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1.0 GENERAL PROGRAM DESCRIPTION

 1.1 PROGRAM PURPOSE

"MD-11-DZDHN" IS A GENERAL PURPOSE TEST AND EXERCISER PROGRAM FOR THE DH11, 16. LINE ASYNCHRONOUS LINE MULTIPLEXOR. IT CONSISTS OF THREE INDEPENDENT SUB-PROGRAMS THAT MAY BE USED FOR ACCEPTANCE TESTING, INSTALLATION CHECKOUT, AND CORRECTIVE MAINTENANCE OF THE DH11 SUB-SYSTEM.

 1.1.1 SUBPROGRAM 1 DH11 DATA RELIABILITY TESTS

ONCE CONFIGURED BY THE AUTOSIZER OR BY INITIAL CONSOLE DIALOGUE THIS PROGRAM CAN TEST UP TO 16. DH11'S. ALL LINES ON EACH DH11 ARE TESTED (ONE AT A TIME) WITH ALL COMBINATIONS OF LINE PARAMETERS (BAUD RATE, CHAR LENGTH, PARITY ETC.) BY TRANSMITTING AND RECEIVING A BINARY COUNT PATTERN. ALL ERRORS DETECTED ARE REPORTED ON THE CONSOLE DEVICE AS THEY OCCUR AND ALSO LOGGED IN ERROR STATISTICS TABLES. AT THE COMPLETION OF TESTING FOR EACH DH11 THESE ERROR STATISTICS TABLES ARE DUMPED ON THE CONSOLE DEVICE TO PROVIDE HISTORICAL EVIDENCE OF THE DATA RELIABILITY OF EACH DH11. REFER TO SECTION 4.0 FOR A DETAILED DESCRIPTION OF THE ERROR STATISTICS PROVIDED. THIS SUB-PROGRAM IS NORMALLY SELECTED FOR OVERALL DH CHECKOUT.

 1.1.2 SUB-PROGRAM 2 DH11 SINGLE LINE ECHO TEST

THIS PROGRAM PROVIDES THE MEANS OF TESTING ANY LINE ON ANY DH11 BY USING AN ASYNCHRONOUS TERMINAL DEVICE (VT50, LA36 ETC) CONNECTED TO THE LINE UNDER TEST. THIS SUB-PROGRAM WOULD NORMALLY BE SELECTED WHEN A PROBLEM IS ISOLATED TO A SPECIFIC LINE. IT HAS TWO MODES OF OPERATION, SEND MODE OR ECHO MODE:

SEND MODE: THE USER TYPES AN ASCII BUFFER IN ON THE CONSOLE DEVICE AND THEN TYPES A UNIQUE CONTROL CHARACTER TO SEND THIS BUFFER TO THE DH11 TEST TERMINAL.

THE USER CAN THEN COMPARE THE TWO IMAGES FOR ACCURACY OF TRANSMISSION.

ECHO MODE: THE USER TYPES IN ON THE DH11 TEST TERMINAL AND CAN OBSERVE EACH CHAR TYPED BEING ECHOED ON THE TERMINAL. BY TYPING A UNIQUE CONTROL CHARACTER THE PROGRAM WILL ECHO THE ENTIRE BUFFER TYPED IN UP TO THAT POINT.

1.1.3 SUBPROGRAM 3 DH11 DATA PATTERNS/CABLE TESTS

THIS PROGRAM PROVIDES THE MEANS OF TESTING ANY LINE ON ANY DH11 USING AN M315 TEST CONNECTOR TO TERMINATE THE LINE UNDER TEST. THE USER CAN SPECIFY BUFFER SIZE AND LINE PARAMETERS PRIOR TO SELECTING ONE OF THE FOLLOWING DATA PATTERNS FOR TRANSMISSION, RECEPTION, AND ERROR CHECKING:

- A. ALTERNATING 1/0 PATTERN
- B. BINARY UP COUNT PATTERN
- C. BINARY DOWN COUNT PATTERN
- D. RANDOM DATA PATTERN
- E. CUMULATIVE SEQUENCE OF (A) THRU (D)
- F. SINGLE CHARACTER PATTERN
- G. TYPED IN BUFFER PATTERN

ALL ERRORS DETECTED ARE REPORTED AS THEY OCCUR AND A SWITCH REGISTER OPTION ALLOWS LOCKING ON A PARTICULAR PATTERN. THIS SUB-PROGRAM WOULD NORMALLY BE SELECTED FOR TROUBLESHOOTING A SPECIFIC PROBLEM.

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GO1

SEQ 0006

1.1.4 MD-11-DZDHN CORE MEMORY MAP

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*****
000000: *
*      VECTOR AREA      *
*      *****
*      STACK AREA      *
*      *****
001100: *
*      SYSMAC CONSTANTS *
*      AND VARIABLES    *
*      *****
BEGIN: *
*      START-UP CODE    *
*      *****
STDH1: *
*      DH11 DATA RELIABILITY *
*      TESTS            *
*      *****
ECHO: *
*      DH11 SINGLE LINE *
*      ECHO TESTS      *
*      *****
EXPAT: *
*      DH11 SINGLE LINE *
*      PATTERNS/CABLE TESTS *
*      *****
SEOP: *
*      STANDARD SYSMAC *
*      UTILITY ROUTINES *
*      *****
CKRST1: *
*      COMMON DH11 UTILITIES *
*      *****
DHADR: *
*      DH11 PROGRAM CONSTANTS *
*      AND VARIABLES        *
*      *****
*****
* CONT. *
*****
```

```
*****
* CONT. *
*****
```

H01

MAINDEC-11-DZDMN-C MACY11 27(1006) 25-APR-77 17:49 PAGE 7
DZDMNC.P11 25-APR-77 17:45

SEQ 0007

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*****  
* CONT. *  
*****  
*  
EMI: *  
* SYSMAC ERROR MESSAGE *  
* BUFFERS *  
*  
TITLE: *  
* DH11 MISCELLANEOUS *  
* MESSAGE BUFFERS *  
*  
RBUF: *  
* TRANSMIT AND RECEIVE *  
* DATA BUFFERS *  
*  
ENBUFS: *****
```

1.2 SYSTEM REQUIREMENTS

1.2.1 HARDWARE REQUIREMENTS

- A. ANY PDP11 COMPUTER SYSTEM WITH 12K OF CORE MEMORY
AND A CONSOLE TERMINAL DEVICE (VT50, LA36 ETC)

NOTE: FOR PAPER TAPE SYSTEMS USING THE PDP11
ABSOLUTE LOADER THE PROGRAM WILL LOAD AND RUN
IN BK OF CORE

- B. A DH11 16. LINE ASYNCHRONOUS SERIAL LINE MULTIPLEXOR

- C. A DH11 TERMINAL DEVICE (LA36, VT50 ETC.) [ECHO TESTS ONLY]

- D. TEST CONNECTORS AND MODULE (THE NO. OF EACH REQUIRED
IS DETERMINED BY THE PARTICULAR TEST APPLICATION.
REFER TO SECTION 6.1 FOR A COMPLETE DISCUSSION OF THE
MAINTENANCE CONNECTORS.)

1. H315 TEST CONNECTOR
2. H8611 TEST CONNECTOR
3. M974 TEST MODULE

1.2.2 SOFTWARE REQUIREMENTS

- A. ACT11/ THE PROGRAM CONTAINS THE NECESSARY "SOFTWARE HOOKS"
APT11 FOR INTERFACING TO THE ACT11/APT11 MANUFACTURING
SYSTEMS. THE PROGRAM CAN BE RUN AS PART
OF A QUICK VERIFY "CHAIN" SINCE IT CONTAINS
AN AUTOSIZER.
- B. XXDP THE PROGRAM MAY BE LOADED FROM ANY "XXDP"
MEDIA. IF AUTO-STARTED BY THE "XXDP" MONITOR
CONTROL WILL BE TRANSFERRED TO THE DATA REL-
IABILITY PROGRAM.

1.3 RELATED DOCUMENTS AND STANDARDS

- A. DH11-0 ENGINEERING DRAWINGS
- B. DH11 MANUAL EK-DH11-MM-002
- C. PDP11 PERIPHERALS HANDBOOK
- D. PDP11 PROCESSOR HANDBOOK
- E. MD-11-DZQAC-C1 SYSMAC SML
- F. MD-11-DZQXA "XXDP" USER'S GUIDE
- G. DIAGNOSTIC ENGINEERING STANDARDS AND CONVENTIONS
PROGRAMMING PRACTICES DOC NO. 175-003-009-00

1.4 DIAGNOSTIC HIERARCHY PREREQUISITES

MD-11-DZDHN ASSUMES THAT THE FOLLOWING DIAGNOSTICS
HAVE BEEN RUN PRIOR TO ITS EXECUTION AND THAT NO ERRORS WERE
DETECTED:

- A. CPU/CORE MEMORY DIAGNOSTICS
- B. MD-11-DZDHN DH11 BASIC DIAGNOSTIC

1.5 FAILURE ASSUMPTIONS

MD-11-DZDHN ASSUMES THAT THE DH11 HARDWARE VERIFIED
BY MD-11-DZDHN, THE BASIC DH11 DIAGNOSTIC, IS FUNCTIONING
ERROR FREE.

2.0 OPERATING INSTRUCTIONS

2.1 LOADING AND STARTING PROCEDURES

2.1.1 LOADING PROCEDURES

A. PAPER TAPE SYSTEMS

USE THE STANDARD POP11 ABSOLUTE LOADER PROCEDURE FOR
LOADING PAPER TAPES. AFTER LOADING THE PROGRAM MUST BE MAN-
UALLY STARTED. (REFER TO SECTION 2.1.2)

B. "XXDP" SYSTEMS (REFER TO "XXDP" USER'S GUIDE MD-11-DZQXA)

1. MOUNT THE APPROPRIATE MEDIUM (DECTAPE, DISK ETC)
CONTAINING THE "XXDP" MONITOR AND MD-11-DZDHN.
2. BOOT THE SYSTEM TO LOAD THE MONITOR
3. ONCE LOADED THE "XXDP" MONITOR PRINTS AN INTRO-
DUCTORY MESSAGE AND RESPONDS WITH A ".".
4. TYPE: "DZDHN" FOLLOWED BY EITHER A <CR>
CARRIAGE RETURN OR AN "ALTMODE"
TO LOAD THE PROGRAM.

IF A <CR> WAS TYPED THE USER MUST MANUALLY
START THE PROGRAM AFTER LOADING.

IF AN "ALTMODE" WAS TYPED THE MONITOR WILL
AUTO START THE PROGRAM AT LOCATION 000200(B)
WHICH WILL BEGIN EXECUTION OF THE DATA REL-
IABILITY PROGRAM.

NOTE: WHENEVER THE DH11 CONFIGURATION IS CHANGED
THE DIAGNOSTIC SHOULD BE RELOADED.

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SEQ 0013

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5. SET THE SR=000200 (WORST CASE TESTING)
SET THE SR=000000 (QUICK PASS)
SET THE SR=000400 (HALT AFTER PARAMETER SETUP)
6. SET THE HALT/ENABLE SWITCH TO ENABLE
7. DEPRESS START
8. PROGRAM WILL ASK FOR DEVICE SELECTION PARAMETER
PROCEED AS IN (B-10) ABOVE.
9. PROGRAM WILL ASK FOR LINE SELECTION PARAMETERS.
PROCEED AS IN (B-11) ABOVE.
10. PROGRAM WILL BEGIN EXECUTION AS DESCRIBED IN
PARA 2.1.2.1 (B,12) ABOVE

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27. IF YOU TYPED SOME CHAR OTHER THAN "Y" IN RESPONSE TO (24) THE PROGRAM WILL ASSUME "ECHO" MODE AND ASK YOU TO TYPE IN ON THE TEST TERMINAL CONNECTED TO THE LINE UNDER TEST.
28. NOW GO TO THE TEST TERMINAL AND BEGIN TYPING. (IF THIS IS A REMOTE TERMINAL, ESTABLISH APPROPRIATE MODEM CONNECTION.) EACH CHAR TYPED SHOULD BE ECHOED ON THE DH11 TEST TERMINAL. IF YOU WANT TO ECHO AN ENTIRE BUFFER TYPE "CONTROL-E" AND THE PROGRAM WILL ECHO THE ENTIRE BUFFER TYPED IN ON THE TERMINAL TO THAT POINT.
29. TO CHANGE LINE # AND PARAMETERS - TYPE "CONTROL-C" ON THE DH11 TEST TERMINAL AND RETURN TO THE CONSOLE TERMINAL.
30. TO TEST A DIFFERENT DH11 UNIT, THE PROGRAM MUST BE RESTARTED AT 000214(8).

H02

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SEQ 0020

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2.2 SPECIAL ENVIRONMENTS

2.2.1 ACT11/ THE PROGRAM MAY BE LOADED BY THE ACT11/APT11
APT11 SYSTEMS, AND MAY BE RUN AS PART OF A QUICK
VERIFY CHAIN SINCE THE PROGRAM CONTAINS AN AUTOSIZER.

2.2.2 XXDP THE PROGRAM MAY BE LOADED AND RUN FROM
ANY "XXDP" MEDIUM PROVIDED THERE IS AT LEAST
12K OF CORE. IT MAY BE RUN AS PART OF AN
"XXDP" CHAIN.

L02

MAINDEC-11-DZDHN-C MACY11 27(1006) 25-APR-77 17:49 PAGE 24
DZDHN.C.P11 25-APR-77 17:45

SEQ 0024

2.4 EXECUTION TIMES

A. SUB-PROGRAM 1 DH11 DATA RELIABILITY TESTS

1. SR07=0 QUICK TEST

APPROXIMATELY 15. SECONDS FOR EACH LINE WITH
1824 CHARS BEING TRANSMITTED AND RECEIVED.

2. SR7=1 COMPLETE TESTING

APPROXIMATELY 15. MINUTES FOR EACH LINE WITH
18,720 CHARS BEING TRANSMITTED AND RECEIVED ON EACH
LINE SELECTED FOR TEST.

B. SUB-PROGRAM 2 DH11 SINGLE LINE ECHO TESTS

NOT APPLICABLE SINCE THESE TESTS INVOLVE THE
USER MANUALLY TYPING IN ON THE TERMINAL.

C. SUB-PROGRAM 3 DH11 SINGLE LINE PATTERNS/CABLE TESTS

EXECUTION TIMES VARY FROM LESS THAN 5 SECONDS TO GREATER
THAN 15. MINUTES DEPENDING UPON BUFFER SIZE, LINE PARAMETERS, AND
PATTERN SELECTED.

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G03

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SEG 0032

1424
1425
1426

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IS THE TOTAL NO. OF FRAMING ERRORS IN DECIMAL
IS THE TOTAL NO. OF OVERRUN ERRORS IN DECIMAL

1610	12	STORAGE INTERRUPT ENABLE
1611		
1612		THIS BIT, WHEN SET, PERMITS THE SETTING OF BIT 14 TO GENERATE AN INTERRUPT
1613	13	TRANSMITTER AND NON-EX-MEM INTERRUPT ENABLE
1614		
1615		THIS BIT, WHEN SET, PERMITS THE SETTING OF BIT 10 OR 15 TO GENERATE AN INTERRUPT
1616	14	STORAGE INTERRUPT
1617		
1618		THIS BIT IS SET WHEN THE RECEIVER SCANNER FINDS A RECEIVER HOLDING BUFFER
1619		STORE THAT CHARACTER IN THE SILO, AND CANNOT DO SO BECAUSE OF A LACK OF
1620		AN INTERRUPT REQUEST IF BIT 12 IS SET. THIS BIT IS READ ONLY, EXCEPT IN
1621		IT IS READ/WRITE.
1622		
1623	15	TRANSMITTER INTERRUPT
1624		
1625		THIS BIT IS SET WHEN THE DRII CONCLUDES AN NPR CYCLE THAT INCREMENTED A
1626		CHARACTER IN A MESSAGE BUFFER WAS LOADED INTO A UART TRANSMITTER HOLDING
1627		REQUEST IF BIT 13 IS SET. THIS BIT IS READ/WRITE. (IT IS SET DURING AN
1628		
1629		
1630		

