



COMPUTER CONTROL DIVISION (EUROPE)

PROGRAM DOCUMENTATION

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0001	* E071-001-6617 (PAL-AP)	3C NO. 180311000	REV. E	PAL 0001
0002	*			PAL 0002
0003	*			PAL 0003
0004	*			PAL 0004
0005	* COMPUTER: DDP-416,DDP-516,DDP-116			PAL 0005
0006	*			PAL 0006
0007	*			PAL 0007
0008	* PROGRAM CATEGORY: INPUT/OUTPUT			PAL 0008
0009	*			PAL 0009
0010	*			PAL 0010
0011	* PROGRAM TITLE: PAL-AP, PAL3			PAL 0011
0012	*	PUNCH AND LOADER PROGRAM (3 FRAMES PER WORD)		PAL 0012
0013	*			PAL 0013
0014	*			PAL 0014
0015	*			PAL 0015
0016	*			PAL 0016
0017	*			PAL 0017
0018	*			PAL 0018
0019	*			PAL 0019
0020	*			PAL 0020
0021	*			PAL 0021
0022	*			PAL 0022
0023	*			PAL 0023
0024	*			PAL 0024
0025	*	APPROVAL	DATE	PAL 0025
0026	*			PAL 0026
0027	*			PAL 0027
0028	*	PROG-----	-----	PAL 0028
0029	*			PAL 0029
0030	*			PAL 0030
0031	*	SUPR-----	-----	PAL 0031
0032	*			PAL 0032
0033	*			PAL 0033
0034	*	QUAL-----	12.11.68	PAL 0034
0035	*			PAL 0035
0036	*			PAL 0036
0037	*			PAL 0037

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* REVISIONS
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* REV. E ECO
* REV. D ECO 5490 02-15-68
* REV. C ECO 5228 12-19-68
* REV. B ECO 4776 10-25-67
* REV. A 10-28-66
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*
* AUTHOR
*
* HONEYWELL INC., COMPUTER CONTROL DIVISION
*
*
* PURPOSE
*
* TO PUNCH SELF-LOADING OBJECT TAPES OF ANY DESIRED
* SEGMENT OF MEMORY.
*
*
* RESTRICTIONS
*
* THIS PROGRAM WILL OPERATE ON ANY STANDARD DDP-X16.
*
*
* STORAGE
*
* THIS PROGRAM OCCUPIES LESS THAN ONE CORE SECTOR.
*
*
* USE
*
* PAL-AP IS DISTRIBUTED IN TWO MODES: PAL MODE AND REL MODE.
*
* PAL MODE:

PAL 0038
PAL 0039
PAL 0040
PAL 0041
PAL 0042
PAL 0043
PAL 0044
PAL 0045
PAL 0046
PAL 0047
PAL 0048
PAL 0049
PAL 0050
PAL 0051
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PAL 0063
PAL 0064
PAL 0065
PAL 0066
PAL 0067
PAL 0068
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PAL 0070
PAL 0071
PAL 0072
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PAL 0074



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0075 * ALL PAL-FORMAT PROGRAMS MUST BE LOADED IN THE FOLLOWING
0076 * MANNER:
0077 * 1) THE FILL-IN LOADER (LOCATIONS 1-17) MUST BE MANUALLY
0078 * SET AS FOLLOWS: ASR DIGITRONICS
0079 *
0080 * 1 STA '57 010057 010057
0081 * 2 OCP '0001/4 030004 030001
0082 * 3 INA '1001/4 131004 131001
0083 * 4 JMP *-1 002003 002003
0084 * 5 SNZ 101040 101040
0085 * 6 JMP *-3 002003 002003
0086 * 7 STA 0 010000 010000
0087 * 10 INA '1001/4 131004 131001
0088 * 11 JMP *-1 002010 002010
0089 * 12 LGL 8 041470 041470
0090 * 13 INA '0001/4 130004 130001
0091 * 14 JMP *-1 002013 002013
0092 * 15 STA* 0 110000 110000
0093 * 16 IRS 0 024000 024000
0094 * 17 SZE 100040 100040
0095 *
0096 * 2) PLACE THE LEADER PORTION OF THE PROGRAM IN THE PAPER
0097 * TAPE READER. SET THE P-COUNTER TO 000001 AND PRESS START.
0098 * (SEE NOTE FOR ASR USERS.)
0099 *
0100 * NOTE: WHEN USING AN ASR-33, MOMENTARILY PRESS THE START
0101 * SWITCH ON THE READER AFTER PRESSING THE COMPUTER START
0102 * BUTTON. WHEN USING AN ASR-35, SET THE MODE SWITCH
0103 * TO KT, PRESS THE CONTROL KEY (CTRL) AND THE Q KEY
0104 * SIMULTANEOUSLY, PRESS THE COMPUTER START BUTTON, AND
0105 * SET THE READER SWITCH TO RUN.
0106 *
0107 * THE PROGRAM WILL LOAD ITSELF. IN THE CASE OF PAL3 THE PROGRAM
0108 * SHOULD BE ORIGINED TO LOAD INTO THE HIGHEST SECTOR OF MEMORY.
0109 *
0110 *
0111 * REL MODE:

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



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0112	*	THE REL MODE PROGRAM WILL LOAD FROM THE 516 LOADER PROGRAM	PAL 0112
0113	*	WHICH IS, ITSELF, PUNCHED IN PAL FORMAT.	PAL 0113
0114	*	1) LOAD THE LOADER PROGRAM INTO MEMORY USING THE NORMAL	PAL 0114
0115	*	PROCEDURE FOR LOADING A PAL MODE PROGRAM.	PAL 0115
0116	*	2) PLACE THE LEADER PORTION OF PAL3 IN THE PAPER TAPE READER.	PAL 0116
0117	*	3) SET THE PROGRAM COUNTER TO XX000 WHERE XX IS THE SECTOR	PAL 0117
0118	*	IN WHICH THE LOADER IS LOCATED.	PAL 0118
0119	*	4) ENTER SECTOR INTO WHICH PAL3 IS TO BE LOADED INTO THE	PAL 0119
0120	*	SEVEN HIGH-ORDER BITS OF REGISTER A.	PAL 0120
0121	*	5) PRESS START.	PAL 0121
0122	*		PAL 0122
0123	*	THE PROGRAM WILL LOAD INTO THE DESIRED SECTOR.	PAL 0123
0124	*		PAL 0124
0125	*		PAL 0125
0126	*	TO USE PROGRAM:	PAL 0126
0127	*	1) MASTER CLEAR	PAL 0127
0128	*	2) SET PROGRAM COUNTER TO XX000 WHERE XX IS THE SECTOR	PAL 0128
0129	*	INTO WHICH PAL3 HAS BEEN LOADED.	PAL 0129
0130	*	3) ENTER THE OUTPUT DEVICE CODE INTO THE A-REGISTER. IF	PAL 0130
0131	*	THE ASR-33 IS TO BE USED, SET BIT 1 OF THE A-REGISTER	PAL 0131
0132	*	AND TURN ON THE PUNCH. IF THE ASR-35 IS TO BE USED,	PAL 0132
0133	*	SET BIT 2 OF THE A-REGISTER. IF THE HIGH SPEED	PAL 0133
0134	*	PUNCH IS TO BE USED, LEAVE THE A-REGISTER CLEARED.	PAL 0134
0135	*	4) PRESS START AND THE PROGRAM WILL HALT.	PAL 0135
0136	*	5) ENTER INTO THE A-REGISTER THE FIRST ADDRESS OF THE PROGRAM	PAL 0136
0137	*	BEING PUNCHED.	PAL 0137
0138	*	6) PRESS START AND THE PROGRAM WILL HALT.	PAL 0138
0139	*	7) ENTER INTO THE A-REGISTER THE LAST ADDRESS OF THE	PAL 0139
0140	*	PROGRAM BEING PUNCHED.	PAL 0140
0141	*	8) PRESS START AND THE SELECTED OUTPUT DEVICE WILL BEGIN	PAL 0141
0142	*	PUNCHING TAPE.	PAL 0142
0143	*	9) UPON COMPLETION OF THE PUNCH, IF ANOTHER TAPE IS TO BE	PAL 0143
0144	*	PUNCHED ON THE SAME DEVICE, CONTINUE FROM STEP 5.	PAL 0144
0145	*		PAL 0145
0146	*		PAL 0146
0147	*	METHOD	PAL 0147
0148	*		PAL 0148



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0149	*	PAL IS MADE UP OF TWO SECTIONS: THE PUNCH SECTION AND THE	PAL 0149
0150	*	LOADER SECTION. THE FORMER OCCUPIES MEMORY LOCATIONS XX000-XX514	PAL 0150
0151	*	WHILE THE LATTER OCCUPIES LOCATIONS XX540-XX777. THE LOADER	PAL 0151
0152	*	SECTION IS OF THE BOOTSTRAP VARIETY. AN 8-8 OBJECT TAPE WILL	PAL 0152
0153	*	LOAD ITSELF INTO MEMORY FROM THE 15 INSTRUCTION FILL-IN PROGRAM	PAL 0153
0154	*	DESCRIBED ABOVE.	PAL 0154
0155	*		PAL 0155
0156	*		PAL 0156
0157	*	ANY PAL MODE PROGRAM HAS THE FOLLOWING OVERALL STRUCTURE:	PAL 0157
0158	*	1) PAL 3 WILL FIRST PUNCH OUT ITS OWN LOADER SECTION IN 8-8	PAL 0158
0159	*	FORMAT FOLLOWED BY TWELVE INCHES OF LEADER.	PAL 0159
0160	*	2) NEXT THE DESIRED PROGRAM IS PUNCHED IN PAL FORMAT WHICH	PAL 0160
0161	*	IS "RECOGNIZED" BY THE LOADER.	PAL 0161
0162	*	THE LOADER ON THE FRONT OF THE TAPE WILL LOAD ITSELF AND	PAL 0162
0163	*	THEN WILL LOAD THE PAL-FORMAT PROGRAM.	PAL 0163
0164	*		PAL 0164
0165	*		PAL 0165
0166	*	DATA IS PUNCHED IN BLOCKS OF 50 WORDS EACH. SALIENT	PAL 0166
0167	*	CHARACTERISTICS OF THE BLOCK STRUCTURE AREA ARE AS FOLLOWS:	PAL 0167
0168	*	1) A START OF MESSAGE CHARACTER (OCTAL 201) IS	PAL 0168
0169	*	PUNCHED AT THE BEGINNING OF EACH BLOCK.	PAL 0169
0170	*	2) FOLLOWING THIS, THE ADDRESS OF THE FIRST MEMORY	PAL 0170
0171	*	LOCATION IS PUNCHED.	PAL 0171
0172	*	3) EACH BLOCK IS ENDED BY:	PAL 0172
0173	*	A) A CHECKSUM. THIS CONSISTS OF A WORD WHICH	PAL 0173
0174	*	IS THE EXCLUSIVE OR OF ALL WORDS PUNCHED	PAL 0174
0175	*	PLUS A WORD COUNT AND A BLOCK COUNT.	PAL 0175
0176	*	(THE FIRST BLOCK IS ZERO AND EACH ONE THERE-	PAL 0176
0177	*	AFTER IS INCREMENTED BY ONE.) THE	PAL 0177
0178	*	CHECKSUM IS ROTATED RIGHT ONE BIT EACH	PAL 0178
0179	*	TIME ANOTHER WORD IS ADDED TO IT.	PAL 0179
0180	*	B) AN END OF MESSAGE CHARACTER (OCTAL 223).	PAL 0180
0181	*	THE EOM IS FOLLOWED BY A RUBOUT CHARACTER (OCTAL 377)	PAL 0181
0182	*	4) SIX FRAMES OF LEADER ARE PUNCHED BETWEEN BLOCKS	PAL 0182
0183	*	AND TWELVE INCHES OF LEADER ARE PUNCHED	PAL 0183
0184	*	AT THE BEGINNING AND END OF THE PROGRAM.	PAL 0184
0185	*		PAL 0185



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0186	*	THE FORMAT OF THE PUNCHED WORDS IS AS FOLLOWS:	PAL 0186
0187	*		PAL 0187
0188	*	1) NON-ZERO WORDS ARE PUNCHED IN "INVISIBLE CODE".	PAL 0188
0189	*	EACH 16-BIT WORD IS WRITTEN AS A FOUR-BIT AND	PAL 0189
0190	*	TWO SIX-BIT CHARACTERS ON TAPE. THE FOUR-BIT	PAL 0190
0191	*	CHARACTER REPRESENTS THE HIGH-ORDER FOUR	PAL 0191
0192	*	BITS OF THE WORD. EACH SIX-BIT CHARACTER	PAL 0192
0193	*	HAS THE HIGH-ORDER BIT IN CHANNEL EIGHT AND THE	PAL 0193
0194	*	FIVE LOW-ORDER BITS IN CHANNELS FIVE THROUGH	PAL 0194
0195	*	ONE. ORDINARILLY, NOTHING IS WRITTEN IN CHANNELS	PAL 0195
0196	*	EIGHT THROUGH FIVE OF THE FOUR-BIT CHARACTER	PAL 0196
0197	*	OR IN CHANNELS SIX AND SEVEN OF THE SIX-BIT	PAL 0197
0198	*	CHARACTERS.	PAL 0198
0199	*	2) EIGHT CHARACTERS CAUSE SPECIAL ACTION BY THE ASR.	PAL 0199
0200	*	THESE ARE 023 AND 223 (X-OFF), 021 AND 221 (X-ON), 012	PAL 0200
0201	*	AND 212 (LINE FEED), 005 AND 205 (WRU). THESE ARE	PAL 0201
0202	*	TRANSLATED INTO 177 AND 377, 176 AND 376, 175 AND	PAL 0202
0203	*	375, 174 AND 374, RESPECTIVELY. IN THE CASE OF EACH OF	PAL 0203
0204	*	THESE CHARACTERS, CHANNELS SIX AND SEVEN ARE PUNCHED.	PAL 0204
0205	*	3) WHEN ONE OR MORE CONSECUTIVE ZERO WORDS ARE	PAL 0205
0206	*	ENCOUNTERED IN MEMORY, THEY ARE REPRESENTED BY	PAL 0206
0207	*	ONE PUNCHED WORD. THIS CONSISTS OF THE TWO'S COMPLEMENT	PAL 0207
0208	*	OF THE NUMBER OF CONSECUTIVE ZERO WORDS ENCOUNTERED. IN	PAL 0208
0209	*	ORDER TO DISTINGUISH THESE Z-COUNT WORDS, CHANNEL EIGHT	PAL 0209
0210	*	OF THE HIGH-ORDER (FOUR-BIT) CHARACTER IS PUNCHED	PAL 0210
0211	*		PAL 0211
0212	*		PAL 0212
0213	*	NOTE: THE WORD COUNT CONSISTS OF THE TOTAL NUMBER OF	PAL 0213
0214	*	WORDS ENCOUNTERED WHILE PUNCHING A BLOCK, INCLUDING ALL	PAL 0214
0215	*	ZERO WORDS.	PAL 0215
0216	*		PAL 0216
0217	*		PAL 0217
0218	*	*****	PAL 0218
0219	*	REL	PAL 0219
0220	*	EXD	PAL 0220
0221	*		PAL 0221
0222	*	EXA	PAL 0222
		ENTER EXTENDED MODE	
		LOAD A WITH DEVICE CODE	
		ENABLE EXTENDED ADDRESSING	

00000 000013



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0223	00001	0 04 00460	STA	CODE	SAVE DEVICE CODE	PAL 0223
0224	00002	140040	BEGN	CRA		PAL 0224
0225	00003	000000	HLT		ENTER FIRST ADDRESS	PAL 0225
0226	00004	0 04 00444	STA	FADD	SAVE IT	PAL 0226
0227	00005	140040	CRA			PAL 0227
0228	00006	000000	HLT		ENTER LAST ADDRESS	PAL 0228
0229	00007	0 04 00445	STA	LADD	SAVE IT	PAL 0229
0230	00010	0 02 00460	LDA	CODE	PICKUP DEVICE CODE	PAL 0230
0231	00011	101400	SMI		IS ASR-33 IN USE	PAL 0231
0232	00012	0 01 00033	JMP	TF35	NO.	PAL 0232
0233	00013	140040	CRA			PAL 0233
0234	00014	0 04 00461	STA	PON		PAL 0234
0235	00015	0 04 00462	STA	RUB		PAL 0235
0236	00016	0 02 00427	SOC P LDA	EASR		PAL 0236
0237	00017	0 04 00056	STA	EPNC		PAL 0237
0238	00020	0 02 00430	LDA	PASR	REPLACE OTA '2 WITH OTA '4.	PAL 0238
0239	00021	0 04 00412	SOTA STA	TPON+2	SET OTA'S	PAL 0239
0240	00022	0 04 00415	STA	TPON+5	SET OTA'S	PAL 0240
0241	00023	0 04 00131	STA	BGBL+5	SET OTA'S	PAL 0241
0242	00024	0 04 00271	STA	XOF+2	SET OTA'S	PAL 0242
0243	00025	0 04 00274	STA	XOF+5	SET OTA'S	PAL 0243
0244	00026	0 04 00071	STA	LLOP+1	SET OTA'S	PAL 0244
0245	00027	0 04 00363	STA	OK+1	SET OTA'S	PAL 0245
0246	00030	0 04 00375	STA	P+2	SET OTA'S	PAL 0246
0247	00031	0 04 00117	STA	ORUB+1		PAL 0247
0248	00032	0 01 00052	JMP	CONT		PAL 0248
0249	00033	0416 77	TF35 ALR	1	TEST FOR ASR-35	PAL 0249
0250	00034	101400	SMI		IS ASR-35 IN USE	PAL 0250
0251	00035	0 01 00043	JMP	HISP	NO.	PAL 0251
0252	00036	0 02 00473	LDA	= '222		PAL 0252
0253	00037	0 04 00461	STA	PON	INITIALIZE PUNCH	PAL 0253
0254	00040	0 02 00472	LDA	= '377	AND RUBOUT CODES	PAL 0254
0255	00041	0 04 00462	STA	RUB		PAL 0255
0256	00042	0 01 00016	JMP	SOC P		PAL 0256
0257	00043	140040	HISP CRA		HIGH SPEED PUNCH IN USE	PAL 0257
0258	00044	0 04 00461	STA	PON		PAL 0258
0259	00045	0 04 00462	STA	RUB		PAL 0259



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0260	00046	0 02 00431	LDA	EBRP
0261	00047	0 04 00056	STA	EPNC
0262	00050	0 02 00432	LDA	PBRP
0263	00051	0 01 00021	JMP	SOTA
0264	00052	140040	CONT	CRA
0265	00053	0 04 00446	STA	BLCT
0266	00054	0 04 00450	STA	ZCNT
0267	00055	0 04 00443	STA	Z
0268	00056	14 0002	EPNC	OCF '2
0269	00057	0 10 00410	JST	TPON
0270	00060	0 01 00077	JMP	LDR
0271	00061	0 000000	LEAD	DAC **
0272	00062	0 02 00436	LDA	N120
0273	00063	0 04 00453	STA	NDX
0274	00064	0 01 00070	JMP	**+4
0275	00065	0 000000	PNC	DAC **
0276	00066	0 02 00065	LDA	PNC
0277	00067	0 04 00061	STA	LEAD
0278	00070	140040	LLOP	CRA
0279	00071	74 0002	OTA	'2
0280	00072	0 01 00071	JMP	*-1
0281	00073	0 12 00453	IRS	NDX
0282	00074	0 01 00070	JMP	*-4
0283	00075	0 04 00447	STA	WDCT
0284	00076	-0 01 00061	JMP*	LEAD
0285	00077	0 10 00061	LDR	JST
0286	00100	0 02 00471	LDA	= '52
0287	00101	0 04 00731	STA	CHAR
0288	00102	0 04 00704	STA	SWCH
0289	00103	0 04 00715	STA	WORD
0290	00104	0 02 00434	LDA	NBL1
0291	00105	0 04 00453	STA	NDX
0292	00106	0 02 00440	LDA	LOAD
0293	00107	0 04 00401	STA	PN88
0294	00110	0 10 00400	JST	PN
0295	00111	0 12 00401	IRS	PN88
0296	00112	0 12 00401	IRS	PN88

OCF '2

OTA '2

STORE IT AWAY

BLOCK COUNT
AND ZCOUNT

ENABLE PUNCH

TURN PUNCH ON

GO TO PUNCH LEADER

ROUTINE TO PUNCH 12 INCHES OF LEADER

SET INDEX FOR 120 FRAMES

AND GO TO

PUNCH

STORE RETURN ADDRESS

IN LEAD

LEADER LOOP

OUTPUT LEADER

RETURN

GO TO PUNCH 12 INCHES OF LEADER

GET FIRST RETURN FOR CHAR SUBROUTINE

INITIALIZE TO PRISTINE CONDITION

INITIALIZE TO PRISTINE CONDITION

LENGTH OF FIRST LEVEL BOOT (NEG)

FIRST

BLOCK

OF

PUNCH BL1

OMIT THE OCF OF BL2

OMIT THE INA OF BL2

PAL 0260

PAL 0261

PAL 0262

PAL 0263

PAL 0264

PAL 0265

PAL 0266

PAL 0267

PAL 0268

PAL 0269

PAL 0270

PAL 0271

PAL 0272

PAL 0273

PAL 0274

PAL 0275

PAL 0276

PAL 0277

PAL 0278

PAL 0279

PAL 0280

PAL 0281

PAL 0282

PAL 0283

PAL 0284

PAL 0285

PAL 0286

PAL 0287

PAL 0288

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0297	00113	0 02 00437	LDA	NBL2	LENGTH OF SECOND LEVEL BOOT (NEG)	PAL 0297
0298	00114	0 04 00453	STA	NDX	BLOCK	PAL 0298
0299	00115	0 10 00400	JST	PN	PUNCH SECOND LEVEL BOOT	PAL 0299
0300	00116	0 02 00472	ORUB LDA	= '377		PAL 0300
0301	00117	74 0002	OTA	'2		PAL 0301
0302	00120	0 01 00117	JMP	*-1		PAL 0302
0303	00121	0 10 00410	JST	TPON		PAL 0303
0304	00122	0 10 00061	JST	LEAD	TURN PUNCH ON, PUNCH LEADER	PAL 0304
0305	00123	0 01 00125	JMP	BGBL+1		PAL 0305
0306			*			PAL 0306
0307			*			PAL 0307
0308			*		BEGIN PUNCHING BLOCK OF CHARACTERS	PAL 0308
0309	00124	0 10 00410	BGBL JST	TPON		PAL 0309
0310	00125	0 02 00433	LDA	N6	BEGIN BLOCK. SET INDEX FOR	PAL 0310
0311	00126	0 04 00453	STA	NDX	SIX FRAMES OF LEADER	PAL 0311
0312	00127	0 10 00065	JST	PNC	AND PUNCH	PAL 0312
0313	00130	0 02 00441	LDA	SOM	LOAD START-OF-MESSAGE	PAL 0313
0314	00131	74 0002	OTA	'2	PUNCH	PAL 0314
0315	00132	0 01 00131	JMP	*-1	(DELAY IF PUNCH NOT READY)	PAL 0315
0316	00133	0 02 00435	LDA	N50	INITIALIZE	PAL 0316
0317	00134	0 04 00451	STA	PNCT	PUNCH COUNT	PAL 0317
0318	00135	0 02 00446	LDA	BLCT	INITIALIZE CHECKSUM	PAL 0318
0319	00136	0 04 00452	STA	CKSM	WITH BLOCKCOUNT	PAL 0319
0320	00137	0 12 00446	IRS	BLCT	AND INCREMENT BLOCKCOUNT	PAL 0320
0321	00140	0 02 00444	LDA	FADD	LOAD FIRST ADDRESS OF BLOCK	PAL 0321
0322	00141	0 07 00470	SUB	=1		PAL 0322
0323	00142	0 10 00277	JST	LOOP	AND PUNCH IT.	PAL 0323
0324	00143	0 02 00443	LDA	Z		PAL 0324
0325	00144	0 04 00450	STA	ZCNT		PAL 0325
0326	00145	0 02 00455	LDA	SAVE		PAL 0326
0327	00146	0 01 00150	JMP	*+2		PAL 0327
0328	00147	0 12 00444	MOVE IRS	FADD	INCREMENT FIRST ADDRESS	PAL 0328
0329	00150	0 12 00447	IRS	WDCT	AND WORD COUNT	PAL 0329
0330	00151	0 05 00452	ERA	CKSM	UPDATE CHECKSUM WITH	PAL 0330
0331	00152	0406 77	ARR	1		PAL 0331
0332	00153	0 04 00452	STA	CKSM	CHARACTER JUST PUNCHED	PAL 0332
0333	00154	0 12 00451	IRS	PNCT	INCREMENT PUNCHCOUNT	PAL 0333



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0334	00155	0 01 00157	JMP	**2	50 WORDS NOT YET PUNCHED	PAL 0334
0335	00156	0 01 00226	JMP	ENBL	50 WORDS PUNCHED-END BLOCK	PAL 0335
0336	00157	0 10 00207	JST	DECD	CHECK IF ZCOUNT ZERO	PAL 0336
0337	00160	0 01 00221	JMP	GO	NO, PUNCH STORED WORD	PAL 0337
0338	00161	-0 02 00444	LDA*	FADD	YES, LOAD NEXT WORD FROM MEMORY	PAL 0338
0339	00162	100040	SZE		IS IT ZERO	PAL 0339
0340	00163	0 01 00201	JMP	NZZZ	NO	PAL 0340
0341	00164	0 12 00450	IRS	ZCNT	YES, INCREMENT ZCOUNT	PAL 0341
0342	00165	0 12 00447	IRS	WDCT	AND WORDCOUNT	PAL 0342
0343	00166	0 12 00444	IRS	FADD	AND FIRST ADDRESS	PAL 0343
0344	00167	0 12 00451	IRS	PNCT	BUMP WORD COUNT	PAL 0344
0345	00170	0 01 00213	JMP	CKLA	CHECK FOR LAST ADDRESS	PAL 0345
0346	00171	0 02 00450	LDA	ZCNT	GO TERMINATE BLOCK	PAL 0346
0347	00172	0 10 00277	JST	LOOP	PUNCH NO. OF ZERO WORDS	PAL 0347
0348	00173	0 05 00452	ERA	CKSM	CALCULATE NEW CKSM	PAL 0348
0349	00174	0406 77	ARR	1	*	PAL 0349
0350	00175	0 04 00452	STA	CKSM	SAVE IT	PAL 0350
0351	00176	140040	CRA		RESET ZCOUNT	PAL 0351
0352	00177	0 04 00450	STA	ZCNT	DO IT	PAL 0352
0353	00200	0 01 00226	JMP	ENBL	GO FINISH BLOCK	PAL 0353
0354	00201	0 04 00454	NZZZ STA	WD	WORD NOT ZERO, STORE IT	PAL 0354
0355	00202	0 02 00450	LDA	ZCNT	CHECK ZCOUNT	PAL 0355
0356	00203	101040	SNZ		IS IT ZERO	PAL 0356
0357	00204	0 01 00223	JMP	GO+2		PAL 0357
0358	00205	0 10 00277	JST	LOOP	NO, TAKE ZCOUNT. PUNCH,	PAL 0358
0359	00206	0 01 00151	JMP	MOVE+2	RETURN	PAL 0359
0360	00207	0 000000	DECD DAC	**	DECISION SUBROUTINE	PAL 0360
0361	00210	0 02 00450	LDA	ZCNT	CHECK ZCOUNT	PAL 0361
0362	00211	101040	SNZ		IS IT ZERO	PAL 0362
0363	00212	0 12 00207	IRS	DECD	YES, INCREMENT RETURN ADDRESS	PAL 0363
0364	00213	0 02 00444	CKLA LDA	FADD	NO, CHECK	PAL 0364
0365	00214	0 07 00470	SUB	=1		PAL 0365
0366	00215	0 05 00445	ERA	LADD	LAST	PAL 0366
0367	00216	100040	SZE		ADDRESS	PAL 0367
0368	00217	-0 01 00207	JMP*	DECD	NOT REACHED. RETURN	PAL 0368
0369	00220	0 01 00263	JMP	CHEK	LAST ADDRESS REACHED, CHECK ZCOUNT	PAL 0369
0370	00221	140040	GO CRA		RESTORE	PAL 0370



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0371	00222	0 04 00450	STA	ZCNT			
0372	00223	0 02 00454	LDA	WD	ZCOUNT TO ZERO		PAL 0371
0373	00224	0 10 00277	JST	LOOP	TAKE STORED WORD		PAL 0372
0374	00225	0 01 00147	JMP	MOVE	AND PUNCH IT		PAL 0373
0375					AND CONTINUE.		PAL 0374
0376			*				PAL 0375
0377			*	END BLOCK			PAL 0376
0378	00226	0 02 00450	ENBL LDA	ZCNT			PAL 0377
0379	00227	0 04 00443	STA	Z			PAL 0378
0380	00230	140040	CRA				PAL 0379
0381	00231	0 04 00450	STA	ZCNT			PAL 0380
0382	00232	0 02 00447	LDA	WDCT			PAL 0381
0383	00233	0 05 00452	ERA	CKSM	WITH CHECKSUM		PAL 0382
0384	00234	0 10 00277	JST	LOOP	AND PUNCH		PAL 0383
0385	00235	0 10 00267	JST	XOF	PUNCH XOFF		PAL 0384
0386	00236	0 01 00124	JMP	BGBL	BEGIN NEW BLOCK		PAL 0385
0387	00237	0 10 00277	ZNZ JST	LOOP	ZCOUNT NOT ZERO, PUNCH IT.		PAL 0386
0388	00240	0 05 00452	ERA	CKSM	UPDATE		PAL 0387
0389	00241	0406 77	ARR	1			PAL 0388
0390	00242	0 04 00452	STA	CKSM	CHECKSUM		PAL 0389
0391	00243	140040	CRA				PAL 0390
0392	00244	0 04 00450	STA	ZCNT			PAL 0391
0393	00245	0 02 00447	LDA	WDCT	LOAD WORD COUNT AND		PAL 0392
0394	00246	0 05 00452	ERA	CKSM	ERA IT WITH CHECKSUM		PAL 0393
0395	00247	0 10 00277	JST	LOOP	PUNCH CHECKSUM		PAL 0394
0396	00250	0 10 00267	JST	XOF	PUNCH TWO XOF'S		PAL 0395
0397	00251	0 10 00410	JST	TPON	TURN PUNCH ON		PAL 0396
0398	00252	0 10 00267	JST	XOF	SECOND XOF		PAL 0397
0399	00253	0 10 00410	JST	TPON			PAL 0398
0400	00254	0 10 00061	JST	LEAD	TURN PUNCH ON, PUNCH LEADER		PAL 0399
0401	00255	0 02 00460	LDA	CODE	PICKUP OUTPUT DEVICE		PAL 0400
0402	00256	0416 77	ALR	1	CHECK IF ASR-35		PAL 0401
0403	00257	101400	SMI		*		PAL 0402
0404	00260	100000	SKP		EITHER 33 OR H/S		PAL 0403
0405	00261	0 10 00267	JST	XOF	STOP PUNCH ON ASR-35		PAL 0404
0406	00262	0 01 00371	JMP	DONE	GO WRAP UP		PAL 0405
0407	00263	0 02 00450	CHEK LDA	ZCNT	IS ZCOUNT ZERO		PAL 0406



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0408	00264	100040		SZE				PAL 0408
0409	00265	0 01 00237		JMP	ZNZ	NO, PUNCH IT		PAL 0409
0410	00266	0 01 00245		JMP	ZNZ+6			PAL 0410
0411	00267	0 000000	XOF	DAC	**	PUNCH XOFF ROUTINE		PAL 0411
0412	00270	0 02 00442		LDA	XOFF	LOAD XOFF		PAL 0412
0413	00271	74 0002		OTA	'2	PUNCH		PAL 0413
0414	00272	0 01 00271		JMP	*-1	(DELAY IF PUNCH NOT READY)		PAL 0414
0415	00273	0 02 00472		LDA	= '377			PAL 0415
0416	00274	74 0002		OTA	'2			PAL 0416
0417	00275	0 01 00274		JMP	*-1			PAL 0417
0418	00276	-0 01 00267		JMP*	XOF	RETURN		PAL 0418
0419	00277	0 000000	LOOP	DAC	**	MAIN PUNCH LOOP		PAL 0419
0420	00300	0 10 00306		JST	TEST	IS WORD A ZCOUNT		PAL 0420
0421	00301	0 05 00467		ERA	= '100000	YES, PUT ONE IN HIGH ORDER BIT		PAL 0421
0422	00302	0 10 00331		JST	PNCH	PUNCH		PAL 0422
0423	00303	0 10 00331		JST	PNCH	THREE		PAL 0423
0424	00304	0 10 00331		JST	PNCH	CHARACTERS		PAL 0424
0425	00305	-0 01 00277		JMP*	LOOP	RETURN		PAL 0425
0426	00306	0 000000	TEST	DAC	**			PAL 0426
0427	00307	0 04 00455		STA	SAVE	SAVE WORD		PAL 0427
0428	00310	0 02 00450		LDA	ZCNT			PAL 0428
0429	00311	101040		SNZ				PAL 0429
0430	00312	0 01 00317		JMP	*+5			PAL 0430
0431	00313	0 05 00466		ERA	=-1	TAKE TWO'S		PAL 0431
0432	00314	0 06 00470		ADD	=1	COMPLEMENT		PAL 0432
0433	00315	0 04 00455		STA	SAVE	UPDATE SAVE		PAL 0433
0434	00316	0 01 00321		JMP	*+3	CONTINUE		PAL 0434
0435	00317	0 12 00306		IRS	TEST	ZCOUNT ZERO, CONTINUE		PAL 0435
0436	00320	0 02 00455		LDA	SAVE	REGAIN SAVE		PAL 0436
0437	00321	0406 76		ARR	2	POSITION CHARACTER		PAL 0437
0438	00322	0 04 00455		STA	SAVE			PAL 0438
0439	00323	0 03 00465		ANA	= '36000	CLEAR TO CHARACTER		PAL 0439
0440	00324	-0 01 00306		JMP*	TEST	RETURN		PAL 0440
0441	00325	0404 66	HOB	LGR	10	CHANGE HIGH-ORDER		PAL 0441
0442	00326	0 03 00464		ANA	= '37	BIT FROM CHANNEL 6		PAL 0442
0443	00327	0 05 00463		ERA	= '200	TO CHANNEL 8		PAL 0443
0444	00330	0 01 00335		JMP	*+5	AND GO TO PUNCH		PAL 0444



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0445	00331	0 000000	PNCH	DAC	**	PUNCH ROUTINE	PAL 0445
0446	00332	100400		SPL		CHECK FOR	PAL 0446
0447	00333	0 01 00325		JMP	HOB	HIGH ORDER BIT	PAL 0447
0448	00334	0404 66		LGR	10	POSITION CHARACTER	PAL 0448
0449	00335	0 04 00456		STA	SAVA	STORE IT	PAL 0449
0450	00336	0 03 00464		ANA	= '37	SET UP FOR TRANSLATION CHECK	PAL 0450
0451	00337	0 04 00457		STA	SAVB	STORE	PAL 0451
0452	00340	0 02 00420		LDA	ADC1	LOAD ADDRESS OF TABLE	PAL 0452
0453	00341	0 04 00421		STA	ADC2	SETUP FOR CHECK	PAL 0453
0454	00342	-0 02 00421		LDA*	ADC2	LOAD FROM TABLE	PAL 0454
0455	00343	101040		SNZ		CHECK FOR END OF TABLE	PAL 0455
0456	00344	0 01 00362		JMP	OK	DONE, NO TRANSLATION NEEDED	PAL 0456
0457	00345	0 03 00472		ANA	= '377	CLEAR 9 HIGH-ORDER BITS	PAL 0457
0458	00346	0 05 00457		ERA	SAVB	CHECK FOR	PAL 0458
0459	00347	101040		SNZ		MATCH	PAL 0459
0460	00350	0 01 00353		JMP	TRNS	YES, TRANSLATE	PAL 0460
0461	00351	0 12 00421		IRS	ADC2	NO, INCREMENT ADDRESS	PAL 0461
0462	00352	0 01 00342		JMP	*-8	AND RETURN.	PAL 0462
0463	00353	0 02 00456	TRNS	LDA	SAVA	PICK UP ORIGINAL CHARACTER	PAL 0463
0464	00354	0 03 00463		ANA	= '200	CLEAR ALL BUT BIT 8	PAL 0464
0465	00355	0 04 00456		STA	SAVA	SAVE BIT	PAL 0465
0466	00356	-0 02 00421		LDA*	ADC2	PICK UP SUBROUTINE	PAL 0466
0467	00357	0404 70		LGR	8	CHARACTER	PAL 0467
0468	00360	0 05 00456		ERA	SAVA	OBTAIN CORRECT BIT 8	PAL 0468
0469	00361	0 01 00363		JMP	*+2	PUNCH	PAL 0469
0470	00362	0 02 00456	OK	LDA	SAVA	NO TRANSLATION, GET CHARACTER	PAL 0470
0471	00363	74 0002		OTA	'2	PUNCH	PAL 0471
0472	00364	0 01 00363		JMP	*-1	(DELAY IF PUNCH NOT READY)	PAL 0472
0473	00365	0 02 00455		LDA	SAVE	POSITION WORD	PAL 0473
0474	00366	0416 72		ALR	6	FOR NEXT CHARACTER	PAL 0474
0475	00367	0 04 00455		STA	SAVE	STORE CHARACTER	PAL 0475
0476	00370	-0 01 00331		JMP*	PNCH	AND RETURN	PAL 0476
0477	00371	14 0102	DONE	OCP	'102		PAL 0477
0478	00372	0 01 00002		JMP	BEGN	RESTART IF DESIRED	PAL 0478
0479	00373	0 000000	P	DAC	**		PAL 0479
0480	00374	0406 70		ARR	8		PAL 0480
0481	00375	74 0002		OTA	'2	PUNCH	PAL 0481



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0482	00376	0 01 00375	JMP	*-1		
0483	00377	-0 01 00373	JMP*	P		PAL 0482
0484	00400	0 00 00000	PN PZE	**		PAL 0483
0485	00401	0 00 00000	PN88 PZE	**		PAL 0484
0486	00402	0 10 00373	JST	P		PAL 0485
0487	00403	0 10 00373	JST	P	PUNCH LOAD PROGRAM	PAL 0486
0488	00404	0 12 00401	IRS	PN88	IN 8-8 FORMAT	PAL 0487
0489	00405	0 12 00453	IRS	NDX		PAL 0488
0490	00406	0 01 00401	JMP	PN88		PAL 0489
0491	00407	-0 01 00400	JMP*	PN		PAL 0490
0492	00410	0 000000	TPON DAC	**	TURN PUNCH ON	PAL 0491
0493	00411	0 02 00461	LDA	PON	OUTPUT '222	PAL 0492
0494	00412	74 0002	OTA	'2	IF ASR-35 IN USE.	PAL 0493
0495	00413	0 01 00412	JMP	*-1		PAL 0494
0496	00414	0 02 00462	LDA	RUB	OUTPUT '377	PAL 0495
0497	00415	74 0002	OTA	'2	IF ASR-35 IN USE.	PAL 0496
0498	00416	0 01 00415	JMP	*-1		PAL 0497
0499	00417	-0 01 00410	JMP*	TPON		PAL 0498
0500	00420	0 000422	ADC1 DAC	C1	ADDRESS OF C1	PAL 0499
0501	00421		ADC2 BSS	1		PAL 0500
0502			*			PAL 0501
0503			* TRANSLATION TABLE. ILLEGAL CHARACTER (7 LOW ORDER BITS)			PAL 0502
0504			* IN RIGHT-HAND HALF, AND SUBSTITUTION CHARACTER (7 LOW ORDER BITS)			PAL 0503
0505			* IN LEFT-HAND HALF.			PAL 0504
0506			*			PAL 0505
0507	00422	077423	C1	OCT	77423,77021,76412,76005,0	PAL 0506
	00423	077021				PAL 0507
	00424	076412				
	00425	076005				
	00426	000000				
0508			*			
0509	00427	14 0104	EASR OCP	'104		PAL 0508
0510	00430	74 0004	PASR OTA	'4		PAL 0509
0511	00431	14 0002	EBRP OCP	'2		PAL 0510
0512	00432	74 0002	PBRP OTA	'2		PAL 0511
0513	00433	177772	N6 DEC	-6		PAL 0512
0514	00434	0 177740	NBL1 DAC	ST-BL2	NEGATIVE LENGTH OF FIRST LEVEL BOOT	PAL 0513
						PAL 0514



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0515	00435	177716	N50	DEC	-50		PAL 0515
0516	00436	177610	N120	DEC	-120		PAL 0516
0517	00437	0 177604	NBL2	DAC	WAIT-STPC-1	NEG LENGTH OF SECOND LEVEL BOOT	PAL 0517
0518	00440	0 02 00540	LOAD	LDA	ST	STARTING ADDRESS	PAL 0518
0519	00441	000201	SOM	OCT	201		PAL 0519
0520	00442	000223	XOFF	OCT	223		PAL 0520
0521	00443		Z	BSS	1		PAL 0521
0522	00444		FADD	BSS	1		PAL 0522
0523	00445		LADD	BSS	1		PAL 0523
0524	00446		BLCT	BSS	1		PAL 0524
0525	00447		WDCT	BSS	1		PAL 0525
0526	00450		ZCNT	BSS	1		PAL 0526
0527	00451		PNCT	BSS	1		PAL 0527
0528	00452		CKSM	BSS	1		PAL 0528
0529	00453		NDX	BSS	1		PAL 0529
0530	00454		WD	BSS	1		PAL 0530
0531	00455		SAVE	BSS	1		PAL 0531
0532	00456		SAVA	BSS	1		PAL 0532
0533	00457		SAVB	BSS	1		PAL 0533
0534	00460		CODE	BSS	1		PAL 0534
0535	00461	000000	PON	BSZ	1		PAL 0535
0536	00462	000000	RUB	BSZ	1		PAL 0536
0537	00463	000200		FIN			PAL 0537
	00464	000037					
	00465	036000					
	00466	177777					
	00467	100000					
	00470	000001					
	00471	000052					
	00472	000377					
	00473	000222					
0538	00474	000000	BSZ	'40			PAL 0538
	00475	000000					
	00476	000000					
	00477	000000					
	00500	000000					



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00501 000000
00502 000000
00503 000000
00504 000000
00505 000000
00506 000000
00507 000000
00510 000000
00511 000000
00512 000000
00513 000000
00514 000000
00515 000000
00516 000000
00517 000000
00520 000000
00521 000000
00522 000000
00523 000000
00524 000000
00525 000000
00526 000000
00527 000000
00530 000000
00531 000000
00532 000000
00533 000000

0539

0540

0541

0542

0543 00540 0 000020 ST

0544 00541 0 01 00010

0545 00542 0 02 00040

0546 00543 0 04 00021

0547 00544 0 02 00057

0548 00545 100040

*
*
*

SYSTEM BOOTSTRAP

ORG '540

DAC '20

JMP '10

LDA '40

STA '21

LDA '57

SZE

STARTING ADDRESS
TO FILL OUT BOOTSTRAP
SET NEXT REENTRY

*
SET STARTING ADDRESS
*

PAL 0539

PAL 0540

PAL 0541

PAL 0542

PAL 0543

PAL 0544

PAL 0545

PAL 0546

PAL 0547

PAL 0548



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0549	00546	0 04 00054	STA	'54		PAL 0549
0550	00547	0 02 00054	LDA	'54		PAL 0550
0551	00550	0 04 00000	STA	0	*	PAL 0551
0552	00551	0 06 00055	ADD	'55		PAL 0552
0553	00552	0 04 00055	STA	'55		PAL 0553
0554	00553	000013	EXA			PAL 0554
0555	00554	0 02 00002	LDA	2	SET I/O ORDERS	PAL 0555
0556	00555	-0 04 00000	STA*	0	*	PAL 0556
0557	00556	0 12 00000	IRS	0	*	PAL 0557
0558	00557	0 02 00003	LDA	3	*	PAL 0558
0559	00560	0 01 00015	JMP	'15	*	PAL 0559
0560	00561	0 01 00041	JMP	'41	SECOND REENTRY	PAL 0560
0561	00562	0 04 00025	STA	'25	CLEAR WORDCOUNT	PAL 0561
0562	00563	0 02 00000	LDA	0	TEST FOR HALT OR END	PAL 0562
0563	00564	0406 71	ARR	7	*	PAL 0563
0564	00565	101400	SMI		*	PAL 0564
0565	00566	0 01 00010	JMP	'10	HALT ONLY	PAL 0565
0566	00567	0 02 00051	LDA	'51	END. SET UP FINAL REENTRY	PAL 0566
0567	00570	0 04 00020	STA	'20	*	PAL 0567
0568	00571	0 01 00010	JMP	'10	*	PAL 0568
0569	00572	-0 01 00054	JMP*	'54		PAL 0569
0570	00573	140040	CRA			PAL 0570
0571	00574	-0 01 00055	JMP*	'55	AUTOMATIC LOAD	PAL 0571
0572	00575	0 000600	DAC	BL2	DEFAULT START	PAL 0572
0573	00576	000033	OCT	33		PAL 0573
0574	00577	000000	OCT	0	TERMINATE FIRST SECTION	PAL 0574
0575						PAL 0575
0576						PAL 0576
0577	00600	14 0001	BL2 OCP	1		PAL 0577
0578	00601	54 0001	INA	1		PAL 0578
0579						PAL 0579
0580	00602	0 01 00601	WAIT JMP	*-1		PAL 0580
0581	00603	14 0101	OCP	'101	READER OFF IF ON	PAL 0581
0582	00604	0 04 00022	STA	'22		PAL 0582
0583	00605	0 05 00775	ERA	STPC	STOP CODE TEST	PAL 0583
0584	00606	100040	SZE			PAL 0584
0585	00607	-0 01 00731	JMP*	CHAR		PAL 0585



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0586	00610	-0 02 00731	LDA*	CHAR		PAL 0586
0587	00611	0 05 00655	ERA	SCAN	TEST FOR SCAN MODE	PAL 0587
0588	00612	101040	SNZ			PAL 0588
0589	00613	0 01 00632	JMP	ENDT		PAL 0589
0590	00614	0 02 00025	LDA	'25		PAL 0590
0591	00615	101040	SNZ		END FILE EXIT	PAL 0591
0592	00616	0 01 00632	JMP	ENDT		PAL 0592
0593	00617	0 05 00020	ERA	'20		PAL 0593
0594	00620	0416 77	ALR	1		PAL 0594
0595	00621	0 05 00021	ERA	'21		PAL 0595
0596	00622	100040	SZE			PAL 0596
0597	00623	0 01 00630	JMP	EROR	RESET WORD COUNT	PAL 0597
0598	00624	0 04 00025	STA	'25		PAL 0598
0599	00625	0 10 00731	JST	CHAR	INCREMENT BLOCK COUNT	PAL 0599
0600	00626	0 12 00024	BUMP IRS	'24		PAL 0600
0601	00627	0 01 00634	JMP	STRT+1	ERROR HALT	PAL 0601
0602	00630	0 01 00630	EROR JMP	*		PAL 0602
0603	00631	0 01 00634	JMP	STRT+1	END TAPE	PAL 0603
0604	00632	000000	ENDT HLT		RESET BLOCK COUNT	PAL 0604
0605	00633	0 04 00024	STRT STA	'24	RESET CHARACTER BUFFER	PAL 0605
0606	00634	140040	CRA		TEST FOR HIGH-SPEED READER	PAL 0606
0607	00635	0 04 00022	STA	'22		PAL 0607
0608	00636	0 02 00002	LDA	2		PAL 0608
0609	00637	0406 77	ARR	1		PAL 0609
0610	00640	100400	SPL			PAL 0610
0611	00641	0 01 00652	JMP	SCAN-3		PAL 0611
0612	00642	34 0104	SKS	'104		PAL 0612
0613	00643	0 01 00642	JMP	*-1		PAL 0613
0614	00644	14 0104	OCP	'104		PAL 0614
0615	00645	0 02 00766	LDA	='221		PAL 0615
0616	00646	74 0004	OTA	4		PAL 0616
0617	00647	34 0104	SKS	'104		PAL 0617
0618	00650	0 01 00647	JMP	*-1		PAL 0618
0619	00651	14 0004	OCP	4		PAL 0619
0620	00652	0 02 00022	LDA	'22	TURN ON TELEPRINTER	PAL 0620
0621	00653	0 01 00655	JMP	*+2	LEADER SCAN	PAL 0621
0622	00654	0 10 00731	JST	CHAR		PAL 0622



COMPUTER CONTROL DIVISION (EUROPE)

PROGRAM DOCUMENTATION

* E071-001-6617 (PAL-AP)

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0623 00655 0 05 00767 SCAN ERA = '22
0624 00656 100040 SZE
0625 00657 0 01 00654 JMP *-3
0626 00660 0 04 00000 STA 0
0627 00661 0 04 00025 STA '25
0628 00662 0 02 00024 LDA '24
0629 00663 0 04 00020 STA '20
0630 00664 0 10 00731 JST CHAR
0631 00665 0 10 00704 DATA JST SWCH
0632 00666 0 01 00665 JMP *-1
0633 00667 0 10 00715 JST WORD
0634 00670 0 05 00765 ERA =2
0635 00671 0 04 00021 STA '21
0636 00672 0 05 00020 ERA '20
0637 00673 0406 77 ARR 1
0638 00674 0 04 00020 STA '20
0639 00675 140040 CRA
0640 00676 -0 04 00000 STA* 0
0641 00677 0 12 00025 IRS '25
0642 00700 0 12 00000 IRS 0
0643 00701 0 12 00021 IRS '21
0644 00702 0 01 00676 JMP *-4
0645 00703 0 01 00665 JMP DATA
0646 00704 0 00 00052 SWCH PZE '52
0647 00705 0 10 00715 JST WORD
0648 00706 -0 04 00000 STA* 0
0649 00707 0 12 00000 IRS 0
0650 00710 0 12 00025 IRS '25
0651 00711 0 05 00020 ERA '20
0652 00712 0406 77 ARR 1
0653 00713 0 04 00020 STA '20
0654 00714 -0 01 00704 JMP* SWCH
0655 00715 0 00 00052 WORD PZE '52
0656 00716 140040 CRA
0657 00717 0 04 00021 STA '21
0658 00720 0 10 00731 JST CHAR
0659 00721 0 10 00731 JST CHAR
```

START OF MESSAGE

*
*

RESET WORD COUNT

INITIALIZE BLOCK

DO DATA LOAD
DO ZERO LOAD

ADD TO WORD COUNT

ADD TO WORD COUNT

INITIALIZED NONZERO CONSTANT

ADD TO WORD COUNT

INITIALIZED NONZERO C

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PAL 0623
PAL 0624
PAL 0625
PAL 0626
PAL 0627
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PAL 0659
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