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AMARS
NO. 1A AUTOMATIC MESSAGE ACCOUNTING AND RECORDING CENTER
DATA SET INTERFACE AND AUXILIARY FUNCTION CIRCUIT DIAGNOSTIC
WHEN EQUIPPED WITH ISOLATION CIRCUITRY

CONTENTS

1. GENERAL INFORMATION

1.1 This section is intended as a guide for using the Data Set Interface and Auxiliary Function (DSIAF) circuit diagnostic when cabinet is equipped with an Isolation Unit. This section is designed to help an installer perform tests using the DSIAF Diagnostic. The DSIAF Diagnostic was designed to:

(1) Test all active devices in the Data Set Connection Cabinet.

(2) Minimize manual intervention.

(3) Isolate failures to a specific board.

(4) Isolate failures to an integrated circuit.

(5) A test tool for an operational No. 1A AMARC System.

1.2 Initially, the load procedure given in Paragraph 5 and the test procedures in Paragraph 6 are to be performed twice; once for each DSIAF circuit associated with CPU0 and then for each DSIAF circuit associated with CPU1. At a later time the DSIAF diagnostic can be used to verify the operation of the majority of circuits in the Data Set Connection Cabinet when attempting to isolate a hardware fault between DEC and WECo equipment.

2. RECORDS AND REQUIREMENTS

2.1 The Test Trouble Record Forms (SD-97-1313 and SD-97-1315) should be used to record all troubles which are encountered when running the test in this Handbook Section.

3. TEST EQUIPMENT

3.1 No. 1A AMARC DSIAF diagnostic on magnetic tape.

Code	Description
ITE-5237B	Oscilloscope
SPP-832	Spare Parts Package

4. DESCRIPTION OF TEST INFORMATION

4.1 The DSIAF Diagnostic is divided into four test groups because the test in each group requires the installer to perform manual operations on the isolation panel. The TTY will output a message of what manual operation is required at the appropriate time.

NOTE: The output message will only be printed upon the execution of the first test in each Test Group.

4.2 The following is a description of test included in Test Group 100.

4.21 TEST 101: This test verifies that the DR11C operates properly.

4.3   The following is a description of test included in Test Group 200.

4.31   TEST 201: This test verifies that the CPU No. is properly wired.

4.4   The following is a description of the test included in Test Group 300. This Test Group diagnosis the different boards of the DSIAF; after the message printout the program will halt waiting for the proper isolation mode. Then it will execute in sequence all other DSIAF tests.

4.41   TEST 301: This test is the ODD parity test.

4.42   TEST 302: Power Disconnect test, CPC4 is tested for Power Disconnect on the other processor.

4.43   TEST 303: Power Switch Test. This test checks the ability of the DR11C to control the switch of the Data Sets power and the related function of CPC4.

4.44   TEST 304: Alarm and Display Drive Test. This test verifies that leads B0, B1 and B2 on CPC's are correct.

4.45   TEST 305: Alarm and Display Drive Test. This test is a continuation of Test 304, except it has an isolation test to CPC5.

4.46   TEST 306: Watch Dog Test. This test verifies that the Watch Dog operates by pulsing every 50 and 250 Msec.

4.47   TEST 307: Request to Send (RTS) Memory Test. In this test the memory is tested first, then the drivers are tested. The circuit packs involved are CPC1 (JW440), CPC2 (JW172), CPC3 (JW173), CPC4 (JW174) and CPC6 (JW443).

4.48   TEST 310: Data Terminal Ready (DTR) Memory Test, this test verifies that the memories associated with the 202S Data Sets are working.

4.5   Test Results Formats for Test Groups 100, 200 and 300.

4.51   PASS

When a specific test has completed a particular test, the following printout occurs:

       TST XXX PASS

where XXX = Test Number

4.52   FAIL

Under a FAIL condition of a test, the following will print:

TST XXX FAIL CPCY, CPCZ, ...

AAAAAA BBBBBB CCCCCC DDDDDD

where XXX = Test Number

Y,Z = CPC Number (Circuit Pack No.)

AAAAAA = contents of the Status Register (SR). SR part of the DR11-C.

BBBBBB = contents of the READ/WRITE Buffer Register (RWBR). RWBR is part of the DR11-C.

CCCCCC = contents of the Input Read Only Register (IROR). IROR is part of the DR11-C.

DDDDDD = Program address of the failure.

4.53   ANALYSIS Condition

Under an Analysis Condition of a test, the following will print:

       ANALYSIS: TEST XXX

       FAILURES IN: CPCY....

            or

       RTS MEMORY ANAL. TST 307

       SINGLE FAILURES IN CPCY ...

            or

       DTR MEMORY ANAL. TST 310

       SINGLE FAILURES IN CPC3, CPC4

4.6   The following is a description of test included in Test Group 400.

4.61   TEST 401: This tests the isolation circuit associated with the DZ11B multiplexers, cables from the isolation circuit to the DZ11B multiplexers and the DZ11B multiplexer circuitry.

4.7   Test Results Formats for Test Group 400

4.71   PASS

When a particular test has been completed, the following printout occurs:

MX aa,b PASS

where: MX = DZ11B multiplexer
aa = multiplexer no. under test (ØØ -13) octal.
b = channel no. within the MX (Ø-7).

4.72   FAIL

Under a FAIL condition of a test, the following will print:

MX aa,b FAIL #C

where: MX = DZ11B multiplexer
aa = multiplexer no. under test (ØØ-13) octal.
b = channel no. within the MX (Ø-7).
c = failure code (Ø-5). See Table 1 for description of codes.

4.73   ANALYSIS Condition

Under the Analysis Condition of a test, the PASS printout remains the same. The FAIL printout is as follows:

MX aa,b FAIL #C rØ,r2,r4,r6

where: MX = DZ11B multiplexer
aa = multiplexer no. under test (ØØ-13) octal.
b = channel no. within the MX (Ø-7)
c = failure code (Ø-5). See Table 1 for description of codes.
rØ = contents of DZ11 Control Status Register.
r2 = contents of DZ11 Receiver Buffer.
r4 = contents of DZ11 Transmit Control Register.
r6 = contents of DZ11 Modem Status Register.

5.   LOADING THE DSIAF DIAGNOSTIC

5.1   Loading the Magnetic Tape

5.11   Taking the magnetic tape containing the No. 1A AMARC DSIAF diagnostic, remove the plastic write enable ring (if equipped) from the reel. Removing the write enable ring will protect the magnetic tape from being overwritten.

5.12   Depress the RESET key on the tape drive unit associated with the processor (RESET lamp will light on the drive unit).

5.13   Place the DSIAF reel on the uppermost mount on the drive unit by pulling the handle on the mount out. After mounting the reel, push handle back in place and verify reel is held securely.

5.14   Thread tape through drive, as indicated in printed diagram on the drive unit. Thread tape on the lower reel and wind around reel only twice*, leaving slack in the process of threading.

*NOTE: There is a metallic tape located near the beginning of the tape. This location is termed the load point on the tape. When threading any magnetic tape, it is important in winding tape on the lower reel (take-up reel) that the load point is before the read/write sensors.

5.15   Depress the LOAD key on the drive unit. The tape should wind forward to the load point and then stop.

5.16   Depress the ONLINE key on the drive unit. Only two lights - ONLINE and LOAD - should be on before continuing.

5.2   Loading Program

5.21   Halt the Central Processor (CU) by placing the ENABLE/HALT key to the HALT position.

5.22   Set the console switches (SWR) on the CU console to 17773030. Then depress the LOAD ADDR key.

5.23   Set the SWR keys to zero - all down.

5.24   Place the ENABLE/HALT key to ENABLE.

5.25 Depress the START key on the CU console. The magnetic tape moves forward and the message CORE MEMORY SIZE IS XXXK WORDS is typed on the processor terminal. The tape then continues to move forward and then rewind back to the supply reel. The DSIAF Diagnostic should now be in memory.

5.26 If CRC check fails the following message will be printed:

CRC CHECK HAS FAILED, RELOAD THE PROGRAM.

It will be necessary to repeat Paragraph 5.2. If errors occur repeatedly, tape could be defective, memory could be defective, or KG11A peripheral could be defective.

5.27 After the magnetic tape rewinds back to the ON LINE/LOAD position, halt the processor using the HALT key.

6. DSIAF DIAGNOSTIC PROCEDURE

6.1 Start

6.11 The DSIAF Diagnostic can be manually restarted at any time following the procedure beginning at this paragraph.

6.12 Set the ENABLE/HALT key on the processor's console to HALT. Load the address 200 into the ADDRESS register by setting the SWR keys to 200 and then depressing the LOAD ADDR key.

6.13 Set the SWR keys to state the test number to be performed and the mode of test operation as follows:

SWR Bits	Description
0 thru 8	Test Number to be performed. Test Number must be valid test number (i.e., not 100, 200, 300 or 400) or all zeroes.

NOTE: If bits 0 thru 8 are zero (all down), the default feature will cause Test 101 to be selected.

SWR Bits	Description
9=1 (up)	Loop on a DZ11B multiplexer channel for test group 400. Not assigned for test groups 100, 200 and 300.
10=1 (up)	Loop on test (subtest within a group test) - scope loop.
11=1 (up)	Loop on a test group.
12=1 (up)	Perform test analysis.
13=1 (up)	No TTY printout.
14=1 (up)	Exercise all tests (continue testing even if error occurs). For test groups 100, 200 and 300. Not assigned for test group 400.
15=1 (up)	Halt on an error.

NOTE: SWR bits 9 thru 15 (mode) can be changed during testing without restarting the DSIAF program.

In performing the DSIAF Diagnostic for the first time on a particular DSIAF unit, all test should be run in consecutive order, starting with TEST 101, with the test analysis options. Therefore, set the SWR keys to 050101 (octal) - 0/101/000/001/000/001 (binary).

6.14 After the SWR keys have been selected, set the ENABLE/HALT key to ENABLE. Then depress the START key. Press the CONTINUE key. A CRC check of the loaded program will be automatically performed to verify that the program is stored accurately. If a "magging" error has been encountered, the following TTY printout will be typed out:

CRC CHECK HAS FAILED

RELOAD PROGRAM

If the above message occurs, reload the program by repeating procedure from Paragraph 5.2. If error occurs again, repeat the entire procedure starting at Paragraph 5.1.

If no CRC failure has been encountered, the program is accurately stored and the following TTY printout will be typed out:

B-C CABINET DIAGNOSTIC BEGINS TEST GIVES INSTRUCTIONS ON OPERATION OF TTY AND PID (PROC ISOLATION & DISPLAY)

OUTPUT FAILURE MESSAGES HAVE THE FOLLOWING FORMAT:

TST xxx FAIL CPCy, CPCz.....a b c d

Where:

xxx = TEST NUMBER
y,z = CPC NUMBER
a = CONTENTS OF DR11-C STATUS REGISTER
b = CONTENTS OF DR11-C R/W BUFF. REG.
c = CONTENTS OF DR11-C READ ONLY REG.
d = PROG. ADDR. OF FAILURE
TO START THE DIAGNOSTIC TYPE THE CABINET IDENTIFICATION (B, C0, OR C1) AND LF.

6.15   At this point a B character and a LF (line feed) character should be typed on TTY.

6.2   Test 101

6.21   The following message will be typed on TTY:

GROUP 1 TST - VERIFY THAT PID IS IN DEC ISOLATION STATE.
TYPE IN LF WHEN ABOVE IS DONE.

6.22   At this point the isolation unit for circuit 0 should be enabled. This is done by pushing the DEC key under CIRCUIT 0 up and pressing the EXECUTE key.

The red LED above the DEC key should light; the red DEC0 LED on all TN38 packs should light; and all the red ISO LED's on TN37 packs in CB0 units light. At this point a LF (line feed) character should be typed on TTY.

6.3   Test 201

6.31   The following message will be typed on TTY:

VERIFY THAT PID IS IN NORMAL STATE
TYPE IN LF WHEN ABOVE IS DONE.

6.32   Put the Isolation Unit back in the normal state by pushing the DEC key under CIRCUIT 0 down and pressing the EXECUTE key. The red LED above the DEC key should extinguish; the red DEC0 LED on TN38 packs should extinguish and the green LED's illuminate.

6.33   A LF (line feed character) should be typed on TTY. The following message will then appear:

GROUP 2 TST - TYPE IN CPU NO. FOLLOWED BY LF

6.34   A 0 character followed by a LF (line feed) character should be typed on TTY.

6.4   Test Group 300

6.41   The computer will then print out the following message on the TTY for this group test:

GROUP 3 TST - VERIFY THAT PID IS IN DSIAF ISOLATION STATE
TYPE IN LF WHEN ABOVE IS DONE.

6.42   Put the isolation unit in the DSIAF mode by pushing the DSIAF key under CIRCUIT 0 up and pressing the EXECUTE key. Verify that the red LED above DSIAF key lights; all red ISO LED'S light in CB0 units except TN37 in position 07; and red DSIAF0 and DEC0 LED's on TN38 light.

6.43   Type in a Line Feed (LF) character.

6.44   Tests 301 through 310 will be run sequentially.

6.5   Test Group 400

6.51   The following TTY printout will be typed out:

DZ11B LOOPBACK TEST BEGINS

OUTPUT FAILURE MESSAGE HAVE THE FOLLOWING FORMAT:

MX   aa,b   PASS   or
MX   aa,b   FAIL   #C or with analysis bit set
MX   aa,b   FAIL   #C r0, r2, r4, r6

Where:

   aa = MULTIPLEXER NO. UNDER TEST (ØØ -
      13) OCTAL.
   b = CHANNEL NO. WITHIN MULTIPLEXER (Ø
      - 7).
   c = FAILURE CODE (Ø -5).
   rØ = CONTENTS OF DZ11 CTRL & STATUS.
   r2 = CONTENTS OF DZ11 RECEIVER BUFF.
   r4 = CONTENTS OF DZ11 TRANSMIT CTRL.
   r6 = CONTENTS OF DZ11 MODEM STATUS.

VERITY THAT THE PID IS IN DSIAF OR DEC
ISOLATION STATE. THEN HIT 'LF'.

6.52   Verify that PID is still in DSIAF iso-
      lation state.

6.53   Type in a Line Feed (LF) character.
      The following message will then ap-
      pear, followed by a prompt " ".

TYPE IN THE NO. OF THE FIRST MPXR TO
BE TESTED. NUMBER MUST BE ØØ-13 OC-
TAL. THEN HIT 'LF'.

6.54   The program checks for a valid input,
      otherwise it responds via the TTY by
      printing the following message fol-
      lowed by a prompt " ".

INVALID MPXR NO. MUST BE OCTAL ØØ to
13 TYPE THE MPXR NUMBER AGAIN. THEN
HIT 'LF'.

6.55   Type in "ØØ" followed by a 'LF' on
      the TTY. The following message will
      then be printed, followed by the
      prompt " ".

TYPE IN NO. OF LAST DZ11 MPXR TO BE
TESTED. NUMBER MUST BE ØØ - 13 OC-
TAL. THEN HIT 'LF'.

6.56   Type in the last multiplexer number
      (in octal) followed by a 'LF' on the
      TTY. The program then starts testing.

6.57   Restore the isolation unit to normal
      by pushing the DSIAF key under CIRCUIT
      0 down and pressing the EXECUTE key.
      The red LED above the DSIAF key should
      extinguish; the red LED's on TN38
      packs should extinguish and the green
      LED's illuminate; and all red LED's on

ATTACHMENT
  FIGURES 7.1A, 7.1B, 7.1C and 7.1D on Page 7.
  TABLES 1, 2.a, 2.b, 2.c, 2.d and 3.

Arrowed Lines indicate new
or changed information.

Reason for Reissue
  To include UIS information.

TN 37 packs should be extinguished and
all green LED's on TN37 should be il-
luminated.

6.6   First C Cabinet Tests

6.61   Repeat Paragraph 6.1 typing CO and LF
      (line feed) characters to start the
      diagnostic.

6.62   Repeat Paragraphs 6.2 - 6.5.

6.7   Second C Cabinet Tests

6.71   Repeat Paragraph 6.1, typing C1 and LF
      (line feed) characters to start the
      diagnostic.

6.72   Repeat Paragraphs 6.2 - 6.5.

6.8   For the initial installation testing,
     repeat the loading procedure given in
     Paragraph 5 and the test procedure
     given in Paragraph 6.1 through 6.7,
     using the other processor and DSIAF
     units.

7.   AIDS

7.1   Figures 7.1A, 7.1B, 7.1C and 7.1D give
     the bit definition for registers RWBR
     (READ/WRITE) Buffer Register IROR (IN-
     PUT READ ONLY REGISTER), and SR (STATUS
     REGISTER) of the DR11-C devices.

7.2   Table 1 gives an analysis of failure
     codes for test group 400, the multi-
     plexer tests.

7.3   Tables 2.a, 2.b, 2.c and 2.d contains
     the data used to test registers TCR
     (Transmit Control Register), MSR (Mo-
     dem Status Register), CSR (Control
     Status Register), and RBUF (Receiver
     Buffer) for the multiplexer tests.

7.4   Table 3 lists the associated compo-
     nents used for the multiplexer tests
     and their corresponding location.

8.   LAMP TEST

8.1   Depress the LPTST button on the alarm
     panel. All lamps on the alarm panel
     should light. Release the LPTST but-
     ton and the lamps will return to their
     original state.

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RWBR

RMV BOTH TAPES	MNR ALM	MJR ALM	EIA PD	EIA PC	ON/ OFF	RTSE	CLEAR		DTRE	RTS/ DTR	DATA SET ADDRESS				
15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0

FIG. 7.1A

IROR

CPU NUMBER OR MAINT.	CAR 20 to 37 (other CU)	CAR 0 to 17 (other CU)	CTSU 20 to 37	CTSU 0 to 17	CAR 20 to 37	CAR 0 to 17	CTSM 20 to 37	CTSM 0 to 17	EIAPD IMAGE (other CU)	EIAPD IMAGE	EIAPI (other CU)	EIAPI	RTSI/ DTRE (other CU)	RTSI/ DTRE	ODD PARITY
15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0

FIG. 7.1B

SR

RB								RA	ENBB	ENBA				WATCH DOG OR MAINT.	WATCH DOG OR MAINT.
15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0

FIG. 7.1C

DR11-C REG.	B CAB	CO CAB	C1 CAB
SR ADDR.	17767770	17767760	17767750
RWBR ADDR.	17767772	17767762	17767752
IROR ADDR.	17767774	17767764	17767754

FIG. 7.1D

TABLE 1

ANALYSIS OF FAILURE CODES FOR TESTS

FAILURE CODE	TEST FUNCTION	POSSIBLE CAUSE	ACTION TO BE TAKEN
Ø	COMPARE CONTENTS OF MSR WITH TABLE 2.b.	1) BAD CABLE 2) ISOLATION CKT 3) DZ11B MPXR	1) REPLACE CABLE · 2) REPLACE TN37 3) REPLACE DZ11B
1	COMPARE CONTENTS OF CSR WITH TABLE 2.c	DZ11B MPXR	REPLACE DZ11B
2	VERIFY CSR BIT $<7>$ = 1 RECEIVER DONE	SAME AS Ø	SAME AS Ø
3	COMPARE CONTENTS OF RBUF WITH TABLE 2.d	SAME AS Ø	SAME AS Ø
4	VERIFY RBUF BIT $<15>$ ·= Ø	SAME AS 1	SAME AS 1
5	VERIFY MSR BITS $<15:0>$ = Ø	SAME AS Ø	SAME AS Ø

The following tables contain data that is used to test the multiplexers.

TABLE 2.a

SET UP THE TCR TO ENABLE TRANSMIT AND RECEIVE

DATA	TRANSMIT ON LINE	SET DTR FOR LINE	RECEIVE ON LINE
ØØ1ØØ1	Ø	1	1
ØØØ4Ø2	1	Ø	Ø
ØØ4ØØ4	2	3	3
ØØ2Ø1Ø	3	2	2
Ø2ØØ2Ø	4	5	5
Ø1ØØ4Ø	5	4	4
1ØØ1ØØ	6	7	7
Ø4Ø2ØØ	7	6	6

TABLE 2.b

EXPECTED CARRIER AND RING INDICATION (MSR)

DATA	RING AND CARRIER ON LINE
ØØØ4Ø1	Ø
ØØ1ØØ2	1
ØØ2ØØ4	2
ØØ4Ø1Ø	3
Ø1ØØ2Ø	4
Ø2ØØ4Ø	5
Ø4Ø1ØØ	6
1ØØ2ØØ	7

TABLE 2.c

EXPECTED CSR VALUE

DATA	MSE BIT <5>	TLINE BITS <10:8>	TRDY BIT <15>
100040	1	000	1
100440	1	001	1
101040	1	010	1
101440	1	011	1
102040	1	100	1
102440	1	101	1
103040	1	110	1
103440	1	111	1

TABLE 2.d

EXPECTED RBUF VALUE

DATA*	LINE NO BITS <10:8>	DATA VALID BIT <15>
1004XX	001	1
1000XX	000	1
1014XX	011	1
1010XX	010	1
1024XX	101	1
1020XX	100	1
1034XX	111	1
1030XX	110	1

* Bits 0 - 7 are the transmitted character in octal.

TABLE 3

ASSOCIATED COMPONENTS AND THEIR CORRESPONDING LOCATION

CABINET	DZ11B MULTIPLEXERS			CP TN37 LOCATION		CABLE	CONNECTOR	
	MPXR NO.	CHANNEL NO.	UNIBUS ADDRESS	CPU0	CPU1		CPU0	CPU1
B	00	0-7	160350	12-15	20-15	CA30	10-13	18-13
B	01	0-7	160360	12-31	20-31	CA31	10-29	18-29
B	02	0-7	160370	12-41	20-41	CA32	10-39	18-39
B	03	0-7	160400	12-65	20-65	CA33	10-63	18-63
C0	04	0-7	160410	12-15	20-15	CA40	10-13	18-13
C0	05	0-7	160420	12-31	20-31	CA41	10-29	18-29
C0	06	0-7	160430	12-41	20-41	CA42	10-39	18-39
C0	07	0-7	160440	12-65	20-65	CA43	10-63	18-63
C1	10	0-7	160450	12-15	20-15	CA50	10-13	18-13
C1	11	0-7	160460	12-31	20-31	CA51	10-29	18-29
C1	12	0-7	160470	12-41	20-41	CA52	10-39	18-39
C1	13	0-7	160500	12-65	20-65	CA53	10-63	18-63