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PBX SYSTEMS

51A CUSTOMER PREMISES SYSTEM

CENTREX ATTENDANT CONSOLE
LAMP CONTROL
CIRCUIT

TABLE OF CONTENTS

SECTION I - GENERAL DESCRIPTION

1. PURPOSE OF CIRCUIT

1.01 It is the purpose of the centrex attendant console lamp control circuit to:

(a) Store and control the states of all lamps on the associated 1B, 2B, 27A, or 47A type telephone console

(b) Generate the flashing rates for lamps on all associated consoles

(c) Respond to a 22-bit word from the centrex data receiver and transmitter circuit which contains information needed to change the states of lamps on one of the associated consoles

(d) Respond, upon completion of a successful cycle, with a reset pulse to the centrex data receiver and transmitter circuit

(e) Upon receipt of an interrogate signal from the centrex data receiver and transmitter circuit, return signals specifying the states of the position-busy lamps and night lamps on all associated consoles, and the state of the power (low battery and/or fuse alarm)

(f) Provide multipling of certain functions between several lamp control circuits where more than three 2B or 47A telephone consoles, or more than four 1B or 27A telephone consoles are serving a single customer.

2. GENERAL DESCRIPTION OF OPERATION

2.01 A lamp control circuit may be used to store and control the states of all lamps on one to four attendant telephone consoles. Associated with each of these consoles is a lamp-state memory (commonly referred to as a console control unit) consisting of fifteen 1-by-8 ferreed switches. Three of these switches are used to control 24 call indicator lamps with which a centrex customer may be equipped. The remaining 12 ferreed switches are used for control of all other lamps on the consoles.

2.02 The memory associated with control of call indicator lamps is divided functionally into four groups called call indicator groups. The remaining 11 ferreed switches are organized into eight variable length words called lamp groups. The lamp control circuit can, upon receipt of a word from the centrex data receiver and transmitter circuit, change the state of all ferreeds in the selected call indicator group and in the selected lamp group in any one of four lamp-state memories. Upon completion of this nominally 10-ms memory updating operation, the lamp control circuit will return a reset pulse indicating the completion of a successful cycle to the centrex data receiver and transmitter circuit.

2.03 During each updating cycle, part of the incoming word is translated to select one of the four associated consoles, one of eight lamp groups, and one of the four call indicator groups associated with that console. A 2-step sequence then occurs on that portion of memory to be updated. First, all ferreeds in the selected portion of the lamp-state memory and released; then, all ferreeds specified in the incoming code are operated.

2.04 Whenever the attendant headset is plugged into the console, all console lamps are connected to battery. A lamp is energized by means of a ferreed switch providing a metallic contact connecting the lamp either to ground or to one of the interrupter terminals for a flashing state.

2.05 Lamp-state memories associated with any customer with more than a single 1B console or any customer with 2B consoles must be provided with facilities for multipling the calls-waiting function and all trunk-busy lamp functions. In these cases, the multipled lamps are connected from the console through its lamp-state memory to a common multipling bus which is connected to every lamp-state memory associated with that customer and to every other lamp control circuit associated with that customer. Control of the leads on this bus is divided over four lamp-state memories in one lamp control circuit. A multipled lamp is energized on all consoles by a reed relay contact connecting the multipling bus lead to ground of to the appropriate terminal on the interrupter. The reed relay is energized by a ferreed contact in one of the associated lamp-state memories. This provides facilities to multiple the calls-waiting and trunk-busy functions on 32 universal attendant telephone consoles (8 cabinets). To extend the multiple beyond 32 consoles requires the installation of one lamp multipling circuit in console control position 1 of the first cabinet for each additional group of 32 consoles (8 cabinets).

2.06 The control of 2B consoles requires additional trunk group busy memory beyond that available in the normal lamp-state memory units. This is provided by a special trunk group busy memory which is always equipped in position 1 of the first lamp control circuit associated with a 2B console customer. The capacity of the first lamp control circuit associated with a 2B console customer is, therefore, limited to three consoles. Additional circuits associated with this customer, if required, can be equipped to control one to four 2-type universal consoles.

2.07 Sharing of a lamp control circuit by more than one customer may be possible under certain circumstances. The lamp-state memory associated with a single, 1B console customer may be equipped in any vacant memory unit position. A lamp control circuit may therefore be equipped to control up to four single 1B console customers or a multiple of a 2B console customer and several 1B console customers, providing that the total number of memory units (lamp-state and trunk-busy memory associated with the multiple-console customer and lamp-state memory associated with the single-console customers) does not exceed four. There is no provision for sharing of a lamp control circuit between two multiple or 2B console customers.

SECTION II - DETAILED DESCRIPTION

1. TRANSLATION AND TIMING CIRCUIT - FS 1

1.01 The translation and timing circuit consists of logic gates and reed relays necessary to buffer and translate the incoming word and to select a pulse path in the ferreed memory, a high-current pulser, and timing circuits necessary for the sequencing of a circuit cycle. A lamp control circuit cycle is started by a negative-going signal on the lamp signal present (LSP) lead connected to terminal 26 of circuit 103-30. In response to this signal, a negative pulse is generated on terminal 20 of circuit 103-30 and is used to set the SP flip-flop. The SP flip-flop, when set, energized the signal present (SPR) relay connected to terminal 2 of circuit 103-31. The make contact of relay SPR operates in approximately 1.5 ms and

applies ground to terminal 13 of circuits 107-20, 107-26, 107-29, 107-18, 107-19, and 105-14; and gating information from the centrex data receiver and transmitter circuit to the lamp control circuit on leads A0 through A21, B0 through B4, and B17 through B21.

1.02 Data leads A0 through A21 are connected in such a way that the signal on each of these leads is high when the corresponding bit stored in the centrex data receiver and transmitter circuit is 1. Data leads B0 through B4 and B17 through B21 are wired so that the signal on each of these leads is high when the corresponding bit stored in the centrex data receiver and transmitter circuit is 0.

1.03 Bits 21 and 20 are translated by logic circuits CNS0 through CNS3 into a 1-out-of-4 code used to select a memory unit. One of the four relays on circuit 107-22 terminals 4, 5, 9, and 7 is operated, grounding one of the four leads CNS0 through CNS3.

1.04 Bits 19, 18, and 17 are translated by circuits LG0 through LG7 into a 1-out-of-8 code used to select a lamp group. One of the eight relays on circuit 107-28 operates, applying +24 volts on one of the eight leads, LG0 through LG7.

1.05 Bits 0, 1, and 2 are translated into a 1-out-of-6 code by logic circuits CI1 through CI6. One of the six relays connected to terminals 0, 1, 2, 3, 4, and 5 of circuit 107-24 may be energized. It is possible that the code specified by bits 0, 1, and 2 will not result in the operation of any of these six relays. If any of bits 0, 1, and 2 is a 1, the corresponding lead (B0, B1, or B2) will go low and terminal 1 of logic circuit CI0 will go high. Terminal 0 of logic circuit CA will go low energizing the reed relay on circuit 107-24 connected to terminal 9. This applies +24 volts on the call indicator enable (CA) lead.

1.06 Bits 3 and 4 are translated by logic circuits CG0 through CG3 into a 1-out-of-4 code. One of the four reed relays on circuit 105-16 connected to terminal 4, 5, 9, or 7 will operate connecting the CA lead to one of the four leads CG0, CG1, CG2, and CG3.

1.07 The lamp-state code is specified by bits 5 through 16. If any of these bits is a 1, the corresponding lead (A5 through A16) will go high. Each of these leads is connected to a logic circuit designated LC0 through LC11 which energizes a relay on circuit 107-22 or 107-31 when the corresponding bit is 1. Each of these relays, when operated, connects a 10-UF capacitor (113-00 through 113-11) to its corresponding lead H0 through H11.

1.08 The PS0 lead is normally connected to ground through a 3.16-ohm resistor by the bank contact of the SPR relay. Each of the capacitors C0 through C17 is charged to 6.2 volts (negative polarity on the PS0 lead) by the precharge and release pulse matrix circuits 107-25 and 107-32. At the start of a circuit cycle, the back contact of the SPR relay is opened. The selection of a memory unit operates a CGS(0-3) and/or LGS(0-5) relay (or relays, in the case of lamp groups 6 and 7 with optional App Fig. 8), connects a ferreed winding between each of leads H0 through H17 and ground, putting -6.2 volts on the PS0 lead. A negative-going signal is applied on the CNS0, 1, 2, or 3 lead by the console select relays driving the delayed pulse generator circuit 103-30. With option K, pin 1 of the delayed pulse generator is tied to ground through a previously spare contact on circuit pack A36. This option ensures that the timing circuit input will be held solidly to ground, and not misfire due to noise from the CNS( ) contacts. The lead to pin 1 of 103-30 comes from pin 25 of 105-16. The relay on that pack is operated by the SPG lead, going low, thus controlling the delayed pulse generator in the same time frame as the CNS( ) leads.

1.09 A nominally 200-USEC positive pulse is generated at terminal 25 of circuit 103-30, delayed by 5 ms from the negative transition at terminal 1, 2, 3, 4, or 5, turning on transistor Q1. This connects capacitors C20, C21, and C22 to the PS0 lead, providing a source for the high-current ferreed release pulse to the selected memory unit. Capacitors C0 through C17 are charged to nominally 24 volts (positive polarity on the PS0 lead) through Diodes in the precharge and release pulse matrix circuits 107-25 and 107-32 or the operated reed relay contacts on circuits 107-22, 107-24, and 107-31. This generates a nominally 30-volt 200-USEC pulse on each of leads H0 through H17. At the completion of this pulse, transistor Q1 turns off.

1.10 A positive pulse of 100-USEC nominal width is generated at terminal 24 of delayed pulse generator circuit 103-30, 800 USEC after the positive pulse at terminal 25. This pulse appears on the gate lead of transistor Q2, turning it on. This connects the PS0 lead to ground, providing for an operate pulse in the selected memory unit on each of leads H0 through H17, which is connected to its corresponding capacitor C0 through C17 by a reed relay contact on one of circuits 107-22, 107-24, and 107-31. Each of the capacitors involved in an operate pulse is discharged in 250 USEC. The remaining capacitors are discharged through the precharge and release pulse matrix circuits and the PS0 lead, which is reconnected to ground through the back

contact of the SPR relay at the end of a circuit cycle. Once all of capacitors C0 through C17 have been discharged, they are precharged in the opposite direction (negative polarity on the PS0 lead) to 6.2 volts in preparation for a new circuit cycle.

1.11 During normal operation of the lamp control circuit, the voltage on capacitors C20, C21, and C22 remains above 18 volts and the PSR relay remains released. Should a fault occur turning Q1 and Q2 on simultaneously or turning Q1 on while the SPR back contact is closed, the voltage on capacitors C20, C21, and C22 will decrease to well below 12 volts. This is sufficient to operate the PSR relay, opening the back contact and breaking the SCR current. Capacitors C20, C21, and C22 will then recharge to +24 volts, and the PSR relay will release.

1.12 When the negative transition on the PS0 lead occurs, it is differentiated and the negative pulse appears on terminal 21 of circuit 103-30. This pulse is used to reset flip-flop SP and release the SPR relay. The release of the SPR relay is detected by the SPRLS gate, and the negative-going transition at its output terminal is differentiated at terminal 11 of circuit 103-30. The negative pulse generated at terminal 22 of 103-30 is applied to the RSINV gate, and the resulting positive pulse is applied to the DRES gate. When the signal on the TR lead is high (the data receiver and transmitter circuit is not transmitting), a negative-reset pulse is generated at terminal 27 of the DRES gate.

1.13 A negative-going signal from the centrex data receiver and transmitter circuit on the interrogate (INT) lead is used to interrogate the states of the ferreeds that control the night and position-busy lamps in the four memory units. The answers appear in the form of negative pulses from memory unit 0 on the NT0 and PB0 leads, from memory unit 1 on the NT1 and PB1 leads, from memory memory unit 2 on the NT2 and PB2 leads, and from memory unit 3 on the NT3 and PB3 leads. The interrogate answers are returned to the centrex data receiver and transmitter circuit on leads S0, S4, S5, S9, S10, S14, S15, and S19. The INT lead is also used to interrogate all fuses on the frame. If none are open, a negative pulse appears on lead S1.

1.14 The strapping needed to provide multipling of the calls-waiting and trunk-busy lamp functions is included in the translation and timing circuit. Control leads MC and M0 through M11, from memory unit 0, are used to control the calls-waiting and trunk-busy lamps 0 through 11 on all consoles associated with a multiple-console customer. Control leads M0 through M23 from memory unit 1 are used to control trunk-busy lamps 12 through 35 on all consoles associated with a multiple-console customer. Control leads M0 through M11 from memory unit 2 are used to control trunk-busy lamps 36 through 47 on all consoles associated with a multiple-console customer. Control leads M0 through M11 from memory unit 3 are used to control trunk-busy lamps 48 through 59 on all consoles associated with a multiple-console customer.

2. LAMP-STATE MEMORY - FS 2

2.01 A lamp control circuit may be equipped with one to four identical (except for certain options) lamp-state memories (or console control units). Each lamp-state memory controls the lamps on the console with which it is associated and may be equipped to control the calls-waiting lamp and a group of trunk group busy lamps on all consoles associated with the same customer.

2.02 A lamp-state memory is selected by a negative-going signal on lead CNS( ). This negative-going signal is transmitted to the translation and timing circuit where it starts the delayed pulse generator timing. Option K is used to provide a more dependable drive to the delayed pulse generator. The SPG lead provides ground to the CNS(0-3) gates, which operate relays in 107-22 to ground the CNS(0-3) leads. With this option, the SPG lead controls a relay at 105-16 pin 3 which grounds pin 1 of the delayed pulse generator, accomplishing the same goal, but more dependably due to possible noise on the CNS( ) contacts. The negative signal is also applied to one side of the windings of 14 relays, CGS0 through CGS3, and LGS0 through LGS7. The translation and timing circuit will connect one of leads LG0 through LG7 to +24 volts, and in addition, may connect one of four leads CG0 through CG3 to +24 volts. As a result, one of relays LGS0 through LGS5, LGS6 and LGS60, or LGS7 and LGS70 will be energized; and one of relays CGS0 through CGS3 may be energized. The operation of an LGS relay connects to ground one side of the winding of each ferreed crosspoint in the selected lamp group corresponding to one ferreed crosspoint in each of switches L0 through L8 and either three or no ferreed crosspoints in switch L9, 2 or none in switch L10, and 4 or none in switch L11. The operation of a CGS relay connects to ground one side of the winding of each of the six ferreed crosspoints in the selected call indicator group corresponding to two ferreed crosspoints in each of switches C0, C1, and C2.

2.03 When the pulser fires, a positive 1- to 3-ampere pulse appears on each of leads H0 through H17 through each of the selected ferreed crosspoint windings and its CGS or LGS relay contact to ground.

This pulse is in such a direction (from terminals 03, 13, 23, etc, to terminals 02, 12, 22, etc) as to release the selected ferreed crosspoint(s). Those ferreed crosspoints in the selected lamp and call indicator groups specified by the incoming lamp-state and call indicator code are then operated by a pulse in the opposite direction.

2.04 The state of the attendant headset jack is continuously monitored by leads HJ and HJG. Whenever the attendant headset is plugged into its jack, lead HJ is connected to ground energizing the four reed relays on circuit 113-12 connected to terminals 4, 5, 9, and 7. This supplies +24 volts on leads 24M, 24L, 24K, and 24J which supply battery to all lamps on the associated console. A lamp is energized through the console cable by three 120-ohm dropping resistors and a ferreed contact or a pair of ferreed contacts on the same ferreed switch, which connects either to ground (to light a lamp continuously) or connects through a diode on circuit 113-10, 113-09, or 113-07 to the appropriate terminal on the lamp interrupter circuit.

2.05 The CW and TB lamps are energized as described in 2.04 for single-console customers (lamp-state memories equipped with Z option). These lamps are connected through the console cable (leads CWL and TBL0 through TBL11) to dropping resistor circuit 113-22 and through the ferreed switches with which these lamps are controlled.

2.06 Lamp-state memories associated with multiple-console customers are equipped with the W option. Lamp-state memories associated with 2E console customers are equipped with both W and X options. These options provide connections through dropping resistor boards in equipment locations 113-24, 113-25, 113-26, 113-27, and 113-28 to the multipling bus in the translation and timing circuit.

2.07 All leads on the multipling bus are controlled in the same lamp control circuit. In centrex installations where it is necessary to provide one customer with two or more circuits, control of the multipling bus is achieved in a circuit designated circuit 0. This circuit is equipped for 1B console customers with a lamp-state memory equipped with Y option in memory units 0 and 1. The Y option provides access to the multipling bus by means of reed relay boards in equipment locations 113-21 and 113-23. When one of the associated ferreed crosspoints is operated, the corresponding reed relay is energized providing a ground on the corresponding multipling bus lead. Memory unit 0 provides control of multipling bus leads CW and TB0 through TB11. Memory unit 1 provides control of bus leads TB12 through TB23. A circuit 0 equipped for control of 2B consoles may have lamp-state memories in memory units 0, 2, and 3. All lamp-state memories in such a circuit are equipped with Y option. Memory unit 0 provides control of multipling bus leads CW and TB0 through TB11. Memory unit 2 provides control of multipling bus leads TB36 through TB47. Memory unit 3 provides control of bus leads TB48 through TB59.

2.08 When a lamp control circuit is shared by a multiple-console customer and one or more single-console customers, the lamp-state memories associated with the multiple-console customer must be equipped in the lower numbered memory unit positions. These lamp-state memories are equipped with W option, an in addition may be equipped with the X and Y options as called for in 2.06 and 2.07. Each lamp-state memory in a lamp control circuit must be associated either with the same multiple-console customer or with a different single-console customer. Memory units associated with a single-console customer are equipped with Z option and must not be equipped with W, X, or Y option. This is to insure that only one customer in a shared lamp control circuit has access to the multipling bus.

2.09 A negative pulse applied by the translation and timing circuit on the INTA lead is used to interrogate the states of the two ferreed contacts which control the night and position-busy lamps. If the night lamp (controlled by ferreed crosspoint 6 on switch L5) is operated, the pulse will be transmitted back to the translation and timing circuit on the NT lead. If the position-busy lamp (energized by ferreed crosspoint 6 on switch L2) is operated, the negative pulse will be transmitted back to the translation and timing circuit on the PB lead.

3. TRUNK-BUSY MEMORY - FS 3

3.01 The (optional) trunk-busy memory is used only in lamp control circuit (cabinet) 0 of a centrex installation equipped to control 2B consoles. This memory is used in place of a lamp-state memory in unit position 1 to provide control of multipling bus leads TB12 through TB35. It is organized into three 8-bit words and uses leads H0 through H7 for pulsing access.

3.02 The trunk-busy memory consists of only three lamp groups designated LGS5, LGS6, and LGS7. These are selected in the manner described in 2.02. The negative-going signal on the CNS(1) lead is applied to one side of the windings of relays TLGS , TLGS6, and TLGS7. Plus 24 volts is applied by the translation and timing circuit to one of three leads LG5, LG6, or LG7, resulting in the operation of one of three relays, TLGS5, TLGS6, or

TLGS7. The operation of one of these relays connects to ground one side of each of the windings of the ferreeds in corresponding switch TL5, TL6, or TL7. The release-operate pulse sequence is identical to that described for the lamp-state memory in 2.03.

3.03 Each of the ferreed crosspoints in the trunk-busy memory, when operated, energizes a reed relay on circuit 119-11, 119-13, or 119-15, connecting the corresponding control lead of the multipling bus to ground.

4. INTERRUPTER - FS 4

4.01 The interrupter is used to generate the three flashing rates required for operation of the centrex console. When connected, it has the capacity to drive lamps on all four consoles which may be associated with the lamp control circuit.

4.02 The flashing rates generated by the interrupter are defined as follows:

(a) 120 IPM: 0.25 second on, 0.25 second off

(b) 60 IPM: 0.50 second on, 0.50 second off

(c) Wink: 1.75 seconds on, 0.25 second off.

4.03 The 120-IPM generator, circuit 103-26, generates a 120-IPM signal at terminals 1 and 3. The signal at terminal 3 is applied to terminal 24 of circuit 103-28 which frequency-divides the signal to 60 IPM appearing on terminal 26, and 30 IPM appearing on terminal 15. Relay A operates and releases 120 times per minute at approximately a 50-percent duty cycle. Relay B operates and releases 60 times per minute at a 50-percent duty cycle. Relay C operates and releases 30 times per minute at a 50-percent duty cycle. The contacts of these relays are wired to provide the three required signals. These terminals, designated 120 IPM, 60 IPM, and WINK, are defined as the terminals of the interrupter.

4.04 A 10-UH inductor is provided in series with the interrupter to protect the contact of the three relays by limiting the rate of increase of current through these contacts to less than 3 amperes per USEC. The CR3 diode is provided to protect the relay contacts upon release by limiting the inductive kick caused by current flowing in the 10-UH inductor.

5. ATTENDANT TELEPHONE ACCESS CIRCUIT - FS 5

5.01 The attendant telephone access circuit (FS 5) connects the tip-ring transmission path from the No. 1 ESS central office to the attendant telephone circuit in the universal attendant telephone console. The attendant telephone access circuit can be arranged to make this interconnection on either a 2-wire (S option) or 4-wire (T option) basis.

5.02 For 2-wire operation, both transmit and receive transmission take place via the T-R leads. The A0 inductor (terminals 1-2, 3-4), in conjunction with a jack-make contact from the attendant telephone circuit of the universal attendant telephone console provides a dc holding bridge for the attendant trunk circuit located in the No. 1 ESS central office. This jack-make contact is connected to the A0 inductor via leads HJA and HJB. The function of this contact is to indicate to the attendant trunk cirucit whether the console is in attendance or not.

5.03 Transmitter battery is fed to the attendant telephone circuit in the universal attendant telephone console via inductor A0 (terminals 5-6, 7-8) and resistors R10 and R20. Capacitors C10A and C10B provide dc isolation between the two winding sections of inductor A0.

5.04 For 4-wire operation (T option) the T-R leads carry the transmit signal from the universal attendant telephone console. The receiver signal to the console is connected through transformer T10 over the T1-R1 leads. When arranged for 4-wire operation, a voice and sidetone amplifier, CPS A738, is provided. The voice amplifier is connected in the transmit leg between the A0 inductors and capacitors C10A and C10B. The voice amplifier provides 3.5 dB gain. The sidetone amplifier associated with CPS A738 provides a unilateral 21-dB loss between the transmit (T-R leads) and receive (T1-R1 leads) legs of the attendant telephone access circuit.

6. POWER DISTRIBUTION CIRCUIT - FS 6

6.01 The power distribution circuit includes the following: one or two power supplies, a power-off key and lamp, a power relay, up to 16 fuses, a filtering arrangement for the attendant talking battery, a fuse alarm circuit, and an optional cabinet-power filter capacitor (C25). Power supply PS1 is used in all lamp control circuits, while power supply PS2 is used only in circuits equipped to control three or four consoles, in installations without emergency power backup. (See 6.04.)

6.02 Power is supplied to the translation and timing circuit (FS 1) and to the interrupter (FS 4) on lead +24F. A separate fuse supplies power over lead +24E for use in the ferreed pulser recharge path. A separate fuse and power feed is

provided to supply lamp power for each of the four consoles, and a separate fuse is provided to supply power to each of the four attendant talking circuits. In addition, six fuses and power feeds are provided to supply power to the centrex data receiver and transmitter circuit.

6.03 The operation of the power-off (PWR-OFF) key removes power from all parts of the lamp control circuit and from the centrex data receiver and transmitter circuit and turns the power-off lamp on.

6.04 When a customer requires emergency power backup, provide one 105E power plant equipped with one 11-amp rectifier and a 50AH battery per circuit (cabinet) or equivalent. Wires have been provided at the top of the cabinet for making connections. The KS-15894,L3 power supplies are not required when an external power plant is used. When the power supplies are not used, the filter circuit (optional App. Fig. 9) must be used to provide adequate +24 filtering.

6.05 If a fuse opens which is associated with the lamp control circuit or the centrex data receiver and transmitter circuit, a lamp will light on all consoles associated with the circuits. This is accomplished by applying +24 volts through the closed contact of the open fuse to leads FA0, 1, 2, and 3. Also +24 volts will be applied to these leads if a fuse associated with an external power plant opens, when wired per option J. Lead ATA will put a ground on terminal 1 of equipment location 105-16 causing a reed relay to operate, thus +24F is applied through the closed contacts of the reed relay to the FA0, 1, 2, and 3 leads.

6.06 A negative signal on lead INTA is used to interrogate all fuses associated with the lamp control circuit and centrex data receiver and transmitter. An answer (negative pulse) is returned on lead S1 if all fuses are good. If a fuse opens, the normally operated reed relay associated with input terminal 0 of equipment location 105-16 releases and there will be no answer returned on lead S1.

7. DESCRIPTION OF OPTIONS

Option K - Delayed Pulse Generator Drive

7.01 This option utilizes a spare relay on an A36 circuit pack to provide a cleaner drive to the delayed pulse generator circuit pack. With option K, the probability of damaging 34A transistors is greatly reduced.

Option L - Capacitor C24

7.02 This option was added to reduce noise on the +24 caused by lamp group select relays.

Options M and N - Power Relay

7.03 In 1973, the manufacture of KS-15756, L1 (option M) relays was stopped, and KS-15756, L4 (option N) relays came into use. Either option is acceptable. The list 4 relay has a plastic cover and a slightly different terminal numbering arrangement.

Options P and Q - Hubbell Power Plug

7.04 The option Q plug is no longer UL listed and is therefore rated A&M Only. Refer to the SD, sheet D1, Equipment Note 204 and Information Note 302.

Option R and App Fig. 8

7.05 Optional App Fig. 8 and option R are functionally related in that both are needed for the conference feature. The busy verify and the steady and wink portions of the conference feature require only App Fig. 8. Option R (A655 diode isolation pack) is necessary only to supply the 60 and 120 IPM signals for the conference feature.

Options S and T - Attendant Trunk Circuits

7.06 For a description of options S and T, refer to Section III, Part 5 of the CD.

Options V and J - Battery Backup Wiring

7.07 When a 105E or equivalent power charge and discharge circuit is used, a short wire must be connected at TS(B) between terminals 2 and 4, (refer to CAD 10). This feeds power over to the other contacts of the P relay, otherwise fed by PS2. Options V and J also require two wires (ATA and ATB) to be brought from the 105E power plant to the TS(B1) terminal strip. These leads indicate the status of the power plant to the cabinet circuitry and ultimately to the central office.

7.08 The difference between options V and J is in the way the ATA and ATB leads are connected to the TS(B1) terminal strip. With option V, they are connected so that the FA lamps will light when low battery is detected in the 105E power plant. With option J, they are connected so the FA lamps light when a fuse blows in the 105E power plant.

Options W, X, and Z - Dropping Resistors

7.09 Option W provides the dropping resistors for the calls-waiting and trunk-busy memory lamps 0 through 23, on all installations except where a customer has a single 1B-type or 27A-type console. These particular dropping resistors are driven by the Y option reed relays of the first cabinet lamp state memory, or by the reed relays of the (optional) trunk busy

memory unit if the first cabinet has one. Option X is used to provide the three packs of dropping resistors used for the extra 36 trunk-group busy lamps on all 2B or 47A-type consoles. Option Z provides the dropping resistors for calls waiting and 12 trunk-group busy lamps in installations where 1B consoles serve single-console customers. Where option Z is used, option Y is not used.

Option Y - Relays

7.10 Option Y provides the 312A reed relays needed to drive the calls-waiting and trunk-busy lamps controlled by the ferreed switches in that particular console control unit. Option Y is used when there are more than one 2B-type or 47A-type consoles in a customer group.

App. Fig. 5, 6, and 9 - Power and Filtering

7.11 If battery backup is not used, the power supplies (App. Figs. 5 and 6) must be provided per Circuit Note 102. When battery backup is provided, the power supplies are not needed. However, additional filtering is desirable, as provided by the C25 capacitor in App. Fig. 9. This capacitor mounts in place of PS1 beneath the common-control circuitry.

SECTION III - REFERENCE DATA

1. WORKING LIMITS

1.01 The dc loop resistance between an attendant console and the lamp control circuit shall not exceed 50 ohms.

1.02 The 1-way cable length between an attendant console and the lamp control circuit shall not exceed 1000 feet.

1.03 The dc loop resistance between an external power supply and the bus in the centrex cabinet shall not exceed 0.1 ohm.

2. FUNCTIONAL DESIGNATIONS

2.01 Circuit Designations

Designation	Meaning
CA	Call Indicator Enable
CG	Call Indicator Group
CGS	Call Indicator Group Selection
CI	Call Indicator
CNS	Console
CW	Calls Waiting
DEST	Destination
FA	Fuse Alarm
FAG	Fuse Alarm Ground
GRD	Ground
HJ	Headset-Jack
HJG	Headset-Jack Ground
INT	Interrogate
IPM	Interruptions Per Minute
KEY	Loop Key Lamp
LC	Lamp State Code
LG	Lamp Group
LGS	Lamp Group Selection
LPL	Loop Lamp
LSP	Lamp Signal Present
NT	Night
PB	Position Busy
PSR	Pulser Reset
PWR-OFF	Power Off
RES	Reset
RSL	Release
RS INV	Reset Inverter
S	Steady
SP	Signal Present
SPR	Signal Present Relay
SRC	Source
TB	Trunk Busy
TLGS	Trunk-Busy Lamp Group Selector
W	Wink

3. FUNCTIONS

3.01 Responds to a start signal on the LSP lead by the gating of information on the A and B data leads and the translation of these into several functional groups.

3.02 Makes changes in a lamp-state memory associated with a console or in a trunk-busy memory associated with a customer, in accordance with the data read on the A and B leads.

3.03 Responds with a reset pulse upon completion of a successful circuit cycle.

3.04 Continuously energizes lamps on all associated consoles in either the steady state or one of the three defined interrupted-rates.

3.05 Multiples trunk-busy and calls-waiting lamps among the console control positions in a cabinet and to additional cabinets asscciated with the same customer.

3.06 Response to an interrogate pulse with information specifying the states of the pcsition-busy lamps and night lamps on all associated consoles.

3.07 Rectifying 24-volt dc power necessary to supply all internal functions and tc energize all lamps on associated consoles and to supply power to the centrex data receiver and transmitter circuit.

3.08 Provide a visible indication at the consoles, that a fuse has blown.

4. CCNNECTING CIRCUITS

4.01 When this circuit is listed on a keysheet, the connecting information thereon is tc be followed. The following are typical connecting circuits.

(a) Attendant Trunk Circuit (2-wire) - SD-1A245-01.

(b) Attendant Trunk Circuit (4-wire) - SD-1A248-01.

(c) Centrex Data Receiver and Transmitter Circuit - SD-1E059-01.

(d) No. 1 ESS Telephone Console SD-66940-01; (27A and 47A).

(e) Universal Attendant Telephone Console - SD-67001-01 (1E and 2E).

5. MANUFACTURING TESTING REQUIREMENTS

5.01 The manufacturing testing requirements are specified in the X-77715 specification.

6. TAKING EQUIPMENT OUT OF SERVICE

6.01 Operation of the power-off key will remove power from all associated consoles and may under certain conditions disable the trunk-busy lamps on consoles controlled by other circuits associated with the same customer.

6.02 The lamp-state memory associated with any console or a trunk-busy memory may be removed from service without disturbing the remainder of the lamp control circuit or other associated consoles by the removal of fuses as follows.

Lamp-State Memory	Fuses Removed
0	F3, F4, F5
1*	F11, F12, F6
2	F7, F8, F13
3	F15, F16, F14

6.03 Once power has been taken off the memory unit by the removal of the appropriate fuses, the memory unit may be removed from the lamp control circuit for service.

SECTION IV - REASONS FOR REISSUE

B. Changes in Apparatus

B.1 Added

C24 Capacitor 596G - App Fig. 1
C25 Capacitor KS-20133,L38 - App Fig. 9
P Relay KS-15756,L4 - App Fig. 1

B.2 Removed

P Relay KS-15756,L1 - App Fig. 1

D. Description of Changes

D.1 Added C24 capacitor to provide filtering on the +24 to eliminate noise from LGS( ) relays and other sources.

D.2 Added C25 capacitor, mounted in place of PS1 in installations with battery backup (105E or equivalent), to provide local filtering. Because of the distance to the power plant, and resulting inductance in the power feeder, C25 will serve to eliminate a great deal of the noise produced in the cabinet. C25 is optional App. Fig. 9.

D.3 Changed power relay p to a List 4 because List 1 has become Mfr Disc. The relay is similar in size, mounting, and function, but has different terminal numbering.

D.4 Optionally wired-in a 312A relay on an existing A36 circuit pack to provide a cleaner drive to the A834 circuit pack (the delayed pulse generator), which drives the 34A transistors. Due to a varying closed-resistance of CNS( ) lead contacts, the A834 pack can falsely trigger the 34As. This change will eliminate such an occurrence.

D.5 Changed the name of the circuit to include the title "51A Customer Premises System." The SD-1E059-01 circuit, which shares the cabinet, is also part of the 51A CPS.

D.6 Made various drawing corrections, modifications, and additions to the SD.

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* Or trunk-busy memory

These changes include the adding of three block diagrams in the H-Section; and Information Note 330 on sheet D4, which shows the relationship between lamp order bits and the specific lamps which are controlled.

D.7 Added option J, superceding option V. The ATA and ATB leads from the power charge and discharge circuit (when so equipped) are wire-reversed with option V. This causes the console FA (fuse alarm) lamps not to light when a fuse blows in the power charge and discharge circuit, and causes the lamp to light on a low-voltage indication. Option J corrects this by reversing the functions.

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