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CROSSBAR SYSTEMS
NO. 3
TROUBLE PERMANENT SIGNAL
OVERFLOW COUNTER
CIRCUIT

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SECTION I - GENERAL DESCRIPTION1. PURPOSE OF CIRCUIT

1.01 This circuit monitors the trouble permanent signal conditions encountered by the office to give an alarm when an excessive number of these conditions are detected within a specified interval. This alarm would indicate a serious problem such as a cable failure when the time interval and count threshold are carefully chosen for local conditions.

2. GENERAL DESCRIPTION OF OPERATION

2.01 The markers segregate trouble permanent signal conditions from receiver

off-hook conditions and direct appropriate treatment for each. This circuit takes the trouble permanent signal indication from the marker and increments its counter. A timer provides this circuit with an adjustable interval in which it may count. This interval is continuously recycled unless a state of alarm has been attained. When the timer recycles, the counter is also reset.

2.02 Timing intervals of 20 to 100 minutes are available in steps of 20 minutes. Within this timing interval, a count of 2 to 20 trouble permanent signal conditions in steps of 2 will operate relay ALM to indicate an alarm condition.

SECTION II - DETAILED DESCRIPTION1. COUNTING - SC1

1.01 When a marker encounters a trouble permanent signal condition it grounds lead TPS- to operate relay PS1/2 in this circuit.

1.02 Relay PS1/2 operated:

(a) Locks to PSA/B relay normal.

1.03 Relay PSA/B operated:

(a) Releases relay PS1/2.

(b) Operates PSC rotary magnet to advance the PSC selector.

(c) Opens the PSC release magnet operate path.

(d) Opens the opposite PSB/A relay operate path.

1.04 Relay PS1/2 released starts to release relay PSA/B.

1.05 Relay PSA/B released:

(a) Releases PSC rotary magnet.

(b) Enables opposite PSB/A relay.

(c) Reestablishes the lock path of relay PS1/2.

(d) Enables the PSC release magnet.

1.06 The circuit is now in its normal state waiting for another trouble permanent signal condition or the end of the timing cycle with the PSC selector in position one.

1.07 Simultaneous or nearly simultaneous trouble permanent signal conditions, one from each marker, will both be locked to the PS1 and PS2 relays.

1.08 Relay PS1 operating will open the PSB operate path and close the PSA operate path so that the PS1 count will always be served first when simultaneous trouble permanent signal conditions are encountered.

1.09 As previously described PSA operating advances the PSC selector and releases the PS1 relay.

1.10 When the PSA relay fully releases the PSB operate path is closed and that trouble permanent signal condition is registered.

2. COUNTER RECYCLE - SC2

2.01 If the alarm cross-connection, A- to ALM is for alarm on trouble permanent signal count ten or more the PSC selector operates relay SD when it reaches position 10.

2.02 Relay SD operated:

(a) Locks to relay SDA released.

(b) Operates the PSC release magnet when relays PSA and PSB are restored to normal.

2.03 The PSC release magnet operated restores the wiper to the off position which returns the PSC off-normal contacts to normal.

2.04 The PSC off-normal contacts restored to normal operates relay SDA.

2.05 Relay SDA operated:

(a) Releases relay SD.

(b) Locks to relay RL normal.

(c) Releases the PSC release magnet.

(d) Closes the A12-A20 cross-connect terminals to the ALM relay operate path.

2.07 The circuit is now prepared to continue counting until a state of alarm is reached or the circuit is reset by the timer.

3. TIMING - SC3, 4

3.01 Timing is provided by CUT and CH selectors. The CUT selector is advanced by one every 6 seconds and is capable of counting to 100. When the CUT selector is energized on count 100 it closes its contact which is used to advance the CH selector. The CUT selector therefore times for 10 minutes and the CH selector positions represent 10 minute increments.

3.02 When the CH selector reaches the position cross-connected to terminal RL for end of timing, relay RL is operated if relay ALM is normal.

3.03 Relay RL operated:

(a) Locks to the PSC and CH selectors off-normal.

(b) Operates the CH release magnet.

(c) Operates the PSC release magnet if relays PSA and PSB are normal.

(d) Opens the SDA relay lock path.

(e) Opens the ALM relay lock path.

3.04 The CH release magnet operated restores the wiper to the off position which returns the CH off-normal contacts to normal.

3.05 The PSC release magnet operated restores the wiper to the off position which returns the PSC off-normal contacts to normal.

3.06 The CH and PSC off-normal contacts restored to normal release relay RL.

3.07 Relay RL released releases CH and PSC release magnets.

3.08 The circuit is now prepared to begin a new count and a new timing cycle.

4. ALARM - SC5

4.01 When a state of alarm is attained, that is the PSC selector reaches the terminal cross-connected for an alarm before the end of a timing interval, relay ALM is operated.

4.02 Relay ALM operated:

- (a) Locks to relay RL normal.
- (b) Opens the timer operate path of relay RL and partially closes operate paths of relay RL to the alarm sending circuit through the alarm circuit to the test circuit.
- (c) Operates relay PSCA in the alarm circuit.
- (d) Lights the PSCA lamp at the test circuit.
- (e) Operates the PSC release magnet with relays PSA and PSB normal.

4.03 The PSC release magnet operated restores the wiper to the off position which returns the PSC off-normal contacts to normal.

4.04 The PSC off-normal contacts restored to normal release the PSC release magnet.

4.05 The circuit remains in this state until restored to normal either by the alarm sending circuit or manually by operation of the PSCR key at the test circuit.

4.06 Operation of the PSCA relay in the alarm circuit initiates audible and visual signals in the office or if alarms are transferred, causes the alarm sending circuit to communicate the alarm.

5. ALARM RELEASE - SC6

5.01 Alarm release whether from the alarm sending circuit or the test circuit operates relay RL.

5.02 Relay RL operated:

- (a) Locks to CH and PSC selectors off-normal.
- (b) Operates CH release magnet.
- (c) Operates PSC release magnet with relays PSA and PSB normal.
- (d) Opens the SDA relay lock path.
- (e) Opens the ALM relay lock path to release it when the PSC selector is restored to normal.

5.03 The operation of CH and PSC release magnets restores the wiper of the CH and PSC selector, respectively, to the off position which returns the CH and PSC off-normal contacts to normal.

5.04 Relay ALM released:

- (a) Extinguishes the PSCA lamp at the test circuit.
- (b) Returns the RL relay operate path to the CH selector.
- (c) Releases relay PSCA in the alarm circuit.

5.05 The CH and PSC off-normal contacts restored to normal release relay RL.

5.06 The circuit is now prepared to begin a new count and a new timing cycle.

SECTION III - REFERENCE DATA

1. WORKING LIMITS

1.01 None.

2. FUNCTIONAL DESIGNATIONS

2.01 Magnets

<u>Designation</u>	<u>Meaning</u>
CH	Count Hundreds
CUT	Count Units, Tens
PSC	Permanent Signal Count

2.02 Relays

<u>Designation</u>	<u>Meaning</u>
ALM	Alarm
PS1	Permanent Signal (Marker 1)
PS2	Permanent Signal (Marker 2)
PSA	Permanent Signal Auxiliary A
PSB	Permanent Signal Auxiliary B
RL	Release

<u>Designation</u>	<u>Meaning</u>
SD	Second Decade
SDA	Second Decade Auxiliary

2.03 Resistors

<u>Designation</u>	<u>Meaning</u>
PSA	Permanent Signal Auxiliary A
PSB	Permanent Signal Auxiliary B

2.04 Thermistors

<u>Designation</u>	<u>Meaning</u>
PSA	Permanent Signal Auxiliary A
PSB	Permanent Signal Auxiliary B

3. FUNCTIONS

- 3.01 Counts the trouble permanent signal conditions handled by the office.
- 3.02 Provides a time interval for the counter so that the alarm may be associated with a particular period of time and to indicate an excessive rate of trouble permanent signal conditions.

3.03 Provides a signal to the alarm circuit to indicate an alarm situation which will either cause the alarm to be sent via the alarm sending circuit or initiate audible and visual alarms within the office.

3.04 Reset of an alarm indication is provided either remotely or locally. Remote reset is via alarm sending alarm release and local reset by the PSCR key at the test circuit.

4. CONNECTING CIRCUITS

4.01 When this circuit is listed on a key-sheet, the connecting information thereon is to be followed.

- (a) Alarm Circuit - SD-26393-01.
- (b) Marker Circuit - SD-26384-01.
- (c) Power, Ringing, and Tone Distributing Circuit - SD-26414-01.
- (d) Test Circuit - SD-26411-01.

5. MANUFACTURING TESTING REQUIREMENTS

5.01 This circuit shall be capable of performing all the functions listed in this Circuit Description and meeting the requirements listed in the Circuit Requirements Tables.

6. TAKING EQUIPMENT OUT OF SERVICE

6.01 While working on any part of the circuit, block the ALM relay nonoperated.

BELL TELEPHONE LABORATORIES, INCORPORATED

DEPT 5245-CB

WE DEPT 355-RLP-KLF-MH