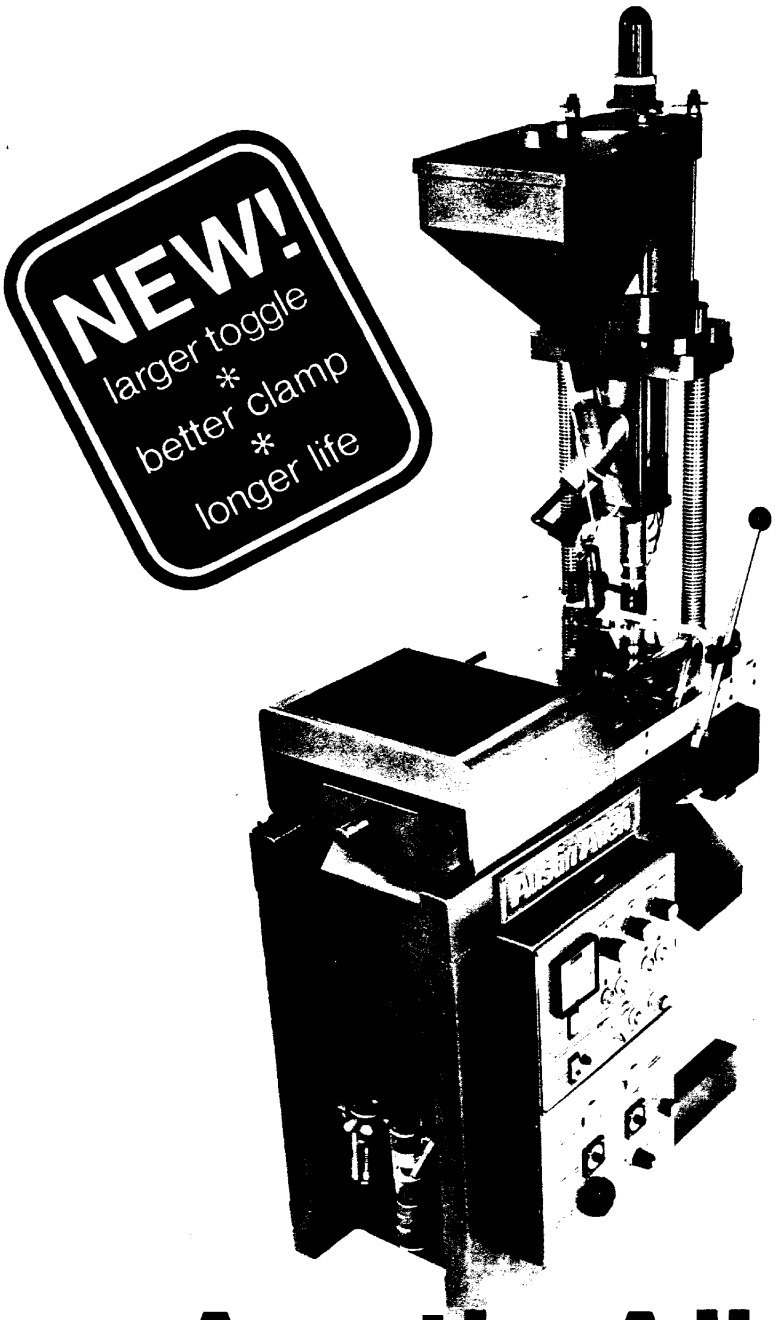


Austin Allen Gnat 250 PRT

Fully Automatic Injection Moulding Machine

We have tried to make this service manual as comprehensive as possible. However, your best ally at all times is the telephone.

Most of us here are able to recognise symptoms and give immediate remedial answers. Basically, the machine is extremely reliable. Where possible, extensive use is made of well established, tried and tested standard parts. These parts are invariably purchased from large concerns which have divisions in most countries in the world. All spares are available from Austin Allen Ltd., but in a case of real emergency it is probable that you will be able to buy replacement parts from stockists, local to you.

If you have reason to telephone the company with an enquiry, it may help you to know the names of individuals and their responsibilities.

*R. E. AUSTIN. Managing Director.

*ROBIN DRURY. Manager, Design, research and development. (Assistants – Peter Hall & John Oliver)

JOHN GRAVES. Buyer.

*ALAN LEE. Service Manager.

*CHARLES PITTAWAY. Production Manager.

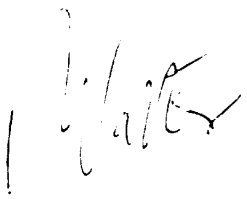
Mrs. MAY SHORT. Accounts.

CHRIS STILE. Tooling Services Manager.

*PHILLIP WALTER. Director of Sales & Marketing. (Assistant – Mrs. Jean Evans)

*These individuals are able to cover each others activities with regard to faults on the machine and technical problems in general concerning running, servicing and maintaining the machine, and as principal officers of the Company will always endeavour to assist you.

As a company we pursue a continuous policy of improvement. Please bring to our attention any suggestions you may have which could improve any aspect of selling or the operation of our machines. I can assure you that all such suggestions will be acknowledged and seriously considered.



SERVICE CHARGES.

Working hours of Service Department are 8.30 a.m. to 4.45 p.m. 30 minutes lunch. Monday to Friday.

Travel time charge: £12.00 per hour, plus 20p per mile.

Work hours: £15.00 per hour (minimum 2 hours)

Mid-week Overtime: £25.00 per hour (by arrangement only)

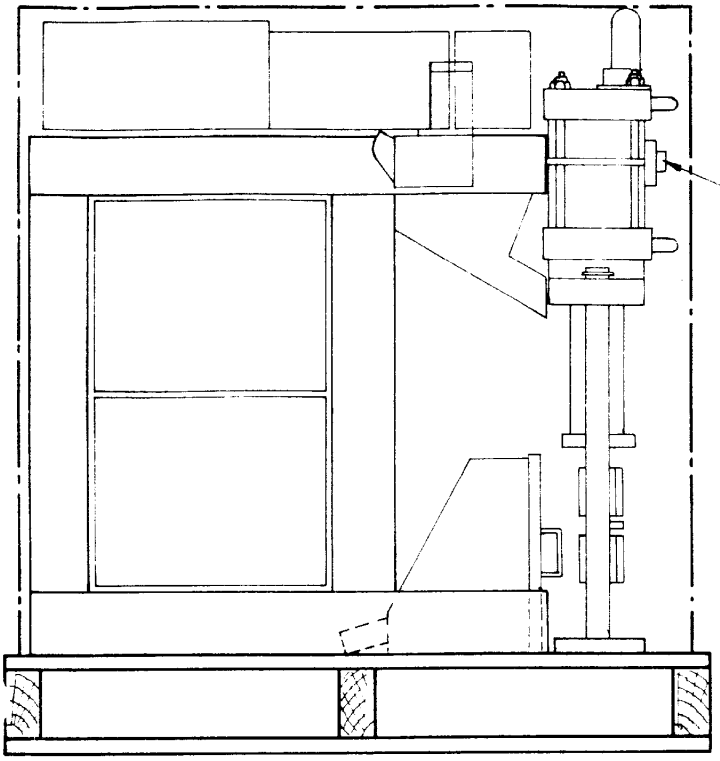
Overnight accommodation and sustenance at cost. (Customer to make arrangements)

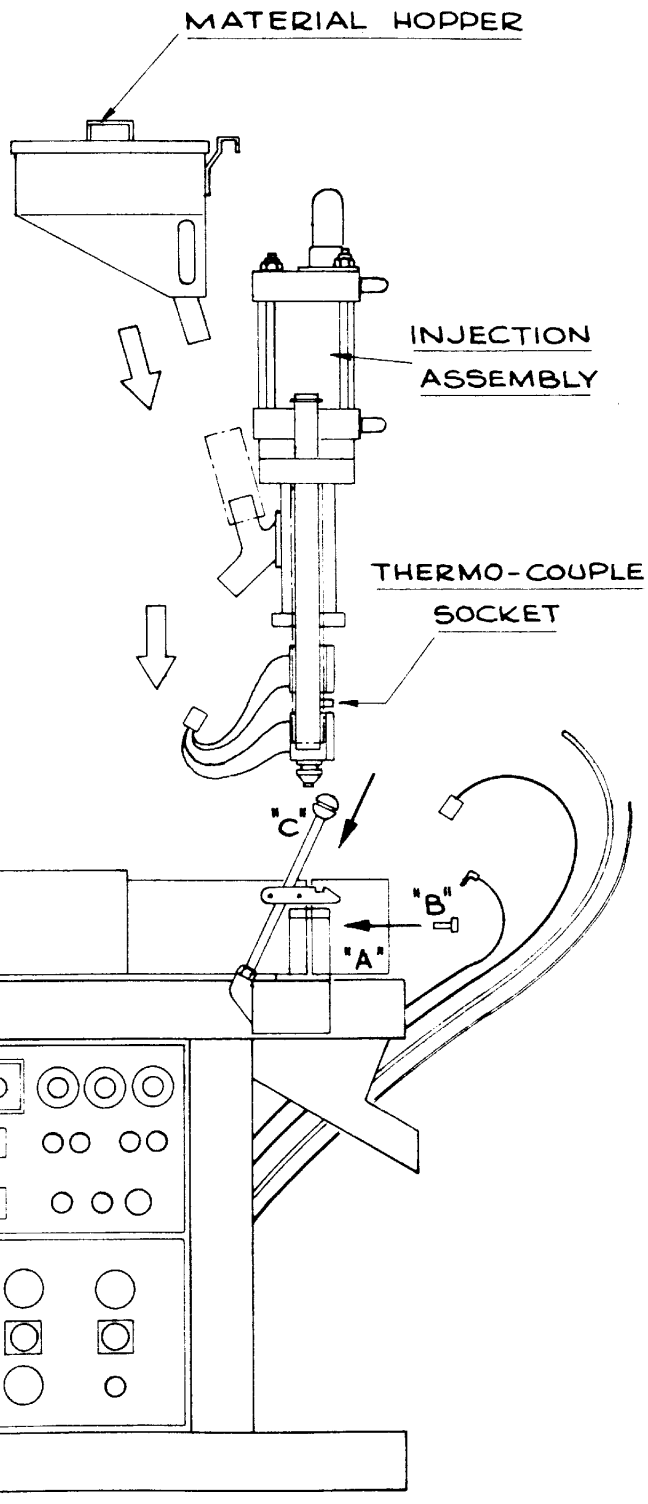
Guarantee work according to conditions of sale.

Travel is calculated on actual mileage.

July, 1981

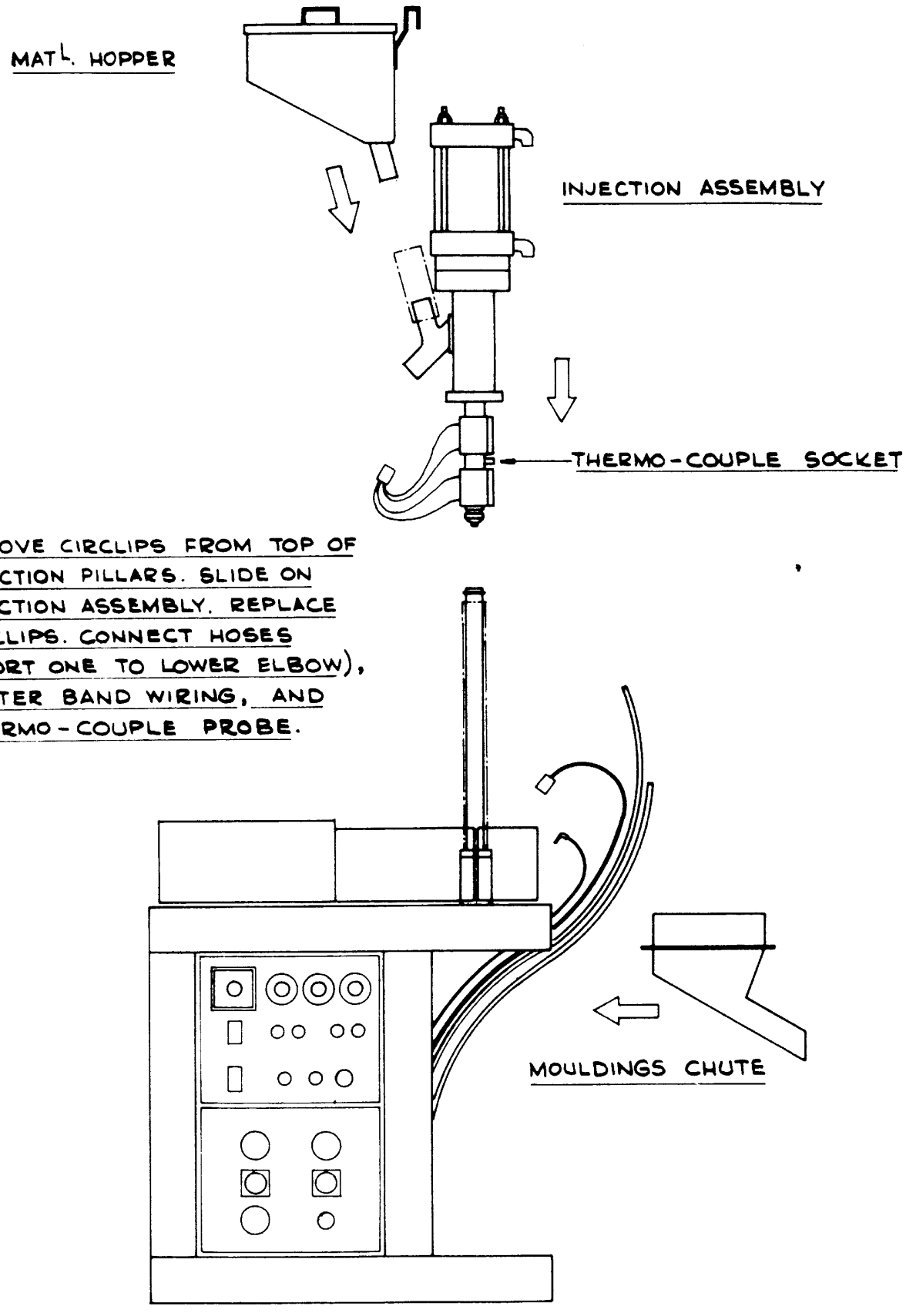
ASSEMBLY DETAILS FOR MACHINES SUPPLIED CRATED.





ASSEMBLY SEQUENCE

1. REMOVE CLAMP BOLTS SECURING INJECTION ASSY. TO END OF MACHINE FRAME.
2. REMOVE FIXED PERSPEX GUARD "A"
3. REMOVE BOLTS "B" FROM INJECTION MOUNTING BLOCKS.
4. OPEN SLIDING GUARD AND LOWER INJECTION ASSY. INTO POSITION IN MOUNTING BLOCKS.
5. REPLACE BOLTS "B" & TIGHTEN.
6. INSERT GUARD OPERATING HANDLE BETWEEN LATCH ASSY. ROLLERS, SCREW INTO LEVER SOCKET & TIGHTEN LOCK-NUT.
7. CONNECT INJECTION AIR PIPES, HEATER BAND WIRING AND THERMO-COUPLE PROBE.
8. LOWER MATERIAL HOPPER INTO POSITION.



ASSEMBLY DETAILS FOR MACHINES SUPPLIED IN DISMANTLED CONDITION

RECOMMENDATIONS FOR ROUTINE CHECKING AND MAINTENANCE OF SAFETY GUARDS FOR AUSTIN ALLEN 250PET AUTOMATIC MOULDING MACHINES.

PERSPEX SLIDING GUARD

This guard is the most important safety device on the entire machine as it provides access to the area of maximum danger, that is the mould closing area. The guard is operated by a handle which slides the guard open and shut and is secured in the closed position by means of a sprung-loaded latch. The operation of the safety handle to OPEN the guard initiates, simultaneously, three safety interlocks:

(i) Mechanical Scotch Bar

As the guard begins to open, a parallelogram type mechanism is actuated and allows a rigid steel arm equipped with a series of notches to drop down onto the top of the moving platen where it will engage with a dovetail block. This will prevent further movement of the moving platen in both the open and close directions. This scotch arm also carries one of the two electrical safety switches (see ELECTRICAL INTERLOCK)

Checking and Maintenance:- At the beginning of each shift, the mechanism should be operated by hand with the sliding guard open and the machine isolated. Make sure that the various actuator links and pivots operate smoothly and that none of the fixing screws etc. have worked loose. Check that the scotch arm drops freely onto the sliding platen. Occasionally apply oil to the various pivots etc.

(ii) Mains Air Dumping Valve

The lower end of the guard operating handle is fitted with an actuator roller of the air dumping valve, which is contained in the black "safety box", can only engage in the cut-out in the actuator cam when the guard is in the FULLY CLOSED position. When the sliding guard is in any position other than fully closed, then the air dumping valve is depressed which exhausts the air supply to the machines cylinders and renders the machine pneumatically safe.

Checking and Maintenance:- All that is required is to occasionally operate the safety handle whilst the machine is connected to an air supply and check that the characteristic loud "hiss" is heard as the air system exhausts. No maintenance is necessary.

(iii) Electrical Interlock

This consists of two switches wired in opposite modes, that is, one switch has to be "made" and the other switch "broken" to provide a continuous circuit. One of these switches is mounted on the scotch arm, and the other is located inside the black "safety box".

Checking and Maintenance:- Occasionally check that the switch mounting screws are tight and that their contacts are free to move when actuated manually. No maintenance is necessary.

FIXED METAL & PERSPEX END GUARDS

These guards are not interlocked with the machine function in any way as they should never need to be removed during normal machine usage. It should be checked, however, that their retaining screws are correctly fitted so that they cannot be removed carelessly whilst the machine is running.

MOULDINGS CHUTE

This item also serves the purpose of a fixed guard preventing access from below to the dangerous"mould close" area. When the chute has been mounted in the required component delivery position, it must be fixed in this position by bolting it to its mounting [illegible] so that it cannot be removed carelessly whilst the machine is running.

INJECTION UNIT GUARDS

The injection unit is fitted with three small perspex guards (two are flat and one is curved), which allow visual access to several important injection functions. These guards are not interlocked with the machine function in any way as they should never need to be removed during normal machine usage. It should be checked however, that their retaining screws are correctly fitted so that they cannot be removed carelessly whilst the machine is running. One of the main functions of these guards is to protect the operator's eyes in the extremely unlikely event of a "blow back" which can occur if highly degradeable material is allowed to overheat in the plasticising cylinder.

INSTRUMENT PANEL STOP BUTTON.

This prominent red button should occasionally be checked to ensure that when operated it latches into the "off" position until it is re-set by twisting.

SPECIFICATION 250PRT

Injection Unit

Shot Weight (grams)		5	12	15	20
Plunger Diameter		.5"	.625"	.750"	1"
Injection Pressure at Line Pressure of:	80 p.s.i.	11500	7000	5000	2800
	100 p.s.i.	14000	9300	6500	3600
	120 p.s.i.	17000	11000	9500	5500

Injection Plunger Stroke: 4"

Heating Capacity: 1000 watts

Locking Pressure at Line pressure of:
100 p.s.i. — 7.5 tons
120 p.s.i. — 9.0 tons
(Imperial) achieved via toggle

Mould Opening Stroke: 4" Max. (adjustable)

Distance between Ties Bars: 7.9" (Note: Reduced to 7.625" by Injector Pillars)

Maximum Daylight: 8" can be increased by special order. Conversion any time.

Minimum Daylight: 3¾"

Maximum Bolster Size: 7.5" x 8" x 8" deep

Power Requirements: 230/250 single phase AC 5 amp

Air requirements: 80 p.s.i. up. Volume approximately 7.8 cfm on 10 second cycle and pro-rata.

Cycle Range: 3 to 50 seconds. Different potentiometers available to give longer cycles.

Floor Area: 32" x 15"

Weight: 4 cwt.

Height: 66"

Nozzle Valve Diameter: $\frac{5}{16}$ O.D.

Fusing: 5 amp

ARE YOU SOUND IN WIND?

It is essential that our machines are fed with a **constant, clean** supply of air. Many of our service visits, where a machine is reported as malfunctioning, have been unnecessary because on inspection, we find the machine has been put right at the end of the air line, with everything from blow-moulders to air guns on the line before our machine, causing severe air starvation. Or, the customer's compressor had a too wide cut in and cut out differential, which required a regulator to be put in the line just before the machine, to regulate the pressure constantly at the minimum level the system fell to. Another cause of trouble is when the run of pipe to the machines is too small in diameter and/or the run is too long. If in doubt, check with us or with your air installation contractor.

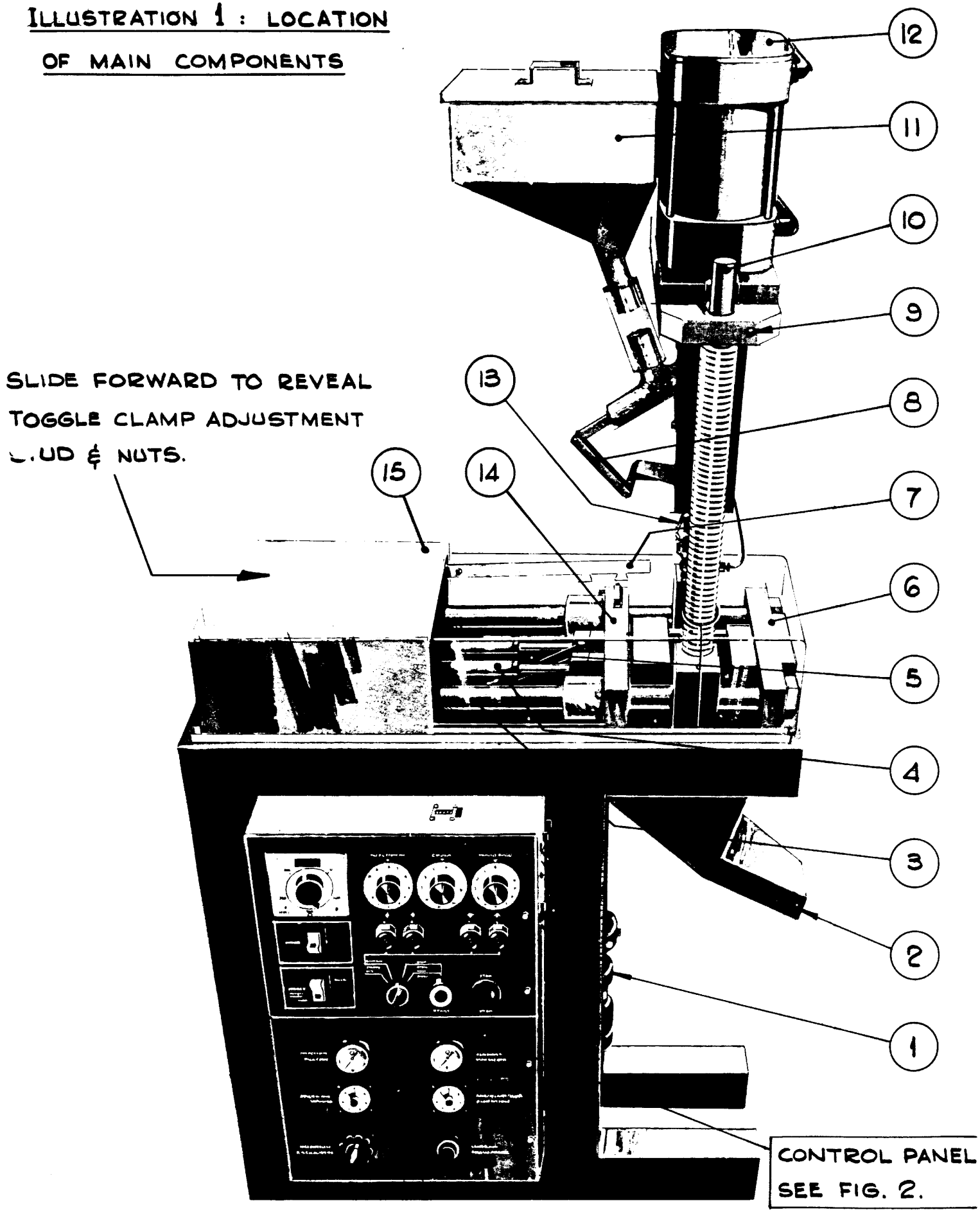
Air is the life-blood of the PRT. So, if you are experiencing lock troubles, feed troubles, occasional short mouldings, occasional flashed mouldings etc., etc., **CHECK YOUR AIR**

OPERATING INSTRUCTIONS

250 PRT
LOCATION OF MAIN COMPONENTS–ILLUSTRATION(1)

1 Air Filter and Lubricator Set
2 Delivery Chute
3 Twin Round 40mm Hard Chromed EN 16 Tie Bars
4 Twin Ejection Studs
5 Toggle Mechanism
6 Fixed Platen
7 Mechanical Safety Scotch
8 Feed Linkage
9 Height Adjustment and Injector Mounting Plate
10 Injection Mounting Pillars
11 Material Hopper
12 Injection Cylinder
13 Plasticising Cylinder
14 Moving Platen
15 Guards (Slide Forward to Reveal Toggle Clamp Adjustment Stud and Nuts).

ILLUSTRATION 1 : LOCATION OF MAIN COMPONENTS



INSTRUCTIONS 250PRT

The machine should be installed with an adequate supply of clean air, and a single phase supply of electricity. (13 amp domestic) See Specification Sheet. The air hose supplied with the machine should be connected to the air supply circuit with a quick-release coupling. We recommend that the air be dis-connected when setting moulds. Check that the lubricator has been filled with the appropriate oil. (See lubrication details). The air filter will drain automatically and this needs no attention.

MOULD SETTING

Facing the machine, remove the delivery chute. The operator should satisfy himself that the main supplies of electricity and air to the machine are disconnected. The services should only be reconnected when the chute is returned. Check that the mould has been completed with $\frac{5}{16}$" BSF mounting holes, and that $\frac{7}{16}$" clearance holes for the ejector studs have been included. The mould should be ground flat on the top around the nozzle contact area. Using four $\frac{5}{16}$" BSF Allen head screws, (2" long on moving half, 2½" long on fixed half) lightly bolt the mould on to the fixed platen. Now move the moving platen up to close on the tool and lightly bolt on. As the moving platen is without air when the guards are open, this can be done by hand, with the safety bar lifted. Alternatively, the platen can be moved by using the normal CLOSE Button with the closing pressure turned down (remember to close the guards). Adjust the nuts on the stud at the end of the toggle until the toggle links are in a straight line with the mould closed. Now, tighten the mould screws firmly, making sure that the ejector studs are fully retracted, the platens can now be freely opened and closed.

With the platens open, fix the ejector studs to give the required movement of the ejection system in the mould. These studs should be parallel to prevent unequal wear of the sliding parts. A feeler gauge check between the studs and ejector plate is a good idea. The lock should now be adjusted by opening and closing the mould by the MANUAL push buttons and adjusting the two nuts on the platen stud. The inside nut will increase or decrease the lock and must be adjusted (minutely each time) when the mould is open. The outside nut locks the platen. It is difficult to detail the amount of lock required, but under air power the mould should just close with a gentle mechanical 'clunk'. Lock the outside nut. **NOTE:** The lock may be adjusted whilst the machine is running. This is sometimes necessary after slight expansion of the mould has taken place, due to heating up during the moulding process.

PREPARING TO MOULD

The nozzle valve of the plasticising cylinder must be located exactly over the runner hole in the mould. It is possible to position the Injection Unit to accommodate a wide range of moulds with split lines that vary in position due to different thicknesses of die plates. It is also possible to raise and lower the Injection Unit to suit different 'heights' of moulds. The Injection Unit can also accept "off-set" injection points where the runner can be up to ½" either side of the centre line of the machine.

To position the Injection Unit

a) With the mould in the closed position, slacken the two nuts which clamp the feet of the Injection Unit Mounting Pillars. These become accessible when the chute is removed.

   The Injection Unit together with Mounting Pillars, can then be moved along the axis of the machine by sliding the feet together along the frame of the machine until the nozzle valve is directly over the sprue in the mould.

b) The nozzle valve should be at a height of approximately ¼" above the mould in order to achieve satisfactory sprue break on Injection Return. To adjust the Injection Unit to the correct height, slacken the clamp screws (Illustration 9) on the Injection Cylinder Mounting Plate sufficiently to enable the unit to slide up and down the pillars. The weight of the unit is counter-balanced by large springs. On obtaining the correct height, re-tighten the clamp screws with high torque.

c) To position the plasticising cylinder over an "off-centre" sprue, slacken the bolts underneath the Injection Cylinder Mounting Plate and using the movement permitted by the slots in the plate, adjust the plasticising cylinder to suit.

To commence moulding

Set the temperature controller to the required setting, switch on the heaters, charge the unit with plastic granules, making sure the granules enter the plasticising cylinder.

GRANULE FEED MECHANISM

This is actuated by a block (Ref. 16 on the Injector Unit Drawing), on the Injection Piston Rod which strikes an adjustable block on a push-pull device which meters an amount of material into the plasticising cylinder. It can be seen that if the block is high up the push-pull device, the Injection Piston Block will strike it earlier in its stroke and feed **more** material into the cylinder and if the block is low, it will feed **less**. This block must be positioned by trial and error to give a rate of feed necessary to maintain automatic moulding.

See the block at a mid position to start with.

AUTOMATIC MOULDING

1 Fill the hopper with material and charge the plasticising cylinder by depressing the Meter Plunger by hand until the granule level just reaches the top of the barrel.

2 Switch on the current to the machine and turn on the Heat Controller. Set the pointer on the dial to the required moulding temperature, (according to the material manufacturer's instructions). We enclose a guide to melt proving temperatures if material manufacturer's information is not available.

3 Watch for the instrument to indicate that the cylinder is up to the set processing temperature.

4 Connect air.

5 Set times to a test sequence of say 6 seconds inject, 10 seconds cool and 5 seconds open. Select the one cycle mode and push START Button. Check for correct cycling time and adjust speed of the cycle to obtain acceptable mouldings. Ensure that the mouldings fall clear of the mould. Continue moulding until adjustments have effect.
Alter injection pressure accordingly. Record the Heat Controller setting. *Record the setting of the inject, cool and open timers. *Record injection pressure. *Adjust mould closing pressure so that there is just enough power to close toggle and mould to the point where high pressure takes over. The closing pressure, then the locking pressure are shown in sequence on the same gauge.

It is important to maintain correct metering of granules. The granules (on observation) should not be allowed to overfill above the top of the barrel. Ideally, (depending on the size of the moulding) the amount of material in the barrel and plasticising cylinder should always be kept as low as possible to maintain automatic cycling. This keeps to a minimum the time the plasticised material is in contact with high temperature cylinder walls. The meter operates on the principle "that the amount of granules pushed in should closely balance the amount of plastic injected". By adjusting the actuator block by trial and error, this can be balanced.

*** The automatic production of thermoplastic mouldings depends on a variety of factors. It is through trial and error that these factors are realised for each moulding. It is, therefore, important that a record is kept of the variables and experience is built up of all materials and components used so that the period of trial and error for each new moulding can be reduced.**

It is obvious that automatic cycling cannot be achieved unless every moulding is fully ejected. Although provision is made for a positive 'knock-off' and/or blast of air to completely clear the mould face, in most circumstances (provided the tool have been carefully made) full ejection is achieved by the correct selection of the cycling variables.

Ensure that:—

(a) The mould is securely fixed and opens and closes on air (MANUAL push buttons). The toggle must be fully extended on the closing stroke or, due to interlock, the injection will not take place.

(b) That on opening the toggle, the ejector studs firmly operate the mould ejection mechanism and that the moulding will fall clear.

(c) The guard is completely replaced. The cycle will not start otherwise.

We illustrate further on examples of some of the types of tools which are used on the AUSTIN ALLEN 250 PRT.

These illustrate that a great variety of component types can be produced by vertical injection on the split line.

'WATCHMAN'

The moulding cycle is 'overseen' by a device incorporated in the timing circuit, which is working all the time.

It incorporates a timer (the first timer on the right with the panel door open – Ref. 2a) the normal function of which is to switch off everything after counting down. The 'switch off' signal is cancelled continuously whilst the cycle remains uninterupted. However, if the cycle is broken by a stall – for instance, when a moulding is caught between the mould faces, then after a maximum wait of sixty seconds, the circuit unlatches. There is a switch which allows the heat to be retained if preferred. We supply a bridging plug so that the "Watchman's" timer can be used to replace any one of the other timers in the event of a failure, until a replacement is obtained.

The machine will also shut off if the re-set switch is not operated at each cycle.

Watchman reset switch (see 1 in diagram) has to be depressed by the rear adjustable actuator block during close and opening strokes. This block will probably never need adjustment.

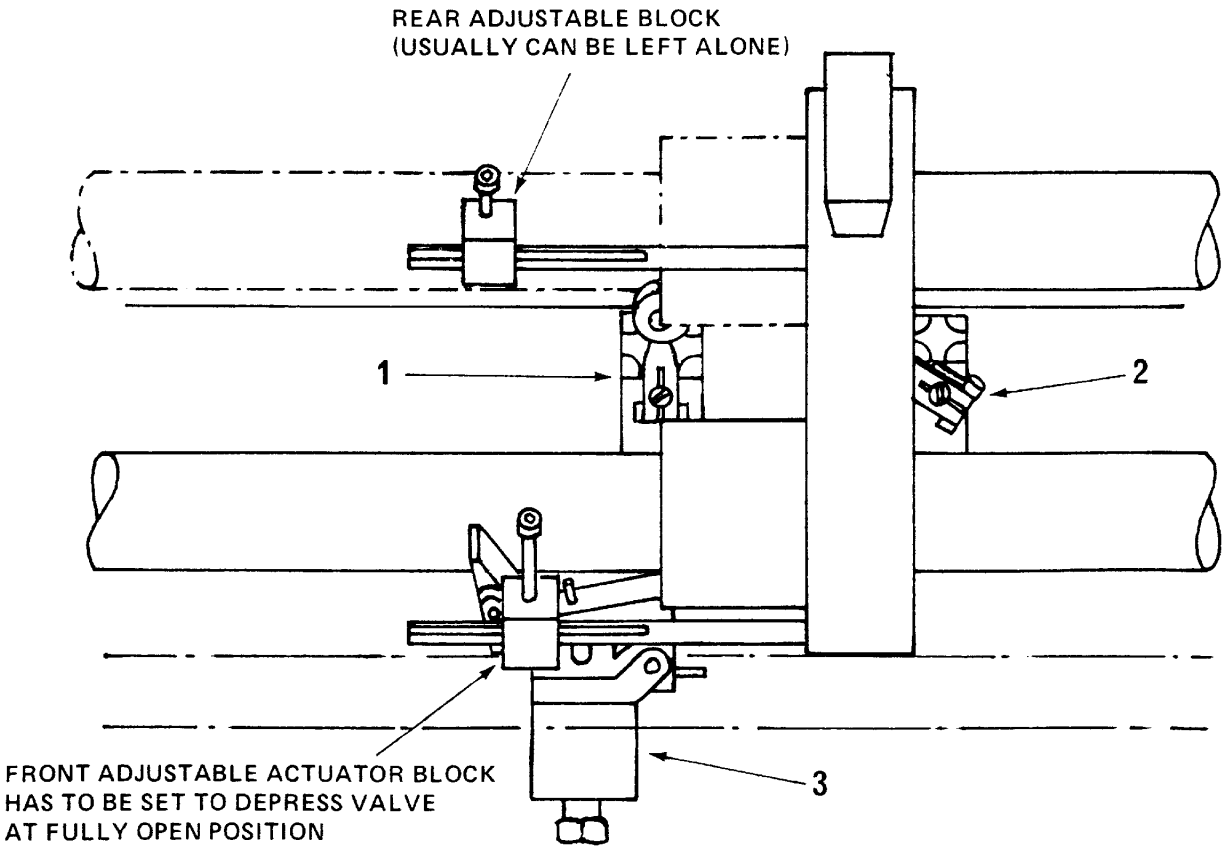
The switch near the chute (see 2 in diagram) isolates an unwanted injection pulse during timer reset. It is operated by the underside of the moving platen and when on Auto allows injection only when the switch can spring up with the platen forward.

The air valve on the front of the machine (see 3 in diagram) is operated by the front actuator block which has to depress the valve at the fully open position, and pilots three functions:–

a) Air blast volume.
b) Knock off duration.
c) Isolation of platen opening pressure. This ensures speedy close of platen on next cycle by allowing cylinder pressure to drop down to atmosphere. It also enables, when required;

BUMP EJECTION

If springs are built into the ejector plate assembly of a mould, so that the moving platen is sprung forward off the ejector studs after fully opening, repeated ejection can be effected by careful adjustment of the actuator block and mould open time. The mould opens fully in the normal way, then due to the toggle pilot valve isolating the mould open, the ejector springs can move the mould forward again until the actuator block is off the switch assembly. The opening signal is remade and the mould is driven open again. This function repeats for as long as the mould open time permits.



CYLINDER CUSHIONING

On the Injection and Lock Cylinders, there are top and bottom adjusting screws which effect the cushioning. Their function is to reduce the impact of the piston at the extremes of its stroke. It does this by restriction, which slows down the piston on the cushion of air that is trapped in front of the piston, and can only escape at a controlled rate. Sometimes, use of this bottom cushion is useful on the injection cylinder to prevent over-packing or, conversely, by releasing the screw slightly, an extra push on the molten plastic at the final stages of injection can make all the difference between filling and not filling awkward components.

Use of the bottom cushion on the lock cylinder will ease the load on the tool as the ejecting system comes to rest after opening and ejecting the finished part.

BE CAREFUL . . . Never unscrew the cushion screw further out than when the head is flush with the housing. If unscrewed too far, the screw will come out with the full air line pressure behind it, and it can cause injury.

IF IN DOUBT, DIS-CONNECT THE AIR LINE

SERVICE SCHEDULE

Lubricate	—	Tie Bars	OIL DAILY
		Links	OIL DAILY (Use Shell Tonna oil T.71 or equivalent).
Lubricator	—	See separate leaflets	

KEEP THE MACHINE CLEAN, ESPECIALLY THE TIE BARS

REGULARLY CHECK IF THE FILTER IS FUNCTIONING

Machines prior to November 30th 1977 are fitted with grease nipples which should be greased daily with Molybdenum Disulphide (Rocal MTS 2000).

PURGING Material or colour changes

When purging, care should be taken that the material following on is compatible and will flow at the same temperature as the plastic already in the plasticising cylinder.

To take an extreme example, to try to follow acetal which has a melt temperature of between 200/220° C with, say, Nylon 66 which has a processing temperature of 260/300° C will result in severe degradation of the acetal, and produce a noxious gas. If in doubt, always use an inert plastic such as polythene to clear one material out, before following on with the new material. Polythene is stable at a very wide range of temperatures. It also has a slight cleaning effect which is helpful. Polystyrene is also suitable as an intermediate plastic.

As the nozzle on the PRT is of the shut-off type, for reasons of convenience and safety it is necessary that the injector be brought into contact with a surface which will lift the nozzle and allow the plastic to flow. Consequently, purging can only be carried out with the tool mounted between the plates. The method is as follows:—

Assuming that the tool is correctly set, (firmly bolted up in line) and that the nozzle is correctly aligned over the runner hole, the selector switch should be put to "Manual" and the sliding platen inched forward on the push buttons until there remains a gap of approximately $\frac{3}{16}$" (4–5mm). Injection pressure should be turned down to achieve the situation whereby there is just sufficient pressure to push plastic out of the nozzle. Purging at full pressure will not do any harm, but it is straining the arrangement unnecessarily, and may result in a pushing back of the sliding platen so that it has to be re-set.

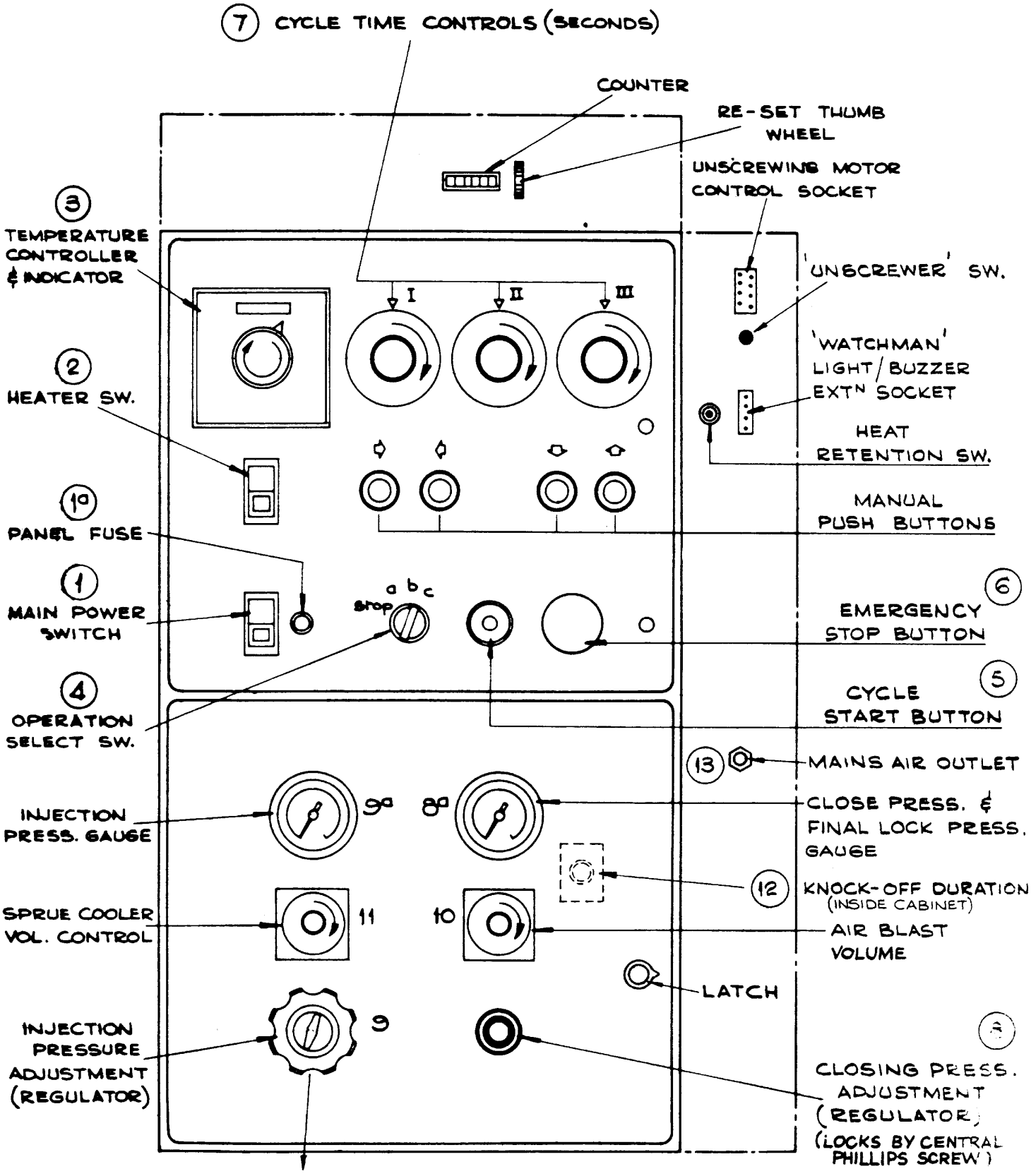
With the mould set as above, the mould pillars and bushes are engaged and ensure that the loading is evenly distributed. With the plastic up to melt temperature, push the Manual Injector "Down" button and the plastic will inject between the mould faces. This plastic can be allowed to solidify in the chute or a suitable receptacle placed between the platens with the chute removed. It may be necessary to fully open the mould, clear the hardened plastic (which should strip easily) and then repeat above instructions.

Avoid using tools which have delicate pins protruding or which have under-cuts which, if filled with plastic, would be difficult to remove, or if the construction of the mould is at all weak or unsatisfactory.

If necessary, a purging tool may be supplied on application to Austin Allen Ltd.

Controls

ILLUSTRATION 2



Illustrated injection pressure regulator has centre knob which locks the control in a clockwise direction. Later machines fitted with control with black cover which locks on being gripped and pulled outwards. Push to release.

CONTROLS – See Illustration 2 (Page 13)

Referring to the instrument panel:

(1)	**Mains:**	This isolates the machine, and must be switched on when wishing to proceed.
(1a)	**Circuit Fuse:**	Protects machine but light in main switch will always indicate mains to machine.
(2)	**Heat Switch:**	This isolates the temperature control unit and in order to supply the heater bands with energy, this switch must be actuated.
(3)	**Automatic Temperature Control:**	Operation of this unit is fully described on a separate sheet.
(4)	**Rotary Select Switch:**	With this switch, select the mode of operation required.
(4a)	**Manual Push:**	In this position the four push buttons will actuate the functions illustrated by the arrow. The platen open/close buttons are adjacent and the injection/natural return buttons are adjacent. Use these buttons for mould proving and purging. These buttons are non-effective until the rotary switch is in the MANUAL PUSH position. **NOTE:** Injector returns automatically when Inject Button is released.
(4b)	**One Cycle Stop:**	In this position, the main start button (5) is pushed to commence the cycle and automatically the machine will stop after one complete cycle. This is useful in setting and mould proving, as it checks the times selected against the moulding produced.
(4c)	**Fully Automatic:**	Select this position for continuous cycling. Cycling will continue until either the STOP Button is pushed, the guard is opened or the machine stalls in a fault condition. N.B. The START Button must always be actuated to re-start cycle. Guard closure will **not** alone re-start the cycle.
(5)	**Start Button:**	The Start Button initiates the cycle by closing the platen.
(6)	**Stop Button:**	This immediately isolates all the electrics (except the temperature control). On machines delivered after November 1977, the emergency stop button stays locked in after being pressed. The machine cannot then be operated without releasing the button by giving it a half-turn in a clockwise direction. The platen can be moved by hand. **NOTE:** Guards also act as Stop Button and makes MANUAL buttons inoperative.

By adjusting the low pressure mould closing regulator (8) as low as possible, according to the type of mould, protection is assured. In the event of a component becoming trapped, the cycle will not continue and the object will be trapped under low pressure only, until machine is isolated by the "Watchman".

(7)	**Cycle Time Controls**	I	Injection time – Controls and limits in seconds, the period between final platen close which (coincides with injection commence) and the return of the injection plunger.
		II	Cool time – controls and limits in seconds, the period between commencement of injection plunger return and mould opening.
		III	Mould Open time – Controls and limits in seconds, the period between commencement of mould open and mould close.
(8)	**Closing Pressure Adjustment Regulator:**		Controls the pressure at which the moving platen closes towards final clamp. Before final clamp, High Pressure is automatically switched to lock the mould.
(8a)	**Closing Pressure Gauge:**		Indicates two pressures: (a) Initially the low pressure (controlled by (8) and (b) Will indicate when high pressure is switched and line pressure at which clamp is made.

(9)	**Injection Pressure Adjustment Regulator:**	Controls the line pressure to give the required Injection pressure (refer to Page 3 for the converted pressure applied to the plastic).
(9a)	**Injection Pressure:**	This gauge indicates Injection pressure with the machine switched off electrically. This gauge can be used to show the actual line pressure available to the machine. This is achieved by turning the regulator (9) fully home and reading the resultant pressure. N.B. Both regulators (8) and (9) have position lock devices which are coloured red.
(10)	**Air Blast Volume:**	Controls volume of air for air blast ejection. Continuous signal the whole time platen is fully open. Can be turned completely off by adjusting volume to zero. This air supply can be used to drive 'Thruster' unit.
(11)	**Sprue Cooler Volume Control:**	The Sprue Cooler control (item 11 on the illustration of Control Cabinet) can be switched on and volume adjusted to suit each particular case. It operates when the injector lifts clear of the mould at the end of the injection time and is designed to freeze the string which occurs on some plastics between the nozzle and the runner in the tool, enabling it to break cleanly on mould opening. The Sprue Cooler fitting is screwed to the fixed platen and requires that a piece of copper tube be inserted in the coupling, with the end slightly flattened and directed at the gap between nozzle and tool. Care should be taken that the nozzle does not become chilled so that a troublesome, cold slug forms in the nozzle, which may prevent a satisfactory component being produced in subsequent shots.
(12)	**Knock Off Duration:**	Adjustable pulse unit determines outstroke time for Knock off cylinder. Does not normally require adjustment, but a longer time can be useful when this air supply is used to drive the Thruster unit.
(13)	**Main Air Outlet:**	For air supply to auxiliary devices such as Sidewinder and double acting Knock off cylinder.

CONTROL CABINET COMPONENTS (Page 16)

1 Temperature controller

2(a) Potentiometer – Injection timer adjustment (0–10 sec. range)
(b) Potentiometer – Cool timer adjustment (0–30 sec. range)
(c) Potentiometer – Open timer adjustment (0–10 sec. range)

3(a) Timer – watchman
(b) Timer – injection time
(c) Timer – cooling time
(d) Timer – opening time

4(a) Relay, RL2 Cycle
(b) Relay, RL1 Heater

5(a) Gauge – injection pressure
(b) Gauge – closing and final lock pressures

6(a) Flow regulator – air blast
(b) Flow regulator – sprue cool

7(a) Regulator – low pressure closing
(b) Regulator – injection pressure

8(a) Exhaust restrictor – opening speed
(b) Exhaust restrictor – closing speed

9(a) Valve – toggle open and low/high pressure changeover
(b) Valve – toggle close

10(a) Air logic unit – NOT
(b) Air logic unit – YES
(c) Air logic unit – OR

11 Air logic unit – adjustable pulse (knock-off duration)

12(a) Electro-solenoid pilot to sprue cool
(b) Electro-solenoid pilot to open
(c) Electro-solenoid pilot to high pressure close
(d) Electro-solenoid pilot to low pressure close
(e) Electro-solenoid pilot to injection

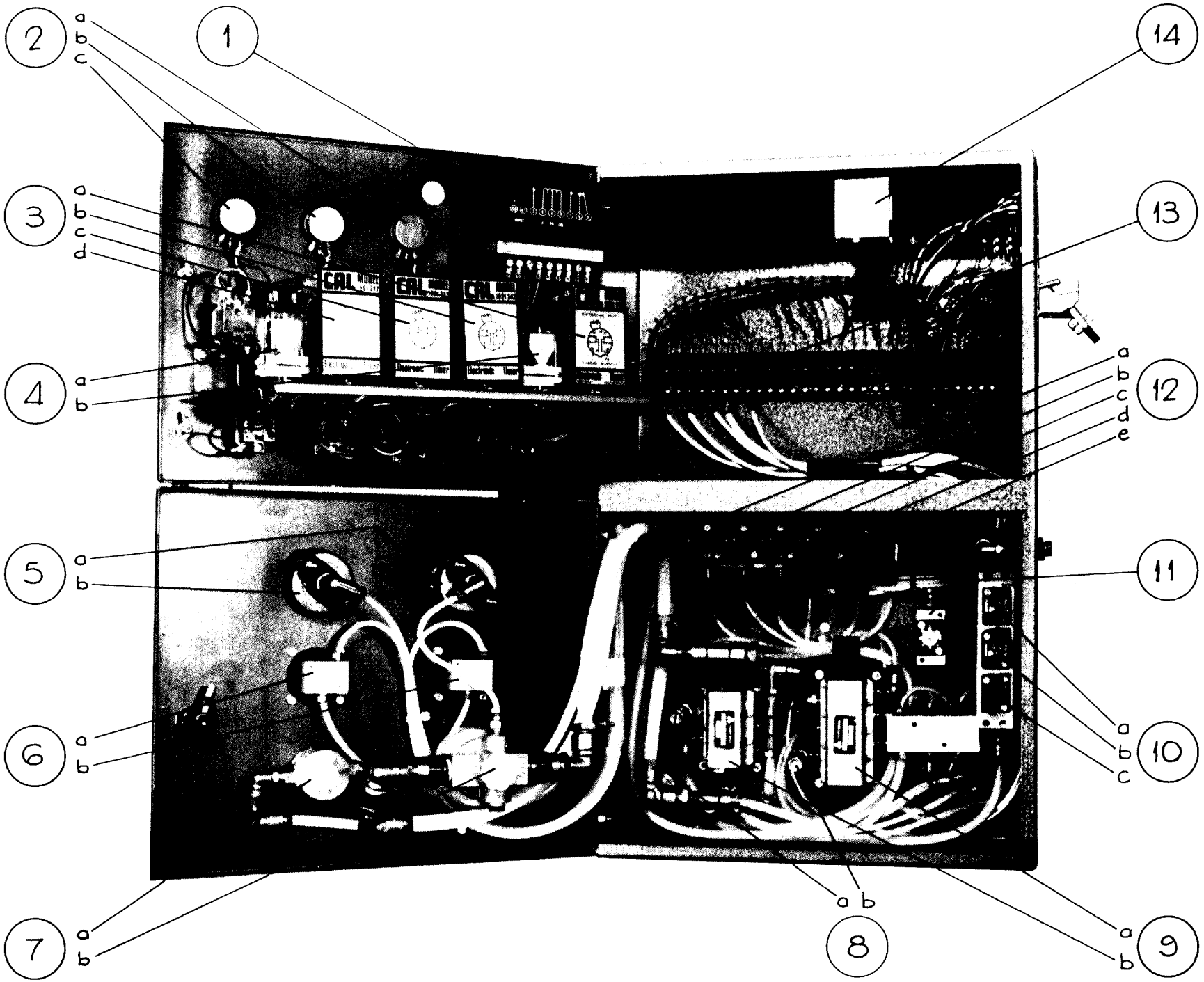
13 Main terminal block

14 Counter

Air valves located elsewhere (Page 16a)

15 Valve – injection outstroke and return

16 Valve – mains air dumping (guard operated)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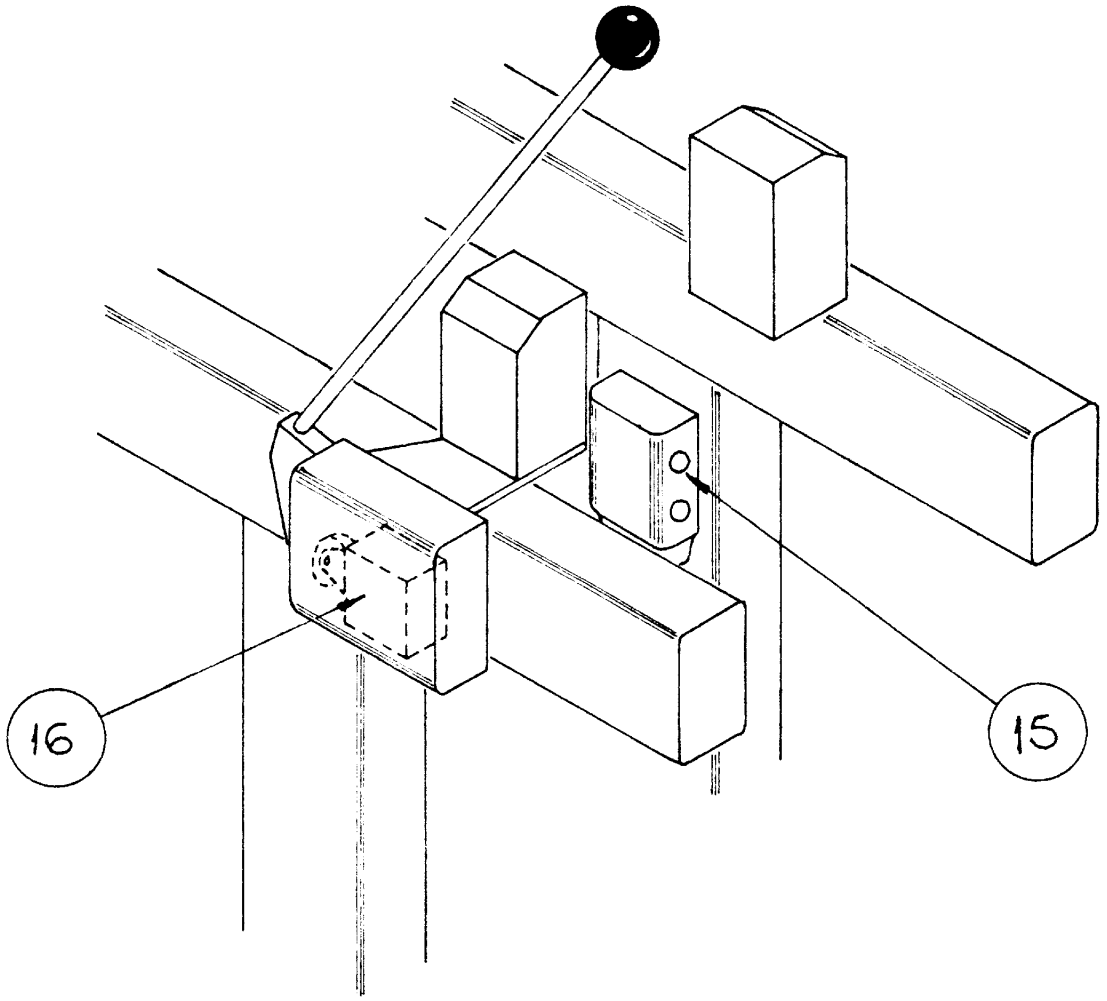


LOCATION OF INJECTION VALVE & GUARD

OPERATED DUMPING VALVE

CONTROL CABINET FAULTS

Included in this section are faults occurring in other parts of the machine as well as in the Control Cabinet, but which are controlled by the Control Cabinet functions.

FAULT	CAUSE	REMEDY
Machine does not start.	No Power	Connect power.
	No Air	Connect air.
	Guards not properly shut	Close guards. The injection pillars may be out of line so that the guard catches are not lining up.
	Cycle start button broken	Replace.
	Mechanical scotch arm switch not making	See if arm pinion needs lubricating to ensure free movement, or if moving platen engaged with one of the arrest points on the safety arm.
	Unscrewing Device switch down with Device plug not inserted	Put switch off.
	Wrong mode selected	Select auto or one cycle mode.
	Blown fuse	Trace fault and replace fuse.
	Relay R.L.2. not making or burnt out	Reseat or replace. SEE "BLOWN FUSE" UNDER FAULT COLUMN.
	Low pressure close turned down.	Increase low pressure regulator until moving platen advances.
Blown Fuse.	Cause could be either temperature or timer circuits.	Determine which by renewing fuse and then turning on temperature control to see whether it blows again. If it does, then it will probably be due to heater band short circuiting. If it does not, then switch to MANUAL and press one after another the push buttons to see if the fise blows. If one does, the button lamp will indicate which solenoid has shorted.
Air and power connected, but Injector will not go down.	Unscrewing Device switch on, but plug not inserted.	Put switch to "OFF".
	*Platen not advancing sufficiently to make injection start switch.	Increase closing pressure. *Advance Low to High pressure change-over switch.

**NOTE:* *THESE TWO SWITCHES, OPERATED BY MOVING PLATEN FACE ARE ON MACHINES PRIOR TO SEPTEMBER, 1974. ON MACHINES SUPPLIED AFTER THIS DATE THE SWITCHES ARE MOUNTED OVER TOGGLE LINKS.*

CONTROL CABINET FAULTS Continued . . .

FAULT 1.	CAUSE	REMEDY
Air and power connected, but Injector will not go down	Injection pressure too low	Increase injection pressure regulator.
	Solenoid jammed	Change Pilot solenoid.
	Injection Valve malfunctioning	Service injection valve.
	Chute is not properly fitted and is jamming the switch mounted on inside face of rear frame	Re-position chute and insert locking screw.
	Stop button latches off	Re-set by clockwise rotation.
Machine switches itself off when switched for automatic running	Moulding trapped between mould faces	Clear obstruction.
	Mould close pressure too low	Increase mould closing pressure.
	Guard not properly actuating switch	Adjust guard. Injector pillars may be out of line so that guard catches not lining up.
	Faulty Relay R.L.2.	Try interchanging with Relay R.L.1.
	Timer loose in socket or malfunctioning	1. Waggle timers in the bases 2. Interchange timers to observe if fault moves correspondingly. Can use Watchman timer for substitute if bridging plug is inserted in vacant socket.
	Unscrewing Device switch on, but plug not inserted.	Switch off.
	Actuator Block on Sliding Platen not resting on switch assembly when Platen back.	Open Platen and move block up to sit on striker of switch assembly.
	Expansion of tool through work heat.	Adjust lock or reduce mould temperatures.
	Jammed/broken Solenoids or Spool Valve.	Strip/replace.
	Intermittant break in power supply causing timer/relays to unlatch.	Look for poor connections in mains socket or plug.
	Power failure	Investigate and restore.
Blowing air from Closing Regulator.	Diaphragm split or rucked.	Can sometimes be re-sited and re-used. Otherwise renew.

CONTROL CABINET FAULTS Continued . . .

FAULT	CAUSE	REMEDY
Blowing air from Injection Regulator	Diaphragm split or rucked.	Replace
Blowing air from Solenoids	Loose on base	Tighten to base
Knock-off not working	Actuator Block on Sliding Platen not making switch assembly.	Move Block to appropriate position.
Blowing air from Cylinder	A cushion screw out.	Disconnect air line and replace screw.
Sliding Platen shoots forward	Low to High switch broken and jammed closed. Large Flo-Master spool sticking. High pressure regulator turned up too far.	Renew. Strip, clean and re-assemble. Reduce.
One of the cycle timers will not control	Either poor connection of timer in base or fault in timer. The time adjustment potentiometer is faulty.	Try waggling the timers in their bases. If the fault persists renew the relevant timer. Twist rapidly from side to side – may restore contact, otherwise replace.

Injection Unit

TITLE:- 1" PLASTI[illegible] CYLINDER ASSEMBLY

DRG. N° [illegible]-2033 A2

SHEET 1 OF 1 SHEETS

REF.	PART N°	DRG SIZE	Q'TY.	DESCRIPTION	REMARKS	FIXING	Q'TY.
1	250P - 2012	A3	1	VALVE			
2	250PRT- 2055	A3	1	NOZZLE			
3	- [illegible]33	A3	1	STRAINER			
4	-2[illegible]57	A3	1	[illegible]			
5	-207[illegible]	A3	1	1" PLAST[illegible] CYLINDER			
6	-2075	A3	1	1" FUNNEL [illegible]			
7	-[illegible]0[illegible]3	A3	1	END PLATE [illegible]			
8	-2079	A3	1	HALF DOG SOCKET CAP SCREW			
9							
10							
11							
12	40/20 - 1073	A2	1	SPRUE BREAK SPRING			
13							
14			1	[illegible] MODULE	[illegible] 50		
15							
16							
17			3	[illegible]			
18							
19			2	[illegible] FREE ADAPTOR 3/8 TUBE 1/2 BSP	ENOTS 34-0321-18		
20							
21							
22							
23							
24	250PRT-2081	A3	1	1" EXTENDER	OPTIONAL		
25							
26							
27							
28							
29							
30							

TITLE:- 3/4" PLASTIC SING CYLINDER ASSEMBLY

DRG.N° [illegible] -2054 | 2

SHEET OF SHEETS

REF.	PART Nº	DRG. SIZE	Q'TY.	DESCRIPTION	REMARKS	FIXING	Q'TY
1	SOP - 012	A3	1	VALVE			•
2	250PRT-1055	A3	1	NOZZLE			
3	-1057	A3	1	[illegible]			
4	-1059	A3	1	TORPEDO			
5	-2073	A3	1	3/4 PLASTIC SING CYLINDER			
6	[illegible]	A2	1	3/4" INNER BLOCK			
7	-2075	A2	1	END STP BLOCK			
8	-1075	A3	1	HALF DOG SOCKET CAP SCREW			
9							
10							
11							
12	10/20 - 029	A3	1	SPRING PLEAT SPRING			
13							
14			1	ENTEX SPRING Nº 100583	1 MONIC 30		
15							
16							
17			2	[illegible]			
18							
19			2	[illegible]	NOTE 3.1 - [illegible]		
20							
21							
22							
23							
24	150PRT-2021	A3		1" EXTENDER	OPTIONAL		
25							
26							
27							
28							
29							
30							

TITLE:- 3/4" P[illegible] [illegible] CYLINDER ASSEMBLY

DRG. N° [illegible] RPT-2083 | A2

SHEET 1 OF 1 SHEETS

REF.	PART N°	DRG. SIZE	Q'TY.	DESCRIPTION	REMARKS	FIXING	Q'TY.
1	250P -2012	A3	1	VALVE			
2	250PR[illegible] -20[illegible]	A3	1	NOZZLE			
3	-2055	A3		[illegible]			
4	[illegible]	[illegible]	1	[illegible]			
5	-20[illegible]3	A3	1	3/4" PLASTICISING [illegible]			
6	-207[illegible]	A3	1	3/4" BFONNEL BLOCK			
7	[illegible]73	A3	1	ENDPLATE BLOCK			
8	-20[illegible]	A3	1	[illegible]			
9							
10							
11							
12	4020 -[illegible]28	A3	1	SPOOL BLEED SPRING			
13							
14			1	ENTEX SPRING N° [illegible]0583	[illegible]MONIC 30		
15							
16							
17			[illegible]	[illegible]			
18							
19			[illegible]	[illegible] 1/4" BSP			
20							
21							
22							
23							
24	250PCT- 2082		1	3/4" EXTENDER	OPTIONAL		
25							
26							
27							
28							
29							
30							

INJECTOR UNIT FAULTS

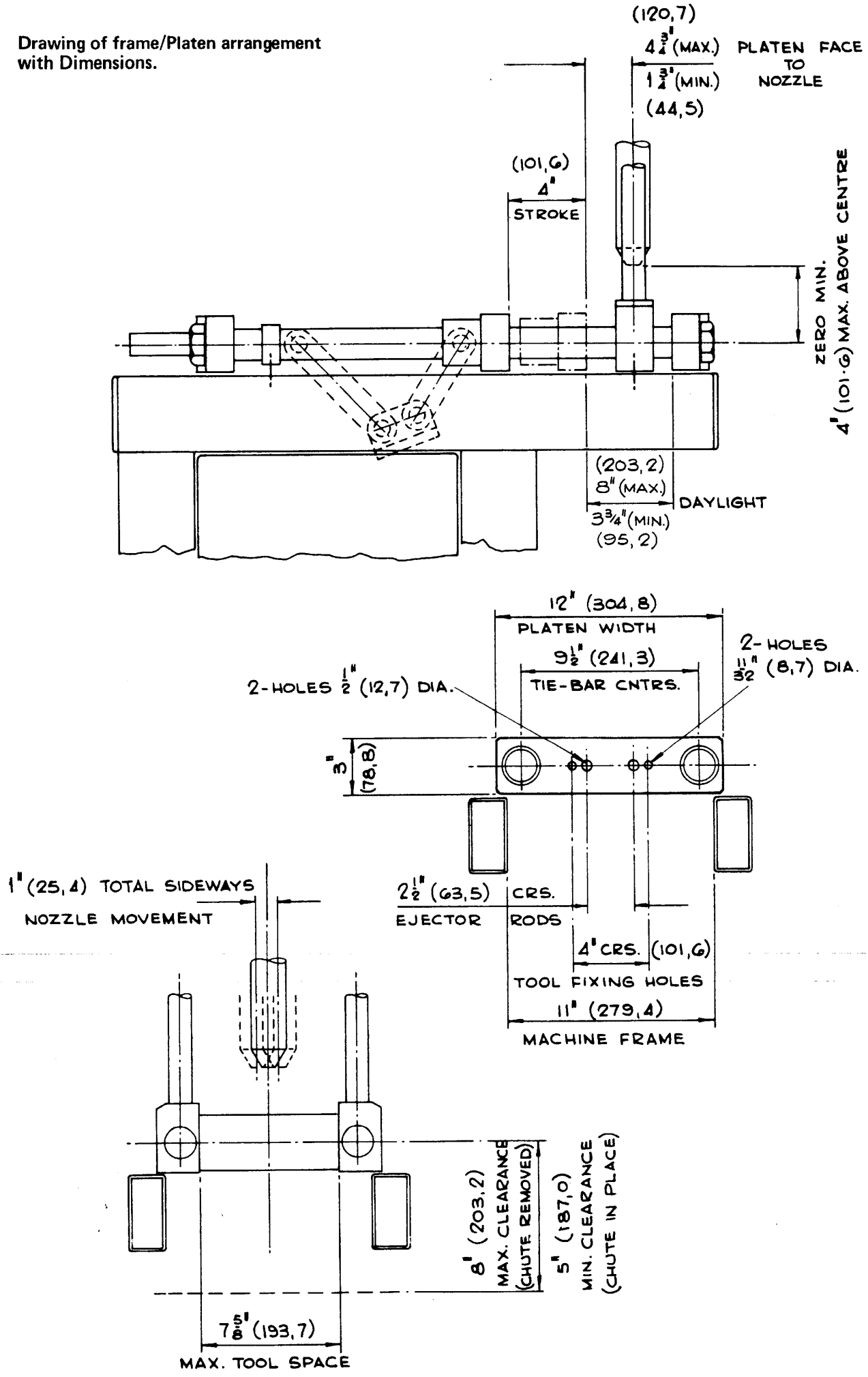
FAULT	CAUSE	REMEDY
1 Nozzle drooling or leaking.	Broken nozzle spring.	Unscrew nozzle from plasticising cylinder and replace spring.
	Swarf or other foreign bodies preventing seating of shut-off nozzle.	Unscrew nozzle, remove and clean valve seating.
	Viscosity of plastic too high.	Increase melt temperature.
	Sprue cool device chilling nozzle.	Re-direct sprue cool jet/decrease sprue cool volume.
	Injection time too long so that nozzle is in contact with cold tool.	Reduce injection time or increase cooling or open time so that nozzle recovers heat.
2 Leakage of plastic from join of nozzle to plasticising cylinder and/or plasticising cylinder to barrel join.	Shut-off surfaces not fully home.	Tighten offending joint whilst machine is hot.
3 Nozzle does not lift off tool when injector retracts.	Return spring in injector housing is broken.	Replace.
	Shoulder bolts seizing or have moved out of line.	Tighten/replace.
4 Irregular feed.	Feed block actuator incorrectly set or loose.	Reset/tighten.
	Fluctuating air pressure.	Check pressure of air line to machine. (Must be constant). Regulate if necessary.
	Parts of linkage binding or slipping	Correct.
	Obstruction in material feed extrusion introduced with material.	Remove.

INJECTOR UNIT FAULTS Continued . . .

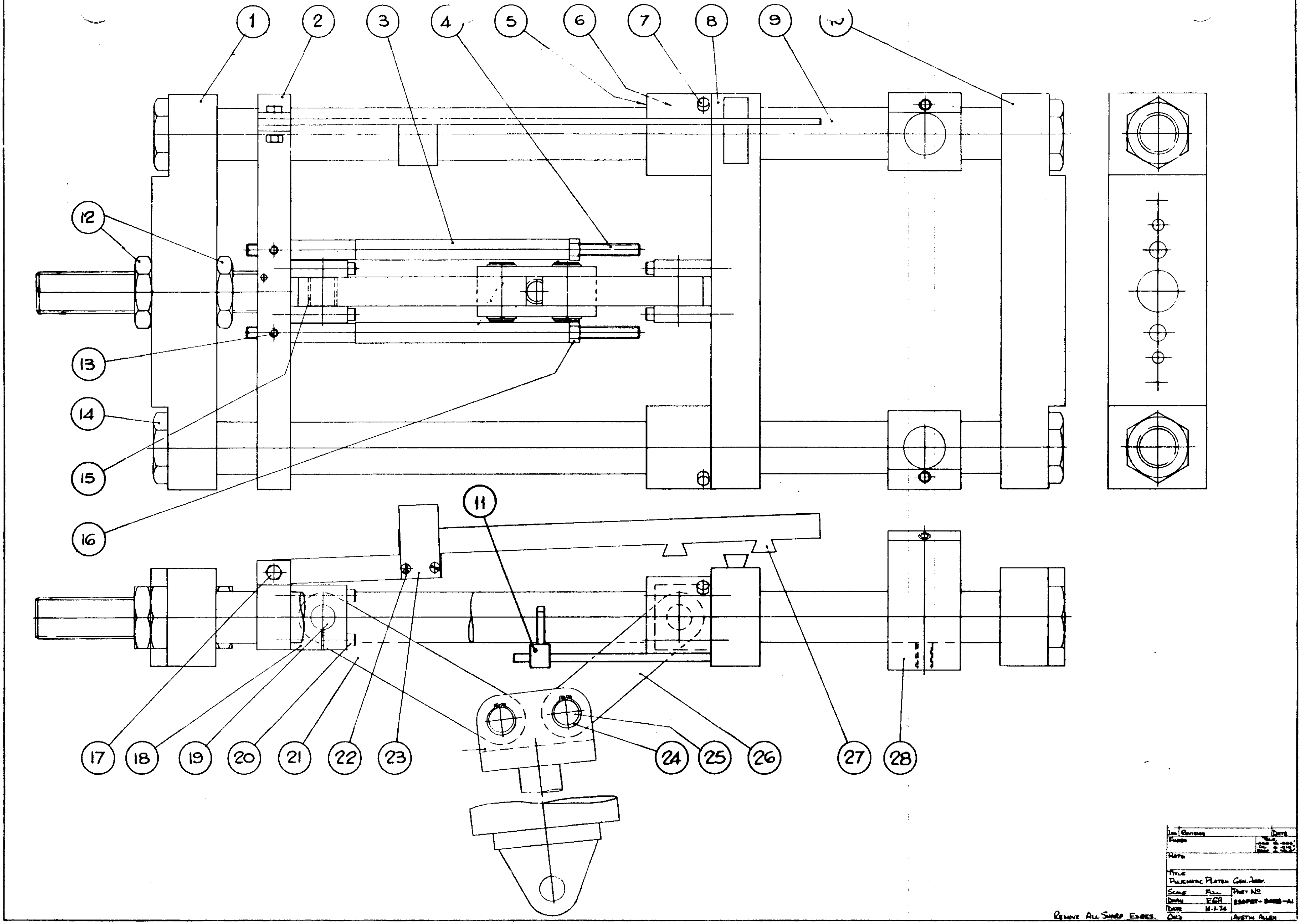
Heaterband, Thermocouple or Temperature Control problems.		See Heat Control section
Injector will not go down		See Control Cabinet section
Injector Cylinder sluggish in either direction.	Blocked exhaust silencers.	Remove and clean.
	Cushions turned in.	Turn out cushions.
	Cylinder plunger binding.	Strip cylinder, possibly replace seals.
Injector or cylinder noisy, i.e. sounds of scraping/injector rubbing	Worn seals.	Strip cylinder and replace seals.
Air to injection cylinder on, plunger will not move. (Noises of rushing air)	Seals worn.	Strip cylinder and replace seals.

Machine Frame Layout & Components

Drawing of frame/Platen arrangement with Dimensions.



PNUEMATIC PLATEN GEN. ASSY.



KEY TO PLATEN GENERAL ASSEMBLY DRAWING (Page 28)

Item	Qty.	Description
1	1	Endblock
2	1	Lock Adjustment Bar
3	2	Ejector Support Tube
4	2	Ejector Rod
5	4	Oil Seal 40mm dia.
6	4	DX Bearing 40mm dia.
7	2	Oil Filler Cap
8	1	Sliding Platen
9	2	Tie Bar 40mm dia. (Quote standard or extended)
10	1	Fixed Platen
11	1	Switch Adjustment Block
12	2	Lock Adjustment Nut
13	2	$\frac{1}{4}$" BSF x $\frac{3}{4}$" Long SKT. Grub Screw
14	4	Tie Bar Nut
15	4	Cast Iron Bearing $\frac{3}{4}$" Dia.
16	2	Ejector Rod Lock-Nut $\frac{3}{8}$" BSF
17	1	$\frac{5}{16}$" BSF x 1" Long SKT. Cap Screw and Nut
18	4	Toggle Lug
19	2	Toggle Pin
20	8	$\frac{1}{4}$" BSF x 2" Long SKT. Cap Screw
21	1	Toggle Link (Long)
22	2	4 BA x 1" Long SKT. Cap Screw, Lock-Nut and Wshr.
23	1	Micro-Switch (Scotch)
24	4	Clevis Circlip $\frac{3}{4}$" External
25	2	Toggle Clevis Pin
26	1	Toggle Link (Short)
27	1	Safety Arm
28	2	Injection Pillar Mounting Block

Heat Control

HEAT CONTROL FAULTS

FAULT FINDING

FAULT	CAUSE	REMEDY
Temperature Control – Temperature continues to rise above the set point. Right hand (ON) indicator light stays on.	Most likely a fault in the thermocouple, the wires twisted together.	Renew thermocouple
Temperature continues to rise, but Left (OFF) light stays on.	Most likely a faulty relay R.L.I.	Renew Relay
Temperature takes a long time to rise and fluctuates when moulding.	Most likely heater band failed.	Renew Heater Band
Temperature falls right away and OFF light stays on.	Most likely a break in the thermocouple	Renew thermocouple

N.B. IF ANY OF THESE FAULTS PERSISTS, AFTER TAKING RECOMMENDED ACTION, THEN THE TEMPERATURE CONTROLLER IS PROBABLY IN NEED OF SERVICING.

See enclosed data sheet from Temperature Controller Manufacturer.

MOULDS - Making Setting & Running

MOULDS

Moulds should be made from tool steels and should be hardened. Depending to some extent on the proposed production requirements, it is fairly satisfactory to leave tools 'soft' provided all moving pieces are hardened i.e., dowels (standard tool dowls), ejector pins and core pins. To obtain a polish within the mould cavity, high chrome steels are preferable.

Moulds for this machine should be made in such a manner that they are engineered to be reliable. Do not scale down larger tools or adopt an attitude of miniature versions of such tools. Think in terms of simplified tooling. Single impression tools should be designed to be robust and if, for example, ½" tool dowels look right, use them.

SHRINKAGE

During the cooling cycle, thermoplastics contract or shrink. The amount of shrinkage depends upon the type of material, injection pressure and temperature and the temperature of the part on ejection, and also the length of 'injection held' time. Shrinkage will be greatest where there is no restraining within the mould.

Refer to compound manufacturer who will quote the shrinkage you need to allow in mould manufacture and advise allowances you need to make for section variances and flow direction etc. See Guide Sheet.

RUNNERS

For tools fitted to the AUSTIN ALLEN 250 PRT, we recommend circular runners $\frac{3}{16}$" dia., and they should be short and smooth and well blended into the gate. Trapezoidal runners are equally acceptable.

GATE

The narrow neck between the runner and the moulding – To enable the runner or sprue to be easily removed, the gate should be small but if minute, temperature and pressure on the material will have to be excessive. The type (e.g., pin, square or fan) of gate required depends upon the type of material and the moulding shape. Material suppliers' literature should be consulted. Providing the particular plastics properties allow, submarine gates work well on our machines.

The location of the gate may prove critical, usually it is desirable to feed into the thickest sections of the moulding. Thus from thick to thin.

DIMENSIONAL ACCURACY

It would be wrong to be specific – .001 can be held in some cases, but much depends upon the part shape and disposition of material mass. Experience and common sense are the only ways of estimating individual cases. It should be remembered that taper or draft is usually necessary, and must be considered in product design. See section on Mould Temperature.

The Temperature of the Mould

In many cases, satisfactory mouldings can be produced without any exterior heating or cooling applied to the mould. However, when dimensions or finish are important, some form of temperature control is necessary. This can be applied by circulating water through the already prepared fixed platen on the machine. Using this platen, you are relying on the mass of metal to have sufficient effect on the mould tool. If greater effect is required, then the mould itself should be drilled and prepared for the application of tubes from the mould heater or cooler. An alternative method of heating the tool is by electricity, using proprietary rod, cartridge of plate heaters with some form of temperature control. The effect of hot or cold tools on thermoplastic components, varies and you should refer to the manufacturer's specification to see if setting up of the plastic is aided by chilling, or by heating. Some plastics, for instance, nylon, set off faster if the mould is hot, in the region of 80 – 120°. This is also true of acetal and some of the other engineering plastics. However the running of materials like polypropylene, polythene and polystyrene, are very much improved by having a cool mould and therefore faster production cycles can be achieved.

SPARES PACKS

Ref. S.P.1.

1 CAL Timer
1 Relay
1 Thermocouple Assembly
1 Ratchet Allen Key
1 Packet of 20mm 5 amp fuses
8 $\frac{5}{16}$" BSF Mould Mounting Screws
1 500 Watt Heater Band
1 Flo Master Valve Seal Kit
1 Set of Seals for 6" Cylinder (Injection) Maxam
1 Set of Seals for 4" Cylinder (Lock) Maxam
6 Nozzle Springs

Ref. S.P.2.

1 CAL Timer
1 Relay
1 Thermocouple Assembly
1 Ratchet Allen Key
1 Packet of 20mm 5 amp fuses
3 $\frac{5}{16}$" BSF Mould Mounting Screws
2 250 watt Heater Bands
1 Flo Master Valve Seal Kit
1 Set of Seals for 6" Cylinder (Injection) Maxam
1 Set of Seals for 4" Cylinder (Lock) Maxam
6 Nozzle Springs

POSSIBLE MOULDING FAULTS

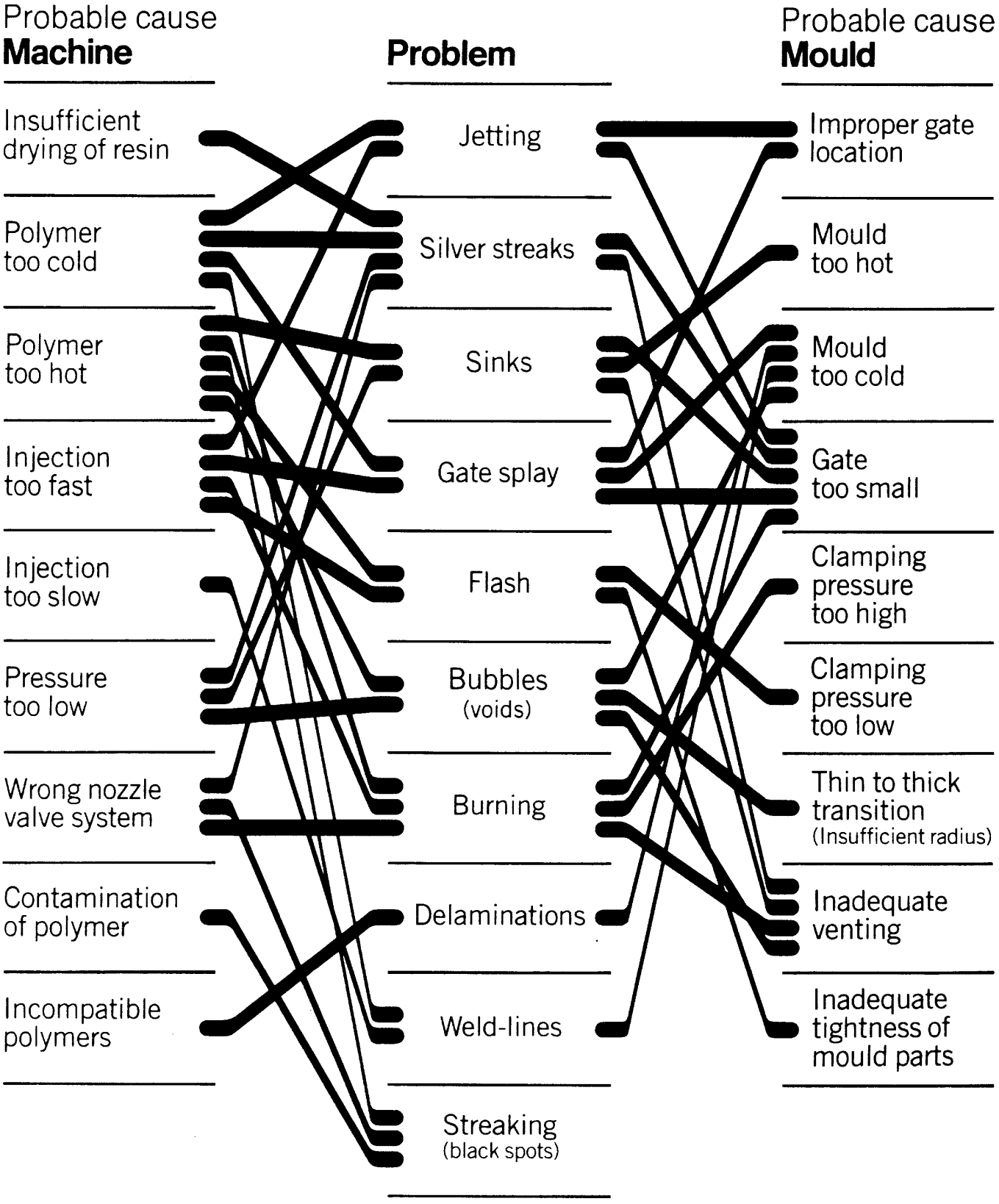
Moulding Fault	Correction Factors
Moulding too soft or with sink marks or ejection marks or voids.	1 Cycle too fast. Insufficient cool time. 2 Temperature too high. 3 Mould temperature wrong. Could try ejecting parts into water.
Flashing	1 Temperature too high. 2 Pressure too high. 3 Locking pressure insufficient. 4 Foreign body i.e., granule lodged in between mould faces or ejection system.
Moulding is produced short, i.e., not completely filled.	1 Temperature too low. 2 Pressure too low. 3 Meter adjustment feeds insufficient material. 4 Gate too small. 5 Runner too long. 6 Blockage in injection unit.

THE NOT ALWAYS OBVIOUS FAULTS

Pressure right, temperature right, but WILL NOT MOULD	Q Is nozzle over mould runner hole?
Incomplete mouldings	Q Are you out of material?
Mould will not close EVEN with close pressure turned up fully	Q Has mould seized because it needs oil? OR Q Have you forgotten to tighten mould bolts and one half of tool has moved off line with the other?
Injector comes down and 'crunches' NO MOULDING	Q Have you switched on the heater bands?
Heater bands struggle to maintain heat.	Q Is machine in a draught?
White blistering in mouldings	Q Is material damp?
Bubbling in plasticising cylinder causing impossible material metering	Q Is material damp?

Austin Allen Ltd.

Theoretical Trouble shooting



Material Processing Guide

MATERIALS PROCESSING GUIDE

Material	Processing Temperature Centigrade	Mould Temperature	Shrinkage	NOTES	Some Trade Names
Acetals					
Copolymer	190 – 240°	80 – 130°	1.8 – 2.5%		HOSTAFORM
					KEMETAL
Homopolymer	200 – 220°	90 – 120°	1.9 – 2.4%		DELRIN
Acrylics	210 – 240°	50 – 70°	0.1 – 0.8%		DIAKON
ABS					
Standard grades	210 – 240°	–	–		CYCOLAC AND STERNITE
High Heat grades	240 – 275°	40 – 90°	0.4 – 0.7% (depending on grade)		
Cellulose Acetate	160 – 230°		0.3 – 0.6%		EANPLAST
Cellulose Acetate Buterate					
Cutyrate	180 – 220°	40 – 70°	0.3 – 0.6%		TENITE
EVA	100 – 230°	25 – 40°	1.5%		MONTOTHENE
Polyamides					
Nylon 6	225 – 280°	20 – 120°	0.5 – 1.5%		AKULON AND GRILON
Nylon 6.6	260 – 300°	70 – 120°	1.2 – 1.8%		MARANYL & ZYTEL
Nylon 6.12	235 – 245°	38 – 72°	0.007 –0.010 in/in for $\frac{1}{8}$ in sections		ZYTEL
Nylon 11 (Natural Material)	186 – 250°	40° (Natural)	0.012 in/in (Natural)		RILSAN
(Glass filled Grade)	200 – 270°	60 – 90° (Glass filled)	0.004 in/in (Glass filled)		
Nylon 12 (Standard Grades)	180 – 250°	20 – 100°	1.0 – 1.7% (Natural)		VESTAMID
	200 – 260° (glassfibre reinforced)		0.4 – 0.8% (Glass filled) Special filled grades even lower		GRILAMID
	180 – 230° (plasticized grades)				
Polycarbonate	275 – 320°	85 – 120°	0.7 – 0.8%		LEXAN
			0.15 – 0.5% (Glass filled)		MAKROLON

Materials Processing Guide Continued . . .

Material	Processing Temperature Centigrade	Mould Temperature	Shrinkage	NOTES	Some Trade Names
Polyethersulphone	320 – 390°	140 – 160°	0.7%		ICI
Polyethelenes					
High Density	200 – 280° may be used 220 – 260° general		1.0 – 3.5%		HOSTALEN
Low Density	190 – 250°	30 – 50°	1.2%		ALKATHENE
Poly (4-Methyl Pentene-1)	280 – 310°	70°	1.5 – 3%		TPX
Polyphenylene Oxide (PPO)	320 – 345°	140 – 160°	0.7 – 0.9%		NORYL
Polypropylenes	200 – 280° (generally in 230 – 260° range)				CARLONA P HOSTERLEN PROPATHENE
Polystyrenes	160 – 280° (Super flow grades) 180 – 280° (General purpose grades) 200 – 280° (High mol. wt. & High heat grades)	5 – 75°	0.2 – 0.7%		CARINEX LUSTREX
Polysulphones	330 – 380°	90 – 150°	0.7%		UDEL
Polyethylene Teraphthalate					
Amorphous	270°	70 – 140°	1%		ARNITE
Crystalline	270°	70 – 140°	1.5 – 2%		DERETON
PVC Plasticized	150 – 200°		0.01 – 05 in/in		PVA VYBAK
SAN	180 – 270°	65 – 75°	0.5 – 0.7%		LURAN TYRIL

Spares

GENERAL INFORMATION

The natural state for clamp valves is both ports to neutral. With electrics isolated no air goes to the clamp cylinder.

The natural state for injection valve is to supply air to inject return. If electrical isolation occurs when injection is taking place, injection will immediately return.

Electrical isolation is effected by two switches, wired in opposite mode, one fixed to the mechanical scotch, the other directed to the fixed guard and operated by the sliding guard. These switches Klockner Moeller (AT11 1I) are considered by H.M. Factory Inspectorate to be fail safe.

Electrical continuity when on one cycle or auto is precarious; it relies on an uninterrupted signal to the Relay 1. Any break in the circuit effects a shutdown which can only be restarted by remaking the circuit and then pressing the start button.

The relay within the Temperature Controller only has to operate the coil of Relay 2.

ELECTRIC/PNEUMATIC INTERFACE

The connection between electric and air is only by Solenoid Plugs, five in all:—

SOL 1. Drives pilot valve to operate injection valve.

SOL 2. Drives pilot valve to operate close valve.

SOL 3. Drives pilot valve to operate High Pressure.

FINAL LOCK

SOL 4. Drives pilot valve to operate open valve.

SOL 5. Is operated by Cool signal and pilot valve supplies sprue cooling facility via panel mounted flow regulator.

COMPONENT FUNCTIONS

SW1. i.e.: Switch 1. Turns on and off everything electrical, both live and neutral.

SW2. Turns on and off heaters and temperature controller.

SW3. Selector switch for off, manual, one cycle and fully auto.

SW4. Push button start.

SW5. Push button stop.

RL1. Relay 1. This relay self holds via coil fed from its own contacts so that when on auto any interruption in the guard circuit turns the machine off.

RL2. Does the actual switching of the heater current, both contact sets sharing the load.

T1. Timer 1. Times the injection, varied by POT 1. i.e. Potentiometer.

T2. Times cool time.

T3. Times open time.

T4. Timer 4. This is the Watchman timer, which has contacts in the guard circuit, and turns the machine off if a stall situation reaches more than one minute.

COMPONENT FUNCTIONS *(Continued)*

PB1. Push Button 1. Illuminated switch indicates close, and is pressed for platen closing when selector is on Manual.

PB2. For open.

PB3. For injection.

PB4. For cool.

SW9. 3 pole changeover switch for introducing sequence switches built into unscrewing device. Only turned on when using unscrewing device.

SW8. 2 pole changeover switch gives choice of heaters switching off with watchman cutout or not.

SKA. Socket A to receive plug from unscrewing device.

SKB. Socket B receives plug from watchman lamp (could be buzzer).

F1. Fuse protects all working circuits on the live input.

MS1. Microswitch 1. By platen operated switch, the first timer (Injection) is activated at full platen close.

MS2. Switch operated just before full platen close brings in High pressure for final lock.

MS3. & MS4. Become sequence switches when unscrewing device is in use.

MS5a. Switch operated at platen full open resets watchman timer.

MS5b. Switch isolates injection signal when platen is fully open (Auto only). Needed because of spurious signal during timer resetting.

SW6. & SW7. Switches fixed to guard and mechanical scotch to stop machine when guard is opened.

PNEUMATIC OPERATIONS

NOTE

Most of the pneumatics are isolated by guard operated valve, the only exceptions are Injection and mains air outlet, usually used for the Sidewinder. The natural position for the Inject valve is in the return mode.

SEQUENCE

1. Sol 2 pilot valve is activated and operates Clamp Close valve (9b). Low pressure close takes place. Pressure adjustable by Closing Pressure reg (7a).

2. Sol 3 pilot valve operates 5 port valve (9a). Final clamp at High Pressure occurs.

3. Sol 1 pilot valve operates Injection valve. Injection takes place. Pressure adjustable by Injection pressure reg (7b).

4. Sol 1 pilot valve is isolated. Injection valve spring returns and Injection Return occurs. This is start of Cool time.

5. Sprue cool is directly effected by Sol 5, activated during the whole of Cool Time. Volume adjustable by sprue cool volume regulator.

PNEUMATIC OPERATIONS *(Continued)*

6. Sol 2 and Sol 3 are isolated. Clamp Close valve spring returns and clamp cylinder plus goes to atmosphere (Via exhaust mounted flow control). Simultaneously;

7. Sol 4 pilot valve is activated, it operates 5 port valve (9a) via 'NOT' unit (valve B). Platen opens at high pressure.

8. When platen reaches fully open, the toggle pilot valve is mechanically operated and sends air signal to perform 3 functions –

    (a) Air blast by YES unit (valve C) Pilot signal initiates main air signal, held on for as long as pilot valve operated. Goes to mould area via Air blast volume regulator.

    (b) Knock off cylinder by Adjustable pulse unit (valve A) Knock off signal is immediately activated by signal air going straight through pulse unit. The inhibitor signal is adjustable time delayed and at end of delay isolates output and knock off cylinder spring returns.

    (c) Inhibits the pilot line from Sol 4 pilot valve to Mould Open Function of 5 port valve (9a) via NOT unit (valve B). This means the 5 port valve springs to centre position and clamp cylinder air is all to atmosphere.

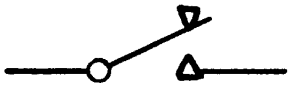
9. The 'OR' unit (valve D) is simply a shuttle valve to send either Low or High pressure air to the closing pressure gauge to read.

SYMBOL EXPLANATION

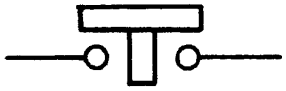
ELECTRICAL

Switch, on – off

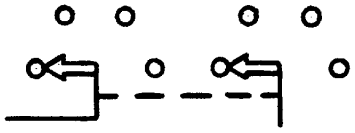
Switch (changeover)



Switch, pushbutton



Switch, rotary, two layer



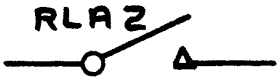
Plug/socket

Lamp, neon

Solenoid (2)

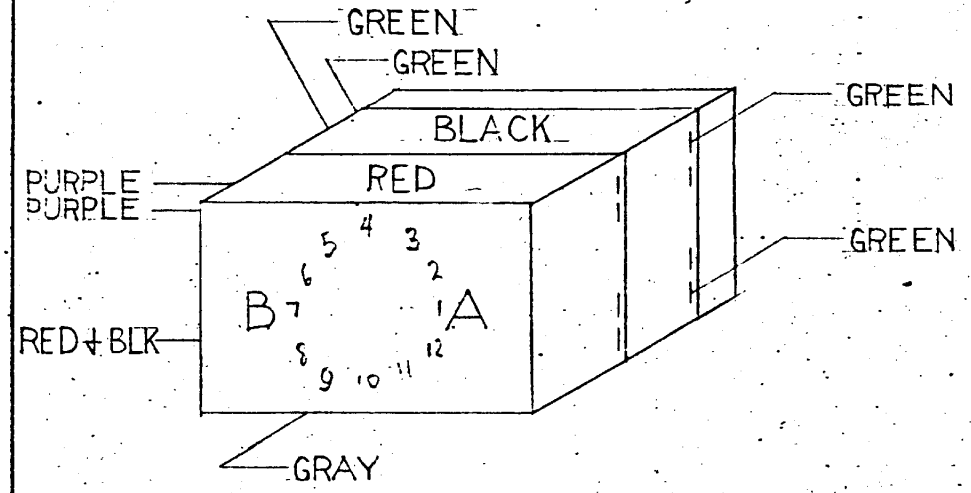
Timer (2)

Relay A, contact 2

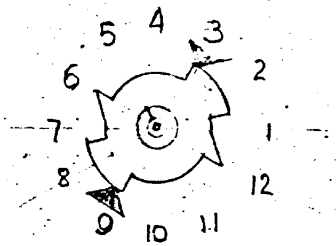


Relay A

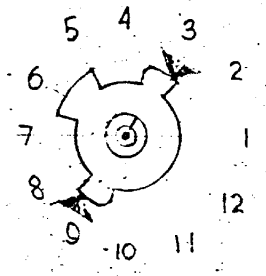
DWG. NO. R-109



RED NOTCH AT 5



BLACK NOTCH AT 3



REVISIONS			
1		6	
2		7	
3		8	
4		9	
5		10	

DATE 3-29-83	L.M. RABINOWITZ CO.
SCALE	
DRAWN AL	DESCRIPTION SW#3 AA-250 PRT
CHECKED	DWG. NO. R-109

TRULUBE

Lubricating oil to suit automatic pneumatic system lubricators

We have had requests from users of Austin Allen moulders for oil to put in the lubricators, as some have experienced difficulty in obtaining oil of the right type in small quantities. Also our service engineers have reported that some service calls would definitely not have been necessary if oil of the right type had been fed into the air.

To ensure smooth efficient running and long life of the pneumatic components in your Austin Allen Machine, we suggest you fill your oil reservoirs with TRULUBE.

TRULUBE is green, so the oil level can easily be seen. The lubricators should be adjusted to administer approximately one drop per 5/6 cycles. As a rough guide, one complete reservoir of oil per week should go through the machine.

WARNING! Too much oil will flood the machine and give rise to other problems!!

Recommended Equivalents:-

Shell Tellus	23
BP Energol	HL 65