M. C. N. REQUIRED
THIS PROGRAM REQUIRES MCN(S)
IN ORDER TO WORK PROPERLY

IDENTIFICATION

PRODUCT CODE:	MAINDEC-Ø8-DHKLC-B-D
PRODUCT NAME:	KL8F DOUBLE BUFFERED ASYNCHRONOUS INTERFACE DIAGNOSTIC
DATE REVISED:	MAY 1972
MAINTAINER:	DIAGNOSTIC GROUP
AUTHOR:	PATRICK COYNE

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1,0 ABSTRACT

THIS DIAGNOSTIC FACILITATES THE CHECK-OUT OF THE KL8F DOUBLE BUFFERED ASNYCHRONOUS INTERFACE, THIS IS A CLOSED LOOP TEST, A METHOD TO CONNECT EIA OUTPUT TO EIA INPUT IS REQUIRED, REFER TO TEST PROCEDURE M8652-0-3 FOR CONFIGURATION, ERROR HALTS AND SCOPE LOOPS ARE PROVIDED,

2,0 REQUIREMENTS

2,1 EQUIPMENT

PDP-8E COMPUTER
ASR-33 TELETYPE OR EQUIVALENT DEVICE
M8652 QUAD MODULE
ONE LOOP BACK PLUG #7008517
IF LOOP BACK PLUG IS NOT AVAILABLE, CONNECT PINS E TO M, AND F TO J ON CONNECTOR J1 OF M8652 MODULE,

2,2 STORAGE

THE PROGRAM OCCUPIES MEMORY LOCATIONS 0000 TO 3000,

3,0 LOADING PROCEDURE

LOAD PROGRAM VIA BINARY LOADER,

4,0 STARTING PROCEDURE

4,1 LOAD STARTING ADDRESS 0200-DEPRESS CONTINUE, PROGRAM WILL HLT AT LOCATION 0202,

4,2 FIRST PROGRAM HLT (0202) IS TO ALLOW OPERATOR TO SELECT IOT STRUCTURE, THROUGH THE SWITCHES, FOR WHICH HIS M8652 HAS BEEN JUMPERED TO OPERATE WITH,

SWITCHES	SELECTS
0-5	RECEIVE IOT
6-11	TRANSMIT IOT

FOR EXAMPLE; IF THE NUMBER 0304 WAS PLACED IN THE SWITCHES THE IOT STRUCTURE WOULD BE;

RECEIVE - 603X
TRANSMIT- 604X

WHERE X=0-7
DEPRESS CONTINUE
PROGRAM WILL HALT AT LOCATION 0204,

4,3 THE SECOND PROGRAM HLT (0204) IS TO ALLOW THE OPERATOR TO PLACE IN THE SWITCH REGISTER (S,R,) THE NUMBER OF DATA BITS PER CHARACTER TO BE TRANSMITTED,
THERE ARE FOUR POSSIBLE COMBINATIONS;

S,R,=0037 (5 DATA BITS)
S,R,=0077 (6 DATA BITS)
S,R,=0177 (7 DATA BITS)
S,R,=0377 (8 DATA BITS)

DEPRESS CONTINUE
PROGRAM WILL HALT AT LOCATION 0207.

4,4 THE THIRD PROGRAM HLT (0207) ALLOWS THE OPERATOR TO SELECT THROUGH THE S,R, THE TEST TO BE RUN, BAUD RATE AT WHICH DATA IS TO BE TRANSFERRED, AND THE TOTAL NUMBER OF BITS (INCLUDING START, STOP, PARITY) EACH CHARACTER IS COMPOSED OF. FOR CONTROL SWITCH SETTINGS REFER TO PARA, 5.1
DEPRESS CONTINUE PROGRAM WILL NOW HALT ONLY IF AN ERROR IS ENCOUNTERED.

5,0 OPERATING PROCEDURE

5,1 CONTROL SWITCH SETTINGS

	S,R, BIT(S)	SET AS	ACTION ON PROGRAM
	0	0	STAY IN SCOPE LOOP
		1	EXIT SCOPE LOOP
	1,2,3	0	RUN ALL TESTS
		1	TEST ONE ONLY
		2	TEST TWO ONLY
		3	TEST THREE ONLY
		4	TEST FOUR ONLY
		5	TEST FIVE ONLY
		6	TEST SIX ONLY
		7	TEST SEVEN ONLY
	4,5	NOT USED	
(A)	6,7,8	0	7 BITS PER CHARACTER
		1	8 BITS PER CHARACTER
		2	9 BITS PER CHARACTER
		3	10 BITS PER CHARACTER
		4	11 BITS PER CHARACTER
		5	12 BITS PER CHARACTER
		6	NOT USED
		7	NOT USED
(B)	9,10,11	0	110 BAUD
		1	134.5 BAUD
		2	150 BAUD
		3	300 BAUD
		4	600 BAUD
		5	1200 BAUD
		6	1800 BAUD
		7	2400 BAUD

NOTE(A)! USED TO SELECT TOTAL NUMBER OF BITS PER CHARACTER, INCLUDING! DATA (5,6,7 OR 8), START (1), STOP (1 OR 2), PARITY (0,1),

NOTE(B)! USED TO SELECT BAUD RATE AT WHICH DATA IS TRANSFERRED,

5,2 THE OPERATOR HAS THE OPTION OF RUNNING ALL TESTS OR ANY ONE TEST, THROUGH THE SETTING OF THE CONTROL SWITCHES, REFER TO PARA 5,1,

5,3 AS AN INDICATION THAT A TEST HAS RUN SUCCESSFULLY THE M,Q, REGISTER IS LOADED WITH THE TEST NUMBER (1,2,3,4,5,6,7) AFTER IT HAS MADE A COMPLETE PASS,

6,0 ERRORS

UPON DETECTION OF AN ERROR DURING ANY TEST THE PROGRAM WILL HALT, FOR A DESCRIPTION OF EACH ERROR REFER TO THE PROGRAM LISTING,

6,1 SCOPE LOOPS - ERROR RECOVERY

SCOPE LOOPS ARE PROVIDED FOR ALL ERRORS, TO ENTER SCOPE LOOP AFTER ENCOUNTERING AN ERROR HALT, DEPRESS KEY CONTINUE, ALL SCOPE LOOPS MAY BE EXITED BY PUTTING S,R, Ø TO A ONE,

DUE TO TIMING CONSIDERATIONS TWO DIFFERENT TYPES OF SCOPE LOOP ARE USED, ALL TIMING AND CONTROL TESTS (TST1, TST2, TST3, TST4, TST5, AND TST7A) SCOPE LOOPS WHEN EXITED (SWØ=Ø) WILL GO TO THE NEXT TEST OR SUBTEST IN SEQUENCE, FOR EXAMPLE, WHEN EXITING A SCOPE LOOP IN TST3A, THE PROGRAM WOULD THEN CONTINUE ON TO TST3B,

ON THE OTHER HAND ALL DATA PATTERN TEST (TST6, TST7B) SCOPE LOOPS WHEN EXITED WILL RETURN TO THE HLT (Ø2Ø7) WHICH REQUIRES THE OPERATOR TO PLACE IN THE S,R, THE CONTROL SWITCH SETTING, AT THIS TIME HE MAY SELECT ANOTHER TEST AND CONTINUE,

7,Ø RESTRICTIONS

STARTING RESTRICTIONS

THE OPERATOR HAS THE CHOICE OF THREE RESTART LOCATIONS, RESTARTING AT Ø2ØØ WILL NECESSITATE SELECTING IOT STRUCTURE, NUMBER OF DATA BITS PER CHARACTER, AND CONTROL SWITCH SETTINGS, THE SECOND RESTART ADDRESS WOULD BE LOCATION Ø2Ø3, THE OPERATOR WOULD LOAD ADDRESS Ø2Ø3 AND THEN SETUP THE NUMBER OF DATA BITS PER CHARACTER BEFORE DEPRESSING CONTINUE, THE PROGRAM WOULD THEN HALT FOR CONTROL SSWITCH SETTINGS, THE THIRD RESTART LOCATION WOULD BE ADDRESS Ø21Ø, THE OPERATOR WOULD LOAD ADDRESS Ø21Ø AND THEN SETUP THE CONTROL SWITCH SETTINGS BEFORE DEPRESSING CONTINUE,

8,Ø PROGRAM DESCRIPTION

THE FIRST FUNCTION PERFORMED BY THE PROGRAM IS TO DETERMINE, THROUGH THE USE OF THE THREE PROGRAM HALTS PREVIOUSLY DESCRIBED (REFER TO PARA 4,Ø), THE CONFIGURATION OF THE M8652 MODULE REGARDING, IOT STRUCTURE, BIT CONFIGURATION AND BAUD RATE,

8,1 THIS PROGRAM CONTAINS SEVEN TESTS:

TST1 - TRANSMIT CONTROL LOGIC TEST
TST2 - TRANSMIT TIMING TEST
TST3 - RECEIVE CONTROL LOGIC TEST
TST4 - RECEIVE TIMING TEST
TST5 - BREAK TEST
TST6 - DATA TEST
TST7 - STATUS REGISTER TEST

8,2 TST1 - TRANSMIT CONTROL LOGIC TEST

THIS IS A BASIC TEST OF THE TRANSMITTER LOGIC, FUNCTIONS SUCH AS SKIPS, CLEARS, AND SETS ARE CHECKED, NO TIMING IS TAKEN INTO ACCOUNT AT THIS POINT.

8,3 TST2 - TRANSMIT TIMING TEST

THIS TEST BEGINS BY INSURING THAT THE TRANSMIT FLAG CAN BE SET AT A TIME APPROXIMATELY DOUBLE THAT OF THE BAUD RATE SELECTED (TST2A), THEN A TIME MUCH LOWER THAN THE BAUD RATE SELECTED IS USED TO VERIFY THAT THE FLAG IS NOT SETTING TOO SOON, AND FINALLY THE FLAG IS CHECKED AT THE CORRECT BAUD RATE.

8,4 TST3 - RECEIVE CONTROL LOGIC TEST

THIS IS A BASIC TEST OF THE RECEIVER LOGIC, BASIC COMMANDS ARE TESTED SUCH AS SKIPS, CLEARS, AND SETS, NO TIMING OR CHECKING OF DATA TRANSFERS IS PERFORMED.

8,5 TST4 - RECEIVE TIMING TEST

IS SIMILAR IN FUNCTION TO THE TRANSMIT TIMING TEST, IN THAT GROSS TIMES ARE FIRST USED TO VERIFY THAT THE RECEIVE FLAG CAN BE SET AND CLEARED, ONCE THIS IS VERIFIED THE CORRECT BAUD RATE IS THEN TESTED.

8,6 TST5 - BREAK TEST

CHECKS THE ABILITY OF UTPK TO GENERATE A BREAK AND AFTER APPROXIMATELY 235 MILS TO SET THE TRANSMIT FLAG, FLAG IS ALSO CHECKED FOR SETTING TOO SOON AND TOO LATE.

8,7 TST6 - DATA TEST

THIS TEST IS DIVIDED INTO TWO SECTIONS, TST6A WHICH GENERATES AND TRANSMITS A BINARY COUNT PATTERN, AND TST6B WHICH GENERATES AND TRANSMITS A RANDOM DATA PATTERN, EACH SECTION OF THIS TEST WHEN IT ENCOUNTERS AN ERROR WILL HALT WITH THE BAD DATA PATTERN IN THE AC, DEPRESSING KEY CONTINUE WILL STEP THE PROGRAM TO A SECOND HALT WHICH WILL DISPLAY THE GOOD DATA PATTERN IN THE AC, DEPRESSING KEY CONTINUE A SECOND TIME WILL PUT THE PROGRAM INTO A SCOPE LOOP, REFER TO PARA, 6,1 FOR INFORMATION REGARDING THE EXITING OF A DATA TEST SCOPE LOOP,

8,8 TST7 - STATUS REGISTER TEST

MADE UP OF TWO SUBTESTS TST7A AND TST7B, TST7A FORCES AN OVERRUN ERROR AND CHECKS THAT THE OVERRUN ERROR BIT (AC02) COMES UP AND COMBINED WITH STATUS WORD ENABLE WILL CAUSE THE STATUS ERROR BIT (AC00) TO COME UP, ERROR HALTS AND SCOPE LOOPS ARE PROVIDED, EXITING SCOPE LOOP, PROGRAM CONTINUES ON TO TST7B,

TST7B GENERATES A RANDOM DATA PATTERN AND CHECKS FOR STATUS ERRORS (OVERRUN, PARITY AND FRAMEING), WHEN AN ERROR OCCURS PROGRAM WILL HALT WITH FAILING STATUS BIT AND DATA WORD IN THE AC, SCOPE LOOP IS ENTERED BY DEPRESSING KEY CONTINUE, EXITING SCOPE LOOP IS THE SAME AS THAT FOR TST6, REFER TO PARA, 6,1,

FOR FURTHER INFORMATION REGARDING TESTS AND ERROR HALTS, REFER TO THE PROGRAM LISTING,

9,0 LISTING

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                        //KL8F DOUBLE BUFFERED ASYNCHRONOUS INTERFACE
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                                                        //INSTRUCTION EQUALITIES//

                4473    UKCF=JMS I      XXKCF           /CLEAR RECEIVE FLAG,
                4474    UKSF=JMS I      XXKSF           /SKIP ON RECEIVE FLAG,
                4475    UKCC=JMS I      XXKCC           /CLEAR RECEIVE FLAG AND AC,
                4476    UKRS=JMS I      XXKRS           /INPUT DATA BUFFER V AC4-11 TO AC4-11
                                                        /PARITY ERROR AND SWE V AC01 TO AC01
                                                        /OVERRUN ERROR AND SWE V AC02 TO AC02,
                                                        /FRAMING ERROR AND SWE V AC03 TO AC03,
                                                        /(PE + OE + FE) AND SWE V AC00 TO AC00',
                4477    UKIE=JMS I      XXKIE           /DATA 11 TO INTERRUPT ENABLE,
                                                        /DATA 10 TO STATUS WORD ENABLE',
                4500    UKRB=JMS I      XXKRB           /CLEAR AC AND RECEIVE FLAG,
                                                        /INPUT DATA BUFFER TO AC4-11,
                4501    USPF=JMS I      XXSPF           /SET TRANSMIT FLAG',
                4502    UTSF=JMS I      XXTSF           /SKIP ON TRANSMIT FLAG',
                4503    UTCF=JMS I      XXTCF           /CLEAR TRANSMIT FLAG',
                4504    UTPC=JMS I      XXTPC           /AC4-11 TO OUTPUT DATA BUFFER,
                                                        /TRANSMIT, SET TRANSMIT FLAG WHEN DONE',
                4505    USPI=JMS I      XXSPI           /SKIP ON INTERRUPT REQUEST SET',
                4506    UTLS=JMS I      XXTLS           /CLEAR TRANSMIT FLAG,
                                                        /AC4-11 TO OUTPUT DATA BUFFER,
                                                        /TRANSMIT, SET TRANSMIT FLAG WHEN DONE',
                4507    UTPK=JMS I      XXTPK           /GENERATE BREAK,

                6007    CAF=6007                        /CLEAR ALL FLAGS',
                7421    MQL=7421                        /LOAD MQ',
                4020    DELAY=JMS       DELLAY
                4544    ERROR=JMS I     XFAIL
                4545    DATERR=JMS I    XSCOPE
                4043    SETCNT=JMS      COUNT
                4510    SET1A=JMS I     XSET1A
                4511    SET1B=JMS I     XSET1B
                4512    SET1C=JMS I     XSET1C
                4513    SET2A=JMS I     XSET2A
                4514    SET2B=JMS I     XSET2B
                4515    SET3A=JMS I     XSET3A
                4516    SET3B=JMS I     XSET3B
                4517    SET3C=JMS I     XSET3C
                4520    SET3D=JMS I     XSET3D
                4521    SET4A=JMS I     XSET4A
                4522    SET5A=JMS I     XSET5A
                4523    SET7A=JMS I     XSET7A


                                                        //ERROR HALT DESCRIPTIONS//

                1207    *HALT1                          /SPF FAILED TO SET TRANSMIT FLAG OR
                                                        /TSF FAILED TO SKIP ON TRANSMIT FLAG,

        1207    1216    HALT2                           /CAF FAILED TO CLEAR TRANSMIT FLAG OR
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                                        /TSF SKIPPED ON TRANSMIT FLAG = 0,

1210  1226    HALT3                     /TCF FAILED TO CLEAR TRANSMIT FLAG OR
                                        /TSF SKIPPED ON TRANSMIT FLAG = 0,

1211  1242    HALT4                     /CAF FAILED TO CLEAR ALL FLAGS OR
                                        /SPI SKIPPED WITHOUT INTERRUPT REQUEST OR
                                        /AN ILLEGAL INTERRUPT DID OCCUR,

1212  1256    HALT5                     /TRANSMIT FLAG FAILED TO CAUSE INTERRUPT,

1213  1274    HALT6                     /SPI FAILED TO SKP ON INTERRUPT REQUEST OR
                                        /SPF FAILED TO SET TRANSMIT FLAG OR
                                        /TRANSMIT FLAG DID NOT SET INTERRUPT REQUEST,

1214  1310    HALT7                     /CAF FAILED TO CLEAR ALL FLAGS OR
                                        /AN ILLEGAL INTERRUPT TOOK PLACE,

1215  1413    HALT8                     /TPC FAILED TO SET TRANSMIT FLAG OR
                                        /FLAG TAKING TOO LONG TO SET,

1216  1424    HALT9                     /TLS FAILED TO CLEAR TRANSMIT FLAG OR
                                        /TRANSMIT FLAG SETTING TOO SOON OR
                                        /TSF SKIPPED ON TRANSMIT FLAG = 0,

1217  1434    HALT10                    /TLS FAILED TO SET TRANSMIT FLAG OR
                                        /TRANSMIT FLAG TAKEING TOO LONG TO SET OR
                                        /TSF FAILED TO SKIP ON TRANSMIT FLAG,

1220  1461    HALT11                    /TRANSMIT FLAG SETTING TOO SOON OR
                                        /TSF SKIPPED ON TRANSMIT FLAG = 0,

1221  1471    HALT12                    /TRANSMIT FLAG TAKING TOO LONG TO SET,

1222  1513    HALT13                    /TLS FAILED TO SET TRANSMIT FLAG OR
                                        /FLAG IS BEING SET TOO LATE,

1223  1606    HALT14                    /KCC FAILED TO CLEAR AC,

1224  1634    HALT15                    /KSF FAILED TO SKIP OR
                                        /RECEIVE WAS NOT SET OR WAS SET TOO LATE,

1225  1643    HALT16                    /KCC FAILED TO CLEAR RECEIVE FLAG OR
                                        /KSF SKIPPED ON RECEIVE FLAG = 0,

1226  1656    HALT17                    /RECEIVE FLAG FAILED TO SET OR SET TOO LATE
                                        /OR KSF FAILED TO SKIP,

1227  1665    HALT18                    /KCF FAILED TO CLEAR RECEIVE FLAG
                                        /OR KSF SKIPPED ON RECEIVE FLAG = 0,

1230  1703    HALT19                    /KIE FAILED TO DISABLE INTERRUPT ENABLE F/F
                                        /OR SPI SKIPPED ON INTERRUPT ENABLE = 0,
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 1231  1715    HALT20                  /KIE AND AC11=1 FAILED TO ENABLE INTERRUPT ENABLE F/F
                                       /OR SPI FAILED TO SKIP;

 1232  1744    HALT21                  /INTERRUPT DID NOT TAKE PLACE;

 1233  2012    HALT22                  /RECEIVE FLAG SET TOO SOON
                                       /OR KSF SKIPPED ON RECEIVE FLAG = 0,

 1234  2022    HALT23                  /RECEIVE FLAG NOT SET OR SET TOO LATE
                                       /OR KSF FAILED TO SKIP;

 1235  2045    HALT24                  /RECEIVE FLAG FAILED TO SET OR SET TOO LATE,

 1236  2215    HALT25                  /TPK FAILED TO SET TRANSMIT FLAG,

 1237  2231    HALT26                  /TRANSMIT FLAG SET TOO SOON,

 1240  2246    HALT27                  /TRANSMIT FLAG SET TOO LATE OR DID NOT SET;

 1241  2256    HALT28                  /TCF FAILED TO CLEAR TRANSMIT AND/OR
                                       /BREAK FLAGS;

                                       //BINARY COUNT PATTERN FAILURES//

 1242  2442    HALT29                  /INCORRECT DATA DISPLAYED IN AC,

 1243  2446    HALT30                  /CORRECT DATA DISPLAYED IN AC;

 1244  2506    HALT31                  /INCORRECT DATA DISPLAYED IN AC,

 1245  2511    HALT32                  /CORRECT DATA DISPLAYED IN AC;

                                       //STATUS TEST ERRORS//

 1246  2631    HALT33                  /OVERRUN ERROR DID NOT OCCUR,

 1247  2642    HALT34                  /BIT 0 FAILED TO GO TO A ONE ON OVERRUN ERROR;

 1250  2710    HALT35                  /PARITY ERROR, FAILING STATUS BIT AND DATA WORD TO AC,

 1251  2720    HALT36                  /OVERRUN ERROR, FAILING STATUS BIT AND DATA WORD TO AC,

 1252  2730    HALT37                  /FRAMEING ERROR, FAILING STATUS BIT AND DATA WORD TO AC,

 1253  2740    HALT38                  /ERROR BIT (AC0) = 1;

       0001    *0001
0001   5402            JMP I   RETURN
0002   0000    RETURN, 0


       0020    *20                     //DELAY ROUTINE FOR ALL BAUD RATES//
0020   0000    DELLAY, 0
0021   7300            CLA CLL
```

```
0022  1124            TAD     NDELAY
0023  3125            DCA     DELAYN
0024  1126  DELOOP,   TAD     CON120
0025  3127            DCA     US120
0026  2127            ISZ     US120
0027  5026            JMP     .-1
0030  7200            CLA
0031  7200            CLA
0032  7200            CLA
0033  7200            CLA
0034  2125            ISZ     DELAYN
0035  7610            SKP CLA
0036  5420            JMP I   DELLAY
0037  0420            AND I   DELLAY
0040  0420            AND I   DELLAY
0041  0020            AND     DELLAY
0042  5024            JMP     DELOOP



                                        //ROUTINE TO SETUP COUNTER FOR TEST LOOPS//
0043  0000  COUNT,    0
0044  7200            CLA
0045  1146            TAD     BAUDNO
0046  1177            TAD     (TSTBL
0047  3140            DCA     TEMP1
0050  1540            TAD I   TEMP1
0051  3132            DCA     TSTCNT
0052  5443            JMP I   COUNT


                                        //POINTER FOR EXACT BAUD RATE TABLES//
0053  3000  ONBAUD,   ON110
0054  3006            ON134
0055  3014            ON150
0056  3022            ON300
0057  3030            ON600
0060  3036            ON1200
0061  3044            ON1800
0062  3052            ON2400


                                        //POINTER FOR LOW END VALUE BAUD RATE TABLES//
0063  3060  LOBAUD,   LO110
0064  3066            LO134
0065  3074            LO150
0066  3102            LO300
0067  3110            LO600
0070  3116            LO1200
0071  3124            LO1800
0072  3132            LO2400


                                        //POINTERS FOR IOT SUBROUTINES//
0073  0600  XXKCF,    XKCF
0074  0604  XXKSF,    XKSF
```

```
2075  0612    XXKCC,  XKCC
2076  0616    XXKRS,  XKRS
2077  0622    XXKIE,  XKIE
2100  0626    XXKRB,  XKRB
2101  0632    XXSPF,  XSPF
2102  0636    XXTSF,  XTSF
2103  0644    XXTCF,  XTCF
2104  0650    XXTPC,  XTPC
2105  0654    XXSPI,  XSPI
2106  0662    XXTLS,  XTLS
2107  0666    XXTPK,  XTPK


                                  //LINKS FOR ERROR HALT ROUTINES//

2110  1000    XSET1A, SETT1A
2111  1010    XSET1B, SETT1B
2112  1016    XSET1C, SETT1C
2113  1024    XSET2A, SETT2A
2114  1034    XSET2B, SETT2B
2115  1044    XSET3A, SETT3A
2116  1050    XSET3B, SETT3B
2117  1062    XSET3C, SETT3C
2120  1070    XSET3D, SETT3D
2121  1074    XSET4A, SETT4A
2122  1104    XSET5A, SETT5A
2123  1116    XSET7A, SETT7A

                                  //CONSTANTS AND WORK LOCATIONS//

2124  0000    NDELAY, 0
2125  0000    DELAYN, 0
2126  7754    CON100, -24
2127  0000    US100,  0
2130  0000    GETBAK, 0
2131  0000    NXTST,  0
2132  0000    TSTCNT, 0
2133  0000    XMTCH,  0
2134  0000    BITMSK, 0
2135  1233    RP1B,   1233
2136  7622    RP2B,   7622
2137  0000    HOLD1,  0
2140  0000    TEMP1,  0
2141  0000    TNOW,   0
2142  0000    TOLD,   0
2143  0000    TLAST,  0
2144  0312    XFAIL,  FAIL
2145  0332    XSCOPE, SCOPE
2146  0000    BAUDNO, 0


      0200    *200
0200  7300    BEGIN,  CLA CLL
0201  6007            CAF
```

```
0222  7402            HLT
0223  4777'           JMS     SETIOT          /GET SWITCHES FOR IOT'S,
0224  7402            HLT
0225  7604            LAS                     /GET SWITCHES TO DETERMINE

0226  3134            DCA     BITMSK          /NUMBER OF DATA BITS PER WORD,
0227  7402            HLT
0210  4250            JMS     DECODE          /CHECK SWITCH SETTINGS,
0211  1146            TAD     BAUDNO          /GET SETTING OF SW'S 9,10,11,
0212  1376            TAD     (ONBAUD         /ADD POINTER OF BAUD TABLE,
0213  3140            DCA     TEMP1           /SAVE NEW POINTER,
0214  1540            TAD I   TEMP1           /GET BAUD RATE THRU POINTER,
0215  1275            TAD     BITNO           /ADD BIT SIZE OF CHARACTER,
0216  3140            DCA     TEMP1           /SAVE FINAL POINTER,
0217  1540            TAD I   TEMP1           /PICK-UP BAUD RATE CONSTANT
0220  3277            DCA     ONRATE          /SAVE IT,
0221  1277            TAD     ONRATE
0222  1277            TAD     ONRATE          /DOUBLE RATE,
0223  3301            DCA     DOUBLE          /SAVE DOUBLE BAUD RATE CONSTANT,
0224  1146            TAD     BAUDNO
0225  1375            TAD     (LOBAUD         /SETUP
0226  3140            DCA     TEMP1
0227  1540            TAD I   TEMP1
0230  1275            TAD     BITNO
0231  3140            DCA     TEMP1
0232  1540            TAD I   TEMP1
0233  3300            DCA     LORATE          /LOWER BAUD LIMIT,
0234  1276            TAD     TESTNO          /GET SETTING OF SW'S 1,2,3,
0235  1374            TAD     (JMP I TEST+1   /TO DETERMINE TEST TO BE RUN,
0236  3237            DCA     TEST

0237  0000    TEST,   0
0240  1200            TST1
0241  1200            TST1                    /TRANSMIT CONTROL LOGIC TEST,
0242  1400            TST2                    /TRANSMIT TIMING TEST,
0243  1600            TST3                    /RECEIVE CONTROL LOGIC TEST,
0244  2000            TST4                    /RECEIVE TIMING TEST,
0245  2200            TST5                    /BREAK TEST,
0246  2400            TST6                    /DATA TEST,
0247  2600            TST7                    /STATUS REGISTER TEST,


                                              /ROUTINE TO CHECK ALL SWITCHES
0250  0000    DECODE, 0
0251  7300            CLA CLL
0252  7604            LAS
0253  3274            DCA     SWITCH
0254  1274            TAD     SWITCH
0255  0773'           AND     MASK7
0256  3146            DCA     BAUDNO          /SAVE BAUD RATE SELECTED,
0257  1274            TAD     SWITCH
0260  7012            RTR
0261  7010            RAR
0262  0773'           AND     MASK7
0263  3275            DCA     BITNO           /SAVE NO, OF BITS PER DATA WORD,
```

```
0264  1274            TAD     SWITCH
0265  7012            RTR
0266  7012            RTR
0267  7012            RTR
0270  7012            RTR
0271  0773'           AND     MASK7
0272  3276            DCA     TESTNO          /SAVE TEST SELECTED,
0273  5650            JMP I   DECODE

0274  0000    SWITCH, 0
0275  0000    BITNO,  0
0276  0000    TESTNO, 0
0277  0000    ONRATE, 0
0300  0000    LORATE, 0
0301  0000    DOUBLE, 0


                                        /TABLE OF TEST COUNTER VALUES,
0302  7000    TSTBL,  -1000
0303  7000            -1000
0304  7000            -1000
0305  6300            -1500
0306  6000            -2000
0307  5000            -3000
0310  4000            -4000
0311  3000            -5000


                                        //ERROR-SCOPE LOOP ROUTINE (FOR TST1 THRU TST5, AND TST7A)//
0312  0000    FAIL,   0
0313  7344            CLA CLL CMA RAL
0314  1312            TAD     FAIL
0315  3140            DCA     TEMP1
0316  1372            TAD     (7000
0317  3540            DCA I   TEMP1
0320  1712            TAD I   FAIL
0321  3130            DCA     GETBAK
0322  2312            ISZ     FAIL
0323  1712            TAD I   FAIL
0324  3131            DCA     NXTST
0325  7604            LAS
0326  0371            AND     (4000
0327  7650            SNA CLA
0330  5530            JMP I   GETBAK
0331  5531            JMP I   NXTST

                                        //ERROR-SCOPE LOOP ROUTINE FOR TST6 AND TST7B//
0332  0000    SCOPE,  0
0333  4506            UTLS
0334  4474            UKSF
0335  7410            SKP
0336  5344            JMP     RCVD
0337  7300            CLA CLL
0340  1142            TAD     TOLD
0341  4506            UTLS
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```
0342  7200          CLA
0343  5334          JMP     SCOPE+2
0344  4500  RCVD,   UKRB
0345  7604          LAS
0346  0371          AND     (4000
0347  7650          SNA CLA
0350  5334          JMP     SCOPE+2
0351  5205          JMP     BEGIN+5

0371  4000
0372  7000
0373  0466
0374  5640
0375  0063
0376  0053
0377  0400
      0400          PAGE

                                        /ROUTINE TO SETUP IOT COMMANDS FROM SWITCHES/
0400  0000  SETIOT, 0
0401  7604          LAS
0402  3140          DCA     TEMP1
0403  1140          TAD     TEMP1
0404  0377          AND     (7700
0405  7012          RTR
0406  7010          RAR
0407  3270          DCA     RCVIOT
0410  1270          TAD     RCVIOT
0411  1376          TAD     (6000
0412  3775'         DCA     RKCF
0413  1270          TAD     RCVIOT
0414  1374          TAD     (6001
0415  3773'         DCA     RKSF
0416  1270          TAD     RCVIOT
0417  1372          TAD     (6002
0420  3771'         DCA     RKCC
0421  1270          TAD     RCVIOT
0422  1370          TAD     (6004
0423  3767'         DCA     RKRS
0424  1270          TAD     RCVIOT
0425  1366          TAD     (6005
0426  3765'         DCA     RKIE
0427  1270          TAD     RCVIOT
0430  1364          TAD     (6006
0431  3763'         DCA     RKRB
0432  7100          CLL
0433  1140          TAD     TEMP1
0434  0362          AND     (0077
0435  7006          RTL
0436  7004          RAL
0437  3267          DCA     XMTIOT
0440  1267          TAD     XMTIOT
0441  1376          TAD     (6000
0442  3761'         DCA     RSPF
0443  1267          TAD     XMTIOT
```

```
0444  1374          TAD     (6001
0445  3760'         DCA     RTSF
0446  1267          TAD     XMTIOT
0447  1372          TAD     (6002
0450  3757'         DCA     RTCF
0451  1267          TAD     XMTIOT
0452  1370          TAD     (6004
0453  3756'         DCA     RTPC
0454  1267          TAD     XMTIOT
0455  1366          TAD     (6005
0456  3755'         DCA     RSPI
0457  1267          TAD     XMTIOT
0460  1364          TAD     (6006
0461  3754'         DCA     RTLS
0462  1267          TAD     XMTIOT
0463  1353          TAD     (6007
0464  3752'         DCA     RTPK
0465  5600          JMP I   SETIOT

0466  0007    MASK7,  7
0467  0000    XMTIOT, 0
0470  0000    RCVIOT, 0
0552  0667
0553  6007
0554  0663
0555  0655
0556  0651
0557  0645
0560  0637
0561  0633
0562  0077
0563  0627
0564  6006
0565  0623
0566  6005
0567  0617
0570  6004
0571  0613
0572  6002
0573  0605
0574  6001
0575  0601
0576  6000
0577  7700
      0600          PAGE


                                          //IOT SUBROUTINES//

0600  0000    XKCF,   0
0601  0000    RKCF,   0                   /CLEAR RECEIVE FLAG,
0602  5600          JMP I   XKCF
0603  7402          HLT

0604  0000    XKSF,   0
```

```
2605  0000    RKSF,   0                       /SKIP ON RECEIVE FLAG;
2606  7410            SKP
2607  2204            ISZ     XKSF
2610  5604            JMP I   XKSF
2611  7402            HLT

2612  0000    XKCC,   0
2613  0000    RKCC,   0                       /CLEAR RECEIVE FLAG AND AC,
2614  5612            JMP I   XKCC
2615  7402            HLT

2616  0000    XKRS,   0
2617  0000    RKRS,   0                       /INPUT DATA BUFFER V AC4-11 TO AC4-11;
2620  5616            JMP I   XKRS
2621  7402            HLT

2622  0000    XKIE,   0
2623  0000    RKIE,   0                       /DATA 11 TO INTERRUPT ENABLE,
2624  5622            JMP I   XKIE            /DATA 10 TO STATUS WORD ENABLE;
2625  7402            HLT

2626  0000    XKRB,   0
2627  0000    RKRB,   0                       /CLEAR AC AND RECEIVE FLAG;
2630  5626            JMP I   XKRB            /INPUT DATA BUFFER TO AC4-11,
2631  7402            HLT

2632  0000    XSPF,   0
2633  0000    RSPF,   0                       /SET TRANSMIT FLAG;
2634  5632            JMP I   XSPF
2635  7402            HLT


2636  0000    XTSF,   0
2637  0000    RTSF,   0                       /SKIP ON TRANSMIT FLAG;
2640  7410            SKP
2641  2236            ISZ     XTSF
2642  5636            JMP I   XTSF
2643  7402            HLT

2644  0000    XTCF,   0
2645  0000    RTCF,   0                       /CLEAR TRANSMIT FLAG;
2646  5644            JMP I   XTCF
2647  7402            HLT

2650  0000    XTPC,   0
2651  0000    RTPC,   0                       /AC4-11 TO OUTPUT DATA BUFFER
2652  5650            JMP I   XTPC            /TRANSMIT, SET TRANSMIT FLAG WHEN DONE;
2653  7402            HLT

2654  0000    XSPI,   0
2655  0000    RSPI,   0                       /SKIP ON INTERRUPT REQUEST SET;
2656  7410            SKP
2657  2254            ISZ     XSPI
2660  5654            JMP I   XSPI
2661  7402            HLT
```

```
0662  0000  XTLS,  0                        /CLEAR TRANSMIT FLAG,
0663  0000  RTLS,  0                        /AS4-11 TO OUTPUT DATA BUFFER,
0664  5662        JMP I  XTLS               /TRANSMIT, SET TRANSMIT FLAG WHENDONE,
0665  7402        HLT

0666  0000  XTPK,  0
0667  0000  RTPK,  0                        /GENERATE BREAK,
0670  5666        JMP I  XTPK
0671  7402        HLT


      1000        PAGE


                                           //ROUTINES TO SETUP ERROR HALT LOCATIONS//

1000  0000  SETT1A, 0
1001  1377        TAD    (7402
1002  3776'       DCA    HALT1
1003  1377        TAD    (7402
1004  3775'       DCA    HALT2
1005  1377        TAD    (7402
1006  3774'       DCA    HALT3
1007  5600        JMP I  SETT1A

1010  0000  SETT1B, 0
1011  1377        TAD    (7402
1012  3773'       DCA    HALT4
1013  1377        TAD    (7402
1014  3772'       DCA    HALT5
1015  5610        JMP I  SETT1B

1016  0000  SETT1C, 0
1017  1377        TAD    (7402
1020  3771'       DCA    HALT6
1021  1377        TAD    (7402
1022  3770'       DCA    HALT7
1023  5616        JMP I  SETT1C

1024  0000  SETT2A, 0
1025  1377        TAD    (7402
1026  3767'       DCA    HALT8
1027  1377        TAD    (7402
1030  3766'       DCA    HALT9
1031  1377        TAD    (7402
1032  3765'       DCA    HALT10
1033  5624        JMP I  SETT2A

1034  0000  SETT2B, 0
1035  1377        TAD    (7402
1036  3764'       DCA    HALT11
1037  1377        TAD    (7402
1040  3763'       DCA    HALT12
1041  1377        TAD    (7402
```

```
1042  3762'          DCA     HALT13
1043  5634           JMP I   SETT2B

1044  0000    SETT3A, 0
1045  1377          TAD     (7402
1046  3761'         DCA     HALT14
1047  5644          JMP I   SETT3A

1050  0000    SETT3B, 0
1051  1377          TAD     (7402
1052  3760'         DCA     HALT15
1053  1377          TAD     (7402
1054  3757'         DCA     HALT16
1055  1377          TAD     (7402
1056  3756'         DCA     HALT17
1057  1377          TAD     (7402
1060  3755'         DCA     HALT18
1061  5650          JMP I   SETT3B


1062  0000    SETT3C, 0
1063  1377          TAD     (7402
1064  3754'         DCA     HALT19
1065  1377          TAD     (7402
1066  3753'         DCA     HALT20
1067  5662          JMP I   SETT3C

1070  0000    SETT3D, 0
1071  1377          TAD     (7402
1072  3752'         DCA     HALT21
1073  5670          JMP I   SETT3D

1074  0000    SETT4A, 0
1075  1377          TAD     (7402
1076  3751'         DCA     HALT22
1077  1377          TAD     (7402
1100  3750'         DCA     HALT23
1101  1377          TAD     (7402
1102  3747'         DCA     HALT24
1103  5674          JMP I   SETT4A


1104  0000    SETT5A, 0
1105  1377          TAD     (7402
1106  3746'         DCA     HALT25
1107  1377          TAD     (7402
1110  3745'         DCA     HALT26
1111  1377          TAD     (7402
1112  3744'         DCA     HALT27
1113  1377          TAD     (7402
1114  3743'         DCA     HALT28
1115  5704          JMP I   SETT5A

1116  0000    SETT7A, 0
1117  1377          TAD     (7402
```

```
1120  3742'           DCA     HALT33
1121  1377            TAD     (7402
1122  3741'           DCA     HALT34
1123  5716            JMP I   SETT7A

1141  2642
1142  2631
1143  2256
1144  2246
1145  2231
1146  2215
1147  2045
1150  2022
1151  2012
1152  1744
1153  1715
1154  1703
1155  1665
1156  1656
1157  1643
1160  1634
1161  1606
1162  1513
1163  1471
1164  1461
1165  1434
1166  1424
1167  1413
1170  1310
1171  1274
1172  1256
1173  1242
1174  1226
1175  1216
1176  1207
1177  7402
      1200          PAGE


                    //TST1-BASIC TEST OF TRANSMIT LOGIC//

                    /TST1A-CHECKS THE ABILITY OF-
                    /SPF TO SET THE TRANSMIT FLAG,
                    /TSF TO SKIP ON TRANSMIT FLAG,
                    /CAF TO CLEAR TRANSMIT FLAG,
                    /TCF TO CLEAR TRANSMIT FLAG,
                    /TSF TO NOT SKIP ON TRANSMIT FLAG EQUAL TO ZERO.

1200  4043  TST1,   SETCNT                  /SETUP TEST LOOP COUNTER
1201  4510          SET1A                   /SETUP HALT LOCATIONS,
1202  7300  TST1A,  CLA CLL
1203  4501          USPF                    /SET TRANSMIT FLAG,
1204  4502          UTSF                    /FLAG SET ?
1205  7610          SKP CLA
```

```
1226  5213            JMP     .+5             /YES, CONTINUE TEST,
1227  7402  HALT1,     HLT                     /NO, SPF OR TSF FAILED',
1210  4544            ERROR                   /SCOPE LOOP, PRESS CONTINUE TO ENTER,
1211  1202            TST1A                   /LOOP ADDRESS,
1212  1222            TST1AB                  /NEXT TEST',
1213  6007            CAF                     /CLEAR FLAG,
1214  4502            UTSF                    /FLAG CLEARED?
1215  5222            JMP     .+5             /YES, CONTINUE TEST,
1216  7402  HALT2,     HLT                     /NO, CAF OR TSF FAILED',
1217  4544            ERROR                   /SCOPE LOOP, PRESS CONTINUE TO ENTER,
1220  1202            TST1A                   /LOOP ADDRESS,
1221  1222            TST1AB                  /NEXT TEST',
1222  4501  TST1AB,   USPF                    /SET TRANSMIT FLAG',
1223  4503            UTCF                    /CLEAR TRANSMIT FLAG,
1224  4502            UTSF                    /FLAG CLEARED?
1225  5232            JMP     .+5             /YES, CONTINUE TEST,
1226  7402  HALT3,     HLT                     /NO, TCF OR TSF FAILED',
1227  4544            ERROR                   /SCOPE LOOP, PRESS CONTINUE TO ENTER,
1230  1222            TST1AB                  /LOOP ADDRESS,
1231  1234            TST1B-2                 /NEXT TEST',
1232  2132            ISZ     TSTCNT          /TEST LOOP COUNTER',
1233  5202            JMP     TST1A           /LOOP,

                /TST1B-CHECKS THAT NO OTHER DEVICE WILL CAUSE AN INTERRUPT,
                /AND THAT TRANSMIT FLAG WILL CAUSE AN INTERRUPT,

1234  4043            SETCNT                  /SETUP TEST LOOP COUNTER,
1235  4511            SET1B                   /SETUP HALT LOCATIONS',
1236  7300  TST1B,    CLA CLL
1237  6007            CAF                     /CLEAR ALL FLAGS',
1240  4505            USPI                    /SKIP ON INTERRUPT REQUEST',
1241  5246            JMP     .+5             /NO INTERRUPT, CONTINUE',
1242  7402  HALT4,     HLT                     /ILLEGAL INTERRUPT, CAF OR SPI FAILED',
1243  4544            ERROR                   /SCOPE LOOP, PRESS CONTINUE TO ENTER,
1244  1236            TST1B                   /LOOP ADDRESS',
1245  1246            TST1BB                  /NEXT TEST',
1246  7300  TST1BB,   CLA CLL
1247  6007            CAF                     /CLEAR ALL FLAGS',
1250  1377            TAD     (INTOK          /GET RETURN ADDRESS,
1251  3002            DCA     RETURN          /SAVE IT,
1252  4501            USPF                    /SET TRANSMIT FLAG',
1253  6001            ION                     /TURN INTERRUPT ON',
1254  7000            NOP                     /WAIT,
1255  6002            IOF                     /TURN INTERRUPT OFF,
1256  7402  HALT5,     HLT                     /FAILED, INTERRUPT DID NOT OCCUR',
1257  4544            ERROR                   /SCOPE LOOP, PRESS CONTINUE TO ENTER,
1260  1246            TST1BB                  /LOOP ADDRESS,
1261  1264            TST1C-2                 /NEXT TEST',
1262  2132  INTOK,    ISZ     TSTCNT          /TEST LOOP COUNTER',
1263  5236            JMP     TST1B           /LOOP,

                /TST1C-CHECKS THAT SPI WILL SKIP ON INTERRUPT REQUEST
                /AND THAT INTERRUPT ENABLE ALONE WILL NOT CAUSE AN INTERRUPT,
```

```
1264  4043            SETCNT                  /SETUP TEST LOOP COUNTER,
1265  4512            SET1C                   /SETUP HALT LOCATIONS,
1266  7300  TST1C,    CLA CLL
1267  6007            CAF                     /CLEAR ALL FLAGS',
1270  4531            USPF                    /SET TRANSMIT FLAG',
1271  4505            USPI                    /SKIP ON INTERRUPT REQUEST SET,
1272  7410            SKP
1273  5300            JMP     .+5             /INTERRUPT REQ', SET, CONTINUE,
1274  7402  HALT6,    HLT                     /SPI FAILED OR INT', REQ, NOT SET,
1275  4544            ERROR                   /SCOPE LOOP, PRESS CONTINUE TO ENTER,
1276  1266            TST1C                   /LOOP ADDRESS',
1277  1300            TST1CB                  /NEXT TEST',
1300  7300  TST1CB,   CLA CLL
1301  1376            TAD     (HALT7          /GET RETURN ADDRESS,
1302  3002            DCA     RETURN          /SETUP RETURN',
1303  6007            CAF                     /CLEAR ALL FLAGS',
1304  6001            ION                     /INTERRUPT ON',
1305  7000            NOP                     /WAIT
1306  6002            IOF                     /INTERRUPT OFF',
1307  5314            JMP     .+5             /NO INTERRUPT, CONTINUE,

1310  7402  HALT7,    HLT                     /ILLEGAL INTERRUPT',
1311  4544            ERROR                   /SCOPE LOOP PRESS CONTINUE TO ENTER,
1312  1300            TST1CB                  /LOOP ADDRESS',

1313  1316            CHECK1                  /NEXT TEST
1314  2132            ISZ     TSTCNT          /TEST LOOP COUNTER',
1315  5266            JMP     TST1C           /LOOP,
1316  7200  CHECK1,   CLA
1317  1375            TAD     (1              /LOAD CURRENT TEST
1320  7421            MQL                     /NUMBER INTO MQ REGISTER,
1321  1774'           TAD     TESTNO          /ARE ALL TESTS BEING RUN?
1322  7640            SZA CLA                 /YES, GO TO NEXT TEST',
1323  5200            JMP     TST1A+2         /NO, CONTINUE CURRENT TEST',
1324  5773'           JMP     TST2            /NXT TEST,

1373  1400
1374  0276
1375  0001
1376  1310
1377  1262
      1400            PAGE


                  //TST2-TRANSMIT TIMING TEST//

                  /TST2A-CHECKS THE ABILITY OF-
                  /TPC TO SET THE TRANSMIT FLAG,
                  /TLS TO CLEAR THE TRANSMIT FLAG,
                  /TLS TO SET THE TRANSMIT FLAG,

1400  4043  TST2,     SETCNT                  /SETUP TEST LOOP COUNTER,
1401  4513            SET2A                   /SETUP HALT LOCATIONS,
1402  7300  TST2A,    CLA CLL
1403  1777'           TAD     DOUBLE          /SET DELAY ROUTINE TO DELAY TWICE AS
```

```
1404  3124            DCA     NDELAY          /LONG AS TIME NEEDED,
1405  4503            UTCF                    /CLEAR TRANSMIT FLAG,
1406  4504            UTPC                    /TRANSMIT
1407  4020            DELAY                   /DELAY TWICE MAX TIME,
1410  4502            UTSF                    /FLAG SET?
1411  7410            SKP
1412  5217            JMP     .+5             /YES, CONTINUE,
1413  7402    HALT8,  HLT                     /NO, TPC FAILED TO SET FLAG,
1414  4544            ERROR                   /SCOPE LOOP, PRESS CONTINUE TO ENTER,
1415  1402            TST2A                   /LOOP ADDRESS,
1416  1417            TST2AB                  /NEXT TEST',
1417  7300    TST2AB, CLA CLL
1420  4501            USPF                    /SET TRANSMIT FLAG',
1421  4506            UTLS                    /CLEAR AND SET TRANSMIT FLAG,
1422  4502            UTSF                    /TRANSMIT FLAG CLEAR?
1423  5230            JMP     .+5             /YES, CONTINUE
1424  7402    HALT9,  HLT                     /NO, TLS FAILED TO CLEAR FLAG,
1425  4544            ERROR                   /SCOPE LOOP, PRESS CONTINUE TO ENTER,
1426  1417            TST2AB                  /LOOP ADDRESS',
1427  1442            TST2B+2                 /NEXT TEST',
1430  4020            DELAY                   /DELAY TWICE MAX TIME',
1431  4502            UTSF                    /TRANSMIT FLAG SET?
1432  7410            SKP
1433  5240            JMP     .+5             /YES, CONTINUE',
1434  7402    HALT10, HLT                     /NO, TLS FAILED TO SET FLAG,
1435  4544            ERROR                   /SCOPE LOOP, PRESS CONTINUE TO ENTER,
1436  1417            TST2AB                  /LOOP ADDRESS,
1437  1442            TST2B+2                 /NEXT TEST',
1440  2132            ISZ     TSTCNT          /TEST LOOP COUNTER',
1441  5202            JMP     TST2A           /LOOP,

                /TST2B - CHECKS THAT THE TRANSMIT FLAG SETS WITHIN
                /THE PROPER TIME FOR THE BAUD RATE SELECTED,

1442  4043            SETCNT                  /SETUP TEST LOOP COUNTER,
1443  4514            SET2B                   /SETUP HALT LOCATIONS',
1444  7300    TST2B,  CLA CLL
1445  1776'           TAD     LORATE          /SET DELAY TO LOWER BAUD LIMIT',
1446  3124            DCA     NDELAY
1447  4506            UTLS                    /INITIALIZE TRANSMIT FLAG,
1450  4502            UTSF                    /FOR UPCOMING TIMING TEST',
1451  5250            JMP     .+1
1452  4506            UTLS
1453  4502            UTSF
1454  5253            JMP     .+1
1455  4506            UTLS
1456  4020            DELAY                   /WAIT,
1457  4502            UTSF                    /FLAG STILL CLEAR?
1460  5265            JMP     .+5             /YES, CONTINUE',
1461  7402    HALT11, HLT                     /NO, FLAG SET TOO SOON',
1462  4544            ERROR                   /SCOPE LOOP, PRESS CONTINUE TO ENTER,
1463  1444            TST2B                   /LOOP ADDRESS,
1464  1475            TST2BB                  /NEXT TEST',
1465  4020            DELAY                   /WAIT AGAIN, TO INSURE THAT FLAG WILL SET',
```

```
 1466  4502            UTSF                    /FLAG STILL CLEAR?
 1467  7410            SKP
 1470  5275            JMP     .+5             /NO, FLAG SET, CONTINUE.
 1471  7402  HALT12,   HLT                     /YES, TAKING TOO LONG TO SET,
 1472  4544            ERROR                   /SCOPE LOOP, PRESS CONTINUE TO ENTER,
 1473  1444            TST2B                   /LOOP ADDRESS,
 1474  1475            TST2BB                  /NEXT TEST;
 1475  7300  TST2BB,   CLA CLL
 1476  1775'           TAD     ONRATE          /SET DELAY ROUTINE TO WAIT THE
 1477  3124            DCA     NDELAY          /EXACT TIME REQUIRED TO SET THE FLAG,
 1500  4506            UTLS                    /INITIALIZE TRANSMIT FLAG,
 1501  4502            UTSF                    /FOR UPCOMING TIMING TEST;
 1502  5301            JMP     .-1
 1503  4506            UTLS
 1504  4502            UTSF
 1505  5304            JMP     .-1
 1506  4506            UTLS                    /TRANSMIT
 1507  4020            DELAY                   /WAIT
 1510  4502            UTSF                    /IS FLAG SET?
 1511  7410            SKP
 1512  5317            JMP     .+5             /YES, CONTINUE;

 1513  7402  HALT13,   HLT                     /NO, TLS FAILED OR FLAG IS BEING SET TOO LATE,
 1514  4544            ERROR                   /SCOPE LOOP, PRESS CONTINUE TO ENTER
 1515  1475            TST2BB                  /LOOP ADDRESS
 1516  1521            CHECK2                  /NEXT TEST;
 1517  2132            ISZ     TSTCNT          /TEST LOOP COUNTER
 1520  5244            JMP     TST2B           /LOOP,
 1521  7200  CHECK2,   CLA
 1522  1374            TAD     (2              /LOAD CURRENT TEST
 1523  7421            MQL                     /NUMBER INTO MQ REGISTER,
 1524  1773'           TAD     TESTNO          /ARE ALL TESTS BEING RUN?
 1525  7640            SZA CLA                 /YES, GO TO NEXT TEST;
 1526  5200            JMP     TST2A-2         /NO, CONTINUE CURRENT TEST
 1527  5772'           JMP     TST3            /NXT TEST,

 1572  1600
 1573  0276
 1574  0002
 1575  0277
 1576  0300
 1577  0301
       1600      PAGE


                 //TST3 - BASIC TEST OF RECEIVE LOGIC//

                 /TST3A - CHECKS THE ABILITY OF KCC TO CLEAR THE AC;

 1600  4043  TST3,    SETCNT                  /SETUP LOOP COUNTER,
 1601  4515            SET3A                   /SETUP HALT LOCATIONS;
 1602  7240  TST3A,   CLA CMA                 /SET AC=7777
 1603  4475            UKCC                    /CLEAR AC
 1604  7450            SNA                     /IS AC CLEAR?
 1605  5212            JMP     .+5             /YES, CONTINUE
```

```
1626  7402  HALT14, HLT                    /NO KCC FAILED
1627  4544          ERROR                  /SCOPE LOOP, PRESS CONTINUE TO ENTER,
1610  1602          TST3A                  /LOOP ADDRESS,
1611  1614          TST3B+2                /NEXT TEST',
1612  2132          ISZ     TSTCNT         /TEST LOOP COUNTER',
1613  5202          JMP     TST3A          /LOOP,

                    /TST3B - CHECKS THE ABILITY OF-
                    /TLS TO SET THE RECEIVE FLAG,
                    /KSF TO SKIP ON RECEIVE FLAG EQUAL TO ONE,
                    /KCF TO CLEAR RECEIVE FLAG,
                    /KCC TO CLEAR RECEIVE FLAG,
                    /KSF TO NOT SKIP ON RECEIVE FLAG EQUAL TO ZERO',
1614  4043          SETCNT                 /SETUP TEST COUNTER,
1615  4516          SET3B                  /SETUP HALT LOCATIONS',
1616  7300  TST3B,  CLA CLL
1617  1777'         TAD     DOUBLE         /SET DELAY ROUTINE TO DELAY TWICE AS
1620  3124          DCA     NDELAY         /LONG AS TIME NEEDED',
1621  6007          CAF                    /CLEAR ALL FLAGS',
1622  4506          UTLS
1623  4502          UTSF
1624  5223          JMP     .-1
1625  4506          UTLS                   /TRANSMIT
1626  4020          DELAY                  /DELAY TWICE MAX TIME',
1627  4502          UTSF                   /TRANSMIT FLAG SET?
1630  5227          JMP     .-1            /WAIT FOR IT
1631  4474          UKSF                   /NOW RECEIVE FLAG SHOULD ALSO BE SET',
1632  7410          SKP
1633  5240          JMP     .+5            /RECEIVE FLAG SET, CONTINUE,
1634  7402  HALT15, HLT                    /RECEIVE FLAG OR KSF FAILED,
1635  4544          ERROR                  /SCOPE LOOP, PRESS CONTINUE TO ENTER,
1636  1616          TST3B                  /LOOP ADDRESS
1637  1647          TST3BB                 /NEXT TEST',
1640  4475          UKCC                   /CLEAR RECEIVE FLAG,
1641  4474          UKSF                   /SKIP ON RECEIVE FLAG=1',
1642  5247          JMP     .+5            /RECEIVE FLAG CLEAR CONTINUE,
1643  7402  HALT16, HLT                    /KCC OR KSF FAILED',
1644  4544          ERROR                  /SCOPE LOOP, PRESS CONTINUE TO ENTER,
1645  1616          TST3B                  /LOOP ADDRESS',
1646  1647          TST3BB                 /NEXT TEST',

1647  7300  TST3BB, CLA CLL
1650  4475          UKCC                   /CLEAR RECEIVE FLAG,
1651  4506          UTLS                   /TRANSMIT,
1652  4020          DELAY                  /DELAY TWICE MAX TIME',
1653  4474          UKSF                   /SKIP ON RECEIVE FLAG',
1654  7410          SKP
1655  5262          JMP     .+5            /FLAG SET CONTINUE
1656  7402  HALT17, HLT                    /RECEIVE FLAG OR KSF FAILED,
1657  4544          ERROR                  /SCOPE LOOP, PRESS CONTINUE TO ENTER,
1660  1647          TST3BB                 /LOOP ADDRESS',
1661  1673          TST3C+2                /NEXT TEST',
1662  4473          UKCF                   /CLEAR RECEIVE FLAG,
1663  4474          UKSF                   /RECEIVE FLAG CLEARED?
1664  5271          JMP     .+5            /YES, CONTINUE
```

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1665  7402  HALT18, HLT                    /NO, KCF OF KSF FAILED,
1666  4544          ERROR                  /SCOPE LOOP, PRESS CONTINUE TO ENTER,
1667  1647          TST3BB                 /LOOP ADDRESS,
1670  1673          TST3C+2                /NEXT TEST
1671  2132          ISZ     TSTCNT         /TEST LOOP COUNTER,
1672  5216          JMP     TST3B          /LOOP,

                    /TST3C - CHECKS THE ABILITY OF-
                    /KIE TO DISABLE INTERRUPT ENABLE F/F,
                    /KIE TO ENABLE INTERRUPT ENABLE F/F,
1673  4043          SETCNT                 /SETUP TEST LOOP COUNTER,
1674  4517          SET3C                  /SETUP HALT LOCATIONS,
1675  7300  TST3C,  CLA CLL
1676  6007          CAF                    /CLEAR ALL FLAGS, ENABLE INT, ENABLE F/F,
1677  4477          UKIE                   /DISABLE INTERRUPT ENABLE F/F,
1700  4501          USPF                   /SET TRANSMIT FLAG,
1701  4505          USPI                   /INTERRUPT REQUEST SET?
1702  5307          JMP     .+5            /NO, CONTINUE,
1703  7402  HALT19, HLT                    /YES, KIE FAILED,
1704  4544          ERROR                  /SCOPE LOOP, PRESS CONTINUE TO ENTER,
1705  1675          TST3C                  /LOOP ADDRESS,
1706  1707          TST3CB                 /NEXT TEST,
1707  7201  TST3CB, CLA IAC                /AC11=1
1710  4477          UKIE                   /ENABLE INTERRUPT ENABLE F/F
1711  4501          USPF                   /SET TRANSMIT FLAG
1712  4505          USPI                   /INTERRUPT REQUEST SET?
1713  7410          SKP
1714  5321          JMP     .+5            /YES, CONTINUE
1715  7402  HALT20, HLT                    /NO, KIE FAILED,
1716  4544          ERROR                  /SCOPE LOOP, PRESS CONTINUE TO ENTER
1717  1707          TST3CB                 /LOOP ADDRESS,
1720  1725          TST3D                  /NEXT TEST,
1721  2132          ISZ     TSTCNT         /TEST LOOP COUNT,
1722  5275          JMP     TST3C          /LOOP,

                    /TST3D - CHECKS THAT THE RECEIVE FLAG WILL CAUSE AN INTERRUPT,

1723  4043          SETCNT                 /SETUP LOOP COUNTER,
1724  4520          SET3D                  /SETUP HALT LOCATIONS,
1725  7300  TST3D,  CLA CLL
1726  6007          CAF                    /CLEAR ALL FLAGS,
1727  1376          TAD     (RINTOK        /GET RETURN ADDRESS,
1730  3002          DCA     RETURN         /SAVE IT,
1731  4506          UTLS
1732  4502          UTSF
1733  5332          JMP     .-1
1734  4506          UTLS                   /TRANSMIT,
1735  4020          DELAY                  /DELAY TWICE MAX TIME,
1736  4502          UTSF                   /WAIT FOR TRANSMIT FLAG, AT WHICH TIME
1737  5336          JMP     .-1            /RECEIVE FLAG SHOULD ALSO BE UP,
1740  4503          UTCF                   /CLEAR TRANSMIT FLAG
1741  6001          ION                    /TURN INTERRUPT ON,
1742  7000          NOP                    /WAIT
```

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1743  6002            IOF                     /TURN INTERRUPT OFF,
1744  7402  HALT21,  HLT                     /FAILED, NO INTERRUPT
1745  4544            ERROR                   /SCOPE LOOP, PRESS CONTINUE TO ENTER,
1746  1725            TST3D                   /LOOP ADDRESS,
1747  1752            CHECK3                  /NEXT TEST',
1750  2132  RINTOK,  ISZ     TSTCNT          /TEST LOOP COUNT
1751  5325            JMP     TST3D           /LOOP,
1752  7200  CHECK3,  CLA
1753  1375            TAD     (3              /LOAD CURRENT TEST
1754  7421            MQL                     /NUMBER INTO MQ REGISTER,
1755  1774'           TAD     TESTNO          /ARE ALL TESTS BEING RUN?
1756  7640            SZA CLA                 /YES, GO TO NEXT TEST',
1757  5200            JMP     TST3A+2         /NO, CONTINUE CURRENT TEST',
1760  5773'           JMP     TST4            /NXT TEST,

1773  2000
1774  0276
1775  0003
1776  1750
1777  0301
      2000            PAGE


                  //TST4 - RECEIVER TIMING TEST//

                  /TST4A - CHECKS THE ABILITY OF THE RECEIVER FLAG TO BE SET,
                  /THAT IT WILL NOT SET TOO SOON, AND THAT IT WILL COME UP
                  /WITHIN THE TIME SPECIFIED BY THE BAUD RATE SELECTED',

2000  4043  TST4,   SETCNT                   /SETUP TEST LOOP COUNTER,
2001  4521            SET4A                   /SETUP HALT LOCATIONS',
2002  7300  TST4A,  CLA CLL
2003  1777'           TAD     LORATE          /SET DELAY TO LOWER BAUD LIMIT',
2004  3124            DCA     NDELAY
2005  4475            UKCC                    /CLEAR RECEIVE FLAG,
2006  4506            UTLS                    /TRANSMIT,
2007  4020            DELAY                   /WAIT,
2010  4474            UKSF                    /FLAG STILL CLEAR?
2011  5216            JMP     .+5             /YES, CONTINUE',
2012  7402  HALT22,  HLT                     /NO, FLAG SET TOO SOON',
2013  4544            ERROR                   /SCOPE LOOP, PRESS CONTINUE TO ENTER',
2014  2002            TST4A                   /LOOP ADDRESS',
2015  2026            TST4AB                  /NEXT TEST',
2016  4020            DELAY                   /WAIT AGAIN, TO INSURE FLAG WILL SET,
2017  4474            UKSF                    /FLAG STILL CLEAR?
2020  7410            SKP
2021  5226            JMP     .+5             /NO, FLAG NOW A ONE, CONTINUE,
2022  7402  HALT23,  HLT                     /YES, TAKING TOO LONG TO SET,
2023  4544            ERROR                   /SCOPE LOOP, PRESS CONTINUE TO ENTER,
2024  2002            TST4A                   /LOOP ADDRESS',
2025  2026            TST4AB                  /NEXT TEST',


2026  7300  TST4AB, CLA CLL
2027  1776'           TAD     ONRATE          /SET DELAY ROUTINE TO WAIT THE
```

```
2030  3124            DCA     NDELAY          /EXACT TIME REQUIRED TO SET THE FLAG,
2031  4506            UTLS
2032  4502            UTSF
2033  5232            JMP     .-1
2034  4506            UTLS
2035  4502            UTSF
2036  5235            JMP     .-1
2037  4475            UKCC                    /CLEAR RECEIVE FLAG,
2040  4506            UTLS                    /TRANSMIT,
2041  4020            DELAY                   /WAIT,
2042  4474            UKSF                    /IS FLAG SET?
2043  7410            SKP
2044  5251            JMP     .+5             /YES, CONTINUE;
2045  7402  HALT24,    HLT                     /NO, FLAG NOT SET OR SET TOO LATE;
2046  4544            ERROR                   /SCOPE LOOP, PRESS CONTINUE TO ENTER,
2047  2026            TST4AB                  /LOOP ADDRESS,
2050  2053            CHECK4                  /NEXT TEST;
2051  2132            ISZ     TSTCNT          /TEST LOOP COUNTER;
2052  5202            JMP     TST4A           /LOOP,
2053  7200  CHECK4,   CLA
2054  1375            TAD     (4              /LOAD CURRENT TEST
2055  7421            MQL                     /NUMBER INTO MQ REGISTER,
2056  1774'           TAD     TESTNO          /ARE ALL TESTS BEING RUN?
2057  7640            SZA CLA                 /YES, GO TO NEXT TEST;
2060  5200            JMP     TST4A+2         /NO, CONTINUE CURRENT TEST,
2061  5773'           JMP     TST5            /NXT TEST,

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2175  0004
2176  0277
2177  0300
      2200            PAGE


                      //TST5 - BREAK TEST//

                      /TST5A - CHECKS THE ABILITY OF UTPK TO GENERATE A BREAK,
                      /AND AFTER APPROXIMATELY 235 MILS TO SET THE TRANSMIT FLAG,
                      /FLAG IS ALSO CHECKED FOR SETTING TOO SOON AND TOO LATE,

2200  7300  TST5,     CLA CLL
2201  1377            TAD     (-5             /SETUP TEST LOOP COUNTER,
2202  3132            DCA     TSTCNT
2203  4522            SET5A                   /SETUP HALT LOCATIONS;
2204  7300  TST5A,    CLA CLL
2205  1273            TAD     HIBKCT          /GET UPPER TIME LIMIT FOR TRANSMIT FLAG TO SET;
2206  3124            DCA     NDELAY          /SAVE IT,
2207  4503            UTCF                    /CLEAR TRANSMIT FLAG;
2210  4507            UTPK                    /GENERATE BREAK,
2211  4020            DELAY                   /WAIT,
2212  4502            UTSF                    /TRANSMIT FLAG SET?
2213  7410            SKP
2214  5221            JMP     .+5             /YES, CONTINUE;
2215  7402  HALT25,    HLT                     /NO, UTPK FAILED TO SET FLAG,
```

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2216  4544            ERROR                   /SCOPE LOOP, PRESS CONTINUE TO ENTER,
2217  2204            TST5A                   /LOOP ADDRESS,
2220  2221            TST5AB                  /NEXT TEST;
2221  7300  TST5AB, CLA CLL
2222  1274            TAD     LOBKCT          /GET LOWER TIME LIMIT;
2223  3124            DCA     NDELAY          /SAVE IT,
2224  4503            UTCF                    /CLEAR TRANSMIT FLAG;
2225  4507            UTPK                    /GENERATE BREAK,
2226  4020            DELAY                   /WAIT,
2227  4502            UTSF                    /TRANSMIT FLAG SET?
2230  5235            JMP     .+5             /NO, CONTINUE;
2231  7402  HALT26, HLT                       /YES, FLAG SET TOO SOON,
2232  4544            ERROR                   /SCOPE LOOP, PRESS CONTINUE TO ENTER,
2233  2221            TST5AB                  /LOOP ADDRESS;
2234  2235            TST5AC                  /NEXT TEST;


2235  7300  TST5AC, CLA CLL
2236  1275            TAD     BRKCNT          /SET DELAY ROUTINE TO WAIT THE
2237  3124            DCA     NDELAY          /EXACT TIME REQUIRED TO SET THE FLAG,
2240  4503            UTCF                    /CLEAR TRANSMIT FLAG;
2241  4507            UTPK                    /GENERATE BREAK,
2242  4020            DELAY                   /WAIT,
2243  4502            UTSF                    /TRANSMIT FLAG SET?
2244  7410            SKP
2245  5252            JMP     .+5             /YES, CONTINUE;
2246  7402  HALT27, HLT                       /NO, FLAG NOT SET OR SET TOO LATE;
2247  4544            ERROR                   /SCOPE LOOP, PRESS CONTINUE TO ENTER,
2250  2235            TST5AC                  /LOOP ADDRESS;
2251  2252            TST5AD                  /NEXT TEST;
2252  4503  TST5AD, UTCF                      /CLEAR TRANSMIT AND BRK FLAGS;
2253  4020            DELAY
2254  4502            UTSF                    /TRANSMIT FLAG SET?
2255  5262            JMP     .+5             /NO, CONTINUE;
2256  7402  HALT28, HLT                       /YES, TRANSMIT AND/OR BRK FLAG STILL SET,
2257  4544            ERROR                   /SCOPE LOOP, PRESS CONTINUE TO ENTER,
2260  2235            TST5AC                  /LOOP ADDRESS;
2261  2264            CHECK5                  /NEXT TEST;
2262  2132            ISZ     TSTCNT          /TEST LOOP COUNTER;
2263  5204            JMP     TST5A           /LOOP,
2264  7200  CHECK5, CLA
2265  1376            TAD     (5              /LOAD CURRENT TEST
2266  7421            MQL                     /NUMBER INTO MQ REGISTER,
2267  1775'           TAD     TESTNO          /ARE ALL TESTS BEING RUN?
2270  7640            SZA CLA                 /YES, GO TO NEXT TEST,
2271  5202            JMP     TST5A+2         /NO, CONTINUE CURRENT TEST;
2272  5774'           JMP     TST6            /NXT TEST,


2273  1000  HIBKCT, -7000
2274  5060  LOBKCT, -2720
2275  2564  BRKCNT, -5214
2374  2400
2375  0276
2376  0005
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2377  7773
      2400          PAGE


                //TST6 - DATA TEST//

                /TST6A - BINARY COUNT PATTERN,

2400  4043  TST6,   SETCNT                 /SETUP TEST COUNTER,
2401  4475  TST6A,  UKCC                   /CLEAR AC AND RECEIVE FLAG,
2402  3133          DCA     XMTCH          /INITIALIZE TRANSMIT AND RECEIVE,
2403  3142          DCA     TOLD           /DATA HOLDING LOCATIONS,
2404  3143          DCA     TLAST
2405  4506          UTLS                   /TRANSMIT,
2406  4474  LOOP6A, UKSF                   /IS RECEIVE FLAG SET?
2407  7410          SKP                    /NO, CHECK TRANSMIT,
2410  5226          JMP     RCV6A          /YES, GO AND CHECK DATA RECEIVED,
2411  4502          UTSF                   /IS TRANSMIT FLAG SET?
2412  5206          JMP     LOOP6A         /NO, CHECK FLAGS AGAIN,
2413  7300          CLA CLL
2414  1143          TAD     TLAST          /GET LAST CHARACTER TRANSMITTED,
2415  3142          DCA     TOLD           /SAVE IT FOR COMPARISON,
2416  2133          ISZ     XMTCH          /SETUP NEXT CHARACTER,
2417  7000          NOP
2420  1133          TAD     XMTCH
2421  3143          DCA     TLAST          /SAVE IT,
2422  1143          TAD     TLAST
2423  4506          UTLS                   /TRANSMIT NEXT CHARACTER,
2424  7200          CLA
2425  5206          JMP     LOOP6A
2426  4500  RCV6A,  UKRB                   /RECEIVE,
2427  0134          AND     BITMSK         /MASK OUT UNWANTED BITS,
2430  3140          DCA     TEMP1          /SAVE DATA,
2431  1140          TAD     TEMP1          /GET IT BACK FOR COMPARISON,
2432  7041          CIA
2433  3137          DCA     HOLD1          /SAVE COMPLEMENT,
2434  1142          TAD     TOLD           /COMPARE TRANSMIT AND RECEIVE DATA,
2435  0134          AND     BITMSK         /MASK OUT UNWANTED BITS,
2436  1137          TAD     HOLD1          /GET COMPLEMENT AND COMPARE,
2437  7650          SNA CLA                /DOES TRANSMIT = RECEIVE?
2440  5250          JMP     UPDATE         /YES, CONTINUE,
2441  1140          TAD     TEMP1          /BAD DATA TO AC,
2442  7402  HALT29, HLT
2443  7200          CLA
2444  1142          TAD     TOLD           /GOOD DATA TO AC,
2445  0134          AND     BITMSK         /MASK OUT UNWANTED BITS,
2446  7402  HALT30, HLT
2447  4545          DATERR                 /SCOPE LOOP, PRESS CONTINUE TO ENTER,
2450  2132  UPDATE, ISZ     TSTCNT         /TEST LOOP COUNTER,
2451  5206          JMP     LOOP6A         /LOOP
2452  4474          UKSF                   /WAIT FOR RECEIVE FLAG
2453  5252          JMP     .-1            /TO SET, BEFORE GOING ON,
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                    /TST6B - RANDOM DATA PATTERN,

2454  4043    TST6B,  SETCNT                  /SETUP TEST COUNTER,
2455  1377            TAD     (1233           /SETUP RANDOM NUMBER
2456  3135            DCA     RP1B            /GENERATOR;
2457  1376            TAD     (7622
2460  3136            DCA     RP2B
2461  4475            UKCC                    /CLEAR AC AND RECEIVE FLAG,
2462  4324            JMS     RAN1            /GET RANDOM DATA,
2463  4506            UTLS                    /TRANSMIT,
2464  4474    LOOP6B, UKSF                    /IS RECEIVE FLAG SET?
2465  7410            SKP                     /NO, CHECK TRANSMIT,
2466  5275            JMP     RCV6B           /YES, GO AND CHECK DATA RECEIVED,
2467  4502            UTSF                    /IS TRANSMIT FLAG SET?
2470  5264            JMP     LOOP6B          /NO, CHECK FLAGS AGAIN;
2471  4324            JMS     RAN1            /YES, GET NEXT RANDOM CHARACTER,
2472  4506            UTLS                    /TRANSMIT,
2473  7200            CLA
2474  5264            JMP     LOOP6B          /CHECK FLAGS AGAIN;
2475  4500    RCV6B,  UKRB                    /RECEIVE;
2476  0134            AND     BITMSK          /MASK OUT UNWANTED BITS;
2477  3140            DCA     TEMP1           /SAVE DATA;
2500  1140            TAD     TEMP1           /GET IT BACK FOR COMPARISON,
2501  7041            CIA
2502  1142            TAD     TOLD            /COMPARE TRANSMIT AND RECEIVE,
2503  7650            SNA CLA                 /DOES TRANSMIT=RECEIVE?
2504  5313            JMP     .+7             /YES, CONTINUE;
2505  1140            TAD     TEMP1           /BAD DATA TO AC,
2506  7402    HALT31, HLT
2507  7200            CLA
2510  1142            TAD     TOLD            /GOOD DATA TO AC;
2511  7402    HALT32, HLT
2512  4545            DATERR                  /SCOPE LOOP, PRESS CONTINUE TO ENTER,
2513  2132            ISZ     TSTCNT          /TEST LOOP COUNTER;
2514  5264            JMP     LOOP6B          /LOOP,
2515  7200            CLA
2516  1375            TAD     (6              /LOAD CURRENT TEST
2517  7421            MQL                     /NUMBER INTO MQ REGISTER,
2520  1774'           TAD     TESTNO          /ARE ALL TESTS BEING RUN?
2521  7640            SZA CLA                 /YES, GO TO NEXT TEST;
2522  5200            JMP     TST6            /NO, CONTINUE CURRENT TEST,
2523  5773'           JMP     TST7            /NEXT TEST;

                                            //RANDOM NUMBER GENERATORS//
2524  0000    RAN1,   0
2525  7300            CLA CLL
2526  1142            TAD     TOLD
2527  3143            DCA     TLAST
2530  1350            TAD     TNEW
2531  3142            DCA     TOLD
2532  1135            TAD     RP1B
2533  7006            RTL
2534  1136            TAD     RP2B
2535  3135            DCA     RP1B
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2536  1135          TAD     RP1B
2537  7006          RTL
2540  1136          TAD     RP2B
2541  7006          RTL
2542  3136          DCA     RP2B
2543  1135          TAD     RP1B
2544  0134          AND     BITMSK          /MASK OUT UNWANTED BITS.
2545  3350          DCA     TNEW
2546  1350          TAD     TNEW
2547  5724          JMP I   RAN1

2550  0000  TNEW,   0

2573  2600
2574  0276
2575  0006
2576  7622
2577  1233
      2600          PAGE


                    //TST7 - STATUS REGISTER TEST//

                    /TST7A - FORCES AN OVERRUN ERROR AND CHECKS THAT THIS CONDITION
                    /WILL CAUSE THE OVERRUN ERROR BIT (AC02) TO COME UP, AND THAT
                    /SWE AND OVERRUN WILL CAUSE AC00 TO COME UP.

2600  4043  TST7,   SETCNT                   /SETUP TEST COUNTER,
2601  4523          SET7A                   /SETUP HALT LOCATIONS,
2602  4475  TST7A,  UKCC                    /CLEAR AC AND RECEIVE FLAG,
2603  1377          TAD     (0002           /ENABLE SWE,
2604  4477          UKIE
2605  4754          JMS I   RANGEN          /GET RANDOM DATA,
2606  3140          DCA     TEMP1           /SAVE RANDOM NUMBER JUST
2607  1140  LOOP7A, TAD     TEMP1           /IN CASE IT IS NEEDED FOR SCOPE LOOP,
2610  4506          UTLS                    /TRANSMIT,
2611  4502          UTSF                    /SKIP ON TRANSMIT FLAG,
2612  5211          JMP     .-1
2613  4506          UTLS                    /REPEAT TRANSMIT TWICE MORE
2614  4502          UTSF                    /TO FORCE OVERRUN,
2615  5214          JMP     .-1
2616  4506          UTLS
2617  4502          UTSF
2620  5217          JMP     .-1
2621  4500          UKRB                    /RECEIVE AND READ ERROR BITS,
2622  0376          AND     (5000           /MASK FOR ANY ERROR AND OVERRUN,
2623  3137          DCA     HOLD1           /SAVE ERROR BITS,
2624  1137          TAD     HOLD1
2625  0375          AND     (1000           /MASK FOR OVERRUN ERROR BIT,
2626  7640          SZA CLA                 /OVERRUN ERROR=1?
2627  7410          SKP
2630  5235          JMP     .+5             /YES, CONTINUE,
2631  7402  HALT33, HLT                     /FAILED, OVERRUN ERROR DID NOT OCCUR,
2632  4544          ERROR                   /SCOPE LOOP, PRESS CONTINUE TO ENTER,
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2633  2607            LOOP7A                  /LOOP ADDRESS',
2634  2650            TST7B                   /NEXT TEST',
2635  1137            TAD     HOLD1
2636  0374            AND     (4000           /MASK FOR ERROR BIT 0',
2637  7650            SNA CLA
2640  7410            SKP
2641  5246            JMP     .+5
2642  7402  HALT34,   HLT                     /BIT 0 FAILED TO COME UP ON ERROR,
2643  4544            ERROR                   /SCOPE LOOP, PRESS CONTINUE TO ENTER,
2644  2607            LOOP7A                  /LOOP ADDRESS',
2645  2650            TST7B                   /NEXT TEST',
2646  2132            ISZ     TSTCNT          /TEST LOOP COUNTER',
2647  5202            JMP     TST7A           /LOOP,

                /TST7B - TRANSMITS BINARY COUNT PATTERN AND CHECKS FOR THE
                /OCCURANCE OF PARITY, OVERRUN OR FRAMEING ERRORS',

2650  4043  TST7B,   SETCNT                   /SETUP TEST COUNTER,
2651  1377            TAD     (0002           /SETUP SWE BIT',
2652  4477            UKIE                    /SET SWE',
2653  4475            UKCC                    /CLEAR AC AND RECEIVE FLAG',
2654  3133            DCA     XMTCH
2655  3142            DCA     TOLD
2656  3143            DCA     TLAST
2657  4506            UTLS                    /TRANSMIT,
2660  4474  LOOP7B,   UKSF                    /IS RECEIVE FLAG SET?
2661  7410            SKP                     /NO, CHECK TRANSMIT,
2662  5300            JMP     RCV7B           /YES, GO AND CHECK FOR STATUS ERRORS',
2663  4502            UTSF                    /IS TRANSMIT FLAG SET?
2664  5260            JMP     LOOP7B          /NO, CHECK FLAGS AGAIN',
2665  7300            CLA CLL
2666  1143            TAD     TLAST
2667  3142            DCA     TOLD
2670  2133            ISZ     XMTCH
2671  7000            NOP
2672  1133            TAD     XMTCH
2673  3143            DCA     TLAST
2674  1143            TAD     TLAST
2675  4506            UTLS                    /TRANSMIT,
2676  7200            CLA
2677  5260            JMP     LOOP7B
2700  4500  RCV7B,    UKRB                    /RECEIVE',
2701  3140            DCA     TEMP1           /SAVE STATUS WORD',
2702  1140            TAD     TEMP1
2703  0373            AND     (2000           /MASK FOR PARITY ERROR',
2704  7640            SZA CLA
2705  7410            SKP
2706  5312            JMP     .+4
2707  1140            TAD     TEMP1           /FAILING STATUS BIT AND DATA
                                              /WORD TO THE AC,
2710  7402  HALT35,   HLT                     /PARITY ERROR',
2711  4545            DATERR                  /SCOPE LOOP, PRESS CONTINUE TO ENTER,
2712  1140            TAD     TEMP1
2713  0375            AND     (1000           /MASK FOR OVERRUN ERROR,
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2714  7640          SZA CLA
2715  7410          SKP
2716  5322          JMP     .+4
2717  1140          TAD     TEMP1           /FAILING STATUS BIT AND DATA
                                            /WORD TO AC.

2720  7402  HALT36, HLT                     /OVERRUN ERROR;
2721  4545          DATERR                  /SCOPE LOOP, PRESS CONTINUE TO ENTER.
2722  1140          TAD     TEMP1
2723  0372          AND     (0400           /MASK FOR FRAMEING ERROR.
2724  7640          SZA CLA
2725  7410          SKP
2726  5332          JMP     .+4
2727  1140          TAD     TEMP1           /FAILING STATUS BIT AND DATA WORD TO AC.
2730  7402  HALT37, HLT                     /FRAMEING ERROR;
2731  4545          DATERR                  /SCOPE LOOP, PRESS CONTINUE TO ENTER.
2732  1140          TAD     TEMP1
2733  0374          AND     (4000           /MASK FOR BIT 0, ANY ERROR BIT;
2734  7640          SZA CLA
2735  7410          SKP
2736  5342          JMP     .+4
2737  1140          TAD     TEMP1           /FAILING STATUS BIT AND DATA WORD TO AC.
2740  7402  HALT38, HLT                     /ERROR BIT 0=1;
2741  4545          DATERR                  /SCOPE LOOP, PRESS CONTINUE TO ENTER.
2742  2132          ISZ     TST CNT         /TEST LOOP COUNTER;
2743  5260          JMP     LOOP7B
2744  7200          CLA
2745  1371          TAD     (7              /LOAD CURRENT TEST
2746  7421          MQL                     /NUMBER INTO MQ REGISTER.
2747  1770'         TAD     TESTNO          /ARE ALL TESTS BEING RUN?
2750  7640          SZA CLA                 /YES, GO TO NEXT TEST;
2751  5200          JMP     TST7            /NO, CONTINUE CURRENT TEST.
2752  4020          DELAY                   /GIVE TIME FOR CKTS TO SETTLE;
2753  5767'         JMP     TST1            /NEXT TEST;

2754  2524  RANGEN, RAN1

2767  1200
2770  0276
2771  0007
2772  0400
2773  2000
2774  4000
2775  1000
2776  5000
2777  0002
      3000          PAGE


                                            /EXACT BAUD RATE TABLES
                                            /USED WHEN TESTING FLAGS TO SET WITHIN SPECS

                                            /110 BAUD
3000  6544  ON110,  -1234                   /7 BIT TIME
3001  6405          -1373                   /8 BIT TIME
3002  6245          -1533                   /9 BIT TIME
```

```
3003  6106          -1672          /10 BIT TIME
3004  5746          -2032          /11 BIT TIME
3005  5606          -2172          /12 BIT TIME

                                   /134.5 BAUD
3006  6737    ON134, -1041         /7 BIT TIME
3007  6620           -1160         /8 BIT TIME
3010  6502           -1276         /9 BIT TIME
3011  6364           -1414         /10 BIT TIME
3012  6246           -1532         /11 BIT TIME
3013  6127           -1651         /12 BIT TIME

                                   /150 BAUD
3014  7027    ON150, -751          /7 BIT TIME
3015  6720           -1060         /8 BIT TIME
3016  6613           -1165         /9 BIT TIME
3017  6505           -1273         /10 BIT TIME
3020  6376           -1402         /11 BIT TIME
3021  6271           -1507         /12 BIT TIME

3022  7413    ON300, -365          /7 BIT TIME
3023  7351           -427          /8 BIT TIME
3024  7305           -473          /9 BIT TIME
3025  7242           -536          /10 BIT TIME
3026  7200           -600          /11 BIT TIME
3027  7134           -644          /12 BIT TIME

                                   /600 BAUD
3030  7606    ON600, -172          /7 BIT TIME
3031  7564           -214          /8 BIT TIME
3032  7544           -234          /9 BIT TIME
3033  7522           -256          /10 BIT TIME
3034  7500           -300          /11 BIT TIME
3035  7457           -321          /12 BIT TIME


                                   /1200 BAUD
3036  7703    ON1200, -75          /7 BIT TIME
3037  7672            -106        /8 BIT TIME
3040  7661            -117        /9 BIT TIME
3041  7651            -127        /10 BIT TIME
3042  7637            -141        /11 BIT TIME
3043  7627            -151        /12 BIT TIME

                                   /1800 BAUD
3044  7727    ON1800, -51          /7 BIT TIME
3045  7722            -56         /8 BIT TIME
3046  7713            -65         /9 BIT TIME
3047  7705            -73         /10 BIT TIME
3050  7700            -100        /11 BIT TIME
3051  7672            -106        /12 BIT TIME

                                   /2400 BAUD
3052  7742    ON2400, -36          /7 BIT TIME
3053  7735            -43         /8 BIT TIME
```

```
3054  7731            -47                     /9 BIT TIME
3055  7724            -54                     /10 BIT TIME
3056  7720            -60                     /11 BIT TIME
3057  7713            -65                     /12 BIT TIME


                                              /LOW BAUD RATE TABLES
                                              /USED WHEN TESTING FLAGS NOT TO SET TOO SOON

                                              /110 BAUD
3060  7003    LO110,  -775                    /7 BIT TIME
3061  6672            -1106                   /8 BIT TIME
3062  6562            -1216                   /9 BIT TIME
3063  6451            -1327                   /10 BIT TIME
3064  6340            -1440                   /11 BIT TIME
3065  6227            -1551                   /12 BIT TIME

                                              /134.5 BAUD
3066  7141    LO134,  -637                    /7 BIT TIME
3067  7045            -733                    /8 BIT TIME
3070  6751            -1027                   /9 BIT TIME
3071  6656            -1122                   /10 BIT TIME
3072  6562            -1216                   /11 BIT TIME
3073  6466            -1312                   /12 BIT TIME

                                              /150 BAUD
3074  7213    LO150,  -565                    /7 BIT TIME
3075  7126            -652                    /8 BIT TIME
3076  7041            -737                    /9 BIT TIME
3077  6753            -1025                   /10 BIT TIME
3100  6666            -1112                   /11 BIT TIME
3101  6601            -1177                   /12 BIT TIME

                                              /300 BAUD
3102  7505    LO300,  -273                    /7 BIT TIME
3103  7453            -325                    /8 BIT TIME
3104  7420            -360                    /9 BIT TIME
3105  7366            -412                    /10 BIT TIME
3106  7333            -445                    /11 BIT TIME
3107  7300            -500                    /12 BIT TIME

                                              /600 BAUD
3110  7643    LO600,  -135                    /7 BIT TIME
3111  7626            -152                    /8 BIT TIME
3112  7611            -167                    /9 BIT TIME
3113  7573            -205                    /10 BIT TIME
3114  7556            -222                    /11 BIT TIME
3115  7541            -237                    /12 BIT TIME


                                              /1200 BAUD
3116  7722    LO1200, -56                     /7 BIT TIME
3117  7712            -66                     /8 BIT TIME
3120  7704            -74                     /9 BIT TIME
3121  7676            -102                    /10 BIT TIME
```

```
3122  7666              -112                /11 BIT TIME
3123  7660              -120                /12 BIT TIME

                                              /1800 BAUD
3124  7741    LO1800,   -37                 /7 BIT TIME
3125  7735              -43                 /8 BIT TIME
3126  7730              -50                 /9 BIT TIME
3127  7723              -55                 /10 BIT TIME
3130  7717              -61                 /11 BIT TIME
3131  7712              -66                 /12 BIT TIME

                                              /2400 BAUD
3132  7751    LO2400,   -27                 /7 BIT TIME
3133  7746              -32                 /8 BIT TIME
3134  7742              -36                 /9 BIT TIME
3135  7736              -42                 /10 BIT TIME
3136  7733              -45                 /11 BIT TIME
3137  7730              -50                 /12 BIT TIME

                        $
0177  0302
```

```
0000  01122000  00000000  11111111  11111111  11111111  11111111  11111111  11111111
0100  11111111  11111111  11111111  11111111  11111110  00000000  00000000  00000001

0200  11111111  11111111  11111111  11111111  11111111  11111111  11111111  11111111
0300  11111111  11111111  11111111  11111111  11111111  11000000  00000000  01111111

0400  11111111  11111111  11111111  11111111  11111111  11111111  11111111  10000000
0500  00000000  00000000  00000000  00000000  00000000  00111111  11111111  11111111

0600  11111111  11111111  11111111  11111111  11111111  11111111  11111111  11000000
0700  00000000  00000000  00000000  00000000  00000000  00000000  00000000  00000000


1000  11111111  11111111  11111111  11111111  11111111  11111111  11111111  11111111
1100  11111111  11111111  11110000  00000000  01111111  11111111  11111111  11111111

1200  11111111  11111111  11111111  11111111  11111111  11111111  11111111  11111111
1300  11111111  11111111  11111000  00000000  00000000  00000000  00000000  00011111

1400  11111111  11111111  11111111  11111111  11111111  11111111  11111111  11111111
1500  11111111  11111111  11111111  00000000  00000000  00000000  00000000  00111111

1600  11111111  11111111  11111111  11111111  11111111  11111111  11111111  11111111
1700  11111111  11111111  11111111  11111111  11111111  11111111  10000000  00011111


2000  11111111  11111111  11111111  11111111  11111111  11111111  11000000  00000000
2100  00000000  00000000  00000000  00000000  00000000  00000000  00000000  00011111

2200  11111111  11111111  11111111  11111111  11111111  11111111  11111111  11111100
2300  00000000  00000000  00000000  00000000  00000000  00000000  00000000  00001111

2400  11111111  11111111  11111111  11111111  11111111  11111111  11111111  11111111
2500  11111111  11111111  11111111  11111111  11111111  10000000  00000000  00011111

2600  11111111  11111111  11111111  11111111  11111111  11111111  11111111  11111111
2700  11111111  11111111  11111111  11111111  11111111  11111000  00000001  11111111


3000  11111111  11111111  11111111  11111111  11111111  11111111  11111111  11111111
3100  11111111  11111111  11111111  11111111  00000000  00000000  00000000  00000000

3200
3300

3400
3500

3600
3700
```

```
4000
4100

4200
4300

4400
4500

4600
4700


5000
5100

5200
5300

5400
5500

5600
5700


6000
6100

6200
6300

6400
6500

6600
6700


7000
7100

7200
7300

7400
7500

7600
7700
```

```
BAUDNO  0146
BEGIN   3200
BITMSK  0134
BITNO   0275
BRKCNT  2275
CAF     6007
CHECK1  1316
CHECK2  1521
CHECK3  1752
CHECK4  2053
CHECK5  2264
CON100  0126
COUNT   0043
DATERR  4545
DECODE  0250
DELAY   4020
DELAYN  0125
DELLAY  0020
DELOOP  0024
DOUBLE  0301
ERROR   4544
FAIL    0312
GETBAK  0130
HALT1   1207
HALT10  1434
HALT11  1461
HALT12  1471
HALT13  1513
HALT14  1606
HALT15  1634
HALT16  1643
HALT17  1656
HALT18  1665
HALT19  1703
HALT2   1216
HALT20  1715
HALT21  1744
HALT22  2012
HALT23  2022
HALT24  2045
HALT25  2215
HALT26  2231
HALT27  2246
HALT28  2256
HALT29  2442
HALT3   1226
HALT30  2446
HALT31  2506
HALT32  2511
HALT33  2631
HALT34  2642
HALT35  2710
HALT36  2720
HALT37  2730
HALT38  2740
HALT4   1242
HALT5   1256
HALT6   1274
HALT7   1310
HALT8   1413
HALT9   1424
HIBKCT  2273
HOLD1   0137
INTOK   1262
LO110   3060
LO1200  3116
LO134   3066
LO150   3074
LO1800  3124
LO2400  3132
LO300   3102
LO600   3110
LOBAUD  0063
LOBKCT  2274
LOOP6A  2406
LOOP6B  2464
LOOP7A  2607
LOOP7B  2660
LORATE  0300
MASK7   0466
MQL     7421
NDELAY  0124
NXTST   0131
ON110   3000
ON1200  3036
ON134   3006
ON150   3014
ON1800  3044
ON2400  3052
ON300   3022
ON600   3030
ONBAUD  0053
ONRATE  0277
RAN1    2524
RANGEN  2754
RCV6A   2426
RCV6B   2475
RCV7B   2700
RCVD    0344
RCVIOT  0470
RETURN  0002
RINTOK  1750
RKCC    0613
RKCF    0601
RKIE    0623
RKRB    0627
RKRS    0617
RKSF    0605
RP1B    0135
RP2B    0136
RSPF    0633
RSPI    0655
RTCF    0645
RTLS    0663
RTPC    0651
RTPK    0667
RTSF    0637
SCOPE   0332
SET1A   4510
SET1B   4511
SET1C   4512
SET2A   4513
SET2B   4514
SET3A   4515
SET3B   4516
SET3C   4517
SET3D   4520
SET4A   4521
SET5A   4522
SET7A   4523
SETCNT  4043
SETIOT  0400
SETT1A  1000
SETT1B  1010
SETT1C  1016
SETT2A  1024
SETT2B  1034
SETT3A  1044
SETT3B  1050
SETT3C  1062
SETT3D  1070
SETT4A  1074
SETT5A  1104
SETT7A  1116
SWITCH  0274
TEMP1   0140
TEST    0237
TESTNO  0276
TLAST   0143
TNEW    2550
TNOW    0141
TOLD    0142
TST1    1200
TST1A   1202
TST1AB  1222
TST1B   1236
TST1BB  1246
TST1C   1266
TST1CB  1300
TST2    1400
TST2A   1402
TST2AB  1417
TST2B   1444
TST2BB  1475
TST3    1600
TST3A   1602
TST3B   1616
TST3BB  1647
TST3C   1675
TST3CB  1707
TST3D   1725
TST4    2000
TST4A   2002
TST4AB  2026
TST5    2200
TST5A   2204
TST5AB  2221
TST5AC  2235
TST5AD  2252
TST6    2400
TST6A   2401
TST6B   2454
TST7    2600
TST7A   2602
TST7B   2650
TSTBL   0302
TSTCNT  0132
UKCC    4475
UKCF    4473
UKIE    4477
UKRB    4500
UKRS    4476
UKSF    4474
UPDATE  2450
US100   0127
USPF    4501
USPI    4505
UTCF    4503
UTLS    4506
UTPC    4504
UTPK    4507
UTSF    4502
XFAIL   0144
XKCC    0612
XKCF    0600
XKIE    0622
XKRB    0626
XKRS    0616
```

```
        XXSF    0604
        XXTCH   0133
        XXTIOT  0467
        XSCOPE  0145
        XSET1A  0110
        XSET1B  0111
        XSET1C  0112
        XSET2A  0113
        XSET2B  0114
        XSET3A  0115
        XSET3B  0116
        XSET3C  0117
        XSET3D  0120
        XSET4A  0121
        XSET5A  0122
        XSET7A  0123
        XSPF    0632
        XSPI    0654
        XTCF    0644
        XTLS    0662
        XTPC    0650
        XTPK    0666
        XTSF    0636
        XXKCC   0075
        XXKCF   0073
        XXKIE   0077
        XXKRB   0100
        XXKRS   0076
        XXKSF   0074
        XXSPF   0101
        XXSPI   0105
        XXTCF   0103
        XXTLS   0106
        XXTPC   0104
        XXTPK   0107
        XXTSF   0102


ERRORS DETECTED: 0

LINKS GENERATED: 67

RUN-TIME:  13 SECONDS

3K CORE USED
```