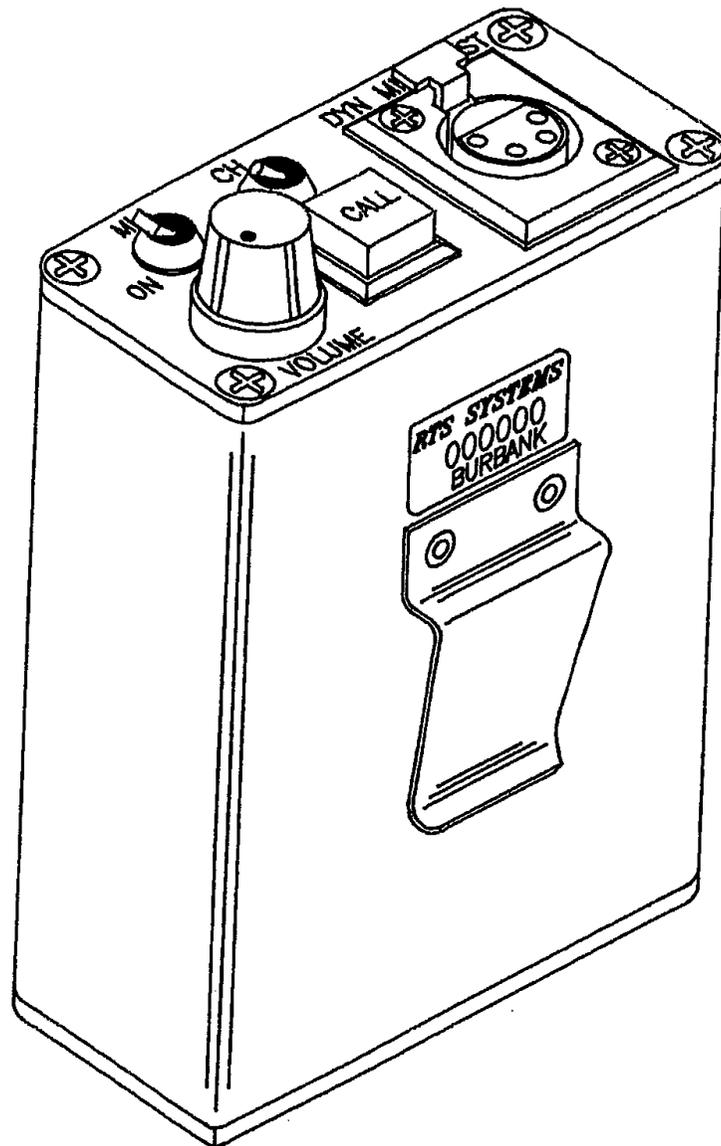


*User Manual*  
**MODEL BP-300**  
*Portable Belt Pack User Station*



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## **WARRANTY NOTICE**

See the enclosed warranty card for further details.

## **CUSTOMER SUPPORT**

Technical questions should be directed to:

Customer Service Department  
RTS/Telex Communications, Inc.  
12000 Portland Avenue South  
Burnsville, MN 55337 USA  
Telephone: 800-392-3497  
Fax: 800-323-0498  
Factory Service: 800-553-5992

## **RETURN SHIPPING INSTRUCTIONS**

Customer Service Department  
Telex Communications, Inc. (Lincoln, NE)  
Telephone: 402-467-5321  
Fax: 402-467-3279  
Factory Service: 800-553-5992

Please include a note in the box which supplies the company name, address, phone number, a person to contact regarding the repair, the type and quantity of equipment, a description of the problem and the serial number(s).

## **SHIPPING TO THE MANUFACTURER**

All shipments of product should be made via UPS Ground, prepaid (you may request from Factory Service a different shipment method). Any shipment upgrades will be paid by the customer. The equipment should be shipped in the original packing carton. If the original carton is not available, use any suitable container that is rigid and of adequate size. If a substitute container is used, the equipment should be wrapped in paper and surrounded with at least four (4) inches of excelsior or similar shock-absorbing material. All shipments must be sent to the following address and must include the Proof of Purchase for warranty repair. Upon completion of any repair the equipment will be returned via United Parcel Service or specified shipper, collect.

Factory Service Department  
Telex Communications, Inc.  
8601 East Cornhusker Hwy.  
Lincoln, NE 68507 U.S.A.  
Attn: Service

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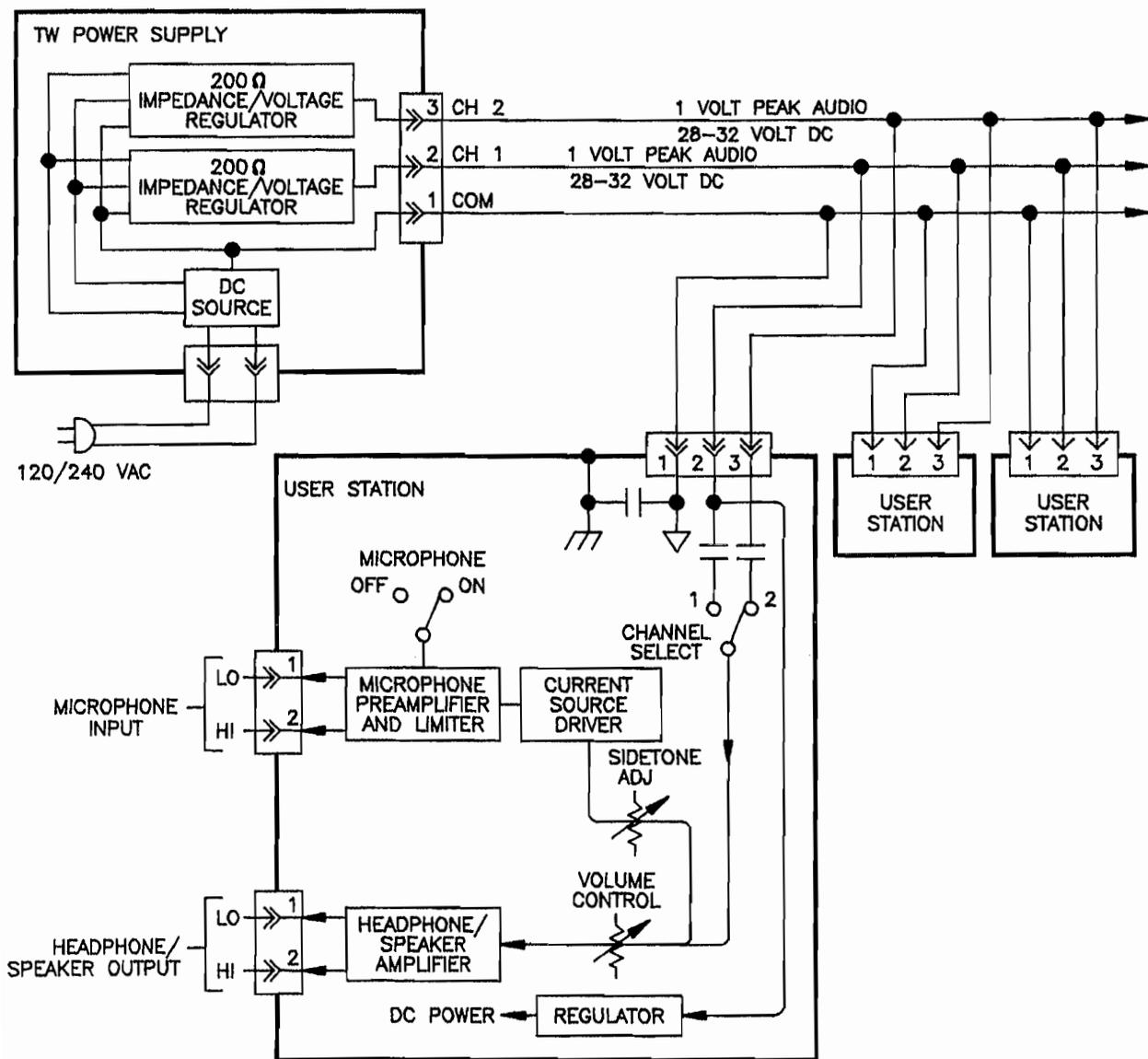


Figure 1-1  
TW System Concept Block Diagram

## SECTION 1: DESCRIPTION & SPECIFICATIONS

### 1.1 DESCRIPTION

The Model BP300 is a portable, two-channel intercom user station. The user station is designed to be used in a full duplex, conference line intercom system.

#### Conference Line Intercom System (Figure 1-1)

A conference line intercom system allows a group of people to talk and listen on a single channel. On this channel, all users can listen when one or more other users are talking (conferencing). Up to 75 users can share the same conference line (or conference bus).

#### Full Duplex Operation

Full duplex operation allows two way conversation at the same time, that is, one user can interrupt a second user while the second user is still talking.

The BP300, with a headset, interfaces a human user to the intercom system. The user talks and listens using the headset (or a handset). The headset connects to the BP300 via a four conductor cable and connector (optionally five or six pin). The BP300 connects to the system using a three conductor "microphone" type cable. The BP300 contains four controls: the volume control, the latching microphone switch, the momentary microphone switch, and the channel select switch. On the Model BP300L, the momentary microphone switch is replaced with the call light button.

#### Volume Control

The volume control on the BP300 has a wide range to compensate for: user hearing differences, ambient noise variation, variations in headset / handset sensitivity, and variations in voices. The volume control in the BP300 reduces distortion by driving the headphone amplifier only as much as needed.

#### Microphone Switch(es)

In normal system operation, one or more users talk and the others listen. A microphone switch on each station allows the talker's microphone to be enabled and allows the listeners to keep their microphones disabled. In this condition, speech intelligibility is enhanced since background noise from other microphones is not present.

On the Model BP300, a latching switch or momentary push button turns the microphone on.

The momentary push button allows quick bursts of communication, especially useful in a high noise environment. The latched position allows "hands free" operation, when the user needs to have two way conversation while performing another activity.

#### The Channel Select Switch

A channel selector switch allows a choice of two (optionally three) channels. When the switch is on the "1" position the station talks and listens on channel 1, on the "2" position, channel 2, and so on. On larger systems the "1" position may be any system channel (1 through 12 for example). Similarly, for position "2". See Section 2.1 for DC powering requirements under these conditions.

#### Call Light Push Button (BP300L, only)

Pushing this button transmits a call signal to all other units on the channel selected by the channel selector switch. A call signal on this channel will cause the call light push button to flash. The flash rate is 2 to 5 times a second. The call signal itself is a 20 kilohertz signal.

#### Options (-DL, -E, -3CH, -USMB, -LP)

The BP300 and BP300L use the CC33 card *except* as indicated below. Codes at the end of each paragraph indicate the card used. Codes are: \*CC33 card, \*\*CC40 card, \*\*\*CC45 card. (CC33 schematic is SD1464; CC40/CC45 schematic is SD1427).

**-DL:** Dual Listen on two channels. The volume control is changed to a dual concentric potentiometer with two knobs. The channel select switch routes the talk signal. The outside knob follows the channel selector. The inside knob is the non-talk, listen only channel.

**-E:** Program Input, balanced. Deletes line loop-through, the balanced program is fed in instead. Pins 2 and 3 are the input connections. A dual concentric potentiometer with two knobs provides separate level controls for intercom and program.

**-3CH:** Three CHannel operation. Line and loop-through connectors are changed to 4-pin from 3-pin. A 3-position channel select switch replaces the 2-position switch.

**-USMB:** UnSwitched Microphone output, Balanced. Deletes line loop-through. Level: -7dBm to +3dBm. The USMB provides a line level microphone signal to other systems such as an Interrupted Feedback System (IFB), telephone, radiotelephone, or Stage Announce.

**-LP:** Local Power source. A small module converts AC line power to low voltage to power the user station, a separate connector is provided. The unit does not use power from the intercom line.

### 1.3 BP300 SPECIFICATIONS

#### Input DC Voltage

TW Mode	18 to 35 volts DC
LP Option	15 to 35 volts DC
Battery	12 to 35 volts DC (reduced performance)

DC Current Drawn from TW Line (Note: LP Option draws no current from TW line)

#### Quiescent

BP300	23 milliamperes ±10%
BP300L	33 milliamperes ±10%

#### Operating, 25 ohm headphones

BP300	37 milliamperes ±10%
BP300L	45 milliamperes ±10%

#### Operating, 25 ohm headphones + Call Light

BP300L	60 milliamperes ±10%
--------	----------------------

**Impedance Across Line** 10,000 ohms, minimum

#### Environmental

##### Temperature

Operating	0°C to 60°C
Storage	- 40°C to 85°C

##### Humidity

Operating & Storage 5% to 95% non-condensing

#### Noise Contribution

One unit	-75 dBu
Ten units:	-67 dBu

#### Microphone Preamplifier

Input Impedance	470 ohms/dynamic mic
Source Impedance	200 ohms, nominal
Maximum Input Level	150 millivolts
Frequency Response (-54 dBu input)	100 hertz to 10 kilohertz ±3 dB
Limiter Range	30 dB
Carbon Mic Excitation Current	10 milliamperes, nominal

#### Current Source

Transfer Ratio	3.3 milliamperes / volt = 3.3 millisiemens
Output	± 5 milliamperes into 200 ohms = ± 1 volt peak, nominal

#### Headphone Amplifier

Voltage Gain	34 dB
Output Voltage	8 volts peak-to-peak into 25 Ω
Output Power	1/2 watt peak into 25 ohms
Frequency Response	150 hertz to 8 kilohertz ± 3 dB
Headphone Impedance Range	25 to 600 ohms (600 to 2000 with reduced levels)

**NOTE: DO NOT USE HEADPHONES WITH IMPEDANCES LESS THAN 25 OHMS.**

Sidetone Adjustment Range - 20 dB to full on

#### Call-Light

Signaling Frequency	20,000 hertz ± 100 hertz
Flashing Rate	5 hertz ± 2 hertz

#### Auxiliary Connections

##### Headset Connector

Dynamic Microphone	XLR type 4-pin female
Carbon Microphone	1/4" standard phone jack, 3 circuit

##### Line Connections

Input	XLR type 3-pin female
Loop/External	XLR type 3-pin male

#### Mechanical

Dimensions	6.00 H x 3.50 W x 1.75 D inches 152.4 H x 88.9 W x 44.5 D, millimeters
Weight	1.0 pounds, 0.45 kilograms
Finish	Clear, anodized aluminum

#### SPECIFICATION NOTES:

0 dBu = 0.775 volts rms.

0 dBm = 1 milliwatt = 0.775 volts rms. into 600 ohm load (0 dBu, open circuit)

**Note: All products and specifications subject to change without notice.**

## SECTION 2: INSTALLATION

Follow the directions: "To Install the BP300", below.

### 2.1 Power Requirements, Type Of System, Powering Method And Power Supply(ies)

#### Power Requirements

To maintain a bridging 10,000 ohms impedance to the intercom line, the BP300 requires +18 to +35 volts DC. To operate in local power or battery modes, the BP300 requires from +15 to +35 volts DC, but is operable at reduced performance from +12 to +17.9 volts. Below that voltage, a safety circuit disables the microphone switch on the CC33 board.

#### Type of System

The BP300 can be installed in a (1) three wire system, (2) two wire system, or (3) special two wire system.

#### Powering Method

Power is carried to the unit from a system power supply using three different methods:

- (1) In a three wire system ("Series 17" type), the power is separate from the audio and supplied by a central power supply.
- (2) In a two wire system ("TW" type), the power and audio may share the same wire. The power is supplied centrally by a special "TW" type power supply.
- (3) In a special two wire system (Local Power), each BP300 is locally powered and operates on switch channel two. The BP300s are interconnected using two wire cable. Power is supplied by a battery or a local power supply. The local power supply should be isolated from earth ground.

In (1) above, the power supply is a regulated supply, 24 volts DC to 32 volts DC, 1.5 amperes. This supply can operate up to 50 BP300 and 30 BP300L user stations.

For case (2) above, assuming the currents shown, the power supplies versus maximum number of stations powered are:

<u>Power Supply</u>	<u>BP300 (37mA)</u>	<u>BP300L (60mA)</u>
Model PS8 (0.43A)	11	7
Model PS15 (1.0A)	27	16
Model PS31 (1.5A)	41	25

*Note: Operation of a system at maximum load does not allow for other variations such as temperature, line*

*voltage, cable resistance, and surges. A more prudent approach is to operate the system at no more than 80% of capacity.*

In (3) above, a local power supply provides 12 to 24 volts DC at 120 milliamperes peak for each station, or, for remote single station operation, two 9-volt batteries in series may be used.

In (1) and (3) above, the two wires carrying the audio require one system termination consisting of a 200 ohm resistor and a 100 microfarad capacitor in series. This combination is connected across the two wires. If the capacitor is polarized, its negative terminal is connected to the system circuit common.

#### **To Install the BP300:**

1. Determine the type of system in which the BP300 is to be installed. Determine the powering method and power supply(ies).
2. Determine the mounting of the BP300: Portable or Permanent.
3. Read "Choosing Headsets or Handsets".
4. Determine the cabling requirements.
5. Create a system block diagram & equipment list (if not already available), then install the system.
6. Verify correct system operation by using the checkout procedure in this chapter (§2.6).
7. Update the system block diagram, equipment list and any other documentation to reflect the "as installed" configuration. If the system block diagram was originally created by RTS Systems, send a copy of the "as installed" system block diagram to RTS Systems. This diagram will be used to update the original documentation, and for future service support.

#### **2.2 Type Of Mounting**

- (1) One type of mounting for the BP300 is portable, when it is worn on clothing or an equipment belt.
- (2) Another type of mounting for the BP300 is permanent or semi-permanent, either a "desk mount" (sitting on a desk) or fastened to furniture. Avoid placing the BP300 on a metal or grounded metal surface. Contact between the Model BP300 and metal surfaces may cause unwanted noises on the intercom line.

## 2.3 Choosing Headsets

**Introduction** Headset or handset choice depends on operating environment, operating requirements, and personal taste.

**Operating Environment** Table 2-1 shows typical operating environments and the amount of background noise present.

A very quiet operating environment, such as a television studio, may require that sound does not leak from the headphones, meaning the headphones should have good "acoustic isolation".

A very noisy or 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, as well.

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.

**Loudness** In general, the loudness of a headphone depends upon its ability to absorb power at a given voltage (impedance) and the efficiency of its design. Practically, the impedance has a larger effect with present day headsets.

**Impedance** Low impedance headphones are louder, causing the BP300 to draw more current from the power supply. High impedance headphones are not as loud, drawing less current from the power supply. The BP300 design range of impedances for the headphone part of the headset is 25 ohms to 600 ohms. Headphone impedances 600 to 2000 ohms will operate at reduced levels. In a double muff headset such as the Beyer DT109 sold by RTS Systems, there are 50 ohm headphones connected in parallel resulting in an impedance of 25 ohms.

**Efficiency** The BP300 produces the loudest sound in low impedance headphones such as the DT109. In this headphone, one milliwatt of electrical power produces 94 dB SPL (Sound Pressure Level).

**Practical Loudness** The BP300 / BP300L can produce an SPL of 111 dB in each ear of a DT109 or DT108 headset. Low impedance headsets such as the DT108 and DT109 headsets, cause the BP300 / BP300L to require more power from the power supply. With DT109 headsets, BP300 peak current is 75 milliamperes. BP300L peak current is 80 milliamperes. With 600 ohm headphones, peak current is 30 milliamperes for the BP300, 40 milliamperes for the BP300L. (Quiescent current

is 23 milliamperes for the BP300, 33 milliamperes for the BP300L).

### 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 such as the RTS Systems LH267 (single muff) and LH268 (double muff), have almost no (0 dB) isolation. The trade-off is that the LH267/LH268 are very comfortable and can be worn for long periods (8 to 12 hours) without physical discomfort from the earmuffs or headband. The LH267/LH268 are low impedance and can be turned up loud.

Because there is less acoustic isolation, care must be taken that the sound signals from the LH267/LH268 are not unintentionally leaked into microphones.

The DT108/DT109 headsets have an isolation ranging from 10 dB to 20 dB.

At least four companies, Telex, Setcom, David Clark, and Carter Engineering sell headsets intended for heavy industrial, aerospace, and military markets. These headsets can provide acoustic isolation figures of 20dB to 40dB. Generally speaking, these headsets are heavier and less comfortable to wear.

### Isolation, Headset Microphones

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

**Comfort** In general, the comfort of headsets depends upon their weight, padding and design.

In the headset connecting cable, prevent coupling between the microphone and headphone leads by using at least a shielded wire for the microphone, and a separate pair of wires for the headphone(s). Better isolation may be possible with a twisted, shielded pair for the microphone leads. Do not allow headphone ground to contact microphone ground or shield. Tie the shield to microphone ground or microphone low. Do not tie the shield to the case of the connector or the case of the user station. In general the maximum length for the headset cable is ten feet (3.1 meters). Lengths over ten feet require a special extension cable. Check with RTS Systems for help with longer cables.

## 2.4. Cabling Requirements

### 2.4.1 Wire Size and Maximum Operating Distance

Wire size determines the maximum operating distance (where the DC voltage drop is the limiting factor). The following equations apply for a conductor size of #22 AWG, a minimum user station voltage of 18.0 volts, and a minimum power supply voltage as stated below.

For Models PS10, PS30, PS31, PS50, PS60 ( $V_{min} = 28.4$  VDC):

$$\text{Distance}_{max} \text{ (feet)} = 322,181 / I_{tot} \text{ (milliamperes).}$$
$$\text{Distance}_{max} \text{ (meters)} = 99,133 / I_{tot} \text{ (milliamperes)}$$

For Models PS8, PS15 ( $V_{min} = 24.0$  VDC):

$$\text{Distance}_{max} \text{ (feet)} = 185,874 / I_{tot} \text{ (milliamperes)}$$
$$\text{Distance}_{max} \text{ (meter)} = 56,654 / I_{tot} \text{ (milliamperes)}$$

**Example:** The BP300L with 25 ohm headphones uses up to 60 milliamperes. With a PS8 supply the maximum operating distance for this station is  $185,874/60$  milliamperes = 3098 feet (944 meters). And with a PS31 power supply the maximum operating distance is  $322,181/60$  milliamperes = 5370 feet (1652 meters). The maximum operating distance using a PS8 power supply and a BP300 with 25 ohm phones (37 mA) is  $185,874/37 = 5024$  feet (1531 meters).

### 2.4.2 Grounding

System circuit ground should not be directly connected to "earth" or "chassis" ground (directly means a connection an ohmmeter would show). Each user station is bypassed to its own chassis via a 0.1 microfarad capacitor, establishing a radio frequency (RF) ground to reduce radio frequency interference from radio transmitters.

To prevent a buildup of voltage across the system capacitance, the power supply has a bleeder resistor to chassis ground (22 kilohms). If the system has *no* RTS Systems power supply, add a bleeder resistor at a central point in the system.

The benefit of not "earth" grounding the RTS System circuit return is that continued operation is possible during an accidental system ground fault. This accidental grounding can happen when a wire is pinched or a cable scraped across a sharp edge. One 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 or bring the system down.

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 System circuit ground conducts these currents, it is likely that they will be heard as interfering noise on the communication line.

### 2.4.3 Signal

The number of conductors required to interconnect user stations is:

<u>No. of</u> <u>Conductors</u>	<u>No. of</u> <u>Channels</u>
2	1
3	2
4	3

Wiring/Cabling (See Cable Wiring Diagrams in Section 7, Application Information)

Two channel "TW" applications, or single channel, three wire 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 each channel should have an individually shielded twisted pair of at least #22 gauge wire; such as Belden 8723 for 2 channels, and 8777 for 3 channels. For plenum and / or 200° C wiring, use Belden 88723 and 88777. The plenum cable has a slightly smaller diameter, is Teflon insulated, and about three times the price of 8723 / 8777.

Wire using Cable Wiring Diagrams, Section 7, to reduce interference and help maintain a low crosstalk figure between channels.

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

The 200 ohm 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 200 ohm 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. Water mud and snow in connectors can cause noise.

#### 2.4.4 Channel to Channel Crosstalk Control

In the TW Intercom System all channels share a common circuit ground return. Crosstalk due to common ground resistance can be reduced by using 22 gage shielded cable, and paralleling shield drain wires with circuit return wires. Capacitive crosstalk can be reduced by using two shielded pair. One wire of one pair connects to channel one (pin 2), one wire of the other pair connects to channel two (pin 3), the remaining wires are circuit return (pin 1). (See Cable Wiring Diagram at back of manual). Crosstalk reduction may also be achieved in some cases using Model CCD 214 Crosstalk Cancellation Device.

#### 2.5 Mechanical

The BP300 user station is either clipped to a user's clothing for portable operation, or mounted on a structure, camera or vehicle.

For permanent installation, temporarily remove the electronics from the case. Drill, deburr and fasten the case as necessary, then reinstall the electronics.

An outline drawing for headset user station BP300 is included at the end of the manual. This drawing provides mechanical information useful for permanent and other type installations. This information includes overall dimensions, mounting information, console cutout dimensions and weights.

It is recommended that space be provided for control access, cabling and servicing, such as cabling service loops, reaching XLR type connector locks, local power option power supplies and headset connectors and cables.

If the headset connector is remoted, do not run this cable close to interfering sources such as video/TV monitors, power supplies and equipment with internal power supplies.

#### 2.6 System Check

Using three beltpacks with three headsets and three persons, verify that all persons can intercommunicate throughout the system. Verify that with all microphone switches off and volume controls midway, only a barely audible hiss is heard. The other two persons should sound equally loud and clear to the third person.

#### 2.7 Standard User Station Connections

##### Dynamic Microphone headset connectors:

XLR-4-31 receptacle  
Input level: -55 dBu, nominal  
Output level to headphone: 10 volts peak-to-peak, open circuit.

Pin 1 - Microphone low  
Pin 2 - Microphone high  
Pin 3 - Headphone low  
Pin 4 - Headphone high

##### XLR-5-31 receptacle

Pin 1 - Microphone low  
Pin 2 - Microphone high  
Pin 3 - Headphone low  
Pin 4 - Headphone high, left  
Pin 5 - Headphone high, right

##### XLR-6-31 receptacle

Pin 1 - Microphone low  
Pin 2 - Microphone high  
Pin 3 - Headphone low  
Pin 4 - Headphone high, left  
Pin 5 - Headphone high, right  
Pin 6 - Microphone switch

Carbon Microphone Headset Connector: 1/4 inch phone jack (J2):

Carbon Microphone: Tip (-15 dBV input, nominal)  
Headphone: Ring (10 V peak to peak open circuit)  
Common: Sleeve

##### LINE input and LOOP/EXTension connectors: (J3/J4)

##### XLR-3-31 receptacle (for single-channel)

Pin 1 - Common (low side of line)  
Pin 2 - Power  
Pin 3 - Channel

##### XLR-3-31 receptacle (for two-channel line)

Pin 1 - Common (low side of line)  
Pin 2 - Channel 1 (+DC)  
Pin 3 - Channel 2

##### XLR-4-31 receptacle (for three-channel line)

Pin 1 - Channel 1  
Pin 2 - Channel 2  
Pin 3 - Channel 3  
Pin 4 - Common

Table 2-1

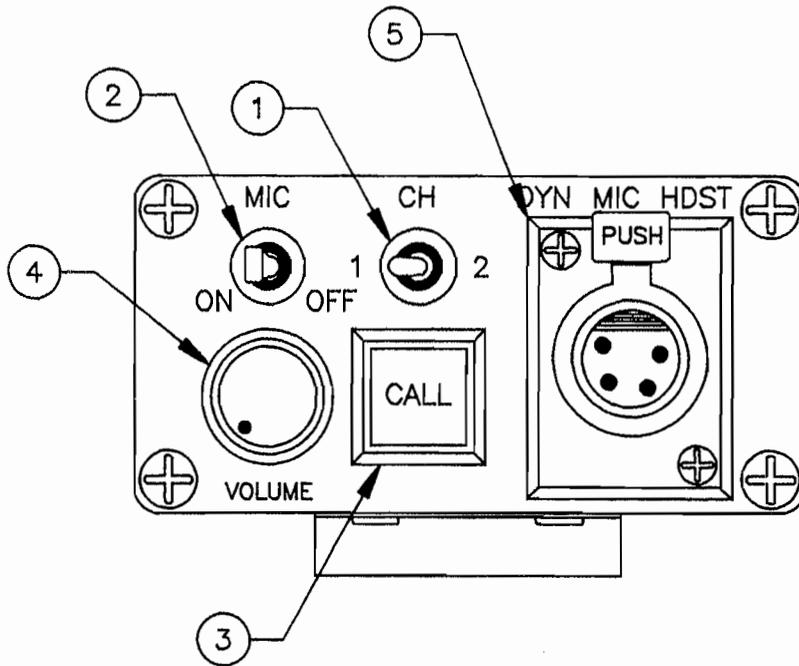
Typical Operating Environments,  
Environmental Noise, Sound Pressure Level,  
at 10 meters distance

<u>Source</u>	<u>SPL</u>
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

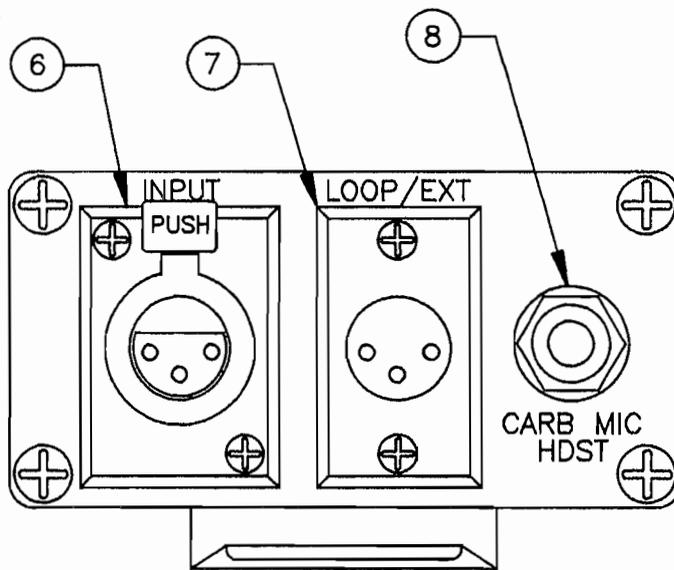
Table 2-2

Typical Operating Environments,  
Sound Pressure Level,  
at Ear

<u>Source</u>	<u>SPL</u>
Maximum Allowable Impulse Exposure	140 db
LH267 + BP300, 10 db below Clipping	114 db
DT109 + BP300, 10 db below Clipping	111 db
LH268 + BP300, 10 db below Clipping	110 db
Setcom Series 5 + BP300, 10 db below Clipping	99 db
Headphones with 20 db Acoustic Isolation at 130 db Rock Concert (Mouth Closed)	110 db
Headphones with 40 db Acoustic Isolation at 140 db Rock Concert (Mouth Closed)	100 db



**Figure 3-1A**  
**Front Panel, Model BP300 Portable Belt Pack User Station**



**Figure 3-1B**  
**Rear Panel, Model BP300 Portable Belt Pack User Station**

## SECTION 3: OPERATION

### 3.1 Operating Controls And Connectors

Table 3-1 below lists the Model BP300 user station controls and connectors. The reference numbers in Table 3-1 correspond to the circled numbers in Figure 3-1A and Figure 3-1B.

**Table 3-1**

<u>Ref No.</u>	<u>Name</u>	<u>Description</u>
1)	<b>CHannel Select Switch</b> 1 2	Selects 1 of 2 channels (standard) or 1 of 3 channels (optional). The optional Call Light operates on the channel selected by this switch. The CHannel select switch is omitted in the Single Channel (SC) option.
2)	<b>MIC ON-OFF toggle</b>	A latching-action switch.
3)	<b>MIC ON-off push button</b>	A momentary-action microphone enable switch on the Model BP300 (Standard - - without the Call Light option).
3)	<b>CALL push button</b>	(Optional) The CALL push button in Model BP300L (No momentary mic).
4)	<b>VOLUME</b>	A headphone VOLUME control. (May be a dual control for the Dual Listen (DL) or Program (E) option).
5)	<b>DYNamic MICrophone HeaDSeT Connector.</b>	A dynamic microphone type headset plugs in here.
6)	<b>INPUT</b>	Plug in the Line connector here. Connects the belt pack user station to the TW intercom system.
7)	<b>LOOP/EXTension</b>	A convenience connector - - allows another belt pack user station to be connected to the TW intercom system.
8)	<b>CARBon MICrophone HeaDSeT Connector</b>	A carbon microphone type headset plugs in here. The headset may also be a carbon microphone emulate type headset.

### **CAUTION!**

**Always turn the volume control all the way counterclockwise (to the left) before plugging in the headset**

### 3.2 Operation (After connecting station to the intercom line and plugging in headset).

To communicate directly with another station or stations:

- 1) Turn the VOLUME control all the way counterclockwise (to the left) before plugging in the headset.
- 2) Select the channel using the CHannel select switch.
- 3) Set the listening level in the headset using the VOLUME control.
- 4) When you want to talk, set the MIC ON/OFF toggle switch to the "ON" position (or push the MIC push button) and speak into the microphone. Return the switch to the OFF position to eliminate unnecessary noise on the intercom line.

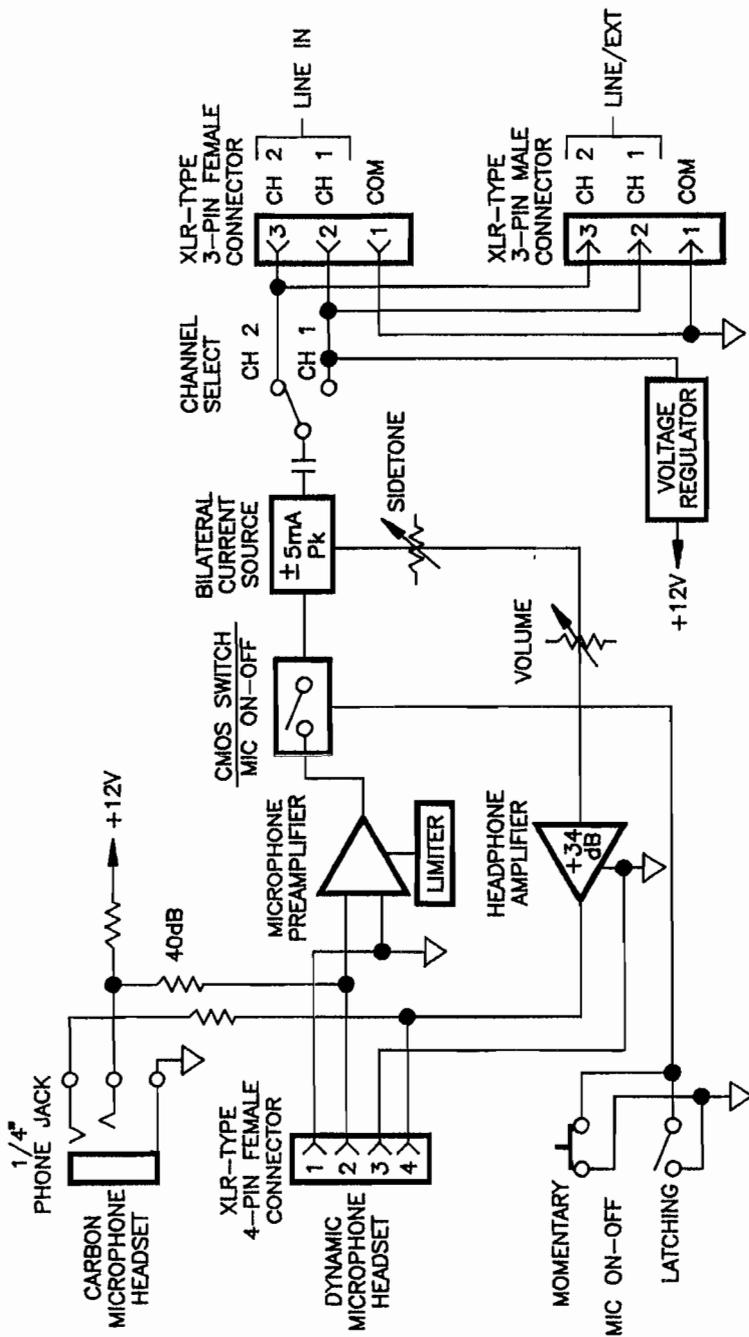


Figure 3-2  
Block Diagram, Model BP300

## SECTION 4: REPLACEMENT PARTS

### 4.1 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

### 4.2 MECHANICAL PARTS

FINAL ASSEMBLY (Refer to Drawing #AS1786 for Item No. locations)		
Item No.	Description	Part No.
1	Front Panel Assy, BP300	9020178700
2	PCB Assy, CC33	9030182100
3	Back Panel Assy	9020178800
4	Case	9060180204
5	Screw, #8-32 X 1/2	1008803400
7	Belt Clip	91101385008
8	Rivet	1002000600
9	Jack, Phone, 3-cond, Double Closed Circuit	2013000300
11	Cap, Gray With Dot	2705000100
12	Knob, Gray	2703000200
13	Nut Cover, Gray	2706000100
15	Mylar, 3-1/2" X 100 Ft	1303000600
17	#73 Shield Bead	2404000100
18	Shrink Sleeveing, 1/4"	1301000100
19	Lockwasher	
20	Potentiometer, Audio, 50K	1406003700
21	Nut, Hex 3/8"	1007000300
22	Washer, Lock, 3/8" Internal Tooth	1006000100
23	Switch, SPDT	1903000100
24	Switch, DPDT Toggle	1903000200
25	Nut	
26	Dress Nut, Satin Finish	2709000300
	Washer, Teflon (for Volume Cont)	1006004400

FRONT PANEL ASSEMBLY (Refer to Drawing #AS1787 for Item No. locations)		
Item No.	Description	Part No.
1	Back Panel	9080231900
5	Connector, 4-Pin Female	2018000102
9	Switch, Pushbutton	1911011500
10	Lens, Mic On	9150294901
21	Lug, Solder, #4	1003000400
23	Screw, 4-40 X 3/8"	1008401200
24	Nut, Hex, KEP 6-32	1007000100

BACK PANEL ASSEMBLY (Refer to Drawing #AS1788 for Item No. locations)		
Item No.	Description	Part No.
1	Back Panel	9080231900
3	Connector, 3-Pin Female, Canon AXR 3-31	2018000302
7	Connector, 3-Pin Male	2018000200
9	Jack, Phone, 3-Cond, Double Closed Circuit	2013000300
10	Washer, :378 ID	1006003100
13-20	Wires, Local Purchase	
22	Screw, 4-40 X 3/8"	1008401200
23	Nut, Hex, KEP 6-32	1007000100
24	Nut, Hex 3/8"	1007000300

### 4.3 ELECTRICAL PARTS

CC-33 CIRCUIT BOARD ASSEMBLY		
Ref. No.	Description	Part No.
C1	Capacitor, CM, 0.1 $\mu$ F, 50V	1511R1042I
C2	Capacitor, CM, 0.033 $\mu$ F, 50V	1511R3332I
C3	Capacitor, Tant, 10 $\mu$ F, 6.3V, 20%	1515R1063B
C4	Capacitor, CM, 0.1 $\mu$ F, 50V	1511R1042I
C5	Capacitor, EL, Rad, 33 $\mu$ F, 16V	1513R3364E
C6	Capacitor, CM, 0.01 $\mu$ F, 50V	1511R1032I
C7	Capacitor, CM, Rad, 100 pF, 50V	1511R1012I
C8,C9	Capacitor, CM, 0.1 $\mu$ F, 50V	1511R1042I
C10	Capacitor, EL, 10 $\mu$ F, 16V	1513R1064E
C11	Capacitor, CM, 0.01 $\mu$ F, 50V	1511R1032I
C13	Capacitor, CM, 0.1 $\mu$ F, 50V	1511R1042I
C14	Capacitor, CD, 10 pF, 500V	1510R1002I
C15	Capacitor, EL, Rad, 47 $\mu$ F, 16V	1513R4764E
C16	Capacitor, CM, 0.1 $\mu$ F, 50V	1511R1042I
C17	Capacitor, Mylar, 0.001 $\mu$ F, 100V	1514R1022L
C19	Capacitor, EL, Rad, 4.7 $\mu$ F, 16V	1513R4754E
C20	Capacitor, Tant, 1.0 $\mu$ F, 35V, 20%	1515R1053G
C21	Capacitor, CM, 0.1 $\mu$ F, 50V	1511R1042I

**PARTS LIST ABBREVIATIONS:** CD, Ceramic Disk; CF, Carbon Film; CM, Ceramic Monolithic; EL, Electrolytic; MF, Metal Film; Rad, Radial Leads; Tant, Tantalum.

CC-33 CIRCUIT BOARD ASSEMBLY		
Ref. No.	Description	Part No.
C27	Capacitor, CM, Rad, 0.01 $\mu$ F, 200V	1514R1032O
C28,C29	Capacitor, EL, 10 $\mu$ F, 50V	1513R1064I
D1-D3	Diode, Signal 1N6263	1601626300
D4	Diode, 1N5231B	160352310B
D5,D6	Diode, 1N4004, 1A, 400V	1601400400
D7	Diode, 1N5245B Zener, Voltage Reg 15V	160152450B
D8	Diode, 1N5365B Zener, Voltage Reg 36V	160153650B
D9-D11	Diode, 1N4004, 1A, 400V	1601400400
Q1,Q2	Transistor, Silicon J305/E305	1602030500
R1	Resistor, CF, 470 Ohm, 1/4W, 5%	140247005D
R2	Resistor, CF, 820 Ohm, 1/4W, 5%	140282005D
R3	Resistor, CF, 220 Ohm, 1/4W, 5%	140222005D
R4	Resistor, CF, 68K, 1/4W, 5%	140268025D
R5	Resistor, CF, 5.1M, 1/4W, 5%	140251045D
R6	Resistor, CF, 330K, 1/4W, 5%	140233035D
R7	Resistor, CF, 10K, 1/4W, 5%	140210025D
R8	Resistor, CF, 22K, 1/4W, 5%	140222025D
R9	Resistor, CF, 100K, 1/4W, 5%	140210035D
R10	Resistor, CF, 22 Ohm, 1/4W, 5%	140222R05D
R11	Trim Pot, 100K	1409001100
R12	Resistor, CF, 22K, 1/4W, 5%	140222025D
R13	Resistor, CF, 200K, 1/4W, 5%	140220035D
R14,R15	Resistor, MF, 60.4K, 1/4W, 1%	140360422D
R16	Trimpot, 10K	1409000300
R17	Resistor, CF, 270K, 1/4W, 5%	140227035D
R18,R19	Resistor, MF, 20.0K, 1/4W, 1%	140320022D
R20	Resistor, CF, 100K, 1/4W, 5%	140210005D
R22	Resistor, CF, 22K, 1/4W, 5%	140222025D
R23	Resistor, CF, 2.2K, 1/4W, 5%	140222015D
R26	Resistor, CF, 1.2K, 1/4W, 5%	140212015D
R27	Resistor, CF, 4.7 Ohm, 1/4W, 5%	14024R705D
R28	Resistor, CF, 22K, 1/4W, 5%	140222025D
R29	Resistor, CF, 100 Ohm, 1/4W, 5%	140210005E
R30	Resistor, CF, 36 Ohm, 1/4W, 5%	140236R05E
R31	Resistor, CF, 1.3K, 1/4W, 5%	140213015D
R32	Resistor, CF, 12K Ohm, 5%, 1/8W	140212025D
R33	Resistor, CF, 1K, 1/4W, 5%	140210015D
R34	Resistor, CF, 3.3 Ohm, 1/8W, 5%	14023R305B
R35,R36	Resistor, CF, 100K, 1/4W, 5%	140210035D
S1	Switch, SPDT	1903000100
S2	Switch, DPDT Toggle	1903000200
U1	IC, Signetics NE5532N	160355320N
U2	IC, CD4053BE	16034053BE
U3	IC, Op Amp, National LM386N-1	1603038600
U4	IC, Voltage Regulator, National LM317MP	16030317MP
	Insulator w/o Hole, Silicon	9130184000
	IC Socket, 16-Pin	2001000300
	IC Socket, 8-Pin	2001000100

**PARTS LIST ABBREVIATIONS:** CD, Ceramic Disk; CF, Carbon Film; CM, Ceramic Monolithic; EL, Electrolytic; MF, Metal Film; Rad, Radial Leads; Tant, Tantalum.

CC-40/45 CIRCUIT BOARD ASSEMBLY		
Ref. No.	Description	Part No.
C2	Capacitor, CM Rad, .033 $\mu$ F, 50V	1511R3332I
C3	Capacitor, Tant, Rad, 1 $\mu$ F, 35V	52257049
C4	Capacitor, EL, Rad., 100 $\mu$ F, 10V	51821529
C5	Capacitor, CM Rad., 1 $\mu$ F, 50V	1511R1042I
C6	Capacitor, CM Rad., 1 $\mu$ F, 50V	1511R1042I
C7	Capacitor, EL, Rad., 47 $\mu$ F, 10V	1513R4764C
C8	Capacitor, EL, Rad., 10 $\mu$ F, 16V	51821230
C9	Capacitor, CD., 22 pF, 50V	1510R2202R
C10	Capacitor, CM Rad., .01 $\mu$ F, 50V	1511R1032I
C11	Capacitor, CM Rad., 1 $\mu$ F, 50V	1511R1042I
C12	Capacitor, CD., .001 $\mu$ F, 50V	52157542
C13	Capacitor, CM Rad., 1 $\mu$ F, 50V	1511R1042I
C14	Capacitor, CM Rad., 1 $\mu$ F, 50V	1511R1042I
C15	Capacitor, EL, Rad., 10 $\mu$ F, 16V	51821230
C16	Capacitor, EL, Rad., 100 $\mu$ F, 10V	51821529
C17	Capacitor, CM Rad., 1 $\mu$ F, 50V	1511R1042I
C19	Capacitor, EL, Rad., 10 $\mu$ F, 50V	51821110
C20	Capacitor, EL, Rad., 10 $\mu$ F, 50V	51821110
C23	Capacitor, EL, Rad., 100 $\mu$ F, 10V	51821529
C25	Capacitor, Mylar, Rad., .001 $\mu$ F, 100V	1514R1022L
C26	Capacitor, EL, Rad., 10 $\mu$ F, 16V	51821230
C27	Capacitor, CM Rad., 1 $\mu$ F, 50V	1511R1042I
C28	Capacitor, EL, Rad., 100 $\mu$ F, 10V	51821529
C29	Capacitor, EL, Axial, 2200 $\mu$ F, 16V	1513A2284E
C30	Capacitor, EL, Axial, 2200 $\mu$ F, 16V	1513A2284E
C31	Capacitor, EL, Rad., 100 $\mu$ F, 16V	51821524
C32	Capacitor, CM Rad., 1 $\mu$ F, 50V	1511R1042I
C42	Capacitor, CD, 100 $\mu$ F, 50V	52157330
CR2	Diode, 1N6263	1601626300
CR3	Diode, 1N6263	1601626300
CR4	Diode, 1N6263	1601626300
CR5	Diode, 1N914B	160109140B
R3	Resistor, CF, 820 Ohm, 1/4W, 5%	52154283
R4	Resistor, CF, 220 Ohm, 1/4W, 5%	52154297
R5	Resistor, CF, 68K, 1/4W, 5%	52154237
R6	Resistor, CF, 220K, 1/4W, 5%	52154225
R7	Resistor, CF, 10M, 1/4W, 5%	52154185
R8	Resistor, CF, 22K, 1/4W, 5%	52154249
R9	Resistor, CF, 10K, 1/4W, 5%	52154257
R10	Potentiometer, Trimmer, 2.5 TO 10K	46643P1
R11	Resistor, CF, 100K, 1/4W, 5%	52154233
R12	Resistor, CF, 22 Ohm, 1/4W, 5%	52154321
R14	Resistor, CF, 22K, 1/4W, 5%	52154249
R15	Resistor, CF, 22K, 1/4W, 5%	52154249
R16	Resistor, CF, 22 Ohm, 1/4W, 5%	52154321
R17	Resistor, CF, 2.2K, 1/4W, 5%	52154273
R18	Resistor, CF, 2.2K, 1/4W, 5%	52154273
R19	Potentiometer, Trimmer, 2.5 TO 10K	46643P1
R20	Resistor, MF, 60.4K, 1/4W, 1%	54045604
R21	Resistor, MF, 60.4K, 1/4W, 1%	54045604
R22	Resistor, MF, 20K, 1/4W, 1%	54045200
R23	Resistor, CF, 1K, 1/4W, 5%	52154281
R24	Resistor, CF, 100 Ohm, 1/4W, 5%	52154305
R25	Resistor, MF, 20K, 1/4W, 1%	54045200

CC-40/45 CIRCUIT BOARD ASSEMBLY		
Ref. No.	Description	Part No.
R26	Resistor, CF, 100 Ohm, 1/2W, 5%	52154482
R28	Resistor, CF, 100K, 1/4W, 5%	52154233
R29	Resistor, CF, 100K, 1/4W, 5%	52154233
R36	Resistor, CF, 22K, 1/4W, 5%	52154249
R38	Resistor, CF, 150 Ohm, 1/4W, 5%	52154301
R39	Resistor, CF, 2.7 Ohm, 1/4W, 5%	52154343
R40	Resistor, CF, 22K, 1/4W, 5%	52154249
R41	Resistor, CF, 36 Ohm, 1/2W, 5%	52154493
R42	Resistor, CF, 1.3K, 1/4W, 5%	52154278
R43	Resistor, CF, 12K, 1/4W, 5%	52154255
R44	Resistor, CF, 1K, 1/4W, 5%	52154281
R45	Resistor, CF, 3.3 Ohm, 1/8W, 5%	52154120
R49	Resistor, CF, 470 Ohm, 1/4W, 5%	52154289
U1	IC, NE5534N	53293000
U2	IC, MC3458P	16033458OP
U3	IC, SGS TBA-820-M	16030820OM
U4	IC, LM317MP	16030317MP
U5	IC, Analog Switch	16034053BE
VR1	Voltage Regulator, 5.1V, 5%, 1N5231B	86266008
VR2	Voltage Regulator, 15V, 5%, 1N5245B	160152450B
VR3	Voltage Regulator, 36V, 5%, 1N5365B	160153650B
XU1	IC Socket, 8 Pin	2001000100
XU2	IC Socket, 8 Pin	2001000100
XU3	IC Socket, 8 Pin	2001000100
XU4	IC Socket, 16 Pin DIP	53041301
	Insulator w/o Hole, Silicone	9130184000
	Shrink Tubing, Clear, .25 Dia. X 1.0 Lg.	51379024

9030141800,B

CC-18SL CIRCUIT BOARD ASSEMBLY		
Ref. No.	Description	Part No.
C25	Capacitor, CD, 330 pF/ 50V	52157536
C26	Capacitor, 220 pF/50V	1520R2211I
C27	Capacitor, Mylar, .022 uF/ 100V	1514R2232L
C28	Capacitor, Cer, .0033 uF/ 50V	1511R3321I
C29	Capacitor, Mylar, .047 uF/ 50V	1514R4732L
C30	Capacitor, CM, .1 uF/ 50V	1511R1042I
C31	Capacitor, CD, 680 pF/ 50V	52157522
C32	Capacitor, Mylar, .01 uF/ 50V	52719007
C33	Capacitor, Tant, 1 uF, 35V	52257049
CR8	Diode, Signal, 1N914B	160109140B
Q5	Transistor, MPSU45	1602004500
R31	Resistor, CF, 68K, 1/4 W, 5%	52154237
R32	Resistor, CF, 470K, 1/4 W, 5%	52154217
R33	Resistor, Variable Trim, 20K	1409000500
R34	Resistor, MF, 63.4K, 1/4 W, 1%	54045-698
R35	Resistor, CF, 22K, 1/4 W, 5%	52154249
R36	Resistor, CF, 22M, 1/4 W, 5%	52154177
R37	Resistor, CF, 2M, 1/4 W, 5%	52154202
R38	Resistor, CF, 10M, 1/4 W, 5%	52154185
R39	Resistor, CF, 22K, 1/4 W, 5%	52154249
R40	Resistor, CF, 4.7K, 1/4 W, 5%	52154337
R42	Resistor, Variable Trim, 5K	1409000400
R43	Resistor, CF, 10K, 1/4 W, 5%	52154257
R44	Resistor, CF, 0 Ohm, 1/4 W, 5%	52154971
R45	Resistor, MF, 12.7K, 1%	54045127
U4	IC, CD4001AE	53266094
U5	IC, NE567N	1603056700
U6	IC, LM78L05AC2W	54746000
	Wire, 24 AWG, Blk, 3.0" LG.	58343010
	Wire, 24 AWG, Blu, 3.0" LG.	58343006
	Wire, 24 AWG, Red, 3.0" LG.	58343002
	Wire, 24 AWG, Brn, 3.0" LG.	58343001
	Pin, Cambion	2015000100
	IC Socket, 14-Pin DIP	2001000200
	IC Socket, 8-Pin DIP	2001000100

9030132001,G

**PARTS LIST ABBREVIATIONS:** CD, Ceramic Disk; CF, Carbon Film; CM, Ceramic Monolithic; EL, Electrolytic; MF, Metal Film; Rad, Radial Leads; Tant, Tantalum.

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**SECTION 5: DIAGRAMS / DRAWINGS**

Drawing Number	Title	Page
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*This drawing applies to BP300 Units with CC33 or CC40 cards. Units with CC45 cards are one inch longer.*

OD3415	Outline Drawing, BP300 . . . . .	20
----	Cable Wiring Diagram, Two Channel System . . . . .	21
----	Cable Wiring Diagram, Three Channel System . . . . .	22

**Application Information**

TMI1786	12-Volt Battery Operation / Teleproduction System Example / Multi-channel Operation / Dry Line Operation (For extended distances) . . . . .	23
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**Model BP300 User Stations with CC33 card (Standard units and units with Call Light Option).**

SD1464	Schematic Diagram, Series B Phase 3 User Station . . . . .	24
AS1821	Assembly Diagram, P.C.B., CC33 . . . . .	25

**Model BP300 User Stations with CC40 card (Units with various options or combinations of options. Also applies to standard units built between 1979 and 1981, approximately.)**

SD1427-01	(Simplified) Schematic Diagram, Phase III User Stations (CC40) sheet 1 . . . . .	26
AS1409	Assembly Diagram, P.C.B. CC40/45 Layout . . . . .	27

**CC40 card detailed diagrams**

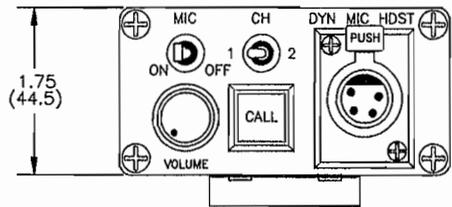
SD1427-00	Schematic Diagram, Phase 3 User Stations, sheet 1 of 2 . . . . .	28
SD1427-00	Schematic Diagram, Phase 3 User Stations, sheet 2 of 2 . . . . .	29

**Call Light Option used by both Model BP300 User Stations with CC33 card (Standard units and units with Call Light Option).**

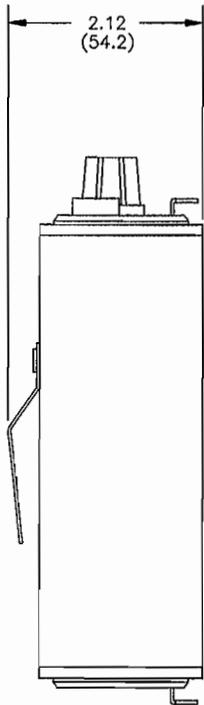
SD1470	Servicing Diagram, Light Signaling Circuit, CC-18SL, Phase 3 Configuration . . . . .	30
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**Exploded Views**

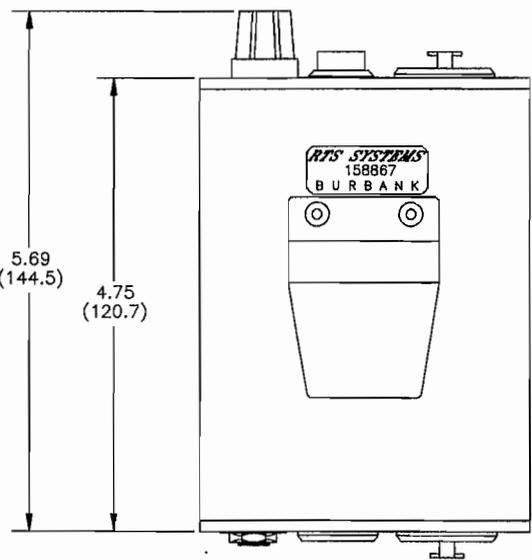
AS1786	Final Assembly, Model BP300 . . . . .	31
AS1787	Front Panel Assembly, Model BP300 . . . . .	32
AS1788	Back Panel Assembly, BP / TWI UNITS . . . . .	33



1.75  
(44.5)

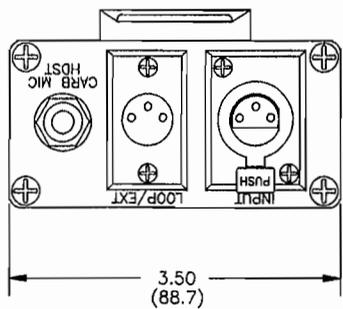


2.12  
(54.2)



5.69  
(144.5)

4.75  
(120.7)



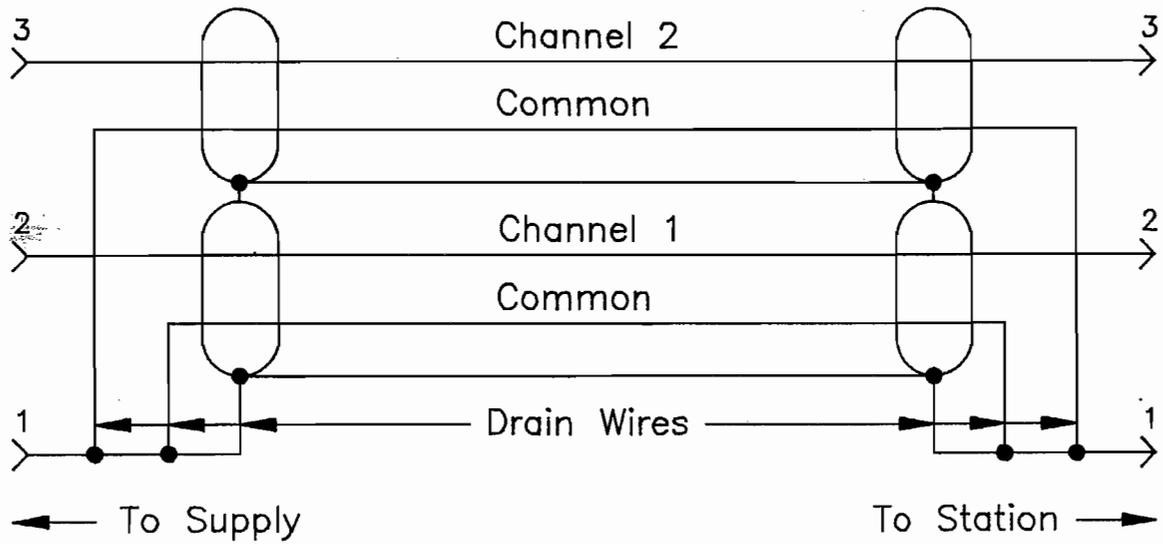
3.50  
(88.7)

WEIGHT: 1.0LBS (.45kg)

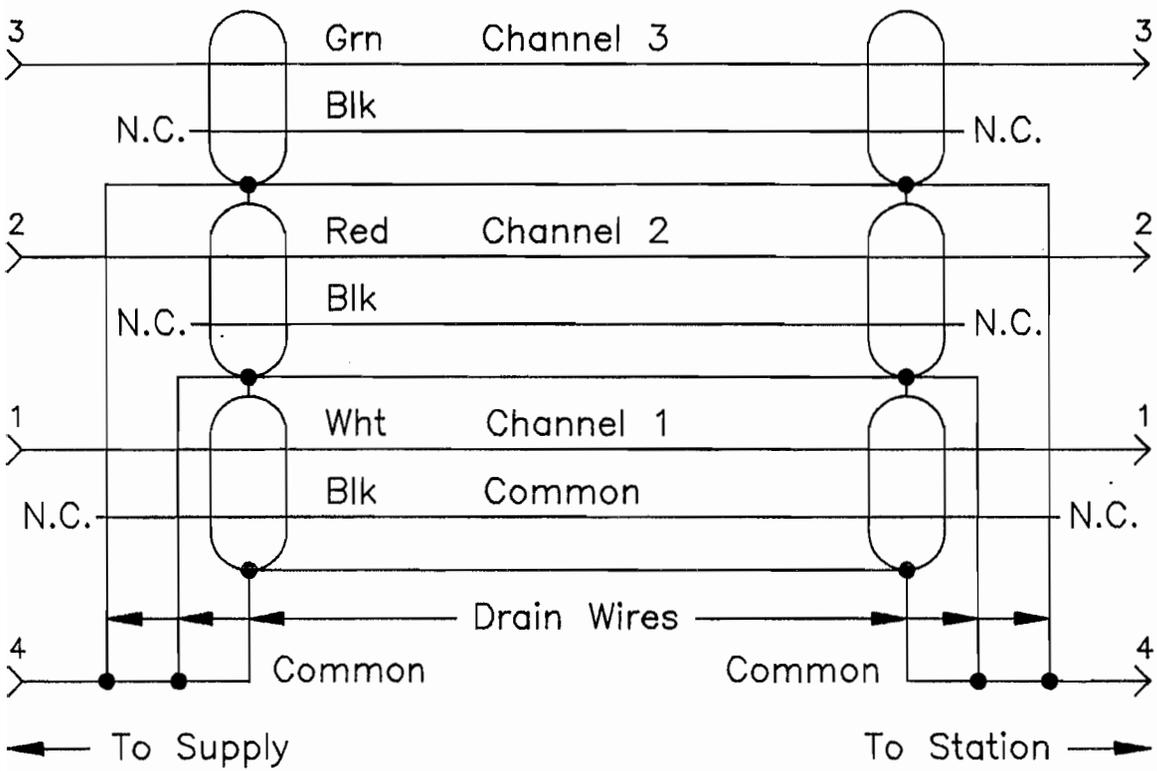
ALL DIMENSIONS: INCHES(mm)

**OD3415  
Outline Drawing,  
BP300**

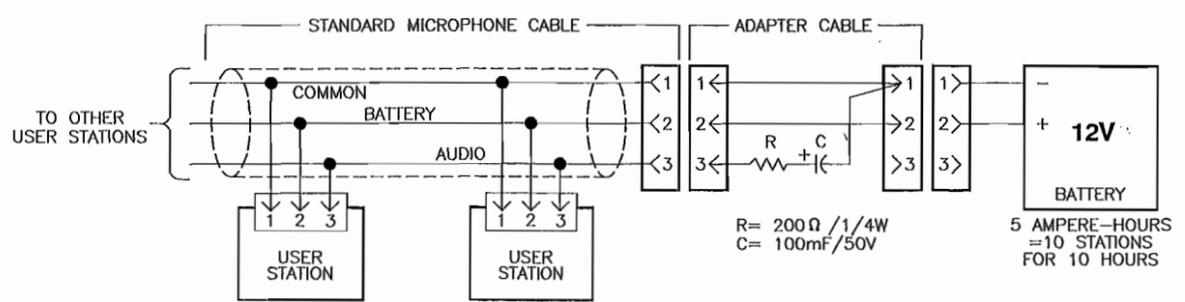
**Cable Wiring Diagram  
Two Channel System**



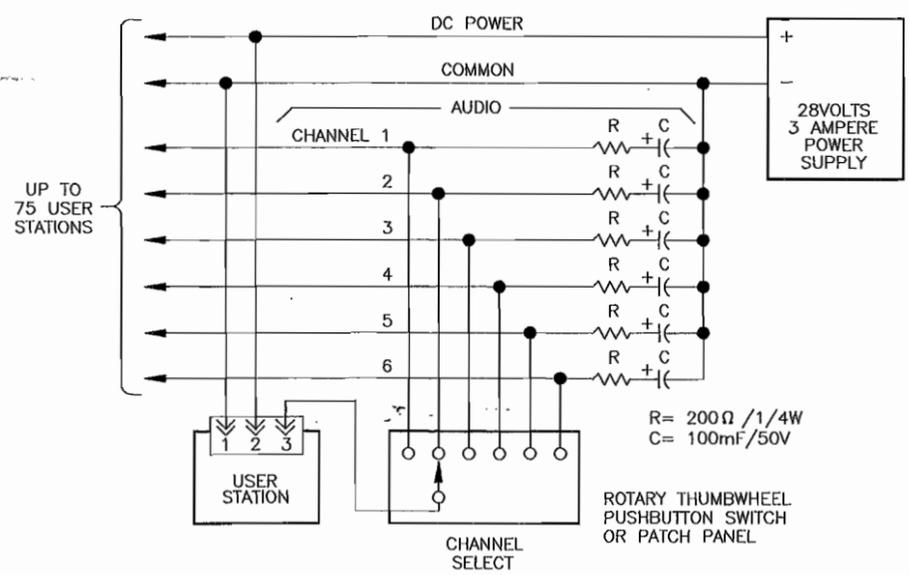
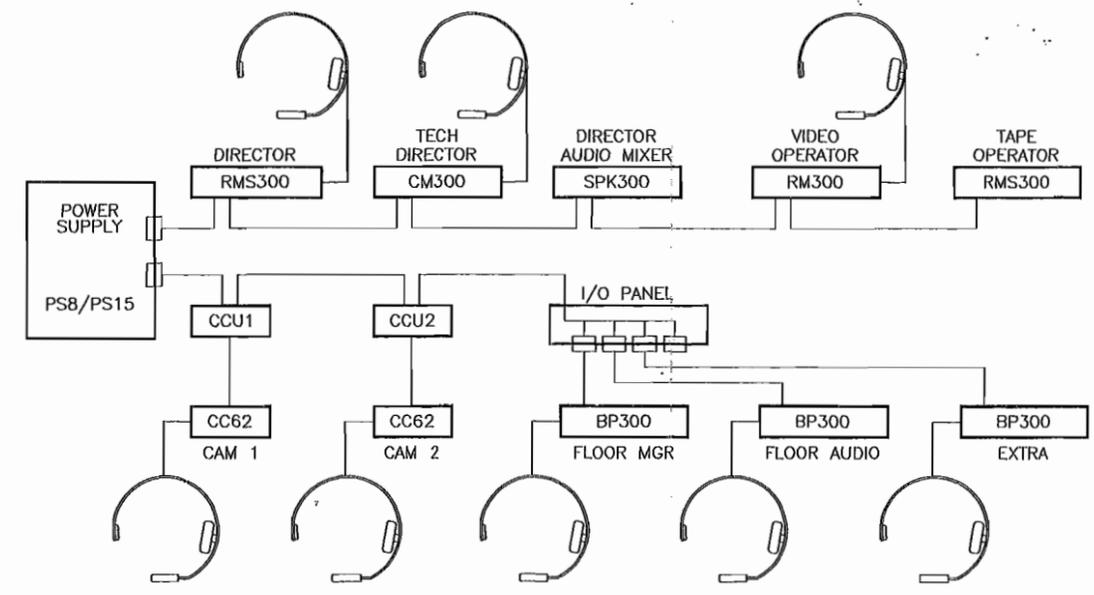
**Cable Wiring Diagram  
Three Channel System**



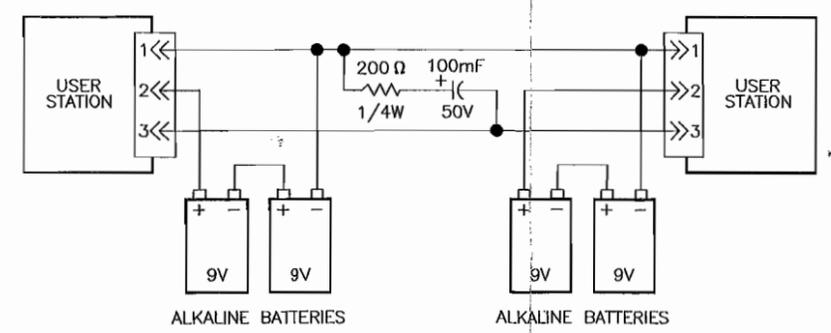
REVISIONS				
ZONE	REV	DESCRIPTION	DATE	APPROVED



12V Battery Operation



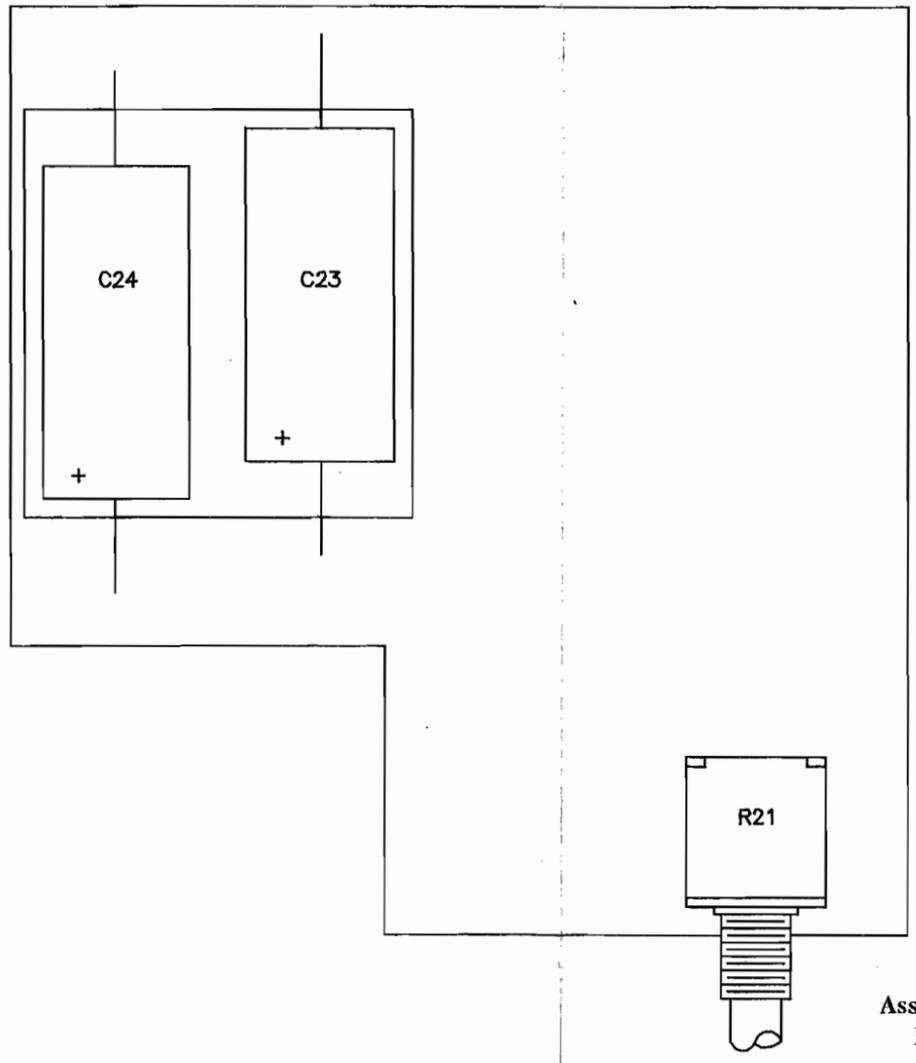
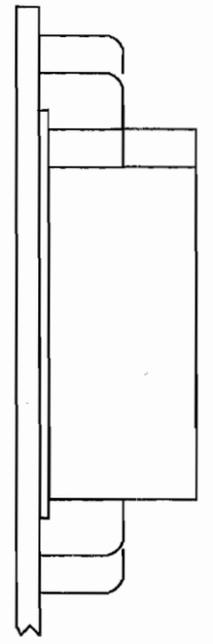
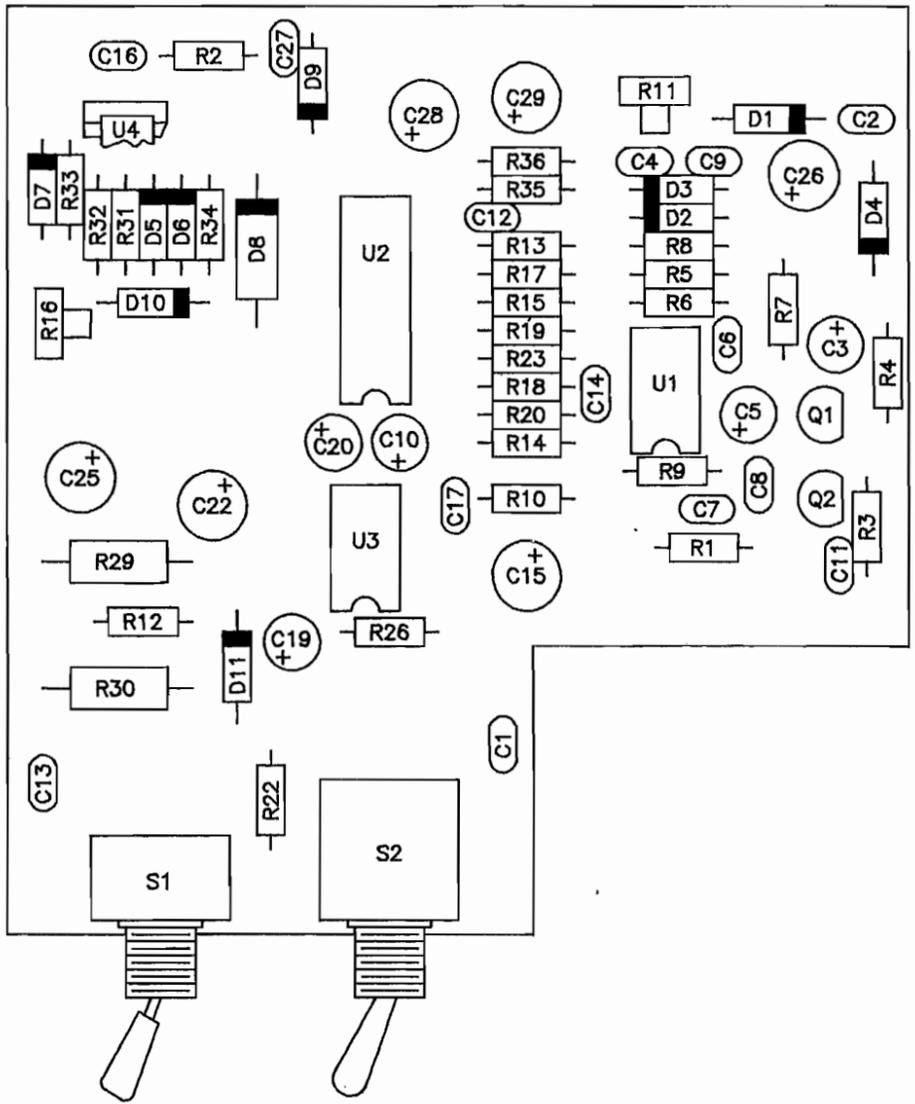
Dry Line Operation



UNLESS OTHERWISE SPECIFIED REMOVE ALL BURRS & BREAK SHARP EDGES HOLE TOLERANCES PER ANSI B4.1-1987, R1972 DIMENSIONS ARE IN INCHES TOLERANCES ARE: FRACTIONS ± 1/16 DECIMALS .X ± .000 .XX ± .030 .XXX ± .010 ANGLES ± 30°		CONTRACT NO.		TECHNICAL MANUAL ILLUSTRATION— APPLICATION INFORMATION FOR MODEL BP300	
APPROVALS		DATE			
DRAWN R.T.CRUIZ		11/5/90			
CHECKED		ISSUED			
NEXT ASSY	USED ON	FINISH	APPLICATION	SIZE D 60572	FSCM NO. DWG NO. TMI1786
SCALE				SHEET 2 OF 2	

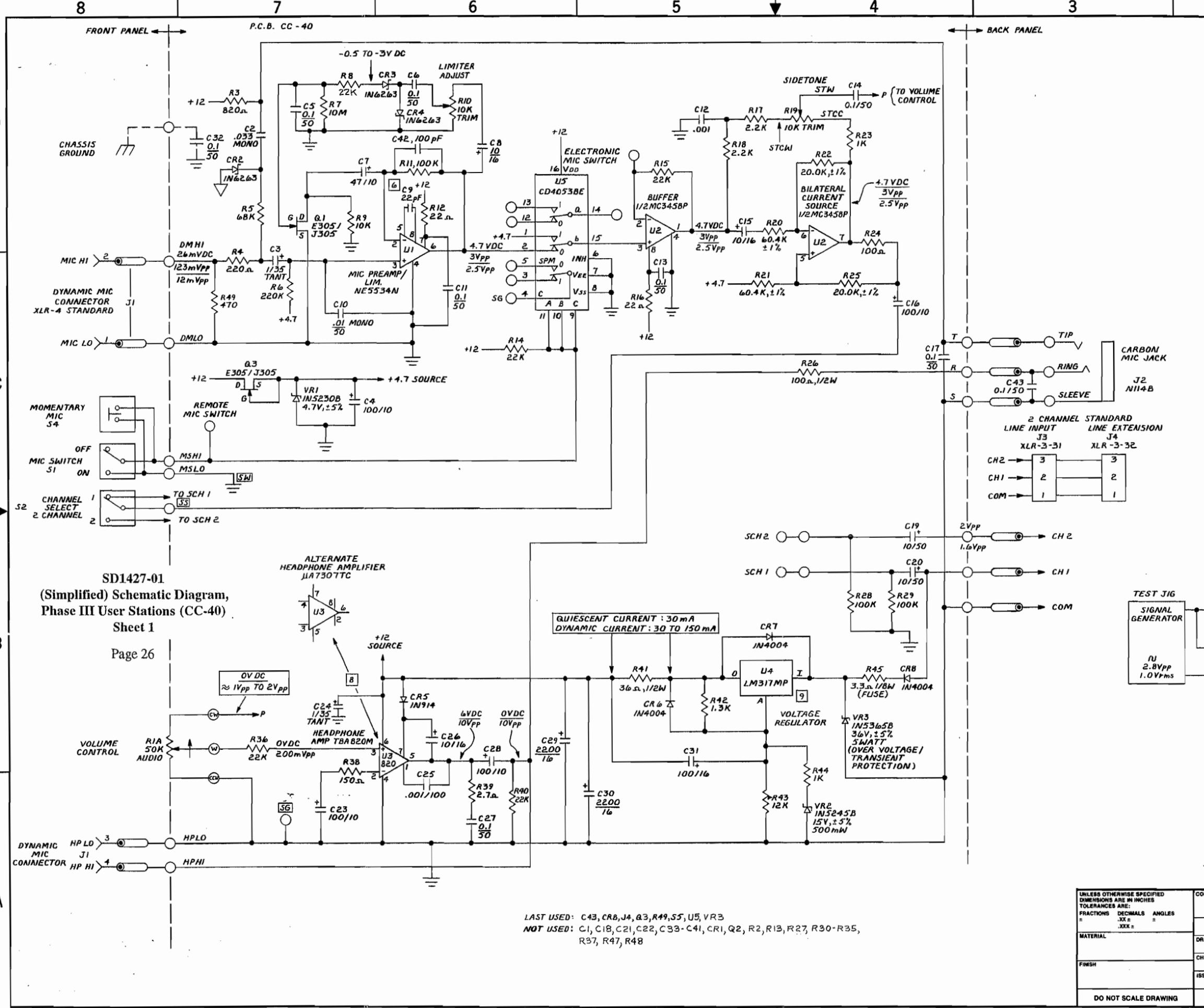


REVISIONS				
ZONE	REV	DESCRIPTION	DATE	APPROVED



AS1821  
 Assembly Diagram,  
 P.C.B., CC33  
 Page 25

UNLESS OTHERWISE SPECIFIED <small>REMOVE ALL BURRS &amp; BREAK SHARP EDGES          HOLE TOLERANCES PER          ANSI B94.11-1987, R1972          DIMENSIONS ARE IN INCHES          TOLERANCES ARE:</small>		CONTRACT NO.		TECHNICAL MANUAL ILLUSTRATION— P.C.B. CC33			
<small>FRACTIONS    DECIMALS    ANGLES</small> <small>±1/16        .X ±.080        ±30'</small> <small>                  .XX ±.030</small> <small>                  .XXX ±.010</small>		APPROVALS	DATE			DRAWN R.T.CRUZ	11/6/90
MATERIAL		CHECKED	ISSUED				
NEXT ASSY	USED ON	FINISH	SIZE			FSCM NO.	DWG NO.
APPLICATION			B60572		TMI1821		
			SCALE	T1821-01.DWG		SHEET 1 OF 1	



REVISIONS				
ZONE	REV.	DESCRIPTION	DATE	APPROVED
	D	REDRAWN	12-9-85	
	E	REVISED PER ECO # 2523	ETC	6-28-89
	F	CHGD NOTE 5 PER ECO # 3186	ETC	9-14-90

SD1427-01  
(Simplified) Schematic Diagram,  
Phase III User Stations (CC-40)  
Sheet 1

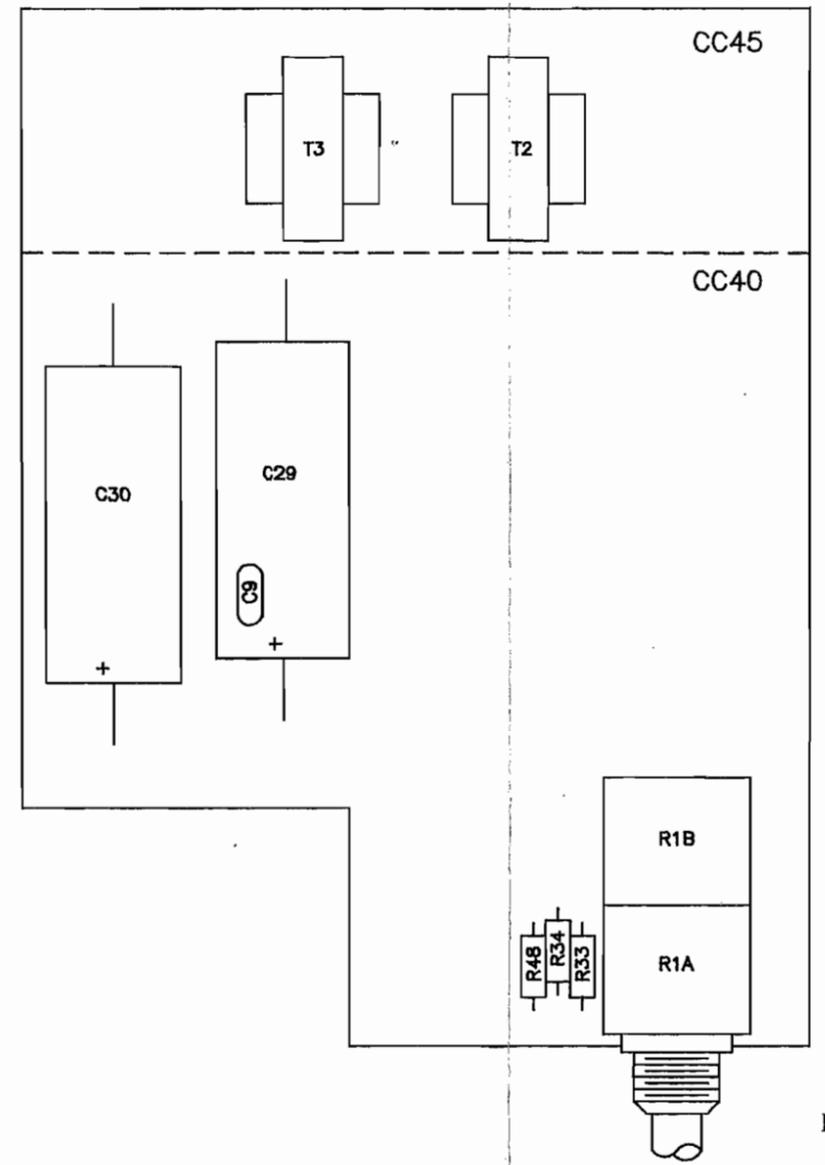
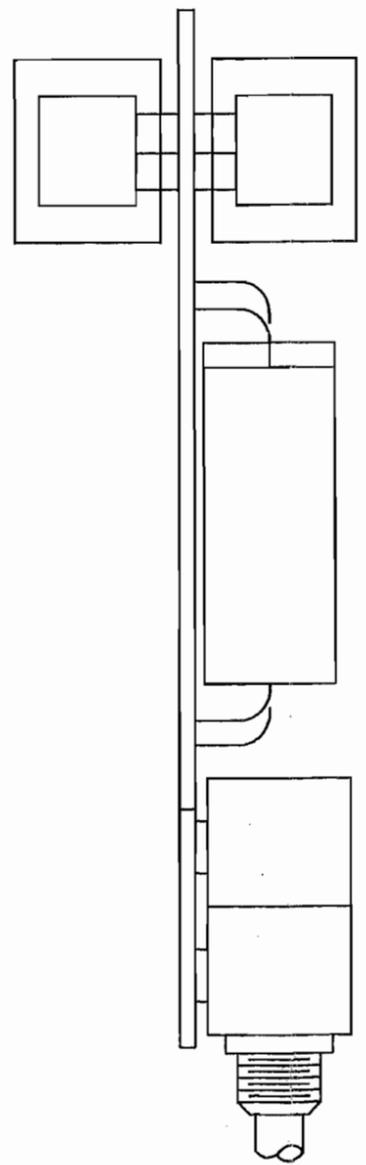
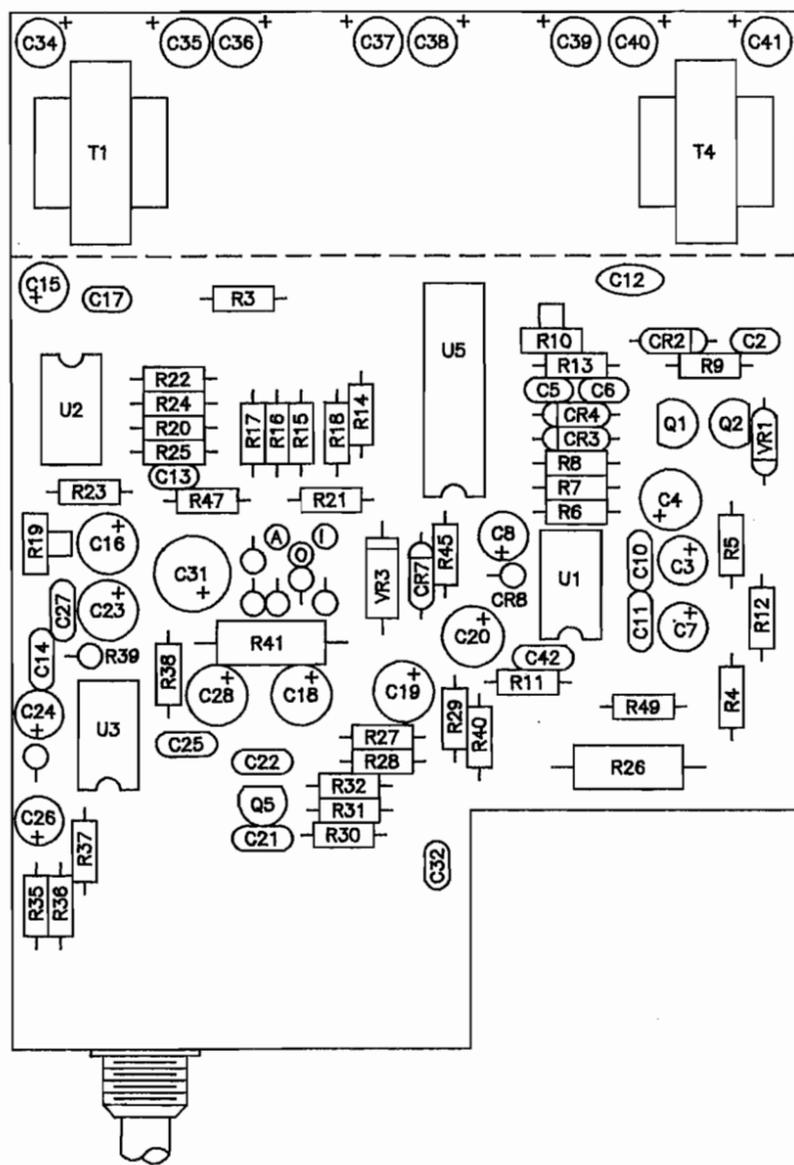
LAST USED: C43, CR8, J4, Q3, R49, S5, U5, VR3  
NOT USED: C1, C18, C21, C22, C33-C41, CR1, Q2, R2, R13, R27, R30-R35, R37, R47, R48

10. THIS DRAWING DOES NOT SHOW OPTIONAL PARTS. FOR OPTION INFORMATION, REFER TO SD 1427-00.
  9. FOR SPEAKER STATIONS, CHANGE U4 TO AN LM317T. THE LM317T MUST BE ATTACHED TO A HEATSINK, SUCH AS AHAM #362.
  8. SEE SD3362 FOR ALTERNATE HEADPHONE/SPEAKER AMP TBA B20M ALT. PINOUT NOTED.
  7.  $\nabla$  = SCHOTTKY DIODE,  $V_F \approx 0.1$  TO  $0.3V$ .
  6. NOMINAL VALUE MAY VARY.
  5. TEST JIG AND SET UP FOR CALIBRATION & VOLTAGE READINGS. SET CHANNEL SELECT FOR CH.2. DISCONNECT SPEAKER.
- TEST SWITCH**
- UPPER VALUES (-25dB)  
LOWER VALUES (-45dB)
- PHASE III USER STATION
- SET FREQUENCY TO 1KHZ, TEST SWITCH IN -25dB, AND VOLUME POT AT MIN. ADJUST LIMITER POT FOR 2Vpp AT J4 PIN 3. TEST FREQUENCIES: 100HZ, 1KHZ, 10KHZ ( $\pm 3db$ ).
  4. ALL TEST VOLTAGES AND CURRENTS:  $\pm 10\%$
  3. OPTIONS AND MNEMONICS ARE EXPLAINED ON THE OPTION LIST, AND ON THE OPTION DETAIL SHEET.
  2. CAP. VALUES ARE SHOWN: MICROFARADS/VOLTS.
  1. ALL RESISTORS ARE CARBON FILM, 1/4 WATT,  $\pm 5\%$ .

NOTES: (UNLESS OTHERWISE SPECIFIED)

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES TOLERANCES ARE FRACTIONS DECIMALS ANGLES .XX ± .XXX ± °		CONTRACT NO.		APPROVALS		DATE		SCHEMATIC DIAGRAM, PHASE III USER STATIONS (CC-40)	
MATERIAL		DRAWN R. NEILSON		CHECKED		12-9-85		SIZE FSCM NO. D 60572 DWG. NO. SD 1427-01 REV. F	
FINISH		ISSUED		SCALE		SHEET			
DO NOT SCALE DRAWING									

REVISIONS				
ZONE	REV	DESCRIPTION	DATE	APPROVED

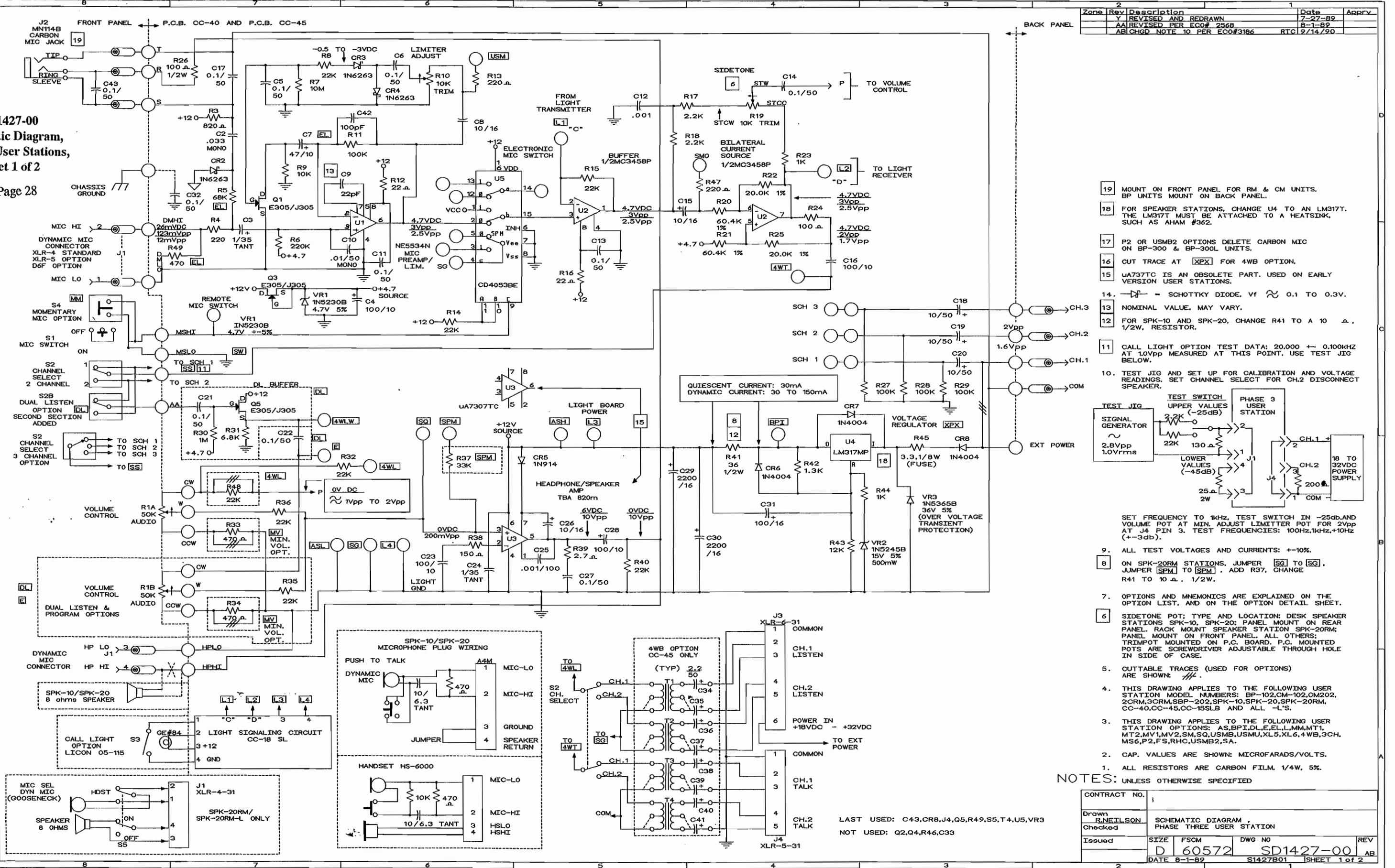


AS1409  
Assembly Diagram,  
P.C.B. CC40/45 Layout

UNLESS OTHERWISE SPECIFIED REMOVE ALL BURRS & BREAK SHARP EDGES HOLE TOLERANCES PER ANSI B94.11-1967, R1972 DIMENSIONS ARE IN INCHES TOLERANCES ARE: FRACTIONS    DECIMALS    ANGLES $\pm 1/16$ .X $\pm .080$ $\pm 30'$ .XX $\pm .030$ .XXX $\pm .010$		CONTRACT NO.		TECHNICAL MANUAL ILLUSTRATION— P.C.B. CC40/45		
		APPROVALS				DATE
DRAWN		R.T.CRUIZ				11/5/90
CHECKED		ISSUED				
MATERIAL		FINISH				
NEXT ASSY	USED ON	SIZE	FSCM NO.	DWG NO.	REV	
APPLICATION		B	60572	TMI1409		
		SCALE	T1409-01.DWG	SHEET 1 OF 1		

SD1427-00  
Schematic Diagram,  
Phase 3 User Stations,  
Sheet 1 of 2

Page 28



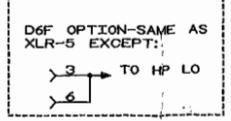
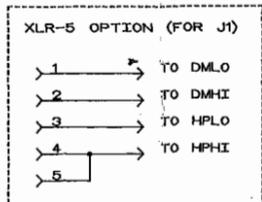
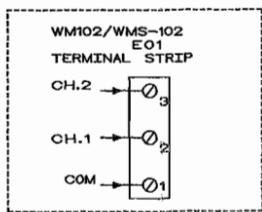
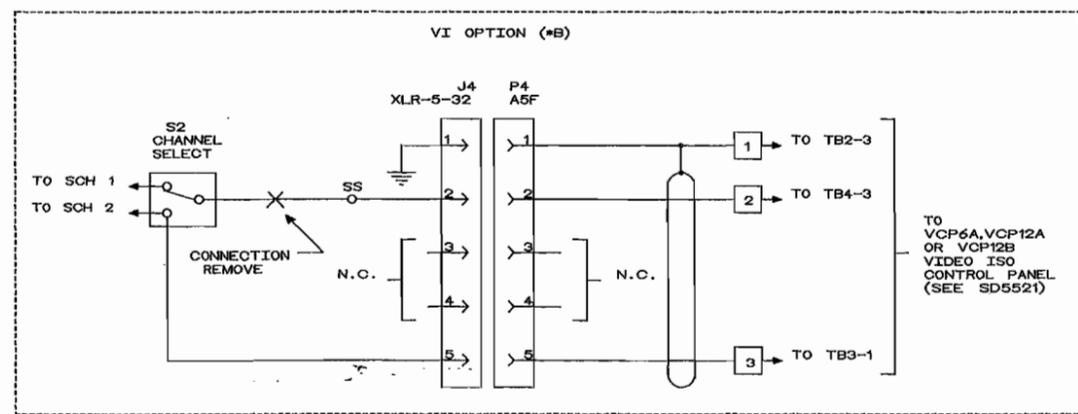
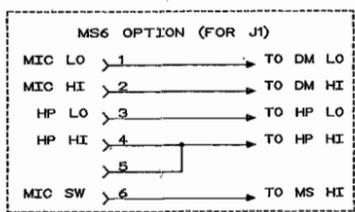
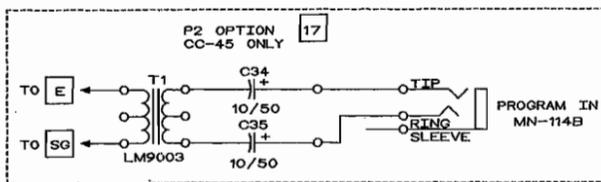
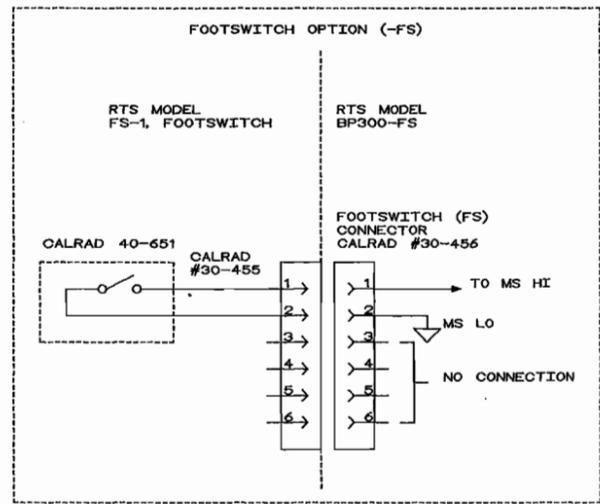
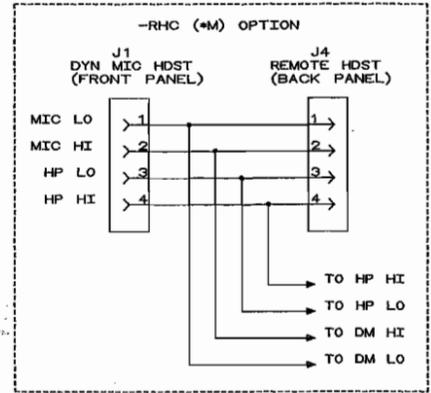
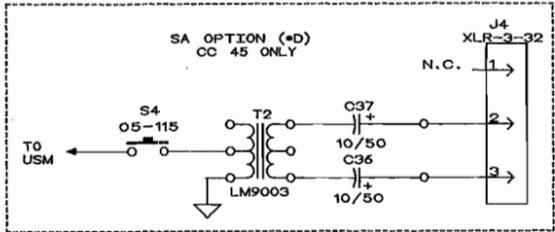
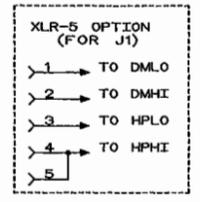
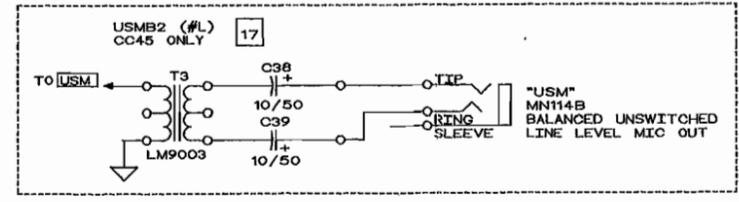
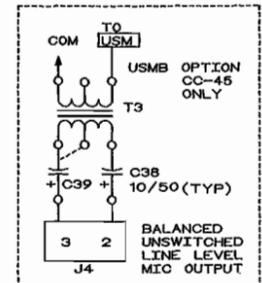
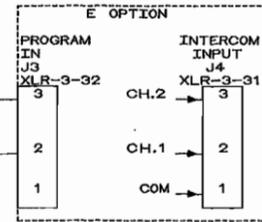
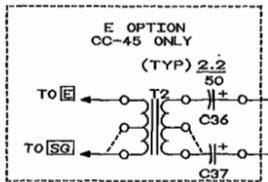
Zone	Rev	Description	Date	Apprv
	Y	REVISED AND REDRAWN	7-27-89	
	AA	REVISED PER ECO# 2568	8-1-89	
		ABLCHGD NOTE 10 PER ECO#3186	RTG 9/14/90	

- 19 MOUNT ON FRONT PANEL FOR RM & CM UNITS. BP UNITS MOUNT ON BACK PANEL.
- 18 FOR SPEAKER STATIONS, CHANGE U4 TO AN LM317T. THE LM317T MUST BE ATTACHED TO A HEATSINK, SUCH AS AHAM #362.
- 17 P2 OR USMB2 OPTIONS DELETE CARBON MIC ON BP-300 & BP-300L UNITS.
- 16 CUT TRACE AT [XPX] FOR 4WB OPTION.
- 15 UA737TC IS AN OBSOLETE PART. USED ON EARLY VERSION USER STATIONS.
- 14.  $\nabla$  - SCHOTTKY DIODE, V<sub>f</sub>  $\approx$  0.1 TO 0.3V.
- 13 NOMINAL VALUE, MAY VARY.
- 12 FOR SPK-10 AND SPK-20, CHANGE R41 TO A 10  $\Omega$ , 1/2W, RESISTOR.
- 11 CALL LIGHT OPTION TEST DATA: 20,000  $\pm$  0.100kHz AT 10Vpp MEASURED AT THIS POINT. USE TEST JIG BELOW.
- 10. TEST JIG AND SET UP FOR CALIBRATION AND VOLTAGE READINGS. SET CHANNEL SELECT FOR CH.2 DISCONNECT SPEAKER.
- 9. ALL TEST VOLTAGES AND CURRENTS:  $\pm$ 10%.
- 8 ON SPK-20RM STATIONS, JUMPER [SQ] TO [SQ]. JUMPER [SPM] TO [SPM]. ADD R37, CHANGE R41 TO 10  $\Omega$ , 1/2W.
- 7. OPTIONS AND MNEMONICS ARE EXPLAINED ON THE OPTION LIST, AND ON THE OPTION DETAIL SHEET.
- 6 SIDETONE POT: TYPE AND LOCATION: DESK SPEAKER STATIONS SPK-10, SPK-20: PANEL MOUNT ON REAR PANEL. RACK MOUNT SPEAKER STATION SPK-20RM; PANEL MOUNT ON FRONT PANEL. ALL OTHERS: TRIMPOT MOUNTED ON P.C. BOARD. P.C. MOUNTED POTS ARE SCREWDRIVER ADJUSTABLE THROUGH HOLE IN SIDE OF CASE.
- 5. CUTTABLE TRACES (USED FOR OPTIONS) ARE SHOWN:  $\nabla$ .
- 4. THIS DRAWING APPLIES TO THE FOLLOWING USER STATION MODEL NUMBERS: BP-102,CM-102,CM202,2CRM,3CRM,SBP-202,SPK-10,SPK-20,SPK-20RM,CC-40,CC-45,CC-15SLB AND ALL -L'S.
- 3. THIS DRAWING APPLIES TO THE FOLLOWING USER STATION OPTIONS: AS,BPI,DL,E,EL,L,MM,MT1,MT2,MV1,MV2,SM,SQ,USMB,USMU,XL5,XL6,4WB,3CH,MS6,P2,F,S,RHC,USMB2,SA.
- 2. CAP. VALUES ARE SHOWN: MICROFARADS/VOLTS.
- 1. ALL RESISTORS ARE CARBON FILM, 1/4W, 5%.

NOTES:

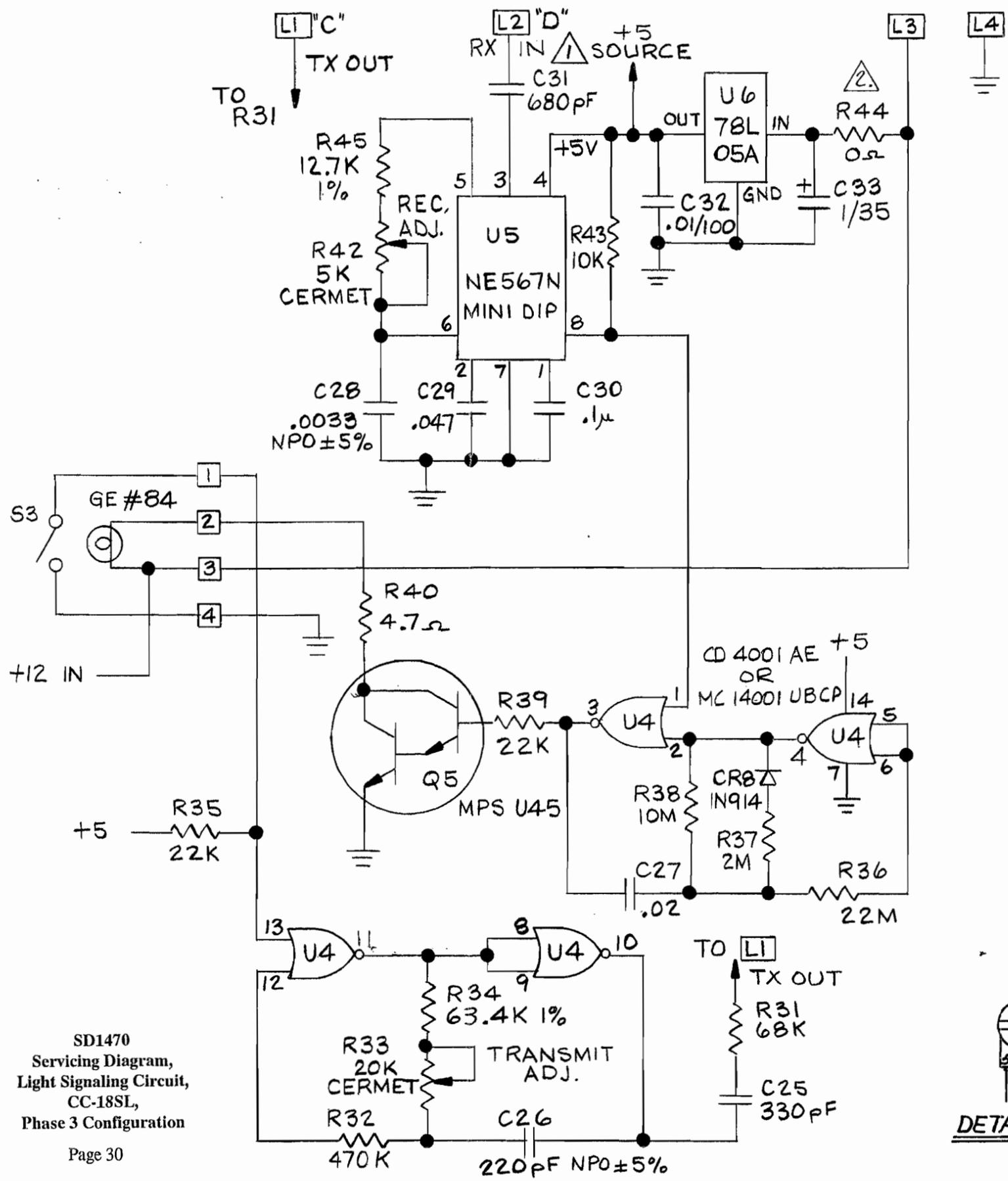
CONTRACT NO.			
Drawn	R.NEILSON	SCHEMATIC DIAGRAM . PHASE THREE USER STATION	
Checked			
Issued		SIZE	FSCM
		D	60572
		DWG NO	SD1427-00
		REV	AB
		DATE	8-1-89
			S1427B01
			SHEET 1 of 2

LAST USED: C43,CR8,J4,G5,R49,S5,T4,U5,VR3  
NOT USED: Q2,Q4,R46,C33

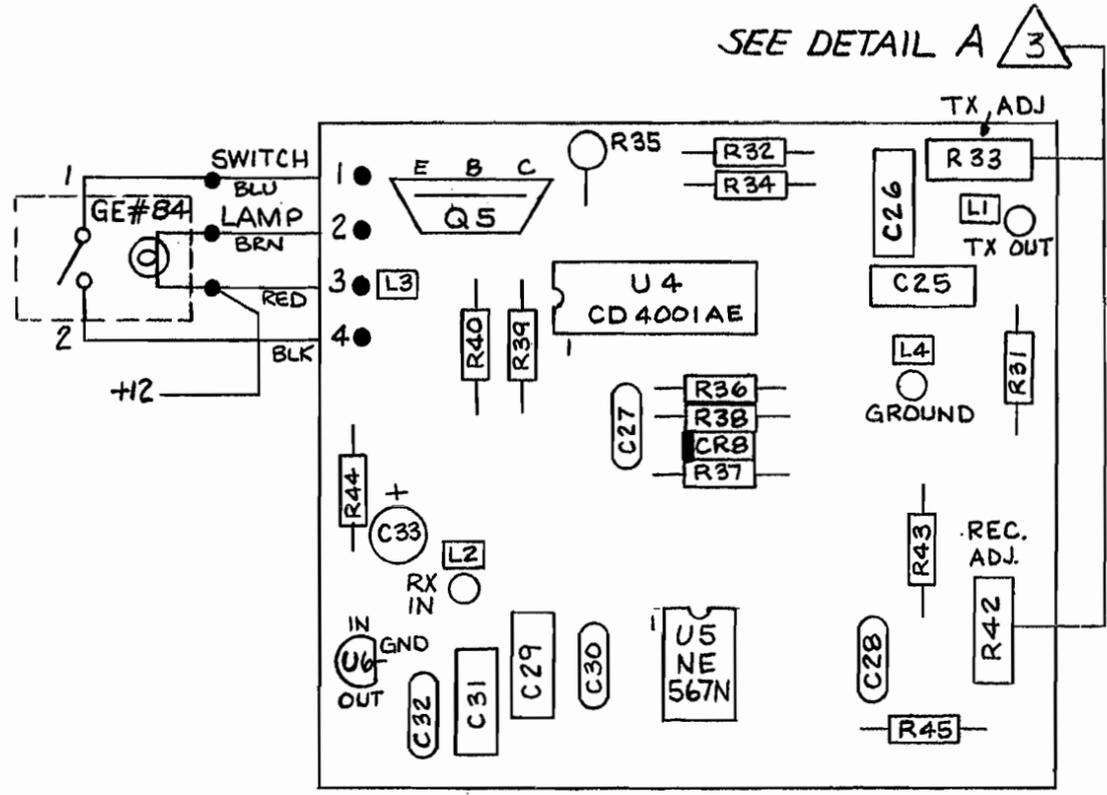


**SD1427-00**  
Schematic Diagram,  
Phase 3 User Stations,  
Sheet 2 of 2  
Page 29

CONTRACT NO.		SCHEMATIC DIAGRAM . PHASE THREE USER STATIONS	
Drawn R.NEILSON	Checked R.K. #4-87	Issued	REV
SIZE D	FSCM 60572	DWG NO SD1427-00	AB
DATE 8-1-82	S1427B02	SHEET 2 of 2	

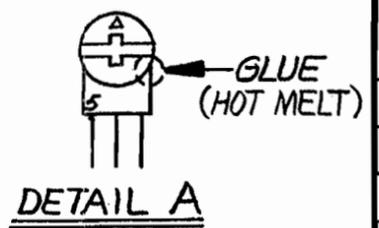


REVISIONS				
ZONE	REV.	DESCRIPTION	DATE	APPROVED
	A	RELEASED	4/10/79	J.F.H.
	B	ADDED NOTES 1. & 2. RKB	2/4/80	SLH
	C	REV PER ECO# 729 B.M.	2-14-83	SLH
	D	REVISED PER ECO# 1537	11-5-85	RN
	E	CORRECTED VALUE FOR R34 WAS 60.4K PER ECO 1603 MW	4-30-86	
	F	REVISED PER ECO 2466 KRC	7-24-89	
	G	ADDED NOTE 3 PER ECO# 2781	1-8-90	



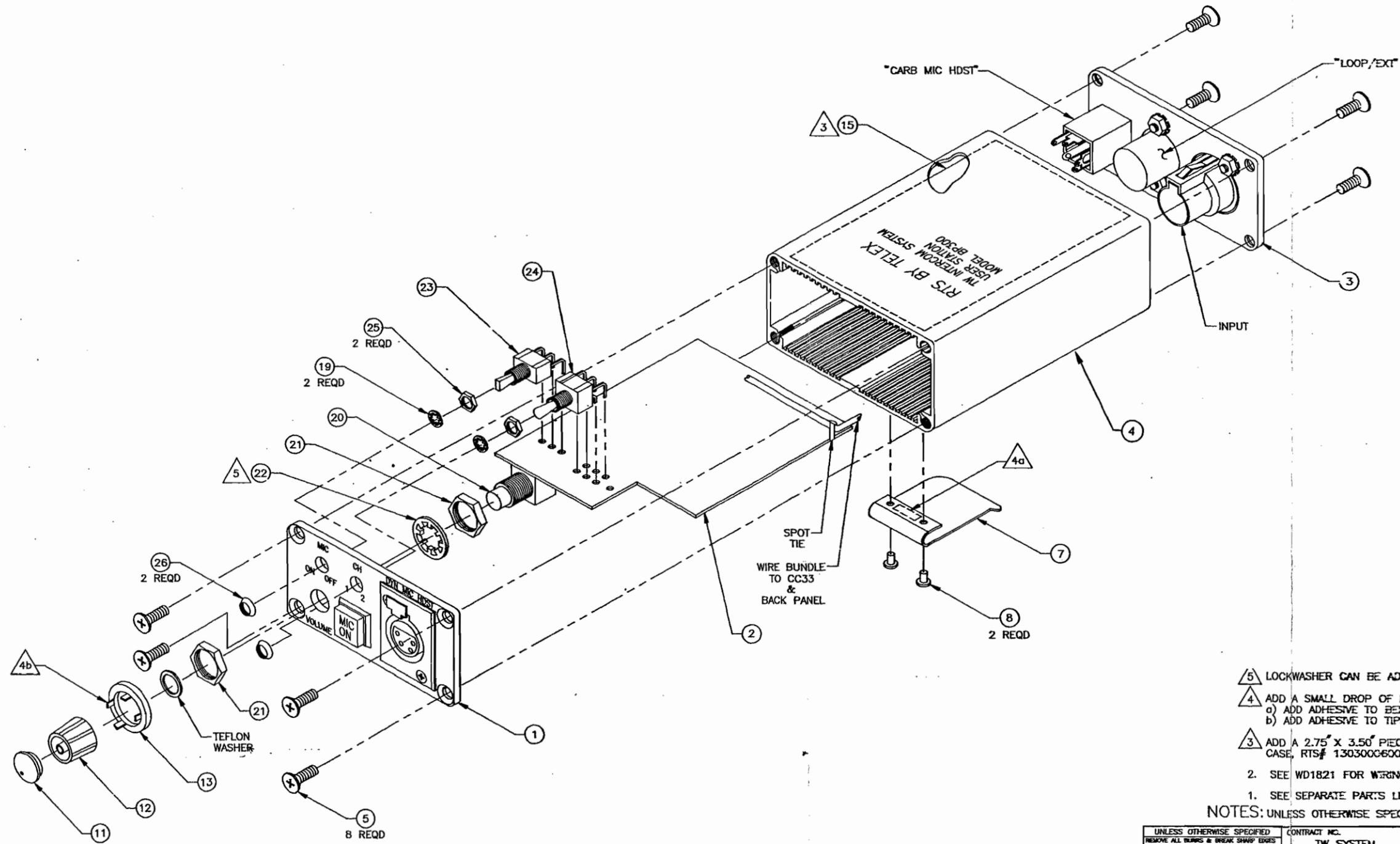
- 3 GLUE SHOULD BE APPLIED TO LOWER RIGHT CORNER OF POT.
- 2 FOR PHASE II USER STATIONS USE 620Ω FOR R44.
- 1 320/501 SERIES: USE 680pF FOR C31.

NOTES: UNLESS OTHERWISE SPECIFIED.



CONTRACT NO.		PRODUCT LINE		
APPROVALS	DATE	SERVICING DIAGRAM, LIGHT SIGNALING CIRCUIT, CC-18SL, PHASE THREE CONFIGURATION		
DRAWN F.C.	4/9/79	SIZE B	FSCM NO. 60572	DWG. NO. SD1470
CHECKED		ISSUED	2/14/83	REV. F
SCALE NONE		SHEET		

REVISIONS			
ZONE/REV	DESCRIPTION	DATE	APPROVED
D	REVISED & REDRAWN PER ECC #2885	4/26/90	
E	UPDATE ARTWORK PER ECC #56698	11/9/92	BF MK
F	CHNG ITEM 7 VIEW ECC #59156	5/31/94	JC

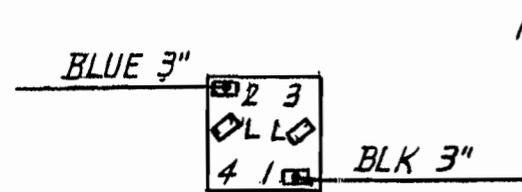


- △ 5 LOCKWASHER CAN BE ADDED TO EITHER SIDE OF PANEL, AS REQUIRED.
- △ 4 ADD A SMALL DROP OF LOCITE #430 SUPER BONDER PRIOR TO ASSEMBLY:  
a) ADD ADHESIVE TO BELT CLIP  
b) ADD ADHESIVE TO TIPS OF SKIRT KEYS (4 PLACES)
- △ 3 ADD A 2.75" X 3.50" PIECE OF ADHESIVE BACKED NYLAR TO INSIDE OF CASE, RTS# 130300600.
- 2. SEE WD1821 FOR WIRING DIAGRAM.
- 1. SEE SEPARATE PARTS LIST 9010-1786-00

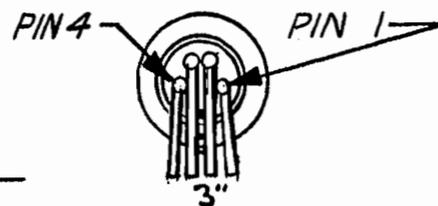
NOTES: UNLESS OTHERWISE SPECIFIED

UNLESS OTHERWISE SPECIFIED REMOVE ALL BURRS & BREAK SHARP EDGES HOLE TOLERANCES PER ANSI B91.1-1987, RYBETZ DIMENSIONS ARE IN INCHES TOLERANCES ARE: FRACTIONS DECIMALS ANGLES ±1/16 ±.000 ±30		CONTRACT NO. TW SYSTEM	RTS SYSTEMS BURBANK, CALIFORNIA, USA	
APPROVALS		DATE	FINAL ASSEMBLY- MODEL BP300	
DRAWN R.NEILSON		4/25/90	REV	
CHECKED		ISSUED		SIZE: FSCM NO. D 60572
MATERIAL		FINISH		DWG NO. AS1786
NONE	BP300	APPLICATION		SCALE 1/1
NEXT ASSY	USED ON			A1786F01.DWG
				SHEET 1 OF 1

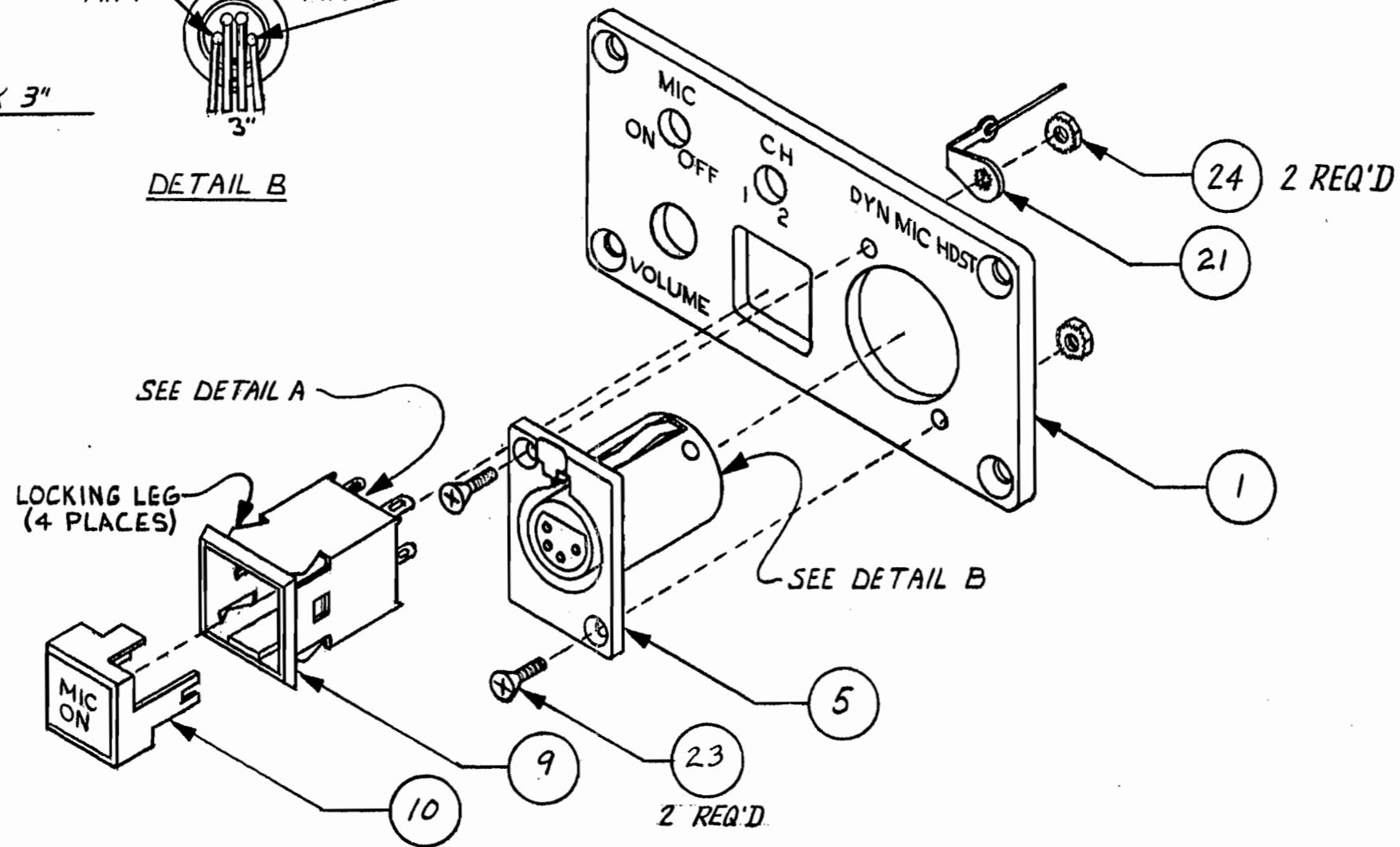
REVISIONS				
ZONE	REV.	DESCRIPTION	DATE	APPROVED
	A	REVISED PER ECO 1266	7-5-84	



DETAIL A



DETAIL B



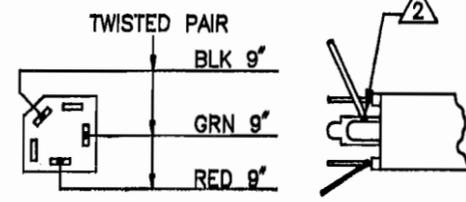
2. ITEM 17 & 18 ARE TWISTED WIRES.

1. FOR PART NUMBERS & DESCRIPTION  
SEE SEPARATE PARTS LIST  
PL 9020-1787-00

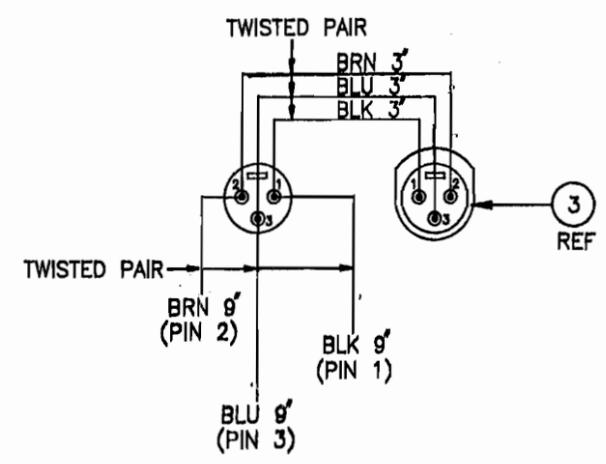
NOTES: UNLESS OTHERWISE SPECIFIED

		UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES TOLERANCES ARE: FRACTIONS DECIMALS ANGLES ± .XX ± .XXX ±	CONTRACT NO. <b>T.W SYSTEM</b>	<b>RTS SYSTEMS</b> BURBANK, CALIFORNIA		
		MATERIAL —	APPROVALS D. MARTINEZ	DATE 7-8-83	FRONT PANEL ASSEMBLY, BP 300	
AS 1786	BP-300	FINISH —	CHECKED M. Van Ouden	DATE 9-1-83	SIZE <b>B</b>	FSCM NO. 60572
NEXT ASSY	USED ON		ISSUED		DWG. NO. AS 1787	REV. A
APPLICATION		DO NOT SCALE DRAWING		SCALE 1/1	SHEET 1	

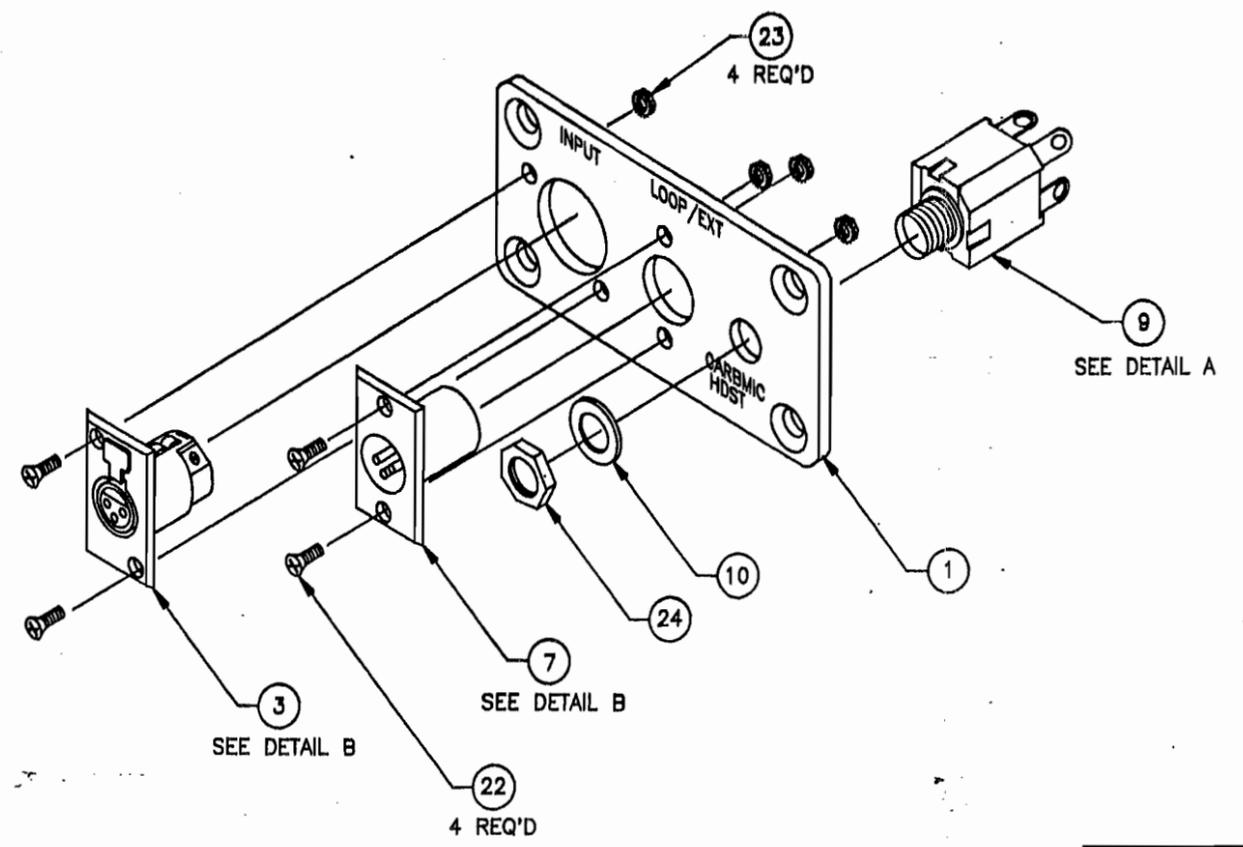
REVISIONS				
ZONE	REV	DESCRIPTION	DATE	APPROVED
	B	REVISED & REDRAWN PER ECO# 2911	3/22/90	RT.K. 3-23-90



DETAIL A



DETAIL B



△ SOLDER WIRES TO TERMINALS OF ITEM 9 AS SHOWN IN DETAIL A (NOT ON TOP).

1. FOR PART NUMBERS & DESCRIPTION SEE SEPARATE PARTS LIST PL 9020-1788-00.

NOTES: UNLESS OTHERWISE SPECIFIED Page 33

UNLESS OTHERWISE SPECIFIED REMOVE ALL BURRS & BREAK SHARP EDGES HOLE TOLERANCES PER ANSI B94.11-1967, R1872 DIMENSIONS ARE IN INCHES TOLERANCES ARE: FRACTIONS ±1/16 DECIMALS .X ±.080 .XX ±.030 .XXXX ±.010		CONTRACT NO. TW SYSTEM		RTS SYSTEMS BURBANK, CALIFORNIA, USA	
AS1786	BP300	APPROVALS	DATE	ASSEMBLY DRAWING, BACK PANEL, BELT PACKS, BP/TWI UNITS	
NEXT ASSY	USED ON	DRAWN R.NEILSON	3/21/90	ISSUED	
APPLICATION		MATERIAL		FINISH	
		CHECKED		SIZE	FSCM NO.
		ISSUED		C 60572	DWG NO.
				SCALE 1/1	AS1788
				A1788B01.DWG	REV B
				SHEET 1 OF 1	