NO. 3 ESS
SYSTEM VERIFICATION
MAIN STORE MEMORY GROWTH

CONTENTS

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1. GENERAL INFORMATION

1.1 Description

1.11 This section provides a method to test Main Store Memory Additions for 3A Control Units in the No. 3 ESS as follows:

a) ODD Module - 32K or 128K

b) Memory Unit and EVEN or EVEN and ODD Module - 32K

1.12 It is recommended that additions to memory be made several weeks in advance of any new application (3E3 retrofit, etc.) to allow devices to "burn in". Store parameters (SPARES and STRLIM) must be adjusted to permit the newly added memory to be diagnosed regularly by the nightly routines.

1.13 This section is designed specifically for working offices (Generic Issue 4A or 3E3) and provides the basis for a MOP. The information within the MOP should be agreed upon by both the responsible telephone company and the Western Electric Company personnel.

1.2 Precautions and General Notes:

1.21 Before performing the work outlined in this section, the installer shall make a detailed analysis and prepare a MOP or MOPs with required approvals as indicated in Handbook 3, Section 5A.

1.22 Because this change is critical to an in-service office, it is strongly suggested that this modification be scheduled during periods of light service demand and that program scheduled test periods (e.g., midnight CU switch) should be avoided.

On issue 3E3, inhibit scheduler message (INH:SCHED) can be used to prevent the nightly routines from starting. (ALW:SCHED) message will restore the scheduler. This will avoid time conflicts with AMA.

1.23 Analyze results of daily routines and audits prior to this change and retest as necessary. Clear any fault condition which persists - particularly main store errors (indicated necessary circuit pack replacement).

1.3 Records

1.31 The results of the tests of this section shall be recorded on forms SD-97-1313 and SD-97-1315. For detailed information on filling out test records, see Section 6B of Handbook 3.

1.4 Installation Tools

1.41 Test Equipment and Tools

ITE 5632 - Digital Multimeter

ITE 4659 - Volt-Ohm-Multiammeter

TK828 - 1A Technology Backplane Repair Kit

NOTE: The above sets are required when the memory addition includes a Memory Unit.

1.42 Document References

Document	Title
SD-1C902-03 (T*1C902-13)	Main Store Controller and Memory (128K module)
SD-1C903-02 (T*1C903-13)	Main Store Memory
SD-1C910-02 (T*1C910-12)	3ACC Processor Frame
SD-1C914-01 (T*1C914-11)	Main Store Power Unit
J1C052B-1	Main Store Controller and Memory Units

2. PREPARATION

2.1 Before any work is started, the status of the system, specifically the control complex, should be checked and any irregularities noted and/or corrected.

2.2 Verify that the module select straps have been applied and are correct. (Refer to Sheet D1 of SD-1C902-02, (JL2) or SD-1C902-03 (JL16). On memory units, add the module select straps prior to installation.

2.3 Diagnose the control units as follows:

```
DGN:CU!
 SW:SYC!
DGN:CU!
```

Verify ATP messages on the diagnostic requests and no apparent system malfunctions.

3. PROCEDURE

3.01 Remove the off-line CU from service.

```
RMV:CU!
```

Operate the LOCK key and verify that the FORCE and SELECT lamps are lit.

3.02 Remove power from the off-line CU by operating its MANUAL and POWER keys.

3.03 If adding an "ODD" Module (32K or 128K) to an existing Memory Unit, perform the following steps, otherwise proceed to Step 3.04.

a) Add JL2 or JL16 Circuit Packs at locations 03-18, 03-23 through 03-29, and 03-31.

b) Add JK3 or JK25 Circuit Pack at location 03-33.

c) Verify the module select straps per Sheet D1 of SD-1C902-02 (JL2) or SD-1C902-03 (JL16).

d) If also adding a Memory Unit, diagnose the installed module using the ADD message below, otherwise proceed to Step 3.05.

e) Power up off-line CU and leave in the MANUAL mode.

f) Diagnose CU and added module. On issue 4A.3, use message:

```
DGN:CU;ADD,UCL:0 XXXXXXX!
```

Issue 3E3 can also use message:

```
DGN:CU;ADR:0 XXXXXX!
```

XXXXXXX = highest equipped address in the off-line store.

On issue 4A when using the ADD option, test 74 will fail due to a program problem. Disregard failure if ATP was received when diagnosing via DGN:CU.

g) Power down the off-line CU.

3.04 Addition of a Memory Unit equipped with EVEN or EVEN and ODD module (32K).

a) Verify that the module select straps, per Sheet D1 of SD-1C902-02, have been added to the Memory Unit.

Perform the following steps in the off-line CU and on the added Memory Unit.

a) Block "operated" the Major (MJO) and Minor (MN) relays and remove all fuses at the bottom of the bay.

b) Install Memory Unit (List 6 of J1C052B) with circuit packs and power converters removed.

c) Connect power and ground to lugs on MLPWB in accordance to Figure 2 on J1C052B-1.

d) Connect power cable BERG connectors at locations 03-38-110, 310, and 03-44-110, 310.

e) Remove the 959B bus terminating resistors from the preceding memory unit and install on new memory unit.

f) Add the FTJ1C052A-1, GRP1 cable assemblies (CA1/1A-CA12/12A).

g) Replace all fuses removed from bottom of bay and unblock the MJO and MN relays.

h) Power up and leave in the MANUAL mode.

i) Verify the voltages below:

Terminal	Voltage
03-38-001	+4.5 to +5.5V DC
03-44-001	-4.75 to -5.25V DC
03-44-005	+11.65 to +12.35V DC
5V CTF LUG	+4.5 to +5.5V DC

j) Power down and remove the 959B bus terminating resistor paddle board from location 01-03T-03. This will open the termination loop and not allow power to be applied to the CU.

k) Power up and verify power shuts down by observing that the POWER lamp is extinguished, the POWER RESET lamp and the LED on the FC262 is lit.

NOTE: If power does not shut down, a ground exists in the termination loop on the memory unit. Isolate by powering down, removing the preceding 959B paddle board and repeating this step. Repeat this step until the ground is isolated.

l) Power down and replace the 959B terminating board.

m) Power up and verify the POWER lamp is lit.

n) Operate and momentarily hold the LAMP and POWER TEST key and verify that the LEDs on all converters are lit.

NOTE: This tests the power alarm (PA) net for continuity through all power mods, FB152 and FC262 circuit packs. (See SD-1C915-01, Sheet B1GA.)

o) Power down and unseat the S7 power converter in Location 03-38. Power up and verify the voltages shown below. Verify no alarm indications appear. The absence of +5V from the S7 will not allow the S9 to turn on. (See SD-1C902-02, FS9, Composite Diag. 1)

Terminal	Voltage
03-44-001	Less than -0.5V DC
03-44-005	Less than +0.5V DC

p) Power down and reinsert the S7 power module. Add JL2 and JK3 circuit packs and 130A designation strips as required.

3.05 Restore power to the off-line CU by operating its POWER key. Power up and verify that no power alarms occur.

3.06 Diagnose the off-line CU. (This will only test existing equipment but will verify that the new memory is not interfering.)

DGN:CU!

Verify that an ATP is received.

3.07 Release the LOCK and MANUAL keys. Then diagnose and restore the off-line CU.

RST:CU!

Verify that an ATP response is received and that the off-line CU is restored to STANDBY at the SSP.

CAUTION: Before proceeding allow the system to soak for at least 15 minutes.

3.08 Switch CUs

SW:SYC!

(The system will now be running on the CU with the newly added MODs.) Allow the system to run in this configuration for approximately one hour.

3.09 Switch CUs

SW:SYC!

3.10 Diagnose the off-line CU including the newly added memory mods.

On issue 4A use message:

DGN:CU;ADD,UCL:0 XXXXXX!
RST:CU;UCL!

Issue 3E3 can also use message:

DGN:CU;ADD:0 XXXXXX!

Where XXXXXXX is the highest equipped address to be tested in the off-line CU.

On issue 4A when using the ADD option, test 74 will fail due to a program problem. Disregard failure if ATP was received from previous diagnosis (DGN:CU).

3.11 Switch CUs

SW:SYC!

and repeat steps 3.01 through 3.10 for the other CU.

The testing of the hardware has been completed. Next, translation adjustments must be made: 1) increase memory size in STRLIM by RC message, 2) calculate the number of spare translation words, 3) If SPARES increased, change by translation overwrite procedure. (The OPDATA program makes a calculation on the number of spare translation words and, if found incorrect, will result in an error message.)

WARNING: To eliminate MAS mismatches, diagnose each CU using the ADD option just before adjusting the translations. This will clear out any bad parity left in the undefined memory from a power/down sequence.

```
DGN:CU;ADD:0 xxxxxx!
SW:SYC!
DGN:CU;ADD:0 xxxxxx!
```

On issue 4A, substitute messages below, otherwise MAS mismatches will occur:

```
DGN:CU;ADD,UCL:0 XXXXXX!
RST:CU;UCL!
```

xxxxxxx = highest equipped address in off-line store.

3.12 Adjust STRLIM to size of newly added memory.

```
RC:OFFICE/
STLIM nnn/
END!
```

nnn = memory size in multiples of 32K(32,64-256K)

3.13 Dump the SPARES and STRLIM MTIs.

```
DMP:ST X!
```

X = 261250 on issue 4A
X = 421633 on issue 3E3

The first 3 words of the data are the contents of the SPARE MTI; The second 3 words are the contents of the STRLIM MTI.

3.14 Verify that the new STRLIM address is the last address of the last equipped memory module.The STRLIM address will be stored as a 20 bit address in the last word and in the low 4 bits of the second word of the MTI. Thus, if the last address of the new memory is 0(577777), the 20 bit address would appear as 000002 177777 in the last two words of STRLIM.

3.15 Compute the number of spare translation words.

CAUTION: There is a limitation in the number of translation words that can be stored on the tapes. Consequently, the SPARES MTI must be adjusted by a maximum 'useable store' value which provides a boundary to accommodate the translation limit. Issue 4A and 3E3 each have different translation limits. Use the algorithym below to calculate the amount of spare words.

0(xxxxxx) - 0(yyyyyy) = 0(ssssss)

On issue 4A tapes, use lower of the two values for:

xxxxxx = 0(430000) 'useable store' value (tape limit of 52K translation words) or STRLIM value (highest equipped address).

On issue 3E3 tapes, use lower of the two values for:

xxxxxx = 0(1000000) 'useable store' value (tape limit of 120K translation words or STRLIM value (highest equipped address).

0(yyyyyy) = address (20 bit) of first spare word which is stored in the third word plus the low 4 bits of the second word of the SPARES MTI. (This address does not change)

0(ssssss) = The amount of spare words which is the first word of the SPARE MTI.

If the number of spare words has increased, use next step 3.16 to change the SPARES word in translations, otherwise proceed to step 3.18.

3.16 Procedure Translation Overwrite.

a. ALW:OW!

b. IN:GENID:XXX!

   xxx = Generic Issue S02 or 3E3

c. IN:ISSID:ISxxxx!

   xxxx = current letter issue of Generic

d. IN:OW pppp; TTY!

   pppp = Assign a 4 digit overwrite number according to local numbering scheme.

e. IN:OWDATA:0,000 ADDRESS, OLD, NEW!

   ADDRESS = Address to be changed
   OLD = Old data contained in address

f. XXX:OW:OLD!

   XXX = VFY on Issue 4A or VER on Issue 3E3

g. LOD:OW:NEW!

h. VFY:OW:NEW!

   NOTE: Required only on Issue 4A

i. SW:SYC!

j. LOD:OW:NEW!

k. VFY:OW:NEW!

NOTE: Required only on Issue 4A

l. UPD:HASH:TRNSLN!

NOTE: Required only on Issue 3E3

m. STOP:OW!

3.17 Repeat steps 3.13 through 3.15 to verify the new data in SPARES MTI.

3.18 Diagnose both CUs (now testing and updating on new STRLIM address).

DGN:CU!
SW:SYC!
DGN:CU!

3.19 Update the translation changes to tape in event office should BOOTSTRAP. If SPARES was changed, zero SEGSTAT word to select all 4K blocks for update to tape.

LOD:ST X;SGL:0!

x = 24133 on Issue 4A
x = 44577 and 44600 on Issue 3E3

The RC message used to change STRLIM automatically selected a 4K block for update to tape.

OP:DATA;CURR!

3.20 Perform an off-line BOOTSTRAP

ALW:TAPEUTIL!
LOD:OMAS;BOOT:FULL!

3.21 Verify HASHSUMS

No arrows shown due to extensive changes.

Manager, Development Engineering - 2/2B, 3, 4, and 5 ESS

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Reason for Reissue:
To add changes to input messages.