

DataGeneral

**TECHNICAL
STATEMENT**

TEXT LISTING

068-000040-05

PROGRAM

4060 QUAD TELETYPE TEST

TEXT TAPE

097-000040-05

ABSTRACT

THIS PROGRAM CONSISTS OF TWO ESSENTIALLY INDEPENDENT PARTS, A GATE BY GATE TEST OF THE HARDWARE, AND A RELIABILITY TEST. SINCE THE GATE BY GATE TEST OR DIAGNOSTIC ASSUMES THAT THERE MAY BE A MALFUNCTION, IT REQUESTS OPERATIONAL PARAMETERS FROM THE OPERATOR.

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MACRO REV 06.30
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: NAME: 4060TTY.TX
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: DESCRIPTION: 4060 QUAD TELETYPE TEST
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: REVISION HISTORY:
:
: REV. DATE
: 00 11/12/71
: 01 01/14/72
: 02 09/06/74
: 03 01/17/75
: 04 XX/XX/XX
: 05 08/20/76
:
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: 1976
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ABSTRACT
? 1.
? THIS PROGRAM CONSISTS OF TWO ESSENTIALLY
? INDEPENDENT PARTS, A GATE BY GATE TEST OF THE
? HARDWARE AND A RELIABILITY TEST. SINCE THE GATE
? BY GATE TEST OR DIAGNOSTIC ASSUMES THAT THERE
? MAY BE A MALFUNCTION, IT REQUESTS OPERATIONAL
? PARAMETERS FROM THE OPERATOR. THE RELIABILITY TEST
? HOWEVER ASSUMES THAT THE HARDWARE IS WORKING
? PROPERLY AND THEREFORE IT TESTS THE HARDWARE FOR THE
? NECESSARY PARAMETERS.
?
? THE DIAGNOSTIC PORTION OF THE PROGRAM REQUESTS
? PARAMETERS FOR THE NUMBER OF THE FIRST TELETYPE
? LINE, LAST TELETYPE LINE, NO. OF LEVELS USED, DEVICE
? CODE, AND THE NO. OF STOP RAUDS, IF REQUIRED.
? THIS PROGRAM MAY BE USED FOR SYSTEMS WITH
? ONE OR MORE BOARDS. IF ALL LINES OPERATE WITH
? THE SAME NUMBER OF LEVELS AND STOP RAUDS,
? PARAMETERS ARE ONLY REQUIRED AT THE START OF
? THE PROGRAM. IF DIFFERENT BOARDS HAVE DIFFERENT
? PARAMETERS IT IS NECESSARY TO TEST A BOARD AT A
? TIME, ENTERING NEW PARAMETERS EACH TIME. AT LEAST
? TWO LINES MUST BE ENTERED AND IF LESS THAN FOUR OR
? LESS THAN THE WHOLE SYSTEM IS ENTERED TEST A13 WILL
? CALL AN ARTIFICIAL ERROR.
?
? THE RELIABILITY PORTION OF THE PROGRAM TRANSMITS
? A SERIES OF RANDOM NUMBERS ON EACH OF THE ACTIVE
? LINES IN THE SYSTEM. THE RECEIVED AND TRANSMITTED
? CHARACTERS ARE COMPARED FOR PROPER SYSTEM OPERATION.
? THIS PART OF THE PROGRAM CAN BE STARTED IN THREE
? WAYS. EITHER THE SYSTEM CAN BE MADE TO DETERMINE
? ALL ACTIVE LINES AND THESE CAN BE TESTED, THE
? OPERATOR CAN SPECIFY WHICH LINES ARE TO BE TESTED,
? OR THOSE LINES TESTED IN A PREVIOUS RUN CAN
? BE RETESTED.
?
? IF THE NECESSARY PARAMETERS ARE NOT KNOWN
? FOR THE DIAGNOSTIC PART OF THE PROGRAM, IT
? IS POSSIBLE TO START AT ADDRESS 000004.
? THE PROGRAM WILL PRINT OUT THE PARAMETERS
? FOR ALL OF THE WORKING LINES. THIS INFORMATION
? CAN THEN BE ENTERED AFTER THE PROGRAM IS
? STOPPED AND RESTARTED AT ADDRESS 000002.
?
? MACHINE REQUIREMENTS
? 2.1 NOVA (EXCEPT MICRO)/ECLIPSE PROCESSOR
? 2.2 4K READ/WRITE MEMORY
? 2.3 CONSOLE TELETYPE
? 2.4 ONE OR MORE TYPE 4060 MULTIPLEXERS
? 2.5 TEST PLUG (SEE SECTION 7.)

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SWITCH SETTINGS
DIAGNOSTIC STARTING ADDRESS=000002
RELIABILITY (USING LAST LINES TESTED)=000003
" (DETERMINES ACTIVE LINES)=000004
" (CENTER LINE NUMBERS) =000005

SWITCH 1(1) WHEN THE DIAGNOSTIC IS RESTARTED NEW
OPERATOR PARAMETERS WILL BE REQUESTED.
SWITCH 1(1) PROCEED FROM THE ERROR LOOP.
SWITCH 2(1) INHIBIT PRINTING ON CONSOLE TELETYPE.
SWITCH 3(1) PRINT THE FAILURE RATE.
SWITCH 5(1) OUTPUT TO LPT

DIAGNOSTIC OPERATING PROCEDURE

:NOTE: WHEN IT IS DESIRED TO START THE PROGRAM AT A GIVEN
ADDRESS AND ALSO HAVE A GIVEN CONFIGURATION OF DATA
SWITCHES SET UPON STARTING,00 THE FOLLOWING:

ENTER STARTING ADDRESS IN DATA SWITCHES,PRESS "EXAMINE",
RESET ALL DATA SWITCHES EXCEPT THOSE DESIRED TO BE ON,
PRESS "CONTINUE".

:4.1 DISCONNECT THE COMMUNICATIONS EQUIPMENT AND IN-
SERV THE TEST PLUG INTO THE CONNECTOR ON THE
NOVA BACK PANNEL.
:4.2 LOAD THE PROGRAM VIA THE BINARY LOADER OR DTOS
:4.3 SET SWITCHES TO 000002
:4.4 PRESS START
:4.5 THE PROGRAM WILL REQUEST THE DEVICE CODE. THE
OPERATOR SHOULD TYPE THE DEVICE CODE (30 OR 70)
CORRESPONDING TO HIS MULTIPLEXER.
THE PROGRAM WILL REQUEST THE NUMBER OF THE FIRST
TELETYPE LINE. THE OPERATOR SHOULD TYPE ,IN DECI-
MAL, THE NUMBER OF THE FIRST TELETYPE LINE.
THE PROGRAM WILL REQUEST THE NUMBER OF THE LAST
TELETYPE LINE. THE OPERATOR SHOULD TYPE IN THE
NUMBER OF THE LAST LINE IN THE SYSTEM.
THE PROGRAM WILL REQUEST THE NUMBER OF LEVELS
USED. THIS REFERS TO THE NUMBER OF BAUDS
CONTAINED IN ONE WORD, NEGLECTING START AND STOP
BAUDS. THE OPERATOR SHOULD TYPE ,IN DECIMAL
THE NUMBER OF CODE BAUDS PER WORD.
THE PROGRAM WILL REQUEST THE NO OF STOP BAUDS IF
THE NUMBER OF LEVELS IS NOT '5'. THE OPERATOR SHOULD
THEN TYPE 1 OR 2 DEPENDING UPON THE JUMPEKS
INSTALLED ON HIS BOARD.
THE PROGRAM WILL REQUEST THE ITO BAUD RATE, IF THERE
IS NO REAL TIME CLOCK IN THE SYSTEM.
THE OPERATOR WILL RESPOND WITH A DECIMAL VALUE OF
THE BAUD RATE OF THE CONSOLE DEVICE BEING USED
FOR OPERATOR INTERFACE. E.G., RESPOND "110" FOR
ASR33, "4800", "2400", ETC. FOR DISPLAY.

:4.6 EXECUTION OF THE PROGRAM WILL NOW BEGIN.
:4.7 THE PROGRAM WILL NOT REQUEST OPERATOR PARA-
METERS UPON RESTARTING UNLESS SWITCH 0 IS SET.
:4.8 IF NO ERRORS ARE DETECTED THE INTERVAL BETWEEN
QTY CLOCK PULSES WILL BE PRINTED EVERY
PROGRAM PASS, THE TIME PRINTED IS ONLY AN
APPROXIMATE VALUE AND IS DEPENDENT ON THE
CONSOLE TELETYPE AS A REFERENCE.
:NOTE: THE TIME PRINTED EQUALS THE NUMBER OF
MICRO-SECONDS NEEDED TO TRANSMIT A BAUD
REFERENCED TO THE CONSOLE TELETYPE. TO CONVERT
THIS VALUE INTO THE BAUD RATE, DIVIDE THIS
NUMBER INTO ONE MILLION.
: WHILE THE ACTUAL VALUE OF THIS PARAMETER
GIVES AN INDICATION OF THE PROPER CRYSTAL
FREQUENCY AND DIVIDER OPERATION OF GREATER
IMPORTANCE IS THE FACT THAT THERE ARE NO LARGE
VARIATIONS IN THE MEASURED VALUE VERSUS TIME SINCE
THIS WOULD INDICATE INTERMITTENT OPERATION OF A PART.

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DIAGNOSTIC ERROR DESCRIPTION

IF A MALFUNCTION IS DETECTED THE PROGRAM WILL HALT AT LOCATION "ERR1+1". THE OPERATOR MAY CHANGE SWITCH SETTINGS AT THIS TIME IF DESIRED. IF SWITCHES 1 AND 2 ARE ZERO PRESSING CONTINUE WILL CAUSE A TVY PAINTOUT OF THE ERROR LOCATION. THE ROUTINE WILL ENTER A LOOP SUITABLE FOR SCOPING THE MALFUNCTION.

WHEN THE PROGRAM IS IN A SCOPE LOOP, SETTING SWITCH 3(1) WILL CAUSE THE FAILURE RATE TO BE PRINTED. SETTING SWITCH 1(1) WILL CAUSE THE PROGRAM TO PROCEED TO THE NEXT TEST.

DIAGNOSTIC THEORY OF OPERATION

THIS PROGRAM PERFORMS A GATE BY GATE CHECK OF THE QTY INTERFACE LOGIC. THE DATA LINE TRANSMITTERS AND RECEIVERS ARE CHECKED IN THE FOLLOWING MANNER. THE PROGRAM SENDS INFORMATION TO THE OUTPUT DRIVERS. THE TEST PLUG PROVIDES A RETURN PATH TO THE DIA INPUTS. THE PROGRAM IS THUS ABLE TO CHECK ON THE INPUT'S DATA SENT TO THE OUTPUT. THE OUTPUT MAY BE CONNECTED TO THE 20 MILLIAMPERE OR EIA STANDARD LEVEL.

MISC

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THE TEST PLUG FOR EIA LEVELS CONSISTS OF A WIRE CONNECTING LINE 0 OUTPUT TO LINE 0 INPUT, ETC.. THE TEST PLUG FOR 20 MA LINES MUST CONTAIN A TRANSISTOR INVERTER IN EACH LINE. THE SEQUENCE IS REPEATED FOR EACH LINE IN THE SYSTEM.

JUMPER CONNECTIONS

LEVELS	STOP BAUDS	WIRES NEEDED
5	1.5	17,28
6	1	13-17-29
7	1	13-17-18-29
8	1	12-16-18-29
1	2	12-15-16-18-29
2	2	12-13-15-16-19-29
2	2	12-13-14-15-16-19-29

10006 .MAIN

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RELIABILITY OPERATING INSTRUCTIONS

IF THE DIAGNOSTIC TEST HAS BEEN RUN, THE PROGRAM IS READY TO RUN. IF NOT REMOVE THE COMMUNICATIONS EQUIPMENT AND INSERT THE TEST PLUG. LOAD THE PROGRAM VIA THE BINARY LOADER. SET SWITCHES AND PRESS START.

RELIABILITY STARTING ADDRESSES

STARTING ADDRESS=000003- USE LINES LAST TESTED, THE PROGRAM PRINTS THE DEVICE CODE AND STARTS.

STARTING ADDRESS=000004- CHECKS FOR ACTIVE LINES AND PRINTS THE LINE NUMBER, CODE LEVEL, NO. OF STOP BITS, AND BAUD RATE FOR EACH LINE AVAILABLE. IT THEN PRINTS THE DEVICE CODE.

STARTING ADDRESS=000005- PROGRAM PRINTS "LINE". TYPE A LINE NUMBER TO BE TESTED FOLLOWED BY A CARRIAGE RETURN. PROGRAM RESPONDS WITH LINE NUMBER, CODE LEVEL, NO. OF STOP BITS, AND BAUD RATE, THEN ASKS FOR ANOTHER LINE. TYPE (ESC) TO START THE PROGRAM. IT THEN PRINTS THE DEVICE CODE.

REMARKS

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MANY DIFFERENT BAUD RATES CAN BE USED DEPENDING UPON THE CRYSTAL AND JUMPER CONFIGURATION. THE PROGRAM MEASURES THE TRANSMISSION TIME AND COMPARES IT TO THE CONSOLE TELETYPE TRANSMISSION TIME TO DETERMINE THE BAUD RATE. ALLOW +-5% TOLERANCE IN CALCULATED VALUES.

THE BAUD RATE AS DETERMINED FROM THE TRANSMISSION TIME IS DEPENDENT UPON THE CODE LEVEL AND THE NUMBER OF STOP AND START UNITS. THE TABLE BELOW DISPLAYS ALL POSSIBLE COMBINATIONS OF CODE LEVELS AND UNITS.

CODE LEVEL	# UNITS
5	7.5
6	8
7	9
8	10
9	10
10	10
11	11

THE PROGRAM DETERMINES THE CODE LEVEL BY EXAMINING THE CHARACTER RECEIVED FROM A TRANSMISSION. THE NUMBER OF STOP BITS ARE DETERMINED FROM A COMPARISON OF THE TIME REQUIRED TO TRANSMIT AND THE TIME REQUIRED TO RECEIVE A CHARACTER.

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0008 .MAIN
**00000 TOTAL ERRORS, 00000 PASS 1 ERRORS

10007 .MAIN
01 RELIABILITY PROGRAM DESCRIPTION
02 ;
03 ;
04 ; UN STARTING, ALL LINES TO BE TESTED ARE GIVEN
05 ; A RANDOM CHARACTER TO TRANSMIT. WITH EACH
06 ; SUCCESSFUL "RECEIVE DONE" INTERRUPT A DIFFERENT
07 ; RANDOM NUMBER IS SELECTED AND OUTPUTTED TO
08 ; THAT LINE. EACH "RECEIVE DONE" INTERRUPT IS
09 ; VERIFIED BY LINE NUMBER/RANDOM CHARACTER
10 ; COMBINATION. THE PROGRAM RUNS INDEFINITELY.
11 ;
12 ; A COUNT OF THE TRANSMITTED AND RECEIVED
13 ; CHARACTERS FOR EACH LINE CAN BE REQUESTED
14 ; BY PRESSING THE TELETYPE SPACE BAR WHILE
15 ; THE PROGRAM IS RUNNING. ALL COUNTS ARE
16 ; MODULO 32768. (1/2 OF 1 16 BIT WORD/COUNTER)
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;11.
; RELIABILITY PROGRAM ERRORS
; AN IDLE LOOP WATCH DOG TIMER IS USED TO INSURE
; THAT NO LINE BEING TESTED HANGS UP SUCH THAT
; DATA TRANSMISSION STOPS. IF THIS OCCURS THE
; LINE NUMBER IS PRINTED ALONG WITH AN ERROR
; MESSAGE AND TRANSMISSION IS TRIED AGAIN.
;
; DATA ERRORS AT THE RECEIVER RESULT IN A PRINTOUT
; OF THE LINE NUMBER AND THE GOOD & BAD CHARACTERS.
; THE PROGRAM CONTINUES REPEATEDLY SENDING THE FAILING
; CHARACTER (SCOPE LOOP) FOR THE FAILING LINE.
; ALL OTHER RANDOM TESTING CONTINUES. SET SW1 TO "1"
; TO RESUME RANDOM TESTING ON "ALL" LINES BEING
; TESTED. WHILE IN A SCOPE LOOP SET SW3 TO "1"
; TO GET A PRINTOUT OF THE FAILURE RATE. (I.E. 89%).
;
.EOT

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