IDENTIFICATION

PRODUCT CODE: MAINDEC-08-DIKLA-C-D

PRODUCT NAME: KL8-JA & KL8-KA/KB/KC/KD
LOOP BACK TEST

PRODUCT DATE: APRIL 1977

MAINTAINER: DIAGNOSTIC GROUP

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1.0 ABSTRACT

KL8-JA & KL8-KA/KB/KC/KD LOOP BACK TEST IS A PROGRAM TO CHECK OUT THE TERMINAL CONTROL/DATA INTERFACE OPTION (M8655). THE BOARD IS TESTED IN LOOP BACK MODE BY CONNECTING EITHER EIA OUTPUT TO EIA INPUT OR CONNECTING 20 MA CURRENT OUTPUT TO 20 MA CURRENT INPUT.

2.0 REQUIREMENTS

2.1 HARDWARE

PDP-8,8I,8L WITH A DW8E-P OR DW8E-N BUS CONVERTER
PDP-8E,F OR M
KL8-JA TERMINAL CONTROL/DATA INTERFACE (M8655 9 BAUDS RATES) OR A
KL8-KA (SAME AS THE KL8-JA) OR A
KL8-KB TERMINAL CONTROL/DATA INTERFACE (M8655-YA 1050 BAUD) OR A
KL8-KC TERMINAL CONTROL/DATA INTERFACE (M8655-YB 66.7 BAUD) OR A
KL8-KD TERMINAL CONTROL/DATA INTERFACE (M8655-YC 56.8 BAUD)

2.2 STORAGE

THE PROGRAM OCCUPIES MEMORY LOCATIONS 0000 TO 5400

2.3 PREREQUISITE SOFTWARE

THE SYSTEM MUST BE CAPABLE OF RUNNING ALL BASIC PROCESSOR DIAGNOSTICS.

3.0 LOADING PROCEDURE

3.1 METHOD

THE PROGRAM IS LOADED USING THE STANDARD BINARY LOADER TECHNIQUE, AND THE PROGRAM MUST RESIDE IN FIELD 0.

4.0 STANDARD TEST PROCEDURE

4.1 CONNECTIONS FOR TESTING

4.1.1 EIA LOOP BACK CONNECTIONS

CONNECT PIN F TO PIN J AND PIN E TO PIN M ON THE BERG CONNECTOR

4.1.2 20MA LOOP BACK CONNECTIONS

CONNECT PIN E TO PIN H, PIN K TO PIN KK, AND PIN S TO PIN AA ON THE BERG CONNECTOR

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////////////////////////////////////////////////////////////////////
/ WARNING: 20MA LOOP CONNECTIONS CAN ONLY BE CONNECTED             /
/ THIS WAY FOR TESTING IN LOOP BACK MODE.  DO NOT ATTEMPT          /
/ TO CONNECT 2 M8655'S TOGETHER AT ANY TIME WITH 20MA LOOPS        /
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4.2 RUN CONTROL/DATA TEST

A. DO EITHER STEP 4.1.1 OR 4.1.2 FOR EIA OR 20MA LOOP BACK CONNECTIONS

B. THE PROGRAM WHEN FIRST LOADED IS INITIALIZED FOR 110 BAUD, 2 STOP BITS, 8 DATA BITS, RECIEVE IOT OF 03 AND A TRANSMIT IOT OF 04. IF THIS IS THE CONFIGURATION DESIRED GO TO PARAGRAPH 4.3 (RESTARTING THE PROGRAM) OTHERWISE GO TO STEP C

C. THE PROGRAM CAN BE INITIALIZED EITHER OF TWO WAYS:
   1. BY WAY OF THE SWITCH REGISTER OR
   2. BY WAY OF AN OPTIONAL TELETYPE WITH DEVICE CODE OF 03 AND 04. THESE DEVICE CODES CANNOT BE CHANGED.

D. SET SWITCH REGISTER TO 0200 AND PRESS "LOAD ADDRESS".

E. SET SR11=0 FOR INITIALIZING THE PROGRAM WITH THE SR OR SET SR11=1 FOR INITIALIZING THE PROGRAM WITH THE TELETYPE AND PRESS "CLEAR" AND THEN "CONTINUE".

F. IF SR11=0 GO TO G. IF SR11=1 GO TO 4.2.1 FOR TELETYPE INTERROGATION.

G. THE PROGRAM WILL HALT AT LOCATION 4110 WITH 0207 IN THE AC.

H. SET SR 0-5 TO THE RECEIVE IOT AND SR 6-11 TO THE TRANSMIT IOT AND PRESS "CONTINUE".

I. THE PROGRAM WILL HALT AT LOCATION 4110 WITH 0212 IN THE AC.

J. SETUP THE SWITCH REGISTER FOR THE FOLLOWING CONDITION AND PRESS "CONTINUE".

NOTE: A 1 FOLLOWING A JUMPER OR SWITCH MEANS THAT THE JUMPER IS INSERTED OR A SWITCH IS IN THE ON POSITION.

SR0=1 IF PARITY JUMPER IS INSTALLED NP=1

SR1=1 IF STATUS ENABLE JUMPER IS INSTALLED SWD=1

SR2=1 IF FILLER CHARACTER JUMPER INSTALLED FIL=1

	SR5	SR6	SR7	SR8	BAUD RATE	ROCKER SWITCHES			JUMPERS	VARIATION
	0	0	0	0	110 BAUD	B1=0	B2=0	B3=0	W2=1 W5=0	KL8-JA & KA
	0	0	0	1	150 BAUD	B1=0	B2=0	B3=1	W2=1 W5=0	KL8-JA & KA
	0	0	1	0	300 BAUD	B1=0	B2=1	B3=0	W2=1 W5=0	KL8-JA & KA
	0	0	1	1	600 BAUD	B1=0	B2=1	B3=1	W2=1 W5=0	KL8-JA & KA
	0	1	0	0	1200 BAUD	B1=1	B2=0	B3=0	W2=1 W5=0	KL8-JA & KA
	0	1	0	1	2400 BAUD	B1=1	B2=0	B3=1	W2=1 W5=0	KL8-JA & KA
	0	1	1	0	4800 BAUD	B1=1	B2=1	B3=0	W2=1 W5=0	KL8-JA & KA
	0	1	1	1	9600 BAUD	B1=1	B2=1	B3=1	W2=1 W5=0	KL8-JA & KA
*	1	0	0	0	19.2K BAUD	B1=1	B2=1	B3=1	W2=0 W5=1	KL8-JA & KA
	1	0	0	1	56.8 BAUD	B1=0	B2=0	B3=0	W2=1 W5=0	KL8-KD (M8655-YC)
	1	0	1	0	66.7 BAUD	B1=0	B2=0	B3=0	W2=1 W5=0	KL8-KC (M8655-YB)
	1	0	1	1	1050 BAUD	B1=1	B2=0	B3=0	W2=1 W5=0	KL8-KB (M8655-YA)

*19.2 KILO BAUD IS ONLY OBTAINABLE WITH A SPECIAL UART.

SR9=1 IF TWO STOP BITS-JUMPER NOT INSTALLED SB=0

SR10	SR11	#	DATA BITS/CHARACTER	JUMPERS	
0	0	5	DATA BITS/CHARACTER	NB1=1	NB2=1
0	1	6	DATA BITS/CHARACTER	NB1=0	NB2=1
1	0	7	DATA BITS/CHARACTER	NB1=1	NB2=0
1	1	8	DATA BITS/CHARACTER	NB1=0	NB2=0

K. THE PROGRAM WILL HALT AT LOCATION 4110 WITH 0247 IN THE AC.

L. SET SWITCH REGISTER TO 0000 IF PROCESSOR IS ONE OF THE PDP-8E FAMILY OTHERWISE SET IT TO 0002 AND PRESS "CONTINUE".

M. SETTING THE SWITCH REGISTER TO 0200 WHILE RUNNING WILL HALT THE PROCESSOR AT THE COMPLETION OF A PROGRAM PASS AT LOCATION 2327

N. THE PROGRAM WILL NOW RUN UNTIL AN ERROR IS ENCOUNTERED OR THE PROGRAM IS STOPPED BY THE OPERATOR OR SR4=1.

4.2.1 TELETYPE INTERROGATION

NOTE: THIS SECTION OF PROGRAM WAS ENTERED FROM STEPS D,E AND F OF PARAGRAPH 4.2.

A. THE PROGRAM WILL TYPE RECEIVE IOT?
THE OPERATOR TYPES IN THE DEVICE CODE OF THE RECEIVER(2 NUMBERS)

B. THE PROGRAM WILL TYPE TRANSMIT IOT?
THE OPERATOR TYPES IN THE DEVICE CODE OF THE TRANSMITTER(2 NUMBERS)

C. THE PROGRAM WILL TYPE PARITY(Y OR N)?
IF NP JUMPER IS INSTALLED TYPE Y IF IT ISN'T TYPE N.
THE PROGRAM WILL THEN TYPE NP=1? IF ANSWER WAS YES, AND NP=0?
IF ANSWER WAS NO. NP=THE PARITY JUMPER 1=INSTALLED 0=NOT INSTALLED.
THE PROGRAM WILL THEN TYPE EVEN PARITY EVN=0? ODD PARITY EVN=1?
EVN= ODD OR EVEN PARITY JUMPER, 1= JUMPER INSTALLED 0= NOT INSTALLED.

D. THE PROGRAM WILL THEN TYPE STATUS ENABLED(Y OR N)?
IF SWD JUMPER IS INSTALLED TYPE Y IF NOT TYPE N
THE PROGRAM WILL THEN TYPE SWD=1? IF ANSWER WAS YES, AND SWD=0? IF ANSWER WAS NO. SWD=STATUS WORD ENABLE JUMPER, 1=JUMPER INSTALLED, 0=JUMPER NOT INSTALLED.

E. THE PROGRAM WILL THEN TYPE FILLER CHARACTERS(Y OR N)?
IF FIL JUMPER IS INSTALLED TYPE Y IF NOT TYPE N.
THE PROGRAM WILL THEN TYPE FIL=1? IF ANSWER WAS YES, AND FIL=0? IF ANSWER WAS NO. FIL=FILLER CHARACTER JUMPER, 1= JUMPER INSTALLED AND 0= JUMPER NOT INSTALLED.

F. THE PROGRAM WILL NOW TYPE OUT THE FOLLOWING MESSAGE
BAUD RATE(00-13)? 00=110 01=150 02=300 03=600 04=1200 05=2400
06=4800 07=9600 10=19,200 11=56.8 12=66.7 13=1050
THE OPERATOR WILL NOW TYPE IN TWO NUMBERS AND THE PROGRAM WILL RESPOND WITH THE FOLLOWING MESSAGE:

XXXX BAUD - B1=Y? B2=Y? B3=Y W2=Z W5=Z

(XXXX IS THE BAUD RATE FROM 56.8 TO 19,200 BAUD
Y=0 OR 1 0=SWITCH IN OFF POSITION 1= SWITCH IN ON POSITION
Z=0 OR 1 0=JUMPER NOT INSTALLED 1=JUMPER INSTALLED).

G. THE PROGRAM WILL NOW TYPE TWO STOP BITS(Y OR N)?
IF SB JUMPER IS NOT INSTALLED TYPE Y IF IT IS TYPE N.
THE PROGRAM WILL THEN TYPE SB=0? IF ANSWER WAS YES,
AND SB=1 IF ANSWER WAS NO. SB=STOP BIT JUMPER,
1=JUMPER INSTALLED 0=JUMPER NOT INSTALLED

H. THE PROGRAM WILL THEN TYPE DATA BITS/CHARACTER? 0=5 1=6 2=7 3=8
THE OPERATOR WILL NOW TYPE IN ONE NUMBER AND THE PROGRAM WILL RESPOND WITH THE FOLLOWING MESSAGE:
X DATA BITS-NB1=Y? NB2=Y?
X=THE NUMBER OF DATA BITS SELECTED 5,6,7 OR 8
Y=0 OR 1 0=JUMPER NOT INSTALLED 1=JUMPER INSTALLED

I. THE PROGRAM WILL HALT AT LOCATION 4110 WITH 0247 IN THE AC.

J. SET SWITCH REGISTER TO 0000 IF PROCESSOR IS ONE OF THE PDP-8E FAMILY OTHERWISE SET IT TO 0002 AND PRESS "CONTINUE".

K. SETTING THE SWITCH REGISTER TO 0200 WHILE RUNNING WILL HALT THE PROCESSOR AT THE COMPLETION OF A PROGRAM PASS AT 4110 WITH 2147 IN THE AC.

L. THE PROGRAM WILL NOW RUN UNTIL AN ERROR IS ENCOUNTERED OR THE PROGRAM IS STOPPED BY OPERATOR OR SR4=1.

4.3 RESTARTING THE PROGRAM

A. SET SR TO 0201 AND PRESS LOAD ADDRESS

B. SET SR TO ALL ZEROES IF PROCESSOR IS ONE OF THE PDP-8E FAMILY OTHERWISE SET SR TO 0002 AND PRESS "CLEAR" AND THEN "CONTINUE"

C. SETTING SR4 TO A ONE WILL HALT THE PROGRAM AFTER ONE COMPLETE PROGRAM PASS AT LOCATION 2327

D. THE PROGRAM WILL NOW RUN UNTIL AN ERROR IS ENCOUNTERED OR THE PROGRAM IS HALTED BY THE OPERATOR OR SR4=1.

4.4 RUN BAUD RATE TIMING TEST

A. DO STEP A-K OF PARAGRAPH 4.2 IF NOT ALREADY DONE

B. THIS TEST IS A 30 SECOND STOP WATCH TIMING TEST

C. SET SR TO 0202 AND PRESS "LOAD ADDRESS" THEN "CLEAR".

D. CHECK STOP WATCH AND PRESS "CONTINUE".

E. THE PROGRAM SHOULD HALT IN APPROXIMATELY 30 SECONDS AT LOCATION 4110 WITH 2330 IN THE AC (SEE NOTE FOR EXCEPTION) IF THE BAUD RATE WAS SETUP CORRECTLY.

NOTE: THE PROGRAM WILL HALT IN APPROXIMATELY 28 SECONDS FOR THE FOLLOWING CONDITIONS:

5 DATA BITS, 2 STOP BITS, AND NO PARITY

5.0 OPERATING PROCEDURES

5.1 STARTING ADDRESSES

200 WITH SR11=0 - INITIALIZE THE PROGRAM BY THE SWITCH REGISTER
200 WITH SR11=1 - INITIALIZE THE PROGRAM BY THE TELETYPE
201 RESTART ADDRESS-NO INITIALIZATION NEEDED
202 BAUD RATE TIMING TEST

5.2 SWITCH REGISTER CONTROL

SR	STATE	ACTION
0	1	DO NOT HALT ON ERROR
1	1	LOOP ON ERROR OR ON A CONSTANT DATA PATTERN
2	1	LOOP ON TEST SEQUENCE
4	1	HALT PROGRAM AFTER A COMPLETE PROGRAM PASS
10	1	PROCESSOR NOT OF THE PDP-8E FAMILY
11	0	INITIALIZE THE PROGRAM WITH SR (STARTING ADDRESS 200 ONLY)
11	1	INITIALIZE THE PROGRAM WITH TELETYPE (STARTING ADDRESS 200 ONLY)

6.0 PROGRAM AND/OR OPERATOR ACTION

6.1 NORMAL HALTS

ALL NORMAL HALTS ARE AT 4110 WITH THE ADDRESSES INDICATED BELOW IN THE AC.

0207 INITIALIZATION OF PROGRAM HALT - SET DEVICE CODES IN THE SR.

0212 INITIALIZATION OF PROGRAM HALT - SETUP THE FOLLOWING CONDITIONS OF JUMPERS AND SWITCHES IN THE SWITCH REGISTER-PARITY STATUS ENABLE, FILLER CHARACTERS, BAUD RATE, NUMBER OF STOP BITS, AND NUMBER OF DATA BITS/CHARACTER

0247 SETUP THE SR OPTIONS FOR RUNNING THE PROGRAM

2147 END OF CONTROL/DATA TEST - SR4=1

2330 END OF BAUD RATE TIMING TEST HALT

7.0 ERRORS

7.1 CONTROL/DATA TEST ERRORS

ALL ERRORS DETECTED BY THE PROGRAM WILL RESULT IN AN ERROR HALT. REFER TO THE PROGRAM LISTING FOR THE CAUSE OF THE ERROR.

7.1.1 CONTROL/DATA TEST ERROR RECOVERY

SET SWITCH REGISTER 0,1 AND 2 TO A 1 AND PRESS "CONTINUE". THERE MAY BE 1 OR 2 MORE ERROR HALTS. IF THE ERROR WAS A DATA ERROR, THE PROGRAM IS NOW IN A SCOPE LOOP.

7.2 BAUD RATE TIMING TEST ERRORS

THE OPERATOR MUST DETECT ANY ERRORS IN THE BAUD RATE TIMING TEST. ONCE STARTED THE PROGRAM SHOULD HALT IN APPROXIMATELY 30 SECONDS EXCEPT WHEN THE MODULE IS SET UP FOR 5 DATA BITS, 2 STOP BITS AND NO PARITY, THE PROGRAM WILL THEN HALT IN APPROXIMATELY 28 SECONDS. ANY DEVIATIONS OF MORE THAN A 1/2 SECOND IS AN ERROR.

7.2.1 BAUD RATE TIMING TEST ERROR RECOVERY

AFTER CHECKING THE MODULE TO BE SET UP CORRECTLY, RESTART THE TEST BY SETTING SR2=1 AND PRESSING "CONTINUE".

IF ERROR STILL EXISTS GO TO PARAGRAPH 4.4 AND DO EACH AND EVERY STEP AGAIN.

IF ERROR STILL EXISTS CHECK THE BAUD RATE WITH A SCOPE.

8.0 PROGRAM DESCRIPTION

8.1 CONTROL/DATA TEST

THE FIRST TEST (CLRBRD) ISSUES A CAF INSTRUCTION TO GENERATE AN INITIALIZE PULSE. THE PROGRAM THEN CHECKS THAT THE TRANSMIT AND RECEIVE FLAGS ARE NOT STUCK ON AND THAT KSF,TSF, AND SPI DON'T SKIP. THE PROGRAM ALSO CHECKS THAT INTERRUPT REQUEST LINE IS NOT PULLED LOW. ALL ERRORS WILL RESULT IN AN ERROR HALT AT LOCATION 2210. THE CONTENTS OF THE AC WILL CONTAIN THE ADDRESS WHERE THE ERROR WAS DETECTED.

THE NEXT TEST (SCXMIT) CHECKS THAT THE TRANSMIT FLAG CAN BE SET AND CLEARED BY TFL,TSF AND TCF. THE RECEIVE FLAG IS ALSO CHECKED TO BE 0. KCF,TFL,TCF,KSF ARE CHECKED NOT TO SKIP. TSF IS CHECKED TO SKIP AND NOT TO SKIP. ALL ERRORS WILL RESULT IN AN ERROR HALT AT LOCATION 2210 WITH THE AC EQUAL TO THE PC WHERE THE ERROR WAS DETECTED.

THE NEXT TEST (CAFXMT) CHECKS THAT THE TRANSMIT FLAG CAN BE CLEARED BY CAF AND THAT THE RECEIVE FLAG IS STILL 0. ALL ERRORS WILL RESULT IN AN ERROR HALT AT LOCATION 2210 WITH THE AC EQUAL TO THE PC WHERE THE ERROR WAS DETECTED.

THE NEXT TEST (INTXMT) USES THE TRANSMIT FLAG TO CHECK THAT INTERRUPT ENABLE CAN BE SET AND CLEARED AND THAT THE PROGRAM CAN INTERRUPT. INTERRUPT ENABLE IS SET AND CLEARED BY DATA BIT 11 AND THE KIE COMMAND. SPI IS CHECKED TO SKIP AND NOT TO SKIP AND THE PROGRAM ALSO CHECKS THE MODULE TO INTERRUPT AND NOT TO INTERRUPT. AT THE END OF THE TEST THE RECEIVE FLAG IS CHECKED TO BE A 0. ALL ERRORS WILL RESULT IN AN ERROR HALT AT LOCATION 2210 WITH THE CONTENTS OF THE AC EQUAL TO THE PC WHERE THE ERROR WAS DETECTED.

THE NEXT TEST (CAFINT) CHECKS THAT CAF WILL SET INTERRUPT ENABLE BY USING THE TRANSMIT FLAG TO SKIP AND INTERRUPT ON. ALL ERRORS WILL RESULT IN AN ERROR HALT AT LOCATION 2210 WITH THE AC EQUAL TO THE PC WHERE THE ERROR WAS DETECTED.

THE NEXT TEST (ACNSKP) CHECKS THE EFFECT OF THE IOT ON THE AC AND ALSO CHECKS THAT THE IOT'S DO NOT SKIP. TPC AND TLS ARE NOT TESTED. AN ERROR HALT AT LOCATION 2231 INDICATES THAT AN IOT SKIPPED THAT SHOULDN'T, THE AC CONTAINS THE PC WHERE THE ERROR WAS DETECTED. AN ERROR HALT AT LOCATION 2246 INDICATES THAT THE IOT AFFECTED THE CONTENTS OF THE AC. THE CONTENTS OF THE AC EQUALS THE PC WHERE THE ERROR WAS DETECTED. PRESSING CONTINUE WILL RESULT IN AN ERROR HALT AT LOCATION 4110 WITH THE AC EQUAL TO THE BITS THAT WERE EFFECTED BY THE IOT.

THE NEXT TEST (STFLGS) CHECKS THAT THE TRANSMIT FLAG CAN BE SET BY TPC AND THAT SOMETIME AFTER THE TRANSMIT FLAG IS SET THE RECEIVE FLAG WILL GET SET BY DATA AVAILABLE. THE PROGRAM CHECKS THAT FLAGS CAN CAUSE AN INTERRUPT AND NOT TO INTERRUPT BY SETTING AND CLEARING INTERRUPT ENABLE. THE PROGRAM CHECKS THAT TCF AND KCC WILL CLEAR THE FLAGS. ALL ERRORS WILL RESULT IN AN ERROR HALT AT LOCATION 2211 WITH THE AC EQUAL TO THE PC WHERE THE ERROR WAS DETECTED. WHEN LOOPING ON THE ERROR, THE PROGRAM WILL DELAY APPROXIMATLEY 200MS AT THE BEGINNING OF EACH LOOP TO ALLOW TIME FOR THE FLAGS TO SETTLE.

THE NEXT TEST (XMTREC) CHECKS THAT A TPC COMMAND WILL SET THE TRANSMIT FLAG AND THAT A TLS COMMAND WILL CLEAR THE FLAG AND THEN RESET IT. THE TEST ALSO CHECKS THAT THE RECEIVE FLAG WILL GET SET FROM THE RESULT OF A TPC AND TLS COMMAND AND THAT THE RECEIVE FLAG CAN BE CLEARED BY A KRB AND KCC OR KCF COMMAND. ALL ERRORS WILL RESULT IN AN ERROR HALT AT LOCATION 2211 WITH THE AC EQUAL TO THE PC WHERE THE ERROR WAS DETECTED. IF SCOPE LOOPING, THERE WILL BE A 200MS DELAY AT THE BEGINNING OF EACH LOOP TO ALLOW THE FLAGS TO SETTLE.

THE NEXT 7 TESTS (SDTST1 TO 7) ARE SIMPLE DATA TESTS. THE PROGRAM TRANSMITS ONE WORD AND THEN WAITS IN A LOOP FOR THE TRANSMIT FLAG OR RECEIVE FLAG TO SET. WHEN THE TRANSMIT FLAG IS SET THE PROGRAM CLEARS IT AND THEN WAITS FOR THE RECEIVE FLAG. WHEN THE RECEIVE FLAG GETS SET, THE PROGRAM COMPARES THE WORD TRANSMITTED WITH THE WORD RECEIVED AND IF THEY DON'T COMPARE THE PROGRAM HALTS AT LOCATION 1366 WITH THE WORD TRANSMITTED IN THE AC. PRESSING "CONTINUE" WILL RESULT WITH AN ERROR HALT AT LOCATION 1371 WITH THE AC EQUAL TO THE WORD READ. ALL OTHER ERRORS WILL RESULT WITH A HALT AT LOCATION 2211 WITH THE AC CONTAINING THE PC WHERE THE ERROR WAS DETECTED

THE NEXT TEST (FDATAT) IS A FASTER DATA TEST USING RANDOM DATA. THE PROGRAM TRANSMITS THE FIRST WORD AND THEN WAITS IN A LOOP FOR THE TRANSMIT OR RECEIVE FLAG TO SET. WHEN THE TRANSMIT FLAG GETS SET A NEW WORD IS THEN GENERATED AND TRANSMITTED. THE PROGRAM THEN WAITS IN THE LOOP AGAIN FOR THE RECEIVE FLAG TO SET AND THEN DATA IS COMPARED WITH THE FIRST WORD TRANSMITTED. THE DIFFERENCE BETWEEN THIS TEST AND SDTST IS THAT THE PROGRAM IS TRANSMITING 1 WORD AHEAD OF WHAT IT IS READING. IF AN ERROR OCCURS THE PROGRAM WILL HALT AT LOCATION 1451 WITH THE AC EQUAL TO THE WORD EXPECTED. PRESS "CONTINUE" AND THE PROGRAM WILL HALT AT LOCATION 1454 WITH THE WORD RECEIVED IN THE AC. PRESS "CONTINUE" AGAIN AND THE PROGRAM WILL HALT AT LOCATION 1457 WITH THE AC EQUAL TO THE NEW WORD TRANSMITTED. THIS WORD MAY BE THE SAME AS THE WORD EXPECTED DEPENDING WHERE THE ERROR WAS DETECTED. WHEN SCOPE LOOPING ON THIS ERROR, THE FIRST AND THIRD ERROR HALT WORDS WILL BE THE WORDS USED TO TRANSMIT. WHEN AN ERROR IS ENCOUNTERED DURING THIS SCOPE LOOP, THE PROGRAM DELAYS 200MS TO ALLOW FLAGS TO SETTLE BEFORE TRANSMITTING AGAIN. THERE ARE NO ERROR HALTS IN THE SCOPE LOOP. ALL OTHER ERRORS WILL RESULT WITH AN ERROR HALT AT LOCATION 2211 WITH THE AC CONTAINING THE PC WHERE THE ERROR WAS DETECTED.

THE NEXT TEST (CHARLG) CHECKS THAT THE OPERATOR HAS SELECTED THE CORRECT NUMBER OF DATA BITS. THE PROGRAM TRANSMITS A 377 AND THEN TAKES THE 1'S COMPLEMENT OF THE NUMBER OF DATA BITS THE OPERATOR HAD SET UP THE PROGRAM WITH AND COMPARES IT TO THE WORD READ. IF THE AC EQUALED ZERO AFTER THE COMPARISON, THE NUMBER OF DATA BITS WERE SELECTED CORRECTLY, OTHERWISE, THE PROGRAM WILL HALT AT LOCATION 1632 WITH THE AC CONTAINING THE BITS THAT WEREN'T SUPPOSED TO BE SELECTED. PRESS "CONTINUE" AND THE PROGRAM WILL HALT AT LOCATION 1635 WITH THE AC EQUAL TO THE BITS THE OPERATOR HAD INITIALIZED THE PROGRAM WITH. ALL OTHER ERRORS WILL RESULT WITH AN ERROR HALT AT LOCATION 2211 WITH THE AC CONTAINING THE PC WHERE THE ERROR WAS DETECTED.

THE NEXT TEST (FILERT) IS A FILLER CHARACTER TEST AND WILL ONLY BE DONE IF THE OPERATOR HAS INITIALIZED THE PROGRAM FOR FILLER CHARACTERS. THE PROGRAM TRANSMITS A LINE FEED AND CHECKS THAT 4 RECEIVE FLAGS GET SET BEFORE THE TRANSMIT FLAG AND THAT THE 5TH RECEIVE FLAG GETS SET AFTER THE TRANSMIT FLAG. THE DATA RECEIVED SHOULD BE 1 WORD OF LINE FEED AND 4 WORDS OF FILLER CHARACTERS. IF THE WORD EXPECTED DOESN'T EQUAL THE WORD RECEIVED THE PROGRAM WILL HALT AT LOCATION 1726 WITH THE AC CONTAINING THE WORD EXPECTED. PRESS "CONTINUE" AND THE PROGRAM WILL HALT AT LOCATION 1731 WITH THE AC CONTAINING THE WORD RECEIVED. SCOPE LOOPING ON THIS ERROR WILL RESULT IN A 200MS DELAY AT THE BEGINNING OF EACH ERROR TO ALLOW TIME FOR THE FLAGS TO SETTLE. ALL OTHER ERRORS WILL RESULT IN AN ERROR HALT AT LOCATION 2211 WITH THE AC EQUAL TO THE PC WHERE ERROR WAS DETECTED.

THE LAST TEST (STENAB) IS A STATUS ENABLE TEST AND WILL ONLY BE EXECUTED IF THE OPERATOR HAD SET THE STATUS ENABLE BIT TO A ONE WHEN HE INITIALIZED THE PROGRAM. THIS TEST WILL CHECK THAT THE ERROR BIT AND THE OVERRUN BIT CAN BE SET AND CLEARED IN THE STATUS REGISTER. THE TEST WILL CHECK THAT STATUS ENABLE F/F CAN BE SET AND CLEARED. THE RECEIVE BUFFER WILL BE CHECKED TO CONTAIN THE CORRECT WORD. THREE WORDS (1,2+3) WILL BE TRANSMITTED AND THEN THE RECEIVE BUFFER WILL BE CHECKED. IF THERE WAS AN ERROR DURING COMPARISON OF DATA THE PROGRAM WILL HALT AT LOCATION 2117 WITH THE AC EQUAL TO THE PC WHERE THE ERROR WAS DETECTED. PRESS "CONTINUE" AND THE PROGRAM WILL HALT AT LOCATION 2122 WITH THE WORD EXPECTED IN THE AC. PRESS "CONTINUE" AGAIN AND THE PROGRAM WILL HALT AT LOCATION 2125 WITH THE WORD RECEIVED IN THE AC. ALL OTHER ERRORS WILL RESULT IN AN ERROR HALT AT LOCATION 2211 WITH THE PC WHERE THE ERROR WAS DETECTED IN THE AC. SCOPE LOOPING ON THIS ERROR CAUSES THE PROGRAM TO DELAY 200MS BEFORE STARTING TEST OVER TO ALLOW FLAGS TIME TO SETTLE.

END OF TEST-START TEST OVER AT CLRBRD IF SR4=0
OTHERWISE HALT AT LOCATION 4110 WITH 2147 IN THE AC.

8,2 BAUD RATE TIMING TEST

BAUD RATE TIMING TEST IS A STOP WATCH TIMING TEST. ONCE THIS TEST (BAUDTM) HAS BEEN STARTED, THE PROGRAM TURNS THE INTERRUPT ON AND TRANSMITS A CALCULATED NUMBER OF CHARACTERS (DETERMINED FROM THE BAUD RATE, PARITY, NUMBER OF DATA BITS/CHARACTER AND NUMBER OF STOP BITS). THE PROGRAM SHOULD HALT AT LOCATION 4110 WITH 2330 IN THE AC IN 30 SECONDS. EXCEPTIONS TO THIS ARE: ANY BAUD RATE, NO PARITY, 5 DATA BITS/CHARACTER AND 2 STOP BITS. THE PROGRAM IN THIS CASE SHOULD HALT IN 28 SECONDS.

9.0 APT-8 INTERFACES

9.1 DESCRIPTION

TWO INTERFACES HAVE BEEN PROVIDED WHICH WILL ALLOW THIS DIAGNOSTIC TO RUN UNDER THE STANDARD APT-8 SYSTEM. THESE INTERFACES ARE:

1. TIMING INTERFACE

2. ERROR INTERFACE

EACH WILL BE EXPLAINED IN MORE DETAIL.

9.2 SETUP

IN ORDER TO RUN UNDER APT-8, ADDRESSES 20 AND 22 MUST BE ESTABLISHED PRIOR TO RUNNING THE PROGRAM UNDER APT-8 CONTROL. THE FOLLOWING INFORMATION MUST BE INDICATED:

1. THE SYSTEM IS RUNNING UNDER APT-8 TEST SYSTEM.

2. DEVICE CODES TO BE USED.

3. PARITY JUMPER IS INSTALLED.

4. STATUS ENABLE JUMPER INSTALLED.

5. FILLER CHARACTER JUMPER INSTALLED

6. BAUD RATE.

7. TWO STOP BITS JUMPER NOT INSTALLED.

8. DATA BITS/CHARACTER.

ADDRESS 20 (PSEUDO-SWITCH REGISTER)

THIS ADDRESS WILL CONTAIN THE DEVICE CODES TO USE FOR TRANSMIT AND RECEIVE IN THE FOLLOWING FORMAT:

0304 INDICATES A TRANSMIT IOT OF 03 AND A RECEIVE IOT OF 04.

ADDRESS 21 (HARDWARE CONFIGURATION WORD 1)

THE FOLLOWING IS THE BIT DEFINITION FOR HARDWARE CONFIGURATION WORD 2.

NOTE: A 1 FOLLOWING A JUMPER OR SWITCH INDICATES THAT THE JUMPER IS INSERTED OR THE SWITCH IS IN THE ON POSITION

BIT1=1 IF PARITY JUMPER IS INSTALLED NP=1

BIT7-BIT11 AMOUNT OF MEMORY AVAILABLE IN SYSTEM IN 1K SEGMENTS

ADDRESS 22 (HARDWARE CONFIGURATION WORD 2)

THE FOLLOWING IS THE BIT DEFINITION FOR ADDRESS 22.

BIT0=1 DIAGNOSTIC IS RUNNING ON APT-8

BIT1=1 MULTIPLE OPTION CONTROLLER ENABLED.

BIT2=1 IF STATUS ENABLE JUMPER IS INSTALLED SWD=1

BIT3=1 IF FILLER CHARACTER JUMPER INSTALLED FIL=1

	BIT5	BIT6	BIT7	BIT8	BAUD RATE	ROCKER SWITCHES			JUMPERS	VARIATION
	0	0	0	0	110 BAUD	B1=0	B2=0	B3=0	W2=1 W5=0	KL8-JA & KA
	0	0	0	1	150 BAUD	B1=0	B2=0	B3=1	W2=1 W5=0	KL8-JA & KA
	0	0	1	0	300 BAUD	B1=0	B2=1	B3=0	W2=1 W5=0	KL8-JA & KA
	0	0	1	1	600 BAUD	B1=0	B2=1	B3=1	W2=1 W5=0	KL8-JA & KA
	0	1	0	0	1200 BAUD	B1=1	B2=0	B3=0	W2=1 W5=0	KL8-JA & KA
	0	1	0	1	2400 BAUD	B1=1	B2=0	B3=1	W2=1 W5=0	KL8-JA & KA
	0	1	1	0	4800 BAUD	B1=1	B2=1	B3=0	W2=1 W5=0	KL8-JA & KA
	0	1	1	1	9600 BAUD	B1=1	B2=1	B3=1	W2=1 W5=0	KL8-JA & KA
*	1	0	0	0	19.2K BAUD	B1=1	B2=1	B3=1	W2=0 W5=1	KL8-JA & KA
	1	0	0	1	56.8 BAUD	B1=0	B2=0	B3=0	W2=1 W5=0	KL8-KD (M8655-YC)
	1	0	1	0	66.7 BAUD	B1=0	B2=0	B3=0	W2=1 W5=0	KL8-KC (M8655-YB)
	1	0	1	1	1050 BAUD	B1=1	B2=0	B3=0	W2=1 W5=0	KL8-KB (M8655-YA)

*19.2 KILO BAUD IS ONLY OBTAINABLE WITH A SPECIAL UART.

BIT9=1 IF TWO STOP BITS-JUMPER NOT INSTALLED SB=0

BIT10	BIT11	#	DATA BITS/CHARACTER	JUMPERS	
0	0	5	DATA BITS/CHARACTER	NB1=1	NB2=1
0	1	6	DATA BITS/CHARACTER	NB1=0	NB2=1
1	0	7	DATA BITS/CHARACTER	NB1=1	NB2=0
1	1	8	DATA BITS/CHARACTER	NB1=0	NB2=0

9.3 APT-8 INTERFACES.

9.3.1 TIMING

APT-8 IS NOTIFIED OF PROGRAM RUN BETWEEN .2 SECONDS AND 2.0 SECONDS. THIS WILL ALLOW THE DIAGNOSTIC TO RUN UNDER THE MUCH SLOWER MOS MEMORY WITHOUT CAUSING APT-8 TO GIVE A TIMEOUT ERROR.

9.3.2 ERRORS

ONLY THE ERROR PC IS REPORTED TO APT-8. THE TYPE OF ERROR CAN BE DETERMINED FROM THE CORRESPONDING ADDRESS IN THE PROGRAM LISTING. THERE IS A POSSIBILITY THAT A TIMEOUT ERROR MAY OCCUR. THIS IS CAUSED BY THE ERROR "HUNG DEVICE". THE PROGRAM WILL HAVE TO BE RERUN IN DUMP MODE IF THIS SHOULD HAPPEN.

9.4 LOADING PRECAUTIONS

THIS PROGRAM SHOULD BE LOADED IN SCRIPT MODE INDICATING TO APT-8 THAT CORE SUMCHECKS ARE TO BE IGNORED.

9.5 MULTIPLE OPTION CONTROLLER

THE DIAGNOSTIC HAS BEEN PROVIDED WITH THE MEANS TO FUNCTION ON THE MULTIPLE OPTION CONTROLLER. TO ENABLE THIS FEATURE HARDWARE CONFIGURATION WORD 2 BIT 1 MUST BE SET TO A ONE. WITH THE MULTIPLE OPTION CONTROLLER ENABLED THE FOLLOWING PSEUDO-SWITCH REGISTER BITS ARE DEFINED:

SR0=0 LIGHT THE FAIL LAMP CORRESPONDING WITH FAILING DEVICE.

SR0=1 GO TO APT PROM ON ERROR

SR6=0 TEST 16 OPTIONS

SR6=1 TEST 8 OPTIONS

NOTE: IT SHOULD BE NOTED THAT ALL OPTIONS MUST BE SET TO DEVICE CODES 03 04. ALL OTHERS CAUSE ERRORS.

10.0 CONSOLE TERMINAL PACKAGE

10.1 ABSTRACT

A CONSOLE TERMINAL PACKAGE HAS BEEN PROVIDED TO ALLOW THIS DIAGNOSTIC TO RUN ON THE CL/8 SYSSTEM. THIS ALLOWS THE USER TO CONVERSE TO THE DIAGNOSTIC THROUGH A SOFTWARE CONTROLED SWITCH REGISTER.

10.2 INITIALIZATION

THE CONSOLE TERMINAL PACKAGE IS INITIALIZED BY MEANS OF ADDRESS 22. TO INDICATE THAT THE CONSOLE TERMINAL PACKAGE IS TO BE USED, BIT 3 MUST BE SET TO A ONE. AT THIS TIME ALL ERROR HALTS AND SWITCH REGISTER FUNCTIONS ARE PASSED TO THE CONSOLE PACKAGE.

10.3 CONTROL G

THIS IS THE CONTROL CHARACTER TO OPEN THE PSEUDO SWITCH REGISTER. WHEN CONTROL G IS TYPED THE PROGRAM IS INTERRUPTED AND SR=XXXX IS TYPED. XXXX IS THE PRESENT CONTENTS OF THE PSEUDO SWITCH REGISTER. THE OPERATOR CAN NOW CHANGE THE SETTING BY ENTERING A NEW SET OF NUMBERS, OR NOT CHANGE IT BY TYPING IN A TERMINATING CHARACTER. WHEN THE PROGRAM RECOGNIZES A CONTROL G IT WILL TYPE AN UP ARROW THEN A G TO SIGNAL THE OPERATOR IT IS RESPONDING TO A CONTROL G.

EXAMPLE:

```
TYPE CONTROL G
^G
SR=XXXX                    /PRESENT CONTENTS OF
                           /PSEUDO SWITCH REGISTER.
```

TERMINATING CHARACTERS ARE CARRIAGE RETURN OR LINE FEED. EACH WILL CAUSE A RETURN TO THE PROGRAM AT THE POINT AT WHICH IS WAS INTERRUPTED.

10.3 CONTROL S

THIS SPECIAL CHARACTER STOPS SENDING OUTPUT THE TO TERMINAL DEVICE. IT WILL WAIT FOR A CONTROL Q FOR RESUMPTION OF THE DIAGNOSTIC. THIS CONTROL CHARACTER IS NOT ECHOED.

10.4 CONTROL Q

THIS CHARACTER CAUSES RESUMPTION OF TERMINAL OUTPUT. IT IS USED IN CONJUNCTION WITH CONTROL S. THE CHARACTER IS NOT ECHOED.

10.5 CONTROL C

THIS CHARACTER IS USED TO RETURN BACK TO AN OPERATING SYSTEM KEYBOARD MONITOR. THE OPERATING SYSTEM SELECTED FOR THE PDP-8 IS THE OS/8 SYSTEM WITH ITS BOOTSTRAP IN LOCATION 07600. THE CONTROL CHARACTER IS ECHOED WHEN RECOGNIZED AND IS REPRESENTED BY AN UPARROW AND A C.

10.6 ERROR REPORTING.

ALL ERRORS ARE REPORTED TO THE TERMINAL. THE PC OF THE ERROR IS REPORTED AND THE SWITCH REGISTER CONTENTS INDICATED. TO CONTINUE FROM THIS POINT TYPE A C.RET. OR CHANGE THE SWITCH REGISTER ACCORDINGLY.

10.7 END OF PASS

END OF PASS WILL BE INDICATED BY THE FOLLOWING:

DIKLAC END OF PASS XXXX.

XXXX IS THE OCTAL NUMBER FOR THE PASS JUST COMPLETED.

11.0 LISTING

```
                /KL8-JA & KL8-KA/KB/KC/KD LOOP BACK TEST.
                /MAINDEC-08-DIKLA-C-L
                /
                /COPYRIGHT (C) 1973, 1976, 1977  DIGITAL EQUIPMENT CORPORATION,MAYNARD,MASS.,01754
                /
                /PROGRAMMER:    REV A ORIGINAL RELEASE - BRUCE HANSEN
                /               REV B KL8-K MODIFICATIONS - R. MOORE
                /               REV C APT-8 INTERFACES - DON RICE
                /
                /THE IOT'S ARE USED ON THE APT8A TEST SYSTEM
                /WHEN MULTIPLE DEVICES ARE TO BE TESTED.
                /
        6370    APTIO0=6370                     /LOAD THE SELECT COUNTER FROM AC BITS
                                                /8-11 AND CLEAR THE AC. THIS IS USED
                                                /TO INITIALIZE TO DEVICE ZERO
        6371    APTIO1=6371                     /INCREMENT THE SELECT COUNTER
        6372    APTIO2=6372                     /SET THE FAIL FLAG DESCRIBED BY THE
                                                /SELECT COUNTER
        6373    APTIO3=6373                     /CLEAR SELECT COUNTERS AND ALL FLAGS
        6374    APTIO4=6374                     /SKIP IF FAILURE FLAG DESCRIBED
                                                /BY THE SELECT COUNTER IS SET.
        6375    APTIO5=6375                     /READ SELECT COUNTERS INTO AC BITS 8-11
                /


                                                /RECEIVE IOTS FOR KL8-JA,KA,KB,KC & KD

        6007            CAF=6007                /CLEAR ALL FLAGS
        6030            KCF=6030                /CLEAR RECEIVE FLAG,DON'T SET READER RUN F/F
        6031            KSF=6031                /SKIP ON RECEIVE FLAG
        6032            KCC=6032                /CLEAR AC AND RECEIVE FLAG AND SET READER RUN
        6034            KRS=6034                /READ RECEIVE BUFFER AND STATUS
        6035            KIE=6035                /AC 11=1 SET INTERRUPT ENABLE
                                                /AC 11 = 0 CLEAR INTERRUPT ENABLE F/F
        6035            KSE=KIE                 /AC10=1 SET STATUS WORD ENABLE
                                                /AC10=0 CLEAR STATUS WORD ENABLE
        6036            KRB=6036                /CLEAR AC AND RECIEVE FLAG,SET READER RUN AND
                                                /READ RECEIVE BUFFER AND STATUS


                                                /TRANSMIT IOTS FOR KL8-JA,KA,KB,KC & KD

        6040            TFL=6040                /SET THE TRANSMIT FLAG
        6041            TSF=6041                /SKIP ON TRANSMIT FLAG
        6042            TCF=6042                /CLEAR THE TRANSMIT FLAG
        6044            TPC=6044                /LOAD TRANSMIT BUFFER AND TRANSMIT
        6045            SPI=6045                /SKIP IF TRANSMIT OR RECEIVE FLAG IS SET AND
                                                /INTERRUPT ENABLE FLIP/FLOP IS SET
        6046            TLS=6046                /LOAD TRANSMIT BUFFER,TRANSMIT AND CLEAR TRANSMIT FLAG
        7402            HALT=7402


                                                /SWITCH REGISTER SETTINGS

                                                /SR0=1          DON'T HALT ON ERROR
                                                /SR1=1          LOOP ON ERROR OR DATA PATTERN
```



```
                                                /SR2=1          LOOP ON TEST SEQUENCE
                                                /SR10=1         PROCESSOR NOT A PDP-8E
                                                /SR11=0         STARTING ADDRESS 200 ONLY-SETUP PROGRAM LIMITS
                                                /               BY WAY OF THE SWITCH REGISTER
                                                /SR11=1         STARTING ADDRESS 200 ONLY-SETUP PROGRAM LIMITS
                                                /               BY WAY OF THE TELETYPE(DEVICE CODES OF 03&04)

        7002    BSW=7002
```

```
                0000    *0
0000  0303              303                     /REVISION C
0001  5001              JMP     1
0002  0002              2
0003  0003              3

                0011    *11
0011  0000              A11,    0               /FORUSE ON APT=8
                0020    *20
                        /THE FOLLOWING 4 LOCATIONS ARE RESERVED FOR USE BY THE APT 8 TEST SYSTEM.
                        /
0020  0000              A20,    0
0021  0000              A21,    0
0022  0000              A22,    0
0023  0000              A23,    0
                        /
                0024    *24
                        /
0024  0000              SAVPNT, 0
0025  0002              K2,     2
0026  0115              K115,   115
0027  0117              K117,   117
0030  0033              K33,    33
0031  0037              K37,    37
0032  0077              C77,    77
0033  0177              C177,   177
0034  0377              K377,   377
0035  0304              DEVCOD, 0304
0036  0007              SAVBTS, 0007
0037  0004              BITNO,  0004
0040  0377              DATBIT, 0377
0041  0000              RAUDNO, 0000
0042  0000              XMTDAT, 0
0043  0000              XMTDT1, 0
0044  0000              ERRFLG, 0
0045  0000              RECDAT, 0
0046  0000              LOOPPC, 0
0047  0000              NDELAY, 0
0050  0000              CNT1,   0
0051  0000              CNT2,   0
0052  0000              TSTCNT, 0
0053  0000              SAV2,   0
0054  7000              M1000,  -1000
0055  0252              K0252,  0252
0056  0125              K0125,  0125
0057  0212              K212,   212
                                                /SUBROUTINE CALLS

                4460    LOAD=JMS I .
0060  2163              XLOAD
                4461    DELAY=JMS  I  .
0061  2620              XDELAY
```



```
                4462    STLPPC=JMS I .
0062  4032              XPCRET
                4463    LOOP=JMS I .
0063  4042              XSR2
                4464    EHLTLP=JMS I .
0064  2200              HLTLOP
                4465    SW10NE=JMS I .
0065  4050              NOT8E
                4466    TSFSKP=JMS I .
0066  2671              WATTSF
                4467    KSFSKP=JMS I .
0067  2707              WATKSF
                4470    LISN=JMS I .
0070  3314              XLISN
                4471    MESAGE=JMS I .
0071  3400              MESAGX
                4472    ONEOCT=JMS I .
0072  3201              ONEOCK
                4473    TWOOCT=JMS I .
0073  3211              TWOOCK
                4474    FOROCT=JMS I .
0074  3464              FOROCK
                4475    PRNT1=JMS I .
0075  3513              XPRNT1
                4476    PRNT2=JMS I .
0076  3224              XPRNT2
                4477    PRNT4=JMS I .
0077  3500              XPRNT4
                4500    SPACE2=JMS I .
0100  3306              SPACX2
                4501    TYPE=JMS I .
0101  3235              XTYPE
                4502    CRLF=JMS I .
0102  3244              XCRLF
                4503    MIOT=JMS I .
0103  3442              XMIOT
                4504    XOR=JMS I .
0104  3261              XORS
                4505    YESRNO=JMS I .
0105  3273              YESRNX
                4506    RANDOM=JMS I .
0106  3537              XRAND
                4507    SAVGEN=JMS I .
0107  3555              XSAVGN
                4510    RESGEN=JMS I .
0110  3564              XRESGN
                4511    BSWAP=JMS I .
0111  3522              XBSW
                4512    AERROR=JMS I .
0112  3664              XAERRO                  /APT ERROR REPORTER.
                4513    APT8=JMS I .
0113  3600              XAPT8                   /TEST FOR APT.
                4514    TICK=JMS I .
0114  4013              XTICK
                4515    CHEK22=JMS I    .
```

```
                4113            XCHK22
                4516    NERROR=JMS I .
                3737            XNERRO
                4517    LAS=JMS I .
                4063            XLAS
                4520    HLT=JMS I .
                4072            XHALT

                0000    CLKCNT, 0
                0000    COUNT,  0
                4000    K4000,  4000
                0000    TEMP,   0                       /TEMP STORAGE FOR APT=8
```



```
        0200    *200

0200    4513    BGNINT, APT8                    /TEST FOR APT OR
                                                /BEGIN INTERROGATION FOR SETUP
0201    5250    NOINTR, JMP START               /GO TO START OF TEST NO INTERROGATION REQUIRED
0202    5777'           JMP     BAUDTM          /BAUD RATE TIMING TEST(THE PROGRAM SHOULD HALT IN 30 SECONDS
0203    4517            LAS                     /LOOK AT SR11 FOR DESIRED TYPE OF INTERROGATION
0204    7012            RTR                     /PUT BIT 11 INTO AC0
0205    7710            SPA     CLA             /IF AC11=1 USE TELETYPE FOR INPUT ,OTHERWISE USE THE SR
0206    5776'           JMP     TYINTR          /GO TO TELETYPE FOR INTERROGATION
0207    4520            HLT                     /SET BITS 0-5 TO THE RECEIVE IOT AND BITS 6-11 TO TRANSMIT IOT
0210    4517            LAS                     /GET DEVICE CODE FROM SWITCH REGISTER
0211    3035            DCA     DEVCOD          /SAVE IT FOR IOT MODIFICATION
0212    4520            HLT                     /SET PARITY-STATUS-FILLER-BAUD RATE-STOP BITS-AND # OF DATA BITS IN SR
0213    4517            LAS                     /GET THE SR AND CALCULATE THE RESULTS
0214    3036            DCA     SAVBTS          /SAVE THEM
0215    1036    SETUP,  TAD     SAVBTS          /SETUP THE NUMBER OF DATA BITS
0216    0375            AND     (3
0217    3037            DCA     BITNO
0220    1374            TAD     (TAD K37
0221    1037            TAD     BITNO
0222    3223            DCA     .+1
0223    4520            HLT/TAD K37+(X)
0224    3040            DCA     DATBIT          /THIS NUMBER=37,77,177,377 FOR 5,6,7 OR 8 DATA BITS
0225    1036            TAD     SAVBTS          /SET UP LENGTH OF CHARACTER FROM # OF STOP BITS
0226    0373            AND     (4              /IF BIT 9=1 2 STOP BITS;IF 0 ONLY 1 STOP BIT
0227    7640            SZA CLA
0230    2037            ISZ     BITNO           /ADD 1 MORE TO CHARACTER LENGTH
0231    1036            TAD     SAVBTS          /DOES IT HAVE PARITY
0232    7710            SPA CLA
0233    2037            ISZ     BITNO           /YES BUMP THE CHARACTER LENGTH BY 1
0234    1036            TAD     SAVBTS          /SET UP FOR BAUD RATE
0235    7012            RTR
0236    7010            RAR
0237    0372            AND     (17
0240    3041            DCA     BAUDNO          /SAVE THE BAUD NUMBER POINTER
0241    1041            TAD     BAUDNO          /IS THE BAUD NUMBER WITHIN LIMITS
0242    1371            TAD     (-13
0243    7740            SMA SZA CLA
0244    5212            JMP     SETUP-3 /NO,BAUD NUMBER OUT OF BOUNDS GO BACK TO STATUS SETUP
0245    4515            CHEK22                  /TEST FOR ACTIVE CONSOLE.
0246    4770'           JMS     XC8PSW          /ASK SWITCH REGISTER QUESTION.
0247    4520            HLT                     /SET SR TO DESIRED SWITCH SETTINGS
0250    1035    START,  TAD     DEVCOD          /GET THE DEVICE CODE
0251    7012            RTR                     /PUT THE RECEIVE DEVICE CODE IN BITS 3-8
0252    7010            RAR                     /
0253    4503            MIOT                    /GO MODIFY THE IOTS
0254    5241            RECPNT                  /RECEIVE IOT TABLE POINTER
0255    1035            TAD     DEVCOD          /GET THE DEVICE CODES
0256    7006            RTL                     /PUT THE TRANSMIT DEVICE CODE IN BITS 3-8
0257    7004            RAL                     /
0260    4503            MIOT                    /GO MODIFY THEM
0261    5352            XMTIOT                  /POINTER TO TRANSMIT IOT TABLE
0262    1367            TAD     (JMP I 2        /SET UP INTERRUPT RETURN LOCATIONS
0263    3001            DCA     1
```

```
                0264  1366            TAD     (INTRET
                0265  3002            DCA     2
                0266  5271            JMP     CLRBRD          /GO START TEST
                
                0267  7240    INTRET, CLA     CMA
                0270  5400            JMP  I  0
                
                
                                                /INIALIZE THE MODULE WITH A CAF INSTRUCTION AND CHECK THAT THE
                                                /RECEIVE AND TRANSMIT FLAGS ARE NOT STUCK ON AND THAT KSF,TSF
                                                /AND SPI DONT SKIP AND THAT THE INTERRUPT REQUEST LINE
                                                /IS NOT PULLED LOW.
                
                0271  4460    CLRBRD, LOAD                    /LOAD TIMING VALUE FOR APT IF REQUIRED.
                0272  4462            STLPPC                  /SET LOOPING PC FOR TEST AND ERROR LOOPING
                0273  4465            SW10NE                  /CHECK SR10 TO SEE IF PROCESSOR A PDP-8E
                0274  0545            ACNSKP                  /PROCESSOR NOT A PDP-8E
                0275  6007            CAF                     /CLEAR THE BOARD-CHECK THE SKIP IOT'S NOT TO SKIP
                0276  6031    KSF0,   KSF                     /SKIP ON RECEIVE FLAG
                0277  7410            SKP
                0300  4464            EHLTLP                  /ERROR,RECEIVE FLAG SET OR KSF SKIPPED
                0301  6041    TSF0,   TSF                     /SKIP ON TRANSMIT FLAG
                0302  7410            SKP
                0303  4464            EHLTLP                  /ERROR,TRANSMIT FLAG SET OR TSF SKIPPED
                0304  6045    SPI0,   SPI                     /SKIP IF XMIT/RECEIVE FLAG SET WITH INT ENB.
                0305  7410            SKP
                0306  4464            EHLTLP                  /SPI SKIPPED OR XMIT/RECEIVE FLAG SET WITH INT ENB
                0307  6001            ION                     /CHECK THAT INT REQ IS NOT PULLED BY INT. ENB.
                0310  7000            NOP                     /AND TRANSMIT/RECEIVE FLAG BEING SET
                0311  6002            IOF
                0312  7710            SPA     CLA
                0313  4464            EHLTLP                  /INT REQ LINE PULLED LOW OR TRANSMIT/RECEIVE FLAG SET
                0314  4516            NERROR
                0315  0273            CLRBRD+2
                0316  4463            LOOP                    /LOOP IF SR2=1
                
                                                /CHECK THAT THE TRANSMIT FLAG CAN BE SET AND CLEARED BY TFL,TSF AND TCF
                
                0317  4462    SCXMIT, STLPPC                  /SET LOOPING PC FOR TEST AND ERROR LOOPING
                0320  6030    KCF0,   KCF                     /CLEAR RECEIVE FLAG FOR SCOPE LOOPING
                0321  7410            SKP                     /SAFETY SKIP IN CASE KCF SKIPPED
                0322  4464            EHLTLP                  /KCF SKIPPED
                0323  6040    TFL0,   TFL                     /SET THE TRANSMIT FLAG
                0324  7410            SKP                     /SAFETY SKIP TO CHECK TFL NOT TO SKIP
                0325  4464            EHLTLP                  /ERROR,TFL SKIPPED
                0326  6041    TSF1,   TSF                     /SKIP IF TRANSMIT FLAG=1
                0327  4464            EHLTLP                  /TRANSMIT FLAG NOT SET OR TFL FAILED
                0330  6042    TCF0,   TCF                     /CLEAR THE TRANSMIT FLAG
                0331  7410            SKP                     /SAFETY SKIP TO CHECK TCF NOT TO SKIP
                0332  4464            EHLTLP                  /ERROR, TCF SKIPPED
                0333  6041    TSF2,   TSF                     /SKIP ON TRANSMIT FLAG
                0334  7410            SKP
                0335  4464            EHLTLP                  /ERROR,TCF FAILED TO CLEAR TRANSMIT FLAG
                0336  6031    KSF1,   KSF                     /CHECK TO SEE IF RECEIVE FLAG GOT SET
                0337  7610            SKP     CLA
```



```
                0340  4464            EHLTLP                  /RECEIVE FLAG SET BY SETTING TRANSMIT FLAG
                0341  4516            NERROR
                0342  0320            SCXMIT+1
                0343  4463            LOOP                    /LOOP IF SR2=1
                
                                                /CHECK THAT TRANSMIT FLAG CAN BE CLEARED BY CAF
                
                0344  4462    CAFXMT, STLPPC                  /SET LOOPING PC FOR TEST AND ERROR LOOPING
                0345  6040    TFL1,   TFL                     /SET THE TRANSMIT FLAG
                0346  6041    TSF3,   TSF                     /SKIP ON TRANSMIT FLAG
                0347  4464            EHLTLP                  /ERROR,TRANSMIT FLAG FAILED TO SET
                0350  6007            CAF                     /CLEAR ALL FLAGS
                0351  6041    TSF4,   TSF                     /SKIP ON TRANSMIT FLAG
                0352  7410            SKP                     /OK FLAG NOT SET
                0353  4464            EHLTLP                  /ERROR,CAF FAILED TO CLEAR TRANSMIT FLAG
                0354  6031    KSF2,   KSF                     /CHECK TO SEE IF RECEIVE FLAG GOT SET
                0355  7610            SKP     CLA             /NO, IT DIDN'T
                0356  4464            EHLTLP                  /ERROR RECEIVE FLAG GOT SET
                0357  4516            NERROR
                0360  0345            CAFXMT+1
                0361  4463            LOOP                    /LOOP IF SR2=1
                0362  5765'           JMP     INTXMT
                                      /
                0365  0400
                0366  0267
                0367  5402
                0370  6703
                0371  7765
                0372  0017
                0373  0004
                0374  1031
                0375  0003
                0376  3000
                0377  2264
                      0400      PAGE
                                      /
                
                                                /USING THE TRANSMIT FLAG-CHECK THAT INTERRUPT ENABLE CAN BE SET
                                                /AND CLEARED AND THAT THE PROGRAM CAN INTERRUPT. INTERRUPT
                                                /ENABLE IS SET AND CLEARED BY DATA BIT 11 AND KIE COMMAND.
                
                0400  4462    INTXMT, STLPPC                  /SET LOOPING PC FOR TEST AND ERROR LOOPING
                0401  6030    KCF1,   KCF                     /CLEAR RECEIVE FLAG FOR SCOPE LOOPING
                0402  7300            CLA     CLL
                0403  6035    KIE0,   KIE                     /CLEAR INTERRUPT ENABLE
                0404  7410            SKP                     /SAFETY SKIP TO CHECK KIE NOT TO SKIP
                0405  4464            EHLTLP                  /ERROR, KIE SKIPPED
                0406  6040    TFL2,   TFL                     /SET THE TRANSMIT FLAG
                0407  6041    TSF5,   TSF                     /SKIP ON TRANSMIT FLAG
                0410  4464            EHLTLP                  /TRANSMIT FLAG FAILED TO SET
                0411  6045    SPI1,   SPI                     /SKIP IF INTERRUPT ENABLE AND XMIT FLAG SET.
                0412  7410            SKP                     /OK,INTERRUPT ENABLE NOT SET
                0413  4464            EHLTLP                  /ERROR,INT ENB. SET,FAILED TO BE CLEARED BY KIE
                0414  6001            ION                     /CHECK THAT INTERRUPT REQUEST IS NOT PULLED
                0415  7000            NOP                     /INTERRUPT HERE IF SET
```

```
                                /TURN THE INTERRUPT OFF
                        SPA     CLA
                                /PROGRAM INTERRUPTED-CHECK INT. ENB.
                        IAC
KIE1,   KIE                     /SET INT. ENB. WITH DATA BIT 11 AND KIE
                        SKP     CLA
                                /ERROR, KIE SKIPPED
                        TSF     /SKIP ON TRANSMIT FLAG
                                /ERROR,TRANSMIT FLAG GOT CLEARED
SPI2,   SPI                     /SKIP ON INT ENB AND TRANSMIT FLAG
                                /SPI FAILED TO SKIP OR INT ENB NOT SET
                        ION     /CHECK THAT INTERRUPT REQUEST IS PULLED
                        NOP     /SHOULD INTERRUPT HERE
                        IOF     /TURN IT OFF
                        SMA     CLA     /DID IT INTERRUPT?
                                /FAILED TO INTERRUPT-CHECK XMIT AND INT ENB
TCF1,   TCF                     /CLEAR THE TRANSMIT FLAG
TSF7,   TSF                     /CHECK TO SEE IF IT CLEARED
                        SKP
                                /IT FAILED TO CLEAR
SPI3,   SPI                     /SKIP ON INT ENB AND TRANSMIT FLAG
                        SKP
                                /TRANSMIT FLAG IS GONE IT SHOULDN'T SKIP
                        ION     /CHECK THAT IT DOESN'T INTERRUPT
                        NOP     /
                        IOF     /
                        SPA     CLA
                                /PROGRAM INTERRUPTED WITHOUT TRANSMIT FLAG
TFL3,   TFL                     /SET THE FLAG AGAIN
TSF8,   TSF                     /SKIP ON THE TRANSMIT FLAG
                                /FLAG FAILED TO SET
SPI4,   SPI                     /SKIP ON XMIT AND INT. ENB.
                                /FAILED TO SKIP ON INT ENB AND XMIT FLAG
KIE2,   KIE                     /CLEAR INTERRUPT ENABLE WITH KIE AND DATA BIT 11
SPI5,   SPI                     /SKIP IF INT ENB=1 WITH XMIT FLAG
                        SKP
                                /KIE FAILED TO CLEAR INTERRUPT ENABLE
                        ION     /CHECK THAT THE PROGRAM DOESN'T INTERRUPT
                        NOP
                        IOF
                        SPA     CLA
                                /PROGRAM INTERRUPTED WITHOUT INT ENB
TCF2,   TCF                     /CLEAR TRANSMIT FLAG
KSF3,   KSF                     /CHECK TO SEE IF RECEIVE FAG GOT SET
                        SKP     CLA
                                /RECEIVE FLAG SET BY ABOVE CODE
                        NERROR
                        INTXMT+1
                        LOOP    /LOOP ON TEST IF SR2=1
                        JMP     .CAFINT


                                /CHECK THAT CAF WILL SET INTERRUPT ENABLE USING THE TRANSMIT
                                /FLAG TO SKIP AND INTERRUPT ON.
```



```

CAFINT, STLPPC                  /SET THE LOOPING PC FOR TEST AND ERROR LOOPING.
KCF2,   KCF                     /CLEAR RECEIVE FLAG
KIE3,   KIE                     /CLEAR INTERRUPT ENABLE
TFL4,   TFL                     /SET THE TRANSMIT FLAG
TSF9,   TSF                     /SKIP ON THE TRANSMIT FLAG
                                /FLAG FAILED TO SET
SPI6,   SPI                     /SKIP ON TRANSMIT FLAG AND INT ENB.
                        SKP
                                /SPI SKIPPED OR INT ENB IS SET
                        CAF     /CLEAR TRANSMIT FLAG AND SET INT ENB.
TSF10,  TSF                     /SKIP IF TRANSMIT FLAG = 1
                        SKP
                                /CAF FAILED TO CLEAR XMIT FLAG
SPI7,   SPI                     /SKIP ON TRANSMIT FLAG AND INT ENB.
                        SKP
                                /SPI SKIPPED WITHOUT TRANSMIT FLAG
TFL5,   TFL                     /SET THE TRANSMIT FLAG
TSF11,  TSF                     /SKIP IF XMIT FLAG IS SET
                                /TRANSMIT FLAG FAILED TO SET
SPI8,   SPI                     /SKIP ON INTERRUPT ENABLE AND TRANSMIT FLAG
                                /CAF FAILED TO SET INTERRUPT ENABLE
                        ION     /CHECK THAT THE PROGRAM WILL INTERRUPT
                        NOP     /GO AND INTERRUPT
                        IOF     /TURN THE INTERRUPT OFF IF IT DIDN'T
                        SMA     CLA
                                /PROGRAM FAILED TO INTERRUPT WITH XMIT AND INT ENB
TCF3,   TCF                     /CLEAR THE TRANSMIT FLAG
TSF12,  TSF                     /SKIP IF TRANSMIT FLAG IS SET
                        SKP     CLA     /IS FLAG SET
                                /FLAG FAILED TO CLEAR
KIE4,   KIE                     /CLEAR INTERRUPT ENABLE
KSF4,   KSF                     /CHECK TO SEE IF RECEIVE FLAG IS SET
                        SKP     CLA
                                /RECEIVE FLAG GOT SET DURING TEST
                        NERROR
                        CAFINT+1
                        LOOP    /LOOP ON TEST IF SR2=1

                                /THE FOLLOWING TEST CHECKS THE EFFECT OF THE IOT ON THE AC
                                /AND ALSO CHECKS THAT THE IOTS DON'T SKIP. TPC AND TLS ARE NOT TESTED.

ACNSKP, STLPPC                  /SET THE LOOPING PC FOR TEST AND ERROR LOOPING
                        SW10NE  /CHECK TO SEE IF PROCESSOR A PDP8E
                        KSF5-1  /NOT A PDP-8E GO TO NEXT SUBTEST
                        CLA     CMA     /SET AC TO ALL ONE'S
KCF3,   KCF                     /CLEAR THE RECEIVE FLAG
                        SKP
                        JMS     HLTLP1  /ERROR,KCF SKIPPED
                        CMA     /SET THE AC BACK TO ZEROES
                        SZA
                        JMS     HLTLP2  /ERROR,KCF CHANGED THE AC
                        CLA     CMA     /SET THE AC BACK TO 1'S
                        JMP     KSF5
                /
```

```
                        /
0575  0600
0576  2241
0577  2217
      0600    PAGE
                        /
0600  6031    KSF5,   KSF                     /SKIP ON RECEIVE FLAG
0601  7410            SKP
0602  4777'           JMS     HLTLP1          /ERROR,RECEIVE FLAG SHOULD NOT BE SET
0603  7040            CMA                     /SET THE AC BACK TO ZEROES
0604  7440            SZA
0605  4776'           JMS     HLTLP2          /ERROR,KSF CHANGED THE AC
0606  7240            CLA     CMA             /SET THE AC TO ALL 1'S
0607  6032    KCC0,   KCC                     /CLEAR AC AND RECEIVE FLAG AND SET READER RUN
0610  7410            SKP
0611  4777'           JMS     HLTLP1          /ERROR, KCC SKIPPED
0612  7440            SZA
0613  4776'           JMS     HLTLP2          /ERROR,KCC FAILED TO CLEAR AC
0614  1375            TAD     (-4             /SET AC TO ALL 1'S EXCEPT BITS 10 AND 11
0615  6035    KIE5,   KIE                     /CLEAR INTERRUPT AND STATUS ENABLE
0616  7410            SKP
0617  4777'           JMS     HLTLP1          /ERROR, KIE SKIPPED
0620  1374            TAD     (3              /ADD 3 TO AC AND THEN COMPLEMENT IT
0621  7040            CMA
0622  7440            SZA
0623  4776'           JMS     HLTLP2          /ERROR, KIE CHANGED THE AC
0624  7240            CLA     CMA             /SET THE AC = TO ALL 1'S
0625  6034    KRS0,   KRS                     /READ RECEIVE BUFFER STATIC AND STATUS
0626  7410            SKP
0627  4777'           JMS     HLTLP1          /ERROR, KRS SKIPPED
0630  7040            CMA                     /SET THE AC BACK TO ZEROES
0631  7440            SZA
0632  4776'           JMS     HLTLP2          /ERROR,KRS CHANGED THE AC
0633  1177            TAD     [7400           /SET AC BITS 0-3
0634  6036    KRB0,   KRB                     /CLEAR AC AND RECEIVE FLAG AND READ RECEIVE BUF
0635  7410            SKP
0636  4777'           JMS     HLTLP1          /ERROR, KRB SKIPPED
0637  0177            AND     [7400
0640  7440            SZA
0641  4776'           JMS     HLTLP2          /KRB FAILED TO CLEAR THE AC
0642  4465            SW10NE                  /CHECK TO SEE IF PDP-8E
0643  0653            TCF4+1                  /PROCESSOR NOT A PDP-8E GO DO NEXT SUBTEST
0644  7240            CLA     CMA             /SET AC EQUAL TO ALL ONES
0645  6040    TFL6,   TFL                     /SET THE TRANSMIT FLAG
0646  7410            SKP
0647  4777'           JMS     HLTLP1          /ERROR, TFL SKIPPED
0650  7040            CMA                     /SET THE AC BACK TO 0
0651  7440            SZA
0652  4776'           JMS     HLTLP2          /TFL CHANGED THE AC
0653  7240            CLA     CMA             /SET THE AC TO 1'S
0654  6042    TCF4,   TCF                     /CLEAR THE TRANSMIT FLAG
0655  7410            SKP
0656  4777'           JMS     HLTLP1          /EPROR,TCF SKIPPED
0657  7040            CMA                     /SET THE AC BACK TO 0
0660  7440            SZA
```



```
0661  4776'           JMS     HLTLP2          /TCF CHANGED THE AC
0662  7240            CLA     CMA             /SET THE AC TO ALL 1'S
0663  6041    TSF13,  TSF                     /SKIP ON TRANSIMIT FLAG
0664  7410            SKP
0665  4777'           JMS     HLTLP1          /TRANSMIT FLAG IS SET
0666  7040            CMA                     /SET THE AC BACK TO 0
0667  7440            SZA
0670  4776'           JMS     HLTLP2          /ERROR,TSF CHANGED THE AC
0671  7240            CLA     CMA             /SET THE AC TO ALL 1'S
0672  6045    SPI9,   SPI                     /SKIP IF XMT/REC + INT ENB =1
0673  7410            SKP
0674  4777'           JMS     HLTLP1          /ERROR,SPI SKIPPED OR XMT/REC AND INT ENB =1
0675  7040            CMA                     /SET THE AC BACK TO ZERO
0676  7440            SZA
0677  4776'           JMS     HLTLP2          /ERROR,SPI CHANGED THE AC
0700  4516            NERROR
0701  0546            ACNSKP+1
0702  4463            LOOP                    /LOOP ON TEST IF SR2=1
```

```
                                        /START OF LOOP BACK TEST
                                        /CHECK THAT THE TRANSMIT FLAG CAN BE SET BY TPC AND THAT DATA
                                        /AVAILIBLE WILL SET THE RECEIVE FLAG.  CHECK THAT THE FLAGS CAN
                                        /BE CLEARED BY TCF AND KCC.  CHECK THAT THE FLAGS CAN CAUSE AN
                                        /INTERRUPT BY MANIPULATING INTERRUPT ENABLE.

0703  4462  STFLGS, STLPPC               /STORE LOOPING PC FOR TEST AND SCOPE LOOPING
0704  1176        TAD     (-3720        /SET UP A DELAY OF 200MS TO ALLOW FLAGS TO SETTLE
0705  3047        DCA     NDELAY
0706  4461        DELAY                 /WAIT FOR 200MS
0707  6035  KIE6,  KIE                  /CLEAR INTERRUPT ENABLE
0710  7610        SKP     CLA           /SAFETY SKIP TO CHECK KIE NOT TO SKIP
0711  4464        EHLTLP                /ERROR,KIE SKIPPED
0712  6032  KCC1,  KCC                  /CLEAR AC AND RECEIVE FLAG AND SET READER RUN
0713  7610        SKP     CLA           /SAFETY SKIP TO CHECK KCC NOT TO SKIP
0714  4464        EHLTLP                /ERROR,KCC SKIPPED
0715  6042  TCF5,  TCF                  /CLEAR TRANSMIT FLAG
0716  7610        SKP     CLA           /SAFETY SKIP TO CHECK TCF NOT TO SKIP
0717  4464        EHLTLP                /ERROR,TCF SKIPPED
0720  6031  KSF6,  KSF                  /CHECK THE RECEIVE FLAG TO BE ZERO
0721  7610        SKP     CLA
0722  4464        EHLTLP                /ERROR,RECEIVE FLAG =1 OR KSF SKIPPED
0723  6041  TSF14, TSF                  /SKIP IF TRANSMIT FLAG =1
0724  7610        SKP     CLA
0725  4464        EHLTLP                /ERROR,TRANSMIT FLAG=1 OR TSF SKIPPED
0726  6044  TPC0,  TPC                  /LOAD TRANSMIT BUFFER AND TRANSMIT
0727  7610        SKP     CLA           /SAFETY SKIP TO CHECK TPC NOT TO SKIP
0730  4464        EHLTLP                /ERROR,TPC SKIPPED
0731  4466        TSFSKP                /WAIT FOR A SECOND FOR TRANSMIT FLAG TO SET
0732  4464        EHLTLP                /ERROR,TPC FAILED TO SET XMIT FLAG OR TSF FAILED
0733  6031  KSF7,  KSF                  /CHECK THE RECEIVE FLAG TO STILL BE A 0
0734  7610        SKP     CLA
0735  4464        EHLTLP                /RECEIVE FLAG GOT SET TO SOON
0736  6045  SPI10, SPI                  /SKIP IF XMIT/RECEIVE FLAG=1 AND INT ENB SET
0737  7610        SKP     CLA
0740  4464        EHLTLP                /ERROR,SPI SKIPPED OR INTERRUPT ENABLE SET
0741  6001        ION                   /CHECK THE PROGRAM NOT TO INTERRUPT
0742  7000        NOP
0743  6002        IOF
0744  7710        SPA     CLA
0745  4464        EHLTLP                /ERROR,INT ENB SET OR INT REQ PULLED LOW
0746  7301        CLA CLL IAC           /SET INTERRUPT ENABLE TO A 1
0747  6035  KIE7,  KIE                  /AC11=1 AND KIE SET INTERRUPT ENABLE
0750  6045  SPI11, SPI                  /SKIP IF XMIT/RECEIVE FLAG=1 WITH INT ENABLE
0751  4464        EHLTLP                /INTERRUPT ENABLE FAILED TO SET OR KIE FAILED
0752  6001        ION                   /CHECK THE PROGRAM TO INTERRUPT
0753  7000        NOP                   /IT SHOULD INTERRUPT HERE
0754  6002        IOF                   /TURN IT OFF
0755  7700        SMA     CLA
0756  4464        EHLTLP                /ERROR PROGRAM FAILED TO INTERRUPT WITH XMIT AND INT ENABLE
0757  6035  KIE8,  KIE                  /SET INT ENB=0 WITH AC11=0 AND KIE COMMAND
0760  6045  SPI12, SPI                  /CHECK THAT INT ENB CLEARED BY KIE
0761  7610        SKP     CLA
0762  4464        EHLTLP                /ERROR,INT ENB FAILED TO CLEAR OR SPI SKIPPED
```



```
0763  6001        ION                   /CHECK THE PROGRAM NOT TO INTERRUPT
0764  7000        NOP
0765  6002        IOF
0766  7710        SPA     CLA
0767  4464        EHLTLP                /ERROR PROGRAM INTERRUPTED WITHOUT INT ENABLE
0770  5773'       JMP     TSF16
                  /
0773  1000
0774  0003
0775  7774
0776  2241
0777  2217
      1000  PAGE
            /
1000  6041  TSF16, TSF                  /CHECK THE TRANSMIT FLAG TO STILL = 1
1001  4464        EHLTLP                /SOMETHING CLEARED THE TRANSMIT FLAG
1002  6042  TCF6,  TCF                  /CLEAR THE TRANSMIT FLAG
1003  6041  TSF17, TSF                  /SKIP IF TRANSMIT FLAG =1
1004  7610        SKP     CLA
1005  4464        EHLTLP                /ERROR,TCF FAILED TO CLEAR XMIT FLAG
1006  4467        KSFSKP                /WAIT FOR ABOUT A SECOND FOR RECEIVE FLAG TO SET
1007  4464        EHLTLP                /ERROR,RECEIVE FLAG=0 OR DATA AVAILABLE FAILED TO SET RECEIVE FLAG
1010  6034  KRS1,  KRS                  /CHECK THAT KRS DOESN'T CLEAR RECEIVE FLAG
1011  7610        SKP     CLA           /SAFETY SKIP TO CHECK KRS NOT TO SKIP
1012  4464        EHLTLP                /ERROR,KRS SKIPPED
1013  6031  KSF9,  KSF                  /SKIP ON RECEIVE FLAG
1014  4464        EHLTLP                /KRS CLEARED RECEIVE FLAG
1015  6045  SPI13, SPI                  /SKIP IF XMIT/RECEIVE FLAG AND INT ENABLE=1
1016  7610        SKP     CLA
1017  4464        EHLTLP                /ERROR SPI SKIPPED OR INT ENABLE=1
1020  6001        ION                   /CHECK THE PROGRAM NOT TO INTERRUPT
1021  7000        NOP
1022  6002        IOF
1023  7710        SPA     CLA
1024  4464        EHLTLP                /PROGRAM INTERRUPT WITHOUT INTERRUPT ENABLE
1025  7301        CLA CLL IAC           /SET INT ENB F/F=1
1026  6035  KIE9,  KIE
1027  6045  SPI14, SPI                  /SKIP IF RECEIVE AND INT ENB=1
1030  4464        EHLTLP                /ERROR,SPI FAILED OR RECEIVE/INT ENB NOT= TO A 1
1031  6001        ION                   /CHECK THE PROGRAM TO INTERRUPT
1032  7000        NOP
1033  6002        IOF
1034  7700        SMA     CLA
1035  4464        EHLTLP                /ERROR,FAILED TO INTERRUPT WITH INT ENB AND RECEIVE FLAG = A 1
1036  6032  KCC2,  KCC                  /CLEAR AC AND RECEIVE FLAG AND SET READER RUN
1037  6031  KSF10, KSF                  /SKIP IF RECEIVE FLAG =1
1040  7610        SKP     CLA
1041  4464        EHLTLP                /ERROR,KCC FAILED TO CLEAR RECEIVE FLAG
1042  6045  SPI15, SPI                  /SKIP IF INT ENB AND RECEIVE FLAG =1
1043  7610        SKP     CLA
1044  4464        EHLTLP                /ERROR,SPI SKIPPED WITHOUT RECEIVE FLAG = 1
1045  6001        ION                   /CHECK THE PROGRAM NOT TO INTERRUPT
1046  7000        NOP
1047  6002        IOF
1050  7710        SPA     CLA
```

```
                    EHLTLP                  /INTERRUPTED WITHOUT RECEIVE FLAG SET
                KIE10, KIE                  /CLEAR INTERRUPT ENABLE
                    CLA     CLL
                    NERROR
                    STFLGS+4
                    LOOP                    /LOOP ON TEST IF SR2=1
                /
                                            /THE FOLLOWING TEST CHECKS THAT A TPC COMMAND WILL SET THE
                                            /TRANSMIT FLAG AND THAT A TLS WILL CLEAR THE FLAG AND THEN RESET
                                            /IT. CHECK THAT THE RECEIVE FLAG WILL GET SET FROM A TPC AND TLS
                                            /COMMAND AND THAT IT CAN BE CLEARED BY A KRB AND KCC OR KCF COMMAND

                XMTREC, STLPPC              /STORE LOOPING PC FOR TEST AND ERROR LOOPING
                    TAD     [-3720          /DELAY 200MS FOR SCOPE LOOPING TO LET
                    DCA     NDELAY          /FLAGS SETTLE
                    DELAY                   /GO DELAY 200MS
                KCC3, KCC                   /CLEAR AC AND RECEIVE FLAG
                TCF7, TCF                   /CLEAR THE TRANSMIT FLAG
                KSF11, KSF                  /CHECK THE RECEIVE FLAG TO BE 0
                    SKP     CLA
                    EHLTLP                  /RECEIVE FLAG STILL = 1 AFTER A KCC COMMAND
                TSF18, TSF                  /SKIP IF TRANSMIT FLAG = 1
                    SKP     CLA
                    EHLTLP                  /TRANSMIT FLAG STILL A 1 AFTER A TCF COMMAND
                TPC1, TPC                   /LOAD TRANSMIT BUFFER AND TRANSMIT
                    CLA
                    TSFSKP                  /WAIT FOR THE FLAG TO SET
                    EHLTLP                  /ERROR XMIT FLAG FAILED TO SET BY TPC
                KSF12, KSF                  /CHECK THE RECEIVE FLAG TO STILL BE 0
                    SKP     CLA
                    EHLTLP                  /RECEIVE FLAG SET TO SOON
                TLS0, TLS                   /LOAD TRANSMIT BUFFER AND TRANSMIT AND CLEAR FLAG
                    CLA
                    SKP     CLA             /SAFETY SKIP TO CHECK TLS NOT TO SKIP
                    EHLTLP                  /ERROR, TLS SKIPPED
                TSF20, TSF                  /SKIP IF TRANSMIT FLAG = 1
                    SKP     CLA
                    EHLTLP                  /ERROR,TLS FAILED TO CLEAR TRANSMIT FLAG
                    KSFSKP                  /WAIT FOR RECEIVE FLAG TO SET FROM FIRST XMIT
                    EHLTLP                  /EPROR,REC FLAG FAILED TO SET FROM FIRST XMIT
                KRB1, KRB                   /CLEAR AC AND RECEIVE FLAG AND READ RECEIVE BUFF
                    SKP     CLA             /SAFETY SKIP TO CHECK KRB NOT TO SKIP
                    EHLTLP                  /ERROR, KRB SKIPPED
                KSF14, KSF                  /SKIP ON RECEIVE FLAG
                    SKP     CLA
                    EHLTLP                  /ERROR,KRB FAILED TO CLEAR RECEIVE FLAG
                    TSFSKP                  /WAIT FOR TRANSMIT FLAG TO SET FROM 2ND XMIT
                    EHLTLP                  /TRANSMIT FLAG FAILED TO SET FROM TLS COMMAND
                TCF8, TCF                   /CLEAR THE TRANSMIT FLAG
                TSF22, TSF                  /SKIP IF TRANSMIT FLAG SET
                    SKP     CLA
                    EHLTLP                  /ERROR, TCF FAILED TO CLEAR FLAG
                    KSFSKP                  /WAIT FOR RECEIVE FLAG TO SET FROM TLS COMMAND
                    EHLTLP                  /ERROR,RECEIVE FLAG FAILED TO SET FROM 2ND TRANSMIT
                    LAS                     /CHECK TO SEE IF PDP-8E
```



```
                    RAR
                    RTR
                    SMA     CLA
                    JMP     .+6             /PDP8F
                KCC4, KCC                   /CLEAR THE AC AND RECEIVE FLAG
                KSF16, KSF                  /SKIP IF RECEIVE FLAG = 1
                    SKP     CLA
                    EHLTLP                  /ERROR, KCC FAILED TO CLEAR RECEIVE FLAG
                    JMP     .+5
                KCF4, KCF                   /CLEAR THE RECEIVE FLAG
                KSF17, KSF                  /SKIP IF RECEIVE FLAG SET
                    SKP     CLA
                    EHLTLP                  /ERROR, KCF FAILED TO CLEAR FLAG
                    NERROR
                    XMTREC+4
                    LOOP                    /LOOP IF SR2=1
                /
                                            /START OF DATA TEST-TRANSMIT 1 WORD AND THEN WAIT FOR THE
                                            /RECEIVE FLAG TO SET

                                            /DATA TEST 1 - TRANSMIT A ROTATING BIT AND CHECK THAT IT CAME BACK

                SDTST1, STLPPC              /STORE LOOPING PC FOR TEST LOOPING
                    DCA     XMTDAT
                    LOAD                    /LOAD TIMING FOR APT IF REQUIRED.
                    CLL CML                 /SET LINK
                    TAD     XMTDAT
                    RAL                     /AND SHIFT LEFT ONE
                    DCA     XMTDAT          /SET TRANSMIT WORD
                    JMS     SLWDAT          /GO TRANSMIT AND RECEIVE 1 WORD
                    NERROR
                    .-5
                    LOOP                    /LOOP IF SR2=1
                    JMP I   .+1
                    SDTST2

                /
                    PAGE
                /
                                            /DATA TEST 2 - TRANSMIT ALL ONES AND CHECK THAT 1'S COME BACK

                SDTST2, STLPPC              /STORE LOOPING PC FOR TEST LOOPING
                    CLA     CMA
                    AND     DATBIT          /MASK OUT FOR THE NUMBER OF DATA BITS
                    DCA     XMTDAT          /SAVE THE WORD FOR TRANSMITTING
                    JMS     SLWDAT          /GO TRANSMIT AND RECEIVE ONE WORD
                    NERROR
                    .-2
                    LOOP                    /LOOP ON TEST IF SR2=1

                                            /DATA TEST 3 - TRANSMIT ONES AND ZEROES

                SDTST3, STLPPC              /STORE LOOPING PC FOR TEST LOOPING
                    DCA     XMTDAT          /SAVE WORD
```

```
  756  1212  7120          CLL CML                 /SET LINK
  757  1213  1042          TAD     XMTDAT
  758  1214  7004          RAL                     /AND SHIFT LEFT
  759  1215  3042          DCA     XMTDAT          /SET TRANSMIT WORD
  760  1216  4333          JMS     SLWDAT          /GO TRANSMIT AND RECEIVE ONE WORD
  761  1217  1042          TAD     XMTDAT          /COMPLEMENT DATA WORD
  762  1220  7040          CMA
  763  1221  0040          AND     DATBIT
  764  1222  3042          DCA     XMTDAT          /SET TRANSMIT WORD
  765  1223  4333          JMS     SLWDAT          /GO TRANSMIT AND CHECK IT
  766  1224  1042          TAD     XMTDAT
  767  1225  7040          CMA
  768  1226  0040          AND     DATBIT
  769  1227  3042          DCA     XMTDAT
  770  1230  4516          NERROR
  771  1231  1213          SDTST3+3
  772  1232  4463          LOOP                    /LOOP ON TEST IF SR 2=1
  773
  774                                             /DATA TEST 4 - TRANSMIT AND RECEIVE A BINARY COUNT PATTERN
  775
  776  1233  4462  SDTST4, STLPPC                 /STORE LOOPING PC FOR TEST LOOPING
  777  1234  4460          LOAD
  778  1235  1040          TAD     DATBIT          /SET UP WORD COUNTER FROM THE # OF DATA BITS
  779  1236  7040          CMA
  780  1237  3052          DCA     TSTCNT          /SAVE IT
  781  1240  3042          DCA     XMTDAT          /CLEAR THE TRANSMIT WORD
  782  1241  4333          JMS     SLWDAT          /GO TRANSMIT AND RECEIVE ONE WORD
  783  1242  2042          ISZ     XMTDAT          /INCREMENT THE TRANSMIT WORD
  784  1243  1042          TAD     XMTDAT
  785  1244  4575          JMS I   (FILCHK         /GO CHECK FILLER CHAR FOR LF IF SELECTED
  786  1245  5242          JMP     .-3             /FIL IS SELECTED AND ITS A LF GO GET NEW WORD
  787  1246  4516          NERROR
  788  1247  1241          .-6                     /NO GO DO NEXT WORD
  789  1250  4463          LOOP                    /LOOP ON TEST IF SR2=1
  790
  791                                             /DATA TEST 5 - TRANSMIT A COMPLEMENTING BINARY COUNT PATTERN
  792
  793  1251  4462  SDTST5, STLPPC                 /STORE LOOPING PC FOR TEST LOOPING
  794  1252  4460          LOAD                    /TIMING VALUE FOR APT,
  795  1253  1040          TAD     DATBIT          /SET UP WC FROM NUMBER OF DATA BITS
  796  1254  7040          CMA
  797  1255  3052          DCA     TSTCNT          /SAVE IT
  798  1256  3042          DCA     XMTDAT          /CLEAR THE TRANSMIT WORD
  799  1257  4333          JMS     SLWDAT          /GO TRANSMIT AND RECEIVE ONE WORD
  800  1260  1042          TAD     XMTDAT          /SET THE TRANSMIT WORD TO ITS COMPLEMENT
  801  1261  7040          CMA
  802  1262  0040          AND     DATBIT
  803  1263  3042          DCA     XMTDAT          /SAVE THE NEW WORD
  804  1264  1042          TAD     XMTDAT
  805  1265  4575          JMS I   (FILCHK
  806  1266  7410          SKP
  807  1267  4333          JMS     SLWDAT          /GO TRANSMIT AND RECEIVE ONE WORD
  808  1270  1042          TAD     XMTDAT          /RESET THE WORD BACK AND ADD ONE
  809  1271  7041          CIA
  810  1272  0040          AND     DATBIT
```



```
  811  1273  3042          DCA     XMTDAT
  812  1274  1042          TAD     XMTDAT
  813  1275  4575          JMS I   (FILCHK
  814  1276  5257          JMP     SDTST5+6
  815  1277  4516          NERROR
  816  1300  1256          SDTST5+5
  817  1301  4463          LOOP                    /LOOP ON TEST IF SR2=1
  818
  819                                             /DATA TEST 6 - TRANSMIT A COMPLEMENTING ONE'S AND ZEROES PATTERN
  820
  821  1302  4462  SDTST6, STLPPC                 /STORE THE LOOPING PC FOR TEST LOOPING
  822  1303  1055          TAD     K0252
  823  1304  0040          AND     DATBIT          /MASK OUT FOR NUMBER OF BITS
  824  1305  3042          DCA     XMTDAT          /SAVE IT
  825  1306  4333          JMS     SLWDAT          /GO TRANSMIT AND CHECK THE WORD
  826  1307  1056          TAD     K0125           /GET THE COMPLEMENTING WORD
  827  1310  0040          AND     DATBIT          /MASK OUT FOR NUMBER OF BITS
  828  1311  3042          DCA     XMTDAT          /SAVE IT
  829  1312  4333          JMS     SLWDAT          /GO TRANSMIT AND CHECK IT
  830  1313  4516          NERROR
  831  1314  1303          SDTST6+1                /DO AGAIN
  832  1315  4463          LOOP                    /LOOP ON TEST IF SR2=1
  833
  834                                             /DATA TEST 7 - RANDOM DATA TEST
  835
  836  1316  4462  SDTST7, STLPPC                 /STORE LOOPING PC FOR TEST LOOPING
  837  1317  4460          LOAD                    /TIMING &OR APT
  838  1320  1054          TAD     M1000
  839  1321  3052          DCA     TSTCNT
  840  1322  4506          RANDOM
  841  1323  1042          TAD     XMTDAT
  842  1324  4575          JMS I   (FILCHK         /CHECK FOR FILLER CHARACTERS
  843  1325  5320          JMP     .-5
  844  1326  4333          JMS     SLWDAT          /GO TRANSMIT THE RANDOM NUMBER AND CHECK IT
  845  1327  4516          NERROR
  846  1330  1322          .-6
  847  1331  4463          LOOP                    /LOOP ON TEST IF SR2=1
  848  1332  5574          JMP I   (FDATAT
  849
  850                                             /SLOW DATA TEST ROUTINE
  851
  852  1333  0000  SLWDAT, 0
  853  1334  7326          CLA CLL CML RTL         /SET STATUS WORD ENABLE
  854  1335  6035  KSE0,   KSE
  855  1336  7200          CLA
  856  1337  1042          TAD     XMTDAT          /GET WORD TO BE TRANSMITTED
  857  1340  6046  SLWTLS, TLS                     /LOAD AND TRANSMIT AND CLEAR
  858  1341  6031  KSF24,  KSF                     /SKIP IF THE RECEIVE FLAG=1
  859  1342  7410          SKP
  860  1343  5350          JMP     SLWREC          /GO GET THE RECEIVE WORD
  861  1344  6041  TSF32,  TSF                     /SKIP IF TRANSMIT FLAG SET
  862  1345  5341          JMP     .-4
  863  1346  6042  TCF14,  TCF                     /CLEAR THE TRANSMIT FLAG
  864  1347  5341          JMP     SLWTLS+1        /GO WAIT FOR THE RECEIVE FLAG
  865
```

```
 866   1350  7240   SLWREC, CLA     CMA
 867   1351  6036   KRB11,  KRB                     /READ RECEIVE BUFFER AND CLEAR RECEIVE FLAG
 868   1352  3045           DCA     RECDAT          /SAVE THE WORD RECEIVED
 869   1353  1045           TAD     RECDAT          /COMPARE THE WORD WITH THE WORD TRANSMITTED
 870   1354  7041           CIA
 871   1355  1042           TAD     XMTDAT
 872   1356  7650           SNA     CLA
 873   1357  5372           JMP     SLOLAS          /GO GET THE NEXT WORD
 874   1360  4512           AERROR                  /TEST FOR APT ERROR CONDITION
 875   1361  5372           JMP     SLOLAS          /ACTIVE CONSOLE
 876   1362  4517           LAS
 877   1363  7700           SMA CLA                 /HALT ON ERROR SWITCH SET?
 878   1364  5372           JMP     SLOLAS          /NO, GO TEST FOR LOOP CONDITION
 879   1365  1042           TAD     XMTDAT
 880   1366  7402           HALT                    /GOOD DATA WORD IN AC=WORD TRANSMITTED
 881   1367  7200           CLA
 882   1370  1045           TAD     RECDAT
 883   1371  7402           HALT                    /AC=BAD DATA WORD=WORD RECEIVED
 884   1372  4517   SLOLAS, LAS                     /CHECK SR1 FOR LOOP ON ERROR
 885   1373  7004           RAL                     /PUT BIT 1 IN AC0
 886   1374  7710           SPA     CLA             /LOOP?
 887   1375  5337           JMP     SLWTLS-1        /YES,GO TRANSMIT AND RECEIVE SAME WORD
 888   1376  5733   SLOLST, JMP  I  SLWDAT          /RETURN FOR THE NEXT WORD
 889
 890
 891         1400   PAGE
 892
 893                                                /FASTER DATA TEST = TRANSMIT-TRANSMIT-RECEIVE-TRANSMIT-RECEIVE-ETC
 894
 895   1400  4462   FDATAT, STLPPC                  /STORE LOOPING PC FOR TEST LOOPING
 896   1401  4460           LOAD                    /TIMING FOR APT-8
 897   1402  1176           TAD     [=3720
 898   1403  3047           DCA     NDELAY          /SETUP A DELAY OF 200 MS FOR SCOPE LOOPING
 899   1404  1054           TAD     M1000
 900   1405  3052           DCA     TSTCNT          /SETUP A TEST LOOP OF 1000 WORDS
 901   1406  3044           DCA     ERRFLG          /CLEAR THE PROGRAM ERROR FLAG
 902   1407  4461           DELAY                   /DELAY 200MS
 903   1410  6036   KRB2,   KRB                     /ISSUE A KRB TO CLEAR ANY RECEIVE FLAG SET
 904   1411  7200           CLA
 905   1412  6042   TCF9,   TCF                     /CLEAR THE TRANSMIT FLAG IF SET
 906   1413  4506           RANDOM                  /GENERATE A RANDOM NUMBER
 907   1414  1042           TAD     XMTDAT
 908   1415  4575           JMS I   [FILCHK         /CHECK TO SEE IF FILL CHAR OPTION SELECTED
 909   1416  5211           JMP     .-5             /GO GET NEW WORD,IT WAS A LF AND FILL WAS SELECTED
 910   1417  1042           TAD     XMTDAT          /GET THE WORD TO TRANSMIT
 911   1420  6046   XMIT,   TLS                     /TRANSMIT THE WORD
 912   1421  6041   TSF23,  TSF                     /WAIT FOR THE FLAG
 913   1422  5221           JMP     .-1
 914   1423  5230           JMP     .+5             /GO TRANSMIT ANOTHER CHARACTER.
 915   1424  6046   TLS10,  TLS
 916   1425  6031   KSF18,  KSF                     /WAIT READER FLAG
 917   1426  5225           JMP     .-1
 918   1427  5236           JMP     RECEVE
 919   1430  4771           RANDM1                  /GO GENERATE ANOTHER WORD (XMTDT1)
 920   1431  1043           TAD     XMTDT1
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 921   1432  4575           JMS I   [FILCHK         /CHECK TO SEE IF FILL=1 AND THAT IT WAS A LF
 922   1433  5226           JMP     .-5             /YES IT WAS,GO GENERATE A NEW WORD
 923   1434  1043           TAD     XMTDT1          /GET THE WORD AND PRINT IT
 924   1435  5224           JMP     TLS10           /
 925   1436  7240   RECEVE, CLA     CMA
 926   1437  6036   KRB3,   KRB                     /READ THE BUFFER AND CLEAR THE FLAGS
 927   1440  3045           DCA     RECDAT          /SAVE THE WORD
 928   1441  1045           TAD     RECDAT          /GET THE WORD AND COMPARE IT TO THE WORD
 929   1442  7041           CIA                     /TRANSMITTED
 930   1443  1042           TAD     XMTDAT
 931   1444  7650           SNA     CLA             /ARE THEY EQUAL?
 932   1445  5265           JMP     UPDATE          /YES,GO CHECK LOOP SWITCH
 933   1446  4512           AERROR                  /REPORT TO APT?
 934   1447  5263           JMP     UPDATE-2        /ACTIVE CONSOLE
 935   1450  4517           LAS
 936   1451  7700           SMA CLA                 /HALT ON ERROR CONDITION
 937   1452  5263           JMP     UPDATE-2        /NO, CHECK FOR LOOP ON ERROR
 938   1453  1042           TAD     XMTDAT          /GET THE FIRST WORD TRANSMITTED
 939   1454  7402           HALT                    /AC=THE 1ST WORD TRANSMITTED
 940   1455  7200           CLA
 941   1456  1045           TAD     RECDAT          /
 942   1457  7402           HALT                    /AC=WORD RECEIVED
 943   1460  7200           CLA
 944   1461  1043           TAD     XMTDT1
 945   1462  7402           HALT                    /AC=2ND WORD TRANSMITTED IF PROGRAM GOT THAT FAR
 946   1463  7240           CLA     CMA
 947   1464  3044           DCA     ERRFLG          /SET ERROR FLAG FOR SCOPE LOOPING
 948   1465  4517   UPDATE, LAS                     /IS SR1=1
 949   1466  7004           RAL
 950   1467  7710           SPA     CLA
 951   1470  5310           JMP     ERRLOP          /LOOP ON DATA PATTERN
 952   1471  1043           TAD     XMTDT1          /PUT SECOND WORD IN FIRST WORD FOR COMPARISON
 953   1472  3042           DCA     XMTDAT          /OF NEXT READ
 954   1473  4516           NERROR
 955   1474  1476           .+2
 956   1475  5302           JMP     END             /END OF TEST
 957   1476  1044           TAD     ERRFLG          /CHECK THE ERRROR FLAG FOR RETURN POINTER
 958   1477  7640           SZA     CLA
 959   1500  5206           JMP     FDATAT+6        /ERROR GO START TEST OVER
 960   1501  5221           JMP     XMIT+1          /GO TRANSMIT NEXT CHARACTER AND WAIT FOR RECEIVE
 961   1502  4467   END,    KSFSKP
 962   1503  4464           EHLTLP                  /LAST FLAG FAILED TO SET
 963   1504  6036   KRB4,   KRB                     /CLEAR THE FLAG
 964   1505  6042   TCF10,  TCF                     /CLEAR THE TRANSMIT FLAG
 965   1506  4463           LOOP                    /LOOP ON TEST IF SR1=1
 966   1507  5573           JMP I   [CHARLG
 967
 968
 969   1510  4461   ERRLOP, DELAY                   /DELAY 200MS TO ALLOW FLAGS TO SETTLE
 970   1511  6036   KRB5,   KRB                     /CLEAR RECEIVE FLAG IF SET
 971   1512  6042   TCF11,  TCF                     /CLEAR TRANSMIT FLAG IF SET
 972   1513  7200           CLA
 973   1514  1042           TAD     XMTDAT          /GET THE FIRST WORD TO TRANSMIT
 974   1515  6046   TLS1,   TLS                     /LOAD AND TRANSMIT IT
 975   1516  6041   TSF24,  TSF
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 976   1517  5316          JMP     .-1             /WAIT FOR THE FIRST TRANSMIT FLAG
 977   1520  7200          CLA
 978   1521  1043          TAD     XMTDT1          /GET THE SECOND WORD TO TRANSMIT
 979   1522  6046  TLS2,   TLS                     /LOAD AND TRANSMIT IT
 980   1523  6031  FDTLOP, KSF                     /WAIT FOR THE FIRST RECEIVE FLAG
 981   1524  5323          JMP     .-1
 982   1525  7240          CLA     CMA
 983   1526  6036  KRB6,   KRB                     /READ THE FIRST WORD
 984   1527  3045          DCA     RECDAT          /SAVE THE FIRST WORD RECEIVED
 985   1530  1045          TAD     RECDAT          /COMPARE IT TO THE FIRST WORD TRANSMITTED
 986   1531  7041          CIA
 987   1532  1042          TAD     XMTDAT
 988   1533  7640          SZA     CLA
 989   1534  5364          JMP     XSR1LP          /ERROR GO CHECK SR1
 990   1535  6041  TSF25,  TSF
 991   1536  5335          JMP     .-1             /WAIT FOR 2ND TRANSMIT FLAG
 992   1537  1042          TAD     XMTDAT          /GET THE FIRST WORD AGAIN
 993   1540  6046  TLS3,   TLS                     /LOAD AND TRANSMIT IT
 994   1541  6031  KSF19,  KSF
 995   1542  5341          JMP     .-1             /WAIT FOR SECOND RECEIVE FLAG
 996   1543  7240          CLA     CMA
 997   1544  6036  KRB7,   KRB                     /READ THE SECOND WORD
 998   1545  3045          DCA     RECDAT          /IS IT EQUAL TO SECOND TRANSMIT
 999   1546  1045          TAD     RECDAT
1000   1547  7041          CIA
1001   1550  1043          TAD     XMTDT1
1002   1551  7640          SZA     CLA
1003   1552  5364          JMP     XSR1LP          /ERROR,GO CHECK SR1=1
1004   1553  6041  TSF26,  TSF
1005   1554  5353          JMP     .-1             /WAIT FOR THE TRANSMIT FLAG
1006   1555  1043          TAD     XMTDT1          /GET 2ND WORD AND TRANSMIT IT
1007   1556  6046  TLS4,   TLS                     /LOAD AND TRANSMIT
1008   1557  4517          LAS                     /CHECK SR1=1 TO LOOP ON TRANSMIT RECEIVE
1009   1560  7004          RAL
1010   1561  7710          SPA     CLA
1011   1562  5323          JMP     FDTLOP
1012   1563  5206          JMP     FDATAT+6
1013
1014   1564  4517  XSR1LP, LAS
1015   1565  7004          RAL
1016   1566  7710          SPA     CLA
1017   1567  5310          JMP     ERRLOP
1018   1570  5271          JMP     UPDATE+4
1019
1020         4771  RANDM1=JMS I    .
1021   1571  4123          XRAND1
1022               /
1023               /
1024         1600  PAGE
1025
1026                                               /THE FOLLOWING TEST CHECKS THAT THE NUMBER OF DATA BITS WERE
1027                                               /SETUP CORRECTLY.  TRANSMIT 377 AND TAKE THE 1'S COMPLEMENT
1028                                               /OF THE DATA BIT MASK WORD AND CHECK THAT THE AC CAME BACK
1029                                               /AS ZEROES.
1030
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1031   1600  4462  CHARLG, STLPPC                  /STORE THE LOOPING PC FOR ERROR AND TEST LOOPING
1032   1601  4460          LOAD                    /TIMING FOR APT.
1033   1602  1040          TAD     DATBIT          /SETUP 1'S COMPLEMENT OF SELECTED DATA
1034   1603  7040          CMA                     /BIT CHARACTER LENGTH
1035   1604  3042          DCA     XMTDAT          /SAVE IT FOR COMPARISON
1036   1605  1034          TAD     K377
1037   1606  6046  TLS5,   TLS                     /TRANSMIT 8 BITS OF ONES
1038   1607  4466          TSFSKP                  /WAIT FOR THE TRANSMIT FLAG TO SET
1039   1610  4464          EHLTLP                  /TRANSMIT FLAG FAILED TO SET
1040   1611  6042  TCF12,  TCF                     /CLEAR THE FLAG
1041   1612  4467          KSFSKP                  /WAIT FOR THE RECEIVE FLAG TO SET
1042   1613  4464          EHLTLP                  /ERROR,RECEIVE FLAG FAILED TO SET
1043   1614  7240          CLA     CMA
1044   1615  6036  KRB8,   KRB                     /READ THE WORD AND SAVE IT
1045   1616  3045          DCA     RECDAT
1046   1617  1045          TAD     RECDAT
1047   1620  0042          AND     XMTDAT
1048   1621  7450          SNA
1049   1622  5242          JMP     FILERT-3        /TEST FOR LOOP ON TEST
1050   1623  3043          DCA     XMTDT1          /SAVE THE BITS THAT WEREN'T SUPPOSED TO BE SELECTED
1051   1624  4512          AERROR
1052   1625  5236          JMP     CHRLAS          /CONSOLE ACTIVE
1053   1626  4517          LAS
1054   1627  7700          SMA CLA                 /HALT ON ERROR
1055   1630  5236          JMP     CHRLAS          /NO, TEST FOR LOOP ON TEST CONDITON
1056   1631  1043          TAD     XMTDT1
1057   1632  7402          HALT                    /AC=BITS THAT WEREN'T SUPPOSED TO BE SELECTED
1058   1633  7200          CLA
1059   1634  1040          TAD     DATBIT          /
1060   1635  7402          HALT                    /AC=DATA BITS THAT OPERATOR HAD TOLD THE PROGRAM
1061   1636  4517  CHRLAS, LAS                     /THAT WERE SELECTED
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1062    1637  7004            RAL
1063    1640  7710            SPA     CLA
1064    1641  5204            JMP     CHARLG+4
1065    1642  4516            NERROR
1066    1643  1604            CHARLG+4                /LOOP ON ERROR
1067    1644  4463            LOOP                    /LOOP ON TEST IF SR2=1
1068
1069                                                  /FILLER CHARACTER TEST-DO THIS TEST IF OPERATOR HAS SELECTED
1070                                                  /THE FILLER CHARACTER OPTION.   THE PROGRAM TRANSMITS A LINE
1071                                                  /FEED AND CHECKS THAT 5 RECEIVE FLAGS COME BACK.  THE DATA RECEIVED
1072                                                  /SHOULD BE 1 WORD OF LINE FEED AND 4 WORDS OF FILLER CHARACTERS.
1073                                                  /THE PROGRAM ALSO CHECKS THAT THE TRANSMIT FLAG DOES NOT GET SET
1074                                                  /UNTIL ALL THE RECEIVE FLAGS ARE IN.
1075
1076    1645  1036    FILERT, TAD     SAVBTS          /CHECK TO SEE IF FILLER CHARACTERS SELECTED
1077    1646  7006            RTL
1078    1647  7700            SMA     CLA             /WAS IT SELECTED BY THE OPERATOR
1079    1650  5777'           JMP     STENAB          /NO,GO CHECK FOR STATUS ENABLE
1080    1651  4462            STLPPC                  /STORE THE LOOPING PC
1081    1652  3047            DCA     NDELAY          /SETUP PROGRAM DELAY OF 409MS.
1082    1653  4461            DELAY                   /DELAY TO ALLOW FLAGS TO SETTLE
1083    1654  6036    KRB9,   KRB                     /CLEAR THE RECEIVE FLAG IF SET
1084    1655  7200            CLA
1085    1656  6042    TCF13,  TCF                     /CLEAR THE TRANSMIT FLAG IF SET
1086    1657  1376            TAD     (-4             /SETUP A COUNTER TO RECEIVE FOUR FLAGS
1087    1660  3043            DCA     XMTDT1          /SAVE IT
1088    1661  1057            TAD     K212            /GET LINE FEED
1089    1662  0040            AND     DATBIT          /MASK OUT TO WORD LENGTH
1090    1663  3042            DCA     XMTDAT          /SAVE IT FOR COMPARISON OF FIRST WORD
1091    1664  1042            TAD     XMTDAT          /GET THE LINE FEED CHARACTER
1092    1665  6046    TLS6,   TLS                     /LOAD AND TRANSMIT IT
1093    1666  7200            CLA
1094    1667  1172    FILLOP, TAD     [-100           /LOOP TO WAIT FOR THE RECEIVE FLAG AND CHECK XMIT
1095    1670  3051            DCA     CNT2
1096    1671  3050            DCA     CNT1
1097    1672  6041    TSF28,  TSF                     /SKIP IF TRANSMIT FLAG=1
1098    1673  7610            SKP     CLA
1099    1674  4464            EHLTLP                  /ERROR,TRANSMIT FLAG SET-SHOULD GET 4 RECEIVE FLAGS FIRST
1100    1675  6031    KSF21,  KSF                     /SKIP IF RECEIVE FLAG SET
1101    1676  7610            SKP     CLA
1102    1677  5305            JMP     .+6
1103    1700  2050            ISZ     CNT1
1104    1701  5272            JMP     .-7
1105    1702  2051            ISZ     CNT2
1106    1703  5272            JMP     .-11
1107    1704  4464            EHLTLP                  /ERROR,RECEIVE FLAG NOT SET OR MISSING SOME
1108    1705  1043            TAD     XMTDT1          /SETUP TO COMPARE FOR EITHER A L.F. OR FILLER
1109    1706  1375            TAD     (4              /WAS IT THE FIRST CHARACTER
1110    1707  7640            SZA     CLA
1111    1710  3042            DCA     XMTDAT          /NO,THEN CLEAR COMPARE WORD FOR FILLER CHAR
1112    1711  6036    KRB10,  KRB                     /READ THE WORD AND CLEAR THE FLAG
1113    1712  3045            DCA     RECDAT          /SAVE IT
1114    1713  1045            TAD     RECDAT          /COMPARE THE WORD RECEIVED WITH WORD EXPECTED
1115    1714  7041            CIA
1116    1715  1042            TAD     XMTDAT
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1117    1716  7650            SNA     CLA
1118    1717  5337            JMP     CNTREC          /WORD COMPARES,GO BUMP RECEIVE COUNTER
1119    1720  4512            AERROR
1120    1721  5344            JMP     CNTREC+5        /ACTIVE CONSOLE
1121    1722  4517            LAS
1122    1723  7700            SMA CLA                 /HALT ON ERROR?
1123    1724  5332            JMP     CNTREC-5        /NO, CHECK FOR LOOP ON ERROR
1124    1725  1042            TAD     XMTDAT          /PRESS "CONTINUE" FOR EXPECTED CHARACTER
1125    1726  7402            HALT                    /AC=WORD EXPECTED X12=LF OR 0000=FIL CHAR.
1126    1727  7200            CLA
1127    1730  1045            TAD     RECDAT          /GET THE WORD RECEIVED
1128    1731  7402            HALT                    /AC=WORD RECEIVED SHOULD BE 212 OR 12 OR 000
1129    1732  4517            LAS                     /CHECK SR1 TO LOOP ON ERROR
1130    1733  7004            RAL
1131    1734  7710            SPA     CLA
1132    1735  5251            JMP     FILERT+4        /LOOP ON THE ERROR
1133    1736  5774'           JMP     FILEXT          /EXIT THE TEST
1134    1737  2043    CNTREC, ISZ     XMTDT1          /BUMP THE RECEIVE COUNTER
1135    1740  5267            JMP     FILLOP          /GO GET THE NEXT RECEIVE FLAG
1136    1741  1172            TAD     [-100
1137    1742  3051            DCA     CNT2
1138    1743  3050            DCA     CNT1
1139    1744  6031    KSF22,  KSF                     /CHECK THAT THE RECEIVE FLAG DOESN'T GET SET BEFORE XMIT
1140    1745  7610            SKP     CLA
1141    1746  4464            EHLTLP                  /LAST RECEIVE FLAG SHOULDN'T GET SET UNTIL SOME
1142                                                  /TIME AFTER THE TRANSMIT FLAG
1143    1747  6041    TSF29,  TSF                     /WAIT FOR THE TRANSMIT FLAG TO GET SET
1144    1750  7610            SKP     CLA
1145    1751  5357            JMP     .+6
1146    1752  2050            ISZ     CNT1
1147    1753  5344            JMP     .-7
1148    1754  2051            ISZ     CNT2
1149    1755  5344            JMP     .-11
1150    1756  4464            EHLTLP                  /TRANSMIT FLAG FAILED TO SET AFTER 5 RECEIVE FLAGS
1151    1757  6032    KCC5,   KCC                     /CLEAR THE FLAG
1152    1760  1172            TAD     [-100
1153    1761  3051            DCA     CNT2
1154    1762  6031    KSF23,  KSF
1155    1763  7610            SKP     CLA
1156    1764  5372            JMP     .+6
1157    1765  2050            ISZ     CNT1
1158    1766  5362            JMP     .-4
1159    1767  2051            ISZ     CNT2
1160    1770  5362            JMP     .-6
1161    1771  4464            EHLTLP                  /LAST RECEIVE FLAG FAILED TO SET
1162    1772  5773'           JMP     KCC6
1163                  /
1164    1773  2000
1165    1774  2003
1166    1775  0004
1167    1776  7774
1168    1777  2005
              2000    PAGE
1169                  /
1170    2000  6032    KCC6,   KCC                     /CLEAR THE RECEIVE FLAG
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1171  2001  4516          NERROR
1172  2002  1657          FILLOP=10.              /GO TRANSMIT ANOTHER FILLER CHARACTER
1173  2003  4463  FILEXT,  LOOP                   /LOOP ON TEST IF SR2=1
1174  2004  5205          JMP     STENAB
1175
1176
1177                                              /THE FOLLOWING TEST WILL BE EXECUTED ONLY IF THE OPERATER HAS SET
1178                                              /THE STATUS ENABLE BIT TO A ONE WHEN HE INITIALIZED THE PROGRAM,
1179                                              /THIS TEST WILL CHECK THAT THE ERROR BIT AND THE OVERRUN BIT CAN
1180                                              /BE SET AND CLEARED IN THE STATUS REGISTER.THE TEST WILL ALSO
1181                                              /CHECK THAT STATUS ENABLE F/F CAN BE SET AND CLEARED. THE RECEIVE
1182                                              /BUFFER WILL ALSO BE CHECKED TO CONTAIN THE CORRECT WORD. THREE
1183                                              /WORDS WILL BE TRANSMITTED AND THEN THE STATUS AND THE RECEIVE BUFFER
1184                                              /WILL BE CHECKED.
1185
1186  2005  1036  STENAB,  TAD     SAVBTS          /CHECK TO SEE IF STATUS ENABLE WAS SELECTED
1187  2006  7004          RAL
1188  2007  7700          SMA     CLA             /WAS IT SELECTED BY THE OPERATOR
1189  2010  5333          JMP     SR4HLT          /NO,GO CHECK END OF PROGRAM HALT
1190  2011  4462          STLPPC                  /STORE THE LOOPING PC FOR TEST AND SCOPE LOOPING
1191  2012  3047          DCA     NDELAY          /SETUP A DELAY OF 409MS
1192  2013  4461          DELAY                   /DELAY TO ALLOW FLAGS TO SETTLE FOR SCOPE LOOPING
1193  2014  6036  KRB12,  KRB                     /CLEAR THE RECEIVE FLAG IF SET
1194  2015  6042  TCF15,  TCF                     /CLEAR THE TRANSMIT FLAG IF SET
1195  2016  7346          CLA CLL CMA RTL         /SETUP A COUNT OF 3 TO TRANSMIT 3 TIMES
1196  2017  3043          DCA     XMTDT1          /SAVE IT
1197  2020  7001          IAC
1198  2021  3042          DCA     XMTDAT          /SET THE FIRST WORD TO BE TRANSMITTED=1
1199  2022  7326          CLA CLL CML RTL         /SET AC BIT 10 TO A 1
1200  2023  6035  KSE1,   KSE                     /AND TRY TO SET STATUS ENABLE TO A 1
1201  2024  7200          CLA
1202  2025  1042          TAD     XMTDAT          /GET THE WORD (1,2 OR 3)
1203  2026  6046  TLS9,   TLS                     /TRANSMIT IT
1204  2027  7200          CLA
1205  2030  4466          TSFSKP                  /WAIT FOR THE TRANSMIT FLAG
1206  2031  4464          EHLTLP                  /ERROR,TRANSMIT FLAG FAILED TO SET
1207  2032  2042          ISZ     XMTDAT          /BUMP THE WORD TO A 2 THEN 3
1208  2033  2043          ISZ     XMTDT1          /TRANSMITTED 3 WORDS YET
1209  2034  5225          JMP     .-7             /NO,GO TRANSMIT NEXT WORD
1210  2035  6042  TCF16,  TCF                     /CLEAR THE TRANSMIT FLAG
1211  2036  6031  KSF25,  KSF                     /SKIP ON THE RECEIVE FLAG
1212  2037  4464          EHLTLP                  /ERROR,RECEIVE FLAG FAILED TO SET AFTER 3 XMITS.
1213  2040  6034  KRS2,   KRS                     /DO A STATIC READ OF STATUS AND RECEIVE BUFFER
1214  2041  3045          DCA     RECDAT          /AND SAVE IT
1215  2042  1377          TAD     (4402           /GET EXPECTED WORD(ERROR=OVERRUN=DATA OF 2)
1216  2043  3042          DCA     XMTDAT          /AND SAVE IT FOR COMPARISON
1217  2044  4301          JMS     STERR           /GO CHECK THE WORDS FOR ERRORS
1218  2045  6035  KSE2,   KSE                     /CLEAR STATUS ENABLE AND CHECK BUFFER FOR A 2
1219  2046  6034  KRS3,   KRS                     /DO A STATIC READ OF THE RECEIVE BUFFER
1220  2047  3045          DCA     RECDAT          /SAVE THE WORD
1221  2050  7326          CLA CLL CML RTL         /SETUP FOR WORD EXPECTED
1222  2051  3042          DCA     XMTDAT          /SAVE IT FOR COMPARISON
1223  2052  4301          JMS     STERR           /GO CHECK FOR ERRORS
1224  2053  7326          CLA CLL CML RTL         /SET AC BIT 10 TO A 1
1225  2054  6035  KSE3,   KSE                     /RESET STATUS ENABLE
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1226  2055  7200          CLA
1227  2056  1377          TAD     (4402
1228  2057  3042          DCA     XMTDAT          /RESET EXPECTED DATA TO(ERROR=OVERRUN=DATA OF 2)
1229  2060  6036  KRB13,  KRB                     /DO A DYNAMIC READ OF STATUS AND RECEIVE BUFFER
1230  2061  3045          DCA     RECDAT          /SAVE THE WORD READ FOR COMPARISON
1231  2062  4301          JMS     STERR           /GO CHECK FOR ERROR CONDITIONS
1232  2063  6031  KSF26,  KSF                     /CHECK THAT RECEIVE FLAG = 0
1233  2064  7610          SKP     CLA
1234  2065  4464          EHLTLP                  /ERROR,RECEIVE FLAG SHOULD NOT BE SET YET
1235  2066  4467          KSFSKP                  /GO WAIT FOR THE LAST TRANSMITTED CHAPACTER
1236  2067  4464          EHLTLP                  /THE THIRD TRANSMIT DID NOT SET RECEIVE FLAG
1237  2070  6036  KRB14,  KRB                     /READ THE CHARACTER
1238  2071  3045          DCA     RECDAT          /SAVE IT FOR COMPARISON
1239  2072  1376          TAD     (3
1240  2073  3042          DCA     XMTDAT          /SETUP FOR WORD EXPECTED
1241  2074  4301          JMS     STERR           /GO CHECK FOR ERRORS
1242  2075  4516          NERROR
1243  2076  2012          STENAB+5                /NO GO DO TEST AGAIN
1244  2077  4463          LOOP                    /LOOP ON TEST IF SR2=1
1245  2100  5333          JMP     SR4HLT          /GO CHECK END OF PROFRAM HALT
1246
1247  2101  0000  STERR,   0                      /CHECK TO SEE IF ERROR EXIST IN STATUS REGISTER AND RECEIVE BUFFER
1248  2102  1045          TAD     RECDAT          /GET THE WORD RECEIVED AND COMPARE IT WITH
1249  2103  7041          CIA                     /THE WORD EXPECTED
1250  2104  1042          TAD     XMTDAT          /
1251  2105  7650          SNA     CLA             /ARE THEY EQUAL?
1252  2106  5701          JMP  I  STERR           /YES,CONTINUE TESTING
1253  2107  7340          CLL CLA CMA             /AC=-1
1254  2110  1301          TAD     STERR           /ESATBLISH ERROR PC
1255  2111  4512          AERROR
1256  2112  5326          JMP     STLAS           /ACTIVE CONSOLE SELECTED
1257  2113  4517          LAS
1258  2114  7700          SMA CLA                 /HALT ON ERROR
1259  2115  5326          JMP     STLAS           /NO, GO TEST FOR LOOP ON ERROR
1260  2116  1010          TAD     10              /GET BACK ERROR PC
1261  2117  7402          HALT                    /AC=PC WERE ERROR WAS DETECTED AT
1262  2120  7200          CLA
1263  2121  1042          TAD     XMTDAT          /GET THE WORD EXPECTED
1264  2122  7402          HALT                    /AC=WORD EXPECTED
1265  2123  7200          CLA
1266  2124  1045          TAD     RECDAT          /GET THE WORD RECEIVED
1267  2125  7402          HALT                    /AC=WORD RECEIVED
1268  2126  4517  STLAS,  LAS                     /LOOP ON ERROR?
1269  2127  7004          RAL
1270  2130  7710          SPA     CLA
1271  2131  5211          JMP     STENAB+4        /YES GO LOOP
1272  2132  5701          JMP  I  STERR           /NO,GO GET NEXT ERROR
1273
1274
1275                                              /HALT AT END OF PROGRAM IF SWITCH REGISTER 4 EQUALS A ONE
1276
1277  2133  1022  SR4HLT,  TAD     22
1278  2134  7710          SPA CLA                 /RUNNING ON APT?
1279  2135  5351          JMP     BAUDST          /YES
1280  2136  4515          CHEK22
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1281  2137  4775'          JMS     XC8PAS          /PRINT END OF PASS IF ON CONSOLE
1282  2140  7000          NOP
1283  2141  4517          LAS
1284  2142  0374          AND     (200
1285  2143  7650          SNA     CLA
1286  2144  5351          JMP     BAUDST          /SET UP BUAD TABLE.
1287  2145  4515          CHEK22
1288  2146  4773'         JMS     XC8PSW
1289  2147  4520          HLT                     /END OF THE PROGRAM SR4=1
1290  2150  5772'         JMP     CLRBRD          /PRESS CONTINUE TO GO ON
1291
1292  2151  1022    BAUDST, TAD     22
1293  2152  7004          RAL
1294  2153  7710          SPA CLA                 /SPECIAL TESTING BEING DONE
1295  2154  4771'         JMS     NEWDEV          /YES UPDATE DEVICE NUMBER
1296  2155  1524          TAD I   TEMP
1297  2156  3121          DCA     CLKCNT          /GET FIRST CLOCK COUNT.
1298  2157  7240          STA
1299  2160  1124          TAD     TEMP            /SET UP FOR AUTO INDEX.
1300  2161  3011          DCA     A11
1301  2162  5772'         JMP     CLRBRD          /EXIT AND CONTINUE PROGRAM
1302
1303                  /
1304                  /ROUTINE TO LOAD VALUE FOR APT TIMING.
1305                  /
1306  2163  0000    XLOAD,  0
1307  2164  1411          TAD I   A11             /GET TIMING VALUE.
1308  2165  7450          SNA                     /TEST FOR A ZERO.
1309  2166  5763          JMP I   XLOAD           /THERE IS ONE. USE SAME VALUE.
1310  2167  3122          DCA     COUNT           /SETUP NEW VALUE.
1311  2170  5763          JMP I   XLOAD           /EXIT.
1312                  /
1313  2171  4000
1314  2172  0271
1315  2173  6703
1316  2174  0200
1317  2175  7241
1318  2176  0003
1319  2177  4402
              2200    PAGE
1320
1321                                            /INHIBIT ERROR HALT IF SR0=1 AND LOOP ON ERROR IF SR1=1
1322  2200  0000    HLTLOP, 0
1323  2201  7240          CLA     CMA
1324  2202  1200          TAD     HLTLOP          /GET THE FAILING PC WHERE THE ERROR WAS DETECTED
1325  2203  4512          AERROR                  /APT ERROR HANDLER.
1326  2204  7410          SKP                     /ACTIVE CONSOLE
1327  2205  4517          LAS                     /HALT ON ERROR?
1328  2206  7700          SMA     CLA
1329  2207  5212          JMP     .+3
1330  2210  1010          TAD     10              /GET BACK ERROR PC
1331  2211  7402          HALT                    /AC=FAILING PC WHERE ERROR WAS DETECTED
1332  2212  4517          LAS                     /LOOP ON THE ERROR?
1333  2213  7004          RAL
1334  2214  7710          SPA     CLA
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1335  2215  5446          JMP  I  LOOPPC
1336  2216  5600          JMP  I  HLTLOP
1337
1338  2217  0000    HLTLP1, 0                       /ROUTINE USED IN ACNSKP TEST TO SAVE AC FOR FALSE SKIPPING
1339  2220  3240          DCA     SAVAC           /SAVE THE AC FOR NON LOOPING PURPOSES
1340  2221  7240          CLA     CMA
1341  2222  1217          TAD     HLTLP1          /GET THE FAILING PC WHERE ERROR WAS DETECTED
1342  2223  4512          AERROR                  /REPORT ERROR TO APT-8 SYSTEM
1343  2224  5232          JMP     .+6             /ACTIVE CONSOLE
1344  2225  4517          LAS                     /HALT ON ERROR?
1345  2226  7700          SMA     CLA
1346  2227  5232          JMP     .+3
1347  2230  1010          TAD     10              /GET BACK ERROR PC
1348  2231  7402          HALT                    /AC=FAILING PC WHERE ERROR WAS DETECTED
1349  2232  4517          LAS                     /LOOP ON THE ERROR?
1350  2233  7004          RAL
1351  2234  7710          SPA     CLA
1352  2235  5446          JMP  I  LOOPPC          /YES,LOOP ON THE ERROR
1353  2236  1240          TAD     SAVAC           /NO,RESET THE AC AND CONTINUE
1354  2237  5617          JMP  I  HLTLP1          /RETURN AND CHECK THE EFFECT OF THE IOT ON AC
1355
1356  2240  0000    SAVAC,  0
1357
1358  2241  0000    HLTLP2, 0                       /THIS ROUTINE USED ONLY WHEN IOT EFFECTS CONTENTS OF AC
1359  2242  3240          DCA     SAVAC           /SAVE THE AC FOR ERROR INDICATION
1360  2243  7240          CLA     CMA             /GET THE FAILING PC WHERE ERROR WAS DETECTED
1361  2244  1241          TAD     HLTLP2          /
1362  2245  4512          AERROR                  /REPORT ERROR TO APT.
1363  2246  5254          JMP     .+6             /ACTIVE CONSOLE
1364  2247  4517          LAS                     /HALT ON ERROR?
1365  2250  7700          SMA     CLA
1366  2251  5254          JMP     .+3
1367  2252  1010          TAD     10              /GET BACK ERROR PC
1368  2253  7402          HALT                    /AC=FAILING PC WHERE ERROR WAS DETECTED
1369  2254  7200          CLA                     /PRESS "CONT" TO GET CONTENTS OF AC AFTER EXECUTION
1370                                              /AND COMPARISON OF THE IOT AND AC
1371  2255  1240          TAD     SAVAC
1372  2256  7402          HALT                    /AC=BITS THAT WERE EFFECTED AFTER EXECUTION OF IOT
1373  2257  4517          LAS                     /LOOP ON THE ERROR?
1374  2260  7004          RAL
1375  2261  7710          SPA     CLA
1376  2262  5446          JMP  I  LOOPPC          /YES,GO LOOP ON THE ERROR
1377  2263  5641          JMP  I  HLTLP2          /RETURN AND CONTINUE THE TEST
1378
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                                        /BAUD RATE TIMING TEST-LOAD AND START 202 AND WATCH  YOUR WATCH
                                        /FOR 30 SECONDS, THE PROCESSOR SHOULD HALT IN 30 SECONDS,IF IT
                                        /DOESN'T CHECK THE BAUD RATE WITH A SCOPE OR CHECK THE BAUD RATE
                                        /SWITCHES

2264  1377  BAUDTM, TAD     (JMP I 2
2265  3001          DCA     1
2266  1376          TAD     (RETINT   /SETUP RETURN POINTER FOR THE INTERRUPT
2267  3002          DCA     2
2270  1041          TAD     BAUDNO    /GET THE BAUD RATE
2271  1375          TAD     (BAUDTB   /GET THE ADDRESS OF THE BAUD RATE TABLE
2272  3333          DCA     BDPNTR    /SAVE THE POINTER TO THE BAUD RATE TABLE
2273  1037          TAD     BITNO     /GET THE CHARACTER LENGTH
2274  7104          CLL     RAL       /MULTIPLY IT BY 2
2275  1733          TAD  I  BDPNTR    /ADD IN BAUD RATE ADDRESS
2276  3333          DCA     BDPNTR    /ADDRESS OF BAUD RATE CONSTANTS ARE READY TO BE SETUP
2277  4462          STLPPC            /STORE THE LOOPING PC FOR TEST LOOPING
2300  1333          TAD     BDPNTR    /GET POINTER ADDRESS TO THE CONSTANTS
2301  3052          DCA     TSTCNT    /SAVE IT IN TEST COUNT
2302  1452          TAD  I  TSTCNT    /GET THE FIRST CONSTANT
2303  3050          DCA     CNT1
2304  2052          ISZ     TSTCNT    /BUMB THE ADDRESS BY 1 FOR NEXT CONSTANT
2305  1452          TAD  I  TSTCNT
2306  3051          DCA     CNT2
2307  6046  TLS7,   TLS               /LOAD AND TRANSMIT FIRST CHARACTER-FLAG
2310  6041  TSF30,  TSF               /COMES UP ALMOST IMMEADIATELY
2311  5310          JMP     .-1
2312  5315          JMP     .+3
2313  6036  INTON,  KRB               /CLEAR THE RECEIVE FLAG
2314  7610          SKP CLA
2315  6046  TLS8,   TLS               /LOAD AND TRANSMIT  NEXT CHARACTER AND CLEAR FLAG
2316  6001          ION                 /TURN THE INTERRUPT ON
2317  6031  RETINT, KSF               /SKIP IF RECEIVE FLAG SET
2320  7610          SKP     CLA       /FLAG NOT SET,CHECK TRANSMIT FLAG
2321  5313          JMP     INTON     /RECEIVE FLAG SET,GO CLEAR IT
2322  6041  TSF31,  TSF               /SKIP IF TRANSMIT FLAG SET
2323  5317          JMP     INTON+4   /NOT SET YET GO WAIT FOR A FLAG
2324  2050          ISZ     CNT1      /BUMP THE FIRST COUNTER
2325  5315          JMP     INTON+2   /GO TRANSMIT ANOTHER CHARACTER
2326  2051          ISZ     CNT2      /FIRST COUNTER OVERFLOWED
2327  5315          JMP     INTON+2   /GO DO ANOTHER 4095 INTERRUPTS
2330  4520          HLT               /TRANSMITTED FOR 30 SECONDS????
2331  4463          LOOP              /LOOP ON TEST IF SR2=1
2332  5330          JMP     .-2       /END OF THE TEST
2333  0000  BDPNTR, 0

                                        /POINTERS TO BAUD RATE TABLE
2334  2400  BAUDTB, BR110
2335  2414          BR150
2336  2430          BR300
2337  2444          BR600
2340  2460          BR1200
2341  2474          BR2400
2342  2510          BR4800
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2343  2524          BR9600
2344  2540          B19200
2345  2554          BR568
2346  2570          BR667
2347  2604          BR1050

                                        /POINTERS TO BAUD RATE TYPEOUTS
2350  4473  MESTAB, MES6A
2351  4520          MES6B
2352  4545          MES6C
2353  4572          MES6D
2354  4617          MES6E
2355  4645          MES6F
2356  4673          MES6G
2357  4721          MES6H
2360  4747          MES6I
2361  4776          MES6J
2362  5024          MES6K
2363  5052          MES6L

                                        /POINTERS TO DATA BIT TYPEOUTS
2364  5145  MESTB1, MES10A
2365  5164          MES10B
2366  5203          MES10C
2367  5222          MES10D


2375  2334
2376  2317
2377  5402
      2400    PAGE

                                        /BAUD RATE CONSTANTS FOR 110 BAUD

2400  7051  BR110,  -727               /7 BITS AT 15.71 CHAR/SEC=471 CHAR/30 SEC
2401  7777          -1
2402  7143          -635              /8 BITS AT 13.75 CHAR/SEC=413 CHAR/30 SEC
2403  7777          -1
2404  7221          -557              /9 BITS AT 12.22 CHAR/SEC=367 CHAR/30 SEC
2405  7777          -1
2406  7266          -512              /10 BITS AT 11 CHAR/SEC=330 CHAR/30 SEC
2407  7777          -1
2410  7324          -454              /11 BITS AT 10 CHAR/SEC=300 CHAR/30 SEC
2411  7777          -1
2412  7355          -423              /12 BITS AT 9.17 CHAR/SEC=275 CHAR/30 SEC
2413  7777          -1

                                        /BAUD RATE CONSTANTS FOR 150 BAUD

2414  6575  BR150,  -1203              /7 BITS AT 21.43 CHAR/SEC=643 CHAR/30 SEC
2415  7777          -1
2416  6715          -1063             /8 BITS AT 18.75 CHAR/SEC=563 CHAR/30 SEC
2417  7777          -1
2420  7014          -764              /9 BITS AT 16.67 CHAR/SEC=500 CHAR/30 SEC
2421  7777          -1
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1488    2422  7076            -702          /10 BITS AT 15 CHAR/SEC=450 CHAR/30 SEC
1489    2423  7777            -1
1490    2424  7147            -631          /11 BITS AT 13.64 CHAR/SEC=409 CHAR/30 SEC
1491    2425  7777            -1
1492    2426  7211            -567          /12 BITS AT 12.50 CHAR/SEC=375 CHAR/30 SEC
1493    2427  7777            -1
1494
1495                                        /BAUD RATE CONSTANTS FOR 300 BAUD
1496
1497    2430  5372    BR300,  -2406         /7 BITS AT 42.86 CHAR/SEC=1286 CHAR/30 SEC
1498    2431  7777            -1
1499    2432  5633            -2145         /8 BITS AT 37.50 CHAR/SEC=1125 CHAR/30 SEC
1500    2433  7777            -1
1501    2434  6030            -1750         /9 BITS AT 33.33 CHAR/SEC=1000 CHAR/30 SEC
1502    2435  7777            -1
1503    2436  6174            -1604         /10 BITS AT 30.00 CHAR/SEC=900 CHAR/30 SEC
1504    2437  7777            -1
1505    2440  6316            -1462         /11 BITS AT 27.27 CHAR/SEC=818 CHAR/30 SEC
1506    2441  7777            -1
1507    2442  6422            -1356         /12 BITS AT 25.00 CHAR/SEC=750 CHAR/30 SEC
1508    2443  7777            -1
1509
1510                                        /BAUD RATE CONSTANTS FOR 600 BAUD
1511
1512    2444  2765    BR600,  -5013         /7 BITS AT 85.71 CHAR/SEC=2571 CHAR/30 SEC
1513    2445  7777            -1
1514    2446  3466            -4312         /8 BITS AT 75.00 CHAR/SEC=2250 CHAR/30 SEC
1515    2447  7777            -1
1516    2450  4060            -3720         /9 BITS AT 66.67 CHAR/SEC=2000 CHAR/30 SEC
1517    2451  7777            -1
1518    2452  4370            -3410         /10 BITS AT 60.00 CHAR/SEC=1800 CHAR/30 SEC
1519    2453  7777            -1
1520    2454  4633            -3145         /11 BITS AT 54.55 CHAR/SEC=1637 CHAR/30 SEC
1521    2455  7777            -1
1522    2456  5044            -2734         /12 BITS AT 50.00 CHAR/SEC=1500 CHAR/30 SEC
1523    2457  7777            -1
1524
1525                                        /BAUD RATE CONSTANTS FOR 1200 BAUD
1526
1527    2460  5750    BR1200, -2030         /7 BITS AT 171.43 CHAR/SEC=5143 CHAR/30 SEC
1528    2461  7776            -2
1529    2462  7153            -625          /8 BITS AT 150 CHAR/SEC=4500 CHAR/30 SEC
1530    2463  7776            -2
1531    2464  0140            -7640         /9 BITS AT 133.33 CHAR/SEC=4000 CHAR/30 SEC
1532    2465  7777            -1
1533    2466  0760            -7020         /10 BITS AT 120 CHAR/SEC=3600 CHAR/30 SEC
1534    2467  7777            -1
1535    2470  1467            -6311         /11 BITS AT 109.09 CHAR/SEC=3273 CHAR/30 SEC
1536    2471  7777            -1
1537    2472  2110            -5670         /12 BITS AT 100 CHAR/SEC=3000 CHAR/30 SEC
1538    2473  7777            -1
1539
1540                                        /BAUD RATE CONSTANTS FOR 2400 BAUD
1541
1542    2474  3720    BR2400, -4060         /7 BITS AT 342.86 CHAR/SEC=10,286 CHAR/30 SEC
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1543    2475  7775            -3
1544    2476  6326            -1452         /8 BITS AT 300 CHAR/SEC=9000 CHAR/30 SEC
1545    2477  7775            -3
1546    2500  0277            -7501         /9 BITS AT 266.67 CHAR/SEC=8000 CHAR/30 SEC
1547    2501  7776            -2
1548    2502  1737            -6041         /10 BITS AT 240 CHAR/SEC=7200 CHAR/30 SEC
1549    2503  7776            -2
1550    2504  3156            -4622         /11 BITS AT 218.18 CHAR/SEC=6545 CHAR/30 SEC
1551    2505  7776            -2
1552    2506  4217            -3561         /12 BITS AT 200 CHAR/SEC=6000 CHAR/30 SEC
1553    2507  7776            -2
1554
1555                                        /BAUD RATE CONSTANTS FOR 4800 BAUD
1556
1557    2510  7640    BR4800, -140          /7 BITS AT 685.71 CHAR/SEC=20,571 CHAR/30 SEC
1558    2511  7772            -6
1559    2512  4654            -3124         /8 BITS AT 600 CHAR/SEC=18,000 CHAR/30 SEC
1560    2513  7773            -5
1561    2514  0575            -7203         /9 BITS AT 533.33 CHAR/SEC=16,000 CHAR/30 SEC
1562    2515  7774            -4
1563    2516  3675            -4103         /10 BITS AT 480 CHAR/SEC=14,400 CHAR/30 SEC
1564    2517  7774            -4
1565    2520  6332            -1446         /11 BITS AT 436.36 CHAR/SEC=13,091 CHAR/30 SEC
1566    2521  7774            -4
1567    2522  0436            -7342         /12 BITS AT 400 CHAR/SEC=12000 CHAR/30 SEC
1568    2523  7775            -3
1569
1570                                        /BAUD RATE CONSTANTS FOR 9600 BAUD
1571
1572    2524  7477    BR9600, -301          /7 BITS AT 1371.43 CHAR/SEC=41,143 CHAR/30 SEC
1573    2525  7765            -13
1574    2526  1530            -6250         /8 BITS AT 1200 CHAR/SEC=36,000 CHAR/30 SEC
1575    2527  7767            -11
1576    2530  1371            -6407         /9 BITS AT 1066.67 CHAR/SEC=32000 CHAR/30 SEC
1577    2531  7770            -10
1578    2532  7571            -207          /10 BITS AT 960 CHAR/SEC=28,800 CHAR/30 SEC
1579    2533  7770            -10
1580    2534  4664            -3114         /11 BITS AT 872.73 CHAR/SEC=26,182 CHAR/30 SEC
1581    2535  7771            -7
1582    2536  1073            -6705         /12 BITS AT 800 CHAR/SEC=24,000 CHAR/30 SEC
1583    2537  7772            -6
1584
1585                                        /BAUD RATE CONSTANTS FOR 19.2 KILO BAUD
1586
1587    2540  7176    B19200, -602          /7 BITS AT  2742.86 CHAR/SEC=82,286 CHAR/30 SEC
1588    2541  7753            -25
1589    2542  3257            -4521         /8 BITS AT 2400 CHAR/SEC=72,000 CHAR/30 SEC
1590    2543  7756            -22
1591    2544  2761            -5017         /9 BITS AT 2133.33 CHAR/SEC=64,000 CHAR/30 SEC
1592    2545  7760            -20
1593    2546  7362            -416          /10 BITS AT 1920 CHAR/SEC=57,600 CHAR/30 SEC
1594    2547  7761            -17
1595    2550  1550            -6230         /11 BITS AT 1745.45 CHAR/SEC=52,364 CHAR/30 SEC
1596    2551  7763            -15
1597    2552  2165            -5613         /12 BITS AT 1600 CHAR/SEC=48,000 CHAR/30 SEC
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1598    2553  7764          -14
1599
1600
1601                                        /BAUD RATE CONSTANTS FOR 56.8 BAUD
1602
1603    2554  7415    BR568,  -363          /7 BITS AT 8.11 CHAR/SEC =243 CHAR/30 SEC
1604    2555  7777          -1
1605    2556  7453          -325            /8 BITS AT 7.10 CHAR/SEC =213 CHAR/30 SEC
1606    2557  7777          -1
1607    2560  7503          -275            /9 BITS AT 6.31 CHAR/SEC =189 CHAR/30 SEC
1608    2561  7777          -1
1609    2562  7526          -252            /10 BITS AT 5.68 CHAR/SEC =170 CHAR/30 SEC
1610    2563  7777          -1
1611    2564  7545          -233            /11 BITS AT 5.16 CHAR/SEC =155 CHAR/30 SEC
1612    2565  7777          -1
1613    2566  7562          -216            /12 BITS AT 4.73 CHAR/SEC =142 CHAR/30 SEC
1614    2567  7777          -1
1615
1616                                        /BAUD RATE CONSTANTS FOR 66.7 BAUD
1617
1618    2570  7342    BR667,  -436          /7 BITS AT 9.53 CHAR/SEC =286/30 SEC
1619    2571  7777          -1
1620    2572  7406          -372            /8 BITS AT 8.35 CHAR/SEC =250/30 SEC
1621    2573  7777          -1
1622    2574  7442          -336            /9 BITS AT 7.41 CHAR/SEC =222/30 SEC
1623    2575  7777          -1
1624    2576  7470          -310            /10 BITS AT 6.67 CHAR/SEC =200/30 SEC
1625    2577  7777          -1
1626    2600  7512          -266            /11 BITS AT 6.06 CHAR/SEC =182/30 SEC
1627    2601  7777          -1
1628    2602  7531          -247            /12 BITS AT 5.56 CHAR/SEC =167/30 SEC
1629    2603  7777          -1
1630
1631                                        /BAUD RATE CONSTANTS FOR 1050 BAUD
1632
1633    2604  7154    BR1050, -624          /7 BITS AT 150 CHAR/SEC =4500/30 SEC
1634    2605  7776          -2
1635    2606  0236          -7542           /8 BITS AT 131.25 CHAR/SEC =3938/30 SEC
1636    2607  7777          -1
1637    2610  1124          -6654           /9 BITS AT 116.66 CHAR/SEC =3500/30 SEC
1638    2611  7777          -1
1639    2612  1662          -6116           /10 BITS AT 105 CHAR/SEC =3150/30 SEC
1640    2613  7777          -1
1641    2614  2320          -5460           /11 BITS AT 95.45 CHAR/SEC =2864/30 SEC
1642    2615  7777          -1
1643    2616  2677          -5101           /12 BITS AT 87.5 CHAR/SEC =2625/30 SEC
1644    2617  7777          -1
1645
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1646    2620  0000    XDELAY, 0
1647    2621  7300            CLA     CLL
1648    2622  1047            TAD     NDELAY
1649    2623  3243            DCA     DELAYN
1650    2624  1244    DELLOP, TAD     CON100
1651    2625  3245            DCA     US100
1652    2626  2245            ISZ     US100
1653    2627  5226            JMP     .-1
1654    2630  7200            CLA
1655    2631  7200            CLA
1656    2632  7200            CLA
1657    2633  7200            CLA
1658    2634  2243            ISZ     DELAYN
1659    2635  7610            SKP     CLA
1660    2636  5620            JMP   I XDELAY
1661    2637  0620            AND   I XDELAY
1662    2640  0620            AND   I XDELAY
1663    2641  0220            AND     XDELAY
1664    2642  5224            JMP     DELLOP
1665
1666    2643  0000    DELAYN, 0
1667    2644  7754    CON100, -24
1668    2645  0000    US100,  0
1669
1670
1671                                        /IF FILLER CHARACTER OPTION IS SELECTED-DO NOT TRANSMIT A L.F.
1672                                        /FILLER CHARACTERS WILL BE CHECKED LATER.
1673
1674    2646  0000    FILCHK, 0
1675    2647  3270            DCA     CHKFIL
1676    2650  1036            TAD     SAVBTS          /WAS FILLER CHARACTER OPTION SELECTED
1677    2651  7006            RTL                     /BY THE OPERATOR
1678    2652  7700            SMA     CLA
1679    2653  5263            JMP     .+10            /NO,EXIT AND TRANSMIT THE CHARACTER
1680    2654  1270            TAD     CHKFIL          /CHECK TO SEE IF THE WORD TO BE TRANSMITTED IS A
1681    2655  1377            TAD     (-12            /LINE FEED
1682    2656  7450            SNA                     /WAS IT A 12
1683    2657  5265            JMP     .+6
1684    2660  1376            TAD     (-200           /WAS IT A 212
1685    2661  7650            SNA     CLA
1686    2662  5265            JMP     .+3             /YES IT WAS A LINE FEED
1687    2663  2246            ISZ     FILCHK          /WORD IS OK,GO TRANSMIT IT
1688    2664  5646            JMP   I FILCHK
1689    2665  2052            ISZ     TSTCNT          /BUMP TEST COUNTER TO GET RID OF WORD
1690    2666  5646            JMP   I FILCHK          /GO GET ANOTHER WORD
1691    2667  5646            JMP   I FILCHK          /GO DO TEST OVER IF LAST WORD IS A LINE FEED
1692
1693    2670  0000    CHKFIL, 0
1694
1695    2671  0000    WAITSF, 0                       /ROUTINE TO WAIT FOR TRANSMIT FLAG.
1696    2672  1172            TAD     (-100           /IF IT DOESN'T SET IN A SECOND OR SO
1697    2673  3051            DCA     CNT2            /TIMEOUT AND HALT
1698    2674  3050            DCA     CNT1
1699    2675  6041    TSF15,  TSF
1700    2676  7610            SKP     CLA
```

```
1701    2677  5305          JMP     .+6
1702    2700  2050          ISZ     CNT1
1703    2701  5275          JMP     .-4
1704    2702  2051          ISZ     CNT2
1705    2703  5275          JMP     .-6
1706    2704  5671          JMP  I  WATTSF          /TSF FAILED TO SKIP
1707    2705  2271          ISZ     WATTSF
1708    2706  5671          JMP  I  WATTSF          /OK,TSF SKIPPED RETURN
1709
1710    2707  0000    WATKSF, 0                     /ROUTINE TO WAIT FOR THE RECEIVE FLAG
1711    2710  1172          TAD     [-100           /IF IT DOESN'T SET IN A SECOND OR SO
1712    2711  3051          DCA     CNT2            /TIMEOUT AND HALT.
1713    2712  3050          DCA     CNT1
1714    2713  6031    KSF8,   KSF
1715    2714  7610          SKP     CLA
1716    2715  5323          JMP     .+6
1717    2716  2050          ISZ     CNT1
1718    2717  5313          JMP     .-4
1719    2720  2051          ISZ     CNT2
1720    2721  5313          JMP     .-6
1721    2722  5707          JMP  I  WATKSF          /ERROR,KSF FAILED TO SKIP
1722    2723  2307          ISZ     WATKSF          /
1723    2724  5707          JMP  I  WATKSF          /OK,RECEIVE FLAG SKIPPED
1724                /
1725                /
1726    2776  7600
1727    2777  7766
              3000  PAGE
1728
1729                                                /INTERAGATION SETUP FOR THE TELETYPE
1730    3000  4471    TYINTR, MESAGE                /TYPE RECEIVE IOT?
1731    3001  4203          MESS1
1732    3002  4473          TWOOCT                  /GET RECEIVE DEVICE CODE
1733    3003  5200          JMP     .-3             /INPUT ERROR
1734    3004  4511          BSWAP                   /SWAP IT AROUND TO BITS 0-5
1735    3005  3035          DCA     DEVCOD          /SAVE THE RECEIVE DEVICE CODE
1736    3006  4471          MESAGE                  /TYPE TRANSMIT IOT
1737    3007  4213          MESS2
1738    3010  4473          TWOOCT                  /GET TRANSMIT IOT
1739    3011  5206          JMP     .-3             /INPUT ERROR
1740    3012  1035          TAD     DEVCOD          /ADD TRANSMIT IOT TO RECEIVE IOT
1741    3013  3035          DCA     DEVCOD          /SAVE THE IOTS
1742    3014  4471          MESAGE                  /TYPE PARITY(Y OR N)?
1743    3015  4224          MESS3
1744    3016  4505          YESRNO                  /WAIT FOR A YES OR NO
1745    3017  5214          JMP     .-3             /NOT A Y OR N
1746    3020  7610          SKP     CLA             /SET NO PARITY BIT
1747    3021  7330          CLA CLL CML RAR         /SET THE PARITY BIT TO A 1
1748    3022  3036          DCA     SAVBTS          /SAVE THE PARITY BIT IN STATUS WORD
1749    3023  4471          MESAGE
1750    3024  4236          MESS3A
1751    3025  1036          TAD     SAVBTS
1752    3026  7710          SPA     CLA
1753    3027  7001          IAC
1754    3030  4475          PRNT1
```



```
1755    3031  4471          MESAGE                  /TYPE STATUS REGISTER(Y OR N)
1756    3032  4241          MESS4
1757    3033  4505          YESRNO                  /WAIT FOR A YES OR NO
1758    3034  5231          JMP     .-3             /NOT A YES OR NO
1759    3035  7610          SKP     CLA             /NO STATUS REGISTER SELECTED
1760    3036  7332          CLA CLL CML RTR         /STATUS REGISTER IS SELECTED
1761    3037  1036          TAD     SAVBTS          /ADD STATUS REGISTER BIT TO WORD
1762    3040  3036          DCA     SAVBTS          /AND SAVE IT
1763    3041  4471          MESAGE
1764    3042  4302          MESS4A
1765    3043  1036          TAD     SAVBTS
1766    3044  7004          RAL
1767    3045  7710          SPA     CLA
1768    3046  7001          IAC
1769    3047  4475          PRNT1
1770    3050  4471          MESAGE                  /TYPE FILLER CHARACTERS(Y OR N)?
1771    3051  4306          MESS5
1772    3052  4505          YESRNO                  /WAIT FOR A YES OR NO
1773    3053  5250          JMP     .-3             /NOT A YES OR NO
1774    3054  7610          SKP     CLA             /NO FILLER CHARACTERS
1775    3055  1377          TAD     (1000           /YES,FILLER CHARACTERS
1776    3056  1036          TAD     SAVBTS          /ADD THE FILLER CHARACTER BIT TO STATUS WORD
1777    3057  3036          DCA     SAVBTS          /
1778    3060  4471          MESAGE
1779    3061  4326          MESS5A
1780    3062  1036          TAD     SAVBTS
1781    3063  7006          RTL
1782    3064  7710          SPA     CLA
1783    3065  7001          IAC
1784    3066  4475          PRNT1
1785    3067  4471          MESAGE                  /TYPE BAUD RATE(00-13)?
1786    3070  4400          MESS6
1787    3071  4471          MESAGE
1788    3072  4440          CMESS6
1789    3073  4473          TWOOCT                  /INPUT A NUMBER FROM 00-13
1790    3074  5267          JMP     .-5             /INPUT ERROR
1791    3075  3364          DCA     SAVIT           /SAVE THE NUMBER TYPED BY OPERATOR
1792    3076  1364          TAD     SAVIT           /WAS THE NUMBER WITHIN BAUD RATE LIMITS
1793    3077  1376          TAD     (-13
1794    3100  7740          SMA SZA CLA
1795    3101  5267          JMP     .-12            /NOT WITHIN LIMITS GO TYPE MESSAGE OVER
1796    3102  1364          TAD     SAVIT           /GET THE NUMBER AND PUT IN SAVBTS
1797    3103  7106          CLL     RTL
1798    3104  7004          RAL                     /PUT NUMBER IN BITS 5 6 7 AND 8
1799    3105  1036          TAD     SAVBTS          /ADD IT TO THE STATUS WORD
1800    3106  3036          DCA     SAVBTS          /AND SAVE IT
1801    3107  1036          TAD     SAVBTS
1802    3110  7012          RTR
1803    3111  7010          RAR
1804    3112  0375          AND     (17
1805    3113  1374          TAD     (MESTAB
1806    3114  3320          DCA     CHGMES
1807    3115  1720          TAD  I  CHGMES
1808    3116  3320          DCA     CHGMES
1809    3117  4471          MESAGE
```

```
1810    3120  4473    CHGMES, MESS6A
1811    3121  4471            MESAGE                  /TYPE TWO STOP BITS?
1812    3122  5100            MESS7
1813    3123  4505            YESRNO                  /WAIT FOR A Y OR N
1814    3124  5321            JMP     .-3             /INPUT ERROR
1815    3125  7610            SKP     CLA             /ONLY 1 STOP BIT
1816    3126  1373            TAD     (4              /2 STOP BITS
1817    3127  1036            TAD     SAVBTS          /ADD THE NUMBER OF STOP BITS
1818    3130  3036            DCA     SAVBTS          /TO THE STATUS WORD
1819    3131  4471            MESAGE
1820    3132  5115            MESS7A
1821    3133  1036            TAD     SAVBTS
1822    3134  0373            AND     (4
1823    3135  7650            SNA     CLA
1824    3136  7001            IAC
1825    3137  4475            PRNT1
1826    3140  4471            MESAGE                  /TYPE # OF DATA BITS (0,1,2,3)
1827    3141  5120            MESS10
1828    3142  4472            ONEOCT                  /WAIT FOR A NUMBER
1829    3143  5340            JMP     .-3             /NOT A NUMBER
1830    3144  3320            DCA     CHGMES          /SAVE THE NUMBER
1831    3145  1372            TAD     (-3             /IS IT GREATER THAN 3
1832    3146  1320            TAD     CHGMES
1833    3147  7740            SMA SZA CLA
1834    3150  5340            JMP     .-10            /YES,TRY AGAIN
1835    3151  1320            TAD     CHGMES          /
1836    3152  1036            TAD     SAVBTS          /ADD IT TO STATUS WORD
1837    3153  3036            DCA     SAVBTS          /AND SAVE IT
1838    3154  1371            TAD     (MESTB1
1839    3155  1320            TAD     CHGMES
1840    3156  3362            DCA     .+4
1841    3157  1762            TAD  I  .+3
1842    3160  3362            DCA     .+2
1843    3161  4471            MESAGE
1844    3162  5145            MES10A
1845    3163  5770'           JMP     SETUP           /GO AND CALCULATE IT
1846
1847    3164  0000    SAVIT,  0
1848    3170  0215
1849    3171  2364
1850    3172  7775
1851    3173  0004
1852    3174  2350
1853    3175  0017
1854    3176  7765
1855    3177  1000
              3200    PAGE
1856
1857
1858
1859
1860
1861
1862          3200    PAGE
1863
```



```
1864    3200  0000    FILLER, 0                       /SET TO NUMBER OF FILLERS REQUIRED
1865
1866                  /INPUT ONE OCTAL NUMBER TO AC 9 THRU 11
1867                  /GOOD RETURN IS JMS+2
1868
1869    3201  0000    ONEOCK, 0                       /CALL BY "ONEOCT"
1870    3202  4470            LISN
1871    3203  0001            1
1872    3204  3207            .+3
1873    3205  0000            0
1874    3206  3210            .+2
1875    3207  2201            ISZ     ONEOCK
1876    3210  5601            JMP I   ONEOCK
1877
1878                  /INPUT TWO OCTAL NUMBERS TO AC 6 THRU 11
1879                  /GOOD RETURN IS JMS+2
1880
1881    3211  0000    TWOOCK, 0                       /CALL BY "TWOOCT"
1882    3212  4201            JMS     ONEOCK
1883    3213  5611            JMP I   TWOOCK
1884    3214  7104            CLL RAL
1885    3215  7006            RTL
1886    3216  3224            DCA     XPRNT2
1887    3217  4201            JMS     ONEOCK
1888    3220  5611            JMP I   TWOOCK
1889    3221  1224            TAD     XPRNT2
1890    3222  2211            ISZ     TWOOCK
1891    3223  5611            JMP I   TWOOCK
1892
1893                  /PRINT THE TWO OCTAL NUMBERS IN THE AC 6 THRU 11
1894
1895    3224  0000    XPRNT2, 0                       /CALL BY "PRNT2"
1896    3225  3211            DCA     TWOOCK
1897    3226  1211            TAD     TWOOCK
1898    3227  7012            RTR
1899    3230  7010            RAR
1900    3231  4475            PRNT1
1901    3232  1211            TAD     TWOOCK
1902    3233  4475            PRNT1
1903    3234  5624            JMP I   XPRNT2
1904
1905                  /TYPE THE ASCII CHARACTER IN THE AC
1906
1907    3235  0000    XTYPE,  0                       /CALL BY "TYPE"
1908    3236  6046            TLS
1909    3237  7200            CLA
1910    3240  6041            TSF
1911    3241  5240            JMP     .-1
1912    3242  6042            TCF
1913    3243  5635            JMP I   XTYPE
1914
1915
1916
1917                  /TYPE A CR AND LF WITH NUMBER OF FILLERS
1918                  /AS DETERMINED BY LOCATION "FILLER"
```

```
                                                
3244  0000  XCRLF,  0                    /CALL BY "CRLF"
3245  7200         CLA
3246  1260         TAD     K215
3247  4501         TYPE
3250  1200         TAD     FILLER
3251  7040         CMA
3252  3261         DCA     XORS
3253  1057         TAD     K212
3254  4501         TYPE
3255  2261         ISZ     XORS
3256  5254         JMP     .-2
3257  5644         JMP I   XCRLF
3260  0215   K215,  0215

               /PERFORM THE XOR OF THE AC AND THE CALL+1
               /RETURN TO CALL+2

3261  0000   XORS,  0                    /CALL BY "XOR"
3262  3273         DCA     YESRNX
3263  1273         TAD     YESRNX
3264  0661         AND I   XORS          /IN BRIEF, TAD THE TWO
3265  7041         CIA                   /NUMBERS THEN SUBTRACT
3266  7104         CLL RAL               /THE CARRIES TO PRODUCE
3267  1273         TAD     YESRNX        /A HALF ADD (XOR)
3270  1661         TAD I   XORS
3271  2261         ISZ     XORS
3272  5661         JMP I   XORS

               /LOOK FOR "Y" OR "N" INPUT

3273  0000   YESRNX, 0                   /CALL BY "YESRNO"
3274  4470         LISN                  /INPUT ONE CHARACTER IF AC=0
3275  7447         "Y
3276  3303         .+5                   /RETURN TO CALL+3 IF "Y"
3277  7462         "N
3300  3304         .+4                   /RETURN TO CALL+2 IF "N"
3301  0000         0
3302  3305         .+3                   /RETURN TO CALL+1 IF NEITHER
3303  2273         ISZ     YESRNX
3304  2273         ISZ     YESRNX
3305  5673         JMP I   YESRNX

               /PRINT 2 SPACES

3306  0000   SPACX2, 0                   /CALL BY "SPACE2"
3307  4471         MESAGE
3310  3312         .+2
3311  5706         JMP I SPACX2
3312  4040         4040
3313  0010   K10,   0010                 /USED BY LISN


               /COMPARE INPUT TO LIST FOLLOWING CALL
               /INPUT ONE CHARACTER IF AC=0
```



```
               /USE LAST INPUT IF AC NON ZERO

3314  0000   XLISN, 0                    /CALL BY "LISN"
3315  7640         SZA CLA
3316  5340         JMP     LISN1         /USE LAST INPUT SINCE AC NOT ZERO
3317  6031         KSF
3320  5317         JMP     .-1
3321  6036         KRB
3322  0372         AND     K177
3323  1373         TAD     K200
3324  3706         DCA I   LISNT1
3325  1706         TAD I   LISNT1
3326  1374         TAD     M212
3327  7450         SNA                   /IS IT A LF?
3330  5334         JMP     .+4           /YES
3331  1375         TAD     M3
3332  7640         SZA CLA               /IS IT A CR?
3333  5336         JMP     .+3           /NO
3334  4502         CRLF
3335  5340         JMP     LISN1
3336  1706         TAD I   LISNT1
3337  4501         TYPE                  /PRINT THE CHARACTER
3340  1714   LISN1, TAD I   XLISN         /GET COMPARE VALUE
3341  2314         ISZ     XLISN
3342  7450         SNA                   /EXIT?
3343  5351         JMP     LISN3         /YES
3344  7500         SMA
3345  5361         JMP     LISNUM        /LOOK FOR OCTAL NUMBER
3346  1706         TAD I   LISNT1        /COMPARE
3347  7640         SZA CLA               /EQUAL?
3350  5356         JMP     LISN2         /NO
3351  3571   LISN3, DCA I   [XPRNT1
3352  1714         TAD I   XLISN
3353  3314         DCA     XLISN
3354  1571         TAD I   [XPRNT1
3355  5714         JMP I   XLISN         /AC IS ZERO UNLESS OCTAL NUMBER
3356  7200   LISN2, CLA
3357  2314         ISZ     XLISN
3360  5340         JMP     LISN1
3361  7200   LISNUM, CLA                 /LOOK FOR OCTAL NUMBER
3362  1706         TAD I   LISNT1
3363  1367         TAD     M270
3364  7500         SMA                   /IS IT LESS THAN 8?
3365  5356         JMP     LISN2         /NO, SO NOT AN OCTAL NUMBER
3366  1313         TAD     K10
3367  7510   M270,  SPA                   /IS IT GREATER THAN ZERO?
3370  5356         JMP     LISN2         /NO, SO NOT A NUMBER
3371  5351         JMP     LISN3
3372  0177   K177,  0177
3373  0200   K200,  0200
3374  7566   M212,  7566
3375  7775   M3,    7775
      0170   LISNT1=[SPACX2
      3400   PAGE
```

```
2029
2030
2031                    /PRINT PACKED ASCII TEXT TERMINATED BY
2032                    /SIX-BIT 00
2033
2034    3400  0000      MESAGX, 0                       /CALL BY "MESAGE"
2035    3401  7200              CLA
2036    3402  1600              TAD I   MESAGX
2037    3403  3264              DCA     FOROCK
2038    3404  2200              ISZ     MESAGX          /SET UP RETURN
2039    3405  1664              TAD I FOROCK
2040    3406  7012              RTR
2041    3407  7012              RTR
2042    3410  7012              RTR
2043    3411  4216              JMS     MESAGF
2044    3412  1664              TAD I FOROCK
2045    3413  4216              JMS     MESAGF
2046    3414  2264              ISZ     FOROCK
2047    3415  5205              JMP     .-10
2048    3416  0000      MESAGF, 0
2049    3417  0235              AND     K77
2050    3420  7450              SNA                     /TERMINATOR (00)?
2051    3421  5600              JMP I   MESAGX          /YES
2052    3422  1236              TAD     M43
2053    3423  7450              SNA                     /CRLF?
2054    3424  5233              JMP     .+7             /YES
2055    3425  1237              TAD     K3
2056    3426  7510              SPA                     /200 OR 300
2057    3427  1240              TAD     K100            /300
2058    3430  1241              TAD     K240            /200
2059    3431  4501              TYPE
2060    3432  5616              JMP  I  MESAGF
2061    3433  4502              CRLF
2062    3434  5616              JMP I   MESAGF
2063    3435  0077      K77,    0077
2064    3436  7735      M43,    7735
2065    3437  0003      K3,     0003
2066    3440  0100      K100,   0100
2067    3441  0240      K240,   0240
2068
2069                    /MODIFY DEVICE CODE FOR A LIST OF IOT ADDRESSES
2070    3442  0000      XMIOT,  0                       /CALL BY "MIOT"
2071    3443  0262              AND     K770
2072    3444  3200              DCA     MESAGX
2073    3445  1642              TAD I   XMIOT
2074    3446  2242              ISZ     XMIOT
2075    3447  3264              DCA     FOROCK
2076    3450  1664              TAD I   FOROCK          /GET NEXT ADDRESS
2077    3451  7450              SNA                     /END OF LIST? (ZERO)
2078    3452  5642              JMP I   XMIOT           /YES
2079    3453  3300              DCA     XPRNT4
2080    3454  1700              TAD I   XPRNT4          /GET IOT
2081    3455  0263              AND     K7007           /REMOVE OLD DEVCIE CODE
2082    3456  1200              TAD     MESAGX          /ADD NEW DEVICE CODE
2083    3457  3700              DCA I   XPRNT4          /PUT BACK IOT
```



```
2084    3460  2264              ISZ     FOROCK
2085    3461  5250              JMP     .-11
2086
2087
2088
2089    3462  0770      K770,   0770
2090    3463  7007      K7007,  7007
2091
2092                    /INPUT 4 OCTAL NUMBERS TO AC
2093                    /GOOD RETURN IS CALL+2
2094
2095    3464  0000      FOROCK, 0                       /CALL BY "FOROCT"
2096    3465  4473              TWOOCT
2097    3466  5664              JMP I   FOROCK
2098    3467  7106              CLL RTL
2099    3470  7006              RTL
2100    3471  7006              RTL
2101    3472  3300              DCA     XPRNT4
2102    3473  4473              TWOOCT
2103    3474  5664              JMP I   FOROCK
2104    3475  1300              TAD     XPRNT4
2105    3476  2264              ISZ     FOROCK
2106    3477  5664              JMP I   FOROCK
2107
```

```
                        /PRINT FOUR OCTAL NUMBERS IN AC 11 THRU 0 FOLLOWED
                        /BY TWO SPACES
                        
3500  0000  XPRNT4,  0                       /CALL BY "PRNT4"
3501  3264            DCA     FOROCK
3502  1264            TAD     FOROCK
3503  7012            RTR
3504  7012            RTR
3505  7012            RTR
3506  4476            PRNT2
3507  1264            TAD     FOROCK
3510  4476            PRNT2
3511  4500            SPACE2
3512  5700            JMP I   XPRNT4
                        /
                        /PRINT THE OCTAL NUMBER IN AC 9 THRU 11
3513  0000  XPRNT1,  0                       /CALL BY "PRNT1"
3514  0320            AND     K7
3515  1321            TAD     K260
3516  4501            TYPE
3517  5713            JMP I   XPRNT1
3520  0007  K7,       0007
3521  0260  K260,     0260
                        /
                        /SWAP BITES IN THE AC, PRESERVE THE LINK
                        /
3522  0000  XBSW,     0                       /CALL BY "BSWAP"
3523  3337            DCA XRAND
3524  7012            RTR
3525  7012            RTR
3526  7012            RTR
3527  1337            TAD     XRAND
3530  0336            AND     K7700
3531  1337            TAD     XRAND
3532  7006            RTL
3533  7006            RTL
3534  7006            RTL
3535  5722            JMP I XBSW
3536  7700  K7700,    7700
                        
                        /GENERATE RANDOM NUMBER
                        /EXIT WITH NUMBER IN AC
                        
3537  0000  XRAND,    0                       /CALL BY "RANDOM"
3540  7301            CLA CLL IAC
3541  1373            TAD     RAN1
3542  1374            TAD     RAN2
3543  7106            CLL RTL
3544  3373            DCA     RAN1
3545  1374            TAD     RAN2
3546  7012            RTR
3547  1373            TAD     RAN1
3550  3374            DCA     RAN2
3551  1374            TAD     RAN2
```



```
3552  0040            AND     DATBIT          /MASK CHAR FOR I/O
3553  3042            DCA     XMTDAT          /STORE
3554  5737            JMP I   XRAND
                        
                        /SAVE RANDOM
                        /GENERATOR PRIMES
                        
3555  0000  XSAVGN,  0                       /CALL BY "SAVGEN"
3556  7200            CLA
3557  1373            TAD     RAN1
3560  3375            DCA     SAV1
3561  1374            TAD     RAN2
3562  3053            DCA     SAV2
3563  5755            JMP I   XSAVGN
                        
                        /RESTORE RANDOM
                        /GENERATOR PRIMES
                        
3564  0000  XRESGN,  0                       /CALL BY "RESGEN"
3565  7200            CLA
3566  1375            TAD     SAV1
3567  3373            DCA     RAN1
3570  1053            TAD     SAV2
3571  3374            DCA     RAN2
3572  5764            JMP I   XRESGN
3573  1234  RAN1,     1234
3574  5670  RAN2,     5670
3575  0000  SAV1,     0
                        
                        /
        3600    PAGE
                        /
                        /ROUTINE TO DETERMINE IF ON APT-8 TEST SYSTEM.
                        /IF ON APT-8 NO HALTS WILL BE RECOGNIZED AND ALL PERTINENT INFORMATION
                        /WILL BE CONTAINED IN ADDRESSES 20 AND 22.
                        /
3600  0000  XAPT8,    0
3601  1022            TAD     22
3602  7104            CLL RAL
3603  7520            SMA SNL                 /ON APT8 OR MULTIPLE OPTION TESTER
3604  5210            JMP     ONAPT-3         /NO, GO CHECK FOR CONSOLE.
3605  7710            SPA CLA                 /SKIP IF NOT ON TESTER
3606  5216            JMP     ONAPT+3
3607  5213            JMP     ONAPT           /THE PROGRAM IS RUNNING UNDER NORMAL
                                              /APT CONFIGURATION
3610  4515            CHEK22                  /TEST FOR CONSOLE
3611  5777            JMP     SETUP-7         /YES
3612  5776            JMP     BGNINT+3        /NO.
3613  1020  ONAPT,    TAD     20              /GET DEVICE CODE TO USE.
3614  7440            SZA                     /TEST TO SEE IF A DEVICE CODE IS THERE
3615  3035            DCA     DEVCOD
3616  1022            TAD     22              /GET THE REST OF THE INFORMATION.
                                              /BADRATE, STATUS ENABLE,
                                              /AND DATA BITS PER WORD.
3617  7104            CLL RAL
```

```
2218  3620  0375          AND     (3000
2219  3621  3010          DCA     10              /SAVE THIS SECTION
2220  3622  1021          TAD     21              /GET PARITY BIT
2221  3623  0374          AND     (2000           /ISOLATE PARITY BIT
2222  3624  7104          CLL RAL
2223  3625  1010          TAD     10
2224  3626  3010          DCA     10              /STORE PARITY,STATUS,AND
2225                                              /FILLER CHARACTER INFORMATION.
2226  3627  1022          TAD     22
2227  3630  0033          AND     C177            /ISOLATE BAUD RATE AND DATA BITS.
2228  3631  1010          TAD     10              /GET BACK OTHER.
2229  3632  3036          DCA     SAVBTS          /STORE IT FOR THE PROGRAM USE.
2230  3633  1022          TAD     22              /SET ADDRESS 22 TO INDICATE APT.
2231  3634  0373          AND     (6000           /ISOLATE APT FEATURE SECTION OF WORD
2232  3635  3022          DCA     22
2233  3636  1036          TAD     SAVBTS
2234  3637  7010          RAR
2235  3640  7012          RTR
2236  3641  0372          AND     (17             /ISOLATE BAUD RATE
2237  3642  3024          DCA     SAVPNT
2238  3643  1024          TAD     SAVPNT          /GET BAUD RATE POINTER.
2239  3644  1371          TAD     (TABLE1
2240  3645  3124          DCA     TEMP            /TEMP STORAGE FOR TIMING
2241  3646  1524          TAD I   TEMP            /GET POINTER.
2242  3647  3264          DCA     XAERRO          /STORE FOR FUTURE USE.
2243  3650  1264          TAD     XAERRO          /GET POINTER
2244  3651  3124          DCA     TEMP            /AND STORE FOR USE BY PROGRAM.
2245  3652  7240          STA                     /SET AC TO -1 FOR AUTO INDEX.
2246  3653  1264          TAD     XAERRO          /GET BACK POINTER
2247  3654  3011          DCA     A11             /STORE VALUE
2248  3655  1664          TAD I   XAERRO          /GET VALUE
2249  3656  3121          DCA     CLKCNT          /STORE FOR APT.
2250  3657  1022          TAD     22
2251  3660  7004          RAL
2252  3661  7710          SPA CLA                 /SPECIAL FEATURES ENABLED?
2253  3662  6370          APTIO0                  /YES, INITIALIZE TO DEVICE ZERO
2254  3663  5770'         JMP     SETUP           /NOW RUN PROGRAM SKIPPING
2255                                              /INITIAL INTEROGATION.
2256                /
2257                /
2258                /ROUTINE TO REPORT ERROR TO APT-8 IF REQUIRED.
2259                /ONLY THE ERROR PC WILL BE ESTABLISHED.
2260                /
2261  3664  0000    XAERRO, 0
2262  3665  7440          SZA                     /WAS ERROR IN THE AC, SKP IF NO
2263  3666  5271          JMP     .+3
2264  3667  7240          STA                     /AC=-1
2265  3670  1264          TAD     XAERRO          /ESTABLISH PC
2266  3671  3010          DCA     10              /SAVE IT
2267  3672  1022          TAD     22              /GET HCW2
2268  3673  7004          RAL
2269  3674  7520          SMA SNL                 /SKP IF ON APT OR MULTIPLE
2270  3675  5317          JMP     EXIT            /WAS NEITHER EXIT ROUTINE.
2271  3676  6002          IOF                     /DISABLE INTERRUPT
2272  3677  7700          SMA CLA                 /MULTIPLE OPTION SELECTED?
```



```
2273  3700  5311          JMP     APTCHK          /NO, NOW GO TEST FOR APT
2274  3701  6372          APTIO2                  /SET FAIL FLAG
2275  3702  7420          SNL                     /SKP IF ON APT
2276  3703  5307          JMP     .+4
2277  3704  4517          LAS                     /GET SWITCHES
2278  3705  7710          SPA CLA                 /SKIP IF NOT GOING TO PROM
2279  3706  5313          JMP     GOTOUV          /GO TO PROM
2280  3707  4767'         JMS     NEWDEV          /GET THE NEXT DEVICE
2281  3710  5766'         JMP     CLRBRD          /AND START OVER
2282                /
2283  3711  7420    APTCHK, SNL                   /SKP IF ON APT
2284  3712  5317          JMP     EXIT            /NOT ON APT
2285                /
2286  3713  1010    GOTOUV, TAD     10            /GET BACK ERROR PC
2287  3714  6272          CIF     70              /SET FIELD TO UV PROM (7)
2288  3715  5736          JMP I   K6520           /GO TO PROM
2289  3716  5316          JMP     .               /SOMETHING WENT WRONG
2290                /
2291  3717  7300    EXIT,   CLL CLA
2292  3720  4515          CHEK22                  /TEST FOR ACTIVE CONSOLE
2293  3721  7410          SKP                     /CONSOLE ACTIVE,
2294  3722  5334          JMP     .+12
2295  3723  4517          LAS
2296  3724  7710          SPA CLA                 /HALT ON ERROR SELECTED?
2297  3725  5334          JMP     .+7             /NO, TAKE EXIT.
2298  3726  4471          MESAGE
2299  3727  4200          MPC                     /PRINT PC=
2300  3730  1010          TAD     10              /GET BACK ERROR PC
2301  3731  4477          PRNT4                   /PRINT IT
2302  3732  4765'         JMS     XC8PSW          /ASK SR QUESTION
2303  3733  5664          JMP I   XAERRO
2304  3734  2264          ISZ     XAERRO
2305  3735  5664          JMP I   XAERRO
2306  3736  6520    K6520,  6520
2307                /
2308                /ROUTINE TO LOOP ON NO ERROR FOR THE DESIRED NUMBER OF TIMES.
2309                /THIS ALSO CONTAINS THE APT TIMING SEECTION.
2310                /
2311  3737  0000    XNERRO, 0
2312  3740  1737          TAD I   XNERRO          /GET TEST TO LOOP ON
2313  3741  3356          DCA     RETURN          /STORE FOR RETURN.
2314  3742  2337          ISZ     XNERRO          /UPDATE RETURN.
2315  3743  4514          TICK                    /APT TIMING
2316  3744  4515          CHEK22                  /CONSOLE ACTIVE
2317  3745  7410          SKP                     /YES, CHECK FOR KEYBOARD FLAG.
2318  3746  5353          JMP     .+5
2319  3747  6031          KSF                     /KEYBOARD FLAG SET?
2320  3750  5353          JMP     .+3             /NO
2321  3751  6036          KRB                     /YES, READ THE CHARACTER
2322  3752  4764'         JMS     XC8CNT          /CHECK FOR CONTROL CHARACTER
2323  3753  2052          ISZ     TSTCNT
2324  3754  5756          JMP I   RETURN
2325  3755  5737          JMP I   XNERRO          /CONTINUE TESTING.
2326                /
2327  3756  0000    RETURN, 0
```

```
2328                        /
2329                        /
2330    3764  6600
2331    3765  6703
2332    3766  0271
2333    3767  4000
2334    3770  0215
2335    3771  5500
2336    3772  0017
2337    3773  6000
2338    3774  2000
2339    3775  3000
2340    3776  0203
2341    3777  0206
              4000          PAGE
2342                        /THIS ROUTINE WILL UPDATE THE DEVICE NUMBER TO TEST IF
2343                        /THE PROGRAM IS BEING RUN FOR MULTIPLE TESTING.
2344                        /
2345    4000  0000    NEWDEV, 0
2346    4001  6007            CAF
2347    4002  1020            TAD     20
2348    4003  7002            BSW                     /MOVE BIT 6 INTO BIT 0
2349    4004  7710            SPA CLA                 /TEST ALL 16 DEVICES?
2350    4005  6371            APTIO1                  /NO, ONLY EVERY OTHER ONE
2351    4006  6371            APTIO1
2352    4007  6374            APTIO4                  /IS ERROR INDICATOR SET ON THIS ONE
2353    4010  7410            SKP                     /NO, JUST EXIT ROUTINE
2354    4011  5201            JMP     NEWDEV+1
2355    4012  5600            JMP I   NEWDEV          /EXIT
2356                        /
2357                        /
2358                        /
2359                        /ROUTINE TO NOTIFIY APT THAT THE PROGRAM IS RUNNING.
2360                        /
2361    4013  0000    XTICK,  0
2362    4014  1022            TAD     22
2363    4015  0123            AND     K4000
2364    4016  7650            SNA CLA                 /ON APT??
2365    4017  5613            JMP I   XTICK           /NO, EXIT.
2366    4020  2121            ISZ     CLKCNT          /READY.
2367    4021  5613            JMP I   XTICK           /NO, EXIT.
2368    4022  1122            TAD     COUNT           /INIT COUNTER
2369    4023  3121            DCA     CLKCNT
2370    4024  6002            IOF
2371    4025  6201            CDF
2372    4026  6272            CIF     70
2373    4027  4631            JMS I   K6500
2374    4030  5613            JMP I   XTICK
2375                        /
2376    4031  6500    K6500,  6500
2377                        /
2378                        /SETS UP LOOP COUNTER AND LOOP TEST POINTER.
2379                        /
2380    4032  0000    XPCRET, 0
2381    4033  7240            CLA     CMA
```



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2382    4034  1232            TAD     XPCRET
2383    4035  3046            DCA     LOOPPC
2384    4036  1241            TAD     M10
2385    4037  3052            DCA     TSTCNT
2386    4040  5632            JMP  I  XPCRET
2387
2388    4041  7770    M10,    -10
2389
2390
2391                                                /LOOP ON TEST IF SR2=1
2392
2393    4042  0000    XSR2,   0
2394    4043  4517            LAS
2395    4044  7006            RTL
2396    4045  7710            SPA     CLA
2397    4046  5446            JMP I   LOOPPC
2398    4047  5642            JMP  I  XSR2
2399
2400    4050  0000    NOT8E,  0                       /IF SR10=1 PROCESSOR NOT PDP-8E FAMILY
2401    4051  4517            LAS
2402    4052  7012            RTR
2403    4053  7010            RAR
2404    4054  7710            SPA     CLA
2405    4055  5260            JMP     .+3
2406    4056  2250            ISZ     NOT8E
2407    4057  5650            JMP  I  NOT8E
2408    4060  1650            TAD  I  NOT8E
2409    4061  3250            DCA     NOT8E
2410    4062  5650            JMP  I  NOT8E
2411                        /
2412
2413                        /
2414                        /ROUTINE TO PERFORM A LAS .
2415                        /
2416    4063  0000    XLAS,   0
2417    4064  7300            CLL CLA
2418    4065  1021            TAD     21              /GET HCW1
2419    4066  7710            SPA CLA                 /USE HARDWARE SWITCHES?
2420    4067  7614            7614                    /LAS AND A SKP
2421    4070  1020            TAD     20              /GET PSR
2422    4071  5663            JMP I   XLAS
2423                        /
2424                        /
2425                        /
2426                        /PROGRAMED HALT INSTRUCTION. IF ON APT THIS ROUTINE IS A NOP.
2427                        /
2428    4072  0000    XHALT,  0
2429    4073  3263            DCA     XLAS            /STORE THE AC IF ANY.
2430    4074  1022            TAD     22
2431    4075  0123            AND     K4000
2432    4076  7650            SNA CLA
2433    4077  5301            JMP     XHLT            /PERFORM HALT FUNCIOTN
2434    4100  5672            JMP I   XHALT
2435                        /
2436    4101  4515    XHLT,   CHEK22                  /TEST FOR ACTIVE CONSOLE
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2437    4102  5672            JMP I   XHALT           /IGNORE HALT INSTRUCTION.
2438    4103  1263            TAD     XLAS
2439    4104  7440            SZA
2440    4105  5310            JMP     .+3
2441    4106  7340            CLL CLA CMA             /SET AC TO -1
2442    4107  1272            TAD     XHALT           /GET ERROR PC
2443    4110  7402            7402
2444    4111  7300            CLL CLA                 /CLEAR OUT ANYTHING IN AC.
2445    4112  5672            JMP I   XHALT
2446                  /
2447                  /
2448                  /THIS ROUTINE TESTS FOR ACTIVE CONSOLE PACKAGE. IF CONSOLE
2449                  /ACTIVE INSTRUCTION FOLLOWING CALL IS PERFORMED.
2450                  /
2451    4113  0000    XCHK22, 0
2452    4114  7300            CLL CLA
2453    4115  1022            TAD     22
2454    4116  0322            AND     K400
2455    4117  7650            SNA CLA                 /CONSOLE ACTIVE?
2456    4120  2313            ISZ     XCHK22          /NO, UPDATE RETURN
2457    4121  5713            JMP I   XCHK22
2458                  /
2459    4122  0400    K400,   400
2460                  /
2461                  /RANDM1- GETS A RANDOM NUMBER (PUT IN XMTDAT) AND PUTS IT IN ITS
2462                  /PROPER LOCATION WHILE SAVING THE CONTENTS OF XMTDAT
2463                  /
2464    4123  0000    XRAND1, 0
2465    4124  7300            CLA CLL
2466    4125  1042            TAD     XMTDAT          /GET FIRST DATA WORD
2467    4126  3335            DCA     TEMSAV          /AND SAVE IT
2468    4127  4506            RANDOM                  /GET THE SECOND DATA WORD
2469    4130  1042            TAD     XMTDAT          /TRANSFER IT TO ITS PROPER LOCATION
2470    4131  3043            DCA     XMTDT1
2471    4132  1335            TAD     TEMSAV          /GET THE FIRST DATA WORD OUT OF ITS
2472    4133  3042            DCA     XMTDAT          /TEMP STORAGE AND RESTOE IT TO ITS PROPER LOCATION
2473    4134  5723            JMP I   XRAND1          /EXIT
2474                  /
2475    4135  0000    TEMSAV, 0
2476                  /
2477          4200    PAGE
2478                  /
2479                  /
2480                  /MESSAGES
2481    4200  4320    MPC,    TEXT    "#PC= "
        4201  0375
        4202  4000
2482    4203  4322    MESS1,  TEXT    "#RECEIVE IOT?  "
        4204  0503
        4205  0511
        4206  2605
        4207  4011
        4210  1724
        4211  7740
        4212  4000
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2483    4213  4324    MESS2,  TEXT    "#TRANSMIT IOT?  "
        4214  2201
        4215  1623
        4216  1511
        4217  2440
        4220  1117
        4221  2477
        4222  4040
        4223  0000
2484    4224  4320    MESS3,  TEXT    "#PARITY(Y OR N)?  "
        4225  0122
        4226  1124
        4227  3150
        4230  3140
        4231  1722
        4232  4016
        4233  5177
        4234  4040
        4235  0000
2485    4236  4040    MESS3A, TEXT    "  NP="
        4237  1620
        4240  7500
2486    4241  7743    MESS4,  TEXT    "?#EVEN PARITY EVN=0?  ODD PARITY EVN=1?#STATUS ENABLED(Y OR N)?  "
        4242  0526
        4243  0516
        4244  4020
        4245  0122
        4246  1124
        4247  3140
        4250  0526
        4251  1675
        4252  6077
        4253  4040
        4254  1704
        4255  0440
        4256  2001
        4257  2211
        4260  2431
        4261  4005
        4262  2616
        4263  7561
        4264  7743
        4265  2324
        4266  0124
        4267  2523
        4270  4005
        4271  1601
        4272  0214
        4273  0504
        4274  5031
        4275  4017
        4276  2240
        4277  1651
        4300  7740
        4301  4000
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 2487    4302  4040    MESS4A, TEXT    "  SWD="
         4303  2327
         4304  0475
         4305  0000
 2488    4306  7743    MESS5,  TEXT    "?#FILLER CHARACTERS(Y OR N)?  "
         4307  0611
         4310  1414
         4311  0522
         4312  4003
         4313  1001
         4314  2201
         4315  0324
         4316  0522
         4317  2350
         4320  3140
         4321  1722
         4322  4016
         4323  5177
         4324  4040
         4325  0000
 2489    4326  4040    MESS5A, TEXT    "  FIL="
         4327  0611
         4330  1475
         4331  0000
 2490          4400    PAGE
 2491
 2492    4400  7743    MESS6,  TEXT    "?#BAUD RATE(00-13)? 00=110 01=150 02=300 03=600 04=1200 05=2400"
         4401  0201
         4402  2504
         4403  4022
         4404  0124
         4405  0550
         4406  6060
         4407  5561
         4410  6351
         4411  7740
         4412  6060
         4413  7561
         4414  6160
         4415  4060
         4416  6175
         4417  6165
         4420  6040
         4421  6062
         4422  7563
         4423  6060
         4424  4060
         4425  6375
         4426  6660
         4427  6040
         4430  6064
         4431  7561
         4432  6260
         4433  6040
         4434  6065
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         4435  7562
         4436  6460
         4437  6000
 2493    4440  4360    CMESS6, TEXT    "#06=4800 07=9600 10=19,200 11=56.8 12=66.7 13=1050  "
         4441  6675
         4442  6470
         4443  6060
         4444  4060
         4445  6775
         4446  7166
         4447  6060
         4450  4061
         4451  6075
         4452  6171
         4453  5462
         4454  6060
         4455  4061
         4456  6175
         4457  6566
         4460  5670
         4461  4061
         4462  6275
         4463  6666
         4464  5667
         4465  4061
         4466  6375
         4467  6160
         4470  6560
         4471  4040
         4472  0000
 2494
 2495    4473  4361    MESS6A, TEXT    "#110 BAUD = B1=0? B2=0? B3=0? W2=1? W5=0?"
         4474  6160
         4475  4002
         4476  0125
         4477  0440
         4500  5540
         4501  0261
         4502  7560
         4503  7740
         4504  0262
         4505  7560
         4506  7740
         4507  0263
         4510  7560
         4511  7740
         4512  2762
         4513  7561
         4514  7740
         4515  2765
         4516  7560
         4517  7700
 2496    4520  4361    MESS6B, TEXT    "#150 BAUD = B1=0? B2=0? B3=1? W2=1? W5=0?"
         4521  6560
         4522  4002
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                4523  0125
                4524  0440
                4525  5540
                4526  0261
                4527  7560
                4530  7740
                4531  0262
                4532  7560
                4533  7740
                4534  0263
                4535  7561
                4536  7740
                4537  2762
                4540  7561
                4541  7740
                4542  2765
                4543  7560
                4544  7700
2497            4545  4363    MESS6C, TEXT    "#300 BAUD - B1=0? B2=1? B3=0? W2=1? W5=0?"
                4546  6060
                4547  4002
                4550  0125
                4551  0440
                4552  5540
                4553  0261
                4554  7560
                4555  7740
                4556  0262
                4557  7561
                4560  7740
                4561  0263
                4562  7560
                4563  7740
                4564  2762
                4565  7561
                4566  7740
                4567  2765
                4570  7560
                4571  7700
2498            4572  4366    MESS6D, TEXT    "#600 BAUD - B1=0? B2=1? B3=1? W2=1? W5=0?"
                4573  6060
                4574  4002
                4575  0125
                4576  0440
                4577  5540
                4600  0261
                4601  7560
                4602  7740
                4603  0262
                4604  7561
                4605  7740
                4606  0263
                4607  7561
                4610  7740
                4611  2762
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                4612  7561
                4613  7740
                4614  2765
                4615  7560
                4616  7700
2499            4617  4361    MESS6E, TEXT    "#1200 BAUD - B1=1? B2=0? B3=0? W2=1? W5=0?"
                4620  6260
                4621  6040
                4622  0201
                4623  2504
                4624  4055
                4625  4002
                4626  6175
                4627  6177
                4630  4002
                4631  6275
                4632  6077
                4633  4002
                4634  6375
                4635  6077
                4636  4027
                4637  6275
                4640  6177
                4641  4027
                4642  6575
                4643  6077
                4644  0000
2500            4645  4362    MESS6F, TEXT    "#2400 BAUD - B1=1? B2=0? B3=1? W2=1? W5=0?"
                4646  6460
                4647  6040
                4650  0201
                4651  2504
                4652  4055
                4653  4002
                4654  6175
                4655  6177
                4656  4002
                4657  6275
                4660  6077
                4661  4002
                4662  6375
                4663  6177
                4664  4027
                4665  6275
                4666  6177
                4667  4027
                4670  6575
                4671  6077
                4672  0000
2501            4673  4364    MESS6G, TEXT    "#4800 BAUD - B1=1? B2=1? B3=0? W2=1? W5=0?"
                4674  7060
                4675  6040
                4676  0201
                4677  2504
                4700  4055
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                4701  4002
                4702  6175
                4703  6177
                4704  4002
                4705  6275
                4706  6177
                4707  4002
                4710  6375
                4711  6077
                4712  4027
                4713  6275
                4714  6177
                4715  4027
                4716  6575
                4717  6077
                4720  0000
2502            4721  4371    MESS6H, TEXT    "#9600 BAUD - B1=1? B2=1? B3=1? W2=1? W5=0?"
                4722  6660
                4723  6040
                4724  0201
                4725  2504
                4726  4055
                4727  4002
                4730  6175
                4731  6177
                4732  4002
                4733  6275
                4734  6177
                4735  4002
                4736  6375
                4737  6177
                4740  4027
                4741  6275
                4742  6177
                4743  4027
                4744  6575
                4745  6077
                4746  0000
2503
2504            4747  4361    MESS6I, TEXT    "#19,200 BAUD - B1=1? B2=1? B3=1? W2=0? W5=1?"
                4750  7154
                4751  6260
                4752  6040
                4753  0201
                4754  2504
                4755  4055
                4756  4002
                4757  6175
                4760  6177
                4761  4002
                4762  6275
                4763  6177
                4764  4002
                4765  6375
                4766  6177
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                4767  4027
                4770  6275
                4771  6077
                4772  4027
                4773  6575
                4774  6177
                4775  0000
2505            4776  4365    MESS6J, TEXT    "#56.8 BAUD - B1=0? B2=0? B3=0? W2=1? W5=0?"
                4777  6656
                5000  7040
                5001  0201
                5002  2504
                5003  4055
                5004  4002
                5005  6175
                5006  6077
                5007  4002
                5010  6275
                5011  6077
                5012  4002
                5013  6375
                5014  6077
                5015  4027
                5016  6275
                5017  6177
                5020  4027
                5021  6575
                5022  6077
                5023  0000
2506            5024  4366    MESS6K, TEXT    "#66.7 BAUD - B1=0? B2=0? B3=0? W2=1? W5=0?"
                5025  6656
                5026  6740
                5027  0201
                5030  2504
                5031  4055
                5032  4002
                5033  6175
                5034  6077
                5035  4002
                5036  6275
                5037  6077
                5040  4002
                5041  6375
                5042  6077
                5043  4027
                5044  6275
                5045  6177
                5046  4027
                5047  6575
                5050  6077
                5051  0000
2507            5052  4361    MESS6L, TEXT    "#1050 BAUD - B1=1? B2=0? B3=0? W2=1? W5=0?"
                5053  6065
                5054  6040
                5055  0201
```

```
                5056  2504
                5057  4055
                5060  4002
                5061  6175
                5062  6177
                5063  4002
                5064  6275
                5065  6077
                5066  4002
                5067  6375
                5070  6077
                5071  4027
                5072  6275
                5073  6177
                5074  4027
                5075  6575
                5076  6077
                5077  0000
2508            5100  4324    MESS7,  TEXT    "#TWO STOP BITS(Y OR N)?  "
                5101  2717
                5102  4023
                5103  2417
                5104  2040
                5105  0211
                5106  2423
                5107  5031
                5110  4017
                5111  2240
                5112  1651
                5113  7740
                5114  4000
2509            5115  4040    MESS7A, TEXT    "  SB="
                5116  2302
                5117  7500
2510            5120  7743    MESS10, TEXT    "?#DATA BITS/CHARACTER? 0=5 1=6 2=7 3=8  "
                5121  0401
                5122  2401
                5123  4002
                5124  1124
                5125  2357
                5126  0310
                5127  0122
                5130  0103
                5131  2405
                5132  2277
                5133  4060
                5134  7565
                5135  4061
                5136  7566
                5137  4062
                5140  7567
                5141  4063
                5142  7570
                5143  4040
                5144  0000
```



```
2511
2512            5145  4365    MES10A, TEXT    "#5 DATA BITS - NB1=1? NB2=1?#"
                5146  4004
                5147  0124
                5150  0140
                5151  0211
                5152  2423
                5153  4055
                5154  4016
                5155  0261
                5156  7561
                5157  7740
                5160  1602
                5161  6275
                5162  6177
                5163  4300
2513            5164  4366    MES10B, TEXT    "#6 DATA BITS - NB1=0? NB2=1?#"
                5165  4004
                5166  0124
                5167  0140
                5170  0211
                5171  2423
                5172  4055
                5173  4016
                5174  0261
                5175  7560
                5176  7740
                5177  1602
                5200  6275
                5201  6177
                5202  4300
2514            5203  4367    MES10C, TEXT    "#7 DATA BITS - NB1=1? NB2=0?#"
                5204  4004
                5205  0124
                5206  0140
                5207  0211
                5210  2423
                5211  4055
                5212  4016
                5213  0261
                5214  7561
                5215  7740
                5216  1602
                5217  6275
                5220  6077
                5221  4300
2515            5222  4370    MES10D, TEXT    "#8 DATA BITS - NB1=0? NB2=0?#"
                5223  4004
                5224  0124
                5225  0140
                5226  0211
                5227  2423
                5230  4055
                5231  4016
                5232  0261
```

```
                5233  7560
                5234  7740
                5235  1602
                5236  6275
                5237  6077
                5240, 4300
2516            5241  0320    RECPNT, KCF0
2517            5242  0401            KCF1
2518            5243  0501            KCF2
2519            5244  0551            KCF3
2520            5245  1143            KCF4
2521            5246  0276            KSF0
2522            5247  0336            KSF1
2523            5250  0354            KSF2
2524            5251  0471            KSF3
2525            5252  0537            KSF4
2526            5253  0600            KSF5
2527            5254  0720            KSF6
2528            5255  0733            KSF7
2529            5256  2713            KSF8
2530            5257  1013            KSF9
2531            5260  1037            KSF10
2532            5261  1065            KSF11
2533            5262  1077            KSF12
2534            5263  1116            KSF14
2535            5264  1137            KSF16
2536            5265  1144            KSF17
2537            5266  1425            KSF18
2538            5267  1523            FDTLOP
2539            5270  1541            KSF19
2540            5271  1675            KSF21
2541            5272  1744            KSF22
2542            5273  1762            KSF23
2543            5274  1341            KSF24
2544            5275  2036            KSF25
2545            5276  2063            KSF26
2546            5277  0607            KCC0
2547            5300  0712            KCC1
2548            5301  1036            KCC2
2549            5302  1063            KCC3
2550            5303  1136            KCC4
2551            5304  1757            KCC5
2552            5305  2000            KCC6
2553            5306  0625            KRS0
2554            5307  1010            KRS1
2555            5310  2040            KRS2
2556            5311  2046            KRS3
2557            5312  1335            KSE0
2558            5313  2023            KSE1
2559            5314  2045            KSE2
2560            5315  2054            KSE3
2561            5316  0403            KIE0
2562            5317  0422            KIE1
2563            5320  0457            KIE2
2564            5321  0502            KIE3
```



```
2565            5322  0536            KIE4
2566            5323  0615            KIE5
2567            5324  0707            KIE6
2568            5325  0747            KIE7
2569            5326  0757            KIE8
2570            5327  1026            KIE9
2571            5330  1052            KIE10
2572            5331  0634            KRB0
2573            5332  1113            KRB1
2574            5333  1410            KRB2
2575            5334  1437            KRB3
2576            5335  1504            KRB4
2577            5336  1511            KRB5
2578            5337  1526            KRB6
2579            5340  1544            KRB7
2580            5341  1615            KRB8
2581            5342  1654            KRB9
2582            5343  1711            KRB10
2583            5344  2313            INTON
2584            5345  1351            KRB11
2585            5346  2014            KRB12
2586            5347  2060            KRB13
2587            5350  2070            KRB14
2588                          /
2589                          /
2590            5351  0000            0000
2591
2592
2593            5352  0323    XMTIOT, TFL0
2594            5353  0345            TFL1
2595            5354  0406            TFL2
2596            5355  0452            TFL3
2597            5356  0503            TFL4
2598            5357  0520            TFL5
2599            5360  0645            TFL6
2600            5361  0301            TSF0
2601            5362  0326            TSF1
2602            5363  0333            TSF2
2603            5364  0346            TSF3
2604            5365  0351            TSF4
2605            5366  0407            TSF5
2606            5367  0425            TSF6
2607            5370  0437            TSF7
2608            5371  0453            TSF8
2609            5372  0504            TSF9
2610            5373  0512            TSF10
2611            5374  0521            TSF11
2612            5375  0533            TSF12
2613            5376  0663            TSF13
2614            5377  0723            TSF14
2615            5400  2675            TSF15
2616            5401  1000            TSF16
2617            5402  1003            TSF17
2618            5403  1070            TSF18
2619            5404  1106            TSF20
```

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2620    5405  1124            TSF22
2621    5406  1421            TSF23
2622    5407  1516            TSF24
2623    5410  1535            TSF25
2624    5411  1553            TSF26
2625    5412  1672            TSF28
2626    5413  1747            TSF29
2627    5414  2310            TSF30
2628    5415  2322            TSF31
2629    5416  1344            TSF32
2630    5417  0330            TCF0
2631    5420  0436            TCF1
2632    5421  0470            TCF2
2633    5422  0532            TCF3
2634    5423  0654            TCF4
2635    5424  0715            TCF5
2636    5425  1002            TCF6
2637    5426  1064            TCF7
2638    5427  1123            TCF8
2639    5430  1412            TCF9
2640    5431  1505            TCF10
2641    5432  1512            TCF11
2642    5433  1611            TCF12
2643    5434  1656            TCF13
2644    5435  1346            TCF14
2645    5436  2015            TCF15
2646    5437  2035            TCF16
2647    5440  0726            TPC0
2648    5441  1073            TPC1
2649    5442  0304            SPI0
2650    5443  0411            SPI1
2651    5444  0427            SPI2
2652    5445  0442            SPI3
2653    5446  0455            SPI4
2654    5447  0460            SPI5
2655    5450  0506            SPI6
2656    5451  0515            SPI7
2657    5452  0523            SPI8
2658    5453  0672            SPI9
2659    5454  0736            SPI10
2660    5455  0750            SPI11
2661    5456  0760            SPI12
2662    5457  1015            SPI13
2663    5460  1027            SPI14
2664    5461  1042            SPI15
2665    5462  1102            TLS0
2666    5463  1420            XMIT
2667    5464  1515            TLS1
2668    5465  1522            TLS2
2669    5466  1540            TLS3
2670    5467  1556            TLS4
2671    5470  1606            TLS5
2672    5471  1665            TLS6
2673    5472  2307            TLS7
2674    5473  2315            TLS8
```



```
2675    5474  2026            TLS9
2676    5475  1424            TLS10
2677    5476  1340            SLWTLS
2678                  /
2679                  /
2680    5477  0000            0000
2681                  /BAUD RATE TABLES FOR USE ONLY UNDER APT-8 TEST SYSTEM.
2682                  /
2683    5500  5514    TABLE1, B110
2684    5501  5523            B150
2685    5502  5532            B300
2686    5503  5541            B600
2687    5504  5550            B1200
2688    5505  5557            B2400
2689    5506  5566            B4800
2690    5507  5575            B9600
2691    5510  5604            B19K2
2692    5511  5613            B56P8
2693    5512  5622            B66P7
2694    5513  5631            B1050
2695                  /
2696                  /ACTUAL VALUES TO USE FOR THE APT TIMING SECTION.
2697                  /
2698    5514  7677    B110,   -101
2699    5515  7750            -30
2700    5516  7765            -13
2701    5517  7771            -7
2702    5520  7765            -13
2703    5521  7765            -13
2704    5522  7770            -10
2705                  /150 BAUD
2706                  /
2707    5523  7677    B150,   -101
2708    5524  7750            -30
2709    5525  7760            -20
2710    5526  7765            -13
2711    5527  7761            -17
2712    5530  7761            -17
2713    5531  7770            -10
2714                  /300 BAUD
2715                  /
2716    5532  7677    B300,   -101
2717    5533  7750            -30
2718    5534  7740            -40
2719    5535  7752            -26
2720    5536  7744            -34
2721    5537  7744            -34
2722    5540  7770            -10
2723                  /
2724                  /600 BAUD
2725    5541  7647    B600,   -131
2726    5542  0000            0
2727    5543  7700            -100
2728    5544  7724            -54
2729    5545  7700            -100
```

```
2730    5546  7700            -100
2731    5547  0000            0
2732                  /
2733                  /1200 BAUD
2734    5550  7647    B1200,  -131
2735    5551  0000            0
2736    5552  7600            -200
2737    5553  7650            -130
2738    5554  7600            -200
2739    5555  7600            -200
2740    5556  0000            0
2741                  /2400 BAUD
2742                  /
2743    5557  7247    B2400,  -531
2744    5560  0000            0
2745    5561  0000            0
2746    5562  0000            0
2747    5563  7400            -400
2748    5564  7400            -400
2749    5565  0000            0
2750                  /
2751                  /4800 BAUD
2752    5566  7247    B4800,  -531
2753    5567  0000            0
2754    5570  0000            0
2755    5571  0000            0
2756    5572  7400            -400
2757    5573  7400            -400
2758    5574  0000            0
2759                  /
2760                  /9600 BAUD
2761    5575  6247    B9600,  -1531
2762    5576  0000            0
2763    5577  0000            0
2764    5600  0000            0
2765    5601  0000            0
2766    5602  0000            0
2767    5603  0000            0
2768                  /
2769                  /19.2 KILo BAUD.
2770    5604  6247    B19K2,  -1531
2771    5605  0000            0
2772    5606  0000            0
2773    5607  0000            0
2774    5610  0000            0
2775    5611  0000            0
2776    5612  0000            0
2777                  /
2778                  /56.8 BAUD.
2779    5613  7740    B56P8,  -40
2780    5614  7763            -15
2781    5615  7772            -6
2782    5616  7775            -3
2783    5617  7772            -6
2784    5620  7772            -6
```



```
2785    5621  7773            -5
2786                  /
2787                  /66.7 BAUD
2788    5622  7740    B66P7,  -40
2789    5623  7763            -15
2790    5624  7772            -6
2791    5625  7775            -3
2792    5626  7772            -6
2793    5627  7772            -6
2794    5630  7773            -5
2795                  /
2796                  /1050 BUAD
2797    5631  7647    B1050,  -131
2798    5632  0000            0
2799    5633  7600            -200
2800    5634  7650            -130
2801    5635  7600            -200
2802    5636  7600            -200
2803    5637  0000            0
2804                  /
2805
2806                  /STANDARD CONSOLE PACKAGE.
2807                  /THE FOLLOWING PARAMETERS MUST BE DEFINED PRIOR TO
2808                  /ASSEMBLY.
2809                  /THSFLD         THIS DEFINES THE FIELD THE ROUTINE
2810                  /               WILL RESIDE IN
2811                  /CALFLD         THIS DEFINES CALLING FIELD.
2812                  /ORIGIN         STARTING ADDRESS OF ROUTINES
2813                  /STRTST DEFINES RESTART TEST FOR LINE FEED DETECTION.
2814                  /
2815          0000    THSFLD=0                        /FIELD 0
2816          0000    CALFLD=00                       /CALLING FIELD
2817          6600    ORIGIN=6600                     /START AT ADDRESS 6600
2818          0000    CONFLD=THSFLD^10
2819          0000    PRGFLD=CALFLD^10
2820          0271    STRTST=CLRBRD
2821
2822    0170  3306
2823    0171  3513
2824    0172  7700
2825    0173  1600
2826    0174  1400
2827    0175  2646
2828    0176  4060
2829    0177  7400
2830          0000    FIELD   THSFLD
```

```
0000  11110000  01000000  11111111  11111111  11111111  11111111  11111111  11111111
0100  11111111  11111111  11111000  00000000  00000000  00000000  00000000  11111111

0200  11111111  11111111  11111111  11111111  11111111  11111111  11111111  11111111
0300  11111111  11111111  11111111  11111111  11111111  11111111  11100111  11111111

0400  11111111  11111111  11111111  11111111  11111111  11111111  11111111  11111111
0500  11111111  11111111  11111111  11111111  11111111  11111111  10000000  00000111

0600  11111111  11111111  11111111  11111111  11111111  11111111  11111111  11111111
0700  11111111  11111111  11111111  11111111  11111111  11111111  11111111  10011111

1000  11111111  11111111  11111111  11111111  11111111  11111111  11111111  11111111
1100  11111111  11111111  11111111  11111111  11111111  11111111  11111110  00000001

1200  11111111  11111111  11111111  11111111  11111111  11111111  11111111  11111111
1300  11111111  11111111  11111111  11111111  11111111  11111111  11111111  11111110

1400  11111111  11111111  11111111  11111111  11111111  11111111  11111111  11111111
1500  11111111  11111111  11111111  11111111  11111111  11111111  11111111  11000000

1600  11111111  11111111  11111111  11111111  11111111  11111111  11111111  11111111
1700  11111111  11111111  11111111  11111111  11111111  11111111  11111111  11111111

2000  11111111  11111111  11111111  11111111  11111111  11111111  11111111  11111111
2100  11111111  11111111  11111111  11111111  11111111  11111111  11111111  11111111

2200  11111111  11111111  11111111  11111111  11111111  11111111  11111111  11111111
2300  11111111  11111111  11111111  11111111  11111111  11111111  11111111  00000111

2400  11111111  11111111  11111111  11111111  11111111  11111111  11111111  11111111
2500  11111111  11111111  11111111  11111111  11111111  11111111  11111111  11111111

2600  11111111  11111111  11111111  11111111  11111111  11111111  11111111  11111111
2700  11111111  11111111  11111000  00000000  00000000  00000000  00000000  00000011

3000  11111111  11111111  11111111  11111111  11111111  11111111  11111111  11111111
3100  11111111  11111111  11111111  11111111  11111111  11111111  11111000  11111111

3200  11111111  11111111  11111111  11111111  11111111  11111111  11111111  11111111
3300  11111111  11111111  11111111  11111111  11111111  11111111  11111111  11111100

3400  11111111  11111111  11111111  11111111  11111111  11111111  11111111  11111111
3500  11111111  11111111  11111111  11111111  11111111  11111111  11111111  11111100

3600  11111111  11111111  11111111  11111111  11111111  11111111  11111111  11111111
3700  11111111  11111111  11111111  11111111  11111111  11111110  00001111  11111111
```



```
4000  11111111  11111111  11111111  11111111  11111111  11111111  11111111  11111111
4100  11111111  11111111  11111111  11111100  00000000  00000000  00000000  00000000

4200  11111111  11111111  11111111  11111111  11111111  11111111  11111111  11111111
4300  11111111  11111111  11111111  11000000  00000000  00000000  00000000  00000000

4400  11111111  11111111  11111111  11111111  11111111  11111111  11111111  11111111
4500  11111111  11111111  11111111  11111111  11111111  11111111  11111111  11111111

4600  11111111  11111111  11111111  11111111  11111111  11111111  11111111  11111111
4700  11111111  11111111  11111111  11111111  11111111  11111111  11111111  11111111

5000  11111111  11111111  11111111  11111111  11111111  11111111  11111111  11111111
5100  11111111  11111111  11111111  11111111  11111111  11111111  11111111  11111111

5200  11111111  11111111  11111111  11111111  11111111  11111111  11111111  11111111
5300  11111111  11111111  11111111  11111111  11111111  11111111  11111111  11111111

5400  11111111  11111111  11111111  11111111  11111111  11111111  11111111  11111111
5500  11111111  11111111  11111111  11111111  11111111  11111111  11111111  11111111

5600  11111111  11111111  11111111  11111111  00000000  00000000  00000000  00000000
5700  00000000  00000000  00000000  00000000  00000000  00000000  00000000  00000000

6000
6100

6200
6300

6400
6500

6600
6700

7000
7100

7200
7300

7400
7500

7600
7700
```

```
2831          6600    *ORIGIN
2832                  /CONTROL CHARACTER DECODE ROUTINE.
2833                  /ENTER WITH CHARACTER IN THE AC.
2834    6600  0000    XC8CNT, 0
2835    6601  3360            DCA     C8CHAR          /STORE CHARACTER.
2836    6602  6214            RDF                     /GET CALLING DATA FIELD.
2837    6603  1257            TAD     KCDFIF          /SET UP RETURN FIELD.
2838    6604  3241            DCA     FLDRTN          /STORE IT
2839    6605  3252            DCA     INDEXA          /SET DISPLACEMENT TO 0
2840    6606  1254            TAD     XTABLA
2841    6607  3253            DCA     GETDAT          /SET UP POINTER TABLE.
2842    6610  6201            CDF     CONFLD
2843    6611  1653    REDOA,  TAD I   GETDAT          /GET CONTROL CHARACTER
2844    6612  7450            SNA                     /END OF TABLE.
2845    6613  5222            JMP     DONEA           /YES.
2846    6614  1360            TAD     C8CHAR
2847    6615  7650            SNA CLA                 /GET A MATCH?
2848    6616  5243            JMP     GOITA           /YES.
2849    6617  2252            ISZ     INDEXA          /NO, UPDATE DISPLACEMENT
2850    6620  2253            ISZ     GETDAT          /UPDATE POINTER.
2851    6621  5211            JMP     REDOA           /GET NEXT COMPARE.
2852    6622  1360    DONEA,  TAD     C8CHAR          /GET BACK CHARACTER.
2853    6623  1777'           TAD     C8M260
2854    6624  7700            SMA CLA
2855    6625  5234            JMP     .+7             /NO, THEN JUST PRINT IT.
2856    6626  1360            TAD     C8CHAR
2857    6627  4776'           JMS     TSTCRL          /GO TEST FOR CRLF.
2858    6630  5236            JMP     FLDRTN+3        /CRLF FOUND.
2859    6631  1775'           TAD     ARROW
2860    6632  4774'           JMS     XC8TYP          /PRINT ^
2861    6633  1256            TAD     C80100          /SET UP CHARACTER
2862    6634  1360            TAD     C8CHAR
2863    6635  4774'           JMS     XC8TYP          /PRINT IT.
2864    6636  1260            TAD     C8K277
2865    6637  4774'           JMS     XC8TYP          /PRINT ?
2866    6640  4773'           JMS     XC8CRL          /AND <CRLF>
2867    6641  6203    FLDRTN, CIF CDF PRGFLD          /RETURN FIELD.
2868    6642  5600            JMP I   XC8CNT          /EXIT BACK TO CALL.
2869                  /
2870    6643  1255    GOITA,  TAD     XTABLB          /GET CONTROL CHARACTER ROUTINES.
2871    6644  1252            TAD     INDEXA          /ADD IN OFFSET
2872    6645  3251            DCA     GOTOA           /STORE THIS
2873    6646  1651            TAD I   GOTOA           /GET ACTUAL POINTER.
2874    6647  3251            DCA     GOTOA
2875    6650  5651            JMP I   GOTOA           /PERFORM FUNCTION.
2876                  /
2877                  /CONSTANTS USED BY THIS ROUTINE.
2878                  /
2879    6651  0000    GOTOA,  0
2880    6652  0000    INDEXA, 0
2881    6653  0000    GETDAT, 0
2882    6654  7254    XTABLA, TABLA
2883    6655  7261    XTABLB, TABLB
2884                  /
2885                  /
```



```
2886    6656  0100    C80100, 100
2887    6657  6203    KCDFIF, CDF CIF
2888    6660  0277    C8K277, 277
2889                  /
2890                  /ABORT PRINT OUT ROUTINE.
2891                  /ALL TERMINAL OUTPUT IS STOPPED UNTIL A "^Q" IS INPUT
2892                  /ALL OTHER CONTROL FUNCTIONS CAN BE PERFORMED.
2893                  /
2894    6661  1302    CNTRLS, TAD     INMODE
2895    6662  7640            SZA CLA                 /HAS ROUTINE BEEN ENTERED BEFORE.
2896    6663  5272            JMP     .+7
2897    6664  1200            TAD     XC8CNT
2898    6665  3301            DCA     C8RTRN          /STORE RETURN ADDRESS.
2899    6666  7240            STA
2900    6667  3302            DCA     INMODE          /SET UP FOR A REENTRY.
2901    6670  4772'           JMS     XC8TTY          /GO BACK AND WAIT FOR NEXT CHARACTER.
2902    6671  4200            JMS     XC8CNT          /DECODE FOR CONTROL FUNCTION.
2903    6672  5270            JMP     .-2             /NO CONTROL FUNTION, GO BACK AND WAIT.
2904                  /
2905                  /CONTROL Q FUNCTION.
2906                  /CLEARS INMODE POINTER, AND SETS UP PROPER RETURN
2907                  /TO CALLING FIELD.
2908                  /
2909    6673  1302    CNTRLQ, TAD     INMODE
2910    6674  7650            SNA CLA                 /HAS CONTOL S BEEN TYPED.?
2911    6675  5241            JMP     FLDRTN          /NO.
2912    6676  3302            DCA     INMODE          /CLEAR REENTRY POINTER
2913    6677  6203    ACTFLD, CIF CDF PRGFLD
2914    6700  5701            JMP I   C8RTRN          /AND TAKE A RETURN
2915                  /
2916    6701  0000    C8RTRN, 0000                    /GETS SETUP TO RETURN ADDRESS.
2917    6702  0000    INMODE, 0000
2918                  /
2919                  /LOADS PSEUDO-SWITCH REGISTER WITH NEW VALUE.
2920                  /
2921    6703  0000    XC8PSW, 0
2922    6704  7300            CLA CLL
2923    6705  6214            RDF                     /GET CLING DATA FIELD
2924    6706  1257            TAD     KCDFIF
2925    6707  3347            DCA     PSWRTN          /SET UP RETURNING FIELD
2926    6710  6201            CDF     CONFLD          /SET DATA FIELD TO FIELD OF CONSOLE.
2927    6711  7200            CLA
2928    6712  3357            DCA     CHRTMP
2929    6713  4773'           JMS     XC8CRL          /<CRLF>
2930    6714  4771'           JMS     XC8PNT
2931    6715  7265            MESA                    /PRINT "SR="
2932    6716  6201            CDF     PRGFLD          /SET UP FIELD OF PSW.
2933    6717  1770            TAD I   (20             /GET PSEUDO SWITCH REGISTER.
2934    6720  6201            CDF     CONFLD          /RESTORE FELDS.
2935    6721  3767'           DCA     C8STOR
2936    6722  1767'           TAD     C8STOR
2937    6723  4766'           JMS     XC8OCT          /PRINT THE CURRENT VALUE.
2938    6724  1356            TAD     C8M4
2939    6725  3765'           DCA     TMPCNT          /SET UP TO INPUT FOUR CHARACTERS.
2940    6726  1764'           TAD     C8K240
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2941    6727  4774'           JMS     XC8TYP          /PRINT A SPACE.
2942    6730  4772'           JMS     XC8TTY          /GET A CHARACTER.
2943    6731  4763'           JMS     TSTCHA          /CHECK FOR A VALID CHARACTER.
2944    6732  5304            JMP     .XC8PSW+1       /ERROR RETURN.
2945    6733  3360            DCA     C8CHAR
2946    6734  1357            TAD     CHRTMP
2947    6735  7106            CLL RTL
2948    6736  7004            RAL                     /MOVE OVER THREE BITS
2949    6737  1360            TAD     C8CHAR
2950    6740  3357            DCA     CHRTMP          /AND STORE IT.
2951    6741  2765'           ISZ     TMPCNT          /DONE YET.
2952    6742  5330            JMP     .-12            /NO, GET NEXT VALUE.
2953    6743  4773'           JMS     XC8CRL
2954    6744  6201    TSTRTN, CDF     PRGFLD
2955    6745  1357            TAD     CHRTMP          /GET NEW SWITCH VALUE
2956    6746  3770            DCA I   (20             /AND STORE IT IN PROGRAM FIELD
2957    6747  0000    PSWRTN, 0000
2958    6750  2354            ISZ     LFFLAG          /WAS A LINE FEED FOUND.
2959    6751  5703            JMP I   XC8PSW
2960    6752  6203            CIF CDF PRGFLD          /RETURN TO PROGRAM FIELD.
2961    6753  5755            JMP I   RSTART          /GO RESTART TESTING.
2962                    /
2963    6754  0000    LFFLAG, 0
2964    6755  0271    RSTART, STRTST                  /STARTING TEST OF DIAGNOSTIC.
2965    6756  7774    C8M4,   -4
2966    6757  0000    CHRTMP, 0
2967    6760  0000    C8CHAR, 0
2968                    /
2969    6763  7022'
2970    6764  7065
2971    6765  7066
2972    6766  7215
2973    6767  7075
2974    6770  0020
2975    6771  7076
2976    6772  7135
2977    6773  7146
2978    6774  7126
2979    6775  7011
2980    6776  7200
2981    6777  7072
              7000      PAGE
2982                    /
2983                    /CONTROL C FUNCTION.
2984                    /ROUTINE CAUSES RETURN TO MONITOR IF ON AN
2985                    /OPERATING SYSTEM OR TO THE LOADER IF NOT.
2986                    /
2987    7000  1211    CNTRLC, TAD     ARROW
2988    7001  4326            JMS     XC8TYP          /PRINT AN ARROW
2989    7002  1210            TAD     C
2990    7003  4326            JMS     XC8TYP          /AND A "C"
2991    7004  4346            JMS     XC8CRL          /NOW A <CRLF>
2992    7005  6203            CIF CDF                 /LOADER MUST BE IN FIELD 0
2993    7006  5607            JMP I   K7600
2994                    /
```



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2995                    /
2996    7007  7600    K7600,  7600
2997    7010  0303    C,      "C
2998    7011  0336    ARROW,  "^
2999    7012  0307    G,      "G
3000
3001                    /CONTROL G FUNCTION
3002                    /PRINT "SR=XXXX" WERE XXXX IS THE CURRENT VALUE OF
3003                    /THE PSEUDO-SWITCH REGISTER, IT THE WAITS FOR A NEW SETTING.
3004                    /
3005    7013  1211    CNTRLG, TAD     ARROW
3006    7014  4326            JMS     XC8TYP          /PRINT "^
3007    7015  1212            TAD     G
3008    7016  4326            JMS     XC8TYP          /AND A "G
3009    7017  4346            JMS     XC8CRL          /AND FINALLY A CRLF
3010    7020  4777'   XCNTLG, JMS     XC8PSW          /GO GET NEW SWITCH VALUE.
3011    7021  5776'           JMP     FLDRTN          /EXIT ROUTINE.
3012                    /
3013                    /THIS ROUTINE WILL VERIFY CHARACTER IS A VALID OCTAL DIGIT
3014                    /OR A LINE FEED OR CARRIAGE RETURN.
3015                    /
3016    7022  0000    TSTCHA, 0
3017    7023  3274            DCA     C8TEMP
3018    7024  1274            TAD     C8TEMP
3019    7025  1375            TAD     (-203           /TEST FOR CONTROL C
3020    7026  7650            SNA CLA                 /WAS IT?
3021    7027  5200            JMP     CNTRLC          /YES.
3022    7030  1274            TAD     C8TEMP
3023    7031  4774'           JMS     TSTCRL          /TEST FOR <CRLF>
3024    7032  5251            JMP     TSTEXT          /FOUND ONE
3025    7033  1274            TAD     C8TEMP
3026    7034  4326            JMS     XC8TYP
3027    7035  1274            TAD     C8TEMP
3028    7036  1272            TAD     C8M260
3029    7037  7710            SPA CLA                 /WAS GREATER THAN 0
3030    7040  5261            JMP     ERREXT          /NO, TAKE ERROR EXIT.
3031    7041  1274            TAD     C8TEMP
3032    7042  1273            TAD     C8M270
3033    7043  7700            SMA CLA                 /WAS 7 OR LESS
3034    7044  5261            JMP     ERREXT          /NO TAKE ERROR EXIT.
3035    7045  1274            TAD     C8TEMP
3036    7046  0271            AND     C8K7
3037    7047  2222            ISZ     TSTCHA          /UPDATE RETURN FOR VALID CHARACTER.
3038    7050  5622            JMP I   TSTCHA
3039    7051  4346    TSTEXT, JMS     XC8CRL
3040    7052  7307            CLL CLA IAC RTL         /+4 TO AC
3041    7053  1266            TAD     TMPCNT
3042    7054  7640            SZA CLA                 /CHANGE SWITCH REGISTER.
3043    7055  5773'           JMP     TSTRTN          /GET BACK TO CALL.
3044    7056  1275            TAD     C8STOR
3045    7057  3772'           DCA     CHRTMP
3046    7060  5773'           JMP     TSTRTN
3047    7061  1771'   ERREXT, TAD     C8K277
3048    7062  4326            JMS     XC8TYP
3049    7063  4346            JMS     XC8CRL          /AND A <CRLF>
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3050    7064  5622          JMP I   TSTCHA          /PRINT A "?" AND EXIT.
3051    7065  0240    C8K240, 240
3052    7066  0000    TMPCNT, 0
3053    7067  7566    C8M212, -212
3054    7070  7775    C8M3,   -3
3055    7071  0007    C8K7,   7
3056    7072  7520    C8M260, -260
3057    7073  7510    C8M270, -270
3058    7074  0000    C8TEMP, 0
3059    7075  0000    C8STOR, 0
3060
3061                  /
3062                  /MESSAGE TYPE ROUTINE. MESSAGE TO PRINT IS
3063                  /CALL +1
3064                  /
3065    7076  0000    XC8PNT, 0
3066    7077  7300          CLL CLA
3067    7100  1676          TAD I   XC8PNT          /GET POINTER TO MESSAGE.
3068    7101  3275          DCA     C8STOR
3069    7102  2276          ISZ     XC8PNT          /UPDATE RETURN.
3070    7103  1675    C8DO1,  TAD I   C8STOR          /GET A SET OF CHARACTERS.
3071    7104  7012          RTR
3072    7105  7012          RTR
3073    7106  7012          RTR
3074    7107  4314          JMS     C8DCOD
3075    7110  1675          TAD I   C8STOR
3076    7111  4314          JMS     C8DCOD
3077    7112  2275          ISZ     C8STOR
3078    7113  5303          JMP     C8DO1
3079                  /
3080                  /
3081                  /
3082    7114  0000    C8DCOD, 0
3083    7115  0356          AND     C8K77
3084    7116  7450          SNA                     /END OF TEXT.
3085    7117  5676          JMP I   XC8PNT          /YES.
3086    7120  1357          TAD     C8M40
3087    7121  7510          SPA
3088    7122  1360          TAD     C8K100
3089    7123  1265          TAD     C8K240          /ESTABLISHES CHARACTER TO PRINT.
3090    7124  4326          JMS     XC8TYP          /NOW PRINT IT.
3091    7125  5714          JMP I   C8DCOD
3092                  /
3093                  /
3094                  /TYPE ROUTINE.
3095                  /
3096    7126  0000    XC8TYP, 0
3097    7127  6046          TLS
3098    7130  6041          TSF
3099    7131  5330          JMP     .-1
3100    7132  6042          TCF
3101    7133  7200          CLA
3102    7134  5726          JMP I   XC8TYP
3103                  /
3104                  /ROUTINE INPUTS A CHARACTER AND EXITS WITH IT IN THE AC
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3105                  /
3106    7135  0000    XC8TTY, 0
3107    7136  6031          KSF
3108    7137  5336          JMP     .-1
3109    7140  6036          KRB
3110    7141  0344          AND     C8K177
3111    7142  1345          TAD     C8K200
3112    7143  5735          JMP I   XC8TTY
3113                  /
3114    7144  0177    C8K177, 177
3115    7145  0200    C8K200, 200
3116                  /
3117                  /
3118    7146  0000    XC8CRL, 0
3119    7147  1355          TAD     C8K215
3120    7150  4326          JMS     XC8TYP
3121    7151  1354          TAD     C8K212
3122    7152  4326          JMS     XC8TYP
3123    7153  5746          JMP I   XC8CRL
3124                  /
3125    7154  0212    C8K212, 212
3126    7155  0215    C8K215, 215
3127                  /
3128    7156  0077    C8K77,  77
3129    7157  7740    C8M40,  -40
3130    7160  0100    C8K100, 100
3131                  /
3132    7171  6660
3133    7172  6757
3134    7173  6744
3135    7174  7200
3136    7175  7575
3137    7176  6641
3138    7177  6703
              7200    PAGE
3139                  /
3140    7200  0000    TSTCRL, 0
3141    7201  1777'         TAD     C8M212
3142    7202  7440          SZA                     /IS IT A LINE FEED?
3143    7203  5207          JMP     .+4             /NO
3144    7204  7240          STA
3145    7205  3776'         DCA     LFFLAG
3146    7206  5600          JMP I   TSTCRL          /EXIT TO PROPER POINT
3147    7207  1775'         TAD     C8M3
3148    7210  7640          SZA CLA                 /IS IT A CARRIAGE RETURN?
3149    7211  2200          ISZ     TSTCRL          /NO, UPDATE RETURN
3150    7212  3776'         DCA     LFFLAG          /CLEAR LINEFEED FLAG
3151    7213  5600          JMP I   TSTCRL          /EXIT
3152    7214  5600          JMP I   TSTCRL          /MUST BE A CONTROL CHARACTER.
3153                  /
3154                  /
3155                  /OCTAL TYPE ROUTINE.
3156                  /
3157    7215  0000    XC8OCT, 0
3158    7216  3237          DCA     C8OCT           /STORE CHARACTER TO BE PRINTED.
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3159    7217  1774'           TAD     C8M4
3160    7220  3773'           DCA     TMPCNT          /SET UP FOR NUMBER OF SHIFTS.
3161    7221  1237            TAD     C8OCT           /GET VALUE
3162    7222  7004            RAL
3163    7223  7004            RAL
3164    7224  7006            RTL                     /MOVE INTO BITS 9-11
3165    7225  3237            DCA     C8OCT           /DON'T CLEAR LINK.
3166    7226  1237            TAD     C8OCT
3167    7227  0772'           AND     C8K7
3168    7230  1240            TAD     C8K260
3169    7231  4771'           JMS     XC8TYP          /NOW TYP DIGIT.
3170    7232  1237            TAD     C8OCT           /GET BACK CHARACTER
3171    7233  2773'           ISZ     TMPCNT          /DONE ALL FOUR YET.
3172    7234  5223            JMP     .-11            /NO, GOBACK AND DO NEXT.
3173    7235  7300            CLL CLA
3174    7236  5615            JMP I   XC8OCT          /EXIT ROUTINE.
3175                  /
3176    7237  0000    C8OCT,  0
3177    7240  0260    C8K260, 260
3178    7241  0000    XC8PAS, 0
3179    7242  6201            CDF     CONFLD
3180    7243  2253            ISZ     PASSES
3181    7244  4770'           JMS     XC8PNT          /PRINT END OF PASS MESSAGE
3182    7245  7267            MESB
3183    7246  1253            TAD     PASSES          /PRINT NUMBER OF PASSES
3184    7247  4215            JMS     XC8OCT
3185    7250  4767'           JMS     XC8CRL
3186    7251  6203            CIF CDF CALFLD
3187    7252  5641            JMP I   XC8PAS          /EXIT
3188                  /
3189    7253  0000    PASSES, 0
3190                  /
3191    7254  7575    TABLA,  100="C
3192    7255  7571            100="G
3193    7256  7557            100="Q
3194    7257  7555            100="S
3195    7260  0000            0000                    /END OF TABLE
3196                  /
3197    7261  7000    TABLB,  CNTPLC
3198    7262  7013            CNTRLG
3199    7263  6673            CNTRLQ
3200    7264  6661            CNTRLS
3201
3202    7265  2322    MESA,   TEXT    "SR="
        7266  7500
3203    7267  0516    MESB,   TEXT    "END OF PASS "
        7270  0440
        7271  1706
        7272  4020
        7273  0123
        7274  2340
        7275  0000
3204                  $$
3205    7367  7146
3206    7370  7076
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3207    7371  7126
3208    7372  7071
3209    7373  7066
3210    7374  6756
3211    7375  7070
3212    7376  6754
3213    7377  7067
```

```
0000
0100

0200
0300

0400
0500

0600
0700


1000
1100

1200
1300

1400
1500

1600
1700


2000
2100

2200
2300

2400
2500

2600
2700


3000
3100

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  11111111  11111111  11111111  11111111  11111111  11111111  11111111  11111111
6700  11111111  11111111  11111111  11111111  11111111  11111111  10011111  11111111


7000  11111111  11111111  11111111  11111111  11111111  11111111  11111111  11111111
7100  11111111  11111111  11111111  11111111  11111111  11111111  10000000  01111111

7200  11111111  11111111  11111111  11111111  11111111  11111111  11111111  11111100
7300  00000000  00000000  00000000  00000000  00000000  00000000  00000001  11111111

7400
7500

7600
7700
```

A11	0011	C77	0032	DELLOP	2624	K4000	0123
A20	0020	C80100	6656	DEVCOD	0035	K6500	4031
A21	0021	C8CHAR	6760	DONEA	6622	K6520	3736
A22	0022	C8DCOD	7114	EHLTLP	4464	K7	3520
A23	0023	C8DO1	7103	END	1502	K7007	3463
ACNSKP	0545	C8K100	7160	ERREXT	7061	K7600	7007
ACTFLD	6677	C8K177	7144	ERRFLG	0044	K77	3435
AERROR	4512	C8K200	7145	ERRLOP	1510	K770	3462
APT8	4513	C8K212	7154	EXIT	3717	K7700	3536
APTCHK	3711	C8K215	7155	FDATAT	1400	KCC	6032
APTIO0	6370	C8K240	7065	FDTLOP	1523	KCC0	0607
APTIO1	6371	C8K260	7240	FILCHK	2646	KCC1	0712
APTIO2	6372	C8K277	6660	FILERT	1645	KCC2	1036
APTIO3	6373	C8K7	7071	FILEXT	2003	KCC3	1063
APTIO4	6374	C8K77	7156	FILLER	3200	KCC4	1136
APTIO5	6375	C8M212	7067	FILLOP	1667	KCC5	1757
ARROW	7011	C8M260	7072	FLDRTN	6641	KCC6	2000
B1050	5631	C8M270	7073	FOROCK	3464	KCDFIF	6657
B110	5514	C8M3	7070	FOROCT	4474	KCF	6030
B1200	5550	C8M4	6756	G	7012	KCF0	0320
B150	5523	C8M40	7157	GETDAT	6653	KCF1	0401
B19200	2540	C8OCT	7237	GOITA	6643	KCF2	0501
B19K2	5604	C8RTRN	6701	GOTOA	6651	KCF3	0551
B2400	5557	C8STOR	7075	GOTOUV	3713	KCF4	1143
B300	5532	C8TEMP	7074	HALT	7402	KIE	6035
B4800	5566	CAF	6007	HLT	4520	KIE0	0403
B56P8	5613	CAFINT	0500	HLTLOP	2200	KIE1	0422
B600	5541	CAFXMT	0344	HLTLP1	2217	KIE10	1052
B66P7	5622	CALFLD	0000	HLTLP2	2241	KIE2	0457
B9600	5575	CHARLG	1600	INDEXA	6652	KIE3	0502
BAUDNO	0041	CHEK22	4515	INMODE	6702	KIE4	0536
BAUDST	2151	CHGMES	3120	INTON	2313	KIE5	0615
BAUDTB	2334	CHKFIL	2670	INTRET	0267	KIE6	0707
BAUDTM	2264	CHRLAS	1636	INTXMT	0400	KIE7	0747
BDPNTR	2333	CHRTMP	6757	K0125	0056	KIE8	0757
BGNINT	0200	CLKCNT	0121	K0252	0055	KIE9	1026
BITNO	0037	CLRBRD	0271	K10	3313	KRB	6036
BR1050	2604	CMESS6	4440	K100	3440	KRB0	0634
BR110	2400	CNT1	0050	K115	0026	KRB1	1113
BR1200	2460	CNT2	0051	K117	0027	KRB10	1711
BR150	2414	CNTREC	1737	K177	3372	KRB11	1351
BR2400	2474	CNTRLC	7000	K2	0025	KRB12	2014
BR300	2430	CNTRLG	7013	K200	3373	KRB13	2060
BR4800	2510	CNTRLQ	6673	K212	0057	KRB14	2070
BR568	2554	CNTRLS	6661	K215	3260	KRB2	1410
BR600	2444	CON100	2644	K240	3441	KRB3	1437
BR667	2570	CONFLD	0000	K260	3521	KRB4	1504
BR9600	2524	COUNT	0122	K3	3437	KRB5	1511
BSW	7002	CRLF	4502	K33	0030	KRB6	1526
BSWAP	4511	DATBIT	0040	K37	0031	KRB7	1544
C	7010	DFLAY	4461	K377	0034	KRB8	1615
C177	0033	DELAYN	2643	K400	4122	KRB9	1654

KRS	6034	M43	3436	PSWRTN	6747	SPI9	0672
KRS0	0625	MES10A	5145	RAN1	3573	SR4HLT	2133
KRS1	1010	MES10B	5164	RAN2	3574	START	0250
KRS2	2040	MES10C	5203	RANDM1	4771	STENAB	2005
KRS3	2046	MES10D	5222	RANDOM	4506	STERR	2101
KSE	6035	MESA	7265	RECDAT	0045	STFLGS	0703
KSE0	1335	MESAGE	4471	RECEVE	1436	STLAS	2126
KSE1	2023	MESAGF	3416	RECPNT	5241	STLPPC	4462
KSE2	2045	MESAGX	3400	REDOA	6611	STRTST	0271
KSE3	2054	MESB	7267	RESGEN	4510	SW10NE	4465
KSF	6031	MESS1	4203	RETINT	2317	TABLA	7254
KSF0	0276	MESS10	5120	RETURN	3756	TABLB	7261
KSF1	0336	MESS2	4213	RSTART	6755	TABLE1	5500
KSF10	1037	MESS3	4224	SAV1	3575	TCF	6042
KSF11	1065	MESS3A	4236	SAV2	0053	TCF0	0330
KSF12	1077	MESS4	4241	SAVAC	2240	TCF1	0436
KSF14	1116	MESS4A	4302	SAVBTS	0036	TCF10	1505
KSF16	1137	MESS5	4306	SAVGEN	4507	TCF11	1512
KSF17	1144	MESS5A	4326	SAVIT	3164	TCF12	1611
KSF18	1425	MESS6	4400	SAVPNT	0024	TCF13	1656
KSF19	1541	MESS6A	4473	SCXMIT	0317	TCF14	1346
KSF2	0354	MESS6B	4520	SDTST1	1152	TCF15	2015
KSF21	1675	MESS6C	4545	SDTST2	1200	TCF16	2035
KSF22	1744	MESS6D	4572	SDTST3	1210	TCF2	0470
KSF23	1762	MESS6E	4617	SDTST4	1233	TCF3	0532
KSF24	1341	MESS6F	4645	SDTST5	1251	TCF4	0654
KSF25	2036	MESS6G	4673	SDTST6	1302	TCF5	0715
KSF26	2063	MESS6H	4721	SDTST7	1316	TCF6	1002
KSF3	0471	MESS6I	4747	SETUP	0215	TCF7	1064
KSF4	0537	MESS6J	4776	SLOLAS	1372	TCF8	1123
KSF5	0600	MESS6K	5024	SLOLST	1376	TCF9	1412
KSF6	0720	MESS6L	5052	SLWDAT	1333	TEMP	0124
KSF7	0733	MESS7	5100	SLWREC	1350	TEMSAV	4135
KSF8	2713	MESS7A	5115	SLWTLS	1340	TFL	6040
KSF9	1013	MESTAB	2350	SPACE2	4500	TFL0	0323
KSFSKP	4467	MESTB1	2364	SPACX2	3306	TFL1	0345
LAS	4517	MIOT	4503	SPI	6045	TFL2	0406
LFFLAG	6754	MPC	4200	SPI0	0304	TFL3	0452
LISN	4470	NDELAY	0047	SPI1	0411	TFL4	0503
LISN1	3340	NERROR	4516	SPI10	0736	TFL5	0520
LISN2	3356	NEWDEV	4000	SPI11	0750	TFL6	0645
LISN3	3351	NOINTR	0201	SPI12	0760	THSFLD	0000
LISNT1	0170	NOT8E	4050	SPI13	1015	TICK	4514
LISNUM	3361	ONAPT	3613	SPI14	1027	TLS	6046
LOAD	4460	ONEOCK	3201	SPI15	1042	TLS0	1102
LOOP	4463	ONEOCT	4472	SPI2	0427	TLS1	1515
LOOPPC	0046	ORIGIN	6600	SPI3	0442	TLS10	1424
M10	4041	PASSES	7253	SPI4	0455	TLS2	1522
M1000	0054	PRGFLD	0000	SPI5	0460	TLS3	1540
M212	3374	PRNT1	4475	SPI6	0506	TLS4	1556
M270	3367	PRNT2	4476	SPI7	0515	TLS5	1606
M3	3375	PRNT4	4477	SPI8	0523	TLS6	1665

TLS7	2307	XAERRO	3664
TLS8	2315	XAPT8	3600
TLS9	2026	XBSW	3522
TMPCNT	7066	XC8CNT	6600
TPC	6044	XC8CRL	7146
TPC0	0726	XC8OCT	7215
TPC1	1073	XC8PAS	7241
TSF	6041	XC8PNT	7076
TSF0	0301	XC8PSW	6703
TSF1	0326	XC8TTY	7135
TSF10	0512	XC8TYP	7126
TSF11	0521	XCHK22	4113
TSF12	0533	XCNTLG	7020
TSF13	0663	XCRLF	3244
TSF14	0723	XDELAY	2620
TSF15	2675	XHALT	4072
TSF16	1000	XHLT	4101
TSF17	1003	XLAS	4063
TSF18	1070	XLISN	3314
TSF2	0333	XLOAD	2163
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TSF22	1124	XMIT	1420
TSF23	1421	XMTDAT	0042
TSF24	1516	XMTDT1	0043
TSF25	1535	XMTIOT	5352
TSF26	1553	XMTREC	1057
TSF28	1672	XNERRO	3737
TSF29	1747	XOR	4504
TSF3	0346	XORS	3261
TSF30	2310	XPCRET	4032
TSF31	2322	XPRNT1	3513
TSF32	1344	XPRNT2	3224
TSF4	0351	XPRNT4	3500
TSF5	0407	XRAND	3537
TSF6	0425	XRAND1	4123
TSF7	0437	XRESGN	3564
TSF8	0453	XSAVGN	3555
TSF9	0504	XSR1LP	1564
TSFSKP	4466	XSR2	4042
TSTCHA	7022	XTABLA	6654
TSTCNT	0052	XTABLB	6655
TSTCRL	7200	XTICK	4013
TSTEXT	7051	XTYPE	3235
TSTRTN	6744	YESRNO	4505
TWOOCK	3211	YESRNX	3273
TWOOCT	4473		
TYINTR	3000		
TYPE	4501		
UPDATE	1465		
US100	2645		
WATKSF	2707		
WATTSF	2671		

ERRORS DETECTED: 0

LINKS GENERATED: 81

RUN-TIME: 7 SECONDS

3K CORE USED

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KRB7        997#   2579
KRB8       1044#   2580
KRB9       1083#   2581
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KRS2       1213#   2555
KRS3       1219#   2556
KSE          35#    854   1200    1218    1225
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KSF          30#    264    299     316     398     442     470     558     569     617     637     665     675     690
            707     712    858     916     980     994    1100    1139    1154    1211    1232    1412    1714    1979
           2319    3107
KSF0        264#   2521
KSF1        299#   2522
KSF10       637#   2531
KSF11       665#   2532
KSF12       675#   2533
KSF14       690#   2534
KSF16       707#   2535
KSF17       712#   2536
KSF18       916#   2537
KSF19       994#   2539
KSF2        316#   2523
KSF21      1100#   2540
KSF22      1139#   2541
KSF23      1154#   2542
KSF24       858#   2543
KSF25      1211#   2544
KSF26      1232#   2545
KSF3        398#   2524
KSF4        442#   2525
KSF5        454     463    470#    2526
KSF6        558#   2527
KSF7        569#   2528
KSF8       1714#   2529
KSF9        617#   2530
KSFSKP      134#    612    685     699     961    1041    1235
LAS         182#    197    202     205     701     876     884     935     948    1008    1014    1053    1061    1121
           1129    1257   1268    1283    1327    1332    1344    1349    1364    1373    2277    2295    2394    2401
LFFLAG     2958   2963#   3145    3150
LISN        136#   1870   1951
LISN1      1978   1993    1996#   2012
LISN2      2004   2010#   2017    2020
LISN3      1999   2005#   2021
LISNT1     1984   1985    1994    2002    2014    2026#
LISNUM     2001   2013#
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            832     847    965    1067    1173    1244    1422
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M1000       114#    838    899
M212       1986   2024#
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M3         1989   2025#
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MES10A     1455   1844   2512#
MES10B     1456   2513#
MES10C     1457   2514#
MES10D     1458   2515#
MESA       2931   3202#
MESAGE      138#   1730   1736    1742    1749    1755    1763    1770    1778    1785    1787    1809    1811    1819
           1826   1843   1965    2298
MESAGF     2043   2045   2048#   2060    2062
MESAGX      139   2034#  2036    2038    2051    2072    2082
MESB       3182   3203#
MESS1      1731   2482#
MESS10     1827   2510#
MESS2      1737   2483#
MESS3      1743   2484#
MESS3A     1750   2485#
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MESS4A     1764   2487#
MESS5      1771   2488#
MESS5A     1779   2489#
MESS6      1786   2492#
MESS6A     1441   1810   2495#
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MESS6C     1443   2497#
MESS6D     1444   2498#
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MESS6G     1447   2501#
MESS6H     1448   2502#
MESS6I     1449   2504#
MESS6J     1450   2505#
MESS6K     1451   2506#
MESS6L     1452   2507#
MESS7      1812   2508#
MESS7A     1820   2509#
MESTAB     1441#  1805
MESTB1     1455#  1838
MIDT        158#   237    242
MPC        2299   2481#
NDELAY      109#    547    661     898    1081    1191    1648
NERROR      180#    278    302     319     401     445     534     650     715     732     748     770     787     815
            830     845    954    1065    1171    1242
NEWDEV     1295   2280   2345#   2354    2355
NOINTR      195#
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TFL6      507#   2599
THSFLD   2815#   2818   2830
TICK      176#   2315
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          1908   3097
TLS0      678#   2665
TLS1      974#   2667
TLS10     915#    924   2676
TLS2      979#   2668
TLS3      993#   2669
TLS4     1007#   2670
TLS5     1037#   2671
TLS6     1092#   2672
TLS7     1404#   2673
TLS8     1410#   2674
TLS9     1203#   2675
TMPCNT   2939    2951   3041   3052#   3160   3171
TPC        45#    564    671
TPC0      564#   2647
TPC1      671#   2648
TSF        43#    267    291    296    310    313    348    362    372    384    415    421    428    438
          521     561    606    609    668    682    696    861    912    975    990   1004   1097   1143
         1405    1415   1699   1910   3098
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TSF1      291#   2601
TSF10     421#   2610
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TSF12     438#   2612
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TSF28    1097#   2625
TSF29    1143#   2626
TSF3      310#   2603
TSF30    1405#   2627
TSF31    1415#   2628
TSF32     861#   2629
TSF4      313#   2604
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TSF7      372#   2607
TSF8      384#   2608
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TSF9      415#   2609
TSFSKP    132#    567    673    693   1038   1205
TSTCHA   2943   3016#  3037   3038   3050
TSTCNT    112#    780    797    839    900   1398   1399   1401   1402   1689   2323   2385
TSTCRL   2857   3023   3140#  3146   3149   3151   3152
TSTEXT   3024   3039#
TSTRTN   2954#  3043   3046
TWOOCK    143   1881#  1883   1888   1890   1891   1896   1897   1901
TWOOCT    142#  1732   1738   1789   2096   2102
TYINTR    200   1730#
TYPE      154#  1923   1928   1995   2059   2127
UPDATE    932    934    937    948#   1018
US100    1651   1652   1668#
WATKSF    135   1710#  1721   1722   1723
WATTSF    133   1695#  1706   1707   1708
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XAPTR     175   2199#
XBSW      171   2134#  2145
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XC8CRL   2866   2929   2953   2991   3009   3039   3049   3118#  3123   3185
XC8OCT   2937   3157#  3174   3184
XC8PAS   1281   3178#  3187
XC8PNT   2930   3065#  3067   3069   3085   3181
XC8PSW    232   1288   2302   2921#  2944   2959   3010
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         3122   3169
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XHLT     2433   2436#
XLAS      183   2416#  2422   2429   2438
XLISN     137   1976#  1996   1997   2006   2007   2009   2011
XLOAD     121   1306#  1309   1311
XMIOT     159   2070#  2073   2074   2078
XMIT      911#   960   2666
XMTDAT    104#   725    728    730    746    755    757    759    761    764    766    769    781    783
          784    798    800    803    804    808    811    812    824    828    841    856    871    879
          907    910    930    938    953    973    987    992   1035   1047   1090   1091   1111   1116
         1124   1198   1202   1207   1216   1222   1228   1240   1250   1263   2164   2466   2469   2472
XMTDT1    105#   920    923    944    952    978   1001   1006   1050   1056   1087   1108   1134   1196
         1208   2470
XMTIOT    243   2593#
XMTREC    659#   716
XNERRO    181   2311#  2312   2314   2325
XOR       160#
XORS      161   1926   1929   1937#  1940   1944   1945   1946
XPCRET    125   2380#  2382   2386
XPRNT1    147   2005   2008   2124#  2128
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XPRNT4    151   2079   2080   2083   2101   2104   2111#  2121
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XSAVGN    167    2170#   2176
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XSR2      127    2393#   2398
XTABLA   2840    2882#
XTABLB   2870    2883#
XTICK     177    2361#   2365    2367    2374
XTYPE     155    1907#   1913
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.V7215	2937	2972#					
.V7241	1281	1317#					
.V7400	497	501	2829#				
.V7575	3019	3136#					
.V7600	1684	1726#					
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.V7774	482	602#	1086	1167#			