IDENTIFICATION

PRODUCT CODE: NAINDEC-11-OZJD-9-D
PRODUCT NAME: DJ11 OVERLAY FOR INTERPROCESSOR TEST PROGRAM
PROGRAM DATE: OCTOBER 1976
MAINTAINER: DIAGNOSTICS
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          JOHN ULRICH
          FAY ENGLISH

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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 line 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 (ZITP) or 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 DJII communication interface.

2.2 STORAGE

4K of core

3.0 LOADING PROCEDURE

This program is in absolute format. The AIB loader must be used to load the program.

4.0 OPERATING PROCEDURES.

A. Two methods of entering parameters are provided.
   A: Load address 200 and start to enter parameters from console TTY, proceed to section B.
   B: Load address 200 and set switch register bit 15 is before starting to enter parameters from console switches, proceed to section C.

The program may be Restarted at LOC 204 (once parameters have already been selected).

B. Console Dialogue Parameter Input (current values for parameters are found in overlay)

1. The program will type out the name of the variable overlay.
   A: If you wish to setup just the indicated overlay, type a carriage return
   B: If you wish to setup a DILL, type ON.
   C: If you wish to setup a DRILL, type On.

   If on or DMB was typed in step 1 above then the bus address vector etc. referred to in steps 2 thru 7, pertain to the DILL or DMB.

2. The program will type the default bus address of the interface under test.
   A: Type a CDR, return to use default bus address
   B: TypELn actual bus address

3. The program will type out the default vector address
   A: Type a CDR, return to use default address
   B: TypELn actual vector address

4. The program will type out the default interface priority
   Note: 200=PAIO 4, 240=PAIO 5, 300=PAIO 6, etc.
5. THE PROGRAM WILL TYPEOUT THE DEFAULT VALUE OF PARAM1
   IF REQUIRED BY THE ISA. (SEE SECT. 10.10 IN OVERLAY LISTING FOR PARAMETER DESCRIPTION)
   A. TYPE A CAR. RETURN TO USE DEFAULT VALUE
   B. TYPE IN ACTUAL VALUE

6. THE PROGRAM WILL TYPEOUT THE DEFAULT VALUE OF PARAM2
   IF REQUIRED BY THE ISA.
   A. TYPE A CAR. RETURN TO USE DEFAULT VALUE
   B. ENTER ACTUAL VALUE

7. THE PROGRAM WILL TYPEOUT THE DEFAULT VALUE OF PARAM3
   IF REQUIRED BY THE OVERLAY.
   A. TYPE A CAR. RETURN TO USE DEFAULT VALUE
   THE DN-11 WILL USE PARAM #3 AS THE # TO DIAL
   IF USING A MODERN WITHOUT AUTOMATIC HANDSHAKING,
   THE NUMBER MUST TERMINATE WITH A
   "END-OF-NUMBER" CHARACTER (;).
   B. ENTER ACTUAL VALUE.

8. THE PROGRAM WILL RETURN TO STEP B1 IF THIS SETUP
   WAS FOR DNL OR DNL180.

9. THE PROGRAM WILL REQUEST THAT SWITCH REGISTER BE SET.
   A. SETUP SWITCH REGISTER AS SPECIFIED IN STEP 6.
      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 ISRA INTERFACE SERVICE ROUTINE SPECIFICATION
   SM114-SETUP DM-11B ISR
   SM112-SETUP DM-11 ISR
   SN1=000000=SETUP VARIABLE ISR

2. THE FOLLOWING HALTS ARE REPEATED FOR EACH ISR SPECIFIED.
   SETUP SEQUENCE IS: DM11, DM11-28 THEN VARIABLE OVERLAY. (EACH ENTRY SET SWICHES 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 #1 (SEE SECTION 10.0 IN Overlay Listing for Parameter Description)
   E. HALT FOR INTERFACE PARAM #2 (DM11 AND DM12 PARAMETERS ARE DISCUSSED IN SECTION 10.0 OF THE MONITOR)
   F. GO BACK TO STEP A IF THIS SETUP WAS FOR DM OR DM2.

3. HALT FOR OPERATIONAL SWITCH SETTINGS. (SEE STEP D.)
   A. PRESS CONTINUE TO START TESTING

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

THIS WILL REQUIRE 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
CONFORMING ON THE NODE 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 DM-11).
D. OPERATIONAL SWITCH SETTINGS.

SW1=1: HALT ON ERROR

SW4=1: SINGLE PASS

SW4 HAS NO EFFECT IF SW4=0

SW3=1: HIDE ERROR TYPEOUTS

SW3=1: HIDE ALL TYPEOUTS EXCEPT ERRORS

IF SW1=0 AND SW3=1, END PASS IS TYPED AND TRANSMITTED RECEIVED DATA IS TYPED.

SW1=1: USE PREVIOUSLY SPECIFIED DATA

SW3=1: DATA SELECT (WITH SW3)

SW4=1: DATA SELECT (WITH SW4)

SW5=1: GET DATA FROM OPERATOR

D1=1: TEST MESSAGE 1 (SB QUICK BROWN FOX)

D2=1: TEST MESSAGE 2 (12 HUMANI)

D3=1: TEST MESSAGE 3 (12 TEKNO/QUICK BROWN FOX/HUMANI)

SW5=1: TRANSMIT RECEIVED DATA (INTERNAL LOOPBACK NODE)

SW6=1: DO NOT TEST RECEIVED DATA

SW7=1: MONITOR TRANSMITTED DATA ON CONSOLE TTY.

SW8=1: MONITOR RECEIVED DATA ON CONSOLE TTY.

9 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 OR THE BaUDS, ALL CHARACTERS MAY NOT APPEAR ON THE CONSOLE.

SW4=1: RETURN TO MONITOR FOR END PASS

WHEN SW4=0 PROGRAM LOOPS IN THE OVERLAY NEVER RETURNING TO THE MONITOR.

SW5=1: INTERNAL LOOPBACK NODE

SW6=1: EXTERNAL LOOPBACK NODE

SW7=1: ONE-WAY-IN NODE

SW8=1: ONE-WAY-OUT NODE
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=OC.176) 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.

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: (UL) 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 (Ctrl-G) on the 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) during routines, after halts, end of pass, and other applicable areas.

If operator specified data has 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 (UL) (up arrow) followed by the octal code (in the range 000 to 377) separated by spaces and terminated by (UL) (up arrow).

I.E. ABO9 0123 3777 (CR) (RETURN)

A typical switch setting for full-duplex=002144 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 83.

A typical switch setting for full-duplex=003190 This setting uses 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 1 CR (016). If (012) receive terminating character (001). A fill (177) and a transmit terminating character (000). During transmission, when a null character is seen, the transmission is stopped. During reception, when a null character is received, the receiver is shut off.

If the message was input by the operator, the terminating characters are added.
TEST MODES

INTERNAL LOOPBACK MODE

1. THE OVERLAY WAITS TO RECEIVE A MESSAGE (TERMINATED BY (0D1))
2. VERIFIES THE DATA AGAINST THE DATA SELECTED BY SND9 AND SND10 (SM7=0)
3. TRANSMITS THE DATA SELECTED BY SND9 AND SND10 (SM8=0) OR
   TRANSMITS THE RECEIVED DATA (SM8=1)
4. RETURNS TO MONITOR FOR "END PASS" (SM4=1) OR
   GO TO STEP 1 (SM4=0)

EXTERNAL LOOPBACK MODE

1. THE OVERLAY SETS REQUEST TO SEND
2. WAITS FOR CLEAR TO SEND
3. TRANSMITS THE SELECTED DATA
4. RESETS REQUEST TO SEND
5. WAITS FOR MESSAGE TO BE RECEIVED
6. VERIFIES THE DATA (SM7=0)
7. RETURNS TO MONITOR FOR "END PASS" (SM4=1) OR
   GO TO STEP 1 (SM4=0)

ONE-WAY-IN MODE

1. THE OVERLAY WAIT FOR MESSAGE TO BE RECEIVED.
2. VERIFIES THE DATA (SM7=1)
3. RETURNS TO MONITOR FOR "END PASS" (SM4=1) OR
   GO TO STEP 1 (SM4=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" (SM4=1) OR
   GO TO STEP 1 (SM4=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 PRINT OUT A "WAITING FOR CLEAR TO SEND"
   MESSAGE AND THE CONTENTS OF THE WAIT CSR EVERY 60 SECS.
   UNTIL CLEAR TO SEND IS ASSERTED.
F. IF S#H=0 THE OVERLAY WILL CONTINUE TO
   TRANSMIT/RECEIVE DATA.

   IF S#H=1 THE OVERLAY WILL RETURN
   TO THE MONITOR AND TYPE "END PASS".

   IF BOTH S#H=1 AND S#H=1, THE PROGRAM WILL REQUEST
   NEW INTERFACE PARMERS AFTER ONE PASS OF THE SELECTED
   TEST NODE.

   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:
   #000000X TO PRINTOUT THE 8 WORDS
   AT LOC XXXXXX.
   #000000X 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 11030 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
   MATCH, THE FOLLOWING ERROR REPORT IS PRINTED:

   RECEIVED DATA=????
   DATA SHOULD BE ????
   DATA COMPARE ERROR; BAD DATA=???
WHERE PARR is the receive buffer (up to 512 characters)
TTTTT is the transmit buffer (up to 512 characters)
00000 is the ISO data character
GGGGG 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 =00000
WHERE 00000 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 (0D0A) 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 PAP-11 system
unless one of the systems is always operating in a fixed
node. The following table lists the valid combinations:

<table>
<thead>
<tr>
<th>CPU 11</th>
<th>CPU 12</th>
</tr>
</thead>
<tbody>
<tr>
<td>ONE-WAY-OUT</td>
<td>ONE-WAY-IN</td>
</tr>
<tr>
<td>ONE-WAY-IN</td>
<td>ONE-WAY-OUT</td>
</tr>
<tr>
<td>EXTERNAL-LOOPBACK</td>
<td>INTERNAL-LOOPBACK</td>
</tr>
<tr>
<td>INTERNAL-LOOPBACK</td>
<td>EXTERNAL-LOOPBACK (FULL DUPLEX)</td>
</tr>
</tbody>
</table>

When the communication link involves modems the following
restriction apply:

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 9. This will result in overrun or SSO over-
run errors, depending on the device. To avoid this situation
run with switch 13 up. If overrun does occur during a
typeout the program should be restarted.

If using an asynchronous device, modems and the
pap110 test station and with loc does not clear the
connection (example the P311) if the program is restarted
on the nodel of a message at loc 204 or by hitting or
an immediate error message from pap110 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

ITCP HAS CHECKED OUT USING THE FOLLOWING BELL TELEPHONE MODEMS.

202A (FULL-DUPLEX SYNCHRONOUS 2000 BAUD)
205C (FULL-DUPLEX SYNCHRONOUS 1200 BAUD)
102A (FULL-DUPLEX ASYNCHRONOUS 110 BAUD)

9.0 PROGRAM DESCRIPTION

9.1 THE DII1 INTERFACE SERVICE PARMS ARE SET UP, AS SPECIFIED BY THE OPERATOR,
BY THE ITCP CONTROL PROGRAM.

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

9.2 WHEN THE OVERLAY IS FIRST ENTERED BY ITCP AT LOCATION START;
THE CONTENTS OF THE SELECT 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 SET UP.
THE SELECTED ROUTINE DETERMINED BY THE MODE IS THEN ENTERED

9.3 THE OVERLAY THEN LOOPS IN ROUTINES: SOWI, IF "ONE WAY IN" MODE
HAS BEEN SELECTED. SOWO, IF "ONE WAY OUT" MODE HAS BEEN SELECTED.
SILB, IF "INTERNAL LOOP BACK" MODE HAS BEEN SELECTED.
SOLB, IF "EXTERNAL LOOP BACK" HAS BEEN 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 60 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 RECIIVER 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 SOLB: IF IN HALF-DUPEX 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" RESPONSE IS TYPED EVERY 50 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 8.0.
IF IN FULL-DUPLEX THE RECEIVED AND TRANSMITTER ARE INITIALIZED
A "WAITING" RESPONSE IS TYPED EVERY 50 SEC IF THERE IS NO
ACTION. WHEN BOTH THE RECEIVER AND TRANSMITTER ARE DONE DATA IS
CHECKED, END PASS IS TYPED AND PROGRAM LOOP TO 8.0 DEPENDING
ON THE SWITCH SETTINGS.

9.4 THE RETURN TO MONITOR ROUTINE FOR END PASS AT 8.0:
LOCKS OUT INTERRUPTS AND SHOES THE TRANSMITTER INTERRUPT ENABLE
BIT AND ALL GENERAL REGISTERS. IT THEN RETURNS TO THE MONITOR
TO TYPE "END PASS". THE MONITOR CHECKS SYS IF UP IT RETURNS
TO ENTER; OTHERWISE IT RESTARTS THE PROGRAM.

9.5 ENTER IS ENTERED FROM THE MONITOR AFTER TYPEING "END PASS".
IT RESTORES THE GENERAL REGISTERS AND THE TRANSMITTER CSA
AS STORED IN 8.0, THE DELAY FLAG IS SET AND PROGRAM RETURNS TO
THE SCAN ROUTINE(8.0, X0, X1, X2, X3) WHERE IT CAME FROM.

9.6 THE INITIALIZE TRANSMIT SUBROUTINE AT 8.0:
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 PARAM TO DETERMINE IF HALF-DUPLEX OPERATION
HAS BEEN SELECTED. IF IT HAS, THE
SUBROUTINE WAITS FOR CLEAR TO SEND.
IF CLEAR TO SEND IS CLEARED, "WAITING FOR CLEAR TO SEND" PHOTOGRAPH OCCURS
EVERY 3.0 SECONDS UNTIL CLEAR TO SEND IS ASSERTED.

9.7 THE INITIALIZE RECEIVED SUBROUTINE AT 8.0:
SETS UP THE INTERFACE AND POINTERS NECESSARY TO
RECEIVE A MESSAGE.

9.8 THE TRANSMIT INTERRUPT SERVICE ROUTINE
AT X8:4, 1S ENTERED VIA TRANSMIT INTERRUPTS
FROM THE INTERFACE.
A TEST IS MADE TO SEE IF THE LAST CHARACTER
TRANSMITTED HAD A NULL (ALL ZEROS) CHARACTER.
IF A TEST IS THE TRANSMIT LOGIC IN THE INTERFACE
AND THE TRANSMIT COMPLETE FLAG IS SET.
AT X8:8, 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 X8:0, 1S 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 ALL, THE
        CBA AND DBA WILL BE SHOWN AND PRINTED OUT
        AFTER THE COMPLETE MESSAGE HAS BEEN RECEIVED.

9.10  THE DATA TEST SUBROUTINE AT TESTD: IS
      ENTERED AFTER A COMPLETE MESSAGE HAS BEEN
      RECEIVED.
      IF A 'RECEIVE ERROR' HAS 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 OJII

   PARA#1 IS THE LINE NUMBER IN OCTAL, DEFAULT= LINE 0
   PARA#2 BIT 0 IS FULL DUPLEX (1), DEFAULT= FULL DUPLEX (1)
   PARA#3 IS NOT USED (177777)
<table>
<thead>
<tr>
<th>Address</th>
<th>Instruction</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>0110E2</td>
<td>MOV D00100</td>
<td>PC STARTR</td>
</tr>
<tr>
<td>0110E2</td>
<td>CLOF, STAT</td>
<td>TIME</td>
</tr>
<tr>
<td>000004</td>
<td>TIME, #100</td>
<td></td>
</tr>
<tr>
<td>0110E2</td>
<td>MCR, #02</td>
<td></td>
</tr>
<tr>
<td>000000</td>
<td>ASR(A1), R3</td>
<td></td>
</tr>
<tr>
<td>000200</td>
<td>17717D</td>
<td>TESTD</td>
</tr>
<tr>
<td>000000</td>
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<td>011710</td>
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<tr>
<td>0115E2</td>
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<td>USE EXTERNAL DATA?</td>
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<tr>
<td>0116E2</td>
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<tr>
<td>0110E8</td>
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</tr>
</tbody>
</table>

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 for, if "NO" is received; it is given.
Once the transmitter is enabled, after the whole message is transmitted, the cycle is repeated as above.
When the program is running in the "external loopback" mode, either half or full duplex may be selected. In this mode, "external loopback" 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.
ROUTINE TO RETURN TO MONITOR FOR END PASS.

**EOP**:
- SET PS PRIORITY TO 7
- SAVE TX CSR
- CLEAR ALL BUT TX IE
- CLEAR TX IE (EVEN IF IT HAN'T SET)
- SET FOR RETURN IF SW 14-1
- SAVE REGISTER D
- RETURN TO CONTROL PROGRAM

**ENTER**:
- SAVE RO, RD
- RESTORE RO
- RESTORE RD
- RESTORE RS
- RESTORE RF
- RETURN TO CONTROL PROGRAM

**SUBROUTINE TO CHECK RECEIVER DATA.**

**TEST**:
- HAS THERE A RECEIVE ERROR?
- IF NO
- IF YES

**TSCRD**:
- TYPE RX, RXAD
- TEST TX, TXAD
- DATA OK?
- IF OK
- IF YES

**TSCRD**:
- TYPE RX, RXAD
- TEST RX, RXAD
- DATA OK?
- IF OK
- IF YES
RECEIVER INITIALIZATION SUBROUTINE

;FIRST TIME HERE?
;BR IF NO
;TYPE "MAKE CONNECTION"
;COMPLEMENT STOP

FULL DUPLEX, PARITY: FULL DUPLEX?
;BR IF NO
;FULL MODE?
;BR IF NO
;START DELAY

;SET UP RECEIVER DATA ROD
;SET UP BUFFER LIMIT
;CLEAR ERROR RECORDS

KEEP CLEARING UNTIL BIT IS CLEAR
PC

DID RECEIVER DONE SET?
;BR IF YES
;SAVE CSR

ERROR RECEIVER INTERRUPTED BUT DONE NOT SET
GET CHAR
STRIP A BIT
AS CHAR PRESENT SET
;BR IF YES
;SAVE CSR

ERROR CHAR PRESENT NOT SET
CHECK FOR RECEIVER ERRORS
;BR IF NO ERRORS

STORE CHAR
MONITOR MODE?
;BR IF NO
IS TTY READY?
;BR IF NO
;TYPE CHAR
INC PAGE POINTER
CLEAR NEXT POSITION
DEC CHAR COUNT
BUFFER FULL YET?
STOP THE SHOW, BUFFER OVERFLOWED
; RECEIVER BUFFER FULL

; IS CHAR 001?

; CLEAR RECEIVER INTERRUPT ENABLE

; SET R DONE FLAG

; GO HOME

; RECEIVED BUFFER FULL ERROR

; ERROR: TRANSMITTER SCAN STOPPED ON WRONG LINE