DMP-60C SERIES CUTTERS

Operation Manual

NOTICE
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1.1   INTRODUCTION

The Houston Instrument (TM) 60C SERIES Cutters provide you with the means to produce computer-generated graphic images on sheet vinyl media. These cutters can also be fitted with a pen holder attachment and paper media to enable you to create inexpensive previews of your ideas for new graphic designs.

This manual uses the term cutter when it provides general information about all cutter models. The specific model terms DMP-65C, DMP-66C, DMP67C and DMP68C are used if information pertains only to that particular model.

A few of the features you'll find on your cutters are:

o   DM/PL(TM) software protocol,

o   Serial RS-232-C interface capabilities,

o   Membrane control panel switches,

o   English or metric scaling,

o   0.1 mm, 0.025 mm, 0.001 inch or 0.005 inch user-addressable
     resolution,

o   A menu mode, which enables you to select the cutter's
     power-up operating configuration,

o   A pen holder attachment which enables you to preview a sign
     design by plotting it on paper media,

o   An extensive customer confidence test capability,

o   Window and scaling capabilities for manipulating the size or
     appearance of a sign,

o   Three different sets of character styles which can be
     produced in many different sizes, rotated to any slope, and
     printed in italics,

o   A wide variety of axial cutting speeds which can be selected
     in either English or metric measures. Each selected velocity
     can be regulated at all angles with the constant velocity
     feature.

and more!

This manual provides:

o   Instructions on how to set up and manually operate the cutter
     in local mode.

1-1

General Information

1.2   SPECIFICATIONS

Cutter specifications are listed in Table 1-1.

TABLE 1-1. 60C SERIES CUTTER SPECIFICATIONS

ITEM	DESCRIPTION	
Cutter	DMP65C/DMP66C	DMP67C/DMP68C
Overall Height (w/o stand)	264 mm (10.4 inches)	264 mm (10.4 inches)
Overall Height with stand	1140 mm (44.9 inches)	1140 mm (44.9 inches)
Width (without stand)	914 mm (36 inches)	1040 mm (41 inches)
Width with stand	997 mm (39.3 inches)	1060 mm (41.7 inches)
Depth (without stand)	333 mm (13.1 inches)	333 mm (13.1 inches)
Depth with stand	560 mm (22 inches)	560 mm (22 inches)
Net Weight (cutter)	14.3 kg (31.6 pounds)	15.5 kg (34.2 pounds)
Stand weight	16 kg (35.3 pounds)	16 kg (35.3 pounds)

Performance (Specifications with 2 mil 3M(TM) Scotchcal(TM))

	DMP65C/DMP66C	DMP67C	DMP68C
Up/down velocity	30 to 400 mm/s	30 to 300 mm/s	30 to 200 mm/s
	(1 to 16 ips)	(1 to 12 ips)	(1 to 8 ips)
default up	400 mm/sec(16 ips)	300 mm/sec(12ips)	200 mm/s (8ips)
default down	400 mm/sec(16 ips)	300 mm/sec(12ips)	200 mm/s (8ips)

all models : DM/PL selectable down velocity (V)

	DMP65C/DMP66C	DMP67C	DMP68C
Up/down acceleration	0.1 to 0.5 g	0.1 to 0.4 g	0.1 to 0.3 g
default up	0.5 g	0.4 g	0.3 g
default down	0.5 g	0.4 g	0.3 g

Addressable Resolution	0.1 mm or 0.025 mm, 0.001 inch, 0.005 inch default 0.025 mm, DM/PL selectable (EC)
Mechanical Resolution	0.0127 mm (0.0005 inch)

General Information

TABLE 1-1   60C SERIES CUTTER SPECIFICATIONS (Continued)

Media	DMP65C	DMP66C	DMP67C	DMP68C
Media Width	381 mm (15inches) with sprocket holes or 406 mm (16inches) without sprocket holes	406 mm (16 inches)	500 mm (19.7 inches)	610 mm (24 inches)
Max. cutting Width or	290 mm (11.4 inches) 312 mm (12.3 inches)	340 mm (13.38 inches)	434 mm (17.0 inches)	544 mm (21.4 inches)

Maximum Cutting Length   2435 mm (8 feet), less a
                                35.5 mm (1.4 inch) margin *

Maximum Plotting Length   2435 mm less 80 mm margin
                                (8 feet less 3.1 inch margin)

* for repeatability on 67C/68C : max. cutting length 1235mm less 35 mm margin
  (4 feet less 1 inch)

Maximum Media Thickness   0.25 mm (0.010 inch)
(vinyl plus backing)

Maximum Vinyl Thickness   0.15 mm (0.006 inch)

Vinyl Type   Tested with most-used
                                vinyls from 3M, Arlon(TM), APA,
                                Fasson(TM), and MACtac(TM).
                                Also tested with Rubylith(TM)

Paper Type   Bond

Knife and Pen

Knife   H.I. proprietary

Knife Pressure   0 to 500 grams adjustable
                                at potentiometer on cutting
                                head

Knife Life   Greater than 6 km
                                (3.7 miles) cutting 2 mil
                                Scotchcal

Pen Types   Hard nib or stainless steel
                                drafting pens

Pen Pressure   25 grams (± 5 grams)

TABLE 1-1   60C SERIES CUTTER SPECIFICATIONS (Continued)

Interface

Interface Capability	Asynchronous serial RS-232-C
Cutter I/O Connector	Rear panel RS-232-C DB-25P
Mating Connector	RS-232-C DB-25S
Transmit Data Format (from cutter)	7 data bits, 1 parity bit (selectable), 2 or more stop bits
Receive Data Format (to cutter)	7 data bits, 1 parity bit (selectable), 1 or more stop bits
Baud Rate	300, 600, 1200, 2400, 4800, or 9600 selectable
Buffer	16K byte
Firmware	DM/PL plus special knife control commands

Environmental (machine only)

Operating Temperature	5 deg. to 35 deg. C (40 deg. to 95 deg. F)
Relative Humidity	20% to 95% (non-condensing)

Power Requirements

NOMINAL LINE	MIN/MAX LINE	FUSE
100 Vac	89-108 Vac	1 Amp, Slo-Blo
120 Vac	108-130 Vac	1 Amp, Slo-Blo
220 Vac	197-238 Vac	0.5 Amp, Slo-Blo
240 Vac	216-260 Vac	0.5 Amp, Slo-Blo

Input Power	48-62 Hz, single-phase, 85 VA maximum

General Information

1.2.1 Supplies

The following supplies and accessories are recommended for use on your cutter and are available from Houston Instrument or from your local distributor.

DOCUMENTATION

PART NR	DESCRIPTION
MI1135	DMP-60C Series Cutter Operation Manual
MI1044	DM/PL Command Language Manual
MI1116	DMP-60 Series Plotter Service Manual

ACCESSORIES

PART NR	DESCRIPTION	QUANTITY
397-598	Knife Blade	1
397-505	Knife Holder	1
397-600	Pen Holder	1

OPTIONS

PART NR	DESCRIPTION	QUANTITY
397-800	Cutter Stand	1
397-801	Vinyl Basket	1

PENS   (The pens and accessories listed below are presently available. Be sure to contact Houston Instrument or your distributor in the future for possible additional supplies.)

PART NR	DESCRIPTION

Water-Based Hard Nib Pens (in quantities of 5) pen point 0.3 mm.

MP06RE	Red
MP06BE	Blue
MP06GR	Green
MP06VI	Violet
MP06BR	Brown
MP06OR	Orange
MP06BK	Black

Stainless Steel Drafting Pens (Disposable) in quantities of 4.

MA0015	Adaptor for Disposable Drafting Pen
MP25RE	Red, fine point (0.25 mm)
MP25BE	Blue, fine point (0.25 mm)
MP25BK	Black, find point (0.25 mm)

General Information

PART NR	DESCRIPTION
MP25GR	Green, fine point (0.25 mm)
MP25VI	Violet, fine point (0.25 mm)
MP25OR	Orange, fine point (0.25 mm)
MP25BR	Brown, fine point (0.25 mm)
MP25MA	Magenta, fine point (0.25 mm)
MP25YE	Yellow, fine point (0.25 mm)
MP35RE	Red, fine point (0.35 mm)
MP35BE	Blue, fine point (0.35 mm)
MP35BK	Black, fine point (0.35 mm)
MP35GR	Green, fine point (0.35 mm)
MP35VI	Violet, fine point (0.35 mm)
MP35OR	Orange, fine point (0.35 mm)
MP35MA	Magenta, fine point (0.35 mm)
MP35YE	Yellow, fine point (0.35 mm)
MP50RE	Red, point 0.50 mm
MP50BE	Blue, point 0.50 mm
MP50BK	Black; point 0.50 mm
MP50GR	Green, point 0.50 mm
MP50VI	Violet, point 0.50 mm
MP50OR	Orange, point 0.50 mm
MP50MA	Magenta, point 0.50 mm
MP50YE	Yellow, point 0.50 mm
MP70RE	Red, broad point (0.70 mm)
MP70BE	Blue, broad point (0.70 mm)
MP70BK	Black, broad point (0.70 mm)
MP70GR	Green, broad point (0.70 mm)
MP70VI	Violet, broad point (0.70 mm)
MP70OR	Orange, broad point (0.70 mm)
MP70MA	Magenta, broad point (0.70 mm)
MP70YE	Yellow, broad point (0.70 mm)

* Adaptor MA0015 not included

Refillable drafting pens (1 each)

DMP-602	Adaptor for refillables
MP-025C5	Black, point 0.25 mm
MP-035C5	Black, point 0.35 mm
MP-050C5	Black, point 0.50 mm
MP-070C5	Black, point 0.70 mm

ink bottles :

MK-517B	Black
MK-503B	Red
MK-509B	Blue
MK-507B	Green

General Information

1.3   TABLE MOUNT OPERATING CONSIDERATIONS

The cutter is designed to be operated on a flat surface. Read the
following operating considerations before powering up the cutter.

o   Be sure the surface on which the cutter will be operated is
     flat, level, and sturdy.

o   Remove all objects from the front and rear areas of the
     cutter.

o   Make certain the cutter's data cable and power cord do not
     interfere with the forward and backward movement of the vinyl
     or paper media.

1.4   FLOOR STAND ASSEMBLY

The assembly instructions for the floor stand are included with
the floor stand kit.
We recommend use of the motorised cutter stand version especially
for the wider DMP-67C and DMP-68C cutter models.
To avoid vinyl dragging on the shop floor, we offer a vinyl catcher
which is very useful in case you cut over long lengths with the
DMP-67C or DMP-68C cutter. (see motorised stand illustration below).
Perform stand assembly and attach the cutter to the stand before
you start reading the remaining guidelines.

GENERAL VIEW
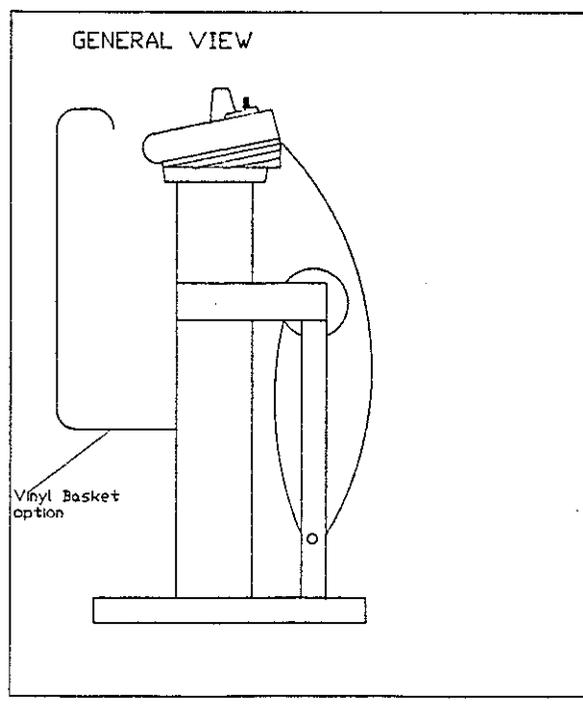
Vinyl Basket option

1.5 REAR AND BOTTOM PANEL COMPONENTS.

Read through the following descriptions of the rear and bottom panel controls and components and familiarize yourself with the cutter. The location of each component is illustrated in Figure 1-1.
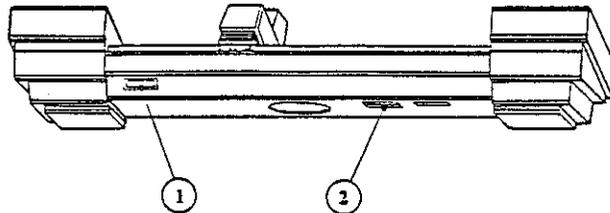
FIGURE 1-1 : REAR AND BOTTOM VIEW OF CUTTER

1   RS-232-C PORT CONNECTOR. This DB-25P connector is the communication link between the cutter and a host computer.

2   POWER ENTRY MODULE. The fuse, the voltage select board, and the receptacle for the ac power cord are located in the power entry module. Section 1.7 explains how to power up the cutter. To convert the cutter's operating voltage, see Section 3.2.

1.6 FRONT PANEL COMPONENTS

Read through the following descriptions of the front panel controls and components and familiarize yourself with the cutter. The location of each component is illustrated in Figure 1-2.
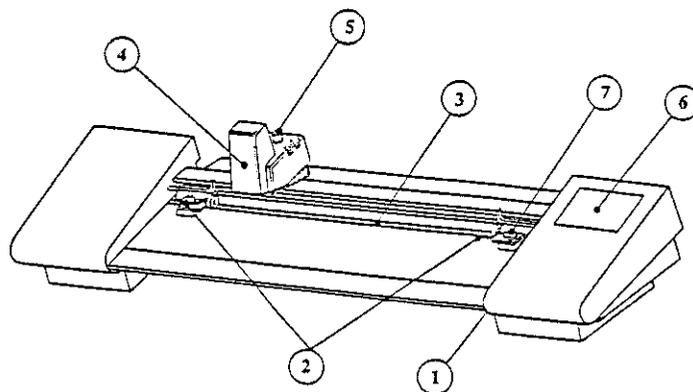

FIGURE 1-2. FRONT VIEW OF CUTTER

1   **POWER SWITCH** This rocker switch sets the cutter's power to
     on or off. When the power is set to ON, the "1" indicator is
     visible on the switch.   If the power is set to OFF, the "0"
     indicator is visible.

2   **PINCH ROLLER LEVER ARMS.** These two levers are used to raise
     and lower the pinch rollers from the chart drive drum during
     media loading.   (Media loading is discussed in Section
     1.9.)

3   **CHART DRIVE DRUM.** When the cutter is operated in axis origin
     right (large chart format), the drive drum moves the chart in
     the X direction.   When the cutter is operated in axis
     origin left (small chart format), the drive drum moves the
     chart in the Y direction.   (Large and small chart formats
     are discussed in Section 1.9.) The drive drum moves the
     media only when the pinch rollers are lowered to the drum.

4   **KNIFE ASSEMBLY.** The knife assembly is the mount for the
     knife holder and the pen holder.   The assembly moves the
     knife or pen in the Y direction when the cutter is operated
     in large chart format and in the X direction when the cutter
     is operated in the small chart format.

5   **KNIFE BLADE PRESSURE POTENTIOMETER.** This potentiometer
     adjusts the pressure of the knife blade (see Section 1.8.2).

6   **CONTROL PANEL.** The control panel consists of 12 keys and
     four illuminating (on/off) LED indicators. All cutter
     activity must be initiated from the control panel functions.
     This includes initiating remote mode for computer control,
     local mode for manual operation, menu mode, and selecting
     window and scale box limit coordinates. Each control panel
     function is explained in Section 2.1.

7   **THUMBSCREWS.** When the thumbscrews on the DMP-65C are loosened,
     the pinch roller assemblies can be moved to different chart
     size markers. When the thumbscrews are tightened, they secure
     the pinch roller assemblies to the platen. The thumbscrews on
     the pinch roller assemblies of the DMP-66C and DMP-67C must
     remain secured. The DMP-68C has no thumbscrews.
     (Media loading is discussed in Section 1.9)

1.7 POWERING UP THE CUTTER

NOTE

Safety Ground Installation: An insulated
grounding conductor that is identical in size,
insulation material, and thickness to the
grounded and ungrounded branch-circuit supply
conductors except that it is green with or
without one or more yellow stripes should be
installed as part of the branch circuit that
supplies power to the wall outlet.

The grounding conductor described above is to
be grounded to earth at the electrical
service equipment, or if supplied by a
separately derived system, the grounding
conductor should be at the supply transformer
motor-generator set.

The attachment plug receptacles in the
vicinity of the unit are all to be of a
grounding type, and the grounding conductors
serving these receptacles are to be connected
to earth ground of the service equipment

Do not attach the power cord to the cutter or to a power source
until after you have determined the cutter's operating voltage
setting (100, 120, 220, or 240 Vac). (See Table 1-1 for the
minimum and maximum operating ranges for these voltage ratings and
the required fuse ratings.)

To check the voltage setting, locate the power entry module shown
in Figure 1-1. The power entry module cover shows four possible
voltage settings (100V, 120V, 220V, or 240V). Notice that a pin
will be in one of these holes, indicating the present voltage
setting for the cutter. If this setting does not match the
voltage available at your site, then it must be changed before
powering on the cutter (see Section 3.2).

The cutter's ground circuitry protects you from electrical shock.
However, this protection is effective only if the ac outlet to be
used is properly grounded to earth. If the cutter is to be
connected to a two-contact wall outlet, a 3/2 adaptor with
grounding lug/wire may be used. This type of connection is
illustrated in Figure 1-3.

MAKE SURE THIS IS
CONNECTED TO A
KNOWN GROUND
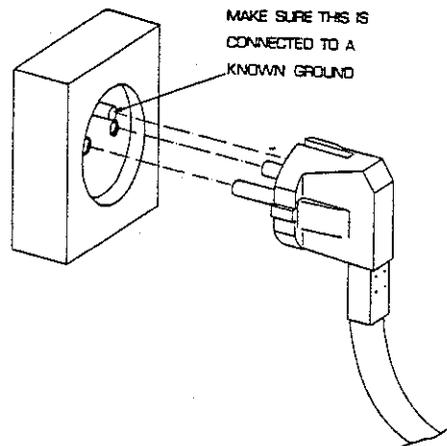
FIGURE 1-3. GROUND CONNECTION

WARNING

To prevent personal injury when operating the cutter, keep your hands, hair, and clothing away from the platen and the chart drive drum.

To power up the cutter:

1. Be sure the cutter is either placed on a flat, level, and sturdy surface or securely attached to its optional stand.

2. Connect one end of the power cord to the cutter's bottom panel ac receptacle, which is on the power entry module.

3. Connect the other end of the power cord to the ac power source.

4. Set the front panel power switch to ON.

NOTE

If the cutter is powered up without a chart
installed, the RESET and the LOAD LED
indicators will flash on and off. This
indicates that no chart is installed and this
is normal. If a chart is installed and the
cutter is powered up, the RESET indicator
will illuminate while the cutter automatically
sizes the chart. After the chart is sized,
the RESET indicator will turn off and the
LOAD indicator will illuminate and remain on.
This indicates that the cutter is in remote
mode and this is normal. However, if the
cutter displays any other code after it is
powered up, an error may have occurred.

The cutter has two types of power-up default values -- fixed and
menu-selectable.

A fixed default value is a variable which can be changed to
another value after the cutter has been powered up, but will reset
to the original value after the power is turned off.

A menu-selectable default value is a variable which can be changed
to another value after the cutter has been powered up and will be
retained after it is powered down. By using the cutter's
menu-selectable default values, you can personalize your cutter's
power up operating configuration. Section 2.4 explains how to
specify menu-selectable default values.

Table 1-2 lists the power up default values. (The values in
parentheses are selected at the factory. If this value is not
suitable for your applications, you can change the value as
explained in Section 2.4.)

TABLE 1-2. FIXED AND MENU-SELECTABLE DEFAULT VALUES

DEFAULT VALUE	TYPE
Cutter deselected	fixed
Remote mode active	fixed
Maximum window limits	fixed
Maximum scale box limits	fixed
Horizontal text path	fixed

TABLE 1-2. FIXED AND MENU-SELECTABLE DEFAULT VALUES (Continued)

DEFAULT VALUE	TYPE	VALUE/MODEL		
		DMP65/66C	DMP67C	DMP68C
Character size 8	fixed			
Text italics off	fixed			
Knife/pen up velocity	Menu-selectable	400mm/s	300mm/s	200mm/s
Knife/pen up acceleration	Menu-selectable	0.5 g	0.4 g	0.3 g
Knife/pen up delay	Menu-selectable	30 ms	30 ms	30 ms
Knife/pen down velocity	Menu-selectable	400mm/s	300mm/s	200mm/s
Knife/pen down acceleration	Menu-selectable	0.5 g	0.4 g	0.3 g
Knife/pen down delay	Menu-selectable	50 ms	50 ms	50 ms
Pen change	Menu-selectable	ignore	ignore	ignore
(Axis) plot origin	Menu-selectable	right	right	right
Constant velocity option	Menu-selectable	on	on	on
Addressing resolution	Menu-selectable	0.025mm	0.025mm	0.025mm
Menu units	Menu-selectable	metric	metric	metric
Text font	Menu-selectable	F0	F0	F0
Character set	Menu-selectable	G0	G0	G0
Auto-knife reset	Menu-selectable	120 sec	120 sec	120 sec
Baud rate	Menu-selectable	9600	9600	9600
UART parity	Menu-selectable	bit 8=0	bit 8=0	bit 8=0
Handshake RTS/DTR	Menu-selectable	toggle	toggle	toggle
Pass-through port option	Menu-selectable	toggle	toggle	toggle
Zero character	Menu-selectable	plain	plain	plain
Comm errors	Menu-selectable	ignore	ignore	ignore
DMPL N command	Menu-selectable	normal	normal	normal
Maximum media length	Menu-selectable	6.0	6.0	6.0
Media sensor	Menu-selectable	off	on	on

NOTE

Read the remainder of this manual and follow
its instructions before attempting to operate
the cutter.

1.8 INSTALLING AND ADJUSTING KNIFE BLADES

The cutter is supplied with a knife holder and blades. The
following instructions explain how to install a knife blade into
the knife holder.

1. As shown in Figure 1-4, the knife holder has an alignment pin
   inside its center shaft and the knife blade has a groove on
   one side. Insert the knife blade into the center shaft so
   that the groove on the blade aligns with the pin.

2. Use the supplied Allen wrench to turn the knife holder's
   adjustment set screw, which is located directly below the
   captive screw, clockwise until it just touches the knife
   blade.

3. Acquire a piece of the same type of vinyl that will be
    installed in the cutter and place it on a flat surface. Hold
    the knife holder in your hand as shown in Figure 1-5 and push
    it across the piece of vinyl. Check the quality of the cut.
    If the knife did not cut the vinyl, then slightly turn the
    adjustment set screw clockwise.   If the knife cut the vinyl
    and the media backing, then slightly turn the adjustment set
    screw counterclockwise. Repeat this procedure until the knife
    cuts only the vinyl and not the media backing.

WARNING

The knife blades that are used in the cutter are   razor
sharp   and will cause personal injury if they are
handled carelessly.   Use extreme care when you   are
operating the cutter and when you are installing,
removing, or storing the knife blades!

CAUTION

Do not install the knife holder and operate the cutter
if the knife blade cuts through the media backing.
Otherwise, damage to the cutter's chart drive drum will
occur.   For most vinyl cutting activities, the knife
blade tip is barely visible at the bottom of the knife
holder. If you can clearly see the knife blade tip, then
it is probably adjusted too far out.

To prevent damage to the cutter, check the length of the knife
blade and the quality of the cut each time you install a different
type of vinyl into the cutter.   For convenience, you can
purchase additional knife holders and preset each knife blade
length for the different types of vinyl that you keep in stock.

NOTE

Installing different blades or knife holders
may cause concentricity errors to occur.   If
misaligned cut lines appear after installing a
new blade or a different knife holder, refer
to Section 4.4.3 and calibrate the knife assem-
bly.

TOP VIEW:

CAPTIVE SCREW

ALIGNMENT
PIN
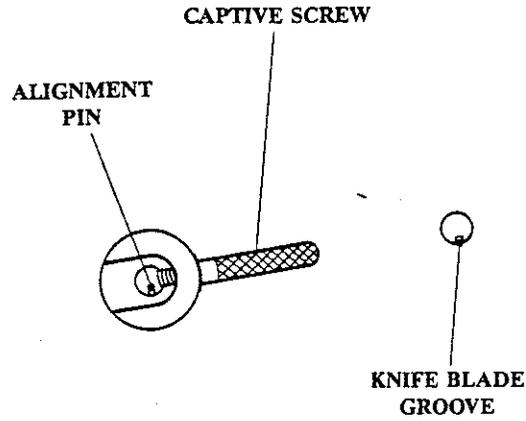
KNIFE BLADE
GROOVE

FIGURE 1-4. INSTALLING THE BLADE INTO THE KNIFE HOLDER

VINYL

PUSH FORWARD
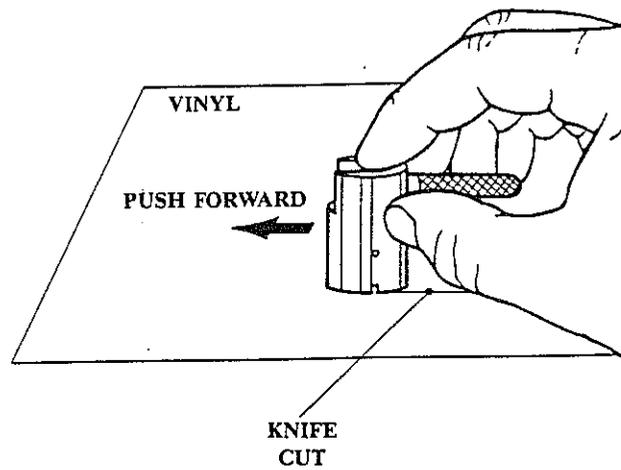
KNIFE
CUT

FIGURE 1-5. DETERMINING THE LENGTH OF THE KNIFE BLADE

1.8.1   Attaching the Knife Holder to the Knife Assembly

The following instructions explain how to attach the knife holder
to the knife assembly.

1.   Set the power switch to OFF.

2.   Attach the knife holder to the knife assembly by screwing the
     long captive screw   into the threaded hole in the blade
     driver as shown in Figure 1-6.

3.   Double-check to make sure that the captive screw is tight.

4.   To remove the knife holder from the driver, loosen the
     captive screw until the knife holder can be detached.

SIDE VIEW OF MAIN KNIFE ASSEMBLY

THREADED
HOLE

DRIVER

CAPTIVE SCREW
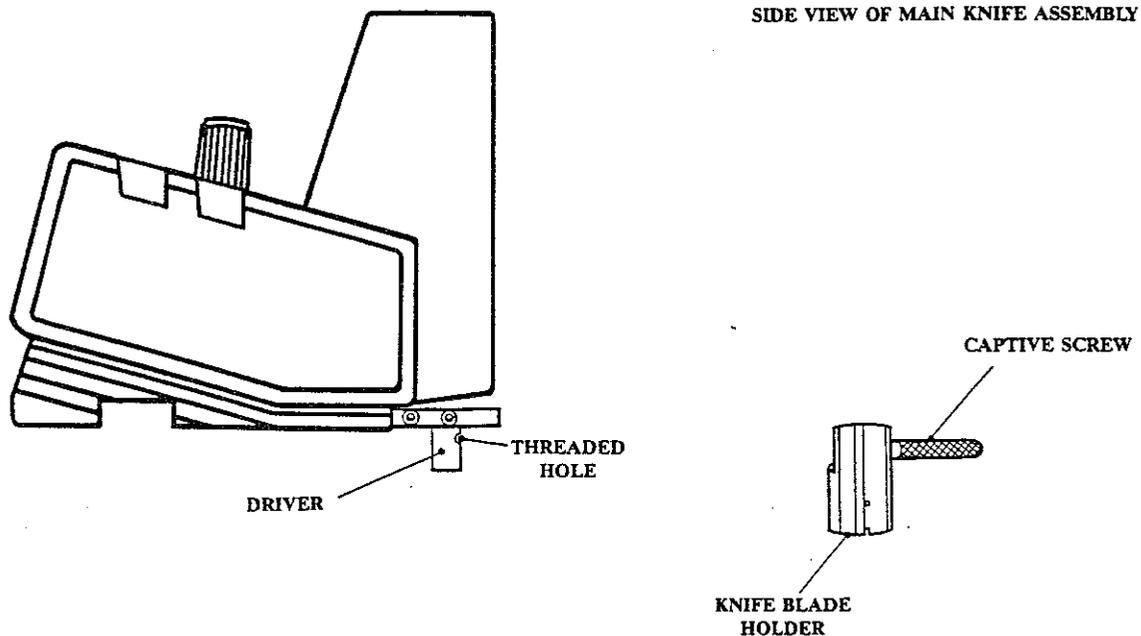
KNIFE BLADE
HOLDER

FIGURE 1-6.   ATTACHING THE KNIFE HOLDER TO THE KNIFE ASSEMBLY

1.8.2   Adjusting the Knife Blade Pressure

The pressure of the knife blade can be adjusted by turning the
potentiometer on the main head assembly cover (see Figure 1-2).
If the potentiometer is turned counterclockwise, the pressure is
gradually decreased to its minimum of zero grams.   If it is
turned clockwise, the pressure is gradually increased to its
maximum.   The ideal pressure setting depends upon the thickness
and the type of vinyl that is installed in the cutter and requires
a trial and error adjustment.

In general, you should increase the pressure when using thicker
types of vinyl, especially those that contain metallic or
reflective compounds.   Thinner types of vinyl require less
pressure.   Also, if the knife tip cuts the vinyl when you were
adjusting the length of the knife as described in Section 1.8
but won't cut the vinyl after you have installed it in the cutter,
then the pressure probably needs to be increased.   If the
pressure is adjusted too high for a type of vinyl, the knife
holder will leave marks or scratches on the vinyl along both sides
of the cut.   Decrease the pressure until the knife cuts the vinyl
without marking or scratching the vinyl.

1.8.3   Pen Holder Attachment

The cutter is supplied with hard nib pens and a pen holder attachment. If the knife holder attachment is removed and replaced with the pen holder, the cutter can be used as a plotter to draw draft plots of a sign design. The following procedure explains how to install the pen holder attachment in the cutter.

1.   Power down the cutter.

2.   Remove the knife holder as described in Section 1.8.1, if installed.

3.   Slide the pen holder onto the rim of the knife assembly (see Figure 1-7) until it makes contact with the two pins on the knife assembly. Insert the pen into the pen holder by gently pushing the large center rim of the pen between the jaws of the pen holder.

The cutter has a micro switch on the knife assembly which detects whether or not the pen holder attachment is installed.   When   it detects the pen holder, the knife blade rotation mechanism is inhibited.   The cutter also flashes a code on the control panel LEDs when it detects a knife/pen holder status change.   Each time the knife holder is removed and the pen holder is installed or vice versa, the control panel RESET and ENTER LEDs flash on and off. After installing either holder, reset the cutter by pressing the RESET key.

Use only paper media with the pen holder attachment.   Paper media must be aligned with the front edge of the platen, not with the vinyl media loading groove (see Section 1.9).


SIDE VIEW OF MAIN KNIFE ASSEMBLY

RIM

PEN HOLDER
ATTACHMENT
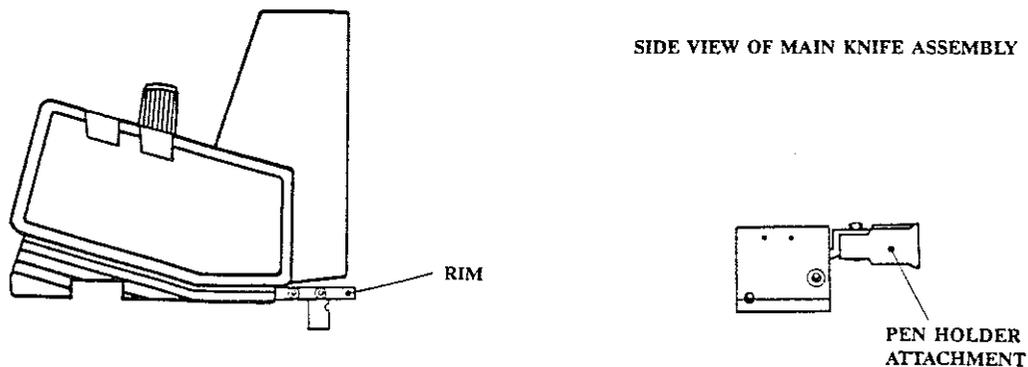
FIGURE 1-7. ATTACHING THE PEN HOLDER TO THE KNIFE ASSEMBLY

NOTE

> If the knife pressure potentiometer is adjusted
> too low, the pen will not move down to the media
> If this occurs, increase the pressure.

1.8.3.1 Hard Nib Pen Care

The hard nib pens are disposable pens that have no particular
care requirements other than to keep them capped when not in
actual use. Test the pen on a piece of scrap plotting material to
verify operation.

A hard nib pen with dried ink can sometimes be saved by dipping
the pen point in water, then rubbing the point on scrap media to
restart ink flow.

1.8.3.2 Disposable Drafting Pens

Disposable drafting pens for paper media are available from
Houston Instrument. The following procedure explains how to
install and use disposable technical pens.

1. Insert a pen tip into each ink cartridge and then place a cap
    on each pen. To use a pen for the first time, press
    downward on the pen cap to push the nib into the body of the
    ink cartridge to break its seal.
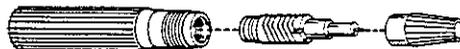
2. Remove and save the pen cap. Gently shake the pen until you
    see ink flow between the ribs of the pen tip and the ink
    cartridge. If the ink does not appear, activate the pen
    again as described in the preceding step.
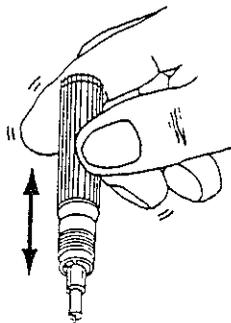
3. Hand draw on scrap H.I.-Frost to verify its operation.
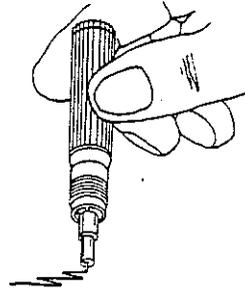
4. Screw the pens into the adaptors (the pens only fit into the adaptors the correct way). The pens are ready for use.
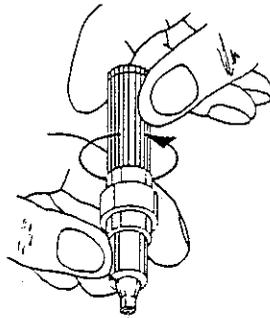
5. When a pen is not in use, cap and store it in the storage box in a horizontal position. Use the short blue pen cap if the pen is in the adaptor. Use the long clear pen cap if the pen is not in the adaptor. Before using the pen again, sharply tap the pen body (not the tip) on a hard surface to restart the flow of ink.

PEN AND ADAPTOR   SHORT BLUE CAP

PEN ONLY   LONG CLEAR CAP
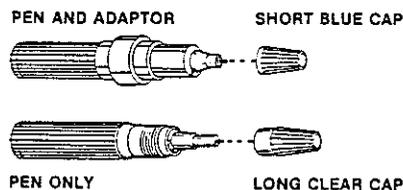
There are no special cleaning requirements for these pens. A drafting pen with dried ink can often be restarted by holding the pen point upward and sharply tapping the reservoir against a hard surface several times. Capping a dried pen for a few days may allow the ink to dissolve the clog. Also, these pens can often be restarted by dipping the pen point in water or an ultrasonic cleaner, then rubbing the point on scrap plotting media.

1.9   MEDIA LOADING

Please find below an overview of the various cutters and the
media they accomodate :

   * The DMP-65C can be configured to handle media having widths
     of either 381 mm (15 inches) or 406 mm (16 inches)
   * The DMP-66C must be loaded with media having 406mm (16 inches)
     width.
   * The DMP-67C runs media having 500 mm (19.7 inches) width
   * The DMP-68C employs media having 610 mm (24 inches) width

Media length run on all cutters can be up to 6 metres (20 feet), however,
Houston Instrument guarantees tracking on 2.4 metres or shorter for the
DMP65C/DMP66C and 1.2 metres or shorter for the DMP67/68C.

Each pinchroller on the DMP-65C has a thumbscrew (see Figure 1-8)
which secures the roller assembly in either one of two threaded holes
in the platen (see Figure 1-9). (The pinch roller assemblies and head
assembly are removed from Figure 1-9 to show platen details). If both
roller assemblies are moved to and secured in the two innermost holes,
then 381 mm (15 inches) sprocket media can be installed. If both roller
assemblies are moved to and secured in the two outermost threaded holes,
then 406 mm (16 inches) plain media can be installed.
Note : Be sure that for the DMP-65C model both roller assemblies are
secured in either the innermost or the outermost threaded holes.
Tracking problems will occur if the roller assemblies are out of sync
(one in the outermost threaded hole and one in the innermost threaded
hole).

The pinch roller assemblies of the DMP-66C and DMP-67C have thumbscrews,
however, they are not to be used to move the pinch rollers and must re-
main secured.

The DMP68C model has no thumbscrews.
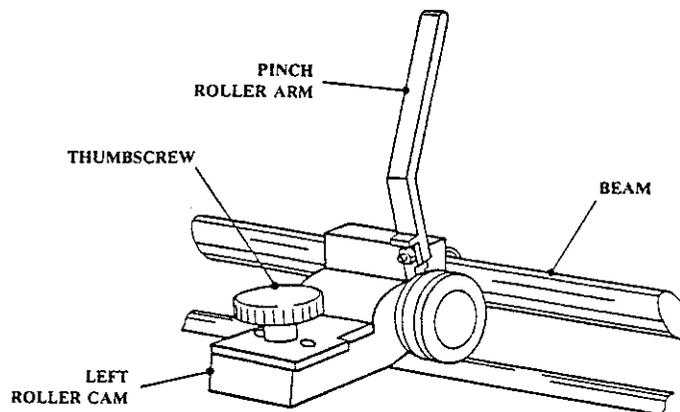
FIGURE 1-8. DMP-60C SERIES PINCH ROLLER ASSEMBLY THUMBSCREW

OUTERMOST
THREADED HOLE

INNERMOST
THREADED HOLE

THREADED HOLE EDMP-67C

ALIGN 400mm (16") MEDIA HERE

ALIGN 381mm (15") MEDIA HERE

ALIGN 500mm (19.7") MEDIA HERE

ALIGN 610mm (24") MEDIA HERE

EDMP-65C and EDMP-66C

EDMP-67C and EDMP-68C
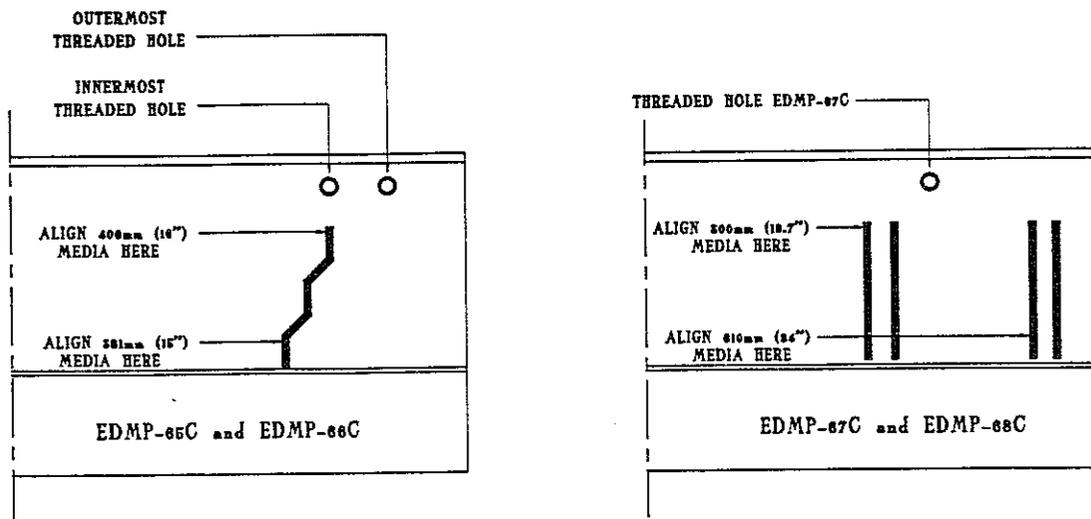
FIGURE 1-9. DMP-60C SERIES CHART ALIGNMENT MARKER AND THREADED
         HOLES ON PLATEN

By using the menu to rotate the plot origin to the right or left,
the cutter models can accommodate a small chart or a large
chart. A left (small or half) chart orientation exists when the
length of the chart side aligned with the knife/pen axis is longer
than the length of the chart side aligned with the chart axis as
shown in Figure 1-10. A right (large or full) chart orientation
exists when the length of the chart side aligned with the chart
axis is longer than the length of the chart side aligned with the
knife/pen axis as shown in Figure 1-11. The menu also has an
option which allows the cutters to automatically select the cor-
rect left/right origin for a particular chart. The menu parameters
and options are explained in Paragraph 2.4.

NOTE

If the knife holder is installed and vinyl media is
being loaded into the cutter, align the front edge of
the vinyl chart with the front loading groove as shown
in Figures 1-10 and 1-11 and center the media between
the pinch roller wheels. If the pen holder is
installed and paper media is being loaded into the
cutter, align the front edge of the paper chart with the
edge of the front platen as shown in Figures 1-10 and
1-11 and center the media between the pinch roller
wheels.

PEN/KNIFE AXIS

CHART AXIS

+Y

+X

ALIGN THE FRONT EDGE OF
VINYL MEDIA WITH THE
GROOVE ON THE PLATEN

ALIGN THE FRONT EDGE OF
PAPER MEDIA WITH THE
FRONT EDGE OF THE PLATEN
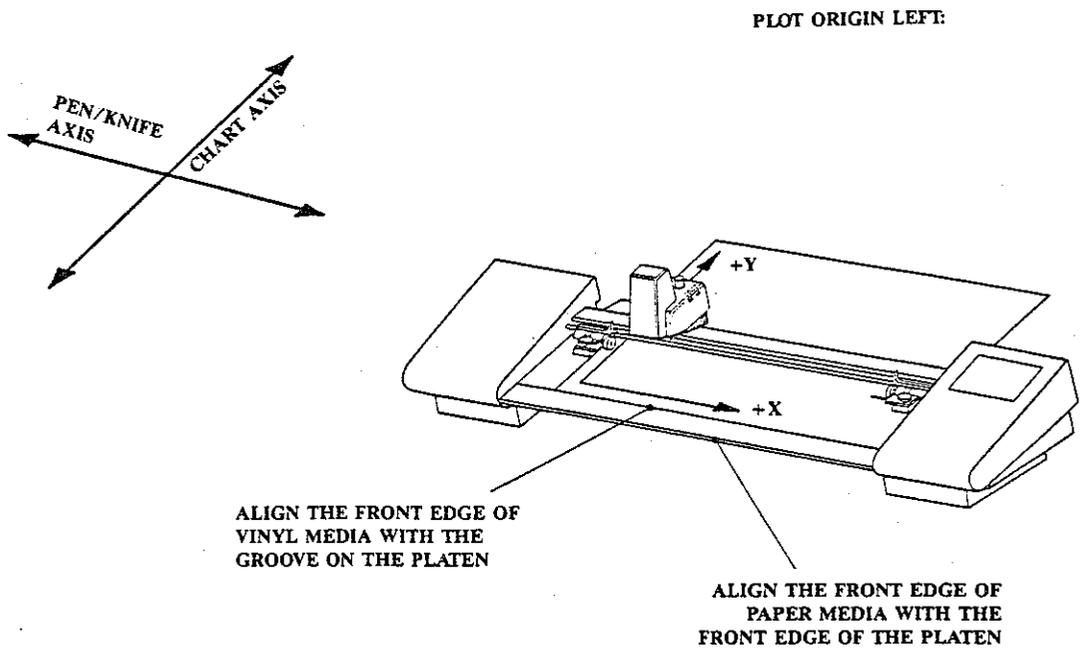
FIGURE 1-10.   SMALL CHART X-,Y-AXIS ORIENTATION

PLOT ORIGIN RIGHT:

PEN/KNIFE AXIS

CHART AXIS

+X

+Y

ALIGN THE FRONT EDGE OF
VINYL MEDIA WITH THE
GROOVE ON THE PLATEN

ALIGN THE FRONT EDGE OF
PAPER MEDIA WITH THE
FRONT EDGE OF THE PLATEN
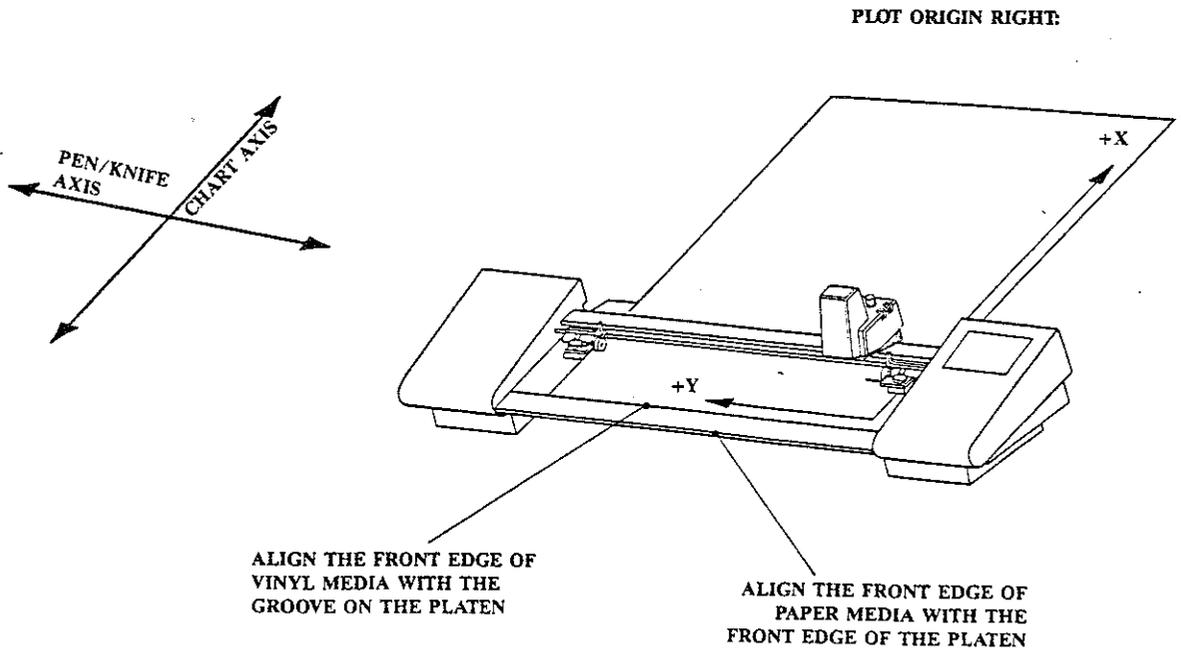
FIGURE 1-11. LARGE CHART X-,Y-AXIS ORIENTATION

All cutter models also allow you to use non-standard sheets of chart media. The only restrictions for using non-standard chart sizes are:

o   The right-to-left length of the chart along the width of the platen (the knife/pen axis) must be approximately 406 mm (16 inches) wide for the DMP-66C,
either approximately 318 mm (15 inches) or 406 mm (16 inches) wide for the DMP-65C
for the DMP-68C approximate width must be 610 mm (24 inches)
for the DMP-67C approximate width must be 510 mm (19.7 inches)

Vinyl charts must be aligned with the front loading groove when installed in all cutter models. Paper charts must be aligned with the front edge of the platen.

o   The front-to-back length of the chart (the side aligned with the chart axis) must be greater than 8 inches (203 mm).

o   The maximum cutting area obtained will be approximately 35 mm. (1.4 inches) less than the chart length.

The maximum cutting areas for the various cutter models are listed below :

MODEL	MEDIA	MAXIMUM CUTTING AREA
DMP-65C	381 mm (15 inches) sprocket	X = media length − 35 mm (1.4 inches) Y = 290 mm (11.4 inches)
	406 mm (16 inches)	X = media length − 35 mm (1.4 inches) Y = 312 mm (12.3 inches)
DMP-66C	406 mm (16 inches)	X = media length − 35 mm (1.4 inches) Y = 340 mm (13.38 inches)
DMP-67C	500 mm (19.7 inches)	X = media length − 35 mm (1.4 inches) Y = 434 mm (17.0 inches)
DMP-68C	610 mm (24 inches)	X = media length − 35 mm (1.4 inches) Y = 544 mm (21.4 inches)

NOTE : Maximum plotting length is always media length − 80 mm (3.15 inches)

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The loading functions of the RESET key and the LOAD key interact with the present menu settings of the MAXIMUM MEDIA LENGTH and MEDIA SENSOR menu parameters. (The menu is explained in Paragraph 2.4.) The factory sets the MAXIMUM MEDIA LENGTH menu parameter to 6 m (20 feet) and the MEDIA SENSOR menu parameter to ON before the cutter is shipped. These parameter settings allow the cutter to be loaded with long lengths of vinyl and operated from a dedicated sign-making computer system. These menu parameter settings must be changed to load and operate the cutter with shorter lengths of vinyl, which will be explained later in this section. Follow the procedure below to load and operate the cutter with media having lengths of 6 m (20 feet).

1.   Raise the pinch roller arms on both pinch roller assemblies. On the DMP-65C, loosen the thumbscrew on top of each pinch roller assembly by turning it counterclockwise until the pinch roller assemblies can slide freely on the beam.

2.   To configure the DMP-65C to handle 15 inches (381 mm) media, move each roller assembly to the two innermost threaded holes on the platen (see Figure 1-9). To configure the DMP-65C to handle 16 inches (406 mm) plain media, move both roller assemblies to the two outermost threaded holes on the platen. Be sure that the thumbscrews are aligned with the threaded holes, and then tighten the thumbscrews by turning them clockwise until they are finger-tight.

                              CAUTION

        Be sure that the DMP-65C thumbscrews are aligned with
        the threaded holes before tightening the thumbscrews.
        Otherwise, the thumbscrews may strip the threads of the
        platen holes.   Do not loosen the DMP-66C thumbscrews.

3.   Align the front edge of vinyl media with the groove on the platen as shown in Figures 1-10 and 1-11 and then center the media between the two pinch roller wheels. Align the front edge of paper media with the front edge of the platen as shown in Figures 1-10 and 1-11 and the left and then center the media between the two pinch roller wheels. Lower both pinch roller arms.

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NOTE

In the following step, you are going to use the LOAD
key to start and stop a media shuffle on the cutter.
Pressing the LOAD key one time starts the shuffle and
pressing the LOAD key a second time stops the shuffle
and returns the media to its load position. Leave your
finger near the LOAD key for better control over the
media shuffle. Also, read step 4 before trying it.

4.   Press the LOAD key and the cutter will begin to shuffle the
     media. Watch the right edge of the media with reference to
     the alignment marker on the right side of the rear platen.
     More than likely the media will appear to shift either to the
     right or left of the rear platen alignment marker during its
     shuffle (unless of course you were lucky and loaded it
     perfectly the first time). Note which way the media appears
     to shift and then press the LOAD key again. This causes
     the cutter to return the media to its load position.

     Lift ONLY the right pinch roller arm. (Leave the left
     pinch roller arm down to allow the media to pivot under the
     left roller wheel.) If the media appeared to shift toward
     the right of the rear alignment marker during the shuffle,
     straighten the media by PUSHING on the right side of the
     media and then lower the right pinch roller arm. If the
     media appeared to shift toward the left of the rear alignment
     marker, straighten the media by PULLING the right side of
     the media and then lower the right pinch roller arm.

5.   Press the LOAD key again and watch the right side of the
     media with reference to the alignment marker on the right
     rear platen as the media is shuffled. If it still appears
     to shift right or left, repeat step 4. The media is
     properly aligned when it can be shuffled the length of the
     cutting area without shifting to the right or left of the
     right rear platen marker. (Read the remainder of this
     section. It contains information on how to select various
     cutting or plotting areas on the media.)

Quite a few sign applications require media lengths of less than
6 m (20 feet). The cutter can be configured to load various
media lengths which also enables you to load scrap vinyl.

The following paragraphs describe different ways to use the menu
parameters and the RESET and LOAD keys to install media and
select cutting/plotting areas.

If the RESET key is pressed after media is installed in the cutter, the knife assembly moves left and right but the media is not shuffled. The maximum cutting length is determined by the present menu MAXIMUM MEDIA LENGTH parameter value (2 to 20 feet or 0.6 to 6.0 m). Pressing the RESET key also establishes the current media position as the new load position and resets the origin at that location.

Pressing the LOAD key initiates a media shuffle. The shuffle can be terminated in four ways:

o   if the MEDIA SENSOR menu parameter is activated (ON), the cutter will detect the rear edge of the media and reverse the shuffle back to the media load position. Maximum cutting length is set to the rear edge minus 0.5 inch (12.7 mm) margin.

o   if the LOAD key is pressed during a shuffle, the shuffle will reverse back to the load position. The maximum cutting size is set to the knife position when the LOAD key was pressed to terminate the shuffle.

o   if the RESET key is pressed during a shuffle, the shuffle will reverse back to the load position. The maximum cutting size is set to the present menu MAXIMUM MEDIA LENGTH parameter value (2 to 20 feet or 0.6 to 6.0 m).

o   if the media moves the distance specified in the MAXIMUM MEDIA LENGTH menu parameter, the cutter will reverse the loading shuffle and return the media to the load position.

The maximum cutting size is set at media load time or when the RESET key is pressed as explained in the preceding paragraphs. The DM/PL Set Window (W) command cannot exceed this value, but the cutting area can be advanced along the media by use of the DM/PL Frame Advance (F) command.

Maximum cutting size is either:

o   the rear margin of vinyl if the media sensor is used to detect it during a load,

o   the knife position when the LOAD key is used to terminate a load shuffle,

o   the menu MAXIMUM MEDIA LENGTH parameter value (2 to 20 feet or 0.6 to 6.0 m) when the RESET key is pressed. This is set when the RESET key is used by itself to reset the machine or when the RESET key is used during a load shuffle to terminate the shuffle.

Operation

SECTION 2
OPERATION

2.1   THE CONTROL PANEL

The control panel consists of 12 membrane switch keys and four LED
indicators (see Figure 2-1).
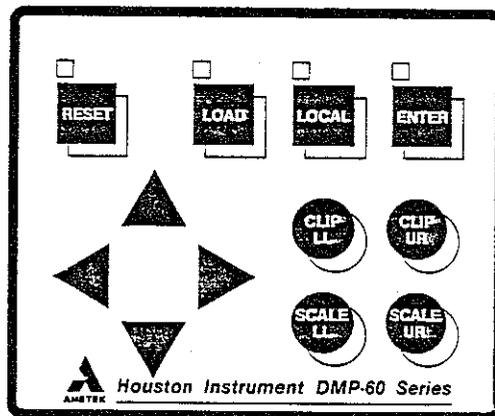
FIGURE 2-1. THE CONTROL PANEL

In general, the   RESET   key causes the cutter to cold reset, and
the LOAD key causes the cutter to warm reset.   The LOCAL and
ENTER keys are used to place the cutter in either remote, local,
menu, or window mode.   The present operating mode of the cutter
determines   the   functions of the remaining   control panel keys.
Control panel-selected operating parameters (such as windows and
velocities) override menu and DM/PL-selected parameters.   The
control panel keys and the four operating modes are explained in
the following sections.

The RESET,   LOAD,   LOCAL, and ENTER keys have LED indicators that
illuminate when their function is activated.   The LED indicators
also display certain operating modes and flashing error conditions
and error codes.   A summary of these codes and their reference
sections are listed in Table 2-1.

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Operation

This section uses three different graphic
symbols to illustrate the status of a LED.
The [ ] symbol means that the LED is off, and
the [X] symbol means that the LED is on. If a
LED is flashing on and off, the [*] symbol is
used.

TABLE 2-1. LED INDICATOR CODE SUMMARY

LED INDICATOR				CONDITION AND REFERENCE SECTION
RESET	LOAD	LOCAL	ENTER	
Normal Operation				
[ ]	[X]	[ ]	[ ]	Remote mode, 2.2
[*]	[*]	[ ]	[ ]	Out of media, 1.9
[ ]	[X]	[X]	[ ]	Local mode, 2.3
[ ]	[X]	[ ]	[X]	Menu mode, 2.4
[ ]	[X]	[X]	[X]	Window mode, *
[ ]	[X]	[X]	[*]	Digitizer mode, *
[*]	[ ]	[*]	[ ]	Pen pause, *
[*]	[ ]	[ ]	[*]	Knife/Pen Holder Status Change, 1.8.3
Error Conditions				
[ ]	[*]	[ ]	[*]	Window error, *
[ ]	[ ]	[ ]	[*]	EEPROM error, *
[ ]	[ ]	[*]	[ ]	ROM error, *
[ ]	[ ]	[*]	[*]	RAM error, *
[ ]	[*]	[ ]	[ ]	Communication error, *

[ ] = LED off
[X] = LED on
[*] = LED flashing

* These topics are described in detail in our MI-1135 Operation Manual
  (in english) supplied upon ordering.

TABLE 2-1. LED INDICATOR CODE SUMMARY (Continued))

LED INDICATOR				CONDITION AND REFERENCE SECTION
RESET	LOAD	LOCAL	ENTER	
Error Conditions (Continued)				
[*]	[*]	[*]	[ ]	Voltage error, *
[*]	[*]	[*]	[*]	Current error, *
[ ]	[*]	[*]	[*]	RS-232-C loopback test error, *
[*]	[*]	[ ]	[*]	Program error, *
[*]	[ ]	[ ]	[ ]	Plot Command Condition, *
[*]	[ ]	[*]	[*]	Knife Rotation Error, 2.6

[ ] = LED off
[X] = LED on
[*] = LED flashing

2.1.1 The Reset Key

The RESET key enables you to manually cold reset the cutter at the control panel.

Pressing this key causes all software-defined parameters and control panel entry parameters to reset to the cutter's power up default values (see Table 1-2).   The RESET key also clears the cutter's DM/PL buffer.

After RESET is pressed, the cutter first determines the size of the presently loaded chart and positions it for use, and then parks the knife/pen holder at the plot origin and enters remote mode.

NOTE

When installing or replacing media of any size, vinyl charts must be aligned with the front loading groove and paper charts must be aligned at the front edge of the platen before pressing the RESET key.   The cutter   uses the proper loading point as a reference to the front plot margin.

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2.1.2   The Load Key

The LOAD key enables you to manually warm reset the cutter at the control panel.

If LOAD is pressed, all software-defined parameters are defaulted to the present menu selections, but control panel entries such as window or temporary velocity settings are retained.

If the chart size is changed, a load defaults to a reset.

NOTE

> When installing or replacing media of any size, vinyl charts must be aligned with the front loading groove and paper charts must be aligned at the front edge of the platen before pressing the LOAD key. The cutter uses the proper loading point as a reference to the front plot margin.

Table 2-2 lists the effects of the LOAD key.

TABLE 2-2. LOAD KEY EFFECTS

ACTION	DEFAULT
Cutter is deselected	
Remote mode is active	
Horizontal text path active	
Character size 8 active	
Text italics are off	
Knife/pen up velocity	Menu value
Knife/pen up acceleration	Menu value
Knife/pen up delay	Menu value
Knife/pen down velocity	Menu value or control panel entry
Knife/pen down acceleration	Menu value
Knife/pen down delay	Menu value

TABLE 2-2. LOAD KEY EFFECTS (Continued)

ACTION	DEFAULT
Pen change	Menu value
Plot origin	Menu value
Constant velocity option	Menu value or last control panel entry
Addressing resolution	Menu value
Menu units	Menu value
Text font	Menu value
Character set	Menu value
Auto-knife reset	Menu value
Baud rate	Menu value
UART parity	Menu value
Handshake RTS/DTR	Menu value
Pass-through port option	Menu value
Zero character	Menu value
Comm errors	Menu value
DMPL N command	Menu value
Window limits	Maximum or last control panel entry
Scale Box limits	Maximum or last control panel entry

2.1.3   The Local and Enter Keys

The LOCAL and ENTER keys enable you to place the cutter into remote, local, menu, or window mode.   Each operating mode causes the control panel keys to have different functions.   The operating modes and key functions are explained in the following paragraphs.

2.2 REMOTE MODE

Remote mode enables your computer to communicate with the cutter and allows the software to control all cutting activity. Remote mode is active when only the LOAD key indicator is illuminated.

Remote mode is automatically activated after plotting or cutting media is installed and the RESET key or the LOAD key is pressed.

Remote mode disables the manual use of all control panel functions (except RESET and LOAD) until the LOCAL and/or ENTER keys are used to specify a different operating mode.

2.3 LOCAL MODE

Local mode enables you to operate the cutter using the control panel keys. Local mode is initiated by first placing the cutter in remote mode (RESET, LOCAL, and ENTER LED indicators are off) and then pressing LOCAL. (The LOCAL LED indicator will illuminate.) To exit the cutter from local mode and return it to remote mode, press LOCAL. (The LOCAL indicator will turn off.)

NOTE

When the cutter is placed in local mode, the manual movement keys can be used to move the knife or pen. When the cutter is returned to remote mode, the present position of the knife is defined as the new home position (x-,y-coordinates 0,0). This enables you to move the origin to any point on the media and produce designs over different areas of the same chart. After a design file completes, the knife or pen returns to the present origin. You can then place the cutter in local mode again and use the manual movement keys to move the origin to a different point on the media. To return the knife or pen to the normal left or right plot origin, you can either place the cutter in local and use the manual movement keys to move the knife or pen to that point or you can reset the cutter.

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2.3.1   Local Operation

When the cutter is placed in local mode, cutting activity can be
manually controlled from the control panel keys. Manual operation
of the cutter is explained below.

When this key is pressed and held, the chart drives
toward the rear of the cutter. To stop the chart drive,
release the key.

When this key is pressed and held, the chart drives
toward the front of the cutter. To stop the chart
drive, release the key.

When this key is pressed and held, the knife assembly
drives along the bar to the right. The knife assembly
will stop at the right pinch roller assembly or when the
key is released.

When this key is pressed and held, the knife assembly
drives along the bar to the left. The knife assembly
will stop at the left pinch roller assembly or when the
key is released.

The knife assembly moves to the present lower left
corner of the window if this key is pressed and released
(see Section 2.5.1).

The knife assembly moves to the present upper right
corner of the window if this key is pressed and
released.

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The knife assembly moves to the present lower left corner of the scale box if this key is pressed and released (see Section 2.5.1).

The knife assembly moves to the present upper right corner of the scale box if this key is pressed and released.

The knife blade or pen tip up/down status changes when the LOCAL key is pressed and held, and then the ENTER key is pressed. (If the pen holder does not change its up/down status, increase the knife pressure potentiometer setting.)
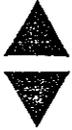
If these two keys are pressed simultaneously, the cutter performs the customer confidence test routine.

If these two keys are pressed simultaneously, the cutter draws the Europlot design.

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Operation

2.4 MENU MODE

The menu mode enables you to personalize the power-up operating configuration of your cutter. For example, you can have your cutter ready to operate at 2400 baud, even parity, 0.001 inch resolution, 12 inches per second knife or pen velocities, origin left, and ASCII character set active every time you set the power switch to on.

An example of a menu in metric units for the DMP66C is shown below.

DMPL OPTIONS: 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 list help

1) UP-VELOCITY	30 50 75 100 125 150 175 200 225 250 275 300 325 350 [400] (mm/s)
2) UP-ACCELERATION	0.1 0.2 0.3 0.4 [0.5] (g)
3) UP-DELAY	25 [30] 35 40 45 50 55 60 65 70 75 80 (msec)
4) DOWN-VELOCITY	30 50 75 100 125 150 175 200 225 250 275 300 325 350 [400] (mm/s)
5) DOWN-ACCELERATION	0.1 0.2 0.3 0.4 [0.5] (g)
6) DOWN-DELAY	25 30 35 40 45 [50] 55 60 65 70 75 80 (msec)
7) PEN-CHANGE	[IGNORE] PAUSE
8) PLOT-ORIGIN	[RIGHT] LEFT AUTO
9) CONSTANT VELOCITY	OFF [ON]
10) ADDRESSING	.001in .005in [.025mm] .100mm NORM
11) MENU UNITS	ENGLISH [METRIC]
12) TEXT FONT	[F0] F1 F2
13) CHARACTER SET	[G0] G1 G2 G3 G4 G5 G6 G7
14) AUTO-KNIFE RESET	15 30 60 [120] 240 480 DISABLE (sec)
15) BAUD RATE	300 600 1200 2400 4800 [9600] (baud)
16) UART PARITY	[BIT 8=0] BIT 8=1 EVEN ODD
17) HANDSHAKE RTS/DTR	[TOGGLE] ALWAYS HIGH
18) PASS-THROUGH PORT	[TOGGLE] ALWAYS ON
19) MAXIMUM MEDIA LENGTH	0.6 1.2 1.8 2.4 3.0 3.6 4.2 4.8 5.4 [6.0] (m)
20) MEDIA SENSOR	OFF [ON]
21) ZERO CHARACTER	[PLAIN] SLASH DOTTED
22) COMM ERRORS	[IGNORED] REPORTED
23) DMPL N COMMAND	[normal] emul40V
24) OPTION BOARD	OFF [ON]

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MENU EXIT: parameters saved

Operation

The following paragraphs first provide an overview of the menu and then explain how to operate the cutter in menu mode.

In general, menu mode works like this:

o   To initiate menu mode, first install the pen holder attach-
     ment and a pen and plotting media. Place the cutter in remote
     mode, and then press the ENTER key and then the SCALE UR key.

o   After menu mode is initiated, the menu parameters and options
     must be selected by first using the ARROW/LEFT and
     ARROW/RIGHT keys to move the pen over the desired parameter
     or option, and then registered by pressing the ENTER key.

o   If the cutter is instructed to plot the help list or the
     parameter list, the plotting of the lists can be aborted
     without exiting the cutter from menu mode by pressing and
     holding the SCALE LL key.

o   To exit menu mode, press the SCALE UR key. (The cutter resets
     and installs all of the menu values when the mode is exited.)
     Exit the cutter from menu mode before changing media for plot-
     ting or cutting activities.

When more information is required, please order the complete Operation
Manual MI1135 (english).

2.5 KNIFE CONTROL COMMANDS (REFERENCES)

The following paragraphs provide information about three commands
that perform specific knife tasks. It is not necessary to use these
commands when writing DM/PL programs for the DMP-60C series cutters.
The standard DM/PL code commands also automatically control any spe-
cific knife tasks. Information about these commands is included for
reference only since they may appear in some early commercial cutter
programs.

2.5.1. KNIFE ROTATION COMMAND

     Nnnn

     nnn specifies a new rotation angle for the knife blade. It is
an integer between 0 and 360. Units of rotation are degrees. The an-
gle of rotation (nnn) parameter value can be outside the range of 0
to 360. If the value is less than 0, then 360 is added until the value
is greater than or equal to 0. If the value is greater than or equal
to 360, then 360 is substracted until the value is less than 360.
For example, a value of -60 (-360) results in 300 degrees.

2-10

When the knife blade tip is at zero degree (or 360 degrees), it points toward the +Y-axis of the chart. The angle of rotation increases in a clockwise direction. Therefore, if 90 is specified as nnn, the knife tip will rotate and point toward the +X-axis of the chart. If 180 is specified as nnn, the knife will rotate and point toward the -Y-axis of the chart, and if 270 is specified as nnn, the knife tip will rotate and point toward the -X-axis of the chart. Use nnn to specify the angle to which you want the knife to rotate.

NOTE

Remember that the present x-,y-axis orientation is rotated if the chart format is changed as shown in Figures 1-10 and 1-11.

Although the degree increments of the circle of rotation increase in a clockwise direction, the knife tip will always rotate on the shortest path to reach a new angle. For example, if the knife is at zero degree and is instructed to rotate 90 degrees, it will rotate clockwise to the 90 degree mark. If it is then instructed to rotate to the 340 degree mark, it will rotate counterclockwise to reach the 340 degree mark because that is the shortest path. (Because the knife tip rotates to a new angle on the shortest path, it will never rotate more than 180 degrees.)

The default reset position is the zero degree position (+Y-axis of the chart).

Following an N command, the cutter will stop automatic rotation of the knife. Automatic rotation will remain turned off until the next B command (threshold).

2.5.2   Knife Blade Threshold

Bnnn

nnn specifies a threshold limit angle for the lifting of the knife blade. nnn is an integer between 0 and 181.

Default for nnn is 181. This turns off the automatic lifting, because there are no rotations greater than 180 degrees due to the shortest path calculation done by the cutter.

Using the B command restores automatic rotation of the knife blade.

The threshold applies to both automatic rotations and explicit rotations using the N command.

Operation

2.5.3   Knife Blade Home Rotation

K

The K command causes the knife to rotate to its home position.
Home position is the +Y-axis direction (zero degree) of the
present chart size.

The knife assembly rotates to home position at power up or after a
reset.

2.6. KNIFE ROTATION ERROR

[*]   [ ]   [*]   [*]

This code indicates that the knife holder has developed some type of
rotation error.

This code has a LED steady state display. If the ENTER key is pressed
one time, the cutter will display the type of error or condition that
has occurred.

Home Seek Failure Code

[ ]   [ ]   [ ]   [X]

This code indicates that the cutter does not sense the home position of
the knife holder. A probable cause of this condition is that the home
sensor in the knife assembly has failed. If this condition exists after
pressing the LOCAL key, then service is required.

Lost Step Condition Code

[ ]   [ ]   [X]   [ ]

This code indicates that a knife rotation step has been lost. A pro-
bable cause of this condition is that an object has prevented the knife
holder from rotating the specified amount of steps. If this has occurred,
correct the situation and the press the LOCAL key. The prolonged cutting
of vinyl that is too heavy for the cutter may cause this condition. If
the cause of the condition cannot be visibly determined, the cutter may
have a knife motor failure and service is required.

SECTION 3
OPERATOR MAINTENANCE AND CLEANING

3.1   OPERATOR MAINTENANCE

Your cutter has several sliding surfaces. These are made of smooth metals and plastics so that they are essentially friction-free and require no lubricants. They will, however, collect dust and lint which will adversely affect the performance of the cutter. Keep the cutter as clean as possible by using a dust cover. When necessary, clean the unit with a soft cloth dampened with isopropyl alcohol or mild detergent. (Do not use abrasives.)

Ink On Surface:

Use a clean cloth dampened in a concentrated solution of soap and water; squeeze out excess water and then scrub the affected surface. Be sure that no water drips into the cutter as this will cause electrical shorting of the internal components. Do not use any aerosol cleaners, such as TV contact cleaner, household wall cleaners, or anything containing a solvent; these may damage certain components.

Care of Paper Media:

The plotting media should be handled by its edges. Pen skipping may occur if the media has smudges or has been permeated with oil, grease, perspiration, or other contaminants.

Pen Care:

Disposable technical pens should be stored in their storage box. Always cap unused pens.

Optical Chart Sensor Care:

Improper chart sensing may result if dirt, dust, or other debris should collect in the chart sensor hole, which is located on the top right side of the rear platen. When necessary, use compressed air or a small soft brush to clear debris from the hole above the sensor.

3.1.1   Cleaning Friction Drive Wheels

The friction drive wheel area of the drive drum can become clogged with accumulated residue from the media. This can cause slippage of the media between the drive drum and the pinch rollers, resulting in inaccurate cut designs and plots.

Operator Maintenance and Cleaning

The following procedure explains how to clean the friction drive wheels when necessary. Note that the special cleaning strips (part number DMP40-303) are available from Houston Instrument or your product distributor.

1. Place the cutter into manufacturing setup mode level 1 (MSM/L1) as explained in Section 4.

2. Remove the media if installed, and then place the cutter in MSM/L1 local mode. This enables you to use the control panel manual movement keys without a chart installed in the cutter.

3. Remove the protective liner from the cleaning strip.

4. Open the right pinch roller arm.

5. Place the cleaning strip between the pinch roller and the drive drum, with the tacky side of the cleaning strip toward the drive drum as shown in Figure 3-1.

6. Using the ARROW/UP and ARROW/DOWN switches on the control panel, slew the cleaning strip back forth several times until all residue is removed from the friction drive wheel.

7. Open the right pinch roller arm and remove the cleaning strip.

8. Repeat steps five through eight for the left friction drive wheel.

9. Set the cutter's power switch to OFF.

10. Residue can be removed from the cleaning strip by washing it in cold water. Thoroughly dry the cleaning strip and replace its protective lining.

CLEANING STRIP   PINCH ROLLER

TACKY SIDE ON BOTTOM

FRICTION DRIVE WHEEL
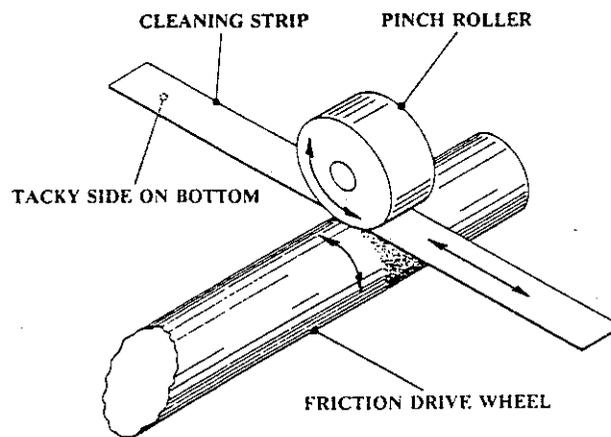
FIGURE 3-1. CLEANING FRICTION DRIVE WHEELS

3.2   OPERATING VOLTAGE CONVERSION

The power entry module cover shows four possible voltage settings
(100V,   120V, 220V, or 240V). Notice that a pin will be in one of
these holes, indicating the present voltage setting for the
cutter.   If this setting does not match the voltage available at
your site, then it must be changed before powering on the cutter.
Figure 3-2 shows an example setting for 120 Vac operation.

3-3

To change the fuse(s), remove the fuse(s) from the fuse carrier on the back of the cover. For 100 or 120 Vac operation, the fuse rating is 1 Amp, Slo-Blo. For 220 or 240 Vac operation, the fuse rating is 0.5 Amp, Slo-Blo. Be sure to use the correct rating for your voltage selection. For installation, insert the fuse(s) of the proper rating into the fuse carrier.
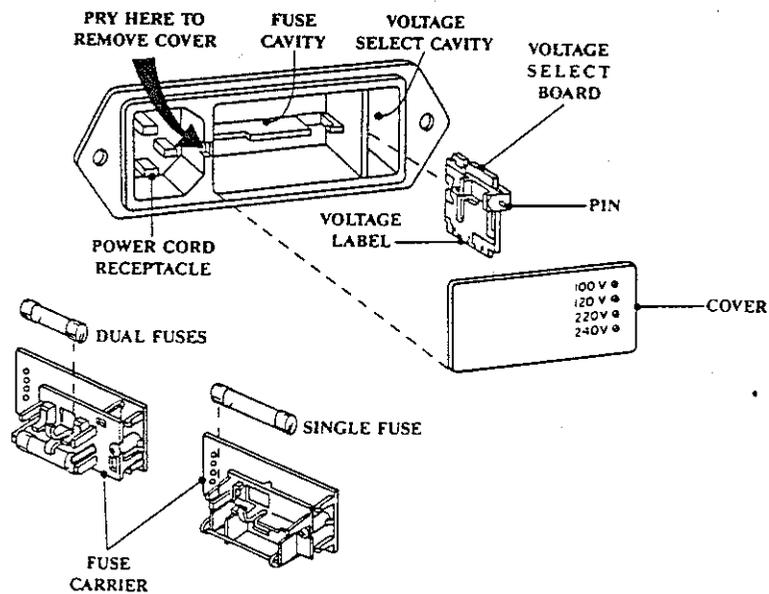
FIGURE 3-2   POWER ENTRY MODULE

SECTION 4
MANUFACTURING SETUP MODE (MSM)

4.1   INTRODUCTION

Manufacturing setup mode (MSM) provides you with eight different test and demonstration routines which can be initiated from the control panel. Normal operation of the cutter, such as remote mode, menu mode, and temporary velocity settings, is inhibited while the cutter is operating in MSM.

MSM has two levels of operation--level one and level two. MSM level one (MSM L1) enables you to select one of the eight MSM routines that you want to run. MSM level two (MSM L2) is the actual execution of the selected MSM L1 routine.

Instructions on how to operate the cutter in MSM L1 and MSM L2 are explained in the following paragraphs. A summary of the instructions is listed below.

1.   Read this section and determine which routine you want to run. Set the power switch to OFF. Depending upon the selected routine, install either a paper chart and the pen holder attachment and a pen into the cutter or install vinyl and the knife holder.

2.   To initiate MSM L1, press and hold the RESET and the LOAD keys while powering up the cutter. Release the keys after the cutter beeps one time.

3.   Use the ARROW/LEFT and the ARROW/RIGHT keys to select a MSM L1 routine.

4.   After selecting a routine, press the ENTER key to initiate MSM L2 to execute the routine.

5.   After the routine completes, press the RESET key to return to MSM L1.

6.   Press the RESET key once more to return to remote mode for normal operation.

<div align="center">NOTE</div>

> This section uses two different graphic
> symbols to illustrate the status of an LED.
> The [ ] symbol means that the LED is off, and
> the [X] symbol means that the LED is on.

4.2 MSM L1 INITIATION

Before initiating MSM L1, be sure you have installed either a paper chart and the pen holder attachment and a pen or vinyl and the knife holder.

To initiate MSM L1, first set the power switch to OFF. With the power off, press and hold the RESET and the LOAD keys, and then power up the cutter while holding the two keys. After the cutter beeps one time, release the two keys.

The cutter will then find the X and Y limits of the chart as in normal operation, however, the knife/pen holder will park at plot origin right (large chart) regardless of the chart size installed. After the chart limits are found and the knife/pen parks at plot origin right, all four LED indicators will turn off.

CAUTION

> Manufacturing setup mode inhibits the chart sensing of the cutter, therefore you must exercise care when operating your unit in this mode. The cutter sizes the chart that is installed at the initialization of MSM and it expects you to use that chart during MSM routines. If you install a different size chart without pressing either the RESET or the LOAD key, then a knife/pen crash may occur. Lifting the pinch rollers and manually moving a chart with your hands may also cause a knife/pen crash.

4.2.1 Local and Reset Key Functions in MSM L1 and L2

If the LOCAL key is pressed while the cutter is in MSM L1, the cutter enters MSM L1 local mode. MSM L1 local mode enables you to use the ARROW/UP, ARROW/RIGHT, ARROW/DOWN, and ARROW/LEFT keys to move the knife/pen holder to any location on the chart. Normal windowing operations can also be performed at the control panel. To exit MSM L1 local mode and return to SM L1, press the LOCAL key again.

If the knife/pen holder is moved while the cutter is in MSM L1 local mode, it will retain that location after MSM L1 local mode is exited. This enables you to execute different routines at different locations on the chart.

If the cutter is in MSM L1 local mode and the RESET key is pressed, the cutter will return to the initial MSM L1. This enables you to reset the cutter in MSM L1 local mode without having to initiate manufacturing setup mode using the power switch again. However, if the RESET key is pressed while the cutter is in the initial MSM L1, the cutter will return to normal remote mode operation.

4.3 MSM L1 ROUTINE SELECT PROCEDURE

The ARROW/LEFT and ARROW/RIGHT keys are used to select MSM L1
routines. The present MSM L1 routine is displayed in binary code
on the control panel LEDs. Use the ARROW/LEFT key to increment
the routine numbers and use the ARROW/RIGHT key to decrement the
routine numbers.

4.4 MSM L2 ROUTINE EXECUTION PROCEDURE

After the desired MSM L1 routine number is displayed on the
control panel LEDs press the ENTER key.
This causes the cutter to enter MSM L2 and execute the selected
MSM L1 routine. It is important to note that once the cutter enters
MSM L2 and is running a routine, the control panel LEDs may or may
not display the present MSM L1 routine number.
This is because the cutter uses the LEDs in some MSM L2 routines
to display information to you. It is your responsibility to keep
track of the MSM level in which you place the cutter. To exit
MSM, press the RESET key.

The following paragraphs provide the binary MSM L1 code number and
describe each corresponding MSM L2 routine.

4.4.1 Service Plot

[ ]   [ ]   [ ]   [ ]

The service plot provides you with two lines of information about
the cutter's configuration.

The first line of information provides the model identification
and the revision numbers of the installed ROMs, the present baud
rate menu selection, and the present addressing resolution.

The second line of information provides the DM/PL buffer size and
the serial number of your unit.

4.4.2 Europlot

[ ]   [ ]   [ ]   [X]

This routine causes the cutter to draw the Europlot design.

4.4.3   Knife Calibration Setup

   [ ]   [ ]   [X]   [X]

This   routine   causes   the cutter to cut test patterns, which are
designed to expose concentricity errors.   The routine enables you
to use the control panel keys and zero degree to calibrate the
knife assembly if required.

After this routine is initiated by pressing the ENTER key, all of
the LEDs will turn off and the cutter will cut the first test
pattern. This basic test pattern consists of two circles having
25 mm and 21 mm diameter respectively (see Figure 4-1).
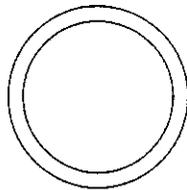
Figure. 4-1 : KNIFE ASSEMBLY CALIBRATION TEST PATTERN 1 :
                BASIC CIRCLE TEST.

Weed the ring from the test pattern, produced by cutting these two
circles. Depending on the shape / roundness of the ring different
corrective measures will be required to close the circles properly.

Compare your result with the two examples given below and follow
the instructions given for each specific case.

Example A :
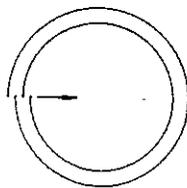
Use the arrow right key to correct closing of circles cut to arrive
at Figure 4-1.

Manufacturing Setup Mode (MSM)

Example B :
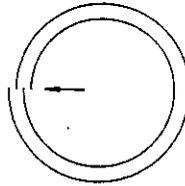
Use the arrow left key to correct closing of circles cut to arrive
at Figure 4-1.

Each time the arrow right or arrow left is being pressed, circles
cut are adjusted by one degree to become identical to Figure 4-1.

When the ring is exactly as shown in Figure 4-1, then press ENTER
to go to the next step of the knife calibration procedure.

WARNING :

Do not proceed with the next step of this procedure if the circle
pattern is not fully identical to the Figure 4-1 shown.
Any further adjustment before having obtained the proper result
will definitely complicate further proceedings and may result in
a fully decentralized knife position.

Now the cutter will cut a new pattern. This pattern consists of
two horizontal lines spaced 25,4 mm (1 inch) and two vertical
lines, which consist of four cuts :
the first vertical line starts from the bottom horizontal line
and moves to the middle, which results in line 1/cut 1
then the knife starts at the top of the horizontal line and moves
to the middle, which results in line 1/cut 2
the second vertical line starts from the middle and moves to the
top horizontal line, which results in line 2/cut 3
then the knife starts from the middle and moves to the bottom hori-
zontal line, which results in line 2/cut 4. (see Figure 4-2)

Manufacturing Setup Mode (MSM)

LINE 2/CUT 3   LINE 1/CUT 2

LINE 2/CUT 4   LINE 1/CUT 1

(enlarged view)
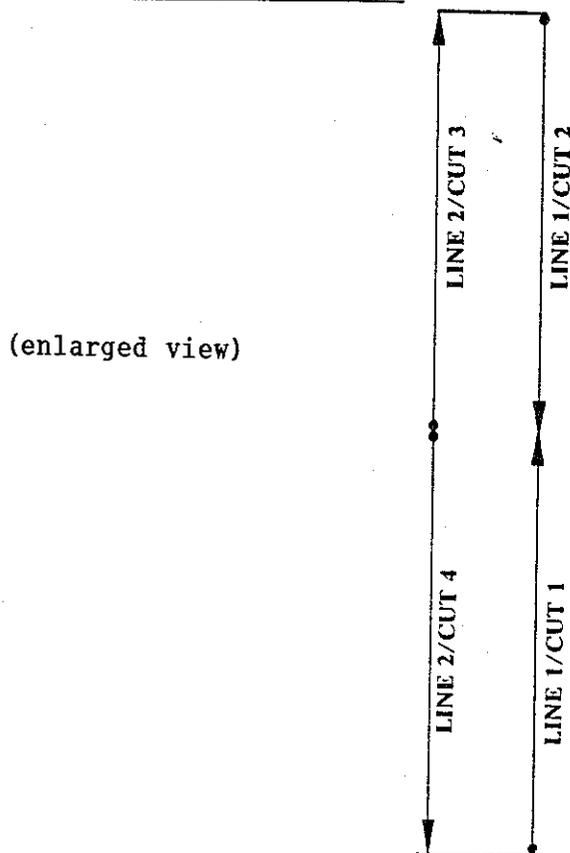
FIGURE 4-2 : KNIFE ASSEMBLY CALIBRATION TEST PATTERN 2 :
             RECTANGLE CUT

Check the alignment of cut 1 and cut 2 and the alignment of cut 3
and cut 4.A correctly calibrated head assembly will produce a test
pattern that contains a near perfect rectangle between the first
two vertical lines.
(Weed the rectangle from the media for better viewing.)   If the
cuts in the rectangle do not meet or they overlap, the head assem-
bly must be further calibrated until the rectangle produced is per-
fect.

The ARROW/UP, ARROW/RIGHT, ARROW/DOWN, and ARROW/LEFT   manual
movement keys can be used to correct alignment errors.   Each time
a manual movement key is pressed, the odd numbered cuts (cuts 1,
3,)are moved 0.001 inch (0.0254 mm) relative to the even numbered
cuts in the direction of the manual movement key.

After an adjustment is made, press the ENTER key one time.   The
cutter will then produce another test pattern to the left of the
first test pattern. The new test pattern contains the new adjust-
ment parameters. Weed the rectangle from the test pattern.
If additional adjustments are required for the odd numbered cuts,
use the manual movement keys to make the adjustments and then
press the ENTER key one time.   The cutter will then cut another
another test pattern for viewing.   Repeat this procedure until
the cuts are aligned.   If the cuts are aligned, press the ENTER
key one more time and the cutter will install the corrections in
its EPROM and exit to MSM L1.

Manufacturing Setup Mode (MSM)

An example of how to calibrate the knife assembly is provided in the following paragraph.

As shown in the test pattern in Figure 4-3, the odd numbered cuts (cuts 1, 3) are shifted to the right and are slightly lower than the even numbered cuts.
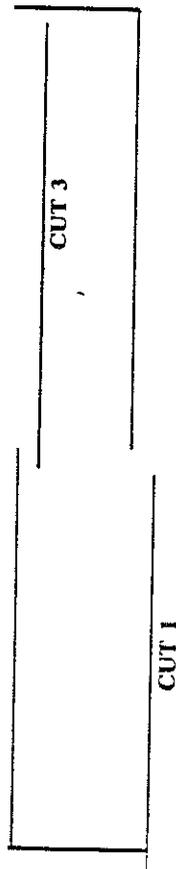
FIGURE 4-3. KNIFE ASSEMBLY CALIBRATION EXAMPLE

To calibrate the knife assembly that produced the Figure 4-3 test pattern, the ARROW/LEFT key would have to be pressed approximately 8 or 9 times to move the odd numbered cuts to the left. The ARROW/UP key would have to be pressed approximately 4 or 5 times to move the odd numbered cuts slightly higher. After pressing the ENTER key, the cutter will produce another test pattern which includes the corrections. If the new pattern is correct (see Figure 4-2) and the rectangle is easy to weed, press the ENTER key to save the new parameters and exit the calibration routine. If additional corrections are required, repeat the procedure using the manual movements keys.

4.4.4   Lift and Lower Knife/Pen Test

[ ]   [X]   [ ]   [ ]

If this test is activated, the knife blade/pen holder can be lowered by pressing the ARROW/UP key and raised by pressing the ARROW/DOWN key. (If the pen holder does not change its up/down status, increase the knife pressure potentiometer setting.)

The auto-up time is inhibited during this routine, therefore the knife or pen will remain in the down position until it is toggled to the up position.

The knife blade/pen holder can be moved by placing the cutter in MSM L1 local mode and then using the manual movement keys.

To exit this routine, press the ENTER key.

4.4.5   Knife/Pen Repeatability Test

[ ]   [X]   [ ]   [X]

This routine tests the repeatability of the knife or pen. After pressing the ENTER key one time, the LEDs turn off. Press the ENTER key once more to begin the test routine.

During the test, the cutter will:

o   draw a border around the internal offsets of the cutter,

o   over-plot the four corners of the border rectangle,

o   draw a cross in the lower right area of the chart,

o   draw a cross in the upper left area of the chart,

o   draw a series of down vectors one-fifth the length of the chart in the X direction and 0.1 inch (2.54 mm) in width in the Y direction,

o   and then over-plot the two crosses already drawn.

4.4.6   RS-232-C Loop-Back Test

[ ]   [X]   [X]   [ ]

This routine verifies that the cutter's handshaking lines are functioning properly.

Manufacturing Setup Mode (MSM)

Before running this routine, pin 2 must be jumpered to pin 3 on the cutter's RS-232-C connector, and pin 4 must be jumpered to pin 5. The routine causes the cutter to transmit and receive data to itself. It automatically repeats the transmission at each available baud rate. After each successful transmission at a given baud rate, the cutter emits a beep. The length of each transmission will vary because of the different baud rates.

The control panel LEDs do not illuminate during successful tests. If an error is detected, the cutter will flash the LOAD, LOCAL, and ENTER LED indicators. If the ENTER key is then pressed, the cutter will display a LED steady state error code(s). If all of the transmissions are successful, the cutter returns to MSM L1 and the LEDs display the loop-back test MSM L1 routine code.

The RS-232-C loop-back error codes are listed below. (If more than one type of error occurs, multiple error codes will be displayed.)

[ ]   [ ]   [ ]   [X]

This error code indicates that data is received, but does not match the data that was transmitted. This implies that the line drivers are functioning properly, but excessive noise is occurring on the RS-232-C line. Service is therefore required.

[ ]   [ ]   [X]   [ ]

This indicates that data is not being received by the CPU. This error occurs if pins 2 and 3 are not jumpered or if there is a general UART failure. If this error code (0010) is displayed with the hardware handshake error code (0100), which will produce a (0110) code, and the correct pins are jumpered, then the UART and/or the line drivers require service.

[ ]   [X]   [ ]   [ ]

This error occurs if the program cannot toggle the hardware handshake line (RTS/DTR). If pins 4 and 5 are properly jumpered, then the UART and/or the line drivers require service.

[X]   [ ]   [ ]   [ ]

This code indicates that a parity, framing, or overrun error has occurred. These errors are usually caused by a UART failure.

4.4.7 Restore Factory-Selected Menu Parameters

[ ]   [X]   [X]   [X]

This routine restores the menu parameters to the factory-selected values.   These values are as follows:

	DMP-65/66C	DMP-67C	DMP-68C
Knife/pen up velocity	400 mm/s	300 mm/s	200 mm/s
Knife/pen up acceleration	0.5 g	0.4 g	0.3 g
Knife/pen up delay	30 ms	30 ms	30 ms
Knife/pen down velocity	400 mm/s	300 mm/s	200 mm/s
Knife/pen down acceleration	0.5 g	0.4 g	0.3 g
Knife/pen down delay	50 ms	50 ms	50 ms
Pen change	ignore	ignore	ignore
Plot origin	right	right	right
Constant velocity option	on	on	on
Addressing resolution	0.025 mm	0.025 mm	0.025 mm
Menu units	Metric	Metric	Metric
Text font	F0	F0	F0
Character set	G0	G0	G0
Auto-knife reset	120 sec	120 sec	120 sec
Baud rate	9600	9600	9600
UART parity	bit 8 = 0	bit 8 = 0	bit 8 = 0
Handshake RTS/DTR	toggle	toggle	toggle
Pass-Through port option	toggle	toggle	toggle
Maximum media length	6 m	6 m	6 m
Media sensor	on	on	on
Zero character	plain	plain	plain
Comm errors	ignore	ignore	ignore
DMPL N command	normal	normal	normal