21 CHANNEL UNIT LINE PRINTER/CARD READER

LIST OF ILLUSTRATIONS

LIST OF TABLES

21.1 CHCD-IDENTIFICATIONS

Type-number: PTS6847, P840-003
PTS6843*, P810-040

Test-programs:		
	Line-Printer	PERTST, MLPTSC
	Card-Reader	CRDTST

Channel: Normally MX (Hardware Channel)
PC is possible

Break-connections: LP: 3A43
CR: 3A41

Devices:

LP-CU:	Data Products interface:	
	X-1415, 200 lpm, matrix-line-printer -	PTS6881
	X-1425, 400 lpm, matrix-line-printer -	PTS6882
CR-CU:	Documation M300, 300 cards/min. -	PTS6885

Power-consumption: + 5 Volt, 1,7 Amp.

* 6843 only LP CU on the board

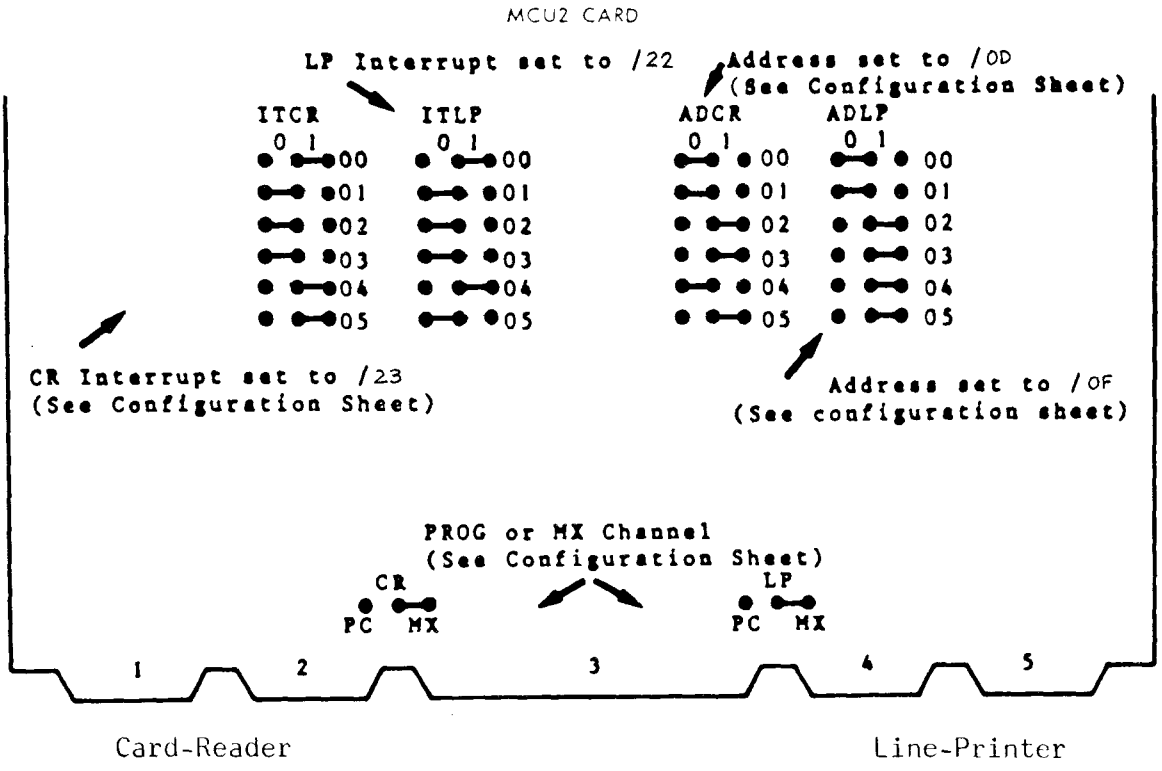


Figure 21.1 STRAP-SETTING

Signal Name	CU Connector	Line Printer Connector
DATA 1	4A06	B
Signal Ground	4B06	D
DATA 2	4A07	F
Signal Ground	4B07	J
DATA 3	4A08	L
Signal Ground	4B08	N
DATA 4	4A09	R
Signal Ground	4B09	T
DATA 5	4A10	V
Signal Ground	4B10	X
DATA 6	4A11	Z
Signal Ground	4B11	b
DATA 7	4A12	n
Signal Ground	4B12	k
PI	4A13	p
Signal Ground	4B13	s
STROBE	5A01	j
Signal Ground	5B01	m
DEMAND	5A11	E
Signal Ground	5B11	C
ONLINE	5A13	y
Signal Ground	5B13	AA

Table 21.1 CU TO LINE-PRINTER CONNECTION

Signal Name	CU Connector	Device Connector
ICL01N	1A10	D
Signal Ground	1B10	J
ICL02N	1A11	K
Signal Ground	1B11	P
ICL03N	1A12	L
Signal Ground	1B12	R
ICL04N	1A13	M
Signal Ground	1B13	S
ICL05N	2A01	N
Signal Ground	2B01	T
ICL06N	2A02	U
Signal Ground	2B02	W
ICL07N	2A03	V
Signal Ground	2B03	X
ICL08N	2A04	Y
Signal Ground	2B04	CC
ICL09N	2A05	Z
Signal Ground	2B05	DD
ICL00N	2A06	C
Signal Ground	2B06	H
ICL11N	2A07	B
Signal Ground	2B07	F
ICL12N	2A08	A
Signal Ground	2B08	E
IDSN	1A04	AA
Signal Ground	1B04	EE
ITRN	1A05	HH
Signal Ground	1B05	NN
IHESFN	1A03	JJ
Signal Ground	1B03	PP
IPFN	1A02	KK
Signal Ground	1B02	RR
IRCN	2A11	LL
Signal Ground	2B11	SS
ICIRN	1A01	MM
Signal Ground	1B01	TT

Table 21.2 CU TO CARD-READER CONNECTIONS

21.4 HARDWARE/SOFTWARE INTERFACE DETAILS

CONTROL UNIT (CU) DATA

MCU2 - LINE PRINTER CU.

DATA and PRINT CONTROL CHARACTER CODE

BIO Lines	08	09	10	11	12	13	14	15
Code Bit Number	P1	7	6	5	4	3	2	1

When the value of P1 is 0 the other seven bits represent either a printable character or a format control character.

VERTICAL FORMAT CONTROL CODE

BIO Lines	08	09	10	11	12	13	14	15
Code Bit Number	P1	7	6	5	4	3	2	1
Logic Value	1	1	X	0	0	Channel Number		

where --

- X is not significant.
- Channel Number indicates the channel number in the paper tape control loop.

BIO Lines	08	09	10	11	12	13	14	15
Code Bit Number	P1	7	6	5	4	3	2	1
Logic Value	1	1	X	1	Number of Lines			

where --

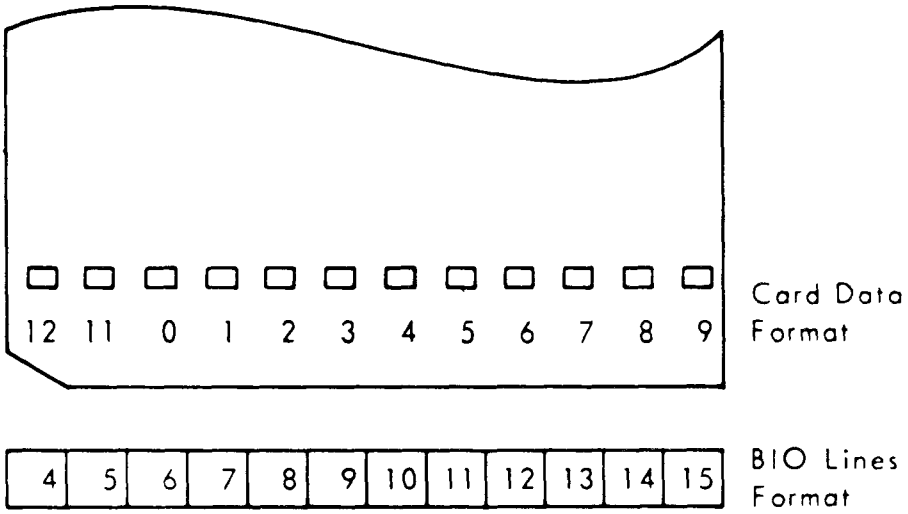
- X is not significant.
- Number of Lines indicates the number of lines to be skipped from 0 to 15.

CHARACTER CODE

			b7	0	0	0	1	1
			b6	0	1	1	0	0
b4	b3	b2	b5 b1	0	0	1	0	1
0	0	0	0		Space	Ø		P
0	0	0	1		!	1	A	Q
0	0	1	0		"	2	B	R
0	0	1	1		#	3	C	S
0	1	0	0		$	4	D	T
0	1	0	1		%	5	E	U
0	1	1	0		&	6	F	V
0	1	1	1		'	7	G	W
1	0	0	0		(	8	H	X
1	0	0	1		)	9	I	Y
1	0	1	0	PF	*	:	J	Z
1	0	1	1		+	;	K	[
1	1	0	0	FF	,	<	L	◇
1	1	0	1	CR	-	=	M	]
1	1	1	0		.	>	N	-
1	1	1	1		/	?	O	♡

- PF Paper Feed: advances the paper one line and prints buffer-contents
- FF Form Feed : advances the paper to the top of the next sheet of paper and prints the buffer-contents
- CR Carriage Return: prints buffer-contents

DATA FORMAT



Note: A hole is a "1".

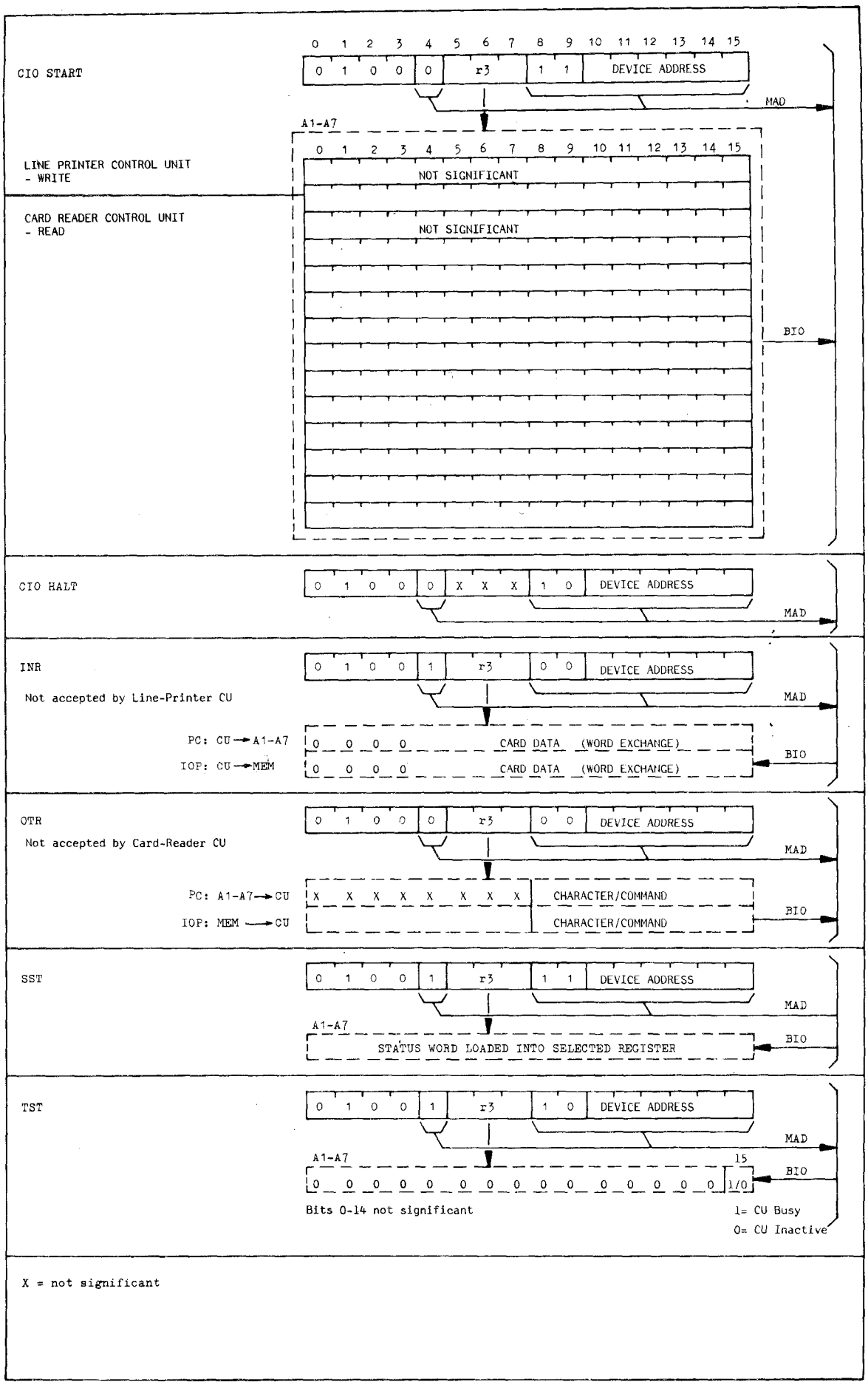


Figure 21.2 INSTRUCTION-/COMMAND-WORD FORMATS

21.4.1 STATUS WORD

LPC-CU

0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	

Not Operable

CR-CU

0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
0	0	0	0	0	0	0	0	0	0		0		0		

Not Operable
Throughput Error
Incorrect Length
Hopper Empty/ Stacker Full

NOT OPERABLE

Bit 15 is set:
- If the Line Printer is inoperable, due to Switched-off/ not On-Line or Paper-Fault.
- If Card Reader is inoperable, due to Switched-off/ not On-Line or Pick-error / Stacker Full / Hopper-Empty.

THROUGHPUT ERROR

Bit 14 is set:
- If a new character is read and the CPU/IOP did not yet answer the data-request Interrupt/Break.

INCORRECT LENGTH

Bit 12 is set:
- If the number of data exchanges by CPU or IOP differs from the number of characters on the card.

HOPPER EMPTY / STACKER FULL

Bit 10 is set:
- If either of these conditions is true.

21.5 SHORT DESCRIPTION TESTPROGRAM

Codes: 90 - 99 PERTST

see detailed description

USER INSTRUCTION

General

Matrix line printer test program MLPTSC performs a complete test of

- PTS 6881 200 l/min
- PTS 6882 400 l/min

The test program can be run on all PTS 6000 computers (except TC 6110).

All control and communication facilities are located to the SOP panel to exclude the need of special test system configuration (CTW, CFP etc).

The test is power failure proof.

Program loading

The program is available as a stand-alone program on cassette and the loading procedure is as normal, see appendix 1 "PTS 6000 - Program loading".

After correct loading the SOP indicator 1 is lit up.

Program initiation

1. Use the SOP panel (see app. 2) to select if the test object is a PTS 6882 line printer. As default a PTS 6881 is assumed.

2. If the printer is connected at programmed channel this must be selected on the SOP. As default MUX channel is assumed.

3. The program is initiated with the following default values that are normally used:

   Interrupt level = 34 (100010)
   CU address = / F (00 1111, not changeable)

   If change of interrupt level is required, input the line printer interrupt level used in the present system (see app. 2).

Program execution

4. Start the test (SOP indicator 1 is turned off)

5. A correct test is as follows:

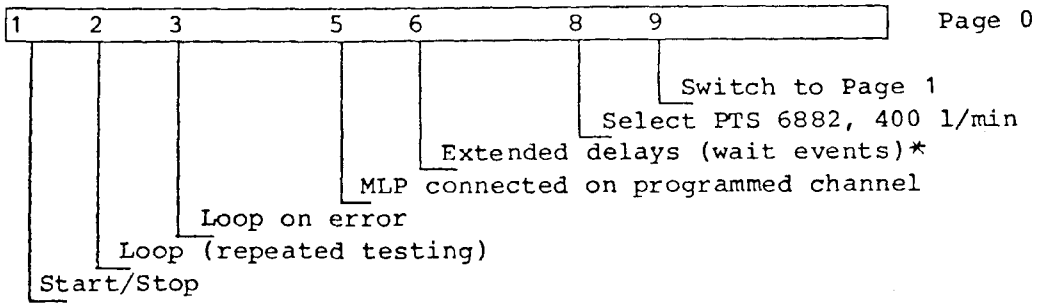
   The printer will print six test patterns preceded by "CHECK 1" to "CHECK 6", see appendix 3 "Printer action". Then SOP indicator 1 is lit up.
   A complete test of the MLP has now been performed except for the status "not operable". For test of this function, see detailed description.

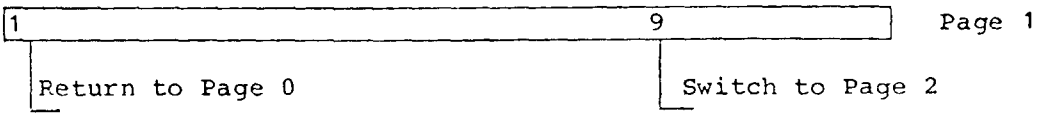
6. If an error is detected by the program this will be displayed on the SOP (see app. 4).
   There is a special service test available for selected testing and measurements. (see detailed description)

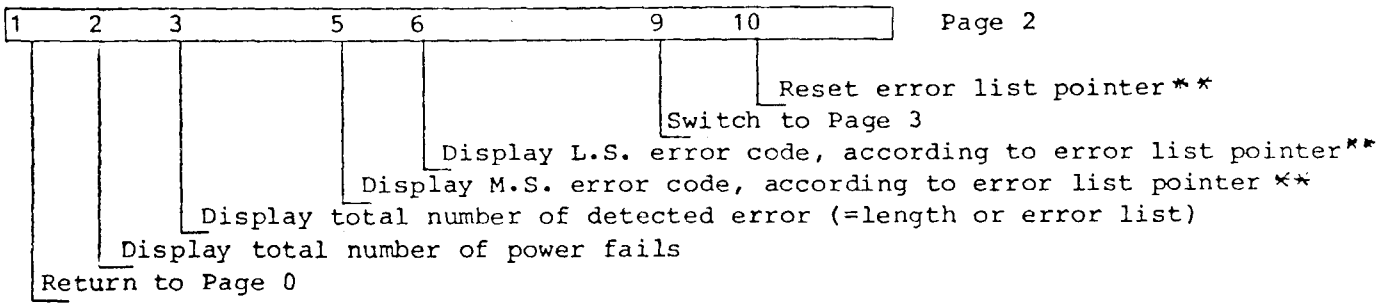
SOP handling - program execution

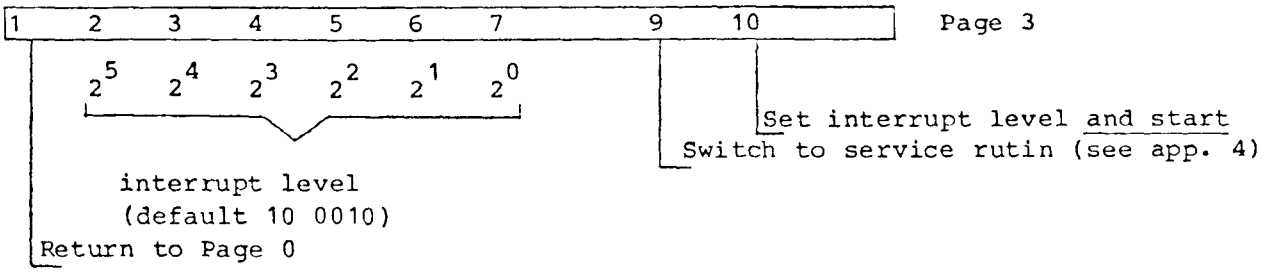
Page 0 is initiated in the following cases:

- after program loading
- after a complete test
- after a return command from other pages







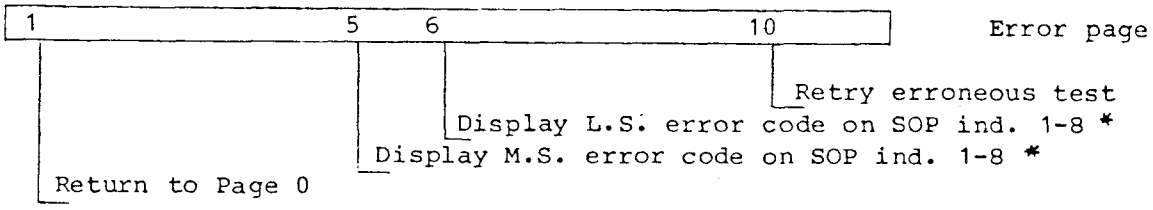


*/ Used to determine if a problem is due to critical timing.

**/ All detected errors during the test are logged in an error list. The error codes are the same as used in the old version of MLPTST that requires CTW and CFP.

SOP handling - error condition

When the test program detects an error the SOP indicators 9, 10 and 11 light up. The SOP switches will then have the following function.



*/ The error codes are the same as used in the old version of MLPTST that requires CTW and CFP.

TESTABLE CONFIGURATION

- PTS 6810 Terminal Computer
- Cassette Drive, or Flexible Disk Drive (FDD) (to load program)
- 4K Memory
- CFP – Customer Full Panel
- Multiplexer PTS 6827
- Card Reader PTS 6885 or Documation M200, M300 or M600
- One Control Peripheral (Console Typewriter)

Program Loading and Normal Running

Set 3 position switch on SOP panel in position 'NO RTC'. – Press IPL
(Run lamp on CFP then lights.)
Load program cassette in recorder (or diskette in FDD).
Depress either:
SW1 (left hand cassette unit or disk drive)
SW2 (right hand cassette unit or disk drive)
Lamp over SW1 or SW2 lights indicating program loading
After loading PGM stops in /700
Set the 3 position switch to 'ON RTC'.
Set:
SHUTDOWN SWITCH POSITION ..... AUTO
MODE SWITCH POSITION ..... REMOTE
POWER SWITCH POSITION ..... ON
Load reference card deck in the Card Reader hopper.
Press RESET on Card Reader.
Press RUN button on CFP (Standard Initialisation)
The program then runs checks 0–6.

Information and error messages are printed out on the Console Typewriter.

When all checks have been completed the program stops in /700 and the card reader hopper is empty.

If the program stops earlier at / 5F0 an error has been detected. (see detailed information)

The operator may at any time stop the program and restart at /700.

Program Modification

A8 Register (standard /8C0D)

Interrupt Level								MUX=0 PC =1	Controller Address						
1	0	0	0	1	1	0	0	0	0	0	0	1	1	0	1

A9 Register (standard /800)

0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Device Select							X4	OS	CSE	CSP	CED	CSI			
0	0	0	0												

Bit 0 Bit 1 Bit 2 Bit 3	Set to '0' for Card Reader
Bits 4–6	Not used
Bit 7 (X4)	'1' all delays (wait events) multiplied by 4. (This enables us to determine if problem is due to critical timing.)
Bit 8 (One Shot (OS))	'1' program prints out the message 0016 on CTW and stops at /5E0 after each check (selected in reg A10) is executed. Run button must be pressed to execute the next check.
Bit 9 (Clear Stop on Error (CSE))	'1' stop is suppressed at 5E0 in case of error. (An error counter may be read out at address /F2. This counter is reset to zero in case of a restart at /700.)
Bit 10 (Clear Stop on Program (CSP))	'1' stop is suppressed at /700 after one pass of checks selected in A10. Program continues to pass through the checks until the operator stops it by depressing the INST or INT on the control panel. A pass counter may be read at address /F0. This counter is reset to zero in the case of a restart at /700.
Bit 11 (Clear Edition (CED))	'1' error and information messages suppressed on CTW.
Bit 12 (Clear Stop on Information (CSI))	'1' stop at /5E0 before execution of each check is suppressed.
Bits 13–15	Not used

A10 Register (standard FE00)

0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
← Check Numbers →															
1	1	1	1	1	1	0	0	0	0	Not Used					

Standard initialized contents /FC00 = bits 0–5 set to '1'

For more information see detailed description

Notes:

LINE PRINTER

This program is written for Programmed Channel operation so if the printer is normally used on the IOP Channel the CU must be connected to operate on the Programmed Channel. The program can be loaded either with the IPL routine or by hand using the switches on the control panel. Once loaded the following routine should be used:

- Load register A6 with the ASCII character to be printed.
- Load register A7 with number of times you want the character printed on each line.
- Load register A0 with the Start address.
- Push the RUN button.

To stop the program push the INST button.

Program LINELP

Memory Address	Data	Program Instructions		
0080	FFFF		Data	/FFFF
0082	0000		Data	0
0084	207F	Start	HLT	
0086	20BF		INH	
0088	0200		LDK	A2,0
008A	4BCF		SST	A3,/0F
008C	42CF		CIO	A2,1,/0F
008E	5C04		RB(NA)	* -2
0090	050A	OUTLF	LDK	A5,/0A
0092	450F		OTR	A5,0,/0F
0094	5C04		RB(NA)	* -2
0096	460F	OUTCH	OTR	A6,0,/0F
0098	5C04		RB(NA)	* -2
009A	1201		ADK	A2,1
009C	EA1C		CWR	A2,A
009E	5C0A		RB(NE)	OUTCH
00A0	0200		LDK	A2,0
00A2	5F14		RB	OUTLF

```
         DATE  82-05-05        IDENT    LPIOP


0000                           IDENT    LPIOP
0001                    *DATE: 820505 FOR PTS
0002                    *
0003                    *
0004                    *        THIS PROGRAM STORES TWO SELECTED CHARACTERS INTO A BUFFER
0005                    *        THEN PRINTS THEM AND STOPS WAITING NEW CHARACTERS TO BE SELECTED
0006                    *
0007                    *
0008      0000          BEGIN    EQU      *
0009                           RORG     BEGIN+/80
0010                    *
0011                    *
0012                    *        LOAD THE TWO CHARACTERS TO BE PRINTED IN REGISTER A3
0013                    *
0014                    *        PUSH THE RUN BUTTON
0015                    *
0016 0080 FFFF                 DATA     /FFFF
0017 0082 0000                 DATA     0
0018 0084 207F          START  HLT
0019 0086 20BF                 INH
0020 0088 850C                 LDR      A5,A3                 LOAD DATA INTO A5
0021 008A 0100                 LDK      A1,0                  CLEAR CHAR COUNTER
0022 008C 8545 00B8 R  REPT    ST       A5,LPBUF,A1           STORE THE CONTENTS OF A5 INTO LPBUF
0023 0090 1102                 ADK      A1,2                  UPDATE LPBUF ADDRESS
0024 0092 E920 00F8            CWK      A1,/F8                AND CHECK IF LINE FULL
0025 0096 5C0C                 RB(NE)   REPT
0026 0098 8520 0D0A            LDKL     A5,/0D0A              LOAD CARRIAGE RETURN LINE FEED CHARS
0027 009C 8545 00B8 R          ST       A5,LPBUF,A1           AND STORE IN LPBUF
0028 00A0 8120 4050            LDKL     A1,/4050              LOAD PARAMS FOR FIRST WER
0029 00A4 711E                 WER      A1,/1E                AND SEND TO IOP
0030 00A6 8120 00B8 R          LDKL     A1,LPBUF              LOAD FIRST ADDRESS OF LPBUF
0031 00AA 711F                 WER      A1,/1F                AND SEND TO IOP
0032 00AC 0600                 LDK      A6,0
0033 00AE 46DF                 CIO      A6,1,/1F              SEND START COMMAND TO PRINTER
0034 00B0 5C04                 RB(NA)   *-2                   TRY AGAIN IF NOT ACCEPTED
0035 00B2 4CDF                 SST      A4,/1F                GET STATUS
0036 00B4 5C04                 RB(NA)   *-2
0037 00B6 5F34                 RB       START                 GO AND WAIT FOR NEW DATA
0038                    *
0039 00B8               LPBUF  RES      80                    OUTPUT BUFFER
0040                           END      START


          SYMBOL TABLE

  BEGIN   0000  R   LPBUF   00B8  R   REPT    008C  R   START   0084  R


          ASS.ERR.    0000
:EOF
PROG ELAPSED TIME:  00H-00M-10S-640MS-
```

```
        DATE  82-05-05          IDENT    CRPROG


0000                            IDENT    CRPROG
0001                    *DATE: 820505 FOR PTS
0002                    *
0003                    *
0004                    *       THIS PROGRAM READS A CARD VIA THE PROGRAMMED CHANNEL AND STOPS SO THAT
0005                    *       CONTENTS OF THE BUFFER CAN BE CHECKED AGAINST THE PUNCHED HOLES IN THE
0006                    *       CARD
0007                    *
0008      0000          BEGIN   EQU      *
0009                            RORG     BEGIN+/80
0010                    *
0011                    *
0012                    *       LOAD THE CARD(S) TO BE READ INTO THE CARDREADER
0013                    *       AND START THE CARD READER
0014                    *
0015                    *       LOAD START ADDRESS(/0086) IN A0 AND PUSH THE RUN BUTTON
0016                    *
0017 0080 FFFF                  DATA     /FFFF
0018 0082 0000                  DATA     0
0019 0084 207F          START   HLT
0020 0086 20BF                  INH
0021 0088 0200                  LDK      A2,0                   LOAD ZERO IN A2
0022 008A 0100                  LDK      A1,0                   CLEAR WORD COUNTER
0023 008C 8245 00B8 R   STORE   ST       A2,BUFF,A1             STORE ZERO INTO BUFF ADDRESS
0024 0090 1102                  ADK      A1,2                   UPDATE WORD COUNT OF BUFF ADDRESS
0025 0092 E920 002A             CWK      A1,42                  CHECK IF LAST WORD IS REACHED
0026 0096 5C0C                  RB(NE)   STORE                  NO? GO AND STORE THE NEXT WORD
0027 0098 0100                  LDK      A1,0                   CLEAR CHARACTER COUNTER
0028 009A 0601                  LDK      A6,1
0029 009C 46CD                  CIO      A6,1,/D                SEND CIO START COMMAND TO THE CARDREADER
0030 009E 5C04                  RB(NA)   *-2
0031 00A0 4D0D          READ    INR      A5,0,/D                GET CHARACTER FROM CU
0032 00A2 5C04                  RB(NA)   *-2
0033 00A4 8545 00B8 R           ST       A5,BUFF,A1             AND STORE IN BUFFER
0034 00A8 1102                  ADK      A1,2                   UPDATE BUFFER ADDRESS
0035 00AA E920 00A0             CWK      A1,/A0                 CHECK IF LAST COLUMN READ
0036 00AE 5C10                  RB(NE)   READ                   NO? GO AND READ NEXT COLUMN
0037 00B0 468D                  CIO      A6,0,/D                SEND STOP COMMAND TO CU
0038 00B2 4CCD                  SST      A4,/D                  GET STATUS FROM CU
0039 00B4 5C04                  RB(NA)   *-2
0040 00B6 5F34                  RB       START                  GO AND WAIT FOR NEXT RUN
0041                    *
0042 00B8               BUFF    RES      42                     READ BUFFER
0043                            END      START


            SYMBOL TABLE

   BEGIN    0000  R    BUFF     00B8  R    READ     00A0  R    START    0084  R
   STORE    008C  R

            ASS.ERR.     0000
  :EOF
  PROG ELAPSED TIME:  00H-00M-11S-360MS-
```

CARD READER

This program is written to use the IOP channel. If the Card Reader normally operates on the Programmed Channel it will be necessary to connect the Break Request line on the CU. The program will read one card and stop; the data on the card can be checked by displaying the contents of the program buffer, BUFF. Once the program has been loaded either by the IPL routine or by hand using the control panel switches, it is only necessary to load the start address into register A0 and push the RUN button.

Program CRTEST

Memory Address	Data	Program Instructions		
0080	FFFF		Data	/FFFF
0082	0000		Data	0
0084	207F	Start	HLT	
0086	20BF		INH	
0088	8120		LDKL	A1,/8050
008A	8050			
008C	710C		WER	A1,/1A
008E	8220		LDKI	A2,BUFF
0090	009E			
0092	720D		WER	A2,/1B
0094	43C6		CIO	A3,1,/0D
0096	5C04		RB(NA	* -2
0098	4CC6		SST	A4,/0D
009A	5C04		RB(NA)	* -2
009C	5F1A		RB	Start
009E		BUFF		