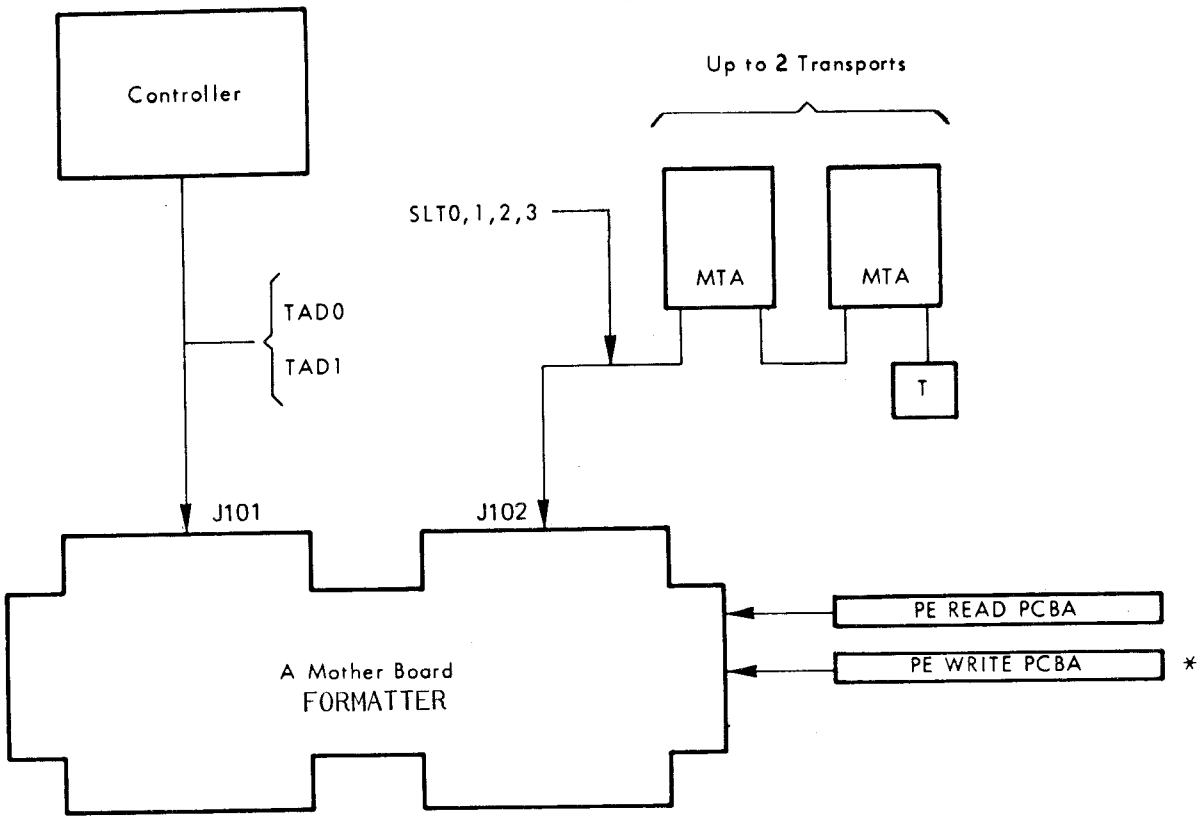
23 CHANNEL UNIT MAGNETIC TAPE UNIT

LIST OF ILLUSTRATIONS

LIST OF TABLES

23.1 CHMT-IDENTIFICATIONS

Type-number:	: PTS-6842
Test-Program:	: MTUTSC
Channel:	: Hardware Channel (IOP)
CU address	: CHMT1: /OC, CHMT2: /OD.
Break Connections	: CHMT1: 3A43 - IOP1: 4B09 (BR04N). : CHMT2: 3A43 - IOP1: 4B08 (BR05N).
Magnetic Tape Units	: MTU 0: PTS 6168, 1600bpi, PE (including formatter F849). or MTU 0: PTS 6872-001, 1600bpi, PE (incl. formatter F849). MTU 1: PTS 6872-002, 1600bpi, PE.
Power-Consumption	: 5 VOLT, 2.5 AMP



* Note: Switch on PCB always to "0".

Figure 23.1 FORMATTER/TRANSPORT SYSTEM CONFIGURATION

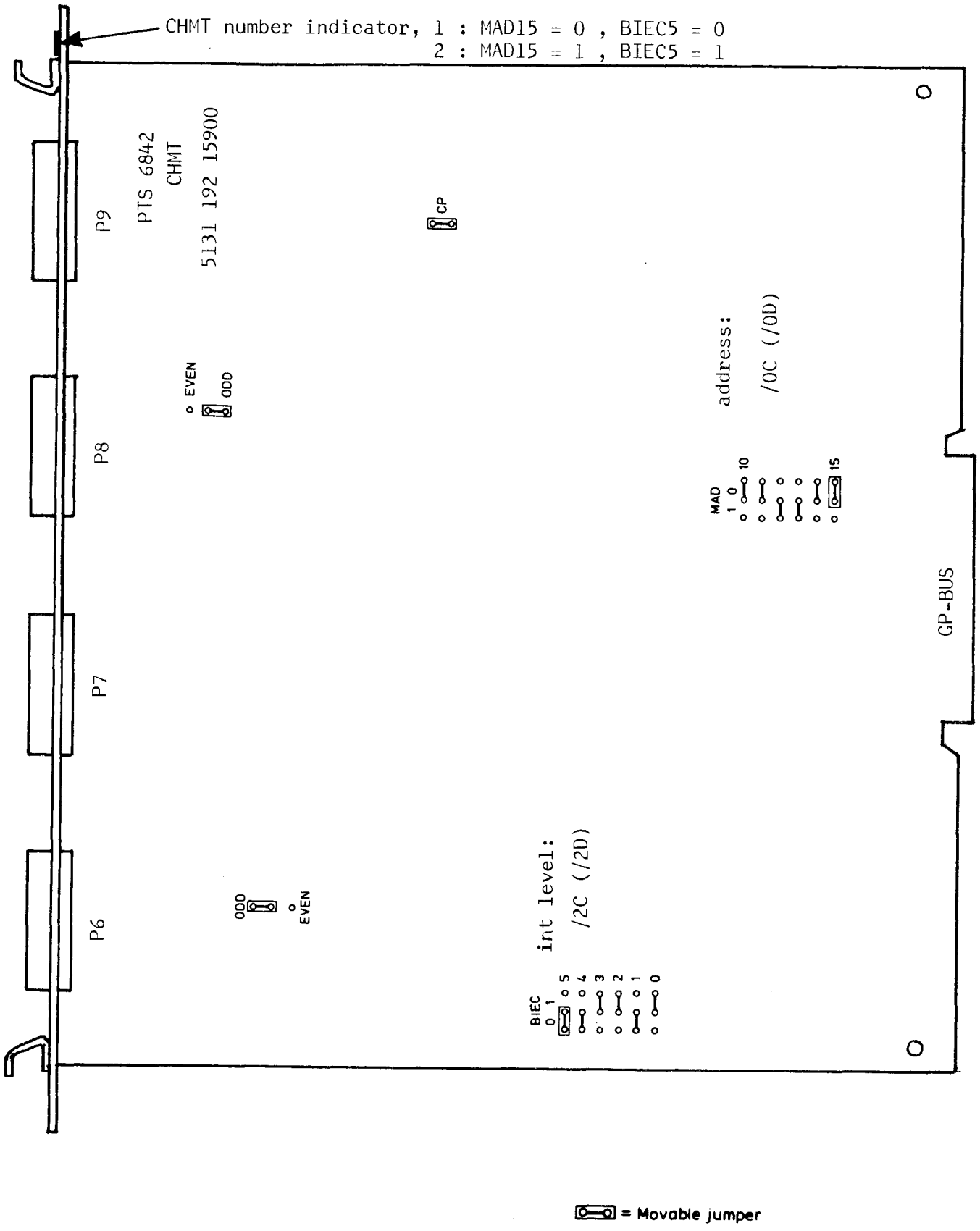


Figure 23.2 CHMT STRAP SETTING

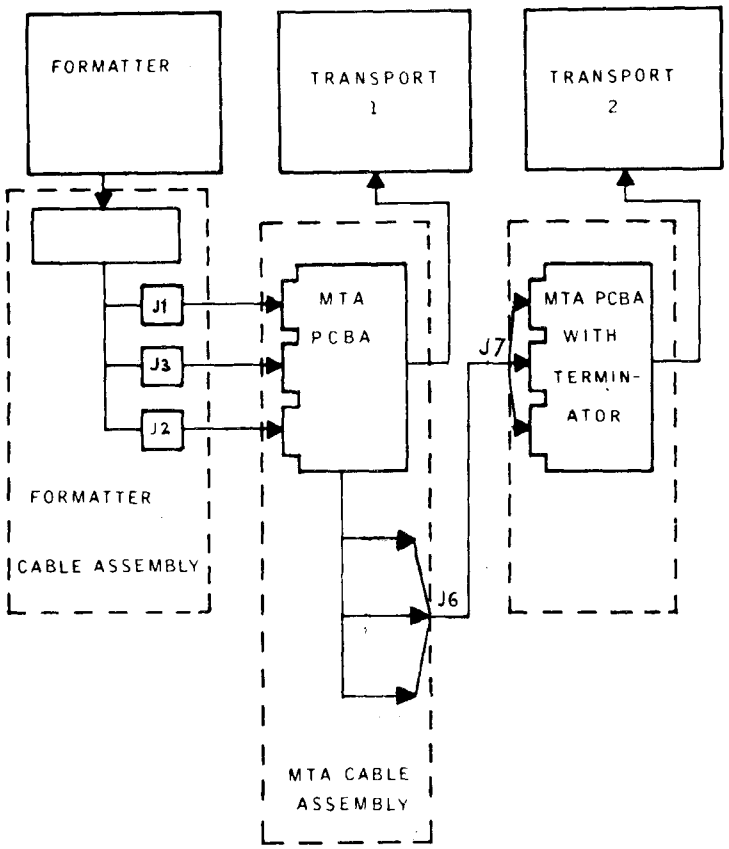


Figure 23.3 MTA SYSTEM DIAGRAM

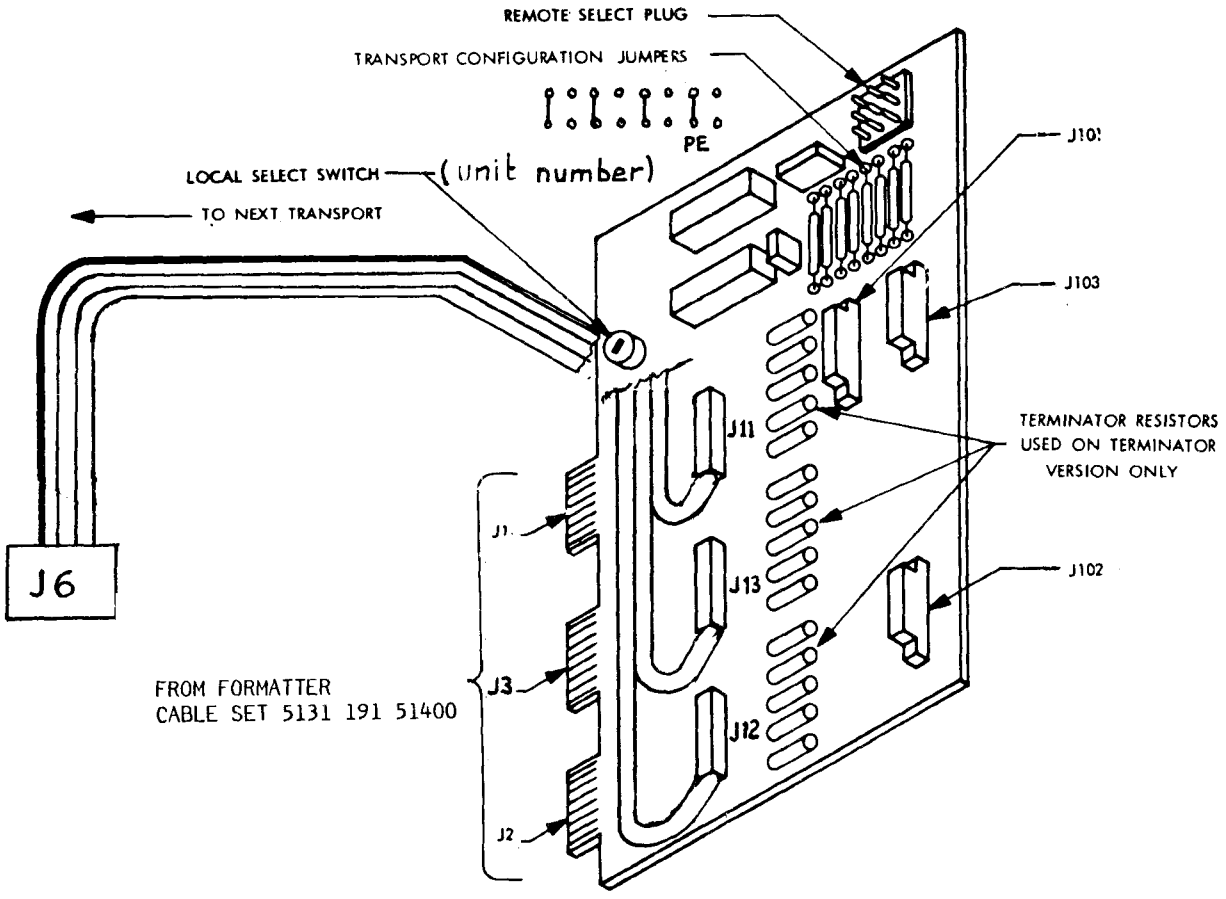
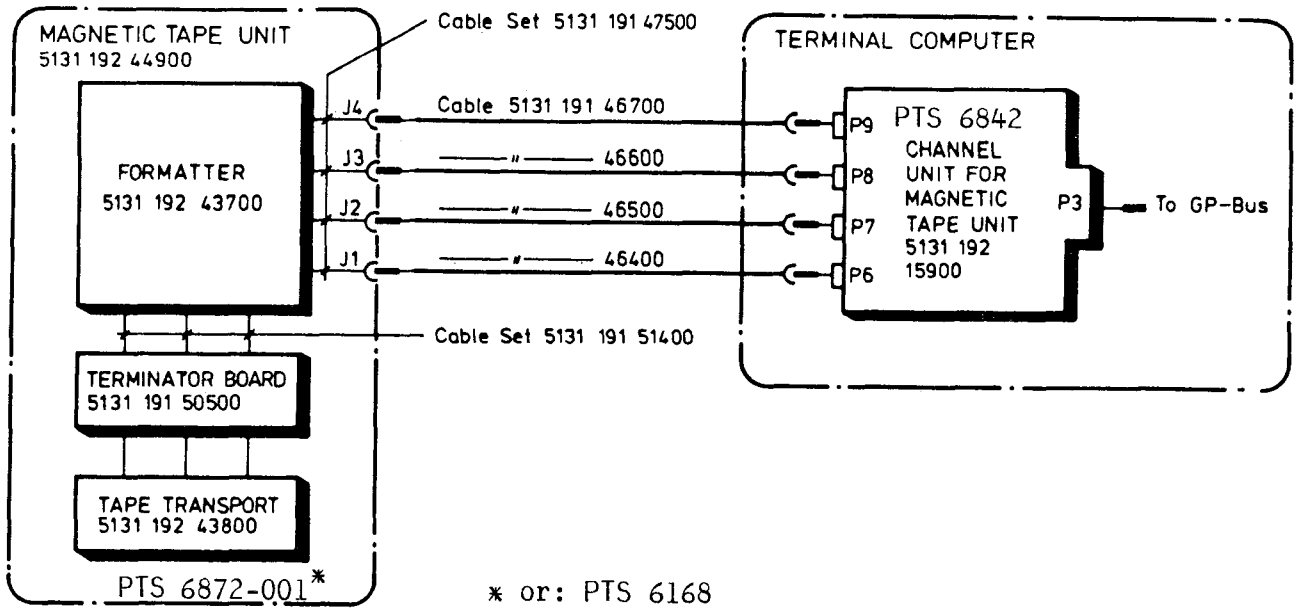
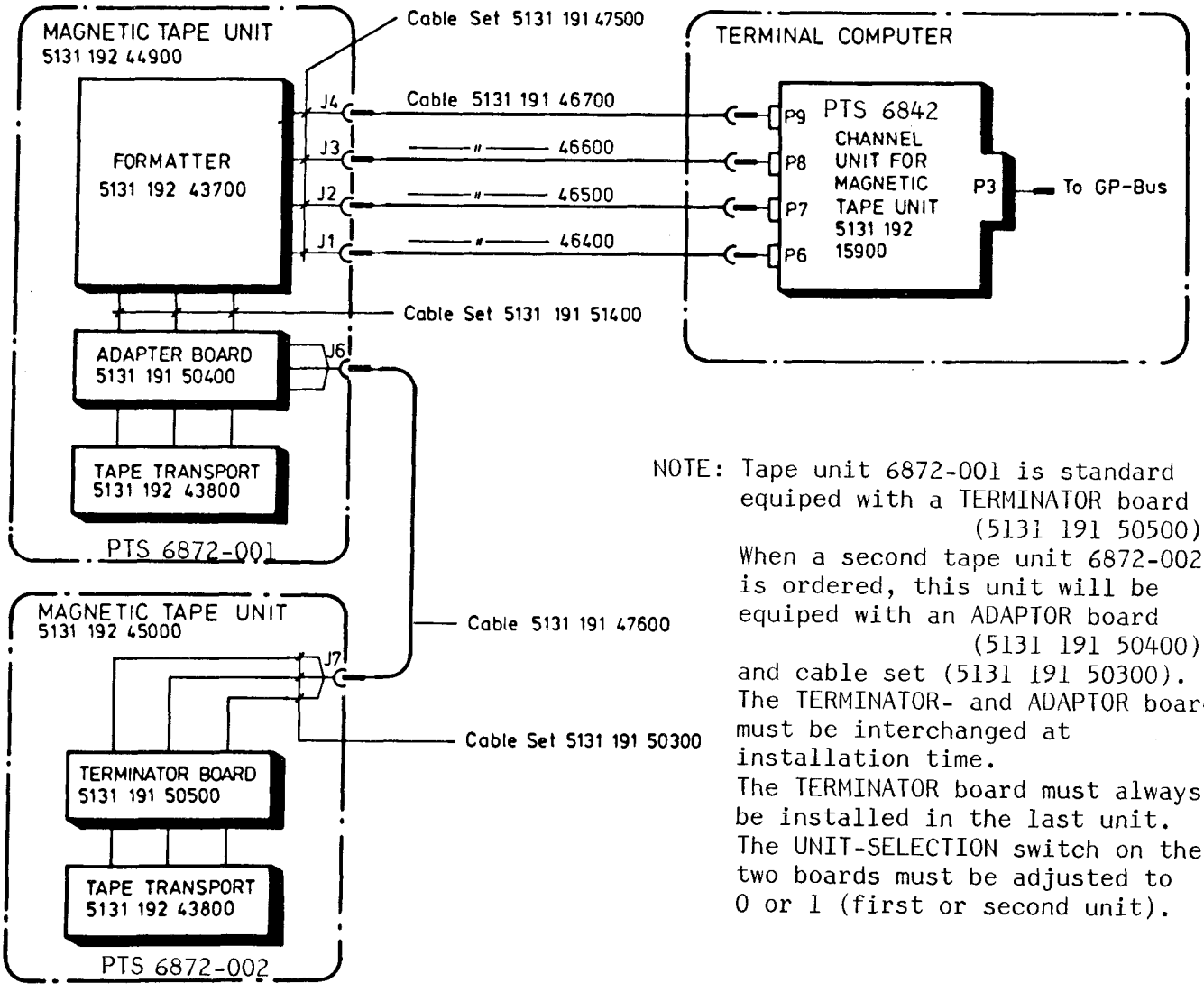


Figure 23.4 MTA CABLE ASSEMBLY 5131 191 50400



* or: PTS 6168



NOTE: Tape unit 6872-001 is standard equiped with a TERMINATOR board (5131 191 50500).
When a second tape unit 6872-002 is ordered, this unit will be equiped with an ADAPTOR board (5131 191 50400) and cable set (5131 191 50300).
The TERMINATOR- and ADAPTOR board must be interchanged at installation time.
The TERMINATOR board must always be installed in the last unit.
The UNIT-SELECTION switch on the two boards must be adjusted to 0 or 1 (first or second unit).

Figure 23.5 CABLING

CU Connector P6 6872-001 J1		INPUT Signal	Formatter Card Connector J101		
Live Pin	Ground Pin	Name	Live Pin	Ground Pin	
02	14	RPN	A36	*	
03	15	RON	B37		
04	16	R1N	A37		
05	17	R2N	B39		
06	18	R3N	A39		READ DATA Lines
07	19	R4N	B40		
08	20	R5N	A40		
09	21	R6N	B42		
10	22	R7N	A42		
11	23	CCGN	B24		IDENTIFICATION BURST
12	24	DBYN	A22		DATA BUSY
13	25				

* Note: Nearest ground pin is used.

Table 23.1a FORMATTER TO CU INTERFACE

CU Connector P7 6872-001 J2		INPUT Signal	Formatter Card Connector J101		
Live Pin	Ground Pin	Name	Live Pin	Ground Pin	
02	14	WSTRN	A34	*	WRITE STROBE
03	15	RSTRN	B36		READ STROBE
04	16	FMKN	A25		FILE MARK READ
05	17	EOTN	A30		END OF TAPE
06	18	HERN	A24		HARD ERROR
07	19	CERN	B25		CORRECTED ERROR
08	20	LDPN	B30		LOAD POINT
09	21	FPTN	A28		FILE PROTECTED
10	22	RDYN	B27		READY
11	23	FBYN	B22		FORMATTER BUSY
12	24	ONLN	A27		ONLINE
13	25				

* Note: Nearest ground pin is used.

Table 23.1b FORMATTER TO CU INTERFACE

CU Connector P8 6872-001 J3		OUTPUT Signal	Formatter Card Connector J101		
Live Pin	Ground Pin	Name	Live Pin	Ground Pin	
02	14	WPN	A15	*	
03	15	W0N	B16		
04	16	W1N	A16		
05	17	W2N	B18		
06	18	W3N	A18		WRITE DATA Lines
07	19	W4N	B19		
08	20	W5N	A19		
09	21	W6N	B21		
10	22	W7N	A21		
11	23	LWDN	B13		LAST WORD
12	24	FENN	A13		FORMATTER ENABLE
13	25				

* Note: Nearest ground pin is used.

Table 23.2a CU TO FORMATTER INTERFACE

CU Connector P9 6872-001 J4		OUTPUT Signal	Formatter Card Connector J101		
Live Pin	Ground Pin	Name	Live Pin	Ground Pin	
02	14	GON	A03	*	INITIATE Command
03	15	REVN	B04		REVERSE/FORWARD
04	16	WRTN	A04		WRITE/READ
05	17	WFMN	B06		WRITE FILE MARK
06	18	EDITN	A06		EDIT Command
07	19	ERASEN	B07		ERASE Command
08	20	REWN	B12		REWIND Command
09	21	LOLN	A10**	B15**	LOAD ON LINE Command
10	22	FADN	B01		FORMATTER ADDRESS
11	23	TADON	A01		TRANSPORT ADDRESS
12	24	TAD1N	B03		TRANSPORT ADDRESS
13	25	OFLN	A12		OFF-LINE Command

* Note: Nearest groundpin is used.

** Note: J101 pin A10 is interconnected with J102 pin A04 (in the formatter)
J101 pin B15 is interconnected with J102 pin B04.

Table 23.2b CU TO FORMATTER INTERFACE

Transport J103 Live	Ret		MTA II J3* Live	Ret		Formatter J102 Live	Ret	Signal
1	A	→	1	A	→	B1	B2	READ DATA PARITY (IRDP)
2	B	→	2	B	→	A1	A2	
3	C	→	3	C	→	B3	B2	READ DATA 0 (IRD0)
4	D	→	4	D	→	A3	A2	READ DATA 1 (IRD1)
8	J	→	8	J	→	A6	A5	READ DATA 2 (IRD2)
9	K	→	9	K	→	B7	A8	READ DATA 3 (IRD3)
10	L	→	10	L	→	A7	A8	
11	M	→	11	M		B9	B8	
12	N	→	12	N		A9	A8	
13	P	→	13	P		B10	B11	
14	R	→	14	R	→	A10	A11	READ DATA 4 (IRD4)
15	S	→	15	S	→	B12	B11	READ DATA 5 (IRD5)
17	U	→	17	U	→	B13	B14	READ DATA 6 (IRD6)
18	V	→	18	V	→	A13	A14	READ DATA 7 (IRD7)

Note: The following pins provide +5v and ground from the Formatter to the MTA assemblies.

5	E	←	A48	B48	
6	F	←	A49	B49	
7	H	←	A50	B50	

*Read signals applied to J3 are also applied in parallel to J10 for application to other MTA II PCBAs in the daisy-chain. Refer to Schematic No. 103914.

Table 23.3 READ SIGNALS, TRANSPORT TO FORMATTER VIA MTA II

Formatter J102 Live	Ret		MTA II J2* Live	Ret		Transport J102 Live	Ret	Signal
B15	B14	→	A	1	→	A	1	WRITE DATA STROBE (IWDS)
B16	B17	→	C	3	→	C	3	WRITE AMPLIFIER RESET (IWARS)
B18	B17		E	5	→	E	5	
A18	A17		F	6	→	F	6	
A21	A20	→	L	10	→	L	10	WRITE DATA PARITY (IWDP)
B22	B23	→	M	11	→	M	11	WRITE DATA 0 (IWD0)
A22	A23	→	N	12	→	N	12	WRITE DATA 1 (IWD1)
B24	B23	→	P	13	→	P	13	WRITE DATA 2 (IWD2)
A24	A23	→	R	14	→	R	14	WRITE DATA 3 (IWD3)
B25	B26	→	S	15	→	S	15	WRITE DATA 4 (IWD4)
A25	A26	→	T	16	→	T	16	WRITE DATA 5 (IWD5)
B26	B26	→	U	17	→	U	17	WRITE DATA 6 (IWD6)
A27	A26	→	V	18	→	V	18	WRITE DATA 7 (IWD7)
						J101		
A42	A41	→	B	2	→	J	2	SELECT 1 (ISLT1)**
B43	B44	→	D	4	→	J	16	SELECT 2 (ISLT2)**
A43	A44	→	H	7	→	J	17	SELECT 3 (ISLT3)**

*Write signals applied to J2 are also applied in parallel to J12 for application to other MTA II PCBAs in the daisy-chain. Refer to Schematic No. 103914.

**Provided through Select Switch

Table 23.4 WRITE SIGNALS, FORMATTER TO TRANSPORT VIA MTA II

Formatter J102 Live	Ret		MTA II J1* Live	Ret		Transport J101 Live	Ret	Signal
A28	A29	→	B	2	→	B	2	OVER WRITE (IOVW)
B30	B29	→	C	3	→	C	3	SYNCHRONOUS FORWARD Command (ISFC)
A30	A29		D	4	→	D	4	
B31	B32	→	E	5	→	E	5	SYNCHRONOUS REVERSE Command (ISRC)
A31	A32	←	F	6	←	F	6	DATA DENSITY INDICATOR (IDDI)*
B33	B32	→	H	7	→	H	7	REWIND Command (IRWC)
B34	B35	→	K	9	→	K	9	SET WRITE STATUS (ISWS)
A34	A35	→	L	10	→	L	10	OFF-LINE Command (IOFC)/REWIND UNLOAD (IRWU)***
B36	B35	←	M	11	←	M	11	ON-LINE (IONL)
A36	A35		N	12	←	N	12	
B37	B38	←	P	13	←	P	13	FILE PROTECT (IFPT)
A37	A38	←	R	14	←	R	14	LOAD POINT (ILDP)
A39	A38	←	T	16	←	T	16	READY (IRDY)
B40	B41	←	U	17	←	U	17	END OF TAPE (IEOT)
B42	B41	→	J	8	→	J	8	SELECT 0 (ISLT0)****
A4	B4	→	1	2	→	1	2	LOAD ON-LINE (ILOL)

*Control signals applied to J1 are also applied in parallel to J11 for application to other MTA II PCBAs in the daisy-chain. Refer to Schematic No. 103914.

***REWIND UNLOAD operation applies to T9000 series transports only.

****Provided through Select Switch.

Table 23.5 CONTROL SIGNALS, TRANSPORT/MTA II/FORMATTER

ADAPTOR BOARD		J6 - J7		TERMINATOR BOARD		SIGNAL NAME
Live	Ground	Live	Ground	Live	Ground	
J11-1	J11-2	1	15	J1-1	J1-2	LOAD ON-LINE (LOL)
B	2	2	16	B	2	OVERWRITE (OVW)
C	3	3	17	C	3	SYNCHRONOUS FORWARD (SFC)
D	4			D	4	
E	5	4	18	E	5	SYNCHRONOUS REVERSE (SRC)
F	6	5	19	F	6	DATA DENSITY INDICATOR (DDI)
H	7	6	20	H	7	REWIND Command (RWC)
J	8	7	21	J	8	SELECT (SLT)
K	9	8	22	K	9	SET WRITE STATUS (SWS)
L	10	9	23	L	10	OFF-LINE Command (OFC)
M	11	10	24	M	11	ON-LINE (ONL)
N	12			N	12	
P	13	11	25	P	13	FILE PROTECT (FPT)
R	14	12	26	R	14	LOAD POINT (LDP)
S	15			S	15	
T	16	13	27	T	16	READY (RDY)
U	17	28	41	U	17	END OF TAPE (EOT)
J11-V	J11-18			J1-V	J1-18	
J12-A	J12-1	29	42	J2-A	J2-1	WRITE DATA STROBE (WDS)
B	2	30	43	B	2	
C	3	31	44	C	3	WRITE AMPLIFIER RESET (WARS)
D	4	36	48	D	4	
E	5			E	5	
F	6			F	6	
H	7	37	49	H	7	
J	8			J	8	
K	9			K	9	
L	10	32	45	L	10	(WDP)
M	11	34	46	M	11	(WD0)
N	12	35	47	N	12	(WD1)
P	13	56	68	P	13	(WD2)
R	14	57	69	R	14	WRITE DATA (WD3)
S	15	58	70	S	15	(WD4)
T	16	59	71	T	16	(WD5)
U	17	60	72	U	17	(WD6)
J12-V	J12-18	61	74	J2-V	J2-18	(WD7)
J13-1	J13-A	62	75	J3-1	J3-A	(RDP)
2	B	63	76	2	B	
3	C	64	77	3	C	READ DATA (RD0)
4	D	78	92	4	D	(RD1)
5	E	79	93	5	E	5 VOLT
6	F	80	94	6	F	5 VOLT
7	H	81	95	7	H	5 VOLT
8	J	82	96	8	J	(RD2)
9	K	83	97	9	K	READ DATA (RD3)
10	L	84	98	10	L	
11	M			11	M	
12	N			12	N	
13	P			13	P	
14	R	85	99	14	R	(RD4)
15	S	86	100	15	S	(RD5)
16	T			16	T	READ DATA
17	U	87	101	17	U	(RD6)
J13-18	J13-V	88	102	J3-18	J3-V	(RD7)

Table 23.6 INTERCONNECTION BETWEEN TWO TAPE UNITS

23.4 HARDWARE SOFTWARE INTERFACE DETAILS

23.4.1 COMMANDS

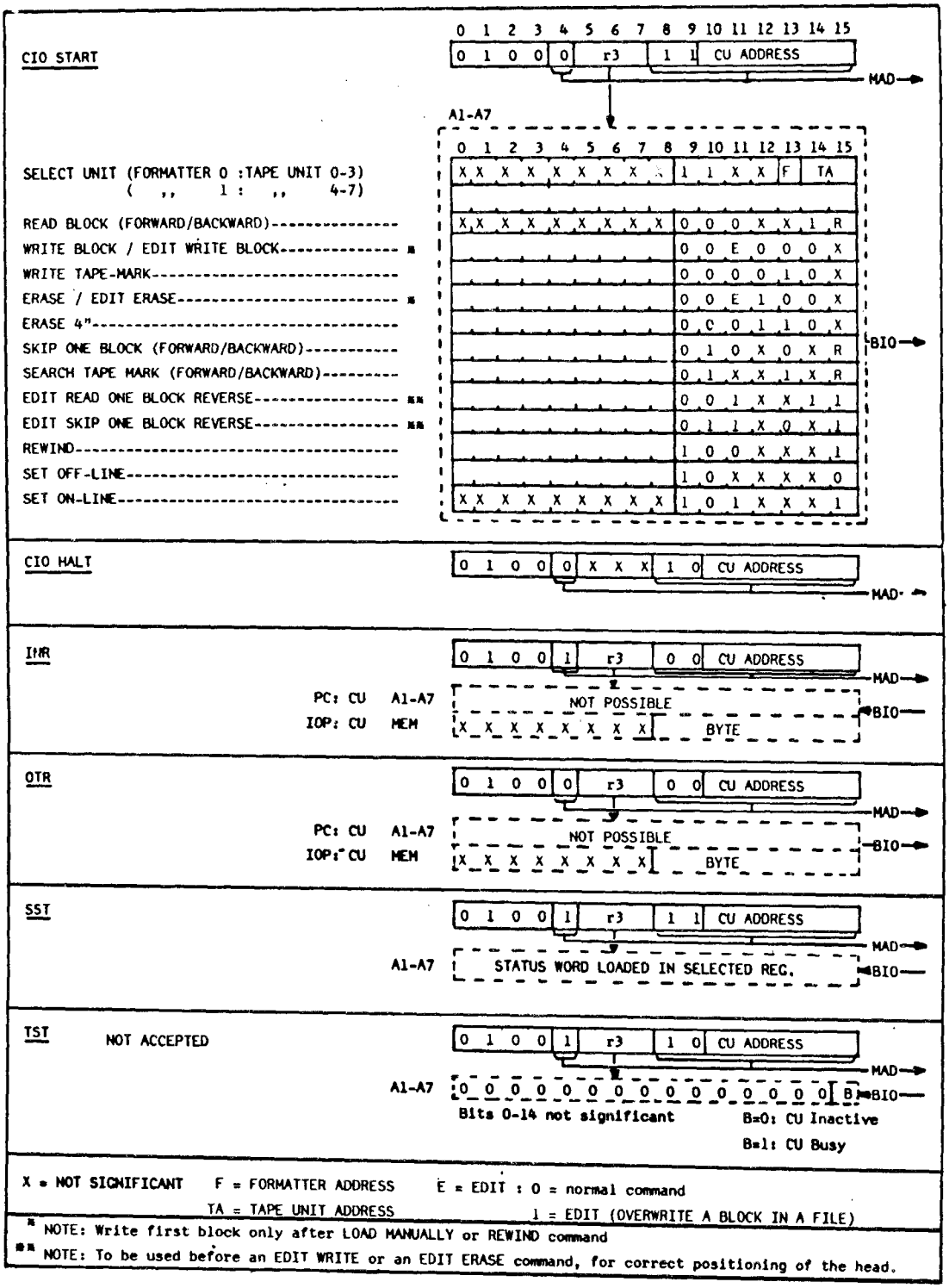
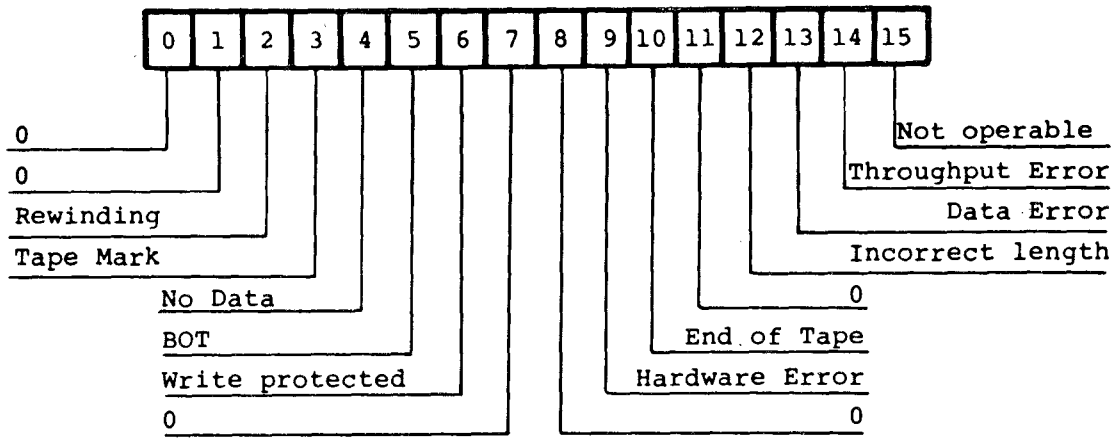


Figure 23.6 INSTRUCTION -/COMMAND-WORD FORMATS

23.4.2 STATUS WORD



Bit	Function	Meaning
0	-	
1	-	
2	Rewinding	Set if the selected transport is rewinding.
3	Tape Mark	Set if the last read/written block was a Tape Mark. It suppresses bit 13 "Data Error".
4	No Data	Set if no data is found within 2 seconds during a read/write command. Also set after a successful erase command.
5	BOT	Set when BOT is reached and the transport is at rest.
6	Write protected	Set if a tape or reel, without a Write Enable ring installed, is mounted on the transport. Set to zero if the selected transport is OFF line.
9	Hardware Error	Set if the transport does not begin the execution of the given command within 2 seconds.
10	End of tape	Set when the EOT is reached or passed on the tape.
11	-	
12	Incorrect length	Set if the number of characters transferred during reading is less than the number of characters in the block.
13	Data Error	Set when a read error has been detected by the formatter (CER or HER) or by the CHMT as parity error. This status bit is not set when a Tape Mark is detected.
14	Throughput Error	Set if an OTR, INR or CIO halt instruction is delayed more than 20 µs after a Break is emitted during a read, write or erase command. This status bit is not set if bit 12, Incorrect length, is set.
15	Not Operable	Set if the selected transport is not On-line.

23.5 DESCRIPTION TESTPROGRAM

MAGNETIC TAPE UNIT TESTPROGRAM

MTUTST

Applicable to Philips Magnetic Tape Unit PTS 6872-001(2) or PTS 6186
Procedure 12NC: 8701-740-41000

MTUTST package includes:
Procedure
Listing
Cassette

GENERAL DESCRIPTION

MTUTST is a test program for the Magnetic Tape Unit (MTU) PTS 6872–001 (2) or PTS 6186.

It tests the tape recorder, formatter plus other units which make up the MTU.

The program is run from the TC 6810 SOP panel. Results of the tests are displayed on the SOP panel lamps.

The program tests all commands given by the channel card CHMT together with control of all the status bits which CHMT can raise after execution of a command.

The program contains 24 short tests for control of individual commands, a longer test (TEST 1) which executes all commands and checks the equivalent status bits raised, and a read/write test (TEST 2) which writes, reads and compares data using the whole tape length until it is interrupted:

For normal testing, tests 1 and 2 are run plus write protect and end of tape test (see General Verification Procedure).

TESTABLE CONFIGURATION

- TC 6810 computer + CPU
- Minimum Memory 4K
- Cassette Drive or Flexible Disk to load the program
- A Multiplexor or I/O Processor for operation in multiplex mode
- MTU PTS 6872-001 (2) or MTU PTS 6168 and associated controller card CHMT PTS 6842–00

NOTE! Original pre-series versions of CHMT card (5131 101 0784) will not accept the test program. Cards with modification AO1867 will accept the program.

The SOP is dedicated as follows:

Switch	Function	Lamp	Function
0 —	IPL	0 —	Power on
1	Select tests	1	Test code
2		2	
3		3	
4		4	
5		5	
6		6	
7		7	
8		8	
9		9	
10		10 —	Error
11 —	Lamp test	11 —	Test completed

Program loading and normal running

On Computer:

- Set 3 position switch on SOP panel to 'NO RTC'.
- Press IPL switch.
- Load program casette in recorder (or diskette in FDD) and depress either:
  SW1 (left hand cassette unit or disk drive)
  or SW2 (right hand cassette unit or disk drive).

Lamp 1 lights indicating program loading. Lamp goes out when loading is complete.
Set 3 position switch to 'RTC'.

On MTU:

- Load a scratch (empty) tape on MTU

For PTS 6872 press switches 5 and 8
For PTS 6168 press switches 5 and 9
For PTS 6872-001 plus PTS 6872-002 press switches 5 and 7.

The program consists of 2 parts:

- 24 short tests which can be run individually by selecting the appropriate switches, or all together by selecting 'TEST 1'
- 'TEST 2', which is a read/write test.

The test to be run is selected by pressing two switches in sequence as follows:
Test–Codes (Two switches on SOP must be pressed)

Switch Code	Test Description	Switch Code	Test Description
4 & 9	TEST 1	3 & 5	ERASE 4 INCHES
5 & 6	TEST 2	3 & 6	SKIP ONE BLOCK FWD
1 & 2	SELECT 0	3 & 7	SKIP ONE BLOCK REV.
1 & 3	SELECT 1	3 & 8	SEARCH TAPE MARK FWD
1 & 4	SELECT 2	3 & 9	SEARCH TAPE MARK REV.

Switch Code	Test Description	Switch Code	Test Description
1 & 5	SELECT 3	4 & 5	EDIT WRITE BLOCK
1 & 6	SELECT 4		(40 characters)
1 & 7	SELECT 5	4 & 6	EDIT ERASE
1 & 8	SELECT 6		(40 characters)
1 & 9	SELECT 7	4 & 7	EDIT READ BLOCK REV.
2 & 3	SET 'OFF LINE'		(20 characters)
2 & 4	SET 'ON LINE'	4 & 8	EDIT SKIP BLOCK REV.
	(6872 only)	9 & 9	STATUS
2 & 5	SEARCH BOT	10 & 10	CLEAR LAMPS
2 & 6	READ BLOCK		(All SOP lamps extinguished)
	(40 characters)		
2 & 7	READ BLOCK REVERSE		
	(40 characters)		
2 & 8	WRITE BLOCK		
	(40 characters)		
2 & 9	WRITE TAPE MARK		
3 & 4	ERASE		
	(40 characters)		

TEST 1

Before running test 1 move the tape past BOT, e.g. by code 26 (6168 and 6872). Then (6872 only) switch off and on the tape drive to make the tension arms go to retracted position. This should be done to check that the SET 'ON LINE' command will be correctly executed by the drive.

The sequence of the short tests in TEST 1 is as follows:

Test	Status	Remarks
12	11	K59 Status–
24	–	
13	11	
24	–	K58 and K59: Status 6 plus 11
14	11	
15	11	
16	11	
17	11	
18	11	
19	11	
12	–	
*23	11	K57: Test-start on MTU 2
24	–	
25	1 }	Command 25 repeated until status 4 comes
25	4 }	Time out = 3 minutes
29	2	
27	2	
27	3+4	
36	2	
28	– }	Repeated 25 times. 40 characters in every block
28	– }	
29	2	
27	2	
27	–	Read data compared with Write Data

Test	Status	Remarks
38	2	
28	–	Repeated 10 times
28	–	
29	2	
47	2	
47	8	Repeated 5 times. Status 7 achieved intentionally
47	8	Only 20 characters read
45	–	Data different to that for test 28
36	–	
36	–	
48	–	
46	3	
39	2	
26	2	
26	–	Repeated 9 times. Blocks nos 1–5 with ordinary data
26	–	Block 6 with special data. Block 7 with ordinary data
		Block 8 missing. Blocks 8 and 10 with ordinary data
26	2	
35	3	K57 and K58: repeated 20 times
35	3	K59: repeated 10 times
39	3	
39	2	
26	2	
26	3	
39	3	If status = 2 next test not carried out
39	2	
37	–	
26	10	Status intentionally received through
28	10	disconnection of MUX
28	–	
29	2	
28	–	Block with 2000 characters
28	–	
37	–	
37	–	
34	3	A half length block erased
37	2	
26	2	
26	3+9	Status 3 means no data to memory
		Status 9 means formatter has found a half block but has not transferred it
26	–	Next block correct
25	1	
23	11	
14	11	
24	6+11	
13	–	K57 first time (MTU1): status–
		K57 second time (MTU2) * K58 and K59 status 11
*		K57 first time (MTU1): Program jumps back to test marked * for test of MTU2.
		K57 second time (MTU2), K58 and K59: Test complete

When test 1 has run successfully, indicator lamps 2, 4 and 11 light.

Status indication should then be 6 + 11. (Press switches 9 & 9 for status)

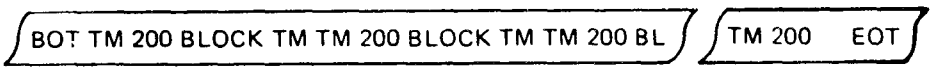
Sequence of test 2

Select type of MTU by pressing switches 5 & 7, 5 & 8 or 5 & 9. With 5 & 9 'ON LINE' switch on tep drive must be pressed. Unit number must then be selected (normally unit 0—test code 1 & 2).

Press switches 5 & 6.

Tape Unit seeks BOT first. Then a Tape mark is written followed by 200 blocks, whos length and contents come from a random number generator, then a new tape mark after the block. The tape unit then seeks reverse to the first tape mark at the beginning of the block and compares the read data with the written data. The unit continues to write blocks of data, read and compare them in this way until EOT mark is reached. The tape is then rewound to BOT and the test repeated. To STOP the test put the MTU 'OFF-LINE' by pressing the 'ON-LINE' switch.

The tape format after test 2 is shown in figure below.



Normal Indication

While a test is running the lamps corresponding to the switch code for that test are lit. On successful completion of a test, lamp 11 lights as well.

Error Indication

If a test fails, the error lamp 10 lights and the program stops. The failing test is indicated by the two lamps corresponding to the switch code of the short test.

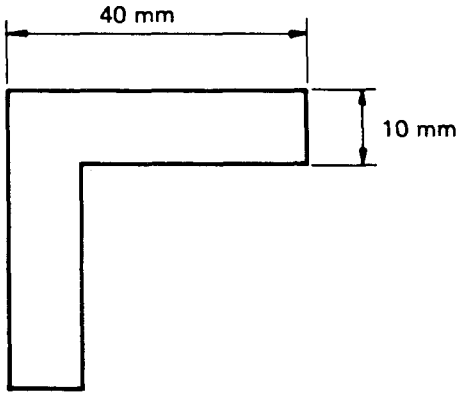
Pressing switch 9 twice gives the status as follows:

Lamp	Status	Lamp	Status
0		6	HARD WARE ERROR
1	REWIND	7	EOT
2	TAPE MARK	8	INCORRECT LENGHT
3	NO DATA	9	DATA ERROR
4	BOT	10	THROUGHPUT ERROR
5	WRITE PROTECT	11	NOT OPERABLE

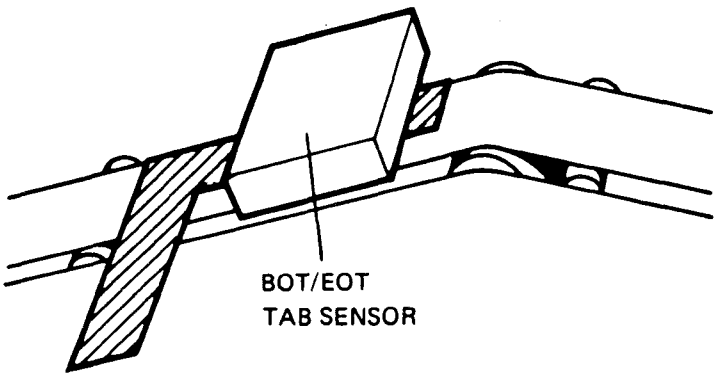
GENERAL VERIFICATION PROCEDURE

To check that MTU is functioning correctly the following 4 verification tests should be performed:

1. Test 1 (code 49)
2. Test 2 (code 56)
3. Write Protect Test.
   Remove rubber ring from the magnetic tape thus write protecting the tape.
   Replace the tape on the MTU and run the tape forward past BOT.
   Press 'ON LINE' switch.
   Choose SELCT 0 (code 12).
   When lamp 11 lights press switch 9 twice to read status.
   Lamp 5 should light indicating write protect status.
   Replace rubber ring.
4. EOT test
   Cut out a pice of white paper as shown



Press switches 5 and 6 (test 2).
Stop the tape drive by pressing the 'ON LINE' switch. Put the tape drive 'ON LINE' again.
Don't stop at BOT!
Place the paper between the tape and the BOT/EOT sensor as shown below.



Check status (test code 9 & 9).
Lamp 7 – EOT should be lit.

To avoid damage to the tape, don't use the L-shaped paper when running the tape.

If a Computer Full Panel is fitted, more elaborate checks, such as looping on a faulty test, can be performed – for more information see 'De-bugger use' document TSB 30/75.

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00000                          IDENT    CHMTGS                  10-09-1982  G SMIT
00001                     *ALL CHMT (PTS 6842) COMMANDS CAN BE TESTED.
00002                     *ALL SOP INDICATORS ARE ON AFTER PROGRAM IS LOADED
00003                     *THE COMMANDS MUST BE SPECIFIED, ONE BY ONE VIA SOP PANEL:
00004                     *
00005                     *  SELECT UNIT                  :SOP SWITCH 4,5 (8,9,10=UNIT NR)
00006                     *  READ BLOCK FORWARD           :           9
00007                     *  READ BLOCK REVERSE           :           9,10
00008                     *  WRITE BLOCK                  :           --
00009                     *  WRITE TAPE MARK              :           8
00010                     *  ERASE                        :           7
00011                     *  ERASE 4 INCH                 :           7,8
00012                     *  SKIP ONE BLOCK FORWARD       :           5
00013                     *  ,,  ,,  ,,  REVERSE          :           5,10
00014                     *  SEARCH TAPE MARK FORWARD     :           5,8
00015                     *  ,,  ,,  ,, REVERSE           :           5,8,10
00016                     *  EDIT WRITE BLOCK             :           6
00017                     *  EDIT ERASE                   :           6,7
00018                     *  EDIT READ BLOCK REVERSE      :           6,9,10
00019                     *  EDIT SKIP ONE BLOCK REVERSE  :           5,6,10
00020                     *  REWIND                       :           4,10
00021                     *  SET OFF-LINE                 :           4
00022                     *  SET ON-LINE                  :           4,6,10
00023                     *
00024                     *FOR REPEAT COMMAND FUNCTION, PRESS SOP SW.  3
00025                     *TO START COMMAND EXECUTION,PRESS   SOP SW.  1
00026                     *TO STOP REPEAT COMMAND EXECUTION, PRESS SOP SW. 1 AGAIN
00027                     *STATUS BITS 5-15 ARE DISPLAYED ON SOP INDICATORS
00028                     *PRESS A SOP SWITCH (NOT SW 1) TO DISPLAY STATUS AND INPUT CHARS
00029                     *PRESS SOP SWITCH 1 TO CONTINUE
00030                     *ENTER NEXT COMMAND WHEN ALL SOP INDICATORS ARE ON
00031                     *
00032  0000                             RES      /40
00033  0080  FFFF                       DATA     /FFFF,0
       0082  0000
00034        000C        ADR          EQU      /0C
00035  0084  208F        START        INH
00036                    *FETCH COMMAND BITS FROM SOP
00037  0086  41EE                       CIO      A1,1,/2E                START SOP
00038  0088  8320        NEWCOM       LDKL     A3,/7FF                 PROGRAM LOADED INDICATION
       008A  07FF
00039  008C  432E                       OTR      A3,0,/2E                DISPLAY ON SOP
00040  008E  8220                       LDKL     A2,/400                 MASK SOP SWITCH 1
       0090  0400
00041  0092  0300                       LDK      A3,0                    CLEAR COMMAND REG
00042  0094  4C2E        NEXBIT       INR      A1,0,/2E                COMMAND BIT FROM SOP
00043  0096  5C04                       RB(NA)   *-2                     WAIT TIL SOP SWITCH IS PRESSED
00044  0098  9104                       ADR      A1,A1                   SHIFT 1 BIT POS LEFT FOR SOP DISPLAY
00045  009A  B304                       XRR      A3,A1                   LOAD COMMAND INTO A3
00046  009C  432E                       OTR      A3,0,/2E                DISPLAY ENTERED COMMAND BITS
00047  009E  A109                       TM       A1,A2                   INITIATE? (SOP SWITCH 1)
00048  00A0  580E                       RB(Z)    NEXBIT                  NEXT COMMAND BIT FROM SOP
00049  00A2  3BE1                       SRC      A3,1                    (A3) BACK TO CORRECT POS.
00050                    *PREPARE IOP DEPENDING ON COMMAND
00051  00A4  0402                       LDK      A4,2
00052  00A6  A40C                       ANR      A4,A3                   COULD IT BE A DATA OUTPUT COMMAND?
00053  00A8  500A                       RF(Z)    OTR                     IF YES, GO TO OTR
00054  00AA  8520                       LDKL     A5,/100                 256 BYTES INPUT MODE
       00AC  0100
00055  00AE  7518                       WER      A5,ADR+ADR
00056  00B0  7519                       WER      A5,ADR+ADR+1            INPUT BUFFER ADDRESS : /100
00057  00B2  570C                       RF       INIT
00058  00B4  8520        OTR          LDKL     A5,/4100                256 BYTES OUTPUT MODE
       00B6  4100
00059  00B8  7518                       WER      A5,ADR+ADR
00060  00BA  8520                       LDKL     A5,BUF                  BUFFER ADDRESS TO IOP
       00BC  00EC  R
00061  00BE  7519                       WER      A5,ADR+ADR+1
00062                    *INITIATE THE COMMAND
00063  00C0  43CC        INIT         CIO      A3,1,ADR                START COMMAND
00064  00C2  4ECC                       SST      A6,ADR
00065  00C4  5C04                       RB(NA)   *-2
00066  00C6  8641                       ST       A6,/FE                  STATUS WORD IN FRONT OF INPUT BUF
       00C8  00FE
00067  00CA  462E                       OTR      A6,0,/2E                STATUS BITS 5-15 TO SOP
00068  00CC  0480                       LDK      A4,/80                  REPEAT FUNCTION MASK
00069  00CE  A40C                       ANR      A4,A3                   WAS IT REPEAT MODE?
00070  00D0  5004                       RF(Z)    NEXTC                   NEXT COMMAND
00071  00D2  492E                       INR      A1,0,/2E                REPEAT IF NO SOP SWITCH WAS PRESSED
00072  00D4  5C16                       RB(NA)   INIT
00073                    *RESTART AFTER STATUS IS DISPLAYED
00074  00D6  8720        NEXTC        LDKL     A7,/FE                  INPUT BUFFER START ADDRESS
       00D8  00FE
00075  00DA  492E        NEXT         INR      A1,0,/2E                (FIRST 2 BYTES = STATUS WORD)
00076  00DC  5C04                       RB(NA)   *-2                     WAIT FOR SOP SWITCH PRESSED
00077  00DE  9104                       ADR      A1,A1                   SHIFT TO CORRECT LAMP POS
00078  00E0  A109                       TM       A1,A2                   SOP SWITCH ONE?
00079  00E2  5C5C                       RB(NZ)   NEWCOM                  IF YES, TO NEW COMMAND
00080  00E4  E43C                       LCR      A4,A7                   FETCH CHARACTER FROM INPUT BUFFER
00081  00E6  442E                       OTR      A4,0,/2E                DISPLAY STATUS + INPUT DATA
00082  00E8  1701                       ADK      A7,1                    NEXT CHAR ADDRESS
00083  00EA  5F12                       RB       NEXT
00084  00EC  0000        BUF          DATA     0
00085  00EE  FFFF                       DATA     /FFFF,0,/FFFF,0
       00F0  0000
       00F2  FFFF
       00F4  0000
00086  00F6  FFFF                       DATA     /FFFF,0,/FFFF,0
       00F8  0000
       00FA  FFFF
       00FC  0000
00087  00FE  FFFF                       DATA     /FFFF,0,/FFFF,0
       0100  0000
       0102  FFFF
       0104  0000
00088                                   END      START
```