

SCANNER TEST PROCEDURES

2-WIRE NO. 1 ELECTRONIC SWITCHING SYSTEM

	CONTENTS	PAGE
1.	GENERAL	1
2.	TEST DESCRIPTION	1
3.	PRELIMINARY PROCEDURE	3
4.	TEST PROCEDURE	3
5.	OUTPUT MESSAGES	4
6.	END PROCEDURE	5
7.	ABBREVIATIONS	5

1. GENERAL

1.01 This section gives procedures for using the scanner test program (XSCN). The XSCN program is covered in PR-1A546 and included in the MOD 5 auxiliary test program APT-05 for 2-wire No. 1 ESS.

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

1.03 The XSCN program is used for testing live office scanner circuits. Input messages allow the option of testing all scanners in an office, or of selecting either line, master, junctor, or universal trunk scanners, or a particular frame. Test results, either passing or failing, are printed. A manual loop mode aids in troubleshooting scanner faults.

1.04 Abbreviations used in this section are explained in Part 7.

2. TEST DESCRIPTION

2.01 The XSCN program consists of five tests. An input message causes the five tests to

run in the sequence given in 2.05 through 2.09. For each requested frame, each test cycles through all four enables in the sequence shown in Table A before continuing on to the next test. Each of the two controllers in each scanner are tested using both peripheral unit buses.

TABLE A

ENABLE TABLE

ENABLE	CON-TROLLER	PUB	ENABLE LABEL ON FS1	CPD HALF OF PAIR
EN00:	0	0	E0	0
EN10:	1	0	E2	1
EN11:	1	1	E3	0
EN01:	0	1	E1	1

2.02 The XSCN program can test 256, 512, and 1024 point scanners.

2.03 The order in which the circuits in a scanner are tested is indicated by the sequence of functional schematic (FS) numbers that follow each XSCN test description (2.05-2.09). Each FS number relates to a scanner circuit as shown in Table B.

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TABLE B

SCANNER FUNCTIONAL SCHEMATIC NUMBERS

FS NUMBER	SCANNER CIRCUIT
1	Access
2	Core Matrix
3	Ferrod Sensor Matrix
4	Output
5	ASW-S Output
6	Maintenance
10	Address and Answer Buses (FS 10 applies to MS only)

Functional schematics are found in schematic diagrams as shown in Table C. FS 10, which gives busing information, exists only for master scanner circuits. For busing information on all other scanner circuits, consult SD-1A119-01 (Communication Bus Circuit for Peripheral Units).

TABLE C

SCANNER SCHEMATIC DIAGRAMS

Scanner Circuit	Schematic Diagram
Line Scanner (2/1 LCR)	SD-1A111-01* SD-1A332-01**
Line Scanner (4/1 LCR)	SD-1A115-01* SD-1A326-01**
Master Scanner	SD-1A209-01
Junctor Frame Scanner	SD-1A214-01
Universal Trunk Frame Scanner	SD-1A215-01 SD-1A338-01***

* For ferreed networks

** For remreed networks

*** Miniaturized UTS

2.04 Tests 1, 2, and 3 send invalid address groups having missing or extra pulses. In normal operation, two eight-bit address groups having one bit present in each group (1 out of 8, 1 out of 8) are used to access a row and column in a scanner controller. The low order address bits are 7-0, and the high order bits are 15-8. A seventeenth bit is provided for a maintenance test bit.

2.05 Test 1 sends a series of invalid "less than" orders. A less than order has one bit present in one address group and no bits present in the other group (1 out of 8, 0 out of 8). An order may have the low address group bit present and the high address group bit missing, or vice versa; the series provides for both combinations. If the ASW-S bit indicates normal operation even with the missing address bit, a failure message prints. The failure indicates a trouble in the scanner access or ASW circuits (FS 10, FS 1, FS 5, FS 10).

2.06 Test 2 sends a series of invalid "more than" orders. A more than order has one bit present in one address group and two bits present in the other group (1 out of 8, 2 out of 8). An order may have one low address group bit and two high address group bits, or vice versa; the series provides for both combinations. A normal ASW-S bit with the extra address bit causes a failure message to print. The failure indicates a fault in the scanner access or ASW circuits (FS 10, FS 1, FS 5, FS 10).

2.07 Test 3 sends an all zero order. The scanner is enabled but no address bits are sent (0 out of 8, 0 out of 8). The expected result is an all-zero output on the scanner output bus. The test is repeated eight times to detect intermittent troubles. A failure indicates a fault in the scanner access or readout circuits, or a noisy bus (FS 10, FS 1, FS 4, FS 5, FS 10).

2.08 Test 4 sends a test order that consists of only the maintenance test bit (address bit 16). The normal result is a scanner answer of all ones on the scanner answer buses. A failure indicates a fault in the test bit or readout circuits (FS 10, FS 1, FS 4, FS 5, FS 6, FS 10).

2.09 Test 5 sends a series of valid orders (1 out of 8, 1 out of 8). Each row in the scanner is addressed eight times in succession to detect possible intermittent troubles, and the ASW-S bit is checked for normal response. A failure indicates a problem in the scanner core matrix or ASW

circuitry (FS 10, FS 1, FS 2, FS 3, FS 4, FS 5, FS 10).

2.10 Test 7, the manual loop mode of operation, allows the address bits to be specified as an aid in troubleshooting scanner faults. A LIB-START input message is used to start the manual mode and select the frame type. Two LIB-OCT messages specify the frame number and address order. To advance from one enable to the next, the LIB-SET-104. message is necessary. The program stays in the manual mode until either all four enables have been tested or until manually terminated with either the LIB-START-00000000. or LIB-SET-122. message.

3. PRELIMINARY PROCEDURE

3.01 CPD 0, CPD 1, and the PUBs must be in service. If they are in trouble, the program will abort.

3.02 PS module 05 or 15 must be loaded with the proper auxiliary program package; therefore, before running XSCN, perform the preliminary procedures in Section 231-147-301 for inserting an auxiliary test module, configuring auxiliary test progress into service, and using the LIB-EDIT. message.

4. TEST PROCEDURE

4.01 The XSCN LIB-START input message allows the following three test procedure options.

- (a) Run the entire program and print each failure.
- (b) Run to the first failing test, print, and loop on the same failing test. Two LIB-SET messages allow requesting an updated printout while looping, or advancing, printing, and looping on the next failing test.
- (c) Select the manual loop mode for troubleshooting.

Frame Test Start Messages

4.02 To start the XSCN test program, type

LIB-START-050tb0c.

5 = unit number assigned to XSCN.

t = frame type to be tested (octal).

= 1 for line scanner. See Table C for SD numbers.

= 2 for master scanner (SD-1A-209-01).

= 3 for junctor scanner (SD-1A214-01).

= 4 for universal trunk scanner. See Table C for SD numbers.

b = loop option bit. (This is not a bus bit. Both buses are tested automatically.)

= 0 to run entire program and print each error.

= 1 to run to first failing test, print out, and loop on that failing test. See 4.06 and 4.07 for loop option messages.

c = number of LIB-OCT messages to follow.

= 0 to request test of all scanners. No LIB-OCT messages to follow.

= 1 to request test of one scanner frame. One LIB-OCT message to follow (4.03).

= 2 to request manual loop mode. Two LIB-OCT message to follow (4.03 and 4.04).

Note: In the manual loop mode (c = 2), the scanner type and member number are specified by the parameter "t" in the LIB-START message, the frame number is specified by the "aab" parameter of a LIB-OCT message (4.03), and the address groups are specified in bits 0-16 of a second LIB-OCT message (4.04).

4.03 To select a frame number when c = 1 or 2 in the LIB-START message, type

LIB-OCT-00000aab.

aab = frame number of MS, JS, or UTS (octal)

SECTION 231-148-304

aa = network number of line scanner
b = frame number of line scanner.

Messages Used Only in Manual Loop Mode

4.04 To specify either the address group bits or the maintenance test bit in manual loop mode (c = 2), type

LIB-OCT-00aaaaaa

aaaaaa = octal order of 17 bits to be sent to frame. (Either 0-15 for address, or bit 16 for test bit).

4.05 In manual loop mode (c = 2), to advance to the next enable, type

LIB-SET-104.

The preceding message requests the program to advance to the next enable in the sequence given in Table A. Also, the error message (5.01) will print. After all enables have been tested, typing this message will terminate the program.

Messages Used Only When the Program is Looping on a Failing Test

4.06 If the program is looping on a failing test (b = 1 in the LIB-START message), the program will continue to loop on that test even after the failure has been corrected; therefore, to order the program to advance and loop on the next failing test, type

LIB-SET-000.

If there are no more failures, the program will complete and the LIB05 UN05 END message (5.04) will print.

4.07 If the program has printed and is looping on a failing test, a check can be made to see if the test is still failing. To get an updated printout, type

LIB-SET-101.

If the test is still failing, the program will print out and continue looping on the same failing test.

If the test passes, the program will not print for the passing test but will advance, print, and loop on the next failing test.

Cancel Test Message

4.08 The program can be cancelled at any time by typing in either one of the two following messages:

(a) LIB-START-0000000.

The preceding message inputs all zeros.

(b) LIB-SET-122.

The preceding message places a 1 in bit 22 of control word 1.

5. OUTPUT MESSAGES

Error Message

5.01 If a failure is detected, the following message will print. In manual mode this message also prints once for each enable used. Manual mode is indicated by TST = 7.

LIB05 xxxx:### FLD TST:#
EN: G:## R:## C:## CPD:##
ODR: fh Og aaaaaaaaa bbbbbbbb

xxxx = LSC, MS, JSC, UTSC

= frame number

TST:# = test number

EN is the frame enable

G:# # = group number

R:## = row number

C:## = column number

CPD:## = CPD number

ORD is the test order sent out, except in tests 3 and 4 when ORD is the scanner answer.

aaaaaaaa = the 1 out of 8 high order binary address

(except in tests 3 and 4). See the individual test description for bit layout.

bbbbbbbb = the 1 out of 8 low order binary address (except in tests 3 and 4)

Note: For tests 3 and 4 aaaaaaaa and bbbbbbbb are the 16-bit answer back from the scanner. For test 3 the answer should be all zeros, and for test 4 the answer should be all ones.

f = CPDRM (CPD reply match)

= 0 if not returned

= 1 if returned

h = ASW-S

= 0 if not returned

= 1 if returned

g = SCAB (scanner answer bus) number. Applies only in test 4, otherwise g = 0.

Table D gives the expected CPDRM and ASWS results.

TABLE D

EXPECTED CPDRM AND ASW-S RESULTS

TEST	CPDRM	ASWS
1	1	0
2	1	0
3	1	0
4	1	0
5	1	1

Abort Message

5.02 The following message signifies an abort:

LIB05-07 RELO ABT ADDR XSCN #####

= address where fault was detected. The cause of the abort is explained in the abort address catalog at the end of the program listing.

Frame ATP Message

5.03 The following ATP message prints for each frame that passes without any failures:

LIB05 xxxx:### ATP

xxxx = LSC, MS, JSC, UTSC

= frame number

Program Pass Message

5.04 The following message prints when all requested frames have passed all tests in the program.

LIB05 UN05 END

6. END PROCEDURE

6.01 After all tasks desired to be performed by XSCN have been finished, configure the MOD 5 containing XSCN out of service, remove the PS module, and replace it with the original PS module 05 using procedures in Section 231-147-301.

7. ABBREVIATIONS

7.01 Abbreviations used in this section are:

- ASW All-seems-well
- ASW-S All-seems-well-scanner
- ATP All tests passed
- CPD Central pulse distributor
- CPDRM CPD reply match
- ESS Electronic switching system

SECTION 231-148-304

FS	Functional schematic	PUB	Peripheral unit bus
JS	Junctor scanner	SCAB	Scanner answer bus
JSC	Junctor scanner circuit	UTS	Universal trunk scanner
LCR	Line concentration radio	UTSC	Universal trunk scanner circuit
LSC	Line scanner circuit		
MS	Master scanner	XSCN	Scanner test program.