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COMMON SYSTEMS MAINTENANCE FRAME POWER CIRCUIT

CHANGES

B. Changes in Apparatus

B.1 Superseded	Superseded By
AAOA, ABOA, AAOB ABOB Fuses, GBB - App Fig. 1	AAOA, ABOA, AAOB, ABOB Fuses, 74G - App Fig. 1
PWRRESET Switch C-H SB1DDY431-5 - App Fig. 1	PWRRESET Switch KS-21608 L14 - App Fig. 1

D. Description of Changes

D.1 Allowed use of 74 type fuses.

D.2 Changed PWRRESET switch part number from commerical to KS.

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COMMON SYSTEMS

MAINTENANCE FRAME POWER CIRCUIT

CHANGES

B. Changes in Apparatus

B.1 Added

C1 Capacitor KS-16390 L12, 75 UF - App Fig. 1.

D. Description of Changes

D.1 Added a 75-UF capacitor, C1(KS-16390 L12), to the NPA relay coil circuit. This capacitor insures that the power reset pulse is wide enough to reset all of the power converters.

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DEPT 5435-DJM-LEG

COMMON SYSTEMS

MAINTENANCE FRAME POWER CIRCUIT

CHANGES

D. Description of Changes

D.1 Provided automatic clearing of the minor (MN) alarm after an alternate bus power switch test occurs.

D.2 Changed the +24 volts RTN ground net sequence. The previous configuration allows wiring errors to go undetected during normal factory test procedures.

BELL TELEPHONE LABORATORIES, INCORPORATED

DEPT 5344-JPL-LAW

COMMON SYSTEMS

MAINTENANCE FRAME POWER CIRCUIT

TABLE OF CONTENTS

SECTION I - GENERAL DESCRIPTION

1. PURPOSE OF CIRCUIT

1.01 The maintenance frame power unit provides the power fusing and distribution for units appearing in this frame. It also detects and provides indication of trouble pertaining to fusing and voltage-level tolerances associated with dc-to-dc converters used for circuits within the maintenance frame.

SECTION II - DETAILED DESCRIPTION

1. PHYSICAL LAYOUT

1.01 The power unit is shown on three FS drawings. FS 1 shows the power distribution and fusing for equipment appearing in the maintenance frame. FS 2 is the interconnection and flow diagram for the A8 +3 volt dc-to-dc converters which are used with the system status panel controller (SSPC) circuit. FS 3 contains the power and alarm control information for equipment appearing in the maintenance frame.

FUSES AND POWER DISTRIBUTION LEADS - FS 1

1.02 Fuses and power distribution leads between the fuses, the power source (battery), and various peripheral units appearing in the maintenance frame comprise FS 1. The destination of each fuse output is labeled to correlate the fuses and lead names with a particular unit. The fuses are generally a WE 70 type, but in certain instances a Bussman GBB fast-blowing fuse is used. The Bussman fuses are used where a 70-type fuse (2 amps or more) could not be guaranteed to blow more quickly than the main supply fuse used in a No. 3 ESS application. Also when the Bussman fuses are used, each is paralleled by a low-amperage 70-type fuse that blows more quickly than higher-amperage 70-type fuses. This parallel operation is used to provide a fuse alarm source, since the Bussman-type fuse has no alarm arrangement compatible with the fuse blocks provided.

POWER CONVERTERS - FS 2

1.03 Appearing on FS 2 are the A8 power converters that convert -48 volts direct current to +3 volts direct current for use with the SSPC circuit. A detailed description of the converter operation may be obtained from SD-82161-01 and CD-82161-01, with additional information available from the lead description in SD-1C909-01 and from 1.04 through 1.08.

POWER AND ALARM CONTROL - FS 3

1.04 Appearing on FS 3 are the power and alarm control circuits for units appearing in the maintenance frame. Five alarm relays (MN, MJ0, MJ1, MJ2, and MJ3) are used to buffer the relay alarm-control flip-flops located on two FC210 circuit packs in this circuit from various system monitors and central office (CO) alarm circuits. The alarm relays are normally operated. If an alarm condition or loss of power should occur, they will release. Release of the relays provides an alarm indication to CO or system alarm circuits via contact closure or opening as required by system specifications. When used as a relay control, each flip-flop appearing on FC210 monitors a specific group of fuse alarm outputs and/or power alarm leads from dc-to-dc converters contained in units appearing in the maintenance frame. The alarm-control flip-flop is normally reset by momentarily operating the POWER RESET switch located on this circuit. The associated alarm relay should be operated and nonalarmed when reset.

1.05 The MN-relay flip-flop monitors the power alarm (PA) lead that is connected to every dc-to-dc converter appearing in the maintenance frame. When the output voltage of a converter drifts out of tolerance, the PA lead goes high and sets the MN-relay flip-flop, which releases the MN relay. Release of the MN relay causes a CC minor alarm. After the trouble has been corrected, the MN-relay alarm-control flip-flop may be reset by momentarily operating the POWER RESET switch located on this circuit.

1.06 The MJ0 and MJ1 relays monitor the fuse alarms and the dc-to-dc converter fuse alarm (FA) lead pertaining to the SSPC. The MJ0 relay monitors the FA lead to determine if either of the two A8 converters that supply +3 volts direct current to the SSPC circuit is in an alarmed state. An alarmed state for either A8 converter causes the FA lead to go high and set the MJ0-relay alarm-control flip-flop, which releases the MJ0 relay. When the MJ0 relay releases, contact 12M of the MJ0 relay opens the +24 volt dc input to the +24VST input of both A8 converters, thus removing the +3 volts direct current from the SSPC circuit. Since the SSPC-related power is connected in an alternate-bus switching arrangement (see CD-1C908-01), any fault capable of blowing one fuse in the alternate-bus arrangement will probably blow the alternate fuse after the transfer from primary to secondary bus. The MJ1 relay monitors these fuses and all other fuses associated with the SSP-related circuits. When a fuse blows, the MJ1-relay flip-flop is set, releasing the MJ1 relay. After the trouble has been corrected, the MJ0- and MJ1-relay alarm-control flip-flops may be reset by momentarily operating the POWER RESET switch located on this circuit.

1.07 The MJ2-relay alarm-control flip-flop monitors the fuse alarms and converter fuse alarm lead associated with the teletypewriter controller (TTYC) circuits appearing in the maintenance frame. When an alarm condition occurs, the MJ2-relay alarm-control flip-flop is set and the MJ2 relay releases, indicating an alarm condition. After the trouble has been corrected, the MJ2 alarm may be retired by momentarily operating the POWER RESET switch located on this circuit.

1.08 The MJ3-relay alarm-control flip-flop monitors the fuse alarms and converter fuse-alarm lead associated with the tape data controller (TDC) circuits appearing in the maintenance frame. When an alarm condition occurs, the MJ3-relay alarm-control flip-flop is set and the MJ3 relay releases, indicating an alarmed condition. After the trouble has been corrected, the MJ3 alarm may be retired by momentarily operating the POWER RESET switch located on this circuit.

2. OPERATIONS

POWER ALARM TEST

2.01 The power alarm test is designed to test the minor alarm circuits in the maintenance frame and the integrity of the PA net. The power alarm test sequence chart shown on the SD should be referenced during this description. In order to accomplish this test, the PA net is connected in a series loop between all dc-to-dc converters and voltage reference circuits contained in the maintenance frame.

2.02 The test is initiated by either operating the LAMP AND POWER TEST key on the system status panel (SSP) or by software control of a peripheral-decoder crosspoint. In either case, lead PAT0 is grounded and the PAT relay operates. When the PAT relay operates, contact 4M connects +24 volts direct current through a resistor via net PAR1 to lead PAT4F. Lead PAT4F is part of the PA net but, because of separate entry/exit points to units appearing in the maintenance frame and the PA net series connection requirement for testing, the net name differs between units in the frame. If the PA net is complete to all converters in the maintenance frame, a positive potential on the PA net end point sets the MN-relay alarm-control flip-flop on FC210. This causes the normally operated MN relay to release and provides the +24VRTN (ground) signal via contact 2M of relay PAT and contact 4B of relay MN to the power alarm test (PAT) lead. This action subsequently tests the various converter and converter regulator circuits in the maintenance frame. If all units are good,

the voltage appearing on nets NPA0 and NPA1 will be reduced to approximately +4 volts direct current.

2.03 Each net is inputted to an inverter stage on FC210, with the inverter outputs collector-tied by net NPAO1. The resultant signal is inverted (net RNPARO0) and then is inputted through contact 1M of relay PAT to the NPA relay driver circuit. The NPA relay is normally operated when input RNPARI0 is not grounded. Unless both NPA0 and NPA1 are active, input RNPARI0 will remain ungrounded and the NPA relay will remain operated. When RNPARI0 is grounded, the NPA relay releases and contacts 9B and 8B close. The result is a path to ground for nets NPA0 and NPA1 through PAT relay contacts 2B and 3B, respectively, when the PAT relay is released. The PAT relay is released upon recognition by the test source of selected information. If the test has been initiated manually, the user will observe the various converter LEDs and then release the SSP LAMP AND POWER TEST key. When this key is released, the PAT relay will release. Release of the PAT relay removes test voltage and ground from the PAT net. The ground path provided via relay PAT contacts 2B and 3B to nets NPA0 and NPA1, respectively, resets the associated converter alarm state, and clears the MN-relay alarm-control flip-flop. Between 20 and 50 milliseconds after the PAT relay is released, the NPA relay reoperates due to the opening of PAT relay contact 1M. If this sequence fails for any reason, either the MN relay will not operate, the NPA relay will not operate, or various visual indicators will fail. Since switch S4 (LAMP AND POWER TEST) on the SSP no longer bridges MN relay contact 2M and NPA relay contact 11M, a minor alarm will sound.

2.04 When a software request for a power alarm test occurs, the process remains the same except the PAT relay is operated by a peripheral-decoder crosspoint and the MN relay alarm is not masked. A software interrogated scanner circuit monitors the MN relay. Upon detecting the MN relay releasing, the scanner circuit causes the peripheral decoder to release the PAT relay. After the PAT relay is released, the MN relay and NPA relay must operate within a given period of time (less than 150 milliseconds). If the time limit has been exceeded, the software may assume a failure has occurred and take appropriate action.

ALTERNATE-BUS SWITCH

2.05 The maintenance frame power circuit is designed for continuous operation from the +24 volt dc B power bus. If the B bus power source should fail, the PAB24 relay will release and transfer to the standby +24 volt dc A power bus. Restoration of the B power source will automatically operate the PAB24 relay and thus transfer the power unit to the B power source. Operation of the ALT BUS key (S3) appearing on the SSP will also cause the PAB24 relay to release. Releasing the ALT BUS key will cause the PAB24 relay to reoperate and switch back to the primary B power source. Contact 12M of relay PAB24 opens the +24VRTN (ground) path to the SSP (via the system status panel relay circuit [SSPR]) as an indication that the power unit is operating on alternate-bus power. Refer to CD-1C908-01 for a description of the alternate-bus switching operation for the SSPR circuit.

SECTION III - REFERENCE DATA

1. WORKING LIMITS

1.01 None.

2. FUNCTIONAL DESIGNATIONS

2.01 Circuits

Designation	Meaning
CONV0	DC-to-DC converter. Converts -48 volts direct current to +3 volts direct current for SSPC circuit.
CONV1	Dc-to-dc converter. Converts -48 volts direct current to +3 volts direct current for SSPC circuit.
E2A	Telemetry unit used in Switching Control Center operations.
SSP	System Status Panel.
SSPC	System Status Panel Controller Circuit.
SSPR	System Status Panel Relay circuit.
TDC 0-1	Tape Data Controller Circuit 0 or 1.
TTYC 0-1	Teletypewriter Controller Circuit 0 or 1.

2.02 Diodes

Designation	Meaning
CR1-CR8	Voltage limiter diodes that prevent collapsing magnetic field of relay from inducing an excessive voltage spike on relay control lead.

2.03 Fuses

Designation	Meaning
AA0A	+24 volt dc (A bus) power source for SSP-related circuits.
AA0AP	Pilot fuse for fuse AA0A.
AA0B	+24 volt dc (B bus) power source for SSP-related circuits.
AA0BP	Pilot fuse for fuse AA0B.
AA1A	+24 volt dc (A bus) power source for maintenance frame power circuit (alarm circuits).
AA1B	+24 volt dc (B bus) power source for maintenance frame power circuit (alarm circuits).
AA2	+24 volt dc supply to SSP LEDs.
AA3	+24 volt dc supply to SSP lamps.
AA4	+24 volt dc supply for E2A telemetry.
AE0A	+24 volt dc (A bus) power source for TTYC0.
AE0AP	Pilot alarm for fuse AB0A.
AE0B	+24 volt dc (B bus) power source for TTYC1.
AE0BP	Pilot alarm for fuse AB0B.
AC0A	+24 volt dc (A bus) power source for TDC0.
AC0B	+24 volt dc (B bus) power source for TDC1.
AC A	-48 volt dc (A bus) power source for SSP-related circuits.
AC B	-48 volt dc (B bus) power source for SSP-related circuits.
A1	-48 volt dc output from the SSP alternate-bus switching relay AB48. Used to provide -48 volts direct current to an E2A telemetry unit in the maintenance frame.
B0A	-48 volt dc (A bus) power source for TTYC0.
B0B	-48 volt dc (B bus) power source for TTYC1.
C0A	-48 volt dc (A bus) power source for TDC0.
C0B	-48 volt dc (B bus) power source for TDC1.
C1A	-48 volt dc (A bus) power source for TDC0.
C1B	-48 volt dc (B bus) power source for TDC1.

2.04 Relays

Designation	Meaning
MJ0	Major alarm for CONV0 and CONV1 power failure.
MJ1	Major alarm for SSP-related fusing.
MJ2	Major alarm for TTYC fusing and converters.
MJ3	Major alarm for TDC fusing and converters.
MN	Minor alarm for all units appearing in maintenance frame.
NPA	Not power alarm. Part of power alarm test sequencing.
PAB24	Power circuit +24 volt dc alternate-bus switching relay.
PAT	Power alarm test.

3. FUNCTIONS

3.01 Provides fusing and power distribution for circuits appearing in the maintenance frame.

3.02 Provides circuits that detect fuse failures and other power problems (eg, dc-to-dc converter failures).

3.03 Provides on-unit visual indications of the above failures and interface relays to off-unit circuits for office alarm indications and/or system scanner detection.

3.04 Incorporates a PAT feature that allows testing of portions of the minor alarm circuit of all dc-to-dc converters within the frame.

4. CONNECTING CIRCUITS

4.01 When this circuit is listed on a keysheet, the connecting information thereon should be followed.

(a) Tape and Data Controller (TDC) - SD-1C904-01.

(b) TTY Controller (TTYC) - SD-1C905-01.

(c) System Status Panel (SSP) - SD-1C906-01.

(d) System Status Panel Controller (SSPC) - SD-1C907-01.

(e) System Status Panel Relay Unit (SSPR) - SD-1C908-01.

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

5. MANUFACTURING TESTING REQUIREMENTS

5.01 The manufacturing test requirements are specified in X-78890.

SECTION IV - REASONS FOR REISSUE

D. Description of Changes

D.1 Corrected a condition which previously allowed a minor alarm when an alternate-bus switching test is conducted for the +3 volt A8 converters in this circuit.

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