TECHNICAL DATA PACKAGE

MODEL BP320

Portable Belt User Station

RTS™

9300-3507-00 Rev A 1/95

TABLE OF CONTENTS

SECTION 1: DESCRIPTION & SPECIFICATIONS

1.1 DESCRIPTION

The Model BP320. a portable belt pack stereo 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 BP320 Block Diagram, Figure 1-2, illustrates a user station functional components, input/output connections and controls.

The BP320 User Station has the following functional components:

1) a microphone preamplifier with limiter,
2) an electronic microphone switch,
3) two electronic channel delegate switches
4) two "bilateral current source" line drivers,
5) two listen volume controls (dual concentric),
6) two headphone amplifiers,
7) a stereo/mono switch and
8) a channel selector/talk delgate 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. The microphone switch transfers the signal to the two electronic talk switches. These two switches each drive a bilateral current source for channels 1 and 2 respectively. A "bilateral current source" adds signal to the line without affecting any signals already on the line. The channel selector switch selects on which channel(s) the user will talk and listen. The BP320 has the capability to talk on either or both channels without connecting the channels together. Each "bilateral current source" also extracts the listen signal from its line and sends it to the respective headphone amplifier and volume control. Some of the user's own voice signal ("sidetone") is also fed to the headphone amplifier. Each headphone amplifier output drives the user's headphones. The monaural switch allows a combined signal to be fed to each of the headphone amplifiers so that a single earphone can hear both channels.

   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 BP320 call light option works in a special way: Thr transmitted call light signal follows the channel delegate switch and may appear on either or both channels. A call light signal on either channels triggers the BP320 call light receiver.

The BP320 User Station has four input/output connectors:

1) DYNamic MICrophone type HeaDSeT or handset.
2) Line INPUT (ties the station to the intercom line.)
3) LOOP/EXTension (allows another station to access the line through the first station), (also called loop-through).
4) Accessories/External Controls allows:
   1) Remote mic switch (or foot switch)
   2) Local powering, and
   3) Stereo program input.

The BP320 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 dual concentric headphone VOLUME control.
5) CALL LIGHT switch/indicator (Call Light Option).

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)

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 (20 to 40 dB) improve communication in high ambient noise environments, and allow the user to use the heaphones 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 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 (.14 m).
-Separate cables, shielded twisted pair in each:
50 feet (15.24 m).
-Balanced microphone input:
up to 100 feet (30.48 m).

1.3 BP320 SPECIFICATIONS

Input DC voltage:	20 to 35 volts DC, operating from -200 to +36 volts DC without damage
DC Current	
Quiescent	10 to 40 milliamps
Operating	50 milliamps, typical (w/25 ohm headphones) 100 milliamps, typical(w/8 ohm speaker) 75 miliamps typical
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 dBu Ten Unit: -67 dBu
Microphone Preamplifier	
Input impedance	470 ohms
Source Impedance	200 ohms, nominal
Maximum Input Level	150 millivolts
Voltage gain:	54 dB
Frequency Response	100 Hz to 10,000 Hz, ±3dB

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.
   Portable 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 the 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 BP320 receives electrical power from either:

1) A system power supply (26 to 32 volts DC on line connector pins 2 (+) and 1 (com) (2 channel operation) or
2) A local power supply option (12 to 18 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 BP320 current requirements range from 20 to 50 mA; BP320-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 (804.67 m). Typical operating distance for one BP320 station is 1 mile (1.609 km) using a normal #22 AWG conductor size; for a BP320-L, 3/4 mile (1.207 km).

2.3 ELECTRICAL INSTALLATION/SIGNALS

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

Number of Channels	Number of Conductors
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 individually shielded twisted pair of at least #22 gauge wire, such as Belden #8723 for 2 channels. For 3 channel installations using XLR type connectors, 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 terminals 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 channel. Connect the shield to system common **but do not tie the shield to chassis, earth or connector shell ground.**

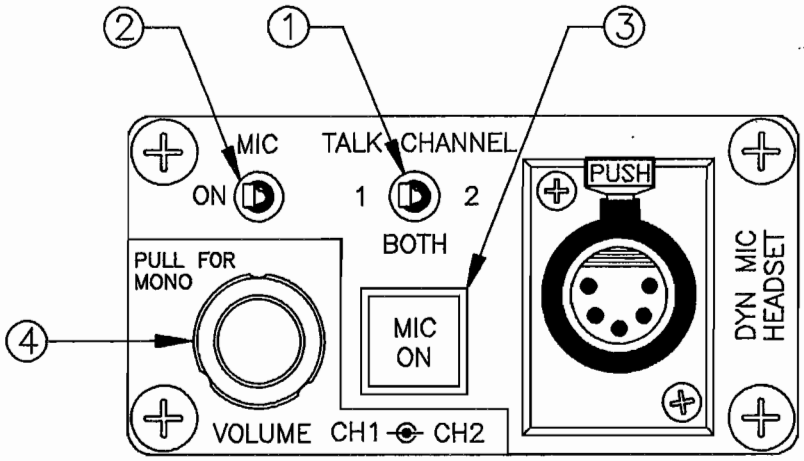
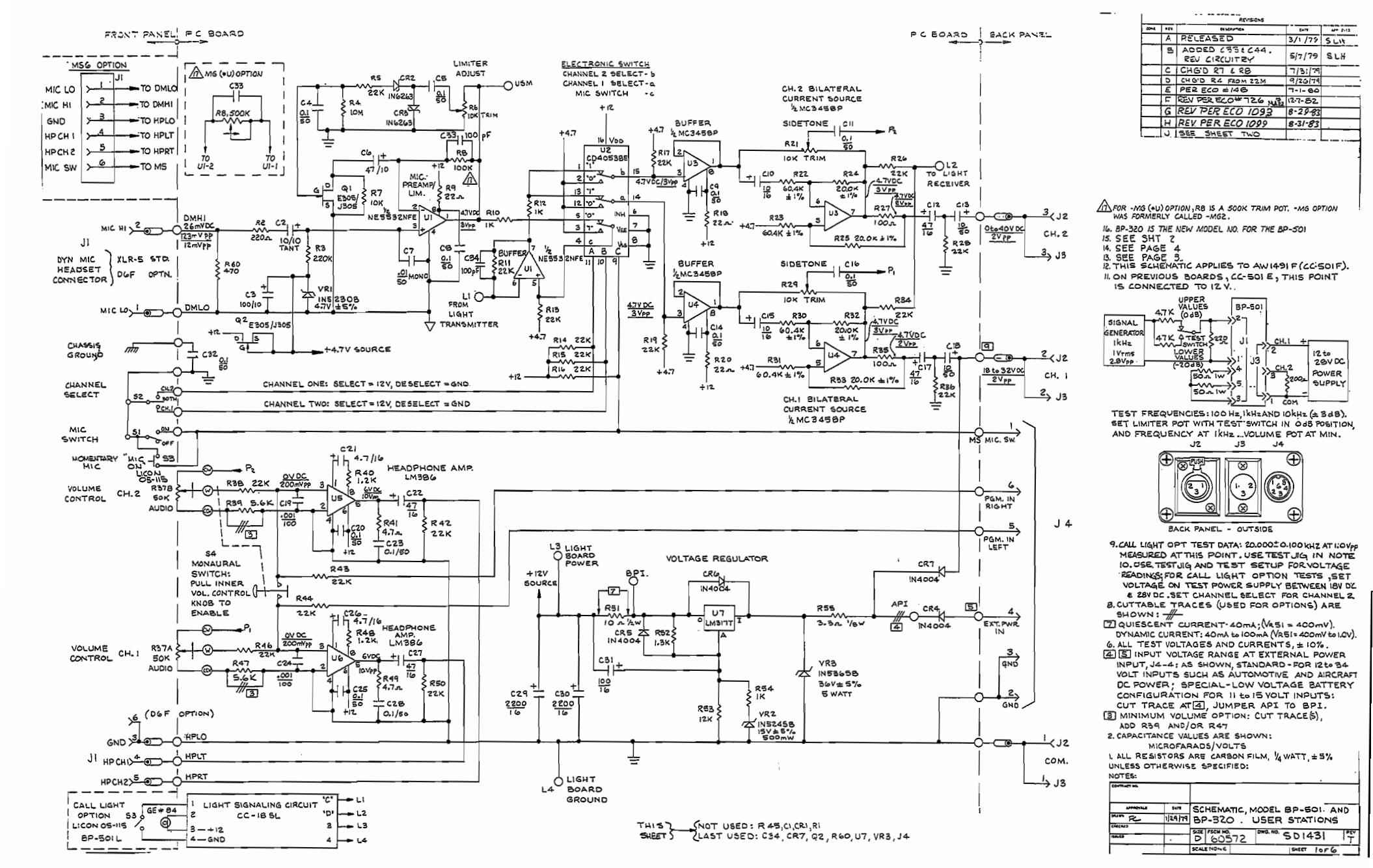


Figure 3-1
Front Panel

SECTION 4: LIST OF DRAWINGS

RTS Document No.	Title
AS1428	Assembly Diagram, P.C.B CC-501 Layout
SD1431	Schematic Diagram, Model BP501 & BP320 User Stations3
SD1470	Servicing Diagram, Light Signalling Circuit, CC-18SL, Phase 3 Configuration



REVISIONS				
ZONE	REV	DESCRIPTION	DATE	APP.
	A	RELEASED	3/1/79	SLH
	B	ADDED C33 & C44. REV CIRCUITRY	5/7/79	SLH
	C	CHG'D R7 & R8	7/31/79	
	D	CH'G'D R4 FROM 22M	9/20/79	
	E	PER ECO #146	7-1-80	
	F	REV PER ECO #726	12-7-82	
	G	REV PER ECO 1093	8-29-83	
	H	REV PER ECO 1099	8-31-83	
	J	SEE SHEET TWO		

⚠7 FOR -MG (•U) OPTION, RB IS A 500K TRIM POT. -MG OPTION WAS FORMERLY CALLED -MG2.

16. BP-320 IS THE NEW MODEL NO. FOR THE BP-501
15. SEE SHT 2
14. SEE PAGE 4
13. SEE PAGE 3
12. THIS SCHEMATIC APPLIES TO AW14911 F (CC-501F).
11. ON PREVIOUS BOARDS, CC-501 E, THIS POINT IS CONNECTED TO 12 V..

TEST FREQUENCIES: 100 Hz, 1kHz AND 10kHz (± 3dB). SET LIMITER POT WITH TEST SWITCH IN 0dB POSITION, AND FREQUENCY AT 1kHz ... VOLUME POT AT MIN.

9. CALL LIGHT OPT TEST DATA: 20.000±0.100 kHz AT 1.0Vpp MEASURED AT THIS POINT. USE TEST JIG IN NOTE 10. USE TEST JIG AND TEST SETUP FOR VOLTAGE READINGS; FOR CALL LIGHT OPTION TESTS, SET VOLTAGE ON TEST POWER SUPPLY BETWEEN 18V DC & 28V DC. SET CHANNEL SELECT FOR CHANNEL 2.
8. CUTTABLE TRACES (USED FOR OPTIONS) ARE SHOWN: ⫽
7 QUIESCENT CURRENT: 40mA; (VR51 = 400mV). DYNAMIC CURRENT: 40mA to 100mA (VR51 = 400mV to 1.0V).
6. ALL TEST VOLTAGES AND CURRENTS, ± 10%.
4 5 INPUT VOLTAGE RANGE AT EXTERNAL POWER INPUT, J4-4: AS SHOWN, STANDARD - FOR 12 to 34 VOLT INPUTS SUCH AS AUTOMOTIVE AND AIRCRAFT DC POWER; SPECIAL - LOW VOLTAGE BATTERY CONFIGURATION FOR 11 to 15 VOLT INPUTS: CUT TRACE AT 4, JUMPER API TO BPI.
3 MINIMUM VOLUME OPTION: CUT TRACE(S), ADD R39 AND/OR R47
2. CAPACITANCE VALUES ARE SHOWN: MICROFARADS/VOLTS
1. ALL RESISTORS ARE CARBON FILM, 1/4 WATT, ± 5% UNLESS OTHERWISE SPECIFIED:

NOTES:

CONTRACT NO.		
APPROVALS	DATE	SCHEMATIC, MODEL BP-501 AND BP-320 . USER STATIONS
DRAWN RL	1/29/79	
CHECKED		
ISSUED		SIZE D FSCM NO. 60572 DWG. NO. SD1431 REV T
		SCALE NONE SHEET 1 of 6