



**MODEL EAS 930A
MULTI-MODULE RECEIVER
USER'S GUIDE**



**TFT INCORPORATED
1953 CONCOURSE DRIVE
SAN JOSE, CA 95131-1708**

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MULTI-MODULE RECEIVER
USER'S GUIDE**



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Chapter 1 - General Information

1.1 About This Guide

This user's guide contains instructions for unpacking, setting up, operating, and routine maintenance of the TFT Model EAS 930A Multi-Module radio receiver for use in conjunction with the new Emergency Alert System (EAS).

It is recommended that the user read this Guide, and follow the pre-installation checkout in Chapter 3 and the steps in Chapter 4 for installation and operation.

1.2 Overview of This Guide

- Chapter 1 contains a general description of the Receiver, technical specifications, and warranty information.
- Chapter 2 contains instructions for unpacking and inspecting the Receiver, an explanation of front and rear panel controls, indicators and connectors, and a description of accessory items.
- Chapter 3 contains instructions for selection of receiver operating frequencies, and pre-installation checkout procedures.
- Chapter 4 contains instructions for installation of antennas, and connections to the Model EAS 930A. It also describes the field installation of the receiver modules when required.
- Chapter 5 describes the theory of operation of the Receiver beginning with a system block diagram description, following by block diagram descriptions of the AM, FM, and NOAA receiver modules and the speaker amplifier and power supply board.
- Chapter 6 contains maintenance instructions including performance checks of the AM, FM and NOAA channels. A troubleshooting guide is also included.
- Appendix A contains Assembly and Schematic drawings of Receiver circuit boards.
- Appendix B is a parts list for the EAS 930A.

1.3 Introducing the Model EAS 930A Receiver

The TFT Model EAS 930A Multi-Module Receiver System is a compact, modular radio receiver system for use with TFT's EAS 911 Emergency Alert System Decoder to enable broadcasters to participate in the Emergency Alert System. The EAS 930A consists of a chassis containing a power supply, audio amplifier, and built-in speaker. The unit can accommodate up to four field-installable receiver modules. The receiver modules can be any combination of AM receiver, FM Receiver, Weather Radio Receiver or VHF/UHF Receiver. Figure 1-1 is a basic block diagram of the Multi-Module Receiver.

The FM Receiver module is a high-performance professional receiver tunable across the FM broadcast band from 88 to 108 MHz in 100 kHz increments via a 3-digit front panel rotary switch.

The AM Receiver module uses a frequency-synthesized local oscillator which is phase-locked to a crystal oscillator. It is tunable across the AM broadcast band from 540 to 1720 kHz in 10 kHz increments via a 3-digit front panel rotary switch.

The NOAA Weather Radio Receiver module is a dual-conversion, FM narrow-band receiver. It is tunable from 162.40 to 162.55 MHz in 25 kHz increments via a single-digit front panel rotary switch.

All three receivers are provided in the standard EAS 930A equipment. A fourth module can be added to the chassis. Instructions for field installation of receiver modules is given in Chapter 4.

Each receiver module has loop-through circuitry for hot standby configuration. It switches to the audio of the hot standby receiver when the primary station is off, then switches back when the RF signal returns. Relay contacts provide drop-out alarm.

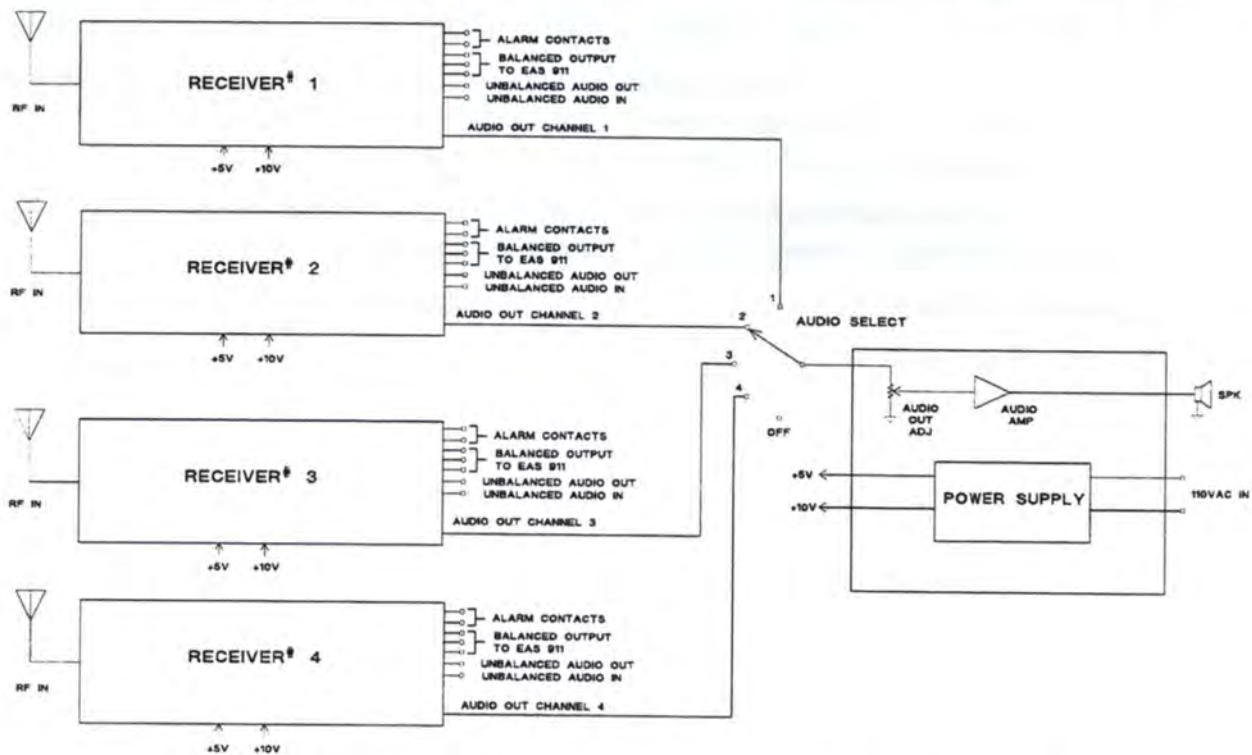


Figure 1-1. Model EAS 930A Multi-Module Receiver Basic Block Diagram

A speaker on the front panel provides audio monitoring of each receiver output. A front panel accessible 5-position switch is used to select the receiver audio to be monitored. The speaker works in conjunction with the **VOLUME** control also mounted on the front panel.

The Model EAS 930A is configured at the factory with an AM, FM, and NOAA receiver. The unit operates from a 117 VAC, 50 or 60 Hz power source.

1.4 Specifications

The EAS 930A performance and physical specifications are listed in Table 1-1.

**Table 1-1
SPECIFICATIONS**

FM RECEIVER MODULE

Frequency Range	88-108 MHz, digitally tunable in 100 kHz steps
Antenna Input	75Ω, Type F connector
Sensitivity	2 μV for 20 dB quieting
Audio Output	-10 dBm to +3 dBm (adjustable from rear panel) 600Ω balanced, 3-pin terminal block
T.H.D.	Less than 3% at 66.6% modulation

AM RECEIVER MODULE

Frequency Range	540 kHz to 1720 kHz, digitally tunable in 10 kHz steps
Antenna Input	Terminal block connector; external AM loop antenna supplied
Sensitivity	20 μV for 20 dB S/N
AGC	45 dB
Audio Output	-10 dBm to +3 dBm (adjustable from rear panel) 600Ω balanced, 3-pin terminal block
T.H.D.	Less than 3% at 66.6% modulation

WEATHER RADIO RECEIVER MODULE

NOAA Weather Channel	Channel 1: 162.550 MHz Channel 2 :162.400 MHz Channel 3 :162.475 MHz Channel 4: 162.425 MHz Channel 5: 162.450 MHz Channel 6: 162.500 MHz Channel 7: 162.525 Mhz
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WEATHER RADIO RECEIVER MODULE

(Continued)

Sensitivity	1.5 μV for 20 dB quieting
Image Rejection	60 dB
I.F. Rejection	70 dB
Modulation	FM, ±5 kHz deviation
Antennna	75Ω, type F connector
Audio Output	-10 dBm to +3 dBm (adjustable from rear panel) balanced, 3-pin terminal block
T.H.D.	Less than 3% at 66.6% modulation

PHYSICAL AND ENVIRONMENTAL

L.O. Emissions	Fully compliant with FCC Rules, Part 15
Dimensions	1-3/4" x 19"W x 12"D
Operating Temperature	0° to 50° C
Net Weight	Approximately 6.5 lbs
Shipping Weight	Approximately 8 lbs

ORDERING INFORMATION

TFT PART NUMBER	DESCRIPTION
5116-0930A	EAS 930A complete assembly with chassis power supply and AM FM, and Weather Receiver Modules
5102-3969	Chassis with power supply and audio monitor speaker only
6608-4037	FM Receiver Module
6608-4038	AM Receiver Module
6608-4039	NOAA Weather Receiver Module

1.5 Warranty Information

The following warranty policy and limitations are applicable to the Model EAS 930A Emergency Alert System Multi-Module Receiver.

WARRANTY

TFT, Inc. warrants each manufactured Model EAS 930A Multi-Module Receiver to meet published specifications and to be free from defects in material and workmanship. TFT will repair or replace, at its expense, for a period of one (1) year from the date of shipment of equipment, all parts which are defective from faulty material or workmanship. This Warranty does not cover equipment which has been misused and/or altered by the user. Units found to be defective during the warranty period shall be returned to TFT with transportation charges prepaid by the BUYER. It is expressly agreed that replacement and repair shall be the sole remedy of the SELLER with respect to any non-conforming equipment and parts thereof, and shall be in lieu of any other remedy available by applicable law. All returns to the factory must be authorized in advance by TFT. Upon examination by the factory, if any EAS911 Equipment is found to be defective, the unit will be repaired and returned to the BUYER with transportation charges prepaid by TFT during the warranty period. Transportation charges for the units found to be defective within the first 30 days of the warranty period will be paid both ways by TFT. Transportation charges for warranty returns wherein failure is found not to be the fault of TFT or one year after the delivery of the equipment shall be paid both ways by the BUYER. This warranty does not apply to equipment which, in the opinion of the SELLER, has been altered or misused.

NO OTHER WARRANTY IS EXPRESSED OR IMPLIED. TFT IS NOT LIABLE FOR ANY CONSEQUENTIAL DAMAGES.

1.6 Claims for Damage in Shipment

Your instrument should be inspected and tested by the method given in Chapter 3 of this guide as soon as it is received. If the instrument is damaged in any way or fails to operate properly due to transportation damage, file a claim with the carrier or, if insured separately, with the insurance company.

OUR EMERGENCY SERVICE IS AVAILABLE 24 HOURS A DAY. PLEASE CALL US IF YOU NEED ASSISTANCE WITH ANY TFT PRODUCT.

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Chapter 2 - Getting to Know Your EAS 930A

2.1 Unpacking and Inspection

Upon receiving the instrument, inspect the packing box for signs of shipping damage. Report any damage to the transportation company.

Open the shipping box, and verify that it contains the following items:

- Model EAS 930A Multi-Module Receiver
- AM Loop Antenna with Base, TFT P/N 2140-7215
- RF Power Splitter 2:1, TFT P/N 1890-0015
- RF Cable Assembly, Type F to Type F, RG59 (2 each), TFT P/N 4750-0981
- Power Cord
- Installation and Operation Guide, TFT P/N 5004-0930A
- Warranty Card

After unpacking, operate the instrument in accordance with the procedures in Chapter 3 of this guide. If the instrument is damaged or fails to operate properly due to transportation damage, file a claim with the transportation company or, if insured separately, with the insurance company.

2.2 Front Panel Controls and Indicators

Receiver front panel controls and indicators are shown in Figure 2-1. Numbered items in this figure are explained in Table 2-1.

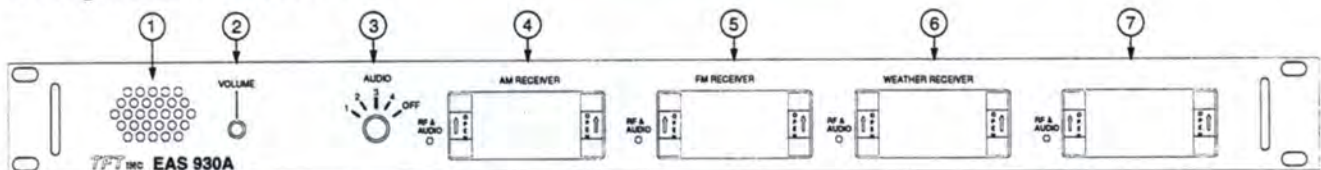


Figure 2-1. Receiver Front Panel Controls and Indicators

Table 2-1. Receiver Front Panel Controls and Indicators

ITEM	TITLE	FUNCTION
1	VOLUME	Speaker. Produces audible output from receiver selected via AUDIO switch (Item 3)
2		Potentiometer. Volume control for receiver audio selected via AUDIO switch (Item 3)
3		5-position rotary switch. Selects the audio output of a receiver for routing to audio amplifier and speaker. In the OFF position, no receiver audio is selected.
		Note:
		Power to the Receivers is always ON. The 5-position switch controls only which receiver audio is routed to the speaker for monitoring.

Table 2-1. Receiver Front Panel Controls and Indicators (Continued)


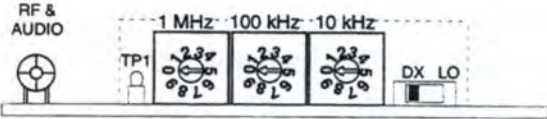
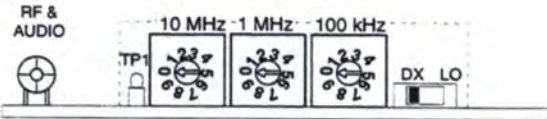
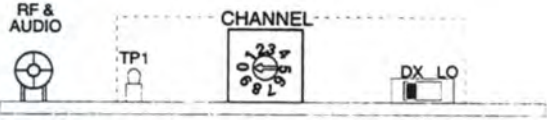
ITEM	TITLE	FUNCTION
4	AM RECEIVER	<p style="text-align: center;">Note:</p> <p>Individual Receiver controls are accessible by removing the associated push-on cover (shown below) from the front panel. To remove the cover, push it upward to disengage its rear hooks, then pull gently forward to remove it from the front panel.</p> <div style="text-align: center;">  <p>FRONT VIEW SIDE VIEW</p> </div> <p>Receiver module for AM broadcast band (540 - 1720 kHz)</p> <div style="text-align: center;">  </div> <p style="text-align: center;">Figure 2-2. AM Receiver Module Edge-Mounted Controls and Indicators</p> <p>RF & AUDIO Yellow LED. Flashes when an RF signal is detected which is above the minimum level of 20 μV and has audio modulation.</p> <p>TP1 Test point for RF Signal Strength Indication (RSSI) monitoring</p> <p>1 MHz, 100 kHz, 10 kHz Rotary switches for setting receive frequency</p> <p>DX/LO Local/Distant switch for setting receiver sensitivity</p>
5	FM RECEIVER	<p>Receiver module for FM broadcast band (88 - 108 MHz)</p> <div style="text-align: center;">  </div> <p style="text-align: center;">Figure 2-3. FM Receiver Module Edge-Mounted Controls and Indicators</p> <p>RF & AUDIO Yellow LED. Flashes when an RF signal is detected which is above the minimum level of 10 μV and has audio modulation.</p> <p>TP1 Test point for RF Signal Strength Indication (RSSI) monitoring</p> <p>10 MHz, 1 MHz, 100 kHz Rotary switches for setting received frequency</p> <p>DX/LO Local/Distant switch for setting receiver sensitivity</p>
6	WEATHER RECEIVER	<p>Radio Receiver module for weather broadcasts (162.400 - 162.550 MHz)</p> <div style="text-align: center;">  </div> <p style="text-align: center;">Figure 2-4. Weather Receiver Module Edge-Mounted Controls and Indicators</p> <p>RF & AUDIO Yellow LED. Flashes when an RF signal is detected which is above the minimum level of 10 μV and has audio modulation.</p> <p>TP1 Test point for RF Signal Strength Indication (RSSI) monitoring</p> <p>CHANNEL Rotary switch for setting received frequency</p> <p>DX/LO Local/Distant switch for setting receiver sensitivity</p>

Table 2-1. Receiver Front Panel Controls and Indicators (Continued)

ITEM	TITLE	FUNCTION
6 (Cont'd.)	RF & AUDIO	Yellow LED. Flashes when an RF signal is detected which is above the minimum level of 5 μ V and has audio modulation.
	TP1	Test point for RSSI monitoring
	CHANNEL	Rotary switch for setting receive channel. See Table 3-1 for weather channel frequencies
	DX/LO	Local/Distant switch for setting receiver sensitivity
7	(unmarked)	Slot for additional Receiver Module. Module can be any type

2.3 Rear Panel Controls and Connectors

Receiver rear panel controls and connectors are shown in Figure 2-5. Numbered items in this figure are explained in Table 2-2.

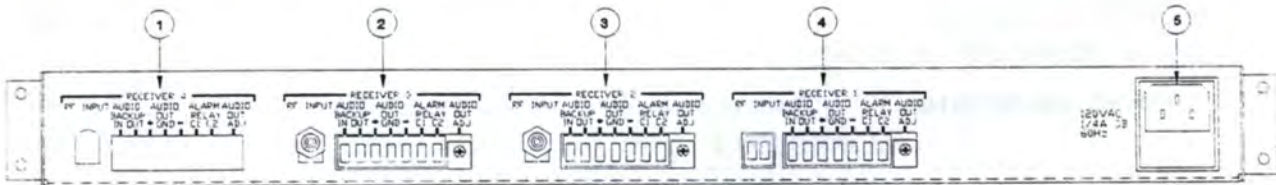


Figure 2-5. Receiver Rear Panel Controls and Connectors

Table 2-2. Receiver Rear Panel Controls and Connectors

ITEM	TITLE	FUNCTION
1	RECEIVER 4	<p>Controls and connectors for Receiver 4:</p> <p>RF INPUT: Type F connector for RF input to the FM and Weather receiver modules, 2 pin terminal block connector for RF input to the AM Receiver module.</p> <p>AUDIO BACKUP INPUT: An unbalanced audio signal can be input to the receiver. If the receiver loses RF or modulation, the AUDIO BACKUP INPUT is switched to the BALANCED AUDIO OUTPUT.</p> <p>NOTE: To activate this feature, refer to 4.2, System Installation.</p> <p>AUDIO BACKUP OUTPUT: An unbalanced audio output is provided to be used as the AUDIO BACKUP INPUT to another module.</p> <p>BALANCED AUDIO OUTPUT: Terminal block connector for balanced audio output to EAS 911 or other external equipment.</p> <p>ALARM RELAY CONTACTS: The ALARM RELAY CONTACTS are closed if the Receiver loses RF or modulation.</p>

Table 2-2. Receiver Rear Panel Controls and Connectors (Continued)

ITEM	TITLE	FUNCTION
		<p>AUDIO OUT ADJ: Level adjustment for balanced audio output. Normally set to 2.2 V_{p-p} as measured with an oscilloscope from ground to either the + or - terminal.</p>
2	RECEIVER 3	<p>Controls and connectors for Receiver 3 Functions of these items are identical to those for Receiver 4</p>
3	RECEIVER 2	<p>Controls and connectors for Receiver 2 Functions of these items are identical to those for Receiver 4</p>
4	RECEIVER 1	<p>Controls and connectors for Receiver 1 Functions of these items are identical to those for Receiver 4</p>
5	120VAC, 1/4A SB 60 Hz	<p>Prime power input connector and fuse holder</p>

Chapter 3 - Pre-Installation Checkout

3.1 Introduction

This chapter describes EAS 930A Multi-Module Receiver pre-installation checkout procedures. It is recommended that the user perform these procedures on the EAS 930A on a work bench before its final installation.

3.2 System Operation

The unit has two front-panel controls. The AUDIO select switch is used to select the audio output of a receiver for monitoring via the front panel speaker. The volume of the speaker output is adjustable via the front panel VOLUME control (Figure 2-1, Item 2).

Controls for receiver modules are edge-mounted on their main circuit cards. The controls are accessible by removing the front panel access plate of the module.

Each receiver module has a level adjustment for its audio output (See Figure 2-5). This audio output is routed to rear-panel terminals (See Figure 2-5), and is separate from that supplied to the front-panel AUDIO select switch (Figure 2-1, Item 3). Receiver audio selected by this switch is routed to the internal speaker/amplifier for local monitoring.

3.3 Selection of Receiver Operating Frequencies

Each receiver module has one or more rotary switches for setting its operating frequency. These switches are shown in Figures 3-1 thru 3-3, and are accessible by removing the receiver's front panel access plate (push-on cover). See Item 3 of Table 2-1 for push-on cover removal instructions.

3.3.1 Selection of AM Receiver Frequency

The AM Receiver controls and indicators accessible from the front panel are shown in Figure 3-1. The receiver operating frequency can be set from 540 to 1720 kHz in 10 kHz steps via three rotary switches. The AM receiver frequency should be set to one of the two FCC-assigned EAS stations.

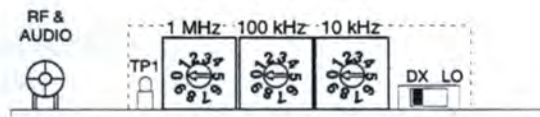


Figure 3-1. AM Receiver Controls and Indicators

3.3.2 Selection of FM Receiver Frequency

The FM Receiver controls and indicators accessible from the front panel are shown in Figure 3-2. The receiver operating frequency can be set from 88 to 108 MHz in 100 kHz steps via three rotary switches. The FM receiver frequency should be set to one of the two FCC-assigned EAS stations.

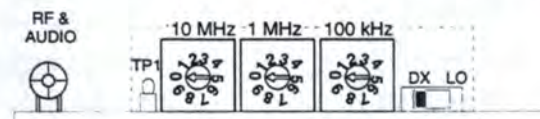


Figure 3-2. FM Receiver Controls and Indicators

3.3.3 Selection of NOAA Weather Radio Receiver Frequency

The NOAA Weather Radio Receiver controls and indicators accessible from the front panel are shown in Figure 3-3. The receiver operating frequency can be set to any of 7 discrete channels from 162.400 to 162.550 MHz via a single rotary switch as listed in Table 3-1. A listing of the frequency assignments for the NOAA Weather Radio Network can be found in Table 3-2.

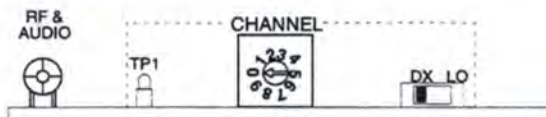


Figure 3-3. NOAA Weather Radio Receiver Controls and Indicators

Table 3-1. NOAA Channel Frequencies

Channel	Frequency (MHz)
1	162.550
2	162.400
3	162.475
4	162.425
5	162.450
6	162.500
7	162.525

There is no FCC requirement for broadcasters or cablecasters to monitor NOAA Weather stations. However, since the Weather Radio stations use the same EAS codes, it is an added protection to monitor these stations. More than 80% of all alert activities are weather related according to the FCC

3.4 Pre-Installation Checkout of the EAS 930A

It is recommended that a bench test of the EAS 930A Receiver be performed before final installation. This will verify that the unit has not been damaged in shipment.

3.4.1 AM Receiver Checks

Connect the loop antenna to the antenna input at the rear panel of the AM Receiver. Check for audio output from the speaker. Tune to a strong, local AM station if there is no audio output at the frequency selected in Paragraph 3.3.1 of this Chapter. The objective is to verify that the AM receiver is operating properly.

3.4.2 FM Receiver Checks

Perform a confidence check of the FM Receiver by repeating the procedures of Paragraph 3.4.1 on the FM receiver using either an indoor dipole antenna or an outdoor antenna described in Paragraph 4.3. The objective is to verify proper operation of the FM Receiver.

3.4.3 NOAA Weather Radio Receiver Check

Perform a confidence check of the FM Receiver by selecting the strongest NOAA Weather Station in the area. Use an indoor or outdoor antenna described in Paragraph 4.3

Table 3-2.

NOAA Weather Radio Network

Legend-Frequencies are identified as follows:

1. 162.550 MHz
2. 162.400 MHz
3. 162.475 MHz
4. 162.425 MHz
5. 162.450 MHz
6. 162.500 MHz
7. 162.525 MHz

Location	Frequency	Location	Frequency	Location	Frequency	Location	Frequency
Alabama		California	continued	Georgia	continued	Kansas	continued
Anniston	3	Monterey	2	Chatsworth	2	Dodge City	3
Birmingham	1	Point Arena	1	Columbus	2	Ellsworth	2
Demopolis	3	Redding (P)	1	Macon	3	Topeka	3
Dozier	1	Sacramento	1	Pelham	1	Wichita	1
Florence	3	San Diego	2	Savannah	2	Kentucky	
Huntsville	2	San Francisco	2	* Valdosta	6	Ashland	1
Louisville	3	San Luis Obispo	1	Waycross	3	Bowling Green	2
Mobile	1	Santa Barbara	2	Waynesboro	4	Covington	1
Montgomery	2	Colorado		Hawaii		Elizabethtown ®	2
Tuscaloosa	2	Alamosa (P)	3	Hilo	1	Hazard	3
Alaska		Colorado Springs	3	Honolulu	1	Lexington	2
Anchorage	1	Denver	1	Kokee	2	Louisville	3
Cordova	1	Fort Collins	5	Mt. Haleakala	2	Mayfield	3
Fairbanks	1	Grand Junction	1	Waimanalo (P)	2	Pikeville ®	2
Homer	2	Greeley	2	Idaho		Somerset	1
Juneau	1	Longmont	1	Boise	1	Louisiana	
Ketchikan	1	Pueblo	2	Lewiston (P)	1	Alexandria	3
Kodiak	1	Sterling	2	Pocatello	1	Baton Rouge	2
Nome	1	Connecticut		Twin Falls	2	Buras	3
Haines	1	Hartford	3	Illinois		Lafayette	1
Seward	1	Meriden	2	Champaign	1	Lake Charles	2
Sitka	1	New London	1	Chicago	1	Monroe	1
Valdez	1	Delaware		Marion	4	Morgan City	3
Wrangell	2	Lewes	1	Moline	1	New Orleans	1
Yakutat	2	District of Columbia		Peoria	3	Shreveport	2
Arizona		Washington, D.C.	1	Rockford	3	Maine	
Flagstaff	2	Florida		Springfield	2	* Caribou	7
Lake Powell	1	Bell Glade	2	Indiana		* Dresden	3
Phoenix	1	Daytona Beach	2	* Bloomington	5	Ellsworth	2
Tucson	2	Fort Myers	3	Evansville	1	Portland	1
Yuma	1	Fort Myers	3	Fort Wayne	1	Maryland	
Arkansas		Gainesville	3	Indianapolis	1	Baltimore	2
Fayetteville	3	Jacksonville	1	Lafayette	3	Hagerstown	3
Fort Smith	2	Key West	2	* Marion	5	Salisbury	3
Gurdon	3	Melbourne	1	South Bend	2	Massachusetts	
Jonesboro	1	Miami	1	Terre Haute	2	Boston	3
Little Rock	1	Orlando	3	Iowa		Hyannis	1
Mountain View	2	Panama City	1	Cedar Rapids	3	Worcester	1
Star-City	2	Pensacola	2	Des Moines	1	Michigan	
Texarkana	1	Tallahassee	2	Dubuque (P)	2	Alpena	1
California		Tampa	1	Sioux City	3	Detroit	1
Bakersfield (P)	1	West Palm Beach	3	Waterloo	1	Flint	2
Coachella (P)	2	Georgia		Kansas		Grand Rapids	1
Eureka	2	Athens	2	Chanute	2	Houghton	2
Fresno	2	Atlanta	1	Colby	3	Marquette	1
Los Angeles	1	Augusta	1	Concordia	1		
Lindsay	6	* Baxley	7				

Location	Frequency	Location	Frequency	Location	Frequency	Location	Frequency
Michigan	continued	New Mexico		Pennsylvania	continued	U.S. Virgin Islands	
* Onondaga	2	Albuquerque	2	Erie	2	* St. Thomas	3
Sault Sainte Marie	1	Clovis	3	Harrisburg	1	Utah	
Traverse City	2	Des Moines	1	Johnstown	2	Logan	2
Minnesota		Farmington	3	Philadelphia	3	Cedar City	2
Detroit Lakes	3	Hobbs	2	Pittsburgh	1	Vernal	2
Duluth	1	Las Cruces	2	State College	3	Salt Lake City	1
International Falls	1	Ruidoso	1	* Towanda	3	Vermont	
Mankato	2	Santa Fe	1	* Wellsboro	1	Burlington	2
Minneapolis	1	New York		Wilkes-Barre	1	* Marlboro	4
Rochester	3	Albany	1	Williamsport	2	Windsor	3
Saint Cloud (P)	3	Binghamton	3	Puerto Rico		Virginia	
Thief River Falls	1	Buffalo	1	Maricao	1	Heathsville	2
Willmar (P)	2	Elmira	2	San Juan	2	* Kynchburg	1
Mississippi		Kingston	3	Rhode Island		Norfolk	1
Ackerman	3	New York City	1	Providence	2	Richmond	3
Booneville	1	* Riverhead	3	South Carolina		Roanoke	2
Bude	1	Rochester	2	Beaufort	3	Washington	
* Columbia	2	Syracuse	1	Charleston	1	Neah Bay	1
Gulfport	2	North Carolina		Columbia	2	Olympia	3
Hattiesburg	3	Asheville	2	Cross	3	Seattle	1
Inverness	1	Cape Hatteras	3	Florence	1	Spokane	2
Jackson	2	Charlotte	3	Greenville	1	Wenatchee	3
Meridian	1	Fayetteville	3	Myrtle Beach	2	Yakima	1
Oxford	2	New Bern	2	Sumter (R)	3	West Virginia	
Missouri		Raleigh/Durham	1	South Dakota		Beckley	6
Columbia	2	Rocky Mount	3	Aberdeen	3	Charleston	2
Camdenton	1	Wilmington	1	Huron	1	Clarksburg	1
Hannibal	3	Winston-Salem	2	Pierre	2	Gilbert	7
Hermitage	5	North Dakota		Rapid city	1	Hinton	4
Joplin/Carthage	1	Bismarck	2	Sioux Falls	2	Moorefield	7
Kansas City	1	Dickinson	2	Tennessee		Spencer	6
St. Joseph	2	Fargo	2	Bristol	1	Sutton	5
St. Louis	1	Jamestown	2	Chattanooga	1	Wisconsin	
Sikeston	2	Minot	2	Cookeville	2	La Crosse (P)	1
Springfield	2	Petersburg	2	Jackson	1	Green Bay	1
Montana		Williston	2	Knoxville	3	Madison	1
Billings	1	Ohio		Memphis	3	Menomonie	2
Butte	1	Akron	2	Nashville	1	Milwaukee	2
Glasgow	1	Cambridge	3	Shelbyville	3	* Park Falls	6
Great Falls	1	Cleveland	1	Waverly	2	Wausau	3
Havre (P)	2	Columbus	1	Texas		Wyoming	
Helena	2	Dayton	3	Abilene	2	Casper	1
Kalispell	1	Lima	2	Amarillo	1	Cheyenne	3
Miles City	2	Sandusky	2	Austin	2	Lander	3
Missoula	2	Toledo	1	Beaumont	3	Sheridan (P)	3
Nebraska		Oklahoma		Big Spring	3	Notes:	
Bassett	3	Clinton	3	Brownsville	1	1. Stations marked with an asterisk (*) are funded private interest groups.	
Grand Island	2	Enid	3	Bryan	1	2. Stations marked @ are low powered experimental repeater stations serving a very limited local area.	
Holdrege	3	Lawton	1	Corpus Christi	1	3. Stations marked (P) operate less than 24 hours/day however, hours are extended when possible during severe weather.	
Lincoln	3	McAlester	3	Dallas	2	4. Occasionally the frequency of an existing or planned station must be changed because of unexpected radio frequency interference with adjacent NOAA Weather Radio stations and/or with other government or commercial operators within the area.	
Merriman	2	Oklahoma City	2	Del Rio (P)	2		
Norfolk	1	Tulsa	1	El Paso	3		
North Platte	1	Oregon		Forth Worth	1		
Omaha	2	Astoria	2	Galveston	1		
Scottsbluff	1	Brookings	1	Houston	2		
Nevada		Coos Bay	2	Laredo	3		
Elko	1	Eugene	2	Lubbock	2		
Ely	2	Klamath Falls	1	Lufkin	1		
Las Vegas	1	Medford	2	Midland	2		
Reno	1	Newport	1	Paris	1		
Winnemucca	2	Pendleton	2	Pharr	2		
New Hampshire		Portland	1	San Angelo	1		
Concord	2	Roseburg	1	San Antonio	1		
New Nersey		Salem	3	Sherman	3		
Atlantic City	2	Pennsylvania		Tyler	3		
		Allentown	2	Victoria	2		
		Clearfield	1	Waco	3		
				Wichita Falls	3		

Chapter 4 - Installation and Operation

4.1 Introduction

This chapter describes EAS 930A Multi-Module Receiver system installation procedures to be performed after the unit passes the pre-installation checkout described in Chapter 3.

4.2 Model EAS 930A System Installation

The EAS 930A Receiver requires connections to antennas as shown in Figure 4-1. The 930A also requires connection to prime power. The receiver audio outputs are typically connected to the TFT Model 911 Emergency Alert System Decoder's audio inputs.

If the receivers are to be used in a hot standby configuration, the AUTO SWITCH strap on the receiver must be placed in the ON position. Remove the top cover of the EAS 930A to gain access to this strap on the module. On the rear panel of the EAS 930A, connect the AUDIO BACKUP OUTPUT of the backup receiver to the AUDIO BACKUP INPUT of the primary receiver. If the primary receiver loses RF or modulation, the backup receiver will be switched to the output of the primary receiver. The ALARM RELAY output provides a set of closed contacts if the receiver loses RF or audio, and can be used for alarm monitoring purposes.

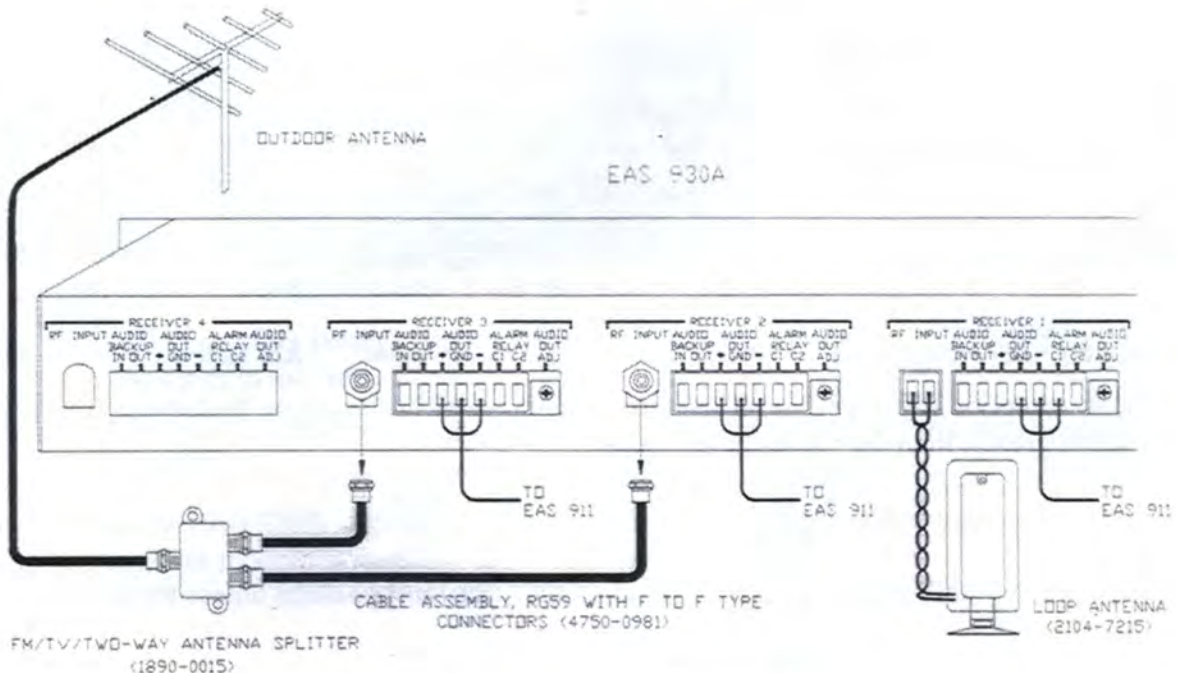


Figure 4-1. EAS 930A RF Input Connections

4.3 FM and NOAA Weather Radio Antenna Installation

The FM and NOAA Receivers can typically share an outdoor VHF antenna. The antenna output is applied to an FM/TV 2-way signal splitter which is supplied with the EAS 930A. The type of VHF antenna can be a Radio Shack VHF/FM Stereo antenna, Part No. 15-2158 or Part No. 15-2164 for shorter receiving distances.

The splitter outputs are fed to the EAS 930A FM and NOAA Receiver inputs. If an additional FM or NOAA Receiver module is installed in the Receiver, a second signal splitter may be inserted in one leg of the first splitter output to provide three RF connections to the Receiver.

4.4 AM Antenna Installation

In high or moderate signal strength areas, the AM Receiver may operate satisfactorily using the indoor loop antenna supplied with the EAS 930A. In weaker signal strength areas, an outdoor antenna may be required. An end-fed long-wire antenna (approximately 250 ft.) can be used with good results. One end of the long wire should be connected at the rear panel AM Receiver module's RF INPUT.

4.5 Received Signal Strength Indication (RSSI)

Test Point TP1 located next to the frequency selection switches on each receiver module is the RSSI voltage of the receiver. The characteristics of the RSSI vs. the RF signal level at the input of the receiver is shown in Figures 4-2, 4-3, and 4-4 for the FM, NOAA Weather, and AM Receiver, respectively.

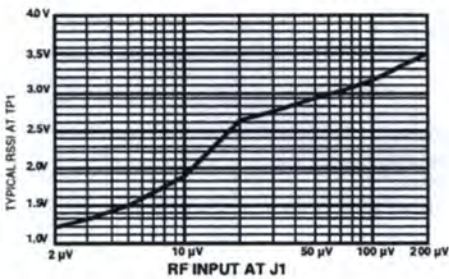


Figure 4-2

FM Receiver RSSI vs. RF Input

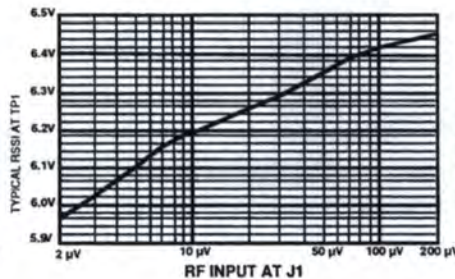


Figure 4-3

NOAA Receiver RSSI vs. RF Input

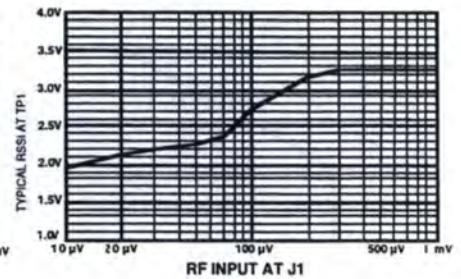


Figure 4-4

AM Receiver RSSI vs. RF Input

For reliable reception, the signal level from the antenna feed line must be high enough to provide an RSSI voltage greater than the values given below.

FM Receiver	> 1.9 VDC
NOAA Receiver	> 6.1 VDC
AM Receiver	> 2.1 VDC

The LOCAL/DISTANT switch should be set to the DX (Distant) position unless the RSSI exceeds the values given below:

FM Receiver	> 3.8 VDC
NOAA Receiver	> 6.4 VDC
AM Receiver	> 3.2 VDC

4.6 How to Install a New Receiver Module

The AM, FM, and NOAA Weather receiver modules are available as kits for field installation. Use the part numbers listed in Table 4-1 when ordering the kits for field installation:

Table 4-1. Receiver Kit Part Numbers

Receiver	TFT Part No.
AM Receiver Kit	7100-4283
FM Receiver Kit	7100-4284
NOAA Receiver Kit	7100-4285

4.6.1 AM Receiver Kit Installation Procedure

- a. Unplug the power cord from the EAS 930A.
- b. Remove the EAS 930A top cover, the cover plate in the rear panel, and the push-cover in the front panel.
- c. Install the AM Receiver module onto standoffs using four #4-40 screws according to the Receiver Kit Installation Diagram (Figure 4-5). Make sure that the RF & AUDIO LED aligns with the corresponding RF & AUDIO hole in the front panel.
- d. Set the jumper to JW4
- e. To connect the AM receiver module to the adjacent PC board, gently insert the 12-pin ribbon cable to J4 on the AM receiver module and J5 on the adjacent PC board.
- f. Apply the label sticker to the appropriate location on the front panel.
- g. Connect the AM loop antenna to the RF INPUT terminals of the AM receiver module in the rear panel according to the EAS 930A RF Input Connections Diagram (Figure 4-1).
- h. On the AM receiver module, set the three rotary switches to the desired frequency. Install the push-on cover in the front panel
- i. If the hot standby feature is going to be used as described in 4.2 for this receiver, set the AUTO SWITCH strap to the ON position.
- j. Install the EAS 930A top cover and power cord. The EAS 930A with the newly installed AM receiver module is ready for use.

4.6.2 FM Receiver Kit Installation Procedure

- a. Unplug the power cord from the EAS 930A.
- b. Remove the EAS 930A top cover, the cover plate in the rear panel, and the push cover in the front panel.
- c. Install the FM Receiver module onto standoffs using four #4-40 screws according to the Receiver Kit Installation Diagram (Figure 4-5). Make sure that the RF & AUDIO LED aligns with the corresponding RF & AUDIO hole in the front panel.
- d. Set the jumper to JW4
- e. To connect the FM receiver module to the adjacent PC board, gently insert the 12-pin ribbon cable to J4 on the AM receiver module and J5 on the adjacent PC board.
- f. Apply the label sticker to the appropriate location on the front panel.
- g. Connect the an FM antenna to the RF INPUT terminals of the AM receiver module in the rear panel according to the EAS 930A RF Input Connections Diagram (Figure 4-1).
- h. On the AM receiver module, set the three rotary switches to the desired frequency. Install the push-on cover in the front panel
- i. If the hot standby feature is going to be used as described in 4.2 for this receiver, set the AUTO SWITCH strap to the ON position.
- j. Install the EAS 930A top cover and power cord. The EAS 930A with the newly installed FM receiver module is ready for use.

4.6.3 Weather Radio Receiver Kit Installation Procedure

- a. Unplug the power cord from the EAS 930A.
- b. Remove the EAS 930A top cover, the cover plate in the rear panel, and the push cover in the front panel.
- c. Install the Weather Receiver module onto standoffs using four #4-40 screws according to the Receiver Kit Installation Diagram (Figure 4-5). Make sure that the RF & AUDIO LED aligns with the corresponding RF & AUDIO hole in the front panel.
- d. Set the jumper to JW4
- e. To connect the Weather receiver module to the adjacent PC board, gently insert the 12-pin ribbon cable to J4 on the AM receiver module and J5 on the adjacent PC board.
- f. Apply the label sticker to the appropriate location on the front panel.
- g. Connect the an outdoor antenna to the RF INPUT terminals of the Weather receiver module in the rear panel according to the EAS 930A RF Input Connections Diagram (Figure 4-1).
- h. On the Weather receiver module, set the rotary switch to the desired weather radio channel. Install the push-on cover in the front panel
- i. If the hot standby feature is going to be used as described in 4.2 for this receiver, set the AUTO SWITCH strap to the ON position.

- j. Install the EAS 930A top cover and power cord. The EAS 930A with the newly installed Weather Radio receiver module is ready for use.

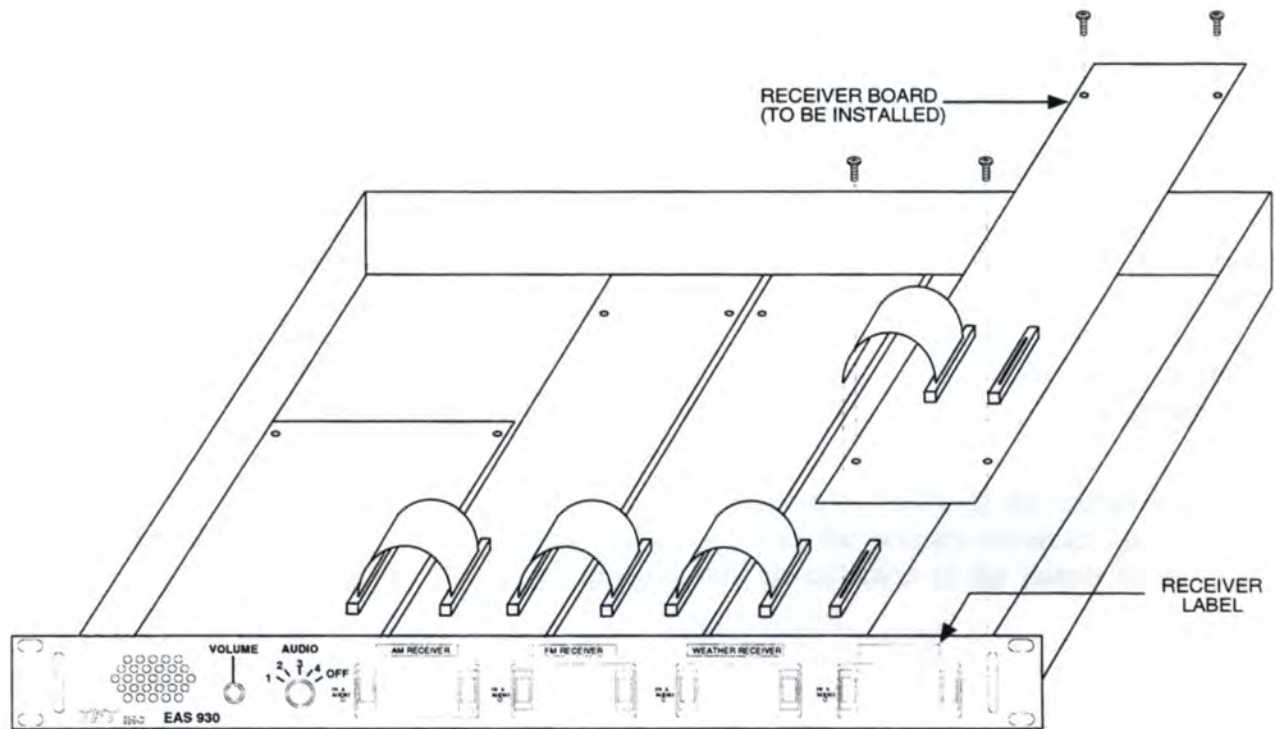


Figure 4-5. Receiver Kit Installation Diagram

Chapter 5 - Theory of Operation

5.1 Introduction

This section describes the principles of operation of the EAS 930A Multi-Module Receiver. It is intended to enable a technical person with an RF background to understand the design of the EAS 930A at the block diagram level.

5.2 System Block Diagram Description

Figure 5-1 is a basic block diagram of the EAS 930A. The unit can accommodate four receiver modules which typically cover the AM, FM and NOAA Weather Radio bands. Each Receiver module has a balanced audio output for routing to the TFT EAS 911 via a rear panel connector. A separate audio output from each Receiver is routed to a front panel rotary switch to select the audio output from one receiver to be amplified and fed to the front panel speaker for monitoring. The power supply board furnishes DC power for receiver board operation.

The receivers can be connected in a hot standby configuration by connecting the unbalanced AUDIO OUT of the backup receiver to the unbalanced AUDIO IN of the primary receiver. If the primary receiver loses RF or modulation, the backup receiver will be switched to the output of the primary receiver.

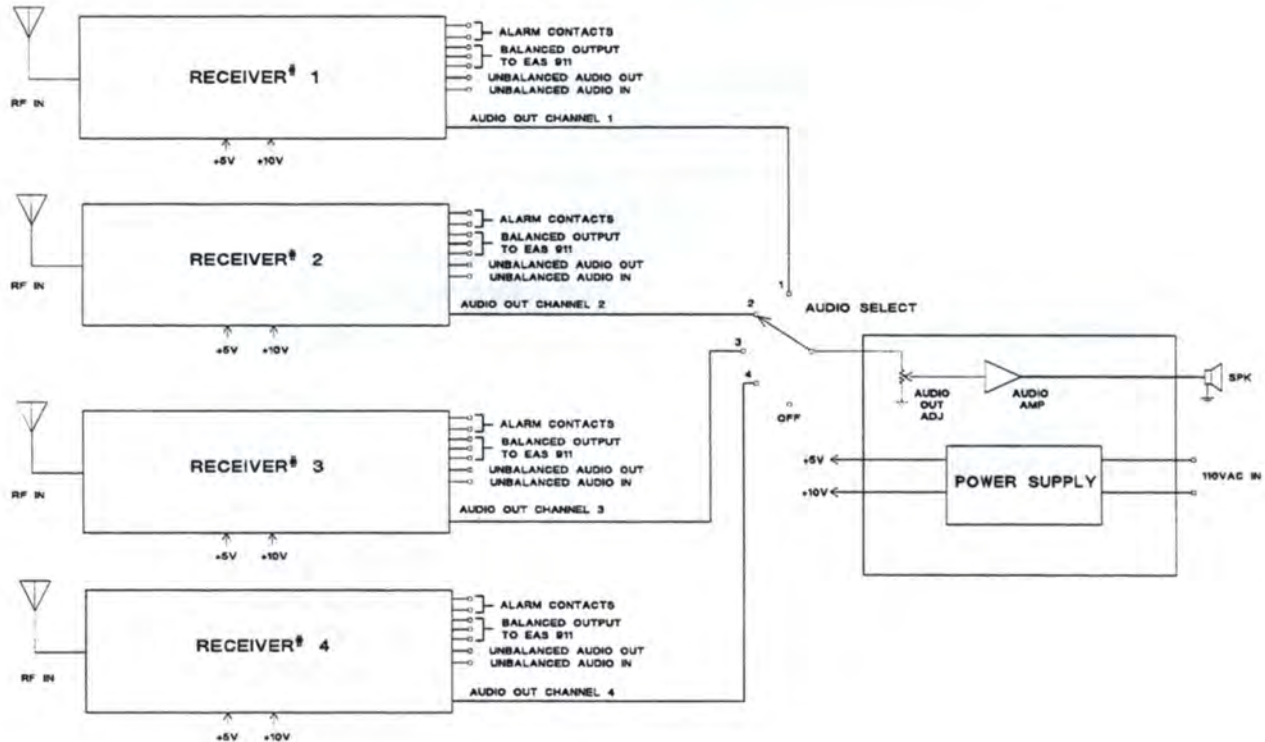


Figure 5-1. EAS 930A Multi-Module Receiver - Basic Block Diagram

5.3 AM Receiver Module Block Diagram Description

The AM Receiver module is tunable from 540 to 1720 kHz in 10 kHz steps. Audio output for external use is balanced 600Ω at up to +3 dBm. Tuning is via three rotary DIP switches which are accessible by removing the associated front panel cover plate. An LED lights to show RF signal presence and audio output.

Figure 5-2 is a block diagram of the AM Receiver module. (See Figure A-3 in Appendix A for the schematic diagram.) The following is a summary of the operating principles of this module.

- a. The AM Receiver module receives 540 to 1720 kHz AM program signals at its rear panel RF INPUT connector. The RF signal is routed to U1, the front end block consisting of a mixer, a voltage-controlled oscillator (VCO), a 450 kHz IF filter, and an AM Detector.
- b. The detected audio signal is routed to relay K1, along with the AUDIO IN from the backup receiver module. If the module loses RF or modulation, and the AUTO SWITCH strap (not shown) is in the ON position, the backup audio will be amplified by U2 for output. If the AUTO SWITCH strap is in the OFF position, the primary receiver audio will be routed to U2 for output.
- c. The selected audio signal is amplified by U2 and sent to the BALANCED AUDIO OUTPUT terminal block connector on the rear panel. The audio output level of U2 can be adjusted by using potentiometer R10 which is accessible from the rear panel.
- d. Frequency selection in 10 kHz steps is performed by a 3-digit BCD rotary DIP switch together with microprocessor U6 and a PLL frequency synthesizer consisting of U4, U5, Q1 and other components.
- e. The output at pin 5 of U1 is a DC voltage analog of the RSSI (RF level) of the input signal. This output can be measured at TP1 using a DC voltmeter.
- f. A DC sample of the RF signal level is routed to one input of comparator U3A; the other input is supplied from reference voltage VREF2. A sample of the audio output level is routed to one input of comparator U3B; the other input is supplied from reference voltage VREF1. When the RF signal level exceeds the reference voltage and the audio signal level exceeds the minimum requirements, the LED lights.

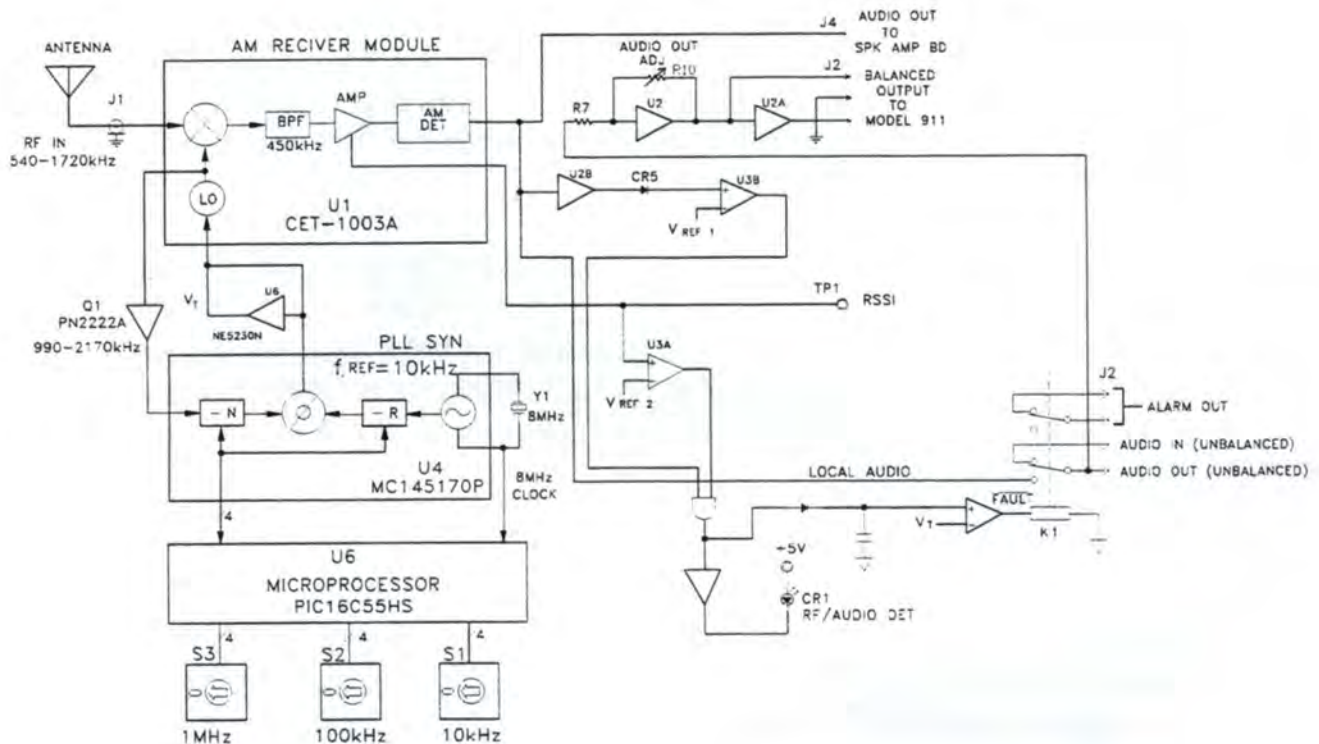


Figure 5-2. AM Receiver Module - Block Diagram

5.4 FM Receiver Module Block Diagram Description

The FM Receiver module is tunable from 88 to 108 MHz in 100 kHz steps. Audio output for external use is balanced 600Ω at up to +3 dBm. Tuning is via three rotary switches which are accessible by removing the associated front panel cover plate. An LED lights to show adequate RF signal level and the presence of audio modulation.

Figure 5-3 is a block diagram of the FM Receiver module. (See Figure A-5 in Appendix A for the schematic diagram.) The following is a summary of the operating principles of this module.

- The FM Receiver module receives 88 to 108 MHz FM program signals at its rear panel RF INPUT connector. The RF signal is routed to front end block U1 consisting of a mixer, a voltage-controlled oscillator (VCO), a 10.7 MHz IF filter, and an FM Detector and other components.
- The detected audio signal is routed to relay K1, along with the AUDIO IN from the backup receiver module. If the module loses RF or modulation, and the AUTO SWITCH strap (not shown) is in the ON position, the backup audio will be amplified by U3 for output. If the AUTO SWITCH strap is in the OFF position, the receiver audio will be routed to U3 for output.
- The selected audio signal from U1 is amplified by U3 and sent to a BALANCED AUDIO OUTPUT terminal block connector on the rear panel. The audio output level from the Receiver board is adjustable via potentiometer R4 which is accessible from the rear panel.

- d. Frequency selection is performed by a 3-digit rotary DIP switch along with microprocessor U7 and a PLL synthesizer consisting of U5, U6, Q1, Q2, and other components.
- e. The output at pin 10 of U1 is a DC voltage analog of the RSSI (RF level) of the input signal. This output can be measured by using a DC voltmeter at TP1 which is accessible by removing the associated front panel cover plate.

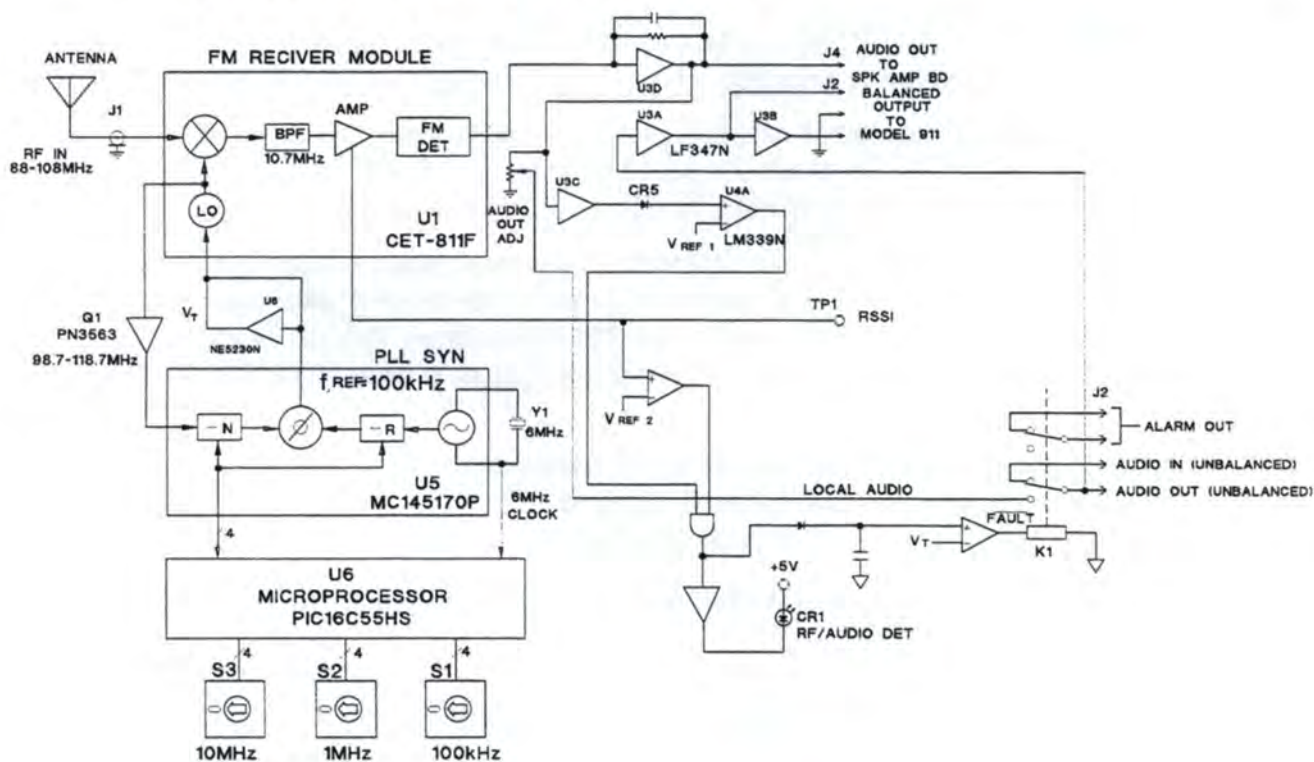


Figure 5-3. FM Receiver Module - Block Diagram

5.5 NOAA Weather Receiver Module Block Diagram Description

The NOAA Weather Receiver module is tunable narrow-band FM Receiver that covers all seven weather channels. Audio output for external use is balanced 600Ω at up to +3 dBm. Tuning is via a 7-position rotary switch which is accessible by removing the associated front panel cover plate. An LED lights to show adequate RF signal level and the presence of audio modulation.

Figure 5-4 is a block diagram of the NOAA Weather Receiver board. (See Figure A-7 for the schematic.) The following is a summary of the operating principles of this module.

- a. The NOAA Weather Receiver module receives 161.4 to 162.55 MHz narrow-band FM signals at its rear panel RF INPUT connector. The RF signal is bandpass filtered, then amplified by Q1.

- b. The RF signal from Q1 is fed to dual conversion receiver module U1 which consists of a 1st mixer, 1st local oscillator, a 2nd mixer, a 2nd local oscillator, limiting IF amplifier and an FM detector.
- c. A 10.7 MHz 1st IF frequency is generated by down converting the incoming RF frequency with the 1st LO frequency. The 10.7 MHz signal is filtered at FL1 and returned to U1 for a second down conversion to 450 kHz.
- d. The 450 kHz IF signal is amplified by a built-in IF limiting amplifier and sent to an FM detector.
- e. The detected audio signal is routed to relay K1, along with the AUDIO IN from the backup receiver module. If the module loses RF or modulation, and the AUTO SWITCH strap (not shown) is in the ON position, the backup audio will be amplified by U6 for output. If the AUTO SWITCH strap is in the OFF position, the receiver audio will be routed to U6 for output. The audio output from the FM detector can be adjusted via potentiometer R30 which is accessible from the rear panel.
- f. Frequency selection is via a single-digit BCD rotary DIP switch along with microprocessor U4 and a PLL frequency synthesizer consisting of U2, U3, Q3 and other components.
- g. The output at pin 10 of U1 is a DC voltage analog of the RSSI (RF level) of the input signal. This output is buffered by U7A, and can be measured with a DC voltmeter at TP1 which is accessible by removing the associated front panel cover plate.

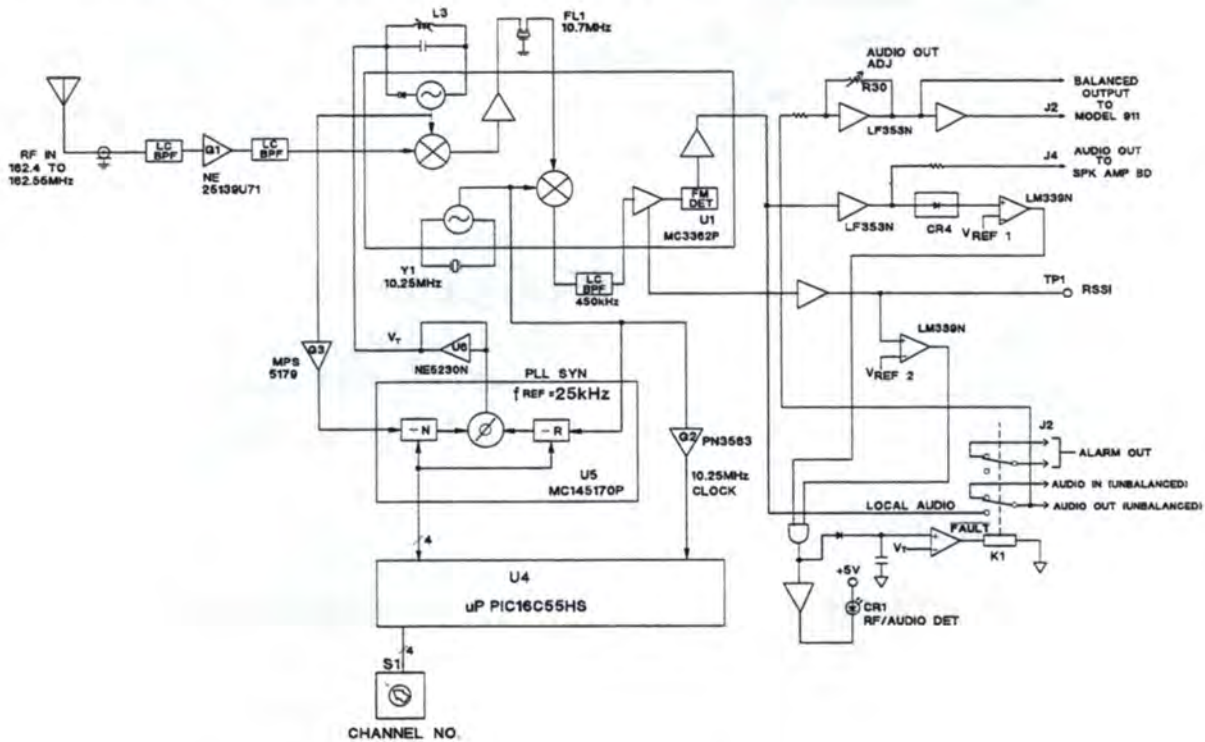


Figure 5-4. NOAA Weather Receiver Module - Block Diagram

5.6 Speaker Amp & Power Supply Board Circuit Description

The Speaker Amplifier & Power Supply board supplies 5- and 10-volt DC power for operation of the Receiver boards. It also contains an audio amplifier to drive the speaker built into the unit. A front panel switch allows the audio output of a receiver to be selected for routing to the audio amplifier and speaker for monitoring.

Figure 5-5 is a simplified schematic diagram of the Speaker Amplifier & Power Supply board. The following is a summary of the operating principles of this board.

- a. The audio output from each receiver is routed to front panel rotary switch S1 for selection. The selected audio is amplified by audio amplifier U4. The amplified audio signal is fed to a front panel speaker for monitoring. The audio output level is adjustable via potentiometer R3 which is accessible from the front panel.
- b. The 115V AC prime power input at J1 is routed to the primary of T1. From the secondary of transformer T1. The output at the secondary of T1 is applied to bridge rectifier U1 which produces an unregulated DC output voltage of at least 11 VDC which is routed to regulators U2 and U3.

The Regulated 10V DC and 5V DC regulator output is routed to J2, pin 2 and pin 4 respectively. Both DC voltages are distributed to all receivers via ribbon cables.

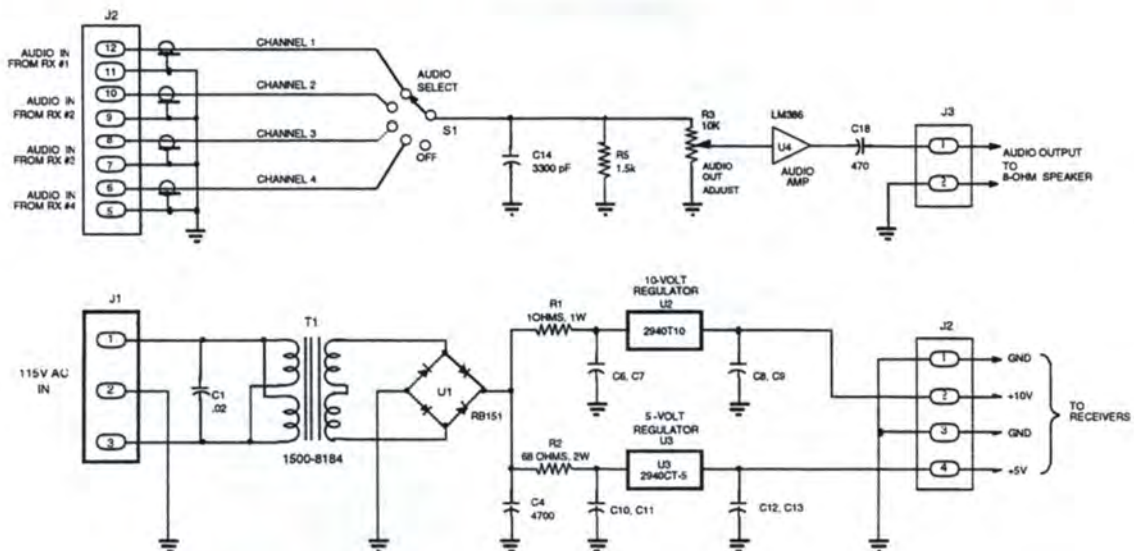


Figure 5-5. Speaker Amp & Power Supply Board - Simplified Schematic Diagram

Chapter 6 - Maintenance

6.1 General Information

The Model EAS 930A Multi-Module Receiver as shipped from the factory is ready for immediate use. No calibration is required; however, periodic performance checks should be made. This section discusses those checks and the adjustments that may be required to maintain optimum system performance.

Performance checks and adjustments described in this section require specific test equipment. The following is a suggested list of test equipment.

Test Equipment Required:

1. Digital multimeter, accurate to within $\pm 1\%$
2. Distortion analyzer
3. Frequency counter, up to 1 GHz
4. Oscilloscope with 100 MHz or better bandwidth
5. RF signal generator, 50Ω impedance with 88-108 MHz FM, 162 - 165 MHz FM, and 500-1700 kHz AM output

6.2 AM Receiver Performance Checks

The Model 930A AM receiver's sensitivity and AGC range should be checked periodically. The following paragraphs discuss the procedures for making these checks using the equipment listed in Paragraph 5.1 above.

6.2.1 AM Receiver Sensitivity Check

To check the AM Receiver sensitivity, proceed as follows:

- a. Connect an RF signal generator to the AM receiver's RF IN connector (part of Figure 3.3-5, Item 3) on the EAS 930A rear panel.
- b. Set the signal generator output frequency to 540 kHz, AM modulation to 30%. Set the generator output level to 20 μ V.
- c. Set the 3-digit BCD rotary DIP switch (Figure 3.3-3) to 0.540 MHz, and the LOCAL/DISTANT switch to DISTANT.
- d. If the receiver is configured for hot standby, remove the top cover and place the AUTO SWITCH in the OFF position. Return it to the ON position after completing this test.
- e. Connect an oscilloscope and distortion analyzer in parallel to the AM Receiver's BALANCED AUDIO OUTPUT terminal block connector at the rear panel.
- f. Turn on the modulation. Observe the oscilloscope. The audio waveform should still be present on the scope.

- g. Note the reading on the meter, then set the distortion analyzer to 0 dB, and turn off the modulation. Read the meter. The difference in the readings with modulation on and with it off should be greater than 20 dB.
- h. Set the signal generator output to 540 kHz and AM modulation to 50% at a modulation frequency of 1 kHz. Set the output level to 10 μ V.
- i. Connect a multimeter to RSSI (Received Signal Strength Indication) on the AM Receiver Module (part of Figure 3.3-3).
- j. Slowly increase the RF level of the signal generator to approximately 30 mV. The voltage on the multimeter at the RSSI should indicate a change from 3 V to 6 VDC.

6.2.2 AM Receiver AGC Range Check

To check the AM receiver AGC range, proceed as follows:

- a. Ensure the signal generator is connected to the RF INPUT connector of the AM Receiver Module at the 930A rear panel, and its output frequency is set to 540 kHz with AM modulation to 66% at a 1 kHz modulating frequency. Set the output level to 20 μ V.
- b. Connect an oscilloscope to the BALANCED AUDIO OUTPUT terminal block connector at the rear panel.
- c. Set the DISTANT/LOCAL switch to the LOCAL position, then increase the signal generator level to 30 mV. The 1 kHz sine wave on the oscilloscope should remain undistorted.
- d. Repeat steps a and b above for 1000 kHz and 1600 kHz input signals.

6.2.3 AM Receiver Audio Output Adjust

To adjust the AM Receiver audio output, proceed as follows:

- a. Connect a 600 Ω load and the balanced input terminals of a distortion analyzer to the AM receiver module BALANCED AUDIO OUTPUT terminals block connector at the rear panel.
- b. Connect a signal generator with an 540 kHz carrier, modulated 90% at 1 kHz, to the RF INPUT connector at the rear panel. Set the signal level to 100 μ V.
- c. While observing the meter on the distortion analyzer, adjust the AUDIO OUT ADJUST at the rear panel for 0 dBm.

6.3 FM Receiver Performance Checks

The FM receiver's sensitivity and AGC range should be checked periodically. The following paragraphs discuss the procedures for making these checks using the equipment listed in Paragraph 6.1.

6.3.1 FM Receiver Sensitivity Check

To check the FM receiver sensitivity, proceed as follows:

- a. Connect a signal generator to the FM Receiver Module RF INPUT connector at the rear panel.
- b. Set the signal generator output frequency to 100 MHz, and the frequency deviation for ± 25 kHz at a 1 kHz modulating frequency. Set the output level to 2 μ V.

- c. Set the 3-digit BCD rotary DIP switch (Figure 3.3.2) to 10-0-0 (100 MHz). Set the DISTANT/LOCAL switch to DISTANT.
- d. If the receiver is configured for hot standby, remove the top cover and place the AUTO SWITCH in the OFF position. Return it to the ON position after completing this test.
- e. Connect an oscilloscope and distortion analyzer in parallel to the FM Receiver's BALANCED AUDIO OUTPUT terminal block connector on the rear panel.
- f. Note the reading on the meter, then set the distortion analyzer to 0 dB, and turn off the modulation. Read the meter. The difference in the readings with modulation on and with it off should be greater than 20 dB.
- g. Turn on the modulation. Observe the oscilloscope. The waveform should still be present on the scope.
- h. Set the signal generator output level to 1 μ V.
- i. Connect a multimeter to TP1 (RSSI) on the front panel.
- j. Slowly increase the RF level of the signal generator to approximately 100 μ V. The voltage on the multimeter at RSSI should indicate a change from 1 to 3 VDC.

6.3.2 FM Receiver AGC Range Check

To check the Receiver AGC range, proceed as follows:

- a. Ensure that a signal generator is connected to the RF INPUT connector on the FM Receiver board rear panel.
- b. Using the 3-digit BCD rotary DIP switch on the front panel, set the FM Receiver to 100 MHz.
- c. Set the signal generator output frequency to 100 MHz, and the frequency deviation to ± 75 kHz at a 1 kHz modulating frequency. Set the output level to 20 μ V.
- d. Connect an oscilloscope to the FM Receiver's BALANCED AUDIO OUTPUT terminal block connector on the rear panel.
- e. Set the DISTANT/LOCAL switch to the LOCAL position, then increase the signal generator level to 10 mV. The 1 kHz sine wave on the oscilloscope should remain undistorted.

6.3.3 FM Receiver Audio Output Adjustment

To adjust the FM Receiver audio output, proceed as follows:

- a. Connect a 600 Ω load and the balanced output of a distortion analyzer to the BALANCED AUDIO OUTPUT terminal block connector on the rear panel.
- b. Connect a signal generator with an 88 MHz carrier, modulated at 1 kHz with ± 75 kHz deviation, to the RF INPUT connector on the rear panel. Set the signal level to 100 μ V.
- c. While observing the meter on the distortion analyzer, adjust R4 on the rear panel for 0 dBm.

6.4 NOAA Weather Radio Receiver Performance Checks

The NOAA Weather Radio Receiver's sensitivity and AGC range should be checked periodically. The following paragraphs discuss the procedures for making these checks using the equipment listed in Paragraph 5.1.

6.4.1 NOAA Weather Radio Receiver Sensitivity Check

To check the NOAA Radio Receiver sensitivity, proceed as follows:

- a. Connect a signal generator to the receiver's RF INPUT connector on the rear panel.
- b. Set the signal generator output to 162.5 MHz, and the frequency deviation for ± 5 kHz at a 1 kHz modulation frequency. Set the output level to 2 μ V.
- c. Set the 1-digit rotary switch (Figure 3-3) to channel 6 (162.5 MHz). Set the LOCAL/DISTANT switch to Distant (DX).
- d. If the receiver is configured for hot standby, remove the top cover and place the AUTO SWITCH in the OFF position. Return it to the ON position after completing this test.
- e. Connect an oscilloscope and distortion analyzer in parallel to the NOAA Radio Receiver's BALANCED AUDIO OUTPUT terminal block connector at the rear panel.
- f. Note the reading on the meter, then set the distortion analyzer to 0 dB, and turn off the modulation. Read the meter. The difference in the readings with modulation on and with it off should be greater than 20 dB.
- g. Turn on the modulation. Observe the oscilloscope. The waveform should still be present on the scope.
- h. Set the signal generator output level to 1 μ V.
- i. Connect a multimeter to TP1 (RSSI) on the front panel.
- j. Slowly increase the RF level of the signal generator to approximately 100 μ V. The voltage on the multimeter at TP1 should indicate a change from 6.0 to 6.5 VDC.

6.4.2 NOAA Weather Radio Receiver AGC Range Check

To check the NOAA Weather Radio Receiver AGC range, proceed as follows:

- a. Ensure that a signal generator is connected to the RF INPUT connector on the receiver module at the rear panel.
- b. Using the 1-digit rotary switch at the front panel, set the receiver to the channel 6 (162.5 MHz).
- c. Set the signal generator output frequency to 162.5 MHz and the frequency deviation for ± 5 kHz at a 1 kHz modulation frequency. Set the output level to 10 μ V.
- d. Connect an oscilloscope to the BALANCED AUDIO OUTPUT terminal block connector at the rear panel.
- e. Set the LOCAL/DISTANT switch to the LOCAL position, then increase the signal generator level to 1 mV. The 1 kHz sine wave displayed on the oscilloscope should remain undistorted.

6.4.3 NOAA Weather Radio Receiver Audio Output Adjustment

To adjust the NOAA Weather Radio Receiver audio output, proceed as follows:

- a. Connect a 600Ω load and the balanced input terminals of a distortion analyzer to the BALANCED AUDIO OUTPUT terminal block connector on the rear panel.
- b. Connect a signal generator with an 162.5 MHz carrier, modulated with 1 kHz at ±5 kHz deviation, to the RF INPUT connector on the rear panel. Set the signal level to 10 μV.
- c. While observing the meter on the distortion analyzer, adjust R30 on the rear panel for 0 dBm.

6.5 Troubleshooting Guide

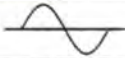
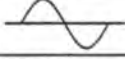
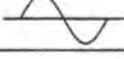
The intent of this troubleshooting guide is to provide voltage levels and/or waveforms to enable a person with RF experience and proper test equipment to perform repair work by isolating the defective section(s) in the Receiver.

6.5.1 AM Receiver Module

Setup Conditions:

1. Channel Select switches at 100
2. RF Frequency = 1000 kHz, Mod = 66%, Tone = 1 kHz, Level = 100 μV
3. DX/LOCAL switch to DX position

Table 6-1. AM Receiver Test Point Data

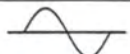
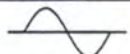
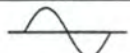
TEST POINT	DESCRIPTION	LEVEL	WAVEFORM
TP1	RSSI	4.4 V	DC
TP2	PLL Phase Voltage	4.0 V	DC
TP3	Demodulated Audio	0.7 Vp-p	
TP4	LO Output to PLL	0.8 Vp-p	
TP5	8 MHz clock to μprocessor	2.5 Vp-p	

6.5.2 FM Receiver Module

Setup Conditions:

1. Channel Select switches at 000 (1000)
2. RF Frequency = 100 MHz, Mod = ±75 kHz, Tone = 1 kHz, Level = 20 μV
3. DX/LOCAL switch to DX position

Table 6-2. FM Receiver Test Point Data

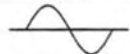
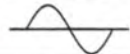
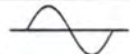
TEST POINT	DESCRIPTION	LEVEL	WAVEFORM
TP1	RSSI	2.3 V	DC
TP2	PLL Phase Voltage	3.8 V	DC
TP3	Demodulated Audio	0.6 Vp-p	
TP4	LO Output to PLL	0.5 Vp-p	
TP5	6 MHz clock to μ processor	3 Vp-p	

6.5.3 NOAA Weather Receiver Module

Setup Conditions:

1. Channel Select switch at 6
2. RF Frequency = 162.5 MHz, Mod = ± 5 kHz, Tone = 1 kHz, Level = 5 μ V
3. DX/LOCAL switch to DX position

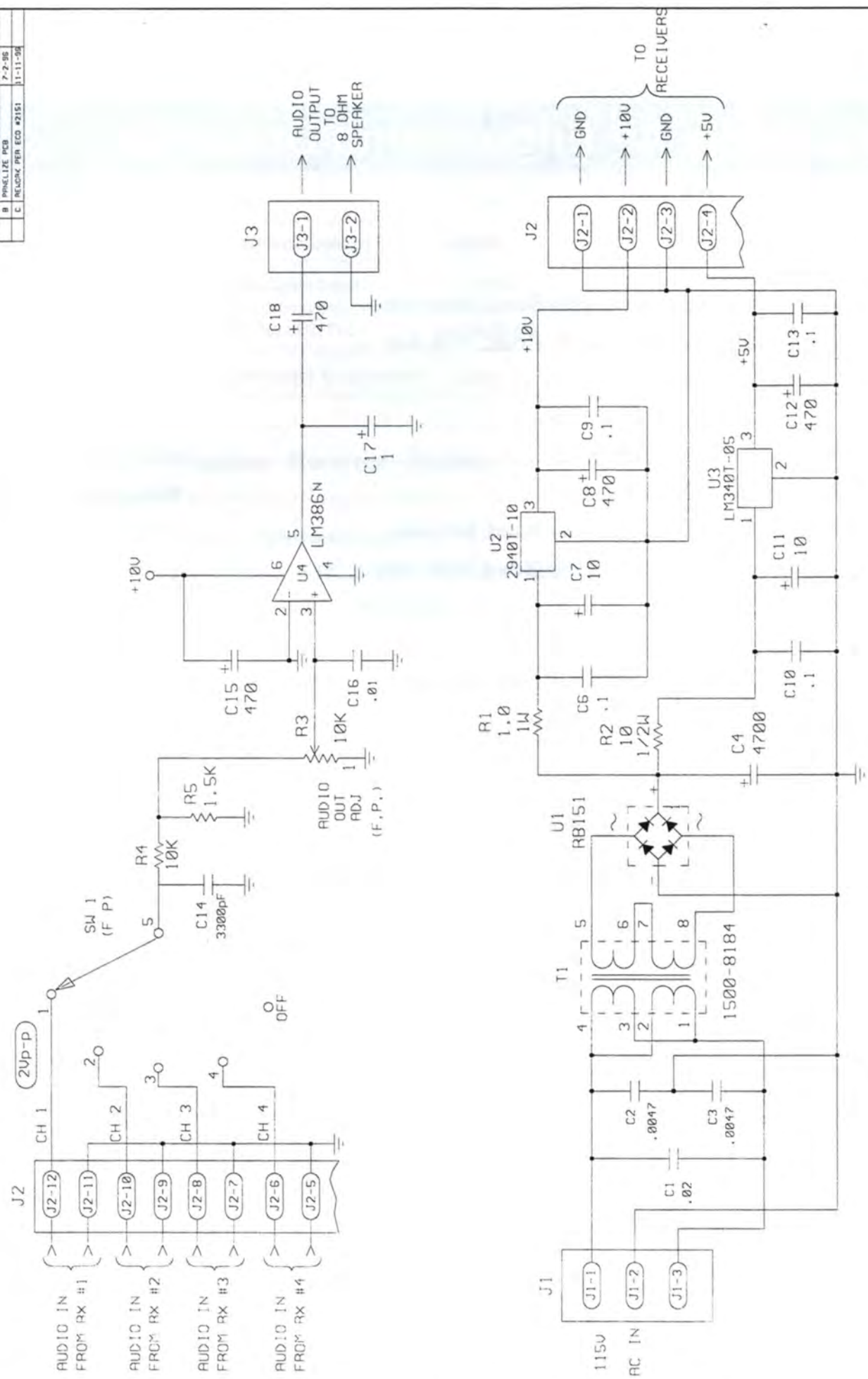
Table 6-3. NOAA Weather Receiver Test Point Data

TEST POINT	DESCRIPTION	LEVEL	WAVEFORM
TP1	RSSI	6.7 V	DC
TP2	Second IF	0.5 Vp-p	
TP3	Demodulated Audio	0.5 Vp-p	
TP4	2nd LO Output to μ process.	3 Vp-p	
TP5	PLL Phase Voltage	3.1 V	DC

Appendix A - Engineering Drawings

Figure	Title	Dwg. No.	Rev
A-1	Speaker Amp. & Power Supply Board, Schematic.....	6601-4026	C
A-2	Speaker Amp. & Power Supply Board, PCB Assy	6608-4026	E
A-3	AM Receiver Board, Schematic.....	6601-4038	B
A-4	AM Receiver Board, PCB Assy.	6608-4038	C
A-5	FM Receiver Board, Schematic	6601-4037	B
A-6	FM Receiver Board, PCB Assy.....	6608-4037	B
A-7	NOAA Weather Radio Receiver Board, Schematic.....	6601-4039	B
A-8	NOAA Weather Radio Receiver Board, PCB Assy.	6608-4039	B

REVISED		DATE	BY
A	PRODUCTION RELEASE	1-17-96	
B	PRELIMINARY PCB	7-2-96	
C	REWORK PER ECO #2151	11-11-96	



REVISED		DATE	BY
A	PRODUCTION RELEASE	1-17-96	
B	PRELIMINARY PCB	7-2-96	
C	REWORK PER ECO #2151	11-11-96	

REVISED		DATE	BY
A	PRODUCTION RELEASE	1-17-96	
B	PRELIMINARY PCB	7-2-96	
C	REWORK PER ECO #2151	11-11-96	

REVISED		DATE	BY
A	PRODUCTION RELEASE	1-17-96	
B	PRELIMINARY PCB	7-2-96	
C	REWORK PER ECO #2151	11-11-96	

REVISED		DATE	BY
A	PRODUCTION RELEASE	1-17-96	
B	PRELIMINARY PCB	7-2-96	
C	REWORK PER ECO #2151	11-11-96	

REVISED		DATE	BY
A	PRODUCTION RELEASE	1-17-96	
B	PRELIMINARY PCB	7-2-96	
C	REWORK PER ECO #2151	11-11-96	

REVISED		DATE	BY
A	PRODUCTION RELEASE	1-17-96	
B	PRELIMINARY PCB	7-2-96	
C	REWORK PER ECO #2151	11-11-96	

REVISED		DATE	BY
A	PRODUCTION RELEASE	1-17-96	
B	PRELIMINARY PCB	7-2-96	
C	REWORK PER ECO #2151	11-11-96	

REVISED		DATE	BY
A	PRODUCTION RELEASE	1-17-96	
B	PRELIMINARY PCB	7-2-96	
C	REWORK PER ECO #2151	11-11-96	

REVISED		DATE	BY
A	PRODUCTION RELEASE	1-17-96	
B	PRELIMINARY PCB	7-2-96	
C	REWORK PER ECO #2151	11-11-96	

REVISED		DATE	BY
A	PRODUCTION RELEASE	1-17-96	
B	PRELIMINARY PCB	7-2-96	
C	REWORK PER ECO #2151	11-11-96	

REVISED		DATE	BY
A	PRODUCTION RELEASE	1-17-96	
B	PRELIMINARY PCB	7-2-96	
C	REWORK PER ECO #2151	11-11-96	

REVISED		DATE	BY
A	PRODUCTION RELEASE	1-17-96	
B	PRELIMINARY PCB	7-2-96	
C	REWORK PER ECO #2151	11-11-96	

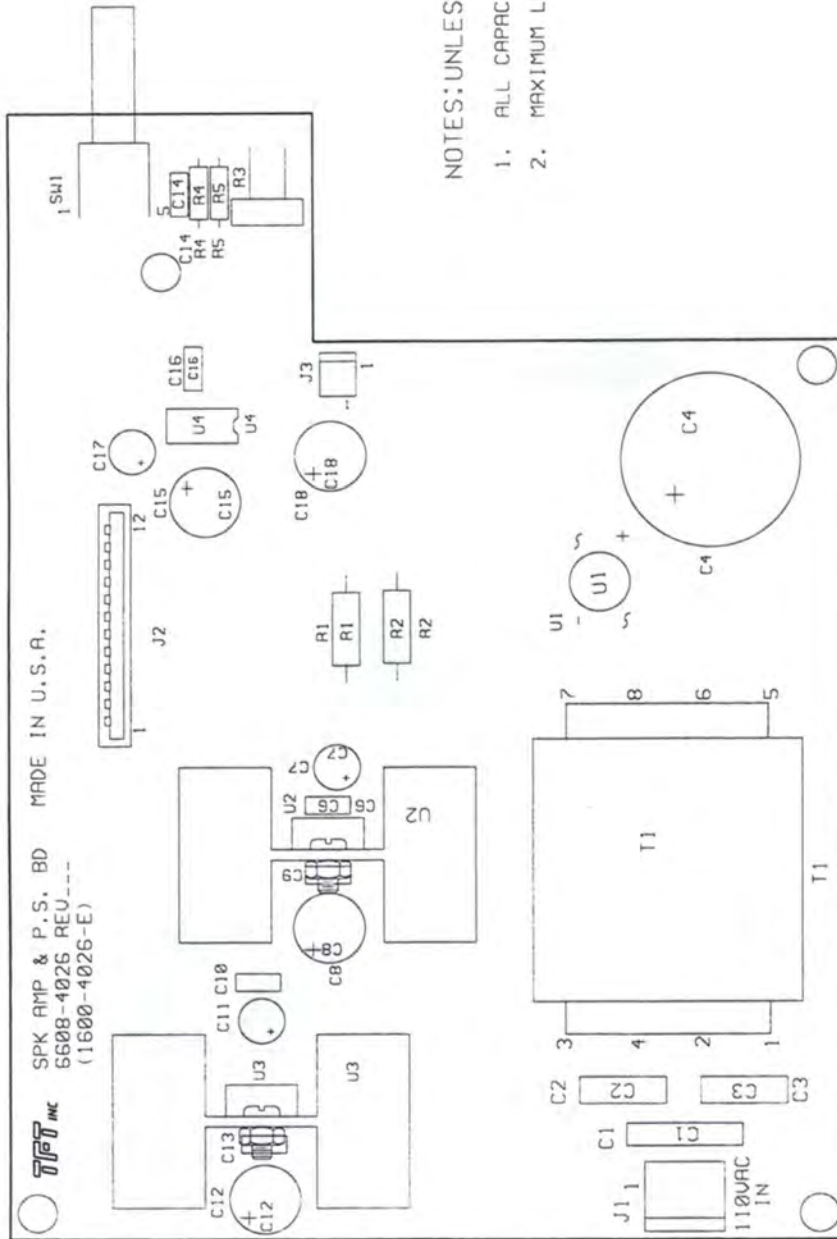
REVISED		DATE	BY
A	PRODUCTION RELEASE	1-17-96	
B	PRELIMINARY PCB	7-2-96	
C	REWORK PER ECO #2151	11-11-96	

Figure A-1

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REVISIONS

REV	DATE	APPROVED
B	7-2-96	
C	8-12-96	
D	10-01-96	
E	10-01-96	



NOTES: UNLESS OTHERWISE SPECIFIED

1. ALL CAPACITORS TO BE FLUSH WITH PCB.
2. MAXIMUM LEAD HEIGHT NOT TO EXCEED .075 INCH.

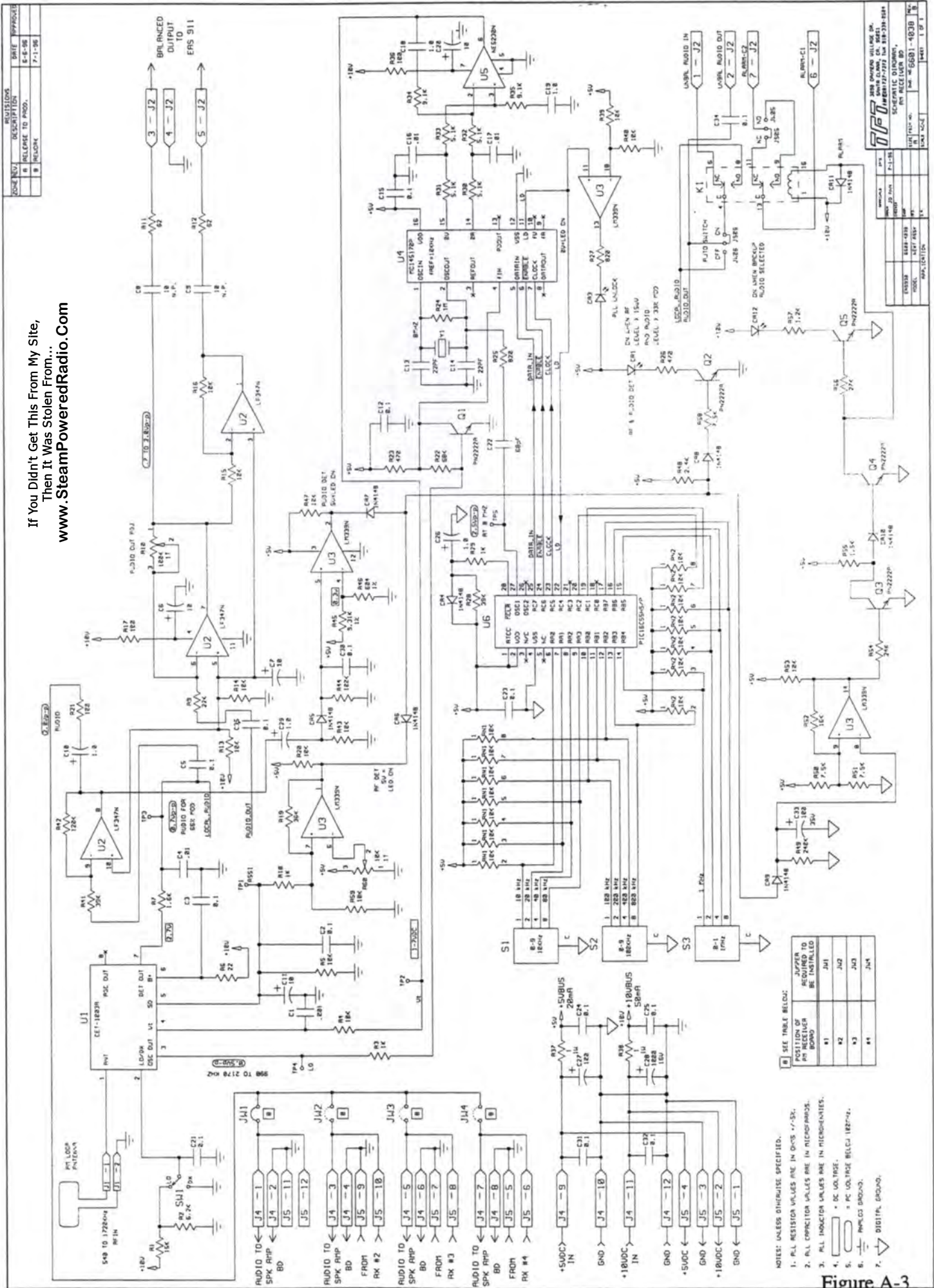
APPROVALS	DATE
DRAIN JO ANN	11-11-96
CHECKED	
ENGR.	
MFG	
Q.A.	

3090 ORKHEAD VILLAGE DR. SANTA CLARA, CA 95051 (408) 727-7272	
PPD INC	
ASSEMBLY DRAWING, POWER SUPPLY BD.	
SIZE A	DWG. NO. 6608-4026
REV E	

APPLICATION	SCALE: NONE	SHEET 1 OF 1
-------------	-------------	--------------

Figure A-2

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ZONE	REV	DESCRIPTION	DATE	APPROVAL
8	8	RELEASE TO PROD.	6-6-06	
9	9	REWORK	7-1-06	

SEE TABLE BELOW:	POSITION OF JUMPER TO BE INSTALLED
81	J41
82	J42
83	J43
84	J44

- NOTES: UNLESS OTHERWISE SPECIFIED.
1. ALL RESISTOR VALUES ARE IN OHMS UNLESS OTHERWISE SPECIFIED.
 2. ALL CAPACITOR VALUES ARE IN MICROFARADS.
 3. ALL INDUCTOR VALUES ARE IN MICROHENRIES.
 4. * = DC VOLTAGE.
 5. * = PC VOLTAGE BELT 18274.
 6. * = ANALOG SIGNAL.
 7. * = DIGITAL GROUND.

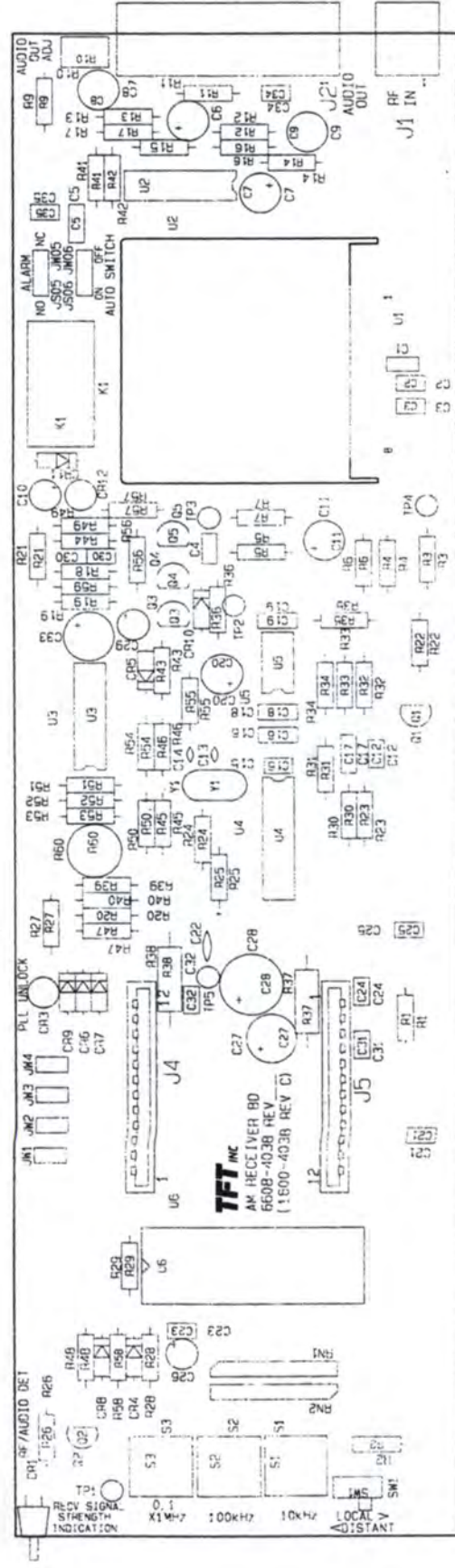
Figure A-3

REVISIONS

REV	DATE	APPROVED
A	6-14-96	
B	7-1-96	
C	9-6-96	

RELEASE TO PROD.
REWORK
SNAP TRACES ON SW1 PIN 1 & 3
REWORK PER ECO 2134

R7



APPROVALS	DATE	DATE
DESIGNER: [Signature]	9-6-96	9-6-96
CHECKED: [Signature]	9-6-96	9-6-96
ENGR: [Signature]	9-6-96	9-6-96
WFG: [Signature]	9-6-96	9-6-96
G.A. [Signature]	9-6-96	9-6-96

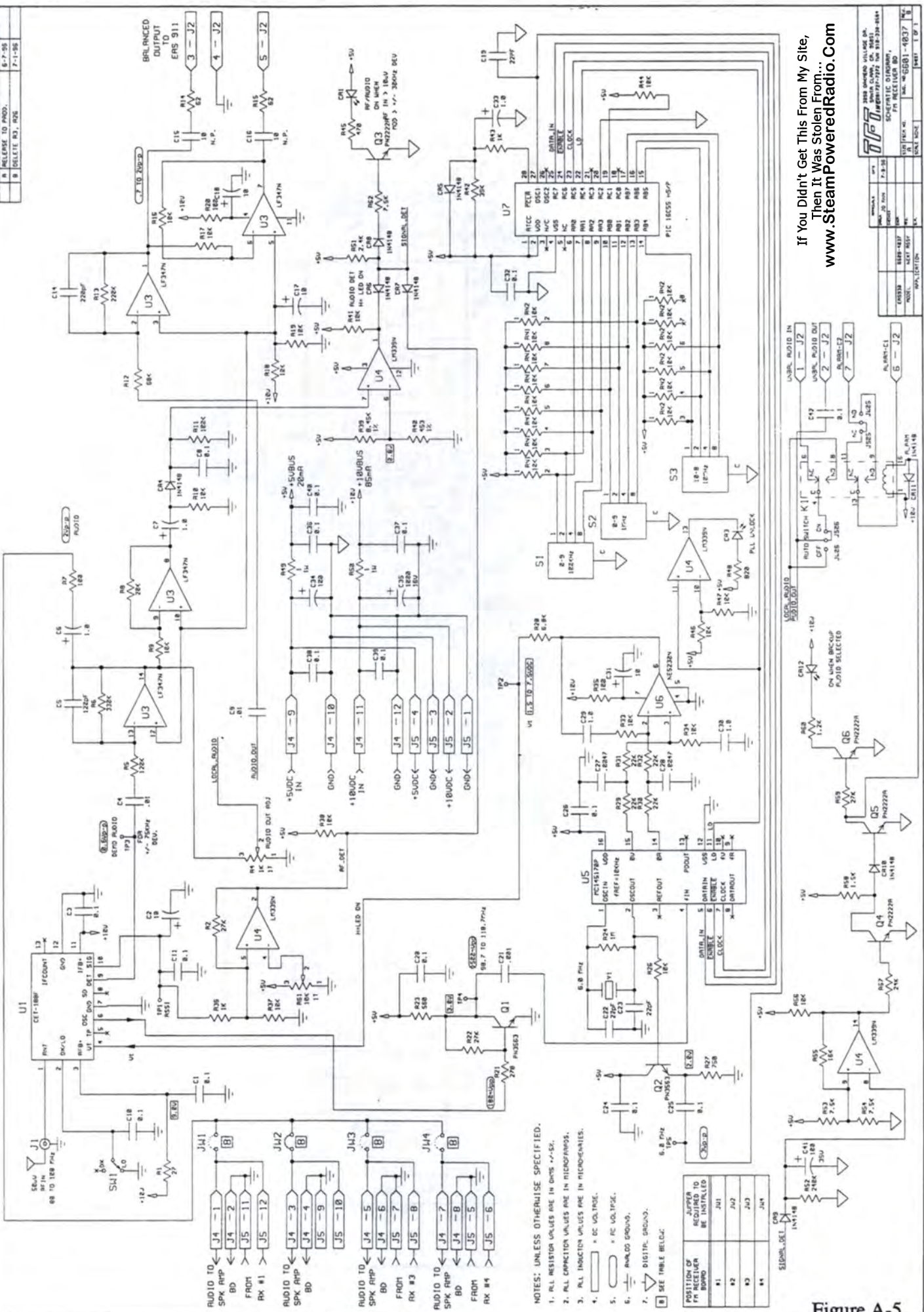
3090 DAKWEAD VILLAGE DR
SANTA CLARA, CA 95051
TFT INC (408) 727-7272 FAX 910-336-0584

ASSEMBLY DRAWING,
AM RECEIVER BD.

SIZE: A
DWG. NO.: 6508-4038
REV: C

SCALE: NONE
SHEET 1 OF 1

REV	DESCRIPTION	DATE	APPROVED
1	RELEASE TO PWD.	6-7-95	
2	RELIEVE R3, R26	7-1-95	



- NOTES: UNLESS OTHERWISE SPECIFIED.
1. ALL RESISTOR VALUES ARE IN OHMS UNLESS OTHERWISE SPECIFIED.
 2. ALL CAPACITOR VALUES ARE IN MICROFARADS.
 3. ALL INDUCTOR VALUES ARE IN MICROHENRIES.
 4. \square = DC VOLTAGE.
 5. \square = IC VOLTAGE.
 6. \square = ANALOG GROUND.
 7. \square = DIGITAL GROUND.
 8. SEE TABLE BELOW.

POSITION OF JUMPER REQUIRED TO BE INSTALLED ON BOARD	J1	J2	J3	J4
1				
2				
3				
4				

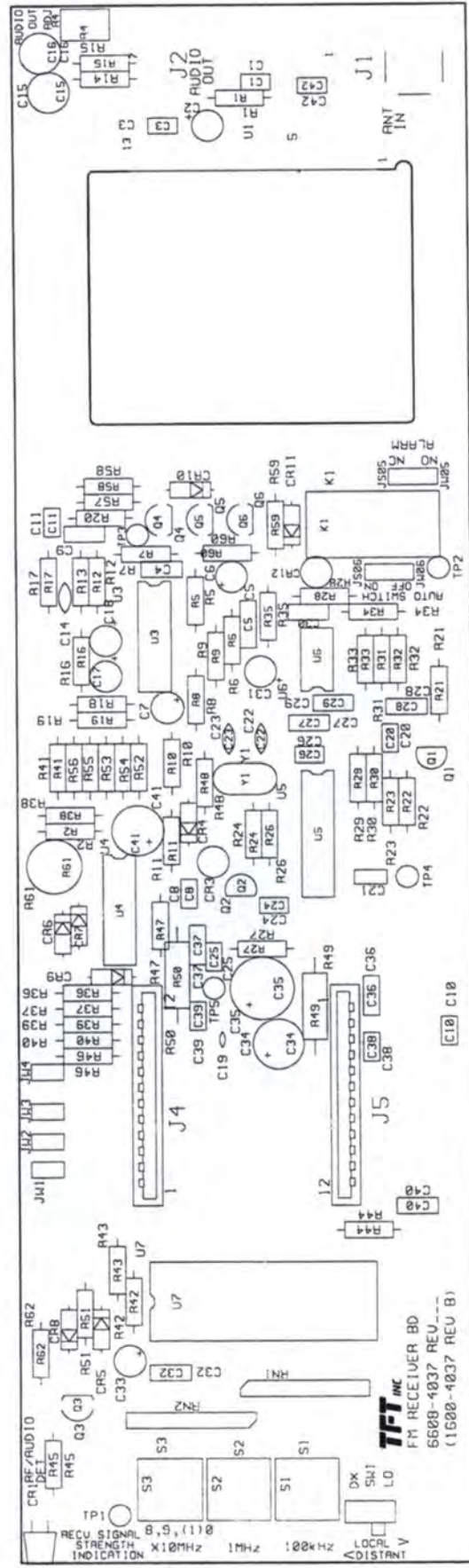
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www.SteamPoweredRadio.Com

REV	DESCRIPTION	DATE	APPROVED
1	RELEASE TO PWD.	6-7-95	
2	RELIEVE R3, R26	7-1-95	

Figure A-5

REVISIONS

REV	DATE	APPROVED
A	6-14-96	
B	7-1-96	

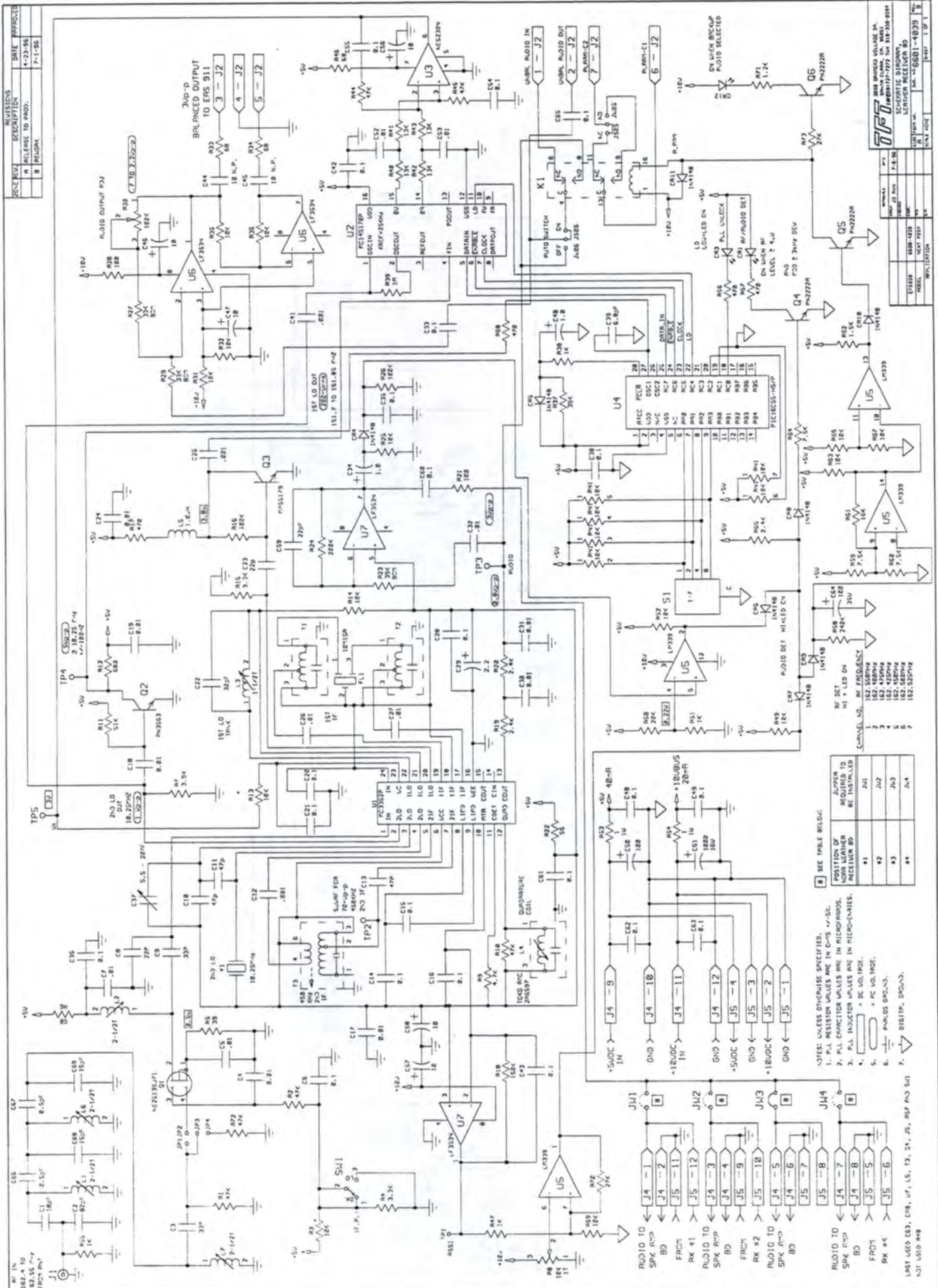


APPROVALS	DATE
DRAWN JO RNN	7-8-96
CHECKED	
ENGR.	
TFG	
D.A.	

3990 ORKMEAD VILLAGE DR. SANTA CLARA, CA 95051 TPT INC (408) 727-7272 FAX 910-338-0584
ASSEMBLY DRAWING, FM RECEIVER BD.
SIZE Dwg. NO. 6608-4037
SCALE: NONE
SHEET 1 OF 1

ERS930	5102-3947
MODEL	NEXT ASSY
APPLICATION	

Figure A-6



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www.SteamPoweredRadio.Com

Figure A-7

REV	DESCRIPTION	DATE	APPROVED
1	RELEASE TO PROD.	4-23-86	
2	REWORK	7-1-86	

REV	DESCRIPTION	DATE	APPROVED
1	RELEASE TO PROD.	4-23-86	
2	REWORK	7-1-86	

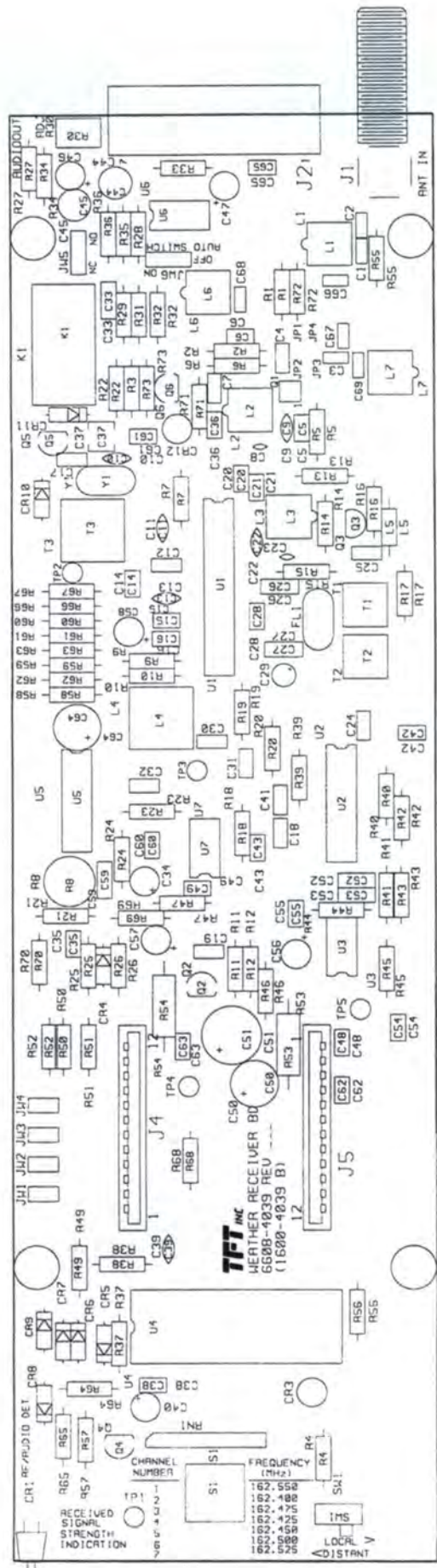
POSITION OF WIRE LEADER RECEIVER ID	REWORK REQUIRED TO BE INSTALLED	DATE
1		J41
2		J42
3		J43
4		J44

- NOTES: UNLESS OTHERWISE SPECIFIED,
 1. ALL RESISTOR VALUES ARE IN OHMS. //5K.
 2. ALL CAPACITOR VALUES ARE IN MICROFARADS.
 3. ALL DIMENSIONAL VALUES ARE IN INCHES/MILLIMETERS.
 4. * PC BOARD.
 5. * PC BOARD.
 6. * PC BOARD.
 7. * PC BOARD.

LAST USED C23, C28, U1, U5, U7, U8, U9, U10, U11, U12, U13, U14, U15, U16, U17, U18, U19, U20, U21, U22, U23, U24, U25, U26, U27, U28, U29, U30, U31, U32, U33, U34, U35, U36, U37, U38, U39, U40, U41, U42, U43, U44, U45, U46, U47, U48, U49, U50, U51, U52, U53, U54, U55, U56, U57, U58, U59, U60, U61, U62, U63, U64, U65, U66, U67, U68, U69, U70, U71, U72, U73, U74, U75, U76, U77, U78, U79, U80, U81, U82, U83, U84, U85, U86, U87, U88, U89, U90, U91, U92, U93, U94, U95, U96, U97, U98, U99, U100, U101, U102, U103, U104, U105, U106, U107, U108, U109, U110, U111, U112, U113, U114, U115, U116, U117, U118, U119, U120, U121, U122, U123, U124, U125, U126, U127, U128, U129, U130, U131, U132, U133, U134, U135, U136, U137, U138, U139, U140, U141, U142, U143, U144, U145, U146, U147, U148, U149, U150, U151, U152, U153, U154, U155, U156, U157, U158, U159, U160, U161, U162, U163, U164, U165, U166, U167, U168, U169, U170, U171, U172, U173, U174, U175, U176, U177, U178, U179, U180, U181, U182, U183, U184, 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REVISIONS		
REV	DATE	APPROVED
A	6-6-96	
B	6-30-96	

REL. TO PROD.	
ADD PIN 1 TO Q1 AND NC, NO TO JWS SILKSCREEN	



		3090 DAKEMER VILLAGE DR. SANTA CLARA, CA 95051 (408) 727-7272 FAX 910-338-9584	
APPROVALS DRAWIN JO RAN CHECKED ENGR. PFG Q.A.		DATE 6-30-96	
MODEL 5102-3947 NEXT ASSY		ASSEMBLY DRAWING, WEATHER RECEIVER BD.	
APPLICATION		SIZE A 6608-4039 REV B	
SCALE: NONE		SHEET 1 OF 1	

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Figure A-8

Appendix B - Parts List

Figure	Title	Dwg. No.	Rev.
B-1	Speaker Amplifier & Power Supply Board Assembly.....	6608-4026	C
B-2	AM Receiver Board Assembly.....	6608-4038	C
B-3	FM Receiver Board Assembly.....	6608-4037	B
B-4	NOAA Weather Radio Board Assembly.....	6608-4039	B

CKT. REF.	DESCRIPTION	TFT PART NO.
C001	CAP CER DISC .02MFD	1005-2039CEAS
C002	CAP CER DISC .0047MFD	1005-4749CEAS
C003	CAP CER DISC .0047MFD	1005-4749CEAS
C004	4700MFD 25V VERT MT LO PRO CAP	1010-0473CEAS
C005	PARTS NOT USED	X000-0001
C006	CAP CER 0.1MF CK05BX K	1015-0001CEAS
C007	CAP ELECT 10 MFD 25V VERT MT	1010-0099CEAS
C008	CAP ELEC 470MF 25V VERT MNT	1010-0045CEAS
C009	CAP CER 0.1MF CK05BX K	1015-0001CEAS
C010	CAP CER 0.1MF CK05BX K	1015-0001CEAS
C011	CAP ELECT 10 MFD 25V VERT MT	1010-0099CEAS
C012	CAP ELEC 470MF 25V VERT MNT	1010-0045CEAS
C013	CAP CER 0.1MF CK05BX K	1015-0001CEAS
C014	CAP CER .0033MF CK05BX K	1015-0014CEAS
C015	CAP ELEC 470MF 25V VERT MNT	1010-0045CEAS
C016	CAP CER .01MF CK05BX103K	1015-0002CEAS
C017	CAP 1.0 MFD 50V (NO SUB.)	1010-0021CEAS
C018	CAP ELEC 470MF 25V VERT MNT	1010-0045CEAS
HS01	HEATSINK 1"WD X 1"H X L.65LG	2010-0647CEAS
HS02	HEATSINK 1"WD X 1"H X L.65LG	2010-0647CEAS
J001	PLUG LOCKING 3 PIN	2250-6003CEAS
J002	12PIN .100CTR FLEX CBL CONN	2250-6019EAS
J003	2 PIN .100 CTR STRAIGHT MALE CONN	2250-5829CEAS
PCB1	SPK AMP & PS BD 930	1600-4026EAS
R001	RES 1W 1.0 OHM 5% METAL OXIDE	1068-0071CEAS
R002	RES CAR FILM 10 OHM 5% 1/2W	1067-1910CEAS
R003	10K POT VT W/HANDLE PTC10WH2.5	1070-0504EAS
R004	RES CAR FILM 1/4W 5% 10K	1065-1002CEAS
R005	RES CAR COMP 1/4W 5% 1.5K	1065-1501CEAS
SW01	ROTARY SWITCH - 1P5T	1800-2130EAS
T001	XFMR 11VDC AT .4A	1500-8184EAS
U001	1.5A BRDG RECT RB-151	1284-0151EAS
U002	LOW DROPOUT REGULATOR +10V 1A	1100-2910EAS
U003	I/C LM340T-05	1100-7805CEAS
U004	I/C LM386 LOW VOLT AUDIO P A	1100-0386CEAS

CKT REF	DESCRIPTION	TFT PART NO.
C001	CAP 1000PF 100V CER NPO	1005-1003CEAS
C002	CAP CER .1MFD	1005-1100CEAS
C003	CAP CER .1MFD	1005-1100CEAS
C004	.01UF CER CAP	1005-1038EAS
C005	CAP CER .1MFD	1005-1100CEAS
C006	CAP ELECT 10 MFD 25V VERT MT	1010-0099CEAS
C007	CAP ELECT 10 MFD 25V VERT MT	1010-0099CEAS
C008	CAP ELEC 10MFD 25V NP V MT	1010-0013CEAS
C009	CAP ELEC 10MFD 25V NP V MT	1010-0013CEAS
C010	CAP 1.0 MFD 50V (NO SUB.)	1010-0021CEAS
C011	CAP ELECT 10 MFD 25V VERT MT	1010-0099CEAS
C012	CAP CER .1MFD	1005-1100CEAS
C013	CAP MINI CER 22 PF NPO 63V	1017-0220CEAS
C014	CAP MINI CER 22 PF NPO 63V	1017-0220CEAS
C015	CAP CER .1MFD	1005-1100CEAS
C016	CAP CER .01MF CK05BX103K	1015-0002CEAS
C017	CAP CER .01MF CK05BX103K	1015-0002CEAS
C018	CAP CER DISC 1MFD	1005-0001CEAS
C019	CAP CER DISC 1MFD	1005-0001CEAS
C020	CAP ELECT 10 MFD 25V VERT MT	1010-0099CEAS
C021	CAP CER .1MFD	1005-1100CEAS
C022	CAP MINI CER 68PF NPO 63V	1017-0680CEAS
C023	CAP CER .1MFD	1005-1100CEAS
C024	CAP CER .1MFD	1005-1100CEAS
C025	CAP CER .1MFD	1005-1100CEAS
C026	CAP 1.0 MFD 50V (NO SUB.)	1010-0021CEAS
C027	CAP ELECT VT MT 100UF (NO SUB.)	1010-0110CEAS
C028	CAP ELEC 1000MF 16V VERT MT	1010-0012CEAS
C029	CAP 1.0 MFD 50V (NO SUB.)	1010-0021CEAS
C030	CAP CER .1MFD	1005-1100CEAS
C031	CAP CER .1MFD	1005-1100CEAS
C032	CAP CER .1MFD	1005-1100CEAS
C033	CAP ELECT VT MT 100UF (NO SUB.)	1010-0110CEAS
C034	CAP CER .1MFD	1005-1100CEAS
C035	CAP CER .1MFD	1005-1100CEAS
CR01	LED AND206Y YELLOW	1285-4207CEAS
CR02	PARTS NOT USED	X000-0001
CR03	LED PL07-CT-R RED	1285-4550EAS
CR04	1N4148 DIODE	1281-4148CEAS
CR05	1N4148 DIODE	1281-4148CEAS
CR06	1N4148 DIODE	1281-4148CEAS
CR07	1N4148 DIODE	1281-4148CEAS
CR08	1N4148 DIODE	1281-4148CEAS
CR09	1N4148 DIODE	1281-4148CEAS
CR10	1N4148 DIODE	1281-4148CEAS
CR11	1N4148 DIODE	1281-4148CEAS
CR12	LED PL07-CT-R RED	1285-4550EAS
J001	2 PIN .200 CTR PLUG CONN	1700-1202EAS
J002	7 PIN .200CTR MALE R/A TERM BLK	1700-5009EAS
J003	PARTS NOT USED	X000-0001
J004	12PIN .100CTR FLEX CBL CONN	2250-6019EAS
J005	12PIN .100CTR FLEX CBL CONN	2250-6019EAS
JS01	SOCKET JUMPER 2 PIN	2250-2502CEAS
JS05	SOCKET JUMPER 2 PIN	2250-2502CEAS
JS06	SOCKET JUMPER 2 PIN	2250-2502CEAS
JW01	CONN 2PIN HEADER MALE .100CTR	2250-5892CEAS
JW02	CONN 2PIN HEADER MALE .100CTR	2250-5892CEAS
JW03	CONN 2PIN HEADER MALE .100CTR	2250-5892CEAS
JW04	CONN 2PIN HEADER MALE .100CTR	2250-5892CEAS
JW05	3 PIN HEADER MALE .100 CTR BLK CON	2250-5833CEAS
JW06	3 PIN HEADER MALE .100 CTR BLK CON	2250-5833CEAS
K001	RELAY 12BDC 2A AT 28 V	1880-0022CEAS
PCB1	AM RECEIVER PCB 930	1600-4038EAS
Q001	TRANS PN2222A NPN	1271-2223CEAS
Q002	TRANS PN2222A NPN	1271-2223CEAS
Q003	TRANS PN2222A NPN	1271-2223CEAS
Q004	TRANS PN2222A NPN	1271-2223CEAS
Q005	TRANS PN2222A NPN	1271-2223CEAS
R001	RES CAR FILM 1/4W 5% 15K	1065-1502CEAS
R002	RES CAR FILM 1/4W 5% 6.2K	1065-6201CEAS
R003	RES CAR FILM 1/4W 5% 1K	1065-1001CEAS
R004	RES CAR FILM 1/4W 5% 10K	1065-1002CEAS
R005	RES CAR FILM 1/4W 5% 10K	1065-1002CEAS
R006	RES CAR FILM 1/4W 5% 22	1065-0022CEAS
R007	RES CAR COMP 1/4 W 5% 1.6K	1065-1601CEAS

CKT REF	DESCRIPTION	TFT PART NO.
R008	PARTS NOT USED	X000-0001
R009	RES CAR FILM 1/4W 5% 22K	1065-2202CEAS
R010	100K 1T SIDE ADJ CERMET POT 3362X	1072-1103EAS
R011	RES CAR FILM 1/4W 5% 62	1065-0062CEAS
R012	RES CAR FILM 1/4W 5% 62	1065-0062CEAS
R013	RES CAR FILM 1/4W 5% 10K	1065-1002CEAS
R014	RES CAR FILM 1/4W 5% 10K	1065-1002CEAS
R015	RES CAR FILM 1/4W 5% 10K	1065-1002CEAS
R016	RES CAR FILM 1/4W 5% 10K	1065-1002CEAS
R017	RES CAR FILM 1/4W 5% 100	1065-0100CEAS
R018	RES CAR FILM 1/4W 5% 1K	1065-1001CEAS
R019	RES CAR FILM 1/4W 5% 36K	1065-3602CEAS
R020	RES CAR FILM 1/4W 5% 10K	1065-1002CEAS
R021	RES CAR FILM 1/4W 5% 100	1065-0100CEAS
R022	RES CAR COMP 1/4W 5% 68K	1065-6802CEAS
R023	RES CAR FILM 1/4W 5% 470 OHM	1065-0470CEAS
R024	RES CAR FILM 1/4W 5% 1M	1065-1004CEAS
R025	RES CAR FILM 1/4W 5% 820 OHM	1065-0820CEAS
R026	RES CAR FILM 1/4W 5% 470 OHM	1065-0470CEAS
R027	RES CAR FILM 1/4W 5% 820 OHM	1065-0820CEAS
R028	RES CAR FILM 1/4W 5% 39K	1065-3902CEAS
R029	RES CAR FILM 1/4W 5% 1K	1065-1001CEAS
R030	RES CAR FILM 1/4W 5% 5.1K	1065-5101CEAS
R031	RES CAR FILM 1/4W 5% 5.1K	1065-5101CEAS
R032	RES CAR FILM 1/4W 5% 5.1K	1065-5101CEAS
R033	RES CAR FILM 1/4W 5% 5.1K	1065-5101CEAS
R034	RES CAR FILM 1/4W 5% 9.1K	1065-9101CEAS
R035	RES CAR FILM 1/4W 5% 9.1K	1065-9101CEAS
R036	RES CAR FILM 1/4W 5% 100	1065-0100CEAS
R037	RES 1W 1.0 OHM 5% METAL OXIDE	1068-0071CEAS
R038	RES 1W 1.0 OHM 5% METAL OXIDE	1068-0071CEAS
R039	RES CAR FILM 1/4W 5% 10K	1065-1002CEAS
R040	RES CAR FILM 1/4W 5% 10K	1065-1002CEAS
R041	RES CAR FILM 1/4W 5% 39K	1065-3902CEAS
R042	RES CAR COMP 1/4W 5% 120K	1065-1203CEAS
R043	RES CAR FILM 1/4W 5% 10K	1065-1002CEAS
R044	RES CAR COMP 1/4W 5% 100K	1065-1003CEAS
R045	RES MT FLM 1/8W 1% 9.31K	1061-9311CEAS
R046	RES MT FLM 604 1/8W 1%	1061-0604CEAS
R047	RES CAR FILM 1/4W 5% 10K	1065-1002CEAS
R048	RES CAR FILM 1/4W 5% 2.4K	1065-2401CEAS
R049	RES CAR 1/4W 5% 240K	1065-2403CEAS
R050	RES CAR FILM 1/4W 5% 7.5K	1065-7501CEAS
R051	RES CAR FILM 1/4W 5% 7.5K	1065-7501CEAS
R052	RES CAR FILM 1/4W 5% 16K	1065-1602CEAS
R053	RES CAR FILM 1/4W 5% 10K	1065-1002CEAS
R054	RES CAR FILM 1/4 W 5% 24K	1065-2402CEAS
R055	RES CAR COMP 1/4W 5% 1.5K	1065-1501CEAS
R056	RES CAR FILM 1/4W 5% 36K	1065-3602CEAS
R057	RES CAR FILM 1/4W 5% 1.2K	1065-1201CEAS
R058	RES CAR FILM 1/4W 5% 7.5K	1065-7501CEAS
R059	RES CAR FILM 1/4W 5% 10K	1065-1002CEAS
R060	POT CERMET 10K PC MNT TOP ADJ	1072-1111CEAS
RN01	10K SIP 8 PIN BUSSED RES NETWORK	1073-1007EAS
RN02	10K SIP 8 PIN BUSSED RES NETWORK	1073-1007EAS
S001	10POS BCD R/A ROTARY DIP SWITCH	1800-3069EAS
S002	10POS BCD R/A ROTARY DIP SWITCH	1800-3069EAS
S003	10POS BCD R/A ROTARY DIP SWITCH	1800-3069EAS
SW01	SPDT R/A PC MNT MINI SWITCH	1800-3089EAS
TP01	1/8 DX .35L BLK TEST TERMINAL	2140-0150CEAS
TP02	1/8 DX .35L BLK TEST TERMINAL	2140-0150CEAS
TP03	1/8 DX .35L BLK TEST TERMINAL	2140-0150CEAS
TP04	1/8 DX .35L BLK TEST TERMINAL	2140-0150CEAS
TP05	1/8 DX .35L BLK TEST TERMINAL	2140-0150CEAS
U001	CE-1003A AM RX TUNER	4500-1815EAS
U002	I/C LF347N LIN QUAD OP AMP	1100-0347CEAS
U003	I/C LM339 VOLTAGE COMPARATOR	1100-0339CEAS
U004	MC145170P I/C	1102-1457EAS
U005	NE5230N LO VOLT OP AMP I/C 8 PIN	1100-5230CEAS
XY01	INSULATOR FOR CRYSTAL HC-25	2140-0104CEAS
Y001	8.000MHZ HC49/U XTAL	2400-0800EAS

CKT REF	DESCRIPTION	TFT PART NO.
C001	CAP CER .1MFD	1005-1100CEAS
C002	CAP ELECT 10 MFD 25V VERT MT	1010-0099CEAS
C003	CAP CER .1MFD	1005-1100CEAS
C004	CAP CER .01MF CK05BX103K	1015-0002CEAS
C005	CAP MINI CER 120PF NPO 63V	1017-1200CEAS
C006	CAP 1.0 MFD 50V (NO SUB.)	1010-0021CEAS
C007	CAP 1.0 MFD 50V (NO SUB.)	1010-0021CEAS
C008	CAP CER .1MFD	1005-1100CEAS
C009	CAP CER .01MF CK05BX103K	1015-0002CEAS
C010	CAP CER .1MFD	1005-1100CEAS
C011	CAP CER .1MFD	1005-1100CEAS
C012	PARTS NOT USED	X000-0001
C013	PARTS NOT USED	X000-0001
C014	220PF NPO MINI CER CAP	1017-2200CEAS
C015	CAP ELEC 10MFD 25V NP V MT	1010-0013CEAS
C016	CAP ELEC 10MFD 25V NP V MT	1010-0013CEAS
C017	CAP ELECT 10 MFD 25V VERT MT	1010-0099CEAS
C018	CAP ELECT 10 MFD 25V VERT MT	1010-0099CEAS
C019	PARTS NOT USED	X000-0001
C020	CAP CER .1MFD	1005-1100CEAS
C021	CAP 1000PF 100V CER NPO	1005-1003CEAS
C022	CAP MINI CER 22 PF NPO 63V	1017-0220CEAS
C023	CAP MINI CER 22 PF NPO 63V	1017-0220CEAS
C024	CAP CER .1MFD	1005-1100CEAS
C025	CAP CER .1MFD	1005-1100CEAS
C026	CAP CER .1MFD	1005-1100CEAS
C027	CAP CER 0.0047MF CK05	1015-0012CEAS
C028	CAP CER 0.0047MF CK05	1015-0012CEAS
C029	CAP CER DISC 1MFD	1005-0001CEAS
C030	CAP CER DISC 1MFD	1005-0001CEAS
C031	CAP ELECT 10 MFD 25V VERT MT	1010-0099CEAS
C032	CAP CER .1MFD	1005-1100CEAS
C033	CAP 1.0 MFD 50V (NO SUB.)	1010-0021CEAS
C034	CAP ELECT VT MT 100UF (NO SUB.)	1010-0110CEAS
C035	CAP ELEC 1000MF 16V VERT MT	1010-0012CEAS
C036	CAP CER .1MFD	1005-1100CEAS
C037	CAP CER .1MFD	1005-1100CEAS
C038	CAP CER .1MFD	1005-1100CEAS
C039	CAP CER .1MFD	1005-1100CEAS
C040	CAP CER .1MFD	1005-1100CEAS
C041	CAP ELECT VT MT 100UF (NO SUB.)	1010-0110CEAS
C042	CAP CER .1MFD	1005-1100CEAS
CR01	LED AND206Y YELLOW	1285-4207CEAS
CR02	PARTS NOT USED	X000-0001
CR03	LED PL07-CT-R RED	1285-4550EAS
CR04	1N4148 DIODE	1281-4148CEAS
CR05	1N4148 DIODE	1281-4148CEAS
CR06	1N4148 DIODE	1281-4148CEAS
CR07	1N4148 DIODE	1281-4148CEAS
CR08	1N4148 DIODE	1281-4148CEAS
CR09	1N4148 DIODE	1281-4148CEAS
CR10	1N4148 DIODE	1281-4148CEAS
CR11	1N4148 DIODE	1281-4148CEAS
CR12	LED PL07-CT-R RED	1285-4550EAS
J001	"F" R/A PC MOUNT JACK	2220-3602CEAS
J002	7 PIN .200CTR MALE R/A TERM BLK	1700-5009EAS
J004	12PIN .100CTR FLEX CBL CONN	2250-8019EAS
J005	12PIN .100CTR FLEX CBL CONN	2250-8019EAS
JS02	SOCKET JUMPER 2 PIN	2250-2502CEAS
JS05	SOCKET JUMPER 2 PIN	2250-2502CEAS
JS06	SOCKET JUMPER 2 PIN	2250-2502CEAS
JW01	CONN 2PIN HEADER MALE .100CTR	2250-5892CEAS
JW02	CONN 2PIN HEADER MALE .100CTR	2250-5892CEAS
JW03	CONN 2PIN HEADER MALE .100CTR	2250-5892CEAS
JW04	CONN 2PIN HEADER MALE .100CTR	2250-5892CEAS
JW05	3 PIN HEADER MALE .100 CTR BLK CON	2250-5833CEAS
JW06	3 PIN HEADER MALE .100 CTR BLK CON	2250-5833CEAS
K001	RELAY 12BDC 2A AT 28 V	1880-0022CEAS
PCB1	FM RECEIVER PCB 930	1600-4037EAS
Q001	TRANS 2N3563	1271-3563CEAS
Q002	TRANS 2N3563	1271-3563CEAS
Q003	TRANS PN2222A NPN	1271-2223CEAS
Q004	TRANS PN2222A NPN	1271-2223CEAS
Q005	TRANS PN2222A NPN	1271-2223CEAS
Q006	TRANS PN2222A NPN	1271-2223CEAS

CKT REF	DESCRIPTION	TFT PART NO.
R001	RES CAR COMP 1/4W 5% 27	1065-0027CEAS
R002	RES CAR FILM 1/4W 5% 27K	1065-2702CEAS
R004	1K 1T SIDE ADJ CERMET POT	1072-1101EAS
R005	RES CAR COMP 1/4W 5% 120K	1065-1203CEAS
R006	RES CAR FILM 1/4W 5% 330K	1065-3303CEAS
R007	RES CAR FILM 1/4W 5% 100	1065-0100CEAS
R008	RES CAR FILM 1/4W 5% 20K	1065-2002CEAS
R009	RES CAR FILM 1/4W 5% 10K	1065-1002CEAS
R010	RES CAR FILM 1/4W 5% 10K	1065-1002CEAS
R011	RES CAR COMP 1/4W 5% 100K	1065-1003CEAS
R012	RES CAR COMP 1/4W 5% 68K	1065-6802CEAS
R014	RES CAR FILM 1/4W 5% 62	1065-0062CEAS
R015	RES CAR FILM 1/4W 5% 62	1065-0062CEAS
R016	RES CAR FILM 1/4W 5% 10K	1065-1002CEAS
R017	RES CAR FILM 1/4W 5% 10K	1065-1002CEAS
R018	RES CAR FILM 1/4W 5% 10K	1065-1002CEAS
R019	RES CAR FILM 1/4W 5% 10K	1065-1002CEAS
R020	RES CAR FILM 1/4W 5% 100	1065-0100CEAS
R021	RES CAR COMP 1/4W 5% 270	1065-0270CEAS
R022	RES CAR FILM 1/4W 5% 27K	1065-2702CEAS
R023	RES CAR FILM 1/4W 5% 560	1065-0560CEAS
R024	RES CAR FILM 1/4W 5% 1M	1065-1004CEAS
R026	RES CAR FILM 1/4W 5% 10K	1065-1002CEAS
R027	RES CAR COMP 1/4W 5% 750	1065-0750CEAS
R028	RES CAR COMP 1/4W 5% 6.8K	1065-6801CEAS
R029	RES CAR FILM 1/4W 5% 22K	1065-2202CEAS
R030	RES CAR FILM 1/4W 5% 22K	1065-2202CEAS
R031	RES CAR FILM 1/4W 5% 22K	1065-2202CEAS
R032	RES CAR FILM 1/4W 5% 22K	1065-2202CEAS
R033	RES CAR FILM 1/4W 5% 10K	1065-1002CEAS
R034	RES CAR FILM 1/4W 5% 10K	1065-1002CEAS
R035	RES CAR FILM 1/4W 5% 100	1065-0100CEAS
R036	RES CAR FILM 1/4W 5% 1K	1065-1001CEAS
R037	RES CAR FILM 1/4W 5% 10K	1065-1002CEAS
R038	RES CAR FILM 1/4W 5% 10K	1065-1002CEAS
R039	RES MT FLM 1/8W 1% 8.45K	1061-8451CEAS
R040	RES MT FLM 1/8W 1% 463	1061-0453CEAS
R041	RES CAR FILM 1/4W 5% 10K	1065-1002CEAS
R042	RES CAR FILM 1/4W 5% 39K	1065-3902CEAS
R043	RES CAR FILM 1/4W 5% 1K	1065-1001CEAS
R044	RES CAR FILM 1/4W 5% 10K	1065-1002CEAS
R045	RES CAR FILM 1/4W 5% 470 OHM	1065-0470CEAS
R046	RES CAR FILM 1/4W 5% 10K	1065-1002CEAS
R047	RES CAR FILM 1/4W 5% 10K	1065-1002CEAS
R048	RES CAR FILM 1/4W 5% 820 OHM	1065-0820CEAS
R049	RES 1W 1.0 OHM 5% METAL OXIDE	1068-0071CEAS
R050	RES 1W 1.0 OHM 5% METAL OXIDE	1068-0071CEAS
R051	RES CAR FILM 1/4W 5% 2.4K	1065-2401CEAS
R052	RES CAR 1/4W 5% 240K	1065-2403CEAS
R053	RES CAR FILM 1/4W 5% 7.5K	1065-7501CEAS
R054	RES CAR FILM 1/4W 5% 7.5K	1065-7501CEAS
R055	RES CAR FILM 1/4W 5%16K	1065-1602CEAS
R056	RES CAR FILM 1/4W 5% 10K	1065-1002CEAS
R057	RES CAR FILM 1/4 W 5% 24K	1065-2402CEAS
R058	RES CAR COMP 1/4W 5% 1.5K	1065-1501CEAS
R059	RES CAR FILM 1/4W 5% 27K	1065-2702CEAS
R060	RES CAR FILM 1/4W 5%1.2K	1065-1201CEAS
R061	POT CERMET 10K PC MNT TOP ADJ	1072-1111CEAS
R062	RES CAR FILM 1/4W 5% 7.5K	1065-7501CEAS
RN01	10K SIP 8 PIN BUSSED RES NETWORK	1073-1007EAS
RN02	10K SIP 8 PIN BUSSED RES NETWORK	1073-1007EAS
SW01	10POS BCD R/A ROTARY DIP SWITCH	1800-3069EAS
SW02	10POS BCD R/A ROTARY DIP SWITCH	1800-3069EAS
SW03	10POS BCD R/A ROTARY DIP SWITCH	1800-3069EAS
SW01	SPDT R/A PC MNT MINI SWITCH	1800-3089EAS
TP01	1/8 DX .35L BLK TEST TERMINAL	2140-0150CEAS
TP02	1/8 DX .35L BLK TEST TERMINAL	2140-0150CEAS
TP03	1/8 DX .35L BLK TEST TERMINAL	2140-0150CEAS
TP04	1/8 DX .35L BLK TEST TERMINAL	2140-0150CEAS
TP05	1/8 DX .35L BLK TEST TERMINAL	2140-0150CEAS
U001	CET-811F FM TUNER W/IF DET	4500-1814EAS
U002	PARTS NOT USED	X000-0001
U003	IC LF347N LIN QUAD OP AMP	1100-0347CEAS
U004	IC LM339 VOLTAGE COMPARATOR	1100-0339CEAS
U005	MC145170P IC	1102-1457EAS
U006	NE5230N LO VOLT OP AMP IC 8 PIN	1100-5230CEAS
U007	E-PROM 1104-1655 FOR 930	6800-0152EAS
XY01	INSULATOR FOR CRYSTAL HC-25	2140-0104CEAS
Y001	6.000MHZ XTAL 930	2400-0600EAS

CKT REF	DESCRIPTION	TFT PART NO.
C001	CHIP CAP 18PF NPO 0805 CASE	1009-0180EAS
C002	CHIP CAP 82PF NPO 0805 CASE	1009-0820EAS
C003	33PF CER CHIP CAP (0805) CASE	1009-0331EAS
C004	.01UF CER CAP	1005-1038EAS
C005	.01UF CER CAP	1005-1038EAS
C006	CAP CER .1MFD	1005-1100CEAS
C007	.01UF CER CAP	1005-1038EAS
C008	CAP MINI CER 22 PF NPO 63V	1017-0220CEAS
C009	CAP MINI CER 33PF NPO RECT	1017-0330CEAS
C010	CAP MINI CER 47PF NPO RECT	1017-0470CEAS
C011	CAP MINI CER 47PF NPO RECT	1017-0470CEAS
C012	CAP 1000PF 100V CER NPO	1005-1003CEAS
C013	CAP MINI CER 47PF NPO RECT	1017-0470CEAS
C014	CAP CER .1MFD	1005-1100CEAS
C015	CAP CER .1MFD	1005-1100CEAS
C016	CAP CER .1MFD	1005-1100CEAS
C017	.01UF CER CAP	1005-1038EAS
C018	.01UF CER CAP	1005-1038EAS
C019	.01UF CER CAP	1005-1038EAS
C020	CAP CER .1MFD	1005-1100CEAS
C021	CAP CER .1MFD	1005-1100CEAS
C022	CAP CER DISC 30PF NPO	1017-0300EAS
C023	CAP MINI CER 22 PF NPO 63V	1017-0220CEAS
C024	.01UF CER CAP	1005-1038EAS
C025	CAP 1000PF 100V CER NPO	1005-1003CEAS
C026	CAP CER .01MF CK05BX103K	1015-0002CEAS
C027	CAP CER .01MF CK05BX103K	1015-0002CEAS
C028	CAP CER .1MFD	1005-1100CEAS
C029	CAP DIPPED TANT 2.2 UF 25V	1008-0023CEAS
C030	.01UF CER CAP	1005-1038EAS
C031	.01UF CER CAP	1005-1038EAS
C032	.01UF CER CAP	1005-1038EAS
C033	CAP CER .1MFD	1005-1100CEAS
C034	CAP 1.0 MFD 50V (NO SUB.)	1010-0021CEAS
C035	CAP CER .1MFD	1005-1100CEAS
C036	CAP CER .1MFD	1005-1100CEAS
C037	5.5-20PF VARI CAP	1012-0520EAS
C038	CAP CER .1MFD	1005-1100CEAS
C039	CAP MINI CER 6.8PF NPO RECT	1017-0068CEAS
C040	CAP 1.0 MFD 50V (NO SUB.)	1010-0021CEAS
C041	CAP 1000PF 100V CER NPO	1005-1003CEAS
C042	CAP CER .1MFD	1005-1100CEAS
C043	CAP CER .1MFD	1005-1100CEAS
C044	CAP ELEC 10MFD 25V NP V MT	1010-0013CEAS
C045	CAP ELEC 10MFD 25V NP V MT	1010-0013CEAS
C046	CAP ELECT 10 MFD 25V VERT MT	1010-0099CEAS
C047	CAP ELECT 10 MFD 25V VERT MT	1010-0099CEAS
C048	CAP CER .1MFD	1005-1100CEAS
C049	CAP CER .1MFD	1005-1100CEAS
C050	CAP ELECT VT MT 100UF (NO SUB.)	1010-0110CEAS
C051	CAP ELEC 1000MF 16V VERT MT	1010-0012CEAS
C052	CAP CER .01MF CK05BX103K	1015-0002CEAS
C053	CAP CER .01MF CK05BX103K	1015-0002CEAS
C054	CAP CER .1MFD	1005-1100CEAS
C055	CAP CER .1MFD	1005-1100CEAS
C056	CAP ELECT 10 MFD 25V VERT MT	1010-0099CEAS
C057	CAP ELECT 10 MFD 25V VERT MT	1010-0099CEAS
C058	CAP ELECT 10 MFD 25V VERT MT	1010-0099CEAS
C059	220PF NPO MINI CER CAP	1017-2200CEAS
C060	CAP CER .1MFD	1005-1100CEAS
C061	CAP CER .1MFD	1005-1100CEAS
C062	CAP CER .1MFD	1005-1100CEAS
C063	CAP CER .1MFD	1005-1100CEAS
C064	CAP ELECT VT MT 100UF (NO SUB.)	1010-0110CEAS
C065	CAP CER .1MFD	1005-1100CEAS
C066	CHIP CAP 0.5PF NPO 0805 CASE	1009-0005EAS
C067	CHIP CAP 0.5PF NPO 0805 CASE	1009-0005EAS
C068	CHIP CAP 15PF NPO 0805 CASE	1009-0150EAS
C069	CHIP CAP 15PF NPO 0805 CASE	1009-0150EAS
CR01	LED AND206Y YELLOW	1285-4207CEAS
CR02	PARTS NOT USED	X000-0001
CR03	LED PL07-CT-R RED	1285-4550EAS
CR04	1N4148 DIODE	1281-4148CEAS
CR05	1N4148 DIODE	1281-4148CEAS
CR06	1N4148 DIODE	1281-4148CEAS

CKT REF	DESCRIPTION	TFT PART NO.
CR07	1N4148 DIODE	1281-4148CEAS
CR08	1N4148 DIODE	1281-4148CEAS
CR09	1N4148 DIODE	1281-4148CEAS
CR10	1N4148 DIODE	1281-4148CEAS
CR11	1N4148 DIODE	1281-4148CEAS
CR12	LED PL07-CT-R RED	1285-4550EAS
FL01	FILT 10.7MHZ/15KHZ BW (QA TEST)	1052-0058CEAS
J001	*F* R/A PC MOUNT JACK	2220-3602CEAS
J002	7 PIN .200CTR MALE R/A TERM BLK	1700-5009EAS
J003	PARTS NOT USED	X000-0001
J004	12PIN .100CTR FLEX CBL CONN	2250-6019EAS
J005	12PIN .100CTR FLEX CBL CONN	2250-6019EAS
JS03	SOCKET JUMPER 2 PIN	2250-2502CEAS
JS05	SOCKET JUMPER 2 PIN	2250-2502CEAS
JS06	SOCKET JUMPER 2 PIN	2250-2502CEAS
JW01	CONN 2PIN HEADER MALE .100CTR	2250-5892CEAS
JW02	CONN 2PIN HEADER MALE .100CTR	2250-5892CEAS
JW03	CONN 2PIN HEADER MALE .100CTR	2250-5892CEAS
JW04	CONN 2PIN HEADER MALE .100CTR	2250-5892CEAS
JW05	3 PIN HEADER MALE .100 CTR BLK CON	2250-5833CEAS
JW06	3 PIN HEADER MALE .100 CTR BLK CON	2250-5833CEAS
K001	RELAY 12BDC 2A AT 28 V	1880-0022CEAS
L001	MC122 TYPE 2 1/2T RED COIL	1575-0028EAS
L002	MC122 TYPE 2 1/2T RED COIL	1575-0028EAS
L003	1 1/2T SHD COIL BRN 146-01J085	1575-0016EAS
L004	10EZ TYPE COIL RMC-2A6597HM	1575-0659EAS
L005	CHOKE RF 1.0UH	1530-0010CEAS
L006	MC122 TYPE 2 1/2T RED COIL	1575-0028EAS
L007	MC122 TYPE 2 1/2T RED COIL	1575-0028EAS
PCB1	WEATHER RECEIVER PCB	1600-4039EAS
Q001	MESFET NE25139 U71 SOT-143	1272-2514EAS
Q002	TRANS 2N3563	1271-3563CEAS
Q003	MPS5179 NPN HI FREQ TRANS	1271-5180EAS
Q004	TRANS PN2222A NPN	1271-2223CEAS
Q005	TRANS PN2222A NPN	1271-2223CEAS
Q006	TRANS PN2222A NPN	1271-2223CEAS
R001	RES CAR FILM 1/4W 5% 47K	1065-4702CEAS
R002	RES CAR FILM 1/4W 5% 47K	1065-4702CEAS
R003	RES CAR FILM 1/4W 5% 10K	1065-1002CEAS
R004	RES CAR COMP 1/4W 5% 3.3K	1065-3301CEAS
R005	RES CAR FILM 1/4W 5% 39 OHM	1065-0039CEAS
R006	RES CAR FILM 1/4W 5% 68 OHM	1065-0068CEAS
R007	RES CAR COMP 1/4W 5% 3.9K	1065-3901CEAS
R008	POT CERMET 10K PC MNT TOP ADJ	1072-1111CEAS
R009	RES CAR FILM 4.7K 1/4W 5%	1065-4701CEAS
R010	RES CAR FILM 1/4W 5% 47K	1065-4702CEAS
R011	RES CAR FILM 1/4W 5% 51K	1065-5102CEAS
R012	RES CAR COMP 1/4W 5% 680	1065-0680CEAS
R013	RES CAR FILM 1/4W 5% 10K	1065-1002CEAS
R014	RES CAR FILM 1/4W 5% 10K	1065-1002CEAS
R015	RES CAR COMP 1/4W 5% 3.3K	1065-3301CEAS
R016	RES CAR COMP 1/4W 5% 100K	1065-1003CEAS
R017	RES CAR FILM 1/4W 5% 470 OHM	1065-0470CEAS
R018	RES CAR FILM 1/4W 5% 150K	1065-1503CEAS
R019	RES CAR FILM 1/4W 5% 2.4K	1065-2401CEAS
R020	RES CAR FILM 1/4W 5% 2.4K	1065-2401CEAS
R021	RES CAR FILM 1/4W 5% 100	1065-0100CEAS
R022	RES CAR COMP 1/4W 5% 56	1065-0056CEAS
R023	RES CAR FILM 1/4W 5% 39K	1065-3902CEAS
R024	RES CAR FILM 1/4W 5% 200K	1065-2003CEAS
R025	RES CAR FILM 1/4W 5% 10K	1065-1002CEAS
R026	RES CAR COMP 1/4W 5% 100K	1065-1003CEAS
R027	RES CAR FILM 1/4W 5% 33K	1065-3302CEAS
R028	RES CAR FILM 1/4W 5% 100	1065-0100CEAS
R029	RES CAR FILM 1/4W 5% 33K	1065-3302CEAS
R030	100K 1T SIDE ADJ CERMET POT 3362X	1072-1103EAS
R031	RES CAR FILM 1/4W 5% 10K	1065-1002CEAS
R032	RES CAR FILM 1/4W 5% 10K	1065-1002CEAS
R033	RES CAR FILM 1/4W 5% 68 OHM	1065-0068CEAS
R034	RES CAR FILM 1/4W 5% 68 OHM	1065-0068CEAS
R035	RES CAR FILM 1/4W 5% 10K	1065-1002CEAS
R036	RES CAR FILM 1/4W 5% 10K	1065-1002CEAS
R037	RES CAR FILM 1/4W 5% 39K	1065-3902CEAS
R038	RES CAR FILM 1/4W 5% 1K	1065-1001CEAS
R039	RES CAR FILM 1/4W 5% 1M	1065-1004CEAS

CKT REF	DESCRIPTION	TFT PART NO.
R040	RES CAR FILM 1/4W 5% 13K	1065-1302CEAS
R041	RES CAR FILM 1/4W 5% 13K	1065-1302CEAS
R042	RES CAR FILM 1/4W 5% 13K	1065-1302CEAS
R043	RES CAR FILM 1/4W 5% 13K	1065-1302CEAS
R044	RES CAR FILM 1/4W 5% 47K	1065-4702CEAS
R045	RES CAR FILM 1/4W 5% 47K	1065-4702CEAS
R046	RES CAR FILM 1/4W 5% 68 OHM	1065-0068CEAS
R047	RES CAR FILM 1/4W 5% 1K	1065-1001CEAS
R049	RES CAR FILM 1/4W 5% 10K	1065-1002CEAS
R050	RES CAR FILM 1/4W 5% 20K	1065-2002CEAS
R051	RES CAR FILM 1/4W 5% 1K	1065-1001CEAS
R052	RES CAR FILM 1/4W 5% 10K	1065-1002CEAS
R053	RES 1W 1.0 OHM 5% METAL OXIDE	1068-0071CEAS
R054	RES 1W 1.0 OHM 5% METAL OXIDE	1068-0071CEAS
R055	RES CAR FILM 1/4W 5% 1K	1065-1001CEAS
R056	RES CAR FILM 1/4W 5% 470 OHM	1065-0470CEAS
R057	RES CAR FILM 1/4W 5% 470 OHM	1065-0470CEAS
R058	RES CAR 1/4W 5% 240K	1065-2403CEAS
R059	RES CAR FILM 1/4W 5% 7.5K	1065-7501CEAS
R060	RES CAR FILM 1/4W 5% 7.5K	1065-7501CEAS
R061	RES CAR FILM 1/4W 5% 16K	1065-1602CEAS
R062	RES CAR COMP 1/4W 5% 1.5K	1065-1501CEAS
R063	RES CAR FILM 1/4W 5% 10K	1065-1002CEAS
R064	RES CAR FILM 1/4W 5% 7.5K	1065-7501CEAS
R065	RES CAR FILM 1/4W 5% 2.4K	1065-2401CEAS
R066	RES CAR FILM 1/4W 5% 10K	1065-1002CEAS
R067	RES CAR FILM 1/4W 5% 10K	1065-1002CEAS
R068	RES CAR FILM 1/4W 5% 470 OHM	1065-0470CEAS
R069	RES CAR FILM 1/4W 5% 10K	1065-1002CEAS
R070	RES CAR FLM 1/4W 5% 27K	1065-2702CEAS
R071	RES CAR FILM 1/4W 5% 1.2K	1065-1201CEAS
R072	RES CAR FILM 1/4W 5% 47K	1065-4702CEAS
R073	RES CAR FLM 1/4W 5% 27K	1065-2702CEAS
RN01	10K SIP 8 PIN BUSSED RES NETWORK	1073-1007EAS
S001	10POS BCD R/A ROTARY DIP SWITCH	1800-3069EAS
SW01	SPDT R/A PC MNT MINI SWITCH	1800-3089EAS
T001	119LC-470073NO TYPE 7PH VAR IN	1052-0119EAS
T002	119LC-470073NO TYPE 7PH VAR IN	1052-0119EAS
T003	RMC-5021182NO TYPE 10EZZ VAR IND	1052-0120EAS
TP01	1/8 DX .35L BLK TEST TERMINAL	2140-0150CEAS
TP02	1/8 DX .35L BLK TEST TERMINAL	2140-0150CEAS
TP03	1/8 DX .35L BLK TEST TERMINAL	2140-0150CEAS
TP04	1/8 DX .35L BLK TEST TERMINAL	2140-0150CEAS
TP05	1/8 DX .35L BLK TEST TERMINAL	2140-0150CEAS
U001	MC3362P LOPWR DUAL CONV FM REC	1100-3362EAS
U002	MC145170P I/C	1102-1457EAS
U003	NE5230N LO VOLT OP AMP I/C 8 PIN	1100-5230CEAS
U004	E-PROM 1104-1655 FOR 930	6800-0152EAS
U005	I/C LM339 VOLTAGE COMPARATOR	1100-0339CEAS
U006	I/C LF353N DUAL J FET OP AMP	1100-0353CEAS
U007	I/C LF353N DUAL J FET OP AMP	1100-0353CEAS
XY01	INSULATOR FOR CRYSTAL HC-25	2140-0104CEAS
Y001	10.25MHZ HC-49U XTAL	2400-1025EAS

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