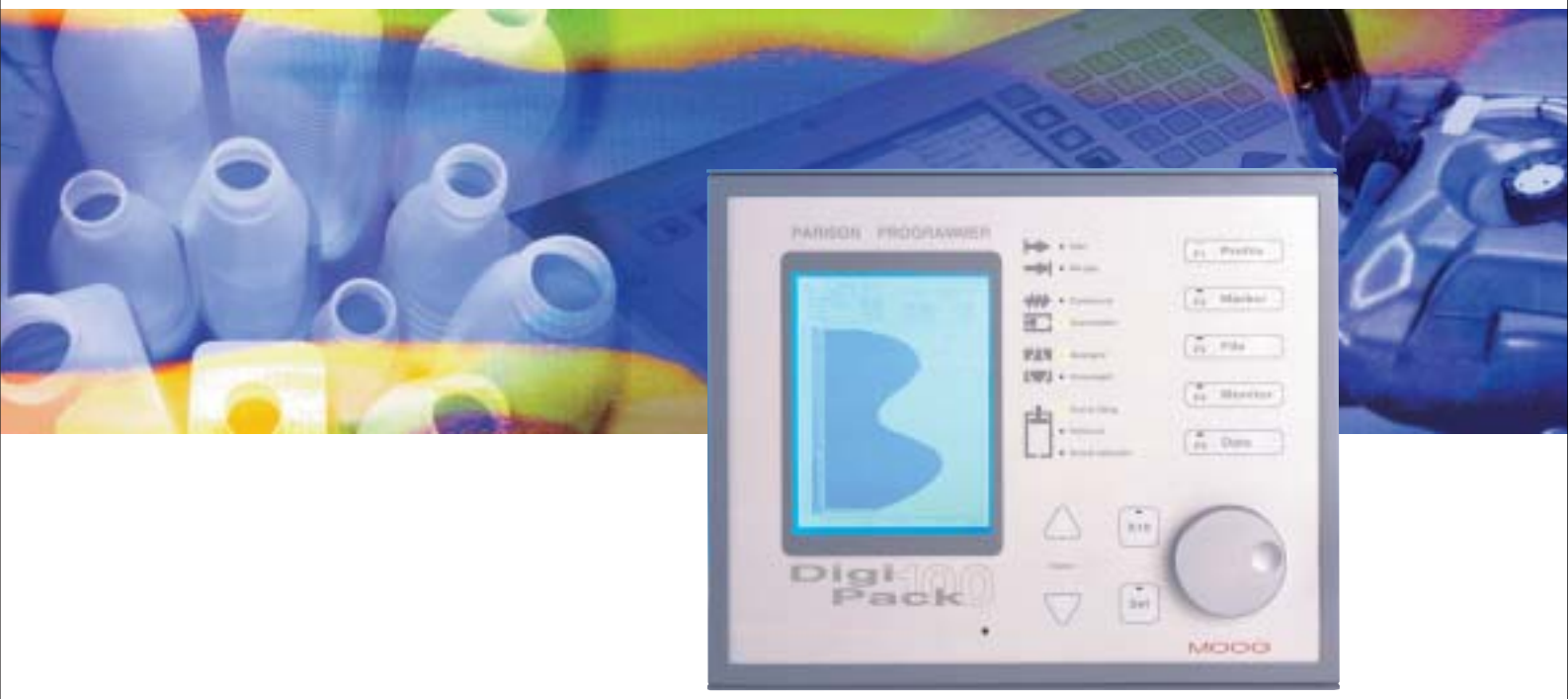
MOOG

DigiPack 100

Parison Controller
J141-213/213A
INSTALLATION,
MAINTENANCE AND USER MANUAL



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Section 1. DigiPack 100 Manual, Installation and Maintenance

1-1 INTRODUCTION

GENERAL DESCRIPTION

The J141-213 DigiPack100 is a user friendly, high performance 100 Point Digital Blow Molding Parison Wall Thickness controller producing lighter, stronger containers at increased production rates.

A properly installed and intelligently used system will deliver higher operating efficiency from your blow molding machine as a result of faster molding cycles, shorter change over times and reduced scrap.

The **DigiPack100** system consists of three main components, the **DigiPack100** control panel, a die gap tooling actuator, feedback transducers to measure tooling die gap opening and in the case of accumulator based blow molding machines, accumulator position. Together, they operate as follows:

The **DigiPack100** control panel is used by the operator to control the tooling die gap opening required to obtain a container with the desired, normally constant, wall thickness required.

The die gap tooling actuator controls the thickness of the parison at the tooling die gap in response to the **DigiPack100** control panel signals.

The **DigiPack100** control panel provides an digital interface with the blow molding machine's PLC controller, providing information such as program end, sequential program point status etc.

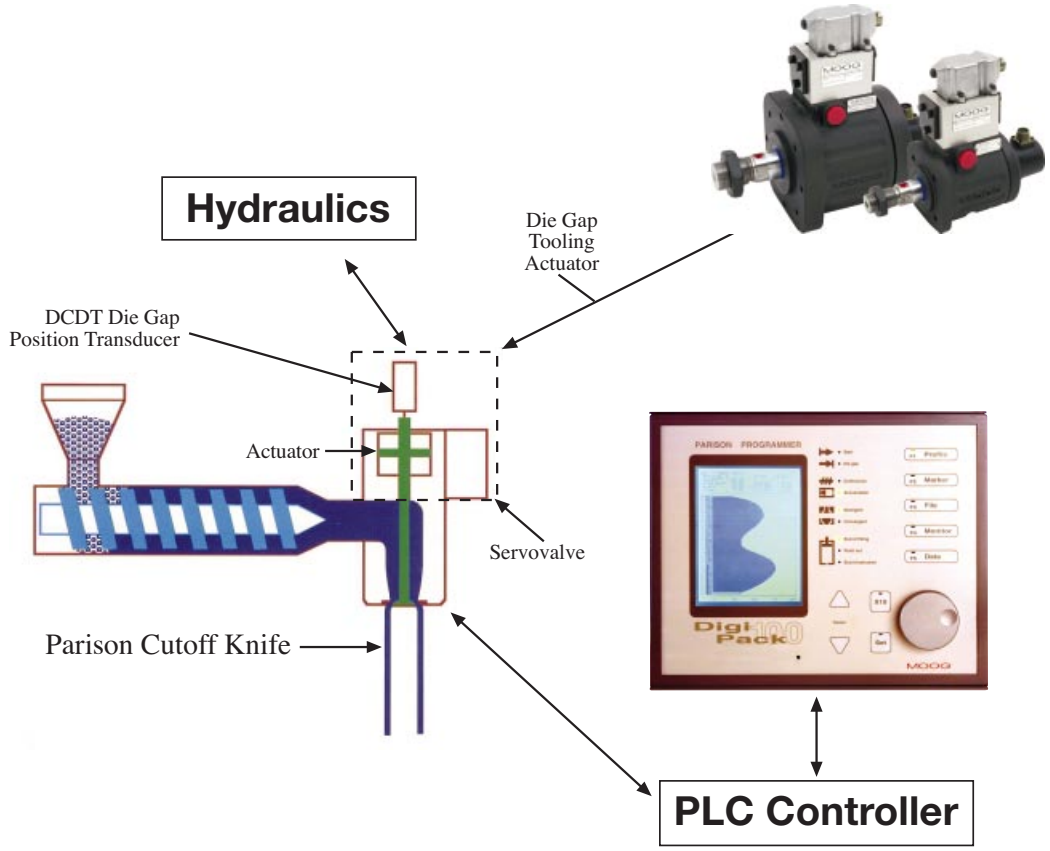


Figure 1-1 - Basic Continuous Blow Molding Machine Control Diagram

When used with continuous blow molding machines, the **DigiPack 100** controls the parison wall thickness relative to the machine cycle time. The machine cycle starts when the parison cutoff knife cuts the parison off. Cycle time may be determined by:

a) a fixed, operator set cycle time or,

b) an automatic cycle time, set by repeated measurement of the time between parison knife cuts or

c) using a fixed DigiPack 100 time cycle and having the DigiPack 100 initiate a machine function such as closing or moving the mold.

The shape of the parison wall profile is set digitally by the operator. The size of the die gap, measured by a die gap position transducer, is compared with the operators commanded position as set on the **DigiPack 100** display.

The error between the operators set position and the actual position causes the servovalve to flow oil to the actuator to reduce the position error to a very small value. This feedback process ensures that the actual die gap follows the commanded die gap very accurately.

When used with accumulator machines, the **DigiPack 100** controls the parison wall thickness relative to the accumulator position as the plastic is being extruded.

As the total quantity or volume of plastic extruded is proportional to the accumulator position, then it follows that the resulting parison wall thickness at any given point on the length of the container must be related to the accumulator position. Given that the physical properties of the plastic and its temperature are constant from container to container, then each container's weight and strength will be consistent.

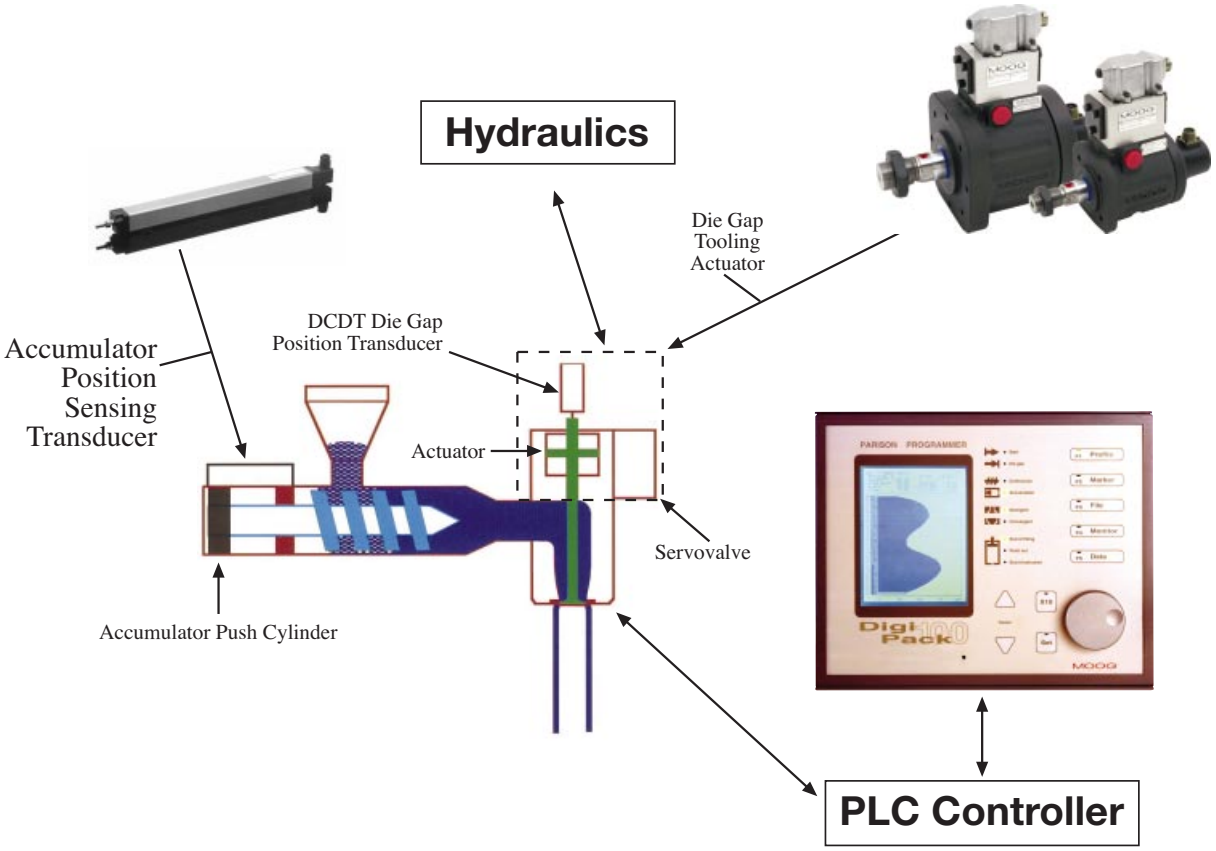


Figure 1-2 - Basic Accumulator Machine Control Diagram

A potentiometer measures the accumulator position and controls the vertical axis of the program display.

The operator can also set the accumulator working stroke, Shot Size, and the desired position at the end of the accumulator push out, Cushion the **DigiPack 100** also provides interfacing signals for these functions with the machines PLC, which then controls the motions of the accumulator.

Set up of the die gap tooling and tooling die gap actuator has been easier with simplified detection of mandrel die zero.

Successful performance of the **DigiPack 100** depends a great deal upon how well it is installed on the machine. By following the instructions contained in this manual it will be possible to easily install this system and obtain many years of trouble free operation.

WHO CAN INSTALL THE DigiPack 100

The installation of the **DigiPack 100** control system requires the installer to be familiar with electrical wiring, hydraulic plumbing and basic metal working. The calibration and start up of the finished system requires some understanding of the blow molding process and use of test instruments such as a digital voltmeter.

The plumbing, wiring and bracketry should not be difficult. Most molding shop maintenance men who are familiar with blow molding machines will have little difficulty with the help of this manual.

The system can be satisfactorily calibrated to the machine and started up without assistance or special equipment by following the instructions in this manual.

INSTALLATION TIME

The time to install a DigiPack 100 varies with the type and size of machine, mechanical constraints such as the location of water lines and auxiliary equipment and the ability of the mechanic doing the installation.

Our experience has shown that typical maintenance men will require about 20 to 30 man hours. Smaller machines will require less time.

Of this time, the actual machine shut down time can be held to 6 hours or less.

1-2 DigiPack 100 SPECIFICATION

Model Number	J141-213 DigiPack 100.
Function	100 Point Single Head Blow Molding Parison Programmer.
Application	Accumulator Based or Continuous Extrusion Blow Molding Machines may be selected.
Profile Points	100 points with linear interpolation.
Tooling Type	Divergent or convergent die gap tooling types may be selected.
Tooling Position Control	Digital closed loop servo system with a 0.5m sec update time.
Tooling Position Monitor	From Tooling Position Actuator's DCDT (10 Vdc. From Accumulator Potentiometer 0 to ~10 Vdc FS.
Programming Inputs	By entry knob and front panel switches.
Display	Back lit Liquid Crystal Display (LCD). 240(W) x 320 (H) pixels. English/Japanese/Chinese language selected by Dip switch and Parameter at Setup screen.
Memory	60 program profile patterns may be stored in a E_PROM.
Marker	A marker output signal may be available at each program point. Marker output may be selected as ON/OFF at each program point.
Other Functions	Shot Size, Delay, Cushion (for accumulator machines only), die gap data saving, profile curve adjustment (Weight and Range H/L), adjustment of the tooling actuator stroke and the accumulator position transducer, battery backup for the system timer and performance data, standard mode for LCD back light and entry knob.
Output to Servovalve	. 100 mA or . 10 Vdc
Servovalve Monitor	. 100% Spool Stroke equals . 10 Vdc I/O for Accumulator: 0 to ~ 10 Vdc transducer output and 15 Vdc transducer excitation.
I/O for Tooling Position	. 10 Vdc DCDT output and . 15 Vdc DCDT excitation.
Common External Input	Photo Coupler Isolated Customer Supplied 15 to 24 Vdc @ 10 to 16 mA /Channel
24 Vdc External Outputs	Photo Coupler Isolated Open Collector for: Customer Supplied 15 to 24 Vdc @ 150mA /Channel Max. (Total 500mA). End of Extrusion/Filling Relay Contacts 250Vac @ 1 A/channel MAX.
Communication	Data transfer with host computer by RS232C
Power Requirements	85 to 265Vac, 50/60 Hz, 30VA
Temperature/Humidity	0 to 45ºC within 95% relative humidity
Dimensions	288 (W) x 240 (H) x 190 (D) mm
Weight	5.6 kg

1-3 CHECK LIST

INSTALLATION CHECK LIST

Order parts for installation

Identify component mounting locations and procure the necessary mounting brackets

Install the DigiPack 100 unit in the blow molding machine or optional enclosure
Mount tooling servoactuator to machine
or Mount servovalve manifold and
or Mount DCDT to tooling actuator
Mount servo actuator pressure filter
Install hydraulic power supply
Install main system filter
Make hydraulic pressure and return connections and flush the hydraulic system,
Mount accumulator position transducer, if required
Install conduit and pull cables for the tooling servoactuator, transducers, filter differential pressure switch and interface between the DigiPack 100 control panel and the machine PLC
Check the wiring
Calibrate transducers
Set up the control loop
Connect the actuator to the die gap tooling and adjust the die gap end points.

1-4 MECHANICAL INSTALLATION

GENERAL

Mounting provisions for the tooling servoactuator should include a stable mounting platform for the tooling actuator, a filter location which allows the filter element to be readily replaced and mechanical provisions allowing simple adjustment of the mechanical relationship between the actuator and the die gap. Figure 4-1 shows such a well planned installation.

A tooling servoactuator provides a long lived solution to the problems caused by high temperatures and force levels. Low friction seals and strong bearings insure long term and good tooling die gap positioning performance. A built in position transducer provides mechanical isolation from shocks and climbing feet. A directly manifold servovalve is tightly coupled to the actuator. Figure 4-2 illustrates a packaged tooling actuator with provisions for pre-blow air..

Figure 4-1 shows a typical tooling actuator installation. A servovalve (upper right) is directly mounted on a manifold, which in turn is attached to an tooling actuator. Directly below is a DCDT position transducer measuring the actuator rod and die gap tooling motion. In addition, a high pressure filter mounted directly on the manifold provides clean oil to the servovalve. Tooling adjustment provisions are also shown.

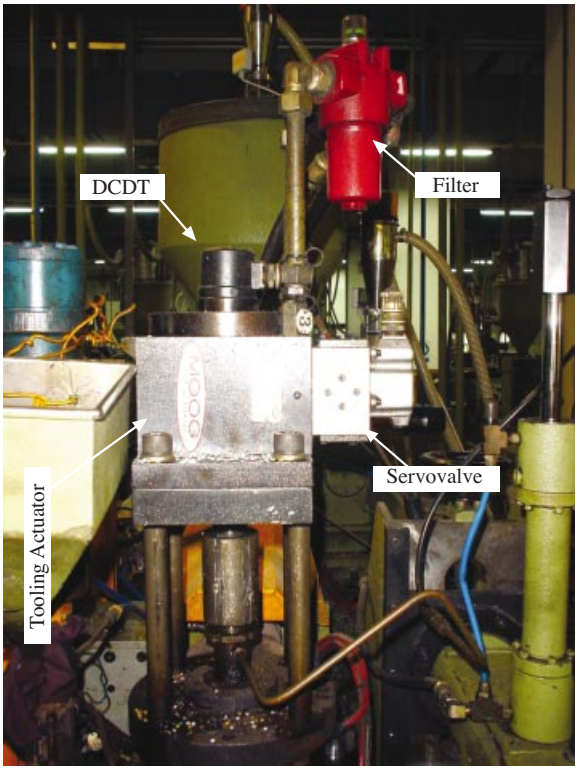


Figure 4-1 Die Gap Tooling Actutor Installation

Figure 4-2 Die Gap Tooling Actuator

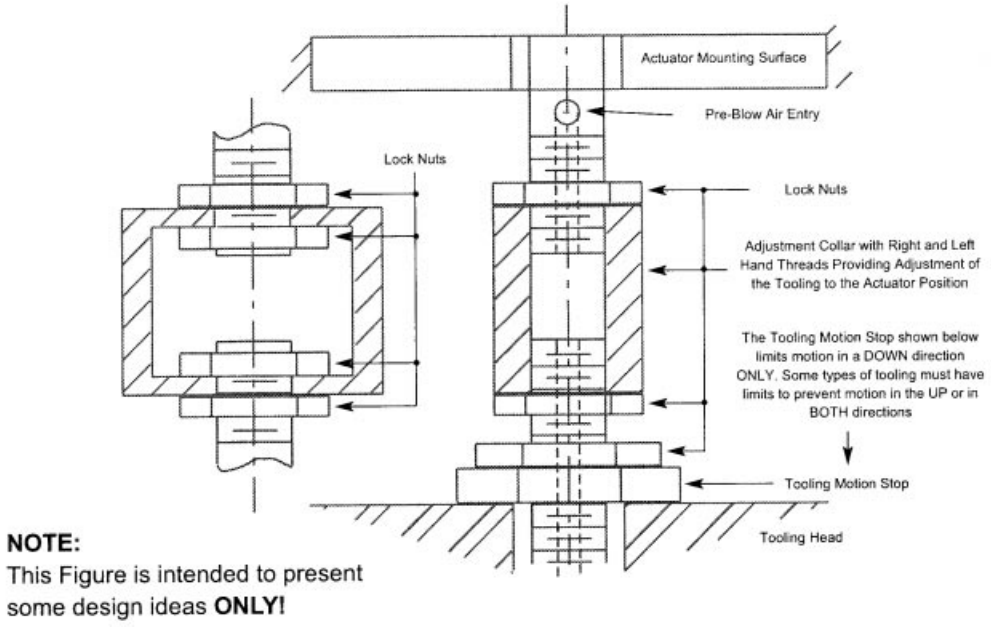


Figure 4-3 Die Gap Tooling Mechanical Adjustment

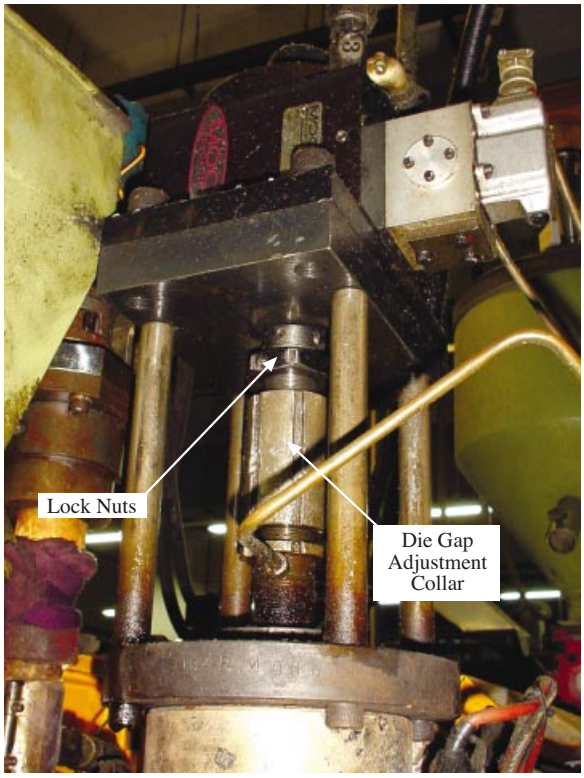


Figure 4-4 Tooling Adjustment Mechanism

TOOLING ADJUSTMENT

When a mold change is made, it is often necessary to change the die gap tooling assembly. Therefore the actuator installation must provide for simple adjustment of the die gap tooling position relative to the actuator position. Figure 4-3 shows two possible methods of adjusting the positional relationship between the tooling actuator and the die gap tooling's closed position. Tooling motion stops may be required to limit the forces on the die gap tooling when the die and mandrel touch. Figure 4-4 is a typical installation.

WARNING! Some actuators with an anti-rotation feature require the nut torque loads on the anti-rotaion device to be limited by absorbing the tightening torque with a wrench on the actuator rod flats

Tooling stops are required to insure a die gap that cannot close on an continuous molding machine. An inadvertent closure of the die gap could cause very high pressures in the extruder barrel and extrusion head and result in their damage and/or failure.

The above comments must be considered for the proper installation of either a Moog supplied die gap tooling actuator or a customer supplied actuator.

WARNING! The extruder barrel and/or screw can be severely damaged if the die gap closes when the extruder is running. A mechanical motion stop must be installed which will not allow the die gap to close.

MOOG DIE GAP TOOLING ACTUATORS

The Die Gap Tooling Actuator is designed specifically to control the die gap motion in blow molding extrusion heads. Their design specification includes: Low friction, Long life piston and rod seals. Graphite flake cast iron rod bearings to absorb potential side loads and high temperatures. Provision for blow air through the piston rod, and pre adjusted position feedback transducer.

The mounting provisions for a die gap tooling actuator must include: a strong mounting structure, provisions for axial and parallel alignment of the tooling actuation rod (mandrel) with the die gap actuators rod, provisions to allow the actuator stroke center and the tooling's effective stroke center to coincide, tooling motion stops to protect the tooling and/or extruder.

Actuator Phasing
The actuator rod extends when valve G631-XXX Pins A, C are positive with respect to Pins B, D.

Actuator Position Connections	Transducer
Pin A	+DC input
Pin B	GND
Pin C	Output
Pin D	Output
Pin E	Not used

Actuator Position Transducer Phasing :Pin C is positive with respect to Pin D when the actuator is retracted.
Connector mates with MS3106-14S-5S

CYLINDER INSTALLATION

Fig 4-5 Typical Cylinder Installation

CUSTOMER SUPPLIED CYLINDER REQUIREMENTS

The customer supplied cylinder is required to control the die gap motion in blow molding extrusion heads. As such their purchase specification must include: Low friction, long life piston and rod seals; Robust rod bearings capable of absorbing large potential side loads and high temperatures. A quality cylinder must be purchased to meet these requirements.

The mounting provisions for the tooling actuator shall include: a strong mounting structure, provisions for axial and parallel alignment of the tooling actuation rod (mandrel) with the die gap actuators rod, provisions to allow the actuator stroke center and the tooling's effective stroke center to coincide, tooling motion stops to protect the tooling and/or extruder.

WARNING! Some actuators with an anti-rotation feature require the nut torque loads on the anti-rotation device to be limited by absorbing the tightening torque with a wrench on the actuator rod flats.

MANIFOLD

The manifold must be mounted using as close as possible to the cylinder. Ideal methods are to mount the manifold directly on the cylinder, sealing the ports with "O" rings or to use tubing between the cylinder and manifold.
The pressure and return connections should be straight thread fittings using an "O" ring as a seal. Tapered thread fittings are not encouraged as they tend to leak and when they are torqued up to stop the leak, the servovalve mounting surface is distorted, causing leakage at the servovalve-manifold seal. Straight thread fittings using "O" rings do not leak or cause mounting surface distortion.

Should tapered thread fittings be used, ONLY Teflon tape can be used on the tapered threads as a sealant. The Teflon tape must not cover the last two threads at the smaller diameter portion of the thread. Any other material will cause eventual contamination problems.
Figure 4-4 shows two possible methods of adjusting the positional relationship between the tooling actuator and the tooling's die gap closed position. Tooling motion stops may be required to limit the forces on the die gap tooling when the die and mandrel touch. Figure 4-5 is a typical installation.
Tooling motion stops may also be required to insure a die gap opening on an continuous molding machine. An inadvertent closure of the die gap could cause very high pressures in the extruder barrel and extrusion head and result in their damage and/or failure. The above comments must be considered for the proper installation of either a Moog supplied die gap tooling actuator or a customer supplied actuator.

SERVOVALE MOUNTING

The servovalve is mounted to a manifold with four mounting screws and using four "O" rings to seal the Pressure, Return (Tank), and the two Cylinder hydraulic connections.
The "O" ring seal between the servovalve and manifold depends upon the servovalve mounting manifold surface flatness to insure that there are no oil leaks. This surface must be flat within 0.025mm and have a .32 RMS finish. Two servovalves mounting patterns are available: a Cetop 5, NG 10 or a Ø22,2mm, Moog 76 port circle.

TOOLING ADJUSTMENT

When a mold change is made, it is often necessary to change the die gap tooling assembly. Therefore the actuator installation must provide for simple adjustment of the die gap tooling position relative to the actuator position.

Figure 4-6 G631-XXX Servovalve

WARNING! The extruder barrel and/or screw can be severely damaged if the tooling die gap closes when the extruder is running. A mechanical motion stop must be installed which will not allow the die gap to close.

ACCUMULATOR POSITION MEASUREMENT

Accumulator type blow molding machines require a position transducer to indicate the accumulator position. The parison wall thickness pattern can then be programmed with direct reference to the accumulator stroke of Shot Size.

If the DigiPack100 is being installed on a continuous extrusion machine please go to the next section.

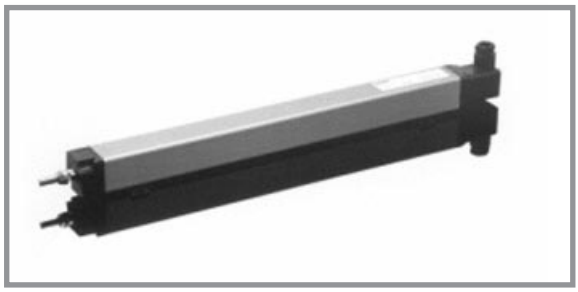


Figure 4-7 Typical Linear Potentiometer

INSTALLATION REQUIREMENTS

The position transducer is required to operate in a high temperature and vibration environment. In addition the transducer must accommodate some mechanical mis-alignment without reduction of life and linearity.

Transducer installation designed to control and adjust the alignment between the potentiometer and the accumulator motions. The features are as follows:

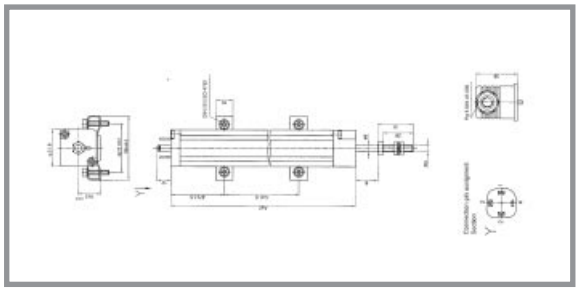


Figure 4-8 B82000 Potentiometer Installation

1) An accumulator driven bearing guided structure for the potentiometer drive arm
2) Mounting provisions for the potentiometer on the same bearing guided structure, provisions for adjustment to insure parallel motion of the potentiometer guide arm and potentiometer drive rod
3) And a rod end bearing between the potentiometer drive rod and the potentiometer guide arm

Installation Information

P/N B82000 -		**300**	**500**	**750**	**900**
Electrical Data					
Rated Stroke	mm	300	500	750	900
Nominal Resistance					
Kohm	5	5	10	10	
Independent Linearity	%	0.07	0.05	0.05	0.05
Mechanical Data	mm				
Mechanical Stroke	**B**	312	515	769	922
Body Length	**A**	375	579	833	985
Mounting Feet Spacing	**X**	280.5	484.5	738.5	890.5

THE IMPORTANCE OF FILTRATION

Adequate contamination control in any hydraulic system is the key to a highly reliable system. Proper filter placement and selection insures long term trouble free operation of every hydraulic system component. There are three essentials:

1) a high pressure filter mounted directly at the tooling actuator
2) a recirculating circuit providing continuous filtration and heat removal
3) proper control of the tank breathing and filling operations to prevent the ingression of contaminant

Figure 4-9 High Pressure Filter

High pressure filter (β_{15}»75, 15µ absolute) mounted directly with tubing at the tooling actuator provides protection against particles created by component failures.

The main contamination protection is provided by oil taken from one corner of the tank, flowing through the low pressure recirculating filter back to the opposite corner of the tank. The recirculation filter is a low pressure filter (β_3»75, 3µ absolute) with an inexpensive replacement filter element. The recirculation also incorporates a heat exchanger to maintain low oil temperature and insure adequate oil life.

Protection against ingression of contaminant during oil make up and normal breathing is provided with breather rated at 10 µ.

FILTER INSTALLATION

High pressure filter or equivalent, β_{15}>75 rated, high pressure filter must be mounted as close as possible (50mm to 300mm) to the acutator or servovalve manifold. The location of the filter must allow an easy access to make a replacement of filter element easy and safety.

Filter Installation Information

The hydraulic connection between the filter and actuator must be tubing. Under no circumstances can hydraulic hose be used as the hose is a contaminant generator and this contaminant will go directly into the servovalve, eventually causing contamination problems.

The hydraulic connections used will be a straight thread "O" ring sealed boss into the servoactuator and high pressure filter with either flared or compression fittings used to connect the tubing to the straight thread fittings.

The use of tapered thread fittings with pipe dope will cause both contamination and leakage problems. Teflon tape may be used, but only if applied in such a manner as to keep the edge of the Teflon tape at least two threads away from the end of the fitting.

HYDRAULIC POWER SUPPLY

The Hydraulic Power Supply provides clean oil to the die gap tooling actuator at a constant supply pressure. An accumulator provides the peak flows that may be required. A water heat exchanger ensures reasonable oil temperatures.

The Hydraulic Power Supply is normally used on first installations when the cleanliness condition of the blow molding machine's hydraulic power supply is unknown or suspect.

A separate hydraulic power supply provides a reliable source of clean oil for trouble free long term operation. A bypass filter allows the oil to be continually cleaned and cooled.

The hydraulic power supply pressure output should be connected directly to the input port of the high pressure filter at the die gap tooling actuator or the servovalve manifold. The actuator or manifold return line goes to the hydraulic power supply return port.

Figure 4-10 Hydraulic Power Supply

HYDRAULIC POWER SUPPLY START UP INSTRUCTIONS

1) Check for any damage to the hydraulic power supply and its parts.
2) Fill the tank through the breather filter with Shell/Tellus 68 or equivalent fluid.
3) Check the nitrogen gas pressure in the accumulator bladder. The pressure should be 35 bar or 66% of the maximum system pressure, whichever is higher. Add nitrogen, if necessary.
4) Replace the filter elements with flushing elements. Store the original filter elements in a clean, very clean plastic bag.
5) Connect the pressure and return lines to and from the tooling actuator assembly
6) Check the motor name plate for the correct line voltages and connect the motor to power. Start the motor and check that it rotates in the proper direction.
7) Connect cooling water to the heat exchanger. The required water flow rate is 30 1/min at 2-3 bar.
8) Run the hydraulic power supply for at least 6 hours. Vary the flow rate and pressure to thoroughly flush all chips and dirt into the filters. Monitor for leaks and repair.
9) Replace the flushing filter elements with the elements removed in step 4.

Figure 4-11 Low Pressure Filter

CONTAMINATION CONTROL

Long term trouble free operation with a minimum of unplanned down time and adequate oil contamination control are linked very closely. It is very important to maintain adequate oil cleanliness. The addition of a system contamination control filter will control oil contamination levels at minimum expense.

The filter should be located such that the flow through the filter is relatively constant and at a low pressure. The junction of the return lines from the tooling actuator and the system relief valve is a suitable location.

1-5 ELECTRICAL INSTALLATION

GENERAL

Electrical installation includes several phases of work:

A) mounting the DigiPack 100 in a suitable location
B) determining the correct phasing so the servovalve, tooling position transducer and, possibly, accumulator postion transducer may be connected to the DigiPack 100
C) determining the blow molding machine interface interaction with the DigiPack 100 and then wiring the machine-DigiPack 100 interface
D) connect the DigiPack 100 to electrical power from the mains through a possible isolation transformer

DigiPack 100 MOUNTING

The DigiPack 100 must be mounted in a location free of vibration, with protection from the environment and most important, located in a position allowing the operator and setup man easy visual and physical access. It is recommended that the mounting be on a swing out panel allowing easy access to the front and back sides of the DigiPack 100.

Mounting information is shown in Figure 5-1. Brackets providing simple panel mounting are included.

WARNING! All wiring from the DigiPack 100 must be shielded. The shield is to be grounded to the DigiPack 100 ground at the DigiPack 100 only Any other ground paths may cause damage.

TB-1, TB-2 WIRING

TB-1 provides the interface between the DigiPack 100 and the servovavle, die gap sensor, accumulator position sensor. TB-1 also provides outputs to optional customer monitors of Mechanical Feedback (MFB) servovalve current, Electrical Feedback (EFB) servovalve spool position, die gap position and accumulator position. A schematic of TB- 1 is shown as Figure 5-3 and TB-1 functions are outlined in the table, Figure 5-4.

Phasing definitions for the servovalve, die gap position and accumulator position (when used) transducers are given in figures 5-2.

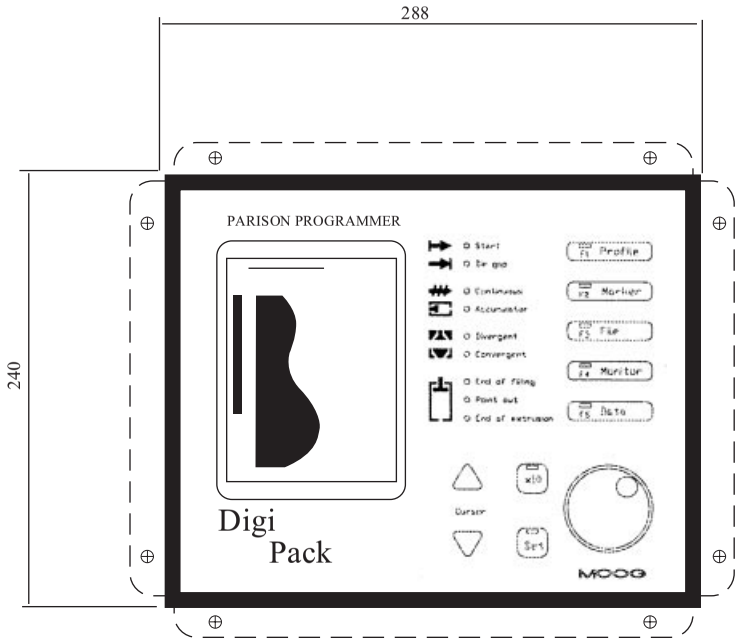
Some connections to TB-1 are shown in parenthesis, (), in Table 5-3. The parenthesis, (), indicate alternate connection possibilities result from particular directions of motion or phasing determined during the design of the mechanical installation.

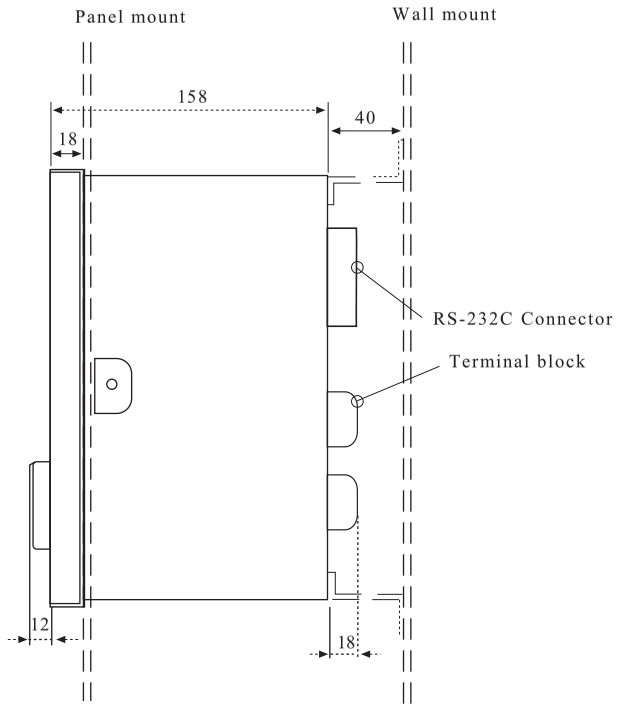
Phasing requires that a defined direction of motion of the tooling actuator will result from TB-1-1 being negative with respect to TB-1-2; that the output voltage of the die gap position transducer be positive or negative when the die gap is moving in a specific direction; and that the accumulator position transducer output voltage direction be defined when the accumulator is ejecting molten plastic into the die head.

Terminal TB-2 is using the external power supply to isolate logic inputs, Figure 5-6, TB-2 functions are outlined in Figure 5-7.

DigiPack 100 SPECIFICATION

Model Number:	J141-213 **DigiPack 100.**
Function:	100 Point Single Head Blow Molding Parison Programmer.
Application:	Accumulator Based or Continuous Extrusion Blow Molding Machines may be selected.
Profile Points:	100 points with linear interpolation.
Tooling Type:	Divergent or convergent die gap tooling types may be selected.
Tooling Position Control:	Digital closed loop servo system with a 0.5m sec update time.
Tooling Position Monitor:	From Tooling Position Actuator's DCDT 10 Vdc. From Accumulator Potentiometer 0 to ~10 Vdc FS.
Programming Inputs:	By entry knob and front panel switches.
Display:	Back lit Liquid Crystal Display (LCD). 240(W) x 320 (H) pixels. English/Japanese/Chinese language selected by Dip switch and parameter at setup screen.
Memory:	60 program profile patterns may be stored in a EPROM.
Marker:	A marker output signal may be available at each program point. Marker output may be selected as ON/OFF at each program point.
Other Functions:	Shot Size, Delay, Cushion (for accumulator machines only), die gap data saving, profile curve adjustment (Weight and Range H/L), adjustment of the tooling actuator stroke and the accumulator position transducer, battery backup for the system timer and performance data, standard mode for LCD back light and entry knob.
Output to Servovalve:	. 100 mA or . 10 Vdc
Servovalve Monitor:	. 100% Spool Stroke equals . 10 Vdc
I/O for Accumulator:	0 to ~ 10 Vdc transducer output and 15 Vdc transducer excitation.
I/O for Tooling Position:	. 10 Vdc DCDT output and . 15 Vdc DCDT excitation.
Common External Input:	Photo Coupler Isolated
	Customer Supplied 15 to 24 Vdc @ 10 to 16 mA /Channel
24 Vdc External Outputs:	Photo Coupler Isolated Open Collector for: Customer Supplied 15 to 24 Vdc @ 150mA /Channel Max. (Total 500mA). End of Extrusion/Filling Relay Contacts: 250Vac @ 1 A/channel MAX
Communication:	Data transfer with host computer by RS232C
Power Requirements:	85 to 265Vac, 50/60 Hz, 30VA
Temperature/Humidity:	0 to 45ºC within 95% relative humidity
Dimensions:	288 (W) x 240 (H) x 190 (D) mm
Weight:	5.6 kg



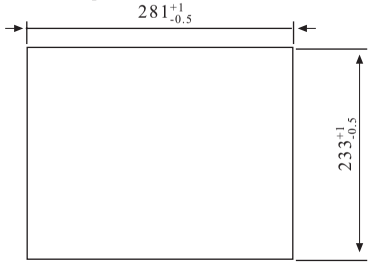


Specification

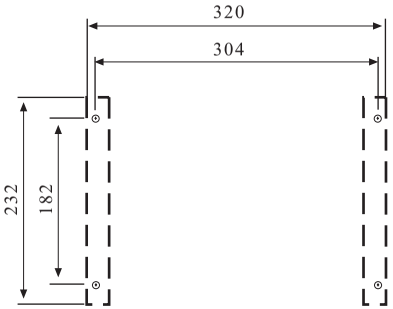
1, Overall dimensions
288(W)x240(H)x190(D)mm
2, Weight5,6kg
3, Temperature, humidity
Temperature : 0 - 45 deg C
Humidity: up to 95% RH without dew
4, Power source AC100~240Vac, 45~65Hz, 30VA
5, Cable connection: Terminal block M3 screws
Terminal block M4 screws
(power source only)

Mounting dimensions : panel

Maximum panel thickness 8mm



B73533 002
Mounting dimensions : panel
Option : Use vertical Z-section
angle brackets



B73533 001
Mounting dimensions : panel
Option : Use vertical Z-section
angle brackets

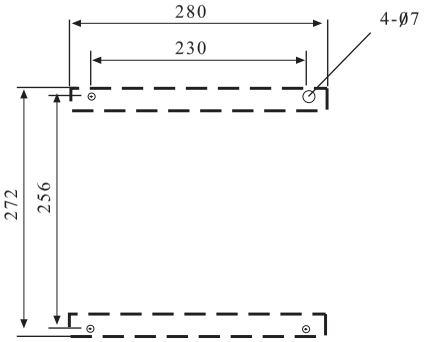


Figure 5-1 DigiPack Installation Drawing

REAR PANEL CONNECTIONS

PHASING TB-1: Analog I/O Terminals (Moog Products and Transducers)

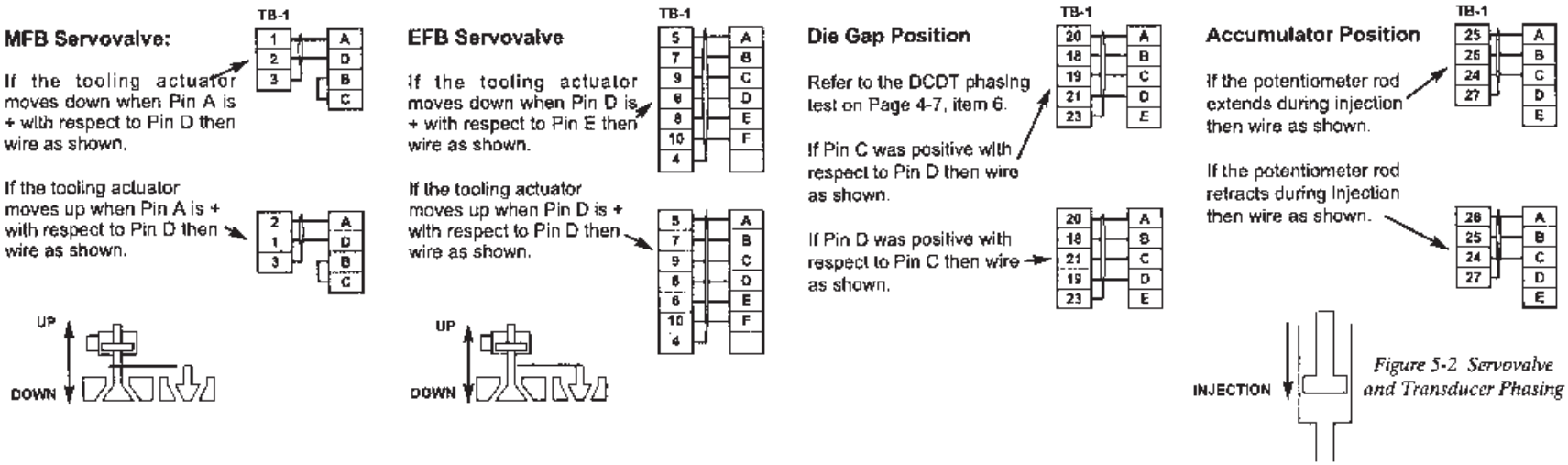


Figure 5-2 Servovalve and Transducer Phasing

TERMINAL TB-1

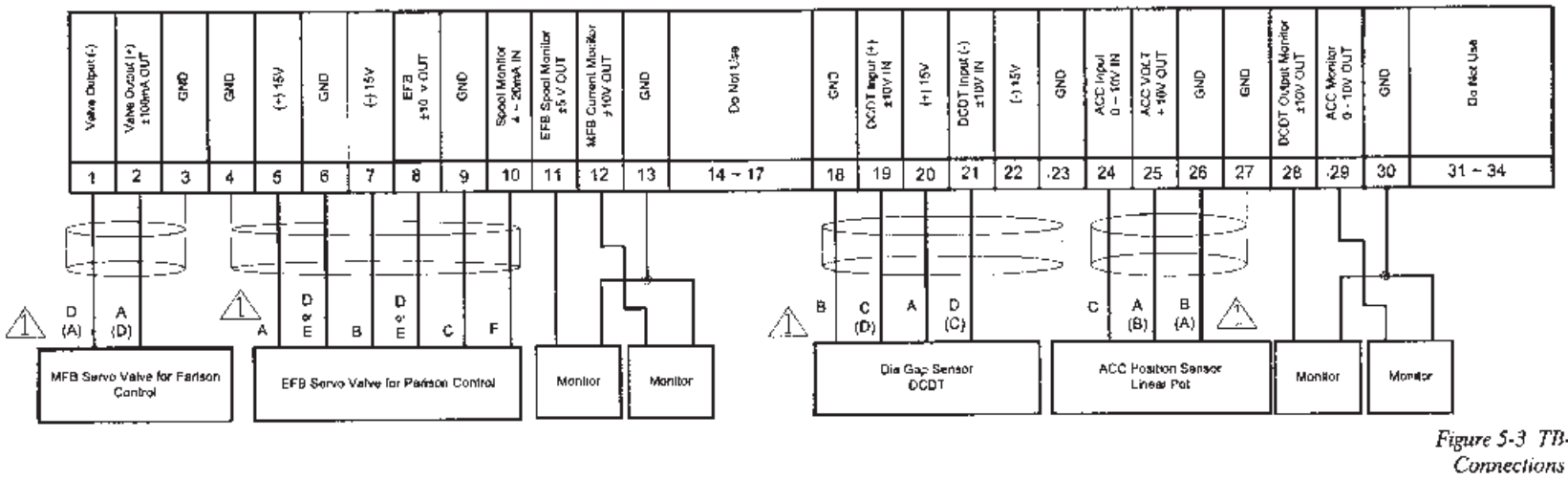


Figure 5-3 TB-1 Connections

TB-2:Analog I/O Terminals (Moog Products and Transducers)

Term No.	Name	Function	Comments
1	-MFV Input	Pin A or D, B to C, MFB Servovalve	(MFB) Mechanical Feedback
2	+MFV Input	Pin A or D, B to C, MFB Servovalve	Connection A to D or D to A allow phase reversal
3	GND(Cable Shield)	Cable Shield groud, MFB Servovalve	Dot not ground the shield at the servovalve!
4	GND(Cable Shield)	Cable Shield groud, EFB Servovalve	Dot not ground the shield at the servovalve!
5	+15Vdc	Pin A, EFB Servovalve	(EFB) Electical Feedback Valve Power
6	Input, - Ground	Pin E or D, EFB Servovalve	EFB Input Command(-)
7	-15Vdc	Pin B, EFB Servovalve	EFB Power
8	Input, + Command	Pin D or E, EFB Servovalve	EFB Input Command(+) ±10V Out
9	GND (power)	Pin C, EFB Servovalve	Power Ground
10	Valve Spool Position	Pin F, EFB Servovalve	Spool position monitor 4~20mA In
11	EFB Spool Position	Monitor EFB Spool Position	±10Vdc = ±100% Spool Motion
12	MFB Input Current	Monitor MFB Input Current	±100mA = ±10V Output Volt
13	GND	Monitor GND	
14 -17	DO NOT USE		
			B63358 Tooling Actuator Connections →
18	GND	Pin B*; Black**	
19	+DCDT Position	Pin C*; Blue**	±10V In
20	+15Vdc Power	Pin A*; Red**	* 010-71670 DCDT Phasing, as core moves
21	-DCDT Position	Pin D*; Green**	** A31121-4 DCDT to Connector or Lead End
22	-15Vdc Power		
23	GND Power to Pot	DCDT Shield Ground	Do not ground the shield at the Actuator or DCDT
24	Accumulator Position	Pin 2, B8200 Potentiometer	0~+10Vdc Input
25	+10Vdc Power to Pot	Pin 1 or 3, B8200 Potentiometer	+10Vdc Output
26	GND Ground Power to Pot	Pin 3 or 1, B8200 Potentiometer	
27	GND(Cable Shield)		
28	DCDT Output Position	Monitor Die Gap Opening	±10Vdc Out
29	MFB Input Current	Monitor Accumulator Position	0~+10V Out
31-34	DO NOT USE		

B63358 Installation Connections

MFB Servovalve

TB-1	Connector
1	A
2	B
3	Shield

EFB Servovalve

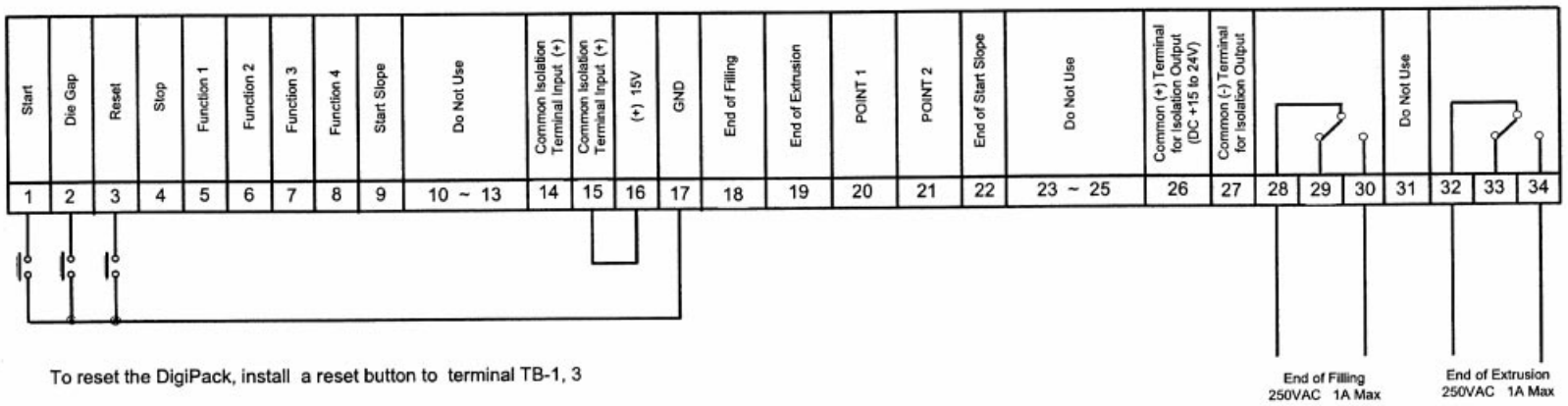
5	A
7	B
9	C
8	D
6	E
10	F
4	Shield

Die Gap Position

20	A
18	B
19	C
21	D
23	Shield

Figure 5-4 TB-1 Functions

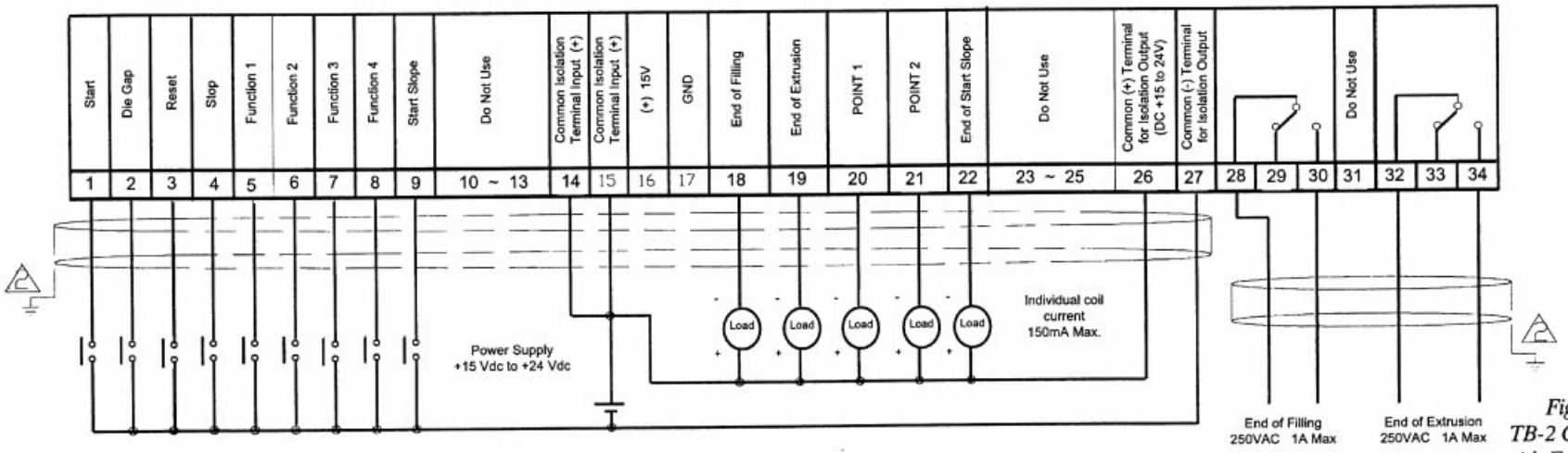
TERMINAL TB-2 The case of internal power supply



To reset the DigiPack, install a reset button to terminal TB-1, 3

Figure 5-5 TB-2 Connections with Internal Logic Supply

TERMINAL TB-2 The case of external power supply (The case of isolation input)



1. Install relay coil diode transient suppression.
2. Non-open contact relays are preferred.

Figure 5-6 TB-2 Connections with External Logic Supply

TB-2:General I/O Terminals

Term No.	Name	Function	Comments Refer to Figures 5-5 and/or 5-6
1	IN1 START	Command for Cycle Start	Required (50 ms min) to enable the start of each machine cycle
2	IN2 DIE GAP	Command to keep the tooling die gap at the set Die Gap value until IN1 START	Provides an independently set Die Gap when energized(50 ms min)
3	IN3 RESET	Software reset terminal for Controller	
4	IN4 STOP	Command for Stop operation	Maintains program point die gap until Start
5	IN5 FUNCTION1	Refer to Function Chart	
6	IN6 FUNCTION2	Refer to Function Chart	
7	IN7 FUNCTION3	Refer to Function Chart	See Function Chart on Page 22
8	IN8 FUNCTION4	Refer to Function Chart	
9	Start Slope	Command to Start Slope	
10-13	DO NOT USE		
14	IN +COM	Common+Isolation Input	15~24 Vdc(IN9~13)
15	IN +COM	Common+Isolation Input	15~24 Vdc(IN1~8)
16	+15Vdc	Power Supply +15Vdc	Output Current 100mA Max
17	GND	Power Supply Ground	Output Current 100mA Max
18	END OF FILLING	Signal output from End of Filling to receipt of Start signal	Pulse to stop accumulator filling
19	END OF EXTRUSION	Output signal at the End of Extrusion	Max time, if reset by START, time will be shorter
20	OUT5 POINT1	Enabled MARKER output signal	Pulse Duration 30msec
21	OUT6 POINT2	Output signal from all program points	Pulse Duration 20msec
22	END OF START SLOPE		
23-25	DO NOT USE		
26	COM-Isolation	15 to 24Vdc	NOTE: I/O isolation is assigned by negative logic.
27	Isolation GND	GND	
28	EOF Relay COM	END OF FILLING Relay Common	Ref! (TB-2,28) Do not use magnet contact relay directly
29	EOF Relay B	END Relay Contact B (NC)	Ref! (TB-2,29) Do not use magnet contact relay directly
30	EOF Relay A	END Relay Contact A (NC)	Ref! (TB-2,30) Do not use magnet contact relay directly
31	DO NOT USE		
32	EOE Relay COM	END OF EXTRUSION Relay Common	Ref! (TB-2,32) Do not use magnet contact relay directly
28	EOE Relay B	End Relay Contact B (NC)	Ref! (TB-2,33) Do not use magnet contact relay directly
28	EOE Relay A	End Relay Contact A (NC)	Ref! (TB-2,34) Do not use magnet contact relay directly

Figure 5-7 TB-2 Functions

TB-2 I/O CIRCUITRY

Input _____

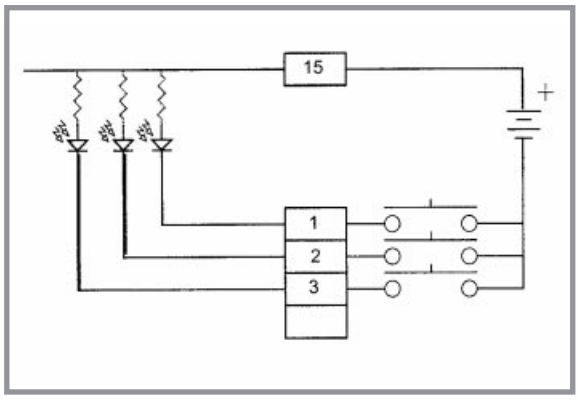


Figure 5-8 Isolated Input

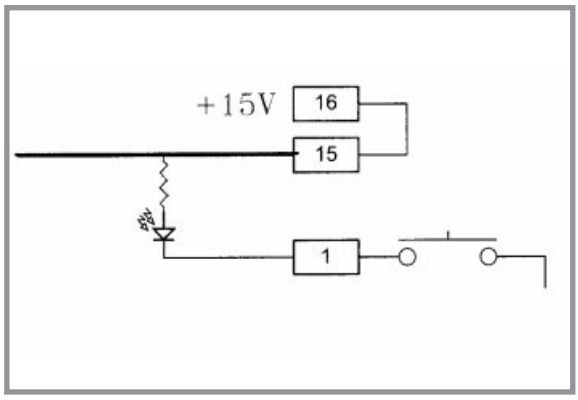


Figure 5-9 Non-Isolated Dry Contacts

All DigiPack 100 I/O uses NEGATVIE LOGIC

Photo Couplers and an external power supply are used to provide isolated inputs to the DigiPack. 100 The external power supply has an output between 15 to 24Vdc.

Dry contacts and the DigiPack 100 internal power supply are used to provide non-isolated inputs to the DigiPack 100.

The contacts used must have very low contact resistance over a long life time.

Extreme care is required when wiring to insure that ground loops do not exist. Ground loops can cause damage to the DigiPack 100 and other electronic equipment. Ground loops can also cause erratic operation of the entire blow molding machine.

Output _____

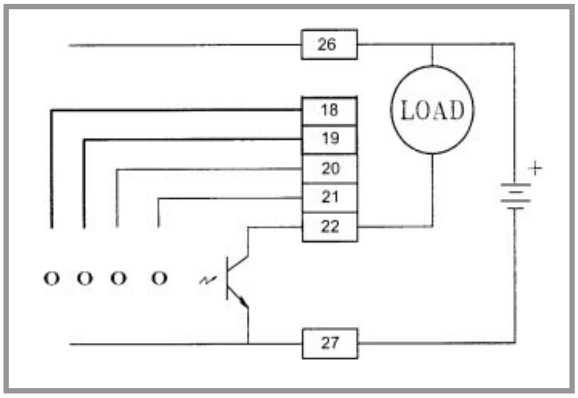


Figure 5-10 Isolated Output

DigiPack 100 output circuits use Photo Couplers to provide isolation from the external circuitry.

An external power supply is required.

The maximum voltage and current output to each load terminal (TB-2, 18, 19, 20, 21 and 22) is 24Vdc and 150 mA each.

Function Chart - Reference Terminal No's 5-8, TB1

IN5	IN6	IN7	IN8	Direction
H	H	H	H	No Movement (Use Front Keys)
L	H	H	H	Move to Profile (F1) Mode
L	L	H	H	Move to Marker (F2) Mode
L	H	L	H	Move to File (F3) Mode
L	L	H	L	Move to Monitor (F4) Mode
L	H	H	L	Move to Data (F5) Mode
L	L	H	L	Move to Set-Up (F1+SET) Mode
L	H	L	L	Move to Timer (F2+SET) ModeL
L	L	L	L	Move to Communication (F5+SET) Mode

NOTES: "H" is the condition for which the Photo Coupler is **OFF**.
Changing form the Monitor (F4) Mode to other Modes can only be done by using the function Keys on the front panel.
The function Keys on the front panel are disabled if IN5 is in condition (L).

TB-3: Power Supply

Term No.	Name	Specification
R	Power Supply	85 to 265 Vac, 50/60 Hz
S	Power Supply	
FG	Earth	

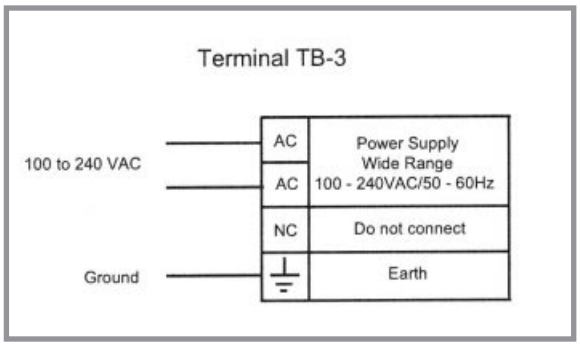


Figure 5-11 Mains Connections

NOISE and GROUND ISOLATION

In any location there is always the potential for electrical noise interference and multiple ground paths. Electrical noise can cause erratic system operation and is very difficult to find and isolate, ground loops also cause unexpected operation as well as burn out components. In addition, mains voltage stability can sometimes be questionable.

An isolation transformer between the mains and DigiPack 100 can provide some relief from noise, ground loops and wandering mains.

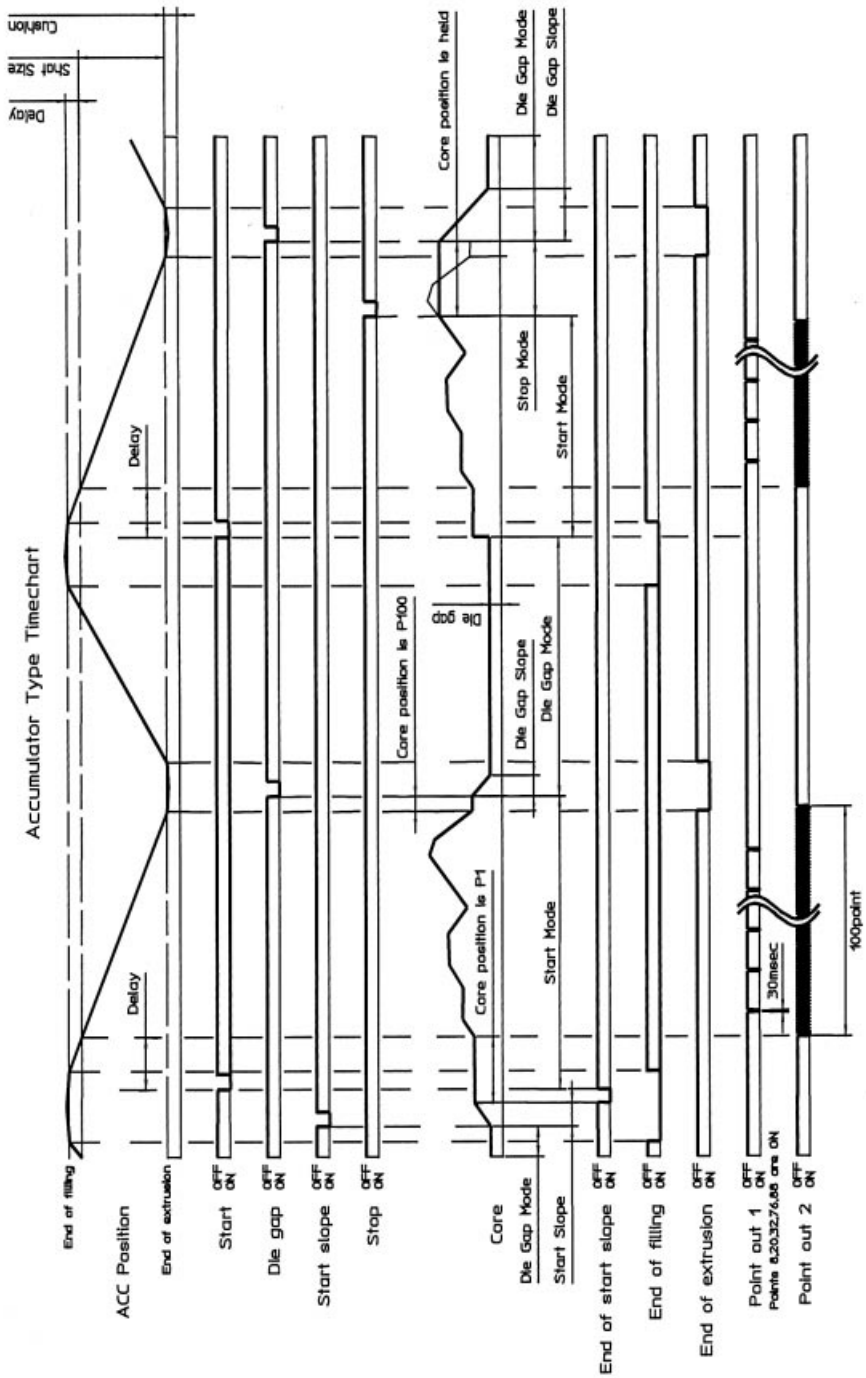


Figure 5-12 Accumulator Machine Timing chart

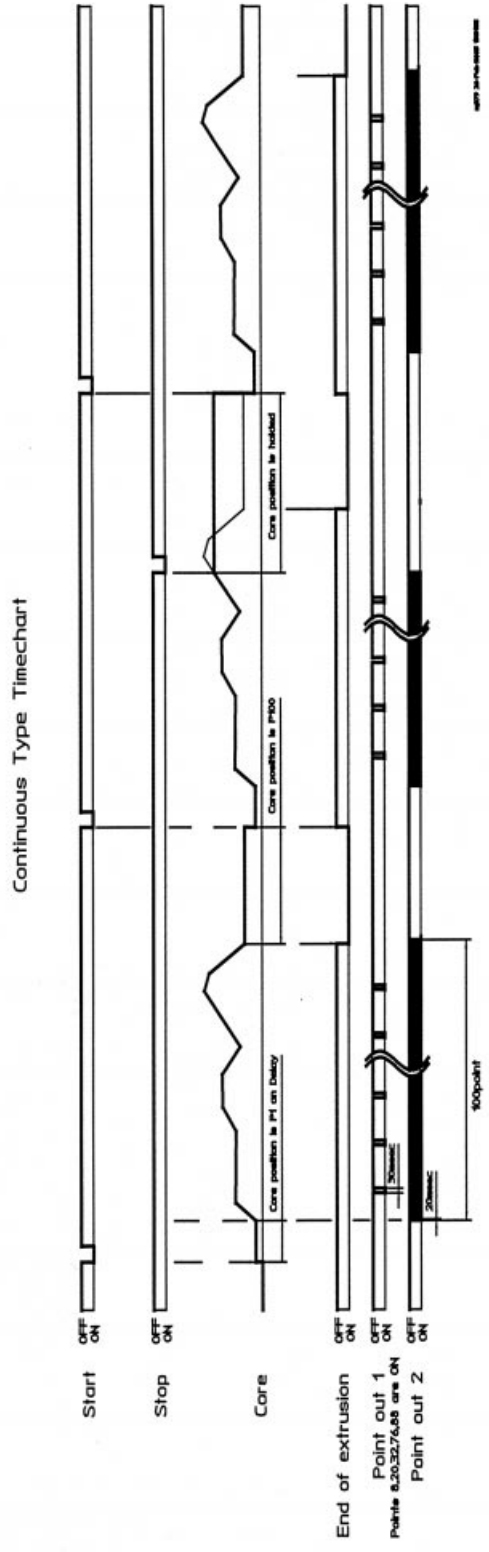


Figure 5-13 Continuous Machine Timingchart

1-6 TOOLING SYSTEM SETUP

GENERAL

The Mechanical and Electrical installation must be finished before the Dig Gap Tooling position control system can be set up. In addition the, hydraulic system must have been flushed for at least 24 hours.

The Die Gap Tooling position control system setup involves several steps:

1) The Dip Switch inside the DigiPack 100 enclosure must be set to match various options determined by the blow molding machine and tooling head type.
2) The correct tooling type selection, Convergent or Divergent, must be determined. This will be determined by which portion of the tooling moves, the die or mandrel, as well as its internal shape.
3) The DigiPack 100 must know if the blow molding machine is a Accumulator or a Continuous molding machine.
4) The working Die Gap end positions, closed and maximum opening, must be set.
5) The responsiveness of the Die Gap Tooling position control system is measured and optimised.

When finished with the Die Gap Tooling system setup, the blow molding machine will be ready to be programmed for production containers.

WARNING! The hydraulic pressure must be lowered during the setup procedure or the die gap tooling may be damaged.

DIP SWITCH SETTINGS

The internal Dip Switch is located near the upper frame in a top center location on the main circuit board.

The switch settings required now are:

1) Language - Either English/Japanese or English/Chinese
2) Type of servovalve internal feedback - Either mechanical feedback, MFB, or electrical feedback, EFB
3) Machine Type - Eigther a Continuous or Accumulator based blow molding machine

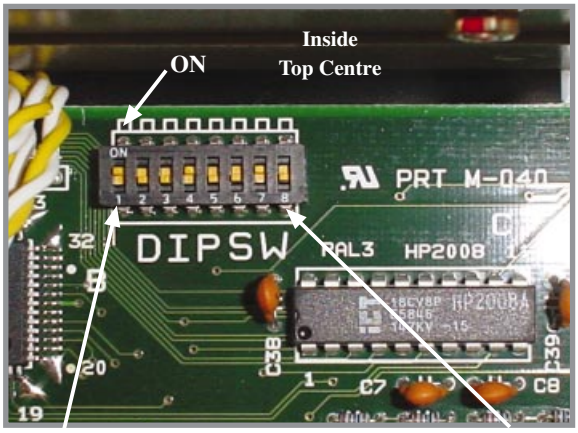


Figure 6-1 Dip Switch Location

Figure 6-2 defines all of the Dip switch settings.

Electrical power must be OFF when the Dip Switch settings are changed.
A small screwdriver will facilitate making the required change (s).

WARNING: External power to the DigiPack 100 must be OFF when setting the DIP switches or circuit damage may result.

Switch No.	Function	Setting ON	Setting OFF
1	Language	English/ Chinese	(English/Japanese)
2	Set Up Mode	Disable	(Enable)
3	Servovalve Type	EFB	(MFB)
4	Open COMN	(Not Used)	Used
5	Standby Mode	Not Used	(Used)
6	Machine Type	Continuous	(Accumulator)
7	RS-232 Baud Rate	(9,600 bps)	4,800 bps
8	Not Available	( )	

Default Items Are Bracketed ( ).

Figure 6-2 DIP Switch Functions

DIP SWITCH FUNCTION

Switch 1	Language - (English/Japanese or English/Chinese) Sets the language used on the LCD Display
Switch 2	Set-Up Mode - (Enable) Controls entry to the F1+Set (Set Up), F2=Set (Timer) and F5+Set (RS232C Communication Modes
Switch 3	Servovalve Type - (MFB) Select either the Mechanical Feedback or Electrical Feedback type servovalve
Switch 4	Open COM - (Not Used) When OFF (Used) allows the DigiPack 100, Servovalve, DCDT and Cable operation to be checked
Switch 5	Stand-by Mode - (Used) Shuts off the LCD back light and disables the Entry Knob if no Key Input occurs for 3 minutes. Touching any of the Keys F1 through F5 will enable the Entry Knob and the backlit LCD
Switch 6	Machine Type - (Accumulator) Select between Accumulator and Continuous Machine Types
Switch 7	RS-232 Baud Rate - (9,600 bps) Select 9,600 bps or 4,800 bps
Switch 8	Not available - (OFF)

DIP SWITCH SETTING

Dip Switch positions 1, 3 and 6 should now be set to reflect the choice of language, servovalve type and machine type.

BACKUP BATTERY

The backup battery is found in the upper right hand side of the open DigiPack 100

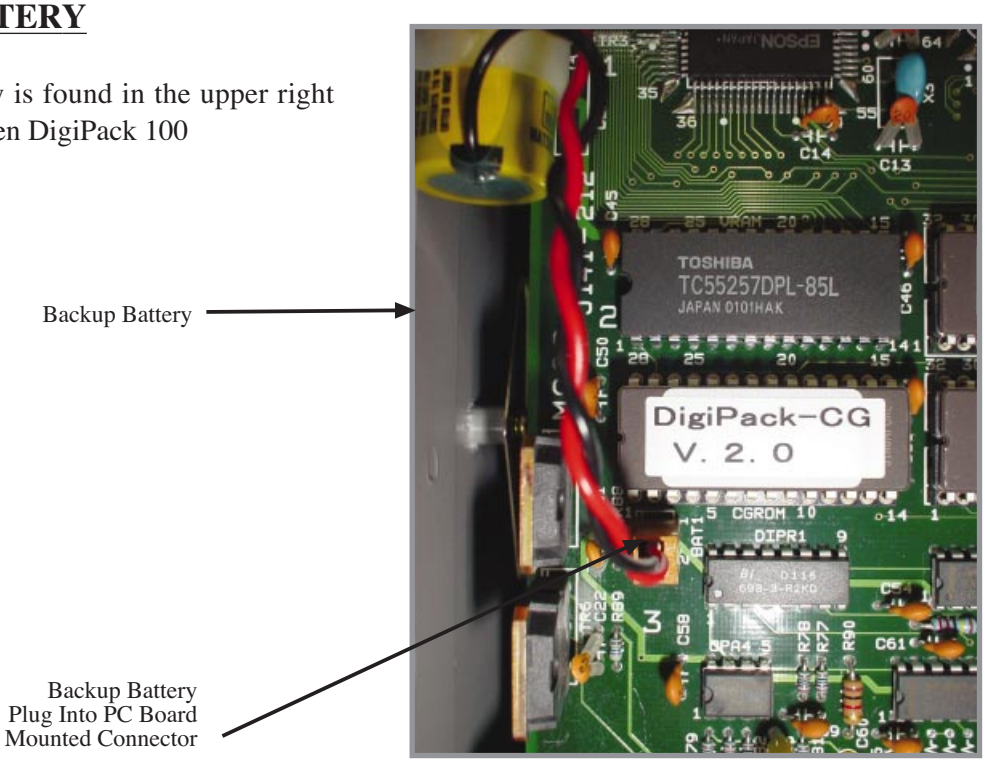


Fig 6-3 Backup Battery and Connector

The backup battery supports the timer and parison thickness program data. When its output voltage is too low an alarm will sound and a warning message "LOW BATTERY ERROR" will appear on the LCD display. The battery, P/N B73556-001, then must be replaced immediately or some corruption of data may occur.

Battery replacement as follows:

1) if required, store the current program information using F3 file
2) Turn off the electrical power
3) Replace the old battery with a new battery
4) Connect the battery lead wires. Use Figure 6-2 as a reference
5) Apply electrical power
6) Move to the F3 file mode and load the program information stored in step 1
7) Reset the timer (Set + F2)

SUM CHECK ERROR

Corruption of the performance data use to a weak battery or some other problem will cause an error message "SUM CHECK ERROR" to appear on the LCD display. If this message is displayed, first reload the profile data stored in the F3 mode and then continue operation.

Should this message occur often, and the battery is not the cause, please contact MOOG.

NOTE: The average life of the backup battery is 5 years

Figure 6-4 DigiPack 100 Front Panel

DigiPack 100 FRONT PANEL

OPERATIONS CONTROLS

The operator will setup and monitor the parison wall thickness program using the display, entry controls, function switches and Led's on the DigiPack 100's front panel, shown in Figure 6-4,

All of the functions normally required to program the parison and machine are available on the front panel.

INPUT FUNCTION SELECTION AND VALUE

Entry Knob Used to enter the value of various functions. Rotation in a clockwise

X10 Increases the sensitivity of the Entry Knob by a factor of 10

Set Push to set value

Cursor Used to scroll the items on the LCD in the direction indicated by the triangular shape

NOTE: Highlighting is used to indicate the action FUNCTION or its VALUE to the operator. In Figure 6-4 the value of SHOT SIZE, 11.0% is highlighted as shown in this case highlighting indicates that the value of SHOT SIZE may be changed by rotating the ENTRY KNOB.

LED's (LIGHT EMITTING DIODEs)

The Led's are used to indicate the status of various functions as follows:

Start	Lights when the cycle Start signal is received.
Die Gap	Lights when the Die Gap signal is received and "DIE GAP" on the LCD is back lit
Continuous	Lit when the "Continuous Extrusion" machine type is selected
Accumulator*	Lit when "Accumulator" machine type is selected
Divergent	Lit when "Divergent" die gap tooling is selected
Convergent*	Lit when "Convergent" die gap tooling is selected
Point Out	Lights when each Marker point is reached
End of Extrusion*	Lights at the end of the accumulator extrusion stroke (Cushion)

*LED is lit in Figure 6-4

FUNCTION SWITCHES

Used to select the Functions F1 through F5 shown on the LCD display. These functions are:

F1 Profile*	Controls the parison wall profile and other related functions
F2 Marker	nables the program point markets
F3 File	Controls the container wall thickness storage functions
F4 Monitor	Enables the I/O functions and indicates current value of servovalve input current and die gap position
F5 Data	Displays the profile point and related function data
SET+F1	SET UP Mode - Provides die gap tooling and other machine related set up functions
SET+F2	Timer Mode - Internal clock control
SET +F5	Communication Mode - Controls the RS-2323C data link

SET UP PROCEDURE

Assuming that the Dip Switch has been changed to reflect language, servovalve type, machine type and that the mechanical and electrical connections are completely checked out; apply power to the DigiPack 100. Do not apply hydraulic power at this time.

The DigiPack 100 LCD will light up and the F1 Profile appear after an interim screen. The Dip switch settings made earlier may also be seen as the language used on the LCD, and the LED indicating either a Continuous or a Accumulator blow molding machine.

To go to Set Up mode press and hold Set and then press F1 Profile. The Set Up mode screen appears as shown in Figure 6-5.

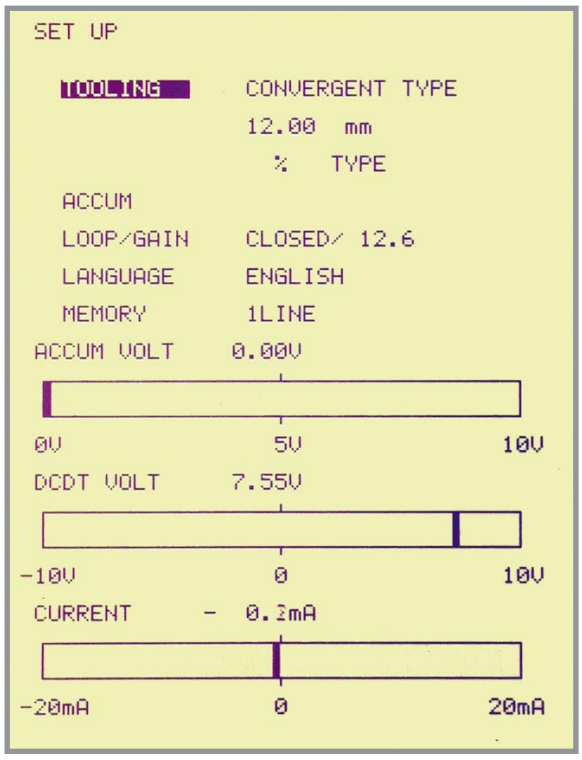


Figure 6-5 Tooling SET UP Mode

Four words appear on the left side of the screen, TOOLING, ACCUM, GAIN and LANGUAGE. The setup functions for TOOLING, ACCUM, GAIN and LANGUAGE are controlled by this screen. The highlighted word, in this case TOOLING, indicates the setup screen to be accessed when SET is pressed. Note that ACCUM will appear only when the Dip Switch's are set for an Accumulator blow molding machine.

Each of the screens for TOOLING, ACCUM, GAIN and LANGUAGE have the word END at the end of the setup procedure for that screen. Pressing SET when END is highlighted will return the display to the SETUP screen. F1 Profile may then be accessed by pressing F1 only from the SETUP screen.

DIE GAP TOOLING

To access the TOOLING setup screen, press SET. The screen shown in Fig. 6-7 will appear.

CONVERGE/DIVERGE SETTING

The selection between Converge and Diverge tooling designs implies that the selection between Converge and Diverge is a simple one. This is not necessarily true.

If the Converge or Diverge tooling uses a moving mandrel (inner part), then simply set Converge or Diverge as dictated by the tooling design.

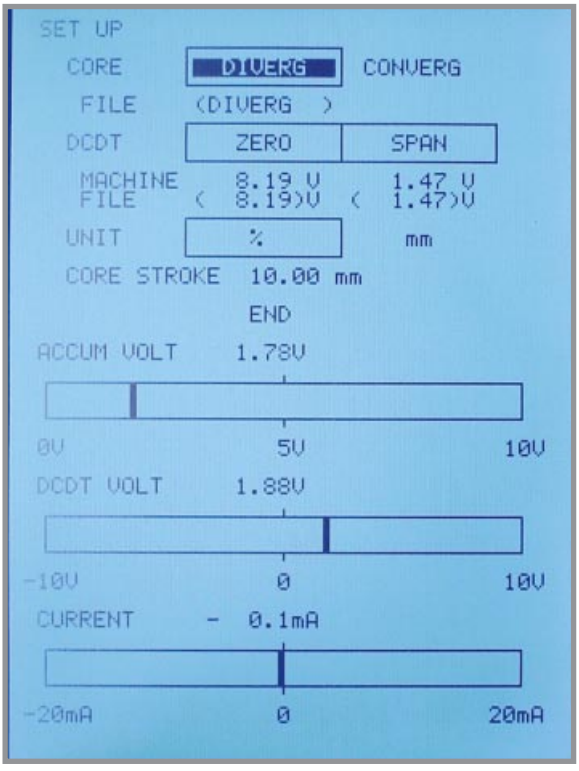


Figure 6-6 Die Converge/Diverge Setup

However, if the Converge or Diverge tooling uses a moving die (outer part), then the other tooling type name must be used. For example, if the tooling design is Converge and the die is the moving part, the proper tooling selection for the DigiPack 100 is Diverge.

An alternate: if the tooling actuator moves in a downward direction to make thicker parison walls, then select Diverge. If the tooling actuator moves in an upward direction to make thicker parison walls, select Converge as the tooling type selection.

CONVERGE/DIVERGE SELECT

TOOLING is highlighted. Press Set and the CORE screen appears (Figure 6-7) with DIVERGE highlighted. Select DIVERGE or CONVERGE by rotating the ENTRY KNOB in a cw or ccw direction. When the selection is made, push Set.

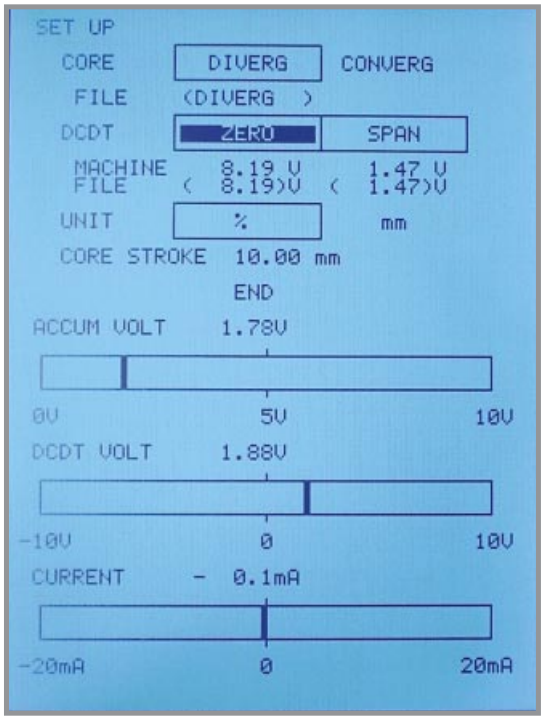


Figure 6-7 Die Gap Setup

NOTE: Figure 6-7 displays the currently set and file values of ZERO and SPAN (arrows). The file values reflect may reflect a previous setup of a particular container which had been filed in the DigiPack 100's memory, using F3: File.

Note that similar information concerning other portions of the setup may appear in other screens.

CORE_____

In this screen, Figure 6-7, under the heading DCDT, ZERO is highlighted. ZERO is the Die Gap closed position. If the tooling installation includes a Tooling Motion Stop then it must be temporarily positioned so the stop does not interfere with the tooling motion.

Note that the CURRENT indicator may show a CURRENT indication that is continuously and rapidly moving back and forth over a band of as much as 25% of the indicated range. If there is a continuously moving indication of more than 3% then the Die Gap transducer connection to TB-1 should be changed to conform to the schematic show in Figure 6-8.

Rotate the ENTRY knob to make the tooling move in the Die Gap closed direction. When the ENTRY Knob is turned, the CURRENT indicator will move slightly and then return to zero or nearly zero when the ENTRY KNOB is stopped. The DCDT VOLT indicator will indicate the changed Die Gap position.

Continue to move the Die Gap towards its closed position while watching the CURRENT indicator. At some point the CURRENT indication will not return to zero, but will increase with further rotation of the ENTRY knob, while the Die Gap does not change position. Increasing CURRENT without Die Gap motion indicates that the Die Gap has closed (or has run into a motion stop).

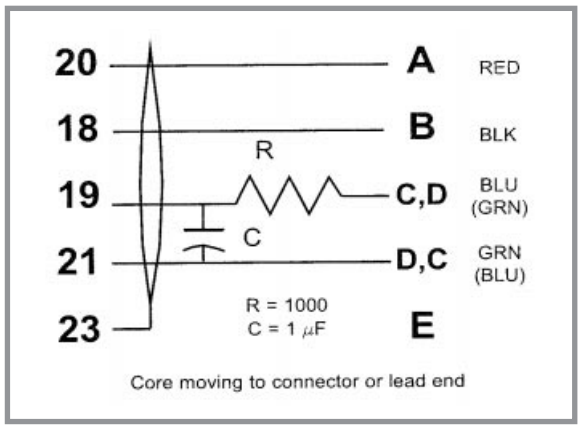


Figure 6-8 DCDT Noise Filter

ZERO_____

Then slowly rotate the ENTRY knob in the reverse (Die Gap Closed) direction while watching the CURRENT indicator until the CURRENT reaches ZERO or the Die Gap indicator moves slightly.

Now turn the ENTRY knob in the original direction until the motion just stops and the CURRENT indicator shows slightly increasing current. The Die Gap has just reached its closed position.

Push set. Install a dial indicator to indicate Die Gap position. Set the dial indicator to zero.

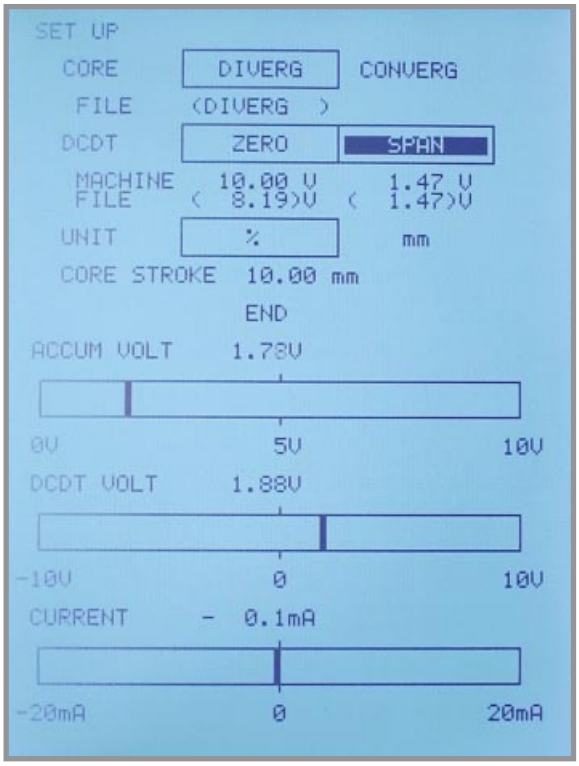


Figure 6-9 Die Gap Span Setting

SPAN_____

The LCD display has changed to indicate SPAN. (Figure 6-9) SPAN is the maximum Die Gap opening and is set, using the dial indicator, to the die gap tooling designers specified opening.

Open the die gap by rotating the ENTRY knob. Continue until the required die gap has been reached. Press Set.

UNITS_____

Press Set or Cursor Key (downward) at DCDT Span. Cursor moves to the Core Stroke UNITS - either % or MM. % will give a die gap opening percentage reference where 100% equals the distance SPAN. MM will give the die gap opening directly in MM based upon the SPAN setting. Select the desired units using the ENTRY

Knob and press Set.

Use the ENTRY KNOB to indicate the CORE STROKE in mm.

Move to END (Figure 6-10) and press set. The SET UP Display is now shown.

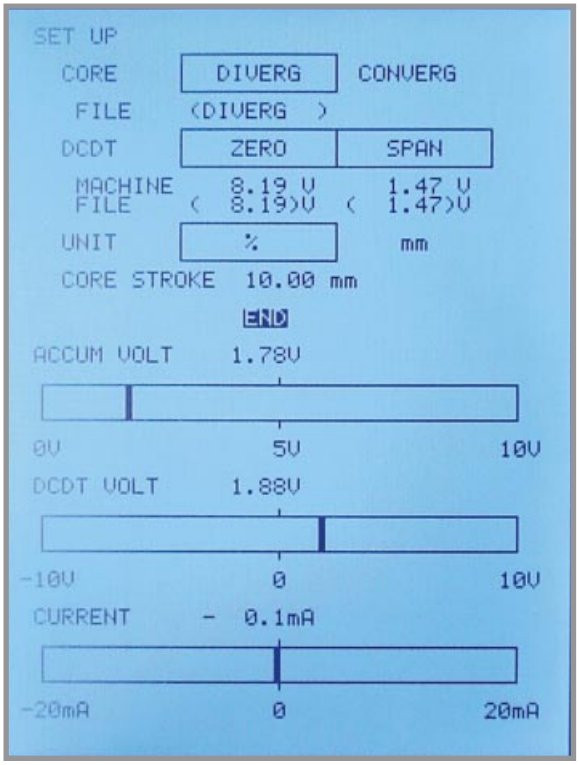


Figure 6-10 End

LOOP/GAIN

Use the Cursor to move to LOOP/GAIN. (Figure 6-11) and press SET. GAIN controls the quickness and stability of the Die Gap Tooling Actuator. At this time the hydraulic pressure should be increased to its proper value.

Use the Cursor to move down to MOVE... Twist the ENTRY Knob back and forth and observe the DCDT indicator. It should move back and forth, following the ENTRY Knob motion faithfully. If it seems sluggish, move back to the gain setting and increase GAIN by 25% followed by Set. If it seems to be noisy, move to GAIN, and decrease it by 25%, followed by Set. Continue until the response seems to be good and then move with the Cursor to End and Set.

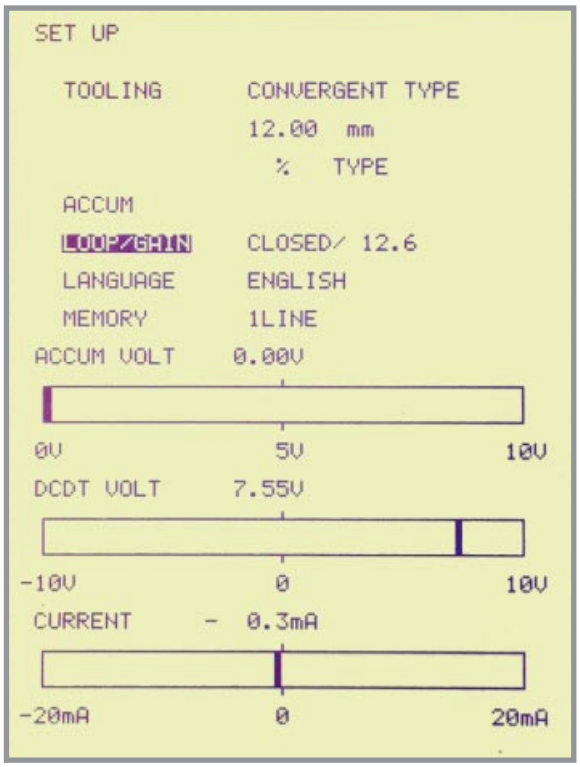


Figure 6-11 Gain

If an oscilloscope is available, connect the Y axis to TB-1, 19. Ground to TB-1, 21. Set the sweep to 0.5 sec/division and return to MOVE. Adjust the response to ENTRY knob motions until a damped response is obtained. Finish with END and Set.
This completes the SET Up for Continuous blow machines.

A NOTE REGARDING CORE STROKE AND ZERO

The DigiPack 100 features the ability to store the program information for individual containers as shown using a specific tooling head and mold. This is done to enable the customer to readily change between products with the expectation of a minimum change over time from the stop of production to the start of production of the new container.

This can be done only if the tooling die gap ZERO and SPAN (CORE STROKE) have the same value in every setup for a particular container on a given machine. The value of SPAN must be measured mechanically and recorded on the job set up sheet!

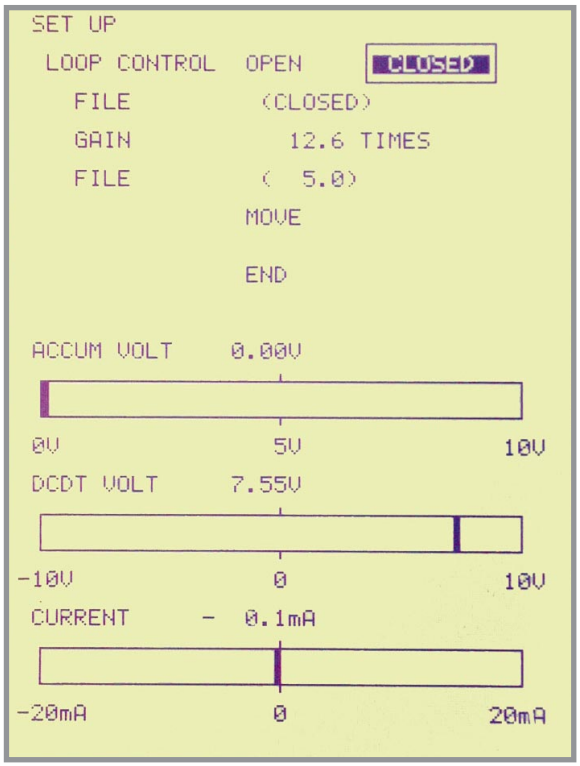


Figure 6-12 Die Gap System Gain Setting

LOOP CONTROL (for J141-213A only)

The Model No. of J141-213A can be selected LOOP CONTROL OPEN/CLOSE. CLOSE is used for normal parison operation, and OPEN is to the servovalve fixation output according to the profile. When choosing "OPEN"(Figure 6-12), automatically, gain is fixed on 1.0.
When setting a loop control to "OPEN", it sets 0% of order voltage (the electric current) of the profile by "zero" section and it sets 100% of order voltage (the electric current) by the "span" section.
Way of setting :
Select the "TOOLING" with the initial setting <F1+SET> screen. The setting of a dipswitch differs in the display by which of "EFB/MFB" to be set.

When the servovalve is EFB:
The numerical value of "MACHINE" changes when adjusting a cursor to the position of zero DCDT and turning a rotary knob. Press the SET button and fixes a value. In the same way, it turns a rotary knob according to the position with DCDT span and it fixes a value with the SET button. "UNIT" is fixed on "%". After that, adjusting a cursor to "END" and pushing SET button and it return to the initial setting main screen.

When the servovalve is MFB:
The way of operating is same as the case of the EFB valve, but the setting item becomes an electric current value. The numerical value of "MACHINE" changes when adjusting a cursor to the position of zero DCDT and turning a rotary knob. Press the SET button and fixes a value. In the same way, it turns a rotary knob according to the position with DCDT span and it fixes a value with the SET button. "UNIT" is fixed on "%". After that, adjusting a cursor to "END" and pushing SET button and it return to the initial setting main screen.

ACCUMULATOR MACHINE SETUP

Setting up an Accumulator blow molding machine is very similar to the set up procedure for an Continuous blow molding machine. The only difference is the Accumulator position transducer calibration.

To enter the SET UP Mode, press and hold F1 Profile and press Set. Then move to ACCUM. The SET UP screen will appear as shown in Figure 6-14.

The set up procedures for the TOOLING type, ZERO, SPABM CORE STROKE, and GAIN etc. are the same as for a Continuous blow molding machine and must be completed before the accumulator can be set up.

After completing the initial tooling set up, press SET and the screen shown in Figure 6-13 appears.

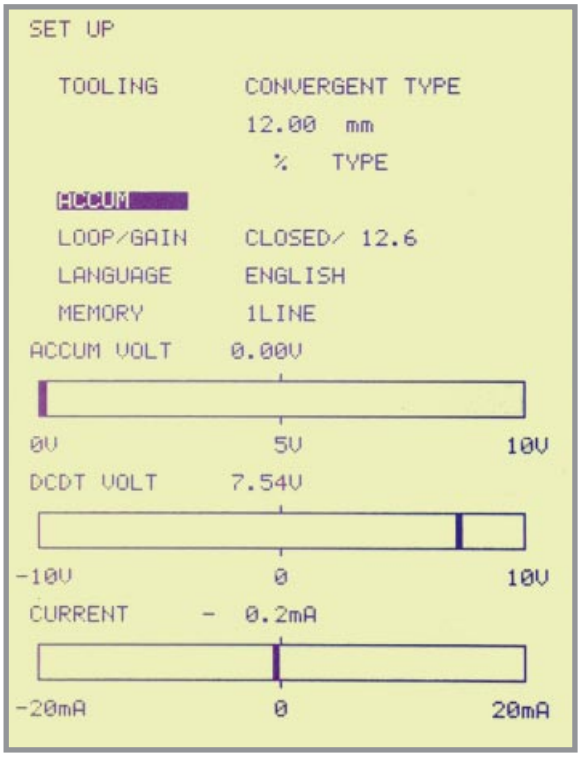


Figure 6-13 Accumulator Setup

EMPTY_____

The accumulator is now moved, using the blow molding machine controls, to its fully EMPTY position, where it should be totally empty of plastic using the following procedure:

1) "Start" signal is activated
2) The die gap tooling moves to 50% open
3) Adjust the tooling opening if necessary
4) Move the accumulator to its empty positon
5) :Push SET at the EMPTY position, the DigiPack 100 will store the EMPTY position and turn on the "End of Extrusion" LED on. The SET UP screen will now display FULL (Figure 6-15)

Figure 6-14 EMPTY Accumulator Set Up

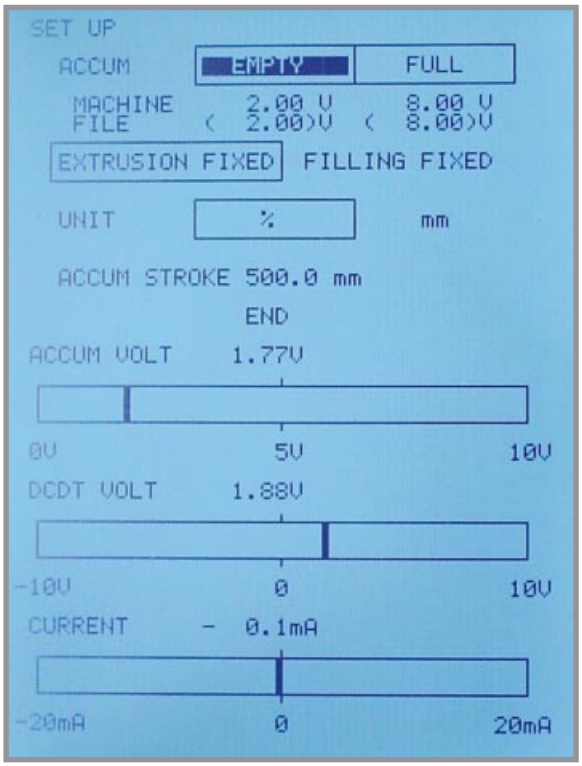


Figure 6-14 Empty Accumulator Set Up

FULL_____

The accumulator is now moved to its totally filled position, where it contains the maximum amount of molten plastic. This is the FULL position. The procedure is:

1) "Die Gap" is activated
2) The die gap tooling moves to 5% open
3) Adjust the tooling opening if necessary
4) Fill the accumulator with plastic

Figure 6-15 FULL Accumulator Set Up

5) Push SET at the FULL position, the DigiPack 100 will store the FULL position and turn on the "End of Filling" LED

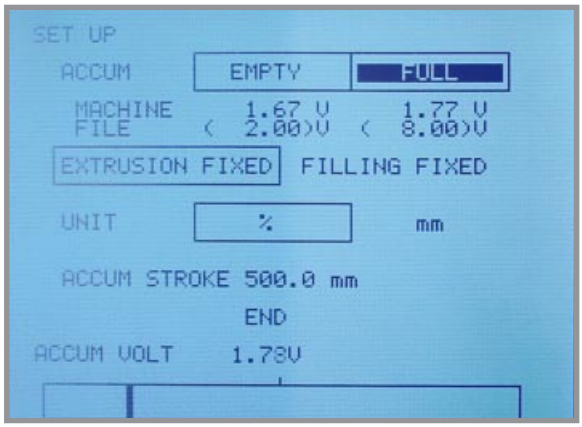


Figure 6-15 Full Accumulator Set Up

Pushing SET also shifts the screen display to EXTRUSION FIEX/FILLING FIXED.

EXTRUSION FIXED_____

Plastic extrusion to the container mold starts at the filled Accumulagtor position determined by the sum of CUSHION, SHOT SIZE and DELAY when EXTRUSION FIXED is selected. END OF EXTRUSION is the CUSHION position. (Figure 6-16) END OF FILLING position is the SHOT SIZE stroke plus DELAY stroke plus the CUSHION stroke.

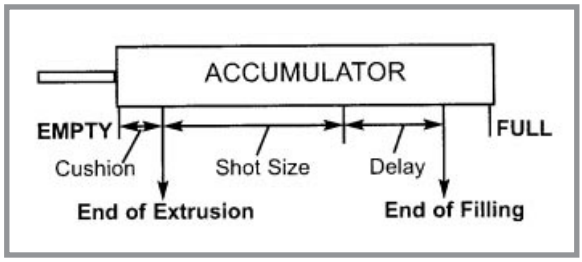


Figure 6-16 Extrusion Fixed

FILLING FIXED_____

Plastic extrusion to the container mold starts at the Accumulator filled position (End of Filling) when FILLING FIXED is selected. The length of stroke is determined by the sum of SHOT SIZE plus DELAY. (Figure 6-17)
Select either EXTRUSION FIXED or FILLING FIXED and press SET. Figure 6-17 Filling Fixed

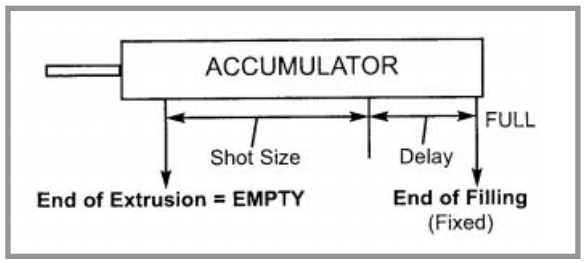


Figure 6-17 Filling Fixed

UNIT_____

Two UNITs are available, % or MM. The Unit selected will be applied to the following parameters: on the F1 screen:

SHOT SIZE
DIE GAP
DELAY
CUSHION

Select either % or MM and press SET

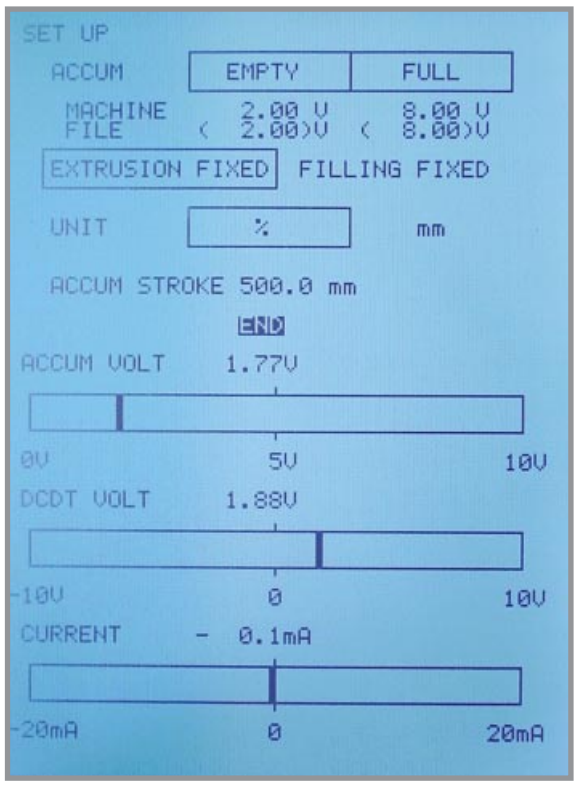


Figure 6-18 Extrusion Fixed, Filling Fixed, Unit, AccumStroke and End

ACCUM STROKE_____

Use the ENGTRY KNOB to indicate the distance between the END OF FILLING and END OF EXTRUSION points on the accumulator.

Press SET, END is selected, press SET again to get to the SET UP screen.

The Accumulator blow molding machine set up process is now complete.

MEMORY (for J141-213A only)

This function can only be used with Model No. J141-213A.
When using a memory function, it can be set to display DCDT track in "1 line", "2 lines" or "OFF (not displaying a track)". The setting of memory function is initial setting <F1+SET> screen.

Way of setting :
Select the screen <F1+SET>, then adjusts a cursor to "memory" pushes SET button (Fig 6-19). Next, it turns a rotary knob, and moves a displayed frame and chooses "OFF/1Line/2Line", then pushes and fixes SET button. After that, adjusting a cursor to "END" and pushing SET button and it return to the initial setting main screen. When the memory function of the DCDT track display is selected 1/2 line, if switching over to the other screen, DCDT track is cleared. Detail as below:

- START - End of Filling (working) The track to be displaying at present is displayed and only the old track which was displayed last time is erased.
- End of Filling - START (stopping) All tracks are erased.

See fig 6-20 and 6-21 for more detail of DCDT track display.

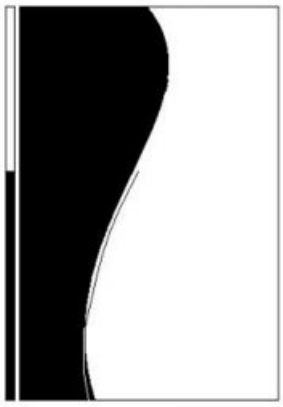


Figure 6-20 Running (1Line)

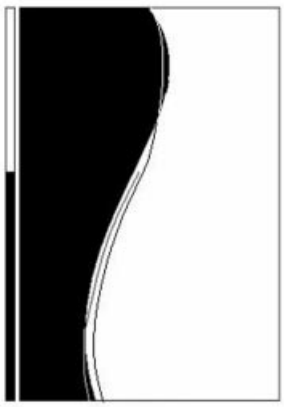


Figure 6-21 Running (2Line)

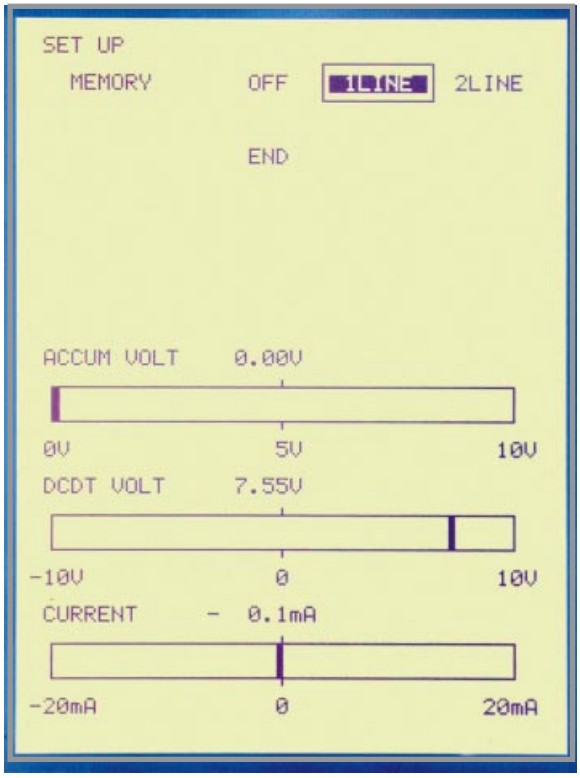


Figure 6-19 Memory

LANGUAGE

To access the LANGUAGE setup screen, press SET. The screen shown in Fig. 6-22 will appear. Select the language used on the LCD Display.

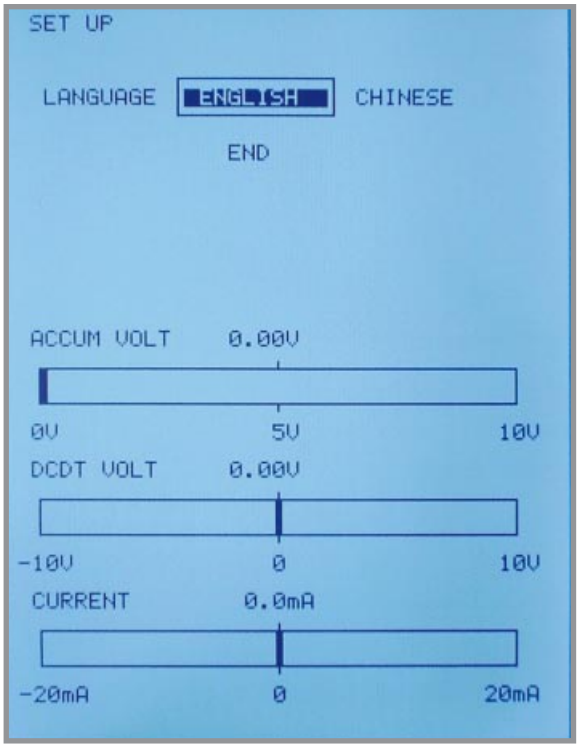


Figure 6-22 LANGUAGE Setup

Section 2. DigiPack 100 User Manual

2-1 INTRODUCTION

How do you program the DigiPack 100 Parison Programmer? Its job is to allow you to easily program a plastic container that will meet your customers specifications for weight and strength.

This manual will provide information about the DigiPack 100's container wall thickness program setup procedure, its controls and information provided available on the front panel.

After a short learning period, you will be able to readily setup your blow molding machine to mold containers to their required specification.

2-2 PARISON CONTROL

HISTORY

Many different products are produced by the Blow Molding process. Any food, drug or toy store is filled with items using blow molded products. Many automobiles use blow molded windshield cleaning fluid. From a small beginning many years ago, the blow molding process has grown to a major industry.

The value of parison wall thickness control was recognised when the industry was young. Some of the early machines used two position hydraulic control of the die-mandrel gap. Others used heavy cams in strong structures to withstand the large forces involved. The first electro-hydraulic blow molding system replaced the heavy cams with light cams that were easy to modify. This was quickly followed by a readily adjustable electronic master cam used to determine the correct cam shape. Electronic interpolation then eliminated the cam. Today's parison programming systems provide reliable programming of parison wall thickness and in addition, may provide control of mold motion; screw speed; injection barrel heater temperatures, etc. or the capability to control all machine functions.

PARISON PROGRAMMING BENEFITS

Parison programming provides improved container quality, higher production rates and increased profits.

Control of parison wall thickness as a function of parison length results in constant container wall thickness after the parison is blown to conform to the mold.
Quality tests determine the ability of a container to withstand drop tests without bursting or leakage of its contents. Parison programming provides constant wall thickness throughout the container, insuring improved mechanical endurance at minimum weight.

Container wall thickness control reduces the container weight, eliminates the hot spots, resulting in decreased parison cooling time. The parison programmed blow molding machine's shorter cycle time results in increased production rates, combining with the decrease in material cost to ensure higher profits.

CONTINUOUS EXTRUSION MACHINES

A continuously rotating extruder screw pressurizes the granular plastic material, driving it through a heated tubular barrel. The resulting molten plastic is then extruded through the mandrel die gap, forming a continuous tubular parison.

As the parison never stops being formed, multiple molds are required to receive the parison in turn. One mold is in the cooling position, where the plastic cools until the container can stand alone when the mold is opened. The open mold has been moved to a position surrounding the parison, and when the parison is long enough, the mold is closed. The parison is then pressurized with air through the blow pin, causing it to expand and take the shape of the mold walls, after which the mold is moved to its cooling position. The other mold is now open and is moved to the position where it surrounds the parison and the cycle repeats.

The machine and parison program cycle is started by the knife cutting the parison. Program start Delay time may be used to properly position the programmed parison profile relative to the mold profile to insure constant wall thickness.

ACCUMULATOR MACHINES

Accumulator blow molding machines are normally used to make large containers. Plastic is extruded into an accumulator until the amount required (Shot Size) to make the container is available. When the mold is positioned to receive the parison the accumulator piston moves, extruding the plastic through the programmable die gap to form the parison.

A position transducer measures the accumulator piston motion and causes the parison profile to be controlled as a function of the volume of plastic extruded through the die gap. During filling, the transducer also causes the accumulator to stop filling when Shot Size is achieved.

PARISON PROGRAMMING BENEFITS

If the die mandrel gap is constant, the extruded parison wall thickness is constant. When the parison is expanded by air pressure, it is stretched and made thinner. The resulting container walls contain thick and thin portions depending upon the amount of parison stretching occurring during the inflation of the container.

When this container is filled with a test fluid and dropped, it is likely to split in the heavy wall areas upon impact, due to reduced material strength resulting from uneven cooling stress. The entire container must be made thicker or more uniform to provide even cooling and improved strength.

As a result the container walls will be heavier throughout the container, require a long cooling time, material cost will increase and container production rates will decrease.

If the parison container thickness can be programmed as it is extruded by varying the die mandrel gap width, the resulting container will have constant thickness walls.

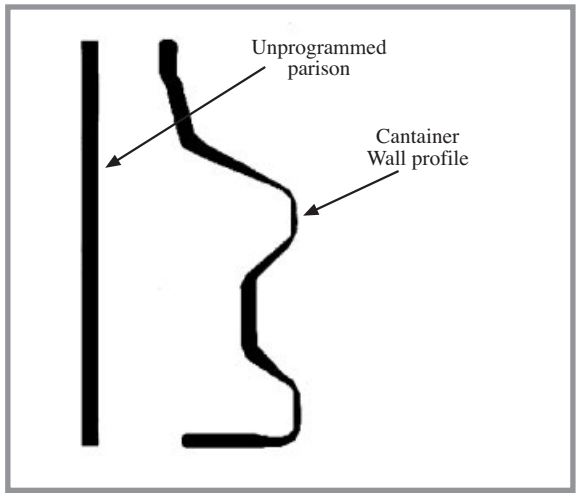


Figure 8-1 Section of an Unprogrammed Parison and the Resulting Container Walls

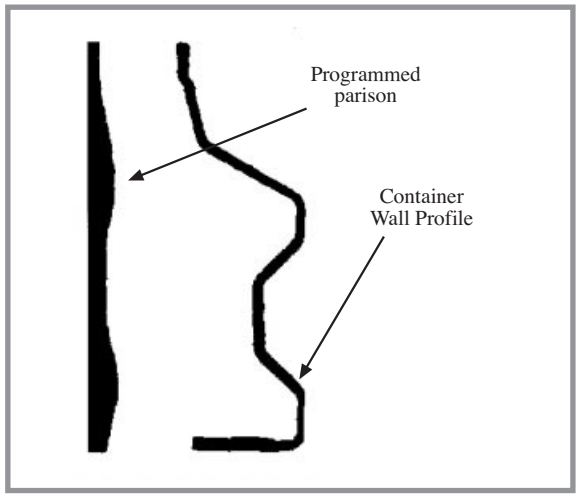


Figure 8-2 Section of a Programmed Parison and the Resulting Container Walls

This container will pass the drop test with less material as there are no heavy spots.

On average, the wall thickness will be less requiring shorter time to cool the container.

The container will have constant thickness walls.

This container will pass the drop test with less material as there are no heavy spots.

On average, the wall thickness will be less requiring shorter time to cool the container.

Programmed parison wall thickness control therefore results in higher container production rates using less material per container and higher profits.

WITH ACCUMULATOR BLOW MOLDING MACHINES

When used with accumulator machines, the DigiPack 100 controls the parison wall thickness relative to the accumulator position as the plastic is being extruded. In this case the displays (LCD) vertical axis is accumulator position and the horizontal axis is die gap opening.

The total quantity or volume of plastic extruded is proportional to the accumulator position, then the resulting parison wall thickness at any given point on the length f the container is related to the accumulator position when that point on the parison was extruded through the die gap.

A potentiometer measures the accumulator position and controls the vertical axis of the program display.

The desired shape of the parison wall profile is commanded digitally by the operator using the display. The size of the tooling opening or die gap, as measured by a die gap position transducer, is compared with the operators commanded die gap opening as set on the DigiPack 100 display.

The error between the operators commanded die gap opening and the actual position causes the servovalve to control the oil flow to the actuator and reduce the difference between the commanded and the actual die gap opening (position error) to a very small value. This feedback process ensures that the actual die gap opening follows the commanded die gap opening very accurately.

The operator can also set the accumulator working stroke, Shot Size, and the desired position at the end of the accumulator push out, Cushion, the DigiPack 100 also provides interfacing signals for these functions with the machines PLC, which then controls the motions of the accumulator.

WITH CONTINUOUS BLOW MOLDING MACHINES

When used with continuous blow molding machines, the DigiPack 100 controls the parison wall thickness relative to time required for one complete machine cycle. The displays (LCD) vertical axis is time and the horizontal axis is die gap opening. The cycle starts when the parison cut off knife cuts through the parison. Cycle end may be determined by a) the end of a fixed, operator set cycle time, b)the end of a time, automatic cycle time, calculate by repeated measurement of the times between parison knife cuts (the blow molding machine controls the cycle time) or c) sensing the end of a fixed time cycle and initiating a machine function such as closing the mold (the DigiPack 100 controls the cycle time).

The desired shape of the parison wall profile is commanded digitally by the operator using the display. The size of the tooling opening or die gap, as measured by a die gap position transducer, is compared with the operators commanded position as set on the DigiPack 100 display.

The error between the operators commanded position and the actual position caused the servovalve to control the oil flow to the actuator and reduce the difference between the commanded and actual die gap opening (position error) to a very small value. This feedback process ensures that the actual die gap opening follows the commanded die gap opening very accurately.

PARISON MOLD ALIGNMENT

The Alignment Lines provide a reference line to indicate the parison thickness and the resulting container wall section after it is blown.

At the alignment lines, the parison is relatively thick and the mold circumference is large. When the parison is blown, the resulting container wall thickness as measured at the alignment lines is consistent with the wall thickness measurements of the rest of the container.

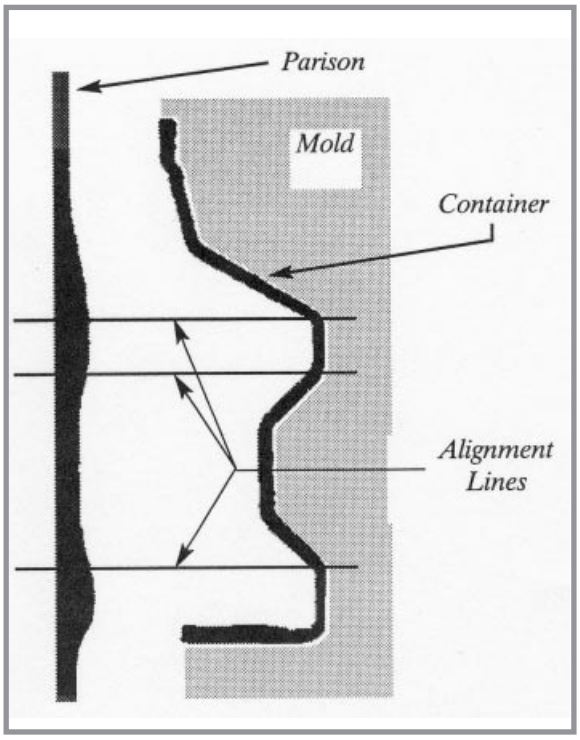


Figure 8-3 - Good Vertical Alignment Between the Parison and the Mold.

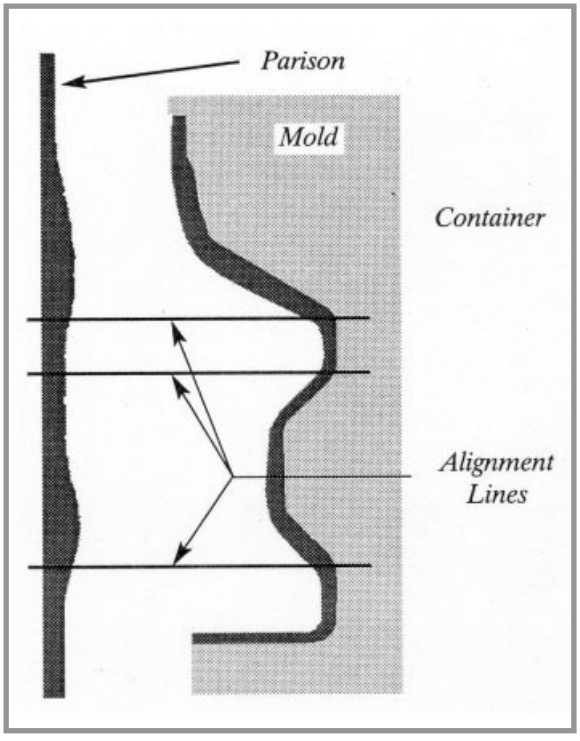


Figure 8-4 - Poor Vertical Alignment Between the Parison and the Mold

If the relative vertical alignment of the parison to the mold is poor, then the wall thickness will not be uniform throughout the container and the container must be scrapped.

Figure 8-3 shows the relative vertical position between the parison and the mold. The thicker portions of the parison are stretched by the blow air pressure to fill the portions of the mold with the greatest circumference. The act of programming the parison to have its thicker sections in vertical alignment with the portions of the mold with greatest circumference will produce a container with the desired constant wall thickness.

This effect is shown in Figure 8-4 where the parison position is high relative to the mold.

The wall thickness profile of the parison is the same as in Figure 8-3. The alignment lines are in the same position relative to the mold as in Figure 8-3. Here the container wall thickness above both the upper and lowest alignment lines is too thick, and at the middle alignment line the wall is too thin.

As the parison position is moved down relative to the mold, the wall thickness consistency throughout the blown container improve until the correct results are obtained. Further parison movement will again result in poor wall thickness control.

It must be noted that horizontal alignment lines are shown as a tool to demonstrate the requirement for vertical alignment of the parison and mold. The actual motion of the plastic as it is blown and stretched is more complicated.

2-3 MAN MACHINE INTERFACE

Figure 9-1 - DigiPack 100 Front Panel

DigiPack 100 FRONT PANEL

OPERATOR CONTROLS

The operator will set up and monitor the parison wall thickness program using the display, entry controls, function switches and LED's on the DigiPack 100 front panel, shown above in Figure 9-1.

All of the functions normally required to program the parison and machine are available on the front panel.

INPUT FUNCTION SELECTION AND VALUE

Entry Knob – Used to enter the value of various functions. Rotation in a clockwise direction will increase the function value.

X10 – increases the sensitivity of the Entry Knob by a factor of 10.

Set – Push to set Item values while the "SET" Led is flashing.

Cursor – Used to scroll the items on the LCD in the direction indicated by the triangular shape.

FUNCTIONS

Used to select the Functions F1 through F5 shown on the LCD display. These functions are:

F1 Profile*	Controls the parison wall profile and other related functions
F2 Marker	Enables the program point markers
F3 File	Allows storage and retrieval of 100 container wall thickness programs and related functions
F4 Monitor	Enables the I/O functions and indicates servovalve input current and die gap position values during machine operation
F5 Data	Displays the profile point and related function data
F1+SET	Set Up Mode – Provides die gap tooling and other machine related set up functions
F2+SET	Timer Mode – Internal clock control
F5+SET	Communication Mode – Controls the RS-232C data link

LED's (LIGHT EMITTING DIODEs)

The Led's are used to indicate the status of various functions as follows:

Start	Lights when the cycle Start signal is received
Die Gap	Lights when the Die Gap signal is received and "DIE GAP" on the LCD is back lit
Continuous	Lit when the "Continuous Extrusion" machine type is selected
Accumulator*	Lit when "Accumulator" machine type is selected
Divergent	Lit when "Divergent" die gap tooling is selected
Convergent*	Lit when "Convergent" die gap tooling is selected
End of Filling	Lights when the accumulator completes its charging stroke
Point Out	Lights when each Marker point is reached

*LED is lit in Figure 9-1

STATUS INDICATORS

Three status indicators for Accumulator Mode ONLY are shown on the Profile page.

Ready Shot Size and Die Gap are not highlighted

Extruding Shot Size is highlighted

Filling Die Gap is highlighted

Status Condition

Ready:

1) When the mode is changed from MANUAL to AUTO
2) When the power is turned on or the DigPack is reset
3) When the STOP signal is input
4) When the extrusion is finished
5) End of movement of the Start Slope

Extruding: From START signal to the end of extrusion

Filling: When the DIE GAP signal is received

LCD (LIQUID CRYSTAL DISPLAY)

The LCD Display shows the detailed screen used when a particular Functin is selected.

Selection of the individual Function Items is done by the **Cursor**. In Figure 9-2 - LCD Display, the value of the Item **Shot Size**, 11.0 sec, is highlighted and therefore **Shot Size** is selected. Turning the **Entry Knob** will increase (CW) or decrease (CCW) the **Shot Size** value. To make this **Shot Size** change permanent, **Set** must be pressed. If **Set** is not pressed, then the value of **Shot Size** will return to its original value.

Selection of other Function Items is done by repeatedly pressing the Up or Down **Cursor** until the desired Item is reached. In this manner, all of the individual Function Items and all of the Program Points (LCD vertical axis) may be selected.

The value of any Function Item or Program Point will not be changed when moving between Function Items or Program Points unless **Set** is pressed.
This input procedure applies to all Function screens.

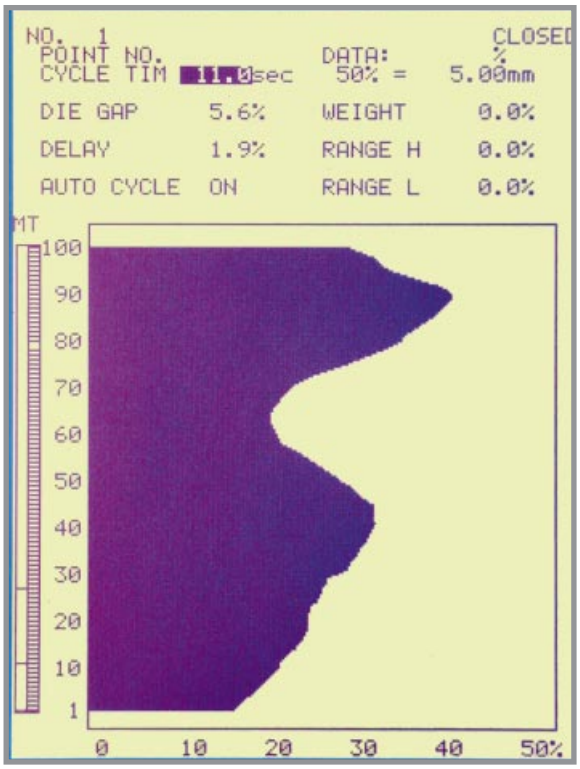


Figure 9-2 LCD Display

2-4 THE SCREENS

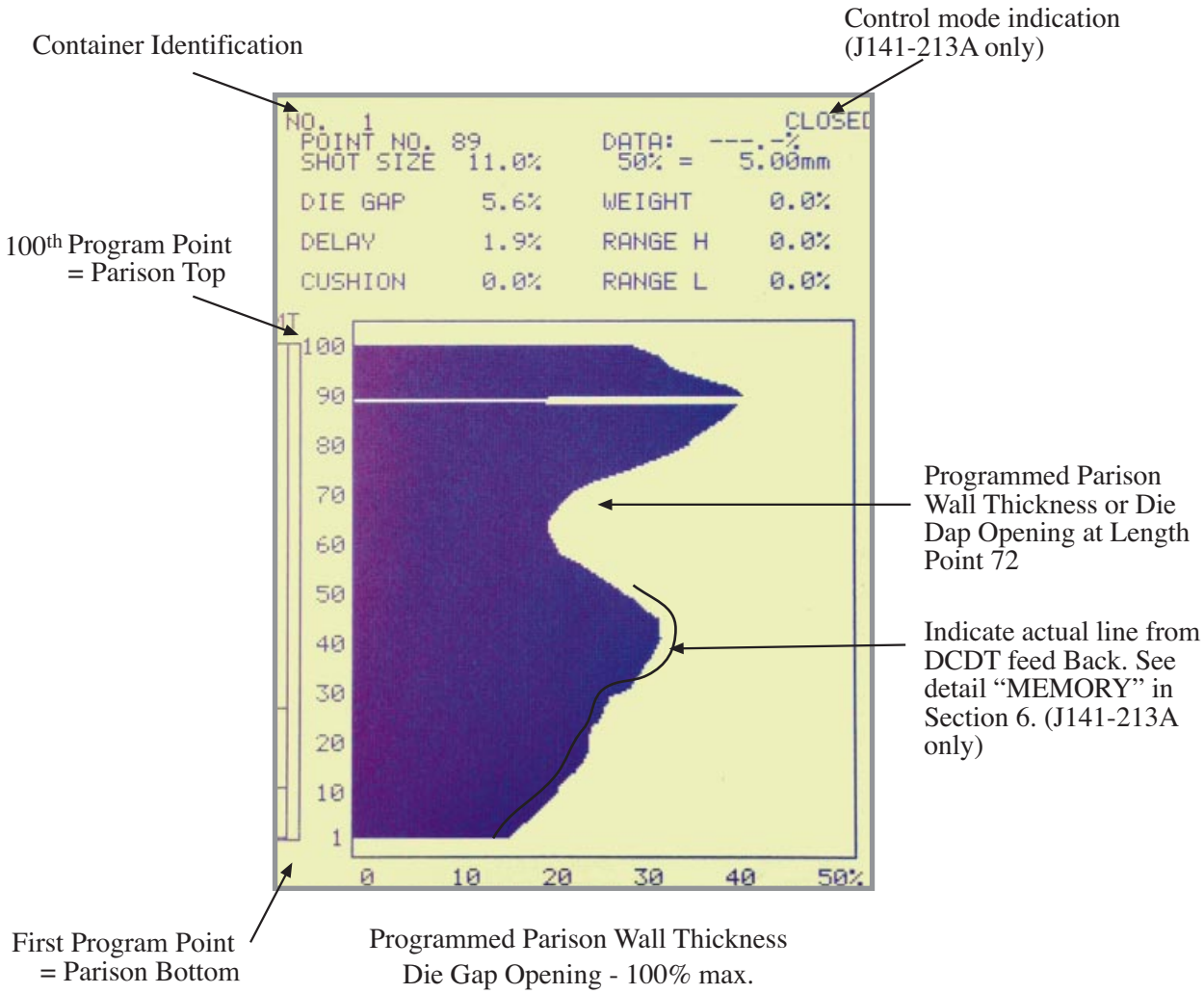


Figure 10-1 The F1: Profile mode Screen

Input Method

The **Cursor** key is used to move the cursor to each displayed **profile** point and **function** item. The **Cursor** will indicate its location by an inverse LCD display. **Profile** point and **function item** value set by rotating the **Entry Knob** (Clockwise to increase, Counterclockwise - to decrease; **X10** key makes the **Entry Knob** faster) to obtain the desired value, then confirm the value by pressing the **Set** key. NOTE: Any item value changed and not confirmed with the Set key will not be changed when the Cursor is moved to the next point. If set values are modified, changes take effect during the next machine cycle.

F1: Profile Mode

Mode obtained by pressing the **F1** Key.

Display

Normally displayed when manufacturing containers.

Profile Mode Function Items

Please refer to Figures 10-2 and 10-8 for further definition information.

Die Gap Opening Profile

The profile uses 100 separate points to define the desired parison wall thickness profile. The horizontal axis of the LCD display is the programmed tooling die gap or parison wall thickness. The points along the vertical axis of the LCD display are Shot Size, either cycle time or accumulator stroke. Linear interpolation is used to define the profile between the operator set points.

Each profile point may be set to a value between 0% to 100% of the maximum tooling die gap opening by rotating the **Entry Knob** and pressing **Set**.

As shown in Figure 10-2, the active profile point on the display is indicated by a inverse video bar. Its value is shown on the upper right hand corner of the LCD display as "**DATA**...%". Points displayed as "*" are interpolated values. If "-" is being displayed as a point value, that value has been set using **F2: Marker Mode**.

To cancel entered profile points, turn the Entry Knob counterclockwise until the display in the upper right hand corner of the LCD display indicates "**DATA**:--.-" and press the **Set** Key.

The scale of the profile display will automatically change between 25%, 50% and 100% as required.

The following Function Items are found in the area of the LCD display above the parison profile.

Shot Size

Shot Size sets the quantity of plastic used during one machine cycle to produce a container.

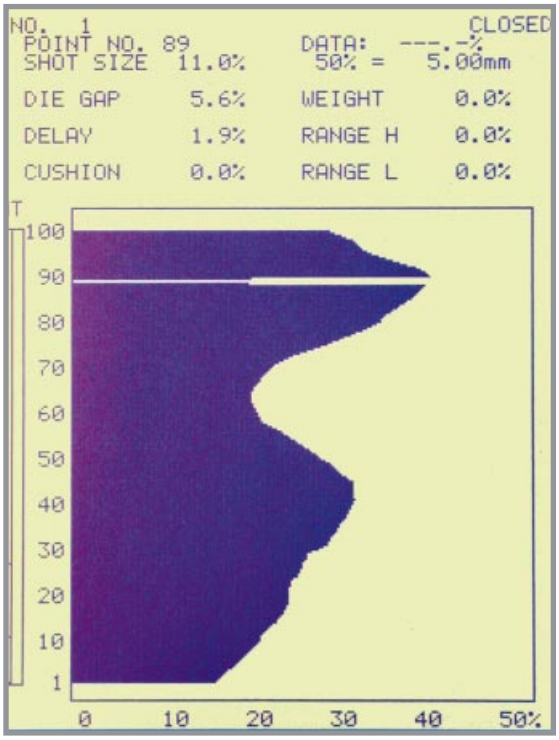


Figure10-2 The Profile Mode Screen

Accumulator Machines:

- the amount of plastic extruded by the accumulator or accumulator stroke. Shot **Size** is shown as a percentage of the accumulator stroke and its value may only be set between 5% and 100%.

Continuous Extrusion Machines:

- the length of time for one machine cycle in seconds. **Cycle Time** may only be set between 0.1 and 100.0 seconds. This time is started by an machine event, such as the motion of the knife cutting the parison.

An additional feature is **Auto Shot** which automatically sets Shot Size to be equal to the time interval between sequential knife cuts. If **Auto Shot** is On then **Shot Size** has no effect on the cycle time.

Die Gap

Die Gap sets the tooling die gap opening during the portion of the cycle between the end of the program profile (point 100) and the next cycle start. Die Gap may be set from 0% to 100% of the maximum tooling die gap opening.

Die Gap is used to control the parison wall thickness for continuous machines and to close the tooling die gap to prevent drool for accumulator machines.

Delay

Delay delays the start of the programmed profile after the machine cycle is started. During this Delay the tooling die gap is maintained at the gap programmed by profile point 1. Delay may be set from 0% to 100% of the Shot Size.

Delay is often used to synchronize the position of the initial programmed portion (bottom) of the parison with the bottom of the container mold.

Cushion

Cushion applies to Accumulator Machines only.

Cushion is the point where the accumulator push out stroke stops. **Cushion** is often set to leave a small amount of material in the accumulator at the end of the push out to insure that the accumulator does not bottom out before all of the plastic required for programmed portion of the parison is extruded.

As the total accumulator stroke has been made equal to a **Shot Size** setting of 100%, the total of the equation

Shot Size + Shot Size x Delay

+ Shot Size x Cushion

must be equal to or less than 100% of the actual maximum accumulator stroke

Weight

Traditionally, **Weight** is a constant value added to each profile point and when varied, has the effect of changing container weight roughly in proportion to the amount of weight change.

As used on the DigiPack 100, **Weight** produces a change proportional to the average thickness of the parison. For a given **Weight** change, the amount of change at each program point is related to the initial value of that point. The effect is to provide a container weight change with a minimal effect on the container wall thickness distribution. **Weight** is expressed as a percentage of the thickest point on the profile. **Weight** can vary from minus 100% to pluse 100%. Weight reduction can occur until the value of one of the 100 profile points reaches zero.

Use the **Entry Knob** and **Set** to change the Weight setting. The percentage **Weight** change will remain displayed after being **Set**. When the **Entry Knob** is turned again the new **Weight** entry will start at zero using the current display as reference. If the **Entry Knob** is accidentally moved and the displayed **Weight** value changed, it will revert to its former value if Set is not pressed and the **Cursor** used.

When you start to generate the profile for a container for the first time, the **Weight** displayed will equal zero. After a **Weight** change has occurred, the **Weight** displayed will indicate the percentage **Weight** change.

Figure 10-4 shows the effect of a **Weight** reduction of -23.3% from the **Weight** value of 0% in Figure 10-3. To make the change easier to visualize, reference lines drawn between the figures starting at three different parison wall thickness program points have been included. The **Weight** change will be largest at the maximum parison wall thickness program point, and proportionately less at the intermediate parison wall thickness points.

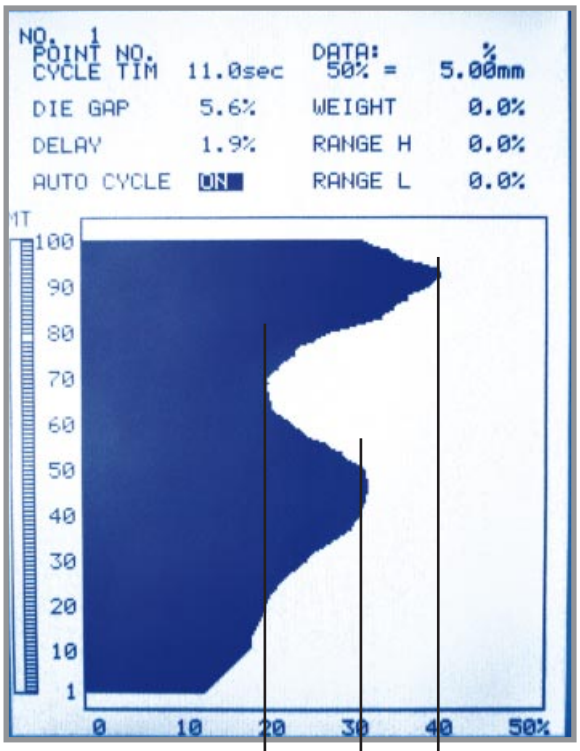


Figure 10-3 - 0%Weight Change

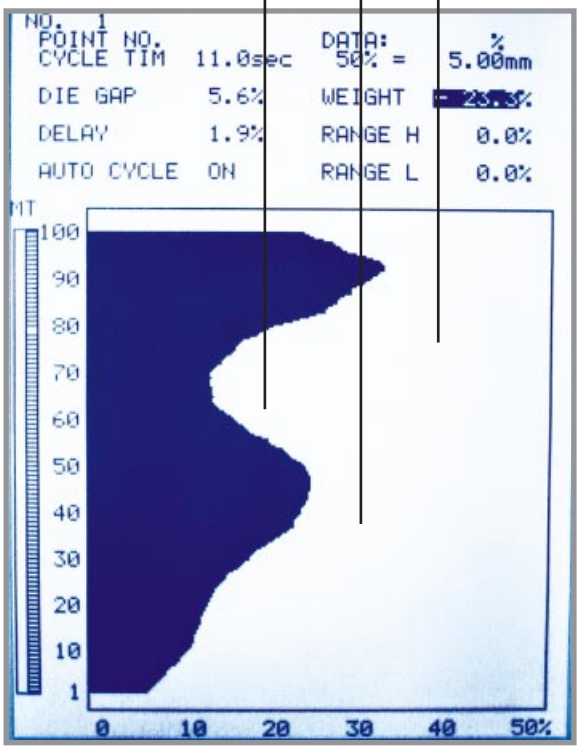


Figure 10-4 - 23.3%Weight Change

Range H

Range H changes the value of all profile points by a percentage of the difference between the thickness and thinnest points. The value of the thinnest profile point remains constant during a Range H change. Range H can vary between -100% and +100%.

Use the **Entry Knob** and **Set** to change the **Range H** setting. The percentage **Range H** change will remain displayed after being **Set**. When the **Entry Knob** is turned again the new **Range H** entry will start at zero using the current display as a reference. If the **Entry Knob** is accidentally moved and the displayed **Range H** value changed, it will revert to its former value if **Set** is not pressed and the **Cursor** used.

Range H has the effect of allowing container weight changes while retaining the containers minimum wall thickness distribution pattern.

Figure 10-6 shows the effect of a **Range H** increase of +32.8% from the **Range H** value of 0% in Figure 10-5. To make the change easier to visualize, reference lines drawn between the figures starting at four different parison wall thickness program points have been included.

Range H will use the thinnest parison wall thickness program point as a reference and will not change its thickness. The **Range H** change will be largest at the maximum parison wall thickness point, and proportionately less at the intermediate parison wall thickness poins.

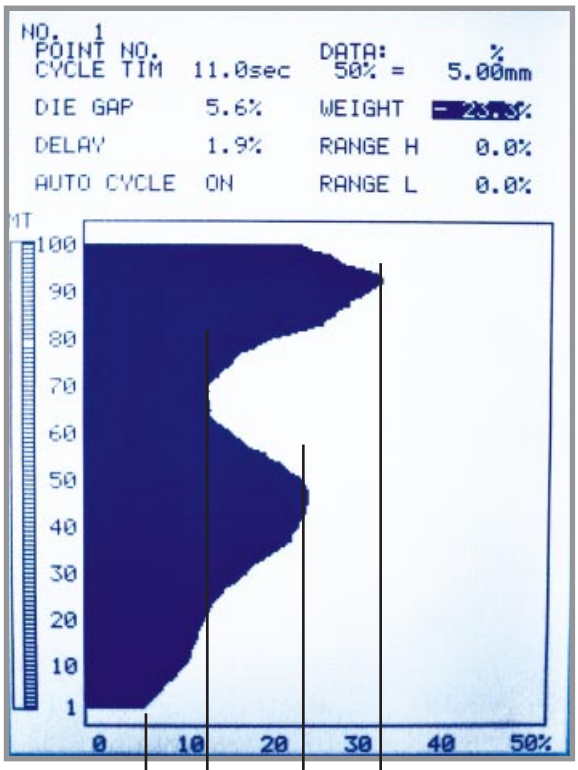


Figure 10-5 - 0% Range H

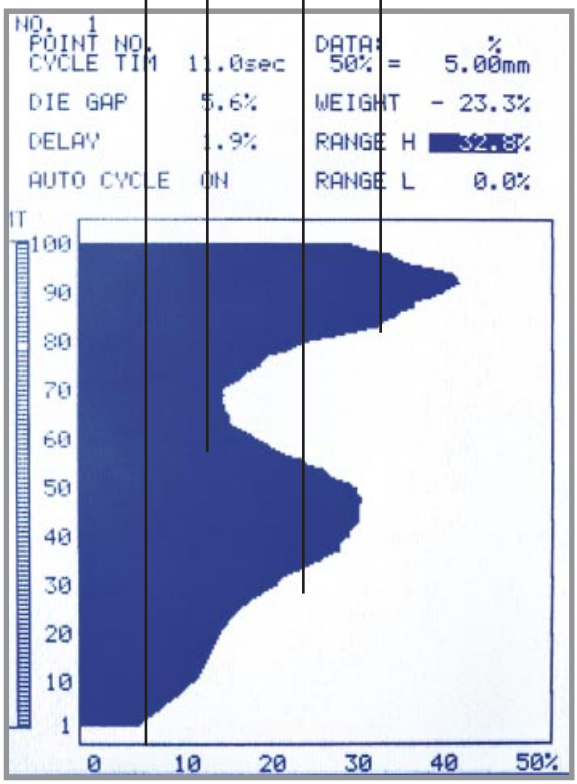


Figure 10-6 - 32.8% Range H Change

Range L

Range L changes the value of all profile points by a percentage of the difference between the thickest and thinnest points. The value of the thickest profile point remains constant during a **Range L** change. **Range L** can vary between –100% and +100%. **Range L** may be changed until the thinnest profile point reaches zero. Use the Entry Knob and Set to change the **Range L** setting. The percentage **Range L** change will remain displayed after being Set. When the **Entry Knob** is turned again the new **Range L** entry will start at zero using the current display as a reference. If the Entry Knob is accidentally moved and the displayed **Range L** value changed, it will revert to its former value if **Set** is not pressed and the **Cursor** used.

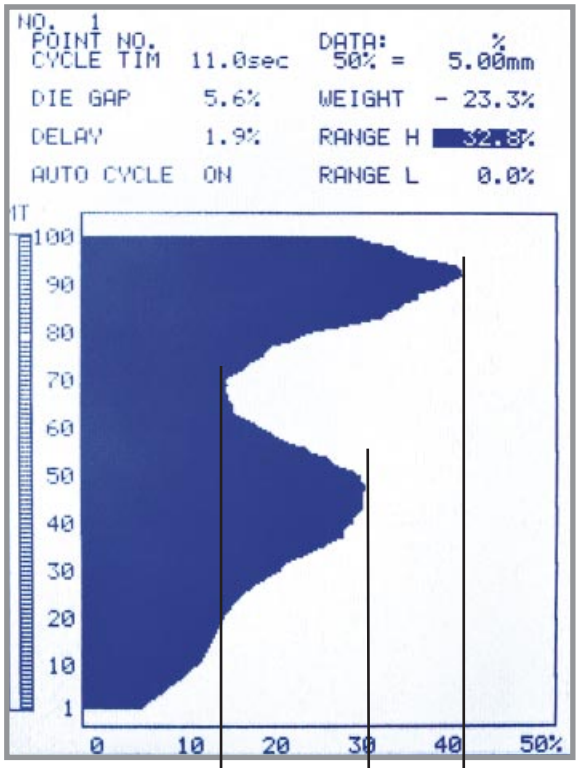


Figure 10-7 - 0% Range L

Range L has the effect of allowing container weight changes while retaining the containers maximum wall thickness distribution pattern.

Figure 10-8 shows the effect of a **Range L** increase of –10.0% from the **Range L** value of 0% in Figure 10-7. To make the change easier to visualize, reference lines drawn between the figures starting at four different parison wall thickness program points have been included.

Range L will use the thickness parison wall thickness program point as a reference and will not change its thickness. The **Range L** change will be largest at the minimum parison wall thickness point, and proportionately less at the intermediate parison wall thickness points.

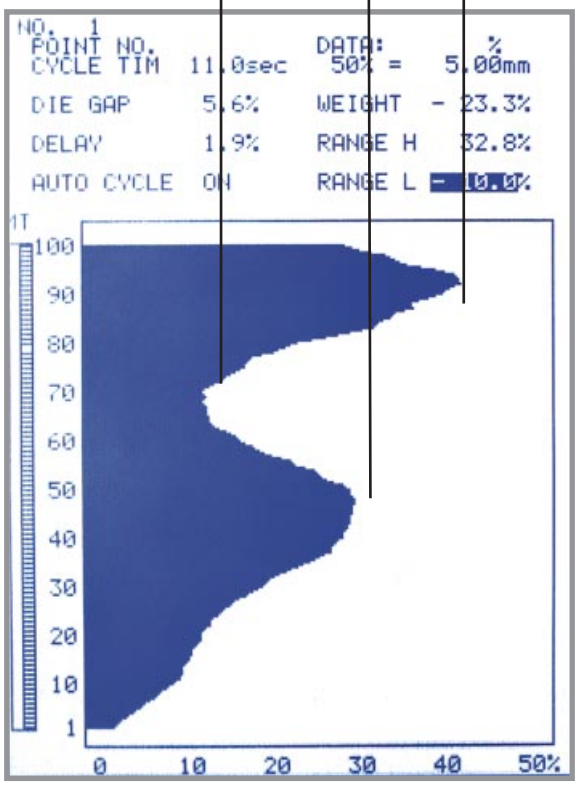


Figure 10-8 - 10.0% Range L

OPEN/CLOSE
This is just indicator of current control mode Open loop or Close loop. To setting up detail refer to “LOOP CONTROL” in Section 6.

F2: Marker Mode

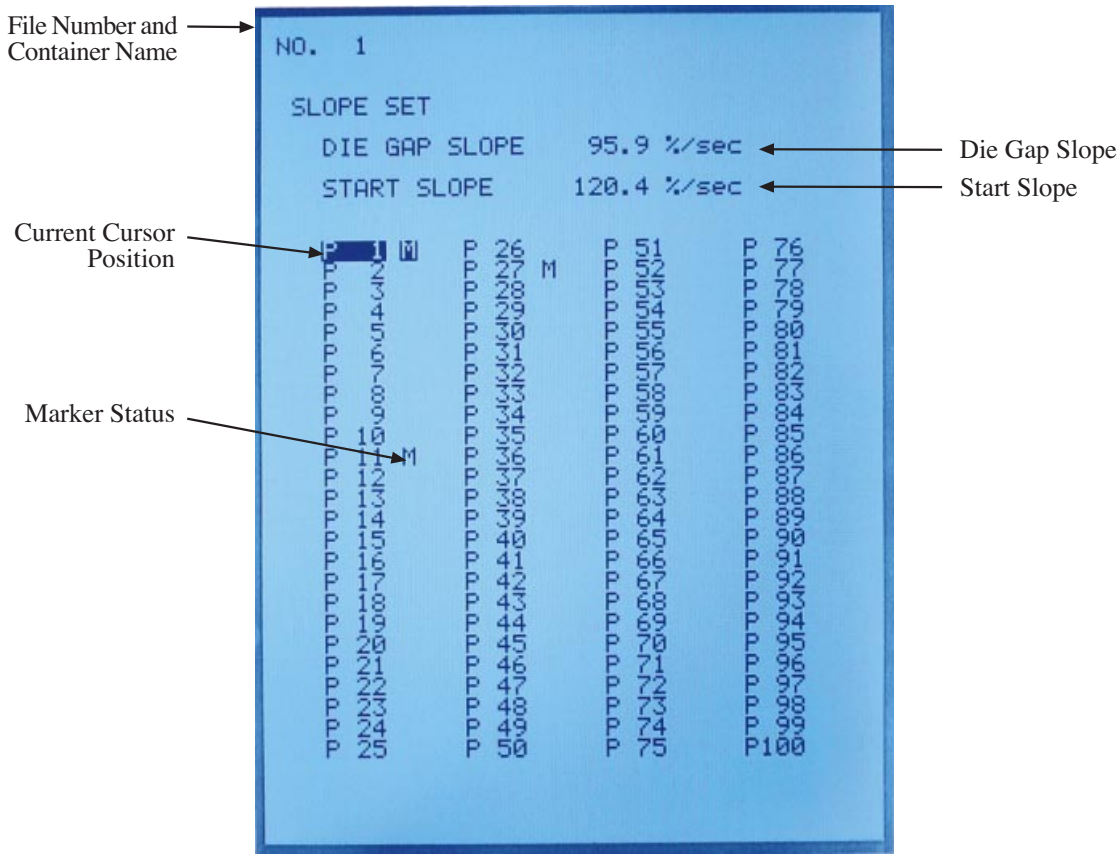


Figure 10-9 The Marker Mode Screen

Mode is obtained by pushing the F2 Key.

Display
May be displayed when manufacturing containers.

Commands
The current ON/OFF condition of the profile point marker for all 100 points is displayed. 'M' is displayed when current condition is ON. To reset these conditions, move from point to point using the Cursor Key and revise the ON/OFF condition with the Set Key.

Use
May be used to provide a pulse output occurring at a selectable point in the DigiPack 100 cycle to control and/or synchronize machine functions or for other uses.

DIE GAP SLOPE
The slope or velocity of the motion to the "Die Gap" opening when the Die Gap signal is given. Setting range is 0.1 to 1000% sec.

START SLOPE
The slope or velocity of motion of P1 starts when the Start Slope signal is given. Setting range is 0.1 to 1000% sec. Valid only when the "Filling" status is indicated. See Figure 5-12.

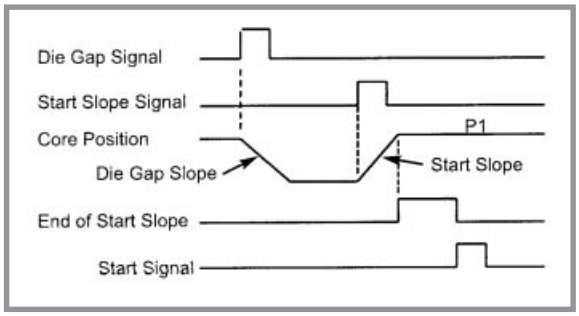


Figure 10-10 Slope Timing

F3: File Mode

Mode is obtained by pressing the **F3** Key.

Display

Available when manufacturing containers.

Function

This mode combines the profile, marker data and setup files and stores them in an E_PROM for future use. 60 files may be stored with an identifying name of up to 16 characters, date and time.

Figure 10-11-F3: File Mode Selection Screen

Commands
When **F3: File Mode** is selected a choice between **SAVE** or **LOAD**, can the name and number of the current container's data file is displayed (Figure 10-11) **SAVE** or **LOAD** must be selected, using the Entry Knob and Set.

Note that if LOAD is selected, the current container data file will be automatically overwritten. If the current container data file is to be stored, SAVE must be selected first.

SAVE
SAVE combines the profile data, function item data and point markers in one file and stores this file in the E^2PROM.

Use the **Entry Knob** to select **SAVE** and press the Set Key. (Figure 10-12)

The prompt **"CHANGE FILE NO.? YES/NO"** is displayed.. (Figure 10-13)

If you select **"YES"**: then go to Page 56.

If you select **"NO"** then go to Page 55.

Figure 10-12 - Select SAVE

"CHANGE FILE NO.? YES/NO"

If you select "**NO**" then follow the instructions below..
The LCD display (Figure 10-14 and 10-15) shows the two page description of the file data and asks "**NEXT PAGE**". Answer by using the Set Key. To save the file - "**SAVE? YES/NO**" answer by using the **Entry Knob** and **Set** Key.
If you select "**YES**", the DigiPack 100 saves the data in the E^2PROM and displays the save data in the Profile mode. **(F1: Profile)**. If you select "**NO**" the first screen of the **F3 File** mode is displayed and no data is saved.
Note: The data will automatically be save in the "**FILE NO....**" file shown in the LCD display even if data is already stored there. In this case, the previously stored data will be lost.

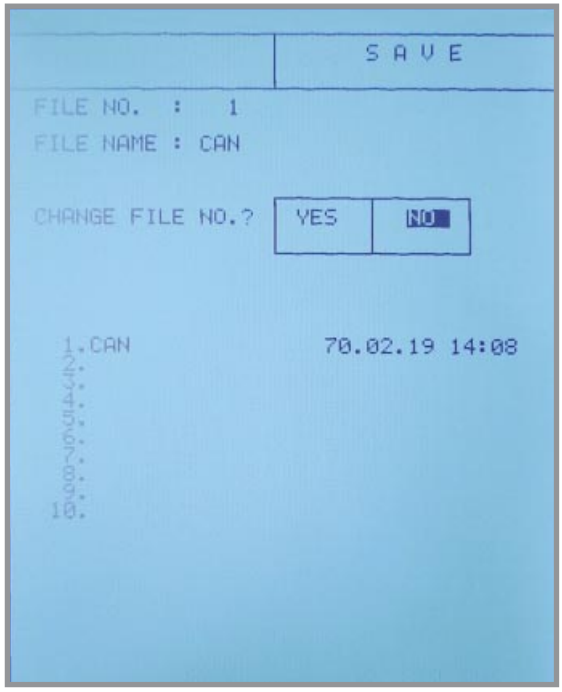


Figure 10-13 Select YES/NO

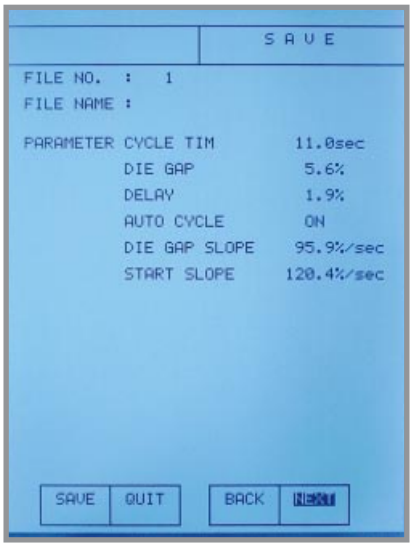


Figure 10-14 File Description Data - Page1

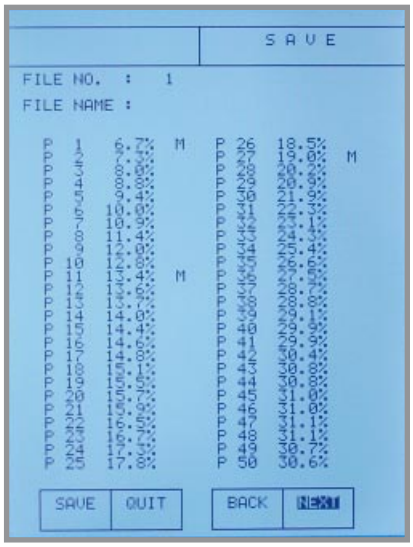


Figure 10-15 File Description Data - Page2

Figure 10-16 File Description Data - Page3

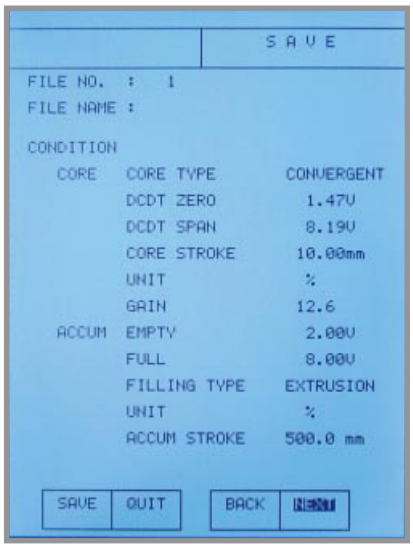


Figure 10-17 File Description Data - Page4

"CHANGE FILE NO.? YES/NO"

If you select "**YES**"...Reference Figure 10-18 and follow the instructions below....

The LCD display changes to the File No. select screen (Figure 10-19) and prompts '**PLEASE CHOOSE FILE NO.**" Move to the desired file number by using the **Entry Knob** (selects in increments of 1) and the **Cursor** Key (selects in increments of 10). Press **Set** to enter.

The LCD display changes to the Edit screen (Figure 10-20) and prompts '**PLEASE EDIT FILE NAME**". Use the **Entry Knob** to name the file (16 characters maximum). The Entry Knob moves the display cursor from character to character. The Set Key enters the individual characters of the file name.

Special Characters

The "←" and "→" symbols are used to move the display cursor within the file name.

The last character in the list inserts a blank space in the name.

The "**END**" character is necessary for entry completion. "**END**" must be inserted at the end of editing or the new file will not be renamed.

After naming a file (after "**END**" has been entered), the LCD display changes to a description of the entry data with the "**SAVE? YES?/NO**" prompt displayed. If you select "**YES**", the DigiPack 100 saves the data and displays it in **F1 Profile** Mode. If you select "**NO**", you are returned to the first screen of the **F3 File** Mode and no data is saved.

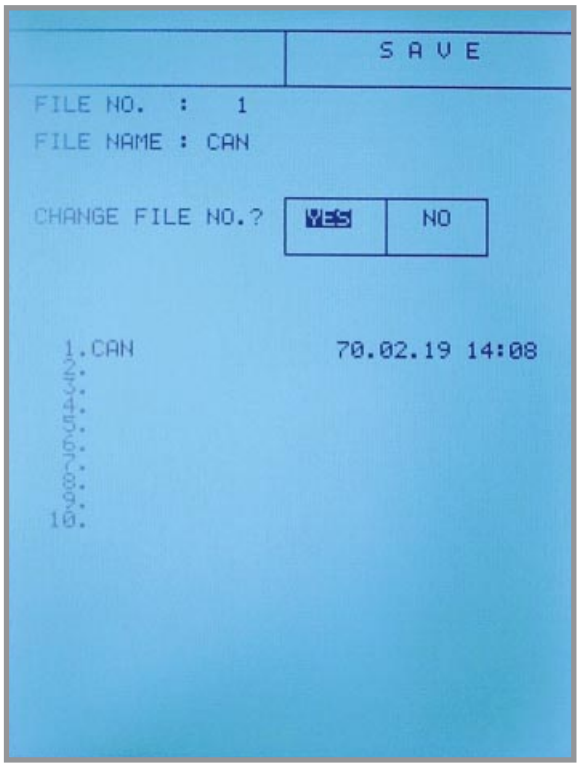


Figure 10-18 Change File Number

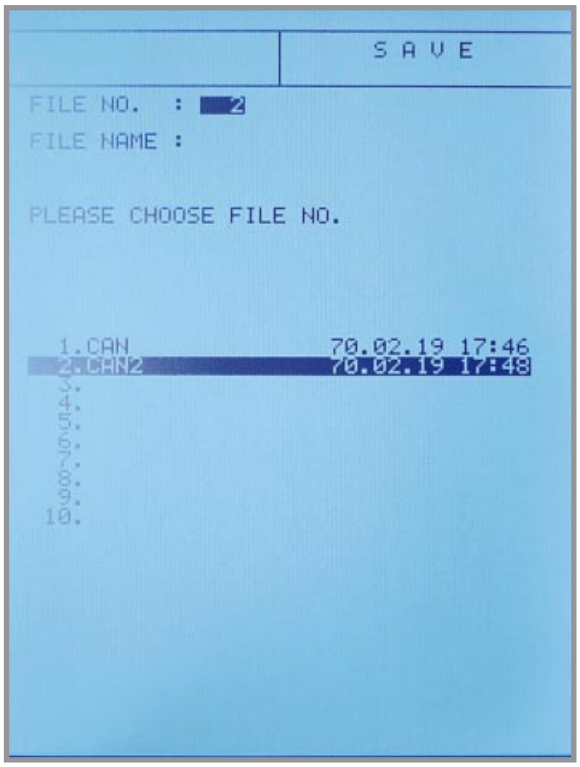


Figure 10-19 Choose File Number

DELETE

DELETE cancels a selected file in the E_PROM. The following procedure will delete an already saved file.

(1) Select "**SAVE**"
(2) Select "**YES**" at the "**CHANGE FILE NO.**?" prompt
(3) Assign the data file number you would like to delete
(4) Choose and **Set**"**DELETE**" from the character list in the **Edit** screen
(5) Select "**YES**" at the "**DELETE?**" prompt. If "NO" is selected, DELETE will not occur.

Note:

A. The "**DELETE**" function will delete files with assigned file numbers only.

(6) The file currently in use is un affected.

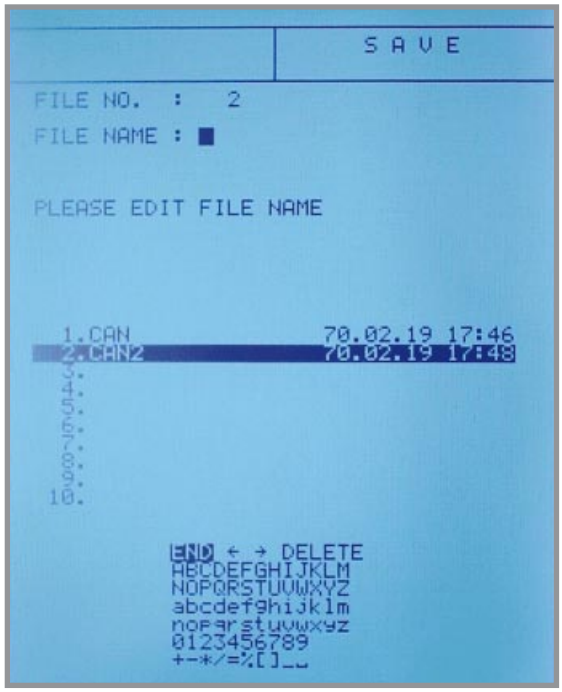


Figure 10-20 Edit File Name

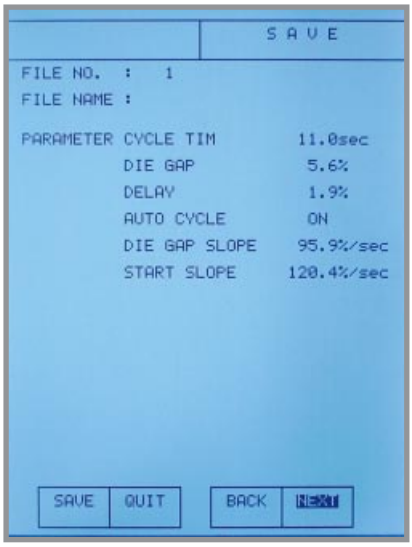


Figure 10-21 File Description Data - Page1

Figure 10-22 File Description Data - Page2

Figure 10-23 File Description Data - Page3

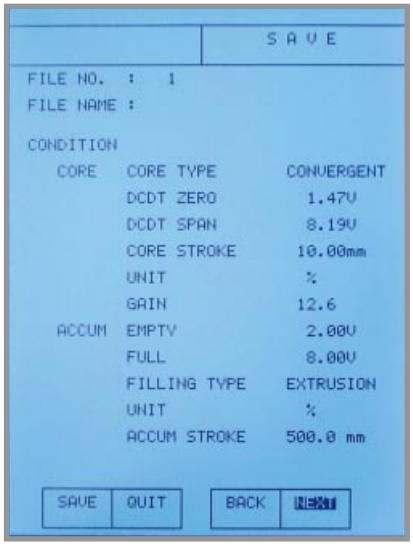


Figure 10-24 File Description Data - Page4

LOAD

If you select "**LOAD**", Figure 10-11, using the **Entry Knob** and **Set** Key. The file list is displayed, starting at "**No. 0 INITIAL FILE**". In this mode, files 0 to 60 are displayed in blocks of 10. You can find the required file by using the **Entry Knob** (the display cursor moves through the files in order) and the Cursor (jumps files in blocks of 10) to find the desired file. Then press the **Set** Key.

The prompt "**LOAD A FILE**?", Figure 10-26, is displayed at the bottom of the LCD display. Select "**YES**" or "**NO**" with the Entry Knob and Set Key.

If "**YES**" is selected the file loads and is displayed in **F1 Profile** Mode. If you select "**NO**", the initial **F3 File** Mode, Figure 10-11, screen is displayed and no file is loaded.

NOTE: Setup data (for example GAIN, DCDT Zero, etc.) will be loaded only for reference because of the machine security.

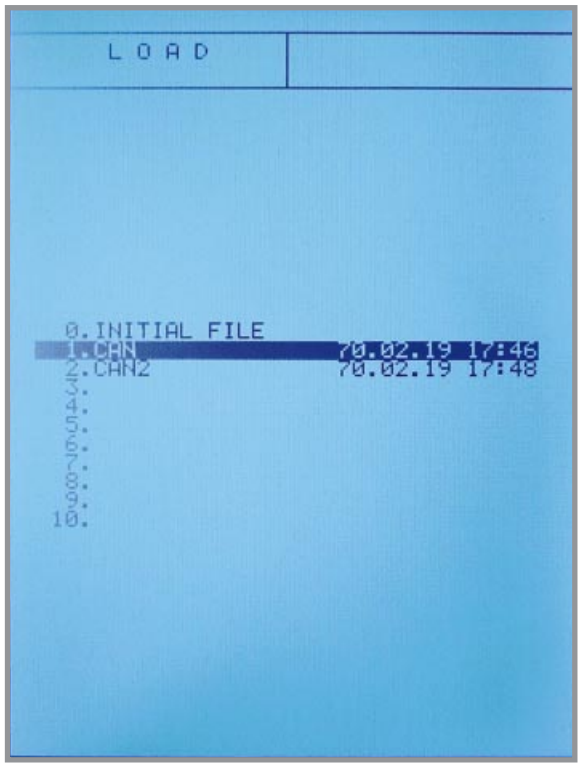


Figure 10-25 Initial Load Screen

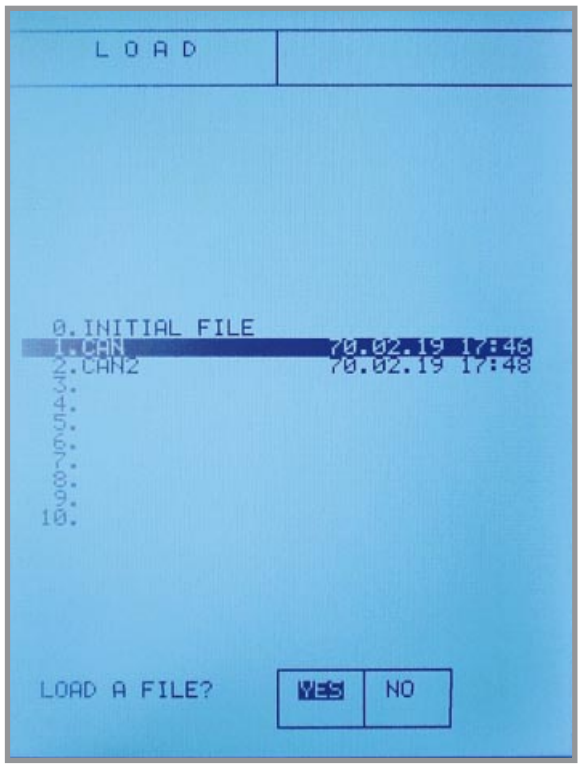


Figure 10-26 Load A File?

F4: Monitor Mode

Mode obtained by pressing the **F4** key.

Display

Available at all times. Refer to STATUS INDICATORS, pg. 45, 46 for MODE information.

Manual Mode is used to display and/or control the positions of the accumulator, the tooling actuator (DCDT) and the value of the servovalve input current as well as the Output ON/OFF functions. Auto Mode ONLY displays the above information.

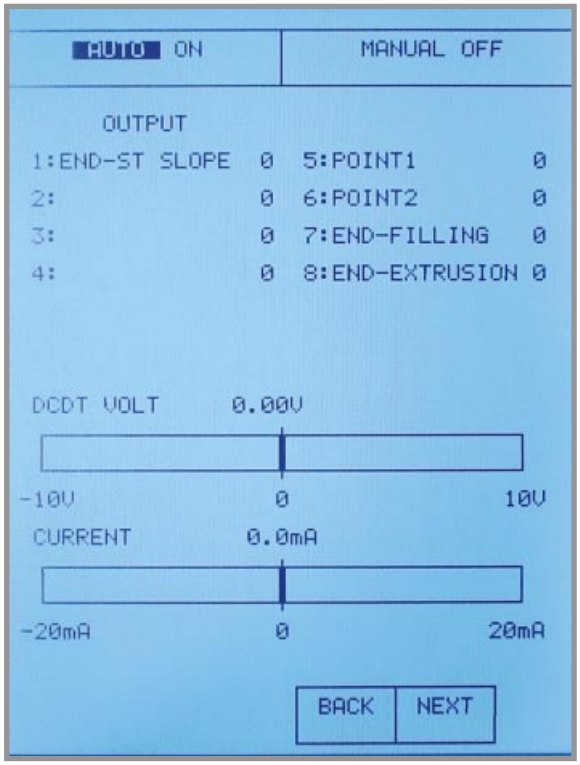


Figure 10-27 - F4: Monitor Mode Screen

Commands

The **Cursor** is used to move to the various commands only in MANUAL mode. The Set Key is inactive. The displayed values reflect the actual positions or servovalve current.

Output

There are 8 output commands which may be changed with the **Entry Knob**. Counter-clockwise rotation produces a 0 (OFF) and Clockwise rotation a 1 (ON).

The functions controlled are: (1) End of Start Slope; (2) Spare; (3) Spare; (4) Spare; (5) Point out 1; (6) Point out 2; (7) End of filling; (8) End of Extrusion.

Input

There are 9 input commands to control the following functions: (1) Start, (2) Die Gap; (3) Reset; (4) Stop; (5) Function 1; (6) Function 2; (7) Function 3; (8) Function 4, (9) Start Slope.

CORE CHECK

When the display Cursor points to "**CORE CHECK**", it is possible to control the tooling position in closed loop using the **Entry Knob** between 0 to over 100%.

OPEN COM

When the display Cursor points to "OPEN COM", it is possible to control the value of the servovalve input current with the Entry Knob.

WARNING! USE OF "OPEN COM" MAY RESULT IN DAMAGE TO THE TOOLING.

When the servovalve input is equal to any value other than those in the Zero range, servovalve oil flow will cause the tooling cylinder to move. The tooling actuator will stop only when the servovalve input current is within a very narrow band in the Zero current range. If the tooling ctuator stops due to contact with the die and mandrel, very high forces may be exerted on the tooling, possibly causing damage. It is highly recommended that the hydraulic pressure be reduced to a low value to prevent possible damage.

To prevent inadvertent damage, setting the DIP Switch position 4 to ON will disable this function.

F5: Data Display Mode

Figure 10-28 - The Data Display Screen A

Figure 10-29 - The Data Display Screen B

Figure 10-30 - The Data Display Screen C

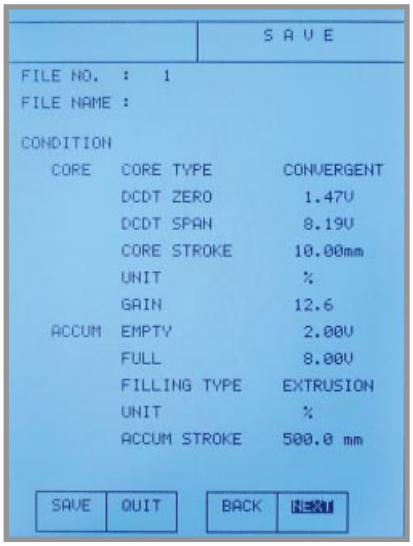


Figure 10-31 - The Data Display Screen D

Mode is displayed by pushing the **F5** Key

Display

Available when manufacturing containers.

Function

To display the conditions, parameters and profile data for the container currently being made.

SET+F1: Set Up Mode

Mode is displayed by pushing the **SET+F1**

Display
Not available when manufacturing containers

Function
Set Up is used to set up the conditions and parameters required for proper operation when the container and/or die gap tooling are changed.

Commands
Set Up Mode is covered in detail in the DigiPack 100 Installation manual, section 6.

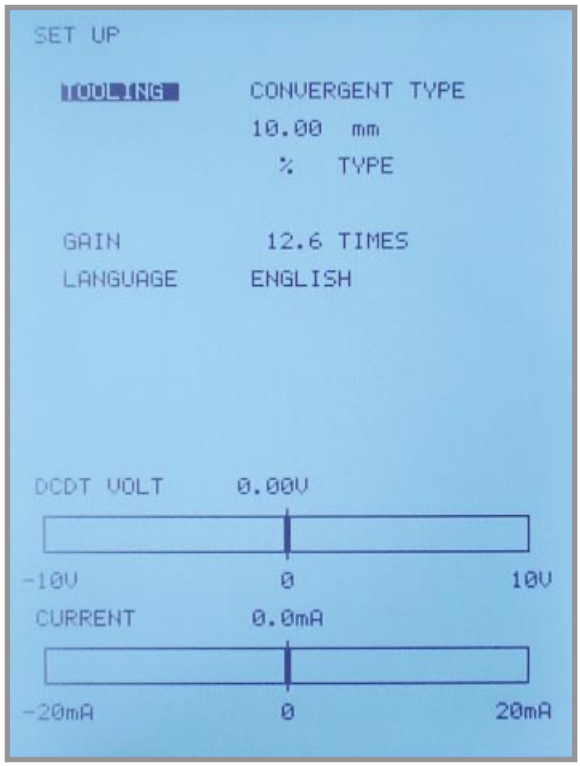


Figure 10-32 - SET + F1 : Set Up Screen

SET+F2 Timer Mode

Mode is obtained by pressing **SET+F2**.

Display
Available while manufacturing containers

Function
Mode sets an internal clock

Commands
Change the displayed parameter using the Set Key, revise the value with the **Entry Knob** and confirm with the **Set** Key. One cycle of this timer is 24 hours.

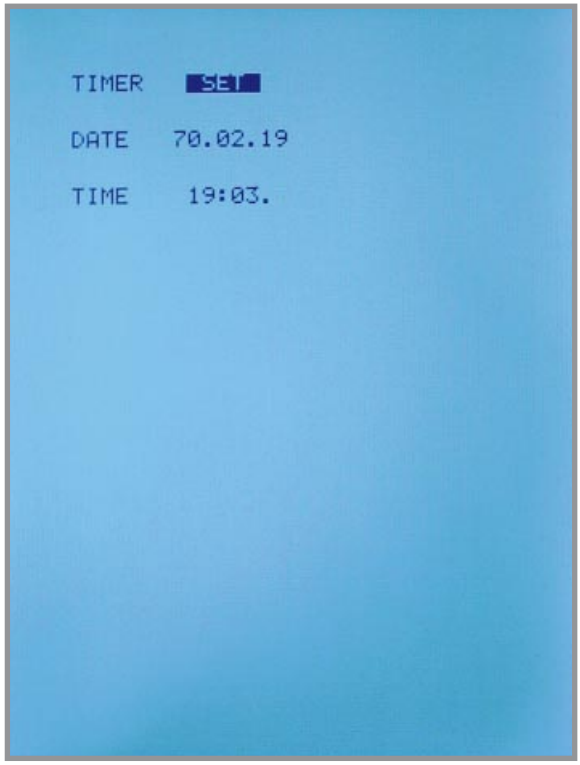


Figure 10-33 - SET + F2 : Timer Screen

SET+F5: Communication Mode

Mode is obtained by pressing **F5+SET**.

Display

Available at all times except in **F3: File Mode**.

Function

Provides RS232 communication with a host computer, using the parameters shown on the LCD display.

Note: The protocol used in the J141-212 and the J141-212A may also be used with the J141-213.

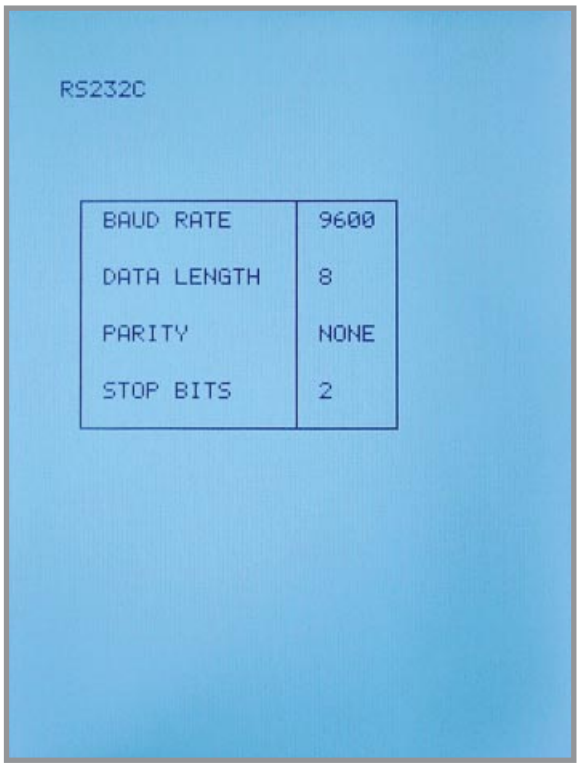


Figure 10-34 - SET + F5 : Communication Mode Screen

RS232C Communication Protocols

Baud Rate (set by DIP Switch)	4800 or 9600 bps
Character Length	8 bits
Parity Check	None
Stop Bit	2 bits
X Parameter	None
Cable	RS233C Cross Cable

Communication PROTOCOL

(a) **PUT_2** Command (Executing Data. Host → DigiPack 100)

1	**2**	**3**	**4**
0x02	0x50	0x32	0x03
STX	P	2	ETX

(b) **GET_2** Command (Executing Data. DigiPack 100 → Host)

1	**2**	**3**	**4**
0x02	0x47	0x31	0x03
STX	G	2	ETX

(c) **EPUT_B** Command (EEPROM Data Host → DigiPack 100)

1	**2**	**3**	**4**	**7**
0x02	0x50	0x42	3n	0x03
STX	P	B	File No	ETX

(d) **EGET_B** Command (EEPROM Data. DigiPack 100 → Host)

1	**2**	**3**	**4**	**7**
0x02	0x47	0x42	3n	0x03
STX	G	B	File No	ETX

(e) **Data Format 1**

1	**2**	**3**	**4**	**7**	**8**	**9**	**25**	**29**	**33**
0x02	0x4E	0x30	3n	0x30	0x31	16n	4n	4n	4n
STX	N	0	File No.	0	1	File NAME	Shot Size	Die Gap	Delay

37	**141**	**142**	**143**	**147**
4n	100n	1n	1n	4n
Cushion (*3)	Point 1~100 (*4)	Core Type	Core Unit %/mm	Core Stoke

148	**152**	**157**	**162**	**166**
In	4n	5n	5n	4n
Accum Unit %/mm	Accum Stroke	Die Gap Slope	Start Slope	Gain

171	**176**	**181**	**186**	**187**	**189**	**190**
5n	5n	5n	5n	1n	1n	0x03
DCDT	DCDT	Accum	Accum	Ext.	Englisgh	ETX
Zero	Span	Zero (*5)	Span (*5)	Fixed/ Fill Fixed	/Japanese (or Chinese)	

(*3) Cushion: NULL for FILLING FIXED in Accum type or Continuous type

(*4) Profile: NULL for interpolated point

(*5) Accum ZERO, SPAN NULL for Continuous type.:

(f) **Data Format 2**

1	**2**	**3**	**4**	**7**	**8**	**9**	**2009**
0x02	0x4E	0x30	3n	0x03	0x32	2000n	0x03
STX	N	0	File No.	0	2	Plofile 1~50	ETX

(g) **Data Format 3**

1	**2**	**3**	**4**	**7**	**8**	**9**	**2009**
0x02	0x4E	0x30	3n	0x03	0x33	2000n	0x03
STX	N	0	File No	0	3	Plofile 51~100	ETX

(h) **NG** Command

1	**2**	**3**	**4**	**6**
0x02	0x4E	0x47	2n	0x03
STX	P	B	NG Code	ETX

NG Code

1. Parity Error
2. Data format error
3. Out of Range
4. Illegal Command
5. Memory over
6. Framing error
7. Over run error
8. Busy
9. File does not Exist
10. Accumulator/Continuous type different
11. Set up data different

(i) OK Command

1	**2**	**3**	**4**
0x02	0x4F	0x4B	0x03
STX	"O"	"K"	ETX

Rules for Communication

Transfer executing data in RAM

1) Computer ➞ DigiPack 100
   If ALL "Set up Data", stored in the RAM is identical to the data being transferred the DATA can be transferred from the computer to the DigiPack 100. The required Set up DATA is listed on page 63 under the heading "Communication PROTOCOL", in e) Data Format, from **Core Type** through **Ext. Fixed/Fill Fixed.**
2) DigiPack 100 ➞ Computer

Data can be transferred with any data condition

Transfer file data in EPROM

1) Computer ➞ DigiPack 100
   Data can be transferred with any data condition.
   The existing data in the DigiPack 100 is overwritten by the transferred data.
2) DigiPack 100 ➞ Computer
   Data can be transferred with any data condition

Data Notes:

1) File No. + 000 ~ 060 (3 characters)
2) File Name = Alphanumeric Characters (16 characters)
3) Shot Size = 10 times value (0000 ~ 1000 : 4 characters)
4) Die Gap = 10 times value (0000 ~ 1000 : 4 characters)
5) Delay = 10 times value (0000 ~ 1000 : 4 characters)
6) Cushion = 10 times value (0000 ~ 1000 : 4 characters)
7) Profile Data = 10 times value
   (0000 ~ 1000 or NULL (00H) X 4:4 characters)
   = NULL X 4 characters for interpolated points
   = 4 characters X 100 points = total of 120 characters
8) Point Marker = On = 1/OFF = 0 (1 character X 100 points = total of 100 characters
9) Core Type = Divergent = o/Convergent = 1 (1 character)
10) Core Unit = % = 0/mm = 1 (1 character)
11) Core Stroke = 10 times the actual value (0001~9999:4 characters)
12) Accum Unit = % = 0/mm = 1 (1 character)
13) Accum Stroke = 10 times the actual value(0001~9999:4 characters)
14) Die Gap Slope = 10 times the value (00010~10000:5 characters)
15) Start Slope = 10 times the value (00010~10000:5 characters)
16) Gain = 10 times the value (0001~1000:4 characters)
17) DCDT Zero = 100 times value (-1000~01000:5 characters)
18) DCDT Span = 100 times value (-1000~01000:5 characters)
19) Accum Zero = 100 times value (00000~10000) for Accumulator type machine setup.
    NULL (00H) x 5 Characters for Continuous type machine setup
20) Accum Span = 100 times value (00000~10000) for Accumulator type machine setup.
    NULL (00H) x 5 Characters for Continuous type machine setup
21) Ext. Fixed/Filled Fixed = Extrusion Fixed set up=0/Filling Fixed setup=1

Commands

Four commands are available for communication.

1) **"PUT_2"** commands the DigiPack 100 to receive performance profile data sent by the host computer. If the DigiPack 100 does not receive the data within 10 seconds, the **PUT_2** command is cancelled. Similarly, if any problems have occurred, the DigiPack 100 sends an **NG** (No Good) message. In either case, try the message again. 1) **PUT_2** (for performance data, from H/C to DigiPack 100)

HOST COMPUTER → → "PUT_2 COMMAND" → → DigiPack 100
HOST COMPUTER ← ← 'OK" or "NG" ← ← DigiPack 100
HOST COMPUTER → → "PROFILE DATA" → → DigiPack 100
HOST COMPUTER ← ← 'OK" or "NG" ← ← DigiPack 100

2) **"GET_2"** (for Performance data, from DigiPack 100 to H/C)

"GET_2" commands the DigiPack 100 to send performance profile data to the host computer.

HOST COMPUTER → → "GET_2 COMMAND" → → DigiPack 100
HOST COMPUTER ← ← 'PROFILE DATA or "NG" → → DigiPack 100

3) **"EPUT_B"** (For EEPROM data, from H/C to DigiPack 100).

"EPUT_B" commands the DigiPack 100 to receive profile data from the host computer and store it in the EEPROM. The address (=file number) must be specified in the **EPUT_B** message. As with **PUT_2**, re-try the communication if the DigiPack 100 has not received the data within 10 seconds or if an NG message is sent.

HOST COMPUTER → → "EPUT_B COMMAND" → → DigiPack 100
HOST COMPUTER ← ← 'OK" or "NG" ← ← DigiPack 100
HOST COMPUTER → → "PROFILE DATA" → → DigiPack 100
HOST COMPUTER ← ← 'OK" or "NG" ← ← DigiPack 100

4) **"EGET_B"** (For EEPROM data, from DigiPack 100 to H/C)

"EGET_B" commands the DigiPack 100 to send EEPROM data to the host computer.

HOST COMPUTER → → "EGET_B COMMAND" → → DigiPack 100
HOST COMPUTER ← ← 'PROFILE DATA or "NG" ← ← DigiPack 100

2-5 SETTING UP

OBJECTIVE

The container produced by the blow molding process must meet the customers specification. Customers specifications normally involve standards for appearance, weight and physical characteristics such as strength, endurance and dimensional accuracy.

The container design process will determine the material to be used, the shape of the mold and required special features as well as the size and shape of the die gap tooling.

The task of the set up man is to use the above information with the DigiPack 100 to control the parison wall thickness and placement in the mold to produce the container to its design specification.

The setup man must become familiar with the contents and definitions contained in Section 3 and 4.

DIE GAP TOOLING SETUP

A feature of the DigiPack 100 is its ability to store the programmed parison wall thickness profile and other settings required to produce a particular container. Up to 60 container files may be stored. The stored container files in the DigiPack 100 easily allow the change from one container to another.

The stored information for a particular container contains the closed tooling die gap position and the relationship between the programmed wall thickness or die gap opening and the actual tooling die gap opening produced by the desired wall thickness. In other words, the relationship between the programmed die gap opening and the actual die gap opening has been calibrated. For example, a commanded die gap opening of 37% could be calibrated to cause an actual die gap opening of 6.7mm. The tooling die gap calibration information is contained in the container file.

In order to quickly change the blow molding machine production from one container to another with minimum change over time, the tooling die gap calibration must be accurately established.

The DigiPack 100 Installation and Maintenance Manual contains a tooling die gap calibration procedure in Section 6, DIE GAP TOOLING SETUP. To achieve the minimum change over time it is essential that this procedure be followed and the requested information recorded.

PRELIMINARY SET UP

SHOT SIZE

Shot Size basically determines the amount of plastic to be extruded through the die gap to make the container. In an accumulator machine it is the extrusion stroke of the accumulator, in an continuous machine it is determined by the time required to extrude the plastic volume or weight required by the container and tail, and also by the cooling capacity of the mold. This time or stroke was probably determined when the particular blow molding machine was selected to produce the container.

DIE GAP

Die Gap will probably be set to 0% for an accumulator machine to eliminate drool. In an continuous extrusion machine, the Die Gap must be used to set a minimum die gap opening (may also have mechanically set minimum opening) to prevent damage to the extruder and/or tooling due to excessive pressure or to a larger opening consistent with the parison tail requirements at the top of the container.

DELAY

Delay will initially be determined by the required tail length at the bottom of the container. Delay would be equal to the tail length divided by the length of the mold.

AUTO SHOT

Auto Shot does not apply to accumulator machines,.
Auto Shot would be ON if the DigiPack 100 is only controlling the parison wall thickness and its cycle time is determined only by the interval between gthe machine controlled knife cuts. **Auto Shot** would be OFF if the machine timing is partially or totally controlled by the DigiPack 100. For example, if the mold closure timing is controlled by a DigiPack 100 marker pulse, then the time from the knife cut to mold closure is set by the DigiPack 100's Shot Size; the time from the marker pulse to the knife cut is controlled by the machine's controller.

WEIGHT, RANGE H and RANGE L

Weight, Range H and Range L are set by default to zero at the beginning of setup.

DIE GAP OPENING

Die Gap Opening is determined by the Die Gap Opening required to extrude the required parison weight for the container and is part of the initial selection of extruder speed and the specific tooling used. This average opening is set at program point 1 and program point 100 and the resulting die gap program will be a constant die gap opening between points 1 and 100.

INITIAL TRIALS

After the heater bands have brought the extruder barrel and extrusion head to the desired temperature, some trial containers are blown. The blow molding machine timing and motions are adjusted to obtain a sealed container. Adjustments to the constant die gap program, **Shot Size, Die Gap** and **Delay** may have to be made before a sealed container is obtained. At this time, the die gap tooling opening is fixed and the operator would follow the same logic he would use if the tooling was mechanically fixed in position to obtain a sealed container.

Once a sealed container is obtained, it should be sliced open along the axis parallel to the parison length. If the containers plastic material is translucent, then thick and thin areas can be found by visual observation In any case, container wall thickness measurements should be made along the cut edge and compared with the target wall thickness. The wall thickness or die gap opening program is then changed based upon the differences with the target thickness.

More containers are then blown, cut open and the die gap opening changed as required. After two or three trials it would be helpful to know the location of the programmed portion of the parison in the mold.

One method is to reduce the programmed thickness at one point and determine where that reduced wall thickness ring is located in the container wall. Often, the reduced thickness point can be clearly seen. Further trials with a single reduced thickness point at different locations along the container will help to determine the position of the programmed points along the length of the actual container.

Do not run tests with more than one reduced thickness point. Reducing the wall thickness at a point will change the distribution of plastic along the parison length and the use of more than one reduced thickness point will lead to improper assessment of the results.

A second method to determine the program point distribution on the container is to mark the parison wall at or as near as possible to the place where the parison leaves the die gap tooling. The marks may be applied manually or it may be possible to use marker pulses to operate an ink jet. This method marks the program points on the parison without distorting the parison or container.

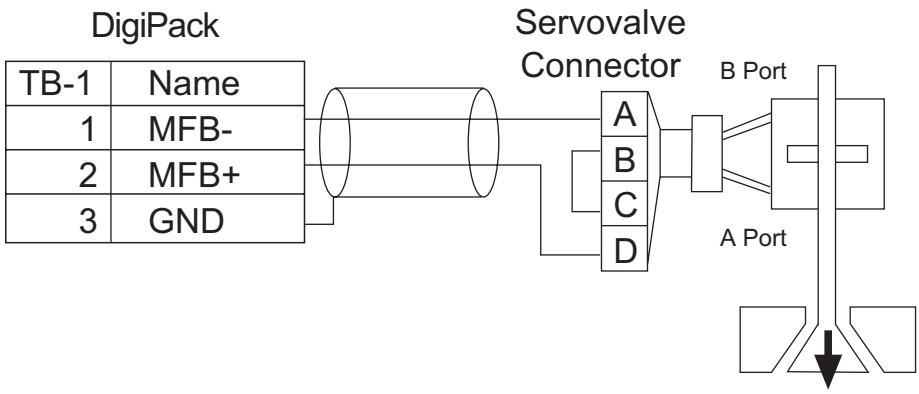
When program points 1 and 100 are marked, the position of the programmed portion of the parison in the mold may be determined and adjusted.

A constant thickness container wall will be probably be obtained before the correct weight. Adjustment of Weight, Range H or Range L will then allow both the correct container weight and wall thickness to be obtained with minimum requirement for the operator to change the value of any individual programmed die gap opening points.

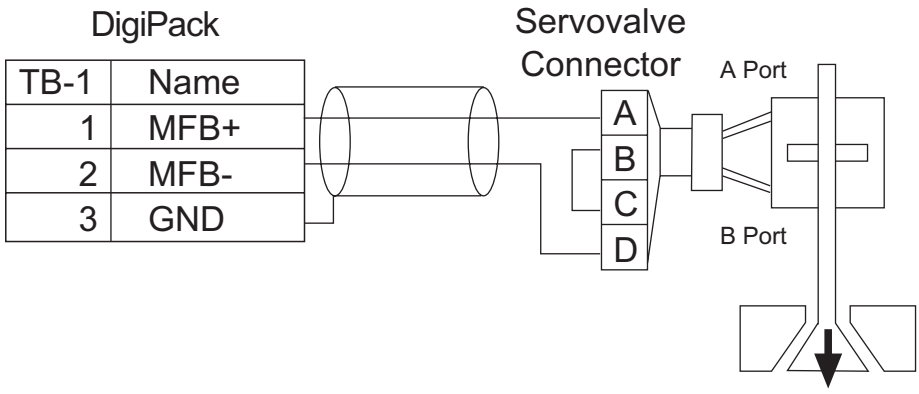
MFB Series Connection

If used with MOOG MFB Valve (rated current is 100mA. Example: G631 series) and our product cable (A04903-7XX: 7XX mean indicated for cable length. Example: 710=10m). Connection as follows:

(1) Please connect as below picture, if the cylinder rod (core) moves to down direction when the (+) command signal input to the servovalve connector terminal "A"(Black Wire). (Regardless of Diverge or Converge of the Tooling Die)



(2) Please connect as below picture, if the cylinder rod (core) moves to Up direction when the (+) command signal input to the servovalve side connector terminal "A"(Black wire). (Regardless of Diverge or Converge of the Tooling Die)



Check

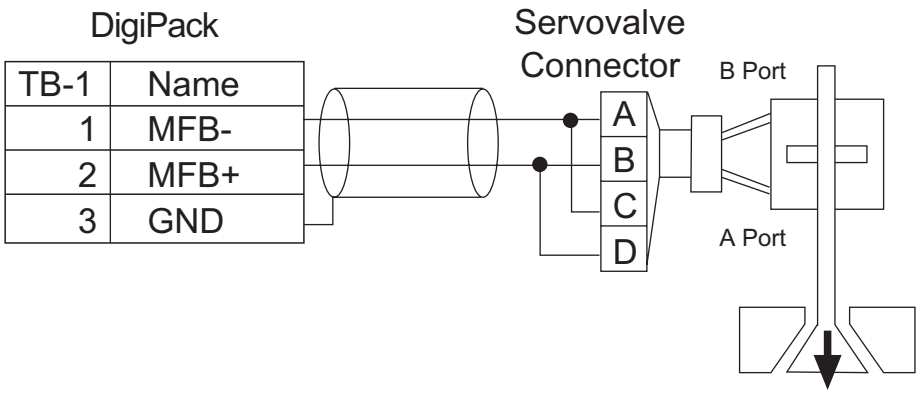
If the direction of cylinder rod (Core) is unknown, set hydraulic pressure to about 2 to 3Mpa (to prevent core from damage if contact to mechanical end). Check the polarity of the servovalve by connecting a battery (1.5V) to A-D pin of servovalve connector.

The above picture illustrated the example with the oil flow to B port if the valve polarity is A (+) and D (-). It is important to check valve polarity with reference to the requirement before use.

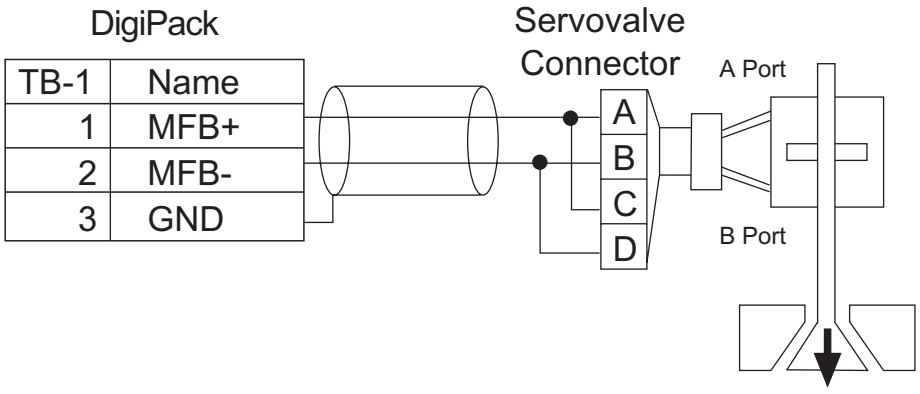
MFB Parallel Connection

If used with MOOG MFB Valve (rated current is 50mA and below. Example: G631 series) and our product cable (A04903-1XX: 1XX mean indicated for cable length. Example: 110=10m). Connection as follows:

(1) Please connect as below picture, if the cylinder rod (core) moves to down direction when the (+) command signal input to the servovalve connector terminal "A"(Black Wire). (Regardless of Diverge or Converge of the Tooling Die)



(2) Please connect as below picture, if the cylinder rod (core) moves to up direction when the (+) command signal input to the servovalve side connector terminal "A"(Black wire). (Regardless of Diverge or Converge of the Tooling Die)



Check

If the direction of cylinder rod (Core) is unknown, set hydraulic pressure to about 2 to 3Mpa (to prevent core from damage if contact to mechanical end). Check the polarity of the servovalve by connecting a battery (1.5V) to A-D pin of servovalve connector.

The above picture illustrated the example with the oil flow to B port if the valve polarity is A (+) and D (-). It is important to check valve polarity with reference to the requirement before use.

Argentina
Australia
Austria
Brazil
China
Finland
France
Germany
India

Ireland
Italy
Japan
Korea
Luxembourg
Norway
Russia
Singapore
South Africa
Spain
Sweden
United Kingdom
USA

DigiPack 100 Installation & User Manual

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