# SYSTEM EVALUATION

# NO. 2 ELECTRONIC SWITCHING SYSTEM

CONTENTS PAGE



## 1. GENERAL

**1.01** This section describes the procedure for evaluating the integrity of a No. 2 Electronic Switching System (ESS). The testing procedures, in varying degrees, are applicable for the following:

- Part of acceptance testing prior to cutover of a new office
- Prior to and after growth additions, restart, and retrofit to an in-service office
- Part of an overall routine for periodic evaluation of an in-service office.

**1.02** This section is being reissued to add centrex information and other general revisions. Since this reissue covers a general revision, arrows ordinarily used to indicate changes have been omitted.

**1.03** The system evaluation is primarily a check of the hardware and software capability of the office to operate in the normal sync mode with little or no difficulty and to sustain call processing at an acceptable call completion rate.

**1.04** The No. 2 ESS performance requirements (Section 820-600-180) require that, during the precutover load testing, the number of mishandled calls (for example, calls left high and dry, calls wrongly routed) should not exceed 1 in 10,000. The allowable troubles that indicate some malfunction, but do not definitely indicate a failure to complete shall not exceed 5 in 10,000. While the quantity of mishandled calls in a cutover office cannot be established exactly, analysis of the PUM and CUA counters (Table A) will establish limits on the machine's capability.

**1.05** Reference should be made to Input Message Manual (IM-2H200) and Output Message Manual (OM-2H200) for detailed descriptions of input and output messages which appear in this section.

**1.06** It is not intent of this section to precisely detail all procedures pertaining to a system evaluation. Reference is made to other procedural and test documents which are essential as a part of system evaluation.

**1.07** If trouble is encountered during the system evaluation, normal maintenance procedures should be used to locate and clear the trouble before proceeding with subsequent tests.

**1.08** Whenever the term TOUCH-TONE® telephone service is used, it refers to the equipment required to provide this service to the customer.

**1.09** The system evaluation procedures contain the following tests:

(a) ***Evaluation of Teletypewriter (TTY) Printouts:*** The evaluation consists of the following.

(1) The plant measurement printouts of the past two (2) days are inspected for specific measurements which provide information relative to the performance of and the service offered by the switching system.

(2) If a plant measurement printout exceeds the specified value, review TTY printouts of previous 24 hours for related TTY alarm printouts.

(3) Analyze the hourly printouts of the last 2 days to determine the integrity of the system on an hourly basis.

(4) Review the alarm printouts of the last two days and determine the disposition of each.

(5) Calculate the percentage of incoming matching loss calls and the percentage of originating matching loss calls and determine if the values are normal for the office.

(b) ***Maintenance Center Tests:*** Verifies the operation of the maintenance center (MC) control and display panel functions using Section 232-106-301.

(c) ***TTY Verification Tests:*** These tests verify that the TTY facilities are operational.

(d) ***Single Card Writer (SCW) Verification Tests:*** This procedure verifies that the SCW can write program store cards error free.

(e) ***Network Fabric Tests:*** The network fabric tests verify the path connections thru the switching network.

(f) ***Ringing and Tone (RT) and Recorded Announcement (RA) Tests:*** These tests verify the RT and RA facilities. Each tone and recorded announcement is accessed and verified.

(g) ***Trunk Test Panel (TTP) Tests:*** The TTP tests verify the operation of all TTP functions using Section 232-130-501.

(h) ***Service Circuit Tests:*** The service circuit tests consists of diagnostics of circuits with automatic diagnostics and manual tests of service circuits which do not have automatic diagnostics.

(i) ***Trunk Tests:*** The trunk tests consist of trunk diagnostics, translation checks, and circuit checks.

(j) ***Office Alarms Tests:*** The office alarms tests are performed in accordance with Section 232-115-501.

(k) ***Emergency Action and Error Recovery:*** This test verifies the emergency action and error recovery functions of the system.

**1.09** The following documents are required or will be of assistance in performing a No. 2 ESS system evaluation:

| DOCUMENT | TITLE |
|---|---|
| 232-120-301 | Traffic and Plant Measurements |
| 232-106-501 | Maintenance Center Control and Display Panel, Tests |
| 232-004-301 | Updating Program Store Translation Information Using Single Card Writer |
| 232-115-501 | Office Alarms Tests |
| IM-2H200 | Input Message Manual |
| OM-2H200 | Output Message Manual |

| | |
|---|---|
| 232-130-501 | Trunk Test Panel Circuit (SD-2H075)—Tests |
| 232-204-501 | Centrex Attendant Loop Circuit (SD-2H172) and Trunk Circuit (SD-2H173) Test |
| 232-208-301 | Impedance Balancing Procedures on SD-2H182 (Centrex Attendant Trunk Circuit) Arranged For 4-Wire to 2-Wire Conversion |

## 2. APPARATUS

**2.01** The following apparatus and test equipment are required for the performance of the system evaluation.

- Test cord, 1 foot long, equipped with a 411A (test pick) tool on one end and a 360 tool on the other end
- 1025A Headset equipped with a 310 plug or equivalent
- Clip, Connecting, KS-6278
- Resistors, 200, 900, 1800, 2200, 4300, 8500, and 9000 ohms with 2-clip leads.
- 258C dummy plug.

## 3. EVALUATION SETUP PROCEDURES

***Note:*** This evaluation setup procedure applies

***Note:*** This evaluation setup procedure applies only to office evaluations performed prior to cutover.

**3.01** In order to perform the evaluation of TTY printouts in Part 4 ***prior to cutover,*** the system must be processing a volume of traffic. This traffic load can be simulated by the use of traffic simulator (load box) combination ITE 4643-4675, ITE 5385 (PDP-8/E mini processor system), or other suitable equipment Section 232-002-302 contains procedures for setting up the ITE 5385. Section 232-002-503 contains procedures for setting up the ITE 4643-4675. The procedures in these sections is intended for performing the call completion rate test during a 24-hour period. The traffic may be generated for an additional 24-hour period in order to evaluate the TTY printouts identified in Part 4.

## 4. EVALUATION OF TTY PRINTOUTS

**4.01** ***Evaluation of the last 48 hours of printouts will give a true indication of system performance. In particular, the automatic tests results for both the control complex and the peripheral units (PU) indicate the condition of these units. Examination of the plant measurements gives performance characteristics of the system during traffic load.***

**4.02** Evaluation of the automatic tests results consists of verifying that all units did have these tests performed (verify that no tests were aborted) and that the results were satisfactory or explainable. Explainable means that trouble(s) was detected by the automatic tests but was discounted because the trouble(s) was located and cleared.

**4.03** Evaluation of the plant measurements is a relative task because the performance of the system presently should be compared to the performance six months or a year ago. For this purpose, information concerning past values of the plant measurements listed in Table A is needed. ***Prior to cutover*** the present performance can only be compared to the values listed in Table A since past values are not available. The plant measurements described in Table A give information relative to the performance of and service offered by the switching system. The number of allowed errors, failures, etc., should ideally be zero; however, in a real situation, any number other than zero may indicate problems. Obtain previous measurements from the dial administration organization and compare with the present measurements. Analyze the reasons for any differences.

TABLE A

EVALUATION OF SELECTED PLANT MEASUREMENTS

| PLANT REGISTER | MAX. COUNT ALLOWED | DESCRIPTION |
|---|---|---|
| CUA 05 | * | Maintenance initiated switches (excludes TTY requested noninitializing switches) |
| PUM 01 | * | Transient errors and bad address errors on SCPDs, local CPD, AMA and AIOD |
| PUM 02 | * | Transient errors and bad address errors on network controllers (except FCG and power cross) |
| PUM 03 | * | Transient errors and bad address errors on line scanners |
| PUM 04 | * | Transient errors and bad address errors on universal scanners |
| PUM 05 | * | Not used |
| PUM 06 | * | Diagnostic faults on SCPDs, local CPD, AMA, AIOD, RA, and R&T |
| PUM 16 | * | Continuity test failures (total system continuity test failures on all types of calls)** |
| PUM 17 | * | False cross and ground failures |
| PUM 18 | * | Power cross failures*** |
| PUM 19 | * | Links removed from service (total number of network links (A, B, and C) removed from service for maintenance purposes by error analysis) |

*Note:* Peripheral unit measurements do not include results of manually requested tests or periodic exercise tests. A transient error occurs when an external order fails the first time but succeeds on a retry. A fault is a true failure found by a diagnostic program as a result of a call processing request (working mode). A bad address occurs when an external order fails the first time and on all subsequent retries.

* The total quantity or error counts in *all* registers in Table A shall not exceed 5/10,000 calls. Transient errors may or may not indicate call failures, therefore count against the 5/10,000 calls requirement. Bad address errors *do indicate call failures,* therefore count against the 1/10,000 calls requirement. Analyze printouts to determine if errors are transient or bad address. (Refer to Section 820-600-180 for No. 2 ESS performance requirements.)

** The number of continuity test failures can vary due to customer dialing habits condition of outside plant lines, and system problems.

*** Failures may be caused by outside plant troubles or network troubles.

SCPD — Supplementary Central Pulse Distributor
CPD — Central Pulse Distributor
AMA — Automatic Message Accounting
AIOD — Automatic Identified Outward Dialing

**4.04** Section 232-120-301, Traffic and Plant Measurements, provides a detailed description of the traffic and plant schedules and printouts. A description of and comments about each register measurement are given. Section 232-120-301 should be used in conjunction with OM-2H200 for evaluation of the traffic and plant measurement printouts.

**4.05** The procedure to evaluate TTY printouts follows:

| STEP | PROCEDURE |
|---|---|
| | **Examination of Plant Measurements** |
| 1 | Inspect the plant measurement printouts (output message index TI PR PLT) of the past 2 days. Verify that the counts in Table A are not exceeded unless a justified explanation can be made. The counts shown are totals for one day. |
| 2 | If the system evaluation is being performed prior to growth or on a routine basis, compare present values with past values. |
| 3 | If any of the plant measurements for a single day exceed the values in Table A, review the preceding 24 hours of printouts for alarm or trouble messages which relate to the excessive counts. |
| 4 | Discount any troubles which were located and cleared. |
| 5 | Outline any problem areas which require additional work. (That is, if maintenance initiated switches (CUA05) were excessive, determine if they were due to control unit (CU) faults or peripheral unit (PU) faults). |
| | **Hourly Printout Evaluation** |
| 6 | The hourly printouts<br><br>tt MI TT aaa jjjjjj kkkkkk<br><br>bb-cc dddd-ee fff ggg<br><br>where:<br><br>jjjjjj = octal contents of the equipment status register (ESR)<br><br>kkkkkk = octal contents of selected alarm maintenance register (AMR) bits<br><br>can be compared from hour to hour to determine how well the system is performing on an hourly basis. Convert the octal contents of the j- and k-fields to binary and record the values of the bit positions (see Tables B and C). |

TABLE B

EQUIPMENT STATUS REGISTER

| EQUIPMENT STATUS REGISTER BIT INDICATORS | CKT LIM TROUBLE* | BLDG/PWR TROUBLE** | MISC TROUBLE | AMA TROUBLE | CU 1 STANDBY | SCANNER TROUBLE | CU 0 STANDBY | NETWORK TROUBLE | MC | | CU 1 | | | CU 0 | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | OUT OF SERVICE | MANUAL | OUT OF SERVICE | RUNNING | ACTIVE | OUT OF SERVICE | RUNNING | ACTIVE |
| BIT POSITIONS | 15 | 14 | 13 | 12 | 11 | 10 | 9 | 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 | 0 |
| OCTAL DATA FIELD | j | j | | | j | | | j | | | j | | | j | | |

*Called "SVC trouble" prior to LO-1, 4.6 or EF-1, 3.4
**Called "TRK trouble" prior to LO-1, 4.6 or EF-1, 3.4

TABLE C

ALARM AND MAINTENANCE REGISTER

| SELECTED ALARM AND MAINTENANCE REGISTER BIT INDICATIONS | MC INTERRUPT DISABLED | TOLL NETWORK PROTECTION | DYNAMIC SERVICE PROTECTION | TRAFFIC† | FUSE ALARM | NOT PRINTED | NOT PRINTED | NOT PRINTED | ALARM TRANSFERRED | AUTOMATIC TEST INHIBIT | SERVICE LOSS | TEST FAIL | NOT PRINTED | NOT PRINTED | TEST PASS | NOT PRINTED |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| BIT POSITIONS | 15 | 14 | 13 | 12 | 11 | 10 | 9 | 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 | 0 |
| OCTAL DATA FIELD | k | | k | | k | | | k | | | k | | | k | | |

†Called "Office overload" prior to LO-1, 4.6 or EF-1 3.4

| STEP | PROCEDURE |
|---|---|

7 If any of the following bit positions of the equipment status register (ESR) or the alarm maintenance register (AMR) were set to one (1), determine why.

**EQUIPMENT STATUS REGISTER**

| BIT POSITION | DESCRIPTION |
|---|---|
| 2 | CU 0 out of service |
| 5 | CU 1 out of service |
| 8 | Network trouble |
| 10 | Scanner trouble |
| 12 | AMA trouble |
| 13 | MISC trouble |
| 14 | BLDG/PWR trouble (Called "SVC trouble" prior to LO-1, 4.6 or EF-1, 3.4) |
| 15 | CKT LIM trouble (Called "TRK trouble" prior to LO-1, 4.6 or EF-1, 3.4) |

**ALARM MAINTENANCE REGISTER**

| BIT POSITION | DESCRIPTION |
|---|---|
| 5 | Service loss |
| 6 | Automatic test inhibit |
| 12 | Traffic (Called "Office overload" prior to LO-1, 4.6 or EF-1, 3.4) |
| 13 | Dynamic service protection |
| 14 | Toll network protection |
| 15 | MC interrupt disable |

8 All failures or troubles in the critical areas (Step 7) must be explained or accounted for before they can be discounted.

**ALARM MESSAGES EVALUATION**

9 Analyze all major and minor alarm messages received during the past 2 days.

A major alarm message is preceded by two asterisks (**), and a minor alarm message is preceded by a single asterisk (*).

| STEP | PROCEDURE |
|---|---|
| 10 | All major and minor alarms must be accounted for and cleared. |
| | **SERVICE ANALYSIS** |
| 11 | Contact the dial administration organization and ask for an analysis of the service offered by the system the past 2 days. Determine if the percentages of incoming matching loss calls and originating matching loss calls for the past 2 days are normal values for the office. |

## 5. MAINTENANCE CENTER TESTS

**5.01** If a complete office evaluation is to be performed, the procedures in Section 232-106-501 should be used to verify the operation of the maintenance center (MC) frame control and display panel functions. However, the method of operation is detailed in Section 232-106-301.

***Caution: The operation of the following functions of the MC should only be verified prior to cutover.***

(1) ***Trap of a transfer error***

(2) ***Test mode reversal***

(3) ***System reset and clear.***

***These functions should not be verified when evaluating an office before or after growth or periodically because they could be service affecting.***

## 6. TELETYPEWRITER VERIFICATION TESTS

**6.01** The following procedures are provided to determine if the TTY facilities are operational and free of wiring errors. The procedure may be performed prior to cutover, before and after growth, restart, or retrofit, and periodically.

***Note 1:*** Personnel are required at each TTY location for Steps 25 through 33 of this procedure.

***Note 2:*** In the following procedure, whenever it is stated to type the following input message:

M TT:SEN:a!

the response consists of all the output characters followed by an input test (see IM-2H200). All characters should be tried on the input test.

| STEP | ACTION | VERIFICATION |
|---|---|---|
| 1 | At TTY control panel—<br>Release LOC MTC key. | |
| 2 | Depress REM MTC key. | |
| 3 | Release TR1 ON key. | |
| 4 | Depress RST key. | |
| 5 | At MC TTY type—<br>Type the following TTY input message:<br>M! | TTY output message follows—<br>Anything except ?O |

| STEP | ACTION | VERIFICATION |
|---|---|---|
| 6a | If ?O was received—<br>Operate BREAK key. | TTY output message follows—<br>MR TT DGN 0 ATP IS aaa<br>MR TT SI 00000a 0bcdef ghijkl 0000mn opqrst<br><br>***Note:*** Refer to OM-2H200 for explanation of variable fields. |
| 7b | At TTY control panel—<br>If TR1 ON lamp is lighted—<br>Depress RST key. | At TTY control panel—<br>TR1 ON lamp extinguished. |
| 8 | At MC TTY—<br>Type the following TTY input message:<br>M TT:DGN:0! | TTY output message follows—<br>MR TT DGN 0 ATP IS aaa<br>MR TT SI 00000a 0bcdef ghijkl 0000mn opqrst<br><br>***Note:*** Refer to OM-2H200 for explanation of variable fields. |
| 9 | At MC TTY—<br>Type the following TTY input message:<br>M TT:DGN:1! | TTY output message follows—<br>NG |
| 10 | At MC TTY control panel—<br>Depress TR1 ON key. | At TTY control panel—<br>TR1 ON lamp lighted. |
| 11 | At MC TTY—<br>Type the following TTY input message:<br>M TT:DGN:0! | TTY output message follows—<br>NG |
| 12 | At MC TTY—<br>Type the following TTY input message:<br>M TT DGN:1! | TTY output message follows—<br>MR TT DGN 1 ATP IS aaa<br>MR TT SI 00000a 0bdcef ghijkl 0000mn opqrst<br><br>***Note:*** Refer to OM-2H200 for explanation of variable fields. |
| 13 | At TTY control panel—<br>Release TR1 ON key. | At TTY control panel—<br>TR1 ON lamp extinguished. |
| 14 | At MC TTY—<br>Type the following TTY input message:<br>M TT:OFF! | At TTY control panel—<br>LOC MTC lamp lighted. |
| 15 | At MC TTY—<br>Type the following TTY input message:<br>M TT:TIM! | No response should be received. |
| 16 | At TTY control panel—<br>Depress RST key. | |

| STEP | ACTION | VERIFICATION |
|---|---|---|
| 17 | At MC TTY—<br>Type the following TTY input message:<br>M TT:SEN:0! | See Note 2 in Part 6. |
| 18 | At TTY control panel—<br>Depress TR1 ON key. | At TTY control panel—<br>TR1 ON lamp lighted. |
| 19 | At MC TTY—<br>Type the following TTY input message:<br>M TT:SEN:1! | See Note 2 in Part 6. |
| 20 | At TTY control panel—<br>Release TR1 ON key. | At TTY control panel—<br>TR1 ON lamp extinguished. |
| 21 | Perform Steps 22 through 33 for each TTY channel (except MC TTY) before proceeding to the next TTY channel. | |
| 22 | Release DATA SET DISCONNECT key for remote TTY on channel under test. | |
| 23c | If channel under test is equipped with a local TTY—<br>Release TTY DISCONNECT key for local TTY on channel under test. | |
| 24 | At MC TTY—<br>Remove TTY channel under test by typing the following TTY input message:<br>M TT:RMV:a!<br>a = TTY channel number (2-5), use the number of TTY channel under test. | |
| 25 | At remote TTY on channel under test—<br>Type the following TTY input message:<br>M TT:DGN:a!<br>a = TTY channel number (2-5), use the TTY number of TTY channel under test. | TTY output message printed:<br>?O |
| 26c | Repeat Step 25 for the local TTY on the channel under test. | |
| 27 | At MC TTY—<br>Restore out of service TTY by typing the following TTY input message:<br>M TT:RST:a! | TTY output message follows at TTY under test:<br>MR TT DGN a ATP IS a<br>At MC TTY—<br>MR TT SI 00000a 0bcdef ghijkl 0000mn opqrst |
| 28 | At remote TTY on channel under test—<br>Remove it from service by typing the following TTY input message:<br>M TT:RMV:a! | TTY output message printed:<br>OK |

| STEP | ACTION | VERIFICATION |
|---|---|---|
| | a = TTY number (2-5), use the number of TTY channel under test. | |
| 29 | At remote TTY—<br>Depress the BREAK key. | TTY output messages follow at TTY under test:<br>MR TT DGN c ATP IS a<br>At MC TTY—<br>MR TT SI 00000a 0bcdef ghijkl 0000mn opqrst |
| 30c | Repeat Steps 28 and 29 using each local TTY on the channel under test. | |
| 31 | At remote TTY on channel under test—<br>Request the complete input-output facilities by typing the following TTY input message:<br>M TT:SEN:a!<br>a = TTY number (2-5) | |
| 32c | Repeat Step 31 using each local TTY on channel under test. | |
| 33 | Restore keys released in Steps 22 and 23c to original positions. | |
| 34 | Repeat Steps 22-33 for remaining TTY channels. | |

## 7. SINGLE CARD WRITER (SCW) VERIFICATION TESTS

**7.01** Follow the procedure in Section 232-004-301 to verify error free writing of the single card writer. This procedure may be performed prior to cutover, before and after growth, restart, or retrofit, and periodically. This SCW verification procedure should be performed with each CU on-line.

## 8. NETWORK FABRIC TESTS

**8.01** Included in the network fabric test program (NETFAB) are the following tests. All of these tests are performed when the NETFAB program is initiated:

- False cross or ground test
- Tip and ring continuity test
- Spurious pulse path test

This procedure may be used prior to cutover, before and after growth, and periodically, on both existing and growth networks. The NETFAB program is designed to be compatible with call processing. Before a path is tested, the status of each link in the path must be determined. If a critical link is found to be busy, no test will be run on the path. If a noncritical link is busy, an alternate noncritical link is searched for. If none is found idle, no test will be performed on the path. When an idle path is found it is marked busy to prevent call processing from tearing it down. Any trouble detection or state change will cause the NETFAB test to abort, thus preventing impairment to call processing.

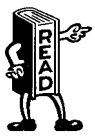
> ***Note:*** The NETFAB test program should not be run under high traffic conditions in an operating office. To do so would not permit a complete test of the network since only idle paths are tested.

**8.02** To completely test all paths in an LTN, type each of the following TTY input messages and observe the respective response (refer to Section 232-108-301):

| INPUT | RESPONSE |
|---|---|
| (1) MS NW:FAB:fg 0- 00c0 | MR NW FAB fg 0- ATP |
| (2) MS NW:FAB:fg 0- 4007 | MR NW FAB fg 0- ATP |

fg = LTN of interest (0-14)

c = last concentrator group equipped in the LTN of interest




***At this point in the NETFAB test program, the tip and ring test have been performed within all concentrator groups and grids using controller 0. Also, the complete pulse path test has been completed using controller 0. Two options (A and B) are provided for the remaining portion of the NETFAB test program. Choose only one option:***

- ***Option A*** will require considerably more machine time to complete than Option B but may be performed without supervising the TTY.. For example, the tests may be performed during the night while the office is unattended. Option A repeats all of the above tests on controller 1.

- ***Option B*** may be performed in considerably less time than Option A; however, Option B will require inserting 4 input messages per concentrator group and 2 input messages per grid at the TTY. For this reason this option should only be performed while the office is attended or under surveillance. Option B performs only those tests that are necessary to test the pulse paths using controller 1, since the tip-ring paths were tested above.

**OPTION A**

| | |
|---|---|
| (3) MS NW:FAB:fg 1- 00g0 | MR NW FAB fg 1- ATP |
| (4) MS NW:FAB:fg 1- 4007 | MR NW FAB fg 1- ATP |

**OPTION B**

| | |
|---|---|
| (5) MS NW:FAB:fg 1- 2k00 | MR NW FAB fg 1- ATP |
| (6) MS NW:FAB:fg 1- 2k11 | MR NW FAB fg 1- ATP |
| (7) MS NW:FAB:fg 1- 2k62 | MR NW FAB fg 1- ATP |
| (8) MS NW:FAB:fg 1- 2k73 | MR NW FAB fg 1- ATP |
| (9) MS NW:FAB:fg 1- 50g0 | MR NW FAB fg 1- ATP |
| (10) MS NW:FAB:fg 1- 60g0 | MR NW FAB fg 1- ATP |

k = concentrator groups (0-7, as equipped)

g = grid (0-7)

***Note 1: If Option A was used:***

Repeat (3) and (4) for each LTN in the office.

***Note 2: If Option B was used:***

Repeat (5) through (8) for each concentrator group that is equipped (k = 0-7).

Repeat (9) for each grid (0-7).

Repeat (10) for each grid (0-7).

Repeat (5) through (10) for each LTN in the office.

## 9. RINGING AND TONE (RT) AND RECORDED ANNOUNCEMENT (RA) TESTS

### A. RT Frame Diagnostics

**9.01** RT frame diagnostics may be performed prior to cutover and before and after growth, restart, retrofit and/or periodically. Request a diagnostic of the RT frames by typing the following TTY input message and observe the expected output messages:

Input: M RT:DGN:fg h-!

fg = two-digit decimal equipment number of RT frame of interest (00)

h = plant of interest (0-1)

= omitted for the on-line plant

= 0 for plant 0, which must be in the off-line mode

= 1 for plant 1, which must be in the off-line mode

Output: MR RT DGN fg hi ATP

***Note:*** If any message other than the preceding is received, an error condition exists. Refer to OM-2H200 for an explanation of this message.

### B. RA Frame Diagnostics

**9.02** RA frame diagnostics may be performed prior to cutover and before and after growth, restart, retrofit and/or periodically. Request a diagnostic of the RA frames by typing the following TTY input message and observe the expected output message.

Input: M RA:DGN:fg -!

fg = two-digit decimal equipment number of RA frame of interest (00-15)

Output: MR RA DGN fg - ATP

***Note:*** If any message other than the preceding is received, an error condition exists. Refer to OM-2H200 for an explanation of this message.

### C. Tone and Recorded Announcement Tests

***Caution: The following tone and recorded announcement tests should only be performed prior to cutover.***

**9.03** Determine the RA channels assigned and the group number of each channel from the Recorded Announcement Tables, form ESS-2509 5J.

**9.04** Verify that the assigned channels have the proper announcement recorded on them using form ESS-2509 and the 624-A10 telephone set. If any channels do not have the proper announcement on them, record it on them.

**9.05** Use the following test procedure and Table D to check all recorded announcements or tones. When all members of a group have been tested and all errors found corrected, go to the next group until all recorded announcement or tone groups have been tested.

#### Test Procedure

**9.06** This procedure is to be used to check all recorded announcements or tones.

(1) Connect either a telephone subset or coin station to the proper type of test line as needed to perform the test of the group. (See Table D.)

(2) Remove all but one tone presence detector (TPD), SD-2H132, group 47, from service by typing the following TTY input message:

M SV:RMV:47 a!

a = Member number of circuit to be removed from service.

(3) Manually remove the power from the TPD left in service.

(4) Request a high-priority diagnostic of the group to be tested by typing the following TTY input messge:

MH SV:DGN:ggg!

ggg = Trunk group number.

All members should fail and be removed from service.

(5) Restore power to the TPD removed in (3) and restore the first member of the group to be tested.

(6) Using the telephone set connected in 1, take the necessary action outlined in Table D to cause the RA or tone for the group under test to be returned in the telephone handset.

(7) If the announcement or tone was verified, restore the next member of the group under test and remove the one just tested.

(8) Repeat (6) through (7) until all members of the group under test have been tested. Restore all members of group just tested.

(9) Repeat (1) through (8) until all groups have been tested per Table D.

(10) Restore all members of the TPD group removed from service.

TABLE D

TONE AND RECORDED ANNOUNCEMENT

| TRK GRP # | TYPE OF TONE OR ANNOUNCEMENT | TYPE OF TELEPHONE | ACTION |
|---|---|---|---|
| 16 | Dial-Tone-First Coin | Dial-Tone-First Coin | Dial legal local telephone number without depositing initial deposit (10 cents or more, as local practice dictates). |
| 18 | Permanent Signal | TOUCH-TONE or Dial Pulse Phone | Remove receiver; just hold |
| 19 | Partial Dial | TOUCH-TONE or Dial Pulse Phone | Dial only the first 5 digits of a legal telephone number. |
| 20 | "No 1+" Dialing Error | TOUCH-TONE or Dial Pulse Phone | Using Form ESS-2300, 3- and 16-digit translation, find an entry which has an "R" option entered in Column 31. The first digit of the office code is given in the upper right hand corner of the form with the second and third digits given in the left-most column for any horizontal entry. Now dial this office code without the required "1" prefix. If no "R" exists in Column 31, this announcement is not used in this office. |
| 21 | Special Service | TOUCH-TONE or Dial Pulse Phone | Dial 72# or 72 plus time-out on a test line which has Call Waiting and/or Add-On Customer Calling features only. |
| 23 | Overtime Monitor | Timed Coin Phone and TOUCH-TONE or Dial Pulse Phone | Check "OFFOP0" to see if bit 12=1 (use TDATA or PA-2H200 to find program store address). If bit 12 is 1, then this announcement can be tested by inserting the initial deposit, dialing the number of the handset, answering it, and leaving both phones off-hook until the announcement occurs. If bit 12 is 0, skip this group. |
| 24 | "Extra 1+" Dialing Error | TOUCH-TONE or Dial Pulse Phone | Follow procedure outlined for trunk group 20 to find an entry on Form ESS-2300 which has a "P" option in Column 31. Then dial this office code using the unwanted "1" prefix. |

TABLE D (Cont)

| TRK GRP # | TYPE OF TONE OR ANNOUNCEMENT | TYPE OF TELEPHONE | ACTION |
|---|---|---|---|
| 30 | Receiver Off-Hook Tone | TOUCH-TONE or Dial Pulse Phone | Remove receiver from hook, wait until ROH tone is heard; a permanent signal announcement is given before the ROH tone is connected. |
| 31 | Busy Tone | Two TOUCH-TONE or Dial Pulse Phones | Take one phone off-hook; dial that phone with the other one. Listen for 60-ipm busy tone. |
| 34 | Reorder Tone | TOUCH-TONE or Dial Pulse Phone | (1) Use Form ESS-2202-R, Trunk Group Table, to find the non-operator local trunk group having the least number of members.<br><br>(2) Use Form ESS-2303-R, Route Index Expansion Table, Columns 36-38, to see if a "Next Route Index" is given for that group. If so, repeat Step 1 until the group with the lowest number of members and no "Next Route Index" is found.<br><br>(3) Using the Code Group Translation Table, Form ESS-2304-R, find the "Code Group Number" which points to a RI which uses the trunk group selected.<br><br>(4) Look in the 3- and 6-Digit Translation Table, Form ESS-2300-R, in the "No Prefix" column, Columns 25-27, for the code group found in Step 3. The office code can now be read off the table.<br><br>(5) Remove all members of the trunk group from service using the M TK RMV ggg mmm! request where ggg = trunk group number and mmm = member number. |

TABLE D (Cont)

| TRK GRP # | TYPE OF TONE OR ANNOUNCEMENT | TYPE OF TELEPHONE | ACTION |
|---|---|---|---|
| 34 (Cont) | | | (6) Now dial a telephone number using the office code found in Step 4. Reorder (120 ipm) tone should be returned. |
| Locally Assign- | Locally assigned by Telco | TOUCH-TONE or Dial Pulse Phone | (1) Using form ESS-2202-R, find any other tone or local recorded announcement groups.<br>(2) On ESS-2303-R, locate a RI that uses the selected trunk group.<br>(3) Using the Code Group Translation Table, Form ESS 2304-R, find the "Code Group Number" which points to a RI which uses the trunk group selected.<br>(4) Using ESS Form 2300-R in anyone of the prefix columns for the code group found in Step 3.<br>(5) Dial the call as indicated by the digits on ESS 2300-R. |

### D. Low, High, and Milliwatt Tone Test

**9.07** To test the low tone (Trunk Group 33), the high tone (Trunk Group 32), and the milliwatt tone (Trunk Group 35) groups, use the following procedure at the TTP. These tests may be performed prior to cutover, before and after growth, restart, retrofit and/or periodically.

(1) Dial a 1 access code + 3-digit group number + 3-digit member number (member to be tested) + ST.

(2) Plug a headset into TEL SET A and B jacks and operate the TALK key. The tone should be heard.

(3) Repeat (1) and (2) until all members of the group have been tested and any errors found corrected.

## 10. TRUNK TEST PANEL TESTS

**10.01** The trunk test panel (TTP) tests should be performed in accordance with Section 232-130-501. These tests may be performed prior to cutover, before and after growth, restart retrofit, and/or periodically.

## 11. SERVICE CIRCUIT TESTS

### A. Service Circuit Diagnostics

**11.01** Service circuit diagnostics may be performed prior to cutover, before and after growth, restart, retrofit and/or periodically. Request a

diagnostic of all service circuits in the office, which have diagnostics, by typing the following input message:

M SV:DGN!

The following output message will be printed to indicate that automatic progression service circuit testing has begun.

MR SV BGN ggg

ggg = service circuit group that is currently being tested.

If a service circuit fails the diagnostic, one of the following TTY printouts will be received.

MR SV BLK a b ggg mmm ccc dddd dddd

MR SV DGN a b ggg mmm ccc dddd dddd

The following TTY printout will be received when all service circuits (which have diagnostics) have been diagnosed.

MR SV END

***Note:*** Refer to OM-2H200 for explanation of variable fields.

### B. Manual Service Circuit Tests

**11.02** The following is a list of service circuits and associated test sections. More comprehensive manual tests are required for these circuits since they do not have automatic tests or since the automatic tests are not extensive enough. These service circuits should be tested in accordance with the associated test section. If any of these tests were performed during the past month they may be omitted. Manual service circuit tests may be performed prior to cutover, before and after growth, restart or retrofit, and periodically.

| TEST SECTION | SERVICE CIRCUIT |
|---|---|
| 232-111-501 | MF Test Environment Circuit (SD-2H134) |
| 232-117-501 | Precise Level Test Tone Circuit (SD-2H169) |
| 232-135-501 | TOUCH-TONE® Station Test Circuit (SD-1A199) |
| 232-136-501 | TOUCH-TONE Calling Detector Test Circuit (SD-2H131) |
| 232-137-501 | Dial Pulse Receiver Test Circuit (SD-2H133) |
| 232-138-501 | Line Insulation Test Circuit (SD-2H142) |
| 232-144-501 | Station Ringer Test Circuit (SD-2H129) |
| 232-148-501 | Range Extension Circuit (SD-2H145) |
| 232-154-501 | Tone Presence Detector Circuit (SD-2H132) |
| 232-155-501 | Ringing and Coin Control Test Circuit (SD-2H135) |
| 232-155-502 | Ringing Circuit for Individual Two-Party Coin and PBX (SD-2H116) |
| 232-155-503 | Ringing Circuit for Coded, Superimposed Reverting and Rural Ringing Off- and On-Hook Ring Back (SD-2H126) |
| 232-157-501 | Audible Ringing and Recorded Announcement Circuit (SD-2H119 and SD-2H118) |
| 232-158-501 | Three Port Conference Circuit (SD-2H137) |

## 12. CENTREX TESTS

### A. Centrex Universal Console Demand Exercise Program Procedures

**12.01** Section 232-202-302 describes the use of the centrex universal console lamp and key demand exercise program as a maintenance aid in identifying and in locating faults in centrex attendant telephone consoles, centrex console control cabinets, and centrex data links associated with the No. 2 Electronic Switching System (ESS).

**12.02** Improper universal console lamp operations and key signals may be caused by faults occurring in a centrex universal attendant telephone

console (hereafter referred to as console), a centrex console control cabinet, the interconnecting data link circuitry, or the No. 2 ESS central office equipment.

**12.03** When a fault becomes apparent at the attendant consoles, attempts may be made at the ESS central office to determine and to correct the faults. Data link diagnostic programs may be requested to determine if the fault is occurring in the data link circuitry. The data link diagnostic programs may be requested automatically due to repeated parity failures or they may be requested manually from the TTY. TTY messages are printed out to indicate any difficulties in the data link circuitry discovered by diagnostic routines.

**12.04** If the trouble cannot be located and corrected from the central office, it may be necessary for maintenance personnel to go to the centrex customer's location to aid in determining the trouble.

**12.05** When a fault causing a trouble occurs at a centrex customer location, its cause may not be readily apparent to maintenance personnel on the customer's premises. By requesting that the exercise program be performed at the ESS central office, routine exercises may be directed to the desired console (and associated equipment) to aid in locating and identifying the fault. These routines may be performed only on consoles and console controls (or trunk busy memory units) which previously have been removed from service by the proper TTY input message.

**12.06** If a request is made to initiate exercise routines and the console and console control to which they are directed have not been removed from service, the request is denied by the ESS.

**12.07** The exercise program is capable of encoding and transmitting data which attempts to operate the lamps on the consoles to all of the states to which they may normally be operated. The exercise program can also receive and analyze key signal data originating from consoles. When key signals are analyzed by the exercise program, a signal is encoded and is then transmitted back to the console to indicate to personnel at the console whether or not the proper key signal was received. Lamps or keys may be exercised either individually or in special sequences.

**12.08** When a major trouble (such as a loss of console power) occurs at the console or when troubles occur in the data link serving the console control cabinet, the use of the exercise routines may not be practical.

**12.09** A console and a console control unit may be returned to service at any time during the progress of a test by a TTY input message. Exercise routines which are in progress when a console is returned to service are aborted. A TTY printout indicates that the exercise has been aborted.

**12.10** Exercise routines may be requested for a console (which was previously removed from service) by an input message at the maintenance TTY or by actions by maintenance personnel at the console location. (Actions required at the console location are covered in Section 540-576-304.)

### B. Centrex Data Link and Console Demand Exercise Fault Location Procedures

**12.11** Section 540-576-304 describes the use of centrex data link and console demand exercise routines to verify the overall operation of console and console controls located on the customer's premises. The routines are part of the attendant diagnostic program and the results of the exercise routines may be used as an aid in determining fault locations.

### C. Centrex Attendant Loop Circuit (SD-2H172) and Trunk Circuit (SD-2H173) Test

**12.12** Centrex attendant loop circuit and trunk circuit tests should be performed in accordance with Section 232-204-501. The test consists of verification of the circuit state and scan point operation and transmission losses of the loop and trunk circuits in their various states. Furthermore, the test are to be performed on a periodic basis or when a malfunction of one of the circuits is suspected.

### D. Impedance Balancing Procedures on SD-2H182 (Centrex Attendant Trunk Circuit) Arranged for 4-Wire to 2-Wire Conversion

**12.13** The impedance balancing procedures, Section 232-208-301, describes and specifies methods of adjusting balancing networks and making balance tests in centrex offices where 4-wire via net loss

circuits are switched on a 2-wire basis. In addition, this section includes the necessary procedures to align the attendant trunk circuit to obtain a negligible bridging effect.

## 13. TRUNK TESTS

### A. Trunk Diagnostics

**13.01** Trunk diagnostics may be performed prior to cutover, before and after growth, restart, or retrofit. Request a diagnostic of all testable trunks in the office by typing the following input message:

M TK:DGN!

***Note:*** Only the following SDs can be tested, and then only if a proper Terminal Office Trunk Access Number Index (TOTANI) reference is made for each trunk group (2H103, 2H112, 2H144, 2H157, 2H158, 2H174, 2H176, 2H180).

The following output message will be printed to indicate that automatic testing of a trunk group has begun.

MR TK BGN ggg

ggg = Trunk group number.

If a trunk fails the diagnostic, one of the following TTY printouts will be received.

MR TK DGN a b ggg mmm ccc dddd dddd

MR TK BLK a b ggg mmm cc dddd dddd

The following TTY printout will be received when all trunk groups (which have diagnostics) have been diagnosed.

MR TK END

***Note:*** Refer to OM-2H200 for explanation of variable fields.

### B. Translation Check and Circuit Test

**13.02** The translation check test on the trunks listed in Table E need only be performed if the office data translation (ODT) changed since turnover or since the last time this test was performed.

**13.03** A translation check and circuit check will be performed prior to cutover, before and after growth, restart, or retrofit on the terminated trunks and the nonterminated trunks as listed in Table F.

TABLE E

TRUNKS WITH TRANSLACTION CHECKS ONLY

| SD AND SECTION NUMBER | DESCRIPTION | TERMINATION |
|---|---|---|
| SD-2H109-01<br>232-140-501 | Incoming Trunk from Local Test Desk No. 14 or Local Test Cabinet No. 3; Sleeve Lead Supervision Circuit. | None |
| SD-2H113-01<br>232-139-501 | Outgoing Trunk to Switchboard No. 3CL in Distant Building; Local Coin Overtime and Stuck Coin Circuit. | None |
| SD-2H141-01<br>232-141-501 | Outgoing Trunk to Local Test Desk No. 14; Sleeve Lead Supervision Circuit. | None |
| SD-2H147-01<br>232-141-504 | Outgoing Trunk Circuit to Repair Service Desk No. 2; High-Low Supervision. | None |
| SD-2H151-01<br>232-145-501 | Outgoing Trunk Circuit, Coin Zone Dialing to SWBD No. 3CL in Distant Bldg., Polar Double Duplex Supervision. | None |

TABLE F

TRUNKS WITH TRANSLATION CHECKS AND CIRCUIT CHECKS

*Note:* **See Table B of Section 232-105-302 as to what test circuits are used to test each trunk listed below.**

| SD AND SECTION NUMBER | DESCRIPTION | TERMINATION |
|---|---|---|
| SD-2H101<br>232-140-503 | Incoming trunk circuit for local and tandem, reverse battery supervision. | Outgoing tip and ring connected through 9000 ohms. |
| SD-2H103<br>232-141-502 | Outgoing trunk circuit for local and tandem, reverse battery supervision. | Outgoing tip and ring open. |
| SD-2H104<br>232-140-503 | Incoming trunk circuit for local and tandem, reverse battery supervision. | Outgoing tip and ring connected through 9000 ohms. |
| SD-2H107<br>232-143-501 | Outgoing trunk circuit for verification request and intercept; reverse battery, high-low supervision. | Outgoing tip and ring open. |
| SD-2H108<br>232-140-505 | Incoming trunk circuit from SWBD No. 3CL in distant bldg., 3rd wire coin control, simplexed rering signal. | Outgoing T & R terminated in 8500 ohms. |
| SD-2H110<br>232-146-501 | Two-way trunk circuit for switchboard No. 3CL in distant building; reverse battery supervision; inband coin and rering signals. | Outgoing tip and ring connected through 4300 ohms. |
| SD-2H111<br>232-140-504 | Incoming trunk circuit from SXS; reverse battery supervision. | Outgoing tip and ring connected through 2200 ohms (short loop) or 4300 ohms (long loop). |
| SD-2H112<br>232-146-502 | Two-way trunk circuit; E & M lead supervision; MF pulsing. | Outgoing tip and ring connected through 1800 ohms, "TO" lead grounded. "TV" lead connected to −48V, "E" lead connected through 200 ohms to ground.<br>*Note:* Code 258C Dummy Plug must be inserted in "D" jack of the E & M ACCESS located on the front edge of the trunk test panel. |
| SD-2H144<br>232-141-503 | Outgoing trunk circuit to crossbar tandem office; reverse battery, high-low supervision. | Outgoing tip connected to "TP2" Outgoing tip connected through 4300 ohms to −48V. Outgoing ring connected to ground. |

TABLE F (Cont)

| SD AND SECTION NUMBER | DESCRIPTION | TERMINATION |
|---|---|---|
| SD-2H148<br>232-146-503 | Two-way trunk circuit; reverse battery supervision incoming; high-low outgoing, distant office requires start pulsing signal. | Outgoing tip and ring connected through 1800 ohms. |
| SD-2H149<br>232-140-502 | Incoming trunk circuit for local and tandem; reverse battery supervision; delay dial. | Outgoing tip and ring connected through 4300 ohms. |
| SD-2H154<br>232-140-504 | Incoming trunk circuit from SXS; reverse battery supervision. | Outgoing tip and ring connected through 2200 ohms (short loop) or 4300 ohms (long loop). |
| SD-2H155<br>232-207-501 | Dial pulse repeater circuit. | Outgoing tip and ring connector through 1800 ohms. |
| SD-2H157<br>232-206-501 | Two-way long haul trunk circuit, dial pulsing; E & M lead supervision. | "BO" lead connected to "CO" lead (pins 4 and 22 on CP A293A). |
| SD-2H158<br>232-206-501 | Two-way long haul trunk circuit, MF pulsing. | Outgoing tip and ring connected through 1800 ohms; "BO" lead connected to "CO" lead (pins 4 and 22 on CP A293A); "E" lead connected to ground through 200 ohms. |
| SD-2H174<br>232-209-501 | Foreign exchange trunk circuit, ground start. | Outgoing tip and ring connected through 2200 ohms. |
| SD-2H176<br>232-212-501 | Six-port conference circuit. | None required. |
| SD-2H180<br>232-211-501 | Foreign exchange trunk circuit (long haul); supervision on "A" and "B" leads; ground start. | "A1" lead connected to "B1" lead; outgoing tip and ring connected through 900 ohms. |
| SD-2H186<br>232-141-505 | Line access trunk circuit with or without reverse battery supervision. | Outgoing tip and ring connected through 2200 ohms. |

**Test Procedures**

**13.04** Check the office records and record the trunk group numbers for those groups which contain the above mentioned type of trunks.

**13.05** Connect the proper termination to the trunk to be tested per 13.02 or 13.03.

**13.06** Request a test of each trunk group by typing the following TTY input message:

M TK:INT:ggg mmm!

ggg = Trunk group number.

mmm = Trunk member number.

System response for successful translation check and circuit check for trunks listed in 13.03 will be as follows:

MR TK ATP a b ggg mmm

***Note:*** Refer to OM-2H200 for explanation of variable fields.

Successful translation checks on trunks in 13.03 will be indicated by the following TTY output message:

MR TK BLK a b ggg mmm eee 4000 0145

eee 4000 0145 = Trouble number found in TLM-2H100 indicating this group has passed translation checks.

If a trunk fails, one of the following TTY printouts will be printed:

MR TK DGN a b ggg mmm ccc dddd dddd

MR TK BLK a b ggg mmm ccc dddd dddd

***Note:*** Refer to the OM-2H200 for explanation of variable fields.

## 14. OFFICE ALARMS TESTS

**14.01** The office alarms tests should be performed in accordance with Section 232-115-501. These tests may be performed prior to cutover, before and after growth, restart, or retrofit, and periodically.

## 15. EMERGENCY ACTION AND ERROR RECOVERY

**15.01** The following procedures verify the emergency action and error recovery functions of the system which are not verified by automatic diagnostics.

***Caution: These procedures are potentially hazardous to call processing and should only be performed during a low traffic period.***

***Note:*** Some messages may not be printed. These messages will be indicated by an asterisk (*).

### TEST OF EMERGENCY ACTION (EA) PANEL

| STEP | ACTION | VERIFICATION |
|---|---|---|
| 1 | If the system is not in sync type in:<br>M CU:RST! | TTY output messages printed:<br>MR CU DGN 00 ATP 00<br>MI CU SYN a b c d |
| 2 | At EA panel—<br>Operate ENABLE key. | Major audible alarm sounds.<br>At TTY, output message printed:<br>MA SY EAP 000002 |
| 3 | Release ENABLE key. | Major alarm silenced. |
| 4 | Operate RECENT key. | Major audible alarm sounds.<br>Output message printed:<br>MA SY EAP 000004 |
| 5 | Release RECENT key. | Major alarm silenced. |
| 6 | Operate STABLE key. | Major audible alarm sounds.<br>Output message printed:<br>MA SY EAP 000010 |
| 7 | Release STABLE key. | Major alarm silenced. |

| STEP | ACTION | VERIFICATION |
|---|---|---|
| 8 | Operate ENABLE key. | Major audible alarm sounds.<br>Output message printed:<br>MA SY EAP 000002 |
| 9 | Operate READY and GO keys and release ENABLE key. | System goes out of sync; CU diagnostics run; system goes back to sync.<br>Output messages printed:<br>MA SY MRF aaaaa bbbbbb cccccc dddddd eeeeee<br>MI AM INL fg hi*<br>MA SY CLK*<br>MI SY CLR EAU ccc ddd eee<br>MI AM DGN*<br>MI CU DGN 0 0 ATP<br>MA AU RLF ATP<br>MI SY ABT 0 40006*<br>MI CU SYN a b c d<br>MI SY MIS a*<br>MI SY PTO a* |
| 10 | At TTY—<br>Switch CUs by typing:<br>M CU:SWO:a!<br>a = CU to be placed off-line. | Output message printed:<br>MI SY SWO a b c d |
| 11 | Repeat Steps 1 through 9. | |

**PU RECOVERY (NETWORK AND MISCELLANEOUS FRAMES)**

**15.02** The following should be done while performing the PU recovery procedure.

(a) Monitor TTY printouts carefully.

(b) Mark on printout what step was performed.

(c) Watch for any unusual conditions.

(d) After each step, type the following input message: M PU:SI!

***Note:*** Some messages may not be printed. These messages will be indicated by an asterisk (*).

**PREPARATION (PU RECOVERY—CU 0 ON-LINE)**

| STEP | ACTION | VERIFICATION |
|---|---|---|
| 1a | If CU 0 is not in service, type the following input message:<br>M CU:RST! | TTY output messages printed:<br>MR CU DGN 00 ATP 00<br>MI CU SYN a b c d |
| 2a | Type input message:<br>M CU:SWO:1! | TTY output messages printed:<br>OK<br>MI SY SWO a b c d |
| 3 | Type input message:<br>M PU:SI! | TTY output messages printed:<br>MR AD SI jk 1 bbbbbb cccccc dddddd eeeeee*<br>MR AL SI fg hi oooooo oooooo oooooo oooooo* |

| STEP | ACTION | VERIFICATION |
|---|---|---|
| | | MR LS SI bbbbbb cccccc dddddd eeeeee*<br>MR TS SI bbbbbb cccccc*<br>MR NW SI bbbbbb cccccc*<br>MR DS SI bbbbbb cccccc*<br>MR RA SIA 00bbbb 00cccc 00dddd 00eeee*<br>MR RT SI 0bb000 cccccc dddddd*<br>MR AM SI fg hi sss tuv*<br>MR SN COL sczyde mmmmmm sczyde mmmmmm*<br>MR SI ACC cxzyde cxzyde cxzyde cxzyde*<br>MR LK AOS ff tcps*<br>MR LK BOS ff pcbg*<br>MR LK COS ff mgo*<br>MR LK JOS ff olg*<br>MR LS MSK cxzyrr*<br>MR SI ADR cxzyde cxzyde cxzyde cxzyde*<br>MR LK END |
| 4 | Connect a test phone to each network. | |
| | **Remove All Odd Controllers, Off-line AMA Transports, RA Channels or Off-line RT Plants** | |
| 5 | At TTY, remove odd controller from service of PU frame under test or off-line AMA transports, RA channel, or off-line RT plants by one of the following input messages:<br>M LS:RMV:fg h- c!<br>M MS:RMV:fg h-!<br>M US:RMV:fg h-!<br>M DS:RMV:fg h-!<br>M AM:RMV:fg h-!<br>M RA:RMV:fg h-!<br>M RT:RMV:fg h-! | One of the following output messages printed:<br>MR LS RMV fg hi c<br>MR NW RMV fg hi<br>MR MS RMV fg hi<br>MR US RMV fg hi<br>MR DS RMV fg hi<br>MR AM RMV fg hi<br>MR RA RMV fg hi<br>MR RT RMV fg hi |
| 6 | At those PU frames under test equipped with frame control—<br>Depress FRAME CONTROL OFF-1 key. | At PU frame control—<br>OS-1 lamp lighted. |
| 7 | Type the following input message:<br>M PU:SI! | TTY status messages follow for PUs which have at least one controller, transport, channel or plant out-of-service. |
| 8 | Repeat Steps 5 through 7 for each frame of each PU type. | |
| 9 | Generate one intraoffice and one interoffice call from each network test phone. | Calls completed successfully. |

| STEP | ACTION | VERIFICATION |
|---|---|---|
| | **Restoring all Odd Controllers, Off-line AMA Transports, RA Channels or Off-line RT plants** | |
| 10 | At PU frames equipped with frame control—<br>Depress FRAME CONTROL NOR key. | At PU frame control—<br>OS-1 lamp extinguished. |
| 11 | At TTY, restore PU controller, AMA transport, RA channel or RT plant to service by one of the following input messages:<br>M LS:RST:fg h- c!<br>M MS:RST:fg h-!<br>M US:RST:fg h-!<br>M DS:RST:fg h-!<br>M AM:RST:fg h-!<br>M RA:RST:fg h-!<br>M RT:RST:fg h-! | One or more of the following output messages printed:<br>MR LS DGN fg hi c ATP<br>MR LS RST fg hi c<br>MR MS DGN fg hi ATP<br>MR MS RST fg hi<br>MR NW DGN fg hi ATP<br>MR NW RST fg hi<br>MR US DGN fg hi ATP<br>MR US RST fg hi<br>MR DS DGN fg hi ATP<br>MR DS RST fg hi<br>MR AM DGN fg hi ATP<br>MR AM RST fg hi<br>MR RA DGN fg - ATP<br>MR RA RST fg hi<br>MR RT DGN fg hi ATP<br>MR RT RST fg hi |
| 12 | Repeat Steps 10 through 12 for each remaining PU frame. | |
| 13 | Restore all equipment to service from the TTY. | |
| 14 | Type the following TTY input message:<br>M PU:SI! | TTY output messages printed:<br>MR AD SI jk 1 bbbbbb cccccc dddddd eeeeee*<br>MR AL SI fg hi oooooo oooooo oooooo oooooo*<br>MR LS SI bbbbbb cccccc dddddd eeeeee*<br>MR TS SI bbbbbb cccccc*<br>MR NW SI bbbbbb cccccc*<br>MR DS SI bbbbbb cccccc*<br>MR RA SIA 00bbbb 00cccc 00dddd 00eeee*<br>MR RT SI 0bb000 cccccc dddddd*<br>MR AM SI fg hi sss tuv*<br>MR SN COL sczyde mmmmmm sczyde mmmmmm*<br>MR SI ACC cxzyde cxzyde cxzyde cxzyde*<br>MR LK AOS ff tcps*<br>MR LK BOS ff pcbg*<br>MR LK COS ff mgo*<br>MR LK JOS ff olg*<br>MR LS MSK cxzyrr*<br>MR LK ADR cxzyde cxzyde cxzyde cxzyde*<br>MR LK END |

| STEP | ACTION | VERIFICATION |
|---|---|---|
| | **Removing All Even Controllers, Off-line, AMA Transports, RA Channels, or Off-line RT Plants** | |
| 15 | At TTY remove even controller from service of PU frame under test or off-line AMA transport, RA channel or off-line RT plant by one of the input messages in Step 5. | |
| 16 | At those PU frames equipped with frame control—<br>Depress FRAME CONTROL OFF-0 key. | At PU frame control—<br>OS-0 lamp lighted. |
| 17 | Type the following TTY input message:<br>M PU:SI! | TTY status messages follow for PUs which have at least one controller transport channel or plant out-of-service. |
| 18 | Repeat Steps 15 through 17 for each frame of each PU type. | |
| 19 | Generate one intraoffice and one interoffice call from each network test phone. | Call completed successfully. |
| | **Restoring All Even Controllers, Off-line AMA Transports, RA Channel, or Off-line RT Plants** | |
| 20 | At those PU frames equipped with frame control—<br>Depress FRAME CONTROL NOR key. | At PU frame control—<br>OS-0 lamp extinguished. |
| 21 | At TTY, restore PU controller, AMA transport, RA channel, or RT plant to service by one of the input messages in Step 11. | |
| 22 | Repeat Steps 20 through 22 for each remaining PU frame. | |
| 23 | Restore all equipment to service from the TTY. | |
| 24 | Type the following TTY input message:<br>M PU:SI! | TTY output messages printed<br>MR AD SI jk 1 bbbbbb cccccc dddddd eeeeee*<br>MR AL SI fg hi oooooo oooooo oooooo oooooo*<br>MR LS SI bbbbbb cccccc dddddd eeeeee*<br>MR TS SI bbbbbb cccccc*<br>MR NW SI bbbbbb cccccc*<br>MR DS SI bbbbbb cccccc*<br>MR RA SIA 00bbbb 00cccc 00dddd 00eeee*<br>MR RT SI 0bb000 cccccc dddddd*<br>MR AM SI fg hi sss tuv*<br>MR SN COL sczyde mmmmmm sczyde mmmmmm*<br>MR SI ACC cxzyde cxzyde cxzyde cxzyde* |

| STEP | ACTION | VERIFICATION |
|---|---|---|
| | | MR LK AOS ff tcps*<br>MR LK BOS ff pcbg*<br>MR LK COS ff mgo*<br>MR LK JOS ff olg*<br>MR LS MSK cxzyrr*<br>MR SI ADR cxzyde cxzyde cxzyde cxzyde*<br>MR LK END |
| **PREPARATION (PU RECOVERY—CU 1 ON-LINE)** | | |
| 25 | Type input messages:<br>M CU:SWO:0! | TTY output messages printed:<br>OK<br>MI SY SWO a b c d |
| 26 | Type input message:<br>M PU:SI! | TTY output messages printed:<br>MR AD SI jk 1 bbbbbb cccccc dddddd eeeeee*<br>MR AL SI fg hi oooooo oooooo oooooo oooooo*<br>MR LS SI bbbbbb cccccc dddddd eeeeee*<br>MR TS SI bbbbbb cccccc*<br>MR NW SI bbbbbb cccccc*<br>MR DS SI bbbbbb cccccc<br>MR RA SIA 00bbbb 00cccc 00dddd 00eeee*<br>MR RT SI 0bb000 cccccc dddddd*<br>MR AM SI fg hi sss tuv*<br>MR SN COL sczyde mmmmmm sczyde mmmmmm*<br>MR SI ACC cxzyde cxzyde cxzyde cxzyde*<br>MR LK AOS ff tcps*<br>MR LK BOS ff pcbg*<br>MR LK COS ff mgo*<br>MR LK JOS ff olg*<br>MR LS MSK cxzyrr*<br>MR SI ADR cxzyde cxzyde cxzyde cxzyde*<br>MR LK END |
| 27 | Repeat Steps 5 through 24 with CU 1 on-line. | |
| 28 | Disconnect test phone from each network. | |
| **CONTROL UNIT SWITCH INHIBIT VERIFICATION** | | |
| | ***Caution: This test is potentially hazardous to call processing and should only be performed during a low traffic period.*** | |
| 1 | Ensure that the CUs are in sync, and that all keys on the EA PANEL are released. | |
| 2 | At TTY—<br>Perform two CU switches by typing in:<br>M CU:SWO:a!<br>a = CU to be placed off-line. | System response:<br>OK and output message index MI SY SWO. |

| STEP | ACTION | VERIFICATION |
|---|---|---|
| 3a | If CU 1 is on-line, type in:<br>M CU:SWO:1! | Same as Step 2. |
| 4 | Type in:<br>M CU:RMV! | System response:<br>OK<br>At MC—<br>OUT OF SERVICE lamp of off-line CU lighted. |
| 5 | At SYSTEM STATUS section of MC—<br>Operate LOCK CU 0 ACTIVE key. | At MC—<br>LOCK CU 0 ACTIVE lamp lighted. |
| 6 | At POWER CONTROL section of MC—<br>Operate CONTROL UNIT SWITCH INHIBIT switch to CONTROL UNIT 0 ACTIVE position. | At POWER CONTROL SECTION of MC—<br>CONTROL UNIT SWITCH INHIBIT lamp lighted. |
| 7 | At SYSTEM STATUS section of MC—<br>Release LOCK CU 0 ACTIVE key. | At SYSTEM STATUS section of MC—<br>LOCK CU 0 ACTIVE lamp extinguished. |
| 8 | At TTY type in:<br>M CU:RST! | System response:<br>IP<br>MR CU DGN 1 0 ATP 00<br>MI CU SYN<br>At MC—<br>OUT OF SERVICE lamp of off-line CU is extinguished. |
| 9 | Type in:<br>M CU:SWO:0! | CU 0 remained on-line.<br>System response:<br>OK and output message indexes MA SY MRF and MI SY CLR NOM.<br>At SYSTEM STATUS section of MC—<br>SERVICE LOSS and MAJOR ALARM lamp lighted.<br>Major alarm sounded. |
| 10 | At MC—<br>Operate MAJOR ALARM RST key. | Major alarm silenced. |
| 11 | Ensure that the system returns to the normal compare mode of operation before proceeding with Step 12. | System is in sync, and MAJOR ALARM lamp extinguished. |
| 12 | At POWER CONTROL section of MC—<br>Operate CONTROL UNIT SWITCH INHIBIT switch to OFF position. | At POWER CONTROL section of MC—<br>CONTROL UNIT SWITCH INHIBIT lamp extinguished. |
| 13 | At TTY type in:<br>M CU:SWO:0! | System response:<br>OK and output message index MI SY SWO. |
| 14 | Type in:<br>M CU:RMV! | System response:<br>OK |

| STEP | ACTION | VERIFICATION |
|---|---|---|
| | | At MC—<br>OUT OF SERVICE lamp of off-line CU lighted. |
| 15 | At SYSTEM STATUS section of MC—<br>Operate LOCK CU 1 ACTIVE key. | At MC—<br>LOCK CU 1 ACTIVE lamp lighted. |
| 16 | At POWER CONTROL section of MC—<br>Operate CONTROL UNIT SWITCH INHIBIT switch to CONTROL UNIT 1 ACTIVE position. | At POWER CONTROL section of MC—<br>CONTROL UNIT SWITCH INHIBIT lamp lighted. |
| 17 | At SYSTEM STATUS section of MC—<br>Release LOCK CU 1 ACTIVE key. | At SYSTEM STATUS section of MC—<br>LOCK CU 1 ACTIVE lamp extinguished. |
| 18 | At TTY type in:<br>M CU:RST! | System response:<br>IP<br>MR CU DGN 0 0 ATP 00<br>MI CU SYN<br>At MC—<br>OUT OF SERVICE lamp of off-line CU extinguished. |
| 19 | Type in:<br>M CU:SWO:1! | CU 1 remained on-line.<br>System response:<br>OK and output message indexes MA SY MRF and MI SY CLR NOM.<br>At SYSTEM STATUS section of MC—<br>SERVICE LOSS and MAJOR ALARM lamps lighted.<br>Major alarm sounded. |
| 20 | At MC—<br>Operate MAJOR ALARM RST key. | Major alarm silenced. |
| 21 | Ensure that the system returns to the normal compare mode of operation before proceeding with Step 22. | System is in sync and MAJOR ALARM lamp extinguished. |
| 22 | At POWER CONTROL section of MC—<br>Operate CONTROL UNIT SWITCH INHIBIT switch to OFF position. | At POWER CONTROL section of MC—<br>CONTROL UNIT SWITCH INHIBIT lamp extinguished. |
| 23 | At TTY type in:<br>M CU:SWO:1! | System response:<br>OK and output message index MI SY SWO. |