IDENTIFICATION

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

MODIFIED TO RUN ON VT78 SYSTEM - APRIL 1977

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

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

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

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

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

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

2.0 REQUIREMENTS

2.1 HARDWARE

THE FOLLOWING HARDWARE IS REQUIRED FOR EXECUTION OF THIS PROGRAM:

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

2.2 STORAGE

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

2.3 PREREQUISITE SOFTWARE

FOR PDP-8/A SYSTEM:

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

FOR VT78 SYSTEM:

VT78 CPU DIAGNOSTIC
VT78 MOS MEMORY DIAGNOSTIC

3.0 RESTRICTIONS

3.1 HARDWARE RESTRICTIONS

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

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

3.2 SOFTWARE RESTRICTIONS

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

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

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

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

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

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

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

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

IF CONSOLE PACKAGE IS ACTIVE.

4.0 STANDARD TEST PROCEDURE

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

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

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

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

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

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

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

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

4.2 LOADING THE PROGRAM

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

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

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

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

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

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

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

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

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

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

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

1. NON ACTIVE CONSOLE PACKAGE

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

2. ACTIVE CONSOLE PACKAGE

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

3. PDP-8A APT TEST LINE

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

4.3.1 RUNNING PROGRAM ON NON ACTIVE CONSOLE PACKAGE

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

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

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

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

END OF PASS HALT.

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

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

4.3.2 RUNNING PROGRAM ON A ACTIVE CONSOLE PACKAGE

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

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

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

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

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

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

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

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

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

4.4 CONSOLE PACKAGE CONTROL CHARACTERS

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

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

CONTROL C

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

CONTROL L

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

CONTROL O

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

CONTROL S

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

CONTROL Q

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

CONTROL G

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

TERMINATING CHARACTERS:

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

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

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

SWITCH REGISTER MESSAGE

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

END OF PASS

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

5.0 ERRORS

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

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

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

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

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

5.1 CATASTROPHIC ERROR HALTS

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

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

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

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

5.2 ERROR HALTS/ERROR PRINTOUTS

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

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

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

SHOULD AGREE WITH ADDRESS 0005 IN FIELD 0.

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

5.3 MEMORY REFEPENCE INSTRUCTION ERRORS

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

MEMORY REFERENCE INSTRUCTION INFORMATION TABLE

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

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

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

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

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

5.4 MEMORY REFERENCE TEST INSTRUCTION SETUP

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

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

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

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

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

C. JMP'S - DIRECT ADDRESSING MODE

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

D. JMP'S - INDIRECT ADDRESS MODE

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

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

E. JMS'S - DIRECT ADDRESS MODE

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

F. JMS'S - INDIRECT ADDRESS MODE

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

5.5 OPERATE INSTRUCTION ERRORS

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

OPERATE INSTRUCTION INFORMATION TABLE

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

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

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

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

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

5.6 OPERATE TEST INSTRUCTION SETUP

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

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

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

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

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

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

F. INSTRUCTION ADDRESS -1 = CIF TO PROGRAM FIELD

G. INSTRUCTION ADDRESS = THE TEST OPERATE INSTRUCTION

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

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

5.7 ILLEGAL INTERRUPT ERRORS

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

5,8 INACTIVE DEVICE ERROR

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

5,9 NO INTERRUPT ERRORS

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

6,0 SWITCH REGISTER SETTINGS

6,1 NORMAL OPERATING SWITCHES

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

6,2 ERROR RELATED SWITCHES

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

7.0 REVISIONS

REVISION B - ADDITIONS TO ALLOW USE ON VT78 SYSTEMS.

8.0 PROGRAM DESCRIPTION

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

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

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

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

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

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

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

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

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

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

9.0 FLOWCHARTS

NONE

10.0 LISTING

ATTACHED

SEQ 0023

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


        7421    MQL=7421
        7701    ACL=7701
        7604    LAS=7604
        7402    HLT=7402
        6001    ION=6001
        6002    IOF=6002
        6160    SIMCLR=6160     /CLEAR 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)
```


SEQ 0024

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

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

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

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

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

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

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

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

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


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


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

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

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



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


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

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


0333  0000  SAVSWR, 0
                    /

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

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

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



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

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

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

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

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

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



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

                    /
              0551  *551
                    /
0551  4752  AACHNG, JMS I XCHNGE
                    /
0552  0202  XCHNGE, CHANGE
0553  1116  CSWPUP, DECSWP
0554  0247  XSTFLD, CNTR3
0555  1165  ZLIMIT, HGHLIM
0556  2750  RTMQD,  MQDONE
0557  2746  RTLINK, LINKDN
0560  0746  BINSTR, INSTR
0561  1201  TSTINS, ANDTST
0562  1223  TSTIN1, TADTST
0563  1234  TSTIN2, ISZTST
0564  1255  TSTIN3, DCATST
0565  1267  TSTIN4, JMSTST
0566  1304  TSTIN5, JMPTST
0567  0200  BEGIN,  BGN
0570  0214  XLWLIM, LOWLIM
0571  0323  RTFLGR, SETFLG-1
0572  0213  RTFLG,  DIRFLG
0573  1144  MAXFLD, FLDLIM
0574  0324  RTFLGF, SETFLG
0575  0245  XSIZE,  SZPRG
0576  5025  XGO,    STARTP
0577  0000          0

              0600  *600
                    /

0600  5365          JMP ACHG

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

```
0607  1343          IAD A7
0610  7630          SZL CLA                 /WAS IT WITHIN AUTO BOUNDARY
0611  7610  NOTAUT, SKP CLA                 /NO, NOT AUTO-INDEX
      5767  VT78G=JMP I XVT78G              /VT78/
0612  7340  OWLVT,  CLA CLL CMA/JMP I XVT78G /VT78//AUTO INDEX,SUBTRACT 1 FROM INDIRECT ADDRESS
                                            /VT78/NOTE:ON THE VT78 PROCESSOR THE PAGE
                                            /VT78/ BIT MUST BE ZERO FOR AUTO INDEXING TO
                                            /VT78/ WORK--EVEN IF THE INST IS ON PAGE 0,
                                            /VT78/ THEREFORE ZERO BIT WHENEVER
                                            /VT78/ AUTO INDEXING FROM PAGE 0,
0613  1350  RFVT,   TAD INDAD
0614  3310          DCA SETRET              /SAVE INDIRECT ADDRESS
0615  1354          IAD RANFLD
0616  1356          TAD K6201               /CHANGE TO A RANDOM DATA FIELD
0617  3220          DCA .+1
0620  7402          HLT/CDF
0621  1310          TAD SETRET              /GET INDIRECT ADDRESS
0622  3747          DCA I REFAD             /PUT INDIRECT ADDRESS INTO REF ADD
0623  1350          TAD INDAD
0624  3347          DCA REFAD               /MAKE REFAD=INDAD
0625  7330  NOTIND, CLA CLL CML RAR
0626  1346          TAD INSTR
0627  7630          SZL CLA                 /WHAT TYPE OF INSTR
0630  5265          JMP JMPJMS              /IT WAS A JMP OR JMS
0631  1354          TAD RANFLD
0632  1356          TAD K6201
0633  3234          DCA .+1
0634  7402          HLT/CDF                 /CHANGE TO A RANDOM DATA FIELD
0635  1351          TAD DATATH              /GET INITIAL MEMORY DATA AND PUT IT IN
0636  3747          DCA I REFAD             /REF ADD OR INDIRECT ADD FOR AND THROUGH DCA
0637  7240  OPRINT, CLA CMA                 /SUBTRACT 1 FROM INSTRUCTION ADDRESS
0640  1345          TAD ADDRS               /AND SAVE IT
0641  3344          DCA HOMCIF
0642  6224          RIF
0643  1357          TAD K6202               /SET UP HOME INSTRUCTION FIELD
0644  3744          DCA I HOMCIF            /IN INSTRUCTION ADDRESS-1 FOR AND-DCA
0645  7301          CLA CLL IAC
0646  1345          TAD ADDRS
0647  4310          JMS SETRET              /SETUP RETURN,INSTR ADD+1,+2=4400 FOR AND-DCA
                                            /LOCATION 0 CONTAINS RETURN POINTER
0650  1346  NOTJJ,  TAD INSTR               /PUT INSTRUCTION IN INSTRUCTION ADDRESS
0651  3745          DCA I ADDRS
0652  1355          TAD SAVLNK
0653  7104          CLL RAL
0654  1353          TAD MQDATA              /GET THE RANDOM MQ DATA
0655  7421          MQL                     /AND LOAD IT INTO THE MQ
0656  7200          CLA                     /SAFETY CLEAR THE AC IN CASE MQL DOESN'T

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

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



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

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

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

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

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

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

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

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

0710  0000    SETRET, 0
```



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

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

```
                0772  2750    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 3K
      1122      5753            JMP  I  FLDFGF        /NO,SET DIRECTION OF SWAP TO FORWARD
                              /
      1123      6201    C6201,  6201
      1124      0400    A400,   400
      1125      0070    K70,    70
      1126      0011    ADD11,  11
      1127      7777    FLDMSK, 7777
      1130      0000    CONFLD, 0
      1131      7777    ADRMSK, 7777
      1132      0000    CONADR, 0
      1133      7777    INDMSK, 7777
```

SEQ 0037

```
 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
```


SEQ 0038

```
 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            IAD 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
```

```
 881  1375  1771          TAD I BREFAD
 882  1376  3756          DCA I ABSAVA
 883  1377  4757          JMS I XGETWD
 884  1400  7041          CIA
 885  1401  7001          IAC
 886  1402  1766          TAD I BADDRS
 887  1403  5206          JMP COMPAR              /DID JMS WORK
 888                /
 889  1404  4755    JMPTST, JMS I ISTPC           /CHECK PC FROM RETURN
 890  1405  1776          TAD I BDATHR
 891  1406  7041          CIA
 892  1407  1772          TAD I DATFN
 893  1410  5206          JMP COMPAR              /DID JMP AFFECT THE AC
 894                /
 895
 896  1411  0000    PCSAVE, 0
 897  1412  0200    C200,   200
 898
 899  1413  1764    ERROR,  TAD I XRNFLD
 900  1414  4335          JMS HALT                /FIELD THAT INSTRUCTION WAS PUT IN
 901  1415  1773          TAD I XRETFL
 902  1416  4335          JMS HALT                /PROGRAM RETURNED FROM THIS FIELD
 903  1417  1411          IAD PCSAVE
 904  1420  4335          JMS HALT                /EXPECTED PC RETURN
 905  1421  1754          TAD I RETURN
 906  1422  4335          JMS HALT                /ACTUAL PC RETURN
 907  1423  1766          IAD I BADDRS
 908  1424  4335          JMS HALT                /INSTRUCTION ADDRESS
 909  1425  1767          TAD I FINSTR
 910  1426  4335          JMS HALT                /INSTRUCTION
 911  1427  1767          TAD I FINSTR
 912  1430  0312          AND C200
 913  1431  7640          SZA CLA
 914  1432  1770    ERRPSR, TAD I ZASAVA
 915  1433  1771          TAD I ZASAVB
 916  1434  5753          JMP I XERROP            /GET REST OF ERROR INFORMATION
 917                /
 918  1435  0000    HALT,   0
 919  1436  4751          JMS I CBEKR/HLT         /ERROR INFORMATION IN AC
 920  1437  7200          CLA
 921  1440  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,  PCTST
 934  1356  2145    XBSAVA, BSAVA
 935  1357  2112    XGETWD, GETWD
```



```
 936  1360  0755    LINKSV, SAVLNK
 937  1361  2746    LINKRT, LINKDN
 938  1362  2750    DONEND, MODONE
 939  1363  0753    MODAT,  MODATA
 940  1364  0754    XRNFLD, RANFLD
 941  1365  0252    RLPCNT, 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    RAND11, 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.
```

SEQ 0041

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


SEQ 0042

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

SEQ 0043

```
1012  1455  7620          SNL CLA
1013  1456  5635          JMP I BNDRY1
1014  1457  2235  BNDOK2, ISZ BNDRY1
1015  1460  7340          CLA CLL CMA
1016  1461  0354          AND CSAVB
1017  1462  5635          JMP I BNDRY1
1018                /
1019  1463  0000  SAME1,   0
1020  1464  3355          DCA CSAVC
1021  1465  1775          TAD I CADDRS
1022  1466  3353          DCA CSAVA
1023  1467  4303          JMS TSAME
1024  1470  2263          ISZ SAME1
1025  1471  1355          TAD CSAVC
1026  1472  5663          JMP I SAME1
1027                /
1028  1473  0000  SAME2,   0
1029  1474  3355          DCA CSAVC
1030  1475  1774          TAD I CREFAD
1031  1476  3353          DCA CSAVA
1032  1477  4303          JMS TSAME
1033  1500  2273          ISZ SAME2
1034  1501  1355          TAD CSAVC
1035  1502  5673          JMP I SAME2
1036                /
1037  1503  0000  TSAME,   0
1038  1504  7344          CLA CLL CMA RAL
1039  1505  1355          TAD CSAVC
1040  1506  7041          CIA
1041  1507  1353          TAD CSAVA
1042  1510  7510          SPA
1043  1511  5320          JMP INSOK
1044  1512  7161          CIA STL
1045  1513  1356          TAD C5
1046  1514  7620          SNL CLA
1047  1515  2303          ISZ TSAME
1048  1516  7420          SNL
1049  1517  2303          ISZ TSAME
1050  1520  7300  INSOK,  CLA CLL
1051  1521  5703          JMP I TSAME
1052                /
1053                /
1054  1522  0000  LIMITS, 0
1055  1523  1021          TAD     OP1SEL          /GET MEMORY SIZE FROM HARDWARE CONFIGURATION
1056  1524  0346          AND     K37             /MASK OFF MERORY BITS
1057  1525  7104          CLL     RAL
1058  1526  3350          DCA UPRLIM

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


SEQ 0044

```
1067  1537  3350          DCA UPRLIM
1068  1540  1020          TAD SWITCH
1069  1541  3764          DCA I SAVESW
1070  1542  5722          JMP I LIMITS
1071
1072                /
1073  1543  1234  RAN1,   1234
1074  1544  5670  RAN2,   5670
1075  1545  7771  MM7,    -7
1076  1546  0037  K37,    37
1077  1547  0400  C400,   400
1078  1550  0000  UPRLIM, 0
1079  1551  0000  BNDCON, 0
1080  1552  5002  PRGSIZ, PRGEND+4-BGN
1081  1553  0000  CSAVA,  0
1082  1554  0000  CSAVB,  0
1083  1555  0000  CSAVC,  0
1084  1556  0005  C5,     0005
1085  1557  0007  C7,     7
1086  1560  0070  C70,    70
1087  1561  1777  C1777,  1777
1088                /
1089        1562  *1562
1090  1562  4763  CCHNG,  JMS I CRERNG          /ROUTINE TO ULTER
1091                /
1092  1563  0202  CRERNG, CHANGE
1093  1564  0333  SAVESW, SAVSWR
1094  1565  1335  XHALT,  HALT
1095  1566  0746  ZINSTR, INSTR
1096  1567  0751  CDATAT, DATAIH
1097  1570  2145  ZBSAVA, BSAVA
1098  1571  0750  ZINDAD, INDAD
1099  1572  0724  XERR2,  ERROR2
1100  1573  1144  XFLDLM, FLDLIM
1101  1574  0747  CREFAD, REFAD
1102  1575  0745  CADDRS, ADDRS
1103  1576  0200  PRGBG,  BGN
1104  1577  0000          0
1105                /
1106
1107
1108                /RANDOM OPERATES-GROUP 1 -  GROUP2 - AND MQ OPERATES
1109
1110        1600  *1600
1111                /
1112  1600  5346          JMP     FCHNG
1113                /
1114
1115
1116  1601  0000  INSGEN, 0                   /ROUTINE TO GENERATE A RANDOM INSTRUCTION
1117  1602  4755          JMS I BRANDY        /GO GENERATE A RANDOM NUMBER
1118  1603  0242          AND INSMSK          /MASK WORD FOR INSTRUCTION
1119  1604  1243          TAD CONINS          /CONSTRAINT WORD FOR INSTRUCTION
1120  1605  3754          DCA I EINSTR        /SAVE THE INSTRUCTION
1121  1606  6201          CDF     00          /CHANGE DATA FIELD TO FIELD 0
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```
1122  1607  6224          RIF             /READ THE INSTRUCTION FIELD
1123  1610  1356          TAD     STARI   /GET THE STARTING ADDRESS
1124  1611  3612          DCA  I  ADDRS5  /PUT FIELD AND STARTING ADDRESS INTO LOC 5
1125  1612  0005  ADDRS5, STRFLD          /ADDRESS 5 OF FIELD 0 = STARTING ADDRESS AND PRG FIELD
1126  1613  6224          RIF             /READ THE INSTRUCTION FIELD
1127  1614  1206          TAD     ADDRS5-4/GET THE CDF INSTRUCTION
1128  1615  3216          DCA     .+1     /PUT CDF TO PROGRAM FIELD IN NEXT LOCATION
1129  1616  7402          HLT/CDF         /CHANGE DF BACK TO PROGRAM FIELD
1130  1617  1754          TAD I EINSTR    /CHECK TO SEE IF IT WAS A IOT
1131  1620  0244          AND K7000
1132  1621  1245          TAD M6000
1133  1622  7450          SNA
1134  1623  5207          JMP INSGEN+1    /IT WAS A IOT REGENERATE A NEW INSTRUCTION
1135  1624  1244          TAD K7000       /IS IT AN OPERATE INSTRUCTION
1136  1625  7650          SNA CLA
1137  1626  5256          JMP OPRBGN      /YES IT WAS AN OPERATE
1138  1627  1351          TAD MRIPNT      /GET THE RETURN POINTER FOR MRI INSTRUCTIONS
1139  1630  3753          DCA I ZJMSRT    /SAVE IT
1140  1631  1754          TAD I EINSTR    /NOT A IOT OR OPERATE
1141  1632  0246          AND K177        /CREATE A REFERENCE ADDRESS
1142  1633  3761          DCA I AASAVB
1143  1634  1754          TAD I EINSTR    /GET THE INSTR
1144  1635  0247          AND A200        /PAGE ZERO OR SAME PAGE
1145  1636  7640          SZA CLA
1146  1637  1760          TAD I AASAVA
1147  1640  1761          TAD I AASAVB
1148  1641  5601          JMP I INSGEN    /RETURN AND CHECK IT
1149
1150  1642  7777  INSMSK, 7777
1151  1643  0000  CONINS, 0
1152  1644  7000  K7000,  7000
1153  1645  2000  M6000,  -6000
1154  1646  0177  K177,   177
1155  1647  0200  A200,   200
1156  1650  0400  B400,   400
1157  1651  0014  A14,    14
1158  1652  7764  NEG14,  -14
1159  1653  0001  A1,     1
1160  1654  0006  BP6,    6
1161  1655  7721  K7721,  7721
1162
1163  1656  1352  OPRBGN, TAD OPRPNT      /GET THE RETURN POINTER FOR OPR INSTRUCTIONS
1164  1657  3753          DCA I ZJMSRT    /SAVE IT
1165  1660  1754          TAD I EINSTR
1166  1661  0250          AND B400
1167  1662  7640          SZA CLA
1168  1663  5272          JMP ILLOP2

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



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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 CSERDR/HLT
1224  1743  7300          CLA CLL
1225  1744  5741          JMP  I  HLTOPR
1226                /
1227
1228                /
1229        1746  *1746
1230                /
1231  1746  4747  FCHNG,  JMS  I  FRERNG
```

```
1232                    /
1233    1747  0202      FREFNG, CHANGE
1234    1750  4401      C8ERDR, XC8ERR
1235    1751  0504      MRIPNT, RETHR
1236    1752  2675      OPRPNT, OPRRET
1237    1753  0776      ZJMSRT, JMSRET
1238    1754  0746      EINSTR, INSTR
1239    1755  1401      BRANDY, RANDI
1240    1756  0200      START,  BGN
1241    1757  0753      INTMQD, MQDATA
1242    1760  1146      AASAVA, ASAVA
1243    1761  1147      AASAVB, ASAVB
1244    1762  0752      XDATAH, DATAHR
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
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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
```



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

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1452    2340  7640          SZA     CLA
1453    2341  3757          DCA  I  XACSIM
1454    2342  5753          JMP  I  ZSETOP          /GO SETUP AND TEST INSTR
1455
1456    2343  0100    Z100, 100
1457    2344  0040    Z40,  40
1458    2345  0020    Z20,  20
1459    2346  0200    Z200, 200
1460    2347  0320    Z320, 320
1461    2350  0010    POS10, 10
1462    2351  0000    SKPFLG, 0
1463
1464                  /BEGINNING OF OPERATE GROUP 2 MQ INSTRUCTION SIMULATION
1465
1466    2352  1745    SIMMQI, TAD  I  DINSTR  /GET THE INSTRUCTION
1467    2353  0247          AND     Z320    /MASK OUT FOR LEGAL BITS 4,5 &7
1468    2354  7450          SNA
1469    2355  5753          JMP  I  ZSETOP  /INSTRUSTION IS A NOP
1470    2356  1304          TAD     NEG20   /SUBTRACT 20
1471    2357  7450          SNA
1472    2360  5754          JMP  I  XSMMQL  /GO SIMULATE A MQL
1473    2361  1305          TAD     M60
1474    2362  7450          SNA
1475    2363  5755          JMP  I  XSMMQA  /GO SIMULATE A MQA
1476    2364  1304          TAD     NEG20
1477    2365  7450          SNA
1478    2366  5756          JMP  I  XSMSWP  /GO SIMULATE A SWP
1479    2367  1305          TAD     M60
1480    2370  7450          SNA
1481    2371  5757          JMP  I  XSMCLA  /GO SIMULATE A CLA
1482    2372  1304          TAD     NEG20
1483    2373  7450          SNA
1484    2374  5760          JMP  I  XSMCAM  /GO SIMULATE A CAM
1485    2375  1305          TAD     M60
1486    2376  7450          SNA
1487    2377  5761          JMP  I  XSMACL  /GO SIMULATE A ACL
1488    2300  1304          TAD     NEG20
1489    2301  7650          SNA     CLA
1490    2302  5762          JMP  I  XCLSWP  /GO SIMULATE A SWP,CLA
1491    2303  7402          HLT             /NONE OF THE ABOVE
1492    2304  7760    NEG20, -20
1493    2305  7720    M60,   -60
1494
1495                  /
1496    2306  1763    ERROPR, TAD  I  GRANFL  /GET THE RANDOM DATA FIELD
1497    2307  4764          JMS  I  OPRHLT
1498    2310  1765          TAD  I  GOPRET  /GET THE ACTUAL RETURN FIELD

1499    2311  4764          JMS  I  OPRHLT
1500    2312  1751          TAD  I  ZEXPRT  /GET THE EXPECTED RETURN PC
1501    2313  4764          JMS  I  OPRHLT
1502    2314  1766          TAD  I  GACTRT  /GET THE ACTUAL RETURN PC
1503    2315  4764          JMS  I  OPRHLT
1504    2316  1767          TAD  I  GADDRS  /GET THE INSTRUCTION ADDRESS
1505    2317  4764          JMS  I  OPRHLT
1506    2320  1745          TAD  I  DINSTR  /GET THE INSTRUCTION
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SEQ 0052

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

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



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1617    2451  7006          RTL             /ROTATE 12 PLACES TO THE LEFT
1618    2452  2225          ISZ     CNT
1619    2453  5251          JMP     .-2
1620    2454  3775          DCA  I  BSIMAC  /SAVE THE SIMULATED ROTATE
1621    2455  7010          RAR             /GET THE LINK
1622    2456  3776          DCA  I  BSMLNK  /SAVE THE LINK
1623    2457  5642          JMP  I  SIMRAR  /RETURN
1624
1625    2460  7772  NEG6,   -6
1626
1627                    /ROUTINE TO SIMULATE A RAL
1628
1629    2461  0000  SIMRAL, 0
1630    2462  7300          CLA     CLL
1631    2463  1776          TAD  I  BSMLNK  /GET THE SIMULATED LINK
1632    2464  7004          RAL             /PUT IT IN THE LINK
1633    2465  1260          TAD     NEG6
1634    2466  3225          DCA     CNT
1635    2467  1775          TAD  I  BSIMAC  /GET THE SIMULATED AC
1636    2470  7012          RTR             /ROTATE IT RIGHT 12 TIMES
1637    2471  2225          ISZ     CNT
1638    2472  5270          JMP     .-2
1639    2473  3775          DCA  I  BSIMAC  /SAVE THE SIMULATED ROTATE
1640    2474  7010          RAR
1641    2475  3776          DCA  I  BSMLNK  /SAVE THE SIMULATED LINK
1642    2476  5661          JMP  I  SIMRAL  /RETURN
1643
1644
1645                    /ROUTINE TO SIMULATE A BYTE SWAP
1646
1647    2477  0000  SIMBSW, 0
1648    2500  7300          CLA     CLL
1649    2501  1776          TAD  I  BSMLNK  /GET THE SIMULATED LINK
1650    2502  7010          RAR
1651    2503  7012          RTR
1652    2504  7012          RTR
1653    2505  1775          TAD  I  BSIMAC  /GET THE SIMULATED AC
1654    2506  0317          AND     K7700
1655    2507  1775          TAD  I  BSIMAC  /GET IT AGAIN
1656    2510  7006          RTL
1657    2511  7006          RTL
1658    2512  7006          RTL
1659    2513  3775          DCA  I  BSIMAC  /SAVE THE SIMULATED BYTE SWAP
1660    2514  7010          RAR
1661    2515  3776          DCA  I  BSMLNK  /SAVE THE LINK
1662    2516  5677          JMP  I  SIMBSW  /RETURN
1663    2517  7700  K7700,  7700
1664
1665                    /ROUTINE TO SIMULATE RTR
1666
1667    2520  0000  SIMRTR, 0
1668    2521  7300          CLA     CLL
1669    2522  1776          TAD  I  BSMLNK  /GET THE SIMULATED LINK
1670    2523  7004          RAL             /PUT IT IN THE LINK
1671    2524  1336          TAD     M13
```

```
1672  2525  3225          DCA     CNT     /SETUP A COUNTER FOR 11 RAL'S
1673  2526  1775          TAD  I  BSIMAC  /GET THE SIMULATED AC
1674  2527  7004          RAL
1675  2530  2225          ISZ     CNT
1676  2531  5327          JMP     .-2
1677  2532  3775          DCA  I  BSIMAC  /SAVE THE SIMULATED ROTATED AC
1678  2533  7010          RAR
1679  2534  3776          DCA  I  BSMLNK  /SAVE THE SIMULATED LINK
1680  2535  5720          JMP  I  SIMRTR  /RETURN
1681
1682  2536  7765    M13,  -13
1683
1684                      /ROUTINE TO SIMULATE RTL
1685
1686  2537  0000    SIMRTL, 0
1687  2540  7300          CLA     CLL
1688  2541  1776          TAD  I  BSMLNK  /GET THE SIMULATED LINK
1689  2542  7004          RAL             /AND PUT IT IN THE LINK
1690  2543  1336          TAD     M13
1691  2544  3225          DCA     CNT     /SET UP A COUNTER TO DO 11 RAR'S
1692  2545  1775          TAD  I  BSIMAC  /GET THE SIMULATED AC
1693  2546  7010          RAR
1694  2547  2225          ISZ     CNT
1695  2550  5346          JMP     .-2
1696  2551  3775          DCA  I  BSIMAC  /SAVE THE SIMULATED ROTATED AC
1697  2552  7010          RAR
1698  2553  3776          DCA  I  BSMLNK  /SAVE THE SIMULATED ROTATED LINK
1699  2554  5737          JMP  I  SIMRTL
1700
1701                      /
1702  2555  1771    FLDCHK, TAD  I UPPERL   /IS THE LAST FIELD = 2K
1703  2556  1365          TAD     M3777
1704  2557  7640          SZA     CLA
1705  2560  5772          JMP  I  TSFLDF  /NO GO SWAP IT UP
1706  2561  6224          RIF             /READ THE INSTRUCTION FIELD
1707  2562  7640          SZA     CLA     /IS IT EQUAL TO FIELD 0
1708  2563  5773          JMP  I  TSWPDN  /NO,GO SWAP THE PROGRAN DOWN
1709  2564  5774          JMP  I  ROLFLG  /YES,DO NOT SWAP FIELDS BUT ROLL UP
1710                      /
1711  2565  4001    M3777,  -3777
1712
1713                      /
1714        2567          *2567
1715                      /
1716  2567  4770    ICHNG,  JMS  I  IRERNG
1717                      /
1718  2570  0202    IRERNG, CHANGE

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



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

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

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



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

```
                        /
                        *3000
                        /
3000  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 XADD1  /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
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```
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    INTAC,  0
2005    3140  0000    INTLNK, 0
2006    3141  0000    ADDRSO, 0
2007    3142  0000    INTRET, 0
2008    3143  6201    KKCDF,  CDF     00
2009    3144  0237    K237,   237
2010    3145  7677    M101,   -101
```



```
2011
2012                  /
2013          3147    *3147
2014                  /
2015    3147  4750    KCHNG,  JMS I KRERNG
2016                  /
2017    3150  0202    KRERNG, CHANGE
2018    3151  3454    SETDOX, DOSET
2019    3152  4224    STRNWL, XC8CRL
2020    3153  1143    XCNFLG, CONFLG
2021    3154  1522    XLIMIT, LIMITS
2022    3155  3275    XTYCNT, TTYCNT
2023    3156  3230    SLUXMT, XMTSLU
2024    3157  3226    FLGXMT, XMTFLG
2025    3160  3227    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, XC8CKP
2038    3175  4401    C8ERRR, XC8ERR
2039    3176  4722    C88M8,  XSTMS
2040    3177  0000            0
2041
2042                  /
2043          3200    *3200
2044                  /
2045    3200  5361            JMP     LCHNG
2046                  /
2047                  /SERIAL LINE UNIT TRANSMIT SERVICE ROUTINE
2048
2049    3201  1770    XMTSER, TAD  I  OP1     /CHECK TO SEE IF OPTION 1 WAS SELECTED
2050    3202  7004            RAL             /MOVE THE HARDWARE BIT INTO LINK
2051    3203  7700            SMA     CLA     /WAS OPTION 1 SELECTED ?
2052    3204  5773            JMP  I  PRGRET  /NO RETURN TO THE PROGRAM
2053    3205  3226            DCA     XMTFLG  /SET SLU XMIT FLAG ACTIVE
2054    3206  6042            TCF             /CLEAR TRANSMIT FLAG
2055    3207  1766            TAD  I  KILLIT  /GET THE KILL FLAG
2056    3210  7640            SZA     CLA     /INTERRUPTS STILL EXCEPTED ?
2057    3211  5241            JMP     OUT     /NO, GO WAIT FOR LAST INTERRUPT FROM CLOCK
2058    3212  2230            ISZ     XMTSLU  /ADD 1 TO THE CHARACTER TO BE PRINTED
2059    3213  2275            ISZ     TTYCNT  /DONE A LINE
2060    3214  5222            JMP     GTCHAR  /NO GO TRANSMIT NEXT CHARACTER
2061    3215  1276            TAD     K240    /GET THE CODE FOR A SPACE
2062    3216  3230            DCA     XMTSLU  /SAVE IT
2063    3217  1277            TAD     NEG100  /SET UP THE LINE COUNTER
2064    3220  3275            DCA     TTYCNT  /SAVE THE LINE COUNTER
2065    3221  4765            JMS  I  C8RSTL  /ISSUE A CARRIAGE RETURN LINE FEED
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2066  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  3400  0000  WAITEN, 0
2126  3401  1770          TAD  I  OP1     /WAS OPTION 1 SELECTED
2127  3402  7004          RAL
2128  3403  7700          SMA     CLA
2129  3404  5316          JMP     .+12    /NO, RETURN TO RELOCATION
2130  3405  2766          ISZ  I  KILLIT
2131  3406  3331          DCA     KILCN1  /CLEAR KILL COUNTER 1
2132  3407  1333          TAD     M24
2133  3410  3332          DCA     KILCN2  /SET UP FOR ABOUT A 300MS DELAY
2134  3411  2331          ISZ     KILCN1
2135  3412  5311          JMP     .-1
2136  3413  2332          ISZ     KILCN2
2137  3414  5311          JMP     .-3
2138  3415  4763          JMS  I  ERRC8   /OPTION 1 SLU OR RTC FAILED TO INTERRUPT
2139  3416  6002          IOF             /TURN THE INTERRUPT OFF
2140  3417  5700          JMP  I  WAITEN  /RETURN TO PROGRAM
2141
2142
2143  3420  0000  C8GET,  0
2144  3421  7200          CLA
2145  3422  1774          TAD  I  MQSAV8
2146  3423  7421          MQL             /RESTORE THE MQ
2147  3424  1775          TAD  I  FLSAV8
2148  3425  7004          RAL             /RESTORE THE LINK
2149  3426  7200          CLA
2150  3427  1776          TAD  I  ACSAV8  /RESTORE THE AC
2151  3430  5720          JMP  I  C8GET   /GET THE REGISTERS
2152
2153
2154  3431  0000  KILCN1, 0
2155  3432  0000  KILCN2, 0
2156  3433  7754  M24,    -24
2157
2158
2159                /ROUTINE TO RESTORE THE MONITOR ON A CONTROL C
2160
2161  3434  6002  RESBOT, IOF             /TURN THE INTERRUPT OFF
2162  3435  1364          TAD     BOOTAD
2163  3436  3010          DCA     AUTO10
2164  3437  1354          TAD     K23
2165  3440  3011          DCA     AUTO11
2166  3441  6224          RIF
2167  3442  1344          TAD     CDFINS
2168  3443  3344          DCA     .+1
2169  3444  6201  CDFINS, CDF     00
2170  3445  1410          TAD  I  AUTO10
2171  3446  6201          CDF     00
2172  3447  3411          DCA  I  AUTO11
2173  3450  2355          ISZ     M36
2174  3451  5344          JMP     .-5
2175  3452  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  ERRC8,   XC8ERR
2187  3364  4625  BOOTAD,  BOOTSV+1
2188  3365  4600  C8RSTL,  TYPEIT
2189  3366  3101  KILLIT,  KILL
2190  3367  0274  RELGO,   XCNT+3
2191  3370  3035  OP1,     SELOP1
2192  3371  1333  PSRERR,  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                  /
```

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

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

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

                        /       C8INQU= JMS XC8INQ

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

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

3736  0400    AC4008,400

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

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



```
3760  4306    C8TYP,  XC8TYP
3761  4224    C8CRL,  XC8CRL
3762  3456    SELO2C, SELOP2
3763  3475    C8TTYI, XC8TTY
3764  3601    C8CNTR, XC8CNT
3765  4524    C8ACSV, ACSAVE
3766  4526    C8FLSV, FLSAVE
3767  4525    C8MQSV, MQSAVE
3770  4042    XPSW,   XC8PSW
3771  4304    CCHAR8, CHAR
3772  4305    C8INMD, INMODE
3773  4332    C8TTYL, TTYLPT
3774  4016    C8UPAR, UPAROW
3775  3320    C88GET, C8GET
3776  3542    C8STOP, STOPNT
3777  0000            0
                /
        4000    PAGE


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

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


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

SEQ 0075

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


SEQ 0076

```
2721                /*****************************************************************
2722
2723
2724                /C8SWIT
2725                /ROUTINE WILL CHECK IF CONSOL IS ACTIVE IF IT IS ACTIVE DISPLAY
2726                /SW QUESTION, IN NOT ACTIVE IT WILL NOT PRINT THE SW QUESTIONBUT
2727                /RETURN TO CALL PLUS ONE AC=0,
2728                /C8SWIT WILL SET UP THE PSEUDO C8SWIT
2729                /REGISTER WITH THE NEW DATA ENTERED
2730                /
2731                /       C8SWIT= JMS XC8PSW
2732
2733                /EX,    C8DOR,  C8SWIT          /SET UP PSEUDO C8SWIT REGISTER IF
2734                                                /ON THE CONSOL PACKAGE, RETURN IS CALL PLUS ONE AC = 0
2735
2736
2737
2738
2739    4042  0000    XC8PSW, 0
2740                /#1
2741    4043  7200            CLA
2742                /#1
2743    4044  1762            TAD  I  SEL02           /GET THE HARD WARE CONFIG WORD
2744    4045  0226            AND     C4008           /MASK FOR CONSOL BIT
2745    4046  7650            SNA CLA                 /SKIP IF CONSOL PACKAGE IS ACTIVE
2746    4047  5642            JMP I   XC8PSW          /RETURN WITHOUT ASKING PSEUDO SWITCH
2747                /#3
2748    4050  1346            TAD     C8SWST          /IS THE SECOND ENTRY FLAG SET?
2749    4051  7640            SZA CLA                 /SKIP IF FIRST ENTRY
2750    4052  5255            JMP     PTSR            /SECOND ENTRY WITH OUT A EXIT GO TO SW QUESTION
2751    4053  2346            ISZ     C8SWST          /FIRSTAR INY SET FLAG
2752    4054  1242            TAD XC8PSW              /SAVE THE RETURN ADDRESS
2753    4055  3233            DCA SXPSW
2754                /#3
2755    4056  1357    PTSR,   TAD     AMES
2756    4057  3261            DCA     .+2
2757    4060  4766            JMS  I  C8PRN                   /C8PRNT SR=XXX
2758    4061  4150            MERA
2759    4062  1763            TAD  I  SAV2            /GET CONTENTS OF SW
2760    4063  4767            JMS  I  C8OCTA          /CONVERT IT TO ASCII
2761    4064  1227            TAD     C840            /GET SPACE
2762    4065  4765            JMS  I  C8TY
2763    4066  2776            ISZ  I  C8INM           /SET FLAG FOR CHAR EXECTED
2764    4067  4770            JMS  I  C8ECHO          /LOOK FOR INPUT
2765    4070  4307            JMS     TSTCHA          /NOT CONTROL TEST IT IS LEGAL
2766    4071  1773            TAD  I  CHAR8           /STORE NEW CHNED M SW REG
2767    4072  3763            DCA  I  SAV2
2768
2769    4073  1237            TAD     C8N3            /GET A MINUS 3
2770    4074  3347            DCA     TMPCNT          /STORE IN TEMP COUNT
2771    4075  4770    GETCH1, JMS  I  C8ECHO          /GET NEXT CHAR
2772    4076  4307            JMS     TSTCHA          /CHECK IF CR + GOOD CHAR
2773    4077  1763            TAD  I  SAV2            /GET C8SWIT REGISTER
2774    4100  7106            RTL CLL                 /ROTATE IT LEFT 3 PLACES
2775    4101  7004            RAL
```

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

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



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

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

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



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

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

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



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

SEQ 0083

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

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


SEQ 0084

```
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  C8B400, 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
```

```
3195  4555  3453  XPASSCT, PASCNT
3196  4556  4224  CRLFC8,  XC8CRL
3197  4557  3506  PRNTC8,  XC8PNT
3198  4560  4201  OCTAC8,  XC8OCT
3199  4561  3466  CK8WC8,  XC8SW
3200  4562  3726  INQUC8,  XC8INQ
3201  4563  3320  C8GETS,  C8GET
3202  4564  3456  SELU2B,  SELOP2
3203  4565  4016  C8UPA,   UPAROW
3204  4566  3712  C8STS,   C8SETS
3205  4567  4305  C8IND,   INMODE
3206  4570  4224  C8LFCR,  XC8CRL
3207  4571  4146  C888SW,  C8SWST
3208  4572  3032  XDOSW,   CL8RGN
3209  4573  3542  NTSTOP,  STOPNT
3210  4574  4765  PAGJMP,  ZCHANGE-1      /VT78/
3211  4575  0000          0
3212  4576  5777          JMP  I  CROSPG
3213  4577  4765  CROSPG,  ZCHANGE-1      /VT78/
3214
3215        4600  *4600
3216
3217  4600  0000  TYPEIT,  0
3218  4601  1213          TAD     CP215
3219  4602  4217          JMS     TYPE
3220  4603  1214          TAD     CP212
3221  4604  4217          JMS     TYPE
3222  4605  1215          TAD     M4
3223  4606  3216          DCA     TYPECT
3224  4607  4217          JMS     TYPE
3225  4610  2216          ISZ     TYPECT
3226  4611  5207          JMP     .-2
3227  4612  5600          JMP  I  TYPEIT
3228
3229  4613  0215  CP215,  215
3230  4614  0212  CP212,  212
3231  4615  7774  M4,     -4
3232  4616  0000  TYPECT,  0
3233
3234  4617  0000  TYPE,    0
3235  4620  6046          TLS
3236  4621  6041          TSF
3237  4622  5221          JMP     .-1
3238  4623  6042          TCF
3239  4624  7200          CLA
3240  4625  5617          JMP  I  TYPE
3241

3242  4626  7126  BOOTSV,  7126
3243  4627  1060          1060
3244  4630  6751          6751
3245  4631  7201          7201
3246  4632  4053          4053
3247  4633  4053          4053
3248  4634  7104          7104
3249  4635  6755          6755
```



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3250  4636  5054          5054
3251  4637  6754          6754
3252  4640  7450          7450
3253  4641  7610          7610
3254  4642  5046          5046
3255  4643  1060          1060
3256  4644  7041          7041
3257  4645  1061          1061
3258  4646  3060          3060
3259  4647  5024          5024
3260  4650  6751          6751
3261  4651  4053          4053
3262  4652  3002          3002
3263  4653  2050          2050
3264  4654  5047          5047
3265  4655  0000          0000
3266  4656  6753          6753
3267  4657  5033          5033
3268  4660  6752          6752
3269  4661  5453          5453
3270  4662  7024          7024
3271  4663  6030          6030
3272  4664  0000          0000
3273
3274              /ROUTINE TO HANDLE HACK IN VT78 CPU--PAGE BIT MUST BE 0 FOR AUTO INDEXING
3275              /  TO WORK--EVEN IF THE INSTRUCTION IS ON PAGE 0.
3276              /ROUTINE USED ONLY WHEN TESTING ON VT78 PROCESSOR.
3277              /
3278
3279        4700  *4700
3280  4700  1771  VT78GL,  TAD I ZADDR5     /VT78/CHECK ADDRESS TO SEE IF IT IS IN THE
3281                                        /VT78/ VULNERABLE RANGE (0000-0177).
3282  4701  0316          AND K7600         /VT78/
3283  4702  7640          SZA CLA           /VT78/
3284  4703  5314          JMP RETN          /VT78/ OUTSIDE VULNERABLE RANGE
3285  4704  1770          TAD I VINSTR      /VT78/CHECK INST. TO SEE IF IT IS THE VULNERABLE
3286                                        /VT78/ TYPE--FORM X6X0
3287  4705  0317          AND K0700         /VT78/
3288  4706  1320          TAD M0600         /VT78/
3289  4707  7640          SZA CLA           /VT78/
3290  4710  5314          JMP RETN          /VT78/ INST NOT VULNERABLE TYPE
3291  4711  1770          TAD I VINSTR      /VT78/ZERO PAGE BIT SO THAT INST WILL WORK PROPERLY
3292  4712  0321          AND K7577         /VT78/
3293  4713  3770          DCA I VINSTR      /VT78/
3294  4714  7340  RETN,   CLA CLL CMA      /VT78/
3295  4715  5767          JMP I BACK        /VT78/
3296
3297  4716  7600  K7600,  7600             /VT78/
3298  4717  0700  K0700,  0700             /VT78/
3299  4720  7200  M0600,  -600             /VT78/
3300  4721  7577  K7577,  7577             /VT78/
3301
3302  4722  0000  XSTMS,   0
3303  4723  7200          CLA
3304  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    DPERNG, CHANGE
3411  5104  3102    XFIRST, FIRST
3412  5105  3036    OP1SET, SETOP1
3413  5106  3245    ENDCNT, CNTEND
3414  5107  0334    INITFO, FOINIT
3415  5110  2127    XRANCN, RANCON
3416  5111  1144    ZFLDLM, FLDLIM
3417  5112  1550    ZUPLIM, UPRLIM
3418  5113  1145    ZHIGH,  HGHLIM
3419  5114  0527    XFILL,  FILALL
3420  5115  3001    XFLRND, FILRND
3421  5116  0216    XSWAP1, SWAP1
3422  5117  5150    XSWAP2, SWAP2
3423  5120  0213    XDRFLG, DIRFLG
3424  5121  0500    XFLDFG, FLDFLG
3425  5122  0247    XCNTR3, CNTR3
3426  5123  0200    PRGBGN, BGN
3427  5124  1001    XGNFLD, GENFLD
3428  5125  5126    TABLE,  XFDMSK
3429  5126  1127    XFDMSK, FLDMSK
3430  5127  1130    XCNFLD, CONFLD
3431  5130  1131    XADRMS, ADRMSK
3432  5131  1132    XCNADR, CONADR
3433  5132  1642    XINSMS, INSMSK
3434  5133  1643    XCNINS, CONINS
3435  5134  1133    XINDMS, INDMSK
3436  5135  1134    XCNIND, CONIND
3437  5136  1135    XMDTMS, MDTMSK
3438  5137  1136    XCNMDT, CONMDT
3439  5140  1137    XACDMS, ACDMSK
3440  5141  1140    XCNACD, CONACD
3441  5142  1141    XMQDMS, MQDMSK
3442  5143  1142    XCNMQD, CONMQD
3443  5144  5025    XRSCNI, 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
```

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

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



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

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

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

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


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

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

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

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


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

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

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

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


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

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

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

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

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

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

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

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


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

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

5400
5500

5600
5700


6000
6100

6200
6300

6400
6500

6600
6700


7000
7100

7200
7300


7400
7500

7600
7700
```



```
A1          1653        AUTO10      0010        C8400       3543        C8N270      4034
A14         1651        AUTO11      0011        C87         4035        C8N3        4037
A1CHG       1150        B400        1650        C87700      3546        C8N4        4242
A1RRNG      1151        B6201       0526        C8@400      4530        C8NTR       4371
A200        1647        B7          0543        C8885W      4571        C8OCT       3572
A400        1124        BACK        4767        C88GET      3775        C8OCTA      4167
A6201       2144        BADDRS      1366        C8ACSV      3765        C8P212      4246
A7          0743        BCHNG       1347        C8BY1       3433        C8P215      4245
AACHNG      0551        BDATHR      1376        C8BY2       4474        C8P260      4244
AADDRS      1166        BDATTH      1375        C8BY3       4271        C8P7        4243
AASAVA      1760        BEGIN       0507        C8BY4       4536        C8PASS      0355
AASAVB      1761        BGN         0200        C8BY5       4327        C8PRN       4166
ABGN        3170        BGNCON      3025        C8CHAR      3576        C8PRNT      3571
ARRRY1      1164        BGOTST      0524        C8CHG1      3562        C8PX        4774
AC4008      3736        BINSTR      0560        C8CHG2      3746        C8RER1      3563
ACDATA      1031        BLPCNT      1385        C8CHG3      4154        C8RER2      3747
ACOMSK      1137        BNDCON      1551        C8CHG4      4361        C8RER3      4155
ACGNOV      5242        BNDOK1      1445        C8CHG5      4544        C8RER4      4362
ACHG        0765        BNDOK2      1457        C8CHKR      3174        C8RER5      4547
ACHNG       0353        BNDRY1      1435        C8CKP       4223        C8RETD      4015
ACL         7701        BOOTAD      3364        C8CKPA      3574        C8RETR      3713
ACMPS       4552        BOOTSV      4626        C8CKSW      3567        C8RSTL      3365
ACSAV8      3376        BOTRES      4363        C8CNTR      3764        C8SETD      4014
ACSAVF      4524        BP6         1654        C8CR        4171        C8SETS      3712
ACSC8       4373        BRANDY      1755        C8CRL       3761        C8SMS       3176
ACTRIN      3372        BREFAD      1374        C8CRLF      3570        C8STOP      3776
ACTOVR      5236        BRERNG      1350        C8DO1       3513        C8STS       4566
ACUTST      2623        BSAVA       2145        C8DO10      4460        C8SWIT      4164
ADATAH      1172        BSIMAC      2575        C8DO11      4010        C8SWR       2766
ADATAT      1171        BSMLNK      2576        C8DO2       4234        C8SWST      4146
ADD11       1126        C10         5073        C8DO4       4207        C8TMP1      4222
ADDONE      5036        C100        4041        C8DO7       3703        C8TPE       4367
ADDR8       0745        C1777       1561        C8ECHO      4170        C8TTYI      3763
ADDR80      3141        C200        1312        C8ERÖR      1750        C8TTYL      3773
ADDR85      1612        C400        1547        C8ERR       1351        C8TY        4165
ADRMSK      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       4569
ALOOID      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
AREFAD      1170        C8177       3544        C8INQU      3573        CCHAR8      3771
AREONG      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    HOMCIF  0744
CINSTR  2162    D6201   2070    FLDLIM  1144    HRERNG  2344
CKCOUT  3435    DATADN  2745    FLDMSK  1127    ICHNG   2567
CKSWC8  4561    DATAHR  0752    FLDRAN  1156    ILLMQ   1703
CL8AGN  3032    DATATH  0751    FLDRET  0761    ILLOP1  1664
CLASWP  2671    DATFN   1372    FLDXRN  2157    ILLOP2  1672
CLCI    6136    DCATST  1255    FLGRTC  3160    INACDV  3273
CLLF    6135    DCHNG   5074    FLGXMT  3157    INDAD   0750
CLSK    6137    DECSWP  1116    FLINK   0771    INDEXA  3655
CNT     2425    DINSTR  2345    FLMES   4554    INDMSK  1133
CNTEND  3245    DIRFLG  0213    FLSAV8  3375    INITF0  5107
CNTR2   0246    DM1     4040    FLSAVE  4526    INMODE  4305
CNTR3   0247    DM2     4031    FLSC8   4374    INQUC8  4562
CNTRLC  4345    DM41    4032    FLXRET  2160    INSGEN  1601
CNTRLG  4001    DOCNT   3452    FMQDAT  0772    INSMSK  1642
CNTRLL  3714    DONEA   3631    FRERNG  1747    INSOK   1520
CNTRLO  3721    DONEMQ  1362    GACTRT  2366    INSTR   0746
CNTRLQ  3671    DOPACK  3414    GADDRS  2367    INT     0003
CNTRLS  3675    DOSET   3454    GCHNG   2147    INTAC   3137
CNTVAL  3455    DRERNG  5103    GDATAD  2371    INTERS  3103
COMCHK  2227    DVINAC  3161    GDATAH  2370    INTLNK  3140
COMPAR  1206    EINSTR  1754    GENADD  1043    INTMQD  1757
CONT7   0122    ENDCMA  2422    GENFLD  1001    INTOPR  2175
CONACD  1140    ENDCNT  5106    GENIND  1072    INTRET  3142
CONADR  1132    ENDIT   4143    GENINS  1055    INTSET  2137
CONFLD  1130    ENDOFP  3172    GENMQD  1037    IOF     6002
CONFLG  1143    ERR1    4137    GETC8   4376    ION     6001
CONTND  1134    ERRC8   3363    GETCH1  4075    IRERNG  2570
CONTNS  1643    ERRMES  4477    GETDAT  3656    ISZTST  1234
CONWDT  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  0527    GSVLNK  2372    K14     2064
CRERNG  1563    FILCNT  4241    GTCHAR  3222    K177    1646

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



```
K240    3276    M36     3355    NOTIND  0625    POS200  2071
K37     1546    M3777   2565    NOTJJ   0650    POWERF  3163
K4      2063    M4      4618    NTCLAS  4465    POWFAL  3246
K40     2066    M400    0215    NTSTOP  4573    PRGBG   1576
K400    0250    M5      0121    O6201   1733    PRGBGN  5123
K4000   2434    M60     2305    OADDRS  1773    PRGEND  5176
K4772   5263    M6000   1645    OCTAC8  4560    PRGRET  3373
K5771   0124    M7      5071    OERROR  2767    PRGSIZ  1552
K5772   0125    MAXFLD  0573    OFIELD  2176    PRNTC8  4557
K6201   0756    MDTMSK  1135    OP1     3370    PSIE    6665
K6202   0757    MEMDAT  1025    OP1MND  5264    PSKE    6663
K70     1125    MESA    4150    OP1OVR  5265    PSKF    6661
K7000   1644    MESAC   4512    OP1SEL  0021    PSRERR  3371
K7577   4721    MESERR  4550    OP1SET  5105    PSTB    6664
K7600   4716    MESFL   4520    OP2SEL  0022    PTSR    4056
K7700   2517    MESHD   4773    OPERR1  1734    PTSTOR  3541
K7721   1655    MESMQ   4515    OPRBGN  1656    R5771   5262
K7770   0760    MESPAS  3457    OPRCOM  2706    RAN1    1543
K7777   2624    MESPC   4507    OPRER1  2376    RAN2    1544
KCHNG   3147    MIN37   0123    OPRERR  2744    RANCON  2127
KIE     6035    MM20    5240    OPRETF  2747    RANDX   1401
KILON1  3331    MM4     3023    OPRHLT  2364    RANDX1  1413
KILON2  3332    MM55    3100    OPRINT  0637    RANFLD  0754
KILL    3101    MM7     1545    OPROVR  0120    REDOA   3620
KILLIT  3366    MMM55   3274    OPRPNT  1752    REFAD   0747
KJMS    0764    MOVDWN  5157    OPRRET  2675    RELGO   3367
KKCOF   3143    MOVOVR  0073    OPRSET  2054    RESBOT  3334
KPERNG  3150    MOVUP   0225    OSINAC  2173    RESCNT  5035
LAS     7604    MOVWDX  5173    OSMLNK  2174    RESET   3264
LCSKPA  4344    MQA     7501    OUT     3241    RESETT  0256
LCHNG   3361    MQDAT   1363    OVR4    5241    RETFLD  0525
LFRR1   4141    MQDATA  0753    OVRLAY  0115    RETHR   0504
LIMITS  1522    MQDMSK  1141    OVRLY1  0117    RETN    4714
LINKDN  2746    MQDONE  2750    OVROPI  5267    RETPNT  0004
LINKRT  1361    MQL     7421    OWLVT   0612    RETPRG  3131
LINKSV  1360    MQMES   4553    OWVT78  5312    RETTDF  2705
LNKSAV  1174    MQSAV8  3374    PAGJMP  4574    RETURN  1354
LOC200  0126    MQSAVE  4525    PASCNT  3453    RFVT    0613
LOC201  0127    MQSC8   4375    PASMES  3566    RFVTP   5314
LOOPID  0601    MRIERR  2161    PATCH   0023    RMF     6244
LOWLIM  0214    MRIOVR  0116    PATCH1  0042    ROLBAK  0401
LPCNT   0252    MRIPNT  1751    PATCH2  5200    ROLFLG  2574
LPSW0   2737    MVWDPG  5174    PATCH3  5307    ROLLUP  0315
LPERNG  3362    NEG10   2072    PATCHC  0070    RSCNT   0376
M0600   4720    NEG100  3277    PATMOV  0130    RSCNTX  0370
M10     0503    NEG14   1652    PCLF    6662    RTCFLG  3227
M101    3145    NEG20   2304    PCMES   4551    RTCSER  3232
M13     2536    NEG6    2460    PCSAV   4523    RTFLG   0572
M14     2424    NEWDFA  0475    PCSAVE  1311    RTFLGF  0574
M20     0502    NEWDTF  0457    PCTST   2073    RTFLGR  0571
M200    0251    NOSET   3445    PNTBUF  4331    RTLINK  0557
M24     3333    NOTAUT  0611    POS10   2250    RTMQD   0556
```

```
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        VT78OW  5767        XFILL   5114
SAVLNK  0755        SMACHK  2202        WAIT    0360        XFIRST  5104
SAVMP2  0071        SMLCHK  2220        WAITEN  3300        XFLD    0354
SAVSI   3565        SPL     6102        XACDMS  5140        XFLDFG  5121
SAVSWR  0333        START   1756        XACSIM  2352        XFLDLM  1573
SBE     6101        STARTP  5025        XADD1   3173        XFLRND  5115
SELM1   3564        STOPNT  3542        XADRMS  5130        XGENTI  1155
SELM2   4162        STRFLD  0005        XASAVA  0364        XGETWD  1357
SELM2A  4366        STRNWL  3152        XASAVB  0365        XGNFLD  5124
SELM2B  4561        STRRNO  5237        XBGCON  0372        XGO     0576
SELM2C  3762        SUBADD  0212        XBGRAN  0371        XHALT   1565
SELM2X  4772        SWAP1   0216        XBNDCN  1160        XINDMS  5134
SELMP1  3035        SWAP2   5150        XBSAVA  1356        XINSGN  2774
SELOP2  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
SETPLG  0324        SXPSW   4033        XC8ERR  4401        XLIMIT  3154
SETTNT  0357        SZACHK  2211        XC8INQ  3726        XLOOP   0367
SETMP1  3036        SZPRG   0245        XC8LF   4531        XLWLIM  0570
SETRET  0710        TABLA   3657        XC8OCT  4201        XMDTMS  5136
SETSKP  2226        TABLB   3752        XC8PAS  3401        XMQDMS  5142
SFLDFG  0433        TABLE   5125        XC8PNT  3506        XMTFLG  3226
SIMAC   2752        TADTST  1223        XC8PSW  4042        XMTSER  3201
SIMACL  2666        TEMP    3024        XC8SW   3466        XMTSLU  3230
SIMASW  2477        TINT    2143        XC8TTY  3475        XNTIND  0363
SIMCAM  2663        TMPCNT  4147        XC8TYP  4306        XOWLVT  5313
SIMCLA  2661        TSAME   1503        XCHNGE  0552        XPASSC  4555
SIMCLR  6160        TSFLDF  2572        XCL8WP  2362        XPCSAV  2155
SIMCMA  2401        TSTCHA  4107        XCNACD  5141        XPSR    4776
SIMCML  2426        TSTIN1  0562        XCNADR  5131        XPSW    3770
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        XSMB&W  2170
SIMSZA  2601        UPDWN   5147        XERR2   1572        XSMCAM  2360
SIMTWC  2042        UPPERL  2571        XERROR  1353        XSMCLA  2357
```



```
XSMSMA  2163        ZLIMIT  0555
XSMSML  2164        ZSETOP  2353
XSMTAC  2165        ZUPLIM  5112
XSMLNK  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
XSVLNK  1764
XSWAP1  5116
XSWAP2  5117
XTARLA  3750
XTARLB  3751
XTYCNT  3155
XUPERL  0373
XUPLIM  1157
XVT78G  0767
XWDMQV  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
```

ERRORS DETECTED: 0

LINKS GENERATED: 0

RUN-TIME: 7 SECONDS

4K CORE USED

```
C8N4      2865    2907#
C8NTR     2956    2980    3061#
C8OC1     2795    2440#
C8OC1A    2760    2836#
C8P212    2898    2911#
C8P215    2893    2910#
C8P260    2869    2909#
C8P7      2868    2908#
C8PASS     212     267#
C8PRN     2757    2835#
C8PRNT    2992    2439#
C8PX      3310    3327#
C8RER1    2431    2433#
C8REP2    2634    2636#
C8PER3    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    2842#
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#
CHAR8     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
CONMOD     706     777#    3442
CONPAN    3142#   3354
CONSET    1930    2027#
CONST1     716     720     722     744#
CONST2     736     738     740     750#
CONTLM    1900    1907    1914    2031#
CONTRO    3529#
COPRSI    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#
```

```
HOMCIF     473     476     493     541     635#
HREPNG    1528    1530#
ICHNG     1561    1716#
ILLMQ     1174    1179    1184    1186#
ILLOP1    1169#
ILLOP2    1168    1176#
INACDV    2026    2108    2116    2119#
INDAD      435     451     459     639#    1098
INDEXA    2487    2496    2517    2523#
INDMSK     733     770#    3435
INITFO    3360    3414#
INMODE    2655    2843    2979    2983    2987#   3205
INQUCB    3139    3200#
INSGEN     792    1116#   1134    1148    1173    1183    1888
INSMSK    1118    1150#   3433
INSOK     1043    1050#
INSTR      272     413     462     481     524     637#    802     943     1095    1238    1398    1531    3323
INT         32      33#     254    1376
INTAC     1975    1999    2004#
INTERS      33    1389    1975#
INTLNK    1977    1997    2005#
INTMQD    1194    1241#
INTOPR    1317    1409#
INTRET    1979    2002    2007#
INTSET     269    1372#   1375
IOF         15#     115     121    2088    2139    2161    3086    3522    3553
ION         14#    2001    3361    3528
IPERNG    1716    1718#
ISZTST     416     846#
JCHNG     1731    1879#
JMPJMS     464     524#
JMPTST     419     889#
JMSLOC     606     608     611     649#    1392
JMSLOD     609     613     650#
JMSRET     614     665#    1237
JMSTST     418     875#
JRERNG    1879    1881#
K0700     3287    3298#
K1        1285    1319#
K10        304     321     357#
K100      1273    1325#
K14       1293    1303    1322#
K177      1141    1154#
K2        1289    1320#
K20       1281    1323#
K200      3197#   3452
K23       2164    2178#
K237      1960    2009#
K240      2061    2122#

K37       1056    1076#
K4        1297    1309    1321#
K40       1277    1324#
K400       190#    199
```



```
K4000     1594    1598#
K4772     3484    3537#
K5771       66     137#
K5772       68     138#
K6201      454     466     531     645#
K6202      475     489     535     646#
K70        674     677     764#
K7000     1131    1135    1152#
K7577     3292    3300#
K7600     3282    3297#
K7700     1654    1663#
K7721     1161#   1187
K7770      436     647#
K7777     1750    1759#   1767
KCHNG     1896    2015#
KIE         18#   1947
KILCN1    2131    2134    2154#
KILCN2    2133    2136    2155#
KILL      1939    1970#   2189
KILLIT    2055    2081    2130    2189#
KJMS       610     612     651#
KKCDF     1981    2008#
KREPNG    2015    2017#
LAS         12#   1368
LCAKPA    3031    3034    3037#
LCHNG     2045    2183#
LERPI     2787    2793    2808#
LIMITS    1054#   1070    2021
LINKDN     412     660     937    1554    1829    1852    1869#
LINKRT     926     937#
LINKSV     924     936#
LNKSAV     703     807#
LOC200      67     139#
LOC201      69     140#
LOOPID     277     435#    809
LOWLIM     160#    203     240     421
LPCNT      194#    664     930     941
LPSWO     1256    1860#
LPERNG    2183    2185#
M0600     3288    3299#
M10        311     359#
M101      1962    2010#
M13       1671    1682#   1690
M14       1567    1586#
M20        320     358#
M200       167     191#
M24       2132    2156#
M36       2173    2179#
M3777     1703    1711#
M4        3222    3231#
M400       161#    239
M5         107     132#
M60       1473    1479    1485    1493#
```

```
XGNFLD  3765  3427#
XGO      353   427#
XHALT    974   976   978   1094#
XINDMS  3435#
XINSGN  1863  1888#
XINSMS  3133#
XINSTR   198   202   272#
XINT    1373  1389#
XJMSLC  1333  1392#
XLF     3312  3328#
XLIMIT  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  3461  3564#
XPASSC  3175  3195#
XPCSAV  1334  1335  1393#
XPSR    3313  3329#
XPSW    2627  2653#
XPTCH3    79   104#
XRANCN  3344  3350  3415#
XREFAD   207   276#
XRETFL   901   947#
XRETHR   726   800#
XRETPC  1337  1394#
XRNFLD   899   940#
XROLBK   228   233   271#
XRSCNT  3443#  3465
XRTOPF  1201  1254#
XSIMAC  1191  1245#
XSIMMQ  1195  1215  1248#
XSIZE    332   426#
XSMACL  1487  1543#
XSMBSW  1305  1404#
XSMCAM  1484  1542#
XSMCLA  1481  1541#
XSMCMA  1279  1399#
XSMCML  1283  1400#
XSMIAC  1287  1401#
XSMLNK  1193  1247#
XSMMQA  1475  1539#
XSMMQI  1210  1252#
XSMMQL  1472  1538#
XSMOP1  1205  1250#

XSMOP2  1209  1251#
XSMRAL  1299  1403#
XSMRAR  1296  1402#
XSMRTL  1311  1406#
```



```
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   663#
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#
```