

**SYSTEM EVALUATION PROCEDURES**  
**4A COMMON CHANNEL INTEROFFICE SIGNALING**  
**SWITCHING OFFICE**

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| A. PTU Verification . . . . .  | 6    | 1.01 This section describes a method of procedures for evaluating the integrity of a 4A Common Channel Intraoffice Signaling (CCIS) switching office. The test procedures, in varying degrees, are applicable for the following:  |      |
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**NOTICE**

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in the initialization portion of these procedures. This is done to minimize the cross-referencing between documents.

**1.04** Where applicable and pertinent to the procedure, teletypewriter (TTY) input and output messages are referenced and appear at the local maintenance TTY. The messages are detailed in Input Message Manual IM-68100 and Output Message Manual OM-68100.

**1.05** Additional information pertaining to procedures is available in other sections and system documents. It is not the intent of this document to precisely detail every individual step of the evaluation procedures; therefore, reference to other appropriate documents should be made for individual procedures not covered in this section. For example, if this section requires an action at the CD panel, refer to Section 254-106-301 for method of operation, etc.

**1.06** In all test procedures, the result of each step must be as indicated before the next step is performed. Whenever a specified output response is not received, a fault may exist and, if so, the condition causing the failure should be identified and corrected before continuing. The system responses indicated must be obtained with no additional printouts, or responses. If extraneous responses are encountered, the problems should be corrected and the test sequence rerun.

**1.07** Where indicated, the MAC07 printouts are always optional, that is, they may or may not be present. Output messages ST13, ST23, ST24, and PR02 may occur at any time and should be ignored.

**1.08** The tests should be run in the sequence in which they are written. They are normally run in the duplex processor operating mode. They may also be run in a segmented form on a day-to-day basis. **However, no test should be terminated unless duplex operation is restored.** If a test is run out of sequence or on an isolated basis, all conditions that would have been established by the previous test must be established for this test before starting.

**1.09** *Since some procedures are potentially hazardous to call processing if trouble exists, it is suggested that all magnetic backup tapes be readily available in the*

*event of an emergency. It is further suggested that these procedures be conducted during light traffic periods.*

**1.10** Part 2 of this section refers to initial procedures. All steps of these procedures are not required for all applications of this document. Selected steps of the procedures may be optionally omitted, dependent upon local option, based on the knowledge of previous office testing and operation. Specifically, this refers to inspection type steps such as interpreting plant measurement printouts prior to routine tests. However, it is mandatory that **all** steps of the initial procedures be included as part of the overall evaluation procedure prior to a growth addition. For acceptance and/or routine testing, the omitted steps must either be not applicable or previously tested by other means and known to be good.

**1.11** The purpose of the initial procedures is to ascertain that the system is operating with little or no difficulty in the normal duplex mode. The procedures primarily consist of inspection methods that cause minimum disturbance to the system. They are composed of observing lamp indications, interpreting plant measurement results, verifying system status, verifying local and remote maintenance TTY operation, enabling store error analysis, and inhibiting and allowing selected programs.

**1.12** Part 3 of this section refers to evaluation procedures. The basic purpose of these tests is to verify that the CCIS equipment and software within the SO is operating properly. Note that the tests do not check all of the CCIS hardware. Generally, the **status** of the hardware is determined, and a specific unit (or combination of units) is tested more completely to demonstrate proper software/hardware interaction.

- Within this section, tests are to be run at the discretion of the office supervisor. This decision should be based upon the reason for performing the test. If for instance, a particular area of the office is to grow, a more comprehensive set of tests for that area should be performed. **Also, during precutover it is recommended that all tests be run to increase familiarity with the CCIS equipment and also to establish the validity of these procedures and the test software/**

**hardware.** The data collected during precutover testing should be retained for future reference. Any discrepancies in the test results must be thoroughly investigated and explained during this interval of time. After the office begins handling traffic, low traffic periods should be utilized to conduct these tests.

**1.13** Part 4 of this section refers to final procedures. The purpose of these procedures is to return the system to its pre-evaluation test condition. These procedures are to be applied whenever segmented or complete testing is terminated. If testing is suspended at any safe stopping point within a test and no further tests are to be done at the time, these procedures are to be applied.

**1.14** Part 5 of this section contains general information regarding the operation of the alarm and display panel, the audible alarm operation, TAC and TRM diagnostics, and general information on the new CCIS equipment operation. This part is intended to provide an overall familiarization with procedures that may be required during execution of the office evaluation. This section can be of assistance in understanding the operation of the CCIS signaling network and also will provide some assistance in the event the evaluation procedures

indicate an unsatisfactory condition. A more complete description of the signaling links and the correlation of the SO and STP actions is contained in section 212-826-303, the system evaluation procedures for 4A/STP offices.

**1.15** Part 6 of this section contains general information regarding the new CCIS trunk maintenance facilities that are pertinent to a 4A/CCIS switching office. Since a 4A/CCIS switching office evaluation procedure can result in many possible subsequent trunk activities, involving both this office and a remote office, a general familiarity with these procedures is required by the craftsman conducting these tests. Although neither Part 5 or Part 6 of this section involve actual test procedures, the information contained in these parts (as well as Part 5 of section 212-826-303) is essential to understanding these procedures.

**2. INITIAL PROCEDURES**

**2.01** The following procedures are to be performed whether the evaluation procedures are run in sequence or in a segmented form on a day-to-day basis. If this part has been performed as part of 212-826-301 and a known good backup tape is available, this part of this section may be omitted.

| STEP | ACTION  | VERIFICATION   |
|------|---|--|
| 1    | Record the initial status of the system to allow restoral to its original configuration at the end of the test sequence. Record the following:<br>(a) The active processor<br>(b) The active store bus<br>(c) Any manual controls, rotary switches, or locking keys that have been operated on the CD panel. The OFF-NORMAL lamp on the BAY CONTROL panel will be on if this is the case. The condition causing the lamp to be lighted should be removed before proceeding.<br><b>Note:</b> Any manual keys which are on may indicate a trouble is being investigated; any problems should be cleared before proceeding, and all office activities coordinated.<br>(d) Status of the BLK key and the PROGRAM CONTROL (PC) keys 00 through 19. | TTY output:<br>PCC10 (If BLK was operated; printout within 2 minutes.) |
| 2    | Release BLK key and PC keys if operated.  |  |



| STEP | ACTION   | VERIFICATION   |
|------|--|--|
|      | ERR/BBAC (055)*<br>FLT/PFT (029)** **=total of 4<br>FLT/PSC (051)**<br>FLT/DREG (053)**<br>FLT/BBAC (056)**<br><b>CCIS Errors and Faults</b><br>FLT/TAC (061) 4<br>ERR/TAC (062) 4<br>FLT/TRM (064) 4<br>ERR/TRM (065) 4<br>FLT/DAS (067) 4<br>ERR/DAS (068) 4 |  |
| 5    | Verify that all red and amber lamps are extinguished on the CD panel.  |  |
| 6    | At CD panel—<br>Momentarily operate LP TST key.  | All lamps on CD panel except BLK and SET MAN are lighted, lamps extinguish when LP TST key released.   |
| 7    | At local maintenance TTY—<br>Type in:<br>(1) TTY-05-SPYØN.<br>(2) TTY-04-RPT 02 ØN 00.<br><br><b>Note:</b> If it is desired to no longer observe the remote TTY, type in: TTY-05-NØ SPY.   | Observe that the following message is printed twice on the local and remote TTYs:<br>TTY01<br>"THE QUICK BRØWN FØX JUMPED ØVER THE LAZY DØG'S BACK 0123456789,"* |
| 8    | Request that deferred store fault recognition be run by typing in:<br>ST-05-DFR.   | TTY output:<br>ST02 DFR<br>00000 00000 00000 00000<br>00000 00000 00000 00000  |
| 9    | Ascertain that all units are in service by typing in:<br>MAC-03-STATUS.  | TTY output:<br>MAC03 NØ TBL  |
| 10a  | If a MAC13 PEST SET message was printed, clear PEST by typing in:<br>MAC-08-N.   | TTY output:<br>MAC06 PEST REP<br>NEW-0400000 OLD-xxxxxxx   |
| 11   | Force a store error analysis for a 4 to 8 minute period by typing in:<br>(1) ST-09-EASE.<br>(2) ST-07-FASE-0.<br><br><b>Note:</b> This test must be run between 5 minutes after the hour and 55 minutes after the hour.  | Acceptable TTY output:<br>ST23 NØ EER<br>ST13 ST ERR CØUNT ZERØ<br>Not acceptable:<br>ST24 ERR ANAL ABT  |
|      |  | <b>Note:</b> If TTY output is ST00 FASE REJ, wait 5 minutes and reinput messages.  |

## 3. EVALUATION PROCEDURES

**3.01** The following procedures are to be performed **only after initial procedure conditions have been met.** If trouble is encountered, normal maintenance procedures should be used to locate and clear the trouble before proceeding with subsequent tests.

**3.02** In the interest of brevity, certain actions and responses may not be completely detailed, reference should be made to other appropriate documents for complete details. In most cases, only the most pertinent information is indicated. It is expected that normal office practices and maintenance experience will disclose abnormal and extraneous indications. A sufficient time should be allowed for delayed messages to be printed before judging success or failure of a test.

**3.03** A test (partial or complete) can be terminated only if a safe stop point is reached. This should be followed by final procedures if no more testing is to be done.

**3.04** Audible alarms resulting from testing procedures should be noted and retired before proceeding to next step. Unexpected alarms should be investigated.

**3.05** For convenience, a list of TTY diagnostic messages specifying all office variables should be prepared beforehand and retained for future use. Reference should **always** be made to the latest issue of the input and output message manuals.

## A. PTU Verification

**Note 1:** This may be omitted if performed as part of Section 212-826-301. However the PTU must be known to be operational and a verified backup tape must be available.

**Note 2:** Refer to Section 254-107-301 for detailed procedures of mounting tape and bringing tape up to load point.

**Note 3:** If errors exist, a new backup tape **must** be made before proceeding with subsequent tests.

| STEP | ACTION   | VERIFICATION                                    |
|------|--|---|
| 1    | Load PTU with blank or scratch tape and <b>with</b> a write enable ring. Place PTU in initial mode. Bring tape up to load point and place in normal mode.              | MODE STATUS lamps lighted:<br>IM<br>WRIP<br>MAN |
| 2    | Request an all phase diagnostic on the PTU by typing in:<br>PTU-02-00-0-0.   | TTY output:<br>DR03 DGN RES PTU 0 ATP           |
| 3    | Remove the scratch tape and mount the <b>oldest</b> all protected (AL) backup tape on the PTU <b>with</b> a write enable ring and bring the tape up to the load point. | WRIP lamp lighted.                              |
| 4    | Create a current AL memory backup tape by typing in:<br>PTU-05-DUMP, OPT:0,TYPE:AL.  | TTY output:<br>PTU03 END ERR 0                  |

**Optional Steps 5 and 6**

5 Some offices consider it desirable to create a **separate backup tape for each IGFET store pair in the office.** This will permit reloading an individual IGFET store in minimum time in the event the contents of a single store are lost due to a system malfunction.

| STEP | ACTION | VERIFICATION |
|------|--------|--------------|
|------|--------|--------------|

***These tapes must be created in addition to the AL tape, not as a replacement.***

The procedure for creating an individual tape for each IGFET **store pair** is as follows:

PTU-06-DUMP,ØPT:0,STADD:wwwwwww,  
ENDAD:xxxxxxx.

where wwwwww=the starting address of the first IGFET store and xxxxxx=the address of the same IGFET store. After the PTU03 END ERR 0 message is received acknowledging correct dump and verification, dump the mate IGFET store data on the same tape using the following input message:

PTU-06-DUMP,ØPT:1,STADD:yyyyyy,  
ENDAD:zzzzzz.

Note that the ØPT:1 field designates that the contents of the mate IGFET store (starting address yyyyyy; end address zzzzzz) is to be dumped on this same tape starting at the end -of-file mark from the first dump. Be certain that the correct option fields are used in each message.

- |   |  |
|---|--|
| 6 | Repeat Step 5 for each IGFET store pair in the office. As each tape is completed and acknowledged by a PTU03 END ERR 0 message, remove the tape and store it where it can be obtained rapidly.   |
| 7 | During system evaluation procedures, it is recommended that the AL tape be left mounted and ready for use on the PTU. After these procedures are completed (or terminated at a safe stop point) the AL tape should be retained for safekeeping: <b><i>Unless a known good AL tape is available, the remainder of these procedures should not be performed.</i></b> |

### ***SAFE STOP POINT***

#### **B. SPC No. 1A Manual Configuration**

***Caution: These procedures can be detrimental to system operation if a step is performed out of sequence or omitted. Be sure the next step of a procedure is thoroughly understood before taking action.***

***Note 1:*** The following tests should be run consecutively without interruptions; that is, a

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STEP ACTION VERIFICATION

test section should be run until a safe stop point is reached. No other possible interfering work on equipment or test panels should be done concurrent with these tests.

**Note 2:** Not all system actions and TTY messages are indicated, therefore, additional responses should be investigated for evidence of trouble indications.

**Note 3:** The system is forced into the configuration specified below as a matter of convenience. It is done so that the lamp status can be defined and to establish a known configuration that can be reliably reproduced. If for some reason a different configuration is chosen, the verification of the lamp status associated with the configuration chosen must be verified by the attendant. **All tests following those in this part will be conducted with the processors operating in the duplex mode, and in the configuration obtained by the operations in this part.**

Force Processor-Store Configuration

- 1 Force processor 0 active on store bus 1 by operating the following keys on the CD panel:
  - (a) STORE STATE CONTROL to STATE CONTROL
  - (b) P0 SEL ACT
  - (c) SELECT BUS 1; verify INV lamp extinguished.
  - (d) SET MAN.

**Responses up to step (d):**

Audible alarm:  
Major  
CD panel lamps lighted:  
P0 ACT (2 lamps)  
P1 STP  
P1 TBL (2 lamps)  
P1 S BUS 1 RCV  
P0 S BUS 0 SEND  
P0 S BUS 1 SEND  
P0 BUS 1 RCV  
SELECT BUS 1  
DJS  
MJ  
TTY output:  
TW02.....  
MCC13 A-INT ØK.  
ST02 DFR.....  
MAC07 CLIENT ABT....(possible)  
RC00 STATUS:9  
MC29.....  
On Bay Power Control panel:  
OFF NORMAL lamp lighted

- (e) Release PO SEL ACT.

(e) No response

| STEP  | ACTION  | VERIFICATION  |
|---|---|---|
| (f) Type in:<br>PRX-05-RESTORE.                                     | <b>Note:</b> This message restores processor 1 to service.  | (f) The PR05 message should <i>not</i> be printed.<br>CD panel lamps extinguished<br>P1 STP<br>P1 TBL (2 lamps)   |
| (g) Release SELECT BUS 1 and operate STORE STATE CONTROL to NORMAL. |   | (g) CD Panel lamps extinguished:<br>SELECT BUS 1<br>CD panel lamp lighted:<br>STORE 0 (0-last store)<br>MJ<br>Audible alarm:<br>MAJOR<br>TTY output:<br>MCC29<br>On Bay Power Control Panel:<br>OFF NOR lamp extinguished.                      |
| (h) Type in:<br>ST-05-DFR.  | <b>Note:</b> This establishes a specific processor/bus configuration and restores duplex operation. | (h) TTY output<br>ST02 DFR<br>00000 00000 00000 00000<br>00000 00000 00000 00000<br>CD Panel lamps extinguished:<br>STORE 0 (0—last store)<br>P1 S BUS 1 RCV<br>P0 S BUS 0 SEND<br>CD Panel lamps lighted:<br>P1 S BUS 0 RCV<br>P1 S BUS 0 SEND |

### SAFE STOP POINT

#### C. Plant Measurement Counter Checks

- 1 Obtain an up-to-date output of the plant measurement counters using the following message:  
PMC-01-.  
TTY output—  
See PLM 01 output message in OM-68100. Counter numbers 060 through 062 are associated with the TAC's, 063-065 with the terminals, and 066-068 with the DAS frames. The fault counts (hard failures discovered by diagnostics) and error counts (temporary faults detected by the hardware error detection circuits but *not* confirmed by diagnostics) should be reasonable. "Reasonableness" can be determined by inspection of the daily PLM 01 outputs and comparing the various readings.

| STEP | ACTION | VERIFICATION |
|------|--------|--------------|
|------|--------|--------------|

**SAFE STOP POINT****D. Signaling Link and VFL Access Testing**

**Note 1:** Whenever testing is to be performed which involves another office, contact shall be established with that office to inform them that a system evaluation is in progress, and what tests are being performed.

**Note 2:** This test uses SLM-00-STA input messages to verify the status of each signaling link within the office. Then the signaling links (SLK's) are forced into a known configuration through use of the SLM-01-message. One link of each category ("A" SLK and "F" SLK in an SØ) is forced to the ØØS state, and then restored to the active (ACT) state. This is done on both the active and standby VFL's which comprise the VFL portion of an "A" type SLK. (The SLK consists of the total arrangement of terminal units, modems and VFL's). For reliability considerations "A" SLKs are equipped with two *coequal* VFLs; these VFLs are labeled according to the modem port utilized for each, A or B. All other SLKs have only VFL B. The VFL connected to the modem is referred to as the "active" VFL, and the other VFL (for "A" SLKs) is called the "standby." Once an SLK assignment is made, the TRM and VFL (VFLs for "A" SLKs) components are fixed for that SLK. The TRM and VFL(s) are *not* shared with other SLKs. Thus, specification of the near-end TRM number is sufficient to uniquely identify the SLK, and that is the strategy that has been adopted. Each SLK is identified by a two part number corresponding to the associated TRM group and member numbers.

- 1 Determine the status of *all* signaling links within the SØ. This is done by using the SLM-00-STA-SLK:00-cc message. The 00 field designates the terminal group and the cc field selects the terminal number. A separate SLM-00-STA-SLK message is required for each SLK, and TTY 10 or TTY 0 may be used for all input tasks and output verifications.

**Note:** SØ's only have terminal group 00.

For each equipped terminal unit, an SLM00 output message will occur as that SLK status is checked. The format of each SLM00 output message is as follows:

```
SLM00 a-SLK:0-CC VFL:d eee fff gg hhhhhh
iiiiii jjjjjjj kkkkkkk llllll mmmmmm nnnnnn
oooooo
MATE:SLK:00 pp
```

**Note 1:** The "h" through "o" fields are printed only in response to an SLM-00 input

| STEP                   | ACTION  | VERIFICATION   |
|------------------------|---|--|
|                        |   | message. The MATE:SLK field is printed only when both of the mate links appear in the office making the SLM-00 request.  |
|                        |   | <b>Note 2:</b> The alarm & display panel should have no lamps lighted when this test is performed.   |
| <b>SAFE STOP POINT</b> |   |  |
| 2                      | Select an "A" link ("a" field of the SLM00 output message) for use in the next sequence of tests. This is an arbitrary choice of the attendant made from inspecting the SLM00 output messages. Note the terminal member number ("cc" field) VFL designation ("d" field) and the state of the SLK ("eee" field) of the type "A" SLK chosen.  |  |
| 3                      | Construct an SLM-01 message that forces the "B" VFL to an active (i.e., connected to modem) state. This places the SLK in a known condition so that subsequent responses can be more accurately predicted. The SLM-01 input message will be constructed as follows: SLM-01-ACT-SLK:00-cc-VFL:B.<br>The "cc" field is taken from the SLM-00 output message chosen as the "A" link to be tested in step 2.<br><br><b>Note:</b> All SLM-.... input messages only require that the first two hyphens be included in the message format for acceptance by the processor; the other hyphens may be inserted or omitted. | SLM00 output message will occur. The contents of this message and the status of the lamps on the alarm and display panel will be a function of the previous status of the SØ. Although the output message and status lamps should be consistent with one another, a specific response cannot be defined until the SLK status is known. (Interrupts should not occur as result of this action.) |
| 4                      | Construct an SLM-01 message that forces this "A" SLK out-of-service (ØØS) on the B VFL. (This leaves the B VFL connected to the modem and forces the SPC to transfer traffic to the mate SLK (The mate SLK for this "A" link is defined in the MATE:SLK:00-pp portion of the SLM00 output message associated with the "A" SLK chosen). The SLM construction is as follows:<br>SLM-01-ØØS SLK:00-cc-VFL:B.   | TTY output message:<br>SLM00 A-SLK:0-cc VFL:B ØØS MAN NE<br>Alarm & Display panel:<br>Flashing secondary (amber) for the SLK complement (SLC) which includes the SLK just made ØØS.  |
| 5                      | Restore the conditions of step 3 by reentering the same SLM-01 message used in Step 3.  | TTY output message:<br>SLM00 A-SLK:0-cc VFL:B ACT<br>Alarm & Display panel:<br>All lamps retired.  |

| STEP                   | ACTION   | VERIFICATION  |
|------------------------|--|---|
| <b>SAFE STOP POINT</b> |  |   |
| 6                      | Construct an SLM-01 message that forces this "A" SLK ØØS on the A VFL. This connects this SLK's modem to the A VFL and also forces signal traffic to be transferred to the mate SLK. The SLM-01 construction is as follows:<br>SLM-01-ØØS SLK:00-cc-VFL:A. | TTY output message:<br>SLM00 A-SLK:0-cc VFL:A ØØS MAN NE<br>Alarm & display panel:<br>Flashing secondary (amber) for the appropriate SLC. |
| 7                      | Construct an SLM-01 message that forces the "A" SLK ACT on the A VFL. This connects this SLK's modem to the A VFL and maintains signaling over that SLK and VFL. The SLM-01 construction is as follows:<br>SLM-01-ACT SLK:00-cc-VFL:A.                     | TTY output message:<br>SLM00 A-SLK:0-cc VFL:A ACT<br>Alarm & Display:<br>No alarms  |
| 8                      | Repeat Step 3 to restore reference configuration by typing in:<br>SLM-01-ACT-SLK:00-cc-VFL:B.  | SLM00A-SLK:0-ccVFL:B ACT  |

**SAFE STOP POINT**

|    |   |  |
|----|---|--|
| 9  | Select an F link ("a" field of the SLM00 output message) that is active (eee field) for use in the next sequence of tests. (All SO's may not have "F" links; if not, skip Steps 10-11). Use the terminal group ("0" field) and terminal number ("cc" field) from the output message. (On the "F" links, only the "B" VFL will be equipped). |  |
| 10 | Construct an SLM-01 message that forces this "F" SLK to the ØØS state. The construction of the SLM-01 message is as follows:<br>SLM-01-ØØS SLK:00-cc-VFL:B.   | TTY output message:<br>SLM00 F-SLK:0-cc VFL:B ØØS MAN NE<br>Alarm & Display panel:<br>Flashing secondary (amber) lamp for F SLK. |
| 11 | Restore the "F" link to the original (active) state. The construction of the SLM-01 message is as follows:<br>SLM-01-ACT SLK:00-cc-VFL:B.   | TTY output message:<br>SLM-00 F-SLK:0-cc VFL:B ACT   |

**SAFE STOP POINT**

|    |   |  |
|----|---|--|
| 12 | Using the same "A" SLK previously chosen, the various subfields of the SLM-02 input message will be exercised to verify proper system response. Either the maintenance TTY or any of trunk test position TTY's (channels 11-18) may be used. First the standby VFL of an "A" SLK is tested. The | TTY output: (see Note 1)<br>SLM02 A-SLK:0-cc VFL:A TST ATP |
|----|---|--|

| STEP | ACTION | VERIFICATION |
|------|--------|--------------|
|------|--------|--------------|

SLM-02 request format is as follows:  
SLM-02-TST-SLK:00-cc-VFL:A.

**Note 1:** The A VFL should be in the **standby** condition as a result of the previous tests. In this condition a unique test of this VFL will take place. Through the exchange of signals on the active VFL, the far-end office is notified that the test is to occur. At the STP, the VFL to be tested is connected to a maintenance TRM (MTCE TRM) and at the SØ the VFL is looped-back to the STP (see the shaded path in Fig. 1.) (Because both end offices must perform some function, it is necessary for the near-end office to signal the far-end regarding the upcoming test. Hence, **the SLK whose standby VFL is to be tested must be active.**) Through the MTCE TRM at the STP, the looped-back VFL is then tested; when the test is complete, the STP forwards the results to the SØ. VFLs that fail this test are brought to the attention of craftspersons at each end office by the appropriate A & D alarm lamp and "VFL test fail" TTY message. (A minor audible alarm is also sounded at the office which had not requested the test.) If the VFL passes the test, the A&D panel at each end office is updated, and a "VFL test pass" TTY message is printed on the TTY where the request originated.

**Note 2:** It may happen that the VFL test results are not received at the end office where the test was requested. If no results are received within ten minutes, a TTY message so informs the craftsperson, and the test is abandoned.

**Note 3:** STBY VFLs tested in the above manner are **not** unavailable for signaling purposes. If a related SLK fails and the VFL being tested is needed to maintain signaling, the test is preempted and a message indicates the test has been denied.

### **SAFE STOP POINT**

13 Use the SLM-02 input message to test the **active** VFL of the "A" SLK. The format of the SLM-02 request is as follows:  
SLM-02-TST-SLK:00-cc-VFL:B.

TTY output:  
SLM02 A-SLK:0-cc VFL:B TST ATP

| STEP | ACTION | VERIFICATION |
|------|--------|--------------|
|------|--------|--------------|

**Note:** Since the active VFL is being tested, normal link security procedures are utilized. The states of the SLK and VFL are **observed** at the test initiation, and **the performance of the SLK and VFL is monitored.** (Error rate is observed.) After a 15 sec interval, the SLK and VFL states are again observed. The test results are derived from the SLK and VFL states, and they are printed on the TTY at which the test was requested. No information regarding the test is passed to the far-end office. Since normal procedures are used, that office is notified via normal mechanisms if a VFL is faulty. Note that an active VFL (VFL connected to the modem) can be tested in this manner even if the "A" SLK of which it is a part is ØØS. When the VFL is active, synchronization signaling units are being transmitted and received and the VFL performance can be monitored.

**SAFE STOP POINT**

- |    |   |   |
|----|---|---|
| 14 | Use the SLM-02 input message to test the <b>active "F"</b> link previously used. The test philosophy is the same as for an active VFL for an "A" link. The SLM-02 format is as follows:<br>SLM-02-TST-SLK:00-cc-VFL:B.<br>00-cc fields are taken from Step 9 or 10. | TTY output:<br>SLM02 F-SLK 0-cc VFL:B TST ATP |
|----|---|---|

**Connection to the VFL Test Position**

- 15 Notes - VFL Testing
- (a) To perform extensive VFL testing, it is necessary to connect the particular VFL to the manual test position. This request can be made at the maintenance TTY or the test position TTY. Just as for the VFL test requests, there should be coordination between the test position and 4A maintenance craft when a request is made to connect a VFL to the test position.
- If the specified SLK and VFL are legitimate, the request is analyzed to see if the VFL can be connected to the test position. (Step 16) The request is denied if the SLK is active and the specified VFL is connected to the modem. (This case is tested in Step 19, and a request denial is the anticipated response.) Normally, if it is necessary to test an active

| STEP | ACTION   | VERIFICATION  |
|------|--|---|
|      | <p>VFL, <b>signaling must be removed from the VFL before connecting it to the test position.</b> (A SLKs should be activated on the other VFL and F SLKs should be put in the ØØS-MAN-NE state prior to connecting the particular VFL to the test position.) An appropriate denial message is printed for whatever reason the request is denied.</p>   |   |
|      | <p>(b) Once a VFL is connected to the test position, it is unavailable to be used for signaling. The SLK A&amp;D alarm lamp is updated to reflect this condition and a TTY message is printed to signify that the connection has been made. Also, the ABN lamp on the A&amp;D panel and a lamp for the particular VFL at the test position are energized. These lamps serve as coordinated reminders to the craftspersons at the two areas that a VFL is at the test position.</p>                             |   |
|      | <p>(c) To perform circuit pack replacement on the VFL access circuit, the associated VFL should first be connected to the test position (message similar to that in Step 16) to prevent a system attempt to use that VFL. Power to the troubled pack can then be removed and the pack replaced. As soon as the necessary VFL repairs are performed, the VFL should be removed from the test position. The request can be made on the maintenance or test position TTY and has the format given in Step 18.</p> |   |
|      | <p>(d) When the VFL is returned to the system, a TTY message is printed and the A&amp;D panel is updated to reflect the restored VFL. That VFL should be tested using the system procedures and the results should be all-tests-pass (ATP) before the VFL is considered fully acceptable for signaling. <b><i>Under no circumstances should a VFL be left connected to the test position without active maintenance on that VFL.</i></b></p>   |   |
| 16   | <p>Connect the <b>standby</b> VFL of the "A" SLK to the test position using an SLM-02 formatted as follows:<br/>SLM-02-CTP-SLK:00-cc-VFL:A.</p>  | <p>TTY output<br/>SLM02 A-SLK:0-cc VFL:A CTP<br/>Alarm &amp; Display panel:<br/>ABN lamp lighted (amber)<br/>SLC secondary lamp lighted (amber)<br/>Test position:<br/>VFL lamp for this VFL lighted.</p> |

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| <b>STEP</b> | <b>ACTION</b>   | <b>VERIFICATION</b>   |
|-------------|---|---|
| 17          | Enter ABN-00-RPT. to verify correct system response.                        | TTY output:<br>ABN00 RPT:00000000000000000001   |
| 18          | Enter SLM-02-RTP-SLK:00-cc-VFL:A. to remove the VFL from the test position. | TTY output:<br>SLM-2 A-SLK 0-cc VFL:A RTP<br>Alarm & Display panel:<br>ABN lamp extinguishes. |

**SAFE STOP POINT**

|    |   |   |
|----|---|---|
| 19 | To obtain a request denial, enter an SLM-02 of the following format:<br>SLM-02-CTP-SLK:00-cc-VFL:B.<br>(Active VFL) | TTY output:<br>SLM02 A-SLK 0-cc VFL:A CTP DNY 1 |
|----|---|---|

**SAFE STOP POINT**  
**Internal VFL Loopback**

20 Notes: (a) The standby VFL of an A SLK is automatically looped-back to the STP during certain VFL tests (as was manually requested in Step 12). The loopback is established through relay contacts in the VFL access circuit via the 4 dB pad (see Fig. 1, lower left end of shaded test path.) Also, the VFL can be looped back within the switching office and tested from the manual VFL test position in the STP (dashed shaded test path). Because this internal loopback is less susceptible to manual interference than its external counterpart, the internal loopback may also be utilized in the manual VFL testing procedures. To establish this test configuration, the craftsperson at one end of the SLK can connect the VFL to the test position (SLM-02-CTP.....) and the craftsperson at the far-end office can establish the internal loopback of the same VFL (SLM-02-LPB.....) This allows the craftsperson at the VFL test position in one office to make extensive measurements of the looped VFL with minimal far-end interference.

(b) The internal loopback feature exists for both "A" and "F" SLKs at the SØ. (Due to the wired connection to the maintenance bus, it is not possible to establish the internal loopback for "A" SLKs at the STP.) The loopback is requested at either the maintenance TTY or test position TTY with the message given in Step 21 for an "A" SLK. No "F" links are tested as part of this evaluation. The request is analyzed to verify that the

| STEP | ACTION   | VERIFICATION   |
|------|--|--|
|      | <p>VFL can be looped back. If the request is not allowed, an appropriate denial message is provided. (Step 24). If the request is allowed, a TTY message is printed to signify that the loopback is established.</p> <p>(c) The looped back VFL is treated by the signaling security procedures in a manner similar to the VFL that is connected to the test position. The VFL is considered to be unavailable to be used for signaling, and it cannot be automatically seized by the system. For this reason, when the loopback is established, the ABN lamp and A&amp;D alarms are updated as described. Because the looped back VFL is unavailable for signaling, it should <b>not</b> be left in that state unless active repair is in progress. The loopback is disconnected by typing in the same message used to remove a VFL from the test position (Step 23).</p> |  |
| 21   | <p>Construct an SLM-02 to loopback the <i>standby</i> VFL of the "A" SLK being exercised. The format of the SLM-02 message is as follows: SLM-02-LPB-SLK:00-cc-VFL:A.</p>  | <p>TTY output:<br/>SLM02 A-SLK:0-cc-VFL:A LPB<br/>Alarm &amp; display panel:<br/>ABN lamp lighted<br/>Appropriate SLC steady secondary</p> |
| 22   | <p>To verify the correct ABN report condition, enter the following:<br/>ABN-00-RPT.</p>  | <p>TTY output:<br/>ABN00 RPT:00000000000000000001</p>  |
| 23   | <p>Construct an SLM-02 to remove the loopback condition from this standby VFL. The format of the SLM-02 message is as follows: SLM-02-RTP-SLK:00-cc-VFL:A.</p>   | <p>TTY output:<br/>SLM02 A-SLK:0-cc-VFL A RTP<br/>Alarm &amp; display panel:<br/>All lamps retired</p>                                     |
| 24   | <p>Construct an SLM-02 message to attempt placing the active VFL in the loopback mode. (This request is expected to be denied with an LPB denial code of 1 indicating it is carrying active traffic.) The format is as follows: SLM-02-LPB-SLK:00-cc-VFL:B.</p>  | <p>TTY output:<br/>SLM02 A-SLK:0-cc-VFL:B LPB DNY 1</p>  |

**WARNING: STEP 24 SHOULD BE CONDUCTED DURING A LIGHT TRAFFIC PERIOD IN CASE OF FAILURE.**

| STEP | ACTION | VERIFICATION |
|------|--------|--------------|
|------|--------|--------------|

**SAFE STOP POINT****E. DAS Status Verification**

- 1 Using a DAS-22-STATUS message, verify the status of the SØ DAS frames. The message format is as follows:  
DAS-22-STATUS.

TTY output:  
(See OM-68100 for the format of this message.)

**Note:** The data contained in the DAS22 output message will be given for *each DAS*. Unless a diagnostic is in progress, the CN & MX status words will be expected to be all zero's. The mode field for the controllers will contain a 1 in the LSB position indicating which controller is active. Deviations from the above format must be verified for validity. The layout of the DAS mode register is given in the DSF00 message format of OM-68100. For DAS frames in the DGN data state, the mode register will also indicate the 04 bit set. Use DST-05 input message to verify the data state as required (see Step 6-[c]).

**SAFE STOP POINT**

- 2 The DAS ignore memory is compared against the protected memory map for non-trunk points by using the following message format:  
IGM-01-REPT-DAS-0.

TTY output:  
TGM01 TGN MEM REPT:DAS 0 TØT=0

**Note:** Any discrepancies reported (i.e., TØT = not zero) should be due to a message requesting *temporary* changes in the DAS ignore bits serving the common equipment. Any non-zero outputs must be verified as being valid. The exception to the above is: TØT = 3000 or TØT = 4000, indicating non-equipped frames or no ignore map provided, respectively. The *row* and *point number* of the first DAS point which does not agree in the ignore status will be printed.

**SAFE STOP POINT**

- 3 Repeat 2 above for DAS-1.
- 4 Verify the highest matrix unit pair equipped on DAS frame 0. A separate message is required for each DAS frame. The format of the message is  
GMX-00-DAS:0.

Same as Step 2.

TTY output:  
GMX00 DAS:0 MUPE:d

**Note:** The MUPE d field should agree with the office physical equipment.

| STEP                   | ACTION   | VERIFICATION                                 |
|------------------------|--|--|
| <b>SAFE STOP POINT</b> |  |  |
| 5                      | Repeat the above for each equipped DAS frame. Format is the same except for the DAS number.  | TTY output<br>Same as in Step 4.             |
| 6                      | Confirm the data state for TAC 0, all terminals, and all DAS frames using the DST message. Message formats follow.   |  |
| 7                      | Type in the following:<br>DST-05-TAC:00.   | TTY output:<br>DST05 TAC:00 DATA STATE:ISV   |
| <b>SAFE STOP POINT</b> |  |  |
| 8                      | Type in the following:<br>DST-05-00T:00.   | TTY output:<br>DST05 00T:00 DATA STATE:ISV   |
| <b>SAFE STOP POINT</b> |  |  |
| 9                      | Repeat Step 8 for all equipped terminals (optional step)   | Same as Step 8 except for terminal number.   |
| 10                     | Type in the following:<br>DST-05-DAS:00.   | TTY output:<br>DST05 DAS:0 DATA STATE:ISV    |
| <b>SAFE STOP POINT</b> |  |  |
| 11                     | Repeat Step 10 for all equipped DAS frames. (Optional step)  | Same as Step 10 except for DAS frame number. |
| <b>SAFE STOP POINT</b> |  |  |
| 12                     | Select the first <b>unequipped</b> TAC position (only one TAC in an S0, therefore this will be TAC #1) and check the state of the software for this TAC as follows:<br>DST-05-TAC:01   | TTY output:<br>DST05 TAC:01 DATA STATE:NEQ   |
| <b>SAFE STOP POINT</b> |  |  |
| 13                     | Select the first <b>unequipped</b> terminal position and check the state of the software for this terminal as follows:<br>DST-05-00T:xx (where xx = first unequipped terminal number). | TTY output:<br>DST05 00T:xx DATA STATE:NEQ   |

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| <b>STEP</b>   | <b>ACTION</b>   | <b>VERIFICATION</b>  |
|---|---|--|
| <b>SAFE STOP POINT</b>  |   |  |
| 14  | Select the first <b>unequipped</b> DAS frame and check the state of the software for this frame as follows:<br>DST-05-DAS:xx. (where xx = first unequipped DAS frame).  | TTY output:<br>DST05 DAS:xx DATA STATE:NEQ                                     |
| <b>SAFE STOP POINT</b><br><b>DAS 55, DAS 66 INPUT MESSAGES</b>  |   |  |
| <b>NOTES:</b>   |   |  |
| (a)   | The DAS-55 input message is normally used to update an out-of-service DAS controller prior to it being restored to service. When this message is used to request an update while the controllers are in the duplex mode, the anticipated response is a DAS-55 output message with a result code of 2 (See OM-68100). The DAS-66 input message is normally used to request a specific DAS controller to assume the active state from an ØS state. These two messages are exercised in the following test.  |  |
| (b)   | Normal duplex operation is assumed to exist for this test. During normal duplex operation, the contents of the DAS controllers simplex registers (see 212-804-101, paragraph 3.07 for a list of simplex and duplex registers) are returned to the SPC only from the "active" controller, along with the matched contents of the various duplex registers from both controllers. The above test only exercises one of the 10 possible update codes (see DAS 55 in OM-68100) that can result from the DAS-55 input message according to the status of the system. |  |
| 15  | Type in the following:<br>DAS-66-REQ-ACT-DAS-1-0  | TTY output:<br>DAS66 DAS 1-0 ACTIVE  |
| <b>Note:</b> If requested to change to a bad controller, the request is not honored. The <b>active</b> controller will be reported in DAS 66. |   |  |
| 16  | Type in the following:<br>DAS-55-UPD-DAS-1-1 (Updates the inactive [standby] controller)  | TTY output:<br>DAS55 UPD REPT DAS 1-1 CODE:2 (DAS not in update status state.) |

| STEP | ACTION | VERIFICATION |
|------|--------|--------------|
|------|--------|--------------|

**SAFE STOP POINT****DAS 88, DAS 99 Input Messages**

**Note:** The DAS 88 input message is normally used to provide a temporary change to the ignore memory map (generate non-reporting scan points), generally for maintenance purposes. The DAS 99 input message is normally used to provide permanent changes to ignore memory and the ignore map data table for organization of the office. Two aspects of the DAS 88 input message are tested in the following tests. These tests are to promote familiarity with the DAS and with these messages. Steps 17 through 19 exercise an **unequipped** DAS scan point; steps 20 through 22 exercises the trunk translation routine and 6 exercises the trunk translation routine and insures that the DAS 88 and DAS 99 input messages do not change the ignore memory map associated with a trunk scan point.

- |    |  |   |
|----|--|---|
| 17 | <p>Type in the following:<br/>DAS-88-DAS-0-ROW:rrr-BIT:bb WIGM=0.</p> <p><b>Note:</b> Select an <b>unequipped</b> DAS scan point for use in this test, using office data.</p>  | <p>TTY output:<br/>DAS99 DAS-0 ROW:rrr BIT:bb<br/>WIGM=0 CODE:10<br/>ABN Lamp on CCIS A &amp; D panel should be lighted.</p>  |
| 18 | <p>Using the ED 56040 drawing, Section 212-804-701, and Fig. 2 of this section as required, locate the scan point terminals associated with the scan point of Step 17. Using a clip lead, short the ground and hot leads of this point together <b>temporarily</b>.</p> <p><b>WARNING: BE CERTAIN TO SHORT THE CORRECT SCAN POINT!</b></p> | <p>TTY output:<br/>DAS44 NON-EQP SC PT CHG<br/>DAS:0 ROW:rrr BIT:bb DIR:1<br/>DAS 44 NON-EQP SC PT CHG<br/>DAS:0 ROW:rrr BIT:bb DIR:0</p> <p><b>Note:</b> The above represents the temporary shorting of the non-equipped point. Multiple DAS 44 messages may be outputted due to multiple scans while shorting the scan point.</p> |
| 19 | <p>Type in the following:<br/>ABN-00-RPT</p> <p><b>Note:</b> This verifies correct system response.</p>  | <p>TTY output:<br/>ABN RPT:000000001000000000<br/>(Reference OM-68100 for other possible ABN states.)</p>   |
| 20 | <p>Type in the following:<br/>DAS-88-DAS-0-ROW:rrr-BIT:bb-WIGM=1.</p> <p><b>Note:</b> This restores the point to a non-reporting status.</p>   | <p>DAS99 DAS-0 ROW:rrr BIT:bb<br/>WIGM=1 CODE:10<br/>ABN lamp on the CCIS A &amp; D panel extinguishes.</p>   |

| STEP                   | ACTION   | VERIFICATION  |
|------------------------|--|---|
| <b>SAFE STOP POINT</b> |  |   |
| 21                     | Select a scan point serving a trunk unit by the following method:<br>Using the DMX-55 input message, request a translation of the trunk ID to DAS ROW and BIT number. Format is as follows:<br>DMX-55-TRANS-TRK:aa-bb. | <b>Note:</b> This output message will give the row and bit number common to the scan and distribute point associated with this trunk.<br><br>TTY output:<br>DMX55 TRANS TRK:aa-bbb<br>DMX C ROW:ddd BIT:ee<br># TRKS ff |
| 22                     | Type in the following:<br>DAS-88-DAS-c-ROW:ddd-BIT:ee-WIGM=1.<br><br>( <b>Note:</b> Variable fields from output message of Step 21.)   | TTY output:<br>DAS 99 DAS-c ROW:ddd BIT:ee<br>WIGM=1 CODE:15<br><br><b>Note:</b> Code 15 or code 05 means this point belongs to a trunk & cannot be changed by this instruction.  |

**SAFE STOP POINT**

|    |  |  |
|----|--|--|
| 23 | Type in the following:<br>DAS-99-DAS-c-ROW:ddd-BIT:ee-WIGM=1.<br>(This <b>attempts</b> to set a trunk point to a non-reporting status) | DAS99 DAS-c ROW:ddd BIT:ee<br>WIGM=1 CODE:05 |
|----|--|--|

**F. Diagnostics For DAS Matrix, DAS Controller, TAC and Terminal**

|   |   |                          |
|---|---|--------------------------|
| 1 | Request diagnostics on the DAS frame 0, DAS controller 0 using the following message:<br>REQ-01-DGN-N-DAS-00-0. | DR03 DGN RES DAS-0-0 ATP |
|---|---|--------------------------|

**SAFE STOP POINT**

|     |   |   |
|-----|---|---|
| 2   | Perform a diagnostic on DAS frame 0, DAS controller 1 by taking the following manual actions at DAS frame 0   |   |
| (a) | Operate the REQ INH key for controller 1  | (a) OS lamp and OFF NOR lamp on DAS A & D panel lights—<br>DAS S MN<br>Audible Alarm:<br>Minor alarm<br>TTY output:<br>MCC01 OK TO REMOVE PWR DAS 0-1 |
| (b) | Operate the NORMAL key to restore the controller. (This causes diagnostics to be run on this controller and is an alternate method of initiating diagnostics on a DAS controller. | (b) A&D lamps retired.<br>TTY output:<br>DR03 DGN RES DAS 0-1 ATP   |

| STEP                   | ACTION   | VERIFICATION   |
|------------------------|--|--|
| <b>SAFE STOP POINT</b> |  |  |
| 3                      | Repeat Step 2 for the remaining DAS controllers in the S0.   | Same as Step 2, except for DAS frame and controller number.  |
| <b>SAFE STOP POINT</b> |  |  |
| 4                      | Request diagnostics on the DAS matrix ( <i>not</i> duplicated) in DAS frame 0 using the following message:<br>REQ-01-DGN-N-DMX-00-N.   | TTY output:<br>DR03 DGN RES DMX 0 ATP  |
| <b>SAFE STOP POINT</b> |  |  |
| 5                      | Perform a diagnostic on the remaining DAS matrix units (not duplicated) by taking the following manual actions at each DAS frame:      |  |
| (a)                    | Operate REQ MX REP   | A&D panel lamp lighted:<br>MN<br>Minor alarm sounds<br>DMX22—DO NOT REPAIR DMX y<br>Where y represents the frame number. |
| (b)                    | Operate the NORMAL key to restore the matrix.  | TTY output:<br>DR03 DGN RES DMX y ATP  |
|                        | <b>Note:</b> The method of Step 4 can also be used to test subsequent DAS matrix units.  |  |
|                        | <b>Note:</b> The REQ MX REP was refused since it was not preceded by a DMX-99 REP message. Return to NORMAL initiates the diagnostics. |  |
| <b>SAFE STOP POINT</b> |  |  |
| 6                      | Request diagnostics on TAC 0, controller 0, by typing in:<br>REQ-01-DGN-N-TAC-00-0.  | TTY output:<br>DR03 DGN RES TAC 0-0 ATP<br>TAC05 0-0..... (See OM-68100)   |
| <b>SAFE STOP POINT</b> |  |  |
| 7                      | Repeat above for controller 1 of TAC 0 by typing in:<br>REQ-01-DGN-N-TAC-00-1.   | TTY output:<br>DR03 DGN RES TAC 00-1 ATP<br>TAC05 0-1.....(See OM-68100)   |

| STEP  | ACTION   | VERIFICATION  |
|---|--|---|
| <b>SAFE STOP POINT</b>  |  |   |
| 8   | Request diagnostic on terminal 0 by typing in:   |   |
|   | (a) SLM-01-ØØS SLK:00-cc-VFL:B (Take appropriate SLK ØØS)  | TTY output: (step a)<br>SLM00 a-SLK:b-cc VFL:B ØØS MAN NE<br>Alarm and Display Panel:<br>Flashing Secondary for appropriate link.   |
|   | (b) REQ-01-DGN-N-00T-aa-0. (Where aa is the terminal number)   | TTY output: (step b)<br>DR03 DGN RES 00T-00 ATP   |
|   | (c) SLM-01-ACT-SLK:00-cc-VFL:B (Restores SLK to service)   | TTY output: (step c)<br>SLM00 a-SLK:b-cc VFL:B ACT<br>Alarm and Display Panel:<br>Alarms extinguish   |
| <b>SAFE STOP POINT</b>  |  |   |
| <b>OPTIONAL STEP; NOT recommended except during initial turn-up testing.</b>  |  |   |
| 9   | Repeat Step 8 for each equipped terminal unit in the SØ.   | TTY output:<br>DR03 DGN RES 00T-xx ATP (where xx is the terminal number)  |
| <b>SAFE STOP POINT</b>  |  |   |
| <b>G. Automatic ISRT Status Changes and Diagnostics</b>   |  |   |
| <b>Note:</b> Part G is written assuming that (1) 2 ASRT's are provided, (2) that no ASRT problems are detected, and (3) that the second ASRT is in a condition that will permit it to be interrupted, ie, not running a demand-test or an ASRT diagnostic, when the request is entered to return the first ASRT to the active (RUN) status. |  |   |
| 1   | Type in the following message to take ASRT 0 manual-out-of-service (MOS):<br>SØT-87-MØS0.  | TTY output:<br>SØT06 IS:0 AUTØ:S COND:MOS/.....   |
| 2   | Type in the following message to restore the ASRT to active service:<br><b>Note:</b> Diagnostics will be performed as a result of this message prior to restoring the frame to service.<br>SØT-87-RUN 0. | TTY outputs: (See SØT06 in OM-68100)<br>SØT06 IS:0 AUTØ:S CØND:OK0.....<br>(This message indicates it is OK to begin diagnostics on ASRT 0),<br>SØT06 IS:0 AUTØ:S CØND:AØS6.....<br>(This message indicates ASRT 0 has been made automatic-out-of-service and diagnostics are running.) |

| STEP | ACTION  | VERIFICATION   |
|------|---|--|
| 3    | Repeat Steps 1 and 2 on ASRT 1. The respective inputs are as follows:<br>SØT-87-MØS 1. (Step 2)<br>SØT-87-RUN 1. (Step 3) | <p>SØT06 IS:1 AUTØ:S CØND:AØS2.....<br/>           (This message indicates ASRT 1 has been made AOS to allow ASRT 0 exclusive access to the DREG; and is only present if 2 ASRT's are provided.)</p> <p>SØT056 IS:0 AUTØ:S CØND:ØK0.....<br/>           (This message indicates the status of the ASRT has been restored to an active condition.)</p> <p>SØT02 ATP TST:D19 IS:0 FØ:0 ISR TC:20<br/>           (This message indicates the 20 phase diagnostic is ATP on ASRT 0.)</p> <p>SØT06 IS:1 AUTØ:S CØND:ØK0.....<br/>           (This message indicates that ASRT 1 has also been restored to active status after the diagnostics were completed on ASRT 0; and is only present when both ASRT's are provided.)</p> <p><b>Note:</b> Any ASRT problems, data problems, or software bugs are reported via SØT 10's, and should be cleared before proceeding. Refusal codes may appear in SØT01's, and should be investigated, the appropriate action taken, and the tests repeated.</p> |
|      |   | <p>TTY output:<br/>           Same as in Steps 1 and 2 except the opposite ASRT numbers (IS:0 or 1) will be printed in the output messages, indicating the role reversal.</p>  |

#### H. Automatic ISRT Transceiver (ASRT) Tests

**Note 1:** This test uses the XCV-03 message to verify the status of all transceivers in the SØ (Step 1). Then the SØT-57 message is used to test all transceivers in the office through the automated ASRT. If the office contains 2 automated ASRT's, and a B (both) option is chosen for designating the ASRT choice, each ASRT will test the circuits assigned to that ASRT. A *separate* group of output data will be printed in the form of SØT02 output messages as a result of the single SØT-57 input message; one group will be associated with each automated ISRT test frame, as identified in the IS:(0,1) field of the SØT02 messages. Two options of the SØT-57 message are given; the office supervisor should decide which option to run, based upon

## STEP

## ACTION

## VERIFICATION

the amount known about the status of the transceivers.

**Note 2:** Test 15 is the only test in the test chart specifically dedicated to transceiver testing; although other tests may *use* a transceiver in performing a test of other circuits. Test 15 is comprised of 7 subtests, numbered 1 through 7. All 7 tests can be run by specifying a zero in the h (last) subfield of the SØT-57 input message when test 15 is specified in the test number subfield.

- 1 List any ØØS transceivers by typing in the following message:  
XCV-03-LIST ØS.

TTY output:

If none ØØS, PF followed by (LØS01  
If some ØØS; PF followed by XCV20;  
See OM-68100 for the format of the XCV20 transceiver status message.

**DANGER:** *Option 1 (following) uses the override maintenance busy option; all circuits will be tested regardless of their status.* Option 2 should be used if transceivers are undergoing modification, since testing could occur while personnel are working on the equipment, resulting in both a personnel hazard and possible damage to the circuits.

## OPTION 1:

- 2 Test all transceivers (test 15, all subtest option) in the office by typing in the following message:  
SØT-57-TCV-9999-015-ABØØ.

TTY output:

SØT02 ATP TST:B015 IS:0  
SØT02 ATP TST:B015 IS:1

**Note:** The above response is only to be expected if *all* transceivers are ATP. The following messages can also occur:

SØT02 END TST:B015 IS:(0)  
FØ:0 TCV TC:ggg MBS:hhh FLT:iii ERR:jjj  
SØT02 END TST:B015 IS:1 FØ:0 TCV TC:ggg  
MBS:hhh FLT:iii ERR:jjj

SØT07 ØMB IS:0 CKT:ccc cccccc-cc TST:D0

SØT07 ØMB IS:1 CKT:ccc cccccc-cc TST:D0

**plus** XCV11 output messages which further define the transeceiver failures. (See OM-68100 for complete definition of these messages.) Also, transceiver test 0 (final 0 in the input message) commands 7 separate transceiver subtests. If either subtest 1 and 2, or subtest 7 fails, the transceiver will be removed from service if no other transceivers in this group

| STEP | ACTION | VERIFICATION |
|------|--------|--------------|
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are ØØS. In this event, an XCV05 and XCV20 will be printed. If other subtests fail, the transceiver remains in-service, but may be operating marginally.

### SAFE STOP POINT

**Note:** If there is only 1 ASRT test frame in the SØ, substitute the frame number (0 or 1) of the automated frame for the B in the above message and only one SØT02 END output message and one SØT02 FIN output message will occur. If defective transceivers are known to exist, it is recommended that these transceivers be made maintenance-busy (via an XCV-01-REMOVE-a-b-c input message), and the SØT-57 message of Step 3 be used rather than the Step 2 version of this message.

### OPTION 2

- 3 Test all transceivers in the office that are not maintenance-busy by typing in the following message:  
SØT-57-TCV-9999-015-ABSØ.

**Note:** This input message is identical to the message of Step 2 except the ABØØ field is changed to ABSØ. This change permits the test of all maintenance-busy to be "skipped" (as opposed to "overridden"). Assuming all defective transceivers are typed maintenance-busy, and all tests are able to be performed, the sum of the ggg field and the hhh field should equal the total number of equipped transceivers in the office. Any test failures (previously unknown) should be reported via the XCV-11 message.

TTY output:

```
SØT02 END TST:B015 IS:0 FØ:0 TCV TC:ggg
MBS:hhh
SØT02 END TST:B015 IS:1 FØ0 TCV TC:ggg
MBS:hhh
```

**Note:** Any maintenance busy circuits will result in a SØT07-SMB notifying the craftsperson that a skip of an MB circuit has occurred.

### SAFE STOP POINT

#### I. Other Automatic ISRT Tests

**Note:** Steps 1 through 10 test individual circuits of the ten types shown. Frame (002) and unit (1) numbers were arbitrarily selected and a different unit may be chosen if desired. (Skip any circuits not equipped in the office;

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|------|--|--|
|      | a SØT01 with a refusal code of 12 will result from any unequipped circuit type entry.) |  |
| 1    | Type in the following:<br>SØT-57-ØPL-002-1-000-ASSN.<br>(ØPL = outputser)              | TTY output: (either one)<br>SØT02 ATP TST:B000 IS:0 FØ:0 ØPL TC:1<br>SØT02 ATP TST:B000 IS:1 FØ:0 ØPL TC:1<br><br><b>Note:</b> Only one of the messages shown will be printed; the circuit assignment will be to one ISRT, and that ISRT (identified by the IS:0 or IS:1 field) will test the circuit. This same note applies to Steps 1 through 10. |

**SAFE STOP POINT:**

|   |   |  |
|---|---|--|
| 2 | Type in the following:<br>SØT-57-MFS-002-1-000-ASSN.<br>(MFS=Multifreq sender-outputser, sender test) | TTY output: (either one)<br>SØT02 ATP TST:B000 IS:0 FØ:0 MFS TC:1<br>SØT02 ATP TST:B000 IS:1 FØ:0 MFS TC:1 |
|---|---|--|

**SAFE STOP POINT**

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|---|--|--|
| 3 | Type in the following:<br>SØT-57-MFØ-002-1-000-ASSN.<br>(MFØ = Multifreq sender-outputser, outputser test) | TTY output: (either one)<br>SØT02 ATP TST:B000 IS:0 FØ:0 MFØ TC:1<br>SØT02 ATP TST:B000 IS:1 FØ:0 MFØ TC:1 |
|---|--|--|

**SAFE STOP POINT**

|   |   |   |
|---|---|---|
| 4 | Type in the following:<br>SØT-57-MFX-002-1-000-ASSN.<br>(MFX = Multifreq sender-outputser, combined test) | TTY output: (either pair)<br>SØT02 ATP TST:B000 IS:0 FØ:0 MFS TC:1<br>SØT02 ATP TST:B000 IS:1 FØ:0 MFS TC:1<br>SØT02 ATP TST:B000 IS:0 FØ:0 MFØ TC:1<br>SØT02 ATP TST:B000 IS:1 FØ:0 MFØ TC:1 |
|---|---|---|

**SAFE STOP POINT**

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|---|--|--|
| 5 | Type in the following:<br>SØT-57-RGN-02-01-000-ASSN.<br>RGN = Dial pulse reg. Non-CAMA | TTY output: (either one)<br>SØT02 ATP TST:B000 IS:0 FØ:0 RGN TC:1<br>SØT02 ATP TST:B000 IS:1 FØ:0 RGN TC:1 |
|---|--|--|

**Note:** Note the different placement of the hyphens in the frame-circuit number fields for Step 4 and Step 5. Although the hyphens can be inserted or omitted, the **position** of the four numbers in this field determines whether it is interpreted as a frame designation or circuit number designation, **and varies with unit type** (See IM-68100). For example, 0201 specifies frame 20, circuit 1

| STEP   | ACTION   | VERIFICATION  |
|--|--|---|
|  | when applied to MF0's and frame 2, circuit 1 when applied to registers. <i>Use of the hyphens is recommended procedure.</i>  |   |
| <b>SAFE STOP POINT</b>   |  |   |
| 6  | Type in the following:<br>SØT-57-RGC-02-01-000-ASSN.<br>RGC = Dial pulse reg., CAMA  | TTY output: (either one)<br>SØT02 ATP TST:B000 IS:0 FØ:0 RGC TC:1<br>SØT02 ATP TST:B000 IS:1 FØ:0 RGC TC:1  |
| <b>SAFE STOP POINT</b>   |  |   |
| 7  | Type in the following:<br>SØT-57-RGX-02-01-000-ASSN.<br>RGX = Dial pulse reg., combined CAMA & Non-CAMA  | TTY output: (either pair)<br>SØT02 ATP TST:B000 IS:0 FØ:0 RGN TC:1<br>SØT02 ATP TST:B000 IS:1 FØ:0 RGN TC:1<br>SØT02 ATP TST:B000 IS:0 FØ:0 RGC TC:1<br>SØT02 ATP TST:B000 IS:1 FØ:0 RGC TC:1   |
| <b>SAFE STOP POINT</b>   |  |   |
| 8  | Type in the following:<br>SØT-57-DPS-002-1-000-ASSN.<br>DPS = Dial pulse sender  | TTY output: (either one)<br>SØT02 ATP TST:B000 IS:0 FØ:0 DPS TC:1<br>SØT02 ATP TST:B000 IS:1 FØ:0 DPS TC:1  |
| <b>SAFE STOP POINT</b>   |  |   |
| 9  | Type in the following:<br>SØT-57-AMA-002-1-000-ASSN.<br>AMA = CAMA sender  | TTY output: (either one)<br>SØT02 ATP TST:B000 IS:0 FØ:0 AMA TC:1<br>SØT02 ATP TST:B000 IS:0 FØ:0 AMA TC:1  |
| <b>SAFE STOP POINT</b>   |  |   |
| 10   | Type in the following:<br>SØT-57-ISR-0000-999-ASØN.<br>ISR=ASRT diagnostic<br><br><b>Note:</b> If two ASRT's are provided, the <b>other</b> ASRT must be in an interruptible state, ie, not doing a demand test or a test that requires the DREG full time, such as the ASRT diagnostic. | TTY output:<br>SØT02 ATP TST:B000 IS:0 FØ:0 ISR TC:1<br>SØT06....(reports any status change required to go to diagnostic state)<br>SØT01 REFUSED:x (may possibly occur if ASRT 1 is in a non-interruptible test state. If so, repeat test after the conflicting state is clear; se SØT01 for all possible refusal codes.) |
| <b>SAFE STOP POINT</b>   |  |   |
| <b>Note:</b> Step 11 or Step 12 (optional, as for transceiver tests) of this section may require several days to complete. Plan accordingly, or omit if a fairly comprehensive test is not appropriate. For initial cutover, it is recommended that this is the <b>minimum</b> amount of testing to be performed. Other test |  |   |

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sequences (see notes in SD-68491) may be added at the discretion of the office supervisor.

**Note:** Either ISRT may finish and report test results first. **Test failures** are reported via the SOT00; the SOT10 output message reports problems encountered in trying to **perform** a test, as opposed to a test failure.

**OPTION 1:**

**DANGER:** This test uses the override maintenance busy option; all circuits will be tested **regardless of their status**. Option 2 should be used if any circuits tested by the ASRT are undergoing modifications, since testing could occur while personnel are working on the equipment, resulting in both a personnel hazard and possible damage to the circuits.

11 Type in:  
SOT-57-XXX-9999-000-ABØN.

**Note:** Assuming all circuits are thought to be operational, this option should be selected; substitute a 1 or 0 for the B in the ABØN portion of the message if only one ASRT is equipped. The MFS, DPS, RGN, AMA, RGC, MFØ, and ØPL equipment will be tested (test 0) by one of the ASRT's, according to ASRT assignment by the options chosen in this message, and the results of each equipment grouping test should be ATP. Any unequipped circuit types will be skipped without comment. (All maintenance-busy equipment is also tested, and must be ATP. Transceivers are **not** tested, since only test 15 applies to transceivers.) If only one ASRT is equipped, expect only half as many results. These replies should originate from the ASRT identified in the IS:(0 or 1) field. Since it may not be realistic to anticipate **all** the equipment to be operational, (those that are maintenance busy may logically be expected to fail test 0), **the SOT-57 format in Step 12 may be more desirable when identified faults are known to exist; these units should be made maintenance-busy.**

SØT07's possible if equipment maintenance busy.

SØT02 ATP TST:B000 IS:0 FØ:0 MFS TC:ggg  
 SØT02 ATP TST:B000 IS:1 FØ:0 MFS TC:ggg  
 SØT02 ATP TST:B000 IS:0 FØ:0 DPS TC:ggg  
 SØT02 ATP TST:B000 IS:1 FØ:0 DPS TC:ggg  
 SØT02 ATP TST:B000 IS:0 FØ:0 RGN TC:ggg  
 SØT02 ATP TST:B000 IS:1 FØ:0 RGN TC:ggg  
 SØT02 ATP TST:B000 IS:0 FØ:0 AMA TC:ggg  
 SØT02 ATP TST:B000 IS:1 FØ:0 AMA TC:ggg  
 SØT02 ATP TST:B000 IS:0 FØ:0 RGC TC:ggg  
 SØT02 ATP TST B000 IS:1 FØ:0 RGC TC:ggg  
 SØT02 ATP TST B000 IS:0 FØ:0 MFO TC:ggg  
 SØT02 ATP TST B000 IS:1 FØ:0 MFO TC:ggg  
 SØT02 ATP TST B000 IS:0 FØ:0 ØPL TC:ggg  
 SØT02 ATP TST B000 IS:1 FØ:0 ØPL TC:ggg  
 SØT02 FIN TST:B000 IS:0  
 SØT02 FIN TST:B000 IS:1

**Note 1:** The order of outputs may vary, since the two ISRT's do not run at the same rate. The SØT02 FIN .... message for each ISRT indicates the completion of the sequence by that ISRT. (Circuit failures are noted by SØT00; the SØT10 messages reports problems in performing the test). SØT07 message report any overridden MB circuits tested.

**Note 2:** If only one ASRT is equipped, or if all circuits of a type are assigned to a single ASRT, only one SØT02 message for

| STEP | ACTION | VERIFICATION |
|------|--------|--------------|
|------|--------|--------------|

that circuit type will be printed. The assigned ASRT is identified in the IS:(0 or 1) field.

### SAFE STOP POINT

#### OPTION 2

- 12 Type in the following:  
SØT-57-XXX-9999-0000-ABSN.

**Note:** Prior to entering the above message, make **all known faulty** sender-outpulsers, outpulsers, etc. maintenance busy. (Note that in the final field, ABSN, the "S" indicates "skip all maintenance busy circuits". This prohibits an "ATP" response, but permits all non-maintenance busy circuits of the types indicated in the SØT02 END ..... output message to be tested.) Both ISRT's are used to test these circuits according the assignment data, assuming both are modified into ASRT's. If only one **Automatic** ISRT exists, substitute a 1 or 0 for the "B" in the ABSN field and anticipate only the appropriate output responses to occur.

SØT02 END TST:B000 IS:0 FØ:0 MFS TC:ggg  
MBS:hhh FLT:00 ERR:000  
SØT02 END TST:B000 IS:1 FØ:0 MFS TC:ggg  
MBS:hhh FLT:000 ERR:000  
SØT02 END TST:B000 IS:0 FØ:0 DPS TC:ggg  
MBS:hhh FLT:000 ERR:000  
SØT02 END TST:B000 IS:1 FØ:0 DPS TC:ggg  
MBS:hhh FLT:000 ERR:000  
SØT02 END TST:B000 IS:0 FØ:0 RGN TC:ggg  
MBS:hhh FLT:000 ERR:000  
SØT02 END TST:B000 IS:1 FØ:0 RGN TC:ggg  
MBS:hhh FLT:000 ERR:000  
SØT02 END TST:B000 IS:0 FØ:0 AMA TC:ggg  
MBS:hhh FLT:000 ERR:000  
SØT END TST:B000 IS:1 FØ:0 AMA TC:ggg  
MBS:hhh FLT:000 ERR:000  
SØT02 END TST:B000 IS:0 FØ:0 RGC TC:ggg  
MBS:hhh FLT:000 ERR:000  
SØT02 END TST:B000 IS:1 FØ:0 RGC TC:ggg  
MBS:hhh FLT:000 ERR:000  
SØT02 END TST:B000 IS:0 FØ:0 MFO TC:ggg  
MBS:hhh FLT:000 ERR:000  
SØT02 END TST:B000 IS:1 FØ:0 MFO TC:ggg  
MBS:hhh FLT:000 ERR:000  
SØT02 END TST:B000 IS:0 FØ:0 ØPL TC:ggg  
MBS:hhh FLT:000 ERR:000  
SØT02 END TST:B000 IS:1 FØ:0 ØPL TC:ggg  
MBS:hhh FLT:000 ERR:000  
SØT02 FIN TST:B000 IS:0  
SØT02 FIN TST:B000 IS:1

**Note:** In the SØT02 END..... messages, the ggg field is the number of test completions and hhh is the number of circuits of each type which are maintenance-busy. Assuming all circuits with known problems are made maintenance-busy prior to this test, and all tests are able to be performed, the sum of ggg and hhh for each type should equal all equipped hardware of the designated type. Any additional (previously unknown) equipment failures should be identified in SØT00 output message, and listed as either faulted or in error. A SØT10 message should be printed for any problems encountered in performing

| STEP | ACTION | VERIFICATION  |
|------|--------|---|
|      |        | a test, as opposed to a test failure of a circuit under test. Order of response may vary; if there is only one automatic ISRT, the responses will only be from one, and the TST:B000 field will be TST:D000. SØT07 messages identify any overridden MB circuits tested. |

**SAFE STOP POINT**

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|----|--|---|
| 13 | Use a SØT-77 message to test all transverters in group A. The format is as follows:<br>SØT-77-TVA-9999-000-0-000-ABSN. | If ATP:<br>SØT02 ATP TST:B000 IS:0 FØ:0 ISR TC:1<br>SØT02 ATP TST:B000 IS:1 FØ:0 ISR TC:1<br>If some circuits MB:<br>Any MB transverters will result in a single SØT02 END ..... message and a SØT07 SMB ... message for each MB transverter. |
| 14 | Use a SØT-77 message to test all transverters in group B. The format is as follows:<br>SØT-77-TVB-9999-050-0-000-ABSN. | Same message as indicated in Step 13 can occur.   |
|    | <b>Note:</b> Each transverter in group B is paired with AMA sender circuit 0 in frame 50 (050-0).                      |   |

**J. Confirmation of ASRT Scheduled Testing**

**3.06** One of the most important actions to be taken during a 4A/CCIS switching office evaluation is to confirm the ASRT scheduled test routine. The following procedure requires no action on the part of the craftsperson other than a review of the TTY printouts obtained during an ASRT scheduled test interval. (See section 212-214-301, Automated Incoming Register Test Frame: Method of Operation, for a description of the ASRT scheduled test routine.) By reviewing the printout of the scheduled high-priority tests for all test zero and test 15 SØT02 test summary messages, a quick check of the circuit equipment tables is possible. Since test zero is normally scheduled to run on all circuits tested by the ASRT except transceivers (other exceptions will be discussed later), and test 15 is scheduled to run on all transceivers, a complete list of all equipped circuits tested by the ASRT should appear in the various SØT02 messages which are printed during each high priority scheduled test interval:

- (a) SØT02 (ATP or END) TST:S0 IS:(0 or 1) FØ:0 MFS TC:ggg MBS:hhh FLT:iii ERR:jjj
- (b) SØT02 (ATP or END) TST:S0 IS:(0 or 1) FØ:0 DPS TC:ggg MBS:hhh FLT:iii ERR:jjj
- (c) SØT02 (ATP or END) TST:S0 IS:(0 or 1) FØ:0 RGN TC:ggg MBS:hhh FLT:iii ERR:jjj
- (d) SØT02 (ATP or END) TST:S0 IS:(0 or 1) FØ:0 AMA TC:ggg MBS:hhh FLT:iii ERR:jjj
- (e) SØT02 (ATP or END) TST:S0 IS:(0 or 1) FØ:0 RGC TC:ggg MBS:hhh FLT:iii ERR:jjj
- (f) SØT02 (ATP or END) TST:S0 IS:(0 or 1) FØ:0 MFØ TC:ggg MBS:hhh FLT:iii ERR:jjj
- (g) SØT02 (ATP or END) TST:S0 IS:(0 or 1) FØ:0 ØPL TC:ggg MBS:hhh FLT:iii ERR:jjj

(h) SØT02 (ATP or END) TST:S0 IS:(0 or 1) FØ:0 TVA TC:ggg MBS:hhh FLT:iii ERR:jjj

(e) SØT02 (ATP or END) TST:S0 IS:(0 or 1) FØ:0 TVB TC:ggg MBS:hhh FLT:iii ERR:jjj

(j) SØT02 (ATP or END) TST:S15 IS:(0 or 1) FØ:0 MFS TC:ggg MBS:hhh FLT:iii ERR:jjj

For each of the above messages (a) through (j), **the sum of the TC and MBS fields in each message should always equal the total number of circuits of the type specified in the message equipped in the office.**

**3.07** The above review of the TTY printout should, assuming the ASRT test program is working properly, normally provide a sufficient check of the scheduled tests being performed. **However, there is no substitute for a complete check of ALL SØT02 messages covering the entire period required for ALL tests to be performed.** Since a SØT02 summary message is printed at the completion of each test on each circuit type, an exact hard copy record of what scheduled tests the ASRT is performing is constantly being generated in an operating office. A complete review of the SØT02 output messages is recommended during the precutover interval and at any time a major program change has been made involving either the skiptab table (Ø3SKPTAB) or the Ø3 series of equipment tables. These tables are used by the ASRT test programs to construct which test (Ø3SKPTAB) is to be performed, and which circuits are equipped and eligible for testing by the ASRT (Ø3 series of equipment tables). Each test on the test chart is assigned a position in the Ø3SKPTAB matrix. A zero in the position assigned to that test means that this test will be performed on a scheduled basis by the ASRT on every circuit of each type eligible for that test. Conversely, a one in the Ø3SKPTAB matrix assigned to a particular test means that this test will be **skipped**, and will not be performed by the scheduled test routine on **any** of the circuits within the office. **Note that no testing of some circuit types, while omitting other circuit types, is permitted via Ø3SKPTAB. If for some reason a portion of the circuits cannot be tested on a scheduled basis by a particular test, and hence must be left non-scheduled by Ø3SKPTAB, the remaining circuits should be tested using demand automatic tests on a manually scheduled basis.**

- Procedures for verifying the Ø3SKPTAB table and Ø3 series of equipment tables are also contained in 212-214-502. In the event all circuits which can be tested via the ASRT on a scheduled basis are not being tested, reference should be made to the appropriate part of Section 212-214-502.

#### K. CIOT Self Test

| STEP | ACTION  | VERIFICATION  |
|------|---|---|
| 1    | Initiate a self test of CIOT Access circuits #1 and #2 by typing in the following message:<br>TKM-45-1-2.<br>(See 6.09 for information regarding the CIOT frame.) | TTY outputs:<br>TKM50 TRK:aa-bbb RESULT:*ATP<br>TKM50 TRK:aa-bbb RESULT:*ATP<br><br><b>Note:</b> The first TKM50 is generated from testing using the #1 test access circuit incoming and the #2 test access circuit outgoing. The second TKM50 reverses the role of the test access circuits. The aa-bbb fields are taken from office data and represents the Trunk Register Block Index and Trunk Register No. assigned to these test access circuits.<br><br><b>CIOT Lamps:</b> Lamps on the CIOT will go through a sequence that will be too fast to follow <b>unless</b> the test fails at some point |

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|------|--------|---|
|      |        | in the sequence. (Reference CD-68744 and Section 212-514-504 for complete information.) |

**SAFE STOP POINT**

|   |   |   |
|---|---|---|
| 2 | Initiate a self-test of CIOT access circuits 3 & 4 by typing in the following message:<br>TKM-45-3-4. | TTY outputs & lamp indications:<br>Same as in Step H-1. |
|---|---|---|

**SAFE STOP POINT**

**L. Trunk Status Information**

**Note:** CCIS trunk status is reported hourly by the TKM33 output message. This output can also be obtained by using a TKM-33 input message on a demand basis. Also, a more detailed summary, *by trunk group*, can be obtained using the TKM-34 input message. This may be desirable if a large number of trunks in a group are to be interrogated for status information. For a particular trunk, the TKM-30 input message permits status checks, testings of the trunk, and state control of the trunk. The use of these messages is given in the following steps. This procedure permits the trunk status to be evaluated to the degree necessary to determine the conditions in the office. It is recommended that a complete test be performed precutover. The tests which will be performed on a routine basis, pregrowth, or postgrowth are left to the discretion of the SØ supervisor.

**Note:** Part 6 of this section contains general information regarding trunk maintenance. Since specific trunk information is highly unpredictable, the subsequent actions required to ascertain the nature of any trunk problems which are discovered must be at the discretion of the craftsperson conducting this test.

|   |   |  |
|---|---|--|
| 1 | Type in the following:<br>TKM-33-ØFSUM. | TTY output: (On trunk status TTY only)<br>TKM33 TRUNK STATUS SUMMARY<br>TRI AVL ØØS<br>(The body of this message is dependent upon the office status.)<br>TOTAL TRUNKS ØØS = ddd |
|---|---|--|

**Note:** If no trunks are out of service in the office, only the first and last lines of this OM will be printed.

| STEP | ACTION   | VERIFICATION   |
|------|--|--|
| 2    | Type in the following:<br>TKM-34-TRI:aaaa ØØS. | TKM34 TRI:aaaa SUMMARY: ØØS<br>TRKID TYP CNTL STATUS<br>(The body of this message is dependent upon<br>the office status.)<br>TOTAL TRUNKS AVL = kkkk ØØS = llll<br><br><b>Note:</b> If no trunks are in the state being<br>queried (in this case, the ØØS state) only the<br>first and last lines of this OM will be printed. |

**SAFE STOP POINT**

|   |  |   |
|---|--|---|
| 3 | Type in the following:<br>TKM-30-TRK:aa-bbb-REQ:STAT.<br><br><b>Note:</b> Choose any idle 2-way CCIS trunk<br>for use in this and the following steps involving<br>a specific trunk. | TTY output:<br>TKM01 TRK:aa-bbb-ccc-ddd....<br>(Where aa-bb identifies the trunk, ccc defines<br>the call state, and ddd defines the overall<br>maintenance state; see Step 4 for an example<br>of the remainder of this output message.) |
|---|--|---|

**SAFE STOP POINT**

|   |  |   |
|---|--|---|
| 4 | Type in the following:<br>TKM-30-TRK:aa-bbb-SET:MLKØ.<br>(Sets trunk to maintenance lock-out to assure<br>this trunk is available for additional testing.) | TTY output:<br>TKM05 TRK:aa-bbb-cccc TO MKLM<br>(where aa-bbb identifies the trunk and cccc<br>identifies the previous maintenance state.)<br><br>TKM01 TRK:aa-bbb IDL-ØØS<br>0-0-000-3-0000-0-0-0-10-1-0-(1,0)<br><br><b>Note:</b> All maintenance state changes (SET<br>subfield) will result in both a TKM05 and<br>TKM01 output message. Review the TKM01<br>format in OM-68100 for the meaning of the<br>various fields in the second line of the TKM01<br>message. If some of these fields indicate an<br>unsatisfactory condition (for this test), either<br>wait for the condition to clear or select another<br>trunk for testing, as appropriate. The TKM05<br>message will also be printed on the trunk<br>status TTY (channel 6 or 7) if the state change<br>request was initiated from a TTY other than<br>the status TTY. |
|---|--|---|

|   |   |  |
|---|---|--|
| 5 | Type in the following:<br>TKM-30-TRK:aa-bbb TST:CIØT.<br><br><b>Note:</b> Results in CIØT test 14 being run.<br>Test 14 (See Fig. 3) is the most comprehensive<br>of the CIØT tests. If a 1-way trunk had<br>been selected, only the portions applicable to<br>that trunk is performed. Since a 2-way trunk | TTY output:<br>TKM50TRK:aa-bbb RESULT:* ATP<br><br><b>Note:</b> The remainder of this message is<br>omitted by ATP.<br><br><b>CIØT Lamps:</b><br>The CIØT lamps will go through a sequence |
|---|---|--|

| STEP | ACTION   | VERIFICATION   |
|------|--|--|
|      | is selected, <b>all</b> tests are performed.   | too fast to follow for an ATP condition. (See 212-514-505 and Step 7 below for more details.)  |
| 6    | Type in the following:<br>TKM-30-TRK:aa-bbb TST:DVPC.<br>(Demand VPC test)   | TTY output:<br>TKM50TRK:aa-bbb RESULT:VPØK<br><b>CIOT Lamps:</b> Note of Step 5 applies.   |
| 7    | Type in the following:<br>TKM-41-TRK:aa-bbb-4-14.<br>(where 4 designates the CIOT access number, and 14 designates the test number to be performed)  | TTY output:<br>TKM50 TRK:aa-bbb RESULT:* ATP<br><b>CIOT Lamps:</b><br>Note of Step 5 applies.  |
|      | <b>Note:</b> The TKM-41 is an alternate method of conducting the same test as in step 5. It is more flexible in that the various tests shown in Fig.3 can all be commanded using TKM-41. CIOT access circuit 4 must be used for any test sequence which uses the reverse wiring test; the reverse wiring test is included in test sequence 14. |  |
| 8    | Type in the following:<br>TKM-30-TRK:aa-bbb TST:TRIG.  | TTY output:<br>TRG01 TRK:aa-bbb ATP:0<br>TRG02 (The remainder of the TRG02 message contains the circuit identification information (CIN) for the trunk chosen. See OM-68100 for interpretation.)   |
|      | <b>Note:</b> A translation integrity test is demanded via this message for the particular 2-way trunk being tested.  | <b>Note:</b> See TRG01 in OM-68100 for the request denial (DNY), signaling problem report (SPL), and identifier message received report (IDL) if any of these messages are received.   |
| 9    | Type in the following:<br>TKM-30-TRK:aa-bbb REQ:TQRY.  | TTY output:<br>TKM06 TRK:aa-bbb NEND:1101 FEND:1110  |
|      | <b>Note:</b> This message enables the craftsperson to determine the state of the trunk at the far-end (FEND) as well as the state of the near-end (NEND)   | <b>Note:</b> In OM-68100, the TKM message gives the 1101 code (expected NEND state) as being idle, LKØ/DSA. Note that the first part (idle) indicates the <b>call state</b> , while the latter part (LKØ/DSA) gives the <b>maintenance state</b> . Also realize that a trunk query state such as 0101 = incoming busy, LKØ/DSA implies the trunk is incoming busy and is being <b>camped-on</b> for an LKØ or DSA maintenance state when it becomes idle. The trunk query state will become 1101 = idle, LKØ/DSA as soon as the call is completed. The FEND is expected to be in the idle, blocked = 1110 state as a result of the previous TKM-30—MLKØ request. If both |

| STEP | ACTION   | VERIFICATION  |
|------|--|---|
|      |  | ends had made the trunk MLKØ, both ends would see a blocked condition as a result of the MLKØ at the other end.   |
| 10   | Type in the following:<br>TKM-30-TRK:aa-bbb REQ:CONV.  | TRG04 SLK:aa-bb BND:ccc TRK:dd<br>TRG02 (CIN data)  |
|      | <b>Note:</b> The above message requests a conversion of the trunk register index information (TRIX) into a circuit identification number (CIN) and the outgoing TRM-band and trunk designations. | <b>Note:</b> See OM-68100 for details of these messages; fields cannot be predicted in advance.   |
| 11   | Type in the following:<br>TKM-30-TRK:aa-bbb REQ:ADIT.  | TTY output:<br>SA01 30 0000000  |
|      |  | <b>Note:</b> If an audit error is found (non-zero in final 7 digits) the SA02 output message will also be printed. (The "30" field represents a trunk audit.) |
| 12   | Type in the following:<br>TKM-30-TRK:aa-bbb REQ:CMPN.  | TTY output:<br>TKM52 TRK:aa-bbb REQUEST DENIED:IVSTAT<br>TKM01 TRK:aa-bbb IDL-ØØS   |
|      |  | <b>Note:</b> This message indicates the request for camp-on was denied because the trunk is idle-ØØS and cannot be camped on.                                 |
| 13   | Type in the following:<br>TKM-30-TRK:aa-bbb-SET:ACTN.  | TTY output:<br>TKM05 TRK:aa-bbb MLKM TO ACTN<br>TKM01 TRK:aa-bbb IDL-ACT  |
|      | <b>Note:</b> Restores trunk to service.  |   |

**SAFE STOP POINT****M. System Audits**

**Note:** The audit program will normally verify the operation of the system in the area specified by the aa field in the SA00-aa input message. The normal response is an SA 01 aa bbbbbb output message. The aa field corresponds to aa of the input message; the "b" field represents the number of errors and should be zero.

|   |  |   |
|---|--|---|
| 1 | Request an enable audit by typing in:<br>SA-00-04.   | TTY output:<br>SA01 04 0000000  |
| 2 | Repeat Step 1 using all the following variations of the aa field in the SA-00-aa input message | For each of the audit requests, the bbbbbb field in the SA01 should indicate no errors. |

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| STEP | ACTION                                | VERIFICATION  |
|------|---------------------------------------|---|
|      | that are listed in SA-00 of IM-68100. | This field may contain a value other than 0 if scheduled audits have not run recently. The audit program prints the errors (SA02's) and clears them. If errors are found on the initial run, repeat the audit, and if errors re-occur, appropriate action should be taken to clear the problem. |

**SAFE STOP POINT AFTER ANY AUDIT**

**4. FINAL PROCEDURES**

**4.01** The following procedures are to be performed whenever evaluation testing is terminated. Ideally, the system is restored to the condition

existing prior to start of testing. Reference should be made to the status of the system recorded in initial procedures to aid in restoring pre-existing features and determining if troubles were introduced during testing.

| STEP | ACTION   | VERIFICATION   |
|------|--|--|
| 1    | If warranted, reimpose any manual controls and features as recorded prior to testing.        |  |
| 2    | Ascertain that all units are in service by typing in:<br>MAC-03-STATUS.                      | TTY output:<br>MAC03 NØ TBL.<br>PCC10.....<br>MAC13 PEST SET (possible)        |
| 3    | Request that a deferred store fault recognition be run by typing in:<br>ST-05-DFR.           | TTY output:<br>ST02 DFR<br>00000 00000 00000 00000<br>00000 00000 00000 00000. |
| 4    | If MAC13 was received in Step 2, restore any inhibited interrupts by typing in:<br>MAC-08-N. | TTY output:<br>MAC06 PEST REP<br>NEW-0400000 ØLD-xxxxxxx.                      |

**Note:** The MAC06 may or may not be present.

**5. GENERAL INFORMATION: SIGNALING LINK FAILURE WITHIN A 4A/CCIS SO**

**Note:** A complete description of SLK failure reporting and repair procedure correlating the STP/SØ operations is contained in Section 212-826-303, covering System Evaluation for an STP-4A/ETS office.

**Failure Reporting Procedures**

**5.01** The basic nature of the VFL is such that several failures are expected to occur daily, and most of these failures are short lived and

require no manual action. These "self-healing" VFL faults are absorbed by the system software in those cases where reserve signaling capability exists. Only those faults which are expected to require manual corrective action are reported to the office maintenance personnel. Because TAC and TRM problems are not normally transient, they are always reported. The reporting method for all faults utilizes the office audible alarms, an alarm and display (A&D) panel of lamps, and the maintenance TTY (channel 0).

**5.02** The audible alarms are used to attract the attention of the craftsperson. Once alerted,

the craftsperson should then direct the attention to the A&D panel and discern which unit types have troubles. TTY messages can then be used to further isolate the fault to a particular member.

#### Office Audible Alarms

**5.03** Three audible alarm levels exist:

- (1) no alarm (silence)
- (2) minor alarm (bell)
- (3) major alarm (gong).

These alarms will accompany the visual state changes in the A&D panel and the TTY messages which report the failure.

**5.04** No alarm is sounded when a unit (TAC, TRM, SLK, or VFL) is retired from service manually since the craftsperson is already aware of his action. Likewise, there is no audible alarm when a unit is returned to service by either the system or by manual action.

**5.05** A minor alarm corresponds to a fault which warrants the craftsperson's attention but is *not* service affecting. For example, if one TAC controller for a terminal group frame (TGF) has a fault, the minor alarm is sounded.

**5.06** Should an accumulation of faults result in a loss of signaling capability, the major audible is sounded. An example of this situation is: both TAC controllers of a TGF have faults.

#### The A&D Panel

**5.07** Once alerted to the existence of a problem by the audible alarm, the A&D panel is used to obtain a visual summary of the office troubles. (The reported troubles should be few in number so that the craftsperson can tell by the panel state change just what type trouble is being reported.) The A&D panel classifies the troubles by unit type and severity. Should multiple troubles exist, both classifications are used in determining the sequence in which to perform the repair.

#### A&D Alarm Lamp Severity Levels

**5.08** Two lamps (amber secondary and red primary) provide four alarm levels for each unit type. In ascending order the alarm levels are:

- (1) No alarm (lamps extinguished),
- (2) Nonservice-affecting trouble with *immediate* reserve capability (steady secondary lamp),
- (3) Nonservice-affecting trouble with *no immediate* reserve capability (flashing secondary lamp),
- (4) Service affecting trouble (primary lamp).

The distinction between levels 2 and 3 is the availability of a reserve signaling route. Should a nonservice-affecting trouble exist, the vulnerability of the office to another similar trouble is important. If the latter anticipated trouble can affect the signaling capability of the office, the reported trouble should be investigated immediately. Hence, it deserves a higher alarm level (flashing secondary). The primary alarm is the most severe in that some signaling capability has been lost.

**5.09** All troubles should be repaired in the order of descending alarm level. That is, a high level alarm for one unit type should be investigated before all alarms of lower priority regardless of the unit type. In cases where two or more unit types display the same alarm trouble level, the unit types must be considered in determining the repair sequence.

**5.10** *A and F SLKs are assigned in consecutive-numbered, load sharing pairs called SLK complements (SLCs).* Each "A" SLC is served by a pair of alarm lamps. All "F" SLK troubles are combined in the state of one pair of lamps.

**5.11** The appropriate A SLC alarm is steady secondary when at most one VFL is faulty on each "A" SLK of the SLC. Should one "A" SLK fail (both VFLs, near- or far-end TRM trouble), there is a flashing SLC alarm. The primary indicates that both "A" SLKs of the SLC are failed.

**5.12** The "F" SLK secondary lamp flashes when one "F" SLK of a pair has failed. (The steady secondary state is not utilized since "F"

SLKs have simplex VFLs and the SLKs are assigned in pairs.) There is a primary alarm when both "F" SLKs of a pair have failed.

**5.13** Alarm criteria for the TAC are similar to those for two-controller units in ETS. One TAC controller trouble on one terminal group frame (TGF) results in a steady secondary alarm. The primary lamp is energized if both TAC controllers for one TGF are in trouble. (The flashing secondary lamp is not used at the SØ since it is reserved for offices with more than one TGF; all SØ's have only one TGF.)

**5.14** Due to the position of the TAC in the SLK, it is difficult to make the TAC alarms obey exactly those rules of 5.08. The alarm levels described, however, do properly position TAC troubles in the overall alarm picture. For instance, one TAC trouble causes no loss in signaling capability because the mate TAC can be utilized; and, hence, the steady secondary alarm is energized. Both TACs in trouble for one TGF means the loss of up to sixteen SLKs and should be immediately investigated. Therefore, the primary alarm is energized.

**5.15** A TRM steady secondary alarm is the result of a single TRM fault. Troubles in more than one TRM which have *not* caused a loss of signaling capability are illustrated with a flashing secondary alarm. Any TRM trouble that contributes to a loss of signaling capability is cause for the primary alarm. This could mean that several TRM faults are reflected in a flashing secondary alarm or one TRM fault is indicated by a primary alarm. In either case the alarm level and not the number of troubles should be used to determine the priority of the repair job.

**5.16** The A&D panel also has a lamp test key, which is utilized to verify each possible alarm state and to regenerate the panel, and an off-normal lamp. This lamp is a further reminder to the craftsman that a trouble exists. ***The lamp is energized whenever a VFL is unavailable to be used for signaling or when a VFL access circuit frame is abnormal; the ABN lamp is also on when DAS ignore memory does not match the "ignore memory map."*** To obtain an indication of the cause for the lamp, the following request is made at the maintenance TTY (channel 0 or 10).

ABN-00-RPT.

The subsequent ABN00 output message tells why the lamp is energized.

***5.17 If a VFL is connected to the test position or looped around to the far end office with the internal VFL loopback, it cannot be used for signaling. Therefore, it should only be in one of these states while active repair procedures are in progress. To return the VFL to service, the VFL state control request (SLM-02) is used.***

**5.18** If the abnormality is the VFL access circuit frame, that frame must be inspected to observe the particular trouble. There should be no circuit packs with power removed. As these problems also limit signaling, they should not be allowed to persist.

#### TTY Failure-Reporting Messages

**5.19** All troubles which are brought to the craftsman's attention via the A&D panel are accompanied with TTY messages that explain the problem. If hardware faults in the TAC or TRM are encountered during normal system operation, the particular unit is diagnosed and appropriate diagnostic result messages are printed. With the aid of a Trouble Location Manual (TLM) and/or the diagnostic listings, these diagnostic messages isolate the faulty hardware. SLK problems that cannot be *directly* attributed to hardware are reported in the following manner.

**5.20** When a nonservice-affecting SLK failure occurs, the system automatically reroutes the signaling traffic via another path, and *no* report of the failure is passed to the craftsman at that time. A timing interval is initiated at the instance of SLK failure during which interval the automatic restoral of the SLK is attempted. Since most failures of the SLK are due to the VFL and the majority of these failures require no manual action, the system should be able to automatically restore the SLK. If the SLK has a simplex VFL (F SLK) and the restoral is successful, there is *no* alarm or TTY message due to this failure. For SLKs with duplex VFLs (A SLKs), it is expected that the restored SLK will utilize what had been the standby VFL. This leaves the VFL which had experienced the fault as the *new*

standby VFL. After a suitable delay period to allow the transient fault to clear, this standby VFL is automatically tested. Only if this test **fails** is a report made to the craftsperson.

**5.21** Should the SLK not be automatically restored in the anticipated interval, a report is made to the craftsperson. Along with the audible alarm and appropriate SLK A&D lamp, there is a TTY message that identifies the faulted SLK. Also at this time, the TRM at each end of the SLK is diagnosed. If the unit fails the diagnostic, the TRM A&D lamps are updated and a TTY message identifies the trouble. To return the TRM to service, the faulty component is first identified thru the aid of the TLM. When the appropriate repairs have been performed, the unit must again be diagnosed. If the diagnostic is ATP and the frame control keys are in the normal state, the TRM is automatically updated and returned to service.

**5.22** If the diagnostic results are all-tests-pass (ATP), an appropriate message is printed and contact with the far-end office must be made to determine whether the far-end TRM or the VFL(s) is (are) at fault. No further fault isolation can be performed by the system, and no additional TTY messages are printed regarding the faulted SLK.

**5.23** Thus, in most instances of signaling interruption, the short interrupt is absorbed by the system. There are **no** A&D alarms or TTY messages regarding the trouble; only if the trouble persists is the craftsperson alerted. For duplex VFL SLKs, a faulty VFL is indicated by a VFL test failure message, a secondary A SLK alarm lamp, and a minor alarm. For simplex VFL SLKs, or if both VFLs of an "A" SLK are faulty, the VFL failure is indicated by a minor alarm, the appropriate SLK alarm lamp, and a TTY message regarding the SLK trouble. When the TRM passes the diagnostic, the accompanying TTY message (and verification of far-end TRM serviceability) isolates the fault to the VFL.

**5.24** Should a service-affecting SLK failure occur, there is no delay in reporting the trouble. Even in those cases of "self-healing" VFL failures, the craftsperson is immediately alerted via a major audible alarm, a primary SLK alarm lamp, and a high priority TTY message. If the system can automatically restore the SLK, the alarm lamps are

retired, an SLK restoral message is printed; and no manual action is required. For those cases requiring manual action to repair the SLK, the early notification should lead to a prompt return of the signaling capability.

#### TAC and TRM Diagnostics

**5.25** These units are automatically diagnosed by the system when troubles are encountered. The diagnostics are described herein only so far as they relate to SLK maintenance.

**5.26** Diagnostics requested on the inactive TAC controller are run independent of SLK security. However, if the active TAC controller is to be diagnosed, the mate controller must have no known troubles. If there are none, that controller is activated and the requested diagnostic is run. Otherwise, the diagnostic is aborted.

**5.27** TRM diagnostics can only be run if the associated SLK is inactive. Normally, a diagnostic is not requested on the TRM of an active SLK since the SLK is obviously capable of carrying traffic; but if an automatic exercise uncovers a TRM problem or that particular SLK is plagued with poor operation, it may be necessary to diagnose the TRM. In this case the SLK must be taken  $\emptyset\emptyset$ S and then the diagnostic can be run.

**5.28** TRMs diagnosed as faulty are made unavailable for signaling. These faults should be repaired as swiftly as possible and an ATP diagnostic obtained so that signaling can be restored to the SLK. Otherwise, the office is in a vulnerable situation whereby a single VFL failure on a related SLK can affect service.

#### 6. GENERAL INFORMATION: TRUNK MAINTENANCE WITHIN A 4A/CCIS SO

**Note:** Part 6 of this section is intended to familiarize the craftsperson with the trunk maintenance procedures within a 4A/CCIS SO. Since the particular actions required to evaluate trunk status can invoke many possible TTY outputs, none of which can be accurately predicted, an overall familiarity of the trunk maintenance schemes are required.

**Testing Arrangements in No. 4A Switching Offices**

**6.01** For discussion, intertoll testing in No. 4A Crossbar office can be considered as falling into the following three work centers:

- (1) The Trunk Operations Center (TØC) — This work center is responsible for testing, sectionalization and repair coordination functions. It also controls the repair of all the VF terminal equipment located on the line side of the Intermediate Distributing Frame (IDF).
- (2) The Maintenance Operations Center (MØC) — This work center is the primary machine maintenance work center. It also controls the maintenance on CCIS signaling links. In addition it controls the repair of all per-trunk associated equipment on the switch side of the IDF.
- (3) The Carrier Maintenance Center (CMC) — This work center controls the repair and maintenance of the facility portion of analog and digital transmission facilities. The repair and maintenance of the channel units associated with these facilities may be under control of the TØC or the CMC depending on the office configuration.

The discussion in the following paragraphs concentrates on correlating the testing methods that involve CCIS trunk testing within a 4A/CCIS Switching Office.

**No. 4A TØC Manual Testing Arrangements for CCIS Trunks**

**6.02** Manual intertoll CCIS message trunk testing for both the 17C and DUIT No. 4A TØC arrangements will be provided by a modified version of the integrated manual test frame (IMTF). In existing 17C offices, the IMTF may be arranged to access conventional as well as CCIS trunks. However, the IMTF would have limited testing capabilities to these conventional trunks because, at present, there would be no way to access the E and M leads at the IMTF. Furthermore, trunk lockout from the SDS frame would not be possible without modification of the existing (pre-DUIT) trunk relay equipment. However, retrofit plans are under study on what approach is to be taken when a large percentage of the intertoll trunks are converted to CCIS in a 17C environment. In the existing DUIT offices either the existing IMTF's

will be retrofitted for CCIS testing or new IMTF positions will be added depending on the office growth requirements.

**6.03** Call setup data for CCIS trunk testing via the CCIS modified IMTF will be fed directly into the No. 4A SPC processor using a Dataspeed Model 40 (DS-40) keyboard mounted in the writing shelf of the IMTF. This DS-40 is equipped with a converter to interface with the 110 baud SPC TTY channel. Call progress responses to these testing messages will be displayed on the DS-40 CRT built into the IMTF. This replaces the class keys, test connector, test connector thumbwheel and the dial or MF keyset employed on conventional trunks. Key access to the IMTF test equipment and transmission leads will remain the same as for conventional trunks.

- The TKM-42 and TKM-48 input messages are used for demand testing from an IMTF. The TKM-48 message permits using one IMTF as the input/output medium while specifying a different IMTF to be used for performing the test. Various TKM50 output messages will be outputted acknowledging the results of the test specified. Normally, a TKM50 message indicating set-up complete (STOK) and, upon test completion and operation of the "Restore Normal" button on the IMTF, a TKM50 indicating release (RLSE) of the IMTF will be obtained. For tests involving a test line, TKM50 messages indicating VPC pass (VPØK) or VPC Fail, no tone received (NTRF), or noise failure (NSEF) or VPA cancelled (VPCN) are also obtained.

**6.04** In those offices already equipped with the Switched Maintenance Access System (SMAS), the CCIS trunks may be optionally equipped for SMAS access. Note, however for CCIS trunks, a SMAS access is not needed for the E and M leads as it is on conventional trunks and therefore its provision is not critical.

**6.05** Additional CCIS trunk trouble sectionalization and testing capability is optionally available at the IMTF in those offices equipped with the Carrier Transmission Measuring System (CTMS). With CTMS, the IMTF can be equipped with a CTMS Remote Control and Display (RC&D) which allows the craft to access and make measurements using TOUCH-TONE signals on specified trunks.

The measurement answers are returned to the LED display on the RC&D unit.

**6.06** Another maintenance consideration is the provision of trunk and facility status information on CCIS trunks. The lockout lamps (either per-circuit with the 17C or via the SDS with the IMTF) required for conventional trunks are not required for CCIS trunks. Two other arrangements will be used to provide trunk and facility maintenance status information associated with CCIS trunks to the TØC.

- General trunk information messages (such as trunks automatically taken out of service, maintenance state changes, peripheral bus computer (PBC) trunk exception reports, etc.) is provided via the PBC DS-40 channel 26 (and 27 when two TØCs are provided in the office). This channel will be backed up, in case of PBC outage, via channel 6 (and 7) from the stored program control (SPC) to a TTY located in the TØC. Initially the CCIS trunk status will only be provided via the SPC channel 6 (and 7).

#### **Routine Automatic Testing of No. 4A CCIS Trunks**

**6.07** Two optional methods of providing routine automatic transmission trunk testing for CCIS trunks will be available. These are a modified version of the present standard Automatically Directed Outgoing Intertoll Trunk Test Frame (ADOIT) or the new Outgoing Trunk Testing System (OTTS). The OTTS can be controlled either locally from the Trunk and Facility Maintenance System (TFMS) or remotely using the Remote Office Test Line (ROTL) option from CAROT (See Section 103-261-100 for information regarding the OTTS.) The choice of these options will depend on the automatic trunk testing equipment already available in the office for testing conventional trunks, as well as the overall direction of Telephone Company planning for controlling automatic trunk testing.

- Both the ADOIT and OTTS can provide demand transmission testing controlled via their normal input channels (the card reader for the ADOIT and the TTY or DS-40 for the OTTS).

**6.08** An early morning routine voice path continuity check (VPC) is employed in the No. 4A CCIS offices. It is intended to provide detection

of single circuit failures before traffic is offered to trunks. It also will add assurance that a good circuit will be set up on these calls where the VPC check is cancelled because of system real time overloads. (See 6.14-6.15 for additional uses of voiceband VPC check on per-call basis.)

- This test is conducted using the voice path continuity check access circuits; test results of this test (and the routine CIOT tests) are summarized in the TKM57 message. Initial failure of a routine VPC check will be handled the same as the per-call VPC checks of 6.14.

#### **CIOT**

**6.09** Routine automatic operational testing of the 4A CCIS trunk relay and crossoffice transmission and signaling path, is provided during the late night (begins at 11:15 PM) and early morning hours by the CCIS intraoffice trunk test circuit (CIOT) frame; results are reported via the TKM57 output message. This frame, which is controlled by the No. 4A SPC processor, also performs manually requested tests (via TTY commands) to aid in trouble clearance, circuit order testing, etc. Four test access ports are provided to enable the processor to establish cross-office connections for testing either the incoming or outgoing operational features of the CCIS trunk relay circuit. Up to three test connections to trunks may be held for manual signal tracing and transmission measurements. Belt lines are provided to loop back the facility side of the trunk relay circuit to the test frame via a test access connector on the trunk circuit.

- The CIOT can be accessed either via a dedicated ETS-driven TTY (see TKM-41 in the IM-68100 and TKM50 in OM-68100) or via the DS-40's on the IMTFs (see TKM-30 in IM-68100 and TKM50 in OM-68100) for man/machine communication. A repertoire of demand CIOT tests has been provided that allows the craft to request different portions of the complete CIOT test capability. (See Fig. 2.)
- The CIOT frame will also be equipped with a 23 CR transmission measuring set and a 1000 Hz test signal source for trouble isolation, together with control keys and display lamps. This frame replaces the T-wagon tests for CCIS trunks and is intended

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to be located in the vicinity of the CCIS trunk relay frames.

- The CIOT is also capable of
  - (1) Testing the VPA access circuits (see TKM-46 in IM-68100 and TKM50 in OM-68100)
  - (2) Being removed or restored to service (see TKM-43 in IM-68100 & TKM53 in OM-68100)
  - (3) Performing specific installation tests (see TKM-44 and TKM-49 in IM-68100 and TKM50 in OM-68300)
  - (4) Performing a CIOT self-check using a TKM-45 input message to specify which of the two access circuits is to be tested. Two TKM50 output messages will result. Each access circuit is alternately used in the incoming and outgoing mode and a separate TKM50 OM results from each test.

- Stopping and restarting of routine CIOT tests (or routine VPA tests) may be done using a TKM-47 input message.

**6.11** The ability to exchange maintenance messages and maintenance state information over the CCIS common signaling channel allows improved procedures in carrying out the various trunk maintenance functions on CCIS trunks. This part describes the various types of CCIS trunk maintenance states and messages and how they are used to meet the overall maintenance objectives.

**6.12** The following are the overall trunk maintenance states used to control the maintenance process for CCIS trunks.

- (1) Active (ACT)
- (2) Out-of-Service (ØØS)
- (3) Unavailable (UNV)
- (4) Unequipped (UNQ)

**6.13** The ØØS states provided specifically for trunk maintenance are the ØØS-MTC and ØØS-CAD states. These maintenance states are further qualified by the following operational restrictions:

**CCIS TRUNK MAINTENANCE PROCESS**

**6.10** The routine CIOT late night and early morning test results are summarized in a TKM57 output message. This message reports the number of test failures, the number of trunks tested, and the number of trunks not tested.

- Test failures initiate a retest; if both tests fail, both failures are scored in the TKM57 output message. **Each failure** also results in a separate TKM50 TRK:aa-bbb RESULT:STF (some test failed) message via channel 3, the CIOT TTY.
- On initial test failure, the trunk is blocked; if, upon retest the results are ATP, the initial failure is scored in the TKM57 summary, a single TKM50 indicating STF message is printed, and blocking is removed. If, upon retest another test failure occurs, a second TKM57 output message is printed, the trunk is placed in the maintenance lockout state, and this action is reported on TTY 6 by a TKM00 message. A two minute timing list is used to allow the retest to occur prior to reporting the failure via the TMK00.

**A. When the Basic State is ACT\* or ØØS\*\***

- \*(1) Active—Normal
- \*(2) Active—Forced
- \*\* (3) Maintenance Lock-Out, Automatic [MTC-LKØ (AUTO)]
- \*\* (4) Maintenance Lock-Out, Manual [MTC-LKØ (MAN)]
- \*\* (5) Circuit Administration Lock-out (CAD-LKØ)
- \*\* (6) Circuit Administration Disabled (CAD-DSA)
- \*\* (7) Maintenance Disable (MTC-DSA)

**Note:** The above states are controllable within the 4A/CCIS SØ by use of the TKM-30 input message

**B. When the Basic State is OOS due to Failures or External Actions**

- (1) Far end blocked (may be combined with LKØ or DSA states)
- (2) OOS—Network Management
- (3) Scan—Distribute Failure (Trunk points)
- (4) Facility Failure

**Note:** The above OOS states are not controllable within the 4A/CCIS SØ, and will override any maintenance state changes that are manually requested to force the trunk active.

**C. When the Basic State is Unavailable (UNV)**

- (1) No test
- (2) Disabled
- (3) Lock-out

**Note:** Blocking can be performed on a trunk band basis by traffic control in the event of carrier group alarm failures (CGA), etc. (See 6.17 for more detail). Also note that a trunk can be manually requested to go to an active state from a MTC or CAD OOS state and still be held OOS by one of the conditions in B above. A TKM05 output message will verify the request and a TKM01 output message will show the externally controlled qualifier which prohibits the request from being accomplished, although it was **not** denied (No TKM52 message).

A trunk that is in any OOS-MTC or OOS-CAD state will not accept incoming or outgoing service calls. All incoming test calls will be accepted except in the Disabled (DSA) condition. While in the DSA condition, only demand VPC and IMTF outgoing interoffice calls will be permitted and all incoming interoffice test calls will be rejected.

**CCIS Trouble Detection**

**6.14** A new trunk maintenance trouble detection tool provided for CCIS trunks is the voicepath continuity check (VPC). For each CCIS trunk in an overall switched connection, the CCIS switching

office, when selecting an outgoing CCIS trunk, attempts to perform a continuity check on the selected outgoing trunk during call set up. If the terminating office is a four-wire machine, the originating processor attaches a 2010 Hz transceiver tone to the selected trunk concurrent with sending the initial address message (IAM) over the CCIS common signaling channel. The distant office, upon receipt of the IAM, connects the receive side of the trunk to the transmit side through a zero-loss loop. If the terminating office is a two-wire No. 1 ESS, the originating office transmits 1780 Hz. The terminating office, upon receipt of the IAM, attaches a transponder to the incoming trunk and returns 2010 Hz upon recognition of the 1780 Hz tone. The originating office checks the level of the returning tone to verify that transmission loss is within acceptable limits. The sensitivity of this check is superior to the implied check obtained with conventional signaling systems, and therefore provides a more effective trouble detection tool.

**6.15** When a CCIS trunk fails a VPC check due to any reason (single circuit failure, facility failure or common equipment failure), the trunk will be immediately taken out of service and blocking will be sent to the far-end office. At the near-end office, the trunk will be scheduled for a VPC recheck after at least a 5-second wait to allow for transient facility hits to clear.

- At the far-end, after receiving the blocking message, the switching processor will put the trunk on a 2-minute timing list. The 2-minute interval at the far-end office is provided to allow sufficient time for the near-end office to make the VPC retest on the trunk, because depending on traffic volumes there may be several trunks in the VPC retest queue awaiting a retest. If the trunk passed the VPC recheck, the near-end processor sends unblocking to the far-end and neither TØC will be alerted. However, a record of the initial failure is retained at the near-end for exception report analysis.
- If the trunk fails the VPC recheck, it is locked-out at the near-end and reported to the near-end TØC as a VPC failure via a TKM00 output message. At the end of the 2-minute timing interval the trunk is also reported to the far-end TØC by a TKM00....BLK message. The office that has maintenance

control for this trunk would then take over the trouble sectionalization phase of the maintenance process. After repair of the trouble is accomplished the trunk would be manually returned to service by the end that repaired the trouble. This assumes that, regardless of which end initially detected the trouble, the two ends would coordinate their near-end maintenance states so that the office affecting the repair would normally return the trunk to service. Note, however, both ends would be notified automatically via the maintenance state change messages (TKM05) when the trunk is returned to service so they could both complete their trouble ticket closure routines. The TKM05 output message would be outputted at TTY 6, since this action results from a demand request. (TKM00 messages result from automatic routine tests which result in state change actions.)

**6.16** Other trunks maintenance trouble detection tools presently used in the office for conventional trunks, such as OTTS, ADOIT, CAROT/ROTL, CTMS, etc., will also be used for CCIS trunks. One difference, however, will be the types of troubles that occur on CCIS trunks. These differences are the result of the separation of the transmission and the signaling paths resulting in the elimination of most per-circuit signaling troubles by the use of the CCIS common signaling channel (some cross-office type per circuit signaling problems can occur in No. 4A offices).

#### **Service Protection on CCIS Trunks**

**6.17** The service protection function is provided on CCIS trunks by changing a trunk's maintenance state at the near-end from ACT to 00S-MTC-LK0 or 00S-MTC-DSA. State changes are reported via TTY 6. A blocking message is also sent to the far-end to change its maintenance state to 00S-BLK. Thus, both ends of the trunk are service protected. Group Blocking and Group Unblocking messages covering from 1 to 16 trunks, will also be provided to speed up the service protection function during large failures.

#### **Trouble Sectionalization on CCIS Trunks**

**6.18** In general, the same trouble sectionalization tools that are used for conventional trunks will also be used for CCIS trunks. This will include

measurements using CTMS and SMAS, where provided, plus manual tests from the test positions or VF jack points to the far-end test position.

**6.19** Because the signaling and voice transmission paths are separate and the maintenance state changes affect both ends of a CCIS trunk, two new trouble sectionalization tools have been provided. These are (a) the translation integrity test and (b) the demand trunk query.

#### ***Translation Integrity Test***

**6.20** The translation integrity test will provide craft personnel at switching offices with the ability to easily establish the integrity of the signaling path used (or to be used) by a CCIS trunk. Since this test is performed independently of the message trunk, it allows pretesting of trunk label assignments before trunk facilities are assigned. It will also equip craft personnel with a means of insuring that failure to pass a continuity check on a CCIS trunk is not due to a signaling problem.

- As an example, craft personnel in a switching office wishing to test the signaling path for a CCIS trunk will initiate the Translation Integrity Test (TKM-30-TRK:aa-bbb TST:TRIG.) through a keyboard, identifying the trunk in question by the trunk identification number (No. 4A switching offices). In return the craft personnel will subsequently receive one of the following:

(1) A TRG01 output message indicating All Tests Pass (ATP) and a TRG02 output message indicating the common language location identification (CLLI) information regarding this CCIS trunk. Mutual CLLI identification is printed from the near and far end standpoints.

(2) A TRG01 output message indicating a request denial (DNY); 6 denial codes are specified in the TRG01 output message (see OM-68100)

(3) A TRG01 output message indicating a signaling problem (SPL) report has been received for the trunk under test. A TRG03 output message will also be printed indicating the CLLI of the office returning the SPL report. The associated error code is provided in the TRG01 message.

(4) A TRG01 output message indicating an identifier message was received for the trunk specified (IDL) but the CIN's do not agree or the local PBC was not available. An appropriate TRG02 will also accompany this message.

### **Trunk Query Test**

**6.21** The demand trunk query test (TKM-30-TRK:aa-bbb REQ:TQRY.) allows the switching office at one end, via the CCIS common channel, to determine the maintenance state of the trunk at the far-end office. This test is particularly useful during circuit order testing.

- The maintenance state replies are given in the TKM06 output message. This message includes **both the call state and maintenance state of the trunk** for both the near-end (NEND) and far-end (FEND). For instance, the NEND state field can specify the near-end as being incoming busy, LK0/DSA. This means the call state is incoming busy, and that a

- Three call state replies include:

- (a) incoming busy
- (b) outgoing busy
- (c) idle

A trunk query audit program (SA-00-33) is automatically run daily to check that the maintenance and call processing states for all the CCIS trunks in the office have not gotten out of synchronism.

### **Trouble Isolation, Repair, Repair Verification, and Restoral**

**6.22** These trunk maintenance functions will be the same for CCIS trunks as for conventional trunks. Note, that when it is desired to restore a CCIS trunk to the ACTIVE state (TKM-30-TRK:aa-bbb SET:ACTN), the trunk must be made ACTIVE at the end where it is Locked-out or Disabled and not from the end that received the Blocking (BLK) message. If it is Locked-out or Disabled at both ends, then both ends must make it ACTIVE independently. Normally it would only be Locked-out or Disabled under control of one end, because the restoral control would be transferred to one end

**maintenance state request** for a LK0/DSA state is pending on this trunk (being camped-on). When the trunk is no longer service busy, another trunk query message should return the idle, LK0/DSA code, indicating the idle call state and that the appropriate maintenance state which was pending, has been attained.

- There are six types of **maintenance state** replies from the far-end to a trunk query message. They are:

- (a) Unequipped
- (b) Transient
- (c) Blocked from the far-end (BLK)
- (d) Active
- (e) Locked Out/Disabled (LK0/DSA)
- (f) LK0/DSA & BLK

or the other during the trouble sectionalization function (see 6.18 - 6.21). Note also that the maintenance forces at both ends of the trunk will be informed when a trunk is returned to service. This results because both ends will receive a change of state message for that trunk, the near-end (TKM05) from 00S-LK0 or 00S-DSA to ACTIVE and the far-end from 00S-BLK to ACTIVE (TKM00).

### **Additional Trunk Maintenance Features**

**6.23** This paragraph lists some additional trunk maintenance features that will be provided at the CCIS test positions. Those items in the following list marked with an asterisk are new "CCIS only" features.

- (1) Call Monitor — This feature allows the craft personnel at the test position to monitor the voice path on a circuit that is suspected of being in trouble when in the ACTIVE service busy state. Access to incoming trunks will not be provided in No. 4A offices. This feature will not be available initially in No. 4A offices.

(2) Test Call VPC Check\* — All 10X-type CCIS test calls will automatically include a voice path continuity check (VPC). However, regardless of whether the VPC check passes or fails the test call will be completed, if possible, and the test position informed of the VPC check results. This feature will be expanded to include the 959-XXXX type test calls in the future.

(3) No Outpulse Connection — This feature, available in either incoming or outgoing mode, enables the craft personnel at a test position to gain access to a traffic idle CCIS trunk. When a no outpulse connection is requested, a blocking message is sent to the far-end to prevent it from being seized by traffic, but no VPC check is made on the trunk. An example of the use of this connection would be to adjust or verify the cross-office loss of a circuit between the jack appearance (+7, -16 transmission level points) and the switch appearance accessed at the test position.

(4) Associated Circuit Connection — This feature will allow the craft personnel to automatically hunt for and select another idle trunk in the same trunk group as the trunk under test. This "Associated Circuit" can then be used as a communications trunk (101 call) or provide a return path for an echo suppressor test. This feature may not be available for initial service.

(5) CIOT Tests\* — This feature allows craft personnel at No. 4A CCIS IMTF test positions to request demand CIOT tests (see 6.09).

(6) Voice Path Loop Back Test\* — This feature allows the craft at the No. 4A CCIS IMTF test position to test the loop-back circuitry in the CCIS trunk relay circuits used during the voice path VPC check. Access at the line side of the trunk circuit can be obtained via SMAS, if available, the VF patch bay jacks or the office belt lines.

#### CCIS Test Line Types

**6.24** The following 10X test line types are available for testing CCIS trunks. These tests may be initiated from the IMTF using input message TKM-42 or TKM-48.

100-type milliwatt followed by quiet termination

101-type distance office testboard

102-type milliwatt

104-type two-way manual transmission and one-way noise

105-type responder

107-type long term P/AR, gain slope and quiet termination

108-type echo suppressor test

Connections to 103, synchronous and non-synchronous test lines will not be permitted.

#### ***Maintenance Actions During Common Signaling Failures***

**6.25** When signaling links, STPs or CCIS switching offices fail, certain signaling network management signals are provided to inform the other STPs and switching offices of the nature of the failure. The major signal used to aid the trunk maintenance process is the Transfer Prohibited (TFP) message (see Section 6 of Section 781-030-100, Notes on Distance Dialing). This signal is sent by the STP detecting a signaling failure to the appropriate STPs and switching offices whenever it determines that it has no signaling path available for trunks with a given band number (representing 1 to 16 trunks). Other network signals are also used when only a partial blockage is encountered and the signaling can be rerouted.

**6.26** When only a single link or single STP failure occurs, an alternate signaling path for the associated trunks is still available, therefore, failure messages relating to the trunks are not provided to the Trunk Operation Center (TØC). However, during dual "A" link failures, dual STP failures in the same region or a CCIS switching office fails, no alternate signaling path is available. In these cases the TØCs at both ends of the associated trunk groups will then be notified that they are out-of-service with a common signaling failure as follows:

(1) Dual "A" link failure — The signaling terminals in the near-end switching office will inform the near-end switching processor which will in turn send a single message to the TOC informing it of the dual "A" link failure.

This type of failure can affect up to 512 bands on a fully loaded "A" link pair. At the STP end of the "A" link pair, both STPs will send TFP messages to the appropriate STPs and switching offices to block all signaling over the trunks in the failed signaling bands. Thus, each far-end switching office having trunks to the switching office with dual "A" link failure will be informed of the failure and will in turn inform its TØC of the failed bands using a trunk maintenance message per band (TKM02 TRUNKS ØØS SLK:XX-XX BAND:XXX). The TTY message at the SØ having the dual A SLK failure is: \*\*SLM08 EMERGENCY RESTART ..... (see OM-68100 for full definition of this message). There will be no SLM....type of message at the far-end office, but a similar message will occur at each connecting STP.

(2) Dual STP failures in the same signaling region — For this type of failure, the TØCs in each of the CCIS switching offices in the failed region would receive a single TKM02....failure message for each of its "A" link pairs similar to the dual "A" link failure message in item 1 above. Also at each SØ within the region of the failed STP pair, the MØC will see the SLM08 EMERGENCY RESTART.....message. The switching offices in the other regions would receive TFPs on all the affected bands. Note, this case could involve a large number of individual band failure messages at a far-end TØC since the failure would include all the CCIS trunk groups in the far-end office that homed on the failed region. In each of the other regions, the TØC will see a TKM02 TRUNKS ØØS SLK:XX-XX BAND:XXX message for *each* band to the failed region.

(3) CCIS switching office failure — When the failure occurs, the action at the far-end switching offices will be the same as for the dual "A" link failure in item 1 above. The action at the failed office will depend on the severity of the failure and will be discussed in detail in the next part.

**6.27** In general these messages will be for information only to the TØC personnel. It is expected that they will help clear up any confusion that might occur if a failure occurred in the middle of trouble sectionalization or circuit order work. The messages are *not* intended to be used as an indication to start taking trunk outage time against

the associated trunks. Thus, from an index point of view, CCIS common signaling failures will be treated as switching processor common equipment failures in the next part and not included in the trunk performance index. Note that a common signaling failure may not cause in-progress calls to terminate. Thus, these trunks will continue to provide service until the customer hangs up. This subsequent call termination may or may not be detected by the CCIS office depending on the nature of the common signaling failure.

#### Maintenance Actions During Switching Machine Failures

**6.28** As described in the preceding paragraphs, when a CCIS switching office experiences a serious processor failure, the CCIS terminals at that office signal the STPs in the signaling network to cut off all CCIS signaling traffic to that office. The STPs then notify all offices with CCIS trunks to the failed office of the failure using the TFP message. This allows the appropriate rerouting or cancellation of the telephone traffic and the alerting of the TØC personnel.

**6.29** In most general system failures, other than the trunks being out-of-service during the failure, there are no other effects on the trunk maintenance process and the trunk maintenance state information (LKO, DSA, BLK, etc) remains intact. However, in the case of the most serious type of processor failure (a phase 4 failure which requires manual intervention) the maintenance state information for the trunks has to be re-initialized. In No. 4A offices after a phase 4 failure, except for those trunks whose maintenance state information resides in protected memory (unavailable state information) the maintenance state information is destroyed when the trunk registers are reinitialized. The far-end initiated maintenance states (Blocked or Group Blocked states) at the failed office will be recovered by the use of a Reset Band signaling message. These Reset Band messages will be sent to the far-end switching offices for all signaling bands after the failed office has recovered, but before traffic handling is reinstated. The maintenance states will be reinitialized by having each far-end office, after receiving a Reset Band Message, send a Reset Band Reply Message that requests blocking be re-initialized on all the trunks in that band for which it has a near-end maintenance state (Locked-Out or Disabled) imposed.

- This Reset Band-Reset Band Reply procedure will only get about half the maintenance states at a No. 4A office with a phase 4 failure re-initialized. The original near-end states at an office will either have to be reimposed manually by the TØC personnel from records or when they are returned to service, rely on the voice path continuity check to again remove any out-of-limit trunks from service.

**PRECUTOVER AND CIRCUIT ORDER TESTING OF CCIS TRUNKS**

**6.30** During circuit order and precutover testing for CCIS and conventional trunks, one of the major turn-up procedure problems is the large amount of coordination required between the craft personnel at the two ends of the trunk. This coordination is required during both the end-to-end testing on the plant test date and the actual turn-up on the service date. Turn-up procedures for CCIS trunks are covered in Section 212-587-301; the following information is intended for familiarization with the use of the terminology and message fields, and restrictions on their usage.

**6.31** On CCIS trunks, because of the ability from the near-end office to control both a trunk's Locked-out (LKØ) or Disabled (DSA) state at the near-end and its Blocked (BLK) state at the far-end, the required end-to-end coordination can be reduced if a systematic turn-up procedure is adopted. The method adopted will allow the noncontrol end, after completion of the testing, to turn over complete control of the turn-up procedure to the control

office. To assure that both ends of a trunk are indeed turned-up, however, the turn-up sequence is specific and has built in safeguards.

**6.32** Another turn-up problem occurs when the far-end is said to be in an "unequipped" state and it will not accept maintenance state messages from the near-end. In this case, if the near-end office craft wish to do their intraoffice tests which result in blocking messages being sent to the far-end, the far-end will ignore these messages. The result will be that the maintenance states at the two ends will not be consistent. To prevent craft confusion over these inconsistencies it is necessary that the turnup procedure automatically coordinate the trunk maintenance states at the two ends as they are independently moved into the "equipped" state. Trunk Query (TRQ) messages (6.21) are used to provide this coordination.

**6.33** Another turn-up problem involves assuring that trunks in the circuit order state are not inadvertently turned up for service prematurely while a switching machine is recovering from a Phase 4 failure. During the precutover or circuit order interval, trunks are normally placed in a Circuit Administration (CAD) - Lockout or Disable maintenance state. The trunk maintenance state in a No. 4A office is wiped out during a Phase 4 failure. This required the establishment of a new protected maintenance state known as Unavailable (UNV) in the No. 4A CCIS machines. The use of this UNV state is primarily for preventing trunks which are not fully functional from being automatically brought into service after a phase 4 failure.

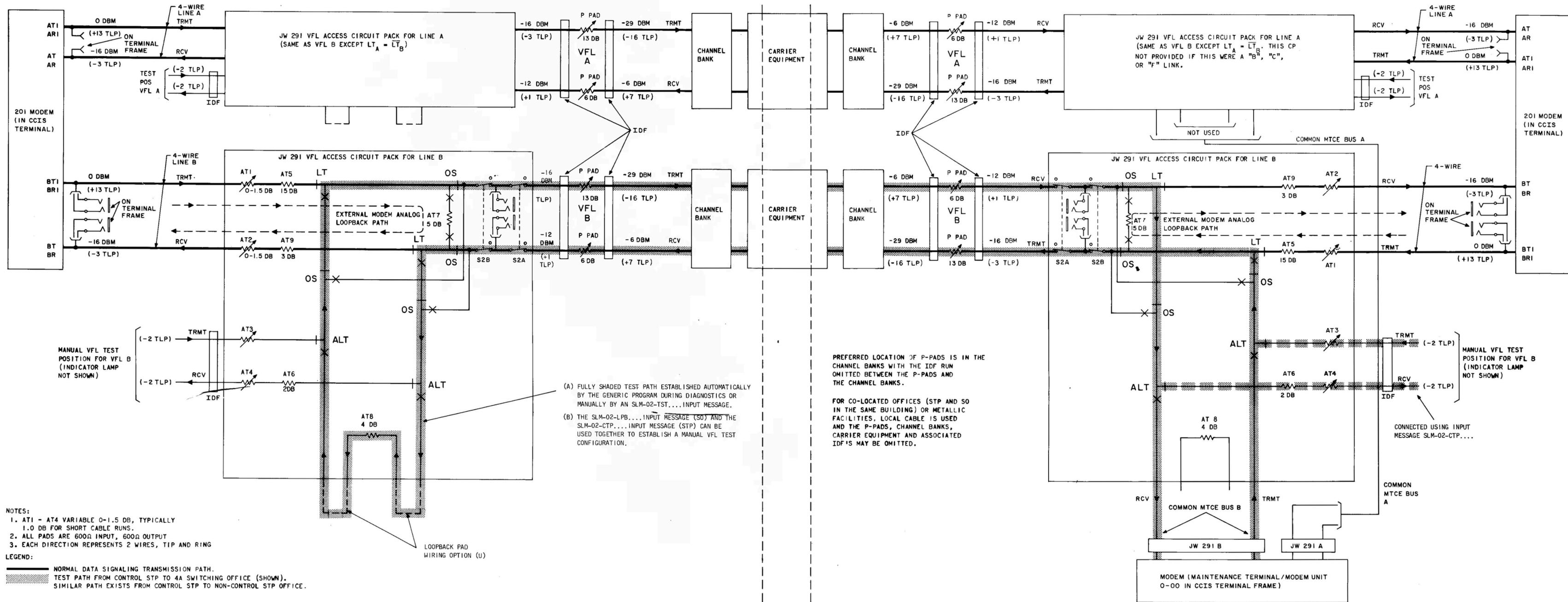
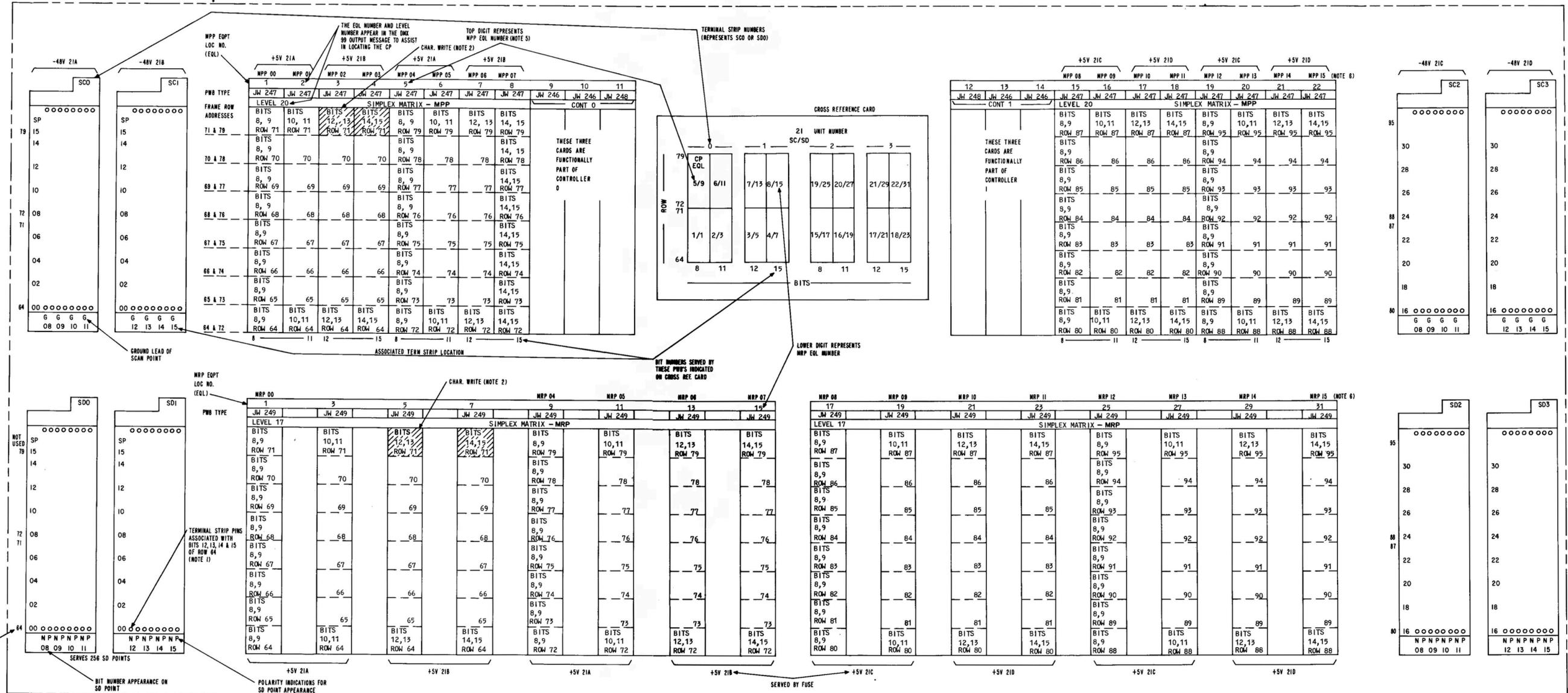
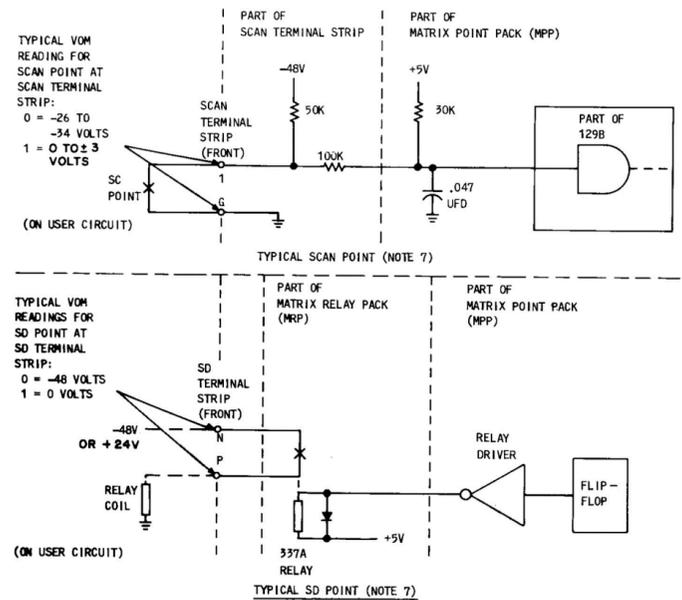


Fig. 1—VFL Interface: SO to STP



- NOTES:**
- THE APPEARANCE OF THE MPP POINTS AND MRP POINTS ON THEIR ASSOCIATED TERMINAL STRIP (SC, SC1, SC2, SC3, SD, SD1, SD2 & SD3) ARE SHOWN. THESE TERMINAL STRIP APPEARANCES PROVIDE ON-LINE ACCESS TO SCAN AND SD POINTS FOR VERIFICATION OF CIRCUIT OPERATION BEFORE OR DURING DAS MATRIX REPAIR.
  - A CHAR. WRITE OF ROW 71, CHAR 3 IS ILLUSTRATED. TWO POINTS ON EACH OF 2 MPP'S AND ALSO 2 POINTS ON EACH OF 2 MRP'S ARE INVOLVED. A ROW 71, CHAR. 2 WRITE INVOLVES BITS 8, 9, 10 & 11 OF ROW 71. CHAR. 0 & CHAR. 1 ARE LOCATED IN UNIT 20 AT THE CORRESPONDING POSITIONS. (BITS 0-7 FOR THESE ROWS ARE LOCATED IN UNIT 20, THE OTHER HALF OF THE FUNCTIONAL UNIT PAIR.)
  - A BYTE WRITE OF ROW 71, BYTE 1 WOULD WRITE BITS 8 - 15. A BYTE WRITE OF ROW 71, BYTE 0 WOULD WRITE THE CORRESPONDING BITS IN UNIT 20.
  - A ROW WRITE OF ROW 71 WOULD WRITE BITS 0 - 7 IN UNIT 20 AND BITS 8 - 15 IN UNIT 21.
  - CORRELATION BETWEEN THE MARKINGS ON THE CROSS REFERENCE CARD AND THE EQUIPMENT LOCATIONS ARE SHOWN ON THIS FIGURE. THIS CARD REFERENCES THE EQUIPMENT LOCATION NUMBER WHICH APPEARS OVER THE PC.
  - THE MPP NUMBER AND MRP NUMBER IS USED IN SD-68747 FOR IDENTIFICATION OF LEAD ROUTING.
  - WHEN DETERMINING STATUS OF AN SD POINT OR SCAN POINT, USE A HIGH IMPEDANCE INSTRUMENT (VOLT METER) WHENEVER POSSIBLE.

**THE BODY OF THIS TABLE CONTAINS THE ROW NUMBERS SERVED BY EACH UNIT IN A DAS FRAME CORRELATED TO THE TERMINAL STRIP MARKING**

| TS STAMP | 00 | 01 | 10 | 11 | 20 | 21  | 30  | 31 | UNIT NUMBER |
|----------|----|----|----|----|----|-----|-----|----|-------------|
| 31       | 31 | 63 | 63 | 95 | 95 | 127 | 127 |    |             |
| 30       | 30 | 62 | 62 | 94 | 94 | 126 | 126 |    |             |
| 29       | 29 | 61 | 61 | 93 | 93 | 125 | 125 |    |             |
| 28       | 28 | 60 | 60 | 92 | 92 | 124 | 124 |    |             |
| 27       | 27 | 59 | 59 | 91 | 91 | 123 | 123 |    |             |
| 26       | 26 | 58 | 58 | 90 | 90 | 122 | 122 |    |             |
| 25       | 25 | 57 | 57 | 89 | 89 | 121 | 121 |    |             |
| 24       | 24 | 56 | 56 | 88 | 88 | 120 | 120 |    |             |
| 23       | 23 | 55 | 55 | 87 | 87 | 119 | 119 |    |             |
| 22       | 22 | 54 | 54 | 86 | 86 | 118 | 118 |    |             |
| 21       | 21 | 53 | 53 | 85 | 85 | 117 | 117 |    |             |
| 20       | 20 | 52 | 52 | 84 | 84 | 116 | 116 |    |             |
| 19       | 19 | 51 | 51 | 83 | 83 | 115 | 115 |    |             |
| 18       | 18 | 50 | 50 | 82 | 82 | 114 | 114 |    |             |
| 17       | 17 | 49 | 49 | 81 | 81 | 113 | 113 |    |             |
| 16       | 16 | 48 | 48 | 80 | 80 | 112 | 112 |    |             |

Fig. 2—Matrix Unit Layout Stamping and Cross Reference Card (Unit 21 Shown)

| TEST | (TTY INPUT MESSAGE) TKM-41 CODE | CIOT ACCESS | NOTES       | TEST DESCRIPTION   | TEST SEQUENCE             |                          |                                |                                |                               |                               |                           |                           |                |  |  |
|------|---------------------------------|-------------|-------------|--|---------------------------|--------------------------|--------------------------------|--------------------------------|-------------------------------|-------------------------------|---------------------------|---------------------------|----------------|--|--|
|      |                                 |             |             |  |                           |                          |                                |                                |                               |                               |                           |                           |                |  |  |
| A    | 00                              | 1-3         | 1,2,5,6,8,9 | MANUAL OUTGOING SETUP.   | X-OFFICE CONNECTIONS      | CIOT OUTGOING CONTINUITY | MANUAL TEST                    | DISCONNECT                     |                               |                               |                           |                           |                |  |  |
| B    | 01                              | 1-3         | 1,2,5,6,8,9 | MANUAL INCOMING SETUP (IT TRAIN).  | X-OFFICE CONNECTIONS (IT) | CIOT INCOMING CONTINUITY | MANUAL TEST                    | DISCONNECT                     |                               |                               |                           |                           |                |  |  |
| C    | 02                              | 1-3         | 1,2,5,6,8,9 | MANUAL INCOMING SETUP (TC TRAIN).  | X-OFFICE CONNECTIONS (TC) | CIOT INCOMING CONTINUITY | MANUAL TEST                    | DISCONNECT                     |                               |                               |                           |                           |                |  |  |
| D    | 03                              | 1-3         | 2,5,6,8,9   | OUTGOING TEST.   | X-OFFICE CONNECTIONS      | CIOT OUTGOING CONTINUITY | OUTGOING RINGFORWARD NO ANSWER | ANSWER                         | TRUNK VERIFICATION            | DISCONNECT                    |                           |                           |                |  |  |
| E    | 04                              | 1-3         | 2,5,6,8,9   | INCOMING ABANDONED CALL TEST.  | X-OFFICE CONNECTIONS      | ABANDONED CALL           |                                |                                |                               |                               |                           |                           |                |  |  |
| F    | 05                              | 1-3         | 2,5,6,8,9   | INCOMING TEST (IT TRAIN) WITHOUT REVERSED WIRING TEST.                                   | X-OFFICE CONNECTIONS (IT) | CIOT INCOMING CONTINUITY | INCOMING RINGFORWARD NO ANSWER | ANSWER                         | INCOMING RINGFORWARD W/ANSWER | DISCONNECT                    |                           |                           |                |  |  |
| G    | 06                              | 1-3         | 2,5,6,8,9   | INCOMING TEST (TC TRAIN) WITHOUT REVERSED WIRING TEST.                                   | X-OFFICE CONNECTIONS (TC) | CIOT INCOMING CONTINUITY | INCOMING RINGFORWARD NO ANSWER | ANSWER                         | INCOMING RINGFORWARD W/ANSWER | DISCONNECT                    |                           |                           |                |  |  |
| H    | 07                              | 4           | 2,4,6       | INCOMING TEST (IT TRAIN) WITH REVERSED WIRING TEST.                                      | X-OFFICE CONNECTIONS (IT) | REVERSE WIRING           | CIOT INCOMING CONTINUITY       | INCOMING RINGFORWARD NO ANSWER | ANSWER                        | INCOMING RINGFORWARD W/ANSWER | DISCONNECT                |                           |                |  |  |
| I    | 08                              | 4           | 2,4,6       | INCOMING TEST (TC TRAIN) WITH REVERSED WIRING TEST.                                      | X-OFFICE CONNECTIONS (TC) | REVERSE WIRING           | CIOT INCOMING CONTINUITY       | INCOMING RINGFORWARD NO ANSWER | ANSWER                        | INCOMING RINGFORWARD W/ANSWER | DISCONNECT                |                           |                |  |  |
| J    | 09                              | 1-3         | 2,5,6,8,9   | INCOMING TEST (IT TRAIN) WITHOUT REVERSED WIRING TEST BUT INCLUDING ABANDONED CALL TEST. | X-OFFICE CONNECTIONS (IT) | CIOT INCOMING CONTINUITY | INCOMING RINGFORWARD NO ANSWER | ANSWER                         | INCOMING RINGFORWARD W/ANSWER | DISCONNECT                    | X-OFFICE CONNECTIONS (IT) | ABANDONED CALL            |                |  |  |
| K    | 10                              | 1-3         | 2,5,6,8,9   | INCOMING TEST (TC TRAIN) WITHOUT REVERSED WIRING TEST BUT INCLUDING ABANDONED CALL TEST. | X-OFFICE CONNECTIONS (TC) | CIOT INCOMING CONTINUITY | INCOMING RINGFORWARD NO ANSWER | ANSWER                         | INCOMING RINGFORWARD W/ANSWER | DISCONNECT                    | X-OFFICE CONNECTIONS (TC) | ABANDONED CALL            |                |  |  |
| L    | 11                              | 4           | 2,4,6       | INCOMING TEST (IT TRAIN) WITH REVERSED WIRING TEST PLUS ABANDONED CALL TEST.             | X-OFFICE CONNECTIONS (IT) | REVERSE WIRING           | CIOT INCOMING CONTINUITY       | INCOMING RINGFORWARD NO ANSWER | ANSWER                        | INCOMING RINGFORWARD W/ANSWER | DISCONNECT                | X-OFFICE CONNECTIONS (IT) | ABANDONED CALL |  |  |
| M    | 12                              | 4           | 2,4,6       | INCOMING TEST (TC TRAIN) WITH REVERSED WIRING TEST PLUS ABANDONED CALL TEST.             | X-OFFICE CONNECTIONS (TC) | REVERSE WIRING           | CIOT INCOMING CONTINUITY       | INCOMING RINGFORWARD NO ANSWER | ANSWER                        | INCOMING RINGFORWARD W/ANSWER | DISCONNECT                | X-OFFICE CONNECTIONS (TC) | ABANDONED CALL |  |  |
| N    | 13                              | 1-4         | 2,3,4,6,7   | ALL FEATURES WITHOUT INCOMING REVERSED WIRING TEST.                                      | X-OFFICE CONNECTIONS (IT) | REVERSE WIRING           | CIOT INCOMING CONTINUITY       | INCOMING RINGFORWARD NO ANSWER | ANSWER                        | INCOMING RINGFORWARD W/ANSWER | DISCONNECT                |                           |                |  |  |
| O    | 14                              | 4           | 2,3,4,6,7   | ALL FEATURES WITH INCOMING REVERSED WIRING TEST.   | X-OFFICE CONNECTIONS (TC) | REVERSE WIRING           | CIOT INCOMING CONTINUITY       | INCOMING RINGFORWARD NO ANSWER | ANSWER                        | INCOMING RINGFORWARD W/ANSWER | DISCONNECT                |                           |                |  |  |
|      |                                 |             |             |  | X-OFFICE CONNECTIONS (TC) | ABANDONED CALL           |                                |                                |                               |                               |                           |                           |                |  |  |
|      |                                 |             |             |  | X-OFFICE CONNECTIONS      | OUTGOING CONTINUITY      | OUTGOING RINGFORWARD           | ANSWER                         | TRUNK VERIFICATION            | DISCONNECT                    |                           |                           |                |  |  |

NOTES:  
 1 = MANUAL SETUP.  
 2 = DEMAND TEST.  
 3 = CAN ALSO BE RUN AUTOMATICALLY.  
 4 = NONREPEATABLE.  
 5 = REPEATABLE.  
 6 = REQUESTED FROM CIOT OR 4A MTCE CTR.  
 7 = REQUESTED FROM IMTF TTY.  
 8 = RELEASED BY CIOT RLS KEY.  
 9 = IF TRUNK ATTACHED TO TEST LINE, TKM-41 MESSAGE MUST SPECIFY CIOT ACCESS (1-3) TO BE USED FOR TEST.

X-OFFICE CONNECTIONS = CROSS-OFFICE CONNECTIONS

TEST PHASE



NOT USED WITH TEST 13.

Fig. 3—CIOT Test Sequences