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ELECTRONIC SWITCHING SYSTEMS NO. 3 CONTROL FRAME CIRCUIT

CHANGES

D. Description of Changes

D.1 Added ground return lead to provide the remote recording of announcement feature with the 13A announcement system.

D.2 Corrected miscellaneous documentation errors.

BELL TELEPHONE LABORATORIES, INCORPORATED

DEPT 7211-RHM-JCM

ELECTRONIC SWITCHING SYSTEMS
NO. 3
CONTROL FRAME
CIRCUIT

CHANGES

D. Description of Changes

D.1 Interchanged scan lead 002405LF with scan lead 002211LF.
Interchanged scan lead 002405HF with scan lead 002211HF.

D.2 Added fixed scan lead assignments for the test vertical circuit; power cross circuit; multifrequency transmitter circuit; and coin control, tone or recorded announcement, and remote recording of announcement circuit.

BELL TELEPHONE LABORATORIES, INCORPORATED

DEPT 5363-LDW-JSC

ELECTRONIC SWITCHING SYSTEMS

NO. 3

CONTROL FRAME CIRCUIT

CHANGES

B. Changes in Apparatus

B.1 Added

PWCA Fuse 70F, 0.5A - App Fig. 2

PWCB Fuse 70F, 0.25A - App Fig. 3

B.2 Superseded	Superseded By
TVPD0 Fuse 70G, 0.5A - App Fig. 3	TVPD0 Fuse 70E, 0.18A - App Fig. 3
TVPD1 Fuse 70G, 0.5A - App Fig. 3	TVPD1 Fuse 70E, 0.18A - App Fig. 3

D. Description of Changes

D.1 Changed fuses TVPD0 and TVPD1 to improve circuit protection for peripheral decoders.

D.2 Fuse PWCA and PWCB were added to provide +24 volt power to the power cross circuit in the test vertical unit. By using separate fuses for the power cross circuit instead

of fuses RCA and RCB which were used initially, power cross circuit faults are prevented from affecting the peripheral controllers.

BELL TELEPHONE LABORATORIES, INCORPORATED

DEPT 5332-GDD-UKS

ELECTRONIC SWITCHING SYSTEMS

NO. 3

CONTROL FRAME CIRCUIT

CHANGES

D. Description of Changes

D.1 Options S and T were added. Option S provides leads STAC-7,SGP when used on control frame D. Option T provides the same leads when used on control frame 1.

D.2 Corrected errors pertaining to leads SIB,SIBR in CAD 190.

D.3 Added information showing the test-talk leads to the test-talk unit via the CDF.

D.4 Added missing information "FROM CFO ONLY" to CAD 120.

D.5 Added part of net "P48RA25" to CAD 2.

D.6 Added title descriptions to CONTENTS.

D.7 Leads P48RA34 and P48RB21 were added to the SWBD cable symbol to correct CAD 112 documentation.

D.8 Added Equipment Note 207.

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DEPT 5333-LDW-GH

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ELECTRONIC SWITCHING SYSTEMS

NO. 3

CONTROL FRAME CIRCUIT

TABLE OF CONTENTS

SECTION I - GENERAL DESCRIPTION

1. PURPOSE OF CIRCUIT

1.01 This circuit shows the interconnection of all circuits on the control frame and the connections to any other circuits on other frames. The circuit detail of the test vertical & power control unit, fuse panel units, control panel unit, and master scanner terminal strip unit is shown in this circuit only. All other units that can be mounted on the control frame are listed in Table A. The CDPR/RR circuit is optional on control frame 0 and the universal trunk circuit is optional on control frames 0 and 1. Two 4-inch positions are used for one or two CDPR/RR circuits or one universal trunk circuit.

2. GENERAL DESCRIPTION OF OPERATION

2.01 The detailed description of operation of all circuits listed in Table A may be found in the CD for each one. The remaining circuits which are shown only in the control frame circuit SD will be explained in detail in this CD.

SECTION II - DETAILED DESCRIPTION

1. TEST VERTICAL

1.01 There are six features provided by the test vertical circuit. These are: test vertical network access, test vertical test circuit access, no-test access, power cross check, false cross and ground check, and restore verify check.

1.02 The test vertical network access circuit allows access to any 15B grid access point. One FB417 circuit pack gains access to the wire side and another FB417 accesses the circuit side of the network.

1.03 The test vertical test circuit access allows quick access to five test circuits. Two FB419 circuit packs are used to gain access to these test circuits. The five test circuits are the tone presence detector, milliwatt and transmission environment, continuity and polarity test,

TABLE A

OTHER POSSIBLE CONTPOL FRAME UNITS

CIRCUIT TITLE	NUMBER
Peripheral Control Circuit	SD-3H110-01
15C Remreed Grid Circuit	SD-3H130-01
Third Stage Access Circuit	SD-3H131-01
Master Scanner Matrix Circuit	SD-3H140-01
Distribute Point Circuit	SD-3H150-01
Universal Trunk Circuit	SD-3H220-01
Multifrequency Transmitter Circuit	SD-3H404-01
CDPR/RR Circuit	SD-3H410-01
Coin Control, Tone or Recorded Announcement, and Remote Recording of Announcement Circuit	SD-3H411-01
Electronic Remreed Pulser Circuit	SD-1C913-01
-48 Volt Filter Unit	(no SD) J1A053AA-1,L73
+24 Volt Filter Unit	(no SD) J1A053AA-1,L86

loop environment, and trunk and line test panel circuits.

1.04 The two no-test access features are operator bridge-on and local test desk (LTD). Access is gained via the FB417 (wire side) circuit pack and FB417 (circuit side) circuit pack. Operator bridge-on is used to let the operator access any call as necessary. The local test desk feature is used to monitor or talk over lines.

1.05 The false cross and ground check provides T and R testing for resistive crosses to battery and ground and for resistive T and R crosses. An FB420 circuit pack is used for the circuit side and another FB420 for the wire side. Negative 130 volts is connected through a ferrod and 4220-ohm resistor to the T, and +24 volts is connected through another ferrod and 1210-ohm resistor to the R. The following are examples of foreign potentials or grounds and the approximate resistance that will allow one or both ferrods to saturate: -48 volts through 9 KOHM to T, -54 volts through 8 KOHM to T, 17 KOHM ground on T, -48 volts through 10 KOHM to R, -54 volts through 11 KOHM to R, 2.5 KOHM ground on R, or 24 KOHM between T and R.

1.06 The power cross-check tests outside plant loop for any foreign potential. These tests are done using one set of FB420 and FB422 circuit packs for the circuit side and another set for the wire side. Also, a pair of 316-ohm resistors is used to discharge a charged line. The following are limits of dc foreign potentials crossed to either T or R or both T and R. The PC relay will operate when T or R is crossed to any potential more positive than +47 volts or more negative than -97 volts. With a cross to both T and R, the relay will operate with any potential more positive than +27 volts or more negative than -77 volts and will not operate with any voltage less positive than +13 volts or less negative than -58 volts. When crosses are to ac foreign potentials, the peak voltage required is greater than the dc threshold. This is because of the minimum operate time of the relay. Thus, the sine wave needs to be above the threshold at least this length of time. The relay will operate when T or R is crossed to any ac potential greater than 35 volts RMS and will not

operate with less than 17 volts RMS. With a cross to both T and R, the relay will operate with any ac potential greater than 20 volts RMS and will not operate with less than 10 volts RMS.

1.07 At completion of a call, a restore verify check is made on the line ferrod using one FB420 circuit pack for the wire side and another FB420 for the circuit side. It will check either loop or ground start ferrods to verify that the ferrod will saturate and be detected on the next line origination.

1.08 The processor, via the PPD, controls the states of the following circuit packs in the test vertical unit using two PD boards (FC181): FB414 (0,1), FB417 (0,1), FB419 (0,1), and FB420 (0,1).

2. OFFICE ALARM

2.01 The No. 3 ESS office alarm circuit (FB425) is used to generate the timing needed to distinguish the different audible alarm signals and to provide the needed drive for the office sounder (S1B) which is mounted in the cable rack above the power frame. The input signal to this circuit comes from the maintenance frame alarm relays as contact closures. When any alarm occurs, the office alarm circuit applies dc pulses to the office sounder which cause it to generate tone bursts. A critical alarm is represented by two 0.5-second tone bursts separated by 0.5 second and occurring every three seconds. A major alarm is represented by a single 0.5-second tone burst occurring every three seconds. A minor alarm is represented by a continuous tone burst that is processor controlled.

3. FUSES AND FUSE ALARMS

3.01 There are three types of -48 volt power provided on the control frame. Negative 48-volt signal battery is unfiltered after entering the frame. Negative 48-volt talk battery is filtered on the control frame and then distributed to the user circuits. Boosted -48 volt talk battery is talk battery that is boosted to a voltage level above the battery plant voltage. It is used to extend the dc-signaling range to 1600 ohms without special per-line treatment. Boosted -48 volt talk battery is nominally -54 volts and is provided to control frame 0 from network frame 1 only.

3.02 Table B contains a list of most circuits used on the control frame and shows how they are fused for -48 volt power. Test vertical circuit packs FB417, FB420, and FB422 are fused by 0.5 A fuse TVA for side 0 and 0.5 A fuse TVB for side 1. Fuse TVC is a 0.5 A fuse that provides -48 volt power to both FB419 circuit packs. Fuses TVPD0 and TVPD1 are 0.5 A and each provides -48 volt power to a FC181 (PD) circuit pack in the test vertical unit. MISA and MISB are 0.75 A fuses and each provides -48 volt power to an FB414 and FB415 circuit pack and several other miscellaneous circuits. The 0.75 A LT fuse supplies -48 volt power to the -48 volt test jack. This power is readily available for use whenever making tests.

3.03 Positive 24-volt power comes from dc-dc converters mounted on the miscellaneous power frame. It is filtered on the control frame before being distributed to three circuits in the peripheral control circuit. Fuses SCA and SCB are 0.75 A and each provides +24 volt power to a scan controller circuit. Fuses NCHA and NCHB are GBB 2A and each provides +24 volt power to a network controller circuit. NCLA and NCLB are 0.5 A fuses that parallel the 2A fuse supplying +24 volt power to the network controller circuits. They are used to indicate the 2A fuse being blown. Fuses PPDA and PPDB are 0.5 A and each provides +24 volt power to a peripheral pulse distributor circuit. All +24 volt power supplied to the peripheral control circuit is switched by the PWR0 and PWR1 relays. Control of these relays is described in 4.01 of this section. RCA and RCB are 0.5 A fuses. Each provides +24 volt power to a power cross circuit (FB422), +3 volt power control circuit (FB414) and alarm circuit (FB415). All are in the test vertical unit. These fuses provide +24 volt power to the +3 volt converters (A8) in the peripheral control circuit. Part of this +24 volt power is switched by the 24ST0 and 24ST1 relays to start these converters. Control of this relay is described in 4.01 of this section.

3.04 When a fuse supplying -48 volt power to one set of +3 volt converters blows, the 48FA relay on an FB415 circuit pack operates. When any other -48 volt fuse blows, the SFA relay on an FB415 circuit pack operates. If any +24 volt fuse blows, the 24FA relay on an FB415 circuit pack operates. Any of these three relays will cause the FA lamp in the fuse panel to light and the appropriate scan points to unsaturate or saturate (see Part 6 of this section). Other contacts from these relays are used for other various functions described in this CD. Any fuse supplying power to a circuit other than those in the peripheral control circuit is removed to remove power to that circuit.

4. POWER SEQUENCING

4.01 There are duplicate peripheral control circuits. The power circuitry associated with them is also duplicated. Power is connected to and disconnected from

Table B

CONTROL FRAME FUSING

CIRCUIT PACK	FRAME LEVEL OF CIRCUIT PACK	MAXIMUM NO. OF CIRCUIT PACKS PER UNIT	FUSE SIZE IN AMPS	SIGNAL FUSE DESIGNATION	TALK FUSE DESIGNATION	BOOSTED TALK FUSE DESIGNATION
RR	014-00	3	0.5	SRR(0-2)	TRR(0-2)	-
CDPP	014-00	4	0.5	SCD(0-3)	-	BCD(0-3)
Coin Control	114-00	4	0.5	CC(0-3)	-	-
Remote Recording	114-00	1	0.5	RMR	-	-
Ferrod	018-00 022-00	24	0.5	-	MS(0-11)(A,B)	-
RR	118-00	3	0.5	SSA(0,1) SSB0	TSA(0,1) TSB0	-
CDPP	118-00	4	0.5	SSA(2,3) SSB(1,2)	-	BCD(4-7)
RR	122-00	3	0.5	SSA(4,5) SSB3	TSA(2,3) TSB1	-
CDPP	122-00	4	0.5	SSA(6,7) SSB(4,5)	-	BCD(8-11)
Trunk	118-00 122-00	24	0.5	SSA(0,1,4,5) SSB(0,3)	TSA(0-3) TSB(0,1)	-
MF XMIT	126-00	4	0.5	SMF(0-3)	TMF(0-3)	-
PD	136-00	14	0.18	-	PD(0-13)	-
Office Alarm	144-00	1	0.5	OFAL	-	-
+3 Volt Converter	062-00, 16200	2 (2 units)	3, 0.5	-	CVH(A,B) CVL(A,B)	-

the peripheral control circuit in a certain sequence to assure proper operation. Negative 48-volt power is connected to the +3 volt converters in the peripheral control circuit as soon as the fuses are installed. When the ON key on the control panel is depressed, the 24ST relay is operated. This causes +24 volt power to be applied to the 24-volt start lead of the +3 volt converters. As +3 volt power becomes available, it is sensed at the FB414 circuit pack and is applied to the peripheral control circuit. If both +3 volt converters are supplying power to the circuit pack, a transistor will operate the PWR relay. A make contact from the PWR relay provides a ground to latch the 24ST relay.

4.02 To remove the +3 volt and +24 volt power from the peripheral control circuit, a ground is applied to the FB414 circuit pack by depressing the OFF key on the control panel. This releases the PWR relay if the peripheral control circuit is out of service. This will then release the 24ST relay. Depressing both OFF and REQ keys will apply a ground to the FB414 circuit pack without having the peripheral control circuit out of service. This allows removal of power in case of an emergency. The PWR OFF lamp in the OFF key lights when the PWR relay is released. If any +24 volt fuse or fuse supplying -48 volt power to the +3 volt converters blows, a ground is again applied to the FB414 circuit pack to remove power from the peripheral control circuit. The 24 volt start lead also is opened. This speeds power removal and also assures power removal.

4.03 If the OFF key is depressed without the peripheral control circuit being out of service, the office alarm will operate the office sounder. The OOS lamp in the REQ key should normally be lighted before power is removed.

4.04 Negative 48-volt power is supplied to the electronic remreed pulser circuit using separate -48 volt feeders from the power frame. It is switched by a contactor in the +24 volt filter unit on the control frame. The contactor is operated by the PWR relay.

4.05 When the PWR relay is released, a ground is applied to the associated peripheral control circuit for clearing it. Another ground is applied to the opposite peripheral control circuit that forces it on-line since this side is out of service.

5. ALARM AND TEST

5.01 When a +3 volt converter (A8) or a +12 volt reference circuit (FB152) is out of the voltage limits for it, the CPA (converter power alarm) relay on the FB414 circuit pack operates and a scan point unsaturates. When the +3 volt converter is in critical condition, it will operate the converter fuse alarm (CFA) relay on the FB415 circuit pack and a scan point unsaturates (see Part 6 of this section). To release the CFA relay, depress the LP & PWR test key.

5.02 The +3 volt converters and +12 volt reference circuit have the power alarm circuits tested periodically in either of two ways. A manual power alarm test (PAT) can be done from the control panel by depressing the LP & PWR test key which grounds the PAT lead. This key is nonduplicated and when depressed does not affect software even though the scan point unsaturates momentarily. Also, each converter and reference circuit has a light-emitting diode (LED) that should light. When a PAT is done by the processor, the PAT lead is grounded via the peripheral decoder circuit. This unsaturates a scan point if all power alarm circuits that are being tested are working properly. If any power alarm circuit is not working, the NPA relay on the FB414 circuit pack will operate which keeps the scan point saturated. After either the manual or processor controlled PAT is finished, a ground is applied momentarily to the NPA lead which causes the LED indication to be cleared.

5.03 A PAT is also run on the processor and maintenance frames. This is done by using other make contacts from the PAT relay. Since the maintenance frame is nonduplicated, either PAT relay initiates the PAT. Scan points in the master scanner detect the results of this test (see Part 6 of this section).

5.04 When the LP & PWR test key is depressed, the OOS, PWR OFF and FA lamps are tested. The TST0 and TST1 relays are slaved off of the LP & PWR test key. Diodes are used around the TST, PWR, and 24ST relay coils to suppress noise.

6. FIXED SCAN POINTS

6.01 There are three scan points associated with the power control of each peripheral control circuit. The peripheral control major power alarm scan point is normally saturated. This becomes unsaturated when a fuse alarm operates the CFA, 24FA, or 48FA relay on the FB415 circuit pack. The other two scan points are electrically coded to indicate four conditions. A power ON (normal) condition exists when the request and peripheral control minor power alarm scan points are saturated. When these two scan points are unsaturated, the power off condition exists. If the REQ key is depressed, the request scan point unsaturates and the request out of service condition is indicated. If a +3 volt converter power alarm condition exists, the CPA relay will operate and unsaturate the peripheral control power alarm scan point. When a PAT is performed, this scan point should unsaturate. If it does not, the NPA relay has operated, indicating a no power alarm condition.

6.02 The fuse alarm for line attending elements scan point will saturate when any fuse supplying -48 volt power to a line attending element on any network frame blows.

6.03 The common fuse alarm for trunks, junctors and service circuits scan point will saturate when any fuse supplying -48 volt or +24 volt power to a trunk, junctor, service or test circuit blows. This includes all network, control, test, and miscellaneous frames.

6.04 The battery boost alarm scan point will saturate when any battery boost converter gives an alarm from any network frame.

6.05 A transfer contact from the RTS relay on each network frame is multipled to the control frame. When the RTS relays are all released, the R & T bus transfer alarm (1) scan point should be saturated and the R & T bus transfer alarm (0) scan point should be unsaturated. When the RTS relays are operated, these two scan points should change to the opposite states. If both are saturated, one of the RTS relays failed to transfer the tones.

6.06 Six scan points from the processor frame and six scan points from the maintenance frame indicate the condition of power circuits.

7. REMOTE TESTING

7.01 An EXEC key, along with a PASS and a FAIL lamp, are mounted on the control panel. These are connected to the maintenance frame and are used to execute tests and observe results from the front of the control frame rather than the system status panel or TTY.

8. JACKS

8.01 A telephone jack and spare jack are each mounted on the front of the control panel. Any other telephone jacks are also connected in parallel and finally connected to the peripheral test circuit on the test frame. Any other spare jacks are also connected in parallel. These jacks are used for a general purpose beltline. A pair of jacks on the rear of the control panel provide -48 volt power for testing purposes.

SECTION III - REFERENCE DATA

1. WORKING LIMITS

1.01 None.

2. FUNCTIONAL DESIGNATIONS

2.01 None.

3. FUNCTIONS

3.01 This circuit shows the interconnection of all circuits on the control frame and connections to any other circuits on other frames. The detail of the test vertical & power control unit, fuse panel units, control panel unit, and master scanner terminal strip unit is shown in this circuit only.

4. CONNECTING CIRCUITS

4.01 When these circuits are listed on the keysheets, the connecting information theron is to be followed.

(a) Network Frame Circuit - SD-3H901-01.

(b) Control Frame Circuit - SD-3H902-01.

(c) Miscellaneous Frame Circuit - SD-3H903-01.

(d) Test Frame Circuit - SD-3H904-01.

(e) Miscellaneous Power Circuit - SD-3H905-01.

(f) Processor Frame Circuit - SD-1C910-01.

(g) Maintenance Frame Circuit - SD-1C912-01.

(h) 881A Ringing and Tone Plant - SD-82255-01.

(i) Charge and Discharge Circuit (151 power plant) - SD-82304-01.

5. MANUFACTURING TESTING REQUIREMENTS

Intermediate Requirements

5.01 None.

End Requirements

5.02 For all requirements refer to test specification Y-79037.

6. TAKING EQUIPMENT OUT OF SERVICE

6.01 Information for taking any circuit on this frame out of service is found in IM-3H000 and OM-3H000.

SECTION IV - REASONS FOR REISSUE

D. Description of Changes

D.1 Provided complete CD information.

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