DU11

OVERLAY FOR ITEP

MD-11-DZDUO-B

EP-DZDUO-B-DL-A

FICHE 1 OF 1

NOV 1976

digital

MADE IN U.S.A.

IDENTIFICATION

PRODUCT CODE: MAINDEC-11-DZDUO-B-D

PRODUCT NAME: DU11 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 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 DU11 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 20[illegible] AND SET SWITCH REGISTER BIT 15 BEFORE
STARTING TO ENTER PARAMS FROM CONSOLE SWITCHES, PROCEED TO SECTION C.
*THE PROGRAM [illegible]Y 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 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 DM11BB, 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 DMBB.

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=PRIO 4, 240=PRIO 5, 300=PRIO 6, ETC.

A. TYPE A CAR. RETURN TO USE DEFAULT VALUE
B. TYPEIN ACTUAL VALUE

5. THE PROGRAM WILL TYPEOUT THE DEFAULT VALUE OF PARAM#1
IF REQUIRED BY THE ISR.(SEE SECT. 10.0 IN OVERLAY LISTING FOR PARAMETER DESCRIPTION)
A. TYPE A CAR. RETURN TO USE DEFAULT VALUE
B. TYPEIN ACTUAL VALUE

6. THE PROGRAM WILL TYPEOUT THE DEFAULT VALUE OF PARAM#2
IF REQUIRED BY THE ISR.
A. TYPE A CAR. RETURN TO USE DEFAULT VALUE
B. ENTER ACTUAL VALUE

7. THE PROGRAM WILL TYPEOUT THE DEFAULT VALUE OF PARAM#3
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 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 B1 IF THIS SETUP
WAS FOR DN11 OR DM11BB.

9. THE PROGRAM WILL REQUEST THAT SWITCH REGISTER BE SET.
A. SETUP SWITCH REGISTER AS SPECIFIED IN STEP D.
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-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,DM11-BB 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 SECT. 10.0 IN OVERLAY LISTING FOR PARAMETER DESCRIPTION)
E. HALT FOR INTERFACE PARAM #2 (DN11 AND DMBB 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 PROCEEDURES
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 SW04=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 #1 ($A QUICK BROWN FOX)
    10=1 TEST MESSAGE #2 ($B NUMERICS)
    11=1 TEST MESSAGE #3 ($C COMTEST/QUICK BROWN FOX/NUMERICS)
SW08=1 TRANSMIT RECEIVED DATA (INTERNAL LOOPBACK MODE)
SW 7=1 DO NOT TEST RECEIVED DATA
SW 6=1 MONITOR TRANSMITTED DATA ON CONSOLE TTY.*
SW 5=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 PASSES LOOPS IN THE OVERLAY NEVER RETURNING TO THE MONITOR.
SW03=1 INTERNAL LOOPBACK MODE
SW02=1 EXTERNAL LOOPBACK MODE
SW 1=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=LOC. 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

(IE) SWR=XXXXXX 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
(CNTL 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. ABCD↑ 000 123 377↑ EFG (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 FILLS(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 OPERATER, THE TERMINATING CHARACTERS ARE ADDED.

TEST MODES

INTERNAL LOOPBACK MODE

1. THE OVERLAY WAITS TO RECEIVE A MESSAGE (TERMINATED BY <001>)
2. VERFIES 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 SW04=0 THE OVERLAY WILL CONTINUE TO
TRANSMIT/RECEIVE DATA.

IF SW04=1 THE OVERLAY WILL RETURN
TO THE MONITOR AND TYPE "END PASS".

IF BOTH SW04=1 AND SW14=1, 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:

#WXXXXXX	TO PRINTOUT THE 8 WORDS AT LOC XXXXXX.
*BXXXXXX	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 MANUALY 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=BBB  GOOD DATA=GGG
```

WHERE RRRRRR IS THE RECEIVE BUFFER (UP TO 512 CHARACTERS)
TTTTTT IS THE TRANSMIT BUFFER (UP TO 512 CHARACTERS)
BBB 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(DC1) 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 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 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 ASYNCRONOUS DEVICE, MODEMS AND THE
MAYNARD TEST STATION AND INITALIZE 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 IMMEDEATE ERROR MESSAGE FROM MAYNARD WILL BE RE-

CEIVED. THIS IS BECAUSE THE TEST STATION IS STILL LOOKING
FOR THE REST OF THE INTERUPTED 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 DU11 INTERFACE SERVICE PARAMS ARE SETUP, AS SPECIFIED BY THE OPERATOR,
BY THE ITEP CONTROL PROGRAM.

TIME: PROVIDES A MEANS OF MEASURING ELASPED 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 START:,
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: $OWI ,IF "ONE WAY IN" MODE
WAS SELECTED. $OWO,IF "ONE WAY OUT" MODE WAS SELECTED.
$ILB, IF "INTERNAL LOOP BACK" MODE WAS SELECTED.
$XLB,IF "EXTERNAL LOOP BACK" WAS SELECTED.

9.31 $OWI: 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 $OWO: 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 $OWO OR TYPES END PASS
DEPENDING ON SWITCH SETTINGS.

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

9.34 $XLB: 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 $XLB.
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 $XLB DEPENDING
ON THE SWITCH SETTINGS.

9.4 THE RETURN TO MONITOR ROUTINE FOR END PASS AT EOP:
LOCKS OUT INTERUPTS AND SAVES THE TRANSMITTER INTERUPT 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 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 CSR
AS SAVED IN EOP. THE DELAY FLAG IS SET AND PROGRAM RETURNS TO
THE SCAN ROUTINE(OWO,OWI,ILB XLB) 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 XISR:, 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 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 RISR:, THE
CSR AND DBR WILL BE SAVED 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' 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 DU11

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

PARAM#1(HIGH BYTE) IS LOADED INTO THE RECEIVER STATUS REGISTER (RXCSR).
BIT 8 STRIP SYNC (1), DEFAULT= STRIP SYNC (1)

PARAM#2 IS LOADED INTO THE PARAMETER STATUS REGISTER (PARCSR).
BITS 0-7 SYNC CHARACTER, DEFAULT= 26 (26)
BIT 8 PARITY SENSE SELECT (1), DEFAULT= (0)
BIT 9 PARITY ENABLE (1), DEFAULT= (0)
BITS 10,11 WORD LENGTH SELECT, DEFAULT= 8 BITS (11)
BITS 12,13 MODE SELECT, DEFAULT= INTERNAL SYNCHRONOUS (11)

PARAM#3 IS NOT USED (177777).

```
                                ;*****************************************************************
                                ;       DU11 INTERFACE SERVICE PARAMS
                                ;*****************************************************************
                        011000          .=11000
011000  052504  000040  DU11:   .ASCIZ  /DU /           ;ISR NAME
011004  160040          BA:     160040                  ;BUS ADDRESS
011006  000300          RIV:    300                     ;VECTOR ADDRESS
011010  000240          PRIOR:  240                     ;PRIORITY
011012  000410          PARAM1: STPSYN!HDXEN                    ;PARAM #1
011014  036026          PARAM2: SYNINT!EIGHT!NOPAR!26                   ;PARAM #2
011016  177777          PARAM3: 177777                  ;PARAM #3
011020  000000          IRDA:   .WORD   0               ;INITIAL READ DATA ADDRESS
011022  000000          IXDA:   .WORD   0               ;INITIAL XMIT DATA ADDRESS
011024  000000          SETTLE: .WORD   0               ;LINE SETTLE DELAY FLAG
011026  000000                  .WORD   0               ;
011030  000000          B2016:  .WORD   0               ;ADDR OF BIN TO OCT TYPE ROUTINE
011032  000000          TIME:   .WORD   0               ;TIMER
011034  000000                  .WORD   0               ;
011036  011102                  .WORD   START           ;ADDR OF START OF PROGRAM
011040                  TX.TERM:
011040     000                  .BYTE   000             ;TRANSMITTER TERMINATING CHAR.
011041                  RX.TERM:
011041     001                  .BYTE   001             ;RECEIVER TERMINATING CHAR.
011042  000000          FLAG:   .WORD   0
011044  177570          SWR:    177570
011046  177570          DISPLAY:177570

                                ;*****************************************************************
                                ;       CONSTANTS + WORKING STORAGE
                                ;*****************************************************************
                        000000          STAT=R0
                        100000          XFLG=100000                     ;XMIT COMPLETE FLAG
                        040000          RFLG=40000                      ;RCV COMPLETE FLAG
                        020000          DSFLG=20000                     ;DATA SET STATUS CHANGE FLAG
                        020000          BIT13=20000                     ;INHIBIT PRINTOUTS

011050  000000          SXCSR:  0               ;SAVED XMIT CSR
011052  000000          SRCSR:  0               ;SAVED RCV CSR
011054  000000          ERCSR:  0               ;RCV CSR SAVED ON ERROR
011056  000000          ERDBR:  0               ;RCV DATA REG SAVED ON ERROR
011060  000000          DSSTAT: 0               ;RCV CSR SAVED ON DS CHANGE

011062  000000          XCC:    0               ;XMIT CHAR COUNT
011064  000000          RCC:    0               ;RCV CHAR COUNT
011066  000000          RDA:    0               ;RCV DATA ADDR.
011070  000000          XDA:    0               ;XMIT DATA ADDR.

011072  177560          TKS:    177560
011074  177562          TKB:    177562
011076  177564          TPS:    177564
011100  177566          TPB:    177566

                        000001  FULL.DUPLEX=000001
```

```
                                ;*****************************************************************
                                ;       DU11-X INTERFACE SERVICE ROUTINE
                                ;*****************************************************************
011102  000240                  START:  NOP
011104  017700  177734                  MOV     @SWR,   R0      ;SETUP MODE IN R0
011110  042700  177400                  BIC     #177400,R0      ;STRIP JUNK
011114  013702  011006                  MOV     RIV,    R2      ;SETUP
011120  012722  013572                  MOV     #RISR,  (R2)+   ;INTERRUPT
011124  013722  011010                  MOV     PRIOR,  (R2)+   ;VECTORS
011130  012722  013474                  MOV     #XISR,  (R2)+   ;
011134  013722  011010                  MOV     PRIOR,  (R2)+   ;
011140  013704  011004                  MOV     BA,     R4      ;SETUP BUS ADDR INDEX
011144  013714  011012                  MOV     PARAM1, @RCSR   ;SETUP VARIABLES
011150  013702  011014                  MOV     PARAM2,R2       ;
011154  042702  000001                  BIC     #0001,R2        ;
011160  010264  000004                  MOV     R2,     XCSR(R4);IN CSR'S
011164  052764  000400  000004          BIS     #MRESET,TXCSR(R4)       ;MASTER RESET
011172  113764  011012  000004          MOVB    PARAM1,TXCSR(R4)        ;SET UP VARIABLES
011200  113764  C.1013  0000L1          MOVB    PARAM1+1,1(R4)  ;LOAD UPPER BYTE RXCSR
011206  013764  011014  000002          MOV     PARAM2,PARCSR(R4)       ;LOAD PARCSR
011214  004537  013770                  JSR     R5,STRIP        ;GO CALC PARITY
011220  011014                          PARAM2
                                ;*****************************************
                                ;       ROUTINE USED TO GOTO
                                ;       SUBROUTINE DEPENDENT
                                ;       ON MODE SELECTED.
                                ;*****************************************
011222  005037  011032          GO:     CLR     TIME
011226  005037  013122                  CLR     DELAY
011232  005037  013126                  CLR     STOP
011236  032700  000001                  BIT     #OWO,MODE
011242  001402                          BEQ     1$
011244  000137  011420                  JMP     $OWO
011250  032700  000002          1$:     BIT     #OWI,MODE
011254  001402                          BEQ     2$
011256  000137  011312                  JMP     $OWI
011262  032700  000010          2$:     BIT     #ILB,MODE
011266  001402                          BEQ     3$
011270  000137  011516                  JMP     $ILB
011274  032700  000004          3$:     BIT     #XLB,MODE
011300  001402                          BEQ     4$
011302  000137  011746                  JMP     $XLB
011306  000000                  4$:     HALT
011310  000776                          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".
```

```
                                ;*****************************.*************************************
                                
                                
                                
011312  104416                  SOWI:   KBDIN
011314  004737  013400                  JSR     PC,STARTR
011320  032700  040000          1$:     BIT     #RFLG,STAT
011324  001013                          BNE     2$
011326  023727  011032  000100          CMP     TIME,#100
011334  103771                          BLO     1$
011336  011402                          MOV     @RCSR,R2
011340  016403  000004                  MOV     XCSR(R4),R3
011344  104001                          HLT     1
011346  005037  011032                  CLR     TIME
011352  000762                          BR      1$

011354  032777  000200  177462  2$:     BIT     #NODAT,@SWR
011362  001002                          BNE     3$
011364  004737  012336                  JSR     PC,TESTD
011370  042700  040000          3$:     BIC     #RFLG,STAT
011374  032777  000020  177442          BIT     #LOOP,@SWR
011402  001405                          BEQ     4$
011404  012737  011416  013124          MOV     #4$,BACK
011412  000137  012176                  JMP     EOP
011416  000735                  4$:     BR      $OWI


                                ;*****************************************************************
                                ;       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.
                                ;*****************************************************************

011420  104416                  $OWO:   KBDIN
011422  004737  013130                  JSR     PC,STARTX
011426  005037  011032                  CLR     TIME
011432  032700  100000          1$:     BIT     #XFLG,STAT
011436  001013                          BNE     2$
011440  023727  011032  000100          CMP     TIME,#100
011446  103771                          BLO     1$
011450  011402                          MOV     @RCSR,R2
011452  016403  000004                  MOV     XCSR(R4),R3
011456  104001                          HLT     1
011460  005037  011032                  CLR     TIME
011464  000762                          BR      1$
011466  042700  100000          2$:     BIC     #XFLG,STAT
011472  032777  000020  177344          BIT     #LOOP,@SWR
011500  001405                          BEQ     3$
011502  012737  011514  013124          MOV     #3$,BACK
011510  000137  012176                  JMP     EOP
011514  000741                  3$:     BR      $OWO
```

```
                                ;*****************************************************************
                                ;       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 COMLPETE MESSAGE IS RECEIVED. IF DATA IS TO BE CHECKED
                                ;       IT IS; IF "END PASS" IS DESIRED; IT IS GIVEN.
                                ;       THEN THE TRANSMITTER IS ENABLED. AFTER THE WHOLE MESSAGE
                                ;       IS TRANSMITTED; THE CYCLE IS REPETED AS ABOVE.
                                ;*****************************************************************

011516  104416                  $ILB:   KBDIN
011520  004737  013400                  JSR     PC,STARTR
011524  005037  011032                  CLR     TIME
011530  032700  040000          1$:     BIT     #RFLG,STAT
011534  001013                          BNE     2$
011536  023727  011032  000100          CMP     TIME,#100
011544  103771                          BLO     1$
011546  011402                          MOV     @RCSR,R2
011550  016403  000004                  MOV     XCSR(R4),R3
011554  104001                          HLT     1
011556  005037  011032                  CLR     TIME
011562  000762                          BR      1$
011564  032777  000200  177252  2$:     BIT     #NODAT,@SWR
011572  001002                          BNE     3$
011574  004737  012336                  JSR     PC,TESTD
011600  042700  040000          3$:     BIC     #RFLG,STAT
011604  032777  000020  177232          BIT     #LOOP,@SWR
011612  001405                          BEQ     4$
011614  012737  011626  013124          MOV     #4$,BACK
011622  000137  012176                  JMP     EOP
011626  032777  000400  177210  4$:     BIT     #400,   @SWR    ;USE EXTERNAL DATA?
011634  001416                          BEQ     7$              ;BR IF NO
011636  013702  011020                  MOV     IRDA,   R2      ;SET POINTER
011642  013703  011022                  MOV     IXDA,   R3      ;SET POINTER
011646  010337  011070                  MOV     R3,     XDA     ;SETUP XMIT DATA ADDR
011652  112223                          MOVB    (R2)+,  (R3)+   ;MOVE INPUT TO OUTPUT
011654  001376                          BNE     .-2             ;LOOP IF NOT ZERO CHAR
011656  112743  000177                  MOVB    #177,   -(R3)   ;INSERT A FILL CHAR
011662  005203                          INC     R3              ;BUMP ADDRESS
011664  112723  000177                  MOVB    #177,   (R3)+   ;INSERT ANOTHER FILL
011670  105023                          CLRB    (R3)+           ;INSERT ZERO CHAR
011672  005037  011032          7$:     CLR     TIME
011676  004737  013130                  JSR     PC,STARTX
011702  032700  100000          5$:     BIT     #XFLG,STAT
011706  001013                          BNE     6$
011710  023727  011032  000100          CMP     TIME,#100
011716  103771                          BLO     5$
011720  011402                          MOV     @RCSR,R2
011722  016403  000004                  MOV     XCSR(R4),R3
011726  104001                          HLT     1
011730  005037  011032                  CLR     TIME
011734  000762                          BR      5$
011736  042700  100000          6$:     BIC     #XFLG,STAT
011742  000137  011515                  JMP     $ILB
```

```
                                        ;*****************************************************************
                                        ;       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.
                                        ;*****************************************************************

011746  104416                  $XLB:   KBDIN
011750  032737  000010  011012          BIT     #HALF.DUPLEX,PARAM1
011756  001002                          BNE     1$
011760  004737  013400                  JSR     PC,STARTR
011764  004737  013130          1$:     JSR     PC,STARTX
011770  005037  011032                  CLR     TIME
011774  032700  100000          2$:     BIT     #XFLG,STAT
012000  001016                          BNE     3$
012002  032700  040000          7$:     BIT     #RFLG,STAT
012006  001024                          BNE     4$
012010  023727  011032  000100          CMP     TIME,#100
012016  103766                          BLO     2$
012020  011402                          MOV     @RCSR,R2
012022  016403  000004                  MOV     XCSR(R4),R3
012026  104001                          HLT     1
012030  005037  011032                  CLR     TIME
012034  000757                          BR      2$
012036  032737  000010  011012  3$:     BIT     #HALF.DUPLEX,PARAM1
012044  001756                          BEQ     7$
012046  042700  100000                  BIC     #XFLG,STAT
012052  004737  013400                  JSR     PC,STARTR
012056  000746                          BR      2$
012060  032737  000010  011012  4$:     BIT     #HALF.DUPLEX,PARAM1
012066  001020                          BNE     8$
012070  032700  100000                  BIT     #XFLG,STAT
012074  001013                          BNE     6$
012076  023727  011032  000100          CMP     TIME,#100
012104  103756                          BLO     4$
012106  011402                          MOV     @RCSR,R2
012110  016403  000004                  MOV     XCSR(R4),R3
012114  104001                          HLT     1
012116  005037  011032                  CLR     TIME
012122  000747                          BR      4$
012124  042700  100000          6$:     BIC     #XFLG,STAT
012130  042700  040000          8$:     BIC     #RFLG,STAT
012134  005037  011032                  CLR     TIME
012140  032777  000200  176676          BIT     #NODAT,@SWR
012146  001002                          BNE     5$
012150  004737  012336                  JSR     PC,TESTD
012154  032777  000020  176662  5$:     BIT     #LOOP,@SWR
012162  001671                          BEQ     $XLB
012164  012737  011746  013124          MOV     #$XLB,BACK
012172  000137  012176                  JMP     EOP
```

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

012176                                  EOP:
012176  104414  000340                          STPS,PRTY7              ;SET PS PRIORITY TO 7
012202  016437  000004  012334                  MOV     XCSR(R4),@TPIE  ;SAVE TX CSR
012210  042737  177677  012334                  BIC     #^C(TIE),@TPIE  ;CLEAR ALL BUT TX IE.
012216  042764  000100  000004                  BIC     #TIE,XCSR(R4)   ;CLEAR TX IE (EVEN IF IT WASN'T SET)
012224  012766  012264  000002                  MOV     #ENTER,2(SP)    ;SET FOR RETURN IF SW 14=1
012232  010037  013106                          MOV     R0,SAVR0        ;SAVE REGISTER 0
012236  010137  013110                          MOV     R1,SAVR1        ;SAVE REGISTER 1
012242  010237  013112                          MOV     R2,SAVR2        ;SAVE REGISTER 2
012246  010337  013114                          MOV     R3,SAVR3        ;SAVE REGISTER 3
012252  010437  013116                          MOV     R4,SAVR4        ;SAVE REGISTER 4
012256  010537  013120                          MOV     R5,SAVR5        ;SAVE REGISTER 5
012262  000207                                  RTS     PC              ;RETURN TO CONTROL PROGRAM

012264                                  ENTER:
012264  013700  013106                          MOV     SAVR0,R0        ;RESTORE R0
012270  013701  013110                          MOV     SAVR1,R1        ;RESTORE R1
012274  013702  013112                          MOV     SAVR2,R2        ;RESTORE R2
012300  013703  013114                          MOV     SAVR3,R3        ;RESTORE R3
012304  013704  013116                          MOV     SAVR4,R4        ;RESTORE R4
012310  013705  013120                          MOV     SAVR5,R5        ;RESTORE R5
012314  012737  177777  013122                  MOV     #-1,DELAY
012322  053764  012334  000004                  BIS     @TPIE,XCSR(R4)  ;IF ORGINALLY SET; SET TX IE
012330  000177  000570                          JMP     @BACK
012334  000000                          @TPIE:  000000

                                        ;*********************************
                                        ;       SUBROUTINE TO CHECK
                                        ;       RECEIVER DATA.
                                        ;*********************************
012336  013746  011056                  TESTD:  MOV     ERR,    -(SP)   ;WAS THERE A RECEIVE ERROR?
012342  001413                          TSTDAT  BEQ     TSTDAT          ;BR IF NO
012344  032777  020000  176472                  BIT     #BIT13,@SWR     ;INHIBIT PRINTOUTS?
012352  001007                                  BNE     TSTDAT          ;BR IF YES
012354  104400  012546                          TYPE    ,MSG0           ;(15)(12)THERE WAS A RECEIVE ERROR. RBUF=
012360  004077  176444                          JSR     R0,@#2016       ;PRINT CONTENTS OF RBUF
012364  005746                                  TST     -(SP)
012366  104400  012627                          TYPE    ,MSG1           ;(15)(12)
012372  013701  011022                  TSTDAT: MOV     #XCSR,  R1      ;SETUP XMIT DATA ADDR
012376  013702  011020                          MOV     #RCSR,  R2      ;SETUP RCV DATA ADDR
012402  122122                          SCANH:  CMPB    (R1)+,  (R2)+   ;DATA OK ?
012404  001776                                  BEQ     SCANH           ;BR IF OK
012406  123741  011040                          CMPB    TX.TERM,-(R1)   ;IS IT END OF DATA
012412  001453                                  BEQ     TESTDX          ;BR IF YES
012414  122742  000002                          CMPB    #002,-(R2)
012420  001005                                  BNE     2$
012422  010237  012430                          MOV     R2,1$
012426  104400                                  TYPE
```

```
                                1$:     .WORD   0
                                        BR      TESTDX
                                2$:
012434  105712                          TSTB    (R2)            ;
012436  001441                          BEQ     TESTDX          ;BR IF YES
012440  122721  000177                  CMPB    #177,   (R1)+   ;IS IT FILL CHAR?
012444  001756                          BEQ     SCAN4           ;BR IF YES
012446  005301                          DEC     R1              ;BACKUP
012450  122722  000177                  CMPB    #177,   (R2)+   ;IS IT FILL?
012454  001752                          BEQ     SCAN4           ;BR IF YES
012456  105742                          TSTB    -(R2)           ;BACK UP POINTER
012460  123722  011014                  CMPB    PARAM2,(R2)+
012464  001746                          BEQ     SCAN4           ;BR IF CHAR WAS SYNC
012466  000240                  SCAN5:  NOP                     ;DATA ERROR
012470  032777  020000  176346          BIT     #BIT13,@SWR     ;INHIBIT PRINTOUTS
012476  001016                          BNE     DERR            ;BR IF YES
012500  104400  012632                  TYPE    ,MSG2           ;<15><12>RECEIVED DATA = <15><12>
012504  013737  011020  012514          MOV     IRDA,   RDAX    ;SETUP DATA ADRESS
012512  104400                          TYPE                    ;PRINT RECEIVED DATA
012514  000000                  RDAX:   0                       ;RECEIVED DATA ADDR.
012516  104400  012657                  TYPE    ,MSG3           ;<15><12>DATA SHOULD BE<15><12>
012522  013737  011022  012532          MOV     IXDA,   .+10    ;SETUP ADDR.
012530  104400                          TYPE                    ;PRINT GOOD DATA
012532  011022                          IXDA
012534  111103                  DERR:   MOVB    (R1),R3 ;SETUP XMIT DATA
012536  114202                          MOVB    -(R2),R2        ;SETUP RCV DATA
012540  104007                          HLT+7                   ;DATA ERROR HALT
012542  005726                  TESTDX: TST     (SP)+           ;POP STACK
012544  000207                          RTS     PC              ;RETURN FROM SUB/ROUT

012546  005015  044124  051105  MSG0:   .ASCIZ  <15><12>/THERE WAS A RECEIVER ERROR. REGISTER (SEL 2) =/
012627     015  000012          MSG1:   .ASCIZ  <15><12>
012632  005015  042522  042503  MSG2:   .ASCIZ  <15><12>/RECEIVED DATA = /<15><12>
012657     015  042012  052101  MSG3:   .ASCIZ  <15><12>/DATA SHOULD BE/<15><12>
012702  005015  046120  040505  MSG4:   .ASCII <15><12>/PLEASE MAKE CONNECTION (DIAL NUMBER)./
012751     015  053412  042510          .ASCIZ <15><12>/WHEN CONNECTION COMPLETE; HIT CONTINUE SWITCH./<15><12>
013034  005015  046120  040505  MSG5:   .ASCIZ <15><12>/PLEASE MAKE CONNECTION (DIAL NUMBER)./<15><12>
                                        .EVEN
013106  000000                  SAVR0:  0
013110  000000                  SAVR1:  0
013112  000000                  SAVR2:  0
013114  000000                  SAVR3:  0
013116  000000                  SAVR4:  0
013120  000000                  SAVR5:  0
013122  000000                  DELAY:  0
013124  000000                  BACK:   0
013126  000000                  STOP:   0


                                ;*****************************************************************
                                ;       INITIALIZE TRANSMIT SUBROUTINE
                                ;*****************************************************************

013130  005037  011032          STARTX: CLR     TIME
013134  005737  013122                  TST     DELAY   ;IF SW04=1 & SW14=0 WAIT BEFORE TURNING ON TX
013140  001416                          BEQ     1$      ;NO GO AHEAD AND TURN ON TX
013142  005037  013470                  CLR     TEMP1   ;PREPARE FOR DELAY
```

```
   961  013146  012737  000007  013472          MOV     #7,TEMP2
   962  013154  062737  000001  013470          ADD     #1,TEMP1        ;INCREMENT DELAY....
   963  013162  001374                          BNE     .-6
   964  013164  005337  013472                  DEC     TEMP2
   965  013170  001371                          BNE     .-14
   966  013172  005037  013122                  CLR     DELAY   ;ZERO DELAY
   967  013176  013737  011022  011070  1$:     MOV     IXDA,XDA        ;SETUP XMIT DATA ADDR.
   968  013204  042700  100000                  BIC     #XFLG,R0        ;RESSET XMIT COMPLETE FLAG
   969  013210  052714  000002                  BIS     #DTR,@RXCSR     ;SET DTR
   970  013214  005737  013126                  TST     STOP
   971  013220  001005                          BNE     2$
   972  013222  104400  012702                  TYPE    ,MSG4
   973  013226  000000                          HALT
   974  013230  005137  013126                  COM     STOP
   975  013234  032737  000010  011012  2$:     BIT     #HALF.DUPLEX,PARAM1
   976  013242  001403                          BEQ     3$
   977  013244  032714  010000          4$:     BIT     #10000,@RXCSR   ;IS CARRIER UP
   978  013250  001375                          BNE     4$      ;BR IF YES
   979  013252  052714  000004          3$:     BIS     #RTS,@RXCSR     ;SET RTS
   980  013256  032714  020000          CTSW:   BIT     #CTS,@RXCSR;IS CLEAR TO SEND SET?
   981  013262  001017                          BNE     CTSOK           ;BR IF YES
   982  013264  023727  011032  000036  CTSWN:  CMP     TIME,#36        ;30 SECS ELAPSED?
   983  013272  103771                          BLO     CTSW            ;BR IF NO
   984  013274  011402                          MOV     @RXCSR,R2       ;SETUP RECEIVE CSR
   985  013276  016403  000004                  MOV     TXCSR(R4),R3    ;SETUP XMIT CSR
   986  013302  032777  010000  175534          BIT     #SW12,@SWR      ;INHIBIT PRINTOUTS?
   987  013310  001001                          BNE     1$              ;BR IF YES
   988  013312  104002                          HLT+2                   ;PRINTOUT "WAITING TO XMIT" MESSAGE
   989  013314  005037  011032          1$:     CLR     TIME            ;RESET TIMER
   990  013320  000756                          BR      CTSW            ;WAIT SOME MORE
   991  013322  005037  011032          CTSOK:  CLR     TIME
   992  013326  012737  000005  013376          MOV     #5,SYNCNO               ;SETUP SYNC. COUNTER
   993  013334  052764  000020  000004          BIS     #SEND,TXCSR(R4) ;SET SEND
   994  013342  113764  011014  000006  1$:     MOVB    PARAM2,TXDBUF(R4);LOAD A SYNC CHAR
   995
   996  013350  105764  000004                  TSTB    TXCSR(R4)               ;IS XMIT READY(TXDONE=1?)
   997  013354  100375                          BPL     .-4             ;BR IF NO
   998  013356  005337  013376                  DEC     SYNCNO          ;DECREMENT COUNTER
   999  013362  001367                          BNE     1$              ;BR IF NOT ZERO
  1000
  1001  013364  052764  000100  000004          BIS     #TXINTE,TXCSR(R4);SET XMIT INTERRUPT ENABLE
  1002  013372  000240                          NOP
  1003  013374  000207                          RTS     PC              ;EXIT FROM SUBROUTINE
  1004  013376  000000          SYNCNO: 0
  1005
  1006                          ;*****************************************************************
  1007                          ;       INITIALIZE RECEIVER SUBROUTINE
  1008                          ;*****************************************************************
  1009  013400                  STARTR:
  1010  013400  005737  013126                  TST     STOP            ;FIRST TIME HERE?
  1011  013404  001006                          BNE     1$              ;BR IF NO
  1012  013406  052714  000002                  BIS     #DTR,@RXCSR     ;SET DTR
  1013  013412  104400  013034                  TYPE    ,MSG5           ;MAKE CONNECTION
  1014  013416  005137  013126                  COM     STOP
  1015  013422  005037  011032          1$:     CLR     TIME
  1016  013426  013737  011020  011066          MOV     IRDA,RDA        ;SETUP RCV DATA ADDR
```

```
1017  013434  012737  001000  011064          MOV     #1000,RCC       ;SETUP RCV CHAR COUNT
1018  013442  042700  040000                  BIC     #RFLG,R0        ;RESET RCV COMPLETE FLAG
1019  013446  005037  011054                  CLR     ERCSR           ;RESET ERROR RECORDS
1020  013452  005037  011056                  CLR     ERDBR
1021  013456  005764  000002                  TST     RXDBUF(R4)      ;CLR ANY RXDONE
1022  013462  052714  000122                  BIS     #RINTEN!SYNSCH!DTR,@RXCSR       ;SET INTER ENABLE & SEARCH SYNC &DTR
1023  013466  000207                          RTS     PC              ;EXIT FROM SUBROUTINE
1024  013470  000000              TEMP1:  0
1025  013472  000000              TEMP2:  0
```

```
1026                                    ;*****************************************************************
1027                                    ;       TRANSMIT INTERRUPT SERVICE ROUTNE
1028                                    ;*****************************************************************
1029  013474  000240                    XISR:   NOP
1030  013476  127737  175366  011040            CMPB    @XDA,TX.TERM            ;FINISHED XMITTING?
1031  013504  001010                            BNE     XISR1                   ;BR IF NO
1032  013506  052700  100000                    BIS     #XFLG,R0                ;SET XMIT COMPLETE FLAG
1033  013512  042764  000120  000004            BIC     #TXINTE!SEND,TXCSR(R4)  ;RESET XMIT INTR ENABLE
1034  013520  042714  000004                    BIC     #RTS,@RXCSR             ;RESET RTS
1035  013524  000417                            BR      XISR2                   ;
1036                                    ;
1037  013526  117764  175336  000006  XISR1:   MOVB    @XDA,TXDBUF(R4);XMIT NEXT CHAR.
1038  013534  032777  000100  175302            BIT     #100,@SWR               ;MONITOR OUTPUT?
1039  013542  001406                            BEQ     NOXMON                  ;BR IF NO
1040  013544  105777  175326                    TSTB    @TPS    ;IS TTY AVAILABLE
1041  013550  100003                            BPL     NOXMON                  ;BR IF NO
1042  013552  117777  175312  175320            MOVB    @XDA,@TPB;TYPE THE CHAR
1043  013560                            NOXMON:
1044  013560  005237  011070                    INC     XDA                     ;INCRMENT ADDRESS
1045  013564  005037  011032            XISR2:  CLR     TIME                    ;RESET TIMER
1046  013570  000002                            RTI                             ;RETURN FROM INTERRUPT
1047                                    ;*****************************************************************
1048                                    ;       RECEIVE INTERRUPT SERVICE ROUTNE
1049                                    ;*****************************************************************
1050  013572  000240                    RISR:   NOP
1051  013574  011402                            MOV     @RXCSR,R2               ;SAVE RXCSR CONTENTS
1052  013576  016403  000004                    MOV     TXCSR(R4),R3            ;SAVE TXCSR CONTENTS
1053  013602  016437  000002  013470            MOV     RXDBUF(R4),TEMP1        ;STORE CHAR AND ERROR FLAGS IF ANY
1054  013610  113737  013470  013472            MOVB    TEMP1,TEMP2
1055  013616  143737  014122  013472            BICB    PARITY,TEMP2            ;STRIP PARITY
1056  013624  113777  013470  175234            MOVB    TEMP1,@RDA              ;MOVE CHAR TO INBUF
1057  013632  032777  000040  175204            BIT     #40,@SWR                ;MONITOR INPUT?
1058  013640  001406                            BEQ     NORMON                  ;BR IF NO
1059  013642  105777  175230                    TSTB    @TPS    ;IS TTY AVAILABLE?
1060  013646  100003                            BPL     NORMON                  ;BR IF NO
1061  013650  113777  013472  175222            MOVB    TEMP2,@TPB;TYPE THE CHAR
1062  013656                            NORMON:
1063  013656  005237  011066                    INC     RDA                     ;BUMP POINTER
1064  013662  105077  175200                    CLRB    @RDA                    ;CLEAR NEXT CHAR POSITION
1065  013666  005337  011064                    DEC     RCC                     ;DECREMENT CHAR. COUNTER
1066  013672  001005                            BNE     1$                      ;BR IF BUFFER NOT FULL
1067  013674  042714  000120                    BIC     #RINTEN!SYNSCH,@RXCSR   ;RESET INTERRUPT ENAB
1068  013700  104006                            HLT+6                           ;RECEIVER BUFFER FULL
1069  013702  004737  013400                    JSR     PC,STARTR               ;INITIALIZE RECEIVER
1070  013706  123737  011041  013472  1$:      CMPB    RX.TERM,TEMP2           ;IS IT LINE FEED?
1071  013714  001004                            BNE     RISR1                   ;BR IF NO
1072  013716  042714  000120                    BIC     #RINTEN!SYNSCH,@RXCSR   ;DISABLE INTERRUPT AND SEARCH SYNC
1073  013722  052700  040C30                    BIS     #RFLG,R0                ;SET RCVR COMPLETE FLAG
1074  013726  005737  013470            RISR1:  TST     TEMP1   ;IS THERE A DATA ERROR
1075  013732  100005                            BPL     RISR2                   ;BR IF NO
1076  013734  010237  011054                    MOV     R2,ERCSR                ;SAVE RXCSR
1077  013740  013737  013470  011056            MOV     TEMP1,ERDBR             ;SAVE RXDBUF
1078  013746  005702                    RISR2:  TST     R2      ;IS THERE A DATA SET STATUS CHANGE
1079  013750  100004                            BPL     RISR3   ;BR IF NO
1080  013752  010237  011060                    MOV     R2,DSSTAT               ;SAVE STATUS
1081  013756  052700  020000                    BIS     #DSFLG,R0               ;SET FLAG
```

```
1082  013762                          RISR3:
1083  013762  005037  011032                  CLR     TIME            ;RESET TIMER
1084  013766  000002                  RTI                             ;RETURN FROM INTERRUPT
1085                                  ;*****************************************************************
1086                                  ;       STRIP PARITY SUBROUTINE
1087                                  ;*****************************************************************
1088  013770  013537  013470  STRIP:  MOV     @(RS)+,TEMP1    ;PICK UP CONTENTS
1089  013774  042737  170777  013470          BIC     #^C<7000>,TEMP1 ;STRIP OUT JUNK
1090  014002  022737  007000  013470          CMP     #EIGHT!PAREN,TEMP1      ;IS IT EIGHT BITS/CHAR ?
1091  014010  001005                          BNE     .+14    ;NO
1092  014012  012737  000400  014122          MOV     #BIT8,PARITY    ;YES
1093  014020  000137  014120                  JMP     OUT
1094  014024  022737  005000  013470          CMP     #SEVEN!PAREN,TEMP1      ;IS IT 7 BITS/CHAR ?
1095  014032  001005                          BNE     .+14    ;NO
1096  014034  012737  000200  014122          MOV     #BIT7,PARITY    ;YES
1097  014042  000137  014120                  JMP     OUT
1098  014046  022737  003000  013470          CMP     #SIX!PAREN,TEMP1        ;IS IT 6 BITS/CHAR ?
1099  014054  001005                          BNE     .+14    ;NO
1100  014056  012737  000100  014122          MOV     #BIT6,PARITY    ;YES
1101  014064  000137  014120                  JMP     OUT
1102  014070  022737  001000  013470          CMP     #FIVE!PAREN,TEMP1       ;IS IT 5 BITS/CHAR ?
1103  014076  001005                          BNE     .+14    ;NO
1104  014100  012737  000040  014122          MOV     #BIT5,PARITY    ;YES
1105  014106  000137  014120                  JMP     OUT
1106  014112  012737  000200  014122          MOV     #BIT7,PARITY    ;DEFAULT VALUE
1107  014120  000205          OUT:    RTS     RS
1108  014122  000200          PARITY:BIT7     ;DEFAULT VALUE
1109          000001          .END
```

```
BA       011004            586#    645
BACK     013124            712*    740*    775*    855*    886     950#
BITH  =  002000            580#
BIT0  =  000001            580#
BIT1  =  000002            580#
BIT10 =  002000            580#
BIT11 =  004000            580#
BIT12 =  010000            580#
BIT13 =  020000            580#    615#    897     927
BIT14 =  040000            580#
BIT15 =  100000            580#
BIT2  =  000004            580#
BIT3  =  000010            580#
BIT4  =  000020            580#
BIT5  =  000040            580#   1104
BIT6  =  000100            580#   1100
BIT7  =  000200            580#   1096    1106    1108
BIT8  =  000400            580#   1092
BIT9  =  001000            580#
BREAK =  000001            580#
B2016    011030            596#    900
CARDET=  010000            580#
CLK   =  020000            580#
CTS   =  020000            580#    980
CTSOK    013322            981     991#
CTSW     013256            980#    983     990
CTSWN    013264            982#
DELAY    013122            664*    884*    949#    958     966*
DERR     012534            928     937#
DISPLA   011046            606#
DMA   =  100000            580#
DMAINT=  000040            580#
DSC   =  100000            580#
DSFLG =  020000            580#    614#   1081
DSINTE=  000040            580#
DSR   =  001000            580#
DSSTAT   011060            621#   1080*
DTR   =  000002            580#    969    1012    1022
DU11     011000            585#
EIGHT =  006000            580#    590    1090
ENTER    012264            868     877#
EOP      012176            713     741     776     856     863#
ERCSR    011054            619#   1019#   1076#
ERDBR    011056            620#    895    1020*   1077*
EVEPAR=  001400            580#
EVPAR =  000400            580#
FIVE  =  000000            580#   1102
FLAG     011042            604#
FRMERR=  020000            580#
FULL.D=  000001            633#
GO       011222            663#
HALF.D=  000010            560#    815     831     836     975
HDXEN =  000010            580#    589
ILB   =  000010            580#    672
IRQA     011020            552#    779     904     930    1016
ISYMOD=  000000            580#
```

```
IXDA    011022            593#    780     903     934     936     967
KBDIN = 104416            580#    694     725     757     814
LOOP  = 000020            580#    710     738     773     853
MEXT  = 010000            580#
MINT  = 004000            580#
MRESET= 000400            580#    650
MSG0    012546            899     943#
MSG1    012627            902     943#
MSG2    012632            929     943#
MSG3    012657            933     943#
MSG4    012702            943#    972
MSG5    013034            943#   1013
MTDATA= 040000            580#
NODAT = 000200            580#    706     769     850
NOPAR = 000000            580#    590
NORMON  013456           1058    1060    1062#
NOXMON  013560           1039    1041    1043#
OOCPAR= 001000            580#
OUT     014120           1093    1097    1101    1105    1107#
OVRRUN= 040000            580#
OWI   = 000002            580#    669
OWO   = 000001            580#    666
PARAM1  011012            589#    646     651     652     815     831     836     975
PARAM2  011014            590#    647     653     655     924     994
PARAM3  011016            591#
PARCSR= 000002            580#    653#
PAREN = 001000            580#   1090    1094    1098    1102
PARER = 010000            580#
PARITY  014122           1055    1092#   1096#   1100#   1104#   1106#   1108#
PRIOR   011010            583#    642     644
PRTY0 = 000000            580#
PRTY1 = 000040            580#
PRTY2 = 000100            580#
PRTY3 = 000140            580#
PRTY4 = 000200            580#
PRTY5 = 000240            580#
PRTY6 = 000300            580#
PRTY7 = 000340            580#    864
QTPIE   012334            865#    866#    885     887#
RCC     011064            624#   1017#   1065#
RDA     011066            625#   1016#   1056#   1063#   1064#
RDAX    012514            930#    932#
RECACT= 004000            580#
RFLG  = 040000            613#    696     709     760     772     822     848    1018    1073
RING  = 040000            580#
RINTEN= 000100            580#   1022    1067    1072
RISR    013572            641    1050#
RISR1   013726           1071    1074#
RISR2   013746           1075    1078#
RISR3   013762           1079    1082#
RIV     011006            587#    640
RTS   = 000004            580#    979    1034
RWAIT = 104410            580#
RXDBUF= 000002            580#   1021    1053
RXDONE= 000200            580#
RXERR = 100000            580#
```

```
RX.TER  011041            602#  1070
SAVR0   013106            869#   878   943#
SAVR1   013110            870#   879   944#
SAVR2   013112            871#   880   945#
SAVR3   013114            872#   881   946#
SAVR4   013116            873#   882   947#
SAVR5   013120            874#   883   948#
SCAN4   012402            905#   906   919   922   925
SCAN5   012466            926#
SEND  = 000020            580#   993  1033
SETTLE  011024            594#
SEVEN = 004000            580#  1094
SIX   = 002000            580#  1098
SRCSR   011052            618#
SR0   = 002000            580#
START   011102            599    637#
STARTR  013400            695    758   817   834  1009#  1069
STARTX  013130            726    789   818   957#
STD   = 000010            580#
STOP    013126            665#   951#  970   974#  1010  1014#
STPS  = 104414            580#   864
STPSYN= 000400            580#   589
STRIP   013770            654   1088#
SWR     011044            605#   638   706   710   738   769   773   777   850   853   897   927   986
                         1038   1057
SW12  = 010000            580#   986
SXCSR   011050            617#
SYNCN0  013376            992#   998#  1004#
SYNEXT= 020000            580#
SYNINT= 030000            580#   590
SYNSCH= 000020            580#  1022  1067  1072
SYSTST= 014000            580#
TEMP1   013470            960#   962#  1024#  1053#  1054  1056  1074  1077  1089#  1089#  1090  1094  1098
                         1102
TEMP2   013472            961#   964#  1025#  1054#  1055#  1061  1070
TESTD   012336            708    771   852   895#
TESTDX  012542            908    914   917   940#
TIE   = 000100            580#   866   867
TIME    011032            597#   663#  698   703#  727#  730   735#  759#  762   767#  788#  792   797#
                          819#   824   829#  840   845#  849#  957#  982   989#  991#  1015#  1045#  1083#
TKB     011074            629#
TKS     011072            628#
TPB     011100            631#  1042#  1061#
TPS     011076            630#  1040   1059
TSTDAT  012372            896    898   903#
TXCSR = 000004            580#   649#  651#  985   993#  996   1001#  1033#  1052
TXDBUF= 000006            580#   944#  1037#
TXDONE= 000200            580#
TXINTE= 000100            580#  1001  1033
TX.TER  011040            600#   907  1030
TYPE  = 104400            580#   899   902   912   929   931   933   935   972  1013
USER  = 000400            580#
VOID  = 000001            580#
XCC     011062            626#
XCSR  = 000004            580#   649#  701   733   765   827   843   865   867#  885#
XDA     011070            666#   761#  967#  1030  1037  1044#  1044#
```

```
XFLG  = 100000            612#    728     737     790     799     820     833     838     847     968    1032
XISR    013474            643    1029#
XISR1   013526           1031    1037#
XISR2   013564           1035    1045#
XLB   = 000004            580#    675
XWAIT = 104412            580#
$ILB    011516            674     757#    800
$OM1    011312            671     694#    714
$OM0    011420            668     725#    742
$XLB    011746            677     814#    854     855
.     = 014124            584#    679     783     934#    963     965     997    1091    1095    1099    1103
```

```
DU11 ITEP OVERLAY       MACY11 27(1006)  29-OCT-76  14:37  PAGE 31
DZDUOB.P11    05-AUG-76 09:24           CROSS REFERENCE TABLE -- MACRO NAMES

BOX          1#    581     608     634     953    1006    1026    1047    1085
DCPARM       1#
DHDOC1       1#
DHPARM       1#
DJPARM       1#
DLPARM       1#
DPPARM       1#
DQDOC1       1#
DUPARM       1#
DUPPARM      1#    560
DVDOC1       1#
DVPARM       1#
DZPARM       1#
HELLO        1#
HLT        580#    702     734     766     796     828     844     939     988    1058
SEQUAT       1#    580
SIMTF        1#    580
SITEP        1#    656
SSERV        1#    623


. ABS.  014124     000

 ERRORS DETECTED:  0
 DEFAULT GLOBALS GENERATED:  0

 DZDUOB,SEQ/SOL/CRF/ML:TOC=ITEP1.MAC,DZDUCB.P11
RUN-TIME:  10 13 .9 SECONDS
RUN-TIME RATIO: 44/26=1.6
CORE USED:  16K  (31 PAGES)
```