VITEL * 2950

SERVICE OBSERVING SYSTEM

ROUTINE MAINTENANCE TESTS

NO. 1 CROSSBAR

1. GENERAL

1.01   This section describes routine maintenance tests that are to be performed on the Vitel 2950 Service Observing System equipment installed in No. 1 crossbar offices.

1.02   (Reserved for future use)

1.03   The 2950 System is an accessory to the Vitel 2900B Local Message Metering System (LMMS). The System consists of Service Observing (SO)/Special Detail Billing (SDB)/Message Register Pulse (MRP) units. The SO/SDB allows complaint service observing and special detail billing data to be included on the magnetic tape record produced by the LMMS recorder. The MRP adaptation is an option to the 2950 System that generates and transmits message-pulses which increments message registers located at the customer premise. The MRP data is not recorded on the LMMS recorder.

1.04   Essential component units, plus optional units, of the 2950 SO/SDB/MRP System are:

- Service Observing Interface (SOI) unit

- Service Observing Control (SOC) unit

- Service Observing Adapter (SOA) unit

- Message Register Pulse Interface (MRPI—) units (optional)

- Message Register Pulse Alarm (MRPL) unit (optional)

1.05   The LMMS components referred to in this section are:

- Output and Control unit (O & CU)

- Magnetic Tape Record (MTR)

- Teletype (TTY)

1.06   The 2950 System is completely modular in construction, such that preplanned card replacement procedures can be used in response to particular alarm loop patterns. This allows rapid repair of most malfunctions without the use of extensive test equipment. A complete list of 2950 System circuit pack cards is provided in Table A.

1.07   The tests covered are:

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1.08 When performing these tests, alarm indications will appear on the 2900B LMMS, O&CU displays. In order to clear alarms while testing, the key switch located in the Routine System Functions grouping of the O&CU must be in the ON position.

1.09 Whenever the SB FAILURE system alarm is generated and appears at the O&CU display panel, the SBA/O&CU PARITY and O&CU FAILURE alarms may also occur. Appearance of the latter alarms is accompanied by automatic switchover of the system data paths. When this occurs, depress the DISPLAY ALARM CLEAR key on the O&CU panel to restore the SB FAILURE alarm display. For tests where the SB FAILURE alarm is momentary, repeat the test to cause reappearance of the alarm.

1.10 The term "MRP Alarm" refers to the following O&CU display and TTY printout:

Location	Display/Printout
O&CU	SB FAILURE with line number 8251ƆƆN
TTY	SB FAILURE with line number 8251;;N

Note: Where N may be any digit from 0 to 9. The SBA number appearing with the display should be one of the SBA numbers assigned to 2950 SOA unit.

1.11 When VERIFICATION of a step fails while testing, refer to the Vitel 2950 Service Analysis System Service Manual, Volume 2, Section 6 (Troubleshooting).

1.12 The design of the 2900B and 2950 Systems is such that 2900B service will not be interrupted during these tests.

1.13 *Lettered Steps:* A letter a, b, c, etc, added to a step number in Part 3 of this section indicates an action which may or may not be required, depending on local conditions. The condition under which a lettered step or series of lettered steps should be made is given in the ACTION column; and all steps governed by the same condition are designated by that letter within a test. Where a condition does not apply, all steps designated by that letter should be omitted.

1.14 Tests that require action at various locations are listed in Table B.

1.15 Any local records of test, failures, and troubles cleared should be taken and entered on the appropriate form. Local instructions and practices should be followed to obtain the tape readout to compare test records with the data entered on the MTR.

TABLE A

2950 SYSTEM CIRCUIT PACK CARDS

TYPE	DESCRIPTION	TYPE	DESCRIPTION
SR1	BUS OUTPUT	SR30	M-LEVEL TEST
SR2	ERROR BYTES & OUTPUT LOGIC	SR31	DUMMY MRP I/O
SR3	ZONE & ACCUMULATOR	SR32	DIALED NUMBER
SR4	ACCUMULATOR BITS 0-7	SR33	ADDRESS DECODER
SR5	CONTROL BITS 0-7	SR34	M-LEAD SCAN
SR6	OSCILLATOR & CONTROL	SR36	M-LEVEL TEST SO
SR7	MEMORY ADDRESS GENERATOR	SR37*	TRMS EXTENDER
SR8	SOA INPUT	SR38	T-R SELECT
SR9	SOA TEST	SR39	SOC SWITCH INTERFACE
SR10	DIRECTORY NUMBER LOGIC	SR40*	SOA TEST
SR11A	CALL NUMBER MEMORY	SR41	DUMMY SOA I/O
SR12A	CALLED NUMBER MEMORY	SR42	MRP M-TEST ALARM OUT
SR13	SOA I/O INTERFACE	SR43	SOC CONTROL LOGIC
SR14	TRMS UNIT	SR44	SO LOOP THUMB WHEEL
SR15	DTMF INTERFACE (TOUCH-TONE®)	SR45	DIRECTORY NUMBER THUMB WHEEL
SR16	MRP I/O & CONTROL – ALPHA	SR49	MRPL DECODER
SR16B	MRP I/O & CONTROL – BETA	SR50	SOC FRONT PANEL CARD
SR16C	MRP I/O & CONTROL – C	SR51	MRPL DISPLAY
SR18	MRP DECODE	SR53*	SO ATP INDICATOR
SR20	MRP TEST A	SR55*	MRP I/O EXTENDER
SR21	MRP TEST B	SR56	TRMSU DUMMY
SR22	MRP TEST COUNTER	SR57*	SOA ALARM OUT DEFEAT
SR23	MRP TEST SEQUENCER – ALPHA	SR58A*	FIXED ADDRESS INDICATOR
SR23B	MRP TEST SEQUENCER – BETA	SR59*	SOA ALARM SWITCH EXTENDER
SR23C	MRP TEST SEQUENCER – C	SR60*	DTMF EXTENDER
SR24	MRPL PULSES		
SR25	MRP I/O		
SR26	} POWER SUPPLY PS2		
SR27	} (SOI, SOC MRPL, MRPI)		
SR28	} POWER SUPPLY PS3		
SR29	} (SOA)		

*INSTALLATION TEST CIRCUIT PACKS & CARDS

TABLE B

ROUTINE MAINTENANCE
TEST LOCATIONS

LOCATION	TEST																			
	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T
OUTPUT AND CONTROL UNIT (O&CU)	X	X	X	X	X	X		X	X	X	X	X	X	X	X	X	X	X	X	X
SERVICE OBSERVING INTERFACE SHELF (SOI)			X	X	X	X			X	X	X	X	X	X	X					
SERVICE OBSERVING CONTROL UNIT (SOC)								X	X		X							X	X	
SERVICE OBSERVING ADAPTOR SHELF (SOA)	X		X					X	X	X	X				P	X	X	X	X	X
MESSAGE REGISTER PULSE ALARM UNIT (MRPL)	X	X	X	X	X		X	X	X	X	X	X	X	X		X	X	X	X	X
MESSAGE REGISTER PULSE INTERFACE SHELF (MRPI)			X										X							
MAGNETIC TAPE RECORDER (MTR)	X					X														
RECEIVE ONLY TELETYPE (TTY)	X	X	X	X	X	X		X	X	X	X	X	X	X	X	X	X	X	X	X

2. APPARATUS

2.01 The apparatus required for each test is shown in Table C. A more descriptive name and additional information on each item is covered in the paragraph indicated by the number in parenthesis.

TABLE C

APPARATUS	TEST																			
	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T
TEST CARD (2.02)	X																	X		
TEST CORD (2.03)				X					X	X	X							X		
TEST CLIP (2.04)				X																
1014A HANDSET (2.05)						X														
TOUCH-TONE TEL SET (2.06)						X														
SWITCH EXTENDER CARD (2.07)																		X	X	X

2.02 SOA test card SR9

2.03 Test cord

2.04 KS-6278 test clip

2.05 1014A dial handset

2.06 1500-Type *Touch-Tone* telephone set

2.07 SOA switch extender SR 59

3. METHOD

STEP	ACTION	VERIFICATION
	A. 208-Call Test	
1	At the SOA shelf, install the SR9 test card in the test slot.	FREQUENCY PASS, POWER PASS and NORMAL light emitting diodes (LEDs) on the SR9 light.
2	At the SOA shelf, remove any dummy SOA I/O (SR41) cards from the SR 13/41 slots.	
3	On the SR9 card, operate the 7-1/2 SEC switch to initiate the 208-Call Test and immediately depress the DISPLAY ALARM CLEAR (DAC) pushbutton at the O&CU.	TEST IN PROGRESS LED on the SR9 lights. At the MTR, in approximately 17 seconds, observe at least 2 seconds of continuous write activity on the active MTR (A or B). Upon completion of the write activity, TEST IN PROGRESS LED is extinguished and NORMAL LED lights.
4a	If the system is equipped for MRP operation, in approximately 8 seconds after operating the 7-1/2 SEC switch (Step 3).	At the MRPL panel all 8 loop alarm LEDs associated with the DISPLAY SELECTION SWITCH light. At the O&CU, the MRP alarm is displayed. At the TTY the MRP alarm is printed out.
5	At the O&CU, depress the DAC pushbutton.	Alarm clears.
6	At the TTY, verify that call count printed out is at least 416 more than when the DAC was depressed in Step 3.	
7	At the SOA shelf, reinsert any SR41 cards removed in Step 2 and remove the SR9 card.	
8	At the O&CU, depress the DAC pushbutton.	Alarm clears if present.
9a	At the MRPL, depress the PRESS TO CLEAR (PTC) pushbutton.	MRPL alarm clears.
	B. MRPL Output Test	
1a	If the system is equipped for MRP, at the MRPL remove the SR24 card.	MRP TEST CALL ALARM LEDs W, X, Y, Z light.

STEP	ACTION	VERIFICATION
2a	At the MRPL, momentarily depress the PTC pushbutton.	In approximately 8 minutes: The MRP alarm at the O&CU is displayed. The MRP alarm at the TTY is printed out.
3a	At the MRPL, reinsert the SR24 card.	
4a	At the MRPL and O&CU, depress the PTC and DAC pushbuttons, respectively.	MRPL and O&CU alarms clear.
	C. Line Fail and Fixed Address Alarm Test	
1	At the SOI-W, remove the SR32A card.	At the O&CU, the SB and SBA FAILURE LEDs light. At the TTY, the SB fail/SBA fail alarm is printed out. At the SOA, SR58A card, note that only the SOI under test is indicated on the display (W, X, Y or Z LEDs).
2	Insert the SR32A in the SBE extender and plug the extender in SOI S32A slot.	
3	At the O&CU, depress the DAC pushbutton.	Alarms clear.
4	On the SR32A, close switch 1 on the switch module located in position C2.	At the O&CU, the SB and SBA FAILURE LEDs light.
5	On the SR32A, reopen Switch 1 on the switch module.	
6	At the O&CU, repeat Step 3.	Same as Step 3 (alarm clears).
7	On the SR32A, repeat Steps 4 through 6 on switches 2 through 5, respectively.	Same as Steps 4 through 6.
8	At the SOI, remove the SBE extender and SR32A card. Reinsert SR32A in slot.	
9	At the O&CU, repeat Step 3.	Same as Step 3 (alarm clears).
10	At the SOI-W, remove SR14 card 00.	

STEP	ACTION	VERIFICATION
11a	If the system is equipped for MRP, remove SR25 card 001, at the SOI.	
12a	At the MRPI-1, remove the SR25 card 022.	
13b	If the MRPI-2 is equipped, remove SR25 card 129.	
14	At the O&CU.	SO line test fail alarm is displayed in approximately 3 minutes after SR14 card 00 was removed in Step 10.
15	At the SOI-W, reinsert SR14 card 00.	
16	At O&CU clear alarm, repeat Step 3.	Same as Step 3.
17a	If the SR25 card 001 and 022 cards were removed—	At the O&CU, MRP line fail alarm is displayed in approximately 8 seconds after Step 16. At the MRPL, W and W1 LEDs light.
18a	At the SOI-W, reinsert SR25 card 001.	
19a	At O&CU clear alarm, repeat Step 3.	Same as Step 3.
20a	At the MRPL, depress the PTC pushbutton.	MRPL alarm clears.
21a	At the O&CU and MRPL—	In approximately 90 seconds, the SR25-022 LINE FAIL alarm is displayed on the O&CU and the W and W1 LEDs light on the MRPL.
22a	At the SOI-W, reinsert SR25 card 22.	
23a	At the O&CU and MRPL, clear alarms (repeat Steps 19a and 20a).	Same as 19a and 20a.
24b	If the SR25 card 129 was removed—	In approximately 15 minutes the SR25-129 LINE FAIL alarm is displayed on the O&CU and the W and W2 LEDs light on the MRPL.
25b	At the SOI-W, reinsert SR25 card 129.	
26b	At the O&CU and MRPL, clear alarms (repeat Steps 19a and 20a).	Same as 19a and 20a.

STEP	ACTION	VERIFICATION
27a	At the SOI-W, remove the SR34 card.	At the O&CU, the SB and SBA FAILURE LEDs light. At the TTY, the SB FAIL/SBA FAIL alarm is printed out. At the SOA, SR58A card note that only the SOI under test is indicated on the display (W, X, Y or Z LEDs).
28c	If the system is equipped with additional SOI-Units (-X, -Y, -Z), repeat tests on each SOI-, MRPL- as required.	Same as Steps 1 through 26b as required.
29	If no further ACTION is required, test is complete. **D. MRP Test Call Fail Alarm**	
1a	If the system is equipped for MRP, at each SOI-(W, X, Y, Z) adapted for MRP, connect a test cord between terminals A1 and B1 on connector J65 backplane.	
2a	At the MRPL, depress the PTC pushbutton.	Alarm clears. In approximately 8 minutes, the MRP TEST CALL alarm LED for each SOI-having a test cord connected lights on the MRPL. At the O&CU, the MRP alarm is displayed. At the TTY, the MRP alarm is printed out.
3a	At the SOI-, remove test cord connected in Step 1a.	
4a	At MRPL, depress the PTC pushbutton.	Alarm clears.
5a	At O&CU, depress the DAC pushbutton.	Alarm clears.
6a	Test complete.	

STEP	ACTION	VERIFICATION
	E. MRP Loop Alarm Test	
1a	If the system is equipped for MRP, at the SOI-(W, X, Y, Z) adapted for MRP, remove the SR21 card for the first SOI-W.	
2a	At the MRPL, depress PTC pushbutton.	Alarm clears. In approximately 2 seconds, the LOOP alarm LED on the DISPLAY SELECTION switch lights for the SOI- under test.
3a	At the MRPL, rotate the DISPLAY SECTION switch so the indicator points to the lighted LOOP alarm LED.	At the MRPL, the MRP LOOP NUMBER display reads 001. At the O&CU, the MRP alarm is displayed. At the TTY, the MRP alarm is printed out. *Note:* The MRP display clears on the O&CU after TTY printout is completed.
4a	At the SOI-, reinsert the SR21 card.	
5a	At the MRPL, depress PTC pushbutton.	Alarm clears.
6a	At the O&CU, depress DAC pushbutton.	Alarm clears.
7b	If other SOI- units (X, Y, Z) are adapted for MRP, repeat test on each unit.	Same as Steps 1a through 6a.
8a	If no further ACTION is required, test is complete.	
	F. Service Observing (SO) Test Calls *Note:* Perform these tests per Section 252-200-301PT, Appendix 1 in accordance with the following steps.	
1	Select a CO test line or connect a vacant line and telephone number whose M-lead is wired to a 2900B scanner bank input.	
2a	If the system is equipped to observe *Touch-Tone* (TT), the test line must also be arranged for TT. Select an SOJ- associated with an SOI- unit equipped with an SR15 (TT) card. *Note:* Repeat each test call using a TT telephone set to dial the test call.	

STEP	ACTION	VERIFICATION
3	Connect apparatus per Section 252-200-301PT, Appendix 1. Perform the following test steps.	
4	Service Observing (SO) Initiate — Dial a 7 digit number per Test A.	Same as Section 252-200-301PT, Appendix 1. Call is recorded on the MTR.
5	Test Call — At the SOC, operate the MODE SELECT switch to the TEST CALL position. Dial a 7 digit number.	Same as Section 252-200-301PT, Appendix 1. Call is recorded on the MTR.
6	Repeat Step 4 (except dial only 6 digits of the 7 digit number and terminate the call).	This call should not appear on the MTR record.
7	Service Observing (SO) Terminate — At the SOC, operate the MODE SELECT switch to the SO TERMINATE position, Dial a 7 digit number per Section 252-200-301PT, Appendix 1.	Same as Section 252-200-301PT, Appendix 1. Call is recorded on MTR.
8	At the O&CU and SOC panels, operate switches to the SO INITIATE position.	
9	At the O&CU, one at a time, cycle each DIRECTORY NUMBER thumbwheel through each of its 10 positions, returning to the correct digit value of the directory number of the test line.	At the SOC, the ALARM lamp lights when any O&CU thumbwheel is set in any position that does not match the SOC thumbwheel setting. The ALARM lamp extinguishes when the O&CU and SOC thumbwheel settings match.
10	At the SOC, repeat Step 5, rotating the SOC DIRECTORY NUMBER thumbwheels.	Same as Step 5.

G. MRP Test Call

1a	If the system is equipped for MRP, at the SOI-(W, X, Y, Z), connect a test cord between the two test terminals on the front of the SR25 card.	
2a	At the O&CU, ensure that the key switch is in the ON position.	

STEP	ACTION	VERIFICATION
3a	At the MRPL, depress the PTC pushbutton.	At the SOI-, immediately observe the sequence of flashes on the top most (D51) LED of the SR25 card 001. Refer to Table D Rate Schedules for sequence and timing of Alpha, Beta or C. *Note:* Depressing the PTC initiates the test sequence of 7 calls starting with a Zone 7 call and ending with a Zone 1 call. The entire sequence is continuous, with only a one second delay between the second overtime pulse(s) of one call and the initial pulse(s) for the next call. The test lasts for 47 minutes for the Alpha rate schedule and 35 minutes for the Beta and C schedules.
4a	When the seven initial pulses occur for the next Zone 7 call, disconnect the test cord on the SR25 card.	
5b	If the system is equipped with additional SOI-(X, Y, Z), repeat test on each SOI-. **SOI TESTS** *Note:* Ignore any MRP alarms that may occur during SOI tests, clear alarms by depressing the PTC pushbutton on the MRPL. **H. SOI Power Failure Test**	Same as Steps 1a through 4a.
1	At fuse panel, remove the SOI-W power fuse.	At the O&CU, the SB POWER alarm LED lights. At the TTY, SB alarm is printed out. At the SOC, SOI-W POWER FAILURE LED lights.
2	Replace the SOI-W power fuse.	
3	At the O&CU, depress the DAC pushbutton.	Alarm clears.
4a	Repeat Steps 1 through 3, if the SOI-W is equipped with SR15 *Touch-Tone* cards. (Remove the second SOI-W power fuse.)	Same as Steps 1 through 3.

STEP	ACTION	VERIFICATION
5b	Repeat test on each additional SOI-(X, Y, Z) in the system, as required.	Same as Steps 1 through 3. *Note:* Appropriate LED lights for the respective SOI-(X, Y, Z).
	I. SOI Battery-Tracking Circuit Failure Test	
1	At SOI-W, connect a test cord between pin A4 and A20 on J55 backplane.	At the O&CU, SB FAIL/SBA FAIL alarm (FIXED ADDRESS TEST alarm) LEDs light. At the TTY, SB FAIL/SBA FAIL alarm is printed out. At the SOA, W LED (only) is lighted on the SR58 card.
2	Remove test cord.	
3	At the O&CU, depress the DAC pushbutton.	Alarm clears.
4a	Repeat test on each additional SOI-(X, Y, Z) in the system.	Same as Steps 1 through 3. *Note:* Appropriate SR58 LED lights for the respective SOI-(X, Y, Z).
	J. SOI Digit Line Fixed Address Test Failure	
1	At SOI-W, connect a test cord between pin B8 and A20 on J55 backplane.	Same as Test I, Step 1.
2	Remove test cord and clear alarms.	Same as Test I.
3a	Repeat test on each additional SOI-(X, Y, Z) in the system.	Same as Steps 1 and 2. *Note:* Appropriate SR58 LED lights for the respective SOI-(X, Y, Z).
	K. SOI Clock Failure Test	
1	At SOI-W, connect a test cord between pin B6 and A20 on J55 backplane.	Same as Test I, Step 1.
2	Remove test cord and clear alarms.	Same as Test I.

STEP	ACTION	VERIFICATION
3	Connect the test cord between pin A6 and A20 on J55 backplane.	Same as Test I, Step 1.
4a	Repeat test on each additional SOI-(X, Y, Z) in the system.	Same as Steps 1 through 3. *Note:* Appropriate SR58 LED lights for the respective SOI-(X, Y, Z).
	L. SOI M-Lead Fixed Address Test Failure	
1	At SOI-W, remove the SR54 card from the SR34/35 slot.	At the O&CU, SB FAIL/SBA FAIL alarm (FIXED ADDRESS TEST alarm) LEDs light. At the TTY, SB FAIL/SBA FAIL alarm is printed out. At the SOA, W and M LEDs are lighted on the SR58 card.
2	Reinsert the SR34 card.	
3	At the O&CU, depress the DAC pushbutton.	Alarm clears.
4a	Repeat test on each additional SOI-(X, Y, Z) in the system.	Same as Steps 1 through 3. *Note:* Appropriate SR58 LED lights for respective SOI-(X, Y, Z).
	M. MRPI Power Fail Test	
1a	If the system is equipped for MRP, at the fuse panel, remove the power fuse for the MRPI-1 associated with SOI-W.	At the O&CU, SB POWER alarm LED lights. At TTY, SB POWER alarm is printed out. At MRPL, MRPI-1W POWER FAIL LED lights.
2a	Replace the MRPI-1 power fuse.	
3a	At the O&CU, depress the DAC pushbutton.	O&CU alarm clears.
4a	At the MRPL, depress the PTC pushbutton.	MRPL alarm clears.
5b	If SOI-W is equipped with MRPI-2, repeat Steps 1a through 4a. (Remove MRPI-2 fuse.)	Same as Steps 1a through 4a. *Note:* MRPI-2W POWER FAIL LED lights.

STEP	ACTION	VERIFICATION
6c	Repeat test on each additional MRPI-1 and MRPI-2 associated with SOI-(X, Y, Z) in the system.	Same as Steps 1a through 5b as required. *Note:* Appropriate MRPI-POWER FAIL LEDs light for SOI-(X, Y, Z).
	N. MRPL Power Fail Test	
1a	If the system is equipped for MRP, at the MRPL, remove the PS2 circuit pack and depress the DAC pushbutton on the O&CU.	At the O&CU, SBA POWER alarm LED lights. At TTY, SBA POWER alarm is printed out. At MRPL, MRPL POWER alarm LED lights.
2a	Reinsert the PS2 circuit pack.	
3a	At the O&CU, depress the DAC pushbutton.	Alarm clears.
4a	At the MRPL, depress the PTC pushbutton.	Alarm clears.
	O. SOC Power Failure Test	
1	At the SOC, remove the PS2 circuit pack.	At the O&CU, SB POWER FAIL alarm LED lights, line number 9NNNCCN is displayed. At the TTY, 9NNN : :N line number is printed out. *Note:* Where N may be any digit from 0 to 9.
2	Reinsert the PS2 circuit pack.	
3	At the O&CU, depress the DAC and OAC pushbuttons.	Alarm clears.
	P. SOA Power Failure Test	
1	At the SOA, remove the PS3 circuit pack from J1/J2 slot and depress the DAC pushbutton on the O&CU.	At the O&CU, SBA POWER alarm LED lights. At the TTY, SBA POWER alarm is printed out. At the SOC, SOA-1 and SOA-2 POWER FAIL LEDs light.
2a	If the system is equipped for MRP—	At the MRPL, MRPI POWER alarm LEDs light.

STEP	ACTION	VERIFICATION
3	Reinsert the PS3 circuit pack.	
4	At the O&CU, depress the DAC pushbutton.	Alarm clears.
5a	At the MRPL, depress the PTC pushbutton.	Alarm clears.
6	Repeat test. (Remove PS3 circuit pack from J23/J24 slot in Step 1.)	Same as Steps 1 through 5a. *Note:* Observe which data path is active on the O&CU DATA PATH A or B ACTIVE key lamp lighted.
7	At the O&CU, change STAND BY data path to ACTIVE and repeat Step 6 on data path A or B as required. **Q. SOA Oscillator Failure Test**	Same as Step 6.
1	At the SOA, remove the SR6 card from the shelf and separate the crystal from its socket contacts on the card.	
2	Reinsert the SR6 card in its slot. Depress the DAC pushbutton on the O&CU.	At the O&CU, SBA FAIL alarm LED lights. At TTY, SBA FAIL alarm is printed out.
3a	If the system is equipped for MRP—	Alarms will appear on the SR58 card of the SOA and on the MRPL.
4	Remove the SR6. Replace the crystal in its socket. Reinsert the SR6 in the shelf.	
5a	At the MRPL, depress the PTC pushbutton.	Alarm clears.
6	At the O&CU, depress the DAC pushbutton. **R. SOA Memory and Timing Failure Test** *Note:* There are 8 tests in this series. Table D summarizes these tests.	Alarm clears.
1	At the SOA, remove the SR3 card. Insert the SR59 (SOA Switch Extender) card in the SR3 slot.	
2	Mate the SR3 card to the SR59 and ensure that all 60, SR59 card switches are closed.	White dot showing on SR59 card switches indicates switch is closed.

STEP	ACTION	VERIFICATION
3	At the O&CU, depress the DAC pushbutton.	Alarm clears.
4a	If the system is equipped for MRP, depress the PTC (if alarm is present on the MRPL).	Alarm clears.
5	Open SR59 switch A22 on the SR59 card.	
6	At the SOA, insert the SR9 (SOA Test) card into the SR9 Test slot.	
7a	If the system is equipped for MRP, connect a test cord between pin A1 and A26 on J4 of the SOA backplane.	
8	Operate the 7-1/2 SEC switch on the SR9 card.	If equipped for MRP, at the MRPL, alarm is immediately displayed. *Note:* MRP POWER alarm will not occur on the O&CU. At the O&CU, in approximately 15 seconds after the 7-1/2 sec switch is operated in Step 1 the SBA FAIL alarm LED lights. This alarm is a soft hit and will clear automatically after the TTY printout is completed. See Table E, Test No. 1.
9a	Remove the test cord from the SOA J4.	
10	Close switch A22 on the SR59 card.	
11a	At the MRPL, depress the PTC pushbutton.	Alarm clears.
12	At the O&CU, depress the DAC pushbutton.	Alarm clears.
13	Open SR59 switch B21 on the SR59 card.	At the O&CU, SBA FAIL and SBA PARITY alarm LEDs light. At TTY, the above alarms are printed out. See Table E, Test No. 2. *Note:* If the alarms do not occur, close the switch and reopen it again several times until the alarms occur.

STEP	ACTION	VERIFICATION
14	Close switch B21 on the SR59 card.	
15	Remove the SR3 card from the SR59 extender, remove the SR59 card and reinsert the SR3 card in the SOA.	
16	Repeat Steps 11a and 12 as required to clear alarms.	Alarms clear.
17	At the SOA, remove the SR5 card and insert the SR59 card in the SR5 slot.	
18	Mate the SR5 card to the SR59 card and ensure that all 60 SR59 card switches are closed.	
19	Repeat Steps 11a and 12 as required to clear alarms.	Alarms clear.
20	Open switch B11 on the SR59 card.	See Table E, Test No. 3 for alarms.
21	Close switch B11 on the SR59 card.	
22	Repeat Step 11a and 12 as required to clear alarms.	Alarms clear.
23	Open switch B5 on the SR59 card.	See Table E, Test No. 4 for alarms.
24	Close switch B5 on the SR59 card.	
25	Remove the SR5 card from the SR59 extender, remove the SR59 card and reinsert the SR5 card in the SOA.	
26	Repeat Step 11a and 12 as required to clear alarms.	Alarms clear.
27	At the SOA, remove the SR11 card and insert the SR59 card in the SR11 slot.	
28	Mate the SR11 card to the SR59 card and ensure all 60 SR59 card switches are closed.	
29	Repeat Steps 11a and 12 as required to clear alarms.	Alarms clear.
30	Open switch B10 on the SR59 card.	See Table E, Test No. 5 for alarms.
31	Close switch B10 on the SR59 card.	

STEP	ACTION	VERIFICATION
32	Remove the SR11 card from the SR59 extender, remove the SR59 card and reinsert the SR11 card in the SOA.	
33	Repeat Steps 11a and 12 as required to clear alarms.	Alarms clear.
34	At the SOA, remove the SR12 card and insert the SR59 card in the SR12 slot.	
35	Mate the SR12 card to the SR59 card and ensure all 60 SR59 card switches are closed.	
36	Repeat Steps 11a and 12 as required to clear alarms.	Alarms clear.
37	Open switch A14 on the SR59 card.	See Table E, Test No. 6 for alarms.
38	Close switch A14 on the SR59 card.	
39	Remove the SR12 card from the SR59 extender, remove the SR59 card and reinsert the SR12 card in the SOA slot.	
40	Repeat Steps 11a and 12 as required to clear alarms.	Alarms clear.
41	At the SOA, remove the SR10 card and insert the SR59 card in the SR10 slot.	
42	Mate the SR10 card to the SR59 card and ensure all 60 SR59 card switches are closed.	
43	Repeat Steps 11a and 12 as required to clear alarms.	
44	Open switch A16 on the SR59 card.	See Table E, Test No. 7 for alarms.
45	Close switch A16 on the SR59 card.	
46	Remove the SR10 card from the SR59 extender, remove the SR59 card and reinsert the SR10 card in the SOA slot.	
47	Repeat Steps 11a and 12 as required to clear alarms.	Alarms clear.

STEP	ACTION	VERIFICATION
48	At the SOA, remove the SR2 card and insert the SR59 card in the SR2 slot.	
49	Mate the SR2 card to the SR59 card and ensure all 60 SR59 card switches are closed.	
50	Repeat Steps 11a and 12 as required to clear alarms.	
51	Open switch A12 on the SR59 card.	See Table E, Test No. 8 for alarms.
52	Close switch A12 on the SR59 card.	
53	Repeat Steps 11a and 12 as required to clear alarms.	Alarms clear.

S. SOA Subscan Failure Test

STEP	ACTION	VERIFICATION
1	At the SOA, remove the SR8 card and insert the SR59 card in the SR8 slot.	
2	Mate the SR8 card to the SR59 card and ensure all 60 SR59 card switches are closed.	White dot showing on SR59 card switches indicates switch is closed.
3a	If the system is equipped for MRP, at the MRPL, depress the PTC pushbutton.	Alarm clears.
4	At the O&CU, depress the DAC pushbutton.	Alarm clears.
5	Open switch B11 on the SR59 card.	At the O&CU, SB FAIL and SBA FAIL alarm LEDs light. At the TTY, SB FAIL/SBA FAIL alarms printout. *Note:* If the alarms do not occur, close the switch and open it again several times until alarms occur.
6	Close switch B11 on the SR59 card.	
7	Remove the SR8 card from the SR59 extender, remove the SR59 card and reinsert the SR8 card in the SOA slot.	
9	Repeat Steps 3a and 4 as required to clear alarms.	Alarms clear.

STEP	ACTION	VERIFICATION
	T. MRP I/O Control Failure Test	
1a	If the system is equipped for MRP, at the SOA, remove the SR16 (Alpha, Beta or C) card and insert the SR59 card in the SR16-slot.	
2a	Mate the SR16- card to the SR59 card and ensure all 60 SR59 card switches are closed.	White dot showing on SR59 card switches indicates switch is closed.
3a	At the MRPL, depress the PTC pushbutton.	Alarm clears.
4a	At the O&CU, depress the DAC pushbutton.	Alarm clears.
5a	On the SR16- card, open switch 1 on the miniature switch module near the rear of the card (located next to Integrated Circuit F7).	At the O&CU, SBA FAIL alarm LED lights. At the TTY, SBA FAIL alarm is printed out.
6a	On the SR16- card, close switch opened in Step 5a.	
7a	Repeat Steps 3a and 4a to clear alarms.	Alarms clear.
8a	On the SR16- card, repeat Steps 5a through 7a (open and close switch 2).	Same as Steps 5a through 7a.
9a	On the SR16- card, repeat Steps 5a through 7a (open and close switch 3).	Same as Steps 5a through 7a.
10a	On the SR16- card, repeat Steps 5a through 7a (open and close switch 5).	Same as Steps 5a through 7a.
11a	Remove the SR16- card from the SR59 extender, remove the SR59 card and reinsert the SR16- card in the SOA slot.	
12a	Repeat Steps 3a and 4a to clear alarms.	Alarms clear.

TABLE D

MRP TEST SEQUENCE
RATE SCHEDULES

ALPHA CARDS (SR16, SR25)		BETA CARDS (SR16B, SR25B)		"C" CARDS (SR16C, SR25C)	
TIME	MRPs	TIME	MRPs	TIME	MRPs
INITIAL	7	INITIAL	7	INITIAL	7
3 MIN	1	3 MIN	1	3 MIN	2
1 MIN	2	1 MIN	2	1 MIN	2
INITIAL	6	INITIAL	6	INITIAL	6
4 MIN	1	3 MIN	1	3 MIN	2
1 MIN	1	1 MIN	2	1 MIN	2
INITIAL	5	INITIAL	5	INITIAL	5
5 MIN	1	3 MIN	1	3 MIN	1
1 MIN	1	1 MIN	1	1 MIN	1
INITIAL	4	INITIAL	4	INITIAL	4
5 MIN	1	3 MIN	1	3 MIN	1
2 MIN	1	1 MIN	1	1 MIN	1
INITIAL	3	INITIAL	3	INITIAL	3
5 MIN	1	3 MIN	1	3 MIN	1
2 MIN	1	1 MIN	1	1 MIN	1
INITIAL	2	INITIAL	2	INITIAL	2
5 MIN	1	3 MIN	1	3 MIN	1
3 MIN	1	1 MIN	1	1 MIN	1
INITIAL	1	INITIAL	1	INITIAL	1
5 MIN	1	3 MIN	1	3 MIN	1
5 MIN	1	1 MIN	1	1 MIN	1

TABLE E

SOA MEMORY AND TIMING FAILURE TEST
ALARM SUMMARY

TEST Q				O&CU AND TTY ALARMS	
TEST NO.	STEPS NO.	CARD	SR59 SW.	SBA FAIL	SBA FAIL/SBA PARITY
1	1-12	SR3	A22	X	
2	13-16	SR3	B21		X
3	17-22	SR5	B11		X
4	23-26	SR5	B5	X	
5	27-33	SR11	B10		X
6	34-40	SR12	A14	X	
7	41-47	SR10	A16	X	
8	48-53	SR12	A12	X	