E2A TELEMETRY
SWITCHING CONTROL CENTER SYSTEM
DESCRIPTION

CONTENTS PAGE

1. INTRODUCTION

1.01 This section describes the E2A telemetry equipment associated with the Switching Control Center System (SCCS). Information in this section covers the No. 1 Electronic Switching System (ESS), No. 2B/3 ESS, No. 2 ESS Automatic Intercept System (No. 2 ESS/AIS), the Traffic Service Position System (TSPS), and the 1A ESS.

1.02 This section is reissued to include information on the 1A ESS. Since this reissue is a general revision, arrows ordinarily used to indicate changes have been omitted.

1.03 The switching control center (SCC) is a centrally located control center capable of providing administrative, operational, and maintenance functions for switching system central offices (COs). The E2A equipment, used in SCCS applications, transfers control and status information between an SCC and a master control center (MCC) at each CO. The MCC is the primary man-machine interface for the equipment at the COs. Each MCC provides the ability to monitor a number of status points (Table A) of which 16 state the overall condition of the CO. These are known as the critical indicators. These 16 status points are constantly monitored and returned to the SCC via E2A. The remaining status points are monitored only when an alarm condition occurs in the critical indicators. The SCC can also send commands to the CO to control a number of momentary and/or latching relays in the E2A CO equipment which are used by the CO to perform various operations.

2. PHYSICAL DESCRIPTION

2.01 E2A equipment in SCC applications consists of a J92621D critical indicator (CI) central (Fig. 1), a J92621C control and display (C&D) central (Fig. 2), or a J92621P C&D central (Fig. 3), or a J92621E telemetry computer translator (TCT) (Fig. 4), and a number of remote units. Figures 5, 6, and 7 illustrate typical remote units and Table A lists all E2A SCCS remotes and capabilities. The type of central and remote unit used with each system is explained in Fig. 8. The CI central is contained in a 23- by 6-inch panel mounted in an SCC equipment cabinet. The C&D central is contained in a 15- by 13-inch panel mounted inside the SCC C&D console. The TCT is a 10-1/2 by 10-1/2 inch unit mounted inside the SCC control console 1A. The remotes are contained on a 25- by 6-inch (J92621B, M, AD, and AE) or a 25- by 25-inch (J92621AH) panel mounted in the MCC bay at the CO.

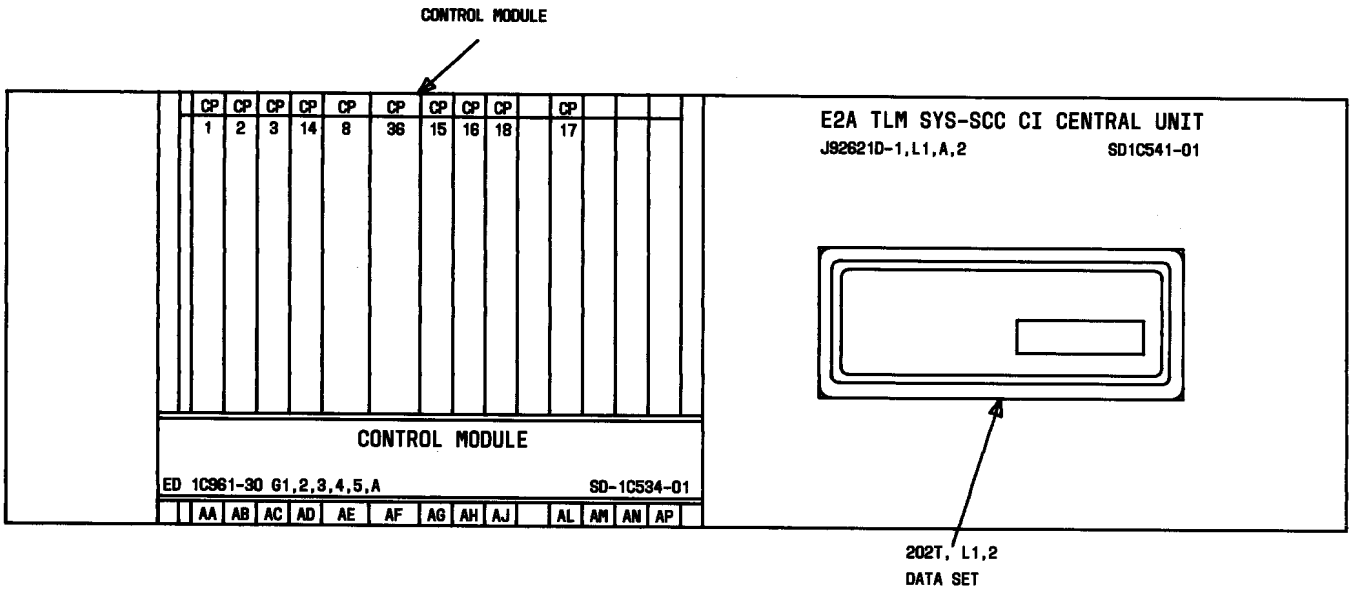

Fig. 1—J92621D CI Central

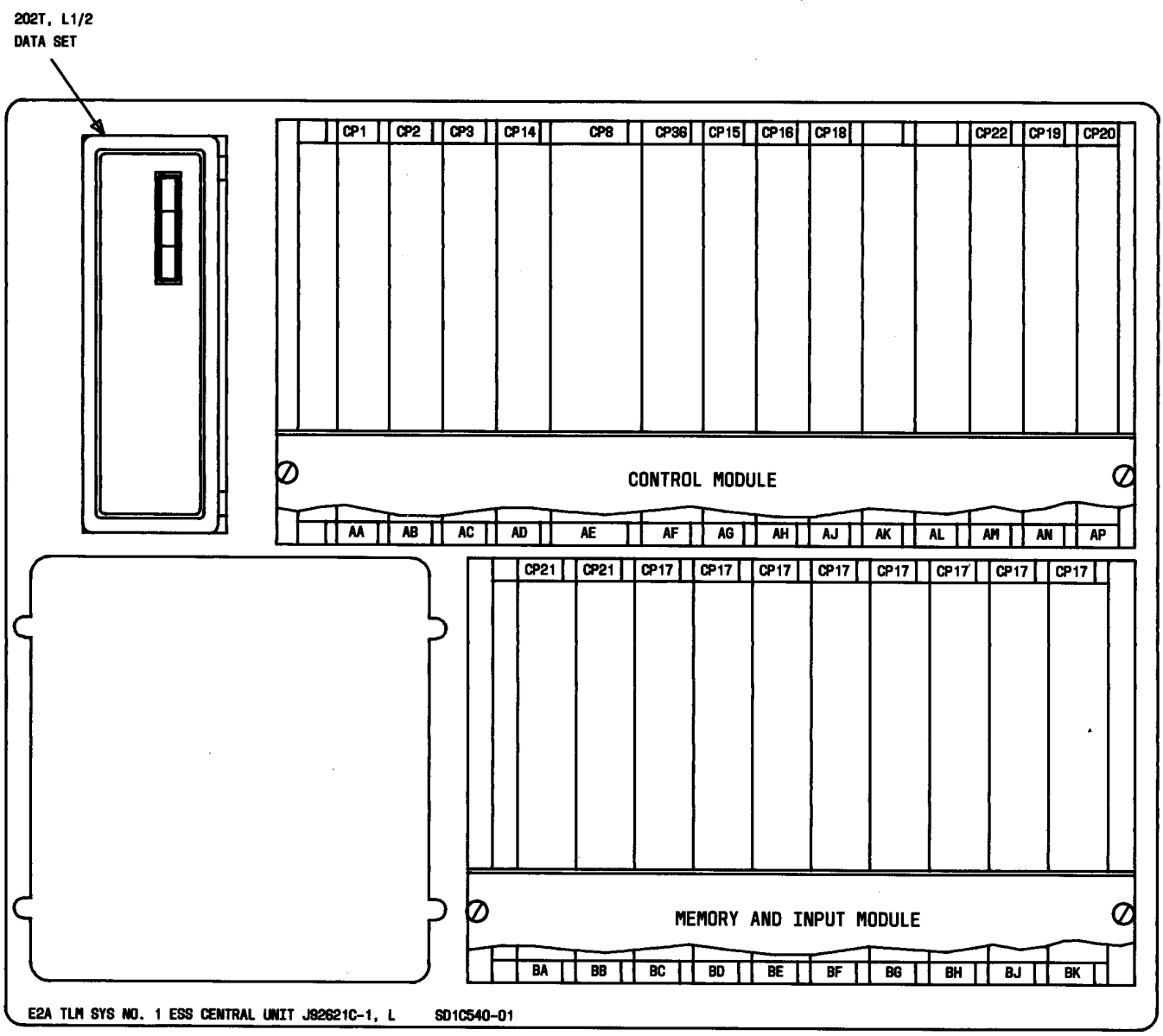

Fig. 2—J92621C C&D Central

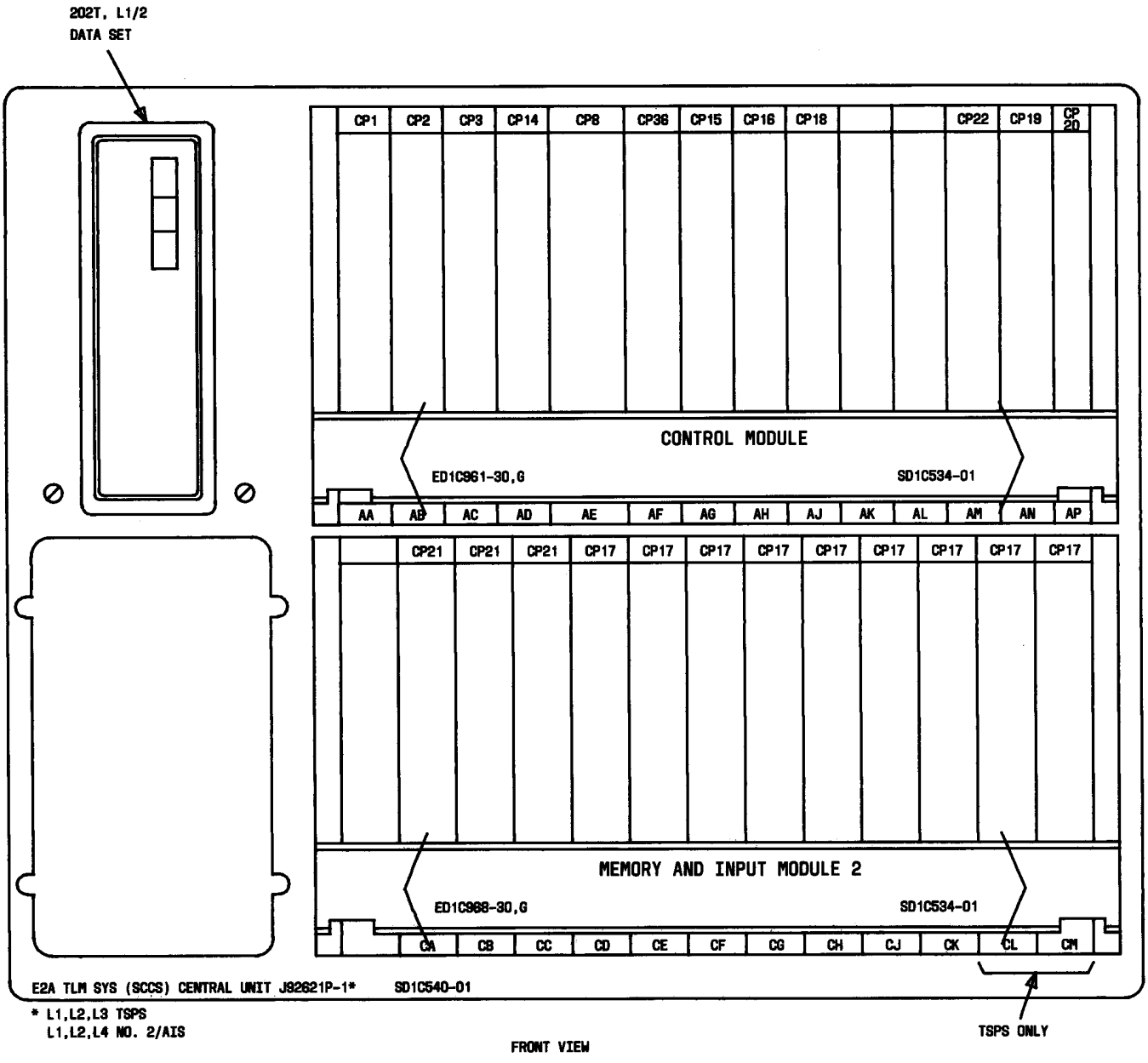

Fig. 3—J92621P C&D Central

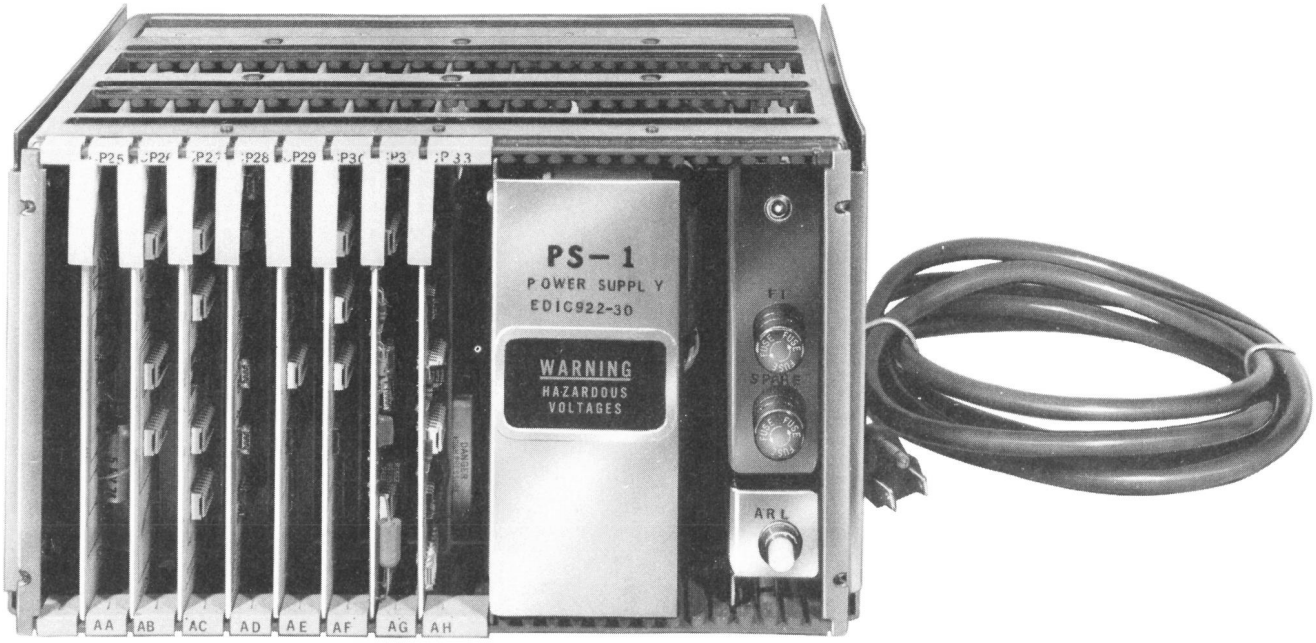

Fig. 4—Telemetry Computer Translator

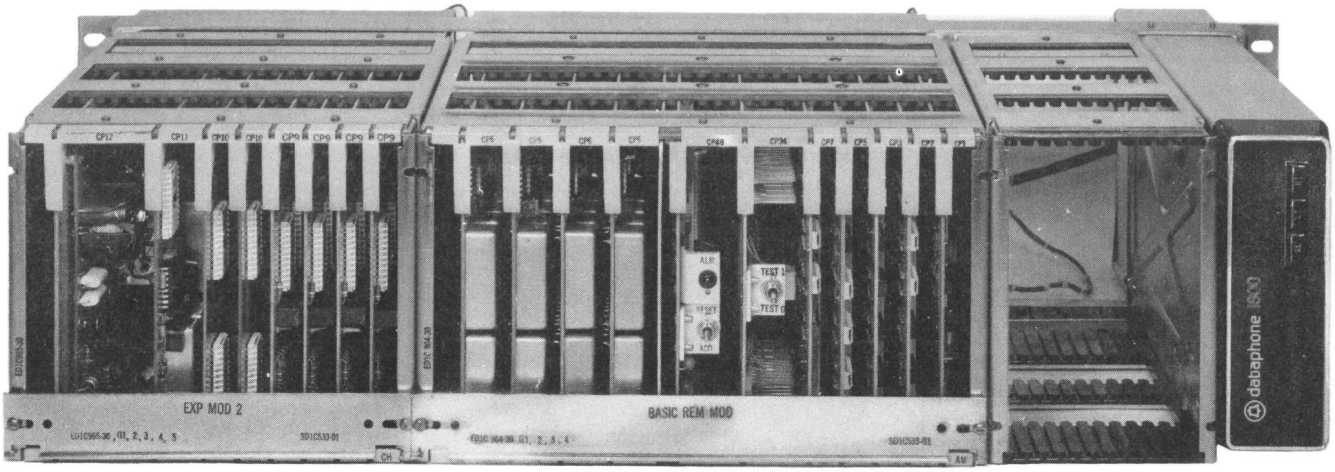

Fig. 5—J92621B E2A Remote

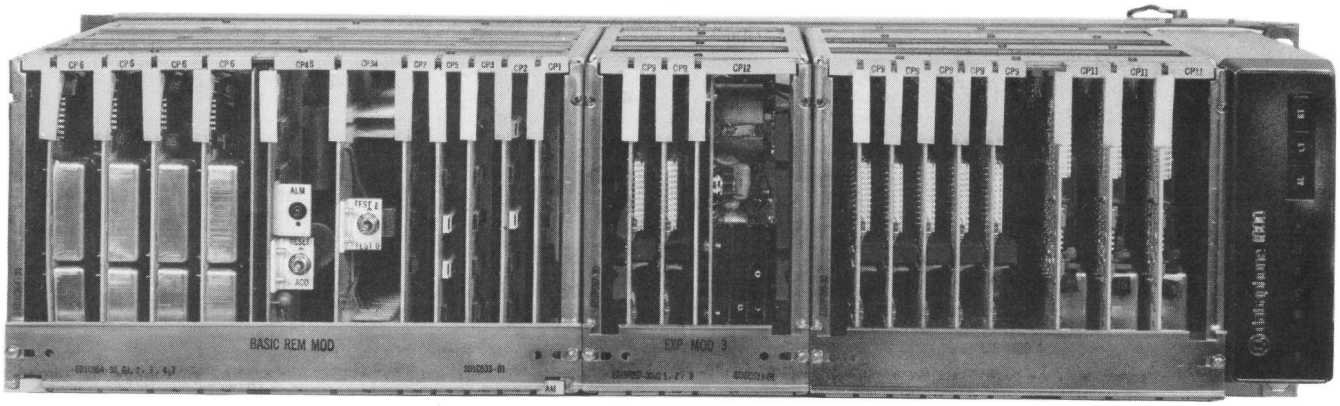

Fig. 6—J92621M E2A Remote

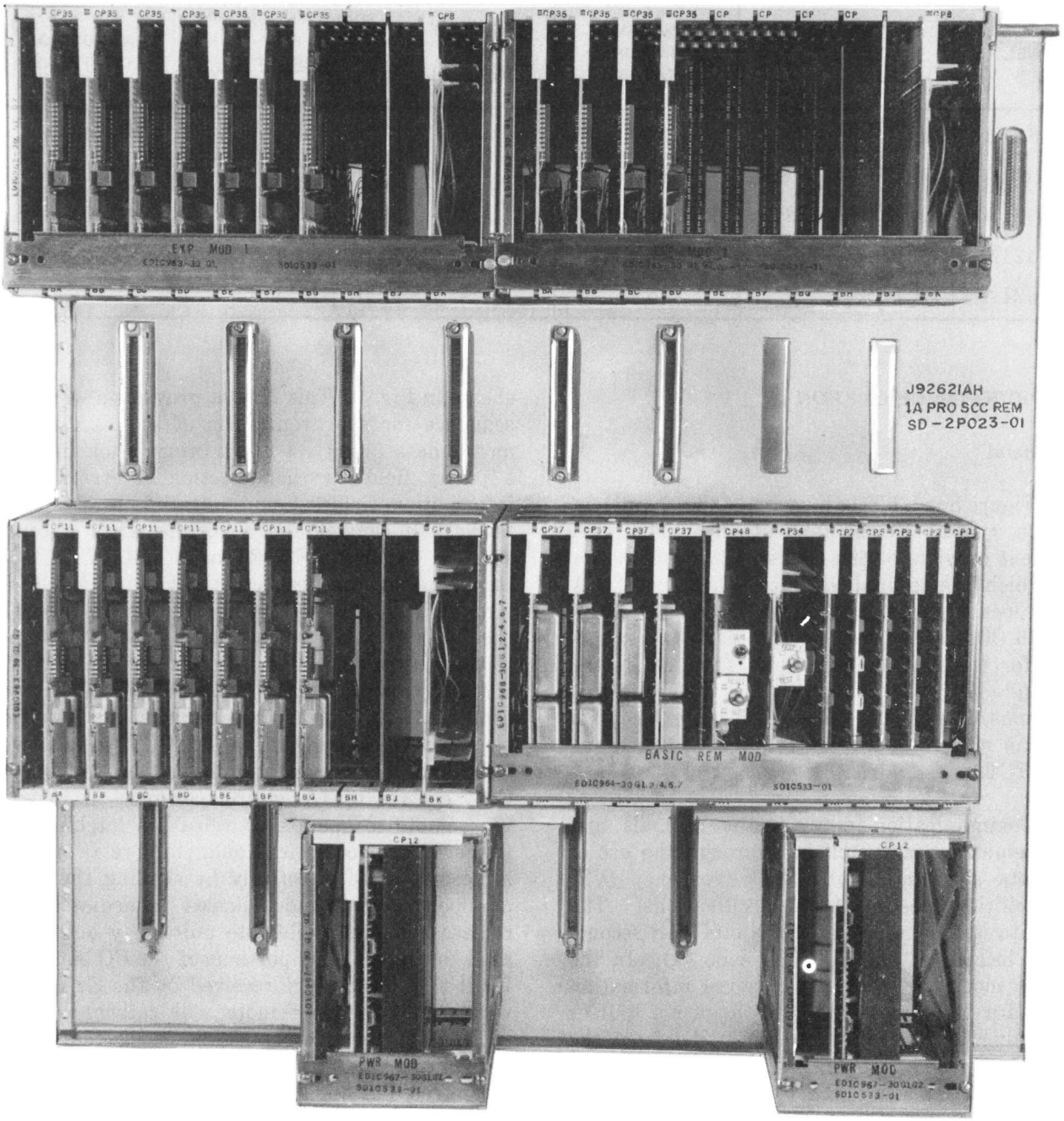

Fig. 7—J92621AH E2A Remote

TABLE A

E2A REMOTE CAPABILITIES

PANEL	SYSTEM	NUMBER OF MONITORED STATUSES	NUMBER OF GROUPS	SCANS (SUBGROUPS) PER GROUP				NUMBER OF CONTROLS
				1	2	3	4	
J92621B	No. 1 ESS	224	4	4	4	6	1	48
J92621AE	No. 2B/No. 3 ESS	160	3	6	4	—	1	32
J92621AD	No. 2 ESS/AIS	224	4	6	4	4	1	64
J92621M	TSPS	288	4	6	4	8	1	80
J92621AH	1A ESS	448	4	10	10	8	1	144

3. FUNCTIONAL DESCRIPTION

A. General

3.01 Figure 8 is a block diagram of the equipment in typical SCCS applications. The E2A equipment consists of the CI and C&D centrals or TCT, which are located at the SCC, and an E2A remote located at each CO served by the SCC. Up to 16 COs can be connected to each CI central. Power for the E2A equipment is supplied by the SCC and MCC equipment. In the following paragraphs, except where noted, reference to central will mean either the CI central, the C&D central, or the TCT.

3.02 Communication between the centrals and remotes is accomplished through the use of 202T data sets and 4-wire voice-frequency (VF) data facilities meeting 3002 specifications. The 202T data sets operate at 1200 bits per second, and are located at the SCC and each CO. In the transmit mode, the data set receives information in the form of positive and negative pulses (conforming to EIA Standard RS-232C) from the E2A equipment and converts them to frequency-shift-keyed (FSK) signals which are transmitted over the data network. In the receive mode, the preceding process is reversed.

3.03 The E2A equipment transmits and receives information in the E2A word format as shown in Fig. 9. This format provides a word-start sequence for synchronization of the E2A remotes on the data facility, a 17-bit information field, and a parity field for the detection of errors in the information field. Communication is established between a central and a remote when a central sends a GROUP REPORT or a RELAY OUTPUT command to the respective remote. A GROUP REPORT is a 1-word command, sent by either the CI or C&D central, which instructs the remote to transmit to the central from one to six STATUS REPLY words. Each STATUS REPLY word contains 16 status bits representing status conditions at the CO. A RELAY OUTPUT is a 3-word command which can only be executed from the C&D central or 1A control console. It instructs the remote to operate or release a latching relay in the E2A remote unit. Nonlatching relay operation is accomplished effectively by sending the remote an operate command followed immediately by a release command. Remote unit relay outputs are used to control some portions of the CO equipment. If all three words are received by the E2A remote without error, the remote will return a QUICK REPLY to the central. This reply indicates to the central that the remote received the command error free, but not that the relay actually operated or that the desired event happened in the CO. This must be verified by the STATUS GROUP report.

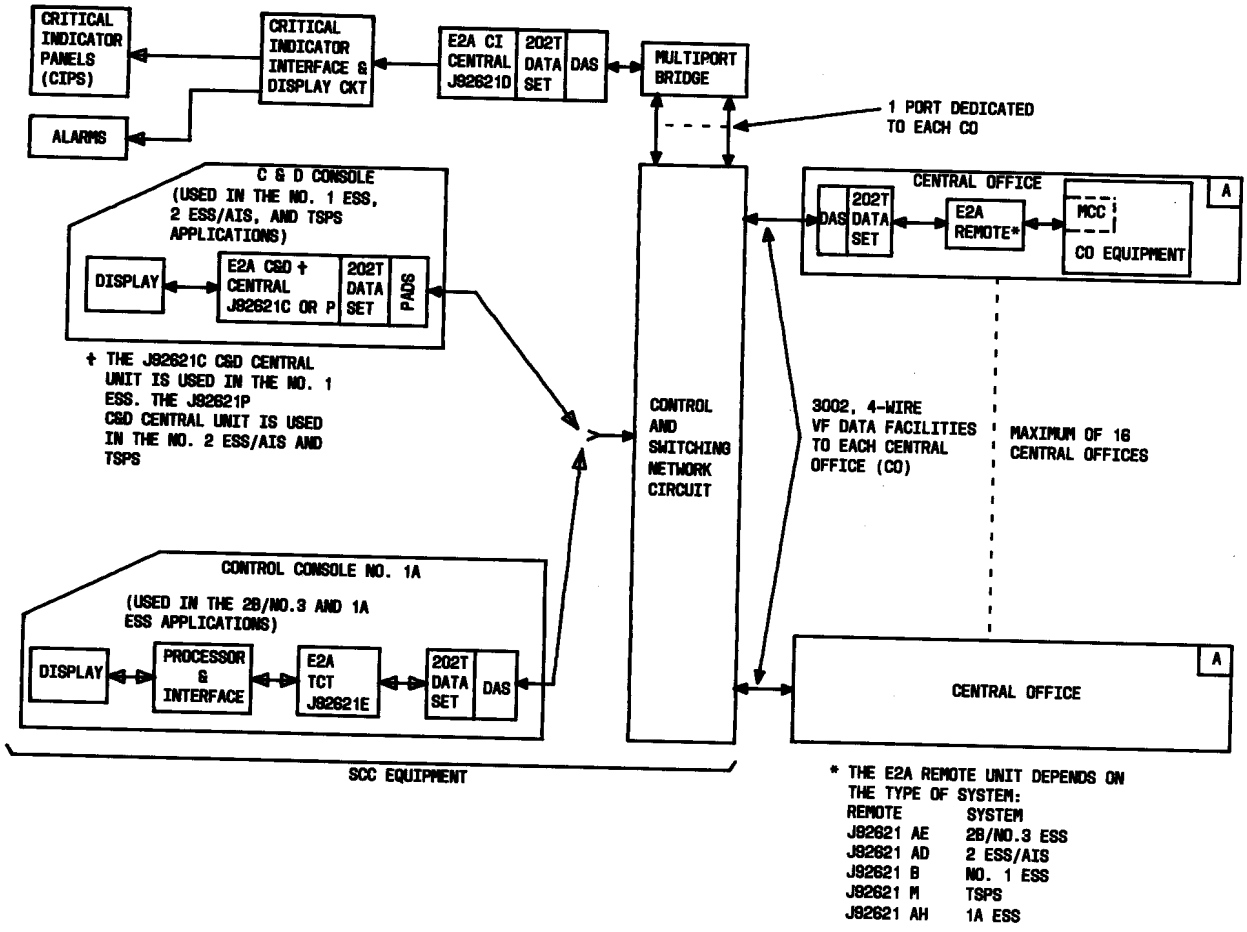

Fig. 8—Switching Control Center Arrangement

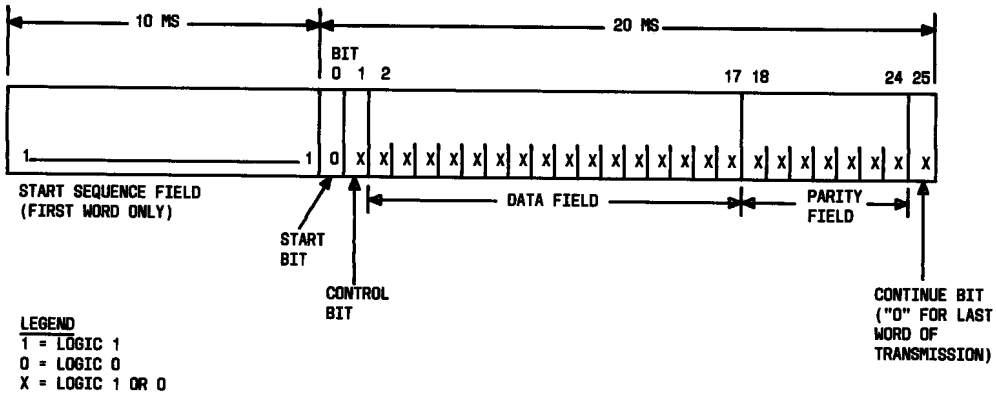

Fig. 9—Basic E2A Word Format

3.04 Figures 10 and 11 show the format for the information bits of the GROUP REPORT and RELAY OUTPUT commands and their respective replies. Each word contains 17 information bits, with the 17 bits segregated into areas which form the station address, group number, etc, as shown in the respective figures.

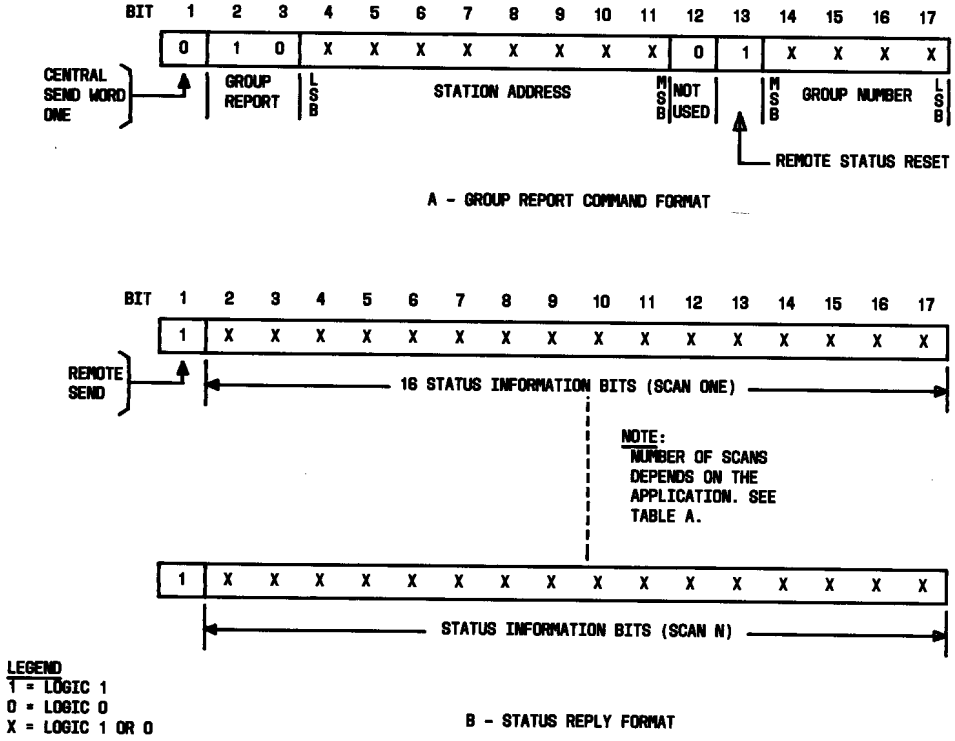

Fig. 10—GROUP REPORT and STATUS REPLY Formats

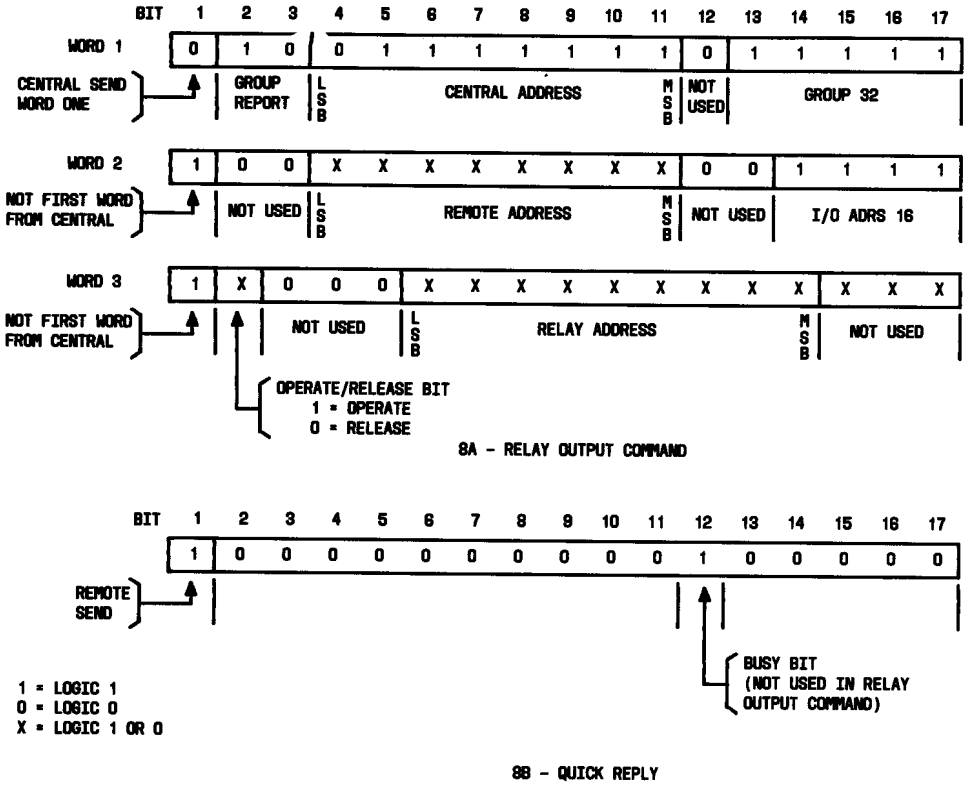

Fig. 11—RELAY OUTPUT Command and QUICK REPLY Formats

B. Operation

3.05 In normal operation, the CI central will sequentially and continuously poll the E2A remotes with GROUP REPORT commands. This command contains the remote address and, when sent by the CI central, instructs the addressed remote to return the statuses of the critical indicators. A GROUP REPORT command from the CI central always requests group 4, which contains the critical indicator information.

3.06 Upon reception of this command, the remote will check for errors and, if the command is received correctly, will transmit one STATUS REPLY word containing the states of the 16 critical indicators. The CI central will, in turn, receive the remote transmission and, if it is received correctly, display the critical indicators on the wall-mounted critical indicator panel (CIP) for the particular remote. The CI central will then interrogate the next remote in a similar manner until all remotes have been interrogated and will then repeat this process continuously.

3.07 If an alarm condition occurs in the critical indicators, the CI central will cause an alarm to be sounded. A switching arrangement controlled by SCC personnel will then disengage the CO indicating the alarm condition and connect that CO to the C&D console or control console No. 1A. The purpose of the C&D console or control console No. 1A is to assist the alarming CO back to normal operation. An example of this, using the C&D console, is as follows. The central in the C&D console will transmit to the remote three GROUP REPORT commands requesting the condition of all statuses in groups 1 through 3. The number of scans in each group depends on the particular application (see Table A). These status words or scans contain all the statuses monitored at the CO including the critical indicators. (The critical indicators are contained in group 1, scan 1, and duplicated in group 4, scan 1; therefore, the C&D central does not have to interrogate group 4.)

These status conditions are continuously updated by the C&D central and displayed on the SCC C&D console for analysis by the SCC personnel.

3.08 The SCC C&D console has a number of command keys which can, via the E2A C&D central, order locking or nonlocking relay operations at the CO. When a command key is depressed, the central in the C&D console interrupts the continuous transmission of GROUP REPORT commands and transmits, a 3-word RELAY OUTPUT command (Fig. 11) to the one E2A remote. As each word is received, it is checked for errors. If all words are received error free, the remote will send a QUICK REPLY back to the central.

3.09 If the operated command key is nonlocking, a contact closure will be made at the remote. When the key is released, a second RELAY OUTPUT command is sent to release the relay contacts. If the command key is a locking type, a command to complement the present state of the relay is sent when the key is depressed, but no RELAY OUTPUT command is sent when the key is released.

3.10 Upon reception of a valid QUICK REPLY, the central will resume GROUP REPORTING. The statuses of the relay contacts are contained in group 1 and are displayed via lamps on the command keys. After each RELAY OUTPUT command operation, the central will resume GROUP REPORTING.

3.11 When the alarming CO is returned to normal operation, the C&D console can be disengaged by SCC personnel and the CO reconnected to the CI central. Then the CI central will continuously poll the remote for the critical indicators.

3.12 When an error is detected in the reception of a command, the remote will not respond with the appropriate QUICK REPLY word or STATUS REPLY words. If a central receives no reply or an erroneous reply from the remote, a retransmission of the command will be made. If the remote fails to respond properly to the retransmission, a telemetry alarm will be activated at the SCC.

3.13 When a control console No. 1A is used, the same sequence of events occurs between the CI central and the control console No. 1A as between the CI central and the C&D console. However, in the control console No. 1A, a central processing unit (computer) performs many of the functions performed manually when using the C&D console. Commands are sent to the remote via input on a keyboard. At the present time, only the No. 2B/3 ESS and 1A Processor Systems use the control console No. 1A.

4. MAINTENANCE CONSIDERATIONS

4.01 Problems within the E2A SCC central and remote units are isolated and corrected through the use of the E-telemetry station test set (KS-20937) and the spare circuit packs provided at the central and remote locations. Once the defective CPs have been isolated and replaced with spares, they are sent to Western Electric Company for repair. TCT problems are corrected by replacing the entire unit with a spare TCT.

5. REFERENCES

5.01 The following Bell System Practices, circuit descriptions, and schematic diagrams provide additional information on the E2A Telemetry System as applied to each SCCS application.

SECTION	TITLE
190-110-110	No. 2 Switching Control Center System—Common Application—Description
190-110-302	No. 2 Switching Control Center System—Common Application—Hardware Check Procedures
190-110-310	No. 2 Switching Control Center System—Common Application—Hardware Operation and Reconfiguration
190-110-314	No. 2 Switching Control Center System—Common Equipment—Troubleshooting Procedures
190-110-321	No. 1 and No. 2 Switching Control Center System—Common Application—System Acceptance Test and Periodic Evaluation Procedures
190-112-110	No. 2 SCCS, 1A ESS Application, Description

SECTION	TITLE
190-113-110	No. 2 SCCS, No. 1 ESS Application, Description and Operation
190-114-110	No. 2 SCCS, TSPS Application, Description
190-115-110	No. 2 SCCS, No. 2 ESS Application, Description
190-116-110	No. 2 SCCS, No. 2B Application, Description
190-117-110	No. 2 SCCS, No. 3 ESS Application, Description
201-653-502	E2A Telemetry, SCCS Central and Remote Maintenance

DRAWING	TITLE
1C533-01	E2A Telemetry System, Remote Circuit Modules
1C534-01	E2A Telemetry System, Central Circuit Modules
1C535-01	E2A Telemetry System, Telemetry Computer Translator
1C539-01	E2A Telemetry System, No. 1 ESS Remote, Application Schematic
1C540-01	E2A Telemetry System, SCC C&D Console, Central Application Schematic
1C541-01	E2A Telemetry System, SCC CI Central, Application Schematic
1C542-01	E2A Telemetry System, Telemetry Computer Translator, Application Schematic
2P021-01	E2A Telemetry System, SCC Remote, Application Schematic
2P023-01	E2A Telemetry System, 1A Processor SCC Remote, Application Schematic