

SWITCHING CONTROL CENTER SYSTEM OVERALL DESCRIPTION

CONTENTS	PAGE	CONTENTS	PAGE
1. GENERAL	2	7. NO. 2 SWITCHING CONTROL CENTER SYSTEM—REMOTE CONTROL EQUIPMENT NO. 1 OPERATION	16
2. NO. 1 SWITCHING CONTROL CENTER SYSTEM EQUIPMENT IDENTIFICATION AND DESCRIPTION	2	8. SWITCHING CONTROL CENTER SYSTEM—MAINTENANCE PLAN	16
A. No. 1 Switching Control Center System Facility	2	9. REFERENCES	16
B. No. 1 Switching Control Center System Equipment	3	FIGURES	
3. NO. 1 SWITCHING CONTROL CENTER SYSTEM OPERATIONAL DESCRIPTION	7	1. No. 1 Switching Control Center System—Sample Floor Plan	3
A. No. 1 Switching Control Center System—Central Office Interface	7	2. Common Equipment Cabinets A and B—Example	5
B. No. 1 Switching Control Center System—Primary Description	9	3. No. 1 ESS Critical Indicator Panel—Example	6
4. SWITCHING CONTROL CENTER SYSTEM GROWTH	11	4. Central Office Select Unit—Example	7
5. NO. 2 SWITCHING CONTROL CENTER SYSTEM EQUIPMENT IDENTIFICATION AND DESCRIPTION	12	5. Switching Control Center Control Console—Example	8
A. No. 2 Switching Control Center System Facility	12	6. Teletypewriters in the No. 1 Switching Control Center System—Block Diagram	9
B. No. 2 Switching Control Center System Equipment	12	7. Switching Control Center—Central Office Interface	9
6. NO. 2 SWITCHING CONTROL CENTER SYSTEM OPERATIONAL DESCRIPTION	14	8. No. 1 Switching Control Center System—Primary Block Diagram	10
A. No. 2 Switching Control Center System—Central Office Interface	14	9. CRT Monitor and Keyboard	17
B. No. 2 Switching Control Center System—Primary Description	14	10. No. 2 Switching Control Center System—Primary Block Diagram	17
		11. No. 2 Switching Control Center System and Remote Common Equipment No. 1	19

1. GENERAL

1.01 This section describes the operation and defines the equipment for the switching *control center system (SCCS)*.

1.02 This section is reissued to include information relating to the No. 2 SCCS and to change the nomenclature for the No. 1 SCCS and No. 2 SCCS. The added information relating to the No. 2 SCCS is included in Parts 5, 6, and 7. The following nomenclature changes have been incorporated.

- What was the Basic SCC is now the No. 1 SCCS.
- What was the Automated SCC is now the No. 2 SCCS.
- The hardware in the No. 2 SCCS is subdivided into control equipment No. 1 (CE No. 1) and computer subsystem No. 1 (CSS No. 1).
- What was the Satellite SCC is now the remote control equipment No. 1.

The control equipment No. 1 includes the A and B common equipment cabinets, history *teletypewriters (TTYs)*, work stations, *Critical Indicator Panels (CIPs)*, line printer, and audible alarms. The computer subsystem No. 1 includes the PDP* 11/40 processor, core memory, disk controller and associated disk memory, magnetic tape controller and associated tape unit, system TTY, and the computer input/output equipment.

Since this reissue covers a general revision, arrows ordinarily used to indicate changes have been omitted.

*Registered trademark of the Digital Equipment Corporation.

1.03 An SCCS is a centrally-located facility capable of accommodating administration, operational, and maintenance functions for several *central offices (COs)*. Technically, the SCCS provides sufficient display, control, and alerting capabilities to enable COs to be remotely controlled.

1.04 It is planned that many types of switching machines can be serviced from the same center. Each center is capable of accessing and servicing up to 16 COs without expanding the basic configuration. The SCCS also has the capability

of shifting the primary CO responsibilities between the SCCS and the associated CO.

1.05 The two hardware configurations of the SCC are No. 1 SCCS and No. 2 SCCS. The No. 1 SCCS facility has manual capabilities to provide remote monitoring and control of the CO's TTYs and *maintenance or control center*. The No. 2 SCCS provides remote manual monitoring and control capabilities as in the No. 1 SCCS, plus a minicomputer with an associated *cathode-ray-tube (CRT)* and keyboard to collect and analyze CO TTY printouts. These SCCS versions are compatible in that growth is available from the No. 1 SCCS to the No. 2 SCCS version.

2. NO. 1 SWITCHING CONTROL CENTER SYSTEM EQUIPMENT IDENTIFICATION AND DESCRIPTION

A. No. 1 Switching Control Center System Facility

2.01 The No. 1 SCCS facility shown in Fig. 1 is a typical or recommended plan, which is intended only to illustrate options and important physical considerations. A No. 1 SCCS facility can be divided into two general areas. The back room, or TTY area, houses the common equipment cabinets and most of the TTYs. This room isolates the noise generated by the TTYs from the work area. Included in the work area (the second area) are the following:

1. Work stations
2. CIPs
3. Supervision and clerical work areas
4. Miscellaneous areas for documentation storage and use, special problem analysis, conferences, and lounge area.

Several important physical considerations are required to provide an efficient No. 1 SCCS. Incorporation of these factors is dependent upon the individual SCCS and must be interpreted with this in mind. (1) The work stations, providing the primary monitoring and control of a CO, are located in the front of the work area in easy view of the CIPs. The CIPs provide key status information of all serviced COs. (2) SCC control consoles are movable and shared among work stations. As a result, work station arrangements and spacings must be configured to allow easy

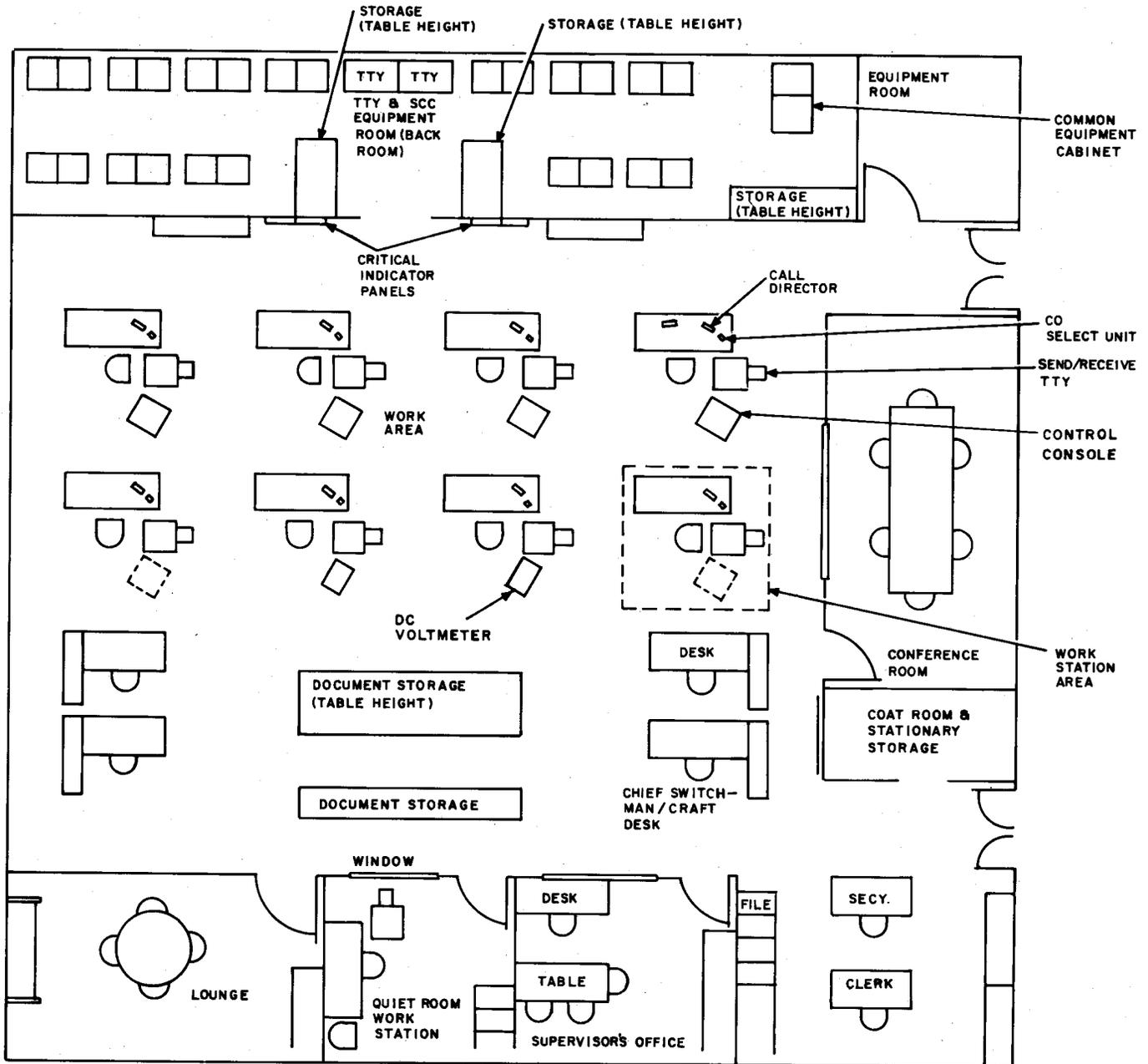


Fig. 1—No. 1 Switching Control Center System—Sample Floor Plan

movement of the control consoles. (3) Most documentation is stored in the work area to allow quick access to the information. (4) A quiet room containing a work station can be provided for special problems requiring a quiet environment for optimum concentration. (5) The conference room is centrally located and arranged to allow convenient access from outside the office with a minimum of disturbance.

B. No. 1 Switching Control Center System Equipment

2.02 The common equipment cabinets (Fig. 2) contain the miscellaneous circuitry required to control allocation of information transferred between the CO and the SCCS. These cabinets also initiate audible alarm indications as required. Status information is transferred between the CO and the SCCS via a telemetry system (E2A telemetry).

SECTION 201-400-100

This information, along with TTY data, transferred via TTY channels, enters and leaves the SCCS via the common equipment cabinets. A patch panel is also included in the common equipment cabinets. Patching allows reconfiguration of TTYs in case of equipment or facility failures. Switching and control circuitry contained in the cabinets routes the data to or receives the data from the TTYs, the CIPs, and the work stations. Information transferred between SCCS equipment is handled via the common equipment cabinets. Critical indications going to the CIP are monitored in the common equipment cabinets and, when an alarm condition exists, an audible alarm is initiated.

2.03 The CIP is a wall-mounted status display board (Fig. 3) providing key status information of 4 serviced COs. The critical indications are derived from lamps at the CO's maintenance center. One column on a CIP is dedicated per CO. Each column contains a maximum of 20 indications per CO. The CIP provides the SCCS with its only full-time status monitoring capabilities of all serviced COs. All information provided by a CIP is real-time status and operates in conjunction with the audible alarm system. A CIP can be duplicated in one other location of the SCCS as required.

2.04 A work station is capable of accessing any one of the COs serviced by the SCCS. The following capabilities exist from a work station:

- Release audible alarms
- Monitor and control the CO maintenance center
- Send and receive, or receive only, TTY channels to the CO
- Perform remote trunk testing (optional)

Table top items located on the work station desk include the call director and *CO Select Unit (COSU)*. An optional remote dc voltmeter is provided to a work station for trunk testing. Trunk testing capabilities are determined by the generic program in each CO. Due to its size, the dc voltmeter may require a support stand rather than being a table top item. A cable junction unit is mounted on the side of the desk. This unit is used to connect the work station components to the common equipment cabinets. Other elements

of a work station include a send-receive TTY and an optional SCC control console.

2.05 The COSU (Fig. 4) provides each work station with CO access and alarm release capabilities. The initial task required when beginning an assignment at a work station is selection of the desired CO. Two rotary switches are used to select the channel to the desired CO. After CO selection, COSU pushbutton keys enable either partial or full CO access. With partial access, a work station gains receive only capabilities on the TTY channel. On the other hand, full access allows work station TTY send/receive capabilities and SCC control console capabilities if a console is provided and console power is on. COSU alarm release enables manual retirement of an audible alarm at the SCCS by first selecting the CO and then depressing the alarm release key.

2.06 Each work station is allocated a call director to allow voice communications between the SCCS and its serviced CO. The communications path should be independent of CO status. In addition to the SCCS CO interface, the call director accommodates calls diverted from the serviced CO to the SCCS. As a result, a CO may transfer its incoming calls to the SCCS for reception.

2.07 The primary purpose of the SCC Control Console (Fig. 5) is to display CO status and configuration and provide control capabilities for the CO. The console is functionally similar to the maintenance center at the CO. As a result, the console panel displays status information, trouble status, and system configuration. Sufficient controls are provided to establish a working configuration should the CO encounter trouble. Each console is mobile and, as a result, can be used at any of the SCCS work stations. A unique console is required for each type of CO. An E2A telemetry central unit is contained in each console. The E2A telemetry provides the path of transfer of control and status information between the SCCS and the CO. When a CO is not being accessed by a work station, control of telemetry for that CO resides at an E2A central unit in the common equipment cabinets. Upon work station access to a CO, control of the telemetry facility for that CO is transferred from the common equipment cabinets to the console.

2.08 Optional remote trunk testing capabilities are provided by a work station voltmeter. This work station voltmeter is a remote test system

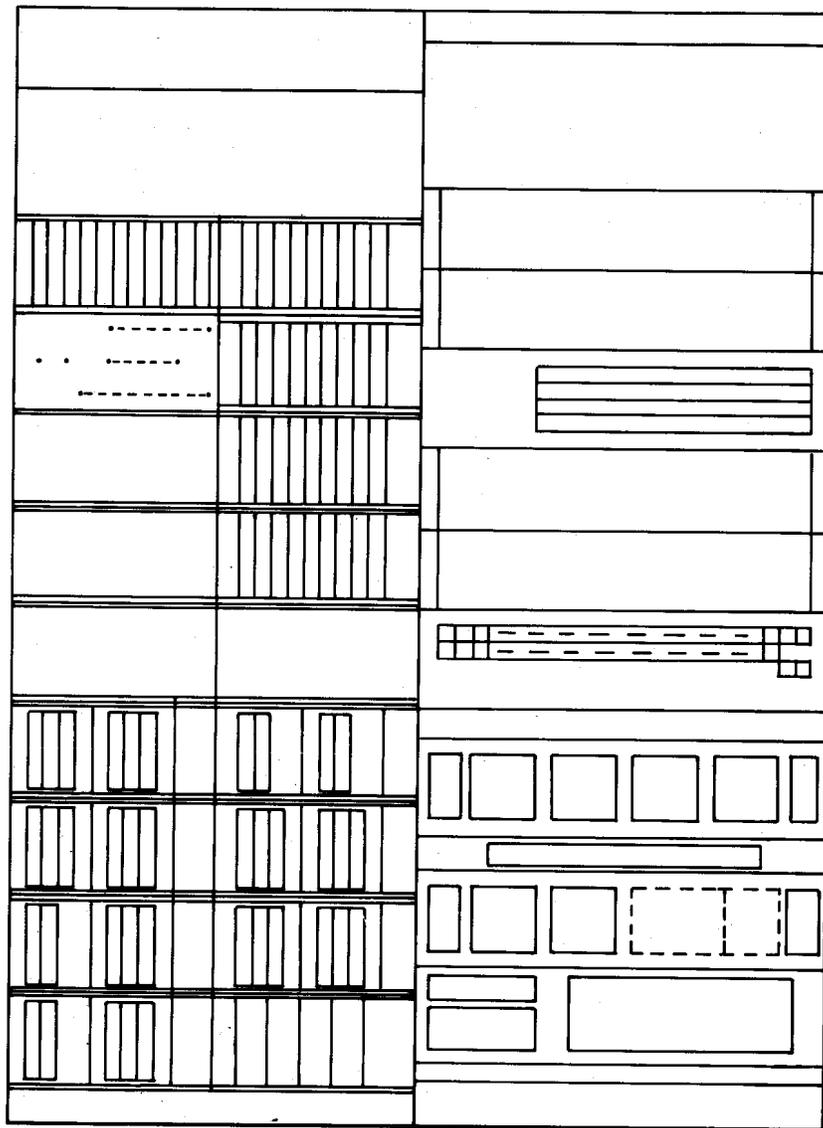


Fig. 2—Common Equipment Cabinets A and B—Example

and operates in conjunction with the work station TTY. Trunk testing communications are established with the desired CO via DDD.

2.09 A key element in No. 1 SCCS operations is the SCCS TTYs and associated channels. Six unique SCCS functions require TTYs. The TTY functions performed include:

- Work station TTY
- Primary history TTY
- Secondary history TTY
- Trunk maintenance TTY
- Shared TTY
- Auxiliary TTY

A maximum of three channels are dedicated to TTY operations in order that these TTYs may

METN	SMVL	N BRNS	ELIZ
ON LINE	ON LINE	ON LINE	ON LINE
AUD OFF	AUD OFF	AUD OFF	AUD OFF
CRITICAL	CRITICAL	CRITICAL	CRITICAL
MAJOR	MAJOR	MAJOR	MAJOR
MINOR	MINOR	MINOR	MINOR
BLDG	BLDG	BLDG	BLDG
TELEM	TELEM	TELEM	TELEM
EM ACT	EM ACT	EM ACT	EM ACT
CC	CC	CC	CC
SP	SP	SP	SP
PS	PS	PS	PS
CS	CS	CS	CS
PERIPH A	PERIPH A	PERIPH A	PERIPH A
PERIPH B	PERIPH B	PERIPH B	PERIPH B
MESSAGE	MESSAGE	MESSAGE	MESSAGE
OFF NOR	OFF NOR	OFF NOR	OFF NOR
BLDG INH	BLDG INH	BLDG INH	BLDG INH
TRAFFIC	TRAFFIC	TRAFFIC	TRAFFIC
SYS NOR	SYS NOR	SYS NOR	SYS NOR

Fig. 3—No. 1 ESS Critical Indicator Panel—Example

communicate with the serviced CO. The TTY channels include:

- Primary maintenance channel (required)
- Secondary maintenance channel (recommended)
- Trunk maintenance channel (optional).

Direct distance dialing (DDD) provides an interface with sources external to the SCCS and to the serviced CO. Refer to Fig. 6 for a block diagram representation of the SCCS TTYs, associated channels, and their relationships.

2.10 The primary maintenance channel is the basic TTY link between the SCCS and each of its associated COs. This channel is continually connected to a dedicated TTY (primary history TTY). The secondary maintenance channel is recommended for SCCS operations. The secondary maintenance channel has a dual role in SCCS operations. First, it serves as a back-up channel for the primary maintenance channel. As a result, the same input/output capabilities exist for both. Ease of transfer is provided between the primary

and secondary channels in case of emergency. To insure continuity, the maintenance history TTY is capable of being connected to the secondary as well as the primary maintenance channels. The other role of the secondary maintenance channel is to assume part of the load for the primary channel. When assuming this load, the secondary channel should accept the messages associated with long-term analysis. Those messages requiring more immediate attention or continuous monitoring should be on the primary channel. A dedicated TTY can optionally be supplied for history purposes on the secondary maintenance channel. This TTY is referred to as the secondary history TTY. If it is not installed, a shared TTY must be available to the secondary maintenance channel on a part-time basis. This channel services an optional centralized trunk test facility. The trunk maintenance channel is restricted to trunk maintenance operations only. A dedicated TTY (trunk maintenance TTY) can be optionally provided for connection to the trunk maintenance channel.

2.11 A **keyboard send-receive (KSR)** TTY is located at each work station. Its primary characteristic is the ability to switch to channels accessing any one of the serviced central offices.

2.12 A dedicated primary history TTY is assigned to monitor each CO. This TTY is continuously connected to the primary maintenance channel. As a result, a continuous printout is received of all TTY outputs per CO. A **receive only (RO)** or KSR TTY can be used depending on whether output capabilities are desired from this TTY. Dual copy output is recommended. One copy is dedicated for immediate analysis, while the second copy is maintained for a continuous record of each CO's output.

2.13 The main function of the secondary history TTY is to back up the primary history TTY. As a result, it is continuously connected to the secondary maintenance channel. It is a receive-only TTY since it handles only long-term messages. This TTY is provided to the system on an optional basis. Like the primary history TTY printouts, two copies of all output messages are recommended.

2.14 The trunk maintenance TTY is an option for the trunk maintenance channel. It is dedicated to the trunk maintenance channel and requires receive-only capabilities. Send-receive

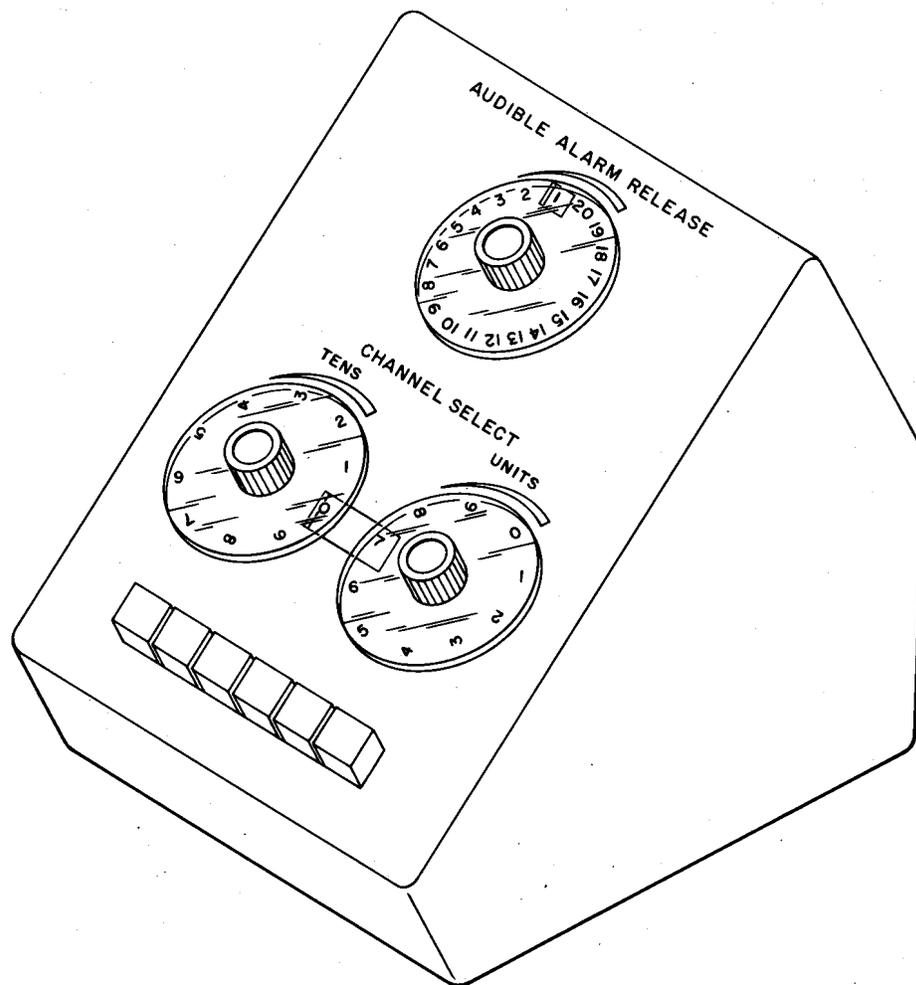


Fig. 4—Central Office Select Unit—Example

option is available if requested. Two copies of all output messages are recommended.

2.15 The primary function of the shared TTYs is to service the secondary maintenance channel and to serve as a spare for any failing TTYs. When a dedicated secondary history TTY is not warranted for the secondary maintenance channel, several shared TTYs are available on an as-required basis. Shared TTYs are also used for DDD appearances.

2.16 The main function of the auxiliary TTY is to automatically receive communications from external sources via DDD. In addition, the auxiliary TTY is easily patched to serve as a replacement for failing TTYs on a temporary basis and is used

to add punched paper tape capabilities to the primary maintenance channel. The auxiliary TTY can both read and cut new paper tapes. This added capability enables it to better service external communications and to provide the primary maintenance channel with translation updates and similar tasks.

3. NO. 1 SWITCHING CONTROL CENTER SYSTEM OPERATIONAL DESCRIPTION

A. No. 1 Switching Control Center System—Central Office Interface

3.01 The SCCS services its associated COs via three communication systems. The three include: E2A telemetry, dedicated TTY channels, and DDD (Fig. 7). The interface rendered provides

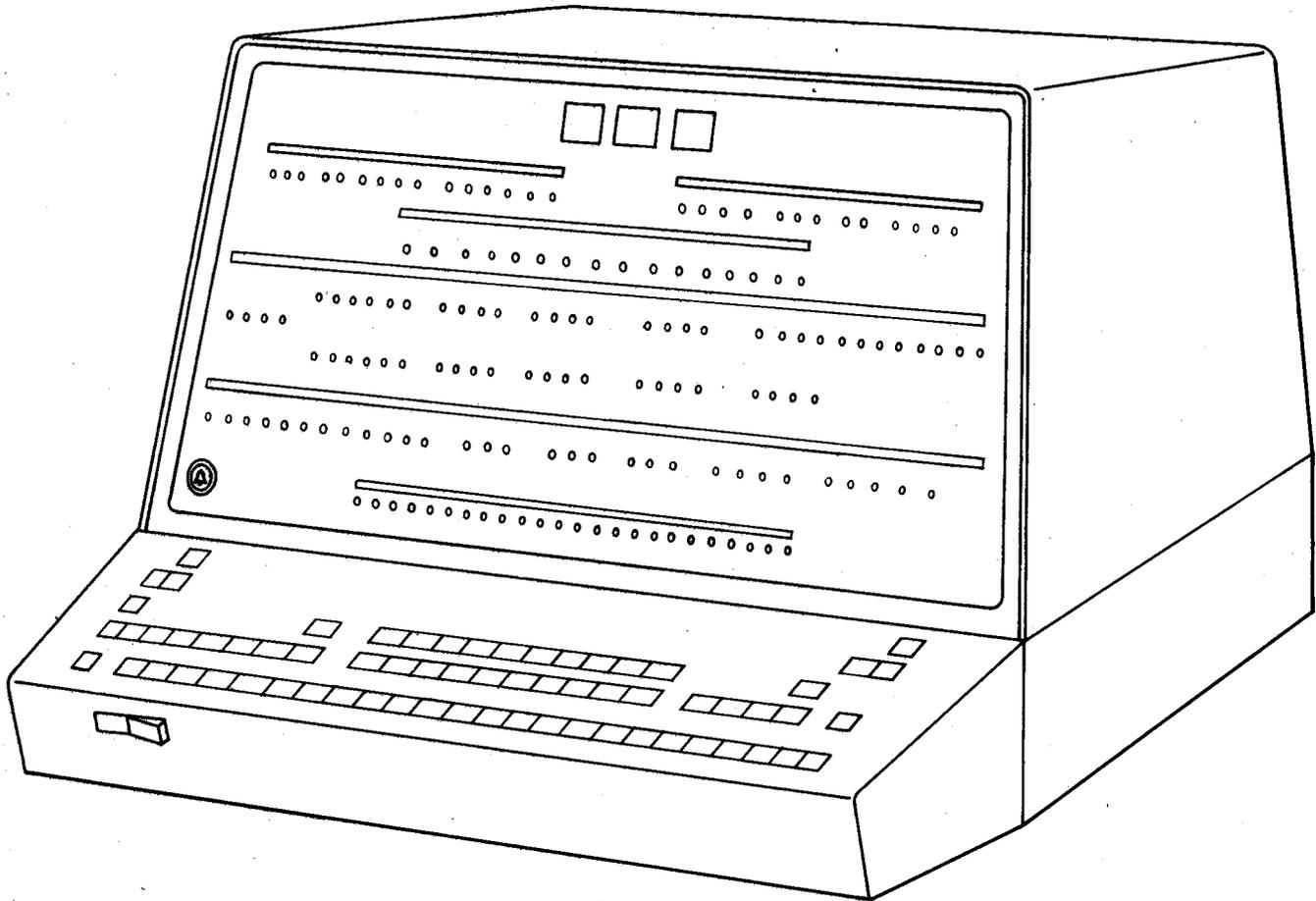


Fig. 5—Switching Control Center Control Console—Example

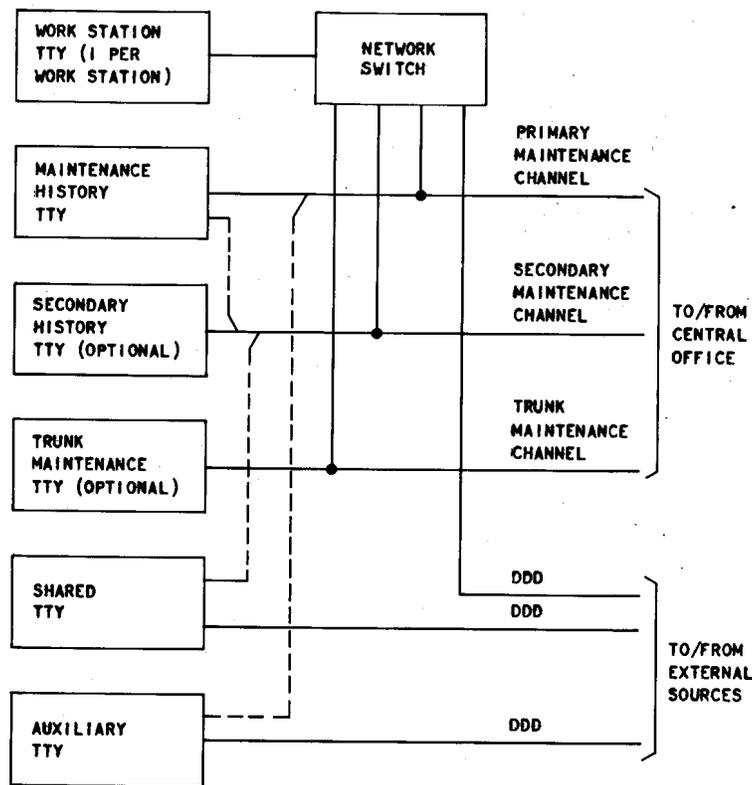


Fig. 6—Teletypewriters in the No. 1 Switching Control Center System—Block Diagram

transmission of system status and control, TTY input/output information, and voice communication. The E2A telemetry consists of an E2A central in the SCCS, the transmission media (4 wire), and an E2A remote in the CO. The CO maintenance center is monitored and the information obtained is transferred to the SCCS for display. Control is initiated by the SCCS and transferred to the CO for execution. As noted earlier, three TTY channels provide transfer of TTY input/output information between the SCCS and the CO. DDD enables the SCCS to have dial-up capabilities for voice and selected TTY communication to the CO and external sources.

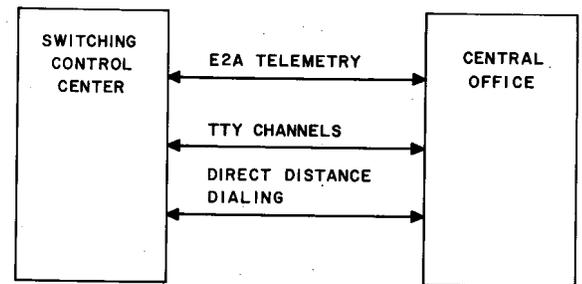


Fig. 7—Switching Control Center—Central Office Interface

B. No. 1 Switching Control Center System—Primary Description

3.02 The primary functional operations of the No. 1 SCCS include:

- Status monitoring
- CO alarms

- TTY support tasks
- Work station intervention and operation
- Trunk testing

These tasks are described in the following paragraphs with the description keyed to Fig. 8.

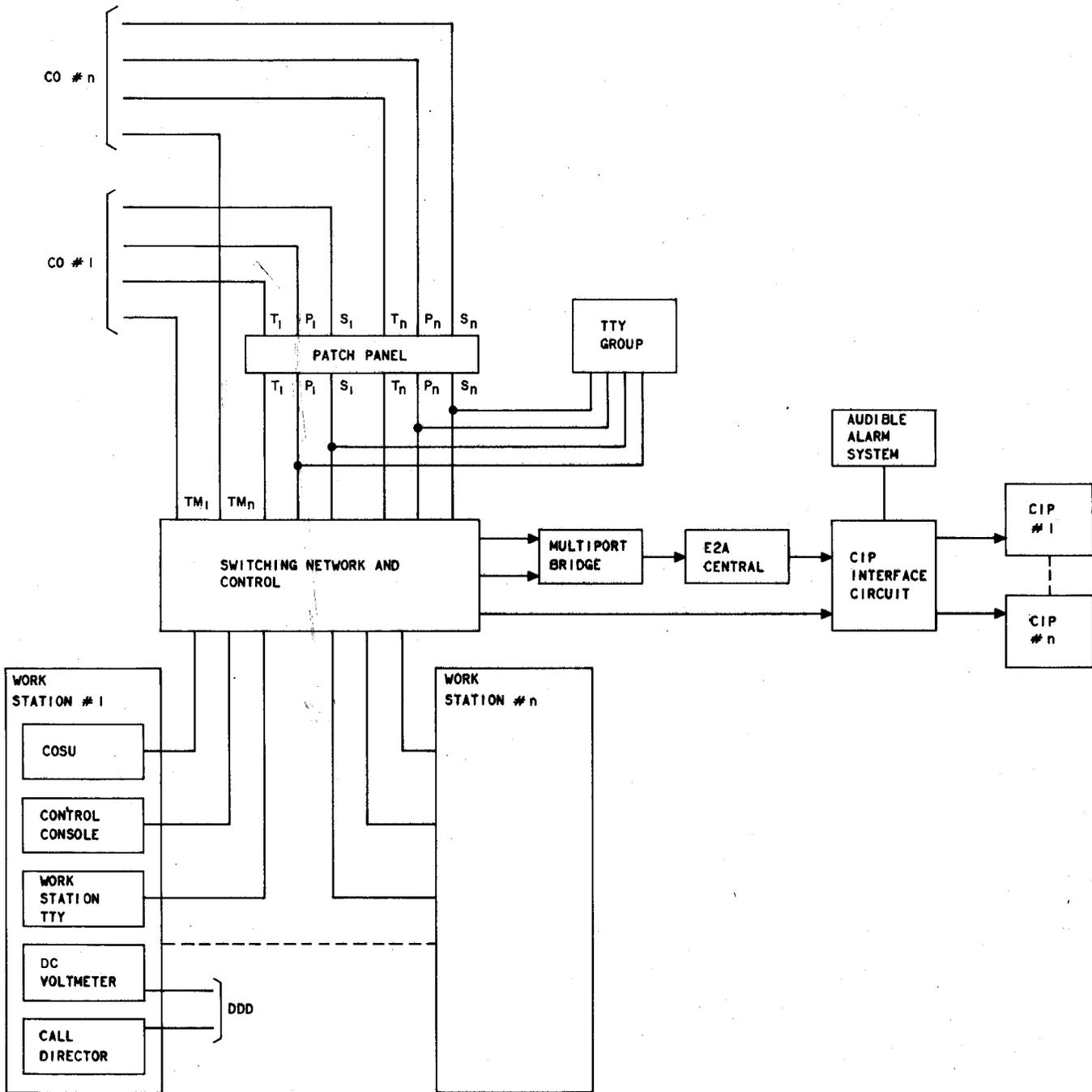


Fig. 8—No. 1 Switching Control Center System—Primary Block Diagram

3.03 The SCCS constantly monitors the status of each of its serviced COs. The COs are sampled, one at a time, and each returns a status word. The E2A central controls the monitoring procedures and initiates the requests for update.

As a result, the status word is sent to the SCCS from the CO via the telemetry (TM). The status bits are received by the E2A central and transferred to the CI interface and display circuit. This circuit distributes the status data to the associated CIP

for display. Additional bits are generated internal to the SCCS resulting in a maximum of 20 status indications on each CIP.

3.04 When a work station is accessing a CO, control of telemetry for that CO is transferred from the E2A central to the SCC control console. The console contains an E2A central. As a result, status sampling of the accessed CO is requested by the SCC control console central. The console receives display information for the CO maintenance center functions via the switching network and control. Some of the status bits are sent to the CIP for display. This data is transferred from the console via the switching network and controls and the CIP interface circuit. This circuit distributes status data to the associated CIP for display.

3.05 An audible alarm system is used in conjunction with the CIP. This alarm system functions on a three-level alarm basis.

- A critical alarm indicates that a service-affecting condition has occurred and requires immediate attention.
- A major alarm indicates that a potentially service-affecting condition exists.
- A minor alarm indicates that trouble has occurred but that it is not service affecting.

A fourth alarm (local equipment alarm) indicates failures in the SCCS equipment or telemetry. This alarm is the same as the minor alarm but with a faster repetition rate. The audible alarm system operates in any one of three modes:

- Alarm sounds only at SCCS.
- Alarm sounds at both the SCCS and CO.
- Alarm sounds only at the CO (with visual indication at the SCCS).

The audible alarm system monitors status indications going to the CIP to determine when an alarm is required. Monitoring of these indications is performed at the CI interface and display circuit. The audible alarm system initiates the required alarm per these status indications.

3.06 As noted earlier, TTYs play a key role in SCCS operations. All SCCS TTYs (except

for the work station TTY) are placed in a TTY group in Fig. 8. These TTYs provide input/output to the CO via the three associated TTY channels and the patch panel (Fig. 8). The patch panel allows easy reallocation of these TTYs as desired.

3.07 Manual intervention into a CO from the SCCS is provided by the work station. The work station enables the following:

- Establishes a working interface between the SCCS and CO
- Indicates the current configuration and status of the CO
- Allows control of the CO maintenance center and trouble analysis of the CO

The work station—CO interface is established by the COSU through the switching network and the telemetry. When this interface is established, control of the telemetry facility to the accessed CO is transferred to the E2A central in the SCC control console. A new status monitoring path is established between the CO and the CIP (as noted earlier). The SCC control console and work station TTY communicate with the serviced CO through the switch network and the telemetry. The console indicates CO status and enables CO maintenance center control. The TTY enables input/output capabilities between the work station and CO. As noted earlier, the call director enables voice communications between the CO and the work station via the DDD. An optional feature of the work station is trunk testing. The test is performed using the remote dc voltmeter via DDD and work station TTY via the switching network.

4. SWITCHING CONTROL CENTER SYSTEM GROWTH

4.01 Growth capabilities exist for the SCCS in two areas. First, the number of COs serviced by the No. 1 SCCS can be increased to a maximum of 16 COs and the number of work stations can be increased to a maximum of 12. On the other hand, growth capabilities also exist to evolve from a No. 1 SCCS to a No. 2 SCCS. Growth in the No. 1 SCCS affects the following equipment:

- Telemetry
- TTY channels

- Work stations
- CIPs
- Common equipment cabinets

Growth from the No. 1 to the No. 2 SCCS requires deletion of some TTYs and the addition of a minicomputer and interface equipment. The No. 2 SCCS provides TTY message handling and analysis capabilities. The high speed operation reduces the manpower requirements to perform routine analysis.

5. NO. 2 SWITCHING CONTROL CENTER SYSTEM EQUIPMENT IDENTIFICATION AND DESCRIPTION

A. No. 2 Switching Control Center System Facility

5.01 The No. 2 SCCS contains much of the same hardware as is in the No. 1 SCCS. There are, however, certain basic differences in the two configurations. These differences are as follows.

- The No. 2 SCCS does not normally require TTYs. Extra TTYs may be retained for backup in case of major failures in the minicomputer system. There is, however, a system TTY that provides direct access to the minicomputer.
- The back room area in the No. 2 SCCS contains the PDP 11/40 processor, magnetic tape transport, disk unit, line printer, and TTYs (as required).
- The alarm video monitors (only in the No. 2 SCCS) are located in a prominent position as are the CIPs.
- A CRT monitor and keyboard is used at the No. 2 SCCS work station as opposed to a send/receive TTY in the No. 1 SCCS.

Refer to 2.01 for a description of a sample No. 1 SCCS.

B. No. 2 Switching Control Center System Equipment

5.02 The common equipment cabinets (Fig. 2) contain the miscellaneous circuitry required to control allocation of information transferred between the CO and the SCCS. Status information is transferred between the CO's MCC and the SCCS via a telemetry system (E2A telemetry). TTY

data is transferred between the CO and the SCCS via TTY channels. Both status information and TTY data enter and leave the SCCS via the common equipment cabinets. Switching and control circuitry, contained in the cabinets, routes the status information to the CIPs via CI interface and display circuitry, also contained in the cabinets. The switching and control circuitry also provides the switching interface between all COs serviced and the control consoles located at the work stations. The common equipment cabinets route the TTY data, from the TTY channels, to and from the PDP 11/40 processor.

5.03 The computer system provides real-time logging of all TTY messages to and from each serviced CO. This system also provides message analysis, exception reports, and filing techniques. The computer system consists of the following equipment:

- PDP 11/40 Processor
- Magnetic Tape Transport
- Disk Unit
- Line Printer
- System TTY

The PDP 11/40 processor is contained in standard *Digital Equipment Corporation (DEC*)* cabinets. The primary logic is located in two pull out drawers for easy access. A DEC TM11-C tape control and TU10 magnetic tape transport provide the tape storage function. Both the tape control and tape transport are mounted in standard DEC cabinets. The disk unit consists of a DEC RP11-C disk control and RP03 disk drive. The No. 2 SCCS is equipped with a DATASPEED 40 *receive only (RO)* printer arrangement consisting of a printer, controller, and a keyboard and lamp strip. The system TTY is a 35 ASR.

*Registered trademark of the Digital Equipment Corporation.

5.04 The CIP is a wall-mounted status display board (Fig. 3) providing key status information of four serviced COs. The critical indications are derived from lamps at the CO's maintenance center. One column on a CIP is dedicated per CO. Each column contains a maximum of 20 indications per CO. The CIP provides the SCCS with full-time

status monitoring capabilities of all serviced COs. A CIP can be duplicated in one other location of the SCCS as required.

5.05 The alarm video monitor physically looks like a commercial television set. The unit must be located in a position easily viewed from all work stations. The video screen of the monitor provides a display capable of status display for 24 COs. In addition, an area in the lower portion of the screen is allocated for five one-line messages. These messages describe the most recent alarm conditions. Key data included in the message is the TTY message type that initiated the alarm, the CO affected, and the alarm level. A work station CRT monitor and data display is dedicated to provide the logic control required to drive the alarm video monitor display. A No. 2 SCCS can have a maximum of four primary alarm video monitors. In addition, each primary monitor can have secondary alarm video monitors connected to it. These secondary monitors are equivalent to the primary alarm video monitors. A maximum of three secondary monitors can be connected to each primary alarm video monitor.

5.06 A work station is capable of accessing any one of the COs serviced by the SCCS. The work station also has access to files of TTY messages generated by a CO over a designated period of time. The following capabilities exist from a work station:

- Release audible alarms
- Monitor and control the CO maintenance center
- Review and manipulate the CO TTY output messages to facilitate analysis of TTY output messages
- Send and receive TTY messages to and from the CO
- Perform remote trunk testing (optional)

Key elements of a work station include:

- COSU
- Cable junction unit
- Call director

- SCC control console
- CRT monitor and keyboard
- Remote dc voltmeter (optional)

5.07 The COSU (Fig. 4) is equipped with several function. In the No. 2 SCCS, however, only one of these functions is used. The COSU enables the control console to gain send-receive access to the desired CO. The channel select dials enable selection of the desired CO. The full access pushbutton key initiates access to the CO selected.

5.08 Each work station is allocated a call director to allow voice communications between the SCCS and its serviced CO. The communications path should be independent of CO status. In addition to the SCCS CO interface, the call director accommodates calls diverted from the serviced CO to the SCCS. As a result, a CO may transfer its incoming calls to the SCCS for reception.

5.09 The primary purpose of the SCC control console (Fig. 5) is to display CO status and configuration and provide control capabilities for the CO. The console is functionally similar to the maintenance center at the CO. As a result, the console panel displays status information, trouble status, and system configuration. Sufficient controls are provided to establish a working configuration should the CO encounter trouble. Each console is mobile and, as a result, can be used at any of the SCCS work stations. A unique console is required for each type of CO. An E2A telemetry central unit is contained in each console. The E2A telemetry provides the path of transfer of control and status information between the SCCS and the CO. When a CO is not being monitored and controlled by a work station, control of telemetry resides at an E2A central unit in the common equipment cabinets. Upon work station access to a CO, control of the telemetry facility is transferred from the common equipment cabinets to the console.

5.10 The CRT monitor and keyboard (Fig. 9) enables review and manipulation of CO TTY output messages and generation of input messages. The keyboard enables the user to request designated SCC functions and to input TTY messages as desired. The monitor (CRT) displays data requested and data generated by the user. Tasks performed by the CRT monitor and keyboard require interface with the PDP 11/40 processor and the accessed

SECTION 201-400-100

CO. Interface with the processor enables review and manipulation of CO TTY messages received by the SCCS. Interface with the CO enables generation of TTY input messages to the CO.

5.11 Optional remote trunk testing capabilities are provided by a work station remote dc voltmeter. This voltmeter is a remote test system and operates in conjunction with the work station CRT monitor and keyboard. Communications are established with the desired CO via DDD.

5.12 A maximum of three TTY channels per CO are dedicated to No. 2 SCCS operations. These channels include:

Primary maintenance channel (required)

Secondary maintenance channel (recommended)

Trunk maintenance channel (optional)

DDD provides an interface with sources external to the SCCS and serviced CO.

5.13 The primary maintenance channel is the basic TTY link between the SCCS and its associated CO. The secondary maintenance channel is recommended for SCCS operations. The secondary maintenance channel has a dual role in SCCS operations. First, it serves as a backup channel for the primary maintenance channel. As a result, the same input/output capabilities exist for both. Ease of transfer is provided between the primary and secondary channels in case of emergency. The other role of the secondary maintenance channel is to assume part of the load for the primary channel. When assuming this load, the secondary channel should accept the messages associated with long-term analysis. Those messages requiring more immediate attention or continuous monitoring should be on the primary channel. The secondary channel services an optional centralized trunk test facility. The tests can be executed via the primary, secondary, or the optional trunk maintenance channel. The trunk maintenance channel is restricted to trunk maintenance operations only.

6. NO. 2 SWITCHING CONTROL CENTER SYSTEM OPERATIONAL DESCRIPTION

A. No. 2 Switching Control Center System—Central Office Interface

6.01 The SCCS services its associated COs via three communication systems. The three include: E2A telemetry, dedicated TTY channels, and DDD (Fig. 7). The interface rendered provides transmission of system status and control, TTY input/output information, and voice communication. The E2A telemetry consists of an E2A central in the SCCS, the transmission media, and an E2A remote in the CO. The CO maintenance center is monitored and the information obtained is transferred to the SCCS for display. Control is initiated by the SCCS and transferred to the CO for execution. As noted earlier, three TTY channels provide transfer of TTY input/output information between the SCCS and the CO. DDD enables the SCCS to have dial-up capabilities for voice and selected TTY communication to the CO and external sources.

B. No. 2 Switching Control Center System—Primary Description

6.02 The primary functional operations of the No. 2 SCCS include:

- Status monitoring
- TTY message monitoring and analysis
- CO alarms
- Work station intervention and operation
- Trunk Testing

These tasks are described in the following paragraphs with the description keyed to Fig. 10.

6.03 The SCCS constantly monitors the status of each of its serviced COs. The COs are sampled, one at a time, and each returns a status word. The E2A central controls the monitoring procedures and initiates the requests for update. As a result, the status word is sent to the SCCS from the CO via the telemetry (TM). The status bits are received by the E2A central and transferred to the CI interface and display circuit. This circuit distributes the status data to the associated CIP for display. Additional bits are generated internal to the SCCS resulting in a maximum of 20 status indications for each CO.

6.04 When a work station is accessing a CO, control of telemetry for that CO is transferred from the E2A central to the SCC control console. The console contain an E2A central. As a result, status sampling of the accessed CO is requested by the SCC central console. The console receives display information for the CO maintenance center functions via the switching network and control. Sixteen bits of this information are sent to the CIP for display. This data is transferred from the console via the switching network and control and the CI interface and display circuit. This circuit distributes status data to the associated CIP for display.

6.05 In addition to the CIP, an alarm video monitor provides constant status monitoring of all serviced COs. The PDP 11/40 processor is constantly monitoring and evaluating TTY output messages from each of the serviced COs. Based on this evaluation, the PDP 11/40 processor controls the alarm video monitor via a CRT monitor and keyboard.

6.06 One of the primary tasks of the No. 2 SCCS is to monitor and evaluate TTY output messages from each of the serviced COs. Much of this task is automatically processed by the PDP 11/40 computer system.

The processor is constantly monitoring its serviced COs for TTY output messages. These messages are sent to the SCCS via the CO's primary maintenance (P), secondary maintenance (S), and trunk maintenance

(T) channels. The message data, along with user generated files, is stored on the magnetic tape transport and the disk unit. Data contained in the computer system can be printed out on the line printer and system TTY. Data can be typed into the system via the system TTY or the work station CRT monitor and keyboard.

6.07 An alarm system is used in conjunction with the CIP and alarm video monitor. This alarm system functions on a three-level alarm basis.

- A critical alarm indicates that a service-affecting condition has occurred and requires immediate attention.
- A major alarm indicates that a potential service-affecting condition exists.
- A minor alarm indicates that trouble has occurred but that it is not service affecting.

A fourth alarm (local equipment alarm) indicates failures in the SCCS equipment or telemetry. This alarm is the same as the minor alarm but with a faster repetition rate. The audible alarm system operates in any one of three modes:

- Alarm sounds only at SCCS
- Alarm sounds at both the SCCS and CO
- Alarm sounds only at the CO (with visual indication at the SCCS)

The audible alarm system monitors status indications going to the CIP and receives alarm commands from the PDP 11/40 processor. Monitoring of status indications is performed at the CI interface and display circuit. The audible alarm system initiated minor alarms (only) per these status indications. TTY messages are monitored and evaluated by the PDP 11/40 processor. When an alarm condition is detected, an alarm command is sent to the alarm video monitor for display. A code detector monitors the signals going to the alarm video monitor. When an alarm occurs, the code detector sends the required control signal to the audible alarm system. The audible alarm system sounds the designated alarm. Critical, major, and

SECTION 201-400-100

minor alarms are initiated by the PDP 11/40 processor.

6.08 Manual intervention into a CO from the SCCS is provided by the work station. The work station enables the following:

- Establishes a working interface between the SCCS and CO
- Indicates the current configuration and status of the CO
- Allows control of the CO maintenance center and trouble analysis of the CO

The primary functions of the work station are conducted on the CRT monitor and keyboard and the control console. The CRT monitor and keyboard enables the user to access SCCS data files (via the PDP 11/40 processor) relating to the CO accessed. The user may generate new files and manipulate existing messages. In addition, the CRT monitor and keyboard enables the user to send TTY messages directly to the CO accessed. The control console functionally remotes the CO's maintenance center. As a result, the user can review CO status and initiate CO control as required. The COSU is used to obtain CO access for the control console via the switching network and control and the telemetry (TM). As noted earlier, the call director enables voice communications between the CO and the work station via the DDD. An optional feature of the work station is trunk testing. This testing is performed using the remote dc voltmeter and CRT monitor and keyboard.

7. NO. 2 SWITCHING CONTROL CENTER SYSTEM—REMOTE CONTROL EQUIPMENT NO. 1 OPERATION

7.01 A computer subsystem No. 1 can service as many as 4 control equipment No. 1 sites. Alarming and alarm retiring for these different control equipment No. 1 sites are totally independent of the other sites. A control equipment No. 1 is

collocated with a computer subsystem No. 1 if: (1) the cabling distance between the control equipment No. 1 common equipment cabinets and the computer subsystem No. 1 is not more than 50 feet and (2) the cabling distance from the computer subsystem No. 1 to all work station CRTs, alarm video monitors, and line printers is not more than 200 feet. Otherwise, the control equipment No. 1 is remote from the computer subsystem No. 1 and data facilities are required (Fig. 11). The data facility provides interface between the minicomputer (in the computer subsystem) and TTYs, CRTs, and printers (in the control equipment No. 1). TTYs require a 110 baud, 2-wire facility and data sets. CRTs and printers require a 1,200 baud 4-wire data facility and 202T data sets. Functionally a remote control equipment No. 1 site is equivalent to a control equipment No. 1 site collocated with the computer subsystem No. 1.

8. SWITCHING CONTROL CENTER SYSTEM—MAINTENANCE PLAN

8.01 Failures in the SCCS and E2A telemetry are indicated by a modified minor alarm and visual indications on the CIP. TTYs in the No. 1 SCCS are configured to provide a quick and easy backup for congested channels and equipment failures. The No. 2 SCCS has the capabilities to be reconfigured to a No. 1 SCCS configuration upon failure of the minicomputer.

9. REFERENCES

201-400-101	No. 1 SCCS—Common Equipment Description
201-400-110	No. 2 SCCS Common Application Description
201-403-101	No. 1 SCCS—Application Description No. 1 ESS.
201-403-110	No. 2 SCCS—No. 1 ESS Application Description

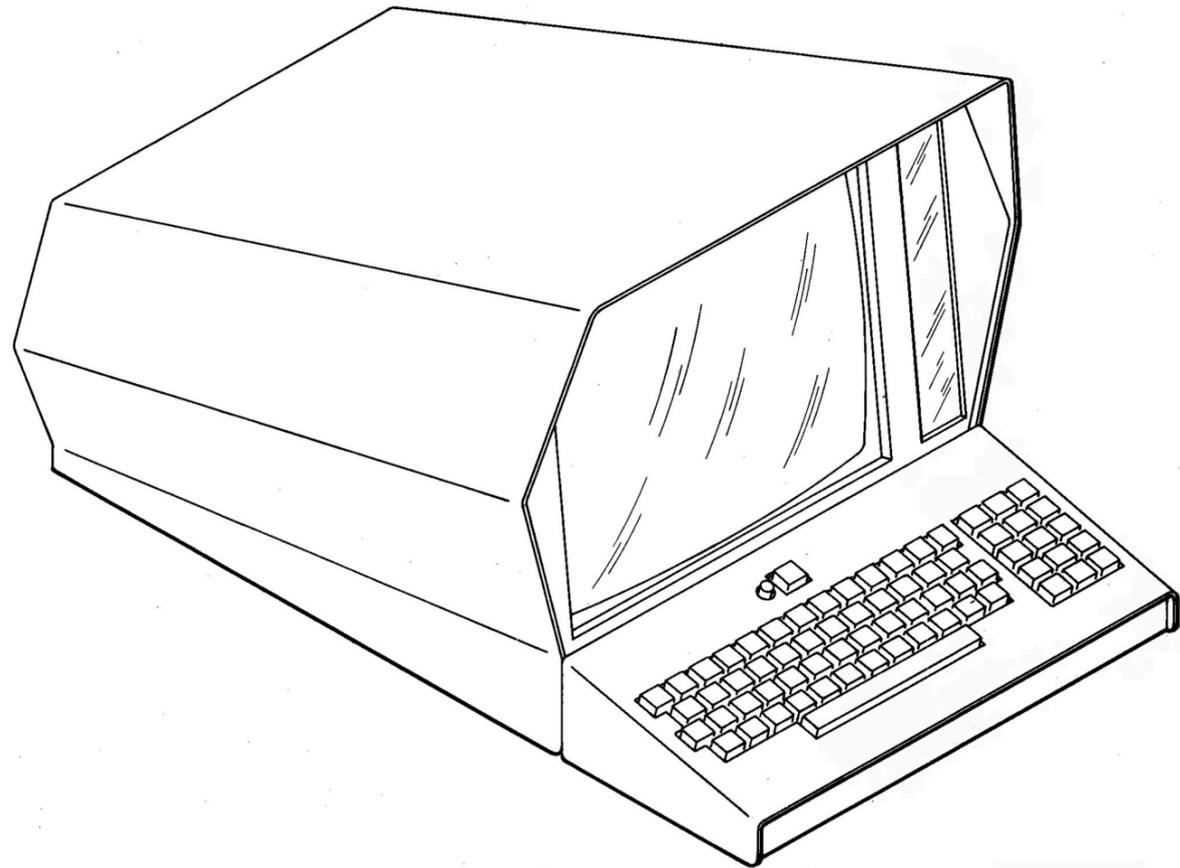


Fig. 9—CRT Monitor and Keyboard

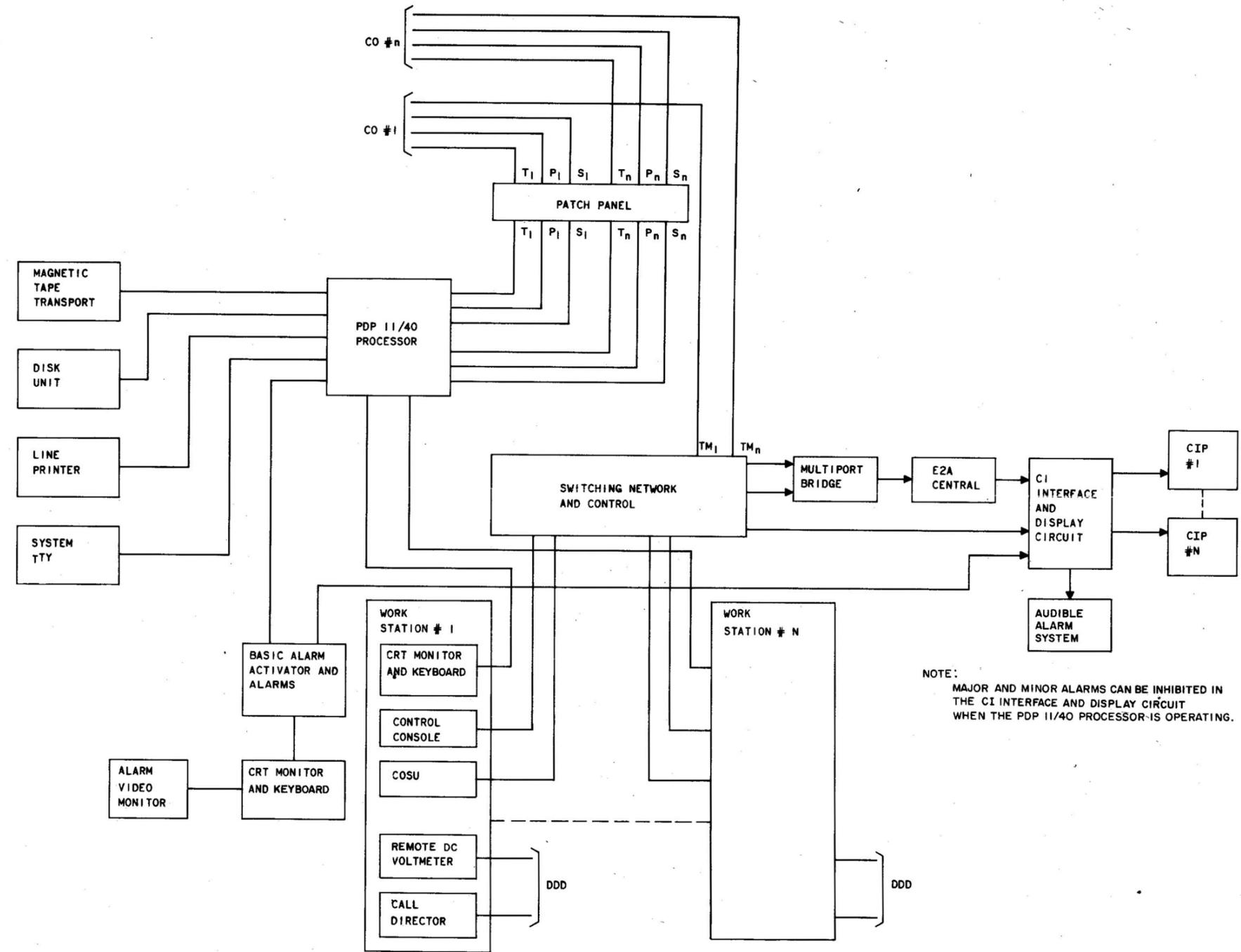


Fig. 10—No. 2 Switching Control Center System—Primary Block Diagram

Fig. 9 and 10

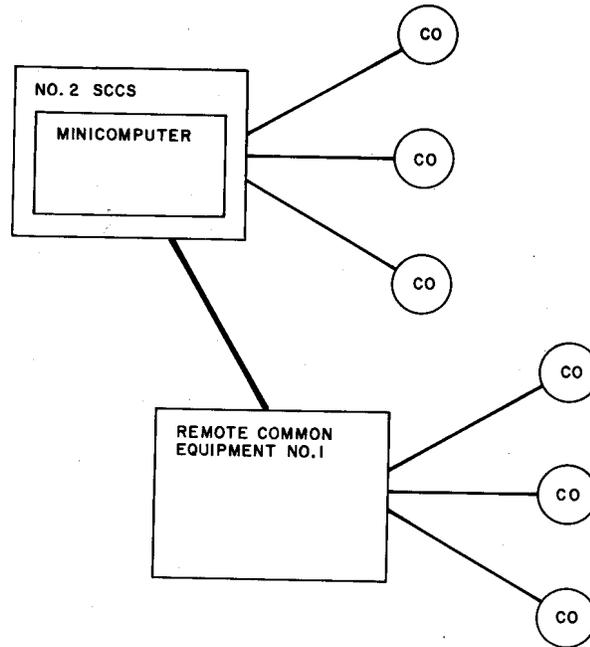


Fig. 11—No. 2 Switching Control Center System and Remote Common Equipment No. 1