

เอกสารอ้างอิง

1. ยืน ภู่วรรณ และวัฒนา เชียงกุล. ไมโครโปรเซสเซอร์ ไมโครคอมพิวเตอร์.
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2. สิบสกุล พิภพมงคล. "การพัฒนาพลอตเตอร์แบบระบบที่ควบคุมด้วยไมโครคอมพิวเตอร์".
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6. Barden Jr., William. The Z80 Microcomputer Handbook. INDIANA
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ภาคผนวก ก. โปรแกรมควบคุมพลอตเตอร์ซีพี -01

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0001 ; MONITOR PROGRAM VERSION 1.1
0002 ; FOR CP-01 PLOTTER
0003 ; CREATED: 13-APRIL-83
0004 ; DEPARTMENT OF COMPUTER ENGINEERING
0005 ; CHULALONGKORN UNIVERSITY
0006         ORG         100H
0100 31F00F 0007 STATUS LD      SP, 00FF0H
0103 C36F03 0008         JP      BEGIN+DF
0009 ;
0106 AF      0010 INIT232 XOR    A          ; INITIALIZE IC# 8251
0107 D305    0011         OUT    005H, A
0109 D305    0012         OUT    005H, A
010B D305    0013         OUT    005H, A
010D 3E40    0014         LD     A, 040H
010F D305    0015         OUT    005H, A
0111 3ECF    0016         LD     A, 0CFH
0113 D305    0017         OUT    005H, A
0115 3E27    0018         LD     A, 027H
0117 D305    0019         OUT    005H, A
0119 DB04    0020         IN     A, 004H
011B C9      0021         RET
0022 ;
011C DB05    0023 REC     IN     A, 005H ; CHECK FOR RECEIVE READY
011E E602    0024         AND    002H
0120 CA1C00  0025         JP     Z, REC+DF
0123 DB04    0026         IN     A, 004H
0125 C9      0027         RET
0126 DB10    0028 FRNTPNL IN    A, 010H ; CHECK FRONT PANEL
0128 CB77    0029         BIT    6, A
012A CA4600  0030         JP     Z, SLFTEST+DF
012D DB10    0031 LFTT    IN    A, 010H
012F CB47    0032         BIT    0, A
0131 CA6400  0033         JP     Z, LFT+DF
0134 CB4F    0034         BIT    1, A
0136 CA7100  0035         JP     Z, RGT+DF
0139 DB10    0036 UPP     IN    A, 010H
013B CB57    0037         BIT    2, A
013D CA7E00  0038         JP     Z, UP+DF
0140 CB5F    0039         BIT    3, A
0142 CA8B00  0040         JP     Z, DWN+DF
0145 C9      0041         RET
0042 ;
0146 3A0408  0043 SLFTEST LD     A, (CNTRL) ; SELFTEST ROUTINE
0149 CB97    0044         RES    2, A
014B 320408  0045         LD     (CNTRL), A
014E D320    0046         OUT    020H, A
0150 DD21A03B 0047         LD     IX, STAREA
0154 CD6901  0048         CALL  INTRPRT+DF
0157 3A0408  0049         LD     A, (CNTRL)
015A CBD7    0050         SET    2, A
015C 320408  0051         LD     (CNTRL), A
015F D320    0052         OUT    020H, A
0161 C32D00  0053         JP     LFTT+DF
0164 DB10    0054 LFT     IN    A, 010H ; LEFT BUTTON PUSHED
0166 CB47    0055         BIT    4, A
0168 CA9800  0056         JP     Z, GRND+DF
016B CD9900  0057         CALL  TRNLFT+DF

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016E	C33900	0058	JP	UPP+DF	
0171	DB10	0059	RGT	IN	A, 010H ; <RIGHT> BUTTON PUSHED
0173	CB67	0060	BIT	4, A	
0175	CA9800	0061	JP	Z, GRND+DF	
0178	CDB500	0062	CALL	TRNRGT+DF	
017B	C33900	0063	JP	UPP+DF	
017E	DB10	0064	UP	IN	A, 010H ; <UP> BUTTON PUSHED
0180	CB6F	0065	BIT	5, A	
0182	CA9800	0066	JP	Z, GRND+DF	
0185	CDD100	0067	CALL	TRNUP+DF	
0188	C39800	0068	JP	GRND+DF	
018B	DB10	0069	DWN	IN	A, 010H ; <DOWN> BUTTON PUSHED
018D	CB6F	0070	BIT	5, A	
018F	CA9800	0071	JP	Z, GRND+DF	
0192	CDED00	0072	CALL	TRNDWN+DF	
0195	C39800	0073	JP	GRND+DF	
0198	C9	0074	GRND	RET	
		0075 ;			
0199	00	0076	TRNLFT	NOP	; MOVE PEN -X DIRECTION
019A	E5	0077		PUSH	HL
019B	2A2008	0078		LD	HL, (XS)
019E	2B	0079		DEC	HL
019F	222008	0080		LD	(XS), HL
01A2	110008	0081		LD	DE, STATEX
01A5	210108	0082		LD	HL, STATEX+1
01A8	CD1201	0083		CALL	RLCA+DF
01AB	3A0008	0084		LD	A, (STATEX)
01AE	D380	0085		OUT	080H, A
01B0	CD1B01	0086		CALL	DELAY+DF
01B3	E1	0087		POP	HL
01B4	C9	0088		RET	
01B5	00	0089	TRNRGT	NOP	; MOVE PEN +X DIRECTION
01B6	E5	0090		PUSH	HL
01B7	2A2008	0091		LD	HL, (XS)
01BA	23	0092		INC	HL
01BB	222008	0093		LD	(XS), HL
01BE	110008	0094		LD	DE, STATEX
01C1	210108	0095		LD	HL, STATEX+1
01C4	CD0901	0096		CALL	RSCA+DF
01C7	3A0008	0097		LD	A, (STATEX)
01CA	D380	0098		OUT	080H, A
01CC	CD1B01	0099		CALL	DELAY+DF
01CF	E1	0100		POP	HL
01D0	C9	0101		RET	
01D1	00	0102	TRNUP	NOP	; MOVE PEN +Y DIRECTION
01D2	E5	0103		PUSH	HL
01D3	2A2208	0104		LD	HL, (YS)
01D6	23	0105		INC	HL
01D7	222208	0106		LD	(YS), HL
01DA	110208	0107		LD	DE, STATEY
01DD	210308	0108		LD	HL, STATEY+1
01E0	CD1201	0109		CALL	RLCA+DF
01E3	3A0208	0110		LD	A, (STATEY)
01E6	D340	0111		OUT	040H, A
01E8	CD1B01	0112		CALL	DELAY+DF
01EB	E1	0113		POP	HL
01EC	C9	0114		RET	

01ED	00	0115	TRNDWN	NOP		; MOVE PEN -Y DIRECTION
01EE	E5	0116		PUSH	HL	
01EF	2A2208	0117		LD	HL, (YS)	
01F2	2B	0118		DEC	HL	
01F3	222208	0119		LD	(YS), HL	
01F6	110208	0120		LD	DE, STATEY	
01F9	210308	0121		LD	HL, STATEY+1	
01FC	0E0901	0122		CALL	RRCA+DF	
01FF	3A0208	0123		LD	A, (STATEY)	
0202	D340	0124		OUT	040H, A	
0204	CD1B01	0125		CALL	DELAY+DF	
0207	E1	0126		POP	HL	
0208	C9	0127		RET		
0209	1A	0128	RRCA	LD	A, (DE)	
020A	ED67	0129		RRD		
020C	0F	0130		RRCA		
020D	0F	0131		RRCA		
020E	0F	0132		RRCA		
020F	0F	0133		RRCA		
0210	12	0134		LD	(DE), A	
0211	C9	0135		RET		
0212	1A	0136	RLCA	LD	A, (DE)	
0213	0F	0137		RRCA		
0214	0F	0138		RRCA		
0215	0F	0139		RRCA		
0216	0F	0140		RRCA		
0217	ED6F	0141		RLD		
0219	12	0142		LD	(DE), A	
021A	C9	0143		RET		
021B	C5	0144	DELAY	PUSH	BC	; 5 MILLISEC. DELAY
		0145				; FOR STEPPING MOTOR
021C	F5	0146		PUSH	AF	
021D	3E03	0147		LD	A, 3	
021F	0E7C	0148	DLYC	LD	C, 124	
0221	0D	0149	DLY1	DEC	C	
0222	C22101	0150		JP	NZ, DLY1+DF	
0225	3D	0151		DEC	A	
0226	C21F01	0152		JP	NZ, DLY0+DF	
0229	F1	0153		POP	AF	
022A	C1	0154		POP	BC	
022B	C9	0155		RET		
022C	C5	0156	DLPEN	PUSH	BC	; TIME DELAY FOR PEN LIFT
022D	F5	0157		PUSH	AF	
022E	3EFA	0158		LD	A, 250	
0230	0EF8	0159	DLPO	LD	C, 248	
0232	0D	0160	DLP1	DEC	C	
0233	C23201	0161		JP	NZ, DLP1+DF	
0236	3D	0162		DEC	A	
0237	C23001	0163		JP	NZ, DLP0+DF	
023A	F1	0164		POP	AF	
023B	C1	0165		POP	BC	
023C	C9	0166		RET		
023D	E5	0167	CP16	PUSH	HL	; 16 BITS COMPARE ROUTINE
023E	D5	0168		PUSH	DE	
023F	B7	0169		OR	A	
0240	ED52	0170		SBC	HL, DE	
0242	D1	0171		POP	DE	

0243	E1	0172	POP	HL	
0244	C9	0173	RET		
0245	E5	0174	ASXDEC	PUSH	HL ; CONVERT ASCII STRING
		0175			; TO HEX STRING BEGIN-
		0176			; ING ADDRESSED BY IX
0246	D5	0177	PUSH	DE	
0247	C5	0178	PUSH	BC	
0248	F5	0179	PUSH	AF	
0249	0604	0180	LD	B, 4	
024B	210000	0181	LD	HL, 0	
024E	29	0182	LOOP	ADD	HL, HL
024F	E5	0183	PUSH	HL	
0250	29	0184	ADD	HL, HL	
0251	29	0185	ADD	HL, HL	
0252	D1	0186	POP	DE	
0253	19	0187	ADD	HL, DE	
0254	DD7E00	0188	LD	A, (IX)	
0257	D630	0189	SUB	A, 30H	
0259	5F	0190	LD	E, A	
025A	1600	0191	LD	D, 0	
025C	19	0192	ADD	HL, DE	
025D	DD23	0193	INC	IX	
025F	10ED	0194	DJNZ	\$-17	
0261	220608	0195	LD	(HEX), HL	
0264	F1	0196	POP	AF	
0265	C1	0197	POP	BC	
0266	D1	0198	POP	DE	
0267	E1	0199	POP	HL	
0268	C9	0200	RET		
		0201			
0269	DD7E00	0202	INTRPRT	LD	A, (IX) ; CHECK FOR COMMAND
026C	FE50	0203	CP	'P'	
026E	CA9B01	0204	JP	Z, PP+DF	
0271	FE4D	0205	CP	'M'	
0273	CAB901	0206	JP	Z, MOO+DF	
0276	FE43	0207	CP	'C'	
0278	CADA01	0208	JP	Z, CHAR+DF	
027B	FE53	0209	CP	'S'	
027D	CAF901	0210	JP	Z, SIZE+DF	
0280	FE20	0211	CP	'/'	
0282	C28A01	0212	JP	NZ, CTRZ+DF	
0285	DD23	0213	INC	IX	
0287	C36901	0214	JP	INTRPRT+DF	
028A	FE1A	0215	CTRZ	CP	01AH
028C	CA9C01	0216	JP	Z, EXIT+DF	
028F	FE03	0217	CP	003H	
0291	CA9C01	0218	JP	Z, EXIT+DF	
0294	3A0408	0219	LD	A, (CNTRL)	
0297	CB8F	0220	RES	1, A	
0299	D320	0221	OUT	020H, A	
029B	76	0222	HALT		
029C	C9	0223	EXIT	RET	
029D	DD23	0224	PP	INC	IX
029F	DD7E00	0225	LD	A, (IX)	
02A2	FE55	0226	CP	'U'	
02A4	CA3F02	0227	JP	Z, POU+DF	
02A7	FE44	0228	CP	'D'	

02A9	CA450Z	0229	JP	Z, PDD+DF
02AC	FE41	0230	CP	<A>
02AE	CA4B0Z	0231	JP	Z, PAA+DF
02B1	FE52	0232	CP	<R>
02B3	CA520Z	0233	JP	Z, PRR+DF
02B6	C38A01	0234	JP	CTRZ+DF
02B9	DD23	0235	MOD INC	IX
02BB	DD7E00	0236	LD	A, (IX)
02BE	FE4F	0237	CP	<D>
02C0	CA700Z	0238	JP	Z, MOR+DF
02C3	FE4C	0239	CP	<L>
02C5	CA580Z	0240	JP	Z, MLL+DF
02C8	FE5Z	0241	CP	<R>
02CA	CA5E0Z	0242	JP	Z, MRR+DF
02CD	FE55	0243	CP	<U>
02CF	CA640Z	0244	JP	Z, MUU+DF
02D2	FE44	0245	CP	<D>
02D4	CA6A0Z	0246	JP	Z, MDD+DF
02D7	C38A01	0247	JP	CTRZ+DF
		0248 ;		
		0249 ;	CHARACTER GEN. COMMAND	
		0250 ;		
02DA	DD23	0251	CHAR INC	IX
02DC	DD7E00	0252	LD	A, (IX)
02DF	FE48	0253	CP	<H>
02E1	C2EC01	0254	JP	NZ, VER+DF
02E4	3E48	0255	LD	A, <H>
02E6	322A08	0256	LD	(HORVER), A
02E9	C3760Z	0257	JP	WRITE+DF
02EC	FE56	0258	VER CP	<V>
02EE	C28A01	0259	JP	NZ, CTRZ+DF
02F1	3E56	0260	LD	A, <V>
02F3	322A08	0261	LD	(HORVER), A
02F6	C3760Z	0262	JP	WRITE+DF
02F9	DD23	0263	SIZE INC	IX
02FB	DD7E00	0264	LD	A, (IX)
02FE	FE31	0265	CP	<1>
0300	C20B0Z	0266	JP	NZ, S2+DF
0303	3E0Z	0267	LD	A, 2
0305	322408	0268	LD	(CHSIZE), A
0308	C3790Z	0269	JP	NXT+DF
030B	FE3Z	0270	S2 CP	<2>
030D	C2180Z	0271	JP	NZ, S3+DF
0310	3E05	0272	LD	A, 5
0312	322408	0273	LD	(CHSIZE), A
0315	C3790Z	0274	JP	NXT+DF
0318	FE33	0275	S3 CP	<3>
031A	C2250Z	0276	JP	NZ, S4+DF
031D	3E0A	0277	LD	A, 10
031F	322408	0278	LD	(CHSIZE), A
0322	C3790Z	0279	JP	NXT+DF
0325	FE34	0280	S4 CP	<4>
0327	C2320Z	0281	JP	NZ, S5+DF
032A	3E14	0282	LD	A, 20
032C	322408	0283	LD	(CHSIZE), A
032F	C3790Z	0284	JP	NXT+DF
033Z	FE35	0285	S5 CP	<5>

0334	C28A01	0286	JP	NZ, CTRLZ+DF	
0337	3E28	0287	LD	A, 40	
0339	322408	0288	LD	(CHSIZE), A	
033C	C37902	0289	JP	NXT+DF	
		0290 ;			
033F	C27E02	0291 PUU	CALL	PU+DF	
0342	C37902	0292	JP	NXT+DF	
0345	CD8C02	0293 PBD	CALL	PD+DF	
0348	C37902	0294	JP	NXT+DF	
034E	00	0295 PAA	NDP		
034C	CD8705	0296	CALL	PA+DF	
034F	C37902	0297	JP	NXT+DF	
0352	CD7B06	0298 PRR	CALL	PR+DF	
0355	C37902	0299	JP	NXT+DF	
0358	CDBA02	0300 MLL	CALL	ML+DF	
035B	C37902	0301	JP	NXT+DF	
035E	CDFF02	0302 MRR	CALL	MR+DF	
0361	C37902	0303	JP	NXT+DF	
0364	CD2403	0304 MUU	CALL	MU+DF	
0367	C37902	0305	JP	NXT+DF	
036A	CD4903	0306 MBD	CALL	MD+DF	
036D	C37902	0307	JP	NXT+DF	
0370	CD9A02	0308 MOR	CALL	MO+DF	
0373	C37902	0309	JP	NXT+DF	
0376	CD0306	0310 WRITE	CALL	CHGEN+DF	
0379	DD23	0311 NXT	INC	IX	
037B	C36901	0312	JP	INTRPRT+DF	
		0313 ;			
037E	3A0408	0314 PU	LD	A, (CNTRL)	; PEN UP ROUTINE
0381	CBC7	0315	SET	0, A	
0383	D320	0316	OUT	020H, A	
0385	320408	0317	LD	(CNTRL), A	
0388	CD2C01	0318	CALL	DLPEN+DF	
038B	C9	0319	RET		
038C	3A0408	0320 PD	LD	A, (CNTRL)	; PEN DOWN ROUTINE
038F	C587	0321	RES	0, A	
0391	D320	0322	OUT	020H, A	
0393	320408	0323	LD	(CNTRL), A	
0396	CD2C01	0324	CALL	DLPEN+DF	
0399	C9	0325	RET		
039A	DB10	0326 MO	IN	A, 010H	; MOVE TO ORIGIN ROUTINE
039C	CB67	0327	BIT	4, A	
039E	C2A402	0328	JP	NZ, WEST+DF	
03A1	C3A702	0329	JP	STH+DF	
03A4	CD9900	0330 WEST	CALL	TRNLFT+DF	
03A7	DB10	0331 STH	IN	A, 010H	
03A9	CB6F	0332	BIT	5, A	
03AB	C2C802	0333	JP	NZ, SOUTH+DF	
03AE	E630	0334	AND	030H	
03B0	C29A02	0335	JP	NZ, MD+DF	
03B3	CDD100	0336	CALL	TRNUP+DF	
03B6	CDD100	0337	CALL	TRNUP+DF	
03B9	CDD100	0338	CALL	TRNUP+DF	
03BC	CD8500	0339	CALL	TRNRGT+DF	
03BF	CD8500	0340	CALL	TRNRGT+DF	
03C2	CD8500	0341	CALL	TRNRGT+DF	
03C5	C3CE02	0342	JP	ORGN+DF	



0308	CEDE00	0343	SOUTH	CALL	TRNDWN+DF
030B	C39A02	0344		JP	MD+DF
030E	D9	0345	DRGN	EXX	
030F	Z10000	0346		LD	HL, 0
03D2	Z22008	0347		LD	(XS), HL
03D5	Z22208	0348		LD	(YS), HL
03D8	D9	0349		EXX	
03D9	C9	0350		RET	
03DA	BD23	0351	ML	INC	IX ; ML COMMAND
03DC	CD4501	0352		CALL	ASXDEC+DF
03DF	2A0608	0353	ML1	LD	HL, (HEX)
03E2	110000	0354		LD	DE, 0
03E5	CD3D01	0355		CALL	CP16+DF
03E8	CA6E03	0356		JP	Z, STILL+DF
03EB	DB10	0357		IN	A, 010H
03ED	CB67	0358		BIT	4, A
03EF	CA6E03	0359		JP	Z, STILL+DF
03F2	CD9900	0360		CALL	TRNLFT+DF
03F5	2A0608	0361		LD	HL, (HEX)
03F8	ZB	0362		DEC	HL
03F9	Z20608	0363		LD	(HEX), HL
03FC	C3DF02	0364		JP	ML1+DF
03FF	DD23	0365	MR	INC	IX ; MR COMMAND
0401	CD4501	0366		CALL	ASXDEC+DF
0404	2A0608	0367	MR1	LD	HL, (HEX)
0407	110000	0368		LD	DE, 0
040A	CD3D01	0369		CALL	CP16+DF
040D	CA6E03	0370		JP	Z, STILL+DF
0410	DB10	0371		IN	A, 010H
0412	CB67	0372		BIT	4, A
0414	CA6E03	0373		JP	Z, STILL+DF
0417	CD3500	0374		CALL	TRNRST+DF
041A	2A0608	0375		LD	HL, (HEX)
041D	ZB	0376		DEC	HL
041E	Z20608	0377		LD	(HEX), HL
0421	C30403	0378		JP	MR1+DF
0424	DD23	0379	MU	INC	IX ; MU COMMAND
0426	CD4501	0380		CALL	ASXDEC+DF
0429	2A0608	0381	MU1	LD	HL, (HEX)
042C	110000	0382		LD	DE, 0
042F	CD3D01	0383		CALL	CP16+DF
0432	CA6E03	0384		JP	Z, STILL+DF
0435	DB10	0385		IN	A, 010H
0437	CB6F	0386		BIT	5, A
0439	CA6E03	0387		JP	Z, STILL+DF
043C	CDD100	0388		CALL	TRNUP+DF
043F	2A0608	0389		LD	HL, (HEX)
0442	ZB	0390		DEC	HL
0443	Z20608	0391		LD	(HEX), HL
0446	C32903	0392		JP	MU1+DF
0449	DD23	0393	MD	INC	IX ; MD COMMAND
044B	CD4501	0394		CALL	ASXDEC+DF
044E	2A0608	0395	MD1	LD	HL, (HEX)
0451	110000	0396		LD	DE, 0
0454	CD3D01	0397		CALL	CP16+DF
0457	CA6E03	0398		JP	Z, STILL+DF
045A	DB10	0399		IN	A, 010H

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0450 C86F      0400      BIT      5, A
045E CA6E03    0401      JP       Z, STILL+DF
0461 CEED00    0402      CALL    TRNDWN+DF
0464 ZA0608    0403      LD      HL, (HEX)
0467 2E        0404      DEC     HL
0468 Z20608    0405      LD      (HEX), HL
046B C84E03    0406      JP      MD1+DF
046E C9        0407 STILL  RET
0408 ;
0409 ; -----
0410 ; MAIN PROGRAM
0411 ; -----
046F 00        0412 BEGIN  NOP      ; INITIALIZE
0413          0413          ; PLOTTER STATUS
0470 3E05      0414      LD      A, 5
0472 322408    0415      LD      (CHSIZE), A
0475 3EFF      0416      LD      A, 0FFH
0477 320408    0417      LD      (CNTRL), A
047A 2156A9    0418      LD      HL, 0A956H
047D Z20008    0419      LD      (STATEX), HL
0480 Z20208    0420      LD      (STATEY), HL
0483 3A0408    0421      LD      A, (CNTRL)
0486 D320      0422      OUT    020H, A
0488 3A0008    0423      LD      A, (STATEX)
048B D380      0424      OUT    080H, A
048D 3A0208    0425      LD      A, (STATEY)
0490 D340      0426      OUT    040H, A
0492 CB7E02    0427      CALL    PU+DF
0495 CD9A02    0428      CALL    NC+IF
0498 CD0600    0429      CALL    INIT232+DF
049B CDZ600    0430 FRONT  CALL    FRNTRNL+DF
049E 212E08    0431 R6232  LD      HL, CMAREA ; ANY INPUT FROM
0432          0432          ; MICROCOMPUTER ?
04A1 DE05      0433      IN      A, 005H
04A3 E602      0434      AND    002H ; IF <NO> JUMP TO FRONT
04A5 CA9B03    0435      JP      Z, FRONT+DF ; IF <YES> PUT
0436          0436          ; IT INTO CMAREA
04A8 0E03      0437      LD      C, 3
04AA DB04      0438      IN      A, 004H
04AC 77        0439 PUT    LD      (HL), A
04AD FE03      0440      CP      003H
04AF CABB03    0441      JP      Z, COUNT+DF
04B2 0E03      0442      LD      C, 3
04B4 23        0443 CONT  INC     HL
04B5 CD1C00    0444      CALL    R6C+DF
04B8 C3AD03    0445      JP      PUT+DF
04BB 0D        0446 COUNT  DEC     C
04BC C2B403    0447      JP      NZ, CONT+DF
04BF DD212E08  0448      LD      IX, CMAREA
04C3 CB6901    0449      CALL    INTRRPT+DF
0450 ; ANSWER THE MICROCOMPUTER
04C6 3E02      0451      LD      A, 002H
04C8 D304      0452      OUT    04H, A
04CA CD1B01    0453      CALL    DELAY+DF
04CD D304      0454      OUT    04H, A
04CF CD1B01    0455      CALL    DELAY+DF
04D2 D304      0456      OUT    04H, A

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04D4	CD1B01	0457	CALL	DELAY+DF
04D7	D304	0458	OUT	04H, A
		0459 ;		
04D9	CD0600	0460	CALL	INIT232+DF
04DC	C39B03	0461	JP	FRONT+DF
		0462 ;	-----	
		0463 ;	END OF MAIN PROGRAM	
		0464 ;	-----	
		0465 ;		
04DF	E5	0466	DEST	PUSH HL
04E0	DD23	0467		INC IX
04E2	CD4501	0468	CALL	ASXDEC+DF
04E5	2A0603	0469	LD	HL, (HEX)
04E8	221408	0470	LD	(DESX), HL
04EB	DD23	0471	INC	IX
04ED	CD4501	0472	CALL	ASXDEC+DF
04F0	2A0603	0473	LD	HL, (HEX)
04F3	221608	0474	LD	(DESY), HL
04F6	E1	0475	POP	HL
04F7	C9	0476	RET	
04F8	E5	0477	DELXY	PUSH HL
04F9	D5	0478		PUSH DE
04FA	F5	0479		PUSH AF
04FB	2A1408	0480	LD	HL, (DESX)
04FE	ED5B2008	0481	LD	DE, (XS)
0502	B7	0482	OR	A
0503	ED52	0483	SBC	HL, DE
0505	F21204	0484	JP	P, DEL1+DF
0508	2A2008	0485	LD	HL, (XS)
050B	ED5B1408	0486	LD	DE, (DESX)
050F	B7	0487	OR	A
0510	ED52	0488	SBC	HL, DE
0512	221808	0489	DEL1	LD (DELX), HL
0515	2A1608	0490	LD	HL, (DESY)
0518	ED5B2208	0491	LD	DE, (YS)
051C	B7	0492	OR	A
051D	ED52	0493	SBC	HL, IE
051F	F22C04	0494	JP	P, DEL2+DF
0522	2A2208	0495	LD	HL, (YS)
0525	ED5B1608	0496	LD	DE, (IESY)
0529	B7	0497	OR	A
052A	ED52	0498	SBC	HL, DE
052C	221A08	0499	DEL2	LD (DELY), HL
052F	F1	0500	POP	AF
0530	D1	0501	POP	DE
0531	E1	0502	POP	HL
0532	C9	0503	RET	
0533	2A1808	0504	PREPARE	LD HL, (DELX)
0536	ED5B1A08	0505		LD DE, (DELY)
053A	CD3D01	0506		CALL CP16+DF
053D	F26A04	0507		JP F, SLOP+DF
0540	220E08	0508	LD	(SLOPE), HL
0543	ED5B1008	0509	LD	(DEVIDER), DE
0547	2A1808	0510	CHFLG	LD HL, (DELX)
054A	ED5B1A08	0511		LD DE, (DELY)
054E	CD3D01	0512		CALL CP16+DF
0551	CA5A04	0513		JP Z, STFLAG+DF

0554	3E00	0514	LD	A, 0
0556	321208	0515	LD	(FLAG), A
0559	C9	0516	RET	
055A	2A1808	0517 STFLAG	LD	HL, (DELX)
055D	7C	0518	LD	A, H
055E	B5	0519	CR	L
055F	CA6804	0520	JP	Z, STLL+DF
0562	3E01	0521	LD	A, 1
0564	321208	0522	LD	(FLAG), A
0567	C9	0523	RET	
0568	F1	0524 STLL	POP	AF
0569	C9	0525	RET	
056A	ED530E08	0526 SLOP	LD	(SLOPE), DE
056E	221008	0527	LD	(DEVIDER), HL
0571	C34704	0528	JP	CHFLG+DF
0574	E5	0529 SETDRC	PUSH	HL
0575	D5	0530	PUSH	DE
0576	3E00	0531	LD	A, 0
0578	2A1408	0532	LD	HL, (DESX)
057B	ED5B2008	0533	LD	DE, (XS)
057F	CD3D01	0534	CALL	CP16+DF
0582	F2A204	0535	JP	P, SDR1+DF
0585	2A1608	0536	LD	HL, (DESY)
0588	ED5B2208	0537	LD	DE, (YS)
058C	CD3D01	0538	CALL	CP16+DF
058F	F2CF04	0539	JP	P, SDR2+DF
0592	2A1808	0540	LD	HL, (DELX)
0595	ED5B1A08	0541	LD	DE, (DELY)
0599	CD3D01	0542	CALL	CP16+DF
059C	F2E004	0543	JP	P, SD7+DF
059F	C3DF04	0544	JP	SD8+DF
05A2	2A1608	0545 SDR1	LD	HL, (DESY)
05A5	ED5B2208	0546	LD	DE, (YS)
05A9	CD3D01	0547	CALL	CP16+DF
05AC	F2BF04	0548	JP	P, SDR11+DF
05AF	2A1808	0549 SDR12	LD	HL, (DELX)
05B2	ED5B1A08	0550	LD	DE, (DELY)
05B6	CD3D01	0551	CALL	CP16+DF
05B9	F2E404	0552	JP	P, SD3+DF
05BC	C3E304	0553	JP	SD4+DF
05BF	2A1808	0554 SDR11	LD	HL, (DELX)
05C2	ED5B1A08	0555	LD	DE, (DELY)
05C6	CD3D01	0556	CALL	CP16+DF
05C9	F2E404	0557	JP	P, SD1+DF
05CC	C3E504	0558	JP	SD2+DF
05CF	2A1808	0559 SDR2	LD	HL, (DELX)
05D2	ED5B1A08	0560	LD	DE, (DELY)
05D6	CD3D01	0561	CALL	CP16+DF
05D9	F2E204	0562	JP	P, SD5+DF
05DC	C3E104	0563	JP	SD6+DF
05DF	3C	0564 SD8	INC	A
05E0	3C	0565 SD7	INC	A
05E1	3C	0566 SD6	INC	A
05E2	3C	0567 SD5	INC	A
05E3	3C	0568 SD4	INC	A
05E4	3C	0569 SD3	INC	A
05E5	3C	0570 SD2	INC	A

05E6	3C	0571	SD1	INC	A
05E7	321E08	0572		LD	(PAT), A
05EA	D1	0573		POP	DE
05EB	E1	0574		POP	HL
05EC	C9	0575		RET	
05ED	3A1E08	0576	APT	LD	A, (PAT)
05F0	FE01	0577		CP	1
05F2	CA1605	0578		JP	Z, AA1+DF
05F5	FE02	0579		CP	2
05F7	CA1A05	0580		JP	Z, AA2+DF
05FA	FE03	0581		CP	3
05FC	CA1605	0582		JP	Z, AA1+DF
05FF	FE04	0583		CP	4
0601	CA1E05	0584		JP	Z, AA4+DF
0604	FE05	0585		CP	5
0606	CA2205	0586		JP	Z, AA5+DF
0609	FE06	0587		CP	6
060B	CA1A05	0588		JP	Z, AA2+DF
060E	FE07	0589		CP	7
0610	CA2205	0590		JP	Z, AA5+DF
0613	C31E05	0591		JP	AA4+DF
0616	CDB500	0592	AA1	CALL	TRNRGT+DF
0619	C9	0593		RET	
061A	CDD100	0594	AA2	CALL	TRNLUP+DF
061D	C9	0595		RET	
061E	CDED00	0596	AA4	CALL	TRNDWN+DF
0621	C9	0597		RET	
0622	CD9900	0598	AA5	CALL	TRNLFT+DF
0625	C9	0599		RET	
0626	3A1E08	0600	BPT	LD	A, (PAT)
0629	FE01	0601		CP	1
062B	CA4F05	0602		JP	Z, BB1+DF
062E	FE02	0603		CP	2
0630	CA5605	0604		JP	Z, BB2+DF
0633	FE03	0605		CP	3
0635	CA5D05	0606		JP	Z, BB3+DF
0638	FE04	0607		CP	4
063A	CA6405	0608		JP	Z, BB4+DF
063D	FE05	0609		CP	5
063F	CA6B05	0610		JP	Z, BB5+DF
0642	FE06	0611		CP	6
0644	CA7205	0612		JP	Z, BB6+DF
0647	FE07	0613		CP	7
0649	CA7905	0614		JP	Z, BB7+DF
064C	C38005	0615		JP	BB8+DF
064F	CDD100	0616	BB1	CALL	TRNLUP+DF
0652	CDB500	0617		CALL	TRNRGT+DF
0655	C9	0618		RET	
0656	CBB500	0619	BB2	CALL	TRNRGT+DF
0659	CDD100	0620		CALL	TRNLUP+DF
065C	C9	0621		RET	
065D	CDED00	0622	BB3	CALL	TRNDWN+DF
0660	CDE500	0623		CALL	TRNRGT+DF
0663	C9	0624		RET	
0664	CDB500	0625	BB4	CALL	TRNRGT+DF
0667	CDED00	0626		CALL	TRNDWN+DF
066A	C9	0627		RET	

0668	CDD100	0628	BB5	CALL	TRNUP+DF
066E	CD9900	0629		CALL	TRNLFT+DF
0671	C9	0630		RET	
0672	CD9900	0631	BB6	CALL	TRNLFT+DF
0675	CDD100	0632		CALL	TRNUP+DF
0678	C9	0633		RET	
0679	CDED00	0634	BB7	CALL	TRNDWN+DF
067C	CD9900	0635		CALL	TRNLFT+DF
067F	C9	0636		RET	
0680	CD9900	0637	BB8	CALL	TRNLFT+DF
0683	CDED00	0638		CALL	TRNDWN+DF
0686	C9	0639		RET	
0687	CDDF03	0640	PA	CALL	DEST+DF
068A	CD8803	0641		CALL	DELXY+DF
068D	CD8804	0642		CALL	PREPARE+DF
0690	2A1008	0643		LD	HL, (DEVIDER)
0693	221008	0644		LD	(CTDWN), HL
0696	CD7404	0645		CALL	SETDRC+DF
0699	210000	0646	GENER	LD	HL, 0
069C	220808	0647		LD	(LAST), HL
069F	0601	0648		LD	B, 1
06A1	2A0E08	0649		LD	HL, (SLOPE)
06A4	220A08	0650		LD	(NEXT), HL
06A7	220C08	0651		LD	(SUM), HL
06AA	00	0652	GNRO	NOP	
06AB	2A0C08	0653		LD	HL, (SUM)
06AE	ED5B1008	0654		LD	DE, (DEVIDER)
06B2	CD3D01	0655		CALL	CP16+DF
06B5	F20C06	0656		JP	P, GNR2+DF
06B8	CDED04	0657		CALL	APT+DF
06BB	0E00	0658		LD	C, 0
06BD	0601	0659		LD	B, 1
06BF	C3C205	0660		JP	JUNC+DF
06C2	3A1208	0661	JUNC	LD	A, (FLAG)
06C5	FE01	0662		CP	I
06C7	CA2406	0663		JP	Z, INIT+DF
06CA	2A0A08	0664		LD	HL, (NEXT)
06CD	220808	0665		LD	(LAST), HL
06D0	ED5B0E08	0666		LD	DE, (SLOPE)
06D4	19	0667		ADD	HL, DE
06D5	220A08	0668		LD	(NEXT), HL
06D8	ED5B0808	0669		LD	DE, (LAST)
06DC	19	0670		ADD	HL, DE
06DD	220C08	0671		LD	(SUM), HL
06E0	C3E305	0672		JP	CROSS+DF
06E3	3E00	0673	CROSS	LD	A, 0
06E5	321208	0674		LD	(FLAG), A
06E8	2A0A08	0675		LD	HL, (NEXT)
06EB	ED5B1008	0676		LD	DE, (DEVIDER)
06EF	CD3D01	0677		CALL	CP16+DF
06F2	FA6806	0678		JP	M, FINISH+DF
06F5	2A0808	0679		LD	HL, (LAST)
06F8	ED5B1008	0680		LD	DE, (DEVIDER)
06FC	CD3D01	0681		CALL	CP16+DF
06FF	F26806	0682		JP	P, FINISH+DF
0702	3E01	0683		LD	A, 1
0704	321208	0684		LD	(FLAG), A

0707	CE00	0685	LD	C, 0
0709	C36806	0686	JP	FINISH+DF
070C	3A1208	0687 GNR2	LD	A, (FLAG)
070F	FE01	0688	CP	I
0711	C24A06	0689	JP	NZ, GNR3+DF
0714	0D	0690	DEC	C
0715	CA4A06	0691	JP	Z, GNR3+DF
0718	05	0692	DEC	B
0719	CA6006	0693	JP	Z, GNR6+DF
071C	CDDED04	0694	CALL	APT+DF
071F	0601	0695	LD	B, I
0721	C3C205	0696	JP	JUNC+DF
0724	ED5B1008	0697 INIT	LD	DE, (DEVIDER)
0728	2A0A08	0698	LD	HL, (NEXT)
072B	B7	0699	OR	A
072C	ED52	0700	SBC	HL, DE
072E	220808	0701	LD	(LAST), HL
0731	2A0808	0702	LD	HL, (LAST)
0734	ED5B0E08	0703	LD	DE, (SLOPE)
0738	19	0704	ADD	HL, DE
0739	220A08	0705	LD	(NEXT), HL
073C	2A0A08	0706	LD	HL, (NEXT)
073F	ED5B0808	0707	LD	DE, (LAST)
0743	19	0708	ADD	HL, DE
0744	220C08	0709	LD	(SUM), HL
0747	C3E305	0710	JP	CROSS+DF
074A	0600	0711 GNR3	LD	B, 0
074C	0D	0712	DEC	C
074D	CA5806	0713	JP	Z, GNR7+DF
0750	CD2605	0714	CALL	BPT+DF
0753	0E01	0715	LD	C, I
0755	C3C205	0716	JP	JUNC+DF
0758	CDDED04	0717 GNR7	CALL	APT+DF
075B	0E01	0718	LD	C, I
075D	C3C205	0719	JP	JUNC+DF
0760	CD2605	0720 GNR6	CALL	BPT+DF
0763	0601	0721	LD	B, I
0765	C3C205	0722	JP	JUNC+DF
0768	2A1C08	0723 FINISH	LD	HL, (CTDWN)
076B	C5	0724	PUSH	BC
076C	2B	0725	DEC	HL
076D	7C	0726	LD	A, H
076E	45	0727	LD	B, L
076F	B0	0728	OR	B
0770	C1	0729	POP	BC
0771	CA7A06	0730	JP	Z, FN+DF
0774	221C08	0731	LD	(CTDWN), HL
0777	C3AA05	0732	JP	GNR0+DF
077A	C9	0733 FN	RET	
		0734 ;		
		0735 ; PLOT RELATIVE ROUTINE		
077B	DD23	0736 PR	INC	IX
077D	CDA006	0737	CALL	CHKSIGN+DF
0780	CD4501	0738	CALL	ASXDEC+DF
0783	2A2008	0739	LD	HL, (XS)
0786	CDB306	0740	CALL	CAL1+DF
0789	221408	0741	LD	(DESX), HL

078C	DD23	0742	INC	IX
078E	CDA006	0743	CALL	CHKSIGN+DF
0791	CD4501	0744	CALL	ASXDEC+DF
0794	2A2208	0745	LD	HL, (YS)
0797	CD8306	0746	CALL	CAL1+DF
079A	221608	0747	LD	(DESY), HL
079D	C38A05	0748	JP	PA+S+DF
07A0	DD7E00	0749	CHKSIGN	LD A, (IX)
07A3	FE2D	0750	CP	---
07A5	2006	0751	JR	NZ, PLUS
07A7	3E2D	0752	LD	A, ---
07A9	DD23	0753	INC	IX
07AB	1802	0754	JR	ENDSIGN
07AD	3E2B	0755	PLUS	LD A, ---
07AF	322C08	0756	ENDSIGN	LD (SIGN), A
07B2	C9	0757	RET	
07B3	ED5B0608	0758	CAL1	LD DE, (HEX)
07B7	3A2C08	0759		LD A, (SIGN)
07BA	FE2D	0760	CP	---
07BC	2003	0761	JR	NZ, DOPLUS
07BE	ED52	0762	SBC	HL, DE
07C0	C9	0763	RET	
07C1	19	0764	DOPLUS	ADD HL, DE
07C2	C9	0765	RET	
		0766	; END OF PLOT RELATIVE ROUTINE	
		0767	;	
		0768	; CHARACTER GEN. ROUTINE	
07C3	DD23	0769	CHGEN	INC IX
07C5	215038	0770	NEXTCH	LD HL, TABLE
07C8	DD23	0771		INC IX
07CA	DD7E00	0772		LD A, (IX)
07CD	FE5F	0773		CP 5FH
07CF	C8	0774		RET Z
07D0	7E	0775	CHKCODE	LD A, (HL)
07D1	FE01	0776		CP 001H
07D3	28F0	0777		JR Z, NEXTCH
07D5	DD7E00	0778		LD A, (IX)
07D8	BE	0779		CP (HL)
07D9	2805	0780		JR Z, DECODE
07DB	23	0781		INC HL
07DC	23	0782		INC HL
07DD	23	0783		INC HL
07DE	18F0	0784		JR CHKCODE
07E0	23	0785	DECODE	INC HL
07E1	E5	0786		PUSH HL
07E2	7E	0787		LD A, (HL)
07E3	23	0788		INC HL
07E4	46	0789		LD B, (HL)
07E5	60	0790		LD H, B
07E6	6F	0791		LD L, A
07E7	7E	0792	NXTCODE	LD A, (HL)
07E8	FEFF	0793		CP 0FFH
07EA	CAA707	0794		JP Z, SHIFT+DF
07ED	E680	0795		AND 80H
07EF	C48C02	0796		CALL NZ, PD+DF
07F2	7E	0797		LD A, (HL)
07F3	E680	0798		AND 80H

07F5	CC7E02	0799	CALL	Z, PU+DF
07F8	7E	0800	LD	A, (HL)
07F9	E60F	0801	AND	0FH
07FE	322808	0802	LD	(STEP), A
07FE	3A2408	0803	LD	A, (CHSIZE)
0801	47	0804	LD	B, A
0802	7E	0805	LD	A, (HL)
0803	E670	0806	AND	70H
0805	FE00	0807	CP	00H
0807	281A	0808	JR	Z, NN
0809	FE10	0809	CP	10H
080B	2825	0810	JR	Z, NE
080D	FE20	0811	CP	20H
080F	2833	0812	JR	Z, EE
0811	FE30	0813	CP	30H
0813	283E	0814	JR	Z, SE
0815	FE40	0815	CP	40H
0817	284C	0816	JR	Z, SS
0819	FE50	0817	CP	50H
081B	2857	0818	JR	Z, SW
081D	FE60	0819	CP	60H
081F	2865	0820	JR	Z, WW
0821	1871	0821	JR	NW
0823	3A2808	0822	LD	A, (STEP)
0826	4F	0823	LD	C, A
0827	CDD100	0824	CALL	TRNUP+DF
082A	0D	0825	DEC	C
082B	20FA	0826	JR	NZ, LOOPNN
082D	10F4	0827	DJNZ	NN
082F	C3A307	0828	JP	CODEEND+DF
0832	3A2808	0829	LD	A, (STEP)
0835	4F	0830	LD	C, A
0836	CDB500	0831	CALL	TRNRGT+DF
0839	CDD100	0832	CALL	TRNUP+DF
083C	0D	0833	DEC	C
083D	20F7	0834	JR	NZ, LOOPNE
083F	10F1	0835	DJNZ	NE
0841	C3A307	0836	JP	CODEEND+DF
0844	3A2808	0837	LD	A, (STEP)
0847	4F	0838	LD	C, A
0848	CDB500	0839	CALL	TRNRGT+DF
084B	0D	0840	DEC	C
084C	20FA	0841	JR	NZ, LOOPEE
084E	10F4	0842	DJNZ	EE
0850	C3A307	0843	JP	CODEEND+DF
0853	3A2808	0844	LD	A, (STEP)
0856	4F	0845	LD	C, A
0857	CDED00	0846	CALL	TRNDWN+DF
085A	CDB500	0847	CALL	TRNRGT+DF
085D	0D	0848	DEC	C
085E	20F7	0849	JR	NZ, LOOPSE
0860	10F1	0850	DJNZ	SE
0862	C3A307	0851	JP	CODEEND+DF
0865	3A2808	0852	LD	A, (STEP)
0868	4F	0853	LD	C, A
0869	CDED00	0854	CALL	TRNDWN+DF
086C	0D	0855	DEC	C

086D	20FA	0856	JR	NZ, LOOPSS
086F	10F4	0857	DJNZ	SS
0871	C3A307	0858	JP	CODEEND+DF
0874	3A2808	0859 SW	LD	A, (STEP)
0877	4F	0860	LD	C, A
0878	CD9900	0861 LOOPSW	CALL	TRNLFT+DF
087B	CEED00	0862	CALL	TRNDWN+DF
087E	0D	0863	DEC	C
087F	20F7	0864	JR	NZ, LOOPSW
0881	10F1	0865	DJNZ	SW
0883	C3A307	0866	JP	CODEEND+DF
0886	3A2808	0867 WW	LD	A, (STEP)
0889	4F	0868	LD	C, A
088A	CD9900	0869 LOOPPW	CALL	TRNLFT+DF
088D	0D	0870	DEC	C
088E	20FA	0871	JR	NZ, LOOPPW
0890	10F4	0872	DJNZ	WW
0892	180F	0873	JR	CODEEND
0894	3A2808	0874 NW	LD	A, (STEP)
0897	4F	0875	LD	C, A
0898	CDB100	0876 LOOPNW	CALL	TRNUP+DF
089B	CD9900	0877	CALL	TRNLFT+DF
089E	0D	0878	DEC	C
089F	20F7	0879	JR	NZ, LOOPNW
08A1	10F1	0880	DJNZ	NW
08A3	23	0881 CODEEND	INC	HL
08A4	C3E706	0882	JP	NXTCODE+DF
08A7	CD7E02	0883 SHIFT	CALL	PU+DF
08AA	3A2408	0884	LD	A, (CRSIZE)
08AD	47	0885	LD	B, A
08AE	3A2A08	0886	LD	A, (HORVER)
08B1	FE48	0887	CP	<H>
08B3	280C	0888	JR	Z, HORSKIP
08B5	0E0A	0889 VERSKIP	LD	C, 10
08B7	CEED00	0890 LOOPVER	CALL	TRNDWN+DF
08BA	0D	0891	DEC	C
08BB	20FA	0892	JR	NZ, LOOPVER
08BD	10F6	0893	DJNZ	VERSKIP
08BF	180A	0894	JR	ENDSKIP
08C1	0E08	0895 HORSKIP	LD	C, 8
08C3	CDB500	0896 LOOPHOR	CALL	TRNRGT+DF
08C6	0D	0897	DEC	C
08C7	20FA	0898	JR	NZ, LOOPHOR
08C9	10F6	0899	DJNZ	HORSKIP
08CB	E1	0900 ENDSKIP	POP	HL
08CC	C3C506	0901	JP	NEXTCH+DF
		0902 ;		
		0903 ;	END OF OP-01 PLOTTER MONITOR PROGRAM	
		0904 ;		
(FF00)		0905 DF	EQU	-100H
(3850)		0906 TABLE	EQU	3850H
(3BA0)		0907 STAREA	EQU	3BA0H
(0800)		0908 RAM	EQU	800H
(0800)		0909 STATEX	EQU	RAM+0
(0802)		0910 STATEY	EQU	RAM+2
(0804)		0911 CNTRL	EQU	RAM+4
(0806)		0912 HEX	EQU	RAM+6

(0808)	0913	LAST	EQU	RAM+8
(080A)	0914	NEXT	EQU	RAM+10
(080C)	0915	SUM	EQU	RAM+12
(080E)	0916	SLOPE	EQU	RAM+14
(0810)	0917	DEVIDER	EQU	RAM+16
(0812)	0918	FLAG	EQU	RAM+18
(0814)	0919	DESX	EQU	RAM+20
(0816)	0920	DESY	EQU	RAM+22
(0818)	0921	DELX	EQU	RAM+24
(081A)	0922	DELY	EQU	RAM+26
(081C)	0923	CTDOWN	EQU	RAM+28
(081E)	0924	PAT	EQU	RAM+30
(0820)	0925	XS	EQU	RAM+32
(0822)	0926	YS	EQU	RAM+34
(0824)	0927	CHSIZE	EQU	RAM+36
(0826)	0928	NEWS	EQU	RAM+38
(0828)	0929	STEP	EQU	RAM+40
(082A)	0930	HORVER	EQU	RAM+42
(082C)	0931	SIGN	EQU	RAM+44
(082E)	0932	CMAREA	EQU	RAM+46
08CF 1A1A1A	0933		DB	1AH, 1AH, 1AH
08D2 (0100)	0934		END	100H

Errors 0

ภาคผนวก ข. ชุดของโปรแกรมย่อยภาษาเบสิก

```
10000 /
10010 / SUBROUTINE "INIT" FOR INITIALIZATION & AXES DRAWING
10020 PORT1. P=&H22
10030 PORT2. P=&H23
10040 OUT PORT2. P, &H0
10050 OUT PORT2. P, &H0
10060 OUT PORT2. P, &H0
10070 OUT PORT2. P, &H40
10080 OUT PORT2. P, &HCF
10090 OUT PORT2. P, &H27
10100 / CLEAR PORT &H22
10110 CLEAR. P%=INP(PORT1. P): CLEAR. P%=INP(PORT2. P)
10120 /
10130 GOSUB 20000 /PU
10140 GOSUB 20100 /MO
10150 RETURN
10160 /SUBROUTINE END OF COMMAND
10170 BUFFER. P=0
10180 WAIT PORT2. P, &H1: OUT PORT1. P, &H3
10190 WAIT PORT2. P, &H1: OUT PORT1. P, &H3
10200 WAIT PORT2. P, &H1: OUT PORT1. P, &H3
10210 WAIT PORT2. P, &H2: PRINT CHR$(7): CLEAR. P%=INP(PORT1. P)
10220 RETURN
10230 /END OF END OF COMMAND
10240 /SUBROUTINE HEX/ASCII
10250 STR. P$=STR$(POS. P%)
10260 LEN. P%=LEN(STR. P$)-1
10270 STR. P$=MID$(STR. P$, 2, LEN. P%)
10280 ON LEN. P% GOSUB 10360, 10370, 10380, 10390
10290 FOR P. P = 1 TO LEN. P%
10300   WAIT PORT2. P, &H1
10310   MID. P$=MID$(STR. P$, P. P, 1)
10320   POINT. P%=ASC(MID. P$)
10330   OUT PORT1. P, POINT. P%
10340 NEXT P. P
10350 RETURN
10360 WAIT PORT2. P, &H1: OUT PORT1. P, &H30
10370 WAIT PORT2. P, &H1: OUT PORT1. P, &H30
10380 WAIT PORT2. P, &H1: OUT PORT1. P, &H30
10390 RETURN
10400 /END OF HEX/ASCII
10410 /END OF SUBROUTINE "INIT"
```

```
11000 /SUBROUTINE "FACTOR"  
11010 IF ((X. LENGTH<=0)OR(X. LENGTH>14))THEN X. LENGTH=14  
11020 IF ((Y. LENGTH<=0)OR(Y. LENGTH>8))THEN Y. LENGTH=8  
11030 IF (X. MIN<0)THEN XDIFF. P=X. MAX+ABS(X. MIN)  
ELSE XDIFF. P=X. MAX-X. MIN  
11040 IF (Y. MIN<0) THEN YDIFF. P=Y. MAX+ABS(Y. MIN)  
ELSE YDIFF. P=Y. MAX-Y. MIN  
11050 YKONST. P#=Y. LENGTH*100/YDIFF. P  
11060 XKONST. P#=X. LENGTH*100/XDIFF. P  
11070 YMIN. P% = ABS(Y. MIN)*YKONST. P#  
11080 XMIN. P% = ABS(X. MIN)*XKONST. P#  
11090 MOVE. P=125  
11100 IF ((X. LENGTH<6)OR(Y. LENGTH<6))THEN MOVE. P=80: SIZE=1  
11110 RETURN  
11120 /END OF SUBROUTINE "FACTOR"
```

```
12000 /SUBROUTINE "AXIS"  
12010 XTIME. P=XDIFF. P/X. TICK  
12020 YTIME. P=YDIFF. P/Y. TICK  
12030 GOSUB 20000 /PU  
12040 GOSUB 20700 /PA  
12050 POS. P%=MOVE. P  
12060 GOSUB 10250  
12070 WAIT PORT2. P, &H1: OUT PORT1. P, &H2C  
12080 POS. P%=MOVE. P  
12090 GOSUB 10250  
12100 WAIT PORT2. P, &H1: OUT PORT1. P, &H2O  
12110 IF Y. MIN >=0 THEN 12160  
12120 GOSUB 20500 /MU  
12130 POS. P%=YMIN. P%  
12140 GOSUB 10250  
12150 WAIT PORT2. P, &H1: OUT PORT1. P, &H2O  
12160 GOSUB 20200 /PD  
12170 GOSUB 20400 /MR  
12180 POS. P%=X. LENGTH*100  
12190 GOSUB 10250  
12200 WAIT PORT2. P, &H1: OUT PORT1. P, &H2O  
12210 GOSUB 20000 /PU  
12220 GOSUB 20300 /ML  
12230 GOSUB 10250  
12240 WAIT PORT2. P, &H1: OUT PORT1. P, &H2O  
12250 FOR TIME. P = 1 TO XTIME. P  
12260 GOSUB 20400 /MR  
12270 POS. P%=X. TICK*XKONST. P#  
12280 GOSUB 10250  
12290 WAIT PORT2. P, &H1: OUT PORT1. P, &H2O  
12300 GOSUB 20500 /MU  
12310 WAIT PORT2. P, &H1: OUT PORT1. P, &H30  
12320 WAIT PORT2. P, &H1: OUT PORT1. P, &H30  
12330 WAIT PORT2. P, &H1: OUT PORT1. P, &H31  
12340 WAIT PORT2. P, &H1: OUT PORT1. P, &H32  
12350 WAIT PORT2. P, &H1: OUT PORT1. P, &H20  
12360 GOSUB 20200 /PD  
12370 GOSUB 20600 /MD  
12380 WAIT PORT2. P, &H1: OUT PORT1. P, &H30  
12390 WAIT PORT2. P, &H1: OUT PORT1. P, &H30  
12400 WAIT PORT2. P, &H1: OUT PORT1. P, &H32  
12410 WAIT PORT2. P, &H1: OUT PORT1. P, &H34  
12420 WAIT PORT2. P, &H1: OUT PORT1. P, &H20  
12430 GOSUB 20000 /PU  
12440 GOSUB 20500 /MU  
12450 WAIT PORT2. P, &H1: OUT PORT1. P, &H30  
12460 WAIT PORT2. P, &H1: OUT PORT1. P, &H30  
12470 WAIT PORT2. P, &H1: OUT PORT1. P, &H31  
12480 WAIT PORT2. P, &H1: OUT PORT1. P, &H32  
12490 WAIT PORT2. P, &H1: OUT PORT1. P, &H20  
12500 NEXT TIME. P  
12510 GOSUB 20000 /PU
```

```

12520 GOSUB 20700 ^PA
12530 POS. P%=MOVE. P
12540 GOSUB 10250
12550 WAIT PORT2. P, &H1: OUT PORT1. P, &H2C
12560 GOSUB 10250
12570 WAIT PORT2. P, &H1: OUT PORT1. P, &H20
12580 IF X. MIN >=0 THEN 12630
12590 GOSUB 20400 ^MR
12600 POS. P%=XMIN. P%
12610 GOSUB 10250
12620 WAIT PORT2. P, &H1: OUT PORT1. P, &H20
12630 GOSUB 20200 ^PD
12640 GOSUB 20500 ^MU
12650 POS. P%=Y. LENGTH*100
12660 GOSUB 10250
12670 WAIT PORT2. P, &H1: OUT PORT1. P, &H20
12680 GOSUB 20000 ^PU
12690 GOSUB 20600 ^MD
12700 GOSUB 10250
12710 WAIT PORT2. P, &H1: OUT PORT1. P, &H20
12720 FOR TIME. P=1 TO YTIME. P
12730 GOSUB 20500 ^MU
12740 POS. P%=Y. TICK*YKONST. P#
12750 GOSUB 10250
12760 WAIT PORT2. P, &H1: OUT PORT1. P, &H20
12770 GOSUB 20400 ^MR
12780 WAIT PORT2. P, &H1: OUT PORT1. P, &H30
12790 WAIT PORT2. P, &H1: OUT PORT1. P, &H30
12800 WAIT PORT2. P, &H1: OUT PORT1. P, &H31
12810 WAIT PORT2. P, &H1: OUT PORT1. P, &H32
12820 WAIT PORT2. P, &H1: OUT PORT1. P, &H20
12830 GOSUB 20200 ^PD
12840 GOSUB 20300 ^ML
12850 WAIT PORT2. P, &H1: OUT PORT1. P, &H30
12860 WAIT PORT2. P, &H1: OUT PORT1. P, &H30
12870 WAIT PORT2. P, &H1: OUT PORT1. P, &H32
12880 WAIT PORT2. P, &H1: OUT PORT1. P, &H34
12890 WAIT PORT2. P, &H1: OUT PORT1. P, &H20
12900 GOSUB 20000 ^PU
12910 GOSUB 20400 ^MR
12920 WAIT PORT2. P, &H1: OUT PORT1. P, &H30
12930 WAIT PORT2. P, &H1: OUT PORT1. P, &H30
12940 WAIT PORT2. P, &H1: OUT PORT1. P, &H31
12950 WAIT PORT2. P, &H1: OUT PORT1. P, &H32
12960 WAIT PORT2. P, &H1: OUT PORT1. P, &H20
12970 NEXT TIME. P
12980 GOSUB 20100 ^MO
12990 ADD. P=0
13000 FOR MARK. P= 1 TO XTIME. P+1
13010 X. VALUE=(ADD. P*XKONST. P#+MOVE. P)/100: Y. VALUE=. 5
13020 CSTRING$=STR$((X. MIN+ADD. P))
13030 IF (X. MIN+ADD. P) >=0 THEN CLENGTH. P=LEN(CSTRING$):
CSTRING$=RIGHT$(CSTRING$, (CLENGTH. P-1))
13040 DIRECTION=1

```



```
13050 GOSUB 17000
13060 ADD. P=ADD. P+X. TICK
13070 NEXT MARK. P
13080 GOSUB 20100 'MO
13090 ADD. P=0
13100 FOR MARK. P=1 TO YTIME. P+1
13110 X. VALUE=. 5: Y. VALUE=(ADD. P*YKONST. P#+MOVE. P)/100
13120 CSTRING$=STR$(Y. MIN+ADD. P)
13130 IF (Y. MIN+ADD. P) >=0 THEN CLENGTH. P=LEN(CSTRING$):
CSTRING$=RIGHT$(CSTRING$, (CLENGTH. P-1))
13140     DIRECTION=1
13150 GOSUB 17000
13160 ADD. P=ADD. P+Y. TICK
13170 NEXT MARK. P
13180 GOSUB 20100 'MO
13190 IF X. TITLE$="" THEN 13240
13200 X. VALUE=(XDIFF. P/3)*XKONST. P#/100: Y. VALUE=0
13210     DIRECTION=1
13220 CSTRING$=X. TITLE$
13230 GOSUB 17000
13240 IF Y. TITLE$="" THEN 13290
13250 X. VALUE=0: Y. VALUE=(YDIFF. P)*YKONST. P#/100
13260 CSTRING$=Y. TITLE$
13270     DIRECTION=2
13280 GOSUB 17000
13290 IF M. TITLE$="" THEN 13340
13300 X. VALUE=(XDIFF. P/3)*XKONST. P#/100: Y. VALUE=Y. LENGTH+(MOVE. P/100)
13310 CSTRING$=M. TITLE$
13320     DIRECTION=1
13330 GOSUB 17000
13340 RETURN
13350 'END OF SUBROUTINE "AXIS"
```

```
14000 /SUBROUTINE "LOCATE"  
14010 GOSUB 20000 /PU  
14020 GOSUB 15000  
14030 GOSUB 20200 /PD  
14040 RETURN  
14050 /END OF SUBROUTINE "LOCATE"
```

```
15000 'SUBROUTINE "PLOTA"  
15010 GOSUB 20700 'PA  
15020 IF X. MIN<0 THEN POS. P%=X. VALUE*XKONST. P# + XMIN. P%+MOVE. P  
    ELSE POS. P%=X. VALUE*XKONST. P#-XMIN. P%+MOVE. P  
15030 GOSUB 10250  
15040 WAIT PORT2. P, &H1: OUT PORT1. P, &H2C  
15050 IF Y. MIN<0 THEN POS. P%=Y. VALUE*YKONST. P# + YMIN. P%+MOVE. P  
    ELSE POS. P%=Y. VALUE*YKONST. P#-YMIN. P%+MOVE. P  
15060 GOSUB 10250  
15070 WAIT PORT2. P, &H1: OUT PORT1. P, &H20  
15080 BUFFER. P=BUFFER. P+1  
15090 IF BUFFER. P>=80 THEN GOSUB 10170  
15100 RETURN  
15110 'END OF SUBROUTINE "PLOTA"
```

```
16000  SUBROUTINE "PLOTR"  
16010  GOSUB 20800  PR  
16020  POS. P%=X. VALUE*XKONST. P#  
16030  IF POS. P%<0 THEN WAIT PORT2. P, &H1: OUT PORT1. P, &H2D  
16040  GOSUB 10250  
16050  WAIT PORT2. P, &H1: OUT PORT1. P, &H2C  
16060  POS. P%=Y. VALUE*YKONST. P#  
16070  IF POS. P%<0 THEN WAIT PORT2. P, &H1: OUT PORT1. P, &H2D  
16080  GOSUB 10250  
16090  WAIT PORT2. P, &H1: OUT PORT1. P, &H2O  
16100  BUFFER. P=BUFFER. P+1  
16110  IF BUFFER. P>=80 THEN GOSUB 10170  
16120  RETURN  
16130  END OF SUBROUTINE "PLOTR"
```

```
17000 'SUBROUTINE "CHAR"
17010 GOSUB 20700 'PA
17020 PDS. P%=X. VALUE*100
17030 GOSUB 10250
17040 WAIT PORT2. P, &H1: OUT PORT1. P, &H2C
17050 PDS. P%=Y. VALUE*100
17060 GOSUB 10250
17070 WAIT PORT2. P, &H1: OUT PORT1. P, &H20
17080 CLENGTH. P=LEN(CSTRING$)
17090 WAIT PORT2. P, &H1: OUT PORT1. P, &H53
17100 IF ((SIZE<=0)OR(SIZE>5)) THEN SIZE=2
17110 ON SIZE GOSUB 17220, 17230, 17240, 17250
17120 IF ((DIRECTION<=0)OR(DIRECTION>2)) THEN DIRECTION=1
17130 ON DIRECTION GOSUB 20900, 21000
17140 WAIT PORT2. P, &H1: OUT PORT1. P, &H5F
17150 FOR TOKEN. P=1 TO CLENGTH. P
17160 ASCII=ASC(MID$(CSTRING$, TOKEN. P, 1))
17170 WAIT PORT2. P, &H1: OUT PORT1. P, ASCII.
17180 NEXT
17190 WAIT PORT2. P, &H1: OUT PORT1. P, &H5F
17200 WAIT PORT2. P, &H1: OUT PORT1. P, &H20
17210 RETURN
17220 OUT PORT1. P, &H31: RETURN
17230 OUT PORT1. P, &H32: RETURN
17240 OUT PORT1. P, &H33: RETURN
17250 OUT PORT1. P, &H34: RETURN
17260 OUT PORT1. P, &H35: RETURN
17270 'END OF SUBROUTINE "CHAR"
```

```
18000 /SUBROUTINE "CIRCLE"  
18010 SAVE1. P#=XKONST. P#  
18020 SAVE2. P#=YKONST. P#  
18030 X. LENGTH=14  
18040 Y. LENGTH=8  
18050 X. MIN=0  
18060 X. MAX=X. LENGTH  
18070 Y. MIN=0  
18080 Y. MAX=Y. LENGTH  
18090 GOSUB 10000  
18100 GOSUB 11000  
18115 XCENTER. P=X. VALUE: YCENTER. P=Y. VALUE  
18120 X. VALUE=RADIUS+XCENTER. P-(MOVE. P/100)  
: Y. VALUE=YCENTER. P-(MOVE. P/100)  
18130 GOSUB 14000  
18140 FOR THETA. P =0 TO 6.3 STEP .1  
18150 Y. P=RADIUS*SIN(THETA. P)  
18160 X. P=RADIUS*COS(THETA. P)  
18170 X. VALUE=X. P+XCENTER. P-(MOVE. P/100)  
18180 Y. VALUE=Y. P+YCENTER. P-(MOVE. P/100)  
18190 GOSUB 15000  
18200 NEXT THETA. P  
18210 XKONST. P#=SAVE1. P#  
18220 YKONST. P#=SAVE2. P#  
18230 RETURN  
18240 /END OF "CIRCLE"
```

```
19000 / SUBROUTINE "QUIT"  
19010 GOSUB 20000 /PU  
19020 GOSUB 20100 /MO  
19030 WAIT PORT2. P, &H1: OUT PORT1. P, &H3  
19040 WAIT PORT2. P, &H1: OUT PORT1. P, &H3  
19050 WAIT PORT2. P, &H1: OUT PORT1. P, &H3  
19060 WAIT PORT2. P, &H2: PRINT CHR$(7): CLEAR. P%=INF(PORT1. P)  
19070 BUFFER. P=0  
19080 RETURN  
19090 / END OF SUBROUTINE "QUIT"
```

```

19998 /SUBROUTINE"CPCOM"
19999 /PU
20000 WAIT PORT2. P, &H1: OUT PORT1. P, &H50
20010 WAIT PORT2. P, &H1: OUT PORT1. P, &H55
20020 WAIT PORT2. P, &H1: OUT PORT1. P, &H20
20030 RETURN
20099 /MO
20100 WAIT PORT2. P, &H1: OUT PORT1. P, &H4D
20110 WAIT PORT2. P, &H1: OUT PORT1. P, &H4F
20120 WAIT PORT2. P, &H1: OUT PORT1. P, &H20
20130 RETURN
20140 /MO
20199 /PD
20200 WAIT PORT2. P, &H1: OUT PORT1. P, &H50
20210 WAIT PORT2. P, &H1: OUT PORT1. P, &H44
20220 WAIT PORT2. P, &H1: OUT PORT1. P, &H20
20230 RETURN
20299 /ML
20300 WAIT PORT2. P, &H1: OUT PORT1. P, &H4D
20310 WAIT PORT2. P, &H1: OUT PORT1. P, &H4C
20330 RETURN
20399 /MR
20400 WAIT PORT2. P, &H1: OUT PORT1. P, &H4D
20410 WAIT PORT2. P, &H1: OUT PORT1. P, &H52
20430 RETURN
20499 /MU
20500 WAIT PORT2. P, &H1: OUT PORT1. P, &H4D
20510 WAIT PORT2. P, &H1: OUT PORT1. P, &H55
20530 RETURN
20599 /MD
20600 WAIT PORT2. P, &H1: OUT PORT1. P, &H4D
20610 WAIT PORT2. P, &H1: OUT PORT1. P, &H44
20630 RETURN
20699 /PA
20700 WAIT PORT2. P, &H1: OUT PORT1. P, &H50
20710 WAIT PORT2. P, &H1: OUT PORT1. P, &H41
20730 RETURN
20799 /PR
20800 WAIT PORT2. P, &H1: OUT PORT1. P, &H50
20810 WAIT PORT2. P, &H1: OUT PORT1. P, &H52
20830 RETURN
20899 /CH
20900 WAIT PORT2. P, &H1: OUT PORT1. P, &H43
20910 WAIT PORT2. P, &H1: OUT PORT1. P, &H48
20930 RETURN
20999 /CV
21000 WAIT PORT2. P, &H1: OUT PORT1. P, &H43
21010 WAIT PORT2. P, &H1: OUT PORT1. P, &H56
21030 RETURN
21040 /END OF SUBROUTINE"CPCOM"

```

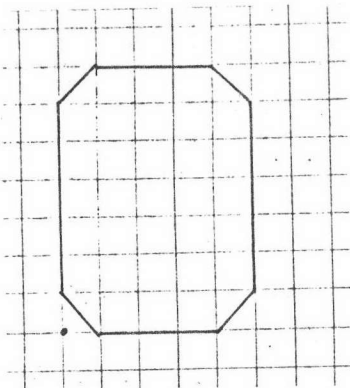


ภาคผนวก ค. สำเนาการใช้โปรแกรมย่อยภาษาเบสิก

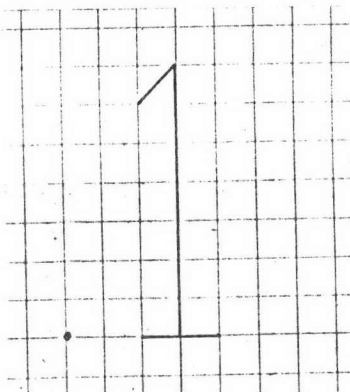
ชื่อโปรแกรม	คำสั่งเรียก	หน้าที่
INIT	GOSUB 10000	ยกปากกาไปที่จุดเริ่มต้น
FACTOR	GOSUB 11000	กำหนดค่าความยาวแกนค่าสูงสุดและต่ำสุดบนแกน พารามิเตอร์คือ X.LENGTH Y.LENGTH X.MIN X.MAX Y.MIN Y.MAX
AXIS	GOSUB 12000	เขียนแกนทั้ง 2 ขีดบนแกน ตัวเลขบนแกน ข้อความบนแกน และข้อความประกอบรูป พารามิเตอร์คือ X.TICK Y.TICK X.TITLE\$ Y.TITLE\$ M.TITLE\$
LOCATE	GOSUB 14000	ยกปากกาไปวางที่จุดเริ่มลากเส้นกราฟ พารามิเตอร์คือ X.VALUE Y.VALUE
PLOTA	GOSUB 15000	ลากเส้นจากจุดเดิมไปยังจุดใด ๆ พารามิเตอร์คือ X.VALUE Y.VALUE
PLOTR	GOSUB 16000	ลากเส้นจากจุดเดิมไปยังจุดใด ๆ พารามิเตอร์คือ X.VALUE Y.VALUE
CHAR	GOSUB 17000	เขียนตัวอักษรที่จุดใด ๆ พารามิเตอร์คือ X.VALUE Y.VALUE DIRECTION SIZE CSTRING\$
CIRCLE	GOSUB 18000	เขียนวงกลมที่ตำแหน่งใด ๆ พารามิเตอร์คือ X.VALUE Y.VALUE RADIUS
QUIT	GOSUB 19000	เลิกการใช้พลอตเตอร์ ยกปากกาสลับไปจุดเริ่มต้น

CPCOM			สิ่งคำสั่งต่อไปนี้ไปยังพลอตเตอร์
	GOSUB	20000	PU
	GOSUB	20100	MO
	GOSUB	20200	PD
	GOSUB	20300	ML
	GOSUB	20400	MR
	GOSUB	20500	MU
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	GOSUB	20700	PA
	GOSUB	20800	PR
	GOSUB	20900	CH
	GOSUB	21000	CV

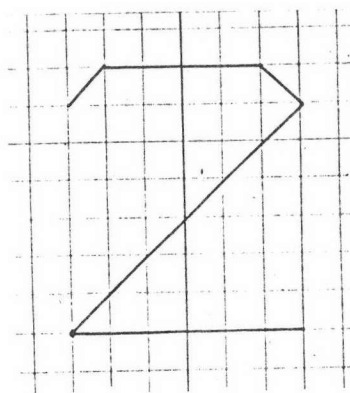
ภาคผนวก ง. แบบตัวอักษร และรหัสในการเขียนตัวอักษร



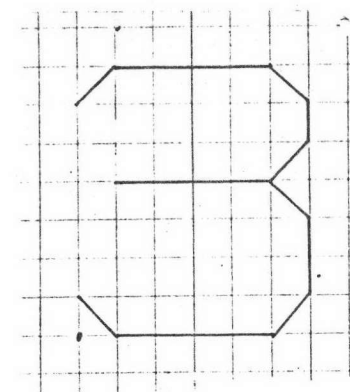
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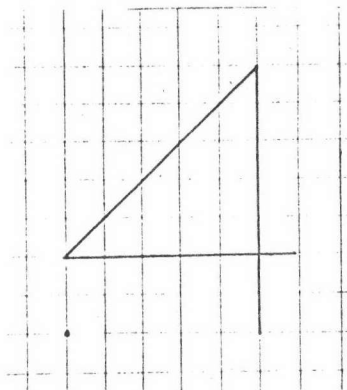
04 12 91 C7 21 E2 62 FF



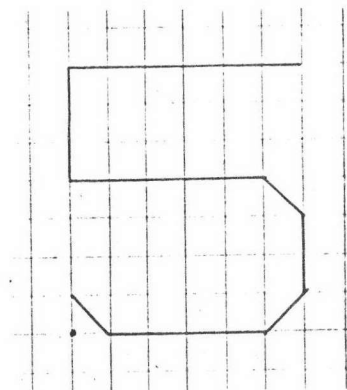
06 91 A4 B1 D6 A6 66 FF



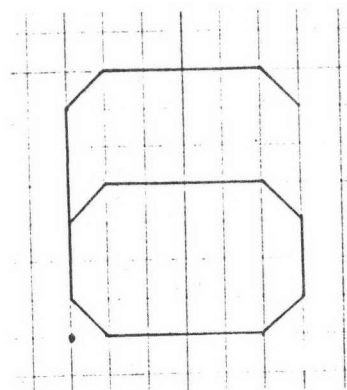
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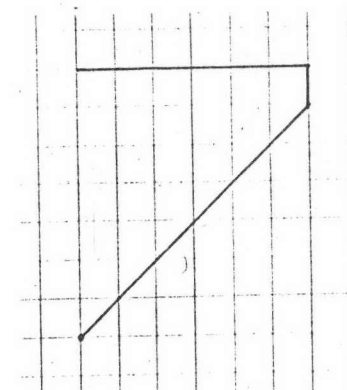
26 02 E6 95 C7 85 FF



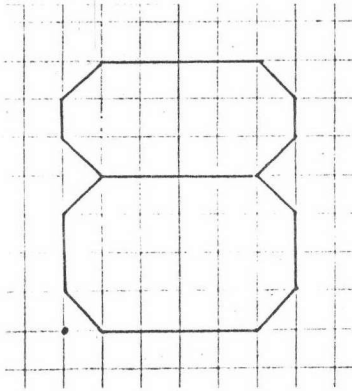
16 01 E6 C3 A5 B1 C2 D1 E4 F1 41 9F



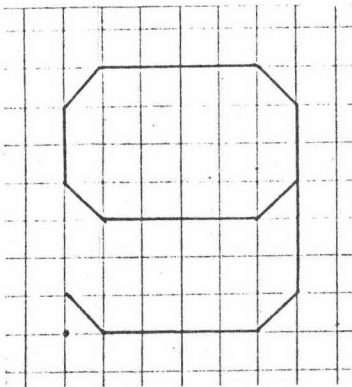
16 F1 E4 D1 C5 B1 A4 91 82 F1 E4 D1 43 FF



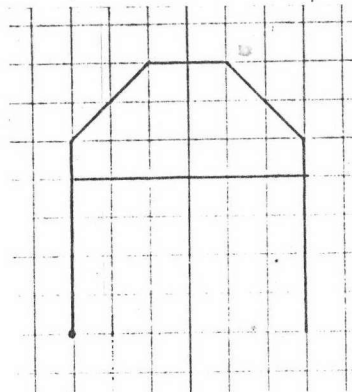
96 81 E6 47 FF



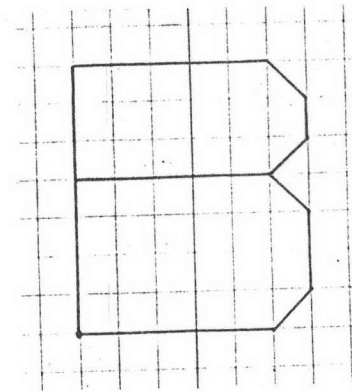
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E4 F1 41 FF



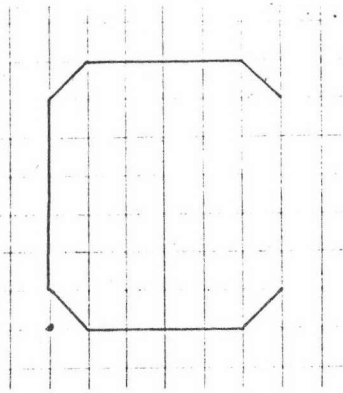
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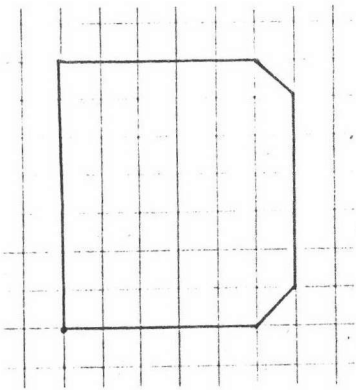
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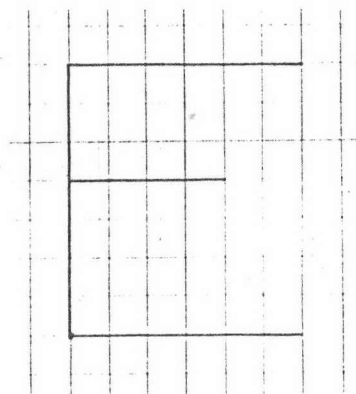
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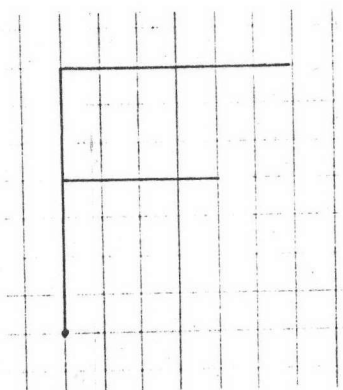
16 F1 E4 D1 C5 B1 A4 91 66 41 FF



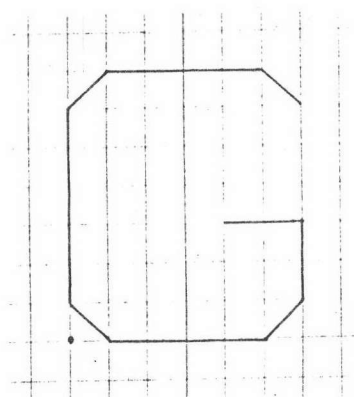
07 A5 B1 C5 D1 E5 87 47 FF



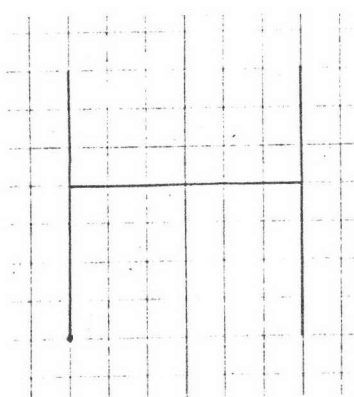
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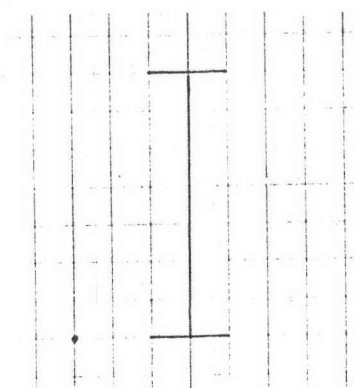
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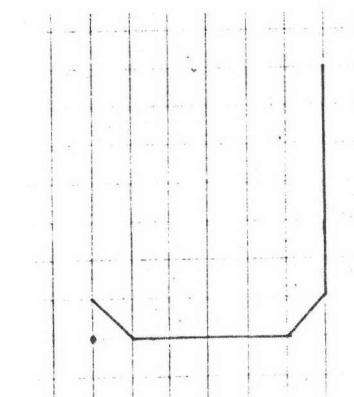
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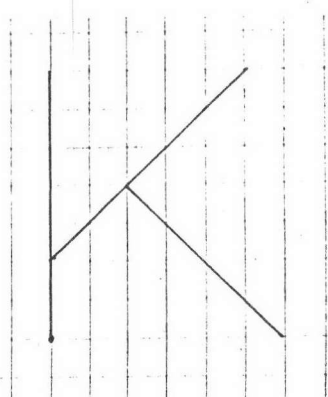
87 26 C7 04 E6 44 FF



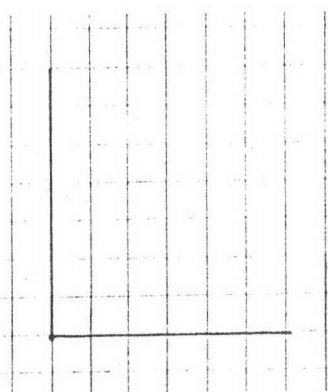
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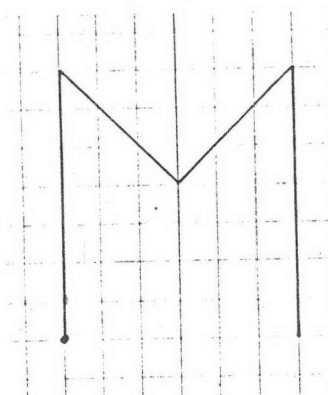
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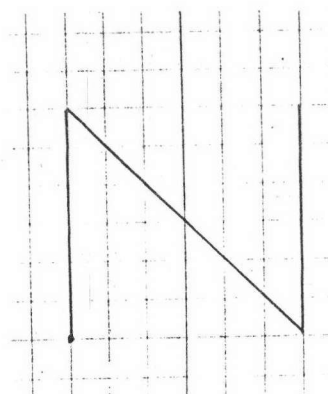
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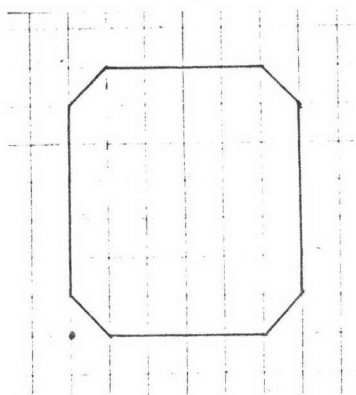
07 C7 A6 66 FF



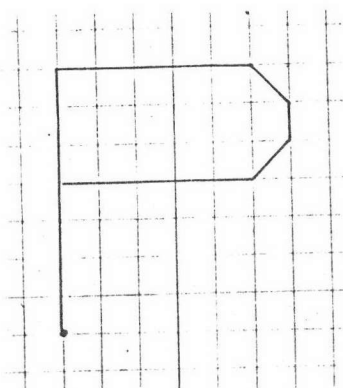
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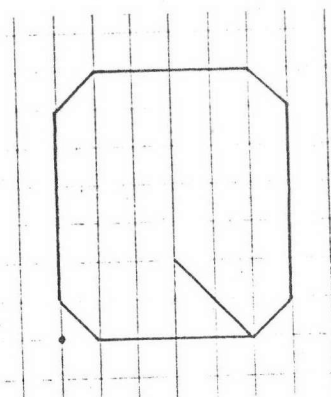
86 B6 86 56 FF



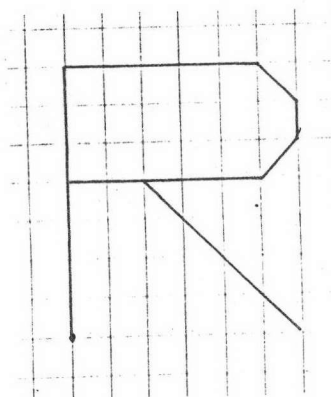
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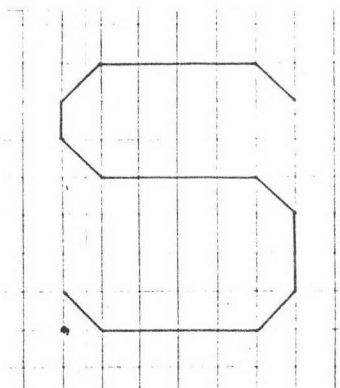
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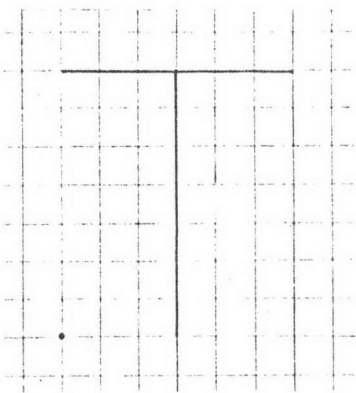
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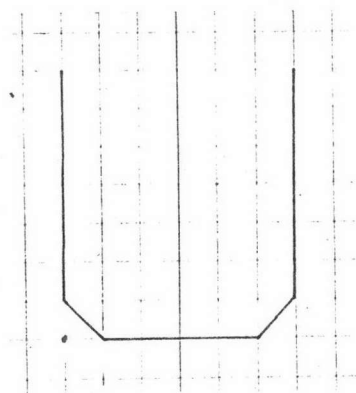
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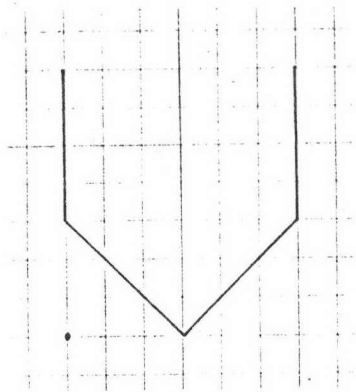
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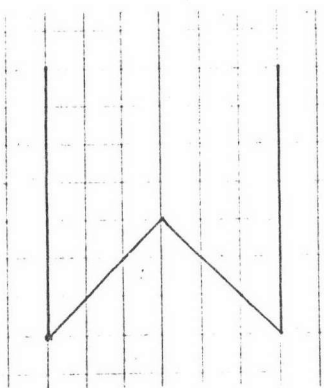
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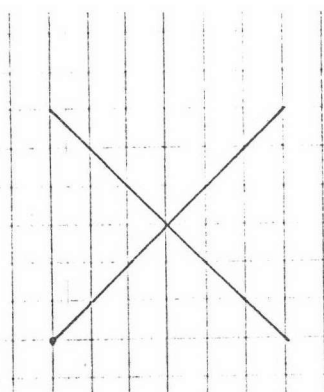
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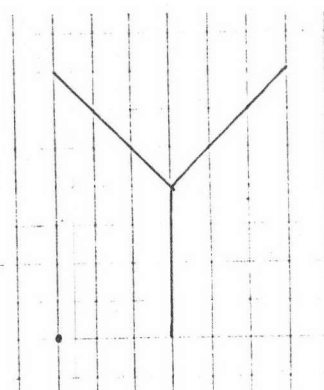
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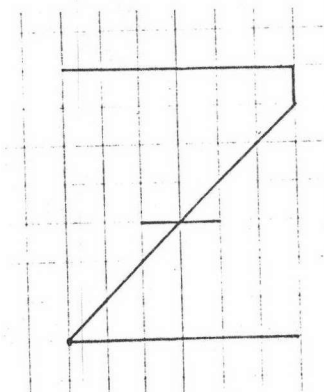
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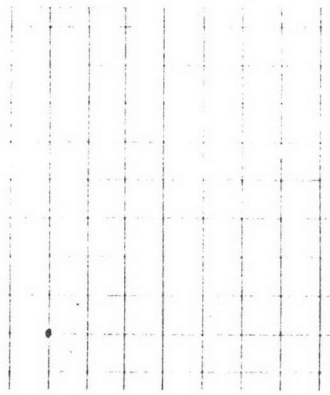
96 46 F6 46 FF



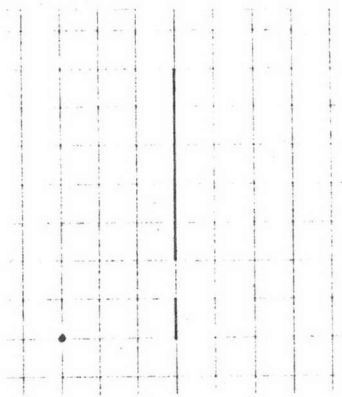
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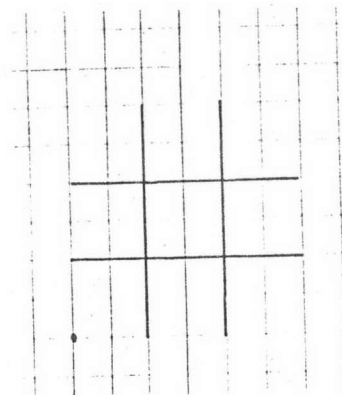
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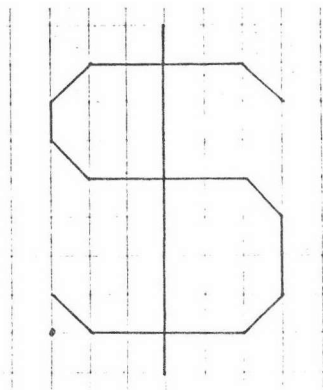
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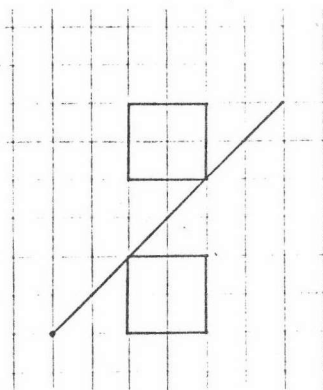
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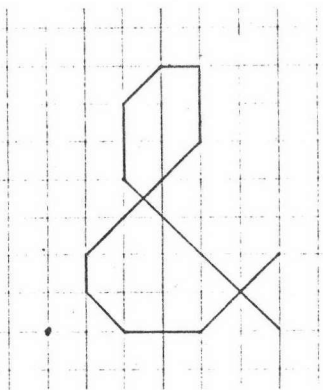
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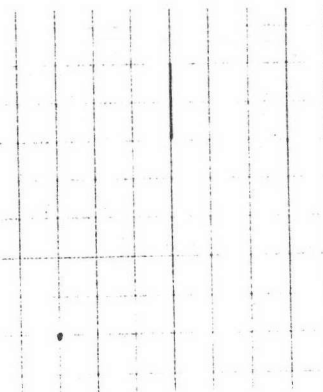
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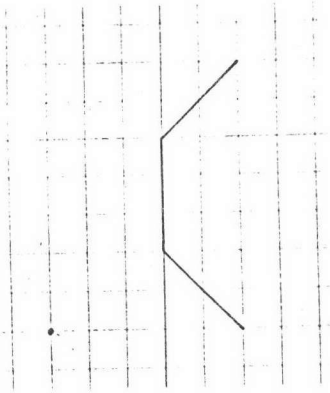
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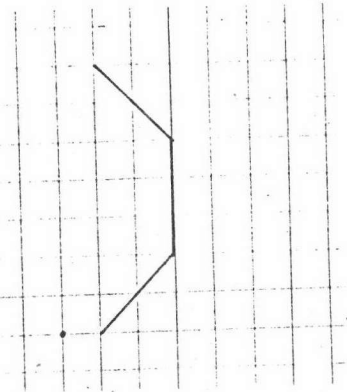
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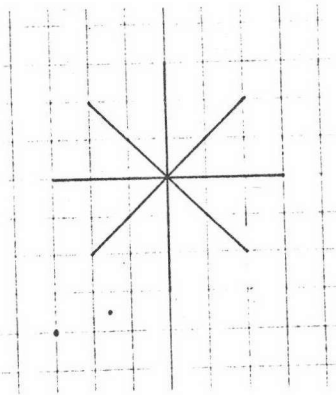
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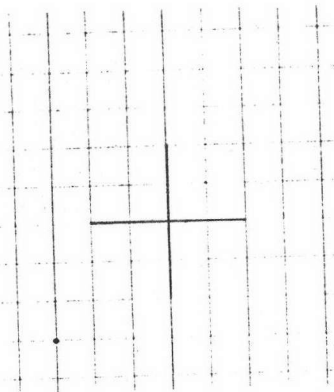
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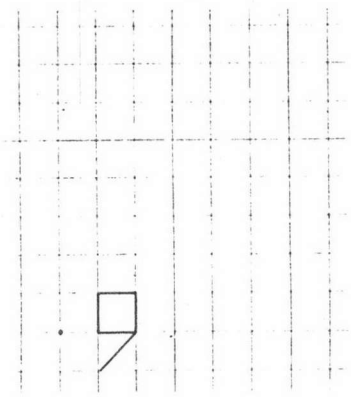
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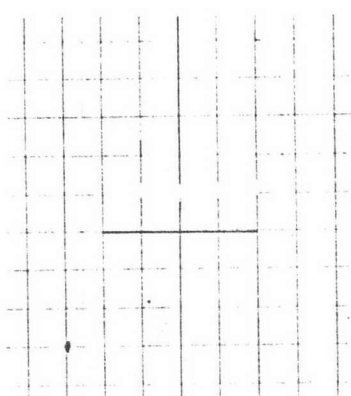
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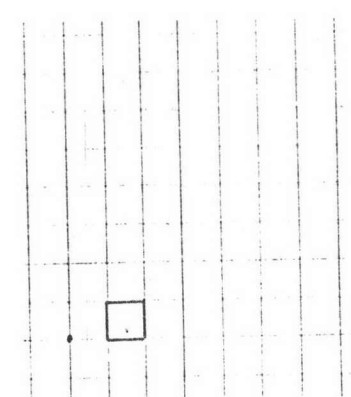
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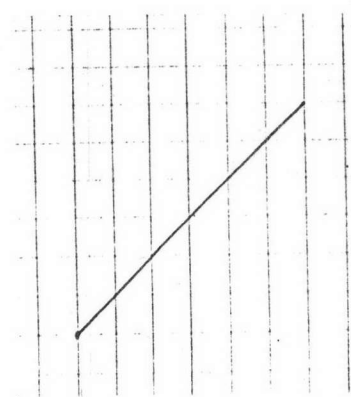
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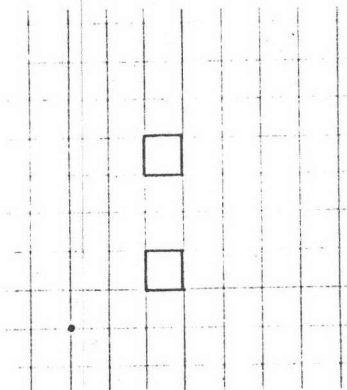


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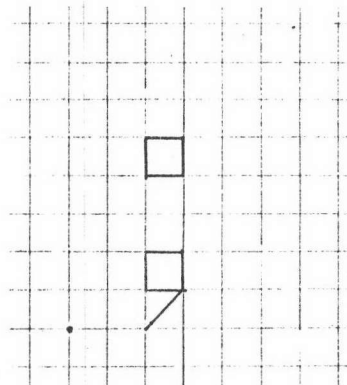


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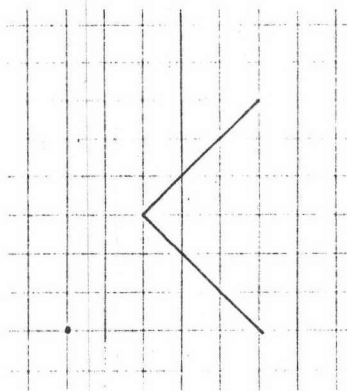




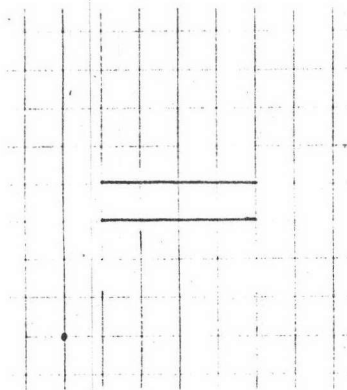
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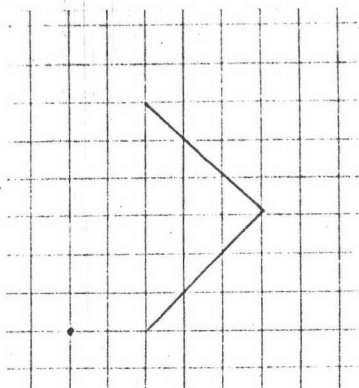
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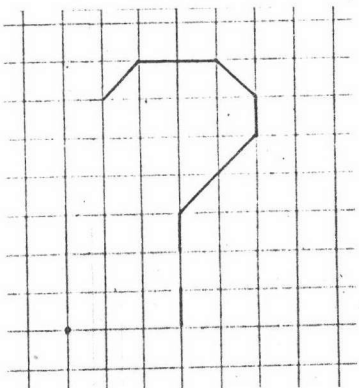
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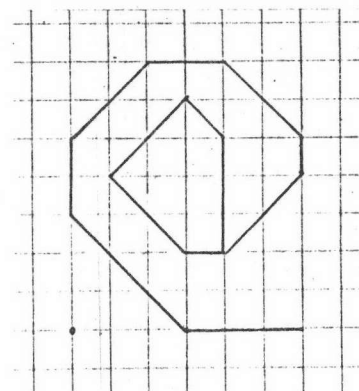
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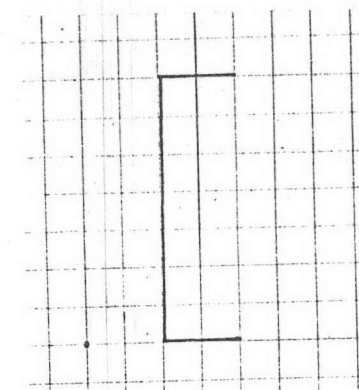
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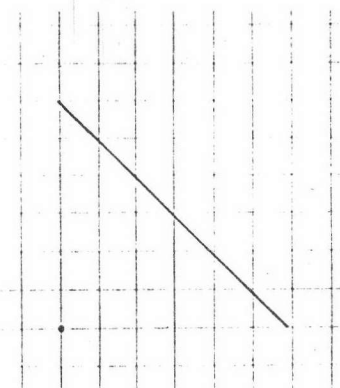
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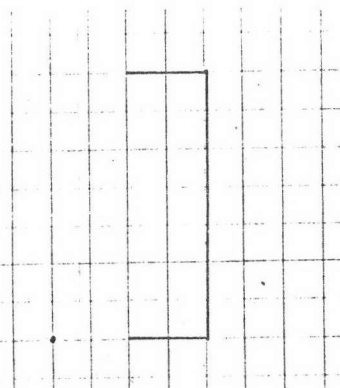
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C3 42 64 FF



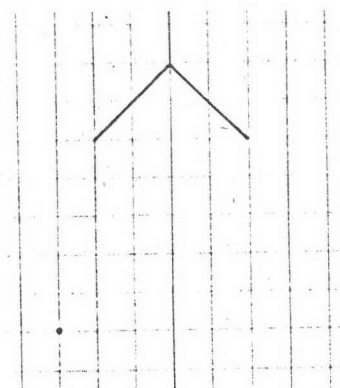
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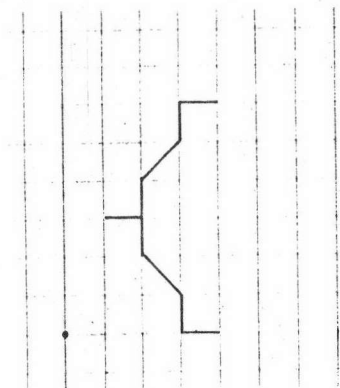
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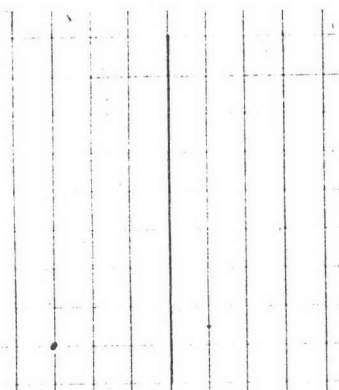
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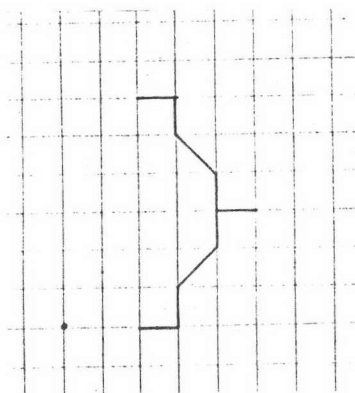
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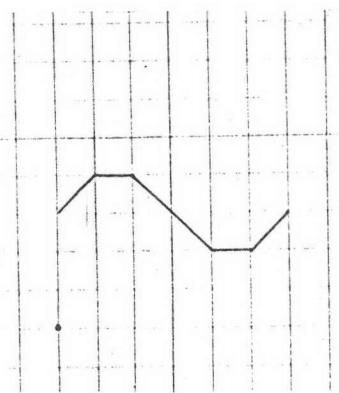
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08 23 C9 63 01 FF



06 22 A1 C1 B1 C1 A1 61 C1 D1 C1 E1 62 FF



03 91 A1 B2 A1 91 43 66 FF

ภาคผนวก จ. รหัสการเขียนตัวอักษรซึ่งบรรจุในหน่วยความจำอีพรม

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0003 ;
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0006 ; & SEFTTEST STRING
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0009 ;         DW         <ADDRESS OF THE CODE>
0010 ;
0011 ; -----
0000' 0012         ORG     8800H
3800 (0050) 0013         DB     50H
0014 ; -----
0015 ;
0016 ; NUMERIC CHARACTERS 0-9
0017 ;
0018 ; -----
3850 30         0019 TABLE  JP     /0/
3851 1039      0020         DW     Z0
3853 31         0021         DB     /1/
3854 2839      0022         DW     Z1
3856 32         0023         DB     /2/
3857 3039      0024         DW     Z2
3859 33         0025         DB     /3/
385A 3839      0026         DW     Z3
385C 34         0027         DB     /4/
385D 4739      0028         DW     Z4
385F 35         0029         DB     /5/
3860 4E39      0030         DW     Z5
3862 36         0031         DB     /6/
3863 5A39      0032         DW     Z6
3865 37         0033         DB     /7/
3866 6839      0034         DW     Z7
3868 38         0035         DB     /8/
3869 6D39      0036         DW     Z8
386B 39         0037         DB     /9/
386C 8039      0038         DW     Z9
0039 ; -----
0040 ;
0041 ; ALPHABETIC CHARACTERS A-Z
0042 ;
0043 ; -----
386E 41         0044         DB     /A/
386F 8F39      0045         DW     ZA
3871 42         0046         DB     /B/
3872 9839      0047         DW     ZB
3874 43         0048         DB     /C/
3875 A539      0049         DW     ZC
3877 44         0050         DB     /D/
3878 B039      0051         DW     ZD
387A 45         0052         DB     /E/
387B B939      0053         DW     ZE
387D 46         0054         DB     /F/
387E C239      0055         DW     ZF
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3881 D939      0057         DW     ZG

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389E	51	0076	DB	<Q>
389F	1A3A	0077	DW	ZQ
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38A2	293A	0079	DW	ZR
38A4	53	0080	DB	<S>
38A5	333A	0081	DW	ZS
38A7	54	0082	DB	<T>
38A8	413A	0083	DW	ZT
38AA	55	0084	DB	<U>
38AB	473A	0085	DW	ZU
38AD	56	0086	DB	<V>
38AE	503A	0087	DW	ZV
38B0	57	0088	DB	<W>
38B1	583A	0089	DW	ZW
38B3	58	0090	DB	<X>
38B4	603A	0091	DW	ZX
38B6	59	0092	DB	<Y>
38B7	653A	0093	DW	ZY
38B9	5A	0094	DB	<Z>
38BA	603A	0095	DW	ZZ
		0096	-----	
		0097	;	
		0098	31 SPECIAL CHARACTERS	
		0099	;	
		0100	-----	
38BC	20	0101	DB	< / >
38BD	773A	0102	DW	X1
38BF	21	0103	DB	< / >
38C0	783A	0104	DW	X2
38C2	22	0105	DB	< / >
38C3	7F3A	0106	DW	X3
38C5	23	0107	DB	< # >
38C6	873A	0108	DW	X4
38C8	24	0109	DB	< # >
38C9	923A	0110	DW	X5
38CB	25	0111	DB	< % >
38CC	A53A	0112	DW	X6
38CE	26	0113	DB	< % >
38CF	B33A	0114	DW	X7

38D1	27	0115	DB	27H
38D2	013A	0116	DW	X8
38D4	28	0117	DB	<1>
38D5	D73A	0118	DW	X9
38D7	29	0119	DB	<1>
38D8	DE3A	0120	DW	X10
38D9	2A	0121	DB	<1>
38DB	053A	0122	DW	X11
38DD	2B	0123	DB	<1>
38DE	E13A	0124	DW	X12
38E0	2C	0125	DB	<1>
38E1	E93A	0126	DW	X13
38E3	2D	0127	DB	<1>
38E4	F13A	0128	DW	X14
38E6	2E	0129	DB	<1>
38E7	F73A	0130	DW	X15
38E9	2F	0131	DB	<1>
38EA	FE3A	0132	DW	X16
38EC	3A	0133	DB	<1>
38ED	013B	0134	DW	X17
38EF	3B	0135	DB	<1>
38F0	0E3B	0136	DW	X18
38F2	3C	0137	DB	<1>
38F3	1D3B	0138	DW	X19
38F5	3D	0139	DB	<1>
38F6	233B	0140	DW	X20
38F8	3E	0141	DB	<1>
38F9	2B3B	0142	DW	X21
38FB	3F	0143	DB	<1>
38FC	313B	0144	DW	X22
38FE	40	0145	DB	<1>
38FF	3E3B	0146	DW	X23
3901	5B	0147	DB	<1>
3902	4F3B	0148	DW	X24
3904	5C	0149	DB	<1>
3905	563B	0150	DW	X25
3907	5D	0151	DB	<1>
3908	5A3B	0152	DW	X26
390A	5E	0153	DB	<1>
390B	613B	0154	DW	X27
390D	5F	0155	DB	<1>
390E	673B	0156	DW	X28
3910	7B	0157	DB	<1>
3911	6A3B	0158	DW	X29
3913	7C	0159	DB	<1>
3914	783B	0160	DW	X30
3916	7D	0161	DB	<1>
3917	7E3B	0162	DW	X31
3919	7E	0163	DB	<1>
391A	8C3B	0164	DW	X32
		0165		
		0166		
		0167		AREA OF THE CODES
		0168		
		0169		
391C	(000C)	0170	Z0	DB 12
3928	(0008)	0171	Z1	DB 8

NOT USE
NOT USE

3930 (0008)	0172 Z2	DS	8
3938 (000F)	0173 Z3	DS	15
3947 (0007)	0174 Z4	DS	7
394E (000C)	0175 Z5	DS	12
395A (000E)	0176 Z6	DS	14
3968 (0005)	0177 Z7	DS	5
396D (0013)	0178 Z8	DS	19
3980 (000F)	0179 Z9	DS	16
398F (0009)	0180 ZA	DS	9
3998 (000D)	0181 ZB	DS	13
39A5 (0008)	0182 ZC	DS	11
39B0 (0009)	0183 ZD	DS	9
39B9 (0009)	0184 ZE	DS	9
39C2 (0007)	0185 ZF	DS	7
39C9 (000F)	0186 ZG	DS	15
39D8 (0007)	0187 ZH	DS	7
39DF (0008)	0188 ZI	DS	8
39E7 (0009)	0189 ZJ	DS	9
39F0 (0007)	0190 ZK	DS	7
39F7 (0005)	0191 ZL	DS	5
39FC (0006)	0192 ZM	DS	6
3A02 (0005)	0193 ZN	DS	10
3A07 (0005)	0194 ZO	DS	11
3A12 (0008)	0195 ZP	DS	8
3A1A (000F)	0196 ZQ	DS	15
3AZ9 (000A)	0197 ZR	DS	10
3A33 (000E)	0198 ZS	DS	14
3A41 (0006)	0199 ZT	DS	6
3A47 (0009)	0200 ZU	DS	9
3A50 (0002)	0201 ZV	DS	8
3A58 (0005)	0202 ZW	DS	8
3A60 (0005)	0203 ZX	DS	8
3A65 (0007)	0204 ZY	DS	7
3A6C (000B)	0205 ZZ	DS	11
3A77 (0001)	0206 X1	DS	1
3A7B (0007)	0207 X2	DS	7
3A7F (0008)	0208 X3	DS	8
3A87 (0002)	0209 X4	DS	11
3A92 (0013)	0210 X5	DS	19
3AA5 (000E)	0211 X6	DS	14
3AB3 (000E)	0212 X7	DS	14
3AC1 (0006)	0213 X8	DS	6
3AC7 (0007)	0214 X9	DS	7
3ACD (0007)	0215 X10	DS	7
3AD5 (000C)	0216 X11	DS	12
3AE1 (0008)	0217 X12	DS	8
3AE9 (0008)	0218 X13	DS	8
3AF1 (0006)	0219 X14	DS	6
3AF7 (0007)	0220 X15	DS	7
3AFE (0003)	0221 X16	DS	3
3B01 (000B)	0222 X17	DS	13
3B0E (000F)	0223 X18	DS	15
3B1D (0004)	0224 X19	DS	6
3B23 (0002)	0225 X20	DS	8
3B2B (0006)	0226 X21	DS	6
3B31 (000D)	0227 X22	DS	13
3B3E (0011)	0228 X23	DS	17

3B4F	(0007)	0229	X24	DS	7
3B56	(0004)	0230	X25	DS	6
3B5A	(0007)	0231	X26	DS	7
3B61	(0006)	0232	X27	DS	6
3B67	(0003)	0233	X28	DS	3
3B6A	(000E)	0234	X29	DS	14
3B78	(0006)	0235	X30	DS	6
3B7E	(000E)	0236	X31	DS	14
3B8C	(0009)	0237	X32	DS	9
3B95	(3800)	0238		END	3800H

Errors 0

-D3800, 3A3F

3800 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00
3810 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00
3820 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00
3830 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00
3840 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00
3850 30 1C 39 31 28 39 32 30 39 33 38 39 34 47 39 35 0. 91(92090894095
3860 4E 39 36 5A 39 37 68 39 38 6D 39 39 80 39 41 3F N96Z97598m99. 9A.
3870 39 42 98 39 43 A5 39 44 B0 39 45 B9 39 46 C2 39 93 9C 9D 9E 9F. 9
3880 47 C9 39 48 D8 39 49 DF 39 4A E7 39 4B F0 39 4C e 94 91 92 9K 9L
3890 F7 39 4D FC 39 4E 02 3A 4F 07 3A 50 12 3A 51 1A . 9M 9N : 0 . P . Q.
38A0 3A 52 29 3A 53 33 3A 54 41 3A 55 47 3A 56 50 3A : 31. 53. TA. TG. VP.
38B0 57 58 3A 58 60 3A 59 65 3A 5A 6C 3A 20 77 3A 21 wX Y. Ze Z) . m l
38C0 78 3A 22 7F 3A 23 87 3A 24 92 3A 25 A5 3A 26 B3 w. " . # . \$. % . &
38D0 3A 27 C1 3A 28 C7 3A 29 CE 3A 2A D5 3A 2B E1 3A (.) . * . + .
38E0 2C E9 3A 2D F1 3A 2E F7 3A 2F FE 3A 3A 01 3B 3B . - . / . : . ;
38F0 0E 3B 3C 1D 3B 3D 23 3B 3E 2B 3B 3F 31 3B 40 3E . ! . " . # . \$. % . &
3900 3B 5B 4F 3B 5C 56 3B 5D 5A 3B 5E 61 3B 5F 67 3B [] ^ _ { | } ~ ` ~`
3910 7B 6A 3B 7C 78 3B 7D 7E 3B 7E 8C 3B 01 85 91 A3 () ! " # \$ % & ' () * + , - . / : ;
3920 B1 C5 D1 E3 F1 41 FF FF 04 12 91 C7 21 E2 62 FF . : ; A . B .
3930 06 91 A4 B1 D6 A6 66 FF 06 91 A4 B1 C1 D1 E4 24 . . . f #
3940 B1 C2 D1 E4 F1 41 FF 26 02 E6 95 C7 65 FF 16 01 . . . A . & . . . e . . .
3950 E6 C3 A5 B1 C2 D1 E4 F1 41 FF 16 F1 E4 D1 C5 P1 A
3960 A4 91 82 F1 E4 D1 43 FF 96 B1 E6 47 FF 01 82 91 C B
3970 F1 81 91 A4 B1 C1 D1 E4 24 B1 C2 D1 E4 F1 41 FF # A
3980 26 04 D1 E4 F1 82 91 A4 B1 C5 D1 E4 F1 41 FF 85 & A . . .
3990 92 A2 B2 C5 04 E6 44 FF 87 A5 B1 C1 D1 E5 25 B1 P X
39A0 C2 D1 E3 FF FF 16 F1 E4 D1 C5 B1 A4 91 66 41 FF f 9 .
39B0 07 A5 B1 C5 D1 E5 87 47 FF 87 A6 43 62 E4 44 A6 S C b D
39C0 66 FF 87 A6 43 62 E4 44 FF 26 05 81 F1 E4 D1 C5 C D
39D0 B1 A4 91 82 E2 53 61 FF 87 26 C7 04 E6 44 FF 22 S a D . . .
39E0 A2 07 E2 21 C7 63 FF 16 01 C6 D1 E4 F1 81 42 FF e B .
39F0 87 45 95 53 B4 66 FF 07 C7 A6 66 FF 87 33 93 C7 F S f
3A00 66 FF 86 36 86 56 FF 01 85 91 A4 B1 C5 31 E4 F1 f V
3A10 41 FF 87 A5 B1 C1 D1 E5 44 FF 01 85 91 A4 B1 C5 A D
3A20 D1 E4 F1 41 25 F2 52 61 FF 87 A5 B1 C1 D1 E5 22 % R a
3A30 E4 66 FF 16 F1 E4 D1 C1 31 A4 B1 C2 D1 E4 F1 41 f A

ประวัติผู้เขียน

นายชัชชัย ส่ารमान เกิดวันที่ 27 มิถุนายน พ.ศ. 2501 ที่กรุงเทพฯ สำเร็จ
การศึกษาปริญญาวิศวกรรมศาสตรบัณฑิต สาขาวิชาวิศวกรรมอุตสาหการ จากจุฬาลงกรณ์
มหาวิทยาลัย พ.ศ. 2523 เข้าศึกษาต่อในระดับปริญญาโท สาขาวิชาวิศวกรรมคอม
พิวเตอร์ จุฬาลงกรณ์มหาวิทยาลัย ในปี พ.ศ. 2524

