

DUP11

OVERLAY FOR INTER TEST
MD-11-DZDPF-B

EP DZDPF B DL

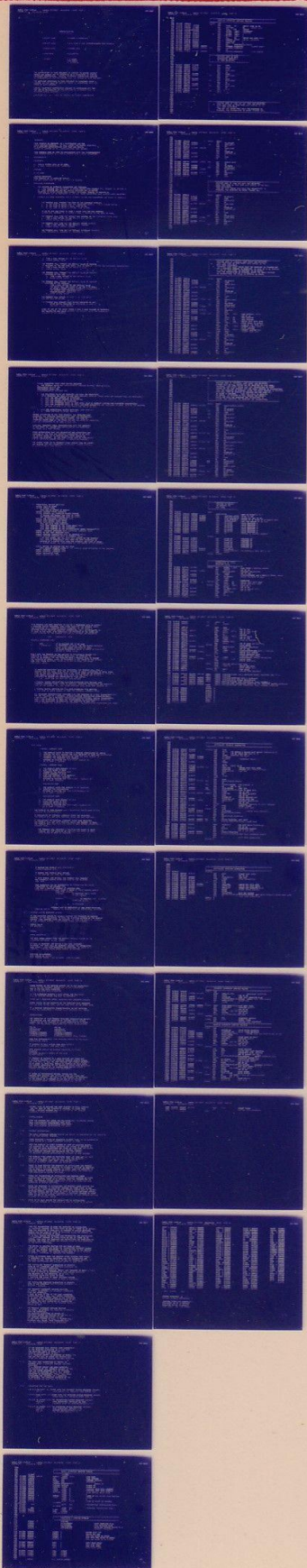
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IDENTIFICATION

PRODUCT CODE:	MATNDEC-11-DZDPF-B-D
PRODUCT NAME:	DUP11 OVERLAY FOR INTERPROCESSOR TEST PROGRAM
PROGRAM DATE:	OCTOBER 1976
MAINTAINER:	DIAGNOSTICS
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1.0 ABSTRACT.

THIS PROGRAM IS DESIGNED AS A MAINTENANCE AID FOR FIELD SERVICE PERSONNEL. 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 DM11, TYPE IN DM.
 - C. IF YOU WISH TO SETUP A DM11M, TYPE IN DM.

IF DM OR DM11 WAS TYPED IN STEP 1 ABOVE THEN THE BUS ADDRESS, VECTOR ETC. REFERED TO IN STEPS 2 THRU 7, PERTAIN TO THE DM11 OR DM11M.

- 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
NOTES 200=PRIO 4, 240=PRIO 5, 300=PRIO 6, ETC.

BI

- A. TYPE A CAR. RETURN TO USE DEFAULT VALUE
- A. TYPEIN ACTUAL VALUE
- 4. THE PROGRAM WILL TYPEOUT THE DEFAULT VALUE OF PARAM01
IF REQUIRED BY THE ISR. (REF SECT. 10.0 IN OVERLAY LISTING FOR PARAMETER DESCRIPTION)
 - A. TYPE A CAR. RETURN TO USE DEFAULT VALUE
 - A. TYPEIN ACTUAL VALUE
- 5. 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 03 AS THE # TO DIAL.
IF USING A MODEM WITHOUT AUTOMATIC HANDSHAKING,
THE NUMBER MUST TERMINATE WITH A
"END-OF-NUMBER" CHARACTER (1).
B. ENTER ACTUAL VALUE.
- 8. THE PROGRAM WILL RETURN TO STEP 01 IF THIS SETUP
WAS FOR DN11 OR DN11RB.
- 9. THE PROGRAM WILL REQUEST THAT SWITCH REGISTER BE SET.
 - 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
SWR14=SETUP DN-110 ISR
SWR13=SETUP DN-11 ISR
SWR00000000=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 DMBR PARAMETERS ARE DISCUSSED IN SECT. 10.0 OF THE MONITOR).
 - F. GO BACK TO STEP A IF THIS SETUP WAS FOR DN OR DMB.
 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 TEST 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 SW04:1 END PASS IS TYPED
 - AND TRANSMITTED/RECEIVED DATA IS TYPED.
- SW11:1 USE PREVIOUSLY SPECIFIED DATA
- SW10:1 DATA SELECT (WITH SW09)
- SW09:1 DATA SELECT (WITH SW10)
 - 00:1 GET DATA FROM OPERATOR
 - 01:1 TEST MESSAGE 01 (SA QUICK BROWN FOX)
 - 10:1 TEST MESSAGE 02 (00 NUMERICS)
 - 11:1 TEST MESSAGE 03 (SC CONTEST/QUICK BROWN FOX/NUMERICS)
- SWP0:1 TRANSMIT RECEIVED DATA (INTERNAL LOOPBACK MODE)
- SW07:1 DO NOT TEST RECEIVED DATA
- SW06:1 MONITOR TRANSMITTED DATA ON CONSOLE TTY.*
- SW05:1 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.
- SW04:1 RETURN TO MONITOR FOR END PASS
 - WHEN SW04:0 PROGRAM LOOPS IN THE OVERLAY NEVER RETURNING TO THE MONITOR.
- SW03:1 INTERNAL LOOPBACK MODE
- SW02:1 EXTERNAL LOOPBACK MODE
- SW01:1 ONE-WAY-IN MODE
- SW00:1 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=LNC. 17A) 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=XXXXXX NEW=

POSSIBLE RESPONSES ARE:

1. <CR> IF NO CHANGES ARE TO BE MADE
2. A 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. ARCH= 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 03.

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 1-4) 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 (SW4=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 (SW7=0)
7. RETURNS TO MONITOR FOR "END PASS". (SW4=1) OR
GO TO STEP 1 (SW4=0)

ONE-WAY-IN MODE

1. THE OVERLAY WAITS FOR MESSAGE TO BE RECEIVED.
2. VERIFIES THE DATA (SW7=0)
3. RETURNS TO MONITOR FOR "END PASS" (SW4=1) OR
GO TO STEP 1 (SW4=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". (SW4=1) OR
GO TO STEP 1 (SW4=0)

- 1
- 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:

*XXXXXX 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, ON 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=PPPPPP
 DATA SHOULD BE TTTTTT
 DATA COMPARE ERROR; BAD DATA=BBB GOOD DATA=GGG

H1

WHERE RRRRRR IS THE RECEIVE BUFFER (UP TO 512 CHARACTERS)
TTTTTT IS THE TRANSMIT BUFFER (UP TO 512 CHARACTERS)
RBR IS THE BAD DATA CHARACTER
GBR 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 (R01) 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 01	CPU 02
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 14,13,7,6 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.

A.0 MISCELLANEOUS

ITPP 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 ITPP CONTROL PROGRAM.

TIME1 PROVIDES A MEANS OF MEASURING ELAPSED TIME. IT IS INCREMENTED EVERY SECOND BY A CLOCK INTERRUPT ROUTINE IN ITPP.

9.2 WHEN THE OVERLAY IS FIRST ENTERED BY ITPP AT LOCATION START1, THE CONTENTS OF THE SWITCH REGISTER ARE STORED IN REGISTER R. 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: SOW1, 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 SOW1: IN THIS ROUTINE THE RECEIVER IS INITIALIZED AND PROGRAM LOOPS WAITING FOR THE RECEIVER TO FINISH. IF NOTHING IS RECEIVED FOR 40 SECS 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 SW14 IF UP IT RETURNS
TO ENTER1, OTHERWISE IT RESTARTS THE PROGRAM.
- 9.5 ENTER1 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 (OWO, ONI, ILR, XLR) WHERE IT CAME FROM.
- 9.6 THE INITIALIZE TRANSMIT SUBROUTINE AT STARTX1:
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 STARTR1:
SETS UP THE INTERFACE AND POINTERS NECESSARY TO
RECEIVE A MESSAGE.
- 9.8 THE TRANSMIT INTERRUPT SERVICE ROUTINE,
AT XISR1, 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 XISR1, 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 RISR1, 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 RSR WILL BE SAVED AND PRINTED OUT
AFTER THE COMPLETE MESSAGE HAS BEEN RECEIVED.

- 9.10 THE DATA TEST SUBROUTINE AT TESTD1 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.

10.3 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 INITIATE, DEFAULT = (1)

mi

635
 636
 637
 638 011102 000200
 639 011104 017700 177734
 640 011110 042700 177400
 641 011114 013702 011006
 642 011120 012722 013606
 643 011124 013722 011010
 644 011130 012722 013510
 645 011134 013722 011010
 646 011140 013704 011004
 647 011144 013714 011012
 648 011150 013702 011014
 649 011154 042702 000001
 650 011160 010264 000004
 651 011164 052764 000000 000004
 652 011172 032740 000000 000004 181
 653 011200 001374
 654 011202 013764 011016 000002
 655
 656
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 659
 660
 661
 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
 679
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 687
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 689
 690

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*****
; DUP11-X INTERFAC SERVICE ROUTINE
*****
START: NOP
      MOV     @SWR,    R0      ;SETUP MODE IN R0
      RLC     @177400,   R0    ;STRIP JUNK
      MOV     RIV,     R2      ;SETUP
      MOV     @WISR,    (R2)+  ;INTERRUPT
      MOV     @PIOR,    (R2)+  ;VECTORS
      MOV     @XISR,    (R2)+  ;
      MOV     @PIOR,    (R2)+  ;
      MOV     RA,      R4      ;SETUP BUS ADDR INDEX
      MOV     @PARAM1, @RCR    ;SETUP VARIABLES
      MOV     @PARAM2,R2      ;
      RLC     @R01,R2        ;
      MOV     R2,      @CSR(R4);IN CSR'S
      RIR     @R0RSET, @XCSR(R4);MASTER RESET
      RIR     @R0RSET, @XCSR(R4);
      RNF     IS
      MOV     @PARAM3, @RCR(R4);LOAD @RCR
  
```

```

*****
; ROUTINE USED TO GOTO
; SUBROUTINE DEPENDENT
; ON MODE SELECTED.
*****
  
```

```

601 CLR     TIME
    CLR     DELAY
    CLR     STOP
    RIR     @R00,MODE
    R00     IS
    JMP     @R00
181 RIR     @R01,MODE
    R00     25
    JMP     @R01
281 RIR     @R10,MODE
    R00     38
    JMP     @R10
381 RIR     @R10,MODE
    R00     48
    JMP     @R10
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".
*****
  
```

F-

```

691
692
693 011300 104416      80W1:  KBNIM
694 011302 004737 013414  JSR    PC,STARTX
695 011306 032700 040000 181  RIT    ORFLG,STAT
696 011312 001013      RNF    20
697 011314 023727 011032 000100 CMP    TIME,0100
698 011322 103771      RLO    10
699 011324 011402      MOV    ORCSR,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 281  RIT    0NDOAT,0SWR
706 011350 001002      RNE    30
707 011352 004737 012324  JSR    PC,TESTD
708 011356 042700 040000 381  RIT    ORFLG,STAT
709 011362 032777 000020 177454  BIT    0LNOP,0SWR
710 011370 001405      REQ    00
711 011372 012737 011404 013112  MOV    000,BACK
712 011400 000137 012164  JMP    EOP
713 011404 000735      BR     00W1
714
715
716
717
718
719
720
721
722
723

```

```

*****
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."
*****

```

```

724 011406 104416      80W0:  KBNIM
725 011410 004737 013116  JSR    PC,STARTX
726 011414 005037 011032  CLR    TIME
727 011420 032700 100000 181  RIT    ORFLG,STAT
728 011424 001013      RNF    20
729 011426 023727 011032 000100 CMP    TIME,0100
730 011434 103771      RLO    10
731 011436 011402      MOV    ORCSR,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 281  RIT    ORFLG,STAT
737 011460 032777 000020 177356  BIT    0LNOP,0SWR
738 011466 001405      REQ    30
739 011470 012737 011402 013112  MOV    000,BACK
740 011476 000137 012164  JMP    EOP
741 011502 000741      BR     381
742
743
744

```

B2

```

745
746
747
748
749
750
751
752
753
754
755
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 000000 381
772 011572 032777 000020 177244
773 011600 001405
774 011602 012737 011614 013112
775 011610 000137 012164
776 011614 032777 000000 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.

```

810: 000100
      JSR  PC,STARTX
      CLR  TIME
      181  RIT  00FLG,STAT
      RNF  28
      CMP  TIME,0100
      ALN  18
      MOV  00CSR,R2
      MOV  XCSR(R4),R3
      HLT  1
      CLR  TIME
      18  18
      181  RIT  0000AT,00SWR
      RNF  38
      JSR  PC,TFSTN
      381  RIT  00FLG,STAT
      RIT  01NOP,00SWR
      RNF  48
      MOV  00S,RACK
      JMP  END
      481  RIT  0000, 00SWR  IUSE EXTERNAL DATA?
      RNF  78  IOR IF NO
      MOV  I00A, R2  ISET POINTER
      MOV  I00A, R3  ISET POINTER
      MOV  R3, X0A  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
      INP  R3  IJUMP ADDRESS
      MOVR 0177, (R3)+  IINSERT ANOTHER FILL
      CLRR (R3)+  IINSERT ZERO CHAR
      781  CLR  TIME
      JSR  PC,STARTX
      581  RIT  00FLG,STAT
      RNF  68
      CMP  TIME,0100
      ALN  58
      MOV  00CSR,R2
      MOV  XCSR(R4),R3
      HLT  1
      CLR  TIME
      681  RIT  00FLG,STAT
      JMP  810

```

C2

```

000
001
002
003
004
005
006
007
008
009
010
011
012
013 011734 104416
014 011736 032737 000010 011012
015 011744 001002
016 011745 004737 013414
017 011752 004737 013116
018 011756 005047 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
031 012032 001756
032 012034 042700 100000
033 012040 004737 013414
034 012044 000746
035 012046 032737 000010 011012
036 012054 001020
037 012056 032700 100000
038 012062 001013
039 012064 023727 011032 000100
040 012072 103766
041 012074 011402
042 012076 016403 000004
043 012102 104001
044 012104 005037 011032
045 012110 000756
046 012112 042700 100000
047 012116 042700 040000
048 012122 005037 011032
049 012126 032727 000200 176710
050 012134 001002
051 012136 004737 012324
052 012142 032727 000020 176674
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.

```

SYL01  K00IN
      RIT  0HALF,DUPLEX,PARAM1
      RNF  10
      JSR  PC,STARTR
181    JSR  PC,STARTX
      CLR  TIME
281    RIT  0XPLG,STAT
      RNF  30
781    RIT  0RFLG,STAT
      RNF  40
      CMP  TIME,0100
      BLO  20
      MOV  0RCSR,R2
      MOV  XCSR(R4),R3
      HLT  1
      CLR  TIME
      RR   20
381    RIT  0HALF,DUPLEX,PARAM1
      REQ  70
      RIF  0XPLG,STAT
      JSR  PC,STARTR
      RR   20
481    RIT  0HALF,DUPLEX,PARAM1
      RNF  00
      RIT  0XPLG,STAT
      RNF  60
      CMP  TIME,0100
      BLO  40
      MOV  0RCSR,R2
      MOV  XCSR(R4),R3
      HLT  1
      CLR  TIME
      RR   40
681    RIF  0XPLG,STAT
881    RIF  0RFLG,STAT
      CLR  TIME
      RIT  0NODAT,0SWR
      RNF  50
      JSR  PC,TESTD
      RIT  0LNOP,0SWR
      REQ  SYL0
      MOV  0SYLA,RACK
      JMP  F00

```

D2

```

056
057
058
059
060
061
062 012164
063 012164 104414 000300
064 012170 016437 000000 012322
065 012176 042737 177677 012322
066 012204 042764 000100 000000
067 012212 012766 012252 000002
068 012220 010037 013074
069 012224 010137 013076
070 012230 010237 013100
071 012234 010337 013102
072 012240 010437 013104
073 012244 010537 013106
074 012250 000207
075
076 012252
077 012252 013700 013074
078 012256 013701 013076
079 012262 013702 013100
080 012266 013703 013102
081 012272 013704 013104
082 012276 013705 013106
083 012302 012737 177777 013110
084 012310 053764 012322 000000
085 012316 000177 000570
086 012322 000000
087
088
089
090
091
092
093
094 012324 013706 011056
095 012330 001013
096 012332 032777 020000 176500
097 012340 001027
098 012342 104400 012534
099 012346 000077 176456
100 012352 005766
101 012354 104400 012615
102 012360 013701 011022
103 012364 013702 011020
104 012370 122122
105 012372 001776
106 012374 123741 011040
107 012400 001453
108 012402 122742 000002
109 012406 001005
110 012410 010237 012616
111 012414 104400

*****
ROUTINE TO RETURN
TO MONITOR FOR
END PASS.
*****

EOP:
STPB,PRTV7
MOV XCSR(R4),OTPIE
R1C 0'CTIE,OTPIE
R1C 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

ISET 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
R1S 0TPIE,XCSR(R4)
JMP 0ACK

OTPIE: 000000

*****
SUBROUTINE TO CHECK
RECEIVER DATA.
*****
TEST0: MOV ERROR, -(SP)
REQ TST0AT
R1T 0RTT13,0800
RNF TST0AT
TYPE ,MSG0
JBR R0,002016
TST -(SP)
TYPE ,MSG1
TST0AT: MOV IYNA, R1
MOV IYNA, R2
SCAN0: CMPR (R1)+, (R2)+
REQ SCAN0
CMPR TX,TERM,-(R1)
REQ TEST0X
CMPB 0002,-(R2)
RNF 28
MOV R2,18
TYPE

I WAS THERE A RECEIVE ERROR?
IF NO
INHIBIT PRINTOUTS?
IF YES
I<15><12>THERE WAS A RECEIVE ERROR. R0UP=
PRINT CONTENTS OF R0UP
I<15><12>
SETUP XMIT DATA ADDR
SETUP RCV DATA ADDR
DATA OK ?
IF OK
IS IT END OF DATA
IF YES

```

012	012416	000000			181	.WORD	R	
013	012420	000443				RR	TESTOX	
014	012422				281			
015	012422	105712				TESTO	(R2)	
016	012424	001441				REQ	TESTOX	IFR IF YES
017	012426	122721	000177			CMPO	0177, (R1)+	IFR IF FILL CHAR?
018	012432	001756				REQ	SCAN4	IFR IF YES
019	012434	005301				DEC	R1	IBACKUP
020	012436	122722	000177			CMPO	0177, (R2)+	IFR IF FILL?
021	012442	001752				REQ	SCAN4	IFR IF YES
022	012444	105742				TESTO	-(R2)	IBACK UP POINTER
023	012446	123722	011014			CMPO	PARAM2, (R2)+	
024	012452	001746				REQ	SCAN4	IFR IF CHAR WAS SYNC
025	012454	000200			SCAN5:	NOP		DATA ERROR
026	012456	032777	020000	176360		RTT	001713, 0500	INHIBIT PRINTOUTS
027	012464	001016				RNF	DEMO	IFR IF YES
028	012466	104400	012620			TYPE	,M862	IF<15><12>RECEIVED DATA = <15><12>
029	012472	013737	011020	012502		MOV	TRNA, ROAX	IFR IF YES
030	012500	104400				TYPE		IFR IF YES
031	012502	000000			ROAX:	R		IFR IF YES
032	012504	104400	012645			TYPE	,M863	IF<15><12>DATA SHOULD BE<15><12>
033	012510	013737	011022	012520		MOV	TRNA, .+10	IFR IF YES
034	012516	104400				TYPE		IFR IF YES
035	012520	011022				TRNA		IFR IF YES
036	012522	111143			DEMO:	MOV	(R1),R3 IFR IF YES	IFR IF YES
037	012524	114202				MOV	-(R2),R2	IFR IF YES
038	012526	104400				HLT+7		IFR IF YES
039	012530	005726			TESTOX:	TEST	(R2)+	IFR IF YES
040	012532	000207				RTN	PC	IFR IF YES
041								IFR IF YES
042	012534	005015	044124	051105	M860:	.ARCTZ	<15><12>/THERE WAS A RECEIVER ERROR. REGISTER (SEL 2) =/	
(1)	012615	015	000012		M861:	.ARCTZ	<15><12>	
(1)	012620	005015	042522	042503	M862:	.ARCTZ	<15><12>/RECEIVED DATA = /<15><12>	
(1)	012645	015	042012	052101	M863:	.ARCTZ	<15><12>/DATA SHOULD BE/<15><12>	
(1)	012670	005015	046120	040505	M864:	.ARCTZ	<15><12>/PLEASE MAKE CONNECTION (DIAL NUMBER)./	
(1)	012737	015	053412	042510	M865:	.ARCTZ	<15><12>/WHEN CONNECTION COMPLETED HIT CONTINUE SWITCH./<15><12>	
(1)	013022	005015	046120	040505	M866:	.ARCTZ	<15><12>/PLEASE MAKE CONNECTION (DIAL NUMBER)./<15><12>	
(1)								
(1)	013074	000000			.EVEN			
043	013076	000000			SAVR0:	R		
044	013100	000000			SAVR1:	R		
045	013102	000000			SAVR2:	R		
046	013104	000000			SAVR3:	R		
047	013106	000000			SAVR4:	R		
048	013110	000000			SAVR5:	R		
049	013112	000000			DELAY:	R		
050	013114	000000			BACK:	R		
051					STOP:	R		

```

952
953
954
955
956 013116 005037 011032 STARTX1 CLR TIME
957 013122 005737 013110 TST DELAY IF SW04=1 & SW14=0 WAIT BEFORE TURNING ON TX
958 013126 001416 REQ IS NO GO AHEAD AND TURN ON TX
959 013130 005037 013504 CLR TEMP1 IPREPARE 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
965 013160 005037 013110 CLR DELAY IZERO DELAY
966 013164 013737 011070 181 MOV TXDA,XDA ISETUP XMIT DATA ADDR.
967 013172 042700 100000 RLC 0XFLG,R0 IRESET XMIT COMPLETE FLAG
968 013176 052714 000002 RIR 0DTR,0RXCSR ISET DTR
969 013202 005737 013114 TST STOP
970 013206 001005 RNF 28
971 013210 104000 012670 TYPE ,MSG4
972 013214 000000 HALT
973 013216 005137 013114 COM STOP
974 013222 032737 000010 011012 281 RIT 0HALF,DUPLEX,PARAM1
975 013230 001403 REQ 39
976 013232 032714 010000 481 RIT 010000,0RXCSR IIS CARRIER UP
977 013236 001375 RNF 48 IOR IF YES
978 013240 052714 000004 781 RIR 0RTS,0RXCSR ISET RTS
979 013244 032714 020000 CTSW1 RIT 0CTS,0RXCSR IIS CLEAR TO SEND SET?
980 013250 001017 RNF CTSOK IOR IF YES
981 013252 023727 011032 000036 CTSW1 CMP TIME,036 I30 SECS ELAPSED?
982 013260 103771 RLO CTSW IOR IF NO
983 013262 011402 MOV 0RXCSR,R2 ISETUP RECEIVE CSR
984 013264 016403 000004 MOV TXCSR(R4),R3 ISETUP XMIT CSR
985 013270 032777 010000 175546 RIT 0SW12,0SWR IINHIBIT PRINTOUTST
986 013276 001001 RNF 18 IOR IF YES
987 013300 104002 HLT+2 IPRINTOUT "WAITING TO XMIT" MESSAGE
988 013302 005037 011032 181 CLR TIME IRESET TIMER
989 013306 000746 RR CTSW IWAIT SOME MORE
990 013310 005037 011032 CTSOK1 CLR TIME
991 013314 012737 000005 013412 MOV 05,SYNCRN ISETUP SYNC. COUNTER
992 013322 032737 000010 011012 RIT 0HALF,DUPLEX,PARAM1
993 013330 001404 REQ 28
994 013332 052764 000030 000004 RIR 0SEND,0H0XEN,TXCSR(R4)
995 013340 000003 RR 18
996 013342 012764 000020 000004 281 MOV 0SEND,TXCSR(R4) ISET SEND
997 013350 013764 011014 000006 181 MOV PARAM2,TXDRUP(R4) ILOAD A SYNC CHAR
998
999 013356 105764 000004 TSTR TXCSR(R4) IIS XMIT READY(TXDONE=1?)
1000 013362 100375 RPL 0=0 IOR IF NO
1001 013364 005347 013412 DEC SYNCRN IDECREMENT COUNTER
1002 013370 001367 RNF 18 IOR IF NOT ZERO
1003 013372 042764 000000 000006 RLC 0TXDM,TXDRUP(R4)
1004 013400 052764 000100 000004 RIR 0TXINTE,TXCSR(R4) ISET XMIT INTERRUPT ENABLF
1005 013406 000240 NOP
1006 013410 000207 RTR PC IEXIT FROM SUBROUTINE
1007 013412 000000 SYNCNO: 0

```

```

1000
1009
1010
1011
1012 013414
1013 013414 005737 013114
1014 013420 0010P6
1015 013422 052714 000002
1016 013426 104400 013022
1017 013432 005137 013114
1018 013436 005037 011032
1019 013442 013737 011020 011066
1020 013450 012737 001000 011064
1021 013456 042700 040000
1022 013462 005037 011034
1023 013466 005037 011036
1024 013472 005764 000002
1025 013476 052714 005522
1026 013502 000207
1027 013504 000000
1028 013506 000000

/*****
/ INITIALIZE RECEIVER SUBROUTINE
/*****
STARTR:
      TST      STOP          IFIRST TIME HERE?
      ANP      IS            ISR IF NO
      RIR      DTR,ORICSR    ISET DTR
      TYPE     ,MSGS         IMAKE CONNECTION
      COM      STOP
      CLR      TIME
      MOV      IRDA,RDA      ISETUP RCV DATA ADDR
      MOV      01000,RCC     ISETUP RCV CHAR COUNT
      RIR      00FLG,R0      IRESET RCV COMPLETE FLAG
      CLR      ERCSR        IRESET ERROR RECORDS
      CLR      ERRNR
      TST      RYDDUP(R4)    ICLR ANY RYDDONE
      RIR      00INTEN,RCVEN,ISTPSYN,IOTR,ORICSR ISET INTER ENABLE & STRIP SYNC BOTH
      RTR      PC           IEXIT 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 000004 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 013614
1072 013714 123737 011041 013506 181
1073 013722 001004
1074 013724 042714 000520
1075 013730 052700 040000
1076 013734 005737 013504
1077 013740 100003
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      IF FINISHED TRANSMITTING?
      BNE  XISR1              IF NOT
      R13  0XFLG, R0          IF SET XMIT COMPLETE FLAG
      R13  0TXINTP, SEND, TXCSR(R4)  IF SET XMIT INTR ENABLE
      BIC  0RYS, 0RXCSR      IF SET RYS
      RR   XISR2              I
/
XISR11: MOVB 0X0A, TXDBUF(R4); XMIT NEXT CHAR.
      R13  0100, 0SMR      IF MONITOR OUTPUT?
      REQ  NOXMON          IF NOT
      TSTB 0TPB          IF TTY AVAILABLE
      RPL  NOXMON          IF NOT
      MOVB 0X0A, 0TPB; TYPE THE CHAR
NOXMON1:
XISR21: INC  X0A          INCREMENT ADDRESS
      CLW  TIME          RESET TIMER
      RTI              RETURN FROM INTERRUPT
*****
/ RECEIVE INTERRUPT SERVICE ROUTINE
*****
RISR1: NOP
      MOV  0RXCSR, R2      ISAVE RXCSR CONTENTS
      MOV  TXCSR(R4), R3   ISAVE TXCSR CONTENTS
      MOV  RXDBUF(R4), TEMP1  ISAVE CHAR AND ERROR FLAGS IF ANY
      MOVB TEMP1, TEMP2
      MOVB TEMP1, 0R0A     IMOVE CHAR TO INBUF
      R13  000, 0SMR      IF MONITOR INPUT?
      REQ  NORMON        IF NOT
      TSTB 0TPB          IF TTY AVAILABLE?
      RPL  NORMON        IF NOT
      MOVB TEMP2, 0TPB; TYPE THE CHAR
NORMON1:
      INC  R0A          IBUMP POINTER
      PLW  0R0A          ICLEAR NEXT CHAR POSITION
      DEC  R0C          IDECREMENT CHAR. COUNTER
      RNF  10          IF BUFFER NOT FULL
      BIC  0RINTEN, RCVEN, STPSYN, 0RXCSR  IF SET INTERRUPT ENAB
      HLT+6          IF RECEIVER BUFFER FULL
      JSR  PC, STARTR     INITIALIZE RECEIVER
      CMPB RX, TERM, TEMP2  IF IT LINE FEED?
      BNE  RISR1          IF NOT
      BIC  0RINTEN, RCVEN, STPSYN, 0RXCSR  IF DISABLE INTERRUPT
      R13  00FLG, R0      IF SET RCVR COMPLETE FLAG
      TST  TEMP1          IF THERE A DATA ERROR
      RPL  RISR2          IF NOT
      MOV  R2, 0RXCSR     ISAVE RXCSR
      MOV  TEMP1, 0RDBUF  ISAVE RXDBUF
      TST  R2          IF THERE A DATA SET STATUS CHANGE
      RPL  RISR3          IF NOT
      MOV  R2, 00STAT     ISAVE STATUS
      R13  000FLG, R0    IF SET FLAG
RISR3:

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820 0023

1005 013770 005037 011032
1006 013774 000002
1007 000001

.END

FLR TIME
RTI

INSET TIMER
RETURN FROM INTERRUPT

ABORT = 002000	DBFLC = 020000	OVRUN = 040000	RWAIT = 104410	TEST0 = 012324
BA = 011004	DBINTE = 000040	OWI = 000002	RXCOR = 0000004	TEST0X = 012330
BACK = 013112	DSR = 001000	OWO = 000001	RXDUP = 000002	TIE = 000100
BITH = 002000	DSSTAT = 011000	PARAM1 = 011012	RXDONE = 000200	TIME = 011032
BITY = 000001	DTR = 000002	PARAM2 = 011014	RXERR = 100000	TNO = 011074
BITY1 = 000002	DUP11 = 011000	PARAM3 = 011016	RX.TER = 011041	TNS = 011072
BITY10 = 002000	ENTER = 012232	PARCOR = 000002	R6 = 0000006	TP0 = 011100
BITY11 = 004300	EOP = 012164	PRIOR = 011010	R7 = 0000007	TPB = 011076
BITY12 = 011000	ENCOR = 011034	PRISFC = 010000	SAVR0 = 013074	TSDM = 000400
BITY13 = 020000	ERDOR = 011036	PRTY0 = 000000	SAVR1 = 013076	TSTDAT = 012360
BITY14 = 040000	FLAG = 011042	PRTY1 = 000040	SAVR2 = 013100	TXACT = 001000
BITY15 = 100000	FULL.D = 000001	PRTY2 = 000100	SAVR3 = 013102	TXCOR = 000004
BITY2 = 000004	GO = 011210	PRTY3 = 000140	SAVR4 = 013104	TXDUP = 000006
BITY3 = 000010	HALF.D = 000010	PRTY4 = 000200	SAVR5 = 013106	TXDONE = 000200
BITY4 = 000020	MAXEN = 000010	PRTY5 = 000240	SCAN4 = 012370	TXINTE = 000100
BITY5 = 000040	IL0 = 000010	PRTY6 = 000300	SCAN5 = 012454	TX.TER = 011040
BITY6 = 000100	IRDA = 011020	PRTY7 = 000340	SEND = 000000	TYPE = 104400
BITY7 = 000200	IXDA = 011022	OTPIE = 012322	SETTLE = 011024	USER = 000000
BITY8 = 000400	KBDIN = 104416	RABORT = 002000	SRCOR = 011052	XCC = 011042
BITY9 = 001000	LOOP = 000020	RCC = 011064	SRO = 002000	XCOR = 000004
B2016 = 011030	MEXT = 010000	RCSR = 0000004	START = 011102	XDA = 011070
CARDET = 010000	MINT = 014000	RCVEN = 000020	STARTX = 013414	XFLC = 100000
CLK = 020000	MMODEA = 004000	RDA = 011046	STAT = 013116	XISR = 013510
CRCEN = 001000	MMODEB = 010000	RMAX = 012502	STAY = 000000	XISR1 = 013542
CRCERR = 010000	MODE = 000000	REACT = 004000	STD = 000010	XISR2 = 013600
CTS = 020000	MRESET = 000400	REFM = 001000	STOP = 013114	XLB = 000004
CT8OK = 013310	M860 = 012534	RFLC = 040000	STPB = 104414	XWAIT = 104412
CT8W = 013244	M861 = 012615	RING = 040000	STPSYN = 000400	XL0 = 011504
CT8WN = 013252	M862 = 012620	RINTEN = 000100	SWR = 011044	SOVI = 011300
DECMOD = 100000	M863 = 012645	RISR = 013606	SW12 = 010000	SOMO = 011400
DELAY = 013110	M864 = 012670	RISR1 = 013734	SXCOR = 011050	SXLB = 011734
DERR = 012522	M865 = 013022	RISR2 = 013754	SYNCHO = 013412	.
DISPLA = 011046	MTDATA = 040000	RISR3 = 013770	SYSTST = 004000	013776
DNA = 100000	MODAT = 000200	RIV = 011006	TEMP1 = 013504	
DSC = 100000	NORMON = 013664	R80M = 000400	TEMP2 = 013506	
DSC2 = 000001	NOXMON = 013574	RTS = 000004	TEOM = 001000	

. ABS. 013776 000

ERRORS DETECTED: 0
 DEFAULT GLOBALS GENERATED: 0

,DUP/SOL,ITP1,MAC,DZDPFB.P11
 RUN-TIME: 10 13 .4 SECONDS
 RUN-TIME RATIO: 67/24=2.7
 CORE USED: 15K (20 PAGES)

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