IDENTIFICATION

PRODUCT CODE:	MAINDEC-08-DJEXC-B-D
PRODUCT NAME:	4K TO 32K PDP-8A PROCESSOR EXERCISER
PRODUCT DATE:	JULY, 1977
MAINTAINER:	DIAGNOSTIC GROUP
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1.0 ABSTRACT

MODIFIED TO RUN ON VT78 SYSTEM - APRIL 1977

THE 4K TO 32K PDP-8A PROCESSOR EXERCISER WILL TEST THE EXECUTION OF MEMORY REFERENCE AND OPERATE INSTRUCTIONS IN A 4K TO 32K PDP-8A. ALL TEST INSTRUCTIONS, ADDRESSES, MEMORY, AC, MQ AND LINK DATA ARE GENERATED FROM A RANDOM NUMBER GENERATOR. THE SERIAL LINE UNIT TRANSMITTER AND REAL TIME CLOCK WILL BE TESTED IN INTERRUPT MODE IF THE SYSTEM UNDER TEST IS A PDP-8/A WITH OPTION BOARD #1 (M8316) INSTALLED, OR A VT78.

THE PROGRAM RELOCATES ITSELF A PAGE AT A TIME, UP AND DOWN, WITHIN ANY 4K MEMORY FIELD. IF THE COMPUTER CONTAINS MORE THAN 4K OF MEMORY, THE PROGRAM WILL RELOCATE UP AND DOWN BETWEEN MEMORY FIELDS. AT LEAST 3K OF MEMORY IS REQUIRED IN THE LAST EXTENDED MEMORY FIELD FOR THE PROGRAM TO TEST AND TO RELOCATED INTO IT.

THE PROGRAM IS CAPABLE OF RUNNING ON THE PDP-8A AND VT78 APT TEST LINES.

A CONSOLE PACKAGE HAS BEEN INCLUDED IN THIS DIAGNOSTIC TO ALLOW THE PROGRAM TO RUN WITH NO HARDWARE SWITCH REGISTER AND TO HAVE COMMUNICATIONS WITH THE DIAGNOSTIC VIA A TERMINAL. THE DIAGNOSTIC CAN BE RUN IN TWO MODES WITH THE CONSOLE PACKAGE.

1. RUNNING WITH THE CONSOLE PACKAGE ACTIVE - (THIS MODE MUST BE SELECTED WHEN TESTING A VT78) - THIS ALLOWS THE OPERATOR CONTROL OF THE DIAGNOSTIC THROUGH THE TERMINAL. THE DIAGNOSTIC WILL ASK FOR THE VALUE OF SWITCH REGISTER, BEFORE CONTINUING WITH THE EXECUTION OF THE DIAGNOSTIC. ALL ERRORS, EXCEPT FOR RELOCATION ERRORS WHICH WILL RESULT IN A HALT, WILL BE PRINTED ON THE TERMINAL. THE NUMBER OF PASSES WILL ALSO BE PRINTED ON THE TERMINAL AFTER 4096 PROCESSOR TEST INSTRUCTIONS HAVE BEEN EXECUTED.

2. CONSOLE PACKAGE NOT ACTIVE - THIS WILL RESULT IN THE USE OF HALTS FOR ERRORS, HALT AT END AT PASS IF SELECTED, USE OF HARDWARE OR PSEUDO SWITCH REGISTER, NOT ASKING SWITCH REGISTER QUESTION.

2.0 REQUIREMENTS

2.1 HARDWARE

THE FOLLOWING HARDWARE IS REQUIRED FOR EXECUTION OF THIS PROGRAM:

PROCESSOR:	PDP-8A, VT78
MEMORY:	4K TO 32K OF MEMORY IN 4K INCREMENTS
OPTIONS:	IF MEMORY SIZE IS GREATER THAN 4K A PDP-8A OPTION BOARD #2 IS REQUIRED. (DOES NOT APPLY TO VT78)
	IF THE SERIAL LINE UNIT AND REAL TIME CLOCK ARE TO BE TESTED, A PDP-8A OPTION BOARD #1 AND A TERMINAL ARE REQUIRED. (DOES NOT APPLY TO VT78)

2.2 STORAGE

THE PROGRAM INITIALLY OCCUPIES LOCATIONS 0000 TO 0130 AND 0200 TO 5314. THE PROGRAM USES LOCATIONS 0000 TO 0130, AND 5200 TO 5314 FOR PROGRAM INITIALIZATION. ONCE THE PROGRAM HAS BEEN STARTED, THESE LOCATIONS WILL BE DESTROYED. ALL LOCATIONS OUTSIDE THE PROGRAM AREA IN THE PROGRAM FIELD AND ANY OTHER FIELD, IF SELECTED ARE USED AS A TEST AREA. THE TEST AREA IS INITIALLY FILLED WITH HALTS AND REFILLED AFTER EVERY 4096 TEST INSTRUCTIONS HAVE BEEN EXECUTED. IF THE PROGRAM IS ALLOWED TO RELOCATE, IT WILL RELOCATE UP AND BACK A PAGE AT A TIME WITHIN A 4K MEMORY FIELD AND UP AND DOWN BETWEEN MEMORY FIELDS IF MORE THAN 4K. THE PROGRAM INITIALLY MUST BE LOADED INTO FIELD 0.

2.3 PREREQUISITE SOFTWARE

FOR PDP-8/A SYSTEM:

PDP-8A CPU TEST
PDP-8A MEMORY TEST
KM8-A OPTION TEST #2 - IF PDP-8A OPTION BOARD #2 IN SYSTEM
DKC8-AA OPTION TEST #1 - IF PDP-8A OPTION BOARD #1 IN SYSTEM

FOR VT78 SYSTEM:

VT78 CPU DIAGNOSTIC
VT78 MOS MEMORY DIAGNOSTIC

3.0 RESTRICTIONS

3.1 HARDWARE RESTRICTIONS

A. MINIMUM OF 4K OF MEMORY TO A MAXIMUM OF 32K OF MEMORY IN 4K CONSECUTIVE INCREMENTS.

B. IF THE PDP-8A OPTION BOARD #1 IS TO BE TESTED BY THE PROGRAM, A TERMINAL MUST BE CONNECTED TO THE SERIAL LINE UNIT, BAUD RATES AND STOP BITS MUST BE SETUP, TTY FILTER MUST BE SET IF ASR/KSR TELETYPE, AND THE REAL TIME CLOCK MUST BE ENABLED.

3.2 SOFTWARE RESTRICTIONS

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////////////////////////////////////////////////////////////
/WARNING:
/ALL SOFTWARE RESTRICTIONS LISTED BELOW PLUS FIELD AND MEMORY
/SIZE MUST BE ADHERED TO, OTHERWISE, THERE IS NO GUARANTY
/WHAT WILL HAPPEN TO THE PROGRAM.
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A. ONCE THE PROGRAM HAS BEEN STARTED, THE PROGRAM LOADERS WILL BE DESTROYED.

B. THE PROGRAM CANNOT BE INITIALIZED TO RUN WITH THE CONSOLE PACKAGE ACTIVE AND TO BE INITIALIZED TO RUN ON THE PDP-8A OR VT78 APT TEST LINE.

C. BEFORE EACH PROGRAM START, LOCATIONS 0020 AND 0021 IN THE PROGRAM FIELD MUST BE INITIALIZED FOR THE SWITCH REGISTER VALUE AND THE AMOUNT OF MEMORY TO BE TESTED RESPECTIVELY. LOCATION 0020 INITIALLY IS PRESET TO ALL 0'S AND LOCATION 0021 INITIALLY IS PRESET TO 0007 (8K OF MEMORY AND NO FRONT PANEL SWITCH REGISTER).

D. ONCE THE PROGRAM HAS RELOCATED INTO ANOTHER MEMORY AREA, AND IT IS DESIRED TO CHANGE MEMORY SIZE, MEMORY SIZE CANNOT BE DECREASED BELOW THE 1K SEGMENT THAT THE PROGRAM IS LOCATED IN.

E. IF THE FRONT PANEL SWITCH REGISTER WAS SELECTED OR IF THE CONSOLE PACKAGE WAS SET TO ACTIVE, ALWAYS STOP THE PROGRAM BY SETTING THE SWITCH REGISTER TO 0400. THIS IS DONE TO INSURE THAT THE PROGRAM IS NOT IN THE PROCESS OF RELOCATING. FOR THOSE SYSTEMS WITHOUT A FRONT PANEL SWITCH REGISTER OR A NON ACTIVE CONSOLE PACKAGE, IT WOULD BE ADVANTAGEOUS TO RELOAD THE PROGRAM.

F. ONCE RUNNING THE CONSOLE PACKAGE NON-ACTIVE AND NOW DESIRING TO RUN IT ACTIVE, ONE MUST RELOAD THE DIAGNOSTIC AND INITIALIZE FOR A ACTIVE CONSOLE PACKAGE.

G. RUNNING OF THIS PROGRAM WILL NOT CHECK BOOTSTRAPS AND AUTO RESTARTS ON THE PDP-8A OPTION BOARD #2.

H. RUNNING OF THIS PROGRAM WILL NOT CHECK THE 12 BIT PARALLEL I/O AND THE SERIAL LINE UNIT RECIEVERS. HOWEVER, THE SERIAL LINE UNIT WILL BE USED FOR INTERAGATION

IF CONSOLE PACKAGE IS ACTIVE.

4.0 STANDARD TEST PROCEDURE

IF THE SYSTEM UNDER TEST IS A VT78 GOTO PARAGRAPH 4.2.

IF THE PDP-8A OPTION BOARD #1 IS TO BE TESTED OR IF THE CONSOLE PACKAGE IS TO BE USED, DO PARAGRAPH 4.1, PDP-8A OPTION BOARD #1 HARDWARE SETUP. IF NEITHER OF THE ABOVE IS TO BE USED GO TO PARAGRAPH 4.2, LOADING THE PROGRAM.

4.1 PDP-8A OPTION BOARD #1 (M8316) HARDWARE SETUP

THIS SECTION IS TO BE EXECUTED IF THE M8316 HAS NOT BEEN SETUP FOR THE TERMINALS BAUD RATE, STOP BITS, TTY FILTER, AND IF THE REAL TIME CLOCK HAS NOT BEEN ENABLED. SET THE FOLLOWING SWITCHES ON THE M8316 TO THE DESIRED BAUD RATES AND STOP BITS FROM THE TABLE BELOW AND ALSO SET THE SWITCHES TO ENABLE THE REAL TIME CLOCK.

BAUD RATE	S1-1	S1-2	S1-3
*110 BAUD	OFF	OFF	OFF
150 BAUD	OFF	OFF	ON
300 BAUD	OFF	ON	OFF
600 BAUD	OFF	ON	ON
1200 BAUD	ON	OFF	OFF
2400 BAUD	ON	OFF	ON
4800 BAUD	ON	ON	OFF
9600 BAUD	ON	ON	ON

STOP BITS	S1-7
1 STOP BIT	ON
2 STOP BITS	OFF

REAL TIME CLOCK	S1-5	S1-6
ENABLED	ON	ON
DISABLED	ON	OFF

*NOTE: IF THE TERMINAL IS A ASR33/KSR33, SET S1-8 TO ON (TTY FILTER), OTHERWISE SET S1-8 TO OFF.

4.2 LOADING THE PROGRAM

SYSTEM UNDER TEST - PDP-8/A:
LOAD THE PROGRAM INTO FIELD 0 USING THE STANDARD BINARY LOADER TECHNIQUE.

SYSTEM UNDER TEST - VT78:
FOR VT78 SYSTEMS THIS DIAGNOSTIC IS PROVIDED ALONG WITH A SYSTEM MONITOR ON FLOPPY MEDIA. TO LOAD THE SYSTEM MONITOR SIMPLY INSERT THE FLOPPY DISKETTE CONTAINING THE DIAGNOSTIC INTO EITHER DRIVE RXA0 OR RXA1 AND PRESS THE VT78 START BUTTON. THE SYSTEM WILL RESPOND ON THE VIDEO DISPLAY WITH A START MESSAGE FOLLOWED BY A PROMPT CHARACTER. TO CALL AND START THE DIAGNOSTIC TYPE 'R DJEXCB' FOLLOWED BY THE RETURN KEY. THE SYSTEM WILL RESPOND WITH A DISPLAY OF THE PROGRAM NAME AND CURRENT PSEUDO SWITCH REGISTER SETTING AND WAIT FOR USER ACTION.
CONTINUE WITH PARAGRAPH 4.3.2 B - OPTIONS AVAILABLE TO USER.

NOTE: THIS DIAGNOSTIC ON THE FLOPPY DISKETTE HAS BEEN PRE-INITIALIZED TO RUN ON A VT78 (LOC 22 BIT 2=1) WITH CONSOLE PACKAGE ACTIVE (LOC 22 BIT 3=1) AND TO EXERCISE SERIAL LINE UNIT #1 AND REAL TIME CLOCK (LOC 21 BITS 0 & 1 =1). THE DIAGNOSTIC CAN ALSO BE RUN ON A VT78 WITHOUT EXERCISING THE SERIAL LINE AND THE REAL TIME CLOCK. TO EXECUTE IN THIS MODE THE USER MUST USE 'ODT' TO CHANGE LOCATION 0021 FROM 30XX (XX IS THE MEMORY SIZE INDICATOR) TO 00XX. NORMALLY XX IS SET TO 17 (16K OF MEMORY) FOR VT78 TESTING BUT CAN ALSO BE CHANGED USING ODT TO A SMALLER NUMBER (REF NOTE IN PARAG 4.3 B) TO EXERCISE ONLY A PORTION OF THE VT78 MEMORY.
FOR TESTING ON THE VT78 APT TEST LINE LOCATION 0021 MUST BE SET TO 3013 (FIELD 3 CONTAINS THE APT LOADER/MONITOR) AND LOCATION 0022 SET TO 5000.

4.3 RUN 4K TO 32K PDP-8A PROCESSOR EXERCISER

THE PROGRAM MUST "ALWAYS" BE INITIALIZED AT ANY PROGRAM RESTART. ONCE THE PROGRAM IS INITIALIZED TO RUN WITH OR WITHOUT THE CONSOLE PACKAGE OR TO RUN ON THE APT TEST LINE, IT CANNOT BE RE-INITIALIZED TO CHANGE THE ABOVE CONDITIONS UNLESS THE PROGRAM IS RELOADED.

IN ORDER TO FIND, INITIALIZE, AND START THE PROGRAM DO THE FOLLOWING STEPS.

A. IF THE PROGRAM WAS JUST LOADED, THE PROGRAM WILL RESIDE IN THE FIRST 3K OF FIELD 0 AND THE STARTING ADDRESS

   WILL BE 0200. IF THIS WAS THE CASE GO TO STEP B TO INITIALIZE THE PROGRAM. TO FIND THE PROGRAM AND STARTING ADDRESS OF THE PROGRAM, ONCE THE PROGRAM HAS BEEN STARTED, DO THE FOLLOWING STEPS.

1. LOAD EXTENDED ADDRESS TO FIELD 0.
2. LOAD ADDRESS TO ADDRESS 0005 AND EXAMINE THAT LOCATION
3. THE CONTENTS OF ADDRESS 0005 WILL CONTAIN THE STARTING ADDRESS OF THE PROGRAM AND THE FIELD THAT THE PROGRAM IS LOCATED IN. THE CONTENTS OF ADDRESS 0005 WILL BE IN A FORM OF SAF0. SA EQUALS THE MOST SIGNIFICANT SIX BITS OF THE STARTING ADDRESS. F EQUALS THE FIELD THAT THE PROGRAM IS LOCATED IN. SA00 WILL BE THE NEW STARTING ADDRESS OF THE PROGRAM.
4. LOAD THE INSTRUCTION AND DATA FIELD TO THE FIELD THAT THE PROGRAM IS LOCATED IN OBTAINED FROM STEP 3 ABOVE.
5. GO TO STEP B.

B. THE PROGRAM WHEN FIRST LOADED IS INITIALIZED TO RUN WITH A NON ACTIVE CONSOLE PACKAGE, NO HARDWARE SWITCH REGISTER, NO PDP-8A OPTION BOARD #1 TESTING, NOT ON PDP-8A APT TEST LINE, AND MEMORY SIZE OF 8K. TO CHANGE THE INITIAL CONFIGURATION OR IF THE PROGRAM IS TO BE RESTARTED LOAD ADDRESS TO 0021 IN THE PROGRAM FIELD. NOW DO ONE OF THE FOLLOWING STEPS FOR THE TYPE OF INITIALIZATION REQUIRED.

NOTE: XX IN THE FOLLOWING STEPS INDICATE MEMORY SIZE. XX=03 INDICATES A MEMORY SIZE OF 4K. ADDING A ONE TO THE NUMBER IN XX WILL INCREASE MEMORY SIZE BY 1K. XX=07 EQUALS 8K, XX=13 EQUALS 12K, ETC..

1. NON ACTIVE CONSOLE PACKAGE

   A. IF THE PSEUDO SWITCH REGISTER IS TO BE USED GO TO SECTION B OF THIS STEP. IF THE HARDWARE SWITCH REGISTER IS TO BE USED, GO TO SECTION C IN THIS STEP.
   B. DEPOSIT INTO LOCATION 0021, 00XX IF NO PDP-8A OPTION BOARD #1 IS TO BE TESTED, OTHERWISE DEPOSIT 30XX TO TEST THE PDP-8A OPTION BOARD #1. NOW, LOAD ADDRESS TO 0020 AND DEPOSIT INTO THIS LOCATION THE SWITCH REGISTER SETTINGS DESIRED (NORMALLY ALL ZEROS). LOAD ADDRESS TO 0022 AND DEPOSIT ALL ZEROES TO INDICATE A NON ACTIVE CONSOLE PACKAGE. GO TO PARAGRAPH 4.3.1 - RUNNING PROGRAM ON NON ACTIVE CONSOLE PACKAGE.
   C. DEPOSIT INTO LOCATION 0021, 40XX IF NO PDP-8A OPTION BOARD #1 IS TO BE TESTED, OTHERWISE, DEPOSIT 70XX TO TEST THE PDP-8A OPTION BOARD #1 NOW LOAD ADDRESS TO 0022 AND DEPOSIT ALL ZEROES TO INDICATE A NON ACTIVE CONSOLE PACKAGE, GO TO PARAGRAPH 4.3.1 - RUNNING PROGRAM ON NON ACTIVE CONSOLE PACKAGE.

2. ACTIVE CONSOLE PACKAGE

A. DEPOSIT INTO LOCATION 0021, 00XX IF NO PDP-8A OPTION BOARD #1 IS TO BE TESTED, OTHERWISE, DEPOSIT 30XX INTO THIS LOCATION TO TEST IT.
B. LOAD ADDRESS TO 0020 AND DEPOSIT INTO THIS LOCATION THE SWITCH REGISTER SETTINGS DESIRED (NORMALLY ALL ZEROES).
C. LOAD ADDRESS TO 0022, AND DEPOSIT INTO THIS LOCATION 0400, TO INDICATE A ACTIVE CONSOLE PACKAGE, GO TO PARAGRAPH 4.3.2 - RUNNING PROGRAM ON A ACTIVE CONSOLE PACKAGE.

3. PDP-8A APT TEST LINE

A. DEPOSIT INTO LOCATION 0021, 00XX IF NO PDP-8A OPTION BOARD #1 IS TO BE TESTED, OTHERWISE, DEPOSIT 30XX INTO THIS LOCATION TO TEST IT.
B. LOAD ADDRESS TO 0020 AND DEPOSIT ALL ZEROES.
C. LOAD ADDRESS TO 0022 AND DEPOSIT 4000, TO INDICATE TO THE PROGRAM THAT ITS ON THE APT TEST LINE.
D. START PROGRAM USING APT SCRIPTS.

4.3.1 RUNNING PROGRAM ON NON ACTIVE CONSOLE PACKAGE

A. LOAD ADDRESS TO THE STARTING ADDRESS OBTAINED FROM PARAGRAPH 4.3 PART A. PRESS "INIT" AND THEN "RUN" THE PROGRAM SHOULD NOW RUN.

B. IF THE PROGRAM WAS INITIALIZED TO TEST THE PDP-8A OPTION BOARD #1, A BINARY COUNT PATTERN SHOULD BE TYPING OUT ON THE CONSOLE TERMINAL. THE PROGRAM WILL ALSO BE TESTING FOR REAL TIME CLOCK INTERRUPTS.

C. TO STOP THE PROGRAM, "ALWAYS" SET THE SWITCH REGISTER OR PSEUDO SWITCH REGISTER WHICHEVER SELECTED TO 0400. FAILURE TO DO THIS MAY DESTROY THE PROGRAM WHEN IT IS RESTARTED. THE PROGRAM WILL HALT AFTER 4096 TEST INSTRUCTIONS HAVE BEEN EXECUTED IF THE SWITCH REGISTER WAS SET TO 0400. RESETTING THE SWITCH REGISTER AND PRESSING "INIT" AND THEN "RUN" WILL CAUSE THE PROGRAM TO CONTINUE TESTING.

D. REFER TO SECTION ON ERRORS FOR ANY HALT OTHER THEN

END OF PASS HALT.

E. RUN THIS PROGRAM FOR 30 MINUTES. A PROGRAM PASS WILL RANGE BETWEEN 5 SECONDS TO 30 SECONDS DEPENDING ON MEMORY SIZE AND CYCLE TIME.

F. TO RESTART THE PROGRAM, GO TO PARAGRAPH 4.3 - RUN 4K TO 32K PDP-8A PROCESSOR EXERCISER.

4.3.2 RUNNING PROGRAM ON A ACTIVE CONSOLE PACKAGE

A. LOAD ADDRESS TO THE STARTING ADDRESS OBTAINED FROM PARAGRAPH 4.3 PART A. PRESS "INIT" AND THEN "RUN".

B. THE PROGRAM WILL NOW TYPE OUT THE PSEUDO SWITCH REGISTER, LOCATION 0020, ON THE CONSOLE TERMINAL AS "SR=0000" AND THEN WAIT FOR THE OPERATOR TO RESPOND. TYPING IN "CP" WILL START RUNNING THE PROGRAM USING THE NUMBER TYPED OUT AS THE SWITCH REGISTER SETTING. TYPING IN 4 OCTAL DIGITS WILL CHANGE THE PSEUDO SWITCH REGISTER AND START RUNNING THE PROGRAM USING THE NUMBER TYPED AS THE NEW SWITCH REGISTER SETTING.

C. IF THE PROGRAM WAS INITIALIZED TO TEST THE PDP-8A OPTION BOARD #1 OR IF THE SYSTEM UNDER TEST IS A VT78, A BINARY COUNT PATTERN SHOULD BE TYPING OUT ON THE CONSOLE TERMINAL. THE PROGRAM WILL ALSO BE TESTING THE REAL TIME CLOCK TO INTERRUPT.

D. THE PROGRAM WILL NOW RUN UNTIL STOPPED BY THE OPERATOR OR A ERROR IS ENCOUNTERED. A END OF PASS MESSAGE WILL BE TYPED OUT IN APPROXIMATELY ONE MINUTE (2 MIN FOR A VT78). THE NUMBER TYPED OUT WILL BE UPDATED ABOUT EVERY MINUTE (2 MINUTES FOR A VT78) THE END OF PASS TYPEOUT WILL LOOK LIKE THIS "DJEXCB PASS 0001".

E. SETTING OF THE PSEUDO SWITCH REGISTER TO 0400 EITHER AT PROGRAM START OR VIA THE CONTROL G CHARACTER WILL CAUSE THE PROGRAM TO TYPEOUT THE END OF PASS MESSAGE FOLLOWED BY THE PSEUDO SWITCH REGISTER. A CARRIAGE RETURN IS NEEDED TO CONTINUE FROM THIS TYPEOUT.

F. REFER TO PARAGRAPH 4.4, CONSOLE PACKAGE CONTROL CHARACTERS, FOR THE CONTROL CHARACTERS AND THEIR FUNCTIONS.

G. REFER TO THE SECTION ON ERRORS FOR ANY ERROR TYPEOUTS OR HALTS WHILE RUNNING THE PROGRAM.

H. RUN THIS PROGRAM FOR APPROXIMATELY 30 MINUTES (1 HOUR ON A VT78).

I. TO RESTART THE PROGRAM OR TO RE-INITIALIZE IT, GO TO PARAGRAPH 4.3, RUN 4K TO 32K PDP-8A PROCESSOR EXERCISER OR PARAGRAPH 4.2 FOR A VT78 SYSTEM..

4.4 CONSOLE PACKAGE CONTROL CHARACTERS

CONTROL CHARACTERS ARE USED TO GIVE THE OPERATOR THE ABILITY TO PERFORM THE FOLLOWING FUNCTIONS.

NOTE: THE PROGRAM WILL RESPOND TO THE CONTROL CHARACTERS IN FIVE SECONDS OR LESS.

CONTROL C

THIS WILL RESTORE THE FLOPPY BOOTSTRAP AND THEN REBOOT TO THE FLOPPY MONITOR.

CONTROL L

THIS WILL SWITCH THE TERMINAL MESSAGES FROM THE CONSOLE TO A LINE PRINTER (DEV CODE 66). TO RESTORE MESSAGES ON THE TERMINAL CONTROL L MUST BE TYPED AGAIN. IF NO PRINTER IS AVAILABLE AND CONTROL L IS TYPED THE RESULT WILL BE THAT THE CONSOLE PACKAGE WILL WAIT FOR A CONTROL CHAR. THE CONTROL L WILL OUTPUT TO THE TERMINAL AND THE PROGRAM WILL ATTEMPT TO CONTINUE.

CONTROL O

THIS WILL STOP THE PRINTING OF ERROR MESSAGES, ALL OTHER MESSAGES WILL BE DISPLAYED. TO START PRINTING THE ERROR MESSAGE TYPE CONTROL O AGAIN. BY TYPING CONTROL O, THE ERROR MESSAGE PRINTOUT WILL BE EFFECTED AND THE PROGRAM WILL ATTEMPT TO CONTINUE.

CONTROL S

THIS WILL STOP PROGRAM EXECUTION AND WAIT IN A LOOP FOR A CONTINUE. THE ONLY WAY TO CONTINUE WILL BE TO TYPE A CONTROL Q, G OR C. THIS IS A NON PRINTING CHARACTER.

CONTROL Q

THIS IS TO CONTINUE A PROGRAM AFTER A CONTROL S IS TYPED. THIS IS A NON-PRINTING CHARACTER.

CONTROL G

THIS WILL ALLOW THE PSEUDO SWITCH REGISTER TO BE CHANGED AT ANY TIME THE DIAGNOSTIC IS RUNNING, THIS WILL ALLOW A CHANGE TO THE SWITCH REGISTER TO BE MADE AFTER THE INITIAL SETTING WAS MADE.

TERMINATING CHARACTERS:

CARRIAGE RETURN -- THIS WILL RESTORE THE PSEUDO SWITCH REGISTER WITH A NEW VALUE IF ONE WAS ENTERED OR KEEP THE OLD VALUE IF NO NUMBERS WERE TYPED IN. THE PROGRAM

WILL THEN RETURN TO THE POINT AT WHICH IT WAS INTERRUPTED AND RESUME OPERATION.

LINE FEED -- A LINE FEED WILL RESTORE THE PSEUDO SWITCH SWITCH REGISTER WITH THE NEW VALUE TYPED IN OR IF NO NUMBERS WERE ENTERED RESTORE THE OLD VALUE. THE PROGRAM WILL THEN RETURN TO THE BEGINNING OF THE PROGRAM.

SWITCH REGISTER MESSAGE

THIS MESSAGE IS USED TO SETUP THE PSEUDO SWITCH REGISTER BEFORE PROGRAM EXECUTION TAKES PLACE. THE SWITCH REGISTER IS SETUP WHEN THE FOURTH CHARACTER IS ENTERED OR A CARRIAGE RETURN IS TYPED.

END OF PASS

A INDICATION WILL BE GIVEN WHEN THE DIAGNOSTIC HAS MADE A SUCCESSFUL PASS. THE PRINTOUT WILL INDICATE THE DIAGNOSTIC MAINDEC NUMBER, THE WORD PASS, AND A FOUR DIGIT PASS NUMBER.

5.0 ERRORS

ALL ERRORS DETECTED, EXCEPT FOR CATASTROPHIC ERRORS, WILL RESULT IN A ERROR HALT FOR A NON ACTIVE CONSOLE PACKAGE OR A ERROR PRINTOUT FOR A ACTIVE CONSOLE PACKAGE. A ERROR PRINTOUT FOR A ACTIVE CONSOLE PACKAGE WILL LOOK LIKE THE FOLLOWING:

DJEXCB FAILED PC;AAAA AC;BBBB MQ;CCCC FL;DDDD

DJEXCB	MAINDEC NAME
PC;AAAA	ADDRESS WHERE PROGRAM DETECTED A ERROR
AC;BBBB	ERROR INFORMATION IN THE AC
MQ;CCCC	NOT APPLICABLE TO PROGRAM
FL;DDDD	NOT APPLICABLE TO PROGRAM

THE ABOVE TYPEOUT WILL BE FOLLOWED BY THE SWITCH REG QUESTION IF BIT 0 IN THE PSEUDO SWITCH REGISTER IS A 0. IF BIT 0 WAS SET THE PROGRAM WILL CONTINUE. RESPONDING WITH A CARRIAGE RETURN TO THE PSR QUESTION WILL CONTINUE DIAGNOSTIC FROM ERROR.

CATASTROPHIC ERRORS WILL RESULT IN A ERROR HALT FOR BOTH ACTIVE AND INACTIVE CONSOLE PACKAGE. USING THE ERROR HALT ADDRESS OR THE ERROR PC PRINTOUT ADDRESS ON A ACTIVE CONSOLE PACKAGE, REFER TO THE ADDRESSES IN THE TABLE IN PARAGRAPH 5.1, CATASTROPHIC ERROR HALTS, AND IN PARAGRAPH 5.2, ERROR HALTS/ERROR PRINTOUTS, TO DETERMINE WHAT TYPE OF ERROR WAS DETECTED BY THE PROGRAM. ANY ERRORS HALTS WHICH DO NOT CORRESPOND TO AN ADDRESS LISTED IN THE TABLES IN PARAGRAPH 5.1 AND 5.2 ARE ALSO CATASTROPHIC ERRORS. THESE ERRORS ARE PROBABLY DUE TO EXECUTION OF A INSTRUCTION TO THE WRONG ADDRESS OR FIELD.

5.1 CATASTROPHIC ERROR HALTS

ALL ADDRESSES WHICH CORRESPOND TO A ADDRESS IN THE TABLE BELOW OR A ADDRESS WHICH DOES NOT CORRESPOND TO A ADDRESS

IN THE TABLE IN PARAGRAPH 5.2 ARE CATASTROPHIC ERRORS. THESE ERRORS CANNOT BE RECOVERED FROM AND THE PROGRAM MUST BE RELOADED. THE HEADERS FOR THE ERROR HALTS LISTED BELOW ARE DEFINED AS FOLLOWS:

BAT EMP - BATTERY BECAME EMPTY WHILE RUNNING EXERCISER
ROL UP - RELOCATION ERROR WHILE RELOCATING UP WITHIN A FIELD
ROL DWN - RELOCATION ERROR WHILE RELOCATING DOWN WITHIN A FIELD.
SWP FLD - RELOCATION ERROR WHILE RELOCATING TO ANOTHER FIELD.

BAT EMP	ROL UP	ROL DWN	SWP FLD
3253	0233	5165	0466
3453	0433	5365	0666
3653	0633	5565	1066
4053	1033	5765	1266
4253	1233	6165	1466
4453	1433	6365	1666
4653	1633	6565	2066
5053	2033	6765	2266
5253	2233	7165	2466
5453	2433	7365	2666
5653	2633	7565	3066
6053	3033	7765	3266

5.2 ERROR HALTS/ERROR PRINTOUTS

THE ADDRESSES LISTED BELOW ARE THE ERROR HALT ADDRESSES ON A NON ACTIVE CONSOLE PACKAGE OR THE PC ERROR ADDRESS IN A ERROR PRINTOUT FOR A ACTIVE CONSOLE PACKAGE. REFERENCE THE ADDRESSES IN THE TABLE BELOW TO THE ADDRESS OBTAINED FROM THE ERROR HALT OR ERROR PRINTOUT, AND GO TO THE PARAGRAPH DESCRIBING THE ERROR AND FOR THE ERROR RECOVERY. ANY ERROR HALTS WHICH OCCUR AND DO NOT CORRESPOND TO ANY OF THE ADDRESSES LISTED BELOW OR TO THE TABLE IN PARAGRAPH 5.1 ARE CATASTROPHIC ERRORS. THE HEADERS FOR THE ERROR ADDRESSES LISTED BELOW ARE DEFINED AS FOLLOWS:

MRI ERR - MEMORY REFERENCE INSTRUCTION ERROR (AND-TAD-ISZ-DCA-JMS-JMP
OPR ERR - OPERATE INSTRUCTION ERROR
ILL INT - ILLEGAL INTERRUPT
INA DEV - INACTIVE DEVICE ERROR
NO INT - NO INTERRUPTS FROM PDP-8A OPTION BOARD #1

SAF0 - SA IS THE STARTING ADDRESS OF THE PROGRAM (SA00) AND F IS DETERMINED BY THE OPERATOR FOR THE FIELD WHICH THE PROGRAM HALTED OR PRINTED OUT IN. SAF0

SHOULD AGREE WITH ADDRESS 0005 IN FIELD 0.

MRI ERR	OPR ERR	ILL INT	INA DEV	NO INT	SAFO
1336	1742	3130	3263	3315	02F0
1536	2142	3330	3453	3515	04F0
1736	2342	3530	3663	3715	06F0
2136	2542	3730	4063	4115	10F0
2336	2742	4130	4263	4315	12F0
2536	3142	4330	4463	4515	14F0
2736	3342	4530	4663	4715	16F0
3136	3542	4730	5063	5115	20F0
3336	3742	5130	5263	5315	22F0
3536	4142	5330	5463	5515	24F0
3736	4342	5530	5663	5715	26F0
4136	4542	5730	6063	6115	30F0

5.3 MEMORY REFEPENCE INSTRUCTION ERRORS

THE PROGRAM WILL HALT FOR A NON ACTIVE CONSOLE PACKAGE AT ADDRESS XX36 OR THE ERROR PC PRINTOUT ON A ACTIVE CONSOLE PACKAGE WILL BE XX36. THIS ADDRESS WILL BE FOR MEMORY REFERENCE (AND-TAD-ISZ-DCA-JMS-JMP) ERRORS. XX36 WILL BE A COMMON HALT OR A COMMON ERROR PC ADDRESS FOR ALL PRINTOUTS. RECORD THE CONTENTS OF THE AC OF THE HALT OR ERROR PRINTOUT INTO THE FIRST ITEM IN THE TABLE. IF ON A NON ACTIVE CONSOLE PACKAGE PRESS "RUN" TO OBTAIN THE NEXT BIT OF ERROR INFORMATION. IF ON A ACTIVE CONSOLE PACKAGE, TYPE CARRIAGE RETURN TO GET THE NEXT BIT OF INFORMATION FROM THE ERROR PRINTOUT. CONTINUE WITH THE ABOVE SEQUENCE UNTIL EACH ITEM IN THE TABLE BELOW IS FILLED.

MEMORY REFERENCE INSTRUCTION INFORMATION TABLE

HALT #	ADDRESS	CONTENTS OF AC	DESCRIPTION
HALT #1	XX36		FIELD THAT PROGRAM PUT INSTRUCTION IN
HALT #2	XX36		INSTRUCTION RETURNED FROM THIS FIELD AFTER EXECUTION OF INSTRUCTION
HALT #3	XX36		EXPECTED PC RETURN FROM INSTRUCTION
HALT #4	XX36		ACTUAL PC RETURN FROM INSTRUCTION
HALT #5	XX36		ADDRESS WHERE INSTRUCTION WAS PLACED
HALT #6	XX36		TEST INSTRUCTION - THE INSTRUCTION WHICH WAS EXECUTED
HALT #7	XX36		REFERENCE ADDRESS - ADDRESS WHICH THE INSTRUCTION WILL REFERENCE, OR IF THE INSTRUCTION IS INDIRECT, THIS ADDRESS WILL CONTAIN THE INDIRECT ADDRESS.

HALT #8 XX36	INDIRECT ADDRESS - THIS IS THE INDIRECT ADDRESS WHICH THE TEST INSTRUCTION WILL REFERENCE. N/A FOR DIRECT ADDRESSING INSTRUCTIONS.
HALT #9 XX36	INITIAL MEMORY DATE- MEMORY DATA WHICH IS PUT INTO REFERENCE ADDRESS OR INDIRECT ADDRESS IF INSTRUCTION IS DIRECT OR INDIRECT, N/A FOR JMP OR JMS INSTRUCTIONS.
HALT#10 XX36	FINAL MEMORY DATA- CONTENTS OF REFERENCE ADDRESS OR INDIRECT ADDRESS AFTER EXECUTION OF INSTRUCTION. FOR A JMP INSTRUCTION, THIS NUMBER SHOULD BE EQUAL TO A CIF X. FOR A JMS INSTRUCTION, THIS NUMBER SHOULD EQUAL THE INSTRUCTION ADDRESS (HALT #5) PLUS 1.
HALT#11 XX36	THE CONTENTS OF THE AC BEFORE THE EXECUTION OF THE INSTRUCTION
HALT#12 XX36	THE CONTENTS OF THE AC AFTER THE EXECUTION OF THE TEST INSTRUCTION
HALT#13 XX36	THE STATE OF THE LINK, BEFORE THE EXECUTION OF THE INSTRUCTION
HALT#14 XX36	THE STATE OF THE LINK, AFTER THE EXECUTION OF THE TEST INSTRUCTION.
HALT#15 XX36	THE CONTENTS OF THE MQ BEFORE THE TEST INSTRUCTION IS EXECUTED
HALT#16 XX36	THE CONTENT OF THE MQ AFTER THE EXECUTION OF THE TEST INSTRUCTION.

THIS IS THE END OF THE MEMORY REFERENCE INSTRUCTION ERROR INFORMATION.
REFER TO MEMORY REFERENCE TEST INSTRUCTION SETUP SECTION,
PARAGRAPH 5.4, TO DETERMINE THE TYPE OF ERROR.

TO LOOP ON THIS ERROR ON A NON ACTIVE CONSOLE PACKAGE,
SET THE SWITCH REGISTER TO 7000 AND PRESS ONLY "RUN". THE
PROGRAM IS NOW IN A SCOPE LOOP, LOOPING OF THE FAILING CONDITIONS

TO LOOP ON THIS ERROR ON A ACTIVE CONSOLE PACKAGE, TYPE
CONTROL G AND THEN TYPE IN 7000 FOR THE SWITCH REGISTER VALUE.
THE PROGRAM IS NOW IN A SCOPE LOOP. TYPE CONTROL O TO INHIBIT ERROR
PRINTOUTS.

5.4 MEMORY REFERENCE TEST INSTRUCTION SETUP

TO DETERMINE THE TYPE OF ERROR, THE OPERATOR MUST UNDERSTAND THE TEST INSTRUCTION SETUP. THE TEST INSTRUCTION SETUPS ARE BROKEN UP INTO GROUPS WHICH ARE LISTED AND DESCRIBED BELOW.

A. AND'S THROUGH DCA'S DIRECT ADDRESSING MODE

1. INSTRUCTION SETUP IS PUT IN SOME RANDOM FIELD
2. LOCATION 4 OF THIS RANDOM FIELD CONTAINS THE RETURN POINTER TO THE PROGRAM.
3. THE CONTENTS OF THE LINK, AC AND MQ CONTAINS SOME RANDOM NUMBER
4. THE PROGRAM JUMPS TO THE INSTRUCTION ADDRESS -1
5. INSTRUCTION ADDRESS -1 = CIF TO PROGRAM FIELD.
6. INSTRUCTION ADDRESS = THE TEST INSTRUCTION
7. INSTRUCTION ADDRESS +1 = JMS I 4 - RETURN TO PROGRAM
8. INSTRUCTION ADDRESS +2 = JMS I 4 - RETURN TO PROGRAM
9. REFERENCE ADDRESS = INITIAL MEMORY DATA - LOCATION THE INSTRUCTION WILL EXECUTE.

B. AND'S THROUGH DCA'S INDIRECT ADDRESS MODE

1. INSTRUCTION SETUP IS PUT IN SOME RANDOM FIELD
2. LOCATION 4 OF THIS FIELD CONTAINS THE RETURN POINTER TO THE PROGRAM
3. THE CONTENTS OF THE LINK, AC, AND MQ CONTAINS SOME RANDOM NUMBER
4. THE PROGRAM JUMPS TO THE INSTRUCTION ADDRESS -1
5. INSTRUCTION ADDRESS -1 = CIF 10 PROGRAM FIELD
6. INSTRUCTION ADDRESS = THE TEST INDIRECT INSTRUCTION
7. INSTRUCTION ADDRESS +1 = JMS I 4 - RETURN TO PROGRAM
8. INSTRUCTION ADDRESS +2 = JMS I 4 - RETURN TO PROGRAM
9. REFERENCE ADDRESS = INDIRECT ADDRESS - THE ADDRESS THE INSTRUCTION WILL REFERENCE
10. INDIRECT ADDRESS = INITIAL MEMORY DATA - THE LOCATIONS THE INSTRUCTIONS WILL EXECUTE

C. JMP'S - DIRECT ADDRESSING MODE

1. INSTRUCTION SETUP IS PUT IN SOME RANDOM FIELD
2. LOCATION 4 OF THIS RANDOM FIELD CONTAINS THE RETURN POINTER TO THE PROGRAM.
3. THE CONTENTS OF THE LINK, AC, AND MQ CONTAIN SOME RANDOM NUMBER
4. THE PROGRAM JUMPS TO THE INSTRUCTION ADDRESS
5. INSTRUCTION ADDRESS = THE TEST JUMP INSTRUCTION
6. REFERENCE ADDRESS = CIF TO PROGRAM FIELD, TEST INSTRUCTION JUMPS TO HERE
7. REFERENCE ADDRESS +1 = JMS I 4 - RETURN TO PROGRAM
8. REFERENCE ADDRESS +2 = JMS I 4 - RETURN TO PROGRAM

D. JMP'S - INDIRECT ADDRESS MODE

1. INSTRUCTION SETUP IS PUT IN SOME RANDOM FIELD
2. LOCATIONS 4 OF THIS RANDOM FIELD CONTAINS THE RETURN POINTER TO THE PROGRAM.
3. THE CONTENTS OF THE LINK, AC, AND MQ CONTAINS SOME RANDOM NUMBER.
4. THE PROGRAM JUMPS TO THE INSTRUCTION ADDRESS
5. INSTRUCTION ADDRESS = THE TEST JMP INDIRECT INSTRUCTION

6. REFERENCE ADDRESS = CONTAINS THE INDIRECT ADDRESS
7. INDIRECT ADDRESS = CIF TO PROGRAM FIELD
8. INDIRECT ADDRESS +1 = JMS I 4 - RETURN TO PROGRAM
9. INDIRECT ADDRESS +2 = JMS I 4 - RETURN TO PROGRAM

E. JMS'S - DIRECT ADDRESS MODE

1. INSTRUCTION SETUP IS PUT IN SOME RANDOM FIELD
2. LOCATION 4 OF THIS FIELD CONTAINS THE RETURN POINTER TO THE PROGRAM.
3. THE CONTENTS OF THE LINK, AC, AND MQ CONTAINS SOME RANDOM NUMBER.
4. THE PROGRAM JUMPS TO THE INSTRUCTION ADDRESS
5. INSTRUCTION ADDRESS = THE TEST JMS INSTRUCTION
6. REFERENCE ADDRESS = SHOULD CONTAIN INSTRUCTION ADDRESS +1 AFTER EXECUTION OF TEST INSTRUCTION
7. REFERENCE ADDRESS +1 = CIF TO PROGRAM FIELD
8. REFERENCE ADDRESS +2 = JMS I 4 - RETURN TO PROGRAM
9. REFERENCE ADDRESS +3 = JMS I 4 - RETURN TO PROGRAM

F. JMS'S - INDIRECT ADDRESS MODE

1. INSTRUCTION SETUP IS PUT IN SOME RANDOM FIELD
2. LOCATION 4 OF THIS FIELD CONTAINS THE RETURN POINTER TO PROGRAM.
3. THE CONTENTS OF THE LINK, AC, AND MQ CONTAINS SOME RANDOM NUMBER.
4. THE PROGRAM JUMPS TO THE INSTRUCTION ADDRESS
5. INSTRUCTION ADDRESS = THE TEST JMS INDIRECT INSTRUCTION
6. REFERENCE ADDRESS = INDIRECT ADDRESS
7. INDIRECT ADDRESS = SHOULD CONTAIN THE INSTRUCTION ADDRESS +1 AFTER EXECUTION OF INSTRUCTION.
8. INDIRECT ADDRESS +1 = CIF TO PROGRAM FIELD
9. INDIRECT ADDRESS +2 = JMS I 4 - RETURN TO PROGRAM
10. INDIRECT ADDRESS +3 = JMS I 4 - RETURN TO PROGRAM

5.5 OPERATE INSTRUCTION ERRORS

THE PROGRAM WILL HALT FOR A NON ACTIVE CONSOLE PACKAGE AT ADDRESS XX42 OR THE ERROR PC PRINTOUT ON A ACTIVE CONSOLE PACKAGE WILL BE XX42. THIS ADDRESS WILL BE FOR ALL OPERATE INSTRUCTION ERRORS. XX42 WILL BE A COMMON HALT OR ERROR PC PRINTOUT FOR ALL IDEMS LISTED BELOW IN THE TABLE. RECORD THE CONTENTS OF THE AC OF THE HALT OR ERROR PRINTOUT INTO THE FIRST IDEM IN THE TABLE. IF ON A NON ACTIVE CONSOLE PACKAGE PRESS "RUN" TO OBTAIN THE NEXT BIT OF ERROR INFORMATION. IF ON A ACTIVE CONSOLE PACKAGE, TYPE CARRIAGE RETURN TO GET THE NEXT BIT OF INFORMATION FROM THE ERROR PRINTOUT. CONTINUE THE SEQUENCE UNTIL EACH IDEM IN THE TABLE BELOW IS FILLED.

OPERATE INSTRUCTION INFORMATION TABLE

HALT #	ADDRESS CONTENTS OF AC	DESCRIPTION
HALT #1	XX42	FIELD THAT PROGRAM PUT INSTRUCTION IN
HALT #2	XX42	INSTRUCTION RETURNED FROM THIS FIELD AFTER EXECUTION OF INSTRUCTION
HALT #3	XX42	EXPECTED PC RETURN FROM INSTRUCTION

HALT #4 XX42	ACTUAL PC RETURN FROM INSTRUCTION
HALT #5 XX42	ADDRESS WHERE INSTRUCTION WAS PLACED
HALT #6 XX42	TEST INSTRUCTION - THE INSTRUCTION WHICH WAS EXECUTED
HALT #7 XX42	THE CONTENTS OF THE AC BEFORE THE INSTRUCTION WAS EXECUTED
HALT #8 XX42	THE SIMULATED RESULTS OF THE AC, AS CALCULATED BY THE PROGRAM, OF WHAT THE AC SHOULD BE AFTER THE EXECUTION OF THE TEST OPERATE INSTRUCTION
HALT #9 XX42	THE CONTENTS OF THE AC AFTER THE EXECUTION OF THE TEST INSTRUCTION
HALT#10 XX42	THE CONTENTS OF THE LINK BEFORE THE TEST OPERATE INSTRUCTION WAS EXECUTED.
HALT#11 XX42	THE SIMULATED RESULTS OF THE LINK AFTER THE TEST INSTRUCTION WAS EXECUTED AS CALCULATED BY THE PROGRAM
HALT#12 XX42	THE CONTENT OF THE LINK AFTER THE EXECUTION OF THE TEST INSTRUCTION
HALT#13 XX42	THE CONTENTS OF THE MQ BEFORE THE EXECUTION OF THE TEST INSTRUCTION
HALT#14 XX42	THE SIMULATED RESULTS OF THE MQ, AFTER EXECUTION OF THE TEST OPERATE INSTRUCTION AS CALCULATED BY THE PROGRAM.
HALT#15 XX42	THE CONTENTS OF THE MQ AFTER THE EXECUTION OF THE TEST INSTRUCTION.

THIS IS THE END OF THE OPERATE INSTRUCTION ERROR INFORMATION. EPRORS ENCOUNTERED UNDER THIS SECTION MAY BE DUE TO THE EXECUTION OF THE TEST OPERATE INSTRUCTION OR THE SIMULATION OF TEST INSTRUCTION DONE BY THE PROGRAM. REFER TO PARAGRAPH 5.6 FOR OPERATE TEST INSTRUCTION SETUP.

TO LOOP ON THIS ERROR ON A NON ACTIVE CONSOLE PACKAGE, SET THE SWITCH REGISTER TO 7000 AND PRESS ONLY "RUN". THE PROGRAM IS NOW IN A SCOPE LOOP, LOOPING ON THE FAILING CONDITIONS.

TO LOOP ON THIS ERROR ON A ACTIVE CONSOLE PACKAGE, TYPE CONTROL G AND THEN TYPE IN 7000 FOR THE SWITCH REGISTER VALUE. THE PROGRAM IS NOW IN A SCOPE LOOP. TYPE CONTROL O TO INHIBIT ERROR PRINTOUTS.

5.6 OPERATE TEST INSTRUCTION SETUP

TO DETERMINE THE TYPE OF ERROR, THE OPERATOR MUST UNDERSTAND THE TEST INSTRUCTION SETUP. THE OPERATE TEST INSTRUCTION SETUP IS LISTED BELOW.

A. BEFORE THE EXECUTION OF THE TEST OPERATE INSTRUCTION, THE PROGRAM SIMULATES THE RESULTS OF THE EXECUTION OF THE TEST OPERATE INSTRUCTION UPON THE LINK, AC, AND MQ

B. THE INSTRUCTION SETUP IS PLACED IN SOME RANDOM FIELD.

C. LOCATION 4 OF THIS RANDOM FIELD CONTAINS THE RETURN POINTER TO THE PROGRAM.

D. THE CONTENTS OF THE LINK, AC AND MQ CONTAINS SOME RANDOM NUMBER.

E. THE PROGRAM JUMPS TO THE INSTRUCTION ADDRESS -1.

F. INSTRUCTION ADDRESS -1 = CIF TO PROGRAM FIELD

G. INSTRUCTION ADDRESS = THE TEST OPERATE INSTRUCTION

H. INSTRUCTION ADDRESS +1 = JMS I 4 - RETURN TO PROGRAM.

I. INSTRUCTION ADDRESS +2 = JMS I 4 - RETURN TO PROGRAM.

5.7 ILLEGAL INTERRUPT ERRORS

THE PROGRAM WILL HALT AT ADDRESS XX30 ON A INACTIVE CONSOLE PACKAGE OR XX30 WILL BE THE ERROR PC PRINTOUT ON AN ACTIVE CONSOLE PACKAGE. THIS ERROR ADDRESS SIGNIFIES THAT A INTERRUPT OCCURRED FROM A DEVICE NOT BEING TESTED BY THE EXERCISER. THIS ERROR ALSO MAY BE CAUSED BY A FLAG GETTING CLEARED ON A INTERRUPT, OR A SKIP IOT FAILING TO SKIP ON A FLAG. TO RECOVER FROM THIS ERROR, RESTART THE PROGRAM (PARAGRAPH 4.3) IF THE ERROR STILL EXISTS, USE A SCOPE TO SEE WHAT OTHER FLAG IS SET BESIDES THE FOLLOWING EXPECTED FLAGS, SERIAL LINE UNIT TRANSMIT FLAG OR RECEIVE FLAG AND THE REAL TIME CLOCK FLAG. INTERRUPTS ARE ONLY EXPECTED IF THE OPTION BOARD #1 IS TO BE TESTED OR IF THE CONSOLE PACKAGE IS ACTIVE. AC LOW FLAG IS ALSO EXPECTED ON A POWER FAILURE.

5,8 INACTIVE DEVICE ERROR

THIS ERROR WILL ONLY OCCUR IF THE PROGRAM WAS INITIALIZED TO TEST THE PDP-8A OPTION BOARD #1 OR IF THE SYSTEM UNDER TEST IS A VT78. THE PROGRAM WILL HALT AT ADDRESS XX63 ON A INACTIVE CONSOLE PACKAGE, OR XX63 WILL BE THE ERROR PC PRINTOUT ON A ACTIVE CONSOLE PACKAGE. THIS ERROR WILL OCCUR IF THE SERIAL LINE UNIT'S TRANSMIT FLAG OR THE REAL TIME CLOCK FLAG HAS NOT INTERRUPTED IN A GIVEN AMOUNT OF TIME. WHEN THE PROGRAM IS RUNNING, A BINARY COUNT PATTERN SHOULD BE OUTPUTTED TO THE CONSOLE TERMINAL. IF IT ISN'T THEN THE SERIAL LINE UNIT IS INACTIVE, IF THE BINARY COUNT PATTERN IS OUTPUTTED TO THE CONSOLE, THEN THE REAL TIME CLOCK IS INACTIVE. USE A SCOPE TO TROUBLE SHOOT THIS PROBLEM. TO RECOVER FROM THIS ERROR, RESTART THE PROGRAM .

5,9 NO INTERRUPT ERRORS

THIS ERROR WILL ONLY OCCUR IF THE PROGRAM WAS INITIALIZED TO TEST THE PDP-8A OPTION BOARD #1 OR THE SYSTEM UNDER TEST IS A VT78. THE PROGRAM WILL HALT AT ADDRESS XX15 ON A INACTIVE CONSOLE PACKAGE, OR XX15 WILL BE THE ERROR PC PRINTOUT ON A ACTIVE CONSOLE PACKAGE. THIS ERROR INDICATES THAT NO INTERRUPTS FROM THE SERIAL LINE UNIT'S TRANSMIT FLAG OR REAL TIME CLOCK FLAG HAVE OCCURRED OR THAT THE LAST FLAG EXPECTED FROM EACH DEVICE NEVER INTERRUPTED. TO RECOVER FROM THIS ERROR PRESS "RUN" ON A INACTIVE CONSOLE PACKAGE OR TYPE CARRIAGE RETURN ON A ACTIVE CONSOLE PACKAGE. USE A SCOPE AND LOOK AT THE SERIAL LINE UNIT'S TRANSMIT FLAG AND THE REAL TIME CLOCK.

6,0 SWITCH REGISTER SETTINGS

6,1 NORMAL OPERATING SWITCHES

SR2=1 (1000) - INHIBIT PROGRAM RELOCATION
SR3=1 (0400) - STOP THE PROGRAM AT THE COMPLETION OF A PROGRAM PASS

6,2 ERROR RELATED SWITCHES

SR0=1 (4000) - INHIBIT ERROR HALTS EXCEPT FOR RELOCATION ERRORS
SR1=1 (2000) - LOOP ON TEST CONDITIONS FOR MEMORY REFERENCE OR OPERATE INSTRUCTIONS
SR2=1 (1000) - INHIBIT PROGRAM RELOCATION

7.0 REVISIONS

REVISION B - ADDITIONS TO ALLOW USE ON VT78 SYSTEMS.

8.0 PROGRAM DESCRIPTION

THE 4K TO 32K PDP-8A PROCESSOR EXERCISER CHECKS THE EXECUTION OF ALL MEMORY REFERENCE AND OPERATE INSTRUCTIONS IN ALL SELECTED FIELDS AND ADDRESSES. ALL INSTRUCTIONS, FIELDS, AND DATA ARE SELECTED FROM A RANDOM NUMBER GENERATOR. THE PROGRAM FILLS MEMORY WITH HALTS AFTER EVERY 4096 TEST INSTRUCTIONS HAVE BEEN EXECUTED. IF THE PROGRAM WAS INITIALIZED TO TEST THE PDP-8A OPTION BOARD #1 OR IF THE SYSTEM UNDER TEST IS A VT78, IT WILL BE TESTED IN INTERRUPT MODE. A BINARY COUNT WILL BE TRANSMITTED ON THE SERIAL LINE UNIT. THE PROGRAM WILL EXPECT INTERRUPTS WHILE RUNNING THE MAIN LINE PROGRAM FROM THE SERIAL LINE UNIT AND REAL TIME CLOCK. AFTER EVERY 4096 TEST INSTRUCTIONS HAVE BEEN EXECUTED, THE PROGRAM RELOCATES ITSELF, A PAGE AT A TIME, "UP AND DOWN" WITHIN A MEMORY FIELD. ONCE THE PROGRAM HAS RELOCATED "UP AND DOWN" WITHIN A SPECIFIC MEMORY FIELD, IT WILL RELOCATE UP INTO THE NEXT FIELD IF MORE THAN 4K OF MEMORY EXISTS AND THE NEXT FIELD CONTAINS AT LEAST 3K OF MEMORY. THIS PROCEDURE WILL CONTINUE UNTIL THE LAST MEMORY FIELD IS ENTERED. THEN THE PROGRAM WILL RELOCATE ITSELF DOWN A FIELD AT A TIME UNTIL FIELD ZERO IS REACHED. THEN THE ENTIRE SEQUENCE IS REPEATED. REFER TO THE PARAGRAPHS BELOW FOR MORE DETAILED INFORMATION.

REFER TO PARAGRAPH 5.4 FOR MEMORY REFERENCE TEST INSTRUCTION SETUP. THE PROGRAM VERIFIES THE EXECUTION OF ALL MEMORY REFERENCE INSTRUCTIONS (AND-TAD-ISZ-DCA-JMS-JMP) FOR THE FOLLOWING:

A. THE INSTRUCTIONS RETURNED TO THE PROGRAM FROM THE CORRECT FIELD
B. THE INSTRUCTION RETURNED TO THE PROGRAM FROM THE CORRECT ADDRESS
C. CORRECT ADDRESSING MODES:
    1. DIRECT AND INDIRECT ADDRESSING
    2. SAME PAGE AND PAGE 0 ADDRESSING
    3. AUTO INDEX ADDRESSING

D. THE CORRECT MEMORY AND AC DATA AFTER THE EXECUTION OF THE TEST INSTRUCTION.
E. THE LINK DOESN'T CHANGE FOR THE FOLLOWING INSTRUCTIONS AND, ISZ, DCA, JMS AND JMP
F. THE MQ DOESN'T CHANGE.

REFER TO PARAGRAPH 5.6 FOR OPERATE TEST INSTRUCTION SETUP. THE PROGRAM SIMULATES THE EXECUTION OF THE TEST "OPERATE" INSTRUCTION AND VERIFIES THE HARDWARE EXECUTION OF THAT SAME OPERATE INSTRUCTION FOR THE FOLLOWING:

A. THE INSTRUCTION RETURNED TO THE PROGRAM FROM THE CORRECT FIELD
B. THE INSTRUCTION RETURNED TO THE PROGRAM FROM THE CORRECT ADDRESS
C. AC DATA RETURNED EQUALS THE SIMULATED AC DATA
D. THE LINK DATA RETURNED EQUALS THE SIMULATED LINK DATA
E. THE MQ DATA RETURNED EQUALS THE SIMULATED MQ DATA

THE PDP-8A OPTION BOARD #1 IS EXERCISED IN INTERRUPT MODE IF SELECTED. THE PROGRAM WHEN FIRST STARTED AND AFTER EACH PROGRAM RELOCATION SETS UP FOR A BINARY COUNT PATTERN ON THE SERIAL LINE UNIT. THE INTERRUPT ENABLE FLIP-FLOPS ARE THEN SET FOR THE SERIAL LINE UNIT AND REAL TIME CLOCK. A WORD IS THEN TRANSMITTED ON THE SERIAL LINE UNIT. THE PROGRAM NOW TURNS THE INTERRUPT ON AND JUMPS TO THE MAIN PART OF THE PROGRAM TO GENERATE AND TEST MEMORY REFERENCE AND OPERATE INSTRUCTIONS. WHEN A INTERRUPT OCCURS, THE PROGRAM DOES THE FOLLOWING:

A. SAVE THE AC, LINK AND THE INTERRUPTED PC
B. THE PROGRAM DOES ONE OF THE FOLLOWING DEPENDING ON THE FLAG SET.

    1. SLU XMIT FLAG - CLEARS XMIT FLAG - UPDATE WORD- TRANSMIT NEW WORD, GO TO STEP C.
    2. REAL TIME CLOCK FLAG - CLEAR REAL TIME CLOCK FLAG, GO TO STEP C.

C. THE PROGRAM CHECKS FOR THE SERIAL LINE UNIT AND REAL TIME CLOCK TO BE ACTIVE, IT THEN RESTORES THE LINK, AND AC, ISSUES A RMF INSTRUCTION AND RETURNS TO THE PROGRAM WHERE IT WAS INTERRUPTED FROM.
D. WHEN THE PROGRAM IS READY TO BE RELOCATED, THE PROGRAM WAITS FOR THE FLAGS AND THEN TURNS THE INTERRUPT OFF.

9.0 FLOWCHARTS

NONE

10.0 LISTING

ATTACHED

SEQ 0023

```
                        /4K TO 32K PDP-8A PROCESSOR EXERCISER
                        /
                        /MAINDEC-08-DJEXC-A-L
                        /
                        /COPYRIGHT 1975, DIGITAL EQUIPMENT CORPORATION
                        /
                        /PROGRAMMER:    BRUCE HANSEN


          7421          MQL=7421
          7701          ACL=7701
          7604          LAS=7604
          7402          HLT=7402
          6001          ION=6001
          6002          IOF=6002
          6160          SIMCLR=6160     /CLEAR SIMULATOR LOGIC
          6244          RMF=6244
          6035          KIE=6035
          6007          CAF=6007        /CLEAR ALL FLAGS
          6101          SBE=6101        /SKIP ON BATTERY EMPTY
          6102          SPL=6102        /SKIP ON AC LOW
          6103          CAL=6103        /CLEAR AC LOW F/F
          6135          CLLE=6135       /SET INT ENA ON REAL TIME CLOCK IF DATA BIT 11 ON A 1
          6136          CLCL=6136       /CLEAR REAL TIME CLOCK FLAG
          6137          CLSK=6137       /SKIP ON REAL TIME CLOCK FLAG

          0000          *0

0000      0302                  302             /REVISION B
0001      6202                  CIF 00/XX
0002      5403                  JMP I INT
0003      3103          INT,    INTERS
0004      0000          RETPNT, 0                       /MRI AND OPR RETURN POINTER
0005      0200          STRFLD, BGN                     /STARTING ADDRESS AND FIELD PROGRAM IS LOCATED IN

          0010          *10
0010      0000          AUTO10, 0
                        AUTO11,

          0020          *20
0020      0000          SWITCH, 0
0021      0007          OP1SEL, 0007
0022      0000          OP2SEL, 0000


                        /SWITCH REGISTER SETTINGS

                        /SR0=1  INHIBIT ERROR HALT
                        /SR1=1  LOOP ON ERROR OR TEST CONDITIONS
                        /SR2=1  INHIBIT PROGRAM RELOCATION
                        /SR3=1  HALT AFTER EXECUTION OF A PROGRAM PASS(4096 TEST INSTRUCTIONS)
```


SEQ 0024

```
                        /LOCATIONS 0005 TO 0177 WILL BE OVERLAYED ONCE THE PROGRAM HAS BEEN STARTED.
                        /IF THE PROGRAM HAS BEEN SETUP TO RUN WITH OR WITHOUT THE FRONT PANEL
                        /SWITCH REGISTER, IT CANNOT BE REINITIALIZED AGAIN.  THE ONLY WAY TO
                        /CHANGE THE FRONT PANEL STATUS IS TO RELOAD THE PROGRAM AND REINITIALIZE IT.

                        /THE FOLLOWING ROUTINE WILL CHANGE "TAD (I) SAVSWR" TO LAS, IF THE
                        /OPERATOR SET BIT 0 OF LOCATION 21 TO A ONE.

0023      0000          PATCH,  0
0024      1124                  TAD     K5771
0025      3526                  DCA  I  LOC200
0026      1125                  TAD     K5772
0027      3527                  DCA  I  LOC201
0030      7340                  CLA CLL CMA
0031      1023                  TAD     PATCH
0032      3023                  DCA     PATCH
0033      6160                  SIMCLR
0034      1022                  TAD     OP2SEL
0035      3471                  DCA  I  SAVOP2
0036      1022                  TAD OP2SEL      /VT78/CHECK IF RUNNING ON A VT78 SYSTEM
0037      7006                  RTL             /VT78/  BIT 2--HARDWARE CONFIG, WORD 2
0040      7710                  SPA CLA         /VT78/
0041      5472                  JMP I XPTCH3    /VT78/ RUNNING ON A VT78!!!
0042      1022          PATCH1, TAD     OP2SEL  /CHECK FOR THE ACT LINE BIT
0043      7700                  SMA     CLA     /IS IT SET ?
0044      5423                  JMP  I  PATCH   /NO RETURN TO THE PROGRAM
0045      1115                  TAD     OVRLAY
0046      3010                  DCA     AUTO10
0047      1116                  TAD     MRIOVR
0050      3011                  DCA     AUTO11
0051      4073                  JMS     MOVOVR  /GO OVERLAY FIRST 5 LOCATIONS OF ERROR
0052      1117                  TAD     OVRLY1
0053      3010                  DCA     AUTO10
0054      1120                  TAD     OPROVR
0055      3011                  DCA     AUTO11
0056      4073                  JMS     MOVOVR  /GO OVERLAY FIRST 5 LOCATIONS OF ERROPR
0057      1021                  TAD     OP1SEL  /GET THE HARDWARE CONFIGURATION
0060      0122                  AND     CON37   /MASK OFF MEMORY SIZE
0061      1123                  TAD     MIN37   /CHECK TO SEE IF 32K SELECTED
0062      7640                  SZA     CLA     /IS THERE 32K SELECTED?
0063      5470                  JMP  I  PATCHC  /NO,GO TO NEXT BUFFER TO GET NEXT OVERLAY
0064      7240                  CLA     CMA     /SUBTRACT 1K FROM 32K
0065      1021                  TAD     OP1SEL
0066      3021                  DCA     OP1SEL  /SAVE MEMORY SIZE AS 31K
0067      5470                  JMP  I  PATCHC  /CONTINUE THE OVERLAY FOR ACT LINE
0070      5200          PATCHC, PATCH2
0071      3456          SAVOP2, SELOP2
0072      5307          XPTCH3, PATCH3          /VT78/

0073      0000          MOVOVR, 0
0074      1121                  TAD     M5
0075      3130                  DCA     PATMOV
0076      1410                  TAD  I  AUTO10
0077      3411                  DCA  I  AUTO11
```

```
0100  2130          ISZ     PATMOV
0101  5076          JMP     .-3
0102  5473          JMP  I  MOVOVP

0103  6002  AEROV1, IOF
0104  6272          CIF     70
0105  1767          1767
0106  5717          5717
0107  6520          6520

0110  6002  AEROV2, IOF
0111  6272          CIF     70
0112  1745          1745
0113  5712          5712
0114  6520          6520

0115  0102  OVRLAY, AEROV1-1
0116  1312  MRIOVR, ERROR-1
0117  0107  OVRLY1, AEROV2-1
0120  2305  OPROVR, ERROPR-1

0121  7773  M5,     -5
0122  0037  CON37,  37
0123  7741  MIN37,  -37


0124  5771  K5771,  5771
0125  5772  K5772,  5772
0126  0200  LOC200, BGN
0127  0201  LOC201, BGN+1
0130  0000  PATMOV, 0


              0200  *200
              /
0200  0000  BGN,    0/JMS PATCH/JMP I XBGRAN
0201  0000          0/JMS PATCH/JMP I XBGCON

0202  0000  CHANGE, 0
0203  1602          TAD I CHANGE            /GET THE WORD TO MODIFY
0204  7450          SNA                     /IS IT EQUAL TO ZERO
0205  5602          JMP  I  CHANGE          /YES ALL DONE MODIFING
0206  1212          TAD SUBADD              /SUBTRACT OR ADD 200
0207  3602          DCA I CHANGE            /RESTORE THE MODIFIED WORD
0210  2202          ISZ CHANGE
0211  5203          JMP .-6                 /GET THE NEXT WORD TO MODIFY
              /

0212  0000  SUBADD, 0
0213  0000  DIRFLG, 0
0214  0200  LOWLIM, 200
0215  7400  M400,   -400
              /
0216  1245  SWAP1,  TAD SZPRG              /ROUTINE TO SWAP PROGRAM UP
0217  3202          DCA CHANGE              /SAVE PROGRAM SIZE
0220  1375          TAD XENDPR              /MODIFIED END OF PROGRAM
```



```
0221  3246          DCA CNTR2
0222  1251          TAD M200
0223  1375          TAD XENDPR
0224  3247          DCA CNTR3               /GET ACTUAL END OF PROGRAM
0225  1647  MOVUP,  TAD I CNTR3
0226  3646          DCA I CNTR2
0227  1647          TAD I CNTR3             /COMPARE THE WORD THAT WAS RELOCATED
0230  7041          CIA
0231  1646          TAD I CNTR2
0232  7640          SZA CLA
0233  7402          HLT                     /COMPARE ERROR DURING RELOCATION
0234  7040          CMA
0235  1247          TAD CNTR3
0236  3247          DCA CNTR3
0237  7040          CMA
0240  1246          TAD CNTR2
0241  3246          DCA CNTR2
0242  2202          ISZ CHANGE
0243  5225          JMP MOVUP
0244  5776          JMP I RSCNT
              /
0245  3001  SZPRG,  BGN-PRGEND-1
0246  0000  CNTR2,  0
0247  0000  CNTR3,  0
0250  0400  K400,   400
0251  7600  M200,   -200


              /
0252  4756  LPCNT,  JMS I GETSWR                  /LOOP ON INSTRUCTION IF SR1 =1
0253  7004          RAL
0254  7700          SMA CLA
0255  5271          JMP XCNT                /EXIT,AND BUMP COUNTERS
0256  1762  RESETT, TAD I XINSTR           /IS INSTRUCTION INDIRECT
0257  0250          AND K400
0260  7650          SNA CLA
0261  5763          JMP I XNTIND            /NO,RESET DATA IN REFERANCE ADDRESS
0262  1762          TAD I XINSTR            /YES,REGENERATE REFERENCE ADDRESS
0263  0214          AND     LOWLIM          /MASK OUT PAGE BIT
0264  7640          SZA CLA
0265  1764          TAD I XASAVA
0266  1765          TAD I XASAVB
0267  3766          DCA I XREFAD
0270  5767          JMP I XLOOP
0271  2247  XCNT,   ISZ CNTR3               /BUMP PASS COUNTER
0272  5770          JMP I RSCNTX
0273  4760          JMS  I  WAIT            /IF OPTION 1 SELECTED WAIT FOR FLAGS
0274  4755          JMS I CSPASS            /END OF A PROGRAM PASS
0275  7402          HLT                     /END OF A PROGRAM PASS HALT IF SR=400
0276  4756          JMS I GETSWR            /CHECK FOR RELOCATION
0277  7006          RTL                     /DO NOT RELOCATE IF SR2=1
0300  7710          SPA CLA
0301  5776          JMP I RSCNT
0302  6224  ARRANG, RIF                     /GET HOME FIELD
0303  7041          CIA
0304  1754          TAD I XFLD              /IS IT EQUAL TO LAST FIELD
```

```
0305  7640          SZA CLA
0306  7240          CLA CMA                 /NO,PROGRAM IS IN A 4K FIELD
0307  7450          SNA                     /YES, IN LAST FIELD GET UPPER LIMITS
0310  1773          TAD I XUPERL
0311  3774          DCA I HIGHLM            /SAVE UPPER LIMIT
0312  1213          TAD DIRFLG              /IS THE PROGRAM ROLLING UP OR ROLLING BACK
0313  7640          SZA CLA
0314  5761          JMP I XROLBK            /THE PROGRAM IS ROLLING BACK
0315  1375  ROLLUP, TAD XENDPR              /GET END OF PROGRAM AND COMPARE IT
0316  7040          CMA                     /WITH HIGH LIMITS
0317  1774          TAD I HIGHLM
0320  7650          SNA CLA
0321  5761          JMP I XROLBK            /THIS IS NEEDED FOR A 1K FIELD OTHER THAN 0
0322  5324          JMP SETFLG
0323  7240          CLA CMA                 /NO,SET REVERSE FLAG
0324  3213  SETFLG, DCA DIRFLG              /=1 IF GOING REVERSE; 0 IG FORWARD
0325  1213          TAD DIRFLG              /ROLLING UP OR ROLLING BACK?
0326  7640          SZA CLA
0327  1215          TAD M400                /ROLLING BACK IF DIRECTIONN FLAG = =1
0330  1214          TAD LOWLIM              /ROLLING UP IF FLAG = 0
0331  3212          DCA SUBADD              /SAVE 200 OR -200
0332  5353          JMP ACHNG


0333  0000  SAVSWR, 0
              /


0334  0000  FOINIT, 0
0335  6201          CDF     00              /CHANGE DATA FIELD TO FIELD 0
0336  6224          RIF                     /READ THE INSTRUCTION FIELD
0337  1335          TAD     FOINIT+1        /GET THE CDF INSTRUCTION
0340  7001          IAC                     /MAKE IT A CIF TO PROGRAM FIELD
0341  3742          DCA  I  CIFFDO          /PUT IT IN LOCATION 1 OF FIELD 0
0342  0001  CIFFDO, INT=2
0343  7240          CLA     CMA             /SET THE AC TO ALL ONE'S
0344  1742          TAD  I  CIFFDO          /CHANGE CIF BACK TO CDF PROGRAM FIELD
0345  3347          DCA     .+2             /PUT IT IN NEXT LOCATION
0346  4757          JMS  I  SETINT
0347  7402          HLT/CDF                 TO PROGRAM FIELD
0350  5734          JMP  I  FOINIT          /RETURN TO PROGRAM


      0353    *353
              /
0353  4202    ACHNG,  JMS CHANGE
              /
0354  1144    XFLD,   FLDLIM
0355  3401    C8PASS, XC8PAS

0356  3466    GEISWR, XC8SW
0357  2137    SETINT, INTSET
0360  3300    WAIT,   WAITEN
0361  0401    XROLBK, ROLBAK
0362  0746    XINSTR, INSTR
0363  0625    XNTIND, NOTIND
0364  1146    XASAVA, ASAVA
0365  1147    XASAVB, ASAVB
```



```
0366  0747    XREFAD, REFAD
0367  0602    XLOOP,  LOOPID+1
0370  1001    RSCNTX, GENFLD
0371  3026    XBGRAN, BGNCON+1
0372  3025    XBGCON, BGNCON
0373  1150    XUPERL, UPRLIM
0374  1145    HIGHLM, HGHLIM
0375  5176    XENDPR, PRGEND
0376  5025    RSCNT,  STARTP
0377  0000          0


      0400    *400
0400  5351          JMP AACHNG
              /
0401  1367    ROLBAK, TAD BEGIN               /GET BEGINNING OF PROGRAM AND COMPARE IT
0402  7041          CIA                     /WITH THE LOW LIMIT
0403  1770          TAD I XLWLIM            /
0404  7640          SZA CLA                 /IS IT EQUAL
0405  5771          JMP I RTFLGR            /NO,ROLL THE PROGRAM BACK
0406  3772          DCA I RTFLG             /SET DIRECTION FLAG TO FORWARD
0407  1773          TAD I MAXFLD            /IS THE PROGRAM LIMIT ONLY 2K-4K
0410  7650          SNA CLA
0411  5774          JMP  I  RTFLGF          /YES, DO NOT SWAP BUT ROLL THE PROGRAM UP
0412  1300          TAD FLDFLG              /SWAP THE PROGRAM UP OR DOWN
0413  7640          SZA CLA
0414  5222          JMP SWAPDN              /SWAP THE PROGRAM DOWN
0415  6224  SWAPUP, RIF                     /GET PROGRAM FIELD
0416  1301          TAD K10                 /ADD 1 FIELD TO IT
0417  7041          CIA
0420  1773          TAD I MAXFLD
0421  5753          JMP  I  CSWPUP
0422  6224  SWAPDN, RIF                     /GET HOME FIELD
0423  7450          SNA                     /IS IT EQUAL TO FIELD 0
0424  5215          JMP SWAPUP              /YES,SWAP THE PROGRAM UP
0425  1303          TAD M10                 /SUBTRACT 1 FIELD
0426  7640          SZA CLA                 /IS IT EQUAL TO FIELD 0?
0427  5232          JMP SFLDFG-1            /NO,SET FLAG TO REVERSE AND SWAP DOWN
0430  3300          DCA FLDFLG              /YES,BUT SWAP DOWN AND SET FLAG TO FORWARD
0431  5236          JMP .+5                 /GO SWAP IT
0432  7240          CLA CMA
0433  3300  SFLDFG, DCA FLDFLG              /FIELD FLAG=0 SWAP UP;=1 SWAP DOWN
0434  1300          TAD FLDFLG              /SWAPING UP OR DOWN
0435  7640          SZA CLA
0436  1302          TAD M20                 /SWAPPING DOWN
0437  1301          TAD K10                 /SWAPING UP
0440  3276          DCA NEWDFA+1            /SAVE 10 OR =10
0441  6224          RIF                     /GET HOME FIELD
0442  1276          TAD NEWDFA+1            /ADD OR SUBTRACT A FIELD
0443  1326          TAD B6201
0444  3257          DCA NEWDTF              /PUT 62X1 IN THE SWAP ROUTINE
0445  6224          RIF                     /GET HOME FIELD
0446  1326          TAD B6201
0447  3263          DCA SWPFLD              /TO RETURN BACK TO HOME FIELD
0450  1257          TAD NEWDTF
```

```
0451  3275          DCA NEWDFA
0452  1775  SWPUP,  TAD I XSIZE             /GET PROGRAM SIZE
0453  3276          DCA NEWDFA+1
0454  1770          TAD I XLWLIM            /GET BEGINNING ADDRESS OF PROGRAM
0455  3304          DCA RETHR               /SAVE IT
0456  1704          TAD I RETHR             /GET WORD FROM HOME DF
0457  7402  NEWDTF, HLT/CDF                 /CHANGE TO NEW DATA FIELD
0460  3704          DCA I RETHR             /PUT THE WORD IN NEW FIELD
0461  1704          TAD I RETHR             /COMPARE THE MOVE
0462  7041          CIA
0463  7402  SWPFLD, HLT/CDF                 /CHANGE BACK TO OWN FIELD
0464  1704          TAD I RETHR
0465  7640          SZA CLA                 /ARE THEY EQUAL?
0466  7402  HLTFIL, HLT                     /ERROR DURING RELOCATING TO ANOTHER FIELD
0467  2304          ISZ RETHR
0470  2276          ISZ NEWDFA+1
0471  5256          JMP NEWDTF-1
0472  2257          ISZ NEWDTF              /MAKE 62X2
0473  1257          TAD NEWDTF
0474  3276          DCA .+2
0475  7402  NEWDFA, HLT/CDF                 /CHANGE TO NEW DATA FIELD
0476  7402          HLT/CIF
0477  5776          JMP I XGO

              /
0500  0000  FLDFLG, 0
0501  0010  K10,    10
0502  7760  M20,    -20
0503  7770  M10,    -10
              /
0504  0000  RETHR,  0                       /JMS RETURN FROM INSTRUCTION
0505  3327          DCA FILALL              /SAVE AC RETURN DATA
0506  6214          RDF                     /GET DATA FIELD INSTRUCTION WAS IN
0507  3325          DCA RETFLD              /SAVE IT
0510  7402          HLT/CDF                 /RETURN TO PROGRAM FIELD
0511  7701          ACL                     /READ IN THE MQ
0512  3756          DCA  I  RTMQD           /SAVE THE MQ
0513  7010          RAR                     /GET THE LINK INTO AC BIT 0
0514  3757          DCA  I  RTLINK
0515  1760          TAD I BINSTR            /GO TEST THE INSTRUCTION
0516  7006          RTL
0517  7006          RTL
0520  0343          AND B7
0521  1324          TAD BGOTST
0522  3323          DCA .+1
0523  0000          0

              /
0524  5761  BGOTST, JMP I TSTINS
0525  0000  RETFLD, 0
0526  6201  B6201,  6201

              /ROUTINE TO FILL THE WHOLE FIELD WITH HALTS
0527  0000  FILALL, 0
0530  3304          DCA RETHR
```



```
0531  1754          TAD I XSTFLD
0532  1326          TAD B6201
0533  3340          DCA CDHLT1
0534  6224          RIF
0535  1326          TAD B6201
0536  3344          DCA CDHLT2
0537  1266          TAD HLTFIL
0540  7402  CDHLT1, HLT/CDF
0541  3704          DCA I RETHR
0542  2304          ISZ RETHR
0543  0007  B7,     7
0544  7402  CDHLT2, HLT/CDF
0545  2755          ISZ I ZLIMIT
0546  5337          JMP .-7
0547  5727          JMP I FILALL

              /
              0551  *551
              /
0551  4752  AACHNG, JMS I XCHNGE
              /
0552  0202  XCHNGE, CHANGE
0553  1116  CSWPUP, DECSWP
0554  0247  XSTFLD, CNTR3
0555  1145  ZLIMIT, HGHLIM
0556  2750  RTMQD,  MQDONE
0557  2746  RTLINK, LINKDN
0560  0746  BINSTR, INSTR
0561  1201  TSTINS, ANDTST
0562  1223  TSTIN1, TADTST
0563  1234  TSTIN2, ISZTST
0564  1255  TSTIN3, DCATST
0565  1267  TSTIN4, JMSTST
0566  1304  TSTIN5, JMPTST
0567  0200  BEGIN,  BGN
0570  0214  XLWLIM, LOWLIM
0571  0323  RTFLGR, SETFLG-1
0572  0213  RTFLG,  DIRFLG
0573  1144  MAXFLD, FLDLIM
0574  0324  RTFLGF, SETFLG
0575  0245  XSIZE,  SZPRG
0576  5025  XGO,    STARTP
0577  0000          0

              0600  *600
              /

0600  5365          JMP ACHG

0601  3350  LOOPID, DCA INDAD              /SAVE THIS WORD AS INDIRECT ADDRESS
0602  1360          TAD K7770               /CHECK FOR AUTO-INDEX
0603  1347          TAD REFAD
0604  7510          SPA                     /WAS IT LESS THAN 10
0605  5211          JMP NOTAUT              /YES, NOT AUTO-INDEX
0606  7161          CIA STL
```

```
0607  1343          IAD A7
0610  7630          SZL CLA                 /WAS IT WITHIN AUTO BOUNDARY
0611  7610  NOTAUT, SKP CLA                 /NO, NOT AUTO-INDEX
      5767  VT780=JMP I XVT78G              /VT78/
0612  7340  OWLVT,  CLA CLL CMA/JMP I XVT78G /VT78//AUTO INDEX,SUBTRACT 1 FROM INDIRECT ADDRESS
                                            /VT78/NOTE:ON THE VT78 PROCESSOR THE PAGE
                                            /VT78/ BIT MUST BE ZERO FOR AUTO INDEXING TO
                                            /VT78/ WORK--EVEN IF THE INST IS ON PAGE 0,
                                            /VT78/ THEREFORE ZERO BIT WHENEVER
                                            /VT78/ AUTO INDEXING FROM PAGE 0,
0613  1350  RFVT,   TAD INDAD
0614  3310          DCA SETRET              /SAVE INDIRECT ADDRESS
0615  1354          IAD RANFLD
0616  1356          TAD K6201               /CHANGE TO A RANDOM DATA FIELD
0617  3220          DCA .+1
0620  7402          HLT/CDF
0621  1310          TAD SETRET              /GET INDIRECT ADDRESS
0622  3747          DCA I REFAD             /PUT INDIRECT ADDRESS INTO REF ADD
0623  1350          TAD INDAD
0624  3347          DCA REFAD               /MAKE REFAD=INDAD
0625  7330  NOTIND, CLA CLL CML RAR
0626  1346          TAD INSTR
0627  7630          SZL CLA                 /WHAT TYPE OF INSTR
0630  5265          JMP JMPJMS              /IT WAS A JMP OR JMS
0631  1354          TAD RANFLD
0632  1356          TAD K6201
0633  3234          DCA .+1
0634  7402          HLT/CDF                 /CHANGE TO A RANDOM DATA FIELD
0635  1351          TAD DATATH              /GET INITIAL MEMORY DATA AND PUT IT IN
0636  3747          DCA I REFAD             /REF ADD OR INDIRECT ADD FOR AND THROUGH DCA
0637  7240  OPRINT, CLA CMA                 /SUBTRACT 1 FROM INSTRUCTION ADDRESS
0640  1345          TAD ADDRS               /AND SAVE IT
0641  3344          DCA HOMCIF
0642  6224          RIF
0643  1357          TAD K6202               /SET UP HOME INSTRUCTION FIELD
0644  3744          DCA I HOMCIF            /IN INSTRUCTION ADDRESS+1 FOR AND-DCA
0645  7301          CLA CLL IAC
0646  1345          TAD ADDRS
0647  4310          JMS SETRET              /SETUP RETURN,INSTR ADD+1,+2=4400 FOR AND-DCA
                                            /LOCATION 0 CONTAINS RETURN POINTER
0650  1346  NOTJJ,  TAD INSTR              /PUT INSTRUCTION IN INSTRUCTION ADDRESS
0651  3745          DCA I ADDRS
0652  1355          TAD SAVLNK
0653  7104          CLL RAL
0654  1353          TAD MQDATA              /GET THE RANDOM MQ DATA
0655  7421          MQL                     /AND LOAD IT INTO THE MQ
0656  7200          CLA                     /SAFETY CLEAR THE AC IN CASE MQL DOESN'T

0657  1354          TAD RANFLD              /MAKE UP A CIF TO A RANDOM FIELD
0660  1357          TAD K6202
0661  3263          DCA .+2
0662  1352          TAD DATAHR              /GET THE AC DATA INTO THE AC
0663  7402          HLT/CIF                 /D.F. HAS BEEN CHANGED NOW CHANGE I.F.
0664  5744          JMP I HOMCIF            /GO EXECUTE INSTRUCTION IN RANDOM FIELD

                    ////////////////////////////////////////////////////////////////////
```



```
                    //FOR AND'S THROUGH DCA'S DIRECTS THE INSTRUCTION SETUP IS AS FOLLOWS:
                    /
                    /SOME RANDOM FIELD
                    /LOCATION 4 OF THIS FIELD EQUALS RETURN POINTER TO PROGRAM FIELD
                    /THE AC EQUALS SOME RANDOM NUMBER
                    /INST ADD-1=    CIF TO PROGRAM FIELD
                    /INST ADD   =   TEST INSTRUCTION
                    /INST ADD+1=    JMS I 4
                    /INST ADD+2=    JMS I 4
                    /
                    /REF ADD    =   INITIAL MEMORY DATA, THIS IS THE LOC THE INST WILL REFERENCE
                    ////////////////////////////////////////////////////////////////////

                    ////////////////////////////////////////////////////////////////////
                    //FOR AND'S THROUGH DCA'S INDIRECTS THE INST SETUP IS AS FOLLOWS
                    /
                    /SOME RANDOM FIELD
                    /LOCATION 4 OF THIS FIELD EQUALS RETURN POINTER TO PROGRAM FIELD
                    /THE AC EQUALS SOME RANDOM NUMBER
                    /INSR ADD-1=    CIF TO HOME FIELD
                    /INST ADD   =   TEST INSTRUCTION
                    /INST ADD+1=    JMS I 4
                    /INST ADD+2=    JMS I 4
                    /
                    /REF ADD    =   INDIRECT ADDRESS
                    /
                    /IND ADD    =   INITIAL MEMORY DAA
                    ////////////////////////////////////////////////////////////////////
0665  1346  JMPJMS, TAD INSTR              /GET THE INSTRUCTION
0666  7006          RTL                     /IS IT A JMP OR JMS?
0667  7700          SMA CLA
0670  7001          IAC                     /JMS ADD 1 TO REFERENCE ADDRESS FOR CIF INST
0671  1347          TAD REFAD               /GET REFERENCE ADDRESS
0672  3310          DCA SETRET              /AND SAVE IT FOR THE CIF INSTRUCTION
0673  1354          TAD RANFLD              /MAKE CDF INST TO THE RANDOM FIELD
0674  1356          TAD K6201
0675  3276          DCA .+1
0676  7402          HLT/CDF                 /CHANGE TO RANDOM DATA FIELD
0677  6224          RIF
0700  1357          TAD K6202               /MAKE A CIF INSTRUCTION TO HOME FIELD
0701  3710          DCA I SETRET            /PUT IT IN REFERENCE ADD OR INDIRECT ADD
0702  7001          IAC
0703  1310          TAD SETRET
0704  4310          JMS SETRET              /SETUP LOC 4 AND JMS I 4 IN APPROPRIATE PLACES
0705  1345          TAD ADDRS               /GET INSTRUCTION ADDRESS
0706  3344          DCA HOMCIF              /SAVE IT
0707  5250          JMP NOTJJ               /GO GET INSTRUCTION AND SETUP
                    ////////////////////////////////////////////////////////////////////
                    //THE INSTRUCTION SETUP FOR JMP DIRECTS IS AS FOLLOWS:
                    /
                    /SOME RANDOM FIELD
                    /LOC 4 OF THIS FIELD EQUALS RETURN POINTER TO PROGRAM FIELD
                    /THE AC EQUALS SOME RANDOM NUMBER
                    /INST ADD  =JMP INSTRUCTION
                    /
```

```
                        /REF ADD   =CIF TO PROGRAM FIELD
                        /REF ADD+1 =JMS I 4
                        /REF ADD+2 =JMS I 4
                        ////////////////////////////////////////////////////////////////

                        ////////////////////////////////////////////////////////////////
                        //THE INSTRUCTION SETUP FOR JMP INDIRECTS IS AS FOLLOWS:
                        /
                        /SOME RANDOM FIELD
                        /LOC 4 OF THIS FIELD EQUALS RETURN POINTER TO PROGRAM FIELD
                        /THE AC EQUALS SOME RANDOM NUMBER
                        /INST ADD  =JMP INDIRECT INSTRUCTION
                        /
                        /REF ADD   =INDIRECT ADDRESS
                        /
                        /IND ADD   =CIF TO PROGRAM FIELD
                        /IND ADD+1 =JMS I 4
                        /IND ADD+2 =JMS I 4
                        ////////////////////////////////////////////////////////////////

                        ////////////////////////////////////////////////////////////////
                        //THE INSTRUCTION SETUP FOR JMS DIRECTS IS AS FOLLOWS
                        /
                        /SOME RANDOM FIELD
                        /LOC 4 OF THIS FIELD EQUALS RETURN POINTER TO PROGRAM FIELD
                        /THE AC EQUALS SOME RANDOM NUMBER
                        /INST ADD  =JMS DIRECT INSTRUCTION
                        /
                        /REF ADD   =SOME UNKNOWN NUMBER
                        /REF ADD+1 =CIF TO PROGRAM FIELD
                        /REF ADD+2 =JMS I 4
                        /REF ADD+3 =JMS I 4
                        ////////////////////////////////////////////////////////////////

                        ////////////////////////////////////////////////////////////////
                        //THE INSTRUCTION SETUP FOR JMS INDIRECTS IS AS FOLLOWS
                        /
                        /SOME RANDOM FIELD
                        /LOC 4 OF THIS FIELD EQUALS RETURN POINTER TO PROGRAM FIELD
                        /THE AC EQUALS SOME RANDOM NUMBER
                        /INST ADD =JMS INDIRECT INSTRUCTION
                        /
                        /REF ADD  =INDIRECT ADDRESS
                        /
                        /IND ADD  =SOME UNKNOWN NUMBER
                        /IND ADD+1=CIF TO PROGRAM FIELD
                        /IND ADD+2=JMS I 4

                        /IND ADD+3=JMS I 4
                        ////////////////////////////////////////////////////////////////

                /THIS ROUTINE SETS UP LOC 0 IN SOME FIELD FOR RETURN POINTER
                /TO THE PROGRAM AND ALSO SETS UP THE JMS I 0'S AFTER THE EXECUTION OF THE
                /INSTRUCTION.

0710  0000    SETRET, 0
```



```
0711  3362            DCA JMSLOC
0712  7301            CLA CLL IAC
0713  1362            TAD JMSLOC
0714  3363            DCA JMSLOD
0715  1364            TAD KJMS
0716  3762            DCA I JMSLOC
0717  1364            TAD KJMS
0720  3763            DCA I JMSLOD
0721  1376            TAD JMSRET
0722  3761            DCA I FLDRET
0723  5710            JMP I SETRET

0724  4773    ERROR2, JMS I ZGETWD
0725  4770            JMS I YHALT             /FINAL MEMORY DATA
0726  1352            TAD DATAHR
0727  4770            JMS I YHALT             /AC DATA BEFORE EXECUTION OF INSTR
0730  1774            TAD I ZFIND
0731  4770            JMS I YHALT             /AC DATA RETURNED
0732  1355            TAD SAVLNK
0733  4770            JMS I YHALT             /INITIAL LINK BEFORE EXEC OF INSTR
0734  1771            TAD I FLINK             /
0735  4770            JMS I YHALT             /LINK AFTER EXEC OF INSTR
0736  1353            TAD MQDATA
0737  4770            JMS I YHALT             /INITIAL MQ DATA
0740  1772            TAD I FMQDAT
0741  4770            JMS I YHALT             /MQ DATA AFTER EXEC OF INSTR
0742  5775            JMP I ZCNT              /BUMP COUNTER AND RETURN
                /
0743  0007    A7,     7
0744  0000    HOMCIF, 0                       /ADDRESS OF THE HOME CIF
0745  0000    ADDRS,  0                       /THE ADDRESS OF THE INSTRUCTION
0746  0000    INSTR,  0                       /THE INSTRUCTION TO TEST
0747  0000    REFAD,  0                       /THE ADDRESS THE INSTR, SHOULD REFERENCE
0750  0000    INDAD,  0                       /THE INDIRECT ADDRESS
0751  0000    DATATH, 0                       /THE DATA IN THE ADDRESS IF AND > DCA
0752  0000    DATAHR, 0                       /THE DATA IN THE AC AND > JMP
0753  0000    MQDATA, 0                       /THA DATA IN THE MQ
0754  0000    RANFLD, 0
0755  0000    SAVLNK, 0
0756  6201    K6201,  6201
0757  6202    K6202,  6202
0760  7770    K7770,  7770
0761  0004    FLDREI, 4
0762  0000    JMSLOC, 0
0763  0000    JMSLOD, 0
0764  4401    KJMS,   JMS I 4
                /
          0765  *765
                /
0765  4766    ACHG,   JMS I ARERNG            /ROUTINE TO ULTER ADDRESSES
                /
0766  0202    ARERNG, CHANGE
0767  4700    XVT78G, VT78GL                  /VT78/
0770  1335    YHALT,  HALT
0771  2746    FLINK,  LINKDN
```

```
0772  2750   FMQDAT, MQDONE
0773  2112   ZGETWD, GETWD
0774  0527   ZFIND,  FILALL
0775  0252   ZCNT,   LPCNT
0776  0504   JMSRET, RETHR
0777  0000           0

              /
      1000    *1000
1000  5350            JMP A1CHG

              /
1001  4763    GENFLD, JMS I ARANDY        /GET A RANDOM FIELD
1002  0325            AND K70             /MASK WORD FOR FIELD BITS
1003  0327            AND FLDMSK          /MASK WORD FOR FIELD
1004  1330            TAD CONFLD          /CONSRAINT WORD FOR FIELD
1005  0325            AND K70
1006  3756            DCA I FLDRAN
1007  1756            TAD I FLDRAN        /COMPARE RANDOM FIELD WITH UPPER LIMITS
1010  7041            CIA
1011  1344            TAD FLDLIM
1012  7510            SPA                 /WITHIN LIMITS ?
1013  5201            JMP GENFLD          /NO REGERATE A NEW FIELD
1014  7640            SZA CLA             /WAS IT THE LAST MEMORY FIELD
1015  7240            CLA CMA             /NO SET UPPER BOUNDRY = TO 7777
1016  7450            SNA                 /
1017  1757            TAD I XUPLIM        /GET THE UPPER LIMIT OF LAST FIELD
1020  3345            DCA HGHLIM          /SAVE  THE UPPER BOUNDRY
1021  1345            TAD HGHLIM          /SETUP A NUMBER FOR BOUNDRY COMPARE
1022  7041            CIA
1023  1326            TAD ADD11
1024  3760            DCA I XBNDCN        /SAVE THE NUMBER FOR CHECKING BOUNDRIES

1025  4763    MEMDAT, JMS I ARANDY        /GENERATE RANDOM MEMORY DATA FOR AND>DCA
1026  0335            AND MDTMSK          /MASK WORD FOR MEMORY DATA
1027  1336            TAD CONMDT          /CONSTRAINT WORD
1030  3771            DCA I ADATAT        /SAVE IT
1031  4763    ACDATA, JMS I ARANDY        /GENERATE RANDOM AC DATA
1032  0337            AND ACDMSK          /MASK WORD
1033  1340            TAD CONACD          /CONSTRAINT WORD
1034  3772            DCA I ADATAH        /SAVE THE AC DATA WORD
1035  7010            RAR                 /MOVE THE LINK INTO AC BIT 0
1036  3774            DCA  I  LNKSAV      /SAVE THE LINK
1037  4763    GENMQD, JMS I ARANDY        /GENERATE RANDOM MQ DATA
1040  0341            AND MQDMSK          /MASK WORD FOR MQ DATA
1041  1342            TAD CONMQD          /CONSTRAINT WORD FOR MQ DATA
1042  3773            DCA I AMQDAT        /SAVE THE MQ DATA WORD

1043  4763    GENADD, JMS I ARANDY        /GENERATE RANDOM ADDRESS FOR INSTRUCTION
1044  0345            AND HGHLIM          /MASK OFF ADDRESS BITS FOR THIS FIELD
1045  0331            AND ADRMSK          /MASK WORD FOR INSTRUCTION ADDRESS
1046  1332            TAD CONADR          /CONSTRAINT WORD
1047  4764            JMS I ABNRY1        /IS IT WITHIN LIMITS
1050  5243            JMP GENADD          /NO, TRY AGAIN
1051  3766            DCA I AADDRS        /THIS IS THE INSTRUCTIONS ADDRESS
1052  1766            TAD I AADDRS
```



```
1053  0305            AND CONST1
1054  3346            DCA ASAVA           /SAVE PAGE BITS FOR FORMING REFERENCE ADDRESS
1055  4755    GENINS, JMS I XGENTI        /GENERATE RANDOM  INSTRUCTION
1056  4764            JMS I ABNRY1        /IS IT WITHIN LIMITS
1057  5305            JMP CONST1          /NO, TRY AGAIN
1060  4761            JMS I ASAME1        /COMPARE TO ADDRS
1061  5305            JMP CONST1          /THERE EQUAL OR TO CLOSE TRY AGAIN
1062  3770            DCA I AREFAD        /STORE REFERENCE ADDRESS
1063  6214            RDF
1064  1323            TAD C6201           /PUT CDF HOME FIELD INTO INSTRUCTION RETURN
1065  3765            DCA I XRETHR
1066  1767            TAD I AINSTR        /INSTR = INSTRUCTION TO TEST
1067  0324            AND A400
1070  7650            SNA CLA             /WAS INSTR INDIRECT
1071  5775            JMP I ANTIND        /NO, NOT INDIRECT GO SETUP TEST CONDITIONS
1072  4763    GENIND, JMS I ARANDY        /GENERATE RANDOM INDIRECT ADDRESS
1073  0345            AND HGHLIM          /MASK OFF ADDRESS BITS FOR THIS FIELD
1074  0333            AND INDMSK          /MASK WORD FOR INDIRECT ADDRESS
1075  1334            TAD CONIND          /CONTRAINT WORD FOR INDIRECT
1076  4764            JMS I ABNRY1        /IS IT WITHIN BOUNDARIES
1077  5312            JMP CONST2          /NO, TRY AGAIN
1100  4761            JMS I ASAME1        /COMPARE TO ADDRS
1101  5312            JMP CONST2          /TRY AGAIN
1102  4762            JMS I ASAME2        /COMPARE TO REFAD
1103  5312            JMP CONST2          /TRY AGAIN
1104  5776            JMP I ALOPID        /GO SETUP TEST CONDITIONS

              /
1105  7600    CONST1, 7600
1106  1343            TAD CONFLG
1107  7640            SZA CLA
1110  5243            JMP GENADD
1111  5255            JMP GENINS
              /
1112  1343    CONST2, TAD CONFLG
1113  7710            SPA CLA
1114  5243            JMP GENADD
1115  5272            JMP GENIND
              /

1116  7510    DECSWP, SPA                 /IS IT WITHIN FIELD LIMITS
1117  5752            JMP  I  FLDFGR      /NO,SET DIRECTION OF SWAP TO REVERSE
1120  7650            SNA     CLA         /WAS IT THE LAST FIELD?
1121  5754            JMP  I  CHK1KF      /GO CHECK TO SEE IF NEXT FIELD IS 3K
1122  5753            JMP  I  FLDFGF      /NO,SET DIRECTION OF SWAP TO FORWARD
              /
1123  6201    C6201,  6201
1124  0400    A400,   400
1125  0070    K70,    70
1126  0011    ADD11,  11
1127  7777    FLDMSK, 7777
1130  0000    CONFLD, 0
1131  7777    ADRMSK, 7777
1132  0000    CONADR, 0
1133  7777    INDMSK, 7777
```

```
0000    CONIND, 0
7777    MDIMSK, 7777
0000    CONMDT, 0
7777    ACDMSK, 7777
0000    CONACD, 0
7777    MQDMSK, 7777
0000    CONMQD, 0000
0000    CONFLG, 0
0000    FLDLIM, 0
0000    HGHLIM, 0
0000    ASAVA,  0
0000    ASAVB,  0

1150    *1150
        /
4751    A1CHG,  JMS I A1RRNG
        /
0202    A1RRNG, CHANGE
0432    FLDFGR, SFLDFG-1
0433    FLDFGF, SFLDFG
2555    CHK1KF, FLDCHK
1601    XGENTI, INSGEN
0754    FLDRAN, RANFLD
1550    XUPLIM, UPRLIM
1551    XBNDCN, BNDCON
1463    ASAME1, SAME1
1473    ASAME2, SAME2
1401    ARANDY, RANDY
1435    ABNRY1, BNDRY1
0510    XRETHR, RETHR+4
0745    AADDRS, ADDRS
0746    AINSTR, INSTR
0747    AREFAD, REFAD
0751    ADATAT, DATATH
0752    ADATAH, DATAHR
0753    AMQDAT, MQDATA
0755    LNKSAV, SAVLNK
0625    ANTIND, NOTIND
0601    ALOPID, LOOPID
0000            0

        /
1200    *1200
        /
5347            JMP BCHNG               /GO ULTER
        /
4755    ANDTST, JMS I TSTPC             /CHECK PC FROM RETURN
1775            TAD I BDATTH
0776            AND I BDATHR
7041            CIA
1772            TAD I DATFN
7640    COMPAR, SZA CLA                 /DID AND WORK
5313            JMP ERROR               /RANDOM AND FAILED
1760            TAD I LINKSV            /CHECK TO SEE IF THE LINK CHANGED
7041            CIA
```



```
1761            TAD I LINKRT            /
7640            SZA CLA
5313            JMP ERROR               /ERROR,THE INSTRUCTION CHANGED THE LINK
1763            TAD I MQDAT             /CHECK TO SEE IF THE INSTR CHANGED THE MQ
7041            CIA
1762            TAD I DONEMQ            /
7640            SZA     CLA
5313            JMP ERROR               /THE INSTRUCTION CHANGED THE MQ
5765            JMP I BLPCNT
        /
4755    TADTST, JMS I TSTPC             /CHECK PC FROM RETURN
7340            CLA CLL CMA
0775            AND I BDATTH
1776            TAD I BDATHR
7041            CIA
1772            TAD I DATFN
7640            SZA CLA
5313            JMP ERROR
5765            JMP I BLPCNT
        /
7301    ISZTST, CLA CLL IAC
1775            TAD I BDATTH
7650            SNA CLA                 /SHOULD THE ISZ SKIP
7001            IAC                     /YES
4755            JMS I TSTPC             /CHECK FOR CORRECT PC
1776            TAD I BDATHR
7041            CIA
1772            TAD I DATFN
7640            SZA CLA                 /DID AC CHANGE ON ISZ
5313            JMP ERROR               /AC FAILED ON ISZ
1774            TAD I BREFAD            /GET INCREMENTED DATA WORD
3756            DCA I XBSAVA
4757            JMS I XGETWD
7041            CIA
7001            IAC
1775            TAD I BDATTH
5206            JMP COMPAR              /DID ISZ WORK
        /
4755    DCATST, JMS I TSTPC             /CHECK PC FROM RETURN
1774            TAD I BREFAD
3756            DCA I XBSAVA
4757            JMS I XGETWD
7041            CIA
1776            TAD I BDATHR
7640            SZA CLA                 /DID DCA WORK
5313            JMP ERROR               /DCA FAILED
1772            TAD I DATFN             /DID AC CLEAR ON DCA
5206            JMP COMPAR              /??
        /
4755    JMSTST, JMS I TSTPC             /CHECK PC FROM RETURN
1776            TAD I BDATHR
7041            CIA
1772            TAD I DATFN
7640            SZA CLA                 /DID JMS CHANGE AC
5313            JMP ERROR               /JMS CHANGED AC
```

```
1275  1774            TAD I BREFAD
1276  3756            DCA I XBSAVA
1277  4757            JMS I XGETWD
1300  7041            CIA
1301  7001            IAC
1302  1766            TAD I BADDRS
1303  5206            JMP COMPAR              /DID JMS WORK
                /
1304  4755      JMPTST, JMS I TSTPC           /CHECK PC FROM RETURN
1305  1776            TAD I BDATHR
1306  7041            CIA
1307  1772            TAD I DATFN
1310  5206            JMP COMPAR              /DID JMP AFFECT THE AC
                /

1311  0000      PCSAVE, 0
1312  0200      C200,   200

1313  1764      ERROR,  TAD I XRNFLD
1314  4335            JMS HALT                /FIELD THAT INSTRUCTION WAS PUT IN
1315  1773            TAD I XRETFL
1316  4335            JMS HALT                /PROGRAM RETURNED FROM THIS FIELD
1317  1311            TAD PCSAVE
1320  4335            JMS HALT                /EXPECTED PC RETURN
1321  1754            TAD I RETURN
1322  4335            JMS HALT                /ACTUAL PC RETURN
1323  1766            TAD I BADDRS
1324  4335            JMS HALT                /INSTRUCTION ADDRESS
1325  1767            TAD I FINSTR
1326  4335            JMS HALT                /INSTRUCTION
1327  1767            TAD I FINSTR
1330  0312            AND C200
1331  7640            SZA CLA
1332  1770      ERRPSR, TAD I ZASAVA
1333  1771            TAD I ZASAVB
1334  5753            JMP I XERROR            /GET REST OF ERROR INFORMATION
                /
1335  0000      HALT,   0
1336  4751            JMS I CBERR/HLT         /ERROR INFORMATION IN AC
1337  7200            CLA
1340  5735            JMP I HALT
                /
                /
      1347      *1347
                /
1347  4750      BCHNG,  JMS I BRERNG
                /

1350  0202      BRERNG, CHANGE
1351  4401      CBERR,  XCBERR
1352  0252      ERRRET, LPCNT
1353  1415      XERROR, ERROR1
1354  0504      RETURN, RETHR
1355  2073      TSTPC,  PCTST
1356  2145      XBSAVA, BSAVA
1357  2112      XGETWD, GETWD
```



```
1360  0755      LINKSV, SAVLNK
1361  2746      LINKRT, LINKDN
1362  2750      DONEMD, MODONE
1363  0753      MODAT,  MODATA
1364  0754      XRNFLD, RANFLD
1365  0252      BLPCNT, LPCNT
1366  0745      BADDRS, ADDRS
1367  0746      FINSTR, INSTR
1370  1146      ZASAVA, ASAVA
1371  1147      ZASAVB, ASAVB
1372  0527      DATFN,  FILALL
1373  0525      XRETFL, RETFLD
1374  0747      BREFAD, REFAD
1375  0751      BDATTH, DATATH
1376  0752      BDATHR, DATAHR
1377  0000              0
                /
      1400      *1400
                /
1400  5362      JMP CCHNG
                /
1401  0000      RANDY,  0
1402  7301            CLA CLL IAC
1403  1343            TAD RAN1
1404  1344            TAD RAN2
1405  7106            CLL RTL
1406  3343            DCA RAN1
1407  1344            TAD RAN2
1410  7012            RTR
1411  1343            TAD RAN1
1412  3344            DCA RAN2
1413  1344      RANDY1, TAD RAN2
1414  5601            JMP I RANDY

                /
                /
1415  3774      ERROR1, DCA I CREFAD
1416  1774            TAD I CREFAD
1417  4765            JMS I XHALT             /REFERENCE ADDRESS
1420  1771            TAD I ZINDAD
1421  4765            JMS I XHALT             /INDIRECT ADDRESS IF ANY
1422  1767            TAD I CDATAT
1423  4765            JMS I XHALT             /INITIAL MEMORY DATA
1424  1766            TAD I ZINSTR
1425  0347            AND C400
1426  7650            SNA CLA
1427  5232            JMP .+3
1430  1771            TAD I ZINDAD
1431  3774            DCA I CREFAD
1432  1774            TAD I CREFAD
1433  3770            DCA I ZBSAVA
1434  5772            JMP I XERR2             /GO GET REST OF INFORMATION

                /THIS SECTION OF THE SUBROUTINE CHECKS FOR ILLEGAL ADDRESSES WHICH
                /ARE AS FOLLOWS:0000 - 0006 AND UPPER TEST AREA LIMIT,-1 AND -2.
```

SEQ 0041

```
  991
  992    1435  0000    BNDRY1, 0
  993    1436  3354            DCA CSAVB
  994    1437  1354            TAD CSAVB               /GET THE NUMBER
  995    1440  1345            TAD MM7                 /SUBTRACT 7 FROM IT
  996    1441  7100            CLL                     /CLEAR OUT THE LINK
```


SEQ 0042

```
  997    1442  1351            TAD BNDCON              /ADD IN BOUNTRY CONSTANT=6012,4012,2012,0012
  998    1443  7630            SZL CLA
  999    1444  5635            JMP I BNDRY1            /ILLEGAL ADDRESS, RETURN TO RANDOM NUMBER GENERATOR
 1000
 1001                  /THIS SECTION OF SUBROUTINE CHECKS FOR ILLEGAL ADDRESS WHICH ARE
 1002                  /THE PROGRAM AREA-3 TO PROGRAM END +1
 1003
 1004    1445  7346    BNDOK1, CLA CLL CMA RTL
 1005    1446  1376            TAD PRGBG
 1006    1447  7041            CIA
 1007    1450  1354            TAD CSAVB
 1008    1451  7420            SNL
 1009    1452  5257            JMP BNDOK2
 1010    1453  7161            CIA STL
 1011    1454  1352            TAD PRGSIZ
```

SEQ 0043

```
1012  1455  7620          SNL CLA
1013  1456  5635          JMP I BNDRY1
1014  1457  2235  BNDOK2, ISZ BNDRY1
1015  1460  7340          CLA CLL CMA
1016  1461  0354          AND CSAVB
1017  1462  5635          JMP I BNDRY1
1018                /
1019  1463  0000  SAME1,  0
1020  1464  3355          DCA CSAVC
1021  1465  1775          TAD I CADDRS
1022  1466  3353          DCA CSAVA
1023  1467  4303          JMS TSAME
1024  1470  2263          ISZ SAME1
1025  1471  1355          TAD CSAVC
1026  1472  5663          JMP I SAME1
1027                /
1028  1473  0000  SAME2,  0
1029  1474  3355          DCA CSAVC
1030  1475  1774          TAD I CREFAD
1031  1476  3353          DCA CSAVA
1032  1477  4303          JMS TSAME
1033  1500  2273          ISZ SAME2
1034  1501  1355          TAD CSAVC
1035  1502  5673          JMP I SAME2
1036                /
1037  1503  0000  TSAME,  0
1038  1504  7344          CLA CLL CMA RAL
1039  1505  1355          TAD CSAVC
1040  1506  7041          CIA
1041  1507  1353          TAD CSAVA
1042  1510  7510          SPA
1043  1511  5320          JMP INSOK
1044  1512  7161          CIA STL
1045  1513  1356          TAD C5
1046  1514  7620          SNL CLA
1047  1515  2303          ISZ TSAME
1048  1516  7420          SNL
1049  1517  2303          ISZ TSAME
1050  1520  7300  INSOK,  CLA CLL
1051  1521  5703          JMP I TSAME
1052                /
1053                /
1054  1522  0000  LIMITS, 0
1055  1523  1021          TAD     OPISEL          /GET MEMORY SIZE FROM HARDWARE CONFIGURATION
1056  1524  0346          AND     K37             /MASK OFF MERORY BITS
1057  1525  7104          CLL     RAL
1058  1526  3350          DCA UPRLIM

1059  1527  1350          TAD UPRLIM
1060  1530  0360          AND C70
1061  1531  3773          DCA I XFLDLM
1062  1532  1350          TAD UPRLIM
1063  1533  0357          AND C7
1064  1534  7112          CLL RTR
1065  1535  7012          RTR
1066  1536  1361          TAD C1777
```


SEQ 0044

```
1067  1537  3350          DCA UPRLIM
1068  1540  1020          TAD SWITCH
1069  1541  3764          DCA I SAVESW
1070  1542  5722          JMP I LIMITS
1071
1072                /
1073  1543  1234  RAN1,   1234
1074  1544  5670  RAN2,   5670
1075  1545  7771  MM7,    -7
1076  1546  0037  K37,    37
1077  1547  0400  C400,   400
1078  1550  0000  UPRLIM, 0
1079  1551  0000  BNDCON, 0
1080  1552  5002  PRGSIZ, PRGEND+4-BGN
1081  1553  0000  CSAVA,  0
1082  1554  0000  CSAVB,  0
1083  1555  0000  CSAVC,  0
1084  1556  0005  C5,     0005
1085  1557  0007  C7,     7
1086  1560  0070  C70,    70
1087  1561  1777  C1777,  1777
1088                /
1089        1562  *1562
1090  1562  4763  CCHNG,  JMS I CRERNG          /ROUTINE TO ULTER
1091                /
1092  1563  0202  CRERNG, CHANGE
1093  1564  0333  SAVESW, SAVSWR
1094  1565  1335  XHALT,  HALT
1095  1566  0746  ZINSTR, INSTR
1096  1567  0751  CDATAT, DATAIH
1097  1570  2145  ZBSAVA, BSAVA
1098  1571  0750  ZINDAD, INDAD
1099  1572  0724  XERR2,  ERROR2
1100  1573  1144  XFLDLM, FLDLIM
1101  1574  0747  CREFAD, REFAD
1102  1575  0745  CADDRS, ADDRS
1103  1576  0200  PRGBG,  BGN
1104  1577  0000          0
1105                /
1106
1107
1108                /RANDOM OPERATES-GROUP 1 -  GROUP2 - AND MQ OPERATES
1109
1110        1600  *1600
1111                /
1112  1600  5346          JMP     FCHNG
1113                /
1114
1115
1116  1601  0000  INSGEN, 0                   /ROUTINE TO GENERATE A RANDOM INSTRUCTION
1117  1602  4755          JMS I BRANDY        /GO GENERATE A RANDOM NUMBER
1118  1603  0242          AND INSMSK          /MASK WORD FOR INSTRUCTION
1119  1604  1243          TAD CONINS          /CONSTRAINT WORD FOR INSTRUCTION
1120  1605  3754          DCA I EINSTR        /SAVE THE INSTRUCTION
1121  1606  6201          CDF     00          /CHANGE DATA FIELD TO FIELD 0
```

```
1122    1607  6224            RIF             /READ THE INSTRUCTION FIELD
1123    1610  1356            TAD     STARI   /GET THE STARTING ADDRESS
1124    1611  3612            DCA  I  ADDRS5  /PUT FIELD AND STARTING ADDRESS INTO LOC 5
1125    1612  0005    ADDRS5, STRFLD          /ADDRESS 5 OF FIELD 0 = STARTING ADDRESS AND PRG FIELD
1126    1613  6224            RIF             /READ THE INSTRUCTION FIELD
1127    1614  1206            TAD     ADDRS5-4/GET THE CDF INSTRUCTION
1128    1615  3216            DCA     .+1     /PUT CDF TO PROGRAM FIELD IN NEXT LOCATION
1129    1616  7402            HLT/CDF         /CHANGE DF BACK TO PROGRAM FIELD
1130    1617  1754            TAD I EINSTR    /CHECK TO SEE IF IT WAS A IOT
1131    1620  0244            AND K7000
1132    1621  1245            TAD M6000
1133    1622  7450            SNA
1134    1623  5207            JMP INSGEN+1    /IT WAS A IOT REGENERATE A NEW INSTRUCTION
1135    1624  1244            TAD K7000       /IS IT AN OPERATE INSTRUCTION
1136    1625  7650            SNA CLA
1137    1626  5256            JMP OPRBGN      /YES IT WAS AN OPERATE
1138    1627  1351            TAD MRIPNT      /GET THE RETURN POINTER FOR MRI INSTRUCTIONS
1139    1630  3753            DCA I ZJMSRT    /SAVE IT
1140    1631  1754            TAD I EINSTR    /NOT A IOT OR OPERATE
1141    1632  0246            AND K177        /CREATE A REFERENCE ADDRESS
1142    1633  3761            DCA I AASAVB
1143    1634  1754            TAD I EINSTR    /GET THE INSTR
1144    1635  0247            AND A200        /PAGE ZERO OR SAME PAGE
1145    1636  7640            SZA CLA
1146    1637  1760            TAD I AASAVA
1147    1640  1761            TAD I AASAVB
1148    1641  5601            JMP I INSGEN    /RETURN AND CHECK IT
1149
1150    1642  7777    INSMSK, 7777
1151    1643  0000    CONINS, 0
1152    1644  7000    K7000,  7000
1153    1645  2000    M6000,  -6000
1154    1646  0177    K177,   177
1155    1647  0200    A200,   200
1156    1650  0400    B400,   400
1157    1651  0014    A14,    14
1158    1652  7764    NEG14,  -14
1159    1653  0001    A1,     1
1160    1654  0006    BP6,    6
1161    1655  7721    K7721,  7721
1162
1163    1656  1352    OPRBGN, TAD OPRPNT      /GET THE RETURN POINTER FOR OPR INSTRUCTIONS
1164    1657  3753            DCA I ZJMSRT    /SAVE IT
1165    1660  1754            TAD I EINSTR
1166    1661  0250            AND B400
1167    1662  7640            SZA CLA
1168    1663  5272            JMP ILLOP2

1169    1664  1754    ILLOP1, TAD  I  EINSTR  /OP1=CHECK BITS 8 AND 9 TO BE ON A ONE
1170    1665  0251            AND     A14
1171    1666  1252            TAD     NEG14
1172    1667  7650            SNA     CLA
1173    1670  5202            JMP     INSGEN+1        /ILLEGAL=REGENERATE A NEW INSTRUCTION
1174    1671  5306            JMP     ILLMQ+3 /GO SETUP RANDOM AC AND MQ DATA
1175
1176    1672  1754    ILLOP2, TAD  I  EINSTR  /IS THE INSTR A MQ OR OP2 INSTR
```



```
1177    1673  0253            AND     A1
1178    1674  7640            SZA     CLA
1179    1675  5303            JMP     ILLMQ   /INSTR IS A MQ INSTR CHECK FOR ILLEGAL INSTR
1180    1676  1754            TAD  I  EINSTR  /IS THE INSTR A OSR OR HLT
1181    1677  0254            AND     BP6
1182    1700  7440            SZA
1183    1701  5202            JMP     INSGEN+1        /INSTR IS A OSR OR HLT REGENERATE
1184    1702  5306            JMP     ILLMQ+3 /GO SET UP SIMULATED AC DATA AND MQ
1185
1186    1703  1754    ILLMQ,  TAD  I  EINSTR  /GET THE INSTRUCTION
1187    1704  0255            AND     K7721   /MASK OUT FOR LEGAL MQ INSTRUCTIONS
1188    1705  3754            DCA  I  EINSTR  /AND SAVE IT
1189
1190    1706  1762            TAD  I  XDATAH
1191    1707  3763            DCA  I  XSIMAC  /PUT INITIAL WORD IN SIMULATED AC
1192    1710  1764            TAD  I  XSVLNK
1193    1711  3765            DCA  I  XSMLNK  /PUT INITIAL LINK IN SIMULATED LINK
1194    1712  1757            TAD  I  INTMQD  /GET THE RANDOM MQ DATA
1195    1713  3766            DCA  I  XSIMMQ  /PUT INITIAL MQ DATA IN SIMULATED MQ
1196    1714  7326            CLA CLL CML RTL /SET UP INSTRUCTION RETURN POINTER
1197    1715  1773            TAD  I  OADDRS  /GET THE INSTRUCTION ADDRESS AND ADD 2
1198    1716  3767            DCA  I  XEXPRT  /SET UP EXPECTED RETURN UNLESS A SKIP
1199    1717  6214            RDF             /READ THE DATA FIELD
1200    1720  1333            TAD     D6201   /ADD IN THE CDF INSTRUCTION
1201    1721  3774            DCA  I  XRTOPF  /SET UP A LOC TO RETURN TO OWN DATA FIELD
1202    1722  1754            TAD  I  EINSTR  /IS THE INSTRUCTION A OP1 OR OP2
1203    1723  0250            AND     B400
1204    1724  7650            SNA     CLA
1205    1725  5770            JMP  I  XSMOP1  /OP1 GO SIMULATE THE INSTRUCTION
1206    1726  1754            TAD  I  EINSTR  /IS THE INSTR A MQ INSTR
1207    1727  0253            AND     A1
1208    1730  7650            SNA     CLA
1209    1731  5771            JMP  I  XSMOP2  /OP2= GO SIMULATE THE INSTRUCTION
1210    1732  5772            JMP  I  XSMMQI  /MQ= GO SIMULATE THE MQ INSTR
1211
1212    1733  6201    D6201,  6201
1213
1214                    /
1215    1734  1766    OPERR1, TAD  I  XSIMMQ  /GET THE SIMULATED MQ
1216    1735  4341            JMS     HLTOPR
1217    1736  1775            TAD  I  GMQDON  /GET THE FINAL MQ
1218    1737  4341            JMS     HLTOPR
1219    1740  5776            JMP  I  GLPSW0  /GO LOOK AT SR0 TO LOOP ON INSTR
1220
1221                    /
1222    1741  0000    HLTOPR, 0
1223    1742  4750            JMS I CSERDR/HLT
1224    1743  7300            CLA CLL
1225    1744  5741            JMP  I  HLTOPR
1226                    /
1227
1228                    /
1229          1746      *1746
1230                    /
1231    1746  4747    FCHNG,  JMS  I  FRERNG
```

SEQ 0047

```
                        /
1747  0202    FRERNG, CHANGE
1750  4401    C8ERDR, XC8ERR
1751  0504    MRIPNT, RETHR
1752  2675    OPRPNT, OPRRET
1753  0776    ZJMSRT, JMSRET
1754  0746    EINSTR, INSTR
1755  1401    BRANDY, RANDY
1756  0200    START,  BGN
1757  0753    INTMQD, MQDATA
1760  1146    AASAVA, ASAVA
1761  1147    AASAVB, ASAVB
1762  0752    XDATAH, DATAHR
1763  2752    XSIMAC, SIMAC
1764  0755    XSVLNK, SAVLNK
1765  2753    XSMLNK, SIMLNK
1766  2754    XSIMMQ, SIMMQ
1767  2751    XEXPRT, EXPRET
1770  2001    XSMOP1, SIMOP1
1771  2201    XSMOP2, SIMOP2
1772  2252    XSMMQI, SIMMQI
1773  0745    OADDRS, ADDRS
1774  2705    XRTUPF, RETTDF
1775  2750    GMQDON, MQDONE
1776  2737    GLPSWO, LPSWO
1777  0000    0
                        /


        2000    *2000
                        /
2000  5347              JMP     GCHNG
                        /

                /BEGINNING OF OPERATE GROUP ONE SIMULATION

2001  1762    SIMOP1, TAD  I  CINSTR  /GET THE INSTRUCTION
2002  0271            AND     POS200  /IS BIT 4 SET TO CLEAR THE AC
2003  7640            SZA     CLA
2004  3773            DCA  I  OSIMAC  /YES,CLEAR OUT THE SIMULATED AC
2005  1762            TAD  I  CINSTR  /GET THE INSTRUCTION
2006  0267            AND     K100    /IS BIT 5 SET TO CLEAR THE LINK
2007  7640            SZA     CLA
2010  3774            DCA  I  OSMLNK  /YES,CLEAR THE SIMULATED LINK
2011  1762            TAD  I  CINSTR  /GET THE INSTRUCTION
2012  0266            AND     K40     /IS BIT 6 SET TO COMPLEMENT THE AC
2013  7640            SZA     CLA

2014  4763            JMS  I  XSMCMA  /YES GO SIMULATE A CMA
2015  1762            TAD  I  CINSTR  /GET THE INSTR
2016  0265            AND     K20     /IS BIT 7 SET TO COMPLEMENT THE LINK
2017  7640            SZA     CLA
2020  4764            JMS  I  XSMCML  /YES, GO SIMULATE A CML
2021  1762            TAD  I  CINSTR  /GET THE INSTRUCTION
2022  0261            AND     K1      /IS BIT 11 SET TO INCREMENT THE AC
2023  7640            SZA     CLA
```


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```
2024  4765            JMS  I  XSMIAC  /YES GO SIMULATE IAC
2025  1762            TAD  I  CINSTR  /GET THE INSTRUCTION
2026  0262            AND     K2      /IS BIT 10 SET TO RTR OR RTL
2027  7640            SZA     CLA
2030  5242            JMP     SIMTWC  /YES GO CHECK TO SEE WHICH ONE
2031  1762            TAD  I  CINSTR  /GET THE INSTRUCTION
2032  0264            AND     K14     /IS IT A ROTATE LEFT OR RIGHT
2033  1272            TAD     NEG10   /RAR?
2034  7450            SNA
2035  4766            JMS  I  XSMRAR  /YES GO SIMULATE A ROTATE RIGHT
2036  1263            TAD     K4      /NO,RAL?
2037  7650            SNA     CLA
2040  4767            JMS  I  XSMRAL  /YES,GO SIMULATE A ROTATE LEFT
2041  5254            JMP     OPRSET  /GO TEST THE INSTRUCTION

2042  1762    SIMTWC, TAD  I  CINSTR  /GET THE INSTRUCTION
2043  0264            AND     K14     /BIT 8 AND 9 = 0
2044  7450            SNA
2045  4770            JMS  I  XSMBSW  /YES,GO SIMULATE A BYTE SWAP
2046  1272            TAD     NEG10   /RTR?
2047  7450            SNA
2050  4771            JMS  I  XSMRTR  /YES, GO SIMULATE A ROTATE TWICE RIGHT
2051  1263            TAD     K4      /RTL?
2052  7650            SNA     CLA
2053  4772            JMS  I  XSMRTL  /YES,GO SIMULATE A ROTATE TWICE LEFT

2054  1776    OPRSET, TAD  I  OFIELD
2055  1270            TAD     D6201
2056  3257            DCA     .+1
2057  7402            HLT/CDF         /CHANGE TO THE RANDOM DATA FIELD
2060  5775            JMP  I  INTOPR  /GO SETUP THE OPERATE INSTRUCTION

2061  0001    K1,     1
2062  0002    K2,     2
2063  0004    K4,     4
2064  0014    K14,    14
2065  0020    K20,    20
2066  0040    K40,    40
2067  0100    K100,   100
2070  6201    D6201,  6201
2071  0200    POS200, 200
2072  7770    NEG10,  -10

                        /
2073  0000    PCTST,  0
2074  7001            IAC
2075  1754            TAD  I  XJMSLC
2076  3755            DCA  I  XPCSAV
2077  1755            TAD  I  XPCSAV
2100  7041            CIA
2101  1756            TAD  I  XRETPC
2102  7640            SZA     CLA
2103  5761            JMP  I  MRIERR
2104  1757            TAD  I  FLDXRN
2105  7041            CIA
```

```
1342  2106  1760          TAD  I  FLXRET
1343  2107  7640          SZA     CLA
1344  2110  5761          JMP  1  MRIERR
1345  2111  5673          JMP  I  PCTST
1346                /
1347  2112  0000    GETWD,  0
1348  2113  1757          TAD  I  FLDXRN
1349  2114  1344          TAD     A6201
1350  2115  3316          DCA     .+1
1351  2116  7402          HLT/CDF
1352  2117  1745          TAD  I  BSAVA
1353  2120  3345          DCA     BSAVA
1354  2121  6224          RIF
1355  2122  1344          TAD     A6201
1356  2123  3324          DCA     .+1
1357  2124  7402          HLT/CDF
1358  2125  1345          TAD     BSAVA
1359  2126  5712          JMP  I  GETWD
1360
1361                /
1362  2127  0000    RANCON, 0
1363  2130  1752          TAD  I  ZCNFLG
1364  2131  7650          SNA     CLA
1365  2132  5727          JMP  I  RANCON
1366  2133  1753          TAD  I  XWDMOV
1367  2134  7402          HLT
1368  2135  7604          LAS
1369  2136  5727          JMP  I  RANCON
1370
1371
1372  2137  0000    INTSET, 0
1373  2140  1351          TAD     XINT
1374  2141  3743          DCA  I  TINT
1375  2142  5737          JMP  I  INTSET
1376  2143  0003    TINT,   INT
1377                /
1378
1379  2144  6201    A6201,  6201
1380  2145  0000    BSAVA,  0
1381                /
1382
1383                /
1384        2147    *2147
1385                /
1386  2147  4750    GCHNG,  JMS  I  GRERNG
1387                /
1388  2150  0202    GRERNG, CHANGE

1389  2151  3103    XINT,   INTERS
1390  2152  1143    ZCNFLG, CONFLG
1391  2153  5173    XWDMOV, MOVWDX
1392  2154  0762    XJMSLC, JMSLOC
1393  2155  1311    XPCSAV, PCSAVE
1394  2156  0504    XRETPC, RETHR
1395  2157  0754    FLDXRN, RANFLD
1396  2160  0525    FLXRET, RETFLD
```



```
1397  2161  1313    MRIERR, ERROR
1398  2162  0746    CINSTR, INSTR
1399  2163  2401    XSMCMA, SIMCMA
1400  2164  2426    XSMCML, SIMCML
1401  2165  2435    XSMIAC, SIMIAC
1402  2166  2442    XSMRAR, SIMRAR
1403  2167  2461    XSMRAL, SIMRAL
1404  2170  2477    XSMBSW, SIMBSW
1405  2171  2520    XSMRTR, SIMRTR
1406  2172  2537    XSMRTL, SIMRTL
1407  2173  2752    OSIMAC, SIMAC
1408  2174  2753    OSMLNK, SIMLNK
1409  2175  0637    INTOPR, OPRINT
1410  2176  0754    OFIELD, RANFLD
1411  2177  0000            0
1412
1413        2200    *2200
1414                /
1415  2200  5343            JMP     HCHNG
1416                        /
1417
1418
1419                /BEGINNING OF OPERATE GROUP 2 SIMULATION
1420
1421  2201  3251    SIMOP2, DCA     SKPFLG          /CLEAR THE SKIP FLAG
1422  2202  1745    SMACHK, TAD  I  DINSTR
1423  2203  0243            AND     Z100
1424  2204  7650            SNA     CLA
1425  2205  5211            JMP     SZACHK
1426  2206  4746            JMS  I  XSMSMA
1427  2207  5211            JMP     SZACHK
1428  2210  5226            JMP     SETSKP
1429  2211  1745    SZACHK, TAD  I  DINSTR
1430  2212  0244            AND     Z40
1431  2213  7650            SNA     CLA
1432  2214  5220            JMP     SNLCHK
1433  2215  4747            JMS  I  XSMSZA
1434  2216  5220            JMP     SNLCHK
1435  2217  5226            JMP     SETSKP
1436  2220  1745    SNLCHK, TAD  I  DINSTR
1437  2221  0245            AND     Z20
1438  2222  7650            SNA     CLA
1439  2223  5227            JMP     COMCHK
1440  2224  4750            JMS  I  XSMSNL
1441  2225  5227            JMP     COMCHK
1442  2226  2251    SETSKP, ISZ     SKPFLG
1443  2227  1745    COMCHK, TAD  I  DINSTR
1444  2230  0250            AND     POS10
1445  2231  7640            SZA     CLA
1446  2232  7240            CLA     CMA
1447  2233  1251            TAD     SKPFLG
1448  2234  7640            SZA     CLA
1449  2235  2751            ISZ  I  ZEXPRT
1450  2236  1745            TAD  I  DINSTR
1451  2237  0246            AND     Z200
```

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```
 1452   2240  7640            SZA     CLA
 1453   2241  3752            DCA  I  XACSIM
 1454   2242  5753            JMP  I  ZSETOP          /GO SETUP AND TEST INSTR
 1455
 1456   2243  0100    Z100,   100
 1457   2244  0040    Z40,    40
 1458   2245  0020    Z20,    20
 1459   2246  0200    Z200,   200
 1460   2247  0320    Z320,   320
 1461   2250  0010    POS10,  10
 1462   2251  0000    SKPFLG, 0
 1463
 1464                  /BEGINNING OF OPERATE GROUP 2 MQ INSTRUCTION SIMULATION
 1465
 1466   2252  1745    SIMMQI, TAD  I  DINSTR  /GET THE INSTRUCTION
 1467   2253  0247            AND     Z320    /MASK OUT FOR LEGAL BITS 4,5 &7
 1468   2254  7450            SNA
 1469   2255  5753            JMP  I  ZSETOP  /INSTRUSTION IS A NOP
 1470   2256  1304            TAD     NEG20   /SUBTRACT 20
 1471   2257  7450            SNA
 1472   2260  5754            JMP  I  XSMMQL  /GO SIMULATE A MQL
 1473   2261  1305            TAD     M60
 1474   2262  7450            SNA
 1475   2263  5755            JMP  I  XSMMQA  /GO SIMULATE A MQA
 1476   2264  1304            TAD     NEG20
 1477   2265  7450            SNA
 1478   2266  5756            JMP  I  XSMSWP  /GO SIMULATE A SWP
 1479   2267  1305            TAD     M60
 1480   2270  7450            SNA
 1481   2271  5757            JMP  I  XSMCLA  /GO SIMULATE A CLA
 1482   2272  1304            TAD     NEG20
 1483   2273  7450            SNA
 1484   2274  5760            JMP  I  XSMCAM  /GO SIMULATE A CAM
 1485   2275  1305            TAD     M60
 1486   2276  7450            SNA
 1487   2277  5761            JMP  I  XSMACL  /GO SIMULATE A ACL
 1488   2300  1304            TAD     NEG20
 1489   2301  7650            SNA     CLA
 1490   2302  5762            JMP  I  XCLSWP  /GO SIMULATE A SWP,CLA
 1491   2303  7402            HLT             /NONE OF THE ABOVE
 1492   2304  7760    NEG20,  -20
 1493   2305  7720    M60,    -60
 1494
 1495                  /
 1496   2306  1763    ERROPR, TAD  I  GRANFL  /GET THE RANDOM DATA FIELD
 1497   2307  4764            JMS  I  OPRHLT
 1498   2310  1765            TAD  I  GOPRET  /GET THE ACTUAL RETURN FIELD

 1499   2311  4764            JMS  I  OPRHLT
 1500   2312  1751            TAD  I  ZEXPRT  /GET THE EXPECTED RETURN PC
 1501   2313  4764            JMS  I  OPRHLT
 1502   2314  1766            TAD  I  GACTRT  /GET THE ACTUAL RETURN PC
 1503   2315  4764            JMS  I  OPRHLT
 1504   2316  1767            TAD  I  GADDRS  /GET THE INSTRUCTION ADDRESS
 1505   2317  4764            JMS  I  OPRHLT
 1506   2320  1745            TAD  I  DINSTR  /GET THE INSTRUCTION
```


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```
 1507   2321  4764            JMS  I  OPRHLT
 1508   2322  1770            TAD  I  GDATAH  /GET THE INITIAL AC DATA
 1509   2323  4764            JMS  I  OPRHLT
 1510   2324  1752            TAD  I  XACSIM  /GET THE SIMULATED AC
 1511   2325  4764            JMS  I  OPRHLT
 1512   2326  1771            TAD  I  GDATAD  /GET THE FINAL AC
 1513   2327  4764            JMS  I  OPRHLT
 1514   2330  1772            TAD  I  GSVLNK  /GET THE INITIAL LINK
 1515   2331  4764            JMS  I  OPRHLT
 1516   2332  1773            TAD  I  GSMLNK  /GET THE SIMULATED LINK
 1517   2333  4764            JMS  I  OPRHLT
 1518   2334  1774            TAD  I  GLNKDN  /GET THE FINAL LINK
 1519   2335  4764            JMS  I  OPRHLT
 1520   2336  1775            TAD  I  GMQDAT  /GET THE INITIAL MQ DATA
 1521   2337  4764            JMS  I  OPRHLT
 1522   2340  5776            JMP  I  OPRER1
 1523                  /
 1524
 1525                  /
 1526          2343    *2343
 1527                  /
 1528   2343  4744    HCHNG,  JMS  I  HRERNG
 1529                  /
 1530   2344  0202    HRERNG, CHANGE
 1531   2345  0746    DINSTR, INSTR
 1532   2346  2611    XSMSMA, SIMSMA
 1533   2347  2601    XSMSZA, SIMSZA
 1534   2350  2626    XSMSNL, SIMSNL
 1535   2351  2751    ZEXPRT, EXPRET
 1536   2352  2752 .  XACSIM, SIMAC
 1537   2353  2054    ZSETOP, OPRSET
 1538   2354  2640    XSMMQL, SIMMQL
 1539   2355  2644    XSMMQA, SIMMQA
 1540   2356  2652    XSMSWP, SIMSWP
 1541   2357  2661    XSMCLA, SIMCLA
 1542   2360  2663    XSMCAM, SIMCAM
 1543   2361  2666    XSMACL, SIMACL
 1544   2362  2671    XCLSWP, CLASWP
 1545   2363  0754    GRANFL, RANFLD
 1546   2364  1741    OPRHLT, HLTOPR
 1547   2365  2747    GOPRET, OPRETF
 1548   2366  2675    GACTRT, OPRRET
 1549   2367  0745    GADDRS, ADDRS
 1550   2370  0752    GDATAH, DATAHR
 1551   2371  2745    GDATAD, DATADN
 1552   2372  0755    GSVLNK, SAVLNK
 1553   2373  2753    GSMLNK, SIMLNK
 1554   2374  2746    GLNKDN, LINKDN
 1555   2375  0753    GMQDAT, MQDATA
 1556   2376  1734    OPRER1, OPERR1
 1557   2377  0000            0
 1558
 1559          2400    *2400
 1560                  /
 1561   2400  5367            JMP     ICHNG
```

```
1562                        /
1563
1564                    /ROUTINE TO SIMULATE A COMPLEMENT
1565
1566    2401  0000  SIMCMA, 0
1567    2402  1224          TAD     M14
1568    2403  3225          DCA     CNT
1569    2404  3226          DCA     SIMCML
1570    2405  1775          TAD  I  BSIMAC
1571    2406  7104          CLL     RAL
1572    2407  3235          DCA     SIMIAC
1573    2410  7420          SNL
1574    2411  2226          ISZ     SIMCML
1575    2412  1226          TAD     SIMCML
1576    2413  2225          ISZ     CNT
1577    2414  5216          JMP     .+2
1578    2415  5222          JMP     ENDCMA
1579    2416  7104          CLL     RAL
1580    2417  3226          DCA     SIMCML
1581    2420  1235          TAD     SIMIAC
1582    2421  5206          JMP     SIMCMA+5
1583    2422  3775  ENDCMA, DCA  I  BSIMAC
1584    2423  5601          JMP  I  SIMCMA
1585
1586    2424  7764  M14,    -14
1587    2425  0000  CNT,    0
1588
1589                    /ROUTINE TO SIMULATE A CML
1590
1591    2426  0000  SIMCML, 0
1592    2427  1776          TAD  I  BSMLNK  /GET THE SIMULATED LINK
1593    2430  7650          SNA     CLA     /IS IT A 0
1594    2431  1234          TAD     K4000   /YES,MAKE IT A ONE
1595    2432  3776          DCA  I  BSMLNK  /SAVE IT
1596    2433  5626          JMP  I  SIMCML
1597
1598    2434  4000  K4000,  4000
1599
1600                    /ROUTINE TO SIMULATE A IAC
1601
1602    2435  0000  SIMIAC, 0
1603    2436  2775          ISZ  I  BSIMAC  /BUMP THE SIMULATED AC
1604    2437  5241          JMP     .+2
1605    2440  4226          JMS     SIMCML
1606    2441  5635          JMP  I  SIMIAC
1607
1608                    /ROUTINE TO SIMULATE A RAR
1609
1610    2442  0000  SIMRAR, 0
1611    2443  7300          CLA     CLL     /CLEAR OUT A LINK AND THE AC
1612    2444  1776          TAD  I  BSMLNK  /GET THE SIMULATED LINK
1613    2445  7004          RAL             /PUT IT IN THE LINK
1614    2446  1260          TAD     NEG6
1615    2447  3225          DCA     CNT
1616    2450  1775          TAD  I  BSIMAC  /GET THE SIMULATED AC
```



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1617    2451  7006          RTL             /ROTATE 12 PLACES TO THE LEFT
1618    2452  2225          ISZ     CNT
1619    2453  5251          JMP     .-2
1620    2454  3775          DCA  I  BSIMAC  /SAVE THE SIMULATED ROTATE
1621    2455  7010          RAR             /GET THE LINK
1622    2456  3776          DCA  I  BSMLNK  /SAVE THE LINK
1623    2457  5642          JMP  I  SIMRAR  /RETURN
1624
1625    2460  7772  NEG6,   -6
1626
1627                    /ROUTINE TO SIMULATE A RAL
1628
1629    2461  0000  SIMRAL, 0
1630    2462  7300          CLA     CLL
1631    2463  1776          TAD  I  BSMLNK  /GET THE SIMULATED LINK
1632    2464  7004          RAL             /PUT IT IN THE LINK
1633    2465  1260          TAD     NEG6
1634    2466  3225          DCA     CNT
1635    2467  1775          TAD  I  BSIMAC  /GET THE SIMULATED AC
1636    2470  7012          RTR             /ROTATE IT RIGHT 12 TIMES
1637    2471  2225          ISZ     CNT
1638    2472  5270          JMP     .-2
1639    2473  3775          DCA  I  BSIMAC  /SAVE THE SIMULATED ROTATE
1640    2474  7010          RAR
1641    2475  3776          DCA  I  BSMLNK  /SAVE THE SIMULATED LINK
1642    2476  5661          JMP  I  SIMRAL  /RETURN
1643
1644
1645                    /ROUTINE TO SIMULATE A BYTE SWAP
1646
1647    2477  0000  SIMBSW, 0
1648    2500  7300          CLA     CLL
1649    2501  1776          TAD  I  BSMLNK  /GET THE SIMULATED LINK
1650    2502  7010          RAR
1651    2503  7012          RTR
1652    2504  7012          RTR
1653    2505  1775          TAD  I  BSIMAC  /GET THE SIMULATED AC
1654    2506  0317          AND     K7700
1655    2507  1775          TAD  I  BSIMAC  /GET IT AGAIN
1656    2510  7006          RTL
1657    2511  7006          RTL
1658    2512  7006          RTL
1659    2513  3775          DCA  I  BSIMAC  /SAVE THE SIMULATED BYTE SWAP
1660    2514  7010          RAR
1661    2515  3776          DCA  I  BSMLNK  /SAVE THE LINK
1662    2516  5677          JMP  I  SIMBSW  /RETURN
1663    2517  7700  K7700,  7700
1664
1665                    /ROUTINE TO SIMULATE RTR
1666
1667    2520  0000  SIMRTR, 0
1668    2521  7300          CLA     CLL
1669    2522  1776          TAD  I  BSMLNK  /GET THE SIMULATED LINK
1670    2523  7004          RAL             /PUT IT IN THE LINK
1671    2524  1336          TAD     M13
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1672  2525  3225          DCA     CNT     /SETUP A COUNTER FOR 11 RAL'S
1673  2526  1775          TAD  I  BSIMAC  /GET THE SIMULATED AC
1674  2527  7004          RAL
1675  2530  2225          ISZ     CNT
1676  2531  5327          JMP     .-2
1677  2532  3775          DCA  I  BSIMAC  /SAVE THE SIMULATED ROTATED AC
1678  2533  7010          RAR
1679  2534  3776          DCA  I  BSMLNK  /SAVE THE SIMULATED LINK
1680  2535  5720          JMP  I  SIMRTR  /RETURN
1681
1682  2536  7765    M13,  -13
1683
1684                      /ROUTINE TO SIMULATE RTL
1685
1686  2537  0000    SIMRTL, 0
1687  2540  7300          CLA     CLL
1688  2541  1776          TAD  I  BSMLNK  /GET THE SIMULATED LINK
1689  2542  7004          RAL             /AND PUT IT IN THE LINK
1690  2543  1336          TAD     M13
1691  2544  3225          DCA     CNT     /SET UP A COUNTER TO DO 11 RAR'S
1692  2545  1775          TAD  I  BSIMAC  /GET THE SIMULATED AC
1693  2546  7010          RAR
1694  2547  2225          ISZ     CNT
1695  2550  5346          JMP     .-2
1696  2551  3775          DCA  I  BSIMAC  /SAVE THE SIMULATED ROTATED AC
1697  2552  7010          RAR
1698  2553  3776          DCA  I  BSMLNK  /SAVE THE SIMULATED ROTATED LINK
1699  2554  5737          JMP  I  SIMRTL
1700
1701                      /
1702  2555  1771    FLDCHK, TAD  I UPPERL   /IS THE LAST FIELD = 2K
1703  2556  1365          TAD     M3777
1704  2557  7640          SZA     CLA
1705  2560  5772          JMP  I  TSFLDF  /NO GO SWAP IT UP
1706  2561  6224          RIF             /READ THE INSTRUCTION FIELD
1707  2562  7640          SZA     CLA     /IS IT EQUAL TO FIELD 0
1708  2563  5773          JMP  I  TSWPDN  /NO,GO SWAP THE PROGRAN DOWN
1709  2564  5774          JMP  I  ROLFLG  /YES,DO NOT SWAP FIELDS BUT ROLL UP
1710                      /
1711  2565  4001    M3777,  -3777
1712
1713                      /
1714        2567          *2567
1715                      /
1716  2567  4770    ICHNG,  JMS  I  IRERNG
1717                      /
1718  2570  0202    IRERNG, CHANGE

1719  2571  1550    UPPERL, UPRLIM
1720  2572  0433    TSFLDF, SFLDFG
1721  2573  0422    TSWPDN, SWAPDN
1722  2574  0324    ROLFLG, SETFLG
1723  2575  2752    BSIMAC, SIMAC
1724  2576  2753    BSMLNK, SIMLNK
1725  2577  0000          0
1726                      /
```



```
1727
1728        2600    *2600
1729
1730                      /
1731  2600  5364          JMP     JCHNG
1732                      /
1733
1734                      /ROUTINE TO SIMULATE A SZA
1735
1736  2601  0000    SIMSZA, 0
1737  2602  7240          CLA     CMA
1738  2603  1770          TAD  I  CSIMAC
1739  2604  3223          DCA     ACUTST
1740  2605  2223          ISZ     ACUTST
1741  2606  5601          JMP  I  SIMSZA
1742  2607  2201          ISZ     SIMSZA
1743  2610  5601          JMP  I  SIMSZA
1744
1745                      /ROUTINE TO SIMULATE A SMA
1746
1747  2611  0000    SIMSMA, 0
1748  2612  1770          TAD  I  CSIMAC
1749  2613  0225          AND     D4000
1750  2614  1224          TAD     K7777
1751  2615  3223          DCA     ACUTST
1752  2616  2223          ISZ     ACUTST
1753  2617  5221          JMP     .+2
1754  2620  5611          JMP  I  SIMSMA
1755  2621  2211          ISZ     SIMSMA
1756  2622  5611          JMP  I  SIMSMA
1757
1758  2623  0000    ACUTST, 0
1759  2624  7777    K7777,  -1
1760  2625  4000    D4000,  4000
1761
1762                      /ROUTINE TO SIMULATE A SNL
1763
1764  2626  0000    SIMSNL, 0
1765  2627  1771          TAD  I  CSMLNK
1766  2630  0225          AND     D4000
1767  2631  1224          TAD     K7777
1768  2632  3223          DCA     ACUTST
1769  2633  2223          ISZ     ACUTST
1770  2634  5236          JMP     .+2
1771  2635  5626          JMP  I  SIMSNL
1772  2636  2226          ISZ     SIMSNL
1773  2637  5626          JMP  I  SIMSNL
1774
1775                      /ROUTINE TO SIMULATE A MQL
1776
1777  2640  1770    SIMMQL, TAD  I  CSIMAC  /GET THE SIMULATED AC
1778  2641  3772          DCA  I  CSIMMQ  /PUT IT IN THE SIMULATED MQ
1779  2642  3770          DCA  I  CSIMAC  /CLEAR OUT THE SIMULATED AC
1780  2643  5773          JMP  I  COPRST  /GO EXECUTE THE INSTRUCTION
1781
```

SEQ 0057

```
1782                    /ROUTINE TO SIMULATE MQA
1783
1784    2644  1772      SIMMQA, TAD  I  CSIMMQ  /GET THE SIMULATED MQ
1785    2645  7040              CMA             /COMPLEMENT THE RESULTS
1786    2646  0770              AND  I  CSIMAC  /MASK RESULTS WITH SIMULATED AC
1787    2647  1772              TAD  I  CSIMMQ  /INCLUSIVE OR THE SIMULATED MQ
1788    2650  3770              DCA  I  CSIMAC  /THE SIMULATED AC = INCLUSIVE OR OF MQ & AC
1789    2651  5773              JMP  I  COPRST  /GO EXECUTE THE INSTR.
1790
1791                    /ROUTINE TO SIMULATE A SWP
1792
1793    2652  1770      SIMSWP, TAD  I  CSIMAC  /GET THE SIMULATED AC
1794    2653  3223              DCA     ACUTST  /AND SAVE IT
1795    2654  1772              TAD  I  CSIMMQ  /GET THE SIMULATED MQ
1796    2655  3770              DCA  I  CSIMAC  /AND PUT IT IN THE SIMULATED AC
1797    2656  1223              TAD     ACUTST  /GET THE SIMULATED AC
1798    2657  3772              DCA  I  CSIMMQ  /AND PUT IT IN THE SIMULATED MQ
1799    2660  5773              JMP  I  COPRST  /GO EXECUTE THE INSTRUCTION
1800
1801                    /ROUTINE TO SIMULATE A CLA
1802
1803    2661  3770      SIMCLA, DCA  I  CSIMAC  /CLEAR THE SIMULATED AC
1804    2662  5773              JMP  I  COPRST  /GO EXECUTE THE INSTRUCTION
1805
1806                    /ROUTINE TO SIMULATE A CAM
1807
1808    2663  3770      SIMCAM, DCA  I  CSIMAC  /CLEAR THE SIMULATED AC
1809    2664  3772              DCA  I  CSIMMQ  /CLEAR THE SIMULATED MQ
1810    2665  5773              JMP  I  COPRST  /GO EXECUTE THE INSTRUCTION
1811
1812                    /ROUTINE TO SIMULATE A ACL
1813
1814    2666  1772      SIMACL, TAD  I  CSIMMQ  /GET THE SIMULATED MQ
1815    2667  3770              DCA  I  CSIMAC  /PUT IT IN THE SIMULATED AC
1816    2670  5773              JMP  I  COPRST  /GO EXECUTE THE INSTR
1817
1818                    /ROUTINE TO SIMULATE A CLA,SWP
1819
1820    2671  1772      CLASWP, TAD  I  CSIMMQ  /GET THE SIMULATED MQ
1821    2672  3770              DCA  I  CSIMAC  /PUT IT IN THE SIMULATED AC
1822    2673  3772              DCA  I  CSIMMQ  /CLEAR THE SIMULATED MQ
1823    2674  5773              JMP  I  COPRST  /GO EXECUTE THE INSTRUCTION
1824
1825                    /
1826    2675  0000      OPRRET, 0               /RETURN HERE FROM OPERATE INSTRUCTION
1827    2676  3345              DCA     DATADN  /SAVE THE FINAL AC
1828    2677  7010              RAR

1829    2700  3346              DCA     LINKDN  /SAVE THE FINAL LINK
1830    2701  6214              RDF             /GET THE RANDOM DATA FIELD
1831    2702  3347              DCA     OPRETF  /SAVE THE DF FROM OPERATE RETURN
1832    2703  7701              ACL             /GET THE FINAL MQ DATA
1833    2704  3350              DCA     MQDONE  /SAVE IT
1834    2705  7402      RETTDF, HLT/CDF         /CHANGE DF BACK TO PROGRAM FIELD
1835    2706  1775      OPRCOM, TAD  I  XFIELD  /GET THE EXPECTED INSTRUCTION FIELD
1836    2707  7041              CIA
```


SEQ 0058

```
1837    2710  1347              TAD     OPRETF  /GET THE FIELD INSTRUCTION RETURNED FROM
1838    2711  7640              SZA     CLA
1839    2712  5344              JMP     OPRERR  /PROGRAM RETURNED FROM THE WRONG FIELD
1840    2713  1351              TAD     EXPRET  /GET THE EXPECTED RETURN PC
1841    2714  7041              CIA
1842    2715  1275              TAD     OPRRET  /GET THE ACTUAL RETURN PC
1843    2716  7640              SZA     CLA
1844    2717  5344              JMP     OPRERR  /EXPECTED PC DOES NOT AGREE WITH ACTUAL
1845    2720  1354              TAD     SIMMQ   /GET THE SIMULATED MQ
1846    2721  7041              CIA
1847    2722  1350              TAD     MQDONE  /GET THE ACTUAL MQ
1848    2723  7640              SZA     CLA
1849    2724  5344              JMP     OPRERR  /ERROR,ACTUAL MQ DOES NOT EQUAL SIMULATED MQ
1850    2725  1353              TAD     SIMLNK  /GET THE SIMULATED LINK
1851    2726  7041              CIA
1852    2727  1346              TAD     LINKDN  /GET THE ACTUAL LINK
1853    2730  7640              SZA     CLA
1854    2731  5344              JMP     OPRERR  /ERROR SIMULATED AND ACTUAL LINK ARE NOT EQUAL
1855    2732  1352              TAD     SIMAC   /GET THE SIMULATED AC
1856    2733  7041              CIA
1857    2734  1345              TAD     DATADN  /GET THE ACTUAL AC RETURNED
1858    2735  7640              SZA     CLA
1859    2736  5344              JMP     OPRERR  /SAIMULATED AND ACTUAL AC DO NOT AGREE
1860    2737  4766      LPSW0,  JMS  I  C8SWR   /IS SR1 SET TO LOOP ON THE INSTRUCTION
1861    2740  7004              RAL
1862    2741  7710              SPA     CLA
1863    2742  5774              JMP  I  XINSGN  /YES GO LOOP ON THE INSTRUCTIN
1864    2743  5776              JMP  I  XXCNT   /GO BUMP INSTRUCTION COUNTER
1865
1866    2744  5767      OPRERR, JMP  I  OERROR  /NO, GO HALT WITH ERROR INFORMATION IN AC
1867
1868    2745  0000      DATADN, 0
1869    2746  0000      LINKDN, 0
1870    2747  0000      OPRETF, 0
1871    2750  0000      MQDONE, 0
1872    2751  0000      EXPRET, 0
1873    2752  0000      SIMAC,  0
1874    2753  0000      SIMLNK, 0
1875    2754  0000      SIMMQ,  0
1876                    /
1877          2764      *2764
1878                    /
1879    2764  4765      JCHNG,  JMS  I  JRERNG
1880                    /
1881    2765  0202      JRERNG, CHANGE
1882    2766  3466      C8SWR,  XC8SW
1883    2767  2306      OERROR, ERROPR
1884    2770  2752      CSIMAC, SIMAC
1885    2771  2753      CSMLNK, SIMLNK
1886    2772  2754      CSIMMQ, SIMMQ
1887    2773  2054      COPRST, OPRSET
1888    2774  1606      XINSGN, INSGEN+5
1889    2775  0754      XFIELD, RANFLD
1890    2776  0271      XXCNT,  XCNT
1891    2777  0000              0
```

```
                        /
                3000    *3000
                        /
3000  5347              JMP KCHNG
                        /
                        /ROUTINE TO FILL MEMORY WITH HALTS AROUND THE PROGRAM

3001  1766    FILRND, TAD I CONTLM    /GET THE UPPER LIMIT COUNTER
3002  3224            DCA   TEMP    /SAVE IT
3003  1767            TAD I FLDCNT    /CHECK TO SEE IF IT IS FIELD 0
3004  7650            SNA     CLA     /IS IT FIELD 0?
3005  1223            TAD     MM4     /YES, SUBTRACT 4 FROM THE BEGINNING ADDRESS
3006  1370            TAD     ABGN
3007  7041            CIA             /NEGATE THE NUMBER FOR A COUNTER
3010  3766            DCA I CONTLM    /SAVE IT
3011  1767            TAD I FLDCNT    /CHECK TO SEE IF IT IS FIELD 0
3012  7650            SNA     CLA     /IS IT FIELD 0
3013  7307            CLA CLL IAC RTL /YES,START FILLING FIELD 0 AT ADDRESS 4
3014  4771            JMS I ZFILL     /FILL THE FIRST HALF OF PROGRAM FIELD
3015  1224            TAD     TEMP    /GET THE UPPER LIMIT COUNTER
3016  1372            TAD     ENDOFP  /ADD END OF PROGRAM TO IT
3017  3766            DCA I CONTLM    /SAVE THIS NUMBER AS THE COUNTER
3020  1372            TAD     ENDOFP  /GET THE ADDRESS TO START FILLING MEMORY
3021  4771            JMS I ZFILL     /WITH HALTS
3022  5773            JMP I XADDR     /RETURN FOR NEXT FIELD

3023  7774    MM4,    -4
3024  0000    TEMP,   0

3025  7240    BGNCON, CLA     CMA     /CONSTRAINT STARTING ADDRESS
3026  3753            DCA   I XCNFLG  /RANDOM STARTING ADDRESS
3027  4754            JMS   I XLIMIT  /SETUP MEMORY LIMITS
3030  1021            TAD     OP1SEL
3031  3235            DCA     SELOP1
3032  4776    CL8BGN, JMS   I C8SMS   /CHECK FOR CLASIC OR TO CHANGE SR
3033  3751            DCA   I SETDOX  /SET DOSET TO 0
3034  5762            JMP   I CONSET  /RETURN TO PROGRAM TO SETUP MASK AND CONSTRAINT WORDS

3035  0000    SELOP1, 0

3036  0000    SETOP1, 0
3037  1235            TAD     SELOP1
3040  7004            RAL             /CHECK TO SEE IF OPTION 1 WAS SELECTED
3041  7700            SMA     CLA     /WAS IT ?
3042  5636            JMP   I SETOP1  /NO , JUST RUN MRI AND OPR

3043  3301            DCA     KILL
3044  7240            CLA     CMA     /SET ALL PROGRAM FLAGS TO INACTIVE STATE
3045  3757            DCA   I FLGXMT  /SLU XMIT FLAG
3046  7240            CLA     CMA
3047  3760            DCA   I FLGRTC  /REAL TIME CLOCK FLAG
3050  1300            TAD     MM55
3051  3761            DCA   I DVINAC  /SETUP A DEVICE INACTIVE COUNTER
3052  7301            CLA CLL IAC     /SET DATA 11 TO A ONE
```



```
3053  6035            KIE             /SET SLU INTERRUPT ENABLE
3054  6135            CLLE            /SET RTC INTERRUPT ENABLE
3055  7300            CLA     CLL
3056  1302            TAD     FIRST   /GET FIRST TIME IN FLAG
3057  7650            SNA     CLA     /WAS IT SET
3060  2302            ISZ     FIRST   /YES SET IT
3061  1751            TAD   I SETDOX  /GET END OF PASS COUNTER
3062  7650            SNA     CLA     /PRINTED END OF PASS?
3063  5270            JMP     .+5     /YES RESET TRANSMIT WORD AND COUNTERS
3064  2756            ISZ   I SLUXMT  /INCREMENT TRANSMIT WORD
3065  2755            ISZ   I XTYCNT  /INCREMENT TRANSMIT COUNTER
3066  5275            JMP     .+7     /GO TRANSMIT THE CHAR
3067  4752            JMS   I STRNWL  /PRINT A CR LF
3070  1344            TAD     K237
3071  3756            DCA   I SLUXMT  /SAVE THE XMIT WORD
3072  1345            TAD     M101
3073  3755            DCA   I XTYCNT  /SAVE THE COUNTER
3074  5264            JMP     .-10    /GO INCREMENT AND PRINT
3075  1756            TAD   I SLUXMT  /GET THE WORD TO BE TRANSMITTED BY SLU
3076  6046            TLS             /CLEAR XMIT FLAG AND TRANSMIT WORD
3077  5636            JMP   I SETOP1  /RETURN TO PROGRAM

3100  7723    MM55,   -55
3101  0000    KILL,   0
3102  0000    FIRST,  0

                        /INTERRUPT SERVICE ROUTINE

3103  3337    INTERS, DCA     INTAC   /SAVE THE AC
3104  7010            RAR             /GET THE LINK INTO BIT 0
3105  3340            DCA     INTLNK  /SAVE THE LINK
3106  1741            TAD   I ADDRS0  /GET THE INTERRUPT PC
3107  3342            DCA     INTRET  /SAVE IT
3110  6224            RIF             /READ THE INSTRUCTION FIELD
3111  1343            TAD     KKCDF   /ADD CDF INSTRUCTION TO BITS 6-8
3112  3313            DCA     .+1     /PUT CDF TO PROGRAM FIELD IN NEXT LOCATION
3113  7402    HLT/CDF         HLT     /TO PROGRAM FIELD
3114  6041            TSF             /SKIP ON SLU XMIT FLAG
3115  7410            SKP
3116  5764            JMP   I SERXMT  /GO SERVICE SLU XMIT FLAG
3117  4774            JMS   I C8CHKR  /CHECK FOR CLASIC CONTROL CHARACTER
3120  7610            SKP     CLA     /NOT CLASIC OR RECEIVE FLAG NOT SET
3121  5764            JMP   I SERXMT  /CHECK TO SEE IF OPTION 1 WAS SELECTED
3122  6137            CLSK            /SKIP ON REAL TIME CLOCK FLAG
3123  7410            SKP
3124  5765            JMP   I SERRTC  /GO SERVICE REAL TIME CLOCK FLAG
3125  6102            SPL             /SKIP ON AC LOW F/F
3126  7410            SKP
3127  5763            JMP   I POWERF  /POWER FAILURE GO CLEAR AC LOW AND RETURN
3130  4775            JMS   I C8ERRR  /ILLEGAL INTERRUPT
3131  1340    RETPRG, TAD     INTLNK  /GET THE LINK
3132  7104            CLL     RAL     /RESTORE IT
3133  1337            TAD     INTAC   /RESTORE THE AC
3134  6244            RMF             /RESTORE MEMORY FIELDS
3135  6001            ION             /TURN THE INTERRUPT ON
```

```
2002    3136  5742          JMP  I  INTRET  /RETURN TO PROGRAM
2003
2004    3137  0000    INTAC,  0
2005    3140  0000    INTLNK, 0
2006    3141  0000    ADDRSO, 0
2007    3142  0000    INTRET, 0
2008    3143  6201    KKCDF,  CDF     00
2009    3144  0237    K237,   237
2010    3145  7677    M101,   -101
```



```
2011
2012                  /
2013          3147    *3147
2014                  /
2015    3147  4750    KCHNG,  JMS I KRERNG
2016                  /
2017    3150  0202    KRERNG, CHANGE
2018    3151  3454    SETDOX, DOSET
2019    3152  4224    STRNWL, XC8CRL
2020    3153  1143    XCNFLG, CONFLG
2021    3154  1522    XLIMIT, LIMITS
2022    3155  3275    XTYCNT, TTYCNT
2023    3156  3230    SLUXMT, XMTSLU
2024    3157  3226    FLGXMT, XMTFLG
2025    3160  3227    FLGRTC, RTCFLG
2026    3161  3273    DVINAC, INACDV
2027    3162  5001    CONSET, SETCON
2028    3163  3246    POWERF, PONFAL
2029    3164  3201    SERXMT, XMTSER
2030    3165  3232    SERRTC, RTCSER
2031    3166  1145    CONTLM, HGHLIM
2032    3167  0247    FLDCNT, CNTR3
2033    3170  0200    ABGN,   BGN
2034    3171  0527    ZFILL,  FILALL
2035    3172  5176    ENDUFP, PRGEND
2036    3173  5036    XADD1,  ADDONE
2037    3174  4250    C8CHKR, XC8CKP
2038    3175  4401    C8ERRR, XC8ERR
2039    3176  4722    C8SMS,  XSTMS
2040    3177  0000            0
2041
2042                  /
2043          3200    *3200
2044                  /
2045    3200  5361            JMP     LCHNG
2046                  /
2047                  /SERIAL LINE UNIT TRANSMIT SERVICE ROUTINE
2048
2049    3201  1770    XMTSER, TAD  I  OP1     /CHECK TO SEE IF OPTION 1 WAS SELECTED
2050    3202  7004            RAL             /MOVE THE HARDWARE BIT INTO LINK
2051    3203  7700            SMA     CLA     /WAS OPTION 1 SELECTED ?
2052    3204  5773            JMP  I  PRGRET  /NO RETURN TO THE PROGRAM
2053    3205  3226            DCA     XMTFLG  /SET SLU XMIT FLAG ACTIVE
2054    3206  6042            TCF             /CLEAR TRANSMIT FLAG
2055    3207  1766            TAD  I  KILLIT  /GET THE KILL FLAG
2056    3210  7640            SZA     CLA     /INTERRUPTS STILL EXCEPTED ?
2057    3211  5241            JMP     OUT     /NO, GO WAIT FOR LAST INTERRUPT FROM CLOCK
2058    3212  2230            ISZ     XMTSLU  /ADD 1 TO THE CHARACTER TO BE PRINTED
2059    3213  2275            ISZ     TTYCNT  /DONE A LINE
2060    3214  5222            JMP     GTCHAR  /NO GO TRANSMIT NEXT CHARACTER
2061    3215  1276            TAD     K240    /GET THE CODE FOR A SPACE
2062    3216  3230            DCA     XMTSLU  /SAVE IT
2063    3217  1277            TAD     NEG100  /SET UP THE LINE COUNTER
2064    3220  3275            DCA     TTYCNT  /SAVE THE LINE COUNTER
2065    3221  4765            JMS  I  C8RSTL  /ISSUE A CARRIAGE RETURN LINE FEED
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```
2066  3222  1230  GTCHAR, TAD     XMTSLU  /GET THE CHARACTER TO BE PRINTED
2067  3223  6046          TLS             /TRANSMIT IT
2068  3224  7300          CLA     CLL
2069  3225  5255          JMP     CHKACT  /GO CHECK DEVICE TO BE ACTIVE
2070
2071  3226  0000  XMITFLG, 0
2072  3227  0000  RTCFLG, 0
2073  3230  0000  XMTSLU, 0
2074  3231  0377  CC377,  377
2075
2076                /REAL TIME CLOCK INTERRUPT SERVICE ROUTINE
2077
2078  3232  3227  RTCSER, DCA     RTCFLG  /SET REAL TIME CLOCK FLAG TO ACTIVE
2079  3233  6136          CLCL            /CLEAR CLOCK FLAG
2080  3234  7000          NOP/JMS I ACTLIN/ THIS LOCATION USED IF ACT LINE AND OPTION 1 SELECTED
2081  3235  1766          TAD  I  KILLIT  /GET THE KILL FLAG
2082  3236  7650          SNA     CLA     /WAS IT SET
2083  3237  5255          JMP     CHKACT  /CHECK DEVICE TO BE ACTIVE
2084  3240  6135          CLLE            /YES - CLEAR RTC INT ENA
2085
2086  3241  2245  OUT,    ISZ     CNTEND
2087  3242  5773          JMP  I  PRGRET  /WAIT FOR NEXT INTERRUPT
2088  3243  6002          IOF             /TURN THE INTERUPT OFF
2089  3244  5767          JMP  I  RELGO   /RETURN TO PROGRAM FOR RELOCATION OR RUN
2090
2091  3245  0000  CNTEND, 0
2092
2093
2094                /POWER FAIL INTERRUPT SERVICE ROUTINE
2095
2096  3246  6103  POWFAL, CAL             /CLEAR AC LOW F/F
2097  3247  6102          SPL             /SKIP ON AC LOW AS A LEVEL
2098  3250  7410          SKP
2099  3251  6101          SBE
2100  3252  7410          SKP
2101  3253  7402          HLT             /BATTERY EMPTY - ITS ALL OVER
2102  3254  5773          JMP  I  PRGRET  /RETURN TO THE PROGRAM
2103
2104  3255  1226  CHKACT, TAD     XMTFLG  /CHECK ALL DEVICES TO BE INTERRUPTING
2105  3256  1227          TAD     RTCFLG
2106  3257  7650          SNA     CLA     /ARE THEY ?
2107  3260  5264          JMP     RESET   /YES, RESET ALL FLAGS TO INACTIVE
2108  3261  2273          ISZ     INACDV  /BUMP INACTIVE COUNTER
2109  3262  5773          JMP  I  PRGRET  /RETURN TO THE PROGRAM
2110  3263  4763          JMS  I  ERRC8   /ONE OR MORE DEVICES ARE INACTIVE
2111  3264  7340  RESET,  CLA CLL CMA    /SET ALL DEVICES TO INACTIVE
2112  3265  3226          DCA     XMTFLG

2113  3266  7240          CLA     CMA
2114  3267  3227          DCA     RTCFLG
2115  3270  1274          TAD     MMM55
2116  3271  3273          DCA     INACDV  /RESET INACTIVE COUNTER
2117  3272  5773          JMP  I  PRGRET  /RETURN TO THE PROGRAM
2118
2119  3273  0000  INACDV, 0
2120  3274  7723  MMM55,  -55
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```
2121  3275  7700  TTYCNT, -100
2122  3276  0240  K240,   240
2123  3277  7700  NEG100, -100
2124
2125  3300  0000  WAITEN, 0
2126  3301  1770          TAD  I  OP1     /WAS OPTION 1 SELECTED
2127  3302  7004          RAL
2128  3303  7700          SMA     CLA
2129  3304  5316          JMP     .+12    /NO, RETURN TO RELOCATION
2130  3305  2766          ISZ  I  KILLIT
2131  3306  3331          DCA     KILCN1  /CLEAR KILL COUNTER 1
2132  3307  1333          TAD     M24
2133  3310  3332          DCA     KILCN2  /SET UP FOR ABOUT A 300MS DELAY
2134  3311  2331          ISZ     KILCN1
2135  3312  5311          JMP     .-1
2136  3313  2332          ISZ     KILCN2
2137  3314  5311          JMP     .-3
2138  3315  4763          JMS  I  ERRC8   /OPTION 1 SLU OR RTC FAILED TO INTERRUPT
2139  3316  6002          IOF             /TURN THE INTERRUPT OFF
2140  3317  5700          JMP  I  WAITEN  /RETURN TO PROGRAM
2141
2142
2143  3320  0000  C8GET,  0
2144  3321  7200          CLA
2145  3322  1774          TAD  I  MQSAV8
2146  3323  7421          MQL             /RESTORE THE MQ
2147  3324  1775          TAD  I  FLSAV8
2148  3325  7004          RAL             /RESTORE THE LINK
2149  3326  7200          CLA
2150  3327  1776          TAD  I  ACSAV8  /RESTORE THE AC
2151  3330  5720          JMP  I  C8GET   /GET THE REGISTERS
2152
2153
2154  3331  0000  KILCN1, 0
2155  3332  0000  KILCN2, 0
2156  3333  7754  M24,    -24
2157
2158
2159                /ROUTINE TO RESTORE THE MONITOR ON A CONTROL C
2160
2161  3334  6002  RESBOT, IOF             /TURN THE INTERRUPT OFF
2162  3335  1364          TAD     BOOTAD
2163  3336  3010          DCA     AUTO10
2164  3337  1354          TAD     K23
2165  3340  3011          DCA     AUTO11
2166  3341  6224          RIF
2167  3342  1344          TAD     CDFINS
2168  3343  3344          DCA     .+1
2169  3344  6201  CDFINS, CDF     00
2170  3345  1410          TAD  I  AUTO10
2171  3346  6201          CDF     00
2172  3347  3411          DCA  I  AUTO11
2173  3350  2355          ISZ     M36
2174  3351  5344          JMP     .-5
2175  3352  6202          CIF     00
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2176  3353  5033          JMP     33
2177
2178  3354  0023    K23,  23
2179  3355  7742    M36,  -36
2180
2181        3361    *3361
2182                /
2183  3361  4762    LCHNG,  JMS I LRERNG
2184                /
2185  3362  0202    LRERNG, CHANGE
2186  3363  4401    ERRC8,  XC8ERR
2187  3364  4625    BOOTAD, BOOTSV+1
2188  3365  4600    C8RSTL, TYPEIT
2189  3366  3101    KILLIT, KILL
2190  3367  0274    RELGO,  XCNT+3
2191  3370  3035    OP1,    SELOP1
2192  3371  1333    PSRERR, ERRPSR+1
2193  3372  1320    ACTLIN, ERROR+5
2194  3373  3131    PRGRET, RETPRG
2195  3374  4525    MQSAV8, MQSAVE
2196  3375  4526    FLSAV8, FLSAVE
2197  3376  4524    ACSAV8, ACSAVE
2198  3377  0000          0
2199
2200
2201
2202
2203                /CONSOL SRC-V1R4-  CONSOL PACKAGE
2204
2205
2206
2207                /SET UP A LAS TO BE EQUALL TO THE CALL C8CKSW
2208
2209                /PROGRAM SHOULD CHECK FOR A CONTROL CHARACTER FROM THE CONSOL
2210                /EVERY FIVE SECONDS OR LESS
2211
2212
2213
2214                /SETUP CNTVAL FOR A RANGE OF 1 TO 4 MINUTES FOR C8PASS TO PRINT PASS
2215                /SETUP OF CNTVAL WILL BE FOUND IN C8PASS
2216                /THIS VALUE SHOULD BE A POSITIVE NUMBER.
2217
2218
2219                /SET UP XDOSW AS THE VALUE NEEDED FOR A RETURN FOR CONTROL R
2220                /RETURN TO ASK THE SWITCH REGISTER QUESTION.
2221
2222                /CHANGE 1 AND 2 APRIL 16 1975

2223
2224                /CHANGE 3 APRIL 18,1975
2225
2226                /CHANGE 4 APRIL 22 1975
2227
2228                /CHANGE 5 APRIL 23 1975
2229
2230
```



```
2231                /CHANGE 6 APRIL 24,1975
2232                /CHANGE 7 APRIL 1975
2233
2234
2235                /THE CALL TABLE IS A CONDITIONAL ASSEMBLY.
2236                / TO ASSEMBLE THE CALL REMOVE THE / BEFORE CONSOL  =0.
2237                /IN COMBINING THE CONSOL PACKAGE TO A DIAGNOSTIC.
2238                / THE CALL TABLE IS TO BE AT THE BEGINNING OF A PROGRAM.
2239                /CONSOL=0
2240        6661            PSKF=   6661
2241        6662            PCLF=   6662
2242        6663            PSKE=   6663
2243        6664            PSTB=   6664
2244        6665            PSIE=   6665
2245        6004            GTF=    6004
2246        7701            ACL=    7701
2247        6007            CAF=    6007
2248        7421            MQL=    7421
2249                /#6
2250        7501            MQA=    7501
2251                /#6
2252        3400    PAGE
2253
2254
2255  3400  5362          JMP     C8CHG1          /GO CHANGE THE LINKS FOR RELOCATION
2256
2257                /*****************************************************************
2258                /C8PASS
2259                /THIS IS CALLED AT THE END OF EACH PROGRAM COMPLETION
2260                /THE VALUE OF** CNTVAL** WILL BE DETERMINED BY THE TIME IT TAKES
2261                /THE PROGRAM TO COMPLEATE THIS MANY C8PASS TO BE IN THE 1 TO 4 MINUTE
2262                /RANGE
2263                /       C8PASS=JMS      XC8PAS
2264                /EX.            C8PASS
2265                /               HLT                     /HALT IF NON CONSOL PACKAGE
2266                /               JMP     START1          /CONTINUE RUNNING THIS PROGRAM
2267                /RETURN TO LOCATION CALL PLUS ONE WITH THE AC=0 IF NON CONSOL PACKAGE AND HLT
2268                /IF CONTINUE TO RUN THEN RETURN TO CALL PLUS2 AC=0
2269
2270
2271  3401  0000    XC8PAS, 0
2272                /#1
2273  3402  7200          CLA
2274                /#1
2275  3403  1256          TAD     SELOP2          /CHECK IF A CLASSIC
2276  3404  0343          AND     C8400           /MASK FOR CLASSIC BIT
2277  3405  7640          SZA CLA                 /SKIP IF NOT CLASSIC
2278  3406  5214          JMP     DOPACK          /IS CLASSIC
2279  3407  4767          JMS  I  C8CKSW          /CHECK SR SETTING
2280  3410  0343          AND     C8400           /FOR HALT ON END OF C8PASS
2281  3411  7640          SZA CLA                 /1= HALT 0 CONTINUE
2282  3412  5601          JMP I   XC8PAS          /GO TO HALT
2283  3413  5233          JMP     C8BY1           /CONTINUE ON RUNNING PROGRAM
2284  3414  4235    DOPACK, JMS     CKCOUT          /CLASS CHECK C8PASS COUNT
2285  3415  5233          JMP     C8BY1           /C8PASS COUNT NOT DONE REDO PROGRAM
```

```
 2286    3416  2253            ISZ     PASCNT          /C8PASS COUNT DONE SET C8PASS COUNT
 2287                    /#2
 2288    3417  4770            JMS  I  C8CRLF
 2289                    /#2
 2290    3420  1366            TAD     PASMES          /GET THE ADDRESS OF THE MESAGE
 2291    3421  3223            DCA     .+2             /SAVE IT IN LOCATION FOLLOWING PRINT CALL
 2292    3422  4771            JMS  I  C8PRNT          /C8PRNT BUFFER
 2293    3423  3457            MESPAS                  /
 2294    3424  1253            TAD     PASCNT          /GET NUMBER
 2295    3425  4772            JMS  I  C8OCT           /CONVERT IT TO ASCII
 2296    3426  4770            JMS  I  C8CRLF          /DO A CARRIAGE RETURN
 2297    3427  4767            JMS  I  C8CKSW          /CHECK A HALT AT END OF C8PASS
 2298    3430  0343            AND     C8400           /MASK BIT
 2299    3431  7640            SZA CLA                 /HALT =1 NO SKIP CONTINUE =0
 2300    3432  4773            JMS  I  C8INQU          /STOP PROGRAM EXECUTION-LOOK FOR INPUT
 2301    3433  2201    C8BY1,  ISZ     XC8PAS          /BUMP RETURN
 2302    3434  5601            JMP I   XC8PAS
 2303    3435  0000    CKCOUT, 0
 2304    3436  1254            TAD     DOSET           /CHECK IF SET UP NEEDED
 2305    3437  7640            SZA CLA                 /0=SET UP C8PASS COUNT VALUE
 2306                                                    /1=C8PASS COUNT VALUE OK
 2307    3440  5245            JMP     NOSET           /C8PASS COUNT VALUE ON
 2308    3441  1255            TAD     CNTVAL          /GET COUNT VALUE FOR THIS PROG
 2309    3442  7040            CMA                     /SET TO NEGATIVE
 2310    3443  3252            DCA     DOCNT           /STORE IN HERE
 2311    3444  2254            ISZ     DOSET           /INDICATE VALUE SET UP
 2312                    /#2
 2313    3445  2252    NOSET,  ISZ     DOCNT           /COUNT THE NUMBER OF PASSES
 2314                    /#2
 2315    3446  5233            JMP     C8BY1           /EXIT FOR ANOTHER PASS
 2316    3447  3254            DCA     DOSET           /SET TO C8PRNT C8PASS
 2317    3450  2235            ISZ     CKCOUT          /BUMP RETURN FOR
 2318    3451  5635            JMP I   CKCOUT          /C8PASS C8TYPE OUT
 2319    3452  0000    DOCNT,  0
 2320    3453  0000    PASCNT, 0                       /
 2321    3454  0000    DOSET,  0
 2322    3455  0004    CNTVAL, 4
 2323    3456  0000    SELOP2, 0
 2324    3457  0412    MESPAS, TEXT    "DJEXCB  PASS "
         3460  0530
         3461  0302
         3462  4040
         3463  2001
         3464  2323
         3465  4000
 2325
 2326
 2327                    /*********************************************************************
 2328
 2329                    /C8CKSW
 2330                    /ROUTINE THAT WILL CHECK WHERE TO READ THE
 2331                    /C8 SWITCHES FROM IE, FROM PANEL OR PSEUDO C8SWIT REGISTER
 2332                    /       C8CKSW= JMS XC8SW
 2333                    /EX     C8CKSW          /READ THE C8SWIT REGISTER
 2334                                            /RETURN WITH THE CONTENTS OF SWITCH REGISTER
```



```
 2335
 2336                    /RETURN TO NEXT LOCATION FOLLOWING CALL WITH THE AC= TO VALUE OF C8SWIT SETTING
 2337
 2338
 2339    3466  0000    XC8SW,  0
 2340                    /#1
 2341    3467  7200            CLA                     /CLEAR AC
 2342                    /#1
 2343    3470  1764            TAD  I  SELO1           /GET WD FOR INDICATOR
 2344    3471  7710            SPA CLA                 /CHECK IF FRONT PANEL 4000
 2345    3472  7614            7614                    /DO LAS AND SKIPGET FROM PANEL WITH LAS
 2346    3473  1765            TAD  I  SAVS1           /PSEUDO SW
 2347    3474  5666            JMP I   XC8SW           /EXIT WITH STATUS BIT IN AC.
 2348
 2349
 2350                    /*********************************************************************
 2351
 2352                    /C8TTYI
 2353                    /THIS ROUTINE WILL LOOK FOR A INPUT FROM THE CONSOL
 2354                    /       C8TTYI= JMS XC8TTY
 2355                    /EX.    C8TTYI          /READ CHAR FROM THE CONSOL DEVICE
 2356                    /                       /RETURN TO CALL PLUS ONE AC CONTAINS THE CHAR
 2357
 2358                    /
 2359                    /
 2360    3475  0000    XC8TTY, 0
 2361    3476  6031            KSF                     /LOOK FOR KEYBOARD FLAG
 2362    3477  5276            JMP     .-1
 2363    3500  6036            KRB                     /GET CHAR
 2364    3501  0344            AND     C8177           /MASK FOR 7 BITS
 2365    3502  1345            TAD     C8200           /ADD THE EIGTH BIT
 2366    3503  3776            DCA  I  C8CHAR          /STORE IT
 2367    3504  1776            TAD  I  C8CHAR
 2368    3505  5675            JMP I   XC8TTY          /EXIT
 2369
```

```
                        /*****************************************************************
                        /C8PRN1
                        /THIS ROUTINE WILL TYPE THE CONTENTS OF THE C8 PRINT BUFFER, THE LOCATION
                        /OF THE BUFFER WILL BE IN THE ADDRS FOLLOWING THE CALL,  C8 PRINTING OF THE BUFFER
                        /WILL STOP WHEN A 00 CHAR IS DETECTED, CHARACTERS ARE PACKED 2 PER WORD.
                        /       C8PRNT= JMS XC8PNT

                        /EX,    C8PRNT                  /C8PRNT THE CONTENTS OF THE FOLLOWING BUFFER
                        /       MESS77                  /LOCATION OF C8PRNT BUFFER
                        /C8PRNT WILL USE THE LOCATION FOLLOWING THE CALL AS THE POINTER FOR THE
                        /C8PRNT ROUTINE,RETURN TO CALL PLUS TWO WITH AC= 0


2390    3506  0000      XC8PNT, 0
2391    3507  7300              CLA CLL
2392    3510  1706              TAD I   XC8PNT          /GET C8PRNT BUFFERS STARTING LOCATION
2393    3511  3341              DCA     PTSTOR          /STORE IN PTSTOR
2394    3512  2306              ISZ     XC8PNT          /BUMP RETURN
2395    3513  1741      C8DO1,  TAD I   PTSTOR          /GET DATA WORD
2396    3514  0346              AND     C87700          /MASK FOR LEFT BYTE
2397    3515  7450              SNA                     /CHECK IF 00 TERMINATE
2398    3516  5706              JMP I   XC8PNT          /EXIT
2399    3517  7500              SMA                     /IS AC MINUS
2400    3520  7020              CML                     /MAKE CHAR A 300 AFTER ROTATE
2401    3521  7001              IAC                     /MAKE CHAR A 200 AFTER ROTATE
2402    3522  7012              RTR
2403    3523  7012              RTR
2404    3524  7012              RTR                     /PUT CHAR IN BITS 4-11 MAKE IT 8 BIT ASCII
2405    3525  4775              JMS  I  C8TYPE          /C8PRNT IT ON CONSOLE
2406    3526  1741              TAD I   PTSTOR          /GET DATA WORD
2407    3527  0347              AND     C80077          /MASK FOR RIGHT BYTE
2408    3530  7450              SNA                     /CHECK IF 00 TERMINATOR
2409    3531  5706              JMP I   XC8PNT          //EXIT
2410    3532  1350              TAD     C83740          /ADD FUDGE FACTOR TO DETERMINE IF 200
2411    3533  7500              SMA                     /OR 300 IS TO BE ADD TO CHAR
2412    3534  1351              TAD     C80100          /ADD 100
2413    3535  1352              TAD     C8240           /ADD 200
2414    3536  4775              JMS  I  C8TYPE          /C8TYPE ONLY BITS 4-11
2415    3537  2341              ISZ     PTSTOR          /BUMP POINTER FOR NEXT WORD
2416    3540  5313              JMP     C8DO1           /DO AGAIN

2417    3541  0000      PTSTOR, 0                       /STOR FOR C8PRNT BUFFER
2418    3542  0000      STOPNT, 0                       /0000 C8PRNT 7777=DO NOT C8PRNT
2419
2420    3543  0400      C8400,  400
2421    3544  0177      C8177,  177
2422    3545  0200      C8200,  200
2423    3546  7700      C87700, 7700
2424    3547  0077      C80077, 0077
```



```
2425    3550  3740      C83740, 3740
2426    3551  0100      C80100, 100
2427    3552  0240      C8240,  240
2428
2429          3562      *3562
2430                    /
2431    3562  4763      C8CHG1, JMS  I  C8RER1
2432                    /
2433    3563  0202      C8RER1, CHANGE
2434    3564  3035      SELO1,  SELOP1
2435    3565  0333      SAVS1,  SAVSWR
2436    3566  3457      PASMES, MESPAS
2437    3567  3466      C8CKSW, XC8SW
2438    3570  4224      C8CRLF, XC8CRL
2439    3571  3506      C8PRNT, XC8PNT
2440    3572  4201      C8OCT,  XC8OCT
2441    3573  3726      CRINQU, XC8INQ
2442    3574  4250      C8CKPA, XC8CKP
2443    3575  4306      C8TYPE, XC8TYP
2444    3576  4304      C8CHAR, CHAR
2445    3577  0000                0
2446
2447
2448
2449          3600      PAGE
2450
2451
2452    3600  5346              JMP     C8CHG2
2453
2454                    /*****************************************************************
2455
2456                    /C8CNTR
2457                    /THIS ROUTINE WILL CHECK FOR THE PRESENCE OF CONTROL CHARACTERS
2458                    /IT WILL CHECK FOR THE FOLLOWING CHAR C=G=Q=O=L=S
2459                    /       C8CNTR= JMS XC8CNT
2460
2461                    /EX,    C8CNTR                  /CHECK FOR CONTROL CHARACTER
2462                    /       JMP     ANYTHING        /LOC FOLLOWING CALL IS FOR CONTINUING THE PROGRAM
2463                    /       JMP     ANYTHING        /LOC, IS FOR RETURN IF INMODE SET AND NOT CNTRL CHAR
2464                    /
2465
2466                    /RETURN IS TO CALL PLUS ONE IFCONTINUE
2467                    /RETURN IS TO CALL PLUS TWO IF INMOD SET AND NOT CONTROL CHAR
2468                    /
2469                    /RETURN IS TO CALL PLUS TWO IF INMODE IS NOT SET AND NO
2470                    /CONTROL CHAR ,,THIS WILL PRINT THE CHARACTER AND A ?
2471                    /CLEAR THE AC AND RETURN CALL+2.
2472
2473    3601  0000      XC8CNT, 0
2474    3602  3765              DCA  I  C8ACSV          /SAVE THE AC
2475    3603  1762              TAD  I  SELO2C
2476    3604  0266              AND     C80400          /CHECK IF ON CONSOL ACTIVE
2477    3605  7640              SZA CLA
2478    3606  5211              JMP     .+3             /ON ACTIVE CONSOLE
2479    3607  1765              TAD  I  C8ACSV          /GET AC FOR RETURN
```

```
2480    3610  5601          JMP I   XC8CNT          /EXIT NOT ON ACTIVE CONSOLE
2481    3611  6004          GIF
2482    3612  3766          DCA  I  C8FLSV
2483                  /#6
2484    3613  7501          MQA
2485                  /#5
2486    3614  3767          DCA  I  C8MQSV          /SAVE THE MQ
2487    3615  3255          DCA     INDEXA          /SET DISPLACEMENT INTO TABLE B
2488    3616  1350          TAD     XTABLA          /GET ADDRS OF TABLE A
2489    3617  3256          DCA     GETDAT          /CONTAINS POINTER TO CONTROL CHAR
2490    3620  1656  REDOA,  TAD I   GETDAT          /GET CONTROL CHAR FROM TABLE
2491    3621  7450          SNA                     /CHECK FOR A 0 END OF TABLE
2492    3622  5231          JMP     DONEA           /END OF TABLE NO CONTROL CHAR
2493    3623  1771          TAD  I  CCHAR8          /COMPARE CHAR TO CONTROL CHAR
2494    3624  7650          SNA CLA                 /0 IF MATCH
2495    3625  5246          JMP     GOITA           /MATCH
2496    3626  2255          ISZ     INDEXA          /NO MATCH NOT END OF TABLE REDO
2497    3627  2256          ISZ     GETDAT          /BUMP INDEX FOR EXIT WHEN CONTROL FOUND
2498    3630  5220          JMP     REDOA           /BUMP GETDAT FOR COMPARE OF NEXT CNTRL CHAR.
2499    3631  1772  DONEA,  TAD  I  C8INMD         /CHECK IF PROGRAM EXPECTS CHAR
2500    3632  7640          SZA CLA                 /1=CHAR EXPECTED  0= NO CHAR EXPECTED
2501    3633  5243          JMP     EXITA           /CHAR EXPECTED
2502    3634  1771          TAD  I  CCHAR8          /GET CHAR = NOT CONTROL + NOT EXPECTED
2503    3635  4760          JMS  I  C8TYP           /C8PRNT CHAR
2504    3636  1267          TAD     C8277           /GET CODE FOR "7"
2505    3637  4760          JMS  I  C8TYP
2506    3640  4761          JMS  I  C8CRL
2507                  /#1
2508    3641  2201          ISZ     XC8CNT          /BUMP RETURN
2509                  /#2
2510    3642  5601          JMP I   XC8CNT          /EXIT CALL+2
2511                  /#2
2512                  /#1
2513    3643  2201  EXITA,  ISZ     XC8CNT          /BUMP RETURN FOR MAIN PROGRAM CHECK OF CHAR
2514    3644  1771          TAD  I  CCHAR8          /PUT CHAR IN AC.
2515    3645  5601          JMP I   XC8CNT          /EXIT
2516    3646  1351  GOITA,  TAD     XTABLB          /GET START OF TABLE B
2517    3647  1255          TAD     INDEXA          /GET NOW FAR INTO TABLE
2518    3650  3254          DCA     GOTOA           /STORE IT
2519    3651  1654          TAD I   GOTOA           /GET THE ROUTINE STARTTING ADDRESS
2520    3652  3254          DCA     GOTOA           /STORE IT IN HERE
2521    3653  5654          JMP I   GOTOA           /GOTO CONTROL CHAR ROUTINE
2522    3654  0000  GOTOA,  0000                   /ADD OF CNTRL ROUTINE TO EXECUTE
2523    3655  0000  INDEXA, 0000                   /DISPLACEMENT INTO CNTRL TABLE
2524    3656  0000  GETDAT, 0000                   /LOCATION OF ADDRS OF CONTROL CHAR.
2525    3657  7575  TABLA,  7575                   /CNTRL C BACK TO MONITOR 203
2526    3660  7564            7564                /CNTRL L SWITCH ERROR PRINTTING DEVICE 214

2527    3661  7561            7561                /CNTRL O STOP OUTPUTTING DATA 217
2528    3662  7557            7557                /CNTRL Q START DISPLAYING CHAR, AGAIN 221
2529    3663  7555            7555                /CNTRL S STOP SENDING CHAR TO DISPLAY WAIT FOR CNTRL Q 223
2530    3664  7571            7571                /CONTROL G CHANGE SWITCH REGISTER ON FLY
2531    3665  0000            0000
2532
2533    3666  0400  C80400, 400
2534    3667  0277  C8277,  277
```



```
2535    3670  0100  C8100,  100
2536
2537                  /
2538                  /START SENDING CHAR, TO THE DISPLAY
2539                  /THIS WILL RETURN CONTROL TO CALL THAT WAS SET BY
2540                  /THE CALL FOR CONTROL S.
2541                  /
2542                  /#7
2543                  /#7
2544    3671  3312  CNTRLQ, DCA     C8SETS          /CLEAR SOFT FLAG FOR CNTRL S
2545                  /#7
2546                  /#2
2547    3672  3772          DCA  I  C8INMD          /CLEAR THE INMODE FLAG
2548                  /#2
2549    3673  4775          JMS  I  C88GET          /GET THE REGISTERS
2550    3674  5713          JMP I   C8RETR          /GO TO CALL SAVED BY CNTRL S
2551
2552                  /
2553                  /
2554                  /
2555                  /
2556                  /STOP SENDING CHAR, TO DISPLAY UNTIL A "Q IS RECEIVED
2557                  /
2558                  /
2559                  /#7
2560    3675  1312  CNTRLS, TAD     C8SETS          /IF1 DO NOT STORE IN C8RETR
2561                  /#7
2562    3676  7640          SZA CLA
2563    3677  5303          JMP     C8DO7           /DONT SET UP C8RETR
2564                  /#5
2565    3700  7001          IAC                     /MAKE RETURN CALL PLUS 2
2566                  /#5
2567    3701  1201          TAD     XC8CNT          /GET RETURN FOR THIS CALL
2568    3702  3313          DCA     C8RETR          /STORE IT HERE FOR USE BE CNTROL Q
2569                  /#2
2570    3703  2312  C8DO7,  ISZ     C8SETS          /SET FLAG TO SAVE CALL
2571                  /#4
2572    3704  4763          JMS  I  C8TTYI          /LOOK FOR THE INPUT
2573                  /#5
2574    3705  4775          JMS  I  C88GET          /GET REGISTERS
2575                  /#5
2576    3706  4764          JMS  I  C8CNTR          /CHECK FOR THE CONTROL CHAR
2577    3707  7000          NOP
2578                  /#4
2579    3710  7200          CLA
2580                  /#7
2581    3711  5275          JMP     CNTRLS          /IF NOT A CNTRL Q C OR G(FOLLOWED BY LF) RE = ASK
2582                  /#7
2583                  /#2
2584    3712  0000  C8SETS, 0
2585    3713  0000  C8RETR, 0
2586                  /
2587                  /SWITCH OUTPUT FROM ONE OUTPUT DEVICE TO ANOTHER - THE TWO OUTPUTS ARE THE
2588                  /CONSOLE AND THE PRINTER WITH DEVICE CDOE 66.
2589                  /
```

```
                        /
3714  1773    CNTRLL, TAD  I  C8TTYL          /GET PRESENT C8SWIT INDICATOR
3715  7040            CMA                     /COMPLEMENT IT
3716  3773            DCA  I  C8TTYL          /STOR NEW C8SWIT
3717  4774            JMS  I  C8UPAR          /C8PRNT " AND CHAR ON NEW DEVICE
                        /#3
                        /#3
                        /#3
                        /#3
3720  5601            JMP I   XC8CNT          /EXIT
                        /
                        /STOP C8PRNTING C8ERR MESSAGES - TO CONTONUE C8PRNTING C8TYPE ^O
                        /
                        /
3721  4774    CNTRLO, JMS  I  C8UPAR
3722  1776            TAD  I  C8STOP          /GET STOP OR START C8PRNT INDICATOR
3723  7040            CMA
3724  3776            DCA  I  C8STOP          /STORE OPPOSITE STATE
3725  5601            JMP I   XC8CNT          /EXIT

                        /*********************************************************************

                        /C8INQU
                        /C8INQU ROUTINE WILL ASK SWITCH REGISTER QUESTION IF CONSOLE IS ACTIVE,
                        //

                        /       C8INQU= JMS XC8INQ

                        /EX     C8INQU                  /C8 WILL ASK SWITCH REG QUESTION
                        /       DO ANYTHING             /RETURN IS CALL PLUS ONE AC =0 CONTINUE

3726  0000    XC8INQ, 0
3727  7300            CLA CLL
3730  1762            TAD  I  SELO2C          /GET THE WORD
3731  0336            AND     AC4008          /CHECK FOR CONSOLE ACTIVE
3732  7650            SNA CLA
3733  5726            JMP I   XC8INQ          /NOT CONSOLE LEAVE
3734  4770            JMS I XPSW              /ASK SWITCH REG QUESTION
3735  5726            JMP I XC8INQ

3736  0400    AC4008,400

                        /
        3746    *3746
3746  4747    C8CHG2, JMS  I  C8RER2
                        /
3747  0202    C8RER2, CHANGE

3750  3657    XTABLA, TABLA
3751  3752    XTABLB, TABLB
3752  4345    TABLB,  CNTRLC
3753  3714            CNTRLL
3754  3721            CNTRLO
3755  3671            CNTRLQ
3756  3675            CNTRLS
3757  4001            CNTRLG
```



```
3760  4306    C8TYP,  XC8TYP
3761  4224    C8CRL,  XC8CRL
3762  3456    SELO2C, SELOP2
3763  3475    C8TTYI, XC8TTY
3764  3601    C8CNTR, XC8CNT
3765  4524    C8ACSV, ACSAVE
3766  4526    C8FLSV, FLSAVE
3767  4525    C8MQSV, MQSAVE
3770  4042    XPSW,   XC8PSW
3771  4304    CCHAR8, CHAR
3772  4305    C8INMD, INMODE
3773  4332    C8TTYL, TTYLPT
3774  4016    C8UPAR, UPAROW
3775  3320    C8GET,  C8GET
3776  3542    C8STOP, STOPNT
3777  0000            0
                /
        4000    PAGE


4000  5354            JMP     C8CHG3
                /
                        /CONTROL G
                        /CHANGE THE SWITCH REGISTER ANYTIME CNTRL G AND RETURN TO
                        /THE PROGRAM RUNNING,


4001  4771    CNTRLG, JMS I C8CR              /PRINT A CR & LF
4002  1214            TAD     C8SETD          /CHECK IF THE RETURN ADDRS IS SAFE
4003  7640            SZA CLA
4004  5210            JMP     C8DO11          /DO NOT CHANGE THE RETURN ADDRS
4005  1772            TAD  I  XC8CN           /GET THE RETURN ADDRS AND SAVE IT
4006  3215            DCA     C8RETD          /SAVE THE RETURN HERE
4007  2214            ISZ     C8SETD          /INDICATE RETURN SAVED DONT DISTROY
4010  4764    C8DO11, JMS  I  C8SWIT          /GO CHANGE THE SWITCH REGISTER
4011  3214            DCA     C8SETD          /CLEAR THE FLAG
                /#3
4012  4774            JMS  I  C8GET8          /RESTORE THE AC MQ LINK ETC
                /#3
4013  5615            JMP I   C8RETD          /RETURN TO THE PROGRAM
                /
4014  0000    C8SETD, 0
4015  0000    C8RETD, 0
                /


4016  0000    UPAROW, 0                       /C8PRNT THE "^" AND THE CHAR C8TYPED IN
4017  1225            TAD     C8336           /CODE FOR ^
4020  4765            JMS  I  C8TY
4021  1773            TAD  I  CHAR8           /C8TYPE THE CHAR
4022  1241            TAD C100                /ADD 100 TO FORM GOOD ASCII CHARACTER
4023  4765            JMS  I  C8TY
4024  5616            JMP I   UPAROW          /EXIT
```

SEQ 0075

```
2700
2701    4025  0336    C8336,  336
2702    4026  0400    C4008,  400
2703    4027  0040    C840,   40
2704    4030  7566    C8M212, -212
2705    4031  7776    DM2,    -2
2706    4032  7737    DM41,   -41
2707    4033  0000    SXPSW,  0
2708    4034  7510    C8N270, -270
2709    4035  0007    C87,    7
2710    4036  0277    C8K277, 277
2711    4037  7775    C8N3,   -3
2712    4040  7777    DM1,    -1
2713    4041  0100    C100,   100
2714
2715
2716
2717
2718
2719
2720
```


SEQ 0076

```
2721                /*********************************************************************
2722
2723
2724                /C8SWIT
2725                /ROUTINE WILL CHECK IF CONSOL IS ACTIVE IF IT IS ACTIVE DISPLAY
2726                /SW QUESTION, IN NOT ACTIVE IT WILL NOT PRINT THE SW QUESTIONBUT
2727                /RETURN TO CALL PLUS ONE AC=0,
2728                /C8SWIT WILL SET UP THE PSEUDO C8SWIT
2729                /REGISTER WITH THE NEW DATA ENTERED
2730                /
2731                /       C8SWIT= JMS XC8PSW
2732
2733                /EX,    C8DOR,  C8SWIT          /SET UP PSEUDO C8SWIT REGISTER IF
2734                                                /ON THE CONSOL PACKAGE, RETURN IS CALL PLUS ONE AC = 0
2735
2736
2737
2738
2739    4042  0000    XC8PSW, 0
2740                /#1
2741    4043  7200            CLA
2742                /#1
2743    4044  1762            TAD  I  SELO2           /GET THE HARD WARE CONFIG WORD
2744    4045  0226            AND     C4008           /MASK FOR CONSOL BIT
2745    4046  7650            SNA CLA                 /SKIP IF CONSOL PACKAGE IS ACTIVE
2746    4047  5642            JMP I   XC8PSW          /RETURN WITHOUT ASKING PSEUDO SWITCH
2747                /#3
2748    4050  1346            TAD     C8SWST          /IS THE SECOND ENTRY FLAG SET?
2749    4051  7640            SZA CLA                 /SKIP IF FIRST ENTRY
2750    4052  5255            JMP     PTSR            /SECOND ENTRY WITH OUT A EXIT GO TO SW QUESTION
2751    4053  2346            ISZ     C8SWST          /FIRSTAR INY SET FLAG
2752    4054  1242            TAD XC8PSW              /SAVE THE RETURN ADDRESS
2753    4055  3233            DCA SXPSW
2754                /#3
2755    4056  1357    PTSR,   TAD     AMES
2756    4057  3261            DCA     .+2
2757    4060  4766            JMS  I  C8PRN                   /C8PRNT SR=XXX
2758    4061  4150            MESA
2759    4062  1763            TAD  I  SAV2            /GET CONTENTS OF SW
2760    4063  4767            JMS  I  C8OCTA          /CONVERT IT TO ASCII
2761    4064  1227            TAD     C840            /GET SPACE
2762    4065  4765            JMS  I  C8TY
2763    4066  2776            ISZ  I  C8INM           /SET FLAG FOR CHAR EXECTED
2764    4067  4770            JMS  I  C8ECHO          /LOOK FOR INPUT
2765    4070  4307            JMS     TSTCHA          /NOT CONTROL TEST IT IS LEGAL
2766    4071  1773            TAD  I  CHAR8           /STORE NEW CHNED M SW REG
2767    4072  3763            DCA  I  SAV2
2768
2769    4073  1237            TAD     C8N3            /GET A MINUS 3
2770    4074  3347            DCA     TMPCNT          /STORE IN TEMP COUNT
2771    4075  4770    GETCH1, JMS  I  C8ECHO          /GET NEXT CHAR
2772    4076  4307            JMS     TSTCHA          /CHECK IF CR + GOOD CHAR
2773    4077  1763            TAD  I  SAV2            /GET C8SWIT REGISTER
2774    4100  7106            RTL CLL                 /ROTATE IT LEFT 3 PLACES
2775    4101  7004            RAL
```

```
2776  4102  1773          TAD  I  CHAR8          /GET CHAR + ADD IT TO PREVIOUS CONTENTS
2777  4103  3763          DCA  I  SAV2           /SAVE NEW CONTENTS
2778  4104  2347          ISZ     TMPCNT         /BUMP COUNT
2779  4105  5275          JMP     GETCH1         /JMP BACK + GET NEXT CHAR
2780  4106  5343          JMP     ENDIT          /END 4 CHAR C8TYPED IN
2781  4107  0000  TSTCHA, 0
2782  4110  1230          TAD C8M212             /IS IT A LF (212) ?
2783  4111  7450          SNA                    /SKIP IF NOT
2784  4112  5756          JMP I C8LF             /YES
2785  4113  1231          TAD DM2                /IS IT A CNTR L (214) ?
2786  4114  7450          SNA
2787  4115  5341          JMP LERR1              /YES
2788  4116  1240          TAD DM1                /IS IT A CR (215) ?
2789  4117  7450          SNA
2790  4120  5343          JMP ENDIT              /YES
2791  4121  1231          TAD DM2                /IS IT A CNTR O (217) ?
2792  4122  7450          SNA
2793  4123  5341          JMP LERR1              /YES
2794  4124  1232          TAD DM41               /CHECK IF IT IS IN THE OCTAL # RANGE (260-267)
2795  4125  7710          SPA CLA                /IF NOT POSITIVE C8ERR CHAR SMALLER THEN 260
2796  4126  5337          JMP     ERR1           /C8ERR = CHAR TOO SMALL
2797  4127  1773          TAD  I  CHAR8          /GET CHAR
2798  4130  1234          TAD     C8N270         /GET Â -270 + CHECK IF IT IS LARGER THEN 7
2799  4131  7700          SMA CLA                /SKIP IF LESS THEN 7
2800  4132  5337          JMP     ERR1           /C8ERR ON CHAR NOT IN RANGE
2801  4133  1773          TAD  I  CHAR8          /GET CHAR
2802  4134  0235          AND     C87            /MASK FOR RIGHT BYTE
2803  4135  3773          DCA  I  CHAR8          /STORE IN CHAR
2804                                             /GET CHAR IN AC
2805  4136  5707          JMP I   TSTCHA         /EXIT
2806  4137  1236  ERR1,   TAD     C8K277         /C8PRNT
2807  4140  4765          JMS  I  C8TY                   /?
2808  4141  4771  LERR1,  JMS  I  C9CR                   /
2809  4142  5243          JMP     XC8PSW+1       /EXIT + ASK AGAIN
2810  4143  4771  ENDIT,  JMS  I  C8CR          /DO A CR LF
2811                /#3
2812  4144  3346          DCA     C8SWST         /CLEAR THE PSW ENTRY FLAG
2813  4145  5633          JMP I   SXPSW          /EXIT ROUTINE
2814  4146  0000  C8SWST, 0
2815                /#3
2816
2817  4147  0000  TMPCNT, 0
2818  4150  2322  MESA,   TEXT    "SR= "
      4151  7540
      4152  0000
2819
2820

2821                /
2822        4154    *4154
2823                /
2824  4154  4755  C8CHG3, JMS  I  C8RER3
2825                /
2826  4155  0202  C8RER3, CHANGE
2827  4156  4531  C8LF,   XC8LF
2828  4157  4150  AMES,   MESA
```



```
2829  4160  4345  XCTLC,  CNTRLC
2830  4161  4001  XCTLG,  CNTRLG
2831  4162  3456  SEL02,  SELOP2
2832  4163  0333  SAV2,   SAVSWR
2833  4164  4042  C8SWIT, XC8PSW
2834  4165  4306  C8TY,   XC8TIP
2835  4166  3506  C8PRN,  XC8PNT
2836  4167  4201  C8OCTA, XC8OCT
2837  4170  4273  C8ECHO, XC8ECH
2838  4171  4224  C8CR,   XC8CRL
2839  4172  3601  XC8CN,  XC8CNT
2840  4173  4304  CHAR8,  CHAR
2841  4174  3320  C8GETA, C8GET
2842  4175  4536  CC8BY4, C8BY4
2843  4176  4305  C8INM,  INMODE
2844  4177  0000          0
2845
2846        4200    PAGE
2847
2848
2849  4200  5361          JMP     C8CHG4
2850
2851                /**********************************************************************
2852                /C8OCTA
2853                /OCTAL TO ASCII CONVERSION
2854                /THIS ROUTINE WILL TAKE THE OCTAL NUMBER IN THE AC AND CONVERT IT TO ASCII
2855                /THE RESULT WILL BE PRINTED ON THE CONSOL DISPLAY
2856                /       C8OCTA= JMS XC8OCT
2857                /
2858                /EX,    C8OCTA          /AC CONTAINS NUMBER TO BE CHANGE
2859                /
2860
2861  4201  0000  XC8OCT, 0
2862  4202  7106          CLL RTL
2863  4203  7006          RTL                    /POSITION THE FIRST CHAR FOR PRINTING
2864  4204  3222          DCA     C8TMP1         /SAVE CORRECT POSITIONED WORD HERE
2865  4205  1242          TAD     C8N4
2866  4206  3223          DCA     C8CKP          /STORE COUNTER IN HERE
2867  4207  1222  C8DO4,  TAD     C8TMP1         /GET FIRST NUMBER
2868  4210  0243          AND     C8P7           /MASK
2869  4211  1244          TAD     C8P260         /ADD THE PRINT CONSTANT
2870  4212  4767          JMS  I  C8TPE          /TYPE THE NUMBER
2871  4213  1222          TAD     C8TMP1         /
2872  4214  7006          RTL
2873  4215  7004          RAL                    /PUT NEXT NUMBER IN POSITION
2874  4216  3222          DCA     C8TMP1         /STORE IT
2875  4217  2223          ISZ     C8CKP          /DONE YET WITH FOUR NUMBERS
2876  4220  5207          JMP     C8DO4          /NOT YET DO MORE
2877  4221  5601          JMP I   XC8OCT         /DONE WITH FOUR
2878  4222  0000  C8TMP1, 0
2879  4223  0000  C8CKP,  0
```

```
2880
2881                    /*****************************************************************
2882
2883                    /C8CRLF
2884                    /C8TYPE CR AND LF WITH FILLERS FOLLOWING EACH LF AND CR
2885                    /
2886                    /       C8CRLF= JMS XC8CRL
2887                    /
2888                    /EX,    C8CRLF          /C8PRNT A CR AND LF WITH FILL
2889                    /                       /RETURN TO CALL PLUS ONE AC =0
2890
2891    4224  0000      XC8CRL, 0
2892    4225  7300              CLA CLL
2893    4226  1245              TAD     C8P215          /GET CODE FOR CR
2894    4227  4767              JMS  I  C8TPE
2895    4230  1240              TAD     FILLER
2896    4231  7040              CMA
2897    4232  3241              DCA     FILCNT          /STORE FILLER IN HERE
2898    4233  1246              TAD     C8P212          /GET CODE FOR LF
2899    4234  4767      C8DO2,  JMS  I  C8TPE
2900    4235  2241              ISZ     FILCNT          /CHECK ON FILLER CHAR
2901    4236  5234              JMP     C8DO2           /TYPE A NON PRINTING CHAR
2902    4237  5624              JMP I   XC8CRL          /EXIT
2903                    /#1/#2
2904    4240  0004      FILLER, 0004            /FILLER SET FOR 4 CHAR
2905                    /#1/#2
2906    4241  0000      FILCNT, 0                       /COUNTER FOR FILL
2907    4242  7774      C8N4,   -4
2908    4243  0007      C8P7,   7
2909    4244  0260      C8P260, 260
2910    4245  0215      C8P215, 215
2911    4246  0212      C8P212, 212
2912    4247  0400      CP400,  400
2913
2914
2915
2916                    //*************************************************************
2917                    /#1
2918                    /C8CKPA
2919                    /THIS ROUTINE WILL CHECK IF A CHARACTER WAS ENTERED FROM THE
2920                    /TERMINAL, IFTHE FLAG IS SET AND THE CONSOLE PACKAGE IS
2921                    /ACTIVE A CHECK IS MADE TO DETERMIND IF IT IS A CONTROL CHAR,
2922                    /IF IT WAS A CONTROL CHAR THEN ITS CONTROL FUNCTION IS PERFORMED,
2923                    /A NON CONTROL CHARACTER WILL BE PRINTED AND A "?" IT WILL RETURN TO
2924                    /CALL PLUS 2.
2925                    /IF NO FLAG IS SET OR THE CONSOL IS NOT ACTIVE THE RETURN IS TO
2926                    /CALL PLUS 1.

2927
2928
2929                    /       C8CKPA= JMS     XC9CKP
2930
2931
2932                    /EX,    C8CKPA                  /CALL TO CHECK IF CONTROL CHAR SET
2933                    /       ANYTHING(SKIP)          /RETURN IF NOT FLAG OR NOT CONSOLE ACTIVE
2934                    /       ANYTHING(JMP EXIT SKIP CHAIN)   /RETURN IF NOT CONTROL OR CONTINUE CONTROL
```



```
2935
2936
2937    4250  0000      XC8CKP, 0
2938    4251  3773              DCA  I  AC8C8           /SAVE THE AC
2939    4252  6004              GTF                     /SAVE THE FLAGS
2940    4253  3774              DCA  I  FL8C8           /SAVE THE FLAGS
2941                    /#2
2942                    /#6
2943    4254  7501              MQA                     /PUT MQ IN AC
2944                    /#6
2945    4255  3775              DCA  I  MQ8C8           /SACE THE MQ
2946                    /#2
2947    4256  6031              KSF                     /CHECK THE KEYBOARD FLAG
2948    4257  5271              JMP     C8BY3           /EXIT TO CALL PLUS 1
2949    4260  1766              TAD  I  SELO2A          /IS CONSOLE ACTIVE
2950    4261  0247              AND     CP400
2951    4262  7650              SNA CLA
2952    4263  5271              JMP     C8BY3           /EXIT TO CALL PLUS 1
2953    4264  4770              JMS  I  C8TYI                   /GET THE CHAR
2954                    /#2
2955    4265  4776              JMS  I  GETC8           /GET THE FLAGS
2956    4266  4771              JMS  I  C8NTR           /CHECK IF CONTROL  CHAR,
2957                    /#2
2958    4267  7000              NOP                     /RETURN IF A CONTINUE CHAR,
2959    4270  2250              ISZ     XC8CKP          /BUMP RETURN FOR CALL PLUS 2
2960    4271  4776      C8BY3,  JMS  I  GETC8           /GET REGISTERS
2961    4272  5650              JMP I   XC8CKP          /SAY GOOD BY
2962                    /#1
2963
2964                    //*************************************************************
2965
2966                    /C8ECHO
2967                    /THIS ROUTINE WILL LOOK FOR A CHAR FROM THE KEYBOARD,  STORE IT IN LOCATION CHAR
2968                    /CHECK IF IT WAS A C8CNTR CHARACTER - SET INMODE - C8PRNT CHARACTER
2969                    /       C8ECHO= JMS XC8ECH
2970                    /EX,    C8ECHO          /LOOK FOR CONSOL CHAR C8PRNT IT
2971                                            /RETURN CALL PLUS ONE AC = CHAR C8TYPED IN
2972
2973
2974                    /
2975    4273  0000      XC8ECH, 0
2976    4274  4770              JMS  I  C8TYI                   /WAIT FOR CHAR FROM KEYBOARD
2977                    /#1
2978                    /#1
2979    4275  2305              ISZ     INMODE          /SET INMODE IDENTIFING THIS AS A EXPECTED CHAR
2980    4276  4771              JMS  I  C8NTR           /GO CHECK IF IT IS A CONTROL CHAR
2981    4277  5302              JMP EXECH               /WAS A CONTROL CHAR - CONTINUE RUNNING
2982    4300  4767              JMS  I  C8TPE           /NOT A CONTROL CHAR C8PRNT IT
2983    4301  3305              DCA     INMODE          /CLEAR FLAG THAT CHAR EXPECTED
2984    4302  1304      EXECH,  TAD     CHAR            /GET CHAR IN AC
2985    4303  5673              JMP I   XC8ECH          /EXIT
2986    4304  0000      CHAR,   0
2987    4305  0000      INMODE, 0
2988
2989                    /*************************************************************
```

```
2990
2991                    /C8TYPE
2992                    /THIS ROUTINE WILL C8PRNT ON THE CONSOLE OR THE LPT WITH DEVICE CODE 66.
2993                    /
2994                    /       CRTYPE= JMS XC8TYP
2995
2996                    /EX.    C8TYPE          /C8PRNT THE CHAR IN THE AC.
2997                    /                       /RETURN CALL PLUS ONE AC =0000
2998                                            /DO NOT CLEAR THE LINK IN THIS ROUTINE NEEDED BYC8OCT
2999
3000
3001    4306  0000      XC8TYP, 0
3002    4307  3331              DCA     PNTBUF          /STORE CHAR
3003    4310  1332              TAD     TTYLPT          /CHECK 0=TTY 7777=LPT
3004    4311  7640              SZA CLA
3005    4312  5321              JMP     XDOLPT          /DO OUT PUT ON LPT
3006    4313  1331              TAD     PNTBUF
3007    4314  6046              TLS
3008    4315  6041              TSF
3009    4316  5315              JMP     .-1
3010    4317  6042              TCF
3011    4320  5327              JMP     C8BY5
3012    4321  1331      XDOLPT, TAD     PNTBUF          /GET CHAR
3013    4322  6666              PSTB    PCLF            /C8PRNT IT
3014                    /#6
3015    4323  4333              JMS     C8HANG          /CHECK KEYBOARD IF HUNG
3016                    /#6
3017    4324  6661              PSKF
3018    4325  5323              JMP     .-2             /WAIT UNTIL DONE
3019    4326  6662              PCLF
3020    4327  7200      C8BY5,  CLA                     /CLEAR THE AC
3021    4330  5706              JMP I   XC8TYP          /EXIT
3022    4331  0000      PNTBUF, 0
3023    4332  0000      TTYLPT, 0
3024
3025
3026                    /#6
3027    4333  0000      C8HANG, 0               /WILL CHECK KEYBOARD FOR CNTRL CHAR
3028                                            /WILL NEED IF LPT HANGS TO GET OUT
3029    4334  7300              CLA CLL
3030    4335  1250              TAD XC8CKP      /SAVE C8CKPA RETURN LINKAGE
3031    4336  3344              DCA LC8KPA
3032    4337  4772              JMS  I  C8KPA           /SEE IF KEYBOARD INPUT
3033    4340  7000              NOP
3034    4341  1344              TAD LC8KPA              /RESTORE C8CKPA RETURN LINKAGE
3035    4342  3250              DCA XC8CKP
3036    4343  5733              JMP I   C8HANG          /IF HUNG IN LPT SKIP FLAG NOT SET

3037    4344  0000      LC8KPA, 0
3038
3039
3040
3041                    /RETURN TO MONITOR
3042                    /#7
3043    4345  7200      CNTRLC, CLA
3044    4346  3764              DCA  I  TTYLC8          /CLEAR SOFTWARE FLAG FOR TERMINAL PRINTER
```



```
3045    4347  4765              JMS  I  UPARC8          /C8PRNT A" AND A CHAR
3046    4350  5763              JMP  I  BOTRES          /GO RESTORE MONITOR AND GO TO IT
3047
3048
3049                    /
3050            4361    *4361
3051                    /
3052    4361  4762      C8CHG4, JMS  I  C8RER4
3053                    /
3054    4362  0202      C8RER4, CHANGE
3055    4363  3334      BOTRES, RESBOT
3056    4364  4332      TTYLC8, TTYLPT
3057    4365  4016      UPARC8, UPAROW
3058    4366  3456      SELO2A, SELOP2
3059    4367  4306      C8TPE,  XC8TYP
3060    4370  3475      C8TYI,  XC8TTY
3061    4371  3601      C8NTR,  XC8CNT
3062    4372  4250      C8KPA,  XC8CKP
3063    4373  4524      ACSC8,  ACSAVE
3064    4374  4526      FLSC8,  FLSAVE
3065    4375  4525      MQSC8,  MQSAVE
3066    4376  3320      GETC8,  C8GET
3067    4377  0000              0
3068
3069            4400    PAGE
3070
3071
3072    4400  5344              JMP     C8CHG5
3073
3074                    /*********************************************************************
3075
3076                    /C8ERR
3077                    /THIS ROUTINE WILL DETERMINE WHAT TO DO WHEN A C8ERR IS ENCOUNTERED
3078                    /WILL CHECK IF CLASSIC SYSTEM, WILL CHECK C8SWIT REGISTERS.
3079                    /       C8ERR=  JMS XC8ERR
3080                    /EX.    C8ERR           /GO TO C8ERR CALL IF NOT CONSOL /0/
3081                    /                       /RETURN IS CALL PLUS ONE AC =0000
3082
3083
3084
3085    4401  0000      XC8ERR, 0
3086    4402  6002              IOF
3087    4403  3324              DCA     ACSAVE          /SAVE AC
3088    4404  6004              GTF
3089    4405  3326              DCA     FLSAVE          /SAVE THE FLAGS
3090    4406  7501              MQA
3091    4407  3325              DCA     MQSAVE          /SAVE THE MQ
3092    4410  7340              CLA CLL CMA             /SUBTRACT A 1 FOR TRUE LOCATION
3093    4411  1201              TAD     XC8ERR          /GET RETTURN LOCATION
3094    4412  3323              DCA     PCSAV           /SAVE ADD OF C8ERR CALL
3095    4413  1764              TAD  I  SELO2B          /GET LOCATION 22
3096    4414  0330              AND     C88400          /MASK FOR CLASSIC SYSTEM
3097    4415  7650              SNA CLA                 /SKIP IF CLASSIC BIT IN LOC 22 SET
3098    4416  5265              JMP     NTCLAS          /NOT CLASSIC SYSTEM
3099    4417  1773              TAD  I  NTSTOP          /NO ERROR PRINTING
```

```
3100  4420  7640          SZA CLA
3101  4421  5260          JMP     C8DU10          /DO NOT PRINT
3102                /#2
3103  4422  4756          JMS  I  CRLFC8
3104                /#2
3105  4423  1350          TAD     MESERR
3106  4424  3226          DCA     .+2
3107  4425  4757          JMS  I  PRNTC8
3108  4426  4477          ERRMES                  /PRINT THE ERROR MESSAGE
3109  4427  1351          TAD     PCMES
3110  4430  3232          DCA     .+2
3111  4431  4757          JMS  I  PRNTC8
3112  4432  4507          MESPC                   /PRINT THE PC STSTEMENT
3113  4433  1323          TAD     PCSAV
3114  4434  4760          JMS  I  OCTAC8          /CONVERT 4 DIGIT PC TO ASCII
3115  4435  1352          TAD     ACMES
3116  4436  3240          DCA     .+2
3117  4437  4757          JMS  I  PRNTC8
3118  4440  4512          MESAC                   /PRINT THE AC MESS
3119  4441  1324          TAD     ACSAVE
3120  4442  4760          JMS  I  OCTAC8
3121  4443  1353          TAD     MQMES
3122  4444  3246          DCA     .+2
3123  4445  4757          JMS  I  PRNTC8
3124  4446  4515          MESMQ                   /PRINT MQ
3125  4447  1325          TAD     MQSAVE
3126  4450  4760          JMS  I  OCTAC8
3127  4451  1354          TAD     FLMES
3128  4452  3254          DCA     .+2
3129  4453  4757          JMS  I  PRNTC8
3130  4454  4520          MESFL                   /PRINT FL
3131  4455  1326          TAD     FLSAVE
3132  4456  4760          JMS  I  OCTAC8
3133  4457  4756          JMS  I  CRLFC8
3134  4460  4761    C8DO10, JMS  I  CKSWC8        /CHECK SWITCH REGISTER
3135                /#1
3136  4461  7710          SPA CLA                 /SKIP IF BIT 0 NOT SET
3137                /#1
3138  4462  5274          JMP     C8BY2           /LEAVE
3139  4463  4762          JMS  I  INQUC8                  /GO TO THE INQUIRE ROUTINE
3140  4464  5274          JMP     C8BY2           /LEAVE
3141  4465  4761    NTCLAS, JMS  I  CKSWC8        /CHECK PSEUDO SWITCH REGISTER
3142                                              /CHECK THE C8SWIT REGISTER
3143                /#1
3144  4466  7710          SPA CLA                 /SKIP IF HALT
3145                /#1
3146  4467  5601          JMP I   XC8ERR          /NO HALT CONTINUE

3147  4470  1327          TAD     C8HLT           /CODE FOR HLT
3148  4471  3723          DCA I   PCSAV           /PUT IT IN CALL LOC.
3149                /#5
3150  4472  4763          JMS  I  C8GETS
3151                /#5
3152  4473  5723          JMP I   PCSAV           /EXIT  TO CALL AND HALT
3153  4474  7000    C8BY2,  NOP
3154  4475  4763          JMS  I  C8GETS          /GET THE REGISTERS
```



```
3155                /#3
3156                /#3
3157  4476  5601          JMP I   XC8ERR
3158
3159  4477  0412    ERRMES, TEXT    "DJEXC8  FAILED "
      4500  0530
      4501  0302
      4502  4040
      4503  0601
      4504  1114
      4505  0504
      4506  4000
3160  4507  4040    MESPC,  TEXT    "  PC:"
      4510  2003
      4511  7200
3161  4512  4040    MESAC,  TEXT    "  AC:"
      4513  0103
      4514  7200
3162  4515  4040    MESMQ,  TEXT    "  MQ:"
      4516  1521
      4517  7200
3163  4520  4040    MESFL,  TEXT    "  FL:"
      4521  0614
      4522  7200
3164  4523  7777    PCSAV,  7777
3165  4524  7777    ACSAVE, 7777
3166  4525  7777    MQSAVE, 7777
3167  4526  7777    FLSAVE, 7777
3168  4527  7402    C8HLT,  7402
3169  4530  0400    C88400, 400
3170
3171                /
3172                /GO TO THE QUESTION C8SWIT
3173                /
3174  4531  7200    XC8LF,  CLA
3175  4532  3755          DCA I XPASSCT   /ZERO PASS COUNTER
3176  4533  3766          DCA  I  C8STS
3177  4534  3767          DCA  I  C8IND
3178  4535  4770          JMS  I  C8LFCR
3179  4536  3771    C8BY4,  DCA  I  C888SW  /CLEAR FLAG FOR CONTROL G
3180  4537  5772          JMP  I  XDOSW   /GO TO ADDRESS FOR C8SWIT
3181
3182                /
3183        4544    *4544
3184                /
3185  4544  1374    C8CHG5, TAD     PAGJMP
3186  4545  3377          DCA     CROSPG
3187  4546  4747          JMS  I  C8RER5
3188                /
3189  4547  0202    C8RER5, CHANGE
3190  4550  4477    MESERR, ERRMES
3191  4551  4507    PCMES,  MESPC
3192  4552  4512    ACMES,  MESAC
3193  4553  4515    MQMES,  MESMQ
3194  4554  4520    FLMES,  MESFL
```

```
        4555  3453    XPASSCT,PASCNT
        4556  4224    CRLFC8, XC8CRL
        4557  3506    PRNTC8, XC8PNT
        4560  4201    OCTAC8, XC8OCT
        4561  3465    CKSWC8, XC8SW
        4562  3726    INQUC8, XC8INQ
        4563  3320    C8GETS, C8GET
        4564  3456    SELO2B, SELOP2
        4565  4016    C8UPA,  UPARGW
        4566  3712    C8STS,  C8SETS
        4567  4305    C8IND,  INMODE
        4570  4224    C8LFCR, XC8CRL
        4571  4146    C888SW, C8SWST
        4572  3032    XDOSW,  CL8BGN
        4573  3542    NTSTOP, STOPNT
        4574  4765    PAGJMP, ZCHANGE-1         /VT78/
        4575  0000            0
        4576  5777            JMP  I  CROSPG
        4577  4765    CROSPG, ZCHANGE-1         /VT78/

              4600    *4600

        4600  0000    TYPEIT, 0
        4601  1213            TAD     CP215
        4602  4217            JMS     TYPE
        4603  1214            TAD     CP212
        4604  4217            JMS     TYPE
        4605  1215            TAD     M4
        4606  3216            DCA     TYPECT
        4607  4217            JMS     TYPE
        4610  2216            ISZ     TYPECT
        4611  5207            JMP     .-2
        4612  5600            JMP  I  TYPEIT

        4613  0215    CP215,  215
        4614  0212    CP212,  212
        4615  7774    M4,     -4
        4616  0000    TYPECT, 0

        4617  0000    TYPE,   0
        4620  6046            TLS
        4621  6041            TSF
        4622  5221            JMP     .-1
        4623  6042            TCF
        4624  7200            CLA
        4625  5617            JMP  I  TYPE

        4626  7126    BOOTSV, 7126
        4627  1060            1060
        4630  6751            6751
        4631  7201            7201
        4632  4053            4053
        4633  4053            4053
        4634  7104            7104
        4635  6755            6755
```



```
        4636  5054            5054
        4637  6754            6754
        4640  7450            7450
        4641  7610            7610
        4642  5046            5046
        4643  1060            1060
        4644  7041            7041
        4645  1061            1061
        4646  3060            3060
        4647  5024            5024
        4650  6751            6751
        4651  4053            4053
        4652  3002            3002
        4653  2050            2050
        4654  5047            5047
        4655  0000            0000
        4656  6753            6753
        4657  5033            5033
        4660  6752            6752
        4661  5453            5453
        4662  7024            7024
        4663  6030            6030
        4664  0000            0000

                      /ROUTINE TO HANDLE HACK IN VT78 CPU--PAGE BIT MUST BE 0 FOR AUTO INDEXING
                      /  TO WORK--EVEN IF THE INSTRUCTION IS ON PAGE 0.
                      /ROUTINE USED ONLY WHEN TESTING ON VT78 PROCESSOR.
                      /

              4700    *4700
        4700  1771    VT78GL, TAD I ZADDRS    /VT78/CHECK ADDRESS TO SEE IF IT IS IN THE
                                              /VT78/ VULNERABLE RANGE (0000-0177).
        4701  0316            AND K7600       /VT78/
        4702  7640            SZA CLA         /VT78/
        4703  5314            JMP RETN        /VT78/ OUTSIDE VULNERABLE RANGE
        4704  1770            TAD I VINSTR    /VT78/CHECK INST, TO SEE IF IT IS THE VULNERABLE
                                              /VT78/ TYPE--FORM X6X0
        4705  0317            AND K0700       /VT78/
        4706  1320            TAD M0600       /VT78/
        4707  7640            SZA CLA         /VT78/
        4710  5314            JMP RETN        /VT78/ INST NOT VULNERABLE TYPE
        4711  1770            TAD I VINSTR    /VT78/ZERO PAGE BIT SO THAT INST WILL WORK PROPERLY
        4712  0321            AND K7577       /VT78/
        4713  3770            DCA I VINSTR    /VT78/
        4714  7340    RETN,   CLA CLL CMA     /VT78/
        4715  5767            JMP I BACK      /VT78/

        4716  7600    K7600,  7600            /VT78/
        4717  0700    K0700,  0700            /VT78/
        4720  7200    M0600,  -600            /VT78/
        4721  7577    K7577,  7577            /VT78/

        4722  0000    XSTMS,  0
        4723  7200            CLA
        4724  1772            TAD I SELO2X    /GET HARDWARE CONFIG WORD
```

```
 3305  4725  0337           AND C400X       /MASK FOR CONSOL BIT
 3306  4726  7650           SNA CLA         /SKIP IF CONSOL PACKAGE IS ACTIVE
 3307  4727  5722           JMP I XSTMS     /RETURN WITHOUT PRINTING HEADING & ASKING PSEUDO SWITCH
 3308  4730  1373           TAD MESHD
 3309  4731  3333           DCA .+2
 3310  4732  4774           JMS I C8PX      /PRINT PROGRAM HEADER MESSAGE
 3311  4733  4740           HDMES
 3312  4734  4775           JMS I XLF       /PRINT A CR & LF
 3313  4735  4776           JMS I XPSR      /ASK SWITCH REG QUESTION
 3314  4736  5722           JMP I XSTMS
 3315  4737  0400  C400X,    400
 3316  4740  1501  HDMES,    TEXT    "MAINDEC-08-DJEXC-B"
       4741  1116
       4742  0405
       4743  0355
       4744  6070
       4745  5504
       4746  1205
       4747  3003
       4750  5502
       4751  0000
 3317
 3318
 3319        4765  *4765
 3320  4765  4766           JMS I ZCHANGE   /VT78/
 3321  4766  0202  ZCHANGE, CHANGE         /VT78/
 3322  4767  0613  BACK,    RFVT            /VT78/
 3323  4770  0746  VINSTR,  INSTR           /VT78/
 3324  4771  0745  ZADDRS,  ADDRS           /VT78/
 3325  4772  3456  SELO2X,  SELOP2
 3326  4773  4740  MESHD,   HDMES
 3327  4774  3506  C8PX,    XC8PNT
 3328  4775  4224  XLF,     XC8CRL
 3329  4776  4042  XPSR,    XC8PSW
 3330  4777  0000           0               /VT78/
 3331
 3332
 3333        5000  *5000
 3334              /
 3335  5000  5274           JMP DCHNG
 3336              /
 3337  5001  1271  SETCON,  TAD M7                  /ROUTINE TO SET UP CONSTRAINT WORDS
 3338  5002  3347           DCA UPDWN
 3339  5003  1325           TAD TABLE
 3340  5004  3373           DCA MOVWDX
 3341  5005  3704           DCA  I  XFIRST
 3342  5006  1773  CONRAN,  TAD I MOVWDX

 3343  5007  3374           DCA MVWDPG
 3344  5010  4710           JMS I XRANCN
 3345  5011  7040           CMA
 3346  5012  3774           DCA I MVWDPG
 3347  5013  2373           ISZ MOVWDX
 3348  5014  1773           TAD I MOVWDX
 3349  5015  3374           DCA MVWDPG
 3350  5016  4710           JMS I XRANCN
```



```
 3351  5017  3774           DCA I MVWDPG
 3352  5020  2373           ISZ MOVWDX
 3353  5021  2347           ISZ UPDWN
 3354  5022  5206           JMP CONRAN
 3355  5023  3720           DCA I XDRFLG
 3356  5024  3721           DCA I XFLDFG
 3357  5025  4705  STARTP,  JMS  1  OP1SET
 3358  5026  7344           CLA CLL CMA RAL
 3359  5027  3706           DCA  I  ENDCNT
 3360  5030  4707           JMS I INITFO
 3361  5031  6001           ION                 /TURN THE INTERRUPT ON
 3362  5032  5240           JMP FILL
 3363  5033  7300           CLA CLL
 3364  5034  3722           DCA I XCNTR3
 3365  5035  5724  RESCNT,  JMP I XGNFLD              /GO,BABY GO !!!
 3366              /
 3367  5036  1273  ADDONE,  TAD C10
 3368  5037  1722           TAD I XCNTR3
 3369  5040  3722  FILL,    DCA I XCNTR3              /START WITH FIELD 0
 3370  5041  1722           TAD I XCNTR3              /IS THIS FIELD =TO LAST FIELD OR OVER
 3371  5042  7041           CIA
 3372  5043  1711           TAD I ZFLDLM
 3373  5044  7510           SPA
 3374  5045  5233           JMP RESCNT-2
 3375  5046  7650           SNA CLA
 3376  5047  1712           TAD I ZUPLIM              /YES,SET UPPER LIMITS(=1777= =7777)
 3377  5050  7041           CIA
 3378  5051  3713           DCA I ZHIGH               /IF NOT LAST FIELD UPPER LIMITS=0
 3379  5052  6224           RIF                       /READ THE INSTRUCTION FIELD
 3380  5053  7041           CIA                       /NEGATE THE FIELD
 3381  5054  1722           TAD I XCNTR3              /GET THE FIELD TO FILL
 3382  5055  7650           SNA CLA                   /IS IT EQUAL TO THE PROGRAM FIELD
 3383  5056  5715           JMP I XFLRND              /YES FILL AROUND THE PROGRAM
 3384  5057  1722           TAD I XCNTR3              /GET THE FIELD TO FILL
 3385  5060  7650           SNA CLA                   /IS IT EQUAL TO FIELD ZERO
 3386  5061  7307           CLA CLL IAC RTL           /YES ADD FOUR TO FILL COUNTER
 3387  5062  1713           TAD I ZHIGH               /GET COUNTER
 3388  5063  3713           DCA I ZHIGH               /RESTORE IT
 3389  5064  1722           TAD I XCNTR3              /GET THE FIELD TO FILL
 3390  5065  7650           SNA CLA
 3391  5066  7307           CLA CLL IAC RTL           /START FILLING AT ADDRESS 4 FOR FIELD 0
 3392  5067  4714           JMS I XFILL               /FILL THE WHOLE FIELD
 3393  5070  5236           JMP ADDONE
 3394              /
 3395
 3396  5071  7771  M7,      -7
 3397  5072  0200  K200,    200
 3398  5073  0010  C10,     10
 3399              /
 3400        5074  *5074
 3401              /
 3402
 3403  5074  1720  DCHNG,   TAD I XDRFLG
 3404  5075  7640           SZA CLA
 3405  5076  1317           TAD XSWAP2
```

```
3406  5077  7450          SNA
3407  5100  1316          TAD XSWAP1
3408  5101  3347          DCA UPDWN
3409  5102  4703          JMS I DRERNG
3410  5103  0202    DPERNG, CHANGE
3411  5104  3102    XFIRST, FIRST
3412  5105  3036    OP1SET, SETOP1
3413  5106  3245    ENDCNT, CNTEND
3414  5107  0334    INITFO, FOINIT
3415  5110  2127    XRANCN, RANCON
3416  5111  1144    ZFLDLM, FLDLIM
3417  5112  1550    ZUPLIM, UPRLIM
3418  5113  1145    ZHIGH,  HGHLIM
3419  5114  0527    XFILL,  FILALL
3420  5115  3001    XFLRND, FILRND
3421  5116  0216    XSWAP1, SWAP1
3422  5117  5150    XSWAP2, SWAP2
3423  5120  0213    XDRFLG, DIRFLG
3424  5121  0500    XFLDFG, FLDFLG
3425  5122  0247    XCNTR3, CNTR3
3426  5123  0200    PRGBGN, BGN
3427  5124  1001    XGNFLD, GENFLD
3428  5125  5126    TABLE,  XFDMSK
3429  5126  1127    XFDMSK, FLDMSK
3430  5127  1130    XCNFLD, CONFLD
3431  5130  1131    XADRMS, ADRMSK
3432  5131  1132    XCNADR, CONADR
3433  5132  1642    XINSMS, INSMSK
3434  5133  1643    XCNINS, CONINS
3435  5134  1133    XINDMS, INDMSK
3436  5135  1134    XCNIND, CONIND
3437  5136  1135    XMDTMS, MDTMSK
3438  5137  1136    XCNMDT, CONMDT
3439  5140  1137    XACDMS, ACDMSK
3440  5141  1140    XCNACD, CONACD
3441  5142  1141    XMQDMS, MQDMSK
3442  5143  1142    XCNMQD, CONMQD
3443  5144  5025    XRSCNT, STARTP
3444  5145  0000          0
3445  5146  5747          JMP I .+1
3446  5147  7402    UPDWN,  HLT                 /ADDRESS OF SWAP ROUTINE
3447  5150  1375    SWAP2,  TAD SIZPRG
3448  5151  3347          DCA UPDWN
3449  5152  1323          TAD PRGBGN
3450  5153  3373          DCA MOVWDX
3451  5154  1323          TAD PRGBGN
3452  5155  1272          TAD K200

3453  5156  3374          DCA MVWDPG
3454  5157  1774    MOVDWN, TAD I MVWDPG
3455  5160  3773          DCA I MOVWDX
3456  5161  1774          TAD I MVWDPG          /COMPARE THE WORDS BEING RELOCATED
3457  5162  7041          CIA
3458  5163  1773          TAD I MOVWDX
3459  5164  7640          SZA CLA
3460  5165  7402          HLT                   /COMPARE ERROR DURING RELOCATION
```



```
3461  5166  2373          ISZ MOVWDX
3462  5167  2374          ISZ MVWDPG
3463  5170  2347          ISZ UPDWN
3464  5171  5357          JMP MOVDWN
3465  5172  5744          JMP I XRSCNT
3466  5173  0000    MOVWDX, 0
3467  5174  0000    MVWDPG, 0
3468  5175  3001    SIZPRG, BGN-PRGEND-1
3469  5176  5176    PRGEND, .
3470
3471
3472        0200    *200
3473  0200  4023          JMS PATCH
3474  0201  4023          JMS PATCH
3475
3476
3477        5200    *5200
3478
3479                /
3480  5200  1021    PATCH2, TAD     OP1SEL  /GET THE HARDWARE CONFIGURATION
3481  5201  7004            RAL             /PUT OPTON1 BIT IN BIT 0
3482  5202  7700            SMA     CLA     /IS OPTION 1 SELECTED?
3483  5203  5223            JMP     SLOWRN  /NO,OVERLAY SECTIONS OF RANDY AND ERROR1
3484  5204  1263            TAD     K4772   /YES, SET UP A TALK LOOP TO PROM
3485  5205  3664            DCA  I  OP1HND  /PUT JMS I ACTLIN IN RTCSER+2
3486  5206  1265            TAD     OP1OVR
3487  5207  3010            DCA     AUTO10
3488  5210  1266            TAD     ERROR5
3489  5211  3011            DCA     AUTO11
3490  5212  1240            TAD     MM20
3491  5213  3130            DCA     PATMOV
3492  5214  1410            TAD  I  AUTO10
3493  5215  3411            DCA  I  AUTO11
3494  5216  2130            ISZ     PATMOV
3495  5217  5214            JMP     .-3
3496  5220  1262            TAD     R5771
3497  5221  3641            DCA  I  OVR4
3498  5222  5423            JMP  I  PATCH
3499                /THIS SECTION OF CODE WILL OVERLAY LAST 2 LOCATIONS OF RANDY ALL OF ERROR1 EXCEPT LAST 2 LOC,
3500
3501  5223  1236    SLOWRN, TAD     ACTOVR
3502  5224  3010            DCA     AUTO10
3503  5225  1237            TAD     STRRND
3504  5226  3011            DCA     AUTO11
3505  5227  1240            TAD     MM20
3506  5230  3130            DCA     PATMOV
3507  5231  1410            TAD  I  AUTO10
3508  5232  3411            DCA  I  AUTO11
3509  5233  2130            ISZ     PATMOV
3510  5234  5231            JMP     .-3
3511  5235  5423            JMP  I  PATCH
3512
3513  5236  5241    ACTOVR, ACGDOV-1
3514  5237  1412    STRRND, RANDY1-1
3515  5240  7760    MM20,   -20
```

```
3516  5241  3263  OVR4,   RESET-1
3517              /
3518  5242  2230  ACGDOV, 2230
3519  5243  5226          5226
3520  5244  2231          2231
3521  5245  5226          5226
3522  5246  6002          IOF
3523  5247  7240          CLA     CMA
3524  5250  3231          3231
3525  5251  3230          3230
3526  5252  6272          CIF     70
3527  5253  4632          4632
3528  5254  6001          ION
3529  5255  1344  CONTRD, 1344
3530  5256  5601          5601
3531  5257  0000          0
3532  5260  7777          -1
3533  5261  6500          6500
3534
3535              /
3536  5262  5771  R5771,  5771
3537  5263  4772  K4772,  4772
3538  5264  3234  OP1HND, RTCSER+2
3539  5265  5266  OP1OVR, OVROP1-1
3540  5266  1317  ERROR5, ERROR+4
3541              /
3542  5267  0000  OVROP1, 0
3543  5270  2331          2331
3544  5271  5720          5720
3545  5272  1332          1332
3546  5273  3331          3331
3547  5274  6272          CIF     70
3548  5275  4730          4730
3549  5276  5720          5720
3550  5277  6500          6500
3551  5300  7634          -144
3552  5301  7634          -144
3553  5302  6002          IOF
3554  5303  1333          1333
3555  5304  6272          CIF     70
3556  5305  5737          5737
3557  5306  6520          6520
3558
3559
3560  5307  1312  PATCH3, TAD OWVT78      /VT78/ OVERWRITE TO RUN ON VT78 SYSTEM
3561  5310  3713          DCA I XOWLVT    /VT78/
3562  5311  5714          JMP I RFVTP     /VT78/

3563  5312  5767  OWVT78, VT78OW         /VT78/ OVERWRITE DATA
3564  5313  0612  XOWLVT, OWLVT          /VT78/ OVERWRITE LOCATION
3565  5314  0042  RFVTP,  PATCH1         /VT78/
3566
3567
3568
3569                    $$$
```



```
0000  11111100  10000000  11111111  11111111  11111111  11111111  11111111  11111111
0100  11111111  11111111  11111111  10000000  00000000  00000000  00000000  00000000

0200  11111111  11111111  11111111  11111111  11111111  11111111  11111111  11111111
0300  11111111  11111111  11111111  11111111  11111111  10011111  11111111  11111111

0400  11111111  11111111  11111111  11111111  11111111  11111111  11111111  11111111
0500  11111111  11111111  11111111  11111111  11111111  01111111  11111111  11111111

0600  11111111  11111111  11111111  11111111  11111111  11111111  11111111  11111111
0700  11111111  11111111  11111111  11111111  11111111  11111111  11111111  11111111


1000  11111111  11111111  11111111  11111111  11111111  11111111  11111111  11111111
1100  11111111  11111111  11111111  11111111  11111111  11111111  11111111  11111111

1200  11111111  11111111  11111111  11111111  11111111  11111111  11111111  11111111
1300  11111111  11111111  11111111  11111111  10000001  11111111  11111111  11111111

1400  11111111  11111111  11111111  11111111  11111111  11111111  11111111  11111111
1500  11111111  11111111  11111111  11111111  11111111  11111111  11111111  11111111

1600  11111111  11111111  11111111  11111111  11111111  11111111  11111111  11111111
1700  11111111  11111111  11111111  11111111  11111011  11111111  11111111  11111111


2000  11111111  11111111  11111111  11111111  11111111  11111111  11111111  11111111
2100  11111111  11111111  11111111  11111111  11111101  11111111  11111111  11111111

2200  11111111  11111111  11111111  11111111  11111111  11111111  11111111  11111111
2300  11111111  11111111  11111111  11111111  10011111  11111111  11111111  11111111

2400  11111111  11111111  11111111  11111111  11111111  11111111  11111111  11111111
2500  11111111  11111111  11111111  11111111  11111111  11111111  11111101  11111111

2600  11111111  11111111  11111111  11111111  11111111  11111111  11111111  11111111
2700  11111111  11111111  11111111  11111111  11111111  11111000  00001111  11111111


3000  11111111  11111111  11111111  11111111  11111111  11111111  11111111  11111111
3100  11111111  11111111  11111111  11111111  11111101  11111111  11111111  11111111

3200  11111111  11111111  11111111  11111111  11111111  11111111  11111111  11111111
3300  11111111  11111111  11111111  11111111  11111111  11111100  01111111  11111111

3400  11111111  11111111  11111111  11111111  11111111  11111111  11111111  11111111
3500  11111111  11111111  11111111  11111111  11111111  11100000  00111111  11111111

3600  11111111  11111111  11111111  11111111  11111111  11111111  11111111  11111111
3700  11111111  11111111  11111111  11111110  00000011  11111111  11111111  11111111
```

```
4000  11111111  11111111  11111111  11111111  11111111  11111111  11111111  11111111
4100  11111111  11111111  11111111  11111111  11111111  11101111  11111111  11111111

4200  11111111  11111111  11111111  11111111  11111111  11111111  11111111  11111111
4300  11111111  11111111  11111111  11111111  11111111  10000000  01111111  11111111

4400  11111111  11111111  11111111  11111111  11111111  11111111  11111111  11111111
4500  11111111  11111111  11111111  11111111  00001111  11111111  11111111  11111111

4600  11111111  11111111  11111111  11111111  11111111  11111111  11111000  00000000
4700  11111111  11111111  11111111  11111111  11111111  11000000  00000111  11111111


5000  11111111  11111111  11111111  11111111  11111111  11111111  11111111  11111111
5100  11111111  11111111  11111111  11111111  11111111  11111111  11111111  11111110

5200  11111111  11111111  11111111  11111111  11111111  11111111  11111111  11111111
5300  11111111  11111000  00000000  00000000  00000000  00000000  00000000  00000000

5400
5500

5600
5700


6000
6100

6200
6300

6400
6500

6600
6700


7000
7100

7200
7300


7400
7500

7600
7700
```



```
A1          1653        AUTO10      0010        C8400       3543        C8N270      4034
A14         1651        AUTO11      0011        C87         4035        C8N3        4037
A1CHG       1150        B400        1650        C87700      3546        C8N4        4242
A1RRNG      1151        B6201       0526        C8@400      4530        C8NTR       4371
A200        1647        B7          0543        C8885W      4571        C8OCT       3572
A400        1124        BACK        4767        C88GET      3775        C8OCTA      4167
A6201       2144        BADDRS      1366        C8ACSV      3765        C8P212      4246
A7          0743        BCHNG       1347        C8BY1       3433        C8P215      4245
AACHNG      0551        BDATHR      1376        C8BY2       4474        C8P260      4244
AADDRS      1166        BDATTH      1375        C8BY3       4271        C8P7        4243
AASAVA      1760        BEGIN       0507        C8BY4       4536        C8PASS      0355
AASAVB      1761        BGN         0200        C8BY5       4327        C8PRN       4166
ABGN        3170        BGNCON      3025        C8CHAR      3576        C8PRNT      3571
ARRRY1      1164        BGOTST      0524        C8CHG1      3562        C8PX        4774
AC4008      3736        BINSTR      0560        C8CHG2      3746        C8RER1      3563
ACDATA      1031        BLPCNT      1385        C8CHG3      4154        C8RER2      3747
ACOMSK      1137        BNDCON      1551        C8CHG4      4361        C8RER3      4155
ACGNDV      5242        BNDOK1      1445        C8CHG5      4544        C8RER4      4362
ACHG        0765        BNDOK2      1457        C8CHKR      3174        C8RER5      4547
ACHNG       0353        BNDRY1      1435        C8CKP       4223        C8RETD      4015
ACL         7701        BOOTAD      3364        C8CKPA      3574        C8RETR      3713
ACMPS       4552        BOOTSV      4626        C8CKSW      3567        C8RSTL      3365
ACSAV8      3376        BOTRES      4363        C8CNTR      3764        C8SETD      4014
ACSAVF      4524        BP6         1654        C8CR        4171        C8SETS      3712
ACSC8       4373        BRANDY      1755        C8CRL       3761        C8SMS       3176
ACTYIN      3372        BREFAD      1374        C8CRLF      3570        C8STOP      3776
ACTOVR      5236        BRERNG      1350        C8DO1       3513        C8STS       4566
ACUTST      2623        BSAVA       2145        C8DO10      4460        C8SWIT      4164
ADATAH      1172        BSIMAC      2575        C8DO11      4010        C8SWR       2766
ADATAT      1171        BSMLNK      2576        C8DO2       4234        C8SWST      4146
ADD11       1126        C10         5073        C8DO4       4207        C8TMP1      4222
ADDONE      5036        C100        4041        C8DO7       3703        C8TPE       4367
ADDRS       0745        C1777       1561        C8ECHO      4170        C8TTYI      3763
ADDRS0      3141        C200        1312        C8ERÖR      1750        C8TTYL      3773
ADDRS5      1612        C400        1547        C8ERR       1351        C8TY        4165
ADRWSK      1131        C4008       4026        C8ERRR      3175        C8TYI       4370
AERRV1      0103        C400X       4737        C8FLSV      3766        C8TYP       3760
AERRV2      0110        C5          1556        C8GET       3320        C8TYPE      3575
AINSTR      1167        C6201       1123        C8GET8      4174        C8UPA       4565
ALOOID      1176        C7          1567        C8GETS      4563        C8UPAR      3774
AMES        4157        C70         1560        C8HANG      4333        CADDR8      1575
AMQDAT      1173        C80077      3547        C8HLT       4527        CAF         6007
ANDTST      1201        C80100      3551        C8IND       4567        CAL         6103
ANTIND      1175        C80400      3666        C8INM       4176        CC377       3231
ARANDY      1163        C8100       3670        C8INMD      3772        CC8BY4      4175
AREFAD      1170        C8177       3544        C8INQU      3573        CCHAR8      3771
AREDNG      0766        C8200       3545        C8K277      4036        CCHNG       1562
ARRANG      0302        C8240       3552        C8KPA       4372        CDATAT      1567
ASAME1      1161        C8277       3667        C8LF        4156        CDFINS      3344
ASAME2      1162        C8336       4025        C8LFCR      4570        CDHLT1      0540
ASAVA       1146        C83740      3550        C8M212      4030        CDHLT2      0544
ASAVB       1147        C840        4027        C8MQSV      3767        CHANGE      0202
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SEQ 0095

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CHAR    4304    CSINAC  2770    FLDCHK  2555    HIGHLM  0374
CHAR8   4173    CSIMMQ  2772    FLDCNT  3167    HLT     7402
CHK1KF  1154    CSMLNK  2771    FLDFGF  1153    HLTFIL  0466
CHKACT  3255    CSWPUP  0553    FLDFGR  1152    HLTUPR  1741
CIFPDO  0342    D4000   2625    FLDFLG  0500    HUMCIF  0744
CINSTR  2162    D6201   2070    FLDLIM  1144    HRERNG  2344
CKCOUT  3435    DATADN  2745    FLDMSK  1127    ICHNG   2567
CKSWC8  4561    DATAHR  0752    FLDRAN  1156    ILLMQ   1703
CL8AGN  3032    DATATH  0751    FLDRET  0761    ILLOP1  1664
CLASWP  2671    DATFN   1372    FLDXRN  2157    ILLOP2  1672
CLCI    6136    DCATST  1255    FLGRTC  3160    INACDV  3273
CLLF    6135    DCHNG   5074    FLGXMT  3157    INDAD   0750
CLSW    6137    DECSWP  1116    FLINK   0771    INDEXA  3655
CNT     2425    DINSTR  2345    FLMES   4554    INDMSK  1133
CNTEND  3245    DIRFLG  0213    FLSAV8  3375    INITF0  5107
CNTR2   0246    DM1     4040    FLSAVE  4526    INMODE  4305
CNTR3   0247    DM2     4031    FLSC8   4374    INQUC8  4562
CNTRLC  4345    DM41    4032    FLXRET  2160    INSGEN  1601
CNTRLG  4001    DOCNT   3452    FMQDAT  0772    INSMSK  1642
CNTRLL  3714    DONEA   3631    FRERNG  1747    INSOK   1520
CNTRLO  3721    DONEMQ  1362    GACTRT  2366    INSTR   0746
CNTRLQ  3671    DOPACK  3414    GADDRS  2367    INT     0003
CNTRLS  3675    DOSET   3454    GCHNG   2147    INTAC   3137
CNTVAL  3455    DRERNG  5103    GDATAD  2371    INTERS  3103
COMCHK  2227    DVINAC  3161    GDATAH  2370    INTLNK  3140
COMPAR  1206    EINSTR  1754    GENADD  1043    INTMQD  1757
CONT7   0122    ENDCMA  2422    GENFLD  1001    INTOPR  2175
CONACD  1140    ENDCNT  5106    GENIND  1072    INTRET  3142
CONADR  1132    ENDIT   4143    GENINS  1055    INTSET  2137
CONFLD  1130    ENDOFP  3172    GENMQD  1037    IOF     6002
CONFLG  1143    ERR1    4137    GETC8   4376    ION     6001
CONTND  1134    ERRC8   3363    GETCH1  4075    IRERNG  2570
CONTNS  1643    ERRMES  4477    GETDAT  3656    ISZTST  1234
CONWOT  1136    ERROPR  2306    GETSWR  0356    JCHNG   2764
CONWQD  1142    ERROR   1313    GETWD   2112    JMPJMS  0665
CONRAN  5006    ERROR1  1415    GLNKDN  2374    JMPTST  1304
CONSET  3162    ERROR2  0724    GLPSWO  1776    JMSLOC  0762
CONST1  1105    ERROR5  5266    GMQDAT  2375    JMSLOD  0763
CONST2  1112    ERRPSR  1332    GMQDON  1775    JMSRET  0776
CONTLM  3166    ERRRET  1352    GOITA   3646    JMSTST  1267
CONTRD  5255    EXECH   4302    GOPRET  2365    JRERNG  2765
COPRST  2773    EXITA   3643    GOTOA   3654    K0700   4717
CP212   4614    EXPRET  2751    GRANFL  2363    K1      2061
CP215   4613    FOINIT  0334    GRERNG  2150    K10     0501
CP4n0   4247    FCHNG   1746    GSMLNK  2373    K100    2067
CREFAD  1574    FILALL  0527    GSVLNK  2372    K14     2064
CRERNG  1563    FILCNT  4241    GTCHAR  3222    K177    1646

CRLFC8  4556    FILL    5040    GTF     6004    K2      2062
CROSPG  4577    FILLER  4240    HALT    1335    K20     2065
CSAVA   1553    FILRND  3001    HCHNG   2343    K200    5072
CSAVB   1554    FINSTR  1367    HDMES   4740    K23     3354
CSAVC   1555    FIRST   3102    HGHLIM  1145    K237    3144
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SEQ 0096

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K240    3276    M36     3355    NOTIND  0625    POS200  2071
K37     1546    M3777   2565    NOTJJ   0650    POWERF  3163
K4      2063    M4      4615    NTCLAS  4465    POWFAL  3246
K40     2066    M400    0215    NTSTOP  4573    PRGBG   1576
K400    0250    M5      0121    O6201   1733    PRGBGN  5123
K4000   2434    M60     2305    OADDRS  1773    PRGEND  5176
K4772   5263    M6000   1645    OCTAC8  4560    PRGRET  3373
K5771   0124    M7      5071    OERROR  2767    PRGSIZ  1552
K5772   0125    MAXFLD  0573    OFIELD  2176    PRNTC8  4557
K6201   0756    MDTMSK  1135    OP1     3370    PSIE    6665
K6202   0757    MEMDAT  1025    OP1MND  5264    PSKE    6663
K70     1125    MESA    4150    OP1OVR  5265    PSKF    6661
K7000   1644    MESAC   4512    OP1SEL  0021    PSRERR  3371
K7577   4721    MESERR  4550    OP1SET  5105    PSTB    6664
K7600   4716    MESFL   4520    OP2SEL  0022    PTSR    4056
K7700   2517    MESHD   4773    OPERR1  1734    PTSTOR  3541
K7721   1655    MESMQ   4515    OPRBGN  1656    R5771   5262
K7770   0760    MESPAS  3457    OPRCOM  2706    RAN1    1543
K7777   2624    MESPC   4507    OPRER1  2376    RAN2    1544
KCHNG   3147    MIN37   0123    OPRERR  2744    RANCON  2127
KIE     6035    MM20    5240    OPRETF  2747    RANDY   1401
KILON1  3331    MM4     3023    OPRHLT  2364    RANDY1  1413
KILON2  3332    MM55    3100    OPRINT  0637    RANFLD  0754
KILL    3101    MM7     1545    OPROVR  0120    REDOA   3620
KILLIT  3366    MMM55   3274    OPRPNT  1752    REFAD   0747
KJMS    0764    MOVDWN  5157    OPRRET  2675    RELGO   3367
KKCDF   3143    MOVOVR  0073    OPRSET  2054    RESBOT  3334
KPERNG  3150    MOVUP   0225    OSINAC  2173    RESCNT  5035
LAS     7604    MOVWDX  5173    OSMLNK  2174    RESET   3264
LCSKPA  4344    MQA     7501    OUT     3241    RESETT  0256
LCHNG   3361    MQDAT   1363    OVR4    5241    RETFLD  0525
LFPR1   4141    MQDATA  0753    OVRLAY  0115    RETHR   0504
LIMITS  1522    MQDMSK  1141    OVRLY1  0117    RETN    4714
LINKDN  2746    MQDONE  2750    OVROPI  5267    RETPNT  0004
LINKRT  1361    MQL     7421    OWLVT   0612    RETPRG  3131
LINKSV  1360    MQMES   4553    OWVT78  5312    RETTDF  2705
LNKSAV  1174    MQSAV8  3374    PAGJMP  4574    RETURN  1354
LOC200  0126    MQSAVE  4525    PASCNT  3453    RFVT    0613
LOC201  0127    MQSC8   4375    PASMES  3566    RFVTP   5314
LOOPID  0601    MRIERR  2161    PATCH   0023    RMF     6244
LOWLIM  0214    MRIOVR  0116    PATCH1  0042    ROLBAK  0401
LPCNT   0252    MRIPNT  1751    PATCH2  5200    ROLFLG  2574
LPSW0   2737    MVWDPG  5174    PATCH3  5307    ROLLUP  0315
LPERNG  3362    NEG10   2072    PATCHC  0070    RSCNT   0376
M0600   4720    NEG100  3277    PATMOV  0130    RSCNTX  0370
M10     0503    NEG14   1652    PCLF    6662    RTCFLG  3227
M101    3145    NEG20   2304    PCMES   4551    RTCSER  3232
M13     2536    NEG6    2460    PCSAV   4523    RTFLG   0572
M14     2424    NEWDFA  0475    PCSAVE  1311    RTFLGF  0574
M20     0502    NEWDTF  0457    PCTST   2073    RTFLGR  0571
M200    0251    NOSET   3445    PNTBUF  4331    RTLINK  0557
M24     3333    NOTAUT  0611    POS10   2250    RTMQD   0556
```

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SAMF1   1463        SIZPRG  5175        UPRLIM  1550        XEXPRT  1767
SAMF2   1473        SKPFLG  2251        VINSTR  4770        XFDMSK  5126
SAV2    4163        SLOWRN  5223        VT78GL  4700        XFIELD  2775
SAVFSW  1564        SLOXMT  3156        VT78OW  5767        XFILL   5114
SAVLNK  0755        SMACHK  2202        WAIT    0360        XFIRST  5104
SAVMP2  0071        SMLCHK  2220        WAITEN  3300        XFLD    0354
SAVSI   3565        SPL     6102        XACDMS  5140        XFLDFG  5121
SAVSWR  0333        START   1756        XACSIM  2352        XFLDLM  1573
SBE     6101        STARTP  5025        XADD1   3173        XFLRND  5115
SELM1   3564        STOPNT  3542        XADRMS  5130        XGENTI  1155
SELM2   4162        STRFLD  0005        XASAVA  0364        XGETWD  1357
SELM2A  4366        STRNWL  3152        XASAVB  0365        XGNFLD  5124
SELM2B  4564        STRRNO  5237        XBGCON  0372        XGO     0576
SELM2C  3762        SUBADD  0212        XBGRAN  0371        XHALT   1565
SELM2X  4772        SWAP1   0216        XBNDCN  1160        XINDMS  5134
SELMP1  3035        SWAP2   5150        XBSAVA  1356        XINSGN  2774
SELMP2  3456        SWAPDN  0422        XC8CKP  4250        XINSMS  5132
SERRTC  3165        SWAPUP  0415        XC8CN   4172        XINSTR  0362
SERXMT  3164        SWITCH  0020        XC8CNT  3601        XINT    2151
SETCON  5001        SWPFLD  0463        XC8CRL  4224        XJMSLC  2154
SETMUX  3151        SWPUP   0452        XC8ECH  4273        XLF     4775
SETFLG  0324        SXPSW   4033        XC8ERR  4401        XLIMIT  3154
SETTNT  0357        SZACHK  2211        XC8INQ  3726        XLOOP   0367
SETMP1  3036        SZPRG   0245        XC8LF   4531        XLWLIM  0570
SETRET  0710        TABLA   3657        XC8OCT  4201        XMDTMS  5136
SETSKP  2226        TABLB   3752        XC8PAS  3401        XMQDMS  5142
SFLDFG  0433        TABLE   5125        XC8PNT  3506        XMTFLG  3226
SIMAC   2752        TADTST  1223        XC8PSW  4042        XMTSER  3201
SIMACL  2666        TEMP    3024        XC8SW   3466        XMTSLU  3230
SIMASW  2477        TINT    2143        XC8TTY  3475        XNTIND  0363
SIMCAM  2663        TMPCNT  4147        XC8TYP  4306        XOWLVT  5313
SIMCLA  2661        TSAME   1503        XCHNGE  0552        XPASSC  4555
SIMCLR  6160        TSFLDF  2572        XCL8WP  2362        XPCSAV  2155
SIMCMA  2401        TSTCHA  4107        XCNACD  5141        XPSR    4776
SIMCML  2426        TSTIN1  0562        XCNADR  5131        XPSW    3770
SIMIAC  2435        TSTIN2  0563        XCNFLD  5127        XPTCH3  0072
SIMLNK  2753        TSTIN3  0564        XCNFLG  3153        XRANCN  5110
SIMMQ   2754        TSTIN4  0565        XCNIND  5135        XREFAD  0366
SIMMQA  2644        TSTIN5  0566        XCNINS  5133        XRETFL  1373
SIMMQI  2252        TSTIN6  0561        XCNMDT  5137        XRETHR  1165
SIMMQL  2640        TSTPC   1355        XCNMQD  5143        XRETPC  2156
SIMOP1  2001        TSWPDN  2573        XCNT    0271        XRNFLD  1364
SIMOP2  2201        TTYCNT  3275        XCNTR3  5122        XROLBK  0361
SIMRAL  2461        TTYLC8  4364        XCTLC   4160        XRSCNT  5144
SIMRAR  2442        TTYLPT  4332        XCTLG   4161        XRTOPF  1774
SIMRTL  2537        TYPE    4617        XDATAH  1762        XSIMAC  1763
SIMRTR  2520        TYPECT  4616        XDOLPT  4321        XSIMMQ  1766

SIMSMA  2611        TYPEIT  4600        XDOSW   4572        XSIZE   0575
SIMSNL  2626        UPARC8  4365        XDRFLG  5120        XSMACL  2361
SIMSWP  2652        UPAROW  4016        XENDPR  0375        XSMB8W  2170
SIMSZA  2601        UPDWN   5147        XERR2   1572        XSMCAM  2360
SIMTWC  2042        UPPERL  2571        XERROR  1353        XSMCLA  2357
```



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XSMSMA  2163        ZLIMIT  0555
XSMSML  2164        ZSETOP  2353
XSMTAC  2165        ZUPLIM  5112
XSMTNK  1765
XSMWQA  2355
XSMWQI  1772
XSMWQL  2354
XSWMP1  1770
XSWMP2  1771
XSWRAL  2167
XSWRAR  2166
XSWRTL  2172
XSWRTR  2171
XSWSMA  2346
XSWSNL  2350
XSWSWP  2356
XSWSZA  2347
XSTFLD  0554
XSTWS   4722
XSVTNK  1764
XSWAP1  5116
XSWAP2  5117
XTARLA  3750
XTARLB  3751
XTYCNT  3155
XUPERL  0373
XUPTIM  1157
XVT78G  0767
XWDWQV  2153
XXCNT   2776
YHALT   0770
Z100    2243
Z20     2245
Z200    2246
Z320    2247
Z40     2244
ZADDRS  4771
ZASAVA  1370
ZASAVB  1371
ZBSAVA  1570
ZCHANG  4766
ZCNFLG  2152
ZCNT    0775
ZEXPRT  2351
ZFILL   3171
ZFIND   0774
ZFLDLM  5111
ZGETWD  0773
ZHIGH   5113
ZINDAD  1571
ZINSTR  1566
ZJMSRT  1753
```

SEQ 0099

ERRORS DETECTED: 0

LINKS GENERATED: 0

RUN-TIME: 7 SECONDS

4K CORE USED

SEQ 0100

```
AUTO11      40#    86     91     110    2165   2172   3489   3493   3504   3508
B400      1156#  1166   1203
B6201      325    328    381#   387    390
B7         374    396#
BACK      3995   3322#
BADDRS     486    907    942#
BCHNG      415    926#
BDATHR     419    839    851    869    876    890    950#
BDATIM     418    838    847    861    949#
BEGIN      991    420#
BGN         35    139    140    146#   187    420    1080   1103   1240   2033   3426   3468
BGNCON     279    280   1923#
BGOTST     375    379#
BINSTR     371    413#
BLPCNT     834    844    941#
BNDCON     795    997   1079#
BNDOK1    1004#
BNDOK2    1009   1014#
BNDRY1     799    992#   999    1013   1014   1017
BOOTAD    2162   2187#
BOOTSV    2187   3242#
BOTPES    3046   3055#
BP6       1160#  1181
BRANDY    1117   1239#
BREFAD     856    865    881    948#
BRERNG     926    928#
BSAVA      934   1097   1352   1353   1358   1380#
BSIMAC    1470   1583   1603   1616   1620   1635   1639   1653   1655   1659   1673   1677   1692   1696
          1723#
BSMLNK    1592   1595   1612   1622   1631   1641   1649   1661   1669   1679   1688   1698   1724#
C10       3367   3398#
C100      2696   2713#
C1777     1066   1087#
C200       897#   912
C400       980   1077#
C4008     2702#  2744
C400X     3305   3315#
C5        1045   1084#
C6201      725    762#
C7        1063   1085#
C70       1060   1086#
C80077    2407   2424#
C80100    2412   2426#
C80400    2476   2533#
C8100     2535#
C8177     2364   2421#
C8200     2365   2422#
C8240     2413   2427#
C8277     2504   2534#

C8336     2693   2701#
C83740    2410   2425#
C840      2703#  2761
C8400     2776   2280   2298   2420#
```



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C87       2709#  2802
C87700    2396   2423#
C88400    3096   3169#
C888SW    3179   3207#
C88GET    2549   2574   2658#
C8ACSV    2474   2479   2650#
C8BY1     2283   2285   2301#  2315
C8BY2     3138   3140   3153#
C8BY3     2948   2952   2960#
C8BY4     2942   3179#
C8BY5     3011   3020#
C8CHAR    2366   2367   2444#
C8CHG1    2255   2431#
C8CHG2    2452   2634#
C8CHG3    2665   2824#
C8CHG4    2849   3052#
C8CHG5    3072   3185#
C8CHKP    1987   2037#
C8CKP     2866   2875   2879#
C8CKPA    2442#
C8CKSW    2279   2297   2437#
C8CNTR    2576   2649#
C8CR      2672   2808   2810   2838#
C8CRL     2506   2646#
C8CRLF    2288   2296   2438#
C8DO1     2395#  2416
C8DO10    3101   3134#
C8DO11    2675   2679#
C8DO2     2899#  2901
C8DO4     2867#  2876
C8DO7     2563   2570#
C8ECHO    2764   2771   2837#
C8EROR    1223   1234#
C8ERR      919    929#
C8ERRP    1996   2038#
C8FLSV    2482   2651#
C8GET     2143#  2151   2658   2841   3066   3201
C8GET8    2682   2841#
C8GETS    3150   3154   3201#
C8HANG    3015   3027#  3036
C8HLT     3147   3168#
C8IND     3177   3205#
C8INM     2763   2843#
C8INMD    2499   2547   2655#
C8INQU    2300   2441#
C8K277    2710#  2806
C8KPA     3032   3062#
C8LF      2784   2827#
C8LFCR    3178   3206#
C8M212    2704#  2782
C8MOSV    2486   2652#
C8N270    2708#  2798
C8N3      2711#  2769
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STOPAI   2418#  2659   3209
STRFLD     35#  1125
STRNWL   1059   2019#
STRRND   3503   3514#
SUBAUD    153    158#   241
SWAP1     163#  3421
SWAP2    3422   3447#
SWAPDN    302    308#  1721
SWAPUP    303#   310
SWITCH     44#  1068
SWPFLD    329    341#
SWPUP     332#
SXPSW    2707#  2753   2813
SZACHK   1425   1427   1429#
SZPRG     163    187#   426
TABLA    2425#  2637
TABLB    2638   2639#
TABLE    3339   3428#
TADTST    415    836#
TEMP     1901   1912   1920#
TINT     1374   1376#
TMPCNT   2770   2778   2817#
TSAME    1023   1032   1037#  1047   1049   1051
TSFLDF   1705   1720#
TSTCHA   2765   2772   2781#  2805
TSTIN1    415#
TSTIN2    416#
TSTIN3    417#
TSTIN4    418#
TSTIN5    419#
TSTINS    379    414#
TSTPC     817    836    850    864    875    889    933#
TSWPDN   1708   1721#
TTYCNT   2022   2059   2064   2121#
TTYLC8   3044   3056#
TTYLPT   2656   3003   3023#  3056
TYPE     3219   3221   3224   3234#  3240
TYPECT   3223   3225   3232#
TYPEIT   2188   3217#  3227
UPARC8   3045   3057#
UPAROW   2657   2692#  2698   3057   3203
UPDWN    3338   3353   3408   3446#  3448   3463
UPPERL   1702   1719#
UPRLIM    981    794   1058   1059   1062   1067   1078#  1719   3417
VINSTR   3285   3291   3293   3323#
VT78GL    658   3280#
VT78OW    444#  3563
WAIT      211    270#
WAITEN    970   2125#  2140

XACDMS   3439#
XACSIM   1453   1510   1536#
XADD1    1917   2036#
XADPMS   3431#
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XASAVA    205    274#
XASAVB    206    275#
XBGCON    280#
XBGPAN    279#
XBNDCN    692    795#
XBSAVA    857    866    882    934#
XC8CKP   2037   2442   2937#  2959   2961   3030   3035   3062
XC8CN    2676   2839#
XC8CNT   2473#  2480   2508   2510   2513   2515   2567   2599   2608   2649   2839   3061
XC8CRL   2019   2438   2646   2838   2891#  2902   3196   3206   3328
XC8ECH   2837   2975#  2985
XC8ERR    929   1234   2038   2186   3085#  3093   3146   3157
XC8INQ   2441   2621#  2626   2828   3200
XC8LF    2827   3174#
XC8OCT   2440   2836   2861#  2877   3198
XC8PAS    967   2271#  2282   2301   2302
XC8PNT   2390#  2392   2394   2398   2409   2439   2835   3197   3327
XC8PSW   2653   2739#  2746   2752   2809   2833   3329
XC8SW     268   1882   2339#  2347   2437   3199
XC8TTY   2360#  2368   2648   3060
XC8TYP   2443   2645   2834   3001#  3021   3059
XCHNGE    405    407#
XCLSWP   1490   1544#
XCNACD   3440#
XCNADR   3432#
XCNFLD   3430#
XCNFLG   1924   2020#
XCNIND   3436#
XCNINS   3434#
XCNMDT   3438#
XCNMOD   3442#
XCNT      197    209#  1890   2190
XCNTR3   3364   3368   3369   3370   3381   3384   3389   3425#
XCTLC    2829#
XCTLG    2830#
XDA1AH   1190   1244#
XDOLPT   3005   3012#
XDOSW    3180   3208#
XDRFLG   3355   3403   3423#
XENDPR    165    168    229    283#
XERR2     987   1099#
XERROR    916    931#
XEXPRT   1198   1249#
XFDMSK   3428   3429#
XFIELD   1835   1889#
XFILL    3392   3419#
XFIRST   3341   3411#
XFLD      220    266#
XFLDFG   3356   3424#
XFLDLM   1061   1100#
XFLRND   3383   3420#
XGENTI    718    792#
XGETWD    858    867    883    935#
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XGNFLD   3765   3427#
XGO       353    427#
XHALT     974    976     978    1094#
XINDMS  3435#
XINSGN  1863   1888#
XINSMS  3133#
XINSTR   198    202     272#
XINT    1373   1389#
XJMSLC  1333   1392#
XLF     3312   3328#
XLIMIT  1025   2021#
XLOOP    208    277#
XLWLIM   293    334     421#
XMDTMS  3437#
XMODMS  3441#
XMTFLG  2024   2053    2071#   2104    2112
XMTSER  2029   2049#
XMTSLU  2023   2058    2062    2066    2073#
XNTIND   201    273#
XOWLVT  3561   3564#
XPASSC  3175   3195#
XPCSAV  1334   1335    1393#
XPSR    3313   3329#
XPSW    2627   2653#
XPTCH3    79    104#
XRANCN  3344   3350    3415#
XREFAD   207    276#
XRETFL   901    947#
XRETHR   726    800#
XRETPC  1337   1394#
XRNFLD   899    940#
XROLBK   228    233     271#
XRSCNT  3443#  3465
XRTOPF  1201   1254#
XSIMAC  1191   1245#
XSIMMQ  1195   1215    1248#
XSIZE    332    426#
XSMACL  1487   1543#
XSMBSW  1305   1404#
XSMCAM  1484   1542#
XSMCLA  1481   1541#
XSMCMA  1279   1399#
XSMCML  1283   1400#
XSMIAC  1287   1401#
XSMLNK  1193   1247#
XSMMQA  1475   1539#
XSMMQI  1210   1252#
XSMMQL  1472   1538#
XSMOP1  1205   1250#

XSMOP2  1209   1251#
XSMRAL  1299   1403#
XSMRAR  1296   1402#
XSMRTL  1311   1406#
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XSMRTR  1308   1405#
XSMSMA  1426   1532#
XSMSNL  1440   1534#
XSMSWP  1478   1540#
XSMSZA  1433   1533#
XSTFLD   386    409#
XSTMS   2039   3302#   3307    3314
XSVLNK  1192   1246#
XSWAP1  3407   3421#
XSWAP2  3405   3422#
XTABLA  2488   2637#
XTABLB  2516   2638#
XTYCNT  1957   1963    2022#
XUPERL   224    281#
XUPLIM   687    794#
XVT78G   444    658#
XWDMOV  1366   1391#
XXCNT   1864   1890#
YHALT    619    621     623     625     627     629     631     659#
Z100    1423   1456#
Z20     1437   1458#
Z200    1451   1459#
Z320    1460#  1467
Z40     1430   1457#
ZADDRS  3280   3324#
ZASAVA   914    944#
ZASAVB   915    945#
ZBSAVA   986   1097#
ZCHANG  3210   3213    3320    3321#
ZCNFLG  1363   1390#
ZCNT     632    664#
ZEXPRT  1449   1500    1535#
ZFILL   1911   1916    2034#
ZFIND    622    653#
ZFLDLM  3372   3416#
ZGETWD   618    662#
ZHIGH   3378   3387    3388    3418#
ZINDAD   975    983    1098#
ZINSIR   979   1095#
ZJMSRT  1139   1164    1237#
ZLIMIT   398    410#
ZSETOP  1454   1469    1537#
```