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 REFERENCE 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. EPROKS 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

```
                        /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 SIMUALATOR 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)
```



```
                        /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  CIFFD0          /PUT IT IN LOCATION 1 OF FIELD 0
0342  0001  CIFFD0, INT-2
0343  7240          CLA     CMA             /SET THE AC TO ALL ONE'S
0344  1742          TAD  I  CIFFD0          /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  1550  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  6274          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
```

```
                1AD A7
                SZL CLA                 /=AS IT WITHIN AUTO BOUNDARY
                SKP CLA                 /NO, NOT AUTO-INDEX
                JMP I XVT78G            /VT78/
                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.
RFVT,           TAD INDAD
                DCA SETRET              /SAVE INDIRECT ADDRESS
                TAD RANFLD
                TAD K6201               /CHANGE TO A RANDOM DATA FIELD
                DCA .+1
                HLT/CDF
                TAD SETRET              /GET INDIRECT ADDRESS
                DCA I REFAD             /PUT INDIRECT ADDRESS INTO REF ADD
                TAD INDAD
                DCA REFAD               /MAKE REFAD=INDAD
NOTIND, CLA CLL CML RAR
                TAD INSTR
                SZL CLA                 /WHAT TYPE OF INSTR
                JMP JMPJMS              /IT WAS A JMP OR JMS
                TAD RANFLD
                TAD K6201
                DCA .+1
                HLT/CDF                 /CHANGE TO A RANDOM DATA FIELD
                TAD DATATH              /GET INITIAL MEMORY DATA AND PUT IT IN
                DCA I REFAD             /REF ADD OR INDIRECT ADD FOR AND THROUGH DCA
OPRINT, CLA CMA                 /SUBTRACT 1 FROM INSTRUCTION ADDRESS
                TAD ADDRS               /AND SAVE IT
                DCA HOMCIF
                RIF
                TAD K6202               /SET UP HOME INSTRUCTION FIELD
                DCA I HOMCIF            /IN INSTRUCTION ADDRESS=1 FOR AND=DCA
                CLA CLL IAC
                TAD ADDRS
                JMS SETRET              /SETUP RETURN,INSTR ADD+1,+2=4400 FOR AND=DCA
                                        /LOCATION 0 CONTAINS RETURN POINTER
NOTJJ,  TAD INSTR               /PUT INSTRUCTION IN INSTRUCTION ADDRESS
                DCA I ADDRS
                TAD SAVLNK
                CLL RAL
                TAD MQDATA              /GET THE RANDOM MQ DATA
                MQL                     /AND LOAD IT INTO THE MQ
                CLA                     /SAFETY CLEAR THE AC IN CASE MQL DOESN'T

                TAD RANFLD              /MAKE UP A CIF TO A RANDOM FIELD
                TAD K6202
                DCA .+2
                TAD DATAHR              /GET THE AC DATA INTO THE AC
                HLT/CIF                 /D,F, HAS BEEN CHANGED NOW CHANGE I,F,
                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
                ////////////////////////////////////////////////////////////////////
JMPJMS, TAD INSTR               /GET THE INSTRUCTION
                RTL                     /IS IT A JMP OR JMS?
                SMA CLA
                IAC                     /JMS ADD 1 TO REFERENCE ADDRESS FOR CIF INST
                TAD REFAD               /GET REFERENCE ADDRESS
                DCA SETRET              /AND SAVE IT FOR THE CIF INSTRUCTION
                TAD RANFLD              /MAKE CDF INST TO THE RANDOM FIELD
                TAD K6201
                DCA .+1
                HLT/CDF                 /CHANGE TO RANDOM DATA FIELD
                RIF
                TAD K6202               /MAKE A CIF INSTRUCTION TO HOME FIELD
                DCA I SETRET            /PUT IT IN REFERENCE ADD OR INDIRECT ADD
                IAC
                TAD SETRET
                JMS SETRET              /SETUP LOC 4 AND JMS I 4 IN APPROPRIATE PLACES
                TAD ADDRS               /GET INSTRUCTION ADDRESS
                DCA HOMCIF              /SAVE IT
                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    F4QDAT, 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 1K
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
```

```
 771  1134  0000    CONIND, 0
 772  1135  7777    MDIMSK, 7777
 773  1136  0000    CONMDT, 0
 774  1137  7777    ACDMSK, 7777
 775  1140  0000    CONACD, 0
 776  1141  7777    MQDMSK, 7777
 777  1142  0000    CONMQD, 0000
 778  1143  0000    CONFLG, 0
 779  1144  0000    FLDLIM, 0
 780  1145  0000    HGHLIM, 0
 781  1146  0000    ASAVA,  0
 782  1147  0000    ASAVB,  0
 783
 784        1150    *1150
 785                /
 786  1150  4751    A1CHG,  JMS I A1RRNG
 787                /
 788  1151  0202    A1RRNG, CHANGE
 789  1152  0432    FLDFGR, SFLDFG-1
 790  1153  0433    FLDFGF, SFLDFG
 791  1154  2555    CHK1KF, FLDCHK
 792  1155  1601    XGENTI, INSGEN
 793  1156  0754    FLDRAN, RANFLD
 794  1157  1550    XUPLIM, UPRLIM
 795  1160  1551    XBNDCN, BNDCON
 796  1161  1463    ASAME1, SAME1
 797  1162  1473    ASAME2, SAME2
 798  1163  1401    ARANDY, RANDY
 799  1164  1435    ABNRY1, BNDRY1
 800  1165  0510    XRETHR, RETHR+4
 801  1166  0745    AADDRS, ADDRS
 802  1167  0746    AINSTR, INSTR
 803  1170  0747    AREFAD, REFAD
 804  1171  0751    ADATAT, DATATH
 805  1172  0752    ADATAH, DATAHR
 806  1173  0753    AMQDAT, MQDATA
 807  1174  0755    LNKSAV, SAVLNK
 808  1175  0625    ANTIND, NOTIND
 809  1176  0601    ALOPID, LOOPID
 810  1177  0000            0
 811
 812                /
 813        1200    *1200
 814                /
 815  1200  5347            JMP BCHNG               /GO ULTER
 816                /
 817  1201  4755    ANDTST, JMS I TSTPC             /CHECK PC FROM RETURN

 818  1202  1775            TAD I BDATTH
 819  1203  0776            AND I BDATHR
 820  1204  7041            CIA
 821  1205  1772            TAD I DATFN
 822  1206  7640    COMPAR, SZA CLA                 /DID AND WORK
 823  1207  5313            JMP ERROR               /RANDOM AND FAILED
 824  1210  1760            TAD I LINKSV            /CHECK TO SEE IF THE LINK CHANGED
 825  1211  7041            CIA
```



```
 826  1212  1761            TAD I LINKRT            /
 827  1213  7640            SZA CLA
 828  1214  5313            JMP ERROR               /ERROR,THE INSTRUCTION CHANGED THE LINK
 829  1215  1763            TAD I MQDAT             /CHECK TO SEE IF THE INSTR CHANGED THE MQ
 830  1216  7041            CIA
 831  1217  1762            TAD I DONEMQ            /
 832  1220  7640                SZA     CLA
 833  1221  5313            JMP ERROR               /THE INSTRUCTION CHANGED THE MQ
 834  1222  5765            JMP I BLPCNT
 835                /
 836  1223  4755    TADTST, JMS I TSTPC             /CHECK PC FROM RETURN
 837  1224  7340            CLA CLL CMA
 838  1225  0775            AND I BDATTH
 839  1226  1776            TAD I BDATHR
 840  1227  7041            CIA
 841  1230  1772            TAD I DATFN
 842  1231  7640            SZA CLA
 843  1232  5313            JMP ERROR
 844  1233  5765            JMP I BLPCNT
 845                /
 846  1234  7301    ISZTST, CLA CLL IAC
 847  1235  1775            TAD I BDATTH
 848  1236  7650            SNA CLA                 /SHOULD THE ISZ SKIP
 849  1237  7001            IAC                     /YES
 850  1240  4755            JMS I TSTPC             /CHECK FOR CORRECT PC
 851  1241  1776            TAD I BDATHR
 852  1242  7041            CIA
 853  1243  1772            TAD I DATFN
 854  1244  7640            SZA CLA                 /DID AC CHANGE ON ISZ
 855  1245  5313            JMP ERROR               /AC FAILED ON ISZ
 856  1246  1774            TAD I BREFAD            /GET INCREMENTED DATA WORD
 857  1247  3756            DCA I XBSAVA
 858  1250  4757            JMS I XGETWD
 859  1251  7041            CIA
 860  1252  7001            IAC
 861  1253  1775            TAD I BDATTH
 862  1254  5206            JMP COMPAR              /DID ISZ WORK
 863                /
 864  1255  4755    DCATST, JMS I TSTPC             /CHECK PC FROM RETURN
 865  1256  1774            TAD I BREFAD
 866  1257  3756            DCA I XBSAVA
 867  1260  4757            JMS I XGETWD
 868  1261  7041            CIA
 869  1262  1776            TAD I BDATHR
 870  1263  7640            SZA CLA                 /DID DCA WORK
 871  1264  5313            JMP ERROR               /DCA FAILED
 872  1265  1772            TAD I DATFN             /DID AC CLEAR ON DCA
 873  1266  5206            JMP COMPAR              /??
 874                /
 875  1267  4755    JMSTST, JMS I TSTPC             /CHECK PC FROM RETURN
 876  1270  1776            TAD I BDATHR
 877  1271  7041            CIA
 878  1272  1772            TAD I DATFN
 879  1273  7640            SZA CLA                 /DID JMS CHANGE AC
 880  1274  5313            JMP ERROR               /JMS CHANGED AC
```

SEQ 0039

```
 881   1275  1771            TAD I BREFAD
 882   1276  3756            DCA I ABSAVA
 883   1277  4757            JMS I XGETWD
 884   1300  7041            CIA
 885   1301  7001            IAC
 886   1302  1766            TAD I BADDRS
 887   1303  5206            JMP COMPAR              /DID JMS WORK
 888                 /
 889   1304  4755    JMPTST, JMS I ISTPC             /CHECK PC FROM RETURN
 890   1305  1776            TAD I BDATHR
 891   1306  7041            CIA
 892   1307  1772            TAD I DATFN
 893   1310  5206            JMP COMPAR              /DID JMP AFFECT THE AC
 894                 /
 895
 896   1311  0000    PCSAVE, 0
 897   1312  0200    C200,   200
 898
 899   1313  1764    ERROR,  TAD I XRNFLD
 900   1314  4335            JMS HALT                /FIELD THAT INSTRUCTION WAS PUT IN
 901   1315  1773            TAD I XRETFL
 902   1316  4335            JMS HALT                /PROGRAM RETURNED FROM THIS FIELD
 903   1317  1311            IAD PCSAVE
 904   1320  4335            JMS HALT                /EXPECTED PC RETURN
 905   1321  1754            TAD I RETURN
 906   1322  4335            JMS HALT                /ACTUAL PC RETURN
 907   1323  1766            IAD I BADDRS
 908   1324  4335            JMS HALT                /INSTRUCTION ADDRESS
 909   1325  1767            IAD I FINSTR
 910   1326  4335            JMS HALT                /INSTRUCTION
 911   1327  1767            TAD I FINSTR
 912   1330  0312            AND C200
 913   1331  7640            SZA CLA
 914   1332  1770    ERRPSR, TAD I ZASAVA
 915   1333  1771            TAD I ZASAVB
 916   1334  5753            JMP I XERROR            /GET REST OF ERROR INFORMATION
 917                 /
 918   1335  0000    HALT,   0
 919   1336  4751            JMS I CBERR/HLT         /ERROR INFORMATION IN AC
 920   1337  7200            CLA
 921   1340  5735            JMP I HALT
 922                 /
 923                 /
 924         1347    *1347
 925                 /
 926   1347  4750    BCHNG,  JMS I BRERNG
 927                 /

 928   1350  0202    BRERNG, CHANGE
 929   1351  4401    CBERR,  XCBERR
 930   1352  0252    ERRRET, LPCNT
 931   1353  1415    XERROR, ERROR1
 932   1354  0504    RETURN, RETHR
 933   1355  2073    TSTPC,  PCTSI
 934   1356  2145    XBSAVA, BSAVA
 935   1357  2112    XGETWD, GETWD
```


SEQ 0040

```
 936   1360  0755    LINKSV, SAVLNK
 937   1361  2746    LINKRT, LINKDN
 938   1362  2750    DONEMQ, MQDONE
 939   1363  0753    MQDAT,  MQDATA
 940   1364  0754    XRNFLD, RANFLD
 941   1365  0252    BLPCNT, LPCNT
 942   1366  0745    BADDRS, ADDRS
 943   1367  0746    FINSTR, INSTR
 944   1370  1146    ZASAVA, ASAVA
 945   1371  1147    ZASAVB, ASAVB
 946   1372  0527    DATFN,  FILALL
 947   1373  0525    XRETFL, RETFLD
 948   1374  0747    BREFAD, REFAD
 949   1375  0751    BDATTH, DATATH
 950   1376  0752    BDATHR, DATAHR
 951   1377  0000            0
 952                 /
 953         1400    *1400
 954                 /
 955   1400  5362    JMP CCHNG
 956                 /
 957   1401  0000    RANDY,  0
 958   1402  7301            CLA CLL IAC
 959   1403  1343            TAD RAN1
 960   1404  1344            TAD RAN2
 961   1405  7106            CLL RTL
 962   1406  3343            DCA RAN1
 963   1407  1344            TAD RAN2
 964   1410  7012            RTR
 965   1411  1343            TAD RAN1
 966   1412  3344            DCA RAN2
 967   1413  1344    RANDY1, TAD RAN2
 968   1414  5601            JMP I RANDY
 969
 970                 /
 971                 /
 972   1415  3774    ERROR1, DCA I CREFAD
 973   1416  1774            TAD I CREFAD
 974   1417  4765            JMS I XHALT
 975   1420  1771            TAD I ZINDAD            /REFERENCE ADDRESS
 976   1421  4765            JMS I XHALT
 977   1422  1767            TAD I CDATAT            /INDIRECT ADDRESS IF ANY
 978   1423  4765            JMS I XHALT
 979   1424  1766            TAD I ZINSTR            /INITIAL MEMORY DATA
 980   1425  0347            AND C400
 981   1426  7650            SNA CLA
 982   1427  5232            JMP .+3
 983   1430  1771            TAD I ZINDAD
 984   1431  3774            DCA I CREFAD
 985   1432  1774            TAD I CREFAD
 986   1433  3770            DCA I ZBSAVA
 987   1434  5772            JMP I XERR2             /GO GET REST OF INFORMATION
 988
 989                 /THIS SECTION OF THE SUBROUTINE CHECKS FOR ILLEGAL ADDRESSES WHICH
 990                 /ARE AS FOLLOWS:0000 - 0006 AND UPPER TEST AREA LIMIT,-1 AND -2.
```

```
  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
```



```
  997    1442  1351            TAD BNDCON              /ADD IN BOUNTRY CONSTANT=6012,4012,2012,0012
  998    1443  7630            S2L 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 MEMORY 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
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```
1122  1607  6224            RIF             /READ THE INSTRUCTION FIELD
1123  1610  1356            TAD     START   /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  5202            JMP INSGEN+1    /IT WAS A IOT REGENERATE A NEW INSTRUCTION
1135  1624  1244            IAD 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
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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 CSEROR/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
```

```
1232                    /
1233    1747  0202      FREENG, CHANGE
1234    1750  4401      CBERDR, XCBERR
1235    1751  0504      MRIPNI, RETMR
1236    1752  2675      OPRPNT, OPRRET
1237    1753  0776      ZJMSRT, JMSRET
1238    1754  0746      EINSTR, INSTR
1239    1755  1401      BRANDY, RANDY
1240    1756  0200      START,  BGN
1241    1757  0753      INTMQD, MQDATA
1242    1760  1146      AASAVA, ASAVA
1243    1761  1147      AASAVB, ASAVB
1244    1762  0752      XDATAM, DATAMR
1245    1763  2752      XSIMAC, SIMAC
1246    1764  0755      XSVLNK, SAVLNK
1247    1765  2753      XSMLNK, SIMLNK
1248    1766  2754      XSIMMQ, SIMMQ
1249    1767  2751      XEXPRT, EXPRET
1250    1770  2001      XSMOP1, SIMOP1
1251    1771  2201      XSMOP2, SIMOP2
1252    1772  2252      XSMMQI, SIMMQI
1253    1773  0745      OADDRS, ADDRS
1254    1774  2705      XRTUPF, RETTDF
1255    1775  2750      GMQDON, MQDONE
1256    1776  2737      GLPSWO, LPSWO
1257    1777  0000      0
1258                    /
1259
1260
1261          2000      *2000
1262                    /
1263    2000  5347              JMP     GCHNG
1264                    /
1265
1266                    /BEGINNING OF OPERATE GROUP ONE SIMULATION
1267
1268    2001  1762      SIMOP1, TAD  I  CINSTR  /GET THE INSTRUCTION
1269    2002  0271              AND     POS200  /IS BIT 4 SET TO CLEAR THE AC
1270    2003  7640              SZA     CLA
1271    2004  3773              DCA  I  OSIMAC  /YES,CLEAR OUT THE SIMULATED AC
1272    2005  1762              TAD  I  CINSTR  /GET THE INSTRUCTION
1273    2006  0267              AND     K100    /IS BIT 5 SET TO CLEAR THE LINK
1274    2007  7640              SZA     CLA
1275    2010  3774              DCA  I  OSMLNK  /YES,CLEAR THE SIMULATED LINK
1276    2011  1762              TAD  I  CINSTR  /GET THE INSTRUCTION
1277    2012  0266              AND     K40     /IS BIT 6 SET TO COMPLEMENT THE AC
1278    2013  7640              SZA     CLA

1279    2014  4763              JMS  I  XSMCMA  /YES GO SIMULATE A CMA
1280    2015  1762              TAD  I  CINSTR  /GET THE INSTR
1281    2016  0265              AND     K20     /IS BIT 7 SET TO COMPLEMENT THE LINK
1282    2017  7640              SZA     CLA
1283    2020  4764              JMS  I  XSMCML  /YES, GO SIMULATE A CML
1284    2021  1762              TAD  I  CINSTR  /GET THE INSTRUCTION
1285    2022  0261              AND     K1      /IS BIT 11 SET TO INCREMENT THE AC
1286    2023  7640              SZA     CLA
```



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1287    2024  4765              JMS  I  XSMIAC  /YES GO SIMULATE IAC
1288    2025  1762              TAD  I  CINSTR  /GET THE INSTRUCTION
1289    2026  0262              AND     K2      /IS BIT 10 SET TO RTR OR RTL
1290    2027  7640              SZA     CLA
1291    2030  5242              JMP     SIMTWC  /YES GO CHECK TO SEE WHICH ONE
1292    2031  1762              TAD  I  CINSTR  /GET THE INSTRUCTION
1293    2032  0264              AND     K14     /IS IT A ROTATE LEFT OR RIGHT
1294    2033  1272              TAD     NEG10   /RAR?
1295    2034  7450              SNA
1296    2035  4766              JMS  I  XSMRAR  /YES GO SIMULATE A ROTATE RIGHT
1297    2036  1263              TAD     K4      /NO,RAL?
1298    2037  7650              SNA     CLA
1299    2040  4767              JMS  I  XSMRAL  /YES,GO SIMULATE A ROTATE LEFT
1300    2041  5254              JMP     OPRSET  /GO TEST THE INSTRUCTION
1301
1302    2042  1762      SIMTWC, TAD  I  CINSTR  /GET THE INSTRUCTION
1303    2043  0264              AND     K14     /BIT 8 AND 9 = 0
1304    2044  7450              SNA
1305    2045  4770              JMS  I  XSMBSW  /YES,GO SIMULATE A BYTE SWAP
1306    2046  1272              TAD     NEG10   /RTR?
1307    2047  7450              SNA
1308    2050  4771              JMS  I  XSMRTR  /YES, GO SIMULATE A ROTATE TWICE RIGHT
1309    2051  1263              TAD     K4      /RTL?
1310    2052  7650              SNA     CLA
1311    2053  4772              JMS  I  XSMRTL  /YES,GO SIMULATE A ROTATE TWICE LEFT
1312
1313    2054  1776      OPRSET, TAD  I  OFIELD
1314    2055  1270              TAD     D6201
1315    2056  3257              DCA     .+1
1316    2057  7402              HLT/CDF         /CHANGE TO THE RANDOM DATA FIELD
1317    2060  5775              JMP  I  INTOPR  /GO SETUP THE OPERATE INSTRUCTION
1318
1319    2061  0001      K1,     1
1320    2062  0002      K2,     2
1321    2063  0004      K4,     4
1322    2064  0014      K14,    14
1323    2065  0020      K20,    20
1324    2066  0040      K40,    40
1325    2067  0100      K100,   100
1326    2070  6201      D6201,  6201
1327    2071  0200      POS200, 200
1328    2072  7770      NEG10,  -10
1329
1330                    /
1331    2073  0000      PCTST,  0
1332    2074  7001              IAC
1333    2075  1754              TAD  I  XJMSLC
1334    2076  3755              DCA  I  XPCSAV
1335    2077  1755              TAD  I  XPCSAV
1336    2100  7041              CIA
1337    2101  1756              TAD  I  XRETPC
1338    2102  7640              SZA     CLA
1339    2103  5761              JMP  I  MRIERR
1340    2104  1757              TAD  I  FLDXRN
1341    2105  7041              CIA
```

```
1342    2106  1760            TAD  I  FLXRET
1343    2107  7640            SZA     CLA
1344    2110  5761            JMP  I  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  CINSTR
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  CINSTR
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  CINSTR
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  CINSTR
1444    2230  0250            AND     PUS10
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  CINSTR
1451    2237  0246            AND     Z200
```

```
1452    2240  7640            SZA     CLA
1453    2241  3752            DCA  I  XACSIM
1454    2242  5753            JMP  I  ZSETUP          /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
```



```
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
```



```
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
```

```
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 PROGRAM 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
```

```
                        /ROUTINE TO SIMULATE MQA
                        
2644  1772    SIMMQA, TAD  I  CSIMMQ  /GET THE SIMULATED MQ
2645  7040            CMA             /COMPLEMENT THE RESULTS
2646  0770            AND  I  CSIMAC  /MASK RESULTS WITH SIMULATED AC
2647  1772            TAD  I  CSIMMQ  /INCLUSIVE OR THE SIMULATED MQ
2650  3770            DCA  I  CSIMAC  /THE SIMULATED AC = INCLUSIVE OR OF MQ & AC
2651  5773            JMP  I  COPRST  /GO EXECUTE THE INSTR,

                        /ROUTINE TO SIMULATE A SWP

2652  1770    SIMSWP, TAD  I  CSIMAC  /GET THE SIMULATED AC
2653  3223            DCA     ACUTST  /AND SAVE IT
2654  1772            TAD  I  CSIMMQ  /GET THE SIMULATED MQ
2655  3770            DCA  I  CSIMAC  /AND PUT IT IN THE SIMULATED AC
2656  1223            TAD     ACUTST  /GET THE SIMULATED AC
2657  3772            DCA  I  CSIMMQ  /AND PUT IT IN THE SIMULATED MQ
2660  5773            JMP  I  COPRST  /GO EXECUTE THE INSTRUCTION

                        /ROUTINE TO SIMULATE A CLA

2661  3770    SIMCLA, DCA  I  CSIMAC  /CLEAR THE SIMULATED AC
2662  5773            JMP  I  COPRST  /GO EXECUTE THE INSTRUCTION

                        /ROUTINE TO SIMULATE A CAM

2663  3770    SIMCAM, DCA  I  CSIMAC  /CLEAR THE SIMULATED AC
2664  3772            DCA  I  CSIMMQ  /CLEAR THE SIMULATED MQ
2665  5773            JMP  I  COPRST  /GO EXECUTE THE INSTRUCTION

                        /ROUTINE TO SIMULATE A ACL

2666  1772    SIMACL, TAD  I  CSIMMQ  /GET THE SIMULATED MQ
2667  3770            DCA  I  CSIMAC  /PUT IT IN THE SIMULATED AC
2670  5773            JMP  I  COPRST  /GO EXECUTE THE INSTR

                        /ROUTINE TO SIMULATE A CLA,SWP

2671  1772    CLASWP, TAD  I  CSIMMQ  /GET THE SIMULATED MQ
2672  3770            DCA  I  CSIMAC  /PUT IT IN THE SIMULATED AC
2673  3772            DCA  I  CSIMMQ  /CLEAR THE SIMULATED MQ
2674  5773            JMP  I  COPRST  /GO EXECUTE THE INSTRUCTION

                        /
2675  0000    OPRRET, 0               /RETURN HERE FROM OPERATE INSTRUCTION
2676  3345            DCA     DATADN  /SAVE THE FINAL AC
2677  7010            RAR

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



```
2710  1347            TAD     OPRETF  /GET THE FIELD INSTRUCTION RETURNED FROM
2711  7640            SZA     CLA
2712  5344            JMP     OPRERR  /PROGRAM RETURNED FROM THE WRONG FIELD
2713  1351            TAD     EXPRET  /GET THE EXPECTED RETURN PC
2714  7041            CIA
2715  1275            TAD     OPRRET  /GET THE ACTUAL RETURN PC
2716  7640            SZA     CLA
2717  5344            JMP     OPRERR  /EXPECTED PC DOES NOT AGREE WITH ACTUAL
2720  1354            TAD     SIMMQ   /GET THE SIMULATED MQ
2721  7041            CIA
2722  1350            TAD     MQDONE  /GET THE ACTUAL MQ
2723  7640            SZA     CLA
2724  5344            JMP     OPRERR  /ERROR,ACTUAL MQ DOES NOT EQUAL SIMULATED MQ
2725  1353            TAD     SIMLNK  /GET THE SIMULATED LINK
2726  7041            CIA
2727  1346            TAD     LINKDN  /GET THE ACTUAL LINK
2730  7640            SZA     CLA
2731  5344            JMP     OPRERR  /ERROR SIMULATED AND ACTUAL LINK ARE NOT EQUAL
2732  1352            TAD     SIMAC   /GET THE SIMULATED AC
2733  7041            CIA
2734  1345            TAD     DATADN  /GET THE ACTUAL AC RETURNED
2735  7640            SZA     CLA
2736  5344            JMP     OPRERR  /SAIMULATED AND ACTUAL AC DO NOT AGREE
2737  4766    LPSW0,  JMS  I  C8SWR   /IS SR1 SET TO LOOP ON THE INSTRUCTION
2740  7004            RAL
2741  7710            SPA     CLA
2742  5774            JMP  I  XINSGN  /YES GO LOOP ON THE INSTRUCTIN
2743  5776            JMP  I  XXCNT   /GO BUMP INSTRUCTION COUNTER

2744  5767    OPRERR, JMP  I  OERROR  /NO, GO HALT WITH ERROR INFORMATION IN AC

2745  0000    DATADN, 0
2746  0000    LINKDN, 0
2747  0000    OPRETF, 0
2750  0000    MQDONE, 0
2751  0000    EXPRET, 0
2752  0000    SIMAC,  0
2753  0000    SIMLNK, 0
2754  0000    SIMMQ,  0
                /
        2764    *2764
                /
2764  4765    JCHNG,  JMS  I  JRERNG
                /
2765  0202    JRERNG, CHANGE
2766  3466    C8SWR,  XC8SW
2767  2306    OERROR, ERROPR
2770  2752    CSIMAC, SIMAC
2771  2753    CSMLNK, SIMLNK
2772  2754    CSIMMQ, SIMMQ
2773  2054    COPRST, OPRSET
2774  1606    XINSGN, INSGEN+5
2775  0754    XFIELD, RANFLD
2776  0271    XXCNT,  XCNT
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            PAL             /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         /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    INIAC,  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    FLGRIC, RICFLG
2026    3161  3273    DVINAC, INACDV
2027    3162  5001    CONSET, SETCON
2028    3163  3246    POWERF, POWFAL
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, XC8CKR
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
```

```
2066  3322  1230  GTCHAR, TAD     XMTSLU  /GET THE CHARACTER TO BE PRINTED
2067  3323  6046          TLS             /TRANSMIT IT
2068  3324  7300          CLA     CLL
2069  3325  5255          JMP     CHKACT  /GO CHECK DEVICE TO BE ACTIVE
2070
2071  3326  0000  XMTFLG, 0
2072  3327  0000  RTCFLG, 0
2073  3330  0000  XMTSLU, 0
2074  3331  0377  CC377,  377
2075
2076                /REAL TIME CLOCK INTERRUPT SERVICE ROUTINE
2077
2078  3332  3227  RTCSER, DCA     RTCFLG  /SET REAL TIME CLOCK FLAG TO ACTIVE
2079  3333  6136          CLCL            /CLEAR CLOCK FLAG
2080  3334  7000          NOP/JMS I ACTLIN/ THIS LOCATION USED IF ACT LINE AND OPTION 1 SELECTED
2081  3335  1766          TAD  I  KILLIT  /GET THE KILL FLAG
2082  3336  7650          SNA     CLA     /WAS IT SET
2083  3337  5255          JMP     CHKACT  /CHECK DEVICE TO BE ACTIVE
2084  3340  6135          CLLE            /YES - CLEAR RTC INT ENA
2085
2086  3341  2245  OUT,    ISZ     CNTEND
2087  3342  5773          JMP  I  PRGRET  /WAIT FOR NEXT INTERRUPT
2088  3343  6002          IOF             /TURN THE INTERUPT OFF
2089  3344  5767          JMP  I  RELGO   /RETURN TO PROGRAM FOR RELOCATION OR RUN
2090
2091  3345  0000  CNTEND, 0
2092
2093
2094                /POWER FAIL INTERRUPT SERVICE ROUTINE
2095
2096  3346  6103  POWFAL, CAL             /CLEAR AC LOW F/F
2097  3347  6102          SPL             /SKIP ON AC LOW AS A LEVEL
2098  3350  7410          SKP
2099  3351  6101          SBE
2100  3352  7410          SKP
2101  3353  7402          HLT             /BATTERY EMPTY - ITS ALL OVER
2102  3354  5773          JMP  I  PRGRET  /RETURN TO THE PROGRAM
2103
2104  3355  1226  CHKACT, TAD     XMTFLG  /CHECK ALL DEVICES TO BE INTERRUPTING
2105  3356  1227          TAD     RTCFLG
2106  3357  7650          SNA     CLA     /ARE THEY ?
2107  3360  5264          JMP     RESET   /YES, RESET ALL FLAGS TO INACTIVE
2108  3361  2273          ISZ     INACDV  /BUMP INACTIVE COUNTER
2109  3362  5773          JMP  I  PRGRET  /RETURN TO THE PROGRAM
2110  3363  4763          JMS  I  ERRC8   /ONE OR MORE DEVICES ARE INACTIVE
2111  3364  7340  RESET,  CLA CLL CMA    /SET ALL DEVICES TO INACTIVE
2112  3365  3226          DCA     XMTFLG

2113  3366  7240          CLA     CMA
2114  3367  3227          DCA     RTCFLG
2115  3370  1274          TAD     MMM55
2116  3371  3273          DCA     INACDV  /RESET INACTIVE COUNTER
2117  3372  5773          JMP  I  PRGRET  /RETURN TO THE PROGRAM
2118
2119  3373  0000  INACDV, 0
2120  3374  7723  MMM55,  -55
```



```
2121  3375  7700  TTYCNT, -100
2122  3376  0240  K240,   240
2123  3377  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     BUOTAD
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
```

```
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    ERRCS,  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, ERRP8R+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  C8BYI,    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     C8BYI           /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


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

3541 0000       PTSTOR, 0                       /STOR FOR C8PRNT BUFFER
3542 0000       STOPNT, 0                       /0000 C8PRNT 7777=DO NOT C8PRNT

3543 0400       C8400,  400
3544 0177       C8177,  177
3545 0200       C8200,  200
3546 7700       C87700, 7700
3547 0077       C80077, 0077
```



```
3550 3740       C83740, 3740
3551 0100       C80100, 100
3552 0240       C8240,  240

        3562    *3562
                /
3562 4763       C8CHG1, JMS  I  C8RER1
                /
3563 0202       C8RER1, CHANGE
3564 3035       SELO1,  SELOP1
3565 0333       SAVS1,  SAVSWR
3566 3457       PASMES, MESPAS
3567 3466       C8CKSW, XC8SW
3570 4224       C8CRLF, XC8CRL
3571 3506       C8PRNT, XC8PNT
3572 4201       C8OCT,  XC8OCT
3573 3726       C8INQU, XC8INQ
3574 4250       C8CKPA, XC8CKP
3575 4306       C8TYPE, XC8TYP
3576 4304       C8CHAR, CHAR
3577 0000               0


        3600    PAGE

3600 5346               JMP     C8CHG2

                /*****************************************************************
                /C8CNTR
                /THIS ROUTINE WILL CHECK FOR THE PRESENCE OF CONTROL CHARACTERS
                /IT WILL CHECK FOR THE FOLLOWING CHAR C=G=Q=O=L=S
                /       C8CNTR= JMS XC8CNT

                /EX,    C8CNTR                  /CHECK FOR CONTROL CHARACTER
                /       JMP     ANYTHING        /LOC FOLLOWING CALL IS FOR CONTINUING THE PROGRAM
                /       JMP     ANYTHING        /LOC, IS FOR RETURN IF INMODE SET AND NOT CNTRL CHAR
                /

                /RETURN IS TO CALL PLUS ONE IFCONTINUE
                /RETURN IS TO CALL PLUS TWO IF INMOD SET AND NOT CONTROL CHAR
                /
                /RETURN IS TO CALL PLUS TWO IF INMODE IS NOT SET AND NO
                /CONTROL CHAR ,.THIS WILL PRINT THE CHARACTER AND A ?
                /CLEAR THE AC AND RETURN CALL+2.

3601 0000       XC8CNT, 0
3602 3765               DCA  I  C8ACSV          /SAVE THE AC
3603 1762               TAD  I  SELO2C
3604 0266               AND     C80400          /CHECK IF ON CONSOL ACTIVE
3605 7640               SZA CLA
3606 5211               JMP     .+3             /ON ACTIVE CONSOLE
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                /
```

```
2590                    /
2591    3714  1773      CNTRLL, TAD  I  C8TTYL          /GET PRESENT C8SWIT INDICATOR
2592    3715  7040              CMA                     /COMPLEMENT IT
2593    3716  3773              DCA  I  C8TTYL          /STOR NEW C8SWIT
2594    3717  4774              JMS  I  C8UPAR          /C8PRNT * AND CHAR ON NEW DEVICE
2595                    /#3
2596                    /#3
2597                    /#3
2598                    /#3
2599    3720  5601              JMP I   XC8CNT          /EXIT
2600                    /
2601                    /STOP C8PRNTING C8ERR MESSAGES = TO CONTONUE C8PRNTING C8TYPE "O
2602                    /
2603                    /
2604    3721  4774      CNTRLO, JMS  I  C8UPAR
2605    3722  1776              TAD  I  C8STOP          /GET STOP OR START C8PRNT INDICATOR
2606    3723  7040              CMA
2607    3724  3776              DCA  I  C8STOP          /STORE OPPOSITE STATE
2608    3725  5601              JMP I   XC8CNT          /EXIT
2609
2610                    /*****************************************************************
2611
2612                    /C8INQU
2613                    /C8INQU ROUTINE WILL ASK SWITCH REGISTER QUESTION IF CONSOLE IS ACTIVE,
2614                    //
2615
2616                    /       C8INQU= JMS XC8INQ
2617
2618                    /EX     C8INQU                  /C8 WILL ASK SWITCH REG QUESTION
2619                    /       DO ANYTHING             /RETURN IS CALL PLUS ONE AC =0 CONTINUE
2620
2621    3726  0000      XC8INQ, 0
2622    3727  7300              CLA CLL
2623    3730  1762              TAD  I  SELO2C          /GET THE WORD
2624    3731  0336              AND     AC4008          /CHECK FOR CONSOLE ACTIVE
2625    3732  7650              SNA CLA
2626    3733  5726              JMP I   XC8INQ          /NOT CONSOLE LEAVE
2627    3734  4770              JMS I XPSW              /ASK SWITCH REG QUESTION
2628    3735  5726              JMP I XC8INQ
2629
2630    3736  0400      AC4008,400
2631
2632                    /
2633            3746    *3746
2634    3746  4747      C8CHG2, JMS  I  C8RER2
2635                    /
2636    3747  0202      C8RER2, CHANGE

2637    3750  3657      XTABLA, TABLA
2638    3751  3752      XTABLB, TABLB
2639    3752  4345      TABLB,  CNTRLC
2640    3753  3714              CNTRLL
2641    3754  3721              CNTRLO
2642    3755  3671              CNTRLQ
2643    3756  3675              CNTRLS
2644    3757  4001              CNTRLG
```



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2645    3760  4306      C8TYP,  XC8TYP
2646    3761  4224      C8CRL,  XC8CRL
2647    3762  3456      SELO2C, SELOP2
2648    3763  3475      C8TTYI, XC8TTY
2649    3764  3601      C8CNTR, XC8CNT
2650    3765  4524      C8ACSV, ACSAVE
2651    3766  4526      C8FLSV, FLSAVE
2652    3767  4525      C8MQSV, MQSAVE
2653    3770  4042      XPSW,   XC8PSW
2654    3771  4304      CCHAR8, CHAR
2655    3772  4305      C8INMD, INMODE
2656    3773  4332      C8TTYL, TTYLPT
2657    3774  4016      C8UPAR, UPAROW
2658    3775  3320      C8GET8, C8GET
2659    3776  3542      C8STOP, STOPNT
2660    3777  0000              0
2661                    /
2662            4000    PAGE
2663
2664
2665    4000  5354              JMP     C8CHG3
2666                    /
2667                            /CONTROL G
2668                            /CHANGE THE SWITCH REGISTER ANYTIME CNTRL G AND RETURN TO
2669                            /THE PROGRAM RUNNING,
2670
2671
2672    4001  4771      CNTRLG, JMS I C8CR              /PRINT A CR & LF
2673    4002  1214              TAD     C8SETD          /CHECK IF THE RETURN ADDRS IS SAFE
2674    4003  7640              SZA CLA
2675    4004  5210              JMP     C8DO11          /DO NOT CHANGE THE RETURN ADDRS
2676    4005  1772              TAD  I  XC8CN           /GET THE RETURN ADDRS AND SAVE IT
2677    4006  3215              DCA     C8RETD          /SAVE THE RETURN HERE
2678    4007  2214              ISZ     C8SETD          /INDICATE RETURN SAVED DONT DISTROY
2679    4010  4764      C8DO11, JMS  I  C8SWIT          /GO CHANGE THE SWITCH REGISTER
2680    4011  3214              DCA     C8SETD          /CLEAR THE FLAG
2681                    /#3
2682    4012  4774              JMS  I  C8GET8          /RESTORE THE AC MQ LINK ETC
2683                    /#3
2684    4013  5615              JMP I   C8RETD          /RETURN TO THE PROGRAM
2685                    /
2686    4014  0000      C8SETD, 0
2687    4015  0000      C8RETD, 0
2688                    /
2689
2690
2691
2692    4016  0000      UPAROW, 0                       /C8PRNT THE "*" AND THE CHAR C8TYPED IN
2693    4017  1225              TAD     C8336           /CODE FOR *
2694    4020  4765              JMS  I  C8TY
2695    4021  1773              TAD  I  CHAR8           /C8TYPE THE CHAR
2696    4022  1241              TAD C100                /ADD 100 TO FORM GOOD ASCII CHARACTER
2697    4023  4765              JMS  I  C8TY
2698    4024  5616              JMP I   UPAROW          /EXIT
2699
```

```
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
```



```
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  5256            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 N 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 1T 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     ENDII          /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 A -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  C8CR                  /
2809  4142  5243          JMP     XC8PSW+1       /EXIT + ASK AGIN
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    SELO2,  SELOP2
2832  4163  0333    SAV2,   SAVSWR
2833  4164  4042    C8SWIT, XC8PSW
2834  4165  4306    C8TY,   XC8TYP
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                    /*********************************************************************
```

```
                        /C8TYPE
                        /THIS ROUTINE WILL C8PRNT ON THE CONSOLE OR THE LPT WITH DEVICE CODE 66.
                        /
                        /       C8TYPE= JMS XC8TYP
                        /EX.    C8TYPE          /C8PRNT THE CHAR IN THE AC.
                        /                       /RETURN CALL PLUS ONE AC =0000
                                                /DO NOT CLEAR THE LINK IN THIS ROUTINE NEEDED BYC8OCT
4306  0000  XC8TYP, 0
4307  3331          DCA     PNTBUF          /STORE CHAR
4310  1332          TAD     TTYLPT          /CHECK 0=TTY 7777=LPT
4311  7640          SZA CLA
4312  5321          JMP     XDOLPT          /DO OUT PUT ON LPT
4313  1331          TAD     PNTBUF
4314  6046          TLS
4315  6041          TSF
4316  5315          JMP     .-1
4317  6042          TCF
4320  5327          JMP     C8BY5
4321  1331  XDOLPT, TAD     PNTBUF          /GET CHAR
4322  6666          PSTB    PCLF            /C8PRNT IT
                        /#6
4323  4333          JMS     C8HANG          /CHECK KEYBOARD IF HUNG
                        /#6
4324  6661          PSKF
4325  5323          JMP     .-2             /WAIT UNTIL DONE
4326  6662          PCLF
4327  7200  C8BY5,  CLA                     /CLEAR THE AC
4330  5706          JMP I   XC8TYP          /EXIT
4331  0000  PNTBUF, 0
4332  0000  TTYLPT, 0

                        /#6
4333  0000  C8HANG, 0                       /WILL CHECK KEYBOARD FOR CNTRL CHAR
                                            /WILL NEED IF LPT HANGS TO GET OUT
4334  7300          CLA CLL
4335  1250          TAD XC8CKP              /SAVE C8CKPA RETURN LINKAGE
4336  3344          DCA LC8KPA
4337  4772          JMS  I  C8KPA           /SEE IF KEYBOARD INPUT
4340  7000          NOP
4341  1344          TAD LC8KPA              /RESTORE C8CKPA RETURN LINKAGE
4342  3250          DCA XC8CKP
4343  5733          JMP I   C8HANG          /IF HUNG IN LPT SKIP FLAG NOT SET

4344  0000  LC8KPA, 0


                        /RETURN TO MONITOR
                        /#7
4345  7200  CNTRLC, CLA
4346  3764          DCA  I  TTYLC8          /CLEAR SOFTWARE FLAG FOR TERMINAL PRINTER
```



```
4347  4765          JMS  I  UPARC8          /C8PRNT A" AND A CHAR
4350  5763          JMP  I  BOTRES          /GO RESTORE MONITOR AND GO TO IT


                /
        4361    *4361
                /
4361  4762  C8CHG4, JMS  I  C8RER4
                /
4362  0202  C8RER4, CHANGE
4363  3334  BOTRES, RESBOT
4364  4332  TTYLC8, TTYLPT
4365  4016  UPARC8, UPAROW
4366  3456  SELO2A, SELOP2
4367  4306  C8TPE,  XC8TYP
4370  3475  C8TYI,  XC8TTY
4371  3601  C8NTR,  XC8CNT
4372  4250  C8KPA,  XC8CKP
4373  4524  ACSC8,  ACSAVE
4374  4526  FLSC8,  FLSAVE
4375  4525  MQSC8,  MQSAVE
4376  3320  GETC8,  C8GET
4377  0000          0

        4400    PAGE


4400  5344          JMP     C8CHG5

                /**********************************************************************
                /C8ERR
                /THIS ROUTINE WILL DETERMINE WHAT TO DO WHEN A C8ERR IS ENCOUNTERED
                /WILL CHECK IF CLASSIC SYSTEM, WILL CHECK C8SWIT REGISTERS.
                /       C8ERR=  JMS XC8ERR
                /EX.    C8ERR           /GO TO C8ERR CALL IF NOT CONSOL /0/
                /                       /RETURN IS CALL PLUS ONE AC =0000


4401  0000  XC8ERR, 0
4402  6002          IOF
4403  3324          DCA     ACSAVE          /SAVE AC
4404  6004          GTF
4405  3326          DCA     FLSAVE          /SAVE THE FLAGS
4406  7501          MQA
4407  3325          DCA     MQSAVE          /SAVE THE MQ
4410  7340          CLA CLL CMA             /SUBTRACT A 1 FOR TRUE LOCATION
4411  1201          TAD     XC8ERR          /GET RETTURN LOCATION
4412  3323          DCA     PC8AV           /SAVE ADD OF C8ERR CALL
4413  1764          TAD  I  SELO2B          /GET LOCATION 22
4414  0330          AND     C88400          /MASK FOR CLASSIC SYSTEM
4415  7650          SNA CLA                 /SKIP IF CLASSIC BIT IN LOC 22 SET
4416  5265          JMP     NTCLAS          /NOT CLASSIC SYSTEM
4417  1773          TAD  I  NTSTOP          /NO ERROR PRINTING
```

```
3100  4420  7640            SZA CLA
3101  4421  5260            JMP     C8DU10          /DO NOT PRINT
3102                  /#7
3103  4422  4756            JMS  I  CRLFC8
3104                  /#2
3105  4423  1350            TAD     MESERR
3106  4424  3224            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    CRLFCB, XC8CRL
4557  3506    PRNTC8, XC8PNT
4560  4201    OCTAC8, XC8OCT
4561  3465    CKSWC8, XC8SW
4562  3726    INQUC8, XC8INQ
4563  3320    C8GETS, C8GET
4564  3456    SELU2B, SELOP2
4565  4016    C8UPA,  UPAROW
4566  3712    C8STS,  C8SETS
4567  4305    CBIND,  INMODE
4570  4224    C8LFCR, XC8CRL
4571  4146    C888SW, C88WST
4572  3032    XDOSW,  CL8BGN
4573  3542    NT8TOP, 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 ZADDR8    /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 SELU2X    /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    DRERNG, 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  ACGDDV,  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        C88400      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
AADRKS      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
ACGROV      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
ACMP8       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        BREAD       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
ADDR8       0745        C1777       1561        C8ECHO      4170        C8TTYI      3763
ADDR80      3141        C200        1312        C8ERÓR      1750        C8TTYL      3773
ADDR85      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
ALOGID      1176        C7          1567        C8GETS      4563        C8UPAR      3774
AMES        4157        C70         1560        C8HANG      4333        CADDR8      1575
AMORAT      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
AREPAD      1170        C8177       3544        C8INQU      3573        CCHAR8      3771
AREORNG     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        C8MOSV      3767        CHANGE      0202
```

```
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
CIFFDO  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
CLC1    6136    DCATST  1255    FLGRTC  3160    INACDV  3273
CLLF    6135    DCHNG   5074    FLGXMT  3157    INDAD   0750
CLSK    6137    DECSWP  1116    FLINK   0771    INDEXA  3655
CNT     2425    DINSTR  2345    FLMES   4554    INDMSK  1133
CNTEND  3245    DIRFLG  0213    FLSAV8  3375    INITFO  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
CONST   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
CONMDT  1136    ERROPR  2306    GETSWR  0356    JCHNG   2764
CONMQD  1142    ERROR   1313    GETWD   2112    JMPJMS  0665
CONRAN  5006    ERROR1  1415    GLNKDN  2374    JMPTST  1304
CONSET  3162    ERROR2  0724    GLPSW0  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
CP400   4247    FCHNG   1746    GSMLNK  2373    K100    2067
CREFAD  1574    FILALL  0827    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    HDNES   4740    K23     3354
CSAVC   1555    FIRST   3102    HGHLIM  1145    K237    3144
```



```
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    OP1HND  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    OPERRI  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
KILCN1  3331    MM4     3023    OPRHLT  2364    RANDY1  1413
KILCN2  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
KKCOF   3143    MOVOVR  0073    OPRSET  2084    RESBOT  3334
KRERNG  3150    MOVUP   0225    OSINAC  2173    RESCNT  5035
LAS     7604    MOVWDX  5173    OSMLNK  2174    RESET   3264
LC8KPA  4344    MQA     7501    OUT     3241    RESETT  0256
LCHNG   3361    MQDAT   1363    OVR4    5241    RETFLD  0525
LERRI   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
LOC600  0126    MQSAVE  4525    PASCNT  3453    RFVT    0613
LOC701  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    NEWDIF  0457    PCTST   2073    RTFLGR  0571
M200    0251    NOSET   3445    PNTBUF  4331    RTLINK  0557
M24     3333    NOTAUT  0611    POS10   2250    RTMQD   0556
```

```
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        SLUXMT  3156        VT78DW  5767        XFILL   5114
SAVLNK  0755        SMACHK  2202        WAIT    0360        XFIRST  5104
SAVMP2  0071        SMLCHK  2220        WAITEN  3300        XFLD    0354
SAVS1   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  4561        STRRND  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
SETUP1  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
SIMTAC  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        XSMBSW  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
XSMMQA  2355
XSMMQI  1772
XSMMQL  2354
XSMOP1  1770
XSMOP2  1771
XSMRAL  2167
XSMRAR  2166
XSMRTL  2172
XSMRTR  2171
XSMSMA  2346
XSMSNL  2350
XSMSWP  2356
XSMSZA  2347
XSTFLD  0554
XSTMS   4722
XSVTNK  1764
XSWAP1  5116
XSWAP2  5117
XTABLA  3750
XTABLB  3751
XTYCNT  3155
XUPERL  0373
XUPTIM  1157
XVT78G  0767
XWDMOV  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

```
C8N4      2865    2907#
C8NIR     2956    2980    3061#
C8OC1     2995    2440#
C8OCIA    2760    2836#
C8P212    2898    2911#
C8P215    2893    2910#
C8P260    2869    2909#
C8P7      2868    2908#
C8PASS     212     267#
C8PRN     2757    2835#
C8PRNT    2992    2839#
C8PX      3310    3327#
C8RER1    2831    2833#
C8REP2    2834    2836#
C8RER3    2824    2826#
C8RER4    3052    3054#
C8RER5    3187    3189#
C8RETD    2677    2684    2687#
C8RETR    2550    2568    2585#
C8RSTL    2065    2188#
C8SETD    2673    2678    2680    2686#
C8SETS    2544    2560    2570    2584#    3204
C8SMS     1928    2039#
C8STOP    2605    2607    2659#
C8STS     3176    3204#
C8SWIT    2679    2833#
C8SWR     1860    1882#
C8SWST    2748    2751    2812    2814#    3207
C8TMP1    2864    2867    2871    2874    2878#
C8TPE     2870    2894    2899    2982    3059#
C8TTYI    2572    2648#
C8TTYL    2591    2593    2656#
C8TY      2694    2697    2762    2807    2834#
C8TYI     2953    2976    3060#
C8TYP     2503    2505    2645#
C8TYPE    2405    2414    2443#
C8UPA     3203#
C8UPAR    2594    2604    2657#
CADDRS    1021    1102#
CAF         19#   2247#
CAL         22#   2096
CC377     2074#
CC8BY4    2442#
CCHAR8    2493    2502    2514    2654#
CCHNG      955    1090#
CDATAT     977    1096#
CDFINS    2167    2169#
CDHLT1     388     393#
CDHLT2     391     397#

CHANGE     149#    150     152     154     155     164     183     264     407     657     788     928    1092    1233
          1388    1530    1718    1881    2017    2185    2433    2636    2826    3054    3189    3321    3410
CHAR      2444    2654    2840    2984    2986#
CHAP8     2695    2766    2776    2797    2801    2803    2840#
```



```
CHK1KF     759     791#
CHKACT    2069    2083    2104#
CIFFDO     253     254#    256
CINSTR    1268    1272    1276    1280    1284    1288    1292    1302    1398#
CKCOUT    2284    2303#   2317    2318
CKSWC8    3134    3141    3199#
CL8BGN    1928#   3208
CLASWP    1544    1820#
CLCL        24#   2079
CLLE        23#   1948    2084
CLSK        25#   1990
CNT       1568    1576    1587#   1615    1618    1634    1637    1672    1675    1691    1694
CNTEND    2086    2091#   3413
CNTR2      166     171     174     181     182     188#
CNTR3      169     170     172     178     179     189#    209     409    2032    3425
CNTRLC    2639    2829    3043#
CNTRLG    2644    2672#   2830
CNTRLL    2591#   2640
CNTRLO    2604#   2641
CNTRLQ    2544#   2642
CNTRLS    2560#   2581    2643
CNTVAL    2308    2322#
COMCHK    1439    1441    1443#
COMPAR     822#    862     873     887     893
CON37       94    133#
CONACD     700     775#   3440
CONADR     711     769#   3432
CONFLD     676     767#   3430
CONFLG     745     750     778#   1390    2020
CONIND     734     771#   3436
CONINS    1119    1151#   3434
CONMDT     696     773#   3438
CONMQD     706     777#   3442
CONPAN    3342#   3354
CONSET    1930    2027#
CONST1     716     720     722     744#
CONST2     736     738     740     750#
CONTLM    1900    1907    1914    2031#
CONTRD    3529#
COPRST    1780    1789    1799    1804    1810    1816    1823    1887#
CP212     3220    3230#
CP215     3218    3229#
CP400     2912#   2950
CREFAD     972     973     984     985    1030    1101#
CRERNG    1090    1092#
CRLFC8    3103    3133    3196#
CROSPG    3186    3212    3213#
CSAVA     1022    1031    1041    1081#
CSAVB      993     994    1007    1016    1082#
CSAVC     1020    1025    1029    1034    1039    1083#
CSIMAC    1738    1748    1777    1779    1786    1788    1793    1796    1803    1808    1815    1821    1884#
CSIMMQ    1778    1784    1787    1795    1798    1809    1814    1820    1822    1886#
CSMLNK    1765    1885#
```

```
CSWPUP    307    408#
D4000    1749   1760#  1766
D6201    1914   1926#
DATADN   1451   1827   1857   1868#
DATAHR    491    620    641#   805    950   1244   1550
DATATH    469    640#   804    949   1096
DATEN     821    841    853    872    878    892    946#
DCATSI    417    864#
DCHNG    3935   3403#
DECSWP    408    756#
DINSTR   1422   1429   1436   1443   1450   1466   1506   1531#
DIRFLG    159#   226    236    237    423   3423
DM1      2712#  2788
DM2      2705#  2785   2791
DM41     2706#  2794
DOCNT    2310   2313   2319#
DONEA    2492   2499#
DONEMQ    831    938#
DOPACK   2278   2284#
DOSET    2418   2304   2311   2316   2321#
DRERNG   3409   3410#
DVINAC   1945   2026#
EINSTR   1120   1130   1140   1143   1165   1169   1176   1180   1186   1188   1202   1206   1238#
ENDCMA   1578   1583#
ENDCNT   3359   3413#
ENDIT    2780   2790   2810#
ENDOFF   1913   1915   2035#
ERR1     2796   2800   2806#
ERRCR    2110   2138   2186#
ERRMES   3108   3159#  3190
ERROPP    130   1496#  1883
ERROR     128    823    828    833    843    855    871    880    899#  1397   2193   3540
ERROR1    931    972#
ERROR2    618#  1099
ERROR5   3488   3540#
ERRPSR    914#  2192
ERRRET    930#
EXECH    2881   2984#
EXITA    2501   2513#
EXPRET   1749   1535   1840   1872#
FOINIT    248#   251    260   3414
FCHNG    1112   1231#
FILALL    363    384#   400    663    946   2034   3419
FILCNT   2897   2900   2906#
FILL     3362   3369#
FILLER   2895   2904#
FILRND   1900#  3420
FINSTR    909    911    943#
FIRST    1950   1952   1971#  3411

FLDCHK    791   1702#
FLDCNT   1902   1908   2032#
FLDFGF    760    790#
FLDFGR    757    789#
```

```
FLDFLG    300    314    317    318    356#  3424
FLDLIM    766    424    681   1779#  1100   3416
FLDMSK    675    766#  3429
FLDRAN    678    679    793#
FLDRET    615    648#
FLDXRN   1340   1348   1395#
FLGRTC   1943   2025#
FLGXMT   1941   2024#
FLINK     626    660#
FLMES    3127   3194#
FLSAVB   2147   2196#
FLSAVE   2196   2651   3064   3089   3131   3167#
FLSCR    2940   3064#
FLXRET   1342   1396#
FMQDAT    630    651#
FRERNG   1931   1233#
GACTRT   1502   1548#
GADDRS   1504   1549#
GCHNG    1263   1386#
GDATAD   1512   1551#
GDATAH   1508   1550#
GENADD    708#   713    747    752
GENFLD    278    673#   683   3427
GENIND    731#   753
GENINS    718#   748
GENMOD    704#
GETCR    2955   2960   3066#
GETCH1   2771#  2779
GETDAT   2489   2490   2497   2524#
GETSWR    194    214    268#
GETWD     662    935   1347#  1359
GLNKDN   1418   1554#
GLPSWD   1219   1256#
GMQDAT   1220   1555#
GMQDON   1217   1255#
GOITA    2495   2516#
GOPRET   1498   1547#
GOTOA    2518   2519   2520   2521   2522#
GRANFL   1496   1545#
GRERNG   1386   1388#
GSMLNK   1516   1553#
GSVLNK   1514   1552#
GTCHAR   2060   2066#
GTF      2945#  2481   2939   3088
HALT      659    900    902    904    906    908    910    918#  921   1094
HCHNG    1415   1528#
HDMES    3311   3316#  3326
HGHLIM    282    410    688    689    709    732    780#  2031   3418
HIGHLM    925    231    282#
HLT        13#   176    213    259    337    341    344    351    352    366    393    397    456    468
           492    533   1129   1316   1351   1357   1367   1491   1834   1983   2101   3446   3460
HLTFIL    344#   392
HLTOPR   1216   1218   1222#  1225   1546
```

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STOPNT   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    2525#  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    270   2125#   2140

XACDMS   3439#
XACSIM   1453   1510    1536#
XADD1    1917   2036#
XADRMS   3431#
```



```
XASAVA    205    274#
XASAVB    206    275#
XBGCON    280#
XBGRAN    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    2628    3200
XC8LF    2827   3174#
XC8OCT   2440   2836    2861#   2877    3198
XC8PAS    767   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#
XCNMOT   3438#
XCNMOD   3442#
XCNT      197    209#   1890    2190
XCNTR3   3364   3368    3369    3370    3381    3384    3389    3425#
XCTLC    2829#
XCTLG    2830#
XDATAH   1190   1244#
XDOLPT   3005   3012#
XDOSW    3180   3208#
XDRFLG   3155   3403    3423#
XENDPR    165    168     229     283#
XERR2     987   1099#
XERROR    916    931#
XEXPRT   1198   1249#
XFDMSK   3428   3429#
XFIELD   1835   1889#
XFILL    3192   3419#
XFIRST   3341   3411#
XFLD      220    266#
XFLDFG   3356   3424#
XFLDLM   1061   1100#
XFLRND   3183   3420#
XGENTI    718    792#
XGETWD    858    867     883     935#
```

```
XGNFLD   3365   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   1925   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#
XSMCMI   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#
```



```
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#
```