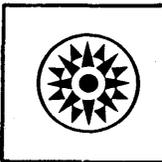


Systems Reference Library

**IBM 2420 Model 7 Magnetic Tape Unit
Original Equipment Manufacturers' Information**

This manual contains detailed electrical, mechanical and cabling considerations and specifications concerning tape control-tape unit interface for the IBM 2420 Model 7 Magnetic Tape Unit.



Preface

This manual is for use by designers and engineers when designing devices which will interface with the IBM 2420 Model 7 Magnetic Tape Unit. It contains all electrical, mechanical and cabling requirements necessary for Model 7 operation. The reader's detailed knowledge of computer techniques and terminology is assumed.

First Edition (October, 1968)

Changes are periodically made to the specifications herein; any changes will be reported in subsequent revisions or Technical Newsletters.

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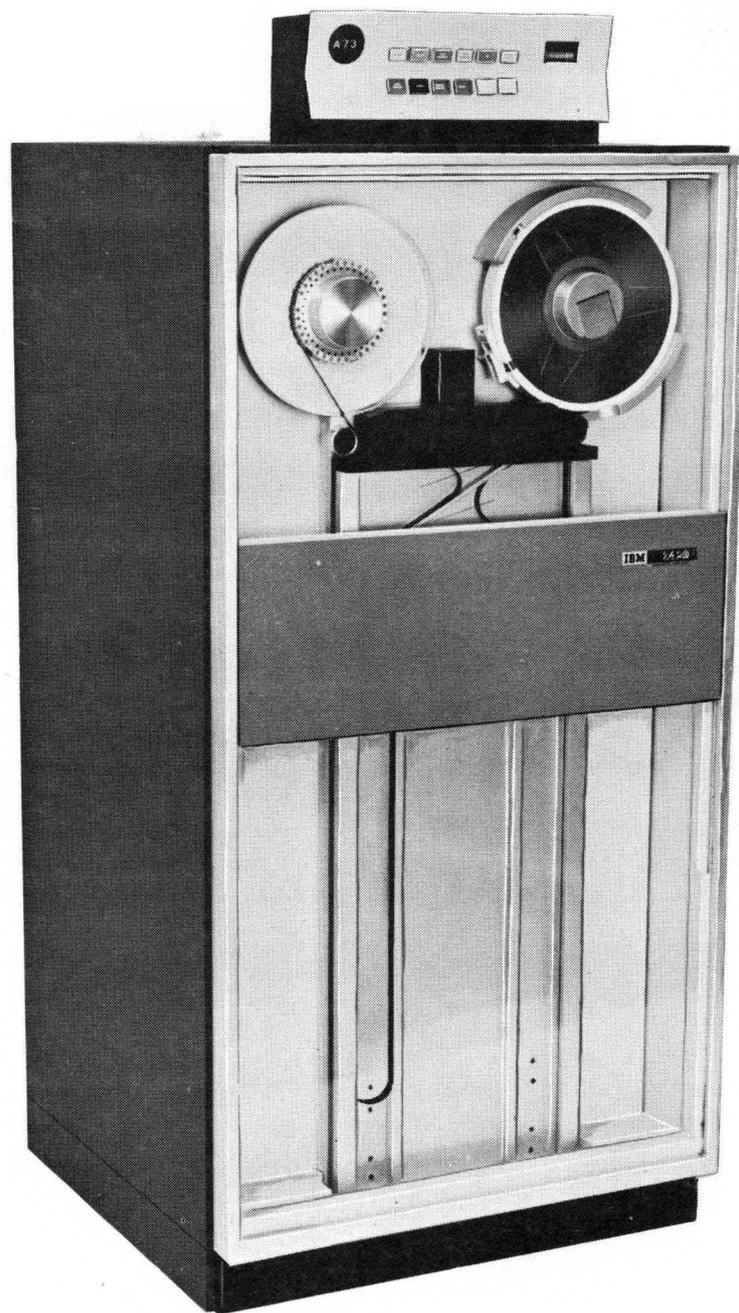
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Abbreviations

ac	alternating current	kg	kilogram
amp	ampere	kva	kilovolt amp
asm	assembly		
AWG	American wire gage	LP	load point
BCD	binary coded decimal	m	meter, minute
bkwd	backward	ma	milliampere
B/M	bill of material	mm	millimeter
BOT	beginning of tape	ms	millisecond
bpi	bits per inch		
BTU	British thermal unit	NA	not applicable
		NFP	not file protect
C	centigrade	NR	not ready
cfm	cubic feet per minute	NRZI	nonreturn to zero indiscrete
cm	centimeter	NS	not specified
dc	direct current	P	parity
		PE	phase encoded
EOF	end of file	PVC	poly-vinyl chloride
EOT	end of tape		
EPO	emergency power off	R/W	read/write
F	fahrenheit	sec	second
fwd	forward	sel	select
		SLT	solid logic technology
gnd	ground		
		TC	tape connector, tape control
HD	heavy duty	TI	tape indicate
IBG	interblock gap	UL	Underwriters Laboratory
Ind	indicator	usec	microsecond
ips	inches per second		
kb	thousands of eight-bit bytes	v	volt
kcal	kilocalorie	vac	volts alternating current
		vdc	volts direct current



IBM 2420 Model 7 Magnetic Tape Unit

INTRODUCTION

The IBM 2420 Model 7 Magnetic Tape Unit reads or writes nine tracks on half-inch (12,7mm) magnetic tape. Writing is in the forward direction, while reading is in the

forward or backward direction. (Each block written is read back by the two-gap read/write head and checked in the tape control.) Figure 1 summarizes functions, specifications, and requirements of the 2420-7.

Characteristic	Specification
Recording medium	Half-inch (12,7 mm) magnetic tape
Data format	Nine-track; eight data bits (0-7) plus parity (P) bit
Recording method and density	Phase-encoded (PE) at 1600 bytes per inch (BPI)*
Tape speed	Read or write – 200 inches per second (ips)* High speed rewind – 500 inches per second.*
Time from stopped position to 90 percent of full (200 ips*) speed	Forward – 2.0 ms average (2.2 maximum) Backward – 2.5 ms average (3.5 maximum)
Data rate	320,000 bytes per second or 640,000 hexadecimal digits per second
Time per byte	3.1 microseconds passing time at 200 inches per second (ips*)
Interblock gap (IBG) length and time	0.6-inch (15,2 mm) length, 3 milliseconds passing time at 200 ips*
Rewind and rewind-unload operation times (2400 ft)	Rewind – 1.0 minute Rewind-unload – 1.1 minutes
Rewind and rewind-unload disconnect times	Rewind – 25 microseconds Rewind-unload – 1 millisecond
Forward/backward status change (reversal) time**	16 milliseconds
Load point (BOT) to first byte	Approximately 45 milliseconds (including reversal time)
Tape reels	Standard IBM (2400ft.) 10.5-inch or 8.5-inch reel, or mini-reel (Optional tape cartridge uses only standard IBM 10.5-inch reel.*)
Tape capacity	2400 feet max. (10.5-inch reel*)
Tape requirements	Series/500, Dynexcel, IBM Heavy Duty, or equivalent (IBM tape formulations prior to Heavy Duty or Dynexcel, or similar formulations, cannot be used.)
Time to 'tape drive ready'	Time from mounted file reel to 'tape drive ready' is approximately seven seconds.
Read/write head	Construction: two-gap (0.150 inch [0,81 mm] between gaps)
Height/width/depth	67 x 30.5 x 29.5 inches (170 x 78 x 75 cm)
Weight	940 lbs. (427 kg)

Figure 1. Functions/Specifications/and Requirements (Part 1 of 2)

Heat output	7900 BTU/hr (1.991 kcal)	
Air flow	700 cfm (20m ³ /m)	
Power requirements	2.9 kva	
	60 cycle/three phase/208 or 230 volts (Domestic)	
	50 cycle/three phase/ 195, 220, 235, 380, or 408 volts (World Trade)	
<u>Environmental requirements</u>	<u>Operating</u>	<u>Nonoperating</u>
Room temperature	60° – 90° F	(16° – 32° C) 50° – 110° F (10° – 43° C)
Relative humidity	20% – 80%	8% – 80%
Maximum wet bulb	78° F (26° C)	80° F (27° C)
Service clearances	Front and rear: 36 inches (91,4 cm) Left and right sides: 30 inches (76,2 cm)	
Special features	None.	

* 1600 bpi = 63 bytes/mm
200 ips = 500 cm per second
500 ips = 1300 cm per second
8.5 inches = 21,6 cm
10.50 inches = 26,7 cm
2400 feet = 742 meters

** The tape unit maintains status (forward/backward) of the operation it has performed. Reversal time must be added for every forward following a backward operation, every backward following a forward operation, and for every forward operation initiated at load point.

Figure 1. Functions/Specifications/and Requirements (Part 2 of 2)

OPERATOR PANEL LIGHTS

Operator Panel Lights

Condition Indicated When Light Is On

Ready	Indicates the tape unit is properly loaded, the start pushbutton pressed, and tape unit can be activated by the tape control. Turned on by pressing the start pushbutton if: <ol style="list-style-type: none"> Tape unit is loaded and tape is in columns Reel door is interlocked Tape unit is not searching for load point. Pressing the start key while tape is in motion, as in a load/rewind operation, does not light the ready light until load-rewind is complete. The reel door should not be opened while the ready light is on. Manual control is indicated when light is off if the tape unit is not rewinding or loading and the reel door is closed.
Select	Indicates this tape unit is addressed by the computer. An addressed tape unit must be 'ready' before receiving program instructions.
File Protect	Indicates that a loaded tape unit is file-protected (can neither write or erase) because: <ol style="list-style-type: none"> No file reel is mounted or The file reel does not contain a write-enable ring or A load-rewind operation is in progress or An unload operation is in progress.
CB	Indicates that a circuit breaker tripped, the gate thermal tripped, or a fuse opened.
Tape Indicate	Indicates that a light-to-dark transition at the end of the end-of-tape (EOT) marker was sensed during a forward operation. Indicator is turned off by the light-to-dark transition of the opposite end of the same marker during a backward operation.
Load Check	Indicates a thread failure or a tape leader longer than thirty feet.

OPERATOR PANEL PUSHBUTTONS

Operator Panel Pushbuttons

Tape Unit Response to Pressed Pushbutton

Load-Rewind	Operative when tape unit is not in ready status. Moves tape to load point if the unit is loaded, or threads tape to load point and loads tape into columns if the unit is unloaded.
Start	Puts the tape unit in ready status and under computer control and turns on ready light if: <ol style="list-style-type: none">Reel door is closedTape is in columnsTape unit is not rewinding. Disables all manual controls except 'reset'.
Rewind-Unload	Operative if the tape unit is not in ready status or rewinding and tape is in columns. Rewinds tape to load point and unloads tape onto the file reel. Closes cartridge (if used). Opens power window at the end of an unload operation. Opens power window if tape unit is unloaded.
Reset	Removes tape unit from ready status and computer control. Performs the following: <ol style="list-style-type: none">Stops tape during low-speed rewind orReduces high-speed rewind to low-speed rewind orStops tape motion during load or unload operations orTurns off load check light andRaises power window.

2420 INTERFACE

The 2420 interface consists of 24 input signal lines, 25 output signal lines, 1 ground line, and 2 dc voltage lines. Specifications for 2420 interface lines are given in Figure 2.

Input Signal Lines

All input lines are SLT level with a minimum active (down) level of +1.2 volts and a minimum inactive (up) level of +2.5 volts.

Select (TC77, 79, 86, 88, 97, 99, 106, and 108)

Each of these eight input lines selects a particular tape unit (0-7) from the group connected in-line to a common control unit. An active select line gates the selected tape unit, allowing it to receive and transmit all subsequent signals from and to the control unit. Because the select signal for any tape unit is always taken from TC77, select lines are rotated in each TU to TU cable. See Figure 3.

Go (TC9)

Controls tape motion; it is conditioned after the status lines have been set to establish the operation to be performed. The go line must be active for all operations that move tape forward or backward, except for rewind and rewind-unload. Tape motion is controlled internally for these operations.

Backward (TC11)

Puts the tape unit in backward status. If the go line is active with 'backward status' set, tape moves backward; if backward status is not set, tape moves forward. The tape unit remains in backward status unless reset by 'set read status' or 'set write status.' Since tape can only be written forward, 'backward' sets 'read status' in the tape unit.

Set Read Status (TC25)

Sets the tape unit in read status and deconditions the write circuits. The tape unit remains in read status until 'set write status' becomes active. 'Set read status' presumes a forward read, and, therefore, resets 'backward status.'

Input Lines (From Tape Control)				
Line Name	Rise or Fall Time (Maximum)	Pulse Width (Minimum)	dc Voltage Level	
			UP	DOWN
Select	0.25 usec	NS*	+2.5	+1.0
Backward	0.25 usec	9.5 usec	+2.5	+1.0
Go	0.25 usec	NS	+2.5	+1.0
Set Read Status	0.25 usec	10.5 usec	+2.5	+1.0
Set Write Status	0.25 usec	7.9 usec	+2.5	+1.0
Rewind	NS*	NS*	+2.5	+1.0
Rewind-Unload	NS*	NS*	+2.5	+1.0
Metering Out	NS*	NS*	+2.5	+1.0
Write Bus	NS*	NS*	+0.6	+0.3
<i>Command</i>		<i>Response</i>		
Rewind		Not Ready or Select & at LP		
Rewind-Unload		Not Ready		
Backward		Backward Status		
Set Read Status		Select and Read Status		
Set Write Status		(Not) Select and Read Status		
*NS-not specified				

Output Lines (To Tape Control)				
Line Name	Rise or Fall Time (Maximum)	Maximum Response Time (from Select)	dc Voltage Level	
			UP	DOWN
Model 1, 2, 3	1 usec	2.0 usec	+2.5	+1.5
Select & TI Off	1 usec	6.8 usec	+2.5	+1.5
Select & at LP	1 usec	6.2 usec	+2.5	+1.5
Select & Read Status	1 usec	6.2 usec	+2.5	+1.5
Select & Not File Protect	NS*	6.2 usec	+2.5	+1.5
Backward	NS*	6.2 usec	+2.5	+1.5
Write Inhibit	See Note	See Note	+2.5	+1.5
Not Ready	NS*	NS*	+1.9	+1.0
Read Bus	NS*	NS*	0.1 vp/p @ 180KC	
<i>Note:</i> Determined by interblock gap (IBG) length and the time necessary to reach full tape speed.				
*NS- not specified				

Figure 2. Interface Lines: Specifications

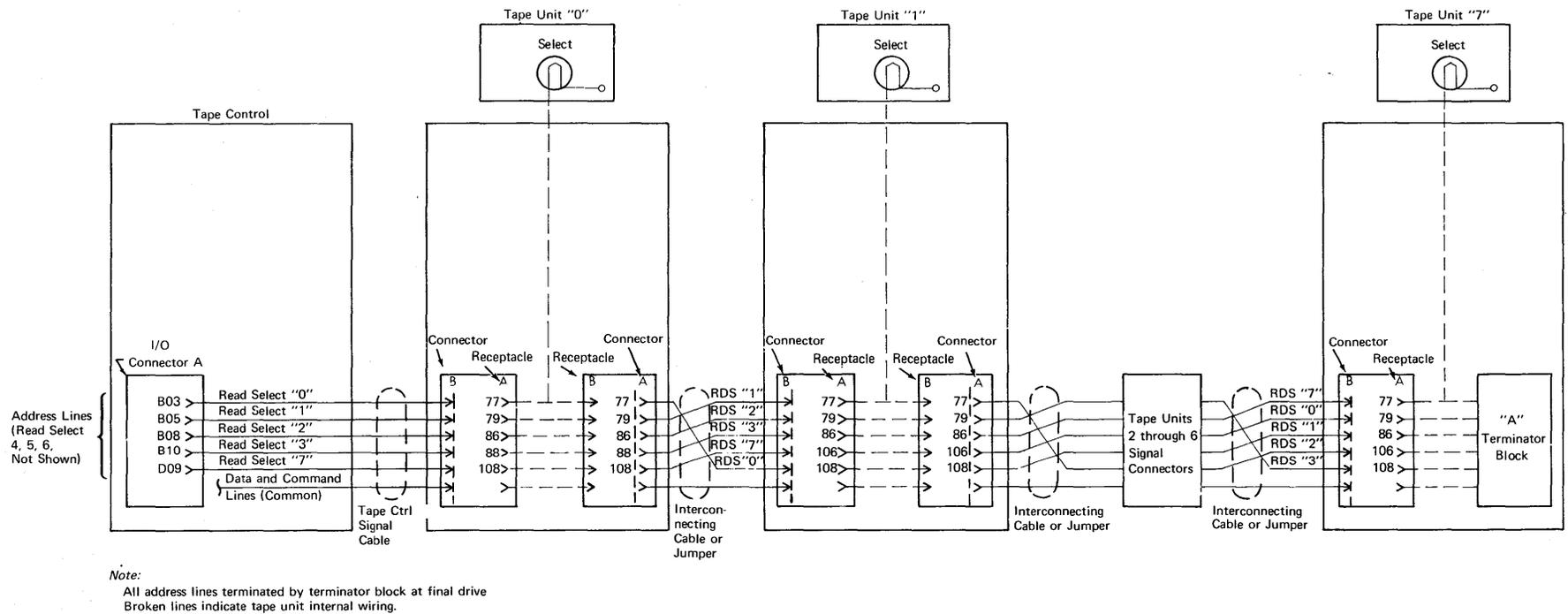


Figure 3. Tape Unit Select Lines

Set Write Status (TC13)

This input line puts the tape unit in write status and conditions tape unit write circuits. The tape unit remains in write status until 'set read status' or 'backward' becomes active. 'Set write status' also resets 'backward status.'

Note: Because write checking is accomplished by reading, read circuits are conditioned during both read and write operations.

Write Bus (TC1, 3, 5, 17, 19, 21, 31, 33, and 35)

These nine input signal lines (0-7 and P) gate data from the tape control directly to the write head drivers. Data sent by the tape control determines time and duration of write head flux reversals.

Rewind (TC39)

This input line causes the tape unit to perform a rewind operation (tape is rewound to the load point). Rewind is at high speed if there is more than approximately 60 feet of tape on the take-up reel; otherwise, it is a low speed rewind.

Rewind-Unload (TC41)

Like rewind, this input line causes tape to rewind to load point. In addition, tape unloads, and the power window opens, preparatory to changing reels.

Metering Out (TC23)

This input line is active when the system's conditions are met for running usage meters and the control unit is not off-line. The tape unit meter stops only if the metering-out line becomes inactive, if the tape unit is unloaded and not rewinding, or if the tape unit is at load point.

Metering out is terminated in each individual tape unit.

Output Signal Lines

All output lines are SLT level with a minimum active (down) level of +0.3 volt and a minimum inactive (up) level of +2.5 volts.

Models 1, 2, 3 (TC180, 182, and 184)

These output lines identify the tape unit model and indicate the tape unit is selected and ready. All three lines (1, 2, and 3) active at the same time identify a model 7 tape unit.

Select and at Load Point (TC198)

Indicates the tape on the selected tape unit is positioned at load point. This line is reset if the tape is unloaded and not rewinding or if tape is moved forward.

Select and Not File-Protected (TC192)

Indicates that a selected and ready tape unit can perform a write operation because it is not file-protected. A tape unit is file-protected (writing or erasing of tape is prevented) when the file reel does not contain a write-enable ring.

Select and TI Off (TC196)

Active when the tape indicator of the selected tape unit is off; this indicates the selected tape unit has not reached the useful end of tape. TI is set by sensing the light-to-dark transition at the end of the EOT marker during a forward operation; it is reset by sensing the light-to-dark transition of the opposite end of the same marker during a backward operation.

Select and Read Status (TC162)

This output line indicates read status when active, and write status when inactive; it is effective only while model 1, 2, and 3 lines are active.

Not Ready (TC142, 144, 156, 158, 172, 174, 186, and 188)

This output line indicates the addressed tape unit (0-7) is connected but not ready. A tape unit is not ready if it is unloaded, in reset status, or performing a rewind operation.

In a tape unit configuration that utilizes a 2816 Switching Unit, the active state of 'not ready' may also indicate the tape unit is switched; that is, the tape unit is operating with another control unit. Because a selected tape unit sends its own 'not ready' signal out on TC142, not ready lines are rotated in TU to TU cables so the tape unit next to the control unit has the 'not ready (n)' line at the proper TC pin. See Figure 4.

On a rewind-unload command, the tape unit drops the model lines (TC180, 182, and 184) before activating the not ready line.

Read Bus (TC82, 84, 93, 95, 102, 104, 113, 115, and 122)

These nine output lines (0-7 and P) carry the data read from tape to the tape control for a read operation and for checking a write operation.

Backward Status (TC164)

This output line is active when the tape unit is in backward status. Conditioning the go line causes backward motion of tape—for example, in backspacing.

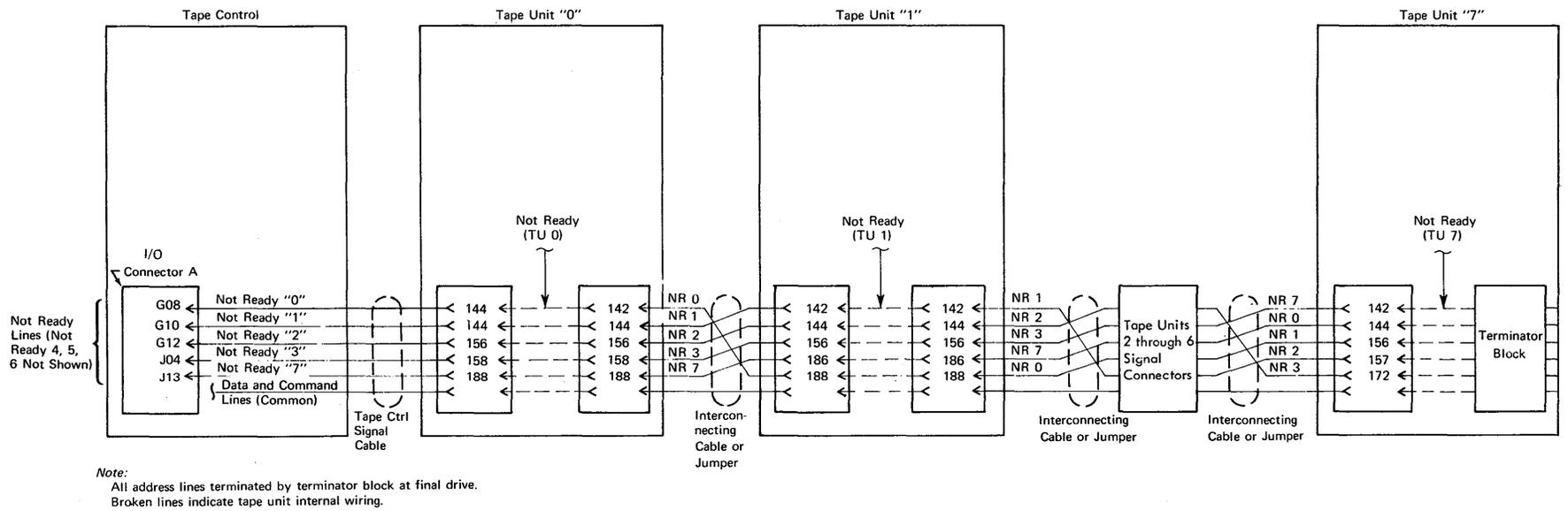


Figure 4. Tape Unit Not Ready Lines

Write Inhibit (TC194)

When active, this output line indicates the tape unit is not ready for writing. 'Write inhibit' ensures no writing is initiated by the tape control until tape is up to speed (200 ips) and/or until the minimum interblock gap has been reached.

Ground and dc Power Lines

Ground (TC136)

This line supplies a ground connection to the field tester and to terminating networks located in the terminator block.

+ 12 (TC132)

This line supplies + 12 volts to the field tester and to terminating networks in the terminator block.

- 12 (TC170)

This line supplies - 12 volts to the field tester.

Cables

IBM will supply the cables shown in Figure 5 to the maximum lengths specified. All cables must be ordered

through the IBM sales representative and by the appropriate cable group number only. IBM part numbers relating to cables are listed for design information only.

In the interest of safety, all IBM machines shipped to the customer have been equipped with grounded cord plugs. No other type of plug will be supplied by IBM. If any machine in a group is grounded, all other machines in the group must be grounded. Grounded machines must be placed so it is impossible to touch simultaneously a grounded machine and an ungrounded machine, electrical equipment, metal cabinet, etc.

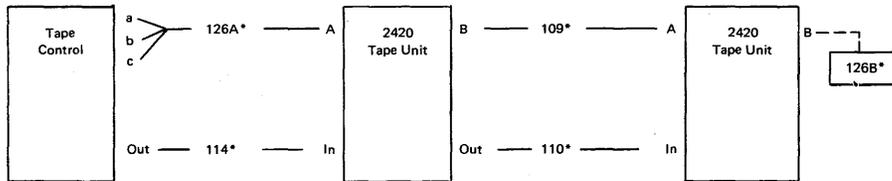
Connectors

IBM will supply the connectors and components shown in Figure 6. All parts must be ordered through the IBM sales representative and by the appropriate part or bill of material number only. See Figures 7, 8, and 9 for connector schematics and pin assignments.

Drivers and Terminators

Figures 10-16 show transistor circuits used to drive, receive, and terminate the lines between the tape unit and its control unit.

	Cable Group Number	Key Number	IBM Part Number	Purpose (From/To)	Number of Conductors (Pairs)	Cable Diameter Inches (Millimeters)	Type Insulation	Type Wire	Size Wire (AWG)	Conductivity (@20°C)	UL Voltage Rating (Maximum)	Temperature Rating of Wire/Insulation	Wire Impedance (Nominal)	Wire Capacitance (Maximum)	Remarks
POWER CABLES	110	110	5382997	TU/TU	13	0.915 max. (23,1)	PVC	Stranded	3 wires # 10	NS	600v	80°C	NS	NS	18 AWG Wires are unused. See Note 2, 3, and 4.
	114	114	5382997	TC/TU	13	0.915 max. (23,1)	PVC	Stranded	3 wires # 14 7 wires # 18	NS	600v	80°C	NS	NS	
SIGNAL CABLES	109	109	5382996	TU/TU	56	1.52 (38,6)	PVC	Coax	Center Wire # 26 Drain Wire # 29	40%	750v	80°C	95 ±3	13.5 pf/ft	See Notes 1 and 4.
	126	126A	2501404	TC/TU	60 (See Note 5)	See Note 5	PVC	Coax	Center Wire # 26 Drain Wire # 29	80%	750v	80°C	95 ±3	13.5 pf/ft	See Notes 1 and 4.
	126	126B	5417910	Signal Terminator	200										



Notes:

1. The total length of signal cables on any one tape channel, for a maximum of eight tape units, must not exceed 120 feet measured from control unit connector to tape connector on the last tape unit in line.
2. The maximum length cable provided for a single tape unit or between tape units in line is 25 feet (X dimension), measured from bottom of unit to bottom of unit.
3. No more than four tape units may be connected in line on each of the control unit power outlets.
4. Connector pin assignments are shown on Figures 7, 8, and 9.
5. Three 20-conductor, one-inch diameter cables lashed together.
6. *—Key Number.
7. NS—Not Specified.

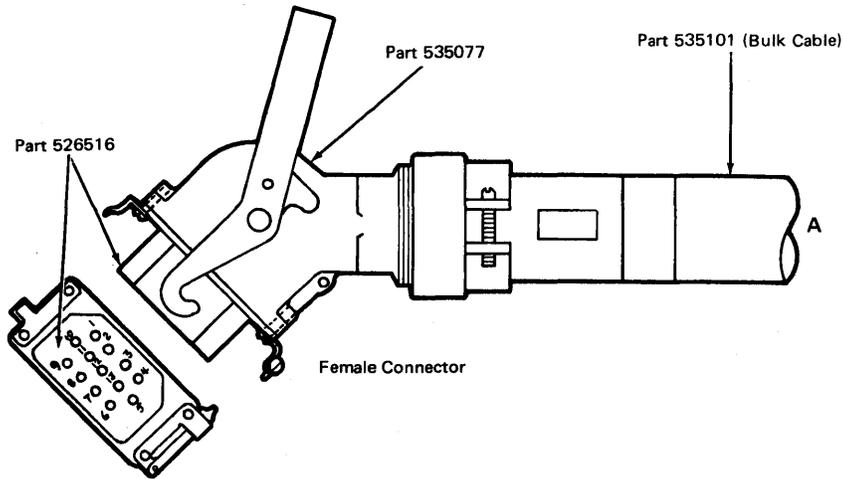
Figure 5. Power Cable and Signal Cable Data

POWER CONNECTORS & CONTACTS	Name	IBM Part or B/M Number	Outside Dimensions inches (mm)	Number of Contacts	UL Voltage Rating (Maximum)	Contact Current Rating (Maximum)	Crimp to Crimp Contact Res (Maximum) @ 25°C, 80% hum	Pin to Center Wire and Pin to Shield Resistance (Max) @25°C, 80% Hum	Insulation Resistance (Minimum)	Connector Grounding	Type of Wire Terminations	Vendor Part No.	Remarks
	Insert (Power Plug)	Part 526516	2.31x1.12x1.09 (58,7x28,5x27,7)	13	250v ac/dc	20 amps	0.1Ω		1000 Megohms	Frame Ground (Pin #3)	Crimp	Burndy Corp ME13P-5F19	
	Insert (Power Plug)	Part 526517	2.31x1.12x1.51 (58,7x28,5x38,1)	13	250v ac/dc	20 amps	0.1Ω		1000 Megohms	Frame Ground (Pin #3)	Crimp	Burndy Corp ME13R-5F19	
	Housing (Power Plug)	Part 535077	2.0x2.3x3.8 (50x58x97)									Burndy Corp ME13-1KC	
	Contact (Female) #14 AWG	Part 535084				15 amps*	0.1Ω	NS			Crimp	Burndy Corp RC14M-3F33	
	Contact (Male) #14 AWG	Part 535085			See "Insert" (Power Plug) above	15 amps*	0.1Ω	NS			Crimp	Burndy Corp RM14M-3F33	
	Contact (Female) #10 AWG	Part 535086				20 amps*	0.1Ω	NS			Crimp	Burndy Corp RC10Z-3F33	
	Contact (Male) #10 AWG	Part 535087				20 amps*	0.1Ω				Crimp	Burndy Corp RM10Z-3F33	
	Contact (Male) #14 AWG	Part 535679				NS	0.1Ω	NS			Crimp	Burndy Corp RM14M-7F33	Grounding pin, Male P Fits Normal #14 AWG Female Contact
SIGNAL CONNECTORS & CONTACTS	Serpent Connector	B/M 5362321	1.0x4.0x.9 (101,6x25,4x21,8)	44	24v**	1.5 amps**	0.1Ω	NA	1000 Megohms	Floating	Crimp		Mounted on Tape Control. Mates with 5362313.
	Serpent Connector	B/M 5362313		44	24v**	1.5 amps**	0.1Ω	NA	1000 Megohms	Floating	Crimp		Mounted on Cable. Mates with 5362321.
	Connector Asm Screw Latch (A)	Part 591752	4.9x5.0x2.9 (124x127x72)	200	24v**	1.5 amps**	0.1Ω	NA	1000 Megohms	Floating	Crimp	Amp Inc. 5824922	See Notes
	Connector Asm Screw Latch (B)	Part 591751		200	24v**	1.5 amps**	0.1Ω	NA	1000 Megohms	Floating	Crimp	Amp Inc. 582493-2	See Notes
	Board	Part 598688	4.75x4.75x1.1 (120,7x120,7x27,9)	200	24v**	1.5 amps**	0.1Ω	NA	1000 Megohms	Floating	NA	Amp Inc. 380412-2	See Notes
	Contacts for #20-#24 AWG	Part 598041	NA	NA	See "Connector Asm Screw Latches A & B" and "Board" (above)	1.5 amps**	0.1Ω	0.006Ω	See "Connector Asm Screw Latches A & B" and "Board" (above)	Floating	Crimp	Amp Inc. 42561-4	Contacts for 200 Position Signal Connector
	Contacts for #16-#18 AWG	Part 596224	NA	NA		1.5 amps**	0.1Ω	NS		Amp Inc. 42928-4			
	Contacts for #26-#29 AWG	Part 5412531 or Part 596224 with Stuffer Part 596230	NA	NA		1.5 amps**	0.1Ω	0.0085Ω		Amp Inc. 42595-2			
Contacts for #22-#28 AWG	Part 5362301	NA	NA	See "Serpent Connector" (above)	1.5 amps**	0.1Ω	0.005Ω	See "Serpent Connector" (above)	Floating	Crimp		Contacts for Serpent Connectors	

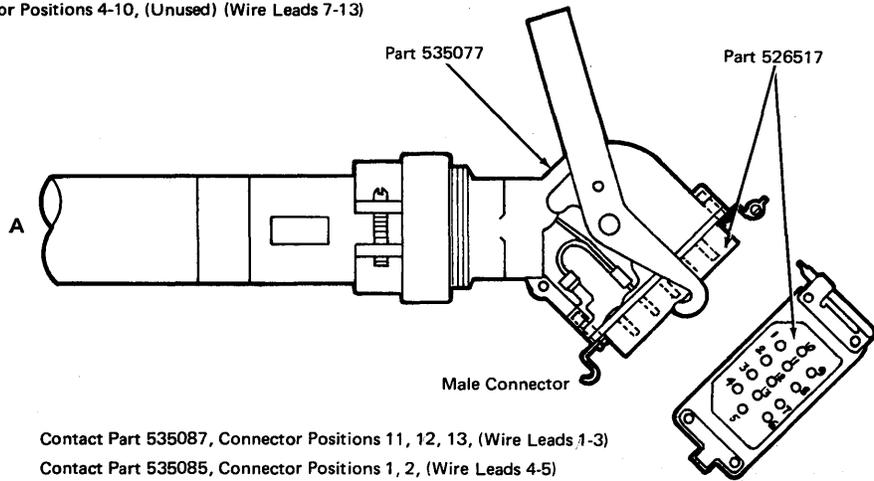
Notes:

1. Connector pin assignments are shown on Figures 7, 8, and 9.
2. *—Only when installed in insert.
3. **—IBM standards only. UL standards not specified.
4. NS—Not Specified.
5. NA—Not Applicable.

Figure 6. Power Cable and Signal Cable Connector and Contact Data



Contact Part 535086, Connector Positions 11, 12, 13, (Wire Leads 1-3)
 Contact Part 535084, Connector Positions 1, 2, 3, (Wire Leads 4-6)
 Contact Part 535082, Connector Positions 4-10, (Unused) (Wire Leads 7-13)



Contact Part 535087, Connector Positions 11, 12, 13, (Wire Leads 1-3)
 Contact Part 535085, Connector Positions 1, 2, (Wire Leads 4-5)
 Contact Part 535083, Connector Positions 4-10 (Unused) (Wire Leads 7-13)
 Contact Part 535679, Connector Position 3 (Gnd) (Wire Lead 6)

60-Hertz Tape Controls

Pin	Function
1	Convenience Outlet
2	Convenience Outlet
3	Frame Ground
11	One Phase } Unregulated ac
12	
13	

50-Hertz Tape Controls

Pin	Function
1	Neutral
2	Frame Ground
3	Frame Ground
4	Frame Ground
5	Frame Ground
6	Convenience Outlet
7	Convenience Outlet
11	One Phase } Unregulated ac
12	
13	

Note: Machine mounted connectors are identical except for housing. See Figures 3 and 4 for cable and contact electrical characteristics.

Figure 7. AC Power Cables and Connectors: Schematic and Pin Assignments

Tape Control Connector	Tape Control Connector Pin No.		Signal Name	Tape Unit Connector Pin No.	
	Signal	Shield		Signal	Shield
a	B03	B02	Select TU0	77	76
	B05	B04	Select TU1	79	78
	B08	B07	Select TU2	86	87
	B10	B09	Select TU3	88	89
	B12	B13	Select TU4	97	96
	D04	D05	Select TU5	99	98
	D06	D07	Select TU6	106	107
	D09	D08	Select TU7	108	109
	D11	D10	Spare	117	116
	D13	D12	Spare	119	118
	G03	G02	Spare	176	175
	G05	G04	Spare	190	191
	G08	G07	TU 0-NR	142	141
	G10	G09	TU 1-NR	144	143
	G12	G13	TU 2-NR	156	157
	J04	J05	TU 3-NR	158	159
	J06	J07	TU 4-NR	172	171
	J09	J08	TU 5-NR	174	173
	J11	J10	TU 6-NR	186	187
	J13	J12	TU 7-NR	188	189
b	B03	B02	Go	9	10
	B05	B04	Backward	11	12
	B08	B07	Set Write Status	13	14
	B10	B09	Set Read Status	25	24
	D04	D05	Spare	7	8
	D06	D07	Rewind	39	40
	D09	D08	Rewind/Unload	41	42
	D11	D10	Metering Out	23	22
	D13	D12	Spare/Shield	37	38
	G03	G02	Write Bus P	1	2
	G05	G04	Write Bus 0	3	4
	G08	G07	Write Bus 1	5	6
	G10	G09	Write Bus 2	17	16
	G12	G13	Write Bus 3	19	18

Tape Control Connector	Tape Control Connector Pin No.		Signal Name	Tape Unit Connector Pin No.	
	Signal	Shield		Signal	Shield
b	J04	J05	Write Bus 4	21	20
	J06	J07	Write Bus 5	31	32
	J09	J08	Write Bus 6	33	34
	J11	J10	Write Bus 7	35	36
	J13	J12	Write Pulse	29	28
c	B03	B02	Mod 3	184	183
	B05	B04	Mod 2	182	181
	B08	B07	Mod 1	180	179
	B12	B13	Sel & Read Status	162	163
	D04	D05	Sel & At Load Point	198	199
	D06	D07	Backward Status	164	165
	D09	D08	Write Inhibit	194	195
	D11	D10	Sel & Not File Protect	192	193
	D13	D12	Spare	124	125
	G03	G02	Read Bus P	82	83
	G05	G04	Read Bus 0	84	85
	G08	G07	Read Bus 1	93	92
	G10	G09	Read Bus 2	95	94
	G12	G13	Read Bus 3	102	103
	J04	J05	Read Bus 4	104	105
J06	J07	Read Bus 5	113	112	
J09	J08	Read Bus 6	115	114	
J11	J10	Read Bus 7	122	123	
J13	J12	Sel & TI Off	196	197	

Note: All shield pins connect to machine ground.
Rwd-NR=Rewinding -Not Ready.

Figure 9. Tape Unit/Tape Control Signal Cable Connector Pin Assignments

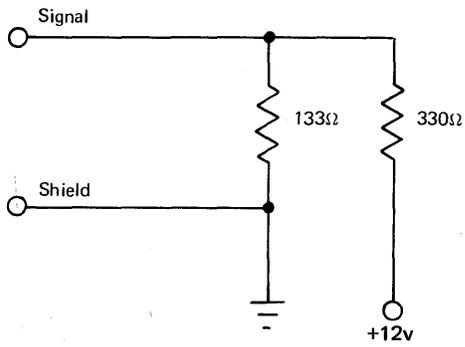
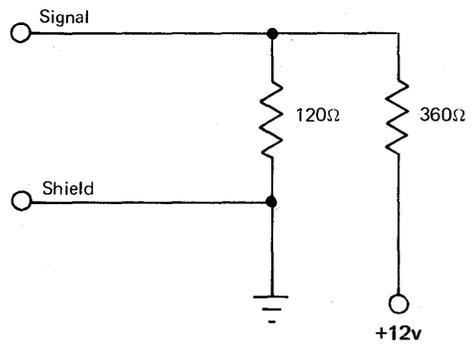


Figure 10. Write Bus Terminator



This is a representative circuit of those used in the terminator connector (part 5417910) which must be inserted in the connector B position of the last tape unit in a line.

Figure 12. Control Line Terminator

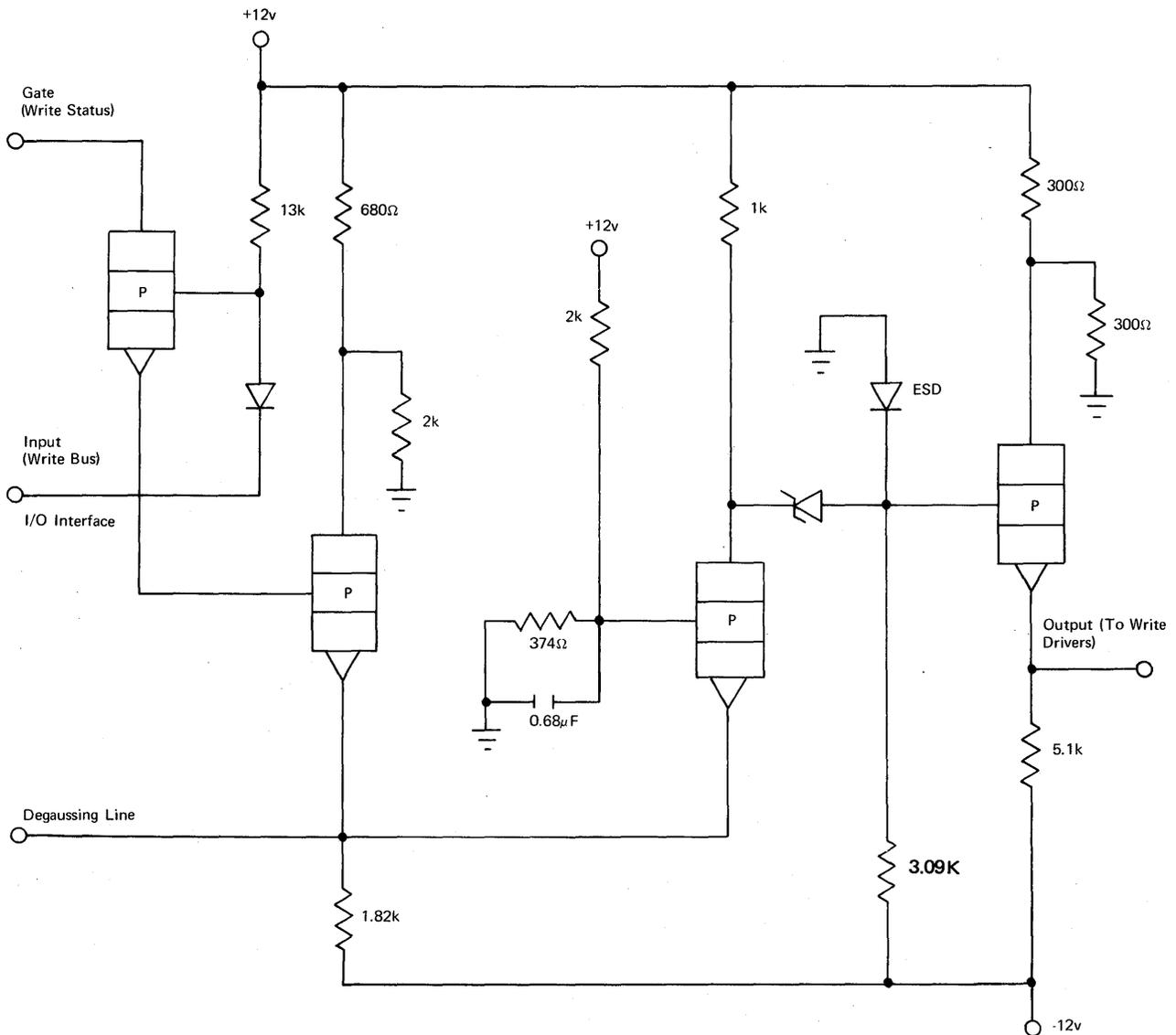


Figure 11. Write Bus Receiver

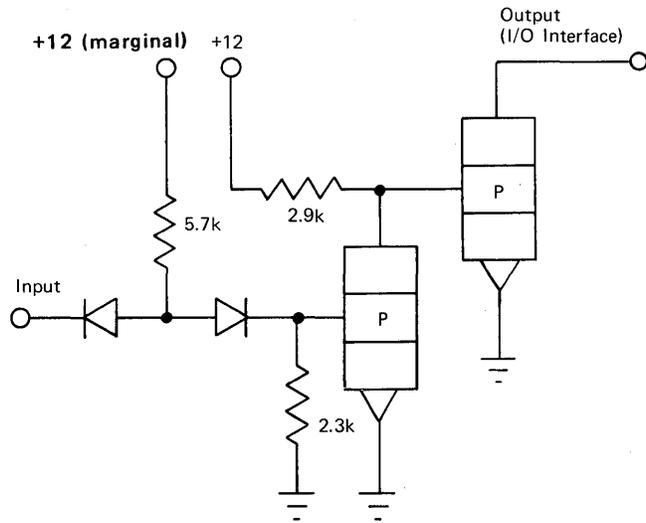


Figure 13. Control Line Driver

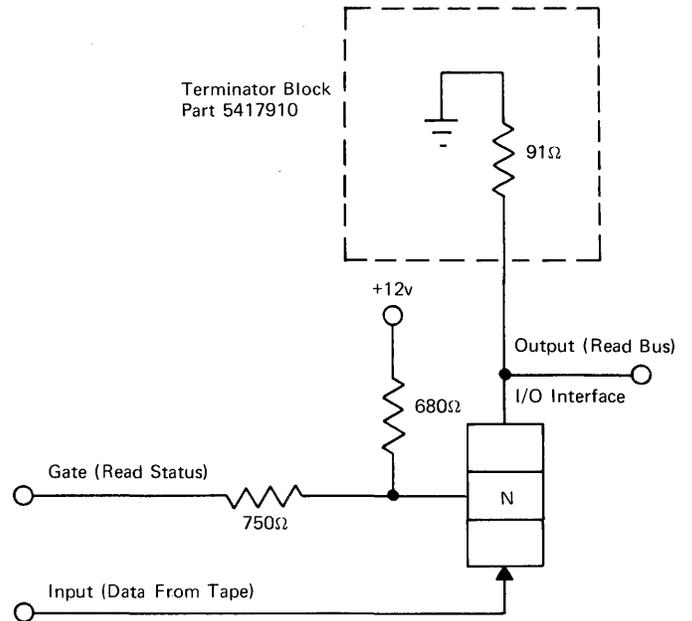


Figure 15. Read Bus Driver and Terminator

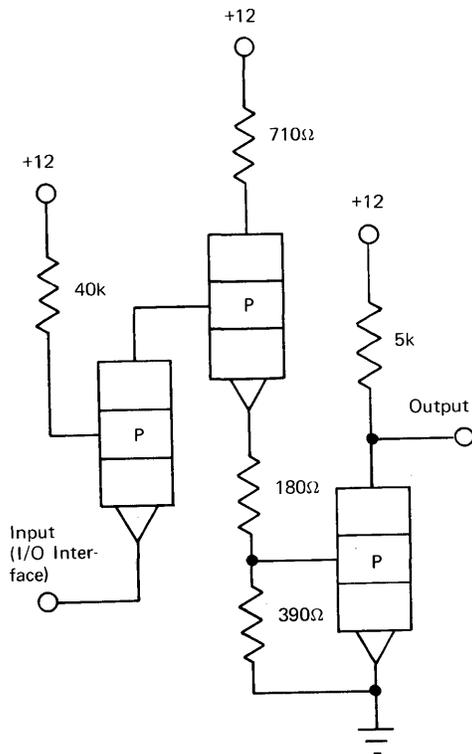


Figure 14. Control Line Receiver

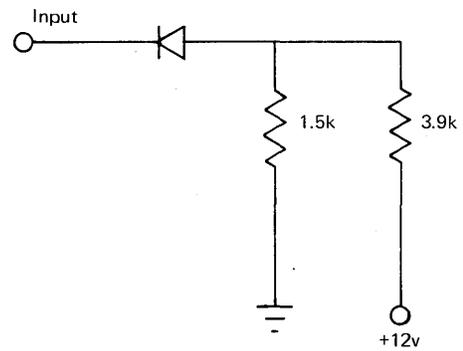


Figure 16. Metering-Out Line Terminator

TAPE UNIT TESTER

A field tester (Figure 17) is used to perform off-line maintenance on 2420 tape units. (Tester must have Engineering Change # 731211 installed for 2420-7 operation.) External power cable (part 460663) is required to power the tape unit and tester. When operating with the field tester, the 2420 tape unit can perform read, write, rewind, and rewind-unload operations.

To use the field tester, turn tape power off, connect the tester cable to tape unit signal connector A, and insert a line terminator (part 5417910) in signal connector B. To perform an operation, turn tape power on, mount and load a work tape, put the tape unit in 'ready' status by depressing the tape unit start pushbutton, and set the field tester controls for the desired operation. Figure 18 shows the tester control settings for given operations.

Tester Switches and Controls

Rewind-Unload

This spring-loaded switch sends a rewind-unload signal to the tape unit to rewind and unload tape if the start/stop switch is in the stop position.

Rewind

This spring-loaded switch sends a rewind signal to the tape unit to rewind tape to load point if the auto-cycle switch is off.

Auto-Cycle

This two-position switch is set to the auto cycle position to cause a rewind signal to be gated to the tape unit when the end-of-tape reflective marker is sensed; in this position, the rewind switch is disabled. In the off position, it enables the rewind switch.

Read/Write

When the tape unit is ready and in forward status, this switch sets or resets the tape unit read/write status trigger.

Count 5

This switch provides two ranges for the variable go-up and go-down controls. When in the off position, go-up and go-down time may be independently varied from approximately 2 ms to 30 ms. When this switch is set to CT5, go-up and go-down may be varied from approximately 300 ms to 6 seconds, permitting the start/stop envelope to be checked for count 5 conditions.

Start/Stop

The starting and stopping of tape is controlled by this three-position switch. In the start position, tape moves intermittently under control of a multivibrator, the count 5 setting, and go-up and go-down controls. In the go position, tape moves continuously. In the stop position, go is inactive, tape does not move, and the rewind/unload switch is enabled.

Forward/Backward

This switch controls the direction of tape motion in the tape unit. The backward position disables the set read and set write lines to the tape unit.

Mode

This two-position rotary switch selects the proper circuitry for either PE or NRZI recording, as required by the model of tape unit being tested.

Write Frequency/Model

This rotary switch selects the proper recording mode and write frequency for the model of tape unit being tested. Set to model 6 for 2420-7 operation.

Go-Up and Go-Down

These controls provide for varying the go-up and go-down time. Two ranges are provided, depending on the setting of the count 5 switch. With the count 5 switch off, go-up and/or go-down may be varied from 2 ms to 30 ms (approximately). With the count 5 switch set to CT5, go-up and/or go-down is varied from 300 ms to 6 seconds (approximately).

Read Scan 1

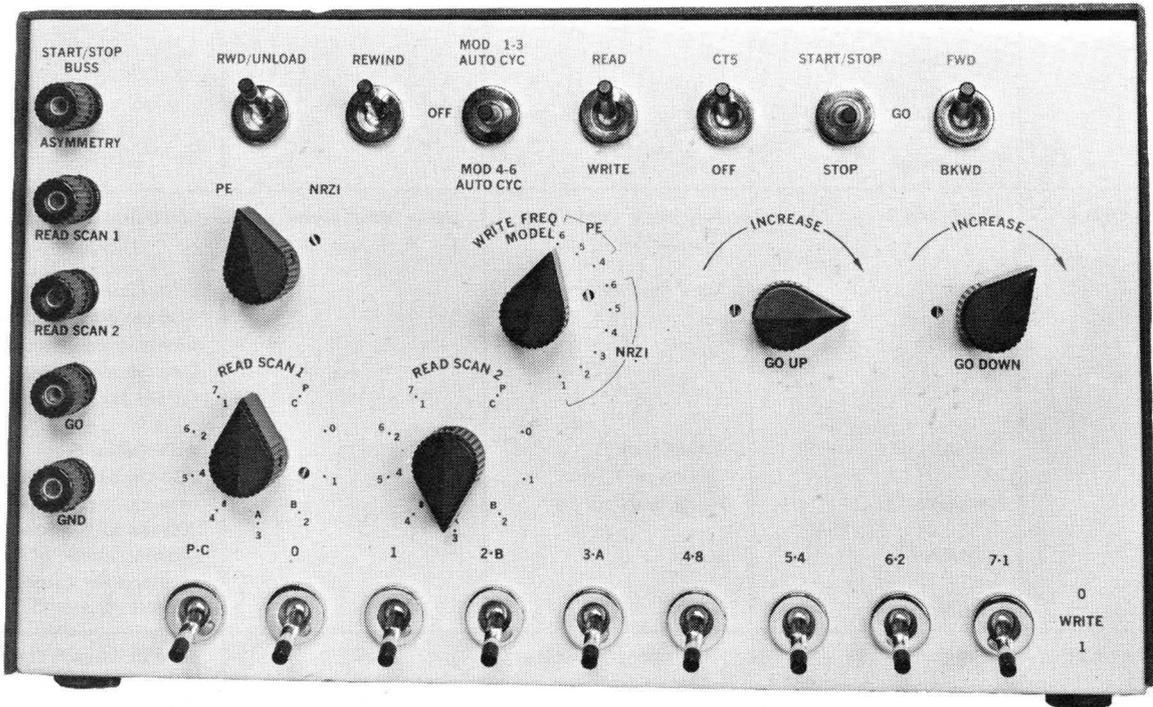
This rotary switch connects any one of the nine read buses to the read scan 1 signal hub. If the mode switch is set to NRZI, this same read signal is amplified and available for checking at the asymmetry jack.

Read Scan 2

This rotary switch connects any one of the nine read buses to the read scan 2 signal hub.

Bit Switches

Each bit switch set to 1 during a write operation causes 1-bits to be written continuously in the corresponding track. Switches set to 0 cause the corresponding tracks to be erased.



TU.60.90.0-60.91.0

Figure 17. Field Tester (Part 5420330)

Tester Signal Hubs

Asymmetry

Provides a simulated final amplifier read signal that may be used to check NRZI asymmetry. See "Read Scan 1".

Read Scan 1

Makes the read bus signal selected by the read scan 1 switch available for scoping.

Read Scan 2

Makes the read bus signal selected by the read scan 2 switch available for scoping.

Go

Connected to the go line to provide a sync pulse when checking start/stop time from the tester.

Ground

Provides a ground for the oscilloscope.

Operation	Switch	Setting	Scope	Observe
Write (all tracks)	Bit Switches Write Frequency/Model Fwd/Bkwd Start/Stop Read/Write PE/NRZI	All "1" Model Number Fwd Go Write As required	Read Scan 1 Hub	Output of each track while writing. (Rotate Read Scan 1 Switch to view output from all tracks.)
Read (continuous)	Read Scan 1 Fwd/Bkwd Start/Stop Read/Write	Any track containing information Fwd Go Read	Read Scan 1 Hub	Output of each read track while reading. (Rotate Read Scan 1 Switch to view output from all tracks.)
Read Start/Stop	Read Scan 1 Go-Up and Go-Down Count 5 Fwd/Bkwd Start/Stop Read/Write	Any track containing information Vary (See "Observe") Either (See "Observe") As desired Start Read	Read Direct Sync on Go (1 ms/cm, 2v/cm)	Start/stop Envelopes With Count 5 switch off, "Go-Up and Go-Down" time can be varied from 2 to 30 ms by turning Go-Up and Go-Down controls. With Count 5 switch on, "Go-Up and Go-Down" time can be varied from 300 ms to 6 seconds, allowing check of start/stop envelope for Count 5 indication.
Read (Auto-Cycle)	Read Scan 1 Fwd/Bkwd Start/Stop Read/Write	Any track containing information Fwd Go Read		Tape unit reads forward continuously. When the EOT reflective marker is sensed, reading stops, and the tape unit rewinds to load point. Reading recommences automatically, and continues until EOT is again sensed.

Figure 18. Field Tester Control Settings

Bus Lines		Output Lines	4
Read Bus Driver and Terminator	15	Output Signal Lines	6
Write Bus Receiver	14		
Write Bus Terminator	14	Panel Lights	2
Cable Data (Signal and Power)	9	Panel Pushbuttons	3
Cables		Pin Assignments	
Connector and Contact Data	10	AC Power	11
General Description	8	Signal	12
Schematic and Pin Assignments (Power)	11	Tape Unit	13
Schematic and Pin Assignments (Signal)	12	Power Cable Data	10
Tape Unit/Tape Control (Signal) Connector Pin Assignments	13	Power Lines	8
Connectors		Pulse Width	4
Connector Data	10	Pushbuttons	3
Contact Data (Signal and Power)	10		
Control Line Driver	15	Read Bus Driver and Terminator	15
Control Line Receiver	15	Response Time	4
Control Line Terminator	14	Rise/Fall Time	4
General Description	8		
Data Format	1	Select Lines	5
Drivers		Signal Cable Connector Data	10
Control Line	15	Signal Cable Data	9
Read Bus	15	Signal Lines	
Drivers and Terminators	8	Input	3
		Output	6
Field Tester	17	Specifications	
Field Tester Control Setting	18	Tape	1
Format, Data	1	Tape Unit	1
Functions, Specifications, and Requirements (TU)	1		
		Tape Specifications	1
Input Lines	4	Tape Unit Not Ready Lines	7
Input Signal Lines	3	Tape Unit Select Lines	5
Interface	3	Tape Unit Specifications	1
Interface Lines	4	Tape Unit Tester	16
		Terminator	
Lights, Operator	2	Metering-Out Line	15
		Read Bus	15
Metering-Out Line Terminator	15	Write Bus	14
		Tester Signal Hubs	18
Not Ready Lines	7	Tester Switches and Controls	16
Operator Panel Lights	2	Voltage Levels	4
Operator Panel Pushbuttons	3		
		Write Bus Receiver	14
		Write Bus Terminator	14

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