4W R7,R9	B	N	I			2	EA	011595	123179	0	0.0
STUFF	000	RES-0001-472	RESISTOR 4.7K 1/4W R4,R5	B	N	I			2	EA	011595	123179	0	0.0
STUFF	000	RES-0001-473	RESISTOR 47K 1/4W R1	B	N	I			1	EA	011595	123179	0	0.0
STUFF	000	RES-0001-511	RESISTOR 510 1/4W R10	B	N	I			1	EA	011595	123179	0	0.0
STUFF	000	RES-0001-681	RESISTOR 680 1/4W R8	B	N	I			1	EA	011595	123179	0	0.0
STUFF	000	RES-0001-683	RESISTOR 68K 1/4W R32	B	N	I			1	EA	011595	123179	0	0.0
STUFF	000	RES-0001-912	RESISTOR 9.1K 1/4W R27	B	N	I			1	EA	011595	123179	0	0.0
STUFF	000	RES-0002-330	RESISTOR, 33 1/2W R28,R29	B	N	I			2	EA	011595	123179	0	0.0
STUFF	000	RES-0002-510	RESISTOR, 51 OHM 1/2 W 5% R23,R24	B	N	I			2	EA	011595	123179	0	0.0
STUFF	000	RES-0002-511	RESISTOR 510 OHM 1/2 W 5% R3	B	N	I			1	EA	011595	123179	0	0.0
STUFF	000	RES-0010-104	RESISTOR, 100K OHM R30	B	N	I			1	EA	011595	123179	0	0.0
STUFF	000	RES-0027-202	RESISTOR, TRIMPOT 2K R31	B	N	I			1	EA	011595	123179	0	0.0

SEA INC.
SINGLE LEVEL BILL OF MATERIAL

11:43:14
FUNCTION: ASBL

PARENT: ASY-0330-02E
OPTION: C

DESC: 30MHZ FILTER/POWER INTERFACE
DRWG:
EFFECTIVITY DATE: 110195

UM: EA MB: M REV:
EFFECTIVE REV:

PT USE	SEQN	COMPONENT	DESCRIPTION	M C Q REV B T T IN	OUT	QUANTITY	UM	EFFECTIVITY IN	OUT	LTOS	SCRAP PCNT
STUFF	000	CON-0039-015	PC MOUNT BNC JACK J7,J11	B N I		2	EA	011595	123179	0	0.0
STUFF	000	FAB-0330-09	POWER FILTER SHIELD, 330	B N I		5	EA	011595	123179	0	0.0
PSTUF	000	FER-0018-003	FERRITE SLEEVE #61 MAT L18	B N I		1	EA	011595	123179	0	0.0
POST	000	FUS-0002-005	FUSE, 5 AMP 3AG F3,F4	B N I		2	EA	011595	123179	0	0.0
POST	000	FUS-0002-030	30 AMP 3AG 32V FUSE F1,F2	B N I		2	EA	011595	123179	0	0.0
PSTUF	000	FUS-0007-003	FUSE CLIP, PC MOUNT W/O E F1,F2,F3,F4	B N I		8	EA	011595	123179	0	0.0
STUFF	000	JUM-0002-035	JUMPER, .35 SPACING JU7,JU8	B N I		2	EA	011595	123179	0	0.0
STUFF	000	JUM-0002-045	JUMPER, .45 TEFLON JU2,JU3,JU4,JU5	B N I		4	EA	011595	123179	0	0.0
STUFF	000	JUM-0002-060	JUMPER, .60 TEFLON JU1	B N I		1	EA	011595	123179	0	0.0
LAB	000	LAB[R]ASSY	LABOR, ASSEMBLY	M R I		0.68	HR	051395		0	0.0
LAB	000	LAB[R]TEST	LABOR, TEST	M R I		0.50	HR	050495		0	0.0
MASK	000	PCB-0330-02	FILTER/POWER INTERFACE BO	B N I		1	EA	011595		0	0.0
STUFF	000	REL-0007-007	D/P BASE REL W/ CLEAR COV K3,K4,K5,K6,K7,K8,K9,K10,K11,K12,K13,K14	B N I		12	EA	011595	123179	0	0.0
STUFF	000	REL-0013-002	RELAY, SPDT 6V COIL K1,K2	B N I		2	EA	011595	123179	0	0.0
STUFF	000	RES-0001-100	RESISTOR 10 1/4W R15,R16,R17,R18,R19,R20,R21,R22	B N I		8	EA	011595	123179	0	0.0
STUFF	000	RES-0001-103	RESISTOR 10K 1/4W R2,R12,R25,R26	B N I		4	EA	011595	123179	0	0.0
STUFF	000	RES-0001-104	RESISTOR 100K 1/4W R6	B N I		1	EA	011595	123179	0	0.0

11:43:14
FUNCTION: ASBL

SEA INC.
SINGLE LEVEL BILL OF MATERIAL

PARENT: ASY-0330-02E
DESC: 30MHZ FILTER/POWER INTERFACE
DRWG:
UM: EA MB: M REV:
EFFECTIVITY DATE: 110195 EFFECTIVE REV:

OPTION: C

PT USE	SEQN	COMPONENT	DESCRIPTION	M B	C T	Q T	REV IN	REV OUT	QUANTITY	UM	EFFECTIVITY IN	EFFECTIVITY OUT	LTOS	SCRAP PCNT
STUFF	000	CAP-0013-003	CAPACITOR MONO .01UF 100V C18,C40,C130,C131	B	N	I			4	EA	011595	123179	0	0.0
STUFF	000	CAP-0013-005	CAPACITOR MONO .001 UF C25,C31	B	N	I			2	EA	011595	123179	0	0.0
STUFF	000	CAP-0017-004	CAP, CERAMIC DISC .01UF 1 C1,C3,C6,C8,C12,C13	B	N	I			6	EA	011595	123179	0	0.0
STUFF	000	CAP-0026-003	CAPACITOR FILM .47UF C5,C7,C16,C20	B	N	I			4	EA	011595	123179	0	0.0
STUFF	000	CAP-0027-102	CAPACITOR FILM CK05 .001 C26	B	N	I			1	EA	011595	123179	0	0.0
STUFF	000	CAP-0027-104	CAPACITOR FILM CK05 .1 C24,C32	B	N	I			2	EA	011595	123179	0	0.0
STUFF	000	CAP-0027-224	CAPACITOR FILM CK05 .22 C22,C27	B	N	I			2	EA	011595	123179	0	0.0
STUFF	000	CAP-0028-104	CAP, FILM .1UF 250V C2,C4,C10,C11,C14,C15	B	N	I			6	EA	011595	123179	0	0.0
STUFF	000	CAP-0031-005	CAPACITOR TANT 10UF 16V C33	B	N	I			1	EA	011595	123179	0	0.0
STUFF	000	CAP-0031-007	CAPACITOR TANT 22UF 16V C17,C23,C28,C29,C36	B	N	I			5	EA	011595	123179	0	0.0
STUFF	000	CAP-0031-008	CAP TANT 1UF 16-25V C133	B	N	I			1	EA	011595	123179	0	0.0
STUFF	000	CAP-0037-016	CAP, ELECT. 470UF 63V RAD C9	B	N	I			1	EA	011595	123179	0	0.0
STUFF	000	CAP-0060-103	CAPACITOR, NETWORK .01UF CN1	B	N	I			1	EA	011595	123179	0	0.0
STUFF	000	CON-0004-002	JACK, PHONO PCB J9	B	N	I			1	EA	011595	123179	0	0.0

SEA INC.
SINGLE LEVEL BILL OF MATERIAL

11:43:14
FUNCTION: ASBL

PARENT: ASY-0330-02E
DESC: 30MHZ FILTER/POWER INTERFACE
UM: EA MB: M REV:
DRWG: EFFECTIVE REV:
EFFECTIVITY DATE: 110195

OPTION: C

PT USE	SEQN	COMPONENT	DESCRIPTION	M B N	C T I	Q REV IN	REV OUT	QUANTITY	UM	EFFECTIVITY IN	EFFECTIVITY OUT	LTOS	SCRAP PCNT
STUFF	000	CAP-0003-024	CAPACITOR DM19 430PF C96,C120	B	N	I		2	EA	011595	123179	0	0.0
STUFF	000	CAP-0003-025	CAPACITOR DM19 560PF C58,C105,C128	B	N	I		3	EA	011595	123179	0	0.0
STUFF	000	CAP-0003-027	CAPICITOR DM19 50PF C112,C115	B	N	I		2	EA	011595	123179	0	0.0
STUFF	000	CAP-0003-028	CAPACITOR DM19 300PF C102,C106,C107	B	N	I		3	EA	011595	123179	0	0.0
STUFF	000	CAP-0003-029	CAPACITOR DM19 120PF C94,C103,C116,C116	B	N	I		4	EA	011595	123179	0	0.0
STUFF	000	CAP-0003-030	CAPICITOR DM19 68PF C51,C63,C73,C78,C86,C97,C110,C114,C121	B	N	I		9	EA	011595	123179	0	0.0
STUFF	000	CAP-0003-031	CAPICITOR DM19 33PF C69,C70,C88,C95,C119	B	N	I		5	EA	011595	123179	0	0.0
STUFF	000	CAP-0003-032	CAPACITOR DM19 180PF C118,C122,C127	B	N	I		3	EA	011595	123179	0	0.0
STUFF	000	CAP-0003-033	CAPICITOR DM19 82PF C90,C93	B	N	I		2	EA	011595	123179	0	0.0
STUFF	000	CAP-0003-034	CAPICITOR DM19 18PF C64,C66,C99	B	N	I		3	EA	011595	123179	0	0.0
STUFF	000	CAP-0003-035	CAPICITOR DM19 22PF C53,C79,C89	B	N	I		3	EA	011595	123179	0	0.0
STUFF	000	CAP-0003-037	CAPACITOR, DM19 15PF C75	B	N	I		1	EA	011595	123179	0	0.0
STUFF	000	CAP-0003-038	CAPACITOR DM19 47PF C74,C113	B	N	I		2	EA	011595	123179	0	0.0
STUFF	000	CAP-0013-001	CAPACITOR MONO .1UF C19,C21,C30,C34,C35,C37,C39,C41,C42,C43,C44,C45,C46,C47,C48, C49,C132	B	N	I		17	EA	011595	123179	0	0.0

11:43:14
FUNCTION: ASBL

SEA INC.
SINGLE LEVEL BILL OF MATERIAL

PARENT: ASY-0330-02E
OPTION: C

DESC: 30MHZ FILTER/POWER INTERFACE
DRWG:
EFFECTIVITY DATE: 110195

UM: EA MB: M REV:
EFFECTIVE REV:

PT USE	SEQN	COMPONENT	DESCRIPTION	M B M	C T I	Q T IN	REV OUT	QUANTITY	UM	EFFECTIVITY IN	EFFECTIVITY OUT	LTOS	SCRAP PCNT
POST	000	ASY-1630-T1	XFORMER,1630/330 POWER DE T1,T2					2	EA	011595	123179	0	0.0
STUFF	000	CAP-0003-001	CAPACITOR DM19 100PF C62	B	N	I		1	EA	011595	123179	0	0.0
STUFF	000	CAP-0003-002	CAPACITOR DM19 220PF C68,C77	B	N	I		2	EA	011595	123179	0	0.0
STUFF	000	CAP-0003-003	CAPACITOR DM19 330PF C59,C101	B	N	I		2	EA	011595	123179	0	0.0
STUFF	000	CAP-0003-004	CAPACITOR DM19 470PF C61,C72,C129	B	N	I		3	EA	011595	123179	0	0.0
STUFF	000	CAP-0003-006	CAPACITOR DM19 1000PF C85,C108,C109	B	N	I		3	EA	011595	123179	0	0.0
STUFF	000	CAP-0003-007	CAPACITOR DM19 1200PF C84	B	N	I		1	EA	011595	123179	0	0.0
STUFF	000	CAP-0003-013	CAPACITOR DM19 150PF C54,C55,C92	B	N	I		3	EA	011595	123179	0	0.0
STUFF	000	CAP-0003-014	CAPACITOR DM19 620PF C57,C100	B	N	I		2	EA	011595	123179	0	0.0
STUFF	000	CAP-0003-017	CAPACITOR DM19 750PF C80,C81	B	N	I		2	EA	011595	123179	0	0.0
STUFF	000	CAP-0003-019	CAPACITOR DM19 270PF C98,C126	B	N	I		2	EA	011595	123179	0	0.0
STUFF	000	CAP-0003-020	CAPACITOR DM19 820PF C60,C76,C104	B	N	I		3	EA	011595	123179	0	0.0
STUFF	000	CAP-0003-022	CAPACITOR DM19 360PF C124,C125	B	N	I		2	EA	011595	123179	0	0.0
STUFF	000	CAP-0003-023	CAPACITOR DM19 130PF C82,C123	B	N	I		2	EA	011595	123179	0	0.0

SEA INC.
SINGLE LEVEL BILL OF MATERIAL

PARENT: ASY-0330-02E DESC: 30MHZ FILTER/POWER INTERFACE
DRWG: UM: EA MB: M REV:
EFFECTIVITY DATE: 110195 EFFECTIVE REV:

OPTION: C

PT USE	SEQN	COMPONENT	DESCRIPTION	M C Q REV B T T IN OUT M P I	QUANTITY UM	EFFECTIVITY IN	EFFECTIVITY OUT	LTOS	SCRAP PCNT
STUFF	000	ASY-0012-07	IND,TOR 7T18-18 ON 13-1 L11,L12	M P I	2 EA	011595	123179	0	0.0
STUFF	000	ASY-0012-08	IND,TOR 8T18-18 ON 13-1 L10	M P I	1 EA	011595	123179	0	0.0
STUFF	000	ASY-0012-10	IND,TOR 10T18-18 ON 13-1 L8,L9	M P I	2 EA	011595	123179	0	0.0
STUFF	000	ASY-0012-11	IND, TOR 11T 18-18 ON 13-L7	M P I	1 EA	011595	123179	0	0.0
STUFF	000	ASY-0012-12	IND,TOR 12T18-18 ON 13-1 L5,L6	M P I	2 EA	011595	123179	0	0.0
STUFF	000	ASY-0012-14	IND,TOR 14T18-18 ON 13-1 L4	M P I	1 EA	011595	123179	0	0.0
STUFF	000	ASY-0012-15	IND,TOR 15T18-18 ON 13-1 L2,L3	M P I	2 EA	011595	123179	0	0.0
STUFF	000	ASY-0012-17	IND, TOR 17T 18-18 ON 13-L1	M P I	1 EA	011595	123179	0	0.0
STUFF	000	ASY-0015-03	IND,TOR 3T18-18 ON 26-1 L17	M P I	1 EA	011595	123179	0	0.0
STUFF	000	ASY-0015-04	IND,TOR 4T18-18 ON 26-1 L16	M P I	1 EA	011595	123179	0	0.0
STUFF	000	ASY-0015-07	IND,TOR 7T18-18 ON 26-1 L14,L15	M P I	2 EA	011595	123179	0	0.0
STUFF	000	ASY-0015-08	IND,TOR 8T18-18 ON 26-1 L13	M P I	1 EA	011595	123179	0	0.0
POST	000	ASY-0330-J12	CABLE ASSY, POWER CONVERT J12	M P I	1 EA	011595	123179	0	0.0

10:53:38
FUNCTION: ASBL

SEA INC.
SINGLE LEVEL BILL OF MATERIAL

PARENT: ASY-0330-02

DESC: FILTER/POWER INTERFACE AS
DRWG:
EFFECTIVITY DATE: 051496

UM: EA

MB: M REV:
EFFECTIVE REV:

OPTION: C

PT USE	SEQN	COMPONENT	DESCRIPTION	M B	C T	Q T	REV IN	REV OUT	QUANTITY	UM	EFFECTIVITY IN	EFFECTIVITY OUT	SCRAP LTOS	SCRAP PCNT
STUFF	000	SM-0076-001-02A	.45 LS, 1N4148	M	N	I			5	EA	011595	123179	0	0.0
STUFF	000	SM-0083-004-02A	.45 LS, 1N4735A CR3,CR4,CR5	M	N	I			3	EA	011595	123179	0	0.0
STUFF	000	SM-0087-001-02A	.45 LS, 1N4004 CR7,CR16	M	N	I			2	EA	011595	123179	0	0.0
STUFF	000	SOC-0002-008	IC SOCKET, 8 PIN DIP U5SOC	B	N	I			1	EA	011595	123179	0	0.0
000	000	SOC-0002-014	IC SOCKET, 14 PIN DIP V4SOC	B	N	I			1	EA	010896	123179	0	0.0
STUFF	000	SOC-0002-016	IC SOCKET, 16 PIN DIP J10	B	N	I			1	EA	011595	123179	0	0.0
STUFF	000	SOC-0002-018	IC SOCKET, 18 PIN DIP U11SOC	B	N	I			1	EA	011595	123179	0	0.0
STUFF	000	TER-0019-002	TERMINAL, DISCONNECT TAB	B	N	I			11	EA	011595	123179	0	0.0

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10:53:38
FUNCTION: ASBL

SEA INC.
SINGLE LEVEL BILL OF MATERIAL

PARENT: ASY-0330-02
DESC: FILTER/POWER INTERFACE AS
DRWG:
EFFECTIVITY DATE: 051496
UM: EA
MB: M REV:
EFFECTIVE REV:

OPTION: C

PT USE	SEQN	COMPONENT	DESCRIPTION	M B	C T	Q T	REV IN	REV OUT	QUANTITY	UM	EFFECTIVITY IN	EFFECTIVITY OUT	SCRAP LTOS	SCRAP PCNT
STUFF	000	RES-0027-202	RESISTOR, TRIMPOT 2K R31	B	N	I			1	EA	011595	123179	0	0.0
STUFF	000	SEM-0021-004	VN2222LM 60V FET (RED) Q2	B	N	I			1	EA	011595	123179	0	0.0
STUFF	000	SEM-0027-002	MTP8P08 P-CHAN TMOSFET 8A,80V Q1	B	N	I			1	EA	011595	123179	0	0.0
STUFF	000	SEM-0089-001	1N5402 DIODE 3A RECTIFIER CR8	B	N	I			1	EA	011595	123179	0	0.0
STUFF	000	SEM-0109-002	LM2940T-10 VOLTAGE REG, 10V U1	B	N	I			1	EA	011595	123179	0	0.0
STUFF	000	SEM-0109-009	LP2950 VOLTAGE REG, 5V PRECISION U8	B	N	I			1	EA	011595	123179	0	0.0
STUFF	000	SEM-0140-093	4093 CMOS QUAD SCHMITT TR U4	B	N	I			1	EA	011595	123179	0	0.0
POST	000	SEM-0151-005	5841 8-BIT DRIVER U11	B	N	I			1	EA	011595	123179	0	0.0
STUFF	000	SEM-0154-017	MC34074 QUAD OP AMP LP U6	B	N	I			1	EA	011595	123179	0	0.0
STUFF	000	SEM-0158-004	ML2284 8-BIT A/D CONV U9	B	N	I			1	EA	011595	123179	0	0.0
STUFF	000	SEM-0159-002	LM335Z PRECISION TEMP SEN U7	B	N	I			1	EA	011595	123179	0	0.0
STUFF	000	SEM-0170-027	SMALL SIGNAL SCHOTTKY DIODE,1N6263 CR1,CR2,CR13,CR14,CR15,CR17	B	N	I			6	EA	011595	123179	0	0.0
STUFF	000	SEM-0179-002	4N38 OPTOCPLR, NPN OUTPUT U2,U3	B	N	I			2	EA	011595	123179	0	0.0
POST	000	SEM-0179-003	HCPL-2530 OPTOCPLR DUAL H U5	B	N	I			1	EA	011595	123179	0	0.0

10:53:38
FUNCTION: ASBL

SEA INC.
SINGLE LEVEL BILL OF MATERIAL

PARENT: ASY-0330-02

DESC: FILTER/POWER INTERFACE AS
UM: EA
MB: M REV:
DRWG:
EFFECTIVITY DATE: 051496
EFFECTIVE REV:

OPTION: C

PT USE	SEQN	COMPONENT	DESCRIPTION	M B	C T	Q T	REV IN	REV OUT	QUANTITY	UM	EFFECTIVITY IN	EFFECTIVITY OUT	LTOS	SCRAP PCNT
STUFF	000	RES-0001-104	RESISTOR 100K 1/4W R6	B	N	I			1	EA	011595	123179	0	0.0
STUFF	000	RES-0001-222	RESISTOR 2.2K 1/4W R13	B	N	I			1	EA	011595	123179	0	0.0
STUFF	000	RES-0001-225	RESISTOR 2.2MEG 1/4W R11,R14	B	N	I			2	EA	011595	123179	0	0.0
STUFF	000	RES-0001-471	RESISTOR 470 1/4W R7,R9	B	N	I			2	EA	011595	123179	0	0.0
STUFF	000	RES-0001-472	RESISTOR 4.7K 1/4W R4,R5	B	N	I			2	EA	011595	123179	0	0.0
STUFF	000	RES-0001-473	RESISTOR 47K 1/4W R1	B	N	I			1	EA	011595	123179	0	0.0
STUFF	000	RES-0001-511	RESISTOR 510 1/4W R10	B	N	I			1	EA	011595	123179	0	0.0
STUFF	000	RES-0001-681	RESISTOR 680 1/4W R8	B	N	I			1	EA	011595	123179	0	0.0
STUFF	000	RES-0001-683	RESISTOR 68K 1/4W R32	B	N	I			1	EA	011595	123179	0	0.0
STUFF	000	RES-0001-912	RESISTOR 9.1K 1/4W R27	B	N	I			1	EA	011595	123179	0	0.0
STUFF	000	RES-0002-330	RESISTOR, 33 1/2W R28,R29	B	N	I			2	EA	011595	123179	0	0.0
STUFF	000	RES-0002-510	RESISTOR, 51 OHM 1/2 W 5% R23,R24	B	N	I			2	EA	011595	123179	0	0.0
STUFF	000	RES-0002-511	RESISTOR 510 OHM 1/2 W 5% R3	B	N	I			1	EA	011595	123179	0	0.0
STUFF	000	RES-0010-104	RESISTOR, 100K OHM R30	B	N	I			1	EA	011595	123179	0	0.0

10:53:38
FUNCTION: ASBL

SEA INC.
SINGLE LEVEL BILL OF MATERIAL

PARENT: ASY-0330-02
OPTION: C

DESC: FILTER/POWER INTERFACE AS
DRWG:
EFFECTIVITY DATE: 051496

UM: EA
MB: M REV:
EFFECTIVE REV:

PT USE	SEQN	COMPONENT	DESCRIPTION	M C Q REV B T T IN OUT	QUANTITY UM	EFFECTIVITY IN	EFFECTIVITY OUT	LTOS	SCRAP PCNT
STUFF	000	CON-0039-015	PC MOUNT BNC JACK J7,J11	B N I	2 EA	011595	123179	0	0.0
REV	000	ECN 6103	ASY-0330-02	M D O	1 EA	010896	123179	0	0.0
STUFF	000	FAB-0330-09	POWER FILTER SHIELD, 330	B N I	5 EA	011595	123179	0	0.0
PSTUF	000	FER-0018-003	FERRITE SLEEVE #61 MAT L18	B N I	1 EA	011595	123179	0	0.0
POST	000	FUS-0002-005	FUSE, 5 AMP 3AG F3,F4	B N I	2 EA	011595	123179	0	0.0
POST	000	FUS-0002-030	30 AMP 3AG 32V FUSE F1,F2	B N I	2 EA	011595	123179	0	0.0
PSTUF	000	FUS-0007-003	FUSE CLIP, PC MOUNT W/O E F1,F2,F3,F4	B N I	8 EA	011595	123179	0	0.0
STUFF	000	JUM-0002-035	JUMPER, .35 SPACING JU7,JU8	B N I	2 EA	011595	123179	0	0.0
STUFF	000	JUM-0002-045	JUMPER, .45 TEFLON JU2,JU3,JU4,JU5	B N I	4 EA	011595	123179	0	0.0
STUFF	000	JUM-0002-060	JUMPER, .60 TEFLON JU1	B N I	1 EA	011595	123179	0	0.0
LAB	000	LAB[R]ASSY	LABOR, ASSEMBLY	M R I	0.68 HR	051395	123179	0	0.0
LAB	000	LAB[R]TEST	LABOR, TEST	M R I	0.50 HR	050495	123179	0	0.0
MASK	000	MSK-0330-02	PCB-0330-02 MASKING	M N I	1 EA	120195	123179	0	0.0
MASK	000	PCB-0330-02	FILTER/POWER INTERFACE BO	B N I	1 EA	011595	123179	0	0.0
STUFF	000	REL-0007-007	D/P BASE REL W/ CLEAR COV K3,K4,K5,K6,K7,K8,K9,K10,K11,K12,K13,K14	B N I	12 EA	011595	123179	0	0.0
STUFF	000	REL-0013-002	RELAY, SPDT 6V COIL K1,K2	B N I	2 EA	011595	123179	0	0.0
STUFF	000	RES-0001-100	RESISTOR 10 1/4W R15,R16,R17,R18,R19,R20,R21,R22	B N I	8 EA	011595	123179	0	0.0
STUFF	000	RES-0001-103	RESISTOR 10K 1/4W R2,R12,R25,R26	B N I	4 EA	011595	123179	0	0.0

10:53:38
FUNCTION: ASBL

SEA INC.
SINGLE LEVEL BILL OF MATERIAL

PARENT: ASY-0330-02 DESC: FILTER/POWER INTERFACE AS UM: EA MB: M REV:
DRWG: EFFECTIVE REV:
OPTION: C EFFECTIVITY DATE: 051496

PT USE	SEQN	COMPONENT	DESCRIPTION	M B N	C T I	Q T N	REV IN	REV OUT	QUANTITY	UM	EFFECTIVITY IN	EFFECTIVITY OUT	LTOS	SCRAP PCNT
STUFF	000	CAP-0013-003	CAPACITOR MONO .01UF 100V C18,C40,C130,C131	B	N	I			4	EA	011595	123179	0	0.0
STUFF	000	CAP-0013-005	CAPACITOR MONO .001 UF C25,C31	B	N	I			2	EA	011595	123179	0	0.0
STUFF	000	CAP-0017-004	CAP, CERAMIC DISC .01UF 1 C1,C3,C6,C8,C12,C13	B	N	I			6	EA	011595	123179	0	0.0
STUFF	000	CAP-0026-003	CAPACITOR FILM .47UF C5,C7,C16,C20	B	N	I			4	EA	011595	123179	0	0.0
STUFF	000	CAP-0027-102	CAPACITOR FILM CK05 .001 C26	B	N	I			1	EA	011595	123179	0	0.0
STUFF	000	CAP-0027-104	CAPACITOR FILM CK05 .1 C24,C32	B	N	I			2	EA	011595	123179	0	0.0
STUFF	000	CAP-0027-224	CAPACITOR FILM CK05 .22 C22,C27	B	N	I			2	EA	011595	123179	0	0.0
STUFF	000	CAP-0028-104	CAP, FILM .1UF 250V C2,C4,C10,C11,C14,C15	B	N	I			6	EA	011595	123179	0	0.0
STUFF	000	CAP-0031-005	CAPACITOR TANT 10UF 16V C33	B	N	I			1	EA	011595	123179	0	0.0
STUFF	000	CAP-0031-007	CAPACITOR TANT 22UF 16V C17,C23,C28,C29,C36	B	N	I			5	EA	011595	123179	0	0.0
STUFF	000	CAP-0031-008	CAP TANT 1UF 16-25V C133	B	N	I			1	EA	011595	123179	0	0.0
STUFF	000	CAP-0037-016	CAP, ELECT. 470UF 63V RAD C9	B	N	I			1	EA	011595	123179	0	0.0
STUFF	000	CAP-0060-103	CAPACITOR, NETWORK .01UF CN1	B	N	I			1	EA	011595	123179	0	0.0
STUFF	000	CON-0004-002	JACK, PHONO PCB J9	B	N	I			1	EA	011595	123179	0	0.0

10:53:38
FUNCTION: ASBL

SEA INC.
SINGLE LEVEL BILL OF MATERIAL

PARENT: ASY-0330-02
DESC: FILTER/POWER INTERFACE AS
DRWG:
EFFECTIVITY DATE: 051496
UM: EA
MB: M REV:
EFFECTIVE REV:

OPTION: C

PT USE	SEQN	COMPONENT	DESCRIPTION	M B	C T	Q T	REV IN	REV OUT	QUANTITY	UM	EFFECTIVITY IN	EFFECTIVITY OUT	LTOS	SCRAP PCNT
STUFF	000	CAP-0003-024	CAPACITOR DM19 430PF C96,C120	B	N	I			2	EA	011595	123179	0	0.0
STUFF	000	CAP-0003-025	CAPACITOR DM19 560PF C58,C105,C128	B	N	I			3	EA	011595	123179	0	0.0
STUFF	000	CAP-0003-027	CAPICITOR DM19 50PF C88,C112,C115	B	N	I			3	EA	011595	123179	0	0.0
STUFF	000	CAP-0003-028	CAPACITOR DM19 300PF C102,C106,C107	B	N	I			3	EA	011595	123179	0	0.0
STUFF	000	CAP-0003-029	CAPACITOR DM19 120PF C94,C103,C116,C116	B	N	I			4	EA	011595	123179	0	0.0
STUFF	000	CAP-0003-030	CAPICITOR DM19 68PF C63,C73,C78,C97,C110,C114,C121	B	N	I			7	EA	011595	123179	0	0.0
STUFF	000	CAP-0003-031	CAPICITOR DM19 33PF C69,C70,C95,C119	B	N	I			4	EA	011595	123179	0	0.0
STUFF	000	CAP-0003-032	CAPACITOR DM19 180PF C118,C122,C127	B	N	I			3	EA	011595	123179	0	0.0
STUFF	000	CAP-0003-033	CAPICITOR DM19 82PF C90,C93	B	N	I			2	EA	011595	123179	0	0.0
STUFF	000	CAP-0003-034	CAPICITOR DM19 18PF C64,C66,C99	B	N	I			3	EA	011595	123179	0	0.0
STUFF	000	CAP-0003-035	CAPICITOR DM19 22PF C51,C53,C79,C86	B	N	I			4	EA	011595	123179	0	0.0
STUFF	000	CAP-0003-037	CAPACITOR, DM19 15PF C75	B	N	I			1	EA	011595	123179	0	0.0
STUFF	000	CAP-0003-038	CAPACITOR DM19 47PF C74,C113	B	N	I			2	EA	011595	123179	0	0.0
STUFF	000	CAP-0013-001	CAPACITOR MONO .1UF C19,C21,C30,C34,C35,C37,C39,C41,C42,C43,C44,C45,C46,C47,C48, C49,C132	B	N	I			17	EA	011595	123179	0	0.0

PARENT: ASY-0330-02 DESC: FILTER/POWER INTERFACE AS
DRWG: UM: EA MB: M REV:
OPTION: C EFFECTIVITY DATE: 051496 EFFECTIVE REV:

PT USE	SEQN	COMPONENT	DESCRIPTION	M B	C T	Q T	REV IN	REV OUT	QUANTITY	UM	EFFECTIVITY IN	EFFECTIVITY OUT	LTOS	SCRAP PCNT
POST	000	ASY-1630-T1	XFORMER,1630/330 POWER DE T1,T2	M	P	I			2	EA	011595	123179	0	0.0
STUFF	000	CAP-0003-001	CAPACITOR DM19 100PF C62	B	N	I			1	EA	011595	123179	0	0.0
STUFF	000	CAP-0003-002	CAPACITOR DM19 220PF C68,C77	B	N	I			2	EA	011595	123179	0	0.0
STUFF	000	CAP-0003-003	CAPACITOR DM19 330PF C59,C101	B	N	I			2	EA	011595	123179	0	0.0
STUFF	000	CAP-0003-004	CAPACITOR DM19 470PF C61,C72,C129	B	N	I			3	EA	011595	123179	0	0.0
STUFF	000	CAP-0003-006	CAPACITOR DM19 1000PF C85,C108,C109	B	N	I			3	EA	011595	123179	0	0.0
STUFF	000	CAP-0003-007	CAPACITOR DM19 1200PF C84	B	N	I			1	EA	011595	123179	0	0.0
STUFF	000	CAP-0003-013	CAPACITOR DM19 150PF C54,C55,C92	B	N	I			3	EA	011595	123179	0	0.0
STUFF	000	CAP-0003-014	CAPACITOR DM19 620PF C57,C100	B	N	I			2	EA	011595	123179	0	0.0
STUFF	000	CAP-0003-017	CAPACITOR DM19 750PF C80,C81	B	N	I			2	EA	011595	123179	0	0.0
STUFF	000	CAP-0003-019	CAPACITOR DM19 270PF C98,C126	B	N	I			2	EA	011595	123179	0	0.0
STUFF	000	CAP-0003-020	CAPACITOR DM19 820PF C60,C76,C104	B	N	I			3	EA	011595	123179	0	0.0
STUFF	000	CAP-0003-022	CAPACITOR DM19 360PF C124,C125	B	N	I			2	EA	011595	123179	0	0.0
STUFF	000	CAP-0003-023	CAPACITOR DM19 130PF C82,C123	B	N	I			2	EA	011595	123179	0	0.0

PARENT: ASY-0330-02 DESC: FILTER/POWER INTERFACE AS
DRWG: UM: EA MB: M REV:
EFFECTIVITY DATE: 051496 EFFECTIVE REV:

OPTION: C

PT USE	SEQN	COMPONENT	DESCRIPTION	M C Q REV B T T IN OUT	QUANTITY	UM	EFFECTIVITY IN	EFFECTIVITY OUT	SCRAP LTOS	SCRAP PCNT
STUFF	000	ASY-0012-07	IND,TOR 7T18-18 ON 13-1 L11,L12	M P I	2	EA	011595	123179	0	0.0
STUFF	000	ASY-0012-08	IND,TOR 8T18-18 ON 13-1 L10	M P I	1	EA	011595	123179	0	0.0
STUFF	000	ASY-0012-10	IND,TOR 10T18-18 ON 13-1 L8,L9	M P I	2	EA	011595	123179	0	0.0
STUFF	000	ASY-0012-11	IND, TOR 11T 18-18 ON 13-L7	M P I	1	EA	011595	123179	0	0.0
STUFF	000	ASY-0012-12	IND,TOR 12T18-18 ON 13-1 L5,L6	M P I	2	EA	011595	123179	0	0.0
STUFF	000	ASY-0012-14	IND,TOR 14T18-18 ON 13-1 L4	M P I	1	EA	011595	123179	0	0.0
STUFF	000	ASY-0012-15	IND,TOR 15T18-18 ON 13-1 L2,L3	M P I	2	EA	011595	123179	0	0.0
STUFF	000	ASY-0012-17	IND, TOR 17T 18-18 ON 13-L1	M P I	1	EA	011595	123179	0	0.0
STUFF	000	ASY-0015-05	IND,TOR 5T18-18 ON 26-1 L17	M P I	1	EA	011595	123179	0	0.0
STUFF	000	ASY-0015-06	IND,TOR 6T18-18 ON 26-1 L16	M P I	1	EA	011595	123179	0	0.0
STUFF	000	ASY-0015-07	IND,TOR 7T18-18 ON 26-1 L14,L15	M P I	2	EA	011595	123179	0	0.0
STUFF	000	ASY-0015-08	IND,TOR 8T18-18 ON 26-1 L13	M P I	1	EA	011595	123179	0	0.0
POST	000	ASY-0330-J12	CABLE ASSY, POWER CONVERT J12	M P I	1	EA	011595	123179	0	0.0

10:58:38
FUNCTION: ASBL

SEA INC.
SINGLE LEVEL BILL OF MATERIAL

PARENT: ASY-0330-01E DESC: MAIN BOARD, EUROPEAN UM: EA MB: M REV:
DRWG: EFFECTIVE REV:
EFFECTIVITY DATE: 051496

OPTION: C

PT USE	SEQN	COMPONENT	DESCRIPTION	M B	C T	Q T	REV IN	REV OUT	QUANTITY	UM	EFFECTIVITY IN	EFFECTIVITY OUT	LTOS	SCRAP PCNT
STUFF	000	SM-0076-001-02A	.45 LS, 1N4148 CR27,CR29,CR30,CR37,CR57,CR65	M	N	I			6	EA	011595	123179	0	0.0
STUFF	000	SM-0076-001-07A	.25 LS, 1N4148 CR32,CR33,CR34,CR61	M	N	I			4	EA	011595	123179	0	0.0
STUFF	000	SM-0076-001-24A	.6 LS, 1N4148 CR2,CR4,CR6	M	N	I			3	EA	011595	123179	0	0.0
STUFF	000	SM-0083-004-02A	.45 LS, 1N4735A	M	N	I			1	EA	011595	123179	0	0.0
STUFF	000	SM-0096-002-17A	.5 LS, KS1001	M	N	I			1	EA	011595	123179	0	0.0
STUFF	000	SM-0096-005-02A	.45 LS, BA282 CR44,CR45,CR46,CR47,CR48,CR49,CR52,CR53,CR54,CR55	M	N	I			10	EA	011595	123179	0	0.0
STUFF	000	SM-0096-005-07A	.25 LS, BA282 CR38,CR39,CR40,CR41,CR42,CR43,CR63,CR64	M	N	I			8	EA	011595	123179	0	0.0
STUFF	000	SOC-0002-008	IC SOCKET, 8 PIN DIP	B	N	I			1	EA	011595	123179	0	0.0
STUFF	000	SOC-0002-016	IC SOCKET, 16 PIN DIP	B	N	I			1	EA	011595	123179	0	0.0
STUFF	000	TER-0004-004	TERMINAL PIN	B	N	I			9	EA	011595	123179	0	0.0
STUFF	000	TRA-0005-001	TRANSFORMER, BLK	B	N	I			3	EA	011595	123179	0	0.0
STUFF	000	TRA-0006-001	TRANSFORMER, ORN	B	N	I			1	EA	011595	123179	0	0.0
STUFF	000	TRA-0011-001	TRANSFORMER, VIOLET	B	N	I			2	EA	011595	123179	0	0.0
STUFF	000	TRA-0011-004	7MM IF TRANSFORMER FOR 45	B	N	I			2	EA	011595	123179	0	0.0
STUFF	000	TRA-0013-003	11MHZ-7MM TRANSFORMER SUB	B	N	I			2	EA	011595	123179	0	0.0

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10:58:38
FUNCTION: ASBL

SEA INC.
SINGLE LEVEL BILL OF MATERIAL

PARENT: ASY-0330-01E
DESC: MAIN BOARD, EUROPEAN
DRWG:
UM: EA MB: M REV:
EFFECTIVITY DATE: 051496 EFFECTIVE REV:

OPTION: C

PT USE	SEQN	COMPONENT	DESCRIPTION	M B	C T	Q T	REV IN	REV OUT	QUANTITY	UM	EFFECTIVITY IN	EFFECTIVITY OUT	SCRAP LTOS	SCRAP PCNT
STUFF	000	SEM-0010-001	MPS-A14	B	N	I			1	EA	011595	123179	0	0.0
STUFF	000	SEM-0015-001	MPS-A63	B	N	I			1	EA	011595	123179	0	0.0
STUFF	000	SEM-0016-002	MPS-A18	B	N	I			4	EA	011595	123179	0	0.0
STUFF	000	SEM-0017-002	U310	B	N	I			1	EA	011595	123179	0	0.0
STUFF	000	SEM-0017-004	J310	B	N	I			4	EA	011595	123179	0	0.0
STUFF	000	SEM-0017-04G	GRADED J310 OSC.	M	N	I			3	EA	011595	123179	0	0.0
STUFF	000	SEM-0021-002	PN2222A	B	N	I			2	EA	011595	123179	0	0.0
STUFF	000	SEM-0021-004	VN2222LM 60V FET (RED)	B	N	I			5	EA	011595	123179	0	0.0
STUFF	000	SEM-0032-002	TIP32 PNP PWR 3A 40V, TO-	B	N	I			1	EA	011595	123179	0	0.0
STUFF	000	SEM-0061-006	SP8789A PRESCALER 200MHZ,	B	N	I			1	EA	011595	123179	0	0.0
STUFF	000	SEM-0061-007	MC12015P PRESCALER 225MHZ	B	N	I			2	EA	011595	123179	0	0.0
STUFF	000	SEM-0063-002	MPS3866 NPN VHF/VHF, TO-9	B	N	I			1	EA	011595	123179	0	0.0
STUFF	000	SEM-0080-004	MV209 DIODE TUNING, TO-22	B	N	I			10	EA	011595	123179	0	0.0
STUFF	000	SEM-0091-001	1N3070 DIODE GP RECTIFIER	B	N	I			2	EA	011595	123179	0	0.0
STUFF	000	SEM-0101-001	MC1350P IF AMPLIFIER 8 BI	B	N	I			3	EA	011595	123179	0	0.0
STUFF	000	SEM-0102-001	MC3340P ANNUATOR DC CONTR	B	N	I			1	EA	011595	123179	0	0.0
STUFF	000	SEM-0102-002	LC403 AGC AMP 14 DIP	B	N	I			1	EA	011595	123179	0	0.0
STUFF	000	SEM-0103-002	MC1496P BAL MODULATOR	B	N	I			1	EA	011595	123179	0	0.0
STUFF	000	SEM-0109-001	7805 VOLTAGE REG, 5V	B	N	I			1	EA	011595	123179	0	0.0
STUFF	000	SEM-0109-004	LM7808 VOLTAGE REG, 8V	B	N	I			1	EA	011595	123179	0	0.0
STUFF	000	SEM-0140-066	4066 CMOS QUAD ANALOG SWI	B	N	I			2	EA	011595	123179	0	0.0
STUFF	000	SEM-0140-504	4504 CMOS HEX LEVEL SHIFT	B	N	I			1	EA	011595	123179	0	0.0
STUFF	000	SEM-0143-086	74HC86 CMOS QUAD EXCL OR	B	N	I			1	EA	011595	123179	0	0.0
STUFF	000	SEM-0151-005	5841 8-BIT DRIVER	B	N	I			1	EA	011595	123179	0	0.0
STUFF	000	SEM-0154-003	LM358 DUAL OP AMP	B	N	I			1	EA	011595	123179	0	0.0
STUFF	000	SEM-0154-010	LM348 QUAD OP AMP	B	N	I			4	EA	011595	123179	0	0.0
STUFF	000	SEM-0154-016	MC34072 DUAL OPAMP LP	B	N	I			1	EA	011595	123179	0	0.0
STUFF	000	SEM-0154-017	MC34074 QUAD OP AMP LP	B	N	I			1	EA	011595	123179	0	0.0
STUFF	000	SEM-0158-006	MC144110 6-BIT DAC X6	B	N	I			1	EA	011595	123179	0	0.0
STUFF	000	SEM-0165-005	MMIC, MSA-0404	B	N	I			1	EA	011595	123179	0	0.0
POST	000	SEM-0165-006	MMIC, MSA-0304	B	N	I			1	EA	011595	123179	0	0.0
STUFF	000	SEM-0165-007	MMIC, MSA-1104	B	N	I			2	EA	011595	123179	0	0.0
STUFF	000	SEM-0170-015	LM78L05AWC	B	N	I			16	EA	011595	123179	0	0.0
STUFF	000	SEM-0170-027	SMALL SIGNAL SCHOTTKY DIODE,1N6263	B	N	I			1	EA	011595	123179	0	0.0
STUFF	000	SEM-0174-001	DATA XCEIVER SN75176	B	N	I			1	EA	011595	123179	0	0.0
STUFF	000	SEM-0175-001	MC145157 SYNTHESIZER SING	B	N	I			3	EA	011595	123179	0	0.0
STUFF	000	SEM-0176-001	MC145158 SYNTHESIZER DUAL	B	N	I			1	EA	011595	123179	0	0.0
POST	000	SEM-0183-003	HY6116ALP-10 2KX8 CMOS SR	B	N	I			1	EA	011595	123179	0	0.0
POST	000	SEM-0187-002	16K-BIT SERIAL E2 PROM	B	N	I			1	EA	011595	123179	0	0.0
STUFF	000	SEM-0190-001	MM88C29, QUAD LINE DRIVER	B	N	I			1	EA	011595	123179	0	0.0
STUFF	000	SEM-0191-001	MC3346, TRANSISTOR ARRAY	B	N	I			1	EA	011595	123179	0	0.0

PARENT: ASY-0330-01E DESC: MAIN BOARD, EUROPEAN
DRWG: UM: EA MB: M REV:
OPTION: C EFFECTIVITY DATE: 051496 EFFECTIVE REV:

PT USE	SEQN	COMPONENT	DESCRIPTION	M B	C T	Q T	REV IN	REV OUT	QUANTITY	UM	EFFECTIVITY IN	EFFECTIVITY OUT	LTOS	SCRAP PCNT
STUFF	000	RES-0010-102	RESISTOR, 1K OHM	B	N	I			16	EA	011595	123179	0	0.0
STUFF	000	RES-0010-103	RESISTOR, 10K OHM	B	N	I			26	EA	011595	123179	0	0.0
STUFF	000	RES-0010-104	RESISTOR, 100K OHM	B	N	I			13	EA	011595	123179	0	0.0
STUFF	000	RES-0010-105	1 MEG 1/8W CARBON FILM 5%	B	N	I			1	EA	011595	123179	0	0.0
STUFF	000	RES-0010-122	RESISTOR, 1.2K, 1/8 WATT	B	N	I			2	EA	011595	123179	0	0.0
STUFF	000	RES-0010-151	RESISTOR, 150 OHM	B	N	I			2	EA	011595	123179	0	0.0
STUFF	000	RES-0010-152	RESISTOR, 1.5K OHM	B	N	I			2	EA	011595	123179	0	0.0
STUFF	000	RES-0010-154	RESISTOR, 150K, 1/8 WATT	B	N	I			2	EA	011595	123179	0	0.0
STUFF	000	RES-0010-164	160K 1/8W CARBON FILM 5%	B	N	I			1	EA	011595	123179	0	0.0
STUFF	000	RES-0010-180	18 OHM 1/8W CARBON FILM 5	B	N	I			2	EA	011595	123179	0	0.0
STUFF	000	RES-0010-182	RESISTOR, 1.8K OHM	B	N	I			1	EA	011595	123179	0	0.0
STUFF	000	RES-0010-220	RESISTOR, 22 OHM	B	N	I			3	EA	011595	123179	0	0.0
STUFF	000	RES-0010-221	RESISTOR, 220 OHM	B	N	I			3	EA	011595	123179	0	0.0
STUFF	000	RES-0010-222	RESISTOR, 2.2K OHM	B	N	I			5	EA	011595	123179	0	0.0
STUFF	000	RES-0010-224	RESISTOR, 220K OHM	B	N	I			1	EA	011595	123179	0	0.0
STUFF	000	RES-0010-244	240K 1/8W CARBON FILM 5%	B	N	I			1	EA	011595	123179	0	0.0
STUFF	000	RES-0010-273	27K 1/8W CARBON FILM 5%	B	N	I			1	EA	011595	123179	0	0.0
STUFF	000	RES-0010-301	RESISTOR, 300 OHM	B	N	I			5	EA	011595	123179	0	0.0
STUFF	000	RES-0010-331	RESISTOR, 330 OHM	B	N	I			3	EA	011595	123179	0	0.0
STUFF	000	RES-0010-333	RESISTOR, 33K OHM	B	N	I			3	EA	011595	123179	0	0.0
STUFF	000	RES-0010-391	RESISTOR, 390 OHM	B	N	I			1	EA	011595	123179	0	0.0
STUFF	000	RES-0010-392	RESISTOR, 3.9K 1/8 WATT	B	N	I			1	EA	011595	123179	0	0.0
STUFF	000	RES-0010-393	RESISTOR, 39K OHM	B	N	I			1	EA	011595	123179	0	0.0
STUFF	000	RES-0010-471	RESISTOR, 470 OHM	B	N	I			5	EA	011595	123179	0	0.0
STUFF	000	RES-0010-472	RESISTOR, 4.7K OHM	B	N	I			11	EA	011595	123179	0	0.0
STUFF	000	RES-0010-473	RESISTOR, 47K OHM	B	N	I			5	EA	011595	123179	0	0.0
STUFF	000	RES-0010-511	510 OHM 1/8W CARBON FILM	B	N	I			2	EA	011595	123179	0	0.0
STUFF	000	RES-0010-512	5.1K 1/8W CARBON FILM 5%	B	N	I			2	EA	011595	123179	0	0.0
STUFF	000	RES-0010-680	RESISTOR, 68 OHM	B	N	I			5	EA	011595	123179	0	0.0
STUFF	000	RES-0010-681	RESISTOR, 680 OHM	B	N	I			2	EA	011595	123179	0	0.0
STUFF	000	RES-0010-752	7.5K 1/8W CARBON FILM 5%	B	N	I			1	EA	011595	123179	0	0.0
STUFF	000	RES-0010-820	RESISTOR, 82 OHM 1/8W	B	N	I			3	EA	011595	123179	0	0.0
STUFF	000	RES-0010-822	8.2K 1/8W CARBON FILM 5%	B	N	I			2	EA	011595	123179	0	0.0
STUFF	000	RES-0027-102	TRIMMER, 1K	B	N	I			1	EA	011595	123179	0	0.0
STUFF	000	RES-0027-103	TRIMMER, 10K	B	N	I			3	EA	011595	123179	0	0.0
STUFF	000	RES-0027-502	TRIMMER,5K	B	N	I			2	EA	011595	123179	0	0.0
STUFF	000	SEM-0001-003	TO 92 TRANSISTOR SHIELD	B	N	I			1	EA	011595	123179	0	0.0
STUFF	000	SEM-0003-001	2N3563	B	N	I			2	EA	011595	123179	0	0.0
STUFF	000	SEM-0003-002	MPS5179	B	N	I			1	EA	011595	123179	0	0.0
STUFF	000	SEM-0004-002	2N2907, MPS2907	B	N	I			5	EA	011595	123179	0	0.0
STUFF	000	SEM-0007-002	NPN TRANSISTOR MPS6531	B	N	I			2	EA	011595	123179	0	0.0

PARENT: ASY-0330-01E DESC: MAIN BOARD, EUROPEAN
DRWG: UM: EA MB: M REV:
OPTION: C EFFECTIVITY DATE: 051496 EFFECTIVE REV:

PT USE	SEQN	COMPONENT	DESCRIPTION	M B	C T	Q T	REV IN	REV OUT	QUANTITY	UM	EFFECTIVITY IN	EFFECTIVITY OUT	LTOS	SCRAP PCNT
STUFF	000	RES-0001-102	RESISTOR 1K 1/4W	B	N	I			8	EA	011595	123179	0	0.0
STUFF	000	RES-0001-103	RESISTOR 10K 1/4W	B	N	I			24	EA	011595	123179	0	0.0
STUFF	000	RES-0001-104	RESISTOR 100K 1/4W	B	N	I			1	EA	011595	123179	0	0.0
STUFF	000	RES-0001-105	RESISTOR 1M 1/4W	B	N	I			1	EA	011595	123179	0	0.0
STUFF	000	RES-0001-122	RESISTOR 1.2K 1/4W	B	N	I			9	EA	011595	123179	0	0.0
STUFF	000	RES-0001-124	RESISTOR, 120K 1/4W	B	N	I			2	EA	011595	123179	0	0.0
STUFF	000	RES-0001-152	RESISTOR 1.5K 1/4W	B	N	I			4	EA	011595	123179	0	0.0
STUFF	000	RES-0001-153	RESISTOR 15K 1/4W	B	N	I			1	EA	011595	123179	0	0.0
STUFF	000	RES-0001-201	RESISTOR 200 1/4W	B	N	I			2	EA	011595	123179	0	0.0
STUFF	000	RES-0001-203	RESISTOR 20K 1/4W	B	N	I			1	EA	011595	123179	0	0.0
STUFF	000	RES-0001-221	RESISTOR 220 1/4W	B	N	I			7	EA	011595	123179	0	0.0
STUFF	000	RES-0001-222	RESISTOR 2.2K 1/4W	B	N	I			3	EA	011595	123179	0	0.0
STUFF	000	RES-0001-224	RESISTOR 220K 1/4W	B	N	I			1	EA	011595	123179	0	0.0
STUFF	000	RES-0001-271	RESISTOR 270 1/4W	B	N	I			1	EA	011595	123179	0	0.0
STUFF	000	RES-0001-272	RESISTOR 2.7K 1/4W	B	N	I			1	EA	011595	123179	0	0.0
STUFF	000	RES-0001-302	3K,1/4WATT 5% CARBON FILM	B	N	I			2	EA	011595	123179	0	0.0
STUFF	000	RES-0001-303	RESISTOR 30K 1/4W	B	N	I			2	EA	011595	123179	0	0.0
STUFF	000	RES-0001-331	RESISTOR 330 1/4W	B	N	I			2	EA	011595	123179	0	0.0
STUFF	000	RES-0001-332	RESISTOR 3.3K 1/4W	B	N	I			2	EA	011595	123179	0	0.0
STUFF	000	RES-0001-333	RESISTOR 33K 1/4W	B	N	I			1	EA	011595	123179	0	0.0
STUFF	000	RES-0001-393	RESISTOR 39K 1/4W	B	N	I			1	EA	011595	123179	0	0.0
STUFF	000	RES-0001-432	RESISTOR 4.3K 1/4W	B	N	I			1	EA	011595	123179	0	0.0
STUFF	000	RES-0001-433	RESISTOR, 43K 1/4W 5%	B	N	I			1	EA	011595	123179	0	0.0
STUFF	000	RES-0001-434	RESISTOR 430K 1/4W	B	N	I			1	EA	011595	123179	0	0.0
STUFF	000	RES-0001-470	RESISTOR 47 1/4W	B	N	I			1	EA	011595	123179	0	0.0
STUFF	000	RES-0001-471	RESISTOR 470 1/4W	B	N	I			1	EA	011595	123179	0	0.0
STUFF	000	RES-0001-472	RESISTOR 4.7K 1/4W	B	N	I			2	EA	011595	123179	0	0.0
STUFF	000	RES-0001-473	RESISTOR 47K 1/4W	B	N	I			2	EA	011595	123179	0	0.0
STUFF	000	RES-0001-510	51 OHM, 1/4W CARBON FILM	B	N	I			1	EA	011595	123179	0	0.0
STUFF	000	RES-0001-511	RESISTOR 510 1/4W	B	N	I			2	EA	011595	123179	0	0.0
STUFF	000	RES-0001-561	RESISTOR 560 1/4W	B	N	I			1	EA	011595	123179	0	0.0
STUFF	000	RES-0001-562	RESISTOR 5.6K 1/4W	B	N	I			1	EA	011595	123179	0	0.0
STUFF	000	RES-0001-563	RESISTOR 56K 1/4W	B	N	I			1	EA	011595	123179	0	0.0
STUFF	000	RES-0001-621	RESISTOR 620 1/4W	B	N	I			1	EA	011595	123179	0	0.0
STUFF	000	RES-0001-682	RESISTOR 6.8K 1/4W	B	N	I			1	EA	011595	123179	0	0.0
STUFF	000	RES-0001-753	RESISTOR, 75K 1/4W	B	N	I			2	EA	011595	123179	0	0.0
STUFF	000	RES-0001-820	RESISTOR 82 1/4W	B	N	I			3	EA	011595	123179	0	0.0
STUFF	000	RES-0001-821	RESISTOR 820 1/4W	B	N	I			2	EA	011595	123179	0	0.0
STUFF	000	RES-0001-822	RESISTOR 8.2K 1/4W	B	N	I			1	EA	011595	123179	0	0.0
STUFF	000	RES-0010-100	RESISTOR, 10 OHM	B	N	I			3	EA	011595	123179	0	0.0
STUFF	000	RES-0010-101	RESISTOR, 100 OHM	B	N	I			1	EA	011595	123179	0	0.0

SEA INC.
SINGLE LEVEL BILL OF MATERIAL

PARENT: ASY-0330-01E DESC: MAIN BOARD, EUROPEAN
OPTION: C DRWG: UM: EA MB: M REV:
EFFECTIVITY DATE: 051496 EFFECTIVE REV:

PT USE	SEQN	COMPONENT	DESCRIPTION	M B T	C T	Q IN	REV OUT	QUANTITY	UM	EFFECTIVITY IN	EFFECTIVITY OUT	LTOS	SCRAP PCNT
POST	000	FIL-0012-004	500HZ TELEX FILTER	B	N	I		1	EA	011595	123179	0	0.0
POST	000	FIL-0012-006	FILTER, 4 POLE, 2.5 KHZ	B	N	I		1	EA	011595	123179	0	0.0
MASK	000	HAR-0080-024	STDF,SW RD 1/4X4-40X.500	B	N	I		4	EA	011595	123179	0	0.0
STUFF	000	ID-0022-002-16A	.4 LS, 2.7UH L28,L43,L44	M	N	I		3	EA	011595		0	0.0
STUFF	000	ID-0022-270-16A	.4 LS, 27UH L3,L5,L27,L38,L41,L45,L46	M	N	I		7	EA	011595		0	0.0
STUFF	000	IND-0001-101	INDUCTOR, 100UH WEE	B	N	I		2	EA	011595	123179	0	0.0
STUFF	000	IND-0001-338	INDUCTOR, .33UH WEE	B	N	I		2	EA	011595	123179	0	0.0
STUFF	000	IND-0001-479	INDUCTOR, 4.7UH WEE	B	N	I		2	EA	011595	123179	0	0.0
STUFF	000	IND-0010-101	100UH RADIAL SHIELD CHOKE	B	N	I		3	EA	011595	123179	0	0.0
STUFF	000	IND-0020-014	INDUCTOR, 470UH CRAMER	B	N	I		5	EA	011595	123179	0	0.0
STUFF	000	IND-0021-015	INDUCTOR, 10UH	B	N	I		2	EA	011595	123179	0	0.0
STUFF	000	IND-0021-020	INDUCTOR, 27UH CRAMER	B	N	I		13	EA	011595	123179	0	0.0
STUFF	000	JUM-0002-020	JUMPER, 0.20 LONG	B	N	I		1	EA	011595	123179	0	0.0
STUFF	000	JUM-0002-030	JUMPER, 0.30 LONG	B	N	I		7	EA	011595	123179	0	0.0
STUFF	000	JUM-0002-045	JUMPER, .45 TEFLON	B	N	I		3	EA	011595	123179	0	0.0
STUFF	000	JUM-0002-055	JUMPER, 0.55 LONG	B	N	I		1	EA	011595	123179	0	0.0
STUFF	000	JUM-0002-062	JUMPER, 0.625 LONG	B	N	I		9	EA	011595	123179	0	0.0
STUFF	000	JUM-0002-070	JUMPER, .70 TEFON	B	N	I		1	EA	011595	123179	0	0.0
STUFF	000	JUM-0002-075	JUMPER, .75 TEFLON	B	N	I		1	EA	011595	123179	0	0.0
STUFF	000	JUM-0002-080	JUMPER, .80 TEFLON	B	N	I		2	EA	011595	123179	0	0.0
STUFF	000	JUM-0002-090	JUMPER, .90 #24 TEFLON	B	N	I		1	EA	011595	123179	0	0.0
STUFF	000	JUM-0002-100	JUMPER, 1.0 #24 TEFLON	B	N	I		1	EA	011595	123179	0	0.0
STUFF	000	JUM-0002-135	JUMPER, 1.35 #24 TEFLON	B	N	I		1	EA	011595	123179	0	0.0
STUFF	000	JUM-0002-150	JUMPER, 1.50 #24 TEFLON	B	N	I		1	EA	011595	123179	0	0.0
STUFF	000	JUM-0002-170	JUMPER, 1.70 #24 TEFLON	B	N	I		2	EA	011595	123179	0	0.0
STUFF	000	JUM-0002-175	JUMPER, 1.75 #24 TEFLON	B	N	I		8	EA	011595	123179	0	0.0
STUFF	000	JUM-0002-190	JUMPER, 1.9 TEFLON AWG 24	B	N	I		1	EA	011595	123179	0	0.0
STUFF	000	JUM-0002-255	JUMPER, 2.55 #24 TEFLON	B	N	I		1	EA	011595	123179	0	0.0
STUFF	000	JUM-0002-280	JUMPER, 2.8 TEFLON AWG 24	B	N	I		1	EA	011595	123179	0	0.0
LAB	000	LAB[R]ASSY	LABOR, ASSEMBLY	M	R	I		2.20	HR	051895	123179	0	0.0
LAB	000	LAB[R]TEST	LABOR, TEST	M	R	I		1.20	HR	051895	123179	0	0.0
STUFF	000	MIX-0002-001	DBL BAL MIXER	B	N	I		2	EA	011595	123179	0	0.0
MASK	000	MSK-0330-01	PCB-0330-01 MASKING	M	N	I		1	EA	120195	123179	0	0.0
POST	000	OVE-0005-004	OVEN, 75 DEG C 13 VDC	B	N	I		1	EA	011595	123179	0	0.0
MASK	000	PCB-0330-01	MAINBOARD	B	N	I		1	EA	011595	123179	0	0.0
STUFF	000	RES-0001-100	RESISTOR 10 1/4W	B	N	I		4	EA	011595	123179	0	0.0
STUFF	000	RES-0001-101	RESISTOR 100 1/4W	B	N	I		23	EA	011595	123179	0	0.0

PARENT: ASY-0330-01E DESC: MAIN BOARD, EUROPEAN
DRWG: UM: EA MB: M REV:
OPTION: C EFFECTIVITY DATE: 051496 EFFECTIVE REV:

PT USE	SEQN	COMPONENT	DESCRIPTION	M B	C T	Q T	REV IN	REV OUT	QUANTITY	UM	EFFECTIVITY IN	EFFECTIVITY OUT	LTOS	SCRAP PCNT
STUFF	000	CAP-0027-103	CAPACITOR FILM CK05 .01	B	N	I			5	EA	011595	123179	0	0.0
STUFF	000	CAP-0027-104	CAPACITOR FILM CK05 .1	B	N	I			11	EA	011595	123179	0	0.0
STUFF	000	CAP-0027-222	CAPACITOR FILM CK05 .0022	B	N	I			2	EA	011595	123179	0	0.0
STUFF	000	CAP-0027-223	CAPACITOR FILM CK05 .022	B	N	I			2	EA	011595	123179	0	0.0
STUFF	000	CAP-0027-224	CAPACITOR FILM CK05 .22	B	N	I			5	EA	011595	123179	0	0.0
STUFF	000	CAP-0027-332	CAPACITOR FILM CK05 .0033	B	N	I			1	EA	011595	123179	0	0.0
STUFF	000	CAP-0027-473	CAPACITOR FILM CK05 .047	B	N	I			1	EA	011595	123179	0	0.0
STUFF	000	CAP-0031-001	CAP TANT 2.2UF 16-25V	B	N	I			2	EA	011595	123179	0	0.0
STUFF	000	CAP-0031-003	CAPACITOR TANT 4.7UF 16V	B	N	I			7	EA	011595	123179	0	0.0
STUFF	000	CAP-0031-005	CAPACITOR TANT 10UF 16V	B	N	I			19	EA	011595	123179	0	0.0
STUFF	000	CAP-0031-007	CAPACITOR TANT 22UF 16V	B	N	I			3	EA	011595	123179	0	0.0
STUFF	000	CAP-0031-008	CAP TANT 1UF 16-25V	B	N	I			2	EA	011595	123179	0	0.0
STUFF	000	CAP-0037-010	CAP, ELECT. 470UF RAD	B	N	I			2	EA	011595	123179	0	0.0
STUFF	000	CAP-0047-102	CAP, FILM .001UF 630VDC	B	N	I			1	EA	011595	123179	0	0.0
STUFF	000	CAP-0073-002	N750 TEMP COMP W/ RADIAL	B	N	I			1	EA	011595	123179	0	0.0
STUFF	000	CAP-0076-002	TRIMMER 3-10PF SEALED	B	N	I			1	EA	011595	123179	0	0.0
STUFF	000	CON-0004-002	JACK, PHONO PCB	B	N	I			2	EA	011595	123179	0	0.0
STUFF	000	CON-0028-002	HEADER MALE 9 TERM.	B	N	I			2	EA	011595	123179	0	0.0
STUFF	000	CON-0028-005	HEADER,4 TERM MALE,GREEN	B	N	I			1	EA	011595	123179	0	0.0
STUFF	000	CON-0043-003	SOCKET, 1X30, .100 SPACIN	B	N	I			1	EA	011595	123179	0	0.0
STUFF	000	CON-0044-004	SOCKET 2X14, .100 X .100	B	N	I			1	EA	011595	123179	0	0.0
STUFF	000	CP-0001-002-32B	.1 LS, 15PF C13,C14,C31,C36,C55,C50,C89	M	N	I			7	EA	011595		0	0.0
STUFF	000	CP-0001-002-33B	.2 LS, 15PF C140	M	N	I			1	EA	011595		0	0.0
STUFF	000	CP-0001-034-33B	.2 LS, 20PF C142	M	N	I			1	EA	011595		0	0.0
STUFF	000	CP-0001-040-32B	.1 LS, 6.2PF OR 6.0PF C77,C97	M	N	I			2	EA	011595		0	0.0
POST	000	CRY-0022-001	CRYSTAL 10.236 MHZ	B	N	I			1	EA	011595	123179	0	0.0
POST	000	CRY-0022-002	CRYSTAL 10.706 MHZ	B	N	I			1	EA	011595	123179	0	0.0
POST	000	CRY-0023-001	CRYSTAL 59.315 MHZ	B	N	I			1	EA	011595	123179	0	0.0
POST	000	CRY-0023-002	CRYSTAL 72.220 MHZ	B	N	I			1	EA	011595	123179	0	0.0
POST	000	CRY-0330-01	CRYSTAL,10.240MHZ TESTED FOR 330	M	N	I			1	EA	030695	123179	0	0.0
REV	000	ECN 5940	ASY-0330-01/ASY-0330-01E	B	D	O			1	EA	032195		0	0.0
POST	000	FIL-0005-004	2 POLE MONO BANDPASS FILT	B	N	I			1	EA	011595	123179	0	0.0
POST	000	FIL-0012-001	6 POLE LADDER ,500 OHM	B	N	I			1	EA	011595	123179	0	0.0

PARENT: ASY-0330-01E DESC: MAIN BOARD, EUROPEAN
DRWG: UM: EA MB: M REV:
OPTION: C EFFECTIVITY DATE: 051496 EFFECTIVE REV:

PT USE	SEQN	COMPONENT	DESCRIPTION	M B	C T	Q T	REV IN	REV OUT	QUANTITY	UM	EFFECTIVITY IN	EFFECTIVITY OUT	LTOS	SCRAP PCNT
POST	000	ASY-0004-07	IND,TOR 7T18-2260N11-1 T3	M	P	I			1	EA	011595	123179	0	0.0
POST	000	ASY-0004-08	IND,TOR 8T18-2260N11-1 T3	M	P	I			2	EA	011595	123179	0	0.0
POST	000	ASY-0016-05	IND,TOR 5T18-226 ON 11-2	M	P	I			1	EA	011595	123179	0	0.0
POST	000	ASY-0016-06	IND,TOR 6T18-226 ON 11-2	M	P	I			1	EA	011595	123179	0	0.0
POST	000	ASY-0016-07	IND,TOR 7T18-226 ON 11-2	M	P	I			1	EA	011595	123179	0	0.0
POST	000	ASY-0017-15	IND,TOR 15T18-228 ON 12-2	M	P	I			1	EA	011595	123179	0	0.0
POST	000	ASY-0209-T1M	TRANSFORMER	M	P	I			1	EA	011595	123179	0	0.0
POST	000	ASY-0222-TT5	INDUCTOR,T TRIFI ON #43	M	P	I			2	EA	011595	123179	0	0.0
POST	000	ASY-0330-W4	13.5" COAX	M	P	I			1	EA	011595	123179	0	0.0
POST	000	ASY-0330-W5	12" COAX	M	P	I			1	EA	011595	123179	0	0.0
POST	000	ASY-0330-W6	9.25" COAX	M	P	I			1	EA	011595	123179	0	0.0
POST	000	ASY-0330-W7	7.25" COAX	M	P	I			1	EA	011595	123179	0	0.0
POST	000	ASY-0504-01	CPU BOARD	M	N	I			1	EA	011595	123179	0	0.0
STUFF	000	CAP-0001-001	CAPACITOR MICA 10PF	B	N	I			10	EA	011595	123179	0	0.0
STUFF	000	CAP-0001-007	CAPACITOR MICA 36PF	B	N	I			3	EA	011595	123179	0	0.0
STUFF	000	CAP-0001-008	CAPACITOR MICA 47PF	B	N	I			1	EA	011595	123179	0	0.0
STUFF	000	CAP-0001-010	CAPACITOR MICA 56PF	B	N	I			1	EA	011595	123179	0	0.0
STUFF	000	CAP-0001-012	CAPACITOR MICA 68PF	B	N	I			2	EA	011595	123179	0	0.0
STUFF	000	CAP-0001-015	CAPACITOR MICA 100PF	B	N	I			4	EA	011595	123179	0	0.0
STUFF	000	CAP-0001-019	CAPACITOR MICA 180PF	B	N	I			2	EA	011595	123179	0	0.0
STUFF	000	CAP-0001-031	CAPACITOR MICA 18PF	B	N	I			1	EA	011595	123179	0	0.0
STUFF	000	CAP-0001-037	CAPACITOR,MICA 39PF	B	N	I			1	EA	011595	123179	0	0.0
STUFF	000	CAP-0001-038	CAPACITOR,MICA 5PF	B	N	I			2	EA	011595	123179	0	0.0
STUFF	000	CAP-0001-039	CAPACITOR,MICA 12PF	B	N	I			4	EA	011595	123179	0	0.0
STUFF	000	CAP-0001-041	CAPACITOR MICA 4PF	B	N	I			4	EA	011595	123179	0	0.0
STUFF	000	CAP-0001-042	CAP,MICA 7.5PF OR DISC 7P	B	N	I			1	EA	011595	123179	0	0.0
STUFF	000	CAP-0001-044	24 PF SILV. MICA LCQ-11	B	N	I			3	EA	011595	123179	0	0.0
STUFF	000	CAP-0006-001	CAP,MULTILAYER CER DIP .1	B	N	I			18	EA	011595	123179	0	0.0
STUFF	000	CAP-0006-002	CAP,MULTILAYER CER DIP .0	B	N	I			14	EA	011595	123179	0	0.0
STUFF	000	CAP-0006-003	CAP,MULTILAYER CER DIP .0	B	N	I			4	EA	011595	123179	0	0.0
STUFF	000	CAP-0006-004	CAP,MULTILAYER CER DIP .0	B	N	I			4	EA	011595	123179	0	0.0
STUFF	000	CAP-0013-001	CAPACITOR MONO .1UF	B	N	I			58	EA	011595	123179	0	0.0
STUFF	000	CAP-0013-003	CAPACITOR MONO .01UF 100V	B	N	I			32	EA	011595	123179	0	0.0
STUFF	000	CAP-0013-004	CAPACITOR, MONO .0047UF	B	N	I			6	EA	011595	123179	0	0.0
STUFF	000	CAP-0013-005	CAPACITOR MONO .001 UF	B	N	I			21	EA	011595	123179	0	0.0
STUFF	000	CAP-0013-006	CAP, MONO .047UF	B	N	I			5	EA	011595	123179	0	0.0
POST	000	CAP-0025-001	CAPACITOR TRIMMER 2-20PF	B	N	I			2	EA	011595	123179	0	0.0
POST	000	CAP-0025-002	CAPACITOR TRIMMER 2-10PF	B	N	I			3	EA	011595	123179	0	0.0

PARENT: ASY-0330-01 DESC: MAINBOARD
DRWG: UM: EA MB: M REV:
OPTION: C EFFECTIVITY DATE: 051496 EFFECTIVE REV:

PT USE	SEQN	COMPONENT	DESCRIPTION	M B	C T	Q T	REV IN	REV OUT	QUANTITY	UM	EFFECTIVITY IN	EFFECTIVITY OUT	LTOS	SCRAP PCNT
STUFF	000	SM-0096-005-07A	.25 LS, BA282 CR38,CR39,CR40,CR41,CR42,CR43,CR63,CR64	M	N	I			8	EA	011596	123179	0	0.0
STUFF	000	SOC-0002-008	IC SOCKET, 8 PIN DIP U11	B	N	I			1	EA	011595	123179	0	0.0
STUFF	000	SOC-0002-016	IC SOCKET, 16 PIN DIP J103	B	N	I			1	EA	011595	123179	0	0.0
STUFF	000	TER-0004-004	TERMINAL PIN TP1,TP2,TP3,TP4,TP5,TP6,IN,OUT,GND	B	N	I			9	EA	011595	123179	0	0.0
STUFF	000	TRA-0005-001	TRANSFORMER, BLK T2,T6,T13	B	N	I			3	EA	011595	123179	0	0.0
STUFF	000	TRA-0006-001	TRANSFORMER, ORN T12	B	N	I			1	EA	011595	123179	0	0.0
STUFF	000	TRA-0011-001	TRANSFORMER, VIOLET T7,T10	B	N	I			2	EA	011595	123179	0	0.0
STUFF	000	TRA-0011-004	7MM IF TRANSFORMER FOR 45 T3,T4	B	N	I			2	EA	011595	123179	0	0.0
STUFF	000	TRA-0013-003	11MHZ-7MM TRANSFORMER SUB T1,T5	B	N	I			2	EA	011595	123179	0	0.0

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PARENT: ASY-0330-01 DESC: MAINBOARD
DRWG: UM: EA MB: M REV:
OPTION: C EFFECTIVITY DATE: 051496 EFFECTIVE REV:

PT USE	SEQN	COMPONENT	DESCRIPTION	M B	C T	Q T	REV IN	REV OUT	QUANTITY	UM	EFFECTIVITY IN	EFFECTIVITY OUT	LTOS	SCRAP PCNT
STUFF	000	SEM-0170-027	SMALL SIGNAL SCHOTTKY DIODE,1N6263 CR8,CR11,CR12,CR16,CR17,CR21,CR22,CR13,CR18,CR23,CR24,CR25,C R26,CR50,CR51,CR60,CR56,CR62	B	N	I			18	EA	011595	123179	0	0.0
STUFF	000	SEM-0174-001	DATA XCEIVER SN75176 U16	B	N	I			1	EA	011595	123179	0	0.0
STUFF	000	SEM-0175-001	MC145157 SYNTHESIZER SING U1	B	N	I			1	EA	011595	123179	0	0.0
STUFF	000	SEM-0176-001	MC145158 SYNTHESIZER DUAL U2,U5,U9	B	N	I			3	EA	011595	123179	0	0.0
POST	000	SEM-0183-003	HY6116ALP-10 2KX8 CMOS SR CPUU6	B	N	I			1	EA	011595	123179	0	0.0
POST	000	SEM-0187-002	16K-BIT SERIAL E2 PROM CPUU2	B	N	I			1	EA	011595	123179	0	0.0
STUFF	000	SEM-0190-001	MM88C29, QUAD LINE DRIVER U23	B	N	I			1	EA	011595	123179	0	0.0
STUFF	000	SEM-0191-001	MC3346, TRANSISTOR ARRAY U27	B	N	I			1	EA	011595	123179	0	0.0
STUFF	000	SM-0076-001-02A	.45 LS, 1N4148 CR27,CR29,CR30,CR37,CR57,CR65	M	N	I			6	EA	011595	123179	0	0.0
STUFF	000	SM-0076-001-07A	.25 LS, 1N4148 CR32,CR33,CR34,CR61	M	N	I			4	EA	011595	123179	0	0.0
STUFF	000	SM-0076-001-24A	.6 LS, 1N4148 CR2,CR4,CR6	M	N	I			3	EA	011595	123179	0	0.0
STUFF	000	SM-0083-004-02A	.45 LS, 1N4735A CR28	M	N	I			1	EA	011595	123179	0	0.0
STUFF	000	SM-0096-002-17A	.5 LS, KS1001 CR31	M	N	I			1	EA	011595	123179	0	0.0
STUFF	000	SM-0096-005-02A	.45 LS, BA282 CR44,CR45,CR46,CR47,CR48,CR49,CR52,CR53,CR54,CR55	M	N	I			10	EA	011596	123179	0	0.0

PARENT: ASY-0330-01 DESC: MAINBOARD
DRWG: UM: EA MB: M REV:
OPTION: C EFFECTIVITY DATE: 051496 EFFECTIVE REV:

PT USE	SEQN	COMPONENT	DESCRIPTION	M B	C T	Q T	REV IN	REV OUT	QUANTITY	UM	EFFECTIVITY IN	EFFECTIVITY OUT	LTOS	SCRAP PCNT
STUFF	000	SEM-0109-001	7805 VOLTAGE REG, 5V U18	B	N	I			1	EA	011595	123179	0	0.0
STUFF	000	SEM-0109-004	LM7808 VOLTAGE REG, 8V U17	B	N	I			1	EA	011595	123179	0	0.0
STUFF	000	SEM-0140-066	4066 CMOS QUAD ANALOG SWI U33	B	N	I			1	EA	011595	123179	0	0.0
STUFF	000	SEM-0140-504	4504 CMOS HEX LEVEL SHIFT U14,U15	B	N	I			2	EA	011595	123179	0	0.0
STUFF	000	SEM-0143-086	74HC86 CMOS QUAD EXCL OR U7	B	N	I			1	EA	011595	123179	0	0.0
STUFF	000	SEM-0151-005	5841 8-BIT DRIVER U19	B	N	I			1	EA	011595	123179	0	0.0
STUFF	000	SEM-0154-010	LM348 QUAD OP AMP U34	B	N	I			1	EA	011595	123179	0	0.0
STUFF	000	SEM-0154-016	MC34072 DUAL OPAMP LP U8,U29,U31,U32	B	N	I			4	EA	011595	123179	0	0.0
STUFF	000	SEM-0154-017	MC34074 QUAD OP AMP LP U22	B	N	I			1	EA	011595	123179	0	0.0
STUFF	000	SEM-0158-006	MC144110 6-BIT DAC X6 U20	B	N	I			1	EA	011595	123179	0	0.0
STUFF	000	SEM-0165-005	MMIC, MSA-0404 U25	B	N	I			1	EA	011595	123179	0	0.0
POST	000	SEM-0165-006	MMIC, MSA-0304 U12	B	N	I			1	EA	011595	123179	0	0.0
STUFF	000	SEM-0165-007	MMIC, MSA-1104 U13	B	N	I			1	EA	011595	123179	0	0.0
STUFF	000	SEM-0170-015	LM78L05AWC U6,U21	B	N	I			2	EA	011595	123179	0	0.0

PARENT: ASY-0330-01 DESC: MAINBOARD
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PT USE	SEQN	COMPONENT	DESCRIPTION	M B	C T	Q T	REV IN	REV OUT	QUANTITY	UM	EFFECTIVITY IN	EFFECTIVITY OUT	LTOS	SCRAP PCNT
STUFF	000	SEM-0017-004	J310 Q11,Q13,Q15,Q8	B	N	I			4	EA	011595	123179	0	0.0
STUFF	000	SEM-0017-04G	GRADED J310 OSC. Q10,Q12,Q14	M	N	I			3	EA	011595	123179	0	0.0
STUFF	000	SEM-0021-002	PN2222A Q21,Q22	B	N	I			2	EA	011595	123179	0	0.0
STUFF	000	SEM-0021-004	VN2222LM 60V FET (RED) Q19,Q25,Q26,Q31,Q33	B	N	I			5	EA	011595	123179	0	0.0
STUFF	000	SEM-0032-002	TIP32 PNP PWR 3A 40V, TO- Q20	B	N	I			1	EA	011595	123179	0	0.0
STUFF	000	SEM-0061-006	SP8789A PRESCALER 200MHZ, U10	B	N	I			1	EA	011595	123179	0	0.0
STUFF	000	SEM-0061-007	MC12015P PRESCALER 225MHZ U3,U4	B	N	I			2	EA	011595	123179	0	0.0
STUFF	000	SEM-0063-002	MPS3866 NPN VHF/VHF, TO-9 Q4	B	N	I			1	EA	011595	123179	0	0.0
STUFF	000	SEM-0080-004	MV209 DIODE TUNING, TO-22 CR1,CR3,CR5,CR7,CR9,CR10,CR19,CR20,CR14,CR15	B	N	I			10	EA	011595	123179	0	0.0
STUFF	000	SEM-0091-001	1N3070 DIODE GP RECTIFIER CR35,CR36	B	N	I			2	EA	011595	123179	0	0.0
STUFF	000	SEM-0101-001	MC1350P IF AMPLIFIER 8 BI U24,U26,U28	B	N	I			3	EA	011595	123179	0	0.0
STUFF	000	SEM-0102-001	MC3340P ANNUATOR DC CONTR U36	B	N	I			1	EA	011595	123179	0	0.0
STUFF	000	SEM-0102-002	LC403 AGC AMP 14 DIP U35	B	N	I			1	EA	011595	123179	0	0.0
STUFF	000	SEM-0103-002	MC1496P BAL MODULATOR U30	B	N	I			1	EA	011595	123179	0	0.0

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PT USE	SEQN	COMPONENT	DESCRIPTION	M B	C T	Q T	REV IN	REV OUT	QUANTITY	UM	EFFECTIVITY IN	EFFECTIVITY OUT	LTOS	SCRAP PCNT
STUFF	000	RES-0010-820	RESISTOR, 82 OHM 1/8W R12,R34,R138	B	N	I			3	EA	011595	123179	0	0.0
STUFF	000	RES-0010-822	8.2K 1/8W CARBON FILM 5% R212,R213	B	N	I			2	EA	011595	123179	0	0.0
STUFF	000	RES-0027-102	TRIMMER, 1K R111	B	N	I			1	EA	011595	123179	0	0.0
STUFF	000	RES-0027-103	TRIMMER, 10K R113,R196,R271	B	N	I			3	EA	011595	123179	0	0.0
STUFF	000	RES-0027-502	TRIMMER,5K R97,R108	B	N	I			2	EA	011595	123179	0	0.0
STUFF	000	SEM-0001-003	TO 92 TRANSISTOR SHIELD Q28	B	N	I			1	EA	011595	123179	0	0.0
STUFF	000	SEM-0003-001	2N3563 Q28,Q30	B	N	I			2	EA	011595	123179	0	0.0
STUFF	000	SEM-0003-002	MPS5179 Q7	B	N	I			1	EA	011595	123179	0	0.0
STUFF	000	SEM-0004-002	2N2907, MPS2907 Q16,Q17,Q18,Q23,Q24	B	N	I			5	EA	011595	123179	0	0.0
STUFF	000	SEM-0007-002	NPN TRANSISTOR MPS6531 Q2,Q6	B	N	I			2	EA	011595	123179	0	0.0
STUFF	000	SEM-0010-001	MPS-A14 Q32	B	N	I			1	EA	011595	123179	0	0.0
STUFF	000	SEM-0015-001	MPS-A63 Q9	B	N	I			1	EA	011595	123179	0	0.0
STUFF	000	SEM-0016-002	MPS-A18 Q1,Q3,Q5,Q29	B	N	I			4	EA	011595	123179	0	0.0
STUFF	000	SEM-0017-002	U310 Q27	B	N	I			1	EA	011595	123179	0	0.0

PARENT: ASY-0330-01 DESC: MAINBOARD
DRWG: UM: EA MB: M REV:
OPTION: C EFFECTIVITY DATE: 051496 EFFECTIVE REV:

PT USE	SEQN	COMPONENT	DESCRIPTION	M B	C T	Q T	REV IN	REV OUT	QUANTITY	UM	EFFECTIVITY IN	EFFECTIVITY OUT	LTOS	SCRAP PCNT
STUFF	000	RES-0010-301	RESISTOR, 300 OHM R123,R125,R143,R145,R77	B	N	I			5	EA	011595	123179	0	0.0
STUFF	000	RES-0010-331	RESISTOR, 330 OHM R62,R64,R66	B	N	I			3	EA	011595	123179	0	0.0
STUFF	000	RES-0010-333	RESISTOR, 33K OHM R156,R50,R52	B	N	I			3	EA	011595	123179	0	0.0
STUFF	000	RES-0010-391	RESISTOR, 390 OHM R57	B	N	I			1	EA	011595	123179	0	0.0
STUFF	000	RES-0010-392	RESISTOR, 3.9K 1/8 WATT R168	B	N	I			1	EA	011595	123179	0	0.0
STUFF	000	RES-0010-393	RESISTOR, 39K OHM R161	B	N	I			1	EA	011595	123179	0	0.0
STUFF	000	RES-0010-471	RESISTOR, 470 OHM R3,R8,R14,R19,R30	B	N	I			5	EA	011595	123179	0	0.0
STUFF	000	RES-0010-472	RESISTOR, 4.7K OHM R7,R11,R18,R22,R29,R33,R40,R56,R160,R260,R261	B	N	I			11	EA	011595	123179	0	0.0
STUFF	000	RES-0010-473	RESISTOR, 47K OHM R41,R49,R51,R272,R273	B	N	I			5	EA	011595	123179	0	0.0
STUFF	000	RES-0010-511	510 OHM 1/8W CARBON FILM R158,R166	B	N	I			2	EA	011595	123179	0	0.0
STUFF	000	RES-0010-512	5.1K 1/8W CARBON FILM 5% R48,R162	B	N	I			2	EA	011595	123179	0	0.0
STUFF	000	RES-0010-680	RESISTOR, 68 OHM R9,R20,R23,R31,R58	B	N	I			5	EA	011595	123179	0	0.0
STUFF	000	RES-0010-681	RESISTOR, 680 OHM R129,R189	B	N	I			2	EA	011595	123179	0	0.0
STUFF	000	RES-0010-752	7.5K 1/8W CARBON FILM 5% R218	B	N	I			1	EA	011595	123179	0	0.0

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PT USE	SEQN	COMPONENT	DESCRIPTION	M B	C T	Q T	REV IN	REV OUT	QUANTITY	UM	EFFECTIVITY IN	EFFECTIVITY OUT	LTOS	SCRAP PCNT
STUFF	000	RES-0010-105	1 MEG 1/8W CARBON FILM 5% R256	B	N	I			1	EA	011595	123179	0	0.0
STUFF	000	RES-0010-122	RESISTOR, 1.2K, 1/8 WATT R206,R211	B	N	I			2	EA	011595	123179	0	0.0
STUFF	000	RES-0010-151	RESISTOR, 150 OHM R159,R167	B	N	I			2	EA	011595	123179	0	0.0
STUFF	000	RES-0010-152	RESISTOR, 1.5K OHM R38,R184	B	N	I			2	EA	011595	123179	0	0.0
STUFF	000	RES-0010-154	RESISTOR, 150K, 1/8 WATT R53,R164	B	N	I			2	EA	011595	123179	0	0.0
STUFF	000	RES-0010-164	160K 1/8W CARBON FILM 5% R4	B	N	I			1	EA	011595	123179	0	0.0
STUFF	000	RES-0010-180	18 OHM 1/8W CARBON FILM 5 R124,R144	B	N	I			2	EA	011595	123179	0	0.0
STUFF	000	RES-0010-182	RESISTOR, 1.8K OHM R2	B	N	I			1	EA	011595	123179	0	0.0
STUFF	000	RES-0010-220	RESISTOR, 22 OHM R13,R24,R46	B	N	I			3	EA	011595	123179	0	0.0
STUFF	000	RES-0010-221	RESISTOR, 220 OHM R1,R67,R255	B	N	I			3	EA	011595	123179	0	0.0
STUFF	000	RES-0010-222	RESISTOR, 2.2K OHM R37,R47,R60,R215,R217	B	N	I			5	EA	011595	123179	0	0.0
STUFF	000	RES-0010-224	RESISTOR, 220K OHM R15	B	N	I			1	EA	011595	123179	0	0.0
STUFF	000	RES-0010-244	240K 1/8W CARBON FILM 5% R163	B	N	I			1	EA	011595	123179	0	0.0
STUFF	000	RES-0010-273	27K 1/8W CARBON FILM 5% R26	B	N	I			1	EA	011595	123179	0	0.0

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PT USE	SEQN	COMPONENT	DESCRIPTION	M B	C T	Q T	REV IN	REV OUT	QUANTITY	UM	EFFECTIVITY IN	EFFECTIVITY OUT	LTOS	SCRAP PCNT
STUFF	000	RES-0001-562	RESISTOR 5.6K 1/4W R177	B	N	I			1	EA	011595	123179	0	0.0
STUFF	000	RES-0001-563	RESISTOR 56K 1/4W R221	B	N	I			1	EA	011595	123179	0	0.0
STUFF	000	RES-0001-621	RESISTOR 620 1/4W R180	B	N	I			1	EA	011595	123179	0	0.0
STUFF	000	RES-0001-682	RESISTOR 6.8K 1/4W R130	B	N	I			1	EA	011595	123179	0	0.0
STUFF	000	RES-0001-753	RESISTOR, 75K 1/4W R110,R112	B	N	I			2	EA	011595	123179	0	0.0
STUFF	000	RES-0001-820	RESISTOR 82 1/4W R79,R80,R267	B	N	I			3	EA	011595	123179	0	0.0
STUFF	000	RES-0001-821	RESISTOR 820 1/4W R200,R146	B	N	I			2	EA	011595	123179	0	0.0
STUFF	000	RES-0001-822	RESISTOR 8.2K 1/4W R203	B	N	I			1	EA	011595	123179	0	0.0
STUFF	000	RES-0010-100	RESISTOR, 10 OHM R42	B	N	I			1	EA	011595	123179	0	0.0
STUFF	000	RES-0010-101	RESISTOR, 100 OHM R214	B	N	I			1	EA	011595	123179	0	0.0
STUFF	000	RES-0010-102	RESISTOR, 1K OHM R43,R70,R71,R72,R73,R74,R75,R165,R216,R254,R135,R137,R139,R140,R141,R142	B	N	I			16	EA	011595	123179	0	0.0
STUFF	000	RES-0010-103	RESISTOR, 10K OHM R6,R10,R17,R21,R25,R28,R32,R39,R44,R45,R55,R59,R68,R69,R92,R117,R118,R121,R122,R157,R187,R257,R258,R119,R274,R275	B	N	I			26	EA	011595	123179	0	0.0
STUFF	000	RES-0010-104	RESISTOR, 100K OHM R5,R16,R35,R36,R27,R54,R61,R63,R65,R76,R185,R188,R262	B	N	I			13	EA	011595	123179	0	0.0

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PT USE	SEQN	COMPONENT	DESCRIPTION	M B	C T	Q T	REV IN	REV OUT	QUANTITY	UM	EFFECTIVITY IN	EFFECTIVITY OUT	LTOS	SCRAP PCNT
STUFF	000	RES-0001-331	RESISTOR 330 1/4W R101,R103	B	N	I			2	EA	011595	123179	0	0.0
STUFF	000	RES-0001-332	RESISTOR 3.3K 1/4W R241,R244	B	N	I			2	EA	011595	123179	0	0.0
STUFF	000	RES-0001-333	RESISTOR 33K 1/4W R207	B	N	I			1	EA	011595	123179	0	0.0
STUFF	000	RES-0001-393	RESISTOR 39K 1/4W R265	B	N	I			1	EA	011595	123179	0	0.0
STUFF	000	RES-0001-432	RESISTOR 4.3K 1/4W R104	B	N	I			1	EA	011595	123179	0	0.0
STUFF	000	RES-0001-433	RESISTOR, 43K 1/4W 5% R269	B	N	I			1	EA	011595	123179	0	0.0
STUFF	000	RES-0001-434	RESISTOR 430K 1/4W R105	B	N	I			1	EA	011595	123179	0	0.0
STUFF	000	RES-0001-470	RESISTOR 47 1/4W R98	B	N	I			1	EA	011595	123179	0	0.0
STUFF	000	RES-0001-471	RESISTOR 470 1/4W R93	B	N	I			1	EA	011595	123179	0	0.0
STUFF	000	RES-0001-472	RESISTOR 4.7K 1/4W R182,R253	B	N	I			2	EA	011595	123179	0	0.0
STUFF	000	RES-0001-473	RESISTOR 47K 1/4W R150,R176	B	N	I			2	EA	011595	123179	0	0.0
STUFF	000	RES-0001-510	51 OHM, 1/4W CARBON FILM R202	B	N	I			1	EA	011595	123179	0	0.0
STUFF	000	RES-0001-511	RESISTOR 510 1/4W R222,R251	B	N	I			2	EA	011595	123179	0	0.0
STUFF	000	RES-0001-561	RESISTOR 560 1/4W R95	B	N	I			1	EA	011595	123179	0	0.0

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PT USE	SEQN	COMPONENT	DESCRIPTION	M B	C T	Q T	REV IN	REV OUT	QUANTITY	UM	EFFECTIVITY IN	EFFECTIVITY OUT	LTOS	SCRAP PCNT
STUFF	000	RES-0001-105	RESISTOR 1M 1/4W R225	B	N	I			1	EA	011595	123179	0	0.0
STUFF	000	RES-0001-122	RESISTOR 1.2K 1/4W R152,R153,R154,R155,R171,R172,R173,R174,R201	B	N	I			9	EA	011595	123179	0	0.0
STUFF	000	RES-0001-124	RESISTOR, 120K 1/4W R107,R109	B	N	I			2	EA	011595	123179	0	0.0
STUFF	000	RES-0001-152	RESISTOR 1.5K 1/4W R87,R89,R147,R148	B	N	I			4	EA	011595	123179	0	0.0
STUFF	000	RES-0001-153	RESISTOR 15K 1/4W R151	B	N	I			1	EA	011595	123179	0	0.0
STUFF	000	RES-0001-201	RESISTOR 200 1/4W R133,R134	B	N	I			2	EA	011595	123179	0	0.0
STUFF	000	RES-0001-203	RESISTOR 20K 1/4W R252	B	N	I			1	EA	011595	123179	0	0.0
STUFF	000	RES-0001-221	RESISTOR 220 1/4W R99,R127,R136,R209,R237,R239,R126	B	N	I			7	EA	011595	123179	0	0.0
STUFF	000	RES-0001-222	RESISTOR 2.2K 1/4W R96,R191,R192	B	N	I			3	EA	011595	123179	0	0.0
STUFF	000	RES-0001-224	RESISTOR 220K 1/4W R131	B	N	I			1	EA	011595	123179	0	0.0
STUFF	000	RES-0001-271	RESISTOR 270 1/4W R183	B	N	I			1	EA	011595	123179	0	0.0
STUFF	000	RES-0001-272	RESISTOR 2.7K 1/4W R186	B	N	I			1	EA	011595	123179	0	0.0
STUFF	000	RES-0001-302	3K,1/4WATT 5% CARBON FILM R204,R205	B	N	I			2	EA	011595	123179	0	0.0
STUFF	000	RES-0001-303	RESISTOR 30K 1/4W R268,R266	B	N	I			2	EA	011595	123179	0	0.0

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PT USE	SEQN	COMPONENT	DESCRIPTION	M B	C T	Q T	REV IN	REV OUT	QUANTITY	UM	EFFECTIVITY IN	EFFECTIVITY OUT	LTOS	SCRAP PCNT
STUFF	000	JUM-0002-030	JUMPER, 0.30 LONG	B	N	I			7	EA	011595	123179	0	0.0
STUFF	000	JUM-0002-045	JUMPER, .45 TEFLON	B	N	I			3	EA	011595	123179	0	0.0
STUFF	000	JUM-0002-055	JUMPER, 0.55 LONG	B	N	I			1	EA	011595	123179	0	0.0
STUFF	000	JUM-0002-062	JUMPER, 0.625 LONG	B	N	I			10	EA	011595	123179	0	0.0
STUFF	000	JUM-0002-070	JUMPER, .70 TEFON	B	N	I			1	EA	011595	123179	0	0.0
STUFF	000	JUM-0002-075	JUMPER, .75 TEFLON	B	N	I			1	EA	011595	123179	0	0.0
STUFF	000	JUM-0002-080	JUMPER, .80 TEFLON	B	N	I			2	EA	011595	123179	0	0.0
STUFF	000	JUM-0002-090	JUMPER, .90 #24 TEFLON	B	N	I			1	EA	011595	123179	0	0.0
STUFF	000	JUM-0002-100	JUMPER, 1.0 #24 TEFLON	B	N	I			1	EA	011595	123179	0	0.0
STUFF	000	JUM-0002-135	JUMPER, 1.35 #24 TEFLON	B	N	I			1	EA	011595	123179	0	0.0
STUFF	000	JUM-0002-150	JUMPER, 1.50 #24 TEFLON	B	N	I			1	EA	011595	123179	0	0.0
STUFF	000	JUM-0002-170	JUMPER, 1.70 #24 TEFLON	B	N	I			2	EA	011595	123179	0	0.0
STUFF	000	JUM-0002-175	JUMPER, 1.75 #24 TEFLON	B	N	I			8	EA	011595	123179	0	0.0
STUFF	000	JUM-0002-190	JUMPER, 1.9 TEFLON AWG 24	B	N	I			1	EA	011595	123179	0	0.0
STUFF	000	JUM-0002-255	JUMPER, 2.55 #24 TEFLON	B	N	I			1	EA	011595	123179	0	0.0
STUFF	000	JUM-0002-280	JUMPER, 2.8 TEFLON AWG 24	B	N	I			1	EA	011595	123179	0	0.0
LAB	000	LAB[R]ASSY	LABOR, ASSEMBLY	M	R	I			2.07	HR	051395	123179	0	0.0
LAB	000	LAB[R]TEST	LABOR, TEST	M	R	I			1.00	HR	050495	123179	0	0.0
STUFF	000	MIX-0002-001	DBL BAL MIXER A1,A2	B	N	I			2	EA	011595	123179	0	0.0
MASK	000	MSK-0330-01	PCB-0330-01 MASKING	M	N	I			1	EA	120195	123179	0	0.0
POST	000	OVE-0005-004	OVEN, 75 DEG C 13 VDC OV1	B	N	I			1	EA	011595	123179	0	0.0
MASK	000	PCB-0330-01	MAINBOARD	B	N	I			1	EA	011595	123179	0	0.0
STUFF	000	RES-0001-100	RESISTOR 10 1/4W R82,R149,R175,R128	B	N	I			4	EA	011595	123179	0	0.0
STUFF	000	RES-0001-101	RESISTOR 100 1/4W R84,R86,R88,R90,R91,R116,R120,R132,R190,R193,R195,R198,R219, R223,R226,R229,R230,R231,R232,R238,R240,R250,R263	B	N	I			23	EA	011595	123179	0	0.0
STUFF	000	RES-0001-102	RESISTOR 1K 1/4W R94,R100,R102,R169,R199,R259,R224,R270	B	N	I			8	EA	011595	123179	0	0.0
STUFF	000	RES-0001-103	RESISTOR 10K 1/4W R81,R83,R85,R106,R114,R115,R194,R208,R220,R227,R228,R233,R23 5,R236,R242,R243,R245,R246,R247,R248,R249,R197,R181,R264	B	N	I			24	EA	011595	123179	0	0.0
STUFF	000	RES-0001-104	RESISTOR 100K 1/4W R234	B	N	I			1	EA	011595	123179	0	0.0

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POST	000	FIL-0005-004	2 POLE MONO BANDPASS FILT FIL1	B	N	I			1	EA	011595	123179	0	0.0
POST	000	FIL-0012-001	6 POLE LADDER ,500 OHM FL2	B	N	I			1	EA	011595	123179	0	0.0
POST	000	FIL-0012-004	500HZ TELEX FILTER FIL4	B	N	I			1	EA	011595	123179	0	0.0
POST	000	FIL-0012-006	FILTER, 4 POLE, 2.5 KHZ FIL3	B	N	I			1	EA	011595	123179	0	0.0
MASK	000	HAR-0080-024	STDF,SW RD 1/4X4-40X.500	B	N	I			4	EA	011595	123179	0	0.0
STUFF	000	ID-0022-002-16A	.4 LS, 2.7UH L28,L43,L44	M	N	I			3	EA	011595		0	0.0
STUFF	000	ID-0022-270-16A	.4 LS, 27UH L3,L5,L27,L38,L41,L45,L46	M	N	I			7	EA	011595		0	0.0
STUFF	000	IND-0001-101	INDUCTOR, 100UH WEE L31,L42	B	N	I			2	EA	011595	123179	0	0.0
STUFF	000	IND-0001-338	INDUCTOR, .33UH WEE L4,L9	B	N	I			2	EA	011595	123179	0	0.0
STUFF	000	IND-0001-479	INDUCTOR, 4.7UH WEE L2,L7	B	N	I			2	EA	011595	123179	0	0.0
STUFF	000	IND-0010-101	100UH RADIAL SHIELD CHOKE L10,L12,L14	B	N	I			3	EA	011595	123179	0	0.0
STUFF	000	IND-0020-014	INDUCTOR, 470UH CRAMER L23,L25,L1,L6,L8	B	N	I			5	EA	011595	123179	0	0.0
STUFF	000	IND-0021-015	INDUCTOR, 10UH L21,L22	B	N	I			2	EA	011595	123179	0	0.0
STUFF	000	IND-0021-020	INDUCTOR, 27UH CRAMER L17,L24,L26,L30,L33,L35,L36,L37,L32,L39,L40,L16,L34	B	N	I			13	EA	011595	123179	0	0.0
STUFF	000	JUM-0002-020	JUMPER, 0.20 LONG	B	N	I			1	EA	011595	123179	0	0.0

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STUFF	000	CAP-0076-002	TRIMMER 3-10PF SEALED C171	B	N	I			1	EA	011595	123179	0	0.0
STUFF	000	CON-0004-002	JACK, PHONO PCB J104,J105	B	N	I			2	EA	011595	123179	0	0.0
STUFF	000	CON-0028-002	HEADER MALE 9 TERM. P1,P2	B	N	I			2	EA	011595	123179	0	0.0
STUFF	000	CON-0028-005	HEADER,4 TERM MALE,GREEN P3	B	N	I			1	EA	011595	123179	0	0.0
STUFF	000	CON-0043-003	SOCKET, 1X30, .100 SPACIN J102	B	N	I			1	EA	011595	123179	0	0.0
STUFF	000	CON-0044-004	SOCKET 2X14, .100 X .100 J101	B	N	I			1	EA	011595	123179	0	0.0
STUFF	000	CP-0001-002-32B	.1 LS, 15PF C13,C14,C31,C36,C55,C50,C89	M	N	I			7	EA	011595		0	0.0
STUFF	000	CP-0001-002-33B	.2 LS, 15PF C140	M	N	I			1	EA	011595		0	0.0
STUFF	000	CP-0001-034-33B	.2 LS, 20PF C142	M	N	I			1	EA	011595		0	0.0
STUFF	000	CP-0001-040-32B	.1 LS, 6.2PF OR 6.0PF C77,C97	M	N	I			2	EA	011595		0	0.0
POST	000	CRY-0022-001	CRYSTAL 10.236 MHZ Y4	B	N	I			1	EA	011595	123179	0	0.0
POST	000	CRY-0022-002	CRYSTAL 10.706 MHZ Y2	B	N	I			1	EA	011595	123179	0	0.0
POST	000	CRY-0023-001	CRYSTAL 59.315 MHZ Y3	B	N	I			1	EA	011595	123179	0	0.0
POST	000	CRY-0330-01	CRYSTAL,10.240MHZ TESTED FOR 330	M	N	I			1	EA	030695	123179	0	0.0
REV	000	ECN 5940	ASY-0330-01/ASY-0330-01E	B	D	O			1	EA	032195		0	0.0

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OPTION: C EFFECTIVITY DATE: 051496 EFFECTIVE REV:

PT USE	SEQN	COMPONENT	DESCRIPTION	M B	C T	Q T	REV IN	REV OUT	QUANTITY	UM	EFFECTIVITY IN	EFFECTIVITY OUT	LTOS	SCRAP PCNT
STUFF	000	CAP-0027-104	CAPACITOR FILM CK05 .1 C9,C23,C24,C50,C73,C74,C72,C238,C241,C271,C259	B	N	I			11	EA	011595	123179	0	0.0
STUFF	000	CAP-0027-222	CAPACITOR FILM CK05 .0022 C148,C150	B	N	I			2	EA	011595	123179	0	0.0
STUFF	000	CAP-0027-223	CAPACITOR FILM CK05 .022 C51,C75	B	N	I			2	EA	011595	123179	0	0.0
STUFF	000	CAP-0027-224	CAPACITOR FILM CK05 .22 C8,C71,C232,C244,C272	B	N	I			5	EA	011595	123179	0	0.0
STUFF	000	CAP-0027-332	CAPACITOR FILM CK05 .0033 C234	B	N	I			1	EA	011595	123179	0	0.0
STUFF	000	CAP-0027-473	CAPACITOR FILM CK05 .047 C258	B	N	I			1	EA	011595	123179	0	0.0
STUFF	000	CAP-0031-001	CAP TANT 2.2UF 16-25V C262,C239	B	N	I			2	EA	011595	123179	0	0.0
STUFF	000	CAP-0031-003	CAPACITOR TANT 4.7UF 16V C1,C103,C248,C251,C264,C265,C266	B	N	I			7	EA	011595	123179	0	0.0
STUFF	000	CAP-0031-005	CAPACITOR TANT 10UF 16V C7,C49,C70,C115,C126,C132,C215,C216,C220,C137,C269,C235,C236 ,C237,C128,C243,C246,C255,C273	B	N	I			19	EA	011595	123179	0	0.0
STUFF	000	CAP-0031-007	CAPACITOR TANT 22UF 16V C210,C213,C256	B	N	I			3	EA	011595	123179	0	0.0
STUFF	000	CAP-0031-008	CAP TANT 1UF 16-25V C260,C263	B	N	I			2	EA	011595	123179	0	0.0
STUFF	000	CAP-0037-010	CAP, ELECT. 470UF RAD C129,C131	B	N	I			2	EA	011595	123179	0	0.0
STUFF	000	CAP-0047-102	CAP, FILM .001UF 630VDC C149	B	N	I			1	EA	011595	123179	0	0.0
STUFF	000	CAP-0073-002	N750 TEMP COMP W/ RADIAL C4	B	N	I			1	EA	011595	123179	0	0.0

PARENT: ASY-0330-01 DESC: MAINBOARD
DRWG: UM: EA MB: M REV:
OPTION: C EFFECTIVITY DATE: 051496 EFFECTIVE REV:

PT USE	SEQN	COMPONENT	DESCRIPTION	M B	C T	Q T	REV IN	REV OUT	QUANTITY	UM	EFFECTIVITY IN	EFFECTIVITY OUT	LTOS	SCRAP PCNT
STUFF	000	CAP-0006-002	CAP,MULTILAYER CER DIP .0 C240,C257,C155,C180,C183,C185,C199,C204,C226,C212,C222,C229, C209,C163	B	N	I			14	EA	011595	123179	0	0.0
STUFF	000	CAP-0006-003	CAP,MULTILAYER CER DIP .0 C190,C195,C227,C228	B	N	I			4	EA	011595	123179	0	0.0
STUFF	000	CAP-0006-004	CAP,MULTILAYER CER DIP .0 C146,C161,C217,C221	B	N	I			4	EA	011595	123179	0	0.0
STUFF	001	CAP-0013-001	CAPACITOR MONO .1UF C15,C20,C22,C30,C38,C39,C34,C43,C44,C57,C62,C66,C67,C68,C102 ,C76,C82,C85,C90,C95,C100,C110,C111,C156,C138,C179,C194,C192 ,C186,C187,C188,C189,C197,C198,C200,C201,C224,C230,C130,C203 ,C112,C113,C114,C127,C124,C118,C119,C274,C159,C279,C268,C166	B	N	I			52	EA	011595	123179	0	0.0
STUFF	002	CAP-0013-001	CAPACITOR MONO .1UF C174,C177,C178,C276,C277,C284	B	N	I			6	EA	110795	123179	0	0.0
STUFF	000	CAP-0013-003	CAPACITOR MONO .01UF 100V C12,C19,C27,C32,C41,C46,C54,C61,C65,C79,C89,C94,C99,C105,C12 5,C116,C117,C168,C157,C191,C247,C267,C250,C164,C167,C169,C17 2,C173,C175,C176,C287,C288	B	N	I			32	EA	011595	123179	0	0.0
STUFF	000	CAP-0013-004	CAPACITOR, MONO .0047UF C120,C121,C123,C122,C249,C252	B	N	I			6	EA	011595	123179	0	0.0
STUFF	000	CAP-0013-005	CAPACITOR MONO .001 UF C40,C17,C35,C37,C42,C45,C59,C63,C64,C101,C104,C106,C107,C108 ,C109,C193,C223,C261,C219,C253,C254	B	N	I			21	EA	011595	123179	0	0.0
STUFF	000	CAP-0013-006	CAP, MONO .047UF C270,C160,C208,C214,C154	B	N	I			5	EA	011595	123179	0	0.0
POST	000	CAP-0025-001	CAPACITOR TRIMMER 2-20PF C11,C53	B	N	I			2	EA	011595	123179	0	0.0
POST	000	CAP-0025-002	CAPACITOR TRIMMER 2-10PF C2,C26,C78	B	N	I			3	EA	011595	123179	0	0.0
STUFF	000	CAP-0027-103	CAPACITOR FILM CK05 .01 C133,C134,C135,C136,C233	B	N	I			5	EA	011595	123179	0	0.0

PARENT: ASY-0330-01 DESC: MAINBOARD
DRWG: UM: EA MB: M REV:
OPTION: C EFFECTIVITY DATE: 051496 EFFECTIVE REV:

PT USE	SEQN	COMPONENT	DESCRIPTION	M B	C T	Q T	REV IN	REV OUT	QUANTITY	UM	EFFECTIVITY IN	EFFECTIVITY OUT	LTOS	SCRAP PCNT
STUFF	000	CAP-0001-007	CAPACITOR MICA 36PF C10,C16,C52	B	N	I			3	EA	011595	123179	0	0.0
STUFF	000	CAP-0001-008	CAPACITOR MICA 47PF C242	B	N	I			1	EA	011595	123179	0	0.0
STUFF	000	CAP-0001-010	CAPACITOR MICA 56PF C5	B	N	I			1	EA	011595	123179	0	0.0
STUFF	000	CAP-0001-012	CAPACITOR MICA 68PF C285,C286	B	N	I			2	EA	011595	123179	0	0.0
STUFF	000	CAP-0001-015	CAPACITOR MICA 100PF C47,C139,C145,C84	B	N	I			4	EA	011595	123179	0	0.0
STUFF	000	CAP-0001-019	CAPACITOR MICA 180PF C141,C143	B	N	I			2	EA	011595	123179	0	0.0
STUFF	000	CAP-0001-031	CAPACITOR MICA 18PF C93	B	N	I			1	EA	011595	123179	0	0.0
STUFF	000	CAP-0001-037	CAPACITOR,MICA 39PF C58	B	N	I			1	EA	011595	123179	0	0.0
STUFF	000	CAP-0001-038	CAPACITOR,MICA 5PF C170,C83	B	N	I			2	EA	011595	123179	0	0.0
STUFF	000	CAP-0001-039	CAPACITOR,MICA 12PF C86,C91,C96,C98	B	N	I			4	EA	011595	123179	0	0.0
STUFF	000	CAP-0001-041	CAPACITOR MICA 4PF C144,C181,C80,C81	B	N	I			4	EA	011595	123179	0	0.0
STUFF	000	CAP-0001-042	CAP,MICA 7.5PF OR DISC 7P C33	B	N	I			1	EA	011595	123179	0	0.0
STUFF	000	CAP-0001-044	24 PF SILV. MICA LCQ-11 C3,C29,C88	B	N	I			3	EA	011595	123179	0	0.0
STUFF	000	CAP-0006-001	CAP,MULTILAYER CER DIP .1 C6,C21,C48,C69,C151,C165,C152,C153,C158,C162,C182,C184,C202, C205,C211,C231,C218,C245	B	N	I			18	EA	011595	123179	0	0.0

PARENT: ASY-0330-01 DESC: MAINBOARD
DRWG: UM: EA MB: M REV:
OPTION: C EFFECTIVITY DATE: 051496 EFFECTIVE REV:

PT USE	SEQN	COMPONENT	DESCRIPTION	M B	C T	Q T	REV IN	REV OUT	QUANTITY	UM	EFFECTIVITY IN	EFFECTIVITY OUT	LTOS	SCRAP PCNT
POST	000	ASY-0004-07	IND,TOR 7T18-2260N11-1 T3 L18	M	P	I			1	EA	011595	123179	0	0.0
POST	000	ASY-0004-08	IND,TOR 8T18-2260N11-1 T3 L19,L20	M	P	I			2	EA	011595	123179	0	0.0
POST	000	ASY-0016-05	IND,TOR 5T18-226 ON 11-2 L15	M	P	I			1	EA	011595	123179	0	0.0
POST	000	ASY-0016-06	IND,TOR 6T18-226 ON 11-2 L13	M	P	I			1	EA	011595	123179	0	0.0
POST	000	ASY-0016-07	IND,TOR 7T18-226 ON 11-2 L11	M	P	I			1	EA	011595	123179	0	0.0
POST	000	ASY-0017-15	IND,TOR 15T18-228 ON 12-2 L29	M	P	I			1	EA	011595	123179	0	0.0
POST	000	ASY-0209-T1M	TRANSFORMER T11	M	P	I			1	EA	011595	123179	0	0.0
POST	000	ASY-0222-TT5	INDUCTOR,T TRIFI ON #43 T8,T9	M	P	I			2	EA	011595	123179	0	0.0
POST	000	ASY-0330-W4	13.5" COAX B	M	P	I			1	EA	011595	123179	0	0.0
POST	000	ASY-0330-W5	12" COAX A	M	P	I			1	EA	011595	123179	0	0.0
POST	000	ASY-0330-W6	9.25" COAX D	M	P	I			1	EA	011595	123179	0	0.0
POST	000	ASY-0330-W7	7.25" COAX C	M	P	I			1	EA	011595	123179	0	0.0
POST	000	ASY-0504-01	CPU BOARD	M	N	I			1	EA	011595	123179	0	0.0
STUFF	000	CAP-0001-001	CAPACITOR MICA 10PF C18,C25,C60,C147,C275,C278,C281,C282,C283,C92	B	N	I			10	EA	011595	123179	0	0.0

PARENT: 3300G DESC: CONTROLLER, GMDSS
RV: UM: EA RUN LT: 20 FIXED LT: 0
PLNR: PLN LT: N PLN POL: N DRWG:

STARTING: PT USE SEQN COMPONENT

PT USE	SEQN	COMPONENT	DESCRIPTION	C T	QUANTITY	Q T	UM	M B	L
BOXNG	000	BOX-0322-02	INSERT FOR BOX-0322-01	N	1	I	EA	B	N
BOXNG	000	FAB-0322-11	FLUSH MOUNT TRIM RING - HALF	N	2	I	EA	B	
BOXNG	000	FAB-0322-13	MOUNTING BRACKET	N	1	I	EA	B	N
BOXNG	000	FOM-0322-03	FOAM END CAPS FOR 3220	N	2	I	EA	B	N
BOXNG	000	KIT-3220-99	PARTS KIT	N	1	I	EA	M	
BOXNG	000	OPR-330	OPERATOR'S MANUAL	N	1	I	EA	B	
BOXNG	000	BOX-0322-01	OUTER CONTAINER FOR 3220	N	1	I	EA	B	N
FINAL	000	ASY-0222-05	MICROPHONE ASSY	N	1	I	EA	M	
FINAL	000	ASY-0223-10M	CABLE ASSY 5.0"	P	1	I	EA	M	
FINAL	000	ASY-3300-03	TERMINAL INTERFACE ASSY	N	1	I	EA	M	N
FINAL	000	ASY-3300-04	330 INTERFACE BOARD	N	1	I	EA	M	N
FINAL	000	FAB-0322-07	TERMINAL FRONT PANEL	N	1	I	EA	B	
FINAL	000	FAB-0322-08	TERMINAL CPU SHIELD	N	1	I	EA	B	N
FINAL	000	FAB-0322-09	ENCLOSURE FACE HALF	N	1	I	EA	B	N
FINAL	000	FAB-0322-10	ENCLOSURE REAR HALF	N	1	I	EA	B	
FINAL	000	FAB-0322-14	ENCLOSURE DISC	N	2	I	EA	B	
FINAL	000	FAB-0322-15	FRONT PANEL GASKET	N	1	I	EA	B	N
FINAL	000	FAB-0322-18	DIFFUSER BAR	N	1	I	EA	B	N
FINAL	000	FAB-0322-19	CPU SHIELD BLOCK	N	1	I	EA	B	
FINAL	000	FAB-0322-22	.5X4.74 PRESSURE SEN. TAP	N	1	I	EA	B	N
FINAL	000	FAB-0322-24	LCD LIGHT BAR	N	1	I	EA	B	N
FINAL	000	FAB-0330-06G	KEYPAD OVERLAY, SEA 330G	N	1	I	EA	B	
FINAL	000	GAS-0001-001	.050 CONTINUOUS NEOPRENE	N	2	I	FT	B	
FINAL	000	HAR-0029-004	COR-PAK BREATHABLE POUCHE	N	1	I	EA	B	N
FINAL	000	HAR-0071-003	M/F 6-32 SPCR HEX BR .500	N	2	I	EA	B	
FINAL	000	HAR-0071-008	M/F STANDOFF 6-32 HEX 1-7	N	6	I	EA	B	
FINAL	000	HAR-0080-037	4-40X3.75 CLEAR. SPCR	N	4	I	EA	B	N
FINAL	000	HAR-060D-438	6-32X7/16 PAN-L SCREW	N	6	I	EA	B	N
FINAL	000	SPE-0001-007	3.5 4 OHM,5W MYLAR SPEAKE	N	1	I	EA	B	
LAB	000	LAB[R]ASSY	LABOR, ASSEMBLY	R	2.63	I	HR	M	N
LAB	000	LAB[R]INSP	LABOR, INSPECTION	R	.3	I	HR	M	N
LAB	000	LAB[R]TEST	LABOR, TEST	R	.2	I	HR	M	

*** END OF REPORT ***

PARENT: 3301G DESC: 3301 GMDSS W/FANS
RV: UM: EA RUN LT: 4 FIXED LT: 5
PLNR: PM LT: Y PLN POL: M DRWG:

PT USE SEQN COMPONENT
STARTING:

PT USE	SEQN	COMPONENT	DESCRIPTION	CT	QUANTITY	QT	UM	MB	LT
BOXNG	000	BOX-0330-001	OUTER CONTAINER,330	N	1	I	EA	B	N
BOXNG	000	BOX-0330-003	FILLER FOR MASTER PACK	N	1	I	EA	B	N
BOXNG	000	FAB-0330-05	330 MOUNTING BRACKET	N	1	I	EA	B	N
BOXNG	000	FOM-0330-02	FOAM INSERTS FOR 330-002	N	1	I	EA	B	N
BOXNG	000	KIT-3301-99	PARTS KIT, 3301	N	1	I	EA	M	N
BOXNG	000	MAN-330	SEA 3301 SERVICE MANUAL	N	1	I	EA	S	N
FINAL	000	ASY-0223-10M	CABLE ASSY 5.0"	P	1	I	EA	M	N
FINAL	000	ASY-3301-RX	RX COAX ASSEMBLY,3301	P	1	I	EA	M	N
FINAL	000	CON-0028-001	PLUG-IN 9 TERM FEMALE	N	4	I	EA	B	N
FINAL	000	CON-0028-006	PLUG IN 4 TERM FEMALE,GRE	N	1	I	EA	B	N
FINAL	000	FAB-0330-04	330 BRACKET COVER	N	2	I	EA	B	N
FINAL	000	HAR-0031-002	CABLE TIE MOUNT	N	1	I	EA	B	N
FINAL	000	WIR-0001-010	PHONO CABLE 10"	P	1	I	EA	M	N
FINAL	000	ASY-0330-12	SEABUSS EXPANDER	N	1	I	EA	M	N
FINAL	000	ASY-0330-01	MAINBOARD	N	1	I	EA	M	N
FINAL	000	ASY-0330-02	FILTER/POWER INTERFACE AS	N	1	I	EA	M	N
FINAL	000	ASY-0330-03	PA ASSY, 330	N	1	I	EA	M	N
FINAL	000	CF330	330 FAN KIT	N	1	I	EA	M	N
PASSY	000	ASY-0330-20	3301G CHASSIS ASSY	N	1	I	EA	M	N
REF	000	LBL-0330-1G	FCC GMDSS LABEL, 330	X	1	I	EA	M	N
REV	000	ECN 6035	3301G	D	1	O	EA	M	N
SN#	000	SNO-0009-002	SN# LABEL	D	4	I	EA	M	N
TEST2	000	HAR-0029-004	COR-PAK BREATHABLE POUCHE	N	1	I	EA	B	N
TEST2	000	HAR-0044-001	WSHR FL NY .250X.141X1/16	N	1	I	EA	B	N
TEST2	000	HAR-060D-313	6-32X5/16 PAN-L SCREW	N	18	I	EA	B	N
TEST2	000	OPS-3301-U3	PROGRAMMED EPLD,3301 ADD	N	1	I	EA	M	N
TEST2	000	OPS-3301G-U5	OP SYSTEM GMDSS 3301	N	1	I	EA	M	N
TEST2	000	FAB-0330-03	330 COVER	N	1	I	EA	B	N
TEST2	000	ASY-0330-21	CPU SHIELD ASSY	N	1	I	EA	M	N

*** END OF REPORT ***