

*Model WM300*  
*Wall Mount User Station*  
*TW Intercom System*

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See the enclosed warranty card for further details.

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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

## **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

This package should include the following:

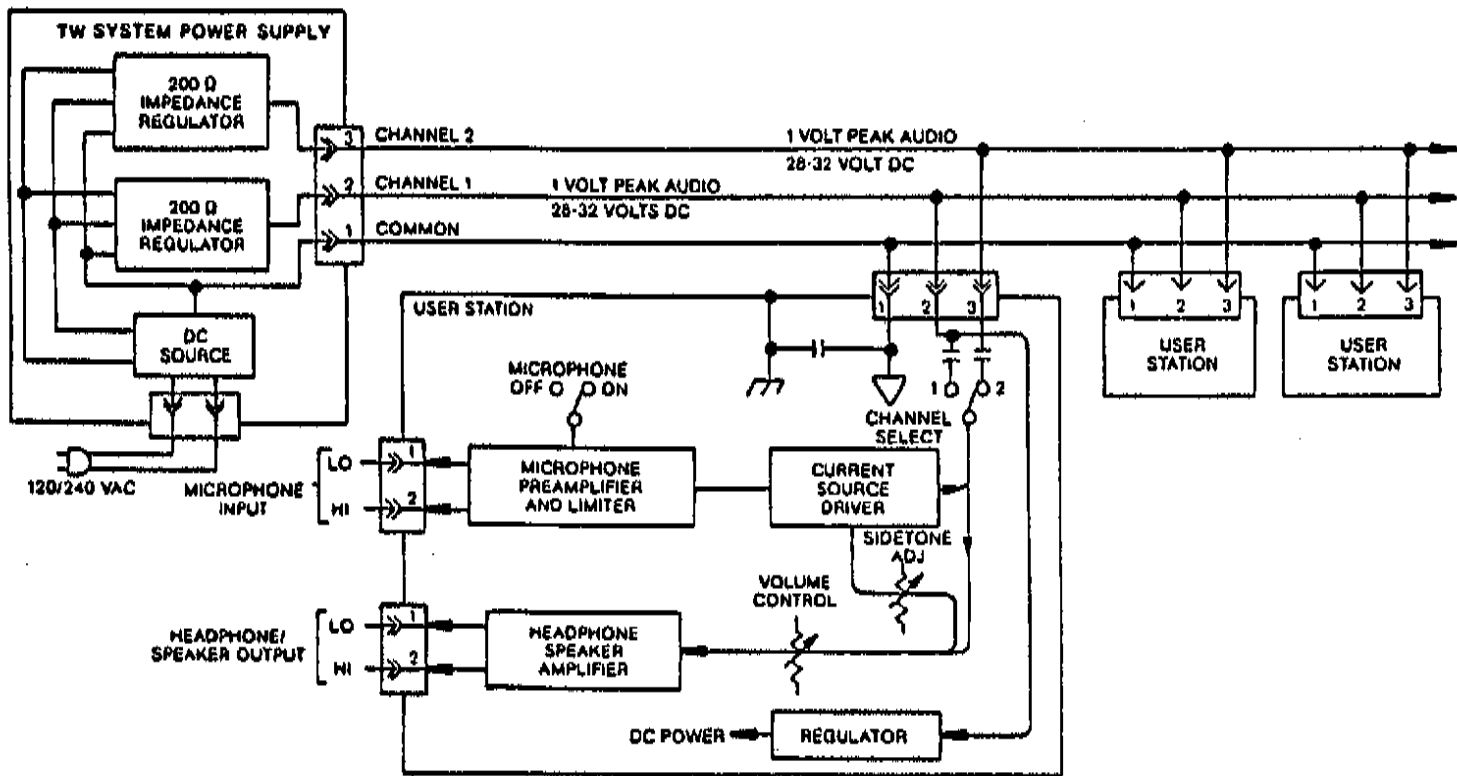


Figure 1-1  
TW System Concept Block Diagram

## SECTION 1: DESCRIPTION & SPECIFICATIONS

### 1.1 DESCRIPTION

The Model WM300, a wall mount user station, is a component used in the TW Intercom System. Each user station is a communications unit along a multi-unit conference bus.

The System Concept Block Diagram, Figure 1-1, illustrates a user station interconnection, and user station connection to the system power supply. User station interconnection can be:

- 1) Centrally wired, with each cable coming from a central point or,
- 2) distributed, where all the user stations are looped together from one to another, or
- 3) a combination of both

The centrally wired interconnection not only reduces interchannel crosstalk but also allows for easier expansion into an assignable channel, multi-channel system.

The WM300 Block Diagram, Figure 1-2, illustrates user station functional components, input/output connections and controls.

The WM300 User Station has the following functional components:

- 1) a microphone preamplifier with limiter,
- 2) a microphone switch,
- 3) a "bilateral current source" line driver,
- 4) a listen volume control,
- 5) a headphone amplifier, and
- 6) a channel selector switch

The microphone preamplifier/limiter:

- 1) converts the small microphone signal to a strong line level signal,
- 2) conditions the signal strength from loud and soft talkers to be almost, the same and
- 3) sends the signal to the line via the microphone switch and a "bilateral current source". The "bilateral current source" adds signal, via the channel select switch, to the line without affecting any signals already on the line. The channel selector switch selects on which channel

the user will talk and listen. The "bilateral current source" also extracts the listen signal from the line and sends it to the headphone amplifier via the volume control. Some of the user's own voice signal ("sidetone") is also fed to the headphone amplifier. The headphone amplifier output drives the user's headphones.

The user station voltage regulator takes power from channel 1 regardless of the channel selector switch setting (exception: local power option units). The regulator not only supplies regulated power to the user station, but also prevents unwanted interaction between the user station and the intercom line supplying power.

The WM300 User Station has three input/output connectors, which are described in section 2.8:

- 1) DYNAMIC MICRophone type HcaDSeT or handset.
- 2) CARBON MICRophone type headset or handset.
- 3) Line INPUT (ties the station to the intercom line.)

The WM300 User Station has the following controls, which are described in Section 3:

- 1) CHannel select switch
- 2) A latching-action MICRophone ON-OFF toggle switch.
- 3) A momentary-action MICRophone ON-OFF pushbutton switch
- 4) A headphone VOLUME control.
- 5) CALL LIGHT switch/indicator (Call Light Option only).

### 1.2 HEADSET REQUIREMENTS

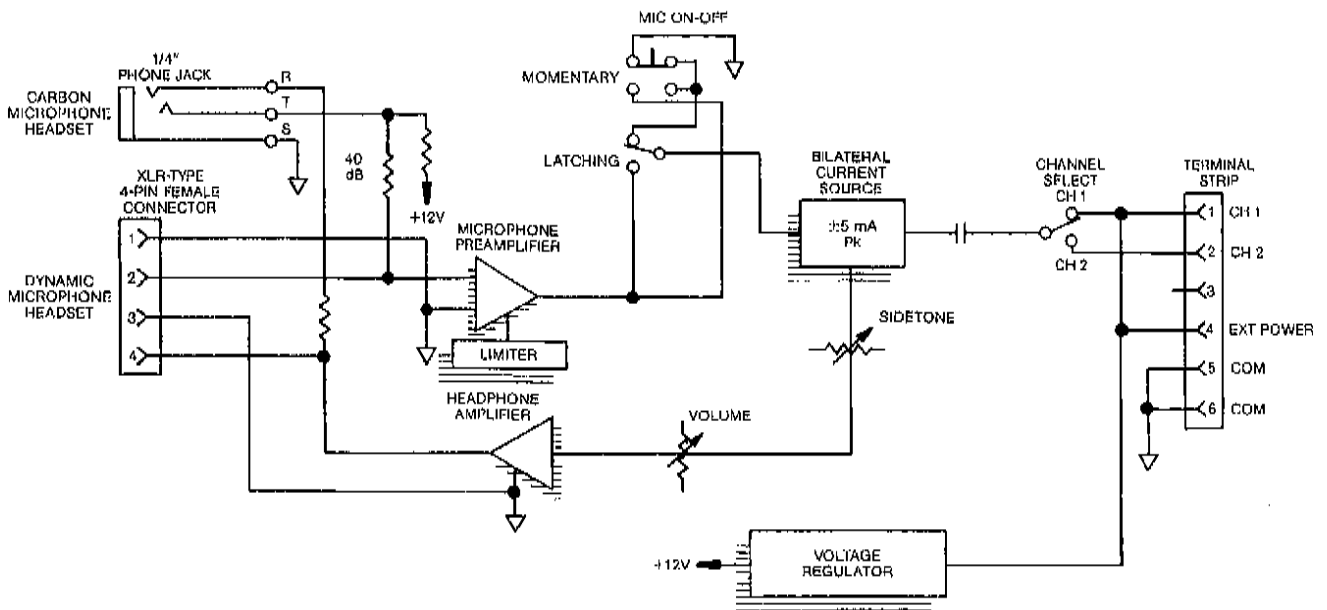
A wide range of headset types may be used:

Dynamic microphone headset type:

50 to 1000 ohm microphone  
25 to 1000 ohm headphone (s)

Carbon microphone headset type:

Standard carbon microphone  
25 to 1000 ohm headphone (s)



**Figure 1-2**  
**WM300 Block Diagram**

High efficiency headphones are recommended because less line current is required from the power supply. Use headphones with an impedance of 25 ohms or greater. Low impedance 8 ohm headphones are not recommended. Headphones with good acoustic isolation not recommended. Headphones with good acoustic isolation (20 to 40 dB) improve communication in high ambient noise environments, and allow the user to listen at a less tiring lower volume.

In the headset connecting cable, prevent coupling between the microphone and headphone leads by using a shielded, twisted pair for the microphone, and a separate, twisted pair for the headphones. Do not allow headphone ground to contact microphone

### 1.3 WM300 SPECIFICATIONS

#### WM300 Specifications:

Input DC voltage: 18 to 33 volts DC, operating from -200 to +36 volts DC without damage

#### DC Current

Quiescent  
Operating

10 to 40 milliamps  
50 milliamps, typical (w/25 ohm headphones)  
75 milliamps typical (w/light & 25 ohm headphones)

Impedance across line:

10,000 ohms typical, 2000 ohms worst case dynamic operation

Ambient Temperature Range

Operating: 0° C to 60° C  
Storage: -55° C to 125° C

Noise contribution  
to 200 ohm line

One Unit: -75 dBV  
Ten Units: -67 dBV

#### Microphone Preamplifier

Input impedance (Dynamic Mic Input)

470 ohms

Source Impedance (Dynamic Mic Input)

200 ohms, nominal

Max. Input Level (Dynamic Mic Input)

150 millivolts

Voltage gain:

54 dB

Frequency Response

100 Hz to 10,000 Hz, ±3dB

Limiter range

30 dB

Carbon Mic Excitation Current

10 milliamps, nominal

Current Source Transfer ratio Output

5 milliamps/1.5 volts  
±5 milliamps into 200 ohms=  
±1 volt peak, nominal

ground or shield. Tie the shield to microphone ground or "mic low". The headset cable can be made longer when the microphone and headphone pairs are physically separated. The wider the separation, the longer the cable length which may be used. Estimated maximum usable headphone cable lengths are as follows:

-Single cable, two shielded twisted pair:  
10 feet (3.05 m).

-Dual ribbed cable, two shielded twisted pair:  
30 feet (9.14 m).

Separate cables, shielded twisted pair in each:  
50 feet (15.24 m).

-Balanced microphone input:  
up to 100 feet (30.48 m).

**Headphone Amplifier**

Overall voltage gain 24 dB  
Overall voltage gain 9 volts peak-to-peak into 25 ohms  
Output power  
Headset station: 1/2 watt into 25 ohms  
Frequency Response 150 Hz to 8,000 Hz,  $\pm 3$  dB  
Headphone Impedance Range 25 to 600 ohms  
Sidetone Adjustment Range 20 dB to full on

**Call Light:**

Signaling Frequency 20,000 kHz  $\pm 100$  Hz  
Flashing Rate 5 Hz  $\pm 2$  Hz

**Dimensions:**

4.5" H x 4.5" W x 1.81" D  
114.3 x 114.3 x 46.0 mm

## SECTION 2: INSTALLATION

### 2.1 ELECTRICAL INSTALLATION/GROUNDING

All console, rack and wall mounted user station chassis should be connected to earth ground or power line safety ground, but the TW Intercom System circuit ground should not be directly connected to "earth" or "chassis" ground. Each user station is bypassed to its own chassis via a 0.1 microfarad capacitor to prevent interference from radio stations.

The power supply has a bleeder resistor from circuit ground to chassis ground (22 kilohms) to prevent a buildup of voltage across the system capacitance. If the system has no RTS power supply, install a bleeder resistor at a central point in the system.

There are two advantages to not "earth" grounding the circuit ground:

- 1) The system continues to operate during an accidental grounding since this can be tolerated by the system until it can be cleared.
- 2) Earth currents from other equipment are prevented from introducing noise into the TW Intercom System.  
-User stations should not arbitrarily be taped or fastened to metal structures. Grounding the case of the user station to an arbitrary structure may introduce large noise voltages due to local ground currents or due to the completion of a "ground loop antenna". Always clear all earth grounds from the RTS TW Intercom System circuit ground. The only ground should be through the 22 kilohm resistor in the power supply.

### 2.2 ELECTRICAL INSTALLATION/POWER

The WM300 receives electrical power from either:

- 1) A system power supply (26 to 32 volts DC on line connector (TB1) terminals 1 (+) and 6 (com) (2 channel operation) or
- 2) A local power supply option (12 to 33 volts DC). A user station requires 18 to 33 volts to be a 10,000 ohm bridging impedance across the powering line, but the station can otherwise operate (as in the local power option) from 12 to 33 volts. Model WM300 current requirements range from 20 to 50 mA; WM300-L, from 30 to 60 mA. Since, in (1), above, the power and

communications signals share conductors, it may be necessary to overcome power losses by increasing conductor size over long runs (over 1/2 mile (804 m)). Typical operating distance for one WM300 station is 1 mile (1.6 km) using a normal #22 AWG conductor size; for a WM300-L, 3/4 mile (1.2 km).

### 2.3 ELECTRICAL INSTALLATION/SIGNALS

The required number of conductors to interconnect user stations is as follows: (For standard, unbalanced TW user stations)

<u>Number of Channels</u>	<u>Number of Conductors</u>
1	2
2	3
3	4

Use shielded cable to interconnect user stations in areas of possible electrical interference, (areas such as those near: digital equipment, high current primary power conductors ("mains"), transformers, transmitters and lamp dimmers).

Most two channel applications may use either standard microphone cable (for convenience) or two-twisted-pair cable (considerably less expensive than microphone cable). Standard wire size for the TW Intercom System is #22 gauge wire for interconnection. For permanent installations it is recommended that each channel should have an individually shielded twisted pair of at least #22 gauge wire, such as Belden #8723 for 2 channels. For 3 channel installations, a cable of 3 individually shielded wires such as Belden #8733 may be used (using the 3 drain wires as circuit ground. For 3 channel installations using terminal blocks or tag strips, a cable of 3 twisted shielded pairs such Belden #8777 maybe used (using the 3 drain wires and one each of the three pair as circuit ground). This will reduce interference and help maintain a low crosstalk figure between channels. Connect the shield to system common but do not tie the shield to chassis, earth or connector shell ground.

### 2.4 ELECTRICAL INSTALLATION/ CROSSTALK CONTROL

In the TW Intercom System all channels share a common circuit ground return. Crosstalk due to common ground resistance can be lowered by reducing the common ground resistance. Reduction



of ground resistance can occur as a side benefit of using shielded cable, since the shield drains can be tied together and electrically parallel the circuit ground. Another way of lowering resistive crosstalk is to "homerun" all interconnecting cables to a central or "home" location. In this configuration, the ground path is short and the corresponding ground resistance is small.

Crosstalk due to mutual capacitance occurs when the signal on one wire of a twisted pair couples into the other wire. Separating the two conductors with a shield greatly reduces the capacitive crosstalk.

To reduce both capacitive and resistive crosstalk and to afford a degree of RF and electrostatic shielding, use a cable which has a shielded twisted pair for each channel. Each pair consists of a conductor for the channel, a conductor for circuit ground return and a shield around the two conductors. The shield is accessed via a drain conductor. This drain conductor and the shield can augment the circuit grounds and thus lower the ground resistance.

Routing the TW Intercom System cables along the same ductways and pathways as power cabling can increase the noise and hum levels.

## 2.5 ELECTRICAL INSTALLATION/MOISTURE/CONTAMINATION PROTECTION

When using equipment in the rain, always protect the equipment with plastic covers. Also, make sure all cable connectors are lifted out of the mud or snow and protected with plastic bags. Water, mud and snow in connectors can cause considerable audible noise.

## 2.6 ELECTRICAL INSTALLATION/HUM PREVENTION

Prevent inducing hum into the system by not locating user stations near hum sources such as power transformers, electrical switch panels, lamp dimmers or TV cameras. When the microphone switch is turned on, the dynamic microphone acts as a sensitive antenna for magnetic field hum sources.

## 2.7 MECHANICAL INSTALLATION

The WM300 mounts directly into a standard 2.25 inch (57.2 mm) deep, 4 inch (102 mm) square, 2 gang electrical conduit box.

Determine space allowances for control access, cabling and servicing on a case by case basis. Provide space for: cabling service loops, reaching XLR type connector lock releases, and headset connectors/cables. If the headset connector is remotely located, allow space between this cable and interfering sources such as video/TV monitors, power supplies and equipment with internal power supplies.

**NOTE:** Because the regulator takes power from channel 1, channel 2 can be expanded into many channels by using a switch and for each channel: a separate wire and a termination network consisting of a 200 ohm resistor and a 10 microfarad capacitor in series (see the Application Diagrams in the TW Intercom System Catalog). (A TW System power supply terminates a line with 200 ohms).

## 2.8 USER STATION CONNECTIONS

Dynamic Microphone headset connector: XLR-4-31 type receptacle (J1)

Input level: -55 dBV nominal  
Output level to headphone: 10 volts peak-to-peak open circuit

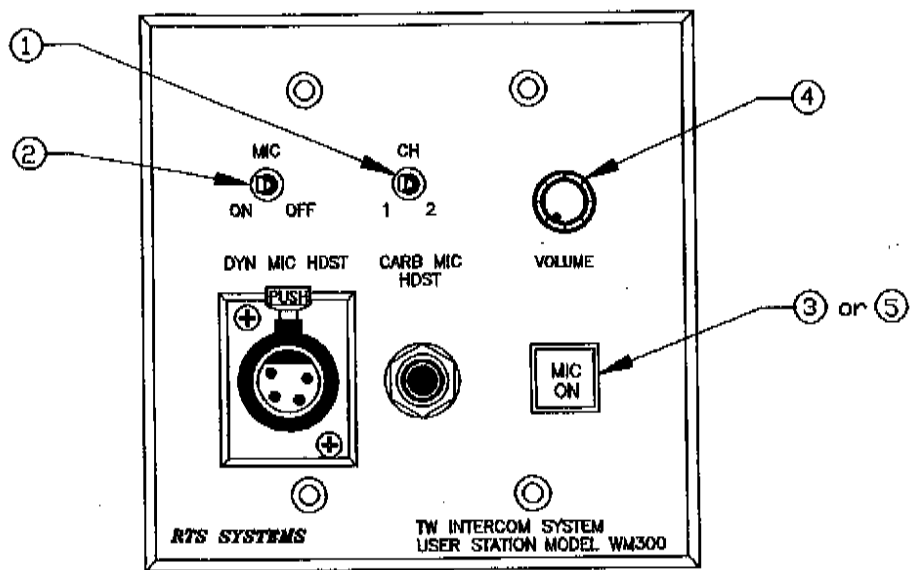
Pin 1 - Microphone low  
Pin 2 - Microphone high  
Pin 3 - Headphone low  
Pin 4 - Headphone high

Carbon Microphone headset connector: Standard 1/4" Phone Jack (J2)  
Input level: -15 dBV nominal  
Output level to Headphone: 10 volts peak-to-peak open circuit

Tip - Carbon Microphone  
Ring - Headphone  
Sleeve - Common/ground

Line input:

Terminal strip type (TB1)  
Terminal #1 - Channel 1  
Terminal #2 - Channel 2  
Terminal #3 - Channel 3 (When 3 Channel option is installed)  
Terminal #4 - External Power  
Terminal #5 - Common (low side of line)  
Terminal #6 - Common (low side of line)



**Figure 3-1**  
**Front Panel**

## SECTION 3: OPERATION

### 3.1 OPERATING CONTROLS

Table 3-1 lists the Model WM300 operating controls, with reference numbers corresponding to Figure 3-1.

Table 3-1

<u>Ref No.</u>	<u>Name</u>	<u>Description</u>
1)	<b>CHannel Select Switch</b>	Selects 1 of 2 channels (standard) or one of three channels (optional). The Call light option transmitter and receiver operate 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 Pushbutton</b>	A momentary-action switch (not standard with the Call Light option).
4)	<b>VOLUME</b>	A headphone VOLUME control. (May be a dual control for the Dual Listen (DL) or Program (E) option).

#### **CAUTION!**

Always Turn The Volume Control All The Way Counterclockwise (To The Left) Before Plugging In The Headset

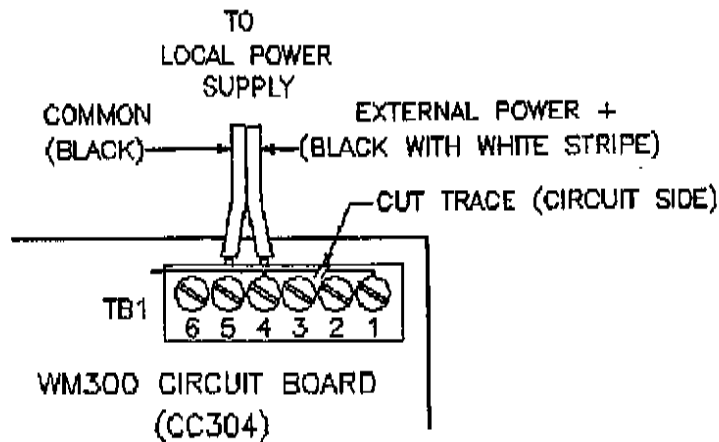
- |    |                                    |   |
|----|------------------------------------|---|
| 5) | <b>CALL LIGHT Switch/Indicator</b> | This switch/indicator appears only on the user stations with the "Call Light" option. The switch, when depressed, adds a 20 kilohertz signal to the TW intercom line on the same channel as the CHannel Select Switch has been set. This signal activates the Call Light receiver on all user stations which are switched to the same channel, causing the lamp in the switch to Flash. |
|----|------------------------------------|---|

## EN6344

### Installation, Local Power Option, WM300

The WM300 can be powered from an external (local) power supply module of between 18 to 33 volts DC, at a minimum current of 100 milliamperes. Connect the external supply across terminal block, TB1 pins 4 (external power +) and 5 (common). When using an external supply, the circuit board trace running between TB1 pins 1 (channel 1) and 4 must be cut.

The local power option can be installed on a WM300 ordered from the RTS Systems facility. WM300 units ordered with the standard local power option will be supplied with a 117 volts AC 60 Hz in, 24 volts DC 400 milliamperes out external supply. Customers whose power mains are not 117 volts AC nominal must provide an AC to DC step-down power conversion/rectifier device.



EN6344

Notes:

**SECTION 4: LIST OF DRAWINGS**

RTS Systems

Document

No.

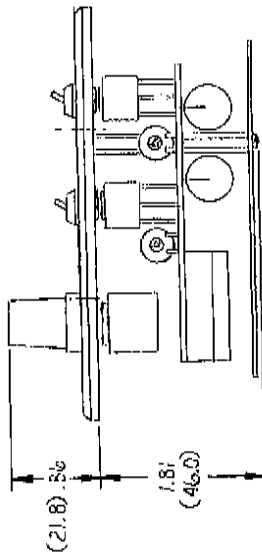
Title

Page

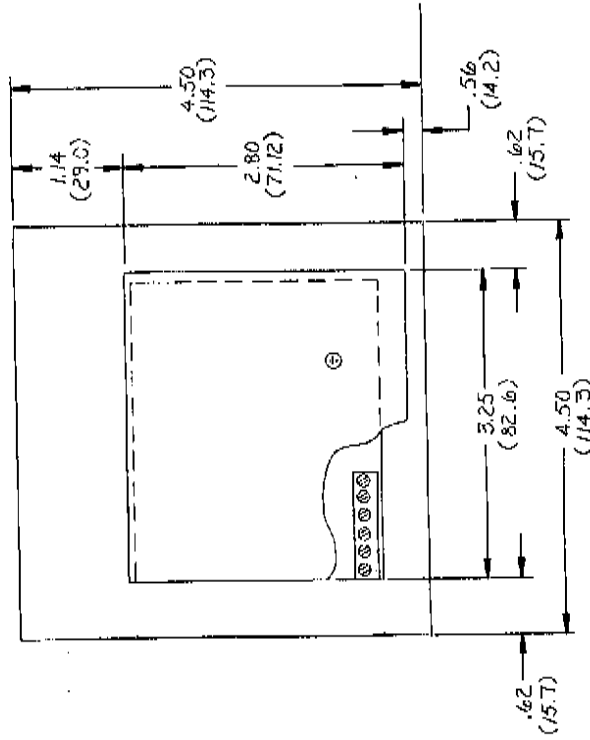
ID3210	Installation Drawing, Model WM300 User Station.....	4-2
SD1470	Servicing Diagram, Light Signalling Circuit, CC-18SL, Phase 3 Configuration .....	4-3
AS2432	Assembly Diagram, P.C.B., Model WM300 & WM300-L.....	4-4
SD2386	Schematic Diagram, Wall Mount User Station, Model WM300 & WM300-L.....	4-5

REV	DESCRIPTION	DATE	BY
A	ADDED DIMENSIONS/EIC 2172	3-26-88	

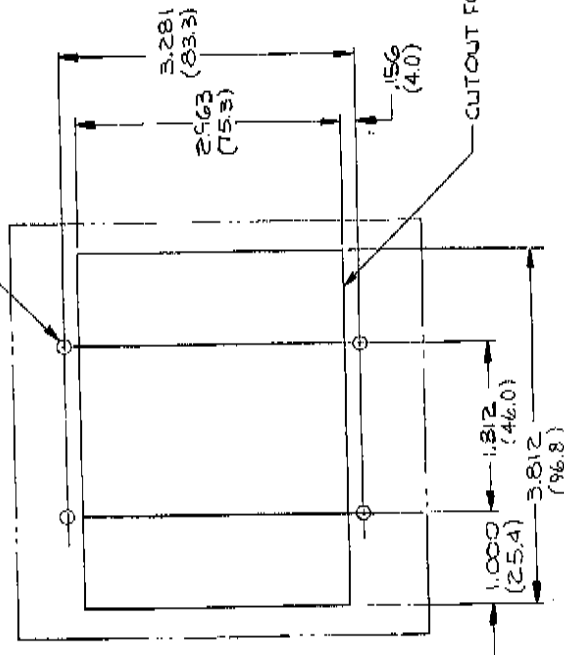
TOP VIEW



REAR VIEW



Ø 6 MTG SCREW  
4 PLACES

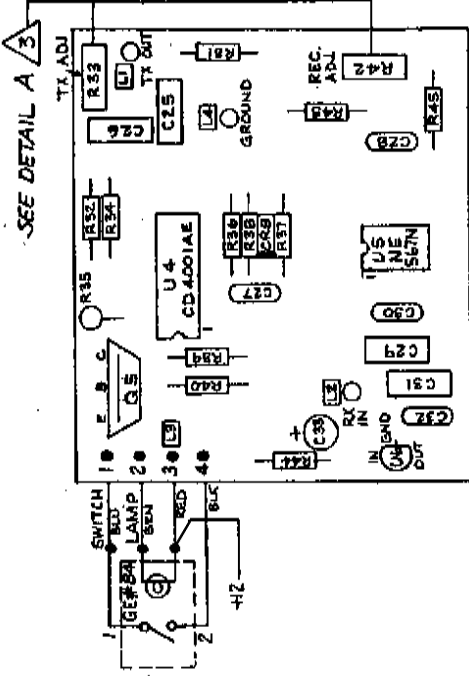


WEIGHT - .3 LBS (.149)

4-2

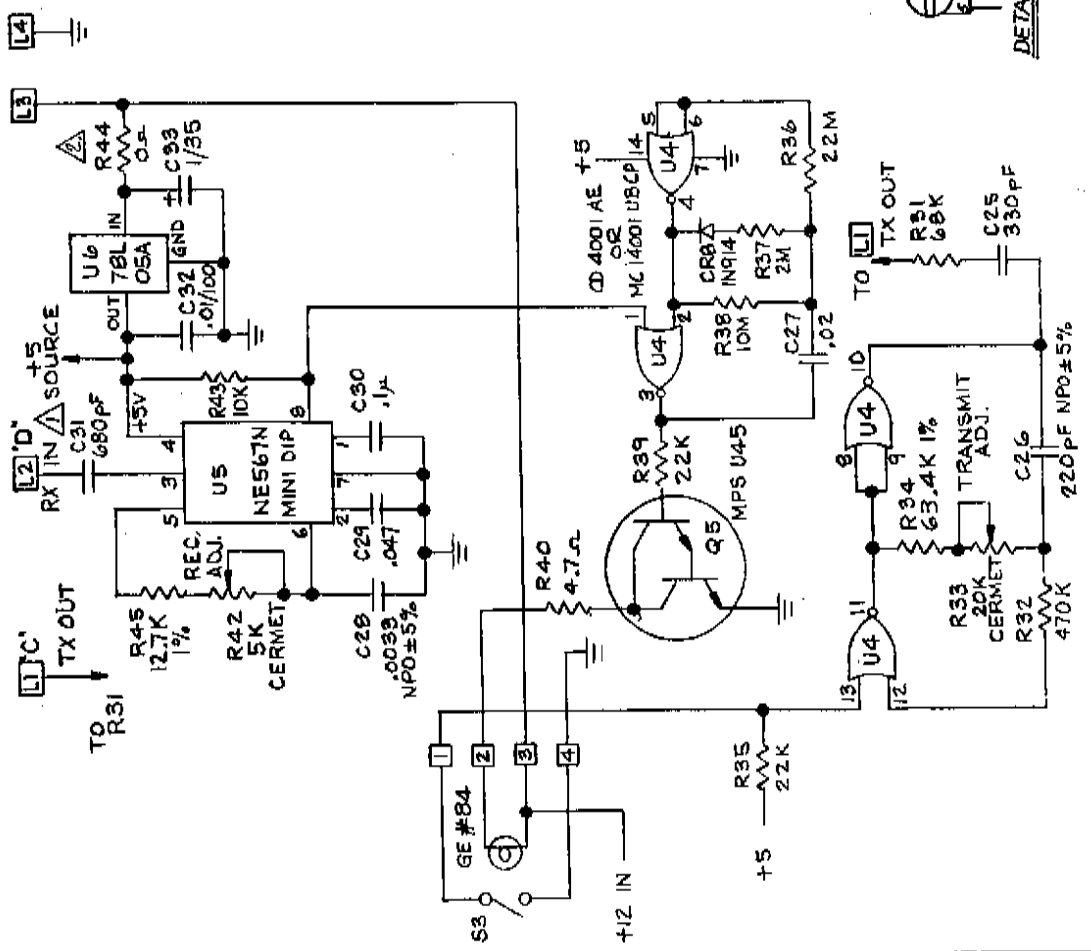
TITLE INSTALLATION DRAWING WM-300 - USER STATION		DATE 1-18-83	DRAWN BY B.MEZ	CHECKED BY B.MEZ
SHEET NO. C	TOTAL SHEETS 3	DWG. NO. 103210	SCALE 1:1	SHEET NO. 1081

ZONE	REV	DESCRIPTION	DATE	APPROVED
A	1	RELEASED	4/10/79	J.P.H.
B	2	ADDED NOTES $\Delta$ & $\Delta$	2/4/80	SUN
C	3	REV PER ECO #129	2-14-83	S.M.
D	4	REVISED PER ECO #1537	11-5-85	R.V.
E	5	CORRECTED VALUE OF R34	4-30-86	
F	6	ADDED NOTE 3 PER ECO #2466	7-24-87	
G	7	ADDED NOTE 3 PER ECO #2781	1-8-90	



- $\Delta$  GLUE SHOULD BE APPLIED TO LOWER RIGHT CORNER OF POT.
  - $\Delta$  FOR PHASE II USER STATIONS USE 620 $\Omega$  FOR R44.
  - $\Delta$  320/501 SERIES; USE 680PF FOR C31.
- NOTES: UNLESS OTHERWISE SPECIFIED.

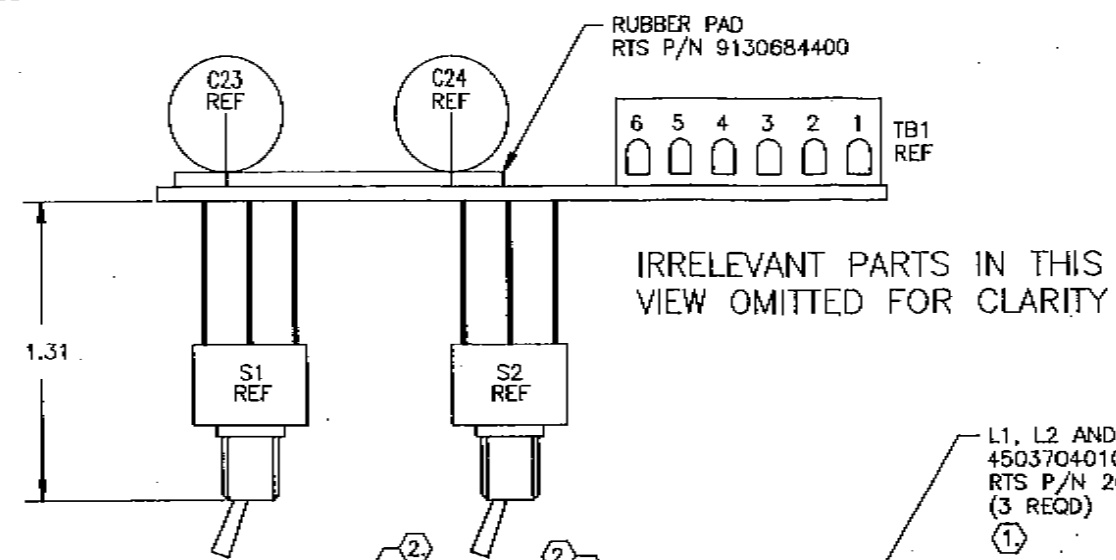
CONTRACT NO.	PRODUCT LINE	RTS SYSTEMS
APPROVALS	DATE	NO. HOLLYWOOD, CA.
DESIGNED	DATE	SERVICING DIAGRAM, LIGHT SIGNALING
CHECKED	DATE	CIRCUIT CC-185L, PHASE THREE
DATE	SCALE	CONFIGURATION
2/14/83	1:1	SIZE PER INCH
		DWG. NO.
		SD1470
		REV. F
		SHEET



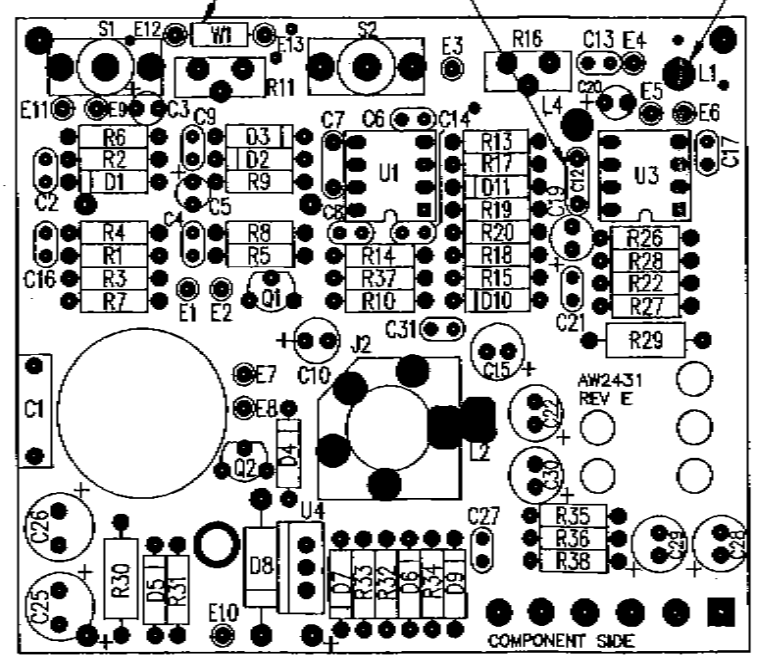




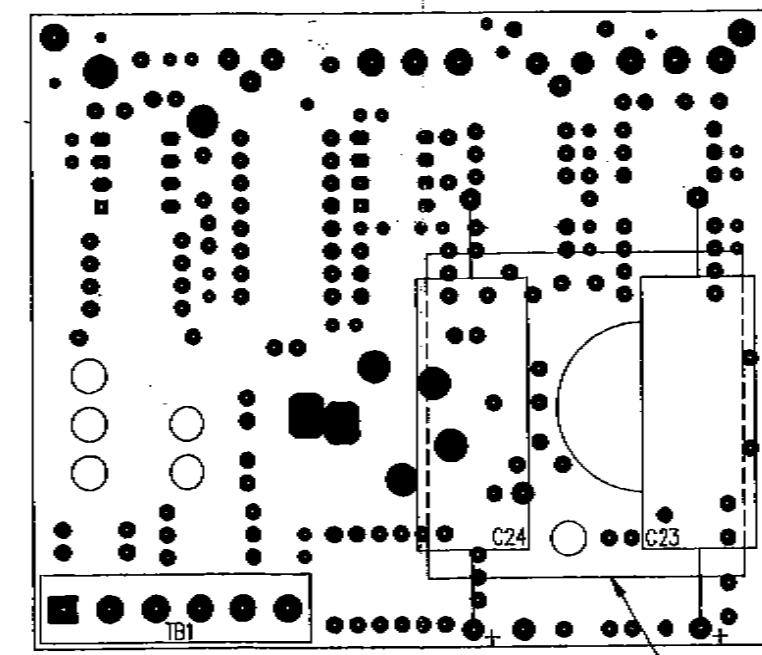
REVISIONS				
ZONE	REV	DESCRIPTION	DATE	APPROVED
	E	REV AND REDRAWN TO COMPLY WITH ARTWORK ECO2986 RKB	9/12/90	
	F	CHGD NOTE 2 PER ECO#3298 RTC	2/5/91	
	G	REVISED PER ECO#2986 RTC	2/20/91	<i>G. Brown</i>



L1, L2 AND L4  
4503704010300 LT SOCKET (CAMBION)  
RTS P/N 2019000100  
(3 REQD)  
①



COMPONENT SIDE

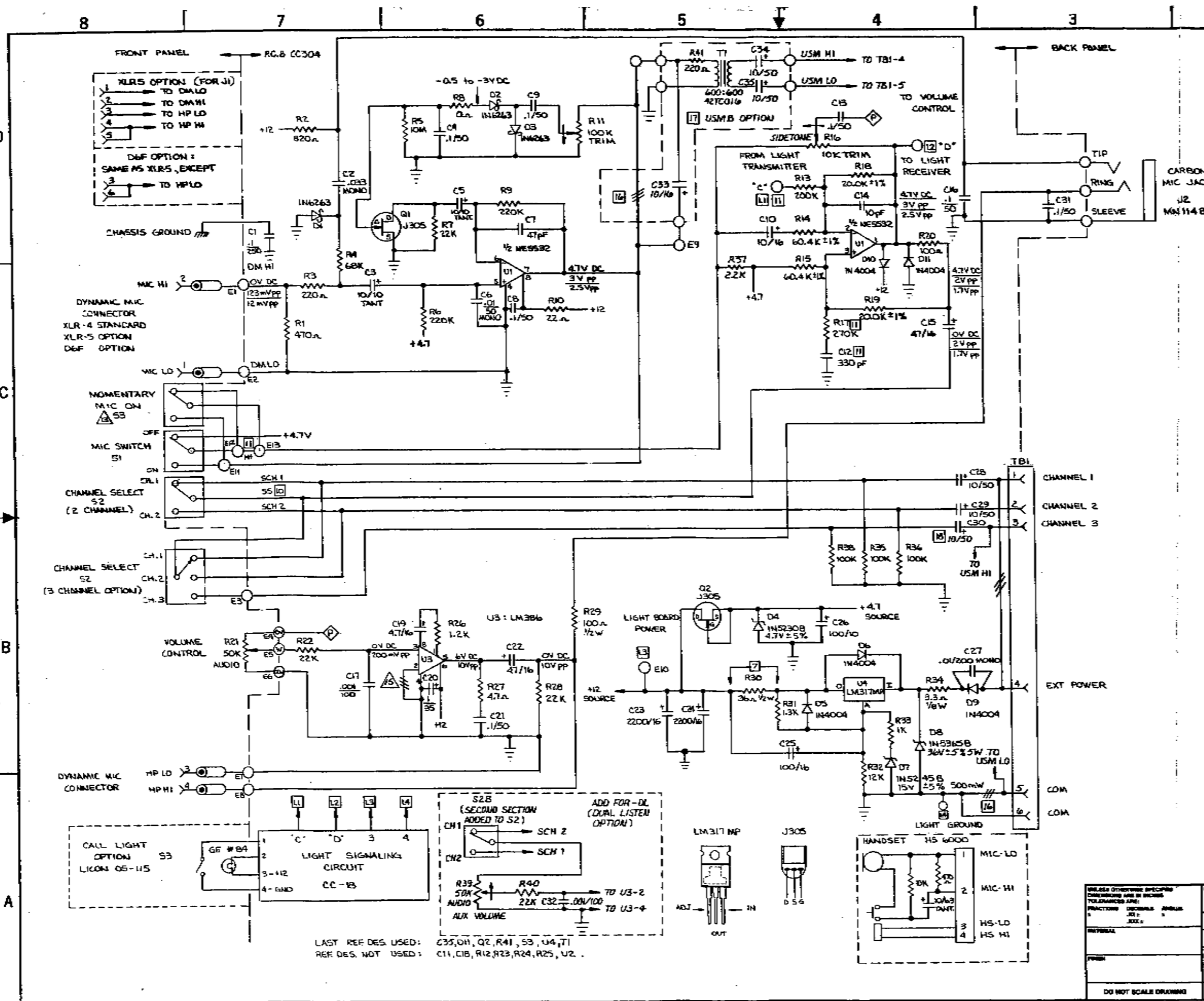


CIRCUIT SIDE

- NOTES:**
- ① INSTALL L1, L2 AND L4 FROM FAR SIDE TO MOUNT OPTIONAL LIGHT BOARD.
  - ② INSTALL C12 AND W1 FOR UNITS WITH CALL LIGHT OPTION (-L) ONLY.

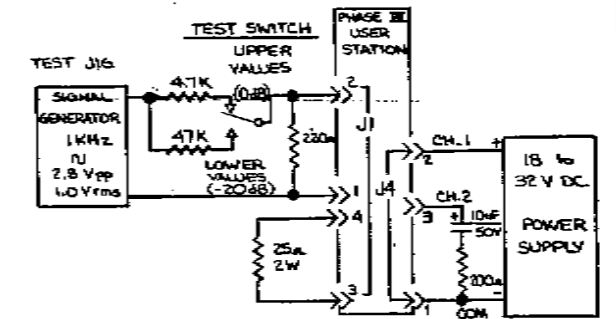
UNLESS OTHERWISE SPECIFIED REMOVE ALL BURRS & BREAK SHARP EDGES HOLE TOLERANCES PER ANSI B94.11-1987, R1972 DIMENSIONS ARE IN INCHES TOLERANCES ARE: FRACTIONS ±1/16 DECIMALS X ±.080 XX ±.030 XXX ±.010		CONTRACT NO.		RTS SYSTEMS BURLINGAME, CALIFORNIA, USA	
		APPROVALS	DATE	ASSEMBLY-P.C.B., MODEL WM300 & WM300L	
NEXT ASSY	USED ON	DRAWN R.K. BOOTH	9/12/90		
APPLICATION		MATERIAL	ISSUED	SCALE 2/1	SHEET 1
		FINISH		DRG NO. AS2432	





REV	DESCRIPTION	DATE	APPROVED
D	REDRAWN WITHOUT CHANGE	9-13-83	
E	ADDED NOTE 14 PER ECO 1865	1-28-86	
F	REMOVED J3 & J4 AND INFO ASSOCIATED WITH THEM PER ECO # 1830	2-18-87	
A5	ADDED -DL OPTION PER ECO # 2163	3-14-88	
H	ADDED USMB OPTION & NOTES 16, 17 & 18 PER ECO # 2258	8-8-88	
J	ADDED EN 512 & 513 PER ECO # 2406	2/21/91	J. Brown

- 18 REMOVE C30 FOR USMB OPTION.
- 17 ADD FOR USMB OPTION.
- 16 CUT TRACE FOR USMB OPTION.
- 15 CUT TRACE FOR -DL (DUAL LISTEN OPTION).
- 14 FOR SINGLE CHANNEL OPTION (OPTION CODE "Z"), REMOVE S2 & JUMPER JS TO SCH 1.
- 13 S3 IS STANDARD & OMITTED FOR WM300-L OPT.
- 12 THIS DRAWING DERIVED FROM SD1464, REV E.
- 11 ADD FOR CALL LIGHT (L) OPTION.
- 10 CALL LIGHT OPTION TEST DATA: 20.000 ± 0.1000 KHZ AT 1.0VPP MEASURED AT THIS POINT.
- 9 TEST J16 AND TEST SET UP FOR VOLTAGE READINGS. SET CHANNEL SELECT FOR CHANNEL 2.



TEST FREQUENCIES: 100 Hz, 1KHz AND 10KHz (±3 dB)  
 SET LIMITER POT WITH TEST SWITCH IN O&B POSITION AND FREQUENCY AT 1KHz. VOLUME POT AT MIN.

- 8. ALL TEST VOLTAGES AND CURRENTS: ± 10%.
  - 7. QUIESCENT CURRENT: 17 mA (NO "L" OPTION)  
 QUIESCENT CURRENT: 27 mA (WITH "L" OPTION)  
 DYNAMIC CURRENT: 20 TO 40 mA ADDITIONAL
  - 6. OPTIONS AND MNEMONICS ARE EXPLAINED ON THE OPTION USE, AND ON THE OPTION DETAIL SHEET.
  - 5. CUTTABLE TRACES (USED FOR OPTIONS) ARE SHOWN: ##
  - 4. THIS DRAWING APPLIES TO THE FOLLOWING USER STATION OPTIONS: USMB, XLS, D6F, L, LP, DL, SCH.
  - 3. THIS DRAWING APPLIES TO THE FOLLOWING USER STATION MODEL NUMBERS: WM300, WM300-L
  - 2. CAP. VALUES ARE SHOWN: MICROFARADS / VOLTS.
  - 1. ALL RESISTORS ARE CARBON FILM, 1/4WATT, ±5%.
- NOTES: (UNLESS OTHERWISE SPECIFIED)

LAST REF DES USED: C33, D11, Q2, R41, S3, U4, T1  
 REF DES. NOT USED: C11, C18, R12, R23, R24, R25, U2.

CONTRACT NO.		RTS SYSTEMS	
TW SYSTEM		BURBANK, CALIFORNIA	
APPROVALS	DATE	SCHEMATIC DIAGRAM, WALL MOUNT USER STATION, MODELS WM 300 & WM 300-L	
DESIGNED		SIZE	DATE
DRAWN		D 60572	SD 2386
CHECKED		SCALE	SHEET 1 OF 1
APPROVED		DO NOT SCALE DRAWING	

