

*User Instructions*  
*RM-325*  
*Rack Mount Intercom Station*



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## SECTION 1: DESCRIPTION AND SPECIFICATIONS

### DESCRIPTION

#### GENERAL

The RM-325 is a programmable, microprocessor controlled, rack-mounted intercom station for use with RTS™ two-wire intercom systems. Power for the RM-325 can be obtained from intercom channel one, channel two, or via "local power."

The RM-325 is a two-channel intercom station with connections for the intercom system, program input and headset/earset microphone or separate carbon microphone. When used with a stereo or mono headset/earset, the RM-325 allows full-duplex two channel voice communications. The 6-pin headset/earset connector accepts both 5 and 6-pin male XLR connectors.

#### FEATURES

Features of the RM-325 include:

- Call function that allows the user to send or receive signals to other devices on either of two intercom channels
- Send and receive microprocessor controlled Talk Off signal
- Other programmable options include: dual channel listen, stereo/mono, program input to the right or left headphone, enable/disable Talk Off, enable/disable Talk on one or both channels
- Powered externally, via the intercom system power supply on channel one, or via the auxiliary inputs connector
- Unswitched mic output at line level, via the auxiliary inputs connector
- Remote mic switch via either the carbon mic connector or via the auxiliary inputs connector
- Headset/earset jack set for intercom operation

#### CONNECTIONS & CONTROLS

The RM-325 has the following connections and controls:

- Two dual-mode talk switches, for latched or momentary operation
- Separate volume controls for intercom channels 1 and 2

- Separate sidetone controls for intercom channels 1 and 2
- Headset connections that accept an XLR type 5 or 6-pin male connector, or a 1/4" stereo phone plug
- Program input volume control
- Program input from either a D-sub 15-pin male connector or a 1/4" stereo phone plug
- Line connector that accepts an XLR type 3-pin male connector for intercom lines and power input
- Line loop connector that accepts an XLR type 3-pin female connector for connection to additional intercom stations
- Connection for auxiliary inputs that accepts a D-sub 15-pin male connector
- Internal jumpers and dip switches that control several programmable options

### SPECIFICATIONS

#### SYSTEM SPECIFICATIONS

##### DC Operating Limits:

5,000 ft. (#22 AWG wire), with power supply at one end

##### AC Operating Limits:

10,000 ft. (#22 AWG wire), "dry" line, with power supplies at both ends

##### System Capacitance:

0.3  $\mu$ F, maximum (10,000 ft. cable at 30 pF/ft.)

#### GENERAL SPECIFICATIONS

##### Intercom System Power Supply Requirements:

30 VDC nominal (standard RTS™ line), 60 to 100 mA

##### "Local Power" Supply Requirements:

24 VDC nominal, 60 to 100 mA

##### Environmental Requirements:

Storage: -40°C to 125°C; 0% to 95% humidity, non-condensing

Operating: 0°C to 50°C; 0% to 95% humidity, non-condensing

##### Dimensions:

1.72" (44 mm) H x 8.2" (208 mm) W x 8" (203 mm) D

##### Weight:

2 lbs 12 oz (1.25 kg)

## INTERFACE REQUIREMENTS

### RTS™ Intercom Channel:

Output Level: 0.7 Vrms (0 dBu) nominal  
Input Impedance: 200Ω ±5%  
Bridging Impedance: greater than 10,000Ω  
Call Signalling:  
Send: 20 kHz ±100 Hz, 0.3 Vrms nominal  
Receive: 20 kHz ±200 Hz, 100 mVrms  
Talk Off Signalling:  
Send: 24 kHz ±100 Hz, 0.3 Vrms nominal  
Receive: 24 kHz ±200 Hz, 100 mVrms  
Noise Contribution: less than -75 dB on the line  
Common Mode Rejection Ratio: greater than 40 dB from the line

### Program Input:

Maximum Input Level: 20 dBu  
Nominal Input Level: -10 to +8 dBu  
Frequency Response: 100 Hz to 12 kHz ±3 dB

### Current Source:

Transfer Ratio: 3.3 mA/V = 3.3 millisiemens  
Output: ±5 mA into 200Ω, ±1 Vpeak (limiter threshold)

## HEADPHONE AMPLIFIER

### Voltage Gain:

30 ±3 dB from the line

### Maximum Output:

150 mW into 50Ω

### Frequency Response:

100 Hz to 8 kHz ±3 db nominal

### Output Voltage Level:

8 volts peak-to-peak

### Headphone Impedance:

50 to 600Ω

### Sidetone:

20 dB minimum range, adjustable

## MICROPHONE PREAMPLIFIER

### Maximum Voltage Gain:

54 dB

### Frequency Response:

100 Hz to 8 kHz, nominal

### Input Impedance:

1,000Ω, balanced

### Limiter Range:

30 dB

### Total Harmonic Distortion:

Less than 0.2% nominal at Channel output

## CONNECTOR PIN CONFIGURATIONS

### Headset Connector

Type: 1/4" Stereo Plug  
Tip Microphone input high  
Ring Headphone high  
Sleeve Common

### Headset Connector

Type: XLR-6F  
Pin 1 Headset microphone low  
Pin 2 Headset microphone high  
Pin 3 Common  
Pin 4 Headphone left high  
Pin 5 Headphone right high  
Pin 6 (Center pin) Remote microphone control  
(an XLR-5F does not have the center pin)

### Intercom Line Input Connector

Type: XLR-3F  
Pin 1 Common  
Pin 2 Intercom channel 1 (audio) and +30 VDC  
Pin 3 Intercom channel 2 (audio)

### Intercom Line Loop Connector

Type: XLR-3M  
Pin 1 Common  
Pin 2 Intercom channel 1 (audio) and +30 VDC  
Pin 3 Intercom channel 2 (audio)

### Program Input Connector

Type: 1/4" Stereo Plug  
Tip Program input high  
Ring Program input low  
Sleeve Common

### Auxiliary Inputs Connector

Type: DB-15F  
Pin 1 Program input high  
Pin 2 Mono headphone high  
Pin 3 Unswitched mic high  
Pin 4 Foot switch channel 1  
Pin 5 Foot switch channel 2  
Pin 6 Local power (+24 VDC)  
Pin 7 Remote mic switch  
Pin 8 Not Used  
Pin 9 Program input low  
Pin 10 Mono headphone low  
Pin 11 Unswitched mic low  
Pin 12 Foot switch channel 1 common  
Pin 13 Foot switch channel 2 common  
Pin 14 Local power common  
Pin 15 Remote mic switch common

## SECTION 2: OPERATION

### EXTERNAL CONNECTIONS & CONTROLS

**NOTE:** The numbers refer to the callouts in Figure 2-1.

#### 1. CALL Button and Indicator

The Call function allows the user to send or receive signals to other devices on the intercom channel selected. The *CALL* button operates in two ways:

Call receive:

When there is an incoming call the red *CALL* and *TALK* indicators will flash.

Call send:

To send a call signal to all stations on a channel, tap the *TALK* button for the desired channel, then press and hold the *CALL* button until a verbal response is received. The indicator will glow red.

#### 2. Talk-Off

To send a Talk-Off signal to all stations on a channel, turn off both *TALK* indicators, then tap the *CALL* button three quick taps. While the red *CALL* indicator is on, momentarily press the *TALK* button for the desired channel.

#### 3. TALK1 and TALK2 Buttons and Indicators

The *TALK* buttons activate the headset microphone on the selected channel and operates in two ways:

Latched Mode:

Tap the button once, then begin to talk. The indicator will glow green. Tap the button again when finished with a conversation.

Momentary Mode:

Press and hold the button to talk momentarily. The indicator will glow green while the button is held. Release the button when finished talking.

#### 4. CH1 and CH2 Volume Controls

Use these controls to adjust the headset/earset listen level for each channel.

#### 5. Sidetone Controls for Channel 1 and Channel 2

When using a headset, these controls adjust the level of your own voice heard in the earphones. To adjust the level for one channel, tap that channel's *TALK* button once to turn on the headset microphone. Then, use a small flat-blade screwdriver to increase or decrease your voice level while talking into the microphone.

#### 6. PGM Volume Control

Use this control to adjust the program input volume.

#### 7. DYN MIC Headset Connector

This connector accepts an RTS™ boom-microphone headset.

#### 8. CARB MIC Headset Connector

This connector accepts a carbon microphone headset/earset with a 1/4" stereo phone plug, or a remote mic switch with a 1/4" stereo phone plug.

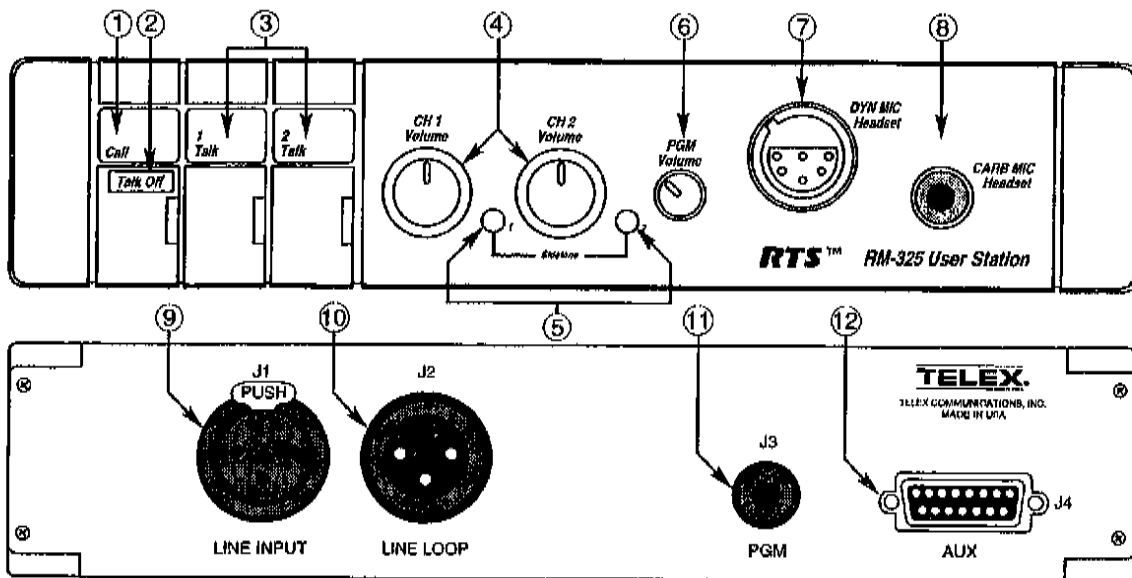


Figure 2-1. RM-325 Connections and Controls

## 9. *LINE INPUT* Connector

The RM-325 intercom channel is connected via a 3-pin female connector. When the RM-325 is powered from the intercom system power supply, it will turn on with the intercom system.

## 10. *LINE LOOP* Connector

The intercom system can be extended by attaching additional stations to this 3-pin male connector. Channel 1 and 2 audio, as well as system power is available here.

## 11. *PGM* Input Connector

This connector accepts program input via a 1/4" stereo phone plug. In a television studio intercom system, the program input is usually the actual program audio signal. In another intercom system, the program input can be any auxiliary audio signal, such as background music.

## 12. *AUX* Input Connector

This 15-pin connector provides an alternate method of connection for "local power," program input, foot switches, headphone and unswitched mic audio, and remote mic switch.

## RM-325 OPERATION

This section describes operation of the RM-325 as supplied from the factory. Use of an RTS™ power supply to power the intercom system is assumed. For options, see the "Internal Switches and Jumpers" section. For use of an alternate power source, see the "Alternate Powering Methods" section.

### Connecting a Headset

Connect a headset using one of the two headset connectors on the front panel. The *DYN MIC* headset connector is for a monaural or stereo dynamic-mic headset. The *CARB MIC* headset connector is for a monaural carbon-mic headset. Refer to the specifications for pin-outs of these connectors.

### Connecting To the Intercom Channels

Connect the RM-325 to the intercom system using the *LINE INPUT* connector on the back panel.

If desired, connect additional intercom stations to the intercom system using the *LINE LOOP* connector on the back panel.

### Adjusting the Sidetone

To adjust the level of your own voice heard in the earphones, tap the *TALK* button once to turn on the headset microphone. Then, use a small flat-blade

screwdriver to increase or decrease your voice level while talking into the microphone.

### Using the Momentary Mode to Make a Call

1. Tap the *CALL* button. The red *CALL* indicator will flash for approximately 30 seconds, indicating that a call signal is ready to be sent.
2. While the *CALL* indicator is flashing, press and hold the desired *TALK* button to send the call signal.
3. When a response is heard, release the *TALK* button to remove the call signal, then press and hold the *TALK* button again to begin your conversation.
4. Release the *TALK* button when finished with your conversation.

### Using the Latched Mode to Make a Call

1. If the talk function is enabled for the desired channel, tap the *TALK* button for the channel to be called (the green *TALK* indicator should be lit).
2. Press and hold the *CALL* button. The red *CALL* indicator will light while the button is pressed, indicating that a call signal is being sent. When a response is heard, release the *CALL* indicator and begin your conversation.
3. Tap the *TALK* button again when finished with your conversation.

### Receiving a Call

1. When there is an incoming call on a channel, the red *CALL* indicator will flash. If the audio listen function is disabled on that channel, you will not be able to hear the incoming call.
2. If a *TALK* indicator is also flashing, this indicates that you need to activate the talk function on that channel to begin your conversation.
3. If no *TALK* indicator is flashing, this indicates that the talk function is already activated for that channel; simply begin your conversation.

### Sending a Talk-Off Signal

The RM-325 can generate an inaudible signal which can be used to deactivate the microphones on other intercom stations connected to the intercom channel. (When the Talk-Off feature is enabled, it can be used with RTS™ models BP-318, BP-325, BP-350, MCE-325 and MRT-327). This feature is useful when there is a microphone activated on an unattended intercom station, and it is causing noise on the intercom channel. To send a Talk-Off signal:

1. Turn off both *TALK* indicators on the RM-325.
2. Tap the *CALL* button three quick taps. The red *CALL* indicator will turn on for a few seconds.



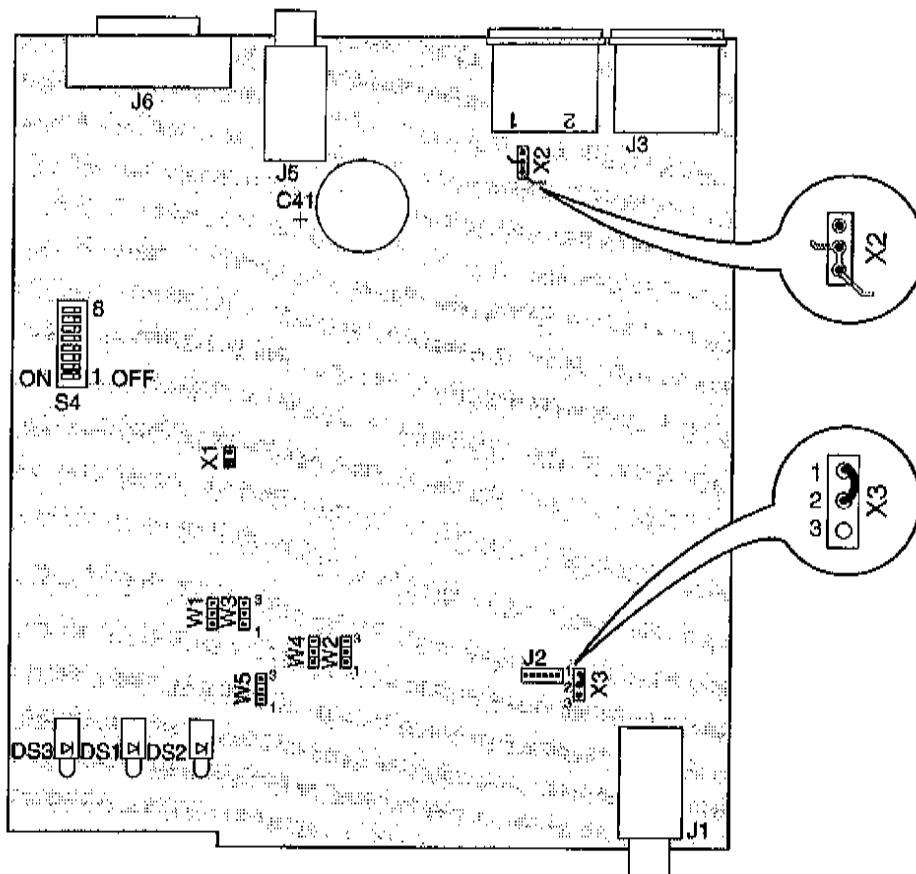


Figure 2-2. Internal Jumpers and Switches

- While the red *CALL* indicator is on, momentarily press the *TALK* button for the desired channel. This will send the Talk-Off signal and turn off all remote microphones on that channel.

## INTERNAL SWITCHES AND JUMPERS

There are several internal switches and jumpers that affect operation. These are described below. To gain access to the switches and jumpers, disconnect all power and line connections. Remove four screws from the back panel and remove the top cover of the case. The jumper and switch locations are shown in Figure 2-2.

TABLE 2-1. INTERNAL JUMPERS

JUMPER NUMBER	JUMPER FUNCTION	DEFAULT SETTING
W1	CH1 Intercom Audio Listen: Pins 1&2 shorted enables channel 1 audio, Pins 2&3 shorted disables channel 1 audio	1 & 2 shorted
W2	CH2 Intercom Audio Listen: Pins 1&2 shorted enables channel 2 audio, Pins 2&3 shorted disables channel 2 audio	1 & 2 shorted
W3	Left Headphone Program Input: Pins 1&2 shorted enables program audio, Pins 2&3 shorted disables program audio	1 & 2 shorted

W4	Right Headphone Program Input: Pins 1&2 shorted enables program audio, Pins 2&3 shorted disables program audio	1 & 2 shorted
W5	Stereo/Mono operation: Pins 1&2 shorted, channel 1 is heard in the left headphone, channel 2 is heard in the right headphone (stereo) Pins 2&3 shorted, both channels are heard in both headphones (mono)	1 & 2 shorted
X1	Audible Alert Option Speaker location to be determined	1 & 2 open
X2	Channel Power Source: Pins 2&3 shorted enables power from channel 1, Pins 1&2 shorted enables power from channel 2	2 & 3 shorted
X3	Carbon Mic/Remote Mic Switch: Pins 1&2 shorted enables use of carbon mic headset; Pins 2&3 shorted enables use of remote mic switch via <i>CARB MIC</i> jack	1 & 2 shorted

**TABLE 2-2. INTERNAL DIP SWITCHES**

DIP SWITCH NUMBER	SWITCH FUNCTION	DEFAULT SETTING
S4-1	Call Signal Transmit Disable	Off
S4-2	CH2 Momentary Only Talk: Off enables both latched and momentary operation; On enables momentary operation only	Off
S4-3	CH2 Talk Disable: On disables channel 2 talk function; Off enables channel 2 talk	Off
S4-4	CH1 Talk Disable: On disables channel 1 talk function; Off enables channel 1 talk	Off
S4-5	CH1 Momentary Only Talk: Off enables both latched and momentary operation; On enables momentary operation only	Off
S4-6	Talk-Off Transmit: On allows RM-325 to send Talk-Off signal; Off prevents RM-325 from sending Talk-Off signal	On
S4-7	Not used	Off
S4-8	Talk-Off Receive: On allows RM-325 to receive Talk-Off signal from other stations; Off prevents RM-325 from receiving Talk-Off signal	On

### Intercom Audio Listen Option

Intercom Audio Listen is factory set to be enabled on both channels. Setting W1 to the off position will disable intercom audio on channel 1 (usually the left headphone of a stereo headset). Setting W2 to the off position will disable intercom audio on channel 2 (usually the right headphone of a stereo headset).

This option could be used, for example, when you want to use the left side of a stereo headphone exclusively for program audio input and the right side for one channel of intercom audio. In this case you would:

1. Set W5 for stereo operation.
2. Set W1 to "off" to disable channel 1 intercom audio.
3. Set DIP switch S4-4 to "on" to disable channel 1 talk.
4. Set W3 and W4 for left channel program input.

### Program Input Audio Option

To use program input audio:

1. Connect program input to either the *PGM* input connector or to the *AUX* inputs connector. (Refer to the connector pin configurations for the proper connections.)

2. If you are using a stereo headset, set W3 and W4 for the desired operation. (If you are using a mono headset, set both W3 and W4 to "on".)
3. Adjust program input volume using the *PGM* volume control.

### Stereo/Mono Option

When a stereo headset is connected to the *DYN MIC Headset* connector, W5 can be set for stereo or mono operation. With W5 set in the stereo position, intercom channel 1 will be heard in the left headphone only, and channel 2 will be heard only in the right headphone. In the mono position, both intercom channels (and program audio if connected) will be heard in both headphones.

If you are using monaural headphones, W5 may be left in the stereo position.

### Remote Mic Switch Option

The *CARB MIC Headset* connector may be used to connect either a headset or a remote mic on/off switch. (If you are using a carbon mic headset, but still wish to use a remote mic switch, the *AUX* connector may alternatively be used for the mic switch.) To use the *CARB MIC Headset* connector for a remote mic on/off switch:

1. Set X3 to the remote mic switch setting.
2. Use a stereo phone plug to connect the remote switch to the *CARB MIC Headset* jack.
3. To use the remote mic switch, set one or both *TALK* buttons to the latched-on position.

**NOTE:** The *TALK* indicators may still be turned on or off from the RM-325; however, the remote mic switch will not work unless the *TALK* indicators are first turned on at the RM-325.

4. To begin your conversation, press and release the remote mic switch, the *TALK* indicator(s) will go off then on.
5. To end your conversation, press and release the remote mic switch again, the *TALK* indicator(s) will go off then on.

### Momentary/Latched Talk Option

As supplied, the *TALK* buttons feature a dual-action momentary/latching operation: press and hold for momentary talk, then release when finished; or tap to latch "on" for hands-free talk, and tap again to turn off when finished talking.

If desired, the latching operation may be defeated, and the *TALK* buttons may be operated in momentary mode only. Use DIP switches S4-1 and S4-5 to disable latching operation on the desired channel.

## Channel Talk Option

Setting DIP switch S4-3 to the "on" position will disable the channel 2 *TALK* button. Setting DIP switch S4-4 to the "on" position will disable the channel 1 *TALK* button.

## Send Talk-Off Option

As supplied, the RM-325 can generate an inaudible Talk-Off signal which can be used to deactivate the *TALK* buttons on other intercom stations connected to an intercom channel. To turn this feature off, set DIP switch S4-6 to the "off" position.

## Receive Talk-Off Option

As supplied, other intercom stations can deactivate the *TALK* buttons on the RM-325 using the Talk-Off feature from their intercom stations. To disable this feature, set DIP switch S4-8 in the "off" position.

## ALTERNATE POWERING METHODS

### General

The unique design of RTS™ power supplies permits power to be carried on an audio channel. When using an RTS™ power supply (PS-15 or PS-31) to power the intercom system, power is carried to the RM-325 on pin 2 of the *LINE INPUT* connector along with the channel 1 audio. Pin 1 is the DC return. RTS™ power supplies also provide the proper terminating impedance for each intercom channel.

If the standard channel 1 RTS™ power supply is not available, there are several options for connecting power and intercom audio:

- One channel operation with a non-RTS™ power supply
- Two channel operation with "local power" via the *AUX* inputs connector
- RTS™ power via channel 2

These options are discussed below.

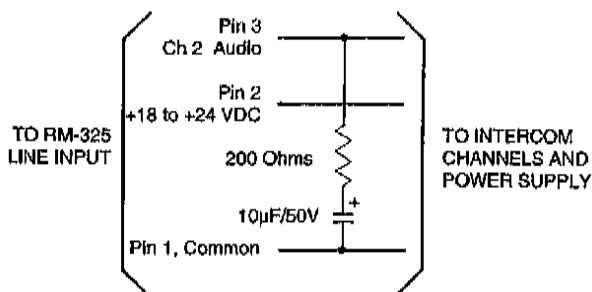


Figure 2-3. Wiring for 1-Channel/External Power

## One Channel Operation With a Non-RTS™ Power Supply

This method uses channel 1 only to connect the non-RTS™ power supply. Audio on channel 1 will be unusable as the power supply will look like a short circuit at audio frequencies. Channel 2, however, will still be operational. Also, channel 2 will require a terminating impedance, since this is not supplied by the non-RTS™ power supply.

Using an XLR-3M connector, connect the external power source and the channel terminating components to the *LINE INPUT* connector as shown in Figure 2-3.

If desired, the *LINE LOOP* connector may be used to connect power and audio to additional intercom stations.

## Two Channel Operation With "Local Power"

This method maintains two audio channels, but requires external impedance matching for the audio lines. In a "local power" system, each RM-325 is powered via the *AUX* inputs connector, and the *LINE LOOP* connector is used for channel impedance matching. The "local power" supply must provide 18 to 24 VDC at 100 mA peak.

1. Refer to Figure 4-1. Remove all four screws (item 11) on the back connector panel of the RM-325.
2. Remove the top cover assembly.
3. On the top side of the main circuit board, cut the trace between pins 2 and 3 at X2 as shown in Figure 2-2.
4. Reassemble the RM-325.
5. Using a DB-15M connector, connect the local power source to the *AUX* inputs connector. Connect +DC to pin 6 and connect power supply common to pin 14 on the *AUX* inputs connector.
6. Using an XLR-3F plug, connect intercom channels and termination components as shown in Figure 2-4. Plug this connector into the *LINE LOOP* jack of the RM-325.

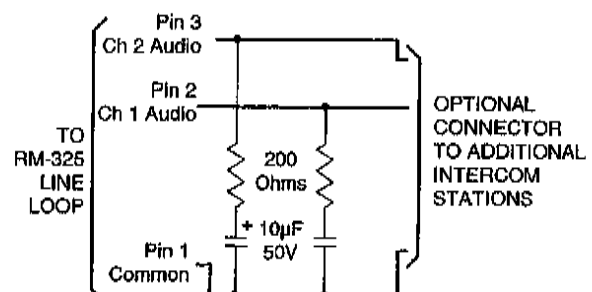


Figure 2-4. Termination for 2-Channel/External Power

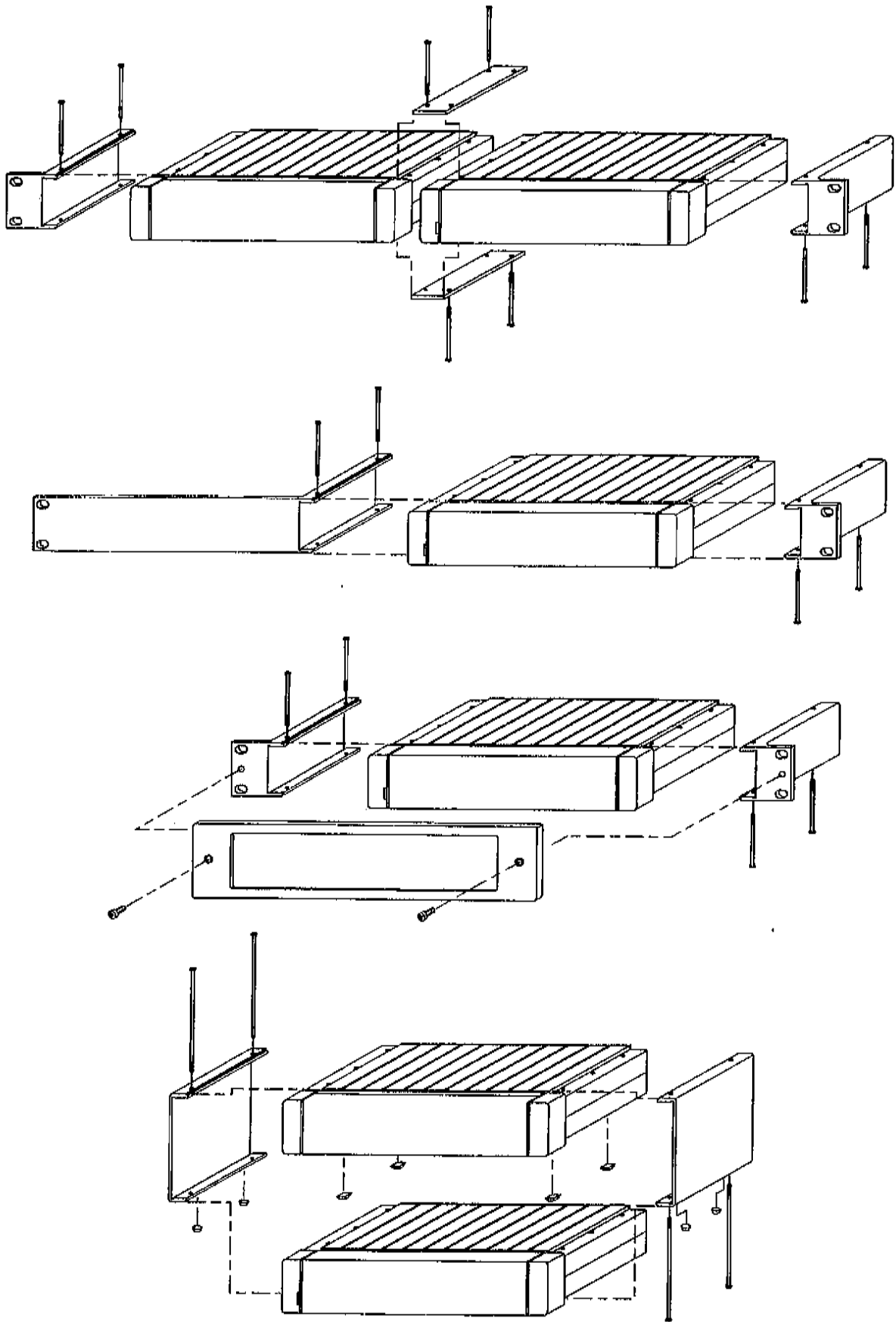


Figure 2-5. Optional Mounting Configurations

## RTS™ Power Via Channel 2

This method uses the RTS™ power supply on channel 2 instead of the standard channel 1 connection. As with the standard RTS™ channel 1 power connection, this method maintains two audio channels and does not require external impedance matching. In a channel 2 RTS™ power system, the *LINE LOOP* connector is usable for connecting channel audio and channel 2 power to other intercom stations.

1. Refer to Figure 4-1. Remove all four screws (item 11) on the back connector panel of the RM-325.
2. Remove the top cover assembly.
3. On the top side of the main circuit board, cut the trace between pins 2 and 3 at X2 as shown in Figure 2-2.
4. On the top side of the main circuit board, add a jumper between pins 2 and 1 at X2 as shown in Figure 2-2.
5. Reassemble the RM-325.
6. Ensure that the RTS™ power is connected to channel 2 on the intercom line. (Refer to the Connector Pin Configurations for the proper connections to the *LINE INPUT* connector.)

## MOUNTING CONFIGURATIONS

Optional mounting configurations for modular RTS™ intercom stations are shown in Figure 2-5 and include rack-mount, console-mount, desk-top and portable stations.

## INSTALLATION GUIDELINES

This section contains some guidelines on installing the RM-325, including:

- Choosing headsets and handsets
- Headphone sound isolation
- Cabling requirements

Use the information provided here and elsewhere in the manual to help you determine the type of system, the powering method, the power supply(ies), and the cabling requirements. Create a system block diagram and equipment list, before installing the system.

### Choosing Headsets or Handsets

The RM-325 accepts a wide variety of headsets and handsets. Headset or handset choice depends on operating environment, operating requirements, and personal taste.

Table 2-3 shows typical operating environments and the level of background noise present. The background noise is measured using a Sound Pressure Level (SPL) meter, which measures the sound pressure level in decibels. SPL is useful for measuring environmental background noise, comparing headphone efficiency, and predicting whether speech communication is possible.

**TABLE 2-3. ENVIRONMENTAL NOISE, SOUND PRESSURE LEVEL AT 10 METERS**

SOURCE	SPL
Aircraft	120 dB to 160 dB
Orchestra, 75 piece, (peaks) or Pipe Organ, (peaks)	140 dB
Rock Concert	110 dB to 140 dB
Piano, (peaks)	120 dB
Blaring Radio	110 dB
Centrifugal Ventilating Fan	110 dB
Auto on Highway	100 dB
Vaneaxial Ventilating Fan	90 dB
Voice, Shouting	90 dB
Factory	75 dB
Voice, Conversational	70 dB
Residence	45 dB
Television Studio	25 dB to 35 dB
Voice, Whisper	30 dB

- A very noisy/loud environment usually requires headphones that prevent outside sound from leaking in (again, good acoustic isolation), headphones that can produce a loud, clear sound, and noise cancelling microphones.
- Understanding speech in a noisy environment requires that the sound from the headphones is as loud or louder than the sound leaking into the headphones from the noisy environment.
- In general, the loudness of a headphone depends upon its ability to absorb power at a given voltage (power=voltage squared divided by the impedance) and the efficiency of its design. Practically, the impedance has a larger effect with present day headsets.
- Low impedance headphones are louder, causing the RM-325 to draw more current from the power supply. High impedance headphones are not as loud, drawing less current from the power supply. The RM-325 design range of impedances for the headphone part of the headset is 25Ω to 600Ω.
- Efficiency is the amount of SPL (Sound Pressure Level) produced for a given electrical input power.

## Headphone Sound Isolation

The ability of headphones to shut out unwanted environmental noise varies from none (0 dB isolation) to about 1/8th as loud (30 dB isolation). The degree of isolation depends both on the design of the headset and the frequency content of the environmental noise. Lightweight, "open" headsets have almost no (0 dB) isolation. The trade off is that lightweight headsets are very comfortable and can be worn for long periods (8 to 12 hours) without physical discomfort from the earmuffs or headband. Because there is no isolation, care must be taken that the sound signals from lightweight headsets are not unintentionally leaked into microphones. In general, the comfort of headsets depends upon their weight, padding and design.

## Isolation, Headset Microphones

In high noise environments, the headset microphone should be a noise cancelling type.

## Cabling Requirements

### Wire Size

It may be necessary to overcome power losses by increasing conductor size over long runs (more than one kilometer). Normal conductor size is #22 AWG. The maximum allowable loop resistance is determined by the power supply voltage, the loop current and the user station minimum operating voltage. The maximum loop resistance equals the difference of the power supply voltage and the minimum operating voltage divided by the maximum loop current (power required by the user station(s)).

Example: A headset station (with 25Ω headphones) uses up to 70 mA. The power supply voltage is 26 VDC and the user station minimum operating voltage is 18 VDC. Then the maximum allowable loop resistance is:

$$(26 - 18) \text{ V} / 0.07 \text{ A} = 114\Omega$$

This corresponds to an operating distance of 1.1 kilometers (3,562 feet) for a #22 AWG wire pair using a single user station with 25 ohm headphones. Data for these calculations can be found in standard electrical wire tables.

### Grounding

System circuit ground should not be directly connected to "earth" or "chassis" ground (where directly means a connection an ohmmeter would show).

In order to prevent a buildup of voltage across the system capacitance, the power supply has a bleeder resistor to chassis ground (22 kΩ). If the system has no RTS™ Systems power supply, such a bleeder resistor should be supplied at a central point in the system.

The basic benefit of not "earth" grounding the RTS™ System circuit return is that it permits continued operation during an accidental system ground fault. This accidental grounding can happen as the result of a pinched wire or a scraped cable that has been pulled across a sharp edge. A single accidental ground can be tolerated by the system until the fault can be cleared and (with luck) before a second ground fault can cause noise or overload. Another benefit of not "earth" grounding the circuit return is that it prevents the introduction of noise through "earth" currents from other equipment. If the RTS™ circuit ground conducts these currents, it is likely that they will be heard as interfering noise on the communication line.

### Signal

Two conductors are required for a one channel system, and three conductors are required for a two channel system. Shielded cable is recommended.

Two channel applications may use either standard microphone cable (for convenience) or two-twisted-pair cable (less expensive than microphone cable). Standard wire size for the system is #22 gauge wire for interconnection. For permanent installations it is recommended that each channel should have individually shielded twisted pair of at least #22 gauge wire; such as Belden #8723 or 9402 for 2 channels. This will reduce interference and help maintain a low crosstalk figure between channels. Connections are as follows:

First shielded pair: connect shield and black to common (pin 1 in two channel system), connect color to channel 1 (pin 2 in two channel system);

Second shielded pair: connect shield and black to common (pin 1 in two channel system), connect color to channel 2 (pin 3 in two channel system).

The audio signal line level is maintained between -10 dBu and 0 dBu (between 0.24 and 0.77 Vrms). These levels are low enough to prevent crosstalk into other equipment (such as TV cameras) yet high enough to reduce external interference to the TW System.

The 200Ω line impedance is high enough to allow communication over line lengths of 1.6 kilometers (one mile) and low enough to permit an adequate speech bandwidth with 3.2 kilometers of accumulated cable. In most systems the 200Ω impedance gives a high fidelity bandwidth with low losses.

When using equipment in rain or conditions of excessive moisture, always protect the equipment with plastic covers and make sure all cable connectors are lifted out of mud, snow or moisture and protected with plastic or tape. Water mud and snow in connectors can cause considerable hum.

## SECTION 3. REPLACEMENT PARTS

### WHERE TO OBTAIN PARTS

Parts may be obtained directly from Telex at:

Telex/RTS Systems  
12000 Portland Ave. S.  
Burnsville, MN 55337  
877-863-4169  
Fax: 800-323-0498

### MECHANICAL PARTS

FINAL ASSEMBLY (Refer to Figure 4-1 for Item No. locations)		
Item No.	Description	Part No.
1	Bezel, RM-325	9070-7491-000
2	Insert, 6 Pin Connector	2018-0077-00
3	Lightpipe, Call Button	4501-0062-00
4	Knob, Volume	2703-0037-00
5	Key Cap, Call	9150-6643-05
6	Key Cap, Talk 1	9150-6643-01
7	Key Cap, Talk 2	9150-6643-03
8	Stem, Switch	2705-0021-00
9	P.C. Board Assy.	9030-7491-000 see Fig. 4-2
10	Case, Extruded	9060-6260-00
11	Screw, Case	9160-6305-00
12	Screw, #4-40 x 3/8"	51845-039
13	Screw, Lock, #4-40	58421-000
14	Screw, M3 x 7.0 mm	16030D8
15	Panel, Rear RM-325	9080-7491-000
16	Valox Film, 0.010 Thk., 7.0" X 6.75"	1303-0009-00
17	Knob, Volume	2703-0034-00
18	Not Used	
19	Not Used	
20	Not Used	
21	Not Used	
22	Not Used	
23	Not Used	
24	Housing, Connector, 6 Pin	59958-006
25	Terminal	59958-200

### ELECTRICAL PARTS

CIRCUIT BOARD ASSEMBLY (Refer to Figures 4-3 and 4-4)		
Ref. No.	Description	Part No.
C1	Heatsink	45020018-00
C1	Capacitor, EL, SM, 47 $\mu$ F, 10V	102884-215
C2	Capacitor, CM, SM, 100 pF, 50V	102879-204

CIRCUIT BOARD ASSEMBLY (Refer to Figures 4-3 and 4-4)		
Ref. No.	Description	Part No.
C3	Capacitor, EL, SM, 47 $\mu$ F, 10V	102884-215
C4	Capacitor, CM, SM, 1000 pF, 50V	102881-327
C5	Capacitor, CM, SM, 1000 pF, 50V	102881-327
C6	Capacitor, CM, SM, 0.1 $\mu$ F, 50V	102881-351
C7	Capacitor, CM, SM, 0.1 $\mu$ F, 50V	102881-351
C8	Capacitor, CM, SM, 0.1 $\mu$ F, 50V	102881-351
C9	Capacitor, EL, SM, 47 $\mu$ F, 10V	102884-215
C10	Capacitor, CM, SM, 470 pF, 50V	102879-212
C11	Capacitor, CM, SM, 0.1 $\mu$ F, 50V	102881-351
C12	Capacitor, EL, SM, 22 $\mu$ F, 35V	1099R226-3G
C13	Capacitor, CM, SM, 0.01 $\mu$ F, 50V	102881-339
C14	Capacitor, CM, SM, 1000 pF, 50V	102881-327
C15	Capacitor, CM, SM, 10 pF, 50V	102879-271
C16	Capacitor, EL, SM, 1 $\mu$ F, 50V	102884-606
C17	Capacitor, CM, SM, 0.1 $\mu$ F, 50V	102881-351
C18	Capacitor, CM, SM, 100 pF, 50V	102879-204
C19	Capacitor, CM, SM, 100 pF, 50V	102879-204
C20	Capacitor, CM, SM, 100 pF, 50V	102879-204
C21	Capacitor, CM, SM, 10 pF, 50V	102879-271
C22	Capacitor, EL, SM, 22 $\mu$ F, 35V	1099R226-3G
C23	Capacitor, EL, SM, 22 $\mu$ F, 35V	1099R226-3G
C24	Capacitor, EL, SM, 22 $\mu$ F, 35V	1099R226-3G
C25	Capacitor, CM, SM, 100 pF, 50V	102879-204
C26	Capacitor, EL, SM, 22 $\mu$ F, 35V	1099R226-3G
C27	Capacitor, CM, SM, 100 pF, 50V	102879-204
C28	Capacitor, CM, SM, 100 pF, 50V	102879-204
C29	Capacitor, CM, SM, 10 pF, 50V	102879-271
C30	Capacitor, EL, SM, 22 $\mu$ F, 35V	1099R226-3G
C31	Capacitor, EL, SM, 22 $\mu$ F, 35V	1099R226-3G
C32	Capacitor, EL, SM, 22 $\mu$ F, 35V	1099R226-3G
C33	Capacitor, CM, SM, 100 pF, 50V	102879-204
C34	Capacitor, EL, SM, 1 $\mu$ F, 50V	102884-606
C35	Capacitor, EL, SM, 1 $\mu$ F, 50V	102884-606
C36	Capacitor, CM, SM, 1000 pF, 50V	102881-327
C37	Capacitor, CM, SM, 1000 pF, 50V	102881-327
C38	Capacitor, EL, SM, 1 $\mu$ F, 50V	102884-606
C39	Capacitor, CM, SM, 100 pF, 50V	102879-204
C40	Capacitor, EL, SM, 47 $\mu$ F, 10V	102884-215
C41	Capacitor, EL, RA, 4700 $\mu$ F, 35V	1513R478-4G
C42	Capacitor, EL, SM, 47 $\mu$ F, 10V	102884-215
C43	Capacitor, EL, SM, 47 $\mu$ F, 10V	102884-215
C44	Capacitor, CM, SM, 0.1 $\mu$ F, 50V	102881-351
C45	Capacitor, CM, SM, 0.1 $\mu$ F, 50V	102881-351
C46	Capacitor, EL, SM, 22 $\mu$ F, 35V	1099R226-3G
C47	Capacitor, CD, RA, 0.1 $\mu$ F, 500V	1510R104-2Q
C48	Capacitor, EL, 1000 $\mu$ F, 16V	51821-072
C49	Capacitor, EL, 1000 $\mu$ F, 16V	51821-072
C50-C99	Not Used	
C100	Capacitor, EL, SM, 1 $\mu$ F, 50V	102884-606
C101	Capacitor, EL, SM, 1 $\mu$ F, 50V	102884-606
C102	Capacitor, CM, SM, 10 pF, 50V	102879-271
C103	Capacitor, CM, SM, 10 pF, 50V	102879-271
C104	Capacitor, CM, SM, 100 pF, 50V	102879-204

CIRCUIT BOARD ASSEMBLY (Refer to Figures 4-3 and 4-4)		
Ref. No.	Description	Part No.
C105	Capacitor, CM, SM, 10 pF, 50V	102879-271
C106	Capacitor, CM, SM, 0.1 μF, 50V	102881-351
C107	Capacitor, CM, SM, 1000 pF, 50V	102881-327
C108	Capacitor, CM, SM, 0.1 μF, 50V	102881-351
C109	Capacitor, CM, SM, 0.1 μF, 50V	102881-351
C110	Capacitor, EL, SM, 47 μF, 10V	102884-215
C111	Capacitor, CM, SM, 0.1 μF, 50V	102881-351
C112	Capacitor, CM, SM, 1000 pF, 50V	102881-327
C113	Capacitor, CM, SM, 0.1 μF, 50V	102881-351
C114	Capacitor, CM, SM, 0.1 μF, 50V	102881-351
C115	Capacitor, EL, SM, 47 μF, 10V	102884-215
C116	Capacitor, EL, SM, 1 μF, 50V	102884-606
C117	Capacitor, EL, SM, 1 μF, 50V	102884-606
CC1	Capacitor, CM, SM, 0.1 μF, 50V	102881-351
CC2	Capacitor, CM, SM, 0.1 μF, 50V	102881-351
CC3	Capacitor, CM, SM, 0.1 μF, 50V	102881-351
CC4	Capacitor, CM, SM, 0.1 μF, 50V	102881-351
CC5	Capacitor, CM, SM, 0.1 μF, 50V	102881-351
CC6	Capacitor, CM, SM, 0.1 μF, 50V	102881-351
CC7	Capacitor, CM, SM, 0.1 μF, 50V	102881-351
CC8, CC9	Not Used	
CC10	Capacitor, CM, SM, 0.1 μF, 50V	102881-351
CC11	Capacitor, CM, SM, 0.1 μF, 50V	102881-351
CC12	Capacitor, CM, SM, 0.1 μF, 50V	102881-351
CC13	Capacitor, CM, SM, 0.1 μF, 50V	102881-351
CC14	Capacitor, CM, SM, 0.1 μF, 50V	102881-351
D1	Diode, SM, Switching, 914/4148	58711-100
D2	Diode, SM, Switching, 914/4140	58711-100
D3	Diode, SM, Switching, 914/4148	58711-100
D4	Diode, 1A, 400V, 1N4004	16016481-SM
D5	Diode, 1A, 400V, 1N4004	16016481-SM
D6	Diode, SM, Zener TVS, 1500W, 1SMC33A	16010004-SM
D7	Diode, SM, Switching, 914/4148	58711-100
D8	Diode, SM, Switching, 914/4148	58711-100
D9	Diode, SM, Switching, 914/4148	58711-100
D10	Diode, SM, Switching, 914/4148	58711-100
D11	Diode, SM, Switching, 914/4148	58711-100
D12	Diode, SM, Switching, 914/4148	58711-100
D13	Diode, SM, Switching, 914/4148	58711-100
D14-D100	Not Used	
D101	Diode, SM, Switching, 914/4148	58711-100
D102	Diode, SM, Switching, 914/4148	58711-100
D103	Diode, SM, Switching, 914/4148	58711-100
DS1	LED, T-1 3/4, Green	18014740-00
DS2	LED, T-1 3/4, Green	18014740-00
DS3	LED, T-1 3/4, Red	18010027-00
	LED, T-1 3/4, Mount	18010028-00
FB1	Inductor, Ferrite Bead	24040001-00
FB2	Inductor, Ferrite Bead	24040001-00
FB3	Inductor, Ferrite Bead	24040001-00
FB4	Inductor, Ferrite Bead	24040001-00
J1	Connector, PC Mount Jack	20130049-00
J2	Connector, ST Locking, 0.059, M-6	59958-106

CIRCUIT BOARD ASSEMBLY (Refer to Figures 4-3 and 4-4)		
Ref. No.	Description	Part No.
J3	Connector, RA XLR, M-3	59892-003
J4	Connector, RA XLR, 3-F	20180081-00
J5	Connector, PC Mount Jack	20130049-00
J6	Connector, RA HD 2-Row D-Sub, F-15	59926-015
Q1	Transistor, SM, SI NPN, MMBT5088	102210-000
Q1	Transistor, N-JFET, SST-108	54750-000
Q2	Transistor, SM, SI NPN, MMBT5088	102210-000
Q3	Transistor, SM, SI NPN, MMBT5088	102210-000
Q4 - Q9	Not Used	
Q10	Transistor, SM, SI, PNP, MBT5087	16025087-SM
Q11	Not Used	
Q12	Transistor, SM, SI, PNP, MBT5087	16025087-SM
Q13	Transistor, SM, SI, PNP, MST5087	16025087-SM
Q14	Transistor, SM, SI, PNP, MBT5087	16025087-SM
Q15	Transistor, SM, SI NPN, MMBT5088	102210-000
R1	Resistor, SM, 22 kΩ, 5%, 1/8W	102513-223
R2	Resistor, SM, 22 kΩ, 5%, 1/8W	102513-223
R3	Resistor, SM, 1 kΩ, 5%, 1/8W	102513-102
R4	Resistor, SM, 301 Ω, 1%, 1/8W	102404-146
R5	Resistor, SM, 3.01 kΩ, 1%, 1/8W	102404-246
R6	Resistor, SM, 301 Ω, 1%, 1/8W	102404-146
R7	Resistor, SM, 3.01 kΩ, 1%, 1/8W	102404-246
R8	Resistor, SM, 1 kΩ, 5%, 1/8W	102513-102
R9	Resistor, SM, 620 Ω, 5%, 1/8W	102513-621
R10	Resistor, SM, 620 Ω, 5%, 1/8W	102513-621
R11	Resistor, SM, 100 kΩ, 5%, 1/8W	102513-104
R12, R13	Not Used	
R14	Resistor, SM, 22 kΩ, 5%, 1/8W	102513-223
R15	Resistor, SM, 5.1 MΩ, 5%, 1/8W	102513-515
R16	Resistor, SM, 5.1 MΩ, 5%, 1/8W	102513-515
R17	Resistor, SM, 5.1 MΩ, 5%, 1/8W	102513-515
R18	Resistor, SM, 200 Ω, 5%, 1/8W	102513-201
R19	Resistor, SM, 100 kΩ, 5%, 1/8W	102513-104
R20	Resistor, SM, 10 kΩ, 1%, 1/8W	102404-300
R21	Resistor, SM, 100 kΩ, 5%, 1/8W	102513-104
R22	Resistor, SM, 22 kΩ, 5%, 1/8W	102513-223
R23	Resistor, SM, 100 kΩ, 5%, 1/8W	102513-104
R24	Resistor, SM, 15 kΩ, 5%, 1/8W	102513-153
R25	Resistor, SM, 10 kΩ, 1%, 1/8W	102404-300
R26	Resistor, SM, 200 Ω, 5%, 1/8W	102513-201
R27	Resistor, SM, 100 Ω, 5%, 1/8W	102513-101
R28	Resistor, SM, 100 kΩ, 5%, 1/8W	102513-104
R29	Resistor, SM, 1 kΩ, 5%, 1/8W	102513-102
R30	Resistor, SM, 10 kΩ, 1%, 1/8W	102404-300
R31	Resistor, SM, 1 kΩ, 5%, 1/8W	102513-102
R32	Resistor, SM, 220 kΩ, 5%, 1/8W	102513-224



CIRCUIT BOARD ASSEMBLY (Refer to Figures 4-3 and 4-4)		
Ref. No.	Description	Part No.
R33	Resistor, SM, 1 k $\Omega$ , 5%, 1/8W	102513-102
R34	Resistor, SM, 22 k $\Omega$ , 5%, 1/8W	102513-223
R35	Resistor, SM, 68 k $\Omega$ , 5%, 1/8W	102513-683
R36	Resistor, SM, 22 k $\Omega$ , 5%, 1/8W	102513-223
R37	Resistor, SM, 22 k $\Omega$ , 5%, 1/8W	102513-223
R38	Resistor, SM, 22 k $\Omega$ , 5%, 1/8W	102513-223
R39	Potentiometer, 10 k $\Omega$ , 20%, 0.1W	14090060-00
R40	Resistor, SM, 60.4 k $\Omega$ , 1%, 1/8W	102404-375
R41	Resistor, SM, 60.4 k $\Omega$ , 1%, 1/8W	102404-375
R42	Resistor, SM, 20 k $\Omega$ , 1%, 1/8W	102404-329
R43	Resistor, SM, 20 k $\Omega$ , 1%, 1/8W	102404-329
R44	Resistor, SM, 100 $\Omega$ , 5%, 1/8W	102513-101
R45	Resistor, SM, 100 k $\Omega$ , 5%, 1/8W	102513-104
R46	Resistor, SM, 22 k $\Omega$ , 5%, 1/8W	102513-223
R47	Resistor, SM, 68 k $\Omega$ , 5%, 1/8W	102513-683
R48	Resistor, SM, 22 k $\Omega$ , 5%, 1/8W	102513-223
R49	Resistor, SM, 1 k $\Omega$ , 5%, 1/8W	102513-102
R50	Resistor, SM, 22 k $\Omega$ , 5%, 1/8W	102513-223
R51	Resistor, SM, 22 k $\Omega$ , 5%, 1/8W	102513-223
R52	Potentiometer, 10 k $\Omega$ , 20%, 0.1W	14090060-00
R53	Resistor, SM, 60.4 k $\Omega$ , 1%, 1/8W	102404-375
R54	Resistor, SM, 60.4 k $\Omega$ , 1%, 1/8W	102404-375
R55	Resistor, SM, 20 k $\Omega$ , 1%, 1/8W	102404-329
R56	Resistor, SM, 20 k $\Omega$ , 1%, 1/8W	102404-329
R57	Resistor, SM, 100 $\Omega$ , 5%, 1/8W	102513-101
R58	Resistor, SM, 100 k $\Omega$ , 5%, 1/8W	102513-104
R59	Resistor, SM, 100 k $\Omega$ , 5%, 1/8W	102513-104
R60	Resistor, SM, 100 k $\Omega$ , 5%, 1/8W	102513-104
R61	Resistor, SM, 60.4 k $\Omega$ , 1%, 1/8W	102404-375
R62	Resistor, SM, 10 k $\Omega$ , 1%, 1/8W	102404-300
R63	Resistor, SM, 60.4 k $\Omega$ , 1%, 1/8W	102404-375
R64	Resistor, SM, 10 k $\Omega$ , 1%, 1/8W	102404-300
R65	Potentiometer, 10 k $\Omega$ , 30%, 0.05W	14060044-00
R66	Resistor, SM, 10 k $\Omega$ , 1%, 1/8W	102404-300
R67	Resistor, SM, 100 k $\Omega$ , 5%, 1/8W	102513-104
R68	Resistor, SM, 10 k $\Omega$ , 1%, 1/8W	102404-300
R69	Resistor, SM, 2.7 $\Omega$ , 5%, 1/8W	102513-2R7
R70	Resistor, SM, 10 k $\Omega$ , 1%, 1/8W	102404-300
R71	Resistor, SM, 1.1 k $\Omega$ , 5%, 1/8W	102513-112
R72	Resistor, SM, 30 $\Omega$ , 5%, 1/8W	102513-300
R73	Resistor, SM, 22 k $\Omega$ , 5%, 1/8W	102513-223
R74	Resistor, SM, 22 k $\Omega$ , 5%, 1/8W	102513-223
R75	Resistor, SM, 22 k $\Omega$ , 5%, 1/8W	102513-223
R76	Resistor, SM, 22 k $\Omega$ , 5%, 1/8W	102513-223
R77	Resistor, SM, 200 $\Omega$ , 5%, 1/8W	102513-201
R78	Resistor, SM, 100 k $\Omega$ , 5%, 1/8W	102513-104
R79	Resistor, SM, 100 k $\Omega$ , 5%, 1/8W	102513-104
R80	Resistor, SM, 22 $\Omega$ , 5%, 1/8W	102513-220
R81	Resistor, SM, 30 $\Omega$ , 5%, 1/8W	102513-300
R82	Resistor, SM, 22 k $\Omega$ , 5%, 1/8W	102513-223
R83	Resistor, SM, 22 k $\Omega$ , 5%, 1/8W	102513-223

CIRCUIT BOARD ASSEMBLY (Refer to Figures 4-3 and 4-4)		
Ref. No.	Description	Part No.
R84	Resistor, SM, 22 k $\Omega$ , 5%, 1/8W	102513-223
R85	Resistor, SM, 100 k $\Omega$ , 5%, 1/8W	102513-104
R86 - R96	Not Used	
R97	Potentiometer, 10 k $\Omega$ , 30%, 0.08W	14060044-00
R98	Resistor, SM, 100 $\Omega$ , 5%, 1/8W	102513-101
R99	Potentiometer, 10 k $\Omega$ , 30%, 0.08W	14060044-00
R100	Resistor, SM, 100 $\Omega$ , 5%, 1/8W	102513-101
R101	Resistor, SM, 100 k $\Omega$ , 5%, 1/8W	102513-104
R102	Resistor, SM, 100 k $\Omega$ , 5%, 1/8W	102513-104
R103	Resistor, SM, 100 k $\Omega$ , 5%, 1/8W	102513-104
R104	Resistor, SM, 100 k $\Omega$ , 5%, 1/8W	102513-104
R105	Resistor, SM, 270 k $\Omega$ , 5%, 1/8W	102513-274
R106	Resistor, SM, 22 k $\Omega$ , 5%, 1/8W	102513-223
R107	Resistor, SM, 270 k $\Omega$ , 5%, 1/8W	102513-274
R108	Resistor, SM, 22 k $\Omega$ , 5%, 1/8W	102513-223
R109	Resistor, SM, 22 k $\Omega$ , 5%, 1/8W	102513-223
R110	Resistor, SM, 22 k $\Omega$ , 5%, 1/8W	102513-223
R111	Resistor, SM, 22 k $\Omega$ , 5%, 1/8W	102513-223
R112	Resistor, SM, 2.2 M $\Omega$ , 5%, 1/8W	102513-225
R113	Resistor, SM, 270 k $\Omega$ , 5%, 1/8W	102513-274
R114	Resistor, SM, 270 k $\Omega$ , 5%, 1/8W	102513-274
R115	Resistor, SM, 270 k $\Omega$ , 5%, 1/8W	102513-274
R116	Resistor, SM, 470 k $\Omega$ , 5%, 1/8W	102513-474
R117	Resistor, SM, 470 k $\Omega$ , 5%, 1/8W	102513-474
R118	Resistor, SM, 470 k $\Omega$ , 5%, 1/8W	102513-474
R119	Resistor, SM, 47 k $\Omega$ , 5%, 1/8W	102513-473
R120	Resistor, SM, 47 k $\Omega$ , 5%, 1/8W	102513-473
R121	Resistor, SM, 47 k $\Omega$ , 5%, 1/8W	102513-473
R122	Resistor, SM, 3.01 k $\Omega$ , 1%, 1/8W	102404-246
R123	Resistor, SM, 39 $\Omega$ , 5%, 1/8W	102513-390
R124	Resistor, SM, 22 k $\Omega$ , 5%, 1/8W	102513-223
R125	Resistor, SM, 47 k $\Omega$ , 5%, 1/8W	102513-473
R126	Resistor, SM, 22 k $\Omega$ , 5%, 1/8W	102513-223
R127	Resistor, SM, 47 k $\Omega$ , 5%, 1/8W	102513-473
R128	Resistor, SM, 2.7 $\Omega$ , 5%, 1/8W	102513-2R7
R129	Resistor, SM, 22 k $\Omega$ , 5%, 1/8W	102513-223
R130	Resistor, SM, 2.7 $\Omega$ , 5%, 1/8W	102513-2R7
R131	Resistor, SM, 22 k $\Omega$ , 5%, 1/8W	102513-223
RR1	Resistor, SM, 22 $\Omega$ , 5%, 1/8W	102513-220
RR2	Resistor, SM, 22 $\Omega$ , 5%, 1/8W	102513-220
RR3	Resistor, SM, 22 $\Omega$ , 5%, 1/8W	102513-220
RR4	Resistor, SM, 22 $\Omega$ , 5%, 1/8W	102513-220
RR5	Resistor, SM, 22 $\Omega$ , 5%, 1/8W	102513-220
RR6	Resistor, SM, 22 $\Omega$ , 5%, 1/8W	102513-220
RR7	Resistor, SM, 22 $\Omega$ , 5%, 1/8W	102513-220
RP1	Resistor, Network 8-Bus, 22 k $\Omega$	14112202-00
RP2	Resistor, Network 8-Bus, 22 k $\Omega$	14112202-00
S1	Switch, Momentary Pushbutton, DPDT	19110047-00
S2	Switch, Momentary Pushbutton, DPDT	19110047-00

**CIRCUIT BOARD ASSEMBLY**  
(Refer to Figures 4-3 and 4-4)

Ref. No.	Description	Part No.
S3	Switch, Momentary Pushbutton, DPDT	19110047-00
S4	Switch, SM, DIP, SPST, 8 Pos	19090002-SM
TP1	Connector, Test Point Terminal	20170014-00
TP2	Connector, Test Point Terminal	20170014-00
TP3	Connector, Test Point Terminal	20170014-00
TP4	Connector, Test Point Terminal	20170014-00
U1	IC, SM, Dual Op Amp, LMS33	16030833-SM
U2	IC, SM, Triple 2 Channel Mux, 4053	53266-123
U3	IC, SM, LP JFET Input Op Amp, TL062	16030131-SM
U4	IC, SM, LP JFET Input Op Amp, TL062	16030131-SM
U5	IC, SM, Dual Op Amp, MC34072	16030140-SM
U6	IC, SM, LP JFET Input Op Amp, TL062	16030131-SM
U7	IC, SM, LP JFET Input Op Amp, TL062	16030131-SM
U8	IC, Voltage Regulator, LM317	53290-000
U9	Not Used	
U10	IC, SM, Adj Micropower Vreg	59631-000
U11	IC, SM, Quad Schmidt 2 Input NAND, 4093B	53266-117
U12	IC, SM, Microcontroller, HD6301VIL	16030144-00
U13	IC, SM, Audio Amp, LM386	53281-100
U14	IC, SM, Audio Amp, LM386	53281-100
U15	IC, SM, Darl Trans Array, ULN2004A	16030008-SM
W1	Connector, ST Header, 0.100, M-3	590089-003
W2	Connector, ST Header, 0.100, M-3	590089-003
W3	Connector, ST Header, 0.100, M-3	590089-003
W4	Connector, ST Header, 0.100, M-3	590089-003
W5	Connector, ST Header, 0.100, M-3	590089-003
Y100	Crystal, SM, 4 MHz	33010009-SM

## SECTION 4. DIAGRAMS

Drawing Number	Title
9010-7491-000	Figure 4-1. Final Assembly, RM-325
9030-7491-000	Figure 4-2. PC Board Assembly, RM-325
9027-7491-000	Figure 4-3. Schematic, Sheet 1, RM-325
9027-7491-000	Figure 4-4. Schematic, Sheet 2, RM-325



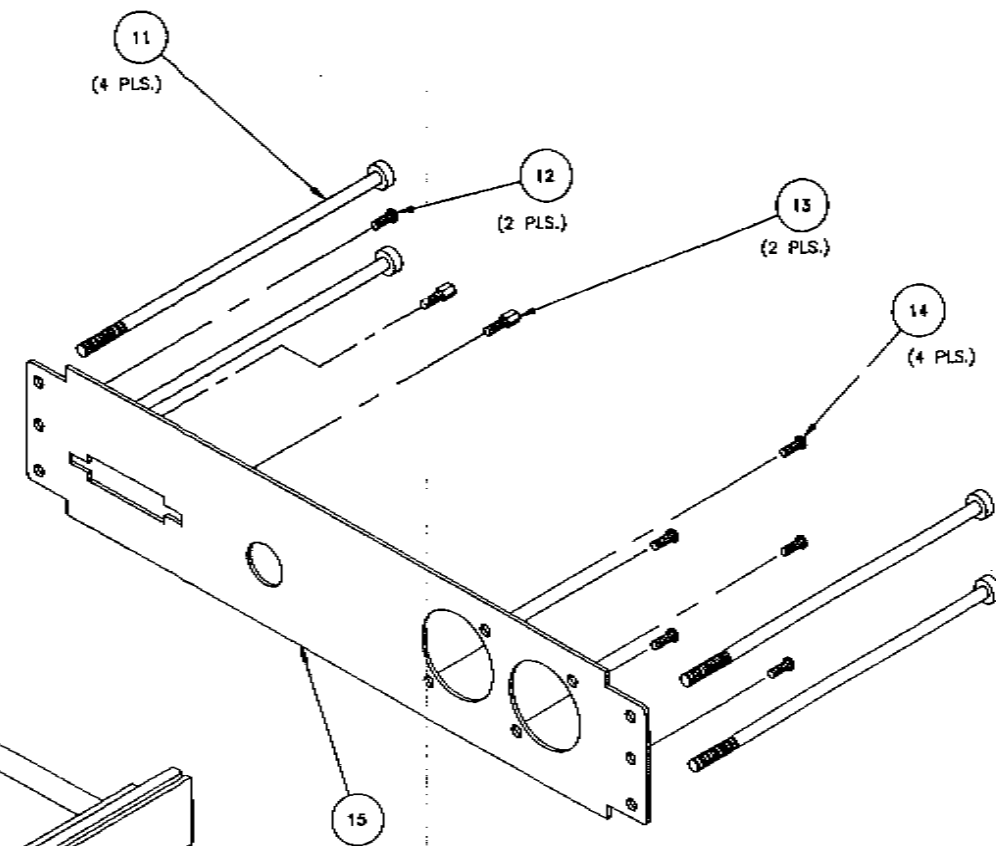
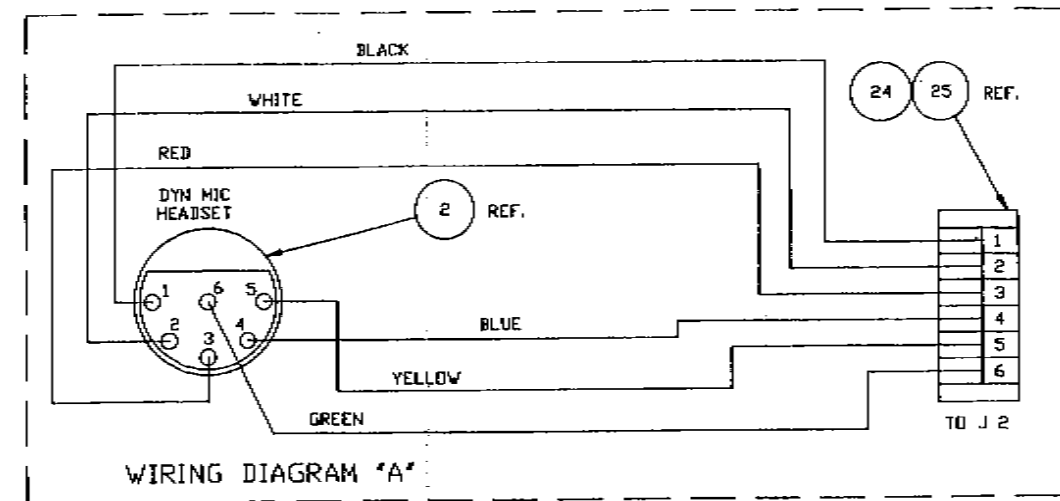
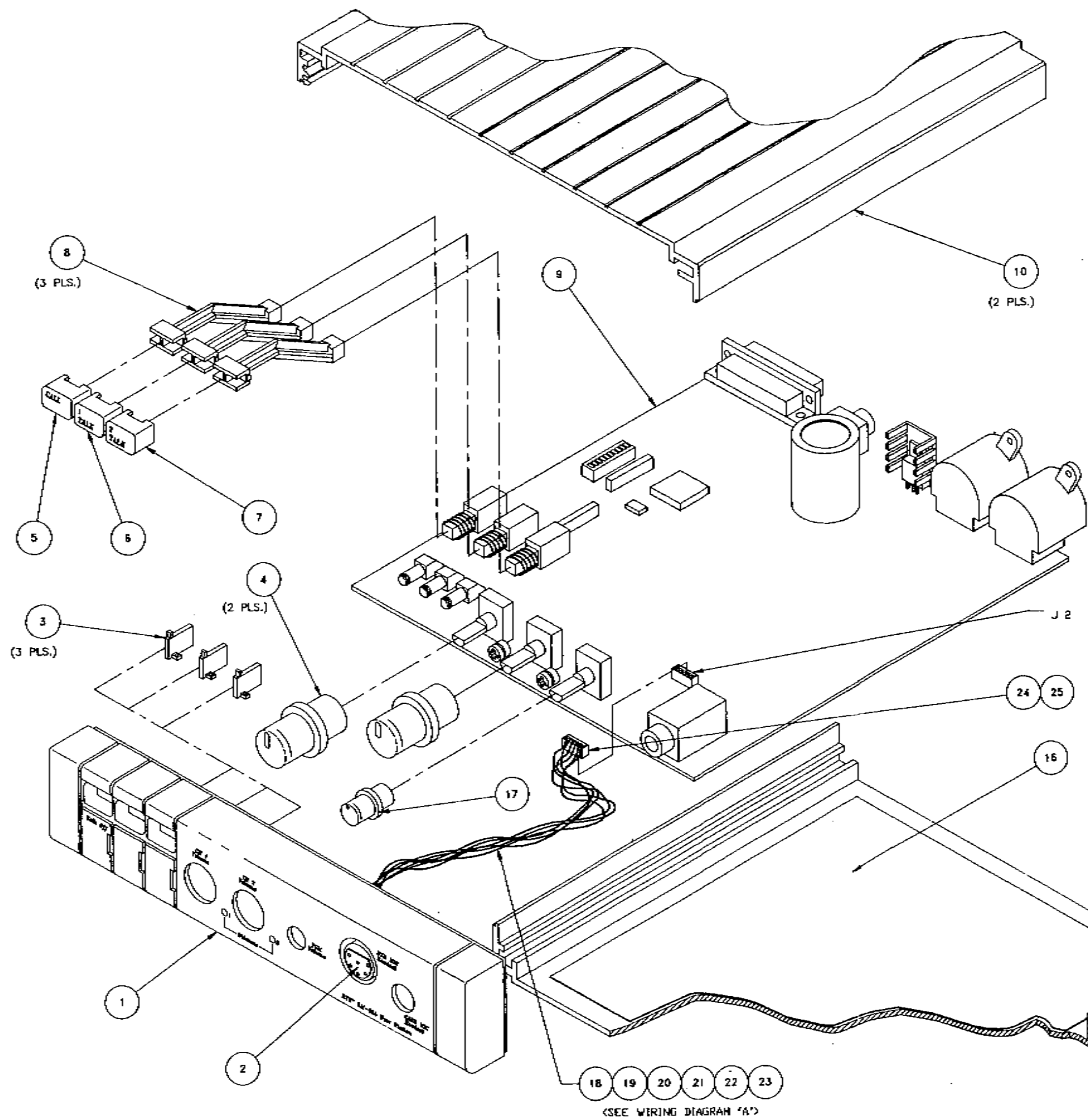


Figure 4-1. RM-325 Final Assembly  
9010-7491-000

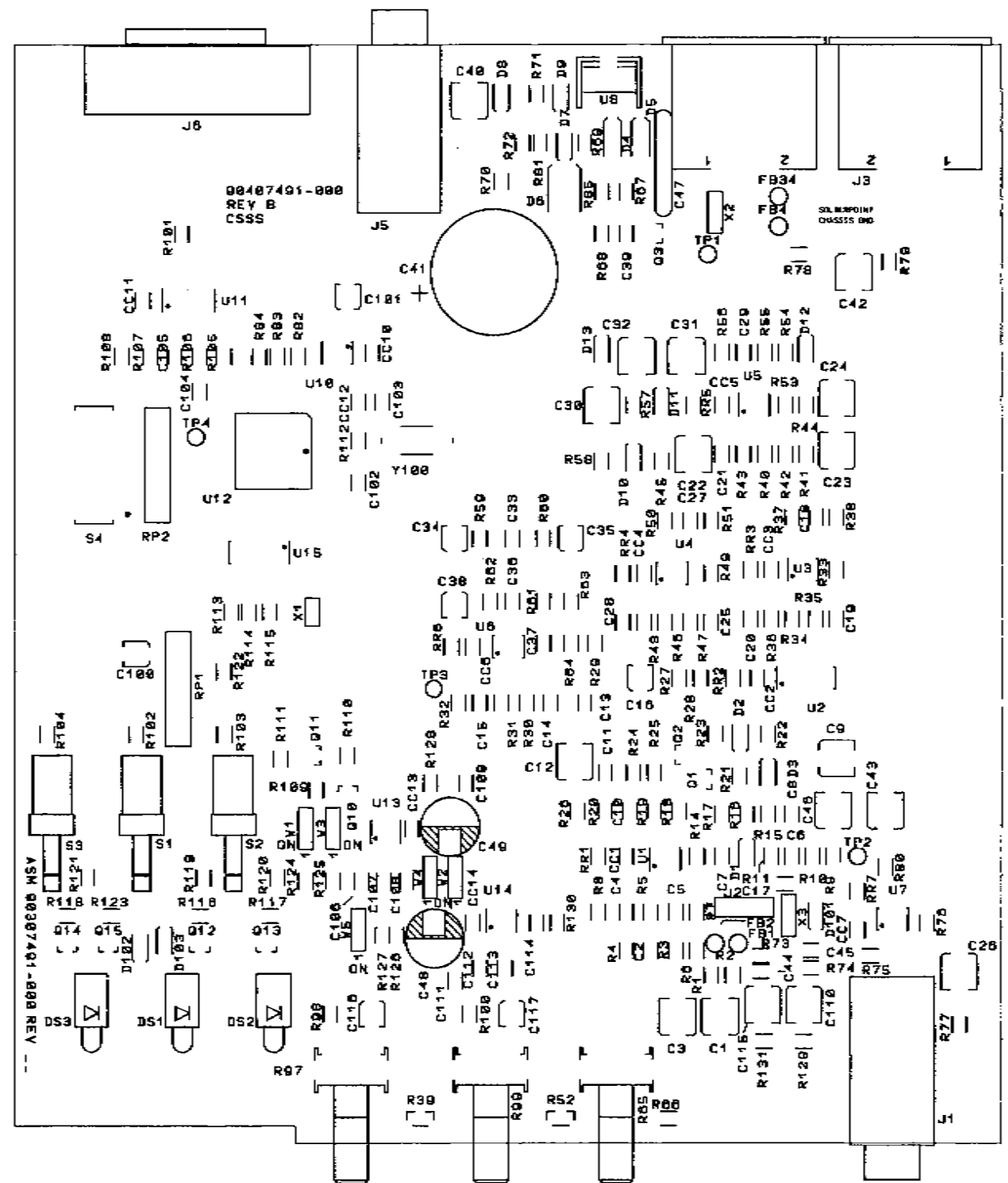
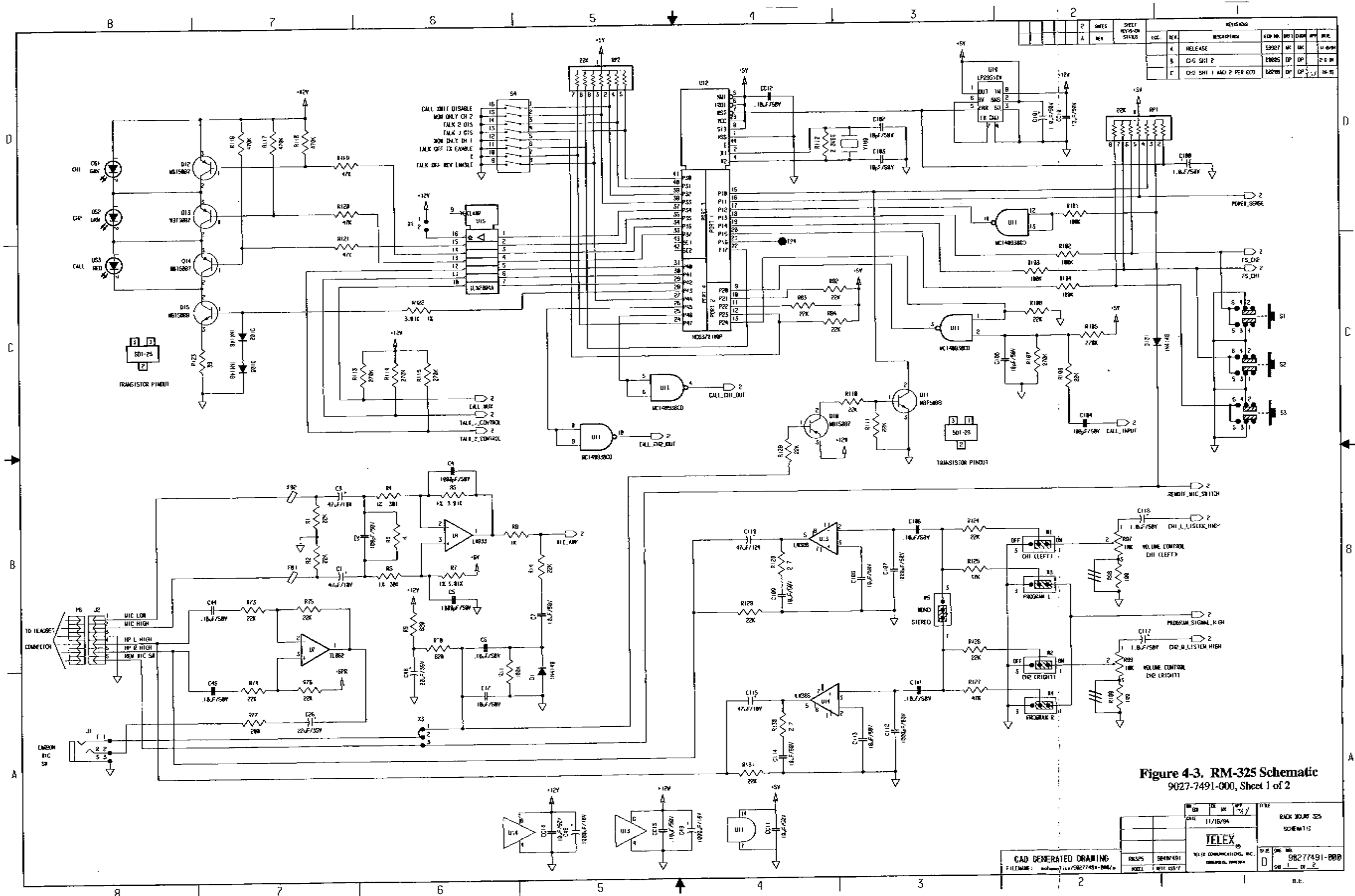


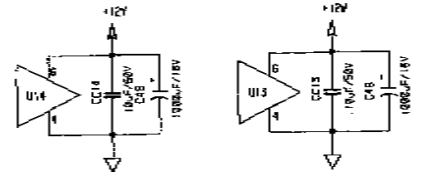
Figure 4-2. RM-325 PC Board Assembly  
9030-7491-000



REVISONS		LOC.	REV.	DESCRIPTION	ENR. NO.	BY	CHK.	APP.	DATE
4	RELEASE		59327	WK	WK				11/16/94
5	CHG SHI 2		59395	DP	DP				2-5-94
6	CHG SHI 1 AND 2 PER ECO		59395	DP	DP				10-94

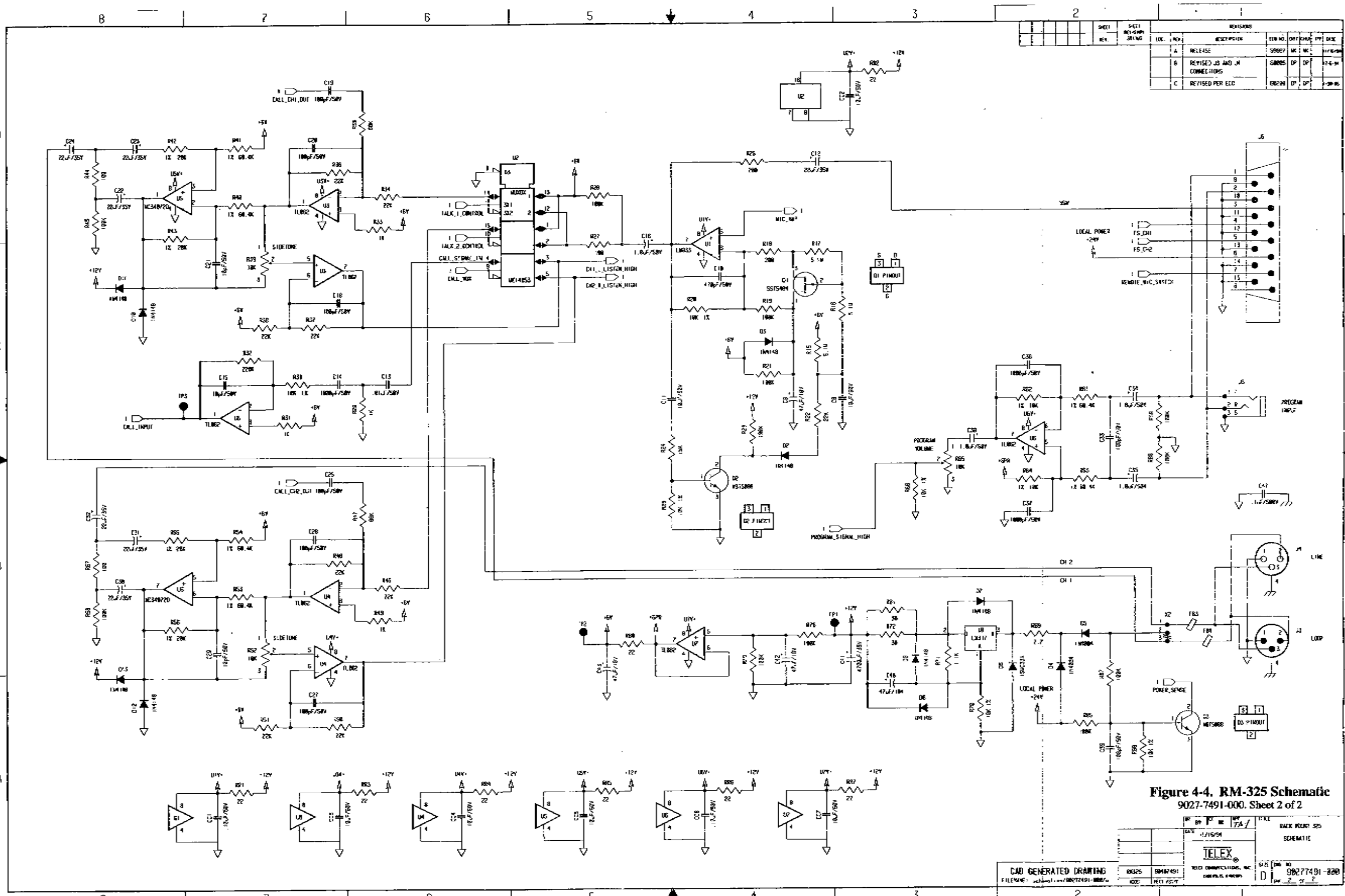
Figure 4-3. RM-325 Schematic  
9027-7491-000, Sheet 1 of 2

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 DATE: 11/16/94  
 SHEET: 1 OF 2  
 TITLE: RM-325 SCHEMATIC  
 PROJECT: 90277491-000  
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 CHECKED BY: [blank]  
 DATE: [blank]  
 DESIGNED BY: [blank]  
 DATE: [blank]  
 DRAWN BY: [blank]  
 DATE: [blank]  
 CHECKED BY: [blank]  
 DATE: [blank]  
 DESIGNED BY: [blank]  
 DATE: [blank]









REVISIONS		REV.	DATE	BY	CHKD.	APP.
1	RELEASE	59827	11/18/54			
2	REVISED AS APT. IN CONNECTIONS	59828	12/1/54			
3	REVISED PER ECD	59829	12/1/54			

Figure 4-4. RM-325 Schematic  
9027-7491-000. Sheet 2 of 2

CAD GENERATED DRAWING

FILE NAME: schem1.cad/90277491-000/2

DATE: 11/18/54

TELEX

9027-7491-000

90277491-000

2 of 2





