



COMPUTER CONTROL DIVISION (EUROPE)

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* E510-001-H902 (X16-08T1) DRAWING NO. 41285222-001-01

* COMPUTER: DDP-416, DDP-516

* PROGRAM CATEGORY: VERIFICATION AND TEST

* PROGRAM TITLE: X16-08T1
* MEMORY LOCKOUT TEST NO.1 FOR THE DDP-416 AND DDP-516

APPROVAL

DATE

PROG

SUPR

QUAL

9.4.69

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*

* AUTHOR

*

* HONEYWELL - COMPUTER CONTROL DIVISION (EUROPE)

*

*

* PURPOSE

*

* TO TEST THE MEMORY LOCKOUT OPTION (516-08)

*

*

* RESTRICTIONS

*

* THIS PROGRAM WILL OPERATE ON ANY DDP-416 OR DDP-516 WHICH HAS
* OPTION 516-08. IT HAS BEEN TESTED ONLY ON A DDP-516.

*

*

* TIMING

*

* THIS PROGRAM TAKES ABOUT 2.3 MILLISEC. PER PASS OR 25,500 PASSES
* PER MINUTE OR 1,530,000 PASSES PER HOUR.

*

*

* STORAGE

*

* THIS PROGRAM USES LOCATIONS IN EVERY LOCKED-OUT SECTOR OF MEMORY.

*

*

* EJECT

0038
0039
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* USE

INSERT THE NUMBER OF 8K INCREMENTS OF MEMORY WHICH HAVE THE
LOCKOUT OPTION (1, 2, 3, OR 4) IN BITS 14-16 OF REGISTER "A" AND
START THE PROGRAM AT LOCATION "STRT".

THE PROGRAM SHOULD STOP AT "EOPH", THE END-OF-PASS HALT.
EACH PUSH OF THE START BUTTON SHOULD CAUSE THE PROGRAM TO LOOP
THROUGH ALL THE TESTS AND STOP AT "EOPH". IF IT DOES, TYPE IN THE
CHARACTER "G" AND THEN PRESS START TO CAUSE THE PROGRAM TO CYCLE
WITHOUT STOPPING UNLESS IT DETECTS AN ERROR.

IF THE CHARACTER "S" IS TYPED IN, THE PROGRAM WILL AGAIN
STOP AFTER EACH PASS.

IF THE CHARACTER "T" IS TYPED IN, THE NUMBER OF PASSES
COMPLETED WILL BE TYPED OUT.

* ERRORS

WHENEVER A PLANNED INTERRUPT DOES NOT OCCUR, A "JST EROR" IS
EXECUTED. SINCE THE "HLT" IN THE ERROR ROUTINE MAY NOW CAUSE AN
INTERRUPT, ANOTHER LINK ADDRESS IS STORED IN LOC. '62 AND A SECOND
"HLT" IS USED. WHEN EITHER OF THESE TWO ERROR HALTS IS ENCOUN-
TERED, THE CONTENTS OF REGISTER "A" WILL BE THE SAME AS THEY WERE
WHEN THE PLANNED INTERRUPT SHOULD HAVE OCCURRED.

IN ORDER TO DISPLAY MORE INFORMATION IN REG. A, NAMELY THE
CONTENTS OF "EROR", THE ORIGINAL CONTENTS OF LOC. '62, AND THE
PRESENT CONTENTS OF LOC. '62, THE "START" BUTTON WILL HAVE TO BE
PUSHED 1, 2, OR 3 TIMES, RESPECTIVELY. A FOURTH PUSH WILL RETURN
CONTROL TO THE MAIN PROGRAM WHICH WILL RE-TRY THE FAILING TEST.

* EJECT



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0136

* METHOD

* THIS PROGRAM CONTAINS A FEATURE WHICH TRACES THE PATH OF THE
* PROGRAM USING JST INSTRUCTIONS. EACH TEST STARTS WITH A "JST
* JSTL" (THE JST-REPORTING LOCATION) FOLLOWED BY A "JST **1" WHICH
* IN TURN IS FOLLOWED BY A "PZE 2". LOCATION "JSTL" IS MODIFIED AT
* THE BEGINNING OF EACH TEST AND EACH "PZE 2" IS MODIFIED TO CONTAIN
* ITS OWN ADDRESS. THE "PZE 2" LOCATIONS ARE CHECKED FOR THEIR OWN
* ADDRESSES AND RESTORED TO "PZE 2" AT THE END OF EACH PASS.

* THIS PROGRAM TESTS TO SEE THAT THE FOLLOWING INSTRUCTIONS
* CAUSE RESTRICTED MODE VIOLATION INTERRUPTS:

- * 1. INDIRECT ADDRESSING (MORE THAN 8 LEVELS)
- * 2. INH
- * 3. OCP
- * 4. SKS
- * 5. OTA
- * 6. INA
- * 7. HLT
- * 8. SMK
- * 9. STX
- * 10. IMA
- * 11. IRS
- * 12. JST
- * 13. INDIRECT STA
- * 14. INDEXED STA
- * 15. LDX

* SECTOR 0 RELOCATION IS ALSO TESTED.

* EJCT





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* ABBREVIATIONS

*
* ASCII-AMERICAN STANDARD CODE FOR INFORMATION INTERCHANGE
* ASR - TELETYPEWRITER (AUTOMATIC SEND-RECEIVE SET)
* INST- (COMPUTER) INSTRUCTION
* INT - INTERRUPT
* LOC - LOCATION (IN CORE MEMORY)
* RA - REGISTER A
* REG - (HARDWARE) REGISTER
* RM - RESTRICTED MODE
* RMVI- RESTRICTED MODE VIOLATION INTERRUPT

CF5
ORG '774
LOAD

THIS PROGRAM IS NOT RELOCATABLE (08-29-66).

*
T0 BSZ 1
T2 BSZ 1
TL0 OCT 100000
TL1 BSZ 1
EJCT





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0161
0162
0163
0164 01000 101040 FSTR SNZ
0165 01001 000000 HLT
0166 01002 100040 SZE
0167 01003 0 04 01723 STA T8
0168 01004 0 10 01734 STRT JST JSTL REPORT IN TO "JSTL"
0169 01005 0 10 01006 JST *+1 AND
0170 01006 0 00 00002 J01 PZE 2 TO THIS LOCATION.
0171 01007 0 02 01634 LDA ERAD PUT "ERROR ADDRESS" IN
0172 01010 0 04 00062 STA '62 LOCKOUT VIOLATION INTERRUPT LINK LOCATION.
0173 01011 0 02 01700 LDA ONES SET ALL SECTORS TO UN-PROTECTED MODE.
0174 01012 74 1420 SMK '1420
0175 01013 74 1520 SMK '1520
0176 01014 74 1620 SMK '1620
0177 01015 74 1720 SMK '1720
0178 01016 0 02 01762 LDA = '100000 RESET
0179 01017 0 04 00776 STA TLO LOC. '776.
0180 01020 0 02 01761 LDA = '140000 SET SECTORS 0 AND 1
0181 01021 74 1420 SMK '1420 TO UN-PROTECTED MODE AND
0182 01022 140040 CRA ALL OTHERS
0183 01023 74 1520 SMK '1520 TO
0184 01024 74 1620 SMK '1620 PROTECTED
0185 01025 74 1720 SMK '1720 MODE.
0186
0187
0188
0189 01026 0 10 01734 S01 JST JSTL REPORT.
0190 01027 0 10 01030 JST *+1 REPORT.
0191 01030 0 00 00002 J02 PZE 2
0192 01031 001401 ERM ENTER RESTRICTED MODE.
0193 01032 0 02 01037 LDA L1 RE-SET
0194 01033 0 04 00062 STA '62 LINK.
0195 01034 -0 04 01703 STA* IAT ATTEMPT 8-LEVEL INDIRECT ADDRESSING.
0196 01035 0 10 01635 JST EROR GO TO ERROR IF NO INTERRUPT.
```



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```
0197 01036 0 01 01026 JMP S01
0198 01037 0 001040 L1 DAC **1
0199 01040 0 000000 DAC **
0200 *
0201 * TEST INH INTERRUPT
0202 *
0203 01041 0 10 01734 S02 JST JSTL
0204 01042 0 10 01043 JST **1
0205 01043 0 00 00002 J03 PZE 2
0206 01044 0 02 01053 LDA L2
0207 01045 0 04 00062 STA '62
0208 01046 001401 ERM
0209 01047 001001 INH
0210 01050 0 02 01760 LDA ='11
0211 01051 0 10 01635 JST EROR
0212 01052 0 01 01041 JMP S02
0213 01053 0 001054 L2 DAC **1
0214 01054 0 000000 DAC **
0215 01055 0 05 01760 ERA ='11
0216 01056 100040 SZE
0217 01057 0 10 01635 JST EROR
0218 *
0219 * TEST OCP INTERRUPT
0220 *
0221 01060 0 10 01734 S03 JST JSTL
0222 01061 0 10 01062 JST **1
0223 01062 0 00 00002 J04 PZE 2
0224 01063 001401 ERM
0225 01064 0 02 01072 LDA L3
0226 01065 0 04 00062 STA '62
0227 01066 14 0037 OCP '37
0228 01067 0 10 01635 JST EROR
0229 01070 0 10 01635 JST EROR
0230 01071 0 01 01060 JMP S03
0231 01072 0 001073 L3 DAC **1
0232 01073 0 000000 DAC **
0233 *
```

TRY AGAIN IF ERROR OCCURRED.
LINK ADDRESS.
LOCKOUT VIOLATION INTERRUPT ENTRY.

REPORT.
REPORT.

SET
LINK.
RE-ENTER RESTR. MODE.
INHIBIT INTERRUPTS, CAUSE RMVI.
THIS INST. SHOULD BE EXECUTED.
THIS ONE SHOULD NOT.
TRY AGAIN IF ERROR OCCURRED.
LINK ADDRESS.
LOCKOUT VIOLATION INTERRUPT ENTRY.
WAS LDA
EXECUTED -
NO.

YES.

RE-ENTER R.M.
SET
LINK.
UNASSIGNED OCP.
GO TO ERROR IF NO INTERRUPT.
ALSO, JUST IN CASE INSTRUCTION SKIPS.
TRY AGAIN IF ERROR OCCURRED.
LINK ADDRESS.
LOCKOUT VIOLATION INTERRUPT ENTRY.



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0234 * TEST SKS INTERRUPT

0235 *

0236 01074 0 10 01734 S04 JST JSTL

0237 01075 0 10 01076 JST *+1

0238 01076 0 00 00002 J05 PZE 2

0239 01077 001401 ERM

0240 01100 0 02 01106 LDA L4

0241 01101 0 04 00062 STA '62

0242 01102 34 0037 SKS '37

0243 01103 0 10 01635 JST EROR

0244 01104 0 10 01635 JST EROR

0245 01105 0 01 01074 JMP S04

0246 01106 0 001107 L4 DAC *+1

0247 01107 0 000000 DAC **

0248 *

0249 * TEST OTA INTERRUPT

0250 *

0251 01110 0 10 01734 S05 JST JSTL

0252 01111 0 10 01112 JST *+1

0253 01112 0 00 00002 J06 PZE 2

0254 01113 0 02 01122 LDA L5

0255 01114 0 04 00062 STA '62

0256 01115 001401 ERM

0257 01116 74 0037 OTA '37

0258 01117 0 10 01635 JST EROR

0259 01120 0 10 01635 JST EROR

0260 01121 0 01 01110 JMP S05

0261 01122 0 001123 L5 DAC *+1

0262 01123 0 000000 DAC **

0263 *

0264 * TEST INA INTERRUPT

0265 *

0266 01124 0 10 01734 S06 JST JSTL

0267 01125 0 10 01126 JST *+1

0268 01126 0 00 00002 J07 PZE 2

0269 01127 0 02 01137 LDA L6

0270 01130 0 04 00062 STA '62

SET R.M.

SET

LINK.

USE UNASSIGNED SKS TO CAUSE RMVI.

IF NOT, GO TO ERROR

WHETHER SKS SKIPS OR DOESN'T.

TRY AGAIN.

LINK ADDRESS.

LOCKOUT VIOLATION INTERRUPT ENTRY.

SET

LINK.

SET R.M.

UNASSIGNED OTA.

IF NO INTERRUPT, GO TO ERROR

WHETHER OTA SKIPS DOESN'T.

TRY AGAIN IF ERROR OCCURRED.

LINK ADDRESS.

LOCKOUT VIOLATION INTERRUPT ENTRY.

SET

LINK.



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0271 01131 001401 ERM
0272 01132 0 02 01757 LDA ='125252
0273 01133 54 1037 INA '1037
0274 01134 0 10 01635 JST EROR
0275 01135 0 10 01635 JST EROR
0276 01136 0 01 01124 JMP S06.
0277 01137 0 001140 L6 DAC *+1
0278 01140 0 000000 DAC **
0279 01141 101040 SNZ
0280 01142 0 10 01635 JST EROR
0281 01143 0 05 01757 ERA ='125252
0282 01144 100040 SZE
0283 01145 0 10 01635 JST EROR
0284
0285 *
0286 * TEST HLT INTERRUPT
0287 01146 0 10 01734 S07 JST JSTL
0288 01147 0 10 01150 JST *+1
0289 01150 0 00 00002 J08 PZE 2
0290 01151 001401 ERM
0291 01152 0 02 01157 LDA L7
0292 01153 0 04 00062 STA '62
0293 01154 000000 HLT
0294 01155 0 10 01635 JST EROR
0295 01156 0 01 01146 JMP S07
0296 01157 0 001160 L7 DAC *+1
0297 01160 0 000000 DAC **
0298
0299 *
0300 * TEST SMK INTERRUPT
0301 01161 0 10 01734 S08 JST JSTL
0302 01162 0 10 01163 JST *+1
0303 01163 0 00 00002 J09 PZE 2
0304 01164 001401 ERM
0305 01165 0 02 01174 LDA L8
0306 01166 0 04 00062 STA '62
0307 01167 140040 CRA
```

```
SET R.M.
PATTERN IN RA SHOULD NOT BE CHANGED
BY INA.
GO TO ERROR IF NO INTERRUPT.
*
TRY AGAIN.
LINK ADDRESS.
LOCKOUT VIOLATION INTERRUPT ENTRY.
RA SHOULD NOT HAVE BEEN CLEARED.
GO TO ERROR IF IT WAS CLEARED.
RA SHOULD NOT HAVE
BEEN CHANGED.
GO TO ERROR IF IT WAS CHANGED.
```

```
SET R.M.
SET
LINK.
USE HLT.
GO TO ERROR IF NO INTERRUPT.
TRY AGAIN.
LINK ADDRESS.
LOCKOUT VIOLATION INTERRUPT ENTRY.
```

```
SET R.M.
SET
LINK.
CLEAR RA JUST IN CASE.
```



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```
0308 01170 74 1720 SMK '1720
0309 01171 0 10 01635 JST EROR
0310 01172 0 10 01635 JST EROR
0311 01173 0 01 01161 JMP S08
0312 01174 0 001175 L8 DAC **1
0313 01175 0 000000 DAC **
0314 *
0315 * TEST STX INTERRUPT (NOT ON DDP-416)
0316 *
0317 01176 0 10 01734 S09 JST JSTL
0318 01177 0 10 01200 JST **1
0319 01200 0 00 00002 J10 PZE 2
0320 01201 140040 CRA
0321 01202 -0 04 01725 STA* TS2
0322 01203 0 11 01756 CAS =0
0323 01204 0 01 01660 JMP P416
0324 01205 001401 P085 ERM
0325 01206 0 02 01215 LDA L9
0326 01207 0 04 00062 STA '62
0327 01210 0 35 01755 LDX ='12345
0328 01211 -0 15 01725 STX* TS2
0329 01212 101000 40R5 NOP
0330 01213 0 10 01635 JST EROR
0331 01214 0 01 01176 JMP S09
0332 01215 0 001216 L9 DAC **1
0333 01216 0 000000 DAC **
0334 01217 -0 02 01725 P091 LDA* TS2
0335 01220 100040 SZE
0336 01221 0 10 01635 JST EROR
0337 *
0338 * TEST IMA INTERRUPT (NOT ON DDP-416)
0339 *
0340 01222 0 10 01734 S10 JST JSTL
0341 01223 0 10 01224 JST **1
0342 01224 0 00 00002 J11 PZE 2
0343 01225 0 02 01754 LDA =-1
0344 01226 -0 04 01726 STA* TS3
```

SMK IS EXECUTED.
GO TO ERROR IF NO INTERRUPT.
ALSO, JUST IN CASE INSTRUCTION SKIPS.
TRY AGAIN IF ERROR OCCURRED.
LINK ADDRESS.
LOCKOUT VIOLATION INTERRUPT ENTRY.

CLEAR
LOCATION '2002.
COMPUTER IS A
DDP-416, MODIFY CERTAIN TESTS.
DDP-516, GO ON.

SET
LINK.

STX SHOULD CAUSE INTERRUPT ON DDP-516.
(JMP P091 IF DDP-416)
GO TO ERROR IF NO INTERRUPT ON DDP-516.
TRY AGAIN IF ERROR OCCURRED
LINK ADDRESS.
LOCKOUT VIOLATION INTERRUPT ENTRY.
'2002 SHOULD NOT HAVE BEEN CHANGED
ON EITHER -416 OR -516.
GO TO ERROR IF IT WAS CHANGED.

PUT ALL ONES
IN '3003.



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```
0345 01227 001401 ERM
0346 01230 0 02 01237 LDA L10
0347 01231 0 04 00062 STA '62
0348 01232 0 02 01753 LDA ='54321
0349 01233 -0 13 01726 IMA* TS3
0350 01234 101000 405 NOP
0351 01235 0 10 01635 JST EROR
0352 01236 0 01 01222 JMP S10
0353 01237 0 001240 L10 DAC *+1
0354 01240 0 000000 DAC **
0355 01241 0 01 01246 JMP P101
0356 01242 0 05 01753 P100 ERA ='54321
0357 01243 100040 SZE
0358 01244 0 10 01635 JST EROR
0359 01245 -0 02 01726 LDA* TS3
0360 01246 0 05 01754 P101 ERA =-1
0361 01247 100040 SZE
0362 01250 0 10 01635 JST EROR
0363 *
0364 * TEST IRS INTERRUPT
0365 *
0366 01251 0 10 01734 S11 JST JSTL
0367 01252 0 10 01253 JST *+1
0368 01253 0 00 00002 J12 PZE 2
0369 01254 0 02 01754 LDA =-1
0370 01255 -0 04 01727 STA* TS4
0371 01256 001401 ERM
0372 01257 0 02 01266 LDA L11
0373 01260 0 04 00062 STA '62
0374 01261 -0 12 01727 IRS* TS4
0375 01262 0 10 01635 JST EROR
0376 01263 0 10 01635 JST EROR
0377 01264 0 01 01251 JMP S11
0378 01265 0 001263 P109 DAC *-2
0379 01266 0 001267 L11 DAC *+1
0380 01267 0 000000 DAC **
0381 01270 0 02 01267 LDA *-1
```

```
SET RESTRICTED MODE.
SET
LINK.
GET A PATTERN.
CAUSE INTERRUPT ON -516.
(JMP P100 IF DDP-416)
GO TO ERROR IF NO INTERRUPT ON -516.
TRY AGAIN IF ERROR OCCURRED.
LINK ADDRESS.
LOCKOUT VIOLATION INTERRUPT ENTRY.
ON DDP-516, SKIP OVER -416 PART.
RA SHOULD NOT HAVE
CHANGED ON -416.
GO TO ERROR IF IT WAS CHANGED.
CHECK CONTENTS OF '3003 ON -416
OR RA ON -516.
ALL ONES -
NO, GO TO ERROR.
```

```
PUT ALL ONES
IN '4004.
ENTER RESTRICTED MODE.
SET
LINK.
TRY TO INCREMENT '4004.
GO TO ERROR IF NO INTERRUPT.
*
TRY AGAIN IF ERROR OCCURRED.
COMPARE ADDRESS.
LINK ADDRESS.
LOCKOUT VIOLATION INTERRUPT ENTRY.
MAKE SURE IRS
```



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0382 01271 0 05 01265 ERA P109
0383 01272 100040 SZE
0384 01273 0 10 01635 JST EROR
0385 01274 -0 02 01727 LDA* TS4
0386 01275 0 05 01754 ERA ==-1
0387 01276 100040 SZE
0388 01277 0 10 01635 JST EROR
0389
0390 * TEST JST INTERRUPT
0391 *
0392 01300 0 10 01734 S12 JST JSTL
0393 01301 0 10 01302 JST **+1
0394 01302 0 00 00002 J13 PZE 2
0395 01303 0 02 01752 LDA ='1234
0396 01304 -0 04 01730 STA* TS5
0397 01305 0 02 01320 LDA ERRJ+1
0398 01306 0 04 00777 STA '777
0399 01307 0 02 01317 LDA ERRJ
0400 01310 -0 04 01731 STA* TS51
0401 01311 001401 ERM
0402 01312 0 02 01323 LDA L12
0403 01313 0 04 00062 STA '62
0404 01314 -0 10 01730 JST* TS5
0405 01315 0 10 01635 JST EROR
0406 01316 0 01 01300 JMP S12
0407 01317 -0 01 00777 ERRJ JMP* TL1
0408 01320 0 001321 DAC **+1
0409 01321 0 10 01635 JST EROR
0410 01322 0 01 01300 JMP S12
0411 01323 0 001324 L12 DAC **+1
0412 01324 0 000000 DAC **
0413 01325 -0 02 01730 LDA* TS5
0414 01326 0 05 01752 ERA ='1234
0415 01327 100040 SZE
0416 01330 0 10 01635 JST EROR
0417 01331 0 02 01324 LDA L12+1
0418 01332 0 05 01731 ERA TS51
```

CAUSED SKIP EVEN THOUGH
INTERRUPT OCCURRED.

ALSO CHECK '4004
TO SEE THAT
IT WAS NOT CHANGED.

GET A PATTERN
FOR LOCATION '5005.
PUT ADDRESS OF LOC. CONTAINING "JST EROR"
IN '777 IN CASE "JST* TS5" TRANSFERS CON-
PUT A JUMP THROUGH '777 / TROL TO '5006.
IN '5006.
ENTER RESTRICTED MODE.
SET
LINK.
TRY TO JST TO '5005.
GO TO ERROR IF NO INTERRUPT.
TRY AGAIN IF ERROR OCCURRED.
THIS INST. GOES IN LOC. '5006.
THIS ADDRESS GOES IN LOC. '777.
THIS INST. MAY BE EXECUTED IF NO INTERRUPT.
TRY AGAIN IF NO INTERRUPT.
LINK ADDRESS.
LOCKOUT VIOLATION INTERRUPT ENTRY.
ARE CONTENTS OF '5005
STILL EQUAL TO PATTERN -
GO TO ERROR IF NOT EQUAL.
WAS REG. P CORRECT
WHEN INTERRUPT OCCURRED -



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0419	01333	100040	SZE		
0420	01334	0 10 01635	JST	EROR	GO TO ERROR IF NOT CORRECT.
0421		*			
0422		*	* TEST STA INTERRUPT (USING INDIRECT STA)		
0423		*			
0424	01335	0 10 01734	S13	JST	JSTL
0425	01336	0 10 01337		JST	*+1
0426	01337	0 00 00002	J14	PZE	2
0427	01340	0 02 01754		LDA	=-1
0428	01341	-0 04 01732		STA*	TS6
0429	01342	001401		ERM	
0430	01343	0 02 01351		LDA	L13
0431	01344	0 04 00062		STA	'62
0432	01345	0 02 01732		LDA	TS6
0433	01346	-0 04 01732		STA*	TS6
0434	01347	0 10 01635		JST	EROR
0435	01350	0 01 01335		JMP	S13
0436	01351	0 001352	L13	DAC	*+1
0437	01352	0 000000		DAC	**
0438	01353	-0 02 01732		LDA*	TS6
0439	01354	0 05 01754		ERA	=-1
0440	01355	100040		SZE	
0441	01356	0 10 01635		JST	EROR
0442		*			
0443		*	* TEST INDEXED STA INTERRUPT (INDIRECT STA ON DDP-416)		
0444		*			
0445	01357	0 10 01734	S14	JST	JSTL
0446	01360	0 10 01361		JST	*+1
0447	01361	0 00 00002	J15	PZE	2
0448	01362	0 02 01753		LDA	= '54321
0449	01363	-0 04 01733		STA*	TS7
0450	01364	001401		ERM	
0451	01365	0 02 01374		LDA	L14
0452	01366	0 04 00062		STA	'62
0453	01367	0 35 01733		LDX	TS7
0454	01370	0 02 01733		LDA	TS7
0455	01371	1 04 00000	4R5	STA	0,1

PUT ALL ONES
IN '6006.
ENTER RESTRICTED MODE.
SET
LINK.
TRY TO PUT '6006
IN LOC. '6006.
GO TO ERROR IF NO INTERRUPT.
TRY AGAIN IF NO INTERRUPT.
LINK ADDRESS.
LOCKOUT VIOLATION INTERRUPT ENTRY.
CHECK '6006.
DOES IT STILL CONTAIN
ALL ONES -
GO TO ERROR IF IT DOESN'T.

PUT A PATTERN
IN '7007.
ENTER RESTRICTED MODE.
SET
LINK.
(EXECUTED ON -516 ONLY.)
GET CONSTANT: '7007.
(STA* TS7 IF DDP-416)



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0456	01372	0 10 01635	JST	EROR	GO TO ERROR IF NO INTERRUPT.
0457	01373	0 01 01357	JMP	S14	TRY AGAIN IF NO INTERRUPT.
0458	01374	0 001375 L14	DAC	#+1	LINK ADDRESS.
0459	01375	0 000000	DAC	**	LOCKOUT VIOLATION INTERRUPT ENTRY.
0460	01376	-0 02 01733	LDA*	TS7	CHECK LOC. '7007.
0461	01377	0 05 01753	ERA	= '54321	DOES IT STILL
0462	01400	100040	SIZE		CONTAIN PATTERN -
0463	01401	0 10 01635	JST	EROR	GO TO ERROR IF NOT.
0464		*			
0465		*			TEST STA INTERRUPT IN 346TH (OCTAL) LOCATION OF EACH SECTOR
0466		*			FROM SECTOR 2 TO TOP OF CORE.
0467		*			
0468	01402	0 10 01734 S15	JST	JSTL	
0469	01403	0 10 01404	JST	#+1	
0470	01404	0 00 00002 J16	PZE	2	
0471	01405	0 02 01723	LDA	T8	
0472	01406	0414 74	LGL	4	
0473	01407	0 05 01754	ERA	= -1	
0474	01410	0 06 01751	ADD	= 3	START WITH SECTOR 2.
0475	01411	0 04 00774	STA	T0	
0476	01412	0 04 01715	STA	C1	
0477	01413	0 02 01427	LDA	L15	SET
0478	01414	0 04 00062	STA	'62	LINK.
0479	01415	0 02 01750	LDA	= '2345	GET ADDRESS OF 1ST TEST LOCATION.
0480	01416	0 04 00775 P149	STA	T2	SAVE ADDRESS.
0481	01417	140040	CRA		CLEAR
0482	01420	-0 04 00775	STA*	T2	TEST LOCATION.
0483	01421	001401	ERM		ENTER RESTRICTED MODE.
0484	01422	0 02 01747	LDA	= '123456	GET A PATTERN.
0485	01423	-0 04 00775	STA*	T2	TRY TO STORE IT.
0486	01424	101000	NOP		INTERRUPT SHOULD OCCUR AFTER THIS INST.
0487	01425	0 10 01635	JST	EROR	GO TO ERROR IF NO INTERRUPT.
0488	01426	0 01 01402	JMP	S15	TRY AGAIN IF NO INTERRUPT.
0489	01427	0 001430 L15	DAC	#+1	LINK ADDRESS.
0490	01430	0 000000	DAC	**	LOCKOUT VIOLATION INTERRUPT ENTRY.
0491	01431	-0 02 00775	LDA*	T2	CHECK CONTENTS OF TEST LOCATION.
0492	01432	100040	SIZE		ARE THEY STILL ZERO -



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0493	01433	0 10 01635	JST	EROR	NO, GO TO ERROR.
0494	01434	0 02 00775	LDA	T2	YES,
0495	01435	0 06 01746	ADD	= '1000	TRY NEXT SECTOR.
0496	01436	0 12 00774	IRS	T0	INCREMENT SECTOR COUNTER.
0497	01437	0 01 01416	JMP	P149	GO BACK UNTIL ALL SECTORS ARE TESTED.
0498					
0499					
0500					
0501	01440	0 10 01734	S16 JST	JSTL	
0502	01441	0 10 01442		JST	*+1
0503	01442	0 00 00002	J17 PZE	2	
0504	01443	0 02 01634	LDA	ERAD	TEMPORARILY, PUT ERROR ADDRESS
0505	01444	0 04 00062	STA	'62	IN LINK LOCATION.
0506	01445	0 02 01762	LDA	= '100000	LEAVE ONLY SECTOR 0
0507	01446	74 1420	SMK	'1420	IN UN-PROTECTED MODE.
0508	01447	001401	ERM		ENTER RESTRICTED MODE.
0509	01450	0 02 01460	LDA	L16	SET
0510	01451	0 04 00062	STA	'62	LINK.
0511	01452	0 04 01457	STA	P159	TRY TO STORE.
0512	01453	101000	NOP		INTERRUPT SHOULD OCCUR AFTER THIS INST.
0513	01454	0 10 01635	JST	EROR	GO TO ERROR IF NO INTERRUPT.
0514	01455	0 01 01440	JMP	S16	TRY AGAIN IF NO INTERRUPT.
0515	01456	0 001454	P158 DAC	*-2	ADDRESS WHICH SHOULD BE STORED BY INT. JST.
0516	01457	000000	P159 BSZ	1	TEST LOCATION.
0517	01460	0 001461	L16 DAC	*+1	LINK ADDRESS.
0518	01461	0 000000	DAC	**	LOCKOUT VIOLATION INTERRUPT ENTRY.
0519	01462	0 02 01457	LDA	P159	MAKE SURE THAT TEST LOCATION
0520	01463	100040	SZE		WAS NOT DISTURBED.
0521	01464	0 10 01635	JST	EROR	GO TO ERROR IF IT WAS.
0522	01465	0 02 01461	LDA	L16+1	CHECK THE ADDRESS
0523	01466	0 05 01456	ERA	P158	STORED BY
0524	01467	100040	SZE		THE FORCED JST.
0525	01470	0 10 01635	JST	EROR	
0526					
0527					
0528					
0529	01471	0 10 01734	S17 JST	JSTL	



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0530	01472	0 10 01473	JST	*+1
0531	01473	0 00 00002 J18	PZE	2
0532	01474	0 02 01506	LDA	L17
0533	01475	0 04 00062	STA	'62
0534	01476	0 02 01745	LDA	= '40000
0535	01477	74 1420	SMK	'1420
0536	01500	001401	ERM	
0537	01501	0 04 00776	STA	TLO
0538	01502	101000	NOP	
0539	01503	0 10 01635	JST	EROR
0540	01504	0 01 01471	JMP	S17
0541	01505	0 001503 P169	DAC	*-2
0542	01506	0 001507 L17	DAC	*+1
0543	01507	0 000000	DAC	**
0544	01510	0 02 00776	LDA	TLO
0545	01511	0 05 01762	ERA	= '100000
0546	01512	100040	SZE	
0547	01513	0 10 01635	JST	EROR
0548	01514	0 02 01507	LDA	L17+1
0549	01515	0 05 01505	ERA	P169
0550	01516	100040	SZE	
0551	01517	0 10 01635	JST	EROR

0552

*

0553

* TEST LDX INTERRUPT (NOT ON DDP-416)

0554

*

0555	01520	0 10 01734 S18	JST	JSTL
0556	01521	0 10 01522	JST	*+1
0557	01522	0 00 00002 J19	PZE	2
0558	01523	101000 4RR5	NOP	
0559	01524	0 02 01533	LDA	L18
0560	01525	0 04 00062	STA	'62
0561	01526	0 35 01744	LDX	=2
0562	01527	001401	ERM	
0563	01530	0 35 01743	LDX	=1
0564	01531	0 10 01635	JST	EROR
0565	01532	0 01 01520	JMP	S18
0566	01533	0 001534 L18	DAC	*+1

SET
LINK.
RE-SET SECTOR 1 TO UN-PROTECTED MODE
(SECTOR 0 IS NOW PROTECTED).
ENTER RESTRICTED MODE.
CAUSE INTERRUPT (TRY TO STORE IN SECTOR 0).
INTERRUPT SHOULD OCCUR AFTER THIS INST.
GO TO ERROR IF NO INTERRUPT.
TRY AGAIN IF NO INTERRUPT.
ADDRESS WHICH SHOULD BE STORED BY INT. JST.
LINK ADDRESS.
LOCKOUT VIOLATION INTERRUPT ENTRY.
CHECK TEST LOCATION
TO MAKE SURE THAT
IT WAS NOT DISTURBED.
GO TO ERROR IF IT WAS.
CHECK THE ADDRESS
WHICH SHOULD HAVE BEEN
STORED BY THE FORCED JST.
GO TO ERROR IF WRONG.

(JMP S19 IF DDP-416)

SET
LINK.
GET A PATTERN.
ENTER RESTRICTED MODE.
CAUSE INTERRUPT (SECTOR 0 IS PROTECTED).
GO TO ERROR IF NO INTERRUPT.
TRY AGAIN IF NO INTERRUPT.
LINK ADDRESS.



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0567 01534 0 000000 DAC **
0568 01535 0 02 00000 LDA 0
0569 01536 0 05 01744 ERA =2
0570 01537 100040 SZE
0571 01540 0 10 01635 JST EROR
0572 *
0573 * TEST SECTOR 0 RELOCATION
0574 *
0575 01541 0 10 01734 S19 JST JSTL
0576 01542 0 10 01543 JST **+1
0577 01543 0 00 00002 J20 PZE 2
0578 01544 0 02 01715 LDA C1
0579 01545 0 07 01743 SUB =1
0580 01546 0 04 00774 STA T0
0581 01547 0 02 01742 LDA ='767
0582 01550 0 04 00000 STA 0
0583 01551 0 02 01741 LDA ='1765
0584 01552 0 04 00775 STA T2
0585 01553 0 02 01746 LDA ='1000
0586 01554 0 04 01716 P29 STA T3
0587 01555 74 1320 SMK '1320
0588 01556 0 04 00765 STA '765
0589 01557 -0 04 01702 STA* S7RA
0590 01560 1 04 00000 4N5 STA 0,1
0591 01561 140040 CRA
0592 01562 74 1320 SMK '1320
0593 01563 0 02 01740 LDA =-3
0594 01564 0 04 01722 STA T7
0595 01565 -0 02 00775 P30 LDA* T2
0596 01566 0 05 01716 ERA T3
0597 01567 100040 SZE
0598 01570 0 10 01635 JST EROR
0599 01571 -0 04 00775 STA* T2
0600 01572 0 12 00775 IRS T2
0601 01573 0 12 01722 IRS T7
0602 01574 0 01 01565 JMP P30
0603 01575 0 02 00775 LDA T2

LOCKOUT VIOLATION INTERRUPT ENTRY.
CHECK CONTENTS OF INDEX REGISTER
TO MAKE SURE THAT PATTERN IS STILL THERE.
*
GO TO ERROR IF IT IS NOT.

START
WITH
SECTOR 1 THIS TIME.
SET 3RD TEST ADDRESS IN LOCATION 0,
AND ALSO INDEX REGISTER ON DDP-516.
GET ADDRESS OF 1ST TEST LOCATION.

GET CONSTANT
WHICH IS ALSO USED AS MASK.
SET RELOCATION REGISTER.
TEST USING STANDARD STA.
TEST USING INDIRECT STA.
(STA* 0 IF DDP-416) TEST USING INDEXED STA.

RE-SET RELOCATION REGISTER.
CHECK
ALL
THREE
LOCATIONS.
*
GO TO ERROR IF ANY INCORRECT.
CLEAR OUT TEST LOCATION.
INCREMENT ADDRESS.
INCREMENT COUNTER.
GO BACK TWICE.
SET UP FOR



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0604	01576	0 06	01746	ADD	= '1000	LOCATION
0605	01577	0 07	01751	SUB	= 3	XX765
0606	01600	0 04	00775	STA	T2	IN NEXT SECTOR.
0607	01601	0 02	01716	LDA	T3	GET NEW CONSTANT
0608	01602	0 06	01746	ADD	= '1000	AND MASK.
0609	01603	0 12	00774	IRS	T0	INCREMENT COUNTER.
0610	01604	0 01	01554	JMP	P29	GO BACK UNTIL DONE.

0611

0612

0613

*

* TEST ECO 4763-11 IMPLEMENTATION

*

0614	01605	0 10	01734	S20 JST	JSTL
0615	01606	0 10	01607	JST	++1
0616	01607	0 00	00002	J21 PZE	2
0617	01610	0 02	01723	LDA	T8
0618	01611	0 07	01751	SUB	= 3
0619	01612	100400		SPL	
0620	01613	0 01	01633	JMP	DONE
0621	01614	000011		DXA	
0622	01615	0 01	01616	JMP	++1
0623	01616	0 02	01737	LDA	= '42000
0624	01617	74 1320		SMK	'1320
0625	01620	0 06	01702	ADD	SZRA
0626	01621	0 04	01724	STA	T9
0627	01622	0 02	01736	LDA	= '76543
0628	01623	-0 04	01702	STA*	SZRA
0629	01624	140040		CRA	
0630	01625	74 1320		SMK	'1320
0631	01626	000013		EXA	
0632	01627	-0 02	01724	LDA*	T9
0633	01630	0 05	01736	ERA	= '76543
0634	01631	101040		SNZ	
0635	01632	0 10	01635	JST	EROR

0636

0637

0638

0639 01633 -0 01 01701 DONE JMP* CJRA

0640

*

* END OF INTERRUPT TESTS

*

GO TO CHECK PROGRAM.

ECO 4763-11 IS NOT CORRECTLY IMPLEMENTED.



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```
0641 * ERROR HALT ROUTINE
0642 *
0643 01634 0 001635 ERAD DAC **1 ADDRESS OF ERROR ROUTINE.
0644 01635 0 000000 EROR DAC ** ENTRY.
0645 01636 0 04 01720 STA T5 SAVE CONTENTS OF RA
0646 01637 0 02 00062 LDA '62 AND CONTENTS
0647 01640 0 04 01721 STA T6 OF LOC. '62.
0648 01641 0 02 01646 LDA L99 SET NEW LINK IN CASE ERROR
0649 01642 0 04 00062 STA '62 HALT CAUSES INTERRUPT.
0650 01643 0 02 01720 LDA T5 DISPLAY CONTENTS OF RA WHEN ERROR OCCURRED.
0651 01644 000000 HLT 1ST ERROR HLT. IF IT CAUSES RMVI,GO TO 2ND.
0652 01645 0 01 01651 JMP ER8
0653 01646 0 001647 L99 DAC **1 LINK ADDRESS.
0654 01647 0 000000 DAC **
0655 01650 000000 HLT 2ND ERROR HALT.
0656 01651 0 02 01635 ER8 LDA EROR DISPLAY CONTENTS OF EROR.
0657 01652 000000 HLT
0658 01653 0 02 01721 LDA T6 DISPLAY ORIGINAL CONTENTS OF LOC. '62.
0659 01654 000000 HLT
0660 01655 0 02 00062 LDA '62 DISPLAY PRESENT CONTENTS OF LOC. '62.
0661 01656 000000 HLT
0662 01657 -0 01 01635 JMP* EROR EXIT.
0663 *
0664 * ROUTINE WHICH CHANGES PROGRAM IF COMPUTER IS DDP-416, INSTEAD OF -516
0665 *
0666 01660 0 02 01673 P416 LDA J1
0667 01661 0 04 01212 STA 40R5
0668 01662 0 02 01674 LDA J2
0669 01663 0 04 01234 STA 405
0670 01664 0 02 01675 LDA S1
0671 01665 0 04 01371 STA 4R5
0672 01666 0 02 01676 LDA J3
0673 01667 0 04 01523 STA 4RR5
0674 01670 0 02 01677 LDA S2
0675 01671 0 04 01560 STA 4N5
0676 01672 0 01 01205 JMP P085
0677 *
```



0678 * CONSTANTS
0679 *
0680 01673 0 01 01217 J1 JMP P091
0681 01674 0 01 01242 J2 JMP P100
0682 01675 -0 04 01733 S1 STA* TS7
0683 01676 0 01 01541 J3 JMP S19
0684 01677 -0 04 00000 S2 STA* 0
0685 01700 177777 ONES OCT 177777
0686 01701 0 002003 CJRA DAC CKJS
0687 01702 0 000766 SZRA DAC '766

0688 *
0689 * INDIRECT ADDRESS TABLE
0690 *

0691 01703 -0 001704 IAT DAC* **1
0692 01704 -0 001705 DAC* **1
0693 01705 -0 001706 DAC* **1
0694 01706 -0 001707 DAC* **1
0695 01707 -0 001710 DAC* **1
0696 01710 -0 001711 DAC* **1
0697 01711 -0 001712 DAC* **1
0698 01712 -0 001713 DAC* **1
0699 01713 0 001714 DAC **1
0700 01714 000000 BSZ 1

INDIRECT ADDRESS TABLE, STEP 1.

STEP 2
STEP 3
STEP 4
STEP 5
STEP 6
STEP 7
STEP 8
STEP 9

FINAL LOCATION OF INDIRECT ADDRESS TABLE.

0701 *
0702 * CONSTANT AND TEMPORARY STORAGE
0703 *

0704 01715 000000 C1 BSZ 1
0705 01716 000000 T3 BSZ 1
0706 01717 000000 T4 BSZ 1
0707 01720 000000 T5 BSZ 1
0708 01721 000000 T6 BSZ 1
0709 01722 000000 T7 BSZ 1
0710 01723 000001 T8 OCT 1
0711 01724 000000 T9 BSZ 1

0712 *
0713 * SECTOR TEST LOCATIONS
0714 *



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0715	01725	0	002002	TS2	DAC	TL4
0716	01726	0	003003	TS3	DAC	'3003
0717	01727	0	004004	TS4	DAC	'4004
0718	01730	0	005005	TS5	DAC	'5005
0719	01731	0	005006	TS51	DAC	'5006
0720	01732	0	006006	TS6	DAC	'6006
0721	01733	0	007007	TS7	DAC	'7007
0722				*		
0723	01734	0	000000	JSTL	DAC	**
0724	01735	-0	01 01734	JMP*		JSTL
0725				*		
0726	01736		076543			FIN
	01737		042000			
	01740		177775			
	01741		001765			
	01742		000767			
	01743		000001			
	01744		000002			
	01745		040000			
	01746		001000			
	01747		123456			
	01750		002345			
	01751		000003			
	01752		001234			
	01753		054321			
	01754		177777			
	01755		012345			
	01756		000000			
	01757		125252			
	01760		000011			
	01761		140000			
	01762		100000			

DUMP LITERALS FOR THIS SECTOR.

0727			*			
0728				ORG		'1765
0729	01765	000000	TL3	BSZ		3
	01766	000000				



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```
01767 000000
0730          ORG      '2002
0731 02002 000000  TL4  BSZ      1
0732          *
0733          *
0734          *          ROUTINE WHICH CHECKS ADDRESSES IN "JXX" LOCATIONS DUE TO
0735          *          "JST *+1" INSTRUCTIONS.
0736          *
0737 02003 0 02 02235 CKJS LDA      =-21          SET UP FOR 21
0738 02004 0 04 00000          STA      0          PASSES THROUGH THIS ROUTINE.
0739 02005 0 02 02214          LDA      TK1          GET ADDRESS OF "TABL"
0740 02006 0 04 02215          STA      TK2          AND SAVE IT FOR ONE-LEVEL IND. ADDRESSING.
0741 02007 0 05 02234          ERA      ='100000      ADD INDIRECT BIT
0742 02010 0 04 02213          STA      TK0          AND SAVE IT FOR TWO-LEVEL IND. ADDRESSING.
0743 02011 -0 02 02213 CK2  LDA*     TK0          GET CONTENTS OF ONE OF THE "JXX" LOCATIONS
0744 02012 -0 05 02215          ERA*     TK2          AND CHECK IT AGAINST THE "TABL" ENTRY.
0745 02013 100040          SZE              GO ON IF OK.
0746 02014 000000          HLT              STOP, IF NOT. - ERROR HALT.
0747 02015 0 02 02233          LDA      =2          RESTORE "PZE 2"
0748 02016 -0 04 02213          STA*     TK0          TO "JXX" LOCATIONS.
0749 02017 0 12 02215          IRS      TK2          INCREMENT
0750 02020 0 12 02213          IRS      TK0          ADDRESSES
0751 02021 0 12 00000          IRS      0          AND COUNTER.
0752 02022 0 01 02011          JMP      CK2          GO BACK UNTIL FINISHED.
0753          *
0754          * INCREMENT-PASS-COUNTER ROUTINE
0755          *
0756 02023 0 02 02232          LDA      =-9          SET UP FOR 9
0757 02024 0 04 00774          STA      T0          DIGITS.
0758 02025 0 02 02165          LDA      NA2          GET ADDRESS OF WORD REPRESENTING "ONES"
0759 02026 0 04 00775 INC2  STA      T2          DIGIT.
0760 02027 -0 12 00775          IRS*     T2          INCREMENT NUMBER.
0761 02030 0 01 02040          JMP      TYIN        EXIT WHEN NO SKIP.
0762 02031 0 02 02231          LDA      =-10         IF SKIP,
0763 02032 -0 04 00775          STA*     T2          RESTORE TO -10.
0764 02033 0 02 00775          LDA      T2          GET
0765 02034 0 07 02230          SUB      =1          NEXT ADDRESS.
```



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```
0766 02035 0 12 00774 IRS TO
0767 02036 0 01 02026 JMP INC2
0768 02037 000000 HLT
0769
0770 *
0771 * TYPE-IN ROUTINE
0772 02040 34 0104 TYIN SKS '104
0773 02041 0 01 02060 JMP EOPH
0774 02042 54 1004 INA '1004
0775 02043 0 01 02057 JMP EOPH-1
0776 02044 0 03 02227 ANA ='177
0777 02045 0 05 02226 ERA ='200
0778 02046 0 05 02225 ERA ='307
0779 02047 101040 SNZ
0780 02050 0 01 02063 JMP STG
0781 02051 0 05 02224 ERA ='24
0782 02052 101040 SNZ
0783 02053 0 04 02060 STA EOPH
0784 02054 0 05 02223 ERA =7
0785 02055 101040 SNZ
0786 02056 0 01 02066 JMP TYPO
0787 02057 14 0004 OCP 4
0788 02060 000000 EOPH HLT
0789 02061 140040 CRA
0790 02062 -0 01 02216 JMP* ASTR
0791 02063 0 02 02061 STG LDA EOPH+1
0792 02064 0 04 02060 STA EOPH
0793 02065 0 01 02060 JMP EOPH
0794
0795 *
0796 * TYPE-OUT ROUTINE
0797 02066 34 0104 TYPO SKS '104
0798 02067 0 01 02066 JMP *-1
0799 02070 14 0104 OCP '104
0800 02071 0 02 02222 LDA =-8
0801 02072 0 04 00774 STA TO
0802 02073 0 02 02142 LDA MA1
```

INCREMENT COUNTER.
REPEAT.
ERROR HALT.

IS ASR-33 BUSY -

YES.

NO.

NOT READY.

ENSURE BIT 8 OF CHARACTER IS SET

IS INPUT CHARACTER A "G" -

YES.

NO.

IS INPUT CHARACTER AN "S" -

YES, STORE HALT IN "EOPH".

IS INPUT CHARACTER A "T" -

YES, GO TO TYPEOUT ROUTINE.

ENABLE ASR-33 IN INPUT MODE.

END-OF-PASS HALT (CRA IN NON-STOP MODE).

GO TO BEGINNING OF PROGRAM.

GET CRA INSTRUCTION

AND REPLACE HLT WITH IT.

RETURN.

BUSY

LOOP.

ENABLE ASR IN OUTPUT MODE.

SET COUNTER FOR 8 WORDS.

*

GET MESSAGE ADDRESS.



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```
0803 02074 0 04 00775 STA T2
0804 02075 0 10 02115 JST OUTL
0805 02076 0 02 02232 LDA =-9
0806 02077 0 04 00774 STA T0
0807 02100 0 02 02153 LDA NA1
0808 02101 0 04 00775 STA T2
0809 02102 0 10 02131 JST OUTN
0810 02103 0 02 02221 LDA =-6
0811 02104 0 04 00774 STA T0
0812 02105 0 02 02220 LDA ='240
0813 02106 74 0004 CHTO OTA 4
0814 02107 0 01 02106 JMP *-1
0815 02110 0 12 00774 IRS T0
0816 02111 0 01 02106 JMP CHTO
0817 02112 34 0104 SKS '104
0818 02113 0 01 02112 JMP *-1
0819 02114 0 01 02057 JMP EOPH-1
```

```
*
* BCI OUTPUT SUBROUTINE
```

```
0820
0821
0822
0823 02115 0 000000 OUTL DAC **
0824 02116 -0 02 00775 LDA* T2
0825 02117 0406 70 ARR 8
0826 02120 74 0004 OTA 4
0827 02121 0 01 02120 JMP *-1
0828 02122 0416 70 ALR 8
0829 02123 74 0004 OTA 4
0830 02124 0 01 02123 JMP *-1
0831 02125 0 12 00775 IRS T2
0832 02126 0 12 00774 IRS T0
0833 02127 0 01 02116 JMP OUTL+1
0834 02130 -0 01 02115 JMP* OUTL
```

```
*
* NUMBER OUTPUT SUBROUTINE
```

```
0835
0836
0837
0838 02131 0 000000 OUTN DAC **
0839 02132 -0 02 00775 LDA* T2
```

OUTPUT MESSAGE (2 CHARACTERS/WORD).
SET COUNTER FOR 9 DIGITS.

*
GET MESSAGE ADDRESS.

OUTPUT DECIMAL DIGITS

FOLLOWED

BY

6

SPACES.

*

*

*

WAIT

WHILE ASR IS BUSY.

RETURN.

ENTRY.

GET 2 CHARACTERS.

TYPE

OUT

1ST CHARACTER (BITS 1-8).

TYPE

OUT

2ND CHARACTER (BITS 9-16).

INCREMENT ADDRESS.

INCREMENT COUNTER.

GO BACK UNTIL ALL OUT.

EXIT.

ENTRY.

GET NUMBER.



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0840	02133	0 06 02217	ADD	= '272	CONVERT TO ASCII DECIMAL DIGIT.
0841	02134	74 0004	OTA	4	TYPE
0842	02135	0 01 02134	JMP	*-1	IT.
0843	02136	0 12 00775	IRS	T2	INCREMENT ADDRESS.
0844	02137	0 12 00774	IRS	T0	INCREMENT COUNTER.
0845	02140	0 01 02132	JMP	OUTN+1	GO BACK UNTIL ALL TYPED.
0846	02141	-0 01 02131	JMP*	OUTN	EXIT.
0847			*		
0848			*	END-OF-PASS MESSAGE	
0849			*		
0850	02142	0 002143	MA1	DAC	*+1
0851	02143	106612		OCT	106612
0852	02144	154261		BCI	7,X16-08T1 PASS \$
	02145	133255			
	02146	130270			
	02147	152261			
	02150	120320			
	02151	140723			
	02152	151640			
0853			*		
0854			*	PASS COUNTERS	
0855			*		
0856	02153	0 002154	NA1	DAC	*+1
0857	02154	177766		DEC	-10,-10,-10,-10,-10,-10,-10,-10,-10
	02155	177766			
	02156	177766			
	02157	177766			
	02160	177766			
	02161	177766			
	02162	177766			
	02163	177766			
	02164	177766			
0858	02165	0 002164	NA2	DAC	*-1
0859			*		
0860			*	JST-ADDRESS-CHECK TABLE	
0861			*		
0862	02166	0 001006	TABL	DAC	J01



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02232	177767
02233	000002
02234	100000
02235	177753

0890 END STRT
NO ERRORS IN ABOVE ASSEMBLY.
DAP-16 INHOUSE 1.1.69 CBAP

END OF X16-08T1 9.4.69 PVP