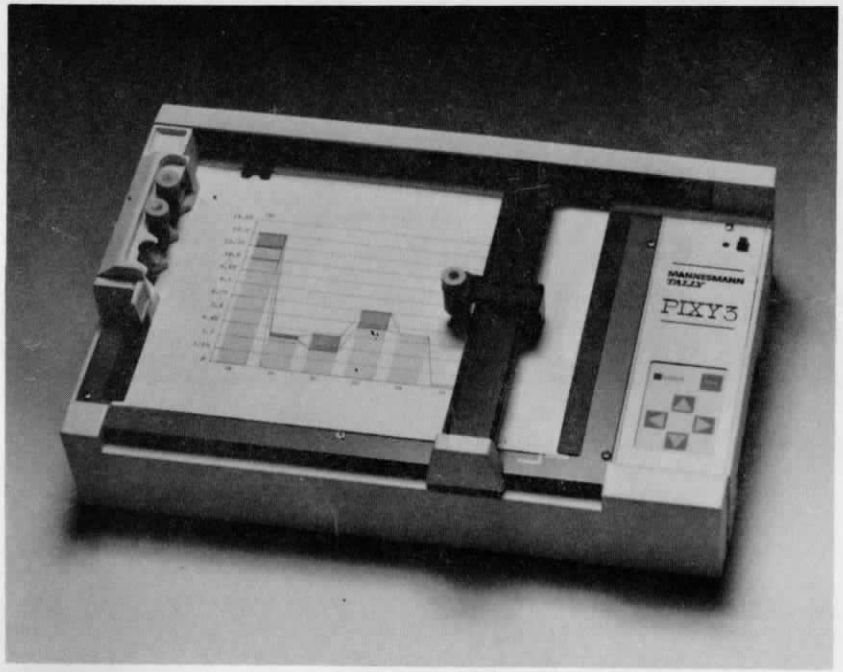
MANNESMANN
TALLY

PIXY 1 and PIXY 3

DESKTOP PLOTTERS



OPERATOR'S MANUAL

IMPORTANT INFORMATION

THIS EQUIPMENT GENERATES AND USES RADIO FREQUENCY ENERGY AND IF NOT INSTALLED AND USED PROPERLY, THAT IS, IN STRICT ACCORDANCE WITH THE MANUFACTURER'S INSTRUCTIONS, MAY CAUSE INTERFERENCE IN RADIO AND TELEVISION RECEPTION. IT HAS BEEN TYPE TESTED AND FOUND TO COMPLY WITH THE LIMITS FOR A CLASS B COMPUTING DEVICE IN ACCORDANCE WITH THE SPECIFICATION IN SUBPART J OF PART 15 OF FCC RULES, WHICH ARE DESIGNED TO PROVIDE REASONABLE PROTECTION AGAINST SUCH INTERFERENCE IN A RESIDENTIAL INSTALLATION. HOWEVER, THERE IS NO GUARANTEE THAT INTERFERENCE WILL NOT OCCUR IN A PARTICULAR INSTALLATION. IF THIS EQUIPMENT DOES CAUSE INTERFERENCE TO RADIO OR TELEVISION RECEPTION, WHICH CAN BE DETERMINED BY TURNING THE EQUIPMENT OFF AND ON, THE USER IS ENCOURAGED TO TRY TO CORRECT THE INTERFERENCE BY ONE OR MORE OF THE FOLLOWING MEASURES:

- REORIENT THE RECIEVING ANTENNA
- RELOCATE THE PERIPHERAL WITH RESPECT TO THE RECEIVER
- MOVE THE PERIPHERAL AWAY FROM THE RECEIVER
- PLUG THE PERIPHERAL INTO A DIFFERENT OUTLET SO THAT PERIPHERAL AND RECEIVER ARE ON DIFFERENT BRANCH CIR CUITS.

IF NECESSARY, THE USER SHOULD CONSULT THE DEALER OR AN EXPERIENCED RADIO/TELEVISION TECHNICIAN FOR ADDITIONAL SUGGESTIONS. THE USER MAY FIND THE FOLLOWING BOOKLET PREPARED BY THE FEDERAL COMMUNICATIONS COMMISSION HELPFUL:

"HOW TO IDENTIFY AND RESOLVE RADIO-TV INTERFERENCE PROBLEMS".

THIS BOOKLET IS AVAILABLE FROM THE U.S. GOVERNMENT PRINTING OFFICE, WASHINGTON, DC 20402. STOCK NO. 004-000-00345-4.

MANUAL NUMBER: 235, May 1983

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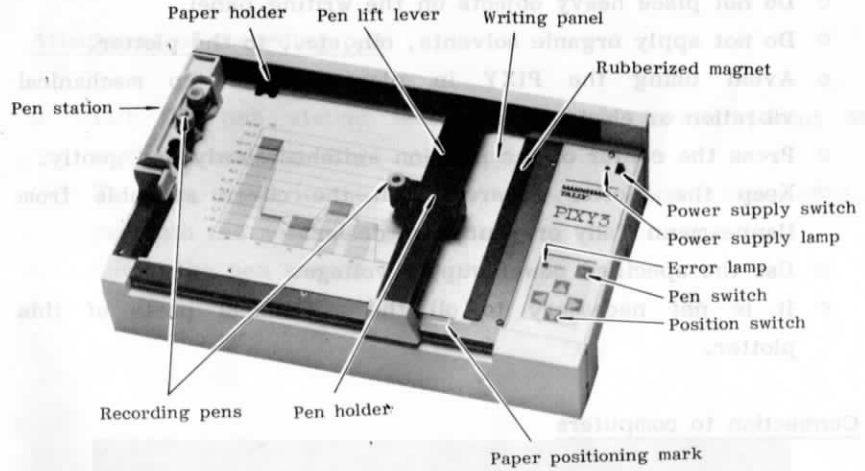
NOTES ON UNPAKING

- WARNING-TO PREVENT FIRE OR SHOCK HAZARD, DO NOT EXPOSE THIS APPLIANCE TO RAIN OR MOISTURE.

When oil based fiber tip pen is used, set the plotting speed less than 10cm/sec.

NOMENCLATURE

PIXY 3



OPERATING NOTES

Installation and use

- Use the PIXY in the horizontal position.
- Avoid use or storage in places subject to strong sunlight or the draft from an air conditioner or heater.
- Avoid use or storage in places where there is a lot of iron filings, etc.
- Do not place heavy objects on the writing panel.
- Do not apply organic solvents, oil, etc., to the plotter.
- Avoid using the PIXY in places subject to mechanical vibration or electrical noise.
- Press the center of the position switches slowly and gently.
- Keep the plotter covered with the cover available from Mannesmann Tally or your local dealer.
- Use the specified power supply voltage.
- It is not necessary to oil the mechanical parts of this plotter.

Connection to computers

- Connection cables for major personal computers are available from Mannesmann Tally or your local dealer.
- Insert the power supply cord and the input/output cables firmly so that they do not come out during operation.
- Use an input cable no longer than 1.5m with the designated connectors.
- Do not connect any wires to the unused terminals of the input/output connector.
- Before connecting the plotter to a computer, be sure to confirm its normal operation by drawing a test pattern in self test mode.

PREPARATIONS FOR DRAWING

The recording pen and its attachment

Recording pen

Two types of pen (paper and overhead transparency-OHT) are available from Mannesmann Tally or your local dealer. Eight colors are available in each type. See accessories on page 44.

Attachment of recording pen

- Lift the pen station lever until it is locked (about 60 degrees, see Fig. 1).
- To place a pen in the station, insert the lower groove of the pen into the notch in the station.
- Lower the pen station.

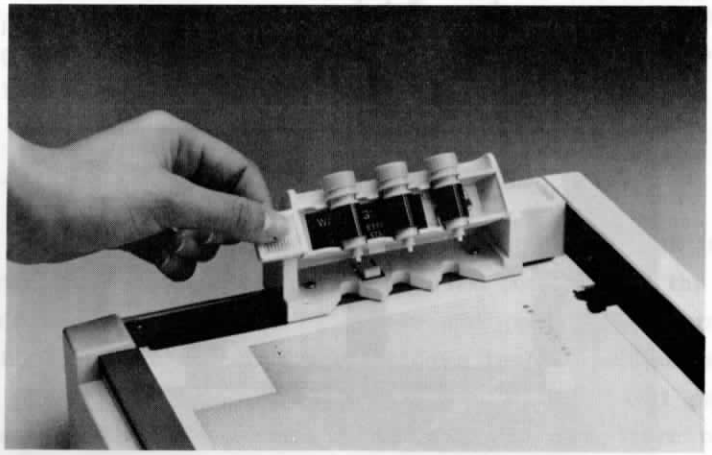


Fig 1

Notes

- Load pens before beginning to plot. However pens may be easily and quickly changed during plotting operations.
- A new pen "J0" command will return the last pen to the pen station when the plot is complete.
- Cap pens when not in use. They may remain in the raised pen station.
- If the pen is not attached correctly or firmly, problems may arise.

Loading of recording paper

- Move the Y-bar to the center before loading the plotting paper.
- Insert the sheet of the plotting paper from the right-hand end of the writing panel.
- Line up the plotting paper with the upper edge of the writing panel and the registration marks in the lower right corner.
- Smooth out the plotting paper so that there are no wrinkles or slack, and hold its left and right edges down with the rubberized magnet.

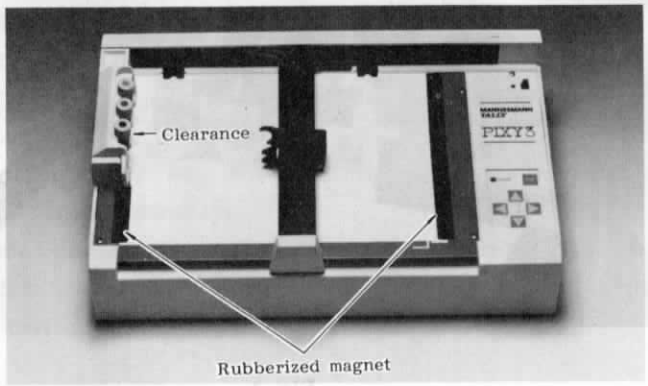


Fig 2

Note: Confirm that the pen is raised before removing the paper after the plot. If the pen is still down, push the PEN switch to raise it. Mannesmann Tally's PL133 or PL134 paper is recommended for best results.

Operating checks

Confirm the rated power supply voltage of your PIXY. Connect the power supply cord after confirming that the POWER switch is OFF. Turn the POWER switch to ON (the pen goes to the lower left corner and the POWER lamp comes on).

Next, operate the POSITION switches to check whether or not the pen moves in the direction of each of the switches as it should.

However, pressing the ◀ or ▼ position switches has no effect when the pen is already at the lower left corner. Similarly, pressing the ▶ or ▲ switches when the pen is at the upper right corner has no effect. This is because of the overscale processing that automatically prevents the pen from going out of the valid plotting area even when such a command has been given.

Self test mode

The PIXY incorporates a self test function to check its own functions by drawing test patterns. First confirm that the power is off and load the plotting paper and pen. Then turn the POWER switch to ON while holding down the ◀ position switch. The plotter will immediately start to plot the self test pattern. To suspend the plotting of the self test pattern, turn off the power supply. If the self test pattern is drawn completely, the

functions of the PIXY are operational except for the interface. The self test pattern is drawn repeatedly until the power supply is turned off (Fig 3).

Note: Once the power is turned on, pressing the ◀ position switch will not activate the self test.

** PIXY **

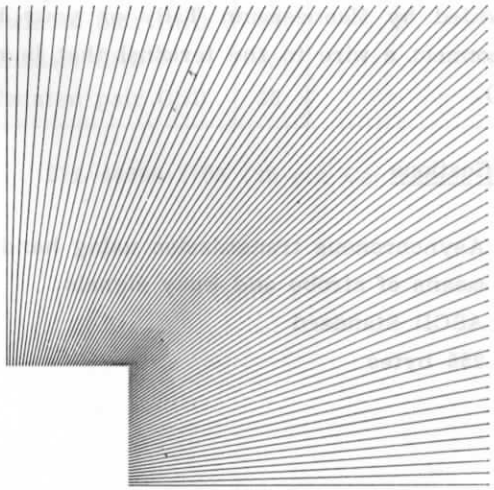


Fig 4

INPUT/OUTPUT INTERFACE

8-Bit Parallel

Wiring of the input/output connector

The connector for the input/output signals is located at the center of the right-hand side of the PIXY. As input data signals, first input DATA and next a STROBE signal to DB1 through 7 or DB1 through 8. The PIXY will turn on the BUSY signal and read in the data after outputting an ACK signal. The buffer for the input data has a capacity of 256 bytes. When the input data buffer is full, the BUSY signal goes on and any transmitted data is not saved until space is available in the buffer. Plotting is carried out as data is being received.

Note: Use an input/output cable no longer than 1.5 meters. (Connection cables for all the major personal computers can be provided by Mannesmann Tally or your local dealer). Never connect a wire to the terminal that is not used (see Table 1).

Interface specifications

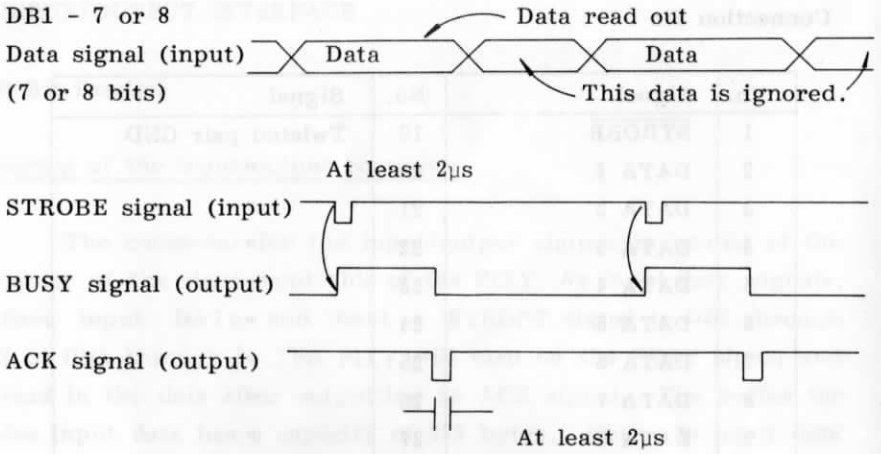
Data transfer	Asynchronous transmission using handshaking by means of strobe and busy signals.
Data format	ASCII Standard
Buffer size	256 bytes

Connection Pin

No.	Signal	No.	Signal
1	$\overline{\text{STROBE}}$	19	Twisted pair GND
2	DATA 1	20	"
3	DATA 2	21	"
4	DATA 3	22	"
5	DATA 4	23	"
6	DATA 5	24	"
7	DATA 6	25	"
8	DATA 7	26	"
9	DATA 8	27	"
10	$\overline{\text{ACK}}$	28	"
11	BUSY	29	"
12	GND (P.E.)	30	"
13		31	
14	Twisted pair GND	32	+5V ($\overline{\text{FAULT}}$)
15		33	Twisted Pair GND
16	Twisted pair GND	34	
17	Chassis GND	35	
18	Twisted pair GND	36	

Connector 57L-40360-2700 (36-pin Centronics type)

Table 1

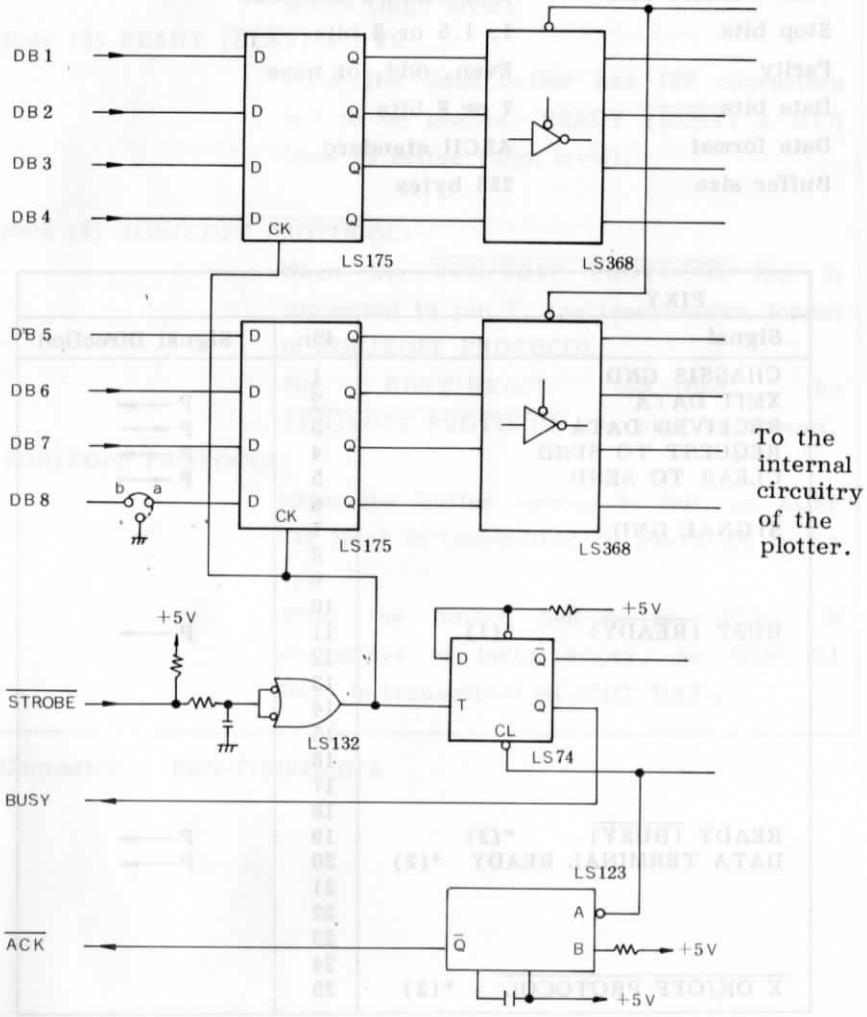


Input/output signal timing chart (waveforms)

Note: Refer to the section "Error indication" for error signals.

The data signals should be maintained from the time the STROBE signal goes high until the ACK signal goes high. The input/output interface circuit is explained in the following section.

Input/output interface circuit



RS-232-C (Serial)

Data transfer	START/STOP
Data transfer rate	600, 1200, 2400, baud
Stop bits	1, 1.5 or 2 bits
Parity	Even, odd, or none
Data bits	7 or 8 bits
Data format	ASCII standard
Buffer size	256 bytes

PIXY

Signal	Pin	Signal Direction
CHASSIS GND	1	
XMIT DATA	2	P ⟶
RECEIVED DATA	3	P ⟵
REQUEST TO SEND	4	P ⟶
CLEAR TO SEND	5	P ⟵
	6	
SIGNAL GND	7	
	8	
	9	
	10	
BUSY $\overline{\text{(READY)}}$ *(1)	11	P ⟶
	12	
	13	
	14	
	15	
	16	
	17	
	18	
READY $\overline{\text{(BUSY)}}$ *(2)	19	P ⟶
DATA TERMINAL READY *(2)	20	P ⟶
	21	
	22	
	23	
	24	
$\overline{\text{X ON/OFF PROTOCOL}}$ *(3)	25	

Note (1) BUSY: When the data buffer has 64 characters of empty space remaining, the BUSY line goes active (high level).

Note (2) READY $\overline{\text{(BUSY)}}$ & DTR:
When the data buffer has 128 characters left to be plotted, READY $\overline{\text{(BUSY)}}$ & DTR lines go active (high level).

Note (3) $\overline{\text{XON/XOFF PROTOCOL}}$:
When the $\overline{\text{XON/XOFF PROTOCOL}}$ line is connected to pin 7, the transmission format is XON/XOFF PROTOCOL.
For BUSY/READY operation, the $\overline{\text{XON/XOFF PROTOCOL}}$ line must be opened.

XON/XOFF PROTOCOL:
When the buffer memory is full, an XOFF (13 Hex) is transmitted on the XMIT DATA (pin 2).
When the buffer memory is within 128 characters of being empty, an XON (11 Hex) is transmitted on XMIT DATA.

Connector FCN-775J025-G/A

RS-232-C

○ Function

○ Data transmission

Asynchronous { DTR / XON/OFF

○ Data transmission speed

600, 1200, 2400 baud (selection by switch)

○ Stop bit

1, 1.5, 2 (selection by switch)

○ Parity

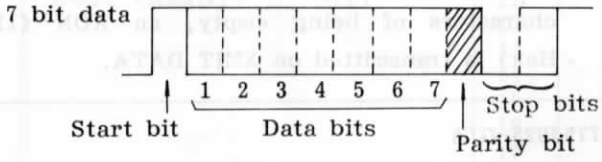
Even, odd, none (selection by switch)

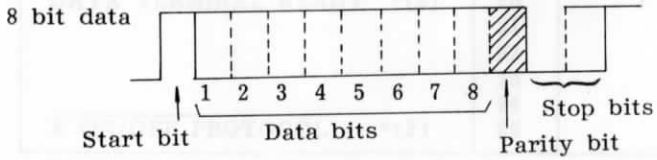
○ Data length

7 bit, 8 bit (selection by switch)

○ Data format

ASCII format (numerical data is represented in decimals as ASCII characters)

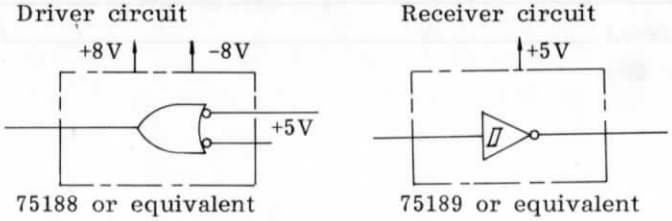




○ Electrical characteristics

Input voltage levels	+5V to +12V -5V to -12V
Output voltage levels	+6V typ. -6V typ.
Load impedance	3 to 7kohms

○ Input/output circuit



○ Connector used

Plotter end FCN-775J025-G/A

Cable end DB-25P

Specifications of Switch

Bit No.	1	2	3	4	5	6	7	8
Meaning	STOP BIT		PARITY		CHARACTER LENGTH	BAUD RATE		
Operation								

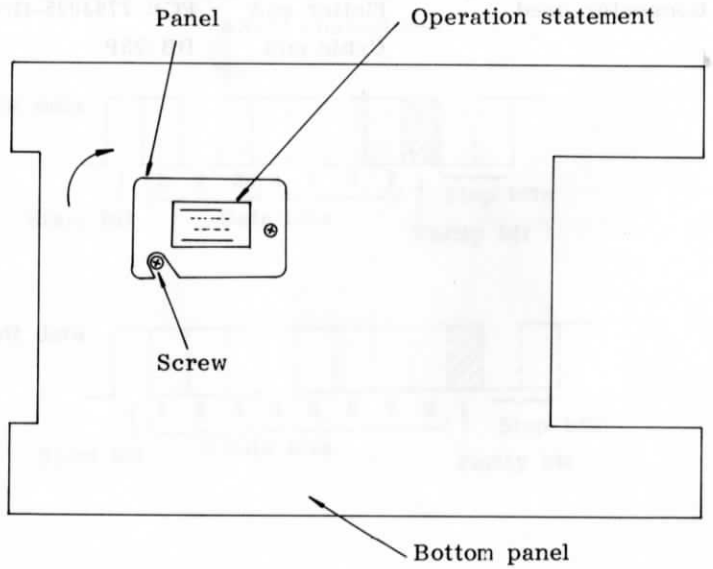
BIT LENGTH \ BIT No.	1	2
	0	0
1 BIT	0	1
1½BIT	1	0
2 BIT	1	1

CONTENT \ BIT No.	3	4
None	0	0
Odd	1	0
None	0	1
Even	1	1

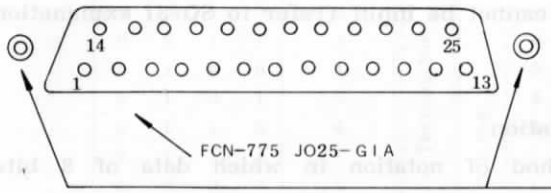
7BIT : 0

8BIT : 1

BAUD RATE \ BIT No.	6	7	8
2400	0	1	1
1200	1	0	1
600	1	1	0



The diagram below shows the connectors on the right-hand side of the plotter.



Input data codes

The character codes of the signals input to the input data lines DB1 to 7 (or DB1 to 8) of the PIXY, are as shown in the following Table 2. These are based on ASCII or JIS codes (of 8 bits). When the input signal consists of 7-bit words, hexadecimal codes greater than 7F cannot be input (refer to SO/SI explanation on page 36).

Note: Hexadecimal notation

This is a method of notation in which data of 8 bits (binary numbers) is divided into the 4 upper (most significant) bits (DB8 to 5) and 4 lower (least significant) bits (DB4 to 1) and are expressed in the form of hexadecimals (0 - F) corresponding to each combination of binary numbers. The following is an example of how to express the uppercase letter A.

ASCII code ..... A

	Upper bits	Lower bits
Binary notation	0100	0001
Hexadecimal notation	4	1
(Decimal notation	65)	

GREEK CHARACTER ..... α

	Upper bits	Lower bits
Binary notation	1110	0001
Hexadecimal notation	E	1
(Decimal notation	225)	

PIXY standard code table

DB3	DB2	DB1	DB0	Lower bits \ Upper bits	0	1	2	3	4	5	6	7
				DB6	0	0	0	0	1	1	1	1
				DB5	0	0	1	1	0	0	1	1
				DB4	0	1	0	1	0	1	0	1
0	0	0	0	0	Terminator		SP	0	@	P	`	p
0	0	0	1	1			!	1	A	Q	a	q
0	0	1	0	2			"	2	B	R	b	r
0	0	1	1	3			#	3	C	S	c	s
0	1	0	0	4			$	4	D	T	d	t
0	1	0	1	5			%	5	E	U	e	u
0	1	1	0	6			&	6	F	V	f	v
0	1	1	1	7			'	7	G	W	g	w
1	0	0	0	8			(	8	H	X	h	x
1	0	0	1	9			)	9	I	Y	i	y
1	0	1	0	A	(LF)		*	:	J	Z	j	z
1	0	1	1	B			+	;	K	[	k	{
1	1	0	0	C			,	<	L	\	l	|
1	1	0	1	D	(CR)		-	=	M	]	m	}
1	1	1	0	E	(SO)		.	>	N	↑	n	~
1	1	1	1	F	(SI)		/	?	O	←	o	SP

Do not use

Table 2

Scientific and Greek characters code table

For 8-bit words, $B_8 = 1$

				SO			
0	0	0	0	1	1	1	1
0	0	1	1	0	0	1	1
0	1	0	1	0	1	0	1
0(8)	1(9)	2(A)	3(B)	4(C)	5(D)	6(E)	7(F)
				SP	P	SP	π
				A	Σ	α	ρ
				B	T	β	σ
ETX				Γ	Υ	γ	τ
				Δ	Φ	δ	υ
				E	X	ε	ϕ
				Z	Ψ	ζ	χ
				H	Ω	η	ψ
BS				(H)		θ	ω
				K		ι	$\leqslant$
LF				Λ		κ	$\geqslant$
				M		λ	$\pm$
				N		μ	∂
CR				(H)		ν	$\subset$
SO				O		ξ	∞
SI				Π		o	

Table 3

COMMAND	FORMAT
FONT	$n (Terminator)

The letters or symbols shown below are substituted for standard characters when the appropriate font ($) command.

		Code Position												
Parameter (n)	Country	2/3	2/4	4/0	5/B	5/C	5/D	5/E	5/F	7/B	7/C	7/D	7/E
0	STANDARD	#	$	@	[	\	]	↑	←	{	¦	}	~
1	ISO	#	¤	@	[	\	]	^	_	{	|	}	–
2	Japan	#	$	@	[	¥	]	^	_	{	|	}	–
3	U.S.A.	#	$	@	[	\	]	^	_	{	¦	}	~
4	England	£	$	@	[	\	]	↑	_	{	|	}	–
5	Germany	£	$	§	Ä	Ö	Ü	^	_	ä	ö	ü	ß
6	France	£	$	à	○	Ç	§	^	_	é	ù	è	¨
7	Sweden	£	$	@	Ä	Ö	Å	^	_	ä	ö	å	–
8	Denmark	£	$	@	Æ	Ø	Å	^	_	æ	Ø	å	–
9	Spain	£	$	@	¡	Ñ	¿	^	_	{	|	}	–

Initial setting is n = 0

I/F test mode

The PIXY has a function by which character codes can be printed out as they are input. This is called the I/F test mode and is used to print out the data received for plotting.

To activate this function, first confirm that the power is off and then load the plotting paper and pens.

○ I/F test 1:

Turn the POWER switch to ON while holding down the ▲ position switch. The pen moves upwards, the plotter enters the PRINT mode, and characters corresponding to the input codes are printed out. When a terminator is input, the carriage returns to the left-hand end and starts a new line. This test is useful for making a program listing.

○ I/F test 2:

Turn the power supply switch to ON while holding down the ▼ position switch. The pen moves upwards, the plotter enters the PRINT mode, and characters corresponding to the input codes are printed out. When the line of characters reaches the end of the valid plotting area, the pen returns to the left-hand end and starts a new line. This test is useful for checking input data.

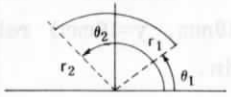
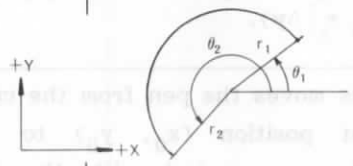
When a sheet of plotting paper is finished, the pen stops and the ERROR lamp comes on. When the plotting paper is changed and the PEN switch is pressed, the PIXY will restart plotting.

Note: Once the power supply is turned on, pressing the above position switches will not activate the I/F mode. To release the I/F test mode, turn the POWER switch to OFF.

PLOTTING COMMANDS AND THEIR FUNCTIONS

Table of commands

Command	Format	Description
LINE TYPE	Lp (Terminator)	This specifies the type of straight line to be drawn. All the lines drawn after the receipt of this command will be solid lines when p=0, and broken lines when p=1-8 until otherwise specified. If this command is not given after turning the power on, solid lines will be drawn by DRAW and RELATIVE DRAW commands. (Refer to Note 1 in the plotting examples.)
LINE SCALE	B ℓ (Terminator)	This specifies the pitch of broken lines. ($\ell \leq 255$) The lines and spaces are in the ratio of 1:1. The pitch will be as large as ℓ. (Initial setting is ℓ =100) The specification is valid until a new one is given. This command can be given either before or after a LINE TYPE command. (Refer to Note 1 in the plotting examples.)
DRAW	Dx_1, y_1, x_2, y_2... ....x_n, y_n (Terminator)	This draws straight line segments connecting the absolute coordinates x_0, y_0 (current pen position), (x_1, y_1), (x_2, y_2) ... (x_n, y_n). The absolute coordinates are specified as integers of up to 4 digits and expressed as integral multiples of 0.1mm. The coordinates (100, 100) indicate the position (x=10mm, y=10mm) relative to the origin.
MOVE	Mx, y (Terminator)	This moves the pen from the current position (x_0, y_0) to coordinates (x, y) with the pen raised.
RELATIVE DRAW	IΔx_1, Δy_1, Δx_2, Δy_2 ... Δx_n, Δy_n (Terminator)	This draws straight lines starting from the current pen position (x_0, y_0) and connecting the relative displacements: ($x_0 + \Delta x_1$,) ($y_0 + \Delta y_1$), ($x_0 + \Delta x_1 + \Delta x_2$), ($y_0 + \Delta y_1 + \Delta y_2$) ... ($x_0 + \sum_{n=1}^{n} \Delta x_n$), ($y_0 + \sum_{n=1}^{n} \Delta y$).
RELATIVE MOVE	RΔx, Δy (Terminator)	This moves the pen from the current position (x_0, y_0) to ($x_0 + \Delta x$, $y_0 + \Delta y$) with the pen raised.

CIRCLE	Wx_0, y_0, r_1, r_2, θ_1, θ_2 (Terminator)  	This draws circles, circular arcs and spirals. (x_0, y_0): Coordinates of the circle's center (integral multiples of 0.1mm) (r_1, r_2): Initial and final radii (integral multiples of 0.1mm) (θ_1, θ_2): Initial and final angles (integral multiples of 0.1^0) The angles are measured positively in the counterclockwise direction, and negatively in the clockwise direction, from the X-axis. $-32767 \leq \theta_1 \leq 32767$ $-32767 \leq \theta_2 \leq 32767$ $-32767 \leq \theta_2 - \theta_1 \leq 32767$
RELATIVE CIRCLE	]r_1, r_2, θ_1, θ_2 (Terminator) Command byte is 5D (hexadecimal)  * Starting point is the current pen position.	Draws circles, circular arcs and spirals starting from the current pen position. r_1, r_2: Initial and final radii (integral multiples of 0.1mm) θ_1, θ_2: Initial and final angles (integral multiples of 0.1°) The angles are measured positively in the counterclockwise direction from the X positive axis and negatively in the clockwise direction from the same. $-32767 \leq \theta_1 \leq 32767$ $-32767 \leq \theta_2 \leq 32767$ $-32767 \leq \theta_2 - \theta_2 \leq 32767$

CURVE	Ya, x_1, y_1, x_2, y_2, ..., x_n, Y_n (Terminator)	Draws a smooth curve through the points with coordinates x_n, y_n. x_1, y_1: Starting point of curve x_2, y_2 - x_n, y_n: Consecutive coordinates of the curve a = 0 Open curve a = 1 Closed curve
	Note: ○ More than 3 coordinates are needed as data. ○ In the case of a closed curve, it is not necessary to specify the starting point, being the end point, again. ○ Do not repeat the same coordinates in the data. ○ In the data, the distance from a point to the next should preferably be not too different from the distance between that point and the one directly before it.	
RELATIVE CURVE	–a, Δx_1, Δy_1, Δx_2, Δy_2 .... Δx_n, Δy_n (Terminator) Command byte is 5F (hexadecimal)	Draws a smooth curve through points whose coordinates are given by successive relative displacements, starting from the current pen position. Δx_1, Δy_1: Relative coordinates of the starting point of the curve from the current pen position. Δx_2, Δy_2 - Δx_n, Δy_n: Relative direct displacements of successive points. a = 0 Open curve a = 1 Closed curve

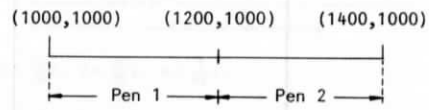
	Note: ○ Same as notes in CURVE above. ○ The "←" character is represented as "_" in JIS code.	
ALPHA SCALE	Sn (Terminator)	This specifies the size of characters and marks. When n=0, characters of 0.7 x 0.4mm are drawn with a spacing of 0.3mm. When n=14, the size of the characters is enlarged to (0.7 x 15 =) 10.5mm x (0.4 x 15=) 6mm and the spacing to (0.3 x 15=) 4.5mm. The specification is valid until the next one is given. If this command is not given after turning the power on, n=3 is automatically specified. The same applies to the printing of marks. When n=0, marks of 0.4mm x 0.4mm are drawn. When n=14, their size is enlarged to (0.4 x 15=) 6mm x (0.4 x 15=) 6mm. However, the marks are not enlarged when n=1. (Refer to Note 6.)
FONT	$n (Terminator)	Selects type of characters to be drawn from PRINT command according to character code table (refer to page 20).
ALPHA ROTATE	Qn (Terminator)	This rotates the characters in the direction specified by n. n is an integer between 0 and 3 and specifies the following angles:

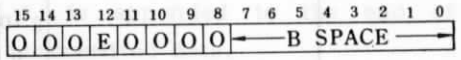
		When n = 0, 0° When n = 1, 90° When n = 2, 180° When n = 3, 270° This command can be given either before or after an ALPHA SCALE command. If this command is not given after turning the power on, n = 0 is specified automatically. The specification is valid until the next one is given. (Refer to Note 4 in the plotting examples.)
ALPHA RESET	A (Terminator)	This command returns the parameters regarding the character and symbol settings to the following initial values. ALPHA SCALE: n = 3 ALPHA ROTATE: n = 0
AXIS	X p, q, r (Terminator) q can be either positive or negative	This draws a coordinate axis. When p=0, the Y-axis is specified and when p=1, the X-axis is specified. The axis is graduated at intervals specified by q, the number of graduations is specified by r. When X1, 150, 6 is given, an X-axis is drawn with 6 graduations at intervals of 15mm, making the total length of the axis 90mm. When the drawing is completed, the pen stays down and waits for the next command. (Refer to Note 2 in the plotting examples.)

GRID	G p, q, r, s (Terminator)	This draws straight line segments parallel to the X or Y axis. p=0 specifies lines parallel to the X-axis, p=1 lines parallel to the Y-axis. q specifies the length of the segments (vector length), r specifies the space between the segments (unit length), and s specifies the number of repetitions. When G0, 450, 25, 4 is given, five straight line segments of 45mm each parallel to the X-axis are drawn at intervals of 2.5mm. (Refer to Note 3 in the plotting examples.)
HOME	H (Terminator)	This moves the raised pen to the original position (where the pen was when the power was turned on). The operation is the same as that activated by M0, 0 (Terminator). If this command is given when the ERROR lamp is on, the lamp will turn off.
PRINT	P c_1 c_2 ... c_i (Terminator)	This plots the characters specified by c_i in succession. There are 95 characters including uppercase alphabetics, lowercase alphabetics and numerals. (Refer to Table 2, PIXY standard code table.)

ALTERNATE (GREEK, SCIENTIFIC)	K c_1 c_2 ... c_i (Terminator)	This shifts data transmitted by 7 bit parallel code into Greek characters. (See note 6)
MARK	Nn (Terminator)	This draws the special mark specified by n. n is an integer between 1 and 15. The size of the marks can be enlarged by an ALPHA SCALE command except for the n=1 mark. (Refer to Note 7 in the plotting examples.)
SPEED	Tℓ (Terminator)	This specifies the speed of the pen when it stays down over 10 steps. ℓ=1, 2, 3 ... 10 (initial setting is ℓ=10). The speed V specified by the parameter ℓ is V = ℓ x MAX SPEED/10. When ℓ=0, V will be the maximum speed. When moving with the pen raised, the pen will move at the maximum speed regardless of the SPEED specification.
TERM	= t_1 t_2	A data terminator is specified by t_1 t_2 (2 characters). The characters specified by the TERM command are interpreted as terminator characters in the reception and transmission of data by the plotter.

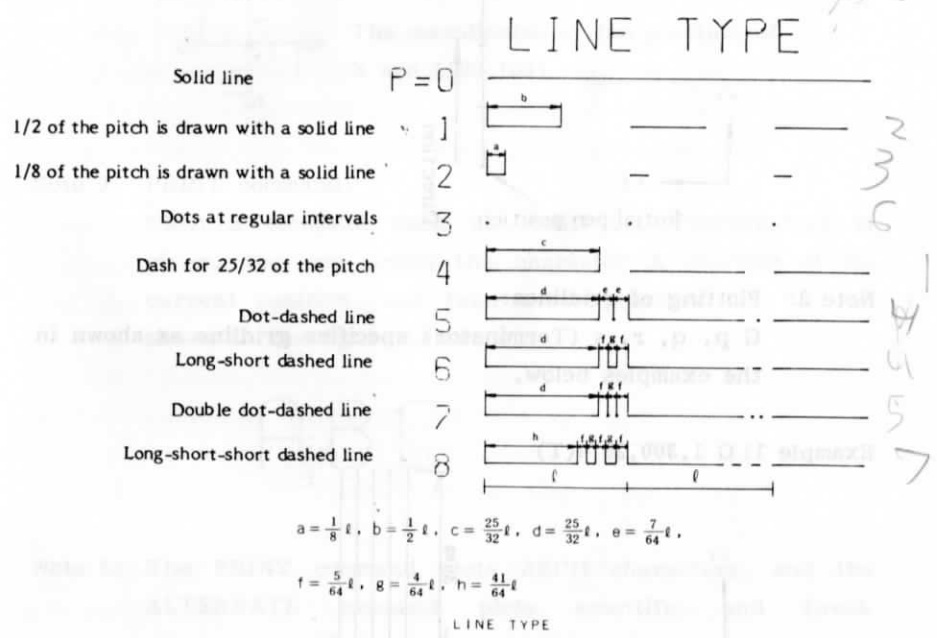
		1) Data reception Either of the single characters t_1 and t_2 are interpreted as a terminator and also the sequence of two characters t_1 t_2. 2) Data transmission In ASCII format, the sequence t_1 t_2 is appended to the end of transmitted data. When t_1 and t_2 are the same, 1 character only is attached. Note that the characters t_1 and t_2 cannot be characters used as command bytes, the numerals 0 to 9 or "-" (minus sign) or (60)16 - (7F)16. The use of the codes (01)16 - (IF)16 is recommended.
	Note: In the explanation of each command, the delimiter is represented by "," (comma) and the terminator by "CR", "LF". Example: (OD)16 (OD)16 Terminator is (OD)16. Only one character, (OD)16, is attached to the transmitted data.	

FACTOR	& p, q, r (Terminator)	Specifies the plotting magnification. The coordinates, length, character size, etc. are multiplied by p/r, q/r. q, r are specified as follows: p/r = magnification of X axis q/r = magnification of Y axis Initial setting is p/r = q/r = 1 $0 < p,q,r \leq 32767$ $1/2 \leq p/r,\ q/r \leq 2$ and, coordinates before magnification by $\lvert 1 \text{ FACTOR} \times (p/r \text{ and } q/r) \rvert \leq \lvert 16383 \rvert$
NEW PEN	Jn (Terminator)	Effective only on PIXY 3. Pen specified by the parameter is automatically selected. When plotter initialized, pen No. 1 is selected n=0 All pens returned n=1 No. 1 pen selected n=2 No. 2 pen selected n=3 No. 3 pen selected Example: M1000,1000(T)J1(T)D1200,1000(T) J2(T)D1400,1000(T) 

READ STATUS WORD 1	V	Monitors the status of the plotter. This command is responsed to immediately when it is received. Internal structure of the status is as follows (internal binary format).  The above status expressed in binary is translated into decimal values and transmitted. B SPACE: Indicates the amount of space currently available in the data buffer memory. When buffer memory is empty (in decimals) 256 is shown. When a unit of data is stored 255 is shown. When buffer memory is full 0 is shown. E: Indicates whether or not an error was present in data received up to the receipt of a READ STATUS WORD1 command. No error "0" Errors "1"

	Note: Cannot be used with 8-bit parallel interface. When there is a 0 to the left of valid data, (space) is sent. A terminator is sent at the end of data. Example: Empty buffer memory is expressed in decimals as follows. $2^8 = 256$ Data is sent as follows. 256 CR, LF The characters "CR", "LF" can be specified by the TERM command. Initial characters "CR", "LF".

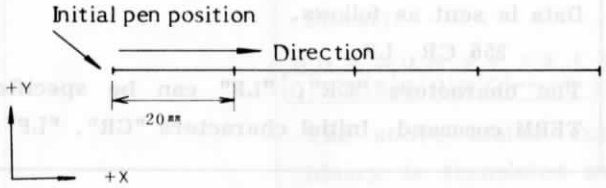
Note 1: Pitch of broken lines:
The parameter in the B (LINE SCALE) command specifies the pitch of broken lines.



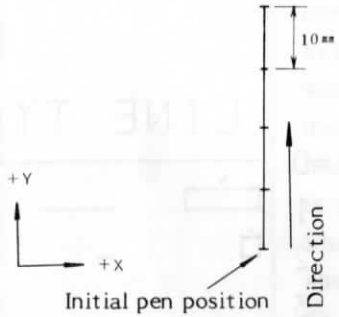
Note 2: Plotting of coordinate axis:

X p, q, r (Terminator) specifies axes as shown in the examples below.

Example 1: X1,200,4(T) or X3,800,4(T)



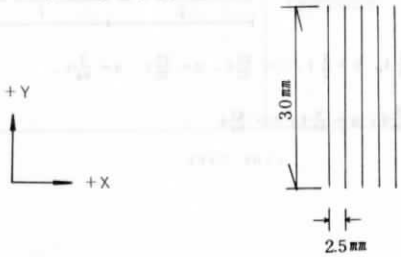
Example 2: X0,100,4(T) or X2,400,4(T)



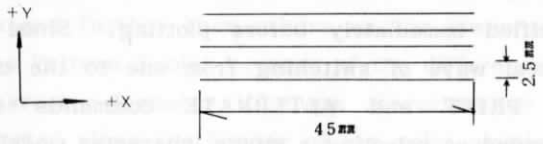
Note 3: Plotting of gridlines:

G p, q, r, s (Terminator) specifies gridline as shown in the examples below.

Example 1: G 1,300,25,4(T)



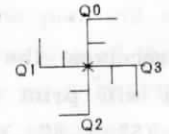
Example 2: G 0,450,25,4(T)



Note 4: Rotation of characters:

Characters are rotated into the direction specified by Qn (Terminator)

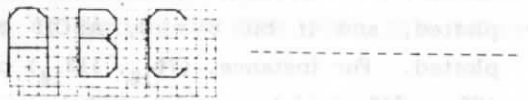
Example: M100,100(T) Q0(T) PF(T) M100,100(T) Q1(T) PF(T)
M100,100(T) Q2(T) PF(T) M100,100(T) Q3(T) PF(T)



The coordinates of the position of X are (100,100)

Note 5: PRINT command:

When a command such as PABC ... (Terminator) is given, the pen draws the character A starting at its current position, and then the characters B,C ... as shown in the figure below.



Note 6: The PRINT command plots ASCII characters, and the ALTERNATE command plots scientific and Greek characters. (Refer to the code charts on page 19.)

Plotting starts from the bottom left-hand corner of the first character. The scale (ALPHA SCALE) and rotation (ALPHA ROTATE) of the character will be those specified immediately before plotting. Since there are several ways of switching from one to the other, both the PRINT and ALTERNATE commands should be regarded as selecting a single 'character mode'.

The ASCII codes SO & SI, plus the logical state of bit eight of the relevant interface data byte control this switching function as follows.

In the PRINT mode, all characters will plot as standard ASCII (see Table 2, page 19), regardless of the state of bit 8. Receipt of the code 'SO' ($\emptyset E_{16}$, 14_{10}) causes all subsequent characters to plot as Greek or scientific (see Table 3, page 19). For instant, an ASCII 'W' will be plotted as 'Ω'; the PIXY acts as though it is in the ALTERNATE mode.

Following this, if the plotter receives the code 'SI' ($\emptyset F_{16}$, 15_{10}), all following data will print exactly as received. For instance, ASCII'W' (57_{16}, 87_{10}) plots as a 'W' and the character ($D8_{16}$, 215_{10}) plots as a 'Ω' symbol.

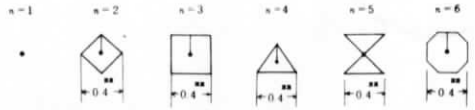
In the ALTERNATE mode all characters will be plotted as Greek or scientific symbols, regardless of the status of bit 8, until receipt of an 'SI' code. Bit 8 will then control which character set will plot: if bit 8 = 1, ALTERNATE (Greek, scientific) characters will be plotted, and if bit 8 = $\emptyset$, ASCII characters will be plotted. For instance, ($7\emptyset_{16}$, 112_{10}) plots as a 'p', and ($F\emptyset_{16}$, $24\emptyset_{10}$) plots as a 'π' symbol.

Note that $7\emptyset_{16}$ with bit 8 set to equal one becomes $F\emptyset_{16}$. Following this receipt of an 'SO' code will return the PIXY to the normal ALTERNATE mode.

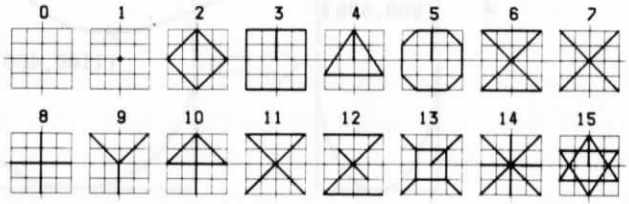
Note: When alphanumerics and ALTERNATE characters are mixed together, the character spacing is not completely even. Some of the alphanumerics and Greek characters extend further than others on the lower side (refer to the Pattern Table) because of the difference between the character formats. If those characters or numbers are plotted along the border of the valid plotting area, part of them (the part that exceeds the valid plotting area) will be omitted.

Note 7: MARK command:

Marks are drawn by Nn (Terminator). In the marks · ◇ □ △ ⧖ ○ , the position of the dot is the current pen position. In the mark ⧖ , the point at which the two triangles touch is the current pen position. The end point of the mark is the same as the starting point. The pen will stay down after the end of the plotting. The size of the marks is as follows and can be enlarged by an S (ALPHA SCALE) command. However n=1 cannot be enlarged because it is just a dot. The following figures show the mark size when S=0.

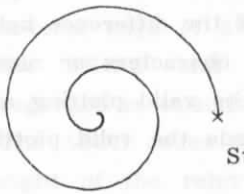


n is an integer between 0 and 15. n=0 represents a blank, so no plotting is done when this parameter is given.



RELATIVE CIRCLE

Example 1 :] 200,0,0,7200(T)

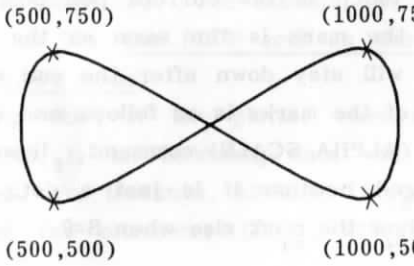


Starting point

(current pen position)

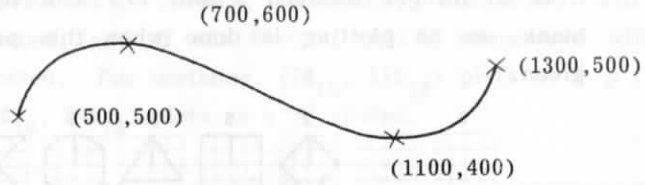
CURVE

Example 2 : Y1,500,500,500,750,1000,500,1000,750(T)



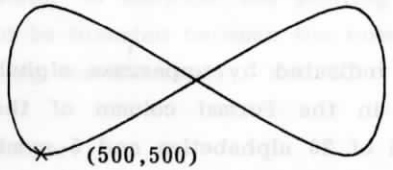
CURVE

Example 3 : Y0,500,500,700,600,1100,400,1300,500(T)



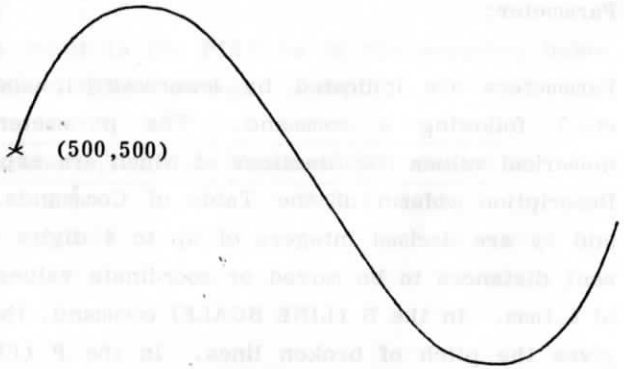
RELATIVE CURVE

Example 1: ←1,500,500,0.250,500,-250,0,250(T)

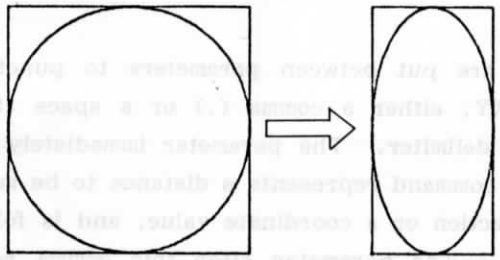


RELATIVE CURVE

Example 2: ←0,500,500,250,250,500,-500,250,250(T)



Example 3: &1,2,2,(T)



PLOTTING COMMANDS AND THEIR FUNCTIONS (CONT'D)

Procedure for inputting plotting commands

(1) Command:

The commands are indicated by uppercase alphabetics such as L or B shown in the Format column of the Table of Commands. A total of 20 alphabetics and 5 symbols (D, I, M, R, P, K, N, W, Y, L, B, S, Q, A, H, T, X, G, V, J,], ←, $, =, &) are used to specify commands. To execute plotting, first input these commands to the plotter. Inputting characters other than those indicated above will result in a command error.

(2) Parameter:

Parameters are indicated by lowercase alphabetics (x, y, etc.) following a command. The parameters represent numerical values the functions of which are explained in the Description column of the Table of Commands. x, y, Δx and Δy are decimal integers of up to 4 digits which represent distances to be moved or coordinate values in multiples of 0.1mm. In the B (LINE SCALE) command, the parameter ℓ gives the pitch of broken lines. In the P (PRINT) and K (ALTERNATE) command, the parameters age given as c_1, c_2 ... c_i in the Table of Commands, these parameters are the codes of the characters to be drawn.

(3) Delimiter:

Delimiters are put between parameters to punctuate them. In the PIXY, either a comma (,) or a space (SP) can be used as a delimiter. The parameter immediately after a D, M, I or R command represents a distance to be moved in the X-axis direction or a coordinate value, and is followed by a comma (,). The parameter after this comma represents a

distance to be moved in the Y-axis direction or a coordinate value. After inputting all the numerical values, input a terminator to complete the plotting command. A comma (,) should be inserted between the numerical values p, q, and r following the commands X and G.

(4) Terminator:

A terminator is input to indicate the end of a plotting command. In the PIXY, codes between 01 - 0D (hexadecimals) can be used instead of CR and LF, etc.

(5) Input procedure:

Data is input to the PIXY as in the sequence below which shows how a DRAW command is input.

Command	Parameter	Delimiter	Parameter	Terminator
D	200	,	1000	(CR/LF)

INPUT ERROR PROCEDURE

Error indication

The PIXY has an error lamp on the control panel. This lamp comes on at either of the following times:

(1) When a character which is not used in the commands is input (e.g., C, E, F, ... X, Z, etc.)

(2) When command data is input in the wrong format. (For example, when D123,H (Terminator) is input, the ERROR lamp will come on with H.)

- Input numerals with up to 4 digits as coordinate values. (Be careful, when a numerical value of 5 digits or more is input, 32767 may be exceeded and management of the input is impossible.)
- When ℓ or n are input as undefined values in the commands B, S, Q, etc., the commands will be accepted as correct, but the operations activated by them cannot be guaranteed.

Note: The $\overline{\text{ERROR}}$ signal is ON when the ERROR lamp is on, and OFF when the lamp goes off.

Recovery from error indication

The ERROR signal goes on when the presence of an error is displayed. Since the operations after it are not guaranteed, it is necessary to put out the ERROR lamp. Once the ERROR lamp comes on, only the input of a terminator will be accepted, so first input a terminator. This will not turn the ERROR lamp off, but

all the commands input after it will be carried out. The ERROR display will not go out until a HOME command is given.

So when the ERROR lamp comes on, input a HOME command (H (Terminator)). When this command is accepted, the ERROR lamp will go out with the input of the H, and the pen will return to the HOME position (origin) with the input of the terminator.

SPECIFICATIONS

Media size	8+(1/2)×11inch (ANSI A size)
	210×297mm (DIN A4 size)
Plotting area	180×250mm PIXY 1
	180×245mm PIXY 3
Plotting speed	200mm/s (max) (programmable)
Step size	0.1mm
Repeatability	Same pen 0.3mm
	Pen to pen 0.4mm
Distance accuracy	+-(1% of travelled distance +0.3mm)
Number of pen	1; PIXY 1 3; PIXY 3
Pen type	Fiber-tip pen; water base for paper; oil base for OHT.
Pen holder	Magnetic clamp
Pen color	Black; red; blue (standard) green; brown; orange; rose; purple (order option for fiber-tip pen)
Pen response	Approx. 5 operations per second
Paper hold down	Magnetic rubber clamps
Operating modes	1) Plotter; 2) Printer; 3) Diagnostic
Character sets	Basic, 96 characters ANSI or other (specified by font command) Plus; 37 characters Greek and scientific
Power supply	120VAC+-10%
	220V or 240VAC+-10% (Service center changeable)

Power supply frq.	48-62Hz
Consumption	40VA (max)
Environmental operating range	+5°C-+35°C
	35%-75% RH
Body size	430(W)×267(D)×113(H)mm;
	PIXY 1
	430(W)×267(D)×124(H)mm;
	PIXY 3
Weight	Approx. 6.2kg
Interface	8-bit parallel; standard
	RS-232-C; Factory option
Control	Power ON/OFF
	Left; right; up; down; (Four direction positions) pen up/down
Indicators	Power on; error
Standard accessories	Fuse 0.5A 120VAC 1PC.
	Fuse 0.3A 220V; 240VAC 1PC.
	Paper clamps 2PC.
	Operator's manual 1PC.
	Pens; black 1PC.; PIXY 1
	black; red; blue Each 1PC.; PIXY 3

MAINTENANCE AND CLEANING

Daily maintenance of the plotter

The PIXY is extremely reliable because it has a very simple mechanism and its electrical circuits are integrated into a single printed circuit board. There is no reason at all to fear breakdowns if the wiring of the connectors is correct and the operating procedure is followed. However, the high precision mechanical parts will require some daily maintenance and attention to ensure their good performance. However, the following precautions will ensure a long life.

- When leaving the plotter unused for some time, remove the pen and cover the machine with the plastic cover.
- Avoid the use of the plotter in places where there is an excess of dust, oil, humidity or salt. If the plotter has been used in such conditions, clean it carefully with a soft cloth. Pay special attention to dust and oil on the shaft of the Y-bar etc. (Use a cloth soaked in alcohol or water, never use organic solvents, oil, or the like).
- There is no need to oil the mechanical parts of the plotter.

TO PLOT ON A2000

1) HOOK UP CABLE F TO AMIGA M TO PLOTTER
2) GET IN COM PROGRAM
3) SET 1200 BAUD 8,N,1
4) SET L OFLAG=100
5) LOAD DRAWPLOTDUMP AS A PUBLIC
6) SEND WAPP

DOT MAT DUMP

MANNESMANN
TALLY

MANNESMANN TALLY CORPORATION
8301 South 180th Street
Kent, WA 98032 (206) 251-5500
Telex: 32-0200
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Mannesmann Tally Gmbh
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