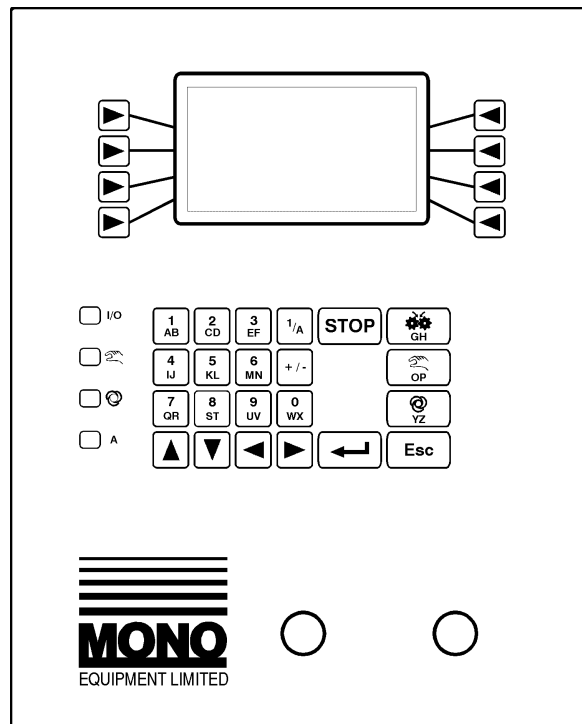




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# CONTROLLER OPERATION MANUAL FOR THE **DELTA DEPOSITOR**

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# 1.0 INTRODUCTION

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This manual covers all functional aspects of the **DELTA** depositor that can only be addressed through data entry into the electronic controller situated on its front panel. Such aspects include

- Product creation,
- Product program storage into memory and retrieval,
- Program deletion,
- Machine set up
- Diagnostics display.

This manual forms a necessary accompaniment to the **DELTA's** "Operation and Maintenance Manual" to give the complete and necessary information to the user and maintenance engineer for successful and safe use of the **DELTA**.

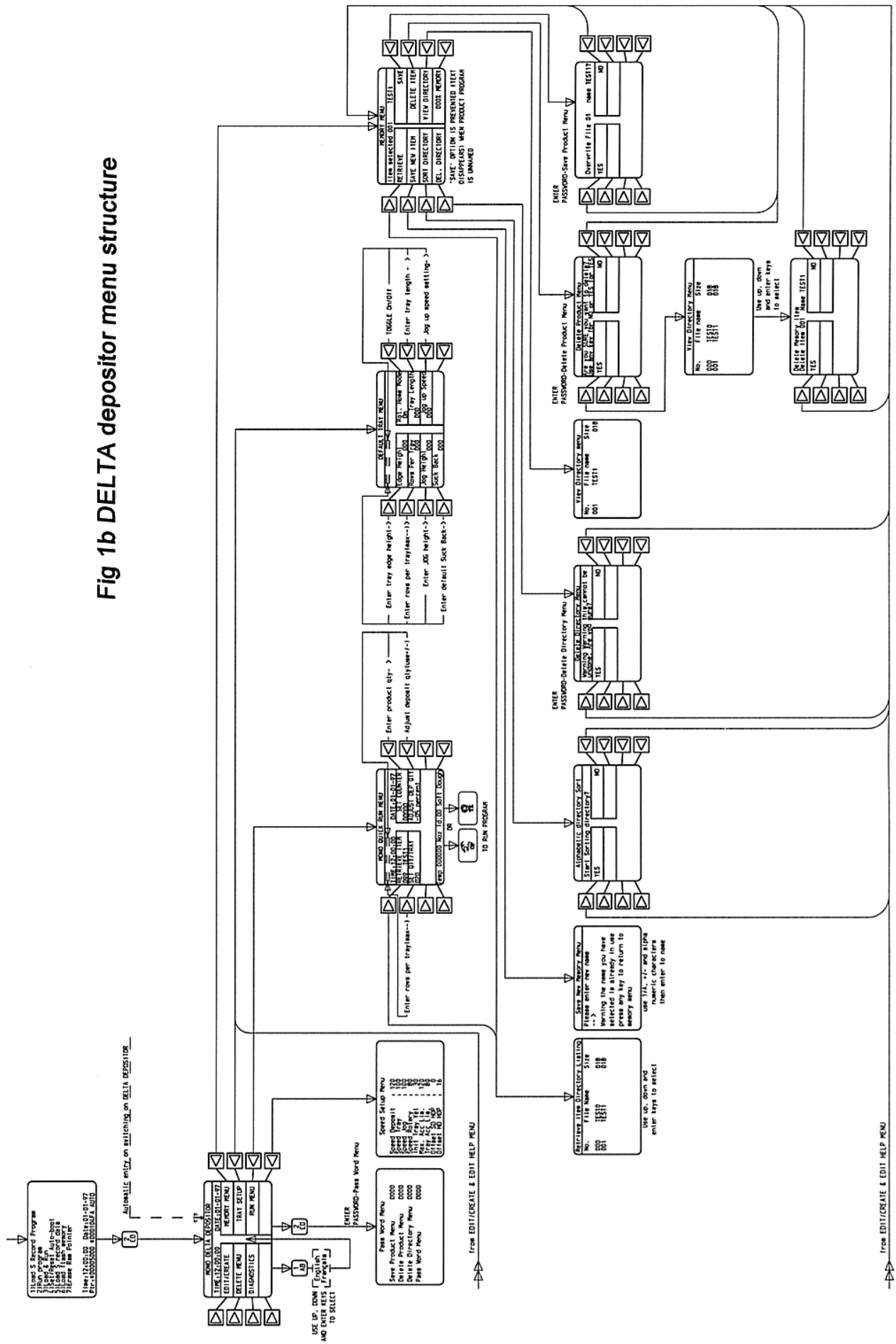
Data entry into the controller is via the membrane covered key switch keypad and the prompted menu-driven LCD screen display allowing word processor type entry. All menu screens are logically arranged in hierarchical order and by reference to Fig1a and 1b, the relative location of all screens can be clearly seen.

*Included in Fig 1a and 1b are details of screens which the user will not require normal access to as these are screens that are made use of by **MONO's** production and maintenance engineers and provide a convenient means of displaying information regarding machine set-up. These screens are consequently password protected for **MONO** use only.*

Prior to taking delivery of the **DELTA** depositor, all controller aspects regarding machine set-up will have been performed at **MONO's** factory. Hence, once commissioned, the **DELTA** will be ready for use with all necessary adjustments made. From this point the user need mainly concern himself with the **DELTA's** functional aspects of creating and storage of a product library.

[illegible]

**Fig 1b DELTA depositor menu structure**



## 2.0 USE OF KEYPAD

Fig 2. shows the **DELTA's** controller keypad and LCD screen.

The keys to the LH and RH side of the screen are for selection of on-screen menu options, each button indicated as leading from a designated screen area. Press these keys to select from the menu option currently being offered on-screen.

Data entry into the controller is by use of the numerical/alphabetical keys (9,10,11 & 19), +/- key (17), alpha/numerical (I/A) key (15), and the enter key (18). Exit from screens is by use of the escape (ESC) key, to a higher-level screen, generally in accordance with Figs. 1a and 1b.

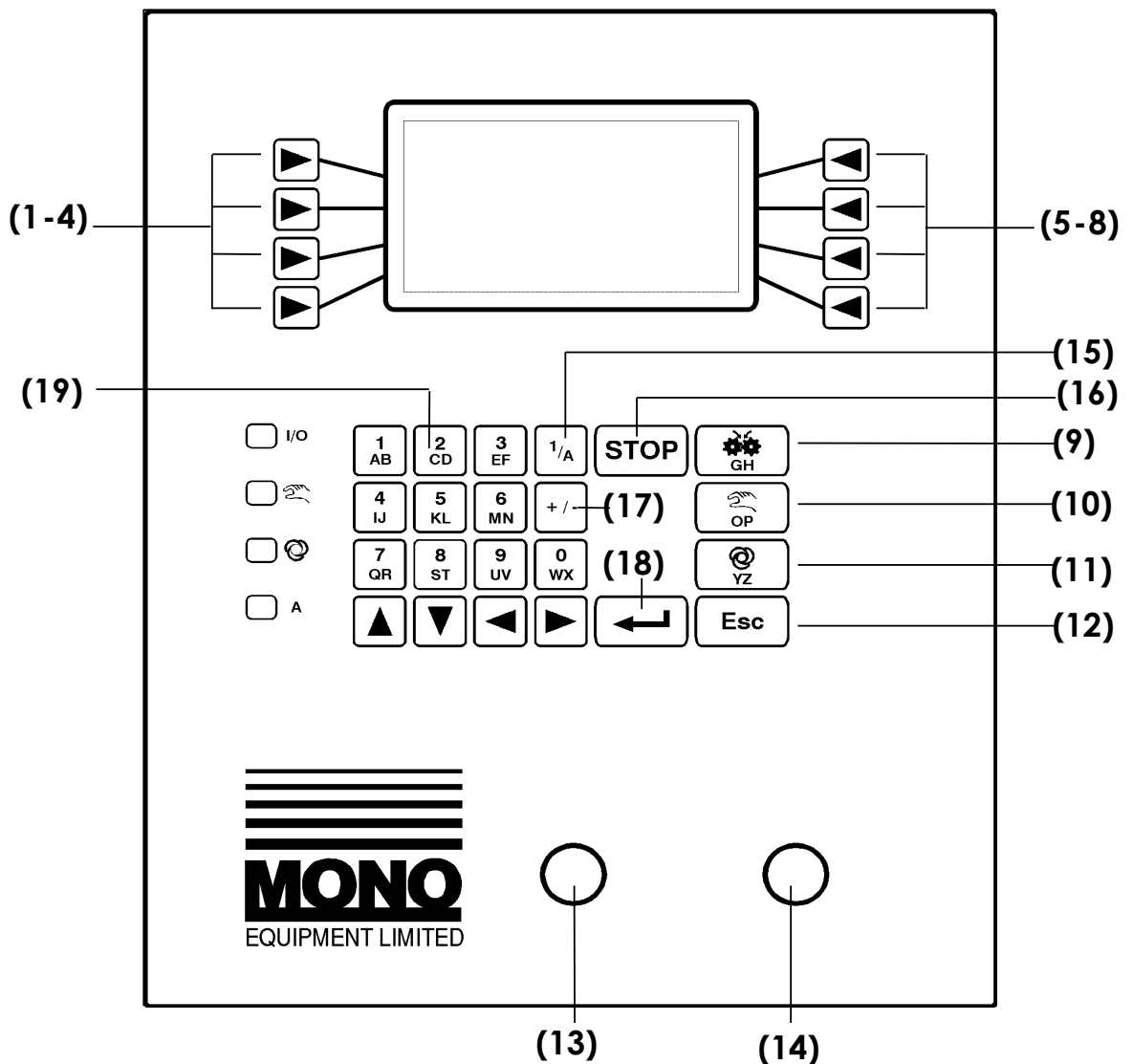


Fig. 2 DELTA Control panel



### 3.0 DESCRIPTION OF CONTROL PANEL – —————

#### KEYFUNCTIONS

<u>DRAWING REF.</u>	<u>FUNCTION</u>	<u>DESCRIPTION</u>
1-8	FUNCTION KEYS	For the selection of screen menu options and to start pop up menus
9	PRIME	<p>This button activates the hopper pump for as long as it is depressed provided either edit/create or run menus are on screen, and all safety guards are properly closed.</p> <p>It fulfils four functions: -</p> <ul style="list-style-type: none"> <li>A. To prime the hopper pump and nozzles with product mix.</li> <li>B. Aids the engagement of the hopper drive gear into the drive shaft.</li> <li>C. Aids the engagement of the rotary template drive gear into the machine drive gear.</li> <li>D. Allows alphabetical character (G &amp; H) entry when naming product programs for storage into memory.</li> </ul>
10	MANUAL	<ul style="list-style-type: none"> <li>- Runs product program for one tray only then returns tray to the operator and stops.</li> <li>- Allows alphabetical character (O &amp; P) entry when naming product programs for storage into memory.</li> <li>- Allows the removal of a partially completed tray from the machine if the program is interrupted before completion of the depositing sequence</li> <li>- Press the key twice to remove tray.</li> </ul>

**11****AUTOMATIC**

Activates an automatic machine cycle so long as a tray is positioned correctly on the table. At the end of the cycle the tray conveyor will continue running to move the full tray from the machine and introduce an empty tray to the deposit start position.

**NOTE**>If two trays are placed too close to each other the machine will interpret this as one long continuous tray and will continue to feed both trays through the machine until a gap is detected.

This button also allows alphabetical character (Y & Z ) entry when naming product programs into memory.

**12****ESCAPE**

Enables exit from menus to higher-level menus and exit from current on screen operation.

**13****EMERGENCY STOP**

Immediately isolates all power circuits. To release – turn clockwise.

**14****START**

Activates all power circuits and all machine facilities can be used once pressed providing that all safety guards are properly closed and the emergency stop button is released.

**15****ALPHA / NUMERIC**

Allows the operator to toggle between alphabetical and numerical button characters. Used when putting names to stored product programs.

**16****STOP**

Stop button for either the manual or automatic modes. Stops machine cycle but not power to the drives.

<b>17</b>	<b>PLUS / MINUS</b>
-----------	---------------------

Allows (when required) negative values as well as positive to be input to product programmes and machine set up parameters. The controller will not allow negative values where not appropriate.

<b>18</b>	<b>ENTER</b>
-----------	--------------

Enters typed and displayed information into product program as well as machine set up program.

<b>19</b>	<b>0 – 9 numeric keys</b>
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Allows data entry of numerical values into product program and machine set up program. Also allows alphabetical character entry (when used in conjunction with alpha/numeric button) when naming product programs for storage into memory.

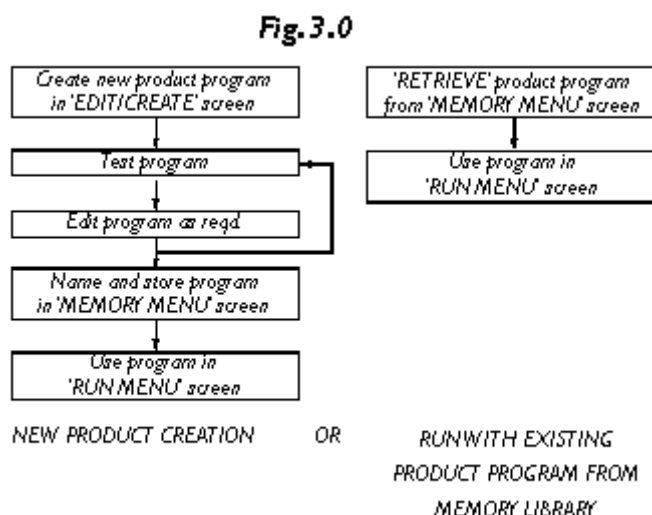
## 4.0 USE OF MENU SCREENS

(Refer to Figs 1a and 1b. at the beginning of this manual)

User screen functionality can be regarded as serving five areas of machine use as follows

- A) **Creating/editing product program**
- 1. Tray set up menu
  - 2. Template menu
  - 3. Edit/create menu
- B) **Memory facilities**
- 1. Memory menu
  - 2. Run menu
  - 3. Delete menu
- C) **Speed set up menu**
- D) **Diagnostics and axis set up.**
- E) **Up/Download system.**

Once familiar with the **DELTA** the usual sequence of user steps will be as Fig. 3.0.



### A) Editing/Creating a product program

When creating a new product program, data entry into 3 separate menus has to be achieved - Tray Set-Up menu, Template menu and the Edit/Create menu. Information contained within all 3 of these menus is stored in the controller's memory for each product program.

#### 1. Tray Set-Up menu

Firstly, consideration needs to be given to the trays onto which the product(s) are to be deposited and the depositing head motion between each product on the tray.

These relevant and important factors are all addressed in the Tray Set-Up menu, and are detailed on the next page:

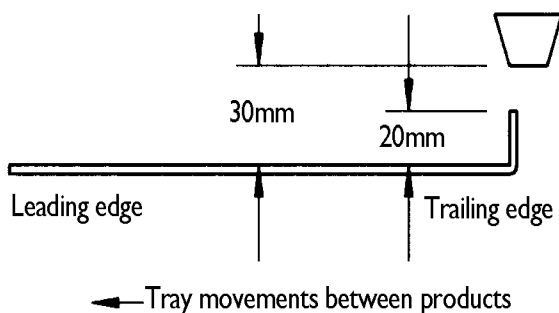
- **Edge Height**

**The depth, in millimetres, of the highest edge (leading or trailing) of the tray.**

This will provide information to park the depositing nozzle at the correct height between the completion of the depositing sequence on one tray and the start of the depositing sequence on the next tray and, also, prior to the introduction of the first tray. For additional safety it is worthwhile adding 10mm to the actual tray edge height to avoid any possibility of collision between depositing nozzles and a tray that might be slightly buckled. i.e. for actual edge height of 20mm

Entered value should be  $20\text{mm} + 10\text{mm} = 30\text{mm}$  (See Fig. 3.1.1.1b).

**IMPORTANT** - No automatic tray edge height detector exists on the DELTA and this programmed height value is stored into the controller's memory for the particular product in question, hence, it is imperative that no tray with an edge height greater than the programmed value is used, otherwise damage to the machine may result.



**Fig. 5**  
**Edge height illustration**

DEFAULT TRAY MENU	
Enter tray edge height- >	
Edge Height	000
Rot. Home Mode	On
Rows Per Tray	000
Tray Length	000
Jog Height	000
Jog up speed	000
Suck Back	000

**Fig. 4**

- **Rows per Tray**

**The number of repeated rows of deposited product required along the tray's length.**

NOTE - this value does not correspond to the number of products deposited across the tray, i.e. the number of nozzles on the template in use. When the LH side key corresponding to this option is pressed, in order to allow data entry, the maximum allowable number of products per tray will be displayed in the on-screen prompt message. This value is automatically calculated based on tray length value, rotary template nozzle offset length (see 3.2.4) and individual product length.

**Fig. 6**

DEFAULT TRAY MENU	
Enter rows per tray(max= )- >	
Edge Height	000
Rot. Home Mode	On
Rows Per Tray	000
Tray Length	000
Jog Height	000
Jog up speed	000
Suck Back	000

- **Jog Height**

The height, in millimetres, that the depositing head is raised vertically up away from the last height position in the product program - that is at the end of each product row on the tray.

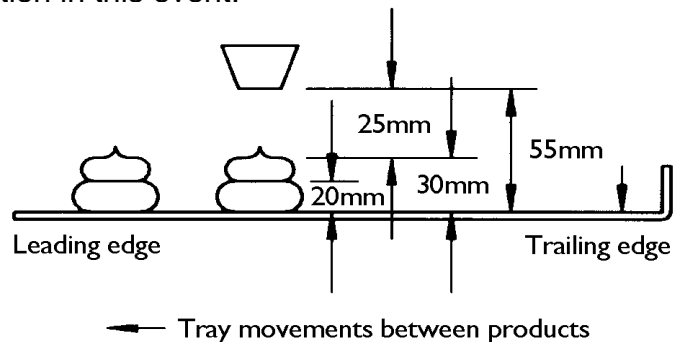
If a product program dictates that two deposits are made at height 20 and then 30mm above the top of the tray (height 0), then a jog height value of 25mm will raise the head up by 25mm

from 30mm, i.e. 55mm above the tray.  
(See fig. 3.1.1.3b)

Machine limits of 110mm vertical head travel are automatically prevented by the controller and an on-screen warning provides information in this event.

DEFAULT TRAY MENU	
Enter JOG Height->	
Edge Height 000	Rot. Home Mode On
Rows Per Tray 000	Tray Length 000
Jog Height 000	Jog up speed 000
Suck Back 000	

**Fig. 7**



**Fig. 8 Jog height illustration**

- **Suck Back**

The amount of reverse rotation by which the depositing pump is subjected to achieve the retraction of product mix back into the depositing nozzle(s) on completion of each individual row of products on the tray.

The value has a linear relationship to the amount of pump rotation but is, by necessity, uncalibrated in product mix quantity terms as any attempt to do so would be inaccurate should either the template arrangement, product mix or pumping speed change.

**Fig. 9**

DEFAULT TRAY MENU	
Enter default Suck Back->	
Edge Height 000	Rot. Home Mode On
Rows Per Tray 000	Tray Length 000
Jog Height 000	Jog up speed 000
Suck Back 000	

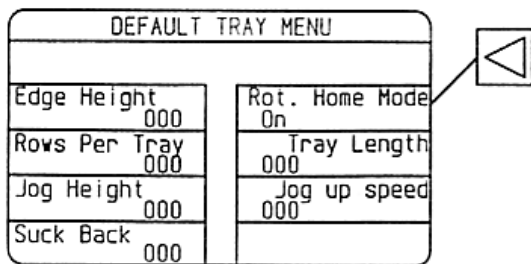
The suck back effect is achieved automatically and in sequence with the upward movement effected by the value entered under the 'jog height' instruction (see fig 7) within this menu, i.e. whilst the depositing head is raising itself upward at the end of each deposited product, then, simultaneously, the deposit pump will operate in reverse rotation to withdraw product mix into the nozzles. If either no suck back effect or jog up motion is required between products, then zero values can be entered as appropriate.

- **Rot(ary) Home Mode**

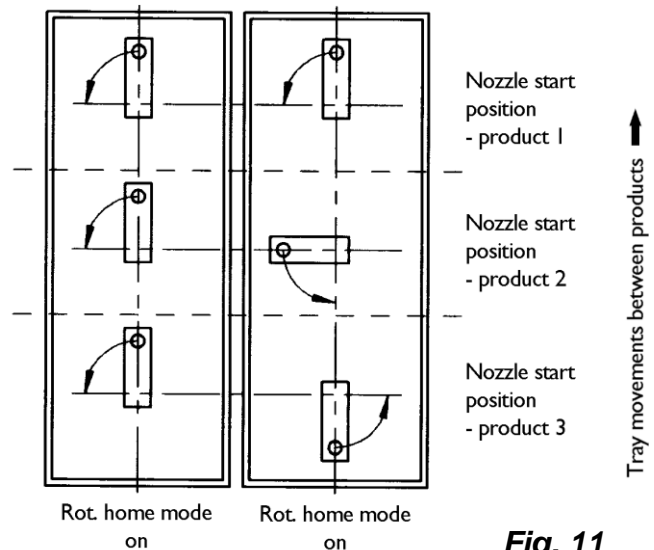
**A toggle type on/off instruction applicable to rotary template use.**

If selected 'on', the rotary template nozzle assembly will automatically return to its 'home' or 'start' position for the start of each product row, regardless of where it had previously finished. This may be necessary for the depositing of some products - particularly if an offset nozzle holder is being used (see fig. 11).

If selected 'off', then the rotary position of the rotary template/nozzle assembly will remain in the same position for start of each product as it was at the end of the previous product (see fig. 11).



**Fig. 10**

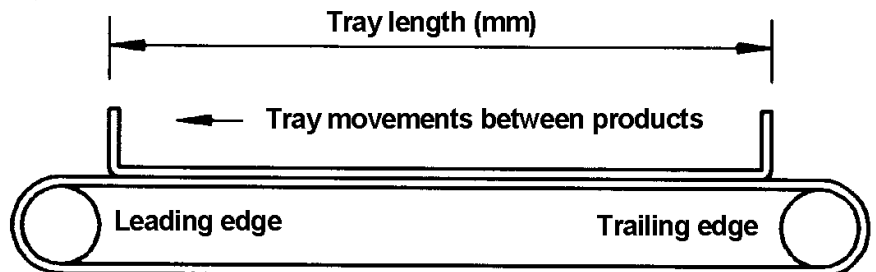


**Fig. 11**

- **Tray Length**

The length, in millimetres, of the tray being used for the depositing of products onto. Dimension of tray to be considered is that in the direction of tray conveyor travel. (see fig.13)

**IMPORTANT** - No automatic tray length detector exists on the DELTA and this programmed length value is stored in the controller's memory for the particular product in question. Hence, it is imperative that no tray with a length shorter than the programmed value is used, otherwise damage to the machine may result and the controller will be unable to complete its full program. Use of longer trays than the programmed value will only result in inefficient use of the trays with the last deposit being positioned somewhat further away from the tray's trailing edge than it's leading edge.



**Fig. 12**

**Fig. 13 Tray length illustration**

- **Jog Up Speed**

The speed value by which the depositing head travels vertically upwards (jogs) through the 'Jog Height' distance (see fig. 7) at the end of each product depositing sequence.

The speed value entered has a linear relationship, up to a maximum preset value, to the constant speed portion of the depositing head's movement whilst jogging upwards, it being after accelerating up to the speed value and prior to decelerating back to rest at the top of the jogging movement.

**Fig. 14**

DEFAULT TRAY MENU	
Jog up speed setting- >	
Edge Height 000	Rot. Home Mode On
Rows Per Tray 000	Tray Length 000
Jog Height 000	Jog up speed 000
Suck Back 000	

## 2. **Template Menu**

Consideration needs to be given to the template assembly being used in the creation of a product. These relevant and important factors are all addressed in the Template Menu and are detailed below.

- **Template No. (number)**

**The 5 digit number stamped on the exposed upper surface of the template body.**

Enter this number as the last 5 digits of the allowable 6 digit Template No. identification code (the 1st digit being 0, and is available for possible future use).

The template identification number is stamped onto the template body at **MONO's** factory and templates of like types are grouped as follows:

Template No. Group	Template type	Description
01----	SHEETING TEMPLATES	- SOFT DOUGH
02----	ROTARY TEMPLATES	- SOFT DOUGH
03----	STANDARD TEMPLATES	- SOFT DOUGH
04----	STUB TEMPLATES	- SOFT DOUGH
05----	SPECIAL TEMPLATES	- SOFT DOUGH
06----	SHEETING TEMPLATES	- HARD DOUGH
07----	ROTARY TEMPLATES	- HARD DOUGH
08----	STANDARD TEMPLATES	- HARD DOUGH
09----	SPECIAL TEMPLATES	- HARD DOUGH

Template Menu	
Enter template No.- >	
Template No. 000000	Nozzle Id. 00
Offset Length 000	Hard/Soft Dough S

**Fig. 15**

The 5 digit template number entry is stored with each product program but serves only as a visual reminder to the user to ensure fitment of correct template body.



- **Hopper Type**

A toggle type HD/SD (Hard Dough/Soft Dough) visual reminder instruction to ensure correct hopper assembly is used for the particular product program in question.

**Fig. 16**

Template Menu	
Template No. 000000	Nozzle Id. 00
Offset Length 000	Hard/Soft Dough S

- **Nozzle ID (identification)**

User defined numerical identification code for nozzle type (serrated, plain, special etc). Acts as a visual reminder instruction to ensure correct nozzle type is used in the template assembly for the particular product program in question. It is suggested that the user keeps nozzle ID records on the sheet provided for this purpose in ANNEX A of this manual.

**Fig. 17**

Template Menu	
Enter nozzle Id->	
Template No. 000000	Nozzle Id. 00
Offset Length 000	Hard/Soft Dough S

- **Offset Length**

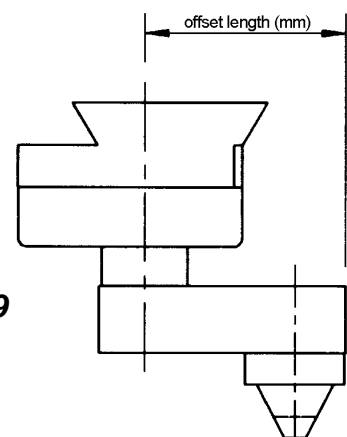
**The distance in millimetres between the centre of rotation and the end of an offset type nozzle holder (see fig.3.1.2.4b).**

This value is in effect the radius through which the extreme tip of the nozzle travels when the holder is rotated in a rotary type template body. Whilst acting as a visual reminder instruction to the user to ensure the correct holder is used for the particular product program in question, the value entered is also used by the DELTA's controller to calculate automatically the correct positioning of products on a tray to avoid possible collision between either leading or trailing edges of the tray and the nozzle holder throughout all possible angular positions (this being so provided the 'Tray Length' value (see fig. 3.1.6) in Tray Set Up menu has been correctly entered).

**Fig. 18**

Template Menu	
Offset dist (attachment len)->	
Template No. 000000	Nozzle Id. 00
Offset Length 000	Hard/Soft Dough S

**Fig. 19**



**IMPORTANT** - No automatic offset length detector exists on the DELTA and this programmed length is stored in the controller's memory for the particular product in question, hence, it is imperative that no longer offset type nozzle holder is used than that which is programmed, otherwise damage to the holder, nozzle, template or machine may result.

### 3. Edit/Create menu and use of commands

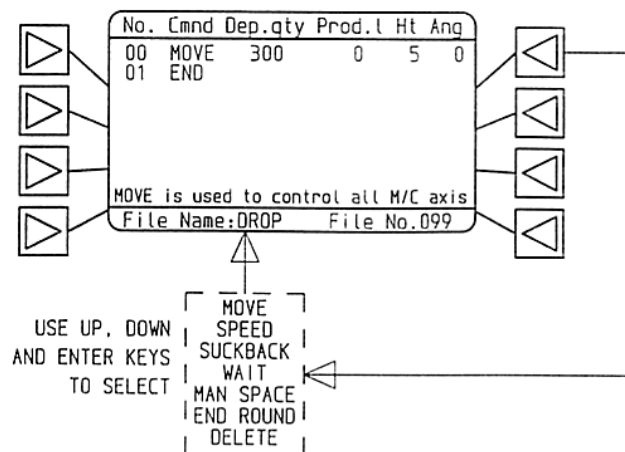
Most significant consideration needs to be given to the product program. **The product program is the sequence of events and command instructions, imparted via the controller and the user written program, necessary to describe the simultaneous and related movements of each of the DELTA's 4 axes to deposit one product row only.** This individual product program then gets repeated by the value programmed in under the 'Rows per Tray' (see fig. 6) instruction within the 'Tray Set Up' menu.

Creating a product program requires the appropriate use of available commands along with numerical data entry to describe simultaneous machine movements as applicable to each of the DELTA's 4 axes.

The available machine movement control commands are as follows:

**MOVE -- SPEED -- SUCK BACK -- WAIT -- MAN SPACE -- END ROUND -- DELETE**

To invoke any of the above commands, use the top RH key to the side of the LCD screen once the EDIT/CREATE menu is current (see fig. 6).



The available commands will appear on a pop-up menu onto the existing EDIT/CREATE menu screen - use the up and/or down arrow key on the main keypad area to move the cursor onto the command required and press enter key to select.

The command will be inserted into the main program above the line that the cursor is currently on; hence, the cursor needs to be positioned correctly before the introduction of a new command into the program. To remove pop-up command menu from the EDIT/CREATE screen, press escape key. The pertinent rules for correct data entry and the effect of each of the available commands are outlined below:

- **MOVE –**

The DELTA has 4 axes of controlled movement; deposit pump, tray conveyor, deposit head raise/lower (jog) and nozzle rotate (rotary template only). A MOVE command will instruct each of the motors associated with the axes to start to move (i.e. rotate) and to finish simultaneously.

By appropriate programming each axis's motor may also be made to remain stationary or to move in reverse to its normal forward movement when carrying out its MOVE command.

**SPECIAL NOTE** - The very first MOVE line on any product program is preceded by an unseen program line that is automatically introduced by the DELTA's controller and is not printed out on screen. This line sets the start positions for all the 4 axes of the DELTA and obviates the need for the user to do so. All MOVE start values are set to zero with the exception of the 'MOVE-Height' value which sets itself to the same value set by the user in the first programmed MOVE line. This enables the head movement) at any point during the product creation program. The command, allowing WAIT periods in increments of 1 second, can be used to allow the complete depositing of mix before continuation onto the next deposit.

The resultant effect of each axis's movement and the programmability using this command is as follows:

**Deposit pump (Axis 0)** - enter a positive numerical value under the 'Dep qty' column on the MOVE command line to achieve rotation of the deposit pump and a quantity of product mix extruded through the selected template assembly. The entered value is proportional to the amount of pump rotation but is, by necessity, uncalibrated in product mix quantity terms as any attempt to do so would be inaccurate should the template arrangement, product mix or either pumping speed change

To increase the amount deposited at any particular stage in the product depositing sequence, move the cursor onto the value to be edited by using the up, down, left and right arrow key, as appropriate, and enter a new value.

Use the +/- key to enter a negative numerical value to achieve reverse rotation of the pump and hence a suck back effect instead of a deposited quantity.

Enter a zero value for 'Dep qty' for the deposit pump to remain stationery and not deposit. All values entered for 'Dep qty' are absolute values, i.e. each entered value will correspond to a proportionate amount of pump rotation.

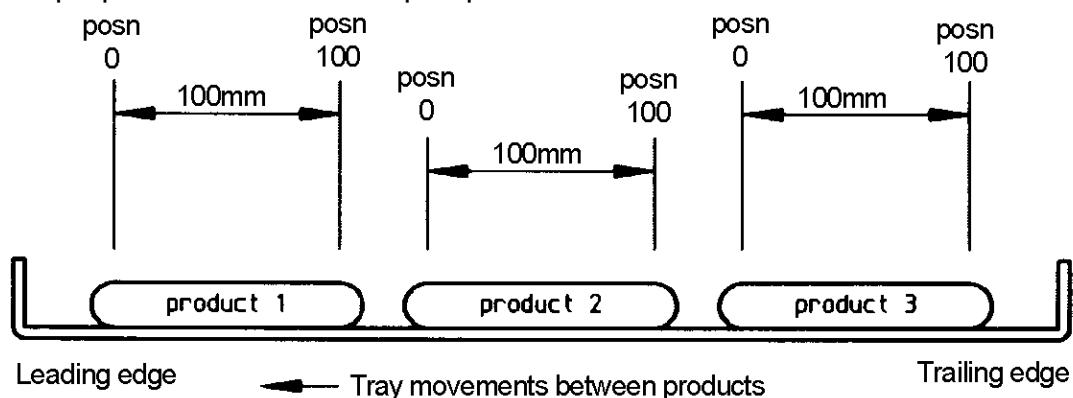
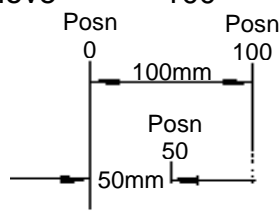


Fig. 21 product length illustration

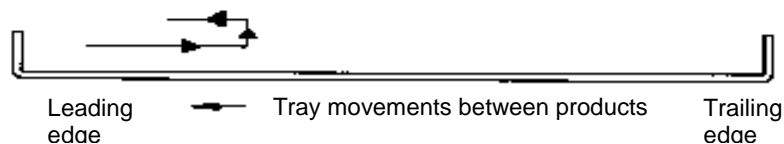
**Tray conveyor (Axis 1)** - enter a positive numerical value under the 'Prod L' column on the MOVE command line to achieve horizontal movement of the tray conveyor in a direction away from the operator and the control panel. The entered value is the horizontal position; measured in millimetres, relative to the initial start position for each product that is regarded as position zero (see fig. 22).

**IMPORTANT** - on a multi line product program consideration needs to be given to the value entered in the previous MOVE command line, as the tray will be progressed from this position to its new position as measured from position zero, i.e. the following program will progress the tray as shown in fig.22 and produce a product as shown in fig.23.

No.	Command	Dep qty	Prod L	Height	Ang
00	Move	200	100	10	0
01	Move	100	100	20	0
02	Move	100	50	20	0



**Fig. 22 Nozzle horizontal movements – multi line program**

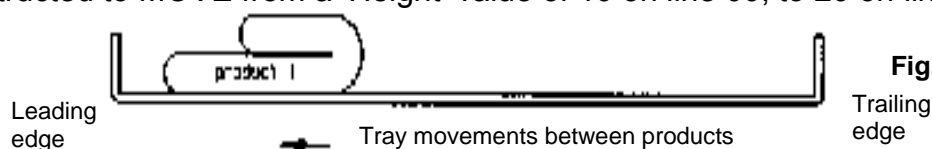


**Deposit Head Raise/Lower - Jog (Axis 2)** - enter a positive numerical value under the 'height' column on the MOVE command line to achieve vertical movement of the deposit head. The entered value is the vertical position, measured in millimetres, relative to the top surface of a tray of 2mm thickness placed directly on top of the conveyor belts, which is regarded as position zero. In this sense the motion behaviour of the jog axis is similar to that of the tray conveyor.

**IMPORTANT** - on a multi line product program, consideration needs to be given to the value entered in the previous MOVE command line as the head will be moved from this position to its new position as measured from position zero, i.e. consider the program in fig 22 the actual head height positions are shown in fig.24:

Notice that the head height for the 3rd MOVE command remains at a constant position as it is instructed to MOVE from a value of 20 on line 01, to 20 on line 02, i.e. no vertical movement. Hence, if the head height is required to remain at a constant position for a multi line product program then the height value figures must be repeated on every line.

To achieve vertical head movement, the 'Height' values entered on successive MOVE command lines need to differ by the distance required to MOVE, i.e. consider the program in fig 22 - the head movement for the 2nd MOVE command is 10mm vertically up as it is instructed to MOVE from a 'Height' value of 10 on line 00, to 20 on line 01 (see fig.24).



**Fig. 23**

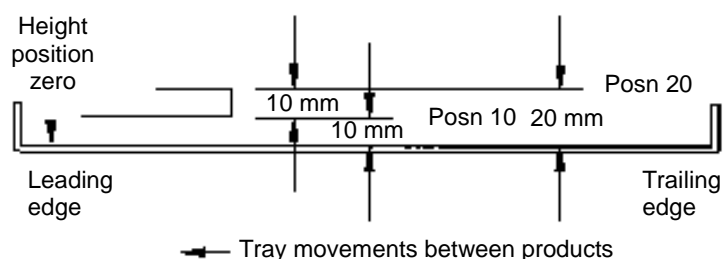


Fig.24

**Nozzle Rotate (Axis 3)** - enter a positive numerical value under the 'Ang' column on a MOVE command line to achieve clockwise rotation (when viewed from above template) of the nozzles in a rotary template assembly. The entered value is the angular position, measured in degrees, relative to its start position, which is regarded as position zero.

In this sense the behaviour of this axis is similar to both the jog and tray axes with position being determined by its relationship to 'position zero'.

**IMPORTANT** - on a multi line product program, consideration needs to be given to the value entered in the previous MOVE command line. The nozzles will rotate from this angular position to its new position as measured from 'position zero', i.e. consider the following program for use with an offset nozzle holder.

No.	Command	Dep qty	Prod L	Height	Ang
00	MOVE	0	0	10	40
01	MOVE	50	0	10	40
02	MOVE	150	0	10	-40
03	MOVE	50	0	10	-40

*This will give actual nozzle movements (as viewed from above) with actual nozzle movements thus (as viewed from above): as shown in fig.25, and a product as shown in fig.23*

*Notice that the head height for the complete program is set at a constant value of 10mm above the tray and so the head will remain at the set height throughout the program. Considering the rules mentioned previously for multi line programs, the complete program defines simultaneous movements for all 4 axes as shown in fig. 27.*

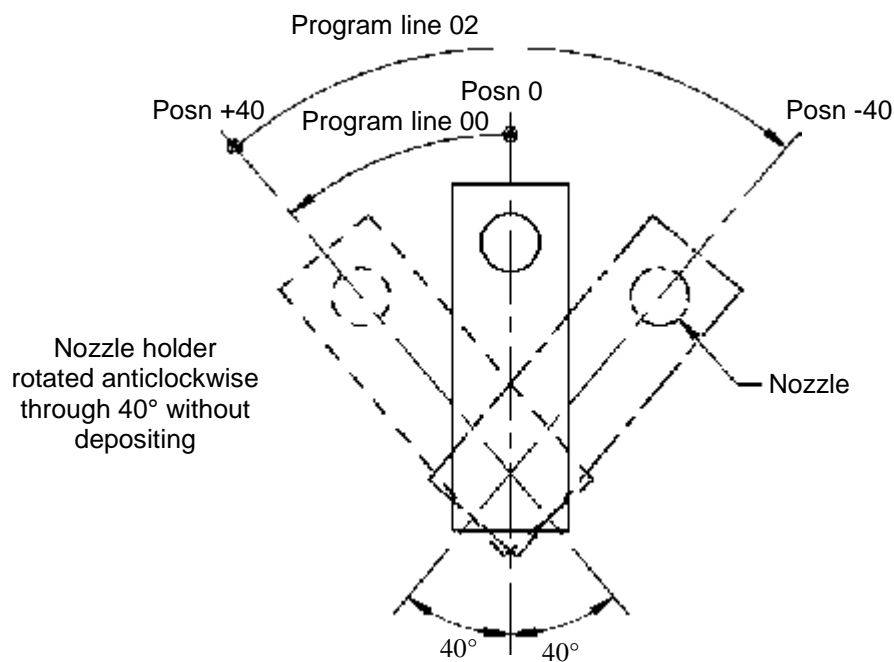
**Command line 00** - as mentioned in SPECIAL NOTE the first MOVE command line is, in this instance automatically preceded by values of 0, 0, 10 & 0 for Dep qty, Prod L, Height and the depositing head to a height 10mm above the tray and rotates the nozzle through an angle of  $-40^{\circ}$  from its start position without depositing any product mix or progressing the tray forward.

**Command line 01** - retains the head height at 10mm, the nozzle at  $-40^{\circ}$  from start position and the tray in the initial start position but deposits a quantity (50) of product mix at this position.

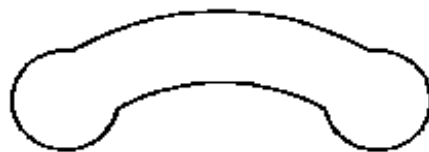
**Command line 02** - retains the head height at 10mm and the tray in the initial start position but deposits a larger quantity (150) of product mix whilst the nozzle is rotated from  $-40^{\circ}$  to  $+40^{\circ}$  (i.e. through a total angle of  $80^{\circ}$ ).

**Command line 03** - retains the head height at 10mm, the tray in the initial start position and the nozzle at  $+40^{\circ}$  from the start position but deposits a quantity (50) of product mix at this position.

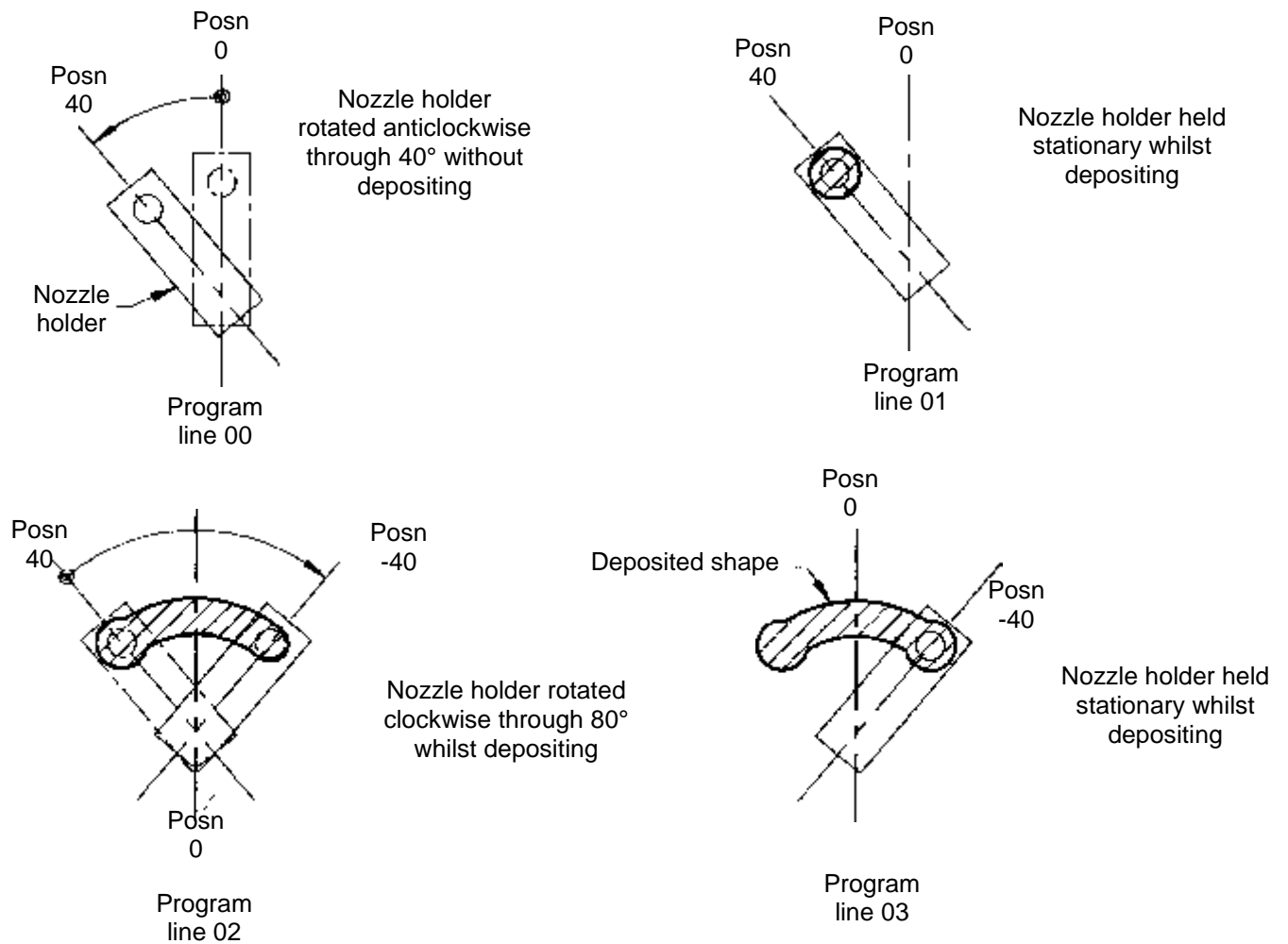
**Fig. 25 Rotary nozzle movements**



**Fig. 26 Deposited product using offset rotary nozzle**



**Fig. 27 Rotary nozzle movements-multi line program**



- **SPEED** –

The speed command sets maximum speed values, up to preset maximum values, to each of the motors linked to the DELTA's 4 axes **during the product creation sequence of movements only**, not prior, in between or after each of the deposited rows on a tray. The SPEED command is inserted into the product program just prior to the MOVE command that it is to 'speed' control and all other MOVE commands, unless superseded by another SPEED command at a later point in the product program. Consequently, the SPEED command will usually be the first command of a product program but it can be used repeatedly throughout any program.

Upon initially invoking the SPEED command into the product program, the maximum allowable values to drive each axis at full speed are automatically entered and displayed. The user chosen value, when entered, will represent a proportionate amount of this full-speed value.

**NOTE!** *Special consideration needs to be given to the application and effect of the SPEED command when more than one axes is moving. Since any number of the four axes may be required to move simultaneously, then such axes must start and finish at the same time - the controller achieves this automatically. Hence, if the programmed value for any one of the moving axes represents a large amount of rotation for its motor compared to any of the other motors, then it is the motor with this large amount of rotation that will dominate events. The SPEED value entered for this dominant axis will be achieved and all other axes involved in the simultaneous movement being performed will have their speeds automatically compensated for so that all axis movements start and finish together. Hence, to affect any control on the speed of events during product creation, the dominant axis of all the simultaneously moving axes must be identified and its SPEED value altered accordingly.*

If no SPEED command is entered into the product program, then the controller will automatically use the default values as set in the 'Speed Set Up' menu (see section 3.3). If these values are acceptable for the product being deposited, then the SPEED command can be omitted from the product program.

- **SUCK BACK** –

The SUCK BACK command combines the effect of the MOVE and the SPEED commands into one command and hence one line in the program thus saving programming time.

The effect of the SUCK BACK command is to withdraw a quantity of mix up into the nozzle whilst raising the head vertically up from the deposited product.

The entered values required are for 'SB QTY' (enter positive value for mix withdrawal), 'Jog Dist', in millimetres (height by which head is raised from previous height position) and 'Jog Speed' (same speed value relationship as in SPEED command – see speed section).

The SUCK BACK command may be used repeatedly in a product program as required.



- **WAIT**

The WAIT command allows the introduction of a period of inactivity (i.e. no movement) at any point during the product creation program. The command, allowing WAIT periods in increments of 1 second, can be used to allow the complete depositing of mix before continuation onto the next deposit.

- **MAN(UAL) SPACE** –

The MAN SPACE command allows the overriding of the automatic product row spacing as determined by the information programmed into the 'Tray Set Up' menu. The command permits user defined positioning of the first deposited product row on the tray from the leading edge of the tray and thereafter at regularly defined distances. The entered values required are distance of first product row from leading edge of tray and distance between product rows (see fig.28), both in millimetres. This command can be used to deposit into rows of equally spaced containers on a tray or just when a known distance between each product row is required.

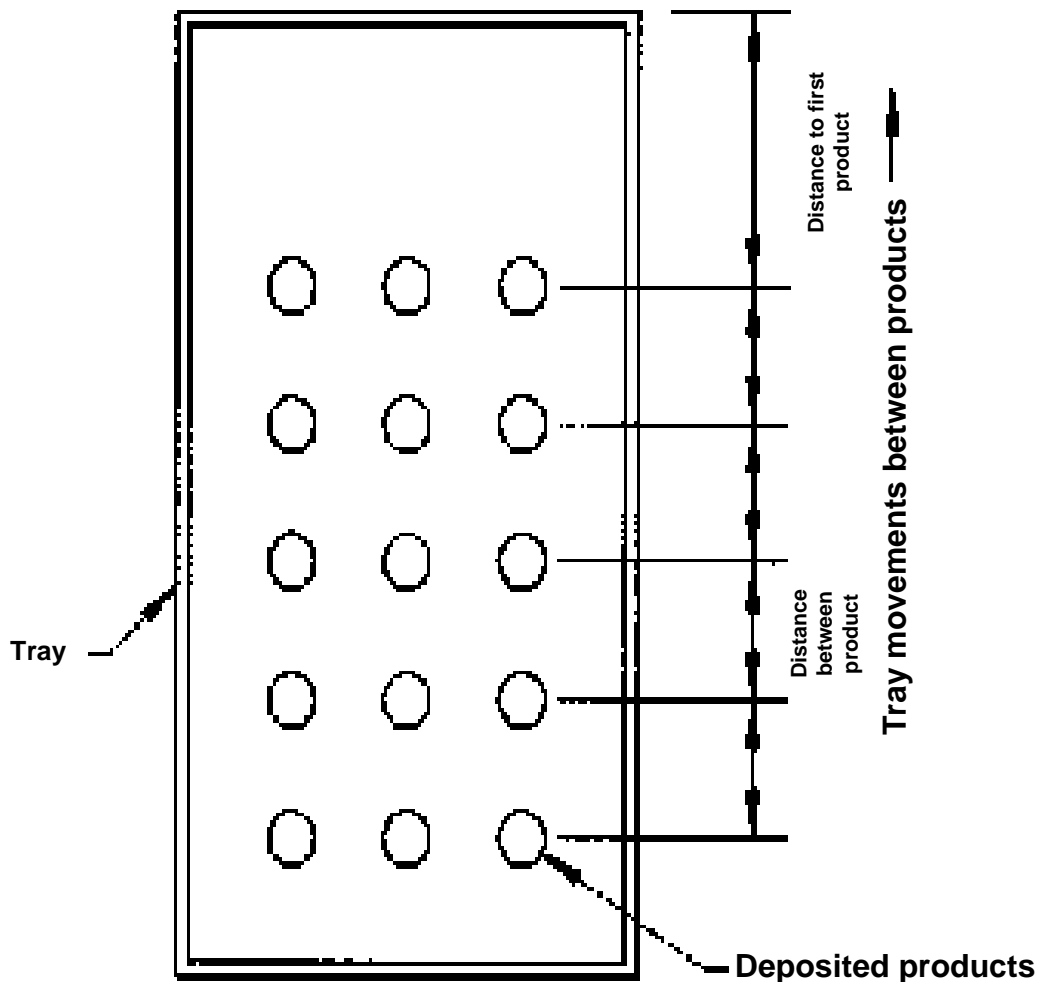


Fig. 28

- **END ROUND** –

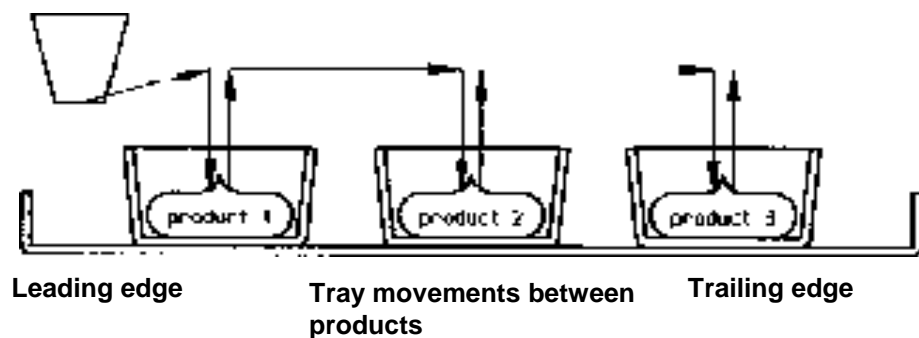
The END ROUND command permits alternative control of the machine between deposits.

Use of this command traverses the tray forward to the start of a new product whilst the deposit head remains in the jogged up position from the previous product. The head is then lowered vertically down to the deposit height whilst the tray remains stationery (see fig. 29). This is of use if edged containers have to be deposited into, whereas the normal machine operation mode is to lower the head down to the deposit height whilst traversing the tray to the start of the next product - thus giving a diagonal approach (see fig. 30).

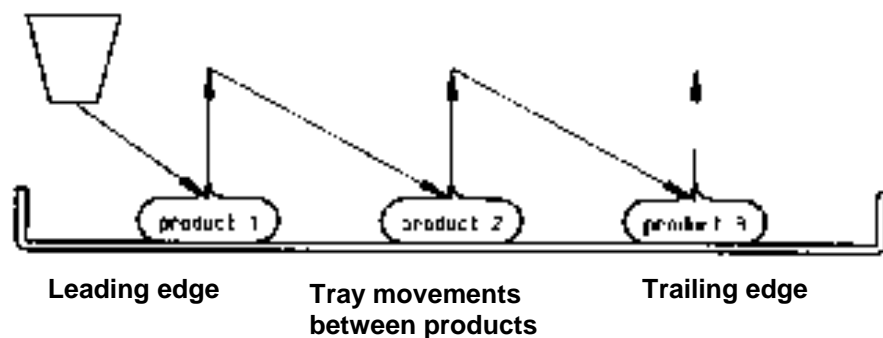
The END ROUND command also allows the automatic addition of a deposit quantity, at the start and end of the MOVE command that immediately follows it. Its main function in this respect is to round off the ends of strip type products such as éclairs.

The entered values required are 'Start R' and 'End Rnd'. Enter positive values accordingly to achieve deposits and/or zero values to prevent deposits.

When using this command it must be on the first command line of a multi line program otherwise a screen message 'Put END ROUND on first line' appears and the controller prevents the running of the program until it is achieved.



**Fig. 29 Nozzle vertical movements using END ROUND command**



**Fig. 30 Normal nozzle vertical movements**

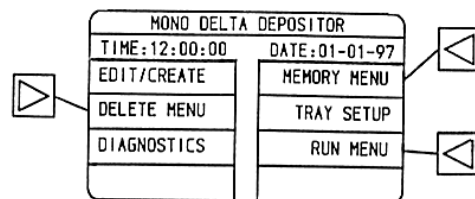
- **DELETE** –

The DELETE command permits editing of the product program by allowing deletion of any one of the above commands from the program one line at a time. Prior to invoking the DELETE command the cursor must be on the command that is to be deleted.

## **B) MEMORY FACILITY**

Access to the controller's memory facilities is via the DELTA's main menu (see Figs 1a and 1b) by pressing the appropriate key to the side of the screen leading from either the 'MEMORY MENU', 'RUN menu' or 'DELETE MENU' option as required. Within these menu options the DELTA's memory will allow the following: -

**Fig. 31**



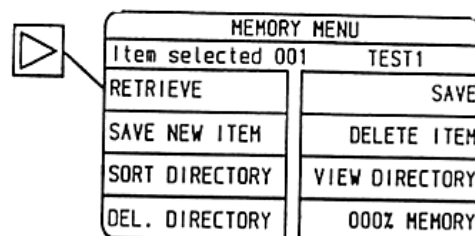
### **1 MEMORY MENU**

- **Retrieve** -

Enables a previously saved product program to be retrieved from the controller's memory. Press the key to the side of the screen leading from the 'RETRIEVE' option to reveal the product program memory directory. Use up or down arrow keys on the main keypad to move the cursor on to the product program required then press 'enter' key to select and make the program current. Once current, the user has the option to use the program in either the EDIT/CREATE menu for editing purposes or in the RUN MENU to use the product program without modification.

Once the product program has been selected the MEMORY MENU screen will be automatically re-started - return to main menu by use of the escape key and then select either EDIT/CREATE or RUN MENU option to use program.

**Fig. 32**

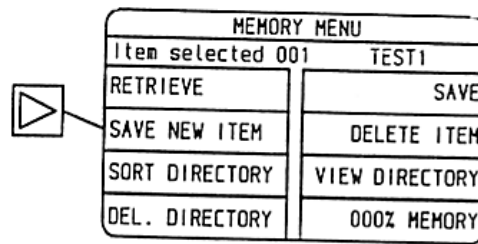


- **Save new item**

Enables the addition of a new product program (item) to the controller's existing directory.

Press the key to the side of the screen leading from the '**SAVE NEW ITEM**' option to reveal the on screen instruction '**Please enter new name -->**'. To enter the product program (item) name press the 1/A key on the main keypad to toggle between numerical and alphabetical character entry then press the appropriate key, also from the main keypad, to name the program (item).

**Fig. 33**



For alphabetical character entry two options are presented on each available button. To select the first of the two just press its key (once toggled into character entry) and to select the second character option press the +/- key, from the main keypad, after selecting the character key required.

i.e. to select Z : press 1/A to toggle onto character entry  
 Press YZ key  
 Press +/- key

Use of the '**enter**' key after each entry is not required. Only when the complete item name has been entered should the '**enter**' key be pressed to accept the complete item name displayed on the screen.

- **Save –**

Enables the overwriting of an existing product program, it being replaced with an edited version of the original but saved under the same name.

Edited data contained within any of the 3 menus that fully define the product program (see fig 3) i.e. **EDIT/CREATE** menu **TRAY SET UP** menu and **TEMPLATE** menu can be overwritten to the existing program.

Press the key to the side of the screen leading from the **SAVE** option to reveal the instruction '**Enter password -->**'. To enter the password, use the main numerical keypad to achieve the correct data entry. For password details see ANNEX B of this manual.


After correct entry of the password a product program directory listing is automatically presented to the user.

Use up and down arrow keys as appropriate to move the cursor onto the product program to be overwritten and then press enter to select. A further check screen, which allows the overwrite operation to be aborted, is then invoked. Press the appropriate key to the side of the screen to accept or prevent the procedure.

**NOTE:** This procedure, as with others, is password protected to avoid accidental use and misuse. The password is common to all user password protected screens and details of which are included in Annex B of this manual.

**Fig. 34**

MEMORY MENU	
Item selected 001	TEST1
RETRIEVE	SAVE
SAVE NEW ITEM	DELETE ITEM
SORT DIRECTORY	VIEW DIRECTORY
DEL. DIRECTORY	000% MEMORY

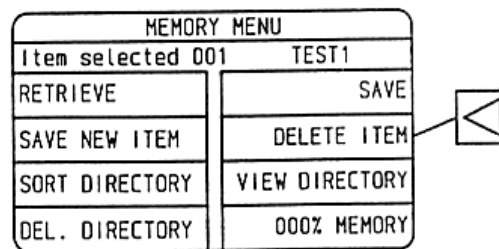


- **Delete item –**

Enables selected product programs to be deleted from the product program directory. This operation is also password protected to avoid misuse and mistakes.

Press the key to the side of the screen leading from the '**DELETE ITEM**' option to reveal the instruction 'Enter password -->'. Enter password via the main keypad to reveal the product program directory. Use up and down arrow keys as appropriate to move the cursor over the program to be deleted and press 'enter' key to select. A further check screen, which allows the '**DELETE ITEM**' operation to be aborted, is then invoked. Press the appropriate key to the side of the screen to finally accept the deletion of the selected product program.

**Fig. 35**

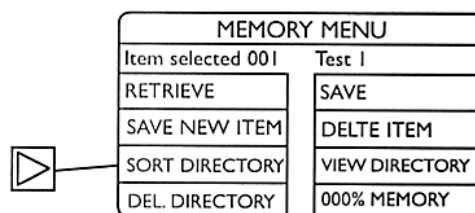


- **Sort directory-**

Enables the list of product programs to be sorted into alphabetical order if so desired.

Press the key to the side of the screen leading from the '**Sort directory**' option to reveal another screen offering the choice of either accepting or refusing the option. Press the appropriate key to the side of the screen leading from either '**YES**' or '**NO**'. Once complete the controller returns to the '**MEMORY MENU**' screen.

**Fig. 36**

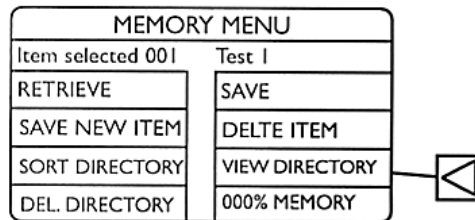


- **View directory –**

Enables just the viewing of the product programs contained in the controller's memory without allowing manipulation of either the programs or the directory.

Press the key to the side of the screen leading from the '**VIEW DIRECTORY**' option to reveal the directory. Press 'escape' key to return to the '**MEMORY MENU**'

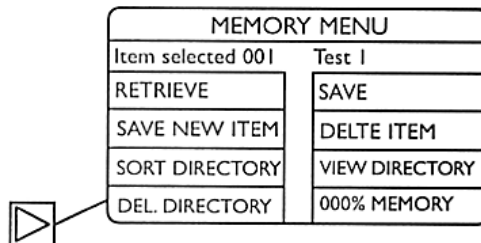
**Fig. 37**



- **Delete directory –**

Enables the complete deletion of all product programs contained within the controller's memory. This function also allows the clearance of all corrupt data from the memory banks of the controller should this occur and could be an essential requirement in this event. Press the key to the side of the screen leading from the '**Del. directory**' option to reveal the instruction '**Enter Password -->**'. Enter correct password (see Annex B) via the main keypad to reveal a lower screen offering the choice of either accepting or refusing the option and a **warning message that the operation cannot be undone if accepted**. Press the appropriate key to the side of the screen leading from either 'Yes' or 'No'. Once completed the controller returns to the 'Memory Menu' screen.

**Fig. 38**



- **000% Memory –**


Gives a visual indication of the percentage of the controller's available memory space used by the currently stored product programs. The readout is constantly updated and displayed within the '**Memory menu**' screen.

## 2 Run Menu -

Enables the use of an existing product program without modification, once made current by recalling from memory to initiate the DELTA into operation in either 'manual' or 'automatic' mode. Once the '**RUN MENU**' screen is evoked it displays, as a visual reminder, pertinent information. Regarding the current product program i.e. template number (see fig15), nozzle identification (see fig 17) and hopper type (see fig16) as well as allowing the following functions: -

**Fig. 39**

MONO DELTA DEPOSITOR	
TIME:12:00:00	DATE:01-01-97
EDIT/CREATE	MEMORY MENU
DELETE MENU	TRAY SETUP
DIAGNOSTICS	RUN MENU




- **Retrieve Item -**

Enables direct entry into the product program directory to allow retrieval of an item into the '**RUN MENU**' screen.

Press the key to the side of the screen leading from '**RETRIEVE ITEM**' option to reveal the product program memory directory. Use up and down arrow keys on the main keypad to move the cursor onto the product program required then press '**enter**' key to select and make the program current and return to the '**Run menu**' screen.

**Fig. 40**



MONO QUICK RUN MENU	
TIME:12:00:00	DATE:01-01-97
RETRIEVE ITEM	SET COUNTER
001 TEST1	00000
SET QTY/TRAY	ADJ DEP QTY
000	00 percent
Temp 000000 Noz Id.00 Soft Dough	

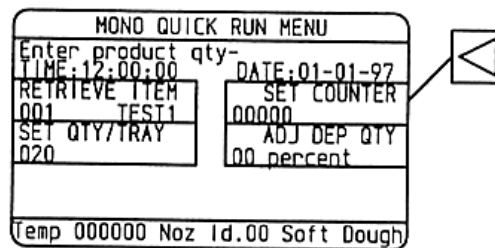


- **Set counter –**

Enables the resetting of the automatic product row counter display (displayed within the 'Set counter' option area) to any value between 0 and 10000. This will be the start value from which the counter will be subsequently incremented as each product row is deposited.

Press the key to the side of the screen leading from the '**Set counter**' option to reveal the on-screen instruction '**Enter product quantity ->**' and enter a numerical value as appropriate using the main keypad. Press 'enter' key to accept value and return to '**RUN MENU**' screen.

**Fig. 41**

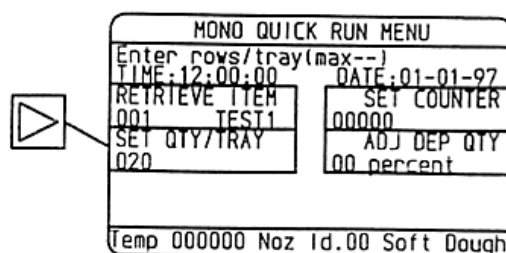


- **Set quantity/tray –**

Enables the manipulation of the number of product rows (up to a maximum value) to be deposited onto the tray whilst in the '**RUN MENU**' screen only without altering the original product program stored in memory.

Press the key to the side of the screen leading from the '**Set quantity/tray**' option to reveal the on - screen instruction '**Enter rows per tray (max...)**' and enter a numerical value, not exceeding the maximum allowable, using the main keypad. Press 'enter' key to accept value and return to '**Run menu**' screen.

**Fig. 42**



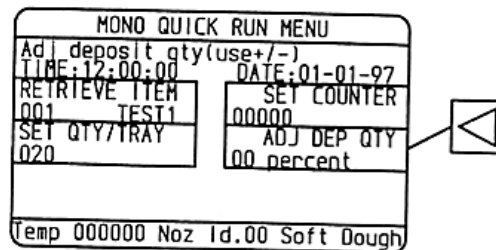
- **Adj(ust) dep(osit) quantity –**

Enables a global increase or decrease adjustment of the original overall deposited quantity for each product row to allow for variations between product mixes. This adjustment affects only the 'Dep qty' values in the product program as detailed in the '**Edit/Create**' menu (see section 3.1.3.1a) and not 'Prod l' , 'Height' nor 'Angle' values. The original program as stored in the controller's memory remains unaffected by this adjustment.

Press the key to the side of the screen leading from the '**ADJ DEP QTY**' (option) and enter a numerical value using the main keypad for the percentage adjustment required. Precede the numerical value with a '-' sign if the weight of the product is to be reduced.

Press the '**enter**' key to accept the entered value and return to the '**RUN MENU**' screen with the adjustment value displayed within the '**ADJ DEP QTY**' option area.

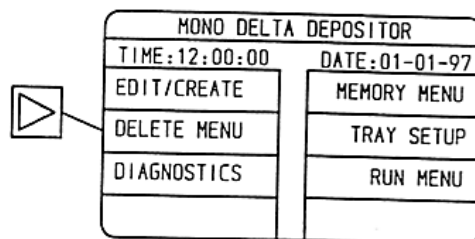
**Fig. 43**



### **3 Delete menu**

Enables the deletion of current screen information without affecting the product programs stored in the controller's memory. Two facilities exist within this menu - press the key to the side of the screen leading from the '**DELETE MENU**' option on the main menu to reveal the following options: -

**Fig. 44**

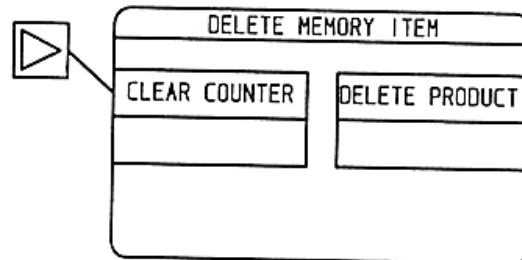


- **Clear counter** –

Enables the product row incremental counter to be cleared and reset to zero (see fig41)

Press the key to the side of the screen leading from the '**CLEAR COUNTER**' option to perform the operation immediately and return to the main menu.

**Fig. 43**

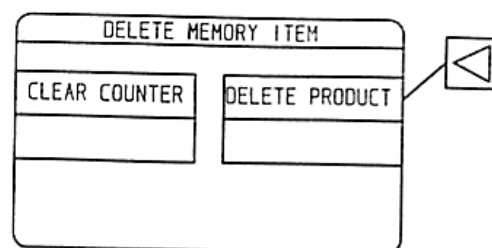


- **Delete product** –

Enables the deletion of the on-screen information within the '**EDIT/CREATE**' screen to clear any previous product program without having to delete each program line individually. **Use of this option does not delete the current program from the controller's memory.**

Press the key to the side of the screen leading from the '**Delete product**' option to perform the operation immediately and return to the main menu. On the next entry into the '**Edit/Create**' screen a clear screen with only the automatically inserted **END** command appearing.

**Fig. 44**



## **C) Speed set up menu –**

Enables default values for maximum speed of each of the DELTA's four axes, acceleration values and offset values to be entered. In the absence of any other speed instruction within the product program the speed values entered within this menu will be used by the controller to produce machine movements.

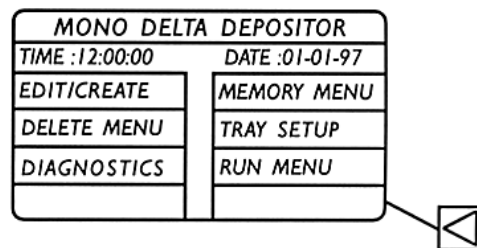
From the main menu the '**SPEED SET UP MENU**' is available from the bottom RH option area.

*This area is unmarked in an attempt to discourage access as, once the parameters contained within this menu have been factory set they should not need adjustment, however, they are user accessible.*

Press the bottom RH key to the side of the screen leading from the **unmarked area** to reveal the '**SPEED SET UP MENU**' with the factory set up figures as shown below: -

Speed deposit	=	120
Speed tray	=	100
Speed jog	=	100
Speed rotary	=	80
Init(ial) tray vel(ocity)	=	30
Max.acc(eleration) lim(it)	=	120
Tray acc(eleration) lim(it)	=	80
Offset SD Hop	=	0
Offset HD Hop	=	-19

**Fig. 45**



The parameters contained within the 'Speed set up menu' have the following effect: -

**1. Speed Deposit –**

Sets the maximum linear speed value (up to a maximum preset value) for the forward and reverse direction of the Deposit Pump axis (Axis 0) for the following conditions:

- a) During depositing of product mix to make products in the absence of an alternative value entered in a SPEED command line in the product program.
- b) During suck back (i.e. in reverse direction) on completion of each deposited product row in the absence of an alternative value entered in a SPEED command line in the product program.

**2. Speed tray –**

Sets the maximum linear speed value (up to a maximum preset value) for the forward and reverse direction of the tray conveyor axis (Axis 1) for the following conditions: -

- a) During product creation in either forward or reverse direction in the absence of an alternative value entered in a SPEED command line in the product program.
- b) Between the point of completion of one product and the start of the next.
- c) On return of the tray to the operator on completion of the depositing sequence when the DELTA is operated in MANUAL mode.

**3. Speed jog –**

sets the maximum linear speed value (up to a maximum preset value) for the up and down direction of the jog axis (axis 2) for the following conditions: -

- a) During product creation in either up or down direction in the absence of an alternative value entered in either a SPEED or SUCKBACK command line in the product program
- b) During downward movement (jog down) to bring the head down to the depositing height from the previously jogged up height.
- c) During the movement between the 'Edge height' value (see fig10) and the depositing height of the first product on the tray.
- d) During the movement between the jogged up height of the last product on the tray and the 'Edge height' value.

#### 4. **Speed rotary** –

Sets the max linear speed value (up to a maximum preset value) for the rotary movements of the nozzle rotate axis (Axis 3) for the following conditions: -

- a) During product creation in either clockwise or anticlockwise direction in the absence of an alternative value entered in a SPEED command line in the product program.
- b) During the return of the nozzle template assembly between products back to its start position when the 'ROTARY HOME MODE' facility is in use (see Section 3.1.1.5).
- c) Again when the 'ROTARY HOME MODE' facility is in use, during the return of the nozzle template assembly, back to its start position when the last product on the tray has been completed and the tray is either being returned to the operator when operating in MANUAL mode or is progressed to the start of the next tray when operating in AUTOMATIC mode.

**NOTE:** *when more than one axis moves simultaneously, see special note under speed section for rules governing actual speeds.*

#### 5. **Init(ial) tray vel(ocity)** –

Sets the maximum linear speed value (up to a maximum preset value) for the forward movement of the tray conveyor axis (Axis 1) to progress the tray to the depositing position and the reverse movement to return the tray to the operator when operating in MANUAL mode.

#### 6. **Maximum acceleration Lim(it)** –

Sets the common maximum acceleration rate (and deceleration) for all of the DELTA's four axes when changing speed either from rest up to the linear speed setting (accelerating) or when slowing down from the maximum speed setting to rest (decelerating).

If more than one axis is moving at the same time then similar rules governing acceleration as does speed apply i.e. the axis that has to accelerate at the fastest rate to achieve its demanded position will assume their program med value and other simultaneously moving axes will be automatically compensated such that all start and finish accelerating (or decelerating) at the same moment.

**7. Tray acc(eleration) Lim(it) -**

Modifies the acceleration value entered under 'max acc lim' to that under 'Tray acc lim' if the machine movements involve movements of the tray conveyor axis (Axis 1). This ensures that sensible acceleration limits for acceleration can be set to avoid tray slippage on the belts whilst not unnecessarily slowing the cyclic movements of the DELTA down for periods when the tray is not moving.

**8. Offset S D Hopper –**

The distance in millimetres, that the tray is progressed forward beyond the point at which the tray is detected by the tray sensor to correctly position the tray underneath the soft dough hopper depositing centre line. Once progressed forward by the offset distance the tray is in the correct position for use with the information entered under 'tray length' (see fig13).

The tray underneath the soft dough hopper depositing centre line. Once progressed forward by the offset distance the tray is in the correct position for use with the information entered under 'tray length' (see fig13).

**9. Off set HD hopper - as above but for hard dough hopper.**

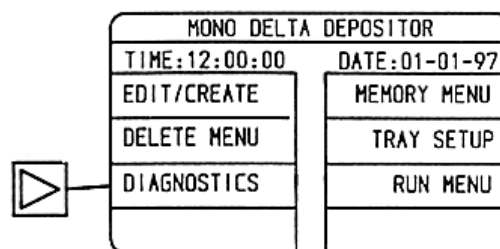
## **D) Diagnostics and axis set up**

A number of controller based diagnostic functions exist on the DELTA that allow controller and machine sensors and motors to be tested through use of the LCD screen and appropriate menus.

Also use is made of the LCD screen, for each axis set up, to display information pertinent to correct adjustment of the DELTA's amplifier cards

From within the main menus press the key to the side of the screen leading from the 'Diagnostics' option to reveal the Diagnostics menu which allows the following facilities: -

**Fig. 46**



### **1. Set time -**

Enables the user to alter the time display (24 hour clock) that appears on a number of screens. Press the key to the side of the screen leading from the '**SET TIME**' option and input numerical values using the main keypad and by following the on-screen prompts.

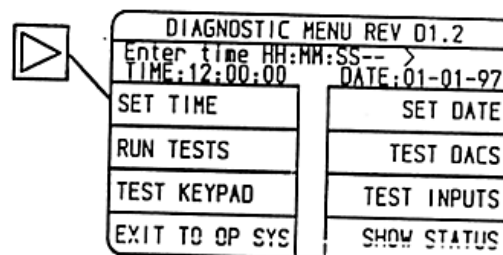
**HH** = Hours (24 hour clock)

**MM** = Minutes

**SS** = Seconds

i.e. for 2.30 pm enter 14:30:00

**Fig. 47**





## 2. Set date –

Enables the user to alter the date display that appears on a number of user screens alongside the time display. Press the key to the side of the screen leading from the '**SET DATE**' option and input numerical values using the main keypad and by following the on-screen prompts.

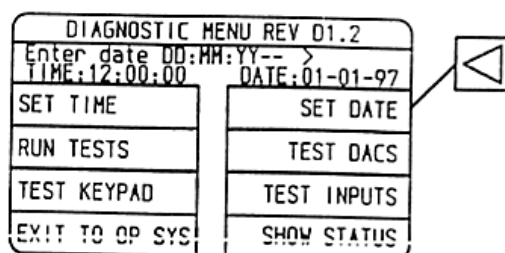
**DD** = Day date

**MM** = Month

**YY** = Year

i.e. for 6th September 98 enter 06:09:98

**Fig. 48**



## 3. Run tests –

Enables each axis's motor in turn to be driven slowly to ensure it rotates in the correct direction and that its encoder is counting correctly. This is established by an on screen display of encoder counts.

Press the key to the side of the screen leading from the '**RUN TESTS**' option to reveal the Run tests menu. Select the axis to test by entering the numerical value corresponding to the axis

i.e. 0 = Deposit axis

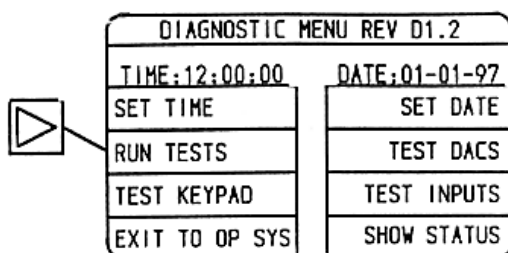
1 = Tray axis

2 = Jog axis

3 = Rotary axis

Press and hold either the left or right arrow keys on the main keypad to move the selected axis in either direction.

**Fig. 49**



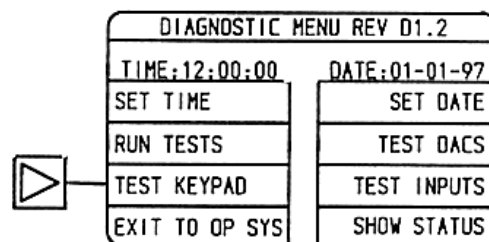
#### 4. Test keypad –

Enables a check by the user that each button on the keypad is registering an output and therefore functioning correctly.

Press the key to the side of the screen leading from the '**TEST KEY**' option to reveal the on-screen instruction '**Press keys in sequence**'. To exit use same key twice. Follow instruction and press any key to register a display on the LCD screen and providing the display changes each time a key is pressed, then that key is functioning. A typical display is :

Key 1 dec = 50    hex = \$31

**Fig. 50**



#### 5. Test DACS (digital to analogue converters) –

Enables a controller hardware test to be performed only by MONO.

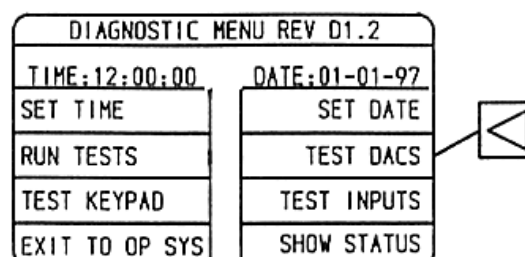
**Important DISABLE THE MOTOR DRIVES USING THE E STOP BEFORE RUNNING THIS TEST.**

Press the key to the side of the screen leading from the '**TEST DACS**' option to reveal the screen as shown in Fig 51. Enter numerical values as appropriate using the main keypad to select the expected test result from on-screen options.

To measure the dac output and to determine whether each is functioning correctly place a voltmeter across its outputs and compare each output with the expected displayed value associated with each option.

Option 3 ramp drivers, is for use by the software developer only.

**Fig. 51**



Enables readout from the LCD screen display as to the on/off status of all the sensors, safety switches and power switch associated with the DELTA thereby giving, at a glance, confirmation of individual sensor failure or otherwise.

Press the key to the side of the screen leading from the '**TEST INPUTS**' option to reveal the display shown in Fig 52. Each input (sensor/switch) to the controller has an individual digital display associated with it indicating its status as either 0 or 1 representing activated or non-activated (low or high) respectively. These status displays are shown on the middle line of the screen. The bottom line of the screen shows a hexadecimal equivalent of the binary readout of the second line.

Each sensor is associated with a digit in the second line as shown in fig 53.

DIAGNOSTIC MENU REV D1.2	
TIME 12:00:00	DATE 01-01-97
SET TIME	SET DATE
RUN TESTS	TEST DACS
TEST KEYPAD	TEST INPUTS
EXIT TO OP SYS	SHOW STATUS

```
012345678901234567890123
JCDJDDCCD1'1'1111''111

----- -E STOP + START (O = START; I = E S CPI)
----- HOPPER FRONT GUARD (I = CLOSED)
----- HOPPER REAR GUARD (I = CLOSED)
----- HOPPER TOP GUARD (I = CLOSED)
----- MOTOR OVERLOAD SENSOR (I = OVERTEMP)
----- HOPPER LIFT SENSOR (I = HOPPER LIFTED)
----- TRAY SENSOR (O = TRAY SENSED)
----- VERTICAL HOVE SWITCH (I = TARGET SENSED)
----- ROTARY TEMPLATE SENSOR (I = NO TEMPLATE)
----- HOPPER TYPE SENSOR (I = SCF1 DOUGH)
```


## 7. Show status –

Enables an instantaneous readout of the number of cycles (jog counter) of the DELTA since its first build. The counter cannot be reset and gives an indication of the DELTA'S use.

Press the key to the side of the screen leading from the 'Show status' option to reveal the screen read out.

**Fig. 54**

DIAGNOSTIC MENU REV D1.2	
TIME: 12:00:00	DATE: 01-01-97
SET TIME	SET DATE
RUN TESTS	TEST DACS
TEST KEYPAD	TEST INPUTS
EXIT TO OP SYS	SHOW STATUS




8. Exit to op(erating) sys(tem) - Enables the reloading of existing or loading of new software to the controller from a suitable source using appropriate communication links (see section on loading new program on the next page)

Press the key to the side of the screen leading from the '**EXIT TO OP(ERATING) SYS(TEM)**' option to reveal the screen shown in fig 56. This screen is at the highest level - one level above the DELTA'S main menu (see Fig. 1a and 1b).


**Fig. 55**

DIAGNOSTIC MENU REV D1.2	
TIME: 12:00:00	DATE: 01-01-97
SET TIME	SET DATE
RUN TESTS	TEST DACS
TEST KEYPAD	TEST INPUTS
EXIT TO OP SYS	SHOW STATUS



**Fig. 56**

1) Load S record program 2) Run program 3) Load & run 4) Set/Reset Auto-boot 5) Load S record data 6) Load flash memory 7) Erase Ram Pointer	
Time: 12:00:00	Date: 01-01-97
Ptr: \$00005000	\$000104fa AUTO



## • **LOADING NEW PROGRAM**

### Equipment required:

Interface lead (2x9 way D-type connector - one male, one female) approx. 2m long.

386 (min) P.C. c/w floppy disc drive and 9 way D-Type serial port

Software: MS-DOS 4.1 or higher

### **PROCEDURE**

- a. At this point remove top cover from DELTA and plug in interface lead into 9 way D-type socket on rear of controller. Plug in other end of interface cable to 9-way serial port of P.C.
- b. Switch on Delta and obtain '**Exit to OP sys**' menu - see menu structure diagram.
- c. Select option 5 to allow manual loading of new program. Message on screen will change from AUTO to MANUAL.
- d. Choose option 3 '**Load and Run**' new program and to give screen display thus.

S record load menu (38k)

Load address = \$

- e. Switch on P.C. and obtain c:\> prompt in DOS if loading from hard disk or a:\> if loading from a floppy disk.
- f. Send program to controller via the PC by entering 'send l.exe\_<program name>'

At this point the message displayed on the screen will show the program loading onto controller and on completion will display completed message.

- g. **Press 'esc' key** on keypad to return to '**Op sys**' menu.
- h. **Press 6** on main keypad **to load program into flash memory** - upon which the pointer (shown as Ptr) values will change to zero. (If unsuccessful at first - retry).
- i. **Press 2** on main keypad to '**run program**' and return to main menu.  
Disconnect the 9-way D-type connector from the rear of the controller and replace top removable cover.

**NOTE:** New programs can be copied to agent / service engineers via E-mail / modem communications

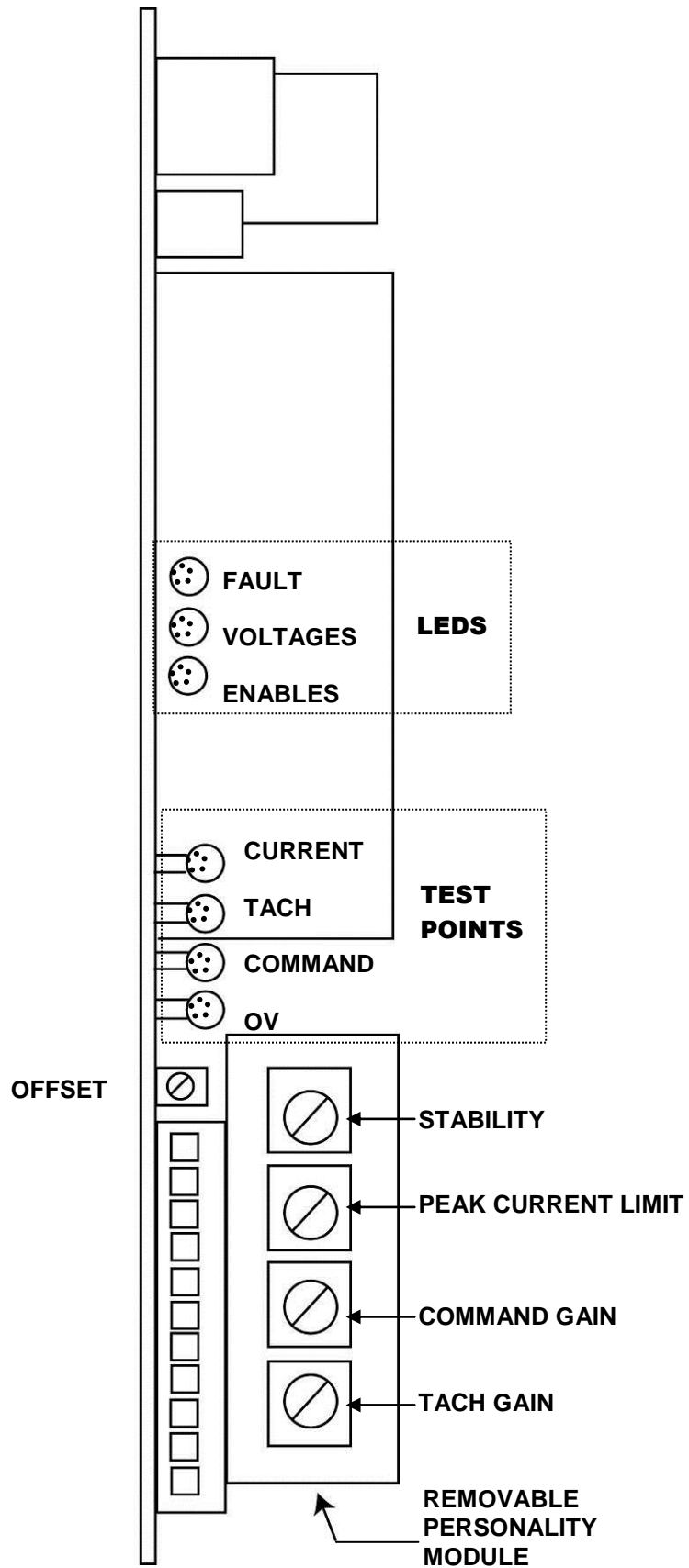
## **9. AXIS SET UP**

### **FACTORY SET-UP PROCEDURE**

#### **CAUTION**

**EXTREME CAUTION MUST BE EXERCISED WHEN APPLYING THESE PROCEDURES TO AVOID INCURRING DAMAGE TO THE MACHINE, DRIVE AND MOTOR. IT IS ESSENTIAL THAT PRIOR TO ENERGISING (ENABLING) THE AMPLIFIER THAT THE MOTOR CONTROLLING THE HEAD RAISE / LOWER MOTION IS DECOUPLED FROM IT'S BALLSCREW. ONCE IT HAS BEEN ESTABLISHED THAT THE MOTOR HAS BEEN CORRECTLY WIRED TO IT'S AMPLIFIER, THE CONTROLLER SIGNAL TO THE AMPLIFIER IS AS IT SHOULD BE, THE HEIGHT SETTING SWITCH IS FUNCTIONING CORRECTLY AND THE CONTROLLER PROGRAM IS CONTROLLING THE MOTOR'S MOVEMENTS CORRECTLY THEN, AND ONLY THEN, SHOULD MOTOR COUPLING BE CONNECTED**

## - Amplifier unit



- **INITIAL CHECKS**

- a. Switch machine on at mains.
- b. Check all safety guards are closed and emergency stop button is released.
- c. With a zero speed command and the drive disabled, apply power to the amplifier units by pressing start button - check 3 status LED's are showing: -

<b>RED</b>	<b>OFF</b>
<b>YELLOW</b>	<b>ON</b>
<b>GREEN</b>	<b>OFF</b>

- d. Ensure head raise / lower motor coupling is decoupled from ball screw.  
See CAUTION.

Obtain 'SPEED SET UP' menu (see fig45) and input the following values: -

<b>Speed Deposit</b>	<b>:</b>	<b>120</b>
<b>Speed Tray</b>	<b>:</b>	<b>100</b>
<b>Speed Jog</b>	<b>:</b>	<b>100</b>
<b>Speed Rotary</b>	<b>:</b>	<b>80</b>
<b>Init. Tray Vel.</b>	<b>:</b>	<b>30</b>
<b>Max Acc. Lim.</b>	<b>:</b>	<b>120</b>
<b>Tray Acc. Lim.</b>	<b>:</b>	<b>80</b>
<b>Offset SD HOP</b>	<b>:</b>	<b>0</b>
<b>Offset HD HOP</b>	<b>:</b>	<b>-19</b>

Obtain the password protected '**SYSTEM SET UP**' menu (see 1a and 1b). This automatically enables the amplifier units with a zero speed command signal.

Input the following values: -

<b>GAIN AXIS 0</b>	<b>:</b>	<b>128</b>
<b>GAIN AXIS 1</b>	<b>:</b>	<b>14</b>
<b>GAIN AXIS 2</b>	<b>:</b>	<b>128</b>
<b>GAIN AXIS 3</b>	<b>:</b>	<b>128</b>
<b>FILTER A 0</b>	<b>:</b>	<b>210</b>
<b>FILTER A 1</b>	<b>:</b>	<b>210</b>
<b>FILTER A 2</b>	<b>:</b>	<b>210</b>
<b>FILTER A 3</b>	<b>:</b>	<b>210</b>
<b>FILTER B 0</b>	<b>:</b>	<b>64</b>
<b>FILTER B 1</b>	<b>:</b>	<b>64</b>
<b>FILTER B 2</b>	<b>:</b>	<b>64</b>
<b>FILTER B 3</b>	<b>:</b>	<b>64</b>
<b>Error lim</b>	<b>:</b>	<b>0000</b>

Check there is no rapid acceleration of any of the 4 motors, the motor shaft should remain stationary or drift slightly in either direction.

If a runaway condition exists it is most likely a result of the motor armature or tacho leads being incorrectly connected.



Check the 3 status LED's:

RED	OFF
YELLOW	ON
GREEN	ON

- Still with zero speed command signal, adjust the offset pot until the MC (machine command signal) and the ENC (encoder counts) for the axis concerned are stable and at or near 0000 readout. These are displayed at the bottom of the screen. Periodically re-check this setting throughout the following procedure.
- Connect digital storage oscilloscope to the test points command and OV on the amplifier unit and select a suitable voltage scale to measure the command signal from the controller to the amplifier. Obtain password protected '**max speed Set up**' menu (see fig. 1a and 1b) to enable a maximum speed signal to all 4 motors at once. **Once again it is imperative that the 'head raise / lower' motor is decoupled** - see CAUTION.
- Addressing each motor in turn adjust the Command and/or Tacho Gain pots to give a command signal value from the controller to the amplifier of 9.5V. **Press stop to cease command.**
- Again with the '**max speed signal**' menu driving all four motors at full speed, adjust the Stability potentiometer to give as smooth a command signal from the controller as possible. Press stop to cease command.
- Adjust Peak Current pot accordingly.

**Axis 0 (Deposit Pump)    fully clockwise**  
**Axis 1 (Tray Conveyor) - ½ way clockwise**  
**Axis 2 (Head raise/lower) - fully clockwise**  
**Axis 3 (Rotary nozzle) - ½ way clockwise**

**All values once set should not need readjustment.**

#### **FIELD SET UP (Amplifier replacement) CAUTION**

Extreme care must be exercised when applying these procedures to machine mounted motors to avoid incurring damage to the machine, drive and/or motor. If at all possible the initial set-up should be performed with the motor decoupled from the machine and/or drive components.

To minimise the amount of setting-up required during commissioning or when replacing a drive on site the majority of the adjustments have been incorporated on a removable personality module. This means that when a drive is replaced on site it is simply necessary to take the personality module from the old drive and fit it on to the new drive. The only adjustments that remain to be done are Offset and Gain. These are altered by means of two pots, the Offset pot being on the main pcb and the Gain pot being on the personality module.

## E) USING THE UP/DOWNLOAD SYSTEM SOFTWARE

### Equipment required:

386(min) P.C. c/w floppy disk drive, 9 way D-Type serial port  
Windows 95 & 98

### NOTE:

**THE DELTA UP/DOWNLOAD SYSTEM WILL NOT RUN UNDER WINDOWS NT.**

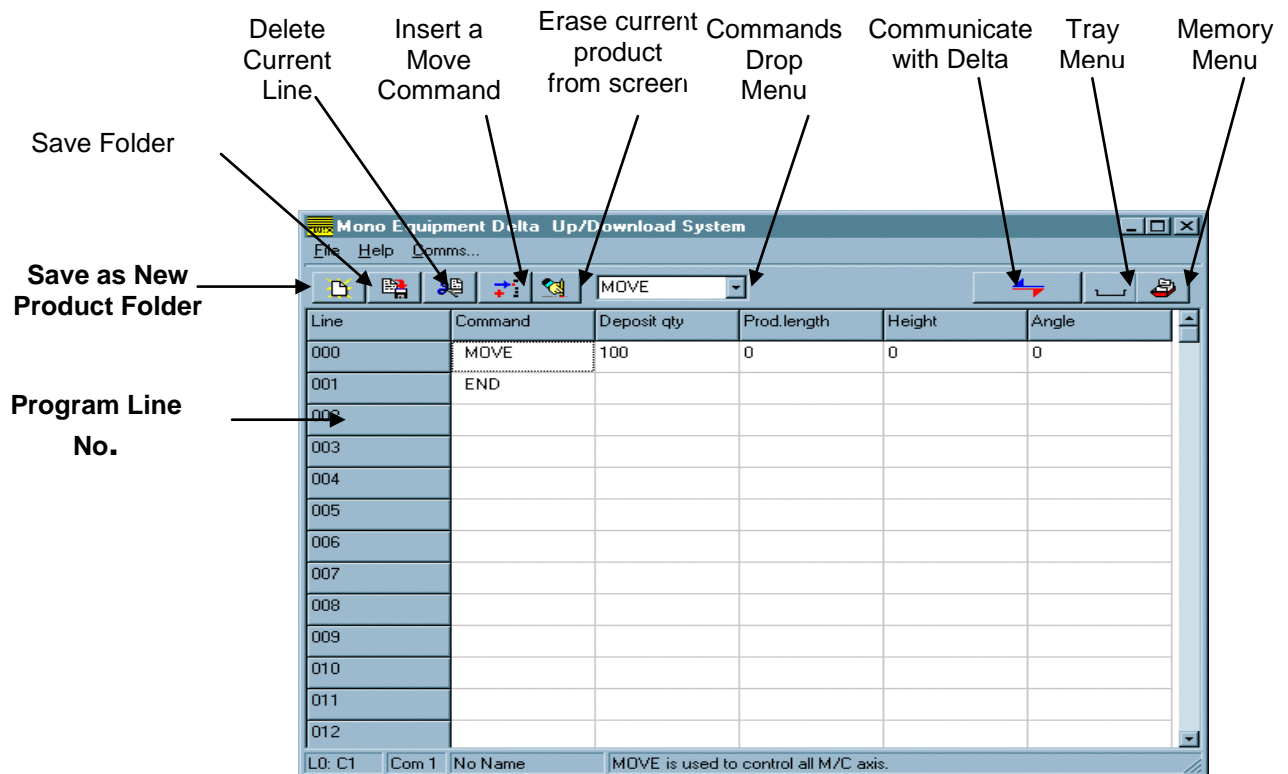
*Delta up/download system*

*Interface lead (2 x 9 way D-type connector – one male, one female) 2m long*

*Delta Depositor (running software Rev 3.34u or above)*

### **Section 1. Getting Started**

Connect the interface lead from the P.C. to the Delta (Male connection in the Delta port). Switch on your P.C. and enter windows. Double click on '**My computer**' icon, then double click on the '**3<sup>1</sup>/<sub>2</sub> Floppy (A)**' icon. Double click the icon marked '**Delta up-download**'. This will then progress you into the main screen as shown below.



**Figure 1.0 Up/Download System – front screen**

## **Section 2. Writing programs on your personal computer (PC).**

The program is structured in the same way as the Delta using a number of lines and commands to describe the motion of the depositor nozzles and ultimately the finished product.

To insert a program command make an appropriate selection from the 'command drop menu' i.e. move, end, speed, suck back etc. The 'command drop menu' is activated by pressing the 'Insert a move command' icon (*see figure 1.0*). Please note it may be necessary to first select a box in the program area to make the menu visible. Once a command has been entered move to the correct box in the program area using the arrow keys or mouse cursor and enter the required figures. To amend an existing figure move to the correct box, backspace and re-enter the figure.

With the core program now written it is important to enter the relevant tray and template information. To do this point and press the 'Tray Menu' button. (*See figure 1.0*) Note: Tray and template information, on the Up/Download software are on the same screen.

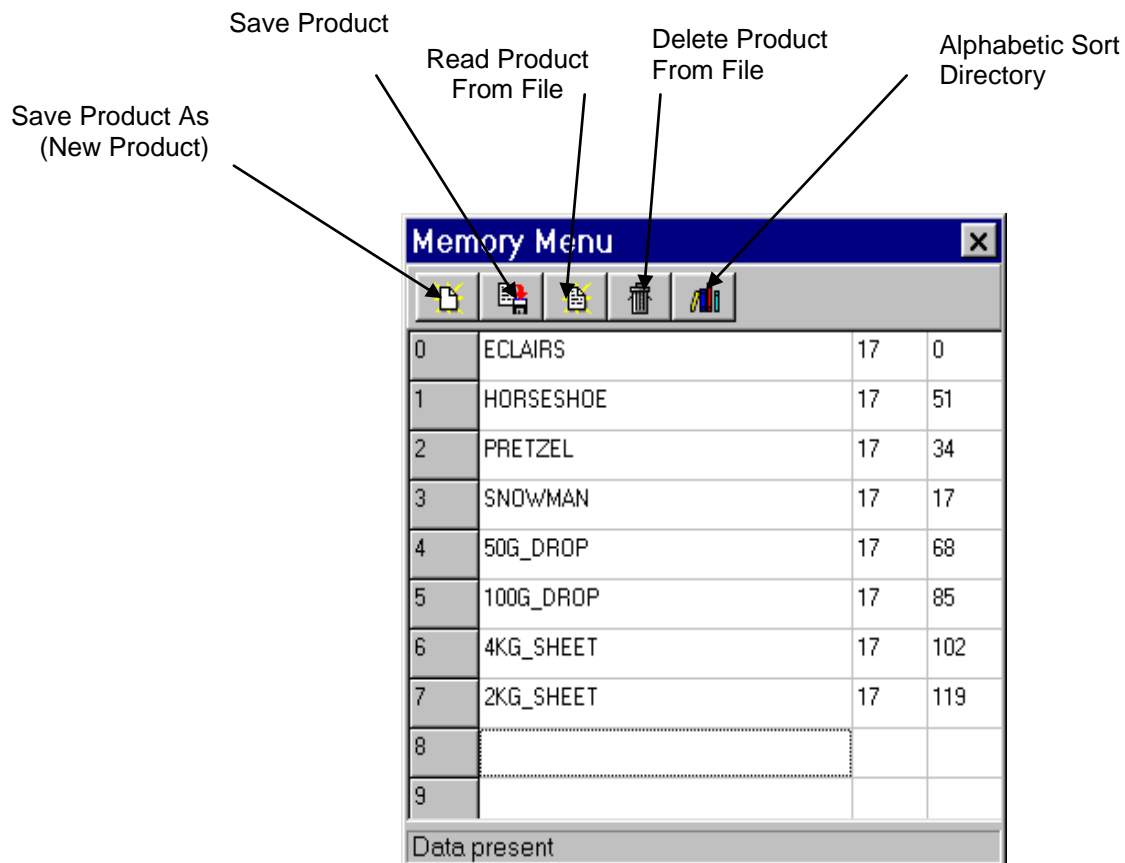
Tray Menu	
Edge Height	30
Rot. Home Mode	Off
Rows per Tray	5
Tray Length	760
Jog Height	25
Suck Back	20
Jog up Speed	80
Template No.	032205
Nozzle Id.	8
Offset Length	0
Rotary Template	Off
Hard/Soft Dough	Soft
Enter the offset length	

**Figure 2.0 'Tray Menu' screen.**

To move either arrow key up and down or point directly using your mouse to make a selection. To make a change delete the current value by pressing backspace and then enter the preferred value. Once complete close the window by pressing the X button.

### **Section 3. Saving and Recalling A Program**

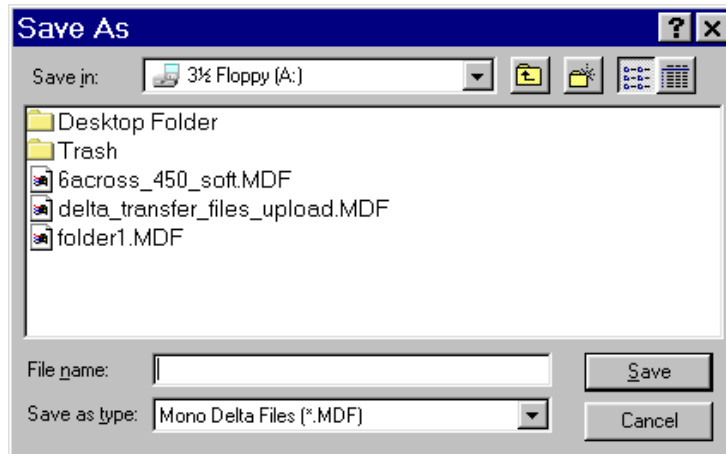
Before explaining how to save and recall a program, it is important to depict the structure of the up/download system. Each file on your P.C. with the MDF extension can be regarded as a folder, each folder will contain a number of Delta program files. The contents of each folder can be seen in the 'Memory Menu'. The 'Memory Menu' is accessed by pressing the 'Memory Menu' icon (**see figure1.0**). It is from this screen Delta files are given their name, saved, recalled, sorted and deleted.



**Figure 3.0 'Memory Menu' screen.**

## Saving a file

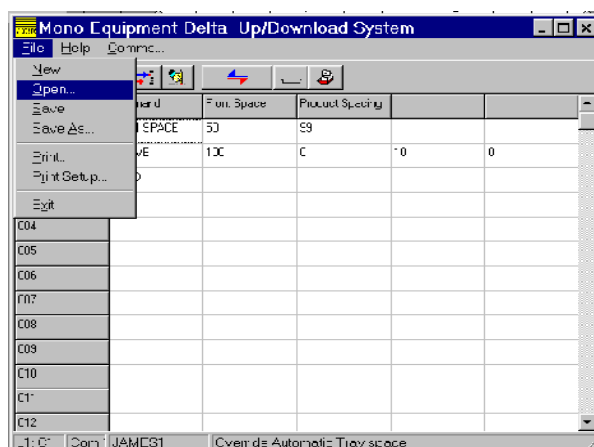
Once in the 'Memory Menu' (see figure 3.0). Select the next available space in the table, type your chosen name and press the 'Save Product As (New Product)' icon (see figure 3.0). A prompt will then appear 'Product Saved Successfully'. Then press OK. The name of the program can then be seen in the bottom left hand corner of the front screen. This can then be repeated up to 99 times. It is now important to save the folder of programs to disk. To do this press the 'Save As New Product folder' button and the following window will appear. Chose an appropriate drive and enter a suitable name for the folder and press save.



**'Save As' screen**

- To recall a folder and delta file.

To recall a folder first point and press the file button, scroll down until open is highlighted then click once more.

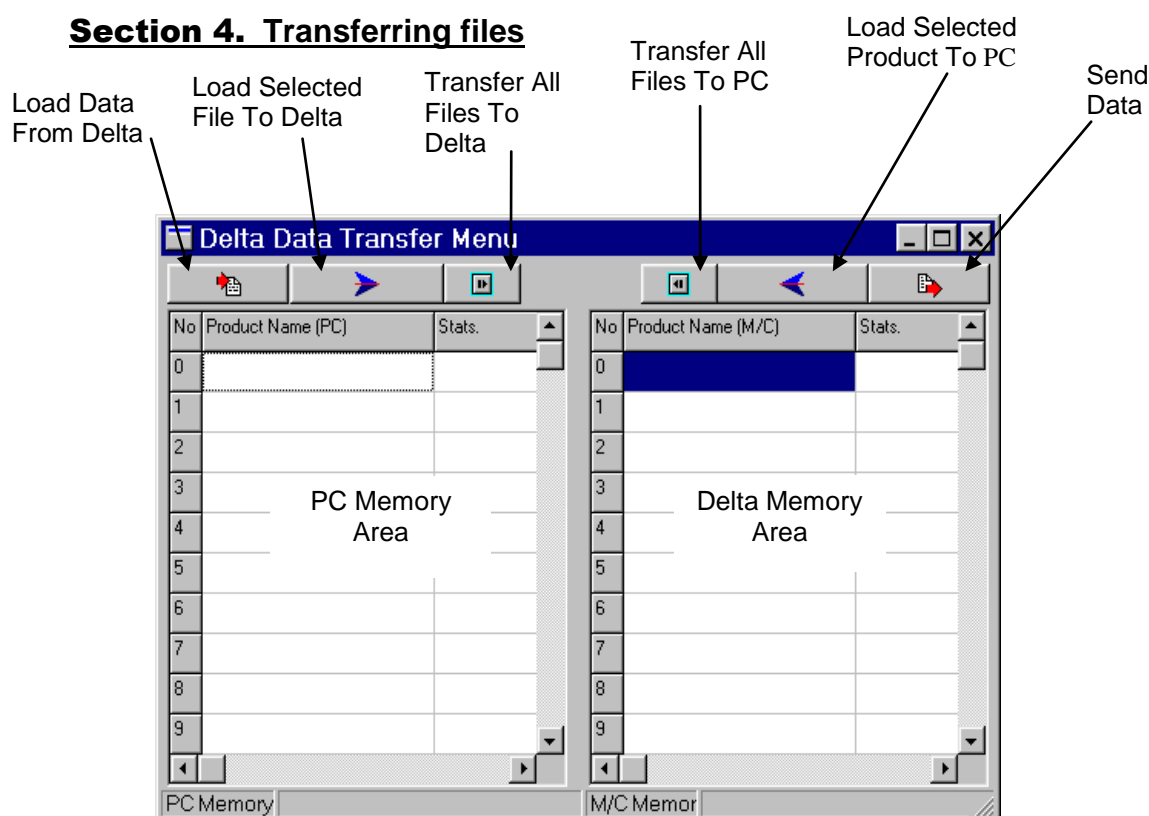


**'File' 'open' Front screen.**

Once in the 'open' window select the required folder and press open. After this you will be progressed back into the front screen. From here press the 'Memory menu' icon (**see figure 1.0**). It is now possible to choose from the list. To do this, firstly point and press to the relevant file, then press the 'read product from file' icon (**see figure 3.0**). The selected delta program file is now shown in the front screen; all appropriate tray information is also recalled. To view press the 'tray menu' button.

To view other delta program files from the folder simply select the 'Memory menu' and follow the same steps as above.

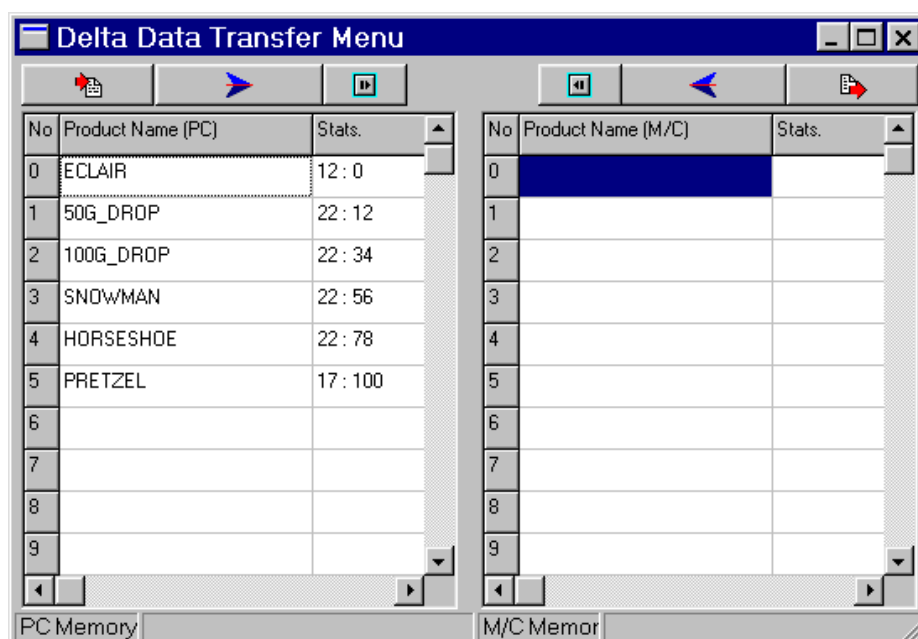
#### **Section 4. Transferring files**



**Figure 4.0 'Delta Data Transfer Menu' screen.**

All file transfer is done from the 'Delta Data Transfer Menu' (See figure 1.0). To enter this screen press the 'Communicate With Delta' icon (see figure 1.0). To simplify the data transfer process the above screen is split in half. The left-hand side is the PC memory and the right hand side the delta memory. This ensures the user can see exactly where all files are located before transfer. It is important to mention that no files can be deleted from this screen. This has been done in an effort to eliminate user error.

## Transferring files from your PC to your Delta depositor (uploading).



PC Memory			M/C Memory		
No	Product Name (PC)	Stats.	No	Product Name (M/C)	Stats.
0	ECLAIR	12 : 0	0		
1	50G_DROP	22 : 12	1		
2	100G_DROP	22 : 34	2		
3	SNOWMAN	22 : 56	3		
4	HORSESHOE	22 : 78	4		
5	PRETZEL	17 : 100	5		
6			6		
7			7		
8			8		
9			9		

**Figure 4.1 'Delta Data Transfer Menu' screen.**

Before any file transfer can take place the folder you wish to transfer files from must be opened. To do this follow the instructions in *Section 3* 'to recall a folder'. Enter the 'Delta Data Transfer Menu' and the previously specified folder and contents will be listed. An example is shown above (*figure 4.1*).

The second step is to load the Delta's memory into the 'Delta Data Transfer Menu' (*figure 4.0*). To do this press the 'Load Data From Delta' button (see *figure 4.0*) and follow the on screen prompts. The Delta screen will display the rate of files being transferred.

At this stage it is now possible to transfer files from the PC memory to the Delta Memory by pressing one of two buttons. For single file transfer select the file from the PC memory side by pointing and pressing with the mouse then press the 'Load Selected File To Delta' button. A copy of the chosen file will then appear on the Delta memory side. Repeat this process as many times as necessary. To transfer all files from the selected folder press the 'Transfer All Files To Delta' icon and follow the on screen prompts. A copy of all the PC files will then appear on the Delta memory side. With the correct files on the Delta memory side it is now possible to do the transfer by pressing the 'Send Data To Delta' button and following the on screen prompts. The Delta screen will display the rate of files being transferred. CHECK!! All the files can now be viewed on the Delta by pressing the View Directory button.

## **Transferring files from your Delta depositor to your PC (downloading).**

Single or multiple files can be copied to either an existing or new folder. The downloading of delta files is done in almost exactly the same way as uploading.

### **Copy a single Delta file to an existing folder**

Make sure that the Delta is in the 'Memory Menu' option. Return to the 'Up/Download System' menu on the P.C. Open the required folder by pointing then pressing the file button, scroll down until open is highlighted then click once more. Choose the required folder. The next step is to press the 'Delta Data Transfer Menu'. Then press the 'Load Data From Delta' icon so that both sides of the 'Delta Data Transfer Menu' have lists of programs. Select the delta file from the Delta memory side that you wish to transfer and press the 'Load Selected Product To PC'. A copy will then be placed on the PC memory side. Close the window and press the 'save folder' button.

### **Copy multiple/all Delta files to an existing folder**

Make sure that the Delta is in the 'Memory Menu' option. Return to the 'Up/Download System' menu on the P.C. Open the required folder by pointing then pressing the file button, scroll down until open is highlighted then click once more. Choose the required folder. The next step is to press the 'Delta Data Transfer Menu'. Then press the 'Load Data From Delta' icon so that both sides of the 'Delta Data Transfer Menu' have lists of programs. Next press the 'Transfer all files to PC'. A copy will then be placed on the PC memory side. Close the window and press the 'save folder' icon.

### **Copy Delta files to a new folder**

Make sure that the Delta is in the 'Memory Menu' option. Return to the Up/Download System' menu on the P.C. The next step is to press the 'Delta Data Transfer Menu'. Press the 'Load Data From Delta' icon and follow the on screen prompts. To transfer a single file, select it by pointing and pressing the mouse. Then press the 'Load Selected Product To PC'. If more files are required repeat the procedure. If all Delta files are to be transferred press the 'Transfer All Files To PC'. Exit the window and press the 'Save As New Product Folder' icon. Enter a suitable name and press 'save'.



## DELTA DEPOSITOR NOZZLE IDENTIFICATION RECORD SHEET

[illegible]

## ANNEX B

### PASSWORD SETUP MENU

The DELTA allows user editable password entry via a dedicated password menu (itself password protected). On initial set-up of the DELTA, access to the password menu is not however, password protected to allow user access to set the password codes (alphabetic or numeric).

To gain access to the password menu first gain access to the DELTA's main menu by repeated use of the escape key or by initial switching on of the DELTA.

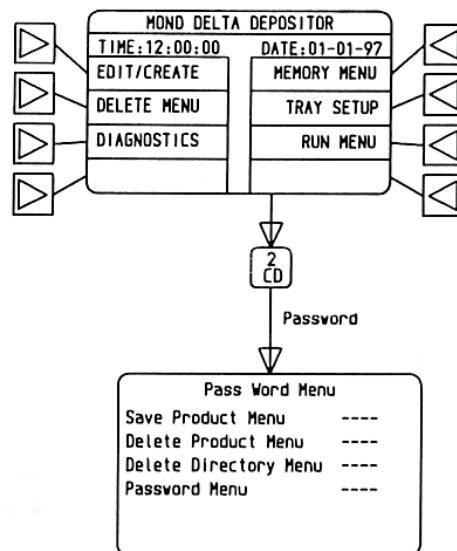
From the main menu press button 2 (see Fig.B) on the main keypad - this will prompt the user to enter the password to gain access to the 'Password Set-up Menu'. Note: Password entry is not required on initial set-up.

Upon correct password entry the 'Password set up menu' is invoked (see Fig.B) and the password codes for the following menus can be entered: -

<b>Save Product Menu</b>	----
<b>Delete Product Menu</b>	----
<b>Delete Directory Menu</b>	----
<b>Password Menu</b>	----

Future entry into these screens is only via correct password entry.

**Fig. B**



## ANNEX C

PROGRAM NAME: \_\_\_\_\_

No.	Command	Dep Qty	Prod L	Height	Angle	No.	Command	Dep Qty	Prod L	Height	Angle
00						38					
01						39					
02						40					
03						41					
04						42					
05						43					
06						44					
07						45					
08						46					
09						47					
10						48					
11						49					
12						50					
13						51					
14						52					
15						53					
16						54					
17						55					
18						56					
19						57					
20						58					
21						59					
22						60					
23						61					
24						62					
25						63					
26						64					
27						65					
28						66					
29						67					
30						68					
31						69					
32						70					
33						71					
34						72					
35						73					
36						74					
37						75					

### DEFAULT TRAY MENU

Edge Height	Rot. Home Mode
Rows Per Tray	Tray Length
Jog Height	Jog up speed
Suck Back	

### Template Menu

Template No.	Nozzle Id.
Offset Length	Hard/Soft Dough

### NOZZLE ID No. LIST

01	= BLUE/WHITE	6 STAR
02	= WHITE	8 STAR
03	= RED	8 STAR
04	= BLUE	8 STAR
05	= ORANGE	ROUND
06	= BLACK	ROUND
07	= GREEN	ROUND
08	= YELLOW	ROUND
09	=	
10	= BLACK	6 STAR



Queensway,  
Swansea West Industrial Estate,  
Swansea.  
SA5 4EB  
UK

**Tel. +44(0)1792 561234**  
Spares Tel. +44(0)1792 564039  
Fax. 01792 561016

Email: [marketing@monoequip.com](mailto:marketing@monoequip.com)

**Web site: [www.monoequip.com](http://www.monoequip.com)**

▪ **DISPOSAL**

Care should be taken when the machine comes to the end of its working life. All parts should be disposed of in the appropriate place, either recycling or other means as the law permits at the time.

The equipment mentioned in this manual has CE accreditation.