AHG9 AND AHG9, S2 LIU-3B LINE INTERFACE UNITS B8ZS (BIPOLAR EIGHT ZERO SUBSTITUTION) D4 CHANNEL BANK

DESCRIPTION

The LIU-3B line interface unit contains the clock and transmit-receive converters needed to interface the D4 channel bank to two bidirectional DS1 facilities. The LIU-3B unit provides optional B8ZS (bipolar eight zero substitution) line coding format or AMI (alternate mark inversion), the standard D4 format. The AMI was labeled ZCS (zero code suppression) on the earlier version LIU-3B. The LIU-3B is used in D4 Mode 3 operation only. Figure 1 shows the LIU-3B circuit board and Figure 2 shows the faceplates of the earlier and later versions of the LIU-3B.

This data sheet is reissued to include information useful when replacing an LIU-3 circuit pack with an LIU-3B circuit pack in a D4 channel bank. Revision arrows are used to identify significant changes.

B8ZS (Bipolar Eight Zero Substitution)

The B8ZS line coding format is used to provide 64-kb/s clear channel transmission over DS1 facilities. In the transmit direction, the B8ZS encoder substitutes the code 000V10V1 for each consecutive string of eight zeros. The Vs represent bipolar violations. In the receive direction, the B8ZS decoder converts the incoming 000V10V1 code back to eight zeros.

AMI (Alternate Mark Inversion)

The AMI format is the standard line format in which alternate logic 1 pulses have alternating polarities. Bipolar violations are not part of the line format. The ZCS code used with AMI is the standard D4 zero suppression technique which substitutes a 1 for the 7th bit of an eight bit zero byte or word. This is used for voice and voiceband data transmission and satisfies the ones density requirement of the DS1 line. The AMI line format does not allow 64-kb/s clear channel data transmission.

Equalization

This LIU-3B unit provides equalization for the transmit signal from digroups A and B to the DS1 cross-connect (DSX-1). Required equalization is selected by setting the appropriate positions on switch **S1**. ED-3C656-( ) G7 strap cards (zero loss) are required in the equalizer slots of the TPU (trunk processing unit) common unit. Refer to the **OPTIONS** section to set the LIU-3B equalizers.

FEATURES

The LIU-3B has the following features:

- Provides optional B8ZS line format for 64-kb/s clear channel transmission capability.
- Provides optional AMI standard line coding format.
- Contains integrated equalizers for digroups A and B for the bipolar signals transmitted to the DSX-1 cross-connect frame. ⏵This eliminates the need to order application specific equalizer cards for the D4 TPU circuit pack [two ED-3C656-( ) G7 strap cards are shipped with the LIU-3B]. ⏴
- Provides independent loopback capability on a digroup basis toward the DS1 line and/or toward the D4 channel bank.
- Provides options selectable on a per digroup basis.

OPTIONS

Faceplate options (Figure 2) are provided by pairs of pin jacks and recessed switches, one pair for each D4 digroup. The top pin jack and switch are for digroup B and the bottom for digroup A. The switch positions are labeled as follows:

- ESF/D4: *This rocker switch is not functional on either version of the LIU-3B.* However, it

is labeled **ESF/D4** on the earlier version of the LIU-3B.

- **B8ZS/AMI:** The B8ZS position provides the B8ZS line format for 64-kb/s clear channel transmission. The AMI (labeled ZCS on the earlier version) provides the standard D4 voice-frequency zero code suppression format. Clear channel 64-kb/s transmission is prohibited when AMI option is set.

- **LP2/OFF:** The LP2 position provides a loopback toward the T1 line. The OFF position removes the loopback.

- **LP3/OFF:** The LP3 position provides a loopback toward the D4 channel bank. ***However, it is recommended that a pin plug inserted into LP-A be used to provide this loopback. Always set the LP3 switch to the OFF position.***

Equalization is made by setting switch sections on **S1** located on the circuit board (Figure 1). Switch sections 1, 2, and 3 provide equalizer settings for digroup A. Sections 4, 5, and 6 provide equalizer settings for digroup B. Refer to Table A for the **S1** switch equalizer settings.

When replacing an LIU-3 with an LIU-3B, the application specific TPU equalizer cards must be replaced with the ED-3C656-( ) G7 strap cards. Equalizer settings made on switch **S1** of the LIU-3B must correspond to the replaced application specific equalizer cards. Use Table B to determine the corresponding equalizer settings.

REFERENCES

The following publications contain description, engineering, and maintenance information on the D4 channel bank.

PRACTICE	TITLE
365-170-000	D4 Channel Bank - (TOP)
365-170-100	D4 Channel Bank - Description
365-170-101	D4 Channel Bank - General Channel Unit Description
801-505-155	D4 Channel Bank Equipment - For Use With Digital Transmission Systems - Equipment Design Requirements - Common Systems
855-351-103	D1, D2, D3, and D4 Digital Channel Banks and D5 Digital Terminal System - Application Engineering - Carrier Engineering
855-351-105	D4 Channel Bank - Channel Units - Application Engineering

SCHEMATIC	TITLE
CPS-AHG9	LIU-3B Line Interface Unit Schematic

DRAWING	TITLE
SD-3C304-02	D4 Channel Bank - Application Schematic

PRECAUTIONS

The **LIU-3B** unit contains devices that are subject to damage or decreased reliability from static discharges. When handling the unit, proper antistatic measures should be taken. Refer to AT&T Practice 365-170-100 for detailed information about the handling of the D4 channel bank circuit packs.

REGIONAL TECHNICAL ASSISTANCE

Technical assistance for the D4 channel bank can be obtained by calling the Regional Technical Assistance Center at **1-800-225-RTAC**. This telephone number is staffed 24 hours per day.

WARRANTY

The terms and conditions of sale will include a five year warranty.

ISSUING ORGANIZATION

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TABLE A

EQUALIZER SETTINGS FOR LIU-3B

CABLE TYPE AND DISTANCE TO CROSS-CONNECT (FEET)		SWITCH S1 POSITIONS (NOTE)	
CABLE TYPE		DIGROUP A	DIGROUP B
750/1249	ABAM/TYPE 600	1 2 3	4 5 6
0 to 90	0 to 133	O O O	O O O
90 to 180	133 to 267	O O C	O O C
180 to 270	267 to 400	O C O	O C O
270 to 360	400 to 533	O C C	O C C
360 to 450	533 to 655	C O O	C O O

Note: O = Switch open (depressed toward OPEN)
C = Switch closed (depressed toward switch number)

▶ TABLE B ◀

EQUALIZER SETTINGS FOR REPLACED TPU EQUALIZER CARDS

EQUALIZER CARD TO BE REPLACED	CORRESPONDING SWITCH S1 POSITIONS (NOTE)	
EQUALIZER	DIGROUP A	DIGROUP B
	1 2 3	4 5 6
ED-3C655-( ) G1 or G6	O O O	O O O
ED-3C655-( ) G2 or G8	O O C	O O C
ED-3C655-( ) G3	O C O	O C O
ED-3C655-( ) G4	O C C	O C C
ED-3C655-( ) G5	C O O	C O O

Note: O = Switch open (depressed toward OPEN)
C = Switch closed (depressed toward switch number)

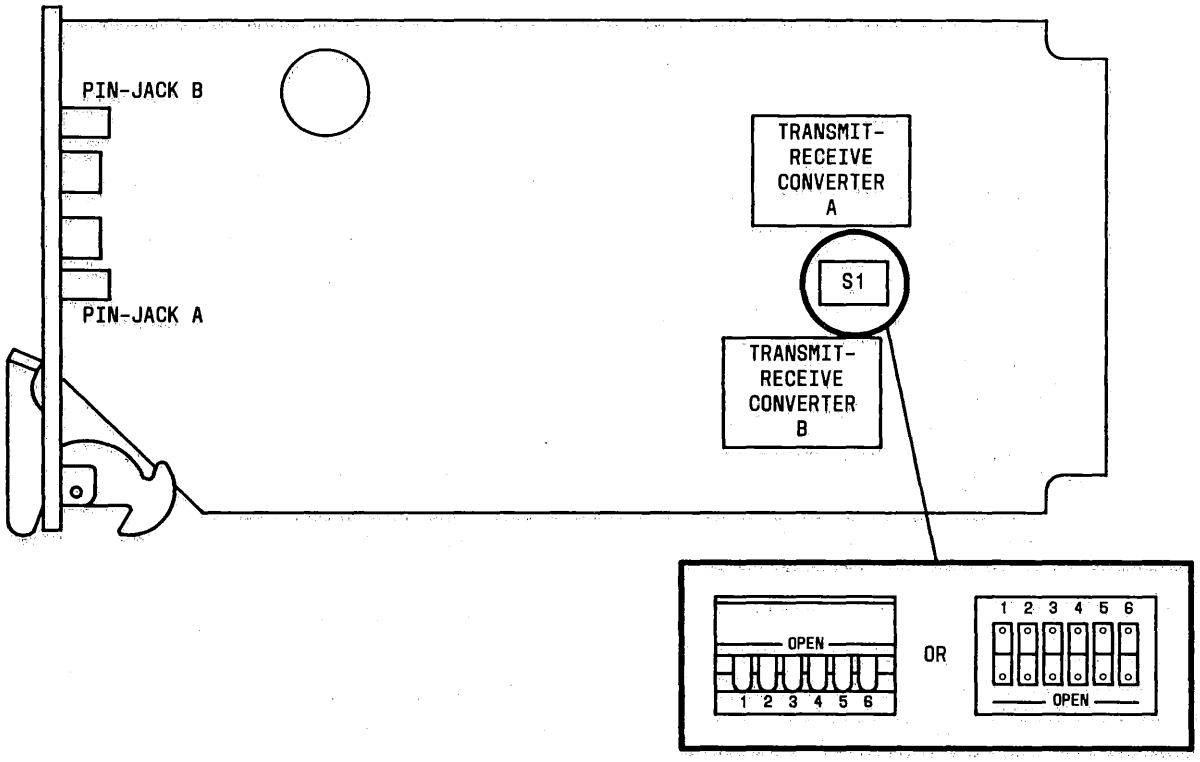
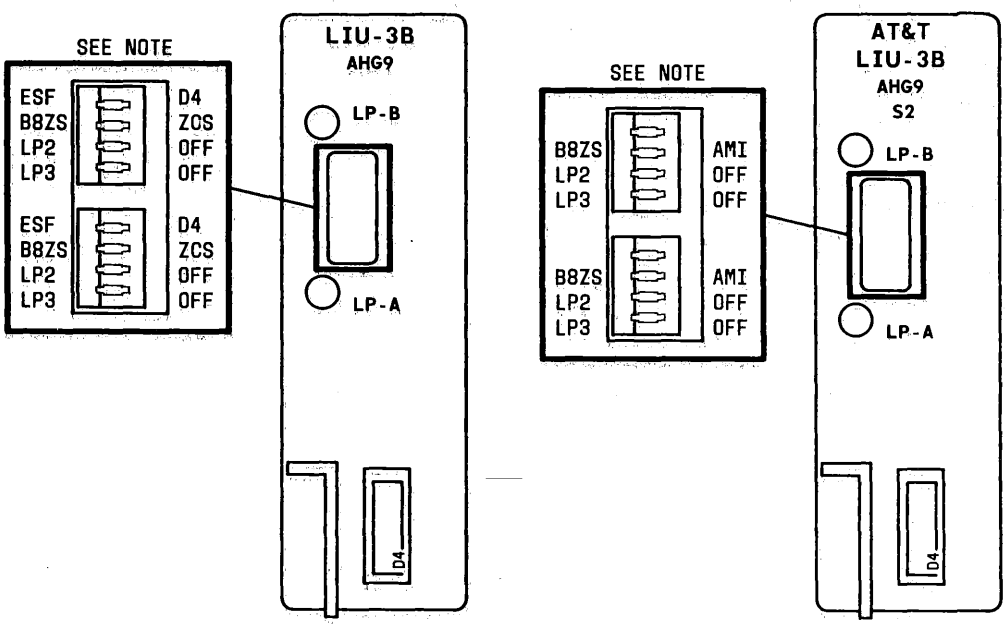


Figure 1—♦ LIU-3B Circuit Board ♦



NOTE: THE TOP ROCKER SWITCH POSITION
IS NOT FUNCTIONAL

Figure 2—LIU-3B Faceplates for AHG9 and AHG9, S2 Versions