Strata® DK24/56/96

Digital Key Telephone Systems

DK24, DK56, and DK96

INSTALLATION AND MAINTENANCE MANUAL

RELEASE 1, 2, 3, and 4

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Telecommunication Systems Division

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Strata® DK24/56/96

RELEASE 1, 2, 3, and 4

INSTALLATION

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Chapter One
INTRODUCTION

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1 PURPOSE

1.00 The purpose of this manual is to provide detailed step-by-step instructions for installing, programming, and maintaining the STRATA DK24, DK56, and DK96 digital key systems.

1.01 This chapter provides an overview of the organization of the installation section; a list of reference documentation that supports the installed system; a list of system mnemonics; and inspection, packaging, and storage guidelines.

2 ORGANIZATION

2.00 The installation section is organized in modular chapters for easy removal and replacement of updated materials. The chapters are as follows:

Chapter One - Introduction
Chapter Two - System Description
Chapter Three - Installation Site Requirements
Chapter Four - System Configuration
Chapter Five - KSU Cabinet Installation
Chapter Six - PCB Installation
Chapter Seven - Telephone Installation
Chapter Eight - Peripherals Installation
Chapter Nine - System Wiring and Main Distribution Frame Arrangements

3 REFERENCE DOCUMENTATION

3.00 The STRATA DK systems are supported by the following complement of reference documentation, in addition to the installation section:

3.10 General Description: An overview of the three STRATA DK systems and their features.

3.20 Programming: Provides detailed step-by-step instructions on how to program each system. Also provides tables, called System Record Sheets, on which all programming and configuration information can be recorded.

3.30 User Guides: Provide step-by-step instructions on how to operate stations connected to the STRATA DK system. There are separate user guides for the digital telephone, electronic telephone, standard telephone, digital telephone Liquid Crystal Display (LCD), electronic telephone LCD, direct station selection console, and data interface unit.

3.40 Fault Finding Procedures: Hardware troubleshooting and diagnostic information presented in flowchart form.

3.50 Remote Maintenance and Administration: Programming and maintenance procedures specially adapted for remote maintenance and administration terminal use. Detailed, step-by-step instructions are provided, complete with the terminal responses.

NOTE:
These procedures also apply when using a local ASCII terminal connected directly to the DK system.

4 SYSTEM MNEMONICS/TERMS

4.01 Mnemonics are used to identify the system's hardware, operation, and features. The following alphabetical listing describes the mnemonics used in this manual.

BPS: Bits Per Second—Unit of measure that refers to the transmission speed (baud rate) of electronic signals. It is used when describing data interface unit and modem operation.

CO: Central Office—The facility which houses switching equipment that provides telephone service (CO lines, E & M TIE lines, Centrex lines, etc.) for the immediate geographical area.

CO Line: A term used to define the STRATA DK hardware circuit that connects to the central office network line pair. Each CO line and TIE line circuit is assigned a CO line number in system software.

CODECs: Coder/Decoder—Semiconductors that allow the system to process analog-to-digital and digital-to-analog conversions.

CRCU-4: An optional upgrade to the system's controller printed circuit board (PCTU or PCTUS) that provides a 4-circuit Dual-tone Multi-frequency (DTMF) receiver for system Direct In-

ward System Access (DISA) CO lines, E & M TIE lines, and stations and peripherals that connect to standard telephone circuits.

CRCU-8: An optional upgrade to the system's controller printed circuit board (PCTU or PCTUS) that provides an 8-circuit Dual-tone Multi-frequency (DTMF) receiver for system Direct Inward System Access (DISA) CO lines, E & M TIE lines, and stations and peripherals that connect to standard telephone circuits.

DDCB (Release 4): Digital Door Phone/Lock Control Unit—A peripheral hardware unit compatible with designated digital telephone circuits that supports optional door phones (MDFBs) and provides door lock control.

DDSS (Release 3 and Higher): Digital Direct Station Selection Console—A device that helps facilitate the processing of a heavy load of incoming calls. The DDSS connects only to designated digital telephone circuits, but can be associated with electronic or digital telephones.

DISA (Release 2 and Higher): Direct Inward System Access—A feature that allows an outside party to access a STRATA DK system's internal stations or outgoing CO lines without having to go through an operator or automated attendant. An optional security code may be set to prevent unauthorized access to outgoing CO lines for through system calling.

DK: Digital Key.

DPFT: Power Failure/Emergency Transfer Unit—An optional backup unit that provides emergency service during power failures by automatically connecting standard telephones to designated CO lines.

DSS: Direct Station Selection—Feature which allows a telephone user (as well as a DDSS console or a HDSS console user) to call another station with the touch of a flexible feature button.

DTMF: Dual-tone Multi-frequency—Push-button dialing.

DVSU (Release 3 and Higher): A subassembly that equips a digital telephone with Off-hook Call Announce capability.

EOCU: Off-hook Call Announce Subassembly—An optional upgrade to the Electronic Telephone Interface Unit (PEKU) that enables properly configured telephones (see HVSU2) that are connected to it to receive Off-hook Call Announce calls.

FCC: Federal Communications Commission—The federal agency which regulates the telecommunication industry. All Toshiba hardware is FCC listed or approved.

HDCB: Electronic Door Phone/Lock Control Unit—A peripheral hardware unit compatible with designated electronic telephone circuits that supports optional door phones (MDFBs) and provides door lock control.

HDSS: Electronic Direct Station Selection Console—A device that helps facilitate the processing of a heavy load of incoming calls. The HDSS console connects only to designated electronic telephone circuits, but can be associated with digital or electronic telephones.

HESB: External Speaker Box—A speaker/amplifier that can be configured with the system to provide a variety of functions, such as a paging speaker and/or Background Music speaker.

HESC-65A: A cable used to connect a HHEU-equipped digital telephone or an HHEU-equipped electronic telephone to an external speaker box (HESB) for the Loud Ringing Bell feature.

HHEU: Loud Ringing Bell/Headset Interface Upgrade Unit—A small printed circuit board (PCB) upgrade that fits inside a digital telephone or a 6500-series Electronic Telephone to allow an external speaker box (HESB) and/or a headset to be connected to the telephone.

HVSU2: Subassembly that fits into a 6500-series Electronic Telephone to give it Off-hook Call Announce (OCA) capability. In addition, the telephone must be connected to an Electronic

Telephone Interface Unit (PEKU) or a Standard Telephone/Electronic Telephone Interface Unit (PESU) equipped with an Off-hook Call Announce subassembly (EOCU) to receive OCA, and must have three-pair wiring and modular cord.

IMDU: Remote Maintenance Modem Interface Unit—A subassembly installed on an option interface unit (PIOU or PIOUS) that allows the system to be connected with a remote maintenance/administration terminal.

KSU: Key Service Unit—The system's cabinet with its common equipment.

LCD: Liquid Crystal Display—The display on digital and electronic telephones.

LED: Light Emitting Diode—Status indicators located on printed circuit boards (PCBs), digital telephones, and electronic telephones.

LSI: Large Scale Integration—Related to circuit design technology. STRATA DK printed circuit boards (PCBs) use LSI circuit design.

MDF: Main Distribution Frame—The wiring frame usually located in a phone closet.

MDFB: Door Phone Box—A peripheral two-way speaker box option.

OCA: Off-hook Call Announce.

PBTC: A Toshiba-supplied cable used to connect customer-supplied batteries to any DK PPSU power supply for emergency reserve power.

PBX: Private Branch Exchange—Industry-standard term which refers to a telephone switch, usually on-premises, which serves an individual company, and is connected to a public telephone exchange through the Central Office (CO).

PCB: Printed Circuit Board.

PCM: Pulse Code Modulation—A widely-used form of digital telephone switching.

PCOU1: CO Line Interface Unit—An optional printed circuit board (PCB) that provides the system with four CO lines.

PCOU2: Replaces PCOU1 and works exactly the same way as PCOU1.

PCTU: Common Control Unit—The system's controller printed circuit board (PCB) that can support up to 14 universal slots, 96 station ports, and 36 CO lines. There are four software versions of the PCTU—PCTU1, PCTU2, PCTU3, and PCTU4—each of which can be installed in any STRATA DK system and supports a unique set of features.

PCTUS: Common Control Unit—A **Release 2** controller printed circuit board (PCB) designed for the DK24 that can support up to six universal slots, 24 station ports and 16 CO lines.

PDIU-DI/PDIU-DI2 (Release 3 and Higher): Integrated Data Interface Unit—Replaces the normal digital telephone base to enable the telephone to be used for the transmission and reception of data between a terminal/personal computer connected to the telephone and devices connected to other PDIU-DIs or to modems, printers, and computers connected to PDIU-DSs. The PDIU-DI is also used to provide personal computer access to outside dial-up data services and/or bulletin boards via modem pooling.

NOTE:
The PDIU-DI and the PDIU-DI2 are identical, except that the PDIU-DI attaches to 1000-series Digital Telephones, while the PDIU-DI2 attaches to 2000-series Digital Telephones.

PDIU-DS (Release 3 and Higher): Stand-alone Data Interface Unit—Used for modem pooling, printer sharing, and accessing host/mainframe computer.

PDKU1 (Release 3 and Higher): Digital Telephone Interface Unit—An optional printed circuit board (PCB) that provides the system with eight digital telephone circuits. In addition to

digital telephones, the PDKU can support data interface units (Stand-alone and Integrated), a digital DSS console (DDSS), and a digital door phone/lock control unit (DDCB). PDKU1 supports DIUs or circuit 1~7 only.

PDKU2: The PDKU2 replaces PDKU1. PDKU2 is identical to the PDKU1, except that the PDKU2 supports DIUs on all circuits (1~8).

PEKU: Electronic Telephone Interface Unit—An optional printed circuit board (PCB) that provides the system with eight electronic telephone circuits, which can support electronic telephones, a Background Music source, a door phone/lock control unit (HDCB), an electronic DSS console (HDSS), and amplifiers for two CO-line conference calls.

PEMU: E & M TIE Line Unit—An optional printed circuit board (PCB) that provides the system with support for four E & M Type I TIE lines.

PEPU: External Page Interface Unit—An optional printed circuit board (PCB) that provides support and/or circuit interface mainly for optional hardware peripherals and upgrades associated with external paging functions.

PESU (Release 2 and Higher): Standard Telephone/Electronic Telephone Interface Unit—An optional printed circuit board (PCB) that provides the system with a combination of two standard and four electronic telephone circuits. The standard telephone circuits can support standard telephones and optional hardware peripherals, such as voice mail devices and fax machines. Except for the Electronic DSS Console, the PESU electronic telephone circuits can support the same stations and peripherals that the PEKU does.

PIOU: Option Interface Unit—An optional printed circuit board (PCB) that provides support and/or circuit interface for optional hardware peripherals and upgrades.

PIOUS: The same as the PIOU, with some exceptions; most notably, the PIOUS has one external paging interface zone, while the PIOU has four.

NOTE:
Each system will support only one of the following PCBs: PIOU, PIOUS or PEPU.

Port: A term used to identify a station circuit location. Each station and TIE line hardware circuit is assigned to a station port number (00 ~ 95) in system software.

PPTC: A Toshiba-supplied adapter that is used to connect the modular SMDR and/or maintenance ports of the PIOU or PIOUS to the DB-25 connector of a printer, terminal, modem, or call accounting machine.

PSTU1: Standard Telephone Interface Unit—An optional printed circuit board (PCB) with a built-in ring generator that provides interface for eight standard telephones or optional hardware peripherals (voice mail devices, a Background Music source with Release 4, fax machines, etc.).

PSTU2: Standard Telephone Interface Unit—Provides same function as the PSTU1 with the addition of a switch to select high or low ringing generator voltage.

RAM: Random Access Memory—Refers to the type of system memory that holds individual system configuration and feature programming. RAM is read/write memory, and can be easily revised in programming.

ROM: Read Only Memory—Refers to the type of system memory that holds static software that comprises the mechanics of the features' functions. ROM is only revised by Toshiba software engineers.

4.10 Use of Notes, Important Notes, Cautions, and Warnings

4.11 Notes call attention to specific items to elaborate, or to refer the reader to other information.

4.12 Important Notes are used when the information is considered to be very important.

4.13 Cautions call attention to the possibility of equipment being damaged if the instructions are not followed closely.

4.14 Warnings are used when the given tasks involved could cause the possibility of personal injury or death to the technician.

5 INSPECTION, PACKAGING, and STORAGE

5.00 Inspection

5.01 When the system is received, examine all packages carefully and note any visible damage. If any damage is found, do not open the packages. Contact the delivery carrier immediately and make the proper claims.

5.02 Check the system against the packing slip. If it is determined that equipment is missing, contact the delivery carrier and your supplier immediately.

5.03 After unpacking (and before installing), check the system against the packing list and inspect all equipment for damage. If equipment is missing or damaged, contact your supplier immediately.

5.04 Be sure to retain original packaging materials for reuse when storing or transporting system hardware.

5.10 Packaging and Storage

CAUTION!

When handling (installing, removing, examining) printed circuit boards (PCBs), do not touch the back (soldered) side or edge connector. Always hold the PCB by its edges.

5.11 When packaging and storing the system, remove PCBs from the system cabinet (the power supply may remain installed in the cabinet for storage and shipment). PCBs should be packaged in their original antistatic bags for protection against electrostatic discharge. Be sure to package equipment in its original shipping containers.

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Strata® DK24/56/96

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INSTALLATION

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Chapter Two
SYSTEM DESCRIPTION

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1 GENERAL

1.00 This chapter provides an overview of the technology employed in the STRATA DK system design and a detailed description of the system hardware, including the basic equipment cabinet (key service unit), printed circuit board (PCB) options, and system peripheral equipment. A description of system controls and indicators is also provided.

1.10 System Description

1.11 The main unit of each STRATA DK system is the KSU (Figure 2-1), which houses the power supply and a number of slots which can support a number of optional PCBs, to which stations and peripherals are connected. The quantity and type of PCBs, stations, and peripherals installed depends on the user's requirements. The primary differences between the STRATA DK systems are KSU sizes, PCB capacities, and power supplies.

1.12 Hardware for all three system types is identical, with the exception of the KSUs and power supplies. Differences between models are identified, as applicable.

2 SYSTEM TECHNOLOGY

2.00 Custom Electronic Circuitry

2.01 STRATA DK system circuitry employs Large Scale Integration (LSI) technology to increase system efficiency, while allowing a reduction in physical size. Use of CMOS circuits, when applicable, minimizes the system's power requirements.

2.10 Microprocessors

2.11 Main Microprocessor. The STRATA DK systems employ a 16-bit, 68000-type microprocessor, which operates at a speed of 8 MHz, for stored program control. The main microprocessor

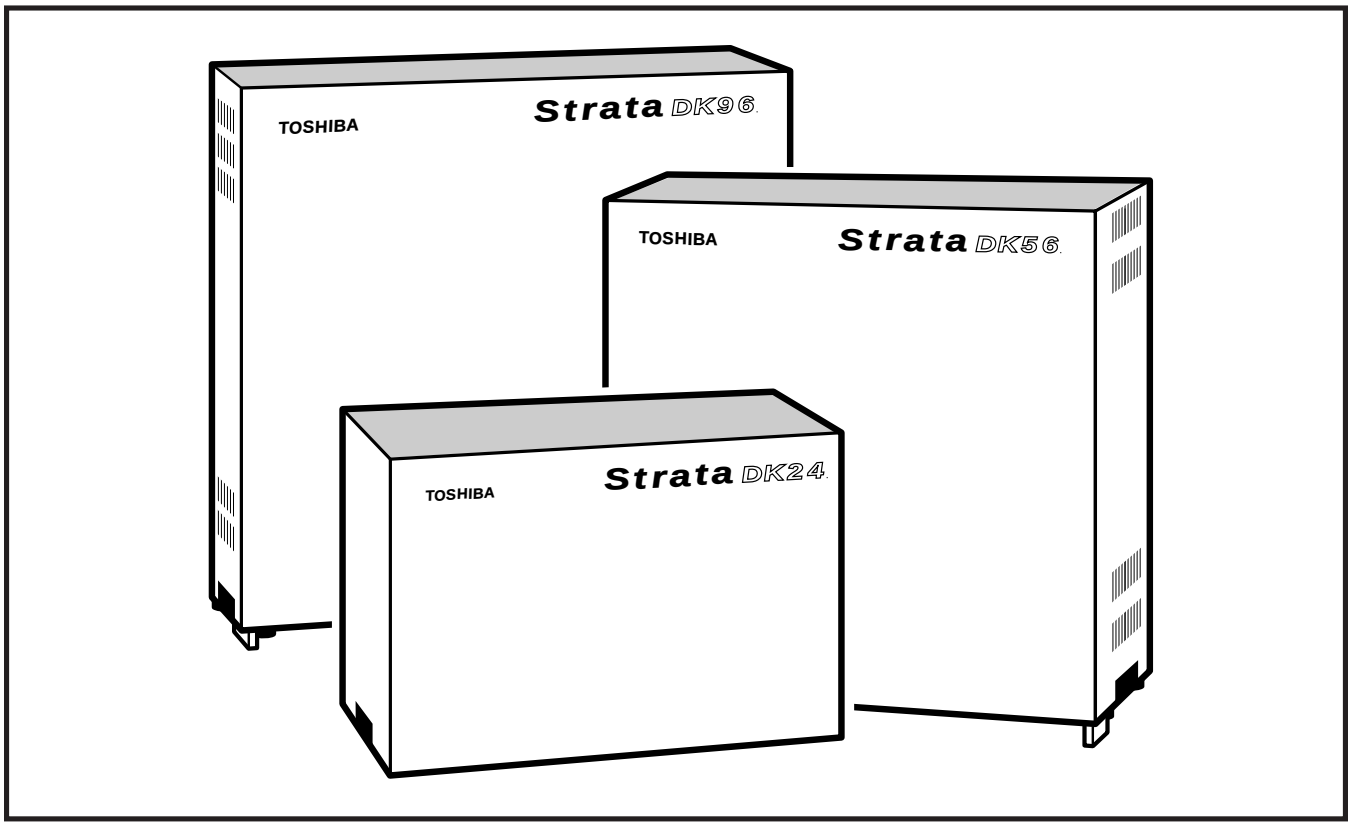

FIGURE 2-1
DK24/56/96 KSUs

is located on the common control unit (PCTU or PCTUS) printed circuit board (PCB).

2.12 Local Microprocessors. Most PCBs and all digital and electronic telephones have 8-bit, TMP90C840-type local microprocessors which operate at a speed of 10 MHz.

2.20 Stored Programming

2.21 System Operating Software. System operating software is stored in Read Only Memory (ROM), and is revised only by Toshiba software engineers.

2.22 Configuration and Custom Programming. Each STRATA DK system's individual configuration and custom programming is stored in Random Access Memory (RAM). The content of system RAM is user-developed and -programmed, based on the system's configuration and the user's requirements. System RAM is protected by a lithium battery with a shelf life of at least six years.

2.30 Pulse Code Modulation (PCM)

2.31 PCM technology allows fully non-blocking intercom and outside line talk paths. Talk paths operate through digital switching, as opposed to analog crosspoints. Analog-to-digital and digital-to-analog conversion is accomplished by CODEC integrated circuits.

3 KEY SERVICE UNITS (KSU)

3.01 The STRATA DK KSUs are single, free-standing cabinets that can be configured for either wall or table-top mounting. One-inch rubber feet on the base of the cabinet ensure that proper clearance is maintained when the KSU is table-top mounted. The KSU interior houses the printed circuit board (PCB) shelves and the power supply.

3.02 External dimensions and approximate weights for the DK24, DK56, and DK96 models are listed below. Weights are based on cabinets containing a full complement of PCBs.

DK24 Height: 10.6 in. (269 mm)
Width: 16.0 in. (406 mm)
Depth: 9.0 in. (229 mm)
Weight: 19.4 lbs (9 kg)

DK56 Height: 15.0 in. (381 mm)
Width: 16.0 in. (406 mm)
Depth: 9.0 in. (229 mm)
Weight: 37.5 lbs (17 kg)

DK96 Height: 18.6 in. (475 mm)
Width: 19.6 in. (500 mm)
Depth: 9.0 in. (229 mm)
Weight: 55.1 lbs (25 kg)

3.10 DK24 KSU Interior

3.11 The DK24 KSU interior has one shelf (Figure 2-2) with seven available PCB slots, labeled PCTU and S01 ~ S06. Only the PCTU slot serves a dedicated function.

3.12 PCB slots S01 ~ S06 each incorporates a standard 40-pin female connector located in the same vertical position on the KSU's backplane. This standardization enables any of the optional PCBs to be installed in any slot. The PCTU slot incorporates the same 40-pin female connector, but it is set 0.25-inch higher, so that only a PCTU or PCTUS PCB may be installed in the slot.

3.13 The power supply is factory-installed, mounted vertically into the right side of the PCB shelf, and is secured with two combination slotted/Phillips mounting screws at the right side of the cabinet.

3.20 DK56 KSU Interior

3.21 The DK56 KSU interior also has just one shelf (Figure 2-3), but with nine available PCB slots. These slots are labeled PCTU and S01 ~ S08; only the PCTU slot serves a dedicated function.

3.22 PCB slots S01 ~ S08 each incorporates a standard 40-pin female connector located in the

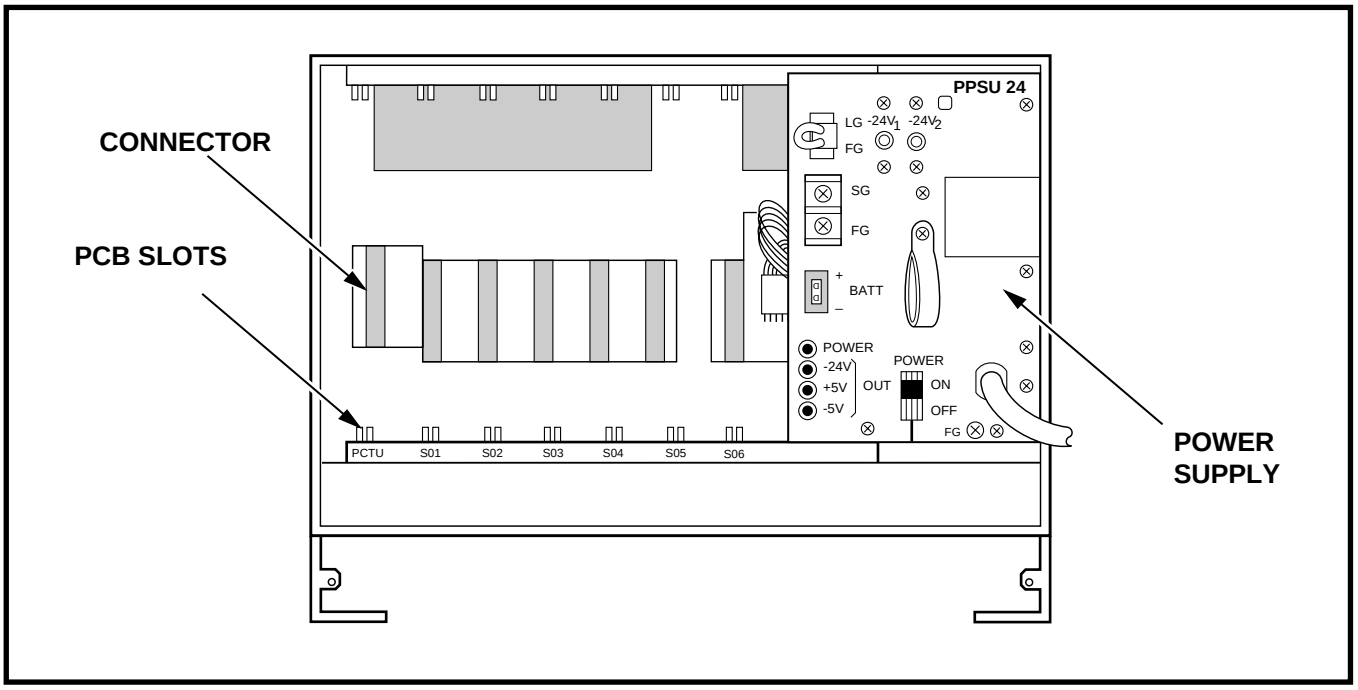

FIGURE 2-2—DK24 KSU INTERIOR

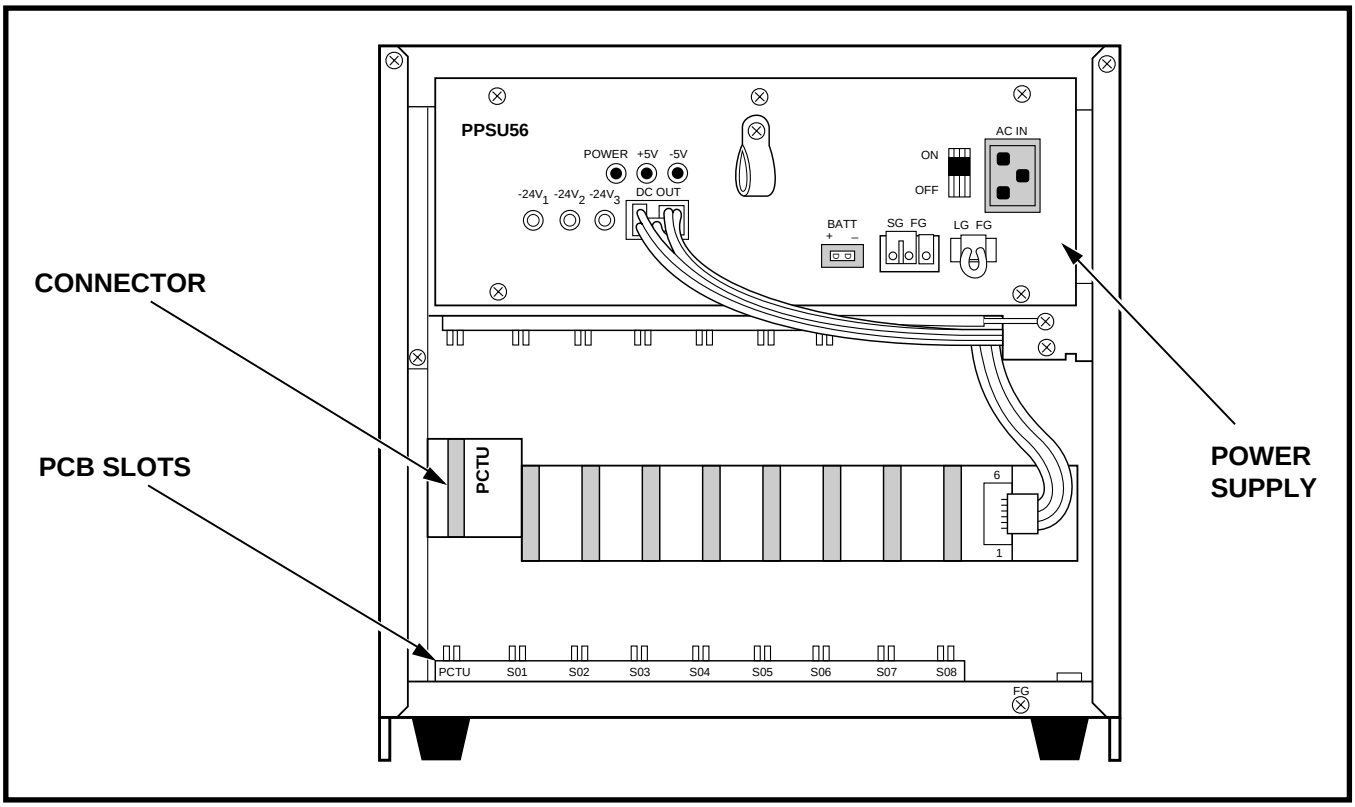

FIGURE 2-3—DK56 KSU INTERIOR

same vertical position on the KSU's backplane. This standardization enables any of the optional PCBs to be installed in any slot. The PCTU slot incorporates the same 40-pin female connector, but it is set 0.25-inch higher, so that only a PCTU PCB may be installed in the slot.

3.23 The power supply is factory-installed, mounted horizontally above the PCB shelf, and is secured with four combination slotted/Phillips mounting screws.

3.30 DK96 KSU Interior

3.31 The DK96 cabinet interior has two shelves (Figure 2-4). The top shelf has eight available PCB slots labeled S01 ~ S08. The bottom shelf has seven available PCB slots labeled PCTU and S09 ~ S14. Only the PCTU slot serves a dedicated function.

3.32 PCB slots S01 ~ S14 each incorporates a standard 40-pin female connector located in the same vertical position on the KSU's backplane. This standardization enables any of the optional PCBs to be installed in any available slot. The PCTU slot incorporates the same 40-pin female connector, but it is set 0.25-inch higher, so that only a PCTU PCB may be installed in the slot.

3.33 The power supply is factory-installed, mounted vertically to the right of the two PCB shelves, and is secured with four combination slotted/Phillips mounting screws.

4 POWER SUPPLIES

4.00 STRATA DK systems incorporate single-chassis, switching-type power supplies. The power supplies for the three models are functionally identical (except for power capacity), although they differ in appearance due to cabinet sizes and mounting considerations. The DK24 model uses a PPSU24 power supply (Figure 2-5), DK56 uses a PPSU56 (Figure 2-6), and DK96 uses a PPSU96 (Figure 2-7).

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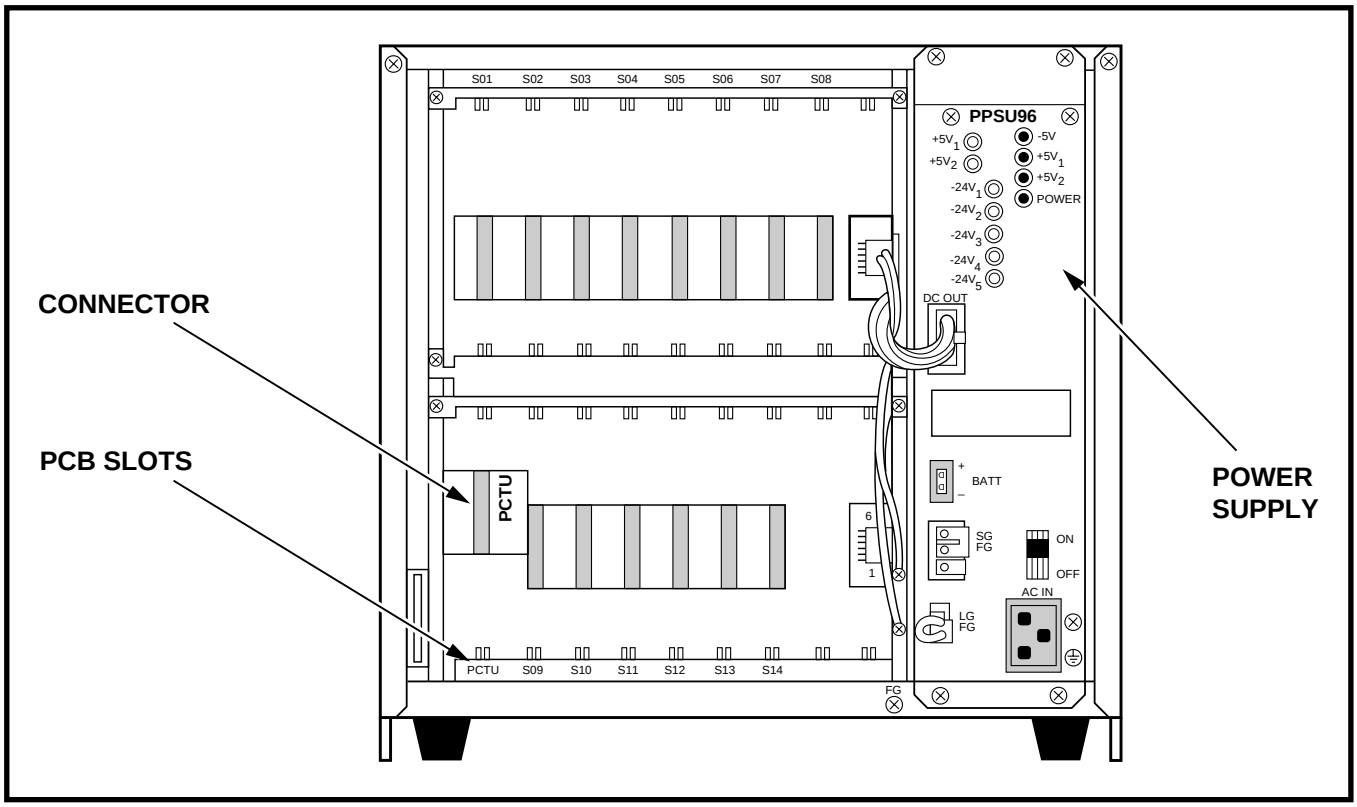

FIGURE 2-4—DK96 KSU INTERIOR

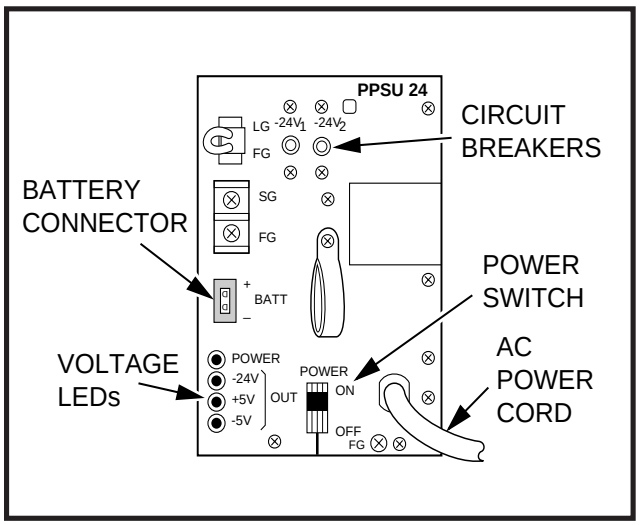

FIGURE 2-5
DK24 POWER SUPPLY FRONT PANEL

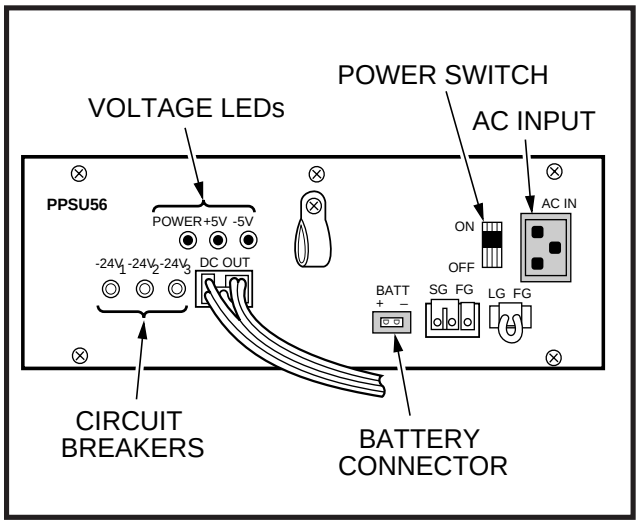

FIGURE 2-6
DK56 POWER SUPPLY FRONT PANEL

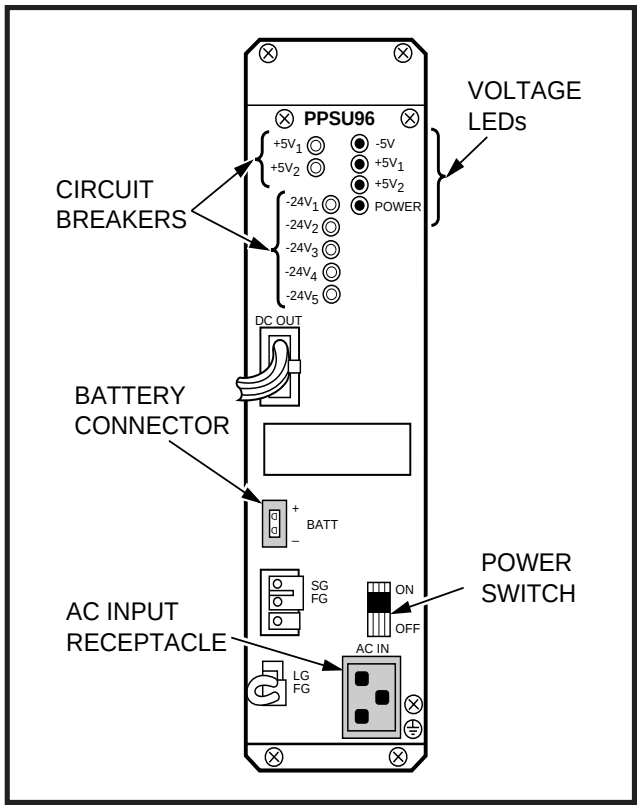

FIGURE 2-7
DK96 POWER SUPPLY FRONT PANEL

4.01 The power supplies generate ±5VDC and -24VDC output voltages (that are protected by mechanical circuit breakers located on the power supply front panel). Input voltage is provided by a standard 117VAC, 15 amp circuit. Electrical characteristics include:

- Primary Power
  - Input AC: 85VAC ~ 135VAC
  - AC Frequency: 50/60 Hz
  - Wattage: DK24/65, DK56/140, DK96/230
- DC Voltage Output Specifications
  - -24VDC; -26.3 ~ -27.8
  - +5VDC; +4.5 ~ +5.5
  - -5VDC; -4.5 ~ -5.5
- Circuit Breakers
  - 24; -24V
  - 56; -24V
  - 96; -24V, +5V

4.10 Reserve Power

4.11 Two customer-supplied, 12-volt batteries (80 ampere hours maximum) can be connected in series to the STRATA DK system as a power failure backup. In the event of a power failure, the system automatically switches over to battery power without any interruption to existing calls or other normal system functions. The length of time reserve power operates depends on the system size, number of batteries provided, and the system load. Typical reserve power duration estimates are provided in Table 2-A.

TABLE 2-A
TYPICAL RESERVE POWER FUNCTION ESTIMATES

Quantities of PCBs Installed (Including PCTU)	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Estimated Operation Time (Hours)	71	45	31	23	19	16	13.5	11.5	10	9	8	7	6	5
Approximate (-24V) Current Drain (DC Amperes)	1	1.7	2.4	3.1	3.8	4.5	5.2	6	6.6	7.3	8	8.7	9.4	10

Time is estimated with the following considerations:

(1) Batteries have full charge at start of operation.
(2) Batteries (2 ea.) are connected in series.
(3) Batteries are 12 VDC, rated at 80 amp/hours each.
(4) System is operating at full load traffic with LCD-type telephones.
(5) Batteries used for this test are gel-cell, maintenance-free batteries. Reserve duration will vary depending on battery type and manufacturer. These figures should only be used as an estimate.

4.12 A Toshiba-supplied, 9-foot battery cable, part number PBTC, supports the reserve battery installation.

IMPORTANT NOTES!

1. ***Local ordinances may dictate battery type and installation details.***
2. ***The reserve power batteries must be installed while commercial AC power is applied to the system to allow the power supply reserve relay to operate. If batteries are connected after AC power is lost, the batteries WILL NOT power the system and the system WILL NOT operate.***

4.20 Battery Charger

4.21 To allow full normal system operation during a power failure, the power supply has a built-in, current limiting battery charger that maintains customer-supplied batteries. Electrical characteristics of the battery charger include:

- Nominal float voltage: 2.275 volts/cell
- Charge current: 0.7 amps maximum
- Battery discharge cut-off voltage: 20.5 ±0.5V

5 POWER FAILURE/EMERGENCY TRANSFER UNIT (DPFT)

5.00 The DPFT provides an optional means of ensuring uninterrupted telephone operation in the event of a power failure. The DPFT (Figure 2-8) automatically connects selected CO lines to standard telephone lines in the event of a power failure, while permitting normal operation when the system is in service.

5.01 The DPFT is a self-contained module that mounts externally to the key service unit (KSU), typically near the main distribution frame (MDF). Connections to the CO lines, standard telephones, and the KSU are made with two 50-pin amphenol-type connectors on the DPFT.

5.02 The DPFT consists of eight normally open relays, connecting the telephones to PSTU (Standard Telephone Interface Unit) printed circuit board PCB circuits and the CO lines to PCOU (CO Line Unit) PCB circuits (Figure 2-9). If a power failure occurs, the relays close, connecting the telephones directly to the CO lines. Calls can then be placed from the selected standard telephones over the CO lines, completely bypassing the system.

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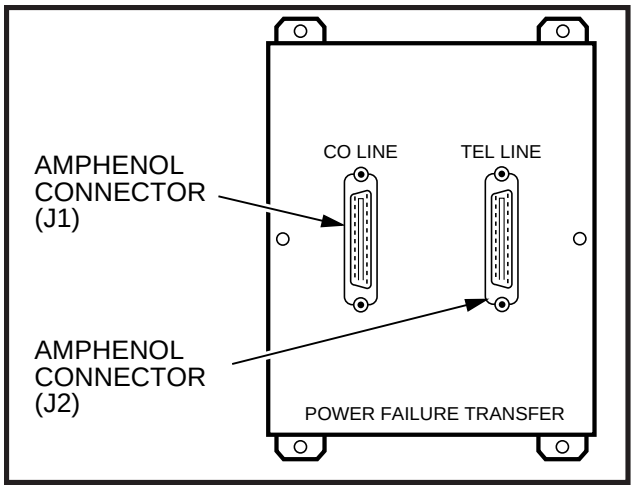

FIGURE 2-8
POWER FAILURE TRANSFER UNIT (DPFT)

5.03 When the DPFT is reset after a transfer, existing power failure transfer conversations are protected. Individual circuits are restored only when they become idle.

6 PRINTED CIRCUIT BOARD (PCB) DESCRIPTIONS

6.00 There have been 15 different types of PCBs available for use in STRATA DK systems. A maximum of seven PCBs can be installed in DK24, nine in DK56, and fifteen in DK96.

6.01 With the exception of the PCTU and PCTUS PCBs, PCB size and connector provisions are standardized. All PCBs measure 7.5 x 5.5 inches (190 x 140 mm). The PCBs connect to the KSU's backplane with identical 40-pin male connectors. Except for the PCTU/PCTUS PCBs, the connectors are positioned in the same location on each board type.

6.02 PCB external connections are made to the main distribution frame (MDF) using the following industry-standard connectors:

- **25-pair Amphenol Female:** Twenty-five-pair amphenol connectors connect digital tele-

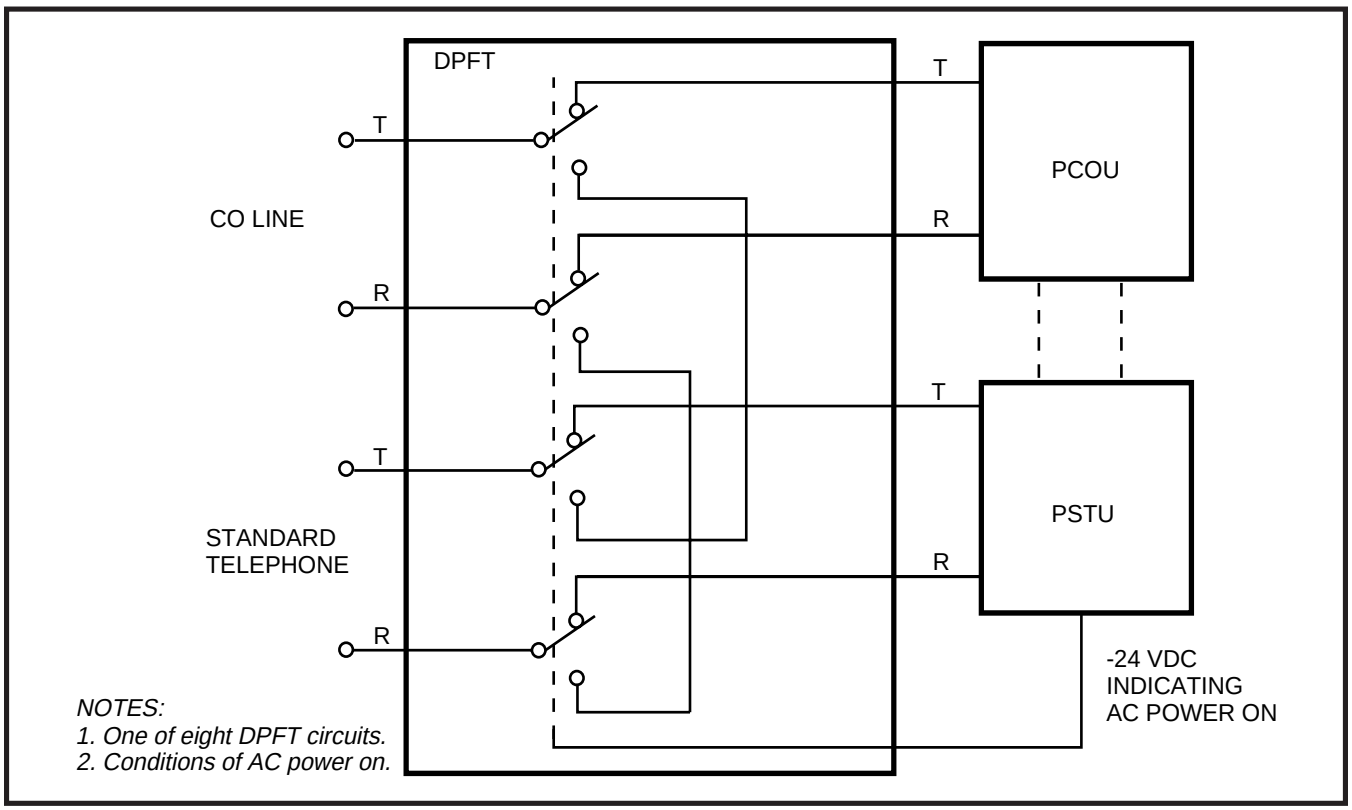

FIGURE 2-9
DPFT FUNCTIONAL BLOCK DIAGRAM

phones, electronic telephones, standard telephones, and most peripherals.

- **Modular:** Modular jacks connect CO lines, E & M TIE lines, the Station Message Detail Recording port (RS-232 signaling), and the Remote Administration and Maintenance port (RS-232 signaling).
- **Terminals:** Screw terminals connect the optional customer-provided Music-on-Hold/Background Music source to the PCTU or PCTUS, and spring-clip terminals connect peripherals to the PIOUS.

6.10 Printed Circuit Boards

6.11 The following paragraphs provide functional descriptions, along with applicable configuration and connection details, for all PCBs available for installation in STRATA DK systems. Refer to Figure 2-10 for a pictorial overview of each PCB's peripheral connections.

PCTU (Common Control Unit): The PCTU is the system controller PCB that is available in four different releases: PCTU1 is equipped with Release 1 software, PCTU2 with Release 2 software, PCTU3 with Release 3 software, and PCTU4 with Release 4 software. The PCTU must be installed in DK56 and DK96, and it or the PCTUS (see "PCTUS" description that follows) must be installed in the DK24. The PCTU contains the system's main microprocessor and microprocessor bus, battery-protected memory circuits, time switch logic, conference logic, and system tones. The PCTU also has a Music-on-Hold/Background Music source interface and connectors to mount an optional DTMF receiver PCB (CRCU) for DISA, TIE lines, standard telephones and peripherals. See Table 2-B for more PCTU details.

PCTUS (Common Control Unit): The PCTUS is a reduced version of the PCTU and is intended for the STRATA DK24 only. Providing the **Release 2** software feature set, the PCTUS supports fewer universal slots, stations, and CO lines than the PCTU. See Table 2-B for more PCTUS details.

CRCU (Dual-tone Multi-frequency (DTMF) Receiver Subassembly): The CRCU is an optional DTMF receiver PCB which mounts on the PCTU or PCTUS "piggyback" style. It translates DTMF signals from Direct Inward System Access (DISA) CO lines, TIE lines, standard telephones, or peripheral devices into data signals for the STRATA DK system. The system will not receive DTMF dialing without the CRCU. The DTMF receivers are shared by users; they are seized for dialing, then released for the next call. Both 4-circuit (CRCU-4) and 8-circuit (CRCU-8) units are available. The CRCU-8 is designed for systems with heavy traffic, the CRCU-4 for systems with lighter traffic.

PDKU (Digital Telephone Interface Unit): Available with Release 3 and higher software, the PDKU provides eight circuits that can support data interface units (DIUs), a digital door phone/lock control unit (DDCB), and a digital direct station selection console (DDSS) as well as digital telephones. (The DDCB is only available with Release 4.)

NOTE:
The new PDKU2 and the older PDKU1 are identical, except that only PDKU1 circuits 1 ~ 7 can support data interface units, while all PDKU2 circuits (1 ~ 8) can support these units. Both PDKU versions are completely compatible and can be mixed in the system.

PIOU (Option Interface Unit): The PIOU provides a circuit interface with the peripheral options listed in Table 2-C.

PIOUS (Option Interface Unit): A reduced version of the PIOU, the PIOUS provides a circuit interface with the peripheral options listed in Table 2-C.

IMDU (Remote Maintenance Modem Subassembly): The IMDU is an optional built-in modem that can be attached to the PIOU or PIOUS to provide the system with a link to off-site programming and maintenance equipment, such as a personal computer or ASCII terminal. The IMDU has an internal maintenance chan-

TABLE 2-B
COMMON CONTROL UNIT DATA

PCTU Control Board	CPU Type	Clock Speed	RAM Memory Capacity	ROM Memory Capacity	Feature Set	Universal PCB Slot Capacity	Station Port Capacity	CO Line Capacity	Conference Capacity
PCTU1	68000/16 bit	8 MHZ	256K	512K	Release 1	14 max.	96 max.	36 max.	4 party/8
PCTU2	68000/16 bit	8 MHZ	256K	512K	Release 2	14 max.	96 max.	36 max.	4 party/8
PCTUS	68000/16 bit	8 MHZ	128K	512K	Release 2	6 max.	24 max.	16 max.	4 party/3
PCTU3	68000/16 bit	8 MHZ	384K	768K	Release 3	14 max.	96 max.	36 max.	4 party/8
PCTU4	68000/16 bit	8 MHZ	384K	768K	Release 4	14 max.	96 max.	36 max.	4 party/8

NOTES:
1. PCTU (1, 2, 3, or 4) ROM is not interchangeable with PCTUS ROM.
2. All PCTU versions provide MOH/BGM input and volume control.

TABLE 2-C
INTERFACE PCB OPTIONS

INTERFACE OPTION	PIOU	PIOUS	PEPU
Unamplified Page Output (Single Zone, 600 ohms)	X, A	X, T	X, A
Amplified Page Output (Single Zone, 3 Watts, 8 ohms)	X, A		X, A
Zone Page Interface (Unamplified, 4 Zones)	X, A		
Night Transfer or Music-on-Hold Control Relay	X, A	X, T	X, A
Door Lock or External Amplifier Control Relay	X, A	X, T	X, A
Alarm Sensor	X, A	X, T	
RS-232 SMDR Output Jack	X, M	X, M	
RS-232 Maintenance Jack for a Local ASCII Terminal or External Modem	X, M	X, M	
Remote Maintenance Modem (IMDU)	X, P	X, P	

A = Amphenol Connector
M = 6-pair Modular Connector
P = Piggy-back PCB
T = Terminal Connector
X = Option equipped

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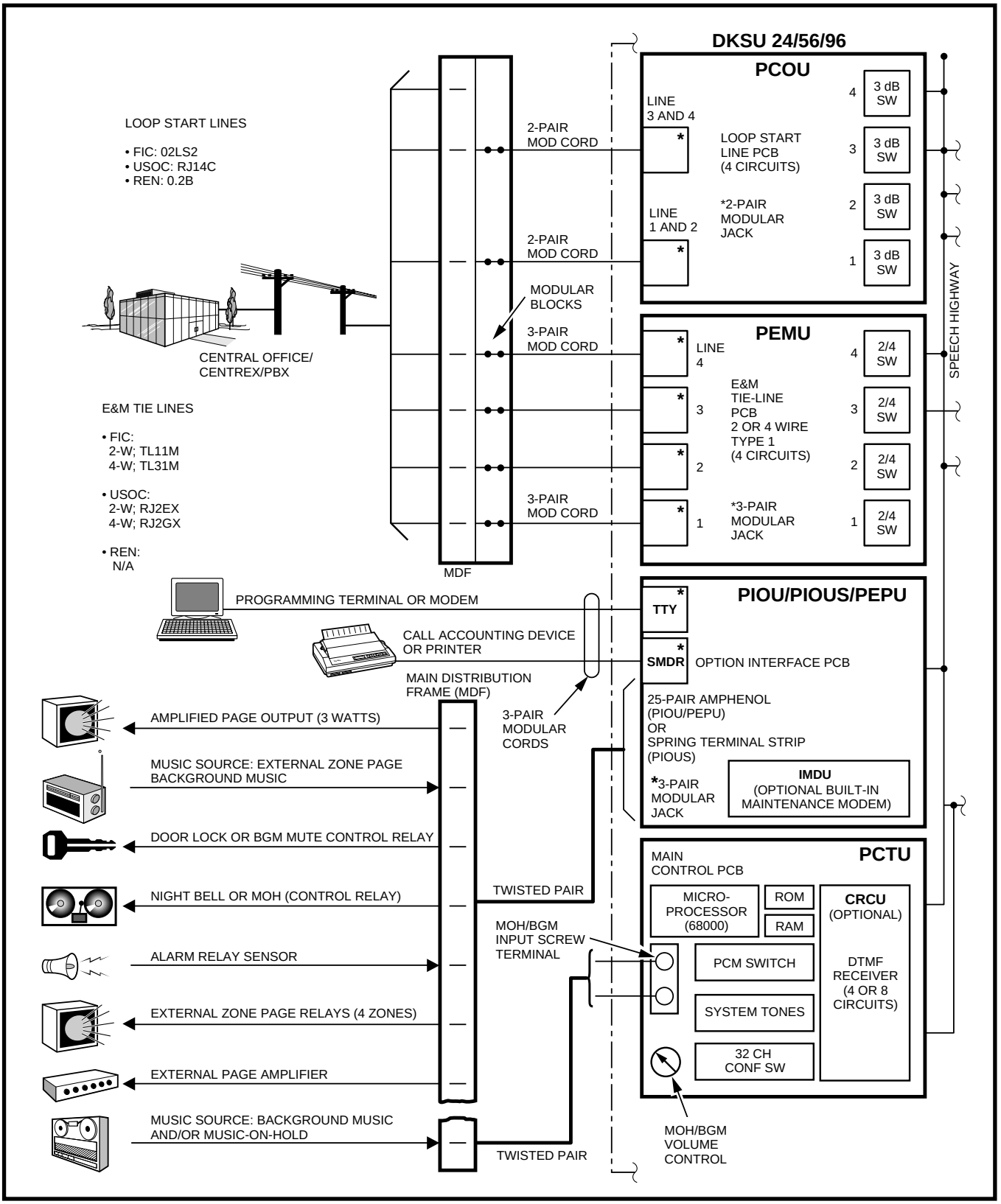

FIGURE 2-10
SYSTEM FUNCTIONAL BLOCK DIAGRAM

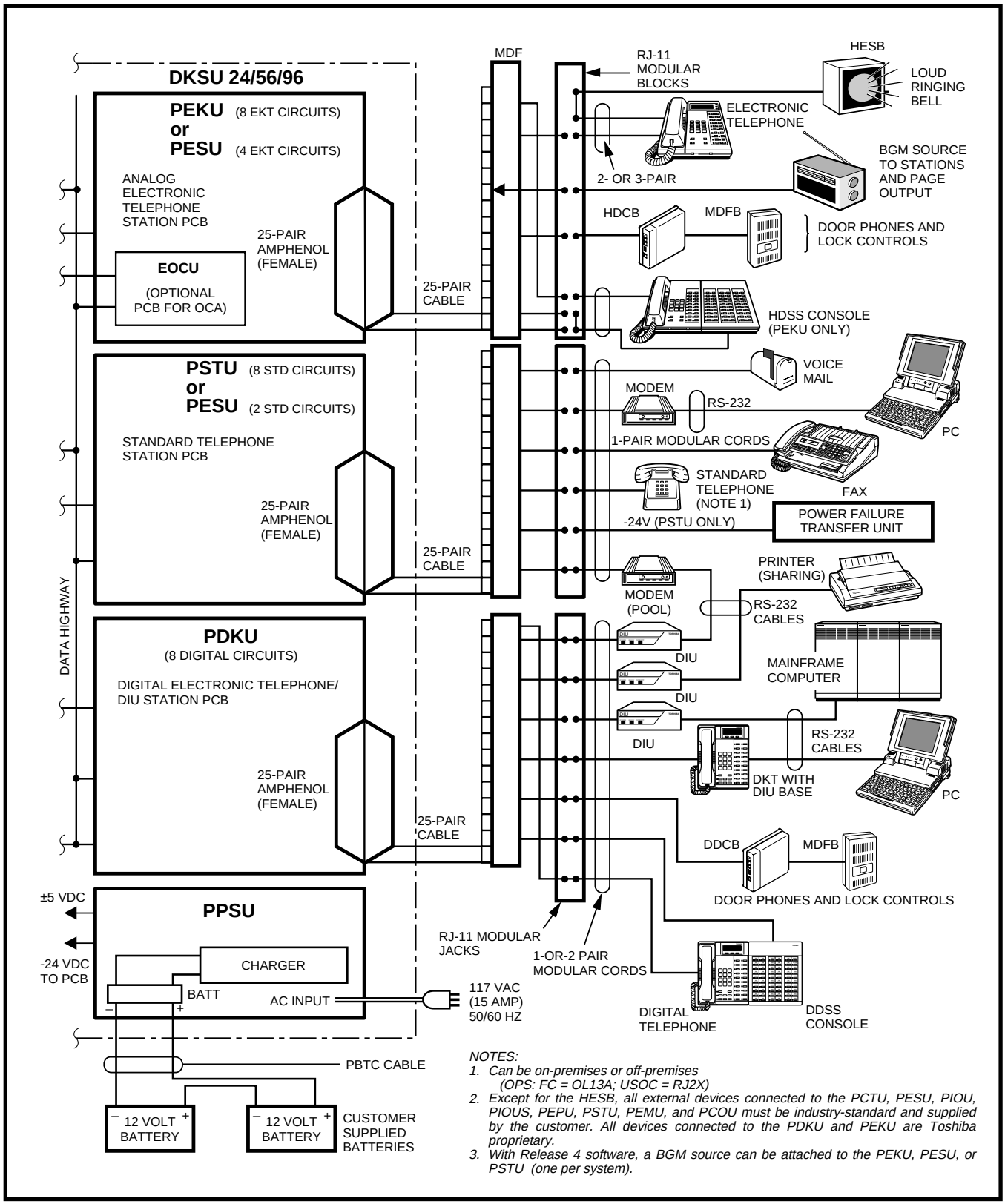

FIGURE 2-10
SYSTEM FUNCTIONAL BLOCK DIAGRAM (continued)

nel and does not require a dedicated CO line or station port. Data transmission speed can be set at 300 or 1200 bps full duplex.

PEPU (External Page Interface Unit): A reduced version of the PIOU, the PEPU provides a circuit interface with the peripheral options listed in Table 2-C.

PESU (Standard/Electronic Telephone Interface Unit): This optional PCB, which is available with **Release 2** and higher software, provides the system with a combination of two standard and four electronic telephone circuits. In addition to standard telephones, the standard telephone circuits can support optional hardware peripherals such as voice mail devices and fax machines. The PESU has a ring generator for the standard telephone circuits which can be set for high- or low-ring voltage. The electronic telephone circuits on the PESU can support all of the devices that the PEKU can, except for the electronic DSS console. The PESU can be configured for Off-hook Call Announce (OCA) by installing an optional OCA upgrade unit (EOCU).

PCOU (CO Line Unit): The PCOU provides the system with four loop-start CO lines and a standard, built-in Automatic Busy Redial (ABR) circuit. Each CO line can be programmed for either rotary or dial pulse and has a three decibel (dB) pad option switch to control excessive loudness resulting from close proximity to the PBX or central office. Each CO line circuit provides built-in gas tubes for limited protection from lightning.

NOTE:
The two versions, PCOU1 and PCOU2, are completely compatible and can be mixed and/or interchanged in the same system.

PEMU (E & M TIE Line Unit): The PEMU provides four E & M Type I signaling (2- or 4-wire, immediate start) TIE lines. Each PEMU reduces the system capacity by four CO lines and four station ports in DK56 and DK96, and by four CO lines and eight station ports in DK24.

PEKU (Electronic Telephone Interface Unit): The PEKU provides eight circuits for electronic telephones, an electronic DSS console (HDSS), an electronic door phone/lock control unit (HDCB), a Background Music source, and an amplifier for two-CO line Conferences. The PEKU can be configured for Off-hook Call Announce by installing an optional Off-hook Call Announce upgrade unit (EOCU).

EOCU (Off-hook Call Announce Upgrade Unit): The EOCU is an optional Off-hook Call Announce upgrade unit which mounts on top of the PEKU or PESU "piggyback" style. It is required on every PEKU or PESU that supports electronic telephones that should receive Off-hook Call Announce. The EOCU has two OCA channels, which are shared by all circuits on a PEKU or PESU.

PSTU 1 and 2 (Standard Telephone Interface Unit): The PSTU provides an interface between standard telephones and the system. It adds eight standard telephone ports, and has a 20Hz, 190V peak-to-peak square wave ring generator (no load). In addition, the PSTU provides support for numerous Toshiba-supplied and customer-supplied peripherals, including:

- Toshiba-supplied (optional):
  - Toshiba VP Systems
  - Power Failure Transfer Unit (DPFT)
- Customer-supplied (optional):
  - Auto Attendant Device
  - Dictation Equipment
  - Fax Machine
  - Modem
  - Voice Mail Device
  - Background Music Source (Release 4)

NOTE:
A PSTU2 is equipped with a jumper plug to change the ring generator no load output from 190V peak-to-peak square wave (high) to 130V peak-to-peak square wave (low). The low setting is used with peripherals that are sensitive to high-ring voltage. (Almost all

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peripherals function with high-ring voltage.)

7 SYSTEM CONTROLS AND INDICATORS

7.00 System controls and indicators are located on the power supply and on various printed circuit boards (PCBs).

7.01 Power supply controls and indicators for the DK24 model are shown in Figure 2-11 and described in Table 2-D; for DK56, see Figure 2-12 and Table 2-E; and for DK96, see Figure 2-13 and Table 2-F. PCB controls and indicators are shown in Figure 2-14 and described in Table 2-G.

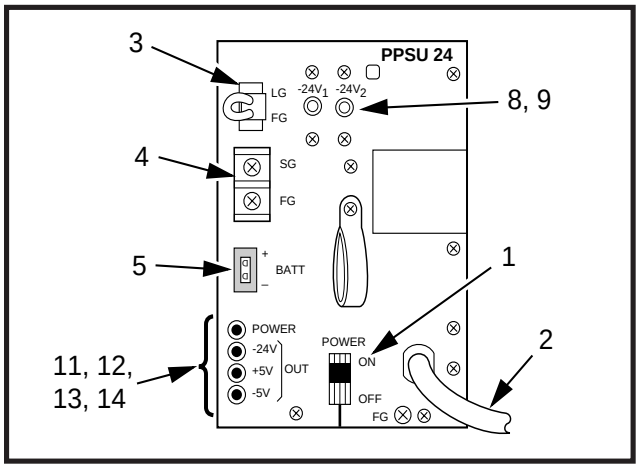

FIGURE 2-11
LOCATION OF DK24 CONTROLS AND INDICATORS

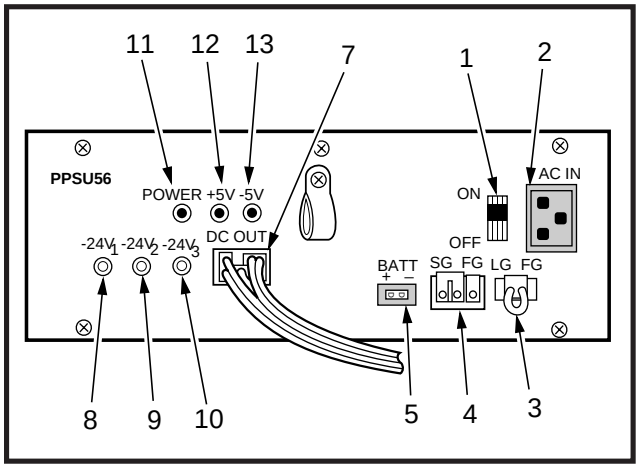

FIGURE 2-12
LOCATION OF DK56 CONTROLS AND INDICATORS

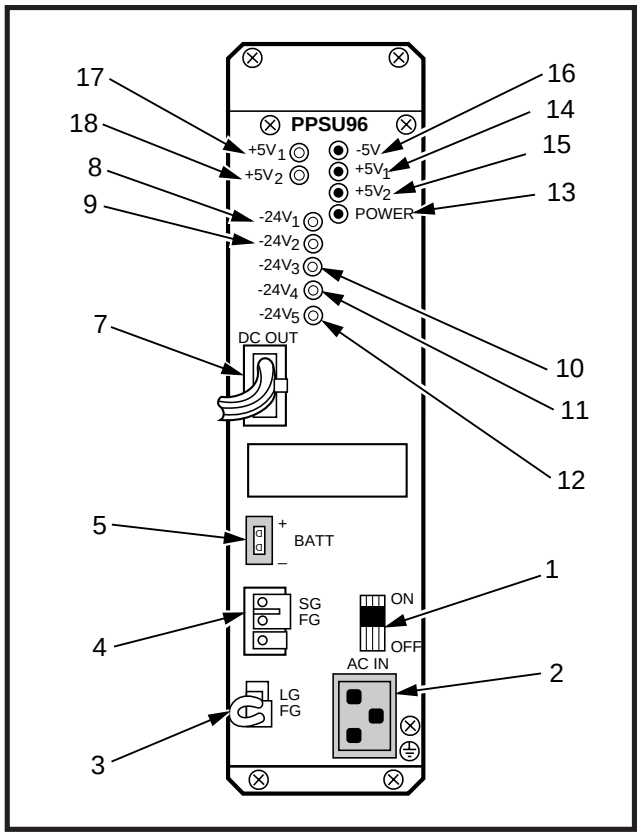

FIGURE 2-13
LOCATION OF DK96 CONTROLS AND INDICATORS

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8 PERIPHERAL EQUIPMENT

8.00 Digital Telephones

8.01 STRATA DK systems support 2000-series Digital Telephones (the DKT2010-H, DKT2010-SD, DKT2020-S, and DKT2020-SD) and 1000-series Digital Telephones (the DKT1010-H and DKT1020-SD). Digital telephones provide a number of standard, useful features and have internal connectors which allow them to be upgraded for data calling and other features. (See Digital and Electronic Telephone Upgrade Options later in this chapter.) All digital telephones come with a standard handset and can be connected to the system with a single-pair modular line cord. See the *General Description* for a more complete description of

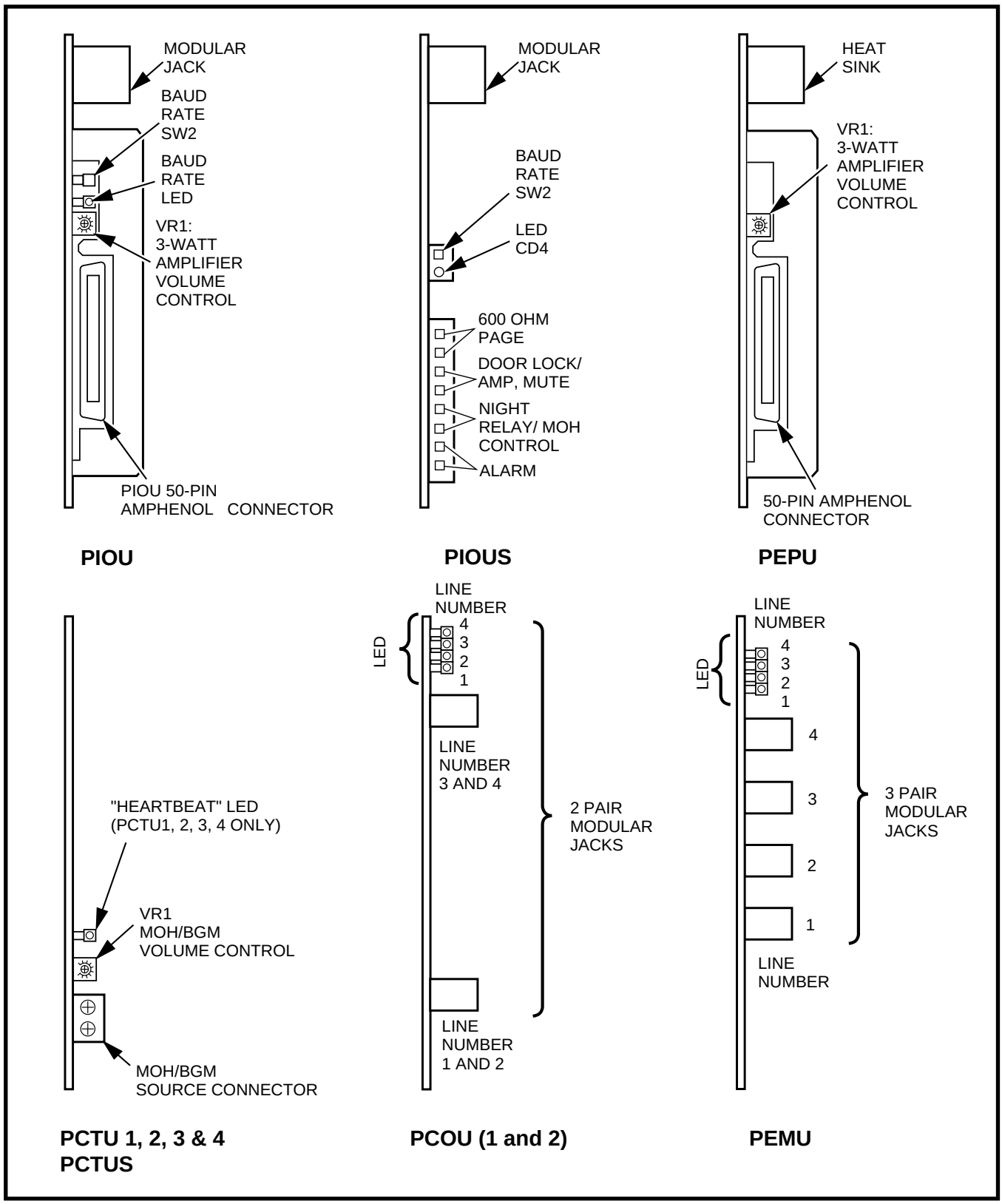

FIGURE 2-14
LOCATION OF PCB CONTROLS AND INDICATORS

TABLE 2-D
DK24 MODEL CONTROLS AND INDICATORS

CONTROL/INDICATOR (Figure 2-11 Item No.)	TYPE OF COMPONENT	DESCRIPTION
POWER Switch (1)	Two-position rocker switch	Power switch for application of AC input power from wall socket to KSU power supply
AC Power Cord (2)	10 3-prong plug with power cord	Cord for application of AC power from wall outlet
LG/FG Connector (3)	2-pin keyed male connector	Interface connector for LG/FG ground strap (ground strap must remain installed in LG/FG connector for all system applications)
SG/FG Terminal Block (4)	Two-terminal screw-type terminal block	Terminal connections for SG/FG ground strap (ground strap must remain installed on SG/FG terminal block for all system applications)
BATT +/- Connector (5)	2-pin keyed male connector	Interface connector for reserve power batteries
FG Terminal (not shown)	Combination slotted/Phillips screw	KSU frame ground terminal
-24V_1 Circuit Breaker (8)	Push-to-reset circuit breaker	Circuit breaker for power supply -24VDC output to PCB slots S01 and S02, S03
-24V_2 Circuit Breaker (9)	Push-to-reset circuit breaker	Circuit breaker for power supply -24VDC output to PCB slots S04, S05, and S06
POWER Indicator (11)	Green LED	Lights to indicate power switch is set to ON (AC input power is applied to power supply)
+5V Indicator (12)	Green LED	Lights to indicate presence of +5VDC output from power supply
-5V Indicator (13)	Green LED	Lights to indicate presence of -5VDC output from power supply
-24V Indicator (14)	Green LED	Lights to indicate presence of -24V output from power supply

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TABLE 2-E
DK56 MODEL CONTROLS AND INDICATORS

CONTROL/INDICATOR (Figure 2-12 Item No.)	TYPE OF COMPONENT	DESCRIPTION
ON/OFF Switch (1)	Two-position rocker switch	Power switch for application of AC input power from wall socket to KSU power supply
AC IN Connector (2)	3-pin keyed male connector	Interface connector for application of AC power from wall outlet
LG/FG Connector (3)	2-pin keyed male connector	Interface connector for LG/FG ground strap (ground strap must remain installed in LG/FG connector for all system applications)
SG/FG Terminal Block (4)	Two-terminal screw-type terminal block	Terminal connections for SG/FG ground strap (ground strap must remain installed on SG/FG terminal block for all system applications)
BATT +/- Connector (5)	2-pin keyed male connector	Interface connector for reserve power batteries
FG Terminal (not shown)	Combination slotted/Phillips screw	KSU frame ground terminal
DC OUT Connector (7)	7-pin keyed male connector	Interface connector for application of power supply ±5VDC and -24VDC outputs to KSU's backplane
-24V_1 Circuit Breaker (8)	Push-to-reset circuit breaker	Circuit breaker for power supply -24VDC output to PCB slots S01 and S02
-24V_2 Circuit Breaker (9)	Push-to-reset circuit breaker	Circuit breaker for power supply -24VDC output to PCB slots S03, S04, and S05
-24V_3 Circuit Breaker (10)	Push-to-reset circuit breaker	Circuit breaker for power supply -24VDC output to PCB slots S06, S07, and S08
POWER Indicator (11)	Green LED	Lights to indicate ON/OFF switch is set to ON (AC input power is applied to power supply)
+5V Indicator (12)	Green LED	Lights to indicate presence of +5VDC output from power supply
-5V Indicator (13)	Green LED	Lights to indicate presence of -5VDC output from power supply

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TABLE 2-F
DK96 MODEL CONTROLS AND INDICATORS

CONTROL/INDICATOR (Figure 2-13 Item No.)	TYPE OF COMPONENT	DESCRIPTION
ON/OFF Switch (1)	Two-position rocker switch	Power switch for application of AC input power from wall socket to KSU power supply
AC IN Connector (2)	3-pin keyed male connector	Interface connector for application of AC power from wall outlet
LG/FG Connector (3)	2-pin keyed male connector	Interface connector for LG/FG ground strap (ground strap must remain installed in LG/FG connector for all system applications)
SG/FG Terminal Block (4)	Two-terminal screw-type terminal block	Terminal connections for SG/FG ground strap (ground strap must remain installed on SG/FG terminal block for all system applications)
BATT +/- Connector (5)	2-pin keyed male connector	Interface connector for reserve power batteries
FG Terminal (not shown)	Combination slotted/Phillips screw	KSU frame ground terminal
DC OUT Connector (7)	7-pin keyed male connector	Interface connector for application of power supply ±5VDC and -24VDC outputs to KSU's backplane
-24V_1 Circuit Breaker (8)	Push-to-reset circuit breaker	Circuit breaker for power supply -24VDC output to PCB slots S01 and S02
-24V_2 Circuit Breaker (9)	Push-to-reset circuit breaker	Circuit breaker for power supply -24VDC output to PCB slots S03, S04, and S05
-24V_3 Circuit Breaker (10)	Push-to-reset circuit breaker	Circuit breaker for power supply -24VDC output to PCB slots S06, S07, and S08
-24V_4 Circuit Breaker (11)	Push-to-reset circuit breaker	Circuit breaker for power supply -24VDC output to PCB slots S09, S10, and S11
-24V_5 Circuit Breaker (12)	Push-to-reset circuit breaker	Circuit breaker for power supply -24VDC output to PCB slots S12, S13, and S14
POWER Indicator (13)	Green LED	Lights to indicate ON/OFF switch is set to ON (AC input power is applied to power supply)
+5V_1 Indicator (14)	Green LED	Lights to indicate presence of +5VDC output from power supply (for KSU's upper PCB shelf backplane)

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TABLE 2-F
DK96 MODEL CONTROLS AND INDICATORS (continued)

CONTROL/INDICATOR (Figure 2-13 Item No.)	TYPE OF COMPONENT	DESCRIPTION
$+5V_2$ Indicator (15)	Green LED	Lights to indicate presence of +5VDC output from power supply (for KSU's lower PCB shelf backplane)
-5V Indicator (16)	Green LED	Lights to indicate presence of -5VDC output from power supply
$+5V_1$ Circuit Breaker (17)	Push-to-reset circuit breaker	Circuit breaker for power supply +5VDC output to KSU's upper PCB shelf
$+5V_2$ Circuit Breaker (18)	Push-to-reset circuit breaker	Circuit breaker for power supply +5VDC output to KSU's lower PCB shelf

TABLE 2-G
PCB CONTROLS AND INDICATORS

CONTROL/INDICATOR (Figure 2-14)	TYPE OF COMPONENT	DESCRIPTION
PIOU/PIOUS Baud Rate Selector (SW2)	Two-position, spring-loaded, locking push-button switch	Selects baud rate for TTY or modem; 300 baud is selected when switch is in locked position, 1200 baud is selected when switch is in released position
PIOU/PIOUS Baud Rate Indicator (CD4)	Red LED	Lights when 300 baud rate is selected, by Baud Rate Selector (5); goes off when 1200 baud rate is selected
PIOU Page Background Music Volume Control	Trim potentiometer (VR1)	Adjusts volume of 3-watt amplifier for page background music feature
PEMU E & M TIE Line Indicators	Four red LEDs	Light to indicate the applicable E & M TIE line is in operation
PCTU "Heartbeat" Indicator (CD3)	Red LED	Flashes to indicate operation (1/4 second on—1/4 second off)
PCTU/PCTUS1 Music-on-Hold/Background Music Volume Control (VR1)	Trim potentiometer	Adjusts volume for music-on-hold/ background music feature
PCOU CO Line Indicators	Four red LEDs	Lights to indicate the applicable CO line is in operation (NOTE: CO line indicators will not light unless PCOU is connected to a CO line)

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digital telephones.

8.10 Electronic Telephones

8.11 Four 6500-series Electronic Telephones (the EKT6510-S, EKT6510-H, EKT6520-H, and EKT6520-SD) are compatible with the STRATA DK systems. These telephones can be used to access a number of standard, useful features and have internal connectors which allow them to be upgraded for more features, such as Off-hook Call Announce. (See Digital and Electronic Telephone Upgrade Options later in this chapter.) All electronic telephones come with a standard handset and, in most cases, can be connected to the system with a two-pair modular line cord. See the *General Description* for a more complete description of these phones.

NOTE:
All electronic telephones compatible with the analog STRATA/STRATA$_e$ key telephone systems are also compatible with the STRATA DK systems and vice versa. However, some features or volume levels may vary.

8.20 Digital and Electronic Telephone Upgrade Options

8.21 All digital and electronic telephones are hearing aid-compatible and may be upgraded with Off-hook Call Announce, Loud Ringing Bell and headset capability. Digital telephones may also be upgraded with data calling capability.

Integrated Data Interface Unit (PDIU-DI, PDIU-DI2): Digital telephones may be upgraded with an integrated data interface unit (PDIU-DI or PDIU-DI2) to receive and transmit simultaneous voice and data; data and voice calls can be made independently of each other. Available only with Release 3 and higher software, the PDIU-DI/PDIU-DI2 is easily installed, replacing the normal digital telephone base. The PDIU-DI2 can be mounted in a 2000-series Digital Telephone, while the PDIU-DI can be mounted in a 1000-series Digital Telephone.

NOTES:

1. *The PDIU-DI will function with all slots, except slots 11 ~ 14 in DK96.*
2. *PDKU1A Circuits 1 ~ 7 only can support PDIU-DIs/PDIU-DI2s, while all PDKU2A circuits, 1 ~ 8, can support PDIU-DIs/PDIU-DI2s.*

Off-hook Call Announce Upgrade (DVSU, HVSU2): A DVSU subassembly can be installed in digital telephones and the HVSU2 in electronic telephones, enabling these phones to receive Off-hook Call Announce (OCA) calls. Electronic telephones can also be equipped with the older HVSU and HVSI subassemblies for OCA reception.

NOTE:
Only those telephones programmed to receive OCA announcements require the OCA upgrade. A telephone does not have to be equipped with an OCA upgrade to make an OCA call.

Loud Ringing Bell/Headset Upgrade (HHEU): An HHEU can be installed in digital and electronic telephones to provide a Loud Ringing Bell interface and a modular headset jack.

- For the Loud Ringing Bell feature, an external speaker/amplifier called the HESB can be connected to the HHEU in the telephone to mimic the ring whenever the telephone is called.
- Most standard headsets are compatible with the HHEU jack.

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8.30 Direct Station Selection (DSS) Consoles

8.31 The DSS console is an optional dedicated answering station normally used on systems with a heavy volume of incoming calls. Each system can support as many as four DSS consoles—the DK24, however, can only support three if equipped with a PCTUS. Each DSS console must be associated with just one telephone, but a telephone can be associated with as many as four DSS consoles. DSS consoles can be connected to designated circuits on the PDKU (DDSS consoles) and PEKU (HDSS consoles) PCBs. For more information on DSS console features, see the *General Description.*

NOTE:
*Digital DSS consoles (DDSS) are only available with **Release 3** and higher software.*

8.40 Toshiba-supplied Peripherals

8.41 This section describes each peripheral item manufactured by Toshiba for use with the STRATA DK systems. Configuration and connection considerations are noted where applicable.

8.42 Stand-alone Data Interface Unit (PDIU-DS). Available with **Release 3** and higher software, the PDIU-DS provides an interface between digital telephones equipped with integrated data interface units (PDIU-DIs/PDIU-DI2s) and printers, modems, and host/mainframe computers.

NOTES:
1. *PDIU-DSs will function with all slots, except slots 11 ~ 14 in DK96.*
2. *PDKU1A Circuits 1 ~ 7 only can support PDIU-DSs, while all PDKU2A circuits, 1 ~ 8, can support PDIU-DSs.*

8.43 Door Phone. STRATA DK systems can support as many as 12 door phones (MDFBs) which can be used in a variety of applications, including visitor screening. Each door phone connects to a door phone/lock control unit (DDCB or HDCB—the DDCB connects to a designated PDKU circuit, and the HDCB connects to a designated PEKU or PESU circuit), which can support as many as three door phones. See the *General Description* for more details.

NOTE:
The DDCB is only available with Release 4.

8.44 Door Lock Control. STRATA DK systems can support as many as five door lock controls that allow a user to momentarily (three or six seconds) open a customer-supplied electronic door lock with the touch of a button on a digital or electronic telephone. Each door lock must connect with either a door phone/lock control unit (DDCB or HDCB) or a PIOU, PIOUS, or PESU PCB.

NOTES:
1. *The DDCB is only available with Release 4.*
2. *Each door lock that interfaces with a DDCB or HDCB reduces the door phone capacity of 12 by one.*

8.45 TOSHIBA VP Systems. TOSHIBA VP (the VP 100, VP 200, and VP 300) systems provide STRATA DK users with an effective voice messaging system. These systems connect to standard telephone circuits on either the PSTU or PESU. STRATA DK systems use in-band Dual-tone Multi-frequency (DTMF) tone signaling to interface with the TOSHIBA VP systems.

8.46 External Speaker (HESB). The HESB is a 3-watt, 6 inch amplifier/speaker that can be used for one of three applications: paging speaker, talk-back speaker, and amplified ringing bell. See the *General Description* for more application details.

8.50 Customer-supplied Peripherals

8.51 The STRATA DK systems support many other commonly used peripheral devices which can be supplied by the customer. Examples of these devices are listed below, with the connecting system PCB noted in parentheses:

- Auto Attendant Device (PSTU and PESU)
- Dictation Equipment (PSTU and PESU)
- External Maintenance Modem (PIOU or PIOUS)
- Fax Machine (PSTU and PESU)
- Local Maintenance Terminal (PIOU or PIOUS)
- Modem (PSTU and PESU)
- Paging System (PIOU or PIOUS or PEPU)
- Radio Paging Equipment (PSTU and PESU)
- Remote Maintenance Terminal (PIOU or IMDU)
- Standard Telephones (PSTU and PESU)
- SMDR Printer/Call Accounting Device (PIOU or PIOUS)
- Voice Mail Messaging System (PSTU and PESU)
- Music-on-hold Source (PCTU)
- Background Music Source (PSTU, PEKU, PESU, and PCTU)

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Strata® DK24/56/96

RELEASE 1, 2, 3, and 4

INSTALLATION

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Chapter Three
SITE REQUIREMENTS

TABLE OF CONTENTS

TABLE LIST

FIGURE LIST

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1 GENERAL

1.00 This chapter defines the installation site requirements necessary to ensure a proper operating environment for STRATA DK systems. Also included are input power requirements, cable lengths/network requirements, and grounding requirements.

2 INPUT POWER REQUIREMENTS

2.00 The systems require an input power source of 117VAC nominal (85VAC ~ 135VAC), 50/60 Hz, 15 amps. The AC outlet must be *dedicated to* system use, fused, and grounded. (Refer to Paragraph **5**.)

2.01 To avoid accidental power turn-off, it is recommended that an ON/OFF wall switch *not* be used on this dedicated AC circuit.

2.02 A reserve power source (two customer-supplied 12-volt batteries) may be connected to the STRATA DK system to serve as a power failure backup.

3 SITE CONSIDERATIONS

3.00 Clearance and Location Requirements

3.01 The key service unit (KSU) for each system may be mounted on a wall or tabletop. Figure 3-1 (DK24/56) and Figure 3-2 (DK96) show the minimum clearance requirements for both mounting options.

3.02 The following conditions must be considered when selecting a location for the KSU:

The location MUST BE:
- Dry and clean
- Well ventilated
- Well illuminated
- Easily accessible

The location MUST NOT BE:
- Subject to extreme heat or cold
- Subject to corrosive fumes, dust, or other airborne contaminants
- Subject to excessive vibration
- Next to television, radio, office automation, or high frequency equipment

3.03 Optional customer-supplied reserve batteries require a well-ventilated location close (within nine feet) to the KSU. (The Toshiba-supplied battery cable, PBTC, is nine feet long.)

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3.10 Electrical/Environmental Requirements and Characteristics

3.11 The electrical/environmental requirements and characteristics for each STRATA DK system are provided in Table 3-A.

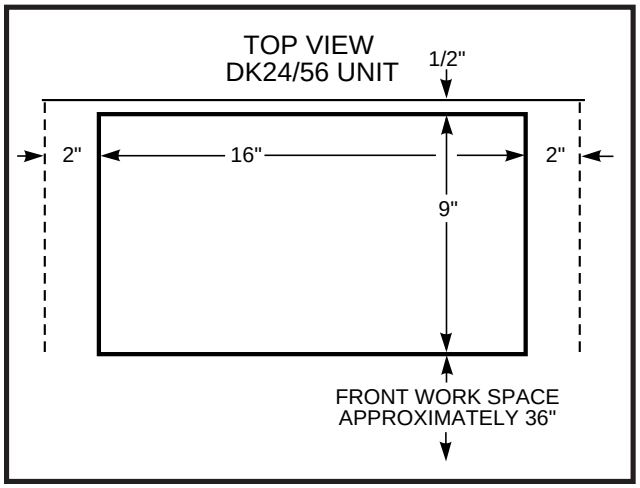

FIGURE 3-1
DK24/56 MINIMUM CLEARANCE REQUIREMENTS

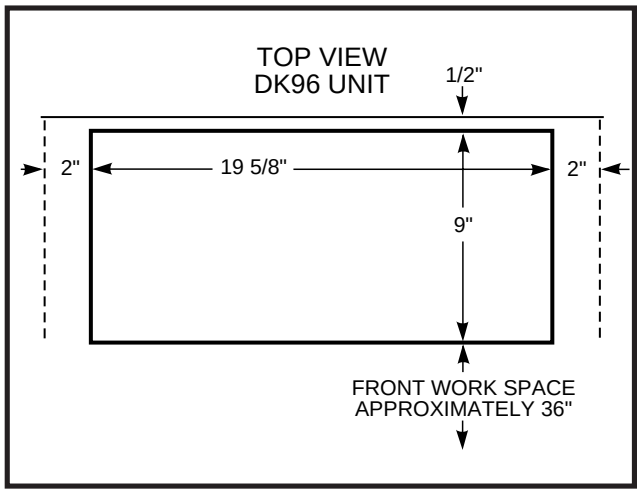

FIGURE 3-2
DK96 MINIMUM CLEARANCE REQUIREMENTS

TABLE 3-A
SUMMARY OF ELECTRICAL/ENVIRONMENTAL CHARACTERISTICS

GENERAL

Primary Power	
Input AC	85VAC ~ 135VAC
AC Frequency	50/60 Hz
DK24 power supply	65 watts
DK56 power supply	140 watts
DK96 power supply	230 watts
Environmental Specifications	
Operating Temperature	32 ~ 104°F (0 ~ 40°C)
Operating Humidity	20 ~ 80% relative humidity (without condensation)
Storage Temperature	–4 ~ 158°F (-20 ~ 70°C)
Power Supply	
DC Voltage Output Specification	–24 VDC: -26.3 ~ -27.8 + 5 VDC: + 4.5 ~ + 5.5 – 5 VDC: – 4.5 ~ – 5.5
Battery Charger Characteristics	Charger: current limiting Nominal Float Voltage: 2.275 volts/cell Charge Current: 0.7 amps maximum Battery Discharge Cut-off Voltage: 20.5 ± 0.5V
PSTU (before November 1989)	Square Wave:
Ring Voltage	190 ± 20V peak-to-peak (no load)
Ringing Capability	up to two ringers maximum per circuit.
PSTU2/PESU (circuits 1 & 2)	Square Wave:
Ring Voltage	Low position 130 ± 20V peak-to-peak (no load) High position 190 ± 25V peak-to-peak (no load)
Ringing Capability	Two ringers maximum per circuit, high or low position
BTU Rating	
DK24	PDKU: 3 103 BTUs (30 wh) PCOU: 2 PCTUS: 1 PIOUS: 1 Digital Telephone: 24
DK56	PDKU: 5 205 BTUs (60 wh) PCOU: 3 PCTU: 1 Digital: Telephone 40
DK96	PDKU: 9 348 BTUs (102 wh) PCOU: 5 PCTU: 1 Digital Telephone: 72

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4 CABLE LENGTHS/NETWORK REQUIREMENTS

4.00 Tables 3-B and 3-C list station loop requirements and system network requirements, respectively. The key service unit (KSU) must be located to allow compliance with the specified requirements.

5 GROUNDING REQUIREMENTS

5.00 The system requires a solid earth ground for proper operation. Failure to provide ground may lead to confusing trouble symptoms and, in extreme cases, system failure. The AC power cord already contains a conductor for the "third wire ground" provided by the commercial power outlet; but connect a conductor between the frame ground terminal on the key service unit (KSU) and a cold water pipe or the building ground (Figure 3-3) to further insure the presence of ground.

NOTES:

1. *The "third wire ground" must be dedicated.*
2. *The conductor connected to the frame ground must comply with the general rules for grounding contained in Article 250 of the National Electrical Code, NFPA 70, but must not depend on the cord and plug of the system.*

5.10 Third Wire Ground Test

5.11 Test the "third wire ground" for continuity by either measuring the resistance between the third prong terminal (earth ground) and a metal cold water pipe (maximum: 5 ohms), or by using a

TABLE 3-B
LOOP REQUIREMENTS

Device	PCB Interface	Max Loop Resistance (Including Device)	Max Distance from KSU to Device	Number of Wire Pairs
Digital Telephone	PDKU	40 ohms	1000 feet (303 m)	1[1]
DDSS Console	PDKU	40 ohms	1000 feet (303 m)	1[1]
DDCB	PDKU	40 ohms	1000 feet (303 m)	1[1]
PDIU-DS	PDKU	40 ohms	1000 feet (303 m)	1[1]
PDIU-DI or PDIU-DI2	PDKU	40 ohms	1000 feet (303 m)	1[1]
Electronic Telephone	PEKU, PESU	40 ohms	1000 feet (303 m)	2[2]
HDSS Console	PEKU	20 ohms	500 feet (152 m)	2
HDCB	PEKU, PESU	40 ohms	1000 feet (303 m)	2
Standard Telephones, Voice Mail, Fax Machine	PSTU, PESU	300 ohms	see Note 3	1

NOTES:

1. Some distance limitations apply. See Table 9-D.
2. Requires 3-pair to receive Off-hook Call Announce calls.
3. Approximately 3000 feet (909 m) with 150 ohm device. See manufacturer's product specifications for exact resistance of device.

TABLE 3-C
NETWORK REQUIREMENTS

TOSHIBA Circuit Board	Facility Interface Code	Network Jack	Ringer Equivalence
PCOU/PCOU2 (Loop Start Line)	02LS2	RJ14C	0.2B
PEMU (Type I, TIE Line)			
2-wire	TL11M	R2JEX	N/A
4-wire	TL31M	RJ2GX	N/A
PSTU/PESU (circuits 1 & 2) (Off-premises Line)	OL13A	RJ21X	N/A

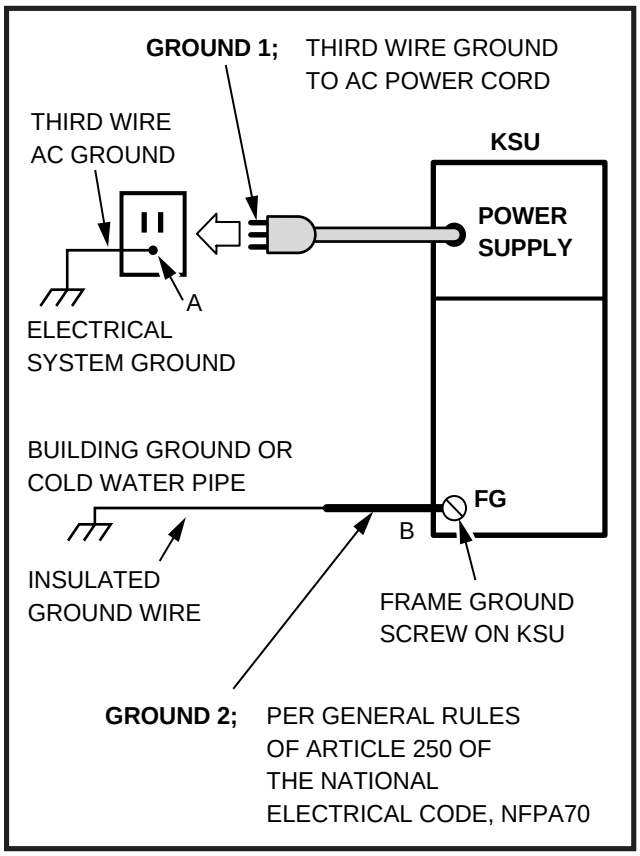

FIGURE 3-3
KSU GROUNDING DIAGRAM

commercially available earth ground indicator. If neither procedure is possible, perform the following procedure.

WARNING!
Hazardous voltages that may cause death or injury are exposed during the following test. Use great care when working with AC power line voltage.

1) Obtain a suitable voltmeter, and set it for a possible reading of up to 250VAC.

2) Connect the meter probes between the two main AC voltage terminals (white and black wires) on the wall outlet. The reading obtained should be between 100 ~ 120VAC.

3) Move one of the meter probes to the third terminal (green wire ground). Either the same reading or a reading of zero volts should be obtained.

4) If the reading is zero volts, leave one probe on the ground terminal and move the other probe to the second voltage terminal.

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CAUTION!

If a reading of zero volts is obtained on both voltage terminals (white wire to green wire, black wire to green wire), the outlet is not properly grounded. Omit steps 5 and 6, and proceed directly to step 7.

5) If a reading of zero volts on one terminal and a reading of 100 ~ 120VAC on the other terminal is obtained, remove both probes from the outlet.

6) Set the meter to the "OHMS/Rx1" scale. Place one probe on the ground terminal, and the other probe on the terminal that produced a reading of zero volts. The reading should be less than one ohm.

CAUTION!

If the reading is more than one ohm, then the outlet is not adequately grounded.

7) If the above tests show the outlet is not properly grounded, the condition should be corrected (per Article 250 of the National Electrical Code) by a qualified electrician before the system is connected.

5.20 Frame Ground Test

5.21 Use the following procedure to test the frame ground conductor for continuity.

WARNING!

Hazardous voltages that may cause death or injury may be exposed during the following test. Use great care when working with AC power line voltage.

1) Refer to Figure 3-3.

2) Disconnect the AC plug of the system to make sure that the two earth ground paths are separated.

3) With a suitable volt/ohm meter, perform a reading between points A and B shown in Figure 3-3. Verify that the readings do not exceed the figures listed below. If they do, the condition must be corrected by a qualified electrician before the system is connected.

A to B: 1 volt maximum
then
A to B: 1 ohm maximum

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Strata® DK24/56/96

RELEASE 1, 2, 3, and 4

INSTALLATION

Chapter Four
SYSTEM CONFIGURATION

H

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TABLE LIST

FIGURE LIST

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1 INTRODUCTION

1.01 STRATA DK systems are flexible in their ability to meet a broad range of customer configuration requirements. A modular building block approach allows the incremental addition of various parts to meet growing and changing system needs and applications.

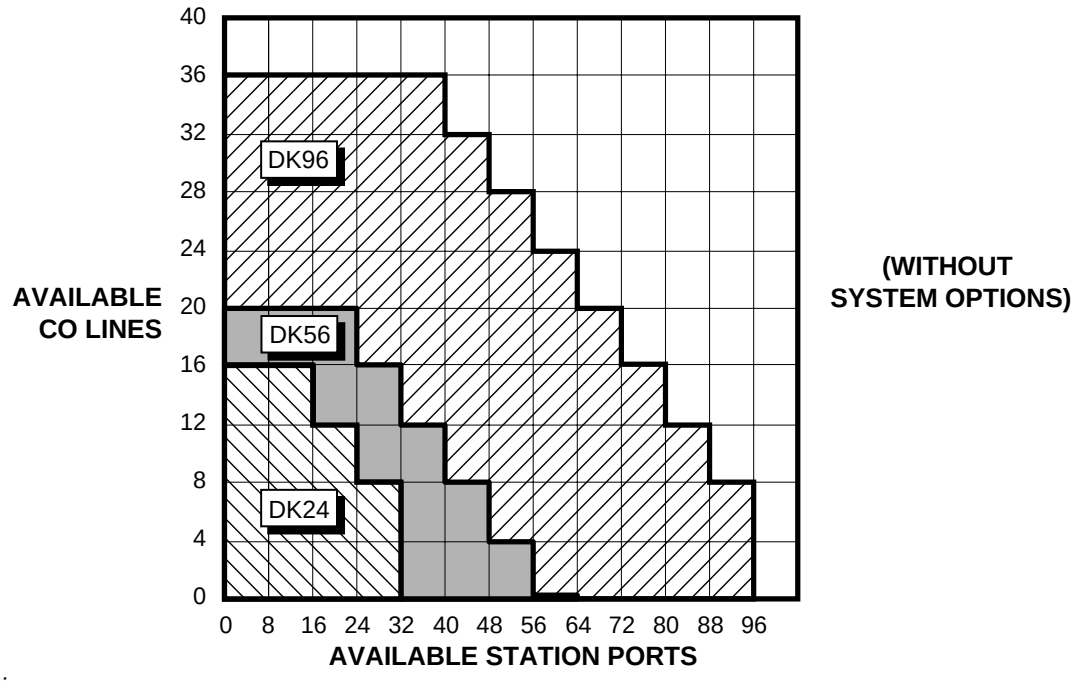
1.02 The main unit of each STRATA DK system is the key service unit (KSU) which contains universal slots that can support any of the various station, CO line, and peripheral printed circuit boards (PCBs) compatible with the systems. This is contrasted with a dedicated slot approach (used in previous STRATA systems), where a particular slot can only accept a specific PCB, such as a CO line interface PCB. DK24 has six universal slots, DK56 has eight, and DK96 has 14. This increased flexibility in STRATA DK means that trade-offs can be made between the number of CO lines and stations in a system application.

1.03 Figure 4-1 shows that in most configurations, four CO lines can be traded for eight stations. Conversely, for every eight stations that are given up, four CO lines can be added. The maximum quantities of 16 CO lines for DK24, 20 CO lines for DK56, and 36 CO lines for DK96 are based on squared systems. Software allows 16 CO lines with PCTUS and 36 CO lines with PCTU (1, 2, 3, or 4). Similarly, the 24 station (PCTUS) and 96 station (PCTU1, 2, 3, or 4) limits are also software limitations.

1.10 System Considerations

1.11 When no external options or TIE lines are installed and only CO lines and station PCBs are exchanged, the maximum configurations can be summarized in Table 4-A.

1.12 Table 4-A shows the maximum number of digital telephones (2000- and 1000-series), 6500-series electronic telephones, and/or standard tele-



NOTES (DK24):
1. *24 stations are available with PCTUS1-equipped DK24.*
2. *32 stations are available with PCTU-(1, 2, 3, or 4) equipped DK24.*

FIGURE 4-1
PCB CONFIGURATION CHART

Table 4-A
DK24/56/96 MAXIMUM CONFIGURATIONS

DK24 (PCTUS1)

CO Lines	Stations
16	16
12	24
8	24
4	24
0	24

DK 24 (PCTU 1, 2, 3, or 4)

CO Lines	Stations
16	16
12	24
8	32
4	32 [3]
0	32 [3]

DK56 (PCTU 1, 2, 3, or 4)

CO Lines	Stations
20	24
16	32
12	40
8	48
4	56
0	64

DK96 (PCTU 1, 2, 3, or 4)

CO Lines	Stations
36	40
32	48
28	56
24	64
20	72
16	80
12	88
8	96

NOTES:

1. *The station capacities apply to any combination of standard telephones, digital telephones (2000- and 1000-series) and 6500-series electronic telephones. Station capacities using other Toshiba electronic telephones are given on Worksheet 7.*
2. *Installing a TIE line (PEMU) PCB or an peripheral interface (PIOU/PIOUS/PEPU) PCB reduces available CO lines by four or available station ports by eight.*
3. *The DK24's 32-station limit is a result of power supply capacity.*

phones that can exist in each STRATA DK system. Due to power availability, the numbers decrease if using 2000-, 3000-, 6000-, or 6005-series electronic telephones, a PEMU PCB, or digital telephones equipped with Integrated Data Interface Units (PDIU-DIs or PDIU-DI2s). When mixing different series telephones and/or if a PEMU PCB is installed, use Worksheet 7 in the Configuration Guide to verify that the power supplied is greater than the power used.

1.20 Common Control PCBs

1.21 DK systems must be configured with one of the following five common control PCBs: PCTU1, PCTU2, PCTU3, PCTU4, or PCTUS. PCTU1, 2, 3, and 4 have the same configuration capacity and can be used in all three system models. The PCTU1 provides **Release 1** features; PCTU2 provides **Release 2** features; PCTU3 provides **Release 3** features; and PCTU4 provides **Release 4** features. Designed for use with the DK24 system only, the PCTUS provides **Release 2** features. Its configuration capacity is less than the other common control PCBs. If a PCTUS is installed in DK56 or DK96, the system will not operate correctly. Station, line, peripheral, and feature capacities for each common control PCB are shown in Table 4-B. These capacities reflect maximum stand-alone capacities and do not indicate combined capacity of the many possible configurations when mixing options, stations, and lines. Use the Configuration Guide later in this chapter to determine combined capacities for a system.

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1.30 Station and CO line PCBs

1.31 The Digital Telephone Interface Unit PCB (PDKU) provides eight digital telephone circuits. The Electronic Telephone Interface Unit PCB (PEKU) provides eight electronic telephone circuits. The Standard Telephone Interface Unit PCB (PSTU) has eight standard telephones circuits. The Standard/Electronic Telephone Interface Unit PCB (PESU) provides two standard and four electronic telephone circuits. (The PESU is intended for configurations that require less than three standard telephone ports and/or less than five electronic telephone ports.)

1.32 Up to four CO lines can be connected with the CO line Interface Unit PCB (PCOU).

1.33 With the exception of the common control PCB (PCTU) described which has its own dedicated slot, any of the PCBs noted above can be

TABLE 4-B
SYSTEM CONTROL PCB (PCTU) CONFIGURATION INFORMATION

Control Board Version	PCTU1/PCTU2/ PCTU3/PCTU4	PCTUS1
System Compatibility	DK24/56/96	DK24 only
DK Feature Set	PCTU1-**Release 1** PCTU2-**Release 2** PCTU3-**Release 3** PCTU4-**Release 4**	**Release 2** features
Universal PCB Slot Capacity	6 max with DK24 8 max with DK56 14 max with DK96	6 max
Station Port Capacity	32 max with DK24 56 max with DK56 96 max with DK96	24 max
CO Line Capacity (squared systems)	16 max with DK24 20 max with DK56 36 max with DK96	16 max
TIE Line Capacity	4 max with DK24 8 max with DK 56 12 max with DK96	4 max
HDSS or DDSS[3] Consoles (or combination)	4 max	3 max
Door Phones	12 max	9 max
Door Lock Controls	5 max (**R2**, **R3,** and **R4**) 1 max (**R1**)	4 max
Simultaneous Multi-party Conference	8 max	3 max
CRCU (-4 or -8) Option	1 max	1 max
PCTU MOH/BGM, Connection	1 max	1 max
PDIU-DI and PDIU-DI2[2] (PCTU3 and PCTU4 only)	21 max with DK24 53 max with DK56 80 max with DK96	Not Supported
PDIU-DS[2] (PCTU3 and PCTU4 only)	24 max with DK24 56 max with DK56 80 max with DK96	Not Supported
Personal Message/Memo Memory for LCD Stations	16 stations max (see Note 1)	6 stations max (see Note 1)
Alternate BGM Connection	1 max (**R2, R3,** and **R4**)	1 max
Simultaneous External Amplified Two-CO Line Conference Calls	4 max (**R3** and **R4**)	Not Supported

NOTES:
1. *This only applies to LCD personal memory; all stations in any DK system can be an LCD telephone.*
2. *In the DK24 and DK56, PDIU-DIs and PDIU-DSs are limited only by the system power capacity per Worksheet 7; both DIU types are limited to slots 01 ~ 10 in the DK96. PDKU1 can support DIUs on circuits 1 ~ 7 only, PDKU supports DIUs on circuits 1 ~ 8.*
3. *DDSS requires PCTU3 or PCTU4.*

used in any of the universal slots. (DK24 has six universal slots, DK56 has eight, and DK96 has 14.) Table 4-C shows all the PCBs which can be installed in universal slots and the maximum quantity of each PCB allowed per system. It may be helpful to consider the following configuration examples:

Example 1—A small business requires a system to handle six CO lines, 12 electronic telephones, and three standard rotary-type telephones.

- The PCB configuration (in addition to common equipment) is as follows:
  Two PCOU PCBs
  Two PEKU PCBs
  One PSTU PCB
- Each of these PCBs requires one universal slot, so a total of five slots are required. Therefore, a DK24 can be used.

Example 2—A bank branch office needs nine CO lines, seven electronic telephones, five digital telephones, and 11 standard rotary-type telephones.

- The PCB configuration (in addition to **Release 3** or **4** common equipment) is as follows:
  Three PCOU PCBs
  One PEKU PCB
  One PDKU PCB
  Two PSTU PCBs
- The configuration requires seven universal slots; therefore, DK24 is ruled out, because it has only six universal slots. Offering 14 universal slots, DK96 could be used, but it is a little too big for the office's needs at the moment. DK56, with its eight universal slots, could meet those needs immediately and could accommodate some minor expansion.

Example 3—A large travel agency needs 18 CO lines, 14 electronic telephones, 14 digital telephones, and two standard push-button dialing, Dual Tone Multifrequency (DTMF) standard telephones.

- The PCB configuration (in addition to **Release 3** or **4** common equipment) is as follows:
  Five PCOU PCBs
  Two PEKU PCBs
  Two PDKU PCBs
  One PESU PCB
  One CRCU subassembly
- Each of these PCBs, except for the CRCU, requires one universal slot. Therefore, a total of 10 slots are required. This is beyond the capacity of DK24 and DK56 (six and eight slots, respectively) but well within the capacity of DK96. The CRCU, which mounts on the PCTU, is required for the DTMF standard telephones.

2 OPTIONS AND PERIPHERALS

2.00 Option Printed Circuit Boards

2.01 Numerous options, such as a paging amplifier, External Page (one zone), relay control, etc., require an additional printed circuit board (PCB) called the PEPU. If even more options are required, such as Multi-zone Paging, an alarm sensor, Station Message Detail Recording (SMDR) or Remote Maintenance, then the PIOU or a PIOUS PCB will be needed. Table 4-D provides more details about the capabilities of these PCBs. Only one option PCB is allowed per DK system. The maximum station port capacity is reduced by eight and CO line capacity by four with the installation of any of these PCBs.

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2.10 Direct Station Selection (DSS) Consoles

2.11 STRATA DK systems equipped with a PCTU1, 2, 3, or 4 can support up to four DSS consoles, and systems operating with a PCTUS can support up to three. There are two types of DSS consoles: the DDSS console and the HDSS console. The DDSS console and the HDSS console share the same function and look essentially alike, but interface with different types of circuits. Each DDSS console can only be connected to circuit 8 of a Digital Telephone Interface Unit (PDKU) PCB, while each HDSS console can only be connected to circuits 7 and 8 of an Electronic Telephone Interface Unit (PEKU) PCB—each console requires a separate PCB. DDSS consoles are available only with PCTU3 and 4, but HDSS consoles are supported by each of the PCTU versions as well as the PCTUS.

2.12 DSS consoles can be assigned flexibly so that one to four DSS consoles can be assigned to one

TABLE 4-C
UNIVERSAL SLOT/PCB CAPACITIES

Printed Circuit Board	Circuits per Printed Circuit Board	PCB Maximum Capacities (Ports/Lines)				Interface to:
		DK24		DK56	DK96	
		PCTUS1	PCTU (1/2/3/4)	PCTU (1/2/3/4)	PCTU (1/2/3/4)	
PDKU[1] (requires PCTU3 or PCTU4)	8/Digital Telephone (Ports, Digital) (without PDIU-DI) (with PDIU-DI)	**3** (24) (N/A) (N/A)	**4** (32) (32) (21)[2]	**8** (64) (64) (53)[2]	**12** (96) (96) (80)[2]	• Digital Telephones • DDSS Consoles • PDIU-DI • PDIU-DS • DDCB Door Phone Box
PEKU[1]	8/Electronic Telephone (Ports, Electronic)	**3** (24)	**4** (32)	**8** (64)	**12** (96)	• Electronic Telephones • HDCB Door Phone Box • HDSS Consoles • BGM Source • EOCU PCB for OCA • Amplified Conference
PSTU	8/Standard Telephone (Ports, Standard)	**3** (24)	**4** (32)	**8** (64)	**12** (96)	• Standard Telephones • Voice Mail Ports • Fax • Dictation Machine • Off-premises Stations • Other similar devices
PESU[3] (requires PCTU2 and above)	2/Standard Telephone 4/Electronic Telephone (Ports Standard/ Electronic)	**3** (6/12)	**5** (10/20)	**8** (16/32)	**12** (24/48)	Standard: Same as PSTU Electronic: Same as PEKU (see Note 3)
PCOU	4/CO Line (Lines)	**4** (16)	**5** (20)	**7** (28)	**9** (36)	• Central Office Loop Start Lines
PEMU[4]	4/TIE Lines (Lines)	**1** (4)	**1** (4)	**2** (8)	**3** (12)	• E&M TIE Lines – Type I - Signaling – 2 or 4 wire transmission – Immediate start
PIOU,[5] PIOUS or PEPU	See Table 4-F	**1**	**1**	**1**	**1**	See Table 4-D

NOTES:

1. *The appropriate capacities apply to digital and 6500-series electronic telephones only. If other Toshiba electronic telephones (2000-, 3000-, 6000-) are used, refer to Worksheet 7.*
2. *The number of digital telephones with PDIU-DIs is limited by the system's power capacity per Worksheet 7. Also, DIUs are limited to slots 01 ~ 10 in DK96 and cannot be connected to Circuit 8 of a PDKU1 but can be connected to Circuit 1 of 8 of the PDKU2.*
3. *Normally only one PESU is installed in a system that requires a mix of standard and electronic telephone circuits. A PESU is installed instead of a PSTU if only one or two standard telephone circuits are needed. It is installed instead of a PEKU if only four electronic telephone circuits or less are needed. The PESU supports the same stations and options as the PSTU and PESU do, except for the HDSS console.*
4. *The maximum number of PEMU PCBs is determined by the system's power supply capacity (caution: do not exceed the numbers shown); also, if a PEMU is installed in a DK24 with a PCTUS1 PCB, only 16 station ports are available for stations.*
5. *Only one type of peripheral interface PCB (PIOU, PIOUS, PEPU) may be installed per system.*

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TABLE 4-D
OPTION INTERFACE PCB INFORMATION

Interface Option	PIOU	PIOUS	PEPU
Unamplified Page Output (Single zone, 600 ohms duplex)	X	X	X
Amplified Page Output (Single zone, 3 watts, 8 ohms)	X		X
Zone Page Interface (Unamplified, 4 zones)	X		
Night Transfer or Music-on-Hold Control Relay	X	X	X
Door Lock or External Amplifier Control Relay	X	X	X
Alarm Sensor	X	X	
SMDR Output (RS-232/6-wire modular connector)	X	X	
Maintenance Port for a Local ASCII Terminal or External Modem (RS-232/6-wire modular connector)	X	X	
Remote Maintenance Modem (IMDU subassembly, no external connector)	X	X	

NOTE:
"X" indicates the option is provided.

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digital or electronic telephone, or one DSS console to each of four digital or electronic telephones, or any intermediate combination. Furthermore, DDSS consoles can be assigned to electronic telephones, although the telephones and the consoles interface with different types of PCBs; likewise, HDSS consoles can be assigned to digital telephones. Table 4-E provides more details regarding DDSS and HDSS consoles.

Example 4—An end user requires nine CO lines, 15 electronic telephones, one HDSS console and External Paging.

- If External Paging speakers can be driven with three watts or less, then the PEPU PCB

can be employed as the paging amplifier. Since each HDSS console requires the equivalent of two electronic telephones for interface, a total of 17 equivalent electronic telephones must be interfaced and, therefore, three PEKU PCBs are needed. Aside from common equipment, the PCBs required for this configuration are as follows:

Three PCOU PCBs
Three PEKU PCBs
One PEPU PCB

- A total of seven universal slots are needed, which is within the maximum of DK56's eight universal slots.

Example 5—A mid-sized business needs 15 CO lines, 12 digital telephones, two DDSS consoles, 14 electronic telephones, two HDSS consoles, and an External Paging system interface to drive an existing 8-ohm speaker. In addition, the business wants to track its employees' calling activity by using the Station Message Detail Recording (SMDR) feature.

- Because an External Paging system and SMDR are required, the PIOU amplified page output and SMDR interface will be needed. Two DDSS consoles require the equivalent of two digital telephone circuits in addition to the 12 digital telephones, for a total of 14 digital telephone circuits; this results in the installation of two PDKU PCBs. Two HDSS consoles require the equivalent of four electronic telephones, for a total of 18 electronic telephone circuits (including the 14 electronic telephones); this results in the installation of three PEKU PCBs. The final PCB configuration (in addition to **Release 3** or **4** common equipment) is:

  Four PCOU PCBs
  Three PEKU PCBs
  Two PDKU PCBs
  One PIOU PCB

- This configuration requires 10 PCBs, which can only be supported by the DK96.

2.20 Data Interface Units

2.21 Integrated Data Interface Unit (PDIU-DI and PDIU-DI2): The PDIU-DI(2) can replace the normal base of the digital telephone to provide the telephone with Data Calling capability. Each system can support a maximum number of PDIU-DI(2)s, as shown in Table 4-B. The PDIU-DI(2) which is attached to the digital telephone shares the same digital circuit on the PDKU.

NOTE:
The PDIU-DI and the PDIU-DI2 are identical, except that the PDIU-DI attaches to 1000-series Digital telephones and the PDIU-DI2 attaches to 2000-series Digital Telephones.

2.22 Stand-alone Data Interface Unit (PDIU-DS): Each PDIU-DS requires a dedicated circuit on a PDKU, unlike the PDIU-DI which shares a circuit with the digital telephone it is integrated with. Therefore, each PDIU-DS reduces the digital telephone maximum capacity by one. Each system can support a maximum number of PDIU-DSs, as shown in Table 4-B.

NOTES:
1. *The PDIU-DI and PDIU-DS will function with all slots, except slots 11 ~ 14 in DK96.*
2. *There are two PDKU versions: PDKU1 and PDKU2. These versions are identical, except that the PDKU1 can only support PDIU-DIs and PDIU-DSs on circuits 1 ~ 7, while all PDKU2 circuits, 1 ~ 8, can support PDIU-DIs and PDIU-DSs.*

Example 6—A small law firm requires three CO lines, 10 digital telephones (all of which will be equipped with a PDIU-DI(2) connected to a personal computer) and two PDIU-DSs connected to modems.

- The 10 digital telephones and the two PDIU-DSs connected to the modems call for 12 digital circuits. (The PDIU-DIs require no dedicated digital circuits, because they share the circuits with the telephones that they are connected to.) If the two modems are configured in a system modem pool, then one standard telephone circuit is required for each; therefore a PESU or PSTU would be needed. The three CO lines can be handled by one PCOU PCB. The PCBs required for this configuration are as follows:

  Two PDKUs
  One PCOU
  One PESU or PSTU

- A total of four universal slots are required for

this configuration, which can be supported by the DK24.

Example 7—Two tenants in one building require, on a combined basis, 13 CO lines, 23 digital telephones, eight standard DTMF telephones, a fax machine, four DDSS consoles, Remote Maintenance, and an interface to their alarm system.

- The 13 CO lines can be supported by four PCOU PCBs, since each PCOU has four CO line circuits. The 23 digital telephones and the four DDSS consoles require 27 digital telephone circuits, which can be accommodated with four PDKU PCBs. The fax machine and the eight DTMF standard telephones can be handled with one PSTU and one PESU. Because DTMF is coming into the system, a CRCU must be installed, but does not deduct from the available universal slots. The PIOUS PCB can be equipped with an IMDU to provide Remote Maintenance. In addition, the PIOUS has an interface for the alarm system. The total PCB requirement (in addition to common equipment) is as follows:
  Four PCOU PCBs
  Four PDKU PCBs
  One PSTU PCB
  One PESU PCB
  One CRCU subassembly
  One PIOUS PCB
  One IMDU subassembly
- A total of 11 universal slots are required; so a STRATA DK96 can meet the requirements of the configuration.

2.30 Door Phones

2.31 Up to 12 door phones (MDFB) can be accommodated by either a DK24, DK56, or a DK96 equipped with a PCTU (1, 2, 3, or 4). DK24s equipped with a PCTUS can support only nine door phones. A Door Phone/Lock Control Unit (DDCB or HDCB) is required for every three door phones. Each DDCB/HDCB interfaces to a STRATA DK system via Ports 04, 12, 20, and 28. Available with PCTU4 only, the DDCB connects to digital circuits associated with Ports 04, 12, 20, and 28; and the HDCB, which can be supported by the PCTUS as well as all versions of the PCTU, connects to electronic circuits associated with four ports. For system configuration, each DDCB and HDCB must be considered equivalent to a telephone as far as consuming station capacity. Table 4-E provides more details regarding DDCB and HDCB configuration.

2.40 E & M TIE Lines

2.41 Each PEMU PCB provides interface to four TIE lines. Up to four TIE lines can be accommodated by DK24, up to eight by DK56, and up to twelve by DK96. TIE lines (PEMU) are the same as CO lines (PCOU), when considering the maximum total outside lines in a system. The maximum lines per system are 16 for DK24, 24 for DK56, and 36 for DK96. In addition, each PEMU uses up station ports so that the software-limited station capacity of a system is reduced with every PEMU added. The number of station ports consumed by the PEMU depends on the type of PCTU used. If a PCTU (1, 2, 3, or 4) is installed, the PEMU reduces the system station capacity by four. If a PCTUS is installed, each PEMU reduces the station capacity by eight. This is of concern only in a DK24 system that requires more than 16 stations. Each PEMU added to a system uses up one universal slot.

NOTES:

1. *DK24's limit of four TIE lines (one PEMU) is due to power supply capacity. Do not exceed this limit.*
2. *Systems that support TIE lines must be equipped with a CRCU.*

2.50 Off-hook Call Announce (OCA)

2.51 Digital and electronic telephones equipped with an OCA subassembly can receive OCA calls. PEKU PCBs supporting electronic telephones equipped for OCA must also be upgraded with an EOCU subassembly. PDKU PCBs supporting digital telephones equipped for OCA require no such upgrade. Telephones making OCA calls do not require an upgrade.

- The OCA upgrade for the digital telephone is the DVSU, which installs inside the base of the telephone.

- The OCA upgrade for the electronic telephone is the HVSU2, which installs inside the base of the telephone. (The combined HVSU and HVSI subassemblies can also provide electronic telephones with OCA capability.) Each PEKU or PESU PCB supporting electronic telephones equipped for OCA must be upgraded with an EOCU. OCA-equipped electronic telephones should be kept in groups of four in concert with a particular PESU and in groups of eight with a particular PEKU. Since the EOCU connects to the PEKU or PESU, it does not reduce the number of available universal slots.
- All system slots, except DK96's 11~14 and DK24's 05 and 06 with PCTUS, can support telephones that receive OCA.

2.60 Data and Modems with Release 1 or 2

2.61 Passing data at up to 9600 bits per second (bps) through STRATA DK standard telephone ports is possible. To accomplish this function, an external, commercially available modem is required. Most typically, the modem will be housed in a personal computer and have its own two-wire modular connection. The modem is interfaced to STRATA DK via a PSTU or PESU PCB , like a standard telephone. The IMDU modem, discussed previously in **Example 7**, can only be used with the PIOU or PIOUS PCB for remote maintenance.

IMPORTANT NOTE:

For data applications requiring more functions than that provided by a personal computer and modem, it is recommended to use the STRATA DK data interface units, PDIU-DI and PDIU-DS. This includes data applications such as modem pooling, printer sharing, PC-to-PC file transfer, etc.

Example 8—A sizable business needs 15 CO lines, three E&M TIE lines, 37 electronic telephones, two HDSS consoles, four door phones, three standard telephones, a fax machine, three modems, Off-hook Call Announce for seven of the 37 electronic telephones, and three-zone paging. The business also wishes to use the Direct Inward System Access (DISA) feature.

- The four door phones can be supported by two HDCBs, since each HDCB has a maximum of three door phone interfaces. Each HDCB requires one electronic telephone circuit. Both HDSS consoles require two electronic telephone circuits. Therefore, including the 37 electronic telephone circuits required for the electronic telephones, the configuration will require PCBs for 43 electronic telephone circuits. The system will need six PEKU PCBs to support this number. One of the PEKUs needs an EOCU PCB to accommodate the seven electronic telephones that will have Off-hook Call Announce. This particular PEKU cannot interface with an HDSS console, because the HDSS console interfaces as the equivalent of two electronic telephones, leaving only six circuits for telephones.
- The equivalent of seven standard telephones (the three standard phones, the fax machine, and the three modems) need to be interfaced; so only one PSTU is required. A CRCU PCB will be required for the DISA feature, since DTMF tones will be coming into the system. Therefore, the standard telephones and like devices can use DTMF without any additional cost. If only one zone of external paging was needed, a PEPU or PIOUS PCB could be used to interface with the paging system. But three zones are required; so a PIOU PCB must be installed—the PIOU only supports zone paging. For 15 CO lines, four PCOU PCBs are needed. Only one PEMU PCB is required for the three TIE lines.
- In summary, the total PCB requirement (in addition to common equipment) is as follows:
  Four PCOU PCBs
  One PEMU PCB
  Six PEKU PCBs
  One PSTU PCB
  One PIOU PCB
  One EOCU subassembly
  One CRCU subassembly
- A total of 13 universal slots (one for each of the PCBs) are needed; so a DK96 system must be used.

2.70 Miscellaneous

2.71 Other hardware items may be needed in a particular system configuration. These include the

DPFT power failure transfer unit, used to connect CO lines to standard telephones in the event of a power outage; the HESB speaker/amplifier, which may interface with a digital or electronic telephone for the Loud Ringing Bell feature and/or a headset; a PBTC-3M cable, for connection to batteries for reserve power; a PPTC connector for an SMDR printer, TTY, or remote maintenance terminal interface. More details on these miscellaneous items can be found in Tables 4-E and 4-F, the *General Description,* and other installation chapters.

2.80 System Ports

2.81 Station Ports. Interfaces to each of some devices (such as telephones) in the STRATA DK system can be referred to as ports. Therefore, a PEKU, PDKU, PSTU, and PESU PCB can be said to have station ports. STRATA DK system programming uses port numbers to identify which device will be equipped with desired features or operation. Ports range from 00 ~ 95 with all of the PCTU versions, and 00 ~ 23 with PCTUS. Port 00 is usually intercom station 200, and is designated as the primary system attendant station. Intercom numbering can be completely flexibly assigned, but is best left to the consecutive standard numbering of 200 ~ 295 with PCTU (1, 2, 3, and 4) and 200 ~ 223 with PCTUS. User guides are written using this standard plan, and LCD digital and electronic telephone busy fields will be meaningful only if the last two digits of the intercom number are consecutive, starting with 00.

NOTES:

1. *Each PEMU uses four station ports and four CO lines; however, if the PEMU is installed in a DK24 with a PCTUS PCB, only 16 station ports are available, because the PCTUS assigns eight station ports to the PEMU PCB.*
2. *Each PESU provides two standard and four electronic telephone ports for a total of six station ports; however, two nonfunctioning ports (circuits 3 and 4) are automatically assigned to the PESU so a total of eight station ports are allocated to each PESU PCB installed.*

2.82 CO Lines. Telephone network CO lines interface to the PCOU PCB, which has four circuits. These circuits are identified as CO lines in DK system software and are not considered as ports. When determining the total station count for a configuration, do not include CO lines as stations.

NOTE:
Each PEMU uses four CO lines in system software, as well as four ports (PCTU1, 2, 3 or 4) or eight ports (with PCTUS) in system software.

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3 WORKSHEETS

TABLE 4-E
OPTIONAL ADD-ON UNIT CONFIGURATION

Option Unit	Interface/ PCB	Capacity	Function
DDCB (Digital door phone/ lock control)	PDKU (circuit 5)	4/system (PCTU4)	Each DDCB provides interface for up to three door phones (MDFBs) or two MDFBs and one door lock.
HDCB (Electronic door phone/lock control)	PEKU or PESU (circuit 5)	4/system (PCTU1, 2, 3, or 4) 3/system (PCTUS1)	Each HDCB provides interface for up to three door phones (MDFBs) or two door phones and one door lock.
DDSS (Digital DSS console)	PDKU (circuit 8)	4 per system with PCTU3 or PCTU4	Provides a 60-button console that functions with digital or electronic telephones. Buttons are flexibly assigned as CO line, speed dial, and DSS.
HDSS (Electronic DSS console)	PEKU (circuits 7 & 8)	4/system (PCTU1, 2, 3, or 4) 3/system (PCTUS1)	Provides a 60-button console that functions with electronic or digital telephones. Buttons are flexibly assigned as CO line, speed dial, and DSS.
MDFB (door phone)	DDCB or HDCB	12/system (PCTU1, 2, 3, or 4) 9/system (PCTUS1)	¥ Door monitor with two-way talk path to system telephones. ¥ Doorbell that rings designated digital and electronic telephones. ¥ Microphone for talkback amplifier with HESB.
PDIU-DI* or PDIU-DI2	Digital telephone 1000-series DKTs or 2000-series DKTs	1 per digital telephone with PCTU3 or PCTU4 (see Table 4-B)	Used for transmitting and receiving data between terminals, personal computers, and devices connected to other PDIUs. The PDIU-DI is also used to provide personal computer access to outside dial-up data services and/or bulletin boards via modem pooling.
PDIU-DS	PDKU (ckts 1~7)	7 per PDKU with PCTU3 or PCTU4 (see Table 4-B)	For making switched data connections for modem pooling, printer sharing, and host/mainframe computer accessing.
HESB (amplified speaker)*	PIOU/PIOUS/PEPU for page/speaker/amplifier Digital or electronic telephone with HHEU PCB for loud ringing bell	1 per PIOU/PIOUS/PEPU 1 per digital, electronic telephone (with HHEU and HESC-65A)	External page amplifier and speaker (talkback with MDFB) Loud Ringing Bell

DSS (DDSS and HDSS) CONSOLE NOTES:

1. *No additional hardware is required to use DSS consoles.*
2. *DSS consoles are assigned to associated digital and electronic telephones in programming.*
3. *DSS consoles cannot be connected to PESU electronic circuits.*
4. *DSS consoles can be flexibly assigned to designated electronic and digital telephone stations: Up to four DSS consoles may be assigned to a designated electronic or digital telephone station.*

DOOR PHONE NOTES:

1. *PCTU (1, 2, 3 or 4) can support as many as 12 MDFBs; PCTUS1 can support 9.*
2. *Each DDCB requires one circuit (Circuit 5) on a PDKU, and each HDCB requires one circuit (Circuit 5) on either a PEKU or PESU.*
3. *DDCBs/HDCBs can only be connected to Ports 04, 12, 20, and 28.*
4. *One door lock control can be configured on each DDCB and HDCB in place of one door phone. (**R2** and higher)*

TABLE 4-F
OPTIONAL SUBASSEMBLY PCB CONFIGURATION

Subassembly PCB	Main PCB (Mount)	Capacity	Function
EOCU[1]	PEKU or PESU	One for each PEKU or PESU that supports OCA	Provides Off-hook Call Announce path for all electronic telephone circuits of main PCB
CRCU (4 or 8 circuits)	PCTU (1, 2, 3, or 4) or PCTUS1	One per PCTU or PCTUS1/system	Provides DTMF receiver for DISA, standard telephone/VM circuits and TIE lines
IMDU	PIOU and PIOUS	One per PIOU or PIOUS/ system	Remote maintenance interface with built-in modem
HHEU[3]	Digital telephone and 6500-series electronic telephone	One per electronic or digital telephone	Interface for headset and Loud Ringing Bell[2]
DVSU	Digital telephone	One per digital telephone	Interface for digital telephone to receive Off-hook Call Announce
HVSU2 or HVSU/HVSI[3]	6500-series electronic telephone	One per electronic telephone	Interface for electronic telephone to receive Off-hook Call Announce

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NOTES:
1. *An EOCU (OCA) will not function in slots 11 ~ 14 on DK96 or slots 05 ~ 06 on DK24 with PCTUS1.*
2. *For digital telephones, an HESC-65A cable is required to connect the HHEU to an HESB for the Loud Ringing Bell feature. An HESC-65A or HESC-65 is required for electronic telephones.*
3. *The combined HVSU and HVSI subassemblies provide the same function as the HVSU2.*

CONFIGURATION GUIDE, WORKSHEET 1

Customer: _____ Location: _____

Complete Worksheet 1 before proceeding with other worksheets.

A1. DDSS consoles required (refer to DDSS in Table 4-E): (A1) DDSS _____

A2. Digital door phone/lock units required (refer to DDCB in Table 4-E): (A2) DDCB _____

A3. PDIU-DSs required (refer to PDIU-DS in Table 4-E): (A3) PDIU-DS _____

A4. Digital telephones, with or without PDIU-DI, required (refer to PDKU in Table 4-C):

2010-SD _____ + 2010-H _____ + 2020-SD _____ + 2020-S _____

1020-H _____ + 1020-SD _____ = (A4) Total digital telephones _____

NOTE:
If adding digital telephones equipped with PDIU-DIs to a system or if the system requires TIE lines (PEMU), refer to the System Power Check, Worksheet 7.

B1. HDSS consoles required (refer to HDSS in Table 4-E): (B1) HDSS _____

B2. Door phone/lock units required (refer to HDCB in Table 4-E): (B2) HDCBs _____

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B3. Electronic telephones required (refer to PEKU and PESU in Table 4-C):

6510-H _____ + 6510-S _____ + 6520-S _____ + 6520-SD _____

NOTE:
If upgrading an existing STRATA DK system using 2000-/3000-/6000-/6005-series electronic telephones and/or if the system requires TIE lines (PEMU), refer to the System Power Check, Worksheet 7.

(B3) Total electronic telephones _____

B4. Separate BGM source (connected to electronic telephone circuit) required (1 maximum):

(B4) Separate BGM source _____

B5. External amplifiers for two-CO line amplified conference required (4 maximum):

(B5) Two-CO line conference amplifiers _____

NOTE:
External amplifiers are customer-supplied.

C1. Number of standard telephones required (refer to PSTU and PESU in Table 4-C):

(C1) Standard telephones _____

WORKSHEET 1 (continued)

C2. Number of auxiliary devices/ports, i.e., voice mail ports, auto attendant ports, fax machines, modems , separate BGM source (refer to PSTU and PESU in Table 4-C):

(C2) Auxiliary devices _____

D. Number of CO lines required (refer to PCOU in Table 4-C):

(D) CO lines _____

E. Number of E&M TIE lines required (refer to PEMU in Table 4-C):

(E) TIE lines _____

F. Does the customer require options that interface with a PIOU, PIOUS, or PEPU PCB? Yes _____ No _____ (refer to Table 4-D). Enter optional interface PCB type:

(F) Optional Interface PCB ____

G. Does the customer require other optional features (yes or no for each): battery backup ____, power failure transfer unit ____, DTMF signals from standard telephone ports ____, off-hook call announce ____, headsets ____, built-in remote maintenance ____, loud ringing bell ____, talkback amplifier ____, external page amplifier/speaker ____, door phones ____, door lock controls ____, PDIU-DI ____.

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NOTE:
These options are configured on Worksheet 6 after completing Worksheets 2 ~ 5.

H. Complete Worksheets 2 ~ 5.

CONFIGURATION GUIDE, WORKSHEET 2

(PDKU/PEKU PCB requirements)

Customer: _____ Location: _____

A. PDKU PCBs (eight station ports)

1. Determine the total PDKU ports required using Chart 1A.

CHART 1A—PDKU PORT REQUIREMENTS

Equipment Type:	Equipment Quantity	X	(Ports/ per)	=	Ports Used
DDSS consoles: (see Worksheet 1, A1)	(A1) _____	X	1	=	_____ .
DDCBs (see Worksheet 1, A2)	(A2) _____	X	1	=	_____ .
PDIU-DSs: (see Worksheet 1, A3)	(A3) _____	X	1	=	_____ .
Digital telephones (with or without PDIU-DIs): (see Worksheet 1, A4)	(A4) _____	X	1	=	_____ .
			Total PDKU Ports	=	_____ .

2. Determine the minimum PDKU PCBs required using Chart 2A.

CHART 2A—MINIMUM PDKU PCB REQUIREMENTS

Total Ports (Chart 1A)	01 ~ 08	09 ~ 16	17 ~ 24	25 ~ 32	33 ~ 40	41 ~ 48	49 ~ 56	57 ~ 64	65 ~ 72	73 ~ 80	81 ~ 88	89 ~ 96
Minimum PDKU PCBs (Am)	1	2	3	4	5	6	7	8	9	10	11	12

3. Determine the actual PDKU PCBs required using Charts 1A and 2A as follows:
   Actual PDKUs (AT) = (Am) or (A1) or (A2), whichever is the largest number.

Actual PDKU PCBs = ____ (AT)

CONFIGURATION GUIDE, WORKSHEET 2 (continued)

(PDKU/PEKU PCB requirements)

Customer: _____ Location: _____

B. PEKU PCBs (eight station ports)

1. Determine the total PEKU ports required using Chart 1.

CHART 1—PEKU PORT REQUIREMENTS

Equipment Type:	Equipment Quantity	X	(Ports/ per)	=	Ports Used
HDSS consoles: (see Worksheet 1, B1)	(B1) _____	X	2	=	_____ .
HDCBs: (see Worksheet 1, B2)	(B2) _____	X	1	=	_____ .
Electronic telephones: (see Worksheet 1, B3)	(B3) _____	X	1	=	_____ .
BGM/MOH separation: (see Worksheet 1, B4)	(B4) _____	X	1	=	_____ .
Conference amplifiers: (see Worksheet 1, B5)	(B5) _____	X	2	=	_____ .
			Total PEKU Ports	=	_____ .

2. Determine the minimum PEKU PCBs required using Chart 2.

CHART 2—MINIMUM PEKU PCB REQUIREMENTS

Total Ports (Chart 1)	01 ~ 08	09 ~ 16	17 ~ 24	25 ~ 32	33 ~ 40	41 ~ 48	49 ~ 56	57 ~ 64	65 ~ 72	73 ~ 80	81 ~ 88	89 ~ 96
Minimum PEKU PCBs (Bm)	1	2	3	4	5	6	7	8	9	10	11	12

3. Determine the actual PEKU PCBs required using Charts 1 and 2 as follows: Actual PEKUs (BT) = (Bm) or (B1) or (B2), whichever is the largest number.

Actual PEKU PCBs = ____(BT)

4. **PESU**: In a configuration that requires less than five electronic telephone station ports, a PESU PCB may be used in place of a PEKU PCB. The PESU supports all stations and peripherals that the PEKU and PSTU support, except for the HDSS console. Normally, only one PESU is installed in a system (see PSTU, Worksheet 3).

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CONFIGURATION GUIDE, WORKSHEET 3
(PSTU/PESU PCB requirements)

C. PSTU PCBs (eight station ports)

1. Determine the total PSTU ports required using Chart 3.

CHART 3—PSTU PORT REQUIREMENTS

Equipment Type:	Equipment Quantity	X	Ports	=	Ports Used
Standard telephones: (see Worksheet 1, C1)	(C1) _____	X	1	=	_____ .
Other devices: (see Worksheet 1, C2)	(C2) _____	X	1	=	_____ .
	Total PSTU Ports			=	_____ .

2. Determine the actual PSTU PCB requirements using Chart 4.

CHART 4—ACTUAL PSTU PCB REQUIREMENTS

Total Ports (Chart 3)	01 ~ 08	09 ~ 16	17 ~ 24	25 ~ 32	33 ~ 40	41 ~ 48	49 ~ 56	57 ~ 64	65 ~ 72	73 ~ 80	81 ~ 88	89 ~ 96
PSTU PCBs	1	2	3	4	5	6	7	8	9	10	11	12

Actual PSTU PCBs = _____(CT1)

3. **PESU**: In a configuration requiring less than two PSTU station ports, a PESU PCB can be used in place of a PSTU PCB. Normally, only one PESU is installed in a system.

Actual PESU PCBs = _____(CT2)

NOTE:
The PCTU or PCTUS1 must be equipped with a CRCU (4 or 8) to translate DTMF signals generated by most devices that interface with standard telephone ports.

H

CONFIGURATION GUIDE, WORKSHEET 4

(PCOU/PEMU requirements)

D. PCOU PCBs (four CO lines)

1. Enter the number of CO lines required from Paragraph D of Worksheet 1.

CO lines _____

2. Determine the number of PCOU PCBs using Chart 5.

CHART 5—ACTUAL PCOU PCB REQUIREMENTS

CO Lines	01 ~ 04	05 ~ 08	09 ~ 12	13 ~ 16	17 ~ 20	21 ~ 24	25 ~ 28	29 ~ 32	33 ~ 36
PCOU PCBs	1	2	3	4	5	6	7	8	9

Actual PCOU PCBs = ____ (DT)

E. PEMU PCBs (four TIE lines)

1. Enter the number of TIE lines required from paragraph E of Worksheet 1.

TIE lines _____

2. Determine the number of PEMU PCBs using Chart 6.

CHART 6—ACTUAL PEMU PCB REQUIREMENTS

TIE Lines	01 ~ 04	05 ~ 08	09 ~ 12
PEMU PCBs	1	2	3

Actual PEMU PCBs = ____ (ET)

NOTE:
A CRCU (4 or 8) must be installed on the PCTU or PCTUS1 to support TIE lines.

F. PIOU/PIOUS/PEPU PCBs

Enter type of optional interface from Paragraph F of Worksheet 1, if required. Only one per system.

Actual Interface PCB ____ (FT)

CONFIGURATION GUIDE, WORKSHEET 5

F. System and Slot Check

1. Add total PCB/slot requirements (from Worksheets 2 ~ 4): AT + BT + CT1 + CT2 + DT + ET + FT = _____ PCB/slot total.

IMPORTANT NOTE!
One or two additional slots should always be considered for future growth.

2. If total is six or less, use **DK24** and **PCTUS1** with the following considerations:
   a. Total PEKU/PSTU/PESU PCBs combined: three or less (no PEMU equipped).
   b. Total PEKU/PSTU/PESU PCBs combined: two or less (PEMU equipped).
   c. Total PCOU PCBs: four or less.
   d. Total PEMU PCBs: one or less.
   e. HDSS consoles: three or less.
   f. HDCB controllers: three or less.
   g. If using 2000-/3000-/6000-/6005-series electronic telephones and/or a PEMU, use Power Check, Worksheet 7.

   DK24 with PCTUS1____

3. If total is six or less, use **DK24** and **PCTU (1, 2, 3, or 4)** with the following considerations:
   a. Total PDKU/PEKU/PSTU/PESU PCBs combined: four or less (no PEMU equipped).
   b. Total PDKU/PEKU/PSTU/PESU PCBs combined: three or less (PEMU equipped).
   c. Total PCOU PCBs: six or less.
   d. Total PEMU PCBs: one or less.
   e. Combined DDSS and HDSS consoles: four or less.
   f. DDCB/HDCB controllers: four or less.
   g. If using 2000-/3000-/6000-/6005-series electronic telephones, PDIU-DIs, and/or a PEMU, use Power Check, Worksheet 7.

   DK24 with PCTU1, 2, 3, or 4 ____

4. If total is eight or less, use **DK56** and **PCTU (1, 2, 3, or 4)** with the following considerations:
   a. PDKU/PEKU/PSTU/PESU PCBs combined: eight or less.
   b. PCOU PCBs: eight or less.
   c. PEMU PCBs: two or less.
   d. PEMU and PCOU: eight or less.
   e. Combined DDSS and HDSS consoles: four or less.
   f. DDCB/HDCB controllers: four or less.
   g. If using 2000-/3000-/6000-/6005-series electronic telephones, PDIU-DIs, and/or a PEMU, use Power Check, Worksheet 7.

   DK56 with PCTU1, 2, 3, or 4 ____

5. If this total is above eight, use **DK96** and **PCTU (1, 2, 3, or 4)** with the following considerations:
   a. PDKU/PEKU/PSTU/PESU PCBs combined: 12 or less.
   b. PCOU PCBs: nine or less.
   c. PEMU PCBs: three or less.
   d. PEMU and PCOU: nine or less.
   e. Combined DDSS and HDSS consoles: four or less.
   f. DDCB/HDCB controllers: four or less.
   g. If using 2000-/3000-/6000-/6005-series electronic telephones, PDIU-DIs, and/or a PEMU, use Power Check, Worksheet 7.

   DK96 with PCTU1, 2, 3, or 4 ____

NOTE:
PDKUs and DDSS s require PCTU3 or PCTU4. DDCBs require PCTU4.

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CONFIGURATION GUIDE, WORKSHEET 6

(Miscellaneous Option Requirements)

G. CRCU PCB (refer to Table 4-F):

1. A CRCU (-4 or -8) must be installed on the PCTUS1, PCTU1, PCTU2, PCTU3, or PCTU4 PCB if the customer has TIE lines, DISA CO lines, or is using standard telephones or voice mail-type devices connected to PSTU or PESU standard telephone ports.

2. For normal traffic, a CRCU-4 (providing four DTMF receiver circuits) will be sufficient. However, for extremely high traffic requirements, a CRCU-8 (providing eight DTMF receiver circuits) may be required.

CRCU-4 ____ or CRCU-8 ____

NOTE:
Only one CRCU can be used per system.

H. EOCU (refer to Table 4-F):

An EOCU must be installed on each PEKU and/or PESU that is connected to electronic telephones which are equipped to receive Off-hook Call Announce (OCA).

Actual EOCU PCBs ____

NOTE:
1. *One EOCU for each PEKU or PESU that supports electronic telephones that must receive OCA.*
2. *Be sure that proper consideration is given to where the PEKU or PESU is placed to provide the most efficient use of the 8-circuit EOCU: The PESU only provides four electronic telephone ports; HDSS consoles use two ports on a PEKU; HDCBs use one port on a PESU or PEKU.*
3. *An EOCU (OCA) will not function in slots 11 ~ 14 on DK96 and slots 05 ~ 06 on DK24 with PCTUS1.*

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I. DVSU (refer to Table 4-F):

One DVSU is required for each digital telephone that must receive OCA.

Actual DVSU _____

J. HVSU2 (refer to Table 4-F):

Electronic telephones equipped with an HVSU2 can receive OCA calls.

Actual HVSU2s _____

K. HVSU/HVSI (refer to Table 4-F):

Electronic telephones equipped with the HVSI and HVSU subassemblies can receive OCA calls.

Actual HVSUs/HVSIs _____

L. IMDU PCB (refer to Table 4-F):

One IMDU PCB must be installed on the PIOU or PIOUS PCB to provide built-in remote maintenance capability for the STRATA DK system.

IMDU PCB _____

M. HHEU PCB (refer to Table 4-F):

One HHEU PCB must be installed in each digital and electronic telephone that supports a headset or connects to an HESB providing a loud ringing bell.

Actual HHEU PCBs _____

CONFIGURATION GUIDE, WORKSHEET 6 (Continued)

N. HESC-65A (refer to Table 4-F):

One HESC-65A modular connecting cable is required to connect the HESB to the HHEU in each digital telephone and 6500-series electronic telephone requiring the Loud Ringing Bell option.

Actual HESC-65As _____

O. HESB Amplifier/Speaker (refer to Table 4-E):

1. One HESB is required for each digital and electronic telephone providing the Loud Ringing Bell option.
2. One HESB is optional to provide single-zone external page connected to either a PIOU, PIOUS, or PEPU (customer-supplied amplifiers/speakers may be used in place of the HESB).
3. One HESB is optional to provide a talkback amplifier/page speaker connected to a PIOU, PIOUS, or PEPU (a customer-supplied talkback amplifier/page speaker may be used in place of HESB).

Actual HESBs _____

P. PBTC-3M Cable:

One PBTC-3M cable is required for each system that requires battery backup (batteries are customer-supplied).

PBTC-3M _____

Q. PPTC Adaptor (Modular to RS-232):

A PPTC is required (one each) to connect a printer or call accounting device to the PIOU or PIOUS SMDR port; or to connect a modem or ASCII terminal to the PIOU or PIOUS maintenance port (TTY).

PPTC _____

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R. DPFT Unit:

The DPFT provides a means to connect eight selected CO lines to standard telephones in the event of a power failure.

DPFT _____

S. MDFB:

The MDFB plugs into the DDCB or HDCB control box to provide a door phone. Three MDFBs can be connected to each DDCB or HDCB. The MDFB may also be connected to the HESB amplifier/speaker to provide page talkback.

Actual MDFBs _____

T. PDIU-DI (refer to Table 4-B):

Digital telephones must be equipped with a PDIU-DI to transmit and receive voice and data calls.

Actual PDIU-DIs _____ for 1000-series DKTS

Actual PDIU-DI2s _____ for 2000-series DKTS

CONFIGURATION GUIDE, WORKSHEET 7

(System Power Check)

Total Power Used:

Equipment Type:	Equipment Quantity	X	Power Used (Factor)	=	Ports Used
2000- and 1000-series digital telephone	_____	X	(1.0)	=	_____ .
2000-series electronic telephone	_____	X	(2.0)	=	_____ .
3000-series electronic telephone	_____	X	(2.5)	=	_____ .
6000-series electronic telephone	_____	X	(2.0)	=	_____ .
6005-series electronic telephone	_____	X	(2.0)	=	_____ .
6500-series electronic telephone	_____	X	(1.0)	=	_____ .
DDSS/HDSS console*	_____	X	(0.8)	=	_____ .
PDIU-DI	_____	X	(0.5)	=	_____ .
PDIU-DS	_____	X	(0.8)	=	_____ .
Standard telephone	_____	X	(1.0)	=	_____ .
PEMU PCB	_____	X	(8.0)	=	_____ .
			Total Power Used		

H

* All series.

Power Supplied:

Power Supply	Power Supplied
PPSU 24	32
PPSU 56	80
PPSU 96	144

Power Criteria:

Power Supplied — **Total Power Used:** Must be greater than zero.

Configuration Power Check: _____ — _____ = _____

Power Supplied

Total Power Used

Must be Greater than Zero

3.00 To use a methodical step-by-step procedure to configure a system, a configuration guide consisting of seven worksheets is provided in this chapter.

4 SYSTEM HARDWARE CONFIGURATION

4.00 General

4.01 The following provides guidelines to configure the STRATA DK system's printed circuit board (PCB) slots, including the recommended order in which the PCBs and PCB options should be assigned to specific slots.

4.02 This section does not detail the physical installation nor the wiring of PCBs or options. It is provided as a guide to plan and record the system hardware configuration. Installation procedures for PCBs are provided in Chapter **6**, and station and peripheral procedures are in Chapter **7**.

4.03 The quantity of each type of PCB and option must be determined by the guidelines given in Worksheets 1 ~ 7 prior to using the following guidelines.

4.10 System Hardware Assignment Record

4.11 Locate the record sheet for **Program 03** in the Basic System Record Sheets, Section **400-096-300.** The system's PCB configuration should be recorded on this record sheet.

NOTE:
Record sheets are also available separately from the manual.

4.12 On the **Program 03** record sheet, record the following information for PCBs: slot assignments, option assignments, code assignments, station port assignments, and line number assignments. The recommended procedures for recording this information are in Paragraphs **4.13** ~ **4.18**. (Refer to Figure 4-2 for an example of each item to be recorded.)

4.13 PCB Slot Assignments—Record in the PCB type row on **Program 03**'s record sheet (in the order shown below) the type of PCB that should be installed in each slot.

- **PCTU**: Assign the PCTU to the PCTU slot, **Slot 00.**

NOTE:
PCTU Codes 91, 92, and 93 apply to all PCTU types (PCTU1, PCTU2, PCTU3, PCTU4, and PCTUS).

- **PDKU and PEKU:** Assign all PDKU and PEKU PCBs, starting with **slot 01** and continuing in numerical order without skipping slots until all these PCBs are assigned.
- **PSTU:** Assign all PSTU PCBs, starting with the **lowest numbered empty slot** and continuing without skipping slots until all PSTU PCBs are assigned.
- **PESU:** Assign all PESU PCBs, starting with the **lowest numbered empty slot** and continuing without skipping slots until all PESU PCBs are assigned.
- **PCOU:** Assign all PCOU PCBs, starting with the **lowest numbered empty slot** and continuing without skipping slots until all PCOU PCBs are assigned.
- **PEMU:** Assign all PEMU PCBs, starting with the **lowest numbered empty slot** and continuing without skipping slots until all PEMU PCBs are assigned.
- **PIOU/PIOUS/PEPU:** Assign the PIOU, PIOUS, or PEPU PCB in **slot 06** of DK24, in **slot 08** of DK56, or in **slot 14** of DK96.

NOTE:
The same code (41) is used for either PIOU, PIOUS, or PEPU.

4.14 PCB Option Assignments—Some PCBs may have subassembly options (PCTU/CRCU, PIOU(S)/IMDU, PEKU/EOCU, PESU/EOCU) or special peripheral equipment (PDKU/DDSS console, PDKU/DDCB, PEKU/HDSS console, PEKU/HDCB, PESU/HDCB) connected to designated ports. These options require special PCB identification codes in **Program 03**; therefore, it is necessary to record each option (in the options row) on the record sheet.

- **CRCU**: If the PCTU or PCTUS will be equipped with a CRCU, record the CRCU-4 or CRCU-8 under the PCTU slot. A special PCB code is required for the PCBs that support the CRCU option.
- **EOCU**: If a PEKU or PESU is required to support Off-hook Call Announce, record EOCU under

the appropriate slot. A special PCB code is required for PCBs that support this option. An EOCU (OCA) will not function in Slots 11 ~ 14 on DK96 and slots 05 and 06 on DK24 with PCTUS.

- **DSS:** If a PDKU or PEKU is required to support a DSS console, record DSS 1, DSS 2, DSS 3, and/or DSS 4, as needed under the appropriate slot(s). Start with DSS 1 in the lowest numbered PCB slot that supports a console and continue, as required, to the highest PDKU or PEKU slot that is supporting a console. A special code must be entered for every slot that hosts a DSS-supporting PCB. (Refer to the DSS console hardware configuration notes at the end of this section.)
- **DDCB/HDCB:** A special code is not required for slots that support a DDCB or HDCB, but note every slot that will be supporting either one of these door phone/lock control units. Only the slots that have Ports 04, 12, 20, and 28 can support DDCBs and HDCBs. (Refer to the door phone hardware configuration notes at the end of this section.)
- **IMDU**: If the PIOU or PIOUS is to be equipped with a remote maintenance modem, record IMDU under the slot that it occupies. A special PCB code is not required for the PCB that supports the IMDU option.
- **PDIU-DS:** If one or more PDIU-DS is connected to a PDKU, record the ports that the PDIU-DSs interface with under the appropriate PDKU slot. A special PCB code must be entered for PDKUs that support PDIU-DSs. PDIU-DSs will not function in Slots 11 ~ 14 on DK96 and Slots 05 and 06 on DK24 with PCTUS. Also, PDKU circuit 8 will not support a PDIU-DS.
- **PDIU-DI(2):** If a PDIU-DI(2) is connected to a digital telephone, the PDIU-DI(2) and the digital telephone will share the same PDKU station port. A special PCB code must be entered for PDKU PCBs that support digital telephones with PDIU-DI(2)s. PDIU-DSs will not function in Slots 11 ~ 14 on DK96 and Slots 05 and 06 on DK24 with PCTUS. Also, PDKU1A Circuit 8 will not support a PDIU-DI(2).

4.15 PCB Code Assignments—Each PCB type has an identification code that must be entered in **Program 03**. If the PCB supports an option, a special PCB code may have to be entered to tell the system that the PCB will be supporting an option. Record the appropriate code in the PCB code row of the **Program 03** record sheet. Use the sequential order shown below:

- **PCTU (1, 2, 3, 4, or S):** Assign the appropriate PCB code (91, 92, or 93) to the PCTU slot:
  - PCB Code 91: PCTU without CRCU
  - PCB Code 92: PCTU with CRCU-4
  - PCB Code 93: PCTU with CRCU-8
- **PDKU:** Assign the appropriate PCB code (61, 62 or 64) to all PDKU slots:
  - PCB Code 61: PDKU without options
  - PCB Code 62: PDKU with OCA and/or PDIU-DI, PDIU-DS
  - PCB Code 64: PDKU with DDSS console, OCA, and/or PDIU-DI, PDIU-DS

  NOTE:
  A special code is not required for PDKUs that support DDCBs.

- **PEKU:** Assign the appropriate PCB code (21, 22, 23, or 24) to all PEKU slots:
  - PCB Code 21: PEKU without options
  - PCB Code 22: PEKU with EOCU
  - PCB Code 23: PEKU with HDSS console
  - PCB Code 24: PEKU with HDSS console and EOCU
- **PSTU:** Assign PCB code 31 to all PSTU slots.
- **PESU:** Assign appropriate PCB code (25 or 26) to all PESU slots:
  - PCB Code 25: PESU without EOCU
  - PCB Code 26: PESU with EOCU

  NOTE:
  A special code is not required for the HDCB if connected to a PEKU or PESU.

- **PCOU:** Assign PCB Code 11 to all PCOU slots.
- **PEMU:** Assign PCB Code 13 to all PEMU slots.
- **PIOU/PIOUS/PEPU:** Assign PCB Code 41 to the PIOU, PIOUS, or PEPU slot.

  NOTE:
  A PIOU or PIOUS equipped with an IMDU does not require a special code.

4.16 Station Port Assignments—Station ports are provided by the PDKU, PEKU, PSTU, and PESU PCBs. Each PDKU, PEKU, or PSTU PCB provides eight station ports. The PESU provides six functioning station ports, although it is allocated

eight. Each PEMU uses four station ports on DK24 systems equipped with a PCTUS or eight station ports on systems operating with any of the other PCTU versions. Each of the PCBs must have station port numbers assigned. Record the station port numbers in the station port numbers row on **Program 03**'s record sheet. Record information for each slot equipped with a PDKU, PEKU, PSTU, PESU, or PEMU PCB in the order shown below:

- **PDKU and/or PEKU Station Ports:** Assign station port numbers, starting with Ports 00 ~ 07 under **Slot 01**, advancing incrementally eight ports for every PDKU and/or PEKU slot. Assign the numbers in numerical order until station ports are assigned to all PDKU and PEKU slots.
- **PSTU Station Ports:** Assign station port numbers, starting where the last station port number stopped, advancing incrementally at eight port numbers per PSTU slot. Assign the numbers in numerical order until station ports are assigned to all PSTU slots.
- **PESU Station Ports:** Assign station port numbers, starting where the last station port number stopped, advancing incrementally at eight port numbers per PESU slot. Assign the numbers in numerical order until station ports are assigned to all PESU slots.

  NOTE:
  PESU Circuits 1 and 2 are standard telephone ports, and Circuits 5 ~ 8 are electronic telephone ports; Circuits 3 and 4 are not used, but are allocated to the PESU slot, anyway.

- **PEMU Station Ports**: Assign station port numbers, starting where the last station port number stopped, advancing incrementally at four port numbers per PEMU slot. Assign the numbers in numerical order until station ports are assigned to all PEMU slots.

  NOTE:
  If a PEMU is installed in a PCTUS-controlled DK24, only 16 station ports will be available for station interface using PDKU, PEKU, PESU, and PSTU PCBs. If the PEMU is installed in a PCTU (1, 2, 3, or 4)-controlled DK24, 24 stations will be available, because of power supply capacity.

4.17 CO Line Number Assignments—Line circuits are provided by the PCOU and PEMU PCBs. Each PCOU provides four line circuits for CO loop start line connections, and each PEMU has four line circuits that support TIE lines. (Each of the PCBs must have line numbers assigned.) Record CO line numbers in the CO/TIE line numbers row on **Program 03**'s record sheet. Record information for each slot equipped with a PCOU or PEMU in the order shown below:

- **PCOU Line Numbers:** Assign CO line numbers, starting with lines 01 ~ 04 in the lowest numbered PCOU slot, advancing incrementally at four line numbers per PCOU slot. Assign the numbers in numerical order until CO lines are assigned to all PCOU slots.
- **PEMU Line Numbers:** Assign TIE line numbers, starting with the next line above the highest PCOU line, advancing incrementally at four line numbers per PEMU slot.

4.18 PCB Additions—To add PCBs to an existing installation, assign the PCBs in the order described above. *Start with the lowest numbered empty slot and continue without skipping a slot* until all PCBs are assigned. Then, using the guidelines described above, record the new PCB configuration information on the record sheet for **Program 03.**

NOTE:
PEMU PCBs should be first moved to higher slot numbers to create the necessary number of empty slots for additions. Be sure to reprogram for the new PEMU positions, including new station number assignments for the PEMU(s).

4.20 Door Phone Hardware Configuration Notes

- **STRATA DK systems** equipped with a PCTU (1, 2, 3, 4) can support a maximum of 12 door phones, while STRATA DK24 systems equipped with a PCTUS can support up to nine door phones. Each door phone must be connected to a door phone/lock control unit (DDCB or HDCB).
- Each DDCB and HDCB provides three door phone interfaces.
- A maximum of four DDCBs or HDCBs (or a combination of both) are allowed for systems operating with the PCTU (1, 2, 3, and 4) and three for STRATA DK24 systems with a PCTUS.

- DDCBs and HDCBs can only be connected to port numbers 04, 12, 20, and 28. DDCBs can connect only to digital telephone ports (PDKU), and HDCBs can interface just with electronic telephone ports (PEKU and PESU).
- Always install DDCBs/HDCBs to PDKU/PEKU/PESU PCBs that are in lower slot numbers than PEMU PCBs. This is required to maintain alignment of Circuit 5 with Port 04, 12, 20, and 28.
- PCB Slots that support DDCBs and HDCBs do not require a special code in **Program 03.**
- DDCB and HDCB assignments are found in **Programs 77-1, 77-2,** and **79**.
- Door phones can be programmed to ring at any digital and electronic telephone (no limit within the system). Door phones will not ring standard telephones, but standard telephone users can answer door phone calls that are ringing at digital and electronic telephones by dialing a pickup access code.
- Cut **W9** on each PEKU and PESU that supports an HDCB. There are no straps to cut on the PDKU.

4.30 DSS Console Hardware Configuration Notes

- A maximum of four DSS consoles are allowed per systems with a PCTU (1, 2, 3, or 4) and three for STRATA DK24 systems with a PCTUS.
- There are two types of DSS consoles, the digital DSS console (DDSS console) and the electronic DSS console (HDSS console). DDSS consoles operate with PCTU3 and PCTU4 only, while HDSS consoles can work with all PCTU versions and the PCTUS.
- DDSS consoles normally operate in conjunction with digital telephones. Each DDSS console is automatically assigned by system software to an associated digital telephone (on Circuit 1 of the same PDKU), which in turn is referred to as a DSS/attendant telephone. A DDSS console, though, can be reassigned in system programming to be associated with an electronic telephone.
- HDSS consoles normally operate in conjunction with electronic telephones. Each HDSS console is automatically assigned by system software to an associated electronic telephone (on Circuit 1 of the same PEKU), which in turn is referred to as a DSS/attendant telephone. An HDSS console, though, can be reassigned in system programming to be associated with a digital telephone.
- One PDKU PCB is required for each DDSS console, and one PEKU is needed for each HDSS console. The DDSS console connects to Circuit 8 of a PDKU, and the HDSS console connects to Circuits 7 and 8 of a PEKU.
- PDKU/DDSS slots are identified and assigned in **Program 03** with special PCB code 64 (Figure 4-2).
- PEKU/HDSS slots are identified and assigned in **Program 03** with special PCB codes 23 or 24 (Figure 4-2).
- DSS consoles and attendant telephones are automatically assigned as DSS1/ATT1, DSS2/ATT2, DSS3/ATT3, or DSS4/ATT4, starting with the lowest DSS slot and continuing, in consecutive order, to the highest DSS slot. But consoles may be reassigned in **Program 28** so that up to four consoles may be assigned to one telephone.
- DSS console buttons may be flexibly assigned (in **Program 29)** as CO line buttons, DSS (hot line) buttons, and speed dial buttons.

4.40 Data Interface Unit (DIU) Configuration Notes

- The Integrated Data Interface Unit (PDIU-DI or PDIU-DI2) shares the same wire pair and PDKU station circuit with the digital telephone to which it is connected. The PDIU-DI(2) requires a PCTU3 or PCTU4 control PCB. The maximum number of PDIU-DI(2)s supported by each STRATA DK system is shown in Table 4-B.
- The PDIU-DI is a DCE type device that normally connects to a personal computer serial communications port or ASCII terminal.
- The Stand-alone Data Interface Unit (PDIU-DS) requires a dedicated PDKU station circuit and one or two pair of wires. (See Section **400-096-209** for wiring information.) The PDIU-DS requires a PCTU3 or PCTU4 PCB. The maximum number of PDIU-DSs supported by each STRATA DK system is shown in Table 4-B.
- PDIU-DSs may be configured as a DTE or DCE type device and connect to modems, printers, or host mainframe computers.

NOTE:
Only Circuits 1 ~ 7 on a PDKU1A support DIUs, while all circuits, 1 ~ 8, on a PDKU2A support DIUs. All KSU slots, except for 11 ~ 14 in the DK96, can support DIUs.

DK 96 (Top Shelf)

SLOT NO.	01	02	03	04	05	06	07	08
PCB CODE	64	64	62	61	64	21	31	11
PCB TYPE	PDKU	PDKU	PDKU	PDKU	PDKU	PEKU	PSTU	PCOU
OPTIONS	DSS1/ATT1 DDCB 04	DSS2/ATT2 DDCB 12	PDIU-DI (1-3)		DDSS3/ ATT3 PDIU-DI (1-6)			
STA. PORT NO.s	00 ~ 07	08 - 15	16 - 23	24 - 31	32 - 39	40 - 47	48 - 55	—
CO/TIE LINE NO.s	—	—	—	—	—	—	—	01-04

DK 96 (Bottom Shelf)

SLOT NO.	00	09	10	11	12	13	14
PCB CODE	92	11	11	25	13	00	41
PCB TYPE	PCTU	PCOU	PCOU	PESU	PEMU		PIOU
OPTIONS	CRCU4						IMDU
STA. PORT NO.s	—	—	—	56-63	64-67		—
CO/TIE LINE NO.s	—	05-08	09-12	—	13-16		—

PCB CODE Reference Table

PCB	CODE	PORTS/TYPE
PCTU	91	NONE
PCTU CRCU4	92	NONE
PCTU CRCU8	93	NONE
PDKU	61	8/STA.
PDKU OCA/DIU	62	8/STA.
PDKU DDSS/OCA/DIU	64	8/STA.
PEKU	21	8/STA.
PEKU EOCU	22	8/STA.
PEKU DSS	23	8/STA.
PEKU EOCU w/DSS	24	8/STA.
PSTU	31	8/STA.
PCOU	11	4/CO
PEMU	13	4/CO 4/STA.
PESU	25	8/STA.
PESU EOCU	41	8/STA.
PIOU/PIOUS PEPU	21	NONE
NONE	00	NONE

H

FIGURE 4-2
HARDWARE CONFIGURATION EXAMPLE

Strata® DK24/56/96

RELEASE 1, 2, 3, and 4

INSTALLATION

H

Chapter Five
KSU INSTALLATION

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FIGURE LIST

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1 INTRODUCTION

1.01 STRATA DK systems are flexible in their ability to meet a broad range of customer configuration requirements. A modular building block approach allows the incremental addition of various parts to meet growing and changing system needs and applications.

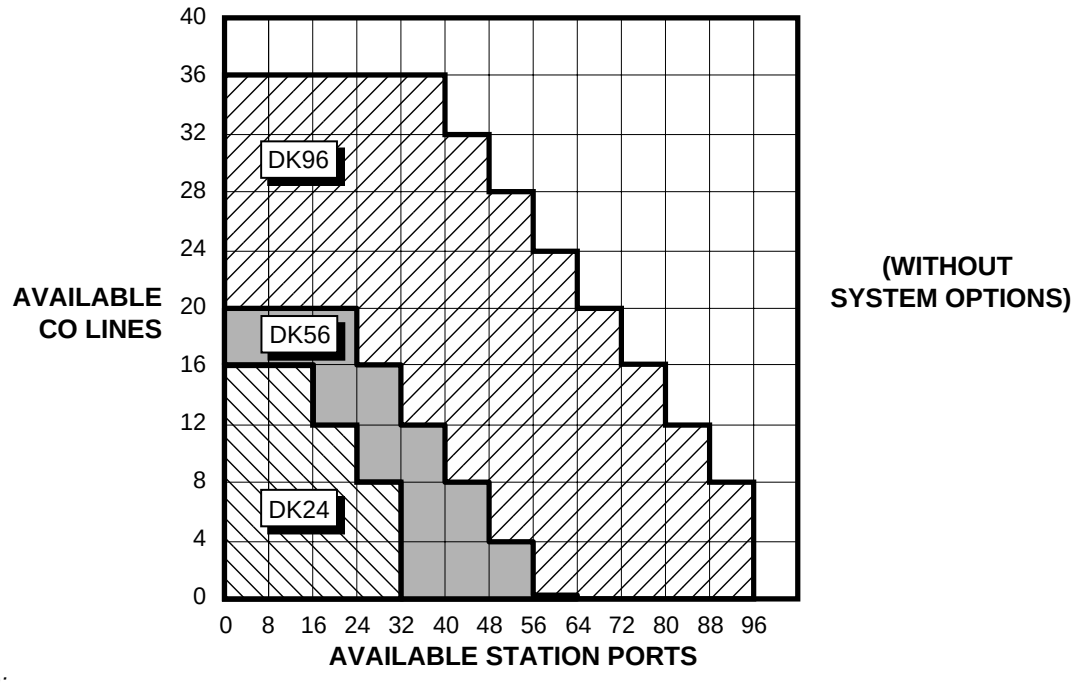
1.02 The main unit of each STRATA DK system is the key service unit (KSU) which contains universal slots that can support any of the various station, CO line, and peripheral printed circuit boards (PCBs) compatible with the systems. This is contrasted with a dedicated slot approach (used in previous STRATA systems), where a particular slot can only accept a specific PCB, such as a CO line interface PCB. DK24 has six universal slots, DK56 has eight, and DK96 has 14. This increased flexibility in STRATA DK means that trade-offs can be made between the number of CO lines and stations in a system application.

1.03 Figure 4-1 shows that in most configurations, four CO lines can be traded for eight stations. Conversely, for every eight stations that are given up, four CO lines can be added. The maximum quantities of 16 CO lines for DK24, 20 CO lines for DK56, and 36 CO lines for DK96 are based on squared systems. Software allows 16 CO lines with PCTUS and 36 CO lines with PCTU (1, 2, 3, or 4). Similarly, the 24 station (PCTUS) and 96 station (PCTU1, 2, 3, or 4) limits are also software limitations.

1.10 System Considerations

1.11 When no external options or TIE lines are installed and only CO lines and station PCBs are exchanged, the maximum configurations can be summarized in Table 4-A.

1.12 Table 4-A shows the maximum number of digital telephones (2000- and 1000-series), 6500-series electronic telephones, and/or standard tele-



NOTES (DK24):
1. *24 stations are available with PCTUS1-equipped DK24.*
2. *32 stations are available with PCTU-(1, 2, 3, or 4) equipped DK24.*

FIGURE 4-1
PCB CONFIGURATION CHART

Table 4-A
DK24/56/96 MAXIMUM CONFIGURATIONS

DK24 (PCTUS1)

CO Lines	Stations
16	16
12	24
8	24
4	24
0	24

DK 24 (PCTU 1, 2, 3, or 4)

CO Lines	Stations
16	16
12	24
8	32
4	32 [3]
0	32 [3]

DK56 (PCTU 1, 2, 3, or 4)

CO Lines	Stations
20	24
16	32
12	40
8	48
4	56
0	64

DK96 (PCTU 1, 2, 3, or 4)

CO Lines	Stations
36	40
32	48
28	56
24	64
20	72
16	80
12	88
8	96

NOTES:

1. *The station capacities apply to any combination of standard telephones, digital telephones (2000- and 1000-series) and 6500-series electronic telephones. Station capacities using other Toshiba electronic telephones are given on Worksheet 7.*
2. *Installing a TIE line (PEMU) PCB or an peripheral interface (PIOU/PIOUS/PEPU) PCB reduces available CO lines by four or available station ports by eight.*
3. *The DK24's 32-station limit is a result of power supply capacity.*

phones that can exist in each STRATA DK system. Due to power availability, the numbers decrease if using 2000-, 3000-, 6000-, or 6005-series electronic telephones, a PEMU PCB, or digital telephones equipped with Integrated Data Interface Units (PDIU-DIs or PDIU-DI2s). When mixing different series telephones and/or if a PEMU PCB is installed, use Worksheet 7 in the Configuration Guide to verify that the power supplied is greater than the power used.

1.20 Common Control PCBs

1.21 DK systems must be configured with one of the following five common control PCBs: PCTU1, PCTU2, PCTU3, PCTU4, or PCTUS. PCTU1, 2, 3, and 4 have the same configuration capacity and can be used in all three system models. The PCTU1 provides **Release 1** features; PCTU2 provides **Release 2** features; PCTU3 provides **Release 3** features; and PCTU4 provides **Release 4** features. Designed for use with the DK24 system only, the PCTUS provides **Release 2** features. Its configuration capacity is less than the other common control PCBs. If a PCTUS is installed in DK56 or DK96, the system will not operate correctly. Station, line, peripheral, and feature capacities for each common control PCB are shown in Table 4-B. These capacities reflect maximum stand-alone capacities and do not indicate combined capacity of the many possible configurations when mixing options, stations, and lines. Use the Configuration Guide later in this chapter to determine combined capacities for a system.

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1.30 Station and CO line PCBs

1.31 The Digital Telephone Interface Unit PCB (PDKU) provides eight digital telephone circuits. The Electronic Telephone Interface Unit PCB (PEKU) provides eight electronic telephone circuits. The Standard Telephone Interface Unit PCB (PSTU) has eight standard telephones circuits. The Standard/Electronic Telephone Interface Unit PCB (PESU) provides two standard and four electronic telephone circuits. (The PESU is intended for configurations that require less than three standard telephone ports and/or less than five electronic telephone ports.)

1.32 Up to four CO lines can be connected with the CO line Interface Unit PCB (PCOU).

1.33 With the exception of the common control PCB (PCTU) described which has its own dedicated slot, any of the PCBs noted above can be

TABLE 4-B
SYSTEM CONTROL PCB (PCTU) CONFIGURATION INFORMATION

Control Board Version	PCTU1/PCTU2/ PCTU3/PCTU4	PCTUS1
System Compatibility	DK24/56/96	DK24 only
DK Feature Set	PCTU1-**Release 1** PCTU2-**Release 2** PCTU3-**Release 3** PCTU4-**Release 4**	**Release 2** features
Universal PCB Slot Capacity	6 max with DK24 8 max with DK56 14 max with DK96	6 max
Station Port Capacity	32 max with DK24 56 max with DK56 96 max with DK96	24 max
CO Line Capacity (squared systems)	16 max with DK24 20 max with DK56 36 max with DK96	16 max
TIE Line Capacity	4 max with DK24 8 max with DK 56 12 max with DK96	4 max
HDSS or DDSS[3] Consoles (or combination)	4 max	3 max
Door Phones	12 max	9 max
Door Lock Controls	5 max (**R2**, **R3,** and **R4**) 1 max (**R1**)	4 max
Simultaneous Multi-party Conference	8 max	3 max
CRCU (-4 or -8) Option	1 max	1 max
PCTU MOH/BGM, Connection	1 max	1 max
PDIU-DI and PDIU-DI2[2] (PCTU3 and PCTU4 only)	21 max with DK24 53 max with DK56 80 max with DK96	Not Supported
PDIU-DS[2] (PCTU3 and PCTU4 only)	24 max with DK24 56 max with DK56 80 max with DK96	Not Supported
Personal Message/Memo Memory for LCD Stations	16 stations max (see Note 1)	6 stations max (see Note 1)
Alternate BGM Connection	1 max (**R2, R3,** and **R4**)	1 max
Simultaneous External Amplified Two-CO Line Conference Calls	4 max (**R3** and **R4**)	Not Supported

NOTES:
1. *This only applies to LCD personal memory; all stations in any DK system can be an LCD telephone.*
2. *In the DK24 and DK56, PDIU-DIs and PDIU-DSs are limited only by the system power capacity per Worksheet 7; both DIU types are limited to slots 01 ~ 10 in the DK96. PDKU1 can support DIUs on circuits 1 ~ 7 only, PDKU supports DIUs on circuits 1 ~ 8.*
3. *DDSS requires PCTU3 or PCTU4.*

used in any of the universal slots. (DK24 has six universal slots, DK56 has eight, and DK96 has 14.) Table 4-C shows all the PCBs which can be installed in universal slots and the maximum quantity of each PCB allowed per system. It may be helpful to consider the following configuration examples:

Example 1—A small business requires a system to handle six CO lines, 12 electronic telephones, and three standard rotary-type telephones.

- The PCB configuration (in addition to common equipment) is as follows:
  Two PCOU PCBs
  Two PEKU PCBs
  One PSTU PCB
- Each of these PCBs requires one universal slot, so a total of five slots are required. Therefore, a DK24 can be used.

Example 2—A bank branch office needs nine CO lines, seven electronic telephones, five digital telephones, and 11 standard rotary-type telephones.

- The PCB configuration (in addition to **Release 3** or **4** common equipment) is as follows:
  Three PCOU PCBs
  One PEKU PCB
  One PDKU PCB
  Two PSTU PCBs
- The configuration requires seven universal slots; therefore, DK24 is ruled out, because it has only six universal slots. Offering 14 universal slots, DK96 could be used, but it is a little too big for the office's needs at the moment. DK56, with its eight universal slots, could meet those needs immediately and could accommodate some minor expansion.

Example 3—A large travel agency needs 18 CO lines, 14 electronic telephones, 14 digital telephones, and two standard push-button dialing, Dual Tone Multifrequency (DTMF) standard telephones.

- The PCB configuration (in addition to **Release 3** or **4** common equipment) is as follows:
  Five PCOU PCBs
  Two PEKU PCBs
  Two PDKU PCBs
  One PESU PCB
  One CRCU subassembly
- Each of these PCBs, except for the CRCU, requires one universal slot. Therefore, a total of 10 slots are required. This is beyond the capacity of DK24 and DK56 (six and eight slots, respectively) but well within the capacity of DK96. The CRCU, which mounts on the PCTU, is required for the DTMF standard telephones.

2 OPTIONS AND PERIPHERALS

2.00 Option Printed Circuit Boards

2.01 Numerous options, such as a paging amplifier, External Page (one zone), relay control, etc., require an additional printed circuit board (PCB) called the PEPU. If even more options are required, such as Multi-zone Paging, an alarm sensor, Station Message Detail Recording (SMDR) or Remote Maintenance, then the PIOU or a PIOUS PCB will be needed. Table 4-D provides more details about the capabilities of these PCBs. Only one option PCB is allowed per DK system. The maximum station port capacity is reduced by eight and CO line capacity by four with the installation of any of these PCBs.

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2.10 Direct Station Selection (DSS) Consoles

2.11 STRATA DK systems equipped with a PCTU1, 2, 3, or 4 can support up to four DSS consoles, and systems operating with a PCTUS can support up to three. There are two types of DSS consoles: the DDSS console and the HDSS console. The DDSS console and the HDSS console share the same function and look essentially alike, but interface with different types of circuits. Each DDSS console can only be connected to circuit 8 of a Digital Telephone Interface Unit (PDKU) PCB, while each HDSS console can only be connected to circuits 7 and 8 of an Electronic Telephone Interface Unit (PEKU) PCB—each console requires a separate PCB. DDSS consoles are available only with PCTU3 and 4, but HDSS consoles are supported by each of the PCTU versions as well as the PCTUS.

2.12 DSS consoles can be assigned flexibly so that one to four DSS consoles can be assigned to one

TABLE 4-C
UNIVERSAL SLOT/PCB CAPACITIES

Printed Circuit Board	Circuits per Printed Circuit Board	PCB Maximum Capacities (Ports/Lines)				Interface to:
		DK24		DK56	DK96	
		PCTUS1	PCTU (1/2/3/4)	PCTU (1/2/3/4)	PCTU (1/2/3/4)	
PDKU[1] (requires PCTU3 or PCTU4)	8/Digital Telephone (Ports, Digital) (without PDIU-DI) (with PDIU-DI)	**3** (24) (N/A) (N/A)	**4** (32) (32) (21)[2]	**8** (64) (64) (53)[2]	**12** (96) (96) (80)[2]	• Digital Telephones • DDSS Consoles • PDIU-DI • PDIU-DS • DDCB Door Phone Box
PEKU[1]	8/Electronic Telephone (Ports, Electronic)	**3** (24)	**4** (32)	**8** (64)	**12** (96)	• Electronic Telephones • HDCB Door Phone Box • HDSS Consoles • BGM Source • EOCU PCB for OCA • Amplified Conference
PSTU	8/Standard Telephone (Ports, Standard)	**3** (24)	**4** (32)	**8** (64)	**12** (96)	• Standard Telephones • Voice Mail Ports • Fax • Dictation Machine • Off-premises Stations • Other similar devices
PESU[3] (requires PCTU2 and above)	2/Standard Telephone 4/Electronic Telephone (Ports Standard/ Electronic)	**3** (6/12)	**5** (10/20)	**8** (16/32)	**12** (24/48)	Standard: Same as PSTU Electronic: Same as PEKU (see Note 3)
PCOU	4/CO Line (Lines)	**4** (16)	**5** (20)	**7** (28)	**9** (36)	• Central Office Loop Start Lines
PEMU[4]	4/TIE Lines (Lines)	**1** (4)	**1** (4)	**2** (8)	**3** (12)	• E&M TIE Lines – Type I - Signaling – 2 or 4 wire transmission – Immediate start
PIOU,[5] PIOUS or PEPU	See Table 4-F	**1**	**1**	**1**	**1**	See Table 4-D

NOTES:

1. *The appropriate capacities apply to digital and 6500-series electronic telephones only. If other Toshiba electronic telephones (2000-, 3000-, 6000-) are used, refer to Worksheet 7.*
2. *The number of digital telephones with PDIU-DIs is limited by the system's power capacity per Worksheet 7. Also, DIUs are limited to slots 01 ~ 10 in DK96 and cannot be connected to Circuit 8 of a PDKU1 but can be connected to Circuit 1 of 8 of the PDKU2.*
3. *Normally only one PESU is installed in a system that requires a mix of standard and electronic telephone circuits. A PESU is installed instead of a PSTU if only one or two standard telephone circuits are needed. It is installed instead of a PEKU if only four electronic telephone circuits or less are needed. The PESU supports the same stations and options as the PSTU and PESU do, except for the HDSS console.*
4. *The maximum number of PEMU PCBs is determined by the system's power supply capacity (caution: do not exceed the numbers shown); also, if a PEMU is installed in a DK24 with a PCTUS1 PCB, only 16 station ports are available for stations.*
5. *Only one type of peripheral interface PCB (PIOU, PIOUS, PEPU) may be installed per system.*

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TABLE 4-D
OPTION INTERFACE PCB INFORMATION

Interface Option	PIOU	PIOUS	PEPU
Unamplified Page Output (Single zone, 600 ohms duplex)	X	X	X
Amplified Page Output (Single zone, 3 watts, 8 ohms)	X		X
Zone Page Interface (Unamplified, 4 zones)	X		
Night Transfer or Music-on-Hold Control Relay	X	X	X
Door Lock or External Amplifier Control Relay	X	X	X
Alarm Sensor	X	X	
SMDR Output (RS-232/6-wire modular connector)	X	X	
Maintenance Port for a Local ASCII Terminal or External Modem (RS-232/6-wire modular connector)	X	X	
Remote Maintenance Modem (IMDU subassembly, no external connector)	X	X	

NOTE:
"X" indicates the option is provided.

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digital or electronic telephone, or one DSS console to each of four digital or electronic telephones, or any intermediate combination. Furthermore, DDSS consoles can be assigned to electronic telephones, although the telephones and the consoles interface with different types of PCBs; likewise, HDSS consoles can be assigned to digital telephones. Table 4-E provides more details regarding DDSS and HDSS consoles.

Example 4—An end user requires nine CO lines, 15 electronic telephones, one HDSS console and External Paging.

- If External Paging speakers can be driven with three watts or less, then the PEPU PCB

can be employed as the paging amplifier. Since each HDSS console requires the equivalent of two electronic telephones for interface, a total of 17 equivalent electronic telephones must be interfaced and, therefore, three PEKU PCBs are needed. Aside from common equipment, the PCBs required for this configuration are as follows:

Three PCOU PCBs
Three PEKU PCBs
One PEPU PCB

- A total of seven universal slots are needed, which is within the maximum of DK56's eight universal slots.

Example 5—A mid-sized business needs 15 CO lines, 12 digital telephones, two DDSS consoles, 14 electronic telephones, two HDSS consoles, and an External Paging system interface to drive an existing 8-ohm speaker. In addition, the business wants to track its employees' calling activity by using the Station Message Detail Recording (SMDR) feature.

- Because an External Paging system and SMDR are required, the PIOU amplified page output and SMDR interface will be needed. Two DDSS consoles require the equivalent of two digital telephone circuits in addition to the 12 digital telephones, for a total of 14 digital telephone circuits; this results in the installation of two PDKU PCBs. Two HDSS consoles require the equivalent of four electronic telephones, for a total of 18 electronic telephone circuits (including the 14 electronic telephones); this results in the installation of three PEKU PCBs. The final PCB configuration (in addition to **Release 3** or **4** common equipment) is:

  Four PCOU PCBs
  Three PEKU PCBs
  Two PDKU PCBs
  One PIOU PCB

- This configuration requires 10 PCBs, which can only be supported by the DK96.

2.20 Data Interface Units

2.21 Integrated Data Interface Unit (PDIU-DI and PDIU-DI2): The PDIU-DI(2) can replace the normal base of the digital telephone to provide the telephone with Data Calling capability. Each system can support a maximum number of PDIU-DI(2)s, as shown in Table 4-B. The PDIU-DI(2) which is attached to the digital telephone shares the same digital circuit on the PDKU.

NOTE:
The PDIU-DI and the PDIU-DI2 are identical, except that the PDIU-DI attaches to 1000-series Digital telephones and the PDIU-DI2 attaches to 2000-series Digital Telephones.

2.22 Stand-alone Data Interface Unit (PDIU-DS): Each PDIU-DS requires a dedicated circuit on a PDKU, unlike the PDIU-DI which shares a circuit with the digital telephone it is integrated with. Therefore, each PDIU-DS reduces the digital telephone maximum capacity by one. Each system can support a maximum number of PDIU-DSs, as shown in Table 4-B.

NOTES:
1. *The PDIU-DI and PDIU-DS will function with all slots, except slots 11 ~ 14 in DK96.*
2. *There are two PDKU versions: PDKU1 and PDKU2. These versions are identical, except that the PDKU1 can only support PDIU-DIs and PDIU-DSs on circuits 1 ~ 7, while all PDKU2 circuits, 1 ~ 8, can support PDIU-DIs and PDIU-DSs.*

Example 6—A small law firm requires three CO lines, 10 digital telephones (all of which will be equipped with a PDIU-DI(2) connected to a personal computer) and two PDIU-DSs connected to modems.

- The 10 digital telephones and the two PDIU-DSs connected to the modems call for 12 digital circuits. (The PDIU-DIs require no dedicated digital circuits, because they share the circuits with the telephones that they are connected to.) If the two modems are configured in a system modem pool, then one standard telephone circuit is required for each; therefore a PESU or PSTU would be needed. The three CO lines can be handled by one PCOU PCB. The PCBs required for this configuration are as follows:

  Two PDKUs
  One PCOU
  One PESU or PSTU

- A total of four universal slots are required for

this configuration, which can be supported by the DK24.

Example 7—Two tenants in one building require, on a combined basis, 13 CO lines, 23 digital telephones, eight standard DTMF telephones, a fax machine, four DDSS consoles, Remote Maintenance, and an interface to their alarm system.

- The 13 CO lines can be supported by four PCOU PCBs, since each PCOU has four CO line circuits. The 23 digital telephones and the four DDSS consoles require 27 digital telephone circuits, which can be accommodated with four PDKU PCBs. The fax machine and the eight DTMF standard telephones can be handled with one PSTU and one PESU. Because DTMF is coming into the system, a CRCU must be installed, but does not deduct from the available universal slots. The PIOUS PCB can be equipped with an IMDU to provide Remote Maintenance. In addition, the PIOUS has an interface for the alarm system. The total PCB requirement (in addition to common equipment) is as follows:
  Four PCOU PCBs
  Four PDKU PCBs
  One PSTU PCB
  One PESU PCB
  One CRCU subassembly
  One PIOUS PCB
  One IMDU subassembly
- A total of 11 universal slots are required; so a STRATA DK96 can meet the requirements of the configuration.

2.30 Door Phones

2.31 Up to 12 door phones (MDFB) can be accommodated by either a DK24, DK56, or a DK96 equipped with a PCTU (1, 2, 3, or 4). DK24s equipped with a PCTUS can support only nine door phones. A Door Phone/Lock Control Unit (DDCB or HDCB) is required for every three door phones. Each DDCB/HDCB interfaces to a STRATA DK system via Ports 04, 12, 20, and 28. Available with PCTU4 only, the DDCB connects to digital circuits associated with Ports 04, 12, 20, and 28; and the HDCB, which can be supported by the PCTUS as well as all versions of the PCTU, connects to electronic circuits associated with four ports. For system configuration, each DDCB and HDCB must be considered equivalent to a telephone as far as consuming station capacity. Table 4-E provides more details regarding DDCB and HDCB configuration.

2.40 E & M TIE Lines

2.41 Each PEMU PCB provides interface to four TIE lines. Up to four TIE lines can be accommodated by DK24, up to eight by DK56, and up to twelve by DK96. TIE lines (PEMU) are the same as CO lines (PCOU), when considering the maximum total outside lines in a system. The maximum lines per system are 16 for DK24, 24 for DK56, and 36 for DK96. In addition, each PEMU uses up station ports so that the software-limited station capacity of a system is reduced with every PEMU added. The number of station ports consumed by the PEMU depends on the type of PCTU used. If a PCTU (1, 2, 3, or 4) is installed, the PEMU reduces the system station capacity by four. If a PCTUS is installed, each PEMU reduces the station capacity by eight. This is of concern only in a DK24 system that requires more than 16 stations. Each PEMU added to a system uses up one universal slot.

NOTES:

1. *DK24's limit of four TIE lines (one PEMU) is due to power supply capacity. Do not exceed this limit.*
2. *Systems that support TIE lines must be equipped with a CRCU.*

2.50 Off-hook Call Announce (OCA)

2.51 Digital and electronic telephones equipped with an OCA subassembly can receive OCA calls. PEKU PCBs supporting electronic telephones equipped for OCA must also be upgraded with an EOCU subassembly. PDKU PCBs supporting digital telephones equipped for OCA require no such upgrade. Telephones making OCA calls do not require an upgrade.

- The OCA upgrade for the digital telephone is the DVSU, which installs inside the base of the telephone.

- The OCA upgrade for the electronic telephone is the HVSU2, which installs inside the base of the telephone. (The combined HVSU and HVSI subassemblies can also provide electronic telephones with OCA capability.) Each PEKU or PESU PCB supporting electronic telephones equipped for OCA must be upgraded with an EOCU. OCA-equipped electronic telephones should be kept in groups of four in concert with a particular PESU and in groups of eight with a particular PEKU. Since the EOCU connects to the PEKU or PESU, it does not reduce the number of available universal slots.
- All system slots, except DK96's 11~14 and DK24's 05 and 06 with PCTUS, can support telephones that receive OCA.

2.60 Data and Modems with Release 1 or 2

2.61 Passing data at up to 9600 bits per second (bps) through STRATA DK standard telephone ports is possible. To accomplish this function, an external, commercially available modem is required. Most typically, the modem will be housed in a personal computer and have its own two-wire modular connection. The modem is interfaced to STRATA DK via a PSTU or PESU PCB , like a standard telephone. The IMDU modem, discussed previously in **Example 7**, can only be used with the PIOU or PIOUS PCB for remote maintenance.

IMPORTANT NOTE:

For data applications requiring more functions than that provided by a personal computer and modem, it is recommended to use the STRATA DK data interface units, PDIU-DI and PDIU-DS. This includes data applications such as modem pooling, printer sharing, PC-to-PC file transfer, etc.

Example 8—A sizable business needs 15 CO lines, three E&M TIE lines, 37 electronic telephones, two HDSS consoles, four door phones, three standard telephones, a fax machine, three modems, Off-hook Call Announce for seven of the 37 electronic telephones, and three-zone paging. The business also wishes to use the Direct Inward System Access (DISA) feature.

- The four door phones can be supported by two HDCBs, since each HDCB has a maximum of three door phone interfaces. Each HDCB requires one electronic telephone circuit. Both HDSS consoles require two electronic telephone circuits. Therefore, including the 37 electronic telephone circuits required for the electronic telephones, the configuration will require PCBs for 43 electronic telephone circuits. The system will need six PEKU PCBs to support this number. One of the PEKUs needs an EOCU PCB to accommodate the seven electronic telephones that will have Off-hook Call Announce. This particular PEKU cannot interface with an HDSS console, because the HDSS console interfaces as the equivalent of two electronic telephones, leaving only six circuits for telephones.
- The equivalent of seven standard telephones (the three standard phones, the fax machine, and the three modems) need to be interfaced; so only one PSTU is required. A CRCU PCB will be required for the DISA feature, since DTMF tones will be coming into the system. Therefore, the standard telephones and like devices can use DTMF without any additional cost. If only one zone of external paging was needed, a PEPU or PIOUS PCB could be used to interface with the paging system. But three zones are required; so a PIOU PCB must be installed—the PIOU only supports zone paging. For 15 CO lines, four PCOU PCBs are needed. Only one PEMU PCB is required for the three TIE lines.
- In summary, the total PCB requirement (in addition to common equipment) is as follows:
  Four PCOU PCBs
  One PEMU PCB
  Six PEKU PCBs
  One PSTU PCB
  One PIOU PCB
  One EOCU subassembly
  One CRCU subassembly
- A total of 13 universal slots (one for each of the PCBs) are needed; so a DK96 system must be used.

2.70 Miscellaneous

2.71 Other hardware items may be needed in a particular system configuration. These include the

DPFT power failure transfer unit, used to connect CO lines to standard telephones in the event of a power outage; the HESB speaker/amplifier, which may interface with a digital or electronic telephone for the Loud Ringing Bell feature and/or a headset; a PBTC-3M cable, for connection to batteries for reserve power; a PPTC connector for an SMDR printer, TTY, or remote maintenance terminal interface. More details on these miscellaneous items can be found in Tables 4-E and 4-F, the *General Description,* and other installation chapters.

2.80 System Ports

2.81 Station Ports. Interfaces to each of some devices (such as telephones) in the STRATA DK system can be referred to as ports. Therefore, a PEKU, PDKU, PSTU, and PESU PCB can be said to have station ports. STRATA DK system programming uses port numbers to identify which device will be equipped with desired features or operation. Ports range from 00 ~ 95 with all of the PCTU versions, and 00 ~ 23 with PCTUS. Port 00 is usually intercom station 200, and is designated as the primary system attendant station. Intercom numbering can be completely flexibly assigned, but is best left to the consecutive standard numbering of 200 ~ 295 with PCTU (1, 2, 3, and 4) and 200 ~ 223 with PCTUS. User guides are written using this standard plan, and LCD digital and electronic telephone busy fields will be meaningful only if the last two digits of the intercom number are consecutive, starting with 00.

NOTES:

1. *Each PEMU uses four station ports and four CO lines; however, if the PEMU is installed in a DK24 with a PCTUS PCB, only 16 station ports are available, because the PCTUS assigns eight station ports to the PEMU PCB.*
2. *Each PESU provides two standard and four electronic telephone ports for a total of six station ports; however, two nonfunctioning ports (circuits 3 and 4) are automatically assigned to the PESU so a total of eight station ports are allocated to each PESU PCB installed.*

2.82 CO Lines. Telephone network CO lines interface to the PCOU PCB, which has four circuits. These circuits are identified as CO lines in DK system software and are not considered as ports. When determining the total station count for a configuration, do not include CO lines as stations.

NOTE:
Each PEMU uses four CO lines in system software, as well as four ports (PCTU1, 2, 3 or 4) or eight ports (with PCTUS) in system software.

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3 WORKSHEETS

TABLE 4-E
OPTIONAL ADD-ON UNIT CONFIGURATION

Option Unit	Interface/ PCB	Capacity	Function
DDCB (Digital door phone/ lock control)	PDKU (circuit 5)	4/system (PCTU4)	Each DDCB provides interface for up to three door phones (MDFBs) or two MDFBs and one door lock.
HDCB (Electronic door phone/lock control)	PEKU or PESU (circuit 5)	4/system (PCTU1, 2, 3, or 4) 3/system (PCTUS1)	Each HDCB provides interface for up to three door phones (MDFBs) or two door phones and one door lock.
DDSS (Digital DSS console)	PDKU (circuit 8)	4 per system with PCTU3 or PCTU4	Provides a 60-button console that functions with digital or electronic telephones. Buttons are flexibly assigned as CO line, speed dial, and DSS.
HDSS (Electronic DSS console)	PEKU (circuits 7 & 8)	4/system (PCTU1, 2, 3, or 4) 3/system (PCTUS1)	Provides a 60-button console that functions with electronic or digital telephones. Buttons are flexibly assigned as CO line, speed dial, and DSS.
MDFB (door phone)	DDCB or HDCB	12/system (PCTU1, 2, 3, or 4) 9/system (PCTUS1)	¥ Door monitor with two-way talk path to system telephones. ¥ Doorbell that rings designated digital and electronic telephones. ¥ Microphone for talkback amplifier with HESB.
PDIU-DI* or PDIU-DI2	Digital telephone 1000-series DKTs or 2000-series DKTs	1 per digital telephone with PCTU3 or PCTU4 (see Table 4-B)	Used for transmitting and receiving data between terminals, personal computers, and devices connected to other PDIUs. The PDIU-DI is also used to provide personal computer access to outside dial-up data services and/or bulletin boards via modem pooling.
PDIU-DS	PDKU (ckts 1~7)	7 per PDKU with PCTU3 or PCTU4 (see Table 4-B)	For making switched data connections for modem pooling, printer sharing, and host/mainframe computer accessing.
HESB (amplified speaker)*	PIOU/PIOUS/PEPU for page/speaker/amplifier Digital or electronic telephone with HHEU PCB for loud ringing bell	1 per PIOU/PIOUS/PEPU 1 per digital, electronic telephone (with HHEU and HESC-65A)	External page amplifier and speaker (talkback with MDFB) Loud Ringing Bell

DSS (DDSS and HDSS) CONSOLE NOTES:

1. *No additional hardware is required to use DSS consoles.*
2. *DSS consoles are assigned to associated digital and electronic telephones in programming.*
3. *DSS consoles cannot be connected to PESU electronic circuits.*
4. *DSS consoles can be flexibly assigned to designated electronic and digital telephone stations: Up to four DSS consoles may be assigned to a designated electronic or digital telephone station.*

DOOR PHONE NOTES:

1. *PCTU (1, 2, 3 or 4) can support as many as 12 MDFBs; PCTUS1 can support 9.*
2. *Each DDCB requires one circuit (Circuit 5) on a PDKU, and each HDCB requires one circuit (Circuit 5) on either a PEKU or PESU.*
3. *DDCBs/HDCBs can only be connected to Ports 04, 12, 20, and 28.*
4. *One door lock control can be configured on each DDCB and HDCB in place of one door phone. (**R2** and higher)*

TABLE 4-F
OPTIONAL SUBASSEMBLY PCB CONFIGURATION

Subassembly PCB	Main PCB (Mount)	Capacity	Function
EOCU[1]	PEKU or PESU	One for each PEKU or PESU that supports OCA	Provides Off-hook Call Announce path for all electronic telephone circuits of main PCB
CRCU (4 or 8 circuits)	PCTU (1, 2, 3, or 4) or PCTUS1	One per PCTU or PCTUS1/system	Provides DTMF receiver for DISA, standard telephone/VM circuits and TIE lines
IMDU	PIOU and PIOUS	One per PIOU or PIOUS/ system	Remote maintenance interface with built-in modem
HHEU[3]	Digital telephone and 6500-series electronic telephone	One per electronic or digital telephone	Interface for headset and Loud Ringing Bell[2]
DVSU	Digital telephone	One per digital telephone	Interface for digital telephone to receive Off-hook Call Announce
HVSU2 or HVSU/HVSI[3]	6500-series electronic telephone	One per electronic telephone	Interface for electronic telephone to receive Off-hook Call Announce

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NOTES:
1. *An EOCU (OCA) will not function in slots 11 ~ 14 on DK96 or slots 05 ~ 06 on DK24 with PCTUS1.*
2. *For digital telephones, an HESC-65A cable is required to connect the HHEU to an HESB for the Loud Ringing Bell feature. An HESC-65A or HESC-65 is required for electronic telephones.*
3. *The combined HVSU and HVSI subassemblies provide the same function as the HVSU2.*

CONFIGURATION GUIDE, WORKSHEET 1

Customer: _____ Location: _____

Complete Worksheet 1 before proceeding with other worksheets.

A1. DDSS consoles required (refer to DDSS in Table 4-E): (A1) DDSS _____

A2. Digital door phone/lock units required (refer to DDCB in Table 4-E): (A2) DDCB _____

A3. PDIU-DSs required (refer to PDIU-DS in Table 4-E): (A3) PDIU-DS _____

A4. Digital telephones, with or without PDIU-DI, required (refer to PDKU in Table 4-C):

2010-SD _____ + 2010-H _____ + 2020-SD _____ + 2020-S _____

1020-H _____ + 1020-SD _____ = (A4) Total digital telephones _____

NOTE:
If adding digital telephones equipped with PDIU-DIs to a system or if the system requires TIE lines (PEMU), refer to the System Power Check, Worksheet 7.

B1. HDSS consoles required (refer to HDSS in Table 4-E): (B1) HDSS _____

B2. Door phone/lock units required (refer to HDCB in Table 4-E): (B2) HDCBs _____

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B3. Electronic telephones required (refer to PEKU and PESU in Table 4-C):

6510-H _____ + 6510-S _____ + 6520-S _____ + 6520-SD _____

NOTE:
If upgrading an existing STRATA DK system using 2000-/3000-/6000-/6005-series electronic telephones and/or if the system requires TIE lines (PEMU), refer to the System Power Check, Worksheet 7.

(B3) Total electronic telephones _____

B4. Separate BGM source (connected to electronic telephone circuit) required (1 maximum):

(B4) Separate BGM source _____

B5. External amplifiers for two-CO line amplified conference required (4 maximum):

(B5) Two-CO line conference amplifiers _____

NOTE:
External amplifiers are customer-supplied.

C1. Number of standard telephones required (refer to PSTU and PESU in Table 4-C):

(C1) Standard telephones _____

WORKSHEET 1 (continued)

C2. Number of auxiliary devices/ports, i.e., voice mail ports, auto attendant ports, fax machines, modems , separate BGM source (refer to PSTU and PESU in Table 4-C):

(C2) Auxiliary devices _____

D. Number of CO lines required (refer to PCOU in Table 4-C):

(D) CO lines _____

E. Number of E&M TIE lines required (refer to PEMU in Table 4-C):

(E) TIE lines _____

F. Does the customer require options that interface with a PIOU, PIOUS, or PEPU PCB? Yes _____ No _____ (refer to Table 4-D). Enter optional interface PCB type:

(F) Optional Interface PCB ____

G. Does the customer require other optional features (yes or no for each): battery backup ____, power failure transfer unit ____, DTMF signals from standard telephone ports ____, off-hook call announce ____, headsets ____, built-in remote maintenance ____, loud ringing bell ____, talkback amplifier ____, external page amplifier/speaker ____, door phones ____, door lock controls ____, PDIU-DI ____.

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NOTE:
These options are configured on Worksheet 6 after completing Worksheets 2 ~ 5.

H. Complete Worksheets 2 ~ 5.

CONFIGURATION GUIDE, WORKSHEET 2

(PDKU/PEKU PCB requirements)

Customer: _____ Location: _____

A. PDKU PCBs (eight station ports)

1. Determine the total PDKU ports required using Chart 1A.

CHART 1A—PDKU PORT REQUIREMENTS

Equipment Type:	Equipment Quantity	X	(Ports/ per)	=	Ports Used
DDSS consoles: (see Worksheet 1, A1)	(A1) _____	X	1	=	_____ .
DDCBs (see Worksheet 1, A2)	(A2) _____	X	1	=	_____ .
PDIU-DSs: (see Worksheet 1, A3)	(A3) _____	X	1	=	_____ .
Digital telephones (with or without PDIU-DIs): (see Worksheet 1, A4)	(A4) _____	X	1	=	_____ .
			Total PDKU Ports	=	_____ .

2. Determine the minimum PDKU PCBs required using Chart 2A.

CHART 2A—MINIMUM PDKU PCB REQUIREMENTS

Total Ports (Chart 1A)	01 ~ 08	09 ~ 16	17 ~ 24	25 ~ 32	33 ~ 40	41 ~ 48	49 ~ 56	57 ~ 64	65 ~ 72	73 ~ 80	81 ~ 88	89 ~ 96
Minimum PDKU PCBs (Am)	1	2	3	4	5	6	7	8	9	10	11	12

3. Determine the actual PDKU PCBs required using Charts 1A and 2A as follows:
   Actual PDKUs (AT) = (Am) or (A1) or (A2), whichever is the largest number.

Actual PDKU PCBs = ____ (AT)

CONFIGURATION GUIDE, WORKSHEET 2 (continued)

(PDKU/PEKU PCB requirements)

Customer: _____ Location: _____

B. PEKU PCBs (eight station ports)

1. Determine the total PEKU ports required using Chart 1.

CHART 1—PEKU PORT REQUIREMENTS

Equipment Type:	Equipment Quantity	X	(Ports/ per)	=	Ports Used
HDSS consoles: (see Worksheet 1, B1)	(B1) _____	X	2	=	_____ .
HDCBs: (see Worksheet 1, B2)	(B2) _____	X	1	=	_____ .
Electronic telephones: (see Worksheet 1, B3)	(B3) _____	X	1	=	_____ .
BGM/MOH separation: (see Worksheet 1, B4)	(B4) _____	X	1	=	_____ .
Conference amplifiers: (see Worksheet 1, B5)	(B5) _____	X	2	=	_____ .
			Total PEKU Ports	=	_____ .

2. Determine the minimum PEKU PCBs required using Chart 2.

CHART 2—MINIMUM PEKU PCB REQUIREMENTS

Total Ports (Chart 1)	01 ~ 08	09 ~ 16	17 ~ 24	25 ~ 32	33 ~ 40	41 ~ 48	49 ~ 56	57 ~ 64	65 ~ 72	73 ~ 80	81 ~ 88	89 ~ 96
Minimum PEKU PCBs (Bm)	1	2	3	4	5	6	7	8	9	10	11	12

3. Determine the actual PEKU PCBs required using Charts 1 and 2 as follows: Actual PEKUs (BT) = (Bm) or (B1) or (B2), whichever is the largest number.

Actual PEKU PCBs = ____(BT)

4. **PESU**: In a configuration that requires less than five electronic telephone station ports, a PESU PCB may be used in place of a PEKU PCB. The PESU supports all stations and peripherals that the PEKU and PSTU support, except for the HDSS console. Normally, only one PESU is installed in a system (see PSTU, Worksheet 3).

H

CONFIGURATION GUIDE, WORKSHEET 3
(PSTU/PESU PCB requirements)

C. PSTU PCBs (eight station ports)

1. Determine the total PSTU ports required using Chart 3.

CHART 3—PSTU PORT REQUIREMENTS

Equipment Type:	Equipment Quantity	X	Ports	=	Ports Used
Standard telephones: (see Worksheet 1, C1)	(C1) _____	X	1	=	_____ .
Other devices: (see Worksheet 1, C2)	(C2) _____	X	1	=	_____ .
	Total PSTU Ports			=	_____ .

2. Determine the actual PSTU PCB requirements using Chart 4.

CHART 4—ACTUAL PSTU PCB REQUIREMENTS

Total Ports (Chart 3)	01 ~ 08	09 ~ 16	17 ~ 24	25 ~ 32	33 ~ 40	41 ~ 48	49 ~ 56	57 ~ 64	65 ~ 72	73 ~ 80	81 ~ 88	89 ~ 96
PSTU PCBs	1	2	3	4	5	6	7	8	9	10	11	12

Actual PSTU PCBs = _____(CT1)

3. **PESU**: In a configuration requiring less than two PSTU station ports, a PESU PCB can be used in place of a PSTU PCB. Normally, only one PESU is installed in a system.

Actual PESU PCBs = _____(CT2)

NOTE:
The PCTU or PCTUS1 must be equipped with a CRCU (4 or 8) to translate DTMF signals generated by most devices that interface with standard telephone ports.

H

CONFIGURATION GUIDE, WORKSHEET 4

(PCOU/PEMU requirements)

D. PCOU PCBs (four CO lines)

1. Enter the number of CO lines required from Paragraph D of Worksheet 1.

CO lines _____

2. Determine the number of PCOU PCBs using Chart 5.

CHART 5—ACTUAL PCOU PCB REQUIREMENTS

CO Lines	01 ~ 04	05 ~ 08	09 ~ 12	13 ~ 16	17 ~ 20	21 ~ 24	25 ~ 28	29 ~ 32	33 ~ 36
PCOU PCBs	1	2	3	4	5	6	7	8	9

Actual PCOU PCBs = ____ (DT)

E. PEMU PCBs (four TIE lines)

1. Enter the number of TIE lines required from paragraph E of Worksheet 1.

TIE lines _____

2. Determine the number of PEMU PCBs using Chart 6.

CHART 6—ACTUAL PEMU PCB REQUIREMENTS

TIE Lines	01 ~ 04	05 ~ 08	09 ~ 12
PEMU PCBs	1	2	3

Actual PEMU PCBs = ____ (ET)

NOTE:
A CRCU (4 or 8) must be installed on the PCTU or PCTUS1 to support TIE lines.

F. PIOU/PIOUS/PEPU PCBs

Enter type of optional interface from Paragraph F of Worksheet 1, if required. Only one per system.

Actual Interface PCB ____ (FT)

CONFIGURATION GUIDE, WORKSHEET 5

F. System and Slot Check

1. Add total PCB/slot requirements (from Worksheets 2 ~ 4): AT + BT + CT1 + CT2 + DT + ET + FT = _____ PCB/slot total.

IMPORTANT NOTE!
One or two additional slots should always be considered for future growth.

2. If total is six or less, use **DK24** and **PCTUS1** with the following considerations:
   a. Total PEKU/PSTU/PESU PCBs combined: three or less (no PEMU equipped).
   b. Total PEKU/PSTU/PESU PCBs combined: two or less (PEMU equipped).
   c. Total PCOU PCBs: four or less.
   d. Total PEMU PCBs: one or less.
   e. HDSS consoles: three or less.
   f. HDCB controllers: three or less.
   g. If using 2000-/3000-/6000-/6005-series electronic telephones and/or a PEMU, use Power Check, Worksheet 7.

   DK24 with PCTUS1____

3. If total is six or less, use **DK24** and **PCTU (1, 2, 3, or 4)** with the following considerations:
   a. Total PDKU/PEKU/PSTU/PESU PCBs combined: four or less (no PEMU equipped).
   b. Total PDKU/PEKU/PSTU/PESU PCBs combined: three or less (PEMU equipped).
   c. Total PCOU PCBs: six or less.
   d. Total PEMU PCBs: one or less.
   e. Combined DDSS and HDSS consoles: four or less.
   f. DDCB/HDCB controllers: four or less.
   g. If using 2000-/3000-/6000-/6005-series electronic telephones, PDIU-DIs, and/or a PEMU, use Power Check, Worksheet 7.

   DK24 with PCTU1, 2, 3, or 4 ____

4. If total is eight or less, use **DK56** and **PCTU (1, 2, 3, or 4)** with the following considerations:
   a. PDKU/PEKU/PSTU/PESU PCBs combined: eight or less.
   b. PCOU PCBs: eight or less.
   c. PEMU PCBs: two or less.
   d. PEMU and PCOU: eight or less.
   e. Combined DDSS and HDSS consoles: four or less.
   f. DDCB/HDCB controllers: four or less.
   g. If using 2000-/3000-/6000-/6005-series electronic telephones, PDIU-DIs, and/or a PEMU, use Power Check, Worksheet 7.

   DK56 with PCTU1, 2, 3, or 4 ____

5. If this total is above eight, use **DK96** and **PCTU (1, 2, 3, or 4)** with the following considerations:
   a. PDKU/PEKU/PSTU/PESU PCBs combined: 12 or less.
   b. PCOU PCBs: nine or less.
   c. PEMU PCBs: three or less.
   d. PEMU and PCOU: nine or less.
   e. Combined DDSS and HDSS consoles: four or less.
   f. DDCB/HDCB controllers: four or less.
   g. If using 2000-/3000-/6000-/6005-series electronic telephones, PDIU-DIs, and/or a PEMU, use Power Check, Worksheet 7.

   DK96 with PCTU1, 2, 3, or 4 ____

NOTE:
PDKUs and DDSS s require PCTU3 or PCTU4. DDCBs require PCTU4.

H

CONFIGURATION GUIDE, WORKSHEET 6

(Miscellaneous Option Requirements)

G. CRCU PCB (refer to Table 4-F):

1. A CRCU (-4 or -8) must be installed on the PCTUS1, PCTU1, PCTU2, PCTU3, or PCTU4 PCB if the customer has TIE lines, DISA CO lines, or is using standard telephones or voice mail-type devices connected to PSTU or PESU standard telephone ports.

2. For normal traffic, a CRCU-4 (providing four DTMF receiver circuits) will be sufficient. However, for extremely high traffic requirements, a CRCU-8 (providing eight DTMF receiver circuits) may be required.

CRCU-4 ____ or CRCU-8 ____

NOTE:
Only one CRCU can be used per system.

H. EOCU (refer to Table 4-F):

An EOCU must be installed on each PEKU and/or PESU that is connected to electronic telephones which are equipped to receive Off-hook Call Announce (OCA).

Actual EOCU PCBs ____

NOTE:
1. *One EOCU for each PEKU or PESU that supports electronic telephones that must receive OCA.*
2. *Be sure that proper consideration is given to where the PEKU or PESU is placed to provide the most efficient use of the 8-circuit EOCU: The PESU only provides four electronic telephone ports; HDSS consoles use two ports on a PEKU; HDCBs use one port on a PESU or PEKU.*
3. *An EOCU (OCA) will not function in slots 11 ~ 14 on DK96 and slots 05 ~ 06 on DK24 with PCTUS1.*

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I. DVSU (refer to Table 4-F):

One DVSU is required for each digital telephone that must receive OCA.

Actual DVSU _____

J. HVSU2 (refer to Table 4-F):

Electronic telephones equipped with an HVSU2 can receive OCA calls.

Actual HVSU2s _____

K. HVSU/HVSI (refer to Table 4-F):

Electronic telephones equipped with the HVSI and HVSU subassemblies can receive OCA calls.

Actual HVSUs/HVSIs _____

L. IMDU PCB (refer to Table 4-F):

One IMDU PCB must be installed on the PIOU or PIOUS PCB to provide built-in remote maintenance capability for the STRATA DK system.

IMDU PCB _____

M. HHEU PCB (refer to Table 4-F):

One HHEU PCB must be installed in each digital and electronic telephone that supports a headset or connects to an HESB providing a loud ringing bell.

Actual HHEU PCBs _____

CONFIGURATION GUIDE, WORKSHEET 6 (Continued)

N. HESC-65A (refer to Table 4-F):

One HESC-65A modular connecting cable is required to connect the HESB to the HHEU in each digital telephone and 6500-series electronic telephone requiring the Loud Ringing Bell option.

Actual HESC-65As _____

O. HESB Amplifier/Speaker (refer to Table 4-E):

1. One HESB is required for each digital and electronic telephone providing the Loud Ringing Bell option.
2. One HESB is optional to provide single-zone external page connected to either a PIOU, PIOUS, or PEPU (customer-supplied amplifiers/speakers may be used in place of the HESB).
3. One HESB is optional to provide a talkback amplifier/page speaker connected to a PIOU, PIOUS, or PEPU (a customer-supplied talkback amplifier/page speaker may be used in place of HESB).

Actual HESBs _____

P. PBTC-3M Cable:

One PBTC-3M cable is required for each system that requires battery backup (batteries are customer-supplied).

PBTC-3M _____

Q. PPTC Adaptor (Modular to RS-232):

A PPTC is required (one each) to connect a printer or call accounting device to the PIOU or PIOUS SMDR port; or to connect a modem or ASCII terminal to the PIOU or PIOUS maintenance port (TTY).

PPTC _____

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R. DPFT Unit:

The DPFT provides a means to connect eight selected CO lines to standard telephones in the event of a power failure.

DPFT _____

S. MDFB:

The MDFB plugs into the DDCB or HDCB control box to provide a door phone. Three MDFBs can be connected to each DDCB or HDCB. The MDFB may also be connected to the HESB amplifier/speaker to provide page talkback.

Actual MDFBs _____

T. PDIU-DI (refer to Table 4-B):

Digital telephones must be equipped with a PDIU-DI to transmit and receive voice and data calls.

Actual PDIU-DIs _____ for 1000-series DKTS

Actual PDIU-DI2s _____ for 2000-series DKTS

CONFIGURATION GUIDE, WORKSHEET 7

(System Power Check)

Total Power Used:

Equipment Type:	Equipment Quantity	X	Power Used (Factor)	=	Ports Used
2000- and 1000-series digital telephone	_____	X	(1.0)	=	_____ .
2000-series electronic telephone	_____	X	(2.0)	=	_____ .
3000-series electronic telephone	_____	X	(2.5)	=	_____ .
6000-series electronic telephone	_____	X	(2.0)	=	_____ .
6005-series electronic telephone	_____	X	(2.0)	=	_____ .
6500-series electronic telephone	_____	X	(1.0)	=	_____ .
DDSS/HDSS console*	_____	X	(0.8)	=	_____ .
PDIU-DI	_____	X	(0.5)	=	_____ .
PDIU-DS	_____	X	(0.8)	=	_____ .
Standard telephone	_____	X	(1.0)	=	_____ .
PEMU PCB	_____	X	(8.0)	=	_____ .
			Total Power Used		

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* All series.

Power Supplied:

Power Supply	Power Supplied
PPSU 24	32
PPSU 56	80
PPSU 96	144

Power Criteria:

Power Supplied — **Total Power Used:** Must be greater than zero.

Configuration Power Check: _____ — _____ = _____

Power Supplied

Total Power Used

Must be Greater than Zero

3.00 To use a methodical step-by-step procedure to configure a system, a configuration guide consisting of seven worksheets is provided in this chapter.

4 SYSTEM HARDWARE CONFIGURATION

4.00 General

4.01 The following provides guidelines to configure the STRATA DK system's printed circuit board (PCB) slots, including the recommended order in which the PCBs and PCB options should be assigned to specific slots.

4.02 This section does not detail the physical installation nor the wiring of PCBs or options. It is provided as a guide to plan and record the system hardware configuration. Installation procedures for PCBs are provided in Chapter **6**, and station and peripheral procedures are in Chapter **7**.

4.03 The quantity of each type of PCB and option must be determined by the guidelines given in Worksheets 1 ~ 7 prior to using the following guidelines.

4.10 System Hardware Assignment Record

4.11 Locate the record sheet for **Program 03** in the Basic System Record Sheets, Section **400-096-300.** The system's PCB configuration should be recorded on this record sheet.

NOTE:
Record sheets are also available separately from the manual.

4.12 On the **Program 03** record sheet, record the following information for PCBs: slot assignments, option assignments, code assignments, station port assignments, and line number assignments. The recommended procedures for recording this information are in Paragraphs **4.13** ~ **4.18**. (Refer to Figure 4-2 for an example of each item to be recorded.)

4.13 PCB Slot Assignments—Record in the PCB type row on **Program 03**'s record sheet (in the order shown below) the type of PCB that should be installed in each slot.

- **PCTU**: Assign the PCTU to the PCTU slot, **Slot 00.**

NOTE:
PCTU Codes 91, 92, and 93 apply to all PCTU types (PCTU1, PCTU2, PCTU3, PCTU4, and PCTUS).

- **PDKU and PEKU:** Assign all PDKU and PEKU PCBs, starting with **slot 01** and continuing in numerical order without skipping slots until all these PCBs are assigned.
- **PSTU:** Assign all PSTU PCBs, starting with the **lowest numbered empty slot** and continuing without skipping slots until all PSTU PCBs are assigned.
- **PESU:** Assign all PESU PCBs, starting with the **lowest numbered empty slot** and continuing without skipping slots until all PESU PCBs are assigned.
- **PCOU:** Assign all PCOU PCBs, starting with the **lowest numbered empty slot** and continuing without skipping slots until all PCOU PCBs are assigned.
- **PEMU:** Assign all PEMU PCBs, starting with the **lowest numbered empty slot** and continuing without skipping slots until all PEMU PCBs are assigned.
- **PIOU/PIOUS/PEPU:** Assign the PIOU, PIOUS, or PEPU PCB in **slot 06** of DK24, in **slot 08** of DK56, or in **slot 14** of DK96.

NOTE:
The same code (41) is used for either PIOU, PIOUS, or PEPU.

4.14 PCB Option Assignments—Some PCBs may have subassembly options (PCTU/CRCU, PIOU(S)/IMDU, PEKU/EOCU, PESU/EOCU) or special peripheral equipment (PDKU/DDSS console, PDKU/DDCB, PEKU/HDSS console, PEKU/HDCB, PESU/HDCB) connected to designated ports. These options require special PCB identification codes in **Program 03**; therefore, it is necessary to record each option (in the options row) on the record sheet.

- **CRCU**: If the PCTU or PCTUS will be equipped with a CRCU, record the CRCU-4 or CRCU-8 under the PCTU slot. A special PCB code is required for the PCBs that support the CRCU option.
- **EOCU**: If a PEKU or PESU is required to support Off-hook Call Announce, record EOCU under

the appropriate slot. A special PCB code is required for PCBs that support this option. An EOCU (OCA) will not function in Slots 11 ~ 14 on DK96 and slots 05 and 06 on DK24 with PCTUS.

- **DSS:** If a PDKU or PEKU is required to support a DSS console, record DSS 1, DSS 2, DSS 3, and/or DSS 4, as needed under the appropriate slot(s). Start with DSS 1 in the lowest numbered PCB slot that supports a console and continue, as required, to the highest PDKU or PEKU slot that is supporting a console. A special code must be entered for every slot that hosts a DSS-supporting PCB. (Refer to the DSS console hardware configuration notes at the end of this section.)
- **DDCB/HDCB:** A special code is not required for slots that support a DDCB or HDCB, but note every slot that will be supporting either one of these door phone/lock control units. Only the slots that have Ports 04, 12, 20, and 28 can support DDCBs and HDCBs. (Refer to the door phone hardware configuration notes at the end of this section.)
- **IMDU**: If the PIOU or PIOUS is to be equipped with a remote maintenance modem, record IMDU under the slot that it occupies. A special PCB code is not required for the PCB that supports the IMDU option.
- **PDIU-DS:** If one or more PDIU-DS is connected to a PDKU, record the ports that the PDIU-DSs interface with under the appropriate PDKU slot. A special PCB code must be entered for PDKUs that support PDIU-DSs. PDIU-DSs will not function in Slots 11 ~ 14 on DK96 and Slots 05 and 06 on DK24 with PCTUS. Also, PDKU circuit 8 will not support a PDIU-DS.
- **PDIU-DI(2):** If a PDIU-DI(2) is connected to a digital telephone, the PDIU-DI(2) and the digital telephone will share the same PDKU station port. A special PCB code must be entered for PDKU PCBs that support digital telephones with PDIU-DI(2)s. PDIU-DSs will not function in Slots 11 ~ 14 on DK96 and Slots 05 and 06 on DK24 with PCTUS. Also, PDKU1A Circuit 8 will not support a PDIU-DI(2).

4.15 PCB Code Assignments—Each PCB type has an identification code that must be entered in **Program 03**. If the PCB supports an option, a special PCB code may have to be entered to tell the system that the PCB will be supporting an option. Record the appropriate code in the PCB code row of the **Program 03** record sheet. Use the sequential order shown below:

- **PCTU (1, 2, 3, 4, or S):** Assign the appropriate PCB code (91, 92, or 93) to the PCTU slot:
  - PCB Code 91: PCTU without CRCU
  - PCB Code 92: PCTU with CRCU-4
  - PCB Code 93: PCTU with CRCU-8
- **PDKU:** Assign the appropriate PCB code (61, 62 or 64) to all PDKU slots:
  - PCB Code 61: PDKU without options
  - PCB Code 62: PDKU with OCA and/or PDIU-DI, PDIU-DS
  - PCB Code 64: PDKU with DDSS console, OCA, and/or PDIU-DI, PDIU-DS

  NOTE:
  A special code is not required for PDKUs that support DDCBs.

- **PEKU:** Assign the appropriate PCB code (21, 22, 23, or 24) to all PEKU slots:
  - PCB Code 21: PEKU without options
  - PCB Code 22: PEKU with EOCU
  - PCB Code 23: PEKU with HDSS console
  - PCB Code 24: PEKU with HDSS console and EOCU
- **PSTU:** Assign PCB code 31 to all PSTU slots.
- **PESU:** Assign appropriate PCB code (25 or 26) to all PESU slots:
  - PCB Code 25: PESU without EOCU
  - PCB Code 26: PESU with EOCU

  NOTE:
  A special code is not required for the HDCB if connected to a PEKU or PESU.

- **PCOU:** Assign PCB Code 11 to all PCOU slots.
- **PEMU:** Assign PCB Code 13 to all PEMU slots.
- **PIOU/PIOUS/PEPU:** Assign PCB Code 41 to the PIOU, PIOUS, or PEPU slot.

  NOTE:
  A PIOU or PIOUS equipped with an IMDU does not require a special code.

4.16 Station Port Assignments—Station ports are provided by the PDKU, PEKU, PSTU, and PESU PCBs. Each PDKU, PEKU, or PSTU PCB provides eight station ports. The PESU provides six functioning station ports, although it is allocated

eight. Each PEMU uses four station ports on DK24 systems equipped with a PCTUS or eight station ports on systems operating with any of the other PCTU versions. Each of the PCBs must have station port numbers assigned. Record the station port numbers in the station port numbers row on **Program 03**'s record sheet. Record information for each slot equipped with a PDKU, PEKU, PSTU, PESU, or PEMU PCB in the order shown below:

- **PDKU and/or PEKU Station Ports:** Assign station port numbers, starting with Ports 00 ~ 07 under **Slot 01**, advancing incrementally eight ports for every PDKU and/or PEKU slot. Assign the numbers in numerical order until station ports are assigned to all PDKU and PEKU slots.
- **PSTU Station Ports:** Assign station port numbers, starting where the last station port number stopped, advancing incrementally at eight port numbers per PSTU slot. Assign the numbers in numerical order until station ports are assigned to all PSTU slots.
- **PESU Station Ports:** Assign station port numbers, starting where the last station port number stopped, advancing incrementally at eight port numbers per PESU slot. Assign the numbers in numerical order until station ports are assigned to all PESU slots.

  NOTE:
  PESU Circuits 1 and 2 are standard telephone ports, and Circuits 5 ~ 8 are electronic telephone ports; Circuits 3 and 4 are not used, but are allocated to the PESU slot, anyway.

- **PEMU Station Ports**: Assign station port numbers, starting where the last station port number stopped, advancing incrementally at four port numbers per PEMU slot. Assign the numbers in numerical order until station ports are assigned to all PEMU slots.

  NOTE:
  If a PEMU is installed in a PCTUS-controlled DK24, only 16 station ports will be available for station interface using PDKU, PEKU, PESU, and PSTU PCBs. If the PEMU is installed in a PCTU (1, 2, 3, or 4)-controlled DK24, 24 stations will be available, because of power supply capacity.

4.17 CO Line Number Assignments—Line circuits are provided by the PCOU and PEMU PCBs. Each PCOU provides four line circuits for CO loop start line connections, and each PEMU has four line circuits that support TIE lines. (Each of the PCBs must have line numbers assigned.) Record CO line numbers in the CO/TIE line numbers row on **Program 03**'s record sheet. Record information for each slot equipped with a PCOU or PEMU in the order shown below:

- **PCOU Line Numbers:** Assign CO line numbers, starting with lines 01 ~ 04 in the lowest numbered PCOU slot, advancing incrementally at four line numbers per PCOU slot. Assign the numbers in numerical order until CO lines are assigned to all PCOU slots.
- **PEMU Line Numbers:** Assign TIE line numbers, starting with the next line above the highest PCOU line, advancing incrementally at four line numbers per PEMU slot.

4.18 PCB Additions—To add PCBs to an existing installation, assign the PCBs in the order described above. *Start with the lowest numbered empty slot and continue without skipping a slot* until all PCBs are assigned. Then, using the guidelines described above, record the new PCB configuration information on the record sheet for **Program 03.**

NOTE:
PEMU PCBs should be first moved to higher slot numbers to create the necessary number of empty slots for additions. Be sure to reprogram for the new PEMU positions, including new station number assignments for the PEMU(s).

4.20 Door Phone Hardware Configuration Notes

- **STRATA DK systems** equipped with a PCTU (1, 2, 3, 4) can support a maximum of 12 door phones, while STRATA DK24 systems equipped with a PCTUS can support up to nine door phones. Each door phone must be connected to a door phone/lock control unit (DDCB or HDCB).
- Each DDCB and HDCB provides three door phone interfaces.
- A maximum of four DDCBs or HDCBs (or a combination of both) are allowed for systems operating with the PCTU (1, 2, 3, and 4) and three for STRATA DK24 systems with a PCTUS.

- DDCBs and HDCBs can only be connected to port numbers 04, 12, 20, and 28. DDCBs can connect only to digital telephone ports (PDKU), and HDCBs can interface just with electronic telephone ports (PEKU and PESU).
- Always install DDCBs/HDCBs to PDKU/PEKU/PESU PCBs that are in lower slot numbers than PEMU PCBs. This is required to maintain alignment of Circuit 5 with Port 04, 12, 20, and 28.
- PCB Slots that support DDCBs and HDCBs do not require a special code in **Program 03.**
- DDCB and HDCB assignments are found in **Programs 77-1, 77-2,** and **79**.
- Door phones can be programmed to ring at any digital and electronic telephone (no limit within the system). Door phones will not ring standard telephones, but standard telephone users can answer door phone calls that are ringing at digital and electronic telephones by dialing a pickup access code.
- Cut **W9** on each PEKU and PESU that supports an HDCB. There are no straps to cut on the PDKU.

4.30 DSS Console Hardware Configuration Notes

- A maximum of four DSS consoles are allowed per systems with a PCTU (1, 2, 3, or 4) and three for STRATA DK24 systems with a PCTUS.
- There are two types of DSS consoles, the digital DSS console (DDSS console) and the electronic DSS console (HDSS console). DDSS consoles operate with PCTU3 and PCTU4 only, while HDSS consoles can work with all PCTU versions and the PCTUS.
- DDSS consoles normally operate in conjunction with digital telephones. Each DDSS console is automatically assigned by system software to an associated digital telephone (on Circuit 1 of the same PDKU), which in turn is referred to as a DSS/attendant telephone. A DDSS console, though, can be reassigned in system programming to be associated with an electronic telephone.
- HDSS consoles normally operate in conjunction with electronic telephones. Each HDSS console is automatically assigned by system software to an associated electronic telephone (on Circuit 1 of the same PEKU), which in turn is referred to as a DSS/attendant telephone. An HDSS console, though, can be reassigned in system programming to be associated with a digital telephone.
- One PDKU PCB is required for each DDSS console, and one PEKU is needed for each HDSS console. The DDSS console connects to Circuit 8 of a PDKU, and the HDSS console connects to Circuits 7 and 8 of a PEKU.
- PDKU/DDSS slots are identified and assigned in **Program 03** with special PCB code 64 (Figure 4-2).
- PEKU/HDSS slots are identified and assigned in **Program 03** with special PCB codes 23 or 24 (Figure 4-2).
- DSS consoles and attendant telephones are automatically assigned as DSS1/ATT1, DSS2/ATT2, DSS3/ATT3, or DSS4/ATT4, starting with the lowest DSS slot and continuing, in consecutive order, to the highest DSS slot. But consoles may be reassigned in **Program 28** so that up to four consoles may be assigned to one telephone.
- DSS console buttons may be flexibly assigned (in **Program 29)** as CO line buttons, DSS (hot line) buttons, and speed dial buttons.

4.40 Data Interface Unit (DIU) Configuration Notes

- The Integrated Data Interface Unit (PDIU-DI or PDIU-DI2) shares the same wire pair and PDKU station circuit with the digital telephone to which it is connected. The PDIU-DI(2) requires a PCTU3 or PCTU4 control PCB. The maximum number of PDIU-DI(2)s supported by each STRATA DK system is shown in Table 4-B.
- The PDIU-DI is a DCE type device that normally connects to a personal computer serial communications port or ASCII terminal.
- The Stand-alone Data Interface Unit (PDIU-DS) requires a dedicated PDKU station circuit and one or two pair of wires. (See Section **400-096-209** for wiring information.) The PDIU-DS requires a PCTU3 or PCTU4 PCB. The maximum number of PDIU-DSs supported by each STRATA DK system is shown in Table 4-B.
- PDIU-DSs may be configured as a DTE or DCE type device and connect to modems, printers, or host mainframe computers.

NOTE:
Only Circuits 1 ~ 7 on a PDKU1A support DIUs, while all circuits, 1 ~ 8, on a PDKU2A support DIUs. All KSU slots, except for 11 ~ 14 in the DK96, can support DIUs.

DK 96 (Top Shelf)

SLOT NO.	01	02	03	04	05	06	07	08
PCB CODE	64	64	62	61	64	21	31	11
PCB TYPE	PDKU	PDKU	PDKU	PDKU	PDKU	PEKU	PSTU	PCOU
OPTIONS	DSS1/ATT1 DDCB 04	DSS2/ATT2 DDCB 12	PDIU-DI (1-3)		DDSS3/ ATT3 PDIU-DI (1-6)			
STA. PORT NO.s	00 ~ 07	08 - 15	16 - 23	24 - 31	32 - 39	40 - 47	48 - 55	—
CO/TIE LINE NO.s	—	—	—	—	—	—	—	01-04

DK 96 (Bottom Shelf)

SLOT NO.	00	09	10	11	12	13	14
PCB CODE	92	11	11	25	13	00	41
PCB TYPE	PCTU	PCOU	PCOU	PESU	PEMU		PIOU
OPTIONS	CRCU4						IMDU
STA. PORT NO.s	—	—	—	56-63	64-67		—
CO/TIE LINE NO.s	—	05-08	09-12	—	13-16		—

PCB CODE Reference Table

PCB	CODE	PORTS/TYPE
PCTU	91	NONE
PCTU CRCU4	92	NONE
PCTU CRCU8	93	NONE
PDKU	61	8/STA.
PDKU OCA/DIU	62	8/STA.
PDKU DDSS/OCA/DIU	64	8/STA.
PEKU	21	8/STA.
PEKU EOCU	22	8/STA.
PEKU DSS	23	8/STA.
PEKU EOCU w/DSS	24	8/STA.
PSTU	31	8/STA.
PCOU	11	4/CO
PEMU	13	4/CO 4/STA.
PESU	25	8/STA.
PESU EOCU	41	8/STA.
PIOU/PIOUS PEPU	21	NONE
NONE	00	NONE

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FIGURE 4-2
HARDWARE CONFIGURATION EXAMPLE

Strata® DK24/56/96

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Chapter Five
KSU INSTALLATION

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FIGURE LIST

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1 GENERAL

1.00 This chapter provides the procedures necessary to install the DK key service units (KSUs). Included in the chapter are mounting considerations, grounding instructions, and instructions to test the power supply. Instructions to remove and replace the power supply are also provided.

2 KSU INSTALLATION

2.00 The KSU may be either wall-mounted or tabletop mounted. The following paragraphs provide procedures for both mounting options.

2.01 To optimize airflow and ventilation:

- Ensure that the installation site provides the minimum clearances specified in Installation Site Requirements, Section **400-096-203**, Paragraph **3**.
- Do not block the ventilation holes at the rear and both sides of the KSU.

2.10 Wall Mounting

1) Install the three wall-mounting brackets (packed in the shipping carton with the KSU) on the rear of the KSU in both upper corners, and at the bottom center. Secure each bracket to the KSU with the back panel screws and the screws supplied with the brackets (Figure 5-1).

NOTE:
The KSU back panel should not be removed.

2) Mark the appropriate mounting screw locations on the wall by using Figure 5-1, or hold the KSU against the wall at the selected mounting location. Mark the positions of the holes in the flat part of each mounting bracket where they contact the wall. Mounting screws will be installed at these locations.

NOTES :
1. *The screw locations should align with studs behind the wall. If they do not, use either wall anchors or a hard board between the wall and the KSU.*
2. *If using a hard board, install screws first to the hard board, and then secure the hard board to the wall, making sure the screws align with the studs (Figure 5-2).*

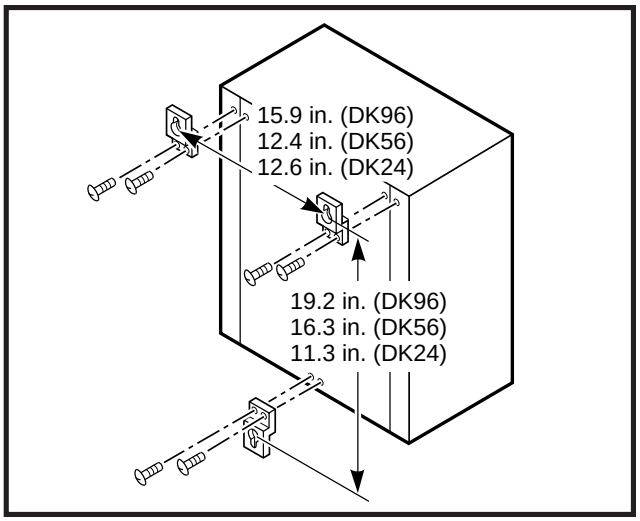

FIGURE 5-1
WALL MOUNTING BRACKET INSTALLATION

3) Install two 1.25-inch long panhead wood screws approximately half way into the wall at the upper mounting bracket locations.

4) Hang the KSU from the top two mounting screws.

5) Install a third 1.25-inch panhead wood screw through the hole in the bottom mounting bracket.

6) Tighten the three mounting screws firmly to secure the KSU to the wall.

2.20 Tabletop Mounting

2.21 Tabletop mounting requires no special installation procedures. However, it is suggested that the top wall-mounting brackets be installed to ensure adequate ventilation at all times.

NOTE:
Do not install the KSU directly on the floor.

2.30 KSU AC Power and Ground

2.31 Ensure the system AC power and earth ground complies with the requirements listed in Installation Site Requirements, Section **400-096-203**, prior to connecting the AC power plug.

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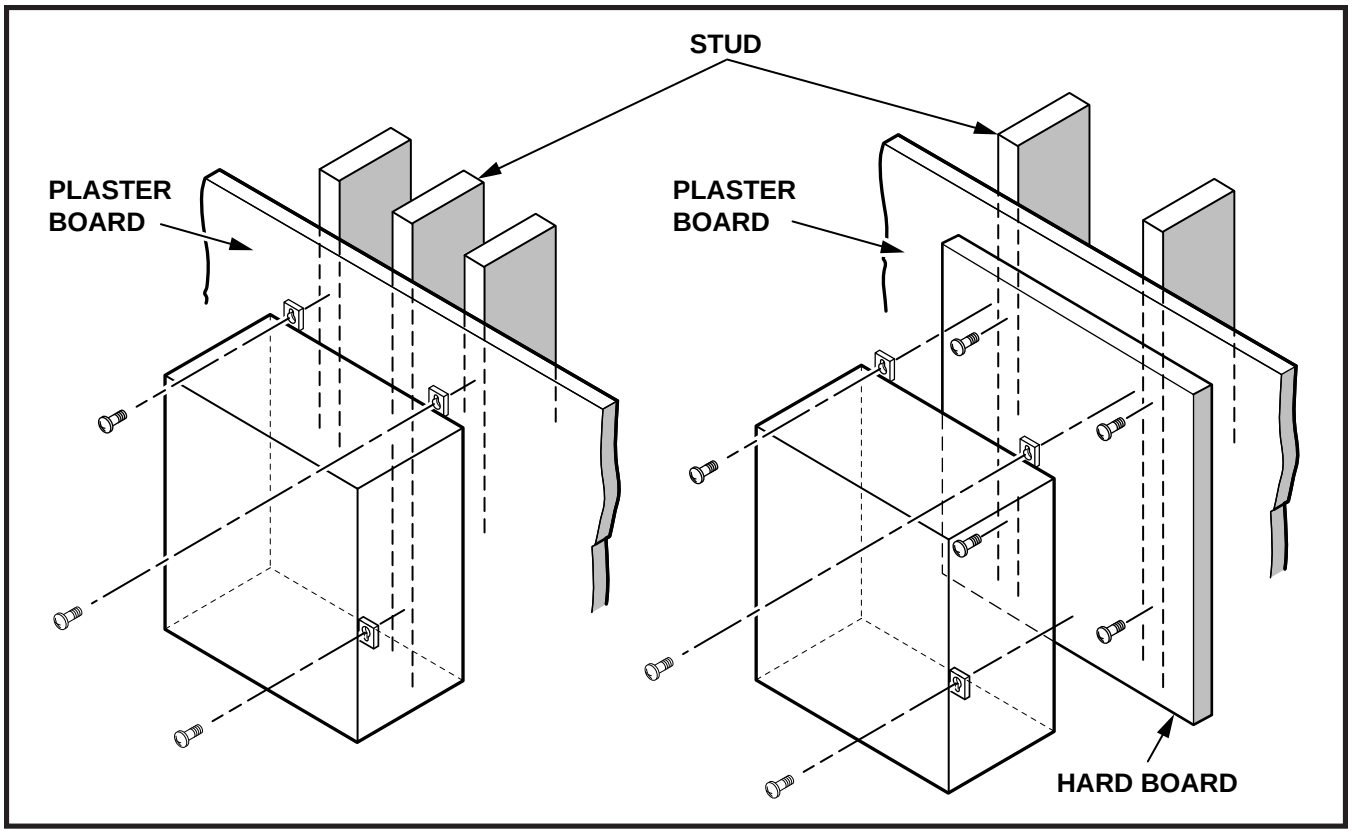

FIGURE 5-2
KSU WALL MOUNTING

NOTE:
The AC power must be dedicated to the KSU. Do not use power/ground intended for another piece of equipment.

2.32 Ensure that **SG/FG** and **LG/FG** ground straps are installed.

3 POWER SUPPLY TEST PROCEDURE

3.00 Perform the power supply test procedure with all PCBs removed from the KSU.

NOTE:
Refer to System Description, Section **200-096-202***, for illustrations and descriptions of KSU controls and indicators.*

1) Plug the AC power cable into the **AC IN** connector and to the AC wall socket.

NOTE:
The DK24 power cable is permanently connected to the power supply.

2) Lightly press all power supply circuit breakers to ensure they have not accidentally opened during shipment.

3) Set the power supply power switch to **ON.** Ensure that the power supply indicators light as follows:
   - **DK24:**
     - **POWER** indicator
     - **-24V** indicator
     - **+5V** indicator
     - **-5V** indicator
     - **-24V$_1$ ~ V$_2$** (circuit breakers)
   - **DK56:**
     - **POWER** indicator
     - **+5V** indicator
     - **-5V** indicator
     - **-24V$_1$ ~ V$_3$** (circuit breakers)
   - **DK96:**
     - **POWER** indicator
     - **-5V** indicator
     - **+5V$_1$** indicator
     - **+5V$_2$** indicator
     - **-24V$_1$ ~ V$_5$** (circuit breakers)

4) Using a multimeter (set to the appropriate range), measure the voltages at the pins of the **DC OUT** connector for DK56/DK96 or the **P1** backplane connector for DK24 as shown in Figures 5-3, 5-4, or 5-5. Ensure that the voltages fall within the ranges specified. If a measured voltage falls outside of the acceptable range, remove the DC power plug from the power supply **DC OUT** connector (DK56/96) or **P1** backplane connector (DK24) and measure again. If a measured voltage is still unacceptable, replace the power supply. (Refer to Paragraph **4**.)

DC Voltage	Range Specifications
-24V:	-26.3 ~ -27.8
-5V:	-4.5 ~ -5.5
+5V:	+4.5 ~ +5.5

3.01 To test the power supply voltages with all circuit boards installed, install the circuit boards and use the procedure in Paragraph **3.00** for the PPSU56/96. Use the following procedure to test the PPSU24.

1) Loosen the four screws holding the panel on the back of the KSU.

2) Lift the panel up and pull it off of the KSU.

3) On the lower left side of the backplane PCB (PMB-824), the test points for the various voltages are marked. Refer to Figure 5-6.

4) Using the multimeter (set to the appropriate range), measure the voltages at the designated test points.

NOTE:
The multimeter test probes must have sharp tips to penetrate solder mask on backplane PCB.

4 POWER SUPPLY REMOVAL AND REPLACEMENT

4.00 The following paragraphs provide procedures necessary to remove and replace faulty power supplies.

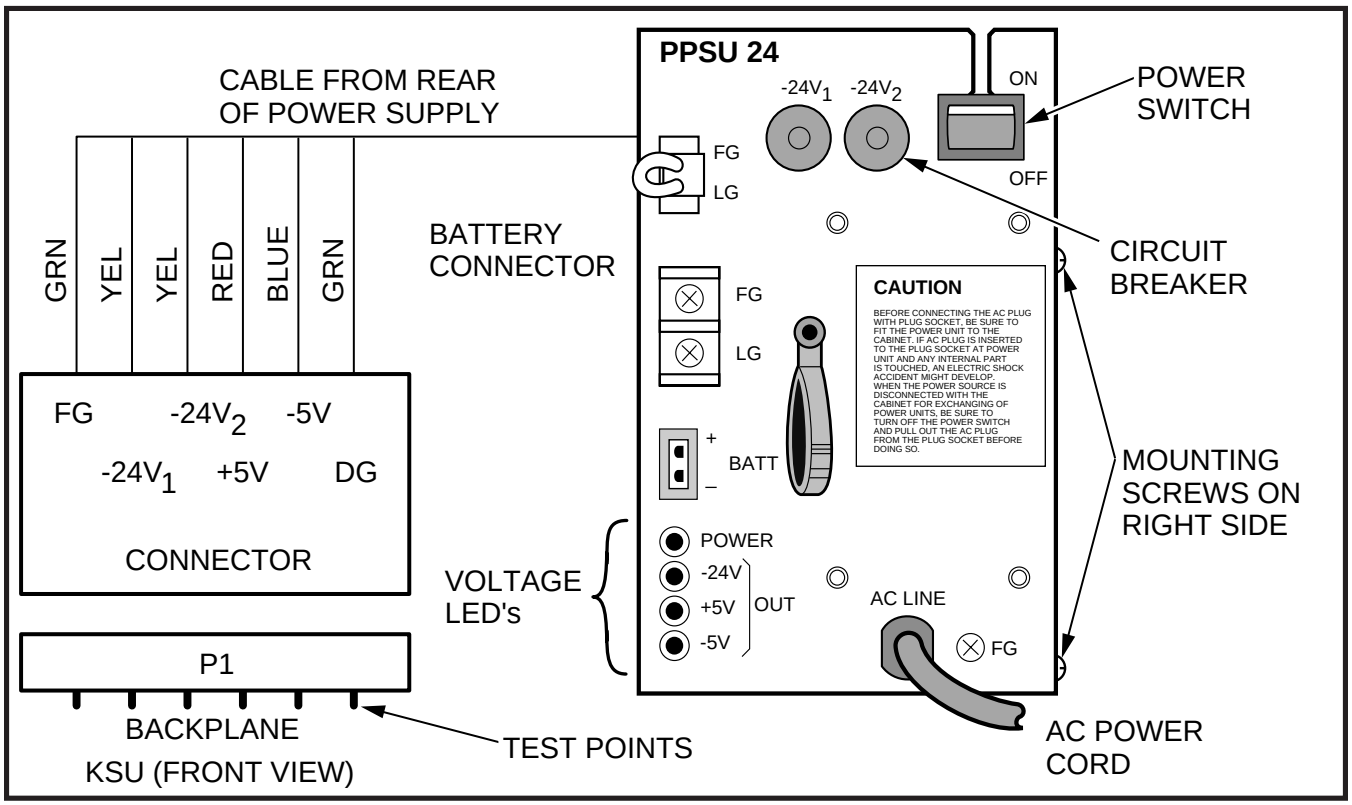

FIGURE 5-3
PPSU24 FRONT PANEL AND DC OUT TEST POINTS

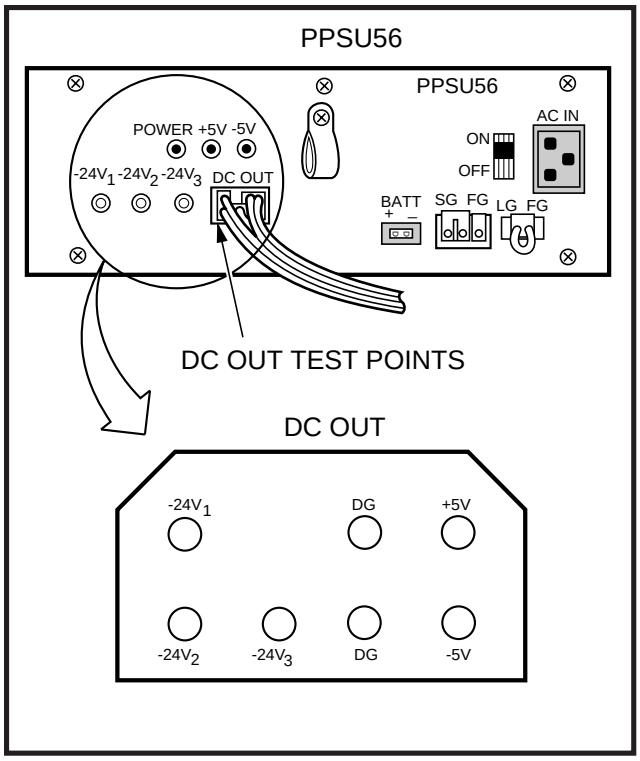

FIGURE 5-4
PPSU56 FRONT PANEL AND
DC OUT TEST POINTS

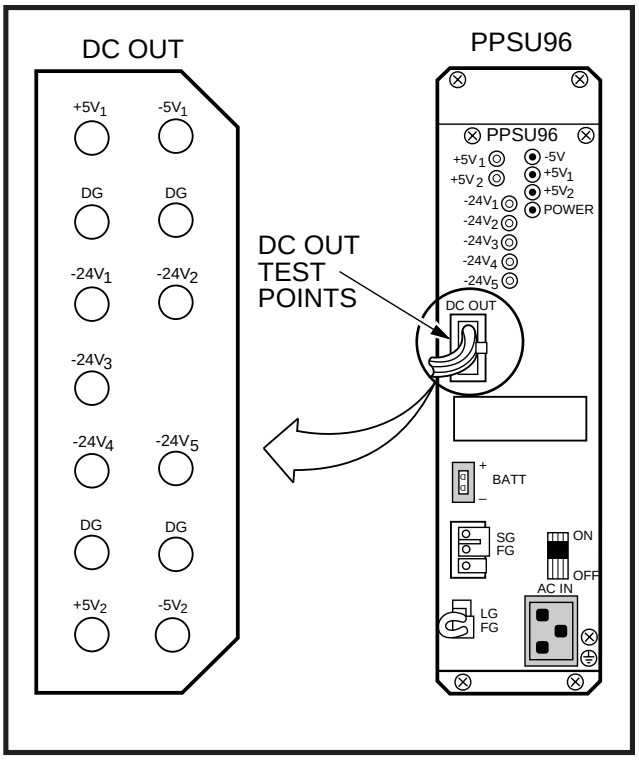

FIGURE 5-5
PPSU96 FRONT PANEL AND
DC OUT TEST POINTS

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4.10 Power Supply Removal

4.11 DK24. Refer to Figure 5-3 and remove the power supply in accordance with the following steps:

1) Remove screws (2) on right side of the KSU.

2) Slide the power supply out and gently remove it from the KSU.

3) Reach behind the power supply and disconnect the cable at the **P1** backplane connector.

4.12 DK56/96. Refer to Figures 5-4 and 5-5 and remove the power supply in accordance with the following steps:

1) Squeeze the locking tab on the **DC OUT** plug, and remove the plug from the **DC OUT** connector.

2) Remove the four combination slotted/Phillips mounting screws from the power supply front panel.

3) Slide the power supply out.

4.20 Power Supply Replacement

4.21 DK24. Refer to Figure 5-3 and replace the PPSU24 in accordance with the following steps:

1) Slide the power supply partially in to the right end of the PCB slot shelf.

2) Reach behind the power supply, and connect the cable from the rear of the power supply into connector **P1** on the KSU backplane.

3) Slide the power supply completely into the slot and secure it with screws (2) on the right side of the KSU.

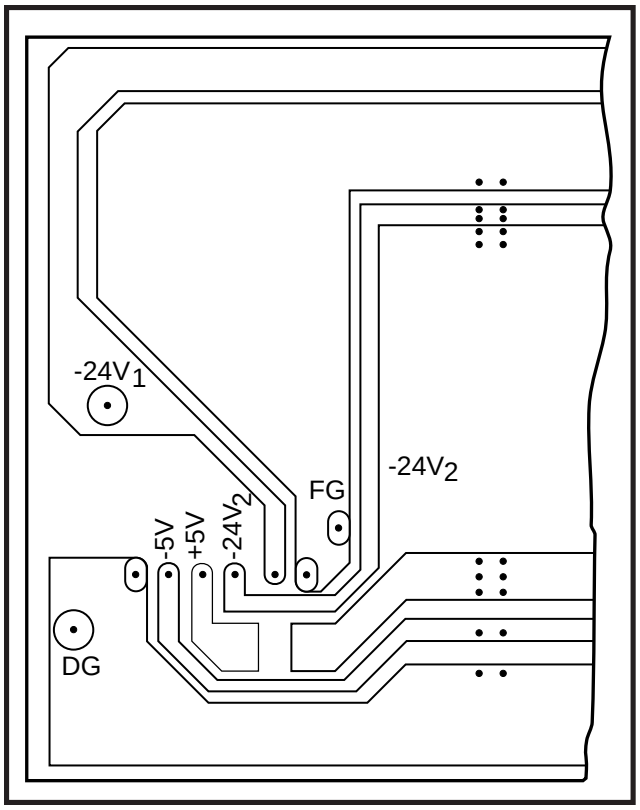

FIGURE 5-6
LOWER LEFT OF DK24 BACKPLANE PCB (PMB-824)

4.22 DK56/96. Refer to Figure 5-4 or 5-5, and replace the power supply in accordance with the following steps:

1) Slide the new power supply into the opening in the KSU.

2) Align the mounting screw holes on the power supply's front panel with the holes in the KSU's power supply mounting bracket.

3) Secure the power supply with the four combination slotted/Phillips screws.

4) Insert the **DC OUT** cable plug into the **DC OUT** connector (this is a keyed plug that can only be inserted one way). Insert the plug into the connector until its locking tab engages.

5 CIRCUIT BREAKER DISTRIBUTION

5.00 Refer to Fault Finding, Section **400-096-500**, Tables B, C, and D for circuit breaker distribution.

6 VOLTAGE TROUBLESHOOTING

6.00 Refer to Fault Finding, Section **400-096-500**, Paragraph **6**, for voltage troubleshooting.

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Chapter Six
PRINTED CIRCUIT BOARD INSTALLATION

IMPORTANT!
It is strongly advisable to install PCBs in the positions and the manner specified in Paragraphs 2.10 and 2.20.

IMPORTANT INITIAL INSTALLATION NOTES:

These minimum installation steps must be carried out for proper system operation.

1. ***Set PCTU or PCTUS jumper plug for BATTERY OPERATION; otherwise, all programmed customer data will be lost on power down.***

2. ***Place PEPU, PIOUS, or PIOU PCB in highest slot number of KSU.***

3. ***Place all other PCBs in KSU from lowest slot number to highest in the following order:***
   PCTU or PCTUS
   PEKU or PDKU/PDKU2 (starting at Slot 01)
   PSTU/PSTU2
   PESU
   PCOU/PCOU2
   PEMU

4. ***Run Program 90. Initialize Programs 00 ~ 97, turn power OFF for 5 seconds, then turn power back ON.***

5. ***Run Program 92.***

6. ***Enter the hardware configuration with Program 03, exit the programming mode, turn power OFF for 5 seconds, then turn power back ON.***

WHEN LATER ADDING KSU PCBs:

1. ***Move PEMU PCBs to a higher slot number to create empty slots for additions.***

2. ***Install new PCBs and reprogram with Program 03, turn power OFF for 5 seconds, then turn power back ON . Change PEMU station numbers or reassign stations with Program 04.***

3. ***Program new features, options, etc. created by new additions.***

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FIGURE LIST

TABLE LIST

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1 GENERAL

1.01 This chapter provides procedures for the installation of STRATA DK system printed circuit boards (PCBs). It includes installation instructions, optional configuration information, and wiring and programming considerations for each PCB.

1.02 Install PCBs only after installing the KSU, per the instructions in Section **400-096-205**.

NOTE:
Be sure the power supply has been tested, and the ground has been checked.

1.03 PCB model numbers end with the letter "A," but in this document the "A" is deleted because it is redundant. Examples: PCB model number PDKU1A is written "PDKU," PSTU2A is witten "PSTU2."

2 PCB INSTALLATION OVERVIEW

2.01 STRATA DK system KSUs are shipped with only the power supply installed. No PCBs are included. PCBs must be installed in accordance with the configuration information obtained and developed in System Configuration, Section **400-096-204**.

2.10 PCB Installation Considerations

2.11 The PCTU or PCTUS (DK24 only) PCB must be installed in the slot labelled "PCTU". PCB slots S01 ~ S06 (DK24), PCB slots S01 ~ S08 (DK56), and PCB slots S01 ~ S14 (DK96) are universal; any of the optional (station, Central Office, and option interface) PCBs may be installed in any available slot, as long as the system is programmed to recognize the chosen configuration. However, it is recommended that the PCBs be installed in the order prescribed in Paragraph **2.20**. Heeding these recommendations will reduce reprogramming if expanding the system and keep the station and CO line numbering scheme simple.

2.20 Recommended Universal PCB Slot Assignments

2.21 The following steps describe the recommended installation order and slot assignments for STRATA DK system station, line, and option PCBs. This order is the same for all systems.

1) Install all PDKU or PEKU PCBs, from left to right, starting with Slot 01. Do not skip slots.

2) Then install all PSTU PCBs, from left to right, starting with the lowest numbered empty slot. Do not skip slots.

3) Then install all PESU PCBs, from left to right, starting with the lowest numbered empty slot. Do not skip slots.

NOTE:
Normally, one PESU is installed instead of a PEKU or PSTU in configurations that require less than three standard telephone ports or five electronic telephone ports.

4) Then install all PCOU PCBs, from left to right, starting with the lowest numbered empty slot. Do not skip slots.

5) Then install all PEMU PCBs, from left to right, starting with the lowest numbered empty slot. Do not skip slots.

6) Install a PIOU, PIOUS, or PEPU in the last slot (Slot 06 in DK24, Slot 08 in DK56, or Slot 14 in DK96).

2.30 Station and Line Expansion

2.31 If station or line PCBs (PEKU, PSTU, PESU, PCOU, and/or PEMU) must be added to an existing installation, install the PCBs in the order recommended in Paragraph **2.20**, starting with the lowest numbered empty slot. For example, if it is necessary to add eight standard telephones and four CO lines, install a PSTU PCB in the lowest numbered empty slot and then a PCOU PCB in the next empty slot. Do not skip slots.

2.32 If PDKU, PEKU, PSTU, PESU, and/or PCOU PCBs are added, it is advisable to move any PEMU PCBs to the right to make room for the new PCBs.

NOTE:
For initial system programming, install a digital (PDKU) or electronic telephone station PCB (PEKU) in Slot 01, and connect a 20-

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button LCD telephone to Port 05. It is suggested that a live telephone not be connected to Port 05 to avoid accidentally entering the programming mode.

2.40 PCB Option Considerations

2.41 STRATA DK PCBs may be configured for a variety of hardware and software options. Hardware options are defined as either internal (generally related to optional PCB subassemblies) or external (related to connection of peripheral equipment such as Background Music, voice mail, etc). Hardware and software options for each PCB are identified in the individual PCB installation procedures in this chapter.

2.42 PCB Hardware Options. Some PCBs must be configured for hardware options prior to installation of the PCB in the KSU. Configuration instructions for internal hardware options are provided in the individual PCB installation procedures in this chapter. Configuration instructions for external hardware options are provided in Peripherals Installation, Section **400-096-208**.

2.43 PCB Software Options. PCBs are configured for software options through programming, after installation of the PCBs in the KSU. A programming overview for each PCB is provided in the individual PCB installation procedures in this chapter. Refer to the Programming Procedures, Section **400-096-300**, for detailed programming instructions.

2.50 PCB Installation Power Supply Considerations

2.51 Whenever removing or installing PCBs, observe the following requirements:

1) The power supply **must** be OFF whenever removing or installing the PCTU or PCTUS PCB.

2) It is recommended that the power supply be OFF, whenever possible, when removing or installing the other PCBs.

3 COMMON CONTROL UNIT (PCTU1, PCTU2, PCTU3, PCTU4, PCTUS)

3.00 General

3.01 The Common Control Unit (PCTU) PCB provides centralized control for the KSU. It incorporates a 68000-type microprocessor and contains custom time switch and conference LSI circuitry. One PCTU must be installed in each system.

3.02 There are five PCTU versions (PCTU1, PCTU2, PCTU3, PCTU4, and PCTUS). The capacity and/or function of each PCTU model is different, so it is important to distinguish between different models.

3.03 PCTU1, PCTU2, PCTU3, and PCTU4 are intended for use with DK56/96, but may also be used in DK24. The PCTUS may **only** be used in DK24. The detailed differences between the PCTU versions are described in Section **400-096-202**.

NOTE:
Any further reference to the PCTU in this section applies to PCTU1, PCTU2, PCTU3, PCTU4, and PCTUS.

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3.04 The PCTU may be equipped with an optional 4- or 8-circuit DTMF receiver (CRCU-4 or CRCU-8), to receive tone dialing. Dual-tone Multi-frequency (DTMF) signals transmit from Direct Inward System Access (DISA), CO lines, TIE lines and PSTU/PESU standard ports, and the PCTU converts these signals to digital data for the STRATA DK system central processing unit (CPU).

3.05 PCTU controls, indicators, and interface connectors are shown in Figures 6-1 and 6-2 and described in Table 6-A.

3.10 PCTU Hardware Options

3.11 The PCTU supports the following hardware options:

- Internal Options
  - DTMF Receiver Unit, four circuit (CRCU-4)
  - DTMF Receiver Unit, eight circuit (CRCU-8)

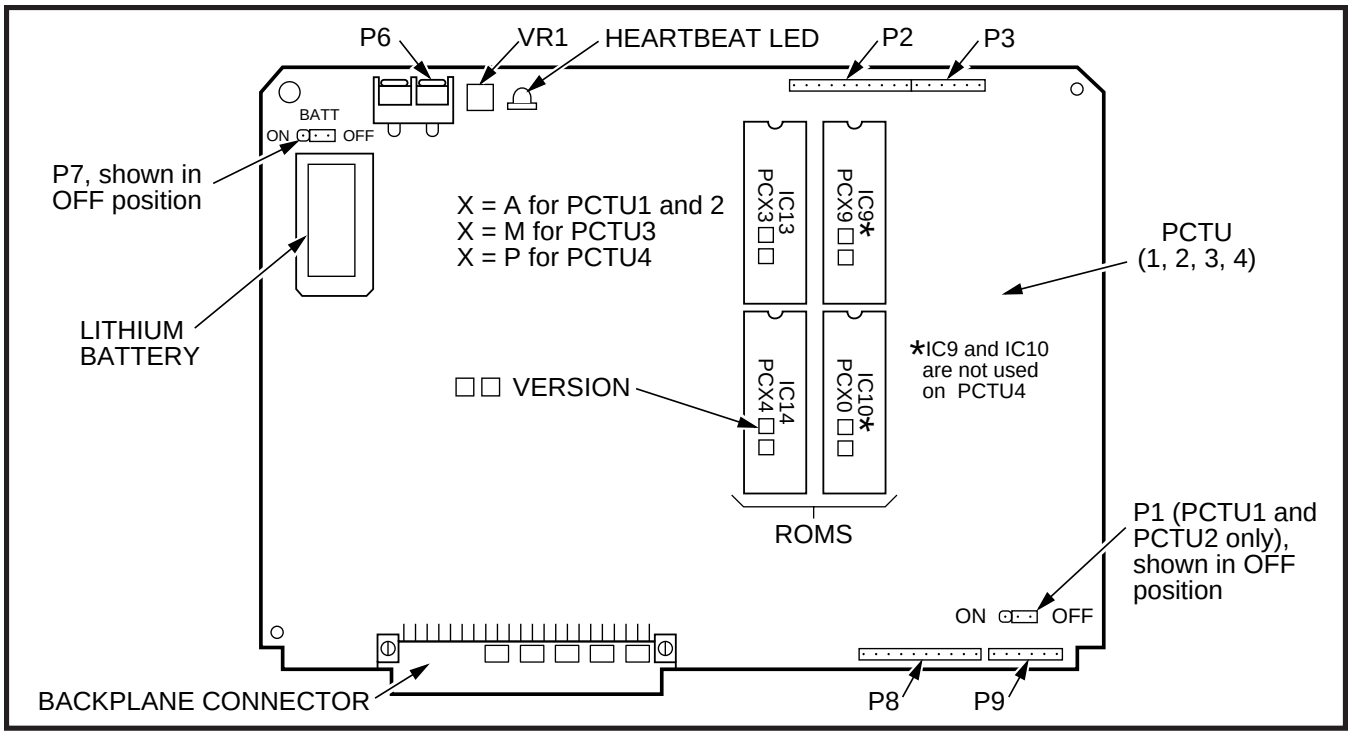

FIGURE 6-1
PCTU (1, 2, 3, 4) CONTROLS, INDICATORS, AND INTERFACE CONNECTORS

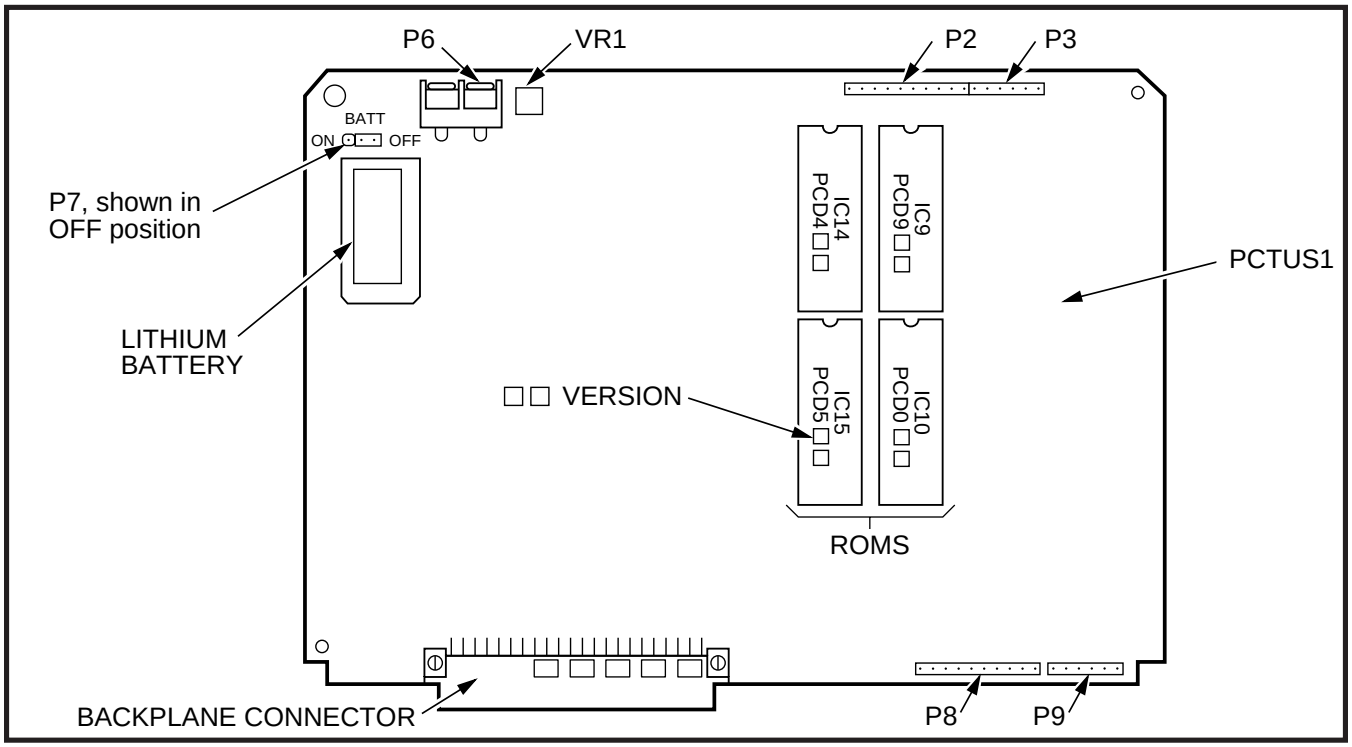

FIGURE 6-2
PCTUS CONTROLS, INDICATORS, AND INTERFACE CONNECTORS

TABLE 6-A
PCTU AND PCTUS1 CONTROLS, INDICATORS, AND INTERFACE CONNECTORS

CONTROL/INDICATOR/ CONNECTOR (Figures 6-1 & 6-2)	TYPE OF COMPONENT	DESCRIPTION
PCTU ON/OFF Jumper P1	3-terminal jumper plug	Enables PCTU (1 & 2 only) PCB for operation. Should always be in ON position.
DTMF Receiver Connector P2	10-pin connector	Interface connector for optional DTMF Receiver Unit subassembly (used in conjunction with P3, P8, and P9).
DTMF Receiver Connector P3	6-pin connector	Interface connector for optional DTMF Receiver Unit subassembly (used in conjunction with P2, P8, and P9).
MOH/BGM Music Source Connector P6	2-terminal connector	Interface connector for Music-on-Hold (MOH)/Background Music(BGM) source.
BATT Battery Strap P7	3-terminal jumper plug	Interface connector for on-board lithium battery that protects configuration data stored in system RAM.
DTMF Receiver Connector P8	10-pin connector	Interface connector for optional DTMF Receiver Unit subassembly (used in conjunction with P2, P3, and P9).
DTMF Receiver Connector P9	6-pin connector	Interface connector for optional DTMF Receiver Unit subassembly (used in conjunction with P2, P3, and P8).
MOH/BGM Music Source Volume Control VR1	Trim potentiometer	Adjusts volume for Music-on-Hold/Background Music feature.
Heartbeat Indicator	Red LED	Flashes to indicate operation (1/4-second on—1/4-second off); (PCTU1, 2, 3, or 4 only).

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- External Options
  - Music-on-Hold/Background Music (connected to **P6** and **VR1** volume level control)

NOTE:
*Refer to Peripheral Equipment Installation, Section **400-096-208**, for installation of external options.*

3.12 DTMF Receiver Unit (CRCU-4 or CRCU-8) Installation. Install the CRCU in accordance with the following steps:

CAUTION!
Do not remove the insulating shield from the back of the PCTU PCB. If the shield comes off, do not allow the back of the PCB to contact metal.

1) Remove the PCTU and CRCU from their protective packaging.

NOTE:
*PCTU connectors **P2**, **P3**, **P8**, and **P9** are positioned to allow installation of the CRCU only in the proper position.*

2) Mate CRCU connectors **J1**, **J2**, **J3**, and **J4** with PCTU connectors **P2**, **P3**, **P8**, and **P9** (Figure 6-3).

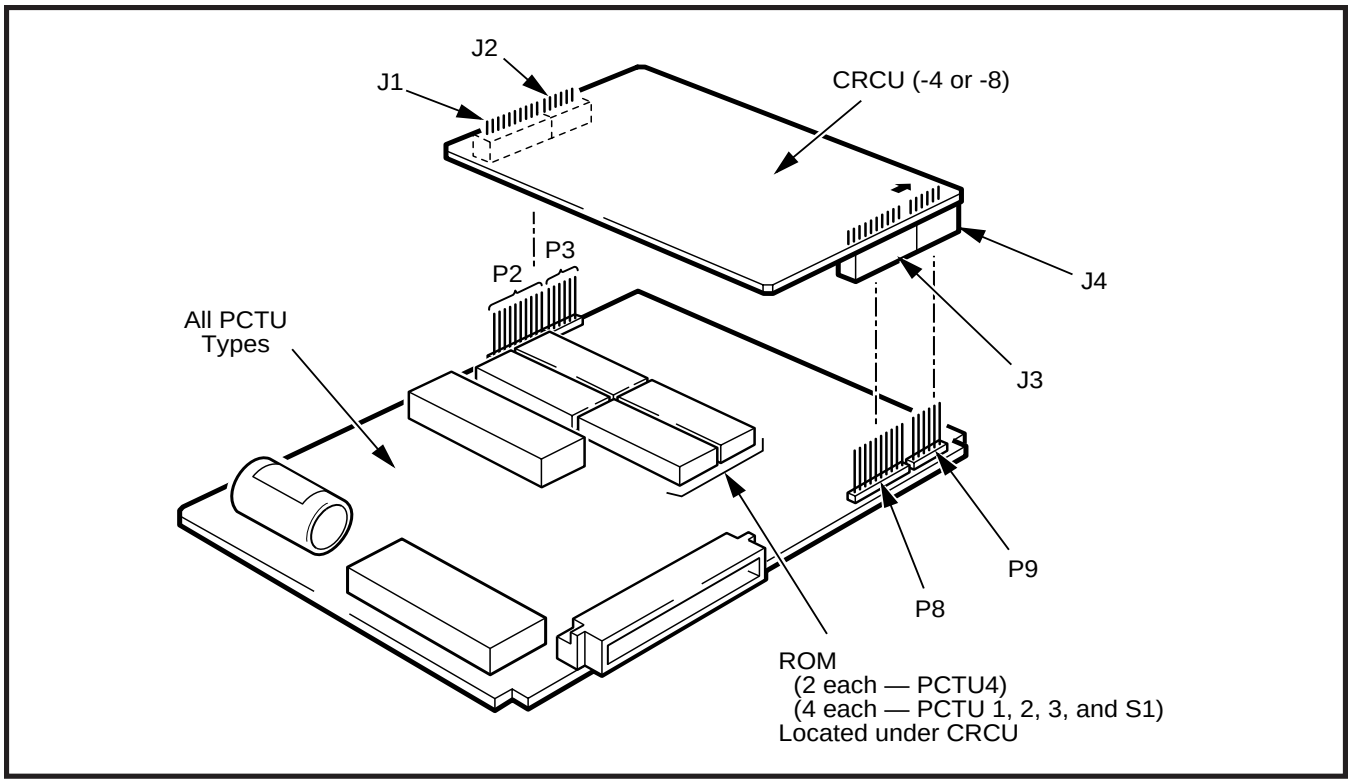

FIGURE 6-3
DTMF RECEIVER UNIT (CRCU) INSTALLATION

3) Apply firm, even pressure to CRCU to ensure proper mating of connectors.

3.20 PCTU Installation Procedures

3.21 Install the PCTU in accordance with the following steps:

CAUTION!
Do not remove plastic insulating shield from back of PCTU PCB. If the shield comes off, do not allow the back of the PCB to contact metal.

1) Remove the PCB from its protective packaging.

2) Set the PCTU **P1** switch to the **ON** position (PCTU1, 2 only, not on PCTU3, PCTU4, or PCTUS).

3) Set the PCTU **P7** battery strap (**BATT**) to the **ON** position.

NOTE:
*The PCTU is shipped from the factory with the **P7** battery strap in the **OFF** position. Ensure it is moved to the **ON** position when installing the PCTU to protect customer configuration information stored in the PCTU RAM.*

4) Ensure the PCTU has been configured for the appropriate hardware options (refer to Paragraph **3.10**).

IMPORTANT NOTE:
The power supply must be OFF when installing the PCTU PCB.

5) Insert the PCTU into Slot 00, labeled **PCTU**, and apply firm, even pressure to ensure proper mating of connectors.

NOTE:
Ensure the component side of the PCTU is facing right when installing it in the KSU.

6) After installing the PCTU, gently pull the PCB outward. If the connectors are properly mated, a slight resistance will be felt.

NOTES:

1. *Do not adjust trimmer capacitor **C4**. The capacitor is factory-calibrated.*
2. *When transporting the PCTU, keep the **P7** battery strap in the **ON** position if it is desired to save the configuration data stored in PCTU RAM (the battery will protect RAM for approximately six years); otherwise, to conserve the lithium battery, move **P7** to the **OFF** position. When packaging the PCTU, use only a non-conductive material enclosure, such as plain paper. Conductive material can cause the internal battery to discharge and erase memory in the PCB.*

3.30 PCTU Wiring

3.31 Refer to the MOH/BGM wiring diagrams in Section **400-096-208** for PCTU wiring/interconnecting details.

3.40 PCTU Programming Overview

3.41 After initially installing a new and unused PCTU, all on-board RAM memory needs to be erased by running **Programs 90** and **92.** If RAM contains configuration or feature data from previous programming that should be retained, either do not run these programs or use them selectively. See the Programming Procedures, Section **400-096-300.**

3.42 The following parameters may be specified, through programming, for the PCTU:

Program 03

- Specify Code 91 to indicate a normal PCTU.
- Specify Code 92 or 93 to indicate a PCTU with DTMF Receiver Unit (CRCU-4 or CRCU-8, respectively) option installed.

NOTE:
Codes 91, 92, and 93 apply to both the PCTU and PCTUS.

Program 12

- Select the seize time of the CRCU circuit.

4 DIGITAL TELEPHONE INTERFACE UNIT (PDKU, 1 & 2)

4.00 General

4.01 The Digital Telephone Interface Unit (PDKU), which is available with **Release 3** and higher, provides eight ports (circuits) for digital telephones and other peripherals. Depending on system configuration, DK24 can support up to four PDKUs, DK56 up to eight, and DK96 up to 12.

4.02 The PDKU can connect with Stand-alone Data Interface Units (PDIU-DSs), a digital direct station selection console (DDSS), a digital door phone/lock control unit (DDCB), in addition to digital telephones. Telephones, DDSS consoles, DDCBs, and PDIU-DSs each connect to a dedicated circuit (port) on the PDKU and require no additional hardware.

4.03 There are two versions of the PDKU: PDKU1 and PDKU2. These two versions are identical, except that the PDKU1 can only support data interface units on Circuits 1 ~ 7, while the PDKU2 can support these units on all circuits. Both versions can be used in the same system.

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4.04 There are no controls or indicators on the PDKU (Figure 6-4).

4.10 PDKU Hardware Options

4.11 PDKUs do not have to be configured for any option**.** Refer to Section **400-096-207** to connect digital telephones, DDCBs, and DDSS consoles to the PDKU. Section **400-096-207** includes instructions on how to upgrade digital telephones with the following options: an Integrated Data Interface Unit (PDIU-DI), an Off-hook Call Announce upgrade (DVSU), and a Headset/Loud Ringing Bell Interface (HHEU). Refer to Section **400-096-208** to connect the PDIU-DS to the PDKU.

4.20 PDKU Installation Procedures

4.21 Install the PDKU in accordance with the following steps:

1) Remove the PCB from its protective packaging.

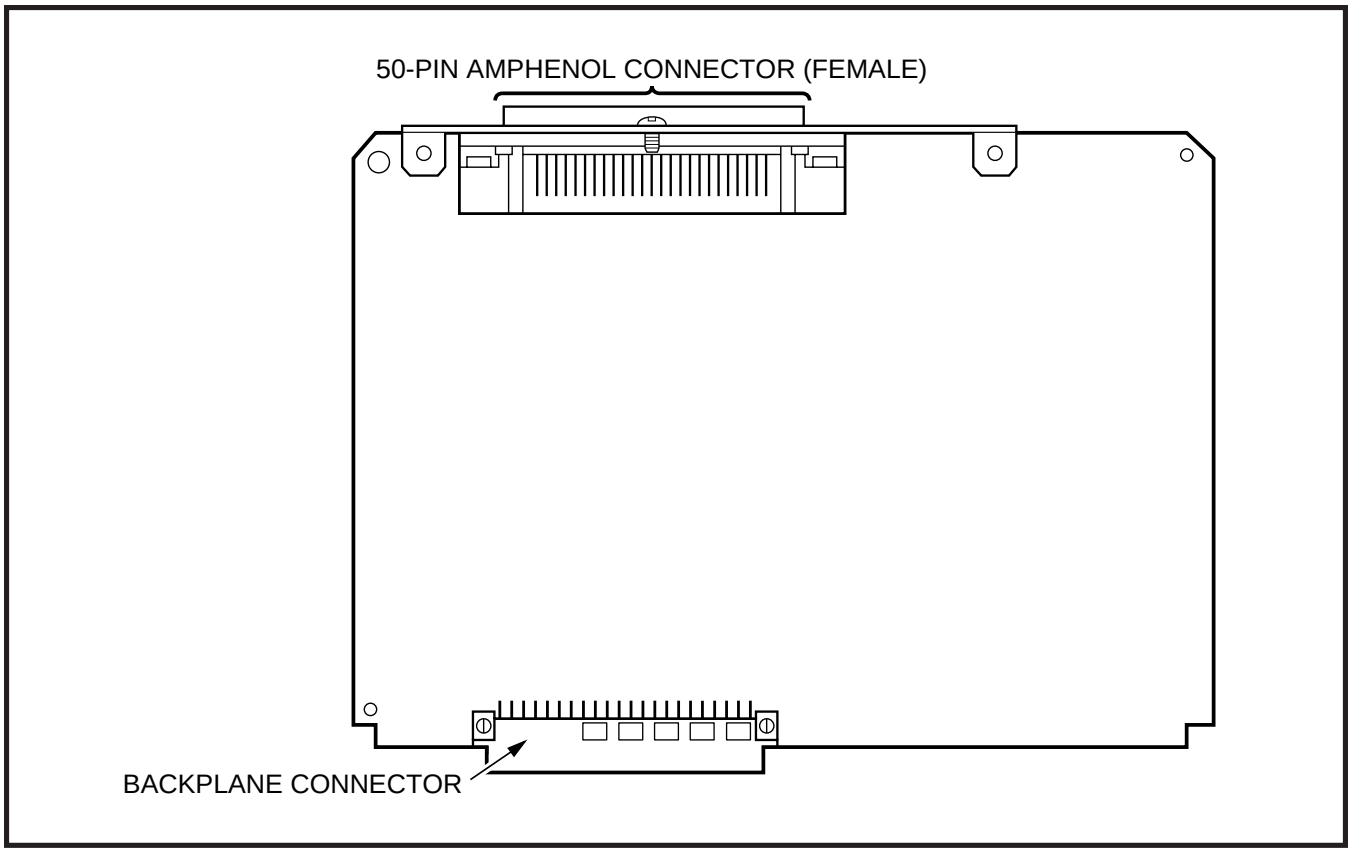

FIGURE 6-4
PDKU INTERFACE CONNECTORS

2) Insert the PDKU into the appropriate slot, and apply firm, even pressure to ensure proper mating of connectors.

NOTE:
Ensure the PDKU's component side is facing right when installing it in the KSU.

3) After installing the PDKU, gently pull the PCB outward. If the connectors are properly mated, a slight resistance will be felt.

4.30 PDKU Wiring

4.31 Refer to PDKU Wiring Diagrams, Section **400-096-209**, for wiring/interconnecting details.

4.40 PDKU Programming Overview

4.41 The following programming parameters may be specified for the PDKU:

Program 03
- Specify Code 61 to indicate a station line PDKU
- Specify Code 62 to indicate a PDKU supporting Off-hook Call Announce (OCA) and/or data interface units (DIUs).
- Specify Code 64 to indicate a PDKU supporting a DDSS console, OCA, and/or DIUs.

Programs 20, 21, and 22
- Use to configure DIUs.

Programs 28 and 29
- Use for DDSS assignments.

Program 30
- Use to Adjust initial off-hook volume level for digital telephone handsets.

Programs 77-1, 77-2, 79
- Used for DDCB and door phone ringing assignments. (DDCBs are only available with **Release 4** software.)

Program 92-5
- Initializes initial ringing, speaker, and muted ring volume levels of digital telephones.

5 ELECTRONIC TELEPHONE INTERFACE UNIT (PEKU)

5.00 General

5.01 The Electronic Telephone Interface Unit (PEKU) provides eight ports for electronic telephones. Depending on system configuration, DK24 can support up to four PEKUs with PCTU (1, 2, 3, or 4) and three PEKUs with PCTUS; DK56 can support up to eight PEKU PCBs, and DK96 up to twelve PEKU PCBs.

5.02 The number of electronic telephones that can be connected to PEKU PCBs in a system depends on the series of telephones used. This is due to power capacity. It is recommended that the current 6500-series be used, because this series consumes the least amount of power. The maximum number of 6500-series Electronic Telephones allowed in DK24 is 32, in DK56 is 64, and in DK96 is 96. If using an electronic telephone series other than, or mixed with, the 6500-series, see Section **400-096-204,** Worksheet 7.

5.03 The PEKU can be configured for Off-hook Call Announce (to receive OCA calls) by installing an EOCU. It can also be configured to support an HDSS console, a Door Phone/Lock Control Unit (HDCB), an external amplifier, and an external background music (BGM) source. HDSS consoles, external amplifiers, HDCBs, and the BGM source, are wired directly to the PEKU and require no additional hardware, but do require specific ports/circuits.

5.04 PEKU controls and interface connectors are shown in Figure 6-5 and described in Table 6-B.

5.10 PEKU Hardware Options

5.11 The PEKU supports the following hardware options:

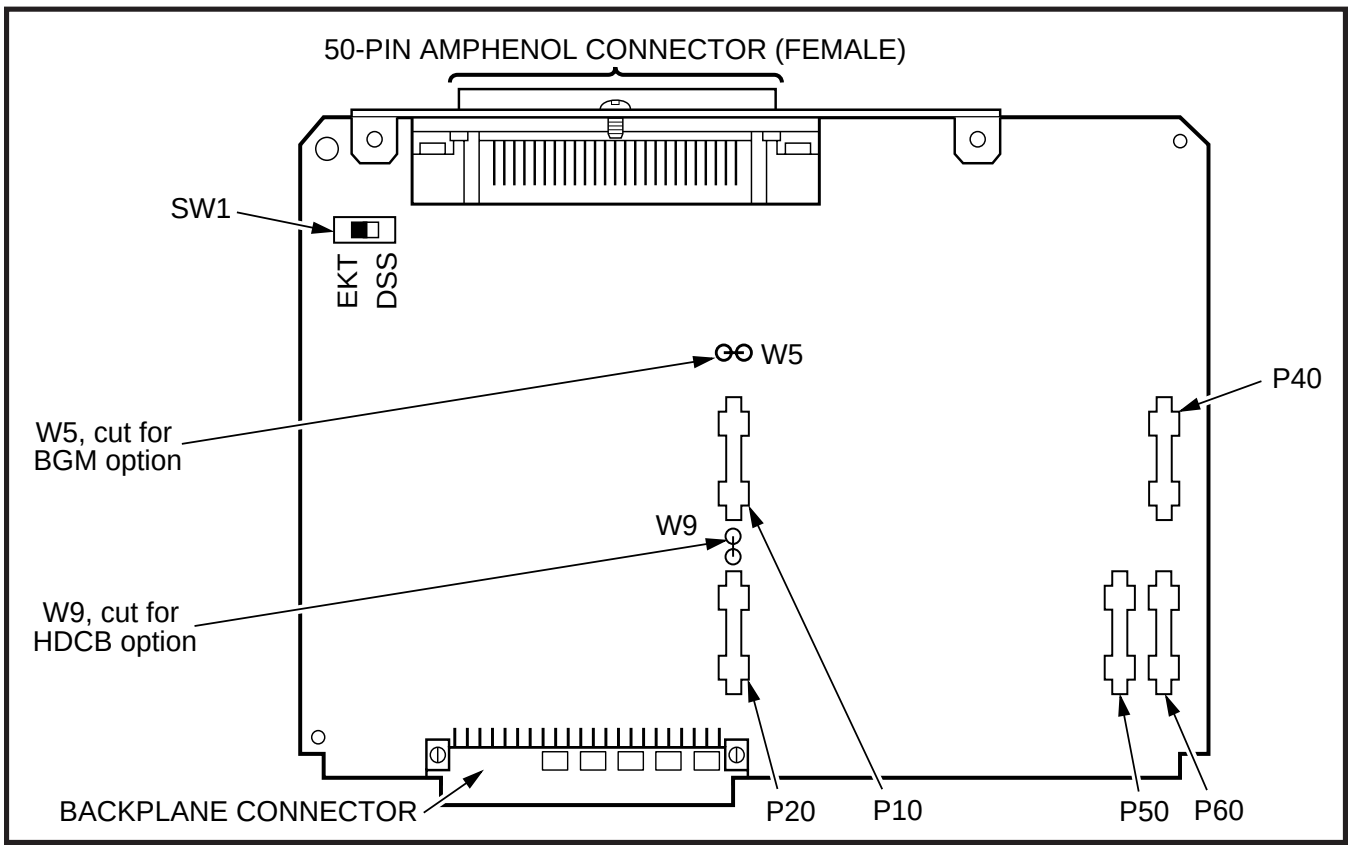

FIGURE 6-5
PEKU CONTROLS AND INTERFACE CONNECTORS

TABLE 6-B
PEKU CONTROLS AND INTERFACE CONNECTORS

CONTROL/INDICATOR/ CONNECTOR (Figure 6-4)	TYPE OF COMPONENT	DESCRIPTION
Off-hook Call Announce P10	10-pin connector	Interface connector for optional Off-hook Call Announce subassembly connector (used in conjunction with P20, P40, P50, and P60).
Off-hook Call Announce P20	10-pin connector	Interface connector for optional Off-hook Call Announce subassembly connector (used in conjunction with P10, P40, P50, and P60).
Off-hook Call Announce P40	10-pin connector	Interface connector for optional Off-hook Call Announce subassembly connector (used in conjunction with P10, P20, P50, and P60).
Off-hook Call Announce P50	10-pin connector	Interface connector for optional Off-hook Call Announce subassembly connector (used in conjunction with P10, P20, P40, and P60).
Off-hook Call Announce P60	10-pin connector	Interface connector for optional Off-hook Call Announce subassembly connector (used in conjunction with P10, P20, P40, and P50).
DSS/EKT HDSS Console/ Electronic Telephone SW1 Switch	2-position slide switch	Configures PEKU for operation with an HDSS console or electronic telephones.
Door Phone W9 Jumper Wire	White jumper wire	When cut, configures PEKU for installation of an optional HDCB.
BGM source connection W5 Jumper Wire	White jumper wire	When cut, configures PEKU for BGM source connection.

Internal Options
- Off-hook Call Announce Unit (EOCU)

External Options
- HDSS Console
- Door Phone/Lock Control Unit (HDCB)
- BGM Source Connection

NOTE:
*Refer to Sections **400-096-207** and **400-096-208** for installation of telephones (including the following upgrades: HVSU2 or HVSU/ HVSI for Off-hook Call Announce and HHEU for headset and/or Loud Ringing Bell interface) and external options, respectively.*

5.12 Off-hook Call Announce (EOCU) Installation. Install the Off-hook Call Announce Unit (EOCU) in accordance with the following steps:

1) Remove the PCB from its protective packaging.

NOTE:
*PEKU connectors **P10**, **P20**, **P40**, **P50,** and **P60** are positioned to allow installation of the EOCU only in the proper position (Figure 6-5).*

2) Mate EOCU connectors **J10**, **J20**, **J40, J50**, and **J60** (Figure 6-6) with PEKU connectors

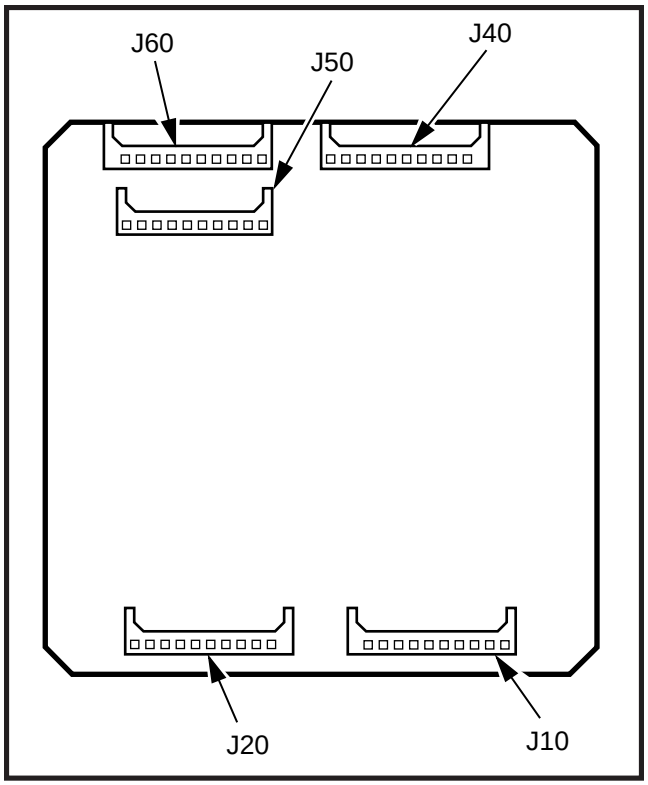

FIGURE 6-6
OFF-HOOK CALL ANNOUNCE UNIT (EOCU) INSTALLATION

P10, **P20**, **P40**, **P50**, and **P60**.

3) Apply firm, even pressure to EOCU to ensure proper mating of connectors.

4) Use a 3-pair cable for making connections between the PEKU and the Off-hook Call Announce (OCA) electronic telephone. Refer to Wiring Diagrams, Section **400-096-209**, for wiring/interconnecting details.

5) Refer to Telephone Installation, Section **400-096-207**, for procedures to upgrade electronic telephones for OCA.

5.13 HDSS Console Configuration. Configure the PEKU to support an HDSS console in accordance with the following steps:

1) Remove the PCB from its protective packaging.

2) Set the **SW1 DSS/EKT** switch to **DSS.**

3) Refer to Telephone Installation, Section **400-096-207**, for installation procedures for the HDSS console. Each HDSS console requires dedicated use of Circuits 7 and 8 of a particular PEKU PCB.

5.14 Door Phone/Lock Unit (HDCB) Configuration. Configure the PEKU to support a Door Phone and/or Door Lock in accordance with the following steps:

1) Remove the PCB from its protective packaging.

2) Cut the **W9** Door Phone jumper wire on the PEKU PCB.

3) Refer to Telephone Installation, Section **400-096-207**, for installation procedures for the HDCB and associated door phones (MDFBs).

4) Each HDCB requires dedicated use of Circuit 5 of a particular PEKU PCB.

5.15 Background Music Configuration. Configure the PEKU to support a separate Background Music source in accordance with the following steps:

1) Remove the PCB from its protective packaging.

2) Cut the **W5** (BGM) jumper wire on the PEKU PCB.

3) Refer to Peripherals Installation, Section **400-096-208,** for installation procedures for BGM connection.

NOTES:
The PEKU must be installed in slot 01 to allow a BGM connection with PCTU1, PCTU2, and PCTUS, but it can be installed in any slot with PCTU3 and PCTU4.

4) In **Program 10-2**, set **LED 09 ON** to enable the PEKU (port 02) BGM source to be sent to

digital and electronic telephone speakers and/or PIOU, PIOUS, PEPU PCBs. For **Release 3 and 4** use **Program 19** to identify BGM slot number.

5.16 External Amplifier Configuration. The PEKU does not have to be configured to support an external amplifier, which is available with PCTU3 and PCTU4. As many as four amplifiers can be installed, and each requires dedicated use of two ports: 09/10, 17/18, 25/26, or 33/34**.** Refer to Peripherals Installation, Section **400-096-208**, for installation procedures.

5.20 PEKU Installation Procedures

5.21 Install the PEKU in accordance with the following steps:

1) Remove the PCB from its protective packaging.

2) Ensure the PEKU has been configured for the appropriate hardware options (refer to Paragraph **5.10**).

NOTE:
Ensure the PEKU's component side is facing right when installing it in the KSU.

3) Insert the PEKU into the appropriate slot (refer to Paragraph **2.12**), and apply firm, even pressure to ensure proper mating of connectors.

4) After installing the PEKU, gently pull the PCB outward. If the connectors are properly mated, a slight resistance will be felt.

5.30 PEKU Wiring

5.31 Refer to PEKU Section **400-096-209**, for PEKU wiring/interconnecting details.

5.40 PEKU Programming Overview

5.41 The following programming parameters may be specified for the PEKU:

Program 03

- Specify Code 21 to indicate a station line PEKU.
- Specify Code 22 to indicate a PEKU configured for OCA.
- Specify Code 23 to indicate a PEKU configured for an HDSS console.
- Specify Code 24 to indicate a PEKU configured for OCA and an HDSS console.
- Door phones, the BGM source connection, and external amplifiers do not require a special code.

Programs 10-2 and 19

- Used for BGM connection.

Programs 10-3

- Used to Assign amplifiers to ports.

Programs 28 and 29

- Used for HDSS console assignments.

Programs 77-1, 77-2, 79

- Used for HDCB and door phone ringing assignments.

6 STANDARD TELEPHONE INTERFACE UNIT (PSTU, 1 & 2)

6.00 General

6.01 The Standard Telephone Interface Unit (PSTU) provides an interface between standard telephones or two-wire (one-pair) devices and the system. Each PSTU PCB adds eight standard telephone lines to the system. There is no limit, other than the station size constraints of the PCTU or PCTUS PCB, to the number of PSTU PCBs that can be installed in the system.

NOTES:
1. *For the system to recognize the Dual-tone Multi-frequency (DTMF) tones generated by a standard telephone (or any other device connected to a PSTU port), a DTMF Receiver Unit (CRCU-4 or CRCU-8) must be installed on the Common Control Unit (PCTU or PCTUS). Refer to Paragraph **3**.*
2. *The PSTU does not support Door Phone/Lock Control Units (DDCB or HDCB).*

6.02 PSTU controls are shown in Figure 6-7 and described in Table 6-C.

6.10 PSTU (1 and 2) Hardware Options

6.11 There are two PSTU versions (1 and 2) that

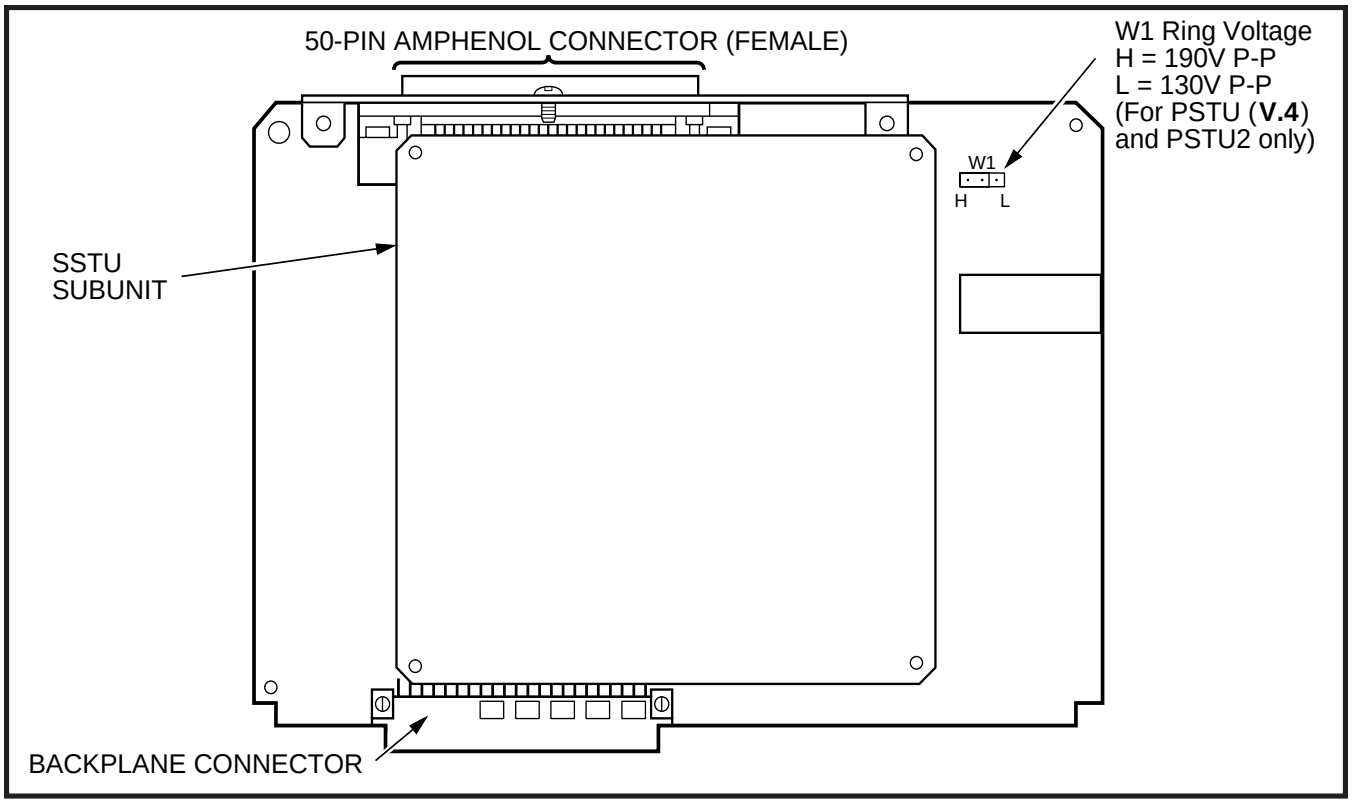

FIGURE 6-7
PSTU AND SUBUNIT (SSTU)

H

are identical except for the ring generator. The ring generator on the original version (**V.3**) of PSTU1 is fixed at a 190V P-P level, while the ring generator on PSTU1 (**V.4**) and PSTU2 can be set for 130V P-P or 190V P-P. The **W1** jumper plug is used to set the voltage level. Most standard telephones and two-wire devices require the 190V P-P level; however, some devices may experience ring-trip with 190V P-P and should be set for 130V P-P level.

NOTE:

*PSTU1 (**V.4**) became available in November 1989. PSTU1(**V.3**) was discontinued.*

6.12 Set the PSTU1 (**V.4**) or PSTU2 ring generator level as required:

- **W1** set to H (190V P-P).
- **W1** set to L (130V P-P).
- Two ringers maximum per port (H or L).

6.20 PSTU Installation Procedures

TABLE 6-C
PSTU CONTROLS

CONTROL (Figure 6-6)	TYPE OF COMPONENT	DESCRIPTION
Ring Voltage W1 Jumper Plug (PSTU1 (**V.4**) and PSTU2 only)	3-terminal jumper	Sets ring generator voltage level for all circuits (V.4 of PSTU1 and PSTU2 only). H = 190V P-P L = 130V P-P

6.21 Install the PSTU in accordance with the following steps:

1) Remove the PCB from its protective packaging. The protective shield on the back of the PSTU is designed to protect the installer from potentially hazardous ring voltage. Do not remove this shield.

2) Ensure that the PSTU subunit (SSTU) is securely attached to the PSTU (Figure 6-7).

NOTE:
***W1**, the ring generator level option, should be set in the H position (factory) for initial installation.*

3) Insert the PSTU into the appropriate slot, and apply firm, even pressure to ensure proper mating of connectors.

4) After installing the PSTU, gently pull the PCB outward. If the connectors are properly mated, a slight resistance will be felt.

6.30 PSTU Wiring

6.31 Refer to Section **400-096-209** for PSTU wiring/interconnecting details.

6.32 The PSTU is registered for use with 0L13A type lines for off-premises stations.

6.33 To wire a separate Background Music source to the PSTU circuit, refer to Section **400-096-208**.

6.40 PSTU Programming Overview

6.41 The following programming parameters may be specified for the PSTU:

Program 03
- Specify Code 31 for all slots that have PSTUs installed.

Program 10-2
- Used to set standard telephone ringing option.

Programs 10-2 and 19
- Used for BGM connection (PCTU4 only).

Program 31
- Used to configure all PSTU ports connected to voice mail or auto attendant devices (see Voice Mail Installation, Section **400-096-208**, for more details).

7 STANDARD/ELECTRONIC TELEPHONE INTERFACE UNIT (PESU)

7.00 General

7.01 The Standard/Electronic Telephone Interface Unit (PESU), available with **Release 2** and higher, provides two standard interface circuits (1 and 2) identical to PSTU circuits for connection between standard telephones, or two-wire devices, and the system. It also provides four electronic telephone interface circuits (5 ~ 8) identical to PEKU circuits for connecting electronic telephones and other peripherals. The PESU provides a ring generator that can be set for either 130V P-P or 190V P-P for the two standard interface circuits.

- The PESU does not support an HDSS console connection or external amplifiers.
- The PESU provides connectors to mount the EOCU for Off-hook Call Announce (OCA) to electronic telephones.

NOTE:
A CRCU (-4 or -8) must be installed on the PCTU or PCTUS for the system to recognize Dual-tone Multi-frequency (DTMF) tones sent from standard telephones or other two-wire devices.

7.02 The maximum number of PESUs allowed per system is as follows:

System	PESUs	Std	Electronic Telephone	PCTU
DK24	3	6	12	(S)
DK24	5	10	20 (1, 2, 3, or 4)	
DK56	8	16	32 (1, 2, 3, or 4)	
DK96	12	24	48 (1, 2, 3, or 4)	

7.03 PESU controls and interface connectors are shown in Figure 6-8 and described in Table 6-D.

7.10 PESU Hardware Options

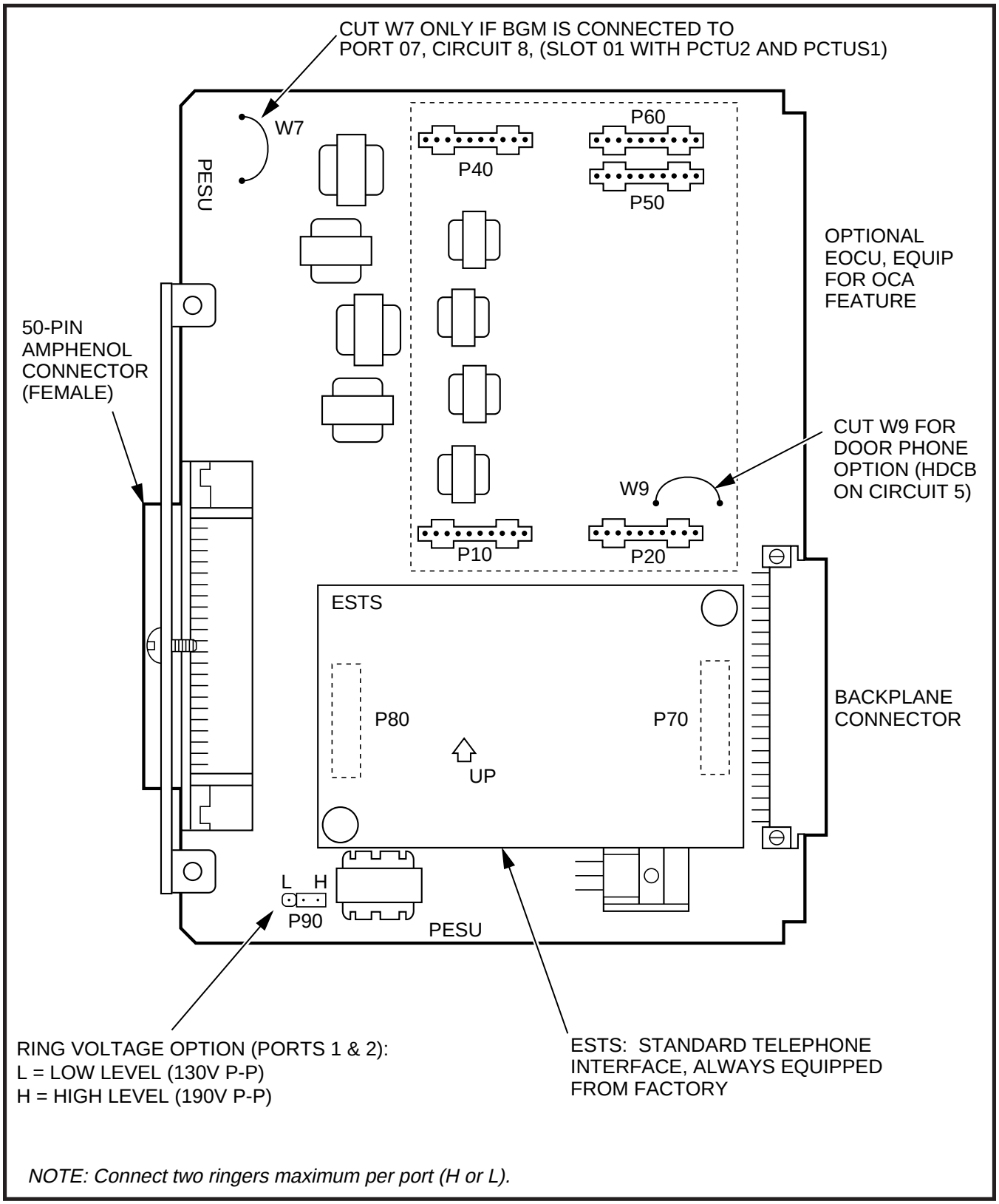

FIGURE 6-8
PESU PCB OPTION LOCATION AND IDENTIFICATION

TABLE 6-D
PESU CONTROLS AND INTERFACE CONNECTORS

CONTROL/INDICATOR/ CONNECTOR (Figure 6-7)	TYPE OF COMPONENT	DESCRIPTION
Off-hook Call Announce P10	10-pin connector	Interface connector for optional Off-hook Call Announce subassembly connector (used in conjunction with P20, P40, P50, and P60).
Off-hook Call Announce P20	10-pin connector	Interface connector for optional Off-hook Call Announce subassembly connector (used in conjunction with P10, P40, P50, and P60).
Off-hook Call Announce P40	10-pin connector	Interface connector for optional Off-hook Call Announce subassembly connector (used in conjunction with P10, P20, P50, and P60).
Off-hook Call Announce P50	10-pin connector	Interface connector for optional Off-hook Call Announce subassembly connector (used in conjunction with P10, P20, P40, and P60).
Off-hook Call Announce P60	10-pin connector	Interface connector for optional Off-hook Call Announce subassembly connector (used in conjunction with P10, P20, P40, and P50).
Ring Voltage Jumper Plug P90	3-terminal jumper	Sets ring generator voltage level for circuits 1 and 2. H = 190V P-P (factory setting) L = 130V P-P
Door Phone W9 Jumper Wire	White jumper wire	When cut, configures PESU, circuit 5 for installation of an optional HDCB.
BGM W7 Jumper Pack	White jumper wire	When cut, configures PESU, port 07, circuit 8, for BGM source connection (slot 01 only with PCTU2 and PCTUS1).

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7.11 The PESU supports the following hardware options:

Internal option:

- Off-hook Call Announce (EOCU)

External option:

- Door Phone/Lock Control Unit (HDCB)
- BGM Source Connection

NOTE:
*Refer to Section **400-096-207** to connnect electronic telephones (including the following upgrades: HVSU2 or HVSU/HVSI for Off-hook Call Announce and HHEU for headset and/or Loud Ringing Bell interface) and HDCBs to the PESU. See Section **400-096-208** to connect standard telephones and other peripherals.*

7.12 Off-hook Call Announce (EOCU) Installation. Install the EOCU in accordance with the following steps:

1) Remove the PCB from its protective packaging.

NOTE:
*PESU connectors **P10**, **P20**, **P40**, **P50**, and **P60** are positioned to allow installation of the EOCU only in the proper position (Figure 6-8).*

2) Mate the EOCU connectors **J10**, **J20**, **J40**, **J50**, and **J60** (Figure 6-6) with the PESU connectors **P10**, **P20**, **P40**, **P50**, and **P60**.

3) Apply firm, even pressure to the EOCU to ensure proper mating of connectors.

4) Use 3-pair cable for connecting the PESU and the OCA electronic telephone (refer to Wiring Diagrams, Section **400-096-209**, for wiring/interconnecting details).

5) Refer to Telephone Installation, Section **400-096-207**, for procedures to add required OCA upgrade (HVSU2 or HVSU/HVSI) to electronic telephones.

7.13 Door Phone/Lock Control Unit (HDCB) Configuration. Configure the PESU to support an HDCB in accordance with the following steps:

1) Remove the PCB from its protective packaging.

2) Cut the **W9** Door Phone jumper wire on the PESU PCB.

3) Refer to Telephone Installation, Section **400-096-207**, for installation procedures for the HDCB and associated door phones (MDFBs).

4) Each HDCB requires dedicated use of Circuit 5 of a particular PESU PCB.

7.14 Background Music Configuration. Configure the PESU to support a separate background music source in accordance with the following steps:

1) Remove the PEKU PCB from its protective packaging.

2) Cut the **W7** (BGM) jumper wire on the PCB.

3) Refer to Peripherals Installation, Section **400-096-208,** for installation procedures for BGM connection.

NOTE:
With PCTU2 or PCTUS, the PESU must be installed in Slot 01 to support BGM. With PCTU3 and PCTU4, it can be in any slot.

7.20 PESU Installation Procedures

7.21 Install the PESU in accordance with the following steps:

1) Remove the PCB from its protective packaging. The protective shield on the back of the PESU is designed to protect the installer from potentially hazardous ring voltage. Do not remove this shield.

2) Ensure that the PESU subunit (ESTS) is securely attached to the PESU (refer to Figure 6-8).

3) Ensure the PESU has been configured for the appropriate hardware options (refer to Paragraph **7.10**).

4) Ensure that the ring voltage option, **P90**, is set to the "H" position for initial installation. The "L" position is used if devices connected to the PESU experience ring-trip.

5) Insert the PESU into the appropriate slot, and apply firm, even pressure to ensure proper mating of connectors.

6) After installing the PESU, gently pull the PCB outward. If the connectors are properly mated, a slight resistance will be felt.

7.30 PESU Wiring

7.31 Refer to Section **400-096-209,** for PESU wiring/interconnecting details.

7.40 PESU Programming Overview

7.41 The following programming parameters may be specified for the PESU:

Program 03

- Specify Code 25 for all slots that have PESUs without an EOCU.

- Specify Code 26 for all slots that have PESUs equipped with an EOCU.

NOTE:
A special code is not required to connect an HDCB, BGM source, or other two-wire devices to a PESU.

Program 31
- Used to configure all PSTU ports connected to voice mail or auto attendant devices (see Voice Mail Installation, Section **400-096-208**, for more details).

Program 10-2
- Used to set standard telephone ringing option.

Programs 10-2 and 19
- Used for BGM connection.

Programs 10-3
- Assigns amplifiers to ports.

Programs 77-1, 77-2 and 79
- Used for HDCB and door phone ringing assignments.

8 CO LINE UNIT (PCOU, 1 & 2)

8.00 General

8.01 Each CO Line Unit (PCOU) PCB adds four CO lines to the system. The PCOU provides Ring Detection, Dial Outpulsing, and Hold, as well as Automatic Busy Redial circuitry. Each CO line can be programmed for Dual-tone Multi-frequency (DTMF) or dial pulse. Depending on system configuration, DK24 can support up to four PCOUs, DK56 up to five, and DK96 up to nine.

NOTE:
There are two PCOU versions (1 and 2). They are identical in fit/form/function and are interchangeable in all DK system models.

8.02 PCOU controls, indicators, and interface connectors are shown in Figure 6-9 and described in Table 6-E.

8.10 PCOU Hardware Options

8.11 There are no hardware options supported by the PCOU.

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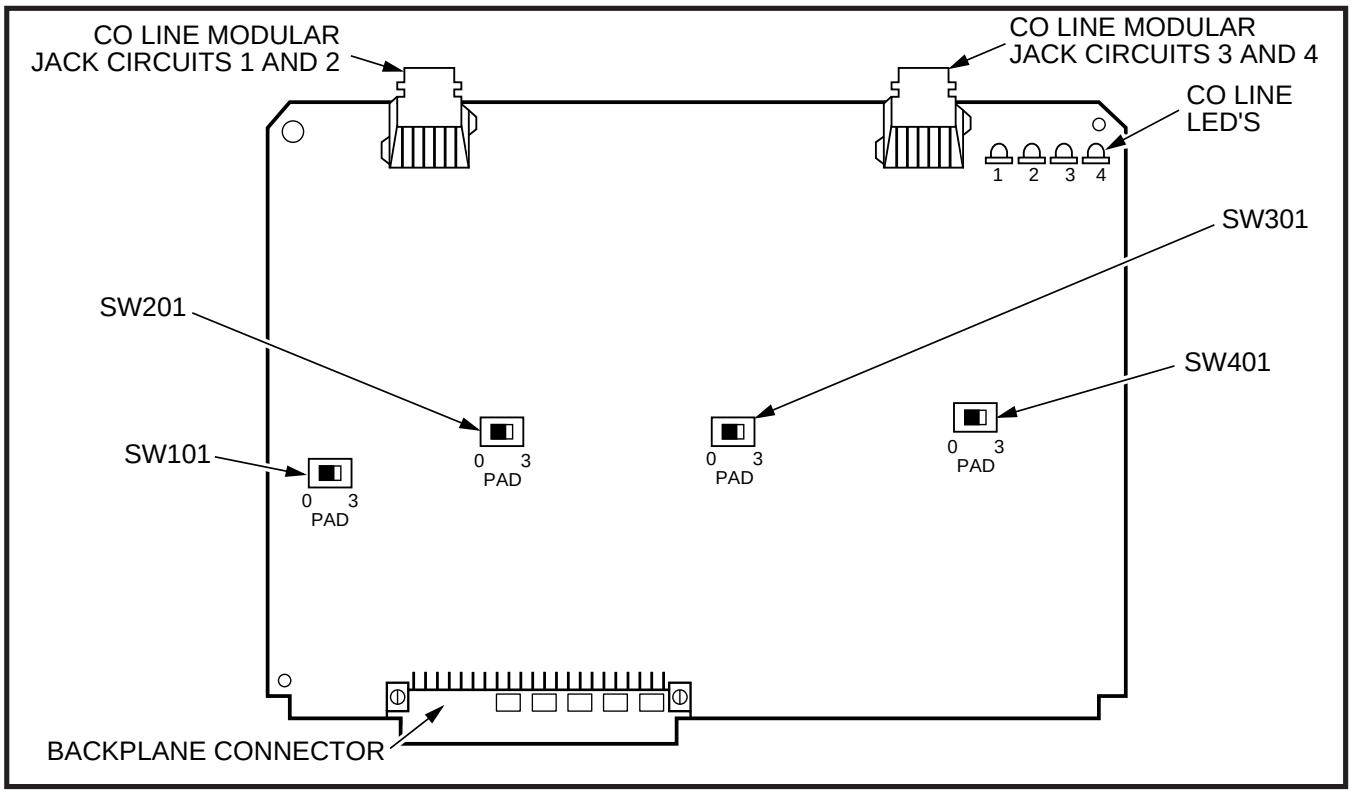

FIGURE 6-9
PCOU CONTROLS, INDICATORS, AND INTERFACE CONNECTORS

TABLE 6-E
PCOU CONTROLS, INDICATORS, AND INTERFACE CONNECTORS

CONTROL/INDICATOR/ CONNECTOR (Figure 6-8)	TYPE OF COMPONENT	DESCRIPTION
CO Line Circuit 1 Indicator CD112	Red LED	Lights to indicate CO line circuit 1 is in operation (NOTE: CO line indicator will not light unless PCOU is connected to a CO).
CO Line Circuit 2 Indicator CD212	Red LED	Lights to indicate CO line circuit 2 is in operation (NOTE: CO line indicator will not light unless PCOU is connected to a CO).
CO Line Circuit 3 Indicator CD312	Red LED	Lights to indicate CO line circuit 3 is in operation (NOTE: CO line indicator will not light unless PCOU is connected to a CO).
CO Line Circuit 4 Indicator CD412	Red LED	Lights to indicate CO line circuit 4 is in operation (NOTE: CO line indicator will not light unless PCOU is connected to a CO).
J1 Connector	Modular connector	Interface connector for CO line circuits 1 and 2.
J2 Connector	Modular connector	Interface connector for CO line circuits 3 and 4.
PAD Switch SW101	2-position slide	Enables -3dB signal level drop for CO line circuit 1.
PAD Switch SW201	2-position slide	Enables -3dB signal level drop for CO line circuit 2.
PAD Switch SW301	2-position slide	Enables -3dB signal level drop for CO line circuit 3.
PAD Switch SW401	2-position slide	Enables -3dB signal level drop for CO line circuit 4.

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8.20 PCOU Installation Procedures

8.21 Install the PCOU in accordance with the following steps:

1) Remove the PCB from its protective packaging.

NOTE:
*The decibel (dB) **PAD** switches **SW101** through **SW401** control excessive loudness resulting from close proximity to a CO or PBX telephone office by providing a -3 db signal level drop to, or from, the PBX or CO when set to the **3** position. Switches are factory-set to the **0** (0 dB signal level drop) position.*

2) If the KSU is located within one mile of the PBX or CO telephone office, set dB **PAD** switches **SW101** through **SW401** to the **3** (-3 dB signal level drop) position.

NOTE:

Ensure the PCOU's component side is facing right when installing it in the KSU.

3) Insert the PCOU into the appropriate slot and apply firm, even pressure to ensure proper mating of connectors.

4) After installing the PCOU, gently pull the PCB outward. If the connectors are properly mated, a slight resistance will be felt.

8.30 PCOU Wiring

8.31 Refer to the PCOU wiring diagram in Section **400-096-209** for wiring/interconnecting details.

8.40 PCOU Programming Overview

8.41 The following programming parameters may be specified for the PCOU:

Program 03
- Specify code 11 for each slot that will support a PCOU.

Program 10-1
- Use to enable or disable two-CO Line Conference and DISA.

Program 15
- Use to assign DTMF/dial pulse dialing, Tenant Service, DISA, and additional attributes to each CO line.

Program 16
- Use to assign CO lines to line groups 81 ~ 89 and the dial 9 group.

Program 39
- Use to assign CO line buttons to digital and electronic telephones.

Program 40
- Use to assign station access to CO lines (incoming and outgoing).

Program 41
- Use to assign station access to CO lines (outgoing only).

Program 42-0, 1-8
- Use to assign behind PBX/CENTREX operation to each CO line.

Programs 45 ~ 48
- Use to define Toll Restrictions for any CO line.

Programs 50 ~ 56
- Use to define Least Cost Routing assignments.

Program 78
- Use to assign special ringing of CO lines: Night Ring Over Page, DISA, and internal maintenance modem (IMDU).

Programs 81 ~ 89
- Use to assign CO lines to ring selected stations.
- Use to assign Delayed Ringing to any CO line.

Program 93
- Use to Assign names to CO lines.

9 E & M TIE LINE UNIT (PEMU)

9.00 General

9.01 Each E & M TIE Line Unit (PEMU) PCB provides four TIE line interface circuits.
- PEMU TIE lines may be configured for either 2- or 4-wire transmission with Type I signaling.
- The TIE lines provide immediate start operation only.
- Each PEMU reduces system capacity by four CO lines and four or eight station ports.
- DK24 supports a maximum of one PEMU PCB, DK56 a maximum of two, and DK96 a maximum of three.

NOTES:
1. *For the system to recognize the Dual-tone Multi-frequency (DTMF) tones generated by incoming TIE lines, a CRCU (-4 or -8) must be installed on the PCTU/PCTUS. (Refer to Paragraph **3**.)*
2. *The PEMU PCB in DK56 and DK96 uses four CO lines and four station ports in software. The same number of lines and stations are consumed in DK24s equipped with a PCTU, but the PEMU takes up four CO lines and eight station ports in DK24s with PCTUS.*

9.02 PEMU controls, indicators, and interface connectors are shown in Figure 6-10 and described in Table 6-F.

9.10 PEMU Hardware Options

9.11 There are no hardware options supported by the PEMU.

9.20 PEMU Installation Procedures

9.21 Install the PEMU in accordance with the fol-

lowing steps:

1) Remove the PCB from its protective packaging.

2) Determine if the E & M TIE lines will be configured for 2- or 4-wire transmission. Set **2W/4W** switches **P103, P203, P303,** and **P403** to the appropriate positions.

3) Set the **FG** jumper **P3** to the **2-3** position.

4) Set all **GND/BAT** jumpers to the **BAT** position for connection to the telephone network.

NOTE:
*The **GND** position is used to connect PEMU circuits back-to-back on premises only, 1000 feet maximum (E & M lead wires must be crossed).*

5) Insert the PEMU into the appropriate slot (refer to Paragraph **2.20**), and apply firm, even pressure to ensure proper mating of connectors.

6) After installing the PEMU, gently pull it outward. If the connectors are properly mated, a slight resistance will be felt.

9.30 PEMU Wiring

9.31 In Section **400-096-209**, refer to the PEMU (2W or 4W) wiring diagram for wiring/interconnecting details and to the secondary protector diagram for secondary protector information.

9.40 PEMU Programming Overview

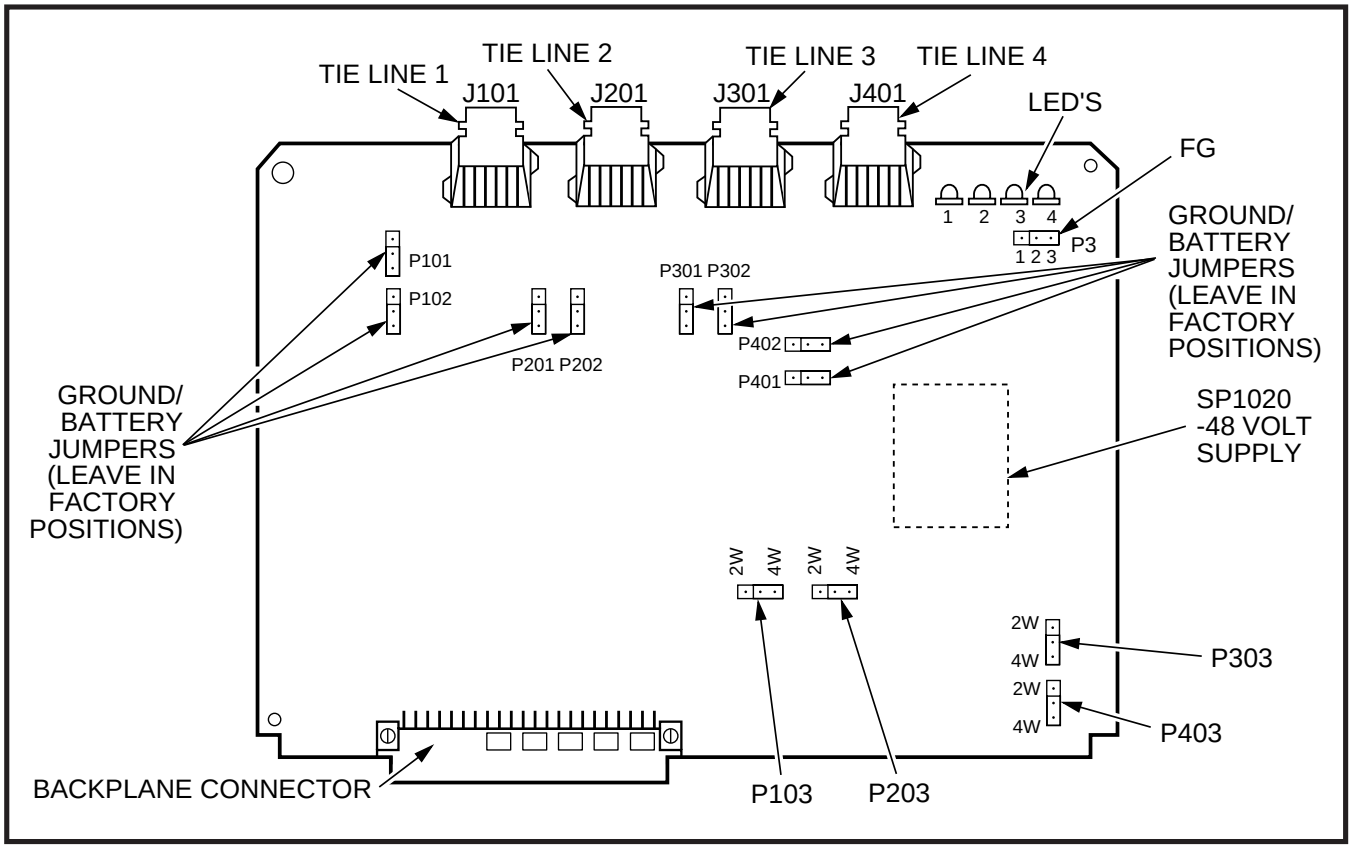

FIGURE 6-10
PEMU CONTROLS AND INDICATORS

TABLE 6-F
PEMU CONTROLS, INDICATORS, AND INTERFACE CONNECTORS

CONTROL/INDICATOR/ CONNECTOR (Figure 6-9)	TYPE OF COMPONENT	DESCRIPTION
TIE Line Circuit 1 Indicator CD102	Red LED	Lights to indicate TIE line 1 is in operation.
TIE Line Circuit 2 Indicator CD202	Red LED	Lights to indicate TIE line 2 is in operation.
TIE Line Circuit 3 Indicator CD302	Red LED	Lights to indicate TIE line 3 is in operation.
TIE Line Circuit 4 Indicator CD402	Red LED	Lights to indicate TIE line 4 is in operation.
E & M TIE Line Connector J101	Modular connector	Interface connector for E & M TIE line circuit 1.
E & M TIE Line Connector J201	Modular connector	Interface connector for E & M TIE line circuit 2.
E & M TIE Line Connector J301	Modular connector	Interface connector for E & M TIE line circuit 3.
E & M TIE Line Connector J401	Modular connector	Interface connector for E & M TIE line circuit 4.
FG Jumper P3	Three-terminal jumper	Enables or disables -48V ground to FG.
GND/BAT Jumper P101	Three-terminal jumper	M-lead origination for TIE line 1 (must be in BAT position per FCC requirements).
GND/BAT Jumper P102	Three-terminal jumper	M-lead origination for TIE line 1 (must be in BAT position per FCC requirements).
GND/BAT Jumper P201	Three-terminal jumper	M-lead origination for TIE line 2 (must be in BAT position per FCC requirements).
GND/BAT Jumper P202	Three-terminal jumper	M-lead origination for TIE line 2 (must be in BAT position per FCC requirements).
GND/BAT Jumper P301	Three-terminal jumper	M-lead origination for TIE line 3 (must be in BAT position per FCC requirements).
GND/BAT Jumper P302	Three-terminal jumper	M-lead origination for TIE line 3 (must be in BAT position per FCC requirements).
GND/BAT Jumper P401	Three-terminal jumper	M-lead origination for TIE line 4 (must be in BAT position per FCC requirements).

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TABLE 6-F
PEMU CONTROLS, INDICATORS, AND INTERFACE CONNECTORS (continued)

CONTROL/INDICATOR (Figure 6-9)	TYPE OF COMPONENT	DESCRIPTION
GND/BAT Jumper P402	Three-terminal jumper	M-lead origination for TIE line 4 (must be in BAT position per FCC requirements).
2W/4W Jumper P103	Three-terminal jumper	Selects 2- or 4-wire configuration for E & M TIE line circuit 1.
2W/4W Jumper P203	Three-terminal jumper	Selects 2- or 4-wire configuration for E & M TIE line circuit 2.
2W/4W Jumper P303	Three-terminal jumper	Selects 2- or 4-wire configuration for E & M TIE line circuit 3.
2W/4W Jumper P403	Three-terminal jumper	Selects 2- or 4-wire configuration for E & M TIE line circuit 4.

9.41 The following programming parameters may be specified for the PEMU:

Program 03
- Specify Code 13 for slots that will support PEMUs.

Program 10-1
- Use to allows or deny Two-CO Line Conference.

Program 15
- Use to Assign tandem connections to TIE lines.

Program 17
- Use to enable Page/Handsfree Answerback.

NOTE:
When a PEMU is installed in a system, it automatically assumes the next consecutive CO line and station port numbers. If the system is equipped with a PCTU(1, 2, 3, or 4), the PEMU assumes four CO line and four station port numbers. With a PCTUS, only 16 station ports will be available.

10 OPTION INTERFACE UNIT (PIOU AND PIOUS)

10.00 General

10.01 The Option Interface Unit (PIOU or PIOUS) provides a circuit interface with the system peripheral options. A maximum of one PIOU or PIOUS PCB can be installed in the system. The PIOU and PIOUS support the same options, except the PIOUS does not support a built-in amplifier or Zone Paging (see Paragraph **10.10**).

NOTE:
If a PIOU is installed, then a PIOUS cannot be installed, and vice versa.

10.02 PIOU controls, indicators, and interface connectors are shown in Figure 6-11 and described in Table 6-G. PIOUS information is provided in Figure 6-12 and Table 6-H.

10.10 PIOU and PIOUS Hardware Options

10.11 The PIOU and PIOUS support the following hardware options:

Internal Options
- Remote Maintenance Modem Unit (IMDU)

External Options
- Built-in Paging Amplifier (PIOU only)
- Door Lock Control or External Amplifier Control
- Alarm Sensor
- External Paging 600Ω (duplex) Interface
- Zone Page, 4-zones (PIOU only)
- Local Maintenance Terminal or Modem
- Music-on-Hold Control or Night Relay Control
- SMDR Printer or Call Accounting Port
- Remote Maintenance Port

NOTE:

*Refer to Section **200-096-208** for external option installation procedures.*

10.12 Remote Maintenance Modem Unit (IMDU) Installation. Install the IMDU on the PIOU or PIOUS PCB in accordance with the following steps:

1) Remove the PCB from its protective packaging.

2) Set the **SW2** baud rate switch on the front panel to **300** or **1200,** as appropriate, after the PCB has been installed in the KSU (in for 300 bps, out for 1200 bps).

3) Set **SW3** to **MODEM** position for IMDU operation.

4) Set the **P13** jumper plug on the PIOU to the **BELL** position; or, cut the **W4** jumper on the PIOUS for **BELL** operation.

5) Mate IMDU connectors **J1, J2,** and **J3** with PIOU or PIOUS connectors **P1, P2,** and **P3** (refer to Figure 6-13).

NOTE:
*PIOU or PIOUS connectors **P1, P2,** and **P3** are positioned to allow installation of the IMDU only in the proper position.*

6) Refer to Programming Procedures, Section **400-096-300**, and turn LED 14 ON in **Program 77-1** to enable IMDU operation.

NOTE:
The IMDU default station intercom number is 19.

7) Apply firm, even pressure to the IMDU to ensure proper mating of connectors.

NOTE:
*Refer to Remote Administration & Maintenance Procedures, Section **400-096-600**, for*

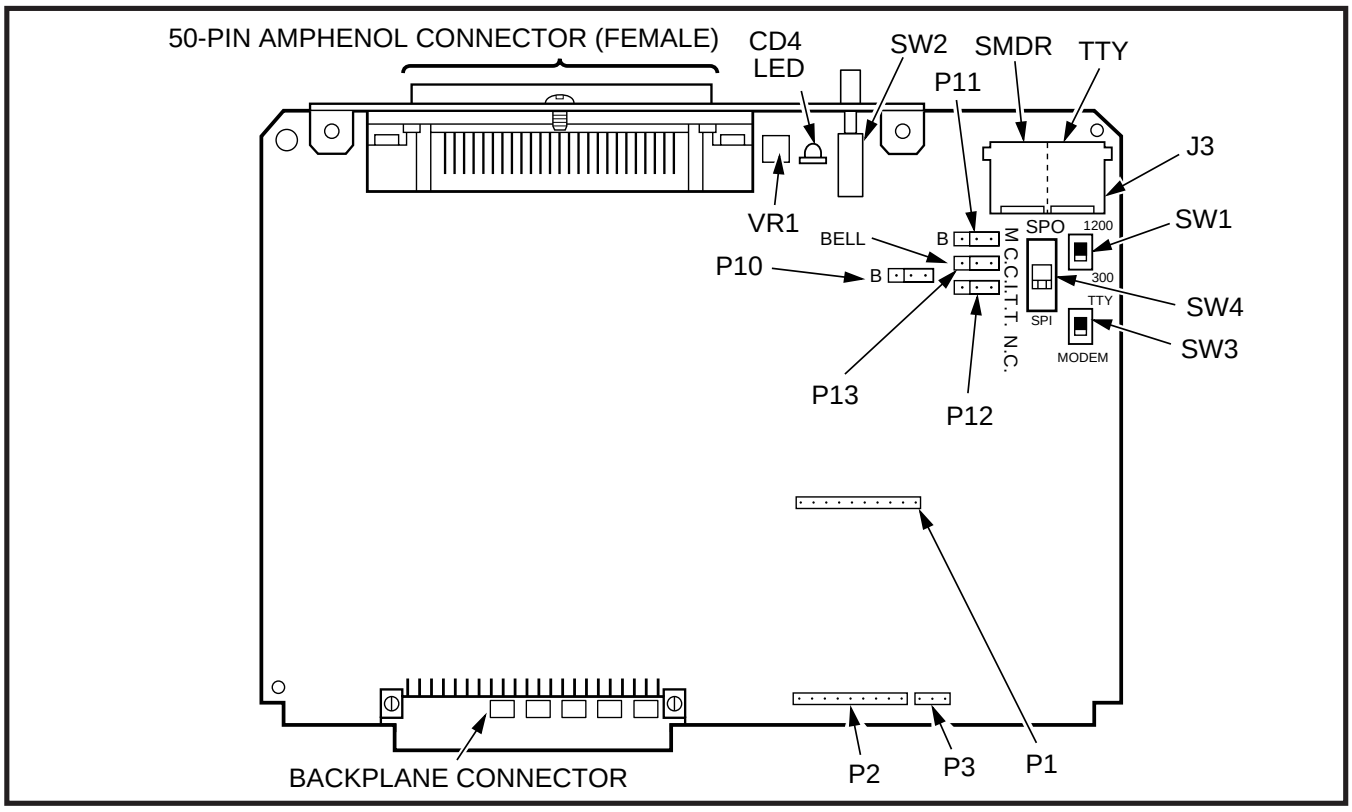

FIGURE 6-11
PIOU CONTROLS, INDICATORS, AND INTERFACE CONNECTORS

TABLE 6-G
PIOU CONTROLS AND INTERFACE CONNECTORS

CONTROL/INDICATOR/ CONNECTOR (Figure 6-10)	TYPE OF COMPONENT	DESCRIPTION
SMDR/TTY Interface Connector J3	Dual modular connector	Interface connector for SMDR printer/ call accounting device and maintenance terminal/modem.
IMDU Connector P1	10-pin connector	Interface connector for Remote Maintenance Modem piggy-back module.
IMDU Connector P2	9-pin connector	Interface connector for Remote Maintenance Modem piggy-back module.
IMDU Connector P3	3-pin connector	Interface connector for Remote Maintenance Modem piggy-back module.
M/B Make/Break Jumper Plug P10	Three-terminal jumper plug	External Page/Door Lock Control Relay MAKE or BREAK jumper plug.
M/B Make/Break Jumper Plug P11	Three-terminal jumper plug	Night/Hold Relay MAKE or BREAK jumper plug.
Alarm Sensor N.O./N.C. Jumper Plug P12	Three-terminal jumper plug	Alarm sensor normally open or normally closed jumper plug.
CCITT/BELL Jumper Plug P13	Three-terminal jumper plug	IMDU or external modem operating specification jumper plug.
SMDR Baud Rate Switch SW1	Two-position slide switch	Selects baud rate (300 or 1200 bps) for SMDR printer or call accounting device.
TTY Baud Rate Switch SW2	Two-position locking push-button switch	Selects baud rate (300 or 1200 bps) for Remote Maintenance Modem piggy-back module (IMDU) or external TTY jack.
Modem/TTY Switch SW3	Two-position slide switch	Enables PIOU for operation with IMDU modem or TTY jack.
SPO/SPI Internal/External Amplifier Switch SW4	Two-position slide switch	Selects built-in 3-watt amplifier (SPI) or 600-ohm output (SPO) for external page/BGM operation.
Volume Control VR1	Trim potentiometer	Adjusts volume of built-in 3-watt amplifier.

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more detailed information about the IMDU.

10.20 PIOU and PIOUS Installation Procedures

10.21 Install the PIOU or PIOUS in accordance with the following steps:

1) Remove the PCB from its protective packaging.

2) Ensure the PIOU or PIOUS has been config-

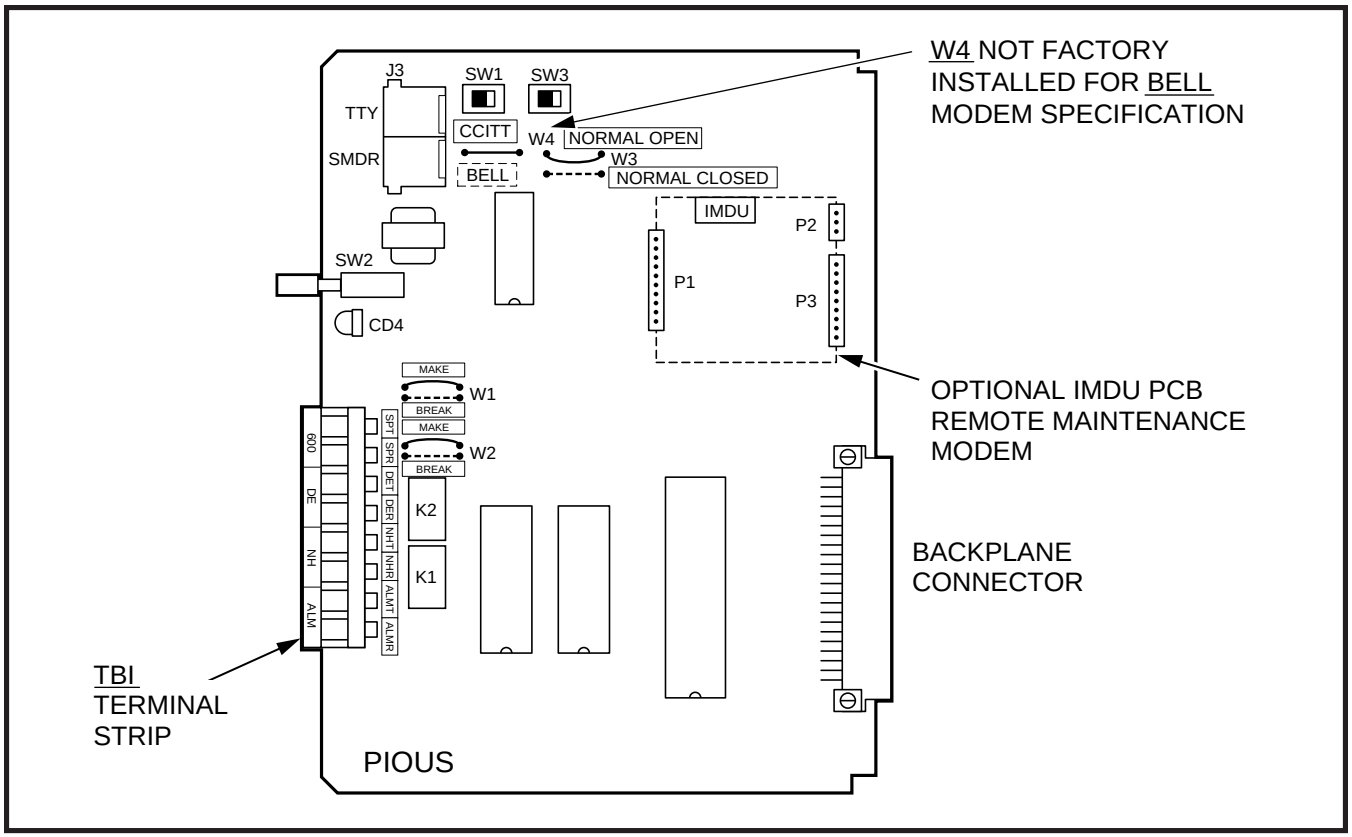

FIGURE 6-12
PIOUS PCB SWITCH/JUMPER, OPTION LOCATION

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ured for the appropriate hardware options (refer to Paragraph **10.10** and Section **400-096-208**).

NOTE:
Ensure the component side of the PCB is facing right when installing it in the KSU.

3) Insert the PIOU or PIOUS into the last slot (Slot 06 for DK24, Slot 08 for DK56, and Slot 14 for DK96), and apply firm, even pressure to ensure proper mating of connectors.

4) After installing the PIOU or PIOUS, gently pull the PCB outward. If the connectors are properly mated, a slight resistance will be felt.

10.30 PIOU and PIOUS Wiring

10.31 Refer to Peripheral Equipment Installation, Section **400-096-208**, and Wiring Diagrams, Section **400-096-209**, for PIOU and PIOUS wiring/interconnecting details.

10.40 PIOU and PIOUS Programming Overview

10.41 The following programming parameters may be specified for the PIOU and PIOUS:

Program 03
- Specify Code 41 for the slot that will support a PIOU or PIOUS.

Program 10-2
- Use to activate External Page with All Call Page (with access code 39 only, not with All Call Page button).

Program 60
- Use to assign SMDR options.

Program 77-1
- Use to assign relay control and IMDU options.

TABLE 6-H
PIOUS CONTROLS AND INTERFACE CONNECTORS

CONTROL/INDICATOR/ CONNECTOR (Figure 6-11)	TYPE OF COMPONENT	DESCRIPTION
SMDR/TTY Interface Connector J3	Dual modular connector	Interface connector for SMDR printer/ call accounting device and maintenance terminal/modem.
IMDU Connector P1	10-pin connector	Interface connector for Remote Maintenance Modem piggy-back module.
IMDU Connector P2	9-pin connector	Interface connector for Remote Maintenance Modem piggy-back module.
IMDU Connector P3	3-pin connector	Interface connector for Remote Maintenance Modem piggy-back module.
M/B Make/Break Jumper W1	Wire jumper	External Page/Door Lock Control Relay MAKE or BREAK jumper.
M/B Make/Break Jumper W2	Wire jumper	Night/Hold Relay MAKE or BREAK jumper.
Alarm Sensor N.O./N.C. W3	Wire jumper	Alarm sensor normally open or normally closed jumper.
CCITT/BELL Jumper W4*	Wire jumper	IMDU or external modem operating specification jumper plug. (BELL = NO W4)
SMDR Baud Rate Switch SW1	Two-position slide switch	Selects baud rate (300 or 1200 bps) for SMDR printer or call accounting device.
TTY Baud Rate Switch SW2	Two-position locking push-button switch	Selects baud rate (300 or 1200 bps) for Remote Maintenance Modem piggy-back module (IMDU) or external TTY jack.
Modem/TTY Switch SW3	Two-position slide switch	Enables PIOUS for operation with IMDU modem or TTY jack.

*Most modems in USA require BELL specification: W4 not factory-installed.

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Program 78

- Use to set Night Ringing over External Page.

11 EXTERNAL PAGE INTERFACE UNIT (PEPU)

11.00 General

11.01 The PEPU is similar to the PIOU and PIOUS, but supports fewer peripherals than both PCBs. In general, PEPU-supported peripherals are paging and relay control related.

NOTE:
If a PIOU or PIOUS is installed, then a PEPU cannot be installed, and vice versa.

11.02 PEPU controls, indicators, and interface connectors are illustrated in Figure 6-14 and described in Table 6-I.

11.10 PEPU Hardware Options

11.11 The PEPU supports the following hardware options:

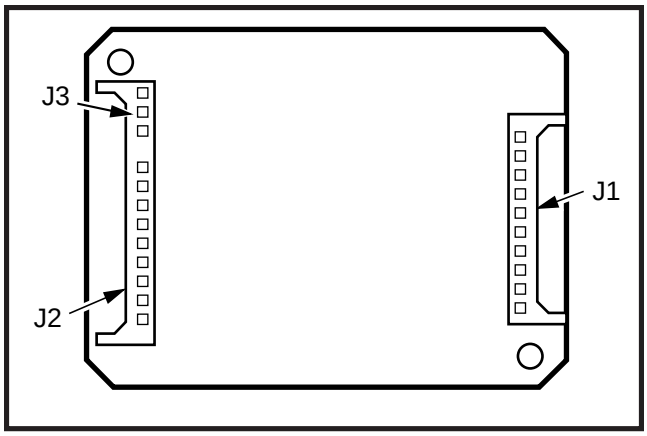

FIGURE 6-13
REMOTE MAINTENANCE MODEM UNIT (IMDU) INSTALLATION

External Options

- Built-in Paging Amplifier
- Door Lock Control or External Amplifier Control
- External Paging 600Ω (duplex) Interface (one zone)
- Music-on-Hold Control or Night Relay Control

NOTE:
*Refer to Peripheral Equipment Installation, Section **400-096-208**, and Wiring Diagrams, Section **400-096-209**, for installation of external options.*

11.12 PEPU does not support the following PIOU and PIOUS options:

- Alarm Sensor
- Four-zone Page
- SMDR Port
- Remote Maintenance Modem or ASCII terminal Connector
- IMDU Connection

11.20 PEPU Installation Procedure

11.21 Install the PEPU in accordance with the following steps:

1) Remove the PCB from its protective packaging.

2) Ensure the PEPU has been configured for the

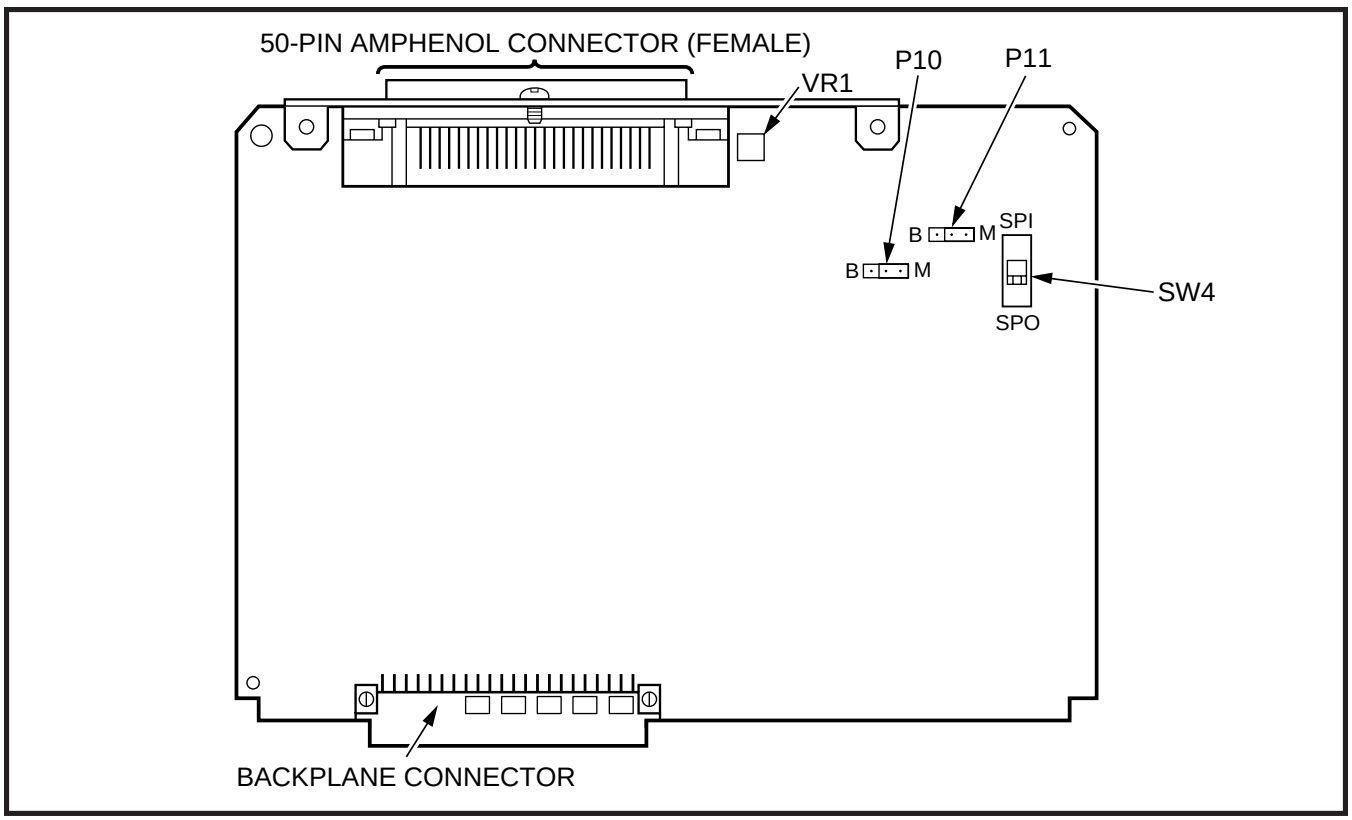

FIGURE 6-14
PEPU CONTROLS, INDICATORS, AND INTERFACE CONNECTORS

TABLE 6-I
PEPU CONTROLS AND INTERFACE CONNECTORS

CONTROL/INDICATOR/ CONNECTOR (Figure 6-13)	TYPE OF COMPONENT	DESCRIPTION
M/B Make/Break Jumper Plug P10	Three-terminal jumper plug	External Page/Door Lock Control Relay MAKE or BREAK jumper plug.
M/B Make/Break Jumper Plug P11	Three-terminal jumper plug	Night/Hold Relay MAKE or BREAK jumper plug.
SPI/SPO Internal/External Amplifier Switch SW4	Two-position slide switch	Selects built-in 3-watt amplifier or 600-ohm output for External Page/BGM operation.
Volume Control VR1	Trim potentiometer	Adjusts volume of built-in 3-watt amplifier.

appropriate hardware options. (Refer to Paragraph **11.10** and Section **400-096-208**.)

NOTE:
Ensure the PEPU's component side is facing right when installing it in the KSU.

3) Insert the PEPU into the last slot (Slot 06 of DK24, Slot 08 for DK56, and Slot 14 for DK96), and apply firm, even pressure to ensure proper mating of connectors.

4) After installing the PEPU, gently pull the PCB outward. If the connectors are properly mated, a slight resistance will be felt.

11.30 PEPU Wiring

11.31 Refer to Peripheral Equipment Installation, Section **400-096-208**, for external option installation; see Wiring Diagrams, Section **400-096-209**, for wiring/interconnecting details.

11.40 PEPU Programming Overview

11.41 The following programming parameters may be specified for the PEPU:

Program 03
- Specify Code 41 for the slot that will support a PEPU.

Program 10-2
- Use to activate External Page with All Call Page (with access code 39 only, not with All Call Page button).

Program 77-1
- Use to assign relay control options.

Program 78
- Use to set Night Ringing over External Page.

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Strata® DK24/56/96

RELEASE 1, 2, 3, and 4

INSTALLATION

H

Chapter Seven
TELEPHONE INSTALLATION

TABLE OF CONTENTS

FIGURE LIST

FIGURE LIST (continued)

H

1 OVERVIEW

1.00 Purpose

1.01 This chapter provides instructions on how to connect telephones to the STRATA DK system and how to configure and upgrade them for optional features. Procedures for installing direct station selection consoles, door phone/lock control boxes, and door phones also appear in his chapter.

1.10 Types of Telephones

1.11 STRATA DK systems can support the following telephones.

- **Digital Telephones:** Installation instructions for digital telephones in this chapter and elsewhere in this manual apply only to the Toshiba 2000- and 1000-series Digital Telephones. The 2000-series Digital Telephones consist of four models: the DKT2010-H, the DKT2010-SD, the DKT2020-S, and the DKT2020-SD. There are two 1000-series Digital Telephone models, the DKT1020-H and the DKT1020-SD.
- **Electronic Telephones:** The electronic telephone instructions here apply to the Toshiba 6500-series electronic telephones, although there are other electronic telephones (the 2000-, 3000-, 6000-, and 6005-series) that are compatible with the STRATA DK systems. The 6500-series electronic telephones consist of four models: the EKT6510-H, the EKT6520-S, the EKT6520-H, and the EKT6520-SD.
- **Standard Telephones:** 500- and 2500-type standard telephones is meant whenever standard telephones is mentioned in this chapter and the rest of this manual.

2 TELEPHONE/SYSTEM CONNECTION

2.00 General

2.01 This section describes the wiring required to connect telephones to the system. Before installing any telephone wiring, read the following warning and caution notes:

WARNING!

1. ***Never install the telephone wiring during a lightning storm.***
2. ***Never install the telephone jacks in wet locations, unless the jack is specifically designed for wet locations.***
3. ***Never touch uninsulated telephone wires or terminals unless the telephone line has been disconnected at the network interface.***
4. ***Use caution when installing or modifying telephone lines.***
5. ***If telephone wiring exits the building, external secondary protection is required. See Section 400-096-209.***

CAUTION!

When installing the station cable, do not run parallel to and within three feet of an AC power line. AC power lines should be crossed at right (90°) angles only. In particular, avoid running station wire pairs near devices that generate electrical noise, such as neon or fluorescent light fixtures.

2.10 Connecting Digital Telephones to the System

2.11 The following provides information on how to connect digital telephones to the system.

NOTE:
Before proceeding, see warning and caution notes in Paragraph ***2.00****.*

2.12 Digital telephones connect to the Digital Telephone Interface Unit (PDKU) via the main distribution frame (MDF) with standard twisted-pair jacketed telephone cable. Single-pair wiring is sufficient in most cases for digital telephones to operate effectively at up to 1000 feet from the key service unit, if using 24 AWG cable. But digital telephones that are equipped with Integrated Data Interface Units should have two-pair (or external power) to function effectively at this distance. This also applies to digital telephones that are supported by systems that must operate with battery reserve power—see Wiring Diagrams, Section **400-096-209**, for loop limits.

To accommodate the digital telephone line cord,

the cable should be terminated in a modular station connector block (RJ-11) at the station location. The standard single-pair, modular digital telephone cord that is sent with the telephone is 7 feet (the maximum allowed is 25 feet).

NOTES:

1 Digital telephone cable runs must not have the following:

- *Cable splits (single or double)*
- *Cable bridges (of any length)*
- *High resistance or faulty cable splices*

*2. See Section **400-096-209** for secondary protector information.*

2.20 Connecting Electronic Telephones to the System

2.21 The following provides information on how to connect electronic telephones to the system.

NOTE:
*Before proceeding, see warning and caution notes in Paragraph **2.00**.*

2.22 Electronic telephones are connected to electronic telephone circuits on the Electronic Telephone Interface Unit (PEKU) and the Standard/ Electronic Telephone Interface Unit (PESU) via the main distribution frame (MDF) with standard twisted-pair jacketed telephone cable. Two-pair wiring, as a minimum, is required for telephone connection. However, three-pair wiring is recommended to permit future upgrades, such as Off-hook Call Announce.

To accommodate the electronic telephone line cord, the cable should be terminated in a modular station connector block (RJ-11) at the station location. The standard two-pair modular electronic telephone cord length is seven feet (the maximum allowed length is 25 feet). See Wiring Diagrams, Section **400-096-209** for more details.

NOTE:
*See Section **400-096-209** for secondary protector information.*

The overall length of the station cable run from the key service unit (KSU) to the telephone must not exceed 1,000 feet (305 meters), if using 24 AWG cable.

2.30 Connecting Standard Telephones to the System

2.31 The following provides information on how to connect standard telephones to the system.

NOTE:
*Before proceeding, see warning and caution notes in Paragraph **2.00**.*

2.32 Standard telephones connect to standard telephone circuits on the Standard Telephone Interface Unit (PSTU) and the Standard/Electronic Telephone Interface Unit (PESU) via the main distribution frame (MDF) with standard twisted-pair jacketed telephone cable. Single-pair wiring is required. (Refer to Wiring Diagrams, Section **400-096-209**, for more details.)

NOTE:
*See Section **400-096-209** for secondary protector information.*

The standard telephone cable's overall loop resistance, connected on- or off-premises, is 300 ohms maximum, including the telephone resistance. This also applies to all devices connected to standard telephone circuits. A standard telephone connected off-premises via the telephone network should interface with OL13A lines (or equivalent) and connect to an RJ21X FIC jack (or equivalent).

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2.40 Telephone Wall Mounting

2.41 This section provides instructions on how to mount digital telephones and electronic telephones to a wall or other vertical surface. Instructions on mounting standard telephones are not provided here; refer to the manufacturer's documentation for those instructions.

2.42 Mount digital and electronic telephones in accordance with the following steps:

NOTES:

1. Digital telephones equipped with Inte-

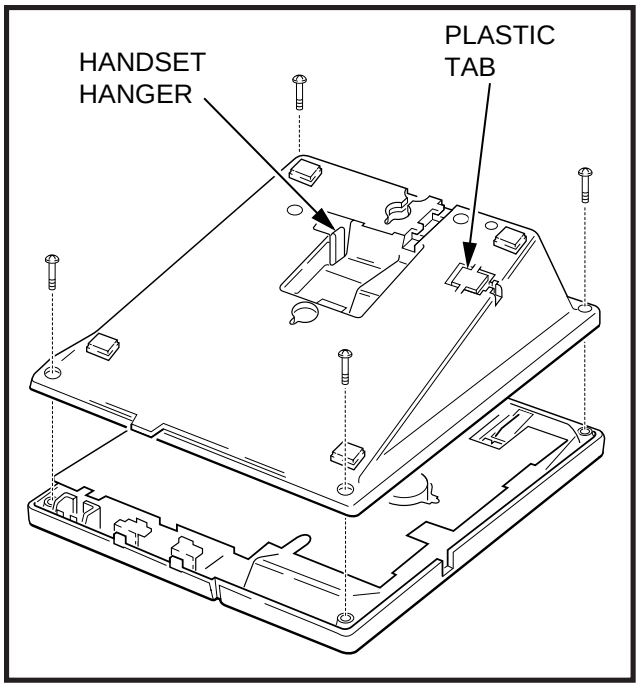

FIGURE 7-1
REMOVING THE TELEPHONE BASE

grated Data Interface Units (PDIU-DIs or PDIU-DI2s) cannot be wall mounted.

2. Electronic and older digital telephones equipped with an HHEU can be wall mounted. 2000-series Digital Telephones can only be wall mounted with an HHEU2.

1) Loosen the captive screws, and remove the telephone base (Figure 7-1).

NOTE:
Figures 7-1 ~ 7-3 show 6500-series Electronic Telephones, but the drawings also apply to digital telephones.

2) Using a suitable cutter, remove the handset hanger from the base (Figure 7-1). Insert the handset hanger in the slot provided on the front of the telephone (Figure 7-2). The hanger fits in the notch on the handset.

3) Rotate the telephone base 180 degrees and secure it to the telephone with its four captive

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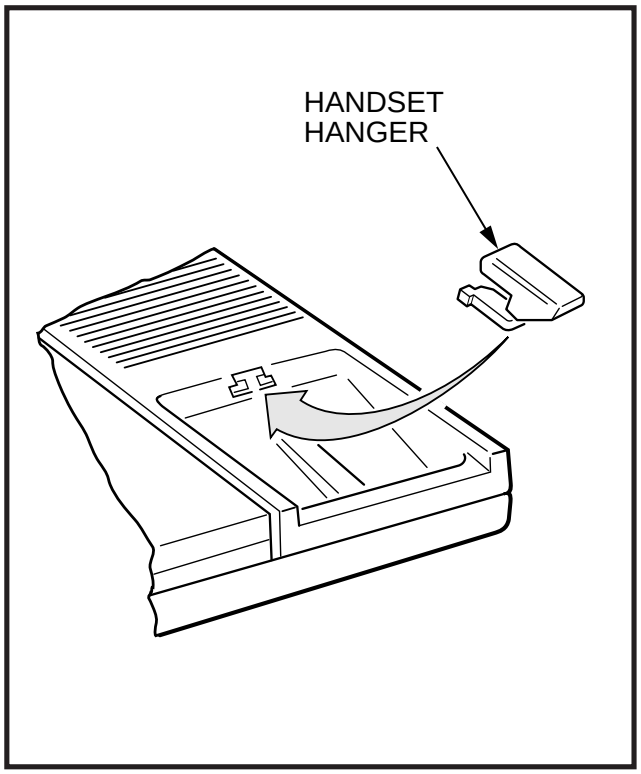

FIGURE 7-2
HANDSET HANGER

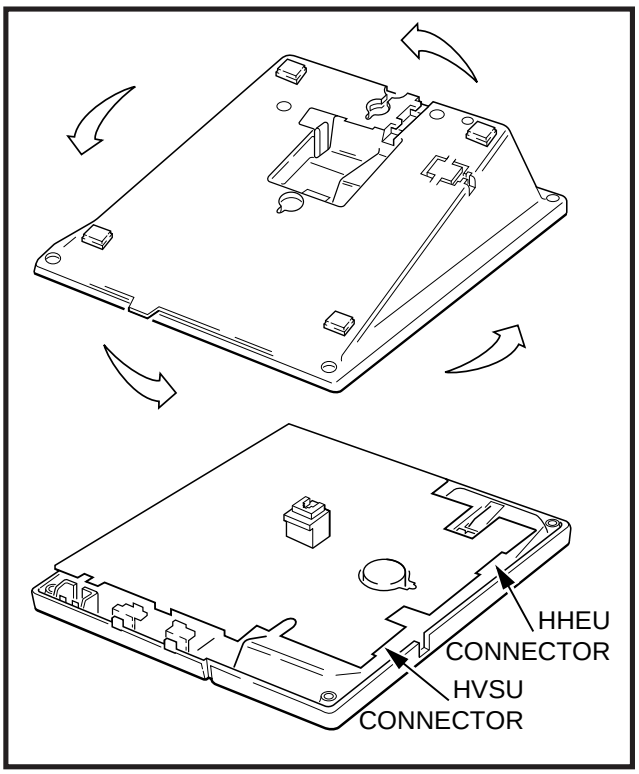

FIGURE 7-3
WALL MOUNTING BASE ROTATION

screws (Figure 7-3).

4) Connect the telephone to the wall modular connector with a cord approximately four inches long (available at most telephone supply companies). Route the cord into the hollow portion of the base.

5) Mount the telephone on the wall mounting modular connector plate.

3 DIGITAL TELEPHONE UPGRADES

3.00 This section describes how to upgrade and configure 2000- and 1000-series Digital Telephones for features and options.

3.10 Simultaneous Voice and Data Upgrade (PDIU-DI2 and PDIU-DI)

3.11 Both the 2000-and 1000-series Digital Telephones can be upgraded with an integrated data interface unit to transmit and receive simultaneous voice and data calls. There are two versions of the integrated unit: the PDIU-DI and the PDIU-DI2. The 2000-series telephones can only be equipped with a PDIU-DI2, and the 1000-series telephones can only be equipped with a PDIU-DI. Asynchronous devices, such as personal computers (PC) and terminals, can be connected to the standard RS-232 connector of the PDIU-DI(2). Station users are able to transmit and receive RS-232 data over the single wire pair of the PDIU-DI(2)-equipped telephone.

3.12 Data calls can be manually dialed with a Data Call (DATA) button and disconnected with a Data Release (DRLS) button on the telephone; or, they can be dialed from the keyboard of the terminal or PC using standard "AT" commands. Digital telephones may also be assigned a Modem (MODEM) button to reserve a modem or monitor modem availability and status. Assign feature buttons to telephones with **Program 39**.

NOTES:
1. *1000- and 2000-series Digital Telephones equipped with a PDIU-DI(2) cannot be wall-mounted. A 2000-series digital telephone equipped with a PDIU-DI2 can support an HHEU at the same time, but cannot support a DVSU. A 1000-series Digital Telephone equipped with a PDIU-DI cannot support an HHEU or a DVSU.*
2. *PDKU1 circuits 1 ~ 7 only can support PDIU-DI(2)s, but all PDKU2 circuits ,1 ~ 8, can support PDIU-DI(2)s.*

3.13 PDIU-DI(2) Installation. Install the integrated data interface unit (PDIU-DI for 1000-series and PDIU-DI2 for 2000-series) in accordance with the following steps:

1) Loosen the four captive screws securing the digital telephone base and remove it (Figure 7-1).

NOTE:
Although Figure 7-1 specifically illustrates how to remove an electronic telephone base, it also applies to digital telephones.

2) Refer to Figure 7-4 for 2000-series telephones or Figure 7-5 for 1000-series telephones, and insert the two integrated unit wire plugs into the connectors on the printed circuit board (PCB) in the telephone (observing the red wire for correct positioning).

3) Attach the integrated unit to the bottom of the telephone and secure with the four captive screws.

4) Remove the telephone number directory tray from the original telephone base and install it on the integrated unit telephone base. Bend the tray by squeezing its sides so it bows slightly to remove and re-install (Figure 7-4 or 7-5).

3.14 Integrated Data Interface Unit Programming Overview

Program 03
- No special code required.

Program 39
- Assigns the Data Call (DATA), Data Release (DRLS), and Modem (MODEM) buttons.

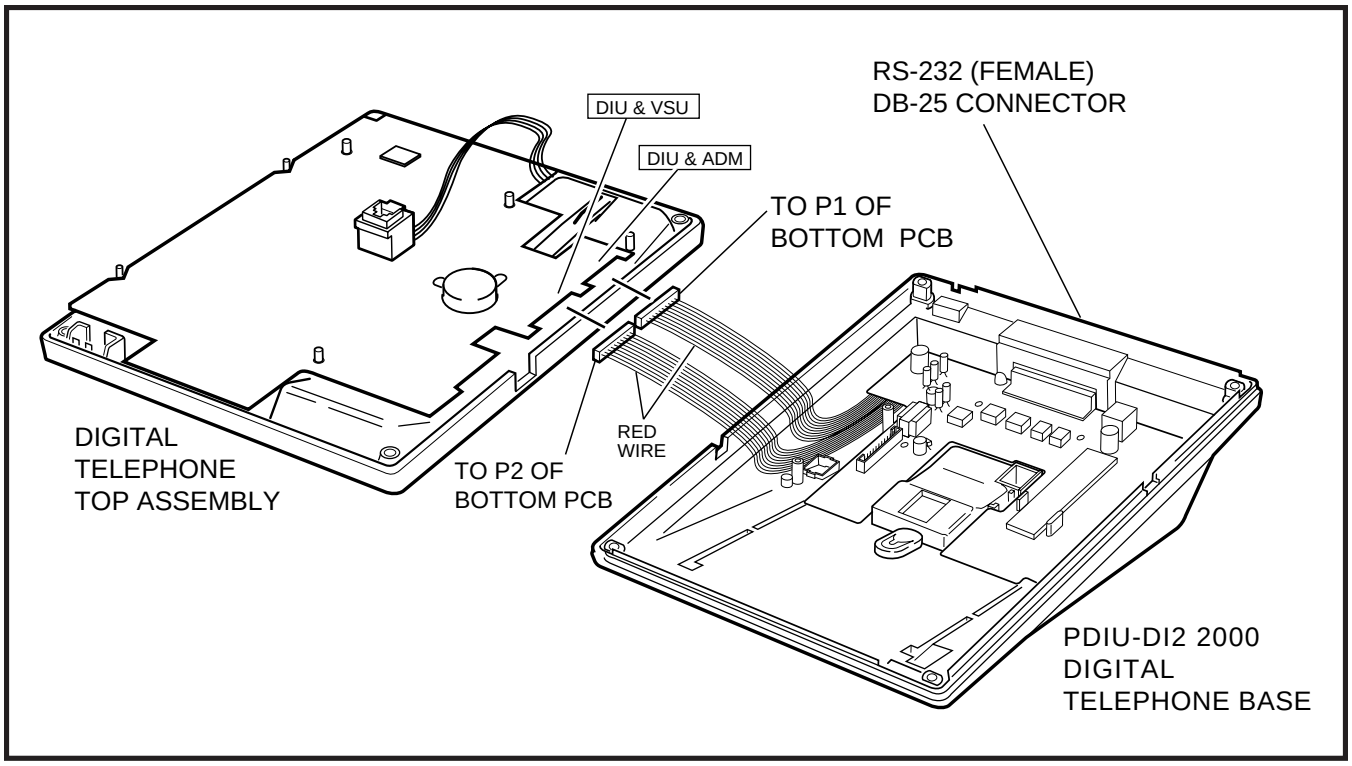

FIGURE 7-4
PDIU-DI2 INSTALLATION INTO 2000-SERIES DIGITAL TELEPHONE

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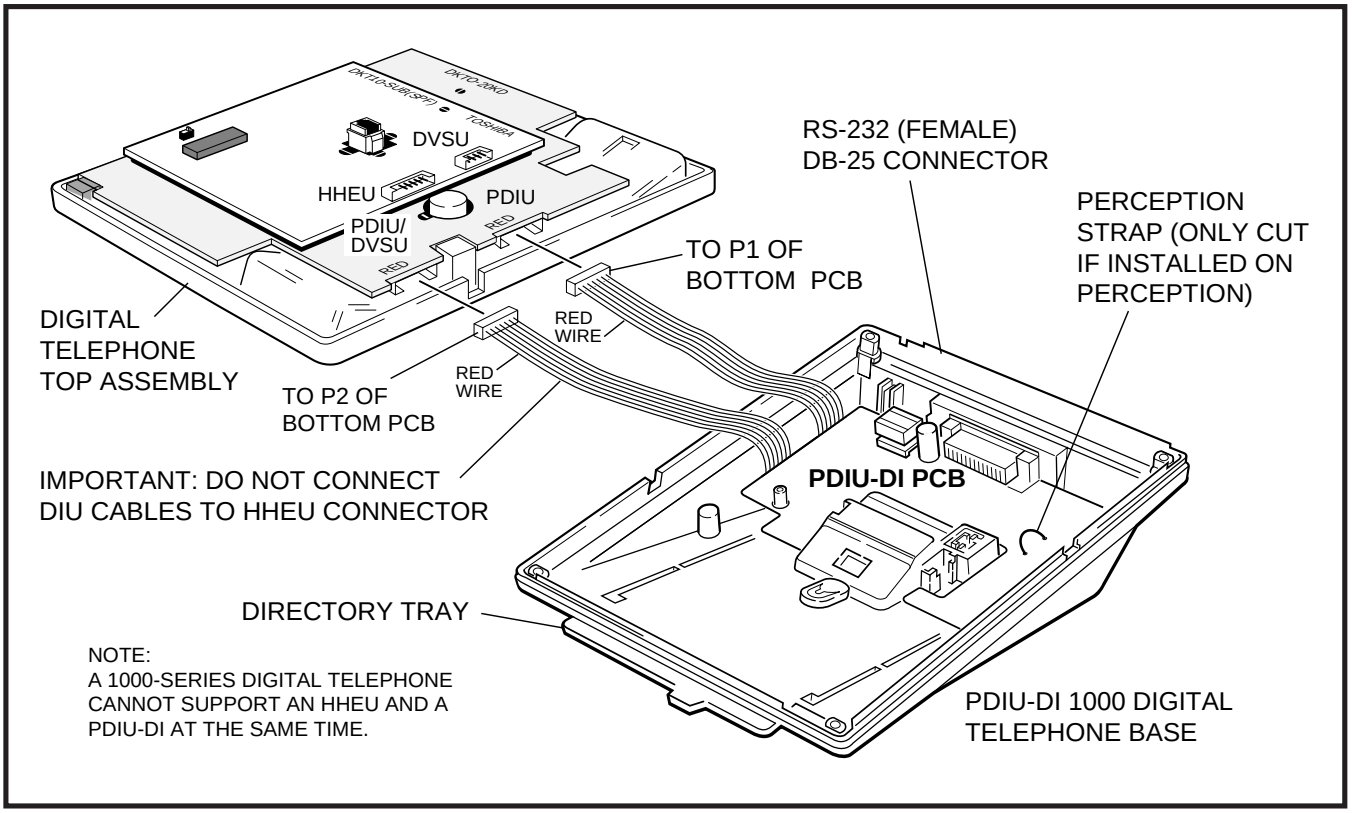


FIGURE 7-5
PDIU-DI INSTALLATION INTO 1000-SERIES DIGITAL TELEPHONE

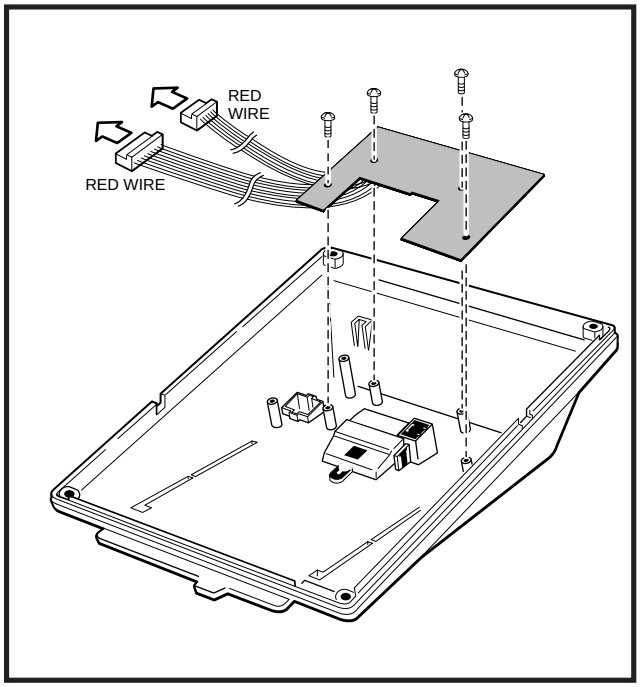


FIGURE 7-6
DVSU INSTALLATION FOR DIGITAL TELEPHONES

Programs 20 and 22

- Used for data interface unit assignments.

3.20 Off-hook Call Announce Upgrade (DVSU)

3.21 To receive Off-hook Call Announce (OCA) calls, a digital telephone must be upgraded with a DVSU; the telephone making the call does not require a DVSU. An additional wire pair is not required for digital telephones that receive OCA calls. The DVSU is compatible with both 2000-series and 1000-series Digital Telephones.

NOTE:
Digital telephones cannot be equipped with a DVSU and integrated data interface unit (PDIU-DI or PDIU-DI2) at the same time.

3.22 DVSU Upgrade Installation. Install the DVSU upgrade in accordance with the following steps.

1) Loosen the four captive screws securing the telephone base (Figure 7-1) and remove the base.

NOTE:
Although Figure 7-1 specifically illustrates how to remove an electronic telephone base, it also applies to digital telephones.

2) Loosen the four captive screws securing the metal plate to the standoffs inside the base where the DVSU will be installed (Figure 7-6). Remove the plate, which can be discarded.

3) Position the DVSU PCB on the standoffs (Figure 7-6), and secure with the four provided screws.

4A) If installing the DVSU into a 2000-series digital telephone, refer to Figures 7-7 (DKT2010-H) or 7-8 (DKT2010-SD, DKT2020-S, DKT2020-SD), and then connect the DVSU wire plugs to the **DVSU** connectors on the printed circuit board (PCB) inside the telephone.

4B) If installing the DVSU into a 1000-series digital telephone, refer to Figure 7-9, and connect the DVSU wire plugs to the **DVSU** connectors on the PCBs inside the telephone.

5) Reinstall the telephone base and secure it with its four captive screws.

3.30 Loud Ringing Bell/Headset Upgrade

3.31 The loud ringing bell/headset upgrade (HHEU) enables an external speaker (HESB) for the Loud Ringing Bell feature and/or a headset to be connected to both series of digital telephones.

NOTES:
1. *There are two types of HHEU: the HHEU1 (which has four versions, **V.1** ~ **V.4**) and the HHEU2.*
2. *Both 2000- and 1000-series Digital Telephones require either an HHEU2 or a **V.3** or **V.4** HHEU1 for HESB operation; earlier HHEU1 versions are only sufficient for headset operation only.*
3. *Only digital telephones equipped with an HHEU2 can be wall mounted. The HHEU2 is identical to the **V.4** HHEU1, except that the HHEU2 has longer wires to accommodate wall mounting.*

H

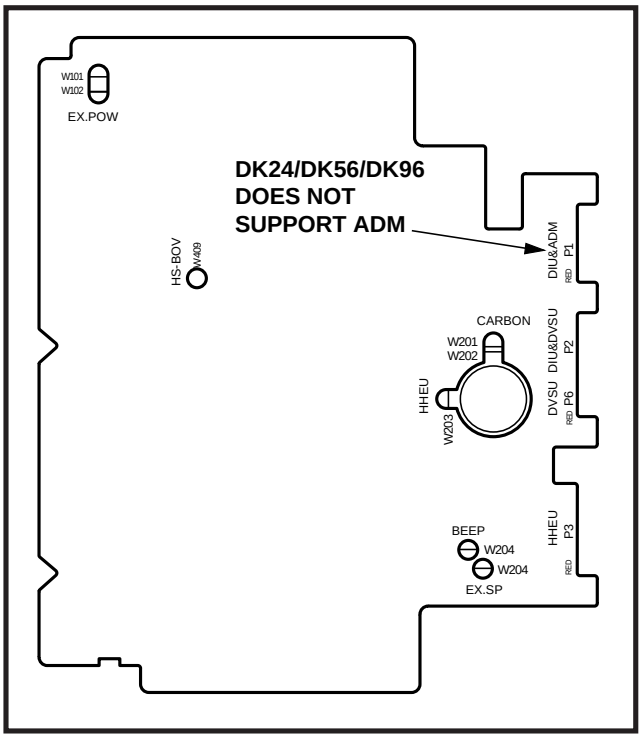


FIGURE 7-7
DKT2010-H STRAP AND CONNECTOR LOCATIONS

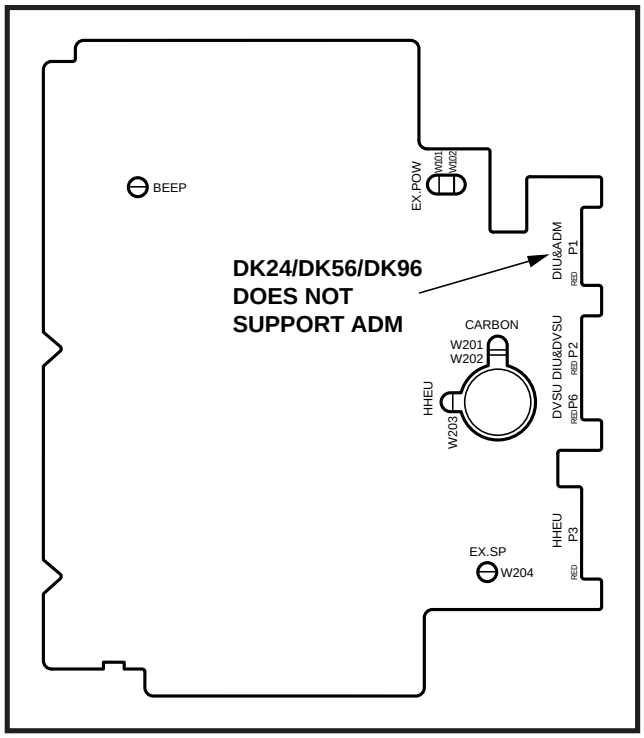


FIGURE 7-8
DKT2010-SD, DKT2020-S, AND DKT2020-SD STRAP AND CONNECTOR LOCATIONS

H

4. *A Toshiba HESC-65A cable is required to connect the HHEU in a digital telephone to the HESB.*
5. *1000-series digital telephones cannot be equipped with the HHEU (any type or version) and the integrated data interface unit (PDIU-DI) at the same time, but 2000-series digital telephones can support an HHEU and a PDIU-DI2 at the same time.*

3.32 HHEU Upgrade Installation (HHEU) Install the Loud Ringing Bell/headset upgrade (HHEU) in accordance with the following steps.

1) Loosen the four captive screws securing the telephone base (Figure 7-1), and remove the base.

NOTE:
Although Figure 7-1 specifically illustrates how to remove an electronic telephone base, it also applies to digital telephones.

2) Using a screwdriver or other suitable tool, remove the plastic tab located on the back of the base (Figure 7-1); the HHEU modular connector for the headset will be accessed through this opening.

3) If installing a **V.3** HHEU1, set the **SW601** switch on the HHEU to **HEADSET** for the headset or loud bell application (Figure 7-10). **V.4** HHEU1 and HHEU2 do not have this switch, because both of these upgrades are automatically set for the headset/loud bell application.

4) Connect the HESC-65A cable to **P601** of the HHEU (both HHEU1A versions and the HHEU2 have **P601**) if the Loud Ringing Bell option is required (Figure 7-11). Refer to Section **400-096-208** for HESB installation procedures.

5A) For the **V.3** HHEU1**:** If only the headset is

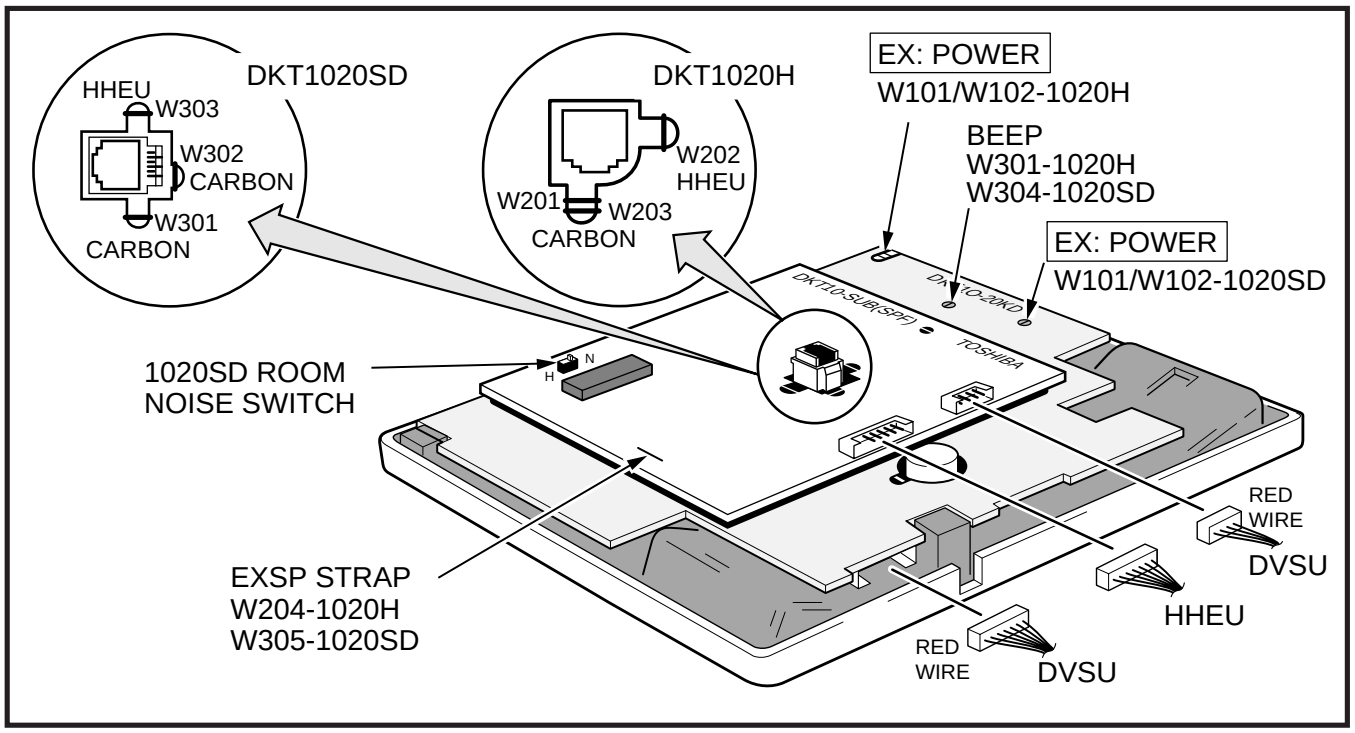


FIGURE 7-9
1000-SERIES DIGITAL TELEPHONE STRAP AND CONNECTION LOCATIONS

H

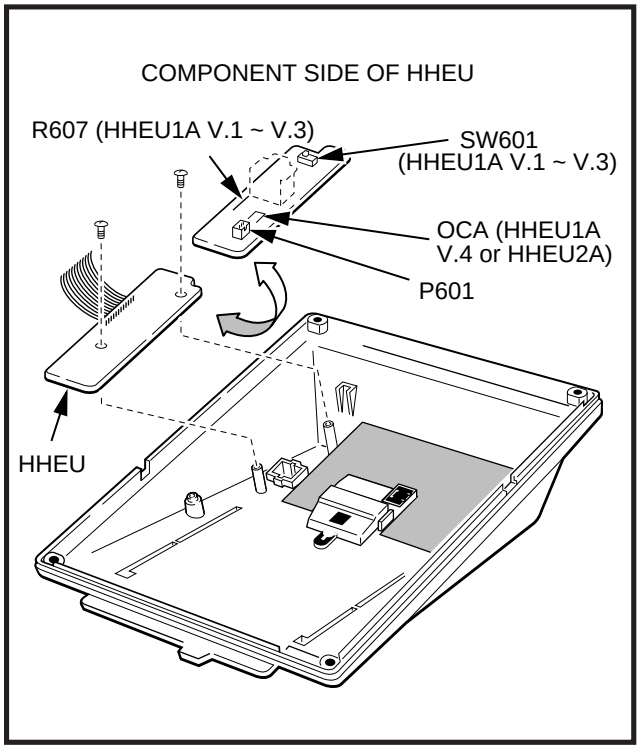


FIGURE 7-10
HHEU INSTALLATION FOR DIGITAL TELEPHONE

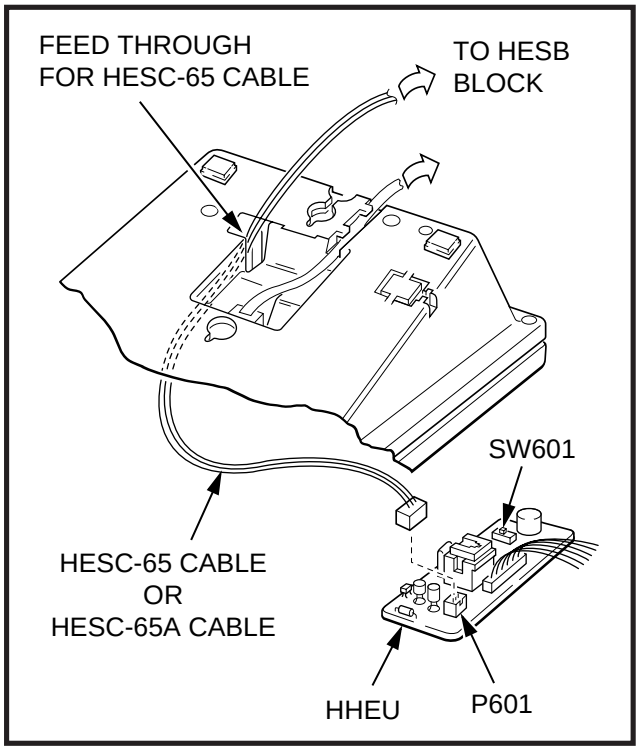


FIGURE 7-11
HESC-65A CABLING

connected to the HHEU, cut both sides of the **R607** resistor (Figure 7-10), then remove the resistor to eliminate electrical contact.

NOTE:
*Do not cut the **R607** resistor if connecting an HESB to the HHEU for the Loud Ringing Bell—even if a headset is also installed on the HHEU.*

5B) For the **V.4** HHEU1 and the HHEU2: If only the headset is connected to the HHEU, cut the **OCA** strap (Figure 7-10).

NOTE:
*Do not cut the **OCA** strap if connecting an HESB to the HHEU for the Loud Ringing Bell—even if a headset is also installed on the HHEU.*

6) Position the HHEU PCB on the standoffs inside the base (Figure 7-10), and secure with the two provided screws.

7A) For 2000-series digital telephones, refer to Figure 7-7 (DKT2010-H) or Figure 7-8 (DKT2010-SD, DKT2020-S, DKT2020-SD), and connect the wire plug of the HHEU PCB to the **HHEU** connector on the printed circuit board (PCB) on the telephone.

7B) For 1000-series digital telephones, refer to Figure 7-9, and connect the wire plug of the HHEU to the **HHEU** connector on the PCB of the telephone.

8A) For 2000-series digital telephones, refer to Figure 7-7 (DKT2010-H) or Figure 7-8 (DKT2010-SD, DKT2020-S, DKT2020-SD), and locate the **EX.SP** strap on the PCB in the telephone. Cut the strap if an HESB will be connected to the HHEU.

8B) For 1000-series digital telephones, refer to Figure 7-9, and locate the **EX.SP** strap on the upper PCB in the telephone, and cut it if an HHEU will be connected to an HESB for the Loud Ringing Bell option.

9A) For 2000-series digital telephones, refer to Figure 7-7 (DKT2010-H) or Figure 7-8 (DKT2010-SD, DKT2020-S, DKT2020-SD), and locate the **HHEU** strap on the PCB in the telephone. Cut the strap if a headset will be connected to the HHEU.

9B) For 1000-series digital telephones, refer to Figure 7-9, and locate the **HHEU** strap on the upper PCB in the telephone. Cut the strap if an HHEU will be connected to a headset.

10) Reinstall the telephone base, and secure it with its four captive screws.

11) To adjust the volume of the HESB Loud Ringing Bell: Call the telephone connected to the HESB, and adjust the volume control on the back of the HESB and the ring volume control on the telephone.

3.40 Carbon Headset/Handset Straps

3.41 If a carbon-type handset or headset is connected to the handset jack on the side of the telephone, two jumper straps inside the telephone must be cut. Cut the straps in accordance with the following steps:

H

NOTE:
It is not necessary to cut these straps if the headset is connected to the HHEU.

1) Loosen the four captive screws securing the telephone base (Figure 7-1), and remove the base.

NOTE:
Although Figure 7-1 specifically illustrates how to remove an electronic telephone base, it also applies to digital telephones.

2A) For 2000-series digital telephones refer to Figure 7-7 or 7-8, and cut the **CARBON** straps, **W201** and **W202**.

2B) For 1000-series digital telephones, refer to Figure 7-9, and cut the **CARBON** straps, (**W301** and **W302** on the DKT1020-SD; **W201** and **W203** on the DKT1020-H).

3) Reinstall the telephone base, and secure it with its four captive screws.

3.50 Beep Strap

3.51 A "beep" sounds whenever a dialpad button or feature button is pressed on a digital telephone. To eliminate this beep follow the procedure below:

1) Loosen the four captive screws securing the telephone base (Figure 7-1), and remove the base.

NOTE:
Although Figure 7-1 specifically illustrates how to remove an electronic telephone base, it also applies to digital telephones.

2A) For 2000-series digital telephones, refer to Figures 7-7 or 7-8**,** and cut the **BEEP** strap.

2B) For 1000-series digital telephones, refer to Figure 7-9, and cut the **BEEP** strap.

3) Reinstall the telephone base, and secure it with its four captive screws.

3.60 Microphone/Speaker Sensitivity Adjustment (Speakerphones Only)

3.61 High ambient noise levels may cause the speaker on some digital telephone speakerphone models to cut off frequently. To prevent this for the 1000-series digital telephone models, perform the following procedure to make the telephones less sensitive to the noise: (The 2000-series Telephones are adjusted per the instructions in the Note after the procedure.)

1) Loosen the four captive screws securing the 1000-series Digital Telephone speakerphone base (Figure 7-1), and remove the base.

NOTE:
Although Figure 7-1 specifically illustrates how to remove an electronic telephone base, it also applies to digital telephones.

2) For the 1000-series speakerphone model (DKT1020-SD), refer to Figure 7-9, and locate the **ROOM NOISE** switch. Push the switch carefully to the **H** (high) position (for low sensitivity) when there is high background noise in the area surrounding the telephone.

3) Reinstall the telephone base, and secure it with its four captive screws.

NOTES:
1. *To make the 2000-series Digital Telephone speakerphone models less sensitive to loud surrounding noise, hold down* Mic *button, then press the up* Vol *button. The less-sensitive level will be set after the third flash of the Mic LED. To reset the sensitivity back to the normal level, hold down the* Mic button*, then press the down* Vol *button. The normal level will be set after the third flash of the Mic LED.*
2. *On 2000-series Digital Telephone speakerphone models that are set for low sensitivity, the Mic LED will flash at the in-use rate when using the speakerphone. When set to normal sensitivity, the Mic LED will be on steady when using the speakerphone.*

3.70 Busy Override and Camp-on Ring Tone over Handset Option

3.71 The Busy Override and Camp-on Ring tones can be sent over the telephone handset or headset, in addition to the speaker, with 2000-series digital telephones. The tones only sound over the speaker with 1000-series Digital Telephones. Perform the following procedure to have these tones sent over the handset of the DKT2010-H model: (For the DKT2010-SD, the DKT2020-S, and the DKT2020-SD models, see the Note following the procedure.)

1) Loosen the four captive screws securing the telephone base (Figure 7-1), and remove the base.

NOTE:
Although Figure 7-1 specifically illustrates how to remove an electronic telephone base, it also applies to digital telephones.

H

2) Refer to Figure 7-7, and install a strap in the **HS-BOV W409** location.

3) Reinstall the telephone base, and secure it with its four captive screws.

NOTE:
To enable Busy Override tone and Camp-on Ring tones over the handset or headset of a DKT2010-SD, DKT2020-SD, DKT2020-S model, hold down the Redial *button and press the up* Vol *button. To block the tone, hold down the* Redial *button and press the down* Vol *button.*

3.80 External Power Straps

3.81 Digital telephones equipped with options such as Integrated Data Interface Units require two-pair wiring or external power to operate efficiently at the maximum-allowed distance from the key service unit (KSU). Two-pair wiring or external power is also necessary for maximum cable run lengths for digital telephones that are connected to systems that must operate with reserve power. (See Table 9-D in Section **400-096-209** for reference.)

Each Digital telephone has two external power straps which can be cut for external power when the cabling of the telephone is connected to an external AC/DC power supply. Cut these straps in accordance with the following procedure:

1) Loosen the four captive screws securing the telephone base (Figure 7-1), and remove the base.

NOTE:
Although Figure 7-1 specifically illustrates how to remove an electronic telephone base, it also applies to digital telephones.

2) Depending on the telephone, refer to Figure 7-7, 7-8, or 7-9 and locate the **EX.POW** straps, **W101** and **W102**. Cut these straps.

3) Reinstall the telephone base, and secure it with its four captive screws.

NOTE:
Refer to ***Section 400-096-209*** *for external AC/DC power supply installation instructions.*

4 ELECTRONIC TELEPHONE UPGRADE OPTIONS

4.00 This section describes how to upgrade and configure electronic telephones for features and options.

4.10 Off-hook Call Announce Upgrade (HVSU2 or HVSU/HVSI)

4.11 Electronic telephones equipped with either the HVSU2 subassembly or the combined HVSU and HVSI subassemblies can receive Off-hook Call Announce (OCA) calls**.** These telephones also require three-pair wiring to receive OCA, instead of the standard two-pair. Telephones making OCA calls do not require an upgrade or extra wire pair.

4.12 HVSU2 Upgrade Installation. Install the HVSU2 in accordance with the following steps:

1) Loosen the four captive screws securing the telephone base (Figure 7-1), and remove the base.

2) Position the HVSU2 on the standoffs inside the base, and secure with the two provided screws (Figure 7-12).

3) Connect the HVSU2 wire plug to the **P2** connector on the printed circuit board (PCB) in the telephone (Figure 7-13).

4.13 HVSU/HVSI Upgrade Installation. Install the HVSU/HVSI subassemblies in accordance with the following steps:

1) Loosen the four captive screws securing the telephone base (Figure 7-1), and remove the base.

2) Align the **P5** connector on the HVSI subassembly with the receptacle on the HVSU subassembly (Figure 7-14). Apply firm, even pressure to the PCBs to ensure that the connectors mate properly (they should click).

H

NOTE:
Exercise care when assembling the HVSU to the HVSI to prevent damage to the connector pins; also, verify that the HVSU is aligned with the silk-screened image on the HVSI.

3) Position the HVSU/HVSI subassembly on the standoffs inside the base, and secure with the two screws provided (Figure 7-14).

4) Connect the HVSU/HVSI subassembly wire plug to the **P2** connector on the electronic telephone PCB (Figure 7-13).

5) Reinstall the electronic telephone base, and secure it with its four captive screws.

4.20 Loud Ringing Bell/Headset Upgrade (HHEU)

4.21 The Loud Ringing Bell/Headset upgrade (HHEU) enables an external speaker (HESB) and/or a headset to be connected to the electronic telephone. The HESB serves as a Loud Ringing Bell when connected to a telephone.

NOTES:
1. *There are two types of HHEU: the HHEU1 (which has four versions, **V.1** ~ **V.4**) and the HHEU2.*
2. *Only electronic telephones equipped with an HHEU2 can be wall mounted. The HHEU2 is identical to the **V.4** HHEU1, except that the HHEU2 has longer wires to accommodate wall mounting.*
3. *A Toshiba HESC-65 or HESC-65A cable is required to connect the HHEU in a digital telephone to the HESB. Refer to Section **400-096-208** for HESB installation procedures.*
4. *All HHEU versions and types, except for **V.1** HHEU1, are compatible with the Off-hook Call Announce upgrades (HVSU2 and HVSU/HVSI).*

4.22 HHEU Upgrade Installation. Install the HHEU upgrade in accordance with the following steps:

1) Loosen the four captive screws securing the telephone base (Figure 7-1), and remove the base.

2) Using a screwdriver or other suitable tool, remove the plastic tab located on the back of the base (Figure 7-1). The HHEU modular connector for the headset will be accessed through this opening.

3) If using a **V.3** or earlier HHEU1, set the **SW601** switch to the **HEADSET** position for HESB and/or headset connection (Figure 7-15). This switch is not on either the **V.4** HHEU1 or the HHEU2, because the operation is automatic with these subassemblies.

4) Connect the HESC-65 or HESC-65A cable (either one) to **P601** of the HHEU if the Loud Ringing Bell option is required (Figure 7-11). Refer to Section **400-096-208** for HESB installation procedures.

5A) For the **V.3** or earlier HHEU1**:** If only the headset is connected to the HHEU, cut both sides of the **R607** resistor on the HHEU (Figure 7-15) and then remove the resistor to eliminate electrical contact.

NOTE:
*Do not cut the **R607** resistor if connecting an HESB to the HHEU for the Loud Ringing Bell—even if a headset is also installed on the HHEU.*

5B) For the **V.4** HHEU1 or the HHEU2: If only the headset is connected to the HHEU, cut the **OCA** strap (Figure 7-15).

NOTE:
*Do not cut the **OCA** strap if connecting an HESB to the HHEU for the Loud Ringing Bell—even if a headset is also installed on the HHEU.*

6) Position the HHEU subassembly on the standoffs inside the base (Figure 7-15), and secure with the two provided screws.

8) Cut the **HHEU** strap on the telephone PCB (7-13).

NOTE:
The HHEU strap must be replaced if the HHEU PCB is removed from the telephone.

9) Reinstall the telephone base, and secure it with its four captive screws.

10) To adjust the volume of the HESB Loud Ringing Bell: Call the telephone connected to the HESB, and adjust the volume control on the back of the HESB and the ring volume control on the telephone.

4.30 Carbon Headset/Handset Straps

4.31 If a carbon-type handset or headset is connected to the handset jack on the side of the 6500-series electronic telephone, two straps inside the telephone must be cut. Cut the straps in accordance with the following steps:

NOTE:
It is not necessary to cut these straps if the headset is connected to the HHEU.

1) Loosen the four captive screws securing the telephone base (Figure 7-1), and remove the base.

2) Refer to Figure 7-13, and locate the **CARBON** straps, **W201** and **W202**. Cut both straps.

3) Reinstall the telephone base, and secure it with its four captive screws.

4.40 Beep Strap

4.41 A "beep" sounds whenever a dialpad button or feature button is pressed on an electronic telephone. This beep can be eliminated with the following procedure:

1) Remove the four captive screws securing the telephone base to the telephone (Figure 7-1), and remove the base.

2) Locate and cut the **BEEP** strap on the telephone printed circuit board (PCB) (Figure 7-13).

3) Reinstall the electronic telephone base, and secure in place using the four captive screws.

4.50 Microphone/Speaker Threshold (Speakerphones only)

4.51 High ambient noise levels may cause the speaker on the electronic telephone speakerphone models (the EKT6520-S and the EKT6520-SD) to cut off frequently. To make these telephones less sensitive to noise and to prevent the cut-off, follow the steps below:

1) Remove the four captive screws securing the base to the telephone, and remove the base (Figure 7-1).

2) Locate the **ROOM NOISE** switch on the printed circuit board (PCB) inside the telephone, and push it carefully to the **HI** (high) position (Figure 7-13).

3) Reinstall the telephone base and secure in place using the four captive screws.

H

4.60 Handset Receiver Volume-up Strap (Version 2 6500-series Telephones Only)

4.61 For **Version 2** (**V.2**) 6500-series electronic telephones only, the handset receiver volume can be increased six decibels (db) by cutting a strap inside of the telephone. Cut the strap in accordance with the following steps:

1) Remove the four captive screws securing the telephone base to the telephone, and remove the base (Figure 7-1).

2) Locate the **R-UP** strap on the printed circuit board (PCB) inside the telephone, and cut it (Figure 7-13).

3) Reinstall the telephone base, and secure in place using the four captive screws.

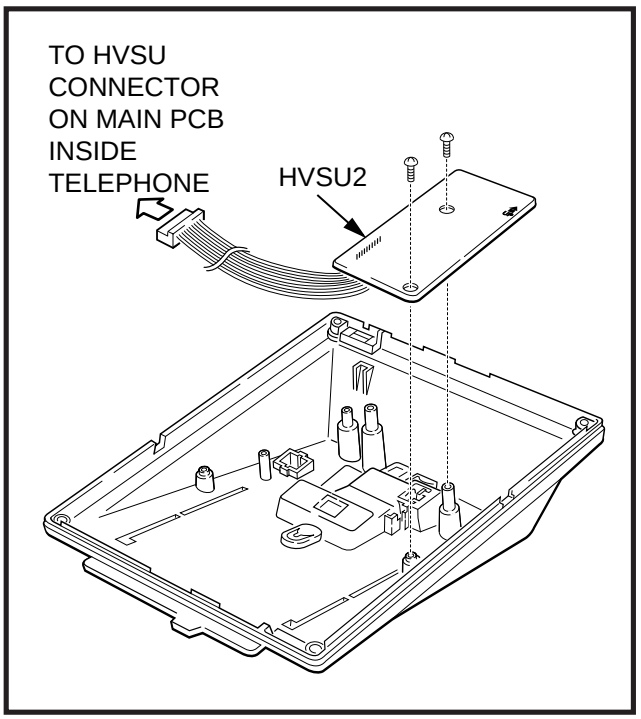


FIGURE 7-12
HVSU2 INSTALLATION FOR ELECTRONIC TELEPHONES

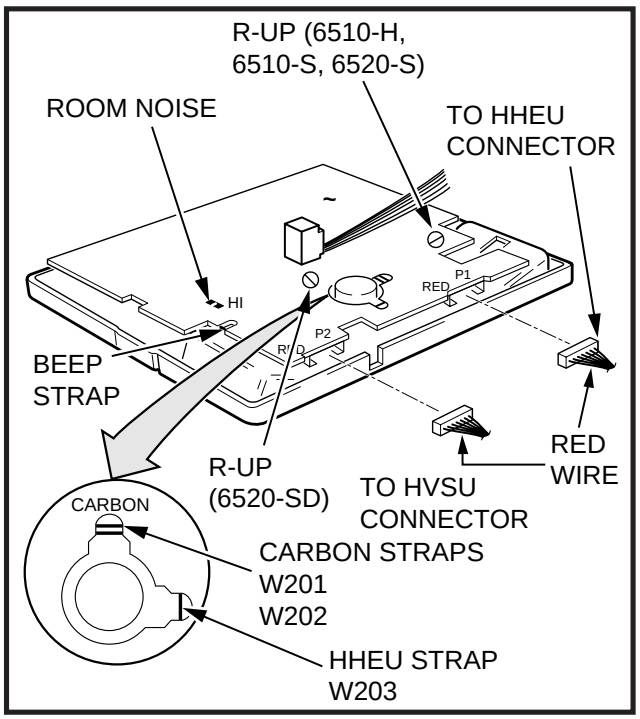


FIGURE 7-13
ELECTRONIC TELEPHONE PCB CONNECTIONS

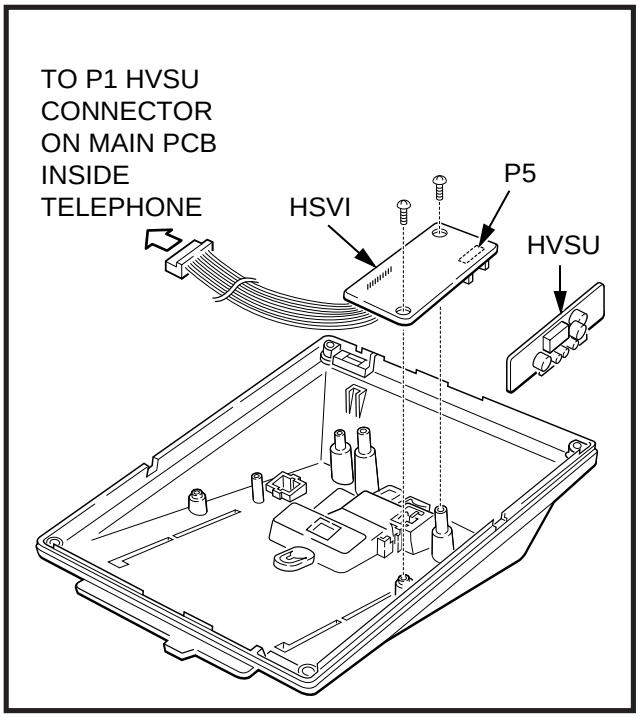


FIGURE 7-14
HVSI/HVSU INSTALLATION FOR ELECTRONIC TELEPHONES

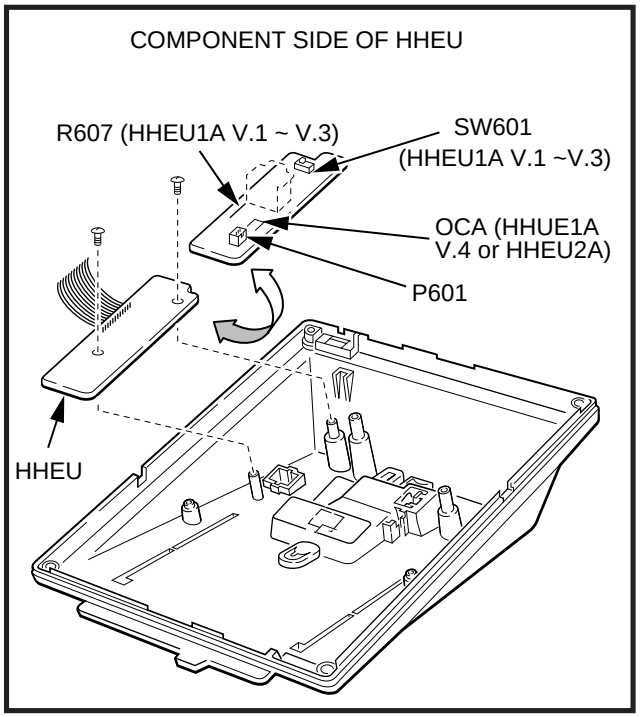


FIGURE 7-15
HHEU INSTALLATION FOR ELECTRONIC TELEPHONES

H

7) Connect the HHEU subassembly wire plug to the **P1** connector on the electronic telephone PCB (Figure 7-13).

5 DIRECT STATION SELECTION CONSOLE/SYSTEM CONNECTION

5.01 The system can support up to four Direct Station Selection consoles with PCTU1, PCTU2, PCTU3, and PCTU4. (three with PCTUS). There are two types of consoles: the DDSS console and the HDSS console. The DDSS console, available with **Release 3** and higher, can be connected to the last circuit on a PDKU. The HDSS console, compatible with any release, can be connected to the last two circuits on a PEKU. This section provides instructions on how to install both types of consoles.

5.10 DDSS Console

5.11 DDSS consoles, which can operate with a digital or electronic telephone (preferably an LCD model), can connect only to circuit 8 on the PDKU (via the MDF). Standard twisted single-pair or two-pair jacketed telephone cable (maximum 1000 feet, 303 meters) is used for the connection. To accommodate the DDSS console connection, the instrument end of the cable should be terminated in a modular station connector block (RJ-11). Refer to Wiring Diagrams, Section **400-096-209**, for wiring/interconnecting details, including cable length limitations.

NOTE:
DDSS console cable runs must not have the following:

- Cable splits (single or double)
- Cable bridges (of any length)
- High resistance or faulty cable splices

CAUTION!

When installing the DDSS cable, do not run parallel to and within 3 feet of an AC power line. AC power lines should be crossed at right (90°) angles only. In particular, avoid running station wire pairs near devices that generate electrical noise, such as neon or fluorescent light fixtures.

5.12 DDSS Console Configuration. The following considerations should be made when installing DDSS consoles:

- DDSS consoles connect only to a PDKU, Circuit 8 only.
- A maximum of four DDSS consoles can be installed per system equipped with a PCTU3 and higher.
- DDSS consoles can operate with an attendant electronic telephone, as well as with a digital one.

5.13 DDSS Programming Overview

Program 03

- Code 64 identifies the PDKU slots that support DDSS consoles.

Program 28

- Assigns DDSS console(s) to telephones.

Program 29

- Assigns button functions for DDSS consoles.

5.20 HDSS Console Connections

5.21 Each HDSS console must be connected to the data pairs of circuits 7 and 8 on a PEKU (via the MDF) with standard two-pair twisted, jacketed telephone cable. To accommodate the connection, the instrument end of the HDSS console cable should be terminated in a modular station connector block (RJ-11). Refer to Wiring Diagrams, Section **400-096-209**, for wiring/interconnecting details. The overall length of the cable run from the key service unit (KSU) to the HDSS console must not exceed 500 feet (152 meters), if using 24 AWG cable. The HDSS console can operate with either an electronic or digital telephone (preferably an LCD model).

CAUTION!

When installing the HDSS console cable, do not run parallel to and within 3 feet of an AC power line. AC power lines should be crossed at right (90°) angles only. Avoid running HDSS console wire pairs near devices that generate electrical noise, such as neon or fluorescent light fixtures.

5.22 HDSS Console Configuration. The following considerations should be made when installing

HDSS consoles:

- One PEKU PCB is required for each HDSS console. (The **DSS** switch on the PEKU must be set to DSS.)
- Two PEKU ports are required for the HDSS console (always Circuits 7 and 8).
- The PESU does not support HDSS consoles.
- A maximum of four HDSS consoles are allowed per system with PCTU1, PCTU2, PCTU3, and PCTU4. PCTUS will support three.

5.23 HDSS Programming Overview

Program 03

- Codes 23 and 24 identify slots that support PEKUs that will interface with HDSS consoles.

Program 28

- Assigns HDSS console(s) to telephones.

Program 29

- Assigns individual button functions for HDSS consoles.

6 DOOR PHONE/LOCK CONTROL UNIT AND DOOR PHONE INSTALLATION

6.01 This section provides installation instructions for both the digital (DDCB) and electronic (HDCB) door phone/lock control units. It also includes installation instructions for the door phone (MDFB). Each DDCB, available with **Release 4** only, or HDCB can support as many as three door phones (MDFBs), or two MDFBs and one door lock.

6.02 Systems equipped with PCTU (1, 2, 3, 4) can support up to 12 MDFBs, and STRATA DK24 systems with PCTUS can accommodate up to nine MDFBs.

6.03 DDCBs and HDCBs can only connect to ports 04, 12, 20, and 28. DDCBs can only connect to PDKU circuits (always Circuit 5) associated with these ports, and HDCBs to PEKU or PESU electronic telephone circuits (always Circuit 5) which align with them.

NOTE:
DDCBs and HDCBs cannot connect to standard telephone circuits on the PSTU or PESU.

6.10 DDCB/HDCB and MDFB Cabling

6.11 Refer to Section **400-096-209** for HDCB/DDCB and MDFB wiring/interconnecting details. For door lock control installation procedures, refer to Section **400-096-208**. The length of the cable run from the key service unit (KSU) to the MDFB (via the HDCB/DDCB) must not exceed 1,000 feet (305 meters), if using 24 AWG cable.

NOTES:

1. *DDCB cable runs must not have the following:*
   - *Cable splits (single or double)*
   - *Cable bridges (of any length)*
   - *High resistance or faulty cable splices*
2. See Section **400-096-209** for secondary protector information.

6.20 DDCB/HDCB Wall Mounting

6.21 The DDCB and HDCB are designed to be mounted on a wall or other vertical surface. Mount the units in accordance with the following steps:

1) Locate the two mounting holes on the right-hand side on the DDCB/HDCB (Figure 7-16).

2) Remove the side cover from the DDCB/HDCB to expose the two left-hand mounting holes (Figure 7-16).

3) Position the DDCB/HDCB adjacent to the key service unit (KSU) with regard to wiring needs.

4) Secure the DDCB/HDCB to the mounting surface with four one-inch panhead wood screws.

6.30 Door Phone (MDFB) Wall Mounting

6.31 Mount door phones (MDFBs) to a wall or vertical surface in accordance with the following steps:

1) Remove the screw from the bottom of the cover. Detach the cover from the base and metal frame (Figure 7-17).

2) Position the metal frame and base to the

mounting surface and secure with two one-inch panhead wood screws (Figure 7-17).

3) Attach cover to the metal frame and base.

6.32 Door Phone Volume Control. Adjust the ring and voice volume to the MDFB in accordance with the following procedure:

1) Remove the screw from the bottom of the cover. Detach the cover from the base and metal frame (Figure 7-17).

2) The volume level is changed by a screw adjustment on the back of the MDFB. Turn the screw with a flat-tipped screwdriver while ringing the MDFB or while on a call with it. The volume level will change as the screw is turned.

6.40 Door Phone/Lock Programming Considerations

6.41 The following programs should be considered when programming the system for door phones:

Program 03

- Slots supporting door phones do not require a special PCB code.

Program 39

- Assigns door phone and door lock buttons to electronic and digital telephones**.**

Program 77-1

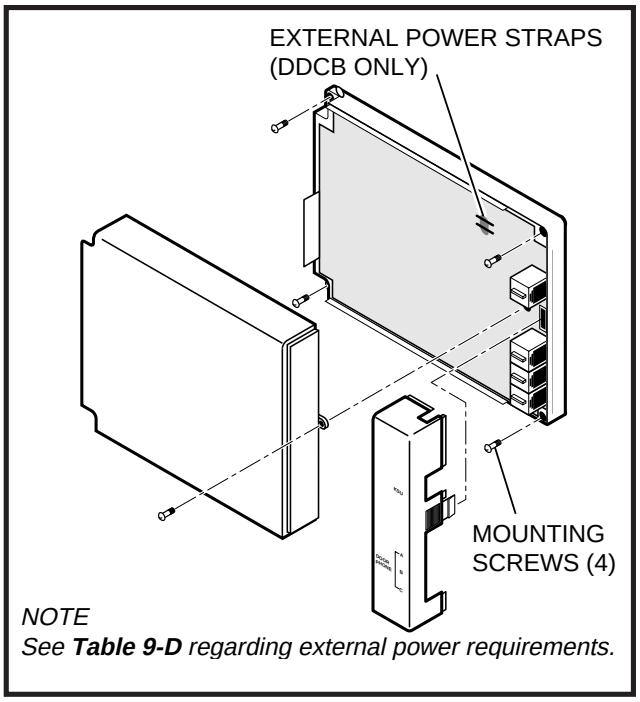
- Assigns DDCBs and HDCBs to ports, door phone ringing over External Page during the NIGHT mode, and door lock activation time.

Program 77-2

- Used to busy out unused MDFB positions and to identify which DDCBs/HDCBs support the door lock option, and to set the door phone to ring one or five times.

Program 79

- Assigns door phone-to-station ringing assignments.



NOTE
*See **Table 9-D** regarding external power requirements.*

FIGURE 7-16
DOOR PHONE/LOCK CONTROL UNIT (DDCB/HDCB) INSTALLATION

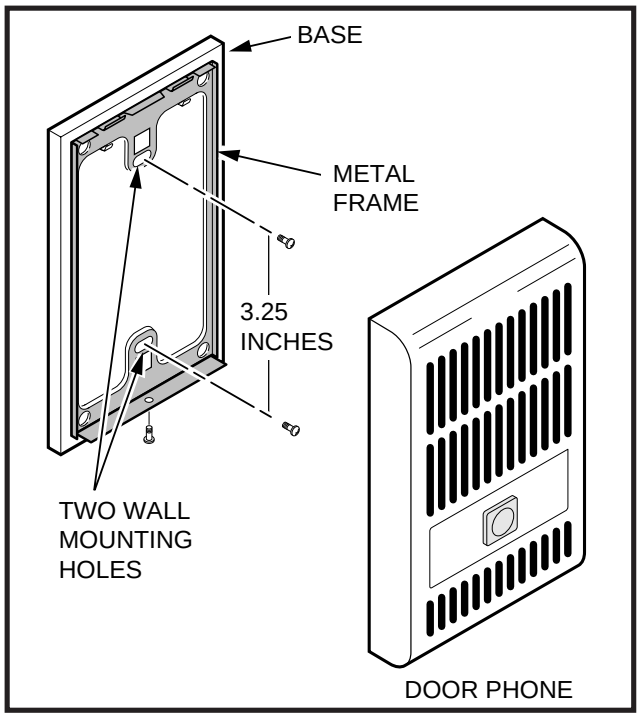


FIGURE 7-17
DOOR PHONE (MDFB) INSTALLATION

Strata® DK24/56/96

RELEASE 1, 2, 3, and 4

INSTALLATION

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Chapter Eight
PERIPHERALS INSTALLATION

TABLE OF CONTENTS

H

FIGURE LIST

FIGURE LIST (continued)

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1 GENERAL

1.00 This chapter provides connection procedures for optional peripheral equipment to STRATA DK systems. The instructions for each option include hardware requirements, printed circuit board (PCB) configuration, interconnection/wiring requirements, and programming considerations.

1.01 Peripheral equipment is connected to system PCBs. Refer to PCB Installation, Section **400-096-206,** for PCB installation and configuration information.

2 RESERVE POWER/POWER FAILURE OPTIONS

2.00 STRATA DK systems offer two options to protect system operation in the event of a power failure: the Reserve Power option and the Power Failure Emergency Transfer option.

2.10 Reserve Power Option

2.11 STRATA DK system power supplies can be equipped with a reserve power source (battery backup) to ensure uninterrupted system operation in the event of a power failure. A pre-assembled interface cable for installation of the Reserve Power option (PBTC-3M) is available from Toshiba.

WARNING!

To reduce the risk of fire or injury to persons, read and follow these instructions:

1. ***Use only the following type and size batteries: 12-volt, gelcell.***
2. ***Do not dispose of the batteries in a fire. The cells may explode. Check with local codes for possible special disposal instructions.***
3. ***Do not open or mutilate the batteries. Released electrolyte is corrosive and may cause damage to the eyes or skin. It may be toxic if swallowed.***
4. ***Exercise care in handling batteries in order not to short the battery with conduction materials such as rings, bracelets, and keys. The battery or conductor may overheat and cause burns.***
5. ***Charge the batteries provided with or identified for use with this product only in accordance with the instructions and limitations specified in this manual.***
6. ***Observe proper polarity orientation between the batteries and battery charger.***
7. ***Enclose batteries in acid-proof containers according to local ordinances.***

2.12 Refer to KSU Installation, Section **400-096-205**, for reserve power battery site requirements.

IMPORTANT NOTE!

Local ordinances may dictate battery type and installation details.

2.13 Reserve Power Installation. Install the Reserve Power option in accordance with the following steps: (Refer to Figure 8-1.)

1) Connect the **PBTC-3M** black jumper wire from the positive terminal of one 12VDC battery to the negative terminal of the second 12VDC battery.

2) Ensure that a serviceable 10-ampere fuse is installed in the in-line fuse holder of the **PBTC-3M** battery cable.

3) Connect the white lead of the **PBTC-3M** battery cable to the open positive terminal of the 12VDC battery. Connect the black lead to the open negative terminal of the second 12VDC battery.

IMPORTANT NOTE!

The KSU must be connected to the AC power source and the power supply ON/OFF switch set to ON before connecting the reserve power batteries to the power supply via the BATT +/- receptacle. If the batteries are connected after AC power is lost, reserve power will not function.

4) Connect the **PBTC-3M** battery cable two-prong male plug to the power supply BATT +/- receptacle.

5) To test reserve power operation, disconnect the system AC power plug with the power supply power switch in the **ON** position. The system should continue to operate without any interruption.

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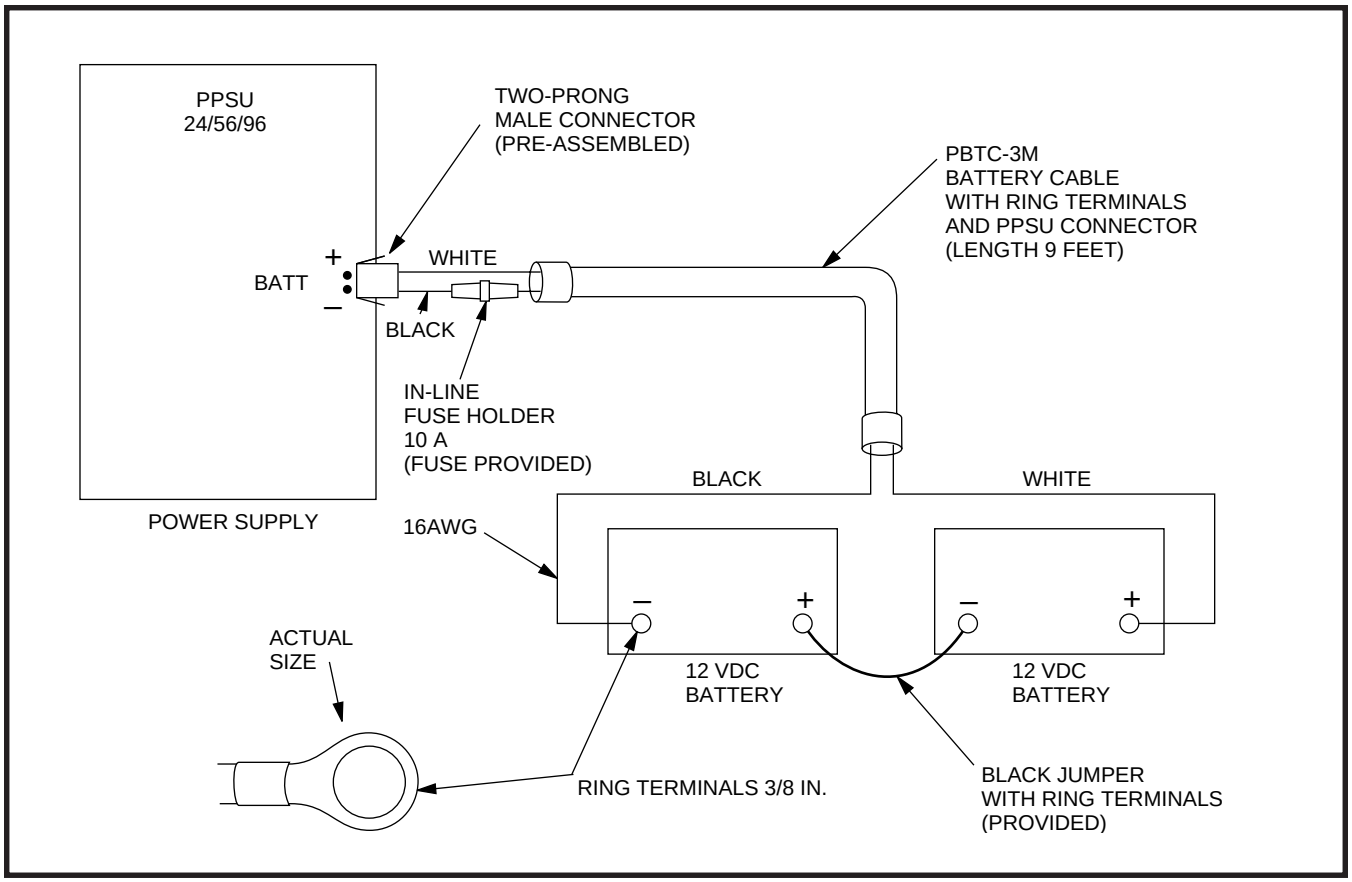

FIGURE 8-1
RESERVE POWER/BATTERY WIRING

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2.20 Power Failure Emergency Transfer Option

2.21 The Power Failure Transfer Unit (DPFT) provides a means of automatically connecting up to eight selected CO lines directly to designated standard telephones in the event of a power failure. The DPFT allows normal operation of the selected CO lines and standard telephones when the system is in service. When power is restored, each telephone is independently reconnected to the system after that telephone is finished with its direct CO line call. The DPFT is normally installed on the Main Distribution Frame (MDF).

2.22 Figure 8-2 provides a circuit diagram of the DPFT.

2.23 Power Failure Emergency Transfer Installation. Install the DPFT in accordance with the following steps:

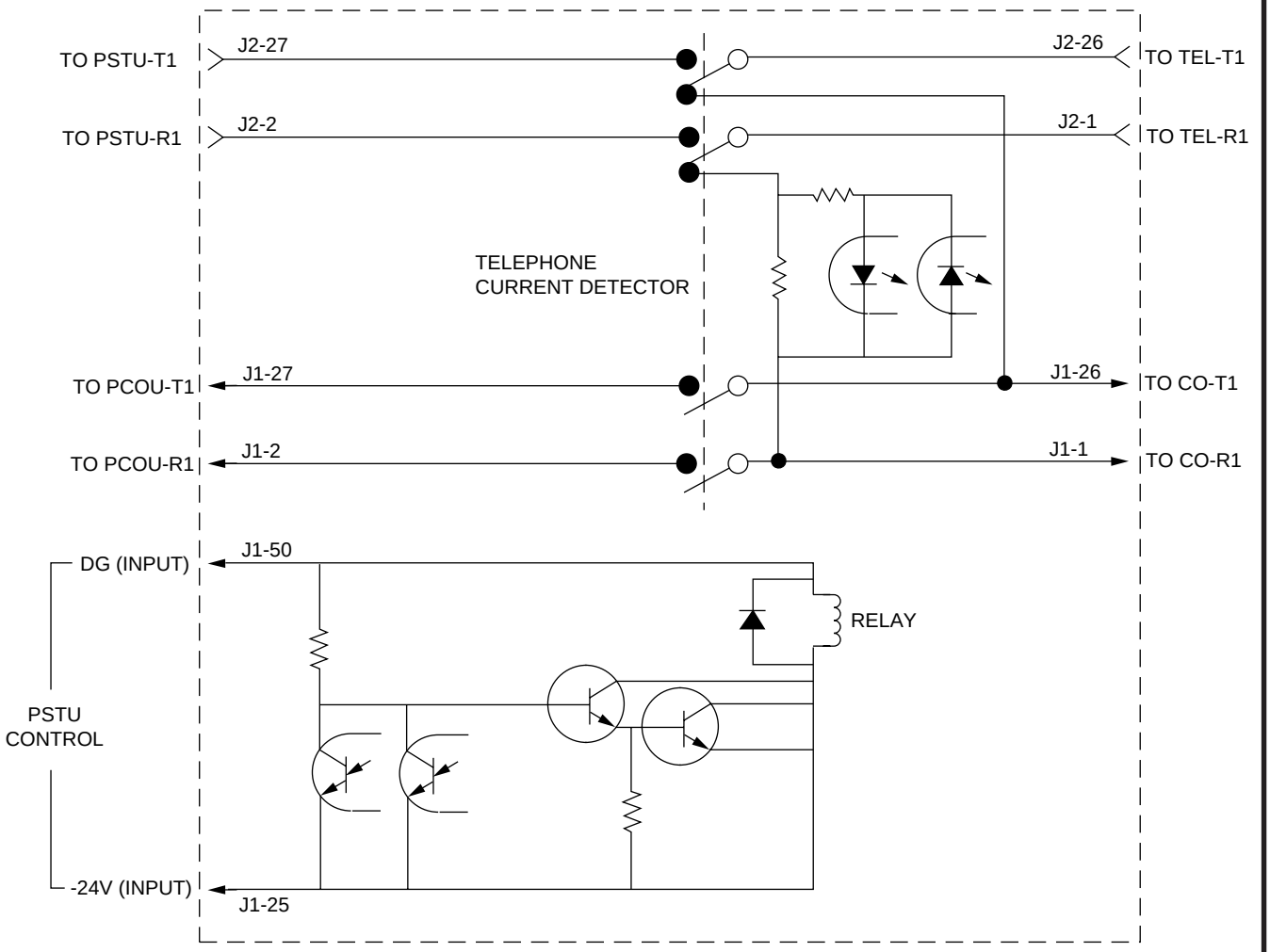
1) Mount the DPFT on or near the MDF.

NOTE:
*Refer to Wiring Diagrams, Section **400-096-209**, DPFT/MDF interconnecting tables.*

2) Using 25-pair cables with amphenol-type connectors (female for DPFT connector **J1**, male for DPFT connector **J2**), connect the DPFT to two 66-type quick-connect blocks.

3) Connect the CO lines selected for emergency use to the DPFT **J1**-block “CO-TIP” and “CO-RING” terminals.

4) Connect the PCOU or PCOU2 circuits related to the emergency CO lines to the DPFT **J1**-block “PCOU-TIP” and “PCOU-RING” terminals.



NOTES:
1. Representation of first of eight circuits.
2. Conditions shown with AC power (-24VDC) off.

FIGURE 8-2
DPFT CIRCUIT DIAGRAM

5) Connect the standard telephone stations selected for emergency use to the DPFT **J2**-block "TEL-TIP" and "TEL-RING" terminals.

6) Connect the PSTU circuits related to the emergency standard telephones to DPFT **J2-**block "PSTU-TIP" and "PSTU-RING" terminals.

7) Connect the DPFT to the PSTU DG and -24V terminals (refer to Wiring Diagrams, Section **400-096-209**, for PSTU and PCOU wiring/ interconnecting details).

NOTE:
The -24V and DG ground terminals are available on the PSTU only, not on the PESU.

8) To test the operation of the DPFT, turn the system power switch **OFF**, and verify that CO dial tone is available at each standard telephone connected to the DPFT. Also, call back to each telephone using an outside line.

3 MUSIC-ON-HOLD (MOH)/BACKGROUND MUSIC (BGM) OPTIONS

3.00 STRATA DK systems provide a MOH option for CO/E & M TIE lines and telephones connected to the system. A variety of BGM options are also provided. (Refer to Figure 8-3.)

3.10 MOH Option

3.11 The PCTU and the PCTUS can both support an external, customer-provided music source—such as a tuner, compact disc player, or tape player—for MOH. The PIOU, PIOUS, and PEPU each has a relay contact on it that can be configured to automatically turn the source on when a CO line or station is placed on hold. MOH source and MOH relay contact specifications are as follows:

- **MOH Source Specifications**
  - Input Impedance: 600 ohms
  - Input Voltage (recommended levels)
    - Minimum: 0.14 VRMS (-15 dBm)
    - Maximum: 0.77 VRMS (0 dBm)
- **Relay Contact Specifications**
  - Voltage: 24VDC maximum
  - Current: 1 ampere maximum

IMPORTANT NOTICE!
MUSIC-ON-HOLD

In accordance with U.S. Copyright Law, a license may be required from the American Society of Composers, Authors, and Publishers (ASCAP), or other similar organization, if copyrighted music is transmitted through the Music-on-Hold feature of this telecommunications system. Toshiba America Information Systems, Inc., hereby disclaims any liability arising out of the failure to obtain such a license.

3.12 MOH Installation. Install the MOH option in accordance with the following steps: (Refer to Figure 8-3.)

1) Connect the external music source to the PCTU or PCTUS connector terminal **P6.**

2) Rotate the PCTU or PCTUS volume control (**VR1**) to adjust MOH volume: clockwise increases volume; counterclockwise decreases volume. Listen to the CO line on-hold when setting MOH to the proper volume.

3) If MOH relay control is required, access **Program 77-1**. Set LED 05 to ON to configure the MOH/Night Transfer Control relay for the MOH function. This feature requires the installation of a PIOU, PIOUS, or PEPU PCB.

4A) If utilizing the MOH Control feature with a PIOU or PEPU, set PIOU or PEPU jumper plug **P11** to the **MAKE** or **BREAK** position as required:
- **MAKE (M)**—Shorts the normally open contacts (pins 9 and 34) when MOH is activated.
- **BREAK (B)**—Opens the normally closed contacts (pins 9 and 34) when MOH is activated.

4B) If utilizing the MOH Control feature with a PIOUS, solder PIOUS jumper **W2** to the **MAKE** or **BREAK** position as required:
- **MAKE (M)**—Shorts the normally open contacts (NHT and NHR) when any CO line is in the hold condition.
- **BREAK (B)**—Opens the normally closed contacts (NHT and NHR) when any CO line is in the hold condition.

5) MOH (CO line or intercom hold) is applied from the PCTU or PCTUS through the KSU cabinet's backplane to the PEMU, PCOU, PDKU, PEKU, PESU, and PSTU to provide MOH for E & M TIE lines, CO lines, electronic, digital, and standard telephones.

6) MOH is also applied through the PCTU or PCTUS Page/BGM control to provide BGM to electronic/digital telephone speakers and external page. (Refer to Paragraph **3.20**.)

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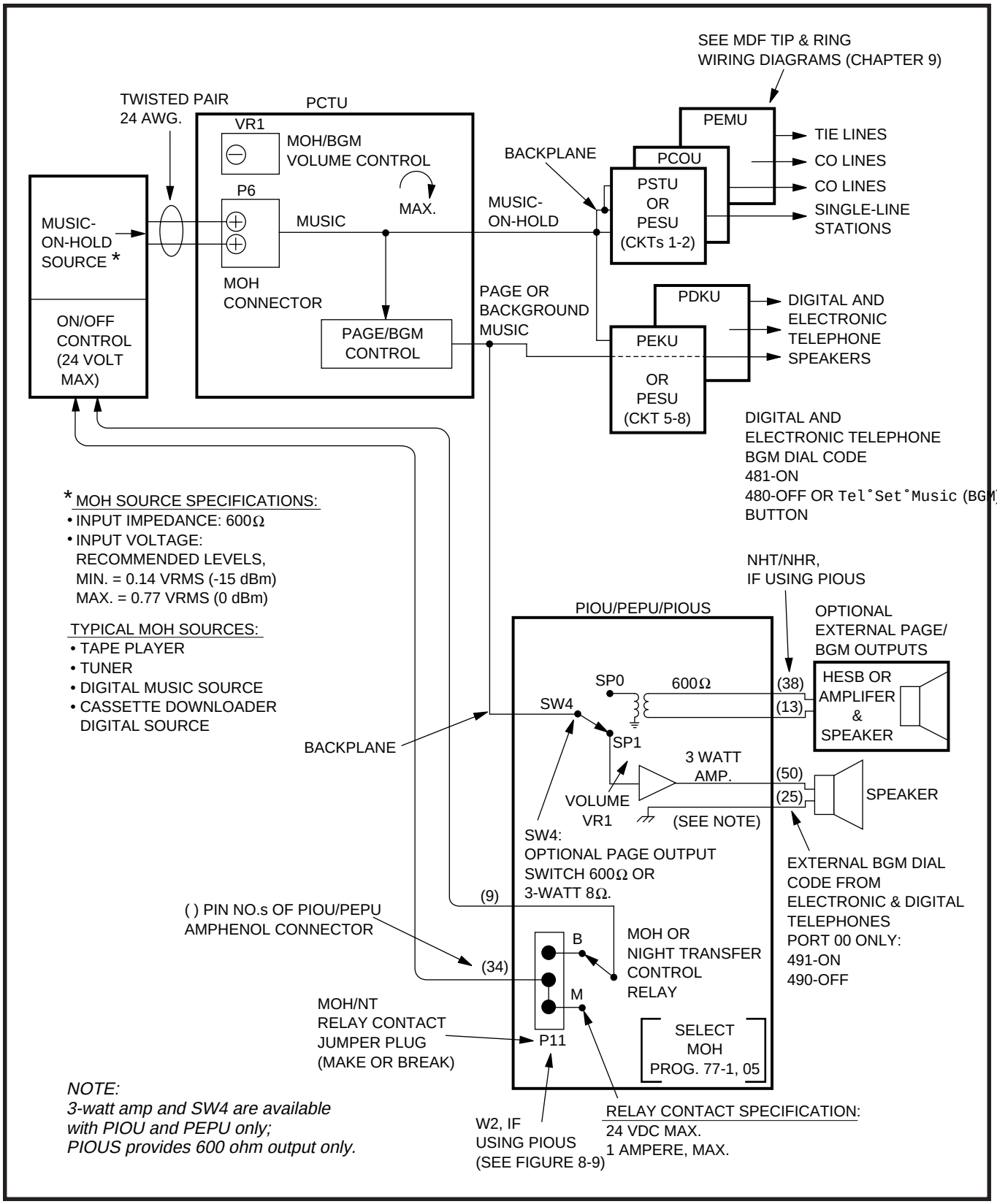

FIGURE 8-3
MUSIC-ON-HOLD AND BACKGROUND MUSIC FUNCTIONAL DIAGRAM

3.20 BGM Options

3.21 The BGM options allow music to play over optional external speakers (external page system) and/or digital and electronic telephone speakers. The system allows BGM to be configured any of the three ways described below:

1) Configuration A—one music source: This configuration allows BGM and MOH to share the same music source. (See Figure 8-4.) With this configuration, the MOH/BGM music source is connected to the **P6** terminal on the PCTU or PCTUS PCB. The music source is sent to CO lines/stations on hold, to electronic/digital telephone speakers, and to the external page system via either the PIOU, PIOUS, or PEPU optional PCB.

NOTE:
Telephone users can turn on BGM at their station by pressing the ***TelíSetíMusic*** *(****BGM****) button; or by pressing the* ***Intercom*** *(****INT****) button and dialing* ***4 8 1****.*

2) Configuration B—two music sources: Available with **Release 2** and higher, this configuration allows the MOH source to be connected to the **P6** terminal of the PCTU or PCTUS PCB (as in Configuration A) and a separate BGM source to be connected to either a PEKU (Circuit 3), a PESU (Circuit 8), or, with **Release 4**, a PSTU (Circuit 3 or 8) PCB (see Figures 8-5 and 8-6). With this configuration, the MOH source is sent only to CO lines/stations on hold, while the BGM source is sent directly to electronic/digital telephone speakers and to the external page system via either the PIOU, PIOUS, or PEPU.

3) Configuration C—three music sources: This configuration allows the MOH source to be connected to the **P6** terminal of the PCTU or PCTUS (as in Configuration A). The digital or electronic telephone BGM source is connected to either a PEKU, a PESU, or PSTU PCB (as in Configuration B), and a separate BGM source is sent to the external page speakers via the PIOU PCB (see Figure 8-7). When a separate BGM source is connected to the PIOU, two customer-supplied amplifiers are required to drive the external speakers. One amplifier drives the speakers for BGM when page is idle and the other amplifier drives the speakers during page. The PIOU switches BGM or page to the external speakers via zone relays. (The PIOUS and PEPU do not

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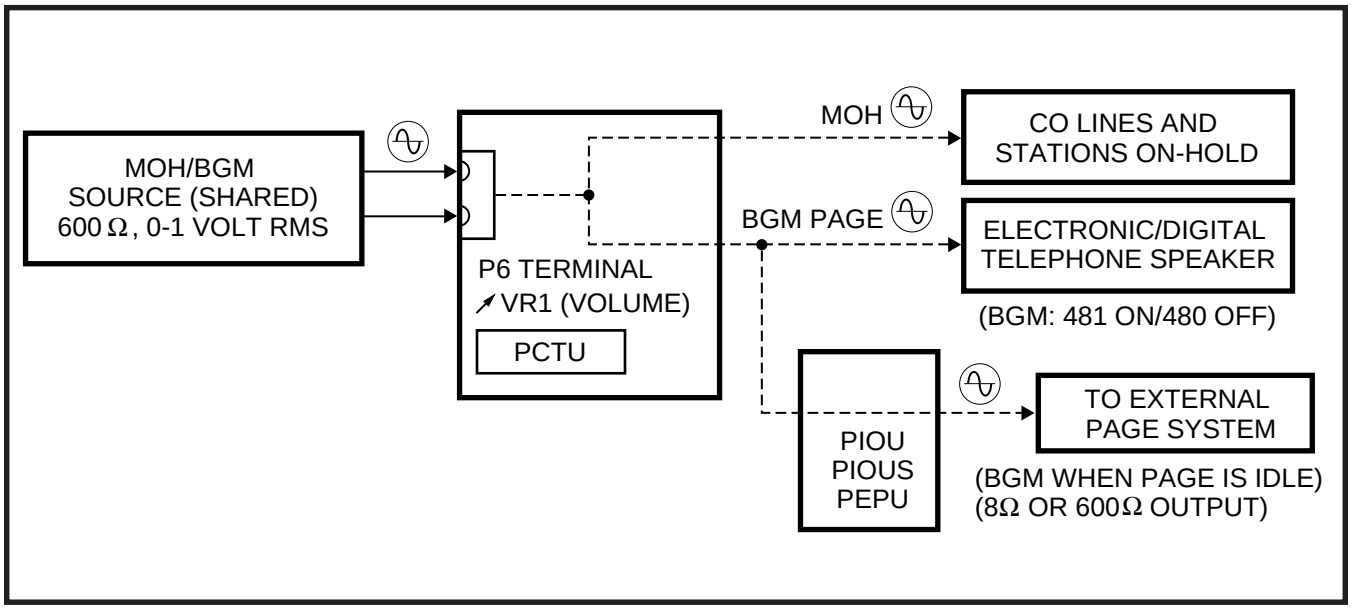


FIGURE 8-4
MUSIC SOURCE CONFIGURATION A

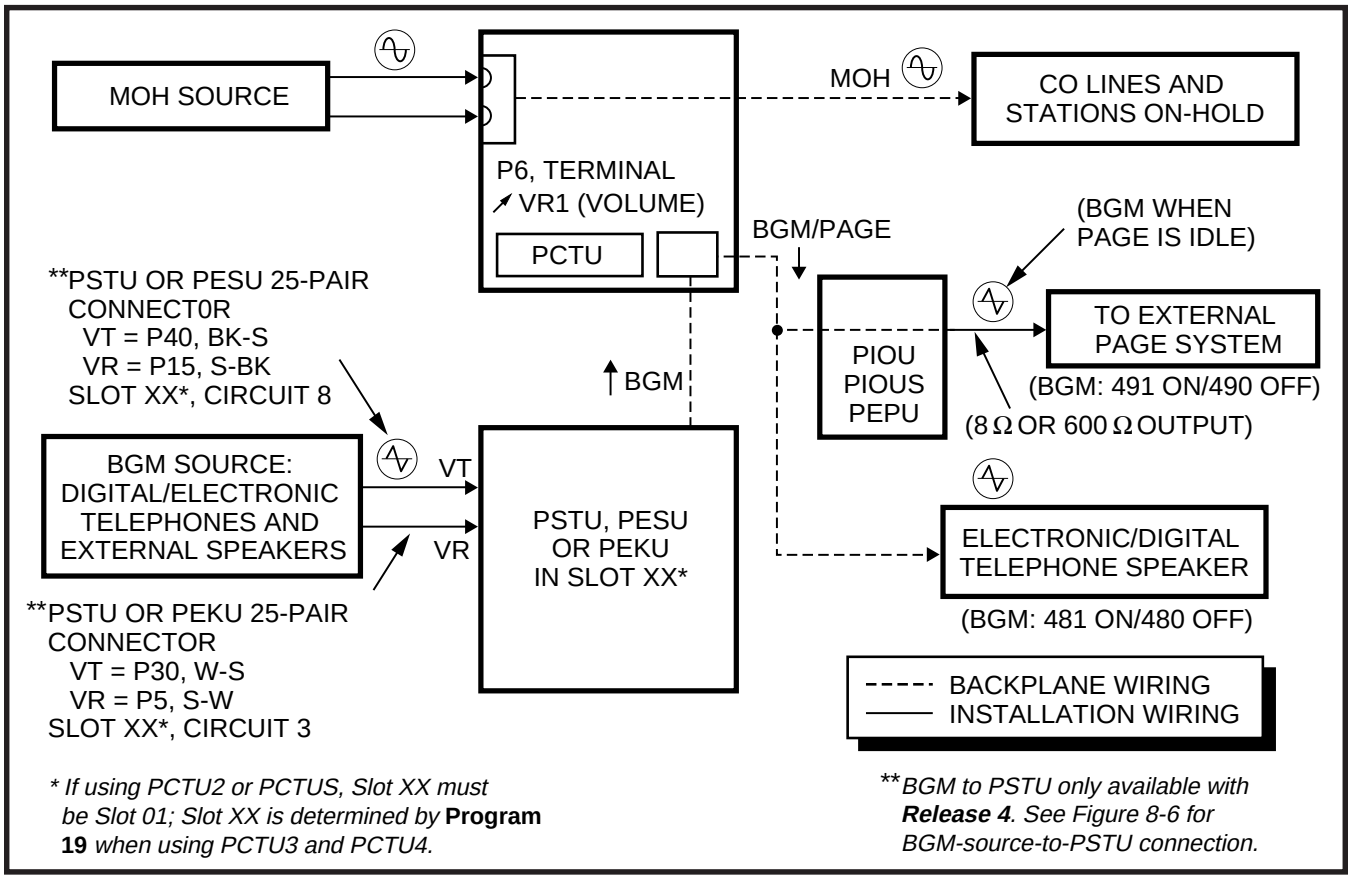


FIGURE 8-5
MUSIC SOURCE CONFIGURATION B

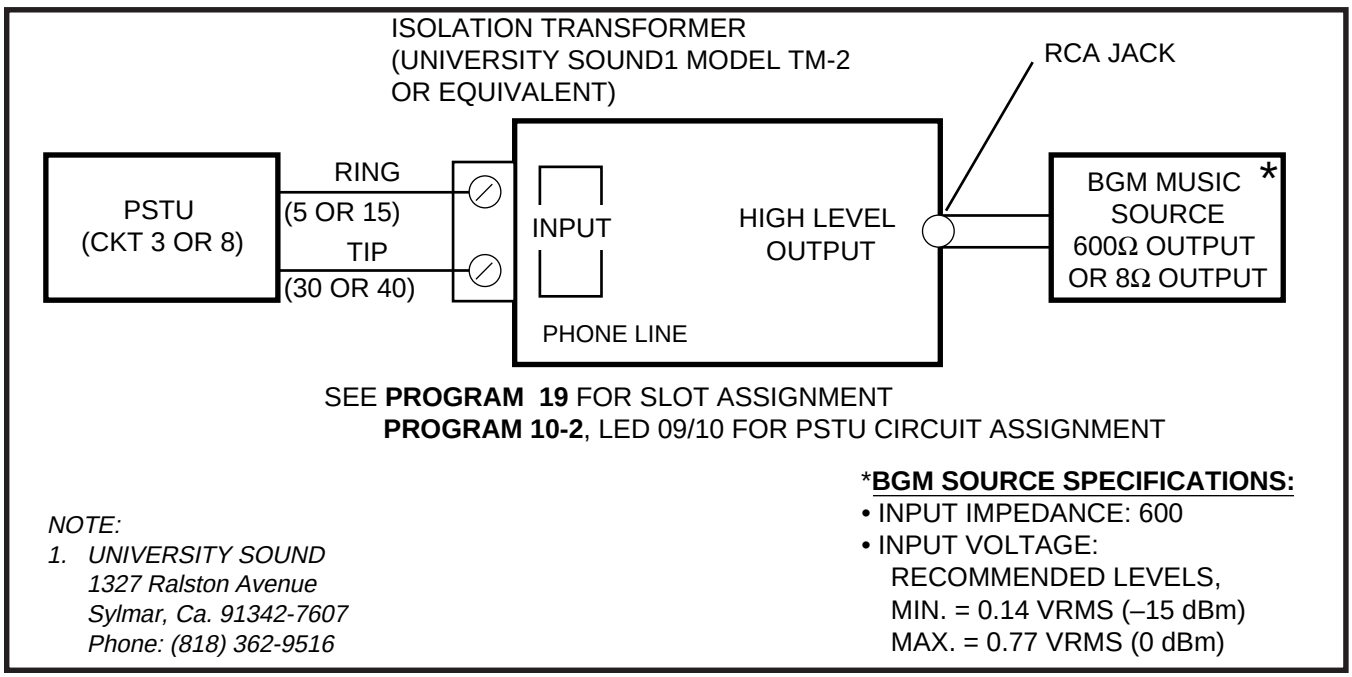


FIGURE 8-6
BGM SOURCE TO STANDARD TELEPHONE PORT CONNECTION

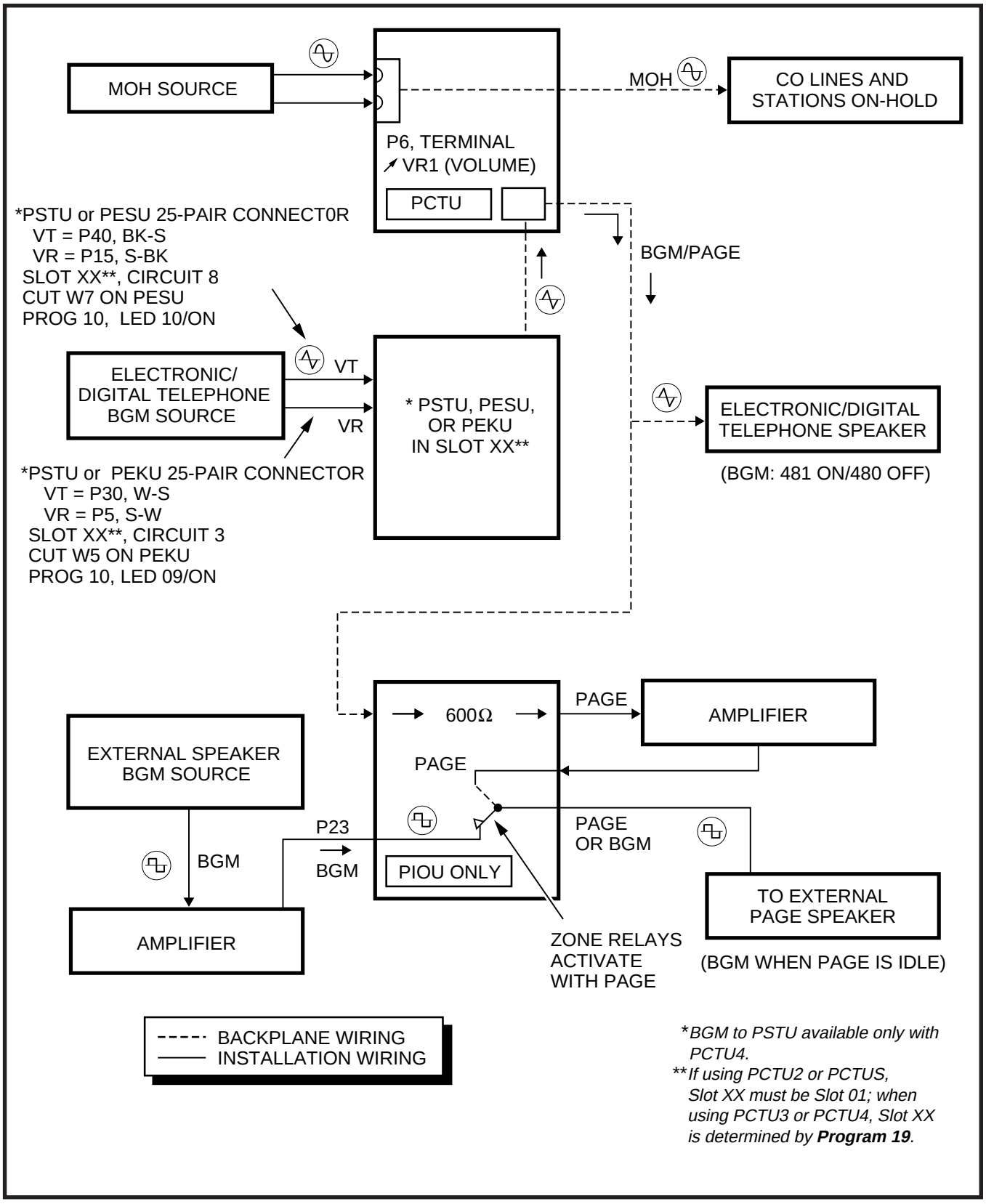


FIGURE 8-7
MUSIC SOURCE CONFIGURATION C

provide zone relays; therefore Configuration C is not possible with these PCBs.)

NOTES:
1. *BGM can be connected to the PSTU also with **Release 4.***
2. *With **Release 3** and higher, the PCB connected to the BGM source can be installed in any slot; it must be in Slot 01 in with **Release 1** or **2**.*

3.22 MOH Source as BGM Installation. Install the MOH/BGM option in accordance with the following steps: (Refer to Figure 8-3.)

1) Ensure that the MOH option is installed in accordance with Paragraph **3.12**.

2) The output of the PCTU or PCTUS page/BGM control is applied through the backplane to the output select switch (**SW4**) on the PIOU or PEPU.

NOTE:
The PIOUS provides non-amplified BGM/page output only (SPT and SPR). See Figure 8-9.

3) Set the **SW4** switch to either **SPO** or **SPI,** as required:
   - **SPO—**Directs external page and non-amplified BGM to the HESB or external amplifier (pins 13 and 38).
   - **SPI—**Directs external page and BGM through the on-board 3-watt amplifier to the external speaker output (pins 25 and 50).

4) When using an HESB or external amplifier for paging/BGM, adjust volume using the HESB or amplifier volume control.

5) When using the internal amplifier for paging/BGM, adjust the volume using the volume control (**VR1**) on the PIOU/PEPU PCB.

3.23 BGM Source to PEKU, PESU, or PSTU Installation. A BGM source can be connected to either a PEKU, PESU, or PSTU to send music to all electronic/digital telephone speakers and to the external page system via a PIOU, PIOUS, or PEPU. The BGM source is separated from the MOH source connected to the PCTU or PCTUS PCB. Connect the BGM source to the PEKU, PESU, or PSTU in accordance with the following steps (Figure 8-5):

NOTES:
1. ***Releases 1** and **2** require that the PCB connected to the BGM source must be in slot 01; **Release 3** and higher allows the PCB to be in any slot assigned in **Program 19**.*
2. *The BGM source can be connected to either a PEKU or PESU with **Releases 2** and **3**. The BGM source can be connected to either the PEKU, PESU, or PSTU with **Release 4**.*

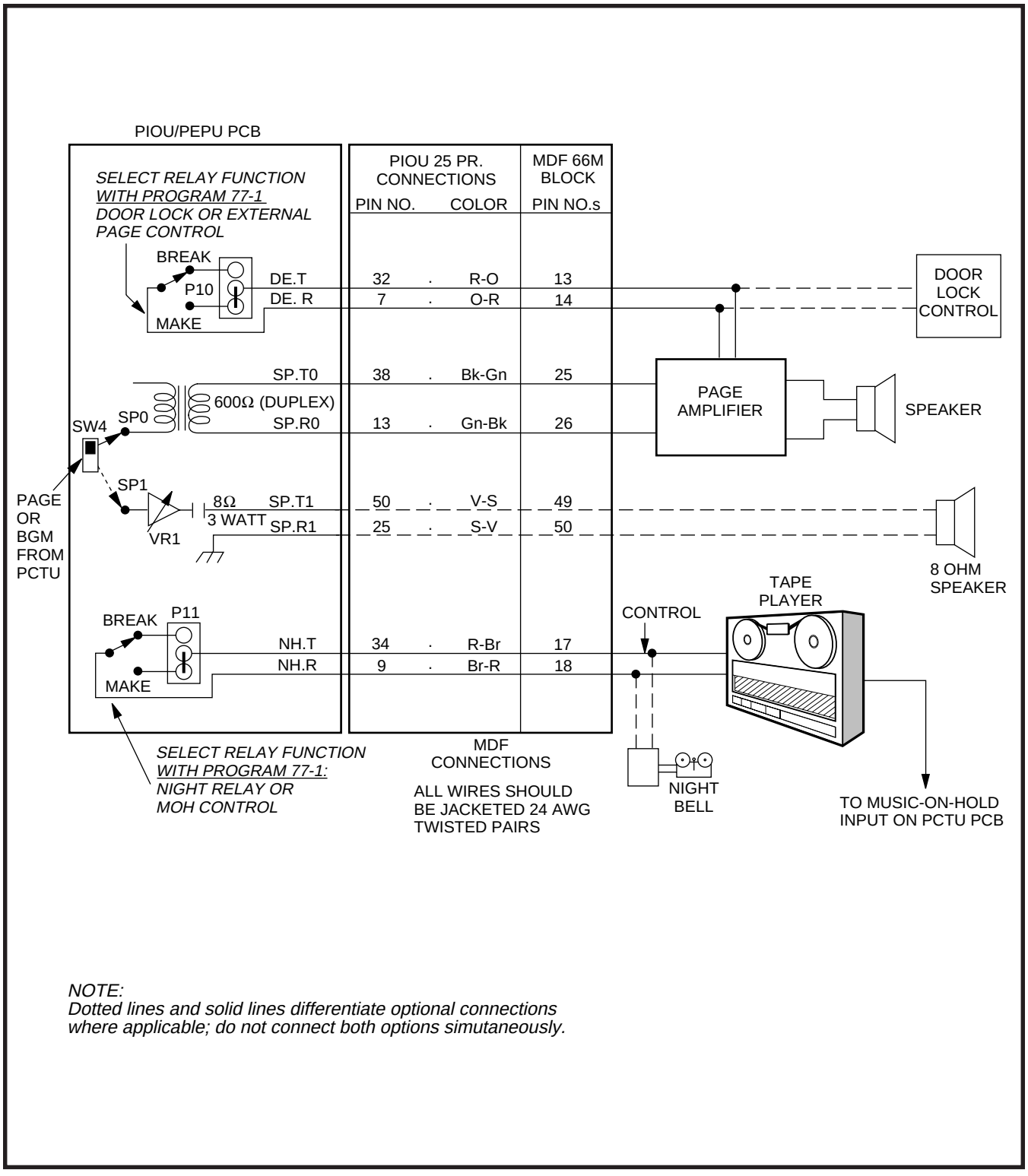
1) Access **Program 10-2**. Set LED 09 to ON, if the BGM source will be connected to Circuit 3 on a PEKU or PSTU. If the source will be connected to Circuit 8 on a PESU or PSTU, set LED 10 to ON.

NOTE:
*If using PCTU3 or PCTU4, identify the BGM slot with **Program 19**.*

2A) If connecting the BGM source to a PEKU or PESU: Connect the PEKU tip and ring of Circuit 03 to the 600 Ω output of the BGM source per Figure 8-5, or connect the BGM output to Circuit 8 of a PESU.

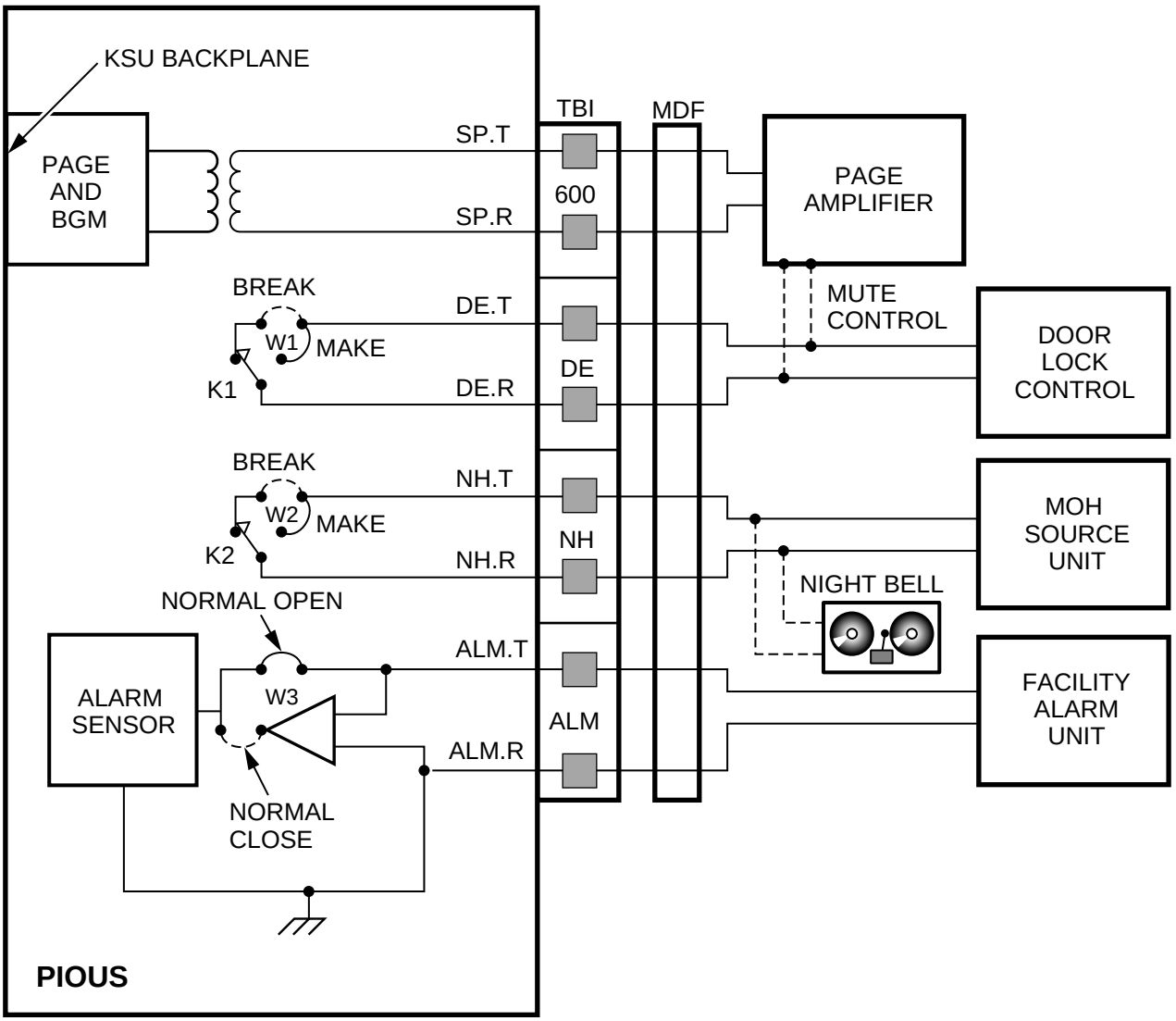
2B) If connecting the BGM source to a PSTU: Connect Circuit 3 or 8 of the PSTU to a customer-supplied isolation transformer and BGM source per Figure 8-6.

NOTE:
The isolation transformer protects the BGM source from potentially damaging PSTU voltage. Some music sources which are designed



NOTE:
Dotted lines and solid lines differentiate optional connections where applicable; do not connect both options simutaneously.

FIGURE 8-8
PIOU/PEPU RELAY CONTROL FUNCTIONAL WIRING DIAGRAM



- *All wiring connections must be 24 AWG twisted pairs.*

RELAY OPTIONS:

- K1 (DE): DOOR LOCK OR AMP MUTE CONTROL; PROGRAM 77-1, LED 07
- K2 (NH): NIGHT RELAY OR MUSIC-ON-HOLD CONTROL; PROGRAM 77-1, LED 05
- K1 & K2: 24VDC, 1 AMP MAXIMUM

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FIGURE 8-9
PIOUS RELAY CONTROL FUNCTIONAL WIRING DIAGRAM

for telephone system applications may have this protection built-in and do not require the transformer. (Consult the documentation provided with the music source.)

3) Cut **W5** on the PEKU or **W7** on the PESU PCB that the BGM source is connected to. There is no strap to cut on the PSTU.

4) Using the BGM source's volume control, adjust the BGM volume to the desired level while listening to BGM via a telephone speaker and/or the external page speakers. When BGM is sent to external speakers via a PIOU or PIOUS or PEPU PCB, use the external amplifier volume control to balance the BGM and page volume levels.

3.24 External BGM Installation. The external BGM options are closely associated with the external paging options. Refer to Paragraph **6** for external paging amplifier installation.

4 RELAY CONTROL OPTIONS AND DOOR LOCK CONTROL

4.00 Two relays are provided on the PIOU, PIOUS, and PEPU PCBs to control the operation of peripheral equipment (see Figures 8-8 and 8-9):
- External Page/Door Lock Relay (DET/DER)
- Night Transfer/Music-on-Hold Relay (NHT/NHR)

4.01 Each relay may be configured to provide one of two possible control functions. Additionally, each relay may be configured as normally open (MAKE) or normally closed (BREAK). Electrical specifications for the relay contacts are as follows:

Voltage:
- 24VDC maximum

Current:
- 1 ampere maximum

CAUTION!
Do not connect relays directly to 120VAC power source.

NOTE:
*Refer to the Programming Procedures, Section **400-096-300**, as necessary when instructed to program the PIOU, PIOUS, or PEPU in the following paragraphs.*

4.10 External Page/Door Lock Relay Options with PIOU, PIOUS, or PEPU.

4.11 The External Page/Door Lock Relay may be programmed for either the external page function or the door lock control function. (Refer to Figures 8-8 and 8-9.)

4.12 When configured in **Program 77-1** for the external page function, the relay controls an external music source connected to the PIOU, PIOUS or PEPU to provide Background Music (BGM) over external speakers. When a paging announcement is made over the external speakers, the external page relay mutes the BGM.

4.13 When configured in **Program 77-1** for the door lock control function, the relay controls an external door lock. When a door lock button at a digital or electronic telephone is pressed, the door lock control relay unlocks the door for 3 or 6 seconds, as specified in programming.

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4.14 External Page Control. Configure the PIOU, PIOUS, or PEPU for the external page mute function in accordance with the following steps: (Refer to Figure 8-8 or 8-9.)

1) Access **Program 77-1**. Set LED 07 to OFF to configure the External Page/Door Lock Relay for the external page function.

2A) If using a PIOU or PEPU, set the jumper plug **P10** on the PIOU or PEPU jumper plug to the **MAKE** or **BREAK** position as required:
- **MAKE**—Shorts the normally open contacts (pins 7 and 32) when external page is activated.
- **BREAK**—Opens the normally closed contacts (pins 7 and 32) when external page is activated.

2B) If using a PIOUS, solder the jumper **W1** on the PIOUS to the **MAKE** or **BREAK** position as required:
- **MAKE—**Shorts the normally open contacts (DET and DER) when external page

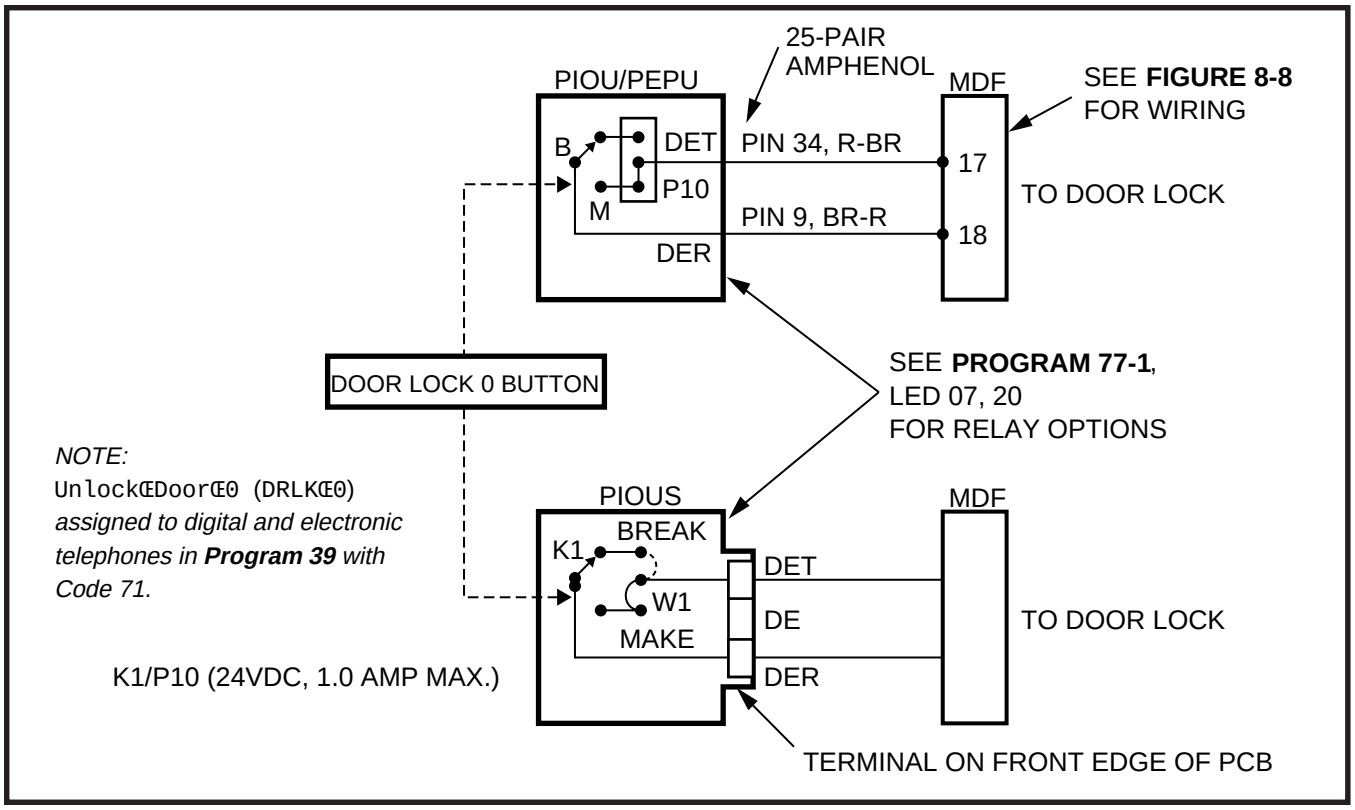

FIGURE 8-10
DOOR LOCK CONTROL OPTION (PIOU/PIOUS/PEPU)

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is activated.

- **BREAK—**Opens the normally closed contacts (DET and DER) when external page is activated.

3) Refer to Figures 8-8 or 8-9 for wiring/interconnecting details. Connect the PIOU, PIOUS, or PEPU to the MDF as required for the external paging function.

4.15 Door Lock Control (PIOU or PIOUS or PEPU). Configure the PIOU, PIOUS, or PEPU for the door lock control function in accordance with the following steps: (Refer to Figure 8-10.)

NOTE:
Only one door lock control is available using an option interface PCB (PIOU, PIOUS, or PEPU), because only one interface PCB is allowed .

1) Access **Program 77-1**. Set LED 07 to ON to configure the External Page/Door Lock Relay for the door lock control function.

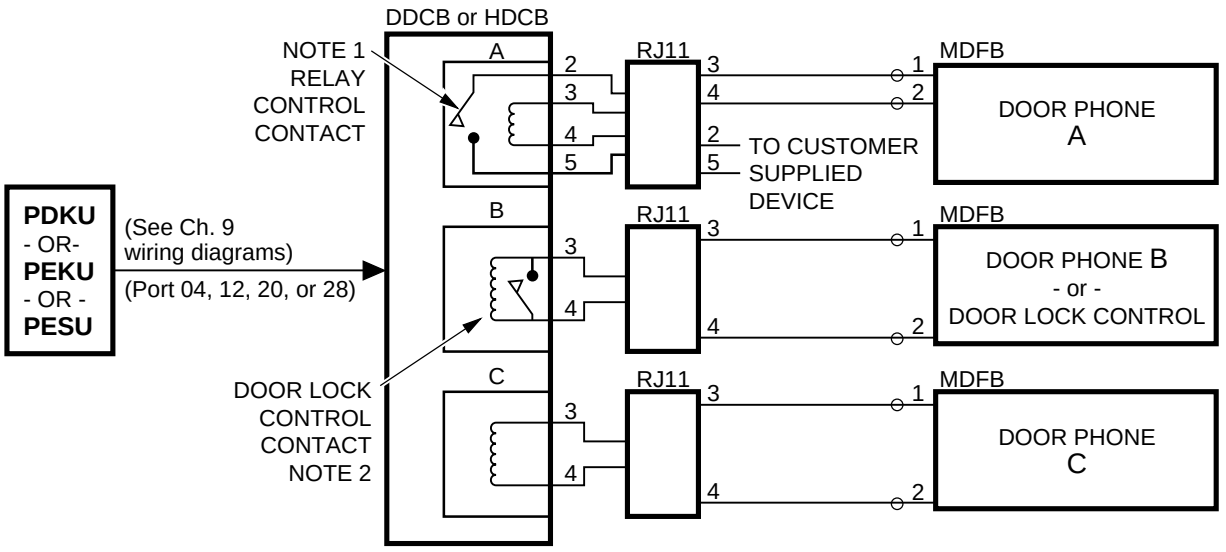
2) Access **Program 77-1**. Set LED 20 to OFF for a 3-second door lock activation time, or set **LED** 20 to ON for a 6-second door lock activation time.

3A) If using a PIOU or PEPU, set the **P10** jumper plug on the PIOU or PEPU to the **MAKE** or **BREAK** position, as required:

- **MAKE**—Shorts the normally open contacts (pins 7 and 32) when a station's door lock button is pressed.
- **BREAK**—Opens the normally closed contacts (pins 7 and 32) when a station's door lock button is pressed.

3B) If using a PIOUS, Solder the **W1** jumper plug on the PIOUS to the **MAKE** or **BREAK** position, as required:

- **MAKE—**Shorts the normally open contacts (DET and DER) when a station's door lock button is pressed.
- **BREAK—**Opens the normally closed contacts (DET and DER) when a station's door lock button is pressed.



HDCB WIRING CHART

PEKU or PESU	TO	HDCB KSU JACK
VT (34) / VR (9)	TO	**PIN 3 / 4**
DT (35) / DR (10)	TO	**PIN 5 / 6**

DDCB WIRING CHART

PDKU	TO	DDCB KSU JACK
DT (34) / DR (9)	TO	**PIN 3 / 4**
PT (35) / PR (10)	TO	**PIN 5 / 6**

See **Chapter 9** for PEKU, PESU, or PDKU pin-out information

NOTES
1. *Relay control contact will close when the door phone is in the ringing, talk, or monitor state.*
2. *See **Paragraph 4.16** and **4.17.***
3. *Relay contact specifications are -24VDC at 1.0 amp. max. Do not connect relay contacts to 120 AC commercial power.*

FIGURE 8-11
MULTIPLE DOOR LOCK CONTROL OPTIONS (DDCB/HDCB)

4) Refer to Figure 8-10 for wiring/interconnecting details. Connect the PIOU, PIOUS, or PEPU to the MDF as required for the door lock control function.

4.16 Door Lock Control with DDCB and HDCB. In addition to the option interface PCB (PIOU, PIOUS, PEPU), each digital door phone/lock control unit (DDCB) and electronic door phone/lock control unit (HDCB) can provide one door lock control. This capability enables as many as four DDCB/HDCB door lock controls to be provided with PCTU1, PCTU2, PCTU3, and PCTU4, and as many as three with PCTUS. The DDCB is available with **Release 4** only, but the HDCB comes with **Release 1** and higher. DDCBs connect only to digital circuits (always Circuit 5 on a PDKU) associated with ports 04, 12, 20, and 28; HDCBs connect only to electronic circuits (always Circuit 5 on a PEKU or PESU) associated with ports 04,12, 20, and 28.

It is important to note that each DDCB/HDCB door lock control reduces the maximum door phone capacity by one. So, for example, a system operating with a PCTU (1, 2, 3, or 4) can only support 10 door phones, if two DDCB/HDCB door lock controls are installed. Door lock control with the PIOU, PIOUS, or PEPU does not reduce door phone capacity. Any digital or electronic telephone can have door lock buttons which open the door locks when pressed. Configure each DDCB/HDCB for the door lock control function as follows:

DDCB Installation (Figure 8-11 and Chapter 9 DDCB Wiring Diagram):

1) Connect PDKU Circuit 5 (T/R and PT/PR) to the DDCB HKSU modular jack per Chapter **9** DDCB wiring diagram.

2) Connect the door lock wire pair to the DDCB modular B-jack (pins 3 and 4) per the Chapter **9** diagram.

3) On the DDCB, set **SW1** to the **DOOR** position.

4) On the DDCB, set **SW2** to the **LOCK** position.

5) **SW3** inside the DDCB can be set to open or close the door lock relay whenever a door lock button is pressed: If **SW3** is in the "1-2" position, the relay will provide a closure when the button is pressed; if in the "2-3" position, the door lock relay will open when the door lock button is pressed.

NOTE:
***SW3** comes from the factory in the "1-2" position.*

6) In **Program 77-1**, set the door lock activation for three or six seconds and enable the PDKU ports for DDCB connection.

7) In **Program 77-2,** enable the DDCB B-jack for door lock operation.

8) In **Program 39**, assign door lock buttons to stations per the customer's record sheet.

9) Check each telephone door lock button from each station: The DDCB modular B-jack (pins 3 and 4) will momentarily open or close (three or six seconds) when the button is pressed.

NOTE:
*The DDCB **SW4** strap is not used with STRATA DK systems. The strap provides an alarm function with other STRATA systems.*

HDCB Installation (Figure 8-11 and Chapter 9 HDCB Wiring Diagram):

1) Cut jumper **W9** of the particular PEKU or PESU that will connect to the HDCB.

2) Connect the Circuit 5 VT/VR and DT/DR pairs to the HDCB HKSU modular jack per the Chapter **9** HDCB wiring diagram.

3) Connect the door lock wire pair to the HDCB modular B-jack (pins 3 and 4) per the Chapter **9** diagram.

4) On the HDCB, set **SW1** to the **DOOR** position.

5) On the HDCB, set **SW2** to the **LOCK** position.

6) **W3** inside the HDCB can be set to open or close the door lock relay whenever a door lock button is pressed: If **W3** is in the "solid-line" position, the relay will provide a closure when the button is pressed; if in the "dotted-line" position, the door lock relay will open when the door lock button is pressed.

7) In **Program 77-1**, set the door lock activation for three or six seconds, and enable the PEKU and PESU ports for HDCB connection.

8) In **Program 77-2,** enable the HDCB B-jack for door lock operation.

9) In **Program 39**, assign door lock buttons to the desired stations per the customer's record sheet.

10) Check each door lock button from each station: The HDCB modular B-jack (pins 3 and 4) will momentarily close (three or six seconds) when the appropriate door lock button is pressed.

PDKU/PEKU/PESU	Port No.	DDCB/ HDCB No.	Program 39 Button Assignments
First (fifth circuit)	04	1	Unlock Door 1 (DRLK 1), Code 72
Second (fifth circuit)	12	2	Unlock Door 2 (DRLK 2), Code 73
Third (fifth circuit)	20	3	Unlock Door 3 (DRLK 3), Code 74
Fourth (fifth circuit)	28	4	Unlock Door 4 (DRLK 4), Code 75

NOTE:
*The HDCB **W2** strap is not used with STRATA DK systems. The strap provides an alarm function with other STRATA systems.*

4.17 DDCB and HDCB/DRLK Assignments Guide

NOTES:
1. *See **Programs 39**, **77-1,** and **77-2** to program assignments.*
2. *DDCB and HDCB hardware option settings for door lock control operation:*
   - *Set **SW1** (jumper) to DOOR position.*
   - *Set **SW2** (switch) to LOCK position.*
3. *Door lock 4 is not available with the PCTUS.*
4. *The DDCB is only available with PCTU4.*

4.20 Night Transfer/Music-on-Hold Relay (NHT/NHR) Options with PIOU, PIOUS, or PEPU

4.21 The NHT/NHR Relay may be programmed for either the Night Relay or the Music-on-Hold (MOH) relay function. (Refer to Figures 8-8 and 8-9.)

4.22 When configured for the Night Transfer function with **Program 77-1**, the relay activates if the system is in the NIGHT mode. The relay may be programmed to activate continuously when the Night Transfer button (only) is set for the NIGHT mode (for indirect answering machine control), or to pulsate at 1-second ON/3-seconds OFF (for a night bell) when incoming CO lines ring (NT1 = tenant 1 CO lines; NT2 = tenant 2 CO lines) per **Program 15**.

4.23 When configured for the MOH function with **Program 77-1**, the relay activates any time a CO line is on hold. In this configuration, the relay is normally used to control the Music-on-Hold source.

4.24 Night Transfer Relay Control. Configure the PIOU, PIOUS, or PEPU for the Night Transfer Relay function in accordance with the following steps (refer to Figures 8-8 and 8-9):

1) Access **Program 77-1**. Set LED 05 to OFF to configure the Night/Hold Relay for the Night Relay function.

2) Access **Program 77-1**. Set LED 06 to provide continuous or pulsating relay activation as follows:
   - **OFF**—Programs the relay for continuous activation when the **NightÍTransfer** (**NT**) button (only) is set in the NIGHT mode.
   - **ON**—Programs the relay for pulsating activation when the **NightÍTransfer** (**NT**) button for tenant 1 or 2 is set to the NIGHT mode and a CO line rings.

NOTE:
*CO lines must be enabled in **Program 78** for the Night Transfer pulsating relay function.*

3) Access **Programs 87**, **88**, and **89** to set the CO lines that will activate the relay (when the system is in the NIGHT mode).

4) Access **Program 39** to assign Night Transfer buttons to telephones that should be able to set the STRATA DK system into the NIGHT mode.

5) Access **Programs 29-1** ~ **29-4** to program a Night Transfer button on all direct station selection consoles that are to transfer the STRATA DK system into the NIGHT mode.

NOTE:
***Program 29-4** is not available when a PCTUS PCB is installed.*

6) If tenant operation is required, access **Program 15** to set the CO lines for tenant 1 or tenant 2 operation.

7A) If using a PIOU or PEPU, set the **P11** jumper plug on the PIOU or PEPU to the **MAKE** or **BREAK** position, as required:
   - **MAKE**—Shorts the normally open contacts (pins 9 and 34) when the night relay is activated.
   - **BREAK**—Opens the normally closed contacts (pins 9 and 34) when the night

H

relay is activated.

7B) If using a PIOUS, solder the jumper **W2** on the PIOUS to the **MAKE** or **BREAK** position, as required:
- **MAKE**—Shorts the normally open contacts (NHT and NHR) when the night relay is activated.
- **BREAK**—Opens the normally closed contacts (NHT and NHR) when night relay is activated.

8) Refer to Figures 8-8 and 8-9 for wiring/interconnecting details. Connect the PIOU, PIOUS, or PEPU to the MDF as required for the night relay function.

NOTE:
*Door phones programmed to ring over external page in the NIGHT mode (**Program 77-1**) do not activate the Night Transfer Relay.*

4.25 MOH Relay Control. Configure the PIOU, PIOUS, or PEPU for the MOH relay function in accordance with the following steps: (Refer to Figures 8-8 and 8-9.)

1) Access **Program 77-1**. Set LED 05 to ON to configure the Night/MOH relay for the MOH relay function.

2A) If using a PIOU or PEPU, set the **P11** jumper plug on the PIOU or PEPU to the **MAKE** or **BREAK** position, as required:
- **MAKE**—Shorts the normally open contacts (pins 9 and 34) when any CO line is on hold.
- **BREAK**—Opens the normally closed contacts (pins 9 and 34) when any CO line is on hold.

2B) If using a PIOUS, solder the **W2** jumper on the PIOUS to the **MAKE** or **BREAK** position, as required:
- **MAKE**—Shorts the normally open contacts (NHT and NHR) when any CO line is on hold.
- **BREAK**—Opens the normally closed contacts (NHT and NHR) when any CO line is on hold.

3) Refer to Figures 8-8 and 8-9 for wiring/interconnecting details. Connect the PIOU, PIOUS, or PEPU to the MDF as required for the MOH Relay function.

5 EXTERNAL SPEAKER UNIT (HESB) OPTIONS

5.00 STRATA DK systems provide three options utilizing an HESB:

5.01 Loud Ringing Bell Option. The Loud Ringing Bell option allows the voice first or ringing signal tone to be amplified without the use of other manufacturers' equipment. The voice first and signal tone can be amplified on all electronic and digital telephones equipped with HHEU PCBs. (Refer to Section **400-096-207**.) The HESB automatically turns off once the ringing call or voice first has been manually answered from the electronic or digital telephone. This turn-off feature prevents audio feedback problems.

5.02 Amplified Speaker Option. The Amplified Speaker option allows the HESB to be configured as a paging speaker. The HESB is connected to the PIOU, PIOUS, or PEPU 600-ohm page output to provide an amplified external speaker.

5.03 Talkback Amplified Speaker Option. The Talkback Amplified Speaker option allows a talkback speaker to be provided in areas where a telephone is not needed, such as in conjunction with a door phone. In this configuration, the HESB is connected to the PIOU, PIOUS, or PEPU 600Ω (duplex) output and is used as the amplifier and speaker. The door phone unit (MDFB) is connected to the HESB, and serves as a microphone to provide talkback operation (the MDFB pushbutton is inoperative, and the unit serves only as a microphone for talkback).

NOTE:
The PIOU, PIOUS, and PEPU 600 Ω (duplex) page output is compatible with most commercially available talkback amplifiers.

5.10 System Hardware Requirements

5.11 System hardware requirements vary depending on the HESB option selected. Refer to the

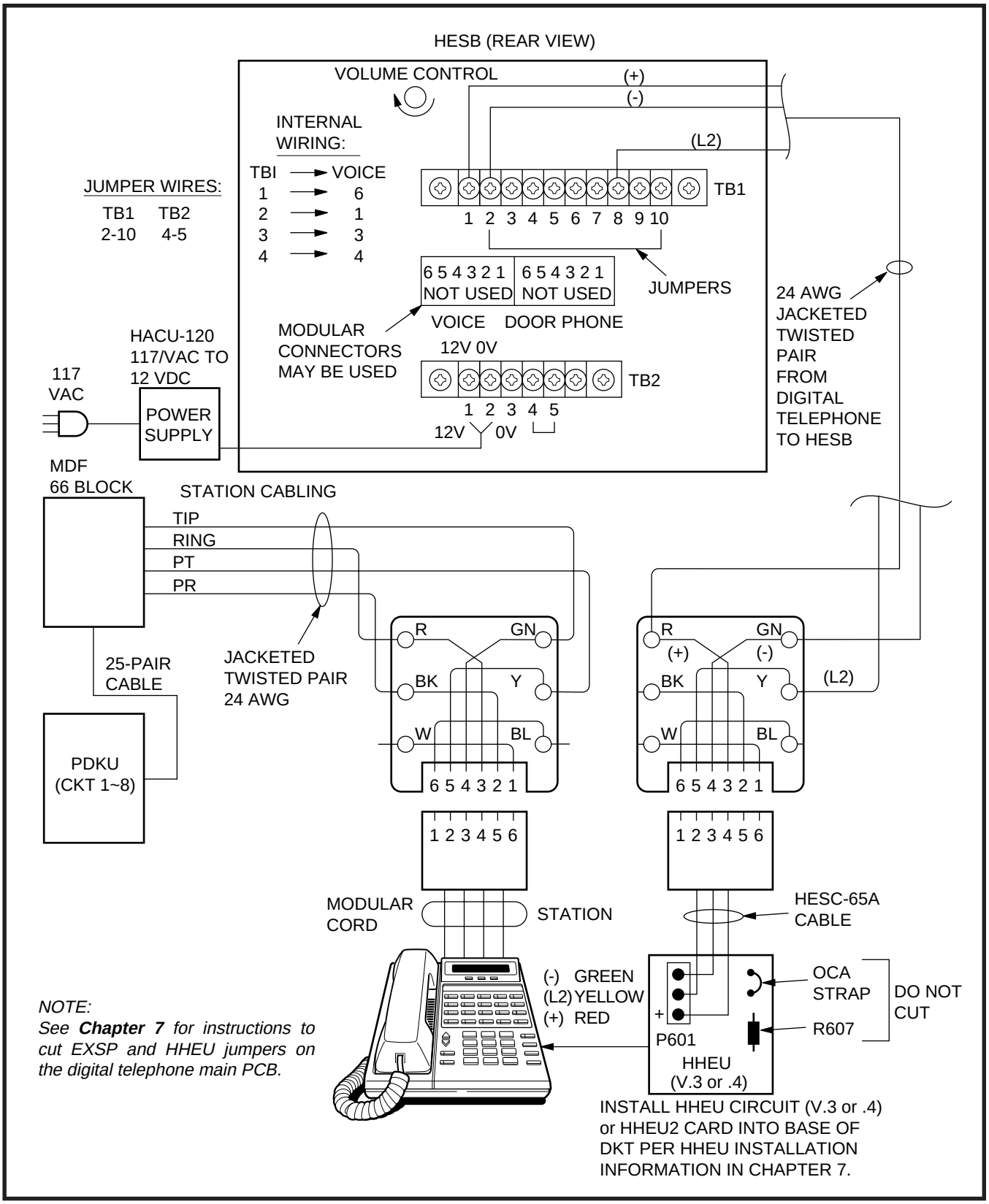


FIGURE 8-12
HESB/DIGITAL TELEPHONE WITH LOUD RINGING BELL WIRING

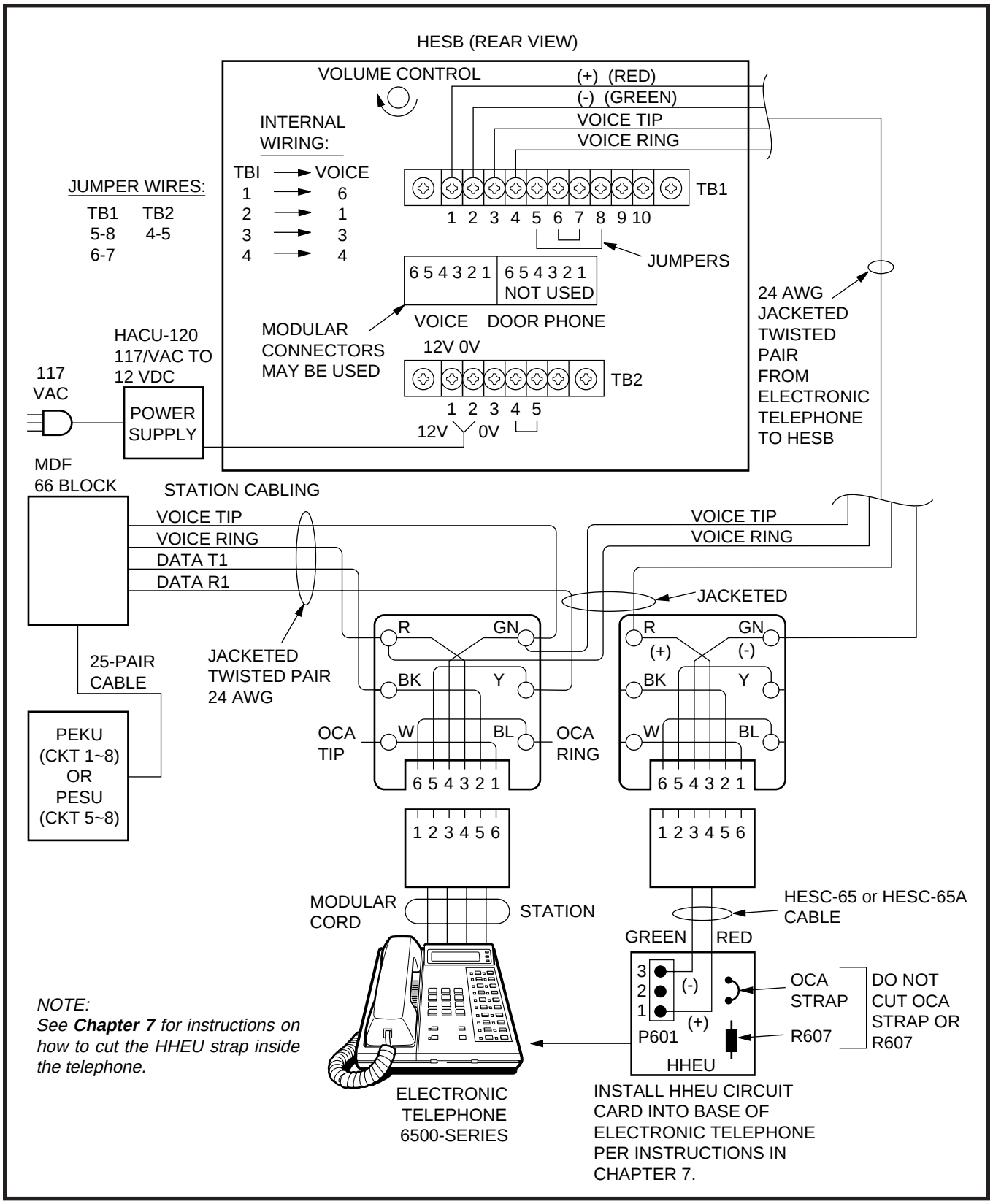


FIGURE 8-13
HESB/ELECTRONIC TELEPHONE WITH LOUD RINGING BELL WIRING

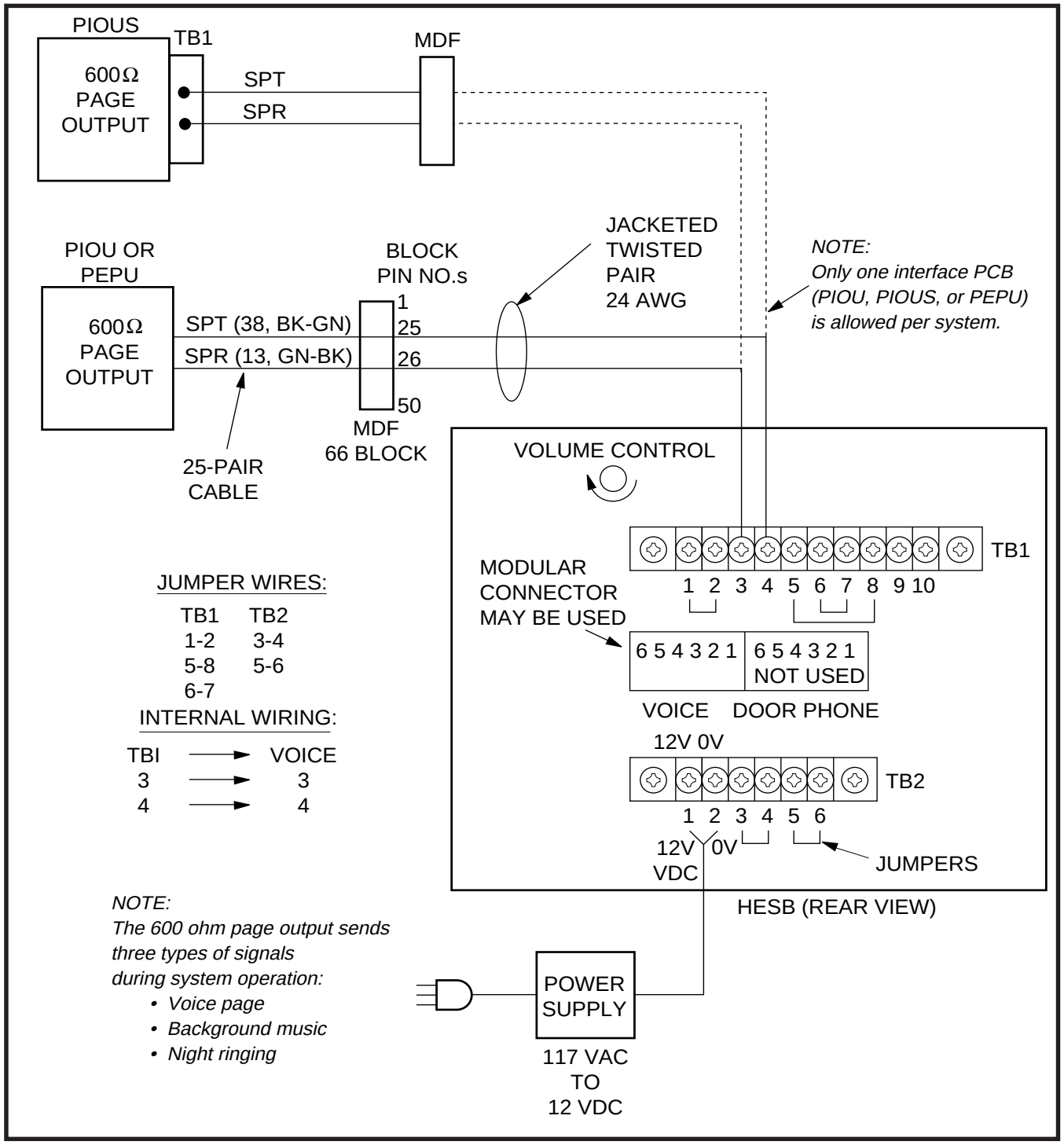


FIGURE 8-14
HESB/AMPLIFIED SPEAKER WIRING

following installation procedures for the system hardware requirements for each option:

5.20 HESB Option Installation

5.21 Loud Ringing Bell Installation. Install the HESB Loud Ringing Bell option in accordance with the following procedures:

HESB Installation for Digital Telephone (Figure 8-12):

1) Connect a jumper between Terminals 2 and 10 on the HESB **TB1** terminal block.

2) Connect a jumper between Terminals 4 and 5 on the HESB **TB2** terminal block.

NOTES:
1. *HESB connections made in steps 3~ 5 may be accomplished using the HESB **VOICE** modular jack instead of the **TB1** terminal block.*
2. *Install an HHEU PCB and HESC-65A cable in the telephone per Section **400-096-207** before proceeding with Step 3.*

3) Connect Terminal 1 of the HESB **TB1** terminal block to the red (+) wire of the HESC-65A using a modular block.

4) Connect Terminal 2 of the HESB **TB1** terminal block to the green (-) wire of the HESC-65A using a modular block.

5) Connect Terminal 8 of the HESB **TB1** terminal block to the yellow (L2) wire of the HESC-65A cable using a modular block.

6) Connect the HACU-120 power supply's **+12V** lead to Terminal 1 of the HESB **TB2** terminal block, and connect the power supply's **0V** lead to Terminal 2.

7) Plug the provided power cord into the power supply and to a 117VAC, 60Hz power source.

HESB Installation for Electronic Telephone (Figure 8-13):

1) On the HESB **TB1** terminal block: connect a jumper between Terminals 6 and 7, and connect another jumper between Terminals 5 and 8.

2) On the HESB **TB2** terminal block, connect a jumper between Terminals 4 and 5 .

NOTES:
1. *HESB connections made in steps 3~ 6 may be accomplished using the HESB **VOICE** modular jack instead of the **TB1** terminal block.*
2. *Install an HHEU PCB and HESC-65 (or HESC-65A) cable in the telephone per Chapter **7** before proceeding with Step 3.*

3) Connect Terminal 1 of the HESB **TB1** terminal block to the red (+) wire of the HESC-65 cable using a modular block.

4) Connect Terminal 2 of the HESB **TB1** terminal block to the green (-) wire of the HESC-65 cable using a modular block.

5) Connect Terminal 3 of the HESB **TB1** terminal block to pin 3 of the electronic telephone's modular block (VOICE TIP).

6) Connect Terminal 4 of the HESB **TB1** terminal block to Pin 4 of the electronic telephone's modular block (VOICE RING).

7) Connect the HACU-120 power supply's **+12V** lead to Terminal 1 of the HESB **TB2** terminal block, and connect the power supply's **0V** lead to Terminal 2.

8) Plug the provided power cord into the power supply and to a 117VAC, 60Hz power source.

5.22 Loud Ringing Bell Test. Test the Loud Ringing Bell installation in accordance with the following steps:

1) Make a CO or station call to the station configured for the loud ringing bell.
   - Ringing will be heard over the HESB.

2) Using a small slotted screwdriver, adjust the HESB volume control to the desired level by turning the volume control on the back of the

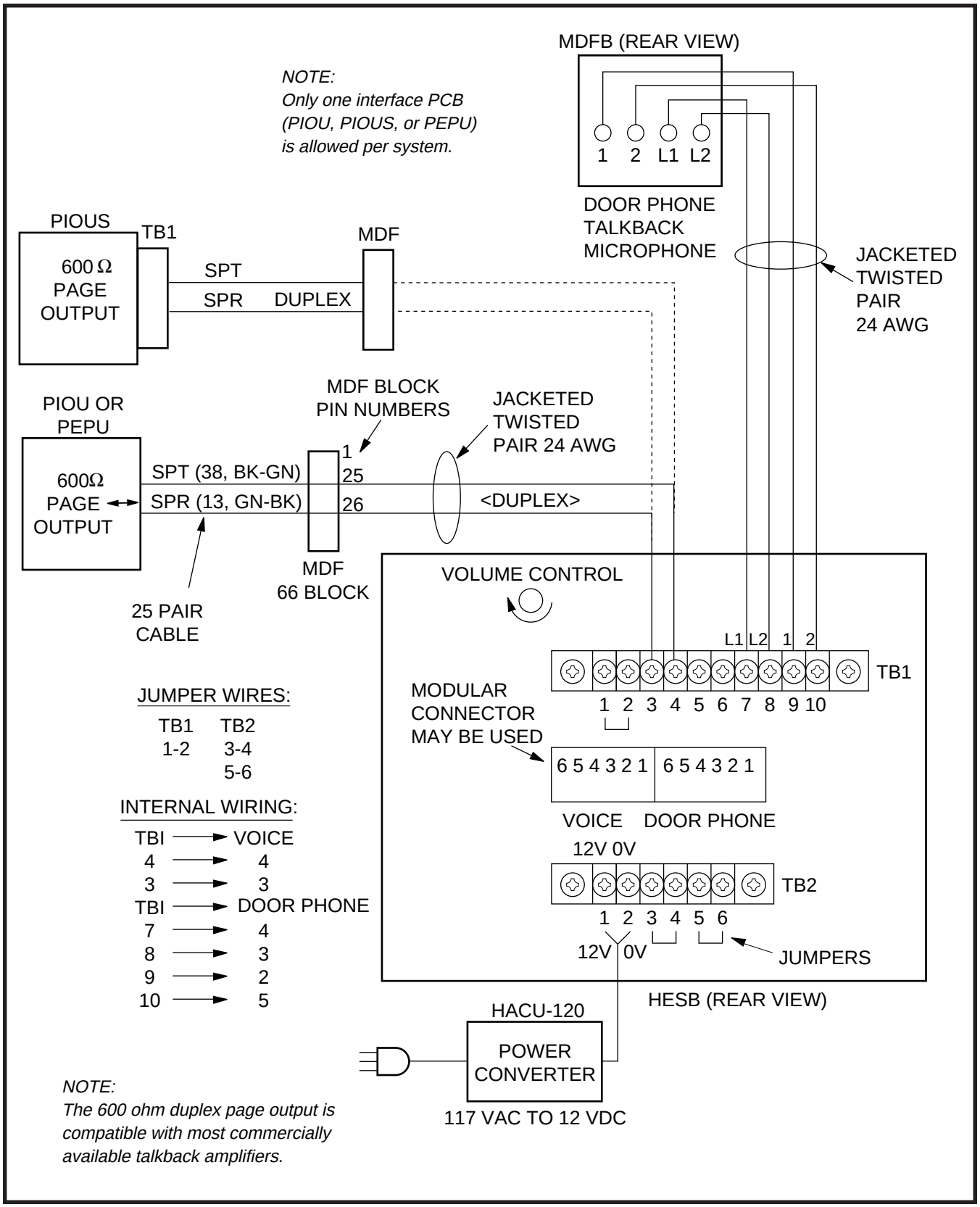


FIGURE 8-15—HESB/TALKBACK AMPLIFIED SPEAKER WIRING

HESB and adjusting the ring volume control on the telephone.

3) If ringing is heard at the station, but not over the HESB, perform the following check while the station is ringing:

   a) Using a suitable voltmeter, measure voltage across Terminals 1 (+) and 2 (-) of the HESB **TB1** terminal block.
      - Voltage indication should be 4.5 ~ 5.0VDC.

NOTE:
Ringing stops once the call is manually answered. There should be NO voltage potential across Terminals 1 and 2.

   b) If voltage is not as specified during ringing, check that the telephone wiring connections to the HESB have been made properly (wires to Terminals 1 and 2 of the HESB **TB1** terminal block may have been reversed).

5.23 Amplified Speaker Installation. Install the HESB Amplified Speaker option in accordance with the following steps (refer to Figure 8-14):

1) Connect a jumper between Terminals 1 and 2 of the HESB **TB1** terminal block.

2) Connect a jumper between Terminals 6 and 7 of the HESB **TB1** terminal block.

3) Connect a jumper between Terminals 5 and 8 of the HESB **TB1** terminal block.

4) Connect a jumper between Terminals 3 and 4 of the HESB **TB2** terminal block.

5) Connect a jumper between Terminals 5 and 6 of the HESB **TB2** terminal block.

6A) If using a PIOU or PEPU, connect the PIOU or PEPU 600-ohm page output (Pins 13 and 38) to Terminals 3 and 4 of the HESB **TB1** terminal block.

6B) If using a PIOUS, connect the PIOUS 600-ohm page output (SPT and SPR) to Terminals 3 and 4 of the HESB **TB1** terminal block.

7) Connect the power supply's **+12V** lead to Terminal 1 of the HESB **TB2** terminal block, and connect the **OV** lead to Terminal 2.

8) Plug the provided power cord into the power supply and to a 117VAC, 60Hz power source.

9) Set the PIOU or PEPU **SW4** switch to the **SPO** position.

5.24 Amplified Speaker Test. Test the Amplified Speaker installation in accordance with the following steps:

1) Make an external page.
   - The page should be heard over the HESB.

2) Adjust the HESB volume control to the desired level.

5.25 Talkback Amplified Speaker Installation. Install the HESB Talkback Amplified Speaker option in accordance with the following steps (refer to Figure 8-15):

1) Connect a jumper between Terminals 1 and 2 of the HESB **TB1** terminal block.

2) Connect a jumper between Terminals 3 and 4 of the HESB **TB2** terminal block.

3) Connect a jumper between Terminals 5 and 6 of the HESB **TB2** terminal block.

NOTE:

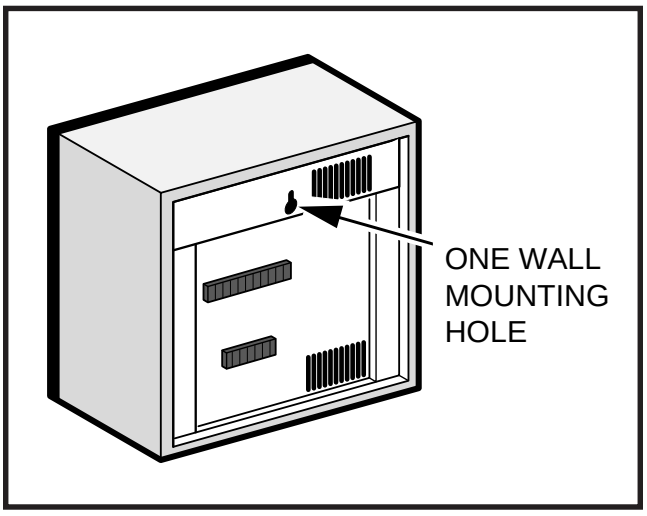


FIGURE 8-16—HESB WALL MOUNTING

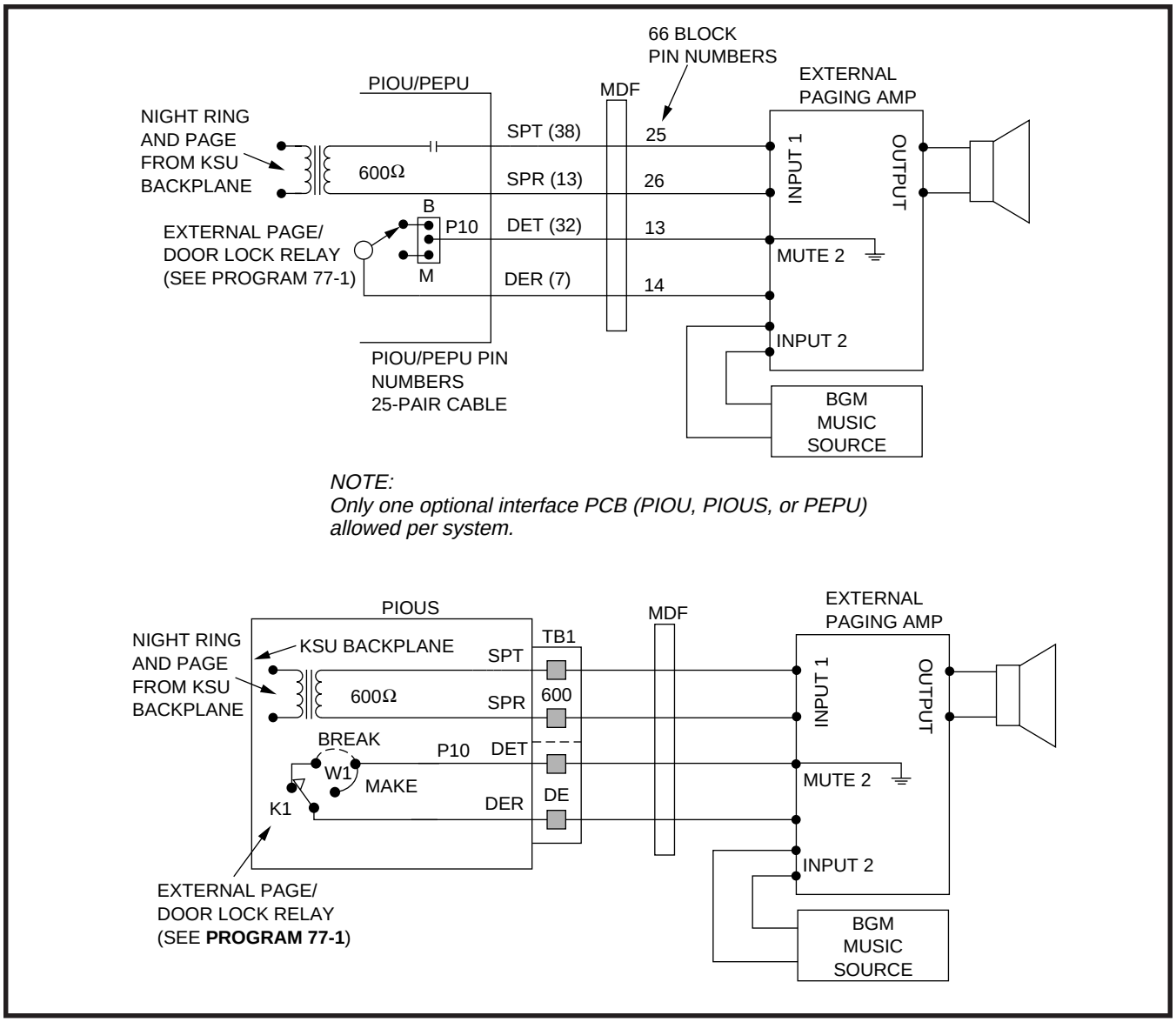


FIGURE 8-17
PAGE AND BGM USING SAME AMPLIFIER (PIOU/PIOUS/PEPU)

*HESB connections made in steps 4 ~ 7 may be accomplished using the HESB **VOICE** and door phone modular jack instead of the **TB1** terminal block.*

4) Connect Terminal 7 of the HESB **TB1** terminal block to Pin L1 of the MDFB.

5) Connect Terminal 8 of the HESB **TB1** terminal block to Pin L2 of the MDFB.

6) Connect Terminal 9 of the HESB **TB1** terminal block to Pin 1 of the MDFB.

7) Connect Terminal 10 of the HESB **TB1** terminal block to Pin 2 of the MDFB.

8A) If using a PIOU or PEPU, connect the PIOU or PEPU 600-ohm page output (Pins 13 and 38) to Terminals 3 and 4 of the HESB **TB1** terminal block.

8B) If using a PIOUS, connect the PIOUS 600-ohm page output (SPT and SPR) to Terminals 3 and 4 of the HESB **TB1** terminal block.

9) Set the PIOU or PEPU **SW4** switch to the **SPO** position.

10) Connect the HACU-120's +**12V** lead to Terminal 1 of the HESB **TB2** terminal block, and connect the **0V** lead to Terminal 2.

11) Plug the provided power cord into the power supply and to a 117VAC, 60Hz power source.

5.26 Talkback Amplified Speaker Test. Test the Talkback Amplified Speaker installation in accordance with the following steps:

1) Make an external page.
   - Page will be heard over the HESB.

2) Verify that someone speaking into the door phone can be heard at the paging station. (With this application, pressing the door phone button is not required to talk back through the door phone.)

5.27 HESB Wall Mounting. Some applications may require that the HESB is mounted on a wall or other vertical surface. Mount the HESB in accordance with the following steps (Figure 8-16):

1) Find a suitable location on the mounting surface for the HESB.

2) Screw a 1.25-inch panhead wood screw into the mounting surface.

3) Hang the HESB from the screw.

6 EXTERNAL PAGE OPTIONS

6.00 System Hardware Requirements

6.01 STRATA DK systems offer a variety of external page options. Additionally, a Background Music (BGM) option is available with each external page option. DK systems support:

- Paging with BGM (same amplifier)
- Zone Paging with BGM (separate amplifiers)
- Zone Paging with BGM (multiple amplifiers)

NOTE:
The PIOU PCB only is equipped with Zone Paging.

6.02 Either a PIOU, PIOUS, or PEPU PCB is required to support the external paging/BGM options. The PIOU will support any of the paging/BGM options. The PEPU and PIOUS will support only the paging with BGM (same amplifier) option.

6.10 External Page Option Installation

6.11 All paging connections are made via the PIOU or PEPU amphenol connectors or the PIOUS **TB1** terminal to the Main Distribution Frame (MDF).

6.12 Page (single zone) with BGM (same amplifier). In this configuration, paging and BGM are amplified by a common customer-supplied paging amplifier. When the external page access code is dialed, the external page control relay is activated, which applies a short (or open) to the amplifier mute control to mute the music. Install this option in accordance with the following steps: (Refer to Figure 8-17.)

1) Connect Input 1 from the paging amplifier to Pins 13 (SPR) and 38 (SPT) of the PIOU or PEPU; or connect to SPT and SPR of the PIOUS.

2) Connect the paging amplifier mute terminal to Pins 7 and 32 of the PIOU or PEPU; or connect to DET and DER of the PIOUS.

3) Connect the music source to the Input 2 of the paging amplifier.

4) Connect the speaker to the paging amplifier output.

5) Verify that the PIOU or PEPU **P10** jumper plug is in the **MAKE** position or that the PIOUS **W1** jumper wire is in the **MAKE** position.

6.13 Zone Page with BGM (separate amplifiers). This configuration provides multiple-zone paging capability. The output of the paging amplifier is routed back to the PIOU, where it is switched to one of four sets of speakers by PIOU Relays **K1** through **K4.** The relay selected is determined by the access code dialed by the station user. Default access codes are:

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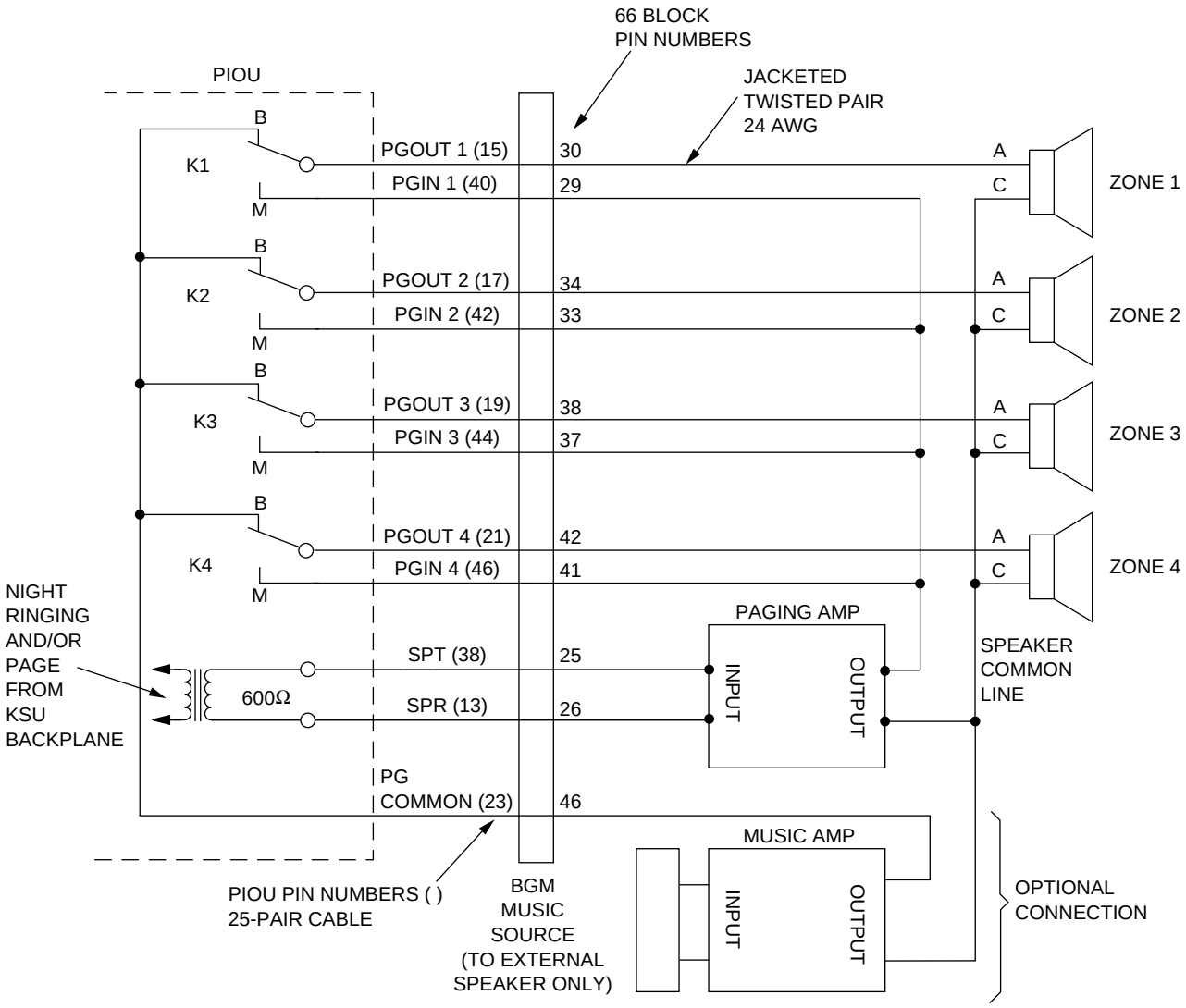


NIGHT RINGING PROGRAM ASSIGNMENTS
(SEE PARAGRAPH **11** OF SECTION **400-096-208**)

Program 77-1 Button/LED	Zone/ Relay	LED ON Assignment	LED OFF Assignment
13	K4	Tenant 2 COs	Tenant 1 COs
12	K3	Tenant 2 COs	Tenant 1 COs
11	K2	Tenant 2 COs	Tenant 1 COs
10	K1	Tenant 2 COs	Tenant 1 COs

NOTE:
See Paragraphs **6** *and* **11** *for zone paging installation instructions.*

FIGURE 8-18
PIOU ZONE, PAGE/BGM/NIGHT RING (SEPARATE AMPLIFIERS)

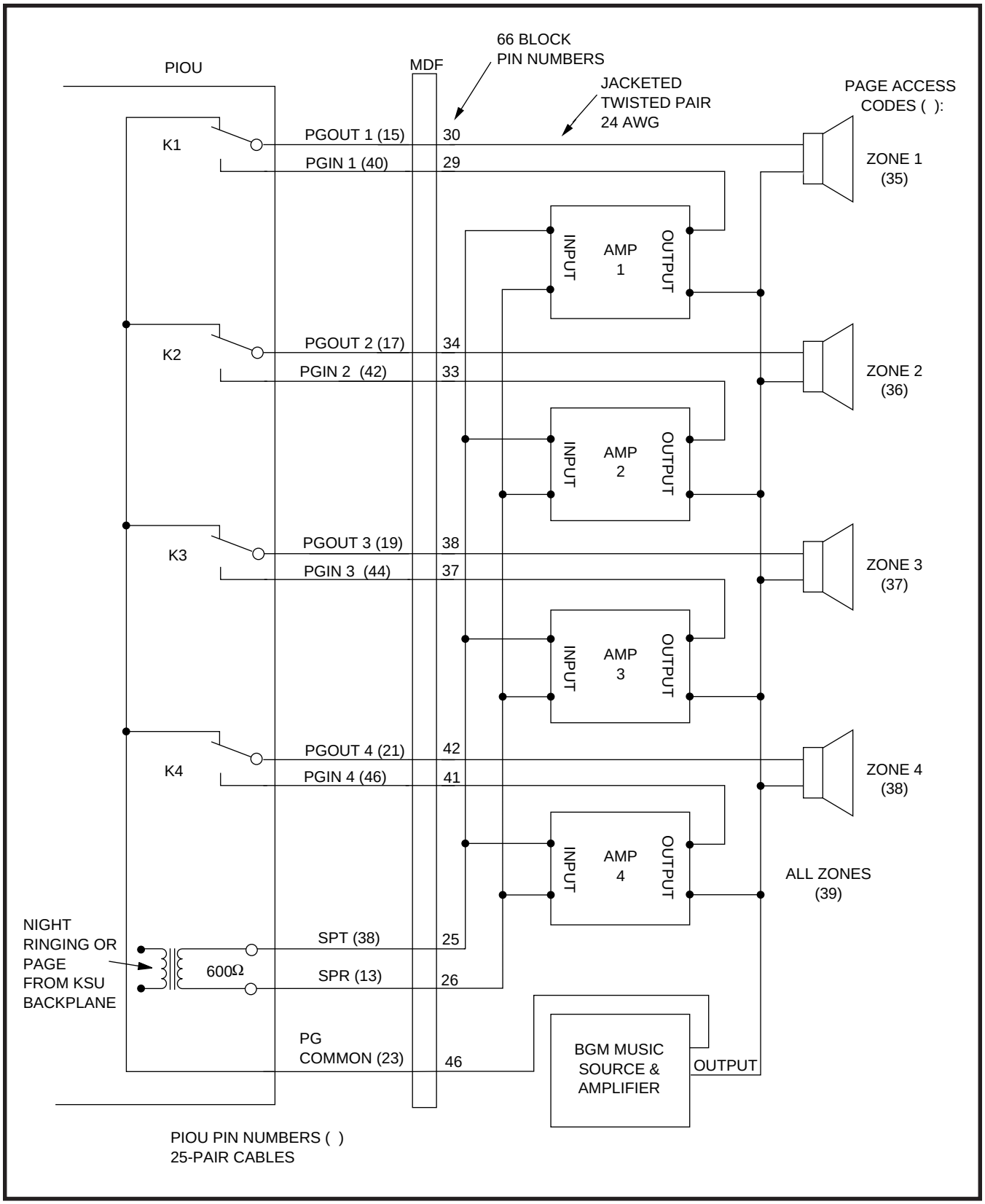
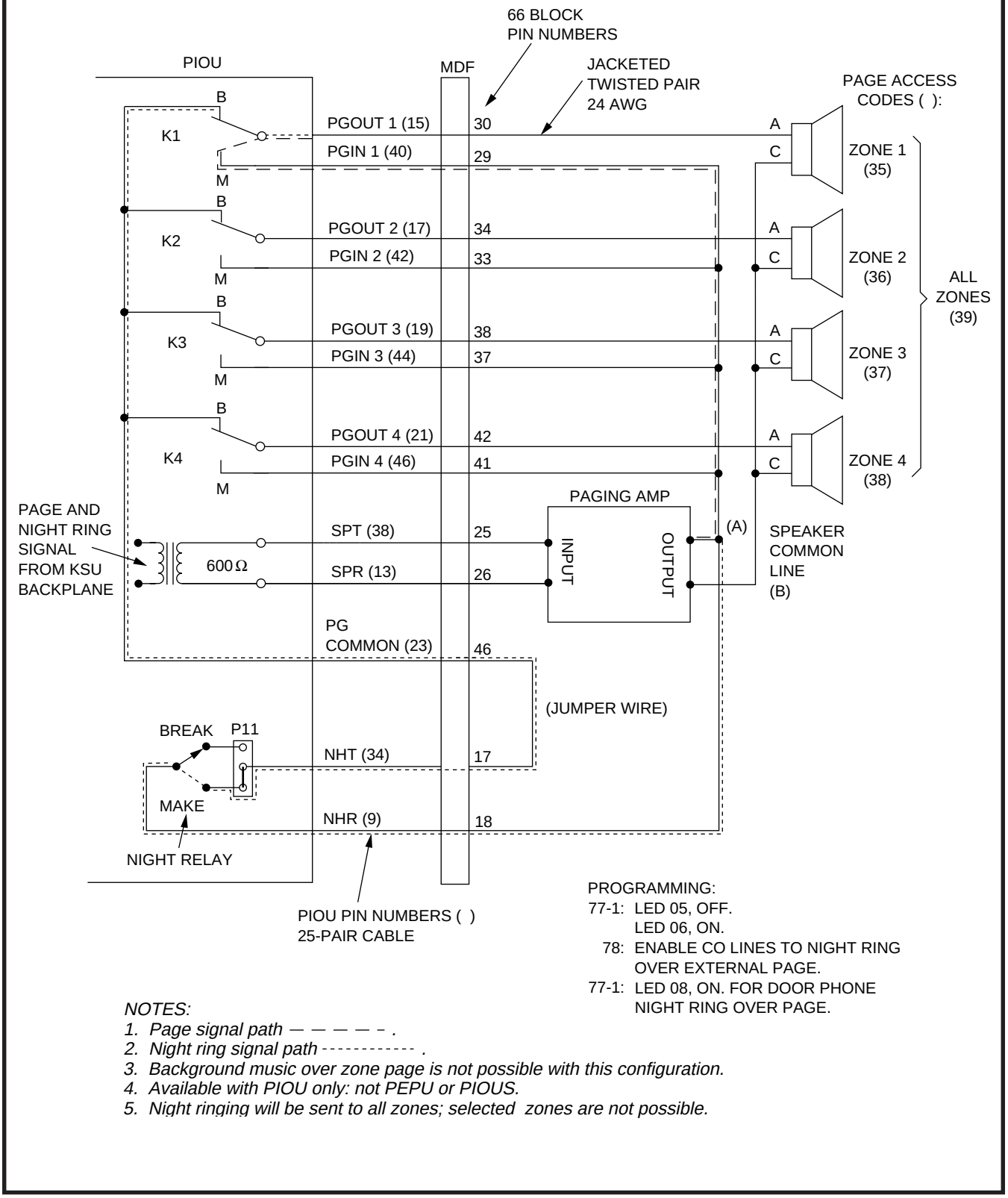


FIGURE 8-19
PAGING WITH MULTIPLE AMPLIFIERS



NOTES:
1. *Page signal path — — — — – .*
2. *Night ring signal path - - - - - - - - - - - - .*
3. *Background music over zone page is not possible with this configuration.*
4. *Available with PIOU only: not PEPU or PIOUS.*
5. *Night ringing will be sent to all zones; selected zones are not possible.*

FIGURE 8-20
NIGHT RINGING OVER EXTERNAL ZONE PAGE

- K1/zone 1 = 35
- K2/zone 2 = 36
- K3/zone 3 = 37
- K4/zone 4 = 38
- All zones = 39

NOTE:
Multi-zone page output rating is 30W/maximum at 300 ohms.

6.14 An all zone page code (39) is also available as an option (see **Program 10-2**). When the all page code is dialed, all four relays are activated to permit simultaneous paging to all speaker zones and all digital and electronic telephone speakers. Install this option in accordance with the following steps: (Refer to Figure 8-18.)

1) Connect the input from the paging amplifier to Pins 13 (SPR) and 38 (SPT) of the PIOU.

2) Connect the BGM music source to the music amplifier input.

3) Connect the paging amplifier output to the "M" contact's PIOU Relays **K1** ~ **K4** and the "C" terminal of Zone 1 ~ Zone 4 speakers.

4) Connect the BGM music amplifier output to Terminal 23 (PG COMMON) of the PIOU, and to Zone 1 ~ Zone 4 speakers.

6.15 Zone Page with BGM (multiple amplifiers). This configuration also provides multiple-zone paging capability, as in Paragraph **6.13**. However, separate amplifiers are used for each zone. Install this option in accordance with the following steps: (Refer to Figure 8-19.)

1) Connect the inputs from the paging amplifiers to Pins 13 (SPR) and 38 (SPT) of the PIOU.

2) Connect the music source to the music amplifier input.

3) Connect the paging amplifier outputs to PIOU Relays **K1** ~ **K4** and Zone 1 ~ Zone 4 speakers.

4) Connect the music amplifier output to Terminal 23 (PG COMMON) of the PIOU, and to the "C" terminal of Zone 1 ~ Zone 4 speakers.

5) Connect Zone 1 ~ Zone 4 speakers "A" terminal to the "B" contact of the PIOU Relays K1 ~ K4, respectively.

6.16 Simultaneous Night Ringing over External Page Zones (PIOU only): Incoming calls during the NIGHT mode will ring all external page zones simultaneously with this feature. Install the paging amplifier in accordance with the following steps (Figure 8-20)—Steps 1 ~ 6 are performed at the MDF:

NOTE:
*See Paragraph **6.17** for night ringing over selected external page zones.*

1) Cross-connect the amplifier input to Pins 13 (SPR) and 38 (SPT) of the PIOU PCB.

2) Cross-connect the amplifier Output A to the PGIN 1 ~ PGIN 4 connector from the PIOU.

3) Cross-connect the amplifier Output B to the Zone 1 ~ Zone 4 speaker common line.

4) Cross-connect the PIOU PGOUT 1 ~ PGOUT 4 to Zone 1 ~ Zone 4 speakers.

5) Cross-connect the amplifier Output A to Pin 9 (NHR) of the PIOU.

6) Cross-connect a jumper from Pin 34 (NHT) to Pin 23 (PG COMMON) from the PIOU PCB.

7) In **Program 77-1**, set LED 05 to OFF and 06 to ON. Set LED 08 to ON if door phones are to ring over external page when the system is in NIGHT mode.

8) In **Program 78,** enable the CO lines that are to ring via external page when the system is set in the NIGHT mode.

9) In **Program 39,** assign the Night Transfer buttons to digital and electronic telephones per the System Record Sheets (see Note).

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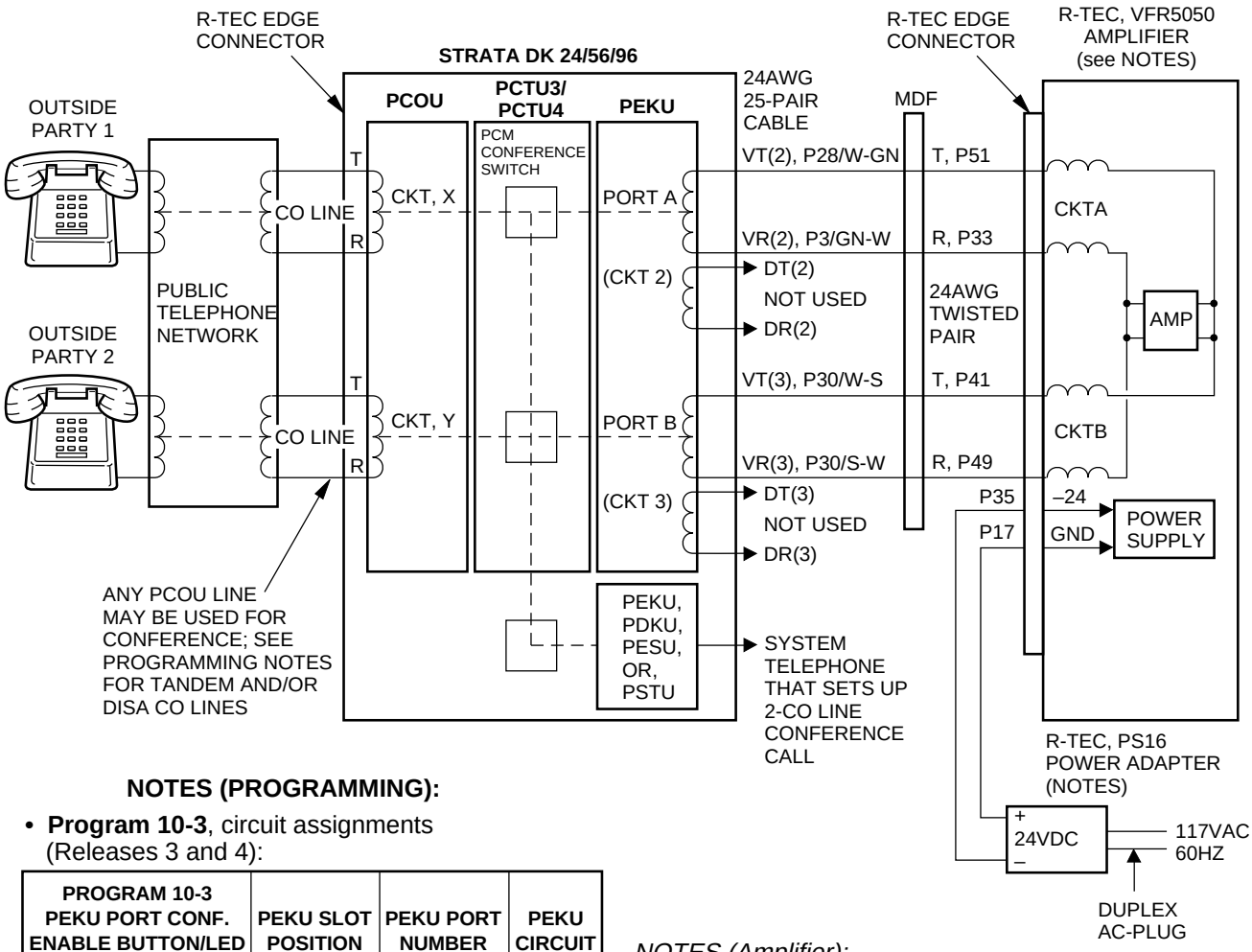


NOTES (PROGRAMMING):

- **Program 10-3**, circuit assignments (Releases 3 and 4):

PROGRAM 10-3 PEKU PORT CONF. ENABLE BUTTON/LED	PEKU SLOT POSITION	PEKU PORT NUMBER	PEKU CIRCUIT
LED 01, **ON**	2nd	A = 09 B = 10	CKT2 CKT3
LED 02, **ON**	3rd	A = 17 B = 18	CKT2 CKT3
LED 03, **ON**	4th	A = 25 B = 26	CKT2 CKT3
LED 04, **ON**	5th	A = 33 B = 34	CKT2 CKT3

- **Program 10-1**, LED 19 and 20 ON.
- **Program 15-5**, enable appropriate CO lines for tandem connection.
- **Program 78-2**, enable appropriate CO lines if amplified DISA is required.
- **Program 10-2**, LED 18 ON.
  For LED 19, see note in Paragraph **7.04**.

NOTES (Amplifier):

1. *All amplifier equipment is customer or dealer-supplied.*
2. *Use a 2-way, telephone CO line amplifier that is FCC Part 68 registered and provides automatic gain control; the above example is with a Reliance Electric Co., R-TEC VFR5050 (VVSG) Repeater, with 500-X or 500-X-CT mounting assembly and a PS16 power adapter.*
3. *Recommended switch settings for VFR5050 are:*
   - *FLAT GAIN (1, 2, 4, 8): all ON*
   - *Equalizer (1 ~ 5): all OFF*
   - *Sensitivity: NORM*
   - *S1 screw: down = Data DIS OFF*
4. *The above R-TEC options may be different for some installations; see R-TEC VFR5050 installation Practice before installing VFR5050.*

FIGURE 8-21
AMPLIFIED TWO-CO LINE CONFERENCE AND/OR AMPLIFIED DISA FUNCTIONAL WIRING DIAGRAM

10) Press the Night Transfer button on a digital or electronic telephone to set the system into the NIGHT mode. Then test by calling into the system on a CO line assigned (**Program 78**) to night ring over external page.
    - When ringing sounds over the page, press the **Intercom** (**INT**) button and dial **5 3 5** to answer.

6.17 Night Ringing Over Selected Page Zones. In **Release 3** and higher systems shared by two tenants, each tenant's CO lines can be assigned to night ring separate PIOU external page zones. This feature can also be used in one-tenant systems.

With shared systems, for example, Tenant 1's night ringing CO lines could be programmed to ring PIOU external page Zones 1 and 2, while Tenant 2's lines could be programmed to ring Zones 3 and 4. In non-shared systems, night ringing CO lines can be assigned to ring all of the zones or just selected zones.

The following programs must be used to assign CO lines to ring selected PIOU page zones:

- **Program 78-1:** Assigns CO lines, Tenant 1 and Tenant 2, that will night ring over PIOU external page zones.
- **Program 15-5:** Assigns CO lines to Tenant 1 or Tenant 2. Lines are initialized as Tenant 1.
- **Program 77-1 (LEDs 10 ~ 13):** Assigns Tenant 1 and Tenant 2 CO lines to night ring specific PIOU external page zones.
- **Program 39:** Assigns appropriate Night Transfer (for Tenant or Non-Tenant systems) buttons to electronic and digital telephones.

NOTES:

1. *See Paragraph **6.14** and Figure 8-18 for PIOU zone paging installation instructions.*
2. *Any station can pick up CO lines that night ring over external page zones by pressing the **Intercom** (**INT**) button and dialing **5 9**.*

7 TWO-CO LINE EXTERNAL AMPLIFIED CONFERENCE (RELEASE 3 AND HIGHER)

7.00 General

7.01 Customer-supplied two-way amplifiers can be installed to amplify two-CO line tandem and/or conference calls. As many as four amplifiers can be installed to support up to four of these calls occurring simultaneously. If three amplifiers are installed, three simultaneous calls can be supported, and so on. If all amplifiers are being used, then subsequent two-CO line tandem calls and/or conference calls will be unamplified. Each amplifier is connected to two designated PEKU station ports and will automatically be switched into a two-CO line connection established between any CO lines in the system.

7.02 Amplified Talk Path. Figure 8-21 provides a functional diagram of a two-CO line amplified conference connection. (An R-TEC VFR5050 amplifier is used here.) The talk path for the connection is as follows: outside party 1—public telephone network—PCOU, CKTX—PCTU—PEKU, port A—into AMP, CKTA—Out AMP, CKTB—PEKU, port B—PCTU—PCOU, CKTY—public telephone network—outside party 2. This path is two-way so when outside party 2 talks, the talk level is amplified in the reverse direction.

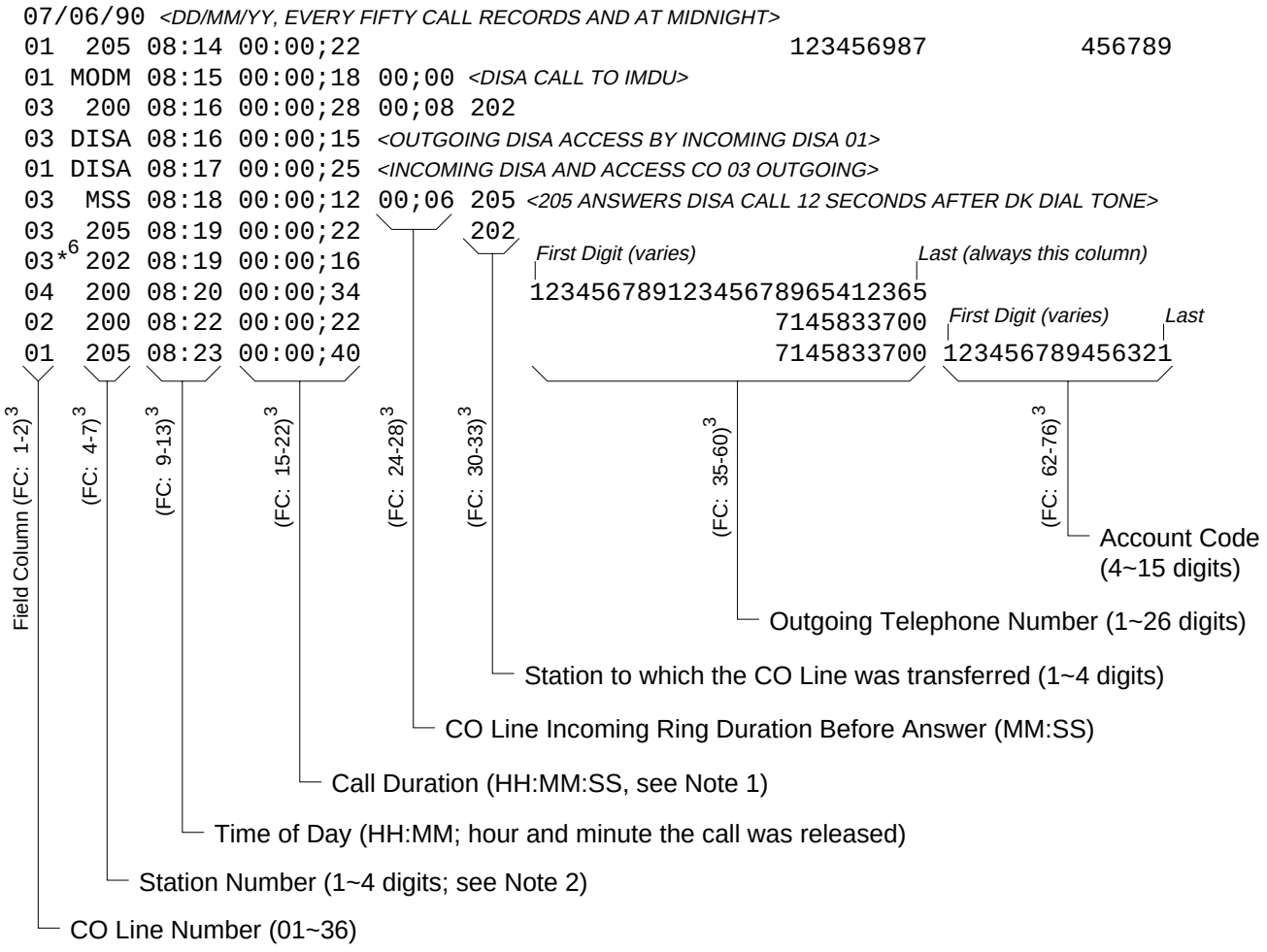
NOTE:
Only the outside party 1 talk path is amplified to/from a system telephone when it is connected into a two-CO line conference.

7.03 Amplifier Requirements

- Customer-supplied (four maximum)
- Must be FCC-registered, Part 68, and provide automatic gain control
- Each amplifier requires two PEKU station ports.
- Refer to the amplifier manufacturer's installation documentation for amplifier grounding instructions

7.04 Installation: Connect a two-way amplifier to the STRATA DK system in accordance with the following steps (see Figures 8-21 and the Amplified Two-CO Line Conference wiring Diagram in Chapter **9**).

1) At the main distribution frame (MDF), connect the voice pair (VT, VR, port A) of Circuit 2 on the designated PEKU PCB to one input of the



NOTES:

1. *Call Duration (incoming, outgoing, or transfer) must be 10 seconds (minimum) to generate a call record printout with Release 3 and lower. It can be 1.0 or 10 seconds with **Release 4** (see **Program 60-2**).*
2. *"MSS": designates a Direct Inward System Access (DISA) CO call to a station that is not answered; or, answered after 10 seconds. With Release 3 and lower, if a station answers a DISA call before 10 seconds elapse, the call will register as a normal incoming call (1.0 or 10 seconds with **Release 4**, depending on **Program 60-2**). DISA calls always register 05 ~ 06 seconds ring before answer duration time.*
   "MODM": designates a call to the IMDU, Remote Maintenance Modem.
   "DISA": designates a DISA call thru the system via CO to CO connection.
3. *Field column information is provided for SMDR output formatting purposes.*
4. *The call record data is ASCII-formatted, 8 bits; no parity, 1-stop bit.*
5. *Special dial printout:*
   Tone = "T"
   Long pause = "L"
   Flash = "F"
   Pause = "P"
6. *The "*****" indicates that the call was disconnected by the Central Office Calling Party Control (CPC) or Automatic Release (AR) signal. CO lines must have Programs 15-0 and 15-3 enabled to be dropped by the CPC signal. (Release 4 only)*

FIGURE 8-22
SMDR PRINTOUT EXAMPLES

customer-supplied two-way amplifier. In the example in Figure 8-21, this is CKTA (Central Office Side A) of the VFR5050.

2) At the MDF, connect the voice pair (VT, VR, port B) of circuit 3 on the designated PEKU PCB to the other input of the amplifier. In the Figure 8-21 example, this is CKTB (subscriber side B) of VFR5050.

3) Plug the amplifier's power cord into the 117VAC (standard) wall outlet.

4) Set the gain and other amplifier parameters options per the amplifier manufacturer's installation documentation.

5) Program the STRATA DK system as follows:
   - **Program 10-3:** Enables the appropriate PEKU PCB ports for amplifier connection. Only enable the ports that will be connected with the amplifier(s).
   - **Program 15-5:** Enables appropriate CO lines for Two-CO line tandem connection.
   - **Program 10-1:** LEDs 19 and 20 must be ON.
   - **Program 10-2:** LED 18 must be ON.

NOTE:
*LED 19 in **Program 10-1** should be ON if it is certain that an amplifier will always be available for two-CO line conference connection (four maximum, simultaneously). If this LED is ON and a two-CO line connection is established without an external amplifier, the STRATA DK station may be unbalanced and receive a hum noise. LED 19 provides additional station amplification when external amplifiers are switched into two-CO line connections.*

8 STATION MESSAGE DETAIL RECORDING (SMDR) PRINTER/CALL ACCOUNTING DEVICE OPTIONS

8.00 An SMDR printer or call accounting device may be connected to the system to provide a hardcopy record (Figure 8-22) of station activity. The STRATA DK system can record incoming, outgoing, and transferred calls, as well as Account Code entries. Call record data is printed out at the completion of each eligible call and is ASCII-formatted, 8-bits, no parity, 1-stop bit. Program SMDR with **Program 60**. A display of the customer data base (Figure 8-23) can also be printed out with **Program 97**.

8.01 SMDR will send out special names for the following types of calls:
- **MSS:** Prints on Direct Inward System Access (DISA) calls to stations (see Note 2).
- **MODM:** Prints on calls to the IMDU remote maintenance modem (Station 19).
- **DISA:** Prints on DISA calls in which CO lines are accessed for outside calling.

NOTES:
1. *The call threshold time—the length of time that a call must be in progress before it is registered by SMDR—can be set for either 1.0 or 10 seconds in **Program 60-2** with **Release 4**. With earlier releases, the threshold time is fixed at 10 seconds.*
2. *For **Release 4**, MSS will print only on DISA calls that are answered after the threshold time (set in **Program 60-2**). If the call is answered before the threshold time, the call will register as a normal incoming call and the MSS/transfer portion of the call will not print out.*

8.02 Figure 8-22 shows a sample SMDR printout and describes the contents of each column of the printout. The following examples show several call record samples and describe the sequence of events which occurred to generate the call records.

NOTE:
SMDR printout "time of day" and day/month/year (DD/MM/YY) is the same as the system clock time/date set by the station connected to Port 00. SMDR DD/MM/YY will print out each time 50 call records are generated.

SMDR PRINTOUT EXAMPLES
Direct Inward System Access (DISA) CO Lines

NOTE:

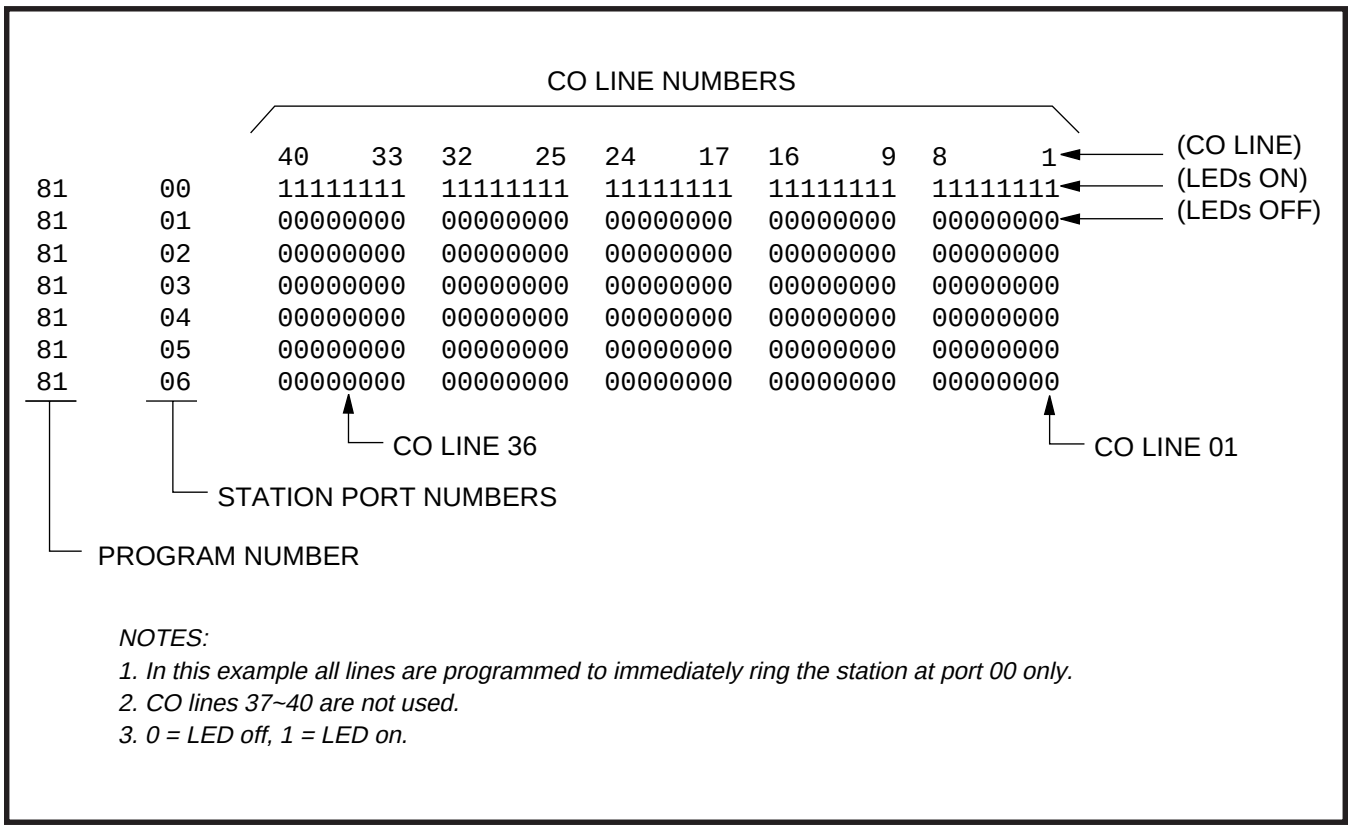


FIGURE 8-23
PIOU/PIOUS TTY PORT (PROGRAM 97) DATA DUMP EXAMPLE

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DISA station calls print out as MSS.

EXAMPLE 1—Ring, No Answer DISA Call

Call Sequence A

- Outside caller rings CO line 03. (CO line 03 is programmed as a DISA line.)
- Line 03 returns intercom dial tone to caller after two ring cycles (5 ~ 6 seconds).
- Caller does nothing.
- After 32 seconds, call is disconnected.
- Printout **A** prints after disconnect at 4:59.

PRINTOUT A

```
03 MSS 04:59 00:00:32 00:06
```

EXAMPLE 2—DISA Internal Station Call

Call Sequence B

- Outside caller rings CO line 03. (CO line 03 is programmed as a DISA line.)
- Line 03 returns intercom dial tone to caller after two ring cycles (5 ~ 6 seconds).
- Caller dials 203.
- After 48 seconds from start of call, station 203 answers.
- Printout **B** prints after station 203 answers the call at 4:32.

NOTE:
*MSS will not print if the call is answered before the threshold time set in **Program 60-2**.*

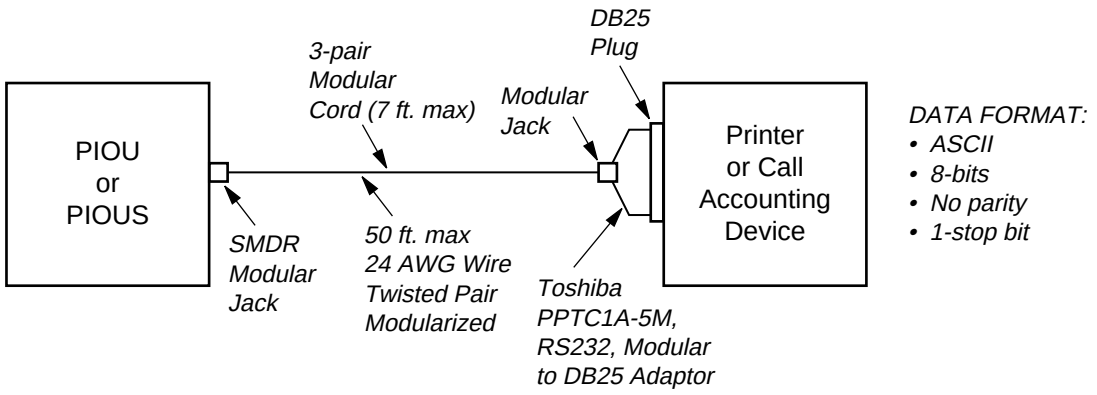
PRINTOUT B

```
03 MSS 04:32 00:00:48 00:05 203
```

EXAMPLE 3—DISA Outgoing CO Line Call

NOTE:
DISA CO line calls print out as DISA.

BASIC CONNECTION



BASIC WIRING (see: PIOU or PIOUS TTY and SMDR Wiring in Chapter 9 for more detail)

PIOU, SMDR Jack Modular Pin No.	PPTC1A-5M Adaptor		RS-232 Lead Name
	Modular Pin No.	DB25 Pin No.	
1 To →	6 To →	3	RD
2 To →	5 To →	2	TD
3 To →	4 To →	6	DSR
4 To →	3 To →	20	DTR
5 To →	2 To →	8	CD
6 To →	1 To →	7	SG
		4 Jumper to 5	RTS to CTS

FIGURE 8-24
PIOU/PIOUS SMDR CABLE CONNECTIONS

Call Sequence C

- Outside caller rings CO line 01. (Line 01 is programmed as DISA.)
- Line 01 returns intercom dial tone after two ring cycles (5 ~ 6 seconds).
- Caller dials 703 to access CO line 03 (outgoing).
- Caller dials the DISA security code and receives CO dial tone.
- Caller dials the telephone number and converses when the call is answered.
- Caller hangs up.
- The call releases, and Printout **C** prints after the call disconnects at 12:22.

NOTES:

1. *If the CO provides the Calling Party Control or Auto Release (AR) signal (see **Program 15-0** and **15-3**), the call disconnects when either party hangs up. A " *" will follow the CO line number on the printout if the call is disconnected by the CPC or AR signal with **Release 4** systems.*
2. *If the CPC or AR signal is not sent, the CO lines will remain seized until the DISA disconnect timer releases the call (approximately five minutes).*

PRINTOUT C

Auto Release signal:

```
03  MSS  12:22 00:02;01 00:06 (outgoing)
03* DISA 12:22 00:02;01 (outgoing)
```

```
01  DISA 12:22 00:02;01 (incoming)
```

Disconnect Timer:

```
01 DISA 12:24 00:04;57 (incoming)
03 DISA 12:24 00:04;57 (outgoing)
```

NOTE:
The "MSS" entry will print out only if the call was originated after the SMDR threshold, 1.0 or 10 seconds. The threshold is set in ***Program 60-2.***

8.03 System Program Data Printout. If a printer is connected to the SMDR port, customer program information stored in the PCTU or PCTUS RAM may be printed out for reference by using **Program 97** (see Paragraph **8.14**).

8.10 SMDR Hardware Requirements

8.11 A DK system must be equipped with a PIOU or PIOUS PCB to support the SMDR printer/call accounting device option. Connection of the printer or call accounting device to the PIOU or PIOUS PCB is accomplished with a 3-pair modular cord (7 feet maximum) and a PPTC connector adaptor (Figure 8-24). Call record data is ASCII-formatted, 8 bits, no parity, 1-stop bit.

8.12 The PIOU or PIOUS contains a call record buffer which stores call record data (for up to 50 calls) when the printed or call accounting device is turned off, or when no device is connected to the SMDR port. No further call records are stored after the buffer is filled. When the printer or call accounting device is made operational, an “ERROR BUFFER OVERFLOW” message is printed to indicate that the buffer was full, and that some call information may have been lost.

8.13 SMDR Programming Considerations

8.14 Selectable programming options for the SMDR printer or call accounting device are as follows:

Program 60

- Item 2 (**Release 4** only)—Selects the minimum duration (1.0 or 10 seconds) of calls that will be registered by SMDR . Any call that lasts less than the set time will not be recorded.
- Item 3—Selects the records of outgoing calls or outgoing and incoming calls to be printed.
- Item 4—Selects the digit length of Account Codes (4 to 15 digits).
- Item 5—Allows only long distance call records to be printed.

Program 97

- Allows system program data to be printed via the SMDR port (Figure 8-23).

NOTES:
1. *An SMDR printer must be connected to the SMDR port to use the printout option selected by* ***Program 97****.*
2. *Call record data is lost when program data is printed out using* ***Program 97****.*

8.20 SMDR Printer/Call Accounting Device Installation

8.21 Install the SMDR printer/call accounting device option in accordance with the following steps: (Refer to Figure 8-24 and related drawings in Chapter **9**.)

1) Connect the interface cable and the PPTC adaptor from the PIOU or PIOUS SMDR port to the SMDR printer or call accounting device DB25 connector.

2) Set the PIOU or PIOUS **SW1** switch to the appropriate baud rate (300 or 1200 bps), as determined by the baud rate of the printer or call accounting device.

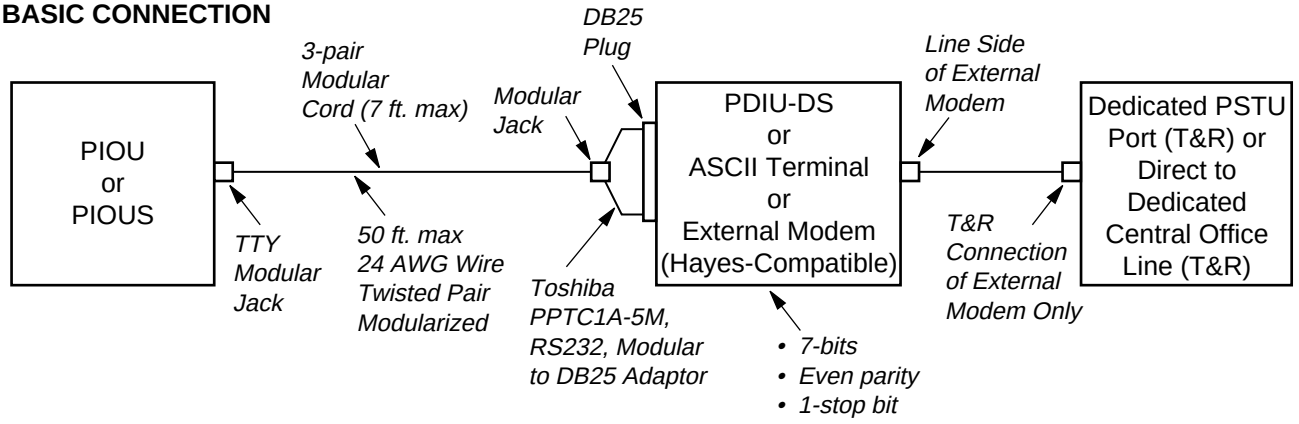
3) Set the printer or call accounting device to 8-bits/no parity/one stop bit.

4) Program (**Program 60**) the system for the required SMDR printer/call accounting device options (refer to Paragraph **8.13** and the Programming Procedures, Section **400-096-300**).

9 MAINTENANCE TERMINAL OPTIONS

9.00 A customer-supplied maintenance terminal may be connected to the system (PIOU or PIOUS) either locally or remotely. The maintenance terminal (ASCII terminal) allows system programming

BASIC CONNECTION



ASCII TERMINAL

BASIC WIRING (see: PIOU/PIOUS TTY Wiring in Chapter 9 for more detail)

PIOU/PIOUS, SMDR Jack Modular Pin No.	PPTC1A-5M Adaptor		RS-232 Lead Name
	Modular Pin No.	DB25 Pin No.	
1 To →	6 To →	3	RD
2 To →	5 To →	2	TD
3 To →	4 To →	6	DSR
4 To →	3 To →	20	DTR
5 To →	2 To →	8	CD
6 To →	1 To →	7	SG
		4 Jumper to 5	RTS to CTS

EXTERNAL MODEM

BASIC WIRING (see: PIOU/PIOUS TTY Wiring in Chapter 9 for more detail)

PIOU/PIOUS, SMDR Jack Modular Pin No.	PPTC1A-5M Adaptor		RS-232 Lead Name
	Modular Pin No.	DB25 Pin No.	
1 To →	6 To →	2 *	TD
2 To →	5 To →	3 *	RD
3 To →	4 To →	6	DSR
4 To →	3 To →	8 *	DTR
5 To →	2 To →	20 *	CD
6 To →	1 To →	7	SG
		4 Jumper to 5	RTS to CTS

IMPORTANT: * *PPTC1A-5M, pins 2 & 3 and pins 8 & 20 must be reversed in the field, as shown, for modem connection. Set Hayes modem to track status of carrier detect signal (AT&C1) and to auto answer (ATS0=1).*

FIGURE 8-25
PIOU/PIOUS (TTY) MAINTENANCE PORT (EXTERNAL MODEM OR ASCII TERMINAL)

and testing to be accomplished. An IMDU modem or an external maintenance modem (300 or 1200 baud full-duplex) can be connected to allow system programming and testing to be accomplished from a remote location.

NOTE:
An external modem is required for Remote Maintenance if an IMDU is not installed on the PIOU or PIOUS. The IMDU has a built-in maintenance channel for remote connection; however, an external modem requires a CO line or a standard telephone port on a PSTU or PESU.

9.10 Maintenance Terminal/External Modem Option System Hardware Requirements

9.11 The STRATA DK system must be equipped with a PIOU or PIOUS PCB to support the maintenance terminal/external modem options. Connecting the maintenance terminal or external maintenance modem to the PIOU or PIOUS PCB is accomplished with a standard 3-pair modular cord and a PPTC adaptor connected to the PIOU or PIOUS TTY jack. (Refer to Figure 8-25.)

NOTE:
If the IMDU modem is used, the PPTC adapter or modular cord is not required.

9.20 Local Maintenance Terminal Installation

9.21 Install the ASCII terminal in accordance with the following steps: (Refer to Figure 8-25.)

1) Connect the 3-pair modular cable (or 24 AWG twisted pairs) and the PPTC adaptor from the PIOU or PIOUS TTY port to the remote maintenance terminal DB25 connector.

2) Set the PIOU or PIOUS **SW2** switch to match the modem or terminal baud rate:
   - Push in for 300 bps (baud rate indicator **CD4** is lighted); let out (by pushing again) for 1200 bps (**CD4** is not lighted).

3) Set the PIOU or PIOUS **SW3** switch to the **TTY** position.

4) Set the **P13** jumper plug on the PIOU to the **BELL** configuration, or cut the **W4** jumper on the PIOUS (also for **BELL** configuration).

NOTE:
*The **P13** (PIOU) and **W4** (PIOUS) **CCITT** configurations are not normally used in the USA.*

5) Set the terminal to 7-bits/even parity/1 stop bit.

6) Programming and system testing, via the maintenance terminal, is described in the Remote Maintenance Procedures, Section **400-096-600.**

NOTE:
If the telephone connected to Port 05 is in the program mode, programming from the maintenance terminal is not allowed.

9.30 Remote Maintenance Option Installation

9.31 IMDU Maintenance Modem. The IMDU modem mounts on the PIOU or PIOUS PCB and provides 300 or 1200 bps, full-duplex communication for remote maintenance. If the IMDU is employed, a dedicated CO line, PSTU, or PESU connection is not required. Connection of the remote maintenance terminal is through existing system CO lines via intercom Number 19. Refer to the PIOU or PIOUS portion of Section **400-096-206** for details on hardware installation and programming requirements. Remote Maintenance Procedures, Section **400-096-600**, provides more information about using the IMDU for remote maintenance.

9.32 External Maintenance Modem Installation. Install the external modem in accordance with the following steps: (Refer to Figure 8-25.)

NOTE:
*The Toshiba **PPTC** RS-232 modular-to-DB25 adaptor is factory-configured for ASCII terminal connection. Pins 2 and 3 and pins 8 and 20 of the adaptor must be reversed for external modem connection.*

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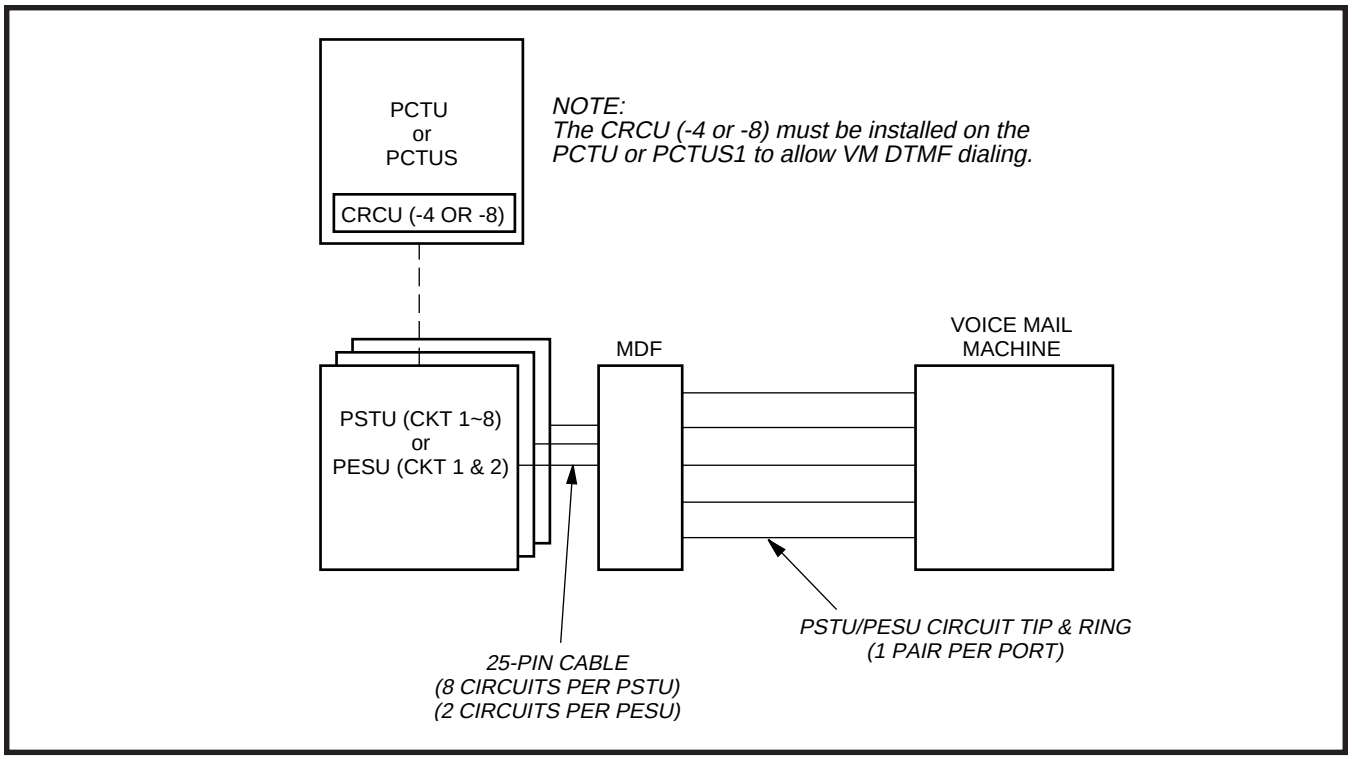

FIGURE 8-26
VOICE MAIL BLOCK DIAGRAM

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1) Connect the modular cord from the PIOU or PIOUS TTY port to the PPTC adaptor and then to the external maintenance modem RS-232 25-pin connector.

2) Connect the external maintenance modem line-side to a dedicated CO line (tip and ring) or to a dedicated PSTU or PESU standard telephone port (tip and ring). Refer to Wiring Diagrams, Section **400-096-209**, for wiring/ interconnecting details.

3) Set the PIOU or PIOUS **SW2** switch to match the modem or terminal baud rate:
   - Push in for 300 bps (baud rate indicator **CD4**/LED is lighted); let out for 1200 bps (**CD4** is not lighted).

4) Set the PIOU or PIOUS **SW3** switch to the **TTY** position.

NOTE:
*The PIOU or PIOUS **SW3** switch is set to the **MODEM** position for IMDU operation only.*

5) Set the **P13** jumper plug on the PIOU to the **BELL** configuration, or cut the **W4** jumper on the PIOUS (also for **BELL** configuration).

NOTE:
*The **P13** (PIOU) or **W4** (PIOUS) **CCITT** configurations are not normally used in the USA.*

6) Programming and system testing, via the external maintenance modem, is described in the Remote Maintenance Procedures, Section **400-096-600**. Access to the external maintenance modem is accomplished as follows:
   - If the modem is connected to a dedicated CO line, call the CO line number to establish modem communication.
   - If the modem is connected to a PSTU or PESU port, call a DK CO line that can be

transferred to (or programmed to ring) the PSTU or PESU modem port to establish modem communication.

10 VOICE MAIL OPTIONS

10.00 System Hardware Requirements

10.01 STRATA DK systems can support a Toshiba VP voice mail messaging system or a customer-supplied voice mail system.

10.02 Voice mail systems connect to standard telephone circuits (PSTU or PESU). The number of circuits required by each device depends on the customer's voice mail requirements, such as the number of voice mail users. The PCTU or PCTUS must be equipped with a CRCU (-4 or -8) to support voice mail.

10.10 Toshiba VP Voice Messaging System

10.11 STRATA DK systems are designed to support the full range of features offered by the Toshiba VP. It provides various call routing, message handling, and information management features, including:

- Auto Attendant
- Call Forward to Voice Mailbox
- Message Waiting Indication
- Voice Mail Control from Digital and Electronic Telephones
- System Monitoring
- Feature Integration

10.12 A block diagram of voice mail-to-PSTU or -PESU connection is shown in Figure 8-26. See section **400-096-206** for PSTU and PESU installation.

10.13 STRATA DK/Toshiba VP Programming Considerations. Some features of STRATA DK system programming were designed for Toshiba VP systems, and do not necessarily apply to customer-supplied voice mail messaging systems. These programming features are as follows:

- **Answer (A) Tone.** The STRATA DK stations will send an answer tone to Toshiba VP when the station answers a Toshiba VP call.
- **Disconnect (D) Tone.** The STRATA DK stations will send a disconnect tone to Toshiba VP when the station hangs up while connected to Toshiba VP. (D Tone is also sent to release the Toshiba VP/Auto Attendant port when an outside CO line caller hangs-up and the CO provides a Calling Party Control (CPC) or Auto Release (AR) disconnect signal per **Program 15-0**.

  NOTES:
  1. *D Tone will not operate in all areas, because some Central Offices fail to provide the CPC or AR signal.*
  2. *Both A and D Tones provide more efficient Toshiba VP port use. Always enable these options. Both options are enabled by accessing **Program 31**, and setting LEDs 15, 16 , and 17 ON.*
  3. *The CPC or AR signal of some Central Offices (COs) is not reliable and may occur during a CO line voice connection, causing the call to disconnect. If this occurs, disable CPC /AR Hold and CPC/AR Voice Mail calls on all CO lines with **Programs 15-0** and **15-3**.*
- **B Tone Signals.** Stations send a recall (B) tone to Toshiba VP whenever they answer a transfer (camp-on) recall from stations that did not answer a Toshiba VP blind transfer. (The B tone notifies Toshiba VP that the call is a recall and not a new call, allowing Toshiba VP to respond with the appropriate greeting.) For this feature to operate, PSTU or PESU voice mail ports must have LEDs 19 and 20 turned ON in **Program 31**.

10.14 See **Paragraph 10.30** for general voice mail programming information.

10.20 Customer-supplied Voice Mail Messaging Systems

STRATA DK systems are designed to support a wide range of customer-supplied voice mail messaging systems. Depending on the voice mail system used, some of the features available with Toshiba VP (refer to Paragraph **10.10**) may be available with the customer-supplied system.

10.30 General Voice Mail (PSTU or PESU Port)

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Programming Considerations

10.31 Voice mail (VM) PSTU or PESU port programming is accomplished using **Programs 31** and **10-2**. (Refer to Programming Procedures, Section **400-096-300**, for more details.) VM programming features are as follows:

- **VM Groups**—This feature groups VM PSTU or PESU ports together so that message waiting set/cancel signals appear to originate from the lowest port in the VM group. All VM ports connected to a particular VM machine should be set in the *same* VM group (**Program 31**, LEDs 05 ~ 08).
- **Message Waiting (MW) Set/Cancel**—If the VM machine has the ability to dial a code and the appropriate station numbers to set or cancel the message waiting LEDs on digital and electronic telephones, program the VM machine to dial the following sequences (**Program 10-2**, LED 04):

  1) To set a MW LED, the VM machine must dial **6 3** + station number.

  2) To cancel a MW LED, the VM machine must dial **6 4** + station number.

  NOTE:
  Only dial codes 6 3 and 6 4 are set in the VM device configuration; the VM device will dial the station number automatically to set/cancel the MW LED.

- **No Conference VM**—Prevents undesired three-party connections during VM call transfers. All VM ports should be set for No Conference (**Program 31**, LED 09).
- **Privacy Override Deny**—Prevents stations from overriding (breaking in) in-progress VM calls (**Program 31**, LED 18).
- **End-to-End Signaling**—Allows VM port Dual-tone Multi-frequency (DTMF) operation. All VM ports should be set for end-to-end signaling (**Program 31,** LED 17).

  NOTE:
  The CRCU (-4 or -8) must be installed on the PCTU or PCTUS to allow End-to-End Signaling.

- **Receive Auto Call Forward ID Codes**—Provides auto digits from call forwarded stations to direct callers to station mailboxes. All VM ports should be set to receive auto ID code (**Program 31**, LED 16).

10.32 Voice Mail Program Checklist. The following items should be verified before programming voice mail:

1) Set Toshiba VP Maintenance Menu system parameters to "D" = STRATA DK (see Toshiba VP documentation for other parameter settings).

2) STRATA DK programs:
   - **Program 92**: Initialization clears voice mail auto dial codes.
   - **Program 03**: Verify that a CRCU (-4 or -8) is installed on the PCTU to allow the VM device to send DTMF tones.
   - **Program 04**: Assigns station numbers to VM ports (initialized numbers recommended).
   - **Program 05**: First digit of special codes 6 3 and 6 4 (initialized numbers recommended).
   - **Program 10-1**: Set the system for voice first, and program the VM device to dial the suffix as "1" after station numbers.
   - **Program 10-2**: Set LED 04 ON for set/cancel operation and LED 06 ON for the VM to detect 80 millisecond tones.
   - **Program 13**: If the VM device is the message center, set the lowest VM port as the message center.
   - **Program 31**: Turn LEDs 04, 05, 09, and 15 ~ 20 ON for the PESU or PSTU ports that are connected to the Toshiba VP ports. Do not set these options for telephone station ports.

   NOTE:
   A, D, and B Tones should be enabled only for VM devices that respond to these tones.

   - **Program 33**: Set the PESU and PSTU ports that are connected to the VM ports to a hunting sequence, starting with the lowest port hunting to the next highest port, etc. The last hunt should be to an attendant station.

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- **Program 35**: LEDs 01 and 02 must be ON for stations to receive the message waiting indication (flashing LED) from a VM device. It is advisable to turn Busy Station Transfer (LED 20) ON for all VM/Auto Attendant ports, and to turn Busy Station Ringing (LED 19) ON for all stations that must never be detected as busy when called by the VM/Auto Attendant port. (Busy Station Transfer and Busy Station Ringing are only available with **Release 4**)
- **Program 36**: Set Fixed Call Forward to VM ports per customer requirements.
- **Program 37**: Set the timer for the VM ports to 22 seconds minimum to allow Call Forward-No Answer to work on VM transferred calls.
- **Program 39**: Set the VM-related buttons on the digital and electronic telephones that will be used to communicate with the VM device.
- **Programs 81 ~ 89**: Verify that the ringing assignments to the VM devices are set per customer requirements.
- **Programs 16**, **40**, **41**, **45 ~ 48** and **50 ~ 56**: Verify that outgoing CO line access is allowed on VM ports to allow the VM beeper notification feature to operate.

10.40 Voice Mail System Installation

10.41 Install the voice mail (VM) system in accordance with the following steps:

1) Ensure that the PSTU or PESU PCB is installed in the system per Section **400-096-206**.

2) Connect the VM system to the selected PSTU or PESU standard telephone port. (Refer to Wiring Diagrams, Section **400-096-209**, for PSTU and PESU wiring/interconnecting details.)

3) Program the STRATA DK system for the required VM features. (Refer to Paragraphs **10.13** and **10.30**.)

4) Ensure that a CRCU (-4 or -8) is installed on the PCTU or PCTUS PCB, and verify that the PCTU code in **Program 03** is for CRCU operation.

5) Perform additional VM system programming as applicable (refer to customer-supplied installation/programming manuals).

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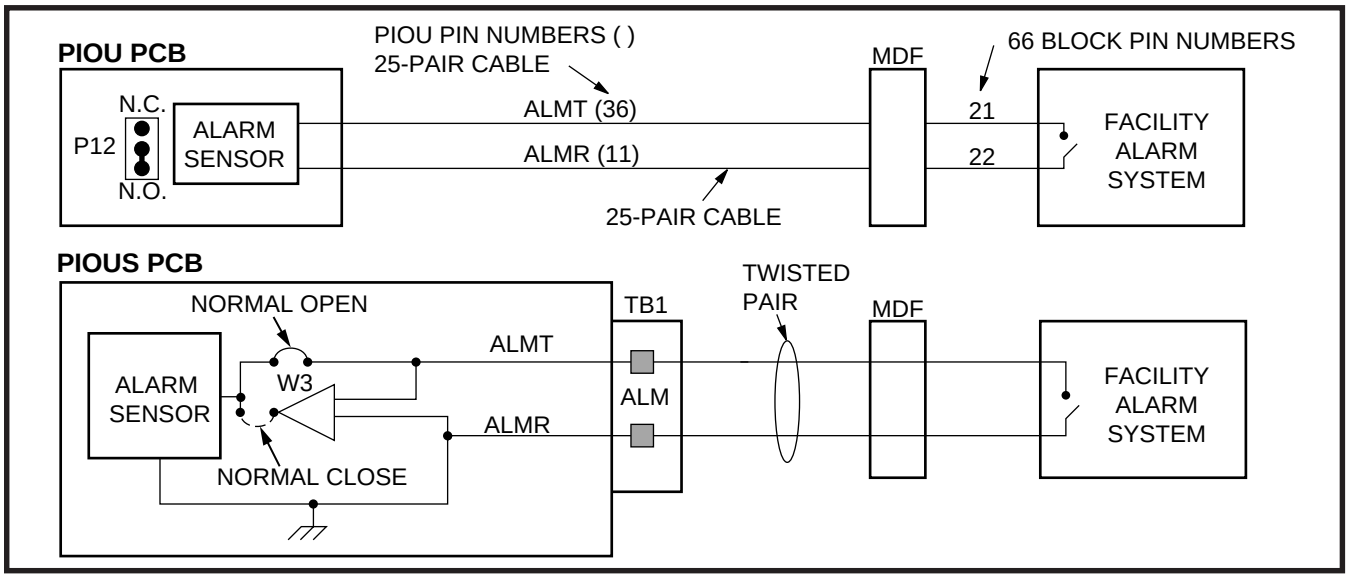

FIGURE 8-27
ALARM SENSOR BLOCK DIAGRAM (PIOU/PIOUS)

NOTE:
Some VM devices may ring trip when called; in this case, set the ring voltage jumper to ***L*** *(low position) on the PESU or PSTU2 PCB connected to the VM device.*

11 ALARM SENSOR INSTALLATION

11.00 The PIOU or PIOUS PCB provides a circuit that can be set to detect a relay open or closed condition from a facility alarm system. When the sensor is activated, all digital and electronic telephones will sound an alarm signal. The telephone alarm signal can be reset by any telephone with an alarm reset button assigned in **Program 39**); also the alarm tone will stop when the activation (open or closure) from the facility alarm system is removed.

11.01 Alarm Sensor Options. Jumper plug **P12** on the PIOU is used to set the alarm sensor to detect an open or closed condition from the facility alarm system. Set **P12** as follows (refer to Figure 8-27):

- To detect a closed condition, set **P12** to the **N.O.** position.
- To detect an open condition, set **P12** to the **N.C.** position.

11.02 Jumper **W3** on the PIOUS is used to set the alarm sensor to detect an open or closed condition from the facility alarm system. Solder the **W3** jumper wire as follows (refer to Figure 8-27):

- To detect a closed condition, solder **W3** to the normal open position.
- To detect an open condition, solder **W3** to the normal closed position.

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11.03 Alarm Sensor Wiring. Refer to Figure 8-27, and connect the facility alarm system relay contacts to the PIOU/PIOUS PCB.

12 DATA INTERFACE UNIT INSTALLATION (RELEASE 3 AND HIGHER)

12.00 General

12.01 Releases 3 and 4 provide two types of data interface units (DIUs) that enable digital telephone users to simultaneously transmit and receive data on the same PDKU station port and wire pair while communicating on a voice call. One unit, called the Integrated DIU (PDIU-DI), becomes part of the digital telephone, replacing the telephone's base; the other unit, is a small self-contained unit called the Stand-alone DIU (PDIU-DS). Each DIU is powered by the PDKU it is connected to; therefore, no external power is required.

NOTE:
2000-series Digital Telephones require a PDIU-DI2 and 1000-series Digital Telephones require a PDIU-DI.

12.02 Both DIUs can be connected to standard Electronic Industries Association (EIA) RS-232 asynchronous serial data devices. EIA devices are divided into two categories: data communication equipment (DCE) and data terminal equipment (DTE). Common DCE devices are modems and some printers; common DTE devices are personal computers, ASCII terminals, and some printers. The PDIU-DI operates like a DCE and connects directly to DTE devices using standard RS-232 cables. Depending on how its internal jumper plugs are configured, the PDIU-DS can either operate like a DTE and connect to DCE devices; or operate like a DCE device and connect to a DTE device. In most applications, DTE and DCE devices exchange data between each other via the standard RS-232 cable connection.

12.03 DIUs can function with DCE and DTE devices at data speeds of up to 19.2 kbps. However, keyboard dialing using AT commands (from a PC or terminal connected to a DIU) is limited to 9600 bps. A speed of 19.2kbps can be achieved when dialing from a PDIU-DI-equipped digital telephone dialpad, but take note that many PC software programs and UART, RS-232 communication ports do not reliably operate at 19.2 kbps. DIU data transmisssion speed is set by the first AT command that the DIU receives once it is in the command state; if manual dialing or receiving calls in the auto answer (default) mode, the transmission speed is transparent.

IMPORTANT NOTE!
To use the PDIU-DI or PDIU-DS with AT commands, communications software or a PC program that performs terminal emulation must be used. AT commands cannot be issued from the computer's operating system prompt.

12.10 Common DIU Connections

12.11 The block diagram in Figure 8-28 illustrates common DIU connections. In this example, PDIU-DIs are connected to personal computers (PC1 and PC2), and PDIU-DSs are connected to a serial printer and modems. The PC users can transfer files internally, print files on the same printer, and access the modem pool to send/receive data to/from an external PC or dial up data service.

12.12 To access these devices, a data call connection must be established between the DIUs. This is accomplished by dialing the destination DIU from a digital telephone dialpad or from a PC keyboard using standard AT dial commands. PDIU-DIs share the same intercom numbers/ports with the digital telephone to which they are connected, while PDIU-DSs have their own. The Intercom (INT) and Data Call (DATA) LEDs on the digital telephone tell the system whether a voice or data call is being made: the Intercom (INT) LED indicates voice calls; and the Data Call (DATA) LED indicates data calls. When dialing from a keyboard with AT commands, **A T D** is typed for voice calls, and **A T D D** for data calls.

12.13 Installation instructions for these devices are provided in Paragraphs **12.40** thru **12.70**. Call paths and scenarios for five types of data test calls are provided in Paragraphs **12.82** ~ **12.86**. Step-

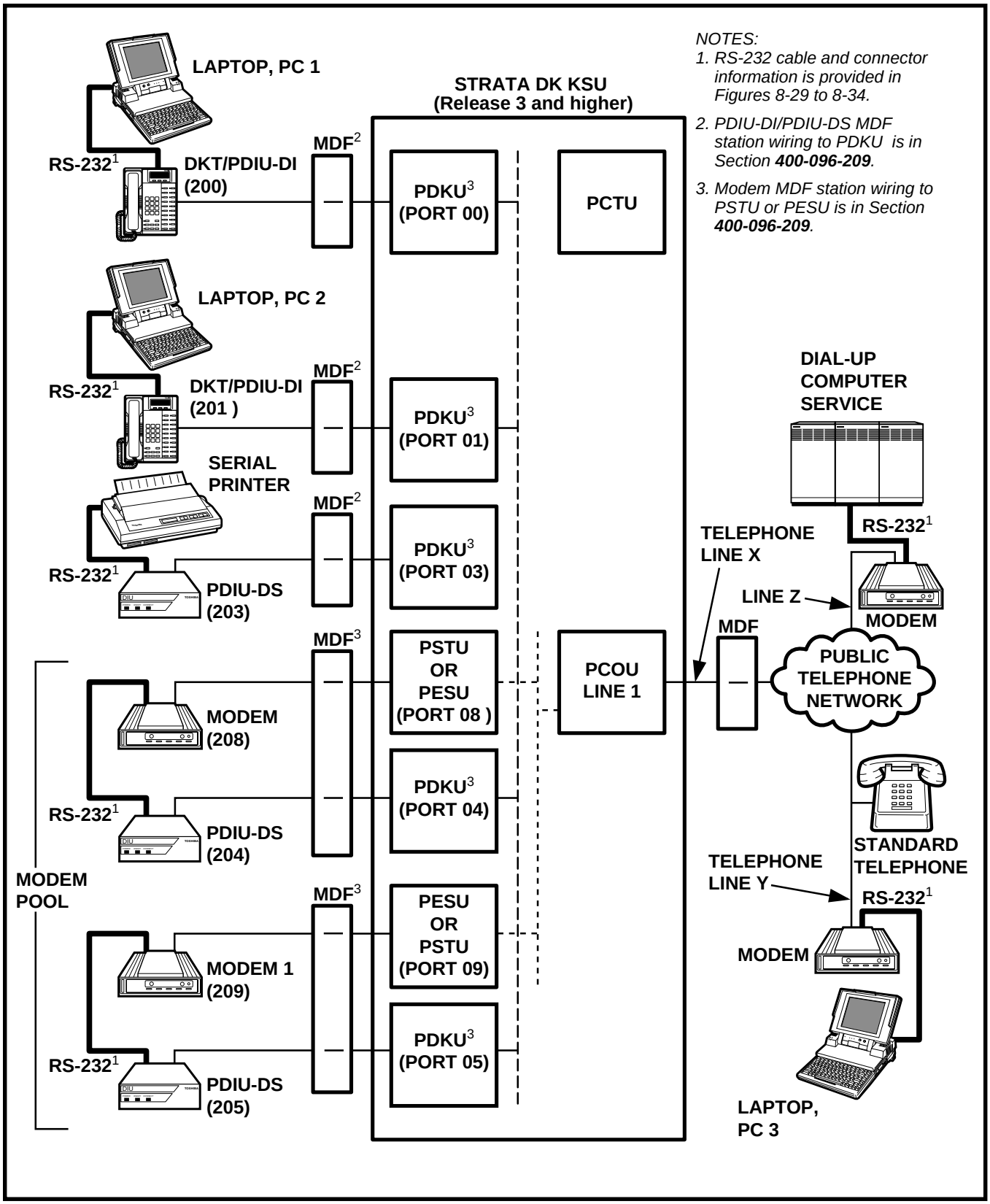


FIGURE 8-28
STRATA DK DATA INSTALLATION EXAMPLE BLOCK DIAGRAM

TOSHIBA LAPTOP OR IBM AT-TYPE PERSONAL COMPUTER (DTE)
PIN DESIGNATIONS

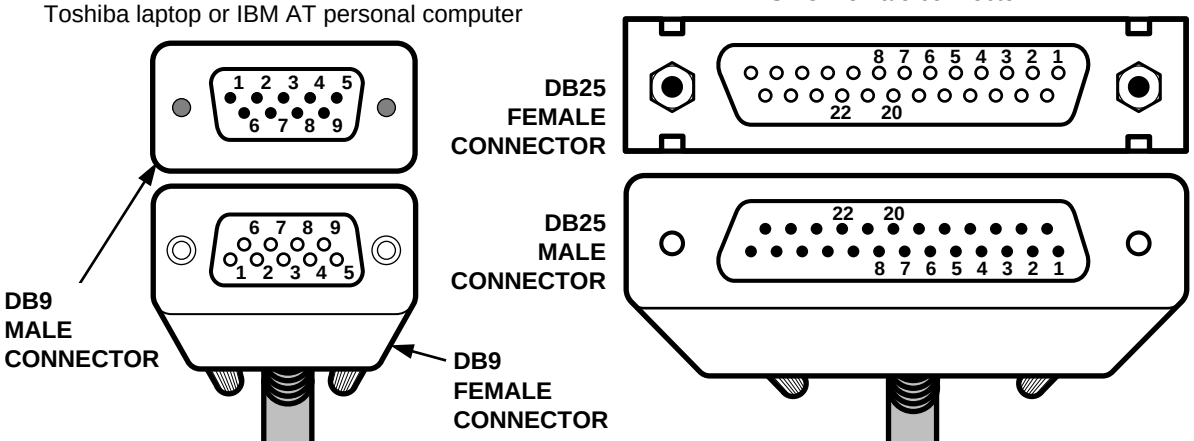
COM PORT PIN #	1	2	3	4	5	6	7	8	9
NAME	DCD	RD	TD	DTR	SG	DSR	RTS	CTS	RI

PDIU-DI (FUNCTIONS LIKE A DCE)
PIN DESIGNATIONS

PDIU-DI PIN #	1	2	3	4	5	6	7	8	20	22
NAME	FG	TD	RD	RTS	CTS	DSR	SG	DCD	DTR	RI

Rear view of asynchronous (serial) communication interface connector (DB9) of Toshiba laptop or IBM AT personal computer

Rear view of PDIU-DI DB25, RS-232 female connector



DB9 PIN #	NAME	DB25 PIN #
1	DCD	8
2	RD	3
3	TD	2
4	DTR	20
5	SG	7
6	DSR	6
7	RTS	4
8	CTS	5
9	RI	22

IBM PC AT modem style (serial) DB25 to DB9, RS-232 cable. Pin to pin connections are confiqured as a straight cable, not as a null modem cable (50 ft max, 24AWG; customer-supplied).

NOTES:
1. Some RS-232 EIA leads may be called by other names by some manufacturers.
2. The computer receives data on Pin 2 (RD) and sends data on Pin 3 (TD).

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FIGURE 8-29
PDIU-DI TO IBM AT-TYPE COMPUTER RS-232 CONNECTOR/CABLE CONNECTIONS

IBM XT PERSONAL COMPUTER OR ASCII TERMINAL (FUNCTIONS LIKE A DTE)

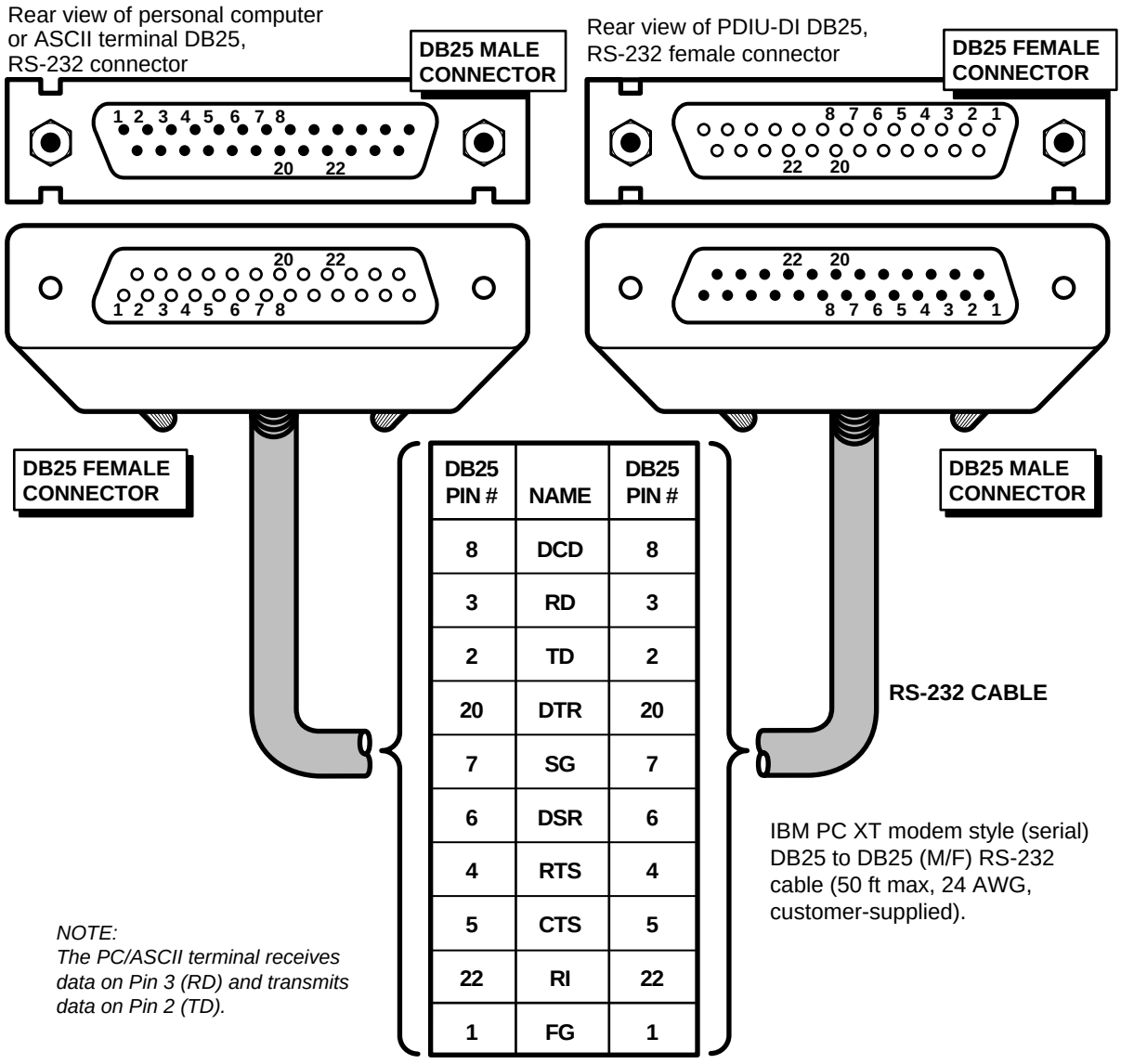
DB25 PIN DESIGNATIONS

PDIU-DI PIN #	1	2	3	4	5	6	7	8	20	22
NAME	FG	TD	RD	RTS	CTS	DSR	SG	DCD	DTR	RI

PDIU-DI (FUNCTIONS LIKE A DCE)

DB25 PIN DESIGNATIONS

PDIU-DI PIN #	1	2	3	4	5	6	7	8	20	22
NAME	FG	TD	RD	RTS	CTS	DSR	SG	DCD	DTR	RI



DB25 PIN #	NAME	DB25 PIN #
8	DCD	8
3	RD	3
2	TD	2
20	DTR	20
7	SG	7
6	DSR	6
4	RTS	4
5	CTS	5
22	RI	22
1	FG	1

IBM PC XT modem style (serial) DB25 to DB25 (M/F) RS-232 cable (50 ft max, 24 AWG, customer-supplied).

NOTE:
The PC/ASCII terminal receives data on Pin 3 (RD) and transmits data on Pin 2 (TD).

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FIGURE 8-30
PDIU-DI TO IBM XT-TYPE COMPUTER, RS-232 CONNECTOR/CABLE CONNECTIONS

TOSHIBA PS321SL PRINTER (FUNCTIONS LIKE A DTE)

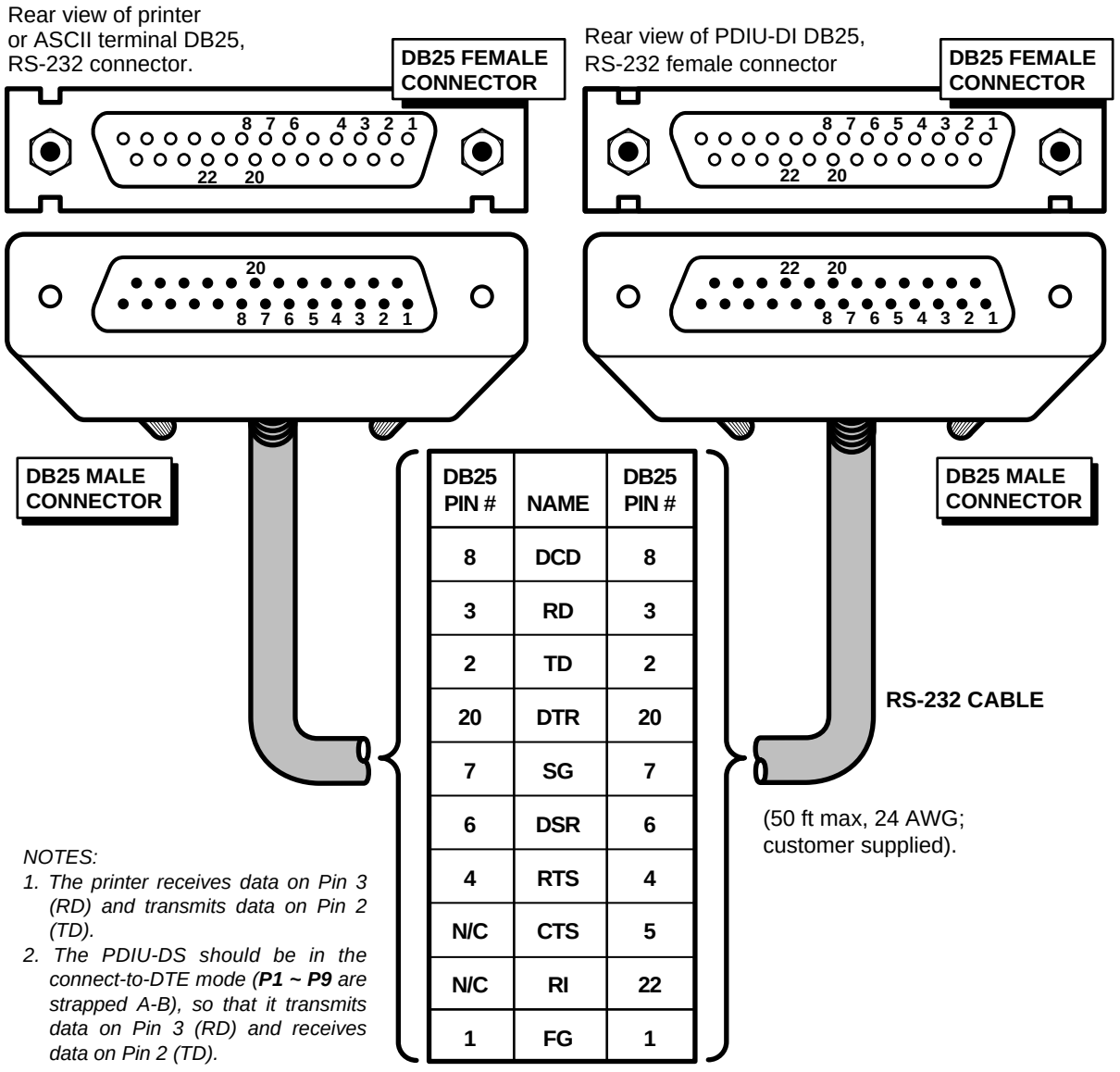
DB25 PIN DESIGNATIONS

PRINTER PIN #	1	2	3	4	5	6	7	8	20	22
NAME	FG	TD	RD	RTS	N/C	DSR	SG	DCD	DTR	RI

PDIU-DS (CONFIGURED IN THE "CONNECT TO DTE" MODE: P1 ~ P9 = A-B SO PDIU FUNCTIONS LIKE A DCE)

DB25 PIN DESIGNATIONS

PDIU-DS PIN #	1	2	3	4	5	6	7	8	20	22
NAME	FG	TD	RD	RTS	CTS	DSR	SG	DCD	DTR	RI



DB25 PIN #	NAME	DB25 PIN #
8	DCD	8
3	RD	3
2	TD	2
20	DTR	20
7	SG	7
6	DSR	6
4	RTS	4
N/C	CTS	5
N/C	RI	22
1	FG	1

NOTES:

1. *The printer receives data on Pin 3 (RD) and transmits data on Pin 2 (TD).*
2. *The PDIU-DS should be in the connect-to-DTE mode (**P1 ~ P9** are strapped A-B), so that it transmits data on Pin 3 (RD) and receives data on Pin 2 (TD).*

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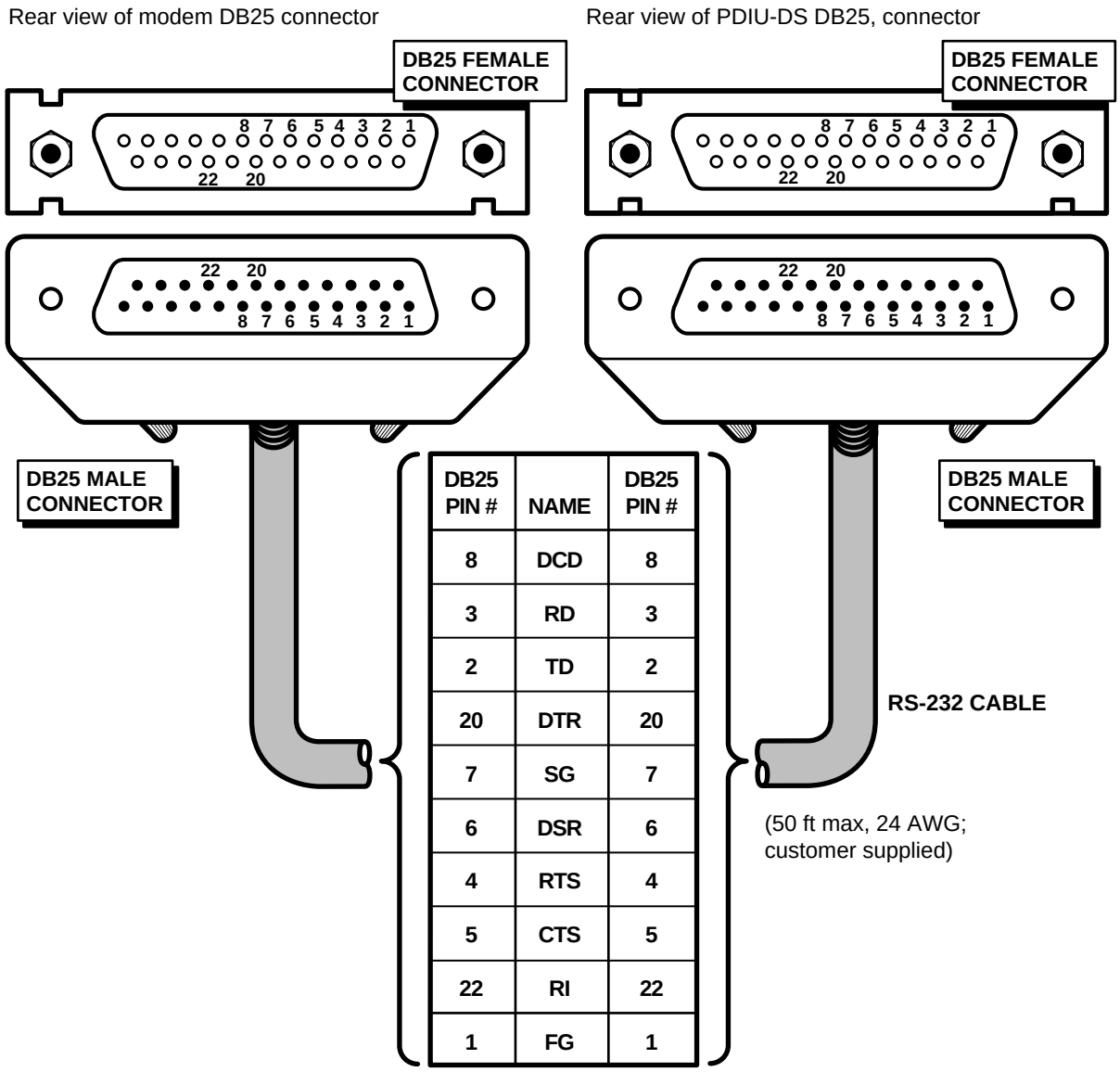
FIGURE 8-31
PDIU-DS TO TOSHIBA PRINTER, RS-232 CONNECTOR/CABLE CONNECTIONS

HAYES-TYPE SMART MODEM (FUNCTIONS LIKE A DCE)

MODEM PIN #	1	2	3	4	5	6	7	8	20	22
NAME	FG	TD	RD	RTS	CTS	DSR	SG	DCD	DTR	RI

PDIU-DS (CONFIGURED IN THE "CONNECT TO MODEM" MODE, P1 ~ P9 = B-C, SO IT FUNCTIONS LIKE A DTE)

PDIU-DS PIN #	1	2	3	4	5	6	7	8	20	22
NAME	FG	TD	RD	RTS	CTS	DSR	SG	DCD	DTR	RI

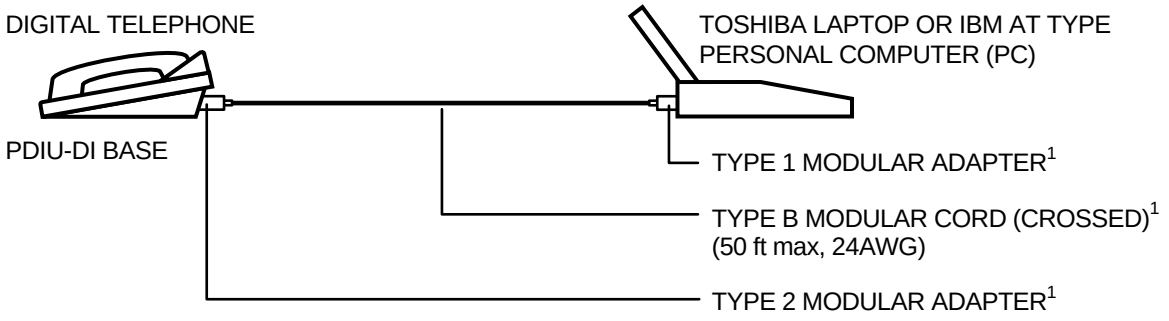


DB25 PIN #	NAME	DB25 PIN #
8	DCD	8
3	RD	3
2	TD	2
20	DTR	20
7	SG	7
6	DSR	6
4	RTS	4
5	CTS	5
22	RI	22
1	FG	1

NOTES:
1. Modem receives data on pin 2 (TD) and transmits data on pin 3 (RD).
*2. The PDIU-DS must be in the connect to modem mode (**P1 ~ P9** strapped B-C) so that it transmits data on pin 2 (TD) and receives data on pin 3 (RD).*

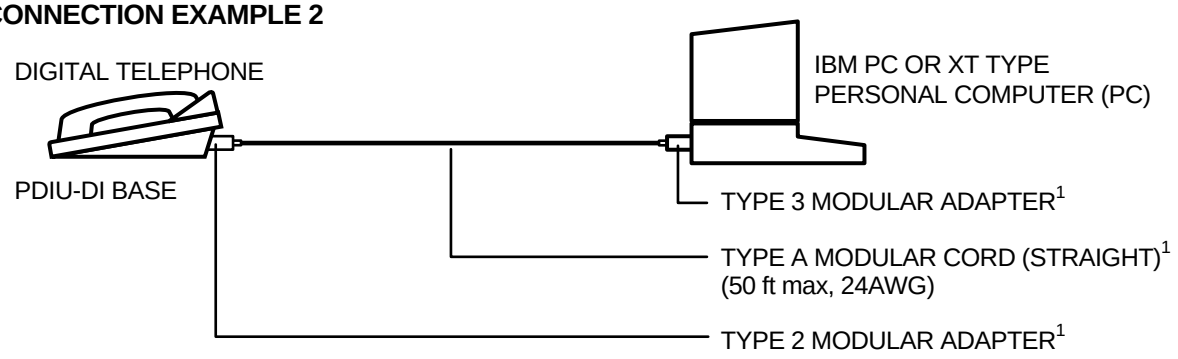
FIGURE 8-32
PDIU-DS TO HAYES-TYPE SMART MODEM, RS-232 CONNECTOR/CABLE CONNECTIONS

CONNECTION EXAMPLE 1



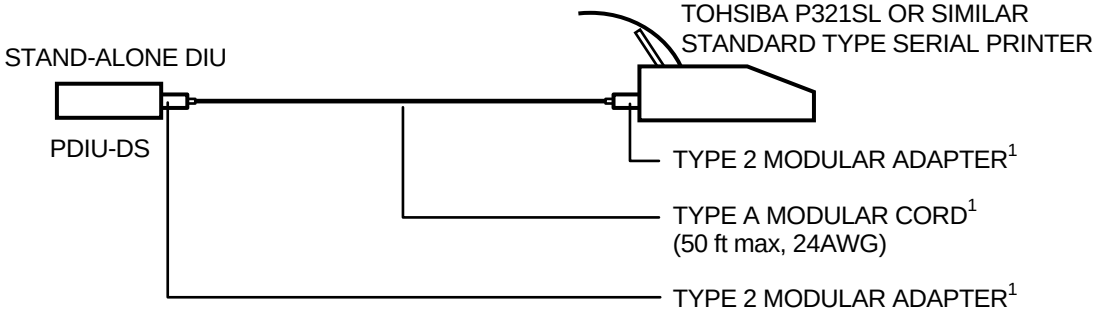
IMPORTANT!
Will not function with applications that require the RI signal to PC.

CONNECTION EXAMPLE 2



IMPORTANT!
Will not function with applications that require the RI signal to PC.

CONNECTION EXAMPLE 3



NOTES:

1. See Figure 8-34 for detailed pin out information of modular cords and adapters.

2. Never use modular cords and adapters when connecting a PDIU-DI/PDIU-DS to a modem.

3. Connection examples 1 and 2 work when using the PDIU-DI to make calls with personal computer applications (auto-dialers, printer sharing, outgoing modem calls, etc). If the PC PDIU-DI must receive calls, the RI lead is normally required; therefore, a standard RS-232 cable must be used (see Figures 8-29 and 8-30).

*4. In Connection Example 3, PDIU-DS must be in the connect to DTE mode (**P1 ~ P9**, strapped A-B).*

5. All modular cords and adapters are customer-supplied.

FIGURE 8-33
PDIU-DI/PDIU-DS MODULAR CABLE/RJ-45 ADAPTER CONNECTIONS

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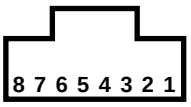
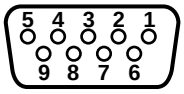
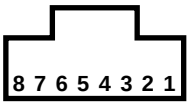
TYPE 1
RJ45 TO DB9 (FEMALE) ADAPTER



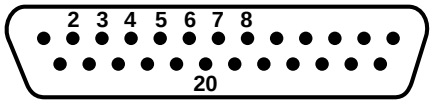
8	7	6	5	4	2	1	N/C	RJ45
DSR	RTS	RD	DCD	TD	GND	CTS	RI	LEAD NAME
6	7	2	1	3	5	8	9	DB9



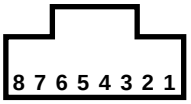
TYPE 2
RJ45 TO DB25 (MALE) ADAPTER



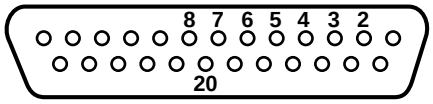
8	7	6	5	4	3	2	1	N/C	RJ45
CTS	SG	DTR	TD	DCD	RD	RTS	DSR	RI	LEAD NAME
5	7	20	2	8	3	4	6	22	DB25



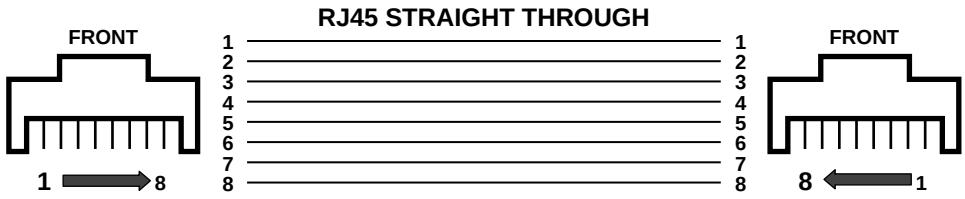
TYPE 3
RJ45 TO DB25 (FEMALE) ADAPTER



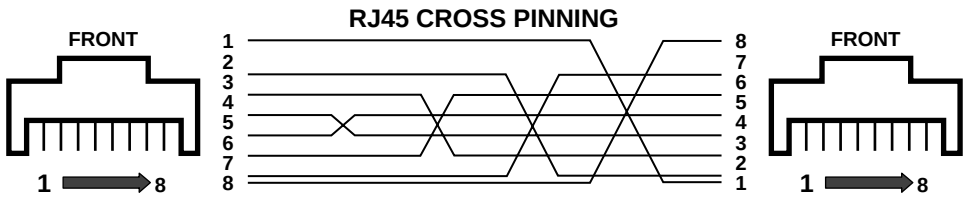
8	7	6	5	4	3	2	1	N/C	RJ45
CTS	SG	DTR	TD	DCD	RD	RTS	DSR	RI	LEAD NAME
5	7	20	2	8	3	4	6	22	DB25



TYPE A
RJ45 FLAT MODULAR CORD (STRAIGHT)



TYPE B
RJ45 FLAT MODULAR CORD (CROSSED)



Modular Cords (50 ft max, 24AWG; customer-supplied)

FIGURE 8-34
PDIU-DI/PDIU-DS MODULAR CORDS AND RJ-45/RS-232 ADAPTER PIN CONNECTIONS

by-step data calling procedures are provided in the STRATA DK *Data Interface User Guide.*

12.20 EIA Interface Leads (Signals)

12.21 Both DIUs operate with the ten standard EIA RS-232 interface leads (signals) on which signaling data is transmitted and received. DIUs connect to serial data devices with standard RS-232 cables, available from telephone supply stores (see Figures 8-29 ~ 8-34). The PDIU-DI/PDIU-DS requires ten signals for some applications, but can function with eight using modular cords and connectors with RJ45/DB25 adapters for other applications. If uncertain which signals are necessary for an application, all ten should be connected.

IMPORTANT NOTES!

1. ***The PDIU-DI is always a DCE device; the PDIU-DS may be a DTE or DCE, depending on how its internal jumpers (1 ~ 9) are configured (see Figure 8-35).***
2. ***In the descriptions below, when a signal is ON, its potential is about seven volts positive relative to signal ground (Pin 7); when a signal is OFF, it is about 7 volts negative relative to the signal ground (Pin 7).***

- **Frame Ground (FG, Pin 1):** The FG signal (EIA circuit AA) is a protective or safety ground which is bonded to the printed circuit board (PCB) in the PDIU-DI/PDIU-DS. If required by local codes, the FG should be connected to external ground.
- **Signal Ground (SG, Pin 7):** The SG signal (EIA circuit AB) establishes the common ground reference for all other DIU and data device signals and must be wired for all applications.
- **Transmit Data (TD, Pin 2):** DTE devices transmit and DCE devices receive data on the TD lead (EIA circuit BA). Before the DTE device can transmit the TD signal, the RTS, CTS, DSR, and DTR signals (all discussed below) must be ON. The TD signal is OFF in the idle state.
- **Receive Data (RD, Pin 3):** The DCE device transmits data to the DTE device on the RD lead (EIA circuit BB); the DTE receives data on the RD.
- **Request to Send (RTS, Pin 4):** Some DTE devices send an RTS signal (EIA circuit CA) to the DCE device when they are ready to transmit data on the TD lead. If the DTE device does not generate the RTS signal, the DIU DIP switch **SW1-4** should be set ON to inform the DIU. Sometimes, the DTE/DCE device may use RTS/CTS for Ready/Busy type flow control; in these cases DIP switch **SW1-4** should be OFF (see Figure 8-36 for DIP switch information).
- **Clear to Send (CTS, Pin 5):** The DCE device sends the CTS signal (EIA circuit CB) which indicates that it is prepared to transmit data to the line side. The DCE device sends this signal only when it receives the RTS signal from the DTE device. Sometimes, the DTE/DCE device may use RTS/CTS for Ready/Busy type flow control; in these cases, dip switch **SW1-4** should be OFF (see Figures 8-36 and 8-37) for DIP switch information).
- **Data Set Ready (DSR, Pin 6)**: When connected to the communication channel and prepared to exchange control characters to initiate data transmission, the DCE device sends the DSR signal (EIA circuit CC) to the DTE device. If the PDIU DIP switch **SW1-2** is set ON, DSR will be ON continuously; if the switch is set OFF, DSR follows DTR (if DSR is ON, DTR is ON, etc.) **SW1-2** should be OFF in most cases (see Figure 8-36 for DIP switch information).
- **Data Carrier Detect (DCD, Pin 8):** The DCE device sends the DCD signal (DCD, Pin 8) when receiving the carrier signal on the line side. Before transmitting or receiving data, most DTE devices require that the DCD be ON. If the carrier signal is removed by the remote end or lost due to a fault condition on the line, the DCE notifies the DTE device by an OFF condition with the DCD signal; PDIU DIP switch **SW1-2** is set ON to set the DCD ON continuously; if set OFF, the DCD signal will only be ON when connection between two DIUs is established and OFF when a connection is not established. **SW1-2** is set OFF when the DTE/DCE uses the DTR/DSR signals for Ready/Busy flow control (see Figure 8-36 for DIP switch information).
- **Data Terminal Ready (DTR, Pin 20):** The DTE device sends the DTR signal (EIA circuit CD) to the DCE device, prompting the DCE device to open the communication line. The line is closed and the call disconnected when the DTE device quits sending the DTR signal. DTR may be sent any time to indicate that the DTE is ready to

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transmit or receive data. DIP switch **SW1-2** should be set OFF in most cases (see Figure 8-36 for DIP switch information).

- **Ring Indicator (RI, Pin 22):** The RI signal (EIA circuit CE) is sent by the DCE device to the DTE device. Whenever the DCE device receives a ringing signal on the line side, it turns the RI signal ON. If DIU DIP switch **SW1-3** is set ON, the RI signal will be on continuously if ringing; if the switch is set OFF, the RI signal will be one second ON/three seconds OFF when the DIU detects ringing signal.

12.30 DIP Switch Options

12.31 The PDIU-DI and the PDIU-DS each have a four-control DIP switch which can be configured for signaling options. The switch is located on the bottom of the PDIU-DI, and on the back panel of the PDIU-DS (see Figure 8-35).

- **SW1-1:** Normally this switch is set ON to disconnect devices from DIUs automatically. The connection is maintained if data is exchanged between the device and the DIU within eight to nine second intervals. If **SW1-1** is OFF on the called and calling DIU, data calls will remain connected until released manually.
- **SW1-2:** This switch is placed in the ON position when the PDIU-DI (or PDIU-DS configured like a DCE) must hold DCD and DSR ON continuously. If **SW1-2** is OFF, DSR follows DTR and DCD will be ON only when the DIU is connected on a data call to another DIU. **SW1-2** should be OFF on a DIU when it is connected to a personal computer that uses a communications software program to establish data calls with AT commands.
- **SW1-3:** The PDIU-DI (or PDIU-DS configured as a DCE) sends the Ring Indicate (RI) signal to the computer to tell the computer (DTE) that the DIU is receiving an incoming call. **SW1-3** should be ON for the DIU to send RI steady, and OFF to send at one second ON/three seconds OFF intervals.
- **SW1-4:** This switch is placed in the ON position if the computer does not output the RTS signal. Sometimes, the DTE device may use RTS/CTS for Ready/Busy flow control, in these cases **SW1-4** should be OFF. In this case, the DCD signal of the calling DTE is used as the RTS lead of the called DTE and the DCD signal of the called DTE is used as the RTS signal of the other DTE. In this case a signal which stops the DTE from transmitting data (usually the CTS lead) should be cross-connected to the DIU's DCD signal. Consult the DTE device or application software documentation to determine which type of flow control is required.

12.40 PDIU-DI to Personal Computer (PC) Installation

12.41 The PDIU-DI always functions as a DCE device; it transmits data on the Receive Data lead (RD) and receives data on the Transmit Data lead (TD). Most personal computers function as a DTE device; PCs transmit data on the TD lead and receive data on the RD lead. Follow the steps below to install the PDIU-DI to a DTE, PC:

NOTES:

1. *Use the steps below when installing an ASCII terminal, personal computer, or any other DTE device to a PDIU-DI.*
2. *These instructions apply to both the PDIU-DI2 (which connects to 2000-series Digital Telephones only) and to the PDIU-DI(which connects to 1000-series Digital Telephones only).*
3. *The PDIU-DI can connect to a DCE computer or any other DCE-type device using a specially configured RS-232 cable or adapter; but this application is rarely required.*

1) Install the PDIU-DI under the digital telephone per the instructions in Section **400-096-207**.

2) Install the digital telephone that is to be equipped with the PDIU-DI per the applicable drawing in Section **400-096-209**.

NOTES:

1. *The PDIU-DI always operates as a DCE device; therefore, unlike the PDIU-DS, it has no internal jumpers for DCE/DTE configuration.*

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2. *Do not cut the PERCEPTION strap when installing the PDIU-DI in STRATA DK systems.*

3) Connect the appropriate RS-232 cable between the PDIU-DI's DB-25 female connector and the PC's appropriate asynchronous serial communications port connector (COM port).

IMPORTANT NOTE!
Check the PC manufacturer's serial communication port interface documentation for correct RS-232 pin requirements; requirements vary with each manufacturer. The number of EIA RS-232 signals required (8, 9, or 10 wires) depends on the application. When EIA signal requirements are not known, connect the 10 EIA signals listed in Paragraph 12.20. Figures 8-29 and 8-30 provide diagrams for connecting RS-232 cables between PDIU-DIs and PCs.

4) Set the PDIU-DI DIP switch (**SW1-1** ~ **4**) for the desired application. Figure 8-36 shows the DIP switch locations and Paragraph **12.30** describes switch functions.

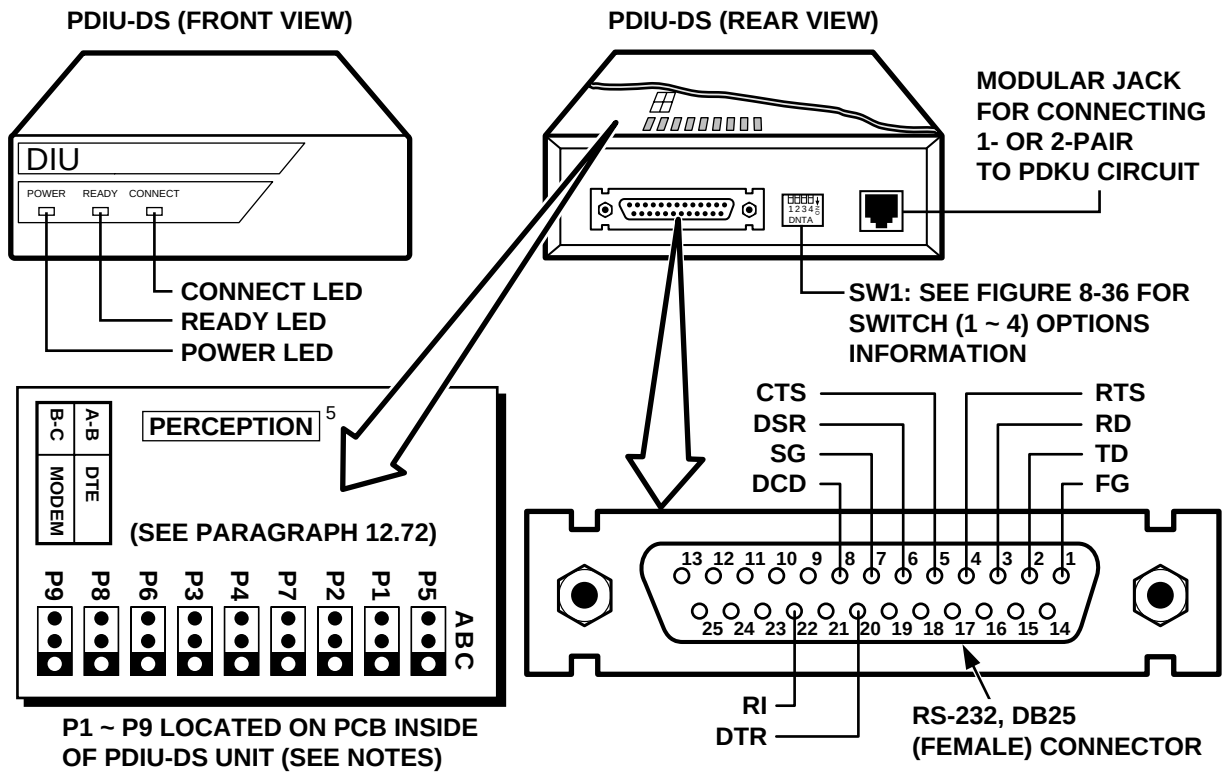
5) Access **Program 20** to configure the PDIU-DI for DTE-type connection and **Program 39** for data button assignments for the digital telephone connected to the PDIU-DI.
   - **Program 20**
     - The port number entered for the PDIU-DI in **Program 20** is the port number of the digital telephone to which the PDIU-DI is connected.
     - **LED 01**: Should always be ON for PDIU-DI ports.
     - **LED 02**: Should be ON for PDIU-DI ports, unless the PC user will never use DIU AT commands (other than ATDD, ATDT, and ATD) and never require the PDIU-DI to send result codes to display on the PC display screen. Frequently, it is difficult to determine the full extent of these requirements; so it is recommended to turn LED 02 ON. See the *Data Interface User Guide* for information regarding DIU AT commands and result codes.
     - **LEDs 03 and 04:** Should be OFF for PDIU-DI ports.
     - **LED 05**: Should be ON if the system is installed behind a PBX or Centrex that uses access codes to make external calls or to insert a pause following DIU access of an outside line.
     - **LEDs 17 ~ 20**: Used to establish data security groups. PDIU DI stations are only allowed to make calls to DIUs in the same data group to which they are assigned.
   - **Program 39**
     - The **DataÍCall** (**DATA**), **DataÍRelease (DRLS**), and **Modem** (**MODEM**) buttons can be assigned to digital telephones equipped with PDIU-DIs. Assign Speed Dial buttons to data devices as required. Do not assign Direct Station Selection (**DSS**) buttons to data devices; **DSS** buttons are used for voice calls only.

12.50 PDIU-DS To Printer Installation

12.51 Serial printers (laser, dot matrix, or other types) can be connected to stand-alone data interface units (PDIU-DSs). Digital telephones equipped with PDIU-DIs can share access to these printers. Serial printers operate as DCE or DTE devices, depending on the vendor; the PDIU-DS can be connected to either type, since it can be configured as a DTE or DCE device. (The PDIU-DS comes from the factory configured as a DCE device.) Follow the steps below to install the PDIU-DS to a serial printer.

NOTES:
1. *Only serial printers (not parallel) that conform to EIA RS-232 signaling requirements can be connected to PDIU-DSs.*
2. *In rare applications, it may be desired to connect printers to PDIU-DIs. Refer to the printer's installation instructions.*

1) Consult the serial printer's documentation and determine if the printer operates as a DCE or DTE device:
   - If the printer is a DCE device: Disas-



			SIGNAL DIRECTION AND FUNCTION OF P1 ~ P9			
			PDIU-DS CONNECTED TO DTE		PDIU-DS CONNECTED TO DCE	
SIGNAL ABBREVIATON	SIGNAL NAME/ FUNCTION	PDIU-DS PIN NO.	SIGNAL DIRECTION	FUNCTION: A-B (DTE MODE)	SIGNAL DIRECTION	FUNCTION: B-C (MODEM MODE)
FG	FRAME GROUND	1				
SG	SIGNAL GROUND	7				
TD	TRANSMIT DATA	2	DTE ⇨ DIU	P1	MODEM ⇦ DIU	P1
RD	RECEIVE DATA	3	DTE ⇦ DIU	P2	MODEM ⇨ DIU	P2
RTS	REQUEST TO SEND	4	DTE ⇨ DIU	P6	MODEM ⇦ DIU	P6
CTS	CLEAR TO SEND	5	DTE ⇦ DIU	P7/P5	MODEM ⇨ DIU	P7/P5
DSR	DATA SET READY	6	DTE ⇦ DIU	P4	MODEM ⇨ DIU	P4
DTR	DATA TERMINAL READY	20	DTE ⇨ DIU	P3	MODEM ⇦ DIU	P3
DCD	DATA CARRIER DETECT	8	DTE ⇦ DIU	P8	MODEM ⇨ DIU	P8
RI	RING INDICATOR	22	DTE ⇦ DIU	P9	MODEM ⇨ DIU	P9

NOTES:
*1. Mode select **(P1 ~ P9)** "A-B" if PDIU-DS is connected to a terminal-type device (DTE).*
*2. Mode select **(P1 ~ P9)** "B-C" if PDIU-DS is connected to a modem-type device (DCE).*
3. See Figure 8-37 to disassemble/assemble PDIU-DS.
4. Some RS-232 leads go by different names depending on the equipment manufacturer.
5. Do not cut the Perception strap when installing a PDIU-DS in Strata DK systems.

FIGURE 8-35
PDIU-DS JUMPER PLUG OPTIONS/RS-232 CONNECTOR INFORMATION

semble the PDIU-DS and configure it to operate like a DTE device by placing the jumper plugs (**P1** ~ **P9**) in the "B-C" (MODEM) position. Reassemble the PDIU-DS, and mark "B-C" on the bottom identification label for future reference. (Paragraph **12.70** provides PDIU-DS disassembly/assembly instructions, and Figure 8-35 provides jumper plug information.)

NOTE:
Do not cut the PERCEPTION strap when installing a PDIU-DS in a STRATA DK system.

- If the printer is a DTE device: It may not be necessary to disassemble the PDIU-DS, since it comes direct from the factory configured as a DCE device. However, if uncertain, disassemble the PDIU-DS and verify that jumper plugs (**P1** ~ **P9**) are in the "A-B" (DTE) position. Reassemble the PDIU-DS and mark "A-B" on the bottom identification label for future reference. (Paragraph **12.70** provides PDIU-DS disassembly/assembly instructions, and Figure 8-35 provides jumper plug information.)

2) Connect the PDIU-DS to the appropriate PDKU circuit per wiring diagrams in Section **400-096-209**.

3) Connect the appropriate RS-232 cable between the printer and the PDIU-DS. (See Figure 8-31 for an example printer cable connection.)

4) If Steps 2 and 3 are done properly, the Power and Ready LEDs on the PDIU-DS should light when the printer is turned on and ready.

5) Set the PDIU-DS DIP switch (**SW1-1 ~ 4**) for the desired application. Figure 8-36 shows the DIP switch locations and Paragraph **12.30** describes switch functions.

IMPORTANT NOTE!
Check the printer's serial documentation for correct RS-232 pin requirements. The requirements vary with each manufacturer.

6) Use **Program 20** to configure the PDIU-DS to connect to a serial printer. (See Programming Section **400-096-302** for instructions and record sheets.)
   - **LED 01**: Should always be ON for PDIU-DS ports.
   - **LED 02**: Should be OFF for PDIU-DS ports connected to printers.
   - **LED 03**: Should be OFF for PDIU-DS ports that connect to DTE- or DCE-type printers.
   - **LED 04**: Should always be ON for PDIU-DS ports.
   - **LED 05**: Should be OFF for PDIU-DS ports connected to printers.
   - **LED 06:** Normally OFF for PDIU-DS ports connected to printers.
   - **LEDs 17 ~ 20**: Data security groups can be used to allow or deny digital telephones equipped with PDIU-DIs access to PDIU-DS ports connected to a printer. PDIU-DI stations can only make data calls to DIUs in the same data security group.

7) **Program 22** should be used to configure PDIU-DSs to hunt if more than one PDIU-DS is connected to the same printer/server.

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12.60 PDIU-DS To Modem Installation

12.61 Asynchronous-type (not synchronous) modems can be connected to PDIU-DSs. This allows PDIU-DI-equipped digital telephones that are connected to personal computers, terminals, and other devices to share access to a modem or modem pool.

IMPORTANT NOTE!
Modems must be "smart modems" that respond to AT commands and return result codes. Modems are customer-supplied.

12.62 A modem(s) can be accessed internally for outgoing data calls or externally for incoming data calls. Modems operate as DCE devices; so PDIU-DSs that are connected to them must be configured

to operate like a DTE device. In the example installation in Figure 8-28, the line side of the two modems are connected to PSTU/PESU ports to establish a modem pool; however, the line side of modems could be connected directly to a dedicated CO line. If modems are connected directly to telephone network CO lines, automatic transfer of CO line voice calls to system modems (data call) will not function as described in the *Data Interface User Guide*. For best operation and utilization of CO lines and modems, it is recommended to connect modems to PSTU/PESU standard station ports in a modem pool configuration. The RS-232 side of the modem connects to the PDIU-DS with standard RS-232 cables; the PDIU-DS line side (RJ-11 connector) always connects to its own individual PDKU port. Use the instructions below to install modems to PDIU-DSs.

1) Configure the PDIU-DS as a DTE device: Disassemble the PDIU-DS and place jumper plugs **P1** ~ **P9** in the "B-C" position (MODEM). Reassemble the PDIU-DS and mark "B-C" on the bottom identification label for future reference. (Paragraph **12.70** provides PDIU-DS disassembly/assembly instructions and Figure 8-35 provides jumper plug information.)

2) Connect the PDIU-DS to the appropriate PDKU circuit per the applicable wiring diagrams in Section **400-096-209**.

3) Connect the appropriate RS-232 cable between the modem and the PDIU-DS. Figure 8-32 shows an example of how to connect a PDIU-DS to a smart modem with an RS-232 cable.

IMPORTANT NOTE!
All ten PDIU-DS EIA leads (signals) should be connected to the modem. Consult the modem's documentation for correct RS-232 pin requirements; the requirements may vary with each manufacturer.

4) Connect the line side of the modem to a PSTU or PESU standard telephone circuit or a dedicated CO line. (Consult the modem's documentation to install it to a CO line.) Section **400-096-209** provides PESU/PSTU station (port) wiring information.

5) Set the PDIU-DS DIP switch (**SW1-1 ~ 4**) for the desired application. Figure 8-36 shows the DIP switch location and Paragraph **12.30** describes switch functions. SW1-2 should be OFF when PDIU-DS is connected to a modem.

6) Use the programs below to configure the PDIU-DS to connect to an asynchronous modem. (See programming Section **400-096-302** for explanations and record sheets.)
   - **Program 20**
     - **LED 01**: Should always be ON for PDIU-DS ports
     - **LED 02**: Should be ON for PDIU-DS ports connected to modems, enabling the use of AT commands and result codes when incoming calls are made from outside the system to modems connected to PDIU-DSs.
     - **LED 03**: Should be set ON for PDIU-DS ports connected to modems.
     - **LED 04**: Should always be ON for PDIU-DS ports.
     - **LED 05**: Should be ON if the system is installed behind a PBX/Centrex that uses access codes to place outgoing trunk calls.
     - **LED 06 (Release 4):** Should be ON for DIUs connected to modems. With this feature turned on, the DIU will send a one-second release signal on the DTR to drop the modem when the data user presses the **DataÍRelease** (**DRLS**) button on their telephone.
     - **LEDs 17 ~ 20**: Data security groups can be used to allow or deny digital telephones equipped with PDIU-DIs access to the PDIU-DS ports connected to a modem. PDIU-DI stations can only make data calls to DIUs in the same data security group.
   - **Program 21**
     - For each PDIU-DS/modem pair, assign the ports on the PDKU and PSTU (or PESU) that will be connected to the PDIU-DS and modem, respectively.
   - **Program 22/33**

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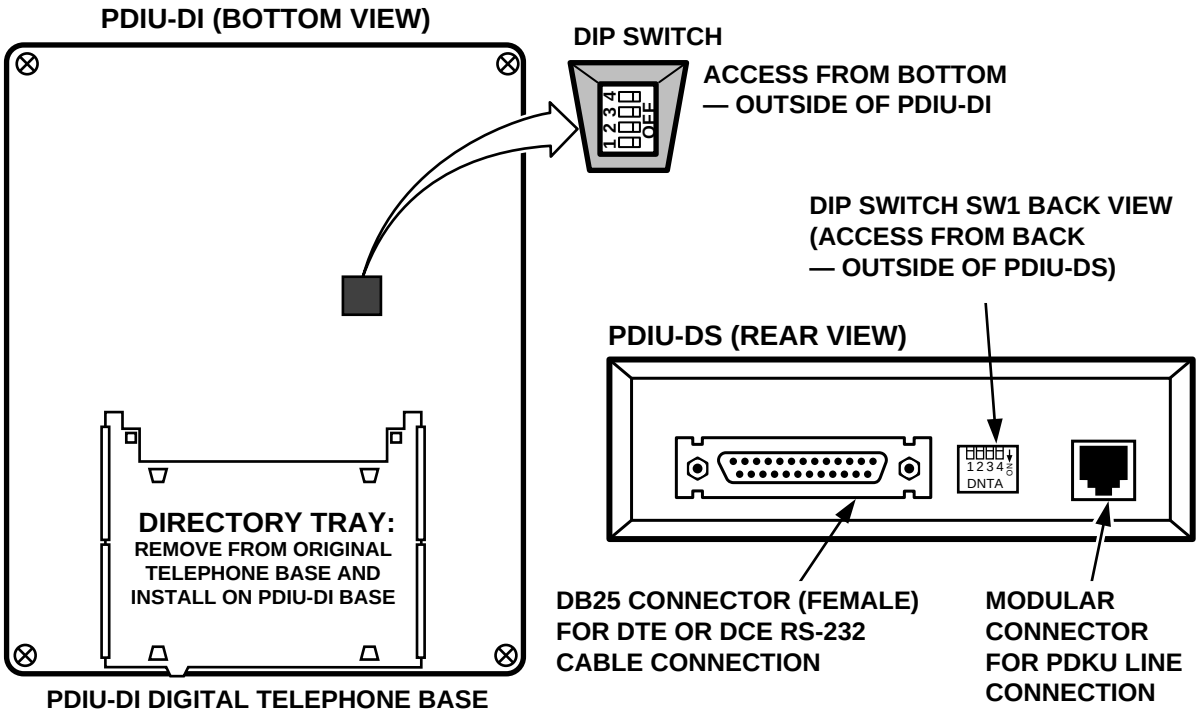
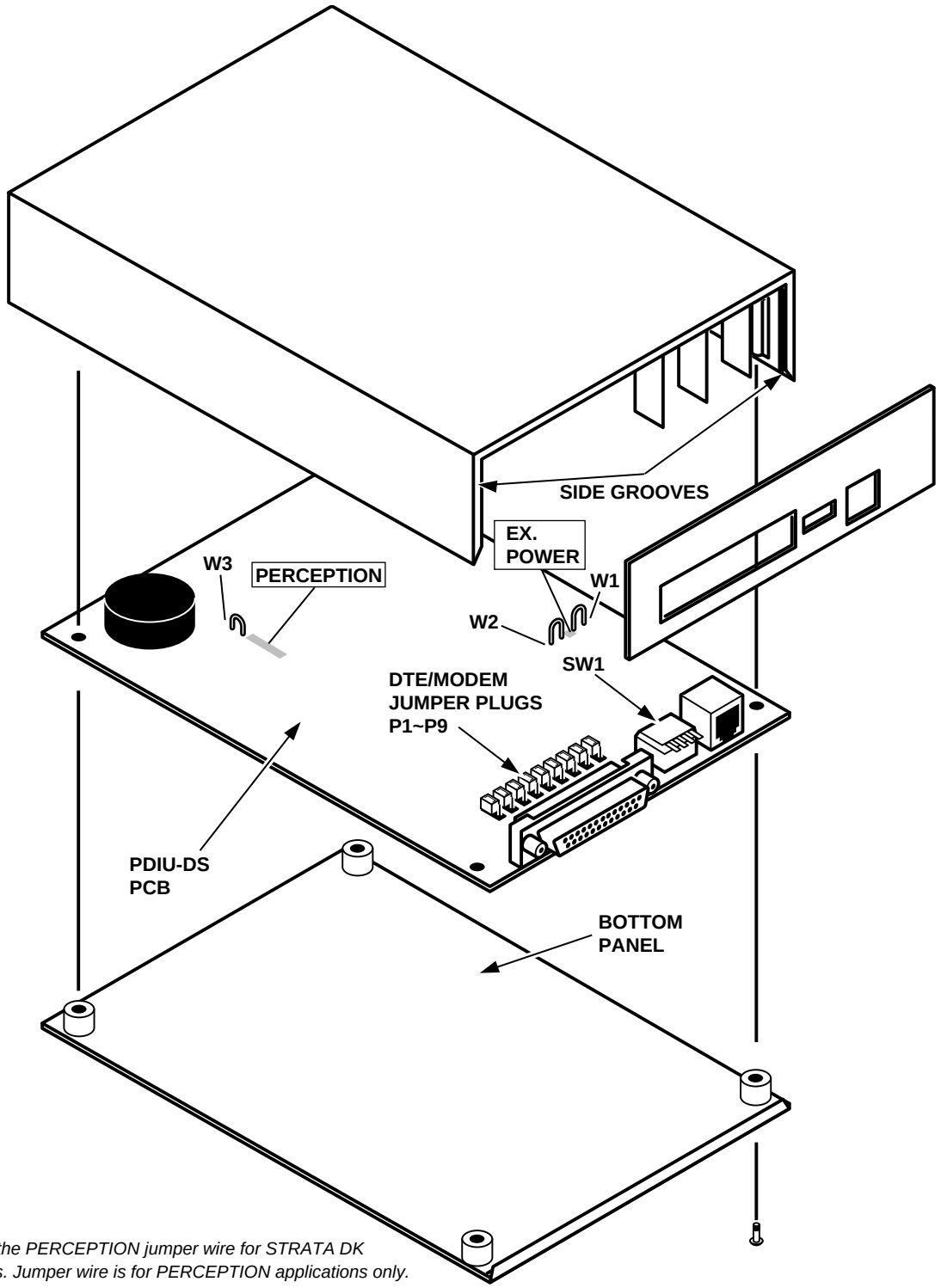


PDIU-DI AND -DS SW1 DIP SWITCH (1 ~ 4) FUNCTIONS

SWITCH	FUNCTION	INITIAL POSITION
SW1 (1)	Forced hang up when DIU does not detect space signal on TD or RD for about 9 minutes ON: enable (auto-disconnect)[1] OFF: disable	OFF
SW1 (2)	DCD, DSR control ON: continuous on OFF: DSR depends on DTR (DCD is on during communication state)	OFF
SW1 (3)	RI control ON: RI is on continuously during ringing state OFF: RI is 1 sec ON/3 sec OFF during ringing state	OFF
SW1 (4)	RTS control ON: DTE doesn't have RTS signal OFF: DTE has RTS signal (ready/busy flow control: RTS/CTS:DCD)	OFF

NOTES:
1. *DIU port must have LED 02 ON in **Program 20** to enable auto disconnect.*
2. *See Paragraphs **12.20** and **12.30** for more details regarding **SWI** option settings.*
3. *When a PDIU-DS is connected to a modem that tracks the DCD signal (AT&C1) SW1(4) must be ON.*
4. *If using Toshiba Personal Computers and Toshiba Printers using X-ON/X-OFF flow control, set SW1(4) ON on PDIU-DIs and -DSs.*

FIGURE 8-36
PDIU-DI/PDIU-DS SW1 DIP SWITCH INFORMATION



NOTES:

1. *Do not cut the PERCEPTION jumper wire for STRATA DK installations. Jumper wire is for PERCEPTION applications only.*
2. *See **Table 9-D** regarding external power requirements.*

FIGURE 8-37
PDIU-DS DISASSEMBLY/ASSEMBLY DIAGRAM

- If more than one modem/PDIU-DS pair is configured as a system modem pool, the PDIU-DSs should be set to hunt each other in **Program 22**. The modem PSTU or PESU ports should be set to hunt each other in **Program 33**.

- **Program 31**
  - LED 18 should be turned on for all PESU or PSTU station ports that are connected to modems. This provides data security by preventing Executive or Privacy Override of modem calls.

12.63 Modem Setup Recommendations.

1) Always change the escape sequence of the modem from "+ + +" to some other ASCII character. (ATS2 = ___ command to modem.)
2) Set the modem to recognize the DTR signal to disconnect. (AT&D2 command to modem.)
3) When the modem tracks the DCD signal, issue AT&C1 command to modem.

12.70 PDIU-DS Disassembly and Assembly

12.71 To set the jumper plugs (**P1** ~ **P9**) on the PCB inside the PDIU-DS for DCE or DTE operation, the PDIU-DS must be disassembled. Disassemble the PDIU-DS in accordance with the following steps:

12.72 Disassembling the PDIU-DS

1) Remove the four screws securing the bottom panel to the rest of the unit. (See Figure 8-37.) These screws are not captive; so place together where they can be easily accessed.

2) Remove the bottom panel.

3) Remove the PCB inside the PDIU-DS by lifting the back panel from its side grooves.

4) Turn the PCB over and set the jumper plugs (**P1** ~ **P9**) as follows:
   - If the PDIU-DS is connected to a DTE,

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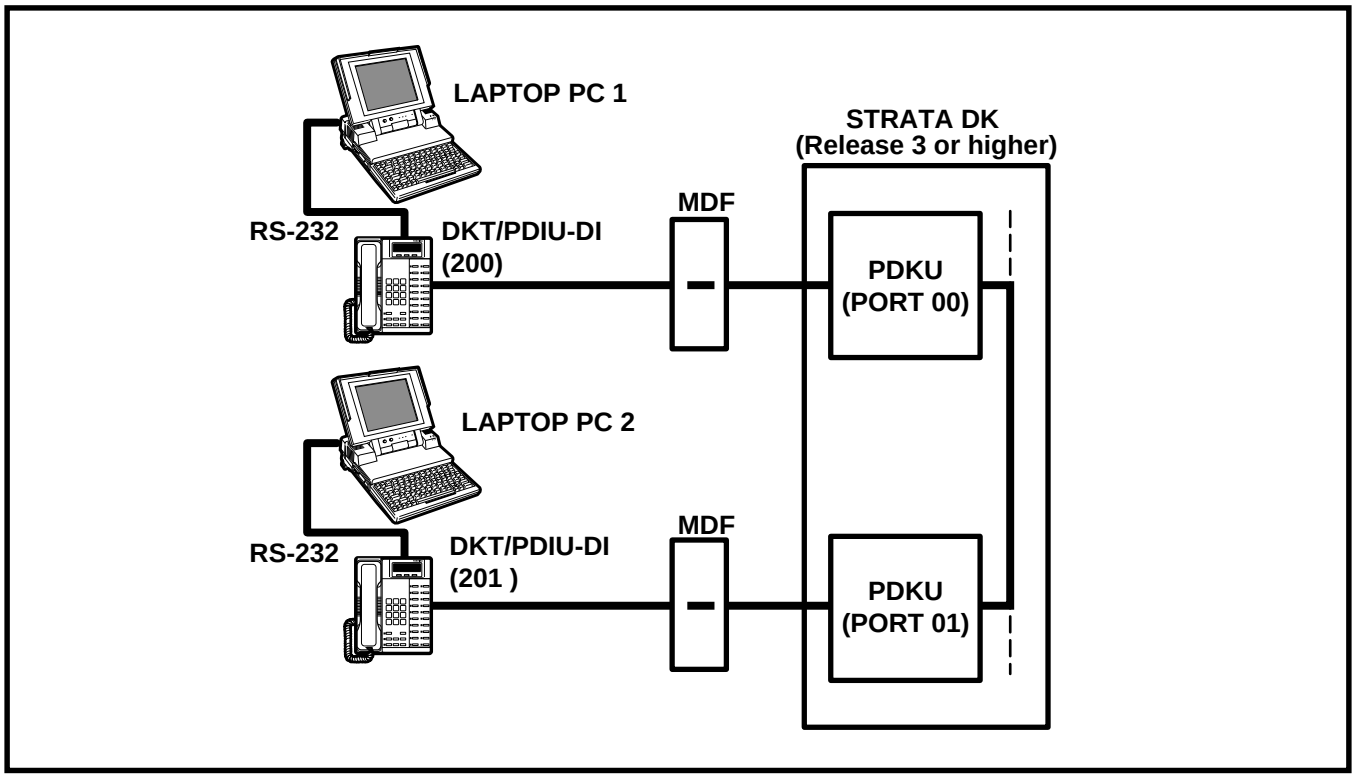

FIGURE 8-38
PC-TO-PC TEST CALL USING AT COMMANDS

set the plugs to the "A-B" position.

- If the PDIU-DS is connected to a DCE device, set the plugs to the "B-C" position.

NOTE:
Do not cut the PERCEPTION jumper wire for STRATA DK installations. The jumper wire is cut for PERCEPTION applications only.

12.73 Assembling the PDIU-DS

1) Position the back panel to the PCB (see Figure 8-37).

2) Slide the back panel down into its side grooves.

3) Attach the bottom panel, and secure with the four non-captive screws.

12.80 PDIU-DI/PDIU-DS Installation Tests

12.81 Paragraphs **12.82** ~ **12.86** provide tests for five DIU call applications. The telephone and port numbers used in these figures are provided for explanation purposes only; when actually testing, use port and telephone numbers appropriate for the system. Each of these tests can be conducted with manual dialing from a digital telephone's dial-pad or AT dialing from a personal computer's keyboard; however, only the preferred method of dialing for each application is presented. *The Data Interface User Guide* in the Operating Procedures section of this manual has additional information useful for the tests.

12.82 PC-to-PC Test Call Using AT Commands (see Figure 8-38)

1) DIU Programming:
   - **Program 20**: Ports 00 and 01. LEDs 01, 02, and 17 ON; all other LEDs OFF.
   - **Program 39**: Ports 00 and 01. **DataÍCall** (**DATA**) (Code 56) and **DataÍRelease** (**DRLS**) (Code 54) buttons should be provided.
   - Default settings for PDIU-DI S-Registers.

2) Make sure PC 1 and PC 2 are on-line with a communications software package and that the communication parameters of each PC and communication software package are set

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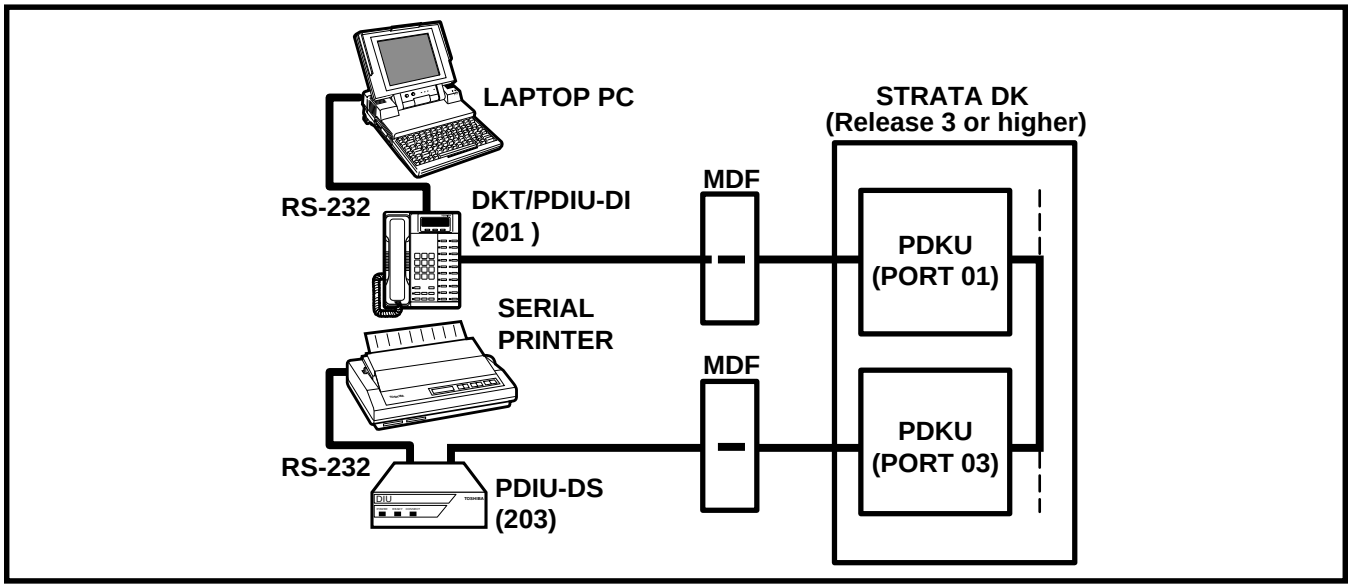

FGURE 8-39
PC-TO-PRINTER TEST CALL USING MANUAL DIALING

to the same values (data transmission rate, parity, data bits, stop bits, flow control, etc.).

3) From PC 1's keyboard, type **A T D D 2 0 1** and press **ENTER.** (AT commands must be capital letters.)
   - The Data Call (DATA) LEDs will be lit on DKT 200 and 201
   - PC 1 displays, CONNECT XXXX.
   - PC 2 displays, RING.
   - PC 1 and PC 2 are connected as shown by the thick solid lines. PDIU-DIs are now in the communication mode.

4) Typing from PC 1 keyboard will display on PC 2 display and vice versa.

5) To terminate the call:
   a) Type **+ + +** from either PC keyboard.
      - The PC screen displays, OK.
   b) Type **A T H** from the PC keyboard used in Step 5a.
      - PC 1 and PC 2 screens both display, NO CARRIER.
      - The Data Call (DATA) LEDs on each DKT are OFF.

12.83 PC-to-Printer Test Call Using Manual Dialing (see Figure 8-39)

1) DIU Programming:
   - **Program 20**: Port 01. LEDs 01, 02, and 17 ON; all other LEDs OFF.
   - **Program 20**: Port 03. LEDs 01, 04, and 17 ON; all other LEDs OFF.
   - **Program 39**: Port 01. **DataÍCall**

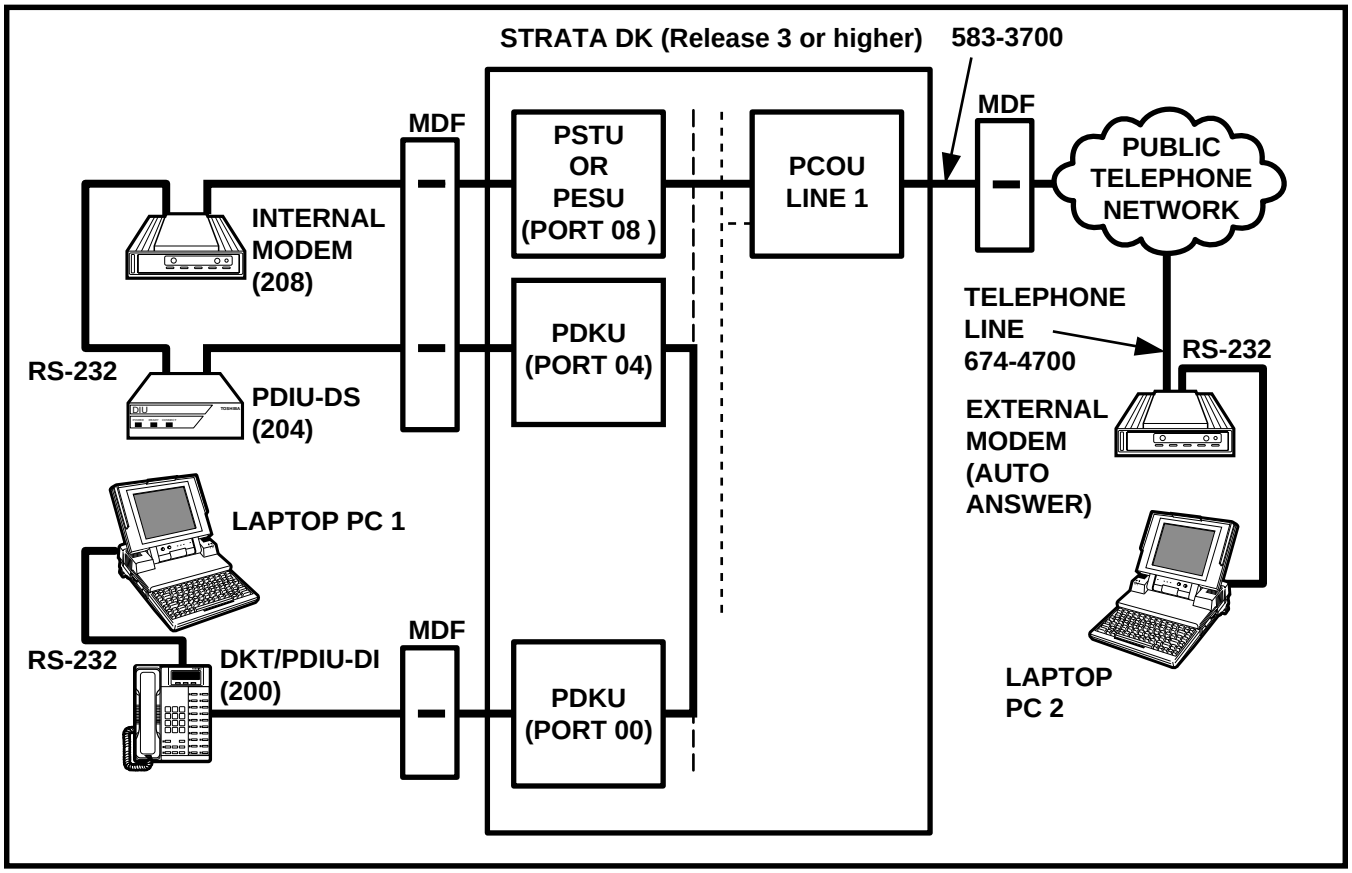

FIGURE 8-40
INTERNAL-PC-TO-EXTERNAL-PC TEST CALL USING AT COMMANDS

(**DATA**) (Code 56) and **DataÍRelease** (**DRLS**) (Code 54) buttons should be provided.
- Default settings for PDIU-DI S-Registers.

2) Make sure the PC is configured to print data from its serial COM port. (The PC COM port connected to DKT/PDIU-DI Port 01.) This is normally accomplished using the DOS and MODE commands.

3) Using the manufacturer's documentation, make sure the communication parameters (data speed, parity, data bits, stop bits, etc.) of the PC COM port match the printer's serial interface parameters.

4) To connect the PC to the printer, press the DKT's **DataÍCall** (**DATA**) button and dial **2 0 3**.
   - The CONNECT LED on the PDIU-DS will be lit.
   - The connection between the PC and the printer is completed, as shown by the thick solid lines. (PDIU-DS 203 is in the communication mode.)
   - If busy tone is sent to the DKT, the connection is not complete; press **DataÍRelease** (**DRLS**) and try Step 4 again.

5) Operate the PC to print data as required.

6) To terminate the call, press the DKT's **DataÍRelease** (**DRLS**) button.

12.84 Internal-PC-to-External-PC Test Call Using AT Commands (see Figure 8-40)

1) DIU Programming:
   - **Program 20**: Port 00. LEDs 01, 02, and 17 ON; all other LEDs OFF.
   - **Program 20**: Port 04. LEDs 01, 02, 03, 04, 05, 06, and17 ON; all other LEDs OFF.
   - **Program 21**: PDKU Port 04 assigned with PSTU port 08.
   - **Program 39**: Port 00. **DataÍCall** (**DATA**) (Code 56), **DataÍRelease** (**DRLS**) (Code 54), and **Modem** (**MODEM**) (Code 55) buttons should be provided.
   - Default settings for PDIU-DI and PDIU-DS S-Registers.

2) Set up modem per Paragraph **12.63**.

3) Make sure PC 1 and PC 2 are on-line with a communications software package and that the communication parameters of each PC and communication software package are set to the same values (data transmission rate, parity, data bits, stop bits, flow control, etc.).

4) From PC 1's keyboard, type **A T D D 2 0 4** and press **ENTER** (AT commands must be capital letters).
   - The Data Call (DATA) LED on DKT 200 will be lit.
   - The CONNECT LED on PDIU-DS 204 will be lit.
   - The screen on PC 1 displays, CONNECT XXXX, where XXXX is the data transmission speed set by the communications software.
   - At this time, PC 1 and PDIU-DS 204 are connected as shown by the thick solid lines; (PDIU-DS 204 is in the communication mode.) PC 1 is now linked directly to the RS-232 side of the internal modem; PC1 can issue AT commands to the internal modem, which is now in the command mode.
   - If PDKU/PDIU-DS Port 04 is the only DIU port connected to the modem (**Program 20**, LED 03 ON), the Modem (MODEM) LEDs on all DKTs will be lit.

5) From PC 1's keyboard, type **A T D T 7 0 1 6 7 4 4 7 0 0** and press **ENTER**.
   - The internal modem (208) goes off-hook, dials 701 to seize the CO line, and then dials the external modem's telephone number (674-4700).
   - The external modem rings and auto answers; the modems handshake and establish communications.
   - If the modems send result codes, the screen on PC 1 displays, CONNECT

H

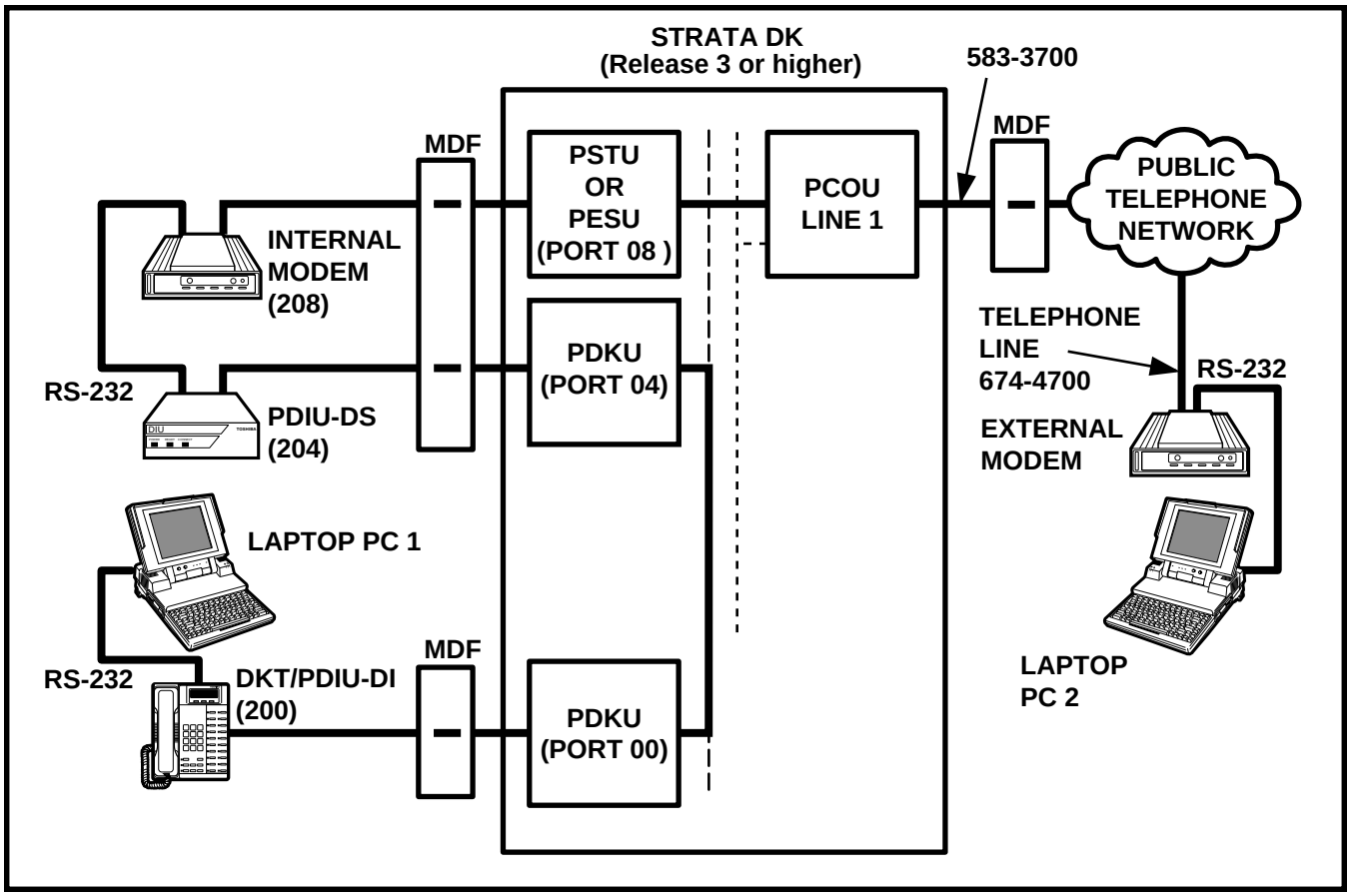

FIGURE 8-41
EXTERNAL-PC-TO-INTERNAL-PC TEST CALL USING AT COMMANDS

XXXX, where XXXX is the data transmission speed set by the communication software.

- At this time PC 1 and PC 2 are connected, as shown by the thick solid lines, to exchange data (file transfers, type messages, etc.).

6) To terminate the call:

a) Type the modem escape sequence from either PC keyboard.
   - The PC screen displays, OK.

b) Type **A T H** from the PC keyboard used in Step 5a.
   - PC 1 and PC 2 screens both display, NO CARRIER.

c) Press the **DataÍRelease** (**DRLS**) button on DKT 200.
   - The Data Call (DATA) LED on DKT 200 will be unlit.

12.85 External-PC-to-Internal-PC Test Call Using AT Commands (see Figure 8-41)

1) DIU Programming:
   - **Program 20**: Port 00. LEDs 01, 02, and 17 ON; all other LEDs OFF.
   - **Program 20**: Port 04. LEDs 01, 02, 03, 04, 05, 06 and 17 ON; all other LEDs OFF.
   - **Program 21**: PDKU Port 04 assigned with PSTU Port 08.
   - **Program 39**: Port 00. **DataÍCall** (**DATA**) (Code 56), **DataÍRelease** (**DRLS**) (Code 54), and **Modem** (**MODEM**) (Code 55) buttons should be provided.
   - **Program 81**: Port 08. LED 01 ON (CO line 01 rings PSTU port 08).

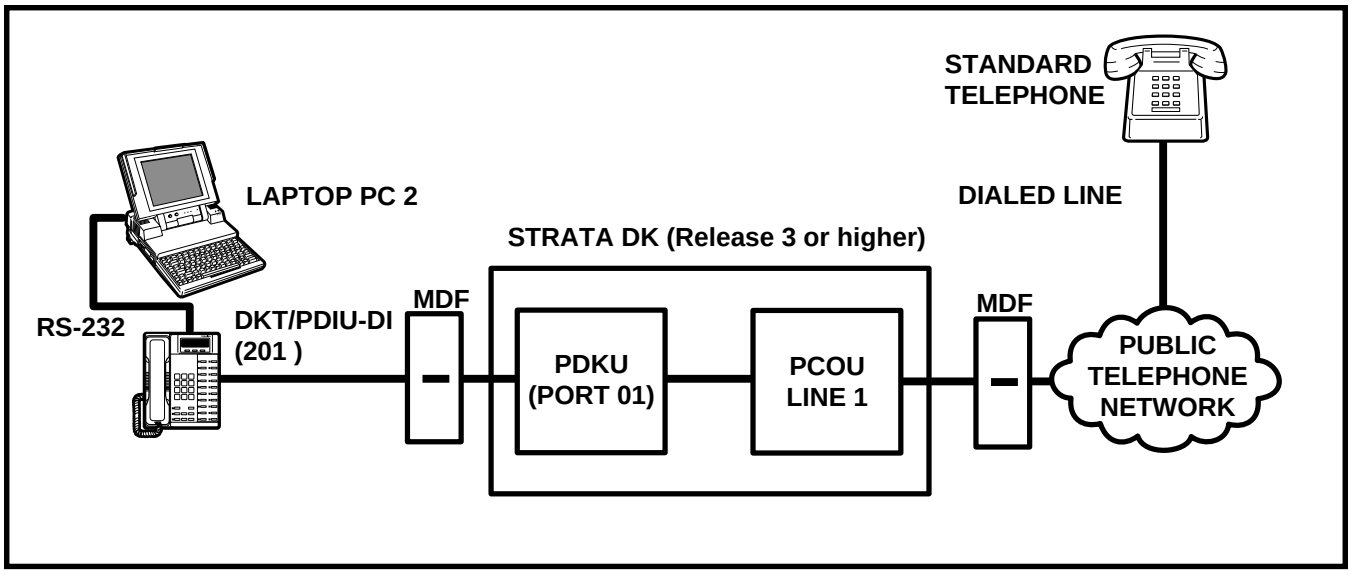

FIGURE 8-42
PC-AUTO DIAL VOICE-CALL TEST

- Internal modem: set to auto answer (S0=1).
- Default settings for PDIU-DI and PDIU-DS S-Registers.

2) Set up modem per Paragraph **12.63**.

3) Make sure PC 1 and PC 2 are on-line with a communications software package and that the communication parameters of each PC and communication software package are set to the same values (data transmission rate, parity, data bits, stop bits, flow control, etc.).

4) From PC 2's keyboard, type **A T D T 5 8 3 3 7 0 0** and press **ENTER**.
   - The external modem originates the call to STRATA CO line 01.
   - CO line 01 rings incoming to the internal modem (PSTU Port 08).
   - The internal modem rings and auto answers; the modems handshake and establish communications.
   - If the modems send result codes, the PCs' screens display, CONNECT XXXX, where XXXX is the data transmission speed set by the communications software.
   - At this time, PC 2 is connected to PDIU-DS (204), as shown by the thick solid lines. (PDIU-DS 204 is in the command mode.) PC 2 can now issue AT commands to PDIU-DS 204.
   - If PDKU/PDIU-DS Port 04 is the only PDIU port connected to a modem (**Program 20**, LED 03 ON), then the Modem (MODEM) LEDs on all DKTs will light.

5) From PC 2's keyboard, type **A T D D 2 0 0** and press **ENTER**;(AT commands must be capital letters.) this prompts PDIU-DS (204) to dial and connect to PDIU-DI (200).
   - The CONNECT LED on the PDIU-DS (204) will be lit; the Data Call (DATA) and Modem (MODEM) LEDs on DKT 200 will also be lit.
   - The screens on PC 1 and PC 2 display, CONNECT XXXX, where XXXX is the data transmission speed set by the communication software.
   - At this time, PC 1 and PC 2 are connected, as shown by the thick lines, to exchange data (file transfers, typed messages, etc.).

6) To terminate the call:

   a) Type the modem escape sequence from either PC keyboard.
      - The PC screen displays, OK.

b) Type **A T H** from the PC keyboard used in Step 5a.
   - PC 1's and PC 2's screens both display, NO CARRIER.

c) Press the **DataÍRelease** (**DRLS**) button.
   - The Data Call (DATA) and Modem (MODEM) LEDs on DKT 200 will turn off.

12.86 PC-Auto Dial Voice-Call Test (see Figure 8-42)

There are many off-the-shelf, IBM/MS-DOS compatible, desktop organizer software packages that provide an auto dialer function. One of these is the terminal resident SideKick. It is used in this section for test explanation purposes only. If you choose another auto dialer software package, the detailed response may be different than that shown here.

1) DIU Programming:
   Program 20: Port 01. LEDs 01, 02, and 17 ON; all other LEDs OFF.
   Program 39: Port 01. **DataÍCall** (**DATA**) (Code 56) and **DataÍRelease** (**DRLS**) (Code 54) buttons are optional; if the PDIU-DI is only used for the PC auto dial application, the **DataÍCall** (**DATA**) and **DataÍRelease** (**DRLS**) buttons are unnecessary.

2) Make sure that the auto dial application software is installed on the PC root directory and that the communication parameters of the PC and application software are set to the same values. (In this test example, Sidekick "SKINSTAL" program.)

3) Make sure that a dialing directory consisting of names and telephone numbers you wish to auto dial is installed within the application software. (Include the appropriate STRATA DK CO line access code prefixing each telephone number.)

4) To auto dial using Sidekick from the PC keyboard:
   a) Press the **ALT** and **CTRL** keys simultaneously.
      - The PC screen displays the Sidekick menu window.
   b) Press **F5** twice. (Sidekick prompts "search for INITials:" to display on the PC's screen.)
   c) Type the initials or name of the person or organization you wish to auto dial.
   d) Press **ENTER**.
      - Sidekick finds and highlights the desired name/number.
   e) Press **ENTER** again.
      - DKT/PDIU-DI 201 seizes the appropriate CO line and auto dials the selected telephone number.
      - The LEDs of the DKT's Data Call (DATA) and CO line 01 buttons will be lit (if assigned in **Program 39**).
      - Dial tone, Dual-tone Multi-frequency (DTMF) tones, and ringback or busy tones are audible from the DKT's speaker.

5) Take the DKT's handset off-hook at any time after the telephone number is dialed; (Press the **SPACE** bar to release the **DataÍCall** (**DATA**) button only) or, remain on-hook and use the DKT's speakerphone to talk when the called party answers. (LCD model only—do not press the **SPACE** bar when using the speakerphone.)

6) To terminate the call anytime:
   a) If off-hook, press the **SPACE** bar and place the DKT handset on-hook.
   b) If talking via the speakerphone, press the **SPACE** bar.

H

Strata® DK24/56/96

RELEASE 1, 2, 3, and 4

INSTALLATION

H

Chapter Nine
WIRING DIAGRAMS

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TABLE LIST

FIGURE LIST

H

FIGURE LIST (continued)

H

1 GENERAL

1.01 This chapter contains point-to-point wiring diagrams for connection of telephones, lines, peripheral equipment, and power supplies to the DK systems. Wiring diagrams are divided into groups according to the printed circuit board (PCB) which provides the interface for, or controls the operation of, the associated equipment.

2 WIRING DIAGRAMS

2.01 The following paragraphs list and identify the wiring diagrams provided in this chapter.

2.10 Station Wiring Diagrams

- Figure 9-A—Secondary Protector Diagram
- Figure 9-1—MDF Wiring/Electronic Telephone to PEKU
- Figure 9-2—MDF Wiring/HDSS Console and Associated Electronic Telephone Wiring to PEKU
- Figure 9-3—MDF Wiring-Door Phone/Lock to PEKU/PESU
- Figure 9-4—PEKU Background Music Connection
- Figure 9-5—PEKU Station/MDF Cross Connect Record
- Figure 9-6—MDF Wiring/Standard Telephone, Voice Mail, DPFT to PSTU/PSTU2
- Figure 9-7—PSTU Station/MDF Cross Connect Record
- Figure 9-8—PESU Wiring Diagram
- Figure 9-9—PESU Station/MDF Cross Connect Record
- Figure 9-21—MDF Wiring for Digital Telephones (DKTs) and DDSS Console to PDKU
- Figure 9-22—MDF Wiring for Digital Telephones with PDIU-DI and PDIU-DS to PDKU
- Figure 9-23—PDKU Station/MDF Cross Connect Record
- Figure 9-24—MDF Wiring/PEKU Amplified Two-CO Line Conference
- Figure 9-25—MDF Wiring-Door Phone/Lock to PDKU
- Figure 9-26—External Power for Digital Telephone Connection

2.20 CO/TIE Line Wiring Diagrams

- Figure 9-10—MDF Wiring/CO Lines to PCOU
- Figure 9-11—MDF Wiring/2-Wire TIE Line to PEMU
- Figure 9-12—MDF Wiring/4-Wire TIE Line to PEMU
- Figure 9-13—PCOU/PEMU/MDF Cross Connect Record

2.30 Power Failure Cut-through (DPFT) Wiring Diagrams

- Figure 9-14—DPFT Connector J1/Terminal Sequence & Designations/Central Office Line Connection & DPFT Control
- Figure 9-15—DPFT Connector J2/Terminal Sequence & Designations/Station Line Connection

2.40 PIOU, PIOUS, and PEPU Wiring Diagrams

- Figure 9-16—MDF Wiring/PIOU or PEPU Peripherals (25-pair)
- Figure 9-17—PIOU/TTY and SMDR Wiring
- Figure 9-18—PIOUS Page/Relay/Alarm Connections
- Figure 9-19—PIOUS SMDR/TTY Options and Wiring

2.50 Power Supply DC Out Wiring Diagram

- Figure 9-20—DK24/56/96 Power Supply DC Out Connector/Cables

TABLE 9-A
FCC REGISTRATION NUMBERS DK24/56/96

Manufacture Country	Key System	Hybrid System
Made in Japan Before October 1989	CJ69XA-10242-KF-E	CJ69XA-10243-MF-E
Made in U.S.A. After September 1989	CJ687N-10578-KF-E	CJ687N-10579-MF-E

TABLE 9-B
STATION LOOP REQUIREMENTS

Device Description		Max Loop Resistance (Including Device)	Max Distance from KSU to Device	Number of Wire Pairs[1]
PDKU (ckts 1 ~ 8)	Digital telephones	40 ohms	1000 ft. (303 m)	1-pair
PDKU (ckt 8)	DDSS consoles	40 ohms	1000 ft. (303 m)	1-pair
PDKU1 (ckts 1 ~ 7)	PDIU-DI or PDIU-DI2	40 ohms	1000 ft. (303 m)	Shares digital telephone wire-pair. 2-pair or ext pwr required
PDKU2 (ckts 1 ~ 8)	PDIU-DS	40 ohms	1000 ft. (303 m)	1-pair
PDKU (ckts 5)	Digital door phone/lock control unit (DDCB)	40 ohms	1000 ft. (303 m)	1-pair
PEKU (ckts 1 ~ 8) or PESU[2] (ckts 5 ~ 8)	Electronic telephone[4]	40 ohms	1000 ft. (303 m)	2-pair
PEKU (ckts 7 & 8)	HDSS consoles	20 ohms	500 ft. (152 m)	
PEKU (ckts 5)	Electronic door phone/lock control unit (HDCB)	40 ohms	1000 ft. (303 m)	
PSTU (ckts 1 ~ 8) or PESU (ckts 1 & 2)[2]	Standard telephones, voice mail, auto attendant, etc.	300 ohms	Approx. 3000 ft. (909 m) with 150 ohm device. See manufacturer's product specifications for exact resistance of device.	1-pair

NOTES:
1. Use 24 AWG twisted pairs.
2. PESU circuits 3 and 4 are not used.
3. Two-pair or larger wire (or external power) is required to achieve maximum range, see Table 9-D.
4. Electronic telephones must have 3-pair wiring to receive Off-hook Call Announce calls.

TABLE 9-C
NETWORK REQUIREMENTS

TOSHIBA Printed Circuit Board	Facility Interface Code	Network Jack	Ringer Equivalence
PCOU/PCOU2 (Loop Start Line)	02LS2	RJ14C	0.2B
PEMU (Type I, TIE Line) 2-wire	TL11M	RJ2EX	N/A
4-wire	TL31M	RJ2GX	N/A
PESU*/PSTU/PSTU2 (Off-premises Station)	0L13A	RJ21X	N/A

*Circuits 1 and 2

TABLE 9-D
DIGITAL TELEPHONE/DIU/DDSS CONSOLE/LOOP LIMITS

MODE	PPSU or Battery Backup[1]	Maximum line length (24 AWG)		
		1 Pair	2 Pair	1 Pair plus external power
DKT Ringing (Volume Max)	PPSU	1000 ft (303 m)	1000 ft (303 m)	1000 ft (303 m)
	Battery Backup	675 ft (204 m)	1000 ft (303 m)	1000 ft (303 m)
DKT with DVSU (OCA)	PPSU	1000 ft (303 m)	1000 ft (303 m)	1000 ft (303 m)
	Battery Backup	495 ft (150 m)	1000 ft (303 m)	1000 ft (303 m)
DKT with HHEU or Carbon Handset	PPSU	1000 ft (303 m)	1000 ft (303 m)	1000 ft (303 m)
	Battery Backup	330 ft (100 m)	1000 ft (303 m)	1000 ft (303 m)
DKT with PDIU-DI	PPSU	495 ft (150 m)	1000 ft (303 m)	1000 ft (303 m)
	Battery Backup	165 ft (50 m)	675 ft (200 m)	1000 ft (303 m)
PDIU-DS	PPSU	1000 ft (303 m)	1000 ft (303 m)	1000 ft (303 m)
	Battery Backup	675 ft (204 m)	1000 ft (303 m)	1000 ft (303 m)
DKT with HHEU and PDIU	PPSU	495 ft (150 m)	1000 ft (303 m)	1000 ft (303 m)
	Battery Backup	33 ft (10 m)	330 ft (100 m)	1000 ft (303 m)
DDSS2060A	PPSU	1000 ft (303 m)	1000 ft (303 m)	1000 ft (303 m)
	Battery Backup	500 ft (151 m)	1000 ft (303 m)	1000 ft (303 m)
DDCB	PPSU	1000 ft (303 m)	1000 ft (303 m)	1000 ft (303 m)
	Battery Backup	500 ft (151 m)	1000 ft (303 m)	1000 ft (303 m)
DKT with DVSU and HHEU	PPSU	1000 ft (303 m)	1000 ft (303 m)	1000 ft (303 m)
	Battery Backup	165 ft (50 m)	1000 ft (303 m)	1000 ft (303 m)

NOTES:

1. *Battery backup applies to instances when the system is being powered by batteries exclusively.*
2. *Digital telephones and other PDKU devices can operate at maximum lengths with two pair wiring or an external power source.*
3. *See **Figure 9-26** for external power wiring.*
4. *Digital cable runs must not have the following:*
   - */ Cable splits (single or double)*
   - */ Cable bridges (of any length)*
   - */ High resistance or faulty cable splices*

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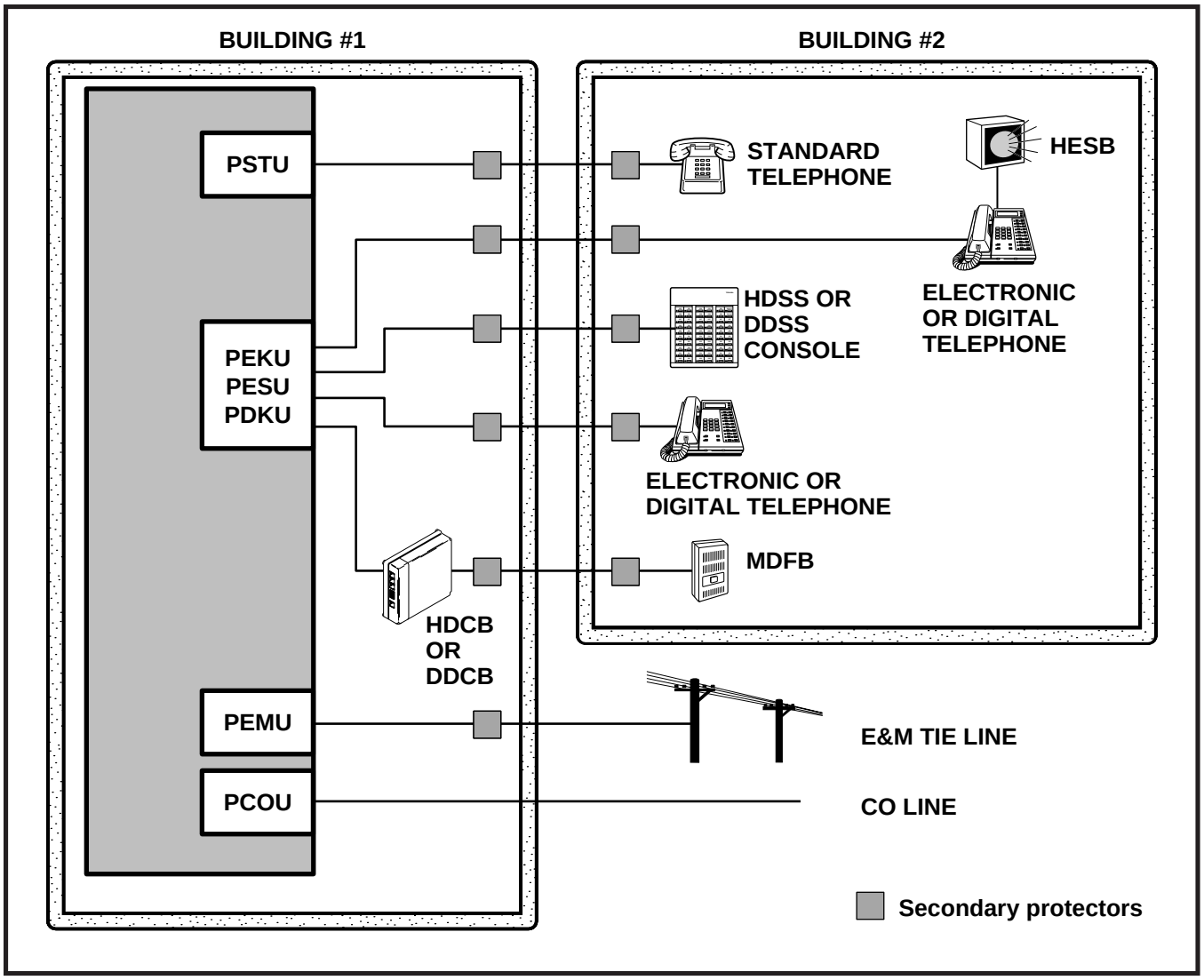


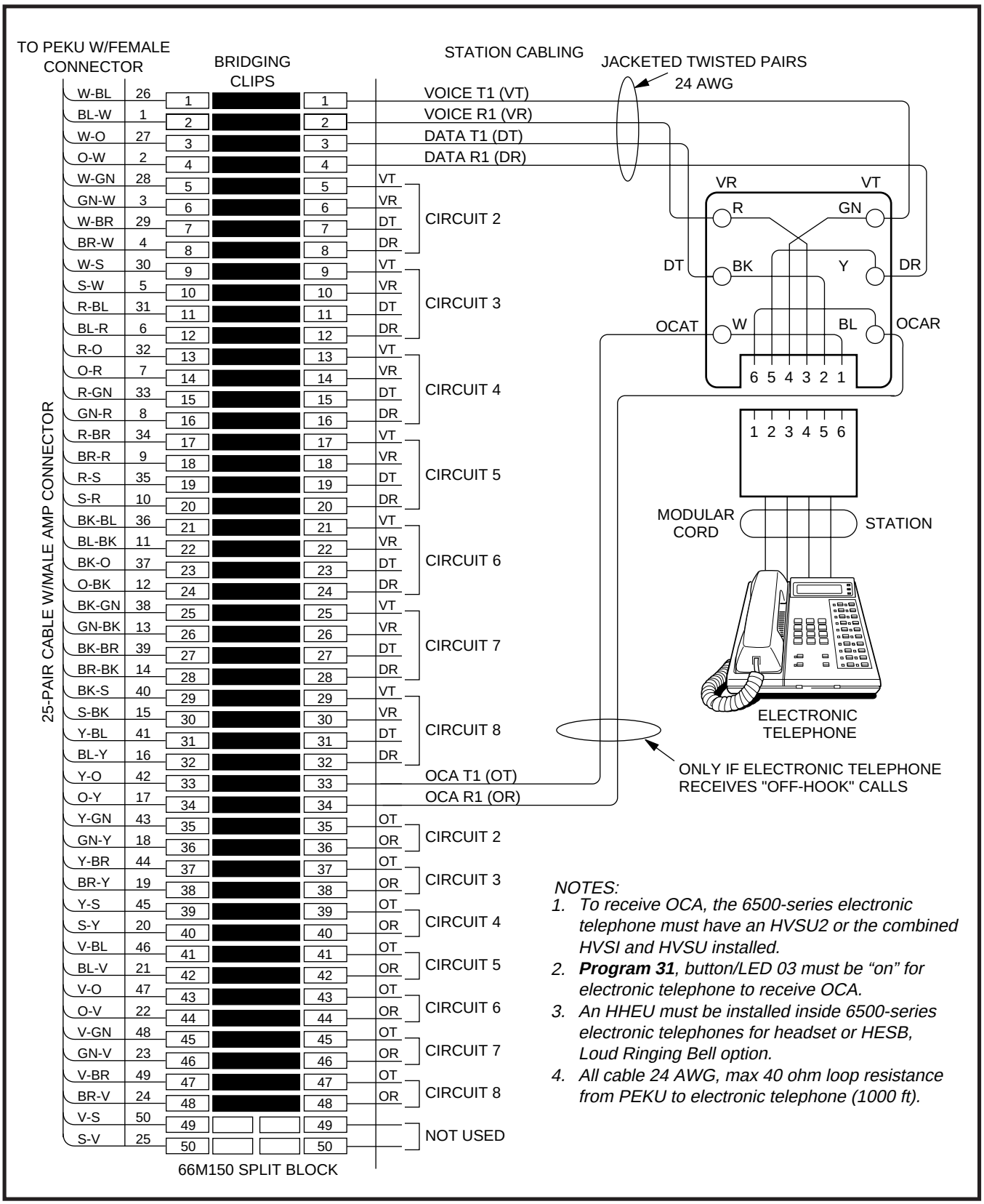
FIGURE 9-A
SECONDARY PROTECTOR DIAGRAM

IMPORTANT!

To protect against transient voltages and currents, secondary protectors must be installed if there is outside wiring (Figure 9-A). These protectors, which contain fast semiconductors in addition to fuses, shall comply with the requirements for secondary protectors for communication circuits, UL 497A. As of October 1, 1990, the following manufacturers offer secondary -protectors that are UL listed.

1. ***Certon Corp; Anaheim , California 92807***
   - ***Secondary protector: Model 08450***
2. ***Curtis Mfg. Co. Inc; Jaffrey, New Hampshire 03452***
   - ***Secondary protector: Model Diamond Chip. For indoor use on the protected side of telephone circuit only.***
3. ***Oneac Corp; Libertyville, Illinois 60048***
   - ***Secondary protector: Model OnLine 614+ and OnLine DG/S. For indoor use on the protected side of primary telephone protector only.***
4. ***Siemon Co.; Watertown, Connect 05795***
   - ***Secondary protector for communication circuits: Model PM-2305. Intended for use with Listed Siemon 66M1 Block; Models PG-04, -25, -50, or PK-04 ground kit and Listed Type 1 enclosure. For use on the protected side of a Listed Primary Telecommunications Protector for indoor use only.***
5. ***Simplex Time Recorder Co.; Gardner, Massachusetts 01440***
   - ***Isolated loop circuit protectors: Models 2081-9027 and 2081-9028. Intended for use between data communication equipment or signal lines of building system equipment.***

Install and test the secondary protectors per the installation instructions of the applicable manufacturer.



NOTES:

1. *To receive OCA, the 6500-series electronic telephone must have an HVSU2 or the combined HVSI and HVSU installed.*
2. ***Program 31**, button/LED 03 must be "on" for electronic telephone to receive OCA.*
3. *An HHEU must be installed inside 6500-series electronic telephones for headset or HESB, Loud Ringing Bell option.*
4. *All cable 24 AWG, max 40 ohm loop resistance from PEKU to electronic telephone (1000 ft).*

FIGURE 9-1
MDF WIRING/ELECTRONIC TELEPHONE TO PEKU

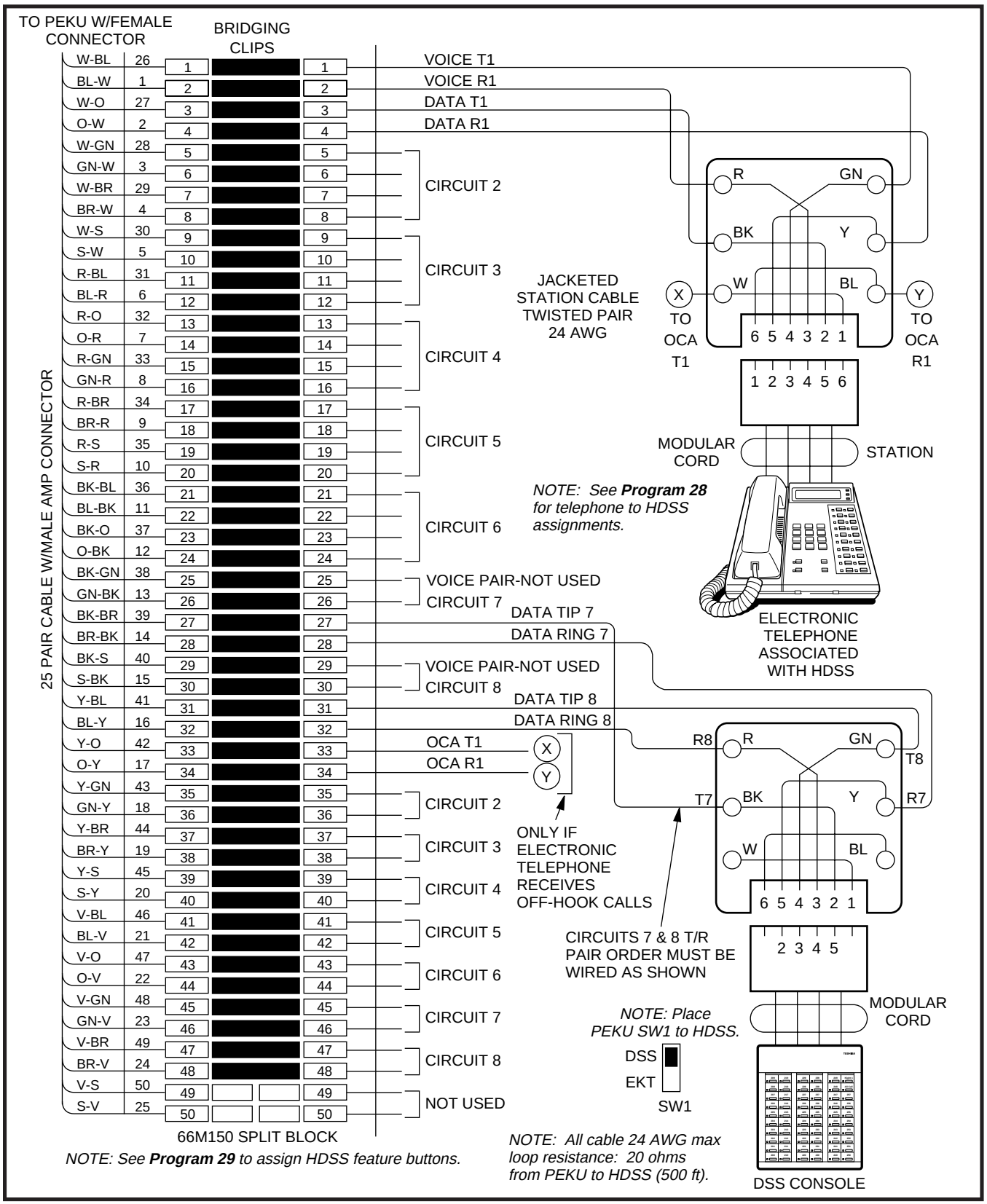
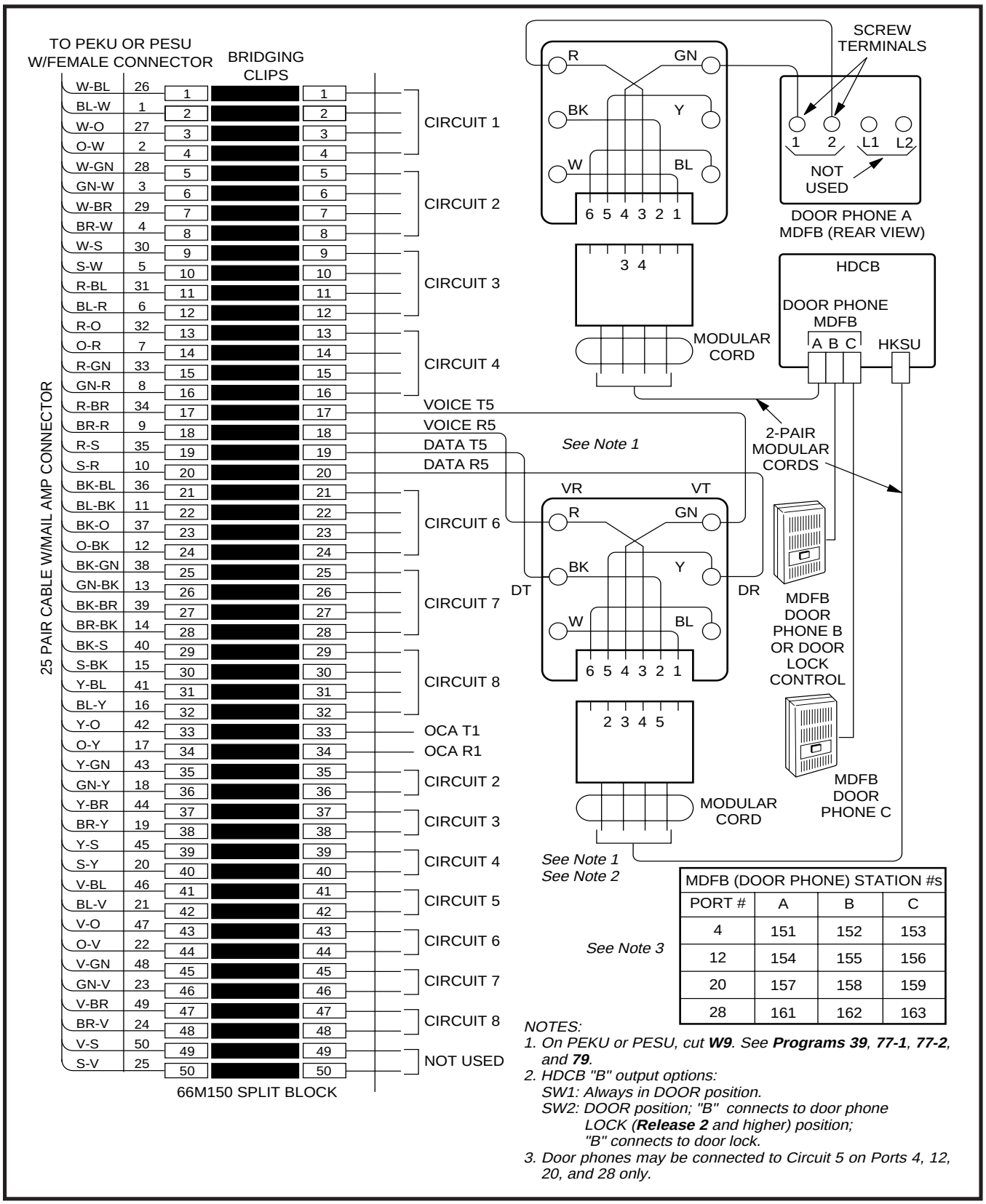


FIGURE 9-2
MDF WIRING/HDSS CONSOLE AND ASSOCIATED ELECTRONIC TELEPHONE WIRING TO PEKU



MDFB (DOOR PHONE) STATION #s			
PORT #	A	B	C
4	151	152	153
12	154	155	156
20	157	158	159
28	161	162	163

NOTES:

1. *On PEKU or PESU, cut **W9**. See **Programs 39**, **77-1**, **77-2**, and **79**.*
2. *HDCB "B" output options:*
   SW1: Always in DOOR position.
   SW2: DOOR position; "B" connects to door phone
   *LOCK (**Release 2** and higher) position;*
   "B" connects to door lock.
3. *Door phones may be connected to Circuit 5 on Ports 4, 12, 20, and 28 only.*

FIGURE 9-3
MDF WIRING-DOOR PHONE/LOCK TO PEKU/PESU

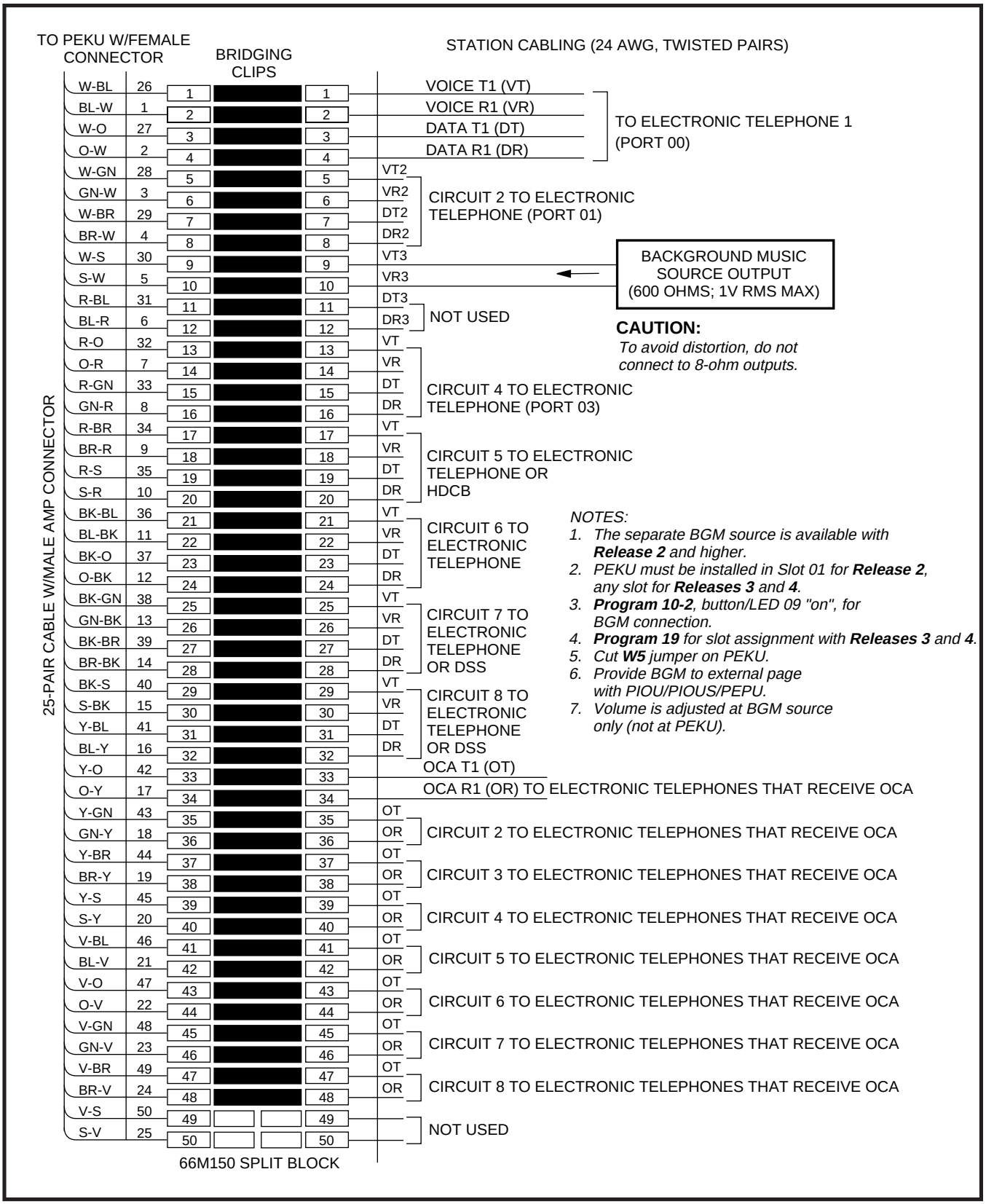


FIGURE 9-4
PEKU BACKGROUND MUSIC CONNECTION

MDF BLOCK NO. _____ KSU SLOT NO. _____

COLOR CODE	DESIGNATION	CKT NUMBER	PORT NUMBER	INTERCOM NUMBER	ELECTRONIC TELEPHONE/ DEVICE LOCATION
W-Bl	VT	1			
Bl-W	VR				
W-O	DT				
O-W	DR				
W-G	VT	2			(See Note 2)
G-W	VR				
W-Br	DT				
Br-W	DR				
W-S	VT	3			(See Notes 2 and 3)
S-W	VR				
R- Bl	DT				
Bl-R	DR				
R-O	VT	4			
O-R	VR				
R-G	DT				
G-R	DR				
R-Br	VT	5			(See Note 4)
Br-R	VR				
R-S	DT				
S-R	DR				
Bk-Bl	VT	6			
Bl-Bk	VR				
Bk-O	DT				
O-Bk	DR				
Bk-G	VT	7			(See Note 5)
G-Bk	VR				
Bk-Br	DT				
Br-Bk	DR				
Bk-S	VT	8			(See Note 5)
S-Bk	VR				
Y-Bl	DT				
Bl-Y	DR				

NOTES:

1. Copy for each PEKU installed.

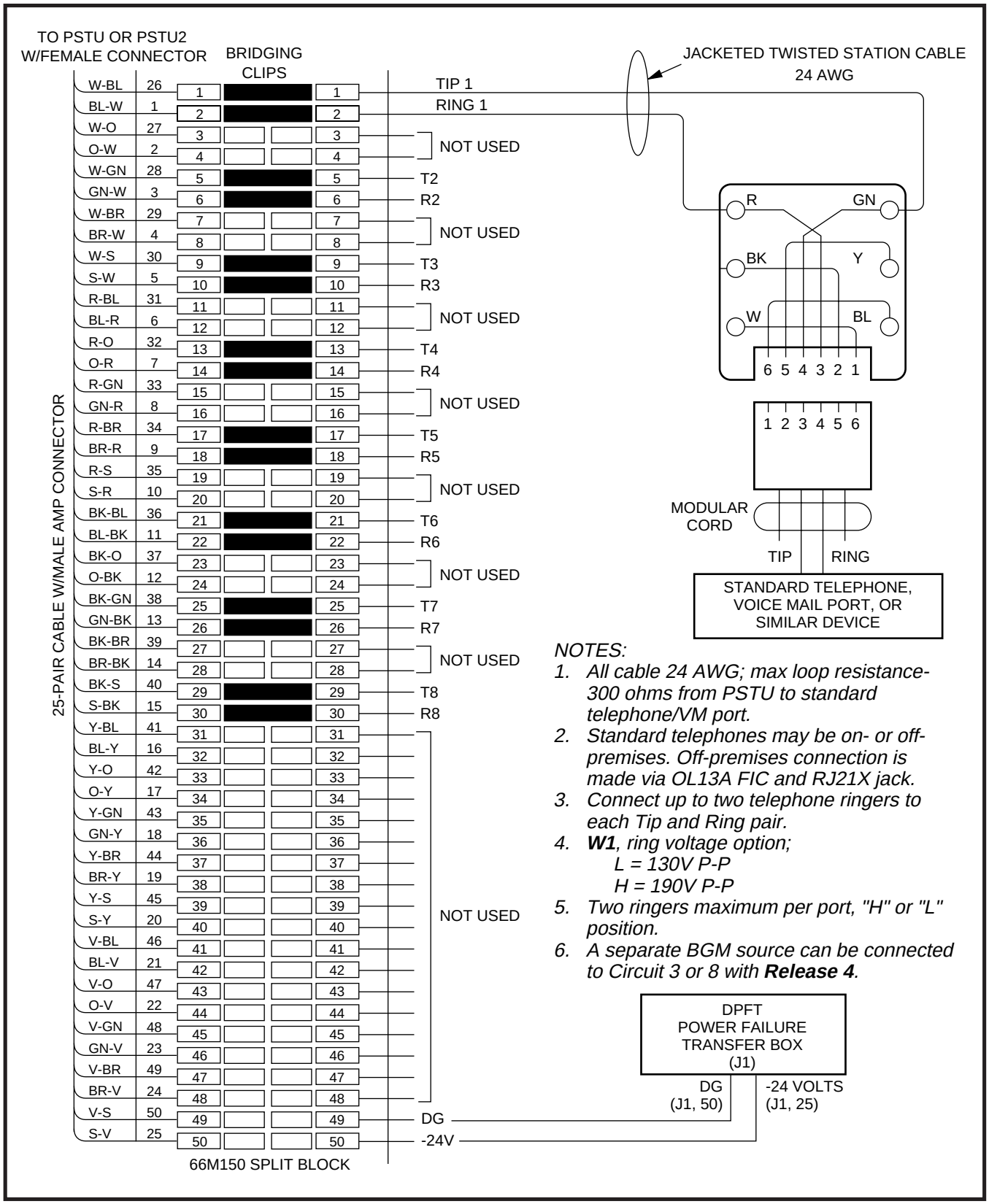
2. Indicate if two-way amplifier or line repeater.

*3. Indicate if BGM or electronic telephone is connected (see **Programs 10-2** and **19**); BGM connects to VT and VR, Circuit 3 only (DT and DR not used).*

4. Indicate if electronic telephone or HDCB (allowed HDCB port numbers: 04, 12, 20, 28).

5. Indicate if electronic telephone or HDSS Console number 1, 2, 3, or 4.

FIGURE 9-5
PEKU STATION/MDF CROSS CONNECT RECORD



NOTES:

1. *All cable 24 AWG; max loop resistance-300 ohms from PSTU to standard telephone/VM port.*
2. *Standard telephones may be on- or off-premises. Off-premises connection is made via OL13A FIC and RJ21X jack.*
3. *Connect up to two telephone ringers to each Tip and Ring pair.*
4. ***W1**, ring voltage option;*
   L = 130V P-P
   H = 190V P-P
5. *Two ringers maximum per port, "H" or "L" position.*
6. *A separate BGM source can be connected to Circuit 3 or 8 with **Release 4**.*

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FIGURE 9-6
MDF WIRING/STANDARD TELEPHONE, VOICE MAIL, DPFT TO PSTU/PSTU2

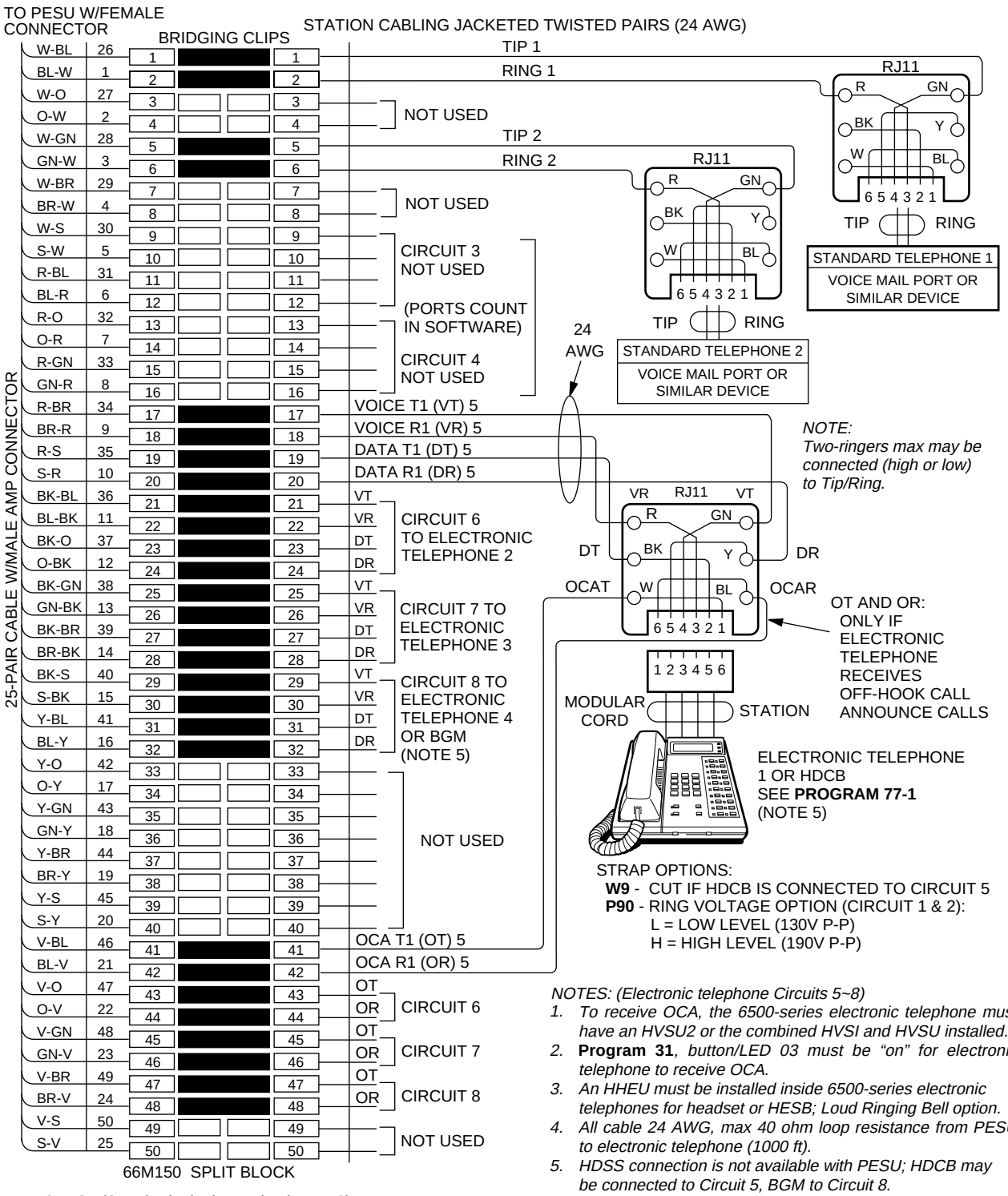
MDF BLOCK NO. _____ KSU SLOT NO. _____

COLOR CODE	DESIGNATION	CKT NUMBER	PORT NUMBER	INTERCOM NUMBER	STANDARD TELEPHONE/ DEVICE LOCATION
W-Bl	T	1			
Bl-W	R				
W-O	NOT USED				
O-W	NOT USED				
W-G	T	2			
G-W	R				
W-Br	NOT USED				
Br-W	NOT USED				
W-S	T	3			(Note 3)
S-W	R				
R- Bl	NOT USED				
Bl-R	NOT USED				
R-O	T	4			
O-R	R				
R-G	NOT USED				
G-R	NOT USED				
R-Br	T	5			
Br-R	R				
R-S	NOT USED				
S-R	NOT USED				
Bk-Bl	T	6			
Bl-Bk	R				
Bk-O	NOT USED				
O-Bk	NOT USED				
Bk-G	T	7			
G-Bk	R				
Bk-Br	NOT USED				
Br-Bk	NOT USED				
Bk-S	T	8			(Note 3)
S-Bk	R				
Y-Bl	NOT USED				
Bl-Y	NOT USED				

NOTES:
1. Copy for each PSTU installed.
2. Indicate if standard telephone, voice mail port, etc.
*3. Indicate if separate BGM source (**Release 4**).*

FIGURE 9-7
PSTU STATION/MDF CROSS CONNECT RECORD

H



NOTES: (Electronic telephone Circuits 5~8)

1. *To receive OCA, the 6500-series electronic telephone must have an HVSU2 or the combined HVSI and HVSU installed.*
2. **Program 31**, *button/LED 03 must be "on" for electronic telephone to receive OCA.*
3. *An HHEU must be installed inside 6500-series electronic telephones for headset or HESB; Loud Ringing Bell option.*
4. *All cable 24 AWG, max 40 ohm loop resistance from PESU to electronic telephone (1000 ft).*
5. *HDSS connection is not available with PESU; HDCB may be connected to Circuit 5, BGM to Circuit 8.*

NOTES: (Standard telephone circuits 1 & 2)

1. *All cable 24 AWG; max loop resistance - 300 ohms from PESU to standard telephone/VM port.*
2. *Standard telephones may be on- or off-premises. Off-premises connection is made via OL13A FIC, and RJ21X jack.*
3. *Two ringers max per port.*

FIGURE 9-8
PESU WIRING DIAGRAM

MDF BLOCK NO. _____ KSU SLOT NO. _____

COLOR CODE	DESIGNATION	CKT NUMBER	PORT NUMBER	INTERCOM NUMBER	DEVICE/STANDARD TELEPHONE/ ELECTRONIC TELEPHONE LOCATION
W-Bl	T	1			
Bl-W	R				
W-O	NOT USED				
O-W	NOT USED				
W-G	T	2			
G-W	R				
W-Br	NOT USED				
Br-W	NOT USED				
W-S	NOT USED	3		N/A	N/A
S-W	NOT USED				
R- Bl	NOT USED				
Bl-R	NOT USED				
R-O	NOT USED	4		N/A	N/A
O-R	NOT USED				
R-G	NOT USED				
G-R	NOT USED				
R-Br	VT	5			(Note 4)
Br-R	VR				
R-S	DT				
S-R	DR				
Bk-Bl	VT	6			
Bl-Bk	VR				
Bk-O	DT				
O-Bk	DR				
Bk-G	VT	7			(Note 5)
G-Bk	VR				
Bk-Br	DT				
Br-Bk	DR				
Bk-S	VT	8			(Notes 5 and 6)
S-Bk	VR				
Y-Bl	DT				
Bl-Y	DR				

NOTES:

1. *Copy for each PESU installed.*
2. *Indicate if standard telephone, voice mail port, electronic telephone, HDCB (allowed HDCB port numbers: 04, 12, 20, 28) or separate BGM source.*
3. *OCA wiring not shown, see MDF-to-electronic telephone wiring.*
4. *Indicate if HDCB or electronic telephone.*
5. *HDSS Console number 1, 2, 3 or 4 is not allowed.*
6. *Indicate if BGM or electronic telephone is connected (Slot 01 with **Release 2**, any slot with **Releases 3** and **4**); BGM connects to VT and VR, Circuit 8 only (DT and DR not used).*

FIGURE 9-9
PESU STATION/MDF CROSS CONNECT RECORD

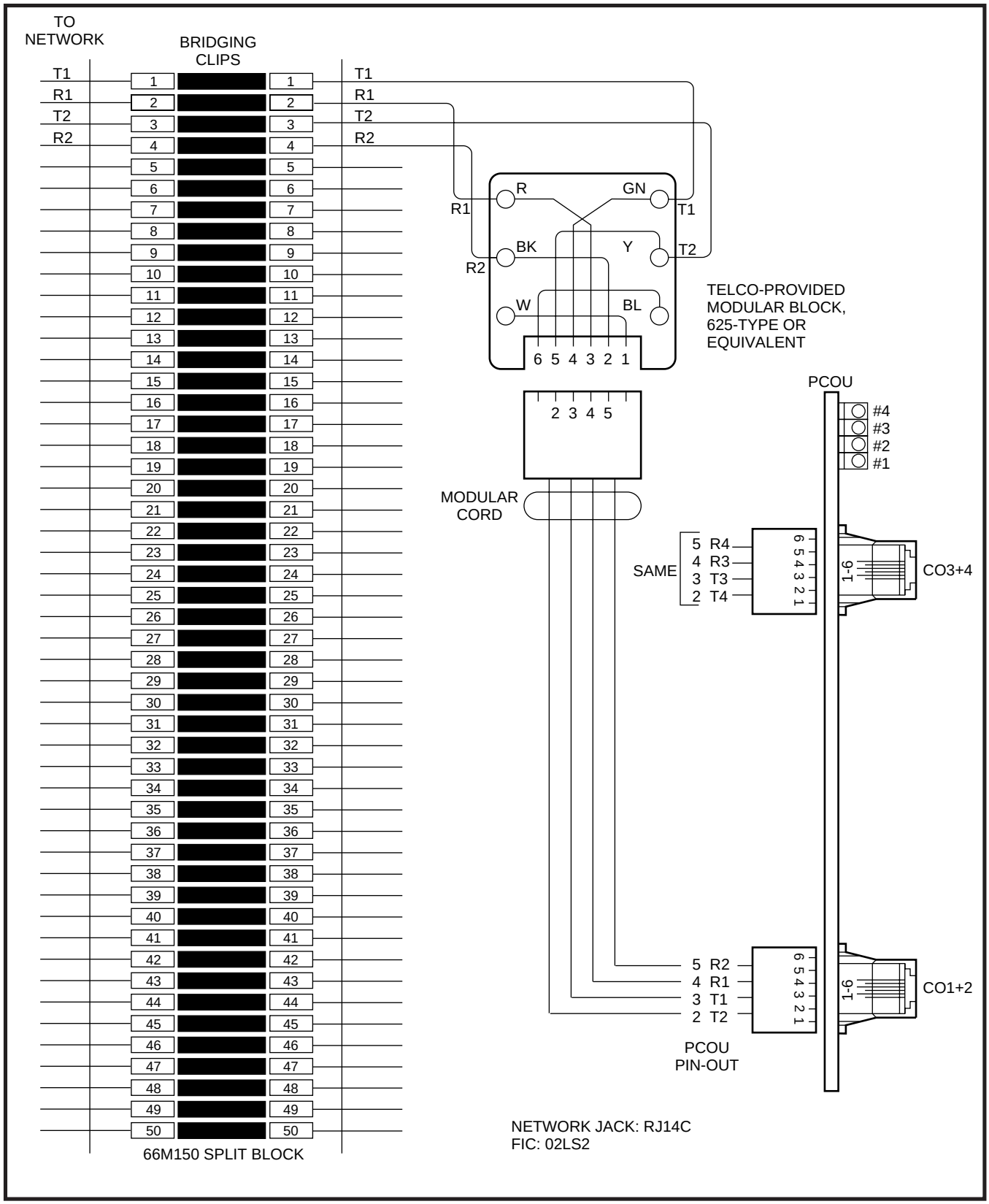


FIGURE 9-10
MDF WIRING/CO LINES TO PCOU

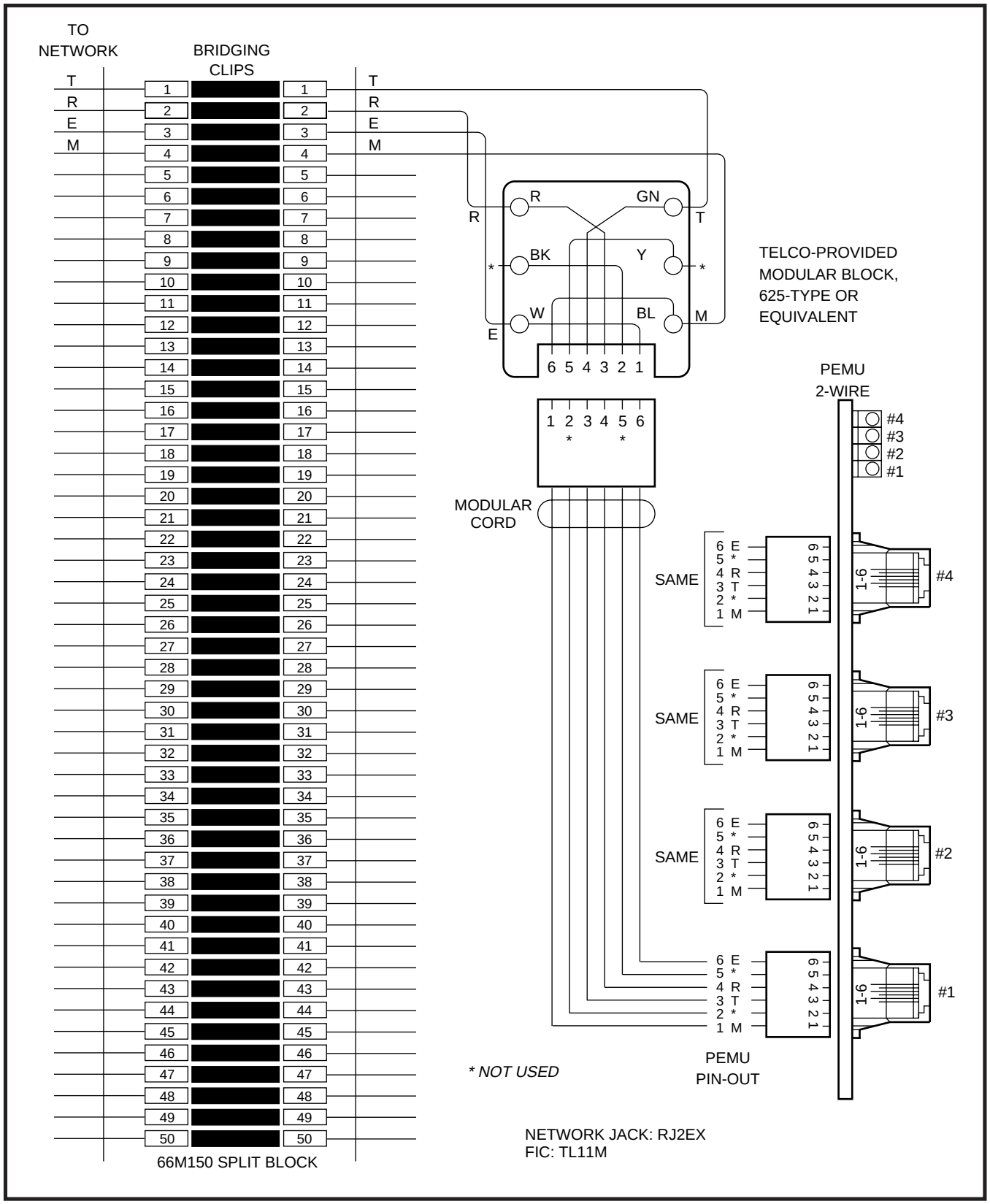


FIGURE 9-11
MDF WIRING/2-WIRE TIE LINE TO PEMU

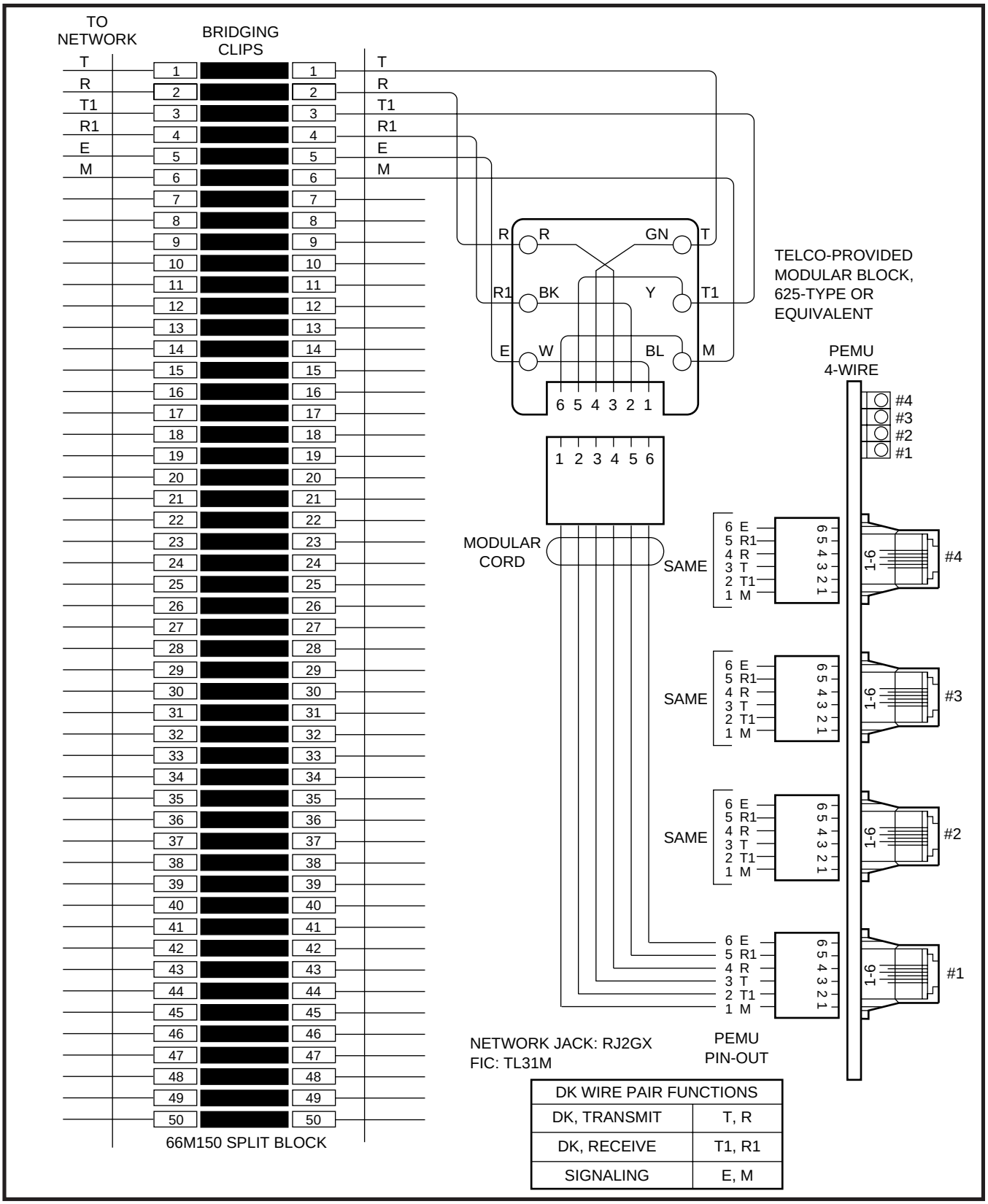


FIGURE 9-12
MDF WIRING/4-WIRE TIE LINE TO PEMU

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CO LINE CROSS-CONNECT RECORD

MDF PAIR NUMBERS RJ14C	CO LINE NUMBER	KSU SLOT NUMBER (PCOU)
	1	
	2	
	3	
	4	
	5	
	6	
	7	
	8	
	9	
	10	
	11	
	12	
	13	
	14	
	15	
	16	
	17	
	18	
	19	
	20	
	21	
	22	
	23	
	24	
	25	
	26	
	27	
	28	
	29	
	30	
	31	
	32	
	33	
	34	
	35	
	36	

TIE LINE CROSS-CONNECT RECORD

MDF PAIR NUMBERS		TIE LINE NUMBER	KSU SLOT NUMBER (PEMU)
2-WIRE RJ2EX	4-WIRE RJ2GX		
		1	
		2	
		3	
		4	
		5	
		6	
		7	
		8	
		9	
		10	
		11	
		12	

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FIGURE 9-13
PCOU/PEMU/MDF CROSS CONNECT RECORD

PAIR	PIN	COLOR CODE	LEAD DESIGNATION	FUNCTION	PCOU PCB POSITION
1T	26	W-Bl	T	TIP-CO #1	
R	1	Bl-W	R	RING-CO #1	
2T	27	W-O	T	TIP-PCOU #1	
R	2	O-W	R	RING-PCOU #1	
3T	28	W-G	T	TIP-CO #2	
R	3	G-W	R	RING-CO #2	
4T	29	W-Br	T	TIP-PCOU #2	
R	4	Br-W	R	RING-PCOU #2	
5T	30	W-S	T	TIP-CO #3	
R	5	S-W	R	RING-CO #3	
6T	31	R-Bl	T	TIP-PCOU #3	
R	6	Bl-R	R	RING-PCOU #3	
7T	32	R-O	T	TIP-CO #4	
R	7	O-R	R	RING-CO #4	
8T	33	R-G	T	TIP-PCOU #4	
R	8	G-R	R	RING-PCOU #4	
9T	34	R-Br	T	TIP-CO #5	
R	9	Br-R	R	RING-CO #5	
10T	35	R-S	T	TIP-PCOU #5	
R	10	S-R	R	RING-PCOU #5	
11T	36	Bk-Bl	T	TIP-CO #6	
R	11	Bl-Bk	R	RING-CO #6	
12T	37	Bk-O	T	TIP-PCOU #6	
R	12	O-Bk	R	RING-PCOU #6	
13T	38	Bk-G	T	TIP-CO #7	
R	13	G-Bk	R	RING-CO #7	
14T	39	Bk-Br	T	TIP-PCOU #7	
R	14	Br-Bk	R	RING-PCOU #7	
15T	40	Bk-S	T	TIP-CO #8	
R	15	S-Bk	R	RING-CO #8	
16T	41	Y-Bl	T	TIP-PCOU #8	
R	16	Bl-Y	R	RING-PCOU #8	
17T	42	Y-O	SPARE		
R	17	O-Y	SPARE		
18T	43	Y-G	SPARE		
R	18	G-Y	SPARE		
19T	44	Y-Br	SPARE		
R	19	Br-Y	SPARE		
20T	45	Y-S	SPARE		
R	20	S-Y	SPARE		
21T	46	V-Bl	SPARE		
R	21	Bl-V	SPARE		
22T	47	V-O	SPARE		
R	22	O-V	SPARE		
23T	48	V-G	SPARE		
R	23	G-V	SPARE		
24T	49	V-Br	SPARE		
R	24	Br-V	SPARE		
25T	50	V-S	PFT DG	PFT GROUND (INPUT)	PSTU/PIN 50
R	25	S-V	PFT -24V	PFT -24V (INPUT)	PSTU/PIN 25

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FIGURE 9-14
DPFT CONNECTOR J1 TERMINAL SEQUENCE & DIAGRAM CENTRAL OFFICE LINE CONNECTION & DPFT CONTROL

PAIR	PIN	COLOR CODE	LEAD DESIGNATION	FUNCTION	PSTU PCB POSITION
1T	26	W-Bl	T	TIP-TEL #1	
R	1	Bl-W	R	RING-TEL #1	
2T	27	W-O	T	TIP-PSTU #1	
R	2	O-W	R	RING-PSTU #1	
3T	28	W-G	T	TIP-TEL #2	
R	3	G-W	R	RING-TEL #2	
4T	29	W-Br	T	TIP-PSTU #2	
R	4	Br-W	R	RING-PSTU #2	
5T	30	W-S	T	TIP-TEL #3	
R	5	S-W	R	RING-TEL #3	
6T	31	R-Bl	T	TIP-PSTU #3	
R	6	Bl-R	R	RING-PSTU #3	
7T	32	R-O	T	TIP-TEL #4	
R	7	O-R	R	RING-TEL #4	
8T	33	R-G	T	TIP-PSTU #4	
R	8	G-R	R	RING-PSTU #4	
9T	34	R-Br	T	TIP-TEL #5	
R	9	Br-R	R	RING-TEL #5	
10T	35	R-S	T	TIP-PSTU #5	
R	10	S-R	R	RING-PSTU #5	
11T	36	Bk-Bl	T	TIP-TEL #6	
R	11	Bl-Bk	R	RING-TEL #6	
12T	37	Bk-O	T	TIP-PSTU #6	
R	12	O-Bk	R	RING-PSTU #6	
13T	38	Bk-G	T	TIP-TEL #7	
R	13	G-Bk	R	RING-TEL #7	
14T	39	Bk-Br	T	TIP-PSTU #7	
R	14	Br-Bk	R	RING-PSTU #7	
15T	40	Bk-S	T	TIP-TEL #8	
R	15	S-Bk	R	RING-TEL #8	
16T	41	Y-Bl	T	TIP-PSTU #8	
R	16	Bl-Y	R	RING-PSTU #8	
17T	42	Y-O	SPARE		
R	17	O-Y	SPARE		
18T	43	Y-G	SPARE		
R	18	G-Y	SPARE		
19T	44	Y-Br	SPARE		
R	19	Br-Y	SPARE		
20T	45	Y-S	SPARE		
R	20	S-Y	SPARE		
21T	46	V-Bl	SPARE		
R	21	Bl-V	SPARE		
22T	47	V-O	SPARE		
R	22	O-V	SPARE		
23T	48	V-G	SPARE		
R	23	G-V	SPARE		
24T	49	V-Br	SPARE		
R	24	Br-V	SPARE		
25T	50	V-S	SPARE		
R	25	S-V	SPARE		

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FIGURE 9-15
DPFT CONNECTOR J2 TERMINAL SEQUENCE & DESIGNATIONS STATION LINE CONNECTION

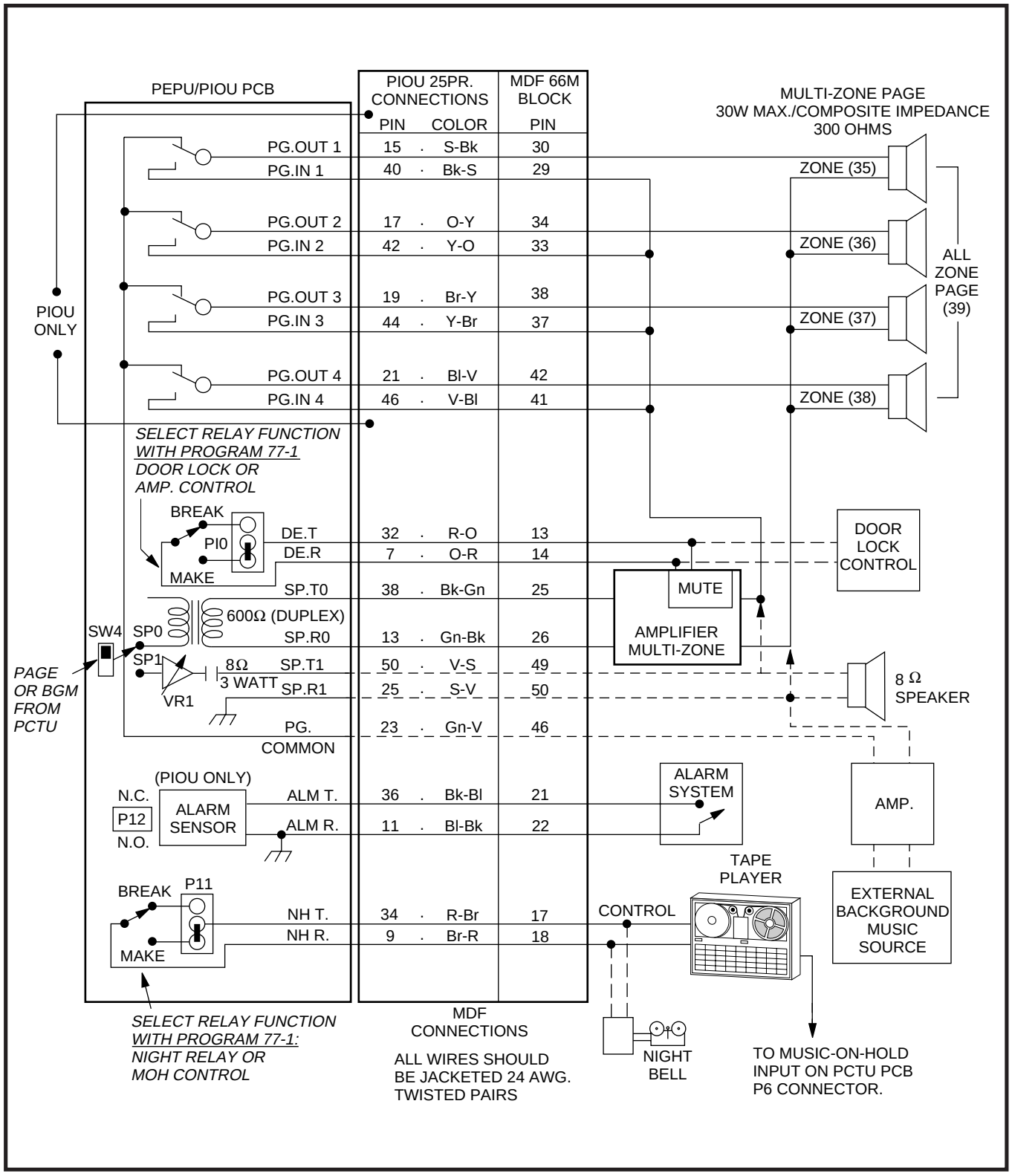
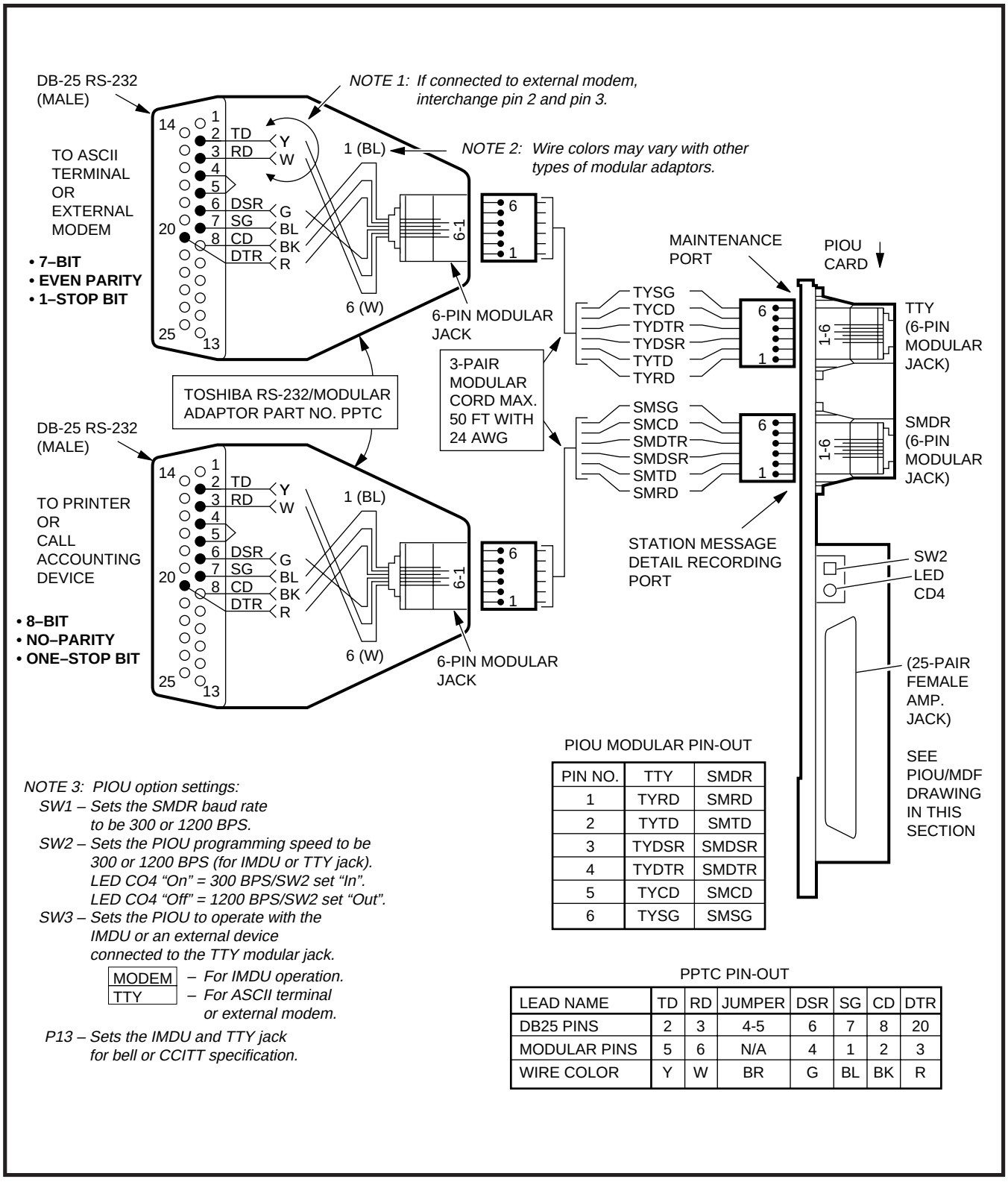


FIGURE 9-16
MDF WIRING/PIOU OR PEPU PERIPHERALS (25-PAIR)



PIOU MODULAR PIN-OUT

PIN NO.	TTY	SMDR
1	TYRD	SMRD
2	TYTD	SMTD
3	TYDSR	SMDSR
4	TYDTR	SMDTR
5	TYCD	SMCD
6	TYSG	SMSG

NOTE 3: PIOU option settings:

SW1 – Sets the SMDR baud rate to be 300 or 1200 BPS.

SW2 – Sets the PIOU programming speed to be 300 or 1200 BPS (for IMDU or TTY jack). LED CO4 "On" = 300 BPS/SW2 set "In". LED CO4 "Off" = 1200 BPS/SW2 set "Out".

SW3 – Sets the PIOU to operate with the IMDU or an external device connected to the TTY modular jack.

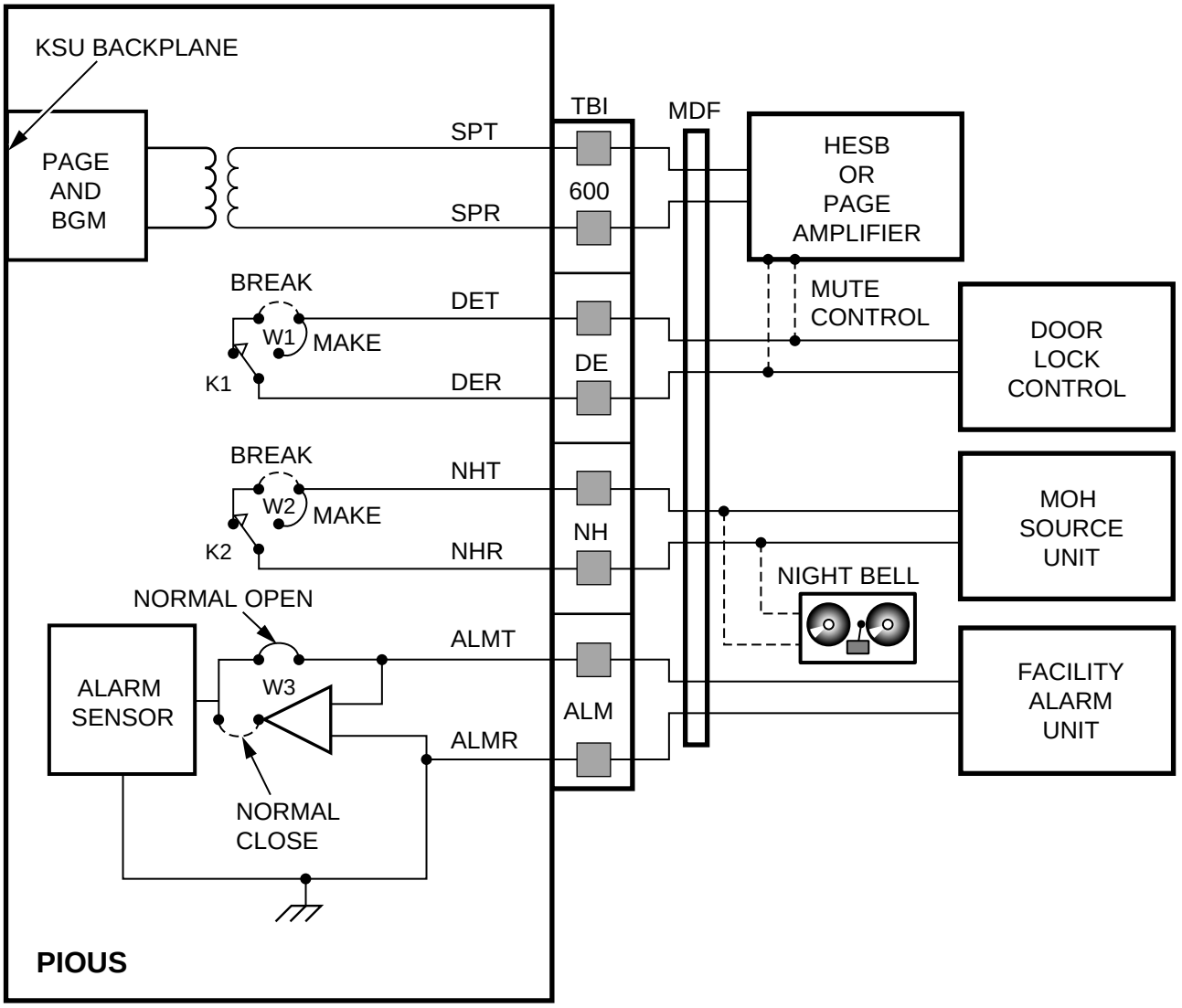
MODEM	– For IMDU operation.
TTY	– For ASCII terminal or external modem.

P13 – Sets the IMDU and TTY jack for bell or CCITT specification.

PPTC PIN-OUT

LEAD NAME	TD	RD	JUMPER	DSR	SG	CD	DTR
DB25 PINS	2	3	4-5	6	7	8	20
MODULAR PINS	5	6	N/A	4	1	2	3
WIRE COLOR	Y	W	BR	G	BL	BK	R

FIGURE 9-17
PIOU/TTY AND SMDR WIRING

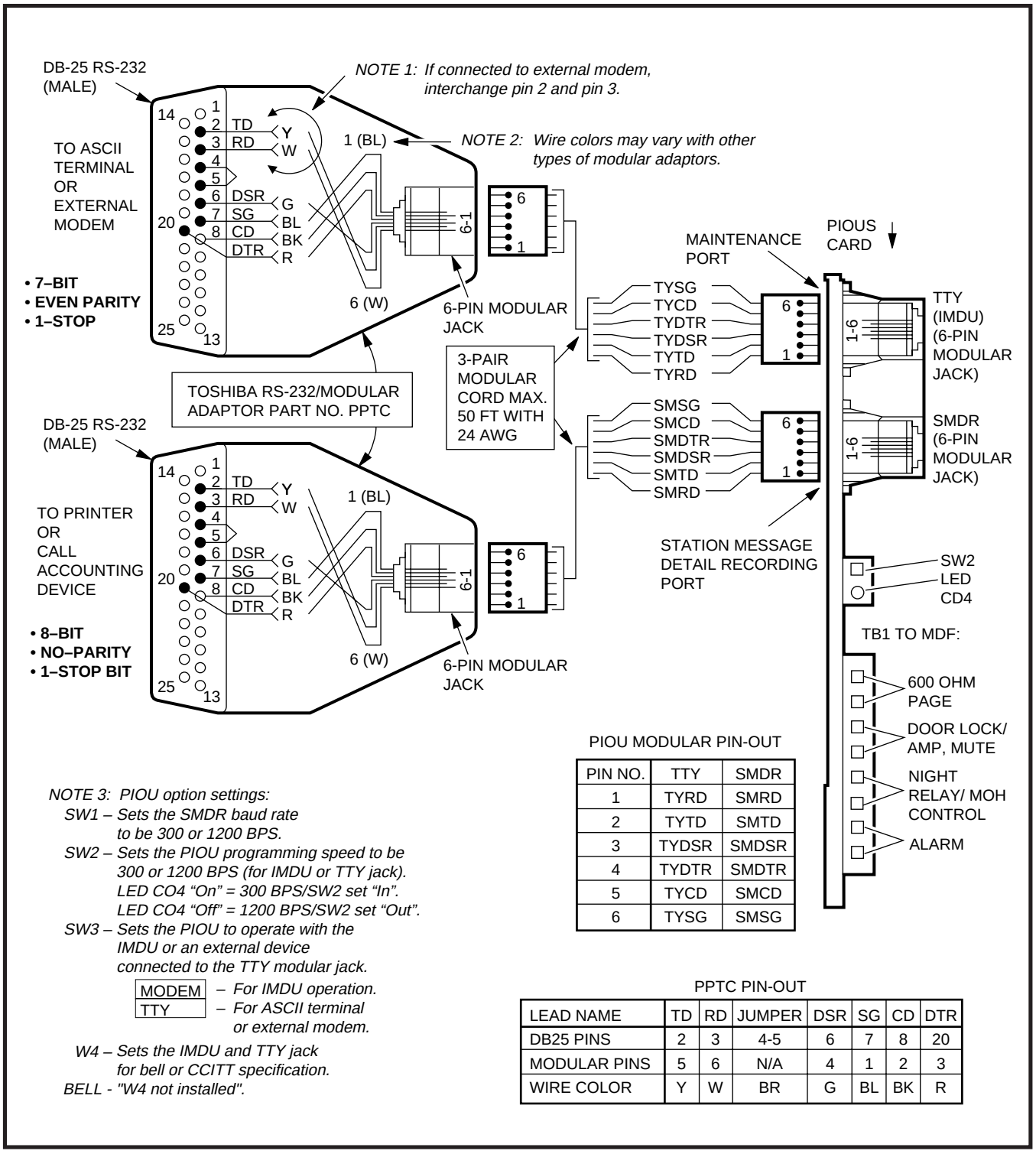


- *All wiring connections must be 24 AWG twisted pairs.*
- *Dotted lines show optional connections; only one optional connection is allowed.*

RELAY OPTIONS:

- K1 (DE): DOOR LOCK OR AMP MUTE CONTROL; PROGRAM 77-1, LED 07
- K2 (NH): NIGHT RELAY OR MUSIC-ON-HOLD CONTROL; PROGRAM 77-1, LED 05
- K1 & K2: 24 VDC, 1 AMP MAXIMUM

FIGURE 9-18
PIOUS PAGE/RELAY/ALARM CONNECTIONS



PIOU MODULAR PIN-OUT

PIN NO.	TTY	SMDR
1	TYRD	SMRD
2	TYTD	SMTD
3	TYDSR	SMDSR
4	TYDTR	SMDTR
5	TYCD	SMCD
6	TYSG	SMSG

NOTE 3: PIOU option settings:

SW1 – Sets the SMDR baud rate to be 300 or 1200 BPS.

SW2 – Sets the PIOU programming speed to be 300 or 1200 BPS (for IMDU or TTY jack). LED CO4 "On" = 300 BPS/SW2 set "In". LED CO4 "Off" = 1200 BPS/SW2 set "Out".

SW3 – Sets the PIOU to operate with the IMDU or an external device connected to the TTY modular jack.

MODEM	– For IMDU operation.
TTY	– For ASCII terminal or external modem.

W4 – Sets the IMDU and TTY jack for bell or CCITT specification.

BELL - "W4 not installed".

PPTC PIN-OUT

LEAD NAME	TD	RD	JUMPER	DSR	SG	CD	DTR
DB25 PINS	2	3	4-5	6	7	8	20
MODULAR PINS	5	6	N/A	4	1	2	3
WIRE COLOR	Y	W	BR	G	BL	BK	R

FIGURE 9-19
PIOUS/TTY OPTIONS AND WIRING

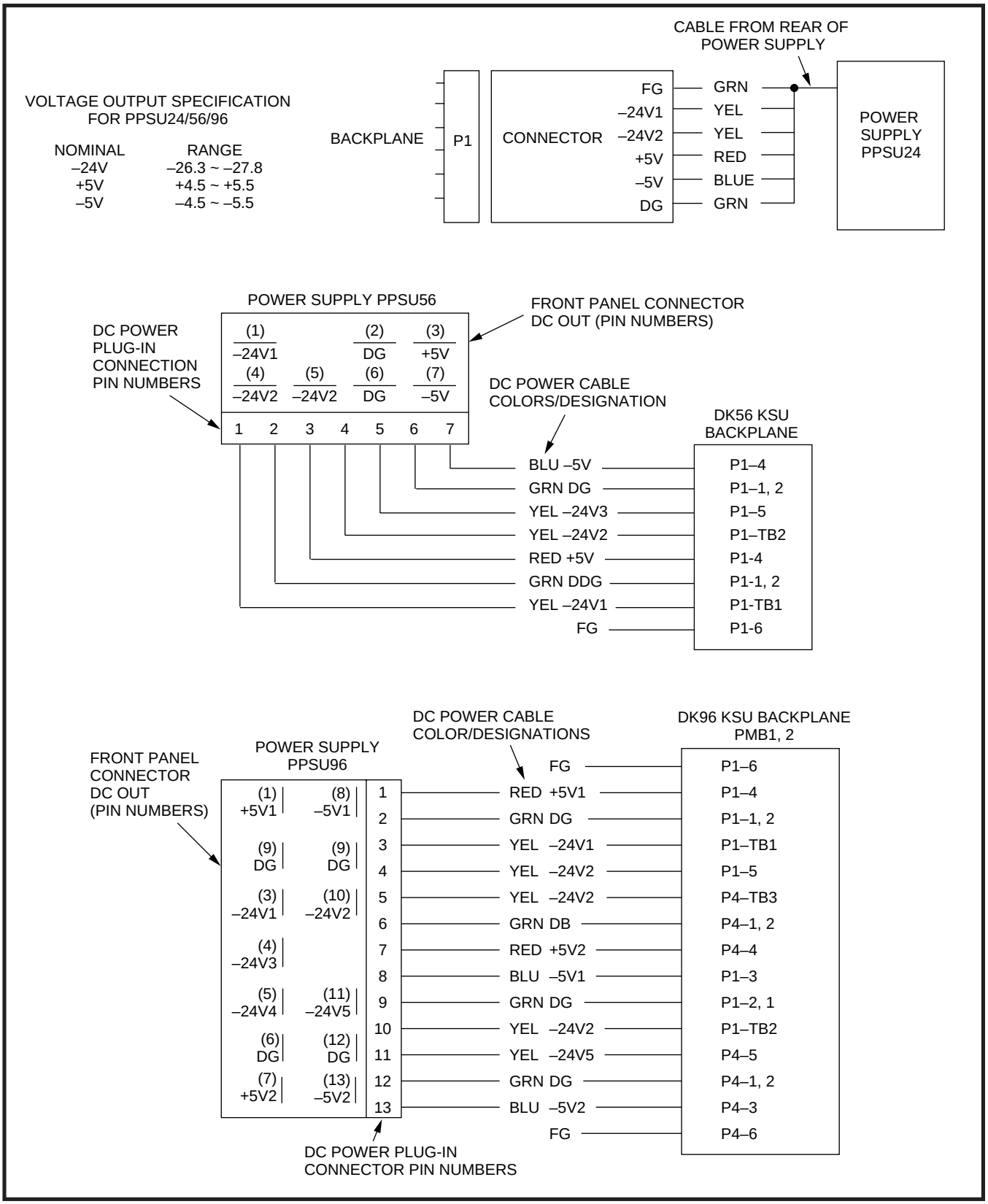
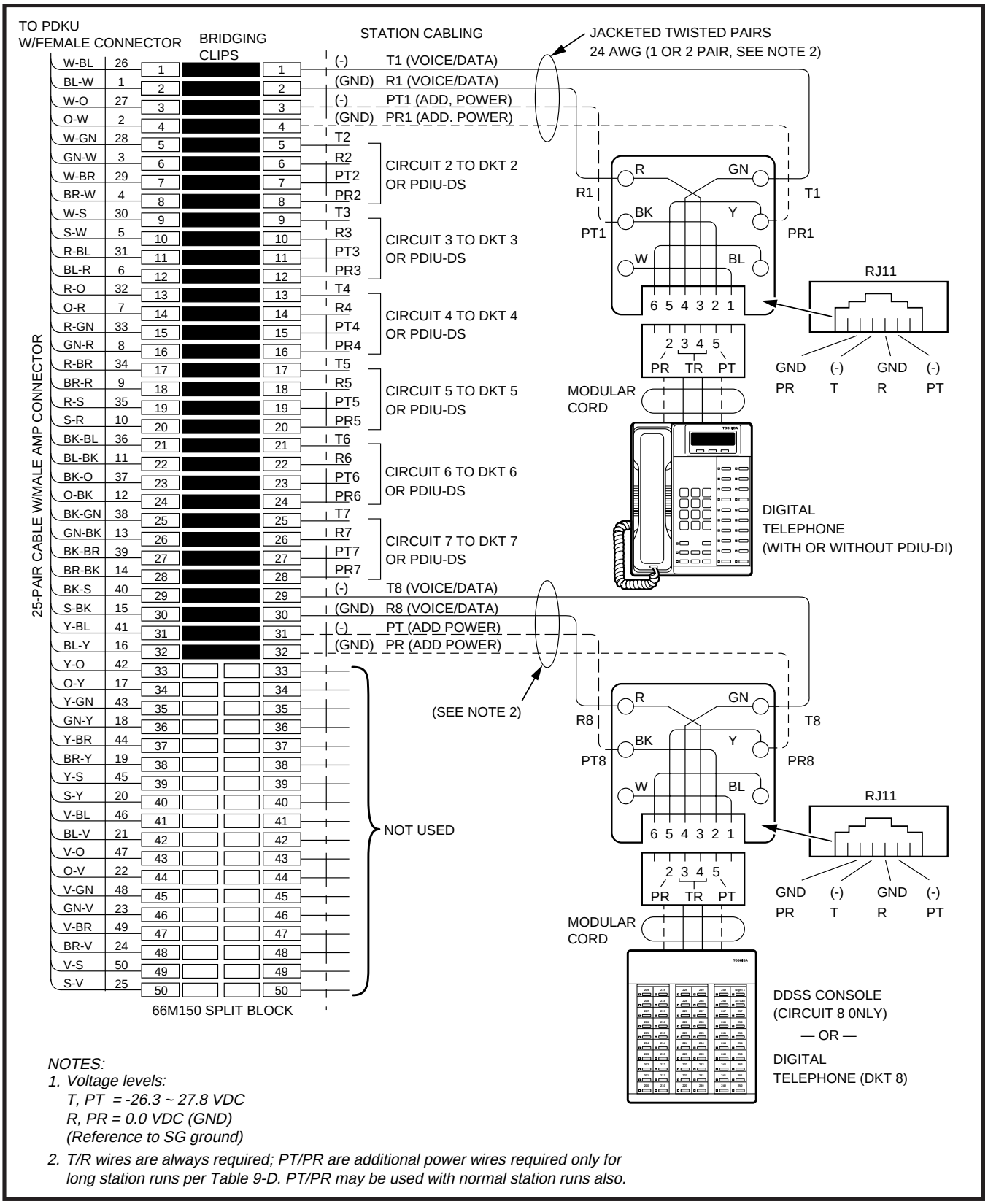


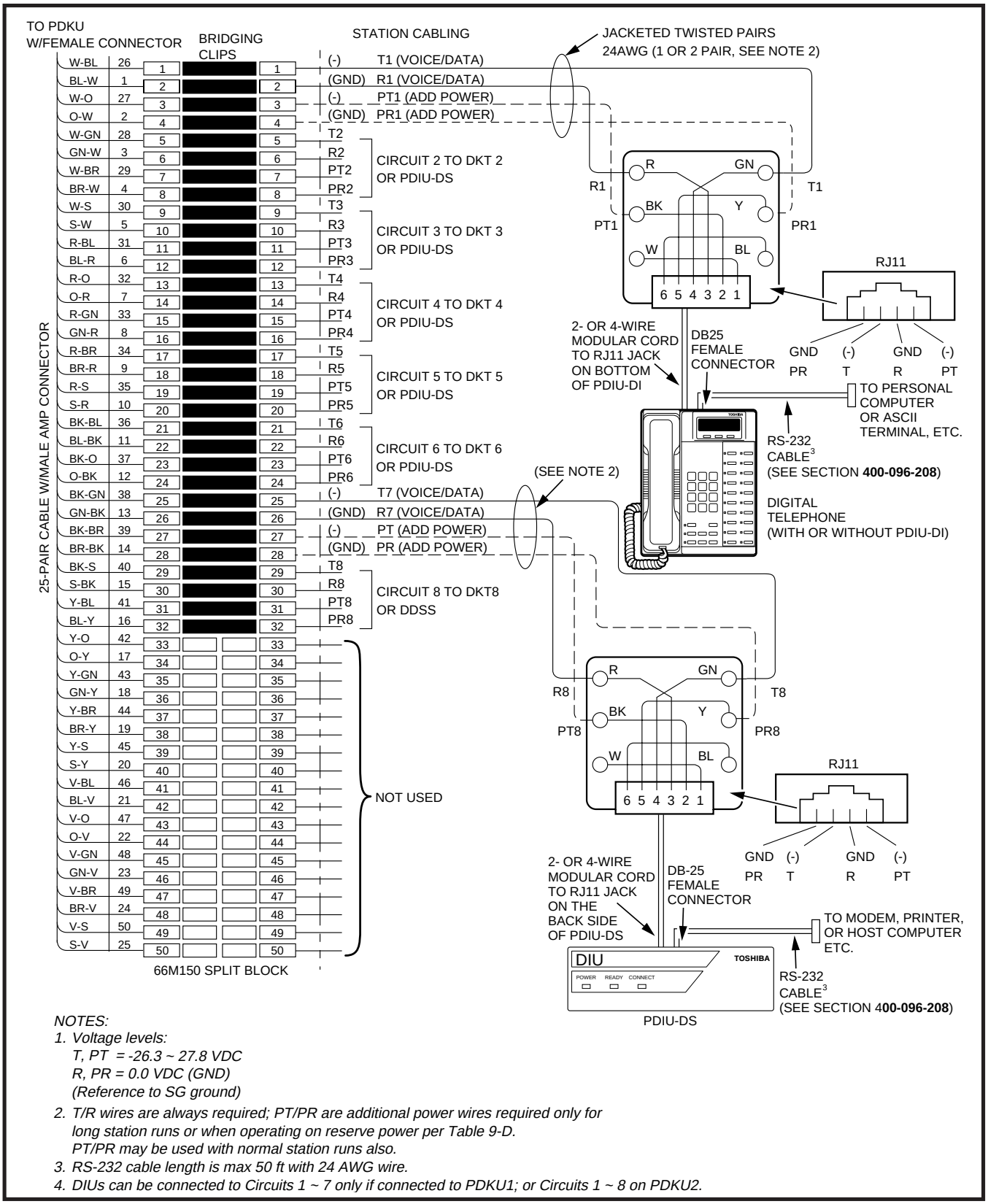
FIGURE 9-20
DK24/DK56/DK96 POWER SUPPLY DC OUT CONNECTOR/CABLES



NOTES:

1. *Voltage levels:*
   T, PT = -26.3 ~ 27.8 VDC
   R, PR = 0.0 VDC (GND)
   (Reference to SG ground)
2. *T/R wires are always required; PT/PR are additional power wires required only for long station runs per Table 9-D. PT/PR may be used with normal station runs also.*

FIGURE 9-21
MDF WIRING FOR DIGITAL TELEPHONES AND DDSS CONSOLE TO PDKU



NOTES:

1. *Voltage levels:*
   T, PT = -26.3 ~ 27.8 VDC
   R, PR = 0.0 VDC (GND)
   (Reference to SG ground)
2. *T/R wires are always required; PT/PR are additional power wires required only for long station runs or when operating on reserve power per Table 9-D. PT/PR may be used with normal station runs also.*
3. *RS-232 cable length is max 50 ft with 24 AWG wire.*
4. *DIUs can be connected to Circuits 1 ~ 7 only if connected to PDKU1; or Circuits 1 ~ 8 on PDKU2.*

FIGURE 9-22
MDF WIRING FOR DIGITAL TELEPHONES WITH PDIU-DI AND PDIU-DS TO PDKU

MDF BLOCK NO. _____ KSU SLOT NO. _____

COLOR CODE	DESIGNATION	CKT NUMBER	PORT NUMBER	INTERCOM NUMBER	DIGITAL TELEPHONE/ DEVICE LOCATION
W-Bl	T	1			
Bl-W	R				
W-O	PWR T				
O-W	PWR R				
W-G	T	2			
G-W	R				
W-Br	PWR T				
Br-W	PWR R				
W-S	T	3			
S-W	R				
R- Bl	PWR T				
Bl-R	PWR R				
R-O	T	4			
O-R	R				
R-G	PWR T				
G-R	PWR R				
R-Br	T	5[3]			
Br-R	R				
R-S	PWR T				
S-R	PWR R				
Bk-Bl	T	6			
Bl-Bk	R				
Bk-O	PWR T				
O-Bk	PWR R				
Bk-G	T	7			
G-Bk	R				
Bk-Br	PWR T				
Br-Bk	PWR R				
Bk-S	T	8			
S-Bk	R				
Y-Bl	PWR T				
Bl-Y	PWR R				

NOTES:

1. *Copy for each PDKU installed.*
2. *Indicate if PDIU-DS, digital telephone (with or without PDIU-DI), DDSS console (number 1, 2, 3, or 4), or DDCB is connected.*
3. *DDCBs connect only to Circuit 5, Ports 04, 12, 20, and 28.*

FIGURE 9-23
PDKU STATION/MDF CROSS CONNECT RECORD

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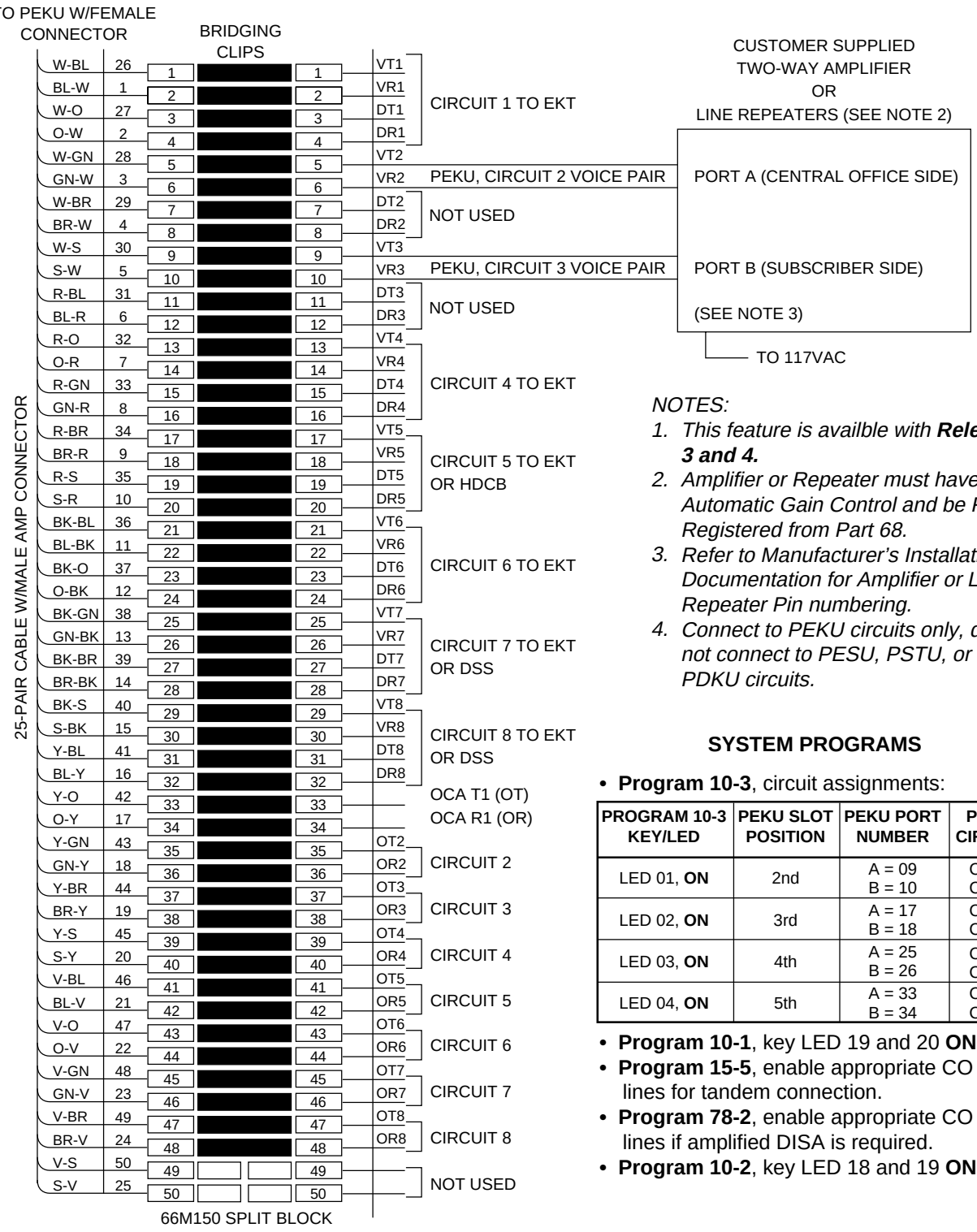


NOTES:

1. *This feature is availble with **Releases 3 and 4.***
2. *Amplifier or Repeater must have Automatic Gain Control and be FCC-Registered from Part 68.*
3. *Refer to Manufacturer's Installation Documentation for Amplifier or Line Repeater Pin numbering.*
4. *Connect to PEKU circuits only, do not connect to PESU, PSTU, or PDKU circuits.*

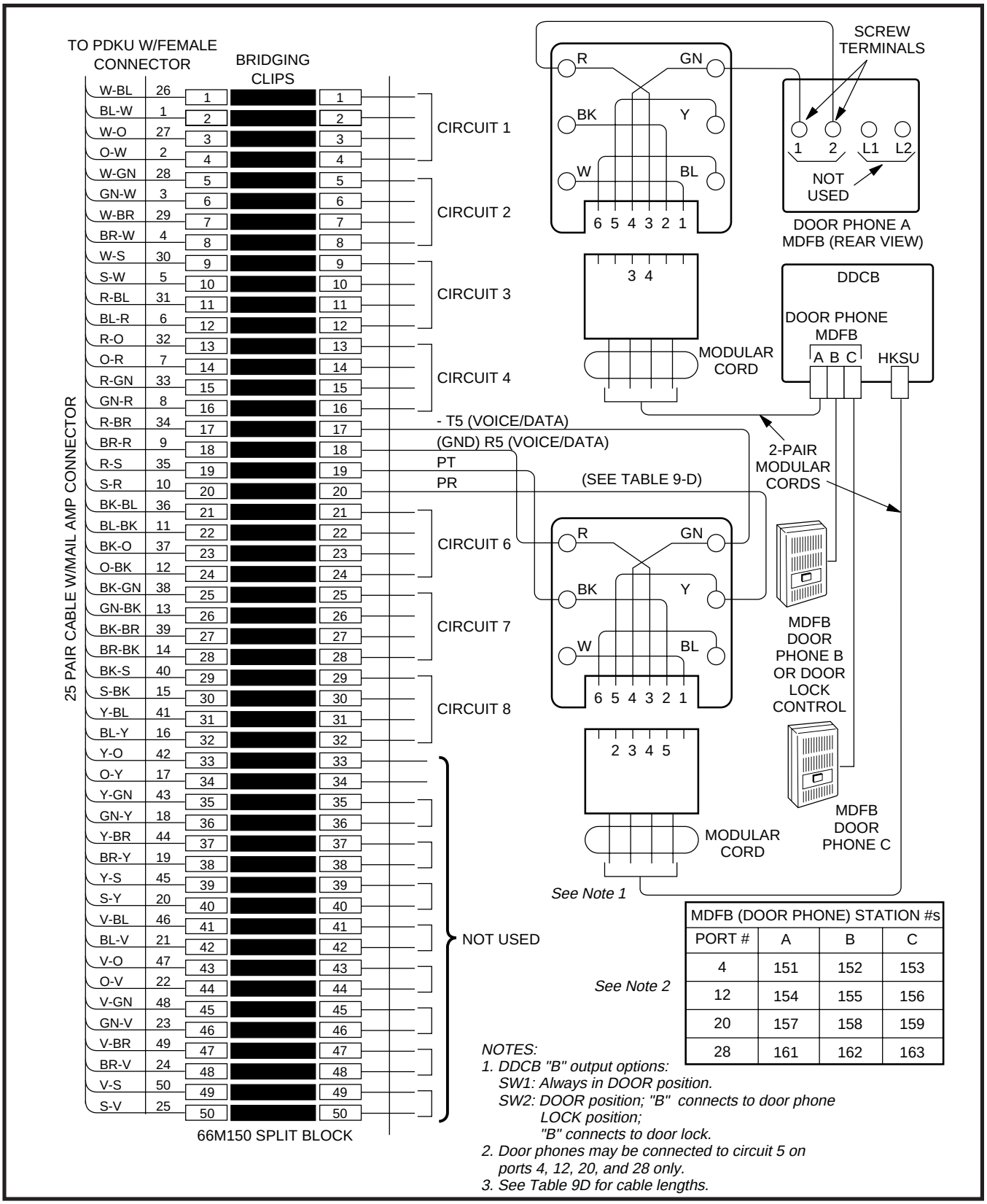
SYSTEM PROGRAMS

- **Program 10-3**, circuit assignments:

PROGRAM 10-3 KEY/LED	PEKU SLOT POSITION	PEKU PORT NUMBER	PEKU CIRCUIT
LED 01, **ON**	2nd	A = 09 B = 10	CKT2 CKT3
LED 02, **ON**	3rd	A = 17 B = 18	CKT2 CKT3
LED 03, **ON**	4th	A = 25 B = 26	CKT2 CKT3
LED 04, **ON**	5th	A = 33 B = 34	CKT2 CKT3

- **Program 10-1**, key LED 19 and 20 **ON.**
- **Program 15-5**, enable appropriate CO lines for tandem connection.
- **Program 78-2**, enable appropriate CO lines if amplified DISA is required.
- **Program 10-2**, key LED 18 and 19 **ON.**

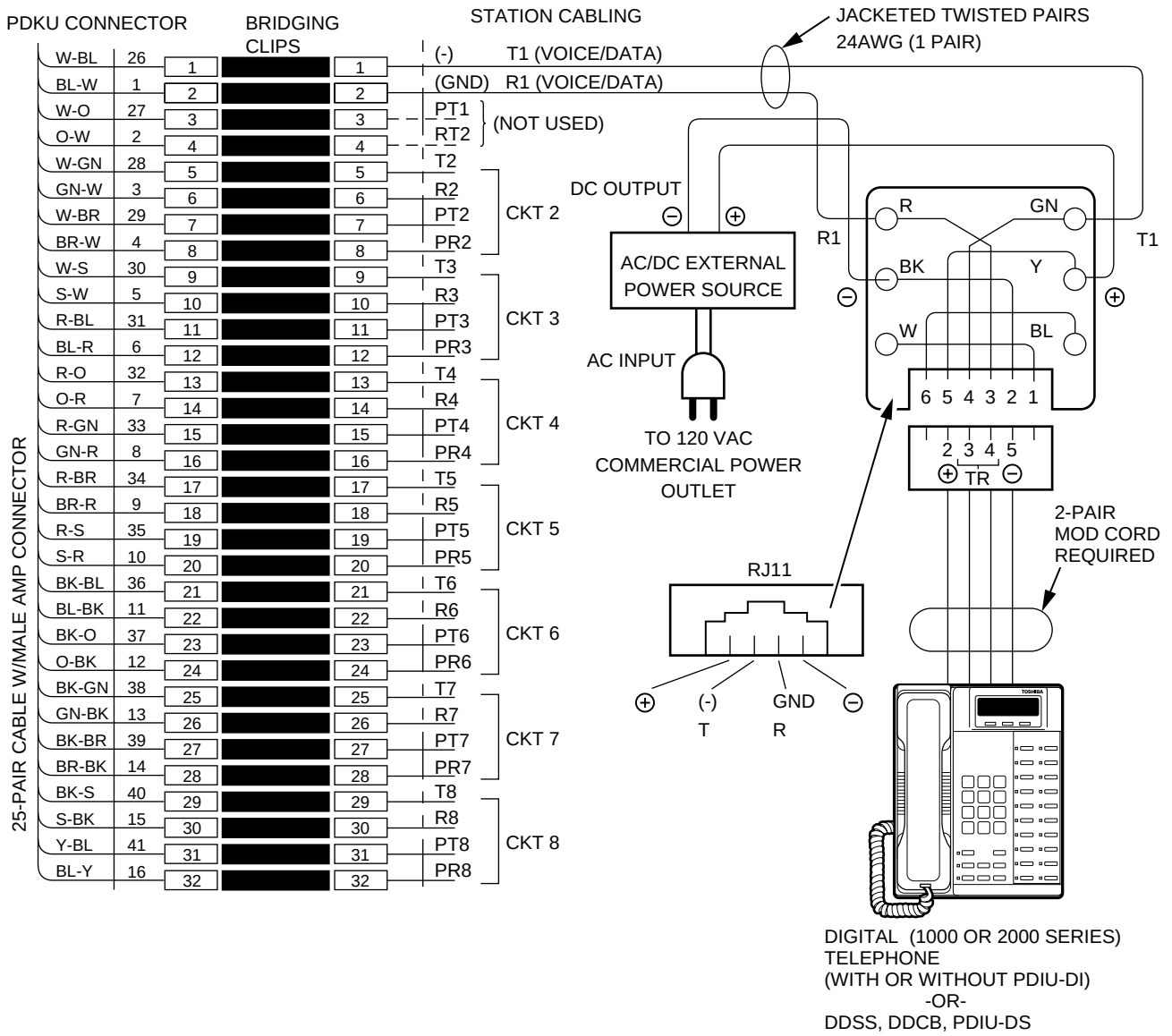
FIGURE 9-24
MDF WIRING/PEKU AMPLIFIED TWO-CO LINE CONFERENCE



MDFB (DOOR PHONE) STATION #s			
PORT #	A	B	C
4	151	152	153
12	154	155	156
20	157	158	159
28	161	162	163

NOTES:
1. DDCB "B" output options:
SW1: Always in DOOR position.
SW2: DOOR position; "B" connects to door phone LOCK position;
"B" connects to door lock.
2. Door phones may be connected to circuit 5 on ports 4, 12, 20, and 28 only.
3. See Table 9D for cable lengths.

FIGURE 9-25
MDF WIRING-DOOR PHONE/LOCK TO PDKU



AC/DC EXTERNAL POWER SOURCE SPECIFICATIONS:

AC IN: **120 VDC ± 10%**
DC OUT: **24 VDC ± 10%**
160 MA (MIN.) DC CURRENT
200 MV P-P (MAX) AC RIPPLE ON DC OUTPUT

EXTERNAL POWER STRAPS:

If the external power is installed, cut the external power straps located inside the digital telephone DDSS, DDCB, or PDIU-DS.
See **Table 9-D** at the front of this section for external power requirements.

FIGURE 9-26
EXTERNAL POWER FOR DIGITAL TELEPHONE CONNECTION

Strata® DK24/56/96

RELEASE 1, 2, 3, and 4

FAULT FINDING PROCEDURES

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TABLE OF CONTENTS

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TABLE LIST

FIGURE LIST

1 GENERAL

1.01 This section describes the maintenance procedures used to diagnose faults in the STRATA DK digital key telephone system. Faults are classified and then cleared by replacing the malfunctioning unit and performing operational tests in the sequences prescribed by the fault clearing flowcharts in Paragraph **5**.

2 FAULT CLASSIFICATION

2.01 A Fault Classification Flowchart is provided to ensure that fault clearing is pursued in a logical sequence (Chart No. 1).

2.02 An assumption is made in the flowcharts that the fault was discovered and reported by a digital or electronic telephone user. All faults, therefore, are classified according to the way they would appear at the digital or electronic telephone.

2.03 Faults and associated flowcharts in Table A are organized into the following categories:

TABLE A
FLOWCHARTS

Flowchart	Title
1	Fault Classification
2	Power Faults
3	Station Faults
4	KSU Faults
5	CO Line Faults
6	Intercom Faults
7	DSS Console Faults
8	Speed Dial Faults
9	MOH, BGM, Page & Relay Faults
10	SMDR Faults
11	PSTU Faults
12	Door Phone Faults
13	TIE Line Faults
14	Remote Maintenance/TTY Faults

3 FAULT CLEARING PROCEDURES

3.01 Before attempting to clear any fault, ensure that it is in the system and not caused by associated external equipment, such as wiring, MOH source, etc.

IMPORTANT!

Many system features are assigned, enabled or disabled using software entries as described in* Programming Procedures. *It is very important to verify that the system programming is correct and functional before troubleshooting the hardware.

3.02 In new systems, or when the PCTU or PCTUS PCB has been changed, the initialization procedure must be performed before testing. The system data stored on the original PCTU or PCTUS will be protected from loss by the backup battery on that PCB. Therefore, the initialization sequence *should not* be performed if the original PCB is reinstalled.

NOTE:
In this section all information relating to the PCTU PCB applies to the PCTUS, PCTU1, PCTU2, PCTU3, and PCTU4 unless otherwise stated.

3.03 Faults in the system are cleared by replacing PCBs, telephones (digital or electronic) or the power supply, as instructed in the flowcharts.

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3.04 Five symbols are used in the flowcharts, which are identified in Figure 1.

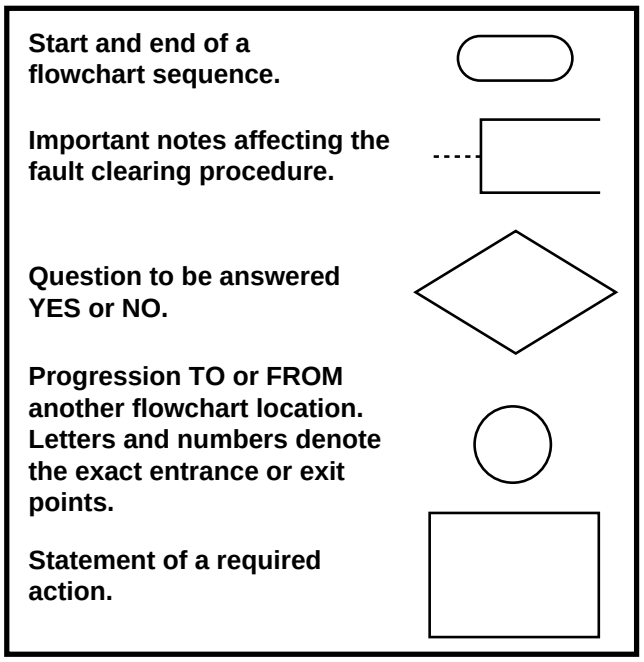

FIGURE 1—FLOWCHART SYMBOLS

3.05 The flowcharts are sequentially arranged to permit rapid fault localization within the system. *All fault clearing must begin with the Fault Classification Flowchart*, which is arranged in the correct fault locating sequence.

3.06 The following precautions must be observed when handling PCBs:

DO NOT:

- Drop a PCB.
- Stack one PCB on top of another.
- Handle a PCB without discharging any static electricity from your person by touching the grounded cabinet.
- Touch PCB contacts with your fingers.

Important!
If the fault is not cleared by substituting a PCB, the original PCB must be reinstalled in the cabinet before trying another PCB.

4 DEFECTIVE APPARATUS RETURNS

4.01 When a defective system apparatus is shipped for repair, the apparatus must be packed in a suitable container (the original box is highly recommended), as follows:

a) Paper container for the PCTU PCB.

b) Anti-static containers for all other PCBs

c) Plastic bags for digital or electronic telephones, KSU, etc.

4.02 NEVER WRITE ON THE APPARATUS ITSELF! Describe the nature of the defect on an information tag. Attach the tag to the front of the unit with string (not wire) so the tag can remain attached during the testing and repair process. Return tags are available from Toshiba America Information Systems, Inc., TSD Division.

5 FAULT IDENTIFICATION AND ELIMINATION PROCEDURES

5.01 The PCTU PCB may contain a ÒsoftÓ fault due to static electricity. If it is found defective during the fault finding procedures, attempt to clear a soft fault prior to returning the PCTU PCB for repair. The correct procedure for this is to reinstall the PCTU, perform the initialization procedure, and then reprogram the system as necessary to test for the fault. If the fault returns after these procedures are performed, tag the defective PCTU and return it for repair.

6 POWER SUPPLY

6.01 If a DC power fault is detected, all PCBs should be disconnected from the backplane connectors to eliminate them as the cause of the power problem. The Power Supply Test Procedure in Paragraph 3, section **400-096-205**, *Installation,*

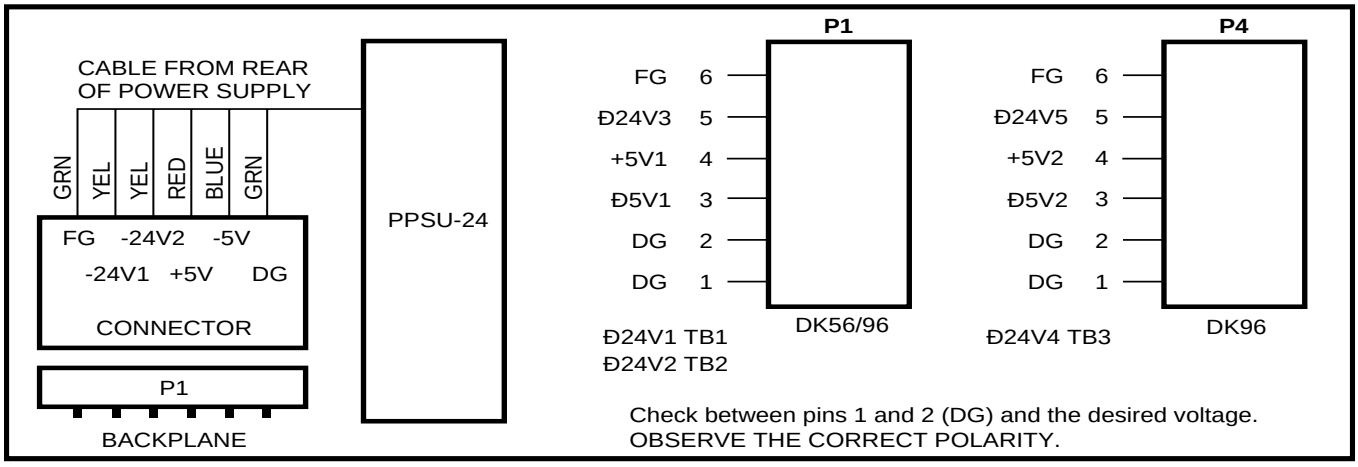

FIGURE 2—BACKPLANE CONNECTORS P1 (DK24), P1 & P4 (DK56/96)

can be employed to further isolate possible causes before removal of the KSU back cover or the power supply unit. Figure 2 shows backplane connector P1 and P4 and voltages at each pin. Voltages should fall within the following ranges:

Nominal	Range
-24v	-26.3 ~ -27.8
+5v	+4.5 ~ +5.5
-5v	-4.5 ~ -5.5

6.02 If voltage checks indicate a power supply fault, replace the power supply with a correctly operating unit. Refer to Section **400-096-200**, *Installation,* for power supply installation procedures.

6.03 The circuit breaker distribution chart show which voltages supply the various slot locations. If a circuit breaker pops out, this chart will help to identify a malfunctioning PCB (reference Tables B, C, and D).

TABLE B
DK24 CIRCUIT BREAKER DISTRIBUTION

Circuit Breaker	Backplane PCB	PCTUS
-24V1	Slot 01, 02, 03	Ñ
-24V2	Slot 04, 05, 06	Ñ
+5V	All slots	+5V
-5V	All slots	-5V

TABLE C
DK56 CIRCUIT BREAKER DISTRIBUTION

Circuit Breaker	Backplane PCB	PCTU
Ð24V1	Slots 01, 02	Ð
Ð24V2	Slots 03, 04, 05	Ð
Ð24V3	Slots 06, 07, 08	Ð

NOTE:
+5 volts goes to all PCB slots.
-5 volts goes to all PCB slots.

TABLE D
DK96 CIRCUIT BREAKER DISTRIBUTION

Circuit Breaker	Backplane PCB (upper)	Backplane PCB (lower)	PCTU
+5V1	All Slots	Ð	+5V
+5V2	Ð	All Slots	Ð5V
Ð24V1	Slot 01, 02	Ð	Ð
Ð24V2	Slot 03, 04, 05	Ð	Ð
Ð24V3	Slot 06, 07, 08	Ð	Ð
Ð24V4	Ð	Slot 09, 10, 11	Ð
Ð24V5	Ð	Slot 12, 13, 14	Ð

NOTE:
+5 volts goes to all PCB slots.
-5 volts goes to all PCB slots.

7 STATION CABLE CONTINUITY CHECK

7.01 Voltmeter Test

7.02 The continuity of the cable run between the HKSU and the digital or electronic telephone is checked with a voltmeter as follows:

H

NOTE:
Perform the following at the locations indicated:
1. *Modular block: Check all stations cables*
2. *MDF: Check cable from KSU to MDF.*
3. *These tests also apply for troubleshooting cable problems with HDCB, DDCB, and PDIU-DS devices.*

1) Disconnect the digital or electronic telephone.

2) Using a DC voltmeter, measure between the wires of the two pairs to verify the readings shown in Table E for electronic telephone ports (PEKU or PESU). Refer to Table G for digital telephone ports. The reading will be a plus or minus depending on meter lead placement.

3) An improper reading indicates an open, crossed or shorted wire.

4) For the MDF-to-telephone (digital or electronic) cable, a more precise check is made using an ohmmeter.

7.10 Ohmmeter Test

7.11 The continuity of the cable run between the KSU and digital or electronic telephone is checked with and ohmmeter as follows:

1) Disconnect the electronic telephone.

2) At the MDF, remove the bridging clips.

3) At the MDF, place shorting jumper wires between the T and R of pair #1 (green-red), the T and R of pair #2 (black-yellow) and the T and R of OCA pair #3 (blue-white) for PEKU/PESU only. (For MDF pin numbers, see Figure 9-1 for electronic telephones or Figure 9-22 for digital telephones).

4) At the modular block, measure the resistance between all wire combinations. The proper readings are shown in Table F for electronic telephones, HDCBs and HDSSs, and Table H for digital telephones, DDSSs and DDCBs.

7.20 Cable Installation

7.21 If cable voltmeter and ohmmeter tests are within limits, digital telephones may not operate because of the following:

1) Digital telephone cable runs must be free of cable splits (single or double). Test for and eliminate all cable splits.

2) Cable bridge taps - Digital telephones will not operate if cable runs contain any type (short or long) or cable bridge. Test for and eliminate all cable bridges.

3) When installing the station cable, do not run parallel to and within 3 feet of an AC power line. AC power lines should be crossed at right (90°) angles only. In particular, avoid running station wire pairs near devices that generate electrical noice, such as neon or fluorescent light fixtures.

H

TABLE E (PEKU OR PESU)
STATION CABLE CONTINUITY
CHECK USING VOLTMETER

FROM			TO			VOLTAGE [3]
Pair	Wire	Color	Pair	Wire	Color	
1	T	Green	2	T	Black	24 [3]
1	R	Red	2	T	Black	24 [3]
1	T	Green	2	R	Yellow	24 [3]
1	R	Red	2	R	Yellow	24 [3]
1	T	Green	1	R	Red	0
2	T	Black	2	R	Yellow	0
3	T	White	3	R	Blue	0
3	T	White	1	R	Red	0
3	R	Blue	1	R	Red	0
3	T	White	1	T	Green	0
3	R	Blue	1	T	Green	0
3	T	White	2	T	Black	0
3	R	Blue	2	T	Black	0
3	T	White	2	R	Yellow	0
3	R	Blue	2	R	Yellow	0

TABLE F (PEKU OR PESU)
STATION CABLE CONTINUITY
CHECK USING OHMMETER

FROM			TO			Resistance
Pair	Wire	Color	Pair	Wire	Color	
1	T	Green	2	T	Black	open
1	R	Red	2	T	Black	open
1	T	Green	2	R	Yellow	open
1	R	Red	2	R	Yellow	open
1	T	Green	1	R	Red	40 ohms [1]
2	T	Black	2	R	Yellow	40 ohms [1]
3	T	White	3	R	Blue	40 ohms [1]
3	T	White	1	R	Red	open
3	R	Blue	1	R	Red	open
3	T	White	1	T	Green	open
3	R	Blue	1	T	Green	open
3	T	White	2	T	Black	open
3	R	Blue	2	T	Black	open
3	T	White	2	R	Yellow	open

TABLE G (PDKU)
STATION CABLE CONTINUITY
CHECK USING VOLTMETER

FROM			TO			VOLTAGE
Pair	Wire	Color	Pair	Wire	Color	
1	T	Green	2	T	Black	0
1	R	Red	2	T	Black	24 [3]
1	T	Green	2	R	Yellow	24 [3]
1	R	Red	2	R	Yellow	0
1	T	Green	1	R	Red	24 [3]
2	T	Black	2	R	Yellow	24 [3]

TABLE H (PDKU)
STATION CABLE CONTINUITY
CHECK USING OHMMETER

FROM			TO			Resistance
Pair	Wire	Color	Pair	Wire	Color	
1	T	Green	2	T	Black	open
1	R	Red	2	T	Black	open
1	T	Green	2	R	Yellow	open
1	R	Red	2	R	Yellow	open
1	T	Green	1	R	Red	40 ohms[1]
2	T	Black	2	R	Yellow	40 ohms[1]

H

NOTES:

1. *This is the maximum allowable reading for all PDKU, PEKU and PESU cable runs except if connecting an HDSS console to Circuits 7 and 8 of a PEKU—then the maximum cable restriction is 20 ohms, not 40 ohms.*
2. *The green-red, black-yellow and white-blue measurements should be within 10% of each other.*
3. *Nominal voltage—within the limits of ±26.3 ~ ±27.8 VDC while under AC power, polarity depending on voltmeter lead placements.*

CHART NO. 1
FAULT CLASSIFICATION

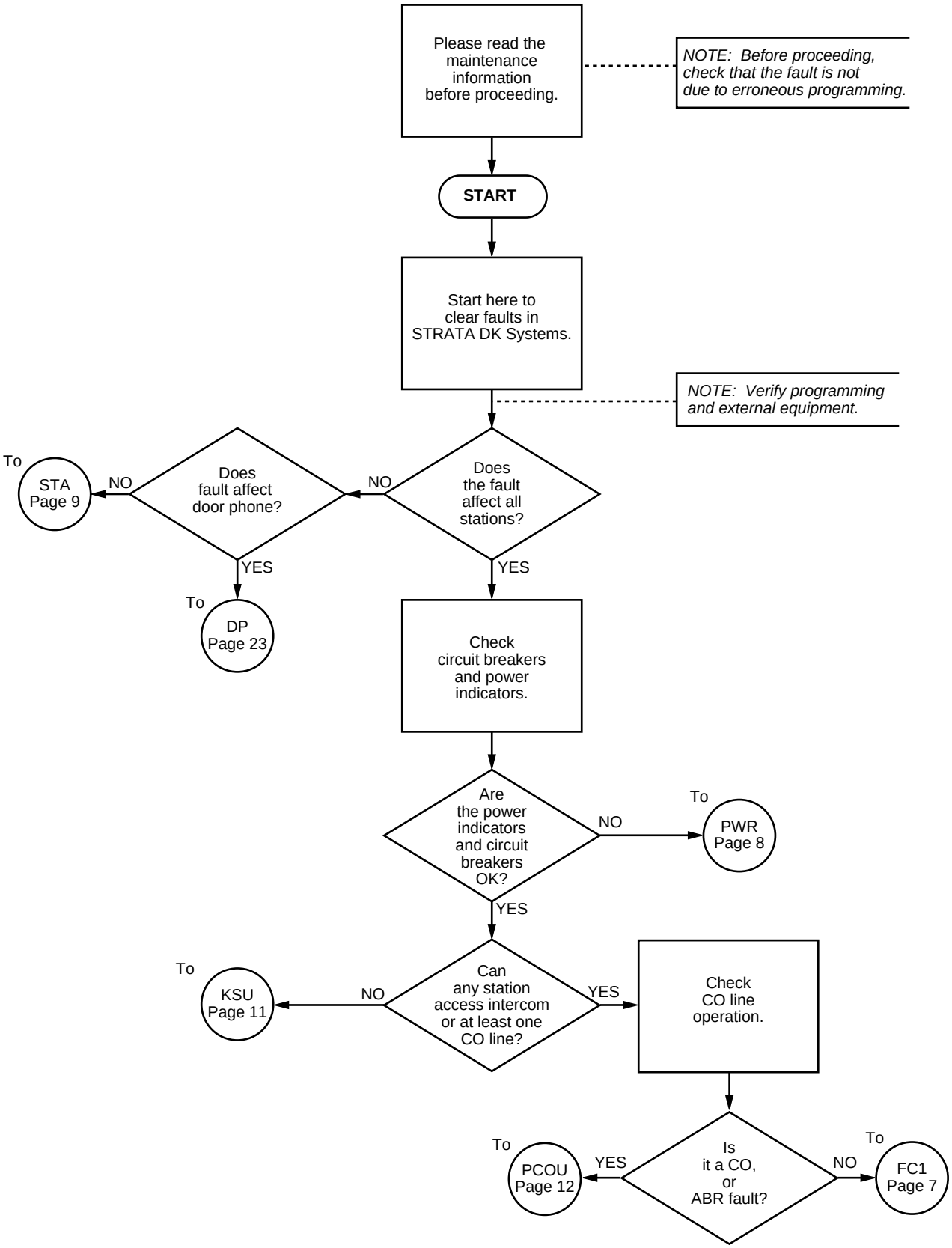

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CHART NO. 1
FAULT CLASSIFICATION (cont.)

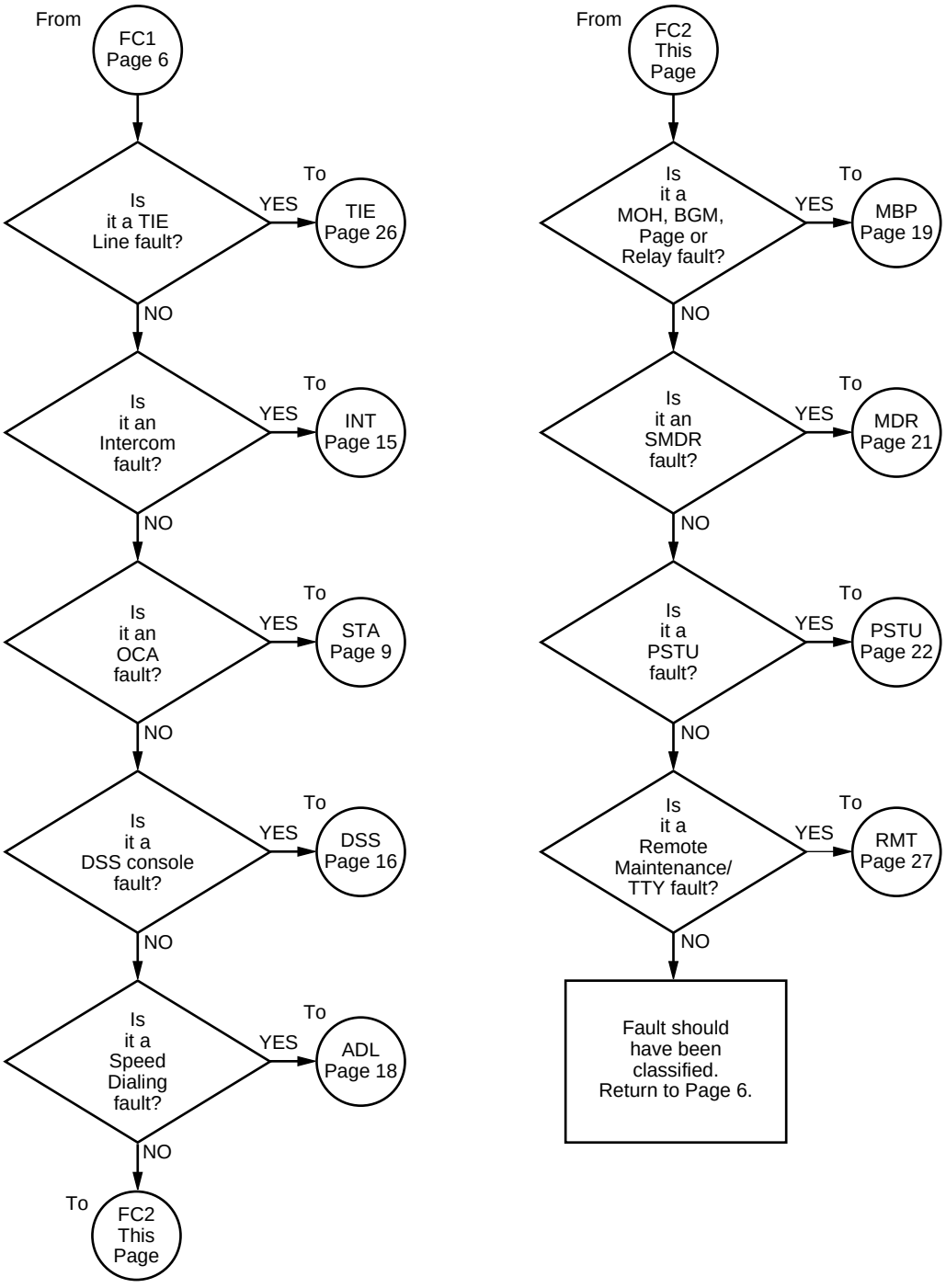

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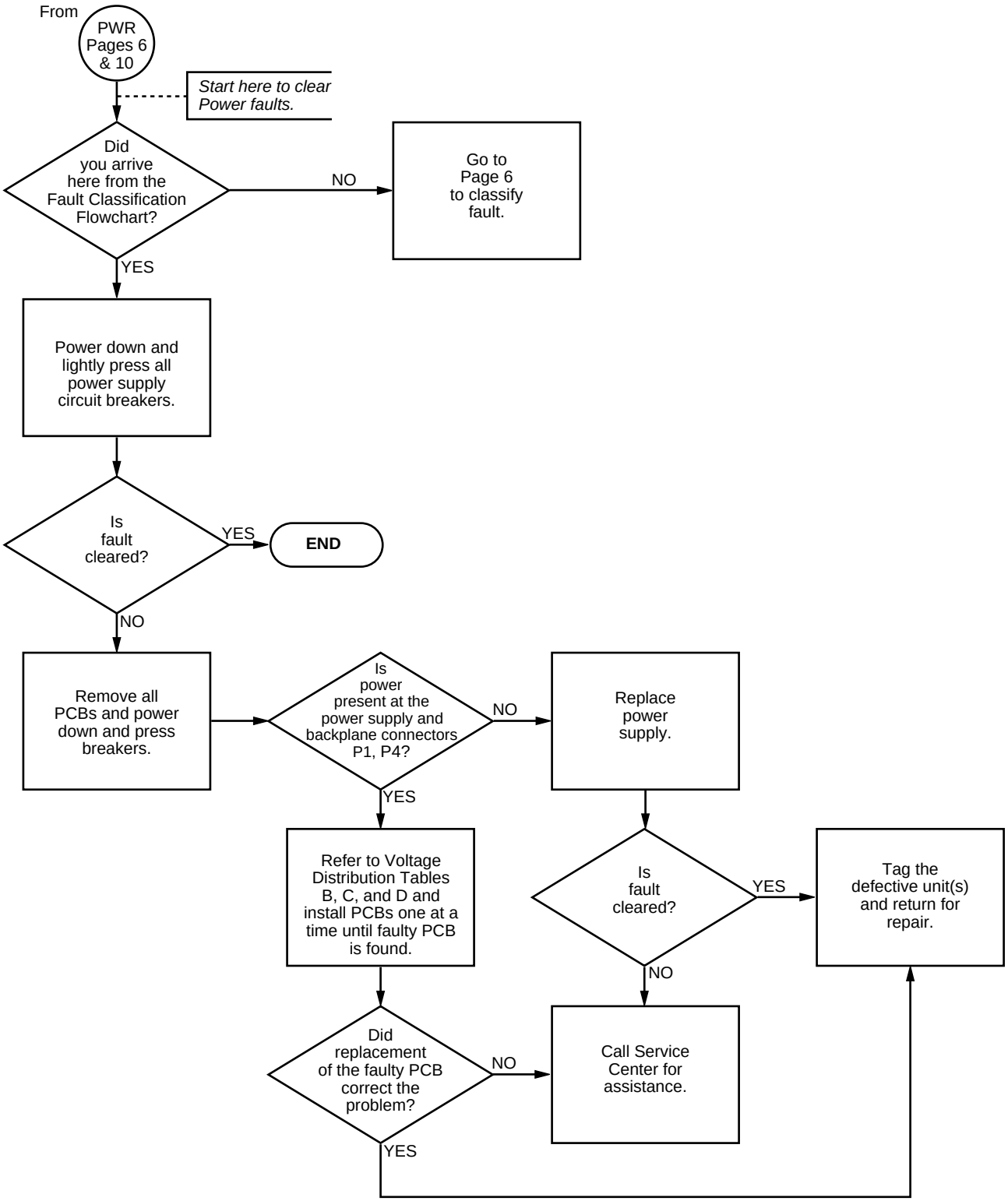
CHART NO. 2
POWER FAULTS



H

CHART NO. 3
STATION FAULTS

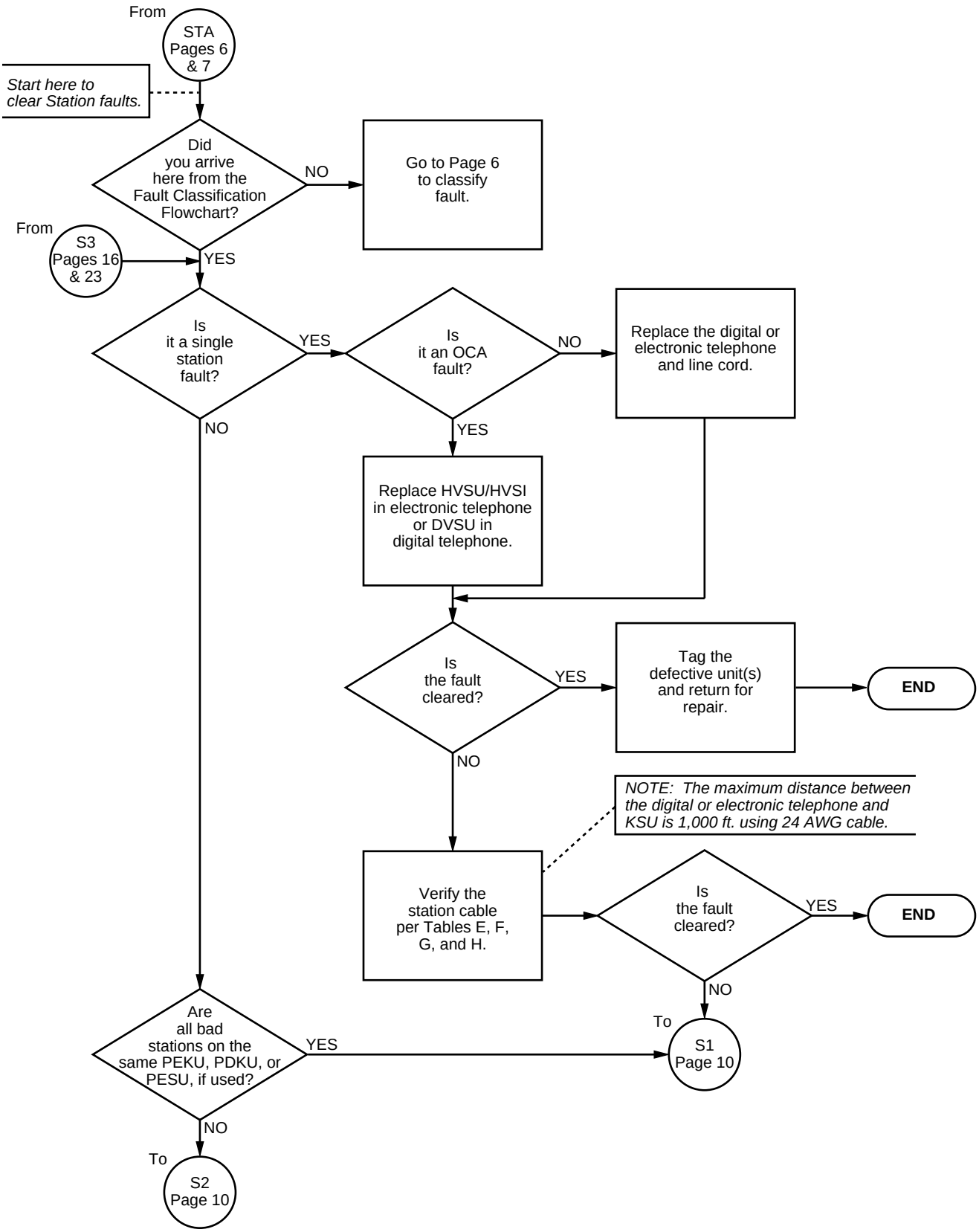


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CHART NO. 3
STATION FAULTS (cont.)

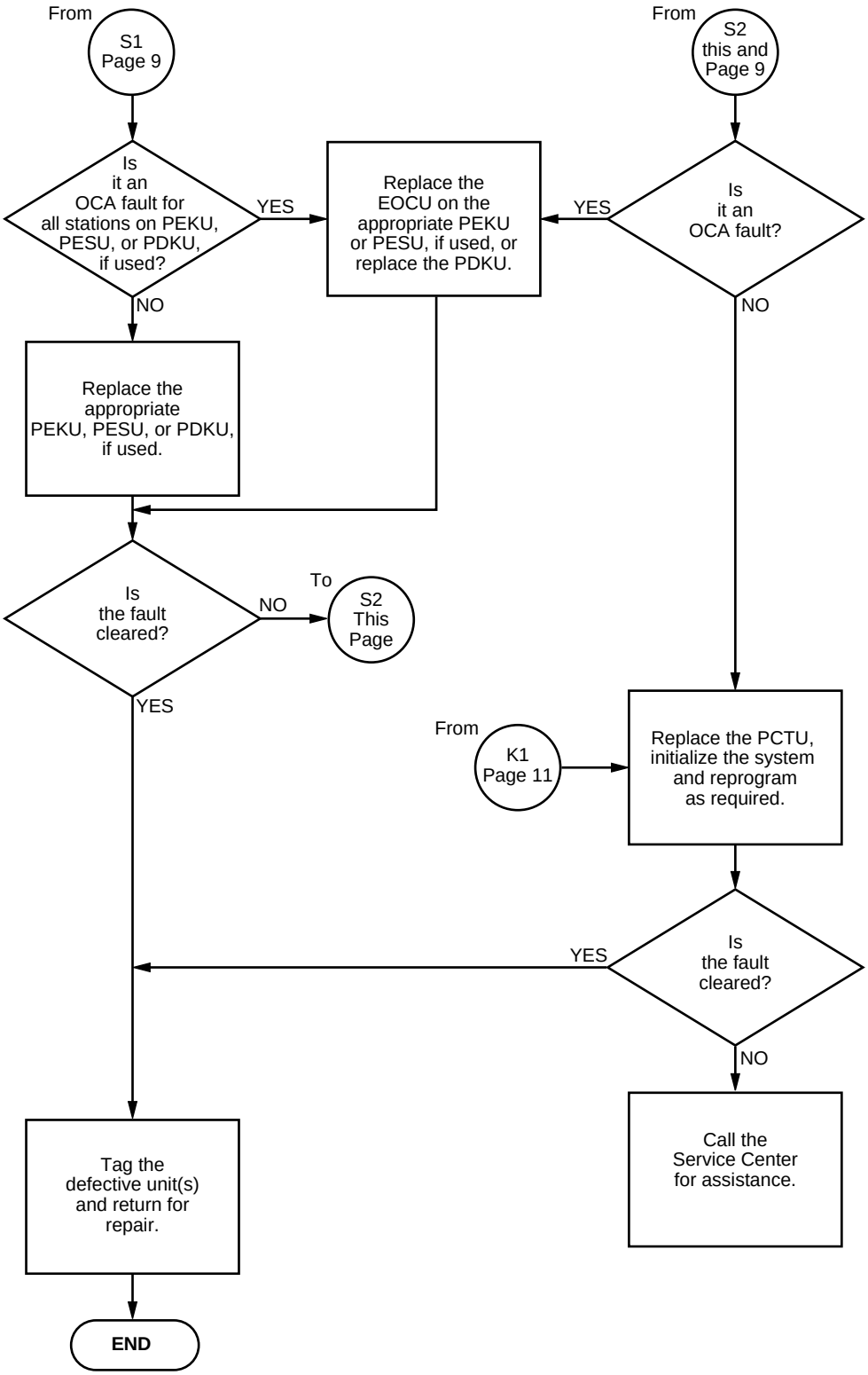

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CHART NO. 4
KSU FAULTS

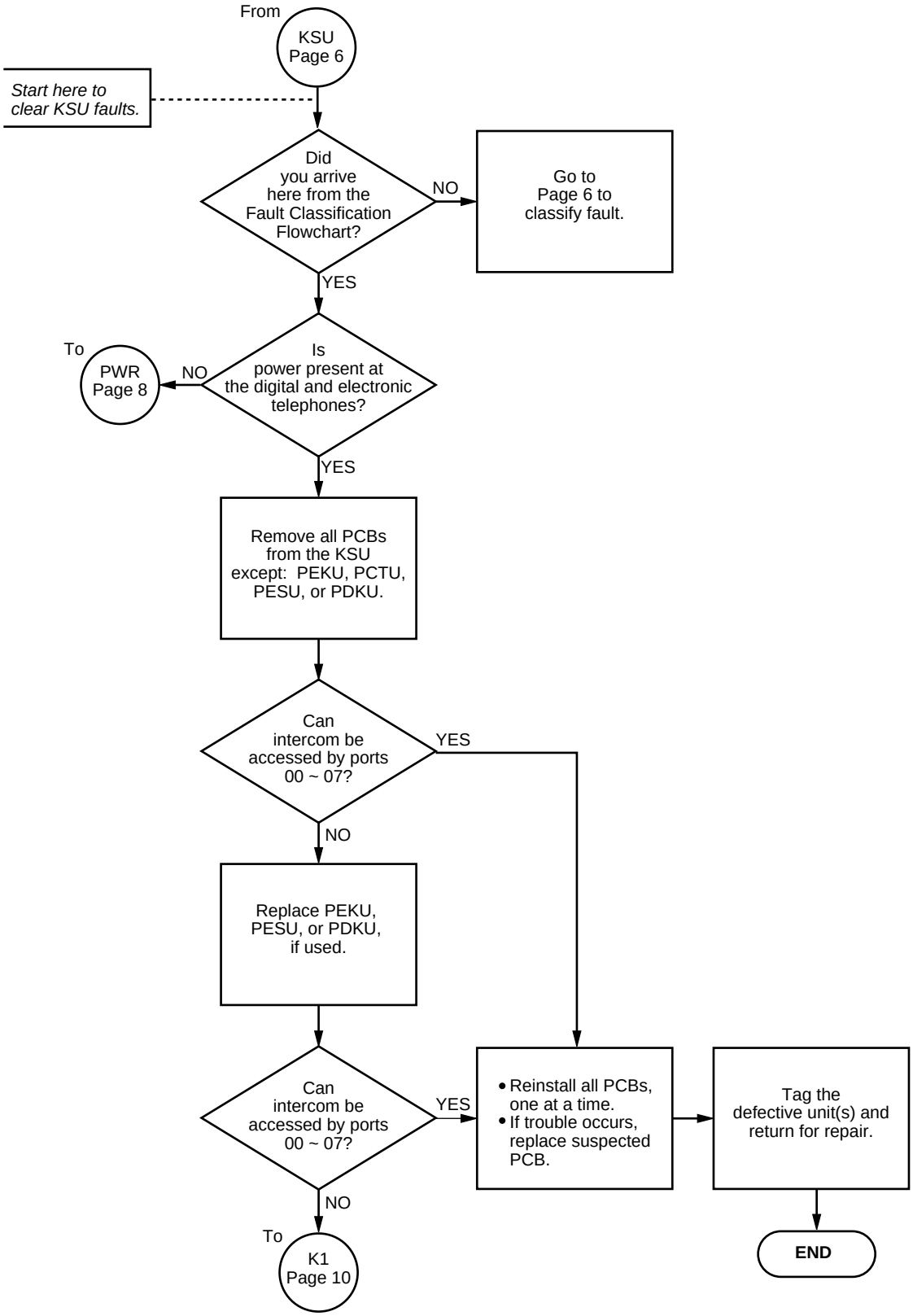

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CHART NO. 5
CO LINE FAULTS

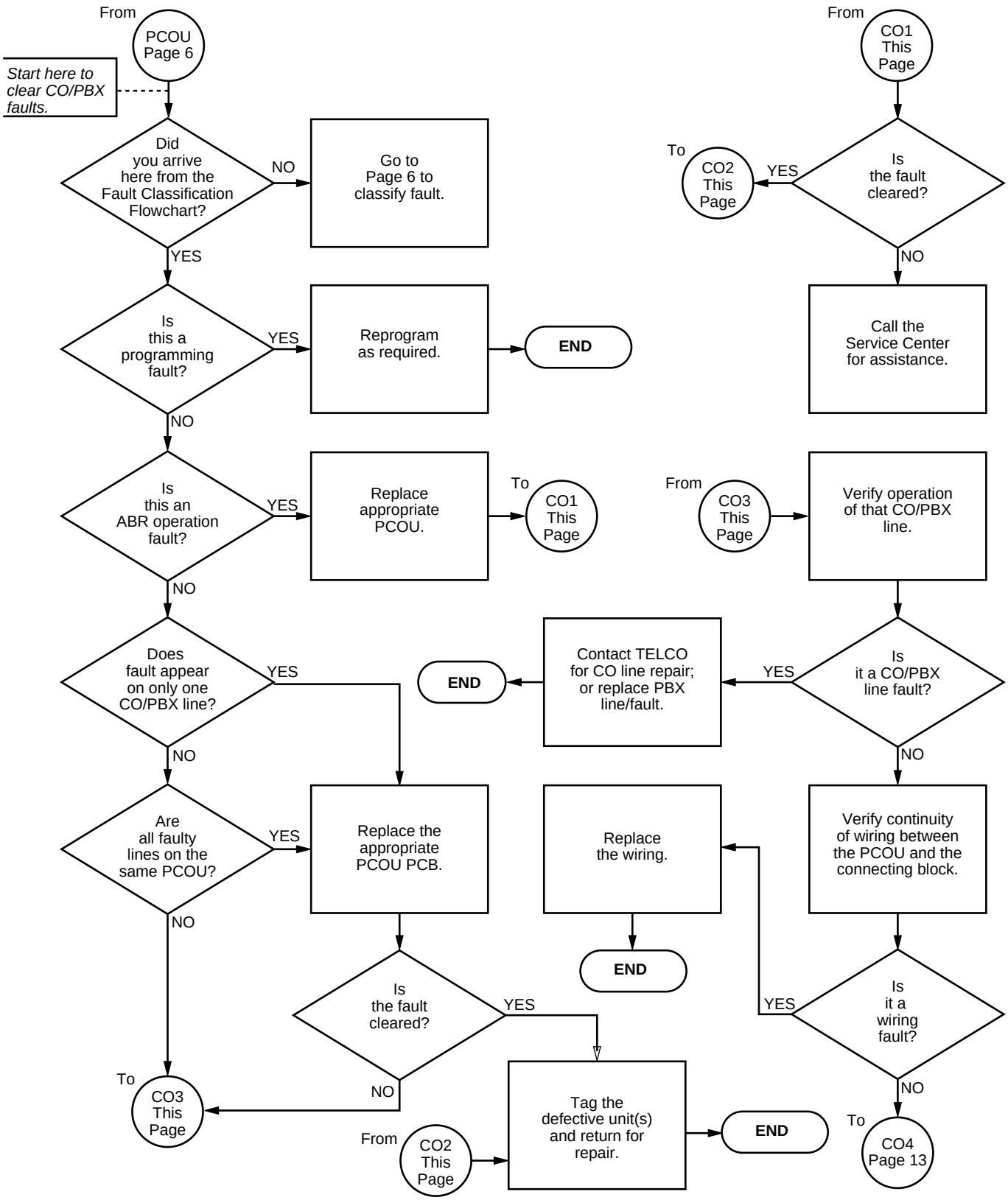

CHART NO. 5
CO LINE FAULTS (cont.)

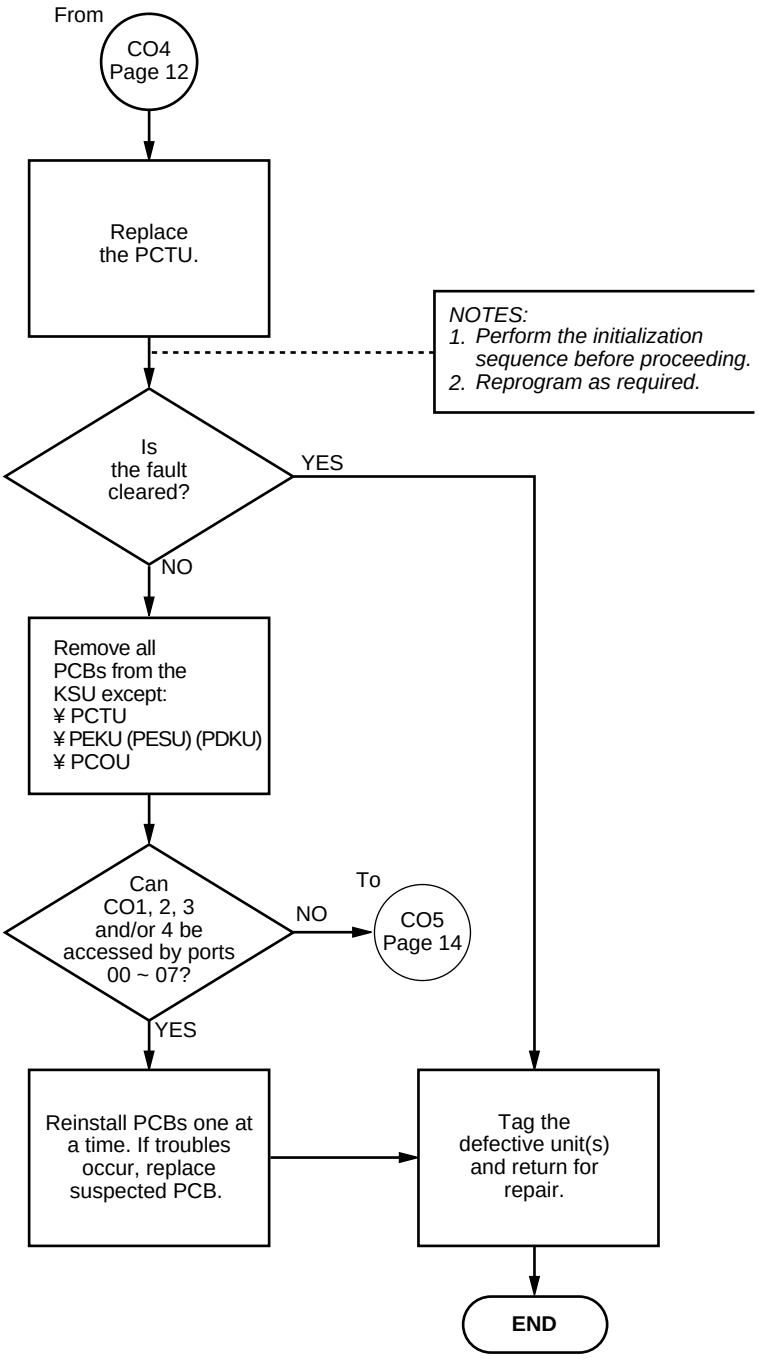

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CHART NO. 5
CO LINE FAULTS (cont.)

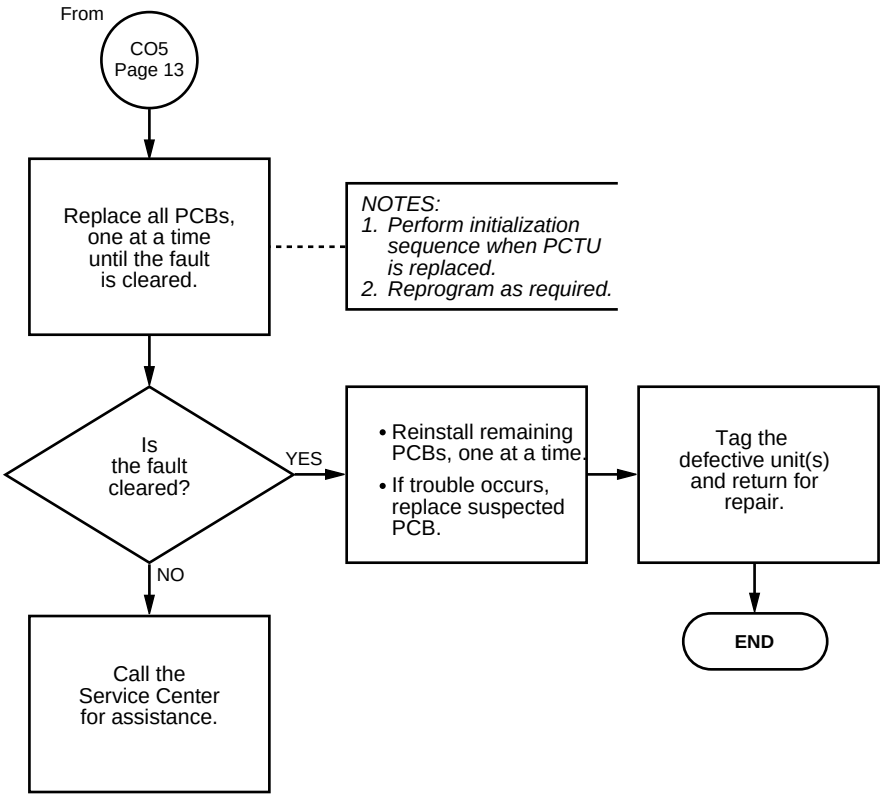

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CHART NO. 6
INTERCOM FAULTS

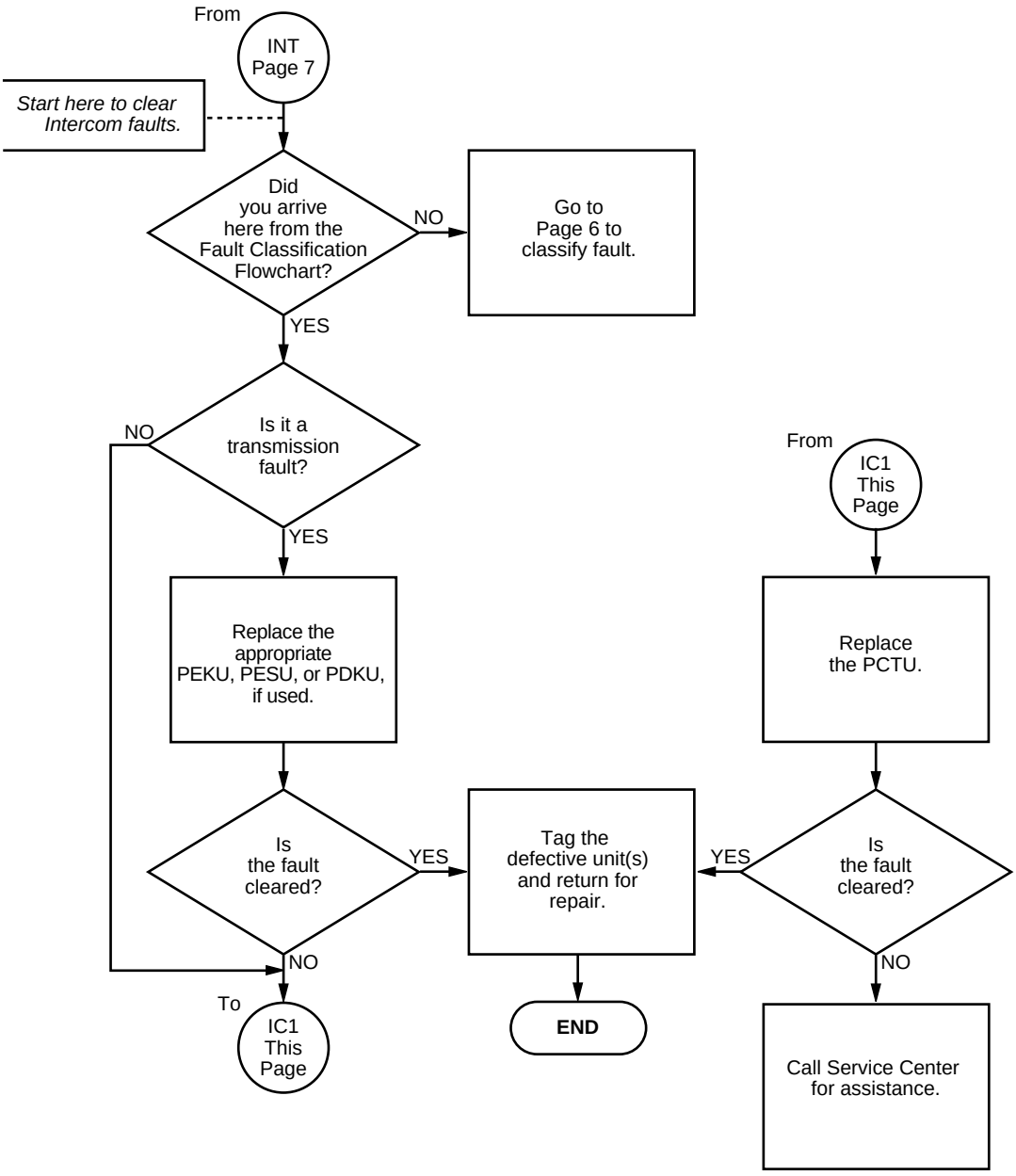

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CHART NO. 7
DSS CONSOLE FAULTS

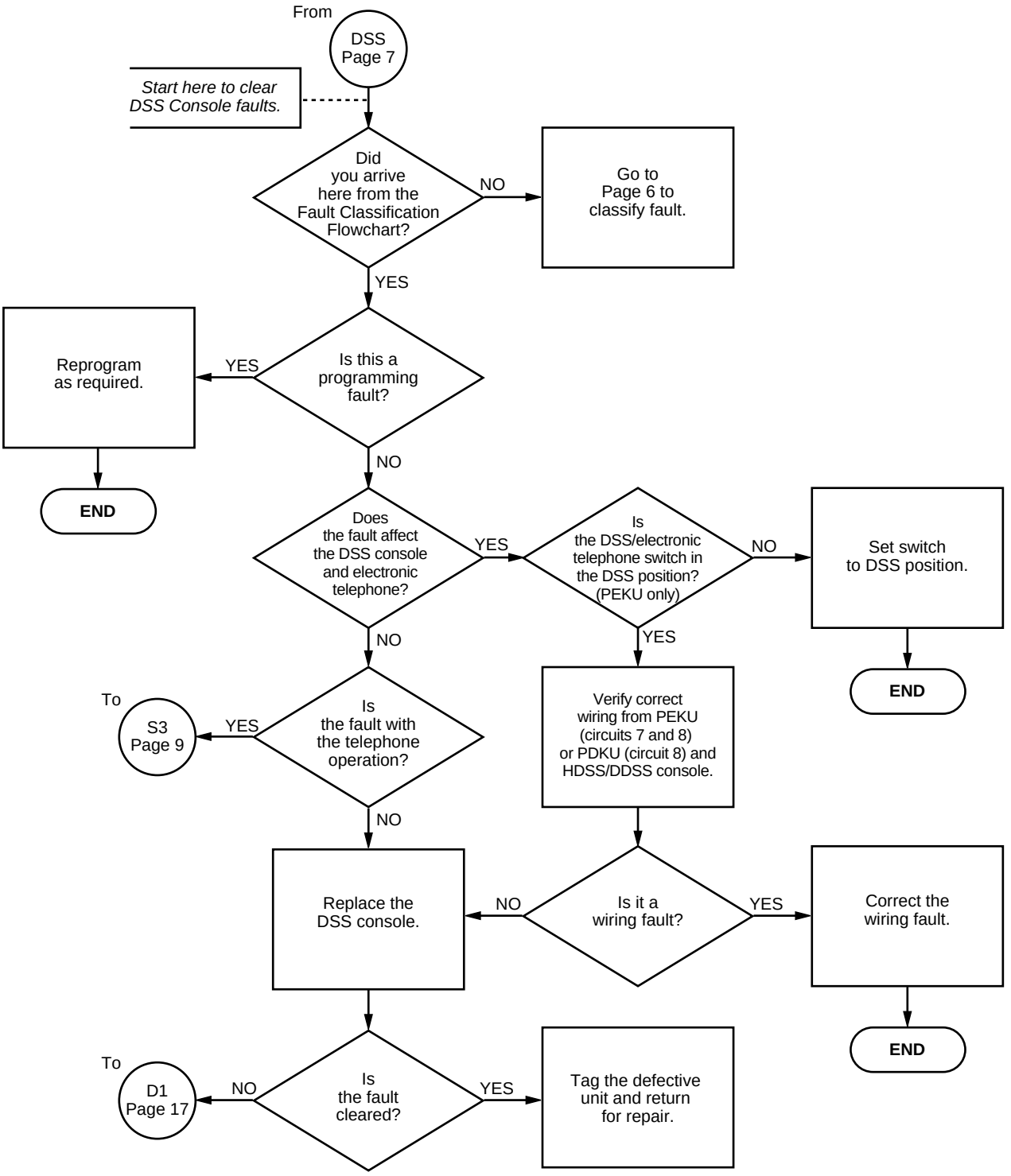

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CHART NO. 7
DSS CONSOLE FAULTS (cont.)

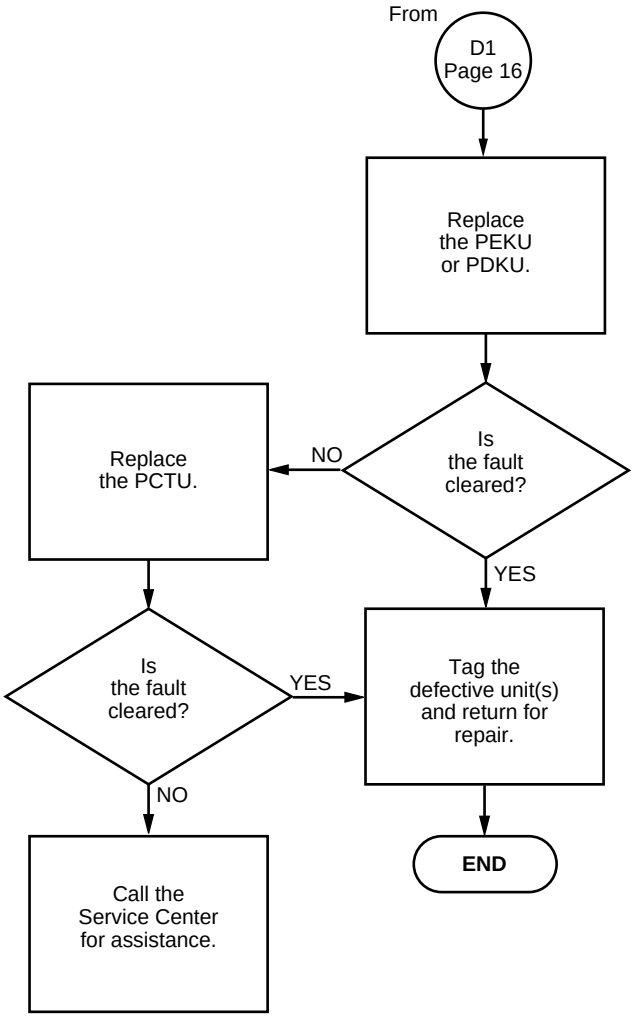

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CHART NO. 8
SPEED DIAL FAULTS

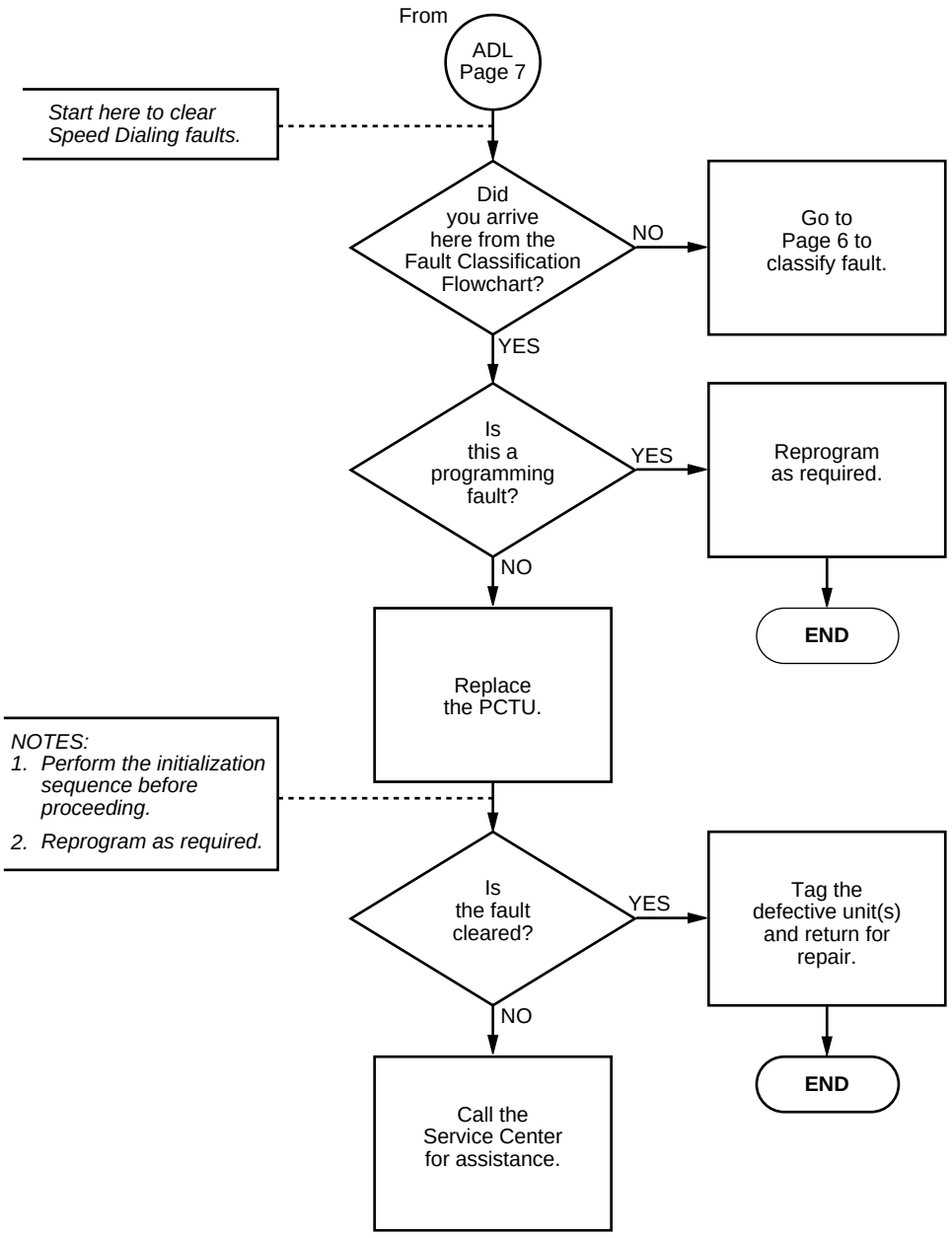

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CHART NO. 9
MOH, BGM, PAGE & RELAY FAULTS

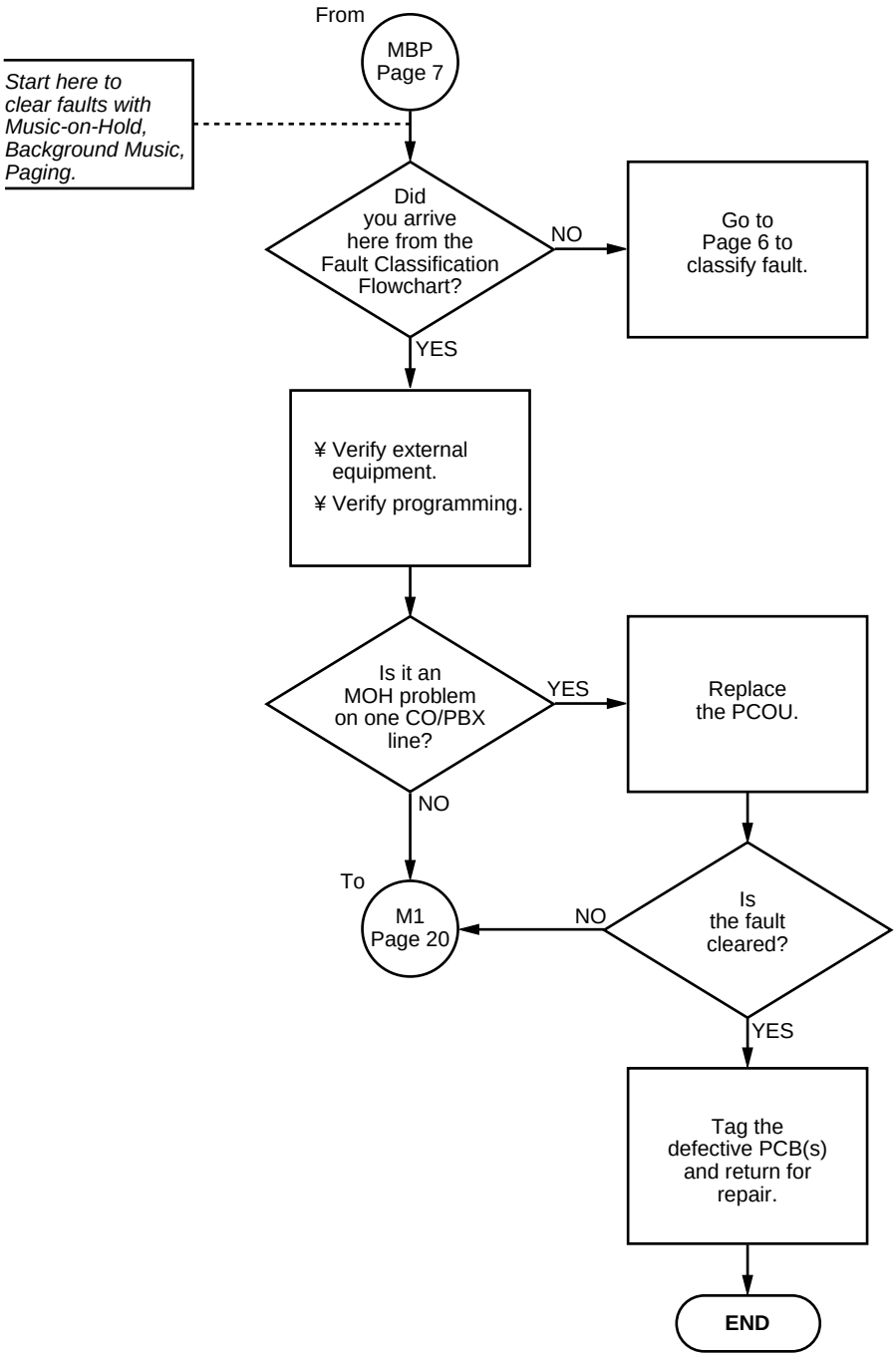

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CHART NO. 9
MOH, BGM, PAGE & RELAY FAULTS (cont.)

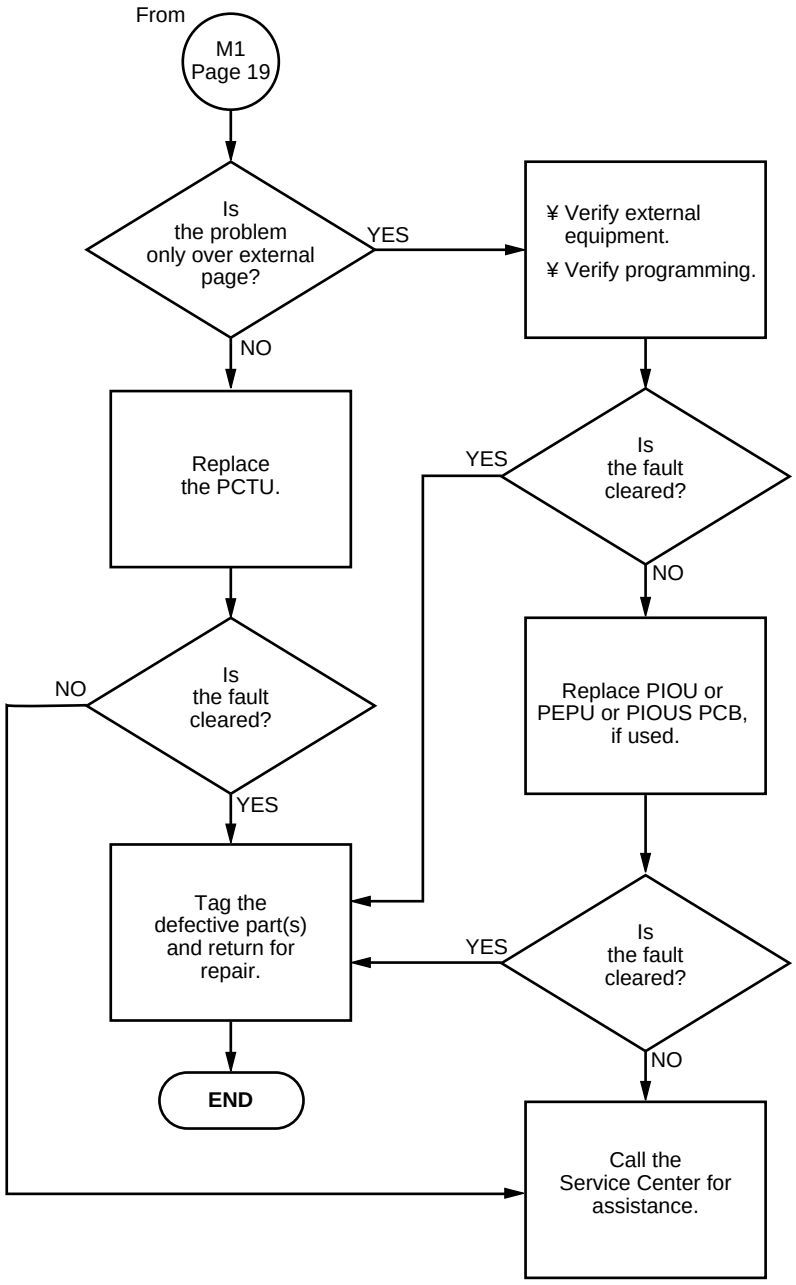

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CHART NO. 10
SMDR FAULTS

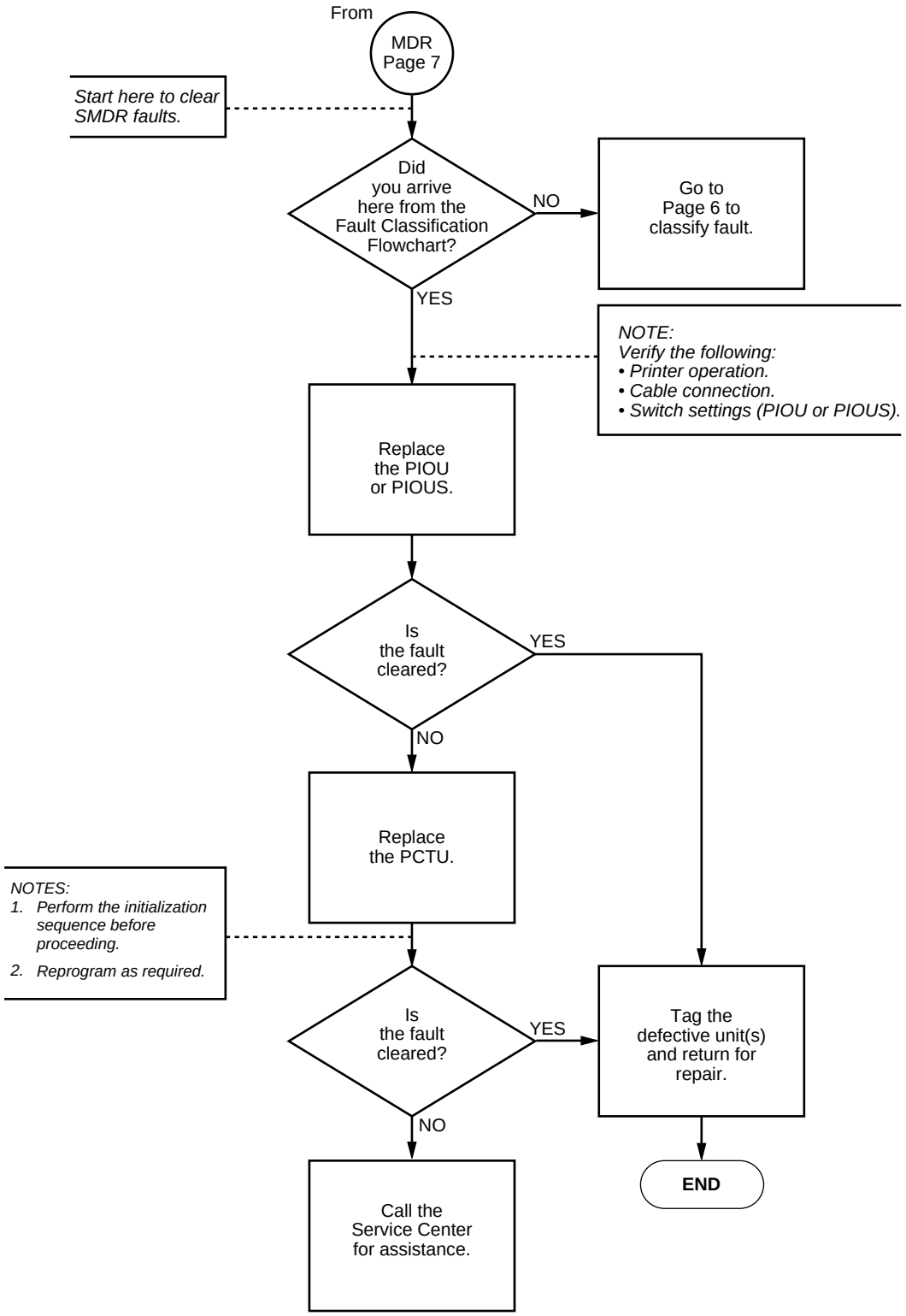
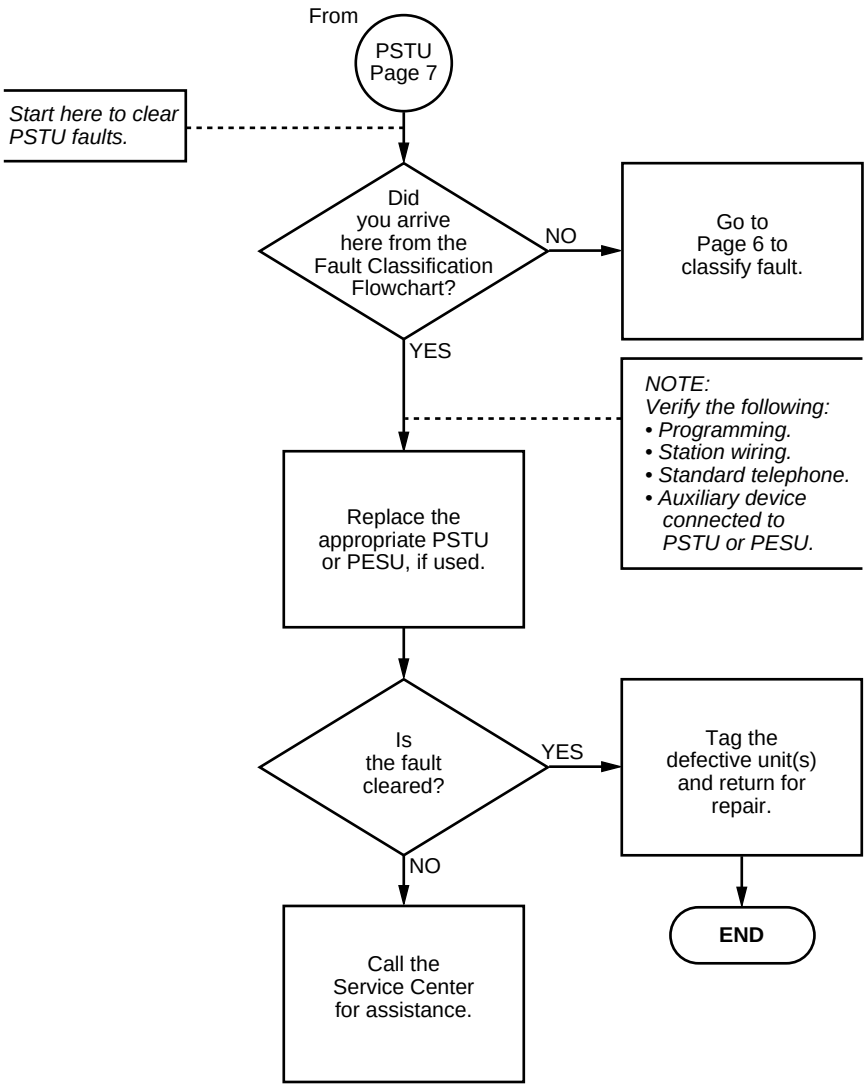


CHART NO. 11
PSTU FAULTS



NOTE:
If "Ring-Trip" is the fault, set the ring generator jumper plug to the "L" (Low) position. The ring generator jumper plug is equipped on the PESU and PTSU2 PCBs.

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CHART NO. 12
DOOR PHONE FAULTS

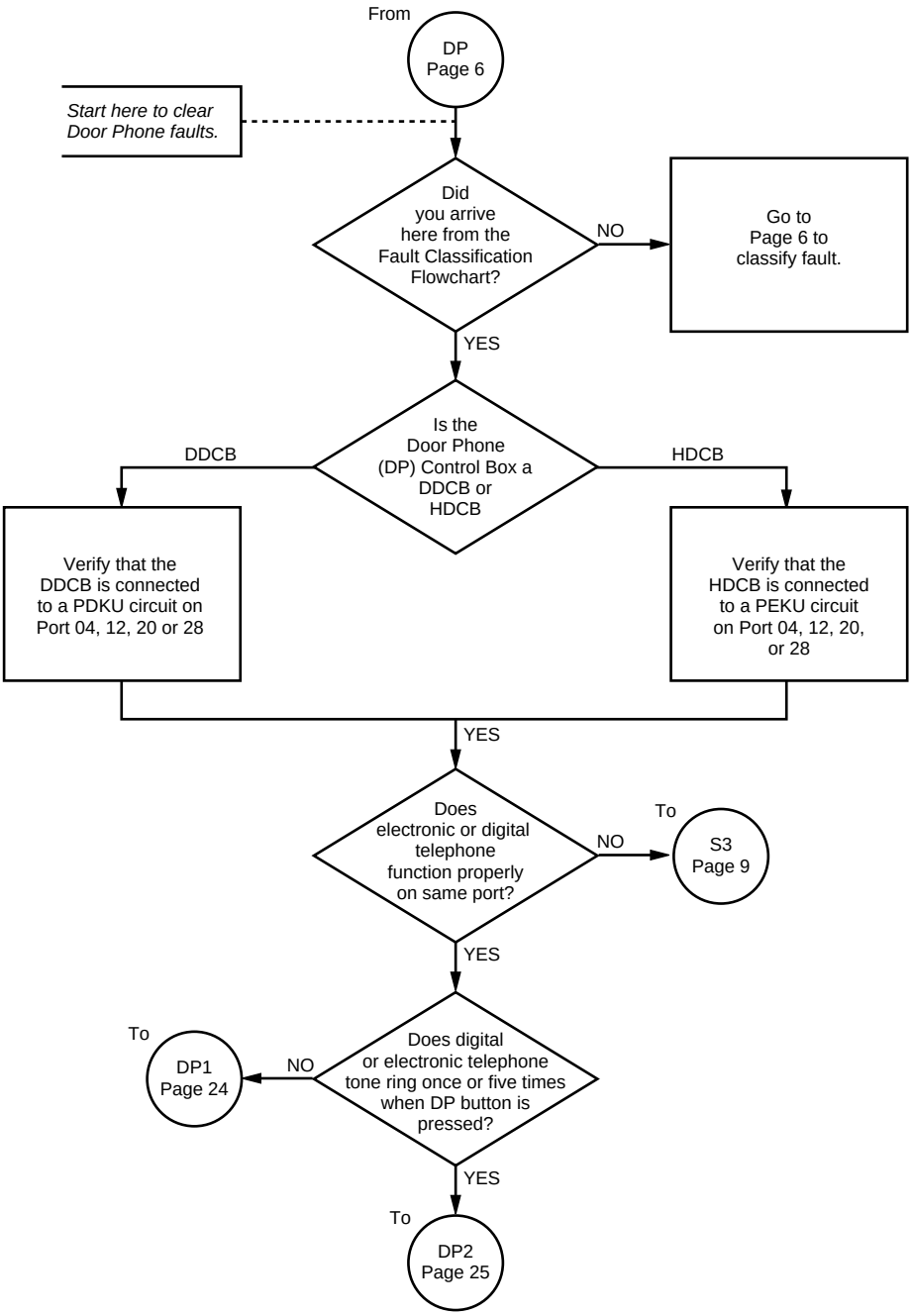


CHART NO. 12
DOOR PHONE FAULTS (cont.)

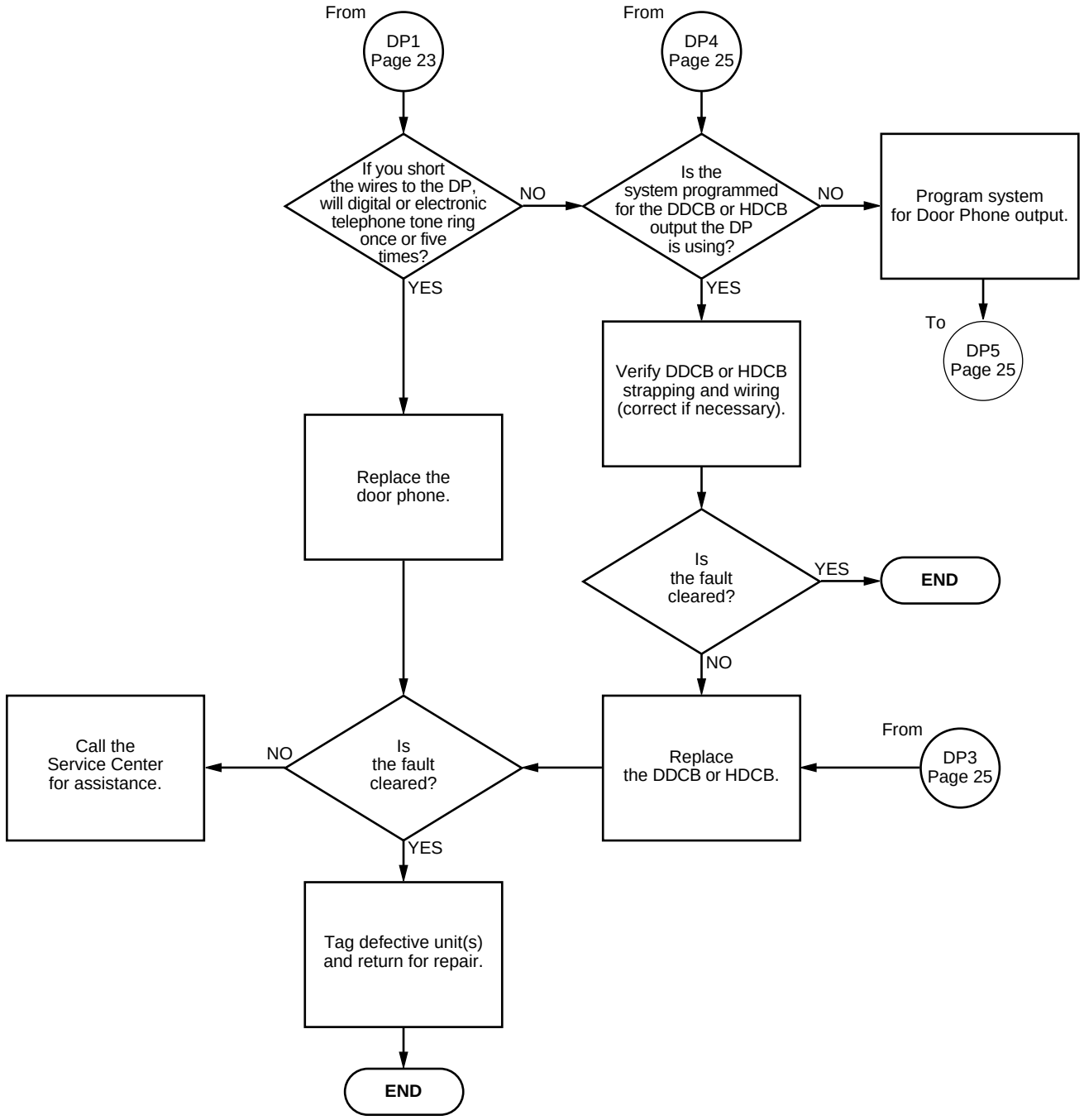


CHART NO. 12
DOOR PHONE FAULTS (cont.)

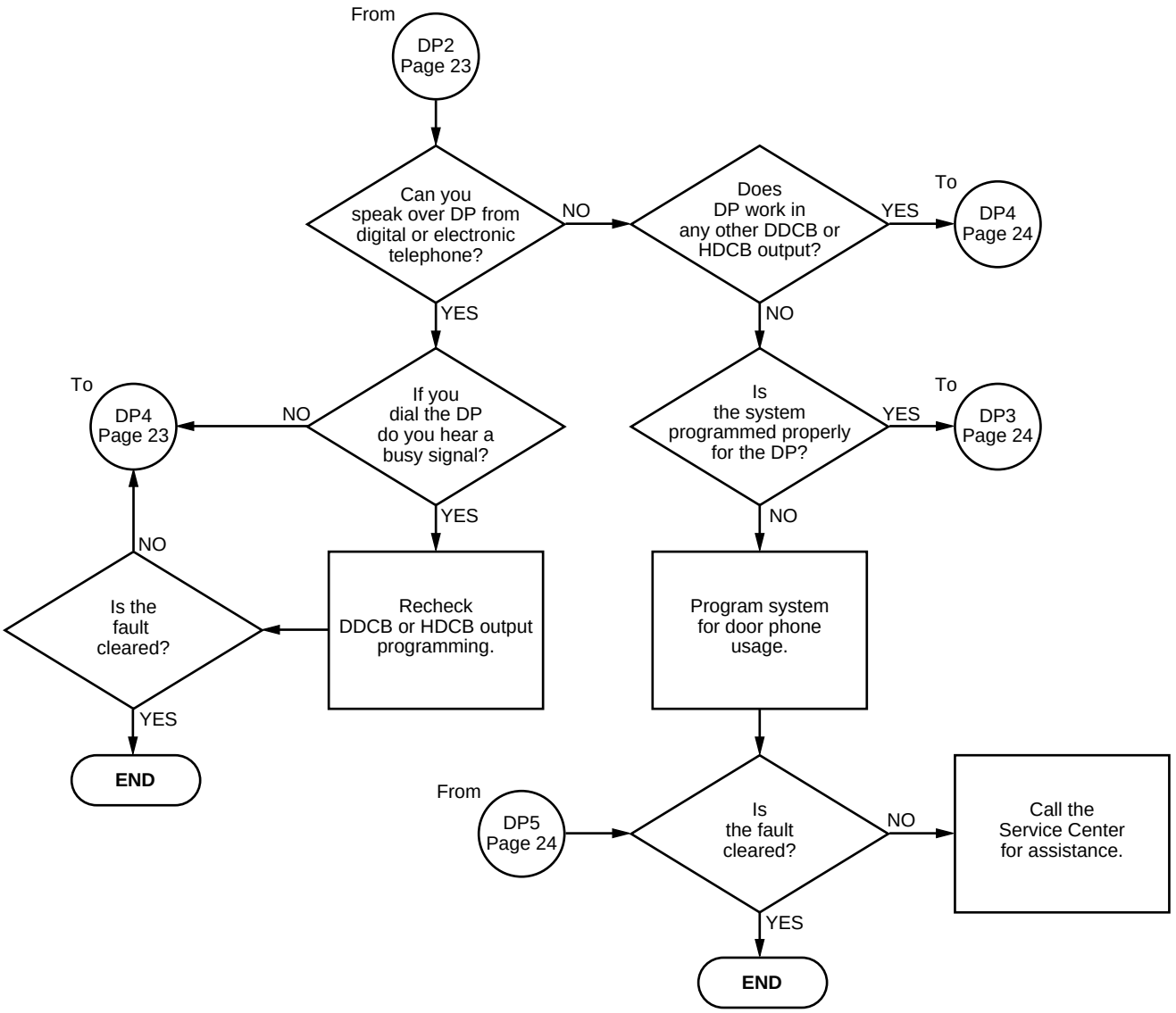


CHART NO. 13
TIE LINE FAULTS

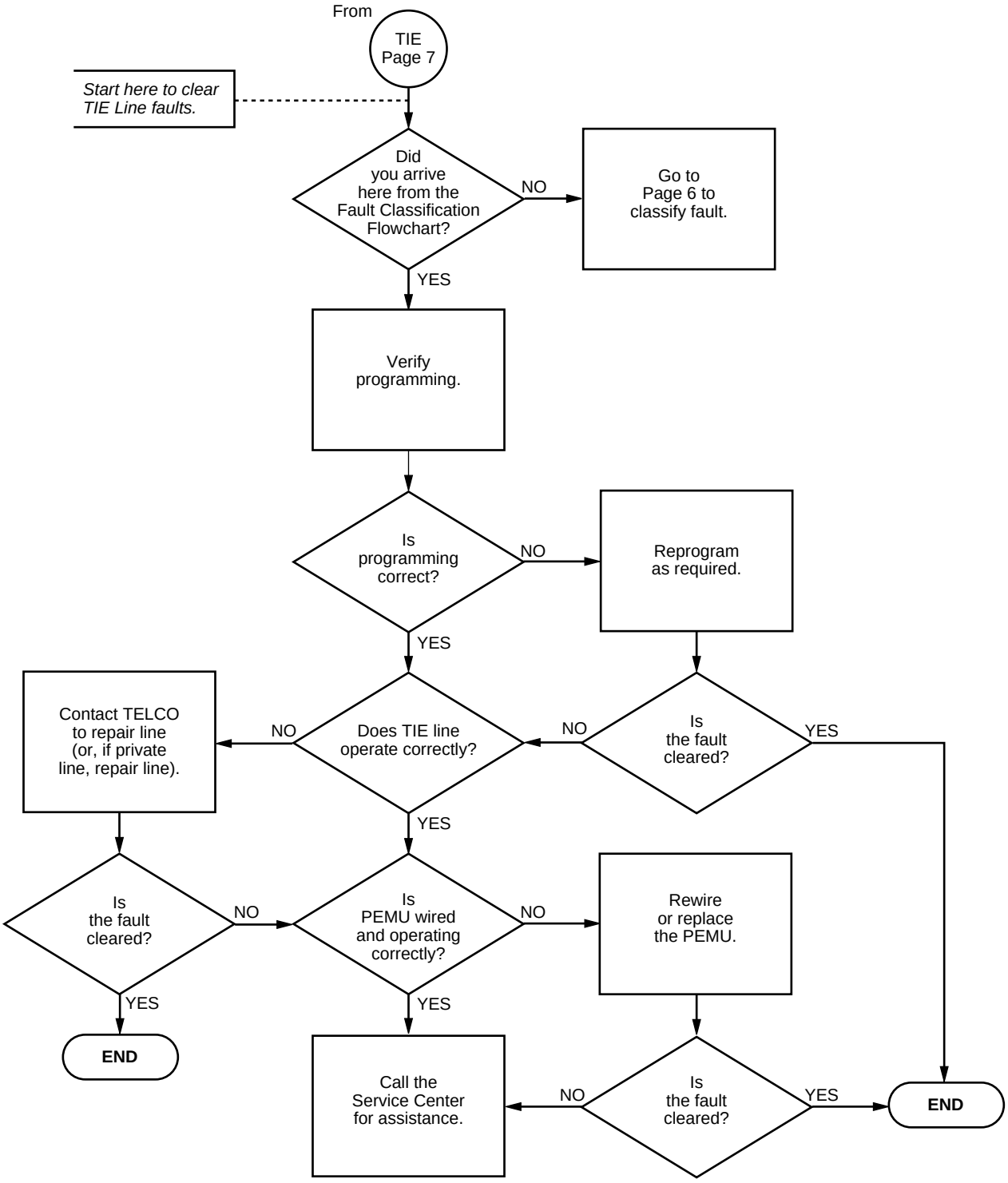
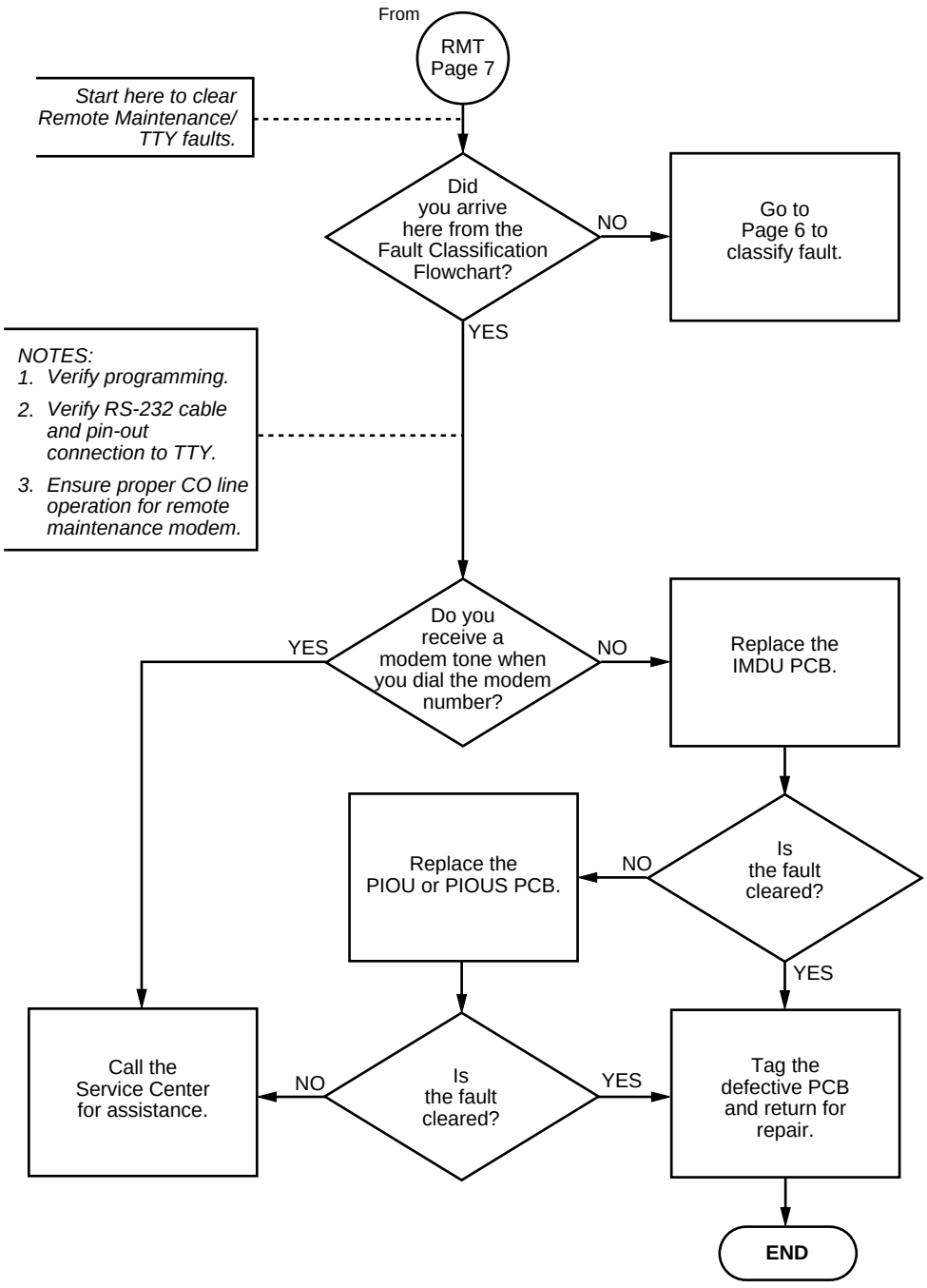


CHART NO. 14
REMOTE MAINTENANCE/TTY FAULTS



Strata® DK24/56/96

RELEASE 1, 2, 3, and 4

REMOTE ADMINISTRATION AND MAINTENANCE PROCEDURES

H

TABLE of CONTENTS

H

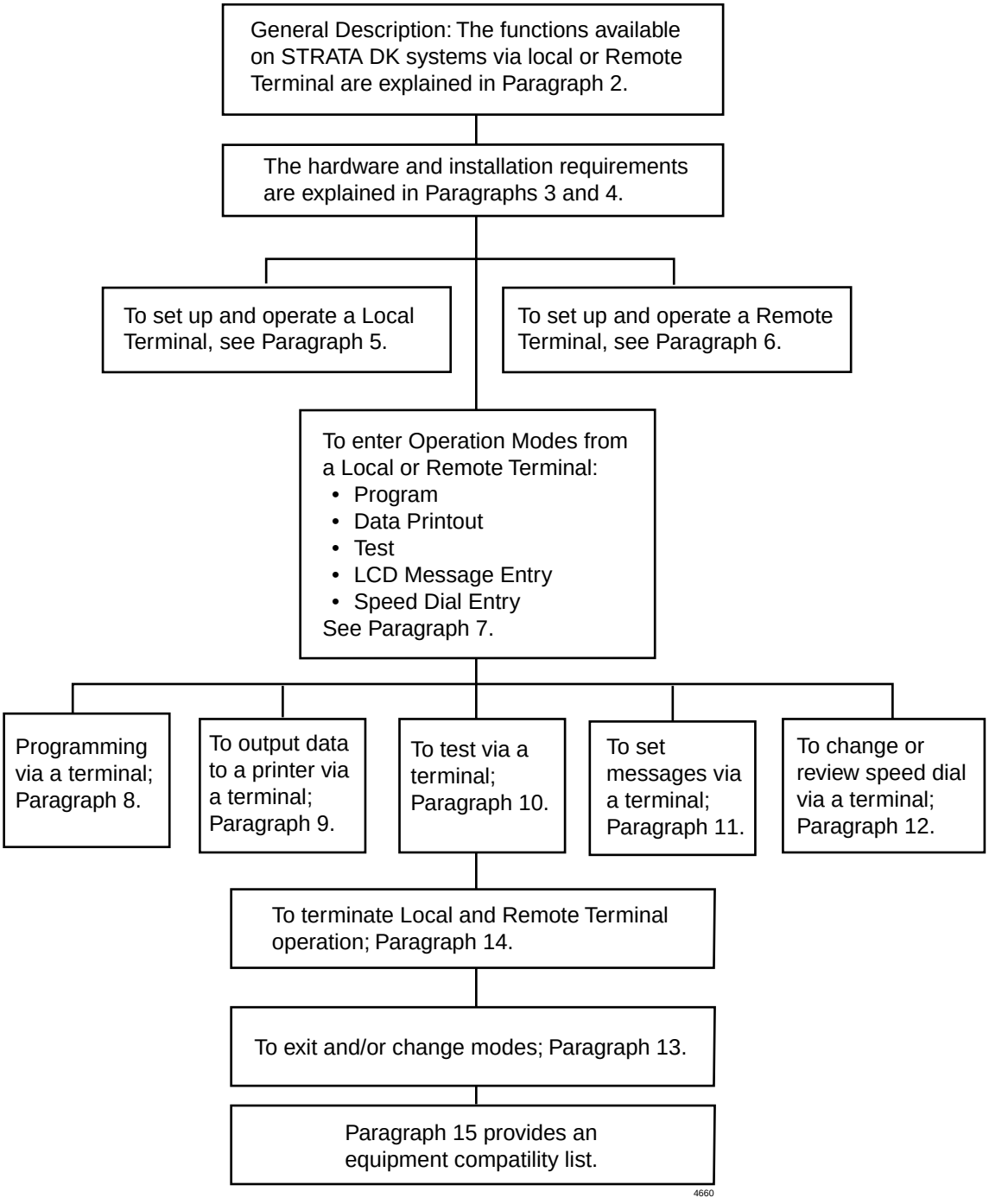
TABLE LIST

FIGURE LIST

H

1 USING REMOTE ADMINISTRATION AND MAINTENANCE

1.01 Table RM-A is provided as a quick reference aid in using this section.



H

2 GENERAL DESCRIPTION

2.01 Remote Administration and Maintenance is accomplished with a remote terminal/modem communicating over the public telephone network via either an external modem (connected to a dedicated CO line or a standard telephone port) or a modem unit (IMDU) installed on a PIOU or PIOUS PCB. See Figure 1.

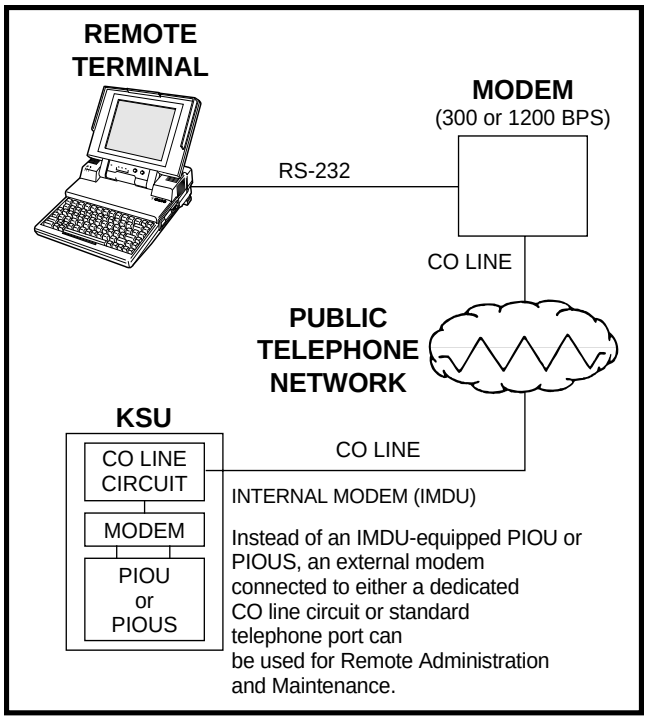


FIGURE 1
PIOUS/IMDU CIRCUIT DIAGRAM

2.02 If using an external modem, the modem may be connected as detailed in the Installation Section, **400-096-208**.

2.03 Remote Administration and Maintenance calls may connect to the IMDU automatically via programmable CO line ringing assignments (**Program 78**), or manually via the standard call transfer feature at intercom number 19. Automatic connection allows remote programming to be accomplished after business hours without on-site assistance via night ringing assignments.

2.04 Remote Administration and Maintenance allows the following functions to be accomplished remotely:

Program Mode: Provides for complete programming of all STRATA DK programs (including speed dial adds/changes).

Test Mode: Provides for testing of STRATA DK stations and CO lines.

Data Dump Mode: Provides a complete printout of all or individual STRATA DK customer data base programs, including speed dial numbers and LCD messages.

Message Mode: Provides for sending, adding, or changing digital and electronic telephone LCD messages.

Speed Dial Mode: Allows station and system speed dial numbers to be programmed remotely.

NOTE:
*All the functions in the preceding paragraphs are also available via a terminal connected directly to the on-site PIOU(S) PCB or a terminal with a modem connected to a PSTU port (Paragraph **5**).*

2.05 There are two levels of Remote Administration and Maintenance.

Level 1: Allows access to all programs.

Level 2: Allows access to **Programs 30 ~ 39** and **77 ~ 89**, which pertain only to individual station options such as button assignments, class of service, etc.

2.06 Each Remote Administration and Maintenance level has a different programmable password for customer data base protection. This allows a customer to make certain station moves, adds, and changes in Level 2; while protecting the critical system assignments in Level 1 (refer to **Program 00**).

3 HARDWARE REQUIREMENTS

3.01 The STRATA DK must be configured with either an IMDU-equipped PIOU or PIOUS or an external modem connected to a dedicated CO line or standard telephone circuit.

H

4 SET-UP

4.00 General

4.01 This section assumes that the system has been properly installed per the appropriate section in this manual.

4.02 The following items must be completed on-site for Remote Administration and Maintenance to be operational.

4.10 Hardware Verification

4.11 Verify the PIOUS or PIOU/IMDU or external modem is installed per instructions in the appropriate installation section of this manual (refer to Sections **400-096-206** and **400-096-208**).

4.20 Programming

4.21 If an IMDU is used, enable the IMDU in **Program77-1** .

4.22 If Remote Administration and Maintenance calls are to connect to the IMDU automatically, assign the designated CO lines to ring the IMDU intercom number (19) in **Program 78** as required (use standard STRATA DK programming procedures).

4.23 Program the security codes for Levels 1 and 2 as in the Programming Procedures, Section **400-096-300**. Reference **Program 00**.

NOTE:
The security codes are initialized as "0000". These codes may also be changed via a local or remote terminal.

4.30 On-site Testing

4.31 From any working station, test the functioning of the IMDU.

1) Press the Intercom (INT) button.
   - Receive intercom dial tone.

2) Dial 1 9.
   - Receive modem tone from the IMDU after a two-second delay.

NOTE:
*If modem tone is not received, check to see that the **SW3** switch on the PIOU/PIOUS is set to "MODEM". See Section **400-096-206**.*

3) Press the Spkr (SPEAKER) button to release.

4) Make an incoming call over each CO line that is programmed to ring the IMDU (station 19).
   - Receive modem tone from the IMDU after a 2-second delay with each call.

NOTE:
This test checks basic programming and IMDU operation, and should be completed before continuing with Remote Administration and Maintenance installation.

5) If a terminal is to be utilized on-site, refer to Paragraph **5**. For off-site programming refer to Paragraph **6**.

5 LOCAL TERMINAL

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5.00 Requirements

5.01 The KSU must have a PIOU(S) PCB installed (refer to Sections **400-096-208** and **400-096-209** for wiring information).

5.02 The local terminal must have an EIA RS-232 interface, communicate in ASCII code (seven bit word length/one stop bit/even parity) at 300 or 1200 bps, have a standard typewriter-type keyboard, and display data via a CRT display or printer. A personal computer capable of emulating the described terminal may also be used (see Figure 2 and Paragraph **15**).

5.03 Operating the terminals, local or remote, is identical. The only difference is the physical connection and the method used to establish initial communications.

5.10 Set-up

5.11 Refer to Figure 2 and verify that the local terminal is connected and set-up as follows:

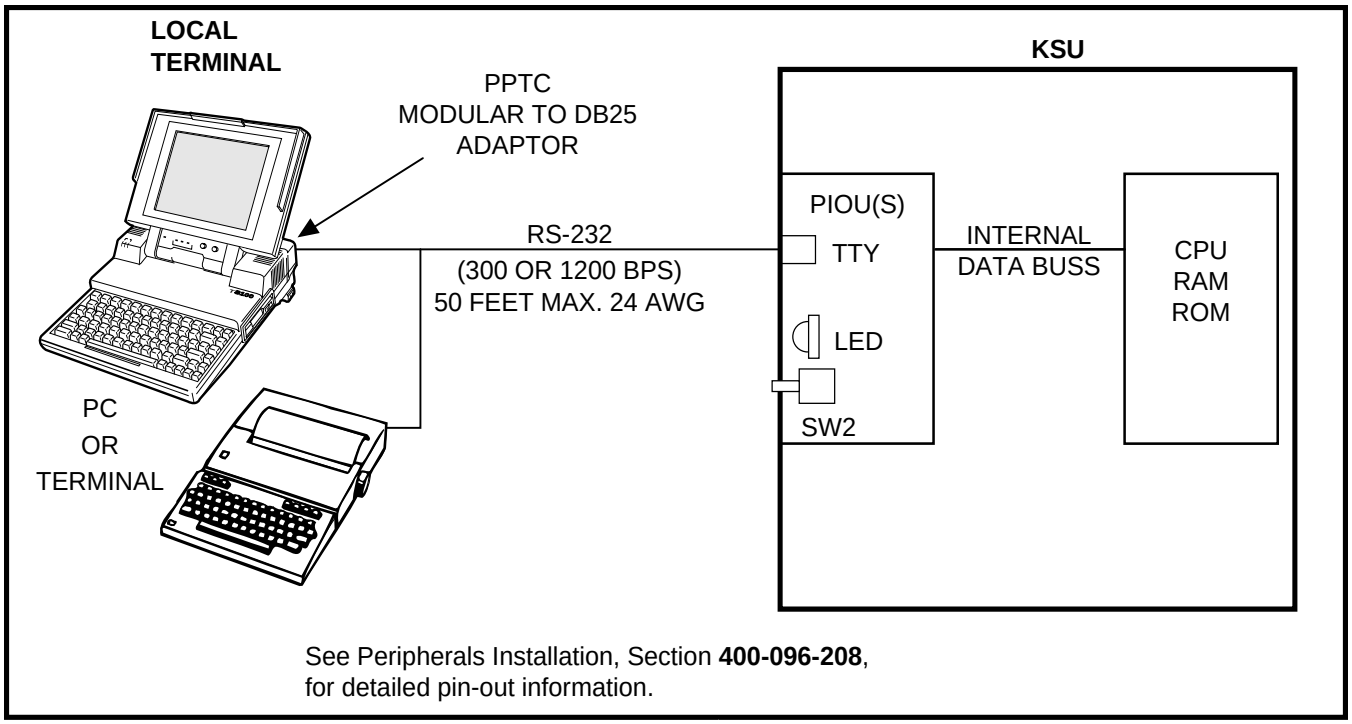

FIGURE 2
LOCAL TERMINAL CONNECTION

1) Connect the RS-232 cable to the terminal connector and the PIOU(S) TTY connector.

NOTE:
If a personal computer is being used, connect the cable to the serial "COM" port.

2) Set the terminal baud rate to match the PIOU(S) setting (PIOU[S], SW2).

3) Set the terminal for "Full Duplex" operation.

4) Set the keyboard for "Caps Lock" on.

5) Set the terminal parameters to:
Word length: 7 bits
Stop bits: 1
Parity: Even

5.20 Local Operation

5.21 Use the procedure below to establish communications between the local terminal and the PIOU(S) so that programming may be accomplished via the terminal.

NOTE:
Hereafter, whenever the term CR *is used, it means the return or enter key, depending on the keyboard being used.* SPACE *means the space bar. An empty square indicates one of several characters will appear in that location (either on the terminal's screen or in a printout).*

1) Set-up the terminal as described in Paragraph **5.10**.

2) Set the terminal to on-line.

3) Set "Caps Lock" on (upper case).

4) Press CR key.
   - The system responds, and the terminal displays:
     DK CONNECT
     > CODE

5) Type the 4-digit security code, and press CR.
   - The system responds, and the terminal displays:
     OK
     MODE

NOTE:
The security code can be entered any time the CODE prom pt appears.

6) To continue, go to Paragraph **7**.

6 REMOTE TERMINAL SITE

6.00 Requirements

6.01 Terminal: The terminal must interface with an asynchronous modem, communicate in ASCII code at 300 or 1200 bps, have a standard typewriter-type keyboard, and display data via a CRT display or printer. A personal computer capable of emulating the described terminal may also be used (see Figure 1 and Paragraph **15**).

6.02 Modem: The modem must be full-duplex asynchronous, operate at 300 or 1200 bps, and have an RS-232 interface to connect with a terminal or PC (as described in Paragraph **5**). It must interface with the public telephone network and be compatible with Bell 103 or 212 modem specifications.

6.10 Set-up

6.11 Refer to Figure 1 and verify that the remote terminal is connected and set-up as follows:

1) Connect the terminal and modem together with the RS-232 cable.

NOTE:
If a personal com puter is being used, connect the cable to the serial "COM" p o r t .

2) Connect the modem line input to a CO/PBX line for access to the public telephone network.

3) Set the terminal and modem baud rate to match the PIOU(S) setting.

4) Set the terminal and modem for "Full Duplex" operation.

5) Set the terminal parameters to:
Word length: 7 bits
Stop bits: 1
Parity: Even

6.20 Remote Operation

6.21 Automatic connection via ringing assignments: To establish communication between the remote terminal and the IMDU, call the number of the system CO line assigned to ring the IMDU via the remote terminal/modem set-up:

1) Observe the following:
   - When the CO line rings-in, it will connect to the IMDU and the IMDU will respond by returning modem tone to the remote modem.
   - The remote modem will return modem tone to the IMDU and communication will be established.
   - When communication is established, the terminal will display: CONNECTED or COMMUNICATIONS (see Note following in **6.22**).

2) To continue, enter the security code per Paragraph **6.30.**

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6.22 Manual connection via call transfer:

1) Using a telephone (at the remote location) that can switch to the terminal/modem, dial the number of a system CO line.

2) When the call is answered, request that it be transferred to station 19 (the IMDU).

3) After the call is transferred and communication is established with the IMDU, switch the call from the telephone to the terminal/modem.

4) Observe the following:
   - When the CO line is transferred, it will connect to the IMDU.
   - The IMDU and the remote modem will respond to each other with modem tone; communication is established.
   - When communication is established, the terminal will display: CONNECTED or COMMUNICATIONS (see Note).

NOTE:
If the connection is not com pleted or com m unication is unsuccessful, the remote term inal displays: ***NO CARRIER.*** *If this is th e c a s e , check that the equipment is installed per Paragraphs* ***5.10, 6.10*** *of this section and try again.*

6.30 Operation

6.31 Once communication is established between the remote terminal and the IMDU, follow these steps to enter the security code and receive the MODE prompt.

NOTE:
H e r e a f t e r , CR *whenever is used, it means the return or enter key, depending on the keyboard being used.* SPACE *means the space bar. An empty square indicates one of several characters will appear in that location (either on the terminal's screen or in a printout).*

1) Set the keyboard for "Caps Lock" on.

2) Press the CR key.
   - The system responds, and the terminal displays:
     DK CONNECT
     >CODE

The software version number is identified in* ***Program 00.*

3) Enter the 4-digit security code and press the CR key.
   - The system responds, and the terminal displays:
     OK
     MODE

7 MODE SELECTION

7.00 Selecting a Mode

7.01 To enter an operating mode, establish communication with the terminal, enter the security code, and press CR to receive the MODE prompt.

NOTE:
Refer to Paragraphs ***5.20*** *or* ***6.20*** *to accom plish the above.*

TABLE RM -B— PROGRAMMING PROMPTS

Mode Function	Mode Name	Prompt Return
Program	PROG	P
Data Dump	DUMP	D
Test	TEST	T
LCD Messages	MESG	(NONE)
Speed Dial No.	REPT	R

1) Set the keyboard for "Caps Lock" on (mode name must be entered in capital letters).

2) At the MODE prompt, enter the desired mode name (Table RM-B).

3) Press the CR key.

4) Verify the correct prompt return (Table RM-B).

8 PROGRAM MODE

8.00 General

8.01 Data governing overall system operation and feature execution for the systems are stored in read-only memory (ROM) and cannot be altered in the field. However, the data controlling operation of the system and station options are stored in random-access memory (RAM) and can easily be changed according to individual installation requirements.

8.02 All options are controlled by selections made in the System Record Sheets. An initialization process is provided for verifying predetermined system assignments. The installer can then proceed with any necessary changes.

8.03 Internal battery power is provided to prevent loss of system data memory in the event of a power failure.

8.10 System Record Sheets

8.11 Before system data can be programmed, the System Record Sheets which contain the customer data base must be available (see Programming, Section **400-096-302**).

8.20 Program Types

8.21 There are three types of programs:

Type 1: All Type 1 programs use the same procedure; however, each button/LED has a different meaning, depending on the program number. The status of these data is reviewed, changed, and stored in system memory using Type 1 program procedures.

Type 2: All Type 2 programs follow the same entry procedure; however, they require port number and button/LED entries. Each button/LED has a different meaning, depending on the program number.

Type 3: In this type program, the information shown in the System Record Sheet indicates the data to be stored in system memory. Each program has a different meaning, and the data is reviewed, changed or stored in memory using an individual procedure for each program.

8.30 Multiple Station (Range) Programming

8.31 Some programs select options for individual stations (where □ □ represents the port number being programmed). To save time, you can program all ports or a range of ports simultaneously.

8.32 Multiple station programming is accomplished by substituting a range of ports (□ □ ***** □ □) for the port number part (□ □) of the program.

Example, all ports: 0 0 * 9 5

8.33 When the multiple station range is entered, the terminal displays existing data as follows:

Y or N: Data is the same for all ports in the dialed group. Y = buttons/LEDs "ON"; N = buttons/LEDs "OFF".

U: Button/LED is "ON" for at least one, but not all ports in that group.

8.40 Programming Procedures

1) Refer to a completed System Record Sheet.

2) Place the terminal into the program mode per Paragraph **7**.

3) Program procedures are categorized and given in the order below. Use these procedures to store System Record Sheet data in working memory.
   a) Initialization procedures:
      These procedures must be completed whenever a system is first installed.
   b) Type 1 programs:
      10-1, 10-2, 10-3, 15, 16, 42-0, 77-1, 77-2.
   c) Type 2 programs:
      Station Class of Service;
      17, 20, 30, 31, 35, 40, 41, 43, 79, 81 ~ 89.
   d) Type 3 programs:
      - Initialization; **90, 92**
      - General; **00, 03, 04, 05, 12, 13, 21, 22, 28, 29, 32, 33, 34, 36, 37, 38, 39, 42-1 ~ 8, 44, 60, 69, 70, 78, 80, 93**.
      - Toll Restriction; **45 ~ 48**.
      - Least Cost Routing; **50 ~ 56**.

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9 DATA DUMP MODE

9.00 General

9.01 This mode allows three types of data to be displayed or output to a printer: STRATA DK Programs (Customer Data Base), Speed Dialing Numbers (Station/System), and LCD Messages (Station/System).

9.02 The three procedures for the Data Dump mode are called: Program Dump, Speed Dialing Dump, and LCD Messages Dump.

9.03 Program Dump: While in the dump mode, enter "PRG" and up to three characters and press CR. The three alphanumeric characters represent a program group or a particular program, i.e., ALL, **03**, **04**, **10**, **39**, etc. For a printout example, see Figure 3.

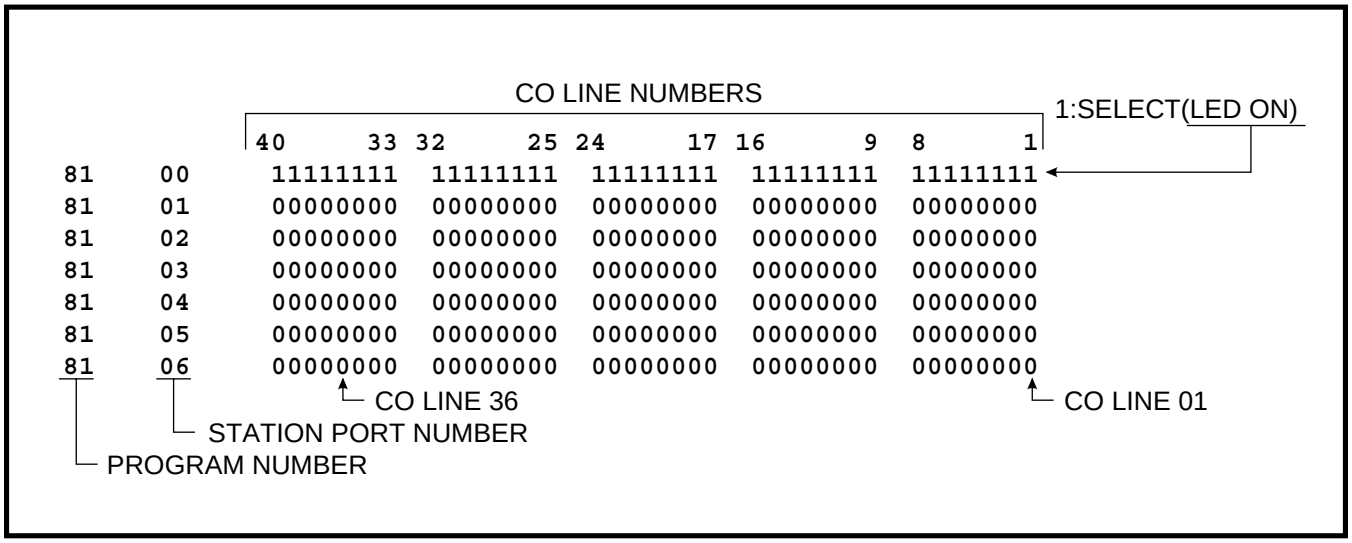

FIGURE 3
DATA DUMP PRINTOUT EXAMPLE

NOTE:
Program s are output only in the groups indicated. To print out or review a program not included above, use Program M ode procedures.

9.04 Speed Dialing Dump: While in the dump mode, enter "REP" and two or three characters and press CR. The characters represent the speed dialing codes for either an individual station, ALL (all stations and system data) SYS (system data only).

9.05 LCD Messages Dump: While in the dump mode, enter "MSG" and two or three characters and press CR. The characters represent stored messages for either an individual station, ALL (all stations and system data) or SYS (system data only). For a printout example, see Figure 4.

9.06 Data dump tables later in this chapter provide a quick reference to the step-by-step procedures to output the appropriate data.

```
>MODE DUMP
D MSG SYS

SYS  M60  OUT TO LUNCH
SYS  M61  IN A MEETING
SYS  M62  CALL
SYS  M63  BACK AT
SYS  M64  RETURN ON
SYS  M65
SYS  M66
SYS  M67
SYS  M68
SYS  M69
D
```

FIGURE 4
SAMPLE PRINTOUT OF SYSTEM MESSAGES

10 TEST MODE

10.00 General

10.01 The remote test mode can be used to test STRATA DK stations and CO line circuits from an off-site location.

10.02 This testing function is accomplished by accessing stations from the remote terminal, and activating various buttons on digital and electronic telephones to make telephone calls, set function buttons, change the system time and date, etc. (see Figure 5).

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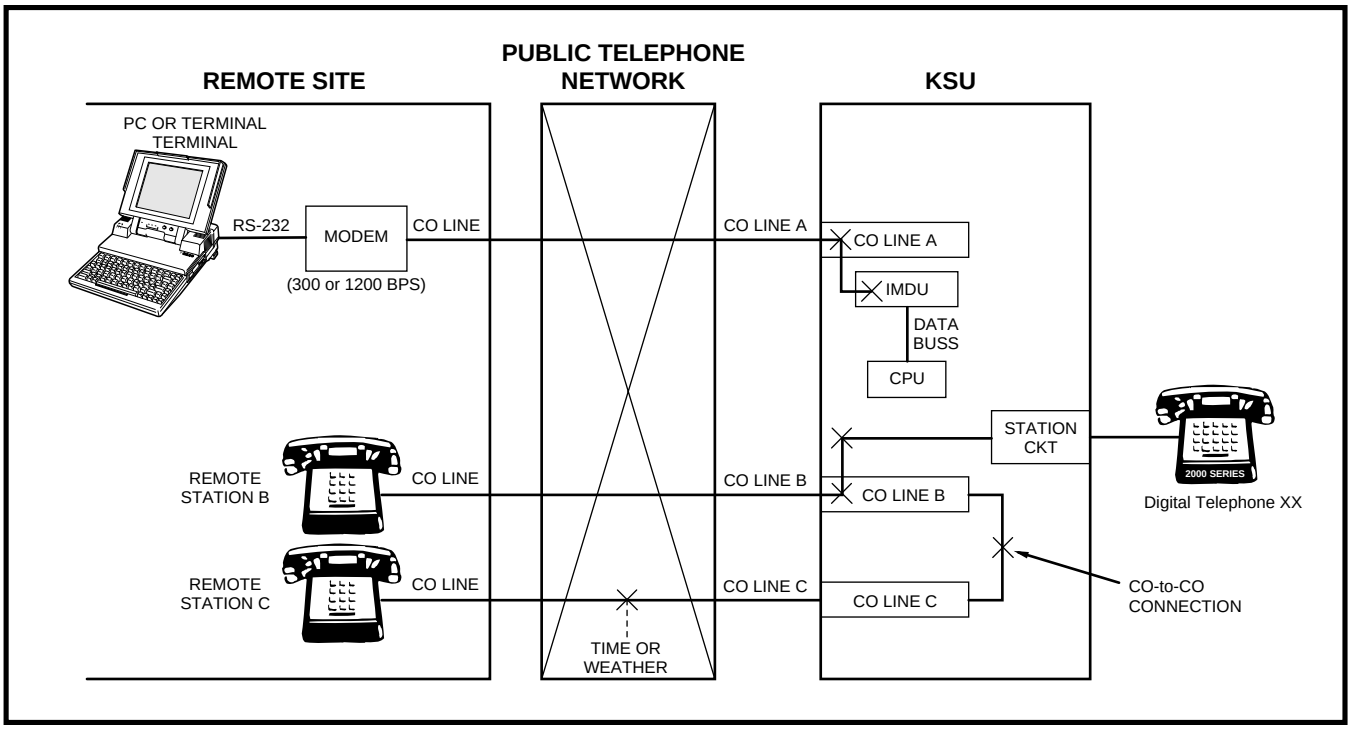

FIGURE 5
TEST MODE FUNCTION DIAGRAM

IMPORTANT!

Any digital or electronic telephone button can be activated from the remote terminal at any time while in the Test Mode (even while the end user is using the telephone). Therefore, caution must be used to prevent service interruption or interference. The Test Mode provides status tests to check whether or not a station or CO line is in use. The status checks should always be made before performing other tests.

10.10 CO Line Testing

10.11 To test CO line transmission, two or three CO lines must be available at the remote site (see Figure 5).

10.12 CO line testing is accomplished by using all of the following three methods:

1) Call station B at the remote site via the STRATA DK system and then place the line on hold (transmission is checked at the remote site via Music-on-Hold).

2) Establish a talk path between the two remote stations (B & C) via a CO-to-CO connection through STRATA DK.

3) Establish a talk path between a remote station and the time or weather service via a CO-to-CO connection through STRATA DK.

10.13 The procedures in the tables provide examples of the types of tests and functions that can be accomplished with the Test Mode. These procedures do not cover all the possible tests that can be performed remotely; however, by using the principles given, other tests are possible.

11 LCD MESSAGE MODE

11.00 General

11.01 This mode allows a local or remote terminal to set Called and Calling Station LCD messages for

station users. The messages may be system or station type and are stored in their respective memory locations when set.

11.10 Remote Called Station Message Mode

11.11 Allows the terminal to set a Called Station Message for an originating station with the destination of the message being a station or group of stations.

11.12 When the message is set, the Msg (Message) LED(s) on the destination station(s) flash.

11.13 When a destination station calls the originating station, the message is displayed on the destination station's LCD.

Mode 94: To edit and/or review a Called Station Message before setting it, use this mode. It will print out the existing message and allow additions to it (such as a time or a date) before it is set. (The message cannot be changed with this mode—just added to.)

Mode 96: To add or change a Called Station Message before setting it, use this mode. It does not display the existing message, but allows a completely new message to be entered before it is set.

11.20 Remote Calling Station Message Mode

11.21 Allows the terminal to set a Calling Station Message for a station. The message will be set on the station's LCD and is automatically displayed on other stations' LCDs whenever they call that station.

Mode 95: To edit and/or review a Calling Station Message before setting it, use this mode. It will display the existing message and allow additions to it (such as a time or a date) before it is set. (The message cannot be changed with this mode—just added to.)

Mode 97: To add or change a Calling Station Message before setting it, use this mode. It does not display the existing message, but allows a completely new message to be entered before it is set.

11.22 Use the procedures in the tables to set messages via Modes 94/96 and 95/97.

12 SPEED DIAL MODE

12.00 General

12.01 The Speed Dial Mode can be used to add or change speed dial numbers to any of the system speed dial memory locations (60 ~ 99) and to any of the station speed dial memory locations (10~49).

12.02 Chain speed dial numbers can also be programmed using the Speed Dial Mode. See the Digital or Electronic Telephone User Guide for more information regarding chain speed dialing operation.

12.03 To program speed dial numbers, enter the REPT mode per Paragraph **7** of this section. Then use the Speed Dial Mode Procedure at the end of this section.

13 MODE EXIT

13.01 Exit the current mode per Paragraph **13.02** and select the desired mode via Paragraph **7**.

TERMINALS	MODEMS	COMPUTERS	SOFTWARE
Texas Instruments	Hayes: Smartmodem 1200	Toshiba: T3100/20, T1100, & T1000	Crosstalk
Silent 700	Universal Data Systems: Model 103J LP		Procomm
Panasonic KXD-4920	U.S. Robotics: Password		PC Plus

13.02 To exit the PROG, DUMP, TEST or SPEED DIAL mode:

- At the P, D, T or R prompt, enter Q U I T CR and observe:

```
>MODE
```

13.03 To exit the MESG mode:

- At anytime while in the message mode, enter: m 0 q and observe:

```
>MODE
```

NOTE:
To exit the Message M ode, the terminal keyboard must be in lower case.

14 DISCONTINUE OPERATION

14.00 Local Terminal

14.01 Exit current operating mode via Paragraph **13** and observe that the MODE prompt is displayed on the terminal.

14.10 Remote Terminal

14.11 Exit current operating mode via Paragraph **13** and observe that the MODE prompt is displayed on the terminal.

14.12 To discontinue remote operation:

1) Take the terminal off-line.

2) Verify that the modem drops the line.

15 EQUIPMENT COMPATIBILITY

15.01 Below is a list of equipment that is known to be compatible with STRATA DK Remote Administration and Maintenance. This list does not show all of the equipment that will work, only the equipment that has been proven compatible in the field or lab.

15.02 As additional equipment is proven compatible, it will be added to an up-dated list.

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TABLE RM-C
PROGRAM 90
INITIALIZING PROGRAMS 00 ~ 97

STEP	ACTION	DISPLAY/PRINTOUT
1	**Enter the Program Mode** At the >MODE prompt enter **P R O G CR**.	`>MODE PROG`
2	**Enter Program Number 90** Press **CR**.	`P 90` `P90`
3	**To Initialize All Programs Enter 0 0 * 9 7** *NOTE: Single programs can be initialized by entering a single program number plus* **#**. *Group numbers are separated by an* *****.	`P90 00-97`
4	Enter button/LED number **0 1**.	`P90 00-97 01 N`
5	Change LED 01 to "ON" by entering **Y**.	`P90 00-97 01 N Y`
6	Press **SPACE**.	`P90 00-97 01 N Y` `02 N`
7	Change LED 02 to "ON" by entering **Y**.	`P90 00-97 01 N Y` `02 N Y`

8	Press **CR**.
	Initialization complete.
	NOTE: If program data is not entered correctly, then **CR** *will not respond. To retry, press* **DELETE CR**.
		`P90 00-97 01 N Y`
		`02 N Y`
		`P90`

9	**Exit Program 90** Press **# # CR**.	`P90 # #` `P`
10	**Enter Program 77** Press **7 7 CR**.	`P77`

11	Press **1 1 4**.
	then: **Y CR**.
		`P77 1 14 N`
		`P77 1 14 N Y`
		`P77`

12	**To Exit this Program:** Press **# # CR**.	

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IMPORTANT NOTE:

If all programs are initialized, the "IMDU enabled" has also been turned off in* Program *77-1, LED 14. If using the IMDU for remote programming, go into* Program 77-1 *and turn Button/LED 14 on as shown in Steps 9, 10, and 11. If this is not completed, remote programming must be reactivated locally from the programmed digital or electronic telephone.

TABLE RM-D
PROGRAM 92
STATION SPEED DIAL, SPEED DIAL MEMO, VM ID CODES INITIALIZATION

STEP	ACTION	DISPLAY/PRINTOUT
1	**Enter Program Mode** At the >MODE prompt, enter **P R O G CR**.	`>MODE PROG`
2	**Enter Program Number 92** Press **CR**.	`P 92` `P92`
3	Enter **1**.	`P92` `P92 1`
4	Enter button/LED number: **0 1**.	`P92` `P92 1 01 N`
5	Change LED 01 to “ON” by entering **Y**.	`P92` `P92 1 01 N Y`

6	Press **SPACE** two times.	`P92`
		`P92 1 01 N Y`
		`02 N`
		`03 N`

7	Change LED 03 to “ON” by entering **Y**.	`P92`
		`P92 1 01 N Y`
		`02 N`
		`03 N Y`

8	Press **CR**.
	Initialization complete.
	NOTE: If program data is not entered correctly, **CR** *will not respond. To retry, press* **DELETE CR**.
		`P92`
		`P92 1 01 N Y`
		`02 N`
		`03 N Y`
		`P92`

9	Clear system speed dial using the procedure on the next page.	

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TABLE RM-E
PROGRAM 92 (continued)
SYSTEM SPEED DIAL, SPEED DIAL MEMO INITIALIZATION

STEP	ACTION	DISPLAY/PRINTOUT
1	**Enter Program Mode** At the >MODE prompt, enter **P R O G CR**.	`>MODE PROG`
2	**Enter Program Number 92** Press **CR**.	`P 92` `P92`
3	Enter **2**.	`P92` `P92 2`
4	Enter button/LED number **0 1**.	`P92` `P92 2 01 N`
5	Change LED 01 to “ON” by entering **Y**.	`P92` `P92 2 01 N Y`

6	Press **SPACE** three times.	`P92`
		`P92 2 01 N Y`
		`02 N`
		`03 N`
		`04 N`

7	Change LED 04 to “ON” by entering **Y**.	`P92`
		`P92 2 01 N Y`
		`02 N`
		`03 N`
		`04 N Y`

8	Press **CR**.
	Initialization complete.
	NOTE: If program data is not entered correctly, **CR** *will not respond. To retry, press* **DELETE CR**.
		`P92`
		`P92 2 01 N Y`
		`02 N`
		`03 N`
		`04 N Y`
		`P92`

9	Clear LCD message memory, using the procedure on the next page.	

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TABLE RM-F
PROGRAM 92 (continued)
LCD CHARACTER MESSAGE MEMORY INITIALIZATION

STEP	ACTION	DISPLAY/PRINTOUT
1	**Enter Program Mode** At the >MODE prompt, enter **P R O G CR**.	`>MODE PROG`
2	**Enter Program Number 92** Press **CR**.	`P 92` `P92`
3	Enter **3**.	`P92` `P92 3`
4	Enter button/LED number **0 2**.	`P92` `P92 3 02 N`
5	Change LED 02 to “ON” by entering **Y**.	`P92` `P92 3 02 N Y`

6	Press **SPACE .**	`P92`
		`P92 3 02 N Y`
		`03 N`

7	Change LED 03 to “ON” by entering **Y**.	`P92`
		`P92 3 02 N Y`
		`03 N Y`

8	Press **CR**.
	Initialization complete.
	NOTE: If program data is not entered correctly, **CR** *will not respond. To retry, press* **DELETE CR**.
		`P92`
		`P92 3 02 N Y`
		`03 N Y`
		`P92`

9	Clear the timed reminders using the procedure on the next page.	

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TABLE RM-G
PROGRAM 92 (continued)
TIMED REMINDERS INITIALIZATION

STEP	ACTION	DISPLAY/PRINTOUT
1	**Enter Program Mode** At the >MODE prompt, enter **P R O G CR**.	`>MODE PROG`
2	**Enter Program Number 92** Press **CR**.	`P 92` `P92`
3	Enter **4**.	`P92` `P92 4`
4	Enter button/LED number **0 2**.	`P92` `P92 4 02 N`
5	Change LED 02 to "ON" by entering **Y**.	`P92` `P92 4 02 N Y`

6	Press **SPACE** two times.	`P92`
		`P92 4 02 N Y`
		`03 N`
		`04 N`

7	Change LED 04 to "ON" by entering **Y**.	`P92`
		`P92 4 02 N Y`
		`03 N`
		`04 N Y`

8	Press **CR**.
	Initialization complete.
	NOTE: If program data is not entered correctly, **CR** *will not respond. To retry, press* **DELETE CR**.
		`P92`
		`P92 4 02 N Y`
		`03 N`
		`04 N Y`
		`P92`

9	To exit this program, press **# # CR**.	

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TABLE RM-H
PROGRAM 92 (continued)
DIGITAL TELEPHONE VOLUME LEVEL INITIALIZATION

STEP	ACTION	DISPLAY/PRINTOUT
1	**Enter Program Mode** At the >MODE prompt, enter **P R O G CR**.	`>MODE PROG` `P`
2	**Enter Program Number 92** Press **CR**.	`P 92` `P92`
3	Enter **5**.	`P92 5`
4	Enter **0 1** ; change button/LED 01 to "ON" by entering **Y**.	`P92 5 01 N Y`

5	Press **SPACE** four times.	`P92 5 01 N Y`
		`02 N`
		`03 N`
		`04 N`
		`05 N`

6	Change LED 05 to “ON” by entering **Y**.
	
	NOTE: If program data is not entered correctly, **CR** *will not respond. To retry, press* **DELETE CR**.
		`P92 5 01 N Y`
		`02 N`
		`03 N`
		`04 N`
		`05 N Y`

7	Press **CR**.
	Initialization complete.
		`P92 5 01 N Y`
		`02 N`
		`03 N`
		`04 N`
		`05 N`
		`P92`

8	To exit this program, press **# # CR**.	

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TABLE RM-I
PROGRAM 92 (continued)
CALL FORWARD BACKUP RAM INITIALIZATION

STEP	ACTION	DISPLAY/PRINTOUT
1	**Enter Program Mode** At the >MODE prompt, enter P R O G CR.	>MODE PROG
2	**Enter Program Number 92** Press **CR**.	P 92 P92
3	Enter **9**.	P92 P92 9
4	Enter button/LED number **0 3**.	P92 P92 9 03 N
5	Change LED 03 to "ON" by entering **Y**.	P92 P92 9 03 N Y
6	Press **SPACE**.	P92 P92 9 03 N Y 04 N
7	Change LED 04 to "ON" by entering **Y**.	P92 P92 9 03 N Y 04 N Y
8	Press **CR**. Initialization complete. *NOTE: If program data is not entered correctly,* **CR** *will not respond. To retry, press* **DELETE CR**.	P92 P92 9 03 N Y 04 N Y P92
9	To exit this program, press # # **CR**.	

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IMPORTANT NOTE:

This program clears call forward memory for all stations, but does not reset the call forward indication on the station (call forward LCD information and/or call forward button/LED). To clear station call forward indications, system power must be turned OFF for five seconds, then ON. Fixed call forward is not cleared by this program.

TABLE RM-J
TYPE 1 PROGRAM PROCEDURE EXAMPLE

(PROGRAMS: 10-1, 10-2, 10-3, 15, 16, 42-0, 77-1, 77-2)

STEP	ACTION	DISPLAY/PRINTOUT
1	**Enter Program Mode** At the >MODE prompt, enter **P R O G CR**.	`>MODE PROG` `P`
2	**Enter Program Number** Refer to the record sheet and enter the desired program number. Example: **Program 10-1**, enter **1 0**, press **CR**.	`P 10` `P10`
3	**Enter Program Code or Digit(s) Per Record Sheet** **1** or other digit required. *NOTE: Most programs do not require a second digit.*	`P10 1`
4	**Enter Button/LED Number** Enter the desired button/LED number. Example: Button/LED 01, enter **0 1**.	`P10 1 01 N` (see Note)
5	**To Change Button/LED Status** Refer to the System Record Sheet and change the button/LED status, if required (Y or N). Example: Enter **Y**.	`P10 1 01 N Y`
6	**To Advance to Next Button/LED** Press **SPACE**. Repeat Step 5 if necessary.	`P10 1 01 Y` `02 N`
7	**To Store Data of Button/LED Status Change** Enter **CR**. Reenter Steps 3 and 4. *NOTE: This step is optional and not required to save data.*	`P10 1 01 Y-` Buttton/LED "ON" Button/LED Number Program Code Program Number

8	**To Exit Program/Store Data**
	A) To exit this program, press **# #**, then press **CR**.
	B) Continue returning to Step 2 until all Type 1 programs are completed.
		`P10`
		`P10 ##`
		`P`

9	**To Exit the Program Mode** Press **# # CR**.	`> MODE`

10	**To Enter Another Mode**
	Press
	D U M P CR (data dump)
	T E S T CR (test)
	M E S G CR (LCD messages)
	R E P T CR (speed dial)
		
		`D`
		`T`
		(no prompt)
		`R`

NOTE:
Y = button/LED "ON", N = button/LED "OFF"

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TABLE RM-K
TYPE 2 PROGRAM PROCEDURE EXAMPLE

(PROGRAMS: 17, 20, 30, 31, 35, 40, 41, 43, 79, 81 ~ 89)

STEP	ACTION	DISPLAY/PRINTOUT
1	**Enter Program Mode** At the >MODE prompt, enter **P R O G CR**.	**>MODE PROG** **P**
2	**Enter Program Number** Refer to the record sheet and enter the desired program number. Example: **Program 30**, enter **3 0**, press **CR**.	**P 30**
3	**Enter Port Number □□ or Port Range □□ * □□** Refer to the System Record Sheet and enter the desired port number(s). Example: **0 4**.	**P30** **P30 04**
4	Press **#** key.	**P30 04#**
5	**Enter the Desired Button/LED Number** Example: Button/LED 01, enter: **0 1**.	**P30 04# 01 N** (Note)
6	**To Change Button/LED Status** Refer to the System Record Sheet and change the Button/LED status, if required (Y or N). Example: Enter **Y**.	**P30 04# 01 N Y**
7	**To Advance to Next Button/LED** Press **SPACE** (repeat step 6 if necessary).	
8	**To Store Data of Button/LED Status Change** Press **CR**. Reenter Steps 3 thru 8 to review or change data.	**P30 04# 01 Y-** LED "ON" Button/LED Number Port Number Program Number
9	**To Exit Program/Store Data** A) To exit this program, press **# #**, then press **CR**. B) Continue returning to Step 2 until all Type 2 programs are completed.	**P10** **P10 ##** **P**
10	**To Exit the Program Mode** Press **# # CR**.	**>MODE**
11	**To Enter Another Mode,** Press **D U M P CR** (data dump) **T E S T CR** (test) **M E S G CR** (LCD messages) **R E P T CR** (speed dial)	 **D** **T** (no prompt) **R**

NOTE:
Y =button/LED(s) "ON", N = button/LED(s) "OFF", U = button/LED(s) "ON" some parts and "OFF" other parts.

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TABLE RM-L
PROGRAM 00
SOFTWARE CHECK/REMOTE MAINTENANCE—SECURITY CODE

STEP	ACTION	DISPLAY/PRINTOUT
1	**Enter Program Mode** At the >MODE prompt, enter **P R O G CR**.	**>MODE PROG** **P**
2	**Enter Program Number 00** Press **CR**.	**P 00** **P00**
3	**To Check Software Version** **Enter Action Code 0**. System will display the system's software version. Press **CR**.	**P00 0 Version = □·□ □·□** **P00** PCTU type Software version
4	**To Change Level 1 Security Code** **Enter Action Code 1**. The system will display the present level 1 (4-digit) code. Refer to the System Record Sheet and change if required. Press **CR**.	**P00 1 0000** **P00**
5	**To Change Level 2 Security Code** **Enter Action Code 2**. The system will display the present level 2 (4-digit) code. Refer to the System Record Sheet and change if required. Press **CR**.	**P00 2 0000** **P00**
6	**To Exit This Program** Press **# # CR**.	**P00 ##** **P**

NOTE: PCTU types –
PCTUS1A, Release 2, DK24 only → **D V**
PCTU1A, Release 1, DK24/56/96 → **D X**
PCTU2A, Release 2, DK24/56/96 → **D X**
PCTU3A, Release 3, DK24/56/96 → **P C M**
PCTU4A, Release 4, DK24/56/96 → **P C P**

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TABLE RM-M
PROGRAM 03
SLOT ASSIGNMENTS

STEP	ACTION	DISPLAY/PRINTOUT
1	**Enter the Program Mode** At the >MODE prompt, enter **P R O G CR**.	**>MODE PROG** **P**
2	**Enter Program Number 03** Press **CR**.	**P 03** **P03**
3	**Enter the Slot Number** Refer to the System Record Sheet and enter the desired slot number. Example: Slot Number 00, enter **0 0**.	**P03** **P03 00 91**
4	**Enter the PCB Code Number** Refer to the System Record Sheet and enter the desired PCB code number. Example: PCB Code 92, enter **9 2**.	**P03** **P03 00 91 92**
5	**To Exit Program/Store Data** A) To store data, press **CR**. B) Continue returning to Step 3 until all **Program 03** data is entered. C) To exit this program, press **# #**, press **CR**.	**P03** **P03 00 91 92** **P03 ##** **P**
6	Turn system power "OFF" for five seconds, then turn power "ON" to store data in working memory (see Notes).	Remote maintenance is disconnected.

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IMPORTANT NOTES!

1. ***This program must be completed with on-site assistance (after installing PCBs) because the system must be powered down momentarily after PCB code entry.***
2. ***Even though PCB codes display as being changed, they are not entered into working memory until the system DC power is cycled OFF and ON.***
3. ***If PCB codes are not entered into working memory by cycling DC power, PCB options will not function.***
4. ***Only* Program 03 *requires the system power to be turned OFF and ON to store data into working memory.***

TABLE RM-N
PROGRAM 04
PORT/STATION NUMBER ASSIGNMENT

STEP	ACTION	DISPLAY/PRINTOUT
1	**Enter the Program Mode** At the >MODE prompt enter **P R O G CR**.	**>MODE PROG** **P**
2	**Enter Program Number 04** Press **CR**.	**P 04** **P04**
3	**Enter the Port Number** Refer to the System Record Sheet and enter the desired port number. Example: Port number 01, enter **0 1**.	**P04** **P04 01**
4	Press # key. System displays present station number. Refer to the System Record Sheet and enter the desired station number. Example: Station number 206, enter **2 0 6**.	**P04** **P04 01# 201 206**
5	**To Exit Program/Store Data** A) To store data; press **CR**. B) Continue returning to Step 3 until all **Program 04** data is entered. C) To exit this program, press **# # CR.**	**P04** **P04 ##** **P**

NOTE:
A blank is displayed by "N".

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TABLE RM-O
PROGRAM 05
FLEXIBLE ACCESS CODE NUMBERING

STEP	ACTION	DISPLAY/PRINTOUT
1	**Enter the Program Mode** At the >MODE prompt, enter **P R O G CR**.	**>MODE PROG**
2	**Enter Program Number 05** Press **CR**.	**P 05** **P05**
3	**Enter Access Code number that you wish to change (0 ~ 9)** Example: 4 (if it was not previously changed, the system will print another 4. If it has been previously changed, the system will print the number to which it was changed).	**P05 4 4**
4	**Change the number if required (one or two digits)** Example: Change to 6, press **CR**.	**P05 4 4 6**
5	Continue returning to Step 3 until all required access codes have been changed.	
6	**To Exit this Program** Press **# # CR**.	**P**

NOTE:
Programs 10-1, 10-2, *and* **10-3***, use Type 1 procedure.*

TABLE RM-P
PROGRAM 12
SYSTEM ASSIGNMENTS – BASIC TIMING

STEP	ACTION	DISPLAY/PRINTOUT
1	**Enter the Program Mode** At the >MODE prompt, enter **P R O G CR**.	**>MODE PROG** **P**
2	**Enter Program Number 12** Press **CR**.	**P 12** **P12**
3	Check the record sheet and enter the program code that is required. As an example, feature 3, enter **3**. The present selection will be displayed.	**P12 3 1**
4	Refer to the record sheet and change if required. As an example, change it to 2. Enter **2**.	**P12 3 1 2**
5	**To Exit Program/Store Data** A) To store data, press **CR**. B) Continue returning to Step 3 until all **Program 12** data is entered. C) To exit this program, press **# # CR**.	**P12** **P12 # #** **P**

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TABLE RM-Q
PROGRAM 13
DEFINING THE MESSAGE CENTER

STEP	ACTION	DISPLAY/PRINTOUT
1	**Enter the Program Mode** At the >MODE prompt, enter **P R O G CR**.	**>MODE PROG** **P**
2	**Enter Program Number 13** Press **CR**.	**P 13** **P13**
3	Enter the number **1**. The present port number will be displayed.	**P13** **P13 1 NN**
4	Refer to the record sheet and enter the required port number. Example: Port 00, enter **0 0 CR**.	**P13 1 NN 00** **P13**
5	**To Exit this Program** Press **# # CR**.	**P13 ##** **P**

NOTES:
1. A blank is displayed by "N".
2. Programs **15** *and* **16**, *use Type 1 procedure, and Program* **17**, *use Type 2 procedure.*

TABLE RM-R
PROGRAM 19
BACKGROUND MUSIC SLOT IDENTIFICATION (RELEASE 3 AND HIGHER)

STEP	ACTION	DISPLAY/PRINTOUT
1	**Enter the Program Mode** At the >MODE prompt, enter **P R O G CR**.	**>MODE PROG** **P**
2	**Enter Program Number 19** Press **CR**.	**P 19** **P19**
3	Enter the number **1**. The present slot number will be displayed.	**P19** **P19 1 NN**
4	Refer to the record sheet and enter the required slot number. Example: Slot 04, enter **0 4 CR**.	**P19 1 NN 04** **P19**
5	**To Exit this Program** Press **# # CR**.	**P1 19 ##** **P**

NOTE:
Program 20 *uses Type 2 procedure.*

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TABLE RM-S
PROGRAM 21
MODEM POOLING (RELEASE 3 AND HIGHER)

STEP	ACTION	DISPLAY/PRINTOUT
1	**Enter Program Mode** At the >MODE prompt, enter **P R O G CR**.	**>MODE PROG** **P**
2	**Enter Program Number 21** Press **CR**.	**P 21** **P21**
3	Refer to the System Record Sheet, and enter the required port number for the PDIU-DS. Example: Port 04; Enter: **0 4**.	**P21 04**
4	Press **#**. The system will display the presently selected standard telephone port number.	**P21 04 # NN**
5	Refer to the System Record Sheet, and enter the required standard telephone port number. Example: port 21; Enter: **2 1**.	**P21 04 # NN 21**
6	**To Exit Program/Store Data** A) To store data, press **CR**. B) Continue returning to Step 3 until all **Program 21** data is entered. C) To exit this program, press **# # CR**.	**P21 04 # NN 21** **P21 # #** **P**

TABLE RM-T
PROGRAM 22
DATA STATION HUNTING (DATA CALL ONLY) (RELEASE 3 AND HIGHER)

STEP	ACTION	DISPLAY/PRINTOUT
1	**Enter the Program Mode** At the >MODE prompt, enter **P R O G CR**.	**>MODE PROG** **P**
2	**Enter Program Number 22** Press **CR**.	**P 22** **P22**
3	Refer to the record sheet and enter the required port number. Example: Port 03, enter **0 3**.	**P22 03**
4	Enter **#**. The present data will be displayed.	**P22 03# NN**
5	Refer to the record sheet and enter the port number that will be the hunt point. Example: Port 00, enter **0 0**.	**P22 03# NN 00**
6	**To Exit Program/Store Data** A) To store data, press **CR**. B) Continue returning to Step 3 until all **Program 22** data is entered. C) To exit this program, press **# # CR**.	**P22 03# NN 00** **P22 ##** **P**

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TABLE RM-U
PROGRAM 28
DSS CONSOLE/ATTENDANT TELEPHONE ASSIGNMENTS

STEP	ACTION	DISPLAY/PRINTOUT
1	**Enter Program Mode** At the >MODE prompt, enter **P R O G CR**.	**>MODE PROG** **P**
2	**Enter Program Number 28** Press **CR**.	**P 28** **P28**
3	Refer to the System Record Sheet and enter the required DSS console number (1 ~ 2). The system will display the telephone to which the DSS console is assigned. Example: DSS console number 1 is assigned to telephone number 1. Refer to the System Record Sheet and change if required. Example: Assign DSS console 1 to digital telephone 2. Enter **2**.	**P28 1 1 2**
4	**To Exit Program/Store Data** A) To store data, press **CR**. B) Continue returning to Step 3 until all data has been entered for this program. C) To exit this program, press **# # CR**.	**P28 1 1 2** **P28 # #** **P**

NOTES:
This program applies to digital and electronic DSS consoles and digital and electronic telephones.

TABLE RM-V
PROGRAM 29
DSS CONSOLE BUTTON ASSIGNMENTS

STEP	ACTION	DISPLAY/PRINTOUT
1	**Enter Program Mode** At the >MODE prompt, enter **P R O G CR**.	**>MODE PROG** **P**
2	**Enter Program Number** Press **2 9 CR**.	**P 29** **P 29**
3	**Enter Console Number and Keystrip Group Number** Press □ □ Key Group Number (1 ~ 3) Console Number (1 ~ 2)	**P29** □ □
4	**Enter the 2-digit Key Number to be Programmed (01 ~ 20):** □□ (current feature code displays □ □ □ after key entry).	**P29** □ □ □ □ □ □ □ Key code
5	**Enter New (2- or 3-digit) Feature Code** Press □ □ or □ □ □ 3-digit code 2-digit code	**P29** □ □ □ □ □ □ □ □ □ Console Key group Key No. Old code New code
6	Press **SPACE** to go to next key. or Press **CR** to store data.	**P29**
7	Continue with Step 3 until all**Program 29** data is entered.	
8	**To Exit this Program** Press **# # CR**.	

NOTE:
Programs 30 *and* **31** *use Type 2 procedure.*

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TABLE RM-W
PROGRAM 32
AUTOMATIC PREFERENCE

STEP	ACTION	DISPLAY/PRINTOUT
1	**Enter the Program Mode** At the >MODE prompt, enter **P R O G CR**.	**>MODE PROG** **P**
2	**Enter the Program Number 32** Press **CR**.	**P 32** **P32**
3	Refer to the record sheet and enter the required port number. Example: Port 01, enter **0 1**.	**P32 01**
4	Enter **#**. The present status for this port will be displayed.	**P32 01# 100**
5	Refer to the record sheet and enter the required ringing code. Example: Code 0, enter **0**.	**P32 01 # 100 0**
6	Refer to the record sheet and enter the required automatic off-hook code. Example: Code 11, enter **1 1**.	**P32 01# 100 011**
7	**To Exit Program/Store Data** A) To store data, press **CR**. B) Continue returning to Step 3 until all **Program 32** data is entered. C) To exit this program, press **# # CR**.	**P32 01# 100 011** **P32 ##** **P**

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TABLE RM-X
PROGRAM 33
STATION HUNTING

STEP	ACTION	DISPLAY/PRINTOUT
1	**Enter the Program Mode** At the >MODE prompt, enter **P R O G CR**.	**>MODE PROG** **P**
2	**Enter Program Number 33** Press **CR**.	**P 33** **P33**
3	Refer to the record sheet and enter the required port number. Example: Port 03, enter **0 3**.	**P33 03**
4	Enter **#**. The present data will be displayed.	**P33 03# NN**
5	Refer to the record sheet and enter the port number that will be the hunt point. Example: Port 00, enter **0 0**.	**P33 03# NN 00**
6	**To Exit Program/Store Data** A) To store data, press **CR**. B) Continue returning to Step 3 until all **Program 33** data is entered. C) To exit this program, press **# # CR**.	**P33 03# NN 00** **P33 ##** **P**

TABLE RM-Y
PROGRAM 34
HOLD RECALL TIMING

STEP	ACTION	DISPLAY/PRINTOUT
1	**Enter the Program Mode** At the >MODE prompt, enter **P R O G CR**.	**>MODE PROG** **P**
2	**Enter Program Number 34** Press **CR**.	**P 34** **P34**
3	Refer to the record sheet and enter the required port number. Example: Port 05, enter **0 5**.	**P34 05**
4	Press **#**. The present data will be displayed.	**P34 05# 032**
5	Refer to the record sheet and enter the required timing. Example: 160 seconds, enter **1 6 0**.	**P34 05# 032 160**
6	**To Exit Program/Store Data** A) To store data, press **CR**. B) Continue returning to Step 3 until all **Program 34** data has been entered. C) To exit this program, press **# # CR**.	**P34 05# 032 160** **P34 ##** **P**

NOTE:
***Program 35**, use Type 2 procedure.*

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TABLE RM-Z
PROGRAM 36
FIXED CALL FORWARD

STEP	ACTION	DISPLAY/PRINTOUT
1	**Enter the Program Mode** At the >MODE prompt, enter **P R O G CR**.	**>MODE PROG** **P**
2	**Enter Program Number 36** Press **CR**.	**P 36** **P36**
3	Refer to the System Record Sheet and enter the port number for the station that will have a Fixed Call Forward button. Example: Port 00, enter **0 0**.	**P36 00**
4	Press **#**. The present data will be displayed.	**P36 00# NN**
5	Refer to the System Record Sheet and enter the port to be forwarded to when the Fixed Call Forward button is pressed. Example: Port 04, enter **0 4**.	**P36 00# NN 04**
6	**To Exit Program/Store Data** A) To store data, press **CR**. B) Continue returning to Step 3 until all **Program 36** data is entered. C) To exit this program, press **# # CR**.	**P36 00# NN 04** **P36 ##** **P**

TABLE RM-AA
PROGRAM 37
RING TRANSFER (CAMP-ON) RECALL TIME

STEP	ACTION	DISPLAY/PRINTOUT
1	**Enter the Program Mode** At the >MODE prompt, enter **P R O G CR**.	**>MODE PROG** **P**
2	**Enter the Program Number 37** Press **CR**.	**P 37** **P37**
3	Refer to the System Record Sheet and enter the required port number. Example: Port 01, enter **0 1**.	**P37 01**
4	Press **#**. System will display the present ring transfer recall time.	**P37 01# 064**
5	Refer to the System Record Sheet and enter the required ring transfer timeout. Example: 70 seconds. Enter **0 7 0**.	**P37 01# 064 070**
6	**To Exit Program/Store Data** A) To store data, press **CR**. B) Continue returning to Step 3 until all **Program 37** data is entered. C) To exit this program, press **# # CR**.	**P37 01# 064 070** **P37 ##** **P**

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TABLE RM-AB
PROGRAM 38
DIGITAL AND ELECTRONIC TELEPHONE BUTTONSTRIP TYPE

STEP	ACTION	DISPLAY/PRINTOUT
1	**Enter the Program Mode** At the >MODE prompt, enter **P R O G CR**.	**>MODE PROG** **P**
2	**Enter the Program Number 38** Press **CR**.	**P 38** **P38**
3	Refer to the System Record Sheet and enter the required port number. Example: Port 00, enter **0 0**.	**P38 00**
4	Press **#**. The system will display the present telephone code.	**P38 00# 31**
5	Refer to the System Record Sheet and enter the required telephone code number. Example: Code 21, enter **2 1**.	**P38 00# 31 21**
6	**To Exit Program/Store Data** A) To store data, press **CR**. B) Continue returning to Step 3 until all **Program 38** data is entered. C) To exit this program, press **# # CR**.	**P38 00# 31 21** **P38 ##** **P**

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TABLE RM-AC
PROGRAM 39
FLEXIBLE BUTTON ASSIGNMENT

STEP	ACTION	DISPLAY/PRINTOUT
1	**Enter the Program Mode** At the >MODE prompt, enter **PROGCR** .	**>MODE PROG** **P**
2	**Enter the Program Number 39** Press **CR** .	**P 39** **P39**
3	Refer to the System Record Sheet and enter the required port number. Example: Port 00, enter **00** .	**P39 00**
4	Press **#** .	**P39 00 #**
5	Refer to the System Record Sheet and enter the key number. Example: Key 01, enter **01** . The system will display the feature code presently assigned to this key.	**P39 00# 01 00**
6	Refer to the System Record Sheet and enter the required feature code (2 or 3 digits). Example: Code 01, enter **01** .	**P39 00# 01 00 01**
7	To select next key number, press **SPACE**. Continue returning to step 6 until all port 00 features are programmed.	**P39 00# 01 00 01** **02 02**
8	Press **CR** to store data.	**P39**
9	A) Continue returning to step 3 until all **Program 39** data has been entered. B) To exit this program and store data, press **##CR** .	**P39 00# 01 00 01** **02 02** **P39 # #** **P**

NOTES:
1. ***Programs 40, 41**; use Type 2 procedure.*
2. ***Program 42-0**; use Type 1 procedure.*

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TABLE RM-AD
PROGRAM 42-1 ~ 8
PBX ACCESS CODE

STEP	ACTION	DISPLAY/PRINTOUT
1	**Enter Program Mode** At the >MODE prompt, enter **P R O G CR**.	**>MODE PROG** **P**
2	**Enter Program Number 42** Press **CR**.	**P 42** **P42**
3	Refer to the System Record Sheet and enter the required PBX group number (1 ~ 8). System will display present PBX access code.	**P42 1 NN**
4	Refer to the System Record Sheet and enter the required access code. N = Space # = Don't care Example: 9, enter **9 N**.	**P42 1 NN 9N**
5	**To Exit Program/Store Data** A) To store data press **CR**. B) Return to Step 3 to continue in this program. C) To exit this program, press **# # CR**.	**P42 1 NN 9N** **P42 ##** **P**

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TABLE RM-AE
PROGRAM 60
SMDR OUTPUT/ACCOUNT CODE DIGIT LENGTH

STEP	ACTION	DISPLAY/PRINTOUT
1	**Enter Program Mode** At the >MODE prompt, enter **PROGCR** .	**>MODE PROG** **P**
2	**Enter Program Number 60** Press **CR**.	**P 60** **P60**
3A **(R4)**	**SMDR Threshold Time** **Enter: Item code 2.** The system displays either "0" or "1". "0" indicates the threshold time is set at 1.0 second. "1" indicates 10 seconds. The default is "1". Refer to the System Record Sheet, enter the correct digit—if it is not already being displayed—then **CR**. To change another parameter in this program,	**P60 21**
3B	**Allow SMDR printout.** **Enter: Item code 3.** System prints out "1" if incoming and outgoing calls will be printed on SMDR. A "0" prints out if only outgoing calls will be printed. Refer to the System Record Sheet and change (to 1 or 0), if required, and press **CR**. If you wish to change another parameter within this program, enter its associated item code. To exit this program, go to Step 4.	**P60 3 1** **P60**
3C	**Set Account Code Digit Length** **Enter: Item code 4.** The system displays the number of digits allowed in the account code. Default is 06. Refer to the System Record Sheet and enter the required number of digits (04 ~ 15), then press **CR**. To change another parameter in this program, enter its item code. To exit this program, go to Step 4.	**P60 4 06**
3D	**SMDR Toll Calls Only** **Enter: Item code 5.** The system displays the presently selected feature (0~5).The default is 0. Refer to the System Record Sheet, enter the feature code, press **CR**. To change another parameter, enter its item code. To exit this program, go to Step 4.	**P60 5 0**
3E	**Enter DISA ID Code** **Enter: Item code 6.** The system displays last entered ID code number. Default = Blank. Refer to the System Record Sheets, enter a new code if desired, then press **CR**. To change another parameter in this program, enter its associated item code. To exit this program, go to Step 4.	**P60 6 NNNN**
3F	**Credit Card Call Digit Length** **Enter: Item code 7.** The system displays the current digit length. Refer to the System Record Sheet, enter the desired length, 01~30 digits, then **CR**. To change another parameter in this program, enter its item code. To exit this program, go to Step 4.	**P60 7 13**
4	**To Exit Program/Store Data** Press **# # CR**.	**P60 6 NNNN** **P60 ##** **P**

TABLE RM-AF
PROGRAM 69
VERIFIABLE ACCOUNT CODE ENTRY (RELEASE 3 AND HIGHER)

STEP	ACTION	DISPLAY/PRINTOUT
1	**Enter Program Mode** At the >MODE prompt, enter **P R O G CR**.	**>MODE PROG** **P**
2	**Enter Program Number 69** Press **CR**.	**P 69** **P69**
3	Refer to the System Record Sheet, and enter the required code number (000 ~ 299). Example: code number 001; Enter: **0 0 1**. The system will display the present account code number assigned to 001. *Note:* *The number of digits verified is defined in* **Program 60-4**.	**P69 001 NNNNNNNNNNNNNNN** **15 DIGITS**
4	A) Refer to the System Record Sheets, and enter the required Account Code number Example: Number 987654; enter **9 8 7 6 5 4**. B) To clear and erase all data, enter (all caps) **N N N N N N N N N N N N N N N**.	**P69 001 NNNNNN 987654**
5	**To Exit Program/Store Data** A) To store data, press **CR**. B) Continue returning to Step 3 until all **Program 69** data is entered. C) To exit this program, press **# # CR**.	**P69 001 NNNNNN 987654** **P69 ##** **P**

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TABLE RM-AG
PROGRAM 70
VERIFY ACCOUNT CODE/TOLL RESTRICTION ASSIGNMENT (RELEASE 3 AND HIGHER)

STEP	ACTION	DISPLAY/PRINTOUT
1	**Enter Program Mode** At the >MODE prompt, enter **P R O G CR**.	**>MODE PROG** **P**
2	**Enter Program Number 70** Press **CR**.	**P 70** **P70**
3	Refer to the System Record Sheet, and enter the required code number (000 ~ 299). Example: code number 002; Enter: **0 0 2**. The system will display the present digit Restrict (Y) and Toll Restriction Class/Status (Z) for entered code number.	**P70 002 ZY** **1** **ZY**
4	Refer to the System Record Sheet, and enter the required digit Restrict and Toll Restriction data. Example: digit Restrict (1) and Toll Restriction (3); Enter: **1 3**.	**P70 002 00 13**
5	**To Exit Program/Store Data** A) To store data, press **CR**. B) Continue returning to Step 3 until all **Program 70** data is entered. C) To exit this program, press **# # CR**.	**P70 002 00 13** **P70 ##** **P**

NOTE:
Programs 77-1 *and* **77-2**, *use Type 1 procedure.*

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TABLE RM-AH
PROGRAM 78
CO LINE SPECIAL RINGING ASSIGNMENTS-DISA/IMDU/ NIGHT RINGING OVER EXTERNAL PAGE

STEP	ACTION	DISPLAY/PRINTOUT
1	**Enter Program Mode** At the >MODE prompt, enter **P R O G CR**.	**>MODE PROG** **P**
2	**Enter Program Number 78** Press **CR**.	**P 78** **P78**
3	Refer to the System Record Sheet and enter the feature number for the feature to be programmed. Example: Feature number 1, enter **1**.	**P78 1**
4	Refer to the System Record Sheet and enter the code number for the area of the feature being programmed. Example: Code 3, enter **3**.	**P78 13**
5	Refer to the System Record Sheet and enter the CO line buttons that will be associated with this feature. Example: CO Button 01, enter **0 1**. The system will designate whether the CO button/LED is on/off. Refer to the System Record Sheet and change if required. Press **SPACE** to display next CO button/LED.	**P78 13 01 N** **02 N Y**
6	**To Exit Program/Store Data** A) To store data, press **CR**. B) Continue returning to Step 3 until all data has been entered for this program. C) To exit this program, press **# # CR**.	**P78 13 01 N** **02 N Y** **P78 ##** **P**

NOTE:
***Program 79**, uses Type 2 procedure.*

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TABLE RM-AI
PROGRAM 80
DIGITAL AND ELECTRONIC TELEPHONE RINGING TONES

STEP	ACTION	DISPLAY/PRINTOUT
1	**Enter Program Mode.** At the >MODE prompt, enter **P R O G CR**.	**>MODE PROG** **P**
2	**Enter Program Number 80** Press **CR**.	**P 80** **P80**
3	Refer to the System Record Sheet and enter the required port number. Example: Port 01, enter **0 1**.	**P80 01**
4	Press **#** key. The system will display 1 or 2 corresponding to tone 1 or tone 2.	**P80 01# 1**
5	Refer to the System Record Sheet and change if required. Example: Tone 2, enter **2**.	**P80 01# 1 2**
6	**To Exit Program/Store Data** A) To store data, press **CR**. B) Continue returning to Step 3 until all data has been entered for this program. C) To exit this program, press **# # CR**.	**P80 01# 1 2** **P80 ##** **P**

NOTE:
***Programs 81 ~ 89**, use Type 2 procedure.*

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TABLE RM-AJ
PROGRAM 93
CO LINE IDENTIFICATION

STEP	ACTION	DISPLAY/PRINTOUT
1	**Enter Program Mode** At the >MODE prompt, enter **P R O G CR**.	**>MODE PROG** **P**
2	**Enter Program Number 93** Press **CR**.	**P 93** **P93**
3	**Enter Action Code 1** Refer to the System Record Sheet and enter the appropriate CO line number. Example: CO line 2, enter **0 2**. The system will display previously entered identification characters (up to 16 characters).	**P93 1 02** □□□ *(up to 16)* └ Current I.D.
4	Refer to the System Record Sheet and change identification if required: □□ . . . . . □□ (16 characters maximum). Example: OVERSEAS.	**P93 1 02** □□□ *(up to 16)* **OVERSEAS**
5	**To Exit Program/Store Data** A) To store data, press **CR**. B) Continue returning to Step 3 until all data has been entered for this program. C) To exit this program, press **# # CR**.	**P93 1 02** □□□ *(up to 16)* **OVERSEAS** **P93 ##** **P**

NOTE:
Use **SPACE** *to clear characters.*

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TABLE RM-AK
PROGRAM 44 (A OR B)
TOLL RESTRICTION TRAVELING CLASS OVERRIDE CODE ENTRY

STEP	ACTION	DISPLAY/PRINTOUT
1	**Enter Program Mode** At the >MODE prompt, enter **P R O G CR**.	**>MODE PROG** **P**
2	**Enter Program Number 44** (Do not enter A or B) Press **CR**.	**P 44** **P44**
3	Refer to the System Record Sheet and enter the required Toll Restriction Class number (1 ~ 4). Example: Class 1; Enter: **1**. The system will display the present override code assigned to that class number.	**P44 1 NNNN**
4	Refer to the System Record Sheet and enter the required override code number. Example: 3456; Enter **3 4 5 6**.	**P44 1 NNNN 3456**
5	**To Exit Program/Store Data** A) To store data, press **CR**. B) Continue returning to Step 3 until all **Program 44** data is entered. C) To exit this program, press **# # CR**.	**P44 1 NNNN 3456** **P44 ##** **P**

TABLE RM-AL
PROGRAM 45-1
TOLL RESTRICTION DIAL PLAN

STEP	ACTION	DISPLAY/PRINTOUT
1	**Enter the Program Mode** At the >MODE prompt, enter **P R O G CR**.	**>MODE PROG** **P**
2	**Enter Program Number 45** Press **CR**.	**P 45** **P45**
3	**Enter the number 1.** The system will display the present dial plan code number (1 ~ 5).	**P45 1 1**
4	Refer to the record sheet and enter the required code number. Example: Code 2, enter **2**.	**P45 1 1 2**
5	**To Exit Program/Store Data** A) To store data, press **CR**. B) To exit this program, press **# # CR**.	**P45 1 1 2** **P45 # #** **P**

TABLE RM-AM
PROGRAM 45-2
TOLL RESTRICTION DISABLE

H

STEP	ACTION	DISPLAY/PRINTOUT
1	**Enter the Program Mode** At the >MODE prompt, enter **P R O G CR**.	**>MODE PROG** **P**
2	**Enter Program Number 45** Press **CR**.	**P 45** **P45**
3	Enter the number **2**.	**P45 2**
4	Refer to the record sheet and enter the required CO line number. Example: CO line 01, enter **0 1**. The system will display N or Y to define if the LED is on or off.	**P45 2 01 N**
5	Refer to the System Record Sheet and change the CO line status as required (Y or N). Press **SPACE** to step to next CO line number.	**P45 2 01 N Y** **02 N**
6	**To Exit Program/Store Data** A) To store data, press **CR**. B) To exit this program, press **# # CR**.	**P45 2 01 N Y** **02 N** **P45 ##** **P**

TABLE RM-AN
PROGRAM 45-3 ~ 6
EQUAL ACCESS, SPECIAL COMMON CARRIER NUMBERS & AUTHORIZATION CODE DIGIT LENGTH

STEP	ACTION	DISPLAY/PRINTOUT
1	**Enter Program Mode** At the >MODE prompt, enter **P R O G CR**.	`>MODE PROG` `P`
2	**Enter Program Number 45** Press **CR**.	`P 45` `P45`
3	Refer to the record sheet and enter the item number (3 ~ 6). Example: Item 3, enter **3**. The system will display the present equal access number or EA1 Code.	`P45 3 NNNNN`
4	Refer to the System Record Sheet and enter the required number. Example: 12345, enter **1 2 3 4 5 CR**.	`P45 3 NNNNN 12345` `P45`
5	Enter code number 4. The system will display present authorization code digit length. Refer to the System Record Sheet and enter the required authorization code number digit length. Example: 12, enter: **1 2 CR**.	`P45 4 00 12` `P45`
6	To exit this program, press **# # CR**.	`P45 ##` `P`

NOTE:
Items 5 and 6 are entered the same way as 3 and 4, respectively.

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TABLE RM-AP
PROGRAM 45-8 ~ 9
TOLL RESTRICTION OVERRIDE CODE

STEP	ACTION	DISPLAY/PRINTOUT
1	**Enter the Program Mode** At the >MODE prompt, enter **PROGCR** .	`>MODE PROG` `P`
2	**Enter the Program Number 45** Press **CR** .	`P 45` `P45`
3	Refer to the System Record Sheet and enter **8** or **9** for the desired code number. The system will display the present override code number.	`P45 8 NNNN`
4	Refer to the record sheet and enter a new number if required. Example: 1234. Enter: **1234** .	`P45 8 NNNN 1234`

5	**To Exit Program/Store Data**
	A) To store data, press **CR** .
	B) To exit this program, press **##CR** .
		`P45 8 NNNN 1234`
		`P45 ##`
		`P`

TABLE RM-AP
PROGRAM 46–2 ~ 4
TOLL RESTRICTION ALLOWED/DENIED AREA CODES ASSIGNED BY CLASS

STEP	ACTION	DISPLAY/PRINTOUT
1	**Enter Program Mode** At the >MODE prompt, enter **P R O G CR**.	**>MODE PROG** **P**
2	**Enter Program Number 46** Press **CR**.	**P 46** **P46**
3	Enter class number (1 ~ 4).	**P46** □ └ Class Number
4	Enter **2**, **3**, or **4 SPACE** • **2** — to add codes to memory (allow). • **3** — to delete codes from memory (deny). • **4 SPACE** — to display codes in memory (allowed codes).	**P46** □ □ └ 2, 3 or 4 **ALLOW? or DENY?**
5	Refer to the System Record Sheet and enter the area code or area code group. Single □□□. Group □□□ * □□□ . Press **SPACE** to enter more codes.	**P46 X Y** **ALLOW** □□□ **–** □□□ **or DENY**
6	Press **SPACE** to temporarily store data. Press **CR** when completed.	**P46**
7	Continue returning to Step 3 until all data input is completed for this program.	
8	**To Exit this Program** Press **# # CR**.	**P46 # #** **P**

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TABLE RM-AQ
PROGRAM 46-6 ~ 8
TOLL RESTRICTION ALLOWED/DENIED OFFICE CODES ASSIGNED BY CLASS

STEP	ACTION	DISPLAY/PRINTOUT
1	**Enter Program Mode** At the >MODE prompt, enter **P R O G CR**.	**>MODE PROG** **P**
2	**Enter Program Number 46** Press **CR**.	**P 46** **P46**
3	Enter class number (1 ~ 4).	**P46** □ └ Class Number
4	Enter **6**, **7**, or **8 SPACE**. • **6** — to add codes to memory (allowed). • **7** — to delete codes from memory (deny). • **8 SPACE** — to display codes in memory (allowed codes).	**P46** □ □ └ 6, 7, or 8
5	Refer to the System Record Sheet and enter the office code or office code group. Single □□□. Group □□□ * □□□ . Press **SPACE** to enter more codes.	**P46 X Y** **ALLOW** □□□ **–** □□□ **or DENY**
6	Press **SPACE** to temporarily store data. Press **SPACE** when completed.	**P46**
7	Continue returning to Step 3 until all data input is completed for this program.	
8	**To Exit this Program** Press **# # CR**.	**P46 # #** **P**

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TABLE RM-AR
PROGRAM 46-10 ~ 40
TOLL RESTRICTION CLASS PARAMETERS

STEP	ACTION	DISPLAY/PRINTOUT
1	**Enter Program Mode** At the >MODE prompt, enter **P R O G CR**.	**>MODE PROG** **P**
2	**Enter Program Number 46** Press **CR**.	**P 46** **P46**
3	Refer to the System Record Sheet and enter the toll restriction class number (1 ~ 4). Then enter the number **0**. Example: Class 1, enter **1 0**.	**P46 10**
4	Refer to the System Record Sheet and enter the required button/LED number. Example: Button number 11, enter **1 1**. The system will display the status of the button/LED.	**P46 10 11 TABLE 1 N**
5	Refer to the System Record Sheet and change if required (Y or N). To access next key number, press **SPACE**.	**P46 10 11 TABLE 1 N Y** **12 TABLE 2 N**
6	**To Exit Program/Store Data** A) To store data, press **CR**. B) To exit this program, press **# # CR**.	**P46 10 11 TABLE 1 N Y** **12 TABLE 2 N** **P46 ##** **P**

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TABLE RM-AS
PROGRAM 47
TOLL RESTRICTION EXCEPTION OFFICE CODES ASSIGNED BY AREA CODE

STEP	ACTION	DISPLAY/PRINTOUT
1	**Enter Program Mode** At the >MODE prompt, enter **P R O G CR**.	**>MODE PROG** **P**
2	**Enter Program Number 47** Press **CR**.	**P 47** **P47**
3	Enter exception table (1 ~ 8) and press **1**.	**P47 Y 1 AREA CODE NNN**
4	Refer to the System Record Sheet and enter the required area code and press **CR**. Example: AC 714, enter **7 1 4 CR**.	**P47 Y 1 AREA CODE NNN 714** **P47**
5a	**To Add Exception Office Codes to Table** • Enter exception table (1 ~ 8) and press **2**. • Enter exception codes □□□ or □□□ * □□□. • Press **SPACE** to add more codes. • Press **SPACE CR** to store codes.	**P47** □**2** **Except** **Except** □□□
5b	**To Delete Exception Office Codes from Table** • Enter exception table (1 ~ 8) and press **3**. • Enter exception codes □□□ or □□□ * □□□ . • Press **SPACE** to delete more codes. • Press **SPACE CR** to store codes.	**P47** □**3** **Delete** **Delete** □□□
5c	**To Display Exception Office Codes in Table** • Enter exception table (1 ~ 8) and press **4 SPACE**. • Press **SPACE** to display more codes. • Press **CR** to exit display.	**P47** □**4** **Except** □□□
6	**To Exit Program/Store Data: # # CR**.	**P47 Y 2** **Except** □□□ **P47 # #** **P**

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TABLE RM-AT
PROGRAM 48
STATION TOLL RESTRICTION CLASSIFICATION

STEP	ACTION	DISPLAY/PRINTOUT
1	**Enter the Program Mode** At the >MODE prompt, enter **P R O G CR**.	**>MODE PROG** **P**
2	**Enter Program Number 48** Press **CR**.	**P 48** **P48**
3	Refer to the System Record Sheet and enter the required port number. Example: Port 00, enter **0 0**.	**P48 0 0**
4	Press **#** key. The system will display the present data as a 2-digit code: The first digit designates digit free or digit restrict. The second digit is the station restriction code. Refer to the System Record Sheet and change if required.	**P48 0 0 # 13**
5	**To Exit Program/Store Data** A) To store data, press **CR**. B) Continue returning to Step 3 until all data is recorded for this program. C) To exit this program, press **# # CR**.	**P48 0 0 # 13** **P48 # #** **P**

TABLE RM-AU
PROGRAM 50-1
LCR PARAMETERS

H

STEP	ACTION	DISPLAY/PRINTOUT
1	**Enter Program Mode** At the >MODE prompt, enter **P R O G CR**.	**>MODE PROG** **P**
2	**Enter Program Number 50.** Press **CR**.	**P 50** **P50**
3	Enter **1**. Refer to the System Record Sheet and enter the required button/LED number. Example: Button 01, enter **0 1**.	**P50 1 01 N**
4	Refer to the System Record Sheet and change button/LED status, if required. Press **SPACE** to move to next button/LED.	**P50 1 01 N** **02 N**
5	**To Exit Program/Store Data** A) To store data, press **CR**. B) To exit this program, press **# # CR**.	**P50 1 01 N** **02 N** **P50 # #** **P**

TABLE RM-AV
PROGRAM 50-2
LCR HOME AREA CODE

STEP	ACTION	DISPLAY/PRINTOUT
1	**Enter Program Mode** At the >MODE prompt, enter **P R O G CR**.	**>MODE PROG** **P**
2	**Enter Program Number 50** Press **CR**.	**P 50** **P50**
3	Enter the number **2**. The system will display the last area code programmed. Refer to the System Record Sheet and change if required.	**P50 2 NNN**
4	**To Exit Program/Store Data** A) To store data, press **CR**. B) To exit this program, press **# # CR**.	**P50 2 NNN** **P50 # #** **P**

TABLE RM-AW
PROGRAM 50-31 ~ 35
LCR SPECIAL CODES

STEP	ACTION	DISPLAY/PRINTOUT
1	**Enter Program Mode** At the >MODE prompt, enter **P R O G CR**.	**>MODE PROG** **P**
2	**Enter Program Number 50** Press **CR**.	**P 50** **P50**
3	Refer to the System Record Sheet and enter 31 ~ 35 as required. Example: 31, enter **3 1**. System will display previously programmed number. Refer to the System Record Sheet and change if required.	**P50 31 NNNN**
4	**To Exit Program/Store Data** A) To store data, press **CR**. B) Continue returning to Step 3 until all data for this program has been entered. C) To exit this program, press **# # CR**.	**P50 31 NNNN** **P50 # #** **P**

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TABLE RM-AX
PROGRAM 50-4
LCR LDI PLAN NUMBER

STEP	ACTION	DISPLAY/PRINTOUT
1	**Enter Program Mode** At the >MODE prompt, enter **PROGCR** .	**>MODE PROG** **P**
2	**Enter Program Number 50** Press **CR** .	**P 50** **P50**
3	**Enter the number 4** The system will display the present LDI route number. Refer to the System Record Sheet and change if required.	**P50 4 1**
4	**Exit Program/Store Data** A) To store data, press **CR** . C) To exit this program, press **##CR** .	**P50 4 1** **P50 # #** **P**

TABLE RM-AY
PROGRAM 50-5
LCR LOCAL CALL PLAN NUMBER

H

STEP	ACTION	DISPLAY/PRINTOUT
1	**Enter Program Mode** At the >MODE prompt, enter **P R O G CR**.	**>MODE PROG** **P**
2	**Enter Program Number 50** Press **CR**.	**P 50** **P50**
3	**Enter the number 5** The system will display the present local route plan number. Refer to the System Record Sheet and change if required. Example: 2, enter **2**.	**P50 5 1 2**
4	**Exit Program/Store Data** A) To store data, press **CR**. B) To exit this program, press **# # CR**.	**P50 5 1 2** **P50 # #** **P**

TABLE RM-AZ
PROGRAM 50-6
LCR DIAL ZERO TIMEOUT

STEP	ACTION	DISPLAY/PRINTOUT
1	**Enter Program Mode** At the >MODE prompt, enter **P R O G CR**.	**>MODE PROG** **P**
2	**Enter Program Number 50** Press **CR**.	**P 50** **P50**
3	**Enter the number 6** The system will display the present dial zero timeout. Refer to the System Record Sheet and change if required. Example: 10, enter **1 0**.	**P50 6 06 10**
4	**Exit Program/Store Data** A) To store data, press **CR**. B) To exit this program, press **# # CR**.	**P50 6 06 10** **P50 # #** **P**

TABLE RM-BA
PROGRAM 51
LCR AREA CODES

STEP	ACTION	DISPLAY/PRINTOUT
1	**Enter Program Mode** At the >MODE prompt, enter P R O G CR.	**>MODE PROG** **P**
2	**Enter Program Number 51** Press CR.	**P 51** **P51**
3	Refer to the System Record Sheet and enter the required route plan number (1 ~ 8). Example: Route plan 1, enter 1.	**P51 1**
4	Enter 2, 3, or 4 SPACE • 2 — To add area codes to table. • 3 — To delete area codes from table. • 4 SPACE — to display area codes in table, continue to press SPACE to display more codes. Press CR to exit display.	**P51**□□ — 2, 3 or 4 └— Plan No. **P51**□□ □□□ <— CODES
5	Enter codes □□□ or □□□ * □□□ and press SPACE after each code entry.	**P51**□□ □□□ □□□
6	**Exit Program/Store Data** A) To store data, press CR. B) Continue returning to Step 3 until all data has been entered for this program. C) To exit this program, press # # CR.	**P51 12** **212** **or** □□□-□□□ **P51 # #** **P**

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TABLE RM-BB
PROGRAM 52
LCR OFFICE CODE EXCEPTIONS FOR SPECIFIED AREA CODE

STEP	ACTION	DISPLAY/PRINTOUT
1	**Enter Program Mode** At the >MODE prompt, enter **P R O G CR**.	**>MODE PROG** **P**
2	**Enter Program Number 52** Press **CR**.	**P 52** **P52**
3	**Define Route Plan Number** Refer to the System Record Sheet and enter the exception table number (1 ~ 8). Example: Table 1, enter **1**. **Enter Action code 0**. The system will print out the currently defined route plan number. Refer to the System Record Sheet and enter new plan number if required. Example: Change to 3.	**P52 10 □ 3** LCR Plan No. Action Code Exception Table No.
4	**Define Area Code Number** Press **CR**. Enter exception table number (1 ~ 8) defined in Step 3. **Enter Action code 1**. The system will print out the currently defined area code number. Refer to the System Record Sheet and enter the new area code number if required. Example: Change to 212, enter **2 1 2**. Press **CR**.	**P52 11 □□□ 212** **P52** Area Code Action Code Exception Table No.
5	**Display Office Codes** Enter exception table number defined in Step 3. **Enter Action Code 4**. Press **SPACE** to display previously selected office codes. Continually press **SPACE** until all previously selected codes have been displayed, then press **CR**.	**P52 14** □□□-□□□ □□□ Office Codes
6	**To Add (2) or Delete (3) Office Codes** Press **CR**. Enter exception table number defined in Step 3. Refer to the System Record Sheets and enter **2** to add office codes or **3** to delete office codes. Example: Add office codes 300-325 Enter **2** (or **3**) **3 0 0 * 3 2 5 CR**.	**P52 12** **300-325** **P52**
7	**To Exit Program/Store Data** A) Data was stored when **CR** was pressed in Step 6. B) Continue returning to Step 3 until all data is entered for this program. C) To exit this program. Press **# # CR**.	**P52 # #** **P**

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TABLE RM-BC
PROGRAM 53
LCR SCHEDULE ASSIGNMENT

STEP	ACTION	DISPLAY/PRINTOUT
1	**Enter Program Mode** At the >MODE prompt, enter **P R O G CR**.	**>MODE PROG** **P**
2	**Enter Program Number 53** Press **CR**.	**P 53** **P53**
3	**Define Route Plan Number** Refer to the System Record Sheet and enter the route plan number (1 ~ 8). Example: Route Plan 1, enter **1**.	**P53 1**
4	**Define Schedule Number** Refer to the System Record Sheet and enter the required schedule number (1 ~ 3). Example: Schedule 1, enter **1**.	**P53 1 1**
5	**Enter Code Number 0** The system will display the previously selected time for the route plan number (Step 3) and the schedule number (Step 4). Refer to the System Record Sheet and change the time if required. Example: Change to 0800. Enter **0 8 0 0**. Press **CR** and repeat Steps 3, 4, and 5 for all plans/schedules. *NOTE: Enter time using 24-hour format:* **H H M M**.	**P53 1 1 0 0000 0800** **P53**
6	**Priority Class Assignment** Enter the route plan number as defined in Step 3. Enter the schedule number as defined in Step 4. Refer to the System Record Sheet and enter the required station group number (1 ~ 4). Example: Group 1, enter **1**. The system will display the previously entered route definition numbers (reference **Program 54**). Refer to the System Record Sheet and enter required route definition numbers (1 ~ 4) and press **CR**. Example: Enter **1** and **2 CR**. Continue to repeat Steps 3, 4, and 6 until all plans/schedules are entered.	**P53 1 1 1 NNNN 12** **P53**
7	**To Exit Program/Store Data** A) Data was stored when pressing **CR** in Step 6. B) Continue returning to Step 3 until all data is entered for this program. C) To exit this program. Press **# # CR**.	**P53 # #** **P**

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TABLE RM-BD
PROGRAM 54
LCR ROUTE DEFINITION

STEP	ACTION	DISPLAY/PRINTOUT
1	**Enter Program Mode** At the >MODE prompt, enter **P R O G CR**.	**>MODE PROG** **P**
2	**Enter Program Number 54** Press **CR**.	**P 54** **P54**
3	**Enter Route Plan Number** Refer to the System Record Sheet and enter the required route plan number (1 ~ 8). Example: Route plan 1, enter **1**.	**P54 1**
4	**Enter Route Definition Number** Refer to the System Record Sheet and enter the required route definition number (1 ~ 4). Example: Enter route definition number 2, enter **2**. The system will display the previously entered CO line group number (1 ~ 8) and the modified digits table number (1 ~ 6). Refer to the System Record Sheet and enter the CO line group and modified digit numbers as required, then press **CR**. Example: Change the CO line group number to 3 and the modified digits table to 2. Enter: **3 2 CR**.	**P54 12 11 32** Modified Digit Table No. CO Line Group No. Route Definition No. Plan No.
5	**To Exit Program/Store Data** A) To store data, press **CR.** B) Continue returning to Step 3 until all data has been entered for this program. C) To exit this program, press **# # CR**.	**P54 12 11 32** **P54 ##** **P**

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TABLE RM-BE
PROGRAM 55-0
LCR MODIFIED DIGITS-DELETE

STEP	ACTION	DISPLAY/PRINTOUT
1	**Enter Program Mode** At the >MODE prompt, enter **P R O G CR**.	**>MODE PROG** **P**
2	**Enter Program Number 55** Press **CR**.	**P 55** **P55**
3	**Enter Modified Digits Table Number** Refer to the System Record Sheet and enter the modified digits table number (1 ~ 6). Example: Enter modified digits table number 1, enter **1**.	**P55 1**
4	**Enter Code 0** The system will display any previously entered number of digits to be deleted (01 ~ 10). Refer to the System Record Sheet and change number if required. Example: Change to 10, enter: **1 0**.	**P55 10 00 10**
5	**To Exit Program/Store Data** A) To store data, press **CR**. B) Continue returning to Step 3 until all data has been entered for this program. C) To exit this program, press # # **CR**.	**P55 10 00 10** **P55 ##** **P**

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TABLE RM-BF
PROGRAM 55-1
LCR MODIFIED DIGITS-ADD

STEP	ACTION	DISPLAY/PRINTOUT
1	**Enter Program Mode** At the >MODE prompt, enter **P R O G CR**.	**>MODE PROG** **P**
2	**Enter Program Number 55** Press **CR**.	**P 55** **P55**
3	**Enter Modified Digits Table Number** Refer to the System Record Sheet and enter the required modified digits table number (1 ~ 6). Example: Enter table number 1, enter **1**.	**P55 1**
4	**Enter Code 1** The system will display any previously entered digits (up to 22). Refer to the System Record Sheet and enter new numbers, if required. Example: Enter **1 2 3 4 P 3**. *NOTE: Pause codes may also be entered. To enter pauses, press "P" plus the pause number (1 ~ 8).* Special Code Input Pause = **P 1** ~ **P 8**. Tone = **T** at beginning of digits to convert. Clear = **C** as first digit, then **CR**.	**P55 11**□□□ *(up to 22 digits)* **1 2 3 4 P3**
5	**To Exit Program/Store Data** A) To store data, press **CR**. B) Continue returning to Step 3 until all data has been entered for this program. C) To exit this program, press **# # CR**.	**P55 11** □□□□ **1 2 3 4 P3** **P55 ##** **P**

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TABLE RM-BG
PROGRAM 55-2
LCR MODIFIED DIGITS-END

STEP	ACTION	DISPLAY/PRINTOUT
1	**Enter Program Mode** At the >MODE prompt, enter **P R O G CR**.	**>MODE PROG** **P**
2	**Enter Program Number 55** Press **CR**.	**P 55** **P55**
3	**Enter Modified Digits Table Number** Refer to the System Record Sheet and enter the required modified digits table number (1 ~ 6). Example: Enter table number 1, enter **1**.	**P55 1**
4	**Enter Code 2** The system will display any previously entered digits (up to 22). Refer to the System Record Sheet and enter new numbers, if required. Example: Enter **1 2 3 4 P 3**. *NOTE: Pause codes may also be entered. To enter pauses, press "P" plus the pause number (1 ~ 8).* Special Code Input Pause = **P 1** ~ **P 8**. Tone = **T** at beginning of digits to convert. Clear = **C** as first digit, then **CR**.	**P55 12** □□□ *(up to 22 digits)* **1 2 3 4 P3**
5	**To Exit Program/Store Data** A) To store data, press **CR**. B) Continue returning to Step 3 until all data has been entered for this program. C) To exit this program, press **# # CR**.	**P55 12** □□□□ *(up to 22 digits)* **1 2 3 4 P3** **P55 ##** **P**

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TABLE RM-BH
PROGRAM 56
LCR STATION GROUP ASSIGNMENT

STEP	ACTION	DISPLAY/PRINTOUT
1	**Enter Program Mode** At the >MODE prompt, enter P R O G CR.	**>MODE PROG** **P**
2	**Enter Program Number 56** Press CR.	**P 56** **P56**
3	**Enter Port Number** Refer to the System Record Sheet and enter the required port number, □□ or □□ * □□. Example: Port 01, enter 0 1.	**P56 01**
4	**Press # Key** (if single port □□ entry in Step 3). The system will display any previously entered group number (1 ~ 4). Refer to the System Record Sheet and change as required. Example: Change to 4, enter 4.	**P56 01# 1 4**
5	**To Exit Program/Store Data** A) To store data, press CR. B) Continue returning to Step 3 until all data has been entered for this program. C) To exit this program, press # # CR.	**P56 01# 1 4** **P56 ##** **P**

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TABLE RM-BI
PROGRAM DATA DUMP

STEP	ACTION	DISPLAY/PRINTOUT
1	**Enter the Data Dump Mode** At the >MODE prompt, enter **D U M P CR**.	**>MODE DUMP** **D**
2	**To Output Program Data** Enter **P R G** □□ **CR** □□ = Program number or **A L L** for all programs.	**D PRG** □□
3	**To Stop Printout at Any Time** Enter **DELETE CR**.	**D**
4	**To Exit the Dump Mode** Enter **Q U I T CR**.	**>MODE**

TABLE RM-BJ
SPEED DIALING DATA DUMP

STEP	ACTION	DISPLAY/PRINTOUT
1	**Enter the Data Dump Mode** At the >MODE prompt, enter **D U M P CR**.	**>MODE DUMP** **D**
2	**To Output Speed Dialing Data** Enter **R E P** □□□ **CR** ---or--- **R E P** □□ **CR** □□□ = **A L L** or **S Y S** □□ = Port number for individual station speed dial.	
3	**To Stop Printout at Any Time** Enter **DELETE CR**.	**D**
4	**To Exit the Dump Mode** Enter **Q U I T CR**.	

TABLE RM-BK
LCD MESSAGING DATA DUMP

STEP	ACTION	DISPLAY/PRINTOUT
1	**Enter the Data Dump Mode** At the >MODE prompt, enter **DUMP CR** .	**>MODE DUMP**
2	**To Output Message Data** Enter **M S G** □□□ **CR** ---or--- **M S G** □□ **CR** □□□ = **A L L** or **SY S** □□ = Port number of individual station.	**D MSG** □□□
3	**To Stop Printout at Any Time** Enter **DELETE CR**	**D**
4	**To Exit the Dump Mode** Enter **Q U I T CR**.	**>MODE**

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TABLE RM-BL
MODE 95
REMOTE CALLING STATION MESSAGING (ADD/REVIEW/CHANGE)

STEP	ACTION	DISPLAY/PRINTOUT
1	**Enter the Message Mode** At the >MODE prompt, enter **M E S G CR**.	**>MODE MESG**
2	**To Add Or Review a Calling Station Message** Set the terminal keyboard to the lower case (cap lock off) and enter **m 9 5**. *NOTE:* *Enter* **M** *anytime it is desired to start over in this procedure.*	**m 95**
3	Enter **X X X** (XXX = station number where the message will be set and stored).	**m95 XXX**
4	Enter **p** □□ (p = page command and □□ = 2-digit message memory location: 10 ~ 19 personal messages and 60 ~ 99 = system message). *NOTES:* *1. To store system messages permanently, DKT or EKT XXX must be the station at port 00.* *2. After* **p** □□ *is entered, the previously stored message is displayed. If there is no stored message, nothing is displayed.*	**m95 XXX p** □□ **[M]**
5	**To Change Previous Message** Set the terminal keyboard to upper case and change message (alphanumeric, 32 characters max.).	**m95 XXX p** □□ **[M+]**
6	**To Set the Message on DKT or EKT XXX's LCD** Set the terminal keyboard to lower case and enter **p m 0**.	**m95 XXX p** □□ **[M+] p** **m 0** └ Zero
7	**To Exit the Message Mode** At any time, enter **m 0 q** (lower case).	**m 0** **q** **> MODE**

NOTES:
1. *To cancel a message set via Mode 95, use Mode 97 procedure.*
2. *[M] represents the message entered.*
3. *With* ***Release 2*** *software only, remote calling station messaging is not available from electronic telephones, but it is available from ASCII terminals connected to the TTY port or via IMDU on the PIOU or PIOUS.*
4. *DKT = digital telephone; EKT = electronic telephone.*

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TABLE RM-BM
MODE 97
REMOTE CALLING STATION MESSAGING (ADD/CHANGE)

STEP	ACTION	DISPLAY/PRINTOUT
1	**Enter the Message Mode** At the >MODE prompt, enter **M E S G CR**.	`>MODE MESG`
2	**To Add a Message** (or change a previously stored message) Set the terminal keyboard to lower case (caps lock off) and enter **m 9 7**. *NOTE:* *Enter* **m** *at anytime it is desired to start over in this procedure.*	`m 97`
3	Enter **X X X** (XXX = station number for which the message will be set and stored).	`m97 XXX`
4	Enter: **p** □□ (p = page command and □□ = 2-digit message memory location: 10 ~ 19 personal messages and 60 ~ 99 = system messages). *NOTE:* *To store system message change permanently, DKT/EKT XXX must be station assigned to Port 00.*	`m97 XXX p` □□
5	**To Add a Message** Set the terminal keyboard to upper case and enter message (alphanumeric, 32 characters max.). New message displays as it is entered.	`m97 XXX p` □□ `[M]`
6	**To Set the Message on the DKT/EKT LCD** Set the terminal keyboard to lower case and enter **p m 0**.	`m97 XXX p` □□ `[M] p` `m 0` ← Zero

7	**To Exit the Message Mode**
	At any time, enter **m 0 q** (lower case).
		`m 0`
		`q`
		`>MODE`

NOTES:

1. *To cancel a message set via Mode 95, use Mode 97 with any message number in Step 4 and skip Step 5.*
2. *[M] represents the message entered.*
3. *With **Release 2** software only, remote calling station messaging is not available from electronic telephones, but it is available from ASCII terminals connected to the TTY port or via IMDU on the PIOU or PIOUS.*
4. *DKT = digital telephone; EKT = electronic telephone.*

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TABLE RM-BN
MODE 94
REMOTE CALLED STATION MESSAGING (ADD/REVIEW/CHANGE)

STEP	ACTION	DISPLAY/PRINTOUT
1	**Enter the Message Mode** At the >MODE prompt, enter **M E S G CR**.	**>MODE MESG**
2	**To Add Or Review a Called Station Message** Set the terminal keyboard to the lower case (cap lock off) and enter **m 9 4**.	**m 94**
3	Enter **X X X** (XXX = Destination station number or destination group number [30 = all stations, 31-34 per system, **Program 31**]).	**m94 XXX**
4	Enter **p Y Y Y** (p = page command [lower case] and **Y Y Y** = originating station number).	**m94 XXX p YYY**
5	Enter **p** □□ (p = page command [lower case] and □□ = 2-digit message memory location: 10 ~ 19 personal messages and 60 ~ 99 = system messages). After **p** □□ is entered, the previously stored message (M) is displayed. (If there is no stored message, nothing is displayed.)	**m94 XXX p YYY p** □□ **[M]**
6	**To Change the Message (M+)** Set the terminal keyboard to upper case and change message as required (alphanumeric, 32 characters max. for total message).	**m94 XXX p YYY p** □□ **[M+]**
7	**To Set Message** Set the terminal keyboard to lower case and enter **p m 0**. Destination station: Msg (MESSAGE) LED flashes, "CALL YYYM" is displayed. Origination station: "SENT XXXM" is displayed.	**m94 XXX p YYY p** □□ **[M+] p m 0** └ Zero
8	**To Exit the Message Mode** At any time, enter **m 0 q** (lower case).	**m 0** **q** **>MODE**

NOTES:
1. *Press **m** at any time to start over.*
2. *[M] represents the message entered.*
3. *With **Release 2** software only, remote called station messaging is not available from electronic telephones, but it is available from ASCII terminals connected to the TTY port or via IMDU on the PIOU or PIOUS.*

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TABLE RM-BO
MODE 96
REMOTE CALLED STATION MESSAGING (ADD/CHANGE)

STEP	ACTION	DISPLAY/PRINTOUT
1	**Enter the Message Mode** At the >MODE prompt, enter **M E S G CR**.	**>MODE MESG**
2	**To Change or Add a New Called Station Message** Set the terminal keyboard to the lower case (cap lock off) and enter **m 9 6**. *NOTE:* *Enter* **m** *(lower case) anytime it is desired to start over in this procedure.*	**m 96**
3	Enter **X X X** (XXX = destination station number or destination station group number – 30 = all DKTs/EKTs, 31 ~ 34 per system, **Program 31**).	**m96 XXX**
4	Enter **p Y Y Y** (p = page command and YYY = originating station number).	**m96 XXX p YYY**
5	Enter **p** □□ (p = page command and □□ = 2-digit message memory location: 10 ~ 19 personal messages and 60 ~ 99 = system messages).	**m96 XXX p YYY p**□□
6	**To Add the New Message [M]** Set the terminal keyboard to upper case and enter message as required (alphanumeric, 32 characters max.). New message displays as it is entered.	**m96 XXX p YYY p**□□**[M]**
7	**To Set the Message** Set the terminal keyboard to lower case and enter **p m 0**. Destination station: Msg (MESSAGE) LED flashes, "CALL YYYM" is displayed on LCD. Origination station: "SENT XXXM" is displayed on LCD.	**m96 XXX p YYY p**□□**[M] p** **m 0** └ Zero
8	**To Exit the Message Mode** At any time, enter **m 0 p** (lower case).	**m 0** **q** **>MODE**

NOTES:
1. *[M] represents the message entered.*
2. *With **Release 2** software only, remote called station messaging is not available from electronic telephones, but it is available from ASCII terminals connected to the TTY port or via IMDU on the PIOU or PIOUS.*

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TABLE RM-BP
STATION/CO LINE STATUS CHECK

STEP	ACTION	DISPLAY/PRINTOUT
1	**Enter the Test Mode** At the >MODE prompt, enter **T E S T CR**.	**>MODE TEST**
2	**To Check Station Line Status** Enter **S E K T X X X X** = port number. Possible status: Idle on-hook, idle off-hook, busy on-hook, busy off-hook. ***IMPORTANT!*** ***To prevent service interference, station line status must be idle on-hook before initiating a test from that station.***	**T SEKT XX IDLE ON-HOOK** **T**
3	**To Check CO Line Status** Enter **S C O Y Y Y Y** = CO line number. Possible status: Idle, busy.	**T SCOYY – BUSY** **T**
4	**To Exit the Test Mode** At the T prompt, enter **Q U I T CR**.	**T QUIT** **> MODE**

TABLE RM-BQ
GENERAL STATION ACCESS AND BUTTON ACTIVATION

STEP	ACTION	DISPLAY/PRINTOUT
1	**Enter the Test Mode** At the >MODE prompt, enter **T E S T CR**.	**>MODE TEST** **T**
2	**To Activate A Button** Enter **T K X X K Y Y CR**. XX = Port number and YY = button number. *NOTE: Button numbers begin at 01.*	**T TKXX KYY** **T**
3	**To Activate A Function Button** Enter **T K X X F CR** F = function button designator SPKR S HOLD H CONF C MIC M F = S, H, C, M	**TTKXX F** **T**
4	**To Access A CO Line (via CO Access Code) and Dial Out** Enter **T K X X K 0 1 A A A** □□□□□□□ **CR**. AAA = 1, 2, or 3-digit CO line access code and □ = telephone number	**TTKXX K01 AAA** □□□□□□□ **T**
5	**To Access A CO Line (via CO Line Button) and Dial Out** Enter **T K X X K Y Y** □□□□□□□ **CR**. YY = CO line number. Telephone Number	**TTKXX KYY** □□□□□□□ **T**
6	**To Exit the Test Mode** At T prompt, enter **Q U I T CR**.	

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TABLE RM-BR
CO LINE TEST

STEP	ACTION	DISPLAY/PRINTOUT
1	**Enter the Test Mode** At the >MODE prompt, enter T E S T CR.	**>MODE TEST**
2	**To Verify Station/CO Line Status** Station line status, enter S E K T X (X X = station port). CO line status, enter S C O Y Y (Y Y = CO line number).	**T SEKT XX IDLE ON-HOOK** **T** **T SCO YY IDLE**
3	**Call Remote Station B** (from SEKT XX and CO line YY) Enter T K X X K Y Y □□□□□□□ CR. (□ = station B's telephone number) Answer station B. *NOTE:* *If the system is equipped with Music-on-Hold, go to Step 4.* *If the line must be tested via a CO-to-CO connection, go to Step 6.*	**T TK XX KYY □□□□□□□** **T**
4	A) Press the Hold (HOLD) button on TK XX (station B on hold). Enter T K X X H CR. B) Listen at station B and check that the transmission from the music source is acceptable. C) Press the Spkr (SPEAKER) button on TKXX (to release the call). Enter T K X X S CR.	**T TKXX H** **T** **T TKXX S** **T**
5	Continue returning to Step 2 until all CO lines are tested.	
6	**To Set Up A CO-to-CO Connection** Press the Cnf/Trn (CONF/TRNS) button on T K X X. Enter T K X X C CR. *NOTES:* *1. Station B is connected via Step 3.* *2. Verify that **Program 15-5** allows CO-to-CO connections.* *3. The next step must be completed immediately to avoid dial tone timeout.*	**T TKXX C** **T**
7	Call Station C (or local time/weather) via CO line C. Enter: T K X X K Y Y □□□□□□□ CR. X X = CO line C's key number and □ = telephone number of Station C. Answer Station C (or verify time/weather connection) and go to next step.	**T TKXX KYY □□□□□□□** **T**
8	Press the Cnf/Trn (CONF/TRNS) button on STXX to establish a conference between all parties.	**T TKXX C** **T**
9	If you wish to tie the two CO lines together and hang up: Enter T K X X C CR. Enter T K X X S CR.	**T TKXX C** **TTKXX S** **T**
10	Continue returning to Step 2 until all CO lines are tested.	
11	**To Exit the Test Mode,** At the T prompt, enter Q U I T CR.	

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TABLE RM-BS
SYSTEM DATE/DAY/TIME SETTING PROCEDURE

STEP	ACTION	DISPLAY/PRINTOUT
1	**Enter the Test Mode** At the >MODE prompt, enter **T E S T CR**.	**>MODE TEST** **T**
2	**To Set Date** Enter **T K 0 0 K 0 1 6 5 1 Y Y M M D D # CR**.	**T TK00 K01 651YYMMDD#** **T**
3	**To Set Time Of Day** Enter **T K 0 0 K 0 1 6 5 2 H H M M S S # CR**.	**TTK00 K01 652HHMMSS#**
4	**To Set Day Of The Week** Enter **T K 0 0 K 0 1 6 5 3 D # CR**. (D = day of week with Sunday = 1 ~ Saturday = 7)	**TTK00 K01 653D#** **T**
5	**To Exit the Test Mode** At T prompt, enter **Q U I T CR**.	

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TABLE RM-BT
SPEED DIAL MODE (CHANGE/REVIEW)

STEP	ACTION	DISPLAY/PRINTOUT
1	**Enter the Speed Dial Mode** At the >MODE prompt, enter **R E P T CR**.	**>MODE REPT**
2	**Enter the station port number for which the speed dial number will be programmed** Press □□ └ (00 ~ 95) *NOTE: If programming system speed dial, enter Port number* **0 0**.	**R** □□ └ Station Port Number
3	**Enter Speed Dial Memory Location to be Programmed** A) Press □□ (current memory will display) └ 10 ~ 49 Station 60 ~ 99 System B) Press **SPACE** to review each memory location or go to Step 4.	**R** □□ □□ **N** Memory location Nothing in memory
4	**1) To enter speed dial number (20 digits max)** Press 20-digit number □□. . . . . □□ . . . . OR . . . **2) To link two speed dial numbers** Press **A** □□ 17-digit number □. . . . . □□ └ System speed dial location (90 ~ 99) (Refer to the Digital or Electronic Telephone User Guide for information regarding chain dialing.) Special Entries: F=Flash; P=1.5 or 3-sec Pause (Prog. 12); L=10-sec Pause; N=Clear Memory. Special code entry (**Release 4**): I = Intercom H = Hold C = Conference	**R** □□ □□ **N** □□. . . . . □□ New speed dial number
5	**To store data, press CR** *NOTE: If program entry is not correct,* **CR** *will not respond. To try again, press* **DELETE CR**.	**R**
6	**To Exit the Speed Dial Mode** Press **Q U I T CR**.	**>MODE**

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Remote Maintenance Procedures Index

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MESSAGE RECORD SHEET—Use several sheets if necessary

MESG.#_____

MESG.#_____

MESG.#_____

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