SYSTEM GROWTH PROCEDURE
ENHANCED PRIVATE SWITCHED COMMUNICATIONS SERVICE (EPSCS) AND E911 PERIPHERAL DATA STORAGE PROCESSOR (PDSP)
2-WIRE NO. 1 ELECTRONIC SWITCHING SYSTEM

CONTENTS PAGE

1. GENERAL

1.01 This section provides memory growth and test procedures for enhanced private switched communications service (EPSCS) and E911 auxiliary processor (3ACC) for No. 1 Electronic Switching System (ESS) application.

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

1.03 This section is designed specifically for working offices. The growth procedures covered are as follows:

- Addition of single odd memory module to existing store (32K or 128K memory module)
- Addition of single even memory module or even and odd memory module pair to existing store (32K memory module)
- Addition of store 1 main store controller and memory unit to 3ACC (128K memory modules)

  Store 1 Growth—Factory Wired
  Store 1 Growth—Shipped Loose

- Addition of Store 2 main store controller and memory unit to the 3ACC (128K memory modules)
- Addition of Store 3 main store controller and memory unit to the 3ACC (128K memory modules).

2. PREPARATION

2.01 This change is critical to an in-service office; it is recommended that this modification be scheduled during a period of light service demand and that other program scheduled test periods be avoided.

2.02 If the required memory growth involves following procedures of more than one paragraph in this section, ie, paragraph 3.14, 3.16 and 4.12), perform each paragraph in its entirety before proceeding to the next.

2.03 Make sure application software contains Extended Operating System (EOS) issue 1H or later for system compatibility (for EPSCS-3AP1-2 or later, for E912-3AP1-1 or later).

2.04 Prepare records for this growth procedure in accordance with local operating procedures.

2.05 The following documents may be useful as reference during the performance of these tests.

Document	*Title*
DCS-1C915-5	SMAS Frame Detail Change Sheets
J1C064A-1	Supplementary Store Frame Power Unit
J1C106B-1	3A Auxiliary Processor Frame
J1C065A-1	Supplementary Store Frame
SD-1C902-02	Main Store Controller and Memory Circuit (32K Memory Units)
SD-1C902-03	Main Store Controller and Memory Circuit (128K Memory Units)
SD-1C903-02	Common Systems Main Store Memory Circuit
SD-1C914-01	Common Systems Supplementary Main Power Unit
SD-1C915-01	Supplementary Store Frame
IMOM	Applicable Input/Output Message Manuals
TLM-1C900	3ACC Trouble Locating Manual
ED-4C132-30	Common System Processor and Maintenance Frame Interframe Cabling
T1C902-12	Store Controller and Memory Unit Wiring (32K Memory units)
T*1C902-13	Store Controller and Memory Unit Wiring (128K Memory Units)
T*1C914-11	Main Store Power Unit Wiring
T*1C915-11	Supplementary Main Store Frame Wiring.

2.06 The following figures may be useful as reference during the performance of this growth procedure:

Fig. 1—Typical Processor Frame
Fig. 2—3ACC Control Panel
Fig. 3—System Status Panel Keys, Lamps, and LEDs
Fig. 4—Supplementary Main Store Frame

Fig. 5—Main Store Configurations
Fig. 6—Main Store Controller and Memory Unit Circuit Pack Arrangements
Fig. 7—959A Resistor Termination Board
Fig. 8—Main Store Bus Leads.

2.07 The following installation test equipment (ITE) will be required for this growth procedure.

ITE	*Description*
5632	Digital multimeter (1 required)
4659	Volt-Ohm-Milliammeter (1 required)

2.08 The following accessories will be required for this growth procedure.

ITE	*Description*
4715	Capacitor Forming Tool* (1 Required)
5478	Adapter SAF-T-Leed* (1 Required)
5590	70-Type Fuse Alarm Verification Test Set* (1 Required)

*With ITE 5543 (3ACC/Auxiliary Processor Test Accessory Set.)

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

2.10 Using the teletypewriter (TTY), diagnose the control units by typing in the following:

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

Using the Trouble Locating Manual (TLM) 1C900 to resolve any faults indicated by the TTY output error message. Verify that an all tests pass (ATP) is indicated for the diagnostic test requests before proceeding further.

3. PROCEDURE FOR ADDITION OF A SINGLE ODD MEMORY TO AN EXISTING STORE (32K or 128K MEMORY MODULES)

3.01 Remove the off-line control unit (CU) from service by typing the following:

RMV:CU!

3.02 Depress the LOCK key on the system status panel (SSP). This will lock the on-line CU active. Note the FORCE and SELECT lamps are lighted.

3.03 Place the off-line CU in manual by depressing the MANUAL key.

3.04 Power down the off-line CU by depressing the POWER key.

3.05 Add one List 5 or List 8 (JL2 or JL16 circuit packs) per J1C052B or J1C052C in the store under growth at locations 03-18, 03-23 through 03-29 and 03-31.

3.06 Insert JK3 or JK25 (List 5 or List 8) at location 03-33.

3.07 Add address identity strap(s) for the new memory module, if not already installed, in accordance with applicable table on D sheet of SD-1C0902-02 (JL2) or SD-1C902-03 (JL16).

3.08 Depress the POWER key to power up the off-line CU and leave in manual.

3.09 Diagnose the off-line CU including the newly added memory (refer to Table A for parameter information) by typing in the following:

DGN:CU;ADD:a, b!

a = Decimal test number—specify 0 to run all tests

b = Highest hexidecimal address of the off-line store to be tested.

3.10 Take the off-line CU out of manual operation by depressing the MANUAL key.

3.11 Update the off-line store by typing in:

RST:CU;UCL!

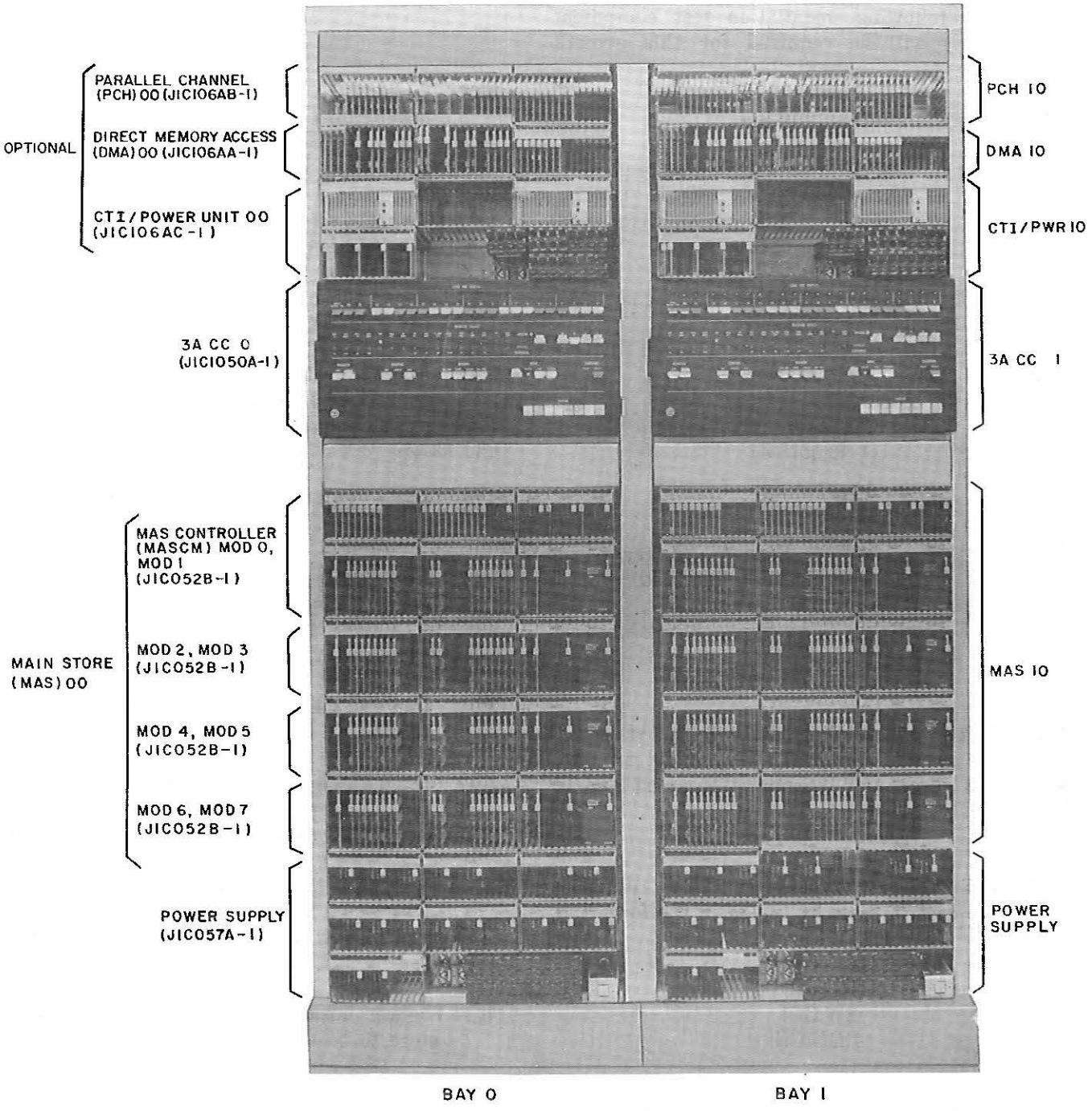
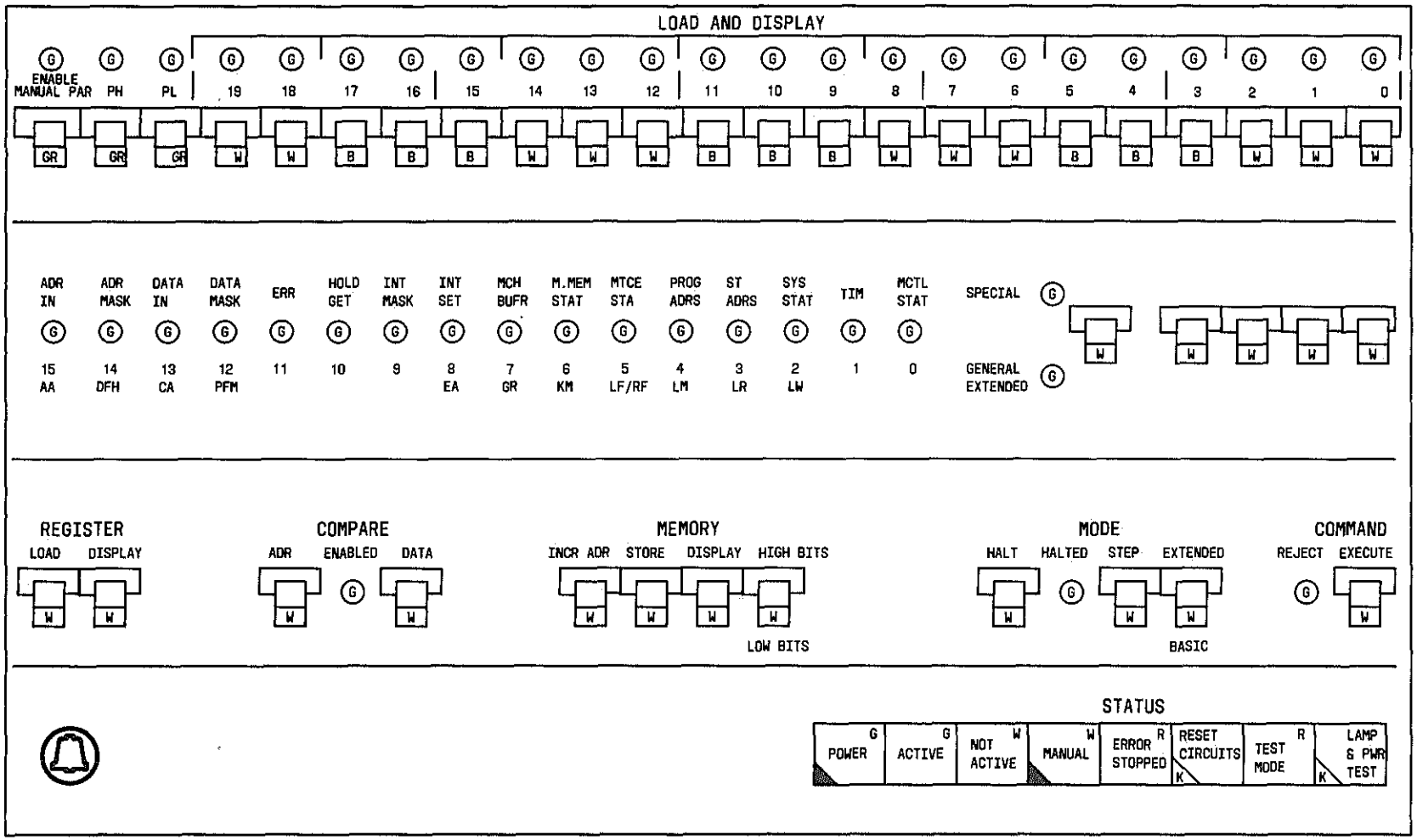


Fig. 1—Typical Processor Frame



LEGEND:
A - AMBER
B - BLUE
G - GREEN
GR - GRAY
R - RED

LIGHT EMITTING DIODE (LED)

SWITCH

LAMP

ALTERNATE-ACTION KEY/LAMP

MOMENTARY-ACTION KEY

MOMENTARY-ACTION KEY/LAMP

Fig. 2—3ACC Control Panel

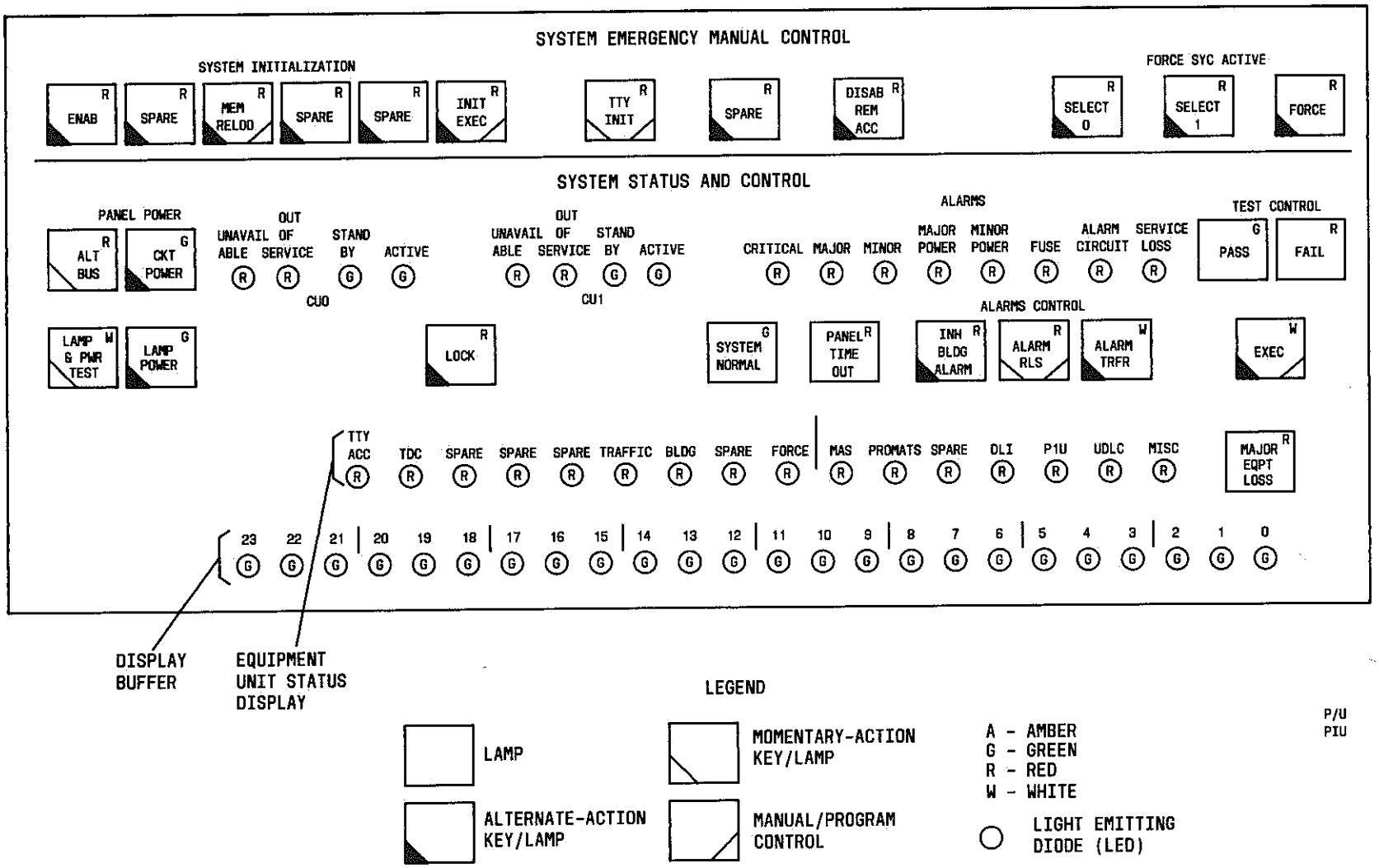
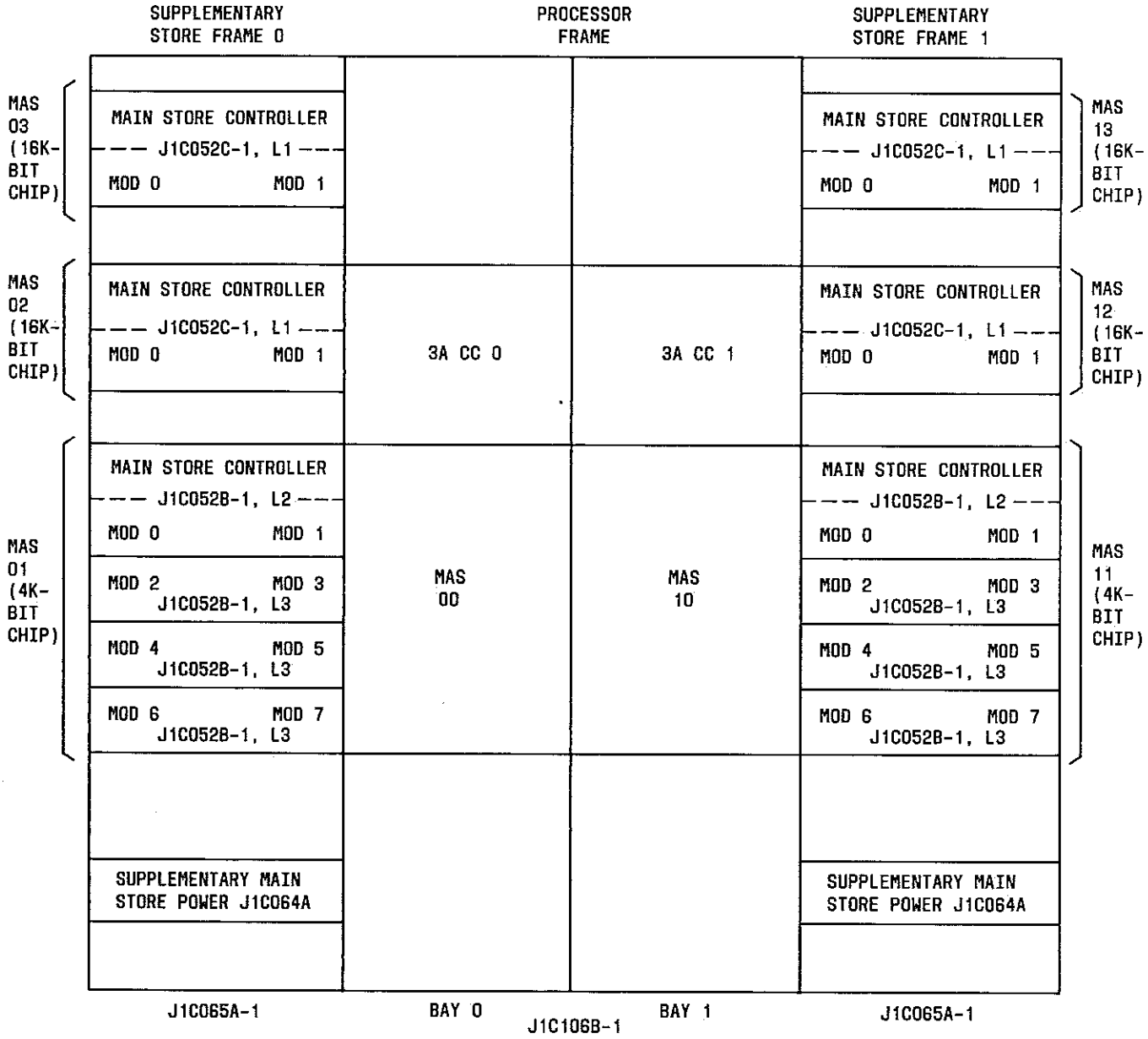


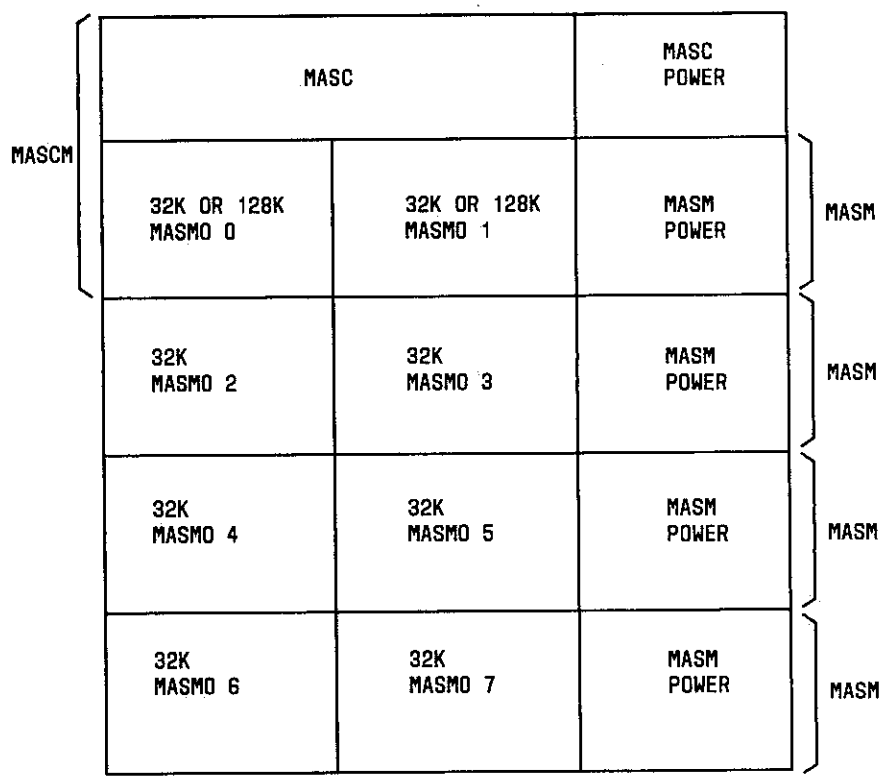
Fig. 3—System Status Panel Keys, Lamps, and LEDs



NOTE 1: WHEN MASs 00 AND 01 ARE 4K-BIT CHIP CONFIGURATION, ADDITIONAL MAS PAIRS MAY BE EITHER 4K OR 16K-BIT CONFIGURATION. WHEN MASs 03 AND 13 ARE ADDED, MASs 02 AND 12 MUST ALSO BE 16K-BIT CHIP CONFIGURATION.

NOTE 2: WHEN MASs 00 AND 01 ARE 16K-BIT CHIP CONFIGURATION, ADDITIONAL MASs MUST BE 16K-BIT CHIP CONFIGURATION

Fig. 4—Supplementary Main Store Arrangement



NOTE:
THE MASCM IS EQUIPPED WITH MASMO 0. MASMO 1 THROUGH 7 ARE GROWTH MODULES AND SUPPLIED PER APPLICATION

Fig. 5—Main Store Configurations

3.12 Depress the LOCK key on the SSP and note that the FORCE and SELECT panel lamps on the SSP extinguish.

3.13 The off-line CU is now in the STANDBY state. Allow the system to run for 15 minutes.

3.14 Switch CUs by typing in:

SW:CU!

3.15 Repeat paragraph 3.01 through 3.13 on alternate CU.

3.16 Add 130A designation strips to new memory modules.

4. PROCEDURE FOR ADDITION OF SINGLE EVEN MEMORY MODULE OR EVEN AND ODD MEMORY MEODULE PAIR TO EXISTING STORE (32K MEMORY MODULES)

4.01 Remove the off-line control units (CU) from service by typing the following:

RMV:CU!

4.02 Depress the LOC key on the system status panel (SSP). This will lock the on-line CU active. Note that the FORCE and SELECT lamps are lighted.

4.03 If the memory module is to be added to Store 0, block operated the MJO and MN relays at bottom of bay containing the offline CU and remove all fuses at bottom of this bay. If the memory module is to be added to Store 1, remove all fuses from the off-line supplementary main store (SMAS) frame fuse block only.

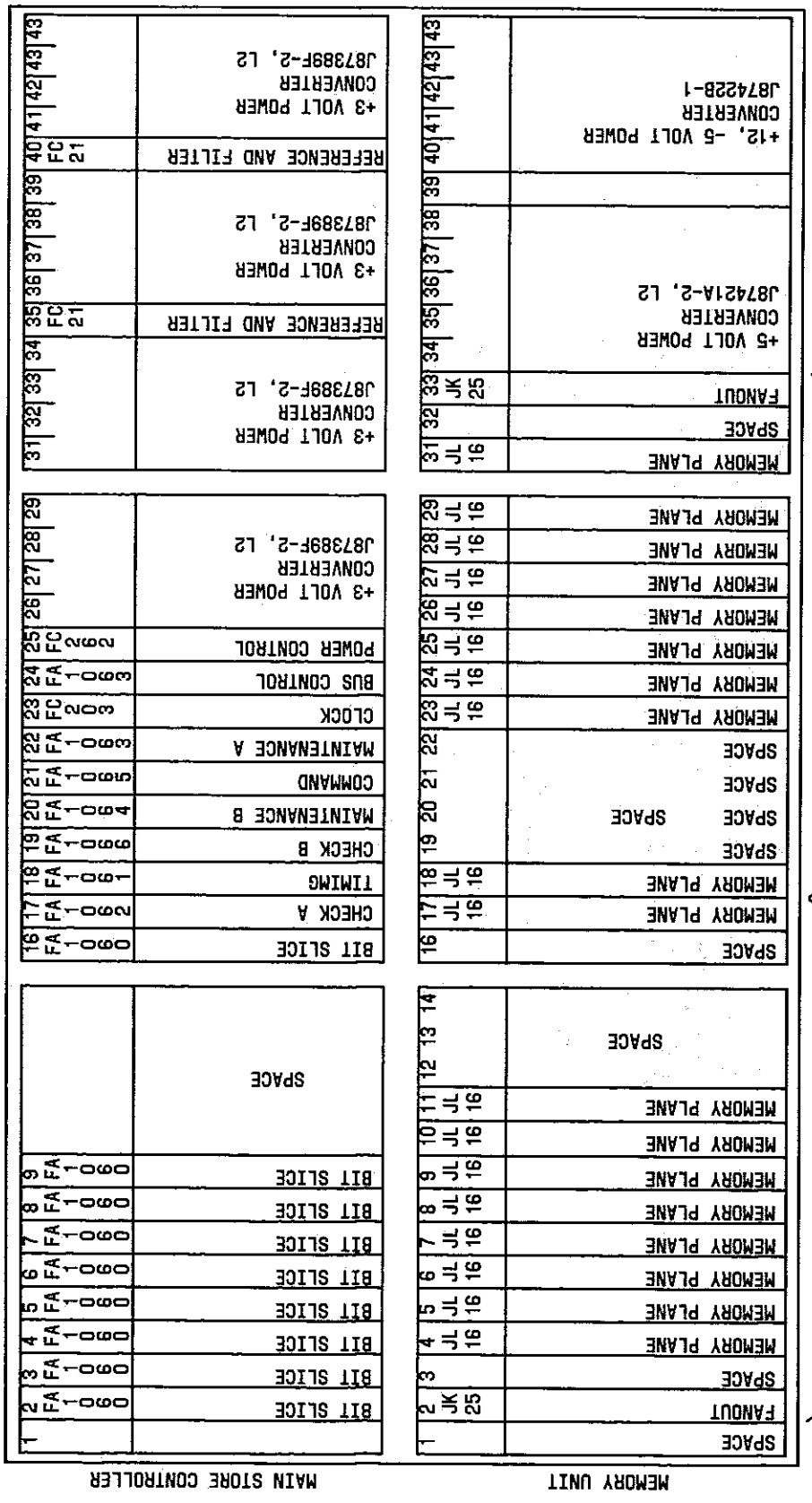
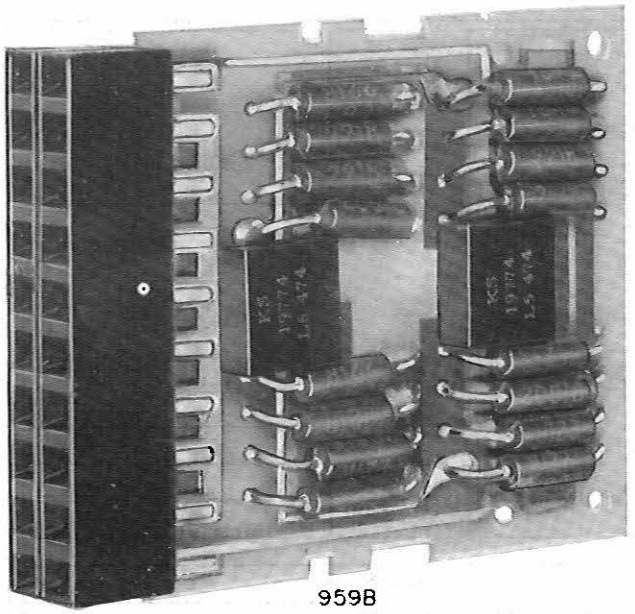
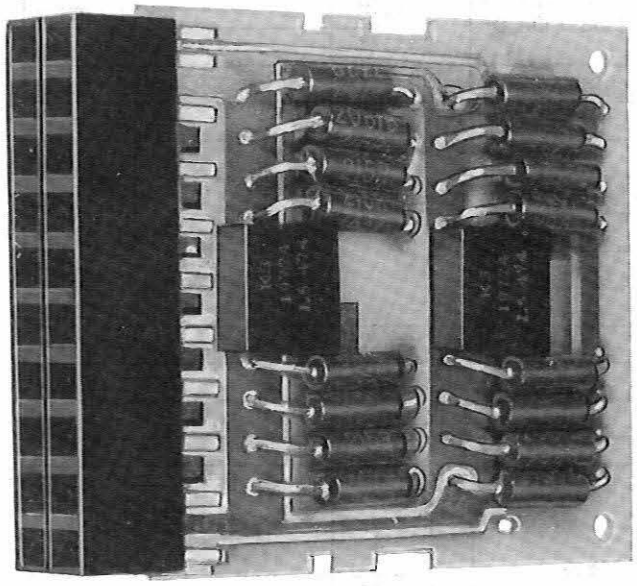


Fig. 6—Main Store Controller and Memory Unit Circuit Pack Arrangement



959B



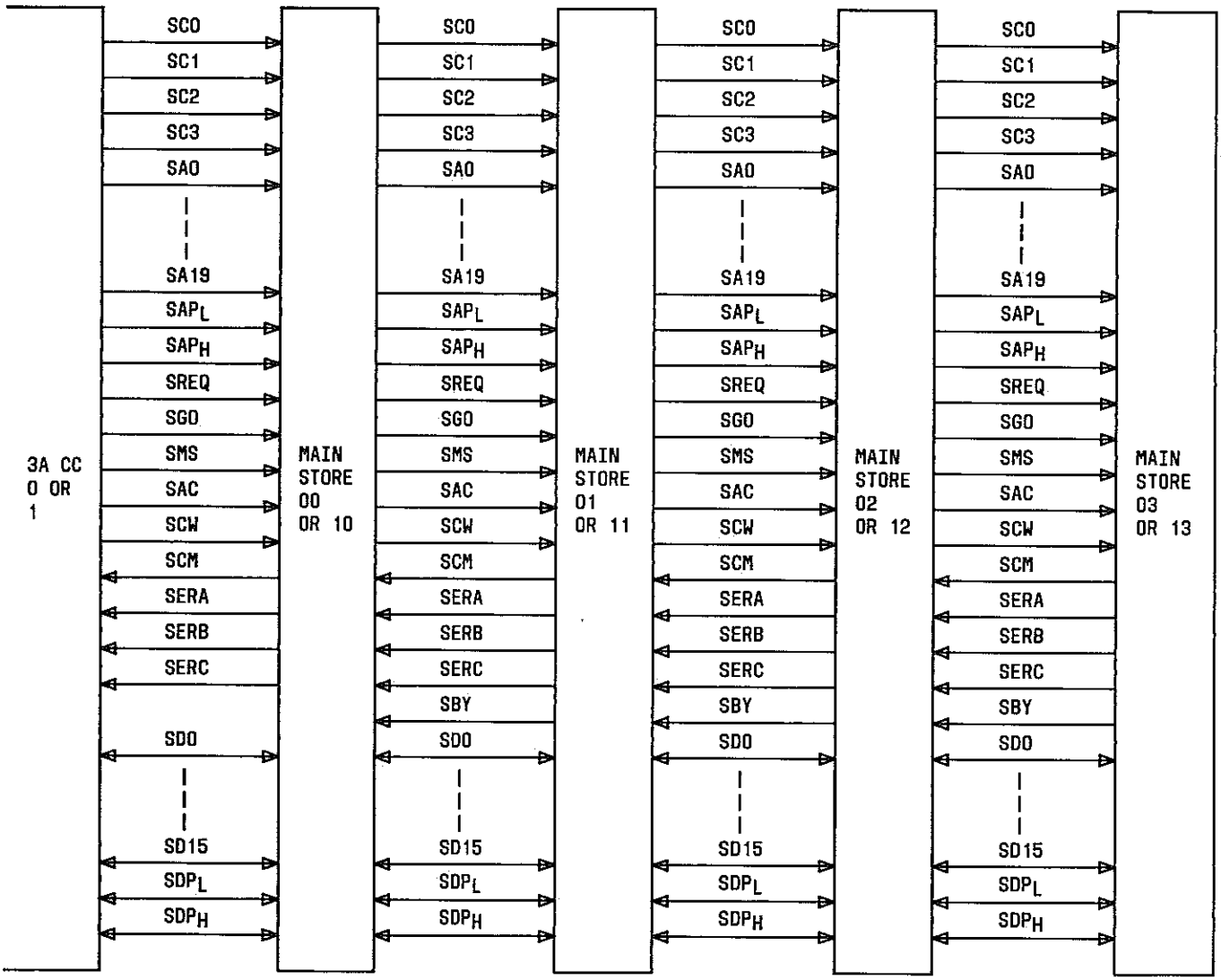
959A

Fig. 7—Resistor Termination Boards

4.04 Install a List 6 unit with circuit packs and power converters removed per J1C052B to the store under growth.

4.05 Connect power and ground to 5V CTF and GRD terminals on List 6 MLPWB of new memory module unit in accordance with manufacturing and installation notes on drawing J1C106B or J1C065A.

4.06 Connect power cable Berg connectors at locations 03-38-110, -310 and 03-44-110, -310 on rear of added memory unit.



SC - STORE COMMAND
SA - STORE ADDRESS BIT
SAP_L - STORE ADDRESS PARITY OVER ADDRESS BITS 7-0
SAP_H - STORE ADDRESS PARITY OVER ADDRESS BITS 19-8
SREQ - STORE REQUEST
SGO - STORE GO
SMS - STORE MAINTENANCE STATE
SCM - STORE COMPLETE
SERA - STORE ERROR A
SERB - STORE ERROR B
SERC - STORE ERROR C
SBY - STORE BUSY
SD - STORE DATA BITS
SDP_L - STORE DATA PARITY OVER DATA BITS 7-0
SDP_H - STORE DATA PARITY OVER DATA BITS 15-8
SAC - STORE AUTOMATIC CORRECTION
SCW - STORE COMPLEMENT WRITE

Fig. 8—Main Store Bus Leads

TABLE A

MEMORY MODULE ENDING ADDRESSES

MODULE NO.		
128K	32K	HEXIDECIMAL ADDRESSES
	0	7FFF
	1	FFFF
	2	17FFF
0	3	1FFFF
	4	27FFF
	5	2FFFF
	6	37FFF
1	7	3FFFF
	8	47FFF
	9	4FFFF
	10	57FFF
2	11	5FFFF
	12	67FFF
	13	6FFFF
	14	77FFF
3	15	7FFFF
	16	87FFF
	17	8FFFF
	18	97FFF
4	19	9FFFF
	20	A7FFF
	21	AFFFF
	22	B7FFF
5	23	BFFFF
	24	C7FFF
	25	CFFFF
	26	D7FFF
6	27	DFFFF
	28	E7FFF
	29	EFFFF
	30	F7FFF
7	31	FFFFF

4.07 Add address identity straps for the new memory module (if not already installed) in accordance with the applicable table on D Sheet of SD-1C902-02.

4.08 Install J87421A DC converter at position 03-38.

4.09 Install J87422B DC converter at position 03-44.

4.10 Remove the 959B bus terminating resistor paddle boards from the last existing memory unit.

4.11 Add the FTJ1C052A-1 GRP1 cable assemblies (CA1/1A-CA12/12A) to the new memory module, if not already installed, in accordance with the manufacturing and installation notes on drawing J1C052B-1.

4.12 Mount the 959B bus termination resistor paddle boards to the new memory module if not already installed. The locations are as follows:

Controller 959A	***Memory 959B***
07-05-01	01-03-01
07-05-03	01-03-03
07-09-01	01-05-31
07-09-03	01-08-21
07-13-01	01-11-11
07-13-03	01-14-01
07-20-01	01-16-31
07-20-03	01-21-01
07-27-01	01-23-31
07-27-03	01-26-21
	01-29-11
	01-32-01
	01-34-31
	01-34-33.

4.13 Replace all fuses removed in paragraph 4.03 and unblock the MJO and MN relays if applicable.

4.14 Depress the 3ACC POWER key to power up the off-line CU and leave in manual.

4.15 Verify the following potentials for the added memory.

Test Point	*Potential*
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.

4.16 Depress the 3ACC POWER key to power down the off line CU. Remove the 959B bus terminating resistor paddle board from location 01-03T-03 on the added memory unit. This will open the termination loop and not allow power application to the CU.

4.17 Depress the off line CU POWER key and verify that power does not come up. Observe that the POWER lamp on the 3ACC control panel is extinguished, the PROC POWER RESET lamp is lighted and the light emitting diode (LED) on the FC262 circuit pack in position 08-25 of the associated main store controller and memory (MASCM) unit is lighted.

> ***Note:*** If power does not shut down, a ground exists in the termination loop on the MASCM unit. Begin troubleshooting by operating 3ACC POWER key to remove power. Then remove the preceding 959B termination resistor paddle board and repeating paragraph 4.17. Continue this procedure until the ground is isolated.

4.18 Operate the 3ACC POWER key to remove power and replace the 959B terminating resistor paddle board.

4.19 Clear the power alarm conditions by monentarily operating POWER RESET key.

4.20 Depress off-line 3ACC POWER key and verify POWER lamp is lighted.

4.21 Operate and hold LAMP & PWR TEST key on the off-line 3ACC panel and verify that the LEDs on the J87421A-2 and J87422B-1 dc converters on the added memory are lighted. This test checks the power alarm network and circuit packs FB152 and FC262. See SD-4C007-02 and SD-16915-01 for power alarm network layout.

> ***Note:*** The K1 relay on FC262 circuit pack should be operated during this test.

4.22 Release LAMP & PWR TEST key and verify that LEDs lighted in paragraph 4.21 are extinguished.

4.23 Operate off-line 3ACC POWER key to remove power and unseat the J87421A-2 power module in location 03-38 of the added memory unit. Operate off-line 3ACC POWER key to power up and verify the potentials shown below for the added memory unit. Verify no alarm indications appear. The absence of +5V from the J87421A-2 will not allow the +12V -5V power module J87422B-1 power module to turn on. (See SD-1C902-02, FS 9, Composite Diagram 1.)

Test Point	*Potential*
03-44-001	Less than -0.5V dc
03-44-005	Less than +0.5V dc.

4.24 Operate off-line 3ACC POWER key to remove power and replace the J87421A-2 power module.

4.25 With off-line control unit power off, add List 5 (JL2 circuit packs) per J1C052B in the added memory unit at locations 03-04 through 03-11 and 03-17.

4.26 Add List 5 (JK3 circuit pack) per J1C052B in the added memory unit at location 03-02.

4.27 If a memory module pair is being added, add JL2 circuit packs in locations 03-18, 03-31 and 03-23 through 03-29, and JK3 circuit pack at location 03-33.

4.28 Operate off-line 3ACC POWER key to power up and verify the POWER lamp is lighted and no power alarms occur.

4.29 Perform paragraphs 3.09 through 3.14.

4.30 Repeat paragraph 4.01 through 4.29 for the alternate CU.

4.31 Add 130A designation strips to added memory units if not already installed.

5. PROCEDURE FOR ADDITION OF STORE 1 MAIN STORE CONTROLLER AND MEMORY UNITS TO 3ACC (128K MODULES)

5.01 This procedure for Store 1 addition is divided into two parts. One part covers the situation where the supplementary main store (SMAS) frame, filter, power unit and store controller are ordered factory wired as a unit. The other part covers the situation where all growth units are shipped unassembled.

A. Store 1 Growth—Factory Wired

5.02 Position and secure SMAS-0, -1 frames in the processor line up (HB 261 Section 100-113.1).

5.03 Insure that -48V and +24V distributing fuses for SMAS-0, -1 frames are removed.

5.04 Route and connect -48V and +24V power feeders to SMAS-0, -1 frames.

5.05 Remove all fuses from each SMAS frame fuse block.

5.06 Unseat all circuit packs and memory planes on each SMAS frame except the following:

(a) Power modules in all units

(b) FC262, FC21 and FC203 circuit packs in the main store controller and memory unit.

5.07 Verify power alarm option wiring exists on SMAS-0, -1 frames as follows:

SMAS Frame Locations

From	*To*
009-31-018	009-31-119

Reference: SD-1C915-01 Sheet B1GA.

5.08 Verify that the 959A and 959B termination resistor paddle boards on the rear of each main store controller and memory (MASCM) unit on the SMAS frames are securely seated. The locations are as follows:

Controller 959A	*Memory 959B*
07-05-01	01-03-01
07-05-03	01-03-03
07-09-01	01-05-31
07-09-03	01-08-21
07-13-01	01-11-11
07-13-03	01-14-01
07-20-01	01-16-31
07-20-03	01-21-01
07-27-03	01-23-31
	01-26-21
	01-29-11
	01-32-01
	01-34-31
	01-34-33

5.09 Verify the blind write and main store select options wiring exists on SMAS-0, -1 frame as follows:

MASCM Unit Location

From	*To*
08-21-003	08-21-200
08-18-112	08-18-109
08-18-107	08-18-210
08-17-300	08-17-101
08-17-218	08-17-011.

5.10 Add ground straps between processor and supplementary main store frame 0, -1 in accordance with Note 26 of J1C065A-1.

5.11 Set up ITE-4659 or equivalent, volt-ohm-milliameter for resistance measurement.

5.12 Measure the resistance between the ground bus and the load terminal of the +24V distributing fuse supplying SMAS (0) frame by connecting the negative volt-ohm-milliammeter lead to the ground bus and the positive lead to the load terminal. Allow sufficient time for the filter capacitor to charge before taking the reading.

5.13 This resistance should read approximately 3300 ohms.

Note: At the instant the volt-ohm-milliammeter is connected, the pointer reads a very low resistance because the plates of the electrolytic capacitor are not formed at that instant. As the filter capacitor begins to charge, the pointer gradually shifts toward a higher resistance value and finally reads approximately 3300 ohms after a lapse of a few minutes.

5.14 Measure the resistance between the ground bus and the load terminal of the -48V distributing fuse supplying the SMAS (0) frame by connecting the positive meter lead to the ground bus and the negative lead to the load terminal.

5.15 This resistance should read infinite ohms.

5.16 Insert ITE-4715 or equivalent capacitor forming tool in the alarm fuse socket of the +24V distributing fuse supplying the SMAS (0) frame. Leave the tool in the socket until the lamp extinguishes indicating the filter capacitor is fully charged.

Note: The lamp normally glows very dimly and rapidly extinguishes.

5.17 Replace the +24V and -48V distributing fuses supplying SMAS (0) frame.

5.18 Using ITE-4659 or equivalent, volt-ohm-milliammeter at SMAS (0) frame, measure the voltage between terminals +24 and GRD on a TS A located at the bottom front of the SMAS frame. This voltage should read between +20.75 and +26.25V dc.

5.19 Measure the voltage between terminals -48 and GRD on TS A. This voltage should read between -42.75V and -52.5V dc.

5.20 Repeat paragraph 5.11 and 5.12 for SMAS (1) frame.

5.21 Remote the off-line CU from service by typing in the following

RMV:CU!

5.22 Depress the LOC key on the SSP. This will lock the on-line CU active. Note the FORCE and SELECT lamps are lighted.

5.23 Place the off-line CU in manual operation by depressing the MANUAL key. See Fig. 2.

5.24 Block operated the MJO and MN relays in the off-line CU power unit and remove all fuses from the power unit and remove all fuses from the off-line CU power unit fuse blocks.

5.25 Remove X wiring strap from between off-line PROC (processor) power unit (frame EQL) 08-14-306 and 08-14-307. (See SD-4C007-02, Composite Diagram 1, Sheet B1GA.)

5.26 Connect ED-4C088-10, G3 or G4 (G3 if CU-0 is off line and G4 if CU-1 is off line) cable assembly between off-line PROC power unit (frame EQL) 08-14-300 and off-line SMAS frame power unit (frame EQL) 009-31-300.

5.27 Connect ED-4C088-10, G1 or G2 (G1 if CU-0 is off line and G2 if CU-1 is off line) cable assembly between off-line PROC main store controller and memory (MASCM) unit and off-line SMAS frame MASCM unit (Store 1). Frame EQL 47-42-37 for both frames.

5.28 Replace +24V fuses AA8 and AA9 in the off-line PROC power unit. Verify the POWER RESET (power unit) lamp is lighted.

5.29 Remove the blocks from the MJ0 and MN relays.

5.30 Monemtarily operate the POWER RESET key in the off-line PROC power unit and verify relays MN MJ0 and NPA are operated; relays PAT, STA0, STB0, STB1, and STB2 are released and the POWER RESET lamp is extinguished. Also, verify relays STA0 and STB0 on associated SMAS frame power unit are released.

Note: Before proceeding, notify personnel that a major alarm will occur.

5.31 Insert ITE-5590 70-Type Fuse Alarm Verification Test Set into off-line SMAS frame power unit fuse position B0 (+24V) and verify that relay MJ0 is released, the POWER RESET lamp in the PROC power unit is lighted and a major alarm is generated.

5.32 Repeat paragraph 5.32 for SMAS frame fuse positions B1 (+24), A0P (-48V) and A8P (-48V).

5.33 Replace all +24V and -48V fuses in the off-line PROC and SMAS frame power unit fuse blocks and monentarily operate the PROC power unit POWER RESET key. Verify no fuse alarms occur.

5.34 Momentarily operate the POWER switch on the off-line 3ACC control panel and verify the following:

(a) On the off-line SMAS power unit, relay STBO operates approximately one second after relay STA0 operates. (STA0 should operate at the same time as STA0 relay in the PROC frame.)

(b) The POWER and MANUAL lamps on the 3ACC control panel are lighted.

(c) No converter LEDs are lighted

(d) The POWER RESET lamp on the PROC power unit is extinguished.

5.35 Momentarily operate the POWER switch on the 3ACC control panel and verify the following:

(a) The POWER lamp on the 3ACC control panel is extinguished.

(b) Relays STA0 and STB0 on SMAS frame are released.

5.36 Operate the POWER switch on the off-line 3ACC control panel and verify the following:

(a) The POWER lamp on the 3ACC control panel is lighted

(b) Relays MJO, MN, STA0, STB0, STB1, STB2 and NPA in the off-line PROC power unit are operated.

(c) Off-line SMAS power unit relays STA0 and STB0 are operated.

(d) No converter LEDs are lighted.

(e) The LED on circuit pack FB152 in location 10-28 on the off-line 3ACC Unit is not lighted.

(f) The LED on circuit pack FC262 in location 08-25 of the off-line PROC and SMAS frame MASCM unit(s) is not lighted.

(g) The POWER RESET lamp on the off-line PROC power unit is not lighted.

5.37 Operate and hold the LAMP and POWER TEST key on the off-line 3ACC control panel and verify the following:

(a) The LED is lighted on the FB152 circuit pack and on all FC262 circuit packs and power modules in the associated PROC and SMAS bays.

(b) The POWER RESET lamp in the off-line PROC power unit is lighted.

(c) The MN and NPA relays in the off-line PROC power unit are released.

This test checks the power alarm (PA) net PAI1 to be continuous through all power modules and the FB152 and FC262 circuit packs. See SD-4C007-02, Sheet B1GA and SD-1C915-01, Sheet B1GA for power alarm net layout.

Note: K1 relay on FC262 circuit pack should be operated during this test.

5.38 Release the LAMP and POWER TEST key and verify the following:

(a) The LEDs on all power modules and the FB152 and FC262 circuit packs are extinguished.

(b) The PROC POWER RESET lamp is extinguished.

(c) The PROC MN and NPA relays are operated.

5.39 Operate the off-line 3ACC POWER key to remove power and block off-line SMAS power unit STB0 relay in the released position. This opens the STB1 net to the FC262 circuit pack(s) (pins 114 and 115) and will inhibit a +24V

start signal on net STB01 (pins 111 and 112) to the +12, -5V power modules J87422B-1. (See SD-1C902-03, FS9 and 10.)

5.40 Operate the off-line 3ACC POWER key to restore power and verify the potentials shown below for the added MASCM unit on the associated SMAS frame. No power alarms should occur.

Test Point	*Potential*
03-38-001	+4.5 to +5.5V dc
03-44-001	Less than -0.5V dc
03-44-005	Less than +0.5V dc
08-23-004	More than +1.0V dc.

5.41 Remove the block from the off-line SMAS STB0 relay and verify the potentials shown below for the added MASCM unit. No power alarms should occur.

Test Point	*Potential*
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
08-23-004	Less than +0.4V dc.

5.42 Operate off-line 3ACC POWER key to remove power and remove the 959A terminating resistor paddle board from location 07-27-01 on the added MASCM unit on the off-line SMAS frame. (See HB 304, Section 150, Fig. 2). This will open the termination loop monitored by the FC262 circuit pack and should not allow power to be applied to the CU.

5.43 Operate 3ACC POWER key to restore power and verify power shuts down by observing that the POWER lamp on the 3ACC control panel is extinguished. PROC power unit relays STA0, STB0, STB1 and STB2 are released, SMAS power unit relays STA0 and STB0 are released, the PROC POWER RESET lamp is lit, and the LED on the FC262 circuit pack in position 08-25 of the added MASCM unit is lit.

Note: If power does not shut down, a ground exists somewhere in the termination loop. HB 304, Section 150, Figure 2 shows the main store bus termination loop. Those portions of the loop labeled with net names are wire wrap connections and should be considered the probable area of trouble. Begin troubleshooting by repeating paragraph 5.43 and 5.44 for the preceding 959A paddle board on the MASCM unit. Continue this procedure until the ground is isolated.

5.44 Operate 3ACC POWER key to remove power and replace the 959A terminating resistor paddle board.

5.45 Clear the power alarm conditions by monentarily operating POWER RESET key.

5.46 Remove the 959B terminating resistor paddle board from location 01-03T-03 on the MASCM unit on the off-line SMAS frame (see HB 304, Section 150, Fig. 2). This will again open the termination loop and not allow power to be applied to the CU.

5.47 Repeat paragraph 5.44.

Note: If power does not shut down, a ground exists in the termination loop on the MASCM unit. Begin troubleshooting by operating 3ACC POWER key to remove power, removing the preceding 959B paddle board, and repeating paragraph 5.44. Continue this procedure until the ground is isolated.

5.48 Operate 3ACC POWER key to remove power and replace the 959B terminating resistor board.

5.49 Clear the power alarm conditions by momentarily operating POWER RESET key.

5.50 With 3ACC POWER key to remove power, unseat the +5V power module J87421A-2 in the off-line SMAS power unit (frame EQL 09-36) and operate 3ACC POWER key to restore power. FC262 circuit pack (pin 308) should detect the absence of +5V and not allow power to be applied to the CU. (See SD-1C902-03, FS 9 and 10, Net 5V039A.)

5.51 Verify that the conditions in paragraph 5.43 are met.

5.52 Operate 3ACC POWER key to remove power, replace the +5V (J87421A-2,L2) power module and clear the alarm indications by momentarily operating the POWER REST key.

5.53 Repeat paragraph 5.50 through 5.52 for each A8 power module in the added MASCM unit on the off-line SMAS frame.

5.54 With POWER key off, unseat the J87421A-2 power module in location 08-38 of the added off-line SMAS frame MASCM unit provided. Operate off-line 3ACC POWER key to restore power and verify the potentials shown below for the added off-line SMAS frame MASCM unit. Verify no alarm indications appear. (The absence of +5V from the J87421A power module will not allow the +12, -5V power module J87422B to turn on.

Test Point	*Potential*
03-44-001	Less than -0.5V dc
03-44-005	Less than +0.5V dc.

5.55 Operate off-line 3ACC POWER key to remove power and replace the J87421A power modules.

5.56 Install diagnostic access serial (I/O cable assemblies to the processor complex as follows: EXERCISE CAUTION while connecting Berg Connectors to the on-line processor.

From	*To*
SMAS-0, 047-29-37	CUO 060-02-300
SMAS-1, 147-29-35	CUO 060-02-300
SMAS-0, 047-29-35	CU1 160-02-300
SMAS-1, 147-29-37	CU1 160-02-300

5.57 Remove flex tape cable assembly FTJ1C058A-1E, G1 and G2 from off-line store 0 and move to identical location on offline store 1. Berg unit EQLs are as follows:

09-27-05	08-01-100
09-18-35	08-01-110
09-11-25	08-01-300
09-06-05	08-01-310.

5.58 Install new store address and data bus cabling between Store 0 controller and store 1 controller at the following unit equipment lists (EQLs) (FTJ1C065A-1A and 1B)

SMAS MASCM Unit EQL	*PROC MASCM Unit EQL*
(Store 1)	*(Store 0)*
09-11-27	09-11-25
09-06-07	09-06-05
09-08-37	09-08-35
09-03-17	09-03-15
09-27-07	09-27-05
09-21-27	09-21-25
09-24-17	09-24-15.

5.59 With off-line control unit power off, reseat all off-line SMAS frame circuit packs and memory planes.

5.60 Operate off-line 3ACC POWER key to restore power and verify the POWER lamp lights and no power alarms occur.

5.61 Diagnose the off-line CU including the newly added memory (refer to Table A for prameter information) by typing in the following:

DGN:CU;ADD:a, b!

a = Decimal test number - specify 0 to run all tests

b = Highest hexidecimal address of the off-line store to the tested.

5.62 Take the off-line out of manual by depressing the MANUAL key.

5.63 Update the off-line store by typing in:

RST:CU;UCL!

5.64 Depress the LOCK key on the SSP and note the FORCE and SELECT panel lamps on the SSP extinguish.

5.65 The off-line CU is now in the STANDBY state. Allow the system to run for 15 minutes.

5.66 Switch CUs by typing in:

SW:CU!

5.67 Repeat paragraph 5.22 through 5.65 on the alternate CU.

B. Store 1 Growth—Loose Shipped Units

5.68 Install the J1C064A power unit in supplementary main store (SMAS) frame (0).

5.69 Remove all fuses from SMAS fram (0) fuse blocks.

5.70 Install the growth main store controller and memory unit per J1C052C in SMAS frame (0).

5.71 Equip the growth main store controller unit with the following circuit packs and power converters ***only***.

Item	***Unit Equipment Location***
FC262 Ckt Pk	08-25
FC203 Ckt Pk	08-23
FC21 Ckt Pk	08-35,-40
J87389F-2, L2 Conv	03-29,-34,-39,-44
J87421A-2, L2 Conv	03-38
J87422B-1, L2 Conv	03-44.

5.72 Remove the +24V and -48V distributing fuses supplying SMAS frame (0) and add the following power wiring between the frame filter and the J1C064A power unit.

From		*To*			
Location	*Term*	*Location*	*Term*	*Color*	*Net*
009-02R	GRD	003-13	G1	S-BK	GRDEA
009-02R	−48RTN	003-06	1R	S-BK	GRDGA
009-02R	−48V	003-06	2R	S	−48GA
009-02R	+48V	003-06	+1	S	+24EA

5.73 Mount the 959A and 959B bus termination resistor paddle boards to the SMAS (0) store controller and memory unit at locations secified below. The unit EQL listed, specifies the location of the upper left terminal of the assembly. (Refer to HB 304, Section 150, Fig. 2)

Controller 959A	***Memory 959B***
07-05-01	01-03-01
07-05-03	01-03-03
07-09-01	01-05-31
07-09-03	01-08-21
07-13-01	01-11-11
07-13-03	01-14-01
07-20-01	01-16-31
07-20-03	01-21-01
07-27-01	01-23-31
07-27-03	01-26-21
	01-29-11
	01-32-01
	01-34-31
	01-34-33

5.74 Install main store select and blind write option wiring in the SMAS (0) store controller and memory unit at the following unit EQLs as required.

MASCM Unit Locations

03-21-003	08-21-200
08-18-112	08-18-109
08-18-107	08-18-210
08-17-300	08-17-101
08-17-218	08-17-011.

5.75 Install power alarm option wiring to the SMAS (0) frame as follows:

SMAS (0) Frame EQLs

From	***To***
009-31-018	009-31-119

Reference: SD-1C915-Sht B1GA.

5.76 Connect Berg connectors and spade lugs of (ED-4C125-10/ED-4C088-10) power and alarm cable assemblies to the growth store controller and memory unit on SMAS (0) at the following locations.

SMAS (0) Frame Locations (Store 1)

47-42-35
46-44-110
41-38-110
41-38-310
41-44-110
41-44-310
39-35S-(5VCTF) RED
41-35S-(GRND) RED/BK

5.77 Connect the pigtails and Berg connectors of the above cable assemblies to the SMAS (0) frame power unit as follows:

SMAS (0) Frame Locations (Pigtails)

Location	Function	Terminal	Color	Net
007-08	FBLK	A0	R	−48V0A0
007-08	FBLK	A1	R	−48V0A1
009-20	FBLK	B0	BL/W	−24V0B0
009-23R	GRDST	12T	W/BL	24T0B0
009-31	PA	210	03W	1PA121
009-31	CVPAI	211	G3W	1STCUPA1
009-31	PAT	214	BR3W	SPAT0
011-28	REL	4M	BR/W	STA041
011-25B	TP	1B	W/BR	STA041 @
011-28	REL	1M	G/W	STA011
011-25R	TP	2B	W/G	STA011 @
011-28	REL	9M	BL/W	STB091
011-25R	TP	2T	W/BL	STB091 @

SMAS (0) Frame Locations (Berg Connectors)

009-31-310
009-36-300
009-36-310.

5.78 Repeat paragraph 5.68 through 5.75.

5.79 All local frame wiring is now applied to both SMAS frames. Complete paragraph 5.02 throug 5.67.

6. PROCEDURE FOR ADDITION OF STORE 2 MAIN STORE CONTROLLER AND MEMORY UNIT TO THE 3ACC (128K MEMORY MODULES)

6.01 Install the main store controller and memory (MASCM) unit (J1C052C) in the MASCM frame (0) in accordance with J1C065A.

6.02 Remove all circuit packs from the added MASCM unit except the power modules and circuit packs FC262, FC21 and FC203.

6.03 Verify that the 959A and 959B termination resistor paddle boards on the rear of the added main store controller are securely seated. Refer to paragraph 5.73 of the procedure for equipment locations. These paddle boards must

be in place to allow power to be applied to the CU.

6.04 Add main store select option wiring to the added MASCM on SMAS (0) as follows:

Note: Factory test personnel often leave store optioned wherever it may have been convenient to install it in the frame for testing. Ensure that these straps are removed unless they are correct for the store being changed by this growth procedure.

6.05 ***SMAS (0) MASCM Unit Locations***

From	*To*
08-18-318	08-18-109
08-18-307	08-18-210
08-17-002	08-17-101
08-17-311	08-17-011.

6.06 Verify blind write feature option strap is applied to the added MASCM unit on SMAS (0) as follows:

SMAS (0) MASCM Unit Locations

From	*To*
08-21-003	08-21-200

6.07 Repeat paragraph 6.01 through 6.06 for SMAS frame (1).

6.08 Remove the off-line control unit (CU) by typing the following.

RMV:CU!

6.09 Depress the LOCK key on the system status panel (SSP). See Fig. 1. This will lock the on-line CU active. Note the FORCE and SELECT lamps are lighted.

6.10 Remove all fuses from the off-line SMAS frame.

6.11 Apply power alarm option wiring to the off-line SMAS frame as follows: (Refer to SD-1C915-01)

Remove wire

From	*To*
009-31-018	009-31-119

Add Wire

From	*To*
009-31-118	009-31-117
009-31-119	009-31-019.

6.12 Connect Berg connectors and spade lugs of (ED-4C125-10) power and alarm cable assemblies to the offline SMAS store controller and memory unit at the following locations:

SMAS Frame Locations

62-42-35
62-44-110
57-38-110
57-38-310
57-44-110
57-44-310
55-41S (5VCTF) RED
55-42S (GRD) RED/BLK

6.13 Connect pigtails of the ED-4C125-10 power and alarm assembly to the offline SMAS frame power unit at the following locations:

Location	*Function*	*Terminal*	*Color*
009-35	BATT	TS-1	R
009-35	GRD	TS-2	R/BK
011-28	REL	2M	0
011-28	REL	8M	BL
011-25R	TP	1T	GR
011-25R	TP	2B	W
009-20	FBLK	B1	G/W
009-23R	GRDST	12B	W/G
007-14	FBLK	A6	R
007-17R	GRDST	19T	BK
007-14	FBLK	A5	R
007-17R	GRDST	21T	BK
009-31		219	W
009-31		318	BL3W

6.14 On the offline SMAS frame, connect the required multiples of the ED-4C125-10 cable assembly to Store 1 at the following locations:

NOTE: Nonconnectorized conductors must be soldered into Berg connectors.

Off-Line SMAS Frame Locations

Color	*Solder to*
0	47-40-24
BL/W	47-40-25
W/BL	47-40-35
BR3W	47-41-15
BL	41-44-312
0	41-44-314
G	41-44-315.

6.15 On off-line SMAS frame, remove flex tape cable assembly FTJ1C058A-1E, G1 and G2 from Store 1 and move to identical location on Store 2. Berg connector EQLs are as follows:

09-27-05	08-01-100
09-18-35	08-01-110
09-11-25	08-01-300
09-06-05	08-01-310.

6.16 On off-line SMAS frame, install new store address and data bus cabling between Store 1 and the new Store 2 at the following frame EQLs. (FTJ1C065A-1D)

Store 2	*Store 1*
63-11-27	47-11-25
63-06-07	47-06-05
63-08-37	47-08-35
63-03-17	47-03-15
63-27-07	47-27-05
63-21-27	47-21-25
63-24-17	47-24-15.

6.17 Connect serial input/output cables to the SMAS frame 0 and 1 Store 2 MASCM units at the following frame locations:

63-29-35
63-29-37.

6.18 Replace all fuses in the off-line SMAS frame fuse block and add fuses for Store 2 as follows:

(a) The -48V fuse designation:

A5, A5P, A6, and A6P.

(b) The +24V fuse designation:

B1, B2 and B4.

6.19 Perform paragraph 5.35 through 5.55.

6.20 With off-line control unit prower off, replace all circuit packs in the added MASCM unit of the off-line SMAS frame.

6.21 Depress the 3ACC POWER key to power up the off-line CU and leave it in manual.

6.22 Diagnose the off-line CU including the newly added memory. (Refer to Table A for parameter information) by typing in the following:

DGN:CU;ADD:a, b!

a = Decimal test number-specify 0 to run all tests

b = Highest hexidecimal address of the off-line store to be tested.

6.23 Take the off-line CU out of manual by depressing the MANUAL key.

6.24 Update the off line store by typing in:

RST:CU;UCL!

6.25 Depress the LOCK key on the SSP and note that the FORCE and SELECT panel lamps on the SSP extinguish.

6.26 The off-line CU is now in the STANDBY state. Allow the system to run for 15 minutes.

6.27 Switch CUs by typing in:

SW:CU!

6.28 Repeat paragraph 6.08 through 6.25.

7. PROCEDURE FOR ADDITION OF STORE 3 MAIN STORE CONTROLLER AND MEMORY UNIT TO THE 3ACC (128K MEMORY MODULES)

7.01 Install the main store controller and memory unit (J1C052-C) in SMAS frame 0 in accordance with J1C065A.

7.02 Remove all circuit packs from the added memory unit except the following:

(a) all power modules

(b) FC262, FC21(2) and FC203.

7.03 Verify that the 959A and 959B termination resistor paddle boards on the rear of the added main store controller and memory unit are securely seated. Refer to paragraph 5.73 of this procedure for unit equipment mounting location in the event they are shipped unassembled. These assemblies must be in place to allow power to be applied to the CU.

7.04 Add main store select option wiring to the added main store controller and memory unit (MASCM) on SMAS (0) as follows:

> ***NOTE:*** Factory test personnel often leave store optioned wherever it may have been convenient to install it in the frame for testing. Ensure that these straps are removed unless they are correct for the store being grown.

SMAS (0) MASCM Unit Locations

From	*To*
08-18-112	08-18-109
08-18-307	08-18-210
08-17-300	08-17-101
08-17-311	08-17-011.

7.05 Verify blind write feature option strap is applied to the added MASCM unit on SMAS (0) as follows:

SMAS (0) MASCM Unit Locations

From	*To*
08-21-003	08-21-200.

7.06 Repeat paragraph 7.02 through 7.05 for SMAS frame.

7.07 Remove the off-line control unit (CU) from service by typing the following:

RMV:CU!

7.08 Depress the LOCK key on the system status panel (SSP). This will lock the on-line CU active. Note the FORCE and SELECT lamps are lighted.

7.09 Place the off-line CU in manual by depressing the MANUAL key.

7.10 Remove all fuses from the off-line SMAS frame.

7.11 Apply power and alarm option wiring to the off-line SMAS frame as follows: (Refer to SD-1C915-01, Sheet B1GA). (Frame EQLs)

Remove wire:

From	*To*
009-31-118	009-31-117

Add wire:

009-31-118	009-31-017

Add the following if not already installed:

009-20-B7	011-28-5
009-26-B11	011-28-10
009-31-218	009-31-017
009-31-117	009-31-018

009-31-317

009-31-307

003-31-318 009-31-118.

7.12 Connect Berg connectors and spade lugs of (ED-4C125-10) power and alarm cable assembly to the off-line SMAS store controller and memory unit at the following equipment locations:

SMAS Frame Equipment Locations

79-42-35
78-44-110
73-38-110
73-38-310
73-44-110
73-44-310
71-41S (5V CTF) RED
71-42S (GRD) RED/BLK.

7.13 Connect pigtails of the (ED-4C125-10) power alarm and cable assembly to the off-line SMAS frame power unit at the following locations:

Location	*Function*	*Terminal*	*Color*
009-40	BATT	TS-1	R
009-40	GRD	TS-2	R/B
011-28	REL	5M	S/W
011-28	REL	10M	BL/R
009-26	FB	B10	G/W
009-23R	GS	6T	W/G
011-25R	TP	1B	W/S
011-25R	TP	1T	R/BL
007-20	FB	A8	R
007-17R	GS	15T	BLK
007-14	FB	A7	R
007-17R	GS	17T	BLK
009-31		218	W
009-31		317	BL3W

7.14 On the off-line SMAS frame, connect the required multiples of the ED-4C125-10 cable assembly to Store 2 at the following equipment locations:

Note: Nonconnectorized conductors must be soldered into Berg connectors.

Off-Line SMAS Frame Locations

Color	*Solder to*
0	63-40-26
BL	63-40-27
W	63-40-37
BR3W	63-41-15
BL	57-44-312
O	57-44-314
G	57-44-315.

7.15 On the off-line SMAS frame, remove Flex tape cable assembly FTJ 1C058A-1E, G1, and G2 from Store 2 and move it to the identical location on Store 3. Refer to paragraph 6.15 of this procedure for the Berg connector EQLs.

7.16 On the off-line SMAS frame, install the new store address and data bus cabling between Store 2 and the new Store 3 at the following EQLs.

(Cable Assembly FTJ-1C065A-ID).

Store 3	*Store 2*
79-11-27	63-11-25
79-06-07	63-06-05
79-08-37	63-08-35
79-03-17	63-03-15
79-27-07	63-27-05
79-21-27	63-21-25
79-24-17	63-24-15.

7.17 Replace serial input/output cables from processors to Stores 1 and 2 with new cable from processor to Store 1, 2, and 3 as follows:

Note: Exercise caution when connecting to the on-line CU.

Remove cables

From	*To*
CU0-060-02-300	SMAS-0, 047-29-37; 063-29-37
CU0-060-02-300	SMAS-1, 147-29-35; 163-29-35
CU1-160-02-300	SMAS-1, 147-29-37; 163-29-37
CU1-160-02-300	SMAS-1, 147-29-37; 163-29-37.

Add new cables

From	*To*
CU0-060-02-300	SMAS-0, 047-29-37; 063-29-37; 079-29-37
CU0-060-02-300	SMAS-1, 147-29-35; 163-39-35
CU0-060-02-110	SMAS-1, 079-29-37
CU0-060-02-110	SMAS-1, 179-29-35
CU1-060-02-300	SMAS-1, 147-29-37; 163-29-37; 179-29-37
CU1-060-02-300	SMAS-0, 047-29-35; 063-29-35
CU1-060-02-110	SMAS-1, 079-29-35.

7.18 Install power module (J87421A-2, L2) in the off-line SMAS power unit (J1C064A-1) at unit location 03-41 and replace designation strip.

7.19 In the event that a connector is not already installed at location 03-41 in the SMAS power unit, procure a 947-C connector and ED-4A048-30, G2 strapping board assembly. Then install and wire as follows:

Net	*From*	*To*	*Color*
STA031	03-41-011	03-41-210	G
+24V0B9	03-41-012	03-41-112	R
GRD	03-41-319	03-41-013	BK
		03-41-113	
		03-41-111	
		03-41-200	
		03-41-208	
+5V040A	03-41-108	03-41-107	G
STA031	03-41-210	03-36-210	G
+24V0B9	03-41-112	03-36-112	R
GRD	03-41-208	03-36-319	BK
—48T0A11	03-40-3	01-17R-1B	BK
—48V0A11	03-40-4	01-20-A11	R
PATST0	03-41-312	03-36-312	G
1PA12	03-41-313	03-36-313	G
CVFAST1	03-41-314	03-36-314	G
NPAST0	03-41-315	03-36-315	G

7.20 Replace all fuses in the off-line SMAS frame fuse block and add fusing for Store 3 as follows:

-48V Fuse Designation	+24V Fuse Designation
A7,A7P	B7
A8,A8P	B10
A11	B11.

7.21 Perform paragraph 5.34 through 5.55.

7.22 With off-line control unit power off, replace all circuit packs in the added MASCM unit of the off-line SMAS frame.

7.23 Depress the 3ACC POWER key to power up the off-line CU and leave it in manual.

7.24 Diagnose the off-line CU including the newly added memory (Refer to Table A for parameter information) by typing in the following:

DGN:CU;ADD:a, b!

a = Decimal test number—specify 0 to run all tests

b = Hightest hexidecimal address of the off-line store to be tested.

7.25 Take the off-line CU out of manual by depressing the MANUAL key.

7.26 Update the off-line store by typing in:

RST:CU;UCL!

7.27 Depress the LOCK key on the SSP and note the FORCE and SELECT panel lamps on the SSP extinguish.

7.28 The off-line CU is now in the STANDBY state. Allow the system to run for 15 minutes.

7.29 Switch CUs by typing in

SW:CU!

7.30 Remove the off-line CU from service by typing the following:

RMV:CU!

7.31 Depress the LOCK key on the SSP. This will lock the on-line CU active. Note the FORCE and SELECT lamps are lighted.

7.32 Place the off-line CU in manual by depressing the MANUAL key.

7.33 Power down the off-line CU by depressing the POWER key.

7.34 Perform paragraph 6.10 through 6.27.

8. ABBREVIATIONS

ATP	All Tests Pass
CU	Control Unit
EOS	Extended Operating System
EPSCS	Enhanced Private Switched Communications Service
EQL	Equipment List
ESS	Electronic Switching System
ITE	Installation Test Equipment
LED	Light Emitting Diode
MASCM	Main Store Controller and Memory
PA	Power Alarm
PROC	Processor
SMAS	Supplementary Main Store
SSP	System Status Panel
TLM	Trouble Location Manual
3ACC	Auxiliary Processor