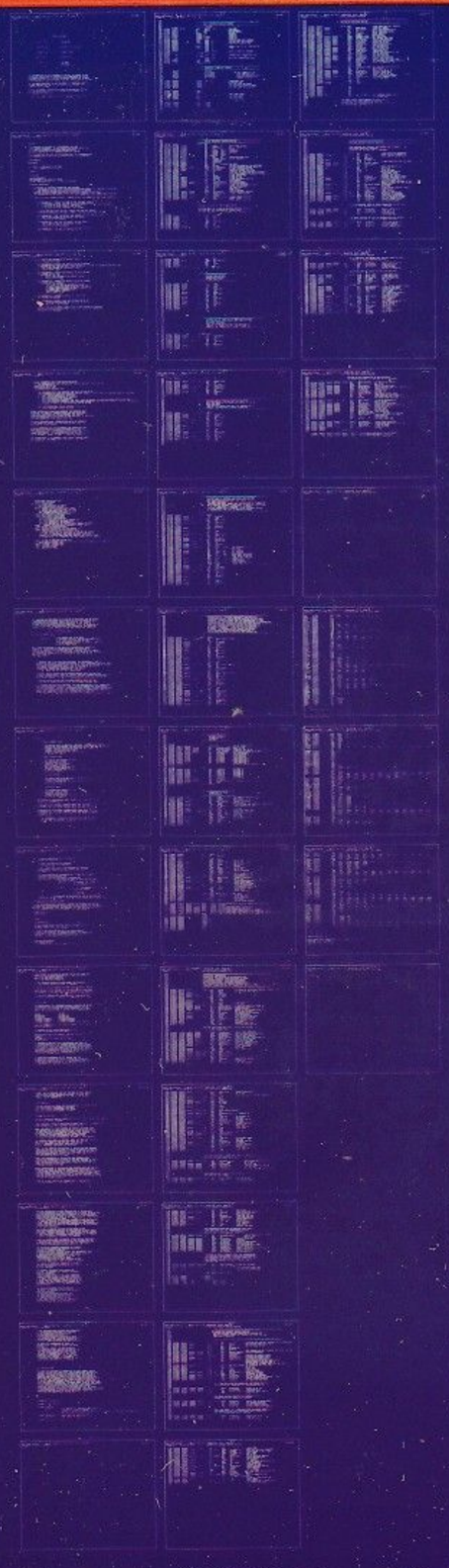
DQ11

ITEP OVERLAY
CZDQOD0

AH-8640D-MC

FICHE 1 OF 1

JAN 1979
digital
MADE IN USA



IDENTIFICATION

PRODUCT CODE: AC-8639D-MC

PRODUCT NAME: CZDQODO DQ11 ITEP OVRLY

PROGRAM DATE: OCTOBER 1978

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 DQ11 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 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 DM-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)
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=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 REPORTINC

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
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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<001> 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 DQ11 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.

DQ11 RESTRICTIONS

THE DQ11 HAS TWO MODES OF OPERATION IN ITEP, NORMAL(WHICH
INTERUPTS EVERY TWO CHARACTERS), AND HI-BAUD(ONE INTERUPT PER
MESSAGE, THE WHOLE MESSAGE IS TRANSMITTED OR RECEIVED ON A
COMPLETE WORD COUNT.). WHEN IN HI-BAUD MODE, DATA CANNOT BE
MONITORED ON THE CONSOLE TTY. IF SW 5=1 (MONITOR RECEIVED DATA)
AN 'R'' WILL BE TYPED AFTER THE WHOLE MESSAGE IS RECEIVED.
IF SW 6=1 (MONITOR TRANSMIT DATA) A 'T'' WILL BE TYPED AFTER THE
WHOLE MESSAGE IS TRANSMITTED. IN NORMAL MODE, EVEN IF THE CONSOLE
TTY IS FASTER OR THE SAME BAUD AS THE DQ11, NOT EVERY CHARACTER
CAN BE TYPED BECAUSE OF THE TWO CHARACTER PER INTERUPT
OPERATION, IN THIS CASE EVERY OTHER CHARACTER WILL BE TYPED
IF DATA MONITORING IS SELECTED. HI-BAUD MODE (SELECTABLE IN PARAM#2)
SHOULD BE USED FOR BAUDS OF 40,000 OR HIGHER. NORMAL MODE IS
SUFFICIENT FOR BAUDS LOWER THAN 40,000 .

10.0 PARAMETERS FOR THE DQ11

PARAM#1 IS NOT USED (0)

PARAM#2 (LOW BYTE)
BIT 0 FULL DUPLEX (1), DEFAULT= HALF DUPLEX (0)
BIT 1 HI-BAUD (1), DEFAULT= NORMAL (0)
(BITS 0,1 ARE NOT LOADED INTO ANY DQ11 REGISTERS, THEY ARE ONLY SOFTWARE FLAGS)

PARAM#2 (HIGH BYTE) IS LOADED INTO THE SYNC REGISTER.
BITS 8-15 SYNC CHARACTER, DEFAULT= 26 (26)

PARAM#3 IS NOT USED (177777)

```
                                ;*****************************************************************
                                ;       DQ11 INTERFACE SERVICE PARAMS
                                ;*****************************************************************
                        011000          .=11000
011000  050504  000040        DQ11:   .ASCIZ  /DQ /           ;ISR NAME
011004  160010                BA:     160010                  ;BUS ADDRESS
011006  000300                RIV:    300                     ;VECTOR ADDRESS
011010  000240                PRIOR:  240                     ;PRIORITY
011012  000000                PARAM1: 0                       ;PARAM #1
011014  013000                PARAM2: 013000                  ;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  011106                        .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        TXWC:0
011064  000000        RXWC:0
011066  000000        XCC:    0               ;XMIT CHAR COUNT
011070  000000        RCC:    0               ;RCV CHAR COUNT
011072  000000        RDA:    0               ;RCV DATA ADDR.
011074  000000        XDA:    0               ;XMIT DATA ADDR.

011076  177560        TKS:    177560
011100  177562        TKB:    177562
011102  177564        TPS:    177564
011104  177566        TPB:    177566

                        000001          FULL.DUPLEX=000001
```

```
                        ;*****************************************************************
                        ;       DQ11-X INTERFACE SERVICE ROUTINE
                        ;*****************************************************************
011106  000240          START:  NOP
011110  017700  177730          MOV     @SWR,   R0      ;SETUP MODE IN R0
011114  042700  177400          BIC     #177400,R0      ;STRIP JUNK
011120  013702  011006          MOV     RIV,    R2      ;SETUP
011124  012722  015052          MOV     #RISR,  (R2)+   ;INTERRUPT
011130  013722  011010          MOV     PRIOR,  (R2)+   ;VECTORS
011134  012722  014230          MOV     #XISR,  (R2)+   ;
011140  013722  011010          MOV     PRIOR,  (R2)+   ;
011144  013704  011004          MOV     BA,     R4      ;SETUP BUS ADDR INDEX
011150  013714  011012          MOV     PARAM1, @RCSR   ;SETUP VARIABLES
011154  013702  011014          MOV     PARAM2,R2       ;
011160  042702  000001          BIC     #0001,R2        ;
011164  010264  000002          MOV     R2,     XCSR(R4);IN CSR'S
011170  012703  000017          MOV     #17,R3          ;SET-UP TO CLEAR ALL 16 LOCATIONS
011174  112764  000014  000005  MOVB    #14,REG(RCSR)   ;OF THE SEQUENCE CONTROL REGISTER
011202  110364  000001  1$:     MOVB    R3,1(RCSR)      ;CLEAR A LOCATION OF THE
011206  005064  000006          CLR     SEC(RCSR)       ;SEQUENCE CONTROL REGISTER
011212  005303                  DEC     R3              ;HAVE ALL 16 LOCATIONS BEEN CLEARED?
011214  100372                  BPL     1$              ;IF NO THEN BRANCH, OTHERWISE PROCEED ON
011216  005014                  CLR     @RCSR           ;CLEAR THE RX CSR
011220  005064  000002          CLR     XCSR(R4)        ;CLEAR TX CSR
011224  005064  000004          CLR     ERR(R4)         ;CLEAR THE ERROR REGISTER
011230  012703  000020          MOV     #16.,R3         ;SET COUNTER
011234  052764  010000  000004  2$:     BIS     #BIT12,ERR(R4)  ;SET WRITE ENABLE
011242  042764  060000  000004  BIC     #60000,ERR(R4)  ;CLEAR EXT MEM BITS
011250  005064  000006          CLR     SEC(R4)         ;CLEAR THE SECONDARY REGISTER
011254  105264  000005          INCB    REG(R4)         ;GET NEXT REGISTER
011260  005303                  DEC     R3              ;DONE YET??
011262  001364                  BNE     2$              ;KEEP CLEARING
011264  112764  000012  000005  MOVB    #12,REG(R4)     ;SELECT THE MISC REGISTER
011272  012764  000040  000006  MOV     #BIT5,SEC(R4)   ;ISSUE A MASTER CLEAR.
011300  005037  014220          CLR     ERRORS
011304  052764  000010  000002  BIS     #BIT3,XCSR(R4)  ;ENABLE ERROR INTERUPTS
011312  005037  011032          CLR     TIME            ;RESET TIMER
011316  005037  013274          CLR     DELAY           ;RESET DELAY INDICATOR.


                        ;ROUTINE TO FIGURE RX AND TX WORD COUNTS.
                        ;
                        ;FOR HIGH BAUD THE TX AND RX MESSAGES MUST BE IDENTICAL
                        ;THE DATA WILL BE TRANSFERED AT A BURST MODE.
                        ;THE TXWC AND RXWC SET FOR HOW MANY CHARS TO DEAL WITH.
                        ;
011322                  X.X:
011322  013702  011022          MOV     IXDA,R2
011326  005003                  CLR     R3
011330  005203          1$:     INC     R3
011332  123722  011040          CMPB    TX.TERM,(R2)+
011336  001374                  BNE     1$
011340  005403                  NEG     R3
011342  010337  011062          MOV     R3,TXWC
011346  013702  011022          MOV     IXDA,R2
011352  005003                  CLR     R3
```

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

011374  005037  011032        GO:     CLR     TIME
011400  005037  013274                CLR     DELAY
011404  005037  013300                CLR     STOP
011410  032700  000001                BIT     #OWO,MODE
011414  001402                        BEQ     1$
011416  000137  011572                JMP     $OWO
011422  032700  000002        1$:     BIT     #OWI,MODE
011426  001402                        BEQ     2$
011430  000137  011464                JMP     $OWI
011434  032700  000010        2$:     BIT     #ILB,MODE
011440  001402                        BEQ     3$
011442  000137  011670                JMP     $ILB
011446  032700  000004        3$:     BIT     #XLB,MODE
011452  001402                        BEQ     4$
011454  000137  012120                JMP     $XLB
011460  000000                4$:     HALT
011462  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'.
                                ;****************************************************************************


011464  104416                $OWI:   KBDIN
011466  004737  014556                JSR     PC,STARTR
011472  032700  040000        1$:     BIT     #RFLG,STAT
011476  001013                        BNE     2$
011500  023727  011032  000100        CMP     TIME,#100
011506  103771                        BLO     1$
011510  011402                        MOV     @RCSR,R2
011512  016403  000002                MOV     XCSR(R4),R3
011516  104001                        HLT     1
011520  005037  011032                CLR     TIME
```

```
767  011524  000762                          BR      1$
768
769  011526  032777  000200  177310  2$:     BIT     #NODAT,@SWR
770  011534  001002                          BNE     3$
771  011536  004737  012510                  JSR     PC,TESTD
772  011542  042700  040000          3$:     BIC     #RFLG,STAT
773  011546  032777  000020  177270          BIT     #LOOP,@SWR
774  011554  001405                          BEQ     4$
775  011556  012737  011570  013276          MOV     #4$,BACK
776  011564  000137  012350                  JMP     EOP
777  011570  000735                  4$:     BR      $OWI
778
779
780                                  ;*************************************************************************
781                                  ;       ROUTINE USED IF 'ONE WAY OUT' WAS SELECTED.
782                                  ;       NOTE THAT WHEN IN THIS MODE HALF DUPLEX IS THE ONLY
783                                  ;       MODE AVAILABLE.
784                                  ;       'ONE WAY OUT' MEANS THAT ONLY THE TRANSMITTER IS
785                                  ;       ENABLED. THE RECEIVER IS NEVER 'TURNED ON.
786                                  ;*************************************************************************
787
788  011572  104416                  $OWO:   KBDIN
789  011574  004737  013302                  JSR     PC,STARTX
790  011600  005037  011032                  CLR     TIME
791  011604  032700  100000          1$:     BIT     #XFLG,STAT
792  011610  001013                          BNE     2$
793  011612  023727  011032  000100          CMP     TIME,#100
794  011620  103771                          BLO     1$
795  011622  011402                          MOV     @RCSR,R2
796  011624  016403  000002                  MOV     XCSR(R4),R3
797  011630  104001                          HLT     1
798  011632  005037  011032                  CLR     TIME
799  011636  000762                          BR      1$
800  011640  042700  100000          2$:     BIC     #XFLG,STAT
801  011644  032777  000020  177172          BIT     #LOOP,@SWR
802  011652  001405                          BEQ     3$
803  011654  012737  011666  013276          MOV     #3$,BACK
804  011662  000137  012350                  JMP     EOP
805  011666  000741                  3$:     BR      $OWO
806
807
808
```

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

011670  104416        $ILB:   KBDIN
011672  004737  014556          JSR     PC,STARTR
011676  005037  011032          CLR     TIME
011702  032700  040000  1$:     BIT     #RFLG,STAT
011706  001013          BNE     2$
011710  023727  011032  000100  CMP     TIME,#100
011716  103771          BLO     1$
011720  011402          MOV     @RCSR,R2
011722  016403  000002          MOV     XCSR(R4),R3
011726  104001          HLT     1
011730  005037  011032          CLR     TIME
011734  000762          BR      1$
011736  032777  000200  177100  2$:     BIT     #NODAT,@SWR
011744  001002          BNE     3$
011746  004737  012510          JSR     PC,TESTD
011752  042700  040000  3$:     BIC     #RFLG,STAT
011756  032777  000020  177060          BIT     #LOOP,@SWR
011764  001405          BEQ     4$
011766  012737  012000  013276          MOV     #4$,BACK
011774  000137  012350          JMP     EOP
012000  032777  000400  177036  4$:     BIT     #400,   @SWR    ;USE EXTERNAL DATA?
012006  001416          BEQ     7$      ;BR IF NO
012010  013702  011020          MOV     IRDA,   R2      ;SET POINTER
012014  013703  011022          MOV     IXDA,   R3      ;SET POINTER
012020  010337  011074          MOV     R3,     XDA     ;SETUP XMIT DATA ADDR
012024  112223          MOVB    (R2)+,  (R3)+   ;MOVE INPUT TO OUTPUT
012026  001376          BNE     .-2             ;LOOP IF NOT ZERO CHAR
012030  112743  000177          MOVB    #177,   -(R3)   ;INSERT A FILL CHAR
012034  005203          INC     R3              ;BUMP ADDRESS
012036  112723  000177          MOVB    #177,   (R3)+   ;INSERT ANOTHER FILL
012042  105023          CLRB    (R3)+           ;INSERT ZERO CHAR
012044  005037  011032  7$:     CLR     TIME
012050  004737  013302          JSR     PC,STARTX
012054  032700  100000  5$:     BIT     #XFLG,STAT
012060  001013          BNE     6$
012062  023727  011032  000100  CMP     TIME,#100
012070  103771          BLO     5$
012072  011402          MOV     @RCSR,R2
012074  016403  000002          MOV     XCSR(R4),R3
012100  104001          HLT     1
012102  005037  011032          CLR     TIME
012106  000762          BR      5$
012110  042700  100000  6$:     BIC     #XFLG,STAT
012114  000137  011670          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.
                        ;*****************************************************************************

012120  104416          $XLB:   KBDIN
012122  032737  000001  011014          BIT     #FULL.DUPLEX,PARAM2
012130  001402                        BEQ     1$
012132  004737  014556              JSR     PC,STARTR
012136  004737  013302      1$:     JSR     PC,STARTX
012142  005037  011032              CLR     TIME
012146  032700  100000      2$:     BIT     #XFLG,STAT
012152  001016                        BNE     3$
012154  032700  040000      7$:     BIT     #RFLG,STAT
012160  001024                        BNE     4$
012162  023727  011032  000100          CMP     TIME,#100
012170  103766                        BLO     2$
012172  011402                        MOV     @RCSR,R2
012174  016403  000002                MOV     XCSR(R4),R3
012200  104001                        HLT     1
012202  005037  011032                CLR     TIME
012206  000757                        BR      2$
012210  032737  000001  011014  3$:     BIT     #FULL.DUPLEX,PARAM2
012216  001356                        BNE     7$
012220  042700  100000                BIC     #XFLG,STAT
012224  004737  014556              JSR     PC,STARTR
012230  000746                        BR      2$
012232  032737  000001  011014  4$:     BIT     #FULL.DUPLEX,PARAM2
012240  001420                        BEQ     8$
012242  032700  100000                BIT     #XFLG,STAT
012246  001013                        BNE     6$
012250  023727  011032  000100          CMP     TIME,#100
012256  103765                        BLO     4$
012260  011402                        MOV     @RCSR,R2
012262  016403  000002                MOV     XCSR(R4),R3
012266  104001                        HLT     1
012270  005037  011032                CLR     TIME
012274  000756                        BR      4$
012276  042700  100000          6$:     BIC     #XFLG,STAT
012302  042700  040000          8$:     BIC     #RFLG,STAT
012306  005037  011032                CLR     TIME
012312  032777  000200  176524          BIT     #NODAT,@SWR
012320  001002                        BNE     5$
012322  004737  012510              JSR     PC,TESTD
012326  032777  000020  176510  5$:     BIT     #LOOP,@SWR
012334  001671                        BEQ     $XLB
012336  012737  012120  013276          MOV     #$XLB,BACK
012344  000137  012350                JMP     EOP
```

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

012350                                  EOP:
012350  104414  000340                          STPS,PRTY7              ;SET PS PRIORITY TO 7
012354  016437  000002  012506                   MOV     XCSR(R4),QTPIE  ;SAVE TX CSR
012362  042737  177737  012506                   BIC     #^C<TIE>,QTPIE  ;CLEAR ALL BUT TX IE.
012370  042764  000040  000002                   BIC     #TIE,XCSR(R4)   ;CLEAR TX IE (EVEN IF IT WASN'T SET)
012376  012766  012436  000002                   MOV     #ENTER,2(SP)    ;SET FOR RETURN IF SW 14=1
012404  010037  013260                          MOV     R0,SAVR0        ;SAVE REGISTER 0
012410  010137  013262                          MOV     R1,SAVR1        ;SAVE REGISTER 1
012414  010237  013264                          MOV     R2,SAVR2        ;SAVE REGISTER 2
012420  010337  013266                          MOV     R3,SAVR3        ;SAVE REGISTER 3
012424  010437  013270                          MOV     R4,SAVR4        ;SAVE REGISTER 4
012430  010537  013272                          MOV     R5,SAVR5        ;SAVE REGISTER 5
012434  000207                                  RTS     PC              ;RETURN TO CONTROL PROGRAM

012436                                  ENTER:
012436  013700  013260                          MOV     SAVR0,R0        ;RESTORE R0
012442  013701  013262                          MOV     SAVR1,R1        ;RESTORE R1
012446  013702  013264                          MOV     SAVR2,R2        ;RESTORE R2
012452  013703  013266                          MOV     SAVR3,R3        ;RESTORE R3
012456  013704  013270                          MOV     SAVR4,R4        ;RESTORE R4
012462  013705  013272                          MOV     SAVR5,R5        ;RESTORE R5
012466  012737  177777  013274                   MOV     #-1,DELAY
012474  053764  012506  000002                   BIS     QTPIE,XCSR(R4)  ;IF ORGINALLY SET; SET TX IE
012502  000177  000570                          JMP     @BACK
012506  000000                          QTPIE:  000000


                                        ;***********************************
                                        ;       SUBROUTINE TO CHECK
                                        ;       RECEIVER DATA.
                                        ;***********************************
012510  013746  011056                  TESTD:  MOV     ERDBR,  -(SP)   ;WAS THERE A RECEIVE ERROR?
012514  001413                                  BEQ     TSTDAT          ;BR IF NO
012516  032777  020000  176320                   BIT     #BIT13,@SWR     ;INHIBIT PRINTOUTS?
012524  001007                                  BNE     TSTDAT          ;BR IF YES
012526  104400  012720                          TYPE    ,MSG0           ;<15><12>THERE WAS A RECEIVE ERROR. RBUF=
012532  004077  176272                          JSR     R0,@B2016       ;PRINT CONTENTS OF RBUF
012536  005746                                  TST     -(SP)
012540  104400  013001                          TYPE    ,MSG1           ;<15><12>
012544  013701  011022                  TSTDAT: MOV     IXDA,   R1      ;SETUP XMIT DATA ADDR
012550  013702  011020                          MOV     IRDA,   R2      ;SETUP RCV DATA ADDR
012554  122122                          SCAN4:  CMPB    (R1)+,  (R2)+   ;DATA OK ?
012556  001776                                  BEQ     SCAN4           ;BR IF OK
012560  123741  011040                          CMPB    TX.TERM,-(R1)   ;IS IT END OF DATA
012564  001453                                  BEQ     TESTDX          ;BR IF YES
012566  122742  000002                          CMPB    #002,-(R2)
012572  001005                                  BNE     2$
012574  010237  012602                          MOV     R2,1$
012600  104400                                  TYPE
```

```
  976  012602  000000                  1$:     .WORD   0
  977  012604  000443                          BR      TESTDX
  978  012606                          2$:
  979  012606  105712                          TSTB    (R2)            ;
  980  012610  001441                          BEQ     TESTDX          ;BR IF YES
  981  012612  122721  000177                CMPB    #177,   (R1)+   ;IS IT FILL CHAR?
  982  012616  001756                          BEQ     SCAN4           ;BR IF YES
  983  012620  005301                          DEC     R1              ;BACKUP
  984  012622  122722  000177                CMPB    #177,   (R2)+   ;IS IT FILL?
  985  012626  001752                          BEQ     SCAN4           ;BR IF YES
  986  012630  105742                          TSTB    -(R2)           ;BACK UP POINTER
  987  012632  123722  011015                CMPB    PARAM2+1,(R2)+
  988  012636  001746                          BEQ     SCAN4           ;BR IF CHAR WAS SYNC
  989  012640  000240                  SCAN5:  NOP                     ;DATA ERROR
  990  012642  032777  020000  176174          BIT     #BIT13,@SWR     ;INHIBIT PRINTOUTS
  991  012650  001016                          BNE     DERR            ;BR IF YES
  992  012652  104400  013004                  TYPE    ,MSG2           ;<15><12>RECEIVED DATA = <15><12>
  993  012656  013737  011020  012666          MOV     IRDA,   RDAX    ;SETUP DATA ADRESS
  994  012664  104400                          TYPE                    ;PRINT RECEIVED DATA
  995  012666  000000                  RDAX:   0                       ;RECEIVED DATA ADDR.
  996  012670  104400  013031                  TYPE    ,MSG3           ;<15><12>DATA SHOULD BE<15><12>
  997  012674  013737  011022  012704          MOV     IXDA,   .+10    ;SETUP ADDR.
  998  012702  104400                          TYPE                    ;PRINT GOOD DATA
  999  012704  011022                          IXDA
 1000  012706  111103                  DERR:   MOVB    (R1),R3 ;SETUP XMIT DATA
 1001  012710  114202                          MOVB    -(R2),R2        ;SETUP RCV DATA
 1002  012712  104007                          HLT+7                   ;DATA ERROR HALT
 1003  012714  005726                  TESTDX: TST     (SP)+           ;POP STACK
 1004  012716  000207                          RTS     PC              ;RETURN FROM SUB/ROUT
 1005
 1006  012720  005015  044124  051105  MSG0:   .ASCIZ  <15><12>/THERE WAS A RECEIVER ERROR. REGISTER (SEL 2) =/
  (1)  013001     015  000012          MSG1:   .ASCIZ  <15><12>
  (1)  013004  005015  042522  042503  MSG2:   .ASCIZ  <15><12>/RECEIVED DATA = /<15><12>
  (1)  013031     015  042012  052101  MSG3:   .ASCIZ  <15><12>/DATA SHOULD BE/<15><12>
  (1)  013054  005015  046120  040505  MSG4:   .ASCII <15><12>/PLEASE MAKE CONNECTION (DIAL NUMBER)./
  (1)  013123     015  053412  042510          .ASCIZ <15><12>/WHEN CONNECTION COMPLETE; HIT CONTINUE SWITCH./<15><12>
  (1)  013206  005015  046120  040505  MSG5:   .ASCIZ <15><12>/PLEASE MAKE CONNECTION (DIAL NUMBER)./<15><12>
  (1)                                  .EVEN
  (1)  013260  000000                  SAVR0:  0
 1007  013262  000000                  SAVR1:  0
 1008  013264  000000                  SAVR2:  0
 1009  013266  000000                  SAVR3:  0
 1010  013270  000000                  SAVR4:  0
 1011  013272  000000                  SAVR5:  0
 1012  013274  000000                  DELAY:  0
 1013  013276  000000                  BACK:   0
 1014  013300  000000                  STOP:   0
 1015
```

```
1016                                ;*****************************************************************************
1017                                ;INITIALIZE TRANSMITTER.
1018                                ;PURPOSE OF THIS ROUTINE IS TO SEND OUT FIVE
1019                                ;SYNC CHARS. THE SYNC CHAR TO BE SENT IS FOUND
1020                                ;IN LOCATION PARAM2+1 (HIGH BYTE OF PARAM2).
1021                                ;WHEN THE SYNC CHARS. HAVE BEEN TRANSMITTED
1022                                ;THE TRANSMITTER WILL BE ENABLED FOR REAL DATA
1023                                ;TRANSFER. CHARACTERS WILL BE TRANSMITTED ONE AT A TIME.
1024                                ;*****************************************************************************
1025
1026  013302  005737  013274        STARTX: TST     DELAY           ;IF SW04=1 & SW14=0 WAIT BEFORE TURNING TX ON
1027  013306  001416                        BEQ     NDLY            ;NO GO AHEAD AND TURN ON TX
1028  013310  005037  014214                CLR     TEMP1
1029  013314  012737  000007  014216        MOV     #7,TEMP2
1030  013322  062737  000001  014214        ADD     #1,TEMP1
1031  013330  001374                        BNE     .-6
1032  013332  005337  014216                DEC     TEMP2
1033  013336  001371                        BNE     .-14
1034  013340  005037  013274                CLR     DELAY           ;ZERO DELAY
1035  013344  005037  011032        NDLY:   CLR     TIME
1036  013350  042764  000300  000002        BIC     #300,XCSR(R4)   ;CLEAR BOTH DONE BITS FROM TX
1037  013356  052764  000010  000002        BIS     #BIT3,XCSR(R4)  ;ENABLE ERRORS
1038  013364  032764  000004  000002        BIT     #BIT2,XCSR(R4)  ;WHERE IS THE POINTER POINTING
1039  013372  001403                        BEQ     1$              ;BR IF PRI IS NEXT.
1040  013374  004737  015426                JSR     PC,GETPRI       ;GO TOGGLE TO GET PRIMARY.
1041  013400  000740                        BR      STARTX          ;GOTO BEGGINING
1042  013402  012701  000005        1$:     MOV     #5,R1           ;SET FOR FIVE SYNC CHARS.
1043  013406  012705  014222                MOV     #SYNC,R5        ;SET POINTER LOCATION
1044  013412  113725  011015                MOVB    PARAM2+1,(R5)+  ;LOAD IN SYNC CHARS.
1045  013416  005301                        DEC     R1              ;ALL DONE??
1046  013420  001374                        BNE     .-6             ;BRANCH IF NOT DONE
1047  013422  105015                        CLRB    (R5)            ;SET LAST BYTE TO ZERO
1048
1049                                ;NOW THE SYNC CHARS ARE LOADED IN CORE FOR THE DQ11 TO
1050                                ;PICK UP AND TRANSMIT OUT.
1051
1052  013424  112764  000012  000005        MOVB    #12,REG(R4)     ;SELECT MISC REGISTER
1053  013432  012764  004000  000006        MOV     #4000,SEC(R4)   ;SET FOR EIGHT BITS PER CHAR.
1054  013440  112764  000002  000005        MOVB    #2,REG(R4)      ;SELECT THE TX BA PRI.
1055  013446  012764  014222  000006        MOV     #SYNC,SEC(R4)   ;LOAD TX BA PRI. WITH SYNC ADDR.
1056  013454  105264  000005                INCB    REG(R4)         ;SELECT THE TX WC PRI.
1057  013460  012764  177773  000006        MOV     #-5,SEC (R4)    ;SET FOR FIVE CHARS.
1058  013466  042700  100000                BIC     #XFLG,STAT      ;RESET TX COMPLETE FLAG
1059  013472  052764  001000  000002        BIS     #DTR,XCSR(R4)   ;SET DATA TERMINAL READY
1060  013500  005737  013300                TST     STOP            ;FIRST TIME HERE?
1061  013504  001004                        BNE     16$             ;BR IF NO
1062  013506  104400  013206                TYPE    ,MSG5           ;MAKE CONNECTION
1063  013512  005137  013300                COM     STOP
1064  013516  032764  002000  000002  16$:  BIT     #MRDY,XCSR(R4)
1065  013524  001037                        BNE     2$
1066  013526  032764  002000  000002  8$:   BIT     #MRDY,XCSR(R4)
1067  013534  001017                        BNE     3$
1068  013536  023727  011032  000036        CMP     TIME,#36        ;HAVE 30 SEC ELAPSED YET
1069  013544  103770                        BLO     8$              ;NO NOT YET
1070  013546  011402                        MOV     @RCSR,R2        ;LOAD FOR TYPEOUT
1071  013550  016403  000002                MOV     XCSR(R4),R3     ;LOAD FOR TYPEOUT
```

```
1072  013554  032777  010000  175262          BIT     #SW12,@SWR      ;INHIBIT PRINTOUTS?
1073  013562  001001                          BNE     12$             ;BR IF YES
1074  013564  104002                          HLT+2                   ;TYPE 'WAITING TO TRANSMIT'' MESSAGE.
1075  013566  005037  011032          12$:    CLR     TIME
1076  013572  000755                          BR      8$
1077  013574  005037  014214          3$:     CLR     TEMP1
1078  013600  012737  000005  014216          MOV     #5,TEMP2
1079  013606  062737  000001  014214          ADD     #1,TEMP1
1080  013614  001374                          BNE     .-6
1081  013616  005337  014216                  DEC     TEMP2
1082  013622  001371                          BNE     .-14
1083  013624  032737  000001  011014  2$:     BIT     #FULL.DUPLEX,PARAM2
1084  013632  001023                          BNE     9$
1085  013634  032764  010000  000002  10$:    BIT     #10000,XCSR(R4) ;IS CARRIER UP?
1086  013642  001417                          BEQ     9$
1087  013644  023727  011032  000036          CMP     TIME,#36        ;30 SECONDS UP ?
1088  013652  103770                          BLO     10$             ;NOT YET
1089  013654  011402                          MOV     @RCSR,R2        ;PREPARE TYPE OUT
1090  013656  016403  000002                  MOV     XCSR(R4),R3     ;AS ABOVE
1091  013662  032777  010000  175154          BIT     #SW12,@SWR      ;INHIBIT PRINTOUTS?
1092  013670  001001                          BNE     13$             ;BR IF YES
1093  013672  104001                          HLT     1               ;TYPE 'WAITING ''
1094  013674  005037  011032          13$:    CLR     TIME            ;ZERO TIMER
1095  013700  000755                          BR      10$
1096  013702  005037  011032          9$:     CLR     TIME            ;SET TIME=0
1097  013706  052764  000400  000002          BIS     #RQTS,XCSR(R4)
1098  013714  032764  020000  000002  11$:    BIT     #CTS,XCSR(R4)
1099  013722  001017                          BNE     6$
1100  013724  023727  011032  000036          CMP     TIME,#36        ;30 SECONDS UP ??
1101  013732  103770                          BLO     11$             ;NOT YET
1102  013734  011402                          MOV     @RCSR,R2        ;PREPARE TYPE OUT
1103  013736  016403  000002                  MOV     XCSR(R4),R3     ;AS ABOVE
1104  013742  032777  010000  175074          BIT     #SW12,@SWR      ;INHIBIT PRINTOUTS?
1105  013750  001001                          BNE     14$             ;BR IF YES
1106  013752  104002                          HLT     2               ;TYPE 'WAITING ''
1107  013754  005037  011032          14$:    CLR     TIME            ;ZERO TIMER
1108  013760  000755                          BR      11$
1109
1110
1111                                  ;TEST AND SETUP FOR HI BAUD RATE. NOTE THE MESSAGES                     ;;++D
1112                                  ;MUST BE THE SAME LENGTH IN HI BAUD.
1113
1114  013762  032737  000002  011014  6$:     BIT     #HI.BAUD,PARAM2         ;HAS HI BAUD BEEN SELECTED?
1115  013770  001414                          BEQ     17$                     ;BR IF NO
1116  013772  112764  000006  000005          MOVB    #6,REG(R4)              ;SEL SEC TXBA
1117  014000  013764  011022  000006          MOV     IXDA,SEC(R4)            ;LOAD SEC TXBA WITH DATTA
1118  014006  112764  000007  000005          MOVB    #7,REG(R4)              ;SEL SEC TXWC
1119  014014  013764  011062  000006          MOV     TXWC,SEC(R4)            ;SET TXWC FOR MAX CHAR XFER RATE
1120
1121
1122                                  ;HERE NOW BECAUSE CLEAR TO SEND HAS BEEN SET
1123                                  ;NOW SEND THE SYNC CHARS.
1124
1125  014022  052764  000001  000002  17$:     BIS     #.GO,XCSR(R4)   ;SET THE GO BIT
1126  014030  005037  011032                  CLR     TIME            ;SET TIME TO ZERO
1127  014034  105764  000002          4$:     TSTB    XCSR(R4)        ;IS TX DONE WITH SYNCS
```

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1128  014040  100417                        BMI     5$              ;BR IF YES
1129  014042  023727  011032  000036        CMP     TIME,#36        ;HAVE 30 SECOND GONE BY??
1130  014050  103771                        BLO     4$              ;BR IF NOT YET
1131  014052  011402                        MOV     @RCSR,R2        ;LOAD FOR TYPE OUT
1132  014054  016403  000002                MOV     XCSR(R4),R3     ;LOAD FOR TYPE OUT
1133  014060  032777  010000  174756        BIT     #SW12,@SWR      ;INHIBIT PRINTOUTS?
1134  014066  001001                        BNE     15$             ;BR IF YES
1135  014070  104002                        HLT     2               ;TYPE WAITING...
1136  014072  005037  011032          15$:  CLR     TIME            ;ZERO TIMER
1137  014076  000756                        BR      4$              ;GO WAIT FOR DONE
1138
1139                                  ;NOW TRANSMITTER DONE HAS SET AND THE SYNC CHARS
1140                                  ;HAVE BEEN SENT OUT. THE TRANSMITTER IS TO BE
1141                                  ;ENABLED AND THE DATA WILL BE TRANSFERED.
1142
1143  014100  032737  000002  011014  5$:   BIT     #HI.BAUD,PARAM2         ;HAS HI BAUD BEEN SELECTED?     ;;++D
1144  014106  001033                        BNE     7$                      ;BR IF YES
1145  014110  112764  000002  000005        MOVB    #2,REG(R4)      ;SELECT TX BA PRI
1146  014116  013764  011022  000006        MOV     IXDA,SEC(R4)    ;LOAD BA
1147  014124  062764  000002  000006        ADD     #2,SEC(R4)      ;POINT BA TWO HIGHER
1148  014132  112764  000003  000005        MOVB    #3,REG(R4)      ;SELECT TX WC PRI
1149  014140  012764  177776  000006        MOV     #-2,SEC(R4)     ;SET TWO CHARS AT A TIME
1150  014146  112764  000006  000005        MOVB    #6,REG(R4)      ;SELECT TX BA SEC
1151  014154  013764  011022  000006        MOV     IXDA,SEC(R4)    ;LOAD TX BA SEC WITH DATA POINTER
1152  014162  112764  000007  000005        MOVB    #7,REG(R4)      ;SELECT TX WC SEC
1153  014170  012764  177776  000006        MOV     #-2,SEC(R4)     ;SET WC WITH -2
1154
1155                                  ;THE DQ11 IS TOTALLY ENABLE TO GO. THE TRANSMISSION
1156                                  ;WILL BEGIN ON THE SECONDAY (THE SYNC CHARS WENT ON
1157                                  ;THE PRIMARY). THE DQ11 WILL INTERUPT AFTER EACH CHAR
1158                                  ;AND CONTINUE TRANSMITTING WHILE THE END CHAR IS
1159                                  ;SEARCHED FOR.
1160
1161  014176  042764  000300  000002  7$:   BIC     #300,XCSR(R4)   ;CLEAR ALL TX DONES
1162  014204  052764  000041  000002        BIS     #IE+.GO,XCSR(R4)
1163                                                                ;SET INTERUPT ENABLE AND GO
1164  014212  000207                        RTS     PC              ;GO BACK TO MAIN PROGRAM
1165
1166                                  ;SYNC CHARACTER BUFFER AREA.
1167
1168  014214  000000                  TEMP1:  0
1169  014216  000000                  TEMP2:  0
1170  014220  000000                  ERRORS: 0
1171  014222    026     026           SYNC:   .BYTE   26,26
1172  014224    026     026                   .BYTE   26,26
1173  014226    026     026                   .BYTE   26,26
```

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                                        ;*****************************************************************************
                                        ;TRANSMITTER INTERUPT SERVICE ROUTINE
                                        ;IN THIS ROUTINE THE END CHARACTER IS CHECKED FOR
                                        ;AND IF IT WASN'T FOUND THE TRANSMITTER CHARACTER COUNT
                                        ;REGISTER IS ADJUSTED.
                                        ;
                                        ;*****************************************************************************
014230  000240                  1.5   XISR:   NOP                     ;LOCATION SET FOR HALT INSTRUCTION IN DEBUGGING.
014232  005764  000004            4.4           TST     ERR(R4)       ;IS THE DQ11 ERROR FLAG SET??
014236  100012                  2.6           BPL     2$            ;NOT SET GOOD SO FAR.
014240  016403  000002            5.0           MOV     XCSR(R4),R3
014244  011402                  3.8           MOV     @RCSR,R2
014246  104000                  9.3           HLT     0             ;DQ11 ERROR FLAG SET. EXAMINE REGISTERS FOR ERRO
014250  016437  000004  014220  6.4           MOV     ERR(R4),ERRORS ;SAVE DQ ERROR REG
014256  042764  000377  000004  7.0           BIC     #377,ERR(R4)
014264  011402                  3.8   2$:     MOV     @RCSR,R2      ;PREPARE FOR ERROR TYPEOUT
014266  016403  000002            5.0           MOV     XCSR(R4),R3   ;PREPARE FOR ERROR TYPEOUT
014272  032764  000300  000002  6.5           BIT     #300,XCSR(R4) ;IS EITHER TX DONE SET??
014300  001001                  2.6           BNE     .+4           ;GOOD EITHER PRI OR SEC DONE IS SET
014302  104000                  9.3           HLT     0             ;REPORT ERROR. INTERUPT WAS TO
                                                                    ;BE CAUSED BY TX DONE; AND TX IS NOT DONE.
014304  032737  000002  011014  5.3           BIT     #HI.BAUD,PARAM2 ;IS HIGH BAUD RATE SELECTED?
014312  001402                  2.6           BEQ     1$            ;BR IF NO
014314  005746                  4.4           TST     -(SP)         ;FAKE STACK
014316  000474                  2.6           BR      HBTCHK        ;XFER ALL DONE
014320  032764  000004  000002  6.5   1$:     BIT     #BIT2,XCSR(R4) ;WHERE IS POINTER??
014326  001424                  2.6           BEQ     TX.SEC        ;SECONDARY IS NEXT.
014330  112764  000002  000005  6.4   TX.PRI: MOVB    #2,REG(R4)    ;SELECT TX BA PRIMARY
014336  016401  000006            5.0           MOV     SEC(R4),R1    ;GET NEXT ADDRESS TO TRANSMIT FROM
014342  062764  000002  000006  6.4           ADD     #2,SEC(R4)    ;UPDATE CURRENT ADDRESS.
014350  004737  014450            5.8           JSR     PC,TX.CK      ;GO CHECK FOR END CHAR.

                                        ;IF I COME BACK FROM THE SUBROUTINE THAT MEANS THAT THE
                                        ;END CHAR WAS NOT FOUND AND THE TRANSMISSON GOES ON.

014354  112764  000003  000005  6.4           MOVB    #3,REG(R4)    ;SELECT TX WC SEC
014362  012764  177776  000006  6.4           MOV     #-2,SEC(R4)   ;LOAD WITH A -2
014370  042764  000200  000002  7.0           BIC     #BIT7,XCSR(R4) ;CLEAR PRI DONE FROM TX
014376  000002                  4.8           RTI                   ;LEAVE TX ISR

                                        ;THE ABOVE ROUTINE SERVICED THE INTERUPT IF THE
                                        ;PRIMARY REGISTERS CAUSED THE INTERUPT.

014400  112764  000006  000005  6.4   TX.SEC: MOVB    #6,REG(R4)    ;SELECT THE TX BA SECONDARY.
014406  016401  000006            5.0           MOV     SEC(R4),R1    ;GET ADDRESS POINTER.
014412  062764  000002  000006  6.4           ADD     #2,SEC(R4)    ;UPDATE CURRENT ADDRESS.
014420  004737  014450            5.8           JSR     PC,TX.CK      ;GO CHECK THE LAST CHARACTER.

                                        ;JUST LIKE ABOVE; IF I COME BACK FROM THE ABOVE SUBROUTIN
                                        ;THAT MEANS THE THE LAST CHAR HASN'T BEEN TRANSMITTED
                                        ;AND THAT TRANSMISSON SHOULD CONTINUE.

014424  112764  000007  000005  6.4           MOVB    #7,REG(R4)    ;SELECT THE TX WC SEC
014432  012764  177776  000006  6.4           MOV     #-2,SEC(R4)   ;LOAD WITH A -2
014440  042764  000100  000002  7.0           BIC     #BIT6,XCSR(R4) ;CLEAR SEC DONE
```

```
1230  014446  000002                    4.8                RTI                          ;LEAVE HERE
1231  014450  123741  011040            5.9   TX.CK:       CMPB    TX.TERM,-(R1)        ;WAS THAT THE LAST CHARACTER.
1232  014454  001427                    2.6                BEQ     XISRDN               ;ISR IS DONE IF BR IS MADE
1233  014456  123741  011040            5.9                CMPB    TX.TERM,-(R1)        ;LAST CHAR?
1234  014462  001424                    2.6                BEQ     XISRDN               ;BR IF YES
1235  014464  032777  000100  174352    7.7   MONDAT:      BIT     #BIT6,@SWR           ;CHECK FOR DATA MONITOR.
1236  014472  001405                    2.6                BEQ     1$                   ;DON'T MONITOR DATA
1237  014474  105777  174402            5.6                TSTB    @TPS                 ;TTY READY??
1238  014500  100002                    2.6                BPL     1$                   ;TTY NOT READY GO ON WITH TEST
1239  014502  111177  174376            7.6                MOVB    (R1),@TPB            ;TYPE CHARACTER
1240  014506  000207                    3.5   1$:          RTS     PC                   ;GO BACK TO ISR
1241  014510  032777  000100  174326    7.7   HBTCHK:      BIT     #BIT6,@SWR           ;CHECK FOR DATA MONITOR
1242  014516  001406                    2.6                BEQ     XISRDN               ;DON'T MONITOR
1243  014520  105777  174356            5.6                TSTB    @TPS                 ;IS TTY READY
1244  014524  100003                    2.6                BPL     XISRDN               ;TTY NOT READY GO ON WITH TEST
1245  014526  112777  000124  174350    7.6                MOVB    #'T,@TPB             ;TYPE 'T'
1246  014534  052700  100000            3.8   XISRDN:      BIS     #XFLG,STAT           ;SET TX COMPLETE FLAG
1247  014540  042764  000441  000002    7.0                BIC     #IE+RQTS+.GO,XCSR(R4)
1248                                                                                    ;CLEAR ALL CONDITIONS FOR TX
1249  014546  005037  011032            3.7                CLR     TIME                 ;ZERO TIMER
1250  014552  005726                    3.2                TST     (SP)+                ;POP SUBROUTINE PC FROM STACK
1251  014554  000002                    4.8   TXOUT:       RTI                          ;LEAVE HERE FOR GOOD.
1252
```

```
1253                                    ;*************************************************************************
1254                                    ;INITIALIZE RECEIVER ROUTINE
1255                                    ;*************************************************************************
1256
1257  014556  000240                    STARTR: NOP                         ;LEAVE OPEN FOR TEST PURPOSES.
1258  014560  042714  000300                    BIC     #300,@RCSR          ;CLEAR ALL DONES
1259  014564  032714  000004                    BIT     #BIT2,@RCSR         ;CHECK FOR POINTER TO SEC.
1260  014570  001403                            BEQ     1$                  ;BR IF POINTING TO PRI
1261  014572  004737  015426                    JSR     PC,GETPRI           ;POINT REGISTERS TO PRI
1262  014576  000767                            BR      STARTR              ;BEGIN AGAIN
1263  014600  113737  011015  014222    1$:     MOVB    PARAM2+1,SYNC       ;GET SYNC CHAR
1264  014606  113737  011015  014223            MOVB    PARAM2+1,SYNC+1     ;GET SECOND SYNC CHAR
1265  014614  112764  000011  000005            MOVB    #11,REG(R4)         ;SELECT SYNC REGISTER
1266  014622  013764  014222  000006            MOV     SYNC,SEC(R4)        ;LOAD SYNC REGISTER
1267  014630  112764  000000  000005            MOVB    #0,REG(R4)          ;SELECT RX BA PRI.
1268  014636  013764  011020  000006            MOV     IRDA,SEC(R4)        ;LOAD RX BA FOR DATA
1269  014644  105264  000005                    INCB    REG(R4)             ;GET WC REGISTER
1270  014650  012764  177776  000006            MOV     #-2,SEC(R4)         ;SET FOR ONE CHAR.
1271  014656  112764  000004  000005            MOVB    #4,REG(R4)          ;SELECT RX BA SEC.
1272  014664  013764  011020  000006            MOV     IRDA,SEC(R4)        ;LOAD RX BA SEC.
1273  014672  062764  000002  000006            ADD     #2,SEC(R4)          ;UPDATE DATA POINTER BY ONE
1274  014700  105264  000005                    INCB    REG(R4)             ;GET WC REGISTER
1275  014704  012764  177776  000006            MOV     #-2,SEC(R4)         ;SET FOR TWO CHAR.
1276  014712  112764  000012  000005            MOVB    #12,REG(R4)         ;SELECT MISC REGISTER
1277  014720  012764  004000  000006            MOV     #4000,SEC(R4)       ;SELECT EIGHT BITS PER CHAR.
1278  014726  012737  000750  011070            MOV     #750,RCC            ;SET FOR MAX 750 CHARS TO BE RXED
1279  014734  042700  040000                    BIC     #RFLG,STAT          ;RESET RX COMPLETE FLAG
1280  014740  005037  011054                    CLR     ERCSR
1281  014744  005037  011056                    CLR     ERDBR
1282  014750  032737  000002  011014          BIT     #HI.BAUD,PARAM2 ;IS HIGH BAUD RATE SELECTED?
1283  014756  001413                            BEQ     2$                  ;BR IF NO
1284  014760  112764  000001  000005            MOVB    #1,REG(R4)          ;SELECT THE RX WC PRI
1285  014766  013764  011064  000006            MOV     RXWC,SEC(R4)        ;RECEIVE CHARS MAX.
1286  014774  112764  000005  000005            MOVB    #5,REG(R4)          ;SELECT THE RX WC SEC.
1287  015002  005064  000006                    CLR     SEC(R4)             ;ZERO THE RX WC SECONDARY.
1288  015006  052764  001000  000002    2$:     BIS     #DTR,XCSR(R4)       ;SET DATA TERMINAL READY.
1289  015014  005737  013300                    TST     STOP                ;FIRST TIME HERE?
1290  015020  001004                            BNE     3$
1291  015022  104400  013206                    TYPE    ,MSG5
1292  015026  005137  013300                    COM     STOP
1293  015032                            3$:
1294  015032  000240                            NOP
1295  015034  000240                            NOP
1296  015036  000240                            NOP
1297  015040  000240                            NOP
1298  015042  000240                            NOP
1299  015044  052714  000041                    BIS     #IE+.GO,@RCSR       ;SET INTERUPT ENABLE AND GO
1300  015050  000207                            RTS     PC                  ;GO TO MAINLINE.....
1301
1302                                    ;THE ABOVE SHOULD HAVE PREPARED THE RECEIVER TO
1303                                    ;RECEIVE ALL THE CHARS NEEDED FOR TESTING.
1304                                    ;THE RECEIVER WILL INTERUPT AFTER EACH CHAR IS RECEIVED.
1305                                    ;CHECKING FOR THE END CHARACTER.
1306
```

```
1307
1308                                    ;*************************************************************************
1309                                    ;RECEIVER INTERUPT SERVICE ROUTINE.
1310                                    ;*************************************************************************
1311
1312                                    ;THIS ROUTINE WILL SERVICE THE PRIMARY AND SECONDARY
1313                                    ;REGISTERS WHEN THEY INTERUPT.
1314                                    ;CHECKING FOR THE END CHAR IS PERFORMED.
1315
1316  015052  000240                1.5  RISR:   NOP                     ;LEAVE SPACE FOR BEBUGGING
1317  015054  005764  000004        4.4          TST     ERR(R4)         ;CHECK THE DQ11 ERROR FLAG
1318  015060  100012                2.6          BPL     2$              ;BR IF ERROR FLAG NOT SET
1319  015062  011402                3.8          MOV     @RCSR,R2
1320  015064  016403  000002        5.0          MOV     XCSR(R4),R3
1321  015070  104000                9.3          HLT     0               ;CHECK ERROR REGISTER FOR ERROR.
1322  015072  016437  000004  014220 6.4          MOV     ERR(R4),ERRORS
1323  015100  042764  000377  000004 7.0          BIC     #377,ERR(R4)
1324  015106  005337  011070        3.7  2$:     DEC     RCC             ;CHECK THE BUFFER SIZE
1325  015112  001004                2.6          BNE     1$              ;BR IF OK
1326  015114  000005                1.5          RESET                   ;STOP THE SHOW
1327  015116  104006                9.3          HLT+6                   ;RECEIVER BUFFER FULL
1328  015120  000000                1.8          HALT                    ;STOP EVERY THING
1329  015122  000776                2.6          BR      .-2             ;DISABLE CONT SWITCH
1330  015124  011402                3.8  1$:     MOV     @RCSR,R2        ;PREPARE FOR ERROR TYPEOUT
1331  015126  016403  000002        5.0          MOV     XCSR(R4),R3     ;PREPARE FOR ERROR TYPEOUT
1332  015132  032714  000300        5.3          BIT     #300,@RCSR      ;IS EITHER DONE SET??
1333  015136  001001                2.6          BNE     .+4             ;BR IF AT LEAST ONE DONE IS SET
1334  015140  104000                9.3          HLT     0               ;NOBODY IS DONE. BUT AN INTERUPT OCCURED.
1335  015142  032737  000002  011014 5.3          BIT     #HI.BAUD,PARAM2 ;HIGH BAUD??
1336  015150  001404                2.6          BEQ     3$              ;BR IF NO
1337  015152  042714  000041        5.8          BIC     #IE+.GO,@RCSR   ;CLEAR GO AND INTERUPT ENABLE
1338  015156  005746                4.4          TST     -(SP)           ;FAKE STACK
1339  015160  000507                2.6          BR      HBRCHK          ;XFER ALL DONE
1340  015162  032714  000004        5.3  3$:     BIT     #BIT2,@RCSR     ;WHERE IS THE POINTER.
1341  015166  001423                2.6          BEQ     RX.SEC          ;POINTING TO SECONDARY.
1342  015170  112764  000000  000005 6.4  RX.PRI: MOVB    #0,REG(R4)      ;SELECT THE RX BA PRIMARY
1343  015176  016401  000006        5.0          MOV     SEC(R4),R1      ;GET THE ADDRESS OF DATA.
1344  015202  062764  000002  000006 6.4          ADD     #2,SEC(R4)      ;UPDATE CURRENT ADDRESS
1345  015210  004737  015304        5.8          JSR     PC,RX.CK        ;GO CHECK THE DATA.
1346
1347                                    ;IF I RETURN BACK FROM THE ABOVE SUBROUTINE THE END CHAR
1348                                    ;WAS NOT FOUND AND RECEIVING WILL CONTINUE.
1349
1350  015214  112764  000001  000005 6.4          MOVB    #1,REG(R4)      ;SELECT THE RX WC PRI.
1351  015222  012764  177776  000006 6.4          MOV     #-2,SEC(R4)     ;LOAD WITH -2
1352  015230  042714  000200        5.8          BIC     #BIT7,@RCSR     ;CLEAR RX DONE
1353  015234  000002                4.8          RTI                     ;LEAVE HERE NOW.
1354
1355
1356                                    ;THE ABOVE ROUTINE WAS FOR THE PRIMARY REGISTER INTERUPT.
1357                                    ;THE BELOW ROUTINE IS FOR THE SECONDARY REGISTERS.
1358  015236  112764  000004  000005 6.4  RX.SEC: MOVB    #4,REG(R4)      ;SELECT THE RX BA SEC.
1359  015244  016401  000006        5.0          MOV     SEC(R4),R1      ;GET DATA ADDRESS
1360  015250  062764  000002  000006 6.4          ADD     #2,SEC(R4)      ;UPDATE CURRENT ADDRESS
1361  015256  004737  015304        5.8          JSR     PC,RX.CK        ;GO CHECK THE DATA
1362
```

```
1363                                                ;IF I COME BACK THAT MEANS THAT THE END CHARACTER WASN'T
1364                                                ;FOUND AND I SHOULD CONTINUE RECEVING.
1365
1366  015262  112764  000005  000005    6.4             MOVB    #5,REG(R4)      ;SELECT THE RX WC SEC
1367  015270  012764  177776  000006    6.4             MOV     #-2,SEC(R4)     ;LOAD WITH A -2
1368  015276  042714  000100            5.8             BIC     #BIT6,@RCSR     ;CLEAR RX DONE
1369  015302  000002                     4.8             RTI                     ;GO BACK TO MAINLINE ....
1370
1371                                                ;THE BELOW ROUTINE CHECKS THE DATA FOR END CHAR.
1372
1373  015304  142741  000200            7.0  RX.CK:     BICB    #BIT7,-(R1)     ;CLEAR PARITY BIT.
1374  015310  142741  000200            7.0             BICB    #BIT7,-(R1)     ;CLEAR PARITY BIT.
1375  015314  123721  011041            4.7             CMPB    RX.TERM,(R1)+   ;WAS THE CHAR =001
1376  015320  001403                     2.6             BEQ     RXISRDN         ;BR IF 001
1377  015322  123721  011041            4.7             CMPB    RX.TERM,(R1)+   ; 001?
1378  015326  001012                     2.6             BNE     NO.12           ; NO 001
1379  015330                           RXISRDN:
1380  015330  042714  000041            5.8             BIC     #IE+.GO,@RCSR   ;CLEAR GO AND INTERUPT ENABLE
1381  015334  042714  000300            5.8             BIC     #300,@RCSR      ;CLEAR ALL RX DONES
1382  015340  052700  040000            3.8             BIS     #RFLG,STAT      ;SET RX COMPLETE FLAG
1383  015344  005037  011032            3.7             CLR     TIME            ;ZERO TIMER
1384  015350  005726                     3.2             TST     (SP)+           ;POP SUBROUTINE POINTER.
1385  015352  000002                     4.8             RTI                     ;ALL DONE GO HOME.....
1386  015354  032777  000040  173462    7.7  NO.12:     BIT     #BIT5,@SWR      ;MONITOR RX DATA??
1387  015362  001405                     2.6             BEQ     1$              ;DON'T MONITOR
1388  015364  105777  173512            5.6             TSTB    @TPS            ;TTY READY??
1389  015370  100002                     2.6             BPL     1$              ;NOT READY GO ON WITH TEST
1390  015372  114177  173506            8.8             MOVB    -(R1),@TPB      ;PRINT CHARACTER
1391  015376  000207                     3.5  1$:        RTS     PC              ;GO TO RX ISR
1392  015400  032777  000040  173436    7.7  HBRCHK:    BIT     #BIT5,@SWR      ;MONITOR RX DATA?
1393  015406  001750                     2.6             BEQ     RXISRDN         ;BR IF NO
1394  015410  105777  173466            5.6             TSTB    @TPS            ;TTY READY?
1395  015414  100345                     2.6             BPL     RXISRDN         ;NO GO ON WITH TEST
1396  015416  112777  000122  173460    7.6             MOVB    #'R,@TPB        ;TYPE 'R'
1397  015424  000741                     2.6             BR      RXISRDN
```

```
1398                                    ;    ROUTINE TO GET TRANSMITTER OR RECEIVER ONTO
1399                                    ;    THE PRIMARY REGISTERS IF THEY ARE ON THE SECONDARY.
1400
1401  015426  032764  000004  000002  GETPRI: BIT     #BIT2,XCSR(R4)  ;IS THE TX ON THE SEC??
1402  015434  001424                          BEQ     1$              ;BR IF NO
1403  015436  112764  000012  000005          MOVB    #12,REG(R4)     ;SELECT THE MISC REG
1404  015444  012764  004010  000006          MOV     #4010,SEC(R4)   ;SET EIGHT BITS AND TEST LOOP FOR CLK
1405  015452  112764  000007  000005          MOVB    #7,REG(R4)      ;SELECT TX WC SEC
1406  015460  012764  177777  000006          MOV     #-1,SEC(R4)     ;TX ONE CHAR
1407  015466  052764  000001  000002          BIS     #.GO,XCSR(R4)   ;SET GO
1408  015474  032764  000100  000002          BIT     #BIT6,XCSR(R4)  ;HANG HERE FOR SEC DONE
1409  015502  001774                          BEQ     .-6             ;KEEP WAITING FOR TX DONE SEC.
1410  015504  000750                          BR      GETPRI          ;GO RECHECK AND CKECK RX
1411
1412  015506  032714  000004          1$:     BIT     #BIT2,@RCSR     ;IS RX ON SECONDARY REG
1413  015512  001430                          BEQ     2$              ;BR IF ON PRI.
1414  015514  112764  000012  000005          MOVB    #12,REG(R4)     ;SELECT MISC REGISTERS
1415  015522  012764  004010  000006          MOV     #4010,SEC(R4)   ;EIGHT BITS AND TEST LOOP (CLK)
1416  015530  112764  000005  000005          MOVB    #5,REG(R4)      ;SELECT RX WC SEC
1417  015536  012764  177777  000006          MOV     #-1,SEC(R4)     ;RX ONE CHAR
1418  015544  112764  000004  000005          MOVB    #4,REG(R4)      ;SEL RX BA SEC.
1419  015552  012764  015624  000006          MOV     #NO.DAT,SEC(R4) ;LOAD RX BA SEC.
1420  015560  052714  010001                  BIS     #BIT12+.GO,@RCSR        ;SET GO!!!!!!!+ACTIVE
1421  015564  032714  000100                  BIT     #BIT6,@RCSR     ;HANG HERE FOR RX SEC DONE.
1422  015570  001775                          BEQ     .-4             ;KEEP WAITING
1423  015572  000715                          BR      GETPRI          ;GO CHECK EVERY ONE
1424
1425  015574  112764  000012  000005  2$:     MOVB    #12,REG(R4)     ;SELECT MISC REGISTER
1426  015602  042764  004010  000006          BIC     #4010,SEC(R4)   ;CLEAR EIGHT BITS AND TEST LOOP
1427  015610  042714  000300                  BIC     #300,@RCSR      ;CLEAR RX DONES
1428  015614  042764  000300  000002          BIC     #300,XCSR(R4)   ;CLEAR TX DONES
1429  015622  000207                          RTS     PC              ;GO HOME
1430  015624  000000                  NO.DAT: 0
1431
      015626  005015  042522  042503  MFULL:  .ASCIZ  <15><12>/RECEIVER BUFFER FILLED. ERROR!!/
      015670  005015  042522  042503  MRXDA:  .ASCIZ  <15><12>/RECEIVED DATA = /<15><12>
      015715     015  051012  041505  MRXSB:  .ASCIZ  <15><12>/RECEIVED DATA SHOULD BE /<15><12>
```

```
                                .EVEN
1432            000001          .END
```

```
BA       011004            605#    666
BACK     013276            775*    803*    838*    918*    949     1013#
BIT0   = 000001            599#
BIT1   = 000002            599#
BIT10  = 002000            599#
BIT11  = 004000            599#
BIT12  = 010000            599#    681     1420
BIT13  = 020000            599#    634#     960     990
BIT14  = 040000            599#
BIT15  = 100000            599#
BIT2   = 000004            599#   1038     1200    1259    1340    1401    1412
BIT3   = 000010            599#    690     1037
BIT4   = 000020            599#
BIT5   = 000040            599#    688     1386    1392
BIT6   = 000100            599#   1229     1235    1241    1368    1408    1421
BIT7   = 000200            599#   1212     1352    1373    1374
BIT8   = 000400            599#
BIT9   = 001000            599#
B2016    011030            615#    963
CTS    = 020000            599#   1098
DELAY    013274            692*    727*    947*   1012#    1026    1034*
DERR     012706            991    1000#
DISPLA   011046            625#
DQ11     011000            604#
DSFLG  = 020000            599#    633#
DSSTAT   011060            640#
DTR    = 001000            599#   1059     1288
ENTER    012436            931     940#
EOP      012350            776     804      839     919     926#
ERCSR    011054            638#   1280*
ERDBR    011056            639#    958     1281*
ERR    = 000004            599#    679*     681*    682*   1183    1188    1189*   1317    1322    1323*
ERRORS   014220            689*   1170#    1188*   1322*
FLAG     011042            623#
FULL.D=  000001            654#    878      894     899    1083
GETPRI   015426           1040    1261     1401#   1410    1423
GO       011374            726#
HBRCHK   015400           1339    1392#
HBTCHK   014510           1199    1241#
HI.BAU=  000002            599#   1114     1143    1196    1282    1335
IE     = 000040            599#   1162     1247    1299    1337    1380
ILB    = 000010            599#    735
IRDA     011020            611#    842      967     993    1268    1272
IXDA     011022            612#    702      709     843     966     997     999    1117    1146    1151
KBDIN  = 104416            599#    757      788     820     877
LOOP   = 000020            599#    773      801     836     916
MFULL    015626           1431#
MONDAT   014464           1235#
MRDY   = 002000            599#   1064     1066
MRXDA    015670           1431#
MRXSB    015715           1431#
MSG0     012720            962    1006#
MSG1     013001            965    1006#
MSG2     013004            992    1006#
MSG3     013031            996    1006#
MSG4     013054           1006#
```

```
MSG5    013206          1006#   1062    1291
NDLY    013344          1027    1035#
NODAT = 000200           599#    769     832     913
NO.DAT  015624          1419    1430#
NO.12   015354          1378    1386#
OWI   = 000002           599#    732
OWO   = 000001           599#    729
PARAM1  011012           608#    667
PARAM2  011014           609#    668     878     894     899     987    1044    1083    1114    1143    1196    1263    1264
                        1282    1335
PARAM3  011016           610#
PRIOR   011010           607#    663     665
PRTY0 = 000000           599#
PRTY1 = 000040           599#
PRTY2 = 000100           599#
PRTY3 = 000140           599#
PRTY4 = 000200           599#
PRTY5 = 000240           599#
PRTY6 = 000300           599#
PRTY7 = 000340           599#    927
QTPIE   012506           928*    929*    948     950#
RCC     011070           645#   1278*   1324*
RDA     011072           646#
RDAX    012666           993*    995#
REG   = 000005           599#    672*    684*    687*   1052*   1054*   1056*   1116*   1118*   1145*   1148*   1150*   1152*
                        1202*   1210*   1218*   1227*   1265*   1267*   1269*   1271*   1274*   1276*   1284*   1286*   1342*
                        1350*   1358*   1366*   1403*   1405*   1414*   1416*   1418*   1425*
RFLG  = 040000           632#    759     772     823     835     885     911    1279    1382
RISR    015052           662    1316#
RIV     011006           606#    661
RQTS  = 000400           599#   1097    1247
RWAIT = 104410           599#
RXISRD  015330          1376    1379#   1393    1395    1397
RXWC    011064           643#    716*   1285
RX.CK   015304          1345    1361    1373#
RX.PRI  015170          1342#
RX.SEC  015236          1341    1358#
RX.TER  011041           621#    712    1375    1377
SAVR0   013260           932*    941    1006#
SAVR1   013262           933*    942    1007#
SAVR2   013264           934*    943    1008#
SAVR3   013266           935*    944    1009#
SAVR4   013270           936*    945    1010#
SAVR5   013272           937*    946    1011#
SCAN4   012554           968#    969     982     985     988
SCAN5   012640           989#
SEC   = 000006           599#    674*    683*    688*   1053*   1055*   1057*   1117*   1119*   1146*   1147*   1149*   1151*
                        1153*   1203    1204*   1211*   1219    1220*   1228*   1266*   1268*   1270*   1272*   1273*   1275*
                        1277*   1285*   1287*   1343    1344*   1351*   1359    1360*   1367*   1404*   1406*   1415*   1417*
                        1419*   1426*
SETTLE  011024           613#
SRCSR   011052           637#
START   011106           618     658#
STARTR  014556           758     821     880     897    1257#   1262
STARTX  013302           789     852     881    1026#   1041
STOP    013300           728*   1014#   1060    1063*   1289    1292*
```

```
STPS   = 104414          599#  927
SWR      011044          624#  659  769  773  801  832  836  840  913  916  960  990  1072
                        1091  1104 1133 1235 1241 1386 1392
SW12   = 010000          599#  1072 1091 1104 1133
SXCSR    011050          636#
SYNC     014222         1043  1055 1171# 1263* 1264* 1266
TEMP1    014214         1028* 1030* 1077* 1079* 1168#
TEMP2    014216         1029* 1032* 1078* 1081* 1169#
TESTD    012510          771  834  915  958#
TESTDX   012714          971  977  980  1003#
TIE    = 000040          599#  929  930
TIME     011032          616#  691* 726* 761  766* 790* 793  798* 822* 825  830* 851* 855
                         860* 882* 887  892* 903  908* 912* 1035* 1068 1075* 1087 1094* 1096*
                        1100  1107* 1126* 1129 1136* 1249* 1383*
TKB      011100          650#
TKS      011076          649#
TPB      011104          652#  1239* 1245* 1390* 1396*
TPS      011102          651#  1237  1243  1388  1394
TSTDAT   012544          959   961   966#
TXOUT    014554         1251#
TXWC     011062          642#  708*  1119
TX.CK    014450         1205  1221  1231#
TX.PRI   014330         1202#
TX.SEC   014400         1201  1218#
TX.TER   011040          619#  705  970  1231 1233
TYPE   = 104400          599#  962  965  975  992  994  996  998  1062 1291
XCC      011066          644#
XCSR   = 000002          599#  670* 678* 690* 764  796  828  858  890  906  928  930* 948*
                        1036* 1037* 1038 1059* 1064 1066 1071 1085 1090 1097* 1098 1103 1125*
                        1127  1132  1161* 1162* 1185 1191 1192 1200 1212* 1229* 1247* 1288* 1320
                        1331  1401  1407* 1408  1428*
XDA      011074          647#  844*
XFLG   = 100000          631#  791  800  853  862  883  896  901  910  1058 1246
XISR     014230          664  1182#
XISRDN   014534         1232  1234  1242 1244 1246#
XLB    = 000004          599#  738
XWAIT  = 104412          599#
X.X      011322          701#
$ILB     011670          737   820#  863
$OWI     011464          734   757#  777
$OWO     011572          731   788#  805
$XLB     012120          740   877#  917  918
.      = 015752          603#  742  846  997* 1031 1033 1046 1080 1082 1193 1329 1333 1409
                        1422
.GO    = 000001          599#  1125 1162 1247 1299 1337 1380 1407 1420

. ABS.  015752     000

 ERRORS DETECTED:  0

 DSKZ:CZDQOD,DSKZ:CZDQOD.SEQ=DSKZ:ITEP1.MAC,DSKZ:CZDQOD.P11
 RUN-TIME: 4 5 .3 SECONDS
 RUN-TIME RATIO: 172/10=16.0
 CORE USED:  16K  (31 PAGES)
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