STUCK SENDER TRUNK IDENTIFICATION (SSTI) FEATURE
DESCRIPTION, OPERATION, AND TROUBLE LOCATING
NO. 1 CROSSBAR OFFICES

1. GENERAL

1.01 This section covers the description, operation, and trouble locating procedures for the Stuck Sender Trunk Identification (SSTI) feature for No. 1 crossbar offices.

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

1.03 The SSTI feature provides the circuitry for automatic tracing and recording of stuck originating senders and their associated trunks.

2. DESCRIPTION

2.01 The SSTI feature uses four new circuits and shares usage of two existing frames, the originating sender test (OST) and automatic test circuit for incoming trunks (ITT) to control the SSTI functions. Fig. 1 displays how the SSTI feature connects to the existing office equipment.

2.02 The SSTI feature provides for controlled sharing of central office test facilities. During the SSTI process, the OST and ITT test frame usage is limited to SSTI functions. If the OST and ITT frames have other tests in progress, the SSTI circuits will wait until the tests are complete before seizing the test frames.

Sender Test Connector Control (STCC) Circuit (SD-28102-01)

2.03 The STCC circuit detects stuck senders by monitoring the J leads of the sender make-busy (SMB) frame. It also monitors the state of the OST to gain control and set up to the stuck sender for application of tracing tone to the sender transmission path.

2.04 The STCC provides SG keys that can be operated to deny access of subgroups of ten senders to SSTI when maintenance is to be performed on them. The operation of the SG key will light the SG lamp.

Trunk Scan Control Circuit (TSCC) (SD-28101-01)

2.05 The TSCC monitors the ITT to gain control of the Incoming Trunk Connector (ITC) crossbar switches, to bridge all outgoing trunk transmission paths, ten at a time, with tone detectors for locating and identifying the trunk connected to the stuck sender being traced.

2.06 The TSCC also provides means for automatic and/or manual testing of tone detectors.

2.07 Various controls are provided for operation and maintenance of the TSCC. The controls and their definitions are listed in Table A.

Printer and Printer Control (PPC) Circuit (SD-28103-01)

2.08 The PPC circuit provides for printing trunk and sender identification data, prefaced with time and date, at the conclusion of a stuck sender trace. Test records may also be printed.

2.09 The printer is a commercial impact type printer used to print parallel binary coded decimal SSTI data in nine numeric columns and three columns of special characters. (See Fig. 2 for example of stuck sender printout.)

2.10 If the office is equipped with Automatic Trouble Analysis (ATA), the TSCC circuit provides controls, when operated, that allow collected data to be printed on the printer, or sent to
Maintenance Data Transmitter (MDT) of ATA, or both.

2.11 Various controls and indicators are provided for operation, maintenance, monitoring, or testing of the PPC. The controls and their definitions are listed in Table B, and the indicators are listed in Table C.

Trap Circuit (SD-28120-01)

2.12 The trap circuit is used to set a three-digit sender identification number or a two-digit subgroup number that will be compared with all senders initiating SSTI traces.

2.13 It is also used to set a five-digit trunk identification number or a three-digit trunk level number that will be compared with all trunks involved in completed SSTI traces.

2.14 The circuit traps and prevents the release of the trapped equipment, which locks out the associated sender subgroup, and indicates that the trap has been activated.

2.15 It prevents reuse of that portion of the trap circuit on which a trap has been set, until it is manually reset.

2.16 Controls and indicators for the operation, maintenance, and monitoring of the trap circuit are described in Tables D and E.

Associated Equipment

2.17 The originating sender test (OST) frame has been modified to add keys and lamps to provide control and trouble indications for the SSTI. The controls and their definitions are listed in Table F, and the lamps are listed in Table G.

2.18 The automatic test circuit for incoming trunk (ITTs) has been modified with the addition of one key and lamp. They are as follows:

- The automatic override stuck sender (AOSS) key is provided to cancel ITT busy and trouble timing and permit control advance of test frame for SSTI use.

- The stuck sender tracing (SST) lamp is provided to indicate that the TSCC has seized the test frame.

3. METHOD OF OPERATION

3.01 With the SSTI feature, the procedure to locate and identify a stuck sender is as follows (Fig. 3):

(a) A sender becomes stuck.

(b) After a 2-second validation delay, STCC proceeds with stuck sender tracing.

(c) The STCC circuit bids for and gains control of OST to set up to stuck sender for application of tracing tone.

(d) The STCC circuit signals the TSCC to initiate a scan of all outgoing trunks.

(e) The TSCC bids for and gains control of ITT and ITC.

(f) Trunk transmission paths are switched to TSCC tone detectors until tracing tone is detected.

(g) The TSCC signals the PPC circuit that trace is completed, and a record of trace is required.

(h) The PPC circuit prints a record of time and date of trace, sender identification number, originating marker group number, and trunk identification number.

(i) If office is equipped with ATA, the TSCC initiates transfer of stuck sender data to the MDT.

(j) Selection of means of recording SSTI identification data is made with the MTO/PO switch (see Table A).

4. TROUBLE LOCATING PROCEDURE

A. Alarms

4.01 When a failure occurs in the SSTI feature, a minor alarm will sound with appropriate lamp indication provided at OST to aid in trouble locating. These lamps and their definitions are listed in Table G.

4.02 Audible alarms are retired by the operation of OST SSAR key.
4.03 See Fig. 4 for trouble-locating procedures for troubles indicated by an alarm.

B. PPC Circuit Alarms

4.04 The OST PF lamp lights and a minor alarm sounds when a failure occurs in the PPC circuit or operation with MDT fails. Indicator lamps light at the PPC circuit to display the cause of the alarm condition. These lamps and their definitions are listed in Table C.

4.05 Alarm and indicator conditions are reset by operation of PPC ALM RLS switch.

C. PPC Circuit Pack Replacement

4.06 If a circuit pack is suspected of causing troubles and must be replaced, power module (A1130) must be removed prior to removing circuit pack and replaced after replacing circuit pack.

### TABLE A

<table>
<thead>
<tr>
<th>CONTROL</th>
<th>MEANING</th>
<th>DEFINITION</th>
</tr>
</thead>
<tbody>
<tr>
<td>MB</td>
<td>Make Busy</td>
<td>Removes circuit from service.</td>
</tr>
<tr>
<td>LT</td>
<td>Lamp Test</td>
<td>Provides a lamp test for all detector indicators.</td>
</tr>
<tr>
<td>MDC</td>
<td>Manual Detector Check</td>
<td>Performs a test to verify ability of selected detectors to respond to system tracing tone.</td>
</tr>
<tr>
<td>AR</td>
<td>Alarm Release</td>
<td>Releases DF alarm and restores circuit to normal operation.</td>
</tr>
<tr>
<td>MTO (See Note)</td>
<td>Maintenance Data Transmitter Only</td>
<td>Provides for transmission to maintenance data transmitter (MDT) only without printer operation.</td>
</tr>
<tr>
<td>PO (See Note)</td>
<td>Printer Only</td>
<td>Provides for printer operation only without transmission to maintenance data transmitter (MDT).</td>
</tr>
<tr>
<td>DS</td>
<td>Detector Selection</td>
<td>Provides for selecting a detector for test purposes.</td>
</tr>
</tbody>
</table>

**Note:** If neither MTO or PO selected (switch at center position), then SSTI records will be made at both the printer and the MDT.
# TABLE B

**PRINTER CONTROL UNIT CONTROLS**

<table>
<thead>
<tr>
<th>CONTROL</th>
<th>DEFINITION</th>
</tr>
</thead>
<tbody>
<tr>
<td>MAKE BUSY</td>
<td>Makes printer and printer control busy.</td>
</tr>
<tr>
<td>ALM RLS</td>
<td>Resets alarm condition.</td>
</tr>
<tr>
<td>ADV PAPER</td>
<td>When operated momentarily, advances paper one line; when held operated, continuously advances paper.</td>
</tr>
<tr>
<td>TIME SET</td>
<td>Advances selected time and date column to set current time and date.</td>
</tr>
<tr>
<td>DATA PWR</td>
<td>Turns +5V on and off to data conversion circuits.</td>
</tr>
<tr>
<td>PRINT TEST</td>
<td>Provides a line test of printer to show it is functional.</td>
</tr>
<tr>
<td>LAMP TEST</td>
<td>Tests BUSY, ALM, PRINT TEST, PRINT and NO PRINT indicators.</td>
</tr>
<tr>
<td>CLK/CAL UPDATE</td>
<td>Selects proper columns to set current time and date.</td>
</tr>
</tbody>
</table>
TABLE C

PRINTER CONTROL UNIT STATUS INDICATORS

<table>
<thead>
<tr>
<th>INDICATOR</th>
<th>DEFINITION</th>
</tr>
</thead>
<tbody>
<tr>
<td>BUSY</td>
<td>Indicates that the PPC was made busy automatically if the ALM indicator is also on or that PPC was made busy with the MAKE BUSY switch if the ALM indicator is not on.</td>
</tr>
<tr>
<td>ALM</td>
<td>Indicates that a printer failure has caused an alarm condition.</td>
</tr>
<tr>
<td>PWR INT</td>
<td>Indicates that an interruption of primary power had occurred with power now restored. (The time and date circuit must be checked and updated if required.)</td>
</tr>
<tr>
<td>DATA PWR</td>
<td>Indicates +5V is present to the data conversion circuit boards.</td>
</tr>
<tr>
<td>PRINT TEST</td>
<td>Indicates a print test print cycle is in progress.</td>
</tr>
<tr>
<td>PRINTER PWR</td>
<td>Indicates that the printer power supply (+30V) is present.</td>
</tr>
<tr>
<td>PAPER OUT</td>
<td>Indicates that the alarm condition was caused by the printer running out of paper.</td>
</tr>
<tr>
<td>NO PRINT</td>
<td>Indicates that the printer failed a print test and caused an alarm condition.</td>
</tr>
<tr>
<td>READY</td>
<td>Indicates that the printer is functional with paper loaded and that the DATA PWR switch is not turned off.</td>
</tr>
<tr>
<td>PRINT</td>
<td>Indicates a print cycle is in progress.</td>
</tr>
<tr>
<td>LAMP</td>
<td>MEANING</td>
</tr>
<tr>
<td>-----------</td>
<td>-----------</td>
</tr>
<tr>
<td>SDR TRAP</td>
<td>Sender Trap</td>
</tr>
<tr>
<td>TRK TRAP</td>
<td>Trunk Trap</td>
</tr>
</tbody>
</table>
### TABLE E
TRAP CIRCUIT KEYS AND SWITCHES

<table>
<thead>
<tr>
<th>KEY/SWITCH</th>
<th>MEANING</th>
<th>DEFINITION</th>
</tr>
</thead>
<tbody>
<tr>
<td>SSG</td>
<td>Stuck Sender Group</td>
<td>Selects the originating sender test frame connector switch group number corresponding to the sender on which trap is desired.</td>
</tr>
<tr>
<td>SSS</td>
<td>Stuck Sender Select</td>
<td>Selects the originating sender test frame connector switch select number corresponding to the sender on which trap is desired.</td>
</tr>
<tr>
<td>SSH</td>
<td>Stuck Sender Hold</td>
<td>Selects the originating sender test frame connector switch hold number corresponding to the sender on which trap is desired.</td>
</tr>
<tr>
<td>SG</td>
<td>Sub-Group</td>
<td>Enables the group and select portions of the trap circuit sender coincidence circuit. A trap will occur on any sender in the sub-group selected on the SSG and SSS switches.</td>
</tr>
<tr>
<td>SDR</td>
<td>Sender</td>
<td>Enables the group, select, and hold portions of the trap circuit sender coincidence circuit. A trap will occur only on the sender selected by the SSG, SSS, and SSH switches.</td>
</tr>
<tr>
<td>THT, THU</td>
<td>Trunk Hold Tens and Trunk Hold Units</td>
<td>Selects the tens and units digits of the trunk hold number corresponding to the trunk on which trap is desired.</td>
</tr>
<tr>
<td>TGT, TGU</td>
<td>Trunk Group Tens and Trunk Group Units</td>
<td>Selects the tens and units digits of the trunk group number corresponding to the trunk on which trap is desired.</td>
</tr>
<tr>
<td>TS</td>
<td>Trunk Select</td>
<td>Selects the trunk select number corresponding to the trunk on which trap is desired.</td>
</tr>
<tr>
<td>TL</td>
<td>Trunk Level</td>
<td>Enables the group and select portions of the trap circuit trunk coincidence circuit. A trap will occur on any trunk in the level selected on the TGT, TGU, and TS switches.</td>
</tr>
<tr>
<td>TRK</td>
<td>Trunk</td>
<td>Enables the group, select, and hold portions of the trap circuit trunk coincidence circuit. A trap will occur only on the trunk selected by the TGT, TGU TS, THT, and THU switches.</td>
</tr>
<tr>
<td>STR</td>
<td>Sender Trap Release</td>
<td>Releases the sender trap lockout circuit to restore circuit to normal.</td>
</tr>
<tr>
<td>TTR</td>
<td>Trunk Trap Release</td>
<td>Releases the trunk trap lockout circuit to restore circuit to normal.</td>
</tr>
</tbody>
</table>
### TABLE F

**ORIGINATING SENDER TEST (OST) FRAME KEYS**

<table>
<thead>
<tr>
<th>KEY</th>
<th>MEANING</th>
<th>DEFINITION</th>
</tr>
</thead>
<tbody>
<tr>
<td>RLS</td>
<td>Release</td>
<td>Releases sender test connector control circuit.</td>
</tr>
<tr>
<td>CANCSS</td>
<td>Cancel Stuck Sender</td>
<td>Disables sender test connector control circuit and prevents SSTI from seizing OST.</td>
</tr>
<tr>
<td>SSAR</td>
<td>Stuck Sender Alarm Release</td>
<td>Retires audible alarms.</td>
</tr>
<tr>
<td>SGRLS</td>
<td>Sender Sub-Group Release</td>
<td>Restores all but manually locked out sub-groups to allow access to SSTI.</td>
</tr>
</tbody>
</table>

### TABLE G

**ORIGINATING SENDER TEST (OST) FRAME LAMPS**

<table>
<thead>
<tr>
<th>LAMP</th>
<th>MEANING</th>
<th>DEFINITION</th>
</tr>
</thead>
<tbody>
<tr>
<td>PF</td>
<td>Peripheral Failure</td>
<td>Indicates peripheral failure in printer and printer control circuit or maintenance data transmitter.</td>
</tr>
<tr>
<td>TO</td>
<td>Time Out</td>
<td>Indicates an overall timeout of 120 seconds has occurred.</td>
</tr>
<tr>
<td>SS</td>
<td>Stuck Sender</td>
<td>Indicates sender test connector control circuit has seized OST.</td>
</tr>
<tr>
<td>MTR</td>
<td>Manual Trace Required</td>
<td>Indicates a trap is activated or a trunk could not be found with an associated stuck sender and that a manual trace is required to locate linkage problems.</td>
</tr>
<tr>
<td>SGPO</td>
<td>Subgroup Primed Out</td>
<td>Indicates that identification to one or more subgroups of senders has been locked out and the subgroup is primed out.</td>
</tr>
<tr>
<td>TFB</td>
<td>Trunk Frame Busy</td>
<td>Incoming trunk test frame is busy.</td>
</tr>
<tr>
<td>DF</td>
<td>Detector Failure</td>
<td>Indicates that a detector failed tone detector tests.</td>
</tr>
<tr>
<td>TRAP</td>
<td>Trap Activated</td>
<td>Indicates that equipment number selected at trap circuit has been involved in an SSTI trace and the sender sub-group has been locked out. An MTR lamp will accompany this indication.</td>
</tr>
</tbody>
</table>
Fig. 1—Stuck Sender Trunk Identification (SSTI) Feature
Note 1: S= Stuck Sender; T= Test; U= Unexpected Loss of Stuck Sender.

Note 2: M= Originating Marker; G=Detector Test — All Tone Detectors good; B= Detector Test — At least one Tone Detector bad.

Note 3: T= Trunk; B= ITT Busy; D= Tone Detector Test.

Note 4: Detector Test — Number of Detector that failed Detector Test.

Fig. 2—Example of Stuck Sender Printout
Fig. 3—SSTI Feature Method of Operation (Sheet 1 of 5)
TSCC PERFORMS AUTO SELF-CHECK TEST OF TONE DETECTORS

DID ALL DETECTORS PASS TEST

YES

TSCC SIGNALS PPC TO PRINT FAILED DETECTOR INFORMATION

NO

AT OST-OF ALARM OPERATED

TSCC RESTARTS ITT FOR A HIGH TONE LEVEL SLOW SCAN OF ALL TRUNKS

IS TONE LOCATED

NO

TSCC SIGNALS PPC TO PRINT FAILED DETECTOR INFORMATION

YES

TSCC DETERMINES TRUNK ID NUMBER

IS PD SWITCH OPERATED

NO

TSCC SIGNALS PPC TO PRINT RESULTS OF TRACE

YES

LAST PERIPHERAL RELEASES STCC

MDT READS SSTI RECORD

IS MTO SWITCH OPERATED

NO

TSCC SIGNALS PPC TO PRINT RESULTS OF TRACE

YES

SHEET 5

SHEET 4

Fig. 3—SSTI Feature Method of Operation (Sheet 3 of 5)
Fig. 3—SSTI Feature Method of Operation (Sheet 4 of 5)
Fig. 3—SSTI Feature Method of Operation
(Sheet 5 of 5)
Notes:
1. ITT has timed-out on a trunk failure. If it is required to cancel ITT busy condition so that SST can override to perform stuck sender trace, the AOSS key must be operated.
2. The TFB condition resulted from operation of long timeout relay (TM) in the TSCC. With the AOSS key operated the ITT frame should have either completed test in progress or should have timed-out on a busy trunk and control-advanced through the operated AOSS key to allow SST seizure. Check ITT frame SST functions.

Fig. 4—Trouble Locating Procedure (Sheet 1 of 4)
Fig. 4—Trouble Locating Procedure (Sheet 2 of 4)
Fig. 4—Trouble Locating Procedure (Sheet 3 of 4)
Fig. 4—Trouble Locating Procedure (Sheet 4 of 4)
[1] AT TSCC- SET DS SWITCH FOR DETECTOR TO BE TESTED

[2] MOMENTARILY OPERATE MDC SWITCH

[3] DID DETECTOR INDICATOR LIGHT (SEE NOTE) YES

[4] MOMENTARILY OPERATE AR SWITCH

[5] ARE OTHER DETECTORS TO BE TESTED YES

[6] MOMENTARILY OPERATE AR SWITCH

[7] PERFORM LAMP TEST PER FIG. 6

[8] DID LAMP TEST INDICATE THAT INDICATOR CIRCUIT IS FUNCTIONAL YES

[9] REPEAT STEPS 1, 2, AND 4 FOR OTHER DETECTORS

[10] DID ANY DETECTOR INDICATOR LIGHT YES

[11] PERFORM DETECTOR TUNING PROCEDURE PER FIG. 7 FOR DETECTOR THAT DIDN'T LIGHT

[12] REPEAT STEPS 1 AND 2

[13] CHECK CIRCUITS PER SD-28101-01 SC10

[14] WHEN TROUBLE IS CLEARED- MOMENTARILY OPERATE AR SWITCH

STEP 1

NOTE: INDICATOR FOR ODD DETECTOR IS AT BOTTOM OF COMPONENT ASSEMBLY; EVEN IS ON TOP.

Fig. 5—Manual Detector Check When Circuit is Idle
[1] AT TSCC- OPERATE LT SWITCH

[2] AT TSCC- DID ALL NET INDICATORS LIGHT

[3] AT TSCC- RELEASE LT SWITCH

[4] DID ANY NET INDICATORS LIGHT

[5] AT TSCC- RELEASE LT SWITCH

[6] AT TSCC- CHECK AND REPAIR OR REPLACE NECESSARY PORTIONS OF LAMP TEST CIRCUIT PER SD-28101-01, FSB AND 10

[7] AT TSCC- CHECK AND REPAIR OR REPLACE NECESSARY PORTIONS OF LAMP TEST CIRCUIT PER SD-28101-01, FSB AND 10

[8] AT TSCC- RELEASE LT SWITCH

STEP 1

Fig. 6—Lamp Test When Circuit is Idle
1. At TSCC- set DS switch to detector to be tested.


3. Did net-indicator light? Yes or No.


5. At TSCC- adjust potentiometer (on PLL component assembly) for detector under test clockwise until indicator lights on for a maximum of 1 full turn.

6. Did net-indicator light? Yes or No.

7. Note position of potentiometer when indicator lighted.

8. Continue to turn potentiometer in same direction until indicator is extinguished.

9. Adjust potentiometer to a midpoint between where indicator lighted and was extinguished.

10. Momentarily operate AR switch.

11. Perform manual detector check per Fig. 5.

12. Return PLL potentiometer to original position.

13. Adjust PLL potentiometer clockwise until indicator lights or for a maximum of 1 full turn.


15. Return potentiometer to original position.

Sheet 2

Fig. 7—Detector Tuning When Circuit is Idle (Sheet 1 of 2)
[10] REPEAT STEPS 5 THEN STEP 13 ALTERNATELY UNTIL INDICATOR LIGHTS. INCREASING ONE FULL TURN EACH TIME TO A MAXIMUM OF 10 FULL TURNS IN EACH DIRECTION.

[17] DID INDICATOR LIGHT?

[18] MOMENTARILY OPERATE AR SWITCH

[19] REPLACE DEFECTIVE PLL COMPONENT ASSEMBLY

[20] PERFORM MANUAL DETECTOR CHECK PER FIG. 5

[21] NOTE POSITION OF POTENTIOMETER WHEN INDICATOR LIGHTED

[22] CONTINUE TO TURN POTENTIOMETER IN SAME DIRECTION UNTIL INDICATOR IS EXTINGUISHED

[23] ADJUST POTENTIOMETER TO A MIDPOINT BETWEEN WHERE INDICATOR LIGHTED AND WAS EXTINGUISHED

[24] MOMENTARILY OPERATE AR SWITCH

Fig. 7—Detector Tuning When Circuit is Idle (Sheet 2 of 2)