

E2A TELEMETRY

STATUS AND COMMAND REMOTE APPLICATIONS

DESCRIPTION

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1. INTRODUCTION

1.01 This section describes the E2A telemetry equipment associated with Status and Command (SAC) remote applications. Systems utilizing the SAC remote include the Centralized Status, Alarm and Control System (CSACS), the Engineering and Administrative Data Acquisition System/Network Management (EADAS/NM), the Telecommunications Alarm, Surveillance and Control System (TASC), and the E3 Alarm System.

1.02 This section is reissued to include two new applications of the status and command remote which are the TASC and the E3 Alarm Systems, and to incorporate the use of satellite remotes which, when hubbed to a SAC remote, provide surveillance and control of community dial offices (CDO).

1.03 CSACS (Fig. 1), is a computerized alarm monitoring and control system designed for use with all electromechanical wire centers (such

as the step-by-step and crossbar systems) except panel. The purpose of CSACS is to centralize maintenance and alarm processing for up to 128 wire centers. CSACS provides a Digital Equipment Corporation PDP11/10 processor and one or more TELETYPE® consoles for handling alarms and information output. This results in a minimum of man-machine interaction since CSACS can automatically monitor wire centers and, via command operations, alleviate most alarm conditions at the wire centers.

1.04 EADAS/NM (Fig. 2), is a computerized system which allows centralized, real-time surveillance and control of all levels of the switching hierarchy, from regional centers to selected end offices, within predefined segments of the network. By analyzing traffic data as it is being gathered from all types of switching machines via EADAS phase one or peripheral bus computers, EADAS/NM will monitor the status of critical switching machines and trunk group functions and report immediately when potential congestion is imminent.

1.05 The TASC system (Fig. 3) is a computerized, real-time alarm and control system designed to monitor and control broadband transmission plant and central office switching systems. TASC systems in the future will supercede the CSACS systems and will have the ability to provide complete centralization of all regional transmission plant and central office switching systems. The only portion of the TASC system that is discussed in this practice is that part relating to the TCT, SAC remote, and CDO satellite remote.

1.06 The E3 alarm system (Fig. 4) is a new generation of the basic E-type alarm and control system. Through the use of a microprocessor, firmware, and memory, it provides alarm and control functions associated with centralizing the monitoring of activities of a limited number of electromechanical switching systems, transmission

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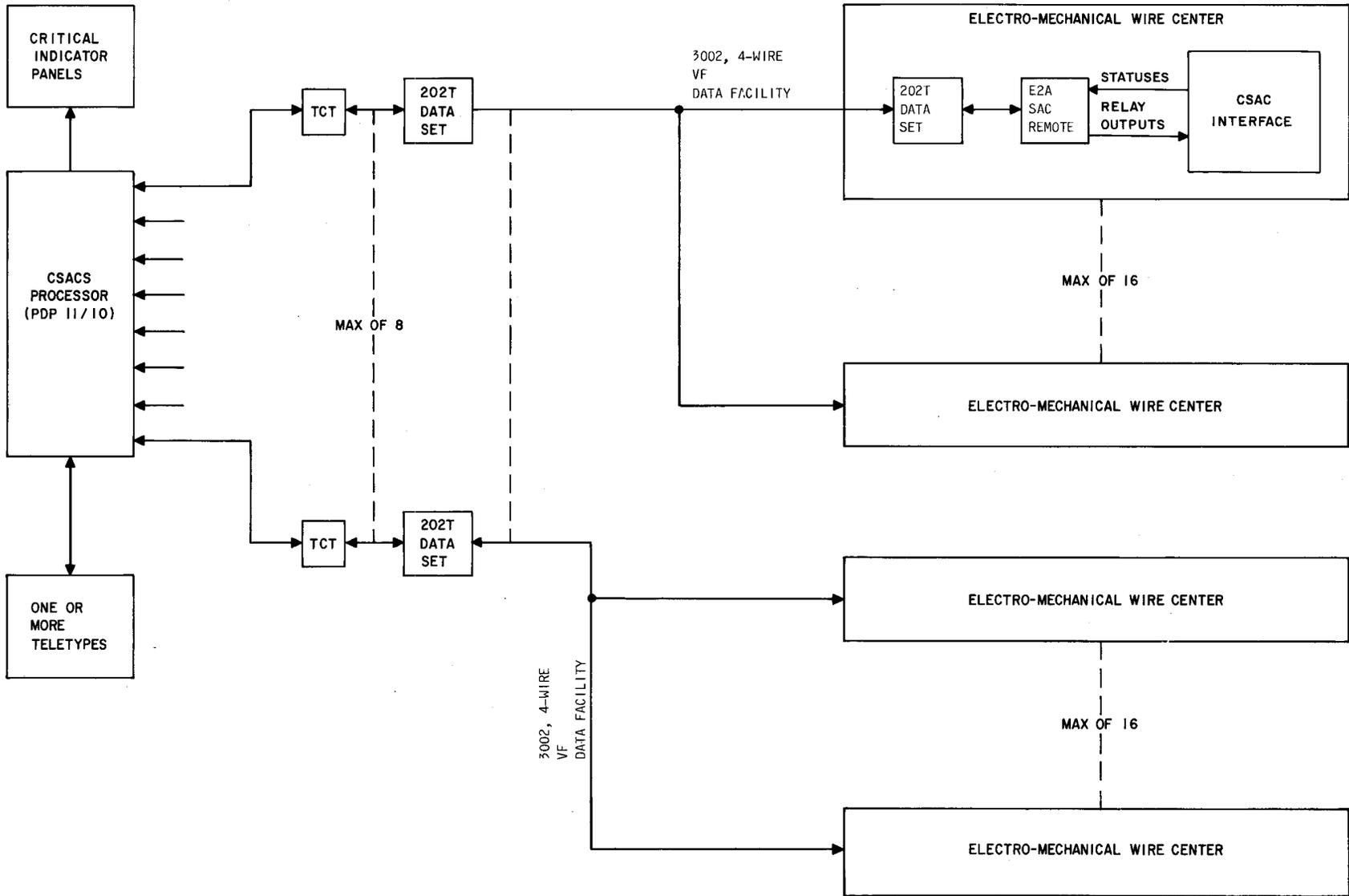


Fig. 1—Block Diagram of the CSACS System

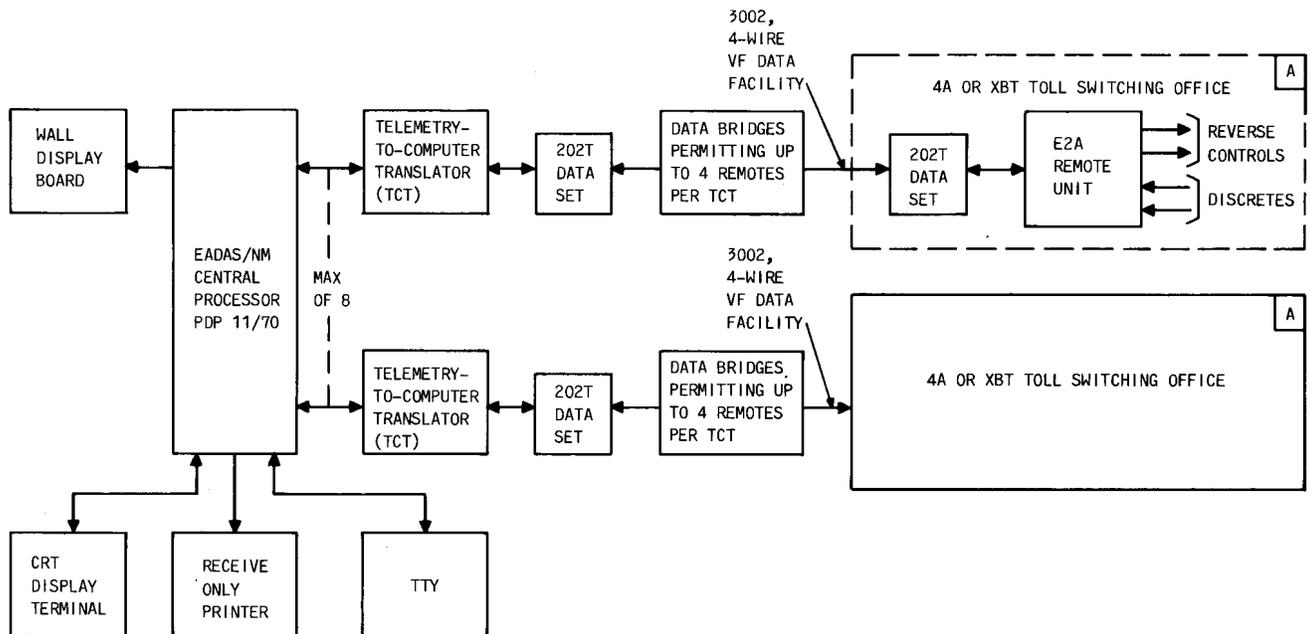


Fig. 2—Block Diagram of the EADAS/NM System

systems, building and power, and other facilities. E3 was designed so that it would be compatible with the TASC system. This means that when the number of monitored offices become sufficient to warrant complete centralization, the TASC system could be installed in place of the E3 central or could tie into the E3 central(s) with a minimal amount of engineering.

1.07 E2A is standard Bell System telemetry equipment which can be tailored to a number of applications. In the CSACS, EADAS/NM, TASC, and E3 applications, E2A is a modularly expandable system which provides the means by which the system can monitor alarms and control equipment at distant wire centers. The maximum capability of each E2A remote is 1024 status and alarm points and 224 relay output control points at each wire center. If one or more CDO satellite remotes are hubbed into a SAC remote, the maximum capability of the SAC remote is 1024 status and alarm points minus 16 status points for each CDO satellite remote connected to it, and 224 relay output control points minus 4 control points for each CDO satellite remote connected to it.

2. PHYSICAL DESCRIPTION

2.01 The E2A equipment consists of one or more telemetry-to-computer translators (TCT)

located at the computerized central locations, and an E2A SAC remote located at each switching office. The TCT (Fig. 5) is coded J92621E and is contained in a 10-1/2 by 10-1/2 by 6-1/2 inch enclosure. The TCT circuitry is on eight removable circuit packs which slide into the enclosure. An alarm cutoff switch, which protrudes through the front cover, is provided for the silencing of office alarms.

2.02 The E2A SAC remote (Fig. 6) consists of a J92621F basic remote module, up to four J92621G expander units, and if required, up to two J92621AG CDO satellite communicator units. The basic remote module is a 23- by 10- by 10-inch panel which contains up to eleven circuit packs. The expander unit is a 23- by 8- by 10-inch panel which contains up to nine circuit packs. The number and types of circuit packs in each unit depend on the individual switching office configuration. The CDO satellite communicator unit is a 23- by 8- by 6-inch panel which contains up to 10 circuit packs, two basic circuit packs and one dedicated circuit pack for each CDO remote hubbed to the SAC remote.

2.03 Also available for use with EADAS/NM is a J92621L panel. This panel supplies power to the J92621G expander panels.

3. FUNCTIONAL DESCRIPTION

A. General

3.01 The functional description is divided into two parts. The first part of the description deals with the operation of the TCT, 202T data set, and the data network. The second part of the description deals with the operation of the SAC remote.

3.02 The TCT is only used in systems incorporating a computer controlled central. The TCT in the transmit mode takes the parallel 16-bit data word from the computer and puts the word in the E2A data format (Fig. 7). This encompasses adding a start sequence and a 7-bit parity sequence derived from the information bits. Once formatted, the word is sent in serial form to the 202T data set for transmission to the remote. In the receive mode, the TCT receives the serial word from the 202T data set in the form of positive- and negative-going pulses. Once received, the TCT strips the start sequence from the word, checks the information bits against the parity bits, and sends the information (16-bits) in parallel to the computer for analysis. If an error is detected by the TCT in the parity check, the data word is still sent to the computer but is accompanied with a flag pulse indicating that the data is in error.

3.03 The 202T data set, in the transmit mode, takes the positive- and negative-going pulses produced by either the TCT at the central or the E2A equipment at the remote and converts the pulses into frequency-shift-keyed (FSK) signals and transmits them at 1200 bits-per-second. In the receive mode the above process is reversed, the FSK signals are converted into positive- and negative-going pulses and sent to either the TCT or SAC remote.

3.04 Communication between the central and the SAC remote is provided by a 3002 4-wire voice-frequency (VF) data facility. SAC remotes come in several equipment configurations. The remote can contain J92621G expander units or J92621AG satellite communicator units, or a combination of the expander (G) and communicator (AG) units. In either arrangement, facility requirements are the same.

B. Remote Configurations

3.05 A remote office consists of a SAC remote panel and up to four expander panels. It also consists of two satellite communicator units if there are CDO satellite remotes hubbed to the SAC remote. However, if two communicator units are used, only one expander unit can be used. The SAC remote unit provides control for receiving and transmitting words in the E2A format. It also provides the capability of monitoring 64 statuses and controlling 32 relay outputs. If additional capacity is required, up to four expander units can be added.

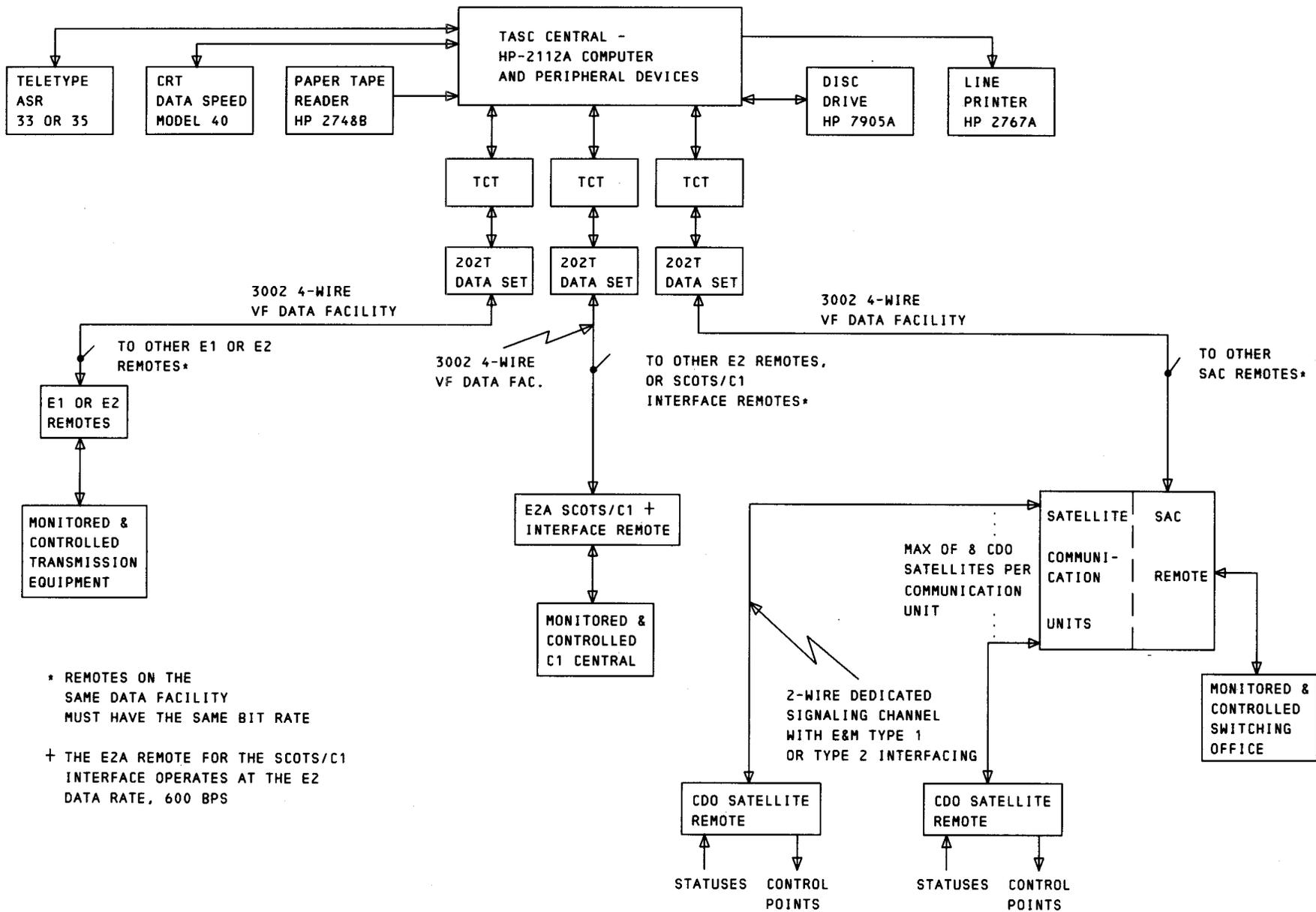
3.06 The SAC expander units can contain up to nine circuit packs which can provide additional status monitoring and relay control. The additional capacity provided by this unit depends on the number and type of circuit packs in it. A fully equipped SAC remote and four SAC expander units can monitor 1024 status points and control the output of 224 relays, or a lesser combination of both.

3.07 The CDO satellite communicator unit consists of two common control circuit packs and up to eight satellite control circuit packs; hence, a maximum of eight CDO satellite remotes can be hubbed into one communicator unit. Two communicator units or a maximum of 16 CDO satellite remotes can be hubbed into a SAC remote.

C. Operation

3.08 During normal operation, the central will, in a continuous and cyclic manner, interrogate each remote with group report commands. When an alarm condition is reported, the central will perform a prescribed sequence of operations which may include a request to the remote for a RELAY OUTPUT command and/or a printout on a teletypewriter.

3.09 The statuses monitored by the remote are arranged in groups, with each group containing up to 16 scans. Each scan (subgroup) represents the state of up to 16 status points. In order to monitor these statuses, the central must initiate a GROUP REPORT command (Fig. 8A). This is a one-word command which contains the group number (bits 14-17) of the statuses to be returned and the address of the remote (bits 4-11). Upon receiving the GROUP REPORT command, the remote will check for parity errors. If no errors



* REMOTES ON THE SAME DATA FACILITY MUST HAVE THE SAME BIT RATE

+ THE E2A REMOTE FOR THE SCOTS/C1 INTERFACE OPERATES AT THE E2 DATA RATE, 600 BPS

Fig. 3—Block Diagram of the TASC System

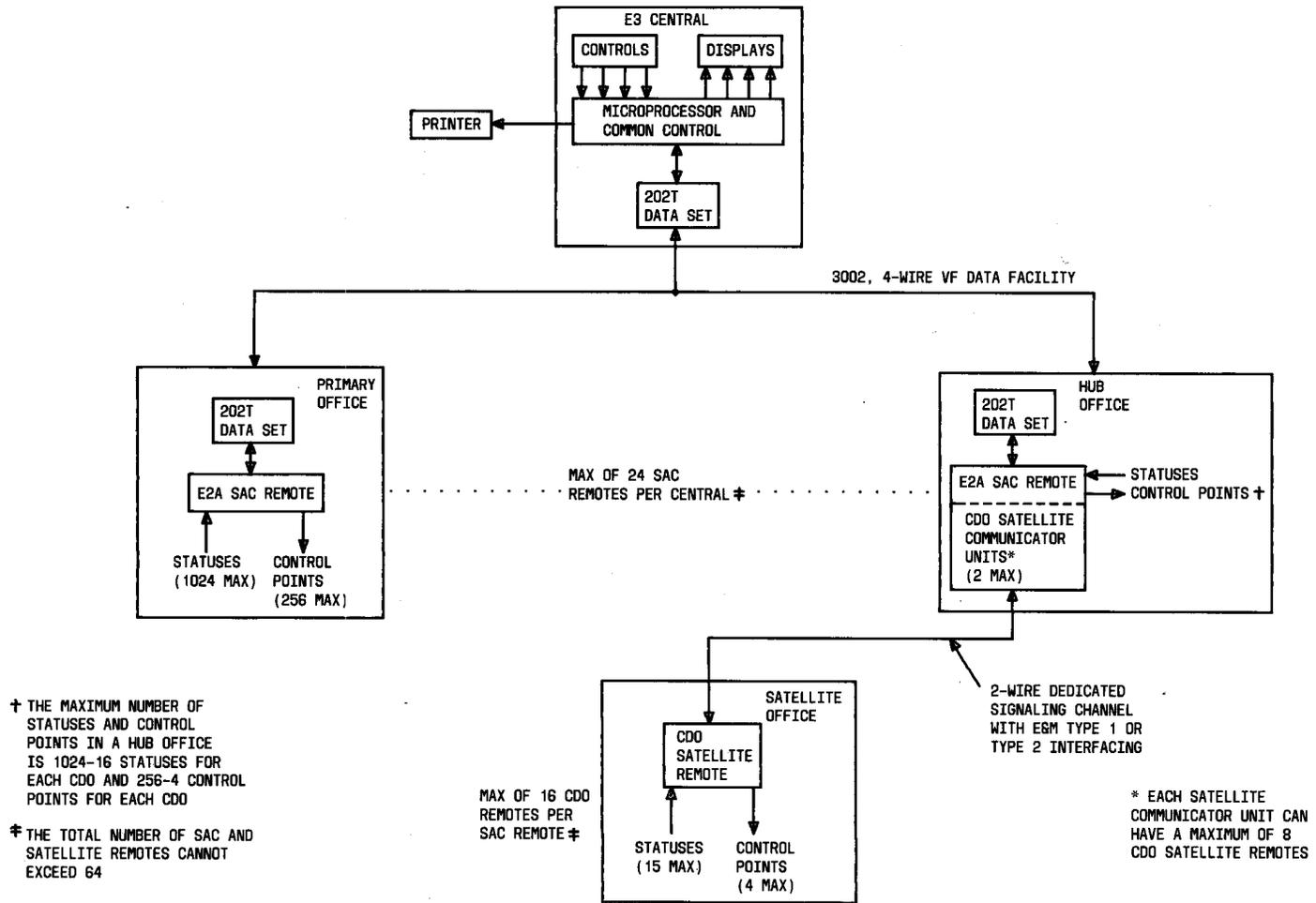


Fig. 4—Block Diagram of the E3 System

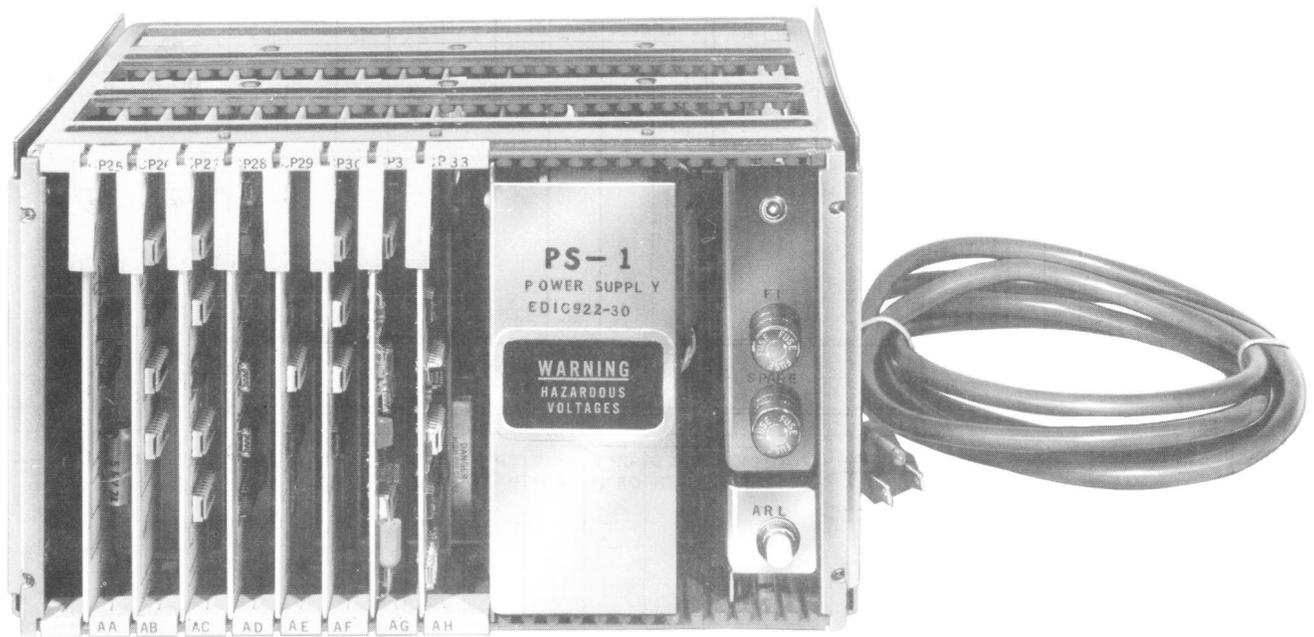


Fig. 5—Telemetry-to-Computer Translator (TCT)

are detected, the remote will respond with from 1 to 16 STATUS REPLY words (Fig. 8B), each representing one scan.

3.10 The E2A-provided relay contacts are activated when an operation is performed in the monitored office. When a contact closure is requested, the central transmits a RELAY OUTPUT command (Fig. 9A). This 3-word command contains the address of the central (bits 4-11), the type of command (bits 2 and 3) in the first word, the remote address (bits 4-11) in the second word, and the relay address (bits 6-14) in the third word. The third word also contains an operate-release bit (bit 2). A logic 1 transmitted in this position causes the addressed relay to operate. Conversely, a logic 0 transmitted in this position will cause the addressed relay to release. If a valid RELAY OUTPUT command is received, the control circuitry in the remote will operate the relay and return a QUICK REPLY (Fig. 9b) to the central. This reply indicates to the central that the remote received the RELAY OUTPUT command without error.

3.11 When a parity error is detected in the reception of a command, the remote will not respond with a QUICK REPLY or STATUS REPLY words. If the central receives no reply or an

erroneous reply from a remote, a retransmission of the command will be made. If the remote still fails to respond properly, the central will indicate that the station has failed or proceed as directed by its software or firmware.

3.12 If one or more CDOs are hubbed to the SAC remote, 16 status points (one subgroup or scan) and 4 control points are dedicated to each. The first CDO satellite is usually assigned subgroup 16, with each additional CDO satellite being assigned the next lower subgroup. For example, in the E3 system, the maximum number of input scans is 6144. If 4 CDO satellites are hubbed into the SAC remote their respective subgroups would be 64, 63, 62, and 61. The E3 central knows when it polls this SAC remote that subgroups 64 through 61 belong to satellite remotes and processes the information accordingly.

4. MAINTENANCE CONSIDERATIONS

4.01 A spare TCT is provided with the CSACS, EADAS/NM, and TASC centrals. If a TCT malfunctions, it is replaced with the spare. The defective TCT is then returned to Western Electric for repair. The E3 central system does not use TCTs.

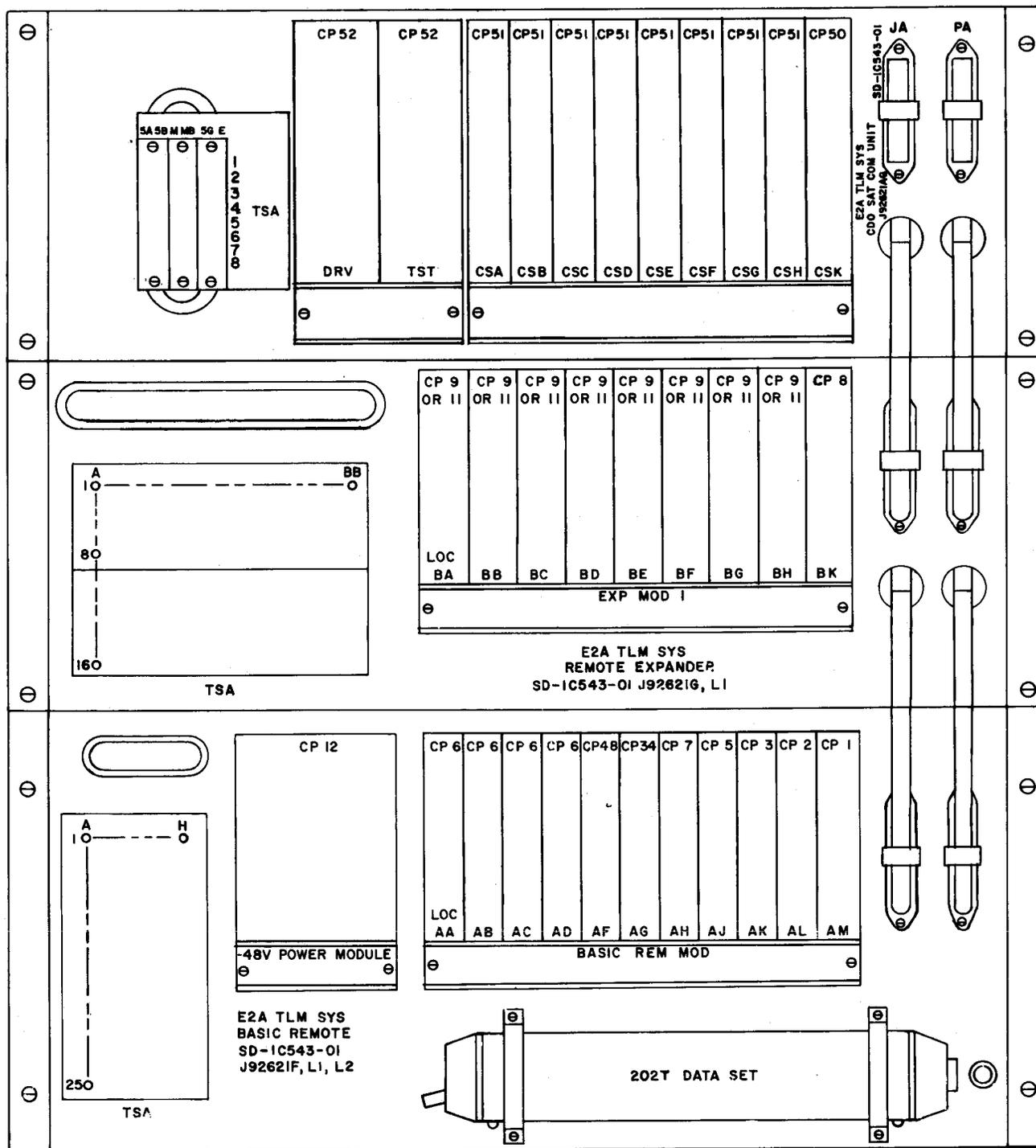


Fig. 6—Typical E2A Remote at a Wire Center with Satellite Communication Unit

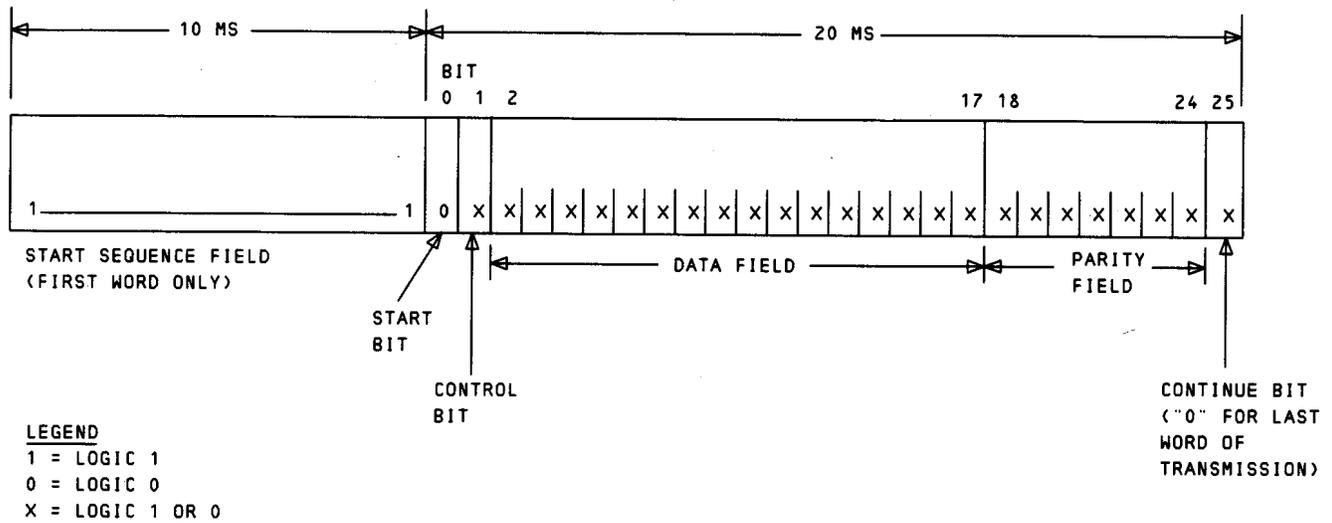


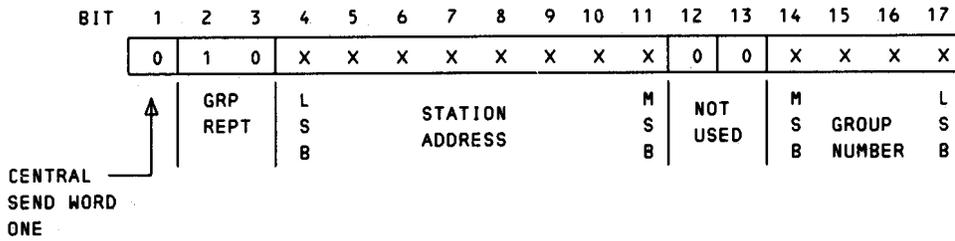
Fig. 7—Basic E2A Word Format

4.02 In the event of a failure of the E2A SAC remote, it is expected that the problem can be isolated to a circuit pack(s) using the E-telemetry station test set (KS-20937). The defective circuit pack(s) are then returned to Western Electric for repair.

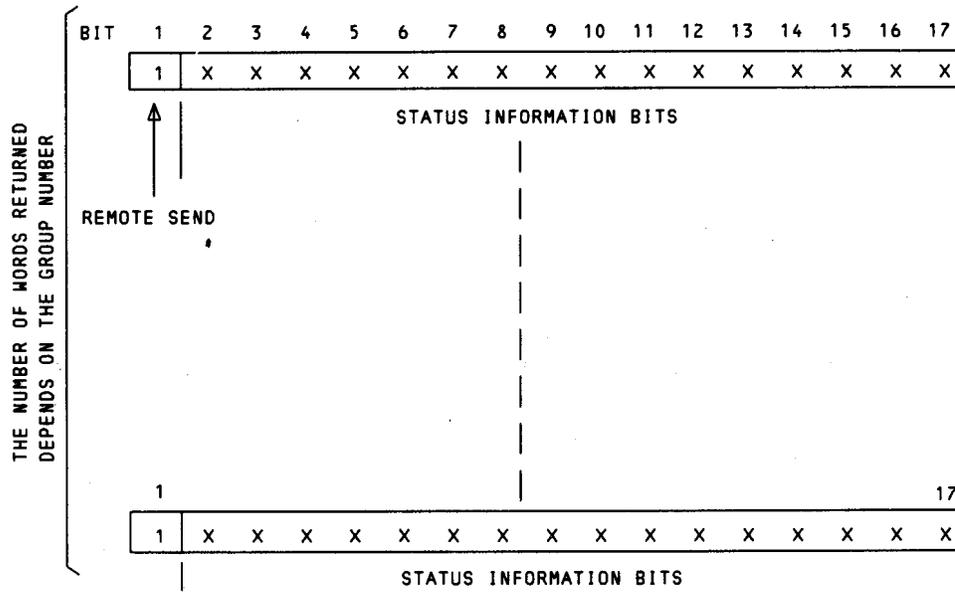
5. REFERENCES

5.01 The following is a list of Bell System Practices (BSP), schematic drawings (SD), and circuit descriptions (CD) associated with the E2A TCT and SAC remote as applied to the CSACS, EADAS/NM, TASC, and E3 systems.

SECTION	TITLE	CD & SD	TITLE
201-616-101	CSACS—Description		
201-647-100	E3 System—Description		
201-653-504	E2A Telemetry—Status and Command Remote and TCT Maintenance		
252-116-101	EADAS/NM—Description		
592-031-100	Data Set 202T—Description and Operation		
190-210-100	TASC—System Description	1C535-01	TCT Application Schematic
		1C543-01	Status and Command Remote—Application Schematic



A - GROUP REPORT COMMAND FORMAT

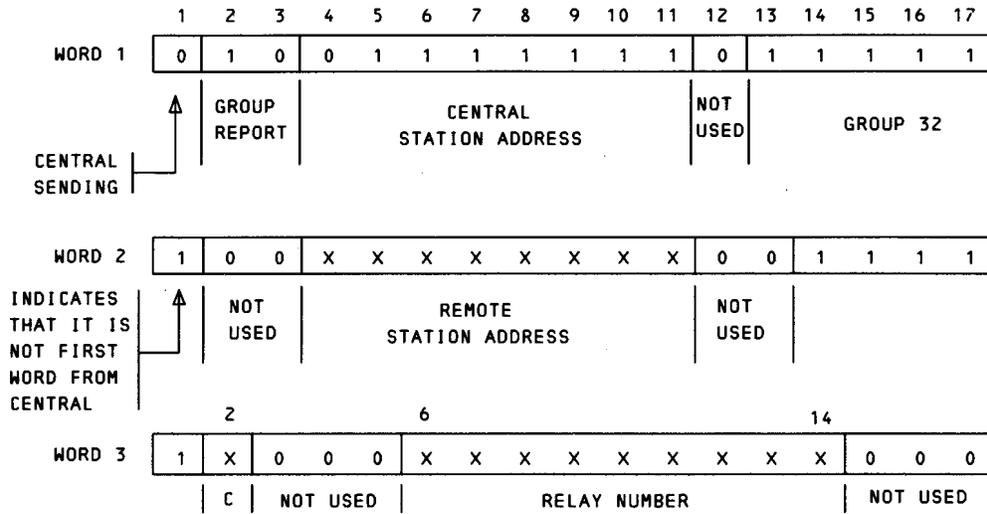


LEGEND

- 1 - LOGIC 1
- 0 - LOGIC 0
- X - LOGIC 1 OR 0

B - STATUS REPLY FORMAT

Fig. 8—Word Formats of the GROUP REPORT Command and Status Reply Words



A - RELAY OUTPUT COMMAND

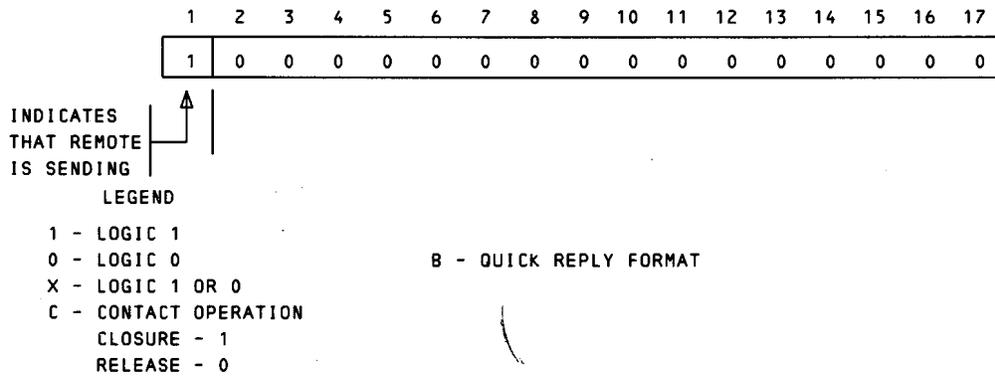


Fig. 9—Word Formats of the RELAY OUTPUT Command and Quick Reply