

# DUAL HEAD ADJUSTABLE CORNERMATIC



## OPERATION & MAINTENANCE MANUAL



E170 Rev A  
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**TABLE OF CONTENTS**

**TABLE OF CONTENTS**  
**SAFETY SUMMARY**  
**LOCKOUT GUIDE**  
**ELECTRICAL SCHEMATIC** (*Back of Manual*)  
**ASSEMBLY DRAWINGS** (*Back of Manual*)

	<u>Section/Page</u>
<b>1. INSTALLATION.....</b>	<b>1-1</b>
<b>A. SELECTING A LOCATION.....</b>	<b>1-1</b>
<b>B. PNEUMATIC REQUIREMENTS .....</b>	<b>1-1</b>
<b>C. ELECTRICAL REQUIREMENTS .....</b>	<b>1-1</b>
<b>D. RECEIVING AND UNPACKING THE EQUIPMENT .....</b>	<b>1-1</b>
<b>E. SAFETY REQUIREMENTS .....</b>	<b>1-3</b>
(1) Safety Precautions Before Starting The Machine .....	1-3
(2) Safety Precautions When Operating The Machine .....	1-3
<b>2. SYSTEM OVERVIEW.....</b>	<b>2-1</b>
<b>A. DUCT FLANGE SIZE ADJUSTMENTS .....</b>	<b>2-2</b>
<b>B. INSULATED DUCT.....</b>	<b>2-2</b>
<b>C. PROGRAMMABLE LOGIC CONTROL (PLC) OPERATING SEQUENCE .....</b>	<b>2-3</b>
<b>D. CONTROLS.....</b>	<b>2-4</b>
(1) POWER .....	2-4
(2) TOP HEAD Power Push/Pull Switch .....	2-4
(3) BOTTOM HEAD Power Push/Pull Switch.....	2-4
(4) TOP HEAD DWN/UP Control Switch.....	2-4
(5) Load Position .....	2-5
(6) Control Sequence .....	2-6
<b>3. SYSTEM OPERATION .....</b>	<b>3-1</b>
<b>A. SAFETY PRECAUTIONS .....</b>	<b>3-1</b>
(1) Before Starting The Machine.....	3-1
(2) When Operating The Machine.....	3-1
<b>B. PREPARATION FOR OPERATION.....</b>	<b>3-2</b>
<b>C. TOOLING CHANGEOVER .....</b>	<b>3-3</b>
<b>D. SYSTEM SHUT-DOWN .....</b>	<b>3-4</b>
<b>4. MAINTENANCE .....</b>	<b>4-1</b>
<b>B. MAINTENANCE SAFETY.....</b>	<b>4-1</b>
<b>C. SERVICING.....</b>	<b>4-1</b>
(1) Lubrication, General Requirements.....	4-1
(a) Lubrication Schedule .....	4-2

# E170 Rev A



<b>D. PREVENTIVE MAINTENANCE</b> .....	<b>4-2</b>
(1) Preventive maintenance checks:.....	4-2
<b>E. TROUBLESHOOTING</b> .....	<b>4-3</b>
<b>F. ASSEMBLY DRAWINGS &amp; ELECTRICAL SCHEMATICS</b> .....	<b>4-5</b>

## LIST OF TABLES

Table 4-1. Troubleshooting Chart.....	4-4
---------------------------------------	-----

## LIST OF FIGURES AND ILLUSTRATIONS

Figure 1-2. Cornermatic Table ( <i>User Supplied</i> ).....	1-2
Figure 2-2. TDC and TDF Duct Flanges Dimension Requirements .....	2-2
Figure 2-3. "Top Flange Present" Proximity Switch .....	2-2
Figure 2-4. Corner Area Free of Insulation Pins .....	2-3
Figure 2-5. Machine Flow Diagram.....	2-4
Figure 2-6. Control Panel Switches .....	2-4
Figure 2-7. Magazine Shift Guide and Position Sensor .....	2-5
Figure 2-8. Bottom Head Cycle Start Levers .....	2-6
Figure 2-9. PLC Press & Crimp Timer Adjust Potentiometers ( <i>Under Cover</i> ) .....	2-7
Figure 3-1. Control Panel .....	3-2
Figure 3-2. Top Head Position Scale.....	3-2
Figure 3-3. Air Pressure Valve, Filter & Regulator .....	3-3
Figure 3-4. Duct Placement.....	3-3
Figure 3-5. Tooling Changeover (Top Head Shown) .....	3-4

## SAFETY SUMMARY

### INTRODUCTION

**Safety is everyone's business...** Whether you are an equipment operator, a maintenance person, a supervisor, or business owner, you are directly responsible for the day-to-day safe operation of the equipment under your control. It is your responsibility to maintain and operate this equipment in strict compliance with all applicable laws, safety regulations, and the manufacturer's recommended procedures.

### PROMOTING SAFETY

**Institute a company safety program.** Management has a moral and legal responsibility for promoting industrial safety. The formation of an organized safety program is strongly recommended. This safety program should include the formation of a safety committee to review and update company safety policies on a regular basis. Establish a firm policy on safety regulations in the work place. Publish these objectives, spelling out each employee's responsibilities. ***Make certain that each employee knows what is expected of them.***

### SAFETY PROGRAM

***The following steps are suggestions*** that a company developing, or expanding, a comprehensive safety program should consider:

1. Industrial equipment manufacturers carefully design safeguards into their products in order to minimize hazards. However, the manner in which equipment is incorporated into a manufacturing process may inadvertently create a hazard or otherwise defeat built-in safeguards. Closely examine the operation of your company's processing equipment. Take notice of potential hazards. Install guards or take other appropriate action to eliminate hazard risks.
2. Make certain equipment operators and maintenance personnel are properly trained.
3. Setup a program of daily, weekly, and monthly machinery inspection. Make a check list. Keep a historical record of all maintenance work, repairs, and adjustments.
4. Frequently evaluate safety guards and devices during actual production runs. ***Correct any unsafe practice or situation immediately.***
5. Establish safe, convenient material handling systems. If conveyor equipment is installed in your facility, it should conform to recommendations published in the 'American National Standard, Conveyors and Related Equipment, Safety Standards for ANSI/ASME B20.1' which is available from the American National Standards Institute (ANSI).
6. Provide personal protective equipment, such as safety glasses with side shields, safety helmets, tongs, gloves, hand pads, spats, and protective sleeves, as required to suit the operation.
7. Organize a company safety committee. Schedule periodic meetings on a regular basis to review and update all safety policies.
8. Establish a firm policy on safety regulations in the work place. Publish these objectives, spelling out each employees responsibilities. ***Make certain that each employee knows what is expected of them.***

9. Investigate all accidents and close calls. Take immediate action to prevent a recurrence of the incident. Keep records of the investigation and the corrective measures taken.
10. Post a list of names, addresses, and phone numbers of physicians and others who are to be called in emergency situations.

## CUSTOMER'S RESPONSIBILITIES

There are certain hazards associated with the operation of any equipment or system of machinery that are impractical, *if not impossible*, for equipment suppliers to safeguard. The user must address these hazards and be responsible for providing guards or barriers for establishing appropriate work procedures and for training personnel in the safe operation of that equipment.

With respect to coil and strip processing equipment, the following hazards should be noted:

- Open pits and depressions or raised areas in the floor.
- Space between machines, where strip edges and ends are exposed during feed-up, run, and tail-out conditions. This includes carry-over tables and both roller and belt conveyors.
- Nip and pinch points of machinery, coils, and strip which may be exposed in feed-up, run, and tail-out.
- Areas surrounding coil handling devices where coils are in motion, such as coil cars, conveyors, upenders and turnstiles.
- Areas surrounding payoff reels and recoilers, where clock-springing strip ends present a hazard during banding, un-banding, feed-up and tail-out conditions.
- Sheet and pack handling devices (*including conveyors*) where the motion, as well as shifting of sheets or packs, may present a hazard.
- The area surrounding sheet stacking devices, which must be approached for setup, but which should be clear of personnel during operation because of moving machinery or material.
- Areas associated with high temperatures, high pressure fluids (*hydraulic, air, or water*) and electrical devices and connections.
- The vicinity of machinery which moves into or out of the line.

## REFERENCE SOURCES

Questions concerning specific hazards or safeguarding of equipment may be addressed to the equipment manufacturer. For additional information, refer to the sources listed here:

### American National Standards Institute (ANSI)

**ANSI B11.18**, "Machinery and Machine Systems for the Processing of Coiled Strip, Sheet and Plate - Safety Requirements for Construction, Care and Use." **ANSI B11.4**, "Shears: Safety Requirements for Construction, Care and Use." **ANSI B11.14**, "Coil-Slitting Machines/Systems Safety Requirements for Construction, Care and Use." **ANSI B11.18**, "Machinery and Machine Systems for the Processing of Coiled Strip, Sheet and Plate - Safety Requirements for Construction, Care and Use."

### National Fire Protection Association (NFPA)

NFPA 79, "Electrical Standards for Industrial Machinery."

European Union

"Directives on Safety of Machinery" and "CE Marking"

## WARNING LABELS

Warning and safety related informational labels are placed on the Iowa Precision Industries' equipment at strategic points. It is important that these labels are not removed, covered, hidden, or defaced. The purpose of these labels is to alert personnel to potential personal injury hazards or *other* direct or indirect safety concerns.

**DANGER** indicates an imminently hazardous situation which, if not avoided, will result in death or serious injury.



**WARNING** indicates a potentially hazardous situation which, if not avoided, could result in minor or serious injury.



**CAUTION** indicates a potentially hazardous situation which, if not avoided, may result in minor or moderate injury.



**NOTICE** indicates a company policy that relates directly or indirectly to the safety of personnel or protection of property.



"It is important that the meaning of a safety sign is clearly understood by those who may come in contact with the hazard. To increase the understanding of a safety sign's components, the ANSI Z535 committee encourages safety sign manufacturers and owners of facilities to publish and exhibit the following (*above*) information on safety posters, safety bulletins or the like. Doing so will assist in the objective of achieving a national uniform system for the recognition of potential personal injury hazards and accident prevention." - ANSI Z535.2, Annex A1

## WARNING MESSAGES IN THIS MANUAL

Throughout this manual various **▲DANGER**, **▲WARNING**, **▲CAUTION**, and safety related **NOTICE** messages appear. The intent is to alert operator and maintenance personnel to potential hazards. In addition, *important* operation and maintenance details are emphasized with the **NOTE** heading.

## SAFETY FIRST

The equipment in this line was designed and manufactured for a specific task. **DO NOT** use the equipment for any other function or to process material that is beyond the equipment's design specifications. Modifications or additions to this equipment line should not be made without first consulting IPI. Replacement and maintenance parts should be equal to original equipment. Use of other parts may result in unsafe operating conditions. If there is a question as to the suitability of a part, IPI should be consulted.

In general, every piece of equipment must be treated as dangerous. While operating or maintaining this equipment, each person must be aware of their own safety as well as the safety of all others around the line.

### Material Coils

Coils present numerous hazards. They may shift, roll or fall without warning. Some coils may spring open without warning. Sharp edges of the strip in the coil are hazardous. Stay clear of coils as they are being moved. Use extreme caution any time a coil is approached or handled.

### Metal Strips

The metal strip may have sharp or ragged edges. The strip is under tension and is subject to abrupt tension changes. This can result in strip breakage with the ends flying without warning. Stay clear of the strip whenever possible. When it is necessary to approach or handle the strip, use extreme caution. Use protective devices such as tongs, gloves, eye protection, and wrist guards as required for safety. The strip presents many pinch hazards with the machinery. Stay clear of these. Never step on or over strip in the line.

### Machinery

Never reach into any piece of machinery which is operating or which is capable of operation. Loose clothing or jewelry should be kept clear of machinery at all times. When working on one piece of equipment, be aware of hazards of surrounding equipment. Any item inserted into a machine may be thrown or may cause a dangerous malfunction or breakage.

### Safe Guards

No equipment should be operated unless the safe guards or devices supplied with the product are securely in place and properly adjusted.

## **▲WARNING**

**IPI has conducted hazard evaluation and risk analysis studies for their products. *Safe guards installed on the equipment are there for a reason.* BEFORE EQUIPMENT IS PLACED INTO SERVICE, ALL SAFE GUARDS OR DEVICES MUST BE IN PLACE AND PROPERLY ADJUSTED.**

### **Maintenance**

Before performing any maintenance on a piece of equipment, insure that all power is locked off in accordance with your company's lockout/tagout policy. Be sure that all movable members (*such as rolls, arms, tables, etc.*) are securely blocked from inadvertent motion which might be hazardous. Treat all electrical lines as being live and all piping as being under high pressure. Insure that all items are properly reassembled before placing them into operation. *Before equipment is returned to service, ALL safe guards or devices MUST BE in place and properly adjusted.*

## **NOTICE**

Before doing any WELDING ON EQUIPMENT, the following precautions must be taken to insure against damage:

- 1) All power is removed from system.
- 2) The weld ground is connected to the closest possible location on the unit where the welding is being performed.
- 3) All encoders, sense eyes, and controls should be electronically disconnected if at all possible to avoid possible damage.

### **Operation**

This equipment is capable of speeds, tensions, and adjustments which may be hazardous for some of the materials within the line specification. For example, thin, narrow strip may be subjected to tensions sufficient to cause breakage. Never attempt to process any material unless the safe adjustments for that particular are known and can be implemented.

### **Traffic Around Equipment**

Care should be taken at all times in moving around the equipment, whether on foot or in a vehicle. Changes in floor elevation, machine bases and debris around the equipment are trip hazards. Take care that personnel are not trapped between vehicles and equipment.

## **▲DANGER**

**Do not attempt to walk or climb on any machine while in operation. Failure to observe this warning may result in death or serious injury.**

### **HAZARD REMINDER**

Use the following HAZARD REMINDER sheet to reinforce awareness of the hazards associated with coil processing lines. This reminder can be a useful supplement to your company's safety program. *IPI suggests the following steps:*

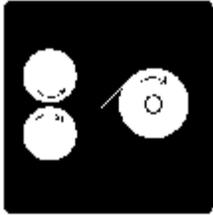
# E170 Rev A



1. SHOW each individual the HAZARD REMINDER sheet and explain each category of hazard.
2. POINT OUT EXAMPLES of each type of hazard on the actual equipment the individual operates or works around.
3. EXPLAIN HOW TO AVOID HAZARDS in the individuals work environment.
4. GIVE a copy of the HAZARD REMINDER sheet to each individual.

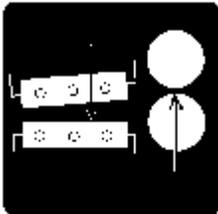
***Safety is everyone's business!***

# THINK SAFETY FIRST



## **NIP POINT**

WHEN ONE OBJECT ROTATES NEAR ANOTHER, IT CAN PULL YOU IN *and* CRUSH YOU



## **PINCH POINT**

WHEN ONE OBJECT MOVES CLOSER TO ANOTHER, IT CAN CUT *or* PINCH YOU.



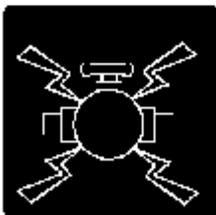
## **MOVING EQUIPMENT *and* COILS**

CAN KNOCK YOU OFF BALANCE *or* CRUSH YOU



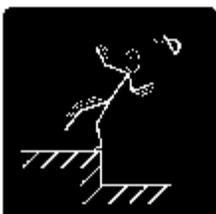
## **STRIP EDGES *and* ENDS**

CAN CUT *or* STRIKE YOU.



## **ELECTRICAL *and* FLUID SYSTEMS**

CAN SHOCK *and* BURN YOU *and* CAN EXPLODE.



## **CLIMBING ON MACHINES**

CAN MAKE YOU FALL - MAYBE INTO ONE OF THE HAZARDS ABOVE.



## LOCKOUT GUIDE

The protection of life and limb through responsible actions and adequate safeguards are the responsibility of all individuals in a workplace environment, or any environment where action or inaction could possibly endanger the safety and wellbeing of others.

All maintenance, repair and adjustment procedures performed on this equipment shall comply with existing established **Lockout** requirements. At a minimum, these requirements must include the use of a keyed padlock or similar device utilized to physically and securely remove and isolate any power source from the equipment, preventing accidental reapplication while personnel may be in exposed circumstances, subject to possible injury or death.

These requirements must also include the **tagging** of the lockout device to notify all individuals working in the area, or anyone who could for whatever reason be in a position to possibly remove or otherwise defeat the purpose of the lockout device, as to its installation, why, and the individual responsible for its application.

Power sources include electrical, pneumatic, hydraulic, or any other hazardous energy source. This procedure shall be used to ensure that the machine is stopped and isolated from all potentially hazardous energy sources and that these energy sources are locked out before employees perform any servicing or maintenance when the unexpected energization, start-up of the machine, or the release of stored energy could cause injury.

### FOR THIS UNIT *(where applicable)*

- **Hydraulic power** sources are provided with a lockable valve to block hydraulic pressure from the system. Where applicable, this valve shall be placed in the off position and locked in place.
- **Electrical power** sources are provided either with a male plug for connection to the electrical source, or are hardwired to the source distribution panel. When a plug is provided, the plug shall be disconnected from the source power and secured within a covering and tagged appropriately.

When hardwired to the source distribution panel, the panel shall have a manual disconnect which is lockable in the off position, or in the event of a circuit breaker, the panel will have a lockable door which will deny access to unauthorized personnel.

- **Pneumatic power** is applied to the machine through a quick disconnect fitting. This quick disconnect fitting shall be disconnected from the pneumatic power source and secured within a covering and tagged appropriately.

**E170 Rev A**



## INSTALLATION

### 1. INSTALLATION

#### A. SELECTING A LOCATION

Select a location that will save the most work and time in moving ductwork about in your shop. A table that matches the height of the bottom head base plate of the Cornermatic is a must in helping to position the duct sections into the Cornermatic, especially if only one person may be handling the duct (*refer to figure 2-2 for a diagram of the suggested table*).

#### B. PNEUMATIC REQUIREMENTS

A clean, dry air supply of **11 CFM at 110 PSI** (*not to exceed 120 PSI*) must be made available to the equipment. This can be a rigid supply line such as pipe, but the terminating line to the equipment should be a nonrigid air line to isolate the compressor and machine from each other's vibrations.

#### C. ELECTRICAL REQUIREMENTS

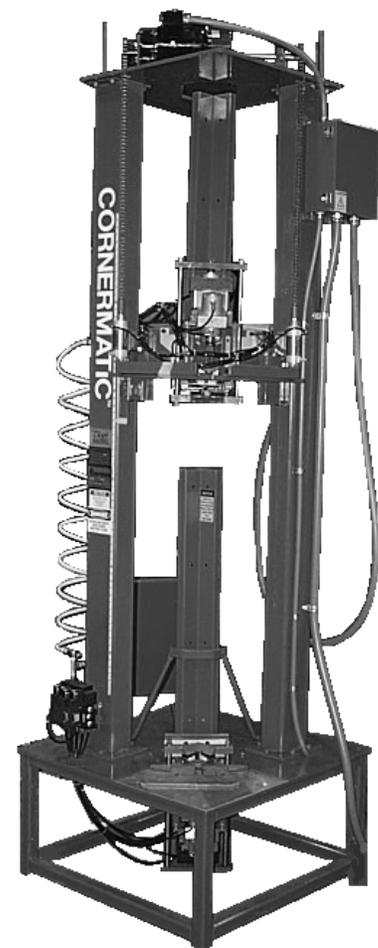
The machine should be properly connected to the available source of electrical power as specified at the time of order. The machine should also be located away from grinding machines, sanding machines, spray painting areas, and other sources of contamination if at all practical.

#### D. RECEIVING AND UNPACKING THE EQUIPMENT

When the equipment arrives, inspect it carefully before accepting the shipment. It is important to note any damage on the Bill of Lading or other shipping documents so that a claim can be filed with the carrier. Pay special attention to the control wiring, air regulator, gauges, etc. Check for physical damage to the switches and the components inside the Cornermatic. If anything looks damaged, notify both the carrier (*to file a claim*) and the Service Department at the factory (*to order replacement parts*). It is important to notify the factory promptly so the new parts arrive before the machine is installed, as it may not be possible to start and run the machine without them.

Normal procedures can be used in unpacking the machine with one exception. The skid can be removed after the machine is standing upright instead of taking the machine off the skid first.

- First, remove loose items on the skid such as the upper head magazine, the two 3/8" x 3/8" x 12" long aluminum corner loading rods, the main electrical panel, and the four stud leveling foot pads.



**Figure 1-1. Dual Head Cornermatic**

# E170 Rev A



- Before removing any covers, steel strapping, or skid, completely thread the four stud leveling foot pads on the legs while the machine is still setting horizontal on the skid.
- Next, by attaching a cable or strap to the skid end the Cornermatic top head is resting on, set the Cornermatic with skid upright in a vertical position, preferably in its final production location.
- Now adjust the leveling foot pads to firmly rest on the foundation with the end of the skid still resting on the floor, keeping the bottom head base plate horizontally as level as possible. With the hoisting cable (*WITH NO SLACK IN THE CABLE*) still attached to the skid and hoisting unit (*fork lift, overhead crane, etc.*), remove the steel strapping attaching the skid to the machine. The skid can now be lifted away and the Cornermatic lowered to the floor.
- Make any final adjustments necessary with the leveling foot pads to make the bottom head base plate level horizontally.

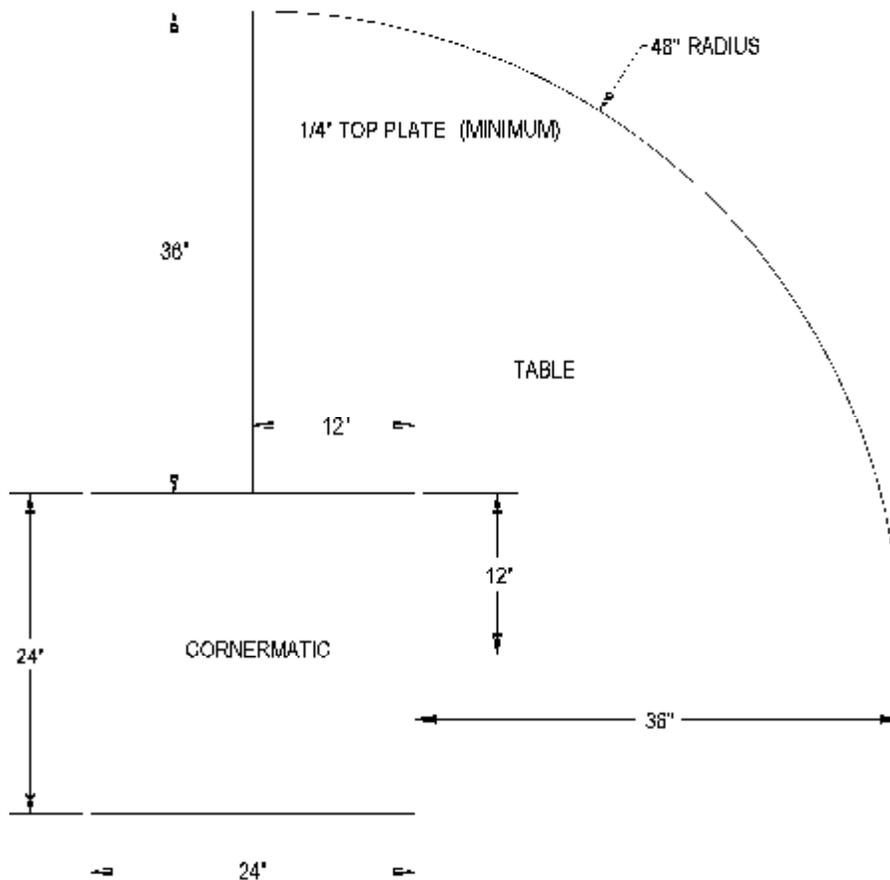


Figure 1-2. Cornermatic Table (User Supplied)

## **E. SAFETY REQUIREMENTS**

Before operating the machine, read this section. Study and follow the safety precautions listed here which are intended to prevent injury to you and your fellow workers. The precautions listed cannot cover all possible situations. Therefore, consider the consequences of your actions before executing any procedure or operation.

### **(1) Safety Precautions Before Starting The Machine**

1. Protect yourself. Wear safety glasses and leather gloves when handling metal. Do not wear loose clothing, neckties, or jewelry. If long sleeves must be worn, avoid cuffs and buttons.
2. Keep your work area clean. Remove all scrap, oil spills, rags, tools, and other loose items that could cause you to slip, trip, and fall.
3. Make sure that the electrical supply and air pressures are at specified levels before operating the machine.
4. Be sure that all guards are in place when operating the machine. Keep the equipment properly maintained.
5. Be alert for loose, worn, or broken parts. Do not attempt to operate the machine with such parts present, or if the machine is making unusual noises or actions.
6. Be sure this operation manual is kept near the machine so the operator can refer to it when necessary. If you have not already done so, study the manual before operating the machine.
7. Be aware of the location of the power off push-pull switch and use it to stop the machine in case of emergencies.

### **(2) Safety Precautions When Operating The Machine**

1. Be alert whenever operating the machine.
2. Only one person should control the machine. Never allow anyone to operate the controls while you are working on the machine. Use "WORK" tags and warning signs to indicate that someone is working on or repairing the machine.
3. Keep your arms and hands away from the internal workings of the machine when starting or stopping the machine.
4. Never leave the work area while the machine is running.
5. Do not try to process material that is beyond the specified thickness or width for your machine. Use good quality metal coils that are free from camber, burrs, and other irregularities.
6. When cleaning the machine, or any components of the machine, do not use toxic or flammable substances. Do not perform any cleaning operations while the machine is running.
7. Never override or disable any safety switch or safety interlock.
8. Use proper size wrenches and tools, most of which are furnished with the machine. Do not use adjustable crescent wrenches or worn wrenches. A slipping wrench can cause injury. Replace worn nuts, bolts, screws, etc., being sure they are of equivalent quality of those being replaced.

**E170 Rev A**



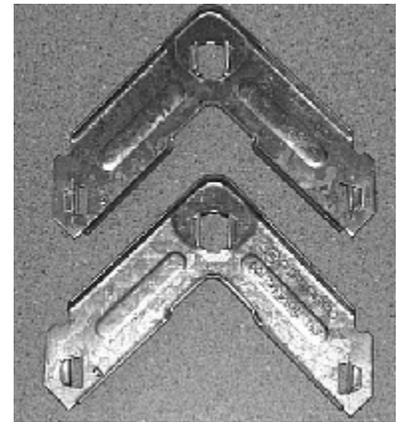
## SYSTEM OVERVIEW

### 2. SYSTEM OVERVIEW

The Iowa Precision Industries Dual Headed Cornermatic is a compact, pneumatically operated machine that inserts specific style TDC/F corners into the ends of assembled duct sections. The unit will automatically place a corner piece in a duct corner at each end of the duct simultaneously and crimp them securely and permanently into place.

The unit is vertically designed so that the top head is directly above the bottom head, with an installation that will put the base plate of the bottom head at operator foot level. The operator can slide the duct into the Cornermatic without having to lift it, saving the operator time and energy, and reducing the possibility of damage to the duct with less handling.

When a piece of air duct with the TDC/F type end connector is manufactured, it is necessary to install corner pieces into the four corners of each end of the duct. When the corners of each end of the air duct is positioned properly into the Cornermatic top and bottom heads, the unit will automatically begin the sequence required to insert a corner piece into each corner. The duct is first clamped into position on each head by rigid clamps, then a corner piece is slid into position on the inside edges of the top and bottom corners. The corners are then immediately pressed into the flange corners and the corner pieces are crimped securely into place with the edges of the TDC/F flanges on the duct. The machine heads retract to their home position, ready for the next insert cycle to be initiated. The operator removes the duct, rotates the duct to the next corner, and repeats the procedure.



**Figure 2-1. TDC & TDF  
Corner Pieces**

The Dual Head Cornermatic is specifically designed to simultaneously insert TDC/F corners into both ends of duct pieces manufactured from 60 inch wide coils. The unit is capable of being operated as a Single Headed Cornermatic if desired. The operator simply selects top, bottom, or both heads on the control panel, depending on the application. This is especially helpful when working with shorter joints of duct where only the bottom machine head is utilized. The top head only selection could be utilized to replace a missing top corner due to an empty magazine, or for a special duct joint requiring corner pieces on one end only.

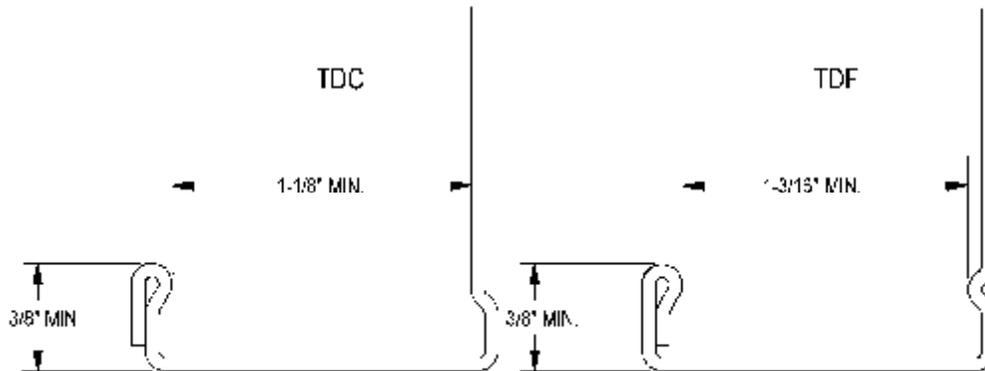


Figure 2-2. TDC and TDF Duct Flanges Dimension Requirements

### A. DUCT FLANGE SIZE ADJUSTMENTS

Mounted to the upper head assembly is a proximity switch referred to as the "Top Flange Present" switch on the electrical schematic. This switch is adjusted at the factory to recognize the flange of the duct when it is within 1/4 inch of the top head base plate. The upper head assembly is disabled if this proximity switch is not activated by the flange of the duct work piece. The proximity switch prevents the possibility of the operator getting their fingers pinched between the top head plate and the flange during a corner insertion cycle of the upper head. The 1/4 inch maximum allowable gap between the flange and the base plate prevents the operator from having enough clearance for placing their fingers in this area. This switch must not be tampered with and should be checked for proper range activation at least weekly. If the switch is found to be loose or out of adjustment of the 1/4 inch range described above, it must be readjusted and properly locked down. If the switch requires replacement for any reason, the new proximity switch must be installed and adjusted to sense the flange within the same 1/4 inch of the top plate as previously described. **FAILURE TO DO SO CAN RESULT IN SERIOUS INJURY TO PERSONNEL!**

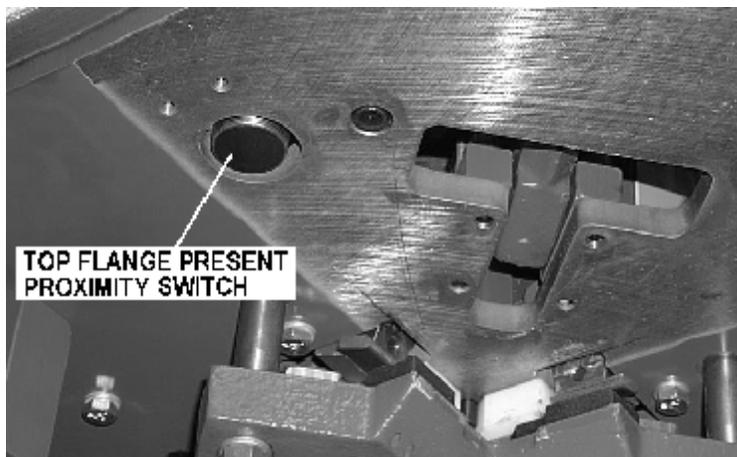


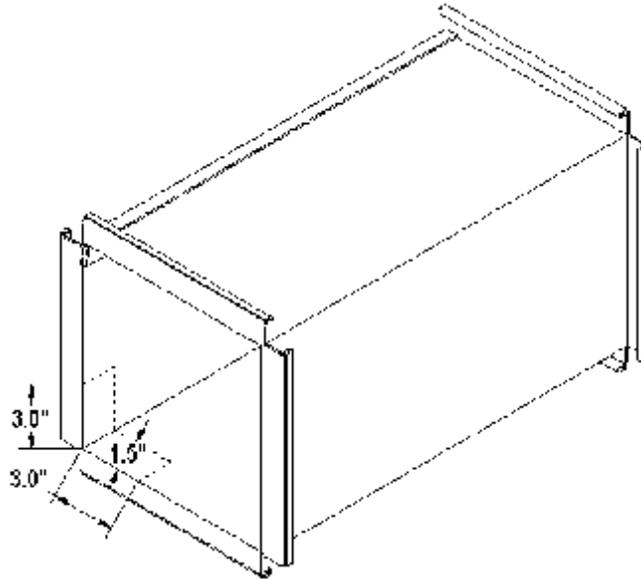
Figure 2-3. "Top Flange Present" Proximity Switch

### B. INSULATED DUCT

If a duct is insulated, before positioning the duct joint into the Dual Head Cornermatic, ensure there are no insulation pins that will interfere with the corner insertion process. Refer to the figure below for a detailed illustration of the area that should be free of insulation pins.

**▲ NOTE**

If a duct is insulated, before positioning the duct joint into the Dual Head Cornermatic, ensure there are no insulation pins that will interfere with the corner insertion process. Refer to the figure below for a detailed illustration of the area that should be free of insulation pins.



**Figure 2-4. Corner Area Free of Insulation Pins**

## **C. PROGRAMMABLE LOGIC CONTROL (PLC) OPERATING SEQUENCE**

The operating sequence of the Dual Head Cornermatic is controlled by a programmable logic control (PLC) located within the electrical enclosure on the machine. The unit operates with a standard 115 VAC outlet circuit. Once the unit is plugged into a power source, power is applied to the system and PLC by pulling Up on the power push-push switch. Power is removed by depressing the power push-pull switch or by unplugging the machine from the power source.

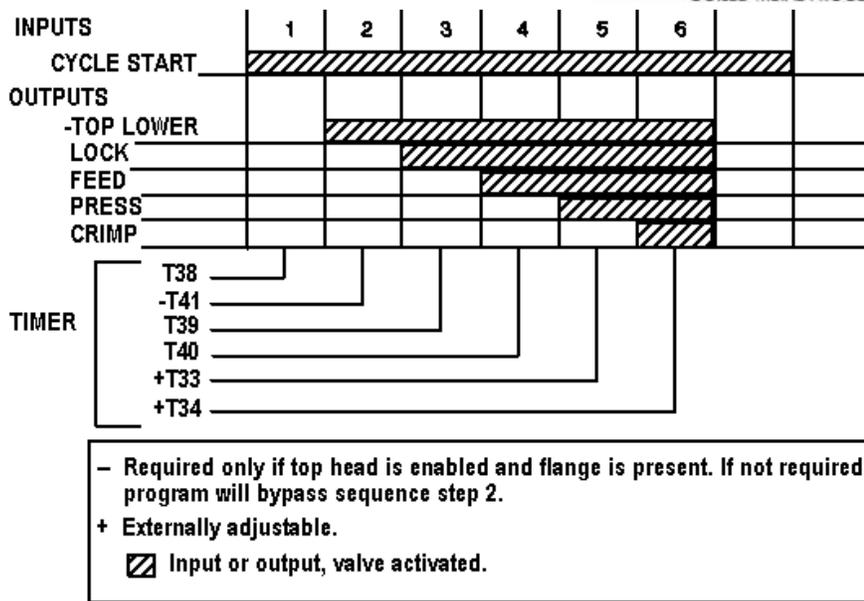


Figure 2-5. Machine Flow Diagram

## D. CONTROLS

### (1) POWER

A mushroom head push/pull switch which is illuminated **red** when pulled-up to power on the machine. When pressed down, power is removed from the machine.

### (2) TOP HEAD Power Push/Pull Switch

A mushroom head push/pull switch which is illuminated **green** when pulled-up to power on the Top Head crimper. When pressed down, the top head is disabled.

### (3) BOTTOM HEAD Power Push/Pull Switch

A mushroom head push/pull switch which is illuminated **green** when pulled-up to power on the Bottom Head crimper. When pressed down, the bottom head is disabled.

### (4) TOP HEAD DWN/UP Control Switch

A 3-position, self-centering OFF selector switch utilized to raise or lower the Top Head to meet the current duct length requirements.

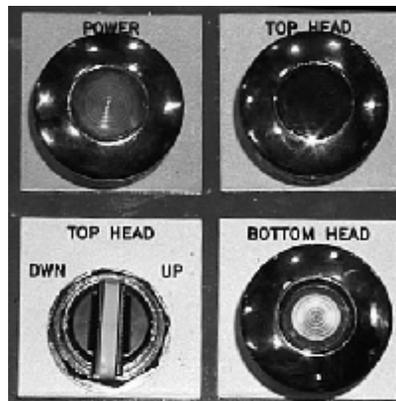


Figure 2-6. Control Panel Switches

## (5) Load Position

To lower the Top Head all the way down for magazine reloading, use the Top Head Dwn/Up selector switch. As the Top Head lowers, a sensor target bar located along the back of the unit's right side vertical upright, triggers a head mounted sensor. As the Top Head lowers, the Upper Corner Magazine Shift Out sensor is activated by the target bar, and the upper corner magazine pneumatic cylinder is activated to move the upper magazine to the rear. This rearward movement provides clearance for the passing of the Lower Corner Magazine.

When the Top Head is raised to a working position, this same sensor, when clear of the target bar, will cause the top head pneumatic cylinder to cycle the upper magazine in to its work ready position.

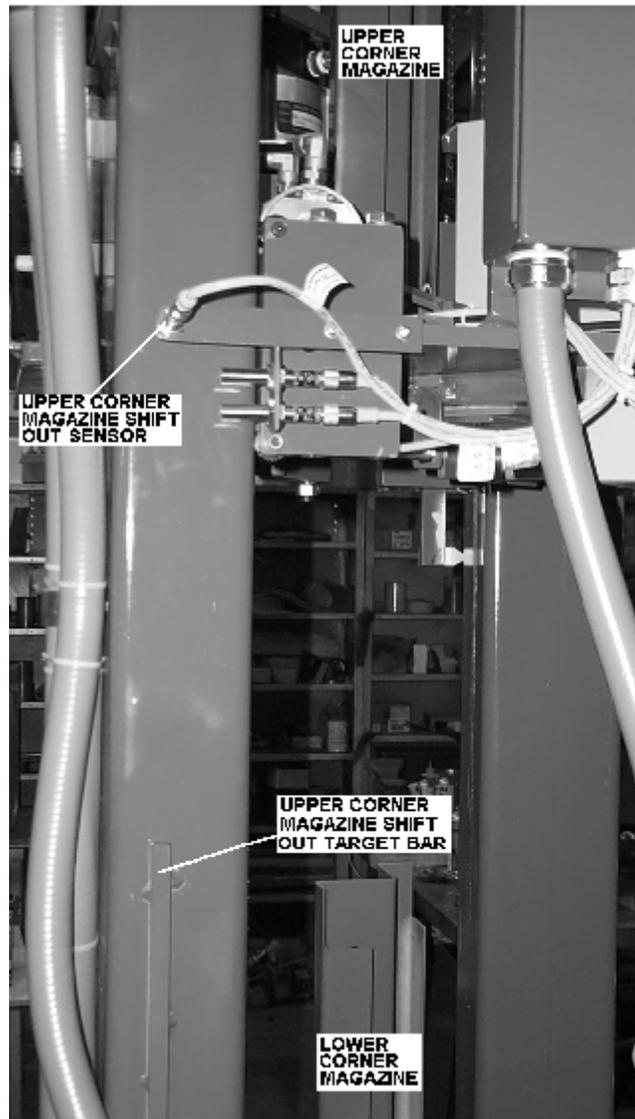


Figure 2-7. Magazine Shift Guide and Position Sensor

## (6) Control Sequence

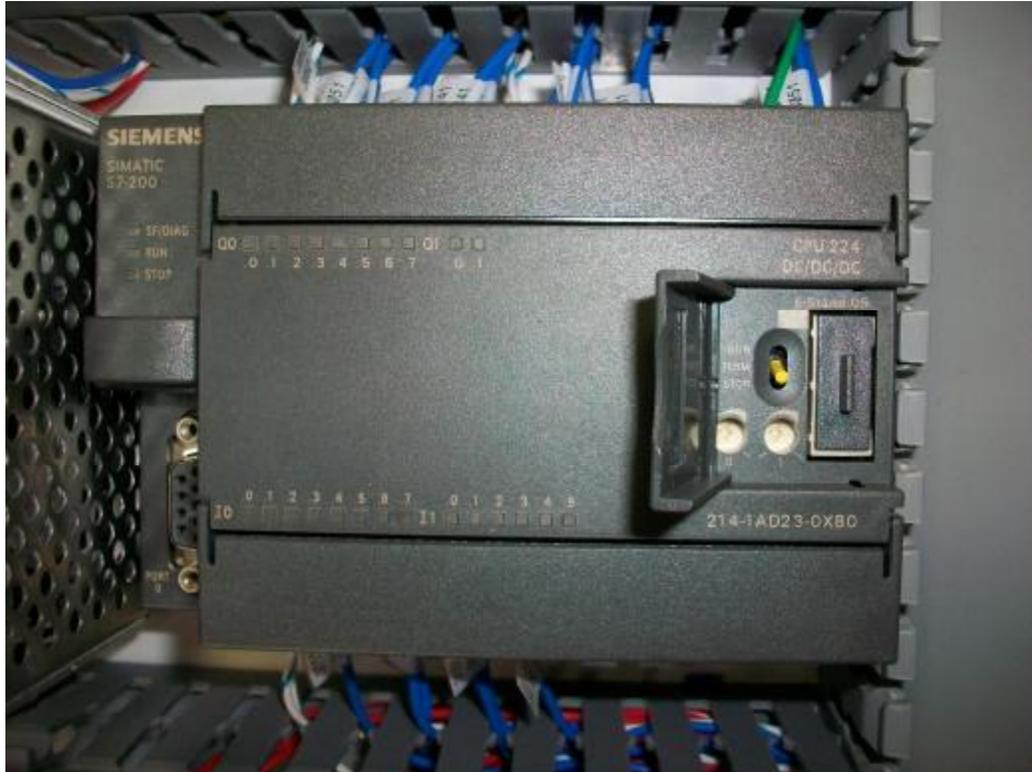
There are two push-pull ON/OFF switches to enable either or both the top and bottom heads as required for the duct being processed. To enable a head, pull out on the push-pull switch. A light in the switch, indicating that the head is enabled, will illuminate. To disable the head, press the push-pull switch. When the indicator lamp goes out, the head is disabled.

The machine operation is controlled by a series of timers within the PLC. The sequence is activated by two cycle start levers located on the bottom head. These levers activate two electrical switches that connect to inputs 0.0 and 0.1 of the PLC. Once these two inputs are activated and debounced, the sequence begins and steps through to completion. Both sequence start switches must be released before the next cycle can begin (*inputs 0.0 and 0.1 off*). If either switch should stick ON the unit will cease to function. Once the top head is enabled, a top flange must be present before the top head will cycle. The flange is sensed by a proximity switch located on the top head connected to input 0.4 of the PLC.



**Figure 2-8. Bottom Head Cycle Start Levers**

The step activation times for the first four steps of the sequence (*refer to the flow diagram Figure 2-5*) are not available for operation adjustment. However, the time for the last two steps, PRESS and CRIMP, can be adjusted by turning one of two potentiometers located under the flip up cover on the top of the PLC. The potentiometer labeled 0 controls the press time and the potentiometer labeled 1 controls the crimp time. Turning the potentiometer clockwise increases the time and turning the potentiometer counterclockwise decrease the time.



**Figure 2-9. PLC Press & Crimp Timer Adjust Potentiometers (*Under Cover*)**

***0 = PRESS, 1 = CRIMP***



## SYSTEM OPERATION

### 3. SYSTEM OPERATION

After completely reading this manual, the safety warnings and cautions, and the system overview, the operator should be ready to put the Cornermatic into operation.

#### A. SAFETY PRECAUTIONS

##### (1) Before Starting The Machine

1. Protect yourself. Wear safety glasses and leather gloves when handling metal. Do not wear loose clothing, neckties, or jewelry. If long sleeves must be worn, avoid cuffs and buttons.
2. Keep your work area clean. Remove all scrap, oil spills, rags, tools, and other loose items that could cause you to slip, trip, and fall.
3. Make sure that the electrical supply and air pressures are at specified levels before operating the machine.
4. Be sure that all guards are in place when operating the machine. Keep the equipment properly maintained.
5. Be alert for loose, worn, or broken parts. Do not attempt to operate the machine with such parts present, or if the machine is making unusual noises or actions.
6. Be sure this operation manual is kept near the machine so the operator can refer to it when necessary. If you have not already done so, study the manual before operating the machine.
7. Be aware of the location of the power off push-pull switch and use it to stop the machine in case of emergencies.

##### (2) When Operating The Machine

1. Be alert whenever operating the machine.
2. Only one person should control the machine. Never allow anyone to operate the controls while you are working on the machine. Use "WORK" tags and warning signs to indicate that someone is working on or repairing the machine.
3. Keep your arms and hands away from the internal workings of the machine when starting or stopping the machine.
4. Never leave the work area while the machine is running.
5. Do not try to process material that is beyond the specified thickness or width for your machine. Use good quality metal coils that are free from camber, burrs, and other irregularities.
6. When cleaning the machine, or any components of the machine, do not use toxic or flammable substances. Do not perform any cleaning operations while the machine is running.
7. Never override or disable any safety switch or safety interlock.

# DUAL HEAD ADJUSTABLE CORNERMATIC



8. Use proper size wrenches and tools, most of which are furnished with the machine. Do not use adjustable crescent wrenches or worn wrenches. A slipping wrench can cause injury. Replace worn nuts, bolts, screws, etc., being sure they are of equivalent quality of those being replaced.

## B. PREPARATION FOR OPERATION

1. Apply electrical power by pulling "UP" on the POWER switch. The switch will be illuminated **red** when power is applied.
2. Apply air pressure to the machine. System pressure should be approximately 110 psi.
3. To load the magazines, lower the Top Head to the full down position for top magazine access.
4. Using the two aluminum rods provided, Load both magazines with corners. The corner pieces are provided in stacked bundles. An aluminum rod is inserted through the holes of a stack so the complete stack can be picked up and slid easily into the magazine of either head.

### ⚠ CAUTION

The corners are loaded with the patent number *UP* on the *bottom head magazine* and the patent number *DOWN* on the *upper head magazine*.

5. At the control panel, use the TOP HEAD DWN/UP selector switch to raise (or lower) the top head to the desired height. Use the scale and indicator pointer on the left side of the unit to adjust the Top Head height. When properly adjusted, the duct should easily slide into position, with the top flange less than  $\frac{1}{4}$ " from the Top Head.

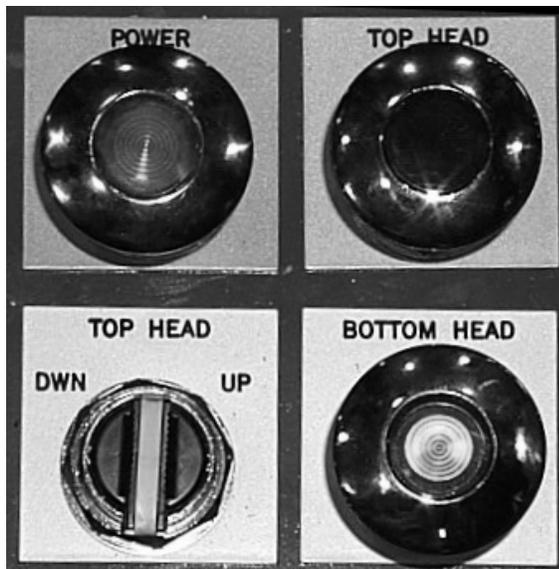
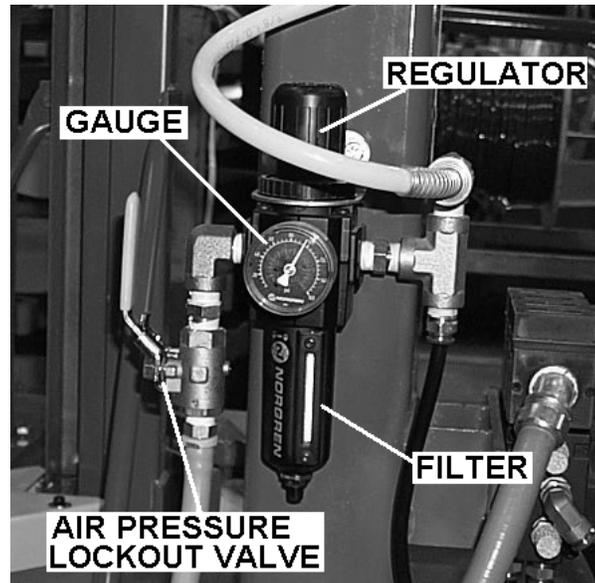


Figure 3-1. Control Panel



Figure 3-2. Top Head Position Scale

6. At the control panel, make the selection of bottom only, top only, or both heads by pulling up on the individual Top Head and/or Bottom Head push/pull switch. Each switch will be illuminated **green** when ON.



**Figure 3-3. Air Pressure Valve, Filter & Regulator**

7. Slide the duct with the TDC/F flange into position in the Cornermatic. When the two levers, one located on each side of the bottom head duct corner are both activated by the duct, the cycle will start. After completion of the cycle, pull the duct away from the heads, rotate the duct to next corner, and repeat the procedure. Repeat this procedure until all four corners of the duct are completed.



**Figure 3-4. Duct Placement**

### **C. TOOLING CHANGEOVER**

When switching from TDC to TDF or vice versa, the crimper blocks and presser blocks will have to be changed. The following is a step-by-step procedure for a tooling changeover.

# DUAL HEAD ADJUSTABLE CORNERMATIC

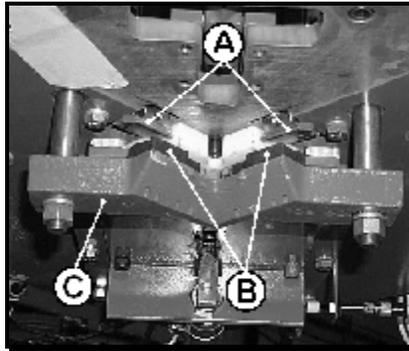
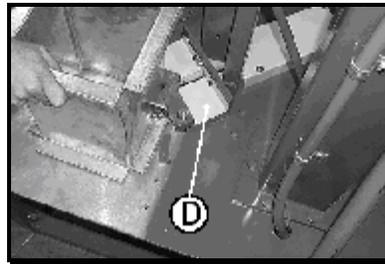


Figure 3-5. Tooling Changeover (Top Head Shown)

1. Manually fire the Crimper Valve, and while activated, shut off and lockout pneumatic supply. The crimper blocks will move to the “crimp” position, which enables access to the mounting bolts.
2. Lockout electrical power sources.
3. When changing the lower head tooling, remove the guard (Item D) that covers the crimping area.



4. Unbolt the presser head (Item C).

## NOTICE

After removing a presser head, mark the head to ensure the heads are replaced correctly.

5. Unbolt both press blocks (Item B) from the presser heads and replace with new blocks. Use a small amount of blue loc-tite when re-assembling.
6. Remove crimper blocks (Item A) and replace with new blocks. Use a small amount of blue loc-tite when re-assembling.
7. Install presser head.
8. Using a TDC or TDF corner, slide the corner up and down the magazine to ensure there is no excessive play as the corner slides. If the corner binds, use a pair of channel locks to open up the magazine.

### D. SYSTEM SHUT-DOWN

1. Remove Air Pressure from the system.
2. Press DOWN on the control panel POWER switch. All control switch lamps should extinguish.

## 4. MAINTENANCE

Assembly drawings of the equipment, along with electrical schematics which are helpful in servicing our equipment, are provided in the back sections of this manual. Exact component data is not always available from our suppliers, and some parts may be modified by Iowa Precision. We recommend that you contact our Service Department to assure that you use proper replacement components. Please take time to become familiar with the maintenance section, which can speed servicing of your equipment.

Precision components, skilled assembly and sophisticated engineering enable Iowa Precision Industries to produce machinery capable of long, trouble-free operation. However, few machines, if any, are totally exempt from the wear and tear resulting from heat, friction, dirt, and neglect. Even with good maintenance, parts eventually wear out and have to be replaced. However, regularly scheduled maintenance will lead to longer machine life. Because your new machine requires minimal maintenance (*and because internal damage may remain hidden for some time*), it is easy to put off maintenance procedures. Without maintenance, damage is almost certain to occur, even though the system appears to be operating satisfactorily. Too often, this results in machine failure.

### B. MAINTENANCE SAFETY

1. Never put hands in the operating area of the machine unless power and air are completely removed from the machine. This includes:
  - Over duct clamps
  - Under or in front of the press head
  - In front of feed plate in magazine or in front of magazine
  - In crimper slots
2. While placing duct in the machine, keep hands well above the surface of the base plate.
3. Should a corner piece get caught under the press head, **DO NOT** try to remove with it using your fingers. Use a long probe and keep away from the path of the duct clamp.
4. Monitor the magazines, and always reload the magazines before they empty.
5. Do not try to initiate machine operation by depressing the actuating fingers other than with the duct flange. Failure to comply may damage the press blocks.
6. NEVER have power ON or air pressure applied when the machine is unattended.
7. REMOVE ALL POWER AND AIR FROM THE MACHINE BEFORE WORKING ON A PROBLEM OR PERFORMING ANY TYPE OF EQUIPMENT MAINTENANCE.

### C. SERVICING

#### (1) Lubrication, General Requirements

To ensure that the system is kept in a correct operating condition, it must be inspected and maintained on a regular basis. Proper cleaning, the periodic lubrication of bearings, bushings and other moving friction and wear generating points will prevent damage to or failure of the unit, and provide optimum performance.

# DUAL HEAD ADJUSTABLE CORNERMATIC



The maintenance technician must become familiar with all the lubrication points located on the machine. Those points where metal-to-metal contacts of movable surfaces are located must be adequately lubricated.

During lubrication procedures, a preventative maintenance inspection should also be conducted. Check the machine visually for loose nuts, bolts, parts out of adjustment, etc. Correct all deficiencies while they are small, and before they become operational problems.

Certain parts of the machine are left unpainted to aid in the movement of slide assemblies, etc. Keep these areas clean and coated with a light grease.

## (a) Lubrication Schedule

Do not over-lubricate.

- When using a low pressure grease gun, lubricate only to the point of grease starting to come out of the edges of the seals, etc., of the item being lubricated.
- Do not over lubricate chains. Chains should not be lubricated to the point that oil is "flung" off during operation.
- Ensure that proximity sensor heads are kept clean and free of lubricant. Dirty sensor heads will affect system operation.

## D. PREVENTIVE MAINTENANCE

A periodic inspection schedule should be established and maintained. The periodic inspection criteria should meet the minimum requirements necessary to ensure safe reliable service under the equipment's operating conditions. It should be modified as required to meet varying operating and environmental conditions.

### (1) Preventive maintenance checks:

1. The system air supply is at a specified level at all times during the operating cycle of the equipment.
2. Check the air supply for excessive moisture. In some areas of high humidity, it may be necessary to drain the water more often on the compressor or add more moisture removing capability.
3. Be alert for loose, worn, or broken parts. Do not attempt to operate the machine with such parts present, or if the machine is making unusual noises or actions.
4. Ensure the machine is sitting level (*bottom head base plate should be level horizontally*) and with all the leg supports planted firmly on the floor.
5. With power and air disconnected from the machine, clean the machine at least weekly by blowing it out and off with compressed air. *Be sure to wear eye protection for this procedure and be sure no other personnel are in the area.*
6. With power and air removed from the machine, periodically add a light coat of oil on all the sliding and moving parts on both heads.
7. With power and air removed from the machine periodically check that all wire connections and terminal connections are tight.
8. Check that the supply voltage is within a 10% tolerance of the specified voltage on the electrical schematic.

9.

## **E. TROUBLESHOOTING**

This section contains troubleshooting information to assist in locating and correcting operating troubles which may develop in the Cornermatic. Each malfunction for an individual component, unit or system, is followed by a list of tests or inspections which will help the technician to determine probable causes and corrective action to take.

The tests/inspections and corrective actions should be performed in the order listed.

Troubleshooting is a logical and systematic process of determining and correcting the cause of a malfunction. The process begins with verification of the malfunction. This may often involve an operation checkout of the unit. After the trouble has been verified, identify all components in the circuit whose failure could cause the symptoms observed during the operational checkout. The technician should start by checking those items which are highest in probability of causing the problem. Inspect and test each component, until the exact cause of the problem is determined and corrected.

# DUAL HEAD ADJUSTABLE CORNERMATIC



Table 4-1. Troubleshooting Chart

SYMPTOM	PROBABLE CAUSE	CORRECTIVE ACTION
Machine will not start the operating cycle when the duct is correctly positioned into the Cornermatic.	One or both of the start switches are not being activated	1. Remove electrical power completely from the machine.
		2. Push each start lever in and listen for each switch to click once. The sooner you hear the click while pushing in on the lever, the less sensitive the machine will be to locating the duct squarely into the machine.
		3. If you here the switch click twice when pushing in the start lever, it probably clicked on and back off. Carefully bend the switch lever so the switch is activated after just a few degrees of rotation of the lever, and remains activated for the maximum possible rotation of the lever.
		4. If you don't hear the switch click at all, the screw that locks the start lever and the switch cam together could be loose or stripped. There is a flat on the start lever shaft for the screw to locate against. Retighten the screw and check actuation of switch. If the hole threads are stripped, it could be quickly drilled and tapped for a larger screw. If it cannot be repaired, replace the part.
The machine won't start or will not complete the operation cycle but both start switches are working properly.	Air valve malfunction.	Each air valve for the complete operating cycle can be manually actuated by turning the little red screw on each valve CW approximately a quarter turn. Turning the screw back CCW will turn the valve back off. With the POWER off, cycle each valve at least 3 or 4 times, observing the mechanical operation of each step to ensure there is no mechanical binding. This procedure will show problems such as mechanical binding, any broken parts, pinched or plugged air lines, low air pressure or valve contamination.
Bottom head will not cycle.	Bottom head power switch not on, or head not powered.	Check to see the head is enabled, the head power switch is lit and PLC input 0.3 is ON.
Neither the bottom or top head will cycle.	Cycle start switches are not functioning properly.	With no duct present, both switches are deactivated PLC inputs 0.0 and 0.1 are off. With duct present, both switches should be activated inputs 0.0 and 0.1 ON.
Top head will not cycle.	Bottom head power switch not on, or head	Check to see the head is enabled, the head power switch is lit and PLC input 0.2 is ON. When a duct is in

**Table 4-1. Troubleshooting Chart**

<b>SYMPTOM</b>	<b>PROBABLE CAUSE</b>	<b>CORRECTIVE ACTION</b>
	not powered.	place and a flange is present, the PLC input 0.4 is ON.

## **F. ASSEMBLY DRAWINGS & ELECTRICAL SCHEMATICS**

This Assembly Drawing and Electrical Schematic sections contain drawings and schematics for your equipment. The drawings contain pertinent information for the operation, maintenance, and repair of your equipment. Refer to the drawings when working on the equipment and when ordering replacement parts.

### **ASSEMBLY DRAWING LIST**

The following listed drawings are included in this manual. If replacement drawings are required, order by drawing number.

<b>DRAWING NO.</b>	<b>TITLE</b>
508-0020-01-00	AIR SCHEMATIC ADJ DUAL HEAD CORNERMATIC
509-0023-01-00	ADJUSTABLE CORNERMATIC ASSY 6FT

### **ELECTRICAL DRAWING GROUP NUMBER (CD)**

<b>DRAWING NO.</b>	<b>TITLE</b>
E95-321	CORNERMATIC DUAL HEAD ADJUSTABLE