

## "DIMENSION\*" PBX PERIPHERAL INTERFACE CIRCUIT

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**1. GENERAL**

1.01 This section furnishes description, installation, operation, and maintenance information for the Peripheral Interface Circuit (PIC) (Fig. 1).

1.02 The reasons for reissuing this section are listed below:

- Adds information for HN10B controller board
- Adds information for Performance Reporting Option Systems (PRO 500 and 150)

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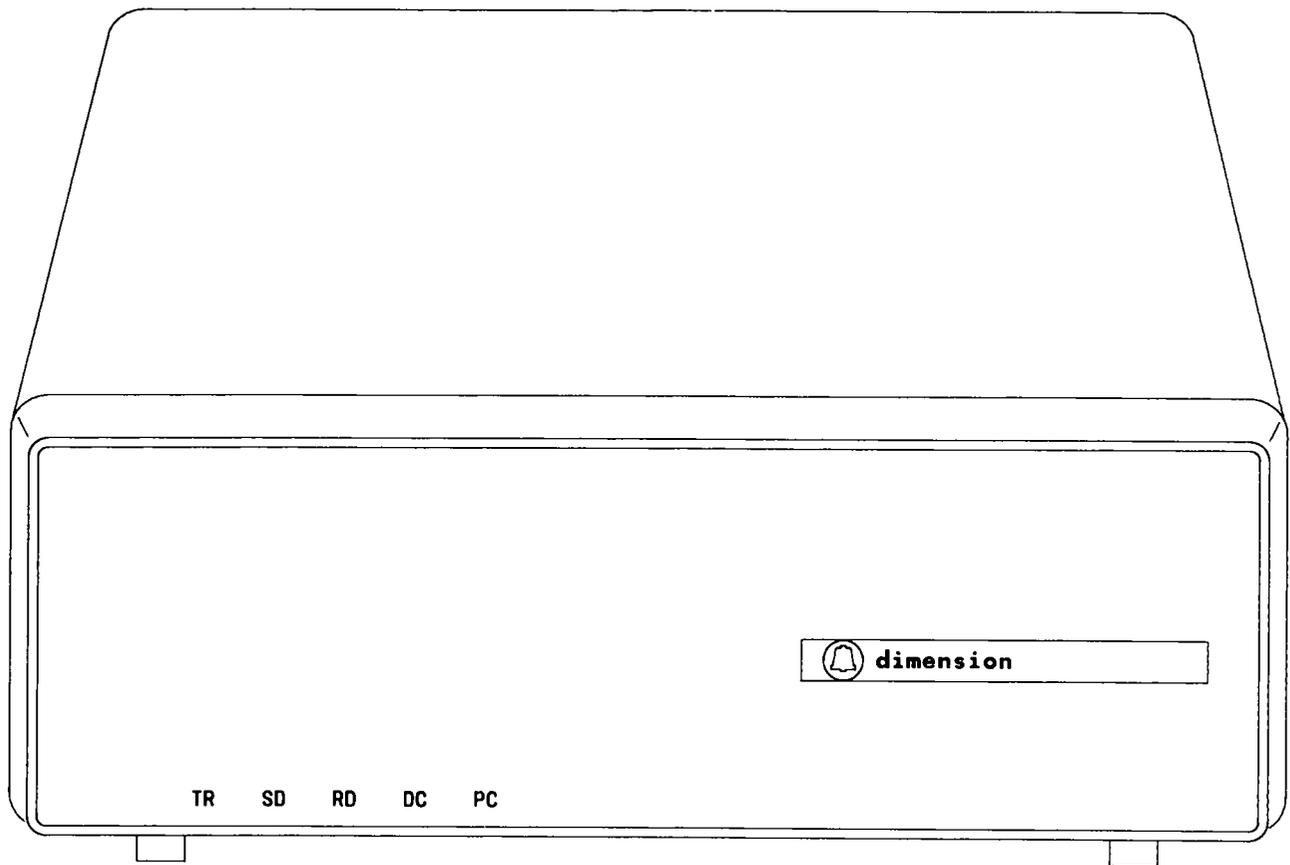


Fig. 1—Peripheral Interface Circuit

- Adds information for Voice Store and Forward Interface Systems
- Updates LC366 circuit pack to LC366B
- Updates HN11 controller board to HN11B
- Updates information associated with baud-rate select switch
- To rate HN9B controller board manufacture discontinued (MD)
- Removes information pertaining to Uninterruptible Power Service (UPS).

Revision arrows have been used to denote significant changes.

**1.03** This section is based on the drawings listed in Part 6. If this section is to be used with equipment or apparatus reflecting later issue(s) of the drawing(s), reference should be made to the SDs and CDs to determine the extent of the changes and the manner in which the section may be affected.

## 2. DESCRIPTION

### A. General

**2.01** The PIC is designed to be used with the DIMENSION 600 (formerly 400E), 2000, and Custom PBXs when configured with the Hospitality Communications System (hotel/motel) or the Hospitality Communications Management System (Feature Packages [FP] 9 and 11).

**2.02** The PIC converts data from the DIMENSION PBX to the Electronic Industries Association (EIA) Standard RS-232C format and converts data from the peripheral unit to data acceptable by the PBX.

**2.03** ♦The PIC functions as follows:

- PBX interface for the data set associated with the Traffic Service Position System (TSPS) which provides automatic quote service for long distance billing
- Communications Interface for Property Management System (CIPMS)
- Communications interface for the Performance Reporting Option (PRO) 500 data terminals
- Communications interface for the PRO 150 data terminals
- Communications interface for the Voice Store and Forward Interface System
- Interface for journal printers
- Interface for display unit associated with Energy Communication Service Adjunct (ECSA) system.♦

## B. Physical Description

**2.04** ♦**Caution:** *DIMENSION PBX systems equipped with J58882GA-type PIC units cannot be modified for use with J58882GB-1 units without first altering the system software.* The peripheral interface circuit is optionally available in three models:

- (a) The J58882GA-1, List 1 includes an HN9B (MD) controller board which has a processor operating at 0.9216 MHz. This unit must be used with PBX systems which have FP9 software prior to issue 1.0. However, the unit may be used with systems which have FP9 software of 1.0 or later issue.
- (b) The J58882GA-1, List 1 and 2 unit includes an HN10B controller board. This unit is identical to the J58882GA-1, List 1 unit except for the HN10B controller board (in place of the HN9B)

and the programming of the 16K erasable and electrically programmable read-only memory (EPROM) chip (A16) located on the controller board. This unit is used with PBX systems which have FP8 software of issue 2.0 or later, and are associated with the customer Management Information Systems (MIS), PRO 150 and 500.

(c) The J58882GB-1, List 1 unit includes an HN11B controller board which has a processor operating at 1.8432 MHz. This unit must be used with PBX systems which have FP11 software. However, the unit may be used with systems which have FP9 software of 1.0 or later issue. This unit may also be used with FP8 or FP11 systems which are associated with a Voice Store and Forward Interface System.♦

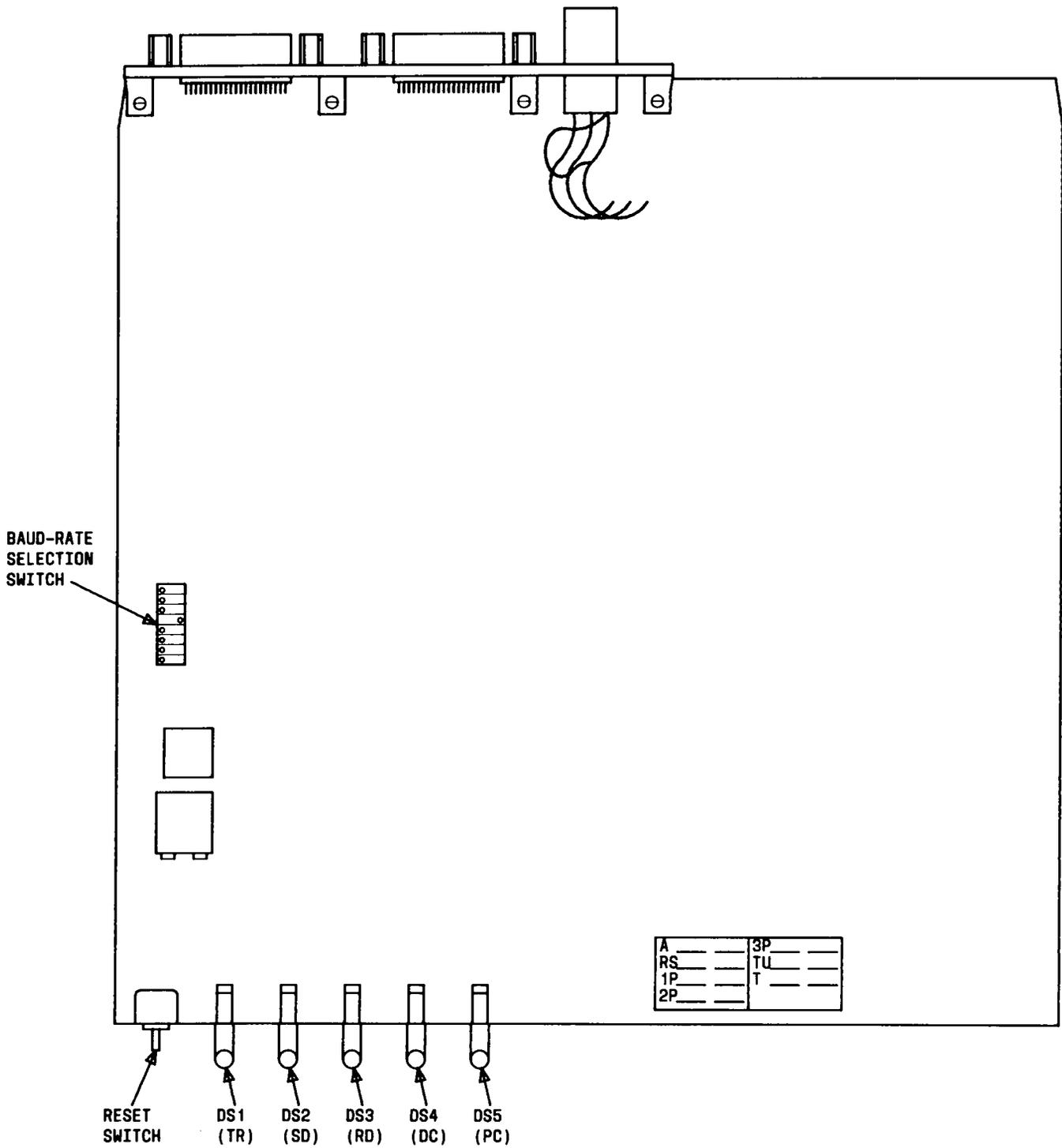
**2.05** The PIC consists of a controller board [HN9B (MD), HN10B, or HN11B], a power board (HP2), and an ac transformer housed in a modified 4800-type data set mounting. The data set mounting measurements are 292 mm (11.5 inches) wide, 89 mm (3.5 inches) high, and 279 mm (11.0 inches) deep. The PIC weighs approximately 6.8 kg (15 pounds) and is configured for desk mounting.

**2.06** The following is a description of the circuit packs used in the PIC.

(a) **Controller Board:** The HN9B (MD), HN10B, or HN11B (Fig. 2) provides the interface between the DIMENSION PBX low-speed data channel and a peripheral device. It contains an 8-bit microprocessor, a 16K of EPROM, 2K of RAM (random access memory), a 24-bit input/output device, a programmable communications interface, a bit rate generator for various baud rates, and EIA interface drivers and receivers. One HN9B (MD), HN10B, or HN11B is required in each PIC unit. A functional block diagram is shown in Fig. 3.

(b) **HP2—Power Board:** One HP2 is required in each PIC unit. The HP2 provides four regulated dc voltages for use by the controller board as follows:

- +5 Vdc at 1 ampere
- -5 Vdc at 50 milliamperes
- -12 Vdc at 250 milliamperes
- +12 Vdc at 250 milliamperes.



◆Fig. 2—HN9B (MD), HN10B, or HN11B Circuit Pack (Controller Board)◆

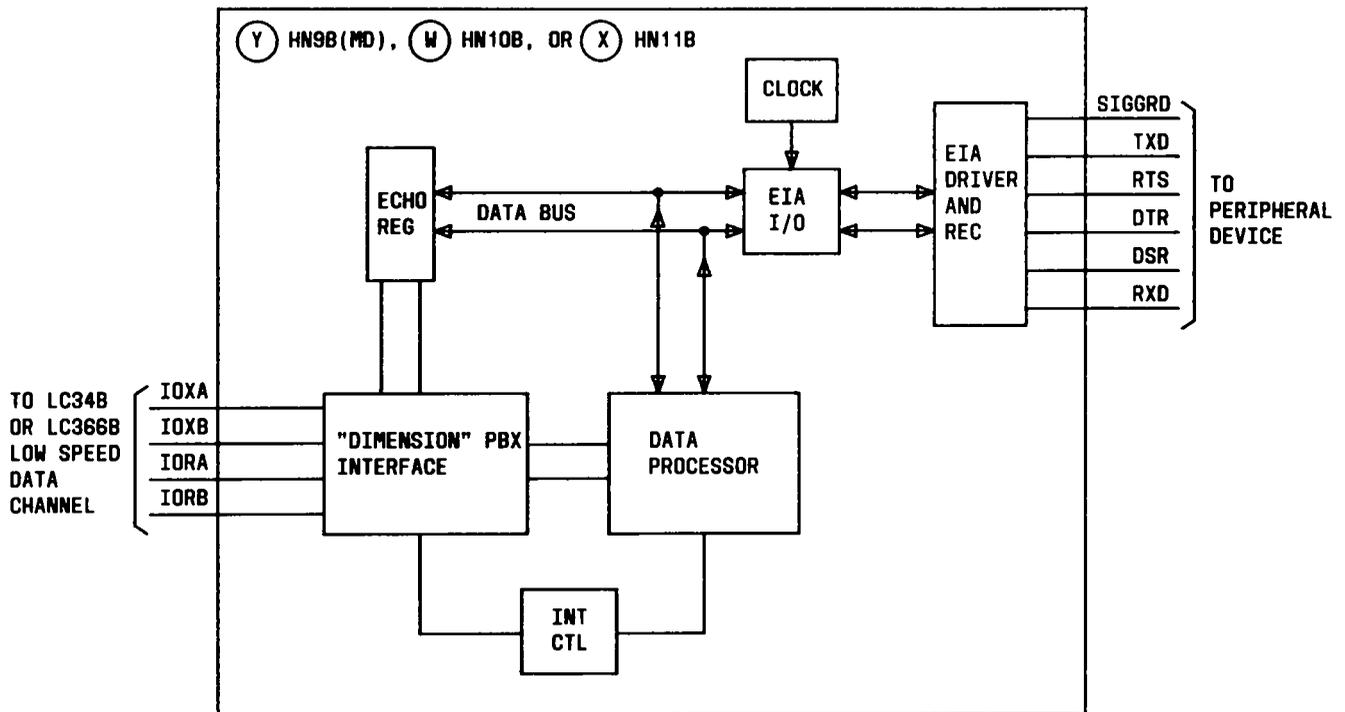


Fig. 3—Functional Block Diagram of HN9B (MD), HN10B, or HN11B Controller Board

**2.07** There are five lamps (LEDs [light emitting diodes]) mounted on the controller board. These lamps are visible at the front panel on the PIC (Fig. 1).

- (a) DS1 (**TR**, terminal ready) shows, when lighted, that the peripheral ready lead is high which signals a ready state.
- (b) DS2 (**SD**, send data) shows, by flashing, that data is being transmitted from the programmable communications interface.
- (c) DS3 (**RD**, received data) shows, by flashing, that data is being transmitted to the programmable communications interface.
- (d) DS4 (**DC**, data channel) shows, when on, the LC34B or LC366B data receiver is operational.
- (e) DS5 (**PC**, peripheral circuit) is a system "heartbeat." During normal unit operation, this lamp should be flashing at a frequency of 0.5 Hz if the HN9B (MD) or HN10B controller

board is used or at a frequency of 1.0 Hz if the HN11B controller board is used.

**2.08** A 3-wire, 3050-mm (10-foot) power cord is furnished with the PIC unit. This power cord mates with a standard 3-prong ac outlet. Commercial power of 120 Vac 60 Hz fused at a minimum of 1 ampere is required. Grounding of the PIC is accomplished through the third wire of the power cord.

### C. Operating Limits

**2.09** The working limits for the PIC for normal operation are listed as follows:

- (a) The input voltage should be between 105 Vac and 129 Vac.
- (b) The input voltage frequency should be within 57 Hz to 63 Hz.
- (c) The ambient temperature range is from 0°C (32°F) to 49°C (120°F).

- (d) The relative humidity is from 5 percent to 95 percent.

### 3. INSTALLATION

**3.01** Table A lists the data terminals that can be used with the PIC.

**3.02** Each PIC connects to the PBX via an LC34B or an LC366B data channel. When connected to a PIC system, the two LC34B channels (Fig. 4) and the first LC366B channel (circuit 0) (Fig. 5) must be wired for the low-speed option. The remaining three LC366B channels (circuits 1, 2, and 3) are fixed at low speed.



*Only one of switch positions 1 through 5, of the 8-position baud-rate switch, should be closed at any one time.*

**3.03** **Warning:** *Authorized grounded wrist strap must be worn in contact with skin to prevent electrostatic damage to circuit packs.* An 8-position dual in-line package (DIP) microswitch is mounted on the controller board (Fig. 2) for selecting hardware options during installation. To verify or set the switch positions, the board must be removed from the PIC (Table B). Switch positions 1 through 5 are used to select a baud-rate clock for the programmable communications interface. The remaining switch positions (6 through 8) are not used in the present design. A closed switch is represented by the position of the rocker arm on the DIP switch. If a DIP switch has **white** characters or dots, that particular switch is closed when the rocker arm is pressed **toward** the characters or dots.

**3.04** There are three connectors on the rear of the PIC (Fig. 6 and Table C). Connector **SR01** connects one data channel from the PBX using an 840608624 cable assembly. Plug **SX01** connects a 108F data set, or an 830A data auxiliary set equipped with a 108D data set (MD), to the PIC using an M25A cord. Connector **SX02** connects a printer or display unit to the PIC using an M25A or M25B cord. Connector **SX02** is also used for the CIPMS or Voice Store and Forward Interface System. The cable connecting the property management system to the PIC should be equipped with an EIA RS-232C type connector (DB-25-S).



*Only one peripheral device (for example, printer, data set, etc) can be connected to a PIC at any one time to ensure proper system operations.*

**3.05** Figure 7 shows the various connections from the PIC to the PBX and peripheral units. The 840608624 cable assembly connects the PIC and the PBX cross-connect field or the PIC and the optional data channel repeater(s). The length of the cable assembly must be specified when the PIC is ordered. The PIC must be within 300m (1,000 feet) of the PBX unless range extension is provided using data channel repeaters. The range may be extended to a maximum of 3350m (11,000 feet) using up to four range extension-equipped data channel repeaters connected in cascade (Fig. 8 through 11). Refer to Section 554-010-101 for more detailed information on the data channel repeaters.

**3.06** The data channel for the PIC is assigned in the system by using PROC 253, and the journal printers are assigned by using PROC 220. Refer to the appropriate Task Oriented Practice (TOP) for administration of these procedures (see Section 554-000-000).

**3.07** One PIC unit is required for each journal printer, ECS display, CIPMS, Voice Store and Forward Interface System, or interface for long distance billing. When used as an interface for long distance billing, a 108F data set or an 830A data auxiliary set equipped with a 108D data set is required for connection to the traffic service position system (TSPS) autoquote equipment (Fig. 7).

### 4. OPERATION

**4.01** A functional block diagram of the peripheral interface circuit is shown in Fig. 12.

**4.02** Data is received from the DIMENSION PBX through a low-speed LC34B or LC366B data channel. Each transmitted word consists of 17 bits (16 data plus even parity) and is transmitted at a 177K-bit data rate, each word taking about 110  $\mu$ s to send. As each bit is received, a data bit from the interface circuit is returned. An odd parity bit is returned instead of the received 17th bit. The data word received from the PBX consists of a 4-bit opcode, a 4-bit function code, and eight bits of data (Fig. 13). The opcode received determines the data word echoed back to the PBX. If the opcode is 1 or 2, the echo is

♦TABLE A♦

**DATA TERMINALS ASSOCIATED WITH  
PERIPHERAL INTERFACE CIRCUIT**

EQUIPMENT	USE
VICTOR* 5011-135 Friction-Feed Paper	Journal Printer
VICTOR 5011-463-135 Sprocket-Feed Paper	
TELETYPE† Model 4310 AAC Pin-Feed Paper	
ADDS- REGENT‡ 40 Cathode Ray Tube (MD)	Energy Communications Service or Energy Communications Service Adjunct
ADDS VIEWPOINT ‡ 60 Cathode Ray Tube	
108F Data Set	Interface for Long-Distance Billing
830A Auxiliary Set Equipped With 108D Data Set (MD)	
DEC§ PDP§ 11/70 or PDP 11/45	Communications Interface for Performance Reporting Option (PRO) 500 System
DEC PDP 11V03	Communications Interface for PRO 150 System
IBM¶ Series 1 Modified Audio Distribution System	Voice Store and Forward Interface System
Asynchronous Line Driver—2400 Baud	
Customer-Provided Equipment	Property Management System

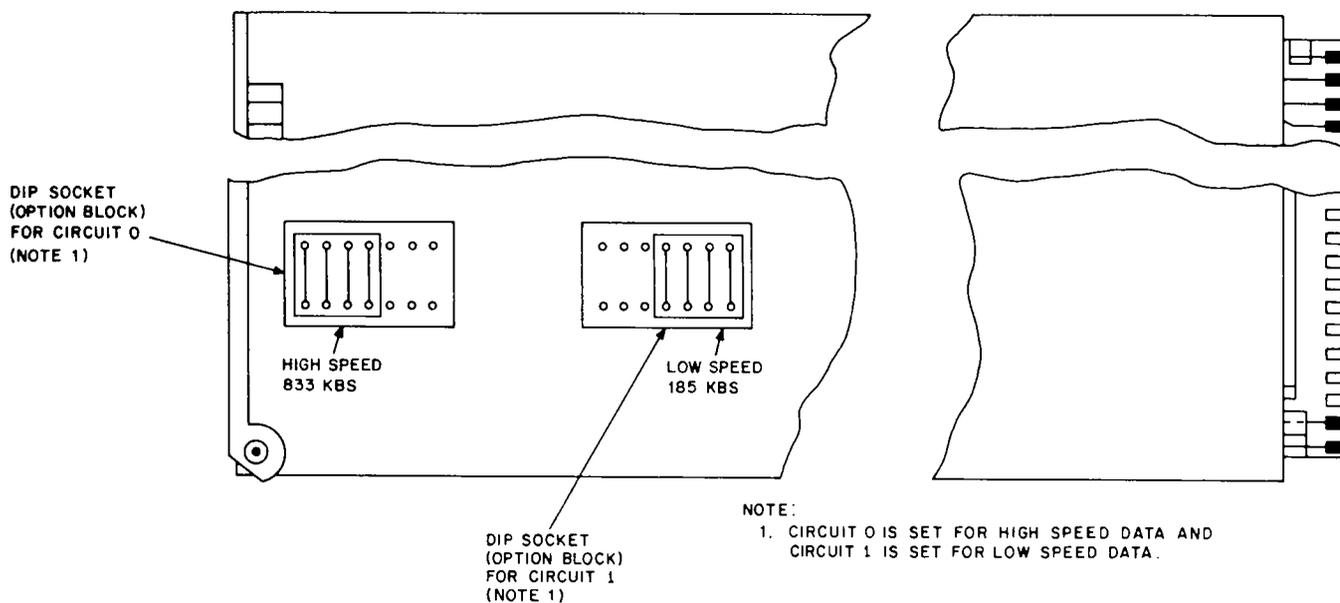
\* Registered trademark of Victor United, Incorporated.

† Registered trademark of Teletype Corporation.

‡ Registered trademark of Applied Digital Data Systems Corporation.

§ Registered trademark of Digital Equipment Corporation.

¶ Trademark of International Business Machine Corporation



◆Fig. 4—LC34B Circuit Pack◆

constructed from data available from the out-status register and the echo register. (The first four bits returned are always the opcode as received.) (See Fig. 13.) If the opcode is a 3, the echoed data is simply the received data transmitted back to the PBX. (The parity bit will always be inverted unless an erroneous parity bit was received.) The echo is returned bit by bit as the data is received; therefore, the echo transmission is completed in approximately one character time after the data word from the PBX has been received. Once all 17 bits have been received, the data channel receiver circuit enables a hardware interrupt to the PIC processor, signaling that data is available from the PBX. The 16-bit data word is read from the I/O device into RAM (temporary word store), and the receiver is then ready for another PBX transmission. The hardware and software interface has been designed so that within 100  $\mu$ s after a word has been received from the PBX, a new transmission may begin. Within a 200- $\mu$ s period, the first word will be stored in the RAM. This timing allows for a new word to be sent from the PBX to the PIC every 300  $\mu$ s for short periods of time. Data flow within the PIC is shown in Fig. 14.

**4.03** The echo data returned to the PBX is controlled by a logic selector which uses the received opcode to determine the source of data bits for the echoed reply. The status register and echo regis-

ter are controlled by the central processor and are updated by software commands. All other data movements in the system, from RAM to peripheral, from peripheral to RAM, etc, are controlled by the processor and are software routines.

**4.04** There is an automatic reset function. If the main controller program ever halts or branches erroneously, the microprocessor is given a reset signal. There is also available (on the controller board) a board-mounted switch (Fig. 15) which, when operated, forces the reset procedure to begin.

**4.05** The PIC has the capability of forcing itself into an internal loop-around condition. In this configuration, which is software controlled, all data transmitted from the programmable communications interface does not go to the EIA drivers. Instead, it is directed to the received data lead of the programmable communications interface. Therefore, any EIA signals sent from the programmable communications interface are looped around and returned to the programmable communications interface where they appear as received data to the controller.

**4.06** The PIC has a self-test program which is initiated during any manual or power reset. A flashing PC lamp indicates the PIC has passed the self-test and is available for PBX communication.

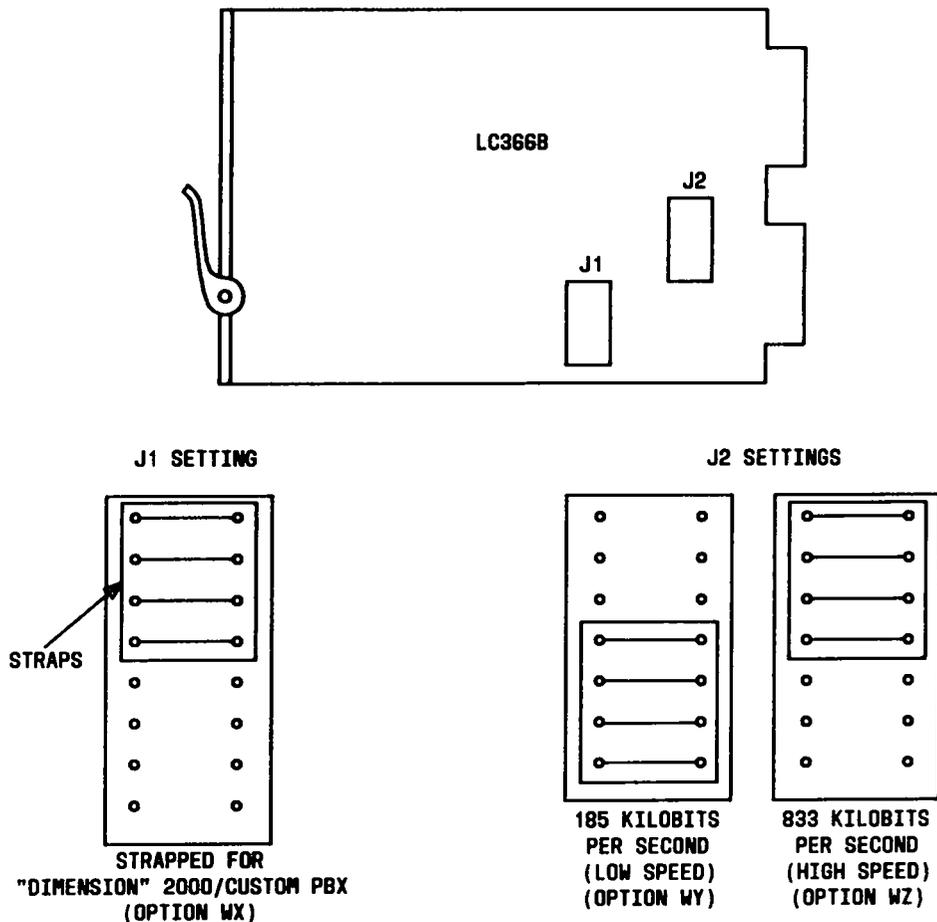


Fig. 5—LC366B Circuit Pack

5. MAINTENANCE

5.01 **Warning:** Authorized grounded wrist strap must be worn in contact with skin to prevent electrostatic damage to circuit packs. Maintenance of the PIC is limited to replacement of the circuit packs or line fuses. The procedures for testing and monitoring the PIC and peripheral devices are in PROCs 530, 531, and 537. Refer to the appropriate TOP document(s) for administration of these procedures (see Section 554-000-000).

5.02 When a trouble is indicated by the lamps on the controller board, manually operate the reset switch on the circuit board. The reset switch is located to the left of the lamps and can be reached after removal of the front panel (Fig. 15). If the trouble does not clear, refer to the appropriate TOP document.

6. REFERENCES

6.01 The following sections are associated with the PIC and, when available, may be used for additional information.

SECTION	TITLE
554-000-000	DIMENSION PBX—Numerical Index (Refer to this index for TOP Documents)
554-105-101	DIMENSION 600 PBX (formerly DIMENSION 400E PBX)—Preinstallation and Planning Information
554-111-101	DIMENSION 2000 and Custom PBX—Preinstallation and Planning Information

◆ TABLE B ◆

## BAUD RATE SELECTION

SWITCH POSITION CLOSED (NOTE)	BAUD RATE	DEVICE
1	9600	Data Switching
2	2400	ECS or ECSA CRT
3	1200	PMS (Equipment) or Voice Store and Forward
4	300	Printer
5	110	LDB (Data Set)

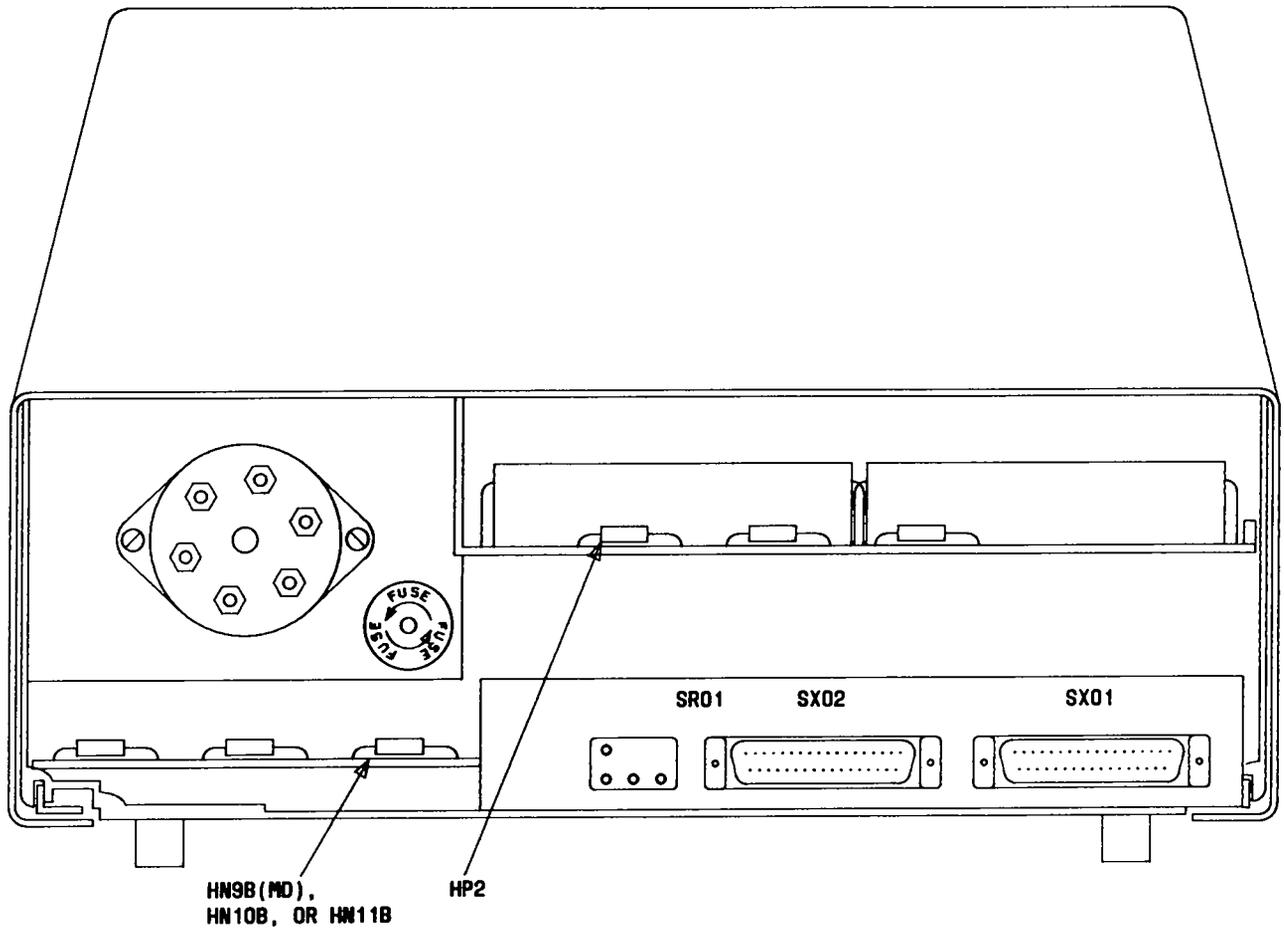
**Note:** Only one of switch positions 1 thru 5 should be closed at any one time.

To set the baud rate switch:

1. Disconnect all external cables from PIC.
2. Disconnect power cord.
3. Remove front and rear covers.
4. Remove cable between HP2 and controller board.
5. Loosen the two mounting screws on bottom of PIC unit. These two screws secure the controller board circuit pack to the chassis.
6. Slide the controller board circuit pack out of the chassis.

The baud rate switch is now exposed. To reassemble PIC, reverse Steps 1 through 6.

SECTION	TITLE	
		SD-1D250-01, Issue 1—Data Auxiliary Sets 830A, B, and C
554-191-100	DIMENSION PBX—Feature Document Reference Guide	SD-1E460-01, Issue 3D—Data Channel Repeater
591-028-100	Data Sets—108D and 108F Types—Description	SD-1E464-01, Issue 17AC—DIMENSION 600 PBX
591-816-200	Private Line Station Arrangements Using 830A and 830B Data Auxiliary Sets With 108- and 109-Type Data Sets—Installation and Connections	SD-1E467-01, Issue 6D—Peripheral Interface Circuit
		SD-1E480-01, Issue 75B—DIMENSION 2000 and Custom PBX.
		◆6.03 The following J-drawings are applicable and may be referred to when necessary:
6.02	The following schematic diagrams (SDs) and associated circuit descriptions (CDs) are applicable and may be referred to when necessary:	J58882GA-1, Issue 14W—Peripheral Interface Unit (0.9216 mHz Clock)
		J58882GB, Issue 3W—Peripheral Interface Unit (1.8452 mHz Clock).◆
	SD-73060-01, Issue 1—Data Set 108D Type	

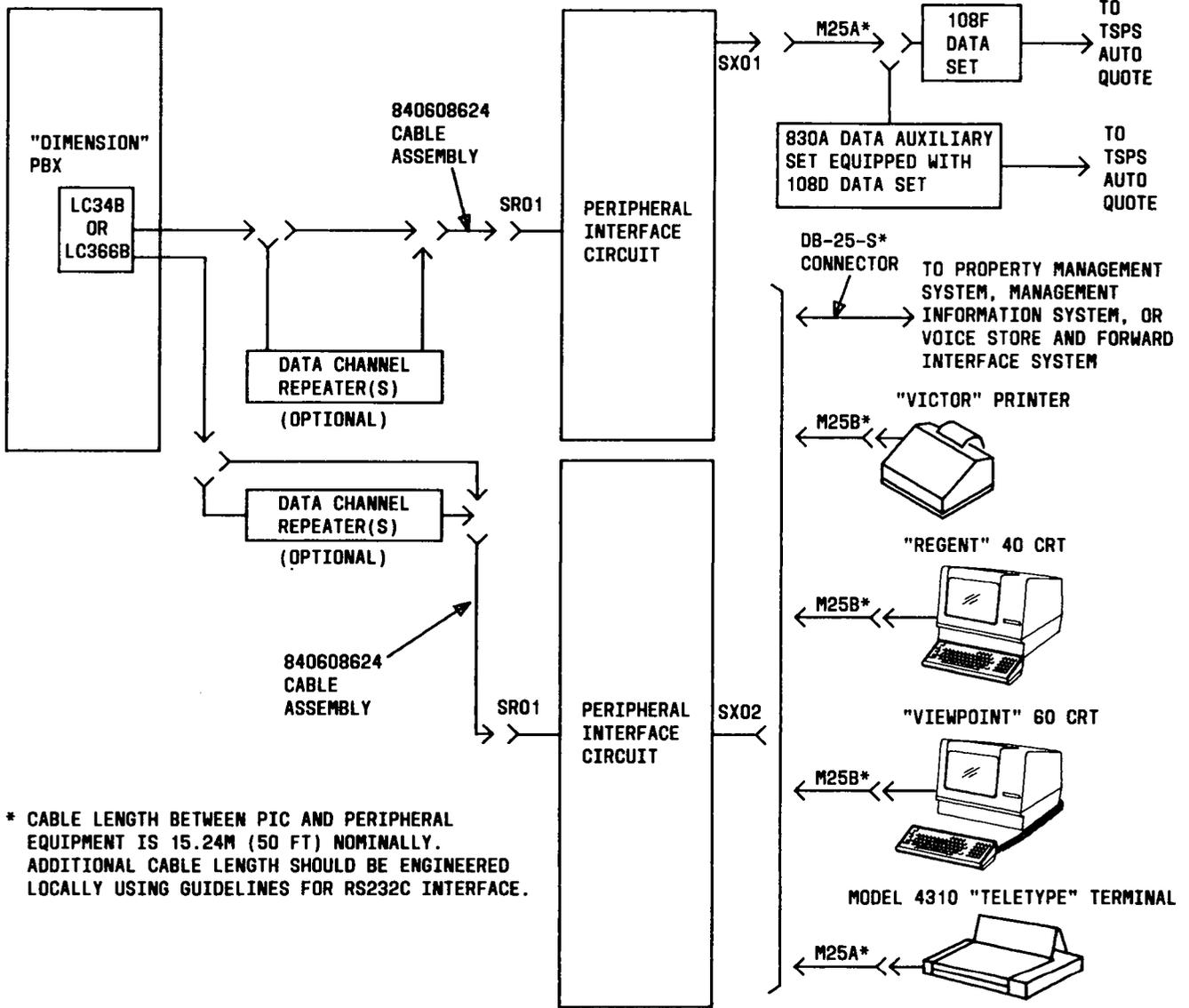


▶ Fig. 6—Peripheral Interface Circuit—Rear View (Cover Removed) ◀

TABLE C

## PIC CONNECTORS

CONNECTOR	PIN	LEAD DESIG	DESTINATION
SR01 (CONN BURNDY SMS6R01)	1	IOXB	BX01, BX02, GX01 GX02 (LC34B or LC366B)
	2	IOXA	
	3	IORB	
	4	IORA	
SX01 (Plug)	1	—	Data Set 108F  830A Data Auxiliary Set Equipped With 108D Data Set (MD)
	2	TXD	
	3	RXD	
	4	RTS	
	5	—	
	6	DSR	
	7	SIG GRD	
	8 20	DTR DTR	
SX02 (Connector)	1	—	VICTOR 5011 Printer TELETYPE 4310 ACC Printer  ADDS-REGENT 40 Cathode Ray Tube (MD)  ADDS "VIEWPOINT" 60 Cathode Ray Tube  CIPMS Interface MIS Interface  VSF Interface
	2	RXD	
	3	TXD	
	4	—	
	5	DTR	
	6	DTR	
	7	SIG GRD	
	8 20	DSR DSR	



\* CABLE LENGTH BETWEEN PIC AND PERIPHERAL EQUIPMENT IS 15.24M (50 FT) NOMINALLY. ADDITIONAL CABLE LENGTH SHOULD BE ENGINEERED LOCALLY USING GUIDELINES FOR RS232C INTERFACE.

◆ Fig. 7—Peripheral Interface Circuit Arrangements◆

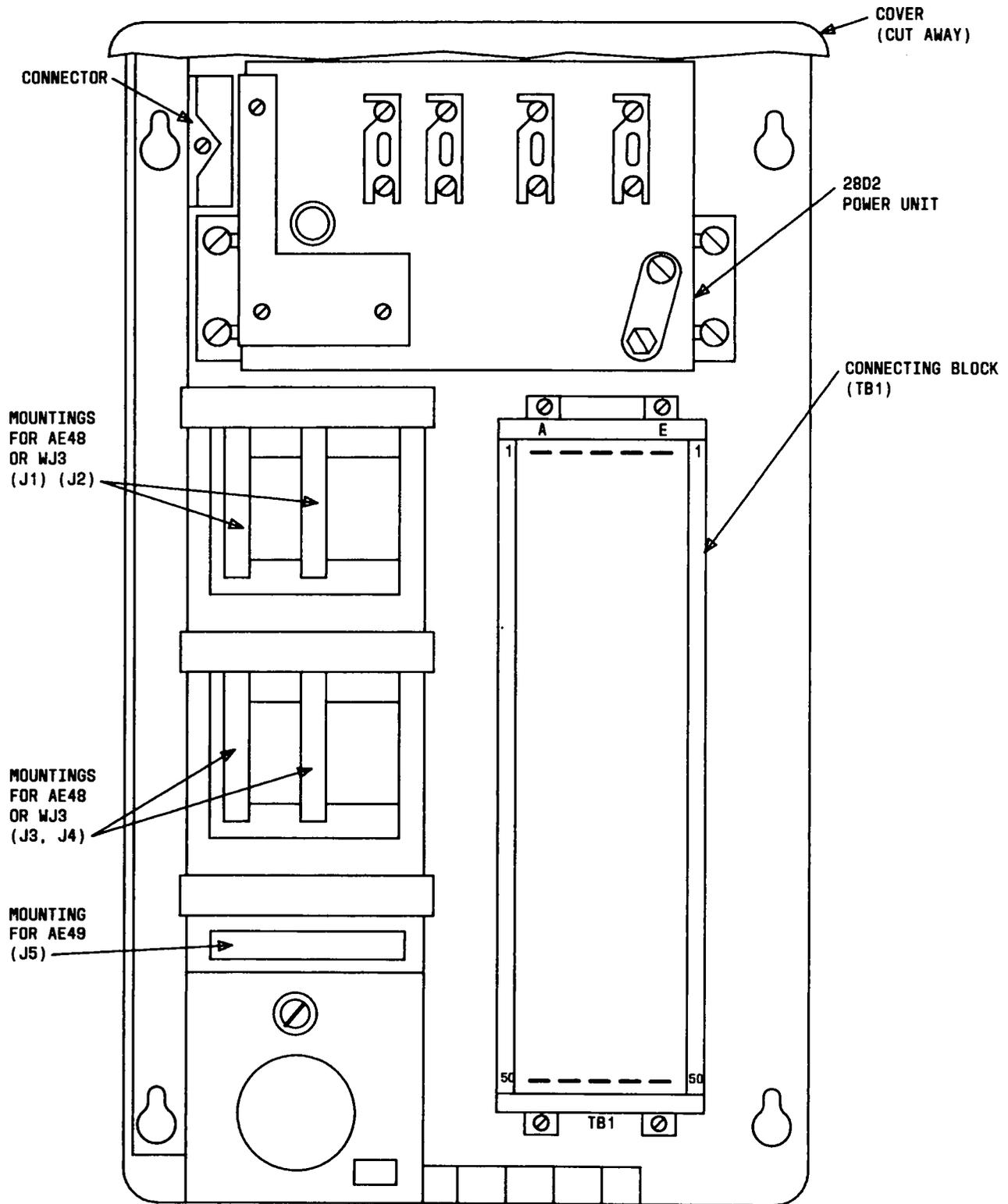


Fig. 8—Data Channel Repeater (J58879KC)

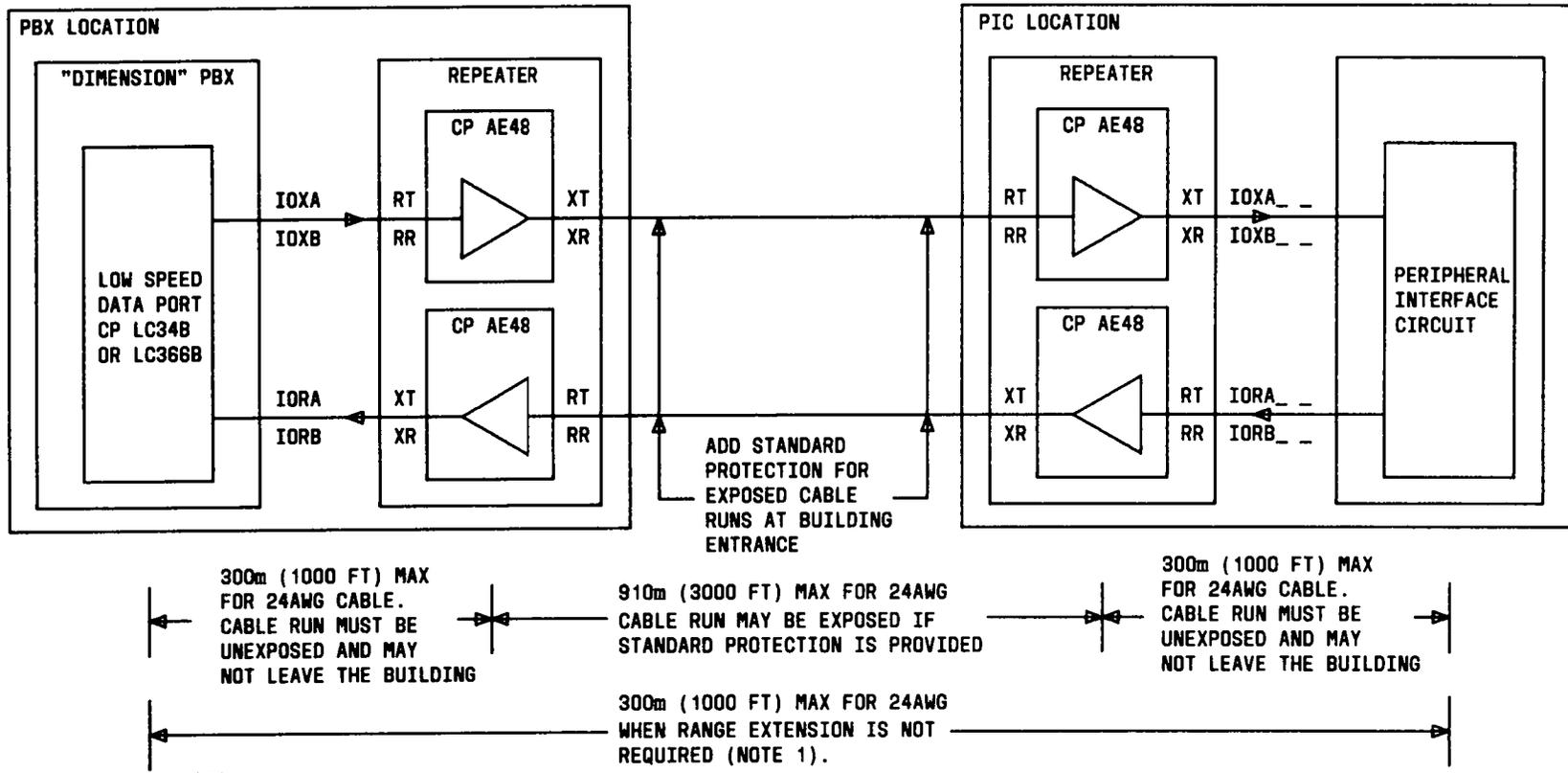
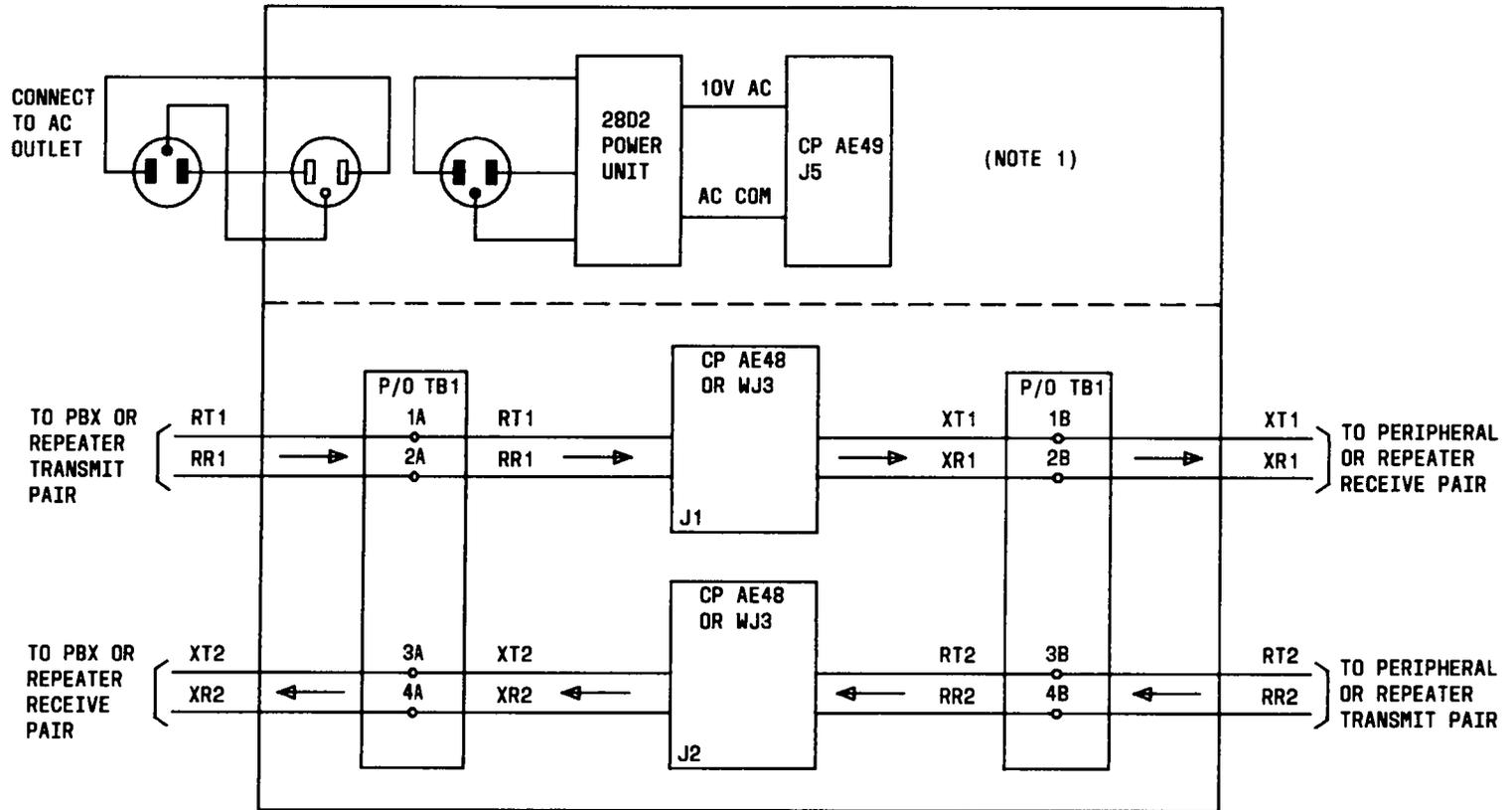


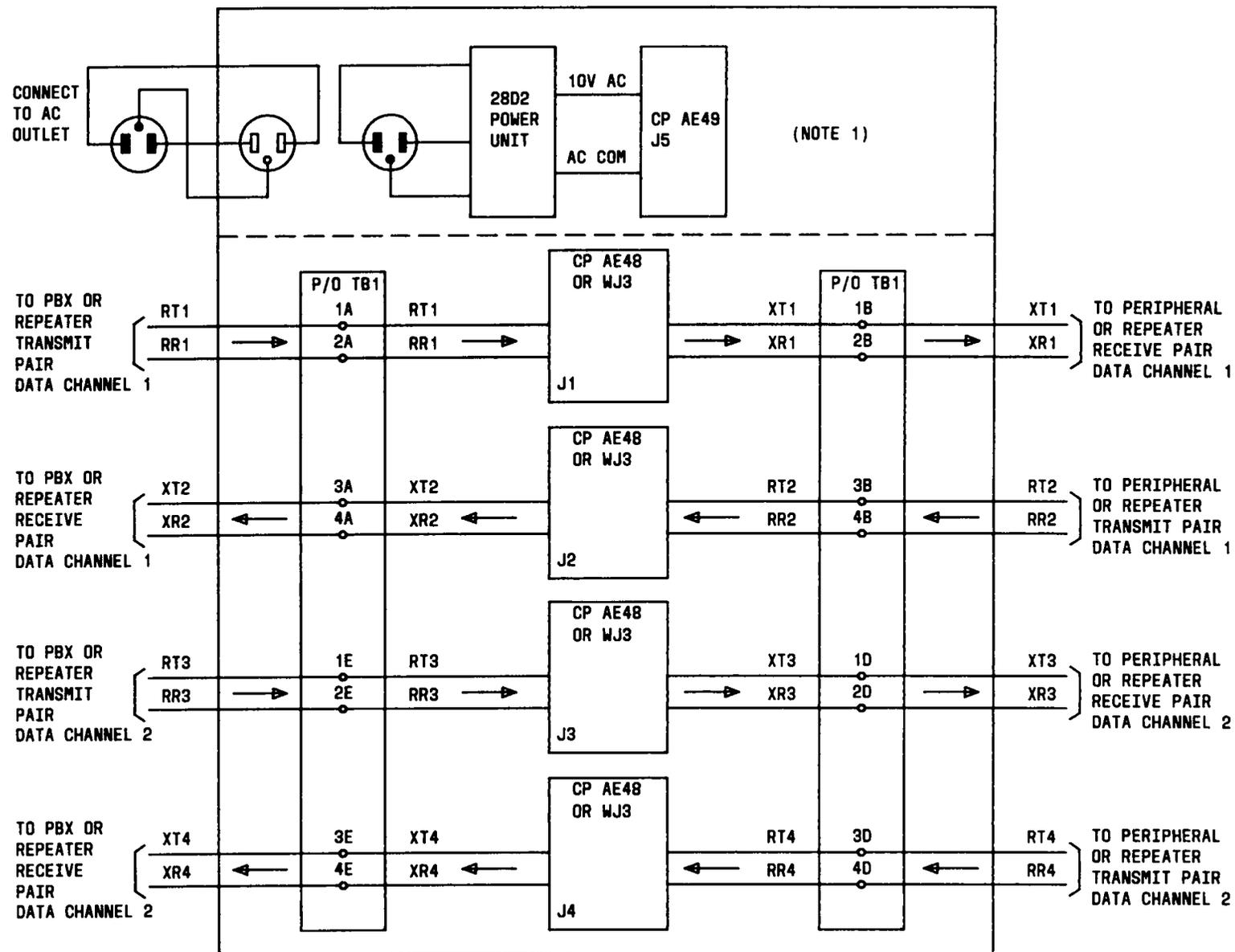
Fig. 9—Peripheral Interface Circuit—Range Extension



NOTE:

1. THE POWER SUPPLY UNIT AND AE49 CIRCUIT PACK ARE NOT REQUIRED WHEN THE WJ3 CIRCUIT IS USED.

◆Fig. 10—Single-Channel Repeater With (AE48) or Without (WJ3) Range Extension◆



NOTE:

1. THE POWER SUPPLY UNIT AND AE49 CIRCUIT PACK ARE NOT REQUIRED WHEN THE WJ3 CIRCUIT CARD IS USED

◆Fig. 11—Dual-Channel Repeater With (AE48) or Without (WJ3) Range Extension◆

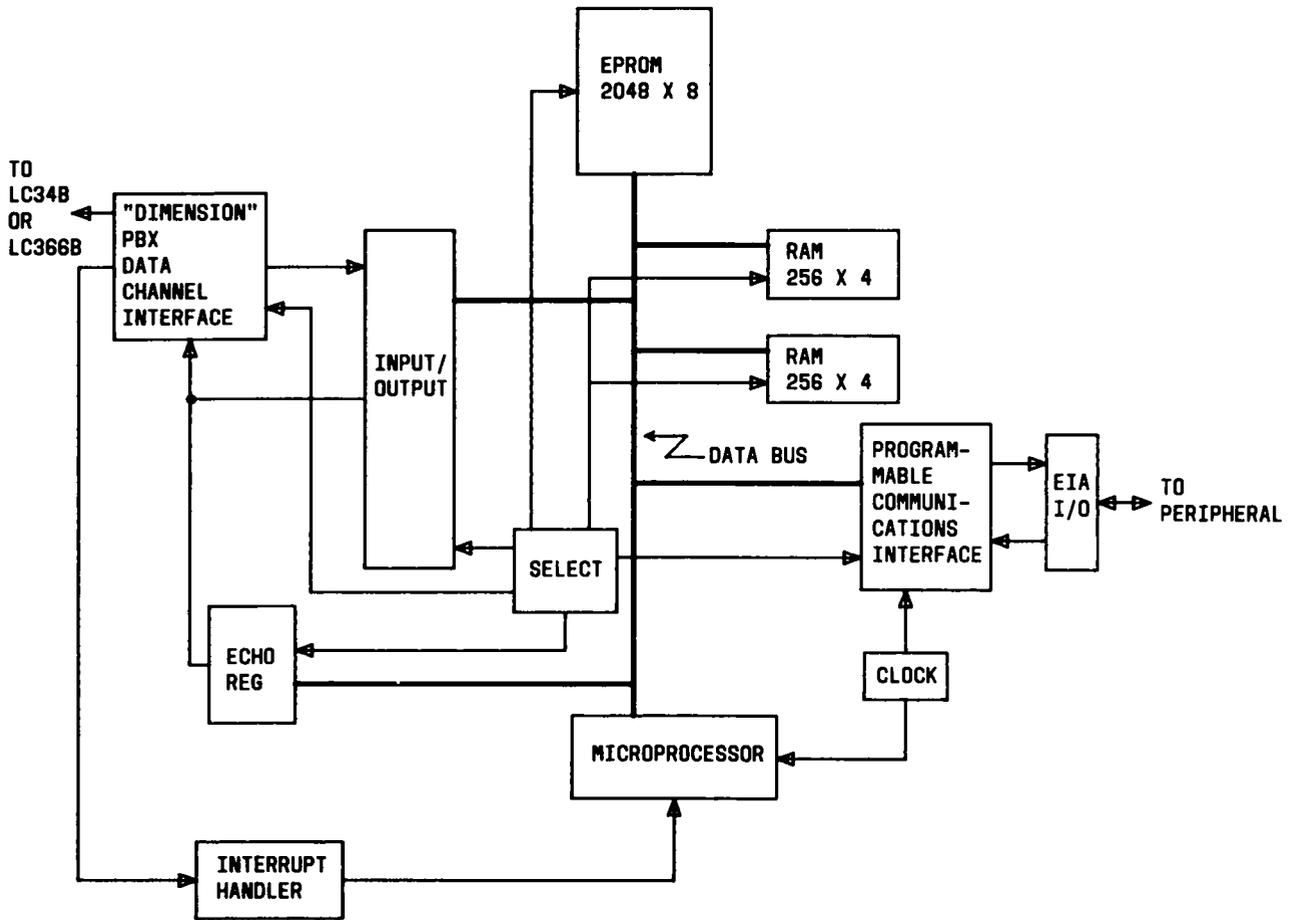


Fig. 12—Peripheral Interface Circuit—Functional Block Diagram

DATA WORD FROM PBX

15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
OPCODE (NOTE 1)				FUNCTION				DATA							

NOTE:

1. OPCODE 1 INDICATES NORMAL DATA
- OPCODE 2 INDICATES RETRANSMISSION OF DATA
- OPCODE 3 INDICATES TEST
- OPCODES 0 AND 4 THRU 15 ARE UNUSED

ECHO TO PBX FOR OPCODES 1 AND 2

15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
OPCODE				SYSTEM (PIC) STATUS				OUTSTATUS REGISTER CONTENTS OR EIA DATA							

ECHO TO PBX FOR OPCODE 3

15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
OPCODE				RECEIVED DATA											

Fig. 13—Data Words

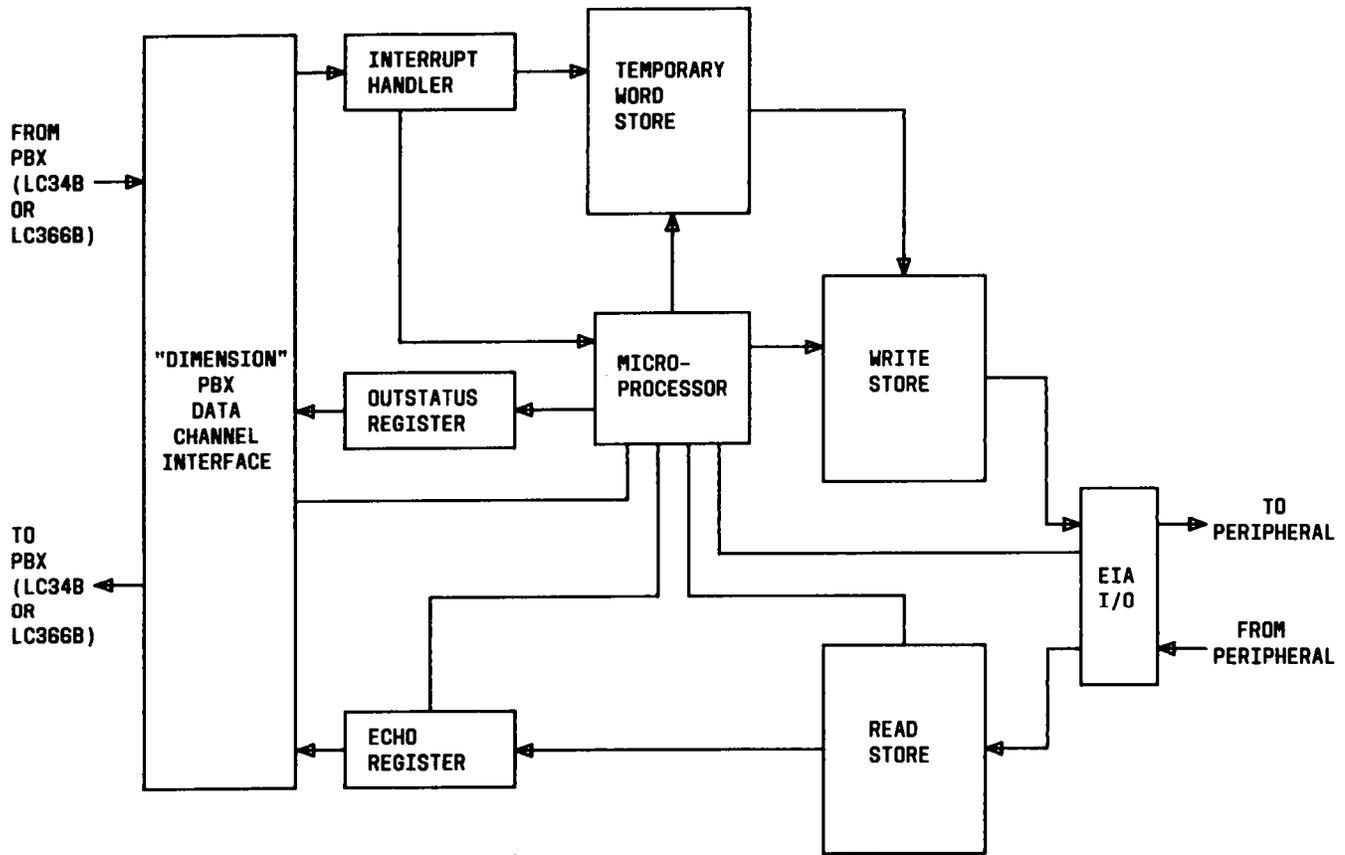


Fig. 14—Data Flow

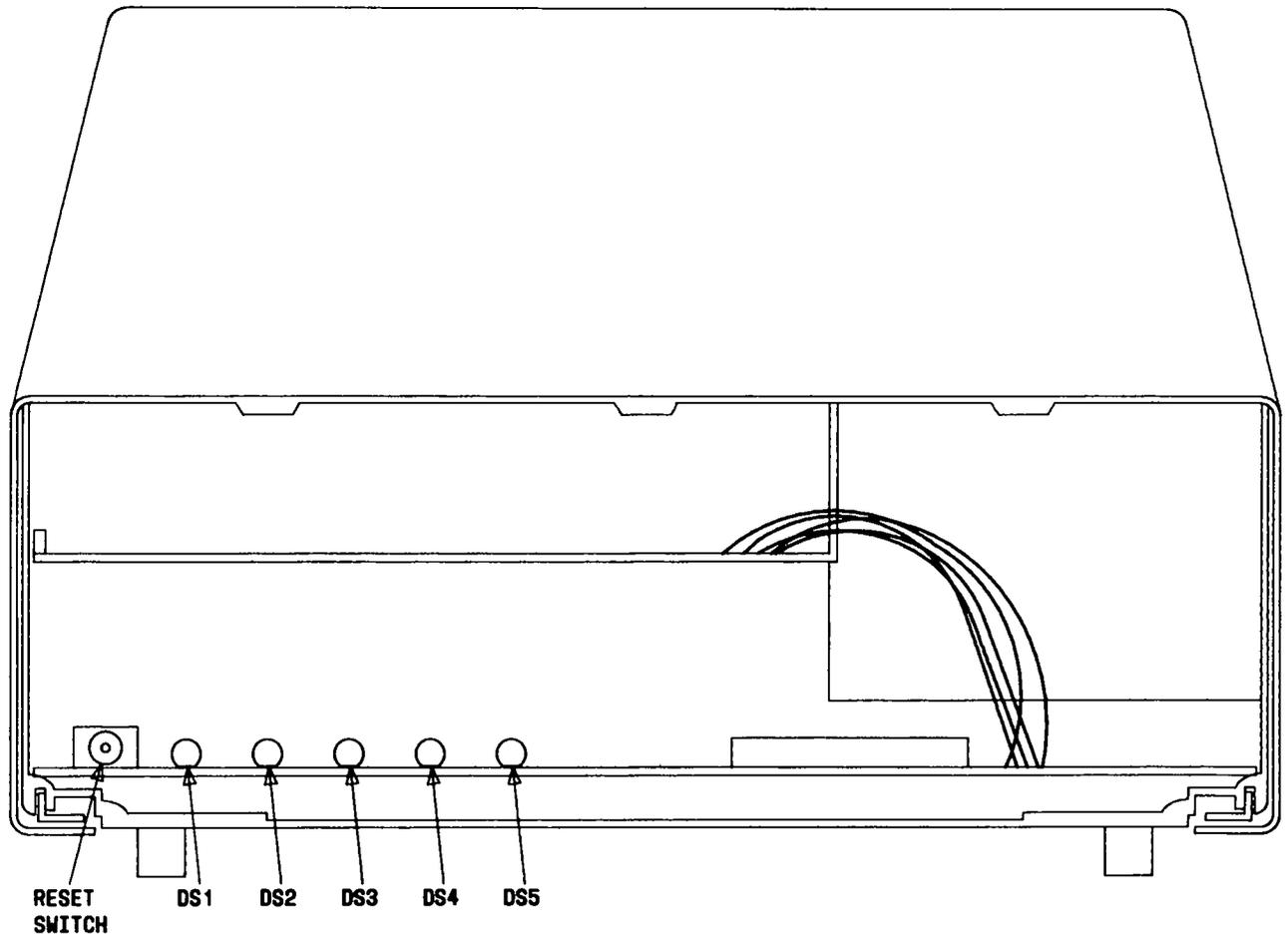


Fig. 15—Peripheral Interface Circuit—Front View (Cover Removed)

