SWITCHING SYSTEMS MANAGEMENT

NO. 4A/4M CROSSBAR

SYSTEM DESCRIPTION

ELECTRONIC TRANSLATOR SYSTEM—PERIPHERAL BUS COMPUTER

CONTENTS PAGE

CONTENTS PAGE

Figures

CONTENTS PAGE

1. GENERAL

1.01 This section provides a general description of the Peripheral Bus Computer (PBC) System associated with a No. 4A/4M Crossbar System that is equipped with an Electronic Translator System (ETS). This section outlines the pertinent features of the PBC system provided to the network administrator as an aid in effectively administering the office.

1.02 Whenever this section is reissued, the reason will be listed in this paragraph.

1.03 The need for processed data in near real time has steadily increased as the nationwide telephone network has grown and become more complex. This need has stimulated the development of several data accumulating and processing arrangements. Previously, these arrangements depended on event count accumulation (basically electromechanical registers) in and immediately adjacent to the 4A/4M switching system.

1.04 With the introduction of the ETS, some improvement was effected with the elimination of many of the electromechanical registers which had been used to record peg count (PC) and overflow (OFL) for trunks. This was accomplished by recording these events in software registers in the ETS memory and, on a scheduled basis, printing out the accumulated data on teletypewriters (TTYs) and/or paper tape.

1.05 In the PBC system, as in the ETS, the PC and OFL counts for trunks will be incremented on software registers in the PBC processor memory from per-call-data supplied by the ETS. In addition, PC, OFL, and usage on 4A switching equipment components and usage on trunks formerly scored on a variety of electromechanical registers will be registered in the PBC memory. Thus, all the data are accumulated as one common data base in the PBC, which has the capability of processing and producing meaningful reports for all interested users.

1.06 The PBC system is considered a standard adjunct in a No. 4A/4M Crossbar System equipped with ETS. It is interfaced directly to the ETS via the stored program control (SPC) No. 1A peripheral unit bus for call processing data formerly registered within the ETS, as well as additional data, previously available in ETS, but not registered. It is also interfaced to the 4A electromechanical switching system via a traffic data converter (TDC) interface ***and*** a traffic usage interface (TUI). This permits the accumulation of switching system, miscellaneous plant and traffic peg count and usage data formerly scored on electromechanical traffic registers and/or the Traffic Data Recording System. Fig. 1 shows the 4A PBC system configuration and Fig. 2 shows the PBC block diagram.

1.07 The processor, core and disk memories, interfaces, input-output (IO) terminals, and industry-compatible magnetic tape unit comprise the bulk of the PBC system hardware. (See Fig. 2.) Data link output equipment may also be provided for connection with the Engineering and Administrative Data Aquisition System (EADAS), if required. The PBC software consists of a generic program for the processor and office data for the specific office involved.

1.08 The interprocessor link allows the ETS/SPC to send retrial and ineffective attempts data to the PBC, as well as selected call routing data permitting the PBC to increment the appropriate traffic measurement counters. Certain plant measurement data are also sent to the PBC by the ETS/SPC. Also, this link will be used to make and verify recent changes to the SPC resident data, since the recent change function for both the SPC and PBC resident data bases will ultimately be completely controlled at the PBC.

1.09 The TDC is used to bring into the PBC up to 1022 points, from the 4A, associated with plant and traffic peg counts. Thus, these counts,

plus those received from the SPC, consolidate at the PBC all plant and traffic counters.

1.10 The scanner/distributor and the TUI frame are used to record traffic usage measurements from the 4A at the PBC. These usage measurements are made on outgoing trunk groups, incoming trunk groups, incoming and outgoing sample links, and common control equipment. The traffic usage scanning is effected by selecting a particular usage group within the TUI family be means of the distributor circuit followed by a scan of the individual points in the group. The TUI frame is a relay connector used to access the 4A points.

1.11 An outage of the PBC will not affect call processing since the PBC is not in any way involved in the switching of calls. The calls are processed by the 4A/ETS as in the past. The PBC (a) receives the data concerning calls and switching apparatus from both the ETS and the 4A system electromechanical components and (b) processes these data to produce reports in a calculated form immediately meaningful to the users. The PBC is provided on a single nonduplicated basis.

2. SYSTEM COMPONENTS—PERIPHERAL BUS COMPUTER

2.01 The PBC system consists of a Digital Equipment Corporation (DEC®) PDP 11/45 minicomputer, peripheral equipment, and a software package. The computer system components and the peripheral equipment connect to and communicate with each other over a single high-speed bus called the UNIBUS®. (See Fig. 3.)

2.02 The processor (connected to the UNIBUS as a subsystem) controls the time allocation of the UNIBUS for peripherals and performs arithmetical and logical operations and instruction decoding. It contains multiple high-speed, general purpose registers which can be used as accumulators, pointers, index registers, etc. The processor can perform data transfers directly between input-output devices and memory.

2.03 The DEC equipment is housed in three bays of a 4-bay cabinet. The fourth bay mounts Western Electric manufactured equipment which includes the peripheral unit bus interface, distributor and scanner, a modified traffic data converter, and a power supply. These four bays are also referred to as the PBC complex. (See Fig. 4).

2.04 The computer control console contains switches and keys for manually inserting programs and data. Indicator lamps display the status of the computer at all times. The control console is shown in Fig. 5.

2.05 The control console has an 18-bit ADDRESS REGISTER display and a 16-bit DATA register display. The ADDRESS REGISTER display is tied directly to the output of an 18-bit flip-flop register called the bus address register. This register displays the address of data examined or deposited.

2.06 The PDP 11/45 is capable of referencing 16-bit addresses. However, the UNIBUS has expansion capability for 18-bit addresses. Therefore, to access the entire 18-bit address scheme, the switch register is 18 bits wide. These bits are assigned as 0 through 17. The highest two bits are used only for addressing. A switch in the DOWN position is considered to have a 0 value. A switch in the UP position is considered to have a 1 value. The condition of the switches can be loaded into the ADDRESS REGISTER or any memory location using the appropriate control switches.

A. ETS-PBC Interfaces

2.07 As previously mentioned, interfaces are required between the PBC and the 4A system for the exchange of data necessary for the proper functioning of the PBC system.

2.08 The interfaces are designed to minimize the ETS program memory requirements as much as possible for both on-line processing and administration and maintenance of the interface minicomputer system.

2.09 These interfaces, although simply designed, provide fault recognition and diagnosis to the extent possible with a nonduplicated system.

2.10 The functions of the interfaces may be divided into four relatively independent parts:

(a) Data transfer from ETS to PBC.

(b) Data transfer from PBC to ETS.

(c) Self-maintenance of the PBC and SPC-PBC interface, and protection of the SPC No. 1A from possible PBC-related trouble.

(d) Data transfer from 4A to PBC. (This means PC events from the 4A ***other*** than those which can be obtained through the ETS and also usage data from the 4A.)

2.11 The communication paths between the SPC and the PDP 11/45 are shown in Fig. 6. Data are transmitted to the PBC over the peripheral unit address bus and received by the SPC over the scanner answer bus.

B. Traffic Data Converter and Access Circuit

2.12 The TDC and the traffic data converter access (TDCA) circuits are located in the PBC interface and control cabinet. The TDC is capable of scanning a maximum of 1022 points and encoding the inputs into 1022 10-bit addresses (2^{10} = 1024—Two of these points are used for test maintenance; therefore, only 1022 points are used for data inputs.) These 10-bit addresses are sent to the PBC over the TDCA circuit. Each address will peg a counter in the PBC memory.

C. Traffic Usage Interface

2.13 The TUI frame and the optional supplemental TUI (STUI) frame provide the connector relays required to give the PBC access to the 4A office traffic usage terminations.

2.14 The PBC accesses these usage terminations by selectively operating connector relays on the TUI and STUI, if equipped, through the distribute circuit which in turn allows a maximum of 48 usage leads at a time to be connected to the PBC scan circuit.

2.15 The traffic usage inputs are assigned to particular data groups. Certain common control usage and maintenance busy inputs are preassigned to specific terminations in data group 0 in order to provide efficient PBC software register assembly. The remaining common control circuit inputs are assigned to data group 0 terminations as required on an individual office basis, as are all incoming trunk usage inputs in data groups 1 through 3. A sample of 1600 intertoll (IT) and toll connecting (TC) incoming and outgoing link frame usage leads are cabled from the link frames to data group 4 through 7, while a sample of up to 24,000 outgoing trunk usage leads are run from the IT and TC trunk block connectors to data groups 8 and 9.

D. DATASPEED® 40 Stations

2.16 The primary input-output devices for the PBC are three DATASPEED 40 terminals. Each terminal is equipped with a keyboard, a cathode ray tube display, and a high-speed line printer. The terminals are provided for the Network Administration, Network Management, and Switching Maintenance functions. Four additional terminals may be used as the following options:

(a) To send trunk-related exception reports directly to trunk maintenance areas (up to two optional terminals).

(b) To provide a central analysis bureau operation.

(c) To alleviate a floor space arrangement that does not permit the switching maintenance terminal and the PBC system to be located reasonably close together. The switching maintenance terminal must remain in the No. 4 crossbar maintenance area and the PBC must have a terminal nearby for PBC system maintenance.

Display Device

2.17 The display device consists of a display monitor and display logic. The display monitor houses the tube and its associated drive circuitry. The tube has a low-glare face; it is tiltable; and it produces a high quality character display. The display logic, which is housed in a logic module, provides the data storage and editing electronics.

Display Logic

2.18 The display logic contains the display storage and editing electronics. The display logic used in the PBC application contains storage for 5,760 characters (72, 80-character lines).

Operator Console

2.19 The operator console provides facilities for entering and editing data and manually controlling the station. It consists of a keyboard,

two editing clusters, operational controls and indicators, and special function controls. A layout of the operator console is shown in Fig. 7.

Printer

2.20 The printer is an electromechanical line-at-a-time friction feed impact printer which provides hard copy of the data stored in the display logic or of data received directly from the communication line.

2.21 The teletypewriter channels driven by the SPC are assigned numbers 0 through 19. The PBC Model 40 channels are assigned numbers 20 and greater. The PBC Model 40 functions and channel number assignments are as follows:

CHANNEL NUMBER	MODEL 40 FUNCTION	REQUIRED OR OPTIONAL
20	4A Switching Maintenance Center & Recent Changes	Required
21	PBC System Maintenance & Recent Changes	Optional
22	Network Management	Required
23	Network Administration	Required
24	Not Assigned	—
25	Central Analysis Bureau	Optional
26	Trunk Maintenance	Optional
27	Trunk Maintenance	Optional

2.22 As shown in 2.21, the Network Administration DATASPEED 40 is ***required*** and is assigned as channel 23. Channel 23 replaces the ETS teletypewriter channel 3 and its associated buffer circuit. The PBC channel 23 output consists of exception, scheduled, and demand reports. Among the reports required are a machine load and service summary (MLSS) and an ineffective machine attempts (IMA) report. The operation of the DATASPEED 40 is described in Bell System Practices Section 212-830-301.

3. DESCRIPTION OF PBC OPERATION

3.01 The following is a general description of the overall operation of the PBC.

3.02 The 4A ETS traffic measurements without the PBC are accumulated in software counters or registers (within the ETS and later printed out on the ETS TTYs), in electromechanical registers directly from the 4A equipment, and via traffic usage recorders (TURs). This assortment of collection devices is replaced by the PBC, which gathers all the data into one place and summarizes, analyzes, and reports it discretely to the users.

3.03 Without PBC, various task programs (such as the call routing, code grouping, network control, inward wide area telephone service [INWATS], and traffic peg count) are continuously incrementing the counters in the ETS memory during call processing. At periodic intervals, the traffic measurements control program is entered by the executive control program to administer the clearing and switching of the counters and to effect the printout of data via TTY if required by the output schedule.

3.04 With PBC, there will be no accumulation of traffic counts in ETS memory. All the programs which normally would score ETS traffic counters are modified to send the data to the PBC via the SPC-PBC interface through the use of ***distribute*** instructions. Data accumulation, analyzation, and reporting are handled entirely by the PBC.

3.05 The ETS uses (a) four pairs of piggyback twistor memory stores for storage of duplicate copies of the generic program and (b) one or two additional pairs of stores, depending on the size of the office, for storage of duplicate copies of the office variable data. With PBC, there is a reduction in the use of memory locations by the ETS generic program. This leaves memory in the existing piggyback twistor frames for future program growth of the ETS within the maximum of six stores specified for ETS.

3.06 The PBC generic program includes instructions for the proper accumulation and manipulation of the total data. This includes not only the traffic, maintenance, ineffective attempts, and sender retrial data (formerly handled in the ETS and now received via the SPC-PBC interface), but also the peg count data from the 4A switching system via the TDC-PBC interface. In addition, the busy-idle status of switching system common control equipment and trunks (formerly presented to traffic usage recorders to determine ***usage data)*** is presented to the

PBC via the TUI and is scanned by the scanner-distributor portion of the PBC complex to determine usage. Incoming trunk usage measurement on a given trunk begins when the sender is connected to the incoming trunk and does not include the time waiting for the sender to connect.

3.07 Thus, all measurement data relating to trunks, performance of the switching system, routing translations, and disposition of calls through the machine are accumulated as a common base in the PBC memory. Programs within the PBC process the specific items of data necessary to produce the desired exception, demand, and scheduled reports. Other programs cause these reports to be printed out to the various users (Network Management, Network Administration, or Maintenance). Also programmed in the PBC is the capability to produce analyzed patterns of ineffective attempts, sender retrials, and vacant codes for the Maintenance personnel, eliminating the auxiliary trouble recording circuit, card puncher, sorter, and the manual effort required to produce the trouble patterns.

A. Input To The PBC

3.08 There are basically two inputs to the PBC: (a) ***software,*** consisting of the PBC generic program and the office data, which are loaded via separate magnetic tapes and (b) ***real-time data,*** consisting of the PC, OFL, and usage occurrences received via the SPC interface, TDC interface, and usage interface from the 4A/ETS.

3.09 ***Software:***

(a) ***PBC generic program tape*** is provided by Western Electric from BTL-produced master tape.

(b) ***Data tape*** is produced by Western Electric from telephone company information submitted via the ETS questionnaires (expanded for PBC information).

3.10 ***Real-Time Data:***

(a) ***PC and OFL data*** are sent via the SPC-PBC interface from the ETS. Counts are derived from the call data sent to the PBC by the ETS in its processing of calls. Prior to the PBC, some of the data incremented software registers in the ETS or electromechanical registers, or they were not scored on any register. Also sent via this interface are ineffective attempts and sender retrial data.

(b) ***Miscellaneous traffic and maintenance PC data*** are sent via the TDC-PBC interface from the switching circuits and equipment of the 4A switching system. Prior to PBC, these data incremented electromechanical registers. The data to the PBC through this interface represent the data to which the ETS generic program does not have access and therefore cannot distribute via the SPC-PBC interface.

(c) ***Usage data*** are sent via the trunk block connector for outgoing trunks, connector relays for the in and out link frames, and usage leads for incoming trunks and common control equipment. These are scanned directly by the PBC, utilizing a scanner/distributor and a traffic usage frame consisting mainly of multicontact relays. This arrangement eliminates the TUR frames and associated cabling.

B. Output From The PBC

3.11 The PBC provides a number of outputs, all of which share the common basic data base. These outputs will be printed discretely on three IO terminals. Up to four additional terminals may be provided. In addition, an output for EADAS may be provided, if required.

3.12 Basic data (PC, OFL, and usage) are stored in accumulator areas of PBC memory on a real-time basis. These accumulator areas, which are in core memory, are duplicated. While one accumulator is actively accumulating, the other serves as the static source of data for calculations and output reports. Switching of accumulator areas alternately to active and passive status at predetermined intervals, usually 5 or 15 minutes, permits data for each timed interval to be analyzed as a base for output reports or stored in long term memory, if required, while new data are being collected in the areas just cleared.

C. Traffic Data

3.13 The trunk group peg count, overflow data, and all other traffic data formerly printed out on the Network Administration (channel 3) TTY and on the Network Management (channel 2) TTY are sent to the PBC from call routing programs in the ETS. The PBC output includes common

control and several hundred miscellaneous counts. All PBC output data are in a calculated ready-to-use form.

D. Traffic Data—Network Administration

3.14 A PBC-driven data terminal (channel 23) is provided for the network administrator. This terminal can be local or remote. The PBC provides a formatted output to the network administrator to identify trunk groups by abbreviated common language location identification (CLLI) mnemonics as described in Bell System Practices Section 795-100-100. Although some 15-minute and monthly data are provided to this station, most information is reported hourly and daily. Probably the most important and most comprehensive scheduled reports are the IMA and the MLSS. The IMA, MLSS, and five other reports can be scheduled to report an hour of data on the hour and the half hour. Seven automatic reports are provided for the network administrator which include (a) a time-of-day message every hour, (b) a marker peg count every 30 minutes, (c) a 24-hour division of revenue report once a day, (d) accumulated monthly average busy day and average predefined busy hour IMA reports once a day, and (e) vacant code exception reports for thresholds set by Maintenance personnel.

3.15 The network administrator can set 15-minute exception report threshold values against 39 IMA items and 60-minute values against 18 types of common control equipment items. Moreover, the network administrator can demand hourly IMA and MLSS reports for data collected during the preceding 24 hours, plus a variety of other reports on traffic separation (division of revenue, incoming and outgoing trunk groups, and trunk block connectors). A number of demand capabilities also exist for querying both dynamic and reference data files, and some of the Network Management demand type of data.

E. Traffic Data—Network Management

3.16 A data terminal (channel 22) is provided for the network manager. This data terminal can be local or remote. The PBC provides a formatted output to the network manager to identify trunk group data by abbreviated CLLI mnemonics. These data will be calculated to provide output in terms of attempts per circuit per hour (ACH), completions per circuit per hour (CCH), and percentage of overflow.

F. Traffic Data—EADAS Data Port

3.17 The EADAS data port hardware provides an interface from the PBC to a dedicated transmission facility connected at the far end to the EADAS system. This interface is similar to that which is provided at the PBC for remote DATASPEED 40 stations. It consists of a DEC line interface unit and a 202T modem.

G. Traffic Data—Dial-Up Data Port

3.18 The dial-up data port hardware connects the PBC system to a standard switched network telephone line. It allows the PBC to ***answer*** a call made from a far-end computer and to subsequently exchange information with that computer system. This hardware consists of a DEC line interface unit and a 202S modem.

4. PBC REPORTS

A. Network Management

4.01 The following ***reports*** for Network Management will be generated. Examples of the 5- and 15-minute exception reports are shown in Figures 8 and 9, respectively.

(a) ***5-Minute Exception Reports***

(1) Trunk group ACH (attempts per circuit per hour)

(2) Trunk group OCCH (outgoing connections per circuit per hour)

(3) Trunk group ICCH (incoming connections per circuit per hour)

(4) Trunk group percentage of overflow (% OFL)

(5) Trunk group percentage of outgoing usage if any of the above thresholds are exceeded

(6) SADR (sender attachment delay registrations) by type of sender (MF, DP, etc)

(7) IT and TC (intertoll and toll completing) marker PC

(8) Percentage of incoming link PC for the following:

- ROA (reorder announcement)
- VCA (vacant code announcement)
- NCA (no circuit announcement)
- EA1 (emergency announcement No. 1)
- EA2 (emergency announcement No. 2)
- SOA (sender overload announcement)
- FRA (final reorder announcement)
- NC-IT (no IT circuits available)
- NC-TC (no TC circuits available)
- FATR (final attempt trouble records)
- FRA OFL (final reorder announcement overflow)
- Decoder, yes—marker, no—attempts
- Second trial network blocking counts on IT train
- Second trial network blocking counts on TC train.

(9) Percentage of transverter PC for the following:

- MCA (misrouted noncentralized automatic message accounting[non-CAMA] announcement)
- UCA (unauthorized CAMA announcement)

(b) ***15-Minute Exception Reports***

(1) percentage of occupancy of common control units

(2) Maintenance CCS usage of common control units

(3) TORC (traffic overload reroute control) PC (Regional Centers only)

(4) Summary of SADR delay count by sender type and groups, and marker PC by train and total.

4.02 In addition to the preceding reports, the network manager can demand data concerning threshold values. Fig. 10 shows an example of responses to threshold demands.

B. Network Administration And Maintenance

4.03 ***Hourly and 24-hourly summary reports*** will be generated as follows:

(a) Switching load and service reports for the network administrator.

(1) PC, holding time, percentage of occupancy, and Maintenance CCS for the following:

- IT and TC marker groups
- Decoder channel group
- Sender groups
- Controller groups.

(2) PC, holding time, and percentage of engineered capacity for IT and TC switching network.

(3) PC, OFL, and percentage of incoming link PC for the following:

- ROA
- VCA
- MCA (% Transverter PC)
- UCA (% Transverter PC)
- NCA
- EA1
- EA2
- SOA
- FRA.

(4) NC-IT percentage of total outgoing intertoll attempts.

(5) NC-TC percentage of total outgoing toll connecting attempts.

(6) SADR:

- Base count
- Delay count
- Percentage of delay count by sender type.

(7) Second trial matching loss counts on the following:

- IT train
- TC train.

(8) First trial matching loss counts

- First trial matching loss—IT, TC
- First trial FST-ATB—IT, TC

(9) INWATS traffic:

- Incoming
- Outgoing
- Through.

(10) Cancel. Follow with second trial—IT, TC.

(11) Common control holding time exception reports.

(12) Additional reports for:

- Regional center offices
- Overseas offices
- CAMA offices.

Example of the preceding reports are shown in Figures 11, 12, and 13.

(b) ***Maintenance reports*** for the 4A/ETS personnel as follows:

(1) Trouble count, percentage of service PC:

- First trial, second trial IT and TC markers
- First trial, second trial decoder channels
- Link controllers
- First trial, second trial transverters
- Automatic message accounting (AMA) recorder
- Position link and controller
- Master timer
- Register link CAMA, non-CAMA.

Fig. 14 shows typical maintenance measurement reports.

(2) Ineffective attempt counts, percentage of incoming link PC for the following:

- Reorders PS (permanent signal)
- Reorders PD (partial dial)
- Reorders PE (pulsing error)
- Reorders MD (mutilated digits)
- Reorders CO (CAMA)
- Vacant codes
- Sender retrial IKF (integrity check failure)
- Sender retrial NSDR (no sender ahead)
- Sender retrial DPD (dial pulse delay)
- Sender retrial UXS (unexpected stop)
- Sender retrial MRE (miscellaneous retrial)
- Sender final attempt failures
- ANI (automatic number identification) failure
- IF (identification frequency) failure

(3) Ineffective attempt exception report summaries.

(4) IT, TC decoder, yes—marker, no.

(5) Equivalent out-of-service common control units.

(6) Additional reports for the following:

- Regional center offices
- Overseas
- CAMA offices.

4.04 Raw Data Output

(a) For EADAS: Traffic and Maintenance counts and usage outputted every 5 minutes via data link.

(b) For Traffic Data Administration System (TDAS): Trunk equipment data accumulated on disks in hourly segments for subsequent daily generation of magnetic tape.

5. TRAFFIC ORDER CONSIDERATIONS

5.01 Prior to the preparation of the traffic order which will provide or include the provision of the PBC system, the network administrator should be contacted by the design (traffic) engineer to determine various equipment locations, future growth requirements, and other items to be specified in the traffic order.

5.02 The network manager and the network administrator should be consulted concerning the locations for the data terminals and the arrangements desired.

6. RECENT CHANGE OF PBC DATA TABLES

6.01 There are 40 data tables stored in the PBC memory. These data tables describe the office to the PBC. Some of these tables are in ***core*** store and some are on ***disk***. The data in these tables can be changed by use of inputted messages. (See Bell System Practices Section 212-840-303.)

6.02 The PBC recent change program consists of routines which can be used to cause the contents of PBC core and/or disk memory to be changed. These routines are selected and executed by entering the desired input messages on DATASPEED 40 channel 20 or 21. Channel 20 is required for all PBC installations and channel 21 is optional.

6.03 The PBC recent change routines are divided into two groups: control and change. The control routines (a) allocate and release disk storage used during the recent change process, (b) update status indicators, (c) build out recent change orders, and (d) write the old and new values into memory at the proper time. The change routines translate input change messages into a data format to be used by the control routines.

6.04 The change routines are executed by entering change messages. The control routines are executed in two ways, depending on the type of control routine. Some control routines are executed by entering a control message, and some control routines are entered as subroutines from change routines.

6.05 The PBC recent change process is done on an order basis. A recent change order is made up of the recent change inputted messages necessary to make the desired PBC memory change. The change information, obtained from the change message, is stored on a disk file called an order buffer.

A. Control Messages

6.06 The control messages are used to begin, end, activate, and cancel a recent change order. The control messages and their functions are as follows:

MESSAGE	FUNCTION
BEG:RCORD:	Used to start a recent change order. This message must be the first recent change message entered when making a change. This message assigns an order buffer to the recent order change.
END:RCORD:	Used to end a recent change order. This message is the last recent change message entered before the change is

activated or canceled. Recent change will accept another begin message after the end message has been entered.

ACT:RCORD: Used to activate all change messages which were entered between the BEG:RCORD:and END:RCORD: messages. No PBC memory is changed until the ACT:RCORD: message is entered. The order buffer assigned to the change order will be released and made available for future change orders.

CAN:RCORD: Used to cancel all change messages which were entered between the BEG:RCORD: and END:RCORD: messages. No data will be changed by a canceled order. The order buffers assigned to the change order will be released and made available for future change orders.

A complete description of these messages is provided in the PBC Input Message Manual, IM-68500.

B. Change Messages

6.07 The change messages are used to define the data table changes. When a change message is entered, a corresponding change routine will be executed. The change routine will generate change data to be placed in the order buffer. If the ACT:RCORD: message is entered, after the order is complete, the desired change in the order buffer will be written into PBC memory.

7. DATA VERIFICATION OF THE PBC MEMORY

7.01 The Data Table Verification Program (PD68516-01) is made up of routines which can be used to verify the contents of PBC memory. The verification routines are executed by entering the desired input message on any DATASPEED 40.

7.02 A general verification can be used to verify any PBC core of disk area by entering a VER:CORE: or VER:DISK: input message on any DATASPEED 40 input channel. The general verification will generate an output message reporting the address and octal contents of each word that was requested.

8. ABBREVIATIONS AND ACRONYMS

ACH	Attempts Per Circuit Per Hour
CCH	Completions Per Circuit Per Hour
CLLI	Common Language Location Identification
DEC	Digital Equipment Corporation
DPD	Dial Pulse Delay
EA	Emergency Action
EADAS	Engineering and Administration Data Acquisition System
ETS	Electronic Translator System
FATR	Final Attempt Trouble Record
FRA	Final Order Announcement
FRA-OFL	Final Order Announcement—Overflow
ICCH	Incoming Connections Per Circuit Per Hour
IF	Identification Frequency
IKF	Integrity Check Failure
IMA	Ineffective Machine Attempts
INWATS	Inward Wide Area Telephone Service
IO	Input-Output
IT	Intertoll
MCA	Misrouted Non-CAMA Announcement
MD	Mutilated Digit
MLSS	Machine Load and Service Summary

MRE	Miscellaneous Retrial
NC-IT	No Intertoll Circuits Available
NC-TC	No Toll Connecting Circuits Available
NSDR	No Sender Ahead
OCCH	Outgoing Connections Per Circuit Per Hour
OFL	Overflow
PBC	Peripheral Bus Computer
PC	Peg Count
PD	Partial Dial
PE	Pulsing Error
PS	Permanent Signal
ROA	Reorder Announcement
SADR	Sender Attachment Delay Registrations
SOA	Sender Overload Announcement
SPC	Stored Program Control
STUI	Supplemental Traffic Usage Interface
TC	Toll Connecting
TDAS	Traffic Data Administration System
TDC	Traffic Data Converter
TDCA	Traffic Data Converter Access
TTY	Teletypewriter
TUI	Traffic Usage Interface
TUR	Traffic Usage Recorder
USX	Unexpected Stop
VCA	Vacant Code Announcement

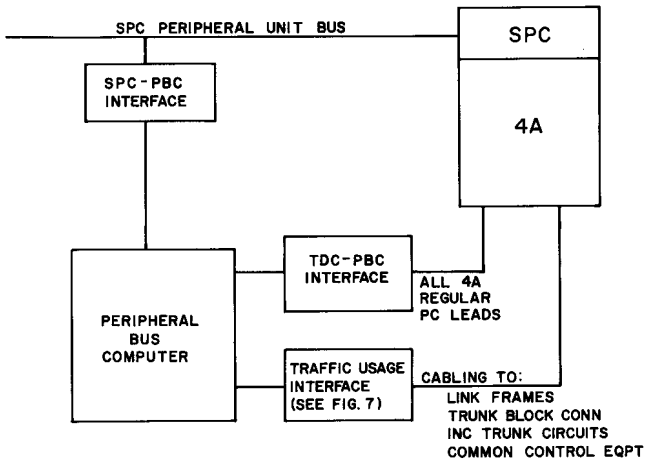


Fig. 1—4A—PBC System Configuration

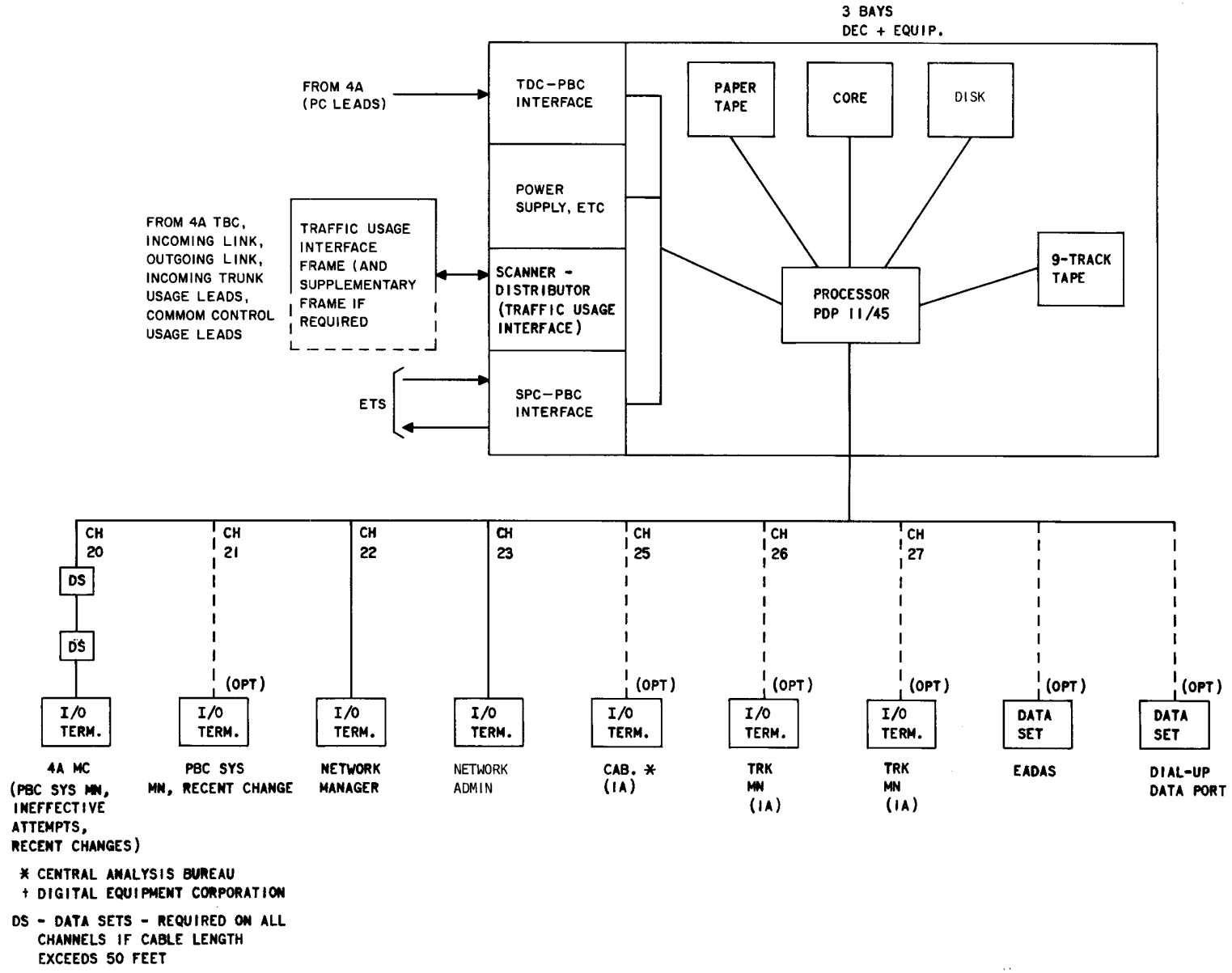


Fig. 2—PBC Minicomputer Block Diagram

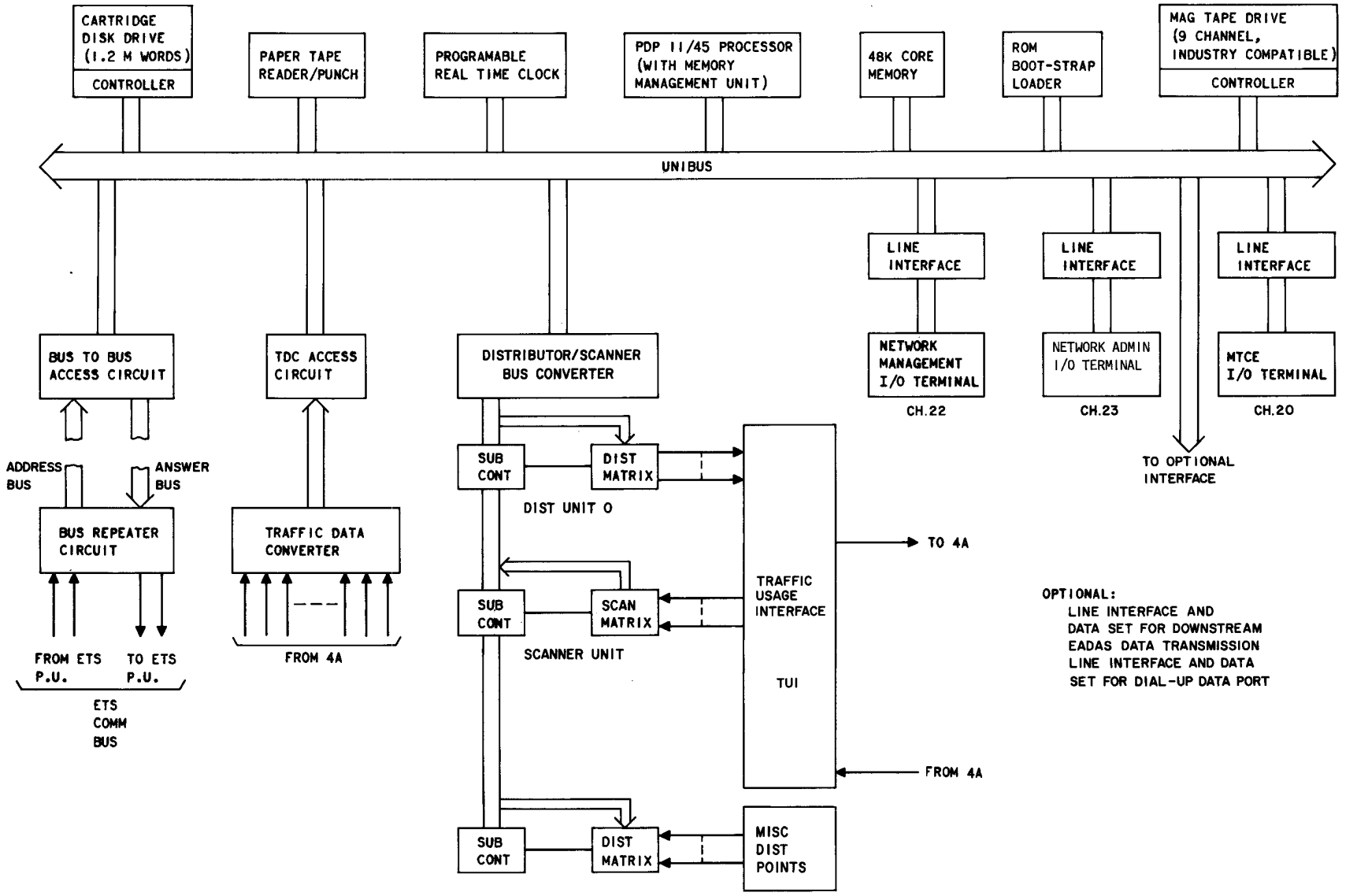


Fig. 3—Basic PBC Equipment Configuration

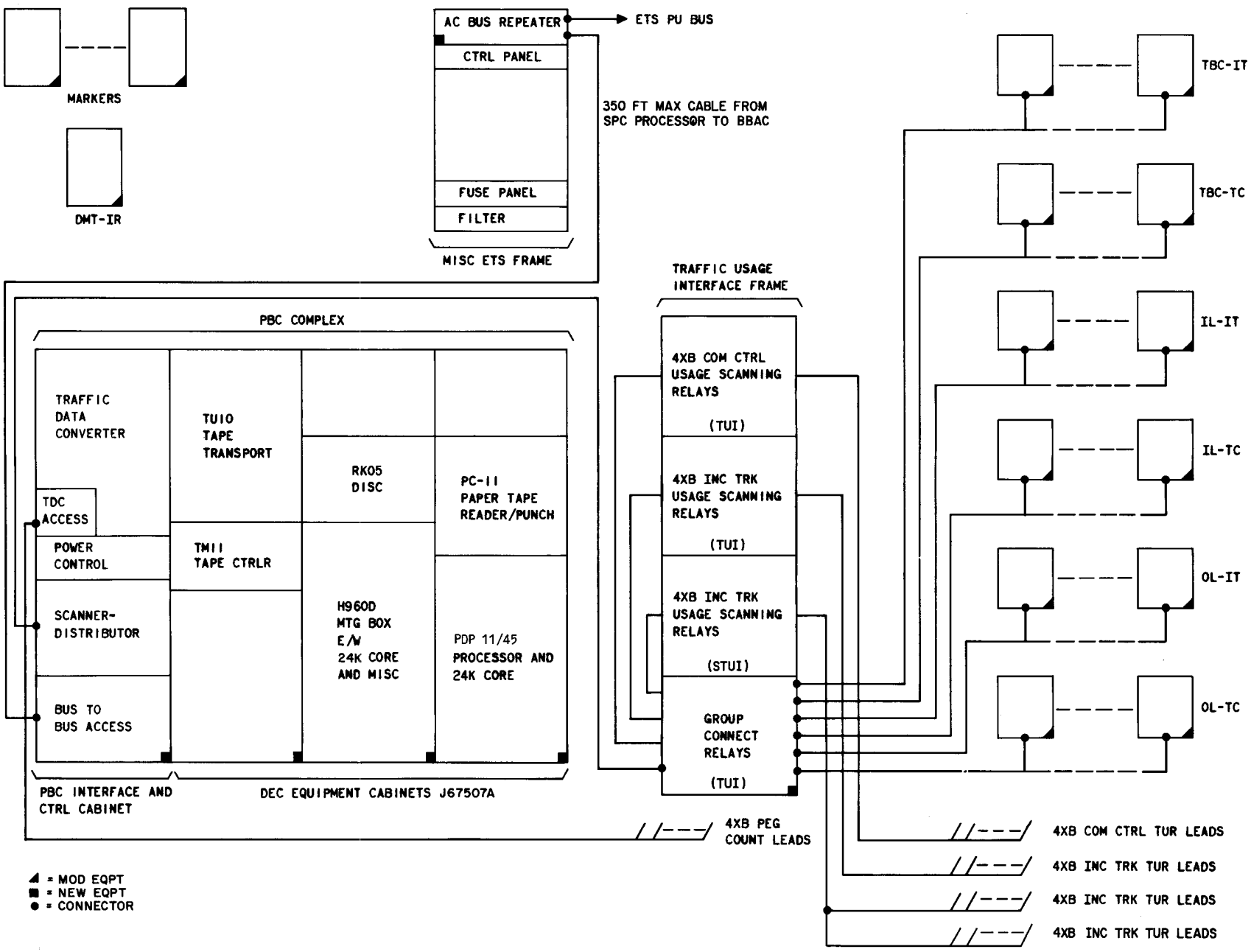


Fig. 4—4A—PBC Equipment Layout

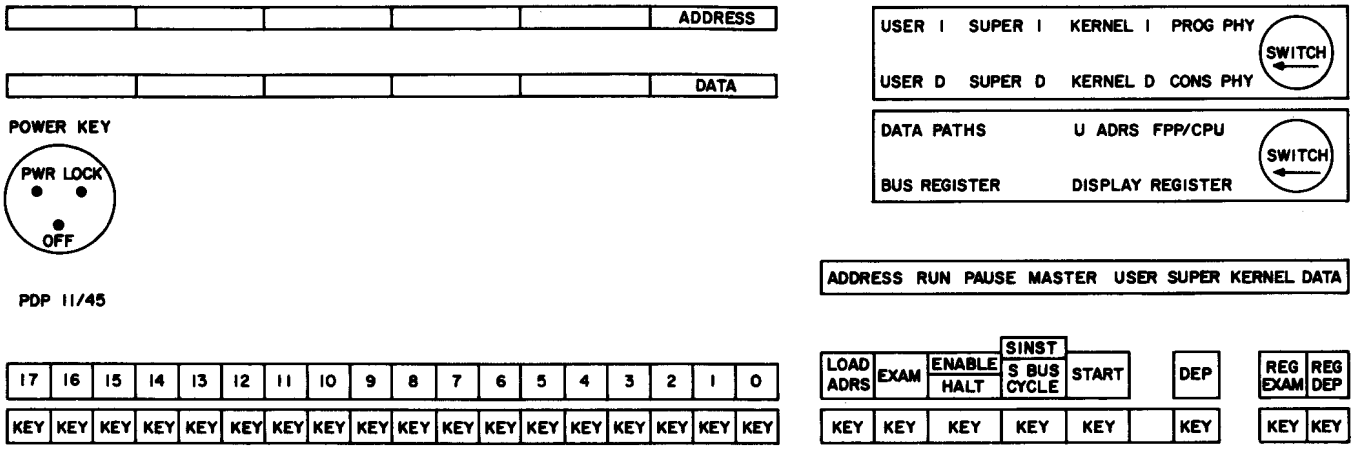


Fig. 5—PDP 11/45 Control Console

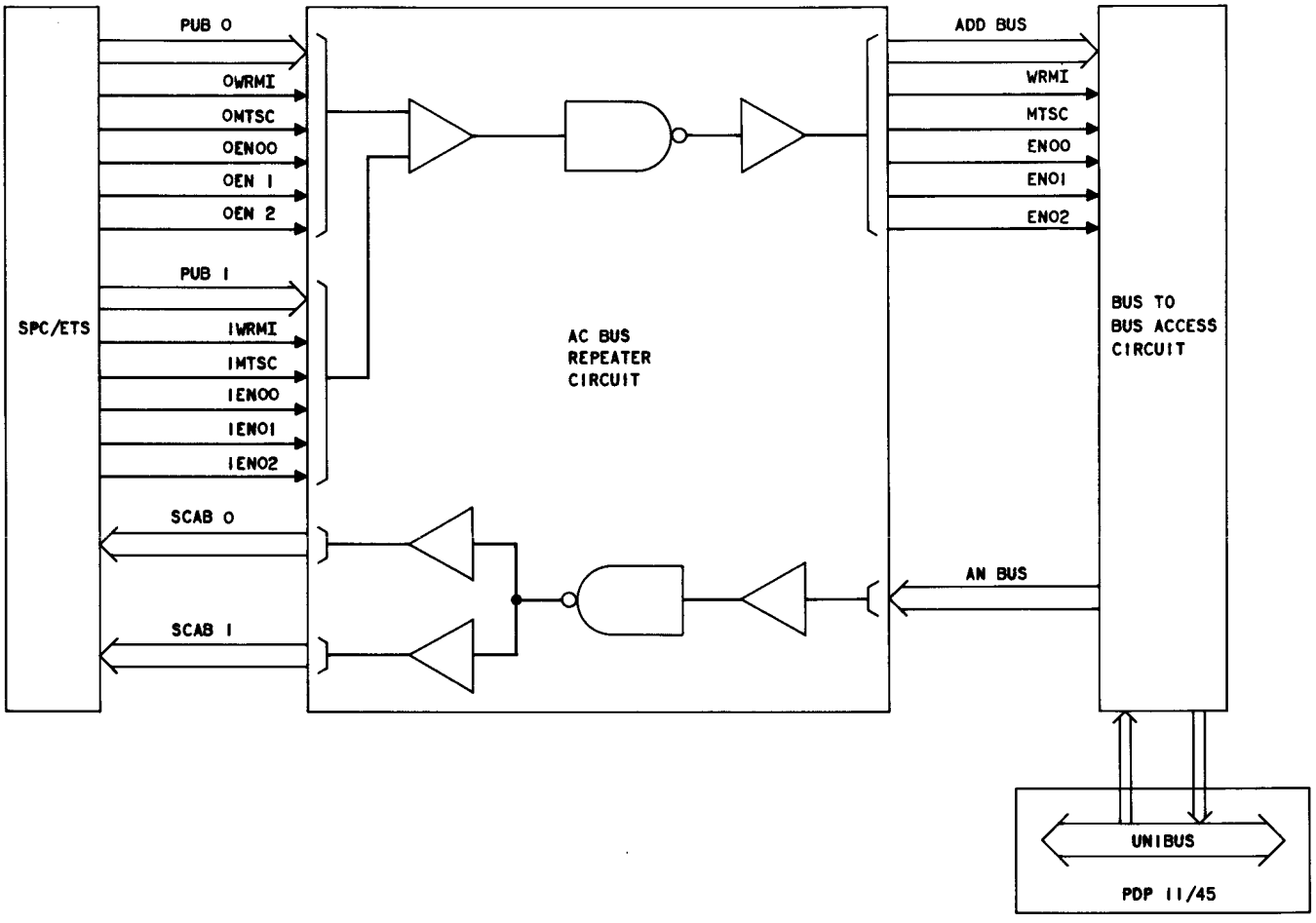
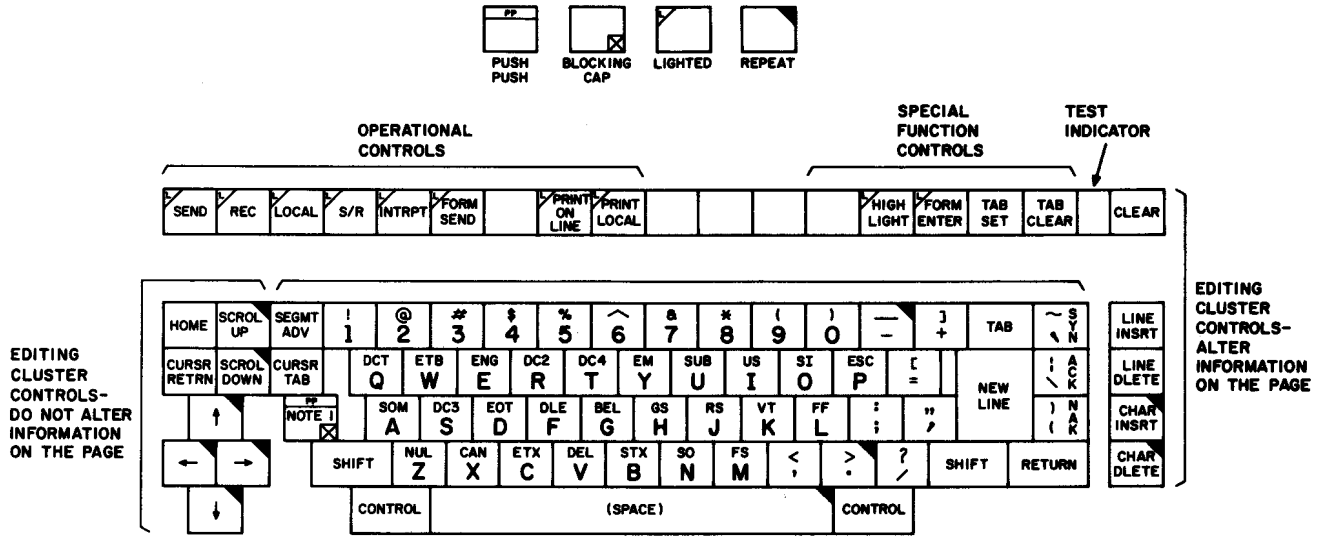


Fig. 6—SPC To PBC Interface Block Diagram



NOTE:
THE CAPS LOCK KEY IS DEPRESSED INTO THE CAPS MODE AND LOCKED BEFORE THE BLOCKING CAP IS INSTALLED.

Fig. 7—Layout Of Operator Console

REPORT:NM5EX

NETWORK MANAGEMENT—5-MINUTE EXCEPTION REPORT
OFFICE DATE TIME

REGISTER	IT PC	TC PC	TOTAL
*MARKER	3025*	3726*	6751
ITLF	3015	3705	6720
*CAMA SENDER			1203

TYPE	%SDA	BC	DC	GROUPS
MF	10.0	60	6	ABCDE
DP	12.5	8	1	
CAMA	28.6	7	2	A

REGISTER		PC	%MKR
FST—ATB	IT	20	0.7
FST—ATB	TC	10	0.3*

REGISTER	PC	OFL	%ITLF
*FRA	20	1*	0.3*
*SOA	21	0	0.3*
*ROA	50	2	0.7
*NCA	40	0	0.6*
*EA1	5	0	0.1*
*EA2	10	0	0.1*
*VCA	30	0	0.4*
			%TRANSV
*UCA	10	1	0.8*
*MCA	2	0	0.2*

REGISTER	PC	%ITLF
NCIT TOTAL	32	0.4*
NCTC TOTAL	7	0.1*
NCIT—NM	4	0.0
NCTC—NM	0	0.0
NCA—NM	4	0.0
CFST IT	4	0.0*
CFST TC	0	0.0

	PC	%ITLF
INWATS TOTAL	75	1.1
ORIGINATING	20	0.3
THRU	12	0.2
TERMINATING	43	0.6
REROUTE	82	

*Before line indicates request made for this data.
*After data indicates exceeded threshold.

REPORT:NM5EX (Cont)

EQPT	AV#OUT	MCCS	TCCS	TOTCCS	%OCC	PC	HT/A
ITMKR	1	3	12	15	50	3025	0.40
TCMKR	0	1	14	15	53	3726	0.38
DCH	2	5	15	20	67	7000	0.21
MF-A	5	14	46	60	50	844	5.45
DP	2	6	66	72	60	505	13.08
CAMA-A	1	2	94	96	80	1442	6.52
LKCNT-B (MF-A)	4	13	81	94	65	1020	0.53
TRNSV	2	5	22	27	75	1400	1.57

REPORT:NM5TG
NETWORK MANAGEMENT — 5-MINUTE TRUNK GROUP EXCEPTION REPORT
OFFICE DATE TIME

NAME	EQ2W OTKS	PC	OFL	%OFL	ACH	OUT CCH	IN CCH	IPC	EQ2W ITKS	OUT %OCC	TGI	RN
*NRWY IL N0 4AT	155	307	222	72*	24*	6	6	77	153	95	460	01
CHCG IL 03 4AT	36	48	40	83	16*	3	4	12	36	90	572	02
CHCG IL 02 4MT	16	22	15	68	17*	5	5	7	16	87	376	03
DESM IA DT 4AT	36	58	47	85	19*	3	4	12	36	98	1054	06
*WHPL NY 02 4AT	132	117	40	34*	11	9*	8*	88	135	85	1276	40
ALBY NY SS 4AT	24	145	139	96*	72*	3	3	6	24	100	2064	44
*DNVR CO MA 4AT CF	72	120	84	70*	20*	6	4	24	72	83	1890	70
DNVR CO MA 4AT 1W	48	100	72	72	25*	7	5	20	46	92	1895	71
DNVR CO MA 4AT 1F	12	21	17	81	21*	4	6	6	12	93	1886	72

*Before line indicates request made for this data.

*After data indicates exceeded threshold.

Fig. 8—Examples Of 5-Minute Network Management Exception Reports

REPORT:NM15EX

NETWORK MANAGEMENT — 15-MINUTE EXCEPTION REPORT
OFFICE DATE TIME

TYPE	%SAD	BC	DC
MF	10.0	180	18
MF-A	18.2	22	4
MF-B	9.1	22	2
MF-C	4.4	23	1
MF-D	13.6	22	3
MF-E	8.7	23	2
MF-F	21.7	23	5
MF-G	0	23	0
MF-H	4.6	22	1
DP	12.5	24	3
CAMA-A	28.6	21	6

REPORT: NM15MKR OFFICE DATE TIME

IT MKR PC 11026 TC MKRPC 10026 MKR TOTAL PC 21052

REPORT: NM15TG

NETWORK MANAGEMENT — 15-MINUTE TRUNK GROUP REPORT
OFFICE DATE TIME

NAME	EQ2W OTKS	PC	OFL	%OFL	ACH	OUT CCH	IN CCH	IPC	EQ2W ITKS	OUT %OCC	TGI	RN
WHPL NY 02 4AT	132	337	120	36	12	7	6	264	135	90	1276	40

Fig. 9—Examples Of 15-Minute Network Management Exception Reports

I. RESPONSE TO TK THRESHOLD DEMAND

NAME	OUT 1W	OUT 2W	IN 1W	EQ2W OUT	EQ2W IN	%OFL	THRESHOLDS ACH	CCH	ICCH	TGI	RN
NRWY 1L NO 4AT	12	131	11	155	153	3	2	1	2	0460	001

II. RESPONSE TO TRUNK THRESHOLD LEVELS DEMAND

LEVEL	%OFL	ACH	CCH	ICCH
1	0	10	5	5
2	2	12	7	7
3	10	15	9	9
4	25	18	11	11
5	50	20	13	13
6	80	25	15	15
7	100	35	18	18
8	101	300	100	100

Fig. 10—Examples Of Responses To Trunk Group Threshold Demands

INEFFECTIVE MACHINE ATTEMPTS REPORT

OFFICE DATE PERIOD 1000-1100

	IT	TC	TOTAL
MARKER PC	60295	56939	117234
ITLF PC	60276	56674	116950
ITLF CCS	89765	88501	178266

SADR	BASE	DELAYS	% DELAY
MF	700	6	.9
DP	42	0	.0
CAMA	51	1	2.0
OVS	57	1	1.8
ORP	25	0	.0
ODP	25	0	.0

	PC	OFL	%ITLF
TOTAL INEFFECTIVE	1262		1.08
ROA	1175	20	1.00
SOA	0	0	.00
FRA MINUS ANN OFL	12		.01
NCA + EA1 + EA2	75		.06
ROA DETAIL			
PERM SIGNAL	550		.47
PART DIGITS	125		.11
PULS ERROR	236		.20
MUT DIGIT	90		.08
FATR	71		.06
MATCH LOSS 2ND TRL	3		.00
MKR 2ND TRL FAIL	32		.03
DCH 2ND TRL FAIL	7		.01
TRNSV 2ND TRL FAIL	6		.00
CAMA OTHER	45		.04
MISCELLANEOUS	10		.01
SENDER RETRIALS	647		.55
INTEGRITY CHK FAIL	31		.03
NO SENDER AHEAD	189		.16
UNEXPECTED STOP	211		.18
DIAL PULSE DELAY	136		.12
MISCELLANEOUS	80		.07
FRA TOTAL PC	32		.03
ANN OFL TO FRA	20		.02
FRA OFL	0		.00
NO CIRCUIT BREAKDOWN			
NCA TOTAL	75	0	.06
EA1	0	0	.00
EA2	0		.00
NCA-NM	0		.00
VCA	817	0	.70
LINE BUSY	20	0	.02

	PC	%
OUTGOING IT PC	73482	
NCIT TOTAL	57	.08
NCIT-NM	0	.00
OUTGOING TC PC	42427	
NCTC TOTAL	18	.04
NCTC-NM	0	.00
INWATS TOTAL	3622	
ORIGINATING	1462	
THRU	528	
TERMINATING	1632	
ROUTED	1483	90.87
NOT ROUTED	149	9.13
MARKER IT PC	60295	
FST-ATB IT	150	.25
CFST IT	0	.00
ML 1TR IT	15	.02
ML 2TR IT	2	.00
MARKER TC PC	56939	
FST-ATB TC	75	.13
CFST TC	0	.00
ML 1TR TC	8	.01
ML 2TR TC	1	.00
TPC TOTAL	115909	
THRU	30726	26.51
INCOMING	40268	34.74
OUTGOING	42756	36.89
NON-THRU	2159	1.86

	PC	%CAMA
CAMA SDR	20943	
UCA PC	65	.31
UCA OFL	0	
MCA PC	103	.49
MCA OFL	0	

	PC	% ONI
ONI TRNSV	5426	
MATCH CHECK	12	.22
WRG CLL CODE	16	.29
POS DISC	14	.26
NO POS AVAIL	3	.05

	PC	% DP
CAMA DP REG	6453	
SERV CODE	1984	30.75
PERM SIGNAL	53	.82
PART DIGITS	27	.42
IRL TR	16	.27

Fig. 11—Example Of Ineffective Attempts Report

MACHINE LOAD AND SERVICE SUMMARY

OFFICE DATE HOUR 1000-1100

ITEM	NO. INSTALLED TFC	MTC	TOT	ENG CAP	PC	% TOTAL	% ITLF	CCS MTC	CCS TFC	%ENG CAP	HT/A
LINK FRAME LOAD											
INC TLF IT	40		40	112000	44060	49.5			81161	72	184.21
TC	40		40	112000	44970	50.5			76071	68	169.16
TOTAL	80		80	224000	89030				157233	70	176.61
THRU TRAFFIC					12707	14.4					
INC TRAFFIC					35199	40.0					
OUT TRAFFIC					37009	42.1					
NON THRU TRAFC					3000	3.4					
COMMON CONTROL											
CONTROLLERS	33	11	44	840	100522		112.9	0	535	64	.53
SENDERS MF	275	26	301	7297	68543	76.5		236	3737	51	5.45
DP	24	6	30	584	3166	3.5		0	414	71	13.08
CAMA	47	3	50	1049	8714	9.7		0	568	54	6.52
OVS	35	2	37	932	9210	10.3		28	543	58	5.90
TOTAL	381	37	418		89633		100.7				
RETRL					503	.6					
OUTSENDERS DP	10	1	11	200	1200		1.3	0	180	90	15.00
RP	8	1	9	160	1023		1.1	0	135	84	13.20
N-CAMA DP REG	38	2	40	380	2330		2.6	0	150	39	6.44
DECODER CHAN	9	1	10	243	91751		103.1	0	122	50	.13
2ND TRIAL					1662	1.8					
IN NHLD RTG					85297	93.0					
IN HLD RTG					4240	4.6					
SUB NHLD RTG					1137	1.2					
SUB HLD RTG					1	.0					
MARKERS IT	9	1	10	260	45190	48.9	102.6	0	169	65	.37
TC	9	1	10	260	47310	51.1	105.2	0	182	70	.39
TOTAL	18	2	20	520	92500		103.9	0	351	68	.39
TRANSVERTERS	8	1	9	216	7833		28.1	0	111	51	1.42
ANI					5633	84.7					
ONI TOTAL					1200	15.3					
ANF					4	.3					
AIF					0	.0					
2ND TRIAL					10	.1					
BLK BIL FREE					0	.0					
RECORDERS	20	1	21	200	17663		19.8		88	44	.50
CAMA POSITION	6		6	195	1200				180	92	15.00
CAMA DP REG	247	13	260	2470	25350		28.5	0	1422	57	5.66
SERV CODE PC					298	1.2					1.00

TEST CALLS	DMT	SDT	OGT	ITT	DRE RTE	ACT PC	%ACT USE	RERTD CALLS	ITLF	SAMP PC	TOT/ SAMP	SAMP CCS
531	36	150	210	135	1	12	5	157	IT	10746	4.1	19795
									TC	10220	4.4	17288

Fig. 12—Example Of Machine Load And Service Summary Report (MLSS) (Sheet 1 Of 4)

CONTROLLER AND SENDER GROUPS

ITEM	NO. INSTALLED TFC	MFC	TOT	ENG CAP	PC	% SDRGP	% TOTAL	CCS MTC	CCS TFC	%ENG CAP	HT/A
CONTROLLER GRP											
A(MF-A)	3	1	4	70	10120	108.2	10.1	0	56	80	.55
B(MF-B)	3	1	4	70	10510	109.7	10.4	0	63	90	.60
C(MF-C)	3	1	4	70	7970	87.9	7.9	0	49	70	.61
D(MF-D)	3	1	4	70	7780	113.7	7.7	0	40	57	.51
E(MF-E)	3	1	4	70	7030	96.0	7.0	0	41	59	.58
F(MF-H)	3	1	4	70	10020	103.6	10.0	0	61	87	.61
G(MF-J)	3	1	4	70	9420	101.1	9.4	0	52	74	.55
H(MF-K)	3	1	4	70	7520	101.6	7.5	0	38	54	.50
J(DP)	3	1	4	70	5090	160.8	5.1	0	30	43	.50
K(CAMA-A)	3	1	4	70	10610	143.7	10.6	0	68	97	.64
L(CAMA-B)	3	1	4	70	6770	509.4	6.7	0	45	64	.66
M(OVS)	3	1	4	70	7682	83.4	7.6	0	37	53	.48
SENDER GRP											
MF-A	36	2	38	965	9350		12.0	0	553	57	5.91
MF-B	34	4	38	900	9580		12.3	0	543	60	5.67
MF-C	34	4	38	900	9070		11.7	0	462	51	5.09
MF-D	34	4	38	900	6840		8.8	0	447	50	6.54
MF-E	35	5	40	932	7320		9.4	36	379	41	5.18
MF-H	35	3	38	932	9667		12.4	72	441	47	4.56
MF-J	35	3	38	932	9316		12.0	68	524	56	5.62
MF-K	32	1	33	836	7400		9.5	60	398	48	5.24
DP	24	6	30	584	3166		100.0	0	414	71	13.08
CAMA-A	33	2	35	867	7385		84.7	0	466	54	6.31
CAMA-B	14	1	15	282	1329		15.2	0	102	36	7.67
OVS	35	2	37	932	9210		100.0	28	543	58	5.90

INCOMING DIAL PULSE REGISTER GROUPS

ITEM	NO. INSTALLED TFC	MTC	TOT	ENG CAP	PC	% TOTAL	SERV CODE	CCS MTC	CCS TFC	%ENG CAP	HT/A
NON-CAMA GROUPS											
0	19	1	20	190	1100	47.2		0	70	37	6.36
1	19	1	20	190	1230	52.8		0	80	42	6.50
CAMA GROUPS											
2	19	1	20	190	1040	4.1	18	0	90	47	8.81
3	19	1	20	190	1040	4.1	32	0	156	82	15.48
4	19	1	20	190	880	3.5	28	0	116	61	13.62
5	19	1	20	190	1080	4.3	16	0	138	73	12.97
6	19	1	20	190	1210	4.7	79	0	146	77	12.82
7	19	1	20	190	6770	26.7	14	0	150	79	2.22
8	19	1	20	190	1010	4.0	18	0	110	58	11.09
9	19	1	20	190	8680	34.2	18	0	108	57	1.25
10	19	1	20	190	1120	4.4	17	0	120	63	10.88
11	19	1	20	190	980	3.9	14	0	102	54	10.56
12	19	1	20	190	920	3.6	17	0	116	61	12.85
13	19	1	20	190	210	.8	9	0	22	12	10.95
14	19	1	20	190	410	1.6	18	0	48	25	12.24

Fig. 12—Example Of Machine Load And Service Summary Report (MLSS) (Sheet 2 Of 4)

INDIVIDUAL EQUIPMENT DATA

ITEM	0	1	2	3	4	5	6	7	8	9	10	11
DEC CH												
PC	10625	11667	12308	10000	9603	7857	7143	6923	7500	8125		
MTC	0	0	0	0	0	0	0	0	0	0		
TFC	17	14	16	12	11	11	10	9	9	13		
HT/A	.16	.12	.13	.12	.12	.14	.14	.13	.12	.16		
MKR IT												
PC	4440	5870	5060	5170	4880	4350	4410	3670	3540	3800		
MTC	0	0	0	0	0	0	0	0	0	0		
TFC	14	18	17	18	16	16	13	15	14	16		
HT/A	.32	.31	.34	.35	.33	.37	.30	.41	.40	.42		
MKR TC												
PC	4930	5430	5460	5420	4940	4770	4440	3870	4030	4020		
MTC	0	0	0	0	0	0	0	0	0	0		
TFC	16	18	19	18	18	16	16	16	16	17		
HT/A	.32	.33	.35	.33	.36	.34	.36	.41	.40	.42		
TRNSV A												
PC	1504	1245	1025	968	959	448	495	653	536			
MTC	0	0	0	0	0	0	0	0	0			
TFC	22	19	14	15	12	6	8	7	6			
HT/A	1.46	1.53	1.36	1.55	1.25	1.34	1.62	1.07	1.12			
RECORDERS A												
0-9 PC	1187	1009	1697	1022	1644	953	1039	935	649	1305		
TFC	8	4	9	7	7	6	5	7	3	6		
HT/A	.67	.40	.53	.68	.42	.63	.48	.75	.46	.46		
RECORDERS A												
10-19 PC	934	438	1	997	1319	1531	49	1	1	1	0	
&EMG TFC	5	3	0	4	7	7	0	0	0	0	0	
HT/A	.54	.68	.00	.40	.53	.46	.00	.00	.00	.00	.00	

CONTROLLERS	0				1				2				3			
GRP	PC	MT	TF	HT/A	PC	MT	TF	HT/A	PC	MT	TF	HT/A	PC	MT	TF	HT/A
A	2500	0	16	.64	2780	0	13	.47	2470	0	12	.49	2370	0	15	.63
B	2510	0	14	.56	2590	0	15	.58	2910	0	16	.55	2500	0	16	.64
C	2040	0	13	.64	1840	0	11	.60	2040	0	13	.64	2050	0	12	.58
D	2170	0	10	.46	2010	0	10	.50	1610	0	10	.62	1990	0	9	.45
E	1700	0	9	.53	1690	0	10	.59	1680	0	11	.66	1960	0	10	.51
F	2610	0	16	.61	2680	0	15	.56	2050	0	14	.68	2680	0	15	.56
G	2510	0	12	.48	2400	0	14	.58	2260	0	13	.58	2250	0	11	.49
H	1700	0	10	.59	2130	0	10	.47	1710	0	8	.47	1980	0	8	.40
J	1440	0	8	.56	1110	0	7	.63	980	0	5	.51	1560	0	9	.58
K	1640	0	11	.67	1680	0	10	.60	1620	0	11	.68	1830	0	12	.66
L	2530	0	17	.67	3060	0	19	.62	2490	0	16	.64	2500	0	16	.64
M	2014	0	11	.55	1683	0	8	.48	2436	0	12	.49	1549	0	6	.39

Fig. 12—Example Of Machine Load And Service Summary Report (MLSS) (Sheet 3 Of 4)

TRK TYPE	# INST	# WKG
INC 1W IT MF	1316	866
INC 2W IT MF	6975	6553
INC OVRSEAS	1000	871
INC TDM-SWBD	500	432
INC CAMA MF	169	23
INC TSPS	4212	3326
INC TOTAL	14172	12071
INC EQU 1W	10185	8359
OUT 1W IT	1392	989
OUT 1W TC	4731	3479
OUT TOTAL	6123	4468

MARKER ATTEMPTS PER EQ 1W INC TRUNK	8.8
ITLF CCS PER EQ 1W INC TRUNK	15.0

Fig. 12—Example Of Machine Load And Service Summary Report (MLSS) (Sheet 4 Of 4)

OUTGOING TRUNK GROUP REPORT ADM-GRP 1
OFFICE DATE PERIOD 1000-1100

----- LOCATION -----	-- PC -	- OFL -	- 1W USE -	- 2W USE -
ALNC OH 8250T	4	0	0	18
CLEV OH 0202T	24	0	60	61
CLEV OH 6201T 01	234	1	520	0
CLMB OH 1102T	297	151	0	325
CNCN OH WS04T	182	98	0	223
IYTN OH 1501T	39	5	0	80
MEDN OH XA50T 01	890	584	684	0
MNFD OH XA50T	9	0	0	18
TOLD OH 2101T	117	15	0	236
STR OH XA50T	16	0	0	29

A

INCOMING TRUNK GROUP USAGE REPORT
OFFICE DATE PERIOD 1000-1100

----- LOCATION -----	USAGE
CLEV OH 4201T 02	689
CNTN OH 0101T 02	54

B

MISCELLANEOUS HARDWARE REGISTER REPORT
OFFICE DATE PERIOD 1000-1100

PEG COUNT

	0	1	2	3	4	5	6	7	8	9
0-9										
10-19										
20-29										
30-39										
70-79										

USAGE — 10 SECOND SCAN

	0	1	2	3	4	5	6	7	8	9
0-9										
10-19										
20-29										
30-31										

C

Fig. 13—Examples Of Miscellaneous Network Administration Reports (Sheet 1 Of 2)

TRAFFIC SEPARATIONS REPORT
OFFICE DATE PERIOD 1000-1100

PEG COUNTS
OUTGOING CATEGORIES

INC CAT	N	A	B	C	D	E	F	G	TOT N-G
N	2	4	0	0	0	0	0	5	11
1	23	2447	0	526	0	0	0	0	2996
2	3	690	0	37	18	0	0	390	1138
3	4	1935	0	357	1	0	0	67	2364
4	17	1604	0	109	7	0	0	1634	3371
5	2	0	0	0	0	0	0	0	2
6	0	4	0	20	0	0	0	0	24
7	0	0	0	0	0	0	0	0	0
TOT N-7	51	6684	0	1049	26	0	0	2096	9906

PERCENTAGES
OUTGOING CATEGORIES

INC CAT	N	A	B	C	D	E	F	G	TOT N-G
N	.0	.0	.0	.0	.0	.0	.0	.0	.1
1	.2	24.7	.0	5.3	.0	.0	.0	.0	30.2
2	.0	6.9	.0	.3	.1	.0	.0	3.9	11.4
3	.0	19.5	.0	3.6	.0	.0	.0	.6	23.8
4	.1	16.1	.0	1.1	.0	.0	.0	16.4	34.0
5	.0	.0	.0	.0	.0	.0	.0	.0	.0
6	.0	.0	.0	.2	.0	.0	.0	.0	.2
7	.0	.0	.0	.0	.0	.0	.0	.0	.0
TOT N-7	.5	67.4	.0	10.5	.2	.0	.0	21.1	100.0

D

TRUNK LINK FRAME LOAD BALANCE REPORT
OFFICE DATE PERIOD 1000-1100

FRAMES	AV. CCS/FRAME
INC IT	XXXXX
INC TC	
OUT IT	
OUT TC	

SWITCH SAMPLE CCS

FRAME	0	1	2	3	4	5	6	7	8	9	TOTAL	% DEV
INC IT											XXXXX	
0												
1												

E

Fig. 13—Examples Of Miscellaneous Network Administration Reports (Sheet 2 Of 2)

PLANT MEASUREMENTS REPORT
0900 TO 1000
11/2/73

SPC PMC

DCH TOTAL	A LVL INT	B LVL INT	C LVL INT	E LVL INT	F LVL INT
646	0	0	0	0	1
E-E CYC	**AUDIT ERR**	**ERR THRS OF**	**ERR ANAL SUC**	**CEF-SFTWR**	**J LVL>100MS**
185706	0	0	0	0	0
PROC ERR	**PROC FLT**	**PROC ATP**	**STORE ERR**	**STORE FLT**	**STORE ATP**
0	0	0	0	0	0
CPD ERR	**CPD FLT**	**CPD ATP**	**SCNR ERR**	**SCNR FLT**	**SCNR ATP**
0	0	0	0	0	0
SD ERR	**SD FLT**	**SD ATP**	**PFT ERR**	**PFT FLT**	**PFT ATP**
0	0	0	0	0	0
TTY MSG LST	**CPR MNR**	**CPR MJR**	**CPR SIA**	**CPR SIB**	
0	0	0	0	0	

ETS PMC

SCN RD ERR	SCN RD FLT	DREG ERR	DREG FLT	DREG ATP	B-B ERR
0	0	0	0	0	0
B-B FLT	**B-B ATP**	**CONT FD**	**LOST CALLS**	**TBL RCDR LD**	
0	0	0	0	0	
DRES	**FRES**	**DTNR**	**NATB**	**DRMF**	**TRES**
0	0	0	0	0	0
DCH 2TR	**ROA**	**SNDR RET**	**ML 2 TR**		
7	38	0	0		
TKS-S MD	**NCA MD**	**NCA-S MD**	**FRA MD**	**FRA-S MD**	**ROB MD**
161	0	0	0	0	0
FST-ATB MD	**COF MD**	**TRL MD**	**INVLD MKR**	**INVLD MD**	**MISSED MD**
4	0	0	0	0	0

Fig. 14—Plant Measurement Reports (Sheet 1 Of 2)

```
OOREPORT:IA'S PROCESSED:      46
         IA'S LOST:      4
         IA'S RECEIVED:
TST=   0    PST=   30    PDT=   2    PMS=   0    PEO=   0    PMD=   0
COF=   0    IOS=    0    EBI    0    PLK=   0    IKF=   1    NSD=   0
DPD=   0    XST=    0    UXS    1    CPF=   5    MPS=   0    MOF=   0
VCA=   6    IWS=    0    ANI    0    KRT=   0                ERR=   1
         ER'S GENERATED:
           NAG:   2    NIV:      0   NTF:     0   TRF:     0
         IA MAN. INH:          CKT. ID.   CKT. NO.
         IA IPO LIST:          CKT. ID.   CKT. NO.
                               SDR        ETS:     0
```

Fig. 14—Plant Measurement Reports (Sheet 2 Of 2)