INDY™

Up and Out Robot System Equipment Manual

⚠ **WARNING - Reliance on this Manual Could Result in Severe Bodily Injury or Death!**

This manual is out-of-date and is provided only for its technical information, data and capacities. Portions of this manual detailing procedures or precautions in the operation, inspection, maintenance and repair of the product forming the subject matter of this manual may be inadequate, inaccurate, and/or incomplete and cannot be used, followed, or relied upon. Contact Conair at info@conairgroup.com or 1-800-654-6661 for more current information, warnings, and materials about more recent product manuals containing warnings, information, precautions, and procedures that may be more adequate than those contained in this out-of-date manual.

CONAIR
MARTIN
Part of The Conair Group

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FORWARD

This manual contains Descriptions, Operations, Service Instructions, Trouble-shooting Guide and Recommended Spare Parts List for the Indy™ UP & OUT Robot System. This manual is intended for use as a reference source only.

Information contained herein is subject to change by CONAIR MARTIN without prior notice. This manual is periodically revised to reflect improvements and engineering changes made on equipment. CONAIR MARTIN is not responsible for errors or omissions which may appear in this manual.

NOTE

Machines made prior or subsequent to the publication date of this manual (11/89) may have parts or configurations that are not covered herein. Please contact the Customer Service Department when this is the case (Ref. below).

CUSTOMER SERVICE

CONAIR MARTIN
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TEL. 413-789-1990
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SAFETY SUMMARY

The following is mandatory reading for all personnel who work in or around the area the Indy UP & OUT Robot System can reach.

This equipment manual is NOT to be considered a self-teaching vehicle.

Failure to comply with the above and subsequent WARNINGS can result in serious injury to personnel and/or major damage to the Indy Robot.

There are three (3) levels of special notation used in this equipment manual. In descending order of importance, they are:

WARNING

Used to signify that when user does not comply with the statement, serious injuries will occur to personnel and/or major damage will be inflicted on the Indy UP & OUT Robot System.

CAUTION

Used to signify that when user does not comply with the statement, the Indy UP & OUT Robot System might be inflicted with minor to near major damage.

NOTE

Used to give supplementary information or to emphasize a point, procedure, functional check, etc.

WARNING

IN GENERAL:

DO's

1. DO realize that adjustments, displacement or replacement of any mechanical drive component will change the positioning of that motion.

2. DO realize that the Indy UP & OUT Robot System cannot see nor reason. Any obstacle placed in its path of operation, after it has been taught a program, will be struck.

3. DO realize that nonmovement periods caused by the programmed time delays and external system delays make it unsafe to assume that the Indy UP & OUT Robot is not about to move.

4. Do realize that the only safe restriction to the movement of the Indy UP & OUT Robot System is its mechanical stop.

5. DO install the Indy UP & OUT Robot System using an approved electrical installation standard (for example, JIC).

6. DO contain electrical or oil class fires, should they occur, using the appropriate fire extinguisher.

7. Do realize that external voltage is connected to the Main Control Enclosure.

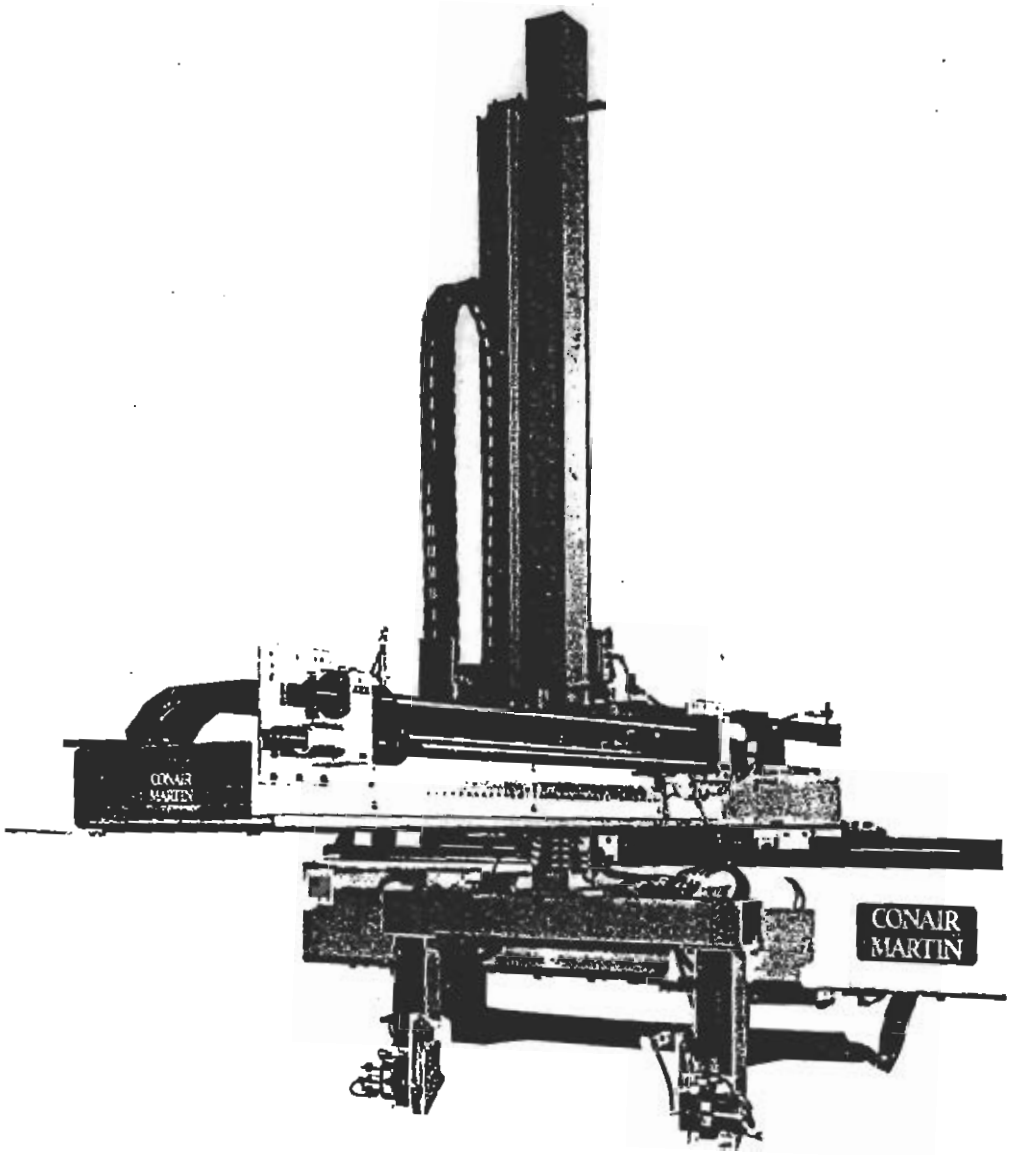
DON'Ts

1. DON'T place yourself or mobile equipment in the area that the Indy UP & OUT Robot System can reach when electrical power or air pressure is present.

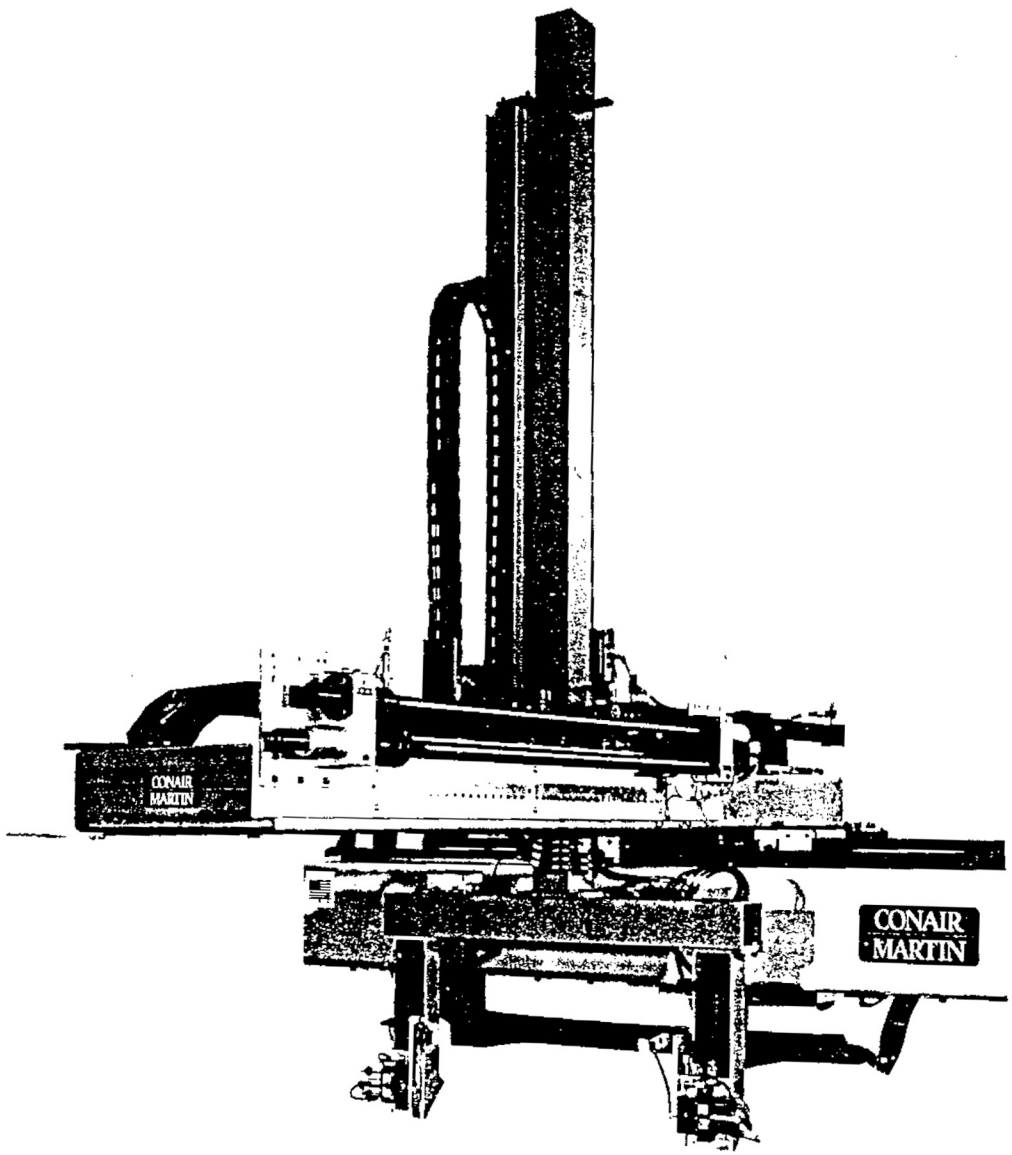
2. DON'T perform electrical, electronic, or mechanical maintenance or service on the Indy UP & OUT Robot System until all electrical power is removed and air pressure is brought to zero.

NOTE

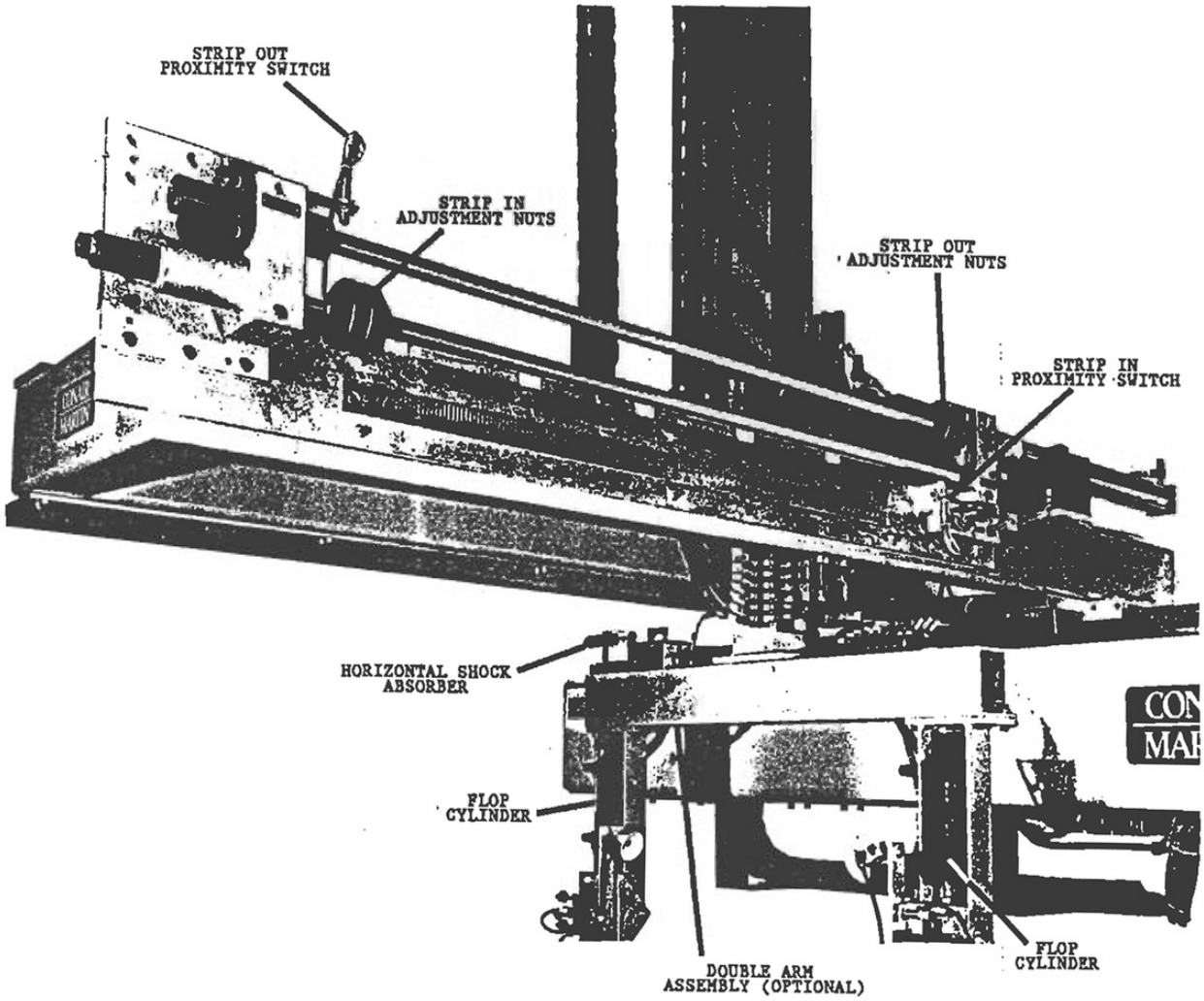
CONAIR MARTIN will not be responsible for any liability arising from use of a robot which has been modified without approval.



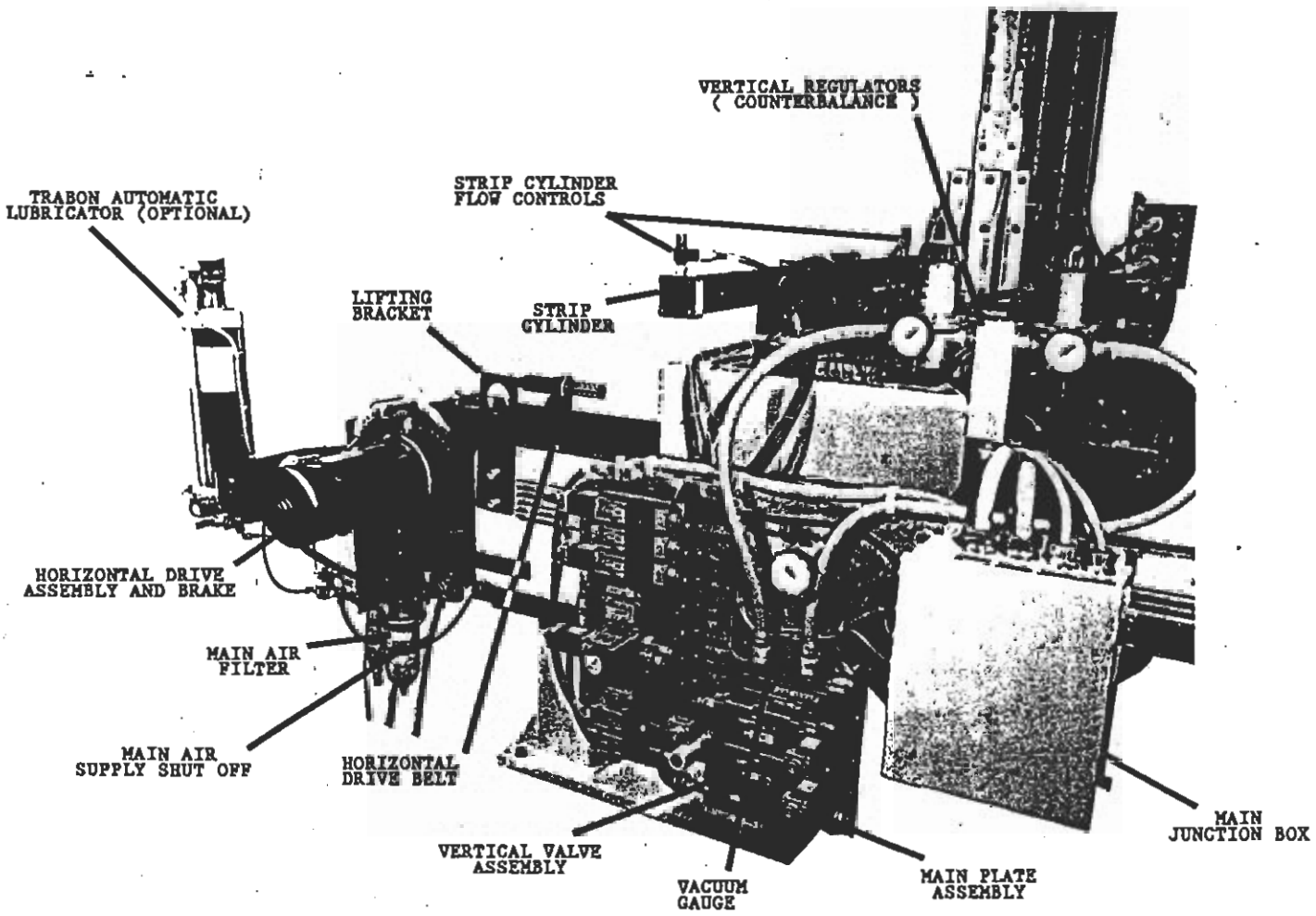
ILL. 1-1 INDY UP & OUT ROBOT SYSTEM



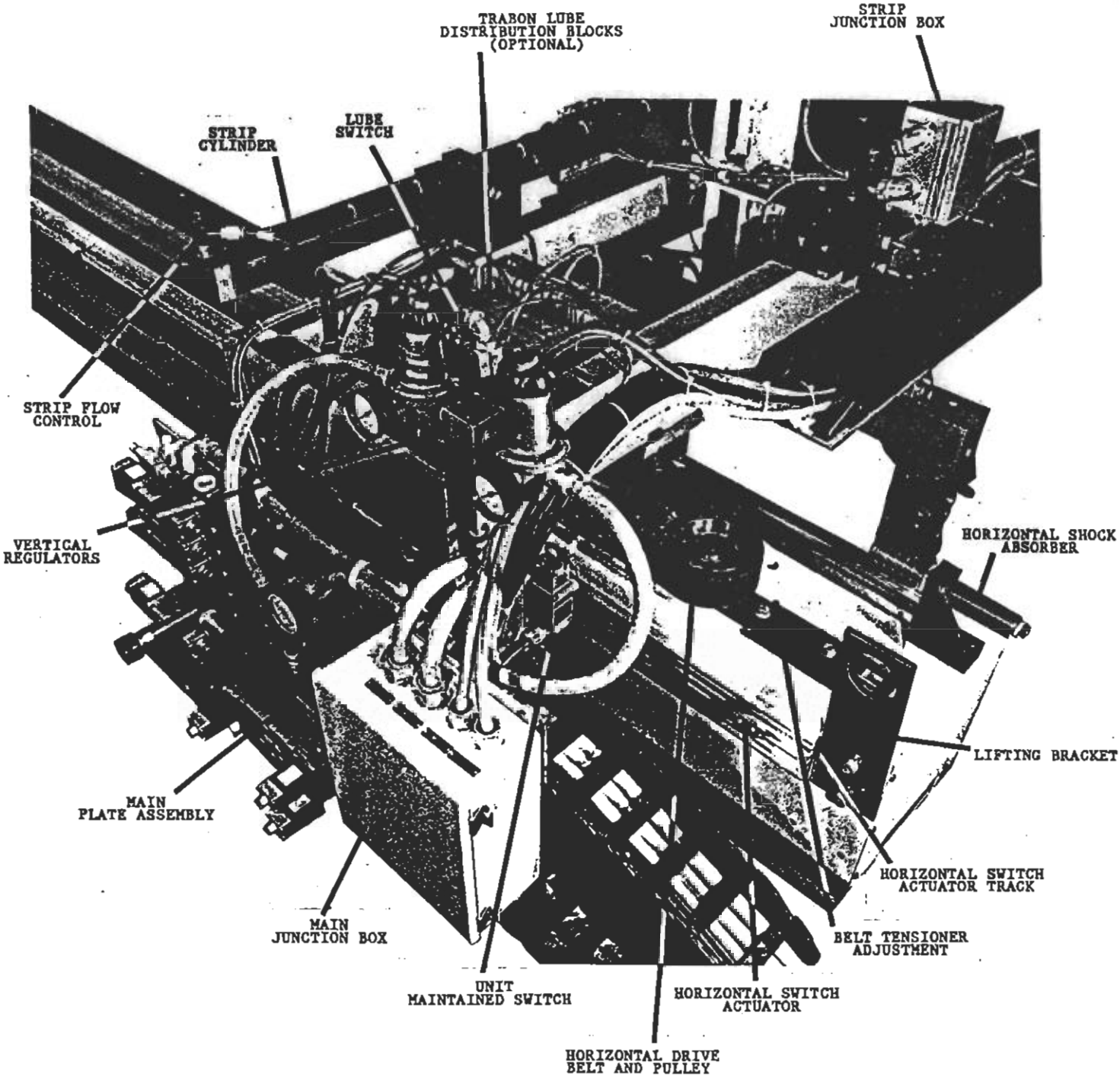
ILL. 1-1 INDY UP & OUT ROBOT SYSTEM



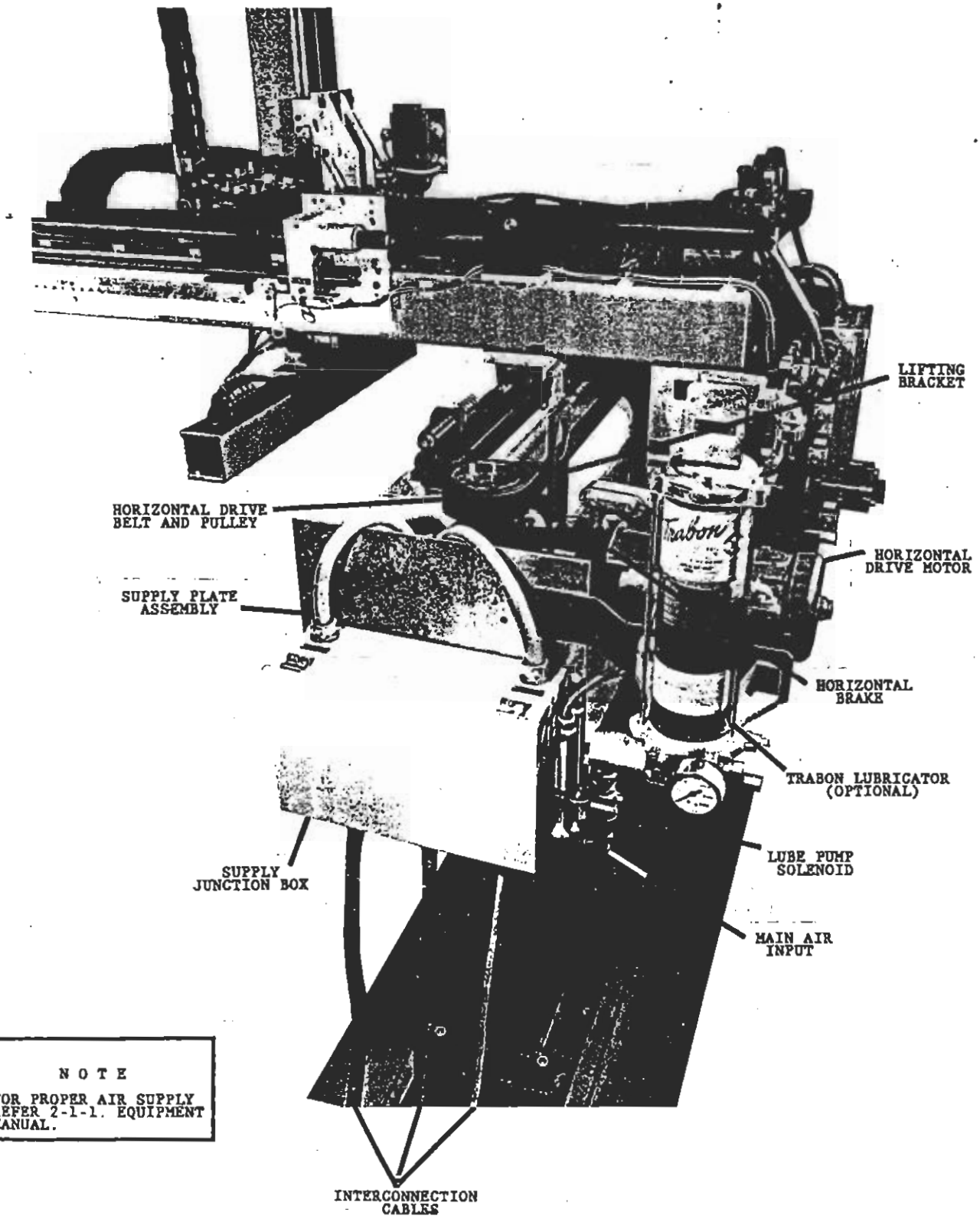
ILL. 1-3 RIGHT FRONT VIEW
INDY ROBOT SYSTEM



ILL. 1-4 REAR VIEW
INDY ROBOT SYSTEM



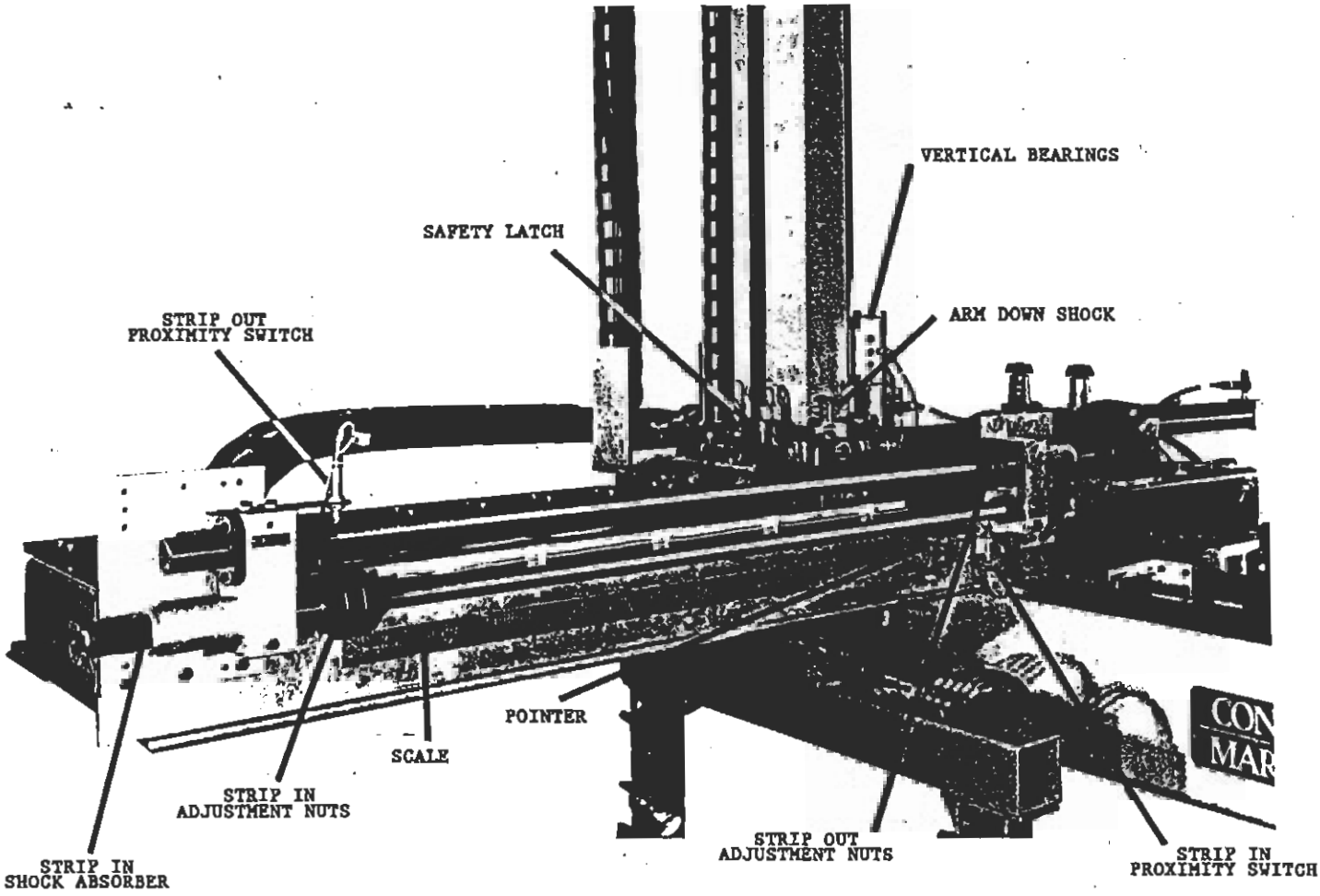
ILL. 1-5 RIGHT END REAR VIEW
INDY ROBOT SYSTEM



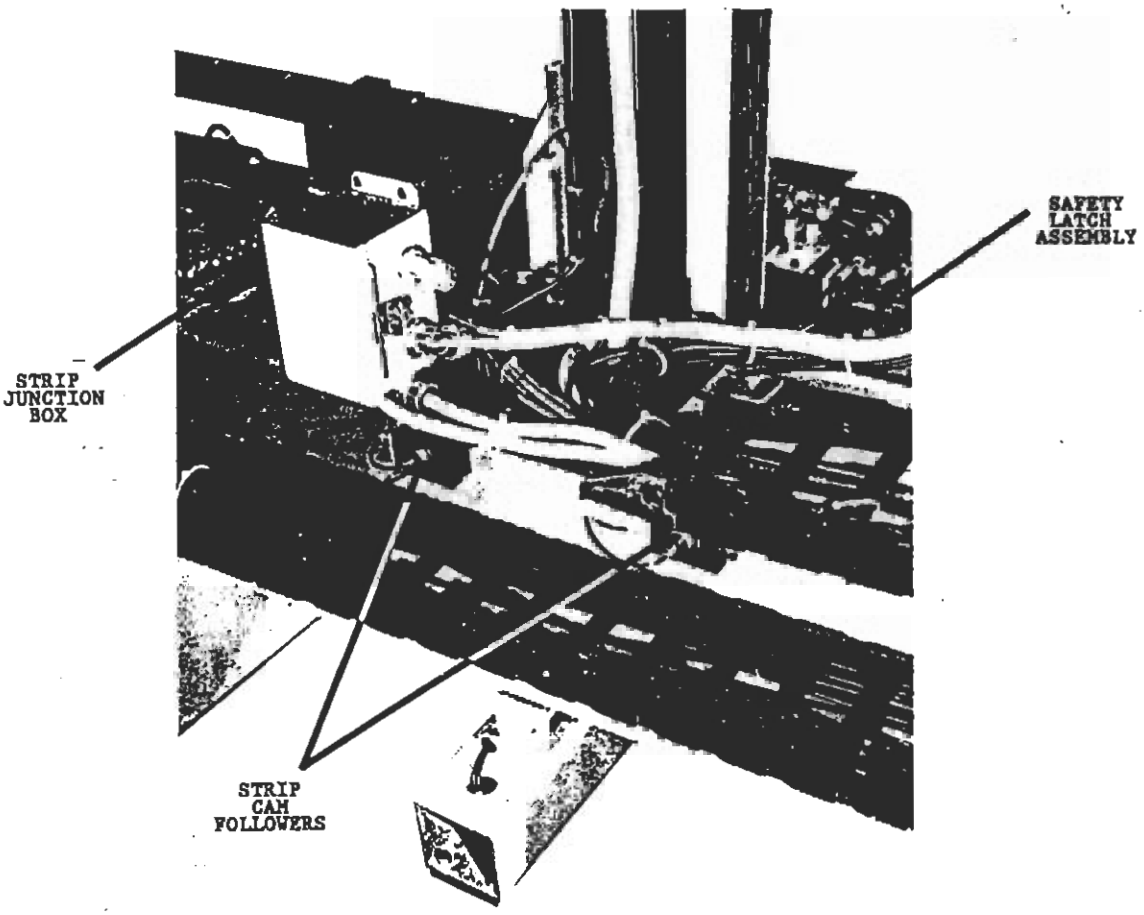
NOTE

FOR PROPER AIR SUPPLY REFER 2-1-1. EQUIPMENT MANUAL.

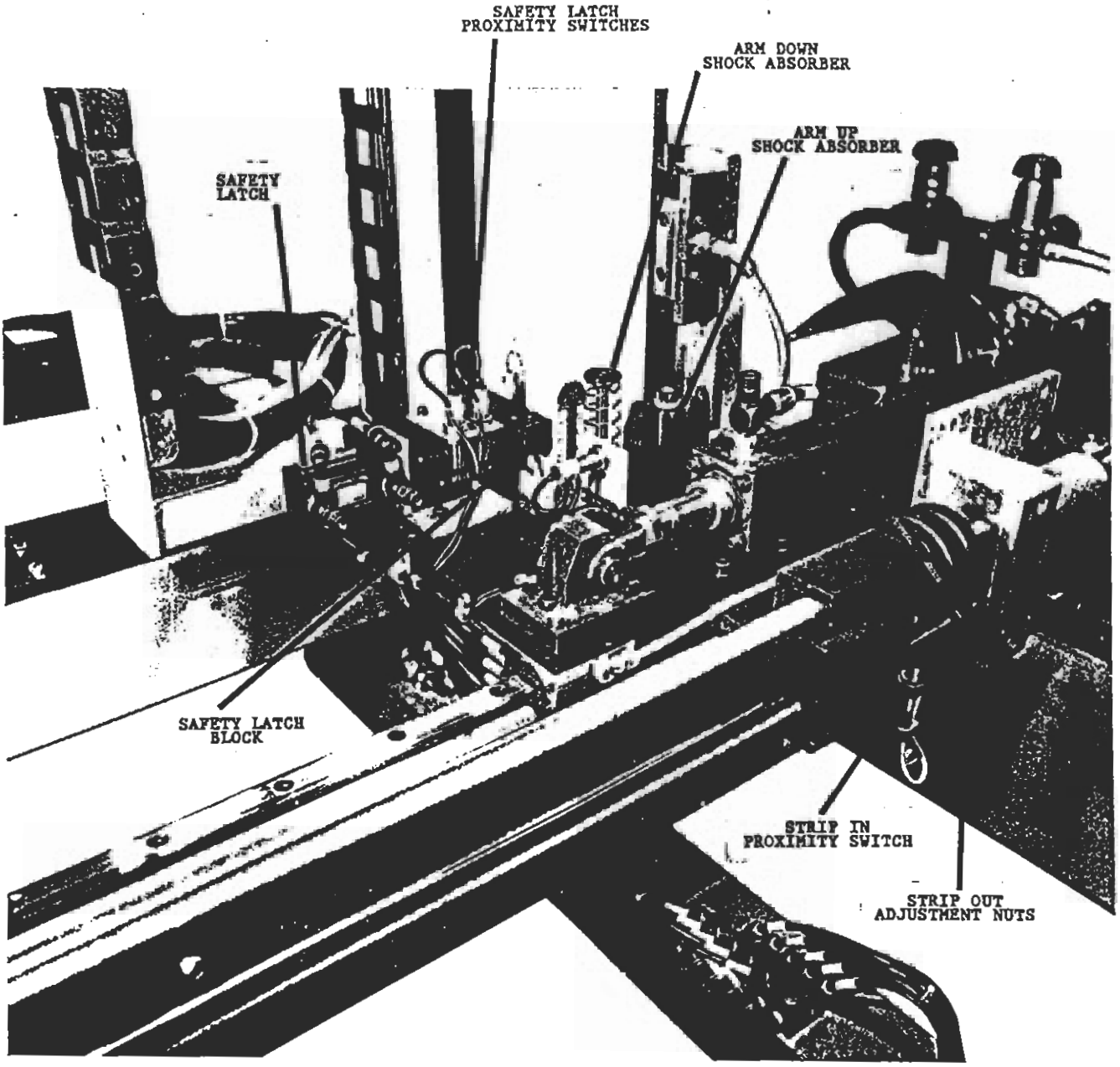
ILL. 1-6 LEFT END REAR VIEW
INDY ROBOT SYSTEM



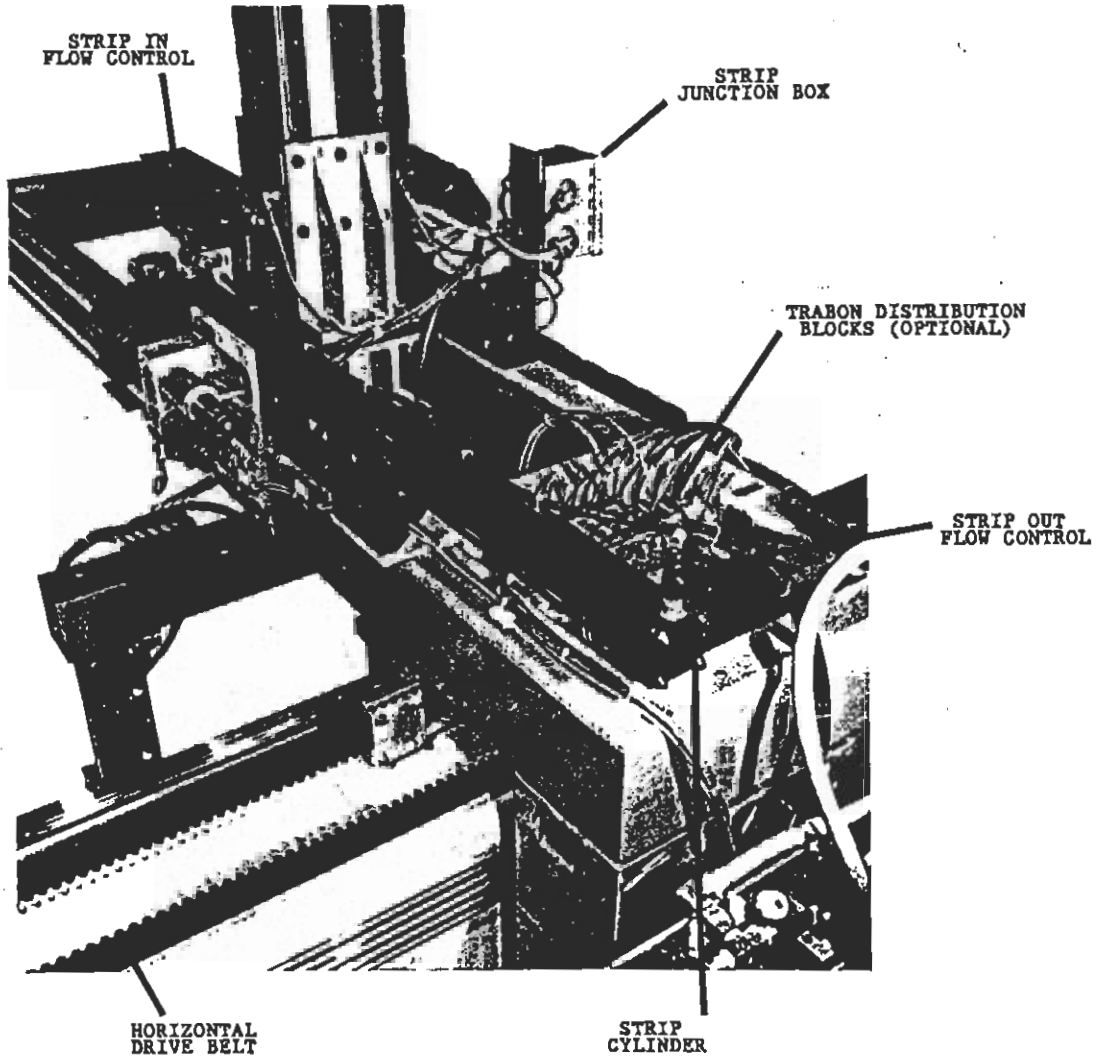
ILL. 1-7 STRIPPER CARRIGE ASSEMBLY
INDY ROBOT SYSTEM



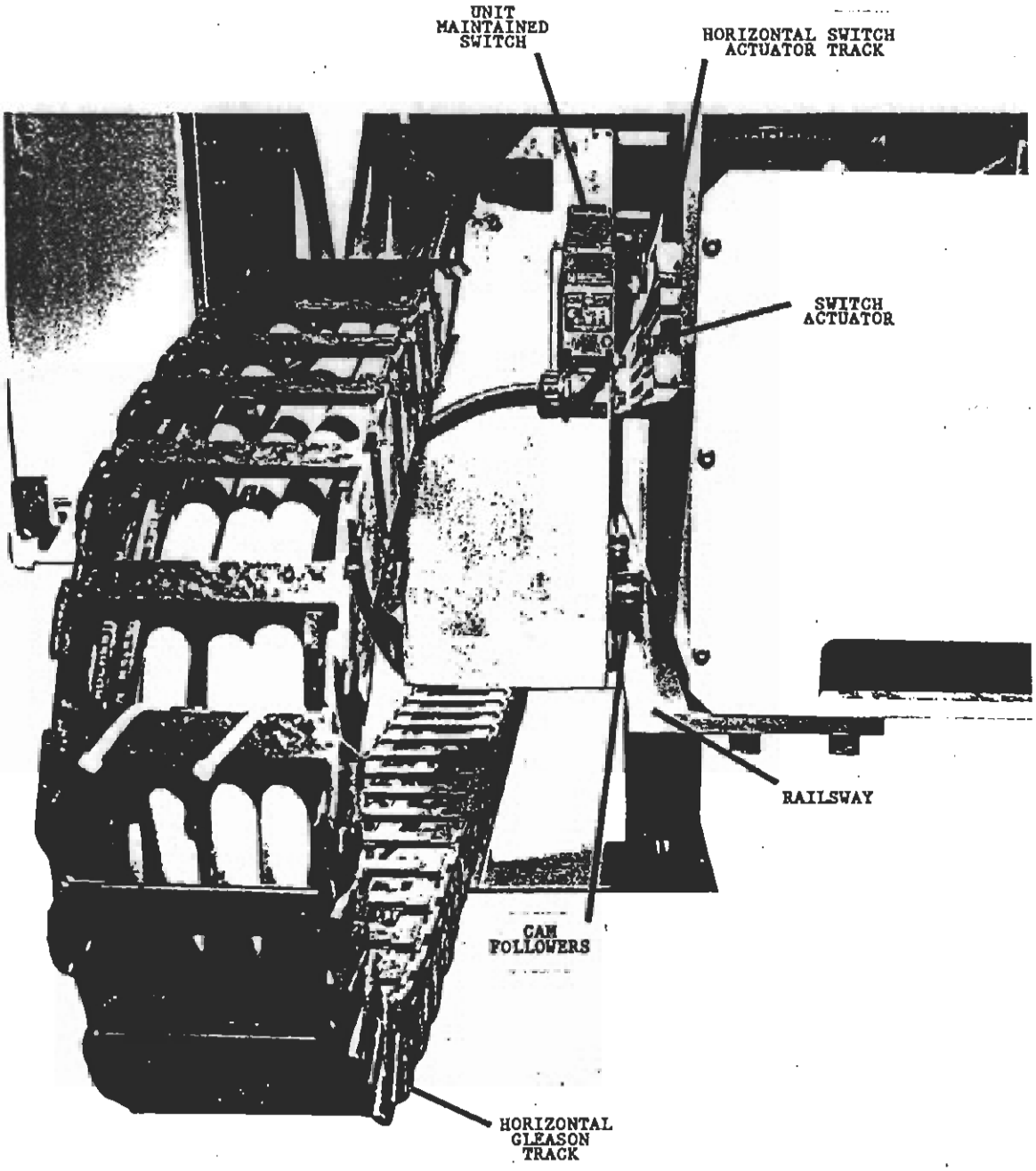
ILL. 1-8 STRIPPER CARRIAGE
LEFT FRONT VIEW ASSEMBLY



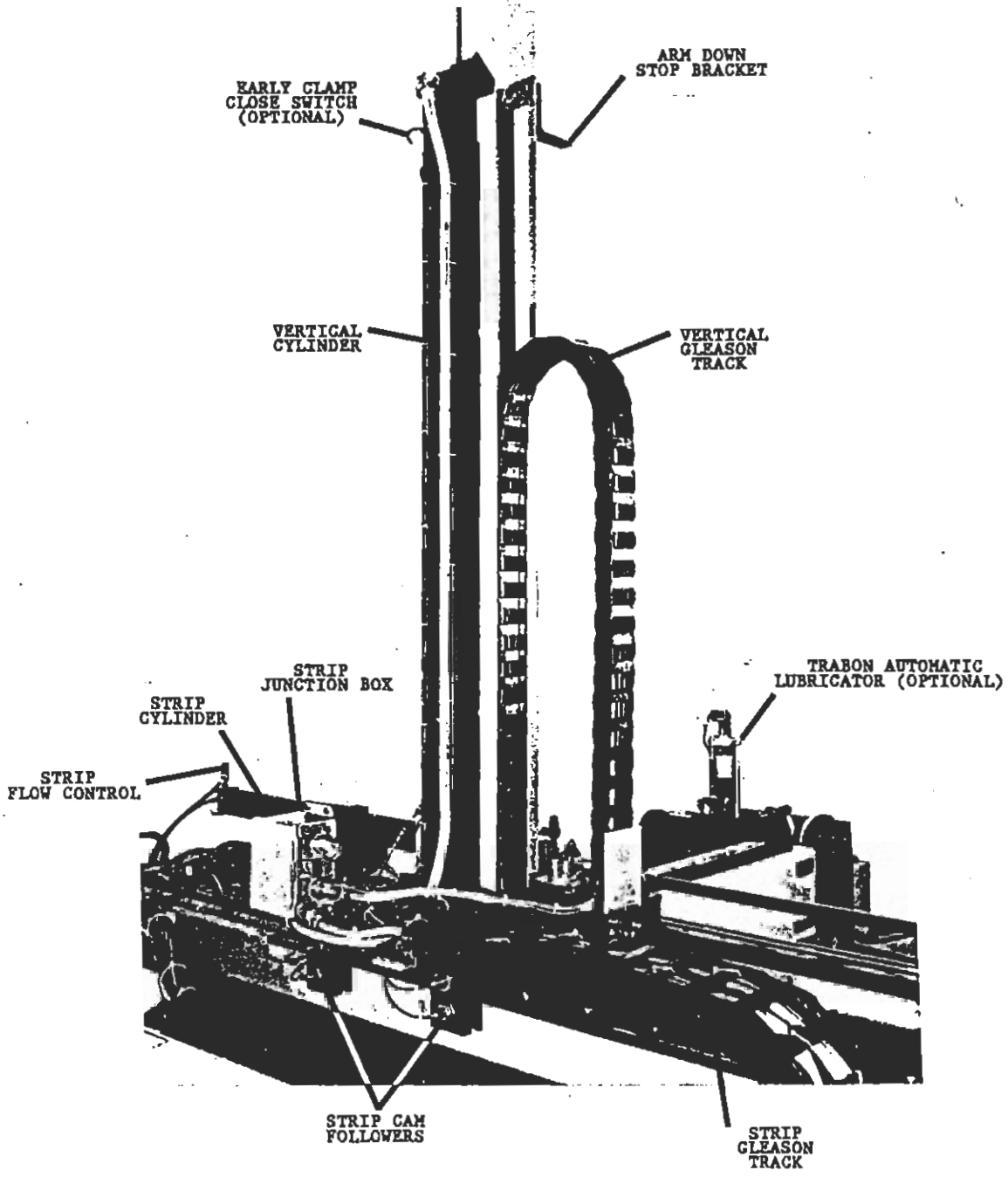
ILL. 1-9 STRIPPER CARRIAGE
RIGHT FRONT VIEW ASSEMBLY



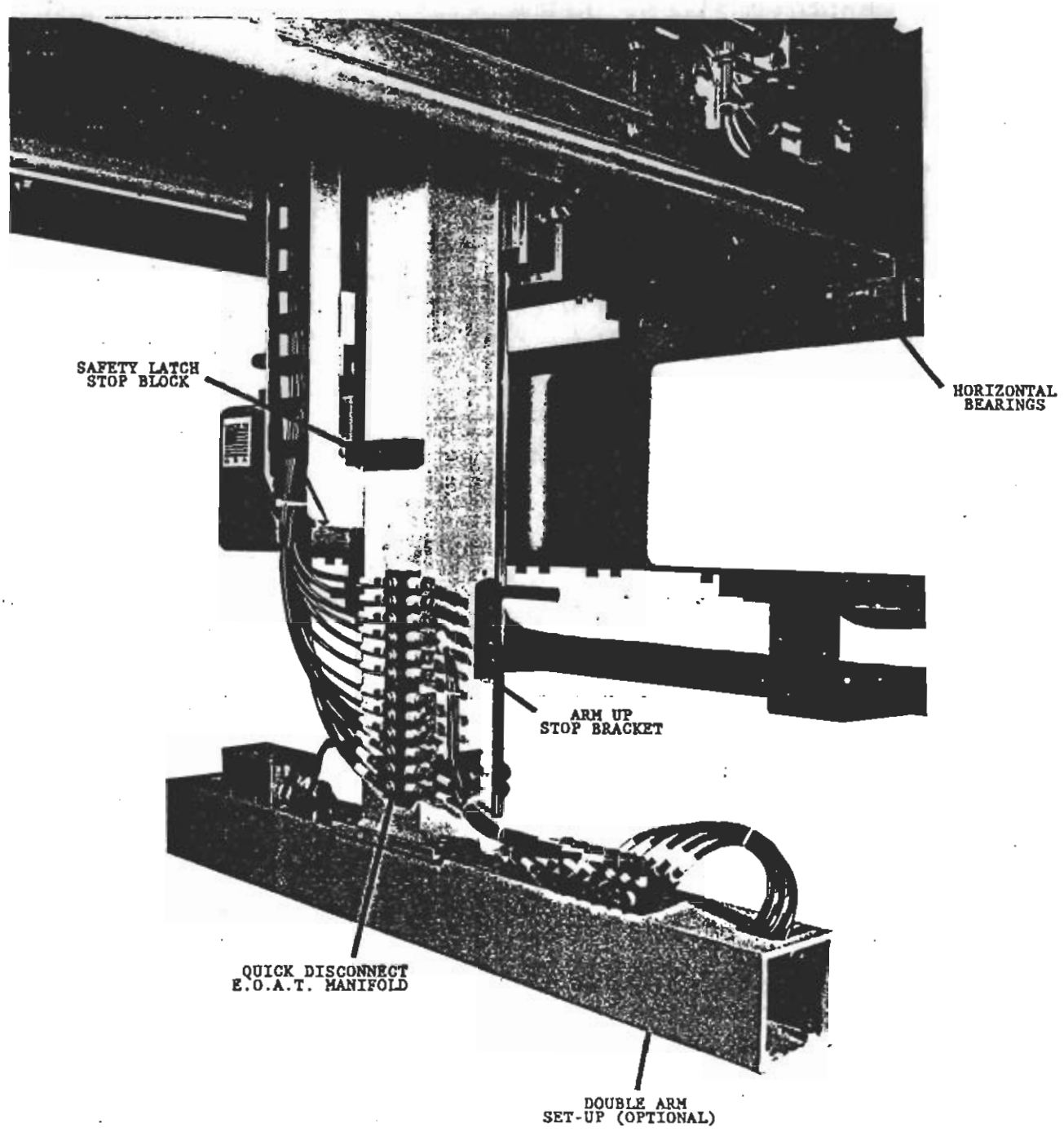
ILL. 1-10 STRIPPER CARRIAGE
LEFT REAR VIEW ASSEMBLY



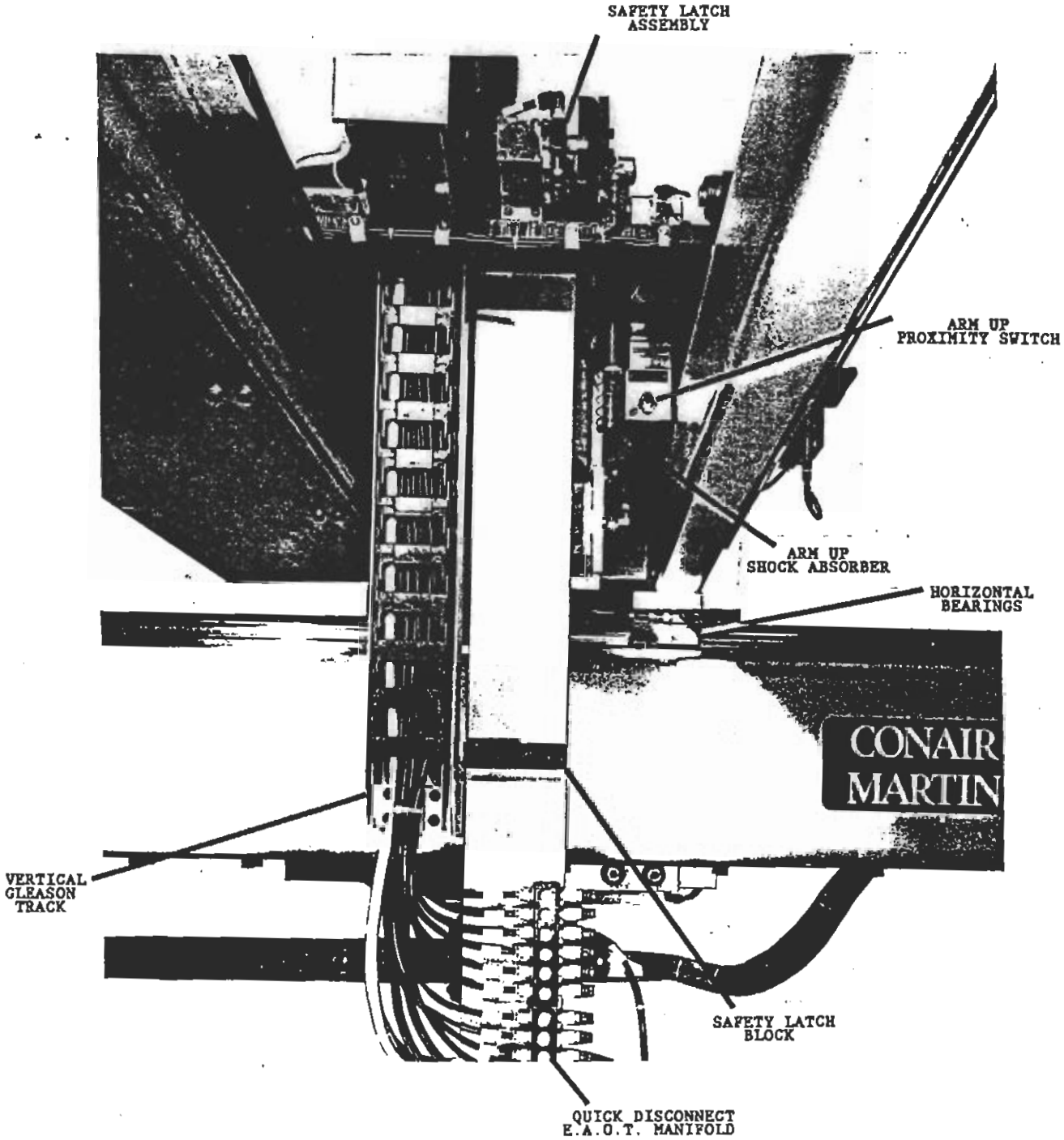
ILL. 1-11 STRIPPER CARRIAGE
RIGHT REAR VIE ASSEMBLY



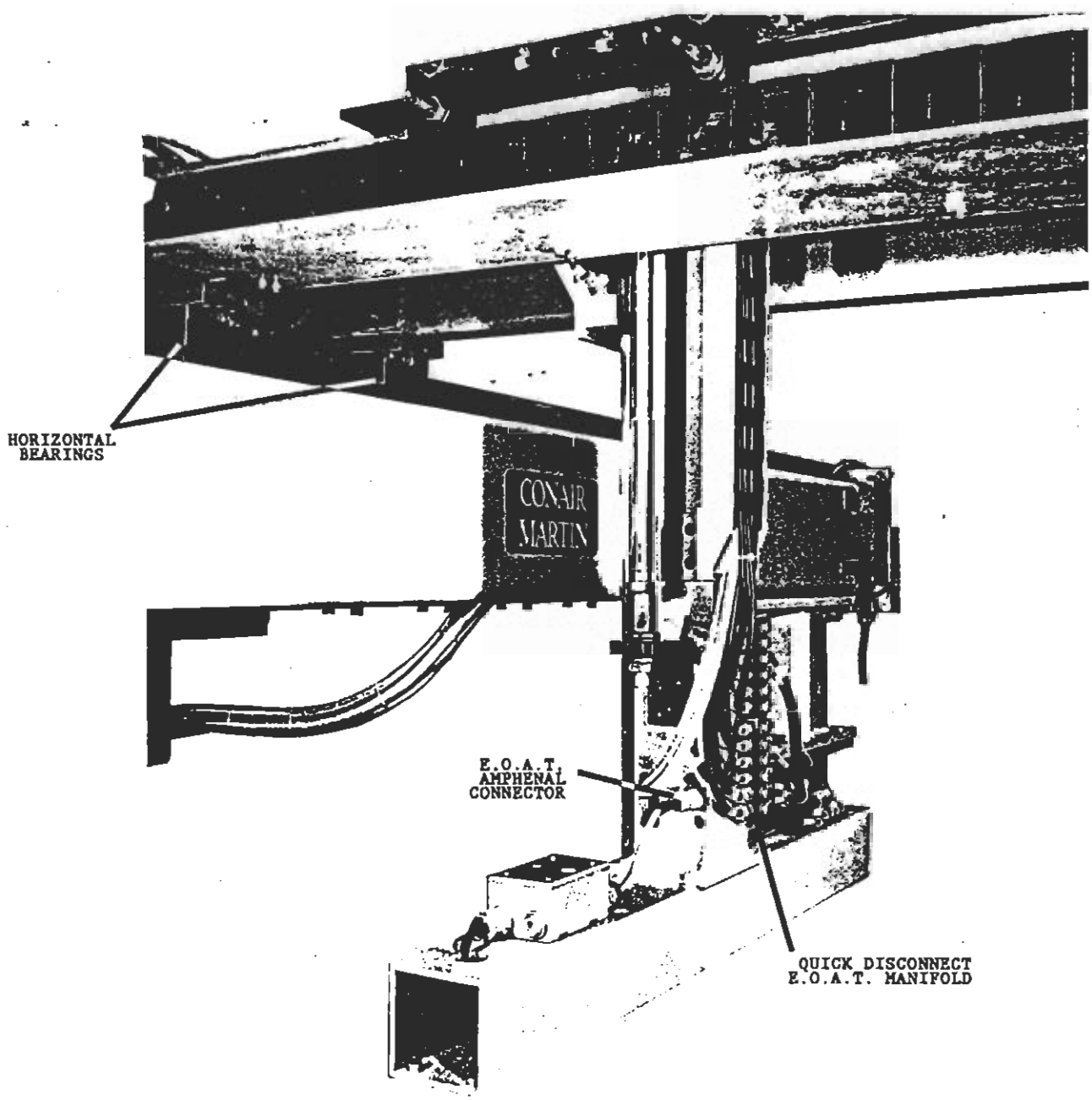
ILL. 1-12 UPPER VERTICAL ASSEMBLY



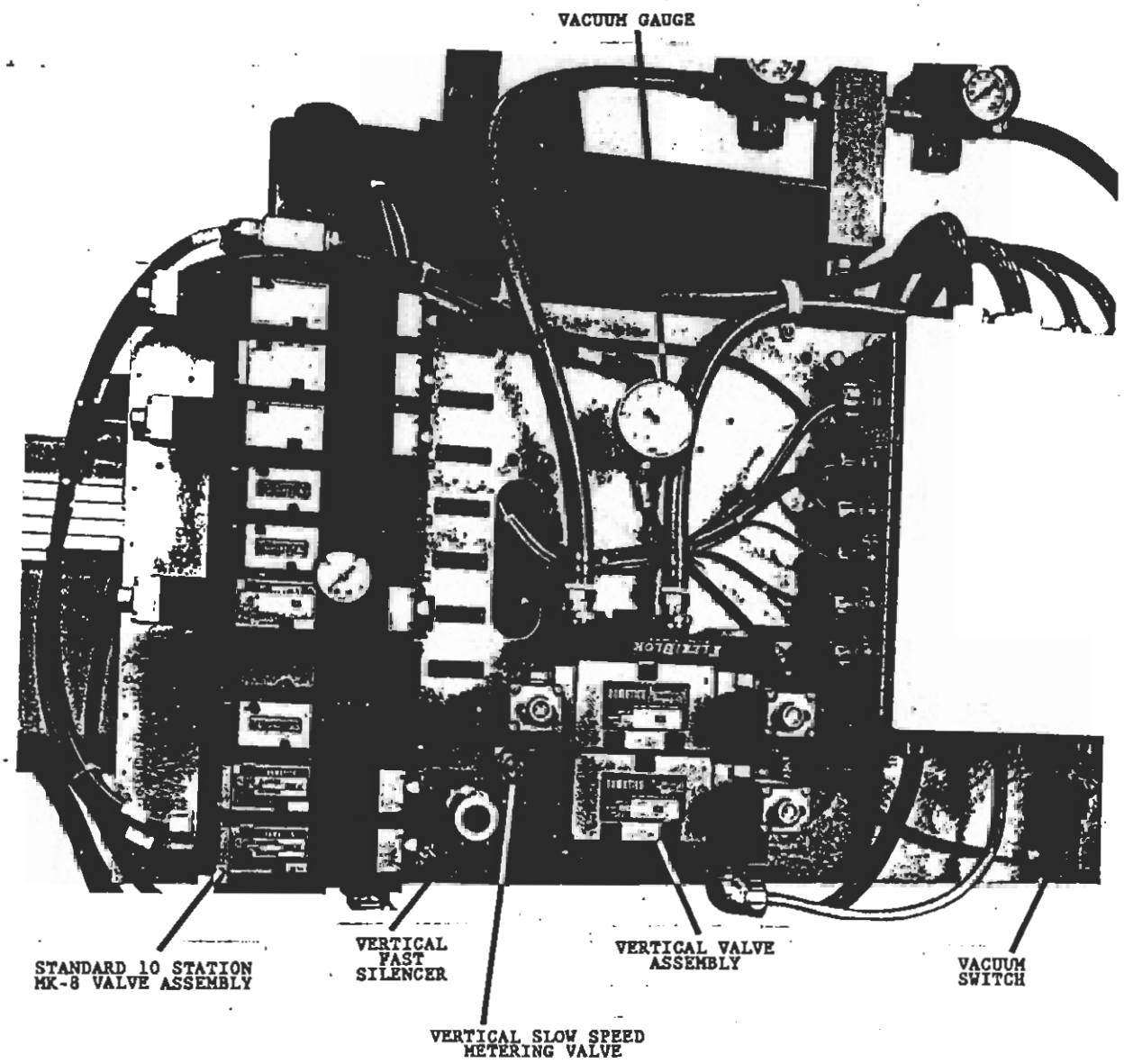
ILL. 1-13 LOWER VERTICAL ASSEMBLY
RIGHT SIDE VIEW



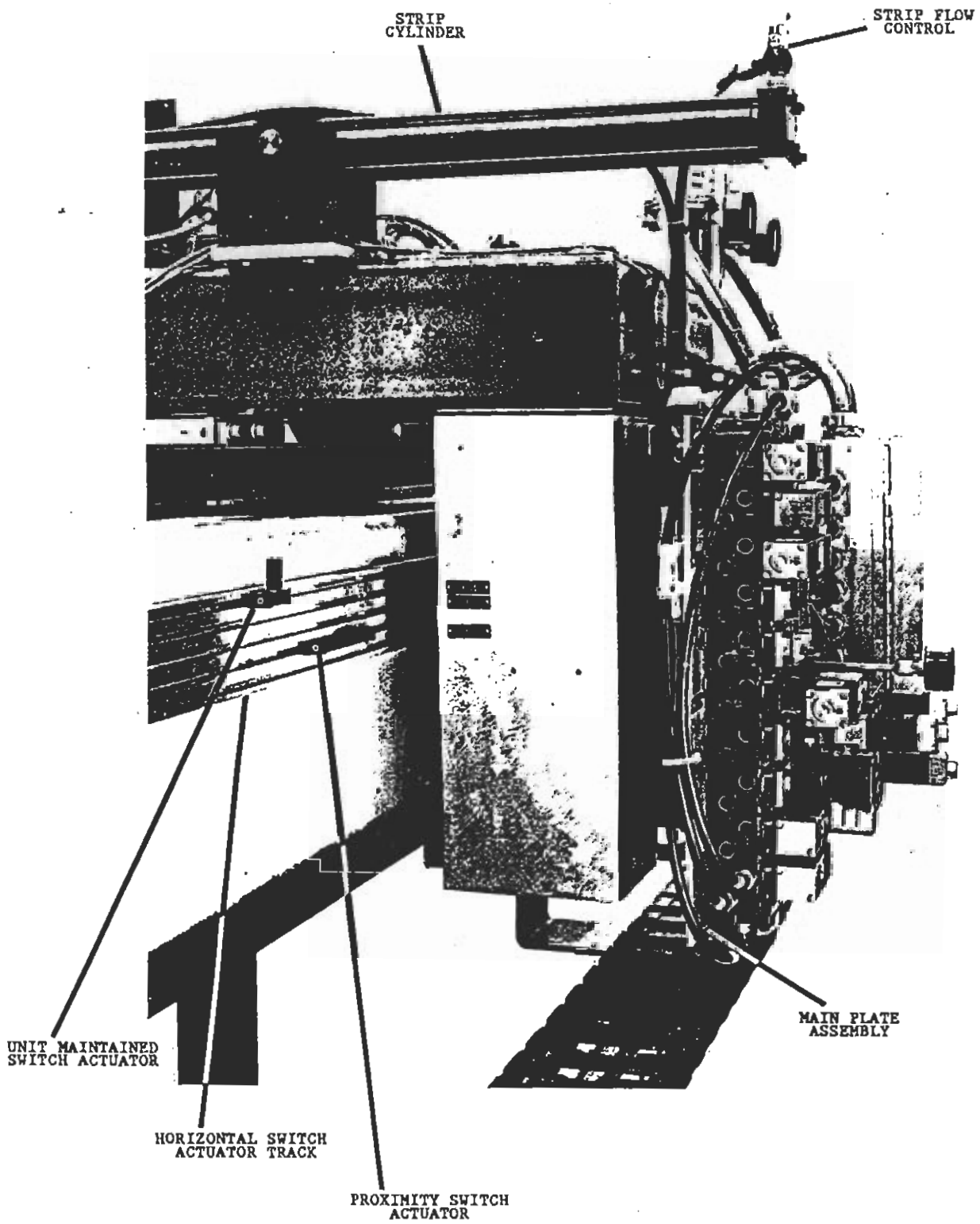
ILL. 1-14 LOWER VERTICAL ASSEMBLY FRONT VIEW



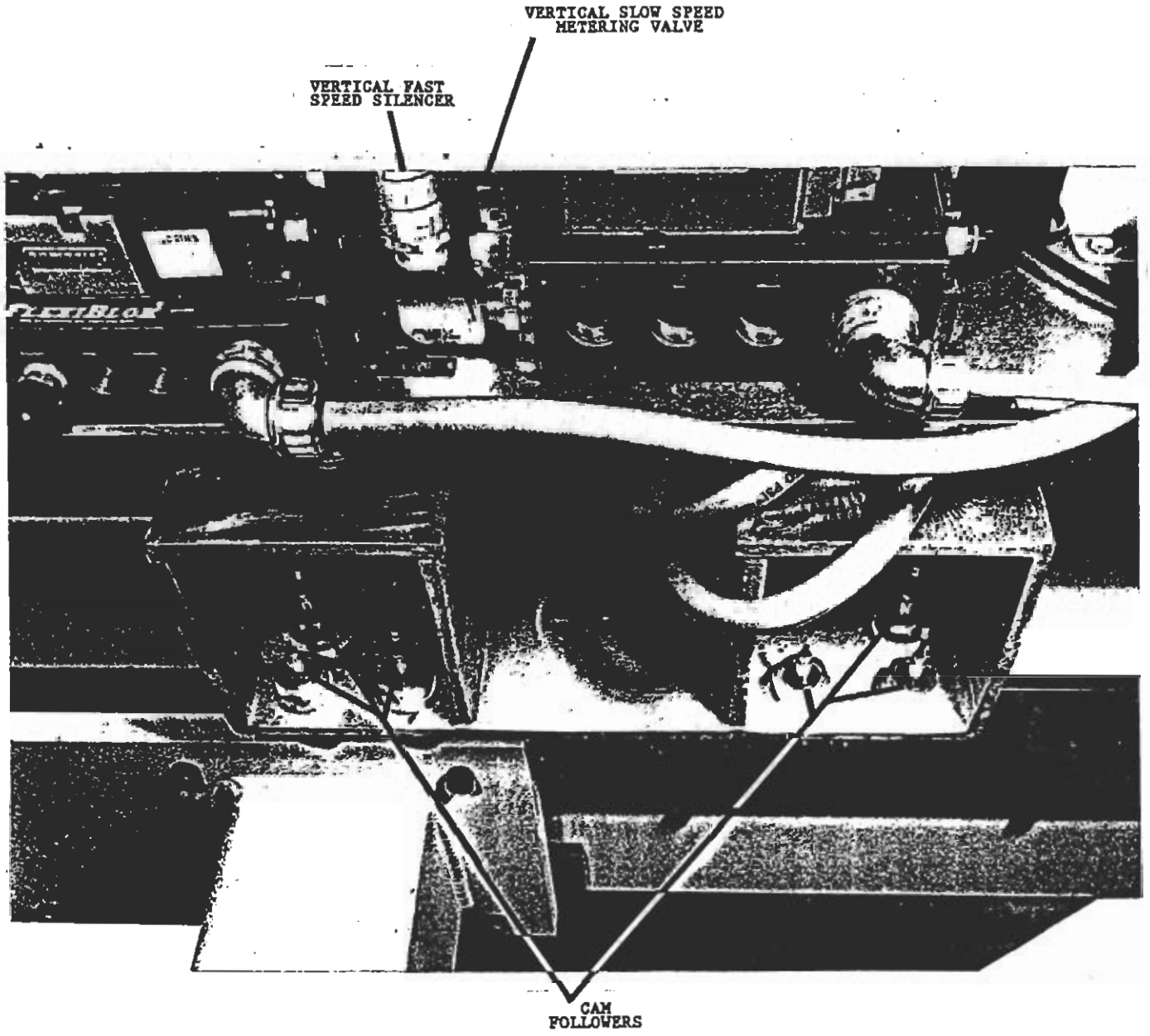
ILL. 1-15 LOWER VERTICAL ASSEMBLY
LEFT SIDE VIEW



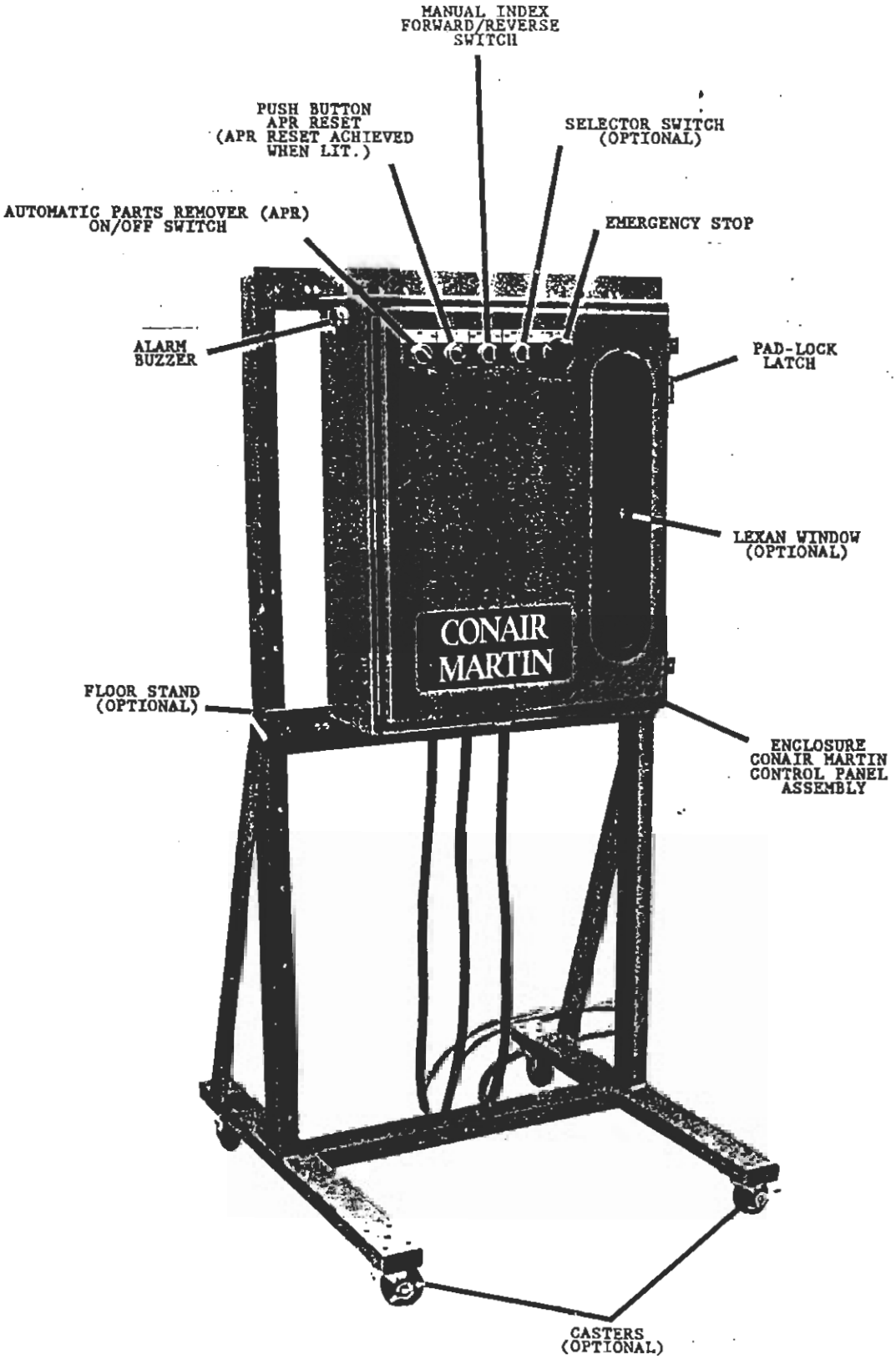
ILL. 1-16 MAIN PLATE ASSEMBLY



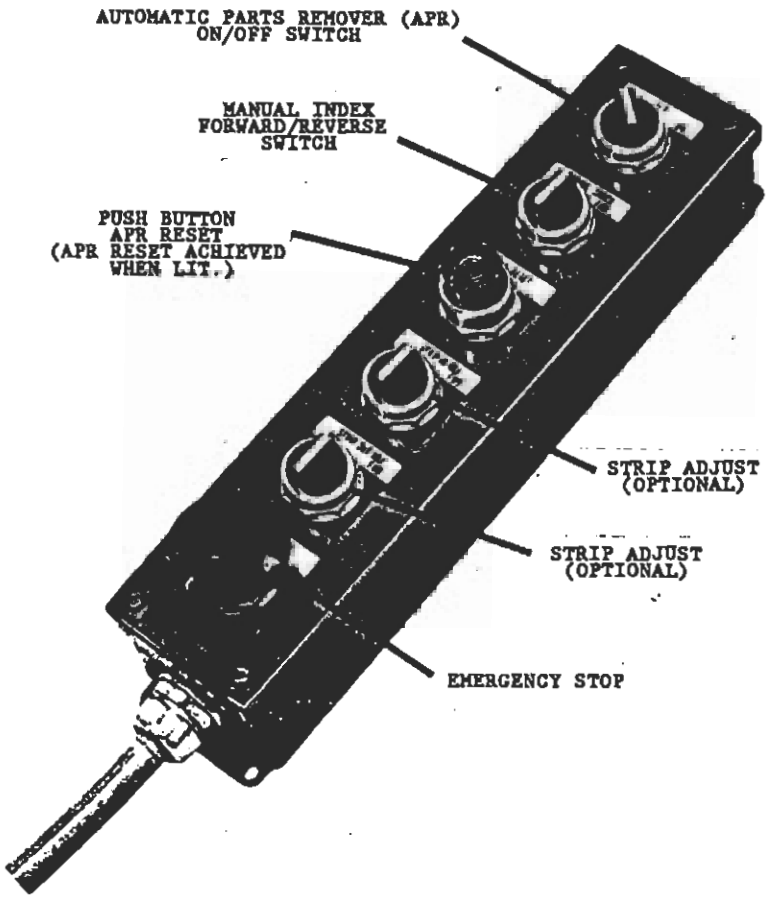
ILL. 1-17 LEFT SIDE VIEW OF MAIN PLATE ASSEMBLY



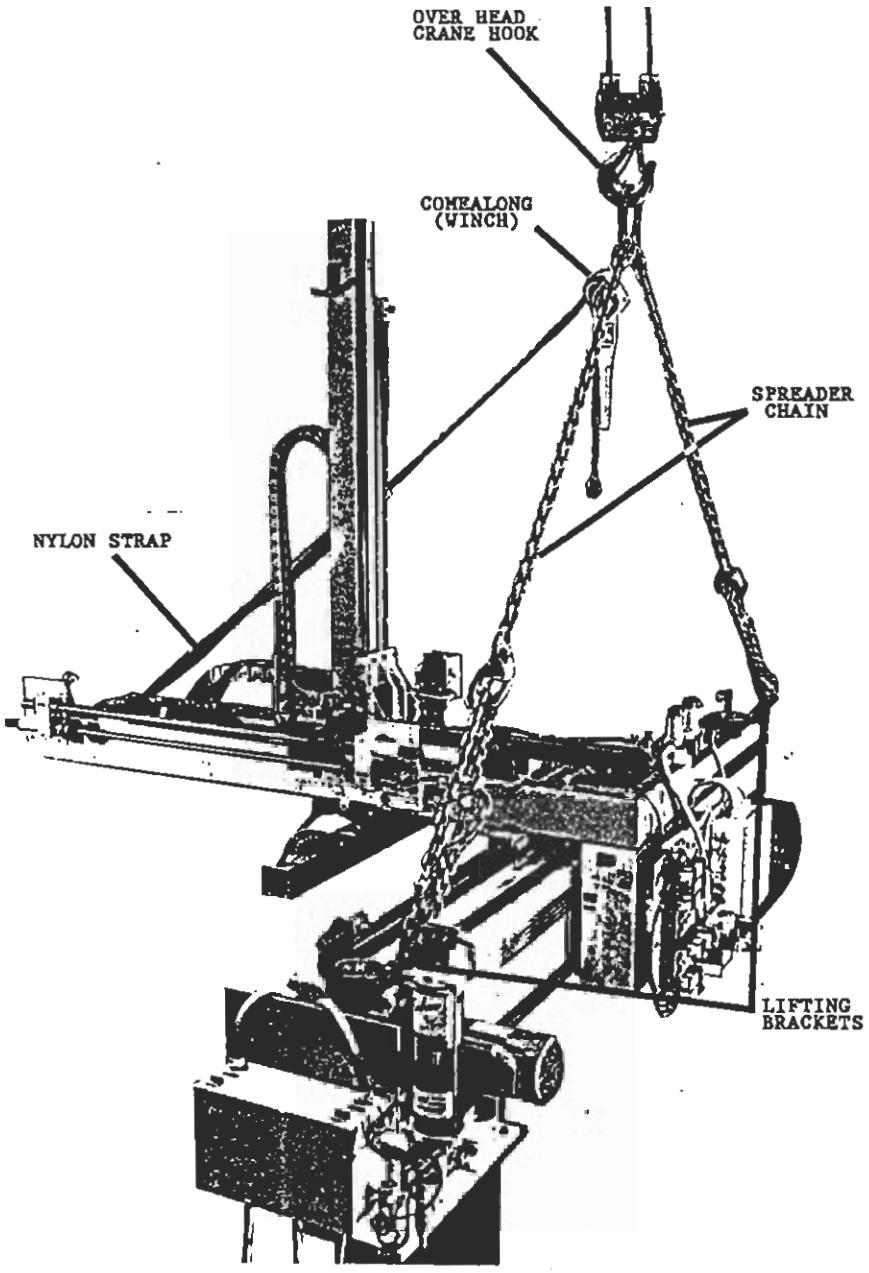
ILL. 1-18 BOTTOM VIEW OF MAIN PLATE ASSEMBLY



ILL. 1-19 MAIN CONTROL ENCLOSURE ASSEMBLY AND STAND WITH CASTERS



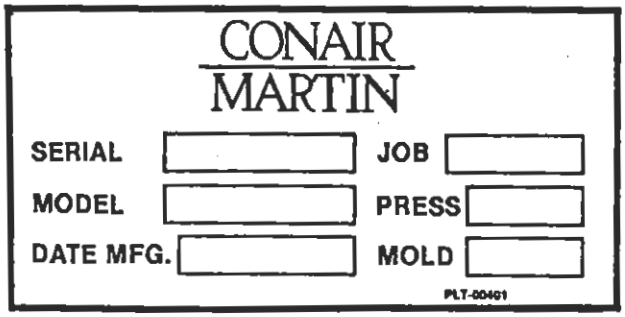
ILL. 1-20 PENDANT ASSEMBLY OPTIONAL



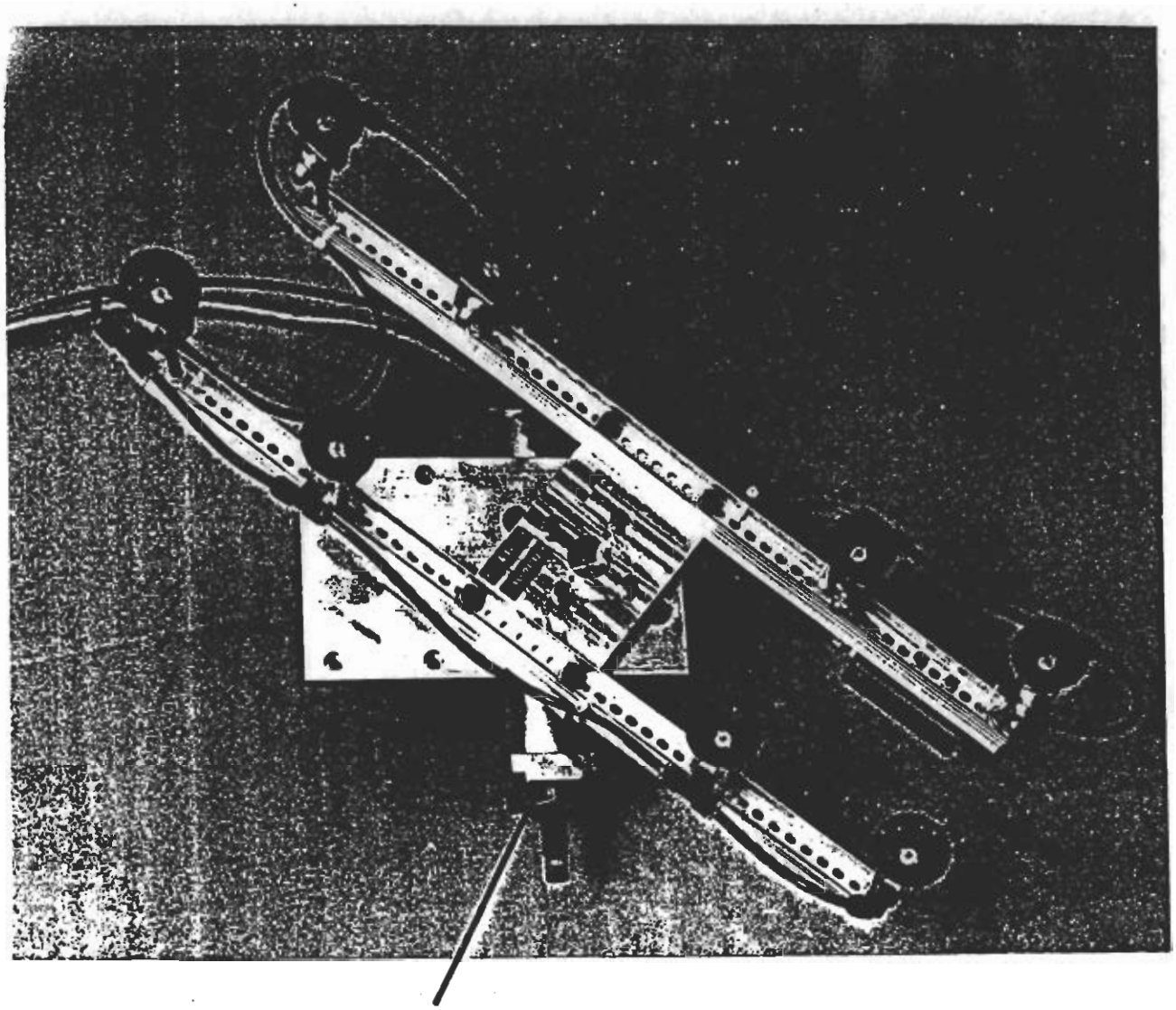
N O T E

FOR RIGGING INFORMATION REFER TO 2-2-1. EQUIPMENT MANUAL UNDER SECTION INSTALLATION 2-2.

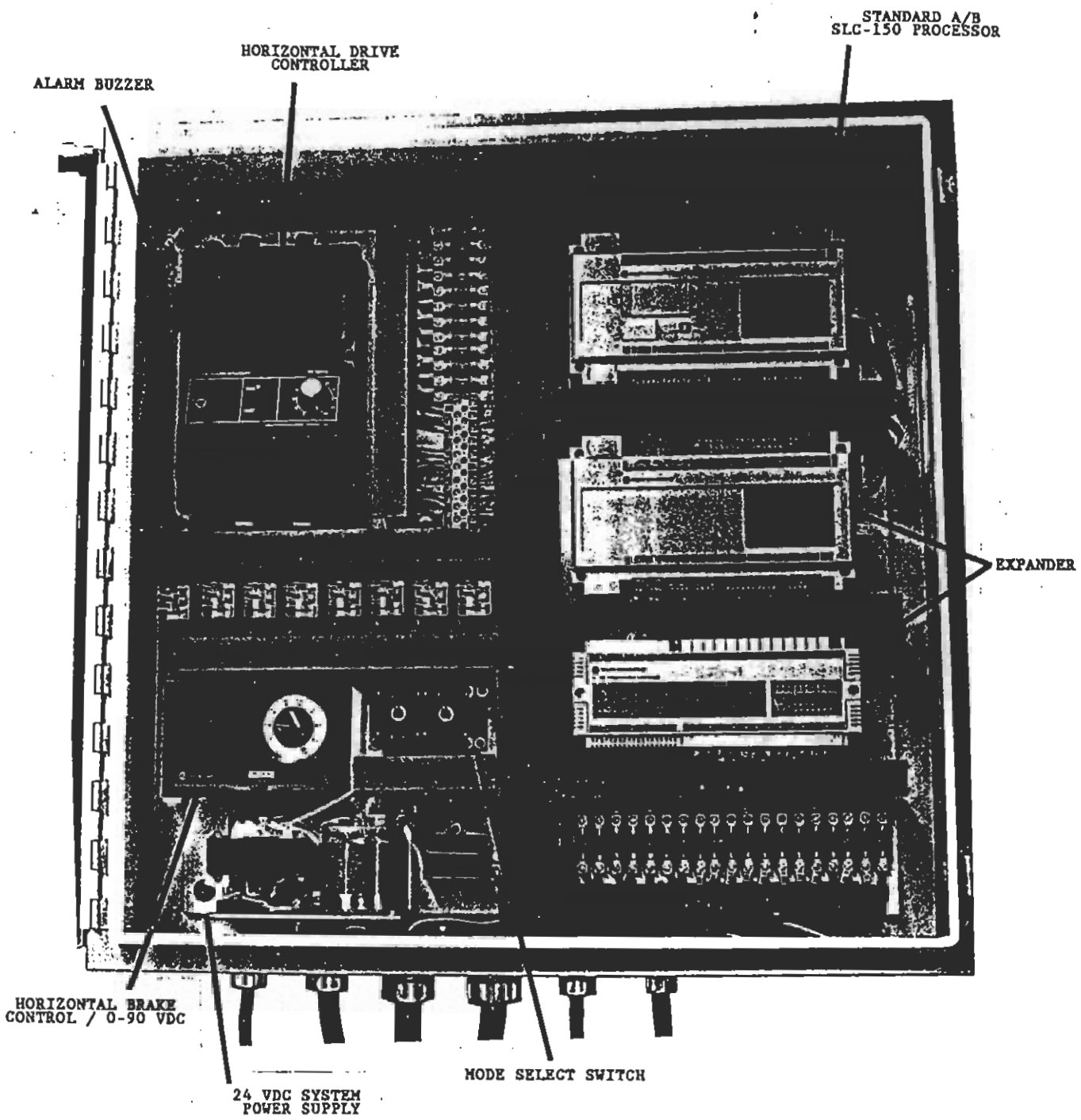
ILL. 1-21 INDY UP & OUT ROBOT SYSTEM RIGGING



ILL. 1-22 CONAIR MARTIN IDENTIFICATION TAG



ILL. 1-23 END OF ARM TOOLING (EOAT)
ASSEMBLY OPTION



ILL.1-24 STANDARD INDY ENCLOSURE (CAH)

CHAPTER 1

INTRODUCTION AND DESCRIPTION

1-1. INTRODUCTION.

1-1-1. The Indy™ UP & OUT Robot System (Ref. Ill. 1-1, page VI) has been designed and manufactured by CONAIR MARTIN. The machine is constructed with all major elements made of steel. This provides the ultimate in stiffness and minimizes vibration and shake. The linear motions are provided with bearings that will render trouble free operation and maximizing "up" time. Offers fast and economical method of automatically removing molded parts from injection molding machines (press).

1-1-2. Horizontal travel arrangement. Horizontal motion is derived from a 3/4 horsepower DC motor driving a gear reducer. The reducer output rotates a timing pulley and belt arrangement. The timing belt is a steel stranded belt, which provides enormous strength, excellent flex life and high resistance to elongation. The horizontal frame is a steel tube with 0.5 inch wall thickness. Motion is controlled by proximity switches and adjustable actuators in an extruded aluminum track. Full "OUT" and full "IN" are limited by heavy duty shock absorbers and the unit is "locked in place" by a motor mounted brake. A roller arm limit switch is provided to sense if the horizontal carriage is located in the mold area or clear of the tie bars, which is essential for auto-homing on power-up. Intermediate runner drop position can be easily achieved with our adjustable actuators. Positive intermediate position is available as an option with a retractable hard stop.

1-1-3. Vertical travel arrangement. In order to achieve rigidity, the vertical arm is constructed of a lightweight aluminum tube with the steel THK track attached. The THK track is supported by two (2) preloaded THK linear bearings mounted with a spread of 18 inches. The vertical arm is powered by a 3.250 inch bore NFPA square body cylinder that has a 1 inch heavy duty rod. The rod end is coupled to the vertical arm with a floating rod attachment eliminating any side thrust on the packing gland. Eight (8) pneumatic quick disconnects are provided as standard to accommodate most tooling arrangements:

Two (2) Grip Parts "A"
Two (2) Grip Parts "B"
Three (3) Grip parts (Grabber)
Two (2) Runner Grip
Two (2) Rotate

A safety latch is provided to assure that the arm is secured in the up position. Proximity switches detect the "safe" position of the latch. The vertical motion can be programmed for two (2) speeds.

A. Fast into the mold
B. Slow over the conveyor.

1-1-4. Strip motion arrangement. The stripper carriage is constructed of fabricated steel rectangular tubing. Strip "IN" and "OUT" motion is provided by a 2 inch bore NFPA square body cylinder with a heavy duty 1 inch rod. The cylinder is trunnion mounted to eliminate unwanted loads on the packing gland.

The strip carriage is supported by two (2) THK bearings and a Conair Martin flat rail and roller assembly. Strip "IN" and "OUT" positions are controlled by an adjustable screw and shock arrangement.

1-1-5. Remote Controlled Strip Positioner Optional. This assembly is optional. It is comprised of two (2) AC motors coupled to two (2) screw assemblies.

Operation is as follows:

On command, the strip "IN" motor is activated, rotating a 1 inch screw. A bronze nut engages the screw and is kept from rotating by a rectangular steel bar. When the screw rotates, the bronze nut moves axially on the screw. A double ended yoke bracket is attached to the strip carriage and straddles both screws. When the strip cycle is activated, the strip carriage and yoke travel until the yoke engages the bronze nut. The nut and screw continue to move axially being limited by an adjustable heavy duty shock absorber. Proximity switches are used to detect strip "IN" and "OUT" positions and prevent "overtraveling" the nuts. A scale and pointer indicate the positions. With this arrangement, the tooling arm can be moved in either direction for both strip "IN" and "OUT" positions, inside or outside the mold. This enables the operator to quickly, easily and safely position the tooling to the desired position. Recording the positions arrived at from the scale makes it easy for the operation to repeat the setting when the mold is run again.

1-2. GENERAL DESCRIPTION.

1-2-1. The Indy UP & OUT Robot System mounts on the stationary platen of the injection molding machine. It is comprised of several sub-assemblies and Main Control Enclosure. The following are illustrations of the sub-assembly sections:

A. Left Front View: (Ref. Ill. 1-2 [VII])
B. Right Front View: (Ref. Ill. 1-3 [VIII])
C. Rear View: (Ref. Ill. 1-4 [IX])
D. Right End Rear View: (Ref. Ill. 1-5 [X])
E. Left End Rear View: (Ref. Ill. 1-6 [XI])
F. Stripper Carriage Assembly: (Ref. Ill. 1-7 [XII])
G. Stripper Carriage Left Front View: (Ref. Ill. 1-8 [XIII])
H. Stripper Carriage Right Front View: (Ref. Ill. 1-9 [XIV])
I. Stripper Carriage Left Rear View: (Ref. Ill. 1-10 [XV])
J. Stripper Carriage Right Rear View: (Ref. Ill. 1-11 [XVI])
K. Upper Vertical Assembly: (Ref.Ill. 1-12 [XVII])
L. Lower Vertical Assembly Right Side: (Ref. Ill. 1-13 [XVIII])
M. Lower Vertical Assembly Front View: (Ref. Ill. 1-14 [XIX])
N. Lower Vertical Assembly Left View: (Ref. Ill.1-15 [XX])
O. Main System Plate Assembly: (Ref. Ill. 1-16 [XXI])
P. Left Side Main System Plate Assembly: (Ref. Ill. 1-17 [XXII])
Q. Bottom View Main System Plate Assembly: (Ref. Ill. 1-18 [XXIII])
R. Main Control Enclosure Assembly: (Ref. Ill. 1-19 [XXIV])
S. Pendant Assembly Optional: (Ref. Ill. 1-20 [XXV])

1-3. MAIN CONTROL ENCLOSURE.

1-3-1. The Standard Main Control Enclosure (Ref. Ill. 1-19, page XXIV) contains a programmable controller and several electrical components mounted in a NEMA 12 enclosure. This Enclosure is shipped with five (5) twenty five (25) foot cables. Three (3) of those cables are used to interconnect the Main Controller Enclosure to the Supply Plate Assembly Junction Box of the robot (Ref. Ill. 1-6, page XI). The fourth (4th) and fifth (5th) cable, which are routed to the control area of the molding machine, plug into the mating amphenol connector which are supplied as a kit by CONAIR MARTIN with wiring information and are wired and mounted to the molding machine for press interfacing.

1-4. DIMENSIONS AND CAPABILITIES

1-4-1. The overall dimensions and the capabilities, such as arm travel and strip stroke ect., are shown in Table 1-1, page 4. Should the machine not be of standard configuration a "write in" space below marked SPECIAL is available and the configuration should be written in by the customer for future reference and information. Many different additional options are available upon request.

Table 1-1. Dimensions and Capabilities of Standard Machines.

DESCRIPTION	MODEL 50 PRESS RANGE 700T	MODEL 60 PRESS RANGE 1000T	MODEL 68 PRESS RANGE 1500T
Vertical stroke (Pneu.)	50"	60"	68"
Horizontal stroke (Elec.)	72"	84"	108"
Strip stroke (Pneu.)	27"	31"	35"
Flopper (Pneu.)	90 deg.	90 deg.	90 deg.
Average Payload.	30 lbs.	30 lbs.	40 lbs.
Working Air Pressure.	80 psi.	80 psi.	80 psi.
Controller.	Solid State.	Solid State.	Solid State.
SPECIAL			

1-5. SEQUENCE OF OPERATION.

1-5-1. A typical sequence of operation follows. Actual sequence may vary with the application. Consult a CONAIR MARTIN Sales Engineer for specific requirements and information.

1-5-2. The initial position (Home Position) of the Indy UP & OUT Robot System is with the arm in the DOWN POSITION; STRIPPER BACK; FLOPPER DOWN; and the unit in the OUT POSITION over the part drop area. A typical operating sequence is as follows:

STEP 1. HOME POSITION
2. ARM UP
3. FLOP UP
4. UNIT IN (OVER MOLD)
5. ARM DOWN (INSIDE MOLD)
6. STRIP IN (TOWARDS PARTS)
7. GRIP PARTS
8. STRIP OUT
9. ARM UP
10. UNIT OUT (TO PART DROP AREA)
11. FLOP DOWN
12. ARM DOWN
13. RELEASE PARTS

CHAPTER 2

PREPARATION FOR USE, STORAGE OR SHIPMENT

2-1. FACILITY REQUIREMENTS.

2-1-1. The customer must prepare the installation site including removal of any obstacles above the stationary platen of the press and provide clean, dry shop air at 80 PSI with a minimum air flow of 50 SCFM for the Standard Indy UP & OUT Robot System. The airline should terminate near the top of the stationary platen opposite the part drop area. Plumbing shall be 3/4 inch minimum pipe size with a shut-off valve. The customer shall also supply 120 VAC, 5 Amp, single phase service with earth ground for the Main Control Enclosure.

2-2. INSTALLATION.

CAUTION

All CAUTION must be observed during the installation of the Indy UP & OUT Robot System. Refer to Safety Summary, page III and Warning In General, page IV & V in this manual.

2-2-1. The Indy UP & OUT Robot System must be installed by qualified personnel in accordance with the following instructions. CONAIR MARTIN will provide installation assistance on a per diem basis. The customer must request this service accompanied by a written purchase order.

NOTE

It is the customer's responsibility to provide the necessary interface signals for the Indy UP & OUT Robot System.

CAUTION

There are two (2) power sources entering the robot enclosure. One (1) is through the 1P cable which supplies power to the PC and 24 VDC power supply. The other power feeds the drive controller.

A. An Interface Kit (Kit #00144) for the Indy UP & OUT Robot System was mailed to your company prior to the arrival of the equipment at your facility. Locate the Interface Kit Documentation and make sure that the installation preparation has been completed accordingly (Ref. 2-1, Facility Requirements, page 6).

B. The unit is shipped on a large wooden pallet. Remove the protective plastic cover and carefully inspect all parts of the Robot to verify that no damage occurred during the shipment of the equipment.

C. The stationary platen should be drilled according to the lay-out drawing for your application. Refer to the main motion lay-out drawing. Use a 27/64" drill and drill the holes 1 1/2" deep. Use a 1/2"-13 tap and tap a minimum of 1" deep. If a separate mounting spacer is supplied, bolt it to the platen at this time.

D. With chains through the two lifting hooks on the Horizontal Assembly and a strap which is around the Stripper Carriage and also attached to the comealong (winch), (Ref. Ill. 1-21, page XXVI) use a suitable fork lift truck or overhead crane to put tension on the Indy UP & OUT Robot System. Remove the nuts that attach the Indy UP & OUT Robot System to the pallet. Remove the wooden blocks from the Horizontal Assembly. Move the Vertical Carriage to approximately the center of the Horizontal Assembly. Lift the system slightly and move the Vertical Carriage until horizontal level is achieved. With two (2) "C" clamps, secure the Vertical Carriage temporarily to the railway.

E. Uncoil the cables from the Main Control Enclosure and remove the enclosure from the pallet.

F. With the fork lift truck or crane, carefully lift the Indy UP & OUT Robot System off the pallet. <u>Take care to insure that the lifting force is on the chains through the lifting hooks and not on the strap around the stripper carriage.</u> The strap around the stripper arrangement is only to prevent any rotation of the Indy UP & OUT Robot System while it is in the air.

G. Carefully lift the Indy UP & OUT Robot System onto the stationary platen and hold it in position until it is bolted down (mounting hardware is supplied by Conair Martin). Tighten the bolts to a minimum of 110 foot pounds of torque. Carefully remove the fork lift truck or crane. Remove the two (2) "C" clamps which were used to hold the Vertical Carriage in place during the lifting and installation of the system.

2-3. CUSTOMER AIR HOOK-UP.

NOTE

Failure to provide proper air pressure and air flow (Ref. paragraph 2-1-1, page 6) may cause erratic Robot operation.

2-3-1. Connect a minimum 3/4 inch ID pipe or hose from the shop air shut-off valve to the Indy UP & OUT Robot System inlet air shut-off valve on the Supply Plate Assembly (Ref. Ill. 1-4, page IX). Slowly turn on the air supply and check for any leaks. Tighten any fittings that may have come loose during shipment. Refer to the pneumatic schematic provided with your Indy UP & OUT Robot System for detailed air flow.

2-4. ELECTRICAL WIRING.

WARNING

BEFORE STARTING TO MAKE ANY ELECTRICAL CONNECTIONS, OPEN AND LOCK-OUT THE MAIN DISCONNECT OF THE PRESS. THIS WILL PREVENT ANY POSSIBLE INJURY FROM INADVERTENTLY CLOSING ANY SWITCH. ALSO REFER TO AND COMPLY WITH ALL REGULATIONS AS STATED IN THIS MANUAL ON PAGE III, IV & V.

2-4-1. Locate the Main Control Enclosure near the press. Route the three (3) cables that run to the Indy UP & OUT Robot System main system junction box assembly so that they are out of the way of any traffic that will go by the press. Route the two (2) cables and amphenol connector that runs to the molding machine so it is also out of the way of any traffic. Connect the amphenol connector to the mating half that was supplied with the CONAIR MARTIN Interface Installation Kit.

2-4-2. The following is a typical wiring interface between the Indy UP & OUT Robot System and the injection molding machine. However, the wiring for your system may vary and caution must be taken for proper wiring of your system. The cable leads for the molding machine are labeled with the same letters as the amphenol connector pins to which they are attached. Wiring of the cable leads to the injection molding machine controller shall be performed so that the function signals to the amphenol connector pins are in accordance with Table 2-1, page 10 & 11 and the CONAIR MARTIN supplied Interface Kit (Ref. 2-2-1, page 6 paragraph "A").

NOTE

This interface function is the responsibility of the customer who MUST provide the proper communication interface between the Indy UP & OUT Robot System and the customers equipment.

Refer to the Electrical Schematic/Wiring Diagram shipped with the Indy UP & OUT Robot System and the Conair Martin supplied Interface Kit #00144.

Table 2-1.

Typical Press Interface to
the Main Control Enclosure of
the Indy UP & OUT Robot System

AMPHENOL PIN
DESIGNATION

A) 120 VAC HOT: This 120 VAC power is taken before the press pumps circuit. Current required is FIVE (5) Amps.

B) 120 VAC NEUTRAL.

C) PRESS SEMI OR AUTO: This signal is a maintained signal whenever the press is in a Semi-Automatic or Full Automatic mode.

D) PRESS FULL OPEN: This signal is a maintained signal whenever the press is at the FULLY OPENED position.

E) PRESS FRONT GATE CLOSED: This signal is a maintained signal whenever the press front gate is CLOSED.

F) PRESS EJECTORS FORWARD DESIRED: This signal is maintained whenever the press desires to extend the ejectors. This signal is taken from the output wire going directly to the press ejector FORWARD solenoid.

G) INPUT VOLTAGE: This power is supplied from the part remover's control cabinet and returned through dry contacts to the part remover's processor upon energizing isolation relays for signals C, D, E and P. This circuit may be positive (+) or negative (-) depending on the processor used. Consult the Conair Martin supplied drawing (CDW-XXXXX) pertaining to your system for proper voltage.

H) PRESS EJECT FORWARD PERMISSIVE: This is a dry contact closure from the Indy when extending the press ejectors is permitted. This contact closure returns the press EJECTORS FORWARD desired signal back to the press EJECT FORWARD solenoid.

K) PRESS CLOSE DESIRED: This signal is a maintained signal whenever the press desires to close. This signal is taken from the output wire going directly to the press CLOSE solenoid.

Table 2-1. CONTINUED

1P AMPHENOL PIN DESIGNATION	
L)	PRESS CLOSE PERMISSIVE: This is a dry contact closure from the Indy when the closing of the press is permitted. This contact closure returns the press CLOSE desired signal back to the press CLOSE solenoid.
M)	PRESS OPEN DESIRED: This signal is a maintained signal (K) whenever the press is permitted to open. This signal is taken from the output wire going directly to the press OPEN solenoid.
N)	PRESS OPEN PERMISSIVE: This is a dry contact closure from the Indy when opening of the press is permitted. This contact closure returns the press OPEN desired signal (M) back to the press OPEN solenoid.
P)	PRESS LOCK-UP: This signal is a maintained signal whenever the press is FULLY LOCKED-UP.
S)	PRESS HIGH VOLUME (OPTIONAL): This signal is from the output wire going directly to the press high volume solenoid. Use this signal if there is a problem with the press pumps building pressure.
T)	PRESS HIGH VOLUME (OPTIONAL): This is a dry contact closure that returns the press high volume (signal "S") back to the press high volume solenoid.
Z)	EARTH GROUND: This wire should be tied directly to earth ground.

16P AMPHENOL PIN DESIGNATION	
A)	120 VAC HOT: This 120 VAC power is taken before the press pumps circuit. Current required is TWELVE (12) Amps. This voltage is used to power the D.C. drive for the horizontal motor.
B)	120 VAC NEUTRAL: This 120 VAC neutral is for the D.C. drive.
C)	EARTH GROUND: This wire should be tied directly to earth ground.

2-5. PREPARATION FOR USE.

WARNING

BEFORE STARTING TO ADJUST ANY SWITCHES IN THE PRESS AREA, OPEN AND LOCK-OUT THE DISCONNECT IN THE MAIN ELECTRICAL SUPPLY TO THE INJECTION MOLDING MACHINE AND THE MAIN CONTROL ENCLOSURE OF THE INDY UP & OUT ROBOT SYSTEM. THIS WILL PREVENT POSSIBLE INJURY FROM INADVERTENT CLOSING OF ANY SWITCH.

CAUTION

Power to the Main Enclosure enters from two (2) points. One (1) trough the 1P cable and the other trough the motor controller feed cable.

2-5-1. The Indy UP & OUT Robot System is factory tested with maximum stroke travel adjustments and will require readjustment during installation to suit the customer's specific application.

2-5-2. Pre start-up adjustment is required after the Indy UP & Out Robot System is mounted on the stationary platen of the press. The following is a step by step adjustment procedure.

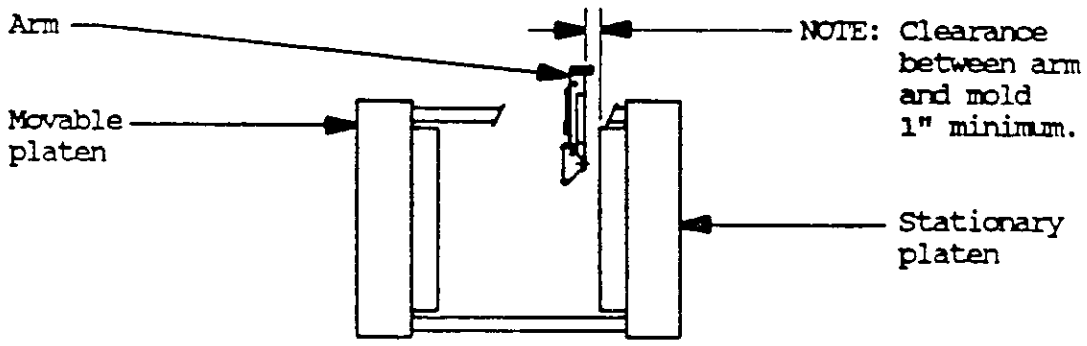
A. Verify that the tooling end of arm tooling (EOAT) installed is the correct tooling for the mold in use.

B. Make sure that the front of the base of the Indy UP & OUT Robot System is parallel to the face of the platen.

C. Open the mold to its widest position.

D. Position the Indy UP & OUT Robot System so that it is centered over the mold.

E. Before lowering the arm into the mold, verify that there is sufficient clearance in back of the arm. A straightedge should be used to verify this clearance.



Ill. 2-1. Tooling (EOAT) Clearance.

F. Safety latch must be retracted before manually lowering the arm into the mold area.

G. Verify that the mold centerline is level with the tooling (EOAT) centerline. Adjust the vertical shock absorber for fully down as necessary.

H. Verify that the tooling (EOAT) is parallel to the face of the mold. The base of the Indy UP & OUT Robot System may have to be shimmed.

I. Verify that the vertical center of the tooling (EOAT) lines up with the center of the mold. Should it not line up with the vertical center line, adjust the "UNIT FULLY IN SHOCK ABSORBER" until alignment is achieved. Also, the "UNIT FULLY IN ACTUATOR" will have to be readjusted. Make sure that the jam nut for the shock absorber is tight after all adjustments have been completed.

J. Manually place a sample of the molded part to be extracted into the tooling (EOAT).

K. Measure the distance from the farthest protrusion on the part to the farthest protrusion on the mold. A one (1) inch spacing must be maintained between these two (2) points. The mold opening will have to be readjusted to obtain this one (1) inch spacing.

L. Set the strip stroke using the following formula:

$$S = (d - e) + c$$

S = Strip stroke to be set.
d = Depth of part to be extracted.
e = Ejection stroke of the press. (Ejection stroke shall be set for the minimum amount required to break the molded part free of the mold).
c = Clearance required between the end of the molded part and any protrusions on the movable mold half.

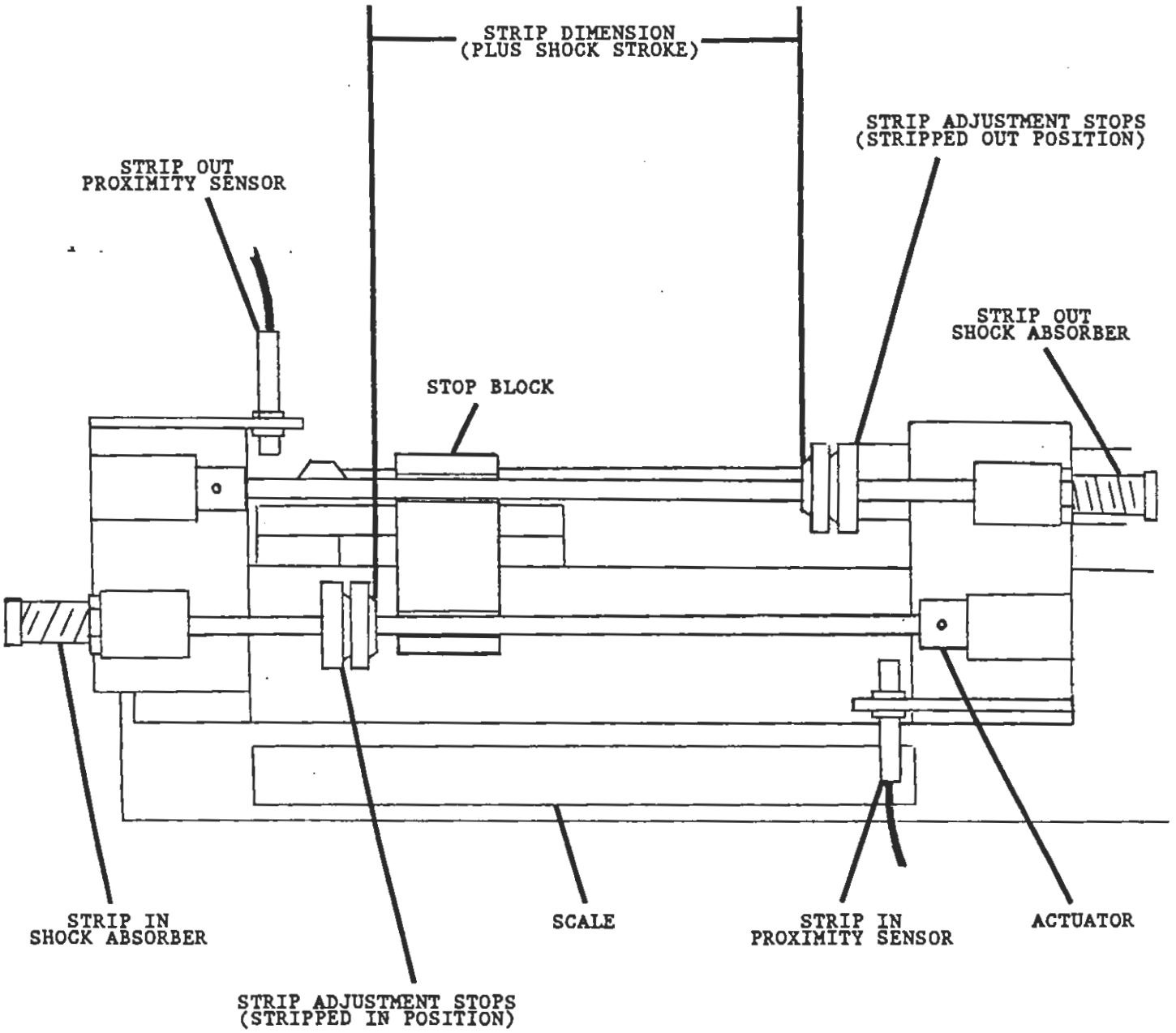
EXAMPLE: To remove a molded part four (4) inches deep with a half (1/2) inch ejection stroke and a required clearance of one and one quarter (1 1/4) inches between the end of the part and the movable mold half of the injection molding machine would be as follows:

$$S = (4 - 1/2) + 1\ 1/4$$

$$S = 4\ 3/4 \text{ inches strip stroke}$$

WARNING

Disconnect the air before adjusting strip.



Ill. 2-2. Strip Stroke Adjustment.

NOTE: Altering the strip stroke does not change the sensing switch setting unless the shock absorber has been adjusted.

2-5-3. Setting the counterbalance regulator:

With the arm in the "FULLY DOWN" position, de-energize the outputs on the programmable controller. Manually pulse the arm "UP" solenoid until the arm is at some mid-stroke position. The arm should maintain its position without drifting either up or down. If it drifts up, increase the counterbalance pressure. If it drifts down, decrease the counterbalance pressure. The arm should maintain a stable position without movement when both the arm "UP" and arm "DOWN" solenoids are de-energized and the air supply is present.

2-5-4. Vertical High Speed theory of Operation of the Indy UP & OUT Robot System.

The vertical circuitry consists of directional valves for up and down and a common valve for fast. The exhaust pressure is controlled by the vertical fast valve. It diverts the exhaust to two (2) different metering valves, one (1) opened more than the other. The "A" port is used for fast speed; the "B" port is used for slow speed.

To go arm "DOWN", both the arm "DOWN" and the Vertical Fast valve are energized. The exhaust is being diverted through the "A" port. When the slowdown is initiated, the Vertical Fast valve is de-energized, diverting the exhaust to the "B" port which offers more restriction and causes a compression of air and a slowdown is achieved.

The arm "UP" motion is identical.

2-5-5. Set-up instructions for vertical fast:

A. Close the "B" port metering valve completely and then reopen the valve a quarter (1/4) turn.

B. Close the "A" port metering valve completely and then reopen the valve by four (4) to five (5) turns.

C. If switches are used for slowdown initiation the arm down slow actuator should be placed at the top of the cylinder. The arm up slow actuator should be placed approximately midway on the cylinder.

D. If timers are used for slowdown initiation, both slowdown timers should be preset to 0.1 second.

NOTE

Refer to the Ladder Logic Diagram for method of slowdown initiation.

E. Operate the machine into a vertical movement step.

F. Arm should slow down early and travel slowly for the remaining stroke.

G. Reverse the sequence.

H. Arm should slow down early and travel slowly for the remaining stroke.

I. If the unit does not slow down in either direction, recheck either the actuator position or timer setting. Recheck the switch adjustment if switches are used.

J Once the arm slowdowns are functional, proceed to the next step.

If switches are used: Move the slowdown actuator away from the end limit actuators. This will bring the slowdown actuators closer together.

If timers are used: Increase the timer preset by small increments (0.1).

K. Cycle the arm up and down several times and observe the point at which the slowdown occurs. It should occur approximately the same distance from each end limit.

L. Adjust the switches or timers to obtain proper slowdown distances.

M. Should bouncing occur after a slowdown, open the "B" port metering valve by one eighth turn (1/8) increments until smooth operation is achieved.

N. If, after the slowdown occurs, the arm does not appear to slow down or hits too hard, close the "B" port metering valve by one eighth (1/8) turn increments until smooth operation is achieved.

O. If a faster speed is desired, the "A" port metering valve can be opened more. The setting of the switches and/or timers must be reset accordingly (Refer to step "K").

P. Lock down all metering valves jam nuts.

NOTE

Load changes, tooling (EOAT) weight or bearing lubrication (or lack of) will necessitate readjustment. Fluctuations in air pressure will cause erratic operation.

2-5-6 Horizontal DC motor brake:

The horizontal DC motor brake function is to hold the horizontal assembly in place when the horizontal travel is at rest and no adjustment are required. The brake is energized when the signal for stop is received. The only maintenance on the braking system will be replacement of the brake pads should they be worn.

2-6. HORIZONTAL OPERATION.

2-6-1. Horizontal theory of operation:

The stripper frame is referred to as the "UNIT" in this section of the manual. "UNIT IN" is with the arm over the center of the molding machine. "UNIT OUT" is with the arm over the center of the drop point. A "UNIT IN" movement would be from "UNIT OUT" to "UNIT IN". Both motions, "UNIT IN and "UNIT OUT" are similar in their operation. The horizontal motion is accomplished by a DC motor with a controller and a drive belt assembly.

2-6-2. The processor outputs required for horizontal motions are:

1. UNIT IN/OUT - this output energizes a control relay to select the the direction of travel. If this output is energized, the direction selected will be UNIT IN. If the output is de-energized, the direction will be UNIT OUT.

2. HORIZONTAL DRIVE START - this output energizes a control relay that turns the drive on. The direction is selected first.

3. HORIZONTAL FAST - this output energizes a control relay that allows fast travel. When de-energized, the horizontal will travel in a slow speed.

4. HORIZONTAL BRAKE - this output will energize the brake and stop horizontal motion.

To travel from a "UNIT FULL IN" position to a "UNIT FULL OUT" position, the brake must be de-energized first. The direction must then be selected. And finally the HORIZONTAL DRIVE START must be activated. When the unit starts travelling horizontally, it will be in the fast mode, HORIZONTAL FAST will be energized. The unit will travel fast until the UNIT OUT SLOW TIMER elapses, causing the HORIZONTAL FAST output to de-energize. This will initiate a slow speed. The Unit will travel slowly until the UNIT FULL OUT proximity switch is activated. his will cause amortisation of the brake and de-energization of the HORIZONTAL DRIVE START output.

2-6-3. Timers associated with the horizontal movement are:

1. HORIZONTAL DRIVE DWELL - this timer delays the amortisation of the HORIZONTAL DRIVE START relay to insure that the direction has been selected first. Typical setting -0.2 seconds

2. UNIT OUT SLOW - this timer determines how long the Unit will travel fast before it drops into slow speed. There may be more than one (1) UNIT OUT TIMER depending on the use of intermediate horizontal positions.

3. UNIT IN SLOW - this timer determines the length of time the Unit will travel fast from FULLY OUT to FULLY IN. There may be more than one (1) UNIT IN SLOW TIMER depending on the use of intermediate stopping positions.

4. HORIZONTAL TRAVEL TIME - this timer is a safety timer that will shut down the drive if it elapses. It will prevent the drive and controller from overheating in the event of a defective end limit sensor.

2-7 HORIZONTAL SET-UP.

WARNING

ONLY AUTHORIZED AND QUALIFIED PERSONNEL SHOULD BE ALLOWED TO WORK ON THE MOTOR AND/OR CONTROLLER. A FAMILIARIZATION OF THE EQUIPMENT AND SET-UP PROCEDURES IS REQUIRED. FAILURE TO ADHERE TO THIS WARNING MAY RESULT IN EQUIPMENT DAMAGE OR PERSONAL INJURY. THE POTENTIOMETERS WHICH MODIFY THE DRIVE SETTINGS ARE LOCATED INSIDE THE DRIVE CONTROLLER. REMOVAL OF THE CONTROLLER FRONT COVER IS REQUIRED A POTENTIAL SHOCK HAZARD EXISTS.

CAUTION

While performing the SET-UP, verify that the Unit performs as indicated. If it does not, DO NOT PROCEED. Correct the malfunction before proceeding.

2-7-1. The potentiometers available for drive adjustments are:

1RH - is the IR compensation pot. This pot is used to maintain a speed regulation. If the motor speed is irregular or "hunts", this pot provides adjustment. This should not have to be adjusted. A meter on the armature leads should show a constant voltage. Not one that fluctuates up and down.

2RH - is the maximum speed pot. This controls the fast speed of the motor. Clockwise = faster, counter-clockwise = slower. Works in the conjunction with 3RH.

3RH - is the minimum speed pot. This controls the slow speed of the motor. Clockwise = faster slow speed. Counter-clockwise = slower slow speed. Works in conjunction with 2RH.

4RH - is the current limit pot. This pot controls the amount of current the drive can supply to the motor armature. Clockwise = more current = faster start. Counter-clockwise = less current = slower motor start.

2-7-2. Set-up procedure:

The speed controller on the face of the controller provides a speed reference to the motor. Leave this setting at 10.

Initial set-up - this portion of the set-up procedure assumes that a new drive controller is being installed. The drive should only require slight modifications.

A. Turn the MIN speed pot, 3RH, fully counter-clockwise. Turn clockwise 1/8 turn.

B. Turn the MAX speed pot, 2RH, mid-range.

C. Turn the current limit pot, 4RH, mid-range.

D. Turn the IR pot, 1RH, mid-range.

E. Change the pre-set of both slowdown timers to 0.3 seconds.

F. Change the pre-set of the horizontal travel timer to 20.0 seconds.

CAUTION

ADJUSTMENT OF THE TIMERS REQUIRES KNOWLEDGE OF THE PROGRAMMABLE CONTROLLER AND ACCESS TO THE PROGRAM. THIS ADJUSTMENT SHOULD BE PERFORMED BY QUALIFIED PERSONNEL ONLY.

G. Operate the machine into a horizontal movement step.

2-7-3. Start here if you are making only minor adjustments:

H. The Unit should slow down early and travel slowly the rest of the travel.

CAUTION

WHEN ADJUSTING THE POTENTIOMETERS, USE SMALL INCREMENTS - 1/16 TURN OR LESS. MACHINE DAMAGE MAY OCCUR IF THIS PROCEDURE IS NOT FOLLOWED. THIS ADJUSTMENT SHOULD BE PERFORMED BY QUALIFIED PERSONNEL ONLY.

1. If the Unit starts slow, increase the current limit pot. Turning the pot clockwise increases the current.

2. If the Unit speed is not fast enough, increase the MAXimum speed pot. Turning the pot clockwise increases the MAX speed.

3 After the slowdown takes place, observe the slow speed travel. If it is too slow, increase the MIN speed pot. Clockwise

4. If the Unit stops before completion of the movement, stalls, increase the minimum speed pot.

5. If the minimum speed is too fast, decrease the minimum speed pot.

I. Increase the pre-set of the slowdown gradually. Use the MANUAL INDEX FORWARD/REVERSE switch to cycle the Unit back and forth. Verify correct operation of the slowdown.

J The slowdown should occur at approximately the same distance from each end limit. Adjust the slowdown pre-set to achieve a long fast travel and a short slow travel.

K. Fine tune the slow speed using the MIN speed pot to achieve a smooth transition from fast speed to end of movement.

NOTE

THE SPEED OF THE DRIVE WILL INCREASE SLIGHTLY ONCE THE DRIVE WARMS UP. YOU WILL NEED TO ALLOW FOR THIS IF ADJUSTING A COLD SYSTEM.

2-8. PREPARATION FOR STORAGE.

2-8-1. If the Indy UP & OUT Robot System is to be shut down for an extended period and remain mounted on the injection molding machine, the following action should be taken:

CAUTION

Follow proper shut-down procedure for power and air before disconnecting the Indy UP & OUT Robot System (Ref. paragraph 3-5, page 28).

A. Strap the Vertical Frame Assembly and any other movable components in an unobstructive location. Shut off and disconnect the air supply. Open the drain valve on the bottom of the air filter. After draining, close the drain valve.

B. Disconnect the amphenol connector on the cable running to the injection molding machine. Coil the cable (if it is not permanently fastened) to prevent any damage to it. Place a protective cap on the cable end of the connector to keep it clean. Install the deadcap, which was supplied by CONAIR MARTIN, onto the injection molding machine half of the amphenol connector. This deadcap provides circuitry completion for press manual operation.

WARNING

INSTALLING THE DEADCAP DISABLES ALL CONAIR MARTIN SAFETIES. CAUTION MUST BE TAKEN TO ASSURE THAT THE ROBOT IS OUT OF PRESS.

C. Wipe the entire Indy UP & OUT Robot System, especially any bearing surfaces or shafts, with a light oil, such as "3 in 1" oil.

D. If possible, cover the Indy UP & OUT Robot System with a moisture proof cover with moisture absorbing material in it.

2-9. PREPARATION FOR MOVING OR SHIPMENT.

2-9-1. The Indy UP & OUT Robot System should be removed from the injection molding machine in the reverse order of the mounting instructions under INSTALLATION 2-2 page 6.

CHAPTER 3

OPERATING INSTRUCTIONS

3-1. INITIAL ADJUSTMENTS.

CAUTION

All CAUTION must be observed during system check of air supply.

3-1-1. Turn on the shop air supply. Make sure that proper air supply for the installed Indy UP & OUT Robot System is available. Check that all gauges on the pressure regulators indicate proper air pressure (Ref. 2-1-1, page 6). These regulators are set at the factory and should be readjusted to render proper customer specified operation. Check the locking collars on all regulators and make sure that they are tight.

WARNING

ONLY QUALIFIED PERSONNEL SHOULD POWER-UP THE INDY UP & OUT ROBOT SYSTEM AND PERFORM ANY NECESSARY ADJUSTMENTS OR CALIBRATION.

Turn power "ON" on the Main Control Enclosure. Verify that all press signals are functioning properly.

3-2. OPERATOR CONTROLS.

3-2-1. There are THREE (3) operator control switches that are standard to the Indy UP & OUT Robot System on the Main Control Enclosure. They are as follows:

A. Automatic Parts Remover (APR) ON/OFF Selector Switch: This two (2) position selector switch, when in the "ON" position, allows the Indy UP & OUT Robot System to be sequenced either manually or automatically with the press. When this switch is in the "OFF" position, the Indy UP & OUT Robot System will not sequence either manually or automatically although the Indy UP & OUT Robot System will still monitor all safeties and still control all press motions.

B. Automatic Parts Remover (APR) "RESET COMPLETE" Illuminated Pushbutton: This illuminated pushbutton, when depressed, will return the Indy UP & OUT Robot System to its "HOME" position. When the pushbutton is depressed, the amber lamp will extinguish until the Indy UP & OUT Robot System successfully reaches the "HOME" position. This amber lamp must be illuminated to sequence the Indy UP & OUT Robot System.

C. MANUAL INDEX FWD/REV Selector Switch: This three (3) position selector switch will, when the press is in manual, allow the Indy UP & OUT Robot System to be manually sequenced "FORWARD" through the entire sequence or "REVERSE" one step only.

D. E-STOP: This will disable the 24 volt power supply to the robot.

3-3. START-UP.

WARNING

ONLY QUALIFIED OPERATORS SHOULD START-UP AND OPERATE THE SYSTEM.

3-3-1. After doing initial adjustments, the Indy UP & OUT Robot System is now ready to be started-up. The sequence to start the Indy UP & OUT Robot System is as follows:

CAUTION

As each step is being checked, constant watch is required before proceeding to the next step.

A. Put the press in the "Manual" mode.

B. Close the press front gate.

C. Turn the APR ON/OFF selector switch to the "ON" position.

D. Depress the APR RESET pushbutton to reset the INDY UP & OUT Robot System to the "HOME" position.

1. When the Indy UP & OUT Robot System is stopped at the "HOME" position, the amber reset complete light will illuminate.

E. Turn the APR ON/OFF selector switch to the "OFF" position.

F. Put the Press into the "Semi-Automatic" mode.

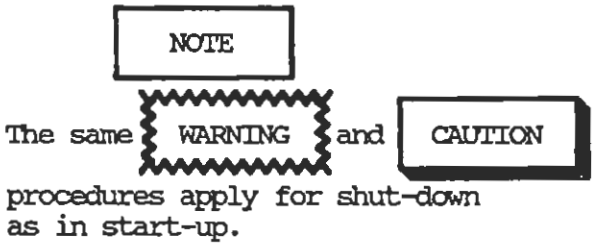
1. Produce a few full, good parts before turning the Indy UP & OUT Robot System to the APR "ON" position.

G. Once good parts are being made, turn the APR ON/OFF selector switch to the "ON" position.

H. The Indy UP & OUT Robot System will now cycle automatically.

I. After successful parts picking is achieved, put the press into "Full Automatic" mode.

3-4. SHUT DOWN PROCEDURE.



3-4-1. To shut down the Indy UP & OUT Robot System from a "Full-Automatic" mode:

A. With the press "FULLY CLOSED", put the press selector switch into the "Semi-Automatic" mode.

1. The press will not reclose after opening unless the press front gate is cycled.

2. This will allow the Indy UP & OUT Robot System to pick the last part automatically.

B. When the press reaches "FULLY OPEN", the Indy UP & OUT Robot System will descend to pick the last part.

C. After the Indy UP & OUT Robot System reaches the "HOME" position, turn the APR ON/OFF selector switch to the "OFF" position on the Main Control Enclosure.

D. Put the press into the "Manual" mode and disconnect power, if desired.

3-5. RESPONSIBILITY WHILE OPERATING.

3-5-1. The operator shall periodically check to verify that the Indy UP & OUT Robot System is functioning smoothly. A little time spent doing this will help eliminate possible costly downtime in the future.

CHAPTER 4

SERVICE INSTRUCTIONS

4-1. SERVICE CHECK POINTS: (Ref. Table 4-1, page 29).

WARNING

ONLY QUALIFIED PERSONNEL SHOULD PERFORM ANY MAINTENANCE ON THE INDY UP & OUT ROBOT SYSTEM.

4-1-1. The following table of service check points may be modified according to conditions at the particular installation of the Indy UP & OUT Robot System.

Table 4-1. Service Check Points

WHEN TO CHECK	WHAT TO CHECK	HOW TO CHECK	REMARKS
· DAILY	Water trap on inlet air filter.	Visually observe the water trap.	Drain if necessary.
	Pneumatic fittings.	Check for leaks.	Tighten fittings if necessary.
	Pneumatic tubing.	Visually check for leaks.	Replace tubing if necessary.
	Bearing rod surface.	Visual observation of dust build up.	Wipe with a lintless cloth.
	Smooth, positive, horizontal stop.	Visually observe.	Check belt tension and brake operation.
	CAUTION During the "Manual" and "Automatic robot operation, observe the Indy UP & OUT Robot System motions carefully during the first 1-5 cycles.		

Service Check Points Continued

WHEN TO CHECK	WHAT TO CHECK	HOW TO CHECK	REMARKS
MONTHLY.	Air filter on inlet air pressure regulator.	Disassemble and visually inspect.	Clean or replace as necessary.
	Lubrication fittings on rollers.	Apply grease gun to fittings.	Use lithium soap base grease.
	Air hoses and fittings.	Check for leaks with soap solution.	Replace or tighten as necessary.
	Lubrication hoses and fittings.	Visual observation.	Replace or tighten as necessary.
	smooth robot operation.	Visually observe robot smooth operation.	Service as needed.
	Shock absorber lock nuts.	Apply wrench and tighten.	Nuts should resist effort to tighten. Refer to torque specifications on page 50.
	Solid stop lock nuts.	Apply wrench and tighten.	Nuts should resist effort to tighten. Refer to torque specifications on page 50.
	Cam rollers.	Check adjustment.	Cam rollers must contact railways evenly.
	Horizontal drive belt tension and condition.	Visually observe and inspect.	Adjust tension as required. Replace belt if worn or damaged.

CAUTION

Use proper tools and wrenches to check and torque bolts and nuts. Do not over tighten.

WHEN TO CHECK	WHAT TO CHECK	HOW TO CHECK	REMARKS
SEMI-ANNUALLY.	All screws, nuts and bolts.	Apply torque wrench.	Tighten to required torque. Refer to torque specifications on page 50.
	Robot and spacer mounting bolts.	Apply torque wrench.	Tighten to required torque. Refer to torque specifications on page 50.
	Shaft mounting block bolts.	Apply torque wrench.	Tighten to required torque. Refer to torque specifications on page 50.
	THK bearing mounting bolts.	Apply torque wrench.	Tighten to required torque. Refer to torque specifications on page 50.

Service Check Points Continued

WHEN TO CHECK	WHAT TO CHECK	HOW TO CHECK	REMARKS
SEMI ANNUALLY.	Railway mounting nuts.	Apply torque wrench.	Tighten to required torque. Refer to torque specifications on page 50.
	Air cylinder mounting nuts.	Apply torque wrench.	Tighten to required torque. Refer to torque specifications on page 50.
	Relays for horizontal drive and interface.	Visually inspect contact for pitting or wear.	Replace as necessary.

4-2. LUBRICATION OF INDY UP & OUT ROBOT SYSTEM. Ref. Table 4-2, page 33.

4-2-1. The following table of lubrication points may be modified according to conditions at the particular installation of the Indy UP & OUT Robot System requirements.

Table 4-2. Lubrication Table.

CAUTION

Before starting with lubrication maintenance of the Indy UP & OUT Robot System, "LOCK-OUT" the main power disconnect and shut off the shop air supply valve.

WHEN TO CHECK	WHAT TO CHECK	HOW TO CHECK	REMARKS
WEEKLY.	Bearing Surfaces.	Wipe all surfaces with a clean rag.	** Apply recommended lube.
	Vertical shafts.	Wipe all shafts with a clean rag.	** Apply recommended lube.
	Stripper assembly lube.	Check grease to see if it is dry or contaminated.	** Apply recommended lube.
	Vertical assembly lube.	Check grease to see if it is dry or contaminated.	** Apply recommended lube.
	Horizontal assembly lube.	Check grease to see if it is dry or contaminated.	** Apply recommended lube.

**For recommended lubricant refer to table 4-3, page 36 & 37

Lubrication Continued

WHEN TO CHECK	WHAT TO CHECK	HOW TO CHECK	REMARKS
BYWEEKLY.	THK Bushing on Arm assembly.	Check grease to see if it is dry or contaminated.	** Apply recommended lube.
	THK Block. Horizontal Frame assembly.	Check grease to see if it is dry or contaminated.	** Fill pockets in the bearing retainers with recommended lube.
	THK Block. Stripper assembly.	Check grease to see if it is dry or contaminated.	** Fill pockets in the bearings retainers with recommended lube.
	Bearing assembly in Stripper.	Check grease to see if it is dry or contaminated.	** Apply with brush recommended lube.
	Pinion (Browning). Horizontal assembly.	Check grease to see if it is dry or contaminated.	** Apply with brush recommended lube.
	Stand-Off Pillow Block. Stripper assembly.	Check grease to see if it is dry or contaminated.	** Apply with brush recommended lube.
EVERY THREE (3) MONTH.	Air Cylinder. Flopper assembly.	Check grease to see if it is dry or contaminated.	** Disassemble and repack with recommended lube. Refer to appendix "C".
	Air Cylinder. Vertical assembly.	Check grease to see if it is dry or contaminated.	** Disassemble and repack with recommended lube. Refer to appendix "C".

**For recommended lubricant refer to table 4-3, page 36 & 37

Lubrication Continued

WHEN TO CHECK	WHAT TO CHECK	HOW TO CHECK	REMARKS
EVERY THREE (3) MONTH.	Air Cylinder. Stripper assembly.	Check grease to see if it is dry or contaminated.	** Disassemble and repack with recommended lube. Refer to appendix "C".

**For recommended lubricant refer to table 4-3, page 36 & 37

4-3. RECOMMENDED LUBRICANT. Ref. Table 4-3 page 36 & 37.

4-3-1. The Indy UP & OUT Robot System requires that it be lubricated with a high quality lubricant.

Table 4-3. LUBRICANTS

OILS: 1. Viscosity: 100-150 SUS at 100 deg F.

2. High Viscosity Index: over 90.

3. Superior Oxidation Stability; ASTM test D943: over 2000.

4. Anti-Foaming.

5. High Film Strength.

6. Compatible with Buna N Rubber.

7. Aniline Range: 180-210.

MANUFACTURER	BRAND NAME
American Oil Company	Rykon No. 11 American Oil No. 15 (was Stanoil No. 15)
Gulf Oil Company	Harmony No. 43AW Harmony No. 44
Mobil Oil Company	D.T.E. Light MisLub 27
Shell Oil Company	Tellus No. 27
Sun Oil Company	Sunvis No. 701 Sunvis No. 706
Texaco Oil Company	Regal "A" R & OF

Recommended Lubricant Type Continued

GREASE: 1. Lithium Soap Base.

2. NLGI Consistency: #2.

3. Micro Molybdenum Disulfide: 1.3%

4. Polyethylene: 5%

5. Rust Rating; ASTM D1743: #1.

6. Dropping Point, deg F (deg C); ASTM D566: 370 (188).

MANUFACTURER	BRAND NAME
BP Oil Inc.	Bearing Gard-2
Carleton - Stuart	Magnalube-G (For ORIGA rodless air cylinder).

CHAPTER 5

INDY UP & OUT ROBOT SYSTEM TROUBLE-SHOOTING INSTRUCTIONS AND GUIDE

5-1. TROUBLE-SHOOTING INSTRUCTIONS

WARNING

BEFORE STARTING MAINTENANCE/TROUBLE-SHOOTING, OPEN AND LOCK-OUT THE MAIN PRESS DISCONNECT SWITCH. THIS WILL PREVENT POSSIBLE INJURY TO MAINTENANCE PERSONNEL FROM AN INADVERTENT CLOSING OF ANY SWITCHES.

5-1-1. All components used on the Indy UP & OUT Robot System are quality materials. Should parts be needed for the Robot, please contact CONAIR MARTIN with your request to the Customer Service Department. For instructions regarding how to order parts, refer to paragraph 5-1-4, page 39 & 40.

CAUTION

WHILE PERFORMING MAINTENANCE/TROUBLE-SHOOTING ON THE INDY UP & OUT ROBOT SYSTEM, ALL PRECAUTION MUST BE OBSERVED.

5-1-2. In the event that the Indy UP & OUT Robot must be modified or repaired and components must be removed, standard shop tools may be used to disconnect all plumbing and/or wiring. Once all disconnections have been made, mounting hardware can be withdrawn and the component removed. All components are easily accessible for removal or installation.

5-1-3. Alarm functions and reset procedures are as follows.

There are three (3) standard alarms used on the Indy UP & OUT Robot System. These are:

1. Missed part.
2. Cycle time exceeded.
3. Out of sequence.

Consult your Ladder Logic Diagram for other Alarms or differences.

A. MISSED PART - When parts verification is not present after an attempt at picking parts, a "Missed Part" condition will exist. Opening the press gate will silence the alarm. Closing the gate will allow the Robot to continue its sequence. The press cannot close with a "Missed Part" alarm. Any parts left in the mold must be manually removed when the gate is opened.

IF PRESS CLOSED DURING A MISSED PARTS CONDITION, STOP OPERATION IMMEDIATELY. CHECK PARTS VERIFICATION AND PRESS INTERFACE.

B. CYCLE TIME EXCEEDED - This alarm will sound if the Robot is not able to complete its cycle or takes too long to complete its cycle (ie. not actuating a limit switch or ejectors not functioning, etc.). This alarm only works with the press in "Semi" or "Automatic" mode and if the Robot is not in the READY position (over the mold, ready to go in and pick a part). To silence the alarm, the Robot must either be taken out of "Automatic" mode and/or returned to the READY position. The reason for the lagging condition should be determined before "Automatic" operation is resumed.

C. OUT OF SEQUENCE - This alarm will sound if the press opens and the Robot is not in the "READY" position. This alarm is reset by either returning to the "READY" position or by turning the APR OFF/ON selector switch on the Main Control Enclosure to the "OFF" position.

5-1-4. Before contacting CONAIR MARTIN to order replacement parts, please follow instructions to expedite and to obtain the correct parts. It is mandatory that the following information and data is available for placing parts orders via telephone. Once all data is available, please contact CONAIR MARTIN.

A. Obtain the following information from the CONAIR MARTIN identification tag which is mounted on the Horizontal Main Frame.

1. SERIAL NUMBER _____
2. MODEL NUMBER _____
3. DATE MFG _____
4. JOB NUMBER _____

B. Specify the assembly where the part is located from the list of illustrations on page II.

C. Have the maintenance person provide the proper part number which can be obtained from the CONAIR MARTIN Drawings and Parts List.

D. Should the INDY UP & OUT Robot System be out of warranty, please have the purchase order number from your company available for order placement. Following the above instructions will expedite the shipment of parts in the shortest possible time and assure that the correct part is selected and shipped. Parts cannot be returned without a CONAIR MARTIN Returned Goods Authorization (RGA).

5-2. TROUBLE-SHOOTING GUIDE

5-2-1. This trouble-shooting guide is a basic tool used to debug system failures. It is in no way all inclusive in the list of problems or remedies covered. Consult your specific Ladder Logic Diagram for specific sequences and permissives. When checking a possible switch failure, also check the opposite switch. The program looks for the status of both switches to be correct to satisfy the permissive logic. For example; if the flop is "FULLY UP", the flop "FULLY DOWN" signal must be off.

WHILE PERFORMING TROUBLE-SHOOTING ON THE INDY UP & OUT ROBOT SYSTEM, ALL PRECAUTIONS MUST BE OBSERVED AND ONLY QUALIFIED PERSONNEL SHOULD BE AUTHORIZED TO PERFORM THE TROUBLE-SHOOTING OF THE SYSTEM.

If the problem cannot be solved, contact the Customer Service Support Group at CONAIR MARTIN for assistance or service.

Table 5-1.
Trouble-shooting Guide.

Preliminary Checks	Check List	Remedy
Is the power on?	1) Is the press on? 2) Is the interface fuse for 120 VAC good? 3) Is the DC power good?	1) Check press power. 2) Correct problem and replace fuse. Check interface. 3) Check the 24 VDC supply fuse. The Robot operates on 24 Volts DC.
Is the processor in the correct mode?	1) Is the processor in the "Run" mode?	1) Put PC in "Run" mode. Check for CPU fault or other errors.

Trouble-shooting Guide continued.

Preliminary Checks	Check List	Remedy
Is the press gate signal functional?	1) Is the press gate closed?	1) Close the press gate. Check the interface. Check the gate closed input on the processor. The gate must be closed for motion to occur.
Are the Robot modes set correctly?	1) Is the APR OFF/ON switch in the correct position?	1) Switch must be "ON" to set reset or sequence.
	2) Has"RESET COMPLETE" been achieved?	2) The "RESET COMPLETE" pushbutton must be lit for sequencing to occur.
Is the air supply present?	1) Is there sufficient air supply?	1) Correct air supply problem.

Problem	Check List	Remedy
Erratic vertical motion.	1) Are the vertical shafts clean and lubricated?	1) Clean the shafts and lubricate.
	2) Is there air pressure?	2) The air pressure has to be constant. Correct the air problem (Ref. 2-1-1, page 6).
	3) Is the counter - balance set correctly?	3) Recheck the counter - balance setting (Ref. 2-5-3, page 16).
	4) Are the timers and switches setting correct?	4) Recheck the vertical settings (Ref. 2-5-5, page 17).
	5) Are the valves sticking?	5) Clean or replace as necessary.

Trouble-shooting guide continued.

Problem	Check List	Remedy
	6) Is the vertical cylinder leaking?	6) Replace the seals and /or the cylinder. Check the alignment.
No vertical movement.	1) Have you gone through the Preliminary Checks?	1) Please refer to the Preliminary Checks.
	2) Is the horizontal fully "IN" or "OUT"?	2) Check the horizontal fully "IN" and the horizontal fully "OUT" switches and inputs.
	3) If the horizontal is fully "IN", is the press fully "OPEN"?	3) The press must be fully "OPEN" for the arm to descend. Check the interface. Check the press.
	4) Is the stripper fully "OUT"?	4) The stripper must be in the correct position for vertical motion to occur. Check the strip fully "OUT" switch and inputs.
	5) Is the flop in the correct orientation for vertical travel?	5) The flop should be fully "UP" if the horizontal is fully "IN". If the horizontal is fully "OUT", the flop may have to be in either the fully "UP" or "DOWN" position. Consult your Ladder Logic Diagram.
	6) Is the safety latch in the correct position?	6) Check safety latch "EXTEND" and safety latch "RETRACT" switches and inputs.

Trouble-shooting Guide continued.

Problem	Check List	Remedy
Erratic horizontal motion.	1) Is the horizontal shaft clean and lubricated?	1) Clean the shaft and lubricate.
	2) Are the timers set correctly for slowdowns?	3) Readjust the horizontal speed.
No horizontal movement.	1) Have you gone through the Preliminary Checks?	1) Please refer to the Preliminary Checks.
	2) Is the flop in the correct orientation for horizontal traverse?	2) Check the flop fully "UP" and flop fully "DOWN" switches and inputs. Check the Ladder Logic Diagram.
	3) Is the Stripper fully "OUT"?	3) The Stripper must be in the correct position for horizontal motion to occur. Check the strip full "IN" and strip full "OUT" switches and inputs.
	4) Is the arm in the correct position for horizontal traverse?	4) Check the arm fully "UP" and fully "DOWN" switches and inputs.

Trouble-shooting Guide continued.

Problem	Check List	Remedy
	5) Is the safety latch in the correct position?	5) Check the safety latch "RETRACTED" and the safety latch "EXTENDED" inputs and switches.

The horizontal drive assembly consists of a drive controller, motor, belt and pulley assembly. Do the preliminary checks first.

WARNING

ALL PRECAUTIONS MUST BE OBSERVED. ONLY QUALIFIED PERSONNEL SHOULD BE AUTHORIZED TO PERFORM THESE CHECKS.

Horizontal preliminary checks.	Check List	Remedy
Is the belt tight?	1. Are the belt teeth in good conditions?	1. Replace as necessary.
	2. Do the idler pulleys turn freely?	2. Repair or replace as necessary.
Is the drive controller working?.	1. Check the fuse on the drive controller.	1. Replace as necessary.
	2. Are the relays and contacts ok?	2. Service as required.

Trouble-shooting guide continued

Horizontal Problems	Check List	Remedy
Slow speed too slow / slow speed too fast.	1. Does the horizontal shaft and bearings have adequate lubrication? 2. Are the timers set correctly for the horizontal slowdown?	1. Clean and lubricate the horizontal shaft and bearings. 2. Adjust the horizontal timers for proper operation. 3. Adjust the minimum speed pot for correct slow speed.
Fast speed too fast / fast speed too slow.	1. Does the horizontal shaft and bearings have adequate lubrication? 2. Are the timers set correctly for the horizontal slowdown? 3. Is the rheostat set correctly?	1. Clean and lubricate the horizontal shaft and bearings. 2. Adjust the horizontal timers for proper operation. 3. Adjust the maximum speed pot for correct slow speed. 4. Adjust the fast speed rheostat on the front of the drive controller for proper fast speed.
Horizontal start is too slow / too fast.	1. Are the shaft bearings lubricated? 2. Is the current limit potentiometer adjusted?	1. Clean and lubricate as necessary. Check for over lubricating. 2. The higher the current limit setting, the quicker the motor will start. Adjust as necessary.

Trouble-shooting guide continued

Horizontal Problems	Check List	Remedy
Horizontal motion stops before completion of travel.	1. Is the sequence calling for a partial stop?	1. Check the program for correct sequence. Check the input for partial position.
	2. Is the motor adjusted correctly?	2. Reset the machine and manually step the machine thru and verify correct speed adjustment.
	3. Is the horizontal safety timer timing out?	3. Check the preset of the timer in the program. Adjust as necessary. This timer is used to shut off the drive if the end limit switch fails, etc.
Unit does not maintain horizontal position.	1. Is the brake functioning?	1. When the unit reaches a proximity sensor, the brake should come on. Check the output for energization of the brake. Check the fuse. Check the 90 VDC power supply.
Drive won't start.	1. Is there AC power at the drive controller?	1. Check for 115 VAC at the drive controller. Terminals 1 and 2.
	2. Is there a speed signal?	2. Turn speed control pot clockwise.
	3. Main PC board malfunction?	3. Replace.
	4. Motor brushes worn or broken?	4. Service or replace as necessary.

Trouble-shooting guide continued

Horizontal Problems	Check List	Remedy
Drive won't start. contiuned	5. Does the motor field windings have continuity?	5. Check motor field windings for continuity. Check field supply terminals F1 and F2.
Drive stalls or won't come up to speed.	1. Is the speed control signal correct?	1. Check the speed control potentiometer.
	2. Is the AC line voltage high enough?	2. Check AC line voltage at terminal 1 and 2.
	3. Motor overloaded?	3. Reduce load.
	4. Worn motor brushes?	4. Replace motor brushes
	5. Maximum speed setting too low?	5. Readjust maximum speed pot.
	6. Current limit too low?	6. Readjust current limit pot.
	7. PC board mailfunction?	7. Replace.
AC line fuse blows repeatedly.	1. Excessive load.	1. Reduce load
	2. Shorted semiconductors in power convertor module.	2. Check module. Replace as necessary.
	3. Worn motor or machine bearings.	3. Replace as necessary.
	4. PC board malfunction.	4. Replace.
	5. Shorted wiring.	5. Check for grounds in external or internal controller wiring.

CHAPTER 6

RECOMMENDED SPARE PARTS LIST

6-1 INTRODUCTION

6-1-1 The spare parts list below identifies the generic parts for the Indy UP & OUT Robot System and is recommended for start-up minimum requirements.

KIT-00228
RECOMMENDED SPARE PARTS KIT
FOR CONAIR MARTIN INDY UP & OUT ROBOT

QTY	DESCRIPTION	PART #
5	Fuse-Glass,Tube .500 Amp	FUS-00005
1	Relay-DPDT, 24 Volt	RLY-00005
1	Spring, Relay Hold Down	SPG-00011
2	Fuse-Glass Tube,3 Amp,50 VAC	FUS-00034
2	Fuse-Ceramic, 5 Amp	FUS-00015
1	Relay-DPDT, 10 Amp	RLY-00010
2	Switch-Proximity, DC,N/O	SWT-00107
1	Switch-Limit, 802T-Amp	SWT-00057
1	Actuator-Unit Clear Switch	ACT-00150
2	Clamp-Actuator, Unit Clear	CMP-00051
1	Switch-Proximity, DC,N/O	SWT-00180
1	Valve-Solenoid, 24 VDC, Plug In W/Light	VAL-00352
1	Valve-Solenoid, 24 VDC, Plug In W/light	VAL-00353
1	Valve-Flow Control, Flow Adj. Swivel	VAL-00031
1	Valve-Solenoid, 24 VDC, Plug In	VAL-00121
1	Regulator-Pressure, 10-130 P.S.I.	REG-00003
2	Shock Absorber, ABS W/Spring	SHK-00011
1	Shock Absorber, ABS	SHK-00022
1	Bushing-Sprocket, Torque Cap .750 Bore	BUS-00080
2	Bearing-Cam, Concentric Sealed	BRG-00053
2	Bearing-cam, Eccentric Sealed	BRG-00051
2	Bearing-Sleeve, .500 I.D. X .634 O.D.	BRG-00099
2	Bearing-Needle, .500 I.D. X .687 O.D.	BRG-00181
2	Bearing-Sleeve, .750 I.D. X .875 O.D.	BRG-00198
2	Bearing-Sleeve, .750 I.D. X 1.00 O.D.	BRG-00199

APPENDIX A
TORQUE SPECIFICATIONS

All values for dry threads.
Decrease torque by 25% for lubricated threads.

Size & Thread	Mild Steel Screws & Bolts	Socket Head Cap Screws	Aluminum Screws & Bolts or any Bolt Into Aluminum
2-56	-	-	1.4 max in.-lb.
2-64	-	-	1.7
3-48	-	-	2.1
3-56	-	-	2.4
4-40	5 in.-lb.	12 in.-lb.	2.9
5-48	6 In.-lb.	13 in.-lb.	3.6
5-40	-	-	4.2
5-44	-	-	5.1
6-32	10 in.-lb.	23 in.-lb.	5.3
6-40	12	25	6.6
8-32	19	41	10.8
8-36	20	43	12.0
10-24	27	60	13.8
10-32	31	68	19.2
1/4-20	66	144	45.6
1/4-28	76 in.-lb.	168 in.-lb.	57.0
5/16-18	11 ft.-lb	25 ft.-lb	80.0
5/16-24	12	25	86.0
3/8-16	20	45	143.0
3/8-24	23	50	157.0
7/16-14	30	70	228.0
7/16-20	35	80	242.0
1/2-13	50	110	313.0
1/2-20	55	120	328.0
9/16-12	70	150	413.0
9/16-18	80	170	456.0
5/8-11	100	220	715.0
5/8-18	110	240	798.0
3/4-10	175	380	980.0
3/4-16	195	420	958.0
7/8-9	165	600	1495.0
7/8-14	185	660	1490.0
1-8	250	900	2205.0
1-14	270 ft.-lb.	1000 ft.-lb.	1995.0 max in.-lb.
1-1/8-7	-	-	265.0 max ft.-lb.
1-1/8-12	-	-	251.0
1-1/4-7	-	-	336.0
1-1/4-12	-	-	308.0
1-1/2-6	-	-	570.0
1-1/2-12	-	-	450.0 max ft.-lb.

APPENDIX B
GLOSSARY OF TERMS

FLOP - Flop is the pivoting action of the end of arm tooling (EOAT).

Flop "FULLY UP" is with the tooling in a vertical position.

Flop "FULLY DOWN" is with the tooling in a horizontal position.

STRIP- "STRIP" is the horizontal movement of the Arm Assembly, perpendicular to the face of the mold.

"STRIP IN" is the movement from the stationary mold half to the moving mold half.

When the arm is stripped "FULLY IN", it is in the parts pick position.

"STRIP OUT" is the movement from the movable mold half to the stationary mold half.

JIC- Joint Industrial Council.

SCFM- Standard Cubic Feet Per Minute.

Press- Injection Molding Machine.

RGA- Return Goods Authorization.

APR- Automatic Parts Remover.

ID- Inside Dimension.

THK- Linear Bearing.

NFPA- National Fluid Power Association.

EOAT- End Of Arm Tooling.

APPENDIX C
ORIGA CYLINDER

Origa Update

Origa Cylinder
Series 200 and 2000

Assembly Instructions/ Spare Parts List

Air Treatment and Lubrication Instructions

Air supply should be dried and filtered. The cylinder should be pre-lubricated with Origa Grease, thereby eliminating the need for periodic lubrication. If foglubrication is used, oil having a viscosity of 170-370 SSU at 100°F (32-68 cST at 40°C) and aniline point more than 185°F (85°C) is recommended. For example:

GULF	*Rock Drill 32*	*MOBIL*	*Mist Lube 27*
EXXON	*Arox EP 46*	*SHELL*	*Torcula Oil 32*

Item numbers (in parenthesis) refer to spare parts list, see pages 3-4.

Please read this before starting!

1. The pistons **(11)** in series 2000 are produced in five different tolerance classes with respect to barrel size. Under the outer band there is a mark (0-4) on the piston top. This figure refers to 0.1 mm units over nominal piston end support diameter. For example a 32 mm piston could range in size from 32.0 to 32.4 mm in diameter. In all cases the piston number should match the barrel number located at each end.
2. The bearing strips **(15)** are available in three thicknesses 1.0, 1.1 and 1.2 mm. Choose the correct combinatioin of bearing strips to permit free movement of the piston, with minimal side play, throughout the entire stroke.

Fig. 1.

A. Mounting of the inner sealing band

1. The band and the cylinder barrel should be well cleaned and degreased. They should be completely dry.
2. The inside of the barrel and both sides of the band should be coated with a well spread lubrication film.
3. Slide the band into the cylinder barrel with the flat side facing to the slit. (See Fig. 1)

B. Mounting of the piston

1. Check that the bearing strips **(15)** are properly placed on the piston **(11)**.
2. Lubricate the surfaces where the inner and outer bands run. Lubricate the piston seals **(12)**. Apply as much grease as possible between seal and support ring. Lubricate the cushion seals **(14)** with Origa Grease. Install the seals onto the piston.

   CAUTION! In cylinder types with two pistons, the piston and cushion seals should only be mounted on the two extreme ends of the dual piston arrangement. In two-piston cylinders, only one of the pistons will contain magnets.
3. Pull the inner band forward about 8 in. and fit it through the piston. It is most suitable to use a 10 in. long piece of the old band and insert it into the opposite end of the piston to permit the band to flow through the piston and over the top of the magnets.
4. Slide the piston into the cylinder barrel without damaging the piston seals or the band edges. Check that the bearing strips remain in position. Make sure that the inner band remains centered under the slot.
5. Position the band so that equal lengths project from both cylinder barrel ends. (See Fig. 3, Page 2)

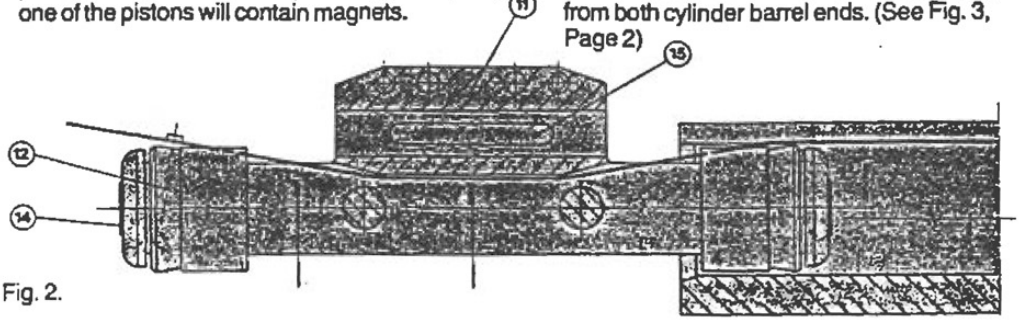


Fig. 2.

Assembly Instructions

C. Mounting of the end caps

The cylinder as shown in Fig. 3 is now assembled according to the above instructions.

Fig. 3.

1. Insert the T-shaped inner band lock **(37)** (Bore 25 only) Screw the two set screws **(39)** into place. (See Fig. 4)
2. Lubricate the end cap O-rings, install the O-rings onto the cushion pipe **(44)** and spread out a film of grease over the entire cushion pipe.
3. Insert the cushion pipe into the barrel, making sure that the flat, notched area is facing upwards towards the slot. Also ensure that the inner sealing band runs freely over the cushion pipe O-ring.
4. Place the locking plate **(43)** on exposed end of inner band. Lubricate the gasket **(45)** and place it into the end cap.

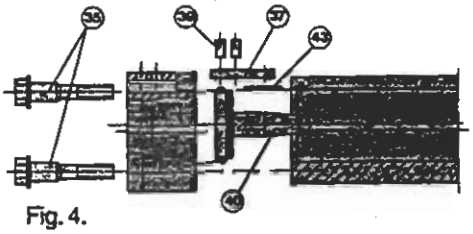


Fig. 4.

5. Mount the end cap onto the barrel making sure it's not twisted. Grease the threads of the end cap screws, insert the screws but do not tighten. Repeat procedure 1-5 for opposite end. Tighten up all the screws.

D. Stretching and locking the inner sealing band

1. Make sure that the band is placed symmetrically according to Fig. 3. The band washer must not slide out of the slit.
2. Lock the band on one side with the set screws.
3. Stretch the band (i.e. with a screwdriver) on the other side, **release tension** and lock the band.
4. Check the band stretching by pushing the band down about .25 in. (6 mm). The band should then spring up towards the slot again.

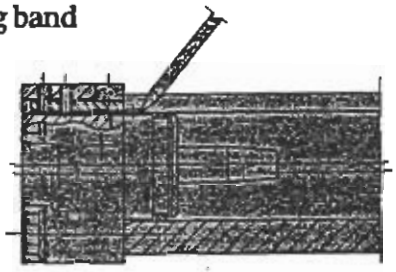


Fig. 5.

Fig. 6.

E. Cleaning

Use safety glasses during the cleaning process!

During assembly dirt particles may enter between the sealing band and the cylinder barrel contact surfaces. These particles will cause leakage and must be removed as follows:

1. Supply compressed air to the cylinder.
2. Loosen the screws and remove the outer band out of one end cap.
3. Locate and mark where the leakage occurs.
4. Lower air pressure to 15 psi (1 bar).
5. Put the cleaning tool into the slot and push the band down. The compressed air will then blow out dirt particles.

   NOTE: ONLY OUR SPECIAL CLEANING TOOL SHOULD BE USED! (See Fig. 6)
6. If leakage still occurs, disassemble the cylinder and examine the inner band for damage. A damaged band must be replaced.
7. Don't forget to lock the outer band after cleaning.

F. Mounting of the outer sealing band and piston mounting

1. Mount the outer band **(3)**. Fig. 7.
2. Place the O-ring **(23)** (Bore 32 & 50) around the scraper and place this unit into the groove of the piston mounting **(16)**. Place this assembly onto the piston yoke. Make sure that the screw holes are aligned to each other. Screw the two flat head screws into place.
3. Tap the tension pins **(25)** into place. Use a flat plate as a backup underneath the piston mounting.
4. Tighten the two screws and apply Loctite to the threaded ends. Attach and tighten the two hex nuts. Use an allen wrench to prevent screws from rotating.
5. Flatten out and lock the outer band **(3)** with the outer band locks **(38)** and screws **(40)**.

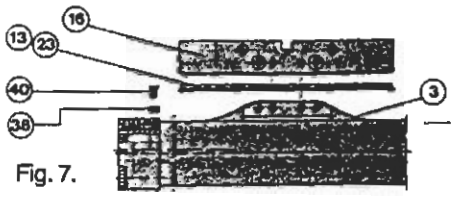
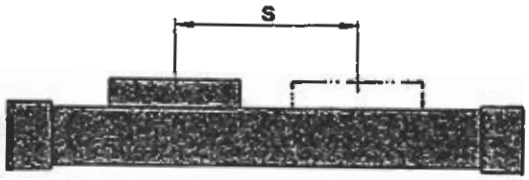


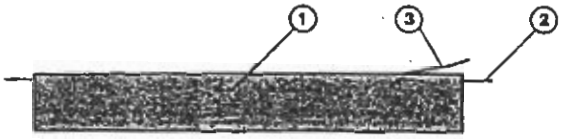
Fig. 7.

Spare Parts List

IMPORTANT!
When ordering spare parts, cylinder type and stroke must be stated.

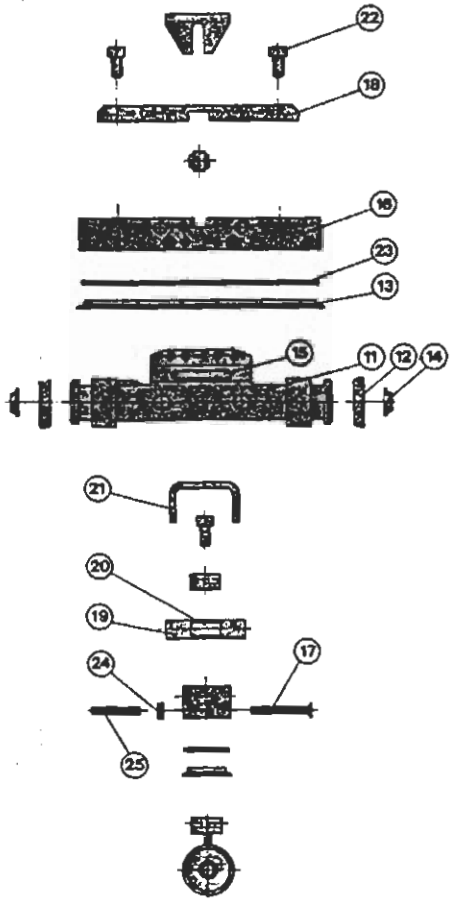


Barrels
Bands
Seal Kits



Cyl. bore	(1) Barrel	(2) Inner band	(3) Outer band	(12, 13, 14, 15, 36, 42, 45, 46, 47) Seal kit Standard	Viton
25	2152 02 01 + S	2192 02 01 + S	2080 02 01 + S	2790 02 02	2791 02 02
32	2152 03 01 + S	2192 03 01 + S	2080 03 01 + S	2790 03 02	2791 03 02
50	2152 05 02 + S	2192 05 02 + S	2080 05 02 + S	2790 05 02	2791 05 02

Piston



Cyl. bore	(11) Piston Standard	(11) Piston Extra**	(12) Piston seal, std	(12) Piston seal, viton
25	2664 02 02	2154 02 02	2050 02 01	2052 02 01
32	2664 03 02-*	2154 03 02-*	2050 03 01	2052 03 01
50	2664 05 02-*	2154 05 02-*	2050 05 02	2052 05 02

Cyl. bore	(13) Scraper	(14) Cushion seal, std	(14) Cush. seal, viton	(15) Bearing strip, std T = 1.0
25	2238 02 01	2054 02 01	2056 02 01	2066 02 01
32	2238 03 01	1235 10 00	1236 10 00	2236 03 03
50	2238 05 01	1235 16 00	1236 16 00	2236 05 03

Cyl. bore	(15) Bearing strip, std T = 1.1	(15) Bearing strip T = 1.2	(15) Bearing strip + 248°F	(16) Piston mounting
25	2066 02 02	———	2064 02 01	2110 02 01
32	2236 03 05	2236 03 04	———	2110 03 51
50	2236 05 05	2236 05 04	———	2110 05 52

Cyl. bore	(17) Screw	(17) Screw stainless	(18) Bracket	(19) Carrier pin
25	1008 04 16	1010 04 15	2115 02 01	2122 02 02
32	1008 05 17	1010 05 17	2115 03 01	2786 03 01
50	1008 05 17	1010 05 17	2115 05 01	2786 05 01

Cyl. bore	(19) Carrier pin, stainless	(20) Bush	(20) Bush stainless	(21) Clevis
25	2123 02 02	2132 02 01	2133 02 01	2120 02 02
32	2787 03 01	———	———	2120 03 01
50	2787 05 01	———	———	2120 05 01

Cyl. bore	(21) Clevis stainless	(22) Screw	(22) Screw stainless	(23) O-Ring standard
25	2121 02 02	1000 05 06	1002 05 06	———
32	2121 03 01	1004 07 07	1006 07 07	1270 02 53
50	2121 05 01	1004 09 12	1006 09 12	1270 02 65

Cyl. bore	(23) O-Ring viton	(24) Nut	(24) Nut stainless	(25) Tension pin
25	———	1046 04 00	1047 04 00	1108 04 26
32	1261 02 53	1046 05 00	1047 05 00	1108 05 32
50	1261 02 65	1046 05 00	1047 05 00	1108 06 32

*Piston part numbers are to be followed by the proper sizing mark. (See note before section A on page 1)
**The second piston (without magnets) in cylinder types with two pistons.

End Cap

(31, 41, 42, 44, 45, 46, 47) End Cap, standard*

Cyl. bore	Type 202, 222, 2020, 2220 Left	Right	Type 203, 223, 2030, 2230
25	2164 02 53-LRU	2164 02 54-LRU	2164 02 55-LRU
32	2164 03 51-LRU	2164 03 52-LRU	2164 03 53-LRU
50	2164 05 51-LRU	2164 05 52-LRU	2164 05 53-LRU

(31, 41, 42, 44, 45, 46, 47) End Cap, viton*

Cyl. bore	Type 202, 222, 2020, 2220 Left	Right	Type 203, 223, 2030, 2030
25	2714 02 53-LRU	2714 02 54-LRU	2714 02 55-LRU
32	2714 03 51-LRU	2714 03 52-LRU	2714 03 53-LRU
50	2714 05 51-LRU	2714 05 52-LRU	2714 05 53-LRU

Cyl. bore	(35) End cap screw	(35) End cap screw, stainless	(36) O-Ring standard	(36) O-Ring viton
25	2014 02 01	2015 02 01	1250 03 01	1261 03 01
32	2014 03 51	2015 03 51	1250 03 04	1261 03 04
50	2014 05 51	2015 05 51	1250 03 11	1261 03 11

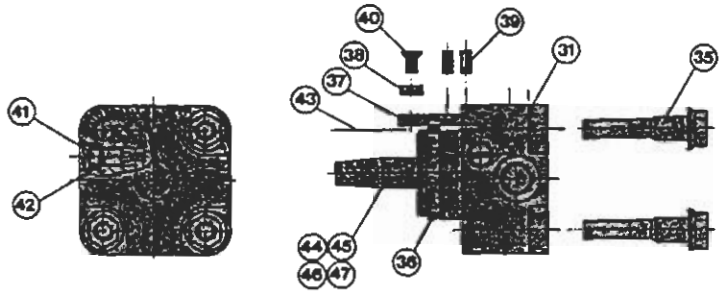
Cyl. bore	(37) Band lock inner (T)	(38) Band lock outer	(39) Screw	(39) Screw stainless
25	2078 02 01	2062 02 01	1024 03 04	1025 03 04
32	———	2062 03 01	1024 04 05	1025 04 05
50	———	2062 03 01	1024 04 07	1025 04 07

Cyl. bore	(40) Screw	(40) Screw stainless	(41) Cushion needle	(42) O-Ring standard
25	1033 03 04	1034 03 04	2072 02 02	1252 11 02
32	1033 04 04	1034 04 04	2072 02 02	1252 11 02
50	1033 04 04	1034 04 04	2072 02 02	1252 11 02

Cyl. bore	(42) O-Ring viton	(43) Plate in. band lock	(44) Cushion pipe	(45) Gasket standard
25	1262 11 02	2078 02 02	2211 02 02	2060 02 01
32	1262 11 02	2078 03 01	2211 03 01	2060 03 01
50	1262 11 02	2078 05 01	2211 05 01	———

Cyl. bore	(45) Gasket viton	(46) O-Ring standard	(46) O-Ring viton	(47) O-Ring standard
25	2061 02 01	———	———	———
32	2061 03 01	———	———	———
50	———	1252 01 03	1262 01 03	1252 01 26

Cyl. bore	(47) O-Ring viton
25	———
32	———
50	1262 01 26



*Shown in the diagram above is the left end cap.

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ORIGA-CYLINDER P120
Assembly Instructions
Spare Parts List

Air Treatment and Lubrication Instructions

Air supply should have water removed and be filtered. The cylinder should be pre-lubricated with Origa Grease so periodic lubrication is therefore normally unnecessary.
If foglubrication is used, oil having a viscosity of 170-370 SSU at 100°F and aniline point more than 185°F are recommended. For example:

GULF	Rock Drill 32	MOBIL	Mist Lube 27	BP	Energol RD-E-46
EXXON	Arox EP 46	SHELL	Torcula Oil 32		

The ORIGA-Cylinder should be assembled according to the instructions and in the order shown by the main headings below.

A. Mounting of the inner sealing band

1. The band and the cylinder barrel should be well cleaned, degreased and completely dry.
The inside of the barrel and both sides of the band should be coated with a well spread lubricating film.
2. Place the band in the cylinder barrel with the flat side facing the slit. Fig. 1.

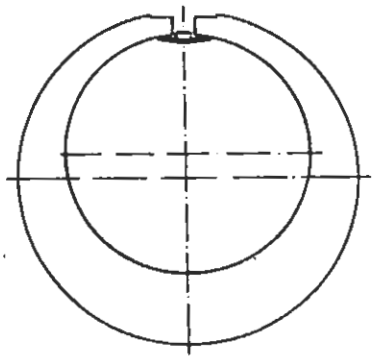


Fig. 1.

B. Mounting of the piston

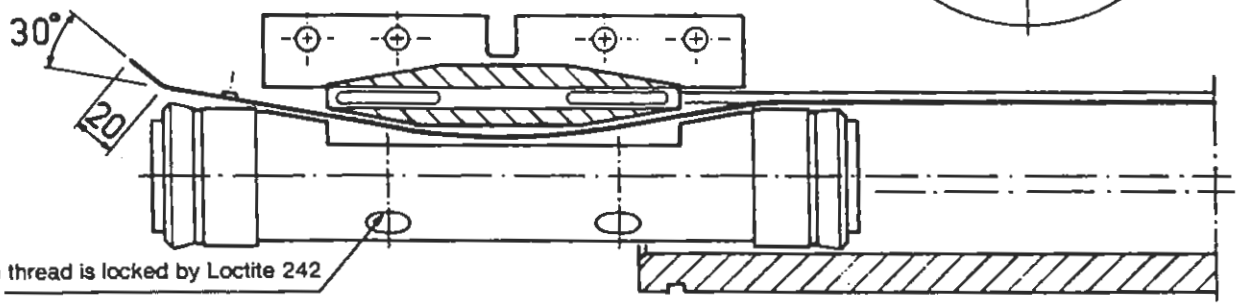


Fig. 2.

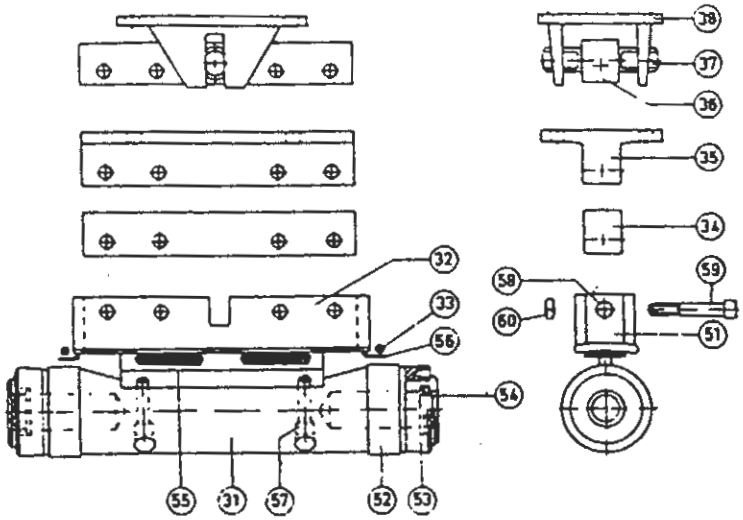
1. Check that the bearing strips (55) are fitted on the piston (32).
2. Lubricate the surfaces where inner and outer band runs. Lubricate the piston seals. (53) Apply as much grease as possible between seal and support ring.
Lubricate the cushion seals generous.
3. Insert one end of the inner band (2) in one end of the piston as shown in Fig. 2, this action can be easily accomplished by employing a guide tool (a short section of inner seal). An alternate method is to bend inner band as shown in Fig. 2. Important note: The bend must not be beyond the rivet.
4. Pull forward the band 6"-8" and fit it through the piston.
5. Press the piston into the cylinder barrel without damaging the piston seals. Check that the bearing strips remain in position.
6. Straighten out the bend in the inner seal if made and pull out the inner seal band so that equal lengths project from bot cylinder barrel ends.

Spare Parts

When ordering spare parts, please state cylinder type, diameter and stroke.

Seal Kits - Complete

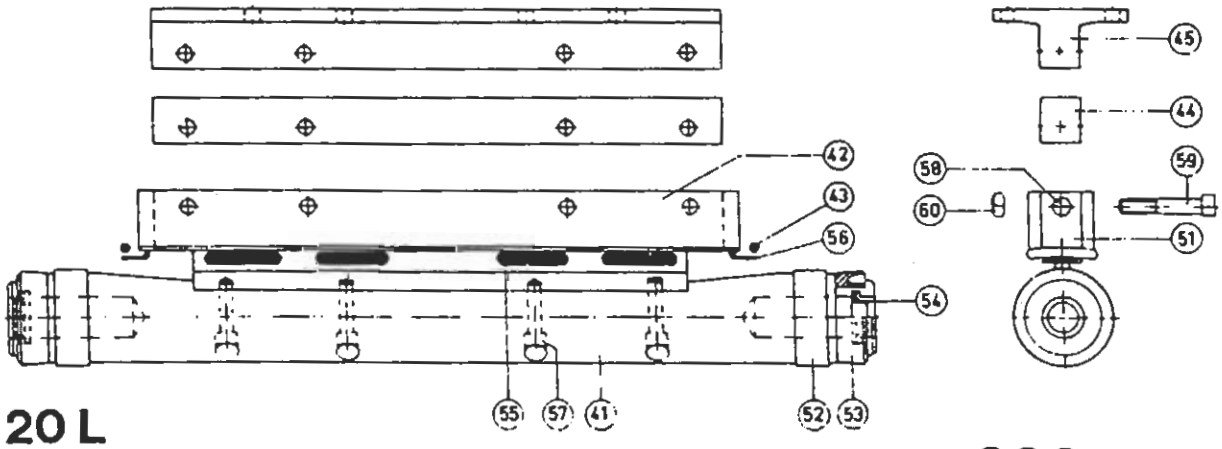
See next page.



Piston Type 120 S

Cyl. Ø	(31) Piston	(32) Yoke	(33) O-ring Standard	(33) O-ring Viton
40	2020 04 04	2031 04 03	1272 05 10	1262 05 10
63	2155 06 01	2031 08 03	1272 05 18	1262 05 18
80	2155 08 01	2031 08 01	1272 05 24	1262 05 24

Cyl. Ø	(34)(51)(58) Mounting, type S/20	(35)(51)(58) Mounting, type S/22	(36)(51)(58) Mounting for Carrier Pin	(37) Carrier pin	(38) Universal mounting	(36)(37)(38)(51)(58) Mounting, type S/25-Complete
40	2778 04 01	2782 04 01	2788 04 01	2122 04 01	2120 04 01	2186 04 04
63	2778 06 01	2782 06 01	2788 06 01	2122 06 01	2120 06 01	2186 06 04
80	2778 08 01	2782 08 01	2788 08 01	2122 08 01	2120 08 02	2186 08 02



Piston Type 120 L

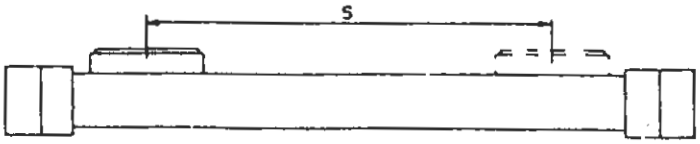
Cyl. Ø	(41) Piston	(42) Yoke	(43) O-ring. Standard	(43) O-ring. Viton	(44)(51)(58) Mounting, type L/26	(45)(51)(58) Mounting, type L/28
40	2022 04 52	2033 04 03	1272 05 26	1262 05 26	2780 04 01	2784 04 01
63	2157 06 51	2033 06 03	1272 05 38	1262 05 38	2780 06 01	2784 06 01
80	2157 08 51	2033 08 01	1272 05 42	1262 05 42	2780 08 01	2784 08 01

Interchangeable parts

Cyl. Ø	(51) End plate	(52) Bearing ring	(53) Piston seal, Standard	(53) Piston seal, Viton	(54) Cushion seal, Standard	(54) Cushion seal, Viton
40	2040 04 04	2042 04 02	2050 04 03	2052 04 01	2054 04 03	2056 04 03
63	2040 06 04	2042 06 02	2050 06 03	2052 06 01	2054 06 04	2056 06 04
80	2040 08 01	2042 08 01	2050 08 02	2052 08 01	2054 08 02	2056 08 02

	(55) Bearing strip	(56) Scraper	(57) Screw	(58) Screw	(59) Screw	(60) Nut
40	2066 04 02	2067 04 03	1000 06 12	1038 05 07	1000 06 16	1040 06 00
63	2066 06 03	2067 06 02	1000 08 16	1038 05 07	1000 08 17	1040 08 00
80	2066 08 02	2067 08 01	1000 08 18	1038 05 07	1000 10 18	1040 10 00

Spare Parts, continued

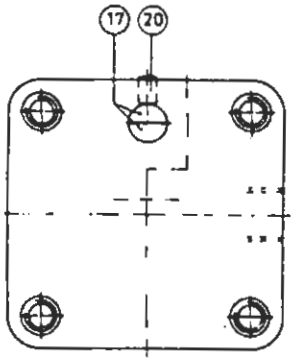


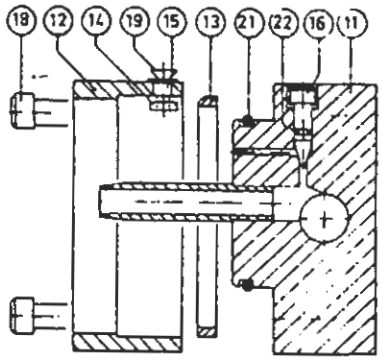
Barrel
Band
Seal kits

Type P 120 S

Cyl. Ø	① Barrel	② Inner Band	③ Outer Band	Seal Kits-Complete ㉑ ㉒ ㊸ ㊸ ㊹ ㊺ ㊻ Standard	Viton	High Speed
40	2152 04 03 + S	2192 04 02+S	2080 04 03+S	2790 04 01	2791 04 01	2796 04 01
63	2152 06 03 + S	2192 06 02+S	2080 06 03+S	2790 06 01	2791 06 01	2796 06 01
80	2152 08 01 + S	2192 08 01+S	2080 08 01+S	2790 08 01	2791 08 01	2796 08 01
Type P 120 L						
40	2153 04 52 + S	2193 04 51+S	2081 04 51+S	2792 04 01	2793 04 01	2797 04 01
63	2153 06 52 + S	2193 06 51+S	2081 06 51+S	2792 06 01	2793 06 01	2797 06 01
80	2153 08 51 + S	2193 08 51+S	2081 08 51+S	2792 08 01	2793 08 01	2797 08 01

End cap





Cyl. Ø	㉒ ⑯ ⑪ End Cap with Cushion screw Standard	Anodized	⑫ Cap ring, Standard	⑫ Cap ring, Anodized	⑬ Lock ring	⑭ Band lock, outer
40	2164 04 54	2164 04 53	2008 04 06	2008 04 05	2012 04 04	2062 04 01
63	2164 06 54	2164 06 53	2008 06 06	2008 06 05	2012 06 04	2062 04 01
80	2164 08 52		2008 08 02		2012 08 02	2062 04 01

Cyl. Ø	⑮ Plug	⑯ Cushion screw	⑰ Band lock, inner	⑱ Screw	⑲ Screw	⑳ Set screw
40	2068 04 01	2072 03 01	2078 04 03	1004 07 18	1033 05 05	1024 06 05
63	2068 04 01	2072 06 01	2078 06 03	1004 09 20	1033 05 06	1024 06 05
80	2068 04 01	2072 06 01	2078 08 03	1004 11 24	1033 05 08	1024 08 07

Cyl. Ø	㉑ O-ring. Standard	㉑ O-ring. Viton	㉒ O-ring. Standard	㉒ O-ring. Viton
40	1250 13 11	1261 13 11	1252 01 01	1262 01 01
63	1250 05 03	1261 05 03	1252 01 01	1262 01 01
80	1250 05 06	1261 05 06	1252 01 01	1261 01 01

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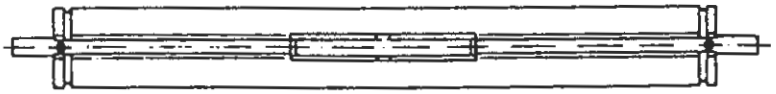
Form No. 310

C. Mounting of the end caps

Fig. 3.

The cylinder is now assembled according to the instructions above as shown in Fig. 3.



1. Push the end ring (12) on the barrel. See Fig. 4. The lock screw faces upwards.
2. Place the lock ring (13) halves on the cylinder barrel and pull the cap ring over.
3. Push the outer band lock (14) into the end ring notch and tighten the screws (19).
4. Lubricate the O-ring and spread out a film over the hole cushion pipe.
5. Mount the end cap on the cylinder barrel. Note that the dog teeth in the end caps should fit into each cavity in the barrel end. Make sure it is not twisted. Also ensure that the inner sealing band runs freely in the lock hole on the end cap.
6. Insert the four end cap bolts (18) but do not tighten. Employ the same procedure at the other end of the cylinder. (1-6)
7. Align the end covers so that they are not displaced in relation to each other or to the piston. Tighten up the bolts securely.

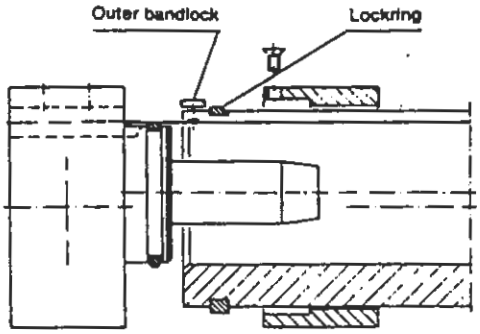


Fig. 4.

D. Stretching and Locking the Inner Sealing Band

1. Stretch the band with a small driver, through the hole in the end cap ring towards the band washer. See Fig. 5. Note that the band is not locked at the other end. For this reason do not stretch so hard that the band washer glides out of the slit. There should be equal lengths on both sides. See Fig. 3.
2. Ensure that the band has clearance in the lock hole.
3. Fit the band lock (17) and lock the band with the set screw (20). See Fig. 5. Repeat points 1-3 at the other end. Stretch the band but not too hard.
4. Place the piston at optional end cap. Push down the band about 0.25". The band should spring up towards the slot if the band stretching has been done properly. Special tool for this operation is available from Origa (cleansing tool).

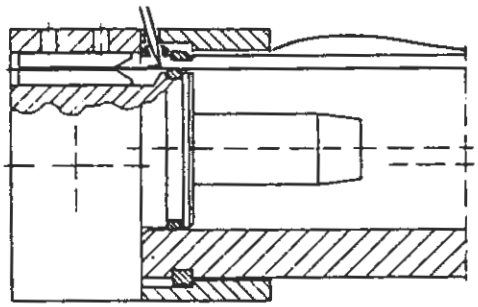


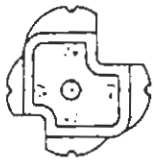
Fig. 5.

NOTE: The end covers may not be aligned after the bands have been locked!

E. Cleansing USE SAFETY GLASSES!

During assembly dirt particles may enter between the sealing band and the cylinder barrel contact surfaces. These particles will cause leakage and must be removed. This is done as follows.

1. Supply compressed air to the cylinder.
2. Undo the screws, withdraw the outer band out of one end cap.
3. Locate and mark where the leakage occurs.
4. Lower air pressure to 15 psi (1 bar).



5. Put the cleansing tool into the slot and push down the band. The compressed air will then blow out dirt particles, if any.
NOTE: ONLY OUR SPECIAL CLEANSING TOOL SHOULD BE USED!
6. If there is still a leakage, dismount the cylinder and examine if the inner band is damaged. Damaged band must be replaced.
7. Don't forget to lock the band after cleansing.

F. Mounting of the Outer Sealing Band, Piston Mounting and O-Ring

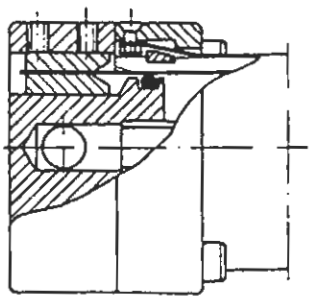


Fig. 6.

1. Mount the outer band.
2. The end plate (51) and scrapers (56) to be fitted on the piston yoke mounting.
3. Bend out the scrapers before pressing down the mounting. Screw the parts together.
4. Pass the ends of the band under the cap ring as far as it pass the hole between the screws. (19) The band can be bend some upwards to make it easier. Flatten the band and lock the band with the screws.