SWITCHING SYSTEMS MANAGEMENT
NO.1 ELECTRONIC SWITCHING SYSTEM (2-WIRE)
MASTER CONTROL CENTER

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1. GENERAL

1.01 This section describes the master control center (MCC), also called the maintenance control center, in the 2-wire No. 1 Electronic Switching System (ESS).

1.02 When this section is reissued, this paragraph will contain the reason for reissue.

1.03 The MCC is the name of a pair of 2-bay frames located in the ESS equipment lineup. The MCC contains the automatic message accounting (AMA) recorders and the maintenance teletypewriter (TTY) in the bays of one frame and the trunk and line test panel (TLTP) and the alarm, display, and control panel in the bays of an adjacent frame (see Fig. 1).

1.04 The No. 1 ESS MCC provides:

(1) Compact and inexpensive storage of subscriber charging information in a form readily usable in an electronic data processing system

(2) A convenient means for both local and remote control of the system via TTYs

(3) A facility to be used for manually testing lines, trunks, and service circuits

(4) A simplified arrangement for displaying and controlling the system operational status as well as for reporting system troubles to the maintenance personnel.

1.05 It is important for network administrators to know the functions and capabilities of the MCC in order to perform their duties. A cooperative effort is necessary for both the administrative and maintenance personnel in order to ensure proper service in the No. 1 ESS office.

1.06 Part 2 through Part 5 describes the AMA recorder, the maintenance TTY, the TLTP, and the alarm, display, and control panel and discusses the responsibilities of the network administrator in relation to each.

1.07 The title of each figure includes a number(s) in parentheses which identifies the paragraph(s) in which the figure is referenced.

2. AUTOMATIC MESSAGE ACCOUNTING RECORDER

2.01 The purpose of AMA equipment is to provide the switching system with a facility to automatically collect and store billing information to be furnished to the data processing center (accounting) on a periodic basis.

2.02 The AMA equipment consists of two tape recorders and the associated circuitry and occupies a double-bay frame with the maintenance TTY in the MCC. There are two distinct AMA systems with separate control circuits for each recorder. Each system can operate as the active system with the other system on a standby basis to ensure reliability and to augment maintenance operations. With this arrangement, the system has access to either AMA 0 or AMA 1 at all times, thus ensuring service continuity.

2.03 During an in-process call, billing information, if required, is stored in a call store area designated as an AMA register. When the call is completed, a central processor program combines this information into a single billing entry and then enters it into another call store area designated as the AMA tape output buffer. When the buffer is full, the central processor transfers the contents to magnetic tape.

2.04 When the tape reel is ready to be replaced, the attendant must remove it and replace it with another reel. The reel may then be transported to the data processing center for computation and billing purposes.

2.05 An AMA register is a block of words in call store which is used to record pertinent billing information on calls. Prior to generic CTX-6, all AMA registers were 13 words long. A 4-word AMA annex register was used to supplement the 13-word register for each international direct distance dialing (IDDD) call processed by the ESS. (IDDD is available in offices with generic CTX-4, Issue 2 or later.) With CTX-6 and later generics, a 9-word AMA register is used for each call requiring bulk billing (no called number recorded) and a 13-word AMA register is used for each call requiring detailed billing (called number is recorded), including international direct distance dialing. No 4-word annex register exists in CTX-6 and later generics.

2.06 The number of AMA registers available in call store is specified by the following parameter set cards:

AMA REGISTER	*SET CARD*
13-word	NAM
4-word annex	NAMA (only in generic CTX-4, Issue 2 through CTX-5)
9-word	NAM 9 (only in CTX-6 and later generics)

2.07 Service can be adversely affected if an adequate number of AMA registers are not provided. It is the responsibility of the network administrator to ensure that a sufficient number of AMA registers are provided. For capacity requirements, see Dial Facilities Management Practices, Division H, Section 6h(1).

2.08 When all details of a call have been recorded in an AMA register, the information is transferred to a 200-word AMA buffer. When the buffer is full, the billing information it contains is transferred to the AMA tape. The size of the AMA buffer is fixed and is not determined by a parameter set card.

2.09 One AMA tape recorder is active while the other is on standby. The standby recorder can be switched to active status by manual control or by system control when the active tape recorder reaches the end of tape. The status of the recorders will also switch at midnight of the morning of each day of the week designated by the value of the

set cards SAT, SUN, MON, TUE, WED, THU, and FRI.

2.10 Stored program control has made it possible to add features to AMA recording in No. 1 ESS which are not found in electromechanical AMA recording. For example, in offices with generic CTX-7 and later the following features are available.

(a) ***Incoming Wide Area Telephone Service (INWATS) Billing:*** An AMA record of the necessary billing data of INWATS calls is made at the terminating office. No mechanical registers are needed such as are needed in electromechanical offices and in No. 1 ESS offices with generics prior to CTX-7.

(b) ***Customer Dial Account Recording (CDAR):*** Customers can be given the capability to dial in an accounting code before dialing a call. The account code will appear with the normal billing information on the AMA tape.

(c) ***Station Billing of Attendant-Handled Calls:*** In a centrex group, when the attendant handles a call for a centrex member, the billing entry is against the member's directory number.

2.11 AMA features unique to an ESS office may stimulate demand for ESS facilities. The network administrator must be aware of the possibility of such a demand and ensure that steps are taken to provide for it.

2.12 In addition to recording billing information, the AMA recorders can be used for writing data into ESS memory and reading information from it.

The AMA data retrieval and insertion program, a MOD 5 program (XDRI), makes it possible to use the standby AMA unit for recording any area of program store or call store on magnetic tape. These operations are interwoven (on J-level interrupt) with the call processing programs, thereby causing no break in the handling of calls. Specifically, the capabilities of program XDRI may be classified into the following two sections.

(a) ***Recording Program Store:*** Recording any program store area on magnetic tape in a format that can be read by a commercial tape system.

(b) ***Recording Call Store:*** Recording any call store area or the complete recent change area on magnetic tape, subsequently reading this tape, and inserting the data on it back into the call store.

3. MAINTENANCE TELETYPEWRITER

3.01 The maintenance TTY provides the primary means of communication between the ESS and maintenance personnel. It is used to request specific system actions; the system can report back on these actions or on internal system conditions.

3.02 The maintenance TTY is located in the right bay of the frame which houses the AMA recorders. A second maintenance channel is provided for an additional TTY. The second TTY associated with the MCC may be located near the MCC or in some remote maintenance center or maintenance bureau. This second TTY will always be located at some remotely attended point if the central office is to be unattended at any time. This machine, besides serving as a communications channel for maintenance personnel, also serves as the alarm broadcasting facility for the remote attended office.

3.03 The normal output messages from the system will consist of alarm indications of various types, messages indicating troubles within the system, results of any self-diagnosis resulting from detected troubles within the system, traffic overload conditions, and answers to questions asked of the system by maintenance personnel.

3.04 Should the No. 1 ESS office become incapable of communicating with the remote center, a fail-safe relay releases, opening the TTY loop. An open loop activates a major alarm at the remote center, indicating that immediate action is required. Input messages can be sent from either TTY.

3.05 Several other TTY channels are associated with the ESS. They include network administration (traffic), automatic line insulation test, and service order channels. For additional discussion of the operation of these TTYs and the maintenance TTY, see Dial Facilities Management Practices, Division H, Section 6d(4).

4. TRUNK AND LINE TEST PANEL

4.01 The TLTP contains the facilities for removing from service and testing trunks, service circuits, and customer lines. The TLTP contains lamps, pushbutton keys, rotary switches, a voltmeter circuit, a transmission measuring set, and a telephone circuit (see Fig. 2 and 3).

4.02 The TLTP is located in a 2-bay frame at the right of the frame containing the AMA recorders and the maintenance TTY.

4.03 If additional trunk testing facilities are required in the office, one or more supplementary trunk test panels (STTPs) may be installed in the ESS office. The STTP is functionally identical to the TLTP with respect to trunk tests. Line test features are not provided on the STTP (see Fig. 4 and 5).

4.04 A TOUCH-TONE® pad is built into the middle of the sloping panel of the TLTP and in each STTP. These TOUCH-TONE pads are used to key the equipment number of the circuit to be tested and to key test information into the system. Each pad is associated with an MCC test line. The line equipment number assignments for MCC test lines are done on the general information record, ESS 1500B, as well as on the directory number record, ESS 1101. See the Translation Guide TG-1A for assignment procedures.

4.05 It is the network administrator's responsibility to ensure that the line equipment numbers assigned to MCC test lines are not reassigned. Transfer of an MCC test line involves extensive translation changes.

4.06 The MCC test lines are to be assigned to essential service.

4.07 The MCC test lines use a separate TOUCH-TONE digit receiver assigned to route index 0079. One extra TOUCH-TONE digit receiver is to be ordered by the network design engineer for use by the MCC test lines. This receiver must not be counted in establishing the number of customer digit receivers for capacity considerations.

4.08 If the MCC TOUCH-TONE digit receiver is in use or made busy, the next MCC test line which attempts to access the receiver is routed to route index 0078 which is the route index for the TOUCH-TONE customer digit receivers. Therefore although MCC test lines have a dedicated digit receiver, they may generate usage on the customer digit receivers.

4.09 The master test line can be connected through the network to any trunk or service circuit to be tested.

4.10 An outgoing trunk connected to the test line can be marked busy in temporary memory by depressing a MAKE-BUSY key at the test panel. ***An audible alarm is sounded and the GROUP BUSY lamp will flash if customer service will be adversely affected by the number of circuits removed from service.*** The number of trunks which, when taken out of service, would sound the alarm is equal to one-fourth of the number of trunks in the group up to 16 trunks, plus one-eighth of the number of trunks in the group in excess of 16. (In generic programs prior to CTX-6, the number of trunks is simply one-fourth of the trunk group or four trunks, whichever is less.)

4.11 Any trunk or service circuit can be connected through the network to an access trunk on the trunk switch frame and then to the voltmeter or transmission test facility. There are three test access trunks for testing purposes on the TLTP and three test access trunks on each STTP.

4.12 Operating the VM key of an access trunk and the TRFR key of the master test line transfers the trunk being tested by the master test line to the voltmeter test circuit. Depressing the XMSN key and the TRSF key of master test line causes the trunk to be connected to transmission test. Similarly, the trunk may be transferred back to the master test line when necessary.

4.13 The trunk network number assignment for each test access trunk (SD-1A322, OC 06770) is done on the general information record, ESS 1500B.

4.14 Depressing the TEST and TRUNK keys and keying a trunk network number on the TOUCH-TONE set requests the system to report on the status of the specified trunk. The busy or idle condition is indicated by the EQPT ST (equipment state) lamp. A steady light indicates an idle state; 60 IPM indicates as traffic busy

(talking); and 120 IPM indicates a maintenance busy. The trunk test keys make possible the following:

(a) Removing a trunk from service.

(b) Restoring a trunk to service.

(c) Monitoring a trunk.

(d) Making repeated outpulsing tests to a distant office, etc.

4.15 Operation of the TEST and LINE keys of the MCC test line informs the system that the digits keyed on the TOUCH-TONE pad specify a customer line. A path is established between the MCC access trunk and the customer line.

4.16 The EQPT ST lamp displays the status of the line. A steady light indicates an idle state; 60 IPM indicates as traffic busy (talking); and 120 IPM indicates a maintenance busy. When the VM key under LINE TEST is operated, the line is connected to voltmeter test facilities.

4.17 If the customer line is busy, a connection is made via the no-test vertical in the line junctor switch frame. Two no-test verticals are provided on each line junctor switch frame and on each trunk junctor switch frame.

4.18 The two no-test verticals provided on each line junctor switch frame and trunk junctor switch frame must be connected to regular line equipment numbers on the line link networks. These line equipment numbers will be automatically generated by the translation data assembly (TDA) program for all balanced network configurations; that is, when the quantity of trunk link networks is equal to or less than the quantity of line link networks, when there are four line and four trunk junctor switch frames per network, and when there are at least four line switch frames per network.

4.19 Under certain network configurations, the generated line equipment numbers will not accommodate all of the no-test vertical assignments. This will be the case if an office is equipped with more trunk link networks than line link networks, has any network which contains fewer than four line switch frames, or has 2048-type trunk link networks. In these situations, additional line equipment number assignments must be made for the no-test vertical line equipment numbers not generated by TDA. These line equipment numbers will require ESS 1506 inputs to build the translation data in memory.

4.20 It is the network administrator's responsibility to make any no-test vertical line equipment number assignments not made by the TDA program. Charts which show no-test vertical assignments and the instructions on assignments can be found in the TG-1A in the section on the ESS 1506.

4.21 Verification of the additional no-test vertical assignments should be done by the network administrator upon receipt of the ESS 1506 printout from the selected line and trunk translations (SLATTS) program.

4.22 It is also the responsibility of the network administrator to ensure that no directory number is assigned to the line equipment number of ***any*** no-test vertical.

4.23 Located on the TLTP is an area labeled PERMANENT SIGNAL TEST. Formerly, all permanent signals came to the TLTP for clearing by maintenance personnel; however, this is no longer done and these displays and controls are now nonfunctional.

4.24 Another feature of the TLTP and STTPs is the ability to insert a substitute trunk between the SD-1A165 outgoing trunk being tested and a test circuit, usually an SD-1A176 trunk circuit. This essentially permits an SD-1A165 outgoing trunk of known reliability to be substituted for another SD-1A165 trunk believed to be encountering difficulty. If difficulty is still encountered with the substitute trunk connection, the diagnostic determines that the trouble is not in the trunk circuit. Upon completion of the diagnostic, the connection will stay up until the trunk is released by maintenance personnel. The substitute trunk diagnostic can be requested from the TLTP or STTP only on a single-trunk basis, not for a trunk group. When the trunk network number and a diagnostic code are keyed, the trunk being tested is put into the bypass state and reduced to a mere pair of wires.

4.25 For a more detailed description of the TLTP and STTP, see Bell System Practices Section 231-130-100.

5. ALARM, DISPLAY, AND CONTROL PANEL

5.01 The maintenance TTY channels described in Part 3 provide the primary means of communication between No. 1 ESS and maintenance personnel. When the system maintenance program detects a trouble, it diagnoses the unit and reports the location of the failure to the maintenance personnel via the maintenance TTY. After repairing the unit, maintenance personnel use the maintenance TTY to instruct the system to return the unit to service.

5.02 TTY communication, however, is not dependable when the system loses its self-organizing capability. When this capability is lost, the need to exert control over the system is imperative. To provide for this need, controls and displays are provided in No. 1 ESS equipment frames and on the alarm, display, and control panel at the MCC. An alarm system is used to alert maintenance personnel and direct them to the proper location for receiving data on the nature of the failure.

5.03 The alarm, display, and control panel is located in the right bay of the frame which contains the TLTP (see Fig. 6).

5.04 Display lamps are used to indicate the status of the No. 1 ESS. Appropriate colors indicate which of the various modes of operation certain units are in, trouble conditions, and certain selections that have been made by operating the various keys and switches.

5.05 Red lamps indicate a primary trouble. They signify that a trouble of major consequence exists and that immediate action should be given to this condition. The lighting of a red lamp activates a major alarm.

5.06 Amber lamps generally indicate a secondary trouble. They signify that a unit is still capable of performing its function but that a major malfunction exists in its duplicate equipment unit. This type of trouble usually activates a minor alarm.

5.07 Green lamps are provided within certain locking pushbutton keys. A lighted green lamp indicates that a key is activated.

5.08 White lamps indicate an active condition or the selection of a particular key (with the exception of the minor alarm lamp which is white). White lamps are provided in some nonlocking keys as well as some locking keys. When the key is operated, the lamp is lighted.

5.09 In addition to lamps, the panel contains various rotary switches and keys of either the locking or nonlocking type. In each key, a lamp mounted behind the transparent button serves as a visual indication of an operated or locked position. A locked key is restored to normal simply by depressing it.

5.10 The significance of the visual indications provided and the procedures to be followed in the operation of various keys and switches associated with the alarm, display, and control panel are described in 5.11 through 5.53. (Refer to Fig. 7, 8, and 9.) For convenience of reference in this description, the controls and displays have been divided into groups with each group indicated by a letter in parentheses following the name.

5.11 ***System Alarm (A):*** All system-detected troubles result in an audible alarm and either a MAJOR or MINOR lamp indication. A third lamp labeled CRITICAL has been added in CTX-7 and later generics. The alarm is retired by operating the alarm release (ALM RLS) key at the bottom right-hand side of the sloping panel.

5.12 ***Peripheral Units (B):*** Primary lamps, identified by a ***P***, and secondary lamps, identified by an ***S***, in this group display the status of individual units or groups of units. The primary lamps light when both scanner controllers or both network controllers are in trouble in a frame. The secondary lamps light when one scanner controller in a frame is out of service.

5.13 ***Central Pulse Distributor (C):*** Primary and secondary lamps indicate that either one or both controllers are out of service in the central pulse distributor.

5.14 ***Signal Processor (D):*** Each signal processor has two lamps: one lamp is labeled TBL and lights when the unit is in trouble; the other lamp is labeled ACT and lights when the unit is in the active status. Primary and secondary lamps for the signal processor call stores light when both or one copy of a memory block is unavailable in the call stores.

5.15 ***Central Control (E):*** Each central control has two lamps: one lamp is labeled TBL and lights when the unit is in trouble; the other lamp is labeled ACT and lights when the unit is in the active status. Each program store has a lamp that lights when the store is out of service. Primary and secondary lamps for the central control call stores light when both or one copy of a memory block is unavailable in the call stores.

5.16 ***Signal Processor Control (F):*** Status lamps are provided for each signal processor and keys are provided for manually stopping and starting the signal processor. On early alarm, display, and control panels, an extra row of lamps and controls were provided for another "community" of signal processors. The original plan was to develop a second group or community of signal processors to increase call capacity; however, these plans were never developed and these lamps and controls, where they appear, have never been used.

5.17 ***Traffic Controls (G):*** This area of the alarm, display, and control panel indicates the status of certain traffic controls.

(a) ENABLE EMER MAN SRV, when depressed, allows the activation of emergency manual service when the EMER MAN SRV key is operated. Emergency manual service allows certain high-priority customers to be connected to a switchboard as a manual line in the event of ESS system failure. When activated, the EMER MAN SRV lamp lights. Each line which is assigned to emergency manual line service requires one emergency manual line circuit, SD-1A156, and one trunk network number appearance in addition to a line equipment number and directory number. Assignment of the line equipment number and trunk network number is done on the ESS 1506 form. (See TG-1A.) The assignment of emergency manual line service and the conditions for its use are subject to local operating company policy.

(b) TOLL NET PROT lights when toll network protection (TNP) is in effect. The TNP feature gave lines marked toll essential access to trunk groups which were designated toll protected. All other lines attempting to complete calls to these trunk groups received overflow tone. TNP is being withdrawn and will not be maintained in future generic programs.

(c) CC OVLD lights when the interval between E-level visitations exceeds a predetermined period of time. Service is affected if the E-to-E visitation rate, an indication of call processing load, is too low. Prior to CTX-4, this lamp was labeled MAIN OVERLOAD.

(d) RCVR OVLD lights when there is an overflow from a receiver queue.

(e) LLC ENAB lights when line load control is in effect. Line load control, when in effect, denies originating service to some nonpriority customers when dial tone speed test failures or incoming matching loss reach a certain level. When line load control is instituted, the LINE LOAD CONTROL lamp is lighted and a major alarm is activated. In generics prior to CTX-4, line load control could be activated by operating a key appearing on the alarm, display, and control panel. It can now be activated only by a TTY message. For additional information on line load control see Dial Facilities Management Practices, Division H, Section 6d(1).

(f) DT DEL lights when a dial tone speed test fails or when the line load control program is denying originating service to one or more groups of nonessential lines.

(g) In addition to the above controls and displays, two lamps are present in offices with CTX-6, CTX-7, and later generic programs for displaying information on network management.

(1) ***In CTX-6 and Later Generic Programs:*** OG LOAD CONT replaces the lamp labeled TOLL NET PROT and lights when toll network protection is in effect or when any network management control is active, either a code block control or a trunk group control.

(2) ***In CTX-7 and Later Generic Programs:*** INC LOAD CONT lights when the office is sending a dynamic overload control to one or more connected offices.

For additional information on network management, see Dial Facilities Management Practices, Division H, Section 6d(2). The network administrator must be aware of the status of traffic controls.

5.18 ***Status (H):*** Status lamps are used to indicate the overall condition of the system.

(a) The MULTIPLE TROUBLE lamp lights when the system detects that a trouble exists in the active central control and the standby central control is already in trouble.

(b) The DIAGNOSIS IN PROGRESS lamp lights when an automatic diagnosis of some system unit has been started and extinguishes when the diagnosis is completed.

(c) The TRUNK MB OVERFLOW lamp lights and a minor alarm sounds when the number of trunks out of service (made busy) exceeds a predetermined number. This indicator uses the same criteria as the GROUP BUSY lamp on the TLTP discussed in 4.10. The difference between the two lamps is that whereas the GROUP BUSY lamp was used when trunks were made busy by maintenance personnel, the TRUNK MB OVERFLOW is used when trunks are made busy by the system itself. In addition, the lamp will light when the system attempts to make trunks busy at a rate greater than one trunk per hour. Beginning with CTX-7, Issue 8, the TRUNK MB OVERFLOW lamp will light if:

(1) One-fourth of the first 16 trunks plus one-eighth of the number of trunks in excess of 16 in a service circuit group protected by data validation checks are made busy, and

(2) A nonzero amount of overflow is experienced in a protected service circuit group during a 15-minute period.

When the lamp lights, a DV0-4 message is printed which identifies the service circuit group in trouble. The service circuit groups which are protected by data validation checks are as follows:

- Dial pulse and TOUCH-TONE customer digit receivers
- Multifrequency, dial pulse, and revertive pulse transmitters
- Multifrequency, dial pulse, and revertive pulse receivers
- Regular and audible ringing circuits.

(d) The EA PHASE IN PROGRESS lamp indicates that an emergency action is being performed.

(e) The MISCELLANEOUS TROUBLE lamp indicates trouble in the AMA recorder.

5.19 ***Bay Control (I):*** Status lamps indicate the condition of the alarm, display, control bay itself. The POWER ALARM lamp indicates a power failure at the alarm display control frame. Depressing the POWER OFF key removes power from the frame. A lighted OFF NORMAL lamp indicates an operated key or switch on the control panel.

5.20 ***Emergency Action (J):*** Depressing the SELECT ACTIVE key for CC-0 or CC-1 forces the selected central control to acquire active status. The six lamps provided at the left-hand side of each central control indicate as follows:

(a) ACTIVE and TROUBLE: indicate whether the central control is active or in trouble.

(b) POWER: indicates that each central control is receiving power, active and standby.

(c) CLOCK: indicates trouble in the clock circuit of the central control.

(d) STOPPED: indicates that the active central control, under program control, has executed a deliberate stop of the standby central control.

(e) OFF LINE: lights when the program completes the task of setting up the proper connections so that the standby central control will operate with the standby program store for off-line operation and testing. The off-line mode is requested by the TTY.

5.21 Occasionally a fault may be suspected in one of the duplicated buses which are used for communication between central control and program store or call store. It is therefore necessary to be able to redirect bus communications.

5.22 Depressing the SELECT PS BUS key for bus 0 or bus 1 forces the specified program store bus to work with the active central control. The SELECT PS BUS key cannot be used alone but must be used with the PS STATE CONTROL rotary switch. This switch enables selection of one of eight predetermined states or configurations of program stores to work with the active central control and the selected program store bus.

5.23 No configuration is selected in which both copies of program store duplicated memory are taken out of service. In each of the eight states, one or more program stores are forced out of service. The remaining stores still contain a complete copy of program and translation information.

5.24 The configurations can be used by operating personnel for "reinitialization". This is a term used mainly when generic programs are changed in an office (updated). These keys are used to force the appropriate units to operate in a particular configuration until the office is ready to use the new program.

5.25 The INVALID lamp lights if the PS STATE CONTROL switch attempts to force into service a store from which power has been previously removed.

5.26 The SET MANUAL key is used in conjunction with the ANSWER BUS controls which are described in 5.36.

5.27 An emergency action (EA) circuit in central control guards against trouble conditions that impair the capability of the system to remove one or more faulty units from service and to assemble the remaining units in a workable combination. The emergency action circuit forces, in sequence, different combinations of buses (program stores and central controls) to restore normal system operation.

5.28 If the emergency action fails to assemble a workable combination, a signal is sent to the MCC. This signal opens the fail-safe loop to the remote maintenance TTY, lights the red REPEATED TIME-OUT lamp, and activates the major alarm. The emergency action circuit can be disabled by operating the DISABLE TIME-OUT key.

5.29 There are two modes of error detection in central control: join and disjoin. In the join mode, both central controls perform an error correction or reread of stored information when either central control detects an error.

5.30 An error correction refers to a ***single*** error in a program store word. A reread of stored information refers to a ***double*** error in a program store word.

5.31 In the disjoin mode, each central control performs an error correction or a reread as required by its own error detection circuit. The DISJOIN lamp is lighted when the active central control is in the disjoin mode. The DISJOIN and JOIN keys can be used to force the active central control into the join or disjoin mode.

5.32 ***Central Control and Bus Isolation Controls (K):*** The lamps in this group display how the central controls are associated with the duplicate buses for program store, call store, peripheral unit, and central pulse distributors. The SEND lamp lights for each central control, program store, or call store bus when central control is connected to send information on that bus. Similarly, the RCV lamp lights when central control is connected to receive information from the bus. For each central control, the PWR lamp is on as long as power is applied.

5.33 A CC ISOLATION CONTROL rotary switch is provided for each of the four types of buses: program store, call store, peripheral unit, and central pulse distributor. For instance, when the switch for the program store bus is set to the CC-0 position, the CC-0 is isolated from the program store buses. The PWR lamps will be off. Similar considerations apply to the CC-1 position and to the other three switches. The CC ISOLATION switches are only effective on the standby central control and only when the other central control is made active by means of the central control SELECT ACTIVE key.

5.34 A BUS ISOLATION CONTROL rotary switch is provided for each of the four types of buses: program store, call store, peripheral unit, and central pulse distributor. For instance, when the switch for the program store buses is in the BUS-0 position, power is removed from BUS-0 in both central controls.

5.35 To reach a BUS-0 or BUS-1 position, a BUS ISOLATION CONTROL switch must pass through an intermediate REQUEST position. This position, which is monitored by a scan point, gives the program an opportunity to mark the bus in trouble and to take it out of service. This ensures that status and routing information kept in call store is updated before the power is removed from the selected bus.

5.36 ***Answer Bus (L):*** The two lamps indicate whether the active central control is using scanner answer bus 0 or bus 1. Setting the rotary switch to the BUS 0 or BUS 1 position and depressing the SET MANUAL key under emergency action forces both central controls to use bus 0 or bus 1.

5.37 ***Store Display (M):*** Setting the rotary switch requests that the association of a specified program store with central control program store buses 0 and 1 be displayed on the eight lamps. When lighted, the four lamps for bus 0 have the following meaning:

(a) TBL: Sending and receiving operations over bus 0 for the specified store are inhibited.

(b) H OUT: The specified store transmits any word read from its H half to bus 0.

(c) INPUT: The specified store receives information from bus 0.

(d) G OUT: The specified store transmits any word read from its G half to bus 0.

The four lamps for bus 1 have similar meanings.

5.38 Setting the rotary switch to the CALL STORE position requests a display for a call store which is specified by means of a TTY input message.

5.39 ***Peripheral (N) and Distributor (0) Modes:*** In the NORMAL mode of operation, the system determines the association of peripheral and central pulse distributor buses with central controls. Three other modes are available for testing purposes. In the N mode, the active central control determines the bus choice. In mode A, the active central control transmits over both buses and the standby central control cannot send over either bus. In mode B, the active central control transmits over a selected bus and the standby central control transmits over the other bus.

5.40 The three lamps, N, A, and B, indicate which mode of operation is being followed. Setting the rotary switch to the desired position forces the system to follow any one of the three modes of peripheral operation.

5.41 These status lamps and switches have been eliminated in offices with CTX-7 and later generic programs. In offices with CTX-6 and earlier generic programs, these lamps and switches are optional.

5.42 ***Program Interrupt Control (P):*** These controls are used in conjunction with the PROGRAM CONTROL (Q) keys to initiate specific A-level interrupt programs. For example, when program interrupt control key A and PROGRAM CONTROL key number 2 are operated together, the primary recent change area is zeroed. Such manual intervention with the system may be required to clear trouble conditions. Extreme caution is required in the use of these controls.

5.43 When the BOTH key is depressed, both central controls are to be affected. If it is not depressed, only the standby central control is involved and the standby lamp is on.

5.44 The ENABLE key is operated prior to operating an INTERRUPT REQUEST key. This key enables activation of controls.

5.45 The EXECUTE key, when operated, causes the execution of the request.

5.46 The CLEAR EXECUTE key, when operated, terminates the request in the event that the interrupt lasts too long.

5.47 Charts showing the possible combinations of INTERRUPT REQUEST keys and PROGRAM CONTROL keys and the resulting actions can be found in Bell System Practices Section 231-125-301.

5.48 ***Program Display (R):*** The 24 lamps can be used to display the contents of memory locations or scanner readouts. The display is requested by a combination of an MCC-BEGIN-1 TTY message and the activation of specific PROGRAM CONTROL keys.

5.49 A display of information of a constant or nonchanging type from program store can be obtained more readily by using the T-READ TTY input message; however, changing information in a call store can be useful when displayed. The state of a particular word may change at various rates, but the PROGRAM DISPLAY will be updated only at 3-second intervals.

5.50 ***Program Control (Q):*** The 23 keys labeled 0 through 22 can be used to insert information into the system. Extreme caution is required when using these controls. When the BLCK key is depressed, the DATA lamp is off and the program control keys are interpreted individually. Each key indicates whether or not an associated program block is to be carried out. When the BLCK key is not depressed, the DATA lamp is on and the information set on the 23 keys is interpreted as a binary word. The 23 keys may be used to preset an address or a data word associated with the message to be typed to the system.

5.51 Many of the above display and control functions may be duplicated at a remote switching control center. See Feature Document 231-190-405 for additional details.

6. DIAL TONE DELAY ALARM

6.01 The purpose of the dial tone delay alarm (SD-1A277-01) is to sound an alarm if an ESS office fails to supply dial tone to a test line within required timing limits of from 8 to 10 seconds (Fig. 10). This device is designed as an external module to detect catastrophic system problems which may not be known or are not available through normal internal means. The alarm is internal to the dial tone delay alarm unit and consists of a 1000-Hz signal amplified and fed at a high level to a monitor speaker.

6.02 The dial tone delay alarm is located below the writing shelf on the alarm, display, and control panel.

6.03 The dial tone delay alarm is completely external to the ESS machine itself. It will bring in an alarm even if the ESS system fails.

6.04 A time control allows adjustment of the dial tone relay alarm to perform a test within the range of one every 20 seconds to one every 60 seconds.

6.05 Each successful test results in the seizure of a customer digit receiver and a false start (measurement code 05, office count number 023) is scored.

6.06 It is the network administrator's responsibility to assign and administer the line used for dial tone delay tests. The class-of-service and whether the line is dial pulse or TOUCH-TONE are left to the discretion of the network administrator; however, certain rules must be followed. The network administrator must:

(a) Assign the dial tone delay alarm test line to essential service

(b) Rotate dial tone delay alarm test line assignments on a routine basis

(c) Give the dial tone delay alarm an originating only (denied terminating) class of service.

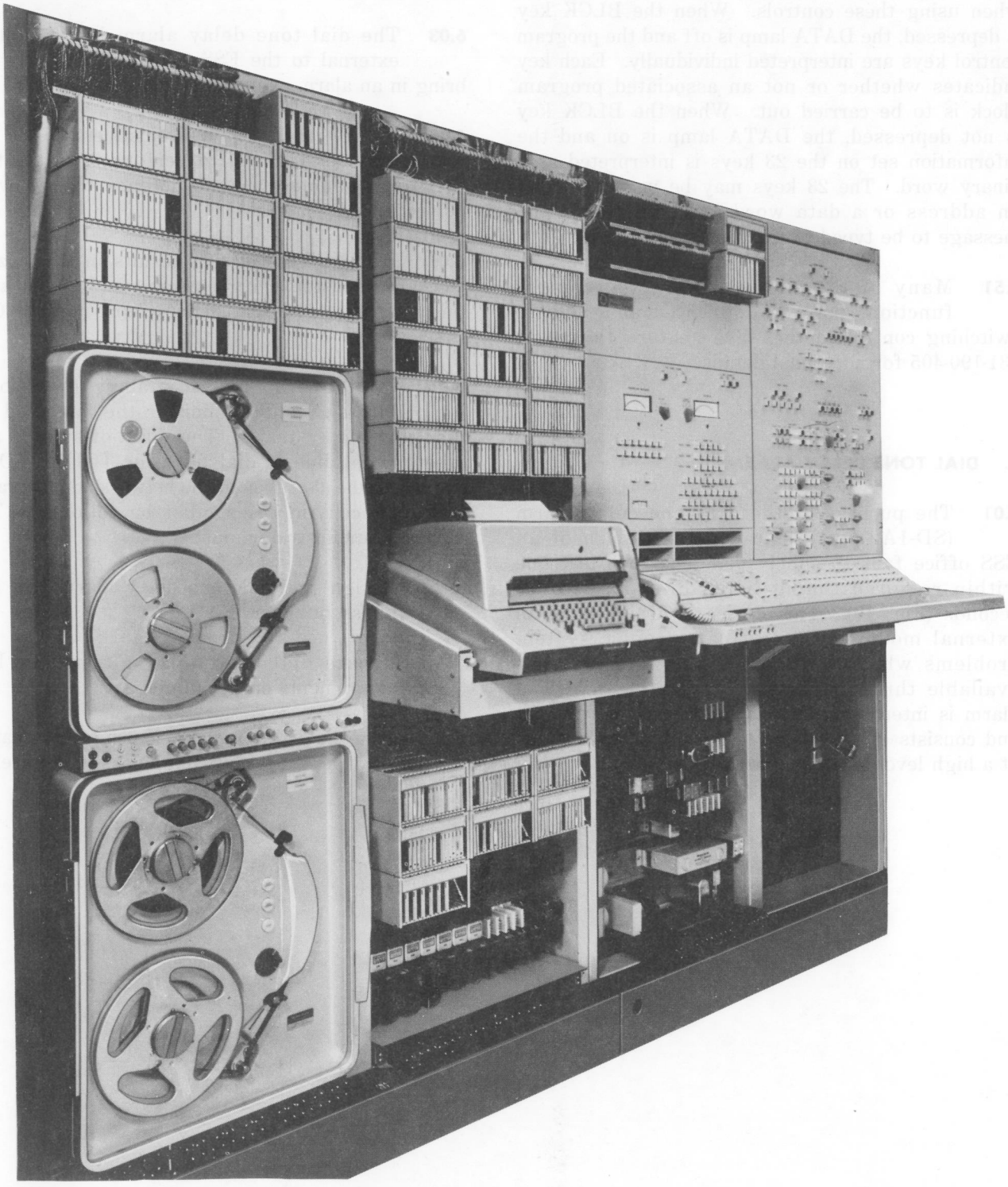


Fig. 1—Master Control Center (1.03)

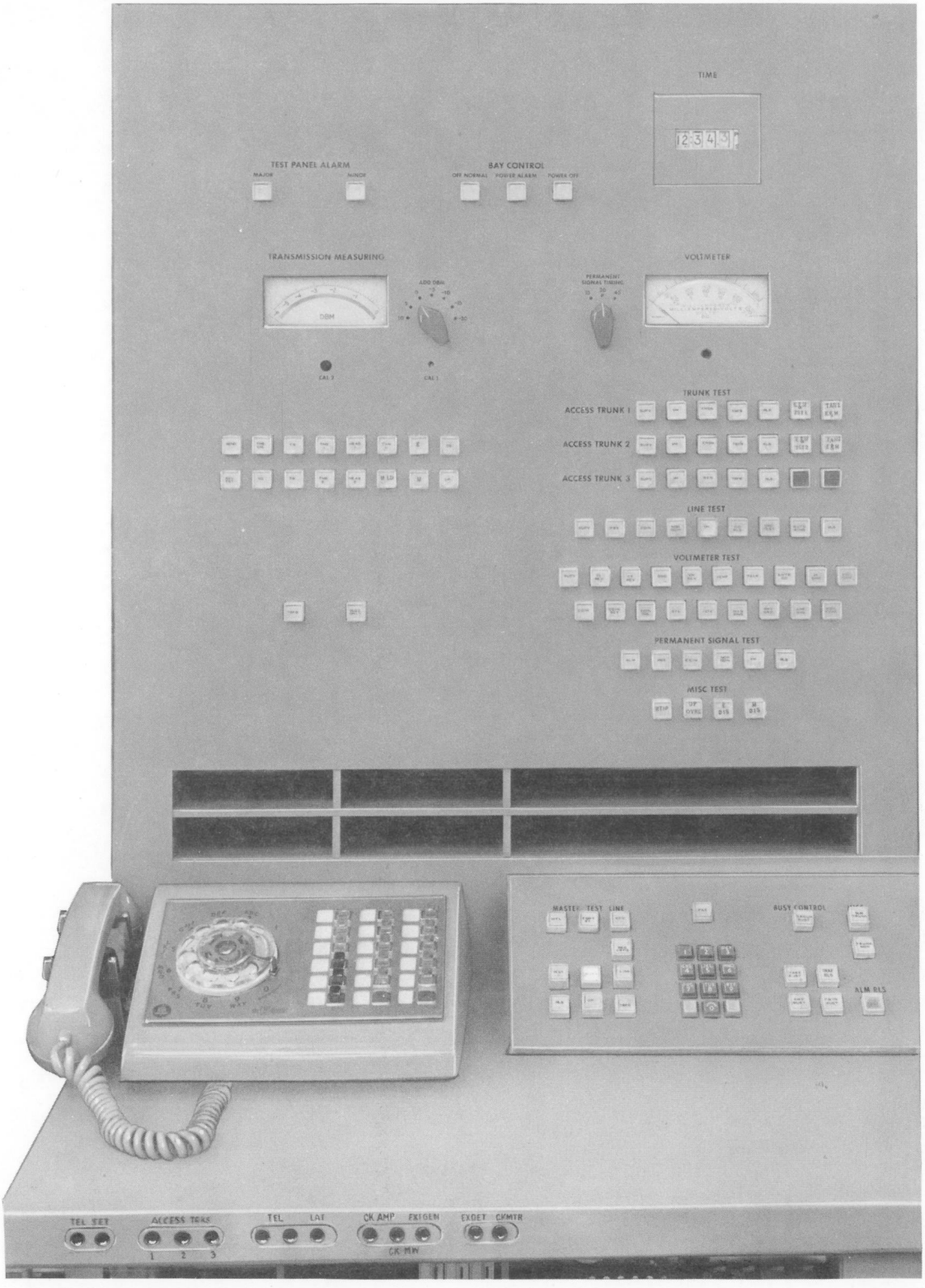
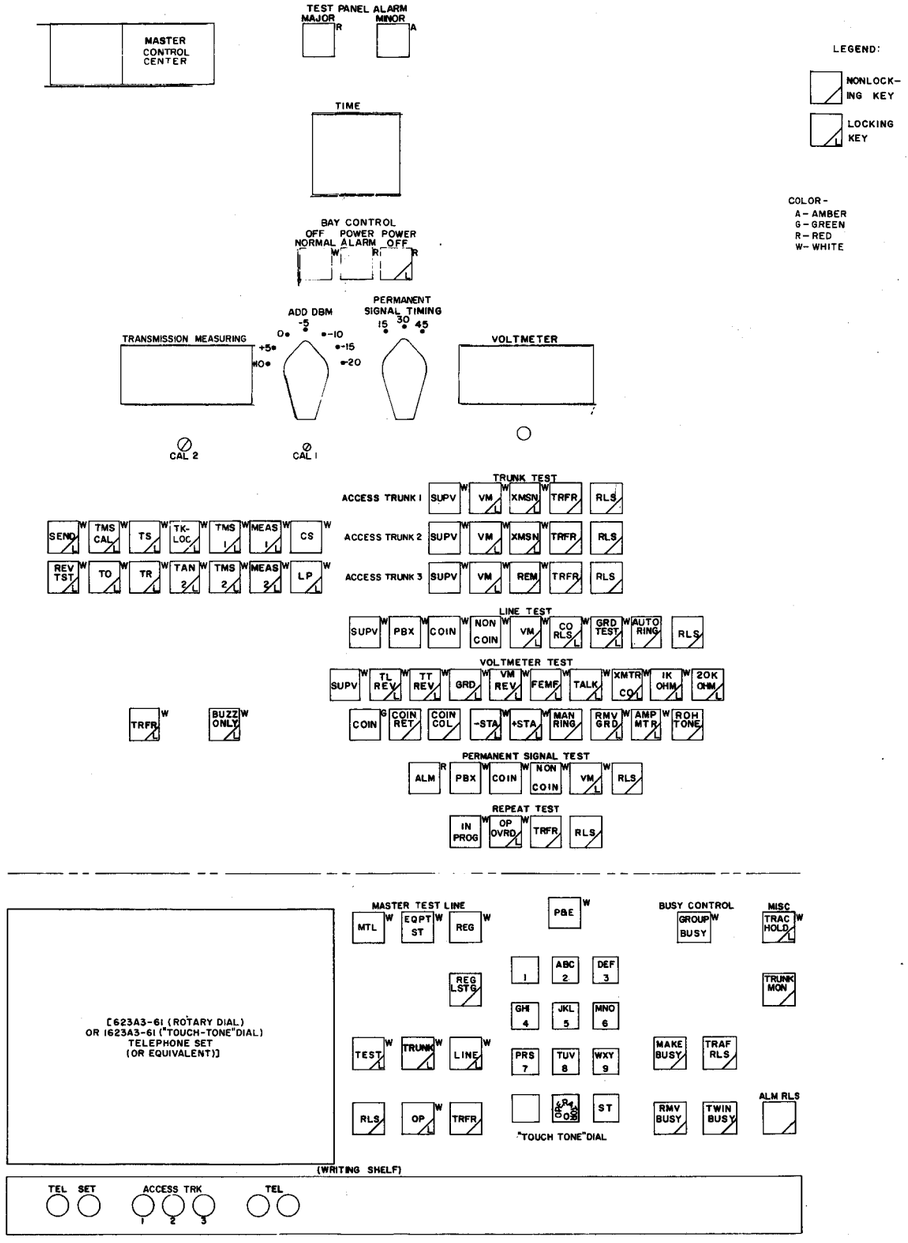


Fig. 2—Trunk and Line Test Panel (4.01)



[623A3-61 (ROTARY DIAL)
OR 1623A3-61 ("TOUCH-TONE" DIAL)
TELEPHONE SET
(OR EQUIVALENT)]

Fig. 3—Trunk and Line Test Panel Keys and Lamps (With Expanded Test Features) (4.01)

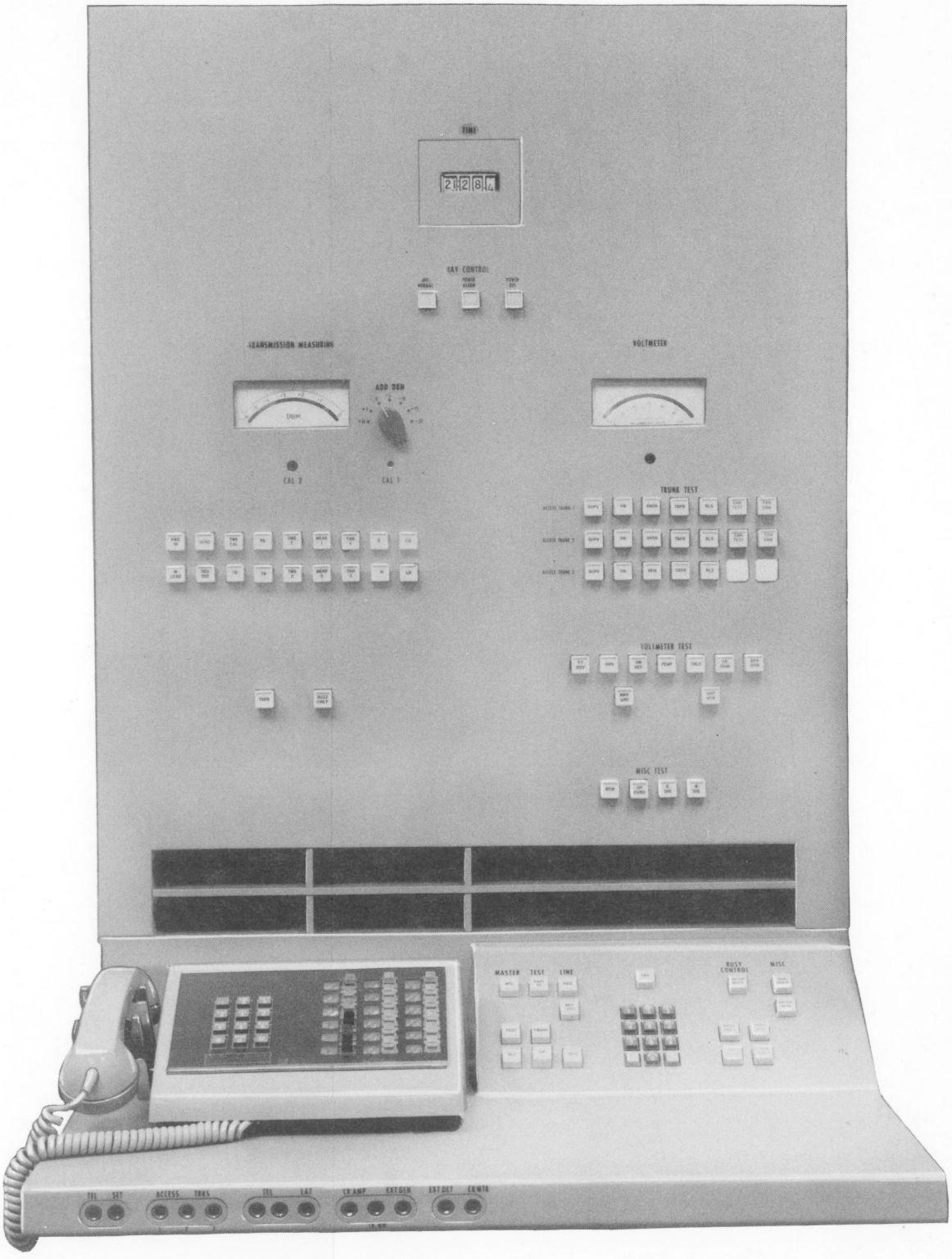


Fig. 4—Supplementary Trunk Test Panel (4.03)

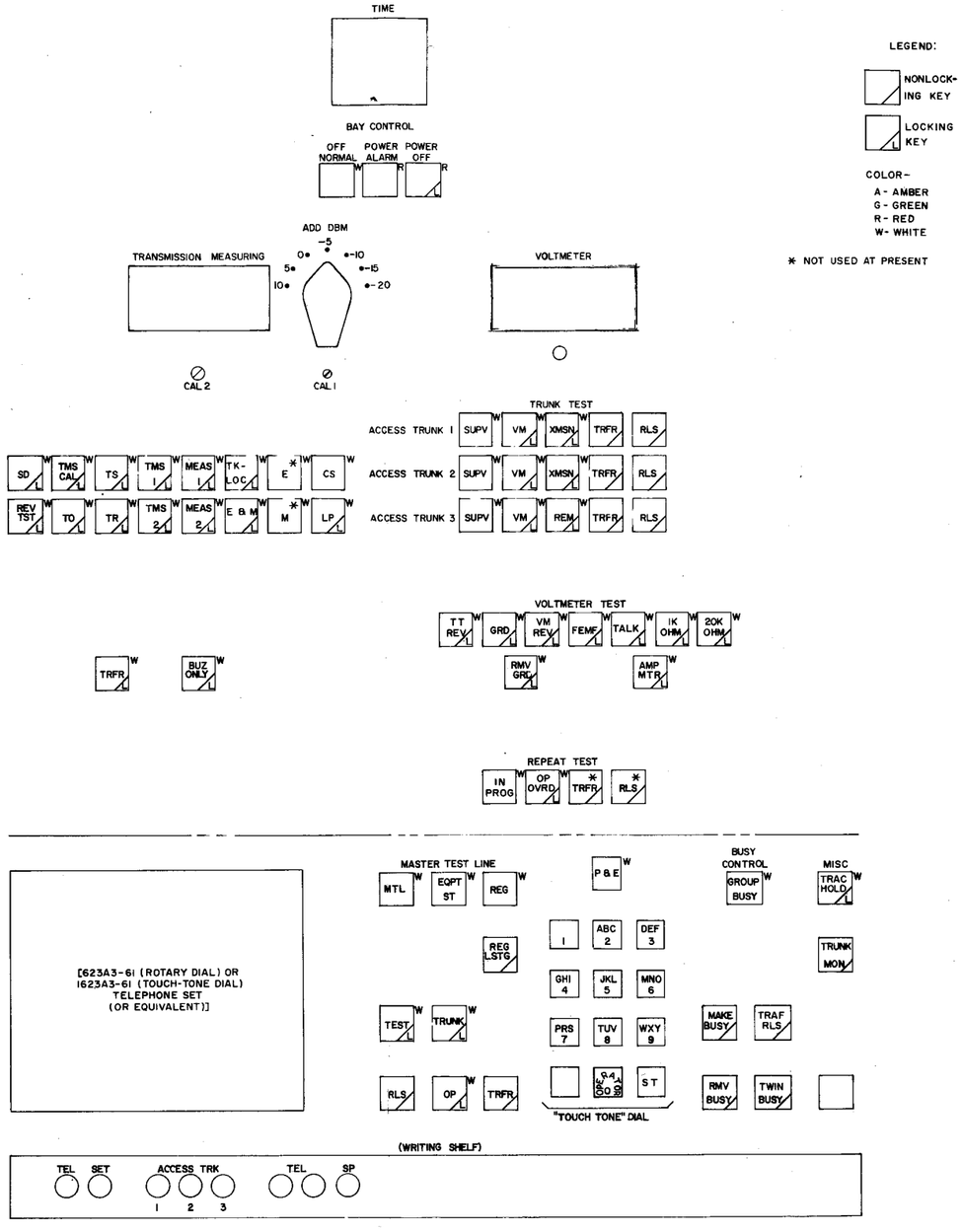


Fig. 5—Supplementary Trunk Test Panel Keys and Lamps (4.03)

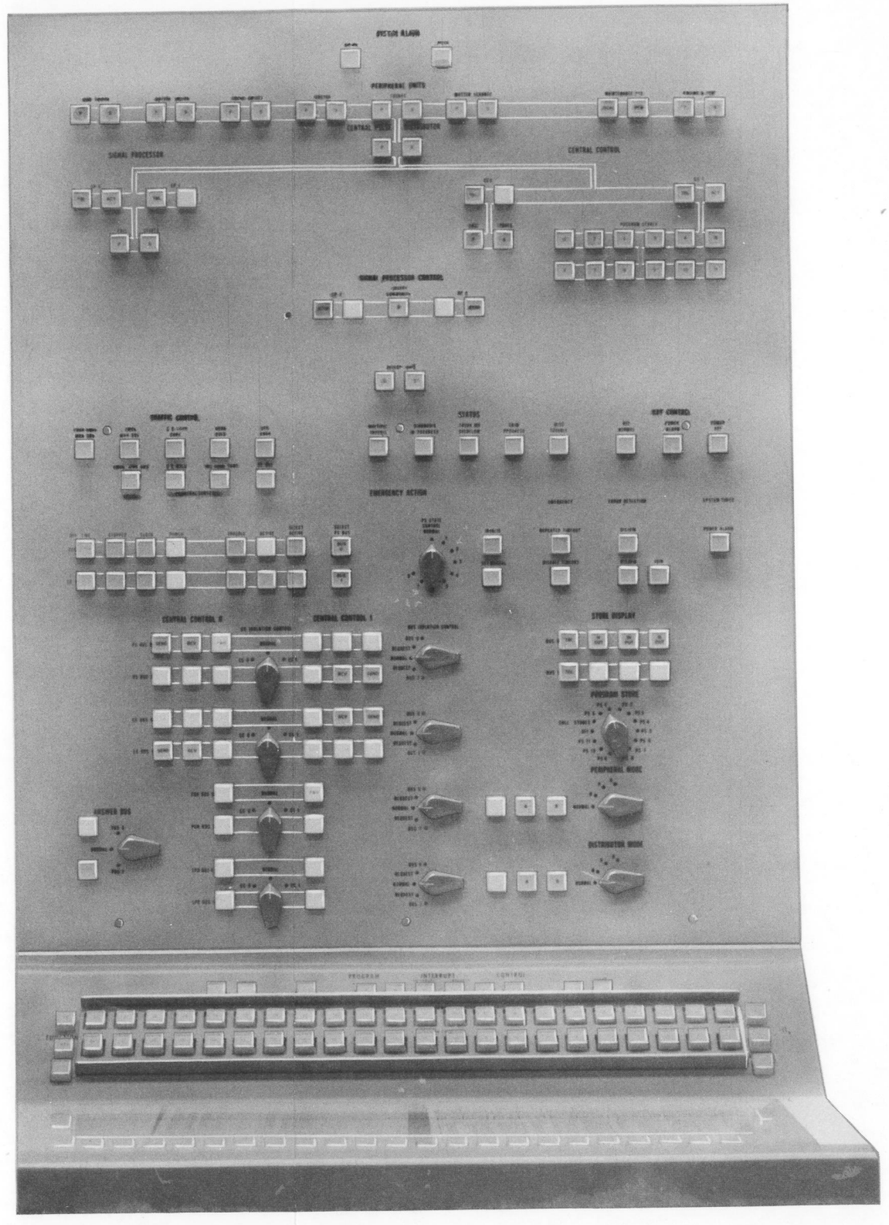
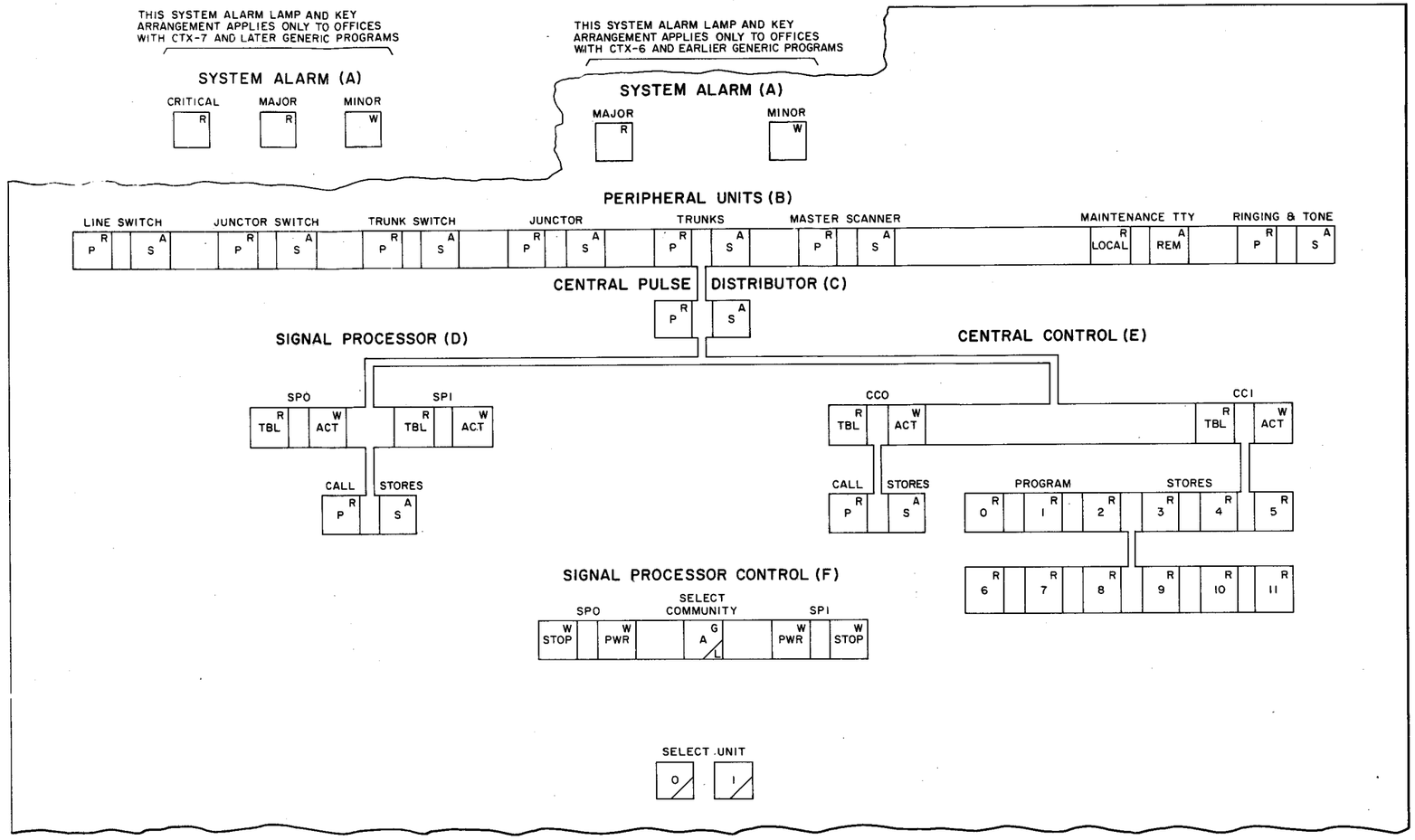


Fig. 6—Alarm, Display, and Control Panel (5.03)

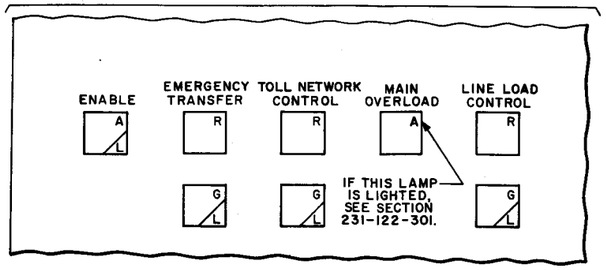


NOTE:
LETTERS IN PARENTHESES ARE TEXT REFERENCES AND DO NOT APPEAR ON THE ALARM, DISPLAY, AND CONTROL PANEL.

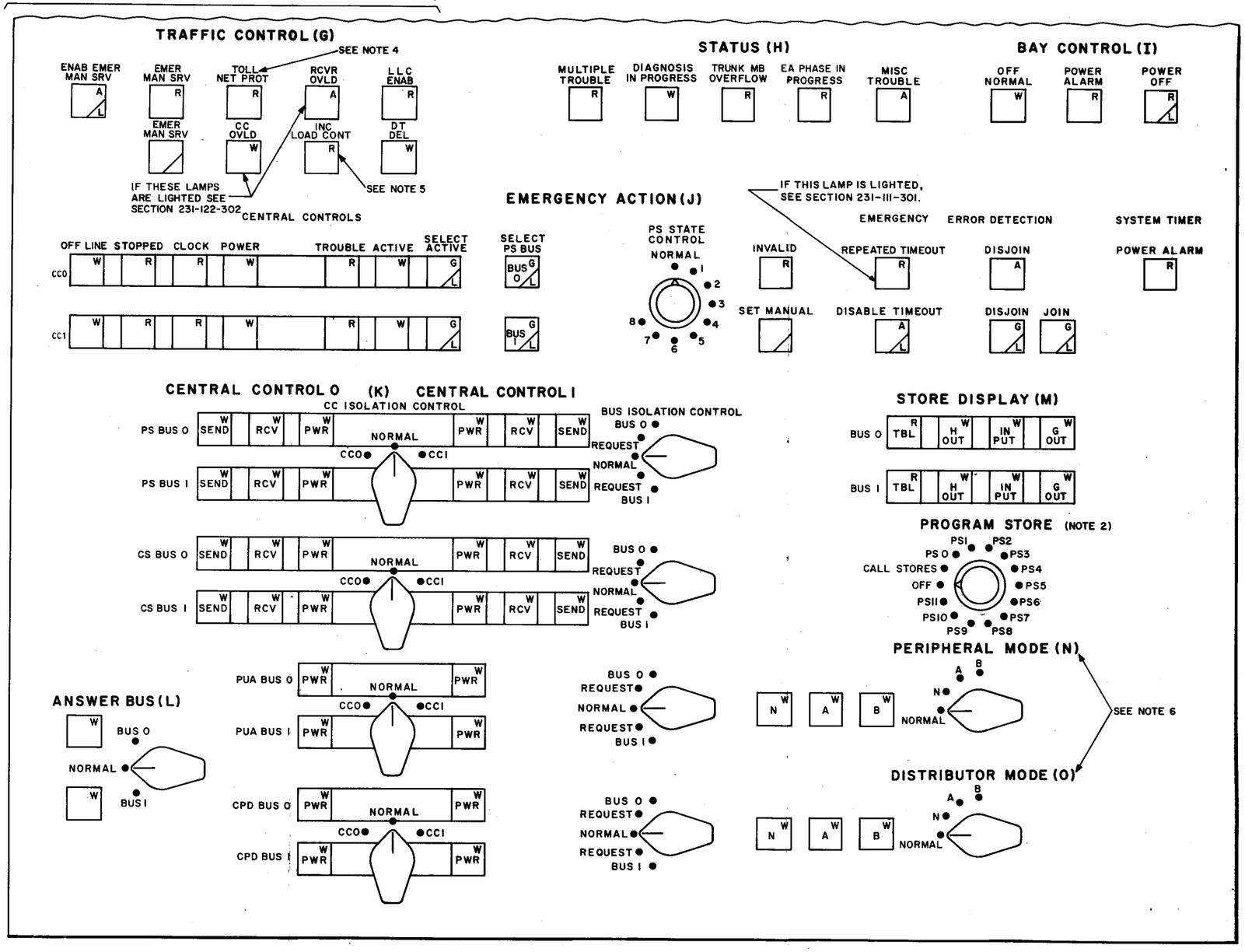
LEGEND:
LAMP
NONLOCKING KEY
LOCKING KEY
*A – AMBER
G – GREEN
R – RED
W – WHITE

Fig. 7—Master Control Center Alarm, Display, and Control Panel—Top Portion (5.10)

THIS TRAFFIC CONTROL LAMP AND KEY ARRANGEMENT APPLIES ONLY TO OFFICE WITH CTX-3 AND EARLIER GENERIC PROGRAMS (SEE NOTES 3 AND 4)



THIS TRAFFIC CONTROL LAMP AND KEY ARRANGEMENT APPLIES ONLY TO OFFICES WITH CTX-4 AND LATER GENERIC PROGRAMS (SEE NOTES 3 AND 4)



NOTES:

1. LETTERS IN PARENTHESES ARE TEXT REFERENCES AND DO NOT APPEAR ON THE ALARM, DISPLAY, AND CONTROL PANEL.
2. EARLY NO. 1 ESS OFFICES HAD NO PS 6 THROUGH PS 11 POSITIONS.
3. ALTHOUGH THE TRAFFIC CONTROL LAMP AND KEY ARRANGEMENT DIFFERS FOR EARLIER GENERIC PROGRAMS (CTX-3 AND EARLIER), THE REMAINDER OF THE CONTROL PANEL IS UNCHANGED.
4. IN OFFICES HAVING CTX-6 AND LATER GENERIC PROGRAMS, THIS LAMP IS LABLED OG LOAD CONTROL.
5. THIS LAMP EXISTS ONLY IN OFFICES WITH CTX-7 AND LATER GENERIC PROGRAMS.
6. THESE STATUS LAMPS AND SWITCHES MAY NOT EXIST IN LATER SYSTEMS.

LEGEND:

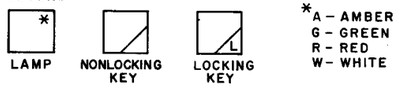
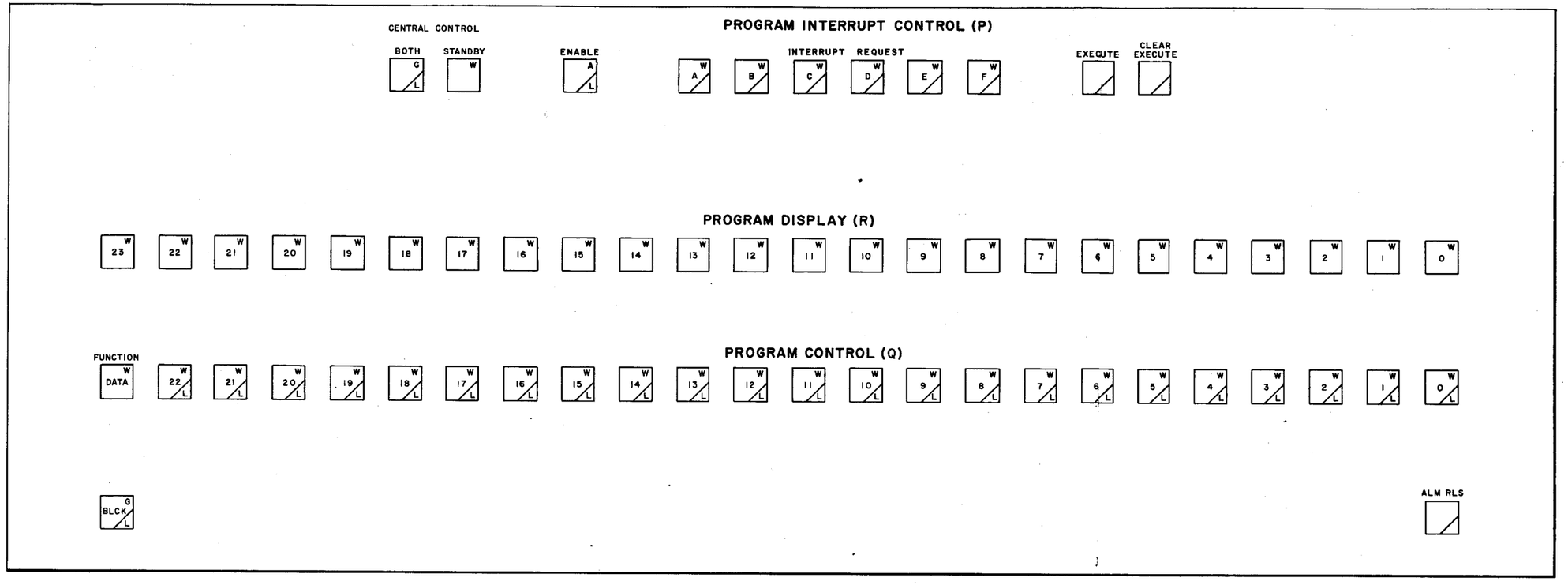


Fig. 8—Master Control Center Alarm, Display, and Control Panel—Center Portion (5.10)



NOTE:
LETTERS IN PARENTHESES ARE TEXT REFERENCES AND DO NOT APPEAR ON THE ALARM, DISPLAY, AND CONTROL PANEL.

LEGEND:
LAMP
NONLOCKING KEY
LOCKING KEY
*A – AMBER
G – GREEN
W – WHITE

Fig. 9—Master Control Center Alarm, Display, and Control Panel—Shelf Portion (5.10)

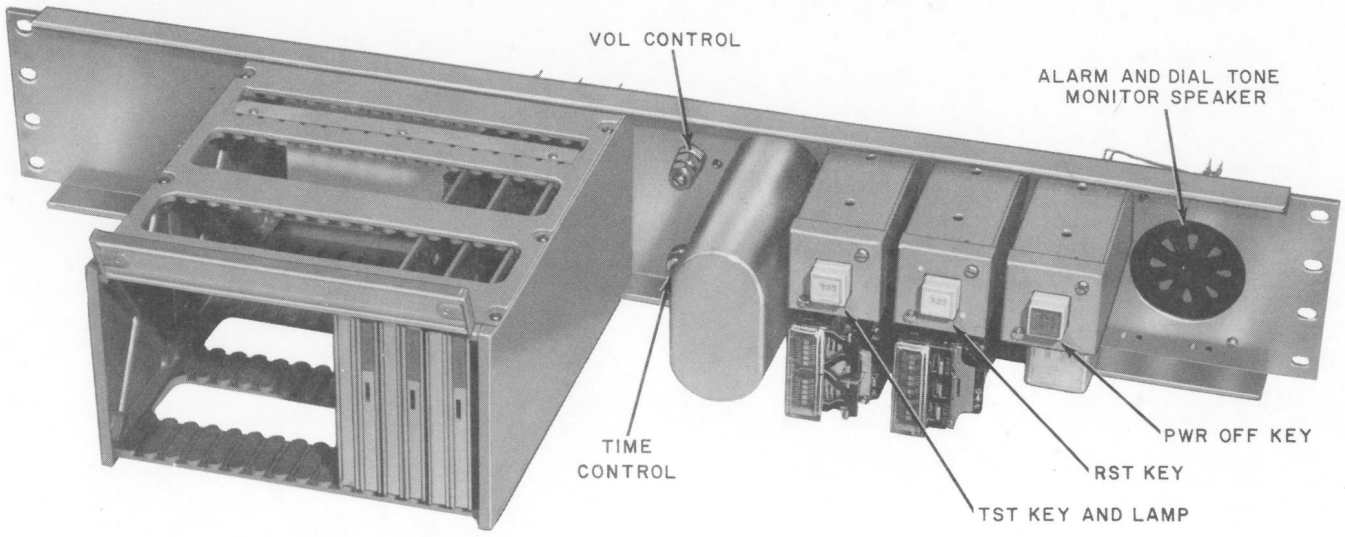


Fig. 10—Dial Tone Alarm Unit (6.01)