


```

0075 *
0076 *
0077 *
0078 *
0079 *
0080 *
0081 *
0082 *
0083 *
0084 *
0085 *
0086 *
0087 *
0088 *
0089 *
0090 *
0091 *
0092 *
0093 *
0094 *
0095 *
0096 *
0097 *
0098 *
0099 *
0100 *
0101 *
0102 *
0103 *
0104 *
0105 *
0106 *
0107 *
0108 *
0109 *
0110 *
0111 *

```

4. THE PROGRAM TYPES OUT THE PROGRAM TITLE FOLLOWED BY THE CENTRAL PROCESSOR TYPE (I.E. DDP-416, DDP-516 OR H316). THIS WILL ONLY BE OUTPUT FOR THE FIRST RUN AFTER THE PROGRAM HAS BEEN LOADED. THE PROGRAM THEN TYPES 'ENTER A-REGISTER SETTING - PRESS START'.

5. WHEN THE PROGRAM HALTS, THE TEST SELECTION SHOULD BE MADE BY SELECTING ONE OF THE FOUR HIGH ORDER BITS OF THE A-REGISTER. N.B. THE SETTINGS MAY BE CHANGED DURING THE COURSE OF THE PROGRAM BY PRESSING THE START BUTTON. THIS WILL GENERATE AN INTERRUPT, WHICH WILL ULTIMATELY CAUSE THE COMPUTER TO HALT. AFTER THE SETTING HAS BEEN CHANGED, PRESS THE START BUTTON ONCE AND THE COMPUTER WILL CONTINUE THE RUNNING OF THE PROGRAM ACCORDING TO THE NEW SETTING.

KEYBOARD INPUT

AFTER PRINTING 'KEYBOARD INPLT' FOLLOWED BY CR, LF, CR, LF, THE PROGRAM WILL WAIT FOR THE ENTRY OF CHARACTERS. UP TO 72 ALPHA-NUMERIC CHARACTERS, PUNCTUATION MARKS ETC. (I.E. 'PRINTING CHARACTERS'), WILL BE ACCEPTED ALONG WITH BELL, LINE FEED (LF), CARRIAGE RETURN (CR), CONTROL N (FOR SHIFT INTO BLACK) AND CONTROL O (FOR SHIFT INTO RED). INPUT MAY BE TERMINATED AFTER ANY ENTRY BY PRESSING THE CARRIAGE-RETURN KEY.

THE CHARACTERS RECEIVED AS INPUT WILL BE PRINTED OUT WHEN A FULL LINE OR CARRIAGE RETURN HAS BEEN RECEIVED. ASK'S FITTED FOR TWO COLOUR PRINTING WILL OBEY THE CONTROL N AND CONTROL O INSTRUCTIONS, PRINTING IN WHICHEVER COLOUR WAS LAST SELECTED, OTHERWISE THESE CHARACTERS WILL BE IGNORED BY THE PRINTER MECHANISM.

AT THIS POINT, THE PROGRAM WILL TAKE ACTION ACCORDING TO THE TEST SELECTION MADE IN THE A-REGISTER PREVIOUSLY:

```

0112 *
0113 *
0114 *
0115 *
0116 *
0117 *
0118 *
0119 *
0120 *
0121 *
0122 *
0123 *
0124 *
0125 *
0126 *
0127 *
0128 *
0129 *
0130 *
0131 *
0132 *
0133 *
0134 *
0135 *
0136 *
0137 *
0138 *
0139 *
0140 *
0141 *
0142 *
0143 *
0144 *
0145 *
0146 *
0147 *
0148 *

```

BIT 1 SET - ENTER NEW LINE OF DATA VIA KEYBOARD (TERMINATE BY START-BUTTON INTERRUPT),

BIT 2 SET - CONTINUOUS OUTPUT OF LAST LINE ENTERED (TERMINATE BY START-BUTTON INTERRUPT),

BIT 4 SET - TERMINATE OUTPUT AND GO TO PRINTER OUT.

PRINTER OUT

ALL CHARACTERS FROM SPACE ('240) TO BACK-ARROW ('337) WILL BE SEQUENTIALLY PRINTED ACROSS AN ENTIRE ROW. ALL SUCCEEDING LINES WILL BE SHIFTED LEFT ONE CHARACTER POSITION PER LINE.

IN THIS PATTERN TEST, THE SEQUENCE WILL FINISH AFTER ONE LINE OF OUTPUT IF BIT 4 WAS SET PREVIOUSLY; OTHERWISE, IT WILL CONTINUE OUTPUT UNTIL MANUALLY TERMINATED BY PRESSING THE START BUTTON.

ALL CHARACTERS IN ALL PRINT POSITIONS WILL BE OUTPUT FROM SPACE ('240) TO BACK-ARROW ('337). EACH CHARACTER WILL BE PRINTED ACROSS AN ENTIRE ROW.

AT THIS POINT, THE PROGRAM WILL TAKE ACTION ACCORDING TO THE LAST TEST SELECTION AS FOLLOWS:

BIT 2 SET - REPEAT THIS SET OF PATTERNS CONTINUOUSLY (TERMINATE BY START-BUTTON INTERRUPT),

BIT 4 SET - TERMINATE OUTPUT AND GO TO PRINTER/PUNCH OUT.

PRINTER/PUNCH OUT

A MESSAGE IS PRINTED TO TURN ON THE PUNCH AND PRESS START. 220 CHARACTERS OF ISO-CODE WILL BE PUNCHED, AND 20 CHARACTERS OF BINARY CODE WILL BE PUNCHED. A READER STOP CODE ('223, X-OFF, DC3) AND DELETE CODE ('377, RUBOUT) WILL BE PUNCHED AT THE END OF THE TAPE. THE TAPE HAS 32 BLANK

```
0149 *      ('000) CHARACTERS AT THE BEGINNING AND END.
0150 *
0151 *      THE INTERRUPT LOGIC WILL BE TESTED DURING THE PUNCHING
0152 *      OF THIS BLOCK.
0153 *
0154 *      READER IN
0155 *
0156 *      A MESSAGE IS PRINTED TO LOAD THE READER, TURN OFF THE PUNCH
0157 *      AND PRESS START. THE TAPE PRODUCED BY THE PUNCH TEST WILL BE
0158 *      READ AND A DATA COMPARISON MADE UNDER PROGRAM CONTROL.
0159 *      WHEN THE COMPARISON IS COMPLETED AND IF NO ERRORS ARE FOUND,
0160 *      AN END MESSAGE IS PRINTED ON THE ASR AND THE PROGRAM HALTS.
0161 *      IF THE START BUTTON IS THEN PUSHED, THE PROGRAM WILL RESTART.
0162 *
0163 *
0164 *      ERRORS
0165 *
0166 *      PUNCH OUT (BINARY)
0167 *
0168 *      ERR1  READY SHOULD BE SET AFTER 100 MS DELAY (108 MS IN
0169 *             WORST CASE)
0170 *             (READY NOT SET BY 100 MS AFTER LAST OTA)
0171 *
0172 *      ERR2  NO INTERRUPT AFTER MASK SET
0173 *             (INTERRUPT DID NOT OCCUR WITH MASK SET, READY SET
0174 *             AND ENB)
0175 *
0176 *      ERR3  INTERRUPT NOT CAUSED BY ASR
0177 *             (SKS '0404 SKIPPED AFTER INTERRUPT RECEIVED)
0178 *
0179 *      ERR4  NO SKIP ON OTA WITH READY SET
0180 *             (OTA '0204 DID NOT SKIP WITH READY SET)
0181 *
0182 *      ERR5  READY SET AFTER OTA
0183 *             (SKS '0204 SKIPPED AFTER OTA)
0184 *
0185 *      READER IN
```

```
0186 *
0187 *      AFTER THE TAPE IS READ, A DATA COMPARISON IS MADE. IF THE
0188 *      STOP CODE IS NOT SENSED AFTER THE BINARY PATTERN HAS BEEN
0189 *      READ FROM THE TAPE, THE PROGRAM WILL GIVE AN ERROR MESSAGE
0190 *      AND HALT. RESTARTING WILL CAUSE THE JUMP TO THE 'READ IN'
0191 *      SECTION.
0192 *
0193 *      IF A DATA ERROR IS DETECTED, THE FOLLOWING MESSAGE WILL
0194 *      BE PRINTED:
0195 *
0196 *      INPJT IS 'XXX SHOULD BE 'XXX
0197 *
0198 *      WHERE XXX IS AN OCTAL CHARACTER REPRESENTATION.
0199 *
0200 *
0201 *      ABBREVIATIONS
0202 *
0203 *      BL      - BLANK CHARACTER - '000
0204 *      CR      - CARRIAGE RETURN - '215
0205 *      LF      - LINE FEED      - '212
0206 *      NZ      - NON-ZERO
0207 *      Z       - ZERO
0208 *
0209 *
0210 *      *****
0211 *
0212 *
0213 *      CF4      H316, DDF-416 OR DDP-516
0214 *      ABS      ABSOLUTE
0215 *      SETB     '144      BASE SECTOR LINKAGES ORIGIN
0216 *      ORG      '200      ORIGIN
0217 *
0218 *
0219 *      DEVICE CODES (STANDARD ASR)
0220 *
0221 *      SKS
0222 *      ASRR EQU  '0004      SKIP IF ASR READY
```

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0223	000104	ASRB EQU	'0104	SKIP IF ASR NOT BUSY
0224	000404	NOTI EQU	'0404	SKIP IF ASR NOT INTERRUPTING
0225	000504	NOTS EQU	'0504	SKIP IF NOT STOP CODE
0226		*		
0227		* OCP		
0228	000004	ASRI EQU	'0004	ASR INPUT MODE
0229	000104	ASRO EQU	'0104	ASR OUTPUT MODE
0230		*		
0231		* INA		
0232	001004	IASR EQU	'1004	CLEAR A-REG AND INPUT A CHARACTER FROM ASR
0233	001204	BIAS EQU	'1204	CLEAR A-REG AND INPUT BINARY CODE FROM ASR
0234		*		
0235		* OTA		
0236	000004	OASR EQU	'0004	OUTPUT A CHARACTER TO ASR
0237	000204	BOAS EQU	'0204	OUTPUT BINARY CODE TO ASR
0238		*		
0239		* SMK		
0240	000020	MASK EQU	'0020	SET/RESET MASK
0241		*		
0242		* MASK BIT		
0243	000040	MBIT EQU	'40	BIT 11
0244		*		
0245		*		
0246		* VARIABLES AND CONSTANTS		
0247		*		
0248	00200	SSW BSZ	1	STORED SENSE SWITCH
0249	00201	SAVE BSZ	1	SAVE A-REGISTER
0250	00202	BLOX BSZ	1	OUTPUT BUFFER POINTER
0251	00203	BINX BSZ	1	INPUT BUFFER POINTER
0252	00204	NDXA BSZ	1	NEXT DIGIT ADDRESS
0253	00205	IND BSZ	1	INTERRUPT INDICATOR
0254	00206	TEMP BSZ	1	TEMPORARY STORE
0255	00207	DELA BSZ	1	DELAY COUNT
0256	00210	TSTB BSZ	1	STORE BLOCK POINTER
0257	00211	PWDC BSZ	1	PRINT WORD COUNT
0258	00212	PTM BSZ	1	TEMPORARY STORE
0259	00213	STRE BSZ	1	STORED ADDRESS

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0260	00214	000000	SORF BSZ	1	SLOW OR FAST CYCLE TIME
0261	00215	000000	LEGN BSZ	1	DELAY COUNT
0262	00216	0 000360	STRA DAC	STOR	SECOND BUFFER POINTER
0263	00217	0 000360	RTY2 DAC	STOR	SECOND BUFFER ADDRESS
0264	00220	0 000246	BLCB DAC	BLCA	FIRST BUFFER ADDRESS
0265	00221	0 000356	BLOC DAC	BLCA+72	END FIRST BUFFER ADDRESS
0266	00222	0 002514	CHIN DAC	CHAR	PRINTER/PUNCH DATA ADDRESS
0267	00223	0 003074	BINA DAC	BIN+20	END BINARY BUFFER ADDRESS
0268	00224	0 002514	CHRA DAC	CHAR	PRINTER/PUNCH DATA POINTER
0269	00225	0 001736	BUTN DAC	BUT	START-BUTTON INTERRUPT ADDRESS
0270	00226	0 001264	RUPT DAC	INTR	ASR INTERRUPT ADDRESS
0271	00227	0 000040	MSK DAC	MBIT	MASK BIT
0272	00230	101000	NOPE	NOP	NOP INSTRUCTION
0273	00231	000240	CHRT OCT	240	SPACE CHARACTER
0274	00232	000223	STOP OCT	223,377	X-OFF / RLBOUT
0275	00233	000377			
0276	00234	177444	MOT4 OCT	177444	MINUS 220
0277	00235	177444	MTT4 OCT	177444	
0278	00236	177754	MTT3 OCT	177754	MINUS 20
0279	00237	177754	MOT3 OCT	177754	
0280	00240	177445	MTT2 OCT	177445	MINUS 219
0281	00241	177445	MOT2 OCT	177445	
0282	00242	177740	MOT1 OCT	177740	MINUS 32
0283	00243	177670	M72 OCT	177670	MINUS 72
0284	00244	177670	COUN OCT	177670	
0285	00245	177777	ONES OCT	177777	MINUS 1
0286		*			
0287		*			
0288		* BUFFERS			
0289	00246		BLCA BSS	72	FIRST BUFFER
0290	00356	000000	OCT	0	
0291	00357	000215	OCT	215	CR CHARACTER
0292	00360	000212	STOR OCT	212	LF CHARACTER
0293		*			SECOND BUFFER STARTS HERE
0294		*			
0295		*			

0296			ORG	'1000	NEW ORIGIN
0297			*		
0298			*		
0299	01000	0 10 01414	STRT	JST	INIT
0300			*		INITIALIZE
0301	01001	0 02 00214	LDA	SORF	SLOW OR FAST CYCLE TIME
0302	01002	100040	SZE		Z, UNKNOWN
0303	01003	0 01 01024	JMP	ENTR	NZ, BY-PASS START MESSAGE
0304			*		
0305	01004	0 10 01522	JST	OUTP	OUTPUT A MESSAGE TO ASR
0306	01005	0 002023	DAC	TITL	START MESSAGE
0307			*		
0308	01006	0 02 00214	LDA	SORF	SLOW OR FAST CYCLE TIME
0309	01007	101400	SMI		MINUS, H316 BEING USED
0310	01010	0 01 01014	JMP	**4	PLUS, DDP-416/516
0311			*		
0312	01011	0 10 01522	JST	OUTP	OUTPUT A MESSAGE TO ASR
0313	01012	0 002062	DAC	H316	H316 MESSAGE
0314	01013	0 01 01024	JMP	ENTR	GO TO ENTER MESSAGE
0315			*		
0316	01014	140600	GCT	140600	SCB - NOP ON DDP-416
0317	01015	101001	GCT	101001	SSC - WILL SKIP FOR DDP-516
0318	01016	0 01 01022	JMP	**4	DDP-416, GO TO DDP-416 MESSAGE
0319			*		
0320	01017	0 10 01522	JST	OUTP	OUTPUT A MESSAGE TO ASR
0321	01020	0 002054	DAC	DDP5	DDP-516 MESSAGE
0322	01021	0 01 01024	JMP	ENTR	GO TO ENTER MESSAGE
0323			*		
0324	01022	0 10 01522	JST	OUTP	OUTPUT A MESSAGE TO ASR
0325	01023	0 002046	DAC	DDP4	DDP-416 MESSAGE
0326			*		
0327	01024	0 10 01522	ENTR	JST	OUTPUT A MESSAGE TO ASR
0328	01025	0 002066	DAC	ENTA	ENTER A-REG SETTING MESSAGE
0329			*		
0330	01026	140040	CRA		
0331	01027	000000	HLT		INITIALIZE "SENSE SWITCHES"
0332					

0333	01030	0 04 00200	STA	SSW	STORE SENSE SWITCHES
0334	01031	0 02 00225	LDA	BUTN	START-BUTTON INTERRUPT ADDRESS
0335	01032	0 04 00063	STA	'63	INTERRUPT LOCATION
0336	01033	000401	ENB		ENABLE INTERRUPTS
0337			*		
0338			*		
0339			*		KEYBOARD INPUT
0340			*		
0341	01034	0 10 01522	KYIN	JST	OUTP
0342	01035	0 002113	DAC	KEYB	KEYBOARD INPUT MESSAGE
0343			*		
0344	01036	0 02 00202	LDA	= '212	STORE LF IN BUFFER
0345	01037	-0 04 00216	STA*	STRA	
0346			*		
0347	01040	34 0104	SKS	ASRB	SKIP IF ASR NOT BUSY
0348	01041	0 01 01040	JMP	**1	WAIT UNTIL NOT BUSY
0349			*		
0350	01042	14 0004	OCF	ASRI	ASR INPUT MODE
0351	01043	0 12 00216	MORE	IRS	TALLY SECOND BUFFER POINTER
0352	01044	54 1004	INA	IASR	CLEAR A-REG AND INPUT A CHARACTER FROM ASR
0353	01045	0 01 01044	JMP	**1	WAIT UNTIL READY
0354			*		
0355	01046	0 03 00201	ANA	= '177	BITS 10 - 16
0356	01047	0 05 00200	ERA	= '200	ENSURE BIT 8 OF CHARACTER IS SET
0357	01050	0 04 00206	STA	TEMP	TEMPORARY STORAGE
0358	01051	0 05 002017	ERA	= '215	CR CHARACTER
0359	01052	101040	SNZ		
0360	01053	0 01 01070	JMP	OUT	JUMP IF CARRIAGE RETURN
0361			*		
0362	01054	0 02 00206	LDA	TEMP	
0363	01055	-0 04 00216	STA*	STRA	STORE CHARACTER IN BUFFER
0364	01056	0 05 002016	ERA	= '207	BELL CHARACTER
0365	01057	101040	SNZ		
0366	01060	0 01 01043	JMP	MORE	JUMP IF BELL
0367			*		
0368	01061	0 02 00206	LDA	TEMP	TEMPORARY STORE
0369	01062	0 05 00202	ERA	= '212	LF CHARACTER

0370	01063	101040	SNZ		
0371	01064	0 01 01043	JMP	MORE	JUMP IF LINE FEED
0372			*		
0373	01065	0 12 00244	IRS	COUN	SKIP IF 72 CHARACTERS INPUT
0374	01066	0 01 01043	JMP	MORE	
0375			*		
0376	01067	0 12 00216	IRS	STRA	TALLY SECOND BUFFER POINTER
0377	01070	0 02 02017	OUT LDA	=*215	
0378	01071	-0 04 00216	STA*	STRA	STORE CARRIAGE RETURN
0379	01072	0 02 00217	OUT2 LDA	RTY2	
0380	01073	0 04 00216	STA	STRA	RE-INITIALIZE SECOND BUFFER POINTER
0381	01074	34 0104	SKS	ASRB	SKIP IF ASR NOT BUSY
0382	01075	0 01 01074	JMP	**1	WAIT UNTIL NOT BUSY
0383			*		
0384	01076	14 0104	OCF	ASRO	ASR OUTPUT MODE
0385	01077	0 02 02017	LDA	=*215	CR CHARACTER
0386	01100	74 0004	OTA	OASR	OUTPUT A CHARACTER TO ASR
0387	01101	0 01 01100	JMP	**1	WAIT UNTIL READY
0388			*		
0389	01102	-0 02 00216	TY2 LDA*	STRA	GET A CHARACTER FROM BUFFER
0390	01103	74 0004	OTA	OASR	OUTPUT A CHARACTER TO ASR
0391	01104	0 01 01103	JMP	**1	WAIT UNTIL READY
0392			*		
0393	01105	0 05 02017	ERA	=*215	CR CHARACTER
0394	01106	101040	SNZ		
0395	01107	0 01 01112	JMP	LSW1	JUMP IF CARRIAGE RETURN
0396			*		
0397	01110	0 12 00216	IRS	STRA	TALLY SECOND BUFFER POINTER
0398	01111	0 01 01102	JMP	TY2	
0399			*		
0400	01112	0 02 00217	LSW1 LDA	RTY2	RE-INITIALIZE SECOND BUFFER POINTER
0401	01113	0 04 00216	STA	STRA	
0402	01114	0 02 00243	LDA	M72	MINUS 72
0403	01115	0 04 00244	STA	COUN	
0404	01116	0 10 01743	JST	CHNG	CHECK IF CHANGE REQUIRED ROUTINE
0405	01117	0 02 00200	LDA	SSW	SENSE SWITCHES
0406	01120	0414 75	LGL	3	MOVE BIT 4 TO BIT 1

0407	01121	100400	SPL		PLUS, SKIP
0408	01122	0 01 01130	JMP	PROM	MINUS, GO TO PRINTER OUT
0409			*		
0410	01123	0 02 00200	LDA	SSW	SR1
0411	01124	100400	SPL		
0412	01125	0 01 01034	JMP	KYIN	NEW INPUT IF SW1 ON
0413			*		
0414	01126	0 10 01730	JST	SR2	
0415	01127	0 01 01072	JMP	OUT2	LOOP OUTPUT IF SW2 ON
0416			*		
0417			*		
0418			*	PRINTER OUT	
0419			*		
0420	01130	0 10 01522	PROM JST	OUTP	OUTPUT A MESSAGE TO ASR
0421	01131	0 002127	DAC	POUT	PRINTER OUT MESSAGE
0422			*		
0423			*	ROTATING PATTERN	
0424	01132	0 02 00243	RT1 LDA	M72	SET INDEX TO 72 CHARACTERS/LINE
0425	01133	0 04 00000	STA	0	
0426	01134	0 02 00231	LDA	CHRT	
0427	01135	0 10 01704	RT2 JST	NDX1	STA* BLOC
0428	01136	0 06 02015	ADD	=1	
0429	01137	0 04 00210	STA	TSTB	
0430	01140	0 05 02014	ERA	=*340	TEST FOR END OF PATTERN
0431	01141	100040	SZE		
0432	01142	0 01 01145	JMP	RT3	
0433			*		
0434	01143	0 02 02013	LDA	=*240	SPACE CHARACTER
0435	01144	0 01 01146	JMP	**2	
0436			*		
0437	01145	0 02 00210	RT3 LDA	TSTB	GET NEXT CHARACTER CODE
0438	01146	0 12 00000	IRS	0	TALLY CHARACTER COUNT
0439	01147	0 01 01135	JMP	RT2	
0440			*		
0441	01150	0 10 01450	JST	PRTY	ASR PRINT ROUTINE
0442	01151	-0 02 00220	LDA*	BLCB	
0443	01152	000113	DEC	75	

```

0444
0445 C1153 0 10 01743 * JST CHNG CHECK IF CHANGE REQUIRED ROUTINE
0446 C1154 0 02 00200 LDA SS* SR4
0447 C1155 0414 75 LGL 3
0448 C1156 100400 SPL
0449 C1157 0 01 01166 JMP RT4 END OUTPUT IF SW4 ON
0450
0451 C1160 0 02 00231 * LDA CHRT ROTATE PATTERN
0452 C1161 0 06 02015 ADD =1
0453 C1162 0 04 00231 STA CHRT
0454 C1163 0 05 02014 ERA =*340
0455 C1164 100040 SZE
0456 C1165 0 01 01132 JMP RT1 SET UP NEXT LINE
0457
0458 C1166 0 02 02013 RT4 LDA =*240 RE-INITIALIZE CHARACTER
0459 C1167 0 04 00231 STA CHRT
0460 C1170 0 10 01722 JST SS4 SS4
0461 C1171 0 01 01132 JMP RT1
0462
0463 C1172 140040 * CRA
0464 C1173 0 04 00200 STA SS* RESET SENSE SWITCHES
0465
0466 * ALL CHARACTERS IN ALL PRINT POSITIONS
0467 C1174 0 02 00243 LOAD LDA M72 MINUS 72 COUNT FOR
0468 C1175 0 04 00000 STA 0 CHARACTERS/LINE
0469 C1176 0 02 00231 LDA CHRT
0470 C1177 0 10 01704 JST NDX1
0471 C1200 0 12 00000 IRS 0
0472 C1201 0 01 01177 JMP *-2 TALLY INDEX REGISTER
0473 LOOP AGAIN
0474
0474 C1202 0 10 01450 * JST PRTY PRINT BLOCK - 1 LINE
0475 C1203 -0 02 00220 LDA* BLCB
0476 C1204 000113 DEC 75
0477
0478 C1205 0 10 01743 * JST CHNG CHECK IF CHANGE REQUIRED ROUTINE
0479 C1206 0 10 01722 JST SS4
0480 C1207 0 01 01211 JMP *-2 BIT 4 NOT SET

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0481 01210 0 01 01227 * JMP DERU BIT 4 SET
0482
0483 01211 0 10 01730 * JST SRL
0484 01212 0 01 01223 * JMP LOOP BIT 2 SET
0485
0486 C1213 0 02 00231 * LDA CHRT CHARACTER
0487 01214 0 05 02012 ERA =*337 TEST FOR END OF PATTERN
0488 01215 101040 SNZ
0489 01216 0 01 01223 * JMP LOOP JUMP IF ALL PRINTED
0490
0491 01217 0 02 00231 * LDA CHRT
0492 01220 0 06 02015 ADD =1 SET UP NEXT CHARACTER
0493 01221 0 04 00231 STA CHRT
0494 01222 0 01 01174 * JMP LOAD
0495
0496 01223 0 02 02013 * LOOP LDA =*240 RE-INITIALIZE CHARACTER
0497 01224 0 04 00231 STA CHRT
0498 01225 0 10 01730 JST SR2
0499 01226 0 01 01174 * JMP LOAD LOOP OUTPUT IF SW2 ON
0500
0501 *
0502 * PRINTER/PUNCH OUTPUT
0503 *
0504 01227 0 10 01522 DERU JST OUTP OUTPUT A MESSAGE TO ASR
0505 01230 0 002142 DAC PPOT PRINTER/PUNCH OUTPUT MESSAGE
0506
0507 01231 000000 * HLT
0508
0509 * ISO-CODE OUTPUT
0510 01232 0 10 01640 * JST MOTO START PUNCH ROUTINE
0511
0512 01233 0 10 01450 * JST PRTY ASR PRINT ROUTINE
0513 01234 -0 02 00224 LDA* CHRA
0514 01235 000334 DEC 220
0515
0516 * BINARY OUTPUT
0517 01236 0 02 02011 LDA =-20 SET INDEX TO 20 CHARACTERS

```

```

0518 01237 0 04 00000 STA 0
0519
0520 * DELAY NOMINAL 100 MS
0521 01240 0 02 00214 DELP LDA SORF SLOW OR FAST CYCLE TIME
0522 01241 101400 SMI MINUS, H3.6 BEING USED
0523 01242 0 01 01245 JMP **3 PLUS, DDP-416/516 BEING USED
0524
0525 01243 0 02 02010 LDA =-18000 18000 = (.08 * 1000 / 4 * 1.50)
0526 01244 100000 SKP SKIP
0527
0528 01245 0 02 02007 LDA =-31270 31270 = (.08 * 1000 / 4 * 0.86)
0529 01246 0 04 00207 STA DELA
0530 01247 0 12 00207 IRS DELA DELAY NOMINAL 100 MS
0531 01250 0 01 01247 JMP *-1
0532
0533 01251 34 0004 SKS ASRR SKIP IF ASR READY
0534 01252 0 01 01660 JMP ERR1 READY SHOULD BE SET
0535
0536 01253 001001 INH INHIBIT INTERRUPTS
0537 01254 0 02 00227 LDA MSK
0538 01255 74 0020 SMK MASK SET MASK
0539 01256 0 02 00226 LDA RUPT
0540 01257 0 04 00063 STA *63 INTERRUPT LOCATION
0541 01260 000401 ENB ENABLE INTERRUPT
0542 01261 101000 NOP INTERRUPT SHOULD OCCUR HERE
0543 01262 001001 INH
0544 01263 0 01 01664 JMP ERR2 NO INTERRUPT
0545
0546 * ASR INTERRUPT ROUTINE
0547 01264 0 000000 INTR DAC ** ASR INTERRUPT ROUTINE
0548 01265 000011 OCT 11 DXA - DISABLE EXTENDED ADDRESSING
0549 01266 34 0404 SKS NOTI SKIP IF ASR NOT INTERRUPTING
0550 01267 100000 SKP INTERRUPTING, SKIP
0551 01270 0 01 01670 JMP ERR3 NOT, ERROR
0552
0553 01271 140040 CRA
0554 01272 74 0020 SMK MASK RESET MASK

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0555 01273 0 02 00225 LDA BUTN
0556 01274 0 04 00063 STA *63 INTERRUPT LOCATION
0557 01275 0 10 01714 JST NDX2 LDA* BINA
0558 01276 74 0204 OTA BOAS OUTPUT BINARY CODE TO ASR
0559 01277 0 01 01674 JMP ERR4 NO SKIP ON OTA WITH READY SET
0560
0561 01300 34 0004 SKS ASRR SKIP IF ASR READY
0562 01301 0 01 01303 JMP **2
0563 01302 0 01 01700 JMP ERR5 READY SET AFTER OTA
0564
0565 01303 0 12 00000 IRS 0 SKIP IF ALL PUNCHED
0566 01304 0 01 01240 JMP DELP GO TO DELAY
0567
0568 01305 34 0104 SKS ASRB SKIP IF ASR NOT BUSY
0569 01306 0 01 01305 JMP *-1 WAIT UNTIL NOT BUSY
0570
0571 * PRINT/PUNCH STOP CODE
0572 01307 0 10 01450 JST PRTY ASR PRINT ROUTINE
0573 01310 0 02 00232 LDA STOP X-OFF / RUBOUT MESSAGE
0574 01311 000002 DEC 2
0575
0576 01312 0 10 01640 JST MOTO START PUNCH ROUTINE
0577
0578 01313 0 10 01450 JST PRTY ASR PRINT ROUTINE
0579 01314 0 02 00232 LDA STOP X-OFF / RUBOUT MESSAGE
0580 01315 000002 DEC 2
0581
0582 *
0583 * READER INPUT
0584 *
0585 01316 0 10 01522 READ JST OUTP OUTPUT A MESSAGE TO ASR
0586 01317 0 002205 DAC RDIN READER INPUT MESSAGE
0587
0588 01320 000000 HLT
0589
0590 * START READER
0591 01321 34 0104 SKS ASRB SKIP IF ASR NOT BUSY

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0592 01322 0 01 01321 JMP *-1 WAIT UNTIL NOT BUSY
0593
0594 01323 14 0104 CCP ASR0 ASR OUTPUT MODE
0595 01324 0 02 02006 LDA =*221 X-ON CHARACTER
0596 01325 74 0004 OTA OASR OUTPUT A CHARACTER TO ASR
0597 01326 0 01 01325 JMP *-1 WAIT UNTIL READY
0598
0599 01327 34 0104 SKS ASRB SKIP IF ASR NOT BUSY
0600 01330 0 01 01327 JMP *-1 WAIT UNTIL NOT BUSY
0601
0602 01331 14 0004 CCP ASR1 ASR INPUT MODE
0603
0604 * READ ZEROS
0605 01332 54 1004 INPT INA IASR CLEAR A-REG AND INPUT A CHARACTER FROM ASR
0606 01333 0 01 01332 JMP *-1 WAIT UNTIL READY
0607
0608 01334 101040 SNZ SKIP IF INPUT IS NOT '000
0609 01335 0 01 01332 JMP INPT '000, LOOP AGAIN
0610
0611 01336 -0 04 00216 STA* STRA TAPE CHARACTER
0612 01337 0 05 02005 ERA =*222 SKIP IF INPUT IS NOT '222
0613 01340 101040 SNZ '222, LOOP AGAIN
0614 01341 0 01 01332 JMP INPT
0615
0616 * READ ISC-CODE PATTERN
0617 01342 0 12 00216 MUR1 IRS STRA INPUT 220 CHARACTERS
0618 01343 54 1004 INA IASR CLEAR A-REG AND INPUT A CHARACTER FROM ASR
0619 01344 0 01 01343 JMP *-1 WAIT UNTIL READY
0620
0621 01345 -0 04 00216 STA* STRA STORE IN SECOND BUFFER
0622 01346 0 12 00241 IRS MOT2 TALLY CHARACTER COUNT
0623 01347 0 01 01342 JMP MOR1 LOOP AGAIN
0624
0625 01350 0 02 00240 LDA MTT2 RE-INITIALIZE COUNT
0626 01351 0 04 00241 STA MOT2
0627
0628 * READ BINARY PATTERN

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```

0629 01352 0 12 00216 MOR2 IRS STRA TALLY SECOND BUFFER POINTER
0630 01353 54 1204 INA BIAS CLEAR A-REG AND INPUT BINARY CODE FROM ASR
0631 01354 0 01 01353 JMP *-1 WAIT UNTIL READY
0632
0633 01355 -0 04 00216 STA* STRA STORE IN SECOND BUFFER
0634 01356 0 12 00237 IRS MOT3 TALLY CHARACTER COUNT
0635 01357 0 01 01352 JMP MOR2 LOOP AGAIN
0636
0637 01360 0 02 00236 LDA MTT3 RE-INITIALIZE COUNT
0638 01361 0 04 00237 STA MOT3
0639 01362 54 1004 INA IASR CLEAR A-REG AND INPUT A CHARACTER FROM ASR
0640 01363 0 01 01362 JMP *-1 WAIT UNTIL READY
0641
0642 01364 34 0504 SKS NOTS SKIP IF NOT STOP CODE
0643 01365 100000 SKP STOP CODE, O.K.
0644 01366 0 01 01410 JMP STPO NO STOP CODE, GO TO ERROR
0645
0646 01367 54 1004 INA IASR CLEAR A-REG AND INPUT A CHARACTER FROM ASR
0647 01370 0 01 01367 JMP *-1 WAIT UNTIL READY
0648
0649 01371 0 02 00217 LDA RTY2 RE-INITIALIZE ADDRESSES
0650 01372 0 04 00216 STA STRA
0651 01373 0 02 00222 LDA CHIN
0652 01374 0 04 00224 STA CHRA
0653
0654 01375 0 10 01624 JST COMP DATA COMPARISON ROUTINE
0655
0656 01376 0 02 00222 LDA CHIN RE-INITIALIZE ADDRESSES
0657 01377 0 04 00224 STA CHRA
0658 01400 0 02 00217 LDA RTY2
0659 01401 0 04 00216 STA STRA
0660 01402 34 0104 SKS ASRB SKIP IF ASR NOT BUSY
0661 01403 0 01 01402 JMP *-1 WAIT UNTIL NOT BUSY
0662
0663 01404 0 10 01522 JST OUTP OUTPUT A MESSAGE TO ASR
0664 01405 0 002254 DAC ENDM END MESSAGE
0665

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```
0666 01406 000000 HLT END OF TEST
0667 *
0668 * RESTART
0669 01407 0 01 01000 JMP STRT RESTART, GO TO START AGAIN
0670 *
0671 01410 0 10 01522 STPO JST OUTP OUTPUT A MESSAGE TO ASR
0672 01411 0 002473 DAC NOSC NO STOP CODE ERROR MESSAGE
0673 01412 000000 HLT ERROR HALT
0674 *
0675 01413 0 01 01316 JMP READ GO TO READER INPUT AGAIN
0676 *
0677 *
0678 * SUBROUTINES
0679 *
0680 *
0681 * INITIALIZE
0682 *
0683 01414 0 000000 INIT DAC ** INITIALIZE
0684 01415 0 02 02013 LDA =*240 SETUP INITIAL CHARACTER
0685 01416 0 04 00231 STA CHRT
0686 01417 0 02 00240 LDA MTT2 SETUP INITIAL COUNTS
0687 01420 0 04 00241 STA MOT2
0688 01421 0 02 00236 LDA MTT3
0689 01422 0 04 00237 STA MOT3
0690 01423 0 02 00235 LDA MTT4
0691 01424 0 04 00234 STA MOT4
0692 01425 0 02 00217 LDA RTY2 INITIALIZE SECOND BUFFER POINTER
0693 01426 0 04 00216 STA STRA
0694 01427 0 02 00243 LDA M72 MINUS 72
0695 01430 0 04 00244 STA COUN
0696 01431 0 02 00222 LDA CHIN INITIALIZE PRINTER/PUNCH DATA POINTER
0697 01432 0 04 00224 STA CHRA
0698 01433 0 02 01516 LDA RESR
0699 01434 0 05 00230 ERA NOPE
0700 01435 101040 SNZ NOPE BITS 1 AND 7 (NOP)
0701 01436 -0 01 01414 JMP* INIT SKIP IF INDIRECT ADDRESSING OF LAST MESSAGE
0702 *
```

```
0703 01437 0 02 00212 LDA PTEM TEMPORARY STORE
0704 01440 0 04 01506 STA ITPT
0705 01441 0 02 01516 LDA RESR
0706 01442 0 04 01444 STA **2
0707 01443 0 02 00213 LDA STRE RESTORE INDIRECT ADDRESS
0708 01444 0 00 00000 *** **
0709 01445 0 02 00230 LDA NOPE NOP INSTRUCTION
0710 01446 0 04 01516 STA RESR
0711 01447 -0 01 01414 JMP* INIT EXIT
0712 *
0713 *
0714 * ASR PRINT ROUTINE
0715 *
0716 01450 0 000000 PRTY DAC ** ASR PRINT ROUTINE
0717 01451 0 02 01506 LDA ITPT
0718 01452 0 04 00212 STA PTEM SAVE CONTENTS OF ITPT
0719 01453 -0 02 01450 LDA* PRTY PICK UP INSTRUCTION
0720 01454 0 12 01450 IRS PRTY TALLY RETURN ADDRESS
0721 01455 0 04 01503 STA PMSG
0722 01456 101400 SMI
0723 01457 0 01 01473 JMP NOIN SKIP IF INDIRECT ADDRESSING OF MESSAGE
0724 * CONTINUE
0725 01460 0 03 02004 ANA =*77777 RESET SIGN BIT
0726 01461 0 06 02003 ADD =*20000 CHANGE INSTRUCTION TO IRS
0727 01462 0 04 01506 STA ITPT
0728 01463 0 07 02003 SUB =*20000 BACK TO LDA
0729 01464 0 04 01465 STA **1
0730 01465 0 00 00000 *** **
0731 01466 0 04 00213 STA STRE SAVE INDIRECT ADDRESS
0732 01467 0 02 01465 LDA *-2 LDA LOC OF INDIRECT ADDRESS
0733 01470 0 03 02002 ANA =*777
0734 01471 0 06 02001 ADD =*10000 STA LOC OF INDIRECT ADDRESS
0735 01472 0 04 01516 STA RESR
0736 01473 -0 02 01450 NOIN LDA* PRTY PICK UP COUNT
0737 01474 0 12 01450 IRS PRTY TALLY RETURN ADDRESS
0738 01475 0 07 02015 SUB =1 TAKE
0739 01476 0 05 00245 ERA ONES TWO'S
```

0740	01477	0 04 00211	STA	PWDC	COMPLEMENT
0741	01500	34 0104	SKS	ASRB	SKIP IF ASR NOT BUSY
0742	01501	0 01 01500	JMP	**1	WAIT UNTIL NOT BUSY
0743		*			
0744	01502	14 0104	OCF	ASRO	ASR OUTPUT MODE
0745		*			
0746	01503	0 00 00000	PMSG	***	GET MESSAGE DATA
0747	01504	74 0004	OTA	OASR	OUTPUT A CHARACTER TO ASR
0748	01505	0 01 01504	JMP	**1	WAIT UNTIL READY
0749		*			
0750	01506	0 12 01503	ITPT	IRS	MODIFIABLE
0751	01507	0 12 00211	IRS	PWDC	TALLY PRINT WORD COUNT
0752	01510	0 01 01503	JMP	PMSG	LOOP AGAIN
0753		*			
0754	01511	34 0104	SKS	ASRB	SKIP IF ASR NOT BUSY
0755	01512	0 01 01511	JMP	**1	WAIT UNTIL NOT BUSY
0756		*			
0757	01513	0 02 00212	LDA	PTM	
0758	01514	0 04 01506	STA	ITPT	
0759	01515	0 02 00213	LDA	STRE	RESTORE INDIRECT ADDRESS
0760	01516	101000	RESR	NOP	
0761	01517	0 02 00230	LDA	NOPE	
0762	01520	0 04 01516	STA	RESR	
0763	01521	-0 01 01450	JMP*	PRTY	EXIT
0764		*			
0765		*			
0766		* OUTPUT A MESSAGE TO ASR			
0767		*			
0768	01522	0 000000	OUTP	DAC	OUTPUT A MESSAGE TO ASR
0769	01523	-0 02 01522	LDA*	SNZ	FETCH MESSAGE ADDRESS
0770	01524	0 04 00206	STA	TEMP	TEMPORARY STORE
0771	01525	0 12 01522	IRS	OUTP	TALLY RETURN ADDRESS
0772		*			
0773	01526	34 0104	SKS	ASRB	SKIP IF ASR NOT BUSY
0774	01527	0 01 01526	JMP	**1	WAIT UNTIL NOT BUSY
0775	01530	14 0104	OCF	ASRO	ASR OUTPUT MODE
0776		*			

0777	01531	-0 02 00206	NUVA	LDA*	TEMP	FETCH ONE WORD FOR OUTPUT
0778	01532	101040		SNZ		NZ, DATA
0779	01533	0 01 01544	JMP	ENDW		Z, END OF MESSAGE
0780		*				
0781	01534	0406 70	ARP	8		RIGHT ROTATE 8 BITS
0782	01535	74 0004	OTA	OASR		OUTPUT A CHARACTER TO ASR
0783	01536	0 01 01535	JMP	**1		WAIT UNTIL READY
0784		*				
0785	01537	0416 70	ALR	8		LEFT ROTATE 8 BITS
0786	01540	74 0004	OTA	OASR		OUTPUT A CHARACTER TO ASR
0787	01541	0 01 01540	JMP	**1		WAIT UNTIL READY
0788		*				
0789	01542	0 12 00206	IRS	TEMP		TALLY TEMPORARY STORE
0790	01543	0 01 01531	JMP	NUVA		LOOP AGAIN
0791		*				
0792	01544	0 02 00214	ENDW	LDA	SORF	SLOW OR FAST CYCLE TIME
0793	01545	101040		SNZ		NZ, DETERMINED BEFORE
0794	01546	0 10 01550	JST	CONF		CONFIGURATION ROUTINE
0795	01547	-0 01 01522	JMP*	OUTP		EXIT
0796		*				
0797		*				
0798		* CONFIGURATION ROUTINE				
0799		*				
0800	01550	0 000000	CONF	DAC	**	CONFIGURATION ROUTINE
0801	01551	140040		CRA		CLEAR A-REGISTER (ZERO)
0802	01552	0 06 02015		ADD	=1	ADD 1
0803	01553	34 0104	SKS	ASRB		SKIP IF ASR NOT BUSY
0804	01554	0 01 01552	JMP	**2		LOOP AGAIN
0805		*				
0806	01555	0 07 02000		SUB	=16500	TIME CONSTANT
0807	01556	101400		SMI		MINUS, H316
0808	01557	0 02 02015		LDA	=1	PLUS, DDP-416 OR DDP-516
0809	01560	0 04 00214		STA	SORF	SLOW OR FAST CYCLE TIME
0810	01561	-0 01 01550		JMP*	CONF	EXIT
0811		*				
0812		*				
0813		* ERROR ROUTINE				

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```
0814
0815 01562 0 000000 * ERR DAC ** ERROR ROUTINE
0816
0817 * CONVERT INPUT CHARACTER TO ISO-CODE
0818 01563 -0 02 00216 LDA* STRA GET A CHARACTER FROM INPUT BUFFER
0819 01564 0405 72 ARS 6 RIGHT SHIFT 6 BITS
0820 01565 0 03 01777 ANA =3 BITS 15 - 16
0821 01566 0 06 01776 ADD =*260 CHARACTER 0
0822 01567 0 04 02455 STA ONE FIRST CHARACTER
0823
0824 01570 -0 02 00216 * LDA* STRA GET A CHARACTER FROM INPUT BUFFER
0825 01571 0405 75 ARS 3 RIGHT SHIFT 3 BITS
0826 01572 0 03 01775 ANA =7 BITS 14 - 16
0827 01573 0 06 01776 ADD =*260 CHARACTER 0
0828 01574 0 04 02456 STA TWO SECOND CHARACTER
0829
0830 01575 -0 02 00216 * LDA* STRA GET A CHARACTER FROM INPUT BUFFER
0831 01576 0 03 01775 ANA =7 BITS 14 - 16
0832 01577 0 06 01776 ADD =*260 CHARACTER 0
0833 01600 0 04 02457 STA THR THIRD CHARACTER
0834
0835 * CONVERT KNOWN CHARACTER TO ISO-CODE
0836 01601 -0 02 00224 LDA* CHRA GET A CHARACTER FROM DATA BUFFER
0837 01602 0405 72 ARS 6 RIGHT SHIFT 6 BITS
0838 01603 0 03 01777 ANA =3 BITS 15 - 16
0839 01604 0 06 01776 ADD =*260 CHARACTER 0
0840 01605 0 04 02466 STA FOR FOURTH CHARACTER
0841
0842 01606 -0 02 00224 * LDA* CHRA GET A CHARACTER FROM DATA BUFFER
0843 01607 0405 75 ARS 3 RIGHT SHIFT 3 BITS
0844 01610 0 03 01775 ANA =7 BITS 14 - 16
0845 01611 0 06 01776 ADD =*260 CHARACTER 0
0846 01612 0 04 02467 STA FIV FIFTH CHARACTER
0847
0848 01613 -0 02 00224 * LDA* CHRA GET A CHARACTER FROM DATA BUFFER
0849 01614 0 03 01775 ANA =7 BITS 14 - 16
0850 01615 0 06 01776 ADD =*260 CHARACTER 0
```

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```
0851 01616 0 04 02470 STA SIX SIXTH CHARACTER
0852
0853 01617 34 0104 * SKS ASRB SKIP IF ASR NOT BUSY
0854 01620 0 01 01617 JMP *-1 WAIT UNTIL NOT BUSY
0855
0856 * PRINT ERROR MESSAGE
0857 01621 0 10 01522 JST OUTP OUTPUT A MESSAGE TO ASR
0858 01622 0 002466 DAC MSG INPUT DATA ERROR MESSAGE
0859
0860 01623 -0 01 01562 * JMP* ERR EXIT
0861
0862 *
0863 * DATA COMPARISON ROUTINE
0864
0865 01624 0 000000 COMP DAC ** DATA COMPARISON ROUTINE
0866 01625 -0 02 00224 MOR LDA* CHRA STORED DATA
0867 01626 -0 05 00216 ERA* STRA SECOND BUFFER DATA
0868 01627 100040 SZE SAME, O.K.
0869 01630 0 10 01562 JST ERR DIFFERENT, ERROR ROUTINE
0870 01631 0 12 00224 IRS CHRA TALLY STORED DATA POINTER
0871 01632 0 12 00216 IRS STRA TALLY SECOND BUFFER DATA POINTER
0872 01633 0 12 00234 IRS MOT4 TALLY CHARACTER COUNT
0873 01634 0 01 01625 JMP MOR LOOP AGAIN
0874
0875 01635 0 02 00235 * LDA MTT4 RESTORE CHARACTER COUNT
0876 01636 0 04 00234 STA MOT4
0877 01637 -0 01 01624 JMP* COMP EXIT
0878
0879 *
0880 * START PUNCH ROUTINE
0881
0882 01640 0 000000 MOTO DAC ** START PUNCH ROUTINE
0883 01641 34 0104 SKS ASRB SKIP IF ASR NOT BUSY
0884 01642 0 01 01641 JMP *-1 WAIT UNTIL NOT BUSY
0885
0886 01643 14 0104 * GCP ASRO ASR OUTPUT MODE
0887 01644 0 02 02005 LDA =*222 TAPE CHARACTER
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0888 01645 74 0004 GTA OASR OUTPUT A CHARACTER TO ASR
0889 01646 0 01 01645 JMP *-1 WAIT UNTIL READY
0890 *
0891 01647 0 10 01760 JST BCHD BUFFER CHARACTER DELAY
0892 *
0893 01650 0 02 00242 LDA MOT1 SET INDEX TO 32
0894 01651 0 04 00000 STA 0
0895 01652 140040 CRA BL/BL CHARACTERS
0896 01653 74 0004 UTA OASR OUTPUT A CHARACTER TO ASR
0897 01654 0 01 01653 JMP *-1 WAIT UNTIL READY
0898 *
0899 01655 0 12 00000 IRS 0 TALLY CHARACTER COUNT
0900 01656 0 01 01653 JMP *-3 LOOP AGAIN
0901 01657 -0 01 01640 JMP* MOTO EXIT
0902 *
0903 *
0904 * READY SHOULD BE SET AFTER 100 MS DELAY
0905 *
0906 01660 0 10 01522 ERR1 JST OUTP OUTPUT A MESSAGE TO ASR
0907 01661 0 002266 DAC RDYE READY ERROR MESSAGE
0908 01662 000000 HLT ERROR HALT
0909 *
0910 01663 0 01 01000 JMP STRT RESTART
0911 *
0912 *
0913 * NO INTERRUPT AFTER MASK SET
0914 *
0915 01664 0 10 01522 ERR2 JST OUTP OUTPUT A MESSAGE TO ASR
0916 01665 0 002321 DAC NINT NO INTERRUPT ERROR MESSAGE
0917 01666 000000 HLT ERROR HALT
0918 *
0919 01667 0 01 01000 JMP STRT RESTART
0920 *
0921 *
0922 * INTERRUPT NOT CAUSED BY ASR
0923 *
0924 01670 0 10 01522 ERR3 JST OUTP OUTPUT A MESSAGE TO ASR
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0925 01671 0 002347 DAC NASR NOT ASR INTERRUPT ERROR MESSAGE
0926 01672 000000 HLT ERROR HALT
0927 *
0928 01673 0 01 01000 JMP STRT RESTART
0929 *
0930 *
0931 * NO SKIP ON UTA WITH READY SET
0932 *
0933 01674 0 10 01522 ERR4 JST OUTP OUTPUT A MESSAGE TO ASR
0934 01675 0 002375 DAC NOSK NO SKIP ON UTA ERROR MESSAGE
0935 01676 000000 HLT ERROR HALT
0936 *
0937 01677 0 01 01000 JMP STRT RESTART
0938 *
0939 *
0940 * READY SET AFTER UTA
0941 *
0942 01700 0 10 01522 ERR5 JST OUTP OUTPUT A MESSAGE TO ASR
0943 01701 0 002424 DAC RDYO READY AFTER UTA ERROR MESSAGE
0944 01702 000000 HLT ERROR HALT
0945 *
0946 01703 0 01 01000 JMP STRT RESTART
0947 *
0948 *
0949 * STORE IN FIRST BUFFER ROUTINE
0950 *
0951 01704 0 000000 NDX1 DAC ** STA* BLOC ROUTINE
0952 01705 0 04 00201 STA SAVA SAVE A-REGISTER
0953 01706 0 02 00221 LDA BLOC
0954 01707 0 06 00000 ADD 0 GET ADDRESS IN FIRST BUFFER
0955 01710 0 04 00202 STA BLOC
0956 01711 0 02 00201 LDA SAVA RESTORE A-REGISTER
0957 01712 -0 04 00202 STA* BLOC STORE IN FIRST BUFFER
0958 01713 -0 01 01704 JMP* NDX1 EXIT
0959 *
0960 *
0961 * GET A BINARY CHARACTER ROUTINE
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0962
0963 01714 0 000000 NDX2 DAC ** GET BINARY CHARACTER
0964 01715 0 02 00223 LDA BINA
0965 01716 0 06 00000 ADD 0 GET ADDRESS IN BINARY BUFFER
0966 01717 0 04 00203 STA BINX
0967 01720 -0 02 00203 LDA* BINX GET CHARACTER FROM BUFFER
0968 01721 -0 01 01714 JMP* NDX2 EXIT
0969
0970
0971
0972
0973 01722 0 000000 SS4 DAC ** TEST A4 SET ROUTINE
0974 01723 0 02 00200 LDA SSW SENSE SWITCHES
0975 01724 0414 75 LGL 3 LEFT SHIFT 3
0976 01725 100400 SPL PLUS, SKIP
0977 01726 0 12 01722 IRS SS4 MINUS, TALLY RETURN ADDRESS
0978 01727 -0 01 01722 JMP* SS4 EXIT
0979
0980
0981
0982
0983 01730 0 000000 SR2 DAC ** TEST A2 RESET ROUTINE
0984 01731 0 02 00200 LDA SSW SENSE SWITCHES
0985 01732 0414 77 LGL 1 LEFT SHIFT 1
0986 01733 101400 SMI MINUS, SKIP
0987 01734 0 12 01730 IRS SR2 PLUS, TALLY RETURN ADDRESS
0988 01735 -0 01 01730 JMP* SR2 EXIT
0989
0990
0991
0992
0993 01736 0 000000 BUT DAC ** START-BUTTON INTERRUPT ROUTINE
0994 01737 000011 OCT 11 DXA - DISABLE EXTENDED ADDRESSING
0995 01740 0 12 00205 IRS IND TALLY INTERRUPT INDICATOR
0996 01741 101000 NOP
0997 01742 -0 01 01736 JMP* BUT EXIT
0998

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0999
1000
1001
1002 01743 0 000000 CHNG DAC ** CHECK IF CHANGE REQUIRED ROUTINE
1003 01744 0 02 00205 LDA IND INTERRUPT INDICATOR
1004 01745 101040 SNZ NZ, SKIP
1005 01746 -0 01 01743 JMP* CHNG Z, EXIT
1006
1007 01747 140040 CRA
1008 01750 0 04 00205 STA IND RESET INTERRUPT INDICATOR
1009
1010 01751 0 10 01522 JST OUTP OUTPUT A MESSAGE TO ASR
1011 01752 0 002066 DAC ENTA ENTER A-REG SETTING MESSAGE
1012
1013 01753 140040 CRA
1014 01754 000000 HLT CLEAR SWITCHES
1015 HALT FOR OPERATOR INTERVENTION
1016 01755 0 04 00200 STA SSW STORE SENSE SWITCHES
1017 01756 000401 ENB ENABLE INTERRUPTS
1018 01757 -0 01 01743 JMP* CHNG EXIT
1019
1020
1021
1022
1023 01760 0 000000 BCHD DAC ** BUFFER CHARACTER DELAY ROUTINE
1024 01761 0 02 00214 LDA SORF SLOW OR FAST CYCLE TIME
1025 01762 101400 SMI MINUS, H316 BEING USED
1026 01763 0 01 01766 JMP **+3 PLUS, DDP-416/516 BEING USED
1027
1028 01764 0 02 01774 LDA =*76713 33333 = (200 * 1000 / 4 * 1.50)
1029 01765 100000 SKP SKIP
1030
1031 01766 0 02 01773 LDA =*30000 53248 = (200 * 1000 / 4 * 0.86)
1032 01767 0 04 00215 STA LEGN DELAY COUNT
1033 01770 0 12 00215 IRS LEGN TALLY DELAY COUNT
1034 01771 0 01 01770 JMP *-1 LOOP AGAIN
1035 01772 -0 01 01760 JMP* BCHD EXIT

```

```
1036
1037
1038
1039
1040 01773 030000
      01774 076713
      01775 000007
      01776 000260
      01777 000003
      02000 040164
      02001 010000
      02002 000777
      02003 020000
      02004 077777
      02005 000222
      02006 000221
      02007 102732
      02010 134660
      02011 177754
      02012 000337
      02013 000240
      02014 000340
      02015 000001
      02016 000207
      02017 000215
      02020 000200
      02021 000177
      02022 000212

1041
1042
1043
1044
1045
1046 02023 106612
      02024 105212
1047 02025 151724

*
*
* LITERALS
*
      FIN
      LITERALS

*
*
* MESSAGES
*
* START MESSAGE
TITL OCT 106612,105212 CR/LF, LF/LF
BCI 15,START N16-TLT9 41285786-001-C1
```

```
02026 140722
02027 152240
02030 147261
02031 133255
02032 152314
02033 152271
02034 120264
02035 130662
02036 134265
02037 133670
02040 133255
02041 130260
02042 130655
02043 130261
1048 02044 106612
      02045 000000

1049
1050
1051 02046 142304
      02047 150255
      02050 132261
      02051 133240
1052 02052 106612
      02053 000000

1053
1054
1055 02054 142304
      02055 150255
      02056 132661
      02057 133240
1056 02060 106612
      02061 000000

1057
1058
1059 02062 144263
      02063 130666
1060 02064 106612

*
* DDP-416 MESSAGE
DDP4 BCI 4,DDP-416

*
* DDP-516 MESSAGE
DDP5 BCI 4,DDP-516

*
* H316 MESSAGE
H316 BCI 2,H316

OCT 106612,0 CR/LF, 3L/BL
OCT 106612,0 CR/LF, 3L/BL
OCT 106612,0 CR/LF, 3L/BL
OCT 106612,0 CR/LF, 3L/BL
```

```
1061 02065 000000
1062
1063 02066 106612 *
      02067 106612 * ENTER A-REG SETTING MESSAGE
      02070 142716 ENTA OCT 106612,106612 CR/LF, CR/LF
      02071 152305
      02072 151240 BCI 17,ENTER A-REG SETTING - PRESS START
      02073 140655
      02074 151305
      02075 143640
      02076 151705
      02077 152324
      02100 144716
      02101 143640
      02102 126640
      02103 150322
      02104 142723
      02105 151640
      02106 151724
      02107 140722
      02110 152240
1065 02111 106612 OCT 106612,0 CR/LF, BL/BL
      02112 000000
1066
1067 *
1068 02113 106612 * KEYBOARD INPUT MESSAGE
      02114 106612 KEYB OCT 106612,106612 CR/LF, CR/LF
1069 02115 145705 BCI 7,KEYBOARD INPUT
      02116 154702
      02117 147701
      02120 151304
      02121 120311
      02122 147320
      02123 152724
1070 02124 106612 OCT 106612,106612,0 CR/LF, CR/LF, BL/BL
      02125 106612
```

```
1071 02126 000000
1072
1073 02127 106612 *
      02130 106612 * PRINTER OUT MESSAGE
      02131 150322 POUT OCT 106612,106612 CR/LF, CR/LF
      02132 144716 BCI 6,PRINTER OUT
      02133 152305
      02134 151240
      02135 147725
      02136 152240
1075 02137 106612 OCT 106612,106612,0 CR/LF, CR/LF, BL/BL
      02140 106612
      02141 000000
1076
1077 *
1078 02142 106612 * PRINTER/PUNCH OUTPUT MESSAGE
      02143 106612 PPOT OCT 106612,106612 CR/LF, CR/LF
1079 02144 150322 BCI 10,PRINTER/PUNCH OUTPUT
      02145 144716
      02146 152305
      02147 151257
      02150 150325
      02151 147303
      02152 144240
      02153 147725
      02154 152320
      02155 152724
1080 02156 106612 OCT 106612,106612 CR/LF, CR/LF
      02157 106612
1081 02160 124324 BCI 18,(TURN ON ASR-33 PUNCH) - PRESS START
      02161 152722
      02162 147240
      02163 147716
      02164 120301
      02165 151722
      02166 126663
```

02167	151640		
02170	150325		
02171	147303		
02172	144251		
02173	120255		
02174	120320		
02175	151305		
02176	151723		
02177	120323		
02200	152301		
02201	151324		
1082 02202	106612	OCT	106612,106612,0 CR/LF, CR/LF, BL/BL
02203	106612		
02204	000000		
1083			
1084			
1085 02205	106612		
02206	106612		
1086 02207	151305		
02210	140704		
02211	142722		
02212	120311		
02213	147320		
02214	152724		
1087 02215	106612	OCT	106612,106612 CR/LF, CR/LF
02216	106612		
1088 02217	146317		
02220	140704		
02221	120322		
02222	142701		
02223	142305		
02224	151240		
02225	126640		
02226	124324		
02227	152722		
02230	147240		
02231	147706		

*
* READER INPUT MESSAGE
RDIN OCT 106612,106612 CR/LF, CR/LF
BCI 6,READER INPUT

OCT 106612,106612 CR/LF, CR/LF
BCI 26,LOAD READER - (TURN OFF ASR-33 PUNCH) - PRESS START

02232	143240		
02233	140723		
02234	151255		
02235	151663		
02236	120320		
02237	152716		
02240	141710		
02241	124640		
02242	126640		
02243	150322		
02244	142723		
02245	151640		
02246	151724		
02247	140722		
02250	152240		
1089 02251	106612	OCT	106612,106612,0 CR/LF, CR/LF, BL/BL
02252	106612		
02253	000000		
1090			
1091			
1092 02254	106612		
02255	106612		
1093 02256	142716		
02257	142240		
02260	147261		
02261	133255		
02262	152314		
02263	152271		
1094 02264	106612	OCT	106612,0 CR/LF, BL/BL
02265	000000		
1095			
1096			
1097			
1098			
1099			
1100 02266	106612		
02267	106612		

*
* END MESSAGE
ENDM OCT 106612,106612 CR/LF, CR/LF
BCI 6,END N16-1LT9

OCT 106612,0 CR/LF, BL/BL

*
* ERROR MESSAGES
* READY SHOULD BE SET AFTER 100 MS DELAY
RDYE OCT 106612,106612 CR/LF, CR/LF

1101 02270 142722 BCI 22,ERR1 READY SHOULD BE SET AFTER 100 MS DELAY
02271 151261
02272 120240
02273 151305
02274 140704
02275 154640
02276 151710
02277 147725
02300 146304
02301 120302
02302 142640
02303 151705
02304 152240
02305 140706
02306 152305
02307 151240
02310 130660
02311 130240
02312 146723
02313 120304
02314 142714
02315 140731
1102 02316 106612 OCT 106612,106612,0 CR/LF, CR/LF, BL/BL
02317 106612
02320 000000
1103 *
1104 * NO INTERRUPT AFTER MASK SET
1105 02321 106612 NINT OCT 106612,106612 CR/LF, CR/LF
02322 106612
1106 02323 142722 BCI 17,ERR2 NO INTERRUPT AFTER MASK SET
02324 151262
02325 120240
02326 147317
02327 120311
02330 147324
02331 142722
02332 151325

02333 150324
02334 120301
02335 143324
02336 142722
02337 120315
02340 140723
02341 145640
02342 151705
02343 152240
1107 02344 106612 OCT 106612,106612,0 CR/LF, CR/LF, BL/BL
02345 106612
02346 000000
1108 *
1109 * INTERRUPT NOT CAUSED BY ASR
1110 02347 106612 NASR OCT 106612,106612 CR/LF, CR/LF
02350 106612
1111 02351 142722 BCI 17,ERR3 INTERRUPT NOT CAUSED BY ASR
02352 151263
02353 120240
02354 144716
02355 152305
02356 151322
02357 152720
02360 152240
02361 147317
02362 152240
02363 141701
02364 152723
02365 142704
02366 120302
02367 154640
02370 140723
02371 151240
1112 02372 106612 OCT 106612,106612,0 CR/LF, CR/LF, BL/BL
02373 106612
02374 000000
1113 *

```
1114
1115 02375 106612      * NO SKIP ON OTA WITH READY SET
      02376 106612      NOSK OCT 106612,106612      CR/LF, CR/LF
1116 02377 142722      BCI 18,ERR4 NO SKIP ON OTA WITH READY SET
      02400 151264
      02401 120240
      02402 147317
      02403 120323
      02404 145711
      02405 150240
      02406 147716
      02407 120317
      02410 152301
      02411 120327
      02412 144724
      02413 144240
      02414 151305
      02415 140704
      02416 154640
      02417 151705
      02420 152240
1117 02421 106612      OCT 106612,106612,0 CR/LF, CR/LF, BL/BL
      02422 106612
      02423 000000
1118
1119
1120 02424 106612      *
      02425 106612      * READY SET AFTER UTA
      02426 142722      RDYO OCT 106612,106612      CR/LF, CR/LF
1121 02427 151265      BCI 13,ERR5 READY SET AFTER UTA
      02430 120240
      02431 151305
      02432 140704
      02433 154640
      02434 151705
      02435 152240
      02436 140706
```

```
02437 152305
02440 151240
02441 147724
02442 140640
1122 02443 106612      OCT 106612,106612,0 CR/LF, CR/LF, BL/BL
      02444 106612
      02445 000000
1123
1124
1125 02446 106612      *
      02447 106612      * INPUT IS 'xxx SHOULD BE 'xxx
      02450 144716      EMSG OCT 106612,106612      CR/LF, CR/LF
1126 02451 150325      BCI 5,INPUT IS '
      02452 152240
      02453 144723
      02454 120247
1127 02455 000000      ONE OCT 0
1128 02456 000000      TWO OCT 0
1129 02457 000000      THR OCT 0
1130 02460 120323      BCI 6, SHOULD BE '
      02461 144317
      02462 152714
      02463 142240
      02464 141305
      02465 120247
1131 02466 000000      FOR OCT 0
1132 02467 000000      FIV OCT 0
1133 02470 000000      SIX OCT 0
1134 02471 106612      OCT 106612,C CR/LF, BL/BL
      02472 000000
1135
1136
1137 02473 106612      *
      02474 106612      * NO STOP CODE RECOGNIZED
      02475 147317      NOSK OCT 106612,106612      CR/LF, CR/LF
1138 02476 120323      BCI 12,NO STOP CODE RECOGNIZED
      02477 152317
```

	02500	150240	
	02501	141717	
	02502	142305	
	02503	120322	
	02504	142703	
	02505	147707	
	02506	147311	
	02507	155305	
	02510	142240	
1139	02511	106612	OCT 106612,106612,0 CR/LF, CR/LF, BL/BL
	02512	106612	
	02513	000000	
1140			
1141			*
1142			*
1143			* PRINTER/PUNCH OUTPUT DATA
1144			*
	02514	000240	CHAR OCT 240,240,240,240,240,240,240,240,240,240,240,240,240,324,310
	02515	000240	
	02516	000240	
	02517	000240	
	02520	000240	
	02521	000240	
	02522	000240	
	02523	000240	
	02524	000240	
	02525	000240	
	02526	000240	
	02527	000240	
	02530	000240	
	02531	000324	
	02532	000310	
1145	02533	000311	OCT 311,323,240,311,323
	02534	000323	
	02535	000240	
	02536	000311	
	02537	000323	
1146	02540	000240	OCT 240,324,310,305,240,324,305,314,305,324,331,320,305,327,322

	02541	000324	
	02542	000310	
	02543	000305	
	02544	000240	
	02545	000324	
	02546	000305	
	02547	000314	
	02550	000305	
	02551	000324	
	02552	000331	
	02553	000320	
	02554	000305	
	02555	000327	
	02556	000322	
1147	02557	000311	OCT 311,324,305,322,257
	02560	000324	
	02561	000305	
	02562	000322	
	02563	000257	
1148	02564	000320	OCT 320,325,316,303,310,240,317,325,324,320,325,324,240,324,305
	02565	000325	
	02566	000316	
	02567	000303	
	02570	000310	
	02571	000240	
	02572	000317	
	02573	000325	
	02574	000324	
	02575	000320	
	02576	000325	
	02577	000324	
	02600	000240	
	02601	000324	
	02602	000305	
1149	02603	000323	OCT 323,324,240,240,240
	02604	000324	
	02605	000240	

	02606	000240		
	02607	000240		
1150	02610	000000	OCT	0,0,0,0,0,0,0,0,0,0,215,212,240
	02611	000000		
	02612	000000		
	02613	000000		
	02614	000000		
	02615	000000		
	02616	000000		
	02617	000000		
	02620	000000		
	02621	000000		
	02622	000000		
	02623	000000		
	02624	000215		
	02625	000212		
	02626	000240		
1151	02627	000240	OCT	240,240,240,240,240
	02630	000240		
	02631	000240		
	02632	000240		
1152	02633	000240	OCT	240,324,310,305,240,304,301,324,301,240,316,317,327,240,302
	02634	000240		
	02635	000324		
	02636	000310		
	02637	000305		
	02640	000240		
	02641	000304		
	02642	000301		
	02643	000324		
	02644	000301		
	02645	000240		
	02646	000316		
	02647	000317		
	02650	000327		
	02651	000240		
	02652	000302		

1153	02653	000305	OCT	305,311,316,307,240
	02654	000311		
	02655	000316		
	02656	000307		
	02657	000240		
1154	02660	000320	OCT	320,325,316,303,310,305,304,240,327,311,314,314,240,302,305
	02661	000325		
	02662	000316		
	02663	000303		
	02664	000310		
	02665	000305		
	02666	000304		
	02667	000240		
	02670	000327		
	02671	000311		
	02672	000314		
	02673	000314		
	02674	000240		
	02675	000302		
	02676	000305		
1155	02677	000240	OCT	240,322,305,301,304
	02700	000322		
	02701	000305		
	02702	000301		
	02703	000304		
1156	02704	000240	OCT	240,302,301,303,313,240,301,316,304,240,303,317,315,320,301
	02705	000302		
	02706	000301		
	02707	000303		
	02710	000313		
	02711	000240		
	02712	000301		
	02713	000316		
	02714	000304		
	02715	000240		
	02716	000303		
	02717	000317		

	02720	000315		
	02721	000320		
	02722	000301		
1157	02723	000322	OCT	322,305,304,240,240
	02724	000305		
	02725	000304		
	02726	000240		
	02727	000240		
1158	02730	000240	OCT	240,240,240,240,240,240,215,212,301,302,303,304,305,306,307
	02731	000240		
	02732	000240		
	02733	000240		
	02734	000240		
	02735	000240		
	02736	000215		
	02737	000212		
	02740	000301		
	02741	000302		
	02742	000303		
	02743	000304		
	02744	000305		
	02745	000306		
	02746	000307		
1159	02747	000310	OCT	310,311,312,313,314
	02750	000311		
	02751	000312		
	02752	000313		
	02753	000314		
1160	02754	000315	OCT	315,316,317,320,321,322,323,324,325,326,327,330,331,332,260
	02755	000316		
	02756	000317		
	02757	000320		
	02760	000321		
	02761	000322		
	02762	000323		
	02763	000324		
	02764	000325		

	02765	000326		
	02766	000327		
	02767	000330		
	02770	000331		
	02771	000332		
	02772	000260		
1161	02773	000261	OCT	261,262,263,264,265
	02774	000262		
	02775	000263		
	02776	000264		
	02777	000265		
1162	03000	000266	OCT	266,267,270,271,271,270,267,266,265,264,263,262,261,260,332
	03001	000267		
	03002	000270		
	03003	000271		
	03004	000271		
	03005	000270		
	03006	000267		
	03007	000266		
	03010	000265		
	03011	000264		
	03012	000263		
	03013	000262		
	03014	000261		
	03015	000260		
	03016	000332		
1163	03017	000331	OCT	331,330,327,326,325
	03020	000330		
	03021	000327		
	03022	000326		
	03023	000325		
1164	03024	000324	OCT	324,323,322,321,320,317,316,315,314,313,312,311,310,307,306
	03025	000323		
	03026	000322		
	03027	000321		
	03030	000320		
	03031	000317		

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03032 000316
03033 000315
03034 000314
03035 000313
03036 000312
03037 000311
03040 000310
03041 000307
03042 000306
1165 03043 000305 OCT 305,304,303,215,212
03044 000304
03045 000303
03046 000215
03047 000212
1166 03050 000077 BIN OCT 77,0,77,0,76,1,75,2,73,4,67,10,57,20,37
03051 000000
03052 000077
03053 000000
03054 000076
03055 000001
03056 000075
03057 000002
03060 000073
03061 000004
03062 000067
03063 000010
03064 000057
03065 000020
03066 000037
1167 03067 000040 OCT 40,77,25,52,77
03070 000077
03071 000025
03072 000052
03073 000077
1168 *
1169 *
1170 END STRT END OF N16-TLT9 701230 PVP
```

```
ASRB 000104A ASRI 000004A ASRD 000104A ASRR 000004A
BCHD 001760A BIAS 001204A BIN 003050A BINA 000223A
BINX 000203A BLCA 000246A BLCD 000220A BLOC 000221A
BLOX 000202A BOAS 000204A BUT 001736A BUTN 000225A
CHAR 002514A CHIN 000222A CHNG 001743A CHRA 000224A
CHRT 000231A COMP 001624A CONF 001550A COUN 000244A
DDP4 002046A DDP5 002054A DELA 000207A DELP 001240A
DERU 001227A EMSG 002446A ENDM 002254A ENDW 001544A
ENTA 002066A ENTR 001024A ERR 001562A ERR1 001660A
ERR2 001664A ERR3 001670A ERR4 001674A ERR5 001700A
FIV 002467A FOR 002466A H316 002062A IASR 001004A
IND 000205A INIT 001414A INPT 001332A INTR 001264A
ITPT 001506A KEYB 002113A KYIN 001034A LEGN 000215A
LOAD 001174A LOOP 001223A LSW1 001112A M72 000243A
MASK 000020A MBIT 000040A MOR 001625A MOR1 001342A
MOR2 001352A MORE 001043A MOT1 000242A MOT2 000241A
MOT3 000237A MOT4 000234A MOTO 001640A MSK 000227A
MTT2 000240A MTT3 000236A MTT4 000235A NASR 002347A
NDX1 001704A NDX2 001714A NDXA 000204A NINT 002321A
NOIN 001473A NOPE 000230A NOSC 002473A NOSK 002375A
NUTI 000404A NOTS 000504A NUVA 001531A OASH 000004A
ONE 002455A ONES 000245A OUT 001070A OUT2 001072A
OUTP 001522A PMSG 001503A POUT 002127A PPOT 002142A
PROM 001130A PRTY 001450A PTEM 000212A PWDC 000211A
RDIN 002205A RDEY 002266A RDYO 002424A READ 001316A
RESR 001516A RT1 001132A RT2 001135A RT3 001145A
RT4 001166A RTY2 000217A RUPT 000226A SAVA 000201A
SIX 002470A SORF 000214A SR2 001730A SS4 001722A
SSW 000200A STOP 000232A STOR 000360A STPO 001410A
STRA 000216A STRE 000213A STRT 001000A TEMP 000206A
THR 002457A TITL 002023A TSTB 000210A TWO 002456A
TY2 001102A
0000 WARNING OR ERROR FLAGS
$DA 41285346-002-03 8.1.71 JDC
```