OPERATION MANUAL
MODEL 886 AM EBS SYSTEM
MODEL 887 FM EBS SYSTEM

TFT INC

P/N 5004-0886
Revision B
September 7, 1990
Equipment Serial No._____
Shipment Date_____

OPERATION MANUAL
MODEL 886 AM EBS SYSTEM
MODEL 887 FM EBS SYSTEM

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P/N 5005- 0886/0887 Rev. D

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TFT OPERATION MANUAL ADDENDUM

MODEL 886/887 **MANUAL P/N 5004-** 0886/0887 **Rev.** B

IMPORTANT MANUAL CHANGES

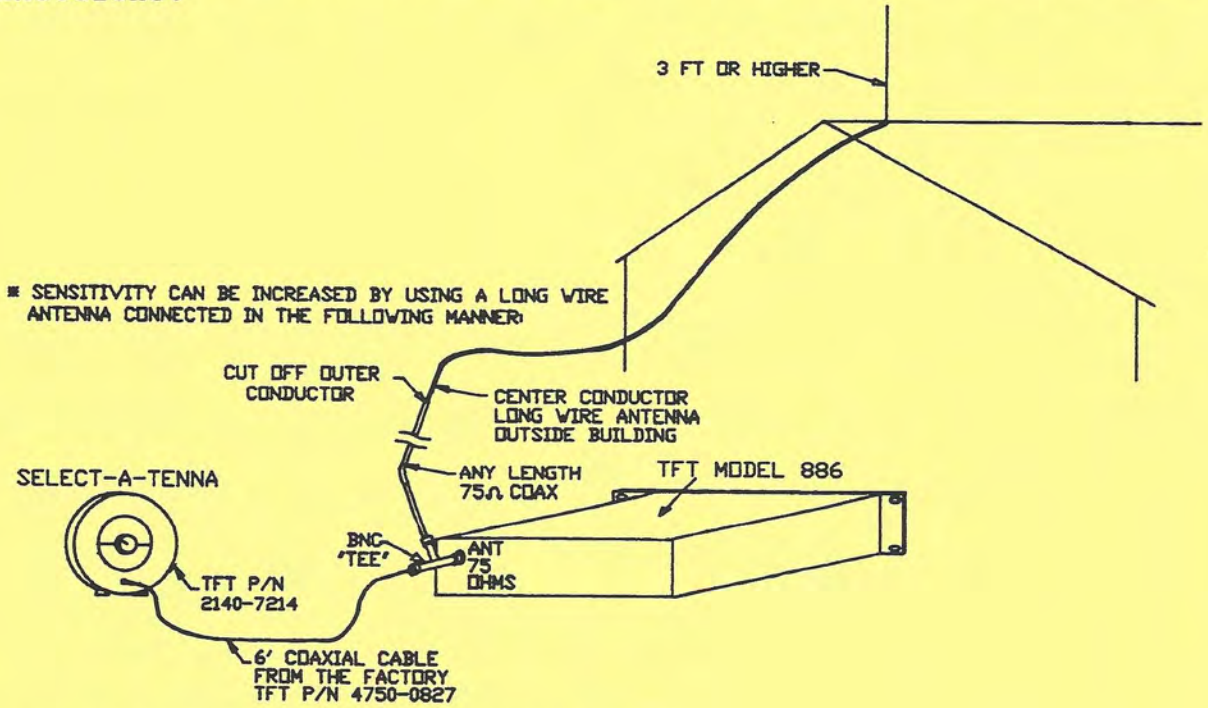
1. AM LOOP ANTENNA FOR MODEL 886 EBS AM RECEIVER

A tuneable loop antenna for AM reception has been tested by TFT and found to be an effective device for use in conjunction with the TFT Model 886, EBS AM Receiver. This loop antenna is used indoors to optimized RF gain and selectivity.

This antenna is also available through: Edmund Scientific
101 E. Gloucester Pike
Barrington, NJ 08007-1380
(609) 573-6250

Trade Name: Super Select-a-tenna
Part No. : 72147

If higher RF signal level to the Model 886 is required an outdoor antenna can be used. See the diagram below for installation and connections.



2. Model 887 FM Antenna Installation

a. Replace page 2.5
b. Add Fig. 2.3 after Fig. 2.2

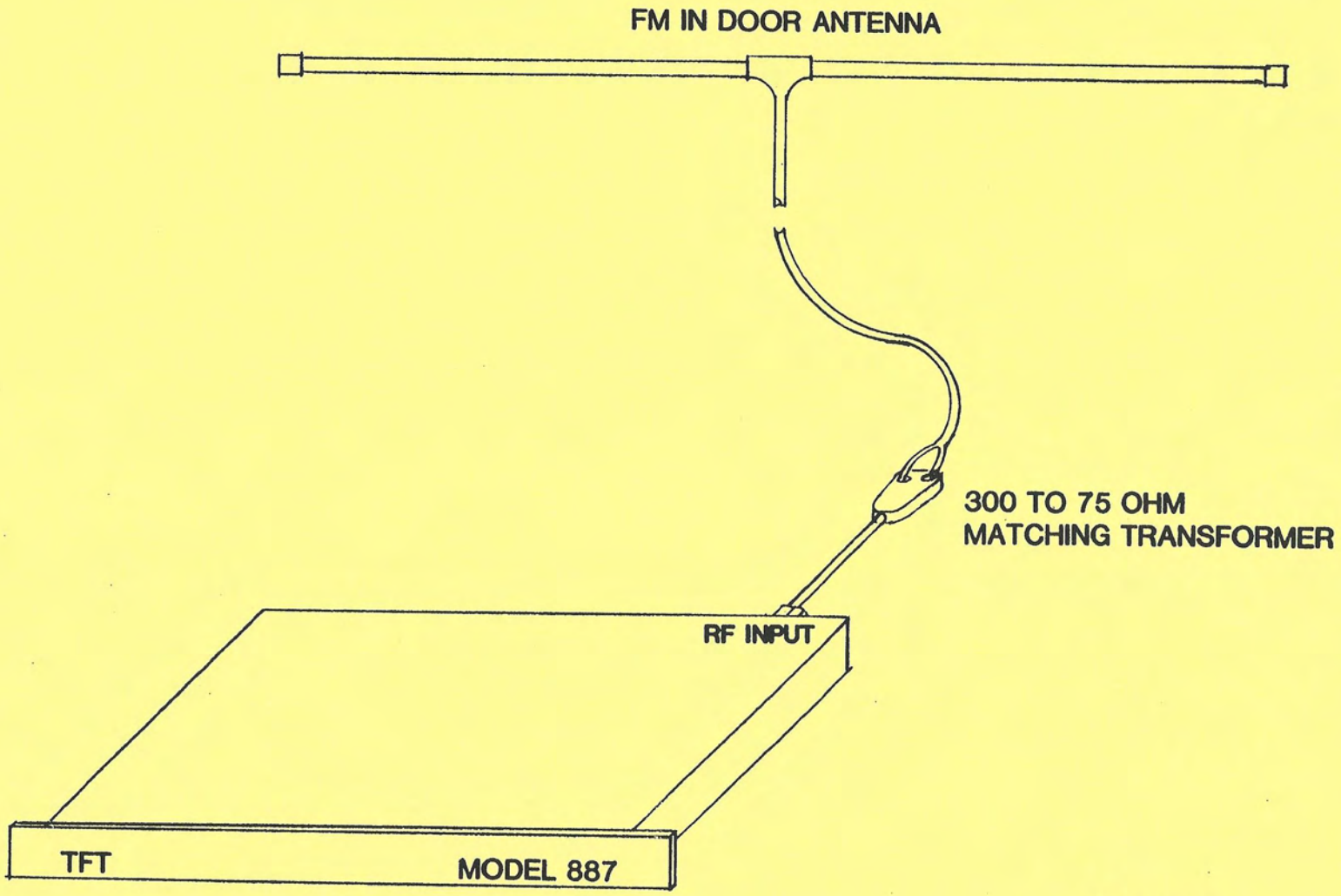


FIG. 2-3

FM ANTENNA MATCHING
INSTALLATION DIAGRAM
6600-2671 REV. A

h. For remote control usage, connect the REMOTE ACTIVATION (ON AIR) terminals, pins 8 (ground) and 9 of J3 on the 887 rear panel, and the REMOTE RESET terminals, pins 10 (ground) and 11 of J3, to momentary-to-ground switches. Grounding these lines activates the functions.

i. If the 887 will be used to activate a station alarm, connect the alarm device to the EBS ALARM RELAY terminals, pins 1 thru 6 of J1 on the 887 rear panel. See Figure 2-1, Model 886/887 Wiring Diagram, at the back of this section for relay configuration.

j. Ac power is applied through the rear panel ac connector. Connect the line cord to an appropriate outlet. The 887 should now be on.

2.6 AM Antenna Installation

If a local AM antenna is not available, an end-fed long wire antenna (approximately 250 ft.) can be used. One end of the long wire should be connected to the ANT 75Ω connector.

For moderately strong signal areas, an alternative to the long-wire antenna connection can be used. Refer to Figure 2-2, AM Antenna Installation Diagram, at the back of this section.

2.7 FM Antenna Installation

For indoor and moderate strong area, the supplied FM indoor antenna and 300Ω to 75Ω matching transformer can be used. Refer to Figure 2-3 FM antenna matching installation diagram at the back of this section for connection.

Model 886 AM EBS System
Model 887 FM EBS System
Table of Contents

SECTION 1
GENERAL INFORMATION

1.1 General Description

The Models 886 and 887 EBS Systems are designed for broadcasters to meet Parts 73.940, 73.941, and 73.942 of the FCC Rules and Regulations.

The 886 AM Receiver uses a frequency-synthesized local oscillator which is phase-locked to a 5 MHz crystal oscillator. It is tunable across the AM broadcast band in 10 kHz increments via a 3-digit front panel pushbutton switch. The 886 Receiver's stability is ±500 Hz per year.

In addition to broadcast station use, the AM Receiver provides low cost EBS monitoring for emergency services such as police, fire, hospitals, and Civil Defense agencies listening to EBS-participating stations during an emergency.

The 887 FM Receiver is a high performance, tunable receiver. It uses a 3-digit front panel pushbutton switch that tunes in 100 kHz increments. This receiver is ideally suited to FM inter-city relay networks, key links in the EBS alerting procedure, thus allowing pickup and rebroadcast of emergency programming without degradation of signal quality.

Both EBS Systems have a built-in, two-tone decoder for the 853 Hz and 960 Hz EBS signaling tones from demodulated outputs. Stable piezoelectric tuning fork filters are used to achieve a bandwidth of ±5 Hz from each tone frequency.

This integral two-tone EBS generator, which uses individual crystal oscillators, produces the 853 Hz and 960 Hz tones simultaneously, with an accuracy of ±0.25 Hz. Tone amplitudes may be observed and adjusted individually. Test and on-air transmission switches are provided on the front panel.

There are two 2-digit LED displays on the front panel of both systems. These displays show the number of days (up to 12) since EBS test transmissions were last received and/or sent. Two LED bar graph displays are also provided for audio and RF level observations.

A speaker is provided on the front panel for audio monitoring. This speaker works in conjunction with the rear panel volume control, which also adjusts the volume of an external speaker when connected to a rear panel phone jack.

Both receivers are configured at the factory to operate from a 117 Vac, 50 Hz or 60 Hz power source.

1.2 Specifications

AM Receiver

Frequency Range	540 kHz to 1750 kHz
Local Oscillator Stability	±500 Hz per year
Tuning Method	Pushbutton stepswitch in 10 kHz increments
Antenna Input	75Ω nominal, unbalanced
Sensitivity	30 μV for 20 dB signal-to-noise at 30% modulation
Image Rejection	25 dB
AGC	60 dB
IF Bandwidth, 6 dB	±5 kHz
Harmonic Distortion	Less than 3% at 75% modulation
Noise	45 dB or greater below 75% modulation with 10 mV/meter RF signal level
Audio Outputs (600Ω)	Balanced: +8 dBm Unbalanced: 1 Vrms
Carrier-off Output	Active pull-up to 10 V, 10 mA

FM Receiver

Frequency Range	88 MHz to 108 MHz
Tuning Method	Pushbutton stepswitch in 100 kHz increments
Antenna Input	75Ω nominal, unbalanced

Sensitivity	2 μV for 20 dB quieting
IF Bandwidth, 6 dB	±150 kHz
Image Rejection	40 dB
AGC	80 dB
Audio Frequency Response	±1 dB, 50 Hz to 15 kHz
Harmonic Distortion	1% at 33% modulation
Signal-to-noise Ratio (SNR)	60 dB or greater below 100% modulation at 50 μV RF input
De-emphasis	75 μsec
Audio Outputs (600Ω)	Balanced: +8 dBm Unbalanced: 1 Vrms
Carrier-off Output	Active pull-up to 10 V, 10 mA

Decoder (AM and FM)

Decoder Input Level	100 mV into 600Ω
Bandwidth	±5 Hz
Frequency Stability	±0.25 Hz, crystal-controlled
Audio Output Level	250 mW, internal speaker
Generator Output Level (600Ω)	Balanced: +8 dBm Unbalanced: 1 Vrms

Harmonic Distortion	Less than 2%
Tone Duration	6, 12, or 24 seconds, adjustable
Tone Level Adjust	Internal
Time Delay for De-muting	Adjustable to 2, 4, or 8 seconds
External Alarm Contacts	SPDT relay contacts to rear panel strip

Front Panel

Day Display	Two 12-day digital displays to record number of days since last transmission and/or reception of two-tone transmission. Automatic reset.
ON/STANDBY Switch	3-position, spring-loaded toggle switch. In the ON mode, the speaker is demuted. In the STANDBY mode, the speaker is muted until an EBS alert is received.
RESET Switch	Resets (mutes) the speaker after receipt of EBS transmission.
TEST/RESET Switch	3-position, spring-loaded toggle switch. In the TEST position, the 886/887 performs a self-test of the decoder. In the RESET position, it interrupts on-air transmission or a self-test.
ON AIR Switches	Two 3-position, spring-loaded toggle switches. Must be held in opposing positions. Used to prevent accidental test transmission.
853 Hz/960 Hz OPERATE Switch	3-position, spring-loaded toggle switch. Tests individual tones and connects both tones to an output for test operations.

Mechanical and Environmental

Receiver Input Power	117 Vac, ±15%, 50 Hz or 60 Hz, 20 W maximum
Operating Temperature	0°C to +50°C (32°F to 122° F)
Dimensions	1 3/4" (4.4 cm) H x 19" (48.3 cm) W x 10" (25.4 cm) D
Weight	6 lbs. (2.7 kg)

1.3 Warranty

TFT, Inc., warrants each of its manufactured instruments to meet the specifications when delivered to the **BUYER** and to be free from defects in material and workmanship. TFT will repair or replace, at its expense, for a period of one year from the date of delivery of equipment, all parts which are defective from faulty material or poor workmanship.

Instruments found to be defective during the warranty period shall be returned to the factory with transportation charges prepaid by the **BUYER.** It is expressly agreed that replacement and repair shall be the sole remedy of **BUYER** 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 by the **SELLER** prior to such returns. Upon examination by the factory, if any instrument is found to be defective, the unit will be repaired and returned to the **BUYER,** with transportation charges prepaid by the **SELLER.**

Transportation charges for instruments found to be defective within the first 30 days of the warranty period will be paid both ways by the **SELLER.**

Transportation charges for warranty returns wherein failure is found not to be the fault of the **SELLER** shall be paid both ways by the **BUYER.**

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

1.4 Claim for Damage in Shipment

Your instrument should be inspected and tested as soon as it is received. The instrument is insured for safe delivery. 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.

WE SINCERELY PLEDGE OUR IMMEDIATE AND FULLEST COOPERATION TO ALL USERS OF OUR PRECISION ELECTRONIC INSTRUMENTS.

PLEASE ADVISE US IF WE CAN ASSIST YOU IN ANY MANNER.

TFT, Inc.
3090 Oakmead Village Drive
P.O. Box 58088
Santa Clara, CA 95052-8088
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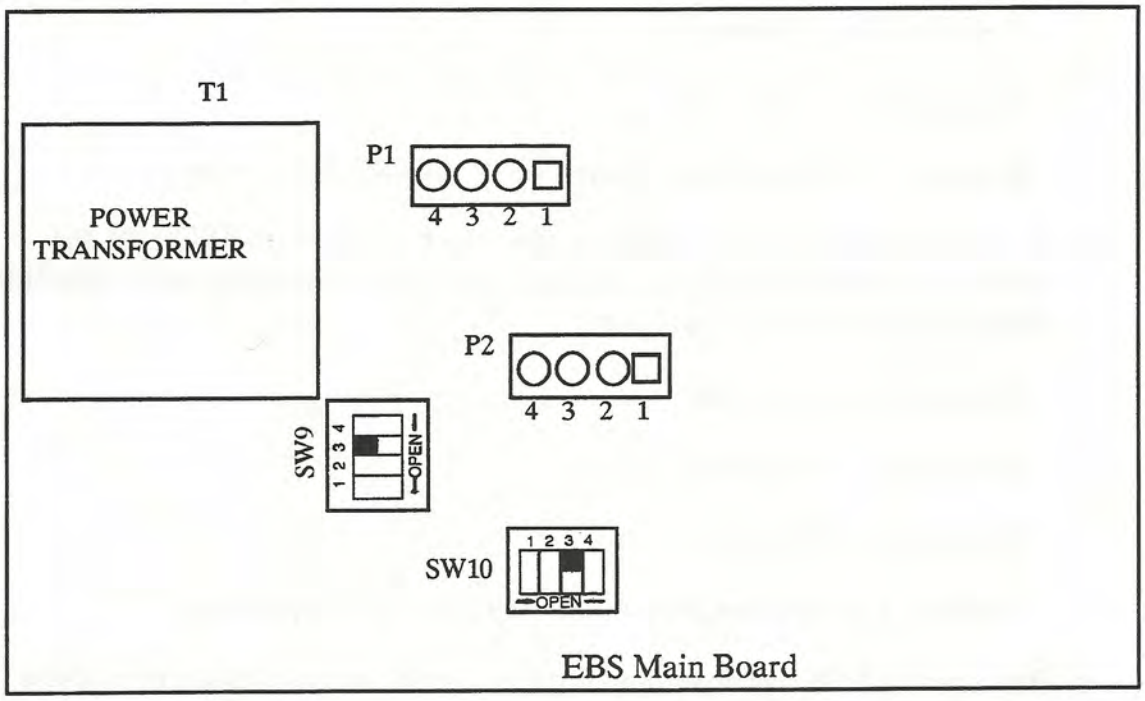
SECTION 2
INSTALLATION

2.1 Unpacking and Inspection

Upon receiving the instrument, inspect the packing box and instrument for signs of possible shipping damage. After installation, operate the instrument in accordance with the procedures in Part A, Section 3, Operation, of this manual. 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 Power Requirements

Both AM and FM EBS Systems are factory-wired to operate from 117 Vac. The line frequency must be either 50 Hz or 60 Hz. To select either 50 Hz or 60 Hz, jumpers (supplied) must be placed at the appropriate pins at both P1 and P2 on the Main Board. For 50 Hz, pins 3 and 4 must be jumpered; for 60 Hz, pins 1 and 2 must be jumpered. Refer to the exploded view of P1 and P2 below for pin locations. Maximum power required is 20 watts.



Front Panel
Model 886/887

Note: Pin 1 of P1 and P2 is the squared hole. From the front panel view, the pins are numbered 1-4 from right to left.

2.3 Pre-installation DIP Switch Settings

There are two DIP switches located on the Main Board. They can be used to set the duration for the dual-tone signal and to set the de-muting time delay. These switches are shown in the figure for Paragraph 2.2 above.

SW9 is used to set the tone duration for the dual-tone signal for either 6, 12, or 24 seconds. This switch is set for 24 seconds at the factory.

SW10 is used to set the time delay for the de-muting circuit. It can be set for either 2, 4, or 8 seconds. SW10 is set for 8 seconds at the factory .

To change these DIP switches for other than the times set at the factory, perform the following:

a. Remove the EBS top cover.

b. To change the dual-tone duration, depress the switch position on SW9 for the desired time according to the following list. The remaining switch positions should be in the OPEN position.

   Position 2 = 6 seconds

   Position 3 = 12 seconds

   Position 4 = 24 seconds

   Position 1 = Unused and should be in the OPEN position

c. To change the time delay, depress the switch position on SW10 for the desired time according to the following list. The remaining switch positions should be in the OPEN position.

   Position 2 = 2 seconds

   Position 3 = 4 seconds

   Position 4 = 8 seconds

   Position 1 = Unused and should be in the OPEN position

d. Replace the EBS top cover and continue with the installation procedure below.

2.4 AM System Installation

The Model 886 is calibrated and ready for installation into an equipment rack for immediate use. Ensure proper environmental conditions exist as specified in Section 1, Paragraph 1.2 of this manual. The operating temperature for this unit is between 0°C and 50°C (32°F and 122°F). To install the 886, perform the following:

a. Mount the Model 886 in the equipment rack and secure.

b. If an AM receiver is installed, connect a 75Ω coaxial cable from the antenna to the ANT 75Ω connector on the rear panel of the 886. If a 75Ω coaxial cable is unavailable, an alternative antenna can be used. See Paragraph 2.6 below for further installation instructions.

c. If desired, the RX AUDIO UNBALANCED terminals, pins 9 (ground) and 10 of J1 on the rear panel of the 886, can be connected to a monitor or other external device.

d. The RX AUDIO BALANCED terminals at J1, pins 11 and 12 on the rear panel of the 886, can be connected to a monitor or other external device. The output at these terminals is +8 dBm into 600Ω.

e. If a remote indication of carrier failure is to be provided, connect the CARRIER FAIL terminals, pins 7 (ground) and 8 of J1 on the rear panel of the 886, to the remote indicator. The output 10 V at 10 mA for carrier loss.

f. Connect the program output to the AUDIO LOOP THRU RIGHT CH BALANCED INPUT terminals, pins 4 and 5 of J2 on the 886 rear panel. Connect the monaural program output line to the AUDIO LOOP THRU RIGHT CH BALANCED OUTPUT terminals, pins 1 and 2 of J2 on the 886 rear panel.

g. For remote control usage, connect the REMOTE ACTIVATION (ON AIR) terminals, pins 8 (ground) and 9 of J3, and the REMOTE RESET terminals, pins 10 (ground) and 11 of J3, to momentary-to-ground switches. Grounding these lines activates the functions.

h. If the 886 will be used to activate a station alarm, connect the alarm device to the EBS ALARM RELAY terminals, pins 1 thru 6 of J1 on the 886 rear panel. See Figure 2-, Model 886/887 Wiring Diagram, at the back of this section for relay configuration.

i. Ac power is applied through the rear panel ac connector. Connect the line cord to an appropriate outlet. The 886 should now be on.

2.5 FM System Installation

The Model 887 is calibrated and ready for installation into an equipment rack for immediate use. Ensure proper environmental conditions exist as specified in Section 1, Paragraph 1.2 of this manual. The operating temperature for this unit is between 0°C and 50°C (32°F and 122°F). To install the 887, perform the following:

a. Mount the Model 887 in the equipment rack and secure.

b. If an FM receiver is installed, connect a 75Ω coaxial cable from the antenna to the ANT 75Ω connector on the rear panel of the 887. If a local FM antenna is not available, a conventional FM or TV antenna is satisfactory.

c. If desired, the RX AUDIO UNBALANCED terminals, pins 9 (ground) and 10 of J1 on the rear panel of the 887, can be connected to a monitor or other external device.

d. The RX AUDIO BALANCED terminals at J1, pins 11 and 12 on the rear panel of the 887, can be connected to a monitor or other external device. The output at these terminals is +8 dBm into 600Ω.

e. If a remote indication of carrier failure is to be provided, connect the CARRIER FAIL terminals, pins 7 (ground) and 8 of J1 on the rear panel of the 887, to the remote indicator. The output is 10 V at 10 mA for carrier loss.

f. To connect the right channel loop thru configuration, connect the program right channel balanced output to the AUDIO LOOP THRU RIGHT CH BALANCED INPUT terminals, pins 4 and 5 of J2 on the 887 rear panel. Connect the stereo generator right channel input line to the AUDIO LOOP THRU RIGHT CH BALANCED OUTPUT terminals, pins 1 and 2 of J2 on the 887 rear panel. See the wiring diagram for these connections, Figure 2-1 (Model 886/887 Wiring Diagram), at the back of this section.

   To connect the left channel loop thru configuration, connect the program left channel balanced output to the AUDIO LOOP THRU LEFT CH BALANCED INPUT terminals, pins 9 and 10 of J2 on the 887 rear panel. Connect the stereo generator left channel input line to the AUDIO LOOP THRU LEFT CH BALANCED OUTPUT terminals, pins 6 and 7 of J2 on the 887 rear panel. See Figure 2-1, Model 886/887 Wiring Diagram, at the back of this section.

g. To use the composite loop thru configuration, connect the stereo generator output or composite output to the COMPOSITE LOOP THRU IN connector. Connect the COMPOSITE LOOP THRU OUT connector to the exciter modulation input. See Figure 2-1, Model 886/887 Wiring Diagram, at the back of this section for wiring connections.

h. For remote control usage, connect the REMOTE ACTIVATION (ON AIR) terminals, pins 8 (ground) and 9 of J3 on the 887 rear panel, and the REMOTE RESET terminals, pins 10 (ground) and 11 of J3, to momentary-to-ground switches. Grounding these lines activates the functions.

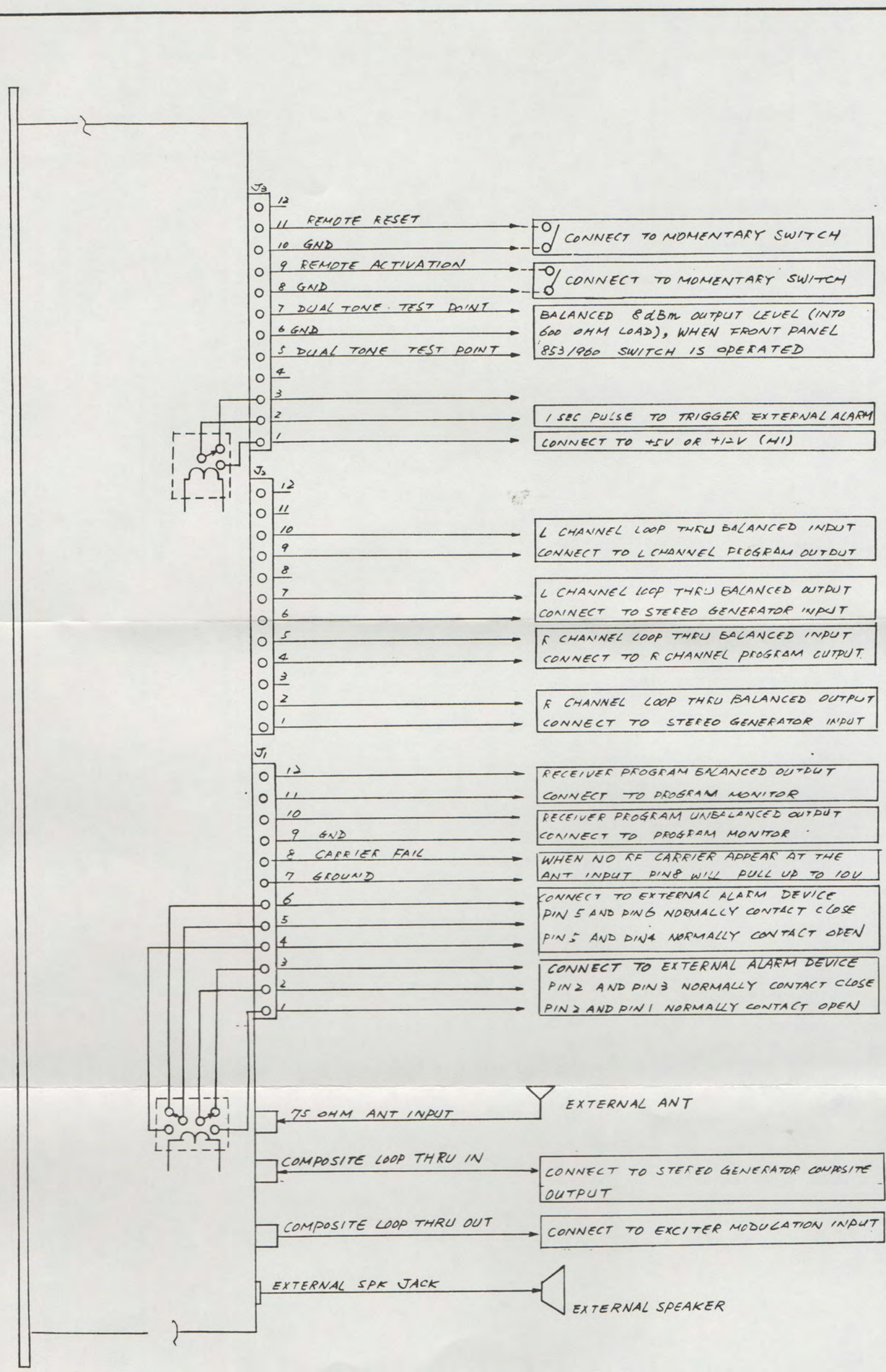
i. If the 887 will be used to activate a station alarm, connect the alarm device to the EBS ALARM RELAY terminals, pins 1 thru 6 of J1 on the 887 rear panel. See Figure 2-1, Model 886/887 Wiring Diagram, at the back of this section for relay configuration.

j. Ac power is applied through the rear panel ac connector. Connect the line cord to an appropriate outlet. The 887 should now be on.

2.6 AM Antenna Installation

If a local AM antenna is not available, an end-fed long wire antenna (approximately 250 ft.) can be used. One end of the long wire should be connected to the ANT 75Ω connector.

For moderately strong signal areas, an alternative to the long-wire antenna connection can be used. Refer to Figure 2-2, AM Antenna Installation Diagram, at the back of this section.



REVISIONS			
ZONE	REV.	DESCRIPTION	DATE	APPROVED
	A	RELEASED TO PROD	6/21/89	

	APPROVALS	DATE
DRAWN		
ENGR.		
MFG		
QA		

MODEL 888/887
WIRING DIAGRAM

SIZE C | FSCM NO. | DWG. NO. 6600-2608 | REV. A

SCALE NONE | SHEET 1 OF 1

FIG. 2-1

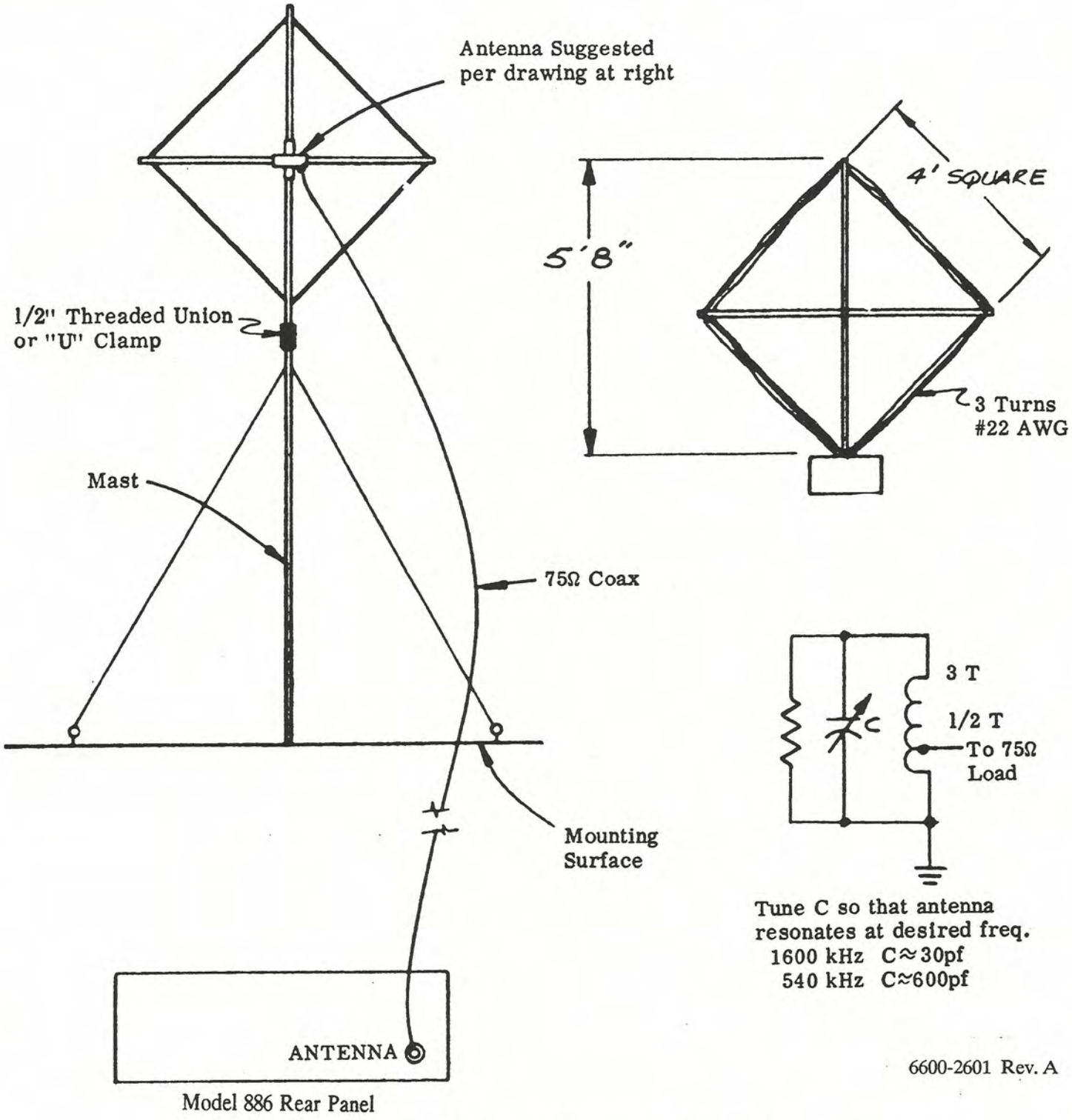


Figure 2-2. AM Antenna Installation Diagram

If a local AM antenna is not available, an end-fed long wire antenna (approximately 250 ft.) can be used. One end of the long wire should be connected to the 886 rear panel ANT 75Ω connector.

For moderately strong signal areas, an alternative to the long-wire antenna connection, shown above, can be used.

SECTION 3
OPERATION

3.1 General Discussion

The Model 886 AM Receiver uses a frequency-synthesized local oscillator which is phase-locked to a 5 MHz crystal oscillator. It is tunable across the AM broadcast band in 10 kHz increments via a 3-digit front panel pushbutton switch.

In addition to broadcast station use, the 886 provides low cost EBS monitoring for emergency services such as police, fire, hospitals, and Civil Defense agencies listening to EBS-participating stations during an emergency.

The Model 887 FM Receiver is a high performance, tunable receiver. It uses a 3-digit front panel pushbutton switch that tunes in 100 kHz increments. This receiver is ideally suited to FM inter-city relay networks, key links in the EBS alerting procedure, thus allowing pickup and rebroadcast of emergency programming without degradation of signal quality.

Both EBS Systems have a built-in, two-tone decoder for the 853 Hz and 960 Hz EBS signaling tones from demodulated outputs. Stable piezoelectric tuning fork filters are used to achieve a bandwidth of ±5 Hz from each tone frequency.

This integral two-tone EBS generator produces the 853 Hz and 960 Hz tones simultaneously with an accuracy of ±0.25 Hz. Tone amplitudes may be observed and adjusted individually.

The front panel of both systems contains both test and on-air transmission switches, two 2-digit LED displays (which show the number of days, up to 12, since EBS test transmissions were last received and/or sent), and two LED bar graph displays for audio and RF level observations.

Also on the front panel of both systems is a speaker for audio monitoring. This speaker works in conjunction with the rear panel volume control, which also controls an external speaker when connected to the rear panel phone jack.

3.2 Turn-on and Warm-up

The Models 886 and 887 EBS Systems are configured at the factory to operate from a 117 Vac, 50 or 60 Hz power source. **Note:** Ensure the proper jumpers for either 50 Hz or 60 Hz are installed at P1 and P2 on the Main Board before applying power to the EBS System. Refer to Paragraph 2.2, Power Requirements, and the exploded view of P1 and P2 on Page 2-1 of this manual for the proper installation of these jumpers. To turn on

the 886/887, connect the ac line cord to an appropriate outlet. No warm-up is required. The 886/887 is now ready for use.

3.3 Controls, Connectors, and Indicators

The following summary descriptions refer to the front and rear panel controls, connectors, and indicators of both 886 and 887 EBS Systems. Numerals in parentheses, ( ), refer to the reference numbers in Figure 3-1, Model 886 Front and Rear Panel Illustration, and Figure 3- 2, Model 887 Front and Rear Panel Illustration, at the back of this section.

Note: The only difference in descriptions between the AM and FM Systems is reference number 15, the FREQUENCY X10 kHz (Model 886) and FREQUENCY MHz (Model 887) pushbutton switches. Each system has its own summary description for these switches.

Front Panel

Ref. No.	Designation	Function
1	GENERATOR RESET/TEST momentary switch	Used to test the operation of the two-tone generator without interrrupting normal programming. In the TEST position, the speaker is on and there will be no delay. If, however, the SPEAKER ON/STANDBY switch is in the STANDBY position you will experience a delay. The delay is dependent on switch positions of DIP switch SW10, the Time Delay for De-muting switch on the EBS Main Board. Refer to Section 2, Paragraph 2.3 of this manual for pre-installation switch position information. In the RESET position, the unit resets ON AIR or TEST during the dual-tone transmission activated by either of these positions.
2	GENERATOR 853 Hz/960 Hz OPERATE momentary switch	3-position, spring-loaded momentary switch used to test the two tones – either 853 or 960 – separately. The specific tone will be heard on the speaker as long as the switch is in the corresponding position with the SPEAKER ON/STANDBY switch (5) in the ON position.
3	GENERATOR ON AIR momentary switches	Used to transmit the dual-tone audio signal. These two switches must be placed in opposite directions, as indicated by the arrows on the front panel, at the same time. When ON AIR is

		activated, pins 1 & 2 and pins 6 & 7 of J2 on the rear panel of the unit (normally used for the loop thru and program) will switch to the internal dual-tone output. The program will be interrupted for the duration of the dual-tone, which is dependent on the switch settings of SW9 on the Main Board. After the dual-tone signal, the unit will switch back to the program.
4	GENERATOR ON AIR LED	Lights when ON AIR is activated by placing the GENERATOR ON AIR momentary switches in opposite directions at the same time.
5	SPEAKER ON/STANDBY momentary switch	3-position, spring-loaded momentary switch. In the ON position, this switch turns on the speaker; in the STANDBY position, it mutes the speaker. In the STANDBY position, the speaker will automatically turn on when one of the following conditions exists after the de-muting delay set by SW10 on the Main Board (refer to Section 2, Paragraph 2.3 of this manual for switch position information): 1) the GENERATOR RESET/TEST switch is in the TEST position; 2) the GENERATOR ON AIR switches are placed in opposing directions (as indicated by the positions of the arrows on the front panel), or; 3) the receiver receives a dual-tone signal.
6	EBS RECEIVED RESET momentary switch	3-position, spring-loaded momentary switch that resets the EBS RECEIVED SET LED (7) on the front panel and the EBS Alarm Relay, K1, on the rear panel. After receiving a dual-tone signal from another transmitter and acknowledging reception of the signal, this switch is used to reset the flashing EBS RECEIVED SET LED (7). Resetting this indicator will prepare it for the next reception of a dual-tone signal.
7	EBS RECEIVED SET LED	Flashes on when the 886/887 receives a dual-tone signal from another transmitter. The LED will flash until reset with the EBS RECEIVED RESET switch (6).

8	EBS RECEIVED SET pushbutton switch	Used to set the calendar display after a power outtage affecting the days since the last dual-tone signal was received.
9	DAYS SINCE LAST RECEPTION calendar display	LED displaying the number of days since the 886/887 received a dual-tone audio signal. Upon receipt of a dual-tone signal, this display resets to 0 (zero) and will increase by 1 each day after receiving the signal. If the 886/887 EBS System has not received a dual-tone signal by day 12, this display will begin flashing. If flashing occurs, either a dual-tone signal has not been received within the last 12 days or the unit may be faulty.
10	CLK LED	Flashes at 1 second intervals (1 Hz) to indicate that the Model 886/887 internal clock is correct.
11	TRANSMISSION SET pushbutton switch	Used to set the calendar display after a power outtage affecting the days since the last dual-tone signal was transmitted.
12	DAYS SINCE LAST TRANSMISSION calendar display	LED displaying the number of days since the 886/887 was used to transmit a dual-tone signal. It resets to 0 (zero) after transmitting the dual-tone signal. It will increase by 1 each day after transmitting the dual- tone signal. On day 12, the display will begin flashing. If flashing occurs, either a dual-tone signal has not been issued within the last 11 days or the unit may be faulty. To test if the unit is functioning properly, reset the display by setting the RESET/TEST switch (1) to the TEST position. The calendar display should reset to 0 (zero), indicating a good unit. If the unit is working properly, reset the display back to its flashing mode. Using the TRANSMISSION SET pushbutton switch (11), set the display back to 12 and it will begin flashing again.
13	AUDIO LEVEL bar graph display	Displays the audio level of the received program.
14	RF LEVEL bar graph display	Displays the RF level of the received program.

15	AM EBS System, FREQUENCY X10 kHz pushbutton switches	For the AM EBS System, indicates the frequency of the station being received. The station frequency is equal to the numerals indicated on the switches times 10 kHz.
15	FM EBS System, FREQUENCY MHz pushbutton switches	For the FM EBS System, indicates the frequency (in MHz) of the station being received. The frequency is read directly off these switches.
16	Speaker	For listening to received program, received dual-tone signal, or transmitted dual-tone signal.

Rear Panel (AM and FM Systems)

17	EXT SPK JACK	Used to connect an external speaker to the Model 886/887.
18	COMPOSITE LOOP THRU OUT connector	Connects to the exciter or transmitter modulation input.
19	COMPOSITE LOOP THRU IN connector	Connects to the stereo generator output. When the EBS ON AIR is activated, the composite output switches to the dual-tone circuit. After the dual-tone signal, the unit will switch back to the program.
20	ANT 75Ω connector	For connecting an antenna to the 886/887.
21	Label	Label for J1, J2, and J3 pin connections.
22	VOLUME adjust	Adjusts the program or audio signal volume. Works in conjunction with the front panel speaker and the external speaker, if connected.
23	J1, 12-pin connector	Used to connect the following: **J1, pins 1-6, EBS ALARM RELAY:** Connects the internal relay, K1 (1 A, 12 V), to these pins for the external studio alarm or control device. Normally, pins 1 and 2 and pins 4 and 5 are open; pins 2 and 3 and pins 5 and 6 are closed. When a dual-tone signal is received, pins 1 and 2 and pins 4 and 5 are closed; pins 2 and 3 and pins 5 and 6 are open. When a dual-tone signal is received, K1 is energized. There is no

de-muting delay. To reset the normal condition, place the EBS RECEIVED RESET switch (6) to the RESET position.

J1, pins 7 and 8, CARRIER FAIL: Used for indicating when no RF carrier is coming into the 886/887. If the carrier is off, pin 8 is high. Pin 7 is ground.

J1, pins 9 and 10, RX AUDIO UNBALANCED: Receiver unbalanced audio signal output; 600Ω output impedance. Used for connecting an external device. Pin 9 is ground.

J1, pins 11 and 12, RX AUDIO BALANCED: Receiver balanced audio signal output; 8 dBm into 600Ω output impedance. Used for connecting an external device.

24 J2, 12-pin connector

Used to connect the following:

J2, pins 1 and 2, AUDIO LOOP THRU RIGHT CH BALANCED OUTPUT: Audio program output normally connected to the transmitter or exciter audio balanced input. When EBS ON AIR is activated, the internal relay disconnects the external audio program from pins 1 and 2 and allows the dual-tone signal to the transmitter. When the dual-tone is over, the loop-thru is reconfigured in order to connect the audio program signal.

J2, pin 3: Ground.

J2, pins 4 and 5, AUDIO LOOP THRU RIGHT CH BALANCED INPUT: Balanced audio input connected to the external audio program balanced output. Normally, the external audio program with loop-thru pins 4 and 5 are connected to pins 1 and 2, respectively, of J2. These are connected to the outside transmitter balanced input. When EBS ON AIR is activated, the internal relay disconnects the external audio program from pins 4 and 4 and allows the dual-tone signal to the transmitter. When the dual-tone is over, the

loop-thru is reconfigured in order to connect the audio program signal.

J2, pins 6 and 7, AUDIO LOOP THRU LEFT CH BALANCED OUTPUT: Audio program output normally connected to the transmitter audio balanced input. When EBS ON AIR is activated, the internal relay disconnects the external audio program from pins 6 and 7 and allows the dual-tone signal to the transmitter. When the dual-tone is over, the loop-thru is reconfigured in order to connect the audio program signal.

J2, pin 8: Ground.

J2, pins 9 and 10, AUDIO LOOP THRU LEFT CH BALANCED INPUT: Balanced audio input connected to the external audio program balanced output. Normally, the external audio program with loop-thru pins 9 and 10 are connected to pins 6 and 7, respectively, of J2. These are connected to the outside transmitter balanced input. When EBS ON AIR is activated, the internal relay disconnects the external audio program and allows the dual-tone signal to the transmitter. When the dual-tone is over, the loop-thru is reconfigured in order to connect the audio program signal.

J2, pins 11 and 12: No connections.

25 J3, 12-pin connector

Used to connect the following:

J3, pins 1-2, ONE SECOND PULSE END OF DUAL TONE ACTIVATION: After the dual-tone signal is transmitted during TEST or ON AIR mode, K2 is energized and pin switches from pin 2 to pin 1 for 1 second. You can use this 1 second to trigger peripheral equipment.

J3, pin 4: No connection.

		J3, pins 5 and 7, DUAL TONE TEST POINT: Used to calibrate a single tone output level. When the front panel GENERATOR 853 Hz/960 Hz OPERATE switch (2) is in either position, there will be an 8 dBm balanced output. 600Ω output impedance per tone.
		J3, pin 6: Ground.
		J3, pins 8 and 9, REMOTE ACTIVATION: Used to remotely control the 886 (887) to transmit the dual-tone signal. To activate, pull pin 9 to ground by connecting a remote control momentary-to-ground switch (or equivalent) to these pins. Pin 8 is ground.
		J3, pins 10 and 11, REMOTE RESET: Used to reset ON AIR or TEST during dual-tone transmission. To activate, pull pin 11 to ground by connecting a remote control momentary-to-ground switch (or equivalent) to these pins. Pin 10 is ground.
26	1/2 A FUSE	1/2 amp fuse for the ac line.
27	117 V AC line	Ac line cord for 117 Vac to the 886/887.
28	DUAL TONE LEVEL adjust (top cover)	Adjusts the output level of the dual-tone alarm signal.

3.4 System Operation

The following paragraphs describe the operation of the 886 and 887 EBS Systems both as receivers and transmitters of the dual-tone emergency signal. On power-up, the EBS unit is in the STANDBY position and ready for immediate use.

3.4.1 Operation of the AM Receiver

To use the 886 as a receiver, perform the following:

a. Select the audio program by depressing the front panel FREQUENCY X10 kHz pushbutton switches (15) for the desired station. The actual station frequency is 10 kHz times what is displayed on these switches. For example, the switch positions for a 540 kHz station are 054.

b. Upon power-up, an internal muting circuit mutes the speaker. To turn the speaker on, place the SPEAKER ON/STANDBY switch (5) to the ON position. The audio program will be on the speaker.

c. Tune the speaker for optimum listening by adjusting the rear panel VOLUME control (22).

3.4.2 Operation of the FM Receiver

To use the 887 as a receiver, perform the following:

a. Select the audio program by depressing the FREQUENCY MHz pushbutton switches (15) for the desired station. The frequency is read directly off these switches, contains four digits, and is read in MHz. The first digit is actually the combination of two switches; this digit can be set from 8 - 10 only. For example, the switch positions for a 100.1 MHz station are 1001.

b. Upon power-up, an internal muting circuit mutes the speaker. To turn the speaker on, place the SPEAKER ON/STANDBY switch (5) to the ON position. The audio program will be on the speaker.

c. Tune the speaker for optimum listening by adjusting the rear panel VOLUME control (22).

3.4.3 Operation of the Two-tone Generator (AM and FM)

To transmit a dual-tone signal, perform the following:

a. Place the two GENERATOR ON AIR switches (3) in opposite directions at the same time. (The directions are indicated by arrows on the front panel.)

b. To restore to normal programming, place the GENERATOR RESET/TEST switch (1) to the RESET position.

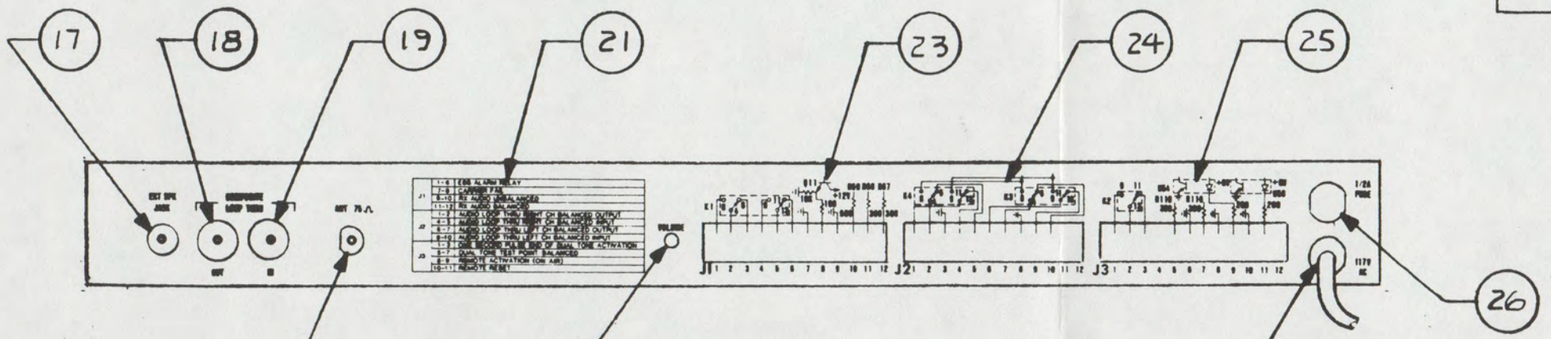
c. To test the two-tone generator without interrupting normal programming, place the RESET/TEST switch (1) to the TEST position. The two-tone signal will be present at the speaker.

d. To test the tones separately, place the OPERATE 853 Hz/960 Hz switch (2) to the desired tone position. The tone corresponding to the selected switch position will be on the speaker as long as the switch is held in that position.

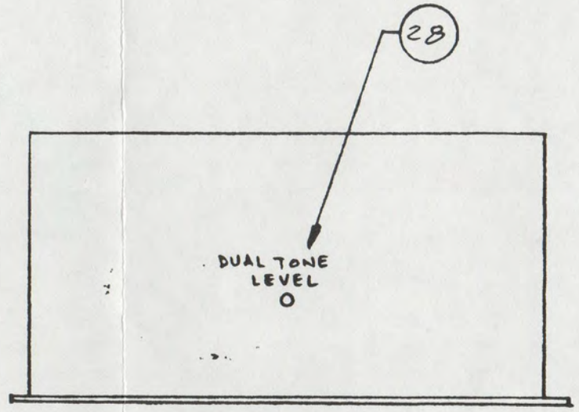
DWG. NO.	SH	REV.

REVISIONS

REV.	DESCRIPTION	DATE	APPROVED
A	RELEASED TO PROD	6-21-89	



REAR VIEW



TOP VIEW

FRONT VIEW

FIG. 3-1

	QTY REQD	FSCM NO.	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	MATERIAL SPECIFICATION	

PARTS LIST

	886
NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES
TOLERANCES ARE:
FRACTIONS ± DECIMALS .XX ± .XXX ± ANGLES ±

MATERIAL

FINISH

DO NOT SCALE DRAWING

CONTRACT NO.

APPROVALS	DATE
DRAWN S.T	6/30/87
CHECKED R Chi	6/30/89
ISSUED	

TIME & FREQUENCY TECHNOLOGY INC.

MODEL 886
FRONT & REAR VIEW ILLUSTRATION

SIZE	FSCM NO.	DWG. NO.	REV.
B		6600-2598	A

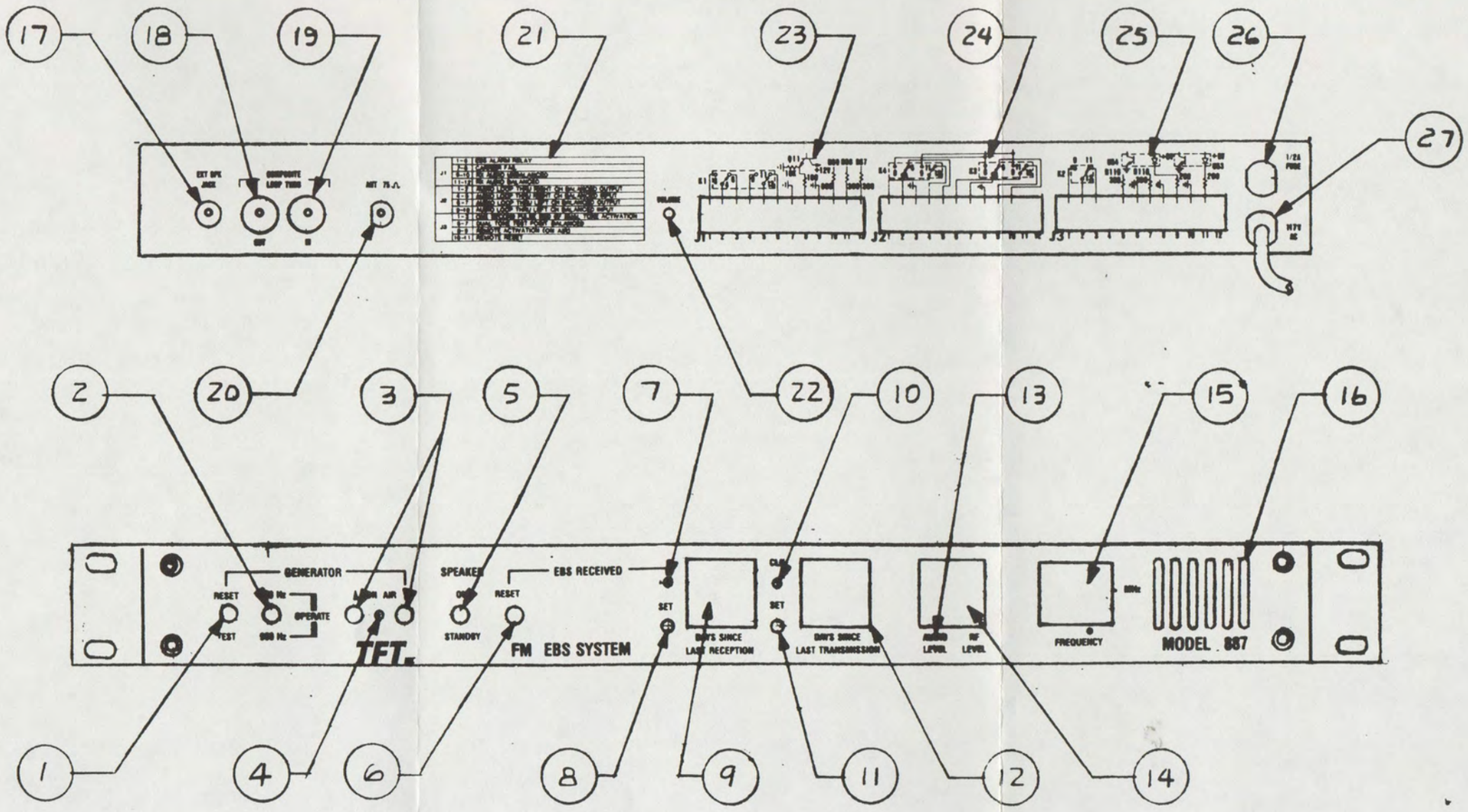
SCALE | SHEET 1 OF 1

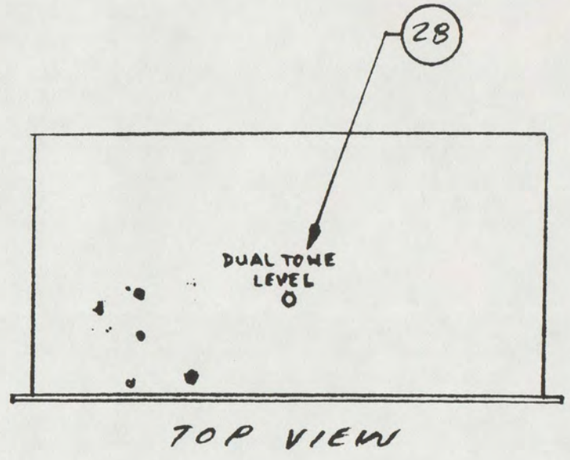
BISHOP GRAPHICS/ACCUPRESS
REORDER NO. A25710

DWG. NO.	SH	REV.

REVISIONS

REV.	DESCRIPTION	DATE	APPROVED
A	RELEASED TO PROD	6-21-89	





TOP VIEW

FIG. 3-2

	QTY REQD	FSCM NO.	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	MATERIAL SPECIFICATION	

PARTS LIST

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES
TOLERANCES ARE:
FRACTIONS ± DECIMALS .XX ± .XXX ± ANGLES ±

MATERIAL

FINISH

DO NOT SCALE DRAWING

CONTRACT NO.

APPROVALS	DATE
DRAWN L. T.	6/21/89
CHECKED K.C.	6/21/89
ENG R. Chin	6/30/89

MEM TIME & FREQUENCY TECHNOLOGY INC.

MODEL 887
FRONT & REAR VIEW ILLUSTRATION

SIZE	FSCM NO.	DWG. NO.	REV.
B		6600-2599	A

SCALE | SHEET 1 OF 1

	887
NEXT ASSY	USED ON
APPLICATION	

BISHOP GRAPHICS/ACCUPRESS
REORDER NO. A25710

SECTION 4
THEORY OF OPERATION

4.1 General Discussion (Block Diagram, Figure 6-1)

Dual-tone generation takes place on the Main Board. When the RESET/TEST switch, SW1, is in the TEST position, the dual-tone signal is generated in the dual-tone generator circuit. The output, DUAL TONE OUTPUT, goes to operational amplifier U15-4. U15-4 separates the dual tone into the 960 Hz and 850 Hz signals, which are then routed to their corresponding filter circuits.

The 960 Hz signal is amplified by U16-1 and routed to U16-3, where a dc level is detected. This dc, a high logic level, is then sent to the demuting circuit via A1. The 853 Hz signal is amplified by U16-2. U16-4, the dc detector, detects the dc level and routes it to the demuting ciruit via A2.

When A1 and A2 are high at the same time, during a self-test, the demuting circuit recognizes either the 2, 4, or 8-second time delay before turning on the speaker.

SW2, the 853 Hz/960 Hz switch, selects a single tone. In the TS2 position, the 960 Hz signal tone is selected. The dual tone generator circuit sends this signal to the 960 Hz filter. When the CR6 LED on the Main Board is on, the 960 Hz filter circuit is operating properly. With SW2 in the TS3 position, the 853 Hz tone is selected and sent to its corresponding filter. When the CR7 LED on the Main Board is on, the 853 Hz filter circuit is operating properly. With the speaker enabled, either tone can be heard.

The ON AIR switches, SW3 and SW4, work together to produce a dual test tone. With these switches in opposing positions at the same time, the dual-tone signal is generated and fed to the DUAL TONE OUTPUT line from the dual-tone generator circuit. This output has three available paths.

The first path is to U15-4, the two-tone filter that separates the 960 and 853 signal tones. After filtering by U16, the two signals are routed to A1, A2, and then the demuting circuit. A high level at A1 and A2 at the same time to the demuting circuit drives Q6, which in turn activates loop-thru relays K3 and K4. This activation changes the loop-thru configuration in order to let the dual-tone signal to the transmitter.

The second path is through R74 to amplifiers U17-3 and U17-4. The result is a balanced dual tone output that is sent to 886/887 rear panel connector, J3, pins 6 and 7, for dual-tone test purposes. The U17 output is also fed through the isolation transformer, T2, to the loop-thru K3/K4 configuration and to the transmitter.

The third path after on-air activation is via the audio power amplifier U18. At the same time the ON AIR switches are placed in opposing directions, the dual-tone signal is fed to the demuting circuit. U18 is activated after the delay set by the internal TIME DELAY DIP switches in the demuting circuit on the Main Board. (This time can be set for either 2, 4, or 8 seconds.) The dual test tone goes through U18 and out to the speaker.

The opto-coupler at J3, pin 9 on the rear panel is used to connect a momentary-to-ground switch in order to remotely control on-air activation. This configuration is used in place of SW3 and SW4 for on-air activation.

The length of time the test tone is on depends on the TONE DURATION DIP switches on the Main Board. The time can be set for either 6, 12, or 24 seconds.

With SW1 to the TEST position, the TEST output line from the dual tone generator circuit will be low. This low level goes to the demuting circuit via TS5. This switch can also be used to reset the EBS RECEIVED LED on the front panel.

The dual tone generator MU (mute) output is high when (1) SW1 is in the TEST position; (2) SW2 is in either the TS2 or TS3 position or; (3) SW3 and SW4 are placed in opposing directions. When this output is high, Q17 is on, thus muting the receiver audio signal to the filter circuit.

The 1/S CLOCK comes in to the dual tone generator circuit from the time base circuit on the Main Board. It uses the ac power line frequency, either 50 or 60 Hz, as a reference. Place a jumper at either the 50 Hz PRESET or 60 Hz PRESET location. A jumper in the appropriate frequency location selects the corresponding frequency for use with the 886/887.

Dual-tone generator 1/S PULSE END OF DUAL TONE output drives the K2 relay. At the end of the dual-tone after on-air activation, the dual-tone generator circuit sends a signal at the rate of 1 pulse/second to drive peripheral studio equipment, if connected at J3, pins 1-3.

The SEND output to the demuting circuit should be a high level. From demuting it goes to Q6 to drive K3/K4 and change the loop-thru configuration. This level also goes out as the SEND/RESET output line to the DAYS SINCE LAST RECEPTION Counter to reset the front panel calendar display to 0 (zero).

From the demuting circuit, the OA high level output lights the ON AIR LED. When the ON AIR switches are in opposite positions, this indicator is lit.

When the 886/887 receiver circuit receives a program signal, it changes to the dual tone. The AUDIO LEVEL output goes to U15-4 via R29. From U15-4, the program signal goes to the filter circuit, whose output is a high level at A1 and A2. This automatically turns on the speaker. The SPK ON/OFF line into U18 should also be high. This high

turns the DAYS SINCE LAST RECEPTION Counter to 0 via the EBS/RECVD line from the demuting circuit.

When a program signal is received, the front panel EBS RECVD LED, CR1, should also be lit. When the ON AIR switches are placed in opposite positions or the RESET/TEST switch is in the TEST position, this LED should be extinguished.

When the 886/887 receives a two-tone signal from another station, the AUDIO LEVEL line will also activate K1 (EBS ALARM) on rear panel connector J1, pins 1-6, when an external alarm is connected.

The receiver circuit AUDIO LEVEL output is also fed to rear panel connector J1 via U17. The outputs from U17 are the balanced and unbalanced outputs connected to J1, pins 1-3, used to monitor reception conditions.

Receiver AUDIO LEVEL output line also goes to the front panel AUDIO LEVEL bar graph display for monitoring the program audio level.

Demuting circuit RF LEVEL output line goes to the front panel RF LEVEL bar graph display for monitoring the program RF level.

SW5 is the SPEAKER ON/STANDBY switch, which is connected to the demuting circuit. When SW5 is in the SPK EN position, the SPK ON/OFF output is enabled and the speaker is on. With SW5 in the SPK DIS position, the SPK ON/OFF output is disabled and the speaker is off.

The EBS ALARM RESET switch, SW6, resets K1 (EBS ALARM).

REC COUNTER SET is the front panel pushbutton switch used to advance the Reception Counter.

TRANS COUNTER SET is the front panel pushbutton switch used to advance the Transmission Counter.

The CLOCK LED, CR2, is the front panel CLK LED that flashes at 1-second intervals to indicate that the 886/887 internal clock is functioning correctly.

The phone jack is used to connect an external speaker.

The power supply circuit is located on the Main Board. The transformer takes the ac line voltage, rectifies it, and regulates it to get an unregulated +20 Vdc and two regulated voltages, +12 Vdc and +5 Vdc. These voltages are distributed to those circuits requiring them.

4.2 Main Board (Figure 6-2)

EBS tones (single and dual), control and display signals, and PC board voltages for the EBS System are generated on the Main Board. The following paragraphs discuss these functions.

4.2.1 Tone Generation

The dual-tone signal is generated on the Main Board either by placing the RESET/TEST switch to the TEST position or by placing the ON AIR switches in opposite positions at the same time.

SW1 is the GENERATOR RESET/TEST momentary switch on the front panel. With SW1 in the TEST position, U2, pin 5 will be high. This logic high level output goes through a series of gates. The high level goes to U5, pins 1 and 5; the output of U5, at pins 3 and 4, will also go high. These outputs are fed to U7, with the outputs at pins 4 and 10 going high. These outputs are then routed to U9. The resulting output levels are high at U9, pins 3 and 4.

The high levels from U9, pins 3 and 4 go to U12, pin 2 and U14, pin 2, respectively. The high input levels at these ICs enable each to generate a single tone signal: U12 generates the 960 Hz and U14 generates the 853 Hz. The single tone signals each are fed to different sections of U15, where the signals are amplified. The outputs go to U15, pin 9. At U15, both signals are mixed. The resulting output is a dual-tone signal at U15, pin 8.

Length of the dual-tone signal is dependent on the 1-second timebase generated at U32. This timebase goes to U10, pin 9 where it is divided by 3 to get a 1/3-second pulse. This pulse is fed to U10, pin 1, the programmable counter, where the position of switch SW9 controls the duration of the dual-tone signal for either 6, 12, or 24 seconds. This counter controls U2. At the end of the dual-tone signal, U2 is cleared and, consequently, turns off the two signal generators, U12 and U14.

Also at the end of the dual-tone signal, U11, pin 5 goes high. At the same time, a 1-second input at U11, pin 11 forces a high output at U11, pin 9. After 1 second, this high will clear U11 and a 1-second pulse will be present at U11, pin 5. This pulse goes to R61 to drive Q4 in order to control relay K2 on rear panel connector J3.

When the two-tone generators are on (either by placing SW1 to TEST or the ON AIR switches in opposing positions), they can be turned off by setting SW1 to the RESET position. With SW1 in the RESET position, U2 and U10 are cleared, thus clearing the tone generation circuit.

SW2 is the GENERATOR 853 Hz/960 Hz momentary switch on the EBS System front panel. With SW2 in the 960 Hz position (TS2), U5, pin 6 is high, causing U7, pin 4 to go high. This logic level high goes to U9, pin 1 and forces the output at U9, pin 3 to go high. This high turns on tone generator U12, which generates the 960 Hz tone.

With SW2 in the 853 Hz position (TS3), U1, pin 8 is high. The high level goes to U5 where the resulting output at U5, pin 4 is also high. This high goes to U7 and the output at U7, pin 10 is high, which causes U9, pin 4 also to go high. The high at U9, pin 4 turns on tone generation at U14, thus generating the 853 Hz tone.

Front panel switches SW3 and SW4 are the GENERATOR ON AIR switches. They must be placed in opposing directions at the same time to generate the dual tone. With these switches in opposite positions, U2, pin 9 will be high. This level goes to gate U9. U9, pins 3 and 4 will go high, thus turning on the tone generators, U12 and U14. Their individual tones are then mixed in U15 with the resulting dual-tone signal generated at U15, pin 8.

When remote activation – connected to the rear panel at J3, pins 8 (ground) and 9 – is low, it drives the opto-coupler U54. U54 will turn on the ON AIR switch function as described above.

When remote reset – connected to the rear panel at J3, pins 10 (ground) and 11 – is low, the opto-coupler U53 will be high. This high turns on Q15, which in turn sends a high to U1, pin 1. This will clear U2 and act as a reset function identical to that of SW1 in the RESET position.

The dual-tone output at U15, pin 8 is fed to three different paths. First, the signal goes to amplifier U15, pin 13 via R22 and C21. The dual-tone signal is amplified here with an output at U15, pin 14. This output is fed to two filters, FL1 and FL2. The tones are separated by the filtering process. FL1 filters out the 960 Hz; FL2 filters out the 853 Hz.

The 960 Hz out of FL1 goes to U16, pin 2 and out at U16, pin 1. This output is fed to CR2 and C32, which rectify the signal, and turn on Q2. Comparator U16, pin 8 will then go high and turn on CR6, LED1. When CR6 is on, it is a visual indication that the 960 Hz is present in the circuit.

The 853 Hz out of FL2 is routed to U16, pin 6 and out at U16, pin 7. This output is rectified by C30 and CR3 and turns on Q3. Comparator U16, pin 14 will go high and turn on CR7, LED2. When CR7 is on, it is a visual indication that the 853 Hz signal is present in the circuit.

The second dual-tone signal path from U15, pin 8 is through R23, C22, R58, and R59 to the audio power amplifier, U1. U18 drives the internal loudspeaker. This audio path is another method used to check the tones.

The third dual-tone signal path is through R74, C44, and R77 to U17, pin 9. Two balanced outputs – U17, pins 8 and 14 – are fed to the secondary of T2. These balanced outputs go to pins 8 and 9 of K3 and K4 for the loop-thru configuration. The outputs, controlled by Q6, are routed to the rear panel of the EBS unit via J3, pins 5 and 7. The balanced outputs are 8 dBm into 600Ω for a single tone at these test points.

From the receiver, the audio program has three paths. First, the audio goes through R29, R129, R30, and C24 to U15, pin 13. If the audio program contains a dual-tone, the signal is amplified, filtered, separated, and rectified as discussed above. Each signal – the 853 Hz and 960 Hz – is used to turn on CR7 and CR6, respectively. If the audio program does not contain a dual-tone signal, the decoding circuit will not be activated and LEDs CR6 and CR7 will be off.

The second audio path is through R56 and R59 to the audio power amplifier. The user can monitor the audio program with the internal loudspeaker.

The final audio path is through R60, C39, and R63 to U17, pin 2. U17, pins 1 and 7 are balanced outputs which are fed to the rear panel at J1, pins 11 and 12. The only purpose of these outputs is to connect monitoring equipment. These outputs are 8 dBm into 600Ω per single tone.

The dual-tone is present when (1) the signal is received in an audio program, (2) the RESET/TEST switch has been placed in the TEST position, or (3) the ON AIR switches have been placed in opposite positions at the same time. When a dual-tone signal is present in the circuit, the output at U16, pin 8 and R54 and at U16, pin 14 and R55 will be high. U19, pins 1 and 2 will also be high; thus, pin 3 of U19 will be high. This high is connected to U19, pin 6; a 1-second pulse from U47, pin 4 is fed to U19, pin 5. C132 and R133 at U19, pin 5 differentiate the leading edge of this 1-second pulse to U19. This pulse triggers programmable counter U20, which is connected to the output of U19.

SW10 is a DIP switch at U20. This switch sets the demuting time to either 2, 4, or 8 seconds, depending on the switch position. The output from SW10 triggers U23 to force pin 5 high. This high is connected to U19 at pin 9 and forces U19, pin 10 to go high. This high output triggers U23, pin 9 high in order to turn on the audio power amplifier and have the dual-tone at the speaker.

4.2.2 Controls and Indicators

At U22, TEST/SEND inputs come from the EBS front panel RESET/TEST and ON AIR switches to pins 8 and 9 of U22. These pins are normally in a low logic state. U22, pin 10, also low, is inverted at U21 and fed to U24, pin 12.

When the EBS System receives an audio program that includes the dual-tone signal, the U20/U23 circuit will detect it. The clock at U24, pin 11 enables U24 to transfer the high logic level from pin 12 to pin 9. This high output indicates that the system has received the dual-tone signal. The high is fed to U19, pin 13 to generate 1-second pulses at its output, U19, pin 11. The pulses go through R106 to drive the front panel EBS RECEIVED LED, causing the indicator to flash.

The high output at U24, pin 9 is fed to R32 to turn on Q5. Q5 activates K1 on the EBS rear panel. This output may be used to connect a studio alarm.

At the same time, U24, pin 9 drives U25, pin 3. The resulting pulse to U46, pin 8 will reset the DAYS SINCE LAST RECEPTION calendar display to 0 (zero).

When U22, pin 9 is high, U22, pin 10 will go high and U21, pin 8 will be low. After a dual-tone signal has been received, the front panel EBS RECEIVED LED and the studio alarm, if connected, can be turned off by placing the RESET/TEST switch (SW1) in the TEST position or the ON AIR switches (SW3 and SW4) in opposing positions.

When the RESET/TEST switch is in the TEST position, the TEST path becomes high (from U7, pin 3). With the ON AIR switches in opposite directions, the SEND path is high (from U2, pin 9). In either case, a high level is present at U24, pin 2. The 1-second pulse will turn on U24; a high output will be present at U24, pin 5 and a low output will be present at U24, pin 6. The high at U24, pin 5 goes to R84, Q6, and then to the K3/K4 loop-thru relays.

The low output at U24, pin 6 goes to inverter U3, pin 11 to drive Q1 and force the ON AIR LED on the board to go on.

A high at U22, pin 8 is also fed to U25 and generates a pulse at pin 9 when the ON AIR switches are placed in opposite positions. Pin 9 of U25 is connected to U40, pin 6. The leading edge of this pulse is used to reset the DAYS SINCE LAST TRANSMISSION calendar display to 0 (zero).

SW5 is the front panel SPEAKER ON/STANDBY switch. In the ON position, a high is present at U23, pin 11 and at U23, pin 9, the output. This high output turns on the internal loudspeaker. The STANDBY position clears U23 and a low is present at U23, pin 9. In this case, the speaker will be off.

SW6 is the front panel EBS RECEIVED RESET switch. The ALARM/RESET position is connected to U24, pin 13 and is used to clear U24. If an alarm has been activated (for example, a studio alarm is connected and a dual-tone signal was received), this switch will reset the alarm.

SW7 is the front panel EBS RECEIVED SET momentary pushbutton switch used to advance the DAYS SINCE LAST RECEPTION calendar display by one, via U40, with each depression of the switch.

SW8 is the front panel SET momentary pushbutton switch used to advance the DAYS SINCE LAST TRANSMISSION calendar display by one, via U44, with each depression of the switch.

U51 is the receiver RF level comparator. Its output is fed to J1, pin 8 on the rear panel as the CARRIER FAIL terminal.

A remote control switch connected to REMOTE RESET, pin 11 of J3 on the rear panel, is used for overall resetting of the EBS System. With a low on this pin, U53 will go high and force Q12, Q13, and Q14, the latch circuit, to reset. This will reset the entire EBS unit – the alarm (if connected), displays, LED indicators, and speaker.

4.2.3 Calendar Displays

The timebase for the calendar displays comes from the power supply. For the transmitter calendar display, DAYS SINCE LAST TRANSMISSION, the timebase is programmed by the jumpers installed at the 50 Hz or 60 Hz setting at U32. U32 divides the line frequency either by 50 or 60 Hz, depending on the line frequency set by these jumpers. This division generates a 1-second output. The output goes to U47, pins 1, 3, and 5. Pin 6 of U47 drives the front panel CLK LED, which will flash every 1 second.

The 1-second output at U47, pin 4 is the 1-second input at U11, pin 11 and U24, pin 3. The 1-second output at U47, pin 2 goes through a series of inverters and gate U48 before being fed to U33 where it is divided by 60 to get 1 pulse/1 minute at U48, pin 4. This pulse is divided by 60 at U29 to get 1 pulse/1 hour.

The 1 pulse/1 hour output at gate U41, pin 10 is fed to U28 to be divided by 24. The output is 1 pulse/1 day and goes to gates U41 and U40 to reset U28. This 1 pulse/1 day also goes to U26, via a series of gates and inverters, to be divided by 30.

U26 has two counters. The first counter divides this pulse by 3, the other divides it by 10. The output of U26 goes to U34 and U35, then to the 7-segment drivers to drive the front panel DAYS SINCE LAST TRANSMISSION calendar display. U34 drives the tens digit; U35 drives the ones digit.

U26 resets when the EBS System transmits a dual-tone or after 30 days since the last time the system was used to transmit a dual-tone. U26 counts to 30 days by using counter A to count to 10 then advancing to counter B. Counter B then counts to 3.

U38 in the circuit detects when the counter is greater than 12 and will force U52, pin 5 high. With a modulated 1 pulse/1 second at U38, pin 13 and the high at U38, pin 12, U38 will drive Q7 and force the LEDs on the DAYS SINCE LAST TRANSMISSION calendar display (common-cathode) to flash.

The D1 RESET (SEND) path at U46, pin 13 comes from U25, pin 9 and is used to reset this DAYS SINCE LAST TRANSMISSION calendar display to 0 (zero).

For the receiver calendar display, DAYS SINCE LAST RECEPTION, the timebase is programmed at U32 as described above for the transmitter calendar display. U32 divides the line frequency either by 50 or 60 Hz, depending on the line frequency set by the jumpers at U32, in order to generate a 1-second output. The resulting 1 pulse/1 minute at U48, pin 4 from the division at U32 and U33 is fed to U31 to be divided by 60. The output of U31 is 1 pulse/1 hour.

At gate U41, pin 10, the 1 pulse/1 hour is fed to U30 to be divided by 24. The output is 1 pulse/1 day and goes to gates U45 and U44 to reset U30. This 1 pulse/1 day also goes to U27, via a series of gates and inverters, to be divided by 30.

U27 has two counters. The first counter divides this pulse by 3, the other divides it by 10. The output of U27 goes to U36 and U37, then to the 7-segment drivers to drive the front panel DAYS SINCE LAST RECEPTION calendar display. U36 drives the tens digit; U37 drives the ones digit.

U27 resets when the EBS System receives a dual-tone or after 30 days since the last time the system received a dual-tone signal. U27 counts to 30 days by using counter A to count to 10 and then advancing to counter B. Counter B then counts to 3.

U39 in the circuit detects when the counter is greater than 12. When more than 12 days pass since the last reception, U39 will force U52, pin 9 high. With a modulated 1 pulse/1 second at U39, pin 12 and the high at U39, pin 13, U39 will drive Q8 and force the LEDs on the DAYS SINCE LAST RECEPTION calendar display (common-cathode) to flash.

The D2 RESET (RCVD) path at U46, pin 8 comes from U25, pin 5 and is used to reset the DAYS SINCE LAST RECEPTION calendar display to 0 (zero).

4.2.4 Power Supply Voltages

Power supply voltages used for the EBS System are generated on the Main Board. Ac comes from the ac line cord to the primary of T1. From the secondary of T1, the voltage goes to a bridge rectifier to get two unregulated dc voltages, 22 V and 11 V. The unregulated 11 Vdc goes to regulators U49 and U50. A regulated 5 Vdc is present at U50, pin 3; a regulated 12 Vdc is present at U49, pin 3. These voltages are distributed throughout the EBS System as needed.

4.3 Display Board (Figure 6-4)

Connector J1 on the Display Board is connected to J1 on the Main Board. The signals used to drive the two calendar displays, DAYS SINCE LAST RECEPTION and DAYS SINCE LAST TRANSMISSION, come from the Main Board into the Front Panel Board through J1, pins 3 thru 33. These signals are then applied to the four 7-segment displays, U1 thru U4.

U36 an U37 on the Main Board drive U1 and U2 on the Display Board. U1 is the tens digit and U2 is the ones digit on the DAYS SINCE LAST RECEPTION display.

U34 and U35 on the Main Board drive U3 and U4 on the Display Board. U3 is the tens digit and U4 is the ones digit on the DAYS SINCE LAST TRANSMISSION display.

The audio output level comes from the Receiver Board. This output is fed to the Main Board at J2, pin 5, routed to J1, pin 35 on the Main Board, and comes into the Display

Board via J1, pin 35. The audio goes to U7, the VU scale bar graph meter driver. This component is used to drive the bar graph LED, U5, to indicate the audio output level. R3 is used to adjust the bar graph LED to full scale.

RF level also comes from the Receiver Board and goes to J2, pin 1 on the Main Board. The RF from J2, pin 1 is routed to J1, pin 36 on the Main Board and comes into the Display Board through J1, pin 36. This level goes to the logarithmic bar graph driver, U8. This driver is used to drive the bar graph LED, U6, which indicates the RF level of the received signal at the antenna.

When an EBS dual-tone signal is received, the Main Board sends a signal to J1, pin 1 on the Display Board. This pin is connected to CR1 (LED1), located on the unit's front panel. It is used to indicate that an EBS signal was received.

A signal from the Main Board is fed to J1, pin 2. This pin is connected to CR2 (LED2), the front panel CLK LED, and flashes at a 1 Hz rate to indicate the internal system clock is functioning correctly.

4.4 AM Receiver Board (Figure 6-6)

A 540-1740 kHz AM signal comes in to the AM EBS System via the rear panel ANT 75Ω connector and is routed to the tuned circuit consisting of C41, C60, and CR1-1. This circuit is used to change to the desired station. The AM signal is also routed to the secondary of transformer T1 and to U15, pin 4. In U15 the RF amplifier amplifies the AM signal.

C4, C5, and CR1-2 make up the local oscillator (L.O.) circuit. The signal from the L.O. goes to U15, pin 12. U11 and U12 make up the voltage-controlled-oscillator (VCO). These two circuits are part of the phase-locked-loop (PLL).

U15 mixes the amplified RF and the L.O. signals. The mixer output at U15, pin 1 is 455 kHz. This 455 kHz goes to the IF filter, L1 and FL1. The pure 455 kHz from FL1, pin 5 goes to U15, pin 3. Here, it is amplified by U15, the IF amplifier.

U15 also detects the audio signal. The audio is amplified in U15. The output of the audio amplifier is the audio program at U15, pin 6. This signal goes to amplfier U17 and out to J1, pin 6 to the Main Board.

The 5 MHz oscillator circuit consists of Y1, the 5 MHz oscillator and Q4. The 5 MHz goes to amplifier Q3 and then to U14, pin 1, where the signal is divided by 5. The resulting 1 MHz goes to U14, pin 15, where the signal is divided by 10. The output at U15, pin 9 goes to U13, pin 4, where it is divided by 10 again. The resulting output is 10 kHz at U13, pin 7. This 10 kHz signal goes to phase-comparator U12, pin 3. This is the reference signal that will be compared to the local frequency at U12 in the PLL.

The local frequency at U15, pin 10 goes to the Q1/Q2 amplifier where it is divided by N. N is controlled by the front panel FREQUENCY X10 kHz pushbutton switches plus 45. The divide-by-N circuit is made up of U1 thru U10. For example, if the incoming frequency is 1000 kHz, the L.O. frequency is 1450 kHz. The L.O. from U15, pin 10 goes to the Q1/Q2 circuit where it is divided by N, which is 100 (from the front panel FREQUENCY switches) plus 45. The resulting output frequency at U10, pin 6 is 10 kHz. This 10 kHz goes to U12, pin 1. At U12 it is compared to the 10 kHz reference at U12, pin 3. If the frequencies are the same, the PLL is locked.

If the front panel FREQUENCY switches are changed, a dc voltage is generated at U12, pin 13. This dc voltage goes to low pass filter U11 and back to R1 and R2 to control varactors CR1-1 and CR1-2. CR1-1 and CR1-2 will correct the local frequency for comparison to the 10 kHz reference at U12. The PLL circuit continues to correct until the local frequency is 10 kHz.

The dc voltage at U15, pin 9 indicates the RF level from the antenna. This voltage goes to amplifier U17, pin 10 and then through J1, pin 10 to the Main Board to drive the front panel RF LEVEL bar graph display.

4.5 FM Receiver Board (Figure 6-8)

The FM Receiver Board receives an 88 MHz-108 MHz FM program signal at the rear panel antenna connector. The signal is routed to Z1, the Front End Block consisting of a mixer, a voltage-controlled oscillator (VCO), and other components. A 10.7 MHz IF signal is generated at Z1 and sent out at Z1, pin 5. The signal is filtered at FL1 and sent to Q3 to be amplified. From Q3 the signal goes to FL2 to be filtered and then to the IF amplifier, U1, pin 1. U1 and quadrature detector L3 (located at U1, pin 9) take the IF signal and generate an audio output at U1, pin 6. This audio goes to R19, which sets the audio level, and to U2, where it is amplified before going out to the FM Receiver Board connector J1. The audio goes out to the Main Board via J1, pin 5.

The output at U1, pin 13 indicates the RF level of the input signal. This output goes to amplifier U2 and to J1, pin 1. From J1, pin 1, it is routed to the front panel RF LEVEL bar graph display via the Main Board. R63, at U2, pin 6 sets the reference for the RF level to the bar graph display.

U1, pin 12 is the muting output. This output goes to U2, pin 3, where it is compared with the level set by R29 at U2, pin 2. (R29 adjusts the muting point.) U2, pin 1 (the output of U2) drives CR3. When the muting level at U2, pin 3 is greater than the level set at U2, pin 2, CR3 is on. When the muting level at U2, pin 3 is less than the level at U2, pin 2, CR3 is off. When CR3 is on, there is a positive voltage drop at R27. This drop in voltage goes to CR1, R13, R11, R10, and U1, pin 5, which is the muting level input. This loop from U2 to U1 is the muting loop. Potentiometer R11 is set to its maximum setting.

U1, pin 15 is the AGC (automatic gain control) voltage output. This output goes to pin 2 of the Front End Block via R100 to perform the AGC function.

Q4 and Y1 make up the oscillator that generates a 5 MHz output. The 5 MHz out of the emitter of Q4 goes to R54, C58, and to the base of amplifier Q5. The output of Q5, the collector, is connected to U16, pin 1. The 5 MHz signal to U16, pin 1 is divided by 2 and output at U16, pin 5. This divided signal is routed to U16, pin 13 where it is divided by 2 again. The resulting signal is sent out at U16, pin 8 to U17, pin 9. At U17 the signal is divided by 100 to get 12.5 kHz. This 12.5 kHz signal is used as a reference at comparator U5, pin 3, where this signal will be compared with a signal originating from the Front End Block.

Pin 6 of the Front End Block is the L.O. output that goes to emitter-follower Q6. From Q6 the signal goes to C69 and then to the Q1/Q2 amplifier to U3, pin 1. Here the signal is divided by 2. The resulting signal is sent out of U3 at pin 5 and goes to U3, pin 13. The signal is divided by 2 at U13 and this output goes out at pin 8 to a divide-by-N circuit.

The divide-by-N circuit consists of U4, U13, U7, U8, U9, and U10. This divide-by circuit is programmed by U11, U12, U14, U15 and the front panel FREQUENCY switches of the unit. The resulting frequency after processing by this circuit is a 12.5 kHz signal at TP4. This 12.5 kHz signal goes to U5, pin 14 and compared with the 12.5 kHz reference signal at U5, pin 3. When the frequencies are the same, there will be no output at U5,13 and no input to U6, pin 2. With no input at pin 2, there will be no output at U6, pin 6, R43, R45, R48, R49, and to the Front End Block at pin 4, which is used to keep the VCO on frequency.

SECTION 5
MAINTENANCE

5.1 Periodic Maintenance

The Models 886 and 887 EBS Systems are calibrated and ready for immediate use. There are no calibrations; however, periodic performance checks and adjustments should be made. This section discusses those checks and adjustments required for optimum system performance.

Note: Numerals in parentheses, ( ), refer to reference numbers in Figure 3-1, Model 886 Front and Rear Panel Illustration, and Figure 3-2, Model 887 Front and Rear Panel Illustration, at the back of Section 3 in this manual.

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

Test Equipment

1. Digital multimeter, accurate to within ±0.1%
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, 500-1700 kHz AM output

5.2 AM Receiver Performance Checks

The Model 886 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.

5.2.1 AM Receiver Sensitivity

To check the AM Receiver sensitivity, perform the following:

a. Connect a signal generator to the ANT 75Ω connector (20) on the 886 rear panel.

b. Set the signal generator output for 30% modulation at a 1 kHz rate. Set the output level to 30 μV output.

c. Connect an oscilloscope and distortion analyzer in parallel to the RX AUDIO BALANCED terminals, pins 11 and 12 of J1, on the 886 rear panel.

d. 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.

e. Observe the oscilloscope. The waveform should still be present on the scope.

f. Set the signal generator output to 540 kHz and AM modulation to 50% at a 1 kHz rate. Set the output level to 10 μV.

g. Connect a multimeter to the CARRIER FAIL terminals, pins 7 and 8 of J1, on the 886 rear panel.

h. Set the FREQUENCY X10 kHz pushbutton switches (15) to read 540 kHz.

i. Slowly increase the RF level of the signal generator to approximately 30 mV. The voltage on the multimeter at the CARRIER FAIL terminals should indicate a change from 0 V to 10 Vdc.

5.2.2 AM Receiver AGC Range

To check the AM Receiver AGC range, perform the following:

a. Ensure the signal generator is connected to the ANT 75Ω connector (20) on the 886 rear panel and its output is set to 540 kHz and AM modulation to 50% at a 1 kHz rate. Set the output level to 10 μV.

b. Connect an oscilloscope to the RX AUDIO BALANCED terminals, pins 11 and 12 of J1, on the 886 rear panel.

c. 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 1030 kHz and 1600 kHz input signals.

5.3 FM Receiver Performance Checks

The Model 887 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 5.1 above.

5.3.1 FM Receiver Sensitivity

To check the FM Receiver sensitivity, perform the following:

a. Connect a signal generator to the ANT 75Ω connector (20) on the 887 rear panel.

b. Set the signal generator output to the receiver's channel frequency (set by the front panel FREQUENCY MHz switches) and the frequency deviation for ±75 kHz at a 1 kHz rate. Set the output level to 2 μV.

c. Connect an oscilloscope and distortion analyzer in parallel to the RX AUDIO BALANCED terminals, pins 11 and 12 of J1, on the 887 rear panel.

d. 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.

e. Observe the oscilloscope. The waveform should still be present on the scope.

f. Set the signal generator output level to 1 μV.

g. Connect a multimeter to the CARRIER FAIL terminals, pins 7 and 8 of J1, on the 887 rear panel.

f. Slowly increase the RF level of the signal generator to approximately 2 μV. The voltage on the multimeter at the CARRIER FAIL terminals should indicate a change from 0 V to 10 Vdc.

5.3.2 FM Receiver AGC Range

To check the FM Receiver AGC range, perform the following:

a. Ensure a signal generator is connected to the ANT 75Ω connector (20) on the 887 rear panel.

b. Using the FREQUENCY MHz pushbutton switches (15), set the 887 for the desired channel frequency.

c. Set the signal generator to the receiver's channel frequency and the frequency deviation for ±75 kHz at a 1 kHz rate. Set the output level to 1 μV.

d. Connect an oscilloscope to the RX AUDIO BALANCED terminals, pins 11 and 12 of J1, on the 887 rear panel.

e. Increase the signal generator level to 20 mV. The 1 kHz sine wave on the oscilloscope should remain undistorted.

5.4 Dual-tone Level Adjust (AM and FM)

To adjust the dual-tone level, perform the following:

a. Remove the EBS System top cover.

b. On the Main Board, connect an oscilloscope to U15, pin 8.

c. Place and hold the 853 Hz/960 Hz OPERATE switch (2) to the 853 Hz position while observing the scope. Adjust R16 on the Main Board until the output at U15, pin 8 is 4 V peak-to-peak.

d. With the scope at U15, pin 8, place and hold the 853Hz/960 Hz OPERATE switch (2) to the 960 Hz position. Adjust R9 on the Main Board for a 4 V peak-to-peak output at this pin.

e. Connect a distortion analyzer to J3, pins 5 and 7 on the EBS rear panel.

f. While observing the meter on the distortion analyzer at J3, adjust R74 on the Main Board for 8 dBm into 600Ω load.

g. Replace the top cover.

5.5 Calendar Display Adjust (AM and FM)

To adjust either EBS front panel calendar display – DAYS SINCE LAST RECEPTION or DAYS SINCE LAST TRANSMISSION – simply take a thin, insulated instrument and depress the corresponding SET pushbutton switch (8 for DAYS SINCE LAST RECEPTION SET switch or 11 for DAYS SINCE LAST TRANSMISSION SET switch) on the 886/887 front panel.

5.6 Receiver Audio Output Adjust

The EBS receiver audio output adjustment procedures for both AM and FM Receivers are described in the following Paragraphs 5.6.1 and 5.6.2 below.

5.6.1 AM Receiver Audio Output Adjust

To adjust the AM Receiver audio output, perform the following:

a. Remove the 886 top cover.

b. Connect a 600Ω load and the balanced output of a distortion analyzer to the RX AUDIO BALANCED terminals, pins 11 and 12 of J1, on the AM EBS System rear panel.

c. Connect a signal generator with a 600 kHz carrier, modulated at 1 kHz with 90% modulation, to the ANT 75Ω connector (20) on the 886 rear panel. Set the signal strength for 100 μV.

d. While observing the meter on the distortion analyzer, adjust R6 on the Main Board for 8 dBm.

e. Replace the top cover.

5.6.2 FM Receiver Audio Output Adjust

To adjust the FM Receiver audio output, perform the following:

a. Remove the 887 top cover.

b. Connect a 600Ω load and the balanced output of a distortion analyzer to the RX AUDIO BALANCED terminals, pins 11 and 12 of J1, on the FM EBS System rear panel.

c. Connect a signal generator with an 88 MHz carrier, modulated at 1 kHz with ±75 kHz deviation, to the ANT 75Ω connector (20) on the 887 rear panel. Set the signal strength for 100 μV.

d. While observing the meter on the distortion analyzer, adjust R6 on the Main Board for 8 dBm.

e. Replace the top cover.

5.7 Receiver Audio Signal versus Dual-tone Signal (AM and FM)

It is suggested that a 1:1 ratio exist between the receiver audio signal and the dual-tone signal for both AM and FM EBS Systems. To adjust for this 1:1 ratio, perform the following:

a. Remove the 886/887 top cover and locate R56 on the Main Board.

b. Ensure you are receiving a program signal from any station. You should hear the program on the speaker.

c. Place the RESET/TEST switch (1) to the TEST position. You can now hear the dual-tone and the program at the same time on the speaker.

d. Adjust R56 on the Main Board so that the program signal and the dual-tone signal are of equal strength.

SECTION 6

DIAGRAMS AND SCHEMATICS

REVISIONS				
REV	DESCRIPTION	DR	DATE	APPD
A	RELEASED TO CADD	JK	6-19-89	

TONE FITSYOPM (6,12,24)SEC.

DIP SET SW: 1 2 4

R SET
SW1
TEST
TS2 960
SW2
TS3 853
SW3
ON AIR
SW4
+5V
U54
J3 9 REMOTE ON AIR (ACTIVATION)

ON AIR

853 R16
960 R9
DUAL TONE GENERATOR

DUAL TONE OUTPUT
TEST
MU
1/S CLOCK
SN5
OA
SEND
1/S PULSE END OF DUAL TONE
K2

0 8 4 X 10 kHz → AM OR FM
10 8 0 MHz → AM OR FM
RECEIVER
AUDIO LEVEL
RF LEVEL
+12 +5

960 → U16-1,Q2,U16-3 → A1
853 → U16-2,Q3,U16-4 → A2
U15-4
CR6
CR7
R29
Q17
R58
R59
SPK ON/OFF
AUDIO POWER AMP
U18
PHONE JACK
EXT SPEAKER

K1
JR1
6 5 4 3 2 1
EBS RECEIVED ALARM RELAY CONTACT

R74
U17-3,4
+20V
300
J3 DUAL TONE TEST POINT OUT
7 6

K2
J3 ONE SECOND PULSE OUT, END OF DUAL TONE.
3 2 1

J2 LOOP THRU AUDIO OUTPUT
10 9 7 6 5 4 2 1
300

R60
U17-3,4
+20V
K3
K4

J1 AUDIO OUTPUT
13 12 11
300
300
800

A1 A2 1/S CLOCK SEND TS5 TEST OA

ON SPK EN
SW5
STAND BY SPK DIS
EBS ALARM RESET
SW6
REC COUNTER SET
TRANS COUNTER SET
DEMUTING

SPK ON/OFF
K3,K4 (ON AIR)
Q6
K1 (EBS ALARM)
EBS/RECVD
RX COUNTER SET OUT
SND/RESET
TX COUNTER SET OUT

+5V
R107
J3 11 REMOTE RESET

1 2 4
TIME DELAY DIP SET SW (2,4,8) SEC

EBS RECIVD
CLOCK
DAYS SINCE LAST RECEPTION COUNTER
DAYS SINCE LAST TRANSMISSION COUNTER
TIME BASE
1/S CLOCK
50Hz 60Hz PRESET
60 Hz 50 Hz PRESET
50 Hz

AUDIO LEVEL
RF LEVEL
FROM RECEIVER
FROM RECEIVER

AC 117V 60Hz OR 50Hz
POWER SUPPLY
+20 V UNREGU.
+12
+5

FIG.6-1

ITEM	QTY	PART NO.	NOMENCLATURE OR DESCRIPTION

SPECIFICATIONS UNLESS OTHERWISE NOTED:
ANGULAR = ±
DECIMAL = 2 PLACE ± 3 PLACE ±
BREAK = .010IN
SURFACE ROUGHNESS = MICROINCHES RMS MAX.
DIAMETERS = CONCENTRIC WITHIN .005 TIR
FILLET RADIUS = MAX
THREADS = CLASS 2
MARK IN ACCORDANCE WITH TFT SPEC 5300-1050

MATERIAL
FINISH

DR. BY		6-19-89
CK. BY	R. Chien	6-19-89
ENGR.	R. Chien	6-19-89
MFG.	[illegible]	6/19/89
Q.A.	TSP	6/21/89

TFT INC 3090 OAKMEAD VILLAGE DR. SANTA CLARA, CA. 95051 (408) 727 7272 TWX 910 338 0584

SCHEMATIC
EBS
BLOCK DIAGRAM

MODEL	NEXT ASSY
886 887	5004-0886
APPLICATION	

CODE IDENT NO.	SIZE	DRAWING NO.	REV.
	D	6600-2591	A
SCALE	DO NOT SCALE PRINT	SHEET 1 OF 1	

REVISIONS				
REV	DESCRIPTION	BY	DATE	APPD
C	PRELIMINARY RELEASE		9/15/90	

DURATION SETTING

SW9	TIME DURATION
1 ON	6 SEC
2 ON	12 SEC
3 ON	24 SEC
4 ON	NOT USED

NOTES : UNLESS OTHERWISE SPECIFIED.
1. ALL RESISTOR VALUES ARE IN OHMS ±5%
2. ALL CAPACITOR VALUES ARE IN MICROFARADS.
3. ALL INDUCTOR VALUES ARE IN MICROHENRIES.

FIG.6-2

ITEM	QTY	PART NO.	NOMENCLATURE OR DESCRIPTION
		MATERIAL	TFT INC 3090 OAKMEAD VILLAGE DR SANTA CLARA, CA 95051 (408) 727 7272 TWX 910-338 0584
		FINISH	SCHEMATIC EBS MAIN BOARD

DR. BY.	Jerry Liu	9-15-90	
CK. BY.	TSP	9/10/90	
ENGR.	C. Hu	9-17-90	
MFG.	EJ	9/17/90	
Q.A.	T. S. PETERSEN	9/17/90	

CODE IDENT NO.	SIZE	DRAWING NO.	REV.
	D	6601-3638	C

SCALE NONE — DO NOT SCALE PRINT — SHEET 1 OF 3

886-887 (MODEL / NEXT ASSY / APPLICATION)

SPECIFICATIONS UNLESS OTHERWISE NOTED
ANGULAR = ±
DECIMAL = 2 PLACE ± 3 PLACE ±
BREAK = .010MIN
SURFACE ROUGHNESS = MICROINCHES RMS MAX
DIAMETERS = CONCENTRIC WITHIN .005 TIR
PILLET RADIUS = MAX
THREADS = CLASS 2 MARK IN ACCORDANCE WITH TFT SPEC 5300-1068

DWG. NO.	SH	REV.

REVISIONS

REV	DESCRIPTION	BY	DATE	APPD
C	PRELIMINARY RELEASE		9/15/90	

SW9	DEMUTE TIME
1 ON	2 SEC
2 ON	4 SEC
3 ON	8 SEC
4 ON	NOT USED

SW10 · SW10-3 · SW10-2 · SW10-1

U20 CD4518 (EN, CLK, RESET; Q1 Q2 Q3 Q4)

FROM SHEET1 R54 · FROM SHEET1 R55 · U19 CD4081 · U21 CD4069 · U22 CD4071 · C56 .1 · C57 .1 · R133 4.7K · C132 100P

U23 74C74 (PR, D, CLK, CP, Q, Q̄)

ONE SECOND CLOCK FROM SHEET3 U47-4

FROM SHEET1 U7-3 · FROM SHEET1 U3-9 U5-13

SW5 SPK ON · SPK STANDBY

SW6 ON-AIR RESET · ALARM RESET · CR18 1N3064

SW7 · R126 10 · C84 .1 · TO SHEET3 U40-6 D1 ADV (SEND)

SW8 · R125 10 · C85 .1 · TO SHEET3 U44-6 D2 ADV (RCVR)

RN2

TO SHEET3 J1-36 RF LEVEL INPUT

J2 (J2 1 – J2 10)

TO SHEET1 R29 RCVR AUDIO OUTPUT · NC · +5V · +12V

BOTTOM VIEW

C83 10 · R122 10K · R123 33K · Q16 2N4275 · R124 180 · R107 200 · REMOTE RESET · R-J3

U53 4N29 · R108 2.2K

Q12 2N4275 · Q13 2N4275 · Q14 2N4275 · Q15 2N4275

R109 39K · R110 39K · R111 39K · R112 39K

TO SHEET1 U1-1 TO RN1 PIN6

U23 74C74 · TO SHEET1 R85 SPK ON/OFF

U24 74C74 · ON-AIR · U3 CD4069 · R2 10K · 2N4275 Q1 · R1 1K · LED ON-AIR INDIC. · +5V

TO SHEET3 R106 EBS RCVR

U24 74C74

K1 · R62 10K · +12V · CR9 1N3064 · Q5 2N2222 · R-J1

U25 74C74 · TO SHEET3 U46-8 D2 RESET (RCVR) · R89 100K · C80 .1

U25 74C74 · TO U46-13 D1 RESET (SEND) · R90 100K · C81 .1

+12V · R101 36K · R103 100K · R100 10K · R102 10K · U51 LM324 · Q11 2N2102 · R105 100 · R104 10K · R-J1 CARRIER FAIL

FIG.6-2

NOTES : UNLESS OTHERWISE SPECIFIED
1. ALL RESISTOR VALUES ARE IN OHMS ±5%
2. ALL CAPACITOR VALUES ARE IN MICROFARADS

886-887	
MODEL	NEXT ASSY
APPLICATION	

SPECIFICATIONS UNLESS OTHERWISE NOTED
ANGULAR = ±
DECIMAL = 2 PLACE ± · 3 PLACE ±
BREAK = .010MIN
SURFACE ROUGHNESS = MICROINCHES RMS MAX
DIAMETERS = CONCENTRIC WITHIN .005 TIR
FILLET RADIUS = MAX
THREADS = CLASS 2
MARK IN ACCORDANCE WITH TFT SPEC 5300-1050

ITEM	QTY	PART NO.	NOMENCLATURE OR DESCRIPTION
MATERIAL			
FINISH			

DR. BY	Cindy Rice	1-15-90
CK. BY	C. Tse	7/19/90
ENGR.	C. Hu	9-25-90
MFG.		9/1/90
Q.A.	I. Stafford	7/14/90

TFT INC 3090 OAKMEAD VILLAGE DR SANTA CLARA, CA 95051 (408) 727-7272 TWX 910-338-0584

SCHEMATIC
EBS
MAIN BOARD

CODE IDENT NO	SIZE	DRAWING NO.	REV
	D	6601-3638	C

SCALE NONE · DO NOT SCALE PRINT · SHEET 2 OF 3

REVISIONS				
REV	DESCRIPTION	BY	DATE	APPD
C	PRELIMINARY RELEASE		9/15/90	

TX DISPLAY

TO F.P CLOCK LED

RX DISPLAY

J1

FROM SHEET2 U19-1 EBS-RCVD

R106 1K

RN3 RN4 RN5 RN6

U34 U35 U36 U37 74C48

Q9 2N2102 R93 10K R91 4.7K

Q7 2N4275 R95 20K

CR11 1N3064 CR12 1N3064

Q10 2N2102 R94 10K R92 4.7K

Q8 2N4275 R96 20K

+12V

FROM SHEET2 RF LEVEL INPUT J2-1

FM RCVR AUDIO INPUT J2-5

U38 U39 CD4081

C82 C83

U52 74C74

U26 U27 CD4518

÷3 ÷10

C100 .1 R121 1M

D1 RESET (SEND) FROM SHEET2 U25-9

D1 ADV

U40 U46 CD4071

U42 CD4069

U41 U45 CD4081

D2 RESET (RCVD) FROM SHEET2 U25-5

D2 ADV. FROM SHEET2 U21-12

U44 U43

U28 ÷24 U29 ÷60 U30 ÷24 U31 ÷60

1 PULSE/DAY

1 PULSE/HOUR

C84 C85 C86 C87

ONE SECOND CLOCK TO SHEET1 U11-11 SHEET3 C132

R97 1K

U47 CD4069

60Hz 50Hz 60Hz 50Hz

U32 ÷60/50 U33 ÷60

CR14 1N3064 CR15 1N3064 R98 10K R99 100K C70 .01

50/60Hz AC SECONDARY

FUSE .25A 117V/60Hz AC LINE

T 50/60Hz

VM18 FB1

U49 7812 U50 7805

C75 .1 C71 1000 C72 1000 C73 1000 C74 1 C76 C77 .1 C78 .1 C86 .0047 C87 .0047

R134 .1 R135 .1

+22V +5V +12V

NOTES : UNLESS OTHERWISE SPECIFIED
1. ALL RESISTOR VALUES ARE IN OHMS ±5%
2. ALL CAPACITOR VALUES ARE IN MICROFARADS

FIG.6-2

ITEM	QTY	PART NO.	NOMENCLATURE OR DESCRIPTION
		MATERIAL	
		FINISH	

SPECIFICATIONS UNLESS OTHERWISE NOTED:
ANGULAR = ± ____
DECIMAL = 2 PLACE ± ____ 3 PLACE ± ____
BREAK = .010MIN
SURFACE ROUGHNESS = ____ MICROINCHES RMS MAX
DIAMETERS = CONCENTRIC WITHIN .005 TIR.
FILLET RADIUS = ____ MAX
THREADS = CLASS 2 MARK IN ACCORDANCE WITH TFT SPEC 5300-1060

886-887 MODEL | NEXT ASSY | APPLICATION

TFT INC 3090 OAKMEAD VILLAGE DR SANTA CLARA, CA 95051 (408) 727-7272 TWX 910-338-0584

SCHEMATIC
EBS
MAIN BOARD

DR. BY	Jimmy Lin	7-15-90
CK. BY	T.P.	9/11/90
ENGR.	C. Hee	7-15-90
MFG.	E.P.	9/11/90
Q.A.	T.S. Peterson	9/11/90

CODE IDENT NO. | SIZE D | DRAWING NO. 6601-3638 | REV. C | SCALE NONE | DO NOT SCALE PRINT | SHEET 3 OF 3

REVISIONS				
REV	DESCRIPTION	DR	DATE	APPD
-	REV. EC [illegible]			

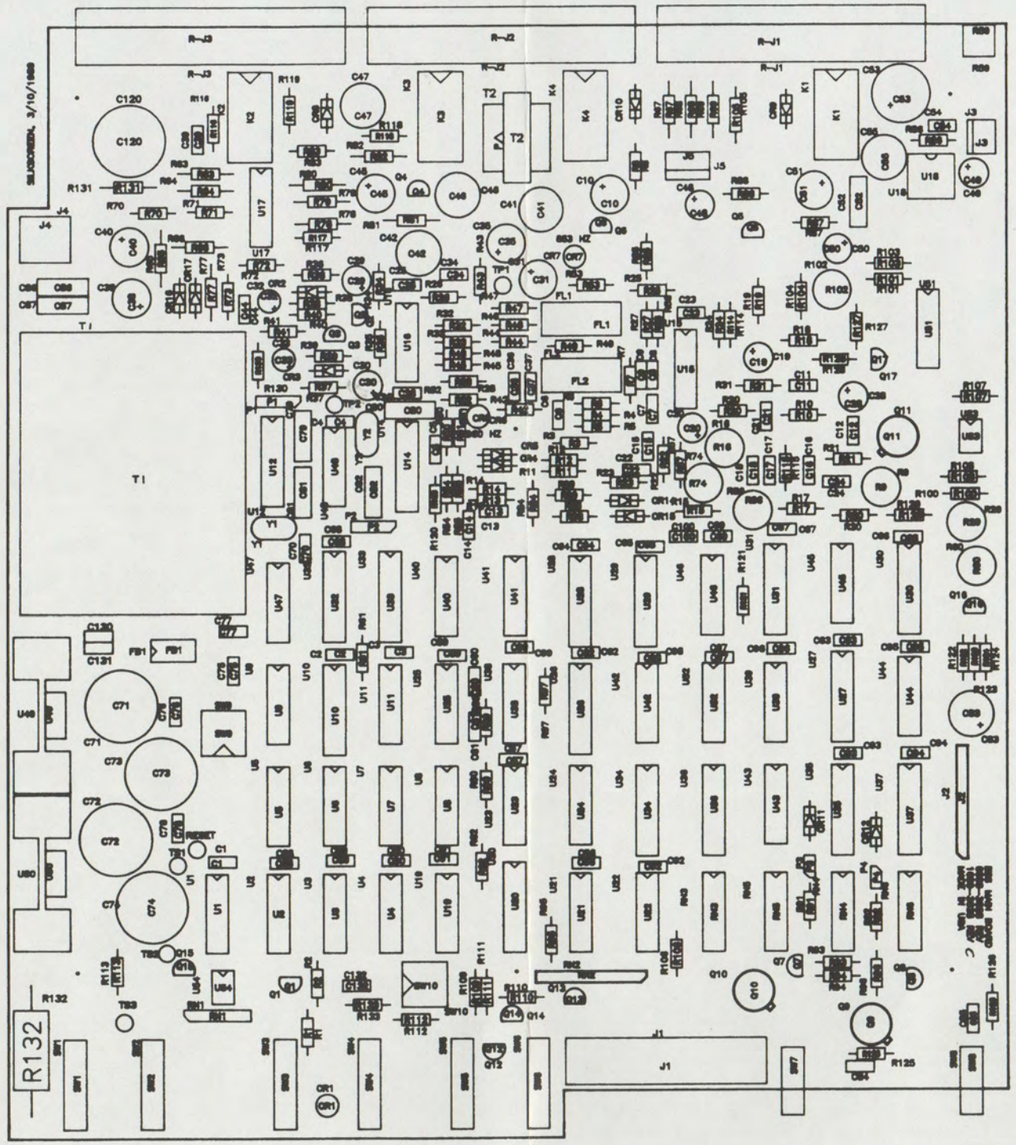


FIG.6-3

ITEM	QTY	PART NO.	NOMENCLATURE OR DESCRIPTION
		MATERIAL	TFT INC 3090 OAKMEAD VILLAGE DR SANTA CLARA, CA 95051 (408) 727-7272 TWX 910-338-0584
		FINISH	PCB ASSY MAIN BOARD

DR BY	E/C	8/7/87	CODE IDENT NO	SIZE	DRAWING NO / REV.
CK BY				D	6608-3638 B
ENGR	[illegible]				
MFG	[illegible]	9/6/87			
Q.A.	TSP	9/6/87	SCALE 1.5/1	DO NOT SCALE PRINT	SHEET 1 OF 1

MODEL	NEXT ASSY
[illegible]	5102-21[illegible]
[illegible]	5102-2621

APPLICATION

SPECIFICATIONS UNLESS OTHERWISE NOTED
ANGULAR = ± _____
DECIMAL =
2 PLACE ± _____
3 PLACE ± _____
BREAK = .010MIN
SURFACE ROUGHNESS = _____ MICROINCHES RMS MAX
DIAMETERS = CONCENTRIC WITHIN .005 TIR
FILLET RADIUS = _____ MAX
THREADS = CLASS 2
MARK IN ACCORDANCE WITH TFT SPEC 5300-1058

CKT. REF.	DESCRIPTION	QTY.	TFT STOCK NO.
C001	CAP CER 0.1MF CK05BX K	1	1015-0001
C002	CAP CER 0.1MF CK05BX K	1	1015-0001
C003	CAP CER 0.1MF CK05BX K	1	1015-0001
C004	CAP CER 0.1MF CK05BX K	1	1015-0001
C005	CAP CER 0.1MF CK05BX K	1	1015-0001
C006	CAP CER DISC 1MFD	1	1005-0001
C007	CAP CER .047MF CK05BX K	1	1015-0006
C008	CAP CER .22MF CK06BX K	1	1015-0003
C009	CAP CER .0012MF CK05	1	1015-0040
C010	CAP ELECT VT MT 100UF (NO SUB.)	1	1010-0110
C011	CAP CER DISC 1MFD	1	1005-0001
C012	CAP CER DISC 1MFD	1	1005-0001
C013	CAP CER DISC 1MFD	1	1005-0001
C014	CAP CER .047MF CK05BX K	1	1015-0006
C015	CAP CER .22MF CK06BX K	1	1015-0003
C016	CAP CER .0012MF CK05	1	1015-0040
C017	CAP CER DISC 1MFD	1	1005-0001
C018	CAP CER DISC 1MFD	1	1005-0001
C019	CAP ELECT 10 MFD 25V VERT MT	1	1010-0099
C020	CAP ELECT 10 MFD 25V VERT MT	1	1010-0099
C021	CAP CER DISC 1MFD	1	1005-0001
C022	CAP CER DISC 1MFD	1	1005-0001
C023	CAP CER DISC 1MFD	1	1005-0001
C024	CAP CER DISC 1MFD	1	1005-0001
C025	CAP CER DISC 1MFD	1	1005-0001
C026	CAP CER DISC 1MFD	1	1005-0001
C027	CAP ELECT 10 MFD 25V VERT MT	1	1010-0099
C028	CAP ELECT 10 MFD 25V VERT MT	1	1010-0099
C029	CAP ELECT 10 MFD 25V VERT MT	1	1010-0099
C030	CAP ELECT 10 MFD 25V VERT MT	1	1010-0099
C031	CAP ELECT VT MT 100UF (NO SUB.)	1	1010-0110
C032	CAP TAN 1MFD 35V	1	1008-0011
C033	CAP TAN 1MFD 35V	1	1008-0011
C034	CAP CER 0.1MF CK05BX K	1	1015-0001
C035	CAP ELECT VT MT 100UF (NO SUB.)	1	1010-0110
C036	CAP CER 0.1MF CK05BX K	1	1015-0001
C037	CAP CER 0.1MF CK05BX K	1	1015-0001
C038	CAP ELECT VT MT 100UF (NO SUB.)	1	1010-0110
C039	CAP CER DISC 1MFD	1	1005-0001
C040	CAP ELECT VT MT 100UF (NO SUB.)	1	1010-0110
C041	CAP EL 100MFD25V NON FOL VE MT	1	1010-0111
C042	CAP EL 100MFD25V NON FOL VE MT	1	1010-0111
C044	CAP CER DISC 1MFD	1	1005-0001
C045	CAP ELECT VT MT 100UF (NO SUB.)	1	1010-0110
C046	CAP EL 100MFD25V NON FOL VE MT	1	1010-0111
C047	CAP EL 100MFD25V NON FOL VE MT	1	1010-0111

CKT. REF.	DESCRIPTION	QTY.	TFT STOCK NO.
C048	CAP ELECT 4.7UF 16V VERT MT	1	1010-0047
C049	CAP ELECT VT MT 100UF (NO SUB.)	1	1010-0110
C050	CAP ELECT 10 MFD 25V VERT MT	1	1010-0099
C051	CAP ELECT VT MT 100UF (NO SUB.)	1	1010-0110
C052	CAP MICA 100 PF	1	1001-0101
C053	CAP ELEC 470MF 25V VERT MNT	1	1010-0045
C054	CAP CER 0.1MF CK05BX K	1	1015-0001
C055	CAP ELECT 220MFD 16V VERT MT	1	1010-0220
C056	CAP CER 0.1MF CK05BX K	1	1015-0001
C057	CAP CER 0.1MF CK05BX K	1	1015-0001
C058	CAP CER 0.1MF CK05BX K	1	1015-0001
C059	CAP CER 0.1MF CK05BX K	1	1015-0001
C060	CAP CER 0.1MF CK05BX K	1	1015-0001
C061	CAP CER 0.1MF CK05BX K	1	1015-0001
C062	CAP CER 0.1MF CK05BX K	1	1015-0001
C063	CAP CER 0.1MF CK05BX K	1	1015-0001
C064	CAP CER 0.1MF CK05BX K	1	1015-0001
C065	CAP CER 0.1MF CK05BX K	1	1015-0001
C066	CAP CER 0.1MF CK05BX K	1	1015-0001
C067	CAP CER 0.1MF CK05BX K	1	1015-0001
C068	CAP CER 0.1MF CK05BX K	1	1015-0001
C069	CAP CER 0.1MF CK05BX K	1	1015-0001
C070	CAP CER .01MF CK05BX K	1	1015-0002
C071	CAP ELECT 1000MFD 25V VERT MT	1	1010-1000
C072	CAP ELECT 1000MFD 25V VERT MT	1	1010-1000
C073	CAP ELECT 1000MFD 25V VERT MT	1	1010-1000
C074	CAP ELECT 1000MFD 25V VERT MT	1	1010-1000
C075	CAP CER 0.1MF CK05BX K	1	1015-0001
C076	CAP CER 0.1MF CK05BX K	1	1015-0001
C077	CAP CER 0.1MF CK05BX K	1	1015-0001
C078	CAP CER 0.1MF CK05BX K	1	1015-0001
C079	CAP MICA 20PF	1	1001-0200
C080	CAP MICA 20PF	1	1001-0200
C081	CAP MICA 30 PF	1	1001 0300
C082	CAP MICA 30 PF	1	1001-0300
C083	CAP DIP TANT 10MF/25V	1	1008 0100
C084	CAP CER 0.1MF CK05BX K	1	1015-0001
C085	CAP CER 0.1MF CK05BX K	1	1015-0001
C086	CAP CER DISC .0047MFD	1	1005-4749
C087	CAP CER DISC .0047MFD	1	1005-4749
C088	CAP CER 0.1MF CK05BX K	1	1015-0001
C089	CAP CER 0.1MF CK05BX K	1	1015-0001
C090	CAP CER 0.1MF CK05BX K	1	1015-0001
C091	CAP CER 0.1MF CK05BX K	1	1015-0001
C092	CAP CER 0.1MF CK05BX K	1	1015-0001
C093	CAP CER 0.1MF CK05BX K	1	1015-0001

CKT. REF.	DESCRIPTION	QTY.	TFT STOCK NO.
C094	CAP CER 0.1MF CK05BX K	1	1015-0001
C095	CAP CER 0.1MF CK05BX K	1	1015-0001
C096	CAP CER 0.1MF CK05BX K	1	1015-0001
C097	CAP CER 0.1MF CK05BX K	1	1015-0001
C098	CAP CER 0.1MF CK05BX K	1	1015-0001
C099	CAP CER 0.1MF CK05BX K	1	1015-0001
C100	CAP CER 0.1MF CK05BX K	1	1015-0001
C120	CAP ELECT 1000MFD 25V VERT MT	1	1010-1000
C130	CAP CER 0.1MF CK05BX K	1	1015-0001
C131	CAP CER 0.1MF CK05BX K	1	1015-0001
C132	CAP CER 100 PF	1	1015-0100
CR01	LED HP 5082-4487 CLEAR	1	1285-4487
CR02	DIO 1N3064	1	1281-3064
CR03	DIO 1N3064	1	1281-3064
CR04	DIO 1N3064	1	1281-3064
CR05	DIO 1N3064	1	1281-3064
CR06	LED HP 5082-4487 CLEAR	1	1285-4487
CR07	LED HP 5082-4487 CLEAR	1	1285-4487
CR08	DIO 1N3064	1	1281-3064
CR09	DIO 1N3064	1	1281-3064
CR10	DIO 1N3064	1	1281-3064
CR11	DIO 1N3064	1	1281-3064
CR12	DIO 1N3064	1	1281-3064
CR13	NOT USED	1	X000-0001
CR14	DIO 1N3064	1	1281-3064
CR15	DIO 1N3064	1	1281-3064
CR16	DIO 1N3064	1	1281-3064
CR17	DIO 1N3064	1	1281-3064
E001	SOLID PIN PLUG	1	2140-0071
E002	SOLID PIN PLUG	1	2140-0071
E003	SOLID PIN PLUG	1	2140-0071
E004	SOLID PIN PLUG	1	2140-0071
E005	SOLID PIN PLUG	1	2140-0071
FR01	DIODE BRIDGE 1 AMP 50V	1	1204-0004
FL01	FILT PIEZOELECTRIC TUNING	1	1055-0960
FL02	FILT PIEZOELECTRIC TUNING	1	1055-0853
HS01	HEATSINK 1.38WDX1"H 886 887	1	2010-0016
HS02	HEATSINK 1.38WDX1"H 886 887	1	2010-0016
J001	CONN RECP 36P .10CTR DUAL ROW	1	2250-9636
J002	CONN 12PIN MOLEX R. ANGLE .100 CTR	1	2250-8811
J003	CONN 3PIN HEADER MALE .100 CTR	1	2250-5830
J004	FDBK JUMPING 3 PIN	1	2250-4007
J005	CONN MINI MOLEX 4PIN	1	2250-5454
K001	RELAY 12VDC 2A AT 28V	1	1880-0022
K002	RELAY 12VDC 2A AT 28V	1	1880-0022
K003	RELAY 12VDC 2A AT 28V	1	1880-0022

CKT. REF.	DESCRIPTION	QTY.	TFT STOCK NO.
K004	RELAY 12VDC 2A AT 28V	1	1880-0022
P001	CONN 4PIN HEADER MALE .100CTR	1	2250-5899
P002	CONN 4PIN HEADER MALE .100CTR	1	2250-5899
PCB1	PCB MAIN BD 886 887	1	1600-3638
PJ01	SOCKET JUMPER 2 PIN	1	2250-2502
PJ02	SOCKET JUMPER 2 PIN	1	2250-2502
Q001	TRANS 2N4275	1	1271-4275
Q002	TRANS 2N4275	1	1271-4275
Q003	TRANS 2N4275	1	1271-4275
Q004	TRANS PN2222A NPN	1	1271-2223
Q005	TRANS PN2222A NPN	1	1271-2223
Q006	TRANS PN2222A NPN	1	1271-2223
Q007	TRANS 2N4275	1	1271-4275
Q008	TRANS 2N4275	1	1271-4275
Q009	TRANS 2N2102 TO-39	1	1271-2102
Q010	TRANS 2N2102 TO-39	1	1271-2102
Q011	TRANS 2N2102 TO-39	1	1271-2102
Q012	TRANS 2N4275	1	1271-4275
Q013	TRANS 2N4275	1	1271-4275
Q014	TRANS 2N4275	1	1271-4275
Q015	TRANS 2N4275	1	1271-4275
Q016	TRANS 2N2222	1	1271-2222
R001	RES CAR FILM 1/4W 5% 1K	1	1065-1001
R002	RES CAR FILM 1/4W 5% 10K	1	1065-1002
R003	RES CAR COMP 1/4W 5% 12K	1	1065-1202
R004	RES CAR COMP 1/4W 5% 12K	1	1065-1202
R005	RES CAR COMP 1/4W 5% 12K	1	1065-1202
R006	RES CAR COMP 1/4W 5% 12K	1	1065-1202
R007	RES CAR COMP 1/4W 5% 12K	1	1065-1202
R008	RES CAR FILM 1/4W 5% 47 OHM	1	1065-0047
R009	POT CERMET 10K PC MNT TOP ADJ	1	1072-1111
R010	RES CAR FILM 1/4W 5% 10K	1	1065-1002
R011	RES CAR COMP 1/4W 5% 12K	1	1065-1202
R012	RES CAR COMP 1/4W 5% 12K	1	1065-1202
R013	RES CAR COMP 1/4W 5% 12K	1	1065-1202
R014	RES CAR COMP 1/4W 5% 12K	1	1065-1202
R015	RES CAR COMP 1/4W 5% 12K	1	1065-1202
R016	POT CERMET 10K PC MNT TOP ADJ	1	1072-1111
R017	RES CAR FILM 1/4W 5% 10K	1	1065-1002
R018	RES CAR FILM 1/4W 5% 10K	1	1065-1002
R019	RES CAR FILM 1/4W 5% 10K	1	1065-1002
R020	RES CAR FILM 1/4W 5% 150K	1	1065-1503
R021	RES CAR FILM 1/4W 5% 10K	1	1065-1002
R022	RES CAR COMP 1/4W 5% 22K	1	1065-2202
R023	RES CAR FILM 1/4W 5% 270K	1	1065-2703

CKT. REF.	DESCRIPTION	QTY.	TFT STOCK NO.
R024	RES CAR COMP 1/4W 5% 470K	1	1065-4703
R025	RES CAR FILM 1/4W 5% 270K	1	1065-2703
R026	RES CAR FILM 1/4W 5% 270K	1	1065-2703
R027	RES CAR FILM 1/4W 5% 270K	1	1065-2703
R028	RES CAR FILM 1/4W 5% 270K	1	1065-2703
R029	POT CERMET 10K PC MNT TOP ADJ	1	1072-1111
R030	RES CAR COMP 1/4W 5% 12K	1	1065-1202
R031	RES CAR FILM 1/4W 5% 10K	1	1065-1002
R032	RES CAR FILM 1/4W 5% 10K	1	1065-1002
R033	RES CAR FILM 1/4W 5% 10K	1	1065-1002
R034	RES CAR COMP 1/4W 5% 470K	1	1065-4703
R035	RES CAR COMP 1/4W 5% 470K	1	1065-4703
R036	RES CAR FILM 4.7K 1/4W 5%	1	1065-4701
R037	RES CAR FILM 4.7K 1/4W 5%	1	1065-4701
R038	RES CAR FILM 4.7K 1/4W 5%	1	1065-4701
R039	RES CAR FILM 4.7K 1/4W 5%	1	1065-4701
R040	RES CAR FILM 1/4W 5% 47K	1	1065-4702
R041	RES CAR FILM 1/4W 5% 47K	1	1065-4702
R042	RES CAR FILM 1/4W 5% 10K	1	1065-1002
R043	RES CAR FILM 1/4W 5% 10K	1	1065-1002
R044	RES CAR FILM 1/4W 5% 47K	1	1065-4702
R045	RES CAR FILM 1/4W 5% 47K	1	1065-4702
R046	RES CAR FILM 1/4W 5% 47K	1	1065-4702
R047	RES CAR FILM 1/4W 5% 47K	1	1065-4702
R048	RES CAR FILM 1/4W 5% 10K	1	1065-1002
R049	RES CAR FILM 1/4W 5% 10K	1	1065-1002
R050	RES CAR COMP 1/4W 5% 20K	1	1065-2002
R051	RES CAR COMP 1/4W 5% 20K	1	1065-2002
R052	RES CAR FILM 4.7K 1/4W 5%	1	1065-4701
R053	RES CAR FILM 4.7K 1/4W 5%	1	1065-4701
R054	RES CAR FILM 1/4W 5% 10K	1	1065-1002
R055	RES CAR FILM 1/4W 5% 10K	1	1065-1002
R056	POT CERMET 10K PC MNT TOP ADJ	1	1072-1111
R057	RES CAR FILM 1/4W 5% 10K	1	1065-1002
R058	RES CAR FILM 1/4W 5% 10K	1	1065-1002
R059	RES VAR PC MT 10K LT	1	1072-1002
R060	POT CERMET 10K PC MNT TOP ADJ	1	1072-1111
R061	RES CAR FILM 1/4W 5% 10K	1	1065-1002
R062	RES CAR FILM 1/4W 5% 10K	1	1065-1002
R063	RES MT FLM 1/8W 1% 22.1K	1	1061-2212
R064	RES MT FLM 1/8W 1% 100K	1	1061-1003
R065	RES MT FLM 1/8W 1% 10K	1	1061-1002
R066	RES MT FLM 1/8W 1% 10K	1	1061-1002
R067	RES MF 301 1% 1/8W	1	1061-0301
R068	RES MF 301 1% 1/8W	1	1061-0301
R069	RES MT FLM 604 1/8W 1%	1	1061 0604

CKT. REF.	DESCRIPTION	QTY.	TFT STOCK NO.
R070	RES CAR COMP 1/4W 5% 100K	1	1065-1003
R071	RES CAR COMP 1/4W 5% 100K	1	1065-1003
R072	RES CAR COMP 1/4W 5% 100K	1	1065-1003
R073	RES CAR FILM 1/4W 5% 1K	1	1065-1001
R074	POT CERMET 10K PC MNT TOP ADJ	1	1072-1111
R077	RES MT FLM 1/8W 1% 20.0K	1	1061-2002
R078	RES MT FLM 1/8W 1% 100K	1	1061-1003
R079	RES MT FLM 1/8W 1% 100K	1	1061-1003
R080	RES MT FLM 1/8W 1% 100K	1	1061-1003
R081	RES MF 301 1% 1/8W	1	1061-0301
R082	RES MF 301 1% 1/8W	1	1061-0301
R083	RES CAR FILM 1/4W 5% 10K	1	1065-1002
R084	RES CAR FILM 4.7K 1/4W 5%	1	1065-4701
R085	RES CAR FILM 4.7K 1/4W 5%	1	1065-4701
R086	RES CAR FILM 1/4W 5% 47K	1	1065-4702
R087	RES CAR COMP 1/4W 5% 75K	1	1065-7502
R088	RES CAR 1/4W 5% 200K	1	1065-2003
R089	RES CAR COMP 1/4W 5% 100K	1	1065-1003
R090	RES CAR COMP 1/4W 5% 100K	1	1065-1003
R091	RES CAR FILM 4.7K 1/4W 5%	1	1065-4701
R092	RES CAR FILM 4.7K 1/4W 5%	1	1065-4701
R093	RES CAR FILM 1/4W 5% 10K	1	1065-1002
R094	RES CAR FILM 1/4W 5% 10K	1	1065-1002
R095	RES CAR COMP 1/4W 5% 20K	1	1065-2002
R096	RES CAR COMP 1/4W 5% 20K	1	1065-2002
R097	RES CAR FILM 1/4W 5% 1K	1	1065-1001
R098	RES CAR FILM 1/4W 5% 10K	1	1065-1002
R099	RES CAR COMP 1/4W 5% 100K	1	1065-1003
R100	RES CAR FILM 1/4W 5% 10K	1	1065-1002
R101	RES CAR COMP 1/4W 5% 36K	1	1065-3602
R102	POT CERMET 10K PC MNT TOP ADJ	1	1072-1111
R103	RES CAR COMP 1/4W 5% 100K	1	1065 1003
R104	RES CAR FILM 1/4W 5% 10K	1	1065-1002
R105	RES CAR COMP 1/2W 10% 12K	1	1067-0120
R106	RES CAR FILM 1/4W 5% 1K	1	1065-1001
R107	RES CAR COMP 1/4W 5% 200	1	1065-0200
R108	RES CAR FILM 1/4W 5% 2.2K	1	1065-2201
R109	RES CAR FILM 1/4W 5% 39K	1	1065-3902
R110	RES CAR FILM 1/4W 5% 39K	1	1065-3902
R111	RES CAR FILM 1/4W 5% 39K	1	1065-3902
R112	RES CAR FILM 1/4W 5% 39K	1	1065-3902
R113	RES CAR COMP 1/4W 5% 200	1	1065-0200
R114	RES CAR FILM 1/4W 5% 10K	1	1065-1002
R115	RES CAR FILM 1/4W 5% 10K	1	1065-1002
R116	RES CAR FILM 1/4W 5% 10K	1	1065-1002
R117	RES CAR FILM 1/4W 5% 10K	1	1065-1002

CKT. REF.	DESCRIPTION	QTY.	TFT STOCK NO.
R118	RES CAR FILM 1/4W 5% 300 OHM	1	1065-0300
R119	RES CAR FILM 1/4W 5% 300 OHM	1	1065-0300
R120	RES CAR COMP 1/4W 5% 5.1K	1	1065-5101
R121	RES CAR FILM 1/4W 5% 1M	1	1065-1004
R122	RES CAR FILM 1/4W 5% 10K	1	1065-1002
R123	RES CAR FILM 1/4W 5% 33K	1	1065-3302
R124	RES CAR COMP 1/4W 5% 180	1	1065-0180
R125	RES CAR FILM 1/4W 5% 10 OHM	1	1065-0010
R126	RES CAR FILM 1/4W 5% 10 OHM	1	1065-0010
R127	RES CAR FILM 1/4W 5% 10K	1	1065-1002
R128	RES CAR FILM 1/4W 5% 10K	1	1065-1002
R129	RES CAR FILM 1/4W 5% 10K	1	1065-1002
R130	RES CAR COMP 1/4W 5% 5.1K	1	1065-5101
R131	RES CAR COMP 1/4W 5% 56	1	1065-0056
R133	RES CAR FILM 4.7K 1/4W 5%	1	1065-4701
RJ01	TERM BLK 12 POS .197 CTR MALE	1	1700-1012
RJ02	TERM BLK 12 POS .197 CTR MALE	1	1700-1012
RJ03	TERM BLK 12 POS .197 CTR MALE	1	1700-1012
RJ11	TERM BLK 12 POS .197 CTR FEMALE	1	1700-1013
RJ12	TERM BLK 12 POS .197 CTR FEMALE	1	1700-1013
RJ13	TERM BLK 12 POS .197 CTR FEMALE	1	1700-1013
RN01	RES NETWORK 10K SIP 6PIN	1	1073-1065
RN02	RES NETWORK 10K 10PIN SIP COM 5%	1	1073-1199
RN03	RESISTOR NETWORK 390 3MEG	1	1073-3900
RN04	RESISTOR NETWORK 390 3MEG	1	1073-3900
RN05	RESISTOR NETWORK 390 3MEG	1	1073-3900
RN06	RESISTOR NETWORK 390 3MEG	1	1073-3900
SW01	SWITCH MOMENTARY SPDT	1	1800-0105
SW02	SWITCH MOMENTARY SPDT	1	1800-0105
SW03	SWITCH MOMENTARY SPDT	1	1800-0105
SW04	SWITCH MOMENTARY SPDT	1	1800-0105
SW05	SWITCH MOMENTARY SPDT	1	1800-0105
SW06	SWITCH MOMENTARY SPDT	1	1800 0105
SW07	SW PB SPST R/A MOM PC MNT TP11	1	1800-2072
SW08	SW PB SPST R/A MOM PC MNT TP11	1	1800-2072
SW09	SWITCH 8 PIN DIP	1	1800-2066
SW10	SWITCH 8 PIN DIP	1	1800-2066
T001	XFMR POWER 16V .7A LP16-700	1	1500-0170
T002	XFMR 600 OHM 1:1	1	1500-0600
U001	I/C RCA CD4069 INVERTER	1	1102-4069
U002	I/C MM74C74N CMOS	1	1102-7474
U003	I/C RCA CD4069 INVERTER	1	1102-4069
U004	I/C RCA CD4069 INVERTER	1	1102-4069
U005	QD 2IN EXCL OR GT CD4071	1	1102-4071
U006	QD 2IN EXCL OR GT CD4071	1	1102-4071
U007	I/C RCA CD4081 QD 2-AND	1	1102-4081

CKT. REF.	DESCRIPTION	QTY.	TFT STOCK NO.
U008	I/C RCA CD4081 QD 2-AND	1	1102-4081
U009	QD 2IN EXCL OR GT CD4071	1	1102-4071
U010	I/C CD4518BE	1	1102-4518
U011	I/C MM74C74N CMOS	1	1102-7474
U012	I/C MV5089 DTMF GENERATOR	1	1102-5089
U013	NOT USED	1	X000-0001
U014	IC MV5089 DTMF GENERATOR	1	1102-5089
U015	IC TL084CN QP AMP JFET INPUT	1	1100-6084
U016	IC TL084CN QP AMP JFET INPUT	1	1100-6084
U017	IC TL084CN QP AMP JFET INPUT	1	1100-6084
U018	I/C LM379S 2W AF PWR AMP	1	1100-0575
U019	I/C RCA CD4081 QD 2-AND	1	1102-4081
U020	I/C CD4518BE	1	1102-4518
U021	I/C RCA CD4069 INVERTER	1	1102-4069
U022	QD 2IN EXCL OR GT CD4071	1	1102-4071
U023	I/C MM74C74N CMOS	1	1102-7474
U024	I/C MM74C74N CMOS	1	1102-7474
U025	I/C MM74C74N CMOS	1	1102-7474
U026	I/C CD4518BE	1	1102-4518
U027	I/C CD4518BE	1	1102-4518
U028	I/C CD4518BE	1	1102-4518
U029	I/C CD4518BE	1	1102-4518
U030	I/C CD4518BE	1	1102-4518
U031	I/C CD4518BE	1	1102-4518
U032	I/C CD4518BE	1	1102-4518
U033	I/C CD4518BE	1	1102-4518
U034	I/C MM74C48N	1	1102-7448
U035	I/C MM74C48N	1	1102-7448
U036	I/C MM74C48N	1	1102-7448
U037	I/C MM74C48N	1	1102-7448
U038	I/C RCA CD4081 QD 2-AND	1	1102-4081
U039	I/C RCA CD4081 QD 2-AND	1	1102-4081
U040	QD 2IN EXCL OR GT CD4071	1	1102-4071
U041	I/C RCA CD4081 QD 2-AND	1	1102-4081
U042	I/C RCA CD4069 INVERTER	1	1102-4069
U043	I/C RCA CD4069 INVERTER	1	1102-4069
U044	QD 2IN EXCL OR GT CD4071	1	1102-4071
U045	I/C RCA CD4081 QD 2-AND	1	1102-4081
U046	QD 2IN EXCL OR GT CD4071	1	1102-4071
U047	I/C RCA CD4069 INVERTER	1	1102-4069
U048	I/C RCA CD4081 QD 2-AND	1	1102-4081
U049	I/C LM78L12 12V 100 .2A 78L12CT	1	1100-7812
U050	I/C LM340T-5	1	1100-7805
U051	I/C RCA LM324 QUAD OPAMP	1	1100-0324
U052	I/C MM74C74N CMOS	1	1102-7474
U053	OCTAL ISOLATING 4N29 DARLINGTON	1	1099-0029

CKT. REF.	DESCRIPTION	QTY.	TFT STOCK NO.
U054	OPTO-ISOLATOR 4N29 DARLINGTON	1	1099-0003
XU01	SOCKET I/C 14PIN	1	2250-1014
XU02	SOCKET I/C 14PIN	1	2250-1014
XU03	SOCKET I/C 14PIN	1	2250-1014
XU04	SOCKET I/C 14PIN	1	2250-1014
XU05	SOCKET I/C 14PIN	1	2250-1014
XU06	SOCKET I/C 14PIN	1	2250-1014
XU07	SOCKET I/C 14PIN	1	2250-1014
XU08	SOCKET I/C 14PIN	1	2250-1014
XU09	SOCKET I/C 14PIN	1	2250-1014
XU10	SOCKET, I/C 16 PIN	1	2250-1016
XU11	SOCKET I/C 14PIN	1	2250-1014
XU12	SOCKET, I/C 16 PIN	1	2250-1016
XU13	NOT USED	1	X000-0001
XU14	SOCKET, I/C 16 PIN	1	2250-1016
XU15	SOCKET I/C 14PIN	1	2250-1014
XU16	SOCKET I/C 14PIN	1	2250-1014
XU17	SOCKET I/C 14PIN	1	2250-1014
XU18	SOCKET, I/C 8 PIN	1	2250-1008
XU19	SOCKET I/C 14PIN	1	2250-1014
XU20	SOCKET, I/C 16 PIN	1	2250-1016
XU21	SOCKET I/C 14PIN	1	2250-1014
XU22	SOCKET I/C 14PIN	1	2250-1014
XU23	SOCKET I/C 14PIN	1	2250-1014
XU24	SOCKET I/C 14PIN	1	2250-1014
XU25	SOCKET I/C 14PIN	1	2250-1014
XU26	SOCKET, I/C 16 PIN	1	2250-1016
XU27	SOCKET, I/C 16 PIN	1	2250-1016
XU28	SOCKET, I/C 16 PIN	1	2250-1016
XU29	SOCKET, I/C 16 PIN	1	2250-1016
XU30	SOCKET, I/C 16 PIN	1	2250-1016
XU31	SOCKET, I/C 16 PIN	1	2250-1016
XU32	SOCKET, I/C 16 PIN	1	2250-1016
XU33	SOCKET, I/C 16 PIN	1	2250-1016
XU34	SOCKET, I/C 16 PIN	1	2250-1016
XU35	SOCKET, I/C 16 PIN	1	2250-1016
XU36	SOCKET, I/C 16 PIN	1	2250-1016
XU37	SOCKET, I/C 16 PIN	1	2250-1016
XU38	SOCKET I/C 14PIN	1	2250-1014
XU39	SOCKET I/C 14PIN	1	2250-1014
XU40	SOCKET I/C 14PIN	1	2250-1014
XU41	SOCKET I/C 14PIN	1	2250-1014
XU42	SOCKET I/C 14PIN	1	2250-1014
XU43	SOCKET I/C 14PIN	1	2250-1014
XU44	SOCKET I/C 14PIN	1	2250-1014

Models 886 and 887
Main Board

PCB Assy. 6608-3638
Rev. B

CKT. REF.	DESCRIPTION	QTY.	TFT STOCK NO.
XU45	SOCKET I/C 14PIN	1	2250-1014
XU46	SOCKET I/C 14PIN	1	2250-1014
XU47	SOCKET I/C 14PIN	1	2250-1014
XU48	SOCKET I/C 14PIN	1	2250-1014
XU49	NOT USED	1	X000-0001
XU50	NOT USED	1	X000-0001
XU51	SOCKET I/C 14PIN	1	2250-1014
XU52	SOCKET I/C 14PIN	1	2250-1014
XU53	NOT USED	1	X000-0001
XU54	NOT USED	1	X000-0001
Y001	CRYSTAL 3.6554MHZ HC-18U	1	2400-0365
Y002	CRYSTAL 3.5824MHZ HC-18U	1	2400-0358

REVISIONS				
REV	DESCRIPTION	BY	DATE	APPD
A	RELEASED TO PROD	[illegible]	6-19-89	
B	REVISED PER ECO 1976	AR	10-01-91	R. Chin

DAYS SINCE LAST RECEPTION

DAYS SINCE LAST TRANSMISSION

10' 1' 10' 1'

U1 HP5082-7760

U2 HP5082-7760

U3 HP5082-7760

U4 HP5082-7760

AUDIO LEVEL LED BARGRAPHY

U5 HDSP-4820

RF LEVEL LED BARGRAPHY

U6 HDSP-4820

U7 VU SCALE BA6124

U8 LOG SCALE AN6875

EBS RCVD

CR1

LED1

J1

FROM MAIN BOARD U34

FROM MAIN BOARD U36

FROM MAIN BOARD U35

FROM MAIN BOARD U37

AUDIO LEVEL

RF LEVEL

CLK CR2

LED2

FROM MAINBOARD J1

C1 10

R1 10K

R2 5.1K

R3 10K

AUDIO LEVEL ADJ

NOTES : UNLESS OTHERWISE SPECIFIED.
1. ALL RESISTOR VALUES ARE IN OHMS ±5%
2. ALL CAPACITOR VALUES ARE IN MICROFARADS.
3. ALL INDUCTOR VALUES ARE IN MICROHENRIES.

EBS, DISPLAY BOARD, DISPLYBD. SCH. 04/19/89

886 887	6608-3636
MODEL	NEXT ASSY
APPLICATION	

SPECIFICATIONS UNLESS OTHERWISE NOTED:
ANGULAR = ±
DECIMAL = 2 PLACE ± 3 PLACE ±
BREAK = .010MM .
SURFACE ROUGHNESS = MICROINCHES RMS MAX.
DIAMETERS = CONCENTRIC WITHIN .005 TIR.
FILLET RADIUS = MAX
THREADS = CLASS 2 MARK IN ACCORDANCE WITH TFT SPEC 5300-1000

ITEM	QTY	PART NO.	NOMENCLATURE OR DESCRIPTION
MATERIAL			
FINISH			

TFT INC. 3090 OAKMEAD VILLAGE DR SANTA CLARA, CA. 95051 (408) 727 7272 TWX 910 338 0584

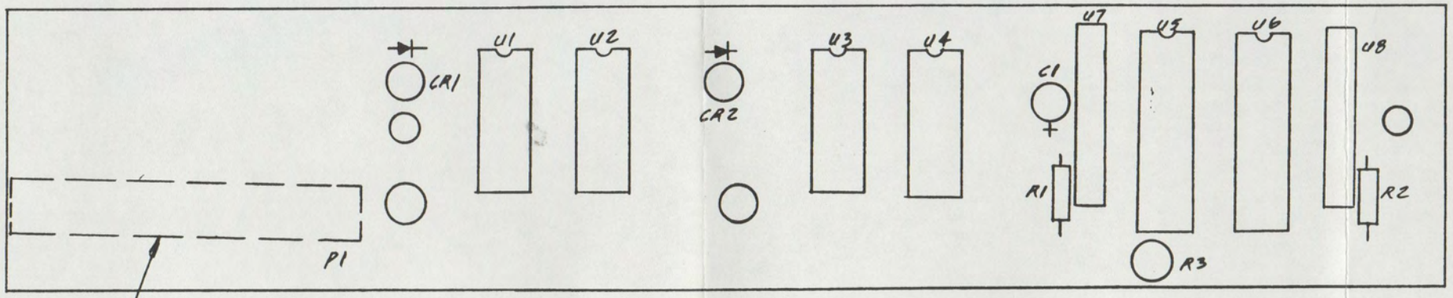
SCHEMATIC
EBS
DISPLAY BOARD

DR. BY	[illegible]	6-14-89
CK. BY	[illegible]	6-18-89
ENGR.	[illegible]	6-20-89
MFG.	[illegible]	7/27/89
Q.A.	TSP	6/27/89

CODE IDENT NO. | SIZE D | DRAWING NO. 6601-3636 | REV B

SCALE | DO NOT SCALE PRINT | SHEET 1 OF 1

REVISIONS				
ZONE	REV.	DESCRIPTION	DATE	APPROVED
	A	RELEASED TO PROD	3/14/89	
	B	REVISED PER ECO 1876	10/25/89	R. Chen



P1 INSTALLED ON CIRCUIT (FARSIDE)

APPROVALS	DATE
DRAWN RdL	3/10/89
ENGR. K.C. Tung	3/13/89
MFG. EZ	6/27/89
Q.A. TSP	6/29/89

MEI

PCB ASSY
DISPLAY BOARD

SIZE	FSCM NO.	DWG. NO.	REV.
C		6608-3636	B

SCALE 2/1 SHEET 1 OF 1

BISHOP GRAPHICS/ACCUPRESS
REORDER NO. A30622

Models 886 and 887
Display Board

PCB Assy. 6608-3636
Rev. B

CKT. REF.	DESCRIPTION	QTY.	TFT STOCK NO.
C001	CAP ELECT VT MT 100UF (NO SUB.)	1	1010-0110
C002	CAP ELECT 1.0MFD 50V RADIAL	1	1010-0009
CR01	LED HP 5082-4487 CLEAR	1	1285-4487
CR02	LED HP 5082-4487 CLEAR	1	1285-4487
J001	PLUG DUAL ROW .100CTR 36 PIN	1	2250-9536
PCB1	PCB FRONT PANEL DISPY 886 887	1	1600-3636
R001	RES CAR FILM 1/4W 5% 10K	1	1065-1002
R002	RES CAR COMP 1/4W 5% 5.1K	1	1065-5101
R003	POT CERMET 10K PC MNT TOP ADJ	1	1072-1111
U001	LED HP5082-7760 DISPLAY	1	1285-7760
U002	LED HP5082-7760 DISPLAY	1	1285-7760
U003	LED HP5082-7760 DISPLAY	1	1285-7760
U004	LED HP5082-7760 DISPLAY	1	1285-7760
U005	LED DISIY HP HDSP-4820 10 ELEM	1	1285-4820
U006	LED DISIY HP HDSP-4820 10 ELEM	1	1285-4820
U007	I/C BA6124 5POINT LED DRIVER	1	1100-6124
U008	I/C AN6875 5DOT LED DRIVER LOG	1	1100-6875
XU01	SOCKET I/C 14PIN	1	2250-1014
XU02	SOCKET I/C 14PIN	1	2250-1014
XU03	SOCKET I/C 14PIN	1	2250-1014
XU04	SOCKET I/C 14PIN	1	2250-1014
XU05	SOCKET I/C DIP-20 PIN	1	2250-1020
XU06	SOCKET I/C DIP-20 PIN	1	2250-1020

REVISIONS				
REV	DESCRIPTION	BY	DATE	APPD
B	PRELIMINARY RELEASE		9/15/90	

TO RF ANT
J3
ANT INPUT
T1
C60 .1
C41 2-18pF
CR1-1 1/2KV1236Z
R1 100K
0.2Vdc /540kHz
C3 .1
R2 100K
CR1-2 1/2KV1236Z
C4 620PF
C5 26pF
R3 22
L2 92.5uH
+12V
R43 47K
R10 10K
R11 5.1K
R12 15K
1/4 U17 LM324
C16 .1
C7 .1
C8 .1
C6 .1
R4 2.7K
C15 .01
C51 10
R6 2.2K
U15 TDA1072A
SFR450F
IN FL1 OUT
L1 TOKO A7523
R5 1.5K
R8 56
C9 3900P
C42 200
CX 3900P
C17 100u
C10 220P
C12 2.2u
C13 22uF
J1 TO MAIN PCB
10 J1 RF LEVEL 0.92V @ RF 1uV
9 J1
8 J1
7 J1
6 J1 AUDIO OUTPUT 4Vp-p
5 J1
4 J1
3 J1
2 J1 +5V
1 J1 +12V
C81-1 10uF
R16 2.2K
R17 10K
R18 2.7K
R41 22K
R42 22K
C53 100
C1 100
C3 .1
C18 100
C18 .1
U5 74176
RN1 10K x4
TO F.P. BOARD
J2
SW1 3rd DIGIT
SW2 2nd DIGIT
SW3 1st DIGIT
C43 .1
C48 .1
C47 .1
C20 100
U9 7425
U8 74LS20
U10 7472
L4 22uH
C24 .1
C34 .1
U12 MC4044
10kHz
R32 5.1K
R19 5.1K
R27 9.1K
C28
U11 CA3130E
R30 5.1K
R31 5.1K
R33 5.1K
R29 9.1K
C29 .1
R28 100
C27 1
C25 1200pF
C26 1200pF
L3 390uH
U6 74176
C44 .1
R20 1K
C33 10
C32 .1
R22 2.2K
R24 36K
R21 22K
Q2 2N3563
R23 1K
Q1 2N3563
C31 .1
C30 .1
R25 330
R26 10K
U7 74176
C45 .1
5MHz Y1
C54 26pF
C38 33pF
C39 100pF
Q4 2N3563
R39 1.5K
R40 180
C40 510P
R38 3.3K
R37 390
C37 .1
R36 1K
R35 6.8K
Q3 2N4275
TP2 5MHz
R34 2.2K
C36 .1
C35 100
L5 21/2T
L6 21/2T
U13 74HC390
U14 74HC390
100KHz
1MHz
C49 .1
C50 .1
R7 12K
C52 .1
C11 .01
C14 .0033
R15 2.2K
R14 3.9K
R13 1M
R44 1K
C55 .1
+5V

FIG.6-6

NOTES : UNLESS OTHERWISE SPECIFIED.
1. ALL RESISTOR VALUES ARE IN OHMS ±5%
2. ALL CAPACITOR VALUES ARE IN MICROFARADS.
3. ALL INDUCTOR VALUES ARE IN MICROHENRIES.

ITEM	QTY	PART NO.	NOMENCLATURE OR DESCRIPTION
		MATERIAL	
		FINISH	

886-887 | MODEL | NEXT ASSY | APPLICATION

SPECIFICATIONS UNLESS OTHERWISE NOTED
ANGULAR = ±
DECIMAL = 2 PLACE ± 3 PLACE ±
BREAK = 0.010IN
SURFACE ROUGHNESS = MICROINCHES RMS MAX
DIAMETERS = CONCENTRIC WITHIN .005 TIR
FILLET RADIUS = MAX
THREADS = CLASS 2 MARK IN ACCORDANCE WITH TFT SPEC 5300-1050

DR. BY	Judy Lyons	7.15.90
CK. BY		7/16/90
ENGR.	C. Lee	7.15.90
MFG.		9/14/90
Q.A.	T. S. Peterson	9/15/90

TFT INC 3090 OAKMEAD VILLAGE DR SANTA CLARA, CA 95051 (408) 727 7272 TWX 910 338 0584

SCHEMATIC
EBS
AM RECEIVER

CODE IDENT NO | SIZE D | DRAWING NO 6601-3635 | REV B
SCALE NONE | DO NOT SCALE PRINT | SHEET 1 OF 1

REVISIONS				
ZONE	REV.	DESCRIPTION	DATE	APPROVED
	A	RELEASED TO P200	3/9/89	

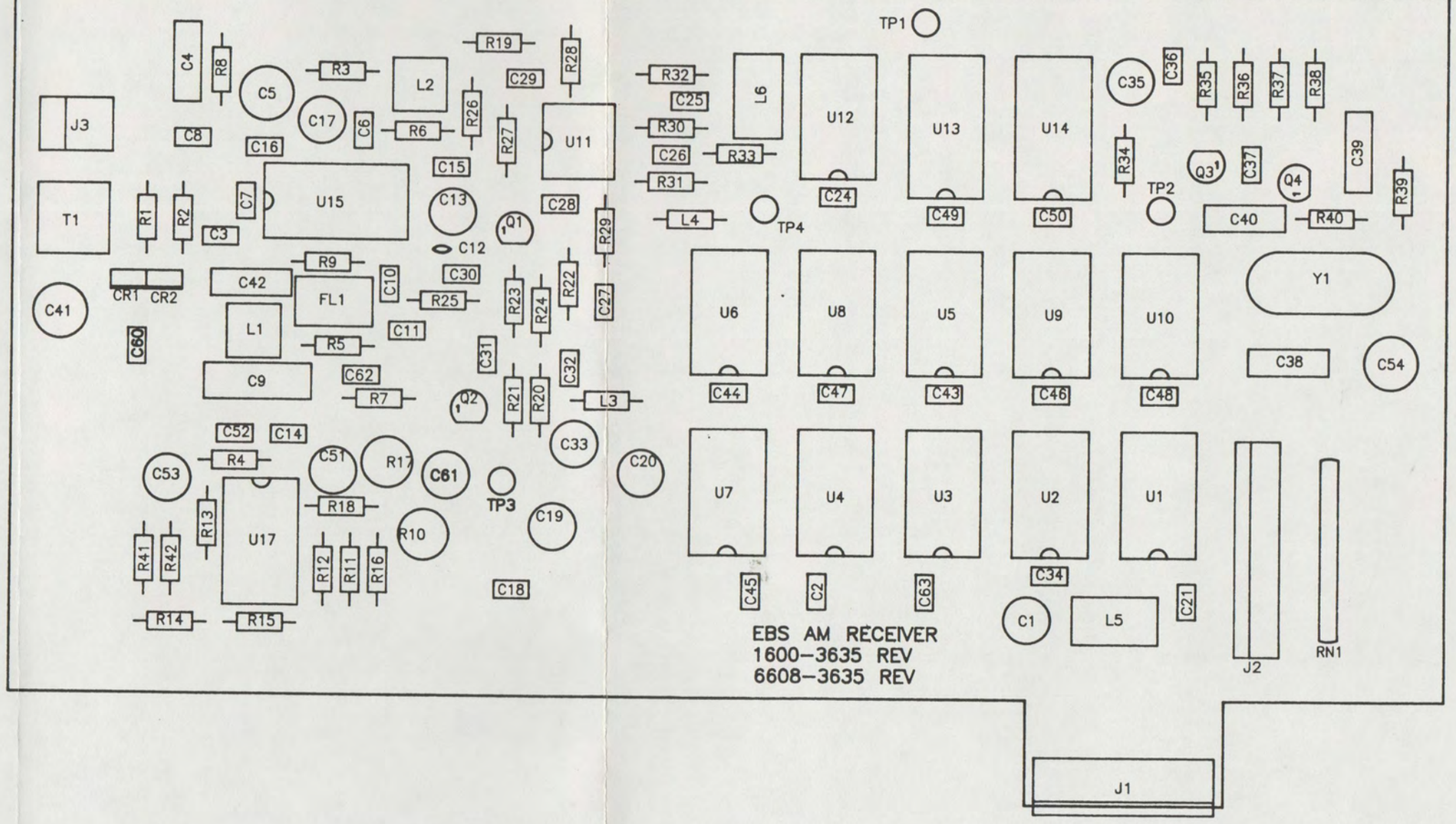


FIG.6-7

1. REF DWGS;
SCHEMATIC 6601-3635
PCB FAB 1600-3635

NOTE;

APPROVALS	DATE
DRAWN LK	3/9/89
ENGR. K.C. Fung	3/10/89
MFG. EZ	4/12/89
Q.A. TSP	4/29/89

MET INC

PCB ASSY
AM RECEIVER

SIZE	FSCM NO.	DWG. NO.	REV.
C		6608-3635	A

SCALE NONE SHEET 1 OF 1

CKT. REF.	DESCRIPTION	QTY.	TFT STOCK NO.
C001	CAP ELECT VT MT 100UF (NO SUB.)	1	1010-0110
C002	CAP CER 0.1MF CK05BX K	1	1015-0001
C003	CAP CER 0.1MF CK05BX K	1	1015-0001
C004	CAP MICA 620 PF	1	1001-0621
C005	CAP TRIMMER 2.5PF TO 27PF	1	1012-0036
C006	CAP CER 0.1MF CK05BX K	1	1015-0001
C007	CAP CER 0.1MF CK05BX K	1	1015-0001
C008	CAP CER 0.1MF CK05BX K	1	1015-0001
C009	CAP MICA 3900PF	1	1001-0392
C010	CAP CER .22MF CK06BX K	1	1015-0003
C011	CAP CER .01MF CK05BX K	1	1015-0002
C012	CAP DIPPED TANT 2.2 UF 25V	1	1004-0027
C013	C SFG LEAD DISTAN 2.5-10	1	1000-0270
C014	CAP CER .0013MF CK05BX K	1	1015-0014
C015	CAP CER .01MF CK05BX K	1	1015-0002
C016	CAP CER 0.1MF CK05BX K	1	1015-0001
C017	CAP ELECT VT MT 100UF (NO SUB.)	1	1010-0110
C018	CAP CER 0.1MF CK05BX K	1	1015-0001
C019	CAP ELECT VT MT 100UF (NO SUB.)	1	1010-0110
C020	CAP ELECT VT MT 100UF (NO SUB.)	1	1010-0110
C021	CAP CER 0.1MF CK05BX K	1	1015-0001
C022	NOT USED	1	X000-0001
C023	NOT USED	1	X000-0001
C024	CAP CER 0.1MF CK05BX K	1	1015-0001
C025	CAP CER .0012MF CK05	1	1015-0040
C026	CAP CER .0012MF CK05	1	1015-0040
C027	CAP CER 1MFD	14	1005-0002
C028	CAP CER 1MFD	1	1005-0002
C029	CAP CER 0.1MF CK05BX K	1	1015-0001
C030	CAP CER 0.1MF CK05BX K	1	1015-0001
C031	CAP CER 0.1MF CK05BX K	1	1015-0001
C032	CAP CER 0.1MF CK05BX K	1	1015-0001
C033	CAP ELECT 10 MFD 25V VERT MT	1	1010-0099
C034	CAP CER 0.1MF CK05BX K	1	1015-0001
C035	CAP ELECT VT MT 100UF (NO SUB.)	1	1010-0110
C036	CAP CER 0.1MF CK05BX K	1	1015-0001
C037	CAP CER 0.1MF CK05BX K	1	1015-0001
C038	CAP MICA 39 PF	1	1001-0390
C039	CAP CER 0.001MF CK05	1	1015-0010
C040	CAP MICA 510 PF	1	1001-0511
C041	CAP VAR 2-18PF	1	1012-2183
C042	CAP MICA 200 PF	1	1001-0201
C043	CAP CER 0.1MF CK05BX K	1	1015-0001
C044	CAP CER 0.1MF CK05BX K	1	1015-0001
C045	CAP CER 0.1MF CK05BX K	1	1015-0001
C046	CAP CER 0.1MF CK05BX K	1	1015-0001

CKT. REF.	DESCRIPTION	QTY.	TFT STOCK NO.
C047	CAP CER 0.1MF CK05BX K	1	1015-0001
C048	CAP CER 0.1MF CK05BX K	1	1015-0001
C049	CAP CER 0.1MF CK05BX K	1	1015-0001
C050	CAP CER 0.1MF CK05BX K	1	1015-0001
C051	CAP ELECT 10 MFD 25V VERT MT	1	1010-0099
C052	CAP CER 0.1MF CK05BX K	1	1015-0001
C053	CAP ELECT VT MT 100UF (NO SUB.)	1	1010-0110
C054	CAP TRIMMER 2.5PF TO 27PF	1	1012-0036
C060	CAP MICA 4700 PF	1	1001-0472
C061	CAP ELECT VT MT 100UF (NO SUB.)	1	1010-0110
C061-1	CAP ELECT 10 MFD 25V VERT MT	1	1010-0099
C062	CAP CER .01MF CK05BX K	1	1015-0002
C063	CAP CER 0.1MF CK05BX K	1	1015-0001
CR01	DIODE VARICAP X 2 HV1236716-22P	1	1299-1236
CX	CAP CER 0.1MF CK05BX K		1015-0001
FL01	FILT IF 450KHZ SFR450F	1	1052-1140
J001	CONN MOLEX R/A 10P .10 CTR FEM	1	2250-8910
J002	CONN. 12 PIN HEADER MALE .100 CTR	1	2250-5842
J003	PLUG, LOCKING 2 PIN	1	2250-6002
L001	455KHZ IF XFMR TOKO 7XNS-A7523	1	1501-0658
L002	COIL 100UH VAR TK2417	1	1550-0121
L003	CHOKE 390 UH	1	1531-0391
L004	CHOKE 22 UHY SMALL	1	1531-0022
L005	CHOKE RF 2 1/2 TURNS	1	1530-0025
L006	CHOKE RF 2 1/2 TURNS	1	1530-0025
PCB1	PCB AM RECEIVER 886	1	1600-3635
Q001	TRANS 2N3563	1	1271-3563
Q002	TRANS 2N3563	1	1271-3563
Q003	TRANS 2N4275	1	1271-4275
Q004	TRANS 2N3563	1	1271-3563
R001	RES CAR COMP 1/4W 5% 100K	1	1065-1003
R002	RES CAR COMP 1/4W 5% 100K	1	1065-1003
R003	RES CAR COMP 1/4W 5% 22	1	1065-0022
R004	RES CAR FILM 1/4W 5% 2.7K	1	1065-2701
R005	RES CAR COMP 1/4W 5% 1.5K	1	1065-1501
R006	RES CAR FILM 1/4W 5% 2.2K	1	1065-2201
R007	RES CAR COMP 1/4W 5% 12K	1	1065-1203
R008	RES CAR COMP 1/4W 5% 56	1	1065-0056
R009	NOT USED	1	X000-0001
R010	POT CERMET 10K PC MNT TOP ADJ	1	1072-1111
R011	RES CAR FILM 1/4W 5% 10K	1	1065-1003
R012	RES CAR FILM 1/4W 5% 15K	1	1065-1503
R013	RES CAR FILM 1/4W 5% 1M	1	1065-1004
R014	RES CAR COMP 1/4W 5% 3.9K	1	1065-3901
R015	RES CAR FILM 1/4W 5% 2.2K	1	1065-2201
R016	RES CAR FILM 1/4W 5% 2.2K	1	1065-2201

CKT. REF.	DESCRIPTION	QTY.	TFT STOCK NO.
R017	POT CERMET 10K PC MNT TOP ADJ	1	1072-1111
R018	RES CAR COMP 1/4W 5% 3.9K	1	1065-3901
R019	RES CAR COMP 1/4W 5% 5.1K	1	1065-5101
R020	RES CAR FILM 1/4W 5% 1K	1	1065-1001
R021	RES CAR COMP 1/4W 5% 22K	1	1065-2203
R022	RES CAR FILM 1/4W 5% 2.2K	1	1065-2201
R023	RES CAR FILM 1/4W 5% 1K	1	1065-1001
R024	RES CAR COMP 1/4W 5% 36K	1	1065-3603
R025	RES CAR COMP 1/4W 5% 33K	1	1065-3303
R026	RES CAR FILM 1/4W 5% 10K	1	1065-1002
R027	RES CAR COMP 1/4W 5% 9.1K	1	1065-9101
R028	RES CAR COMP 1/4W 5% 100	1	1065-0100
R029	RES CAR COMP 1/4W 5% 9.1K	1	1065-9101
R030	RES CAR COMP 1/4W 5% 5.1K	1	1065-5101
R031	RES CAR COMP 1/4W 5% 5.1K	1	1065-5101
R032	RES CAR COMP 1/4W 5% 5.1K	1	1065-5101
R033	RES CAR COMP 1/4W 5% 5.1K	1	1065-5101
R034	RES CAR FILM 1/4W 5% 2.2K	1	1065-2201
R035	RES CAR COMP 1/4W 5% 6.8K	1	1065-6801
R036	RES CAR FILM 1/4W 5% 1K	1	1065-1001
R037	RES CAR FILM 1/4W 5% 390 OHM	1	1065-0390
R038	RES CAR COMP 1/4W 5% 3.3K	1	1065-3301
R039	RES CAR COMP 1/4W 5% 1.5K	1	1065-1501
R040	RES CAR COMP 1/4W 5% 180	1	1065-0180
R041	RES CAR COMP 1/4W 5% 22K	1	1065-2203
R042	RES CAR COMP 1/4W 5% 22K	1	1065-2203
RN01	RES NETWORK 10K 10PIN SIP COM 5%	1	1073-1199
T001	COIL 115UH EBS AM 886 VAR	1	1550-0122
U001	I/C SN7410N	1	1100-7410
U002	I/C DM 7400N	1	1100-7400
U003	I/C SN7410N	1	1100-7410
U004	I/C DM 7400N	1	1100-7400
U005	I/C SN74176 BINARY CNTR/LATCH	1	1100-7417
U006	I/C SN74176 BINARY CNTR/LATCH	1	1100-7417
U007	I/C SN74176 BINARY CNTR/LATCH	1	1100-7417
U008	I/C SN74LS20N	1	1101-7420
U009	I/C SN7425N	1	1100-7425
U010	I/C SN7472N	1	1100-7472
U012	I/C MC4044	1	1100-4044
U013	I/C 74HC390N DUAL 4-STAGE	1	1104-0390
U014	I/C 74HC390N DUAL 4-STAGE	1	1104-0390
U015	I/C TDA1072A AM RCVR CIRCUIT	1	1100-1072
XU01	SOCKET I/C 14PIN	1	2250-1014
XU02	SOCKET I/C 14PIN	1	2250-1014
XU03	SOCKET I/C 14PIN	1	2250-1014
XU04	SOCKET I/C 14PIN	1	2250-1014

CKT. REF.	DESCRIPTION	QTY.	TFT STOCK NO.
XU05	SOCKET I/C 14PIN	1	2250-1014
XU06	SOCKET I/C 14PIN	1	2250-1014
XU07	SOCKET I/C 14PIN	1	2250-1014
XU08	SOCKET I/C 14PIN	1	2250-1014
XU09	SOCKET I/C 14PIN	1	2250-1014
XU10	SOCKET I/C 14PIN	1	2250-1014
XU11	SOCKET, I/C 8 PIN	1	2250-1008
XU12	SOCKET I/C 14PIN	1	2250-1014
XU13	SOCKET I/C 14PIN	1	2250-1014
XU14	SOCKET I/C 14PIN	1	2250-1014
XU15	SOCKET, I/C 16 PIN	1	2250-1016
XU17	SOCKET I/C 14PIN	1	2250-1014
Y001	XTAL 5.0 MHZ (755A)	1	2400-0502

REVISIONS				
REV	DESCRIPTION	BY	DATE	APPD
C	PRELIMINARY RELEASE	JJ	9/15/90	C. Ho

J3 — TO RP / FM ANT — 88M–108MHz — ANT — Vt — IF OUT — OSC OUT — AGC — VCC — Z1 FM FRONT END — CET-502NF(V)

+12V R1 120 C1 .01

+12V R2 390 R3 3.9K R4 330 R5 390 R6 3.9K R7 1K C4 .01 C5 .01 C6 .1 C8 .01 C68 .1

FL1 10.7MHz — 10.7MHz — 4.70V p-p — Q3 2N3563 3.95V dc

FL2 10.7MHz — 1V p-p @1uVin — 6.7V dc

R58 1K +12V — 8.30V dc — R60 10K R62 10K — Q6 2N3563 3.31V dc — R61 1K 300mV p-p

TP1 TP9 TP8 R8 330 R100 10K R9 12K

U1 CA3189E

Pin	Name
11	VCC
8	IF OUT
9	QUAD IN
10	REF BIAS
7	AFC O
6	AUDIO O
5	MUTE IN
12	MUTE LOG
1	IF IN
3	IF BIAS
2	DECOUPLE
16	AGC
15	AGC
4	GND
14	GND
13	TUNE METER

1501-0225 — L3 2.2u — L1 47u — L2 22 — C18 110pF — C65 10 — R14 2K — R15 3.6K — R16 5.1K — C7 .01 — 5.7V dc — 5.7V dc — 0.5V p-p — C17 820pF — C15 10 — C16 820pF — C11 1 — R10 22K — C13 .33 — R12 470 — C14 1 — R11 MUTE ADJ2 10K — C12 1 — CR1 1N3064 — R13 20K — C10 .1 — 0.96V dc @1uV RF IN

OUTPUT LEVEL ADJ R19 10K — C21 10 — R20 20K — 75uSEC DE-EMP — R21 270K — C22 270pF — R66 2.2K — +12V R23 56K — C23 1 — R24 56K — U2 LM324 — R22 100 — C24 10 — TP10 — 0.92V dc @1uVin — TP11 — 1.414Vrms — TO MAIN PCB J1 — J1 1 RF SIGNAL LEVEL — J1 5 AUDIO OUTPUT

RF LEVEL ADJ R63 10k — C66A 10u — R64 10K — R65 10K — R17 100 — U2 LM324 — +12VO — R25 100K — R26 27K — +5VO — C25 10 — U2 LM324 — PLL LOCL LED (ON WHEN UNLOCK) CR2 — MUTING LED (ON WHEN MUTE) CR3 — U2 LM324 — R28 10K — +12V — +5V — R29 20K MUTE ADJ 1 — R67 10K — C26 1 — R27 4.7K

TP6 TP7 — C35 100P — R42 68K — C36 4.7u — +12V — CR4 1N3064 — R43 8.2K — CR5 1N3064 — R45 27K — C38 .1 — C39 .01 — C40 .01 — R46 10K — R48 1.2K — R49 1.2K — 1.5Vdc AT 88MHz 7.25Vdc AT 108MHz — TO Z1-4 Vt — U8 CA3140E — VCO ADJ R44 10K — C37 100 — +5VO — J1 9 +5V — +12VO — J1 10 +12V — C81 100 — C82 .1 — C83 100 — C84 .1

R30 47 — C27 .1 — R31 1.5k — R35 560 — R36 10K — C28 .001 — 4.5V dc 350mV p-p — Q1 2N3563 — R32 1.2k — R33 470 — C29 .1 — R37 4.7K — R38 270 — 5.26V dc — Q2 2N3563 — 2.85V dc — C31 .1 — 1V p-p — R39 1K — C30 .01

C32 .1 — +5V — U3 74S113 — U4 74S113 — U13 1/4 74LS00 — C33 .1 — R18 33k — C19 .01 — C20 10 — TP4 — TP3 — TP2

U5 — 12.5KHz — SIGIN — COMP — VOCIN — INH — C1-1 — C1-2 — RX1 — RX2 — ZENER — PCOMP1 — PCOMP2 — PPULSE — VCOOUT — PMCO — CD4046 — C34 .1 — R41 100K

U7 74LS163 — U8 74LS162 — U9 74LS162 — U10 74LS163 — U12 MC14561B — U11 MC14561B — C44 .1 — C45 .1 — C46 .1 — C47 .1 — C48 .1 — C50 .1 — U13 1/4 74LS00 — C51 .1

TP5 — 12.5KHz — C80 .1 — C59 .1 — +5VO — L4 4.7u — +12VO — R52 100 — C57 .1 — 10.75Vdc — C54 0.1 — R51 10K — 9V p-p 3.06V dc — Q4 2N3563 6V p-p 3.17V dc — C55 .001 — C56 470P — R53 270 — R54 1K — R56 470 — +5V — R55 5.6K — 5V p-p — C58 .1 — 1V p-p — Q5 2N3563 — R50 4.7K — 5MHz Y1 — C53 5-55P 1012-0555 — C87 20P

U17 CD4518B — Q1A Q2A Q3A Q4A Q1B Q2B Q3B Q4B — ENA ENB CLKA CLKB RESETA RESETB ÷10 — U16 ÷2 — 1.25MHz — 74LS113 — 2.5MHz — U16 ÷2 — 74LS113

F.P P/B SW — TO F.P. BOARD — J2 — 1ST DIGIT SW3 — 2ND DIGIT SW2 — 3RD DIGIT SW1 — 0 1 2 4 8

RN1 — RN2 — 6 5 4 3 2 1

U14 CD4070B — U15 — U15

FIG.6-8

NOTES : UNLESS OTHERWISE SPECIFIED.
1. ALL RESISTOR VALUES ARE IN OHMS ±5%
2. ALL CAPACITOR VALUES ARE IN MICROFARADS.
3. ALL INDUCTOR VALUES ARE IN MICROHENRIES.

886-887 — MODEL — NEXT ASSY — APPLICATION

SPECIFICATIONS UNLESS OTHERWISE NOTED
ANGULAR = ±
DECIMAL = 2 PLACE ± 3 PLACE ±
BREAK = .010MIN
SURFACE ROUGHNESS = MICROINCHES RMS MAX.
DIAMETERS = CONCENTRIC WITHIN .005 TIR.
FILLET RADIUS = MAX
THREADS = CLASS 2 MADE IN ACCORDANCE WITH TFT SPEC 5300-1058

ITEM	QTY	PART NO.	NOMENCLATURE OR DESCRIPTION
MATERIAL			
FINISH			

DR. BY	Judy Rice	1-15-90
CK. BY	TSP	9/15/90
ENGR.		7-15-90
MFG		9/15/90
Q.A.	T. S. Peterson	9/15/90

TFT INC 3090 OAKMEAD VILLAGE DR SANTA CLARA, CA 95051 (408) 727 7272 TWX 910-338-0584

SCHEMATIC
EBS
FM RECEIVER

CODE IDENT NO.	SIZE	DRAWING NO.	REV.
	D	6601-3637	C

SCALE NONE — DO NOT SCALE PRINT — SHEET 1 OF 1

129044

REVISIONS				
ZONE	REV	DESCRIPTION	DATE	APPROVED

SILKSCREEN

3/1/89

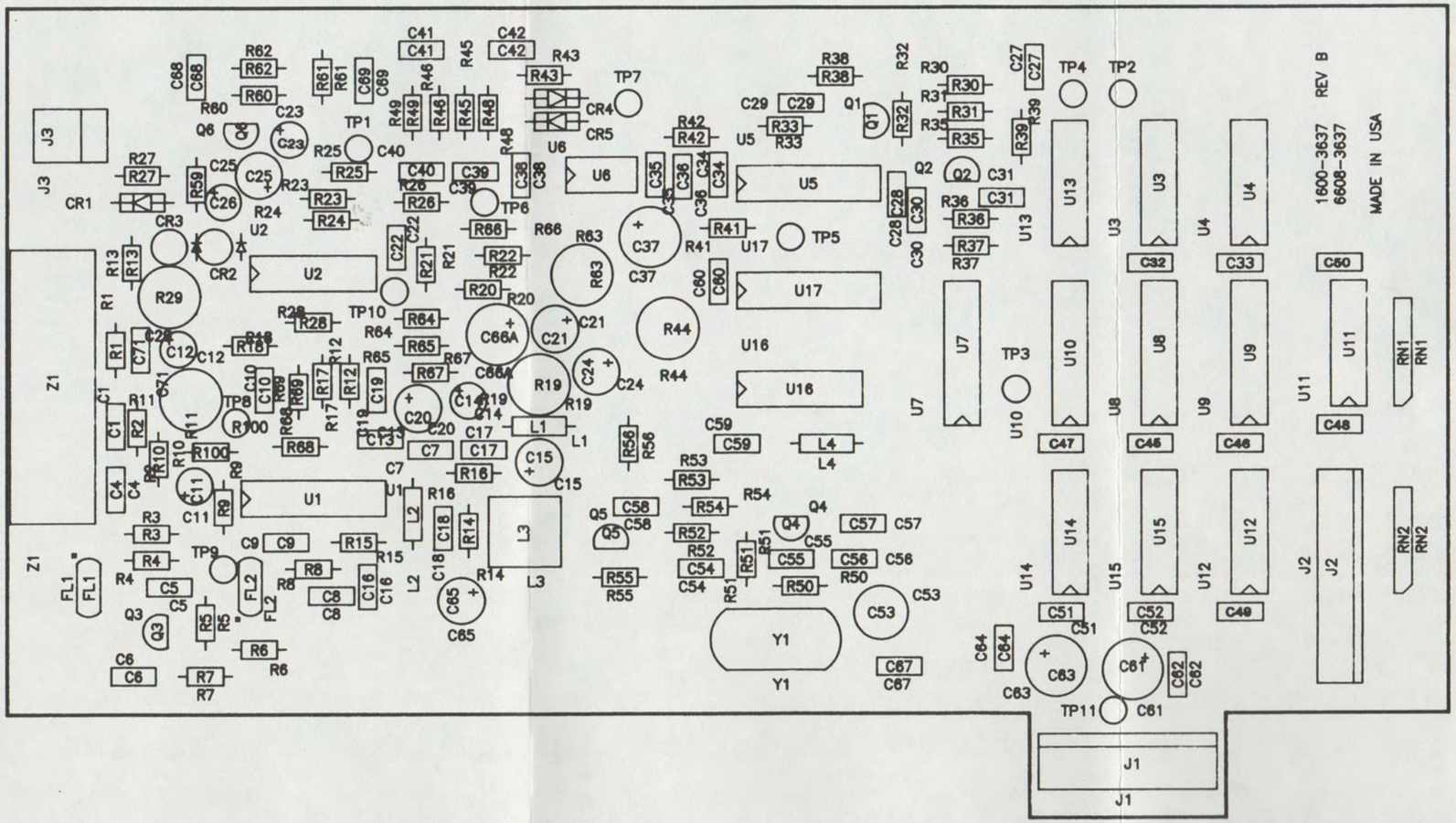


FIG.6-9

		APPROVALS	DATE
		DRAWN	
5102-3624	887	ENGR	
NEXT ASSY	USED ON	MFG	9/8/89
APPLICATION		QA	

TFT INC. 3090 OAKMEAD VILLAGE DR. SANTA CLARA, CA 95051 (408) 727 7272 TWX 910 338 0584

EBS
FM RECEIVER

SIZE	FSCM NO.	DWG. NO.	REV.
C		6608-3637	B
SCALE	NONE	SHEET	1 OF 1

CKT. REF.	DESCRIPTION	QTY.	TFT STOCK NO.
C001	CAP CER .01MF CK05BX K	1	1015-0002
C002	CAP VAR 5-55PF	1	1012-0555
C003	NOT USED	1	X000-0001
C004	CAP CER .01MF CK05BX K	1	1015-0002
C005	CAP CER .01MF CK05BX K	1	1015-0002
C006	CAP CER .01MF CK05BX K	1	1015-0002
C007	CAP CER .01MF CK05BX K	1	1015-0002
C008	CAP CER .01MF CK05BX K	1	1015-0002
C009	CAP CER .01MF CK05BX K	1	1015-0002
C010	CAP CER 0.1MF CK05BX K	1	1015-0001
C011	CAP ELECT 1.0MFD 50V RADIAL	1	1010-0009
C012	CAP ELECT 1.0MFD 50V RADIAL	1	1010-0009
C013	CAP CER 0.33MF CK06BXK	1	1015-0011
C014	CAP ELECT 1.0MFD 50V RADIAL	1	1010-0009
C015	CAP ELECT 10 MFD 25V VERT MT	1	1010-0099
C016	CAP MICA 820 PF	1	1001-0821
C017	CAP MICA 820 PF	1	1001-0821
C018	CAP MICA 110 PF	1	1001-0111
C019	CAP CER .01MF CK05BX K	1	1015-0002
C020	CAP ELECT 10 MFD 25V VERT MT	1	1010-0099
C021	CAP ELECT 10 MFD 25V VERT MT	1	1010-0099
C022	CAP MICA 270 PF	1	1001-0271
C023	CAP ELECT 1.0MFD 50V RADIAL	1	1010-0009
C024	CAP ELECT 10 MFD 25V VERT MT	1	1010-0099
C025	CAP ELECT 10 MFD 25V VERT MT	1	1010-0099
C026	CAP ELECT 1.0MFD 50V RADIAL	1	1010-0009
C027	CAP CER 0.1MF CK05BX K	1	1015-0001
C028	CAP CER 0.001MF CK05	1	1015-0010
C029	CAP CER 0.1MF CK05BX K	1	1015-0001
C030	CAP CER .01MF CK05BX K	1	1015-0002
C031	CAP CER 0.1MF CK05BX K	1	1015-0001
C032	CAP CER 0.1MF CK05BX K	1	1015-0001
C033	CAP CER 0.1MF CK05BX K	1	1015-0001
C034	CAP CER 0.1MF CK05BX K	1	1015-0001
C035	CAP CER 100 PF	1	1015-0100
C036	CAP DIPPED TANT 2.2 UF 25V	1	1000-0023
C037	CAP ELECT VT MT 100UF (NO SUB.)	1	1010-0110
C038	CAP CER 0.1MF CK05BX K	1	1015-0001
C039	CAP CER .01MF CK05BX K	1	1015-0002
C040	CAP CER .01MF CK05BX K	1	1015-0002
C041	CAP CER .01MF CK05BX K	1	1015-0002
C042	CAP CER .01MF CK05BX K	1	1015-0002
C043	NOT USED	1	X000-0001
C044	CAP CER 0.1MF CK05BX K	1	1015-0001
C045	CAP CER 0.1MF CK05BX K	1	1015-0001
C046	CAP CER 0.1MF CK05BX K	1	1015-0001

CKT. REF.	DESCRIPTION	QTY.	TFT STOCK NO.
C047	CAP CER 0.1MF CK05BX K	1	1015-0001
C048	CAP CER 0.1MF CK05BX K	1	1015-0001
C049	CAP CER 0.1MF CK05BX K	1	1015-0001
C050	CAP CER 0.1MF CK05BX K	1	1015-0001
C051	CAP CER 0.1MF CK05BX K	1	1015-0001
C052	CAP CER 0.1MF CK05BX K	1	1015-0001
C053	CAP VAR 5-55PF	1	1012-0555
C054	CAP ELECT 1.0MFD 50V RADIAL	1	1010-0009
C055	CAP MICA 1000PF 500V	1	1001-0102
C056	CAP MICA 470PF 500V	1	1001-0471
C057	CAP CER 0.1MF CK05BX K	1	1015-0001
C058	CAP CER 0.1MF CK05BX K	1	1015-0001
C059	CAP CER 0.1MF CK05BX K	1	1015-0001
C060	CAP CER 0.1MF CK05BX K	1	1015-0001
C061	CAP ELECT VT MT 100UF (NO SUB.)	1	1010-0110
C062	CAP CER 0.1MF CK05BX K	1	1015-0001
C063	CAP ELECT VT MT 100UF (NO SUB.)	1	1010-0110
C064	CAP CER 0.1MF CK05BX K	1	1015-0001
C065	CAP ELECT 10 MFD 25V VERT MT	1	1010-0099
C066A	CAP ELECT 10 MFD 25V VERT MT	1	1010-0099
C067	CAP MICA 20PF	1	1001-0200
C068	CAP CER 0.1MF CK05BX K	1	1015-0001
C069	CAP CER 0.1MF CK05BX K	1	1015-0001
C071	CAP ELECT VT MT 100UF (NO SUB.)	1	1010-0110
CR01	DIO 1N3064	1	1281-3064
CR02	LED HP 5082-4487 CLEAR	1	1285-4487
CR03	LED HP 5082-4487 CLEAR	1	1285-4487
CR04	DIO 1N3064	1	1281-3064
CR05	DIO 1N3064	1	1281-3064
FL01	FILT CERAMIC 10.7MHZ(RED COLOR DOT)	1	1052-0107
FL02	FILT CERAMIC 10.7MHZ(RED COLOR DOT)	1	1052-0107
J001	CONN MOLEX R/A 10P .10 CTR FEM	1	2250-8910
J002	CONN. 12 PIN HEADER MALE .100 CTR	1	2250-5842
J003	PLUG, LOCKING 2 PIN	1	2250-6002
L001	CHOKE 47UH	1	1531-0470
L002	CHOKE 22 UHY SMALL	1	1531-0022
L003	M/L 760 COIL VAR 2.2 MH	1	1501-0225
L004	CHOKE 47UH	1	1531-0470
PCB1	PCB FM RECEIVER 887	1	1600-3637
Q001	TRANS 2N3563	1	1271-3563
Q002	TRANS 2N3563	1	1271-3563
Q003	TRANS 2N3563	1	1271-3563
Q004	TRANS 2N3563	1	1271-3563
Q005	TRANS 2N3563	1	1271-3563
Q006	TRANS 2N3563	1	1271-3563
R001	RES CAR COMP 1/4W 5% 120	1	1065-0120

CKT. REF.	DESCRIPTION	QTY.	TFT STOCK NO.
R002	RES CAR FILM 1/4W 5% 390 OHM	1	1065-0390
R003	RES CAR COMP 1/4W 5% 3.9K	1	1065-3901
R004	RES CAR COMP 1/4W 5% 330	1	1065-0330
R005	RES CAR FILM 1/4W 5% 390 OHM	1	1065-0390
R006	RES CAR COMP 1/4W 5% 3.9K	1	1065-3901
R007	RES CAR FILM 1/4W 5% 1K	1	1065-1001
R008	RES CAR COMP 1/4W 5% 330	1	1065-0330
R009	RES CAR COMP 1/4W 5% 12K	1	1065-1202
R010	RES CAR COMP 1/4W 5% 22K	1	1065-2202
R011	POT CERMET 10K PC MNT TOP ADJ	1	1072-1111
R012	RES CAR FILM 1/4W 5% 470 OHM	1	1065-0470
R013	RES CAR COMP 1/4W 5% 20K	1	1065-2002
R014	RES CAR COMP 1/4W 5% 2K	1	1065-2001
R015	RES CAR FILM 1/4W 5% 3.6K	1	1065-3601
R016	RES CAR COMP 1/4W 5% 5.6K	1	1065-5601
R017	POT CERMET 10K PC MNT TOP ADJ	1	1072-1111
R018	RES CAR FILM 1/4W 5% 33K	1	1065-3302
R019	POT CERMET 10K PC MNT TOP ADJ	1	1072-1111
R020	RES CAR COMP 1/4W 5% 43K	1	1065-4302
R021	RES CAR FILM 1/4W 5% 270K	1	1065-2703
R022	RES CAR COMP 1/4W 5% 100	1	1065-0100
R023	RES CAR FILM 1/4W 5% 56K	1	1065-5602
R024	RES CAR FILM 1/4W 5% 56K	1	1065-5602
R025	RES CAR COMP 1/4W 5% 100K	1	1065-1003
R026	RES CAR FILM 1/4W 5% 27K	1	1065-2702
R027	RES CAR FILM 4.7K 1/4W 5%	1	1065-4701
R028	RES CAR FILM 1/4W 5% 10K	1	1065-1002
R029	POT CERMET 10K PC MNT TOP ADJ	1	1072-1111
R030	RES CAR FILM 1/4W 5% 47 OHM	1	1065-0047
R031	RES CAR COMP 1/4W 5% 1.5K	1	1065-1501
R032	RES CAR COMP 1/4W 5% 1.2K	1	1065-1201
R033	RES CAR FILM 1/4W 5% 470 OHM	1	1065-0470
R034	RES CAR FILM 1/4W 5% 150 OHM	1	1065-0150
R035	RES CAR FILM 1/4W 5% 560	1	1065-0560
R036	RES CAR FILM 1/4W 5% 10K	1	1065-1002
R037	RES CAR FILM 4.7K 1/4W 5%	1	1065-4701
R038	RES CAR COMP 1/4W 5% 270	1	1065-0270
R039	RES CAR FILM 1/4W 5% 1K	1	1065-1001
R040	RES CAR FILM 1/4W 5% 10K	1	1065-1002
R041	RES CAR COMP 1/4W 5% 100K	1	1065-1003
R042	RES CAR COMP 1/4W 5% 100K	1	1065-1003
R043	RES CAR COMP 1/4W 5% 8.2K	1	1065-8201
R044	POT CERMET 10K PC MNT TOP ADJ	1	1072-1111
R045	RES CAR FILM 1/4W 5% 2.2K	1	1065-2201
R046	RES CAR FILM 1/4W 5% 620 OHM	1	1065-8620
R047	NOT USED	1	X000-0001

CKT. REF.	DESCRIPTION	QTY.	TFT STOCK NO.
R048	RES CAR COMP 1/4W 5% 1.2K	1	1065-1201
R049	RES CAR COMP 1/4W 5% 1.2K	1	1065-1201
R050	RES CAR FILM 4.7K 1/4W 5%	1	1065-4701
R051	RES CAR FILM 1/4W 5% 10K	1	1065-1002
R052	RES CAR COMP 1/4W 5% 100	1	1065-0100
R053	RES CAR COMP 1/4W 5% 270	1	1065-0270
R054	RES CAR FILM 1/4W 5% 1K	1	1065-1001
R055	RES CAR COMP 1/4W 5% 5.6K	1	1065-5601
R056	RES CAR FILM 1/4W 5% 470 OHM	1	1065-0470
R059	RES CAR FILM 1/4W 5% 1K	1	1065-1001
R060	RES CAR FILM 1/4W 5% 10K	1	1065-1002
R061	RES CAR FILM 1/4W 5% 1K	1	1065-1001
R062	RES CAR FILM 1/4W 5% 10K	1	1065-1002
R063	POT CERMET 10K PC MNT TOP ADJ	1	1072-1111
R064	RES CAR FILM 1/4W 5% 10K	1	1065-1002
R065	RES CAR FILM 1/4W 5% 10K	1	1065-1002
R066	RES CAR FILM 1/4W 5% 2.2K	1	1065-2201
R067	RES CAR FILM 1/4W 5% 10K	1	1065-1002
R068	RES CAR FILM 1/4W 5% 27K	1	1065-2702
R069	RES CAR FILM 1/4W 5% 27K	1	1065-2702
RN01	RES NETWORK 10K SIP 6PIN	1	1073-1005
RN02	RES NETWORK 10K SIP 6PIN	1	1073-1005
U001	I/C CA5180E	1	1100-5180
U002	I C NSC LM324 QUAD OPAMP	1	1100-0324
U003	IC 74S113 DUAL JK FF	1	1100-7113
U004	IC 74S113 DUAL JK FF	1	1100-7113
U005	I/C CD 4046 BE PLL	1	1102-4046
U006	I/C OP AMP	1	1100-5140
U007	I/C 74LS163 4 BIT BINARY CTR	1	1101-0163
U008	I/C MM74LS162	1	1101-0162
U009	I/C MM74LS162	1	1101-0162
U010	I/C 74LS163 4 BIT BINARY CTR	1	1101-0163
U011	IC MC14561B 9'S COMPLEMENTER	1	1102-4561
U012	IC MC14561B 9'S COMPLEMENTER	1	1102-4561
U013	I/C SN74LS00N	1	1101-7400
U014	I/C CD4070BE OD EX OR EX NOR	1	1102-4070
U015	I/C RCA CD4011 QD 2-NAND	1	1102-4011
U016	I/C 74LS113 DUAL JK FF	1	1101-0113
U017	I/C CD4518BE	1	1102-4518
XU01	SOCKET, I/C 16 PIN	1	2250-1016
XU02	SOCKET I/C 14PIN	1	2250-1014
XU03	SOCKET I/C 14PIN	1	2250-1014
XU04	SOCKET I/C 14PIN	1	2250-1014
XU05	SOCKET, I/C 16 PIN	1	2250-1016
XU06	SOCKET, I/C 8 PIN	1	2250-1008
XU07	SOCKET, I/C 16 PIN	1	2250-1016

CKT. REF.	DESCRIPTION	QTY.	TFT STOCK NO.
XU08	SOCKET, I/C 16 PIN	1	2250-1016
XU09	SOCKET, I/C 16 PIN	1	2250-1016
XU10	SOCKET, I/C 16 PIN	1	2250-1016
XU11	SOCKET I/C 14PIN	1	2250-1014
XU12	SOCKET I/C 14PIN	1	2250-1014
XU13	SOCKET I/C 14PIN	1	2250-1014
XU14	SOCKET I/C 14PIN	1	2250-1014
XU15	SOCKET I/C 14PIN	1	2250-1014
XU16	SOCKET I/C 14PIN	1	2250-1014
XU17	SOCKET, I/C 16 PIN	1	2250-1016
Y001	XTAL 5.0 MHZ (7S5A)	1	2400-0502
Z001	FM TUNER CET-502CNF (V)	1	4500-1813

DWG. NO.	SH	REV.

REVISIONS

REV.	DESCRIPTION	DATE	APPROVED
A	RELEASED TO PROD	5/23/89	

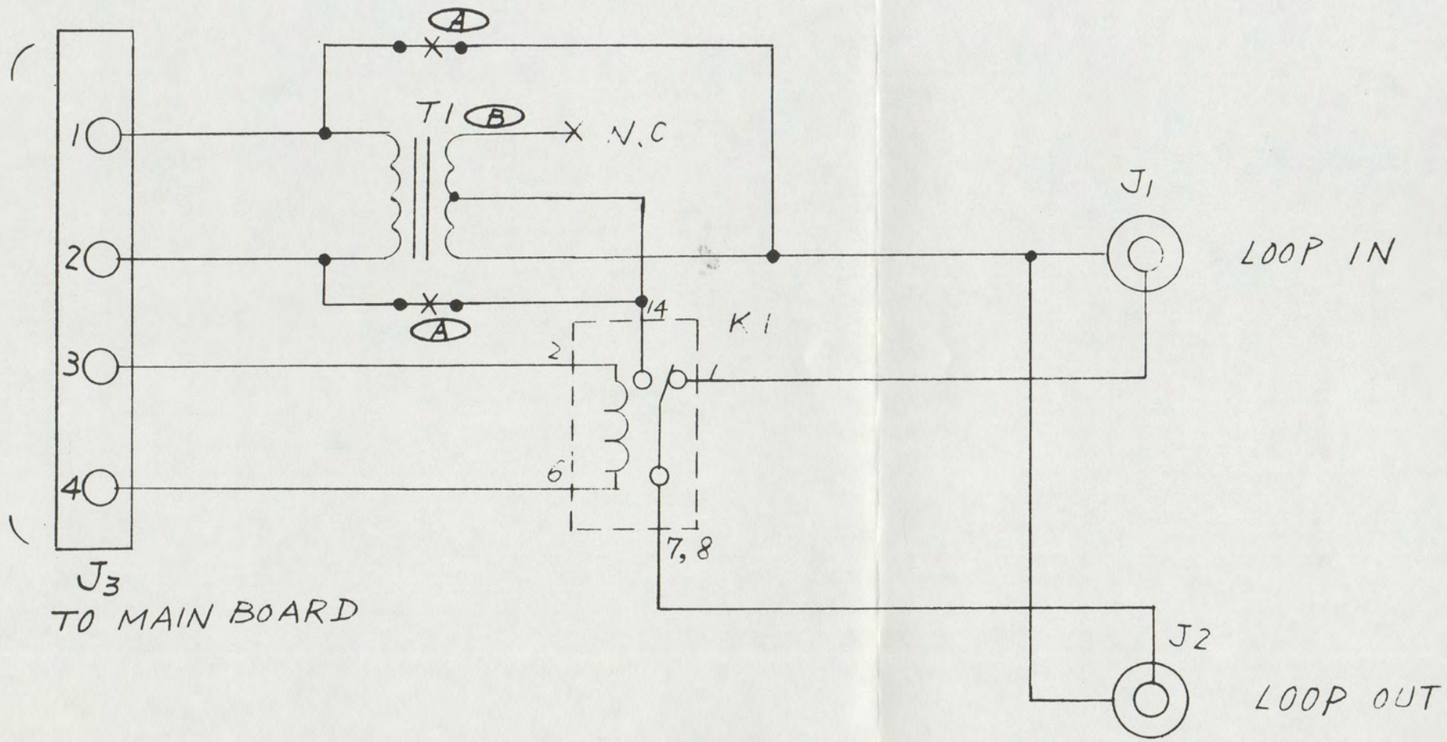


FIG. 6-10

NOTE (A): trace should be cut on PCB

	QTY REQD	FSCM NO.	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	MATERIAL SPECIFICATION	

PARTS LIST

	887
	886
NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES
TOLERANCES ARE:
FRACTIONS ± DECIMALS .XX ± .XXX ± ANGLES ±

MATERIAL

FINISH

DO NOT SCALE DRAWING

CONTRACT NO.

APPROVALS	DATE
DRAWN K. Chien	5-19-89
CHECKED K. C Tung	5.19.89
ISSUED	

TIME & FREQUENCY TECHNOLOGY INC.

COMPOSITE LOOP THRU

SIZE	FSCM NO.	DWG. NO.	REV.
B		6601-3734	A

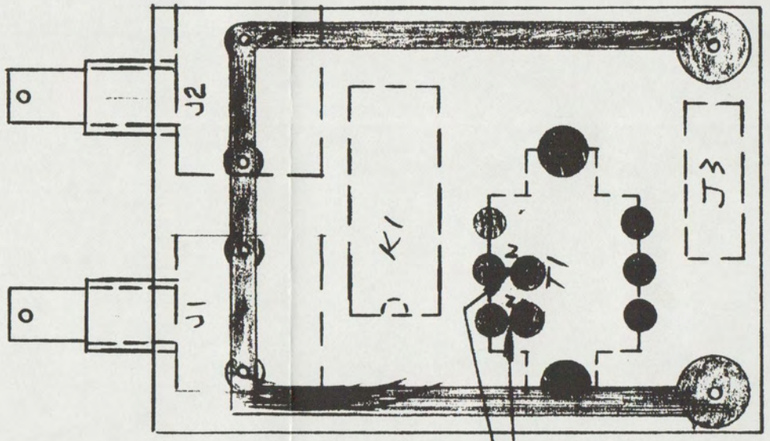
SCALE | SHEET 1 OF 1

BISHOP GRAPHICS/ACCUPRESS
REORDER NO. A25710

DWG. NO.	SH	REV.

REVISIONS

REV.	DESCRIPTION	DATE	APPROVED
A	RELEASED TO PROD	5/19/89	



NOTES;

1. COMPONENTS LOADED ON FAR SIDE.

FIG. 6-11

	QTY REQD	FSCM NO.	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	MATERIAL SPECIFICATION	

PARTS LIST

	887
	886
NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES
TOLERANCES ARE:
FRACTIONS ± DECIMALS .XX ± .XXX ± ANGLES ±

MATERIAL

FINISH

DO NOT SCALE DRAWING

CONTRACT NO.

APPROVALS	DATE
DRAWN [illegible]	5/19/89
CHECKED R. Chin	5/23/89
ISSUED	

MEM TIME & FREQUENCY TECHNOLOGY INC.

PCB ASSY
COMPOSITE LOOP THRU

SIZE	FSCM NO.	DWG. NO.	REV.
B		6608-3734	A

SCALE 2/1 SHEET 1 OF 1

BISHOP GRAPHICS/ACCUPRESS
REORDER NO. A25710

Models 886 and 887
Composite Loop Thru Board

PCB Assy. 6608-3734
Rev. A

CKT. REF.	DESCRIPTION	QTY.	TFT STOCK NO.
J001	CONN BNC ANGLE PC MNT	1	2220-9480
J002	CONN BNC ANGLE PC MNT	1	2220-9480
J003	CONN 12PIN MOLEX R. ANGLE .100 CTR	1	2250-8811
K001	RELAY SPDT 12V DIP	1	1800-0023
PCB1	PCB COMPOSITE LOOP THRU	1	1600-3734
T001	XFMR 600 OHM 1:1	1	1500-0A00