

**50B CUSTOMER PREMISES SYSTEM (CPS)  
THEORY OF OPERATION AND DESCRIPTIVE INFORMATION**

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**1. GENERAL**

1.01 The 50B Customer Premises System (CPS) works in conjunction with a No. 1 or No. 1A Electronic Switching System (ESS) Central Office (CO) to provide Centrex/ESSX-1 attendant services. The No. 2 ESS offices provide Centrex service only. The CO provides switching and translation for the 50B CPS loop circuits and for the customer stations which are external to the 50B CPS. One customer system may have up to 4 attendant positions with Busy Lamp Field (BLF)/Direct Station Selection (DSS) features or up to 16 attendant positions without BLF/DSS features. Attendant features available with the earlier 50A CPS are available with the 50B CPS, plus additional features. Each system is custom engineered for the desired features and traffic capability. A control unit provides a microprocessor controlled interface between the CO and system units. Any of three types of attendant consoles may be provided with more or fewer features to match the customer's requirements. If a console with BLF/DSS features is provided, scanner circuits monitor the customer station lines for busy status. Station busy status is displayed on the console. See Fig. 1.

1.02 Whenever this section is reissued, the reason(s) for reissue will be listed in this paragraph.

**2. EQUIPMENT DESCRIPTION**

**GENERAL**

2.01 The 50B CPS consists of the following equipment.

- Any of three types of Attendant Consoles [two electronic and one Multibutton Electronic Telephone (MET) types]. All consoles used in one installation must be identical.
- One J59217A Control Unit per Attendant Console.
- One J59217B Scanner Unit per 300 Station Lines Monitored for Busy Status (6 units maximum for 1800 station lines).

**2.02** Tables may be provided by the customer for the support of units in a small system. A KS-20018A L15 cabinet may be provided to support a maximum of four control or scanner units (per cabinet) in larger systems.

**2.03** Interconnecting cables (Fig. 1) are required between system units and to external interfaces as follows:

- Console to control unit—25-pair B25A cables for electronic consoles, 8-pair D8W-50 cord for MET sets (1000 feet maximum)
- Control unit to registered network interface connector—25-pair A25D double-ended cable (per control unit)
- Control unit to option wiring connector—25-pair A25D double-ended cable (per control unit)
- Scanner to control unit—4-pair D4BU-29 cord extended up to 1000 feet by inside wiring cable as required (24 maximum for 6 scanners and 4 control units)
- Scanner to registered network (station) interface—25-pair A25D double-ended cable per 25 stations.

**2.04** Pairs are required for connection between the cross-connect field (external to the 50B CPS) and the CO as follows:

- Attendant loops—one pair per loop, up to sixteen per console
- Trunk group busy—one to four per console (typically multiplied to each identical position)
- Calls waiting—one pair if CO queuing of calls for multiple consoles is required. One pair multiplied to each position
- Night service—one pair for one (master) console only
- Position busy—one pair per console, only if more than one console is provided.

## ATTENDANT CONSOLES

### A. Electronic Consoles (Fig. 2)

**2.05** The AGK-04AF-03 electronic console provides attendant features as described below.

- Repertory dialer for 1-button auto-dialing of trunk group access codes and frequently dialed extension numbers, local numbers, or long distance numbers.
- Trunk group busy indicators for up to four trunk groups.
- Call control buttons to answer, originate, and control basic call processing.
- Feature control buttons to provide special functions, such as hold, splitting, and night service.
- A 12-button dial which can be used in programming the repertory dialer in addition to normal manual dialing.
- Loop buttons and indicators. While only one loop may be serviced (active) at one time, the call status of up to 6 loops (out of 16) may be displayed at once and the attendant may switch from loop to loop as required.
- Busy Lamp Field (BLF) provides a display of the busy idle status of any 100 stations at a time.
- Hundreds group select buttons select 1 of 18 hundreds groups for display on the Busy Lamp Field and for Direct Station Selection (DSS).
- DSS buttons provide 1-button auto-dialing of station extension numbers.
- Alphanumeric display for incoming call identification (ICI), time of day (TOD), and traffic data. Four characters are displayed for incoming call identification and time of day. Traffic data requires eight characters.

- Jacks for connection of headsets or handsets.
- Tone ringer with variable volume to indicate incoming calls or timed reminders.

**2.06** All buttons are nonlocking, and all indicators are red light emitting diode (LED) type lamps. More detailed descriptions of each control and indicator are provided in Tables A, B, and C. Locations and designations are shown in Fig. 3. Stick-on teakwood- or walnut-colored decorative strips for electronic consoles are separately provided and installed in the field.

**2.07** The AAK-04AF-03 electronic console provides features similar to the "AGK" console (2.05), but no BLF/DSS features are provided.

**B. Multibutton Electronic Telephone (MET) Sets (Fig. 4)**

**2.08** The 2993C01 MET set is called a "30-button" set and is used as an attendant console. Dial and R (release) buttons are provided in addition to the three rows of ten buttons. Two indicators are associated with each of the 30 nonlocking buttons, 1 green LED, and 1 red LED. The general functions are listed below.

- Loop and call control buttons to answer, originate, or control basic call processing. Up to 16 loops may be provided. Only one loop may be active at one time, but the status of each is displayed continuously.
- Trunk group busy indicators for up to four trunk groups.
- Feature control buttons for special functions, such as hold, splitting, and night service.
- A 12-button dial pad. All dialing is manual.
- A tone ringer with variable volume to indicate incoming calls or timed reminders.
- A handset provided with every console.
- An optional headset adapter (Fig. 5) may be separately provided.

**2.09** Detailed descriptions of each control and indicator are provided in Tables A, B, and C. Locations and designations are shown in Fig. 6.

A colored faceplate is separately provided and installed in the field. Colors are avocado, teak, walnut, gold, orange, brown, red, blue, and black.

**2.10** A D-180979 Kit of Parts, including a 35AU3A dial and a wiring harness, is installed in the field to modify the MET set to an attendant console. Blank and preprinted button tabs are also provided.

**J59217A CONTROL UNIT (Fig. 7)**

**2.11** The J59217A control unit is furnished per attendant position. It provides a microprocessor controlled interface between the console digital and voice circuits and the network pairs. A 6-foot power cord is included for connection to the customer power outlet. A black plastic cover is removable for access to the circuit packs and power supply. Access to connectors is at the rear of the unit. Each unit may be freestanding on a table or pedestal, or several units may be stacked in a cabinet (2.25).

**2.12** The control unit contains removable circuit packs and a power unit as listed below.

- LC169/LC169B Processor Circuit Pack
- LC335 Processor Interface Circuit Pack
- LC336 Console Control Circuit Pack
- LC337 Translator Circuit Pack
- LC358 Steering Circuit Pack
- LC412 CO Line Circuit Pack
- LC445 Extended Memory Circuit Pack
- 289A2 Power Unit

**2.13** The LC169 or an equivalent LC169B processor circuit pack (Fig. 7) controls the system in response to both external stimuli and internal programming. External stimuli include depressed console buttons or signals over pairs from the CO via other circuit packs. For example, extra calls may be held waiting (locally queued) and presented one at a time to the attendant. The LC169/LC169B processor circuit pack has option switches to provide compatibility to various customer systems which may have local or remote (CO) queuing, Customer

Dialed Account Recording (CDAR) features or no CDAR features (3.16), and one of two split digits. The "split digit" is automatically dialed when the SPLIT button is depressed. Two versions of the LC169/LC169B processor circuit pack are programmed differently as listed below.

- LC169 PRCSR MC65004A-01 for use in systems with MET sets at attendant positions
- LC169 PRCSR MC65005A-01 for use in systems with electronic consoles at attendant positions.

**2.14** The LC335 processor interface circuit pack provides several data interfaces between the processor and other parts of the system. Indicator data is sent to the console to turn LEDs on or off and control displays. When buttons are depressed, data is received from the console. Other signals received or controlled through this interface are calls waiting, night service, trunk group busy, auto-dialing tones, loop switching signals, and system fault indications.

**2.15** The LC336 console control circuit pack provides a talk circuit interface for either the electronic console or MET set. An option plug is removed and reinserted in one of two positions to adapt the circuit to MET sets or electronic attendant consoles.

**2.16** The LC337 translator circuit pack is optional and is used only for systems with electronic consoles. It contains translation option switches for ICI and DSS features. Five switches are set for each of 16 loops to match the ICI display with the type of call to which the loop is dedicated per Table C. Four switches are set for each of the digits (TTH, TH, and H) which indicate the lowest hundreds groups dialed by the DSS buttons per Table D. Unless 5-digit extension numbers are required, the four TTH switches are set to 0000. If only 3-digit extension numbers are required, the four TH switches are also set to 0000. If only 2-digit extension numbers are required, the TTH, TH, and H switches are all set to 0000. If no DSS feature is provided, the TTH, TH, and H switches are set to 1111 (Table D).

**2.17** The LC358 steering circuit pack provides a processor controlled interface between the processor (2.13) and the scanners. A data link channel is provided for each of up to six scanners.

The LC358 steering circuit pack is provided only with the BLF feature.

**2.18** The LC412 CO line circuit pack contains four line circuits, each providing an interface between a CO pair (loop) and the attendant talking circuit on LC336 console control circuit pack. Two to four circuit packs are provided for up to sixteen loops. Talk circuits are switched through a PNP matrix controlled by the processor (via LC335 processor interface and LC336 console control circuit packs). Ringing and dc signaling from the CO is detected, and the loop on-hook/off-hook state is relay controlled. Option screw switches provide some signaling circuit adjustment for long loops or short loops (over or under 800 ohms).

**2.19** The LC445 extended memory circuit pack (with MC65005B1 memory arrangement) provides storage for traffic statistics, numbers for CDAR charged calls, repertory dialer numbers, time of day, and other critical data. The LC445 extended memory circuit pack is used only with electronic consoles. A small 3.75V battery is installed in the back of the control unit to prevent loss of data during power loss. The battery provides a static-holding voltage for the extended memory circuits, not the entire control unit.

**2.20** The 289A2 power unit (Fig. 7) converts ac power into six regulated dc voltages to power the control unit circuit packs. The console is also powered via the console connecting cord or cable. Each voltage output is separately protected by circuit breakers or fuses. The power unit is protected by a thermal switch that opens the ac input circuit at 130°F.

#### **J59217B SCANNER UNIT**

**2.21** The J59217B scanner unit (Fig. 8) is provided per 300 station lines monitored for busy line status and required only with the console BLF feature. A maximum of 6 scanner units are required for 1800 lines. A 6-foot power cord and transformer are included for connection to the customer power outlet. A black plastic cover is removable for access to the circuit packs. Access to connectors is at the rear of the unit. Each unit may be freestanding, on a table or pedestal, or may be stacked in a cabinet with the control unit(s).

**2.22** Each scanner unit contains removable circuit packs as listed below.

- LC338 Line Scanner Circuit Pack (2 to 12)
- LC339 Scanner Control Circuit Pack.

**2.23** The LC338 line scanner circuit pack is provided for each contiguous group of 25 station lines to be monitored for busy status. A maximum of 72 circuit packs can be provided in 6 scanner units to scan 1800 station lines. An unused (not connected) line appears to have an on-hook status. An off-hook or ringing station line is detected as a busy line.

**2.24** The LC339 scanner control circuit pack provides a data link interface with up to four control units. Multiplexing circuits combine the data from 100 of the 300 station lines which can be scanned by one unit. A green LED on the circuit pack for each of four data links indicates when each link is servicing an update request from a control unit. Each control unit may request, via an input address, the status of a different hundreds group of station lines.

#### **KS-20018A L15 CABINET (OPTIONAL)**

**2.25** The KS-20018A L15 cabinet (Fig. 9 or equivalent) can be used to stack up to four units of a multiple unit system. The cabinet has a transparent front door. A perforated back door and ventilated top prevent excessive temperatures. Knockout panels in the base allow cabling entrance. The cabinet comes with an internal power strip and an 8-foot power cord. Adjustable feet allow cabinet leveling. Two side panels, KS-20018 L16, and up to four shelves, KS-20018 L9D, must be installed. The assembled cabinet is 72 inches high by 29 inches wide by 26 inches deep and weighs approximately 200 pounds. The shelves must be wire shelves to provide adequate ventilation. The depth of the shelves is only 12 inches, and the feet of the units extend over the edge of the shelves.

### **3. FUNCTIONAL DESCRIPTION**

#### **A. Interaction Between System and Basic Console Digital Circuits (Fig. 10)**

**3.01** Button scanning circuits in the console detect depression of a console button. The button

address is encoded and sent via data link to the processor. The processor uses the address to access button definition tables in software and to produce the desired system responses.

**3.02** Lamp and tone ringer circuits are processor controlled. If the processor determines (from program execution) that a console lamp is to be lighted, a data link message with address is sent to the console. After decoding, the message causes a register bit to be latched and the lamp to be lighted until another message is sent to turn the lamp off. Lamp status is stored, and at least one lamp updated each 12.5 ms from memory. The tone ringer is turned on and off in the same way. A volume control also affects the tone ringer output.

**3.03** System interface signals, such as trunk group busy, calls waiting, and ringing on a loop, are detected by the LC335 and LC412 circuit packs and cause processor action to light appropriate console lamps. Depression of console buttons, power failure, or busy conditions cause outputs via night service and position busy pairs to the CO. Signaling on a loop is transmitted to and from the CO via LC412 circuit packs. Signaling consists of opening and closing of the loop circuit, including flashes (caused by START, SPLIT, and CANCL buttons), loop seizure, disconnect, and answer supervision. This interaction with the CO is initiated by the console buttons, timed by the processor, and indicated by console lamps.

#### **B. Attendant Talking Circuits (Fig. 10)**

**3.04** The attendant talking circuit is connected to a loop via solid-state switching networks in the LC412 and LC336 circuit packs. The console loop buttons, via the processor, control the switching. Only one loop can be connected at one time. Tones from the dial go out over the talking path. The LC336 circuit pack has an option plug which is removed and reversed to select MET or electronic attendant console circuits. The electronic consoles have 4-wire circuits; the MET sets have 2-wire circuits between console and control unit.

#### **C. Incoming Call Identification (ICI)**

**3.05** The MET set requires no ICI circuits because the attendant loop pairs and loop buttons are provided on a one-to-one basis. Each loop button is designated to indicate the category of call to which it is dedicated (similar to Table C).

**3.06** Electronic consoles have only 6 loop buttons and up to 16 loops. As a call is received, the processor determines which loop (CO line) has an incoming call (Fig. 11). An associated set of loop code switches (five switches per loop) on LC337 circuit pack is read to determine which four ICI characters are to be displayed. The characters are sent to the console as data link messages to be decoded and displayed on the alphanumeric display. Any of 32 codes can be selected by each of 16 sets of loop code switches, each corresponding to a unique 4-character display per Table C.

**3.07** When a "glare" condition exists between outgoing and incoming calls, the incoming call is given precedence but may come in without the ICI characters displayed. An ICI button on the console may be depressed to force a display. The ICI button can also be used to identify the loop used on any outgoing call if trouble is encountered.

#### D. Busy Lamp Field (BLF)

##### Busy Line Status Scanner Units

**3.08** Scanner circuits are used to monitor the off-hook, on-hook, and ringing status of station lines (Fig. 12). Each LC338 circuit pack monitors 25 lines. A control unit can address the 12 LC338 circuit packs. The LC339 circuit pack decodes the address and multiplexes the data for the selected hundreds group (100 lines) over the data link. Off-hook and ringing lines are detected as busy lines, while on-hook and unassigned lines are detected as idle lines.

**3.09** Each scanner can supply requested data up to four control units (Fig. 13). Each control unit can gather data from any one of up to six scanners. The number of data links installed is therefore the product of the number of installed units (maximum =  $6 \times 4 = 24$ ). The status of a selected group of 100 lines is gathered every one-half second via the LC358 circuit pack and stored in processor memory.

##### Hundreds Group Selection

**3.10** The busy status of any 1 of 18 hundreds groups can be displayed on the console Busy Lamp Field. To select one hundreds group for display, 1 of 18 buttons is depressed. These buttons, via program execution, cause addressing

of the proper four circuit packs in a scanner. Addressing is consecutive starting at the lowest hundreds group (set by option switches, 3.12). The lowest group corresponds to the first four circuit packs in the first scanner. ***There is no provision for skipping of hundreds groups of extension numbers;*** however, a hundreds group to be added at a later date or never to be used may be assigned to a hundreds group select button which is left blank. If a hundreds group is selected for which a scanner is inoperative or unassigned, the hundreds group lamp will flash to indicate a fault or error. The DSS operation is not affected.

##### BLF Display Updating

**3.11** When a hundreds group is selected, the data for those 100 lines is fetched, stored in memory, and sent as lamp messages to the console. Messages to the console are decoded to light the proper line busy lamps. In addition to the initial update, all console lamps including Busy Lamp Field are refreshed periodically from lamp status tables in memory to keep lamp status current.

#### E. Attendant Direct Station Selection (DSS) (Fig. 13)

##### DSS Button Address Conversion to Digits

**3.12** Several button and switch inputs are used by the processor to generate extension numbers. The Binary Coded Decimal (BCD) values set into the H and TH option switches (Table D) indicate the lowest hundreds group in the system (typically the first two digits of a 4-digit extension number). In the example shown in Fig. 3 with a lowest hundreds group of 2100, the settings would be 0000 (TTH), 0010 (TH), and 0001 (H). The hundreds group select button determines the BCD values added for the selected hundreds group. The last two digits are determined according to which DSS button (00 through 99) is depressed.

**3.13** For systems where 5-digit extension numbers are used, the TTH option switches are set to the BCD value of that digit. The BCD value 0000 indicates no digit, while BCD value 1010 is used for digit 0. For systems which use only 3-digit extension numbers, the TH option switches are set to 0000 (no TH digit). For systems which use only 2-digit extension numbers, the H, TH, and TTH option switches are set to 0000.

**DSS Auto-Dialing Sequence**

**3.14** When a DSS button is depressed, a start sequence is initiated to send a "flash" over the active loop (as if the START button were depressed for manual dialing). When dial tone is detected on the active loop, the processor causes the digits to be loaded one by one into the TOUCH-TONE® auto-dialer and outpulsed. Paths from the active loop to the auto-dialer and dial-tone detector are processor controlled via solid-state switching arrays. Dialing tones heard by the attendant are muted during outpulsing (auto-dialing). The calling party is on soft hold and does not hear dialing tones.

**F. Time and Traffic Data Display (Fig. 14)**

**3.15** Traffic statistics are derived using inputs from the loops (such as calls offered), inputs from the console buttons (such as calls answered or released), and real time. Peg counts and calculations are stored in the LC445 circuit pack. When AWT (attendant work time) or NCH (number of calls handled) button is depressed, the request is sent to the processor. The requested data is fetched from the real-time clock or extended memory and sent to the console for display. Resetting of the real-time clock or traffic data is in response to console buttons and the dial. The TOD (time of day) is always displayed unless CDAR numbers are being displayed (3.18)

**G. Customer Dialed Account Recording (CDAR) (Fig. 15)**

**3.16** A prerequisite for Customer Dialed Account Recording is the Station Message Detail Recording (SMDR) feature (4.37) implemented at the No. 1 ESS office only. Account numbers and other call details are recorded on an automatic message accounting (AMA) tape and later processed by the customer for billing purposes. This feature is primarily for station message data records and secondarily for attendants.

**3.17** An attendant using a MET set or electronic consoles without the automated CDAR features implemented can dial account numbers and telephone numbers exactly as a station would with no display or edit function on the console. Extra dial tones and confirmation tones indicate when progressive steps in the sequence are complete. Attendant assistance is sometimes required because some

station users may not know the proper codes, do not have TOUCH-TONE dialing, or are originating the call from a remote location without the CDAR feature.

**3.18** On the electronic consoles with automated CDAR functions, some functions can be preprogrammed to reduce attendant work time. Frequently used account numbers and authorization codes can be programmed for console repertory dialer buttons. Other buttons and the dial can be used to edit (display and if necessary correct) access codes, account numbers, authorization codes, and associated telephone numbers. Preprogrammed data is stored in extended memory. All data for an individual call is auto-dialed to the CO for recording by SMDR equipment. Waiting for intermediate dial tones (between numbers) is automatic.

**H. Night Service**

**Flexible Night Service**

**3.19** Flexible night service is activated and canceled using the call forwarding-variable feature and dialed access codes. No unique 50B CPS hardware circuits are used.

**Fixed Night Service (Fig. 16)**

**3.20** Fixed night service is activated or deactivated by a button on the console via processor control of the night service relay. A contact of the night service relay is connected via wiring option straps and a pair to the CO. In normal (day) service, the relay contact is opened. If the night service button is depressed or power should be lost, the relay contact is closed. After initiating night service, the electronic console handset or headset is unjacked to prevent tampering by unauthorized persons. The MET set D8W-50 cord can also be disconnected for the same purpose.

**3.21** When power is lost to a master console and control unit, two actions occur as listed below.

- Night service is activated during power loss because normally closed relay contacts are used.
- In systems with MET sets, stored status data is lost, including data for night service

activation, because that section of memory is volatile.

**3.22** When power is restored to a master console and control unit, a reinitialization cycle occurs with the following programmed assumptions [in read only memory (ROM) and in battery backed up random access memory (RAM) (electronic consoles only)] for restoring night or day service status.

- A system with electronic console and a **connected** handset/headset is reinitialized to the night/day service state before power was lost. Status bits are retained in memory because of the battery backup.
- Systems with electronic consoles and **disconnected** headset/handset are reinitialized to the night service state.
- A system with MET set will always be reinitialized in night service state.

**3.23** Night stations are external to the 50B CPS. They may be any local and/or remote station, separate stations for certain loops, or one or more of a hunt group of stations. During night service, calls for all consoles are received at the night station(s) depending on options selected at the CO.

#### **Trunk Answer From Any Station (TAAS) Night Service (Fig. 17)**

**3.24** The night service relay is activated or deactivated using the same circuits and programmed assumptions as for fixed night service (3.20 through 3.23). However, different wiring option straps are used to allow the relay to divert ringing from one console loop to a night bell. A further assumption is that all consoles are unmanned (and made busy) and that the CO is arranged to divert calls from busy positions to the loop which causes the night bell to operate.

**3.25** Night calls can be answered at a station connected in parallel with the night bell (optional) but are normally answered from any station(s) in the Centrex system using a dialed TAAS code.

#### **Combination of Night Services**

**3.26** Flexible night service is not compatible with fixed night service (fixed takes precedence

if both are active) nor can it be used with certain types of multiple position hunt groups. (See feature documentation for CO.) Fixed and TAAS night services can be used together but only if extra (external) keys and/or relays are added on customer premises (locally engineered).

#### **I. Position Busy Circuits (Fig. 18)**

**3.27** When an attendant position is manned and available for incoming calls, processor programming will cause the position busy relay contact to be closed. When a position is made busy or power is lost, the contact is opened. The relay is connected via wiring option straps and a pair to the CO. The CO will stop calls to the position when a busy state is detected. The option wiring straps are connected for multiple-position systems and single-position system in which CO queuing is provided.

**3.28** Since the previously stored MET set busy status is lost on power failure, the program assumptions (in nonvolatile memory) on power-on initialization are similar to those for night service. That is, an unattended electronic console will always be restored in a busy state, while an attended console will be restored in the same state as before power loss. MET sets will be restored in a busy state whether attended or not.

#### **J. Power Distribution and Grounds**

**3.29** Primary power for the 50B CPS is obtained from commercial 117-Vac 60-Hz power. An uninterruptible ac supply can be provided (external to the 50B CPS) where attendant service is important during times when commercial power is lost or when power is interrupted frequently. These supplies typically provide ac power for 4 to 8 busy hours. Power requirements for units are shown on Table E. Several control and/or scanner units may be supplied from one outlet strip, protected by a 15A circuit breaker.

**3.30** The 289A2 power supply in the control unit changes ac to regulated dc voltages as shown on Fig. 19. Power is distributed to the console and to control unit circuit packs per Table F. The backup battery, KS-20390 L9, supplies dc power only to LC445 circuit pack to supply the extended memory and prevent loss of data for about 72 hours.

**3.31** The power transformer for the scanner unit is at the power outlet end of the power cord (Fig. 20). The 11 Vac is converted to regulated -5 Vdc and -10 Vdc outputs used in the LC338 and LC339 circuit packs.

**3.32** Normally, all frame grounds, power outlet (green wire) grounds, and circuit grounds are connected together within units. Control and scanner units are connected together (Fig. 19 and 20). One unit is connected to an approved ground, such as a water pipe, building steel, ground rod, etc.

**3.33** If units are over 50 feet apart, separate 10-gauge wires to the approved ground point are required, but all are still connected to the same single-point ground. The single-point ground is usually located near the point where the CO pairs enter the building, since the CO cable pair protector blocks must also be connected to the common ground point.

**3.34** If exceptionally high noise is measured on the power grounding point, power (frame) grounds and circuit grounds may be separated. This should be done only with local engineering approval. The ground screw (Fig. 19 and 20) is removed from below each unit ground window which leaves the unit case insulated from the ground window block.

#### K. Alarm and Fault Indications

**3.35** The only positive system trouble indication readily seen by the attendant is the ALM (alarm) lamp (LED) on the console which winks to indicate a system trouble detected by the processor. Some faults, such as processor failure or power failure, will prevent the ALM lamp from being lighted. The attendant may also detect trouble by system response failures as listed below.

- The LED associated with a console button fails when a button is depressed.
- All LEDs on console go dark (with headset/handset jacked in).
- The LEDs, tone ringer, and/or alphanumeric display is not activated by TEST switch or TEST button on attendant position.

**3.36** In addition to the above indications, control unit alarm, fault, and normal indications are provided per Table G. One electronic console loop is tested (for battery and dial tone) each 5 minutes when no incoming call is being serviced. If a loop fault is found on two consecutive tests, the CO line trouble LED and the ALM LED are lighted. If the lamp TEST switch is then operated, a trouble indication is displayed on the console. For example, failure of loop 5 would cause a "FAIL 0005" Indication. Scanner unit busy and fault indications are provided per Table H. Some power failure conditions, eg, +5V loss, may prevent the processor from lighting the console ALM lamp and/or processor fault lamps.

**3.37** Optionally, an alarm circuit (Fig. 21) may be connected to indicate on an electronic console or connected to external lamps to indicate when the external supply is operating on batteries. This circuit is intended to prevent complete discharge of the reserve batteries before a trouble is reported. The console circuit can be used only if the external circuit is engineered to produce 5V (optimum) at 10 to 15 mA in the correct direction through the circuit.

## 4. SYSTEM FEATURE DESCRIPTIONS

### GENERAL

**4.01** Some features, such as the alphanumeric display on attendant position (4.02), require hardware and/or software on customer premises. Other features, such as attendant conference (4.05), are implemented by hardware and software in the CO. Brief descriptions of the features used by the attendant are provided in 4.02 through 4.47. These features are more fully documented in feature document series 231-090-XXX (No. 1 ESS) and 232-190-XXX (No. 2 ESS).

### ALPHANUMERIC DISPLAY ON ATTENDANT POSITION

**4.02** A visual device is provided on the attendant console to display characters as required for displayed data. The 50B CPS displays incoming call identification, 12-hour time, and traffic data on all electronic consoles. On electronic consoles, eight digits are provided to display access, account, and telephone numbers. Longer numbers are displayed in two "bytes" of eight digits.

**ATTENDANT CAMP-ON**

**4.03** With this feature, an incoming call which the attendant attempts to extend to a busy station line, is held waiting until the called station becomes idle. The called station is then automatically rung and connected upon answer. In the 50B CPS, the feature is implemented by providing a CAMP button, appropriate control unit programming, and the calls waiting service—originating feature on attendant loops (4.13).

*Note:* The camp-on feature is not recommended unless the BLF feature is also provided, or unless silence or a tone other than normal ringback tone is available. (ESS No. 1 Generic 1E4 Issue 5 or ESS No. 2 Generic EF2 or later is required for these tone options.) Customer premises equipment is required for music or special tones on camped-on calls.

**ATTENDANT COMMON CONTROL SWITCHING ARRANGEMENT (CCSA) ACCESS**

**4.04** This service provides attendant assistance on the listed directory number calls incoming from the CCSA network as well as on calls outgoing to the CCSA network.

**ATTENDANT CONFERENCE**

**4.05** An attendant can establish a multiparty conference connection of up to five parties (No. 1 ESS) or up to six parties (No. 2 ESS). An access code is dialed prior to dialing of conferees.

**ATTENDANT CONTROL OF TRUNK GROUP ACCESS**

**4.06** An attendant can restrict dial access by station lines to a trunk group [such as foreign exchange (FX) or Wide Area Telecommunications Service (WATS)] by dialing a code or by operating a key. When control is activated, calls to restricted trunks will be routed to an attendant. In the 50B CPS connected to a No. 1 ESS CO, a key must be provided externally. For systems connected to a No. 2 ESS CO, an external key or dialed code may be used.

**ATTENDANT CONSOLE**

**4.07** A console is a desk-top position from which an attendant handles assistance calls by means of pushbuttons. Pushbuttons are provided

for each of the control features, loops, or other facilities and for manual dialing. Some of the 50B CPS consoles also have Direct Station Selection and repertory dialing.

**ATTENDANT DIRECT STATION SELECTION WITH BUSY LAMP FIELD**

**4.08** An attendant can extend or originate calls to customer stations by depressing a nonlocking button associated with the station line. A visual indication of the busy or idle status of the stations is provided via a lamp associated with each button. The 50B CPS electronic console can display the status of 100 stations at a time. It has selector buttons to control which one of up to 18 consecutive hundreds groups is displayed and available for Direct Station Selection.

**AUTOMATIC CALL DISTRIBUTION TO ATTENDANT POSITIONS**

**4.09** This feature automatically spreads incoming calls among idle attendant positions, so that average work time is approximately equal for all positions.

**AUTOMATIC IDENTIFIED OUTWARD DIALING (AIOD)**

**4.10** Automatic identification of station line numbers is provided on calls outside the Centrex group by automatic message accounting (AMA) facilities in the CO. This permits station identification on billing for toll calls. The 50B CPS attendant lines can also be identified.

**AUTOMATIC QUEUING TO ATTENDANT POSITION**

**4.11** The switching system automatically determines the order in which incoming calls are answered by presenting only one new (unanswered) call to each attendant position at a time. See 4.27 for local queuing.

**CALL FORWARDING—ALL CALLS**

**4.12** This feature allows calls destined for a station to be routed to another station (or attendant), designated during activation, regardless of the busy or idle status of the called station. Stations with this feature activated can originate calls normally. This feature can be activated or canceled by the station user or by the attendant (for a station).

**CALLS WAITING SERVICE—ORIGINATING**

**4.13** This feature allows a call to a busy station line to be held waiting while a tone signal is directed toward the busy station. (Only the called station user hears this tone.) The called station user may hang up, whereby the station will be rung and connected to the call upon answer. In the 50B CPS, this feature is assigned to the attendant loops if attendant camp-on is to be implemented.

**CALLS WAITING INDICATION AT ATTENDANT POSITION**

**4.14** A visual signal on each attendant position indicates whether calls are waiting to be served. On 50B CPS electronic consoles, in systems having local queuing, more than three waiting calls will cause a winking CW (calls waiting) lamp; otherwise, only a steady indication is provided.

**CODE CALLING ACCESS**

**4.15** Attendants and station users can dial an access code and a 2- or 3-digit called party code to control signals (bells, gongs, etc) corresponding to the dialed digits. The called party can then be connected to the calling party by dialing an answering code from any station within the Centrex group.

**CUSTOMER DIALED ACCOUNT RECORDING (CDAR)**

**4.16** This feature permits a station user to add an account number to the AMA record for any call. The station user picks up the handset, receives dial tone, dials the unique CDAR access code, then dials the account number and receives dial tone. The station user then dials the telephone number to originate a call.

**4.17** The attendant can use the CDAR feature in a manner similar to a station user. In addition, the attendant may cause automatic recording of the access code and account number when incoming calls are completed through the attendant position. With the 50B CPS electronic consoles, access, account, and telephone numbers can be manually dialed, preprogrammed, displayed on the attendant console, and edited before sending to the CO.

**4.18** The SMDR feature is a prerequisite for the CDAR feature (in No. 1 ESS offices only).

**DIAL ACCESS TO ATTENDANT**

**4.19** This feature allows station users within the Centrex group to reach an attendant by dialing a code, usually a single digit "0". In the 50B CPS, these calls are routed to a dedicated attendant line(s) on the console to allow incoming call identification.

**DIRECT TRUNK GROUP SELECTION**

**4.20** An attendant can access an outgoing trunk in a trunk group by depressing a single button associated with the trunk group. In the 50B CPS, the feature is implemented by programming a button in the repertory dialer.

**FOREIGN EXCHANGE (FX) CO ACCESS**

**4.21** This service provides access to a distant CO via FX trunks. Incoming calls are dialed using an FX directory number, routed to the service CO, and answered on a loop dedicated to the foreign exchange on a 50B CPS position. Outgoing calls require an FX trunk access code.

**HOLD**

**4.22** An attendant can hold a call by depressing the HOLD button. The associated loop lamp indicates the hold state.

**INCOMING CALL IDENTIFICATION AND INCOMING CALL INDICATORS**

**4.23** With the 50B CPS electronic console, four alphanumeric characters are displayed to identify the loop dedicated to each category of incoming calls. Some characters may be blanks. On Multibutton Electronic Telephone (MET) sets, each loop button is identified directly by a designation tab. Several loops may be identified by the same or similar characters.

**INTERCEPT TREATMENT**

**4.24** Calls which cannot be completed are routed to a recorded announcement or to an attendant, depending on the CO options. In the 50B CPS, a loop may be dedicated to attendant intercept calls.

## INTERPOSITION CALLING AND INTERPOSITION TRANSFER

**4.25** An attendant at one position can call another attendant for consultation or call transfer. Transfer is used where one position is equipped (or assigned) to handle certain kinds of calls, such as conferences, WATS access, or internal directory assistance. In the 50B CPS, a loop can be dedicated to interposition calls to allow incoming call identification. Access to the loop is via dialed directory number for the attendant line assigned to the desired console.

## LISTED DIRECTORY NUMBER (LDN) SERVICE

**4.26** Local or long distance calls to the listed directory number are routed to an attendant who may extend the call to stations within the Centrex group or via dedicated trunk groups. The 50B CPS may have up to four listed directory numbers (per console), but one or two per customer are more common.

## LOCAL QUEUING OF INCOMING CALLS

**4.27** This feature is used primarily for low-traffic 50B CPS installations in lieu of automatic queuing at the CO. Up to 16 loops may be assigned per console. On electronic consoles, calls waiting on loops are presented one at a time, oldest call first. On MET sets, all calls on loops can be indicated as incoming at the same time, and one loop is manually selected (answered) by the attendant. [See 4.11 for remote (CO) queuing.]

## LOUDSPEAKER PAGING—DIAL ACCESS

**4.28** This feature allows access to paging (public announcement) equipment for voice paging using the telephone transmitter as a microphone. The paging equipment (loudspeakers and amplifiers) may be customer owned or provided by the Telephone Company (TELCO).

## NIGHT SERVICE

**4.29** Limited service is provided for calls directed toward the attendant(s) at night or other times when the position(s) are unattended (or inoperative). Calls are routed to preselected stations when night service is activated. Routing may be provided on a fixed or flexible basis as listed below.

- **Fixed:** Routing is arranged by the TELCO and can only be changed by them.
- **Flexible:** The attendant uses the call forwarding variable feature to arrange routing prior to activating night service each night.
- **Trunk Answer From Any Station (TAAS):** A night bell is activated, and calls may be answered at any station by dialing the answer access code for the CO call pickup feature.

## POSITION BUSY

**4.30** In a multiposition 50B CPS, unattended or inoperative positions cause a busy signal to the CO so that calls are not routed to the position. A POS BUSY (position busy) button is provided for attendant control, and a lamp indicates the busy state.

## POWER FAILURE—ACTIVATION OF NIGHT SERVICE OR POSITION BUSY

**4.31** In the 50B CPS, loss of internal or external power to a control unit associated with a position will cause a busy signal to the CO so calls will not be directed to the position. In addition, power loss at a master position will activate fixed or TAAS night service.

## RADIO PAGING ACCESS

**4.32** The attendant and station users can dial to access customer-owned radio paging equipment to selectively tone-alert or voice-page individuals carrying pocket radio receivers. Optional arrangements may be provided whereby the paged party can be connected to the call by dialing an answer code.

## RECORDED TELEPHONE DICTATION ACCESS

**4.33** This feature permits dialed access to and control of customer-owned dictating equipment by users within the Centrex system. The start and stop functions may be voice controlled or dial controlled. The record, playback, etc, functions are dial controlled. Dialed access may be controlled by an attendant, but other functions would be controlled by a station user.

## REPERTORY DIALER

**4.34** On 50B CPS electronic consoles, buttons may be programmed to cause auto-dialing of up to 15 digit numbers when a single button is depressed. Programming may include one or more sequential access codes, area codes, trunk access codes, and frequently called local or long distance numbers. A wait for additional dial tones (before automatic resumption of dialing) may also be programmed. A long series of codes (separated by one or more wait states) may be programmed on one button if digits plus wait states do not exceed 30. Feature access codes, such as attendant conference, can also be programmed.

## RESERVE POWER

**4.35** This feature provides an alternate, independent source of power to maintain service for a limited time (normally 8 busy hours) during a power failure. Reserve power is locally engineered for customers with a critical need for uninterrupted attendant service when no emergency power is provided by the customer. For the 50B CPS, an uninterruptible ac power supply can be provided (externally) to prevent degradation of service. For systems with low-priority and low-volume attendant traffic, the alternative of night service during power failure (4.29 and 4.31) may be adequate.

## SPLITTING—ONE-WAY MANUAL

**4.36** This feature allows an attendant to consult privately with the called party without the calling party hearing. In the 50B CPS, the attendant depresses the SPLIT button before dialing, and the calling party is held (split away) until the SPLIT button is again depressed or until the attendant releases.

## STATION MESSAGE DETAIL RECORDING (SMDR)

**4.37** This feature provides a record of station (or attendant position) line identity, starting time, call duration, and trunk group used for outgoing and/or incoming calls. For outgoing calls, the called number is recorded. The call duration is measured from call connection to station on-hook. Busy, don't answer, and wrong number calls are also recorded. A station dialed account code or authorization code number may be recorded in addition to or in lieu of the calling number. The SMDR equipment and software are installed in the

CO. Data is recorded on tape and provided to the customer who processes the tape (No. 1 ESS offices only, Fig. 15).

## STRAIGHTFORWARD OUTWARD COMPLETION

**4.38** Attendants can complete outgoing calls without requiring the calling station user to hang up and be called back. The attendant can dial the called number for the station user or (if thru dialing is available) allow the station user to complete the dialing after the trunk is accessed.

## SWITCHED LOOP OPERATION

**4.39** With this attendant position arrangement, each call requiring attendant assistance is automatically switched to one of a limited number of loops (attendant lines) to an idle attendant position. Normally the call is automatically released from the position when answered by the third party. In the 50B CPS, a CO feature provides 3-way conference and transfer capability implemented via a 3-port circuit (4.40).

## THREE-WAY CONFERENCE TRANSFER

**4.40** A station user can flash while on a 2-party call to effect a 3-way conference and/or transfer. After flashing, the station user dials the third party for private consultation while the second party is held. By flashing a second time, a 3-way conference is effected. Transfer is accomplished when the flashing station goes on-hook. In the 50B CPS, attendant-handled calls are extended to a third party using this feature. Flashing is done automatically in response to depression of buttons on the attendant position, such as START, SPLIT, and CANCL. An attendant may be allowed to transfer all calls, incoming calls only, or incoming and outgoing calls only. A 3-way (unsplit) connection is automatically made (at the CO) when dialing is completed unless the SPLIT button was depressed.

## THRU DIALING

**4.41** Station users can complete dialing after the attendant accesses the trunk facility on attendant-handled outgoing calls.

## TIMED REMINDERS

**4.42** After 30 seconds, the attendant is automatically alerted to a held call, camped-on call, or

unanswered call so that the calling party may be given a progress report. In the 50B CPS, a single ring is heard accompanied by a flashing loop status lamp. Timing is reset each time the attendant reenters the call. For the MET set only, no timed reminder is provided in the hold state.

#### **TOUCH-TONE DIALING AND/OR DC KEY PULSE ON ATTENDANT POSITION**

**4.43** A TOUCH-TONE pushbutton dial is provided on all attendant positions used with the 50B CPS. In addition, the electronic console dial has a dc key pulse output (sent via the data link to the control unit) which allows programming of certain buttons using dialed digits.

#### **TRAFFIC DISPLAY TO CUSTOMER**

**4.44** A display of certain traffic statistics is provided as requested by the customer. In the 50B CPS, number of calls handled and average attendant work time are displayed when associated buttons are depressed. Statistics apply only to calls offered to the position, not including time waiting in a CO queue or calls abandoned before connection to an attendant loop.

#### **TRUNK GROUP BUSY INDICATORS ON ATTENDANT POSITION**

**4.45** A visual signal is provided on the attendant positions when all trunks in a trunk group are busy. In the 50B CPS, a maximum of four busy lamps are provided on each console. Each console is typically arranged identically but can be different, depending on trunk group access assignments.

#### **TWO-PARTY HOLD ON CONSOLE**

**4.46** This feature allows an attendant to hold a call on the console with two parties connected (not counting the attendant).

#### **WIDE AREA TELECOMMUNICATIONS SERVICE (WATS) ACCESS**

**4.47** This service provides access to or from a WATS serving office. Remote station users dial listed 800 service (formerly INWATS) numbers which causes routing to the attendant (or stations) in a manner similar to long distance LDN calls except for charging to the business customer. The

OUTWATS calls require appropriate trunk access codes.

### **5. OPERATION OF CONSOLE—TYPICAL CALLS AND FEATURES**

#### **A. Putting Attendant Position Into Normal (Day) Service**

**5.01** The electronic consoles and MET sets are powered and supported by control unit circuits. The control units must therefore have power applied and operating correctly as indicated by indicator light emitting diodes (LEDs) (Table G). The console talking, power, and data link circuits are completed by connecting the console mounting cords to the control units. If the position uses a Busy Lamp Field (BLF), the station busy status scanner units must also be powered and operating (Table H).

**5.02** Tables A, B, and C supplement 5.03 through 5.44 to show control/indicator designations and descriptions. Electronic, electronic CDAR, and MET set attendant position control locations are shown in Fig. 3 and 6.

**5.03** A headset or handset must be connected to the attendant position. Test all console lamps (LEDs) and the tone ringer by depressing the TEST button or TEST switch. All LEDs are lighted (including some not otherwise used), and the alphanumeric display is LAMP TEST. Tone ringer volume may be adjusted while the test condition is maintained. After testing, depress NIGHT and POS BUSY (position busy) buttons if the associated LEDs are lighted. The console is now conditioned to receive or originate calls.

#### **B. Answering Incoming Call**

**5.04** Incoming calls to attendant positions are indicated by a sounding tone ringer and flashing console loop LED indications (Table B). When the call is answered by depressing the associated loop button (Table A), the LED is lighted steadily, and the tone ringer stops. The attendant talk circuit is connected. The ANSWER button (electronic consoles only) may be depressed with the same result. The incoming call source is identified by four alphanumeric characters (electronic console) or loop button tabs (MET set) per Table C.

**C. Extending Call to Station**

**5.05** A call on a loop to which the attendant is connected can be extended to a station (also referred to as the third party or called party). Manual dialing can be used on all positions, and Direct Station Selection (DSS) can be used on some electronic consoles. The call can be camped-on a busy station line if the feature is provided.

**5.06** The manual dialing sequence is START, then two, three, four, or five dialed digits, depending on the system (usually four digits). When START is depressed, dial tone is heard and then dialing tones are heard. The CO responds by splitting the calling party away during dialing, then providing audible (ringback) tone to the calling party and attendant while the called station is ringing.

**5.07** On positions with busy lamp field and direct station selection, the busy/idle status is first observed by selecting the appropriate hundreds group. If the station is idle, the DSS button is depressed, producing the same dial tone, dialing tones, CO, and station responses as for manual dialing. (These tones are muted and the sequence is more rapid than with manual dialing.) A flashing hundreds group lamp indicates a selection error or equipment fault. The DSS output (dialing) is not affected.

**5.08** If the camp-on feature is provided, the call is automatically camped-on a busy line by the CO after manual or DSS dialing is complete. The called party hears tone(s) depending on the serving CO as listed below.

- No. 1 ESS, Generic 1E5 or earlier—one burst repeated in 10 seconds.
- No. 1 ESS, Generic 1E6 or later—two bursts.
- No. 2 ESS—one burst.

The attendant hears ringback tone, silence, special tone, or music depending on CO and customer options provided. After a call is camped-on, the CAMP button is depressed to release and causes a camped-on indication for the attendant (Table B).

**5.09** Typically, the attendant releases from the call before the station answers by depressing the RING button or CAMP button, producing a

loop LED response per Table B. When the station answers, a disconnect signal is automatically sent and the call is reconfigured. This frees the 3-port circuit in the CO and the attendant loop for another call.

**D. Extending Call via Trunk Group or Direct Distance Dialing (DDD) Network**

**5.10** A call on a loop to which the attendant is connected can be extended to any party outside the Centrex group (if attendant lines are not restricted). The call may be extended via the DDD network, FX line, tie trunks, or private corporate network (CCSA). Unique access codes and routing prefixes are dialed for each trunk group which can be accessed, and on some calls extra dial tones may be received.

**5.11** Manual dialing is available on all positions using the console dial pad. Single-button initiated automatic dialing of access codes or complete numbers is available on electronic consoles via programmed repertory dialer buttons (5.28). In either case, dial tone, dialing tones, and CO responses are heard by the attendant. The calling party is held split away during dialing. The attendant typically releases from the call (using the RING button) while the remote station is ringing, and the call is temporarily held on the loop until answered. On trunks which do not return answer supervision, the RLS or R button is depressed and the call is not held on the loop.

**E. Private Announcement of Calls**

**5.12** If a call is to be privately announced, the split digit (digit \* or #) must be dialed ahead of other digits. This can be done manually by a button sequence of START, digit \* or #, and dialed digits. The same thing is done automatically by the button sequence SPLIT and dialed digits. If dialing is to be via the DSS button, the hundreds group is selected (to get the busy status display); then SPLIT and DSS buttons are depressed. Use of the SPLIT button can similarly precede the use of a repertory dialer button. The calling party is held split away by the CO after dialing is completed. After announcing the call, the attendant can (1) cancel a refused call (5.15); (2) cause a 3-way connection by again depressing SPLIT; or (3) release from the call (using the RLS or R button) leaving the calling and called parties connected.

**F. Attendant-Originated Calls**

**5.13** The attendant may originate calls to local stations and to remote stations, depending on restrictions of position lines (loops). An idle loop is selected by depressing a loop button. Dialing of the desired party can be manual via DSS button or via repertory dialer button. The dialing sequence is the same as for extending a call to a local or remote called party (5.05 and 5.10). At the end of the call, releasing will cause a disconnect and loop indicators will go dark indicating an idle loop.

**G. Release and Cancellation of Calls**

**5.14** The RING, CAMP, and RLS or R buttons all release the attendant from a call. The RLS/R button causes a disconnect signal to be sent to the CO resulting in unconditional release of the call from the console. When an urgent outgoing call (eg, to report a fire) must be made and no loop is idle, a busy loop can be disconnected by depressing the RLS/R button. It is recommended that a call already in the ring or camp-on state be disconnected in this case, since the only consequence is that if the call is not answered, no timed reminder will alert the attendant. The attendant cannot reenter a disconnected call. The RLS/R button also serves to force disconnection of a loop when trouble is encountered; for example, a loop not automatically made idle after the third party answers.

**5.15** If a busy, don't answer, misdialed digit, or wrong number condition is encountered when extending a call, or a privately announced call is refused, the attendant depresses the CANCL (cancel) button. This button causes disconnection of the call destination and causes reconnection of the attendant and the calling party for possible additional service (by sending a flash to the CO).

**H. One- and Two-Party Hold**

**5.16** A calling party (incoming call) can be placed on local (permanent) hold by depressing the HOLD button. This keeps the single-party call on the console loop for future service, while the attendant is released to provide service to another loop. On the electronic console only, a timed reminder is given after 30 seconds (5.18).

**5.17** There is very rarely any need for holding a call on the console after the call has been extended to a third party. However, the 50B hardware and software will achieve 2-party hold if the HOLD button is depressed while the call is in the ring, camp-on, or answered state. When the HOLD button is depressed, the attendant is released from the loop, but the call is not dropped from the console when the called party answers. The ANS LED (electronic console) or red loop LED (MET set) is lighted (Table B). One example of a need for 2-party hold is an urgent call extended to an inward restricted station. The two parties would be disconnected if the attendant released the call from the console. A timed reminder (5.18) will be given in 30 seconds on electronic consoles only. The attendant must therefore reenter the call every 30 seconds or allow the loop lamp to continue flashing.

**I. Timed Reminders**

**5.18** Timed reminders are automatically given if a call is left in the camp-on or ringing and unanswered call state. The associated loop lamp (electronic console) or the CAMP or RING lamp (MET set) is flashed at 60 ipm (Table B). The tone ringer emits a single ring. When the attendant depresses the loop button to give a progress report, the timed reminders are stopped and the timer reset. A timed reminder is also provided for the hold state on electronic consoles.

**J. Dialed Access to Paging, Code Calling, or Recording Equipment**

**5.19** External equipment is typically customer owned and accessed by dialing locally assigned access codes. Connection is via access lines or trunks from the CO. Some access lines to the equipment may be assigned extension numbers (dialed manually or via Direct Station Selection), while others are assigned trunk access codes (dialed manually or via programmed repertory dialer button).

**K. Thru Dialing**

**5.20** When thru dialing is used, the attendant dials only the trunk access codes required to extend a call to a party outside the Centrex group. The attendant then depresses the RLS/R button, and the station user completes the dialing

process. The call is not kept on the loop after release.

**L. Night Service**

**Fixed Night Service**

**5.21** The attendant at the master position depresses the NIGHT button to place the system (all positions) in night service. The NIGHT LED is lighted. All new incoming calls are switched (at the CO) to the assigned night stations. Calls already on attendant loops are not affected and can be answered as usual. When no more calls are waiting on a loop, the position is disabled to prevent tampering. For electronic consoles, headsets and handsets are unjacked which removes power from the console, all indicators go out, and controls are disabled. For MET sets, the cord connected to a wall-mounted modular connector is disconnected; again all indicators go out, and controls are disabled. The disconnected MET set and cord or headset may be stored away to prevent unauthorized use.

**5.22** The attendant removes the system (all positions) from night service by connecting the master position headset or set cord and depressing the NIGHT button a second time. The NIGHT LED goes out.

**Trunk Answer From Any Position (TAAS) Night Service**

**5.23** The attendant enables or disables TAAS night service in the same manner as for fixed night service (5.21 and 5.22). The answering of night calls is changed, since a TAAS access code permits answering from any station. An incoming night call is indicated by the ringing of a night bell.

**Flexible Night Service**

**5.24** The attendant places a position in flexible night service by dialing a call-forwarding activate code, the primary listed directory number of the system, and the number to which calls are to be forwarded (No. 1 ESS COs). Dial tones are heard between dialed codes, and confirmation tone is heard after the last dialed number. If the serving office is No. 2 ESS, different loops may be forwarded to the same or separate stations as necessary. Also, all calls to all console loops can be forwarded if call forwarding is activated on the loop designated ATND (usually a "dial 0" line).

Only one position need be placed in night service. Other positions can be made busy by depressing the POS BUSY (position busy) button to force all calls toward the position in night service (and thereby forwarded).

**5.25** The attendant removes a position from flexible night service by dialing a night service deactivate code on the same loop (or loops) used to activate night service. The CO responds with a confirmation tone.

**5.26** Because of the conflict between flexible and fixed night service, the two types of night service are not recommended in the same system. If flexible night service is established and then fixed night service is activated, the fixed night service routing takes precedence because of CO translations. Loss of power would automatically activate fixed night service if provided.

**M. Position Busy**

**5.27** Before an attendant leaves a position of a multiposition system, the POS BUSY button must be depressed to stop new calls to the position. The POS BUSY LED is lighted. Calls already connected are left on console loops to be serviced. After existing calls are serviced, the headset is usually removed and/or the MET set mounting cord may be disconnected if tampering is to be prevented. When an attendant returns, the headset (and/or set cord) is reconnected and the POS BUSY button again depressed.

**N. Attendant Programmable Features**

**Repertory Dialer Buttons**

**5.28** Repertory dialer buttons (electronic consoles only) can be programmed for any frequently dialed number, local or long distance, or for access to private lines (trunks). Generally, the lower rows of buttons are programmed for trunk access and the top row of buttons for frequently dialed extensions, paging lines, and feature access such as attendant conference. A wait for second dial tone can also be programmed. Manual dialing is recommended for less than two digits. The CO will accept a maximum of 15 digits at once. More than 15 digits can be programmed only if broken into several dialing sequences by a waiting period(s) for second (or third) dial tones.

**5.29** All consoles in a multiposition system should be programmed alike, if possible. A typical programming sequence is listed below.

- Depress PROG. Program mode is activated and PROG LED lighted.
- Depress first button to be programmed.
- Dial number assigned to button; eg, 9, WAIT, 911 (for emergency calls).
- Depress second button to be programmed.
- Dial number assigned to button; eg, 8, WAIT, 456 (for access to private trunk group).
- Depress PROG. Program mode is disabled, and PROG LED is out.

#### Feature Control Buttons

**5.30** Some feature buttons have fixed functions assigned but can have associated values changed in the programming mode. The traffic feature NCH (number of calls handled) button can be zeroed by the button sequence PROG, NCH, CANCL, and PROG. The AWT (accumulated attendant work time) button is also zeroed at the same time. The TOD is reset by the button sequence PROG, TOD, dial two hour and two minute digits, PROG.

**5.31** Spare feature buttons (not assigned in Fig. 3) can be programmed for any dial-accessed feature, such as paging or attendant conference. The sequence is the same as for repertory dialer buttons and, in fact, some of the repertory dialer buttons may be assigned for feature-access dialing.

#### Clearing Programmed Button

**5.32** A repertory dialer or feature button can be cleared if a programming error is made or if the programmed data is to be erased. If already in the program mode and an error is made, depress CANCL and repeat the previous programming. If not already in the program mode, the button clearing sequence would be PROG, (button X), CANCL, and PROG.

#### CDAR Functions

**5.33** The customer access code buttons CAC1 and CAC2 can be programmed with up to five dialed digits. The button sequence is PROG, CAC(X), dialed digits (displayed), and PROG. Subsequent depression of CAC(X) fetches the number from memory for display, editing, and outpulsing (5.38 through 5.42).

**5.34** The ACCT (account number) button can be programmed with two digits (01 to 14) which define the maximum number of digits in the customer's longest account number. The button sequence is PROG, ACCT, dialed digits (displayed), and PROG. See limitations (3.16).

#### Programming Errors

**5.35** Attempted programming of a button which has a previously assigned (fixed) function will result in an error indication on the alphanumeric display. An exception is the TOD button which can have its associated value changed. Attempted programming of buttons with values not allowed will also result in an error indication. The error indications are as listed below.

- Customer access codes over 5 digits—OVFL
- Attempted programming of account number length over 14 digits—ILGL
- Button not programmable (fixed function)—ILGL
- Attempted programming while active on a loop—ILGL
- More than 15 digits in sequence unbroken by wait for dial tone—not accepted by CO
- More than 30 digits programmed on one button—OVFL (wait states count as digit).

To correct an error condition above, depress CANCL button and modify the last programming step. Entry of an incorrect CDAR digit is detected by the attendant and corrected by editing (5.40). Nonexistent access or account codes are not accepted by the CO, and dial tone or verification tone is not returned after dialing or outpulsing (5.42). A button to be reprogrammed is automatically cleared by the normal programming sequence (5.28) before new data is entered.

## O. Recording of Call Details via CDAR Features

### Receiving Incoming Call

**5.36** A call incoming on an attendant position is answered as for any locally or remotely originated call (5.04). The details of either a call from “outside” to a station (via the attendant) or a call from a station via an attendant-controlled trunk can be recorded in association with a customer account number by the attendant.

### Manual Preparation for Call Detail Recording

**5.37** If the attendant position does not have the “automated” CDAR features, the START button is depressed and the customer access code, customer account number, and telephone number are manually dialed in the order listed. Operation of the SPLIT button immediately preceding the telephone number is optional (5.12). Dial tone is heard between access code and account number, and confirmation tone is heard after the account number. The telephone number is the number normally dialed for extending calls inward or outward. Call processing then proceeds as for any attendant extended call after dialing (5.05 through 5.12). The duration of the call is measured at the CO.

### Automated Preparation for Call Detail Recording

**5.38** If the console has buttons for “automated” CDAR feature, the attendant first depresses the CAC1 or CAC2 button to enter the “CDAR mode”. The access code is fetched from memory and displayed on the alphanumeric display. Next, the account number is dialed (manually or via repertory dialer) and eight digits of the account number are displayed. Since only eight digits can be displayed at once, the ACCT (account) button must be depressed if display of the remaining digits is desired. When an account number shorter than the maximum **programmed** length is entered, the TEL (telephone number) button is depressed after the last account number digit. Last, the attendant dials the telephone number of the party to receive the call. Again, the first eight digits are displayed, and if more digits were dialed, depressing the TEL button causes display of the remaining digits. Use of manual dial, DSS, or repertory dialer buttons for telephone numbers is optional.

**5.39** None of the numbers fetched from memory or dialed (5.38) are outpulsed immediately, but are stored in special registers. The attendant may verify and edit the displayed numbers at the time they are first entered, or display them again after all numbers are stored for verification and editing (5.40 and 5.41).

**5.40** Only displayed numbers can be edited. Editing of a **displayed number** is initiated by depressing the CURSR (cursor) button. The first depression causes the first digit to blink, the second causes the second to blink, etc. While an incorrect digit is blinking, dialing the correct digit causes the correct digit to be substituted and displayed. Depressing the CANCL button causes deletion of the blinking digit. Display of a new number resets the cursor position to the left.

**5.41** Repeated display of previously entered numbers for verification and editing can be accomplished as listed below.

- Customer Access Code—Depress CAC1 or CAC2
- Account Number—Depress ACCT (once per eight digits)
- Telephone Number—Depress TEL (once per eight digits)

**Note:** The split digit (digit \* or #) is displayed as part of the telephone number when SPLIT is used.

**5.42** After all numbers associated with a call are entered and are correct, the START button is depressed. The numbers are then automatically outpulsed to the CO (in TOUCH-TONE dialing format). Waiting for dial and confirmation tones is automatic. The WAIT lamp will be lighted briefly after each number is automatically dialed but may not be observed because of very rapid response. After the numbers are outpulsed, the call is processed as for any attendant extended call (5.05 through 5.12). The duration of the call is measured at the CO.

### Repeating Call Which Was Not Completed

**5.43** A busy signal is sometimes encountered after CDAR numbers are outpulsed. After canceling (5.15), the numbers are retained in memory as

the last number dialed on the loop. The stored numbers can be fetched and outpulsed on the same loop by depressing the LAST NO. dialed button. However, the calling party must be held on the loop to assure reentry to the same loop and to prevent destruction of the stored numbers by processing another call on the same loop. If the call was attendant originated, a special register holds the number. The number may be repeated on any loop without holding.

#### Abandoned Calls

5.44 Calls which are abandoned by the calling party (in the held state) are not immediately torn down at the CO. A timeout period of 10 to 15 seconds is required. Then, since the loop is still held by the 50B CPS, a reorigination occurs with another 10 to 15 second timeout before the loop is made idle. An attendant reentering the loop for a progress report after 20 to 30 seconds hears dial tone, then releases.

## 6. MAINTENANCE

### GENERAL

6.01 Most repairs of the 50B CPS can be performed by replacement of circuit packs in the control units, scanners, and attendant consoles. Trouble clearing information will be found in TOP 533-101-000. If it cannot be quickly determined which circuit pack is faulty, replacement consoles or control units may be required. Since scanner faults do not seriously affect call processing, these faults can be repaired on a lower priority basis.

### CONTROL UNIT

6.02 The major replaceable parts of the control unit are the circuit packs, power supply, and 3.75V battery (2.11 through 2.19). Some circuit packs have alarm or fault indicators as listed in Table G.

6.03 One particularly critical failure is one which causes the master-position control unit to be in a false fixed night service state. ***Calls to all positions are diverted to the night station(s).*** Temporary disconnection of the night service pair to the CO (Fig. 18) will remove night service and restore normal operation of nonmaster positions. The master position may also be restored

to operation (except for the false night service condition) depending on the type of fault.

### ELECTRONIC CONSOLES

6.04 Diagnosis and replacement of some internal parts of the console may take considerable time. If possible, especially in single-console installations, a spare console should be installed for quick restoration of service. Replacement parts can then be installed, and the original console reconnected.

### MULTIBUTTON ELECTRONIC TELEPHONE (MET) SETS

6.05 To save time a spare MET set should be installed if possible, especially in single-console installations. Replacement parts can then be used to repair the faulty console.

### SCANNER UNITS

6.06 The major replaceable parts of the scanner unit are the LC338 and LC339 circuit packs (2.21 through 2.24). The busy and fault indications are listed in Table H. Scanner faults may cause faulty busy/idle state indications on the busy lamp field, but do not seriously interfere with call handling.

## 7. REFERENCES

7.01 This issue is based on the following drawings:

- J59217A, Issue 1
- J59217B, Issue 1
- SD-66961-01, Issue W1B
- SD-66962-01, Issue W1

7.02 The following sections are associated with the 50B CPS. These sections, when available, may be used for additional information:

SECTION	TITLE
231-090-177	50B CPS Attendant Position Feature—2-Wire No. 1 and No. 1A Electronic Switching Systems

**SECTION 533-101-100**

<b>SECTION</b>	<b>TITLE</b>
503-100-130	2993C-Type MET Sets—General Description
533-101-000	50B CPS—Installation and Test (TOP)
533-101-200	50B CPS—Identification Information
533-101-300	50B CPS—Preinstallation Information

**7.03** The following Business Services Engineering sections are associated with the 50A CPS and are also applicable to the 50B CPS:

<b>SECTION</b>	<b>TITLE</b>
533-100-600	50A Traffic Measurements
533-100-601	50A Traffic Engineering

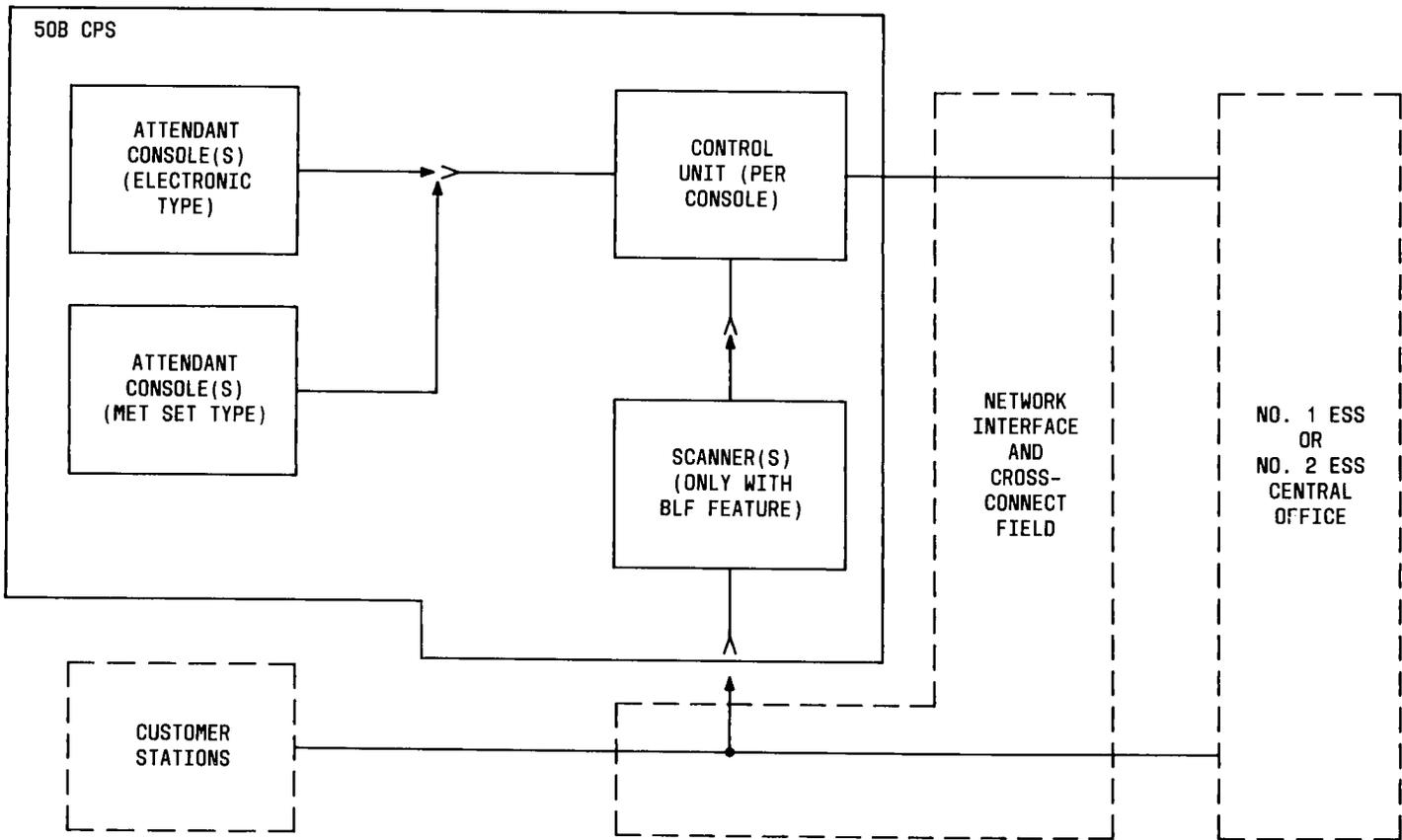


Fig. 1—50B Customer Premises System (CPS) Block Diagram

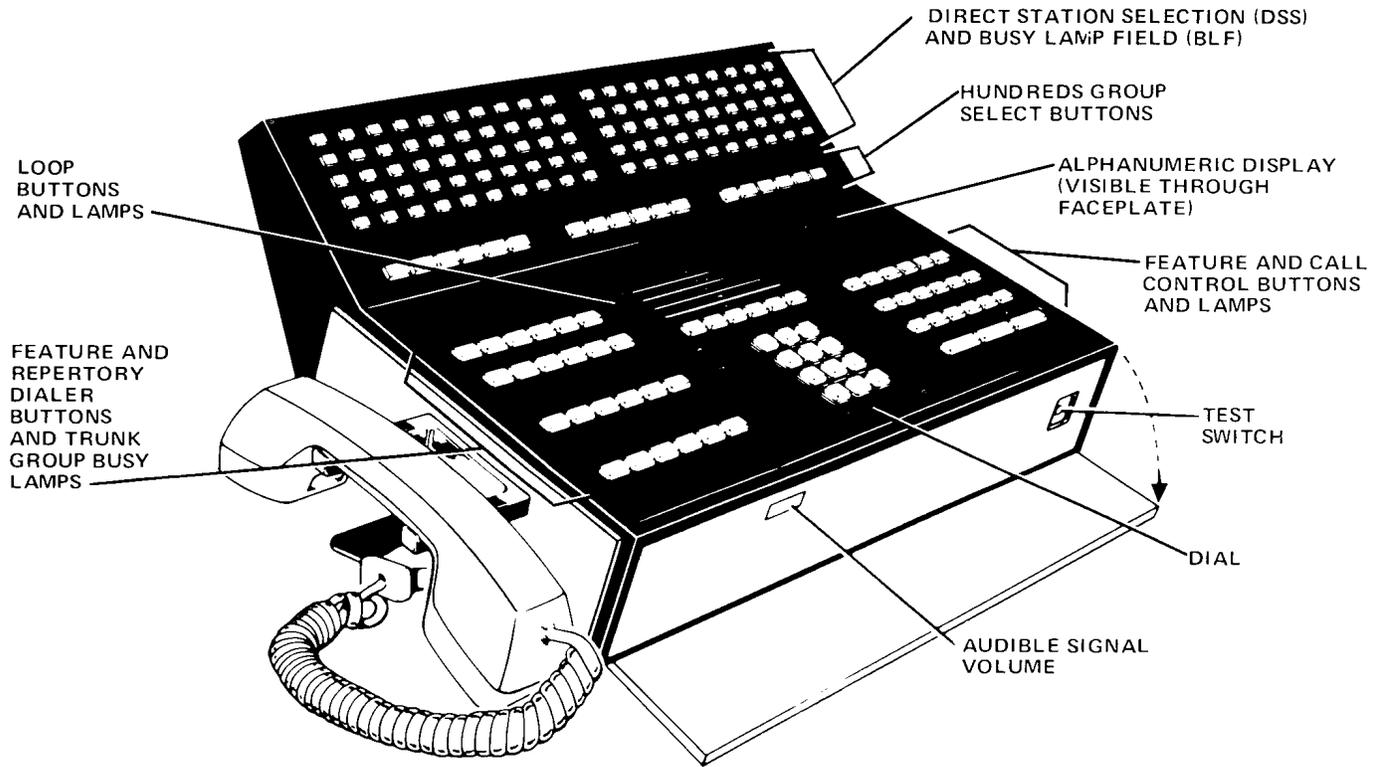
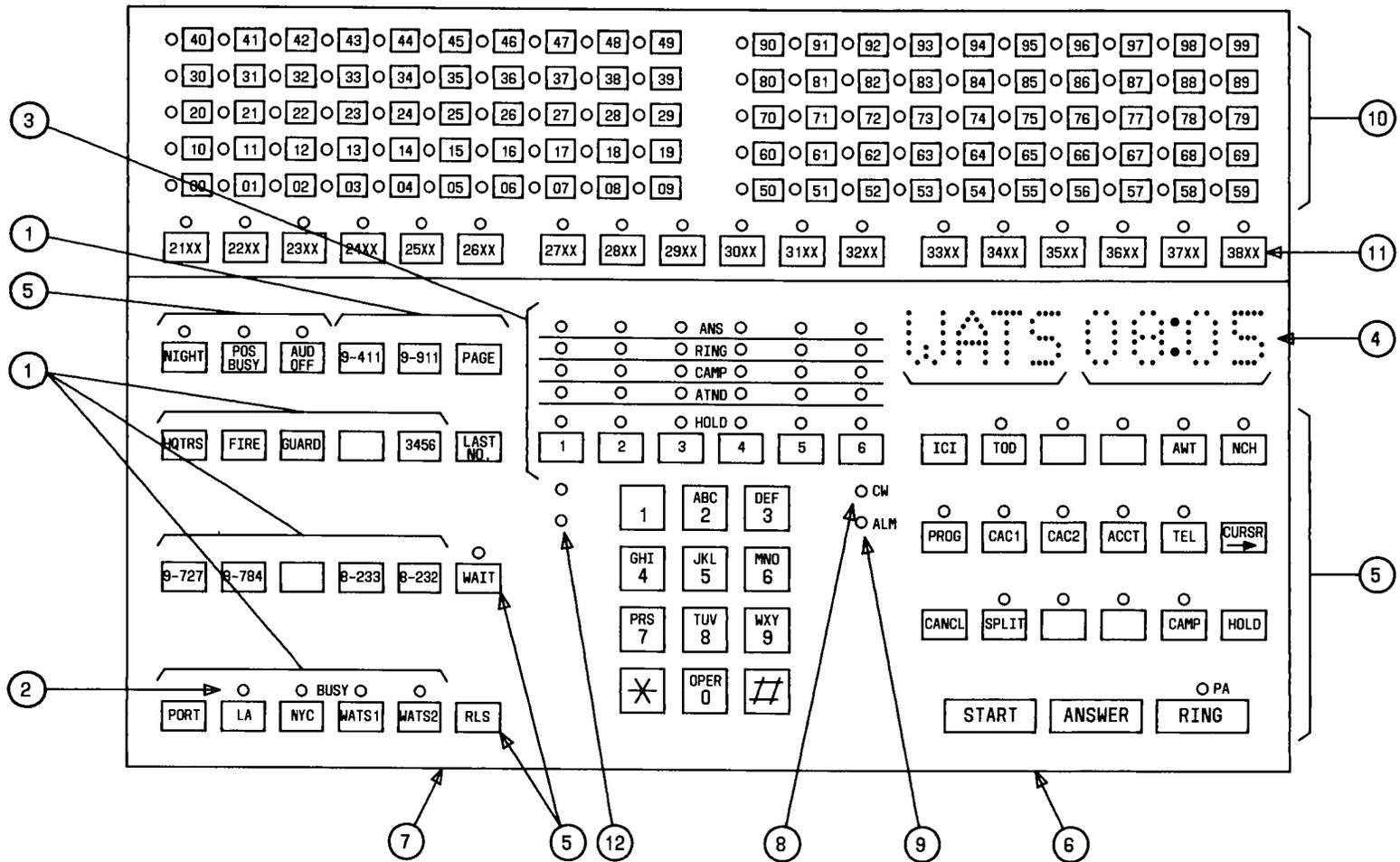


Fig. 2—Electronic Console



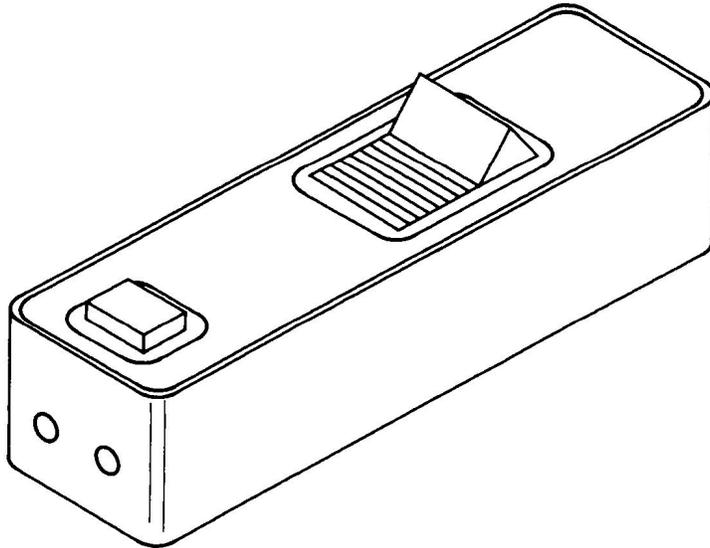
**LEGEND:**

- |  |                           |  |              |
|--|---------------------------|--|--------------|
| <ul style="list-style-type: none"> <li>1. REPERTORY DIALER (TRUNK GROUP ACCESS, FREQUENTLY CALLED NO.)</li> <li>2. TRUNK GROUP BUSY LAMPS</li> <li>3. ATTENDANT LOOP BUTTONS AND LAMPS</li> <li>4. ALPHANUMERIC ICI DISPLAY</li> <li>5. FEATURE AND CALL CONTROL BUTTONS AND LAMPS</li> <li>6. LAMPS AND AUDIBLE SIGNAL TEST SWITCH</li> <li>7. AUDIBLE SIGNAL VOLUME CONTROL</li> </ul> | } BEHIND SWING-DOWN PANEL | <ul style="list-style-type: none"> <li>8. CALLS WAITING LAMP</li> <li>9. ALARM LAMP</li> <li>10. DSS BUTTONS AND BLF (OPTIONAL)</li> <li>11. HUNDREDS GROUP SELECT BUTTONS AND LAMPS (CONSECUTIVE GROUPS ONLY)</li> <li>12. CUSTOMER-DESIGNATED LAMPS (2)</li> </ul> | } (OPTIONAL) |
|--|---------------------------|--|--------------|

**Fig. 3—Electronic Customer Dialed Account Recording (CDAR) Console Controls and Indicators**



**Fig. 4—Multibutton Electronic Telephone (MET) Set**



**Fig. 5—Headset Adapter**

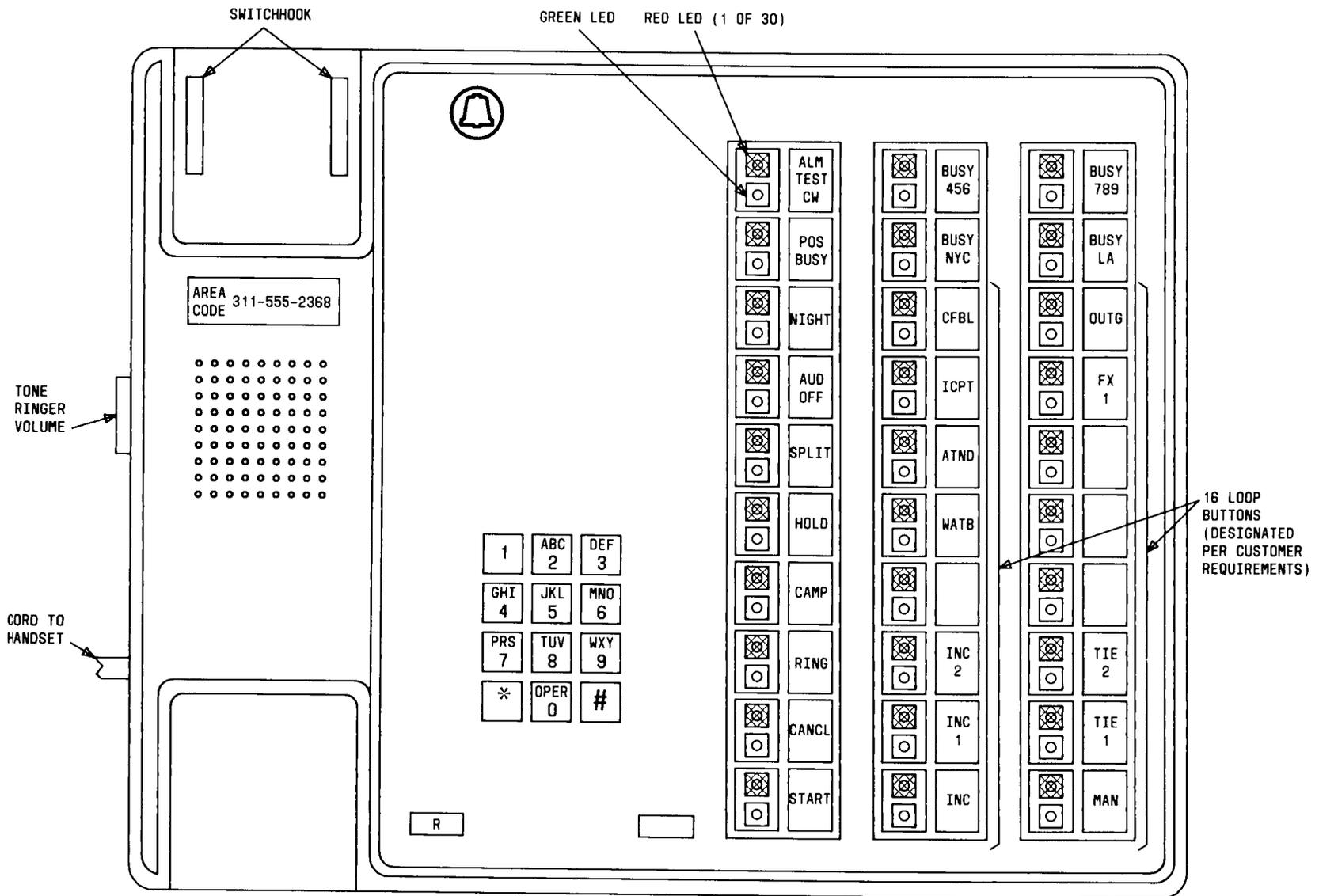


Fig. 6—Multibutton Electronic Telephone (MET) Set—Controls and Indicators

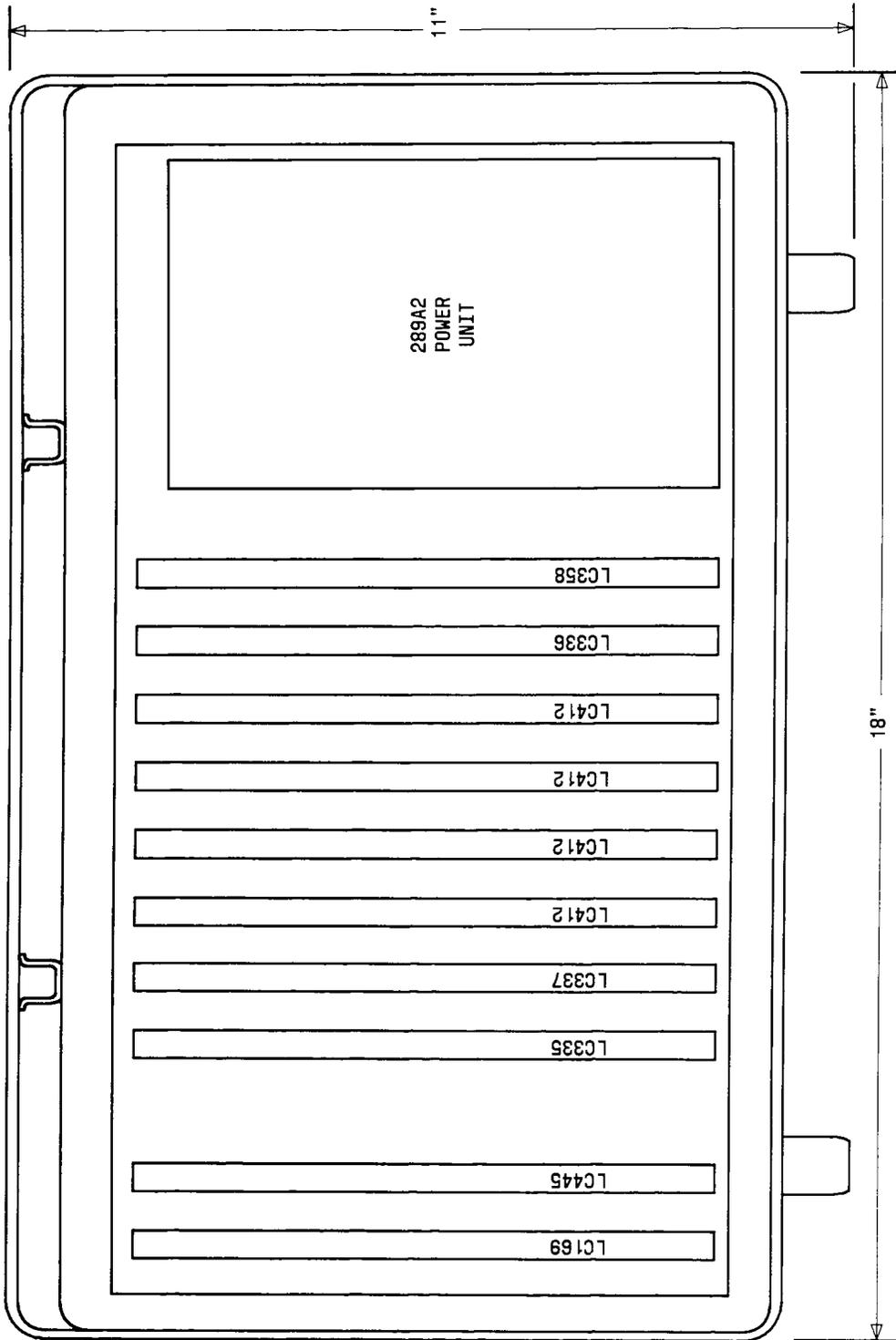


Fig. 7—Control Unit (Cover Removed)

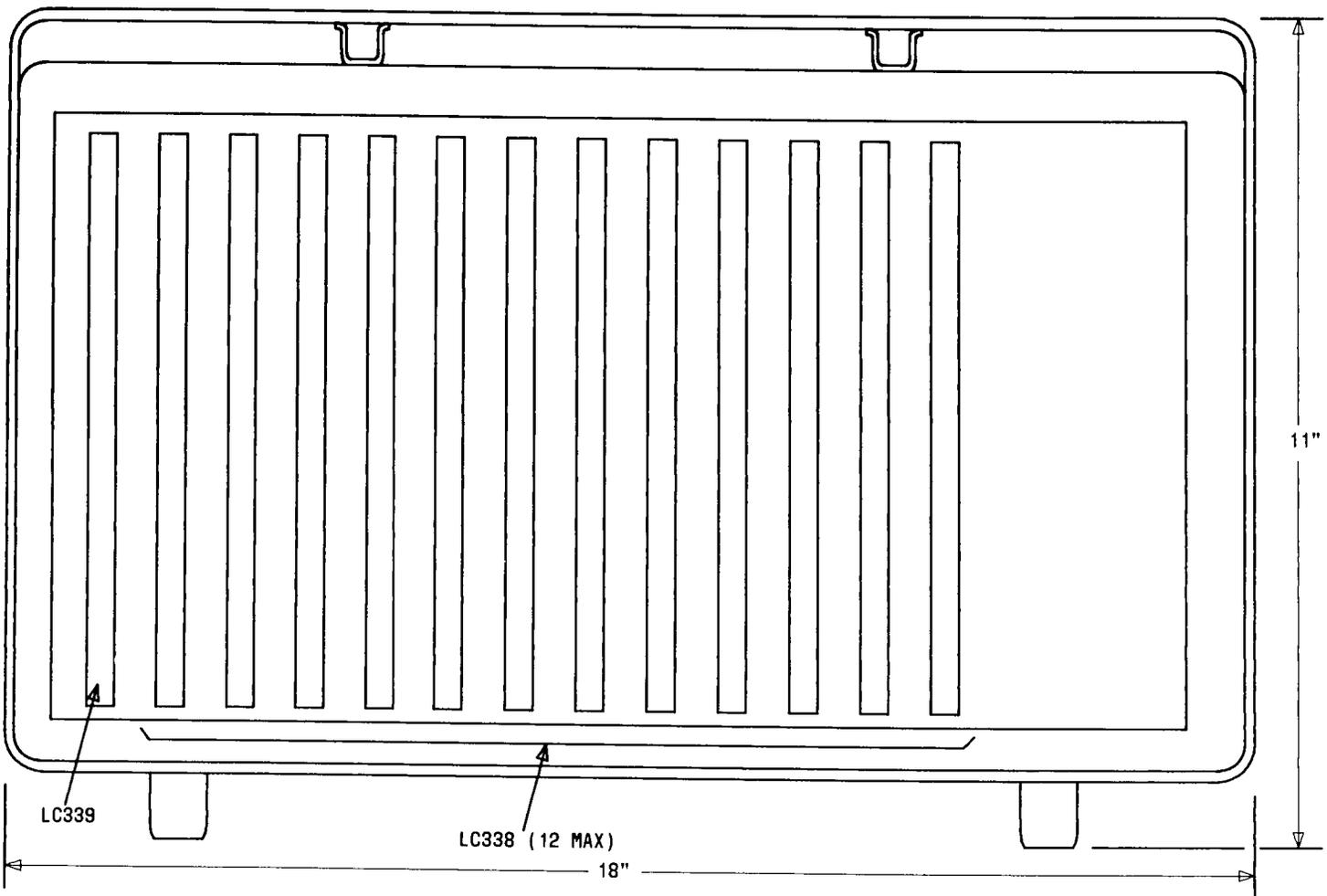


Fig. 8—Scanner Unit (Cover Removed)

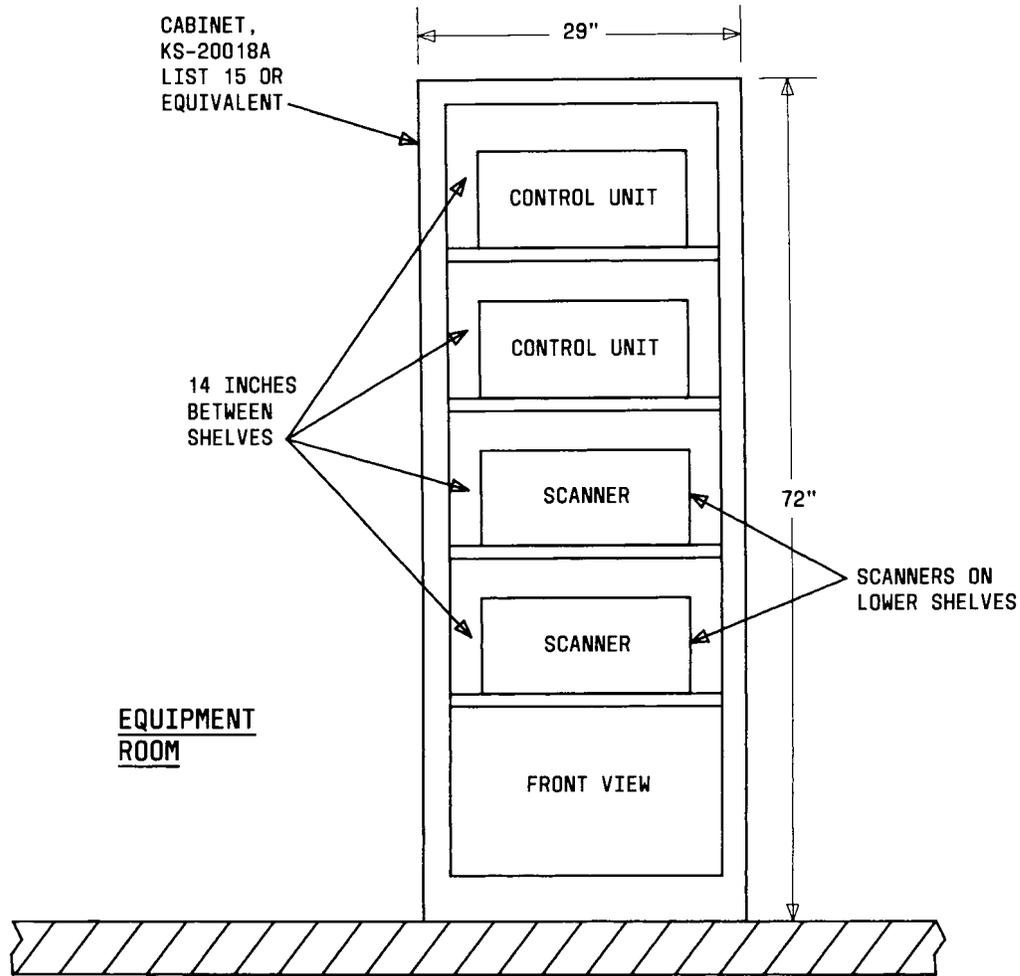


Fig. 9—Optional Vertical Stacking of Units for Multiple Unit Systems

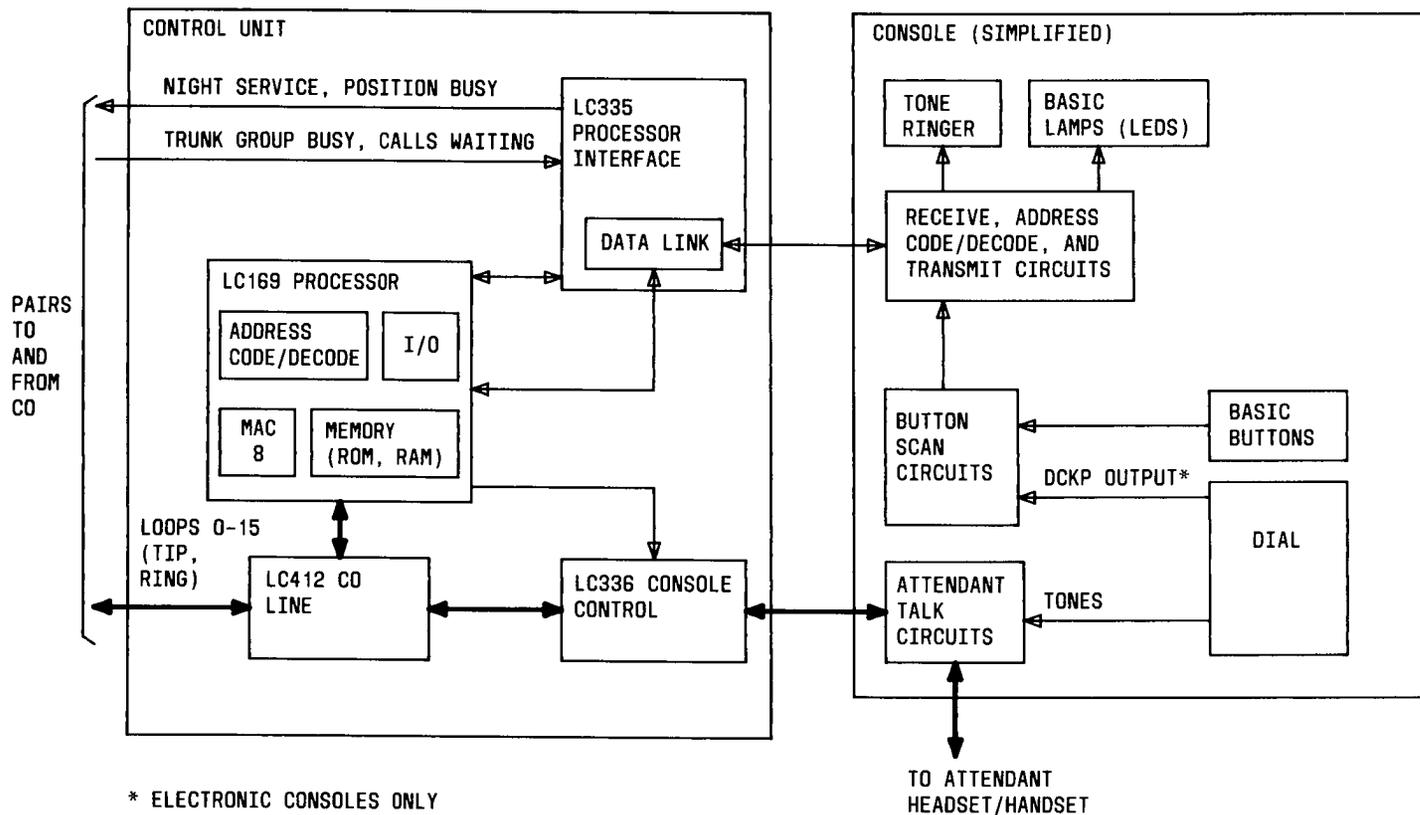


Fig. 10—Interface Between System and Basic Console Circuits (Generalized for Electronic Console and MET Set)

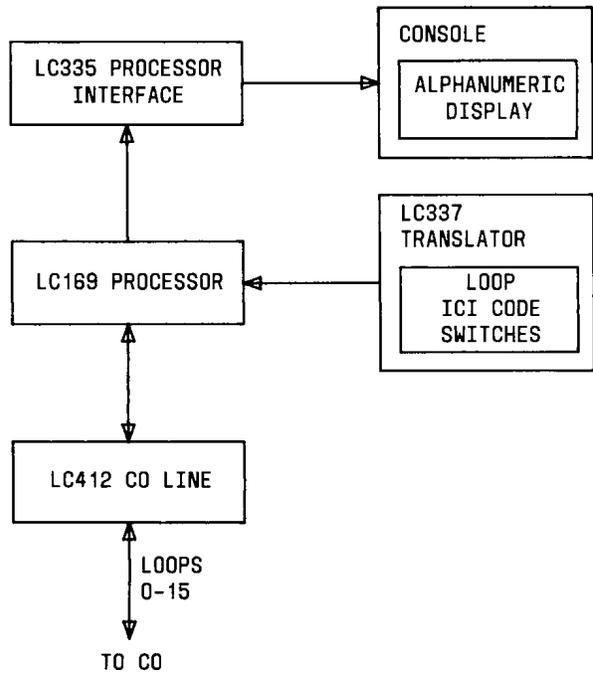


Fig. 11—Incoming Call Identification (ICI) Circuits

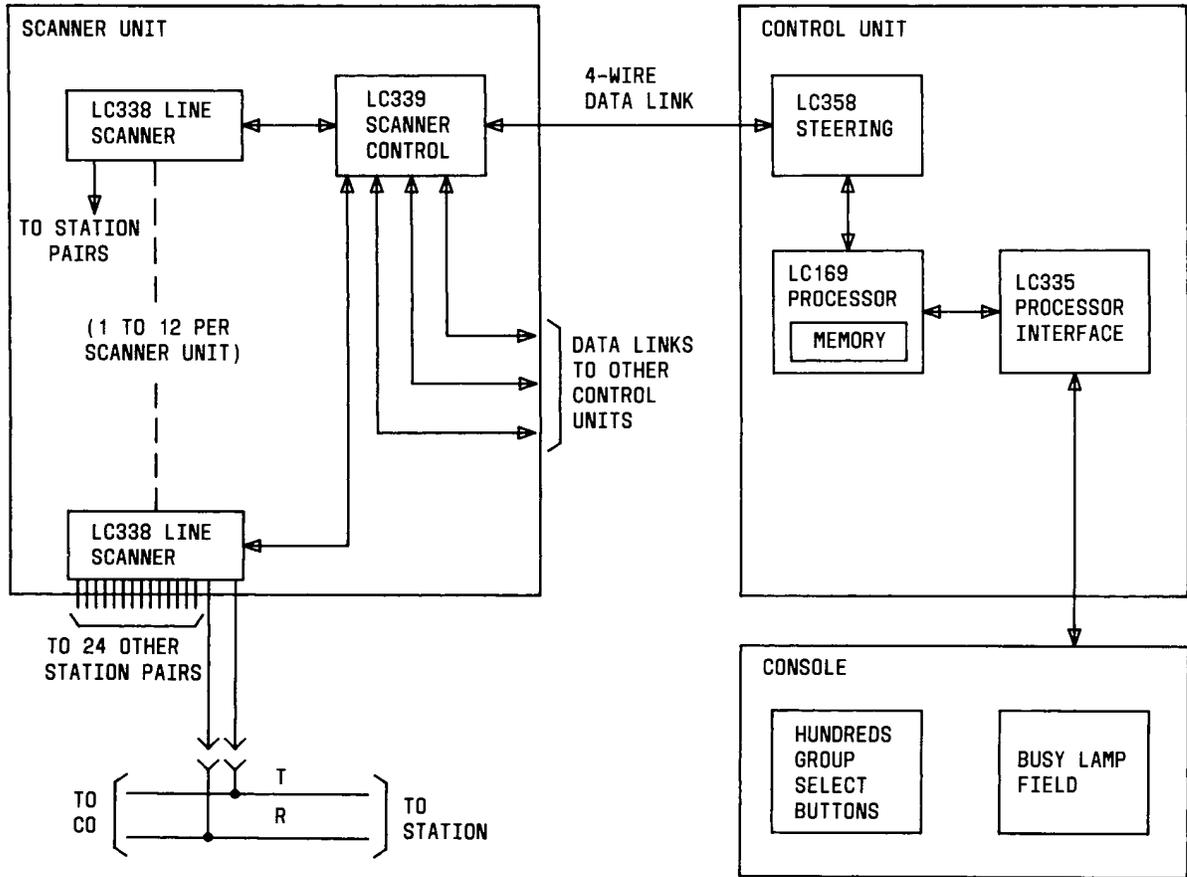


Fig. 12—Busy Lamp Field (BLF) Circuits

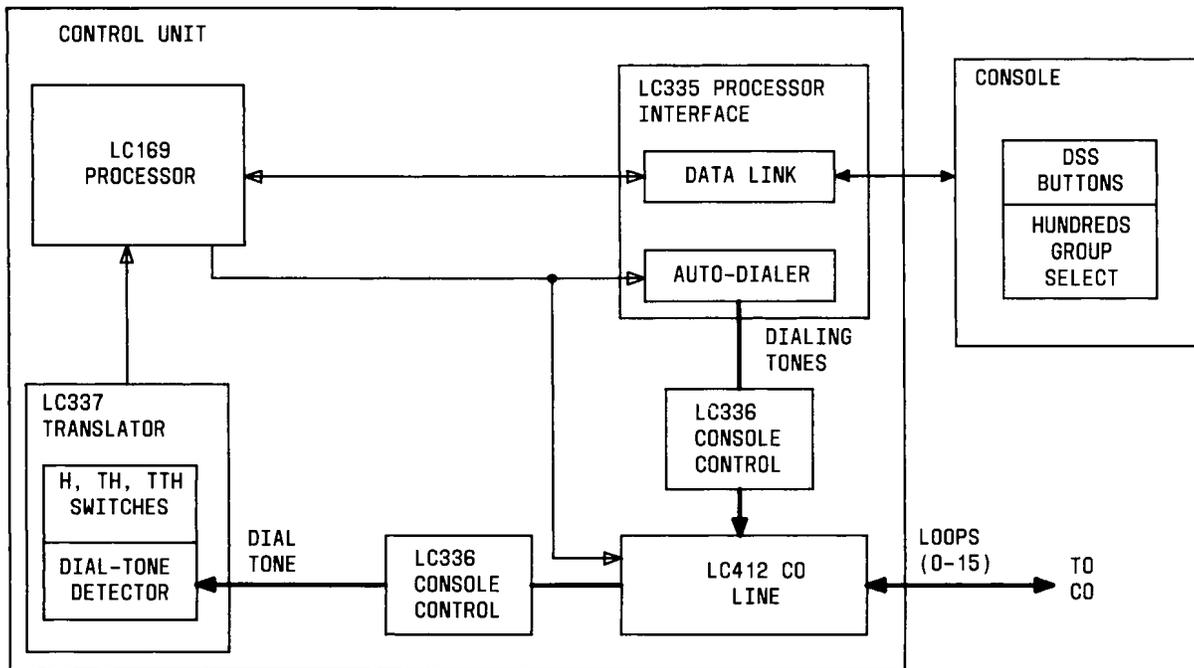


Fig. 13—Direct Station Selection (DSS) Circuits

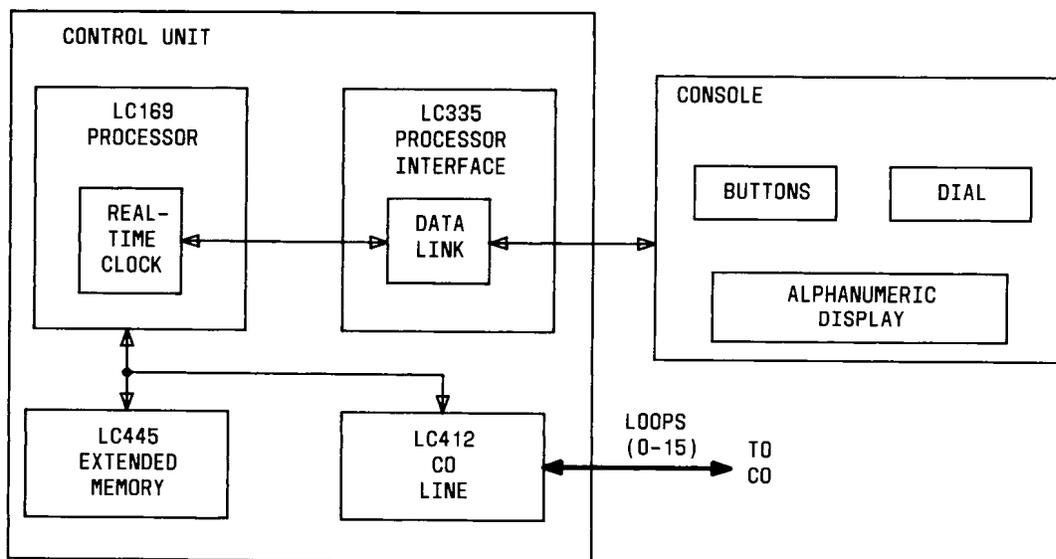


Fig. 14—Time and Traffic Data Display Circuits

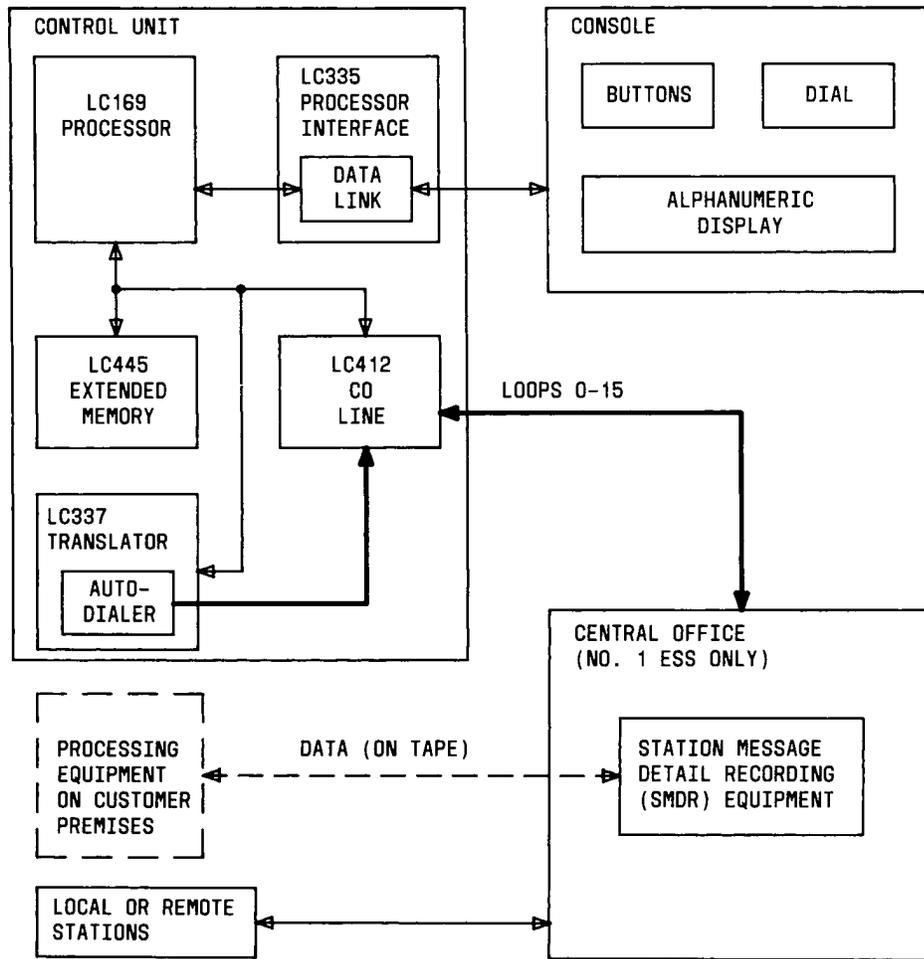


Fig. 15—Customer Dialed Account Recording (CDAR)

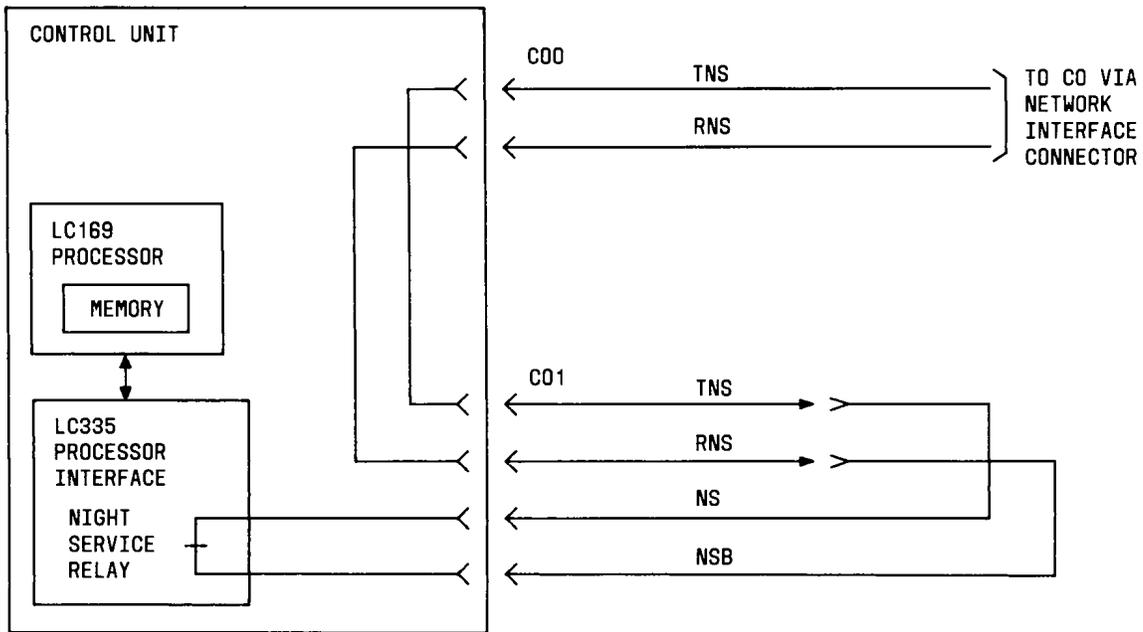


Fig. 16—Fixed Night Service Option (Master Console Only)

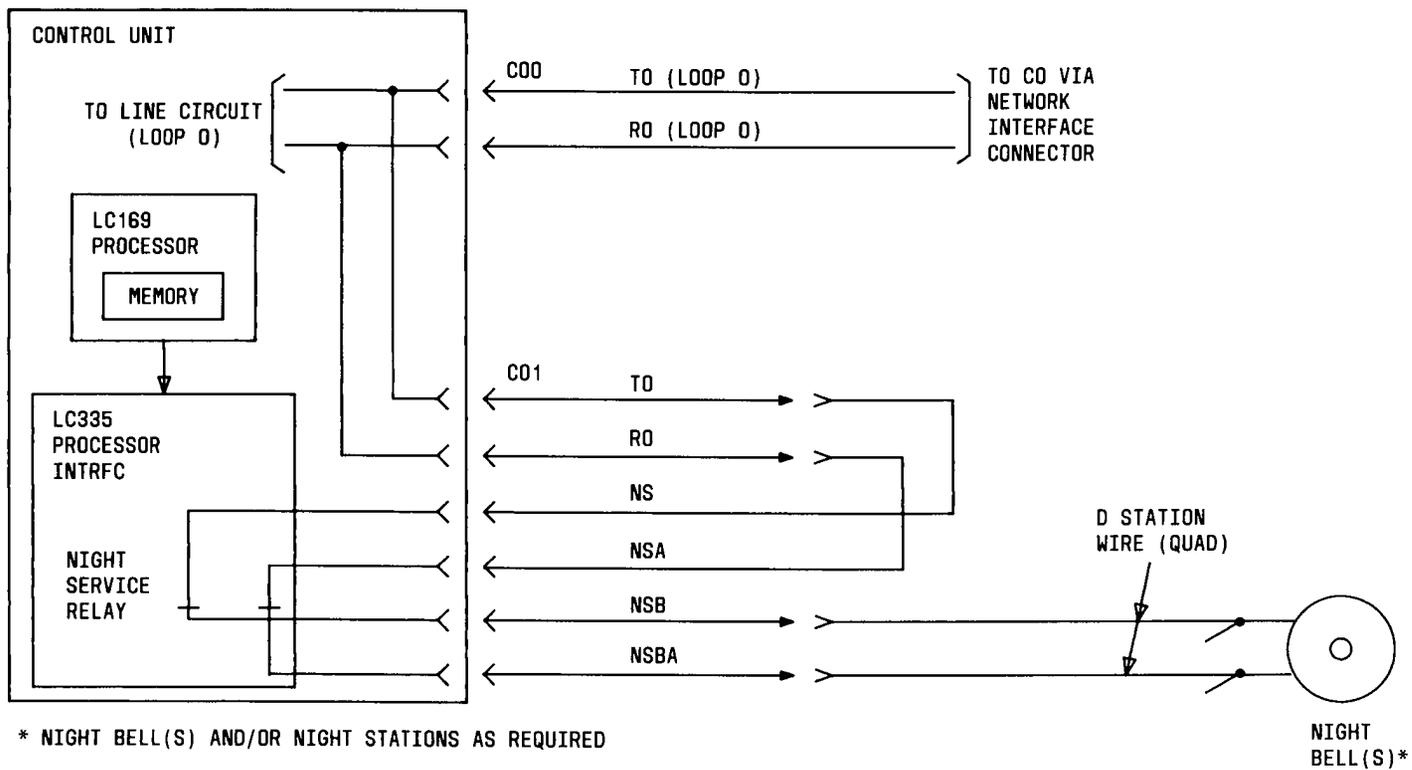


Fig. 17—Trunk Answer From Any Station (TAAS) Night Service Option (Master Console Only)

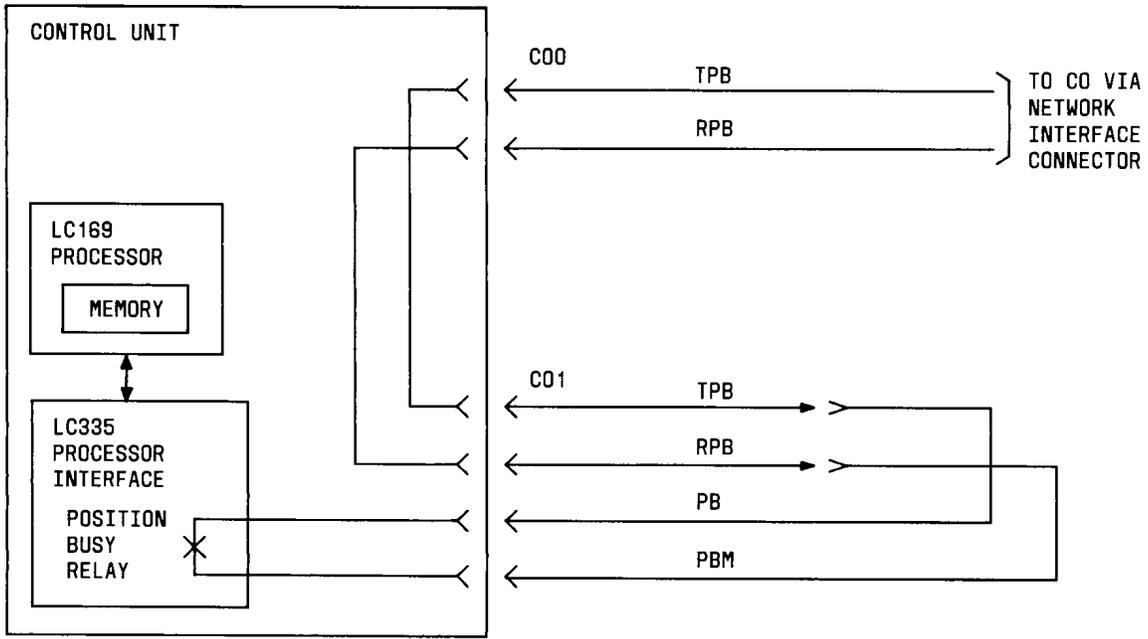


Fig. 18—Position Busy Option

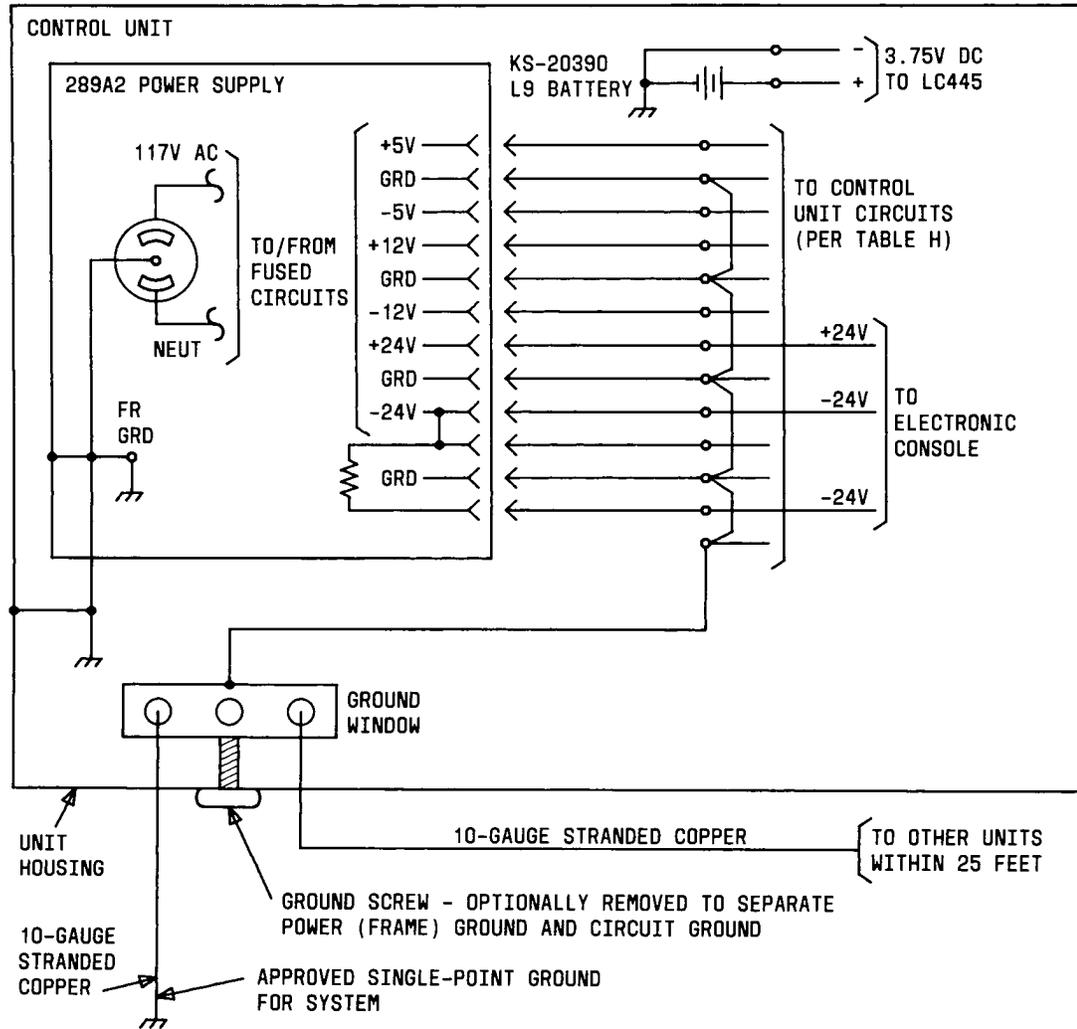


Fig. 19—Control Unit Power and Grounds

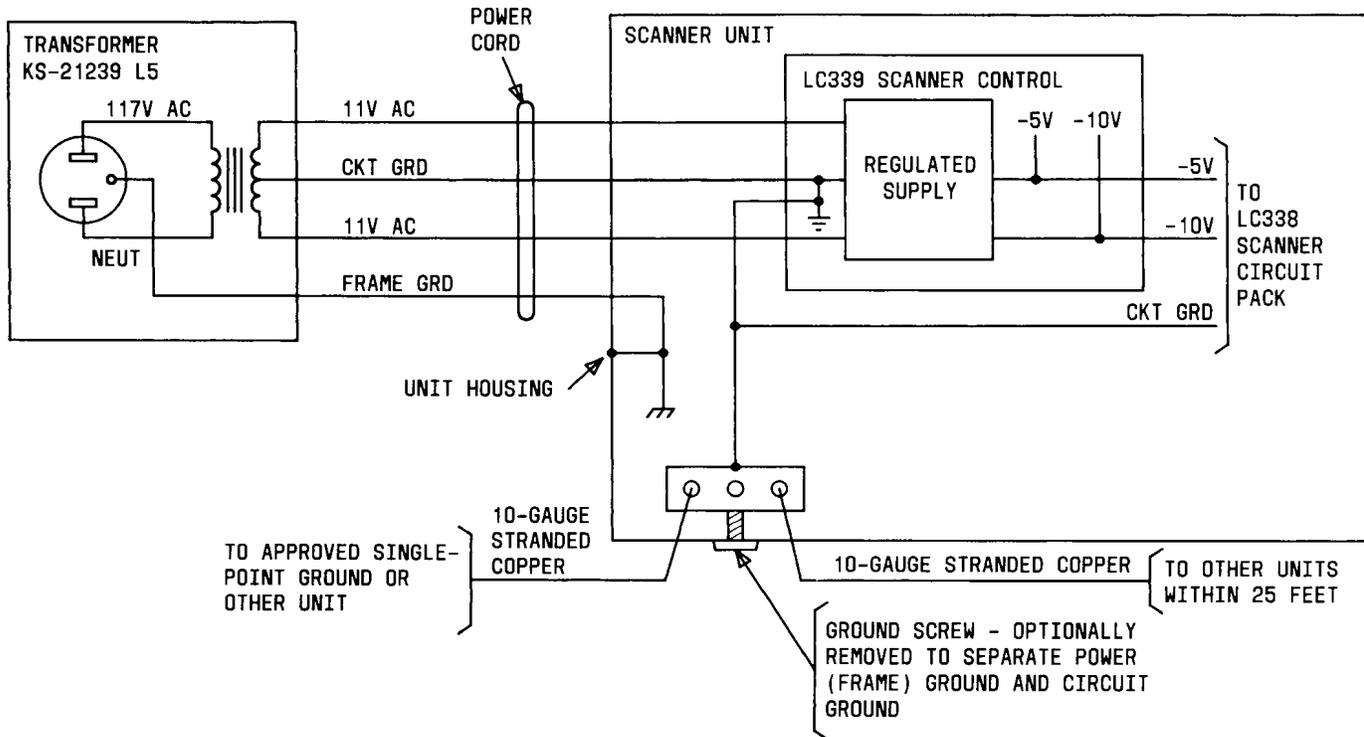


Fig. 20—Scanner Unit Power and Grounds

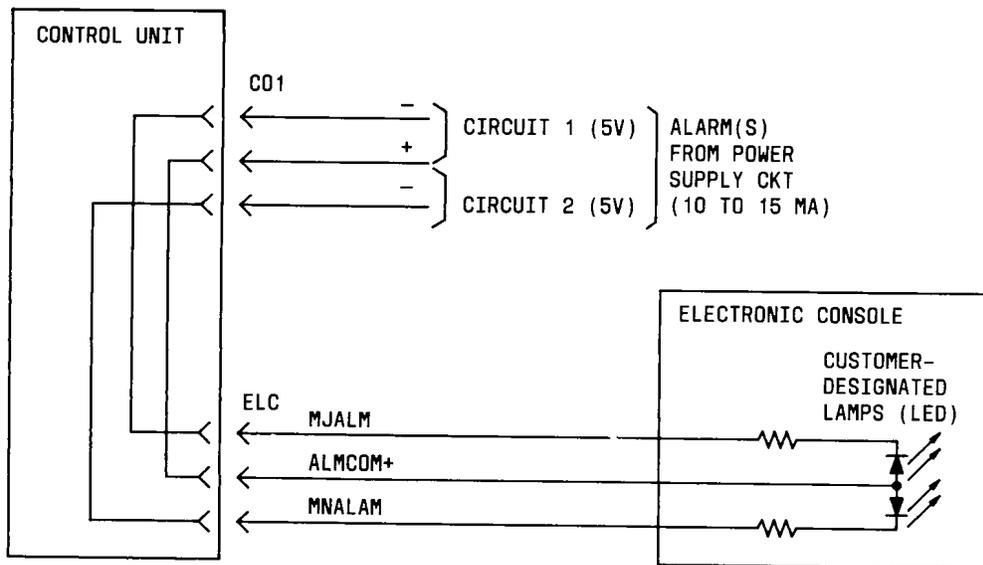


Fig. 21—Alarm From External Power Supply

TABLE A  
CONSOLE CONTROLS AND INDICATORS

MET SET BUTTON OR LED	ELECTRONIC CONSOLE BUTTON/LED	DESCRIPTION OF BUTTON, LAMP (LED), AND/OR SYSTEM FUNCTION
—	ACCT	Account Number — A button which causes the account number (dialed and stored while setting up a CDAR call) to be displayed. If the account number exceeds eight digits, the remaining digits are displayed by a second depression of the button. If depressed after PROG, the length of the account number can be preprogrammed using the sequence: PROG, ACCT, two dialed digits (01 through 14), PROG. Dialed digits are displayed.
ALM	ALM	Alarm — A green LED (MET) or red LED (electronic) which winks to indicate a system fault condition.
—	Alphanumeric Display	An array of LEDs which display eight characters on electronic or CDAR electronic consoles. Displays include ICI, TOD, traffic statistics, CDAR access codes, account numbers, and telephone numbers described elsewhere in this table.
—	ANSWER	A large button used on new calls only to connect the attendant to an unanswered call on the loop. Button cannot be used to reenter an established or held call. Loop LEDs respond per Table B.
AUD OFF [green] *	AUD OFF	Audible Signal Off — A button which disables and enables the console tone ringer. A red LED indicates the disabled state. †
Audible Signal Volume	AUDIBLE SIGNAL VOLUME	A small knob which controls console tone ringer volume (at the side of the MET set or front of the electronic console behind the swing-down panel).
—	AWT	Average Attendant Work Time — A button which causes display of the average time required to service a call. Work time is incremented whenever the attendant is connected to a loop. Total work time, since NCH was last zeroed, is divided by the number of calls handled. Time for progress reports is included.
BUSY (xxxx) [yellow] *	BUSY (xxxx)	Trunk Group Busy — One to four red LEDs at the left side of the electronic console which are lighted when all trunks in the designated customer trunk group are busy. The location is at the top of the MET sets. Designation (xxxx) may be trunk access digits, trunk far-end location, etc.
—	Busy Lamp Field	A Busy Lamp Field (BLF) of 100 LEDs indicates which stations are busy. One hundreds group (of 18) is displayed. (See Hundreds Group Select also.) The last two digits of the station extension number are engraved on the DSS button to the right of each LED.

See footnotes at end of table.

TABLE A (Contd)

## CONSOLE CONTROLS AND INDICATORS

MET SET BUTTON OR LED	ELECTRONIC CONSOLE BUTTON/LED	DESCRIPTION OF BUTTON, LAMP (LED), AND/OR SYSTEM FUNCTION
—	CAC1 or CAC2	CDAR Access — A button used to enter the CDAR mode. The preprogrammed access code associated with the button selected is fetched from storage and displayed. A red LED indicates which button was depressed to cause the display. An example programming sequence is: PROG, CAC(x), (up to five dialed digits displayed), PROG. The button can be depressed at any time for display and possible editing of the access code. See CURSR.
CAMP [yellow]*	CAMP	A button which releases the attendant from the active loop. The calling party is left “camped on” the busy called party line. Tone heard by attendant depends on CO options. The called party is alerted by a single call-waiting tone. The call is completed when the called party flashes or hangs up. Loop LEDs respond per Table B.† On MET set only, CAMP LED will flash in 30 seconds as a timed reminder; then CAMP button is depressed to pick up call.
CANCL [green]*	CANCL	Cancel — A button which releases the called station or trunk from the active loop. Used when wrong number, busy tone, or no answer is encountered by attendant. Attendant is reconnected to calling party. In console program mode, it cancels previous programming of button or clears error or zeroes traffic data.†
—	CURSR	CDAR Cursor Control — A button which controls the editing process for any CDAR numbers displayed. The button is depressed once to cause the first digit to blink, twice to cause the second digit to blink, etc. Any blinking digit can be changed by dialing the desired digit. Cursor position is reset to the left on display of a new number.
—	Customer- Designated Lamps	Two undesigned LEDs (left of dial) can be wired to an external customer or telephone company circuit such as a reserve supply power alarm.
CW	CW	Calls Waiting — A lighted LED indicates calls waiting in queue. Calls are queued at CO or locally on loops. A winking CW LED indicates more than three calls are waiting.
Dial	Dial	A 12-button dial providing TOUCH-TONE® dialing. Electronic consoles provide digital outputs for programming.

See footnotes at end of table.

TABLE A (Contd)

## CONSOLE CONTROLS AND INDICATORS

MET SET BUTTON OR LED	ELECTRONIC CONSOLE BUTTON/LED	DESCRIPTION OF BUTTON, LAMP (LED), AND/OR SYSTEM FUNCTION
—	Direct Station Selection (DSS)	The DSS buttons cause a station extension number to be auto-dialed. (START is not required.) The first two digits are determined by the hundreds group selected, and the last two extension digits are engraved on the DSS buttons (00 through 99).
Headset On-Off Hook	—	A rocker-type switch on the headset adapter connected to the MET set. Depressed at the top to put the headset in service (off-hook) or at the bottom to put the headset out of service (on-hook). The handset can be used only when the headset is on-hook.
HOLD [red] *	HOLD	A button which releases the attendant from the active loop and puts the loop in the local (permanent) hold state. The call is held on the console until all parties disconnect or the attendant operates the loop button. Call can progress from ring or camp-on states to the talk (answered) state during hold, but call is still held on console. Loop LEDs respond per Table B.
—	Hundreds Group Select	Buttons under the BLF and DSS fields which select 1 of 18 hundreds groups of stations. A lighted red LED indicates the group selected (with status displayed on the BLF). Buttons are designated (or reserved for growth) for any 2 to 18 “consecutive hundreds groups” with none skipped.
—	Incoming Call Identi- fication (ICI) on Alphanumeric Display	An array of LEDs which display four characters identifying the type of call. Each of up to 16 loops may be programmed for 1 of 31 ICI indications to be associated with a call on the loop. Each console is limited to 16 unique ICI displays (Table C). See TOD also.
ICI by Loop	—	Loops of the MET set are assigned to particular types of calls, permitting call identification by loop button designation. See loop buttons.
—	LAST NO.	Last Number Dialed — A button which causes the last number “manually dialed” on an active loop to be repeated. Dialed numbers are automatically stored for each loop and overwritten when a new number is dialed on the same loop. Access, account, and telephone numbers are repeated if the last call on the loop was made via CDAR features on the console. Attendant-originated call numbers are stored in a special register not associated with one loop.

See footnotes at end of table.

TABLE A (Contd)

## CONSOLE CONTROLS AND INDICATORS

MET SET BUTTON OR LED	ELECTRONIC CONSOLE BUTTON/LED	DESCRIPTION OF BUTTON, LAMP (LED), AND/OR SYSTEM FUNCTION
Loop Buttons and LEDs	—	A button per loop designated per ICI (Table C) and associated with particular types of incoming calls. The buttons connect the attendant to a loop. Since only one loop can be active (serviced by attendant) at one time, depressing a second loop button will connect the attendant to the second loop and release the first. This shortcut should not be used if a called station is ringing or camped on. Limit is 16 loops. Loop LEDs respond per Table B.
—	Loop Buttons 1 Through 6 and LEDs	Six buttons, any of which can connect the attendant to any loop (16 maximum). Loop buttons are interlocked as for MET loops above. Loop LEDs respond per Table B. Only six loops can have the call state displayed at one time, and only one loop can be active. See ICI also.
—	NCH	Number of Calls Handled — A button which causes the number of attendant-answered calls to be displayed on the alphanumeric display. A red LED is lighted when NCH is displayed. NCH is zeroed by depressing a sequence of buttons: PROG, NCH, CANCL, and PROG. When NCH is zeroed, the accumulated work time is also zeroed.
NIGHT [green] *	NIGHT	Night Service — A button which enables or disables fixed night service or enables the bell provided with TAAS night service. A red LED is lighted when night service is enabled. After enabling night service, the headset must be unjacked (electronic) or the console cord disconnected (MET). <i>Note:</i> Only one console can control night service. Power failure also activates night service, but all console LEDs are off. †
—	PA	Position Available — A red LED which indicates no incoming call is waiting and the attendant is not active on a loop.
POS BUSY [green] *	POS BUSY	Position Busy — A button which signals the CO to stop incoming calls. A second depression of the button enables incoming calls. A red LED indicates the busy (disabled) state. † (Used only if two or more consoles are provided. Also activated by power failure.)
—	PROG	Program — A button which enables and disables the button programming mode. A red LED is lighted when programming is enabled. See Repertory Dialer.

See footnotes at end of table.

TABLE A (Contd)

## CONSOLE CONTROLS AND INDICATORS

MET SET BUTTON OR LED	ELECTRONIC CONSOLE BUTTON/LED	DESCRIPTION OF BUTTON, LAMP (LED), AND/OR SYSTEM FUNCTION
-	Repertory Dialer Buttons	Any buttons on left side of console with no fixed function can be programmed to auto-dial codes for trunk group access or frequently dialed numbers (local or long distance). Auto-dialing of less than 3 or more than 15 consecutive digits is not recommended. More than 15 digits are allowed if separated by a wait for dial tone. Up to 30 digits can be programmed with wait periods counted as digits. See WAIT if additional dial tone is required. Example programming for two buttons: PROG, (button x), 9, WAIT, 555-2368 (button y), 8, WAIT, 233, PROG. Auto-dialed tones are heard by the attendant (muted). Spare buttons on the right side can be similarly programmed for special features.
R	RLS	Release — A button used to unconditionally release the call and attendant from the active loop with no temporary (soft) hold. Station call states (after ringing state) are not changed. The attendant cannot reenter a call after unconditional release. Also used for forced release to clear trouble condition on loop. †
RING [yellow]*	RING	A button which releases the attendant from the active loop, while the called station is ringing. The call is held on the console (soft-hold) until the called party answers. Loop LEDs respond per Table B. On MET set only, RING LED will flash in 30 seconds as a timed reminder; then RING button is depressed to pick up the call.
SPLIT	SPLIT	A button which causes the calling party to be kept split away after the called party answers (in addition to automatic splitting after START below). SPLIT must be operated before dialing the called party. A second operation of SPLIT causes unsplit (3-way) connection. A red LED is lighted in the split state.
START [green] *	START	A button depressed to get dial tone before manual dialing to extend a call. A calling party is automatically split away until the ring state is established or until the attendant releases from the loop. See SPLIT button. Also used to output stored digits (in tone format) to CO at the beginning of each CDAR call.
—	TEL	Telephone Number — A button which causes the telephone number (stored while setting up a CDAR call) to be displayed for verification or editing. See CURSR. If the number exceeds eight digits, another depression of the button causes the display of the remaining digits.

See footnotes at end of table.

TABLE A (Contd)

## CONSOLE CONTROLS AND INDICATORS

MET SET BUTTON OR LED	ELECTRONIC CONSOLE BUTTON/LED	DESCRIPTION OF BUTTON, LAMP (LED), AND/OR SYSTEM FUNCTION
TEST	TEST	A button (MET) or toggle switch (electronic) which causes all console LEDs to be lighted and tone ringer to sound. The alphanumeric display normally shows LAMP TEST but can also indicate a trouble number if loop trouble is detected.
—	Time-of-Day Display (in hours and minutes)	Four digits showing 12-hour time are displayed at all times when CDAR data is not displayed. TOD is also displayed on demand. (See TOD button.)
—	TOD	Time of Day — A button which causes the time to be displayed for 3 seconds. The time can be reset; for example, the sequence for 10:15 AM/PM is: PROG, TOD, 1015, PROG.
—	Trunk Group Access Buttons	Any of the Repertory Dialer buttons at the left side can be used, preferably starting with the bottom row. Programmed code may include area code and any other numbers required to access trunk groups or exchanges. See WAIT below.
—	WAIT	A button which causes a programmed pause for detection of dial tone before the programmed dialing sequence is resumed. Several dial tones may be detected in a dialing sequence. Typically used to wait for "outside dial tone" after "9" is dialed. WAIT is used while programming the repertory dialer or account number. The WAIT lamp is lighted, while the repertory dialer is waiting for dial tone to be detected. If dial tone is not detected (WAIT LED stays on), depression of WAIT button will force resumption of auto-dialing.

\*["color"] indicates color of tab in button; all others are white.

†On the MET set only, the associated green LED is lighted while the specified button is depressed to confirm response of button, data link, processor, and LED.

TABLE B

## CONSOLE LOOP LIGHT EMITTING DIODE (LED) INDICATIONS

MET SET STATE	ELECTRONIC CSL STATE	STATUS OF CALL ON LOOP
Dark	Dark	No call — loop idle.
Flashing green (60 ipm)	ATND flashing (60 ipm)	Incoming call to attendant. LED flashes until attendant is connected to call or call is abandoned. (See ANSWER and loop buttons, Table A.)
Lighted green (steady)	ATND lighted (steady)	Attendant is active on loop, either serving a calling party or originating a call. Only one loop can be “active” at a time.
Winking green (120 ipm)	HOLD lighted (steady)	Call is on local (permanent) hold because HOLD button was operated. Attendant is released from loop. Hold state continues until attendant reenters call or all parties disconnect. Two parties can be held, but attendant cannot be recalled.
Fluttering green (300 ipm)	CAMP lighted (steady)	Call on loop is in soft (temporary) hold, while call is camped on a busy line. Attendant has released from loop using the CAMP button. Camp-on state continues until called party hangs up, flashes, calling party disconnects, or attendant reenters call.
	RING lighted (steady)	Called station is ringing, LED remains lighted until party answers, attendant releases loop, or call is abandoned. Attendant was released from loop using R or RELEASE button.
Lighted red (steady)	ANS lighted (steady)	Call has been held on console (because attendant remained on loop or depressed HOLD button) and called party (third party) has answered. LED will remain lighted until all parties disconnect or attendant releases loop. <i>Note:</i> Not lighted when 2-party (attendant originated) call is answered.
*	Flashing HOLD, CAMP, or RING (60 ipm)	Timed Reminder (Accompanied by single ring on tone ringer) — Call has been left in hold, camp on, or ring state for over 30 seconds. Timing is reset each time attendant reenters the call on loop. On MET sets the normal hold, camp-on, or ring status indication remains.

\*Timed reminders on the MET set consist of flashing green CAMP or RING LED and single-ring tone. No timed reminder on hold state. Multiple timed reminders are queued.

TABLE C

## INCOMING CALL IDENTIFICATION (ICI)

CATEGORY OF CALL ON ATTENDANT LOOP	ICI CHARACTERS
Station dialing attendant	ATND
Manual line	MAN
Corporate network (via common control switching arrangement)	CNET
Restricted station dialing 9	OUTG
Attendant recall	RCL
Intercepted call	ICPT
Interposition call	ATAT
Call forwarding — don't answer	CFDA
Call forwarding — busy line	CFBL
Foreign exchange trunk group(s)	FX1 through FX5
Tie-trunk group(s)	TIE1 through TIE8
800 service (INWATS)	WATA through WATE
Listed directory number (LDN)	INC1 through INC4

TABLE D

## DIRECT STATION SELECTION (DSS) OPTION SWITCH SETTINGS

TTH SWITCH		TH SWITCH		H SWITCH	
SWITCH (BINARY) CODE	DIGIT DIALED	SWITCH (BINARY) CODE	DIGIT DIALED	SWITCH (BINARY) CODE	DIGIT DIALED
0000	None	0000	None	0000	None
0001	1	0001	1	0001	1
0010	2	0010	2	0010	2
0011	3	0011	3	0011	3
0100	4	0100	4	0100	4
0101	5	0101	5	0101	5
0110	6	0110	6	0110	6
0111	7	0111	7	0111	7
1000	8	1000	8	1000	8
1001	9	1001	9	1001	9
1010	0	1010	0	1010	0
1011 through 1110	Not Legal	1011 through 1110	Not Legal	1011 through 1110	Not Legal
1111	No DSS	1111	No DSS	1111	No DSS

TABLE E

SYSTEM POWER REQUIREMENTS (NOTE)

UNIT	AC CURRENT	VOLTAGE AND FREQUENCY
Control unit	1.3A	117V ac, +10% -15% 60Hz, ±5%
Scanner	0.1A	
Electronic console	—	+24V and -24V dc from control unit
MET set	—	+24V and -24V dc from control unit

*Note:* Per system unit.

TABLE F

CONTROL UNIT POWER DISTRIBUTION

CIRCUIT PACK	DC VOLTAGE					
	+24	+12	+5	-5	-12	-24
LC169		✓	✓		✓	
LC335	✓*	✓	✓	✓	✓	✓*
LC336	✓		✓	✓		✓
LC337			✓			
LC358			✓			✓
LC412	✓		✓	✓		
LC445		✓	✓			

\*Also +24, -24V to MET set, phantomed via data link connections on circuit pack.

TABLE G

## CONTROL UNIT ALARM, FAULT, AND NORMAL SYSTEM INDICATIONS

CIRCUIT PACK	LED (NOTE)	COLOR		CONDITION INDICATED
LC335 PROCESSOR INTRFC	DS1	Green	+24V	Voltage present when lighted
	DS2	Green	+12V	
	DS3	Green	+5V	
	DS4	Green	-5V	
	DS5	Green	-12V	
	DS6	Green	-24V	
LC358 STEERING	DS1	Red	-24V	Fuse alarm for data link to scanners (systems with BLF/DSS only)
	DS2	Red	+5V	
LC169 PROCR	DS1	Green	Spare	Electronic console only
	DS2	Red	Power failure (See LC335 above)*	
	DS3	Red	Electronic console (or data link) failure	
	DS4	Green	Heartbeat (Normal = 500 ms on, 500 ms off). Always off is fault.	
	DS5	Red	Scanner data link or scanner failure (See LC358 above.)	
	DS6	Red	Spare	
	DS7	Green	Spare	
	DS8	Red	CO LINE circuit pack trouble (See LC412 below.)*	
LC412 CO LINE	DS1	Red	Trouble — one of four circuits on circuit pack	
	DS2	Green	Busy — one of four circuits on circuit pack (False busy is trouble.)	

Note: LEDs not labeled but numbered from top (DS1) to bottom (DSX).

\*Console ALM lamp lighted if circuit condition permits.

TABLE H

## SCANNER UNIT BUSY AND FAULT INDICATIONS

LOCATION	GREEN LED (NOTE)	CONTROL UNIT DATA LINK NO.	BUSY OR NORMAL INDICATION	FAULT INDICATION
LC339 SCANNER CONTROL	DS0	0	For connected link:	For connected link:
	DS1	1	Blinks on for short time, every half-second (more often during high console usage)	Always on, abnormal blinking pattern, or always off
	DS2	2	For unconnected link:	For unconnected link:
	DS3	3	Always off	Any lighting of LED

*Note:* LEDs not labeled but numbered from top (DS0) to bottom (DS3).