

DUP11

OVERLAY FOR INTER TEST
MD-11-DZDPF-B

EP DZDPF B DL

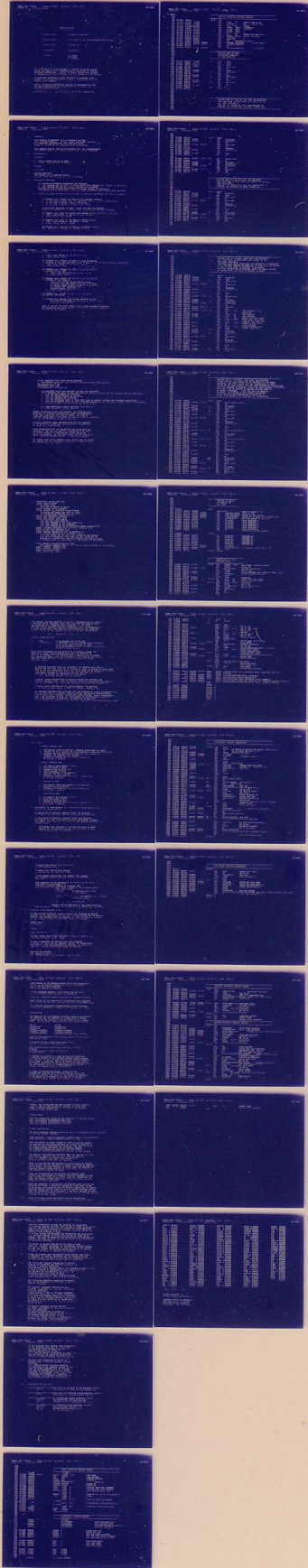
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IDENTIFICATION

PRODUCT CODE: MATNDEC-11-DZDPF-B-D

PRODUCT NAME: DUP11 OVERLAY FOR INTERPROCESSOR TEST PROGRAM

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MAINTAINER: DIAGNOSTICS

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1.0 ABSTRACT.

THIS PROGRAM IS DESIGNED AS A MAINTENANCE AID FOR FIELD SERVICE PERSONEL. IT WILL VERIFY THE PROPER OPERATION OF A COMPLETE COMMUNICATION LINK FROM ONE PDP-11 SYSTEM TO ANOTHER OR TO A COMMUNICATION TEST CENTER.

THIS PROGRAM MUST BE USED IN CONJUNCTION WITH THE INTERPROCESSOR TEST PROGRAM(DZITP) ON A PDP-11 SYSTEM WITH A DL-11 INTERFACE.

2.0 REQUIREMENTS.

2.1 EQUIPMENT

- A. PDP-11 SYSTEM WITH 4K OF CORE.
- B. A DUP11 COMMUNICATION INTERFACE.

2.2 STORAGE.

4K OF CORE

3.0 LOADING PROCEDURE

THIS PROGRAM IS IN ABSOLUTE FORMAT.
THE ABS LOADER MUST BE USED TO LOAD THE PROGRAM.

4.0 OPERATING PROCEDURES.

- A. TWO METHODS OF ENTERING PARAMETERS ARE PROVIDED
 - 1. LOAD ADDRESS 200 AND START TO ENTER PARAMS FROM CONSOLE TTY, PROCEED TO SECTION B.
 - 2. LOAD ADDRESS 200 AND SET SWITCH REGISTER BIT 15 BEFORE STARTING TO ENTER PARAMS FROM CONSOLE SWITCHES, PROCEED TO SECTION C.
- *THE PROGRAM MAY BE RESTARTED AT LOC 200 (ONCE PARAMETERS HAVE ALREADY BEEN SELECTED)

B. CONSOLE DIALOGUE PARAMETER INPUT (CURRENT VALUES FOR PARAMETERS ARE FOUND IN OVERLAY)

- 1. THE PROGRAM WILL TYPEOUT THE NAME OF THE VARIABLE OVERLAY.
 - A. IF YOU WISH TO SETUP JUST THE INDICATED OVERLAY, TYPE A CARAGE RETURN
 - B. IF YOU WISH TO SETUP A DN11, TYPE IN DN.
 - C. IF YOU WISH TO SETUP A DN1100, TYPE IN DMB.

IF DN OR DMB WAS TYPED IN STEP 1 ABOVE THEN THE BUS ADDRESS, VECTOR ETC. REFERED TO IN STEPS 2 THRU 7, PERTAIN TO THE DN11 OR DMB.

- 2. THE PROGRAM WILL TYPE THE DEFAULT BUS ADDRESS OF THE INTERFACE UNDER TEST.
 - A. TYPE A CAR. RETURN TO USE DEFAULT BUS ADDRESS
 - B. TYPEIN ACTUAL BUS ADDRESS
- 3. THE PROGRAM WILL TYPE OUT THE DEFAULT VECTOR ADDRESS
 - A. TYPE A CAR. RETURN TO USE DEFAULT ADDRESS
 - B. TYPEIN ACTUAL VECTOR ADDRESS

- 4. THE PROGRAM WILL TYPE OUT THE DEFAULT INTERFACE PRIORITY
NOTE: 200=PRI0 4, 240=PRI0 5, 300=PRI0 6, ETC.

- A. TYPE A CAR. RETURN TO USE DEFAULT VALUE
- A. TYPEIN ACTUAL VALUE
- 5. THE PROGRAM WILL TYPEOUT THE DEFAULT VALUE OF PARAM01
IF REQUIRED BY THE ISR. (SEE SECT. 10.0 IN OVERLAY LISTING FOR PARAMETER DESCRIPTION)
 - A. TYPE A CAR. RETURN TO USE DEFAULT VALUE
 - A. TYPEIN ACTUAL VALUE
- 6. THE PROGRAM WILL TYPEOUT THE DEFAULT VALUE OF PARAM02
IF REQUIRED BY THE ISR.
 - A. TYPE A CAR. RETURN TO USE DEFAULT VALUE
 - A. ENTER ACTUAL VALUE
- 7. THE PROGRAM WILL TYPEOUT THE DEFAULT VALUE OF PARAM03
IF REQUIRED BY THE OVERLAY.
 - A. TYPE A CAR. RETURN TO USE DEFAULT VALUE
THE DN-11 WILL USE PARAM 04 AS THE # TO DIAL.
IF USING A MODEM WITHOUT AUTOMATIC HANDSHAKING,
THE NUMBER MUST TERMINATE WITH A
"END-OF-NUMBER" CHARACTER (#).
 - B. ENTER ACTUAL VALUE.
- 8. THE PROGRAM WILL RETURN TO STEP 01 IF THIS SETUP
WAS FOR DN11 OR DN1100.
- 9. THE PROGRAM WILL REQUEST THAT SWITCH REGISTER BE SFT.
 - A. SETUP SWITCH REGISTER AS SPECIFIED IN STEP 0.
AND TYPE A CAR. RETURN.

NOTE: IF ANY OF THE ABOVE ITEMS 2 THRU 7 WERE CHANGED BY ENTERING
NEW VALUES, THE NEW VALUE BECOMES THE DEFAULT VALUE FOR SUBSEQUENT
RESTARTS OF THE PROGRAM.

- C. MANUAL PARAMETER INPUT FROM SWITCH REGISTER
1. THE PROGRAM HALTS FOR ISR (INTERFACE SERVICE ROUTINE) SPECIFICATION
SWR10=SETUP DN-11B ISR
SWR13=SETUP DN-11 ISR
SWR=000000=SETUP VARIABLE ISR
 2. THE FOLLOWING HALTS ARE REPEATED FOR EACH ISR SPECIFIED.
SETUP SEQUENCE IS: DN11, DN11-00 THEN VARIABLE OVERLAY. (EACH ENTRY SET SWITCHES THEN HIT CONTINUE.)
 - A. HALT FOR BUS ADDRESS OF INTERFACE
 - B. HALT FOR VECTOR ADDRESS OF INTERFACE
 - C. HALT FOR PRIORITY OF INTERFACE
 - D. HALT FOR INTERFACE PARAM 01 (SEE SECT. 10.0 IN OVERLAY LISTING FOR PARAMETER DESCRIPTION)
 - E. HALT FOR INTERFACE PARAM 02 (DN11 AND DN00 PARAMETERS ARE DISCUSSED IN SECT. 10.0 OF THE MONITOR.
 - F. GO BACK TO STEP A IF THIS SETUP WAS FOR DN OR DN0.
 3. HALT FOR OPERATIONAL SWITCH SETTINGS. (SEE STEP D.)
 - A. PRESS CONTINUE TO START TESTING

BEFORE ATTEMPTING TO RUN THIS PROGRAM, THE OPERATOR MUST ACCERTAIN THE COMPLETE COMMUNICATION LOOP AND PROCEDURES TO BE USED, INCLUDING THE TYPE OF MODEMS, THE TYPE OF INTERFACE BEING USED AT THE OTHER CPU AND THE MODES OF OPERATION, DATA AND PARAMETERS TO BE USED AT EACH CPU.

THIS WILL REQUIRED VOCAL COMMUNICATION WITH THE OPERATOR AT THE OTHER CPU UNLESS ITS CONFIGURATION AND OPERATION ARE FIXED AS A TTY CENTER.

AFTER DETERMINING THAT THE EQUIPMENTS ARE COMPATIBLE AND AGREEING ON THE MODE AND VARIABLE PARAMETERS TO BE USED, THE SYSTEM WHICH IS TO RECEIVE DATA FIRST SHOULD BE LOADED AND STARTED. IF THE MODEM BEING USED ON THIS SYSTEM HAS AN AUTOMATIC ANSWER FEATURE, IT SHOULD BE ENABLED.

THE SYSTEM WHICH IS TO TRANSMIT FIRST SHOULD THEN BE LOADED AND STARTED AND THE CONNECTION ESTABLISHED EITHER MANUALLY OR AUTOMATICALLY (VIA DN-11).

D. OPERATIONAL SWITCH SETTINGS.

- SW15=1 HALT ON ERROR
- SW14=1 SINGLE PASS
 - SW14 HAS NO EFFECT IF SWP4=0
- SW13=1 INHIBIT ERROR TYPEOUTS
- SW12=1 INHIBIT ALL TYPEOUTS EXCEPT ERRORS
 - IF SW12=0 AND SWP4=1 END PASS IS TYPED
 - AND TRANSMITTED/RECEIVED DATA IS TYPED.
- SW11=1 USE PREVIOUSLY SPECIFIED DATA
- SW1P=1 DATA SELECT (WITH SWP4)
- SWP4=1 DATA SELECT (WITH SW1P)
 - 00=1 GET DATA FROM OPERATOR
 - 01=1 TEST MESSAGE 01 (SA QUICK BROWN FOX)
 - 10=1 TEST MESSAGE 02 (SB NUMERICS)
 - 11=1 TEST MESSAGE 03 (SC CONTEST/QUICK BROWN FOX/NUMERICS)
- SWP8=1 TRANSMIT RECEIVED DATA (INTERNAL LOOPBACK MODE)
- SWP7=1 DO NOT TEST RECEIVED DATA
- SWP6=1 MONITOR TRANSMITTED DATA ON CONSOLE TTY.*
- SWP5=1 MONITOR RECEIVED DATA ON CONSOLE TTY.*
 - * IN MANY CASES, NOT ALL DATA WILL APPEAR ON THE CONSOLE
 - TTY. THIS IS ESPECIALLY TRUE WHEN THE COMM INTERFACE IS
 - RUNNING AT A FASTER BAUD THAN THE CONSOLE, BUT EVEN AT EQUAL
 - OR SLOWER BAUDS, ALL CHARACTERS MAY NOT APPEAR ON THE CONSOLE.

- SWP4=1 RETURN TO MONITOR FOR END PASS
 - WHEN SWP4=0 PROGRAM LOOPS IN THE OVERLAY NEVER RETURNING TO THE MONITOR.
- SWP3=1 INTERNAL LOOPBACK MODE
- SWP2=1 EXTERNAL LOOPBACK MODE
- SWP1=1 ONE-WAY-IN MODE
- SWP0=1 ONE-WAY-OUT MODE

THIS PROGRAM HAS BEEN MODIFIED TO RUN ON A PROCESSOR WITH OR WITHOUT A HARDWARE SWITCH REGISTER. WHEN FIRST EXECUTED THE PROGRAM TESTS THE EXISTENCE OF A HARDWARE SWITCH REGISTER. IF NOT FOUND A SOFTWARE SWITCH REGISTER LOCATION (SWREG=LOC. 174) IS DEFAULTED TO. IF THIS IS THE CASE, UPON EXECUTION THE CONTENTS OF THE SWREG ARE DUMPED IN OCTAL ON THE CONSOLE TTY AND ANY CHANGES ARE REQUESTED

(IE) SWR=XXXXXXXX NEW=

POSSIBLE RESPONSES ARE:

1. <CR> IF NO CHANGES ARE TO BE MADE
2. 6 DIGITS 0-7 TO REPRESENT IN OCTAL THE NEW SWITCH REGISTER VALUE (LAST DIGIT FOLLOWED BY <CR>).
3. ^U TO ALLOW REENTERING VALUE IF ERROR IS COMMITTED KEYING IN SWREG VALUE.

BUILT INTO THE PROGRAM IS THE ABILITY TO DYNAMICALLY CHANGE THE CONTENTS OF SWREG DURING PROGRAM EXECUTION. BY STRIKING ^G (CNTRL G) ON CONSOLE TTY THE OPERATOR SETS A REQUEST FLAG TO CHANGE THE CONTENTS OF SWREG, WHICH IS PROCESSED IN KEY AREAS OF THE PROGRAM CODE (IE) ERROR ROUTINES, AFTER HALTS END OF PASS, AND OTHER APPLICABLE AREAS.

IF OPERATOR SPECIFIED DATA WAS INDICATED, THE PROGRAM WILL TYPE A REQUEST FOR THE DATA. DATA MAY BE ENTERED AS ASCII CHARACTERS OR OCTAL CODE. TYPE IN THE DATA TERMINATED WITH A CR. OCTAL CODE MAY BE ENTERED BY TYPING AN ^ (UP ARROW) FOLLOWED BY THE OCTAL CODE (IN THE RANGE 000 TO 377) SEPERATED BY SPACES AND TERMINATED BY ^ (UP ARROW).
I.E. ARCD^ 000 123 377^ EPG (CAR,RETURN)

A TYPICAL SWITCH SETTING FOR HALF-DUPLEX=003150 THIS SETTING USES INTERNAL LOOPBACK MODE, LOOPS IN OVERLAY, MONITORS TRANSMITTED AND RECEIVED DATA ON THE CONSOLE TTY, AND TESTS RECEIVED DATA USING TEST MESSAGE #3.

A TYPICAL SWITCH SETTING FOR FULL-DUPLEX=003144 THIS SETTING IS THE SAME AS ABOVE EXCEPT IT USES THE EXTERNAL LOOPBACK MODE.

ALL STANDARD MESSAGES (TEST MESSAGES 1-3) ARE PRECEDED BY 2 FILL CHARACTERS(177), AND ARE FOLLOWED BY A CR(015), LF(012), RECEIVE TERMINATING CHARACTER(001), 4 FILL(177), AND A TRANSMIT TERMINATING CHARACTER(000). DURING TRANSMISSION, WHEN A 000 CHARACTER IS SEEN THE TRANSMISSION IS STOPPED. DURING RECEPTION, WHEN A 001 CHARACTER IS RECEIVED, THE RECEIVER IS SHUT OFF. IF THE MESSAGE WAS INPUTED BY THE OPERATOR, THE TERMINATING CHARACTERS ARE ADDED.

TEST MODES

INTERNAL LOOPBACK MODE

1. THE OVERLAY WAITS TO RECEIVE A MESSAGE (TERMINATED BY <001>)
2. VERIFIES THE DATA AGAINST THE DATA SELECTED BY SW09 AND SW10 (SW7=0)
3. TRANSMIT THE DATA SELECTED BY SW09 AND SW10 (SW8=0) OR TRANSMIT THE RECEIVED DATA (SW8=1)
4. RETURNS TO MONITOR FOR "END PASS" (SW4=1) OR GO TO STEP 1. (SW4=0)

EXTERNAL LOOPBACK MODE

1. THE OVERLAY SETS REQUEST TO SEND
2. WAIT FOR CLEAR TO SEND
3. TRANSMITS THE SELECTED DATA
4. RESETS REQUEST TO SEND
5. WAIT FOR MESSAGE TO BE RECEIVED
6. VERIFIES THE DATA (SW07=0)
7. RETURNS TO MONITOR FOR "END PASS". (SW04=1) OR GO TO STEP 1 (SW04=0)

ONE-WAY-IN MODE

1. THE OVERLAY WAITS FOR MESSAGE TO BE RECEIVED.
2. VERIFIES THE DATA (SW07=0)
3. RETURNS TO MONITOR FOR "END PASS" (SW04=1) OR GO TO STEP 1 (SW04=0)

ONE-WAY-OUT MODE

1. THE OVERLAY SETS REQUEST TO SEND
2. WAITS FOR CLEAR TO SEND
3. TRANSMITS SELECTED DATA
4. RETURNS TO MONITOR FOR "END PASS". (SW04=1) OR GO TO STEP 1 (SW04=0)

- E. THE OVERLAY IS THEN ENTERED AND A CONNECTION ESTABLISHED EITHER MANUALLY OR AUTOMATICALLY.

IF ONE-WAY-IN OR INTERNAL LOOPBACK MODES ARE SELECTED, THE OVERLAY WILL SET DATA TERMINAL READY AND WAIT FOR DATA.

IF ONE-WAY-OUT OR EXTERNAL LOOPBACK MODES WERE SELECTED, THE OVERLAY WILL SET DATA TERMINAL READY AND REQUEST TO SEND. THE OVERLAY WILL THEN WAIT FOR CLEAR TO SEND BEFORE ATTEMPTING TO TRANSMIT DATA.

THE PROGRAM WILL PRINTOUT A "WAITING FOR CLEAR TO SEND" MESSAGE AND THE CONTENTS OF THE XMIT CSR EVERY 60 SECS. UNTIL CLEAR TO SEND IS ASSERTED.

F. IF SW0000 THE OVERLAY WILL CONTINUE TO TRANSMIT/RECEIVE DATA.

IF SW0001 THE OVERLAY WILL RETURN TO THE MONITOR AND TYPE "END PASS".

IF BOTH SW0001 AND SW1001, THE PROGRAM WILL REQUEST NEW INTERFACE PARAMS AFTER ONE PASS OF THE SELECTED TEST MODE.

TEST EXECUTION MAY BE INTERRUPTED BY TYPING THE FOLLOWING CHARACTERS ON THE CONSOLE TTY.

LINE FEED = RESTART PROGRAM AT LOCATION 200.

QUESTION MARK = PRINTOUT FIRST 8 WORDS OF INPUT BUFFER.(ASCII)

THEN TYPE EITHER:

*XXXXXXX TO PRINTOUT THE 8 WORDS AT LOC XXXXXX.

*0XXXXXX TO PRINTOUT THE 16 BYTES AFTER LOC XXXXXX.

*C TO CONTINUE

PROGRAM MUST BE RESTARTED AT 200 AFTER PRINTING.
CARRIAGE RETURN = RESTART AT REQUEST FOR NEW OPERATIONAL SWITCHES.

5.0 PROGRAM AND/OR OPERATOR ACTION

IF THE OPERATOR WISHES TO MANUALLY EXAMINE THE TRANSMIT OR RECEIVE BUFFERS, DO THE FOLLOWING; TO FIND THE STARTING ADDRESS OF THE RECEIVE BUFFER, LOAD ADDRESS 11020 AND EXAMINE. TO FIND THE STARTING ADDRESS OF THE TRANSMIT BUFFER, LOAD ADDRESS 11022 AND EXAMINE.

5.1 NORMAL HALTS
SEE SECTION 4.

6.0 ERRORS

6.1 ERROR REPORTING

THE ONLY ERROR REPORT FROM THE CONTROL PROGRAM OCCURS IF THE INTERFACE SPECIFIED IS NOT LOADED.

IF DATA IS RECEIVED AND SWITCH 7 (NO DATA COMPARE) IS RESET, THE DATA WILL BE COMPARED AGAINST THE PRESELECTED DATA AFTER A LINE FEED CHARACTER IS RECEIVED. IF THERE IS A MISMATCH, THE FOLLOWING ERROR REPORT IS PRINTED:

RECEIVED DATA=RRRRRR
DATA SHOULD BE TTTTTT
DATA COMPARE ERROR; BAD DATA=RRR GOOD DATA=GGG

H1

WHERE RRRRRR IS THE RECEIVE BUFFER (UP TO 512 CHARACTERS)
TTTTT IS THE TRANSMIT BUFFER (UP TO 512 CHARACTERS)
RBR IS THE BAD DATA CHARACTER
GGG IS THE GOOD DATA CHARACTER

IF THE INTERFACE DETECTS A DATA ERROR, THE FOLLOWING
WILL BE PRINTED BEFORE THE DATA IS COMPARED:

THERE WAS A RECEIVER ERROR, RECEIVER DATA REGISTER =XXXXXX

WHERE XXXXXX IS THE CONTENTS OF THE RECEIVER DATA REGISTER
THE LOW BYTE IS THE DATA, AND THE HIGH BYTE IS THE ERROR BITS.

IF A RECEIVE TERMINATING CHARACTER (RBI) IS NOT DETECTED
WITHIN 512 CHARACTERS A "BUFFER FULL" PRINTOUT WILL OCCUR.

7.0 RESTRICTIONS

THE OPERATION OF THIS PROGRAM REQUIRES COORDINATION BETWEEN
THE OPERATOR AND THE OPERATOR OF ANOTHER PDP-11 SYSTEM
UNLESS ONE OF THE SYSTEMS IS ALWAYS OPERATING IN A FIXED
MODE. THE FOLLOWING TABLE LISTS THE VALID COMBINATIONS:

CPU #1	CPU #2
ONE-WAY-OUT	ONE-WAY-IN
ONE-WAY-IN	ONE-WAY-OUT
EXTERNAL-LOOPBACK	INTERNAL-LOOPBACK
INTERNAL-LOOPBACK	EXTERNAL-LOOPBACK
EXTERNAL-LOOPBACK	EXTERNAL-LOOPBACK (FULL DUPLEX)

WHEN THE COMMUNICATION LINK INVOLVES MODEMS THE FOLLOWING
RESTRICTION APPLIES:

IF RUNNING IN FULL DUPLEX MODE BOTH SYSTEMS
MUST BE IN EXTERNAL LOOP BACK MODE.

BOTH SYSTEMS SHOULD BE RUNNING IDENTICAL ROUTINES.

EXAMPLE:

SWITCHES 14,13,7,4 SHOULD BE THE SAME
ON BOTH CPU S

IF PROGRAM IS WAITING IN A SCAN ROUTINE AND TYPES OUT
A "WAITING MESSAGE", IF AN INCOMING MESSAGE STARTS DURING
THE TYPE OUT, IT WILL BE LOST BECAUSE THE TYPEOUT PRIORITY
IS AT LEVEL 7. THIS WILL RESULT IN OVERRUN OR SILO OVER-
RUN ERRORS, DEPENDING ON THE DEVICE. TO AVOID THIS SITUATION
RUN WITH SWITCH 13 UP. IF OVERRUN DOES OCCURE DURING A
TYPEOUT THE PROGRAM SHOULD BE RESTARTED.

IF USING AN ASYNCHRONOUS DEVICE, MODEMS AND THE
MAYNARD TEST STATION AND INITIALIZE DOES NOT CLEAR THE
CONNECTION (EXAMPLE THE DJ11) IF THE PROGRAM IS RESTARTED
IN THE MIDDLE OF A MESSAGE AT LOC 204 OR BY HITTING CR
AN IMMEDIATE ERROR MESSAGE FROM MAYNARD WILL BE RE-

CEIVED. THIS IS BECAUSE THE TEST STATION IS STILL LOOKING FOR THE REST OF THE INTERRUPTED MESSAGE. TO AVOID THIS ERROR, RESTART PROGRAM ONLY AT THE END OF THE MESSAGE CURRENTLY BEING TRANSMITTED.

8.0 MISCELLANEOUS

ITEP WAS CHECKED OUT USING THE FOLLOWING BELL TELEPHONE MODEMS.
201A (HALF-DUPLEX SYNCHRONOUS 2000 BAUD)
202C (HALF-DUPLEX ASYNCHRONOUS 1200 BAUD)
103A (FULL-DUPLEX ASYNCHRONOUS 110 BAUD)

9.0 PROGRAM DESCRIPTION

9.1 THE DUP11 INTERFACE SERVICE PARAMS ARE SETUP, AS SPECIFIED BY THE OPERATOR, BY THE ITEP CONTROL PROGRAM.

TIME: PROVIDES A MEANS OF MEASURING ELAPSED TIME. IT IS INCREMENTED EVERY SECOND BY A CLOCK INTERRUPT ROUTINE IN ITEP.

9.2 WHEN THE OVERLAY IS FIRST ENTERED BY ITEP AT LOCATION START1, THE CONTENTS OF THE SWITCH REGISTER ARE STORED IN REGISTER 0. THE MODE AND DATA SELECTIONS ARE FIXED AT THIS TIME AND CANNOT BE ALTERED WITHOUT RETURNING TO THE CONTROL PROGRAM. THE INTERRUPT VECTORS AND VARIABLES ARE THEN SETUP. THE SELECTED ROUTINE DETERMINED BY THE MODE IS THEN ENTERED

9.3 THE OVERLAY THEN LOOPS IN ROUTINES: SOWI, IF "ONE WAY IN" MODE WAS SELECTED. SOWO, IF "ONE WAY OUT" MODE WAS SELECTED. SILB, IF "INTERNAL LOOP BACK" MODE WAS SELECTED. SXLB, IF "EXTERNAL LOOP BACK" WAS SELECTED.

9.31 SOWI: IN THIS ROUTINE THE RECEIVER IS INITIALIZED AND PROGRAM LOOPS WAITING FOR THE RECEIVER TO FINISH. IF NOTHING IS RECEIVED FOR 40 SFCS A "WAITING" MESSAGE IS TYPED. WHEN THE RECEIVER IS DONE, THE PROGRAM CHECKS DATA IF SWITCHES PERMIT, AND TYPES END PASS DEPENDING ON SWITCH SETTINGS.

9.32 SOWO: THE TRANSMITTER IS INITIALIZED AND PROGRAM LOOPS WAITING FOR TRANSMITTER TO FINISH, A "WAITING" MESSAGE IS TYPED EVERY 60 SECS IF THERE IS NO ACTION. WHEN THE TRANSMITTER IS DONE, THE PROGRAM EITHER LOOPS BACK TO SOWO OR TYPES END PASS DEPENDING ON SWITCH SETTINGS.

9.33 SILB: THE RECEIVER IS INITIALIZED AND PROGRAM LOOPS WAITING FOR RECEIVER TO FINISH, A "WAITING" MESSAGE IS TYPED EVERY 60 SEC IF NO ACTION. WHEN RECEIVER IS DONE PROGRAM CHECKS DATA IF SWITCH SETTINGS PERMIT, AND END PASS IS TYPED IF SWITCH SETTINGS PERMIT. THEN THE TRANSMITTER IS INITIALIZED, A "WAITING" MESSAGE IS TYPED EVERY 60 SEC IF NO ACTION. WHEN TRANSMITTER IS DONE PROGRAM RETURNS TO START OF ROUTINE. (SILB)

9.34 SXLB: IF IN HALF DUPLEX THE TRANSMITTER IS INITIALIZED, A "WAITING MESSAGE IS TYPED EVERY 60 SEC IF THERE IS NO ACTION

WHEN THE TRANSMITTER IS DONE THE RECEIVER IS INITIALIZED
, A "WAITING" MESSAGE IS TYPED EVERY 60 SEC IF THERE IS NO ACTION.
WHEN THE RECEIVER IS DONE, DATA IS CHECKED IF SWITCH SETTINGS
PERMIT AND END PASS IS TYPED IF SWITCHES ALLOW. THE PROGRAM NOW
REPEATS CYCLE STARTING AT 8XLB.
IF IN FULL DUPLEX THE RECEIVER AND TRANSMITTER ARE INITIALIZED
, A "WAITING" MESSAGE IS TYPED EVERY 60 SEC IF THERE IS NO
ACTION. WHEN BOTH THE RECEIVER AND TRANSMITTER ARE DONE, DATA IS
CHECKED, END PASS IS TYPED AND PROGRAM LOOPS TO 8XLB DEPENDING
ON THE SWITCH SETTINGS.

- 9.4 THE RETURN TO MONITOR ROUTINE FOR END PASS AT EOP:
LOCKS OUT INTERRUPTS AND SAVES THE TRANSMITTER INTERRUPT ENABLE
BIT AND ALL GENERAL REGISTERS. IT THEN RETURNS TO THE MONITOR
TO TYPE "END PASS". THE MONITOR CHECKS SW16 IF UP IT RETURNS
TO ENTERI, OTHERWISE IT RESTARTS THE PROGRAM.
- 9.5 ENTERI IS ENTERED FROM THE MONITOR AFTER TYPING "END PASS",
IT RESTORES THE GENERAL REGISTERS AND THE TRANSMITTER CSR
AS SAVED IN EOP. THE DELAY FLAG IS SET AND PROGRAM RETURNS TO
THE SCAN ROUTINE (OWD, ONI, ILR, XLR) WHERE IT CAME FROM.
- 9.6 THE INITIALIZE TRANSMIT SUBROUTINE AT STARTX:
SETS UP THE INTERFACE AND POINTERS NECESSARY TO
INITIATE A TRANSMIT OPERATION.
AFTER SETTING "DATA TERMINAL READY" AND "REQUEST TO SEND" A CHECK
IS MADE ON PARAM2 TO DETERMINE IF HALF DUPLEX OPERATION
WAS SELECTED BY THE OPERATOR. IF IT WAS, THE
SUBROUTINE WAITS FOR CLEAR TO SEND.
A "WAITING FOR CLEAR TO SEND" PRINTOUT OCCURS
EVERY 30 SECONDS UNTIL CLEAR TO SEND IS ASSERTED.
- 9.7 THE INITIALIZE RECEIVED SUBROUTINE AT STARTR:
SETS UP THE INTERFACE AND POINTERS NECESSARY TO
RECEIVE A MESSAGE.
- 9.8 THE TRANSMIT INTERRUPT SERVICE ROUTINE,
AT XTSR:, IS ENTERED VIA TRANSMIT INTERRUPTS
FROM THE INTERFACE.
A TEST IS MADE TO SEE IF THE LAST CHARACTER
TRANSMITTED WAS A NULL (ALL ZEROS) CHARACTER.
IF IT WAS; THE TRANSMIT LOGIC IN THE INTERFACE
IS RESET AND THE TRANSMIT COMPLETE FLAG IS SET.
AT XTSR:; THE NEXT CHARACTER IS TRANSMITTED
AND PRINTED ON THE TTY IF THE MONITOR TRANSMIT
SWITCH IS SET.
- 9.9 THE RECEIVE INTERRUPT SERVICE ROUTINE
, AT RISR:, IS ENTERED VIA RECEIVER INTERRUPTS
FROM THE INTERFACE.
THE RECEIVED CHARACTER IS STORED IN
THE INPUT BUFFER AND PRINTED ON THE TTY IF
THE MONITOR RECEIVER SWITCH IS SET.
IF THE INPUT BUFFER IS FULL, A "BUFFER FULL"
PRINTOUT WILL OCCUR. THIS INDICATES THAT A
LINE FEED CHARACTER WAS NOT RECOGNIZED

IN THE RECEIVED DATA (WITHIN 1000 CHARACTERS).
IF THE RECEIVED CHARACTER IS A LINE FEED,
THE RECEIVED LOGIC IS RESET AND THE
RECEIVE COMPLETE FLAG IS SET.
IF A 'RECEIVE ERROR' IS DETECTED AT RISR1, THE
CSR AND DCR WILL BE SAVED AND PRINTED OUT
AFTER THE COMPLETE MESSAGE HAS BEEN RECEIVED.

9.10 THE DATA TEST SUBROUTINE AT TESTDI IS
ENTERED AFTER A COMPLETE MESSAGE HAS BEEN
RECEIVED.
IF A 'RECEIVE ERROR' HAD BEEN DETECTED,
THE CONTENTS OF THE 'RECEIVE BUFFER' AT THE
TIME THE ERROR OCCURRED WILL BE PRINTED.
THE DATA IS COMPARED UNTIL A 'ALL ZEROS'
CHARACTER IS RECOGNIZED. 'FILL' (ALL ONES)
CHARACTERS ARE IGNORED. IF A MISMATCH
IS DETECTED, THE COMPLETE CONTENTS OF THE
INPUT BUFFER AND GOOD DATA IS PRINTED.

10.0 PARAMETERS FOR THE DUP11

PARAMB1 (LOW BYTE) IS LOADED INTO THE TRANSMIT STATUS REGISTER (TXCSR).
BIT 3 HALF DUPLEX (1), DEFAULT = HALF DUPLEX (1)

PARAMB1 (HIGH BYTE) IS LOADED INTO THE RECEIVER STATUS REGISTER (RXCSR).
BIT 0 STRIP SYNC (1), DEFAULT = STRIP SYNC (1)

PARAMB2 IS LOADED INTO THE TRANSMITTER BUFFER REGISTER (TXDRUF).
BITS 0-7 SYNC CHARACTER, DEFAULT = 26 (26)
BIT 8 TRANSMIT START OF MESSAGE, DEFAULT = (1)

PARAMB3 IS LOADED INTO THE PARAMETER STATUS REGISTER (PARCSR).
BITS 0-7 SYNC CHARACTER, DEFAULT = 26
BIT 15 DECODE SELECT, DEFAULT = (1)
BIT 9 CRC INHIBIT, DEFAULT = (1)

501
 502
 503
 504
 505
 506 011000 011000
 507 011000 052500 APP120
 508 011000 160050
 509 011000 000300
 510 011010 000200
 511 011012 000410
 512 011014 000476
 513 011016 101076
 514 011020 000000
 515 011022 000000
 516 011024 000000
 517 011026 000000
 518 011030 000000
 519 011032 000000
 520 011034 000000
 600 011036 011102
 601 011040
 602 011040 000
 603 011041
 604 011041 001
 605 011042 000000
 606 011044 177570
 607 011046 177570
 608
 609
 610
 611
 612 000000
 613 100000
 614 040000
 615 020000
 616 020000
 617
 618 011050 000000
 619 011052 000000
 620 011054 000000
 621 011056 000000
 622 011060 000000
 623
 624 011062 000000
 625 011064 000000
 626 011066 000000
 627 011070 000000
 628
 629 011072 177560
 630 011074 177562
 631 011076 177564
 632 011100 177566
 633
 634 000001

```

).....
)      DUP11 INTERFACE SERVICE PARAMS
).....
          .011000
DUP11:  .ARCTZ /DUP/          IISR NAME
BA:     160050                IISB ADDRESS
RIV:    300                   IIVECTOR ADDRESS
PRIOR:  240                   IIPRIORITY
PARAM1: STPSVNIHXEN          IPARAM 01
PARAM2: T80M126             IPARAM 02
PARAM3: 101026              IPARAM 03
IRDA:   .WORD 0              IINITIAL READ DATA ADDRESS
IYDA:   .WORD 0              IINITIAL XMIT DATA ADDRESS
SETTLE: .WORD 0              ILINE SETTLE DELAY FLAG
)
B2016:  .WORD 0              IADDR OF BIN TO OCT TYPE ROUTINE
TIME:   .WORD 0              ITIMER
)
          .WORD 0            IADDR OF START OF PROGRAM
TX.TERM: .BYTE 000          ITRANSMITTER TERMINATING CHAR.
RX.TERM: .BYTE 001          IRECEIVER TERMINATING CHAR.
FLAG:    .WORD 0
SMR:     177570
DISPLAY: 177570

).....
)      CONSTANTS + WORKING STORAGE
).....
          STAT=00
          XFLG=100000          IXMIT COMPLETE FLAG
          RFLG=40000          IRCV COMPLETE FLAG
          DSFLG=20000         IDATA SET STATUS CHANGE FLAG
          RIT13=20000        IINHIBIT PRINTOUTS

SXCSR: 0                      ISAVED XMIT CSR
SRCSR: 0                      ISAVED RCV CSR
ERCSR: 0                      IRCV CSR SAVED ON ERROR
ERDBR: 0                      IRCV DATA REG SAVED ON ERROR
DSSTAT: 0                     IRCV CSR SAVED ON DS CHANGE

XCC: 0                         IXMIT CHAR COUNT
RCC: 0                         IRCV CHAR COUNT
RDA: 0                         IRCV DATA ADDR.
XDA: 0                         IXMIT DATA ADDR.

TKS: 177560
TKB: 177562
TPS: 177564
TPB: 177566

FULL.DUPLEX=000001

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MI

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638 011102 000200
639 011104 017700 177734
640 011110 002700 177400
641 011114 013702 011006
642 011120 012702 013606
643 011124 013702 011010
644 011130 012702 013510
645 011134 013702 011010
646 011140 013704 011004
647 011144 013714 011012
648 011150 013702 011014
649 011154 002702 000001
650 011160 010264 000004
651 011164 052764 000000 000004
652 011172 032764 000000 000004
653 011200 001374
654 011202 013764 011016 000002
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662 011210 005037 011032
663 011214 005037 013110
664 011220 005037 013114
665 011224 032700 000001
666 011230 001402
667 011232 000137 011406
668 011236 032700 000002
669 011242 001402
670 011244 000137 011300
671 011250 032700 000010
672 011254 001402
673 011256 000137 011504
674 011262 032700 000004
675 011266 001402
676 011270 000137 011734
677 011274 000000
678 011276 000776
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;*****
;   DUP11-X INTERFACF SERVICE ROUTINE
;*****
START:  NOP
        MOV     0SWR,  R0      ;SETUP MODE IN R0
        RLC     0177400,  R0   ;STRIP JUNK
        MOV     RIV,  R2      ;SETUP
        MOV     0RTSR,  (R2)+  ;INTERRUPT
        MOV     PRTOR,  (R2)+  ;VECTORS
        MOV     0XTSR,  (R2)+  ;
        MOV     PRTOR,  (R2)+  ;
        MOV     RA,  R4       ;SETUP BUS ADDR INDEX
        MOV     PARAM1,  0RCSR ;SETUP VARIABLES
        MOV     PARAM2,  R2    ;
        RLC     00001,  R2    ;
        MOV     R2,  XCSR(R4) ;IN CSR'S
        RIR     0MRESET,  TXCSR(R4) ;MASTER RESET
        RIT     0MRESET,  TXCSR(R4)
        RNF     IS
        MOV     PARAM3,  PARCSR(R4) ;LOAD PARCSR
;*****
;   ROUTINE USED TO GOTO
;   SUBROUTINE DEPENDENT
;   ON MODE SELECTED.
;*****
GOI     CLR     TIME
        CLR     DELAY
        CLR     STOP
        RIT     0NWO,  MODE
        RER     IS
        JMP     0OWO
181     RIT     0OWI,  MODE
        RER     2S
        JMP     0OWI
281     RIT     0TLO,  MODE
        RER     3S
        JMP     0TLO
381     RIT     0XLO,  MODE
        RER     4S
        JMP     0XLO
481     HALT
        BR     .-2
;*****
;   ROUTINE USED IF "ONE WAY IN" MODE WAS SELECTED.
;   NOTE THAT WHEN IN THIS MODE HALF DUPLEX IS THE
;   ONLY MODE AVAILABLE.
;   "ONE WAY IN" MEANS THAT ONLY THE RECEIVER IS
;   ENABLED. THE TRANSMITTER IS NEVER "TURNED ON".
;*****
  
```

A2

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691  
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693 011300 104416          SOWI:  KBDIN  
694 011302 004737 013414      JSR    PC,STARTR  
695 011306 032700 040000      180   RIT    BRPLG,STAT  
696 011312 001013          RNF    20  
697 011314 023727 011032 000100  CMP    TIME,0100  
698 011322 103771          RLO    10  
699 011324 011402          MOV    BRCSR,R2  
700 011326 016403 000004      MOV    XCSR(R4),R3  
701 011332 104001          HLT    1  
702 011334 005037 011032      CLR    TIME  
703 011340 000762          BR     10  
704  
705 011342 032777 000200 177474 280   RIT    BRDAT,OSWR  
706 011350 001002          RNF    30  
707 011352 004737 012324      JSR    PC,TESTD  
708 011356 042700 040000      380   RIT    BRPLG,STAT  
709 011362 032777 000020 177454  BIT    BRNOP,OSWR  
710 011370 001405          REQ    40  
711 011372 012737 011404 013112  MOV    BR0,BACK  
712 011400 000137 012164      JMP    EOP  
713 011404 000735      480   BR     SOWI
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724 011406 104416          SOWO:  KBDIN  
725 011410 004737 013116      JSR    PC,STARTX  
726 011414 005037 011032      CLR    TIME  
727 011420 032700 100000      180   RIT    BRPLG,STAT  
728 011424 001013          RNF    20  
729 011426 023727 011032 000100  CMP    TIME,0100  
730 011434 103771          RLO    10  
731 011436 011402          MOV    BRCSR,R2  
732 011440 016403 000004      MOV    XCSR(R4),R3  
733 011444 104001          HLT    1  
734 011446 005037 011032      CLR    TIME  
735 011452 000762          BR     10  
736 011454 042700 100000 280   RIT    BRPLG,STAT  
737 011460 032777 000020 177356  BIT    BRNOP,OSWR  
738 011466 001405          REQ    30  
739 011470 012737 011404 013112  MOV    BR0,BACK  
740 011476 000137 012164      JMP    EOP  
741 011502 000741      380   BR     SOWO
```

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```
*****  
ROUTINE USED IF "ONE WAY OUT" WAS SELECTED.  
NOTE THAT WHEN IN THIS MODE HALF DUPLEX IS THE ONLY  
MODE AVAILABLE.  
"ONE WAY OUT" MEANS THAT ONLY THE TRANSMITTER IS  
ENABLED, THE RECEIVER IS NEVER "TURNED ON."  
*****
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B2


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756 011504 104416
757 011506 004737 013414
758 011512 005037 011032
759 011516 032700 000000
760 011522 001013
761 011524 023727 011032 000100
762 011532 103771
763 011534 011402
764 011536 016403 000004
765 011542 104001
766 011544 005037 011032
767 011550 000762
768 011552 032777 000200 177264 281
769 011560 001002
770 011562 004737 012324
771 011566 042700 040000 381
772 011572 032777 000020 177244
773 011600 001405
774 011602 012737 011614 013112
775 011610 000137 012164
776 011614 032777 000400 177222 481
777 011622 001416
778 011624 013702 011020
779 011630 013703 011022
780 011634 010337 011070
781 011640 112223
782 011642 001376
783 011644 112743 000177
784 011650 005203
785 011652 112723 000177
786 011656 105023
787 011660 005037 011032 781
788 011664 004737 013116
789 011670 032700 100000 581
790 011674 001013
791 011676 023727 011032 000100
792 011704 103771
793 011706 011402
794 011710 016403 000004
795 011714 104001
796 011716 005037 011032
797 011722 000762
798 011724 042700 100000 681
799 011730 000137 011504

```

 ROUTINE USED IF INTERNAL LOOP BACK" WAS SELECTED.
 NOTE THAT WHEN IN THIS MODE, HALF DUPLEX IS THE
 ONLY MODE AVAILABLE.
 "INTERNAL LOOP BACK" MEANS THAT THE RECEIVER IS "TURNED ON"
 AND A COMPLETE MESSAGE IS RECEIVED. IF DATA IS TO BE CHECKED
 IT IS; IF "END PASS" IS DESIRED, IT IS GIVEN.
 WHEN THE TRANSMITTER IS ENABLED, AFTER THE WHOLE MESSAGE
 IS TRANSMITTED, THE CYCLE IS REPEATED AS ABOVE.

```

SIL0:  K00IN
      JSR  PC,STARTR
      CLR  TIME
181   RIT  BRFLG,STAT
      RNE  28
      CMP  TIME,0100
      BLO  18
      MOV  BRCSR,R2
      MOV  XCSR(R4),R3
      HLT  1
      CLR  TIME
      BR   18
281   RIT  BR0DAT,0SWR
      RNF  38
      JSR  PC,TEST0
381   RIT  BRFLG,STAT
      RIT  BRLOP,0SWR
      RER  48
      MOV  048,RACK
      JMP  END
481   RIT  0400, 0SWR  IUSE EXTERNAL DATA?
      RER  78  IBR IF NO
      MOV  I00A, R2  ISET POINTER
      MOV  I00A, R3  ISET POINTER
      MOV  R3, XDA  ISETUP XMIT DATA ADDR
      MOVR (R2)+, (R3)+ IMOVE INPUT TO OUTPUT
      RNF  00  ILOOP IF NOT ZERO CHAR
      MOVR 0177, -(R3) IINSERT A FILL CHAR
      INC  R3  IJUMP ADDRESS
      MOVR 0177, (R3)+ IINSERT ANOTHER FILL
      CLRR (R3)+ IINSERT ZERO CHAR
781   CLR  TIME
      JSR  PC,STARTX
581   RIT  BRFLG,STAT
      RNE  68
      CMP  TIME,0100
      BLO  58
      MOV  BRCSR,R2
      MOV  XCSR(R4),R3
      HLT  1
      CLR  TIME
      BR   58
681   RIT  BRFLG,STAT
      JMP  SIL0

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C2

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013 011730 104016
014 011736 032737 000010 011012
015 011744 001002
016 011746 004737 013414
017 011752 004737 013116
018 011756 005037 011032
019 011762 032700 100000
020 011766 001016
021 011770 032700 040000
022 011774 001024
023 011776 023727 011032 000100
024 012004 103766
025 012006 011402
026 012010 016403 000004
027 012014 104001
028 012016 005037 011032
029 012022 000757
030 012024 032737 000010 011012 301
031 012032 001756
032 012034 042700 100000
033 012040 004737 013414
034 012044 000746
035 012046 032737 000010 011012 401
036 012054 001020
037 012056 032700 100000
038 012062 001013
039 012064 023727 011032 000100
040 012072 103765
041 012074 011402
042 012076 016403 000004
043 012102 104001
044 012104 005037 011032
045 012110 000756
046 012112 042700 100000 601
047 012116 042700 040000 801
048 012122 005037 011032
049 012126 032777 000200 176710
050 012134 001002
051 012136 004737 012324
052 012142 032777 000020 176674 501
053 012150 001671
054 012152 012737 011734 013112
055 012160 000137 012164

```

) ROUTINE USED IF "EXTERNAL LOOP BACK" WAS SELECTED.
) EITHER HALF OR FULL DUPLEX MAY BE SELECTED IN THIS MODE.
) "EXTERNAL LOOP BACK" MEANS THAT THE TRANSMITTER IS FIRST
) TURNED ON (IF HALF DUPLEX) AND THE WHOLE MESSAGE IS TRANSMITTED;
) THEN THE RECEIVER IS ENABLED. AFTER THE WHOLE MESSAGE IS RECEIVED
) DATA WILL THEN BE CHECKED IF DESIRED AND END PASS WILL
) BE GIVEN IF DESIRED. THEN THE CYCLE IS REPEATED
) AS ABOVE. IF RUNNING IN FULL DUPLEX THE PROGRAM
) WAITS FOR BOTH THE RECEIVER AND TRANSMITTER TO
) FINISH THEN RESTARTS THE RECEIVER AND TRANSMITTER.

D2

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012164
012164 104414 000300
012170 016477 000000 012322
012176 042737 177677 012322
012204 042764 000100 000000
012212 012766 012252 000002
012220 010077 013074
012224 010137 013076
012230 010237 013100
012234 010337 013102
012240 010437 013104
012244 010537 013106
012250 000207
012252
012252 013700 013074
012256 013701 013076
012262 013702 013100
012266 013703 013102
012272 013704 013104
012276 013705 013106
012302 012737 177777 013110
012310 053764 012322 000000
012316 000177 000570
012322 000000
012324 013706 011056
012330 001413
012332 032777 020000 176500
012340 001027
012342 104400 012534
012346 004077 176456
012352 005746
012354 104400 012615
012360 013701 011022
012364 013702 011020
012370 122122
012372 001776
012374 123741 011040
012400 001453
012402 122742 000002
012406 001005
012410 010237 012416
012414 104400

ROUTINE TO RETURN
TO MONITOR FOR
END PASS.

EOP:

STPS,PRTY7
MOV XCSR(R4),OTPIE
RHC 0<C<TIE>,OTPIE
RHC 0TIE,XCSR(R4)
MOV 0ENTER,2(SP)
MOV R0,SAVR0
MOV R1,SAVR1
MOV R2,SAVR2
MOV R3,SAVR3
MOV R4,SAVR4
MOV R5,SAVR5
RTS PC

ISSET PS PRIORITY TO 7
ISAVE TX CSR
ICLEAR ALL BUT TX IE.
ICLEAR TX IE (EVEN IF IT WASN'T SET)
ISET FOR RETURN IF SW 14=1
ISAVE REGISTER 0
ISAVE REGISTER 1
ISAVE REGISTER 2
ISAVE REGISTER 3
ISAVE REGISTER 4
ISAVE REGISTER 5
IRETURN TO CONTROL PROGRAM

ENTER:

MOV SAVR0,R0
MOV SAVR1,R1
MOV SAVR2,R2
MOV SAVR3,R3
MOV SAVR4,R4
MOV SAVR5,R5
MOV 0-1,DELAY
RIS 0TPIE,XCSR(R4)
JMP 0BACK

IRESTORE R0
IRESTORE R1
IRESTORE R2
IRESTORE R3
IRESTORE R4
IRESTORE R5
IF ORIGINALLY SET: SET TX IE

OTPIE: 000000

SUBROUTINE TO CHECK
RECEIVER DATA.

TEST0: MOV ERROR, -(SP)
REQ TSTDAT
RIT 0RTT13,0SWR
RNF TSTDAT
TYPE ,MSG0
JSR R0,0R2016
TST -(SP)
TYPE ,MSG1
TSTDAT: MOV IYNA, R1
MOV IRNA, R2
SCAN0: CMPB (R1)+, (R2)+
REQ SCAN0
CMPB TX_TERM,-(R1)
REQ TEST0X
CMPB 0002,-(R2)
RNF 29
MOV R2,18
TYPE

WAS THERE A RECEIVE ERROR?
IF NO
INHIBIT PRINTOUTS?
IF YES
1415>12>THERE WAS A RECEIVE ERROR. RBUF=0
PRINT CONTENTS OF RBUF
1415>12>
1SETUP XMIT DATA ADDR
1SETUP RCV DATA ADDR
DATA OK ?
IF OK
IS IT END OF DATA
IF YES

E2

912	012416	000000				181	.WORD	0		
913	012420	000443					RR	TESTDX		
914	012422					281				
915	012422	105712					TSTB	(R2)		
916	012424	001441					REQ	TESTDX		IFR IF YES
917	012426	122721	000177				CMPR	0177, (R1)+		IFB IT FILL CHAR?
918	012432	001756					REQ	SCAN4		IFR IF YES
919	012434	005301					DEC	R1		IBACKUP
920	012436	122722	000177				CMPR	0177, (R2)+		IFB IT FILL?
921	012442	001752					REQ	SCAN4		IFR IF YES
922	012444	105742					TSTB	-(R2)		IBACK UP POINTER
923	012446	123722	011014				CMPR	PARAM2,(R2)+		
924	012452	001746					REQ	SCAN4		IFR IF CHAR WAS SYNC
925	012454	000240				SCANS:	NOP			DATA ERROR
926	012456	032777	020000	176360			RIT	007T13,0SWR		INHIBIT PRINTOUTS
927	012464	001016					RNF	NER0		IFR IF YES
928	012466	104400	012620				TYPE	,MSG2		<15><12>RECEIVED DATA = <15><12>
929	012472	013737	011020	012502			MOV	IRNA, RDAX		SETUP DATA ADDRESS
930	012500	104400					TYPE			PRINT RECEIVED DATA
931	012502	000000				RDAX:	0			RECEIVED DATA ADDR.
932	012504	104400	012645				TYPE	,MSG3		<15><12>DATA SHOULD BE<15><12>
933	012510	013737	011022	012520			MOV	IRNA, .+10		SETUP ADDR.
934	012516	104400					TYPE			PRINT GOOD DATA
935	012520	011022					IRNA			
936	012522	111103				DERR:	MOVR	(R1),R3	SETUP XMIT DATA	
937	012524	114202					MOVR	-(R2),R2	SETUP RCV DATA	
938	012526	104007					HLT+7		DATA ERROR HALT	
939	012530	005726				TESTDX:	TST	(R2)+	POP STACK	
940	012532	000207					RTS	PC	RETURN FROM SUB/ROUT	
941										
942	012534	005015	044124	051105	MSG0:	.ASCII	<15><12>/THERE WAS A RECEIVER ERROR, REGISTER (SEL 2) =/			
(1)	012615	015	000012		MSG1:	.ASCII	<15><12>			
(1)	012620	005015	042522	042503	MSG2:	.ASCII	<15><12>/RECEIVED DATA = /<15><12>			
(1)	012645	015	042012	052101	MSG3:	.ASCII	<15><12>/DATA SHOULD BE/<15><12>			
(1)	012670	005015	046120	040505	MSG4:	.ASCII	<15><12>/PLEASE MAKE CONNECTION (DIAL NUMBER)./			
(1)	012737	015	053412	042510		.ASCII	<15><12>/WHEN CONNECTION COMPLETE; HIT CONTINUE SWITCH./<15><12>			
(1)	013022	005015	046120	040505	MSG5:	.ASCII	<15><12>/PLEASE MAKE CONNECTION (DIAL NUMBER)./<15><12>			
(1)					.EVEN					
943	013074	000000			SAVR0:	0				
944	013076	000000			SAVR1:	0				
945	013100	000000			SAVR2:	0				
946	013102	030000			SAVR3:	0				
947	013104	000000			SAVR4:	0				
948	013106	030000			SAVR5:	0				
949	013110	000000			DELAY:	0				
950	013112	000000			RACK:	0				
951	013114	000000			STOP:	0				

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956 013116 005037 011032          STARTX: CLR      TIME
957 013122 005737 013110          TST      DELAY   ;IF SW04=1 & SW14=0 WAIT BEFORE TURNING ON TX
958 013126 001416          REQ      18      ;NO GO AHEAD AND TURN ON TX
959 013130 005037 013504          CLR      TEMP1  ;PREPARE FOR DELAY
960 013134 012737 000007 013506          MOV      07,TEMP2
961 013142 002737 000001 013504          ADD      01,TEMP1      ;INCREMENT DELAY....
962 013150 001374          RNF
963 013152 005337 013506          DEC      TEMP2
964 013156 001371          RNE      .-14
965 013160 005037 013110          CLR      DELAY   ;ZERO DELAY
966 013164 013737 011022 011070 181          MOV      TXDA,XDA      ;SETUP XMIT DATA ADDR.
967 013172 042700 100000          RIC      0XFLG,R0     ;RESET XMIT COMPLETE FLAG
968 013176 052714 000002          RIS      0DTR,0RXCSR ;SET DTR
969 013202 005737 013114          TST      STOP
970 013206 001005          RNF      28
971 013210 104400 012670          TYPE    ,MSG4
972 013214 000000          HALT
973 013216 005137 013114          COM
974 013222 032737 000010 011012 281          RIT      0HALF,DUPLEX,PARAM1
975 013230 001403          REQ      39
976 013232 032714 010000          481     RIT      010000,0RXCSR ;IS CARRIED UP
977 013236 001375          RNE      48      ;OR IF YES
978 013240 052714 000004          381     RIS      0RTS,0RXCSR ;SET RTS
979 013244 032714 020000          CTSW1   RIT      0CTS,0RXCSR,IS CLEAR TO SEND SET?
980 013250 001017          RNF      CTSOK     ;OR IF YES
981 013252 023727 011032 000036 CTSW1:  CMP      TIME,036   ;30 SECS ELAPSED?
982 013260 103771          RLO      CTSW     ;OR IF NO
983 013262 011402          MOV      0RXCSR,R2   ;SETUP RECEIVE CSR
984 013264 016403 000004          MOV      TXCSR(R4),R3 ;SETUP XMIT CSR
985 013270 032777 010000 175546          RIT      0SW12,0SWR  ;INHIBIT PRINTOUT?
986 013276 001001          RNF      18
987 013300 104002          HLT+2
988 013302 005037 011032          181     CLR      TIME
989 013306 000756          RR      CTSW      ;WAIT SOME MORE
990 013310 005037 011032          CTSOK:  CLR      TIME
991 013314 012737 000005 013412          MOV      05,SYNCR0   ;SETUP SYNC. COUNTER
992 013322 032737 000010 011012          RIT      0HALF,DUPLEX,PARAM1
993 013330 001404          REQ      28
994 013332 052764 000030 000004          RIS      0SEND,0RXEN,TXCSR(R4)
995 013340 000403          RR      18
996 013342 012764 000020 000004 281          MOV      0SEND,TXCSR(R4) ;SET SEND
997 013350 013764 011014 000006 181          MOV      PARAM2,TXDBUF(R4) ;LOAD A SYNC CHAR
998
999 013356 105764 000004          TSTR    TXCSR(R4)     ;IS XMIT READY(TXDONE=1?)
1000 013362 100375          RPL     .-4         ;OR IF NO
1001 013364 005337 013412          DEC     SYNCR0      ;DECREMENT COUNTER
1002 013370 001367          RNF     18         ;OR IF NOT ZERO
1003 013372 042764 000400 000006          RIC     0TR0M,TXDBUF(R4)
1004 013400 052764 000100 000004          RIS     0TXINTE,TXCSR(R4) ;SET XMIT INTERRUPT ENABLF
1005 013406 000240          NOP
1006 013410 000207          RTS
1007 013412 000000          SYNCNO: 0

```

G2

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1000
1009
1010
1011
1012 013414
1013 013414 005737 013114
1014 013420 001006
1015 013422 052714 000002
1016 013426 104400 013022
1017 013432 025137 013114
1018 013436 005037 011032
1019 013442 013737 011020 011066
1020 013450 012737 001000 011064
1021 013456 042700 040000
1022 013462 005037 011054
1023 013466 025037 011056
1024 013472 005764 000002
1025 013476 052714 000522
1026 013502 000207
1027 013504 000000
1028 013506 000000

;*****
; INITIALIZE RECEIVER SUBROUTINE
;*****
STARTR:
TST STOP ;FIRST TIME HERE?
AND IS ;OR IF NO
RIR 0DTR,0RXCSR ;SET DTR
TYPE ,MSG5 ;MAKE CONNECTION
COM STOP
CLR TIME
MOV IRDA,RDA ;SETUP RCV DATA ADDR
MOV 01000,RCC ;SETUP RCV CHAR COUNT
RIR 0RFLG,00 ;RESET RCV COMPLETE FLAG
CLR ERCSR ;RESET ERROR RECORDS
CLR ERROR
TST RYD00P(R4) ;CLR ANY RYD00E
RIS 0RTNEN,RCVEN,STPSYN,0DTR,0RXCSR ;SET INTER ENABLE & STRIP SYNC 0DTR
RTR PC ;EXIT FROM SUBROUTINE

TEMP1: 0
TEMP2: 0
  
```

H2

```

1029
1030
1031
1032 013510 000200
1033 013512 127737 175352 011040
1034 013520 001010
1035 013522 052700 100000
1036 013526 042764 000120 000004
1037 013534 042714 000004
1038 013540 000417
1039
1040 013542 117764 175322 000006
1041 013550 032777 000100 175266
1042 013556 001406
1043 013560 105777 175312
1044 013564 100003
1045 013566 117777 175276 175304
1046 013574
1047 013574 005237 011070
1048 013600 005037 011032
1049 013604 000002
1050
1051
1052
1053 013606 000200
1054 013610 011402
1055 013612 016403 000004
1056 013616 016437 000002 013504
1057 013624 113737 013504 013506
1058 013632 113777 013504 175226
1059 013640 032777 000000 175176
1060 013646 001406
1061 013650 105777 175222
1062 013654 100003
1063 013656 113777 013506 175214
1064 013664
1065 013664 005237 011066
1066 013670 105077 175172
1067 013674 005337 011064
1068 013700 001005
1069 013702 042714 000520
1070 013706 104006
1071 013710 004737 013414
1072 013714 123737 011041 013506 181
1073 013722 001004
1074 013724 042714 000520
1075 013730 052700 040000
1076 013734 005737 013504
1077 013740 100005
1078 013742 010237 011054
1079 013746 013737 013504 011056
1080 013754 005702
1081 013756 100004
1082 013760 010237 011060
1083 013764 052700 020000
1084 013770

;*****
; TRANSMIT INTERRUPT SERVICE ROUTINE
;*****
XISR1:  NOP
        CMPB   0X0A, TX, TERM           ;FINISHED XMITTING?
        BNE    XISR1                    ;BR IF NO
        RIS    0XPLG, R0                 ;SET XMIT COMPLETE FLAG
        BIC    0TXINTE, SEND, TXCSR(R4) ;RESET XMIT INTR ENABLE
        BIC    0RTS, 0RXCSR             ;RESET RTS
        BR     XISR2                    ;
;
XISR11: MOVB   0X0A, TX00BUF(R4); XMIT NEXT CHAR.
        RIT    01R0, 0SWR               ;MONITOR OUTPUT?
        BEQ    NOXMON                    ;BR IF NO
        TSTB   0TPB                      ;IS TTY AVAILABLE
        RPL    NOXMON                     ;BR IF NO
        MOVB   0X0A, 0TPB; TYPE THE CHAR
NOXMON1:
        INC    X0A                        ;INCREMENT ADDRESS
XISR21: CLR    TIME                       ;RESET TIMER
        RTI                                     ;RETURN FROM INTERRUPT
;*****
; RECEIVE INTERRUPT SERVICE ROUTINE
;*****
RISR1:  NOP
        MOV    0RXCSR, R2                ;SAVE RXCSR CONTENTS
        MOV    TXCSR(R4), R3             ;SAVE TXCSR CONTENTS
        MOV    RX00BUF(R4), TEMP1        ;STORE CHAR AND ERROR FLAGS IF ANY
        MOVB   TEMP1, TEMP2
        MOVB   TEMP1, 0R0A                ;MOVE CHAR TO INRUF
        RIT    0AR, 0SWR                 ;MONITOR INPUT?
        BEQ    NORMON                     ;BR IF NO
        TSTB   0TPB                      ;IS TTY AVAILABLE?
        RPL    NORMON                     ;BR IF NO
        MOVB   TEMP2, 0TPB; TYPE THE CHAR
NORMON1:
        INC    R0A                        ;BUMP POINTER
        CLRB   0R0A                       ;CLEAR NEXT CHAR POSITION
        DEC    R0C                          ;DECREMENT CHAR. COUNTER
        ANF    10                          ;BR IF BUFFER NOT FULL
        BIC    0RINTEN, RCVEN, STPSYN, 0RXCSR ;RESET INTERRUPT ENAB
        HLT+6                               ;RECEIVER BUFFER FULL
        JSR    PC, STARTR                 ;INITIALIZE RECEIVER
        CMPB   RX, TERM, TEMP2           ;IS IT LINE FEED?
        BNE    RISR1                      ;BR IF NO
        BIC    0RINTEN, RCVEN, STPSYN, 0RXCSR ;DISABLE INTERRUPT
        RIS    0RPLG, R0                  ;SET RCVR COMPLETE FLAG
RISR11: TST    TEMP1                      ;IS THERE A DATA ERROR
        RPL    RISR2                      ;BR IF NO
        MOV    R2, 0RXCSR                 ;SAVE RXCSR
        MOV    TEMP1, 0R00R              ;SAVE RX00BUF
RISR21: TST    R2                          ;IS THERE A DATA SET STATUS CHANGE
        RPL    RISR3                      ;BR IF NO
        MOV    R2, 0SSTAT                 ;SAVE STATUS
        RIS    0DSPLG, R0                 ;SET FLAG
RISR31:

```

12

1005	013770	005037	011032	CLR	TIME	IRFSET TIMER
1006	013774	000002		RTI		IRETURN FROM INTERRUPT
1007		000001				

.END

ABORT = 007000	DBFLG = 020000	OVRUN = 040000	RWAIT = 104410	TESTD = 012324
BA = 011004	DSINTE = 000040	OWI = 000002	RXCOR = 0200004	TESTOX = 012930
BACK = 013112	DSR = 001000	OWO = 000001	RXDDBUF = 000002	TIE = 000100
BITH = 002000	DSSTAT = 011060	PARAM1 = 011012	RXDONE = 000200	TIME = 011032
BIT0 = 000001	DTR = 000002	PARAM2 = 011014	RXERR = 100000	TK0 = 011074
BIT1 = 000002	DUP11 = 011000	PARAM3 = 011016	RX.TER = 011041	TK8 = 011072
BIT10 = 002000	ENTER = 012252	PARCSR = 000002	R6 = 0200006	TP0 = 011100
BIT11 = 004300	EOP = 012164	PRIOR = 011010	R7 = 0200007	TP8 = 011076
BIT12 = 010000	ERCSR = 011054	PRISec = 010000	SAVR0 = 013074	TSON = 000400
BIT13 = 020000	ERDBR = 011056	PRTY0 = 000000	SAVR1 = 013076	TSTDAT = 012360
BIT14 = 040000	FLAG = 011042	PRTY1 = 000040	SAVR2 = 013100	TXACT = 001000
BIT15 = 100000	FULL.D = 000001	PRTY2 = 000100	SAVR3 = 013102	TXCSR = 000004
BIT2 = 000004	GO = 011210	PRTY3 = 000140	SAVR4 = 013104	TXDBUF = 000006
BIT3 = 000010	HALF.D = 000010	PRTY4 = 000200	SAVR5 = 013106	TXDONE = 000200
BIT4 = 000020	MDXEN = 000010	PRTY5 = 000240	SCANA = 012370	TXINTE = 000100
BIT5 = 000040	IL0 = 000010	PRTY6 = 000300	SCAN5 = 012454	TX.TER = 011040
BIT6 = 000100	IRDA = 011020	PRTY7 = 000340	SEND = 000070	TYPE = 104400
BIT7 = 000200	IXDA = 011022	QTYPE = 012322	SETTLE = 011074	USER = 000000
BIT8 = 000400	KBDIN = 104416	RABORT = 002000	SRCOR = 011052	XCC = 011062
BIT9 = 001000	LOOP = 000020	RCC = 011064	SRO = 002000	XCSR = 000004
B2016 = 011030	MEXT = 010000	RCSR = 0200004	START = 011102	XDA = 011070
CARDET = 010000	MINT = 014000	RCVEN = 000020	STARTR = 013414	XFLG = 100000
CLK = 020000	MMODEA = 004000	RDA = 011066	STARTX = 013116	XISR = 013510
CRCEN = 001000	MMODEB = 010000	RDAY = 012502	STAT = 0200000	XISR1 = 013542
CRCERR = 010000	MODE = 0200000	REACT = 004000	STD = 000010	XISR2 = 013600
CTS = 020000	MRESET = 000400	REFM = 001000	STOP = 013114	XLB = 000004
CT8OK = 013310	MSG0 = 012534	RFLG = 040000	STPS = 104414	XWAIT = 104412
CT8W = 013244	MSG1 = 012615	RING = 040000	STPSYN = 000400	XL0 = 011904
CT8WN = 013252	MSG2 = 012620	RINTEN = 000100	SWR = 011044	SOWI = 011300
DECMOD = 100000	MSG3 = 012645	RISR = 013606	SW12 = 010000	SOWO = 011406
DELAY = 013110	MSG4 = 012670	RISR1 = 013734	SXCOR = 011050	SXLB = 011734
DERR = 012522	MSG5 = 013022	RISR2 = 013754	SYNCNO = 013412	.
DISPLA = 011046	MTDATA = 040000	RISR3 = 013770	SYSTAT = 004000	
DNA = 100000	NODAT = 000200	RIV = 011006	TEMP1 = 013504	
DSC = 100000	NORMON = 013664	RSON = 000400	TEMP2 = 013506	
DSC2 = 000001	NOXMON = 013574	RTS = 000004	TEOM = 001000	

. ABS. 013776 000

ERRORS DETECTED: 0
 DEFAULT GLOBALS GENERATED: 0

,DUP/SOL,ITEP1,MAC,DZDPFB.P11
 RUN-TIME: 10 13 .4 SECONDS
 RUN-TIME RATIO: 67/24=2.7
 CORE USED: 15K (29 PAGES)

K2