Stein
Jet Stream
Oven II

JSO II Operation and Maintenance Manual

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JSO II (D)

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E.E. Approval _____

Compiled By: _____

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Chapter 1

Safety Information

WHAT SAFETY MESSAGES MEAN

The safety alert symbol signals important safety messages in this manual. Information which follows this symbol tells you the correct procedure to follow to prevent personal injury or damage to the equipment. It also tells you what could happen if you don't follow the directions. **Whenever you see this symbol, be very sure you understand the message that follows it.**

⚠

This safety alert symbol will be followed with a term that identifies the seriousness level of the message to follow:

⚠ DANGER — **When the word DANGER follows the alert symbol, this always signifies an immediate hazard which WILL cause severe personal injury or death if instructions (including recommended precautions) are not followed.**

⚠ WARNING — **When the word WARNING follows the alert symbol, this signifies hazards or unsafe practices which COULD cause severe personal injury or death if instructions (including recommended precautions) are not followed.**

⚠CAUTION

When the word CAUTION follows the alert symbol, this signifies hazards or unsafe practices which could result in minor injury, product or property damage if instructions (including recommended precautions) are not followed.

⚠ Safety Instructions

The use of the wording **Safety Instructions** after the alert symbol signifies that the message that follows will assist you in the safe operation of the machine.

⚠ Note

When you see **Note** in the manual, the message that follows is important, but not safety related.

SAFETY FIRST

Stein equipment is designed and manufactured with due consideration and care for generally accepted safety standards. However, like any mechanical device, the proper and safe performance of this equipment depends upon using sound and prudent operating, maintenance, and servicing procedures under properly trained supervision.

For your protection, and the protection of others, **learn and always follow the safety rules** outlined in the following paragraphs and this manual. Observe warning signs on machines and exercise safe practices. Form safe working habits by reading the rules and abiding by them. Keep this manual handy and review it from time to time to refresh your understanding of the rules.

Do not take chances. The odds are stacked against you!!

OPERATING ZONE

An operating zone should be established around all machines. A brightly painted guard rail or warning stripe should define the zone. Only the operator or other authorized personnel should be within the operating zone when machine control circuits are energized or the machine is running.

No tools or other equipment should be kept within the operating zone.

SAFETY INSPECTION

BEFORE STARTING MACHINE:

1. Be absolutely positive all guards and safety devices are installed and operative.

2. Be sure all personnel are clear of machine.

3. Remove (from the operating zone) any materials, tools or other foreign objects that could cause injury to personnel or damage the machine.

4. Make certain the machine is in operating condition.

5. Make certain all indicating lights, horns, pressure gauges or other safety devices or indicators are in working order.

AFTER SHUT DOWN:

Make certain all air, hydraulic, and electrical power is turned off.

OPERATING SAFETY

1. Do not operate this machine until you read and understand the operating instructions and become thoroughly familiar with the machine and its controls.

2. Never operate a machine while a safety device or guard is removed or disconnected.

3. Always wear safety glasses, safety hats or any other required safety equipment.

4. Never remove "Warnings" that are displayed on the machine. Torn or worn labels should be replaced.

5. Do not start the machine until all other personnel in the area have been warned and have moved outside the operating zone.

6. Remove any tools or other foreign objects from the operating zone before starting.

7. Absolutely do not have loose clothing or unrestrained long hair near operating machinery.

8. Keep operating zone free of obstacles that could cause a person to trip or fall towards an operating machine.

9. Never sit or stand on anything that might cause you to fall against the machine.

10. "Horseplay" around machine at any time is dangerous and prohibited.

11. Know the **EMERGENCY STOP** procedure for the machine or know how to stop a machine quickly.

12. Air, hydraulic and electrical power must be off when machine is not in use.

⚠ CAUTION

For maximum protection the power source should be locked out using a padlock for which only you have the key. This prevents anyone from accidentally turning on the power while you are servicing the machine.

13. Never operate machine above specified speeds, pressures, or temperatures.

14. Never manually operate limit switches with power on.

15. Keep alert and observe indicator lights and warnings that are displayed on the machine.

16. Never leave the machine unattended while in operation.

17. Do not operate faulty or damaged equipment. Make certain proper service and maintenance procedures have been performed.

18. Never place fingers, hands, or any part of your body into the machine or near moving parts when control circuits are energized.

SERVICE AND MAINTENANCE SAFETY

1. Do not service a machine until you are thoroughly qualified and familiar with the tasks to be performed.

2. Exercise caution when moving machines on casters.

3. Never operate any controls while other persons are performing maintenance on the machine.

4. Do not by-pass a safety device.

5. Always use the proper tool for the job.

6. Never open covers that house electrical components with power on.

7. When directed to make adjustments on machines in motion, extreme care must be taken.

8. Relieve all air and hydraulic pressure before performing maintenance or loosening connections on any pressurized system.

9. Air, hydraulic, and electrical power are to be turned off unless they are absolutely required for the specific servicing being performed.

⚠ CAUTION

For maximum protection the power source should be locked out using a pad lock for which only you have the key. This prevents anyone from accidentally turning on the power while you are servicing the machine.

10. Replace fuses only when electrical power is off (locked out).

ELECTRICAL SAFETY

1. **All electrical/electronic maintenance and service should be performed by trained and authorized electricians only.**

2. **Assume at all times that POWER is "ON" and treat all conditions as live.** This practice assures a cautious approach which may prevent an accident or injury.

3. To remove power from circuit or equipment, open disconnect or breaker and lock in open position.

⚠ CAUTION

For maximum protection the power source should be locked out using a padlock for which only you have the key. This prevents anyone from accidentally turning on the power while you are servicing the machine.

4. Make certain that the circuit is OPEN by using the proper test equipment.

⚠ Note

Test equipment must be checked at regular intervals.

5. Capacitors must be given time to discharge, otherwise it should be done manually with care.

6. There may be circumstances where "trouble-shooting" on live equipment may be required. Under such conditions, special precautions must be taken as follows:

   (A) Make certain your tools and body are clear of power sources.

   (B) Extra safety measures should be taken in damp areas.

   (C) Be alert and avoid any outside distractions.

7. Before applying power to any equipment, make certain that all personnel are clear of the machine.

8. Control panel doors should be open only when checking out the electrical equipment or wiring. After closing the panel door, make certain that (on those panels where applicable) the disconnect handle mechanism is operating properly.

9. All covers on junction panels should be closed before leaving any job.

HYDRAULIC SYSTEM SAFETY

1. Never operate a hydraulic system unless covers, safety devices and indicators are operating and in place.

2. Never operate a hydraulic system above the pressure specified.

3. Hydraulic fluid should never be allowed to collect on floors or equipment.

4. Avoid skin contact with hydraulic fluid. Always wear proper protective clothing when handling hydraulic fluid.

5. Never loosen any hydraulic connection when the system is under pressure.

6. Hydraulic and electrical power are to be turned off unless they are expressly required for the specific maintenance being performed.

7. Never operate a machine that has leaks in the hydraulic system.

8. Use only recommended hydraulic fluids in the system.

9. Inspect your complete hydraulic system for signs of damage or oil leakage at least once a week. Immediately replace damaged or leaking parts.

CLEANING SAFETY

MANUAL CLEANING PROCEDURES:

1. Be careful when using toxic and/or flammable solvents to clean a machine.

2. Keep electrical panel covers closed and power off when washing a machine.

⚠ CAUTION

For maximum protection the power source should be locked out using a lock for which only you have the key. This prevents anyone from accidentally turning on the power while you are servicing the machine.

3. Always clean up spills around machine as soon as possible.

Safety Label Application Instructions

1. Thoroughly clean metal surface using **absolutely clean, lint free cloth,** saturated with isopropyl (rubbing) alcohol.

⚠ Note Do not use lacquer thinner or other thinner solvent to clean the metal surface.

2. Allow alcohol to evaporate.

3. Remove **only** the top band of backing paper.

4. Position decal where indicated on the Warning Label Location Drawing (next page).

⚠ Note Position decals only where indicated. These sites have been tested for surface temperature. Do not apply decals on surfaces which will exceed 250 degrees F (121 degrees C) under operating conditions or the adhesive will fail.

5. Remove the rest of the backing paper bands one at a time while **lightly** pressing decal down through the vertical center.

6. Starting **at the center**, smooth the decal in place.

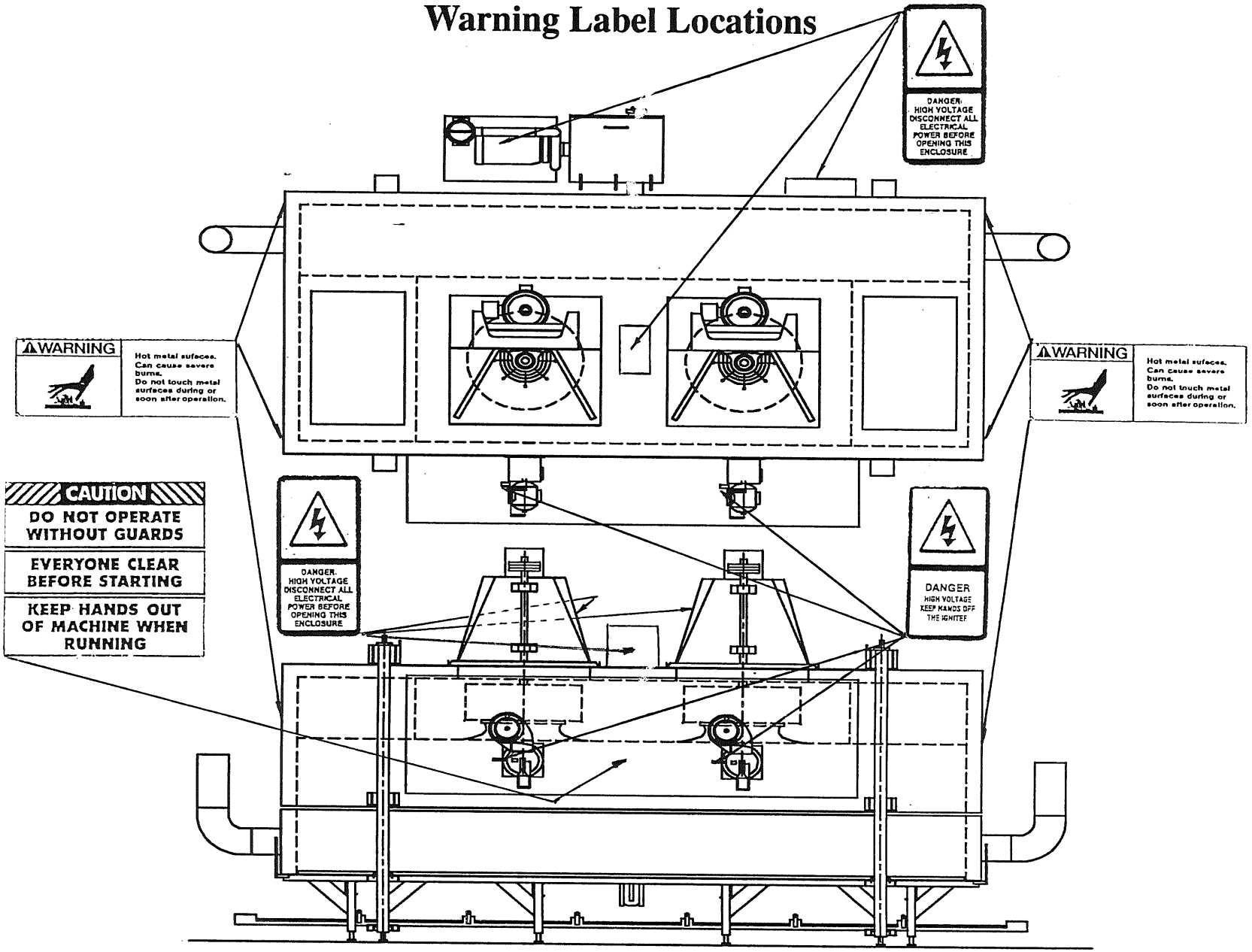
⚠ Note Avoid touching the adhesive with cloth or hands to prevent contamination, which will reduce adhesive effectiveness.

7. Make sure all corners and edges are fully sealed.

8. If decal is wrinkled or damaged, peel off, wash metal with alcohol again and apply new decal. Additional safety decals can be ordered from:

Stein, Inc.
1622 First St., PO Box 5001
Sandusky, Ohio 44871-8001
(419) 626-0304

Stein JSO II
Warning Label Locations

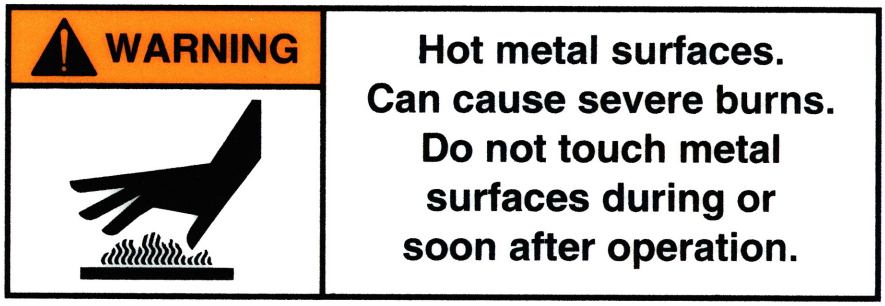


HOT SURFACE WARNING LABEL

APPLY **HOT SURFACE WARNING LABEL** TO SURFACES OF EQUIPMENT WHICH EXCEEDS 140°F (60°C). APPLY TO ALL FRYERS, OVENS, AND OTHER EQUIPMENT AS NECESSARY.

SEE SAFETY DECAL APPLICATION INSTRUCTIONS BEFORE APPLYING

NOTE: THESE LABELS SHOULD NOT BE APPLIED TO SURFACES WHERE THE TEMPERATURE EXCEEDS 250°F (121°C).



A001-01-0100

IMPORTANT

DISCONNECT EQUIPMENT ELECTRICALLY AND/
OR HYDRAULICALLY BEFORE ATTEMPTING
ANY MAINTENANCE ON MACHINE

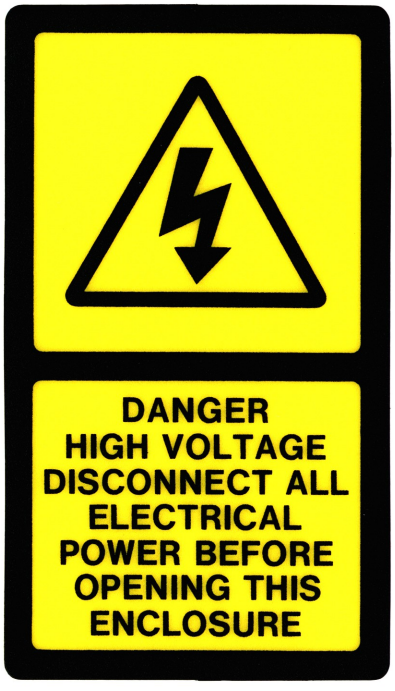
I.E.C. HIGH VOLTAGE WARNING LABELS

APPLY **IEC HIGH VOLTAGE WARNING LABEL** TO ALL CONTROL ENCLOSURES AND JUNCTION BOXES. THE LABEL SHOULD BE APPLIED AT A LOCATION WHERE IT WILL BE VISIBLE TO ANYONE ATTEMPTING TO OPEN THE ENCLOSURE. IF AN ENCLOSURE HAS MORE THAN THE ONE DOOR (LARGE OVEN CABINETS) USE ONE LABEL PER DOOR.

APPLY **IEC GROUND SYMBOL LABEL** ADJACENT TO THE GROUND BARS IN ALL CONTROL ENCLOSURES AND JUNCTION BOXES. THE GROUND SYMBOL LABEL IS NOT NECESSARY ON CORD CONNECTED EQUIPMENT, OR WHERE THE YELLOW/GREEN ENTERLEC GROUND TERMINALS ARE USED.

SEE SAFETY DECAL APPLICATION INSTRUCTIONS BEFORE APPLYING

HIGH VOLTAGE WARNING LABEL



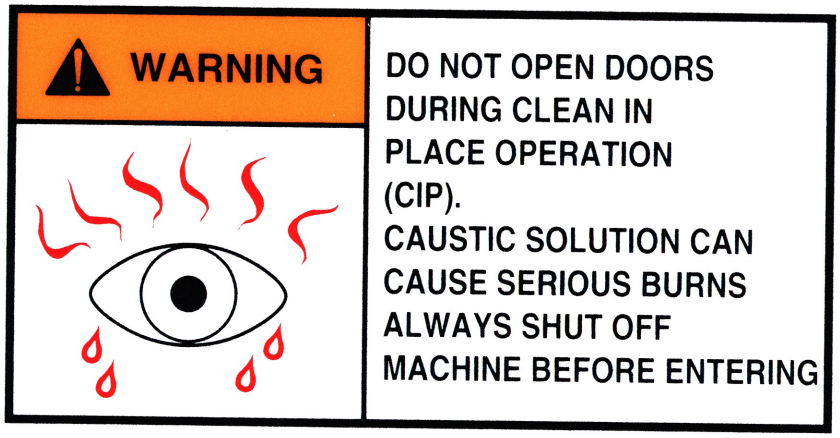
GROUND SYMBOL LABEL

C.I.P. WARNING LABEL

APPLY **CIP (CLEAN IN PLACE) WARNING LABEL** (STEIN PART 001-01-0118) TO ALL OVEN DOORS. THE LABEL SHOULD BE APPLIED WHERE IT WILL BE VISIBLE TO ANYONE ATTEMPTING TO OPEN THE DOORS. IF AN ENCLOSURE HAS MORE THAN ONE DOOR (LARGE OVEN CABINETS) USE ONE LABEL PER DOOR.

SEE SAFETY DECAL APPLICATION INSTRUCTIONS BEFORE APPLYING

CIP (CLEAN IN PLACE) WARNING LABEL



A001-01-0118

Chapter 2

Operating Instructions

The following procedure applies to the normal day-to-day operation of the oven. If you have any questions, check with your supervisor or contact Stein, Inc.

Pre-start-up Checklist

Before attempting to start the oven, check the following:

1. Be sure the oven has been thoroughly cleaned.
2. Inspect the temperature detectors inside the oven. To operate properly, these sensors must be clean. Clean them if necessary.
3. Check to be sure that all guards are securely in place.
4. Check water seals to be sure they are in place.

⚠ WARNING

Be sure to read and make certain you understand all the procedures in this chapter before you operate this oven. Read this chapter all the way through, including the Emergency Shutdown Procedure (pg. 2 · 7), before you start the oven for the first time.

Start-up Procedure

⚠ WARNING

Before applying power, make certain that all personnel are clear of the equipment and control cabinet is closed.

1. Turn on main electric power switch at control cabinet.
2. Turn on control power by pressing the pushbutton labeled **Control Reset**.
3. Turn on gas, steam and hydraulic power by opening the appropriate valves.
4. Turn the water on for bottom cooling plates and water seals.
5. Turn on the conveyor.
6. Turn on the belt-cleaning brush motors.

At this time, before starting the burner firing sequence, complete the following **Daily Preventive Maintenance** inspection:

⚠ CAUTION

Do not attempt any maintenance or service procedures with the equipment running or power turned on. Be certain the power is disconnected and locked out to prevent accidental starting when completing any maintenance or service procedures.

1. Inspect product belt. Straighten bent wires and replace broken ones. (See detailed instructions in **Maintenance** section.)
2. Lubricate infeed- and discharge-end belt shaft bearings. (Refer to the lubrication drawing at the end of the **Maintenance** section).
3. Check each internal air plenum (finger) to be sure it is securely seated. Also check to be sure the jet plate is seated securely on the plenum.
4. Inspect all drains to be sure they are free-flowing.
5. Check hydraulic motors, valves, hoses, fittings and filter for leaks. Replace seals immediately on any leaking part.

⚠ **CAUTION** **Replace any hoses showing wear, fitting leaks or damage caused by kinking. Any break in the hose's outer covering makes it susceptible to deterioration caused by cleaning solutions.**

6. Check gas pressure. The incoming gas pressure gauge should read between 15" w.c. and 28" w.c. If the pressure is either too high or too low, inform your supervisor or service personnel.

7. Check the position of the belt cleaning brushes. If they are worn and not solidly contacting the belt, move them closer to the belt by rotating the brush assembly on the slots in the brush bearing plate.

Burner Firing Sequence

After you have completed the preventive maintenance inspection, complete the following steps to light the oven:

1. Lower the oven hood by pressing the **Lower** pushbutton on either end of the operator's side of the oven. Be certain that the water seals contact the water in the lower cabinet trough.

2. Turn on the vent fans by pressing the green **Vent Fans Start** pushbutton on the control panel.

3. Depending on the airflow control equipment on your oven, you will complete one of the two following procedures to start the circulation fans:

   a. If the oven is equipped with either a **single-speed** or **two-speed fan**, select **High** or **Low** speed for the two-speed fan, then press the green **Circulation Fan Start** pushbutton.

   b. If the oven is equipped with a **variable speed circulation fan controller or an airflow damper**, press the green **Circulation Fan Start** pushbutton.

⚠ **Note** **For ovens with variable speed circulation fans:**

There is a digital readout labeled **Fan Speed** and a knob labeled **Circulation Fan Speed** on the oven control cabinet. The readout shows the percentage of full speed at which the fans are running. Turn the knob clockwise to increase fan speed and counterclockwise to decrease speed.

⚠ Note

For ovens with airflow damper controls:

There is a dial labeled **Airflow Camper Control** on the control cabinet. Turn the dial to the percentage of airflow required through the nozzles in the internal plenums (fingers). 100% is full airflow.

4. Reset the High Temperature Limit device by pressing the green **High Temperature** pushbutton.

5. When the **Low Water Pressure** light comes on, start the Burner Firing Sequence by pushing the green **Burner Start** pushbutton.

⚠ Note

The burner **will not** light if **any one** of the green Limits Circuit lights (High Temperature, Circ. Fan at Speed, Low Gas Pressure, High Gas Pressure, Low Water Pressure) on the control panel is not lit. (See the **Limits Circuit** description in the **Technical Service Information** section of this manual for a detailed explanation of the circuit.)

⚠ Note

The system goes through a purge cycle for several minutes before ignition. While the system is purging, the green **Purge** light on the control panel will be lit. The light will go out when the cycle is complete.

After the oven is lit, you can adjust the following according to the requirements of the product you are running:

1. Set the temperature at the temperature controller by pressing the "arrow up" or "arrow down" key. This will either increase or decrease the set point (bottom) number on the controller's display. The top number on the display shows the actual temperature of the oven.

Temperature Controller Notes

When a temperature alarm is present, the temperature reading (upper display) on the Eurotherm unit labeled **Temperature Control** will flash on and off. Two alternating messages will flash in the lower display area. A "d AL" symbol indicates deviation alarm. The "d AL" symbol will alternate with a number which indicates the setpoint.

A temperature deviation alarm is normal at start up since the actual oven temperature is less than the setpoint by more than 25 degrees F (15 degrees C).

2. To set the steam flow rate:

   a. for **manual systems,** follow the steps below:

⚠ Note Check to be sure the valve in the steam line to the heat exchanger is closed.

   1. Open the main oven steam valve.

   2. Set the valves immediately upstream of the steam flow meters to deliver the amount of steam required for the product you are running. (See **Setting Steam Flow**, in the **Technical Service Information** section):

   b. For ovens with **automatic steam flow control**, simply enter the required steam flow on the **Steam Flow Controller** on the control panel.

⚠ WARNING **Maintain a safe distance from the steam trap near the floor on the steam flow line if it is not connected to a drain line. You could suffer steam burns if the automatic valve opens while your feet are directly under it.**

3. Set the belt speed by turning the dial on the remote flow control valve. The belt speed determines the cook time, which is displayed on the Process Time Indicator on the control panel.

Cooling System Notes

Mueller Cooling Plates

Every day, with the oven at operating temperature, check the cooling plate drain at the discharge end to be sure a steady stream of water is flowing from it. The flow will be minimal when the oven is cold and should increase as the oven temperature increases.

The water temperature should be 180 degrees F (82 degrees C). If the temperature is too high, check to be sure the plant water pressure is at the recommended 40 PSI.

If the flow slows or stops, flush the plates according to the **Mueller Cooling Plate Preventive Maintenance Instructions** in the **Maintenance** section.

If neither action corrects the temperature problem, repair or replace the Penn valves located on the water supply line just after it branches to each Mueller plate. (Refer to the **Component Data Sheet** section of the manual.

Water Troughs

⚠ WARNING

Be certain the water temperature in the troughs is *140 degrees F (60 degrees C) or less.* Increase water flow to the troughs if the temperature reaches 140 degrees. If the temperature exceeds 140 degrees the outside surface of the oven could become hot enough to burn you.

Shut-down Procedure

To stop the oven, complete the following steps:

1. Turn off the burner by pressing the red **Burner** "Stop" pushbutton on the control panel.

2. Turn off the steam.

⚠ **CAUTION**

Allow the circulation fan(s), combustion blower, exhaust fans and product belt to run until the oven temperature is 200 degrees F. (93 degrees C.) or less, to prevent warping the oven and its components.

3. When the oven has cooled to 200 degrees F, turn off the following components by pushing the labeled "Stop" push-buttons on the control panel:

   a. circulation fan(s)

   b. combustion blower

   c. exhaust fans

4. Turn off the conveyor.

5. Turn off the belt-cleaning brush motor.

6. Turn off gas, steam and hydraulic power.

7. Turn off control power by pressing the red **Group Stop** pushbutton.

8. Turn off main electric power.

Emergency Shutdown Procedure

Press any **Group Stop** pushbutton to stop all oven operation in an emergency. There are three **Group Stop** pushbuttons. These are the large, red pushbuttons with safety-yellow decals mounted behind them.

There is one **Group Stop** pushbutton on the control cabinet. The other two **Group Stop** pushbuttons are on either end of the oven, near the bottom of the tank.

Damper Adjustment

There are five sets of dampers in each oven section that must be adjusted for the proper operation of the oven. Individual oven and plant characteristics, as well as product requirements influence the adjustment of these dampers.

Plenum Damper

VFO - 15 ft. (4.57 m) Oven Section

1. Turn the crank on either end of the oven. Turn the crank **clockwise** at the infeed (or **counterclockwise** at the discharge) to raise the damper plate inside the plenum to the vertical position. The arm visible in the slot on the oven hood toward the operator's side (right side as viewed from the infeed) is 45° closer to horizontal than the damper plate.

   a. Adjust the damper toward the vertical position to increase the airflow to the lower fingers.

   b. Adjust the damper toward the horizontal position to increase the airflow to the upper fingers.To redirect the airflow between the upper and lower fingers, adjust the large damper plate inside the plenum. Adjust the plenum in each zone separately.

VFO - 22 ft. (6.7 m) Oven Section and JSO II

1. To adjust the damper move the damper arm, on either end of the oven, up or down. The position of the arm indicates the position of the damper.

   a. Adjust the damper toward vertical to increase the airflow to the lower fingers.

   b. Adjust the damper toward horizontal to increase the airflow to the upper fingers. Adjust each damper separately.

Powered Exhaust Dampers

Adjust these dampers, located just above the belt in the infeed and discharge exhaust housings, to the minimum opening needed to keep smoke from entering the processing area. If these dampers are open too far, the heat from the oven will be wasted up the exhaust stack.

The slot in the damper plate shaft shows the position of the damper plate. When the slot is horizontal that means the damper is completely closed. When the slot is vertical the plate is open as far as possible.

To adjust the powered exhaust damper plate:

1. Loosen the thumb screw holding the damper handle.
2. Move the damper to any of the predetermined settings.
3. Tighten the thumb screw.

Infeed and Outfeed Dampers

To control the proportion of oven air and room air exhausted through the powered exhaust stacks, these dampers should be adjusted as follows:

1. The dampers mounted on the oven directly above the opening at either the infeed or discharge end should be adjusted as high as they will move on their slots.
2. The dampers at the outboard ends of the infeed and discharge sections should be adjusted only high enough to clear the product.

Non-powered Exhaust Dampers

The non-powered exhaust dampers, located in each of the large ducts connected to each side of the oven, control the amount of exhaust air out of the oven.

The slot in the damper shaft shows the position of the damper plate. When the slot is horizontal, the damper is completely open. When it is vertical, the damper is completely closed.

To adjust the non-powered exhaust damper plate:

1. Loosen the thumb screw holding the damper handle.
2. Move the damper to any of the predetermined settings.
3. Tighten the thumb screw.

Burner Dampers (JSO II Only)

The burner dampers are located on the burner sleeves. These dampers control the amount of make-up air entering the oven.

When the oven is operating, the burner dampers are normally open.

⚠CAUTION **If the oven is operated with the burner dampers closed, the welds around the burners could be overheated, causing weld failure.**

During clean-up the burner dampers are normally closed to prevent the excessive loss of cleaning solution.

To adjust the burner dampers:

1. Loosen the retaining bolts on each side of the damper rings.
2. Slide the rings to the desired position.
3. Tighten the retaining bolts.

Chapter 3

Maintenance Information

Recommended Cleaning Procedure

⚠ WARNING

Always wear protective clothing when cleaning the oven. Required clothing includes, but is not limited to, full face protection, gloves and caustic-resistant coveralls.

The cleaning solution is very caustic. It will give you painful chemical burns if you get it in your eyes or on your skin. Always follow the cleaning solution supplier's safety instructions.

⚠Note

Before you begin cleaning the oven, check to be sure the oven temperature is less than 200 degrees F (93 degrees C).

1. Remove heavy solids and use a high pressure, hot water hose to rinse all loose particles from inside the oven.
2. Check to be sure all CIP spray nozzles are clean and that they turn freely.
3. Check to be sure the fine filter, located in a housing just after the CIP pump, is clean. Replace the housing cap and secure it with the wing nut clamp.
4. Turn off bottom plate cooling water.

⚠Note

Step **5** is not necessary for many applications, but is inserted here to indicate the order in which it should be performed if it is needed due to unusually heavy or resistant deposits.

5. Prepare caustic gel or foam according to the manufacturer's instructions. Cover the entire inside of the oven with a thick layer of foam or gel. Let it soak for about 30 minutes, but do not let it dry on the oven surface. If it starts to dry, respray the area.

6. Run the product belt slowly.

7. Close the drain valve on the belt wash tank

8. Close the drain valve on the CIP fill tank.

9. Fill the oven with water to the volume recommended by the caustic manufacturer (see the drawing immediately following these directions to estimate the water volume according to its level in the oven).

10. Lower the oven hood completely. All water seals should be securely fastened.

11. Start the vent fans by pressing the green **Vent Fans Start** pushbutton on the control cabinet.

12. Start the CIP circulating pump by pressing the green **CIP Pump Start** pushbutton. The combustion blowers will start at the same time.

13. **Carefully** add caustic to the CIP tank while the water circulates through the system. Follow the caustic manufacturer's recommended mixing instructions.

14. Close lid on CIP tank.

15. Open the CIP steam supply valve to heat the cleaning solution. Process steam may also be added to heat the solution more quickly.

16. Start the circulation fans by pressing the green **Circ. Fans Start** pushbutton on the control panel.

⚠Note Set two-speed circulation fans on **Low** and variable-speed fans at **20 - 50%** of full speed.

17. Let the cleaning solution circulate as long as necessary.

⚠WARNING **Be certain the CIP system, circulation fans and steam are turned off before you make the following inspections.**

17. After about 30 minutes:

    a. Remove and clean the fine filter. Replace the filter in the housing, and secure the cap with the wing nut clamp.

    b. Check spray balls; clean as required.

    c. CIP tank screen; clean as required.

    d. Water/caustic level; adjust as required.

18. Restart the circulating pump and circulation fans. Re-open the steam supply valve.

19. Repeat this inspection about every 30 minutes for best cleaning results.

⚠Note It is helpful to spray the product belt at the infeed and discharge ends with a high pressure spray during the CIP cycle.

20. While the cleaning solution is circulating, clean the equilibration chambers, if the oven is so equipped, by completing the following steps:

    a. Spray with gel mixture or foam, if necessary.

    b. Rinse with hot water at high pressure.

    c. Repeat as necessary.

21. When the inside of the oven is clean, stop the circulating pump and fans. Close the steam supply valve.

22. Drain the cleaning solution by opening the drain valves on the CIP tank, belt wash tank and water troughs.

23. Thoroughly rinse oven with hose, leaving drain valves open.

24. If necessary, remove all the waterseal plates, fingers and nozzle plates for hand-cleaning.

25. Clean other areas of the oven as needed.

26. Check the spray balls, fine filter and CIP tank screen. Clean as needed.

27. Replace fingers, finger nozzle plates and waterseals.

28. Inspect the oven and reclean any unacceptable areas.

29. Rinse the oven with a high pressure spray to remove any remaining deposits.

30. Refill the oven with clean water.

31. Add neutralizer to CIP tank to neutralize the caustic.

⚠ Note

It is **very important** to follow the chemical manufacturer's instructions regarding the type and amount of neutralizing agent to use.

32. Circulate the water and neutralizer for 30 to 45 minutes, running the combustion blower and circulation fans.

⚠ Note

Be certain that the **entire** belt has passed throught the oven while circulating the neutralizing solution, otherwise product will stick to the belt during production.

33. Drain the oven and the belt wash tank.

34. Turn off fans, blowers, belt and main power.

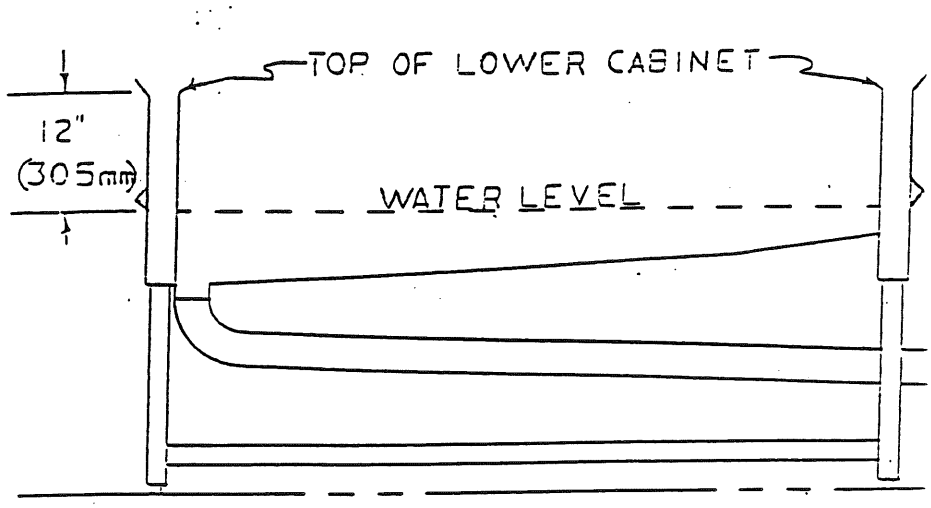
35. Rinse the oven and flush the drip tray thoroughly with hose.

36. Check the spray balls and screen in CIP tank. Clean as required.

5/90

Water Volume and Weight - 15' (4.57 m) section

Use the following information to compute the amount of caustic required for effective oven cleaning, according to the caustic manufacturer's recommendations.



When the water level in the lower cabinet is 12" (305 mm) below the top of the lower cabinet:

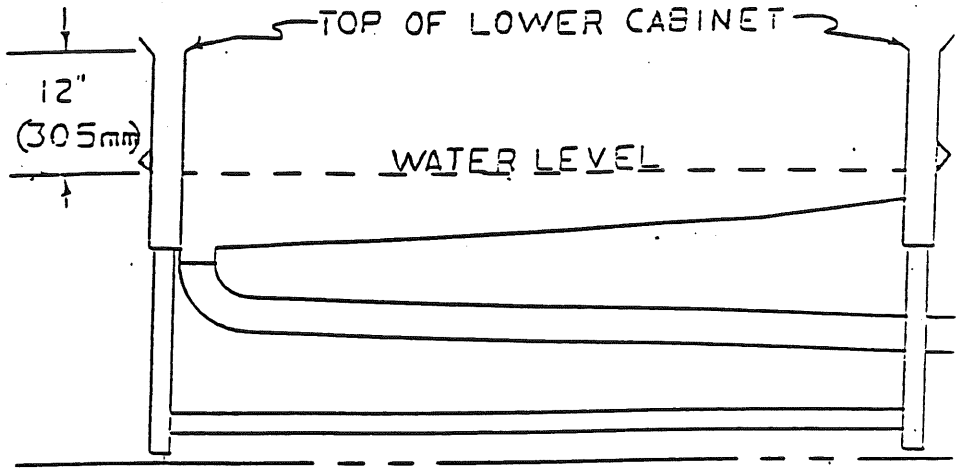
Water Volume (approx.) = 300 gal (1.14 m^3)
Water Weight (approx.) = 2500 lbs.(1136 kg.)

Each one inch (25.4 mm) above or below the 12" (305 mm) level equals:

Water Volume (approx.) = 45 gal. (.17 m^3)
Water Weight = 375 lbs. (170 kg.)

Water Volume and Weight - 22' (6.7 m) section

Use the following information to compute the amount of caustic required for effective oven cleaning, according to the caustic manufacturer's recommendations.



When the water level in the lower cabinet is 12" (305 mm) below the top of the lower cabinet:

Water Volume (approx.) = 450 gal (1..70 m^3)
Water Weight (approx.) = 3750 lbs.(1702.5 kg.)

Each one inch (25.4 mm) above or below the 12" (305 mm) level equals:

Water Volume (approx.) = 67 gal. (.25 m^3)
Water Weight = 562 lbs. (255 kg.)

Preventive Maintenance Program

The Oven Preventive Maintenance Program consists of:

1. Cleaning
2. Lubrication
3. Inspection
4. Repair or replacement of defective or worn items discovered in the inspection.

As an operator, you should perform the following preventive maintenance checks DAILY:

⚠ CAUTION

Before any maintenance or service is performed, be certain the power is disconnected and locked out to prevent accidental starting.

1. Be sure the oven has been thoroughly cleaned.
2. Inspect the temperature detectors inside the oven. To operate properly, these sensors must be clean. Clean them if necessary.
3. Check to be sure that all guards are securely in place.
4. Check waterseals for proper installation.
5. Inspect product belt. Straighten bent wires and replace broken ones. (See detailed instructions later in this section.)
6. Inspect all drains to be sure they are free-flowing.
7. With the oven at operating temperature, check the cooling plate drain at the discharge end to be sure a steady stream of water is flowing from it.

⚠ Note

The flow will be minimal when the oven is cold and should increase as the oven temperature increases. The water temperature should be 180 degrees F (82 degrees C) when the oven is at operating temperature. If the temperature is too high, check to be sure the plant water pressure is at the recommended 40 PSI.

If the flow slows or stops, flush the cooling plates according to the **Mueller Cooling Plate Preventive Maintenance Instructions** later in this section.

If neither action corrects the temperature problem, replace the Penn valves (located on the water supply line just after it branches to each Mueller plate.)

8. If equipped: Check hydraulic motors, valves, hoses, fittings and filter for leaks. Replace seals immediately on any leaking part.

⚠ CAUTION

Replace any hoses showing wear, fitting leaks or damage caused by kinking. Any break in the hose's outer covering makes it susceptible to deterioration caused by cleaning solutions.

9. Lubricate infeed and discharge end belt shaft bearings. (Refer to the lubrication drawing at the end of this section.)

10. Check gas pressure. The incoming gas pressure gauge should read between 20" w.c. and 28" w.c. If the pressure is either too high or too low, inform your supervisor or service personnel.

13. Check the operation of the belt cleaning brushes. If they are worn and not solidly contacting the belt, move them closer to the belt by rotating the brush assembly on the slots in the brush bearing plate.

Maintenance personnel should perform the following checks WEEKLY:

1. Complete the weekly conveyor preventive maintenance checks, using the **Conveyor Preventive Maintenance** list later in this section.

2. Inspect exhaust fan, bearings and belts.

   a. Replace worn bearings and tighten or replace belts as needed.

   b. Clean fan blades to prevent fan unbalance.

3. Inspect circulating fans, bearings and belts.

   a. Replace worn bearings and tighten or replace belts as needed.

   b. Clean fan blades to prevent fan unbalance.

   c. Lubricate fan bearings according to the lubrication drawing at the end of this section.

⚠Note Do not overtighten V-belt drives. Excessive belt tension overloads fan and motor bearings. It is less expensive to replace V-belts than to replace bearings damaged from excessive loading.

4. Inspect the oven "end to end, side to side, and top to bottom" for cracked and broken welds. Repair welds if needed.

5. Inspect the plumbing system for broken fittings, plugged lines and leaks. Repair promptly.

6. Inspect the steam system for broken fittings, plugged lines and leaks. Repair promptly.

7. Inspect the lift chain for wear. Replace immediately if worn.

8. Inspect and clean the combustion blower air filters.

The following maintenance checks should be performed MONTHLY by maintenance personnel:

1. Complete the monthly conveyor preventive maintenance checks, using the **Conveyor Preventive Maintenance** list later in this section.

2. Flush the Mueller cooling plates on the bottom of the oven. (See **Preventive Maintenance Mueller Cooling Plates** later in this section.)

3. Check level of oil in the belt drive gear box (40" and 48" wide ovens only). Fill with SAE 90 gear oil if needed.

4. Inspect the gas train, control motor(s) and linkage(s) and the burner(s). Clean up rust and dirt accumulation. Repair and repaint as needed.

5. Lubricate all idlers and lift tubes in the lift mechanism.

6. Apply food-grade lubricant to the CIP pump in areas indicated on the lubrication drawing at the end of this section.

7. Lubricate exhaust fan bearings according to the lubrication drawing at the end of this section.

8. Check hydraulic filter indicator. Change the filter if the indicator is in the "change" range on the scale. Replace **yearly** whether or not the indicator has reached the "change" level.

Complete the following preventive maintenance checks according to the schedule called for:

1. Change the lift gear reducer oil **after the first 1500 hours of operation** and **every 5000 hours from then on.**

Conveyor Preventive Maintenance Program

Daily

Inspect wire belt, straighten bent wires and replace any broken links.

Weekly

In addition to the daily check, complete the following:

1. Inspect all wire belt drive sprockets and collars. Tighten set screws if necessary. Be sure the sprockets are properly aligned.

2. Inspect all chain sprockets. Tighten set screws if necessary.

3. Inspect all bearings. Replace if necessary.

4. Check to be sure all inner bearing races are turning with shafts. Tighten set screws if necessary.

5. Inspect hydraulic motor. Replace shaft seals if they are leaking.

Monthly

In addition to the daily and weekly checks, complete the following:

1. Inspect all wire belt support assemblies for excessive wear. Repair or replace if necessary.

2. Inspect all belt suppport rods in wire belt drive area. Replace if necessary.

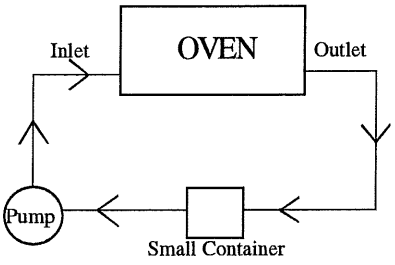
3. Check to be sure all set screws are tight.

4. Replace worn chain and chain sprockets.

Preventive Maintenence -

Mueller Cooling Plates

It is important to maintain an adequate water flow through the cooling plates on the bottom of the oven. To prevent the buildup of calcium deposits from hard water, the following preventive maintenance procedure should be completed **monthly.**



1. Shut off cooling water.
2. Disconnect water feed line after the cooling plate temperature control valve.
3. Attach output of an approximately 5 GPM circulating pump to the water line
4. Connect the outlet of the cooling plates to a small (approximately 5 gallons) container.
5. Connect the 5 gallon container to the input (suction side) of the pump.
6. Fill the container with a 50-50 mixture of muriatic acid and water.
7. Start the pump and circulate the solution through the plates for 30 minutes.
8. Turn off pump and disconnect the cooling plate outlet from the 5 gallon container.
9. Provide a continuous fresh water supply to the container (a hose from the plant water source will do).
10. Turn on the pump and flush the plates for 10 minutes.
11. Disconnect the flushing equipment and re-connect water lines.

Maintenance of Flat Flex Wire Belt

The life of Flat Flex Wire Belt depends on you. Belt life can be improved by following basic maintenance procedures.

Observe the following practices to increase belt life:

1. **Maintain low tension on the belt.** Flat Flex Wire belt is a **low** tension belt. Running the belt under high tension causes unnecessary wear.

2. **Run the belt "right side up".** Sprockets will **not** operate properly on the smooth side of the belt.

3. **Pay close attention to the alignment of the drive sprockets.** Interference with the gear teeth will snap the belt.

4. **Always contact Stein, Inc. for replacement sprockets.** Stein sprockets are specifically designed to fit and to pull the belt properly. Others will not fit perfectly and their use could shorten belt life.

Maintenance of belts is easy and when done routinely will increase belt life substantially. We recommend the following:

1. New belts will usually stretch after initial use. If the belt starts to jump sprocket teeth, adjust it to the lowest tension required to keep it meshed properly with the drive sprockets.

2. Promptly repair distorted or broken strands to prevent damage to the entire belt or to other parts of the machine. (See instructions at end of this section)

3. Temporary repairs can be made with one and three space splicing clips. Replace an old belt that is breaking up all over. Do not continue to make temporary repairs.

4. Always have a spare roll of belt on hand. To eliminate downtime on smaller machines like breaders, a spare can be installed immediately when a belt must be replaced. On larger machines such as fryers, replacement might not be necessary if you can repair damaged strands or use splicing clips. You will reduce downtime, however, if you have a spare on hand to use when the whole belt must be removed for repairs.

5. If a jam or unusual belt wear occurs, be sure to determine the cause and fix it. If a belt is breaking up at one or two joints but is otherwise strong, you have two possible causes to check:

   a. A manufacturing defect in the belt. Check the joints on the spare roll of belting that correspond to the problem area on the machine belting. If the spare roll wire breaks easily, there is a manufacturing problem.

   b. A problem in the conveyor system. Examine the system for:

      1. a mis-aligned drive sprocket

      2. the drive/idler shaft out of parallel

      3. interference with belt movement at a transfer point. Occasionally, other pieces of machinery on a line will be bumped out of alignment, causing parts of one machine to ride on or rub against the belt of another machine. This will eventually cause weakness and breakage of the belt.

6. After installation, check the belt for tracking, proper fit with the drive sprockets and correct tension.

7. When installing a new belt, reset belt tensioning devices back to minimum adjustment position so that as belt stretches during use you will have adjustment available for take-up.

Humitrol Maintenance and Troubleshooting

(if so equipped)

Filter Maintenance

There are two filters, one internal and one external, to protect the sensors in the instrument probe. The external filter is inside the barrel of the probe, under the filter cover. You must inspect this filter and clean it daily.

To inspect and clean the filter, complete the following steps:

1. Turn the power off at the Humitrol control cabinet.

⚠ DANGER **The probe is very HOT during and soon after operation. Do not touch the probe during or soon after operation. Disconnect all power to the probe and wait for it to cool to room temperature before you touch it. You could be seriously burned.**

2. Loosen the sanitary clamp and slide the probe out of the mounting tube.
3. Hang the probe from the snap hook on the connector chain through the the U-bold on the probe back.
4. Unthread the filter cover.
5. Unthread the filter retainer cap.
6. Pull the filter to remove it from the filter stem.
7. Clean the filter with detergent or caustic cleaning solution. Be certain to thoroughly rinse the filter to remove all traces of cleaning chemicals before you put it back on the probe.
8. Slide the filter over the filter stem and secure it snugly in place with the retainer cap.
9. Replace the filter cover.

⚠ CAUTION **Always be certain to replace the filter after cleaning. If you operate the Humitrol without the filter, you could damage it.**

Troubleshooting

⚠ DANGER **Hot surfaces and high voltage. Only properly trained and certified personnel familiar with this type of equipment and the safety measures required should attempt the following procedures. You could be severely injured.**

⚠ CAUTION **Incorrect wiring could cause extensive damage to the probe. Make a continuity check of the wiring to be certain that each conductor in the control box is connected to the identically numbered pin connector at the instrument probe.**

1. Problem: Low Temperature light stays on.

Possible Cause: There is no power to the heater in the probe. Check the following:

A. Check to be sure main power is on. The two LEDs on the circuit board should be lit.

B. Check the 2 AMP fuse (FU3) in the circuit board. There are 3 fuses on the circuit board; a grouping of two fuses and a single fuse. FU3 is the single fuse.

C. Check for loose wires at terminals C1, C2, C7 and C8 in the control box and at the sensor probe.

D. Check the heater connectionss to pins 1 and 2 of the 4-pin connector in the probe.

E. The heating element in the probe may be burned out. Use one of the two following methods to check the heater circuit.

1. Remove FU3 and use an ohmmeter to measure the resistance between the heater leads at pins 1 and 2 of the 4-pin connector in the probe. The heater resistance should measure between 90 and 110 ohms.

2. Remove FU3 and measure the resistance between pins C1 and C2 in the control box. A resistance of 90 to 110 ohms indicates an acceptable heater and interconnecting wiring.

2. Problem: The High Temperature light stays on.

Possible Cause:

A. Loose wires - Check for loose wires at pins C7 and C8 in the control box and at C7 and C8 in the probe.

B. Incorrect wiring - A high temperature cut-out is wired in series with the heater. The switch is normally closed. Check to be sure pins 1 and 2 in the probe are connected to C1 and C2 in the control box.

C. Air pressure set too high or too low - Check to be sure the air pressure gauge is set at approximately 7.5 psi (51.7 kPa). Do not exceed 10 psi (68.9 kPa).

3. Problem: The Air Pressure light stays on, the Ready light flashes on and off.

Possible Cause:

A. Water in air system - Push the water drain valve stem at the bottom of the filter on the air station. Let the air flow until it is free of water.

B. Air station solenoid valve not operating - Check to be sure that the solenoid valve at the air station opens when the Ready light comes on. To check, disconnect the air tubing at the probe and feel for air flow. Pinch the tubing at the probe end and make sure it holds pressure.

C. Air pressure gauge set too high or too low - Check to be sure the air pressure gauge is set at approximately 7.5 psi (51.7 kPa). Do not exceed 10 psi (68.9 kPa).

D. Loose wires - Check for loose wires at pins C3 and C5 in the control box and probe.

E. Loose connections - Check for loose connections at the air pressure switch in the probe.

4. Problem: Display or output is sluggish, does not change, or is incorrect.

Possible Cause:

A. The drain port on the bottom of the Humitrol probe body could be blocked. Clear the port.

B. The internal filter could be dirty. Try cleaning the internal filter by holding a finger over the drain port to force the air supply to flow backwards through the probe and filter. If this technique works but the problem occurs again, return the probe to Stein for cleaning and calibration.

⚠ Note

If the external filter is clean and you have tried to clear the internal filter, but the probe is still sluggish, return it to Stein for rebuilding and calibration.

LUBRICATION CHART
VFO/JSO-II OVEN

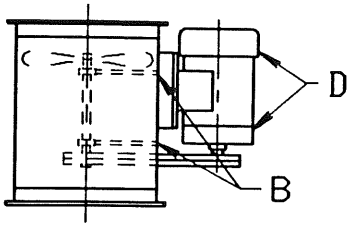
REV. 3 05-13-93

"A" SHAFT BEARINGS LUBRICATE DAILY WITH FOOD MACHINERY GREASE.

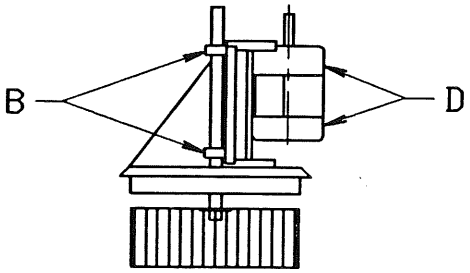
"B" FAN BEARINGS LUBRICATE WEEKLY WITH HI TEMPERATURE GREASE.

"C" GEARBOX (IF USED) CHECK LEVEL MONTHLY AND FILL WITH SAE 90 GEAR OIL.

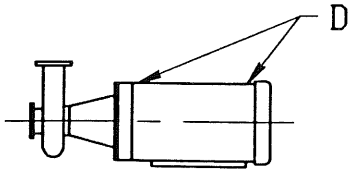
"D" MOTORS LUBRICATE MONTHLY WITH FOOD MACHINERY GREASE.



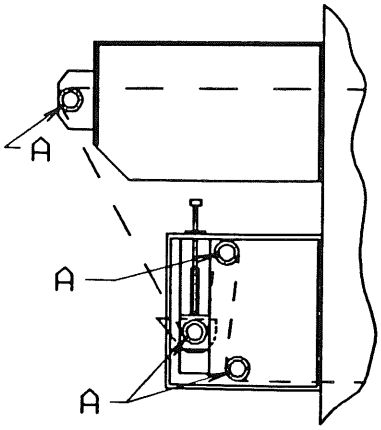
VENT FAN



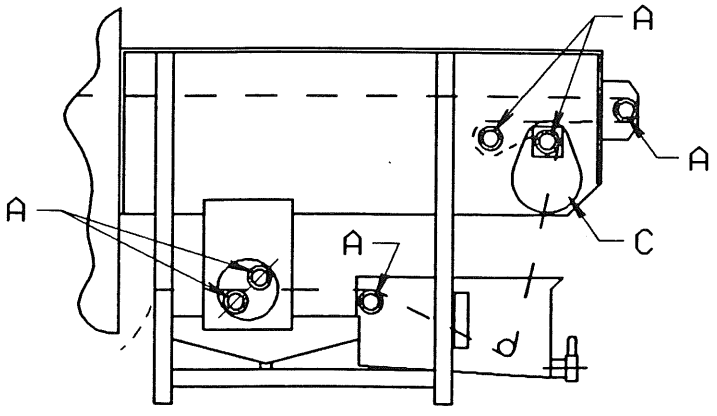
CIRCULATING FAN



C. I. P. PUMP

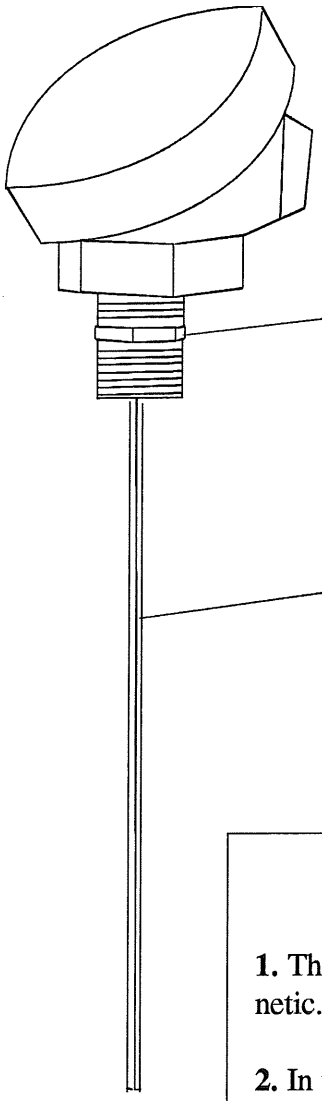


INFEED



DISCHARGE

Thermocouple Installation Instructions



Tighten the thermocouple housing using this nut only.

A 90° bend, if required in the sheath, must have at least a 2" (50mm) radius.

Thermocouple Wire Notes

1. The positive wire is magnetic. The negative wire is not magnetic.

2. In the U.S., on Type "J" thermocouple wire white is positive (+) and red is negative (-).

3. In some countries, red is positive (+) on Type "J" thermocouple wire.

Appendix A

Chemidyne Chemical Cleaning Recommendations

Safety Recommendations:

Protective Equipment:

Respiratory:	Avoid breathing mists or vapors. Use of NIOSH/MSHA approved respirator protection is required when TLV values for airborne materials are met or exceeded. Respiratory protection must be in compliance with 29 CFR 1910.134 and other applicable regulations. Use equipment designed for dusts and mists or acids.
Eye:	OSHA approved chemical splash goggles (should meet current ANSI standard). **NEVER WEAR CONTACT LENSES.**
Gloves:	Always wear permeation resistant gloves (neoprene, butyl & other rubbers). Consult with glove manufacturer for most resistant glove to materials handled.
Other clothing equipment:	Impervious protective clothing such as rain suits and rubber boots. An emergency eye wash and shower should be in the chemical storage area plus in any area where chemicals are mixed.
Chemical Addition:	Use of face shields is highly recommended (in addition to goggles). While adding either caustic or acid cleaners to CIP system also in applications where chemicals can splash.
Chemical Cleaning:	Follow chemical manufactures recommendations for cleaning & safety.
Foam Cleaning of Interior and Exterior Surfaces:	Use well maintained foaming equipment of good quality such as Chemidyne CD-918 C/D or CD-918 A/B stations to apply caustic foams. The following liquid foam cleaners are recommended for use in Stein Ovens.
Light to Medium Soils use:	A mid range heavy duty foaming caustic cleaner such as CD-564 at 1 - 6 fluid oz. per gallon (0.8 to 4.7%) (0.15 - 1% causticity). CD-564 is a Heavy Duty Cleaner with about 20% causticity.
Medium to heavy soils use:	A heavy duty foaming caustic cleaner made for oven cleaning such as CD-588 or CD-568 at 1 - 8 fluid oz. per gallon (0.8 to 6.3%) (0.25 - 2.0% causticity). CD-588 and CD-568 are smokehouse/oven cleaners with the equivalent of 30% causticity and adherent foams.
Extremely Heavy Soil Use:	An extra heavy duty foaming caustic cleaner made for oven cleaning such as CD-584 at 1 - 10 fluid oz. per gallon (0.8 to 8.0%) (0.3% to 3.0% causticity). CD-584 is an extra strength smokehouse/oven cleaner with the equivalent of 35% causticity and adherent foams.
CIP Cycles:	Generally CIP cycles should be run at 0.5 to 2.0% causticity. Under extreme circumstances higher levels may be required. Please consult with your chemical supplier and Stein before going above 2.0% causticity on a cleaning cycle.

Chemidyne (216) 467-1400
Stein (419) 626-0304

Products recommended for CIP cycle.

Powders:	Use a powdered strong caustic cleaner designed for CIP/oven cleaning containing between 70 - 100% Sodium Hydroxide.
	CD-510 use at 1 - 5 oz. per gallon (0.75 - 2.5% causticity).
	CD-10 or CD-10NP use at 1 - 5 oz. per gallon (0.5 - 2.6% causticity). In hard water the addition of CD-723 or other water conditioner maybe required.
Liquids:	Use a liquid low foam caustic cleaner designed for oven CIP cleaning.
	CD-102, Cd-553 or CD-583 added at 2 - 8 fluid oz. per gallon (0.5 - 2.1% causticity).

CIP cycle time and temperature will depend on soils consult with your Chemidyne Representative for recommendations.

Safety Note:	Always add caustic products at cool to luke warm water. **NEVER ADD CAUSTIC CLEANERS TO HOT WATER (above 100° F)** they may cause boiling and spitting. Add caustic cleaners to CIP system slowly.
Neutralization and Acid Cleaning:	Use a low foam acid for neutralization following manufacturers recommendations. Foaming acid cleaners can be used to polish or brighten metal following manufacturers recommendations.
Chemidyne Products:	CD-400 and CD-410 are recommended for neutralizing at 0.5 to 4.0 oz. per gallon (0.3 - 3.0%) the amount used will vary depending on caustic carry over. CD-400 and CD-410 contain phosphoric acid and other cleaning agents.
	CD-470 and CD-404 which are mixtures of phosphoric & Nitric acids can also be used for neutralizing at the same levels.
	CD-450 and CD-462 are recommended for foam application to exterior or interior stainless steel surfaces at 0.5 to 3.0 oz. per gallon. **DO NOT MIX ACID WITH CAUSTIC CLEANERS.**

Chapter 4

Technical Service Information

Control System

1. A control transformer supplies 220V power for the control circuit.

2. Control power is turned on by pressing the **Control Reset** pushbutton, and off by pressing the **Group Stop** pushbutton.

3. The process time indicator displays the length of time it will take the product to pass through the oven. A proximity switch connected to the indicator detects the motion of teeth on a the conveyor belt drive sprocket at the discharge end of the oven. The display shows the time in minutes and tenths of a minute on the control panel.

4. Two vent fans collect steam and combustion products from the infeed and discharge ends of the oven and vent them to the out side. They start and stop at the same time.

   The vent fans must be started before the burner can be started. Also, the burner will shut down if the vent fans are stopped.

5. A CIP (Clean In Place) pump is used to pump cleaning solution to spray heads within the oven. To keep the burner(s) dry during cleaning, the combustion blower(s) starts automatically when the CIP pump is started.

6. To start the burner, the circulation fans must be running. If the circulation fans are stopped or fail, the burner(s) will shut down.

   Circulation fan speed is detected by a magnetic pickup and speed switch.

7. The burner(s) is turned on and off using the **Burner Start/ Stop** pushbuttons. An interlock prevents the burner from being started if the CIP pump is running. This is necessary since the combustion blower starts automatically when the CIP pump is started, and the burner control unit normally starts the combustion blower as part of the burner start-up sequence. If the blower is running when the burner is started, the burner control will lock out.

5/90

Limits Circuit

The **Limits Circuit** is a series of safety checks which occur automatically before the oven burner can be lit. At each stage in the circuit, certain conditions must be met before the power can move to the next stage. Electrical switches control the flow of power. Following is a step-by- step explanation of how the Limits Circuit works.

1. The first device in the Limits Circuit is a contact of the vent fan starters. The vent fans must be running to complete the circuit.

2. The next element in the circuit is the **High Temperature** limit device(s). If the oven temperature is below the device setting, power passes through a contact(s) and on to the **Circulation Fan(s) Speed Switch(es)**.

3. The circulation fan(s) must be running to complete the circuit and allow power to pass through to the **Pressure Switches**.

4. There are three pressure switches in the limits circuit: the **Low Gas Pressure** switch, the **High Gas Pressure** switch and the **Low Water Pressure** switch.

   a. If the gas pressure is at or above the Low Gas Pressure Switch setting a contact closes and the power goes to the High Gas Pressure switch.

   b. The High Gas Pressure switch is always closed unless the gas pressure is too high. If the pressure is within the preset limits, the switch remains closed and the power goes on the Low Water Pressure switch.

   c. If the cooling water pressure is at or above the switch setting, the switch closes, completing the Limits Circuit.

5. As each limit condition is satisfied, a labeled light on the oven control panel glows. When the **Low Water Pressure** light comes on indicating that the Limits Circuit is complete, press the green **Burner Start** pushbutton to initiate the **Burner Firing Sequence** .

⚠Note The CIP pump must be off or burner lockout will occur. If that happens, turn off the pump and follow the start-up sequence from the beginning. (See **Burner Firing Sequence** in the **Operating Instructions** section of the manual).

Burner Firing Sequence

The flame safety unit on single burner ovens is a Landis & Gyr LFE 1. On dual burner ovens the flame safety is an LEC 1 with separate flame relays.

The Landis & Gyr flame safety unit is mounted inside the control cabinet. Through the window on the front of the unit's cover you can read a dial which turns as the sequencing motor runs. The dial shows timed events with numbers that represent the time in seconds. Other events are indicated with letters "A" through "G".

When the flame safety unit has gone through a normal burner firing sequence (described below) it will stop at the letter "G". This is then the starting point for the next burner firing sequence.

Normal Sequence

If the Limits circuit is complete and the CIP pump is not running, the burner can be started. A contact of the **burner control relay** (BCR) applies power to terminal 1 of the Landis & Gyr Flame Safety Unit.

1. The sequence timer motor of the flame safety unit starts to run. The dial turns and the "G" goes out of view. In about 30 seconds, a "60" appears in the window. The motor runs until the dial shows "35", then stops.

2. At this point, the unit applies power to terminals 3 and 22. Terminal 3 energizes the **combustion blower relay** (CBR), which starts the combustion blower(s). Terminal 3 also powers the **Sequence Running** light on the control cabinet door.

   Terminal 22 energizes the **purge position relay** (PPR). Contacts of the PPR cause the Modutrol motor(s) to drive the burner to the high fire position. This allows the maximum air flow into the oven for purging.

3. As the Modutrol motor(s) reaches the high fire position, the high fire limit switch(es) close, applying power to the **purge timer** (PT) and the **Purge** light on the control cabinet door.

4. After the purge timer completes its cycle, it applies power to terminal 20 of the flame safety unit, restarting the sequence timer motor. The dial turns past "35" toward "A".

5. When the dial shows "A", the sequence timer motor stops and the PPR is de-energized. This causes the Modutrol motor(s) to drive the burner to the low fire position.

6. When the low fire limit switch(es) trips, power is applied to terminal 21 of the flame safety unit and the sequence timer motor starts to run. The dial moves from "A" toward "B".

7. The **ignition transformer(s)** is energized through terminal 6 of the flame safety unit when the dial shows "B". This causes sparks at the igniter in the burner(s). The sequence timer motor continues to run, turning the dial through "B" toward "C".

8. When the dial shows "C", the **pilot gas solenoid valve(s)** and the **Pilot Gas** light on the control cabinet door are both energized through terminal 10 of the flame safety unit. The solenoid valve allows pilot gas to enter the burner, where sparks from the igniter will light the pilot flame. The sequence timer motor continues to run through "C" toward "D" and then "E".

9. At "E" on the dial, the **main gas valves** are energized through terminal 7 of the flame safety unit. The pilot flame then ignites the main flame.

10. 9 seconds after power is applied to the main gas valves, the flame safety unit removes power from the pilot gas solenoid valves. The **Pilot Gas** light on the cabinet door will then go out.

11. When the second main gas valve is fully open, a switch inside the valve closes, which energizes the **main gas relay** (MGR) and the **Main Gas** light on the cabinet door. Contacts of the main gas relay connect the Modutrol motor(s) to the output of the temperature controller(s). The sequence timer motor turns the dial to "G" and stops. The burners are now lit and controlled by the temperature controller.

Lockout

When lockout occurs, the **Burner Lockout** light is energized through terminal 12. This de-energizes all gas valves. To return to normal pre-ignition conditions, reset the flame safety device by pressing the **Burner Reset** pushbutton. The burner firing sequence will continue if the conditions causing lockout have been corrected.

Burner Purge System

Function

The burner purge system prevents steam from entering the burner and combustion blower motor housing during steam processing.

System Calibration

1. Remove the mesh filters on the combustion blower housings to expose the combustion blower inlet.

2. Turn the air pressure regulator knob on the purge assembly counter-clockwise until it stops.

3. Turn on the circulation fans.

4. Fully open the steam supply valve to fill the oven with process steam.

The burner and combustion blower are **OFF**.

5. After you begin to see steam escaping from the blower motor housing, turn the air pressure regulator knob clockwise until no more steam escapes.

6. Check the pressure on the gauge above the knob. Continue to turn the knob clockwise until you have raised the pressure by an additional 5 psi (34.45 kPa) above the pressure required to stop the steam flow.

Final pressures of 15 psi (103.35 kPa), ± 5 psi (34.45 kPa) are typical. **DO NOT EXCEED 25 PSI (172.25 kPa).**

7. Turn off the circulation fans.

8. Turn off the steam supply.

9. Replace the mesh filters on the combustion blower housings.

Maintenance

1. The purge assembly includes an air filter with automatic drain. A manual drain is not required. Replace the filter element every 6 months. **Stein Part # 409-20-0018**

2. Periodically check to be sure that no steam is entering the combustion blower housing during steam processing by removing the filters from the blower housings. If you see steam escaping, repeat steps 2 - 10 in the **System Calibration** section of these instructions.

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Process Time Readout

Set Up Procedure

This procedure is for the programming and calibration of the Dynapar MAXjr. Tach 2 Process Time Indicator (Stein part number 405-20-0227).
This process time indicator uses a proximity switch that detects teeth on a sprocket. To calibrate the process time indicator it is necessary to know the following:

P = Pitch circumference (in feet) of the conveyor belt drive sprockets

N = Number of sprocket teeth passing the proximity detector per revolution of the conveyor belt drive sprockets

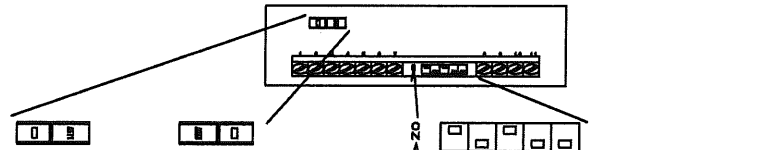
L = Process length (feet)

Calculate the calibration constant "K"

Calibration Constant = K = $\frac{\mathbf{N \times L}}{\mathbf{60 \times P}}$ (for process time, minutes)

Oven _____
S/N _____
P _____ $K = \frac{(\quad) \times (\quad)}{60 \times (\quad)} =$
N _____
L _____

SET THE SWITCHES ON THE BACK OF THE DYNAPAR UNIT AS SHOWN BELOW:



Now program the unit as follows:

1. Press the RUN PGM key until PGM DP appears.
2. Press the ▶ key until the display shows .0
3. Press the ▼ key until PGM CAL DP appears.
4. Press the ▶ key until the display shows .000

5. Press the ▼ key until PGM CAL appears.

6. Enter the calibration number (K). Use the ▶ key to highlight the digit to be changed.

   Then use the INC ON key to raise the digit or the DEC OFF key to lower the digit.

7. Press the ▼ key until PGM INP appears.

8. Press the ▶ key until the display shows Ab. Hi .

9. Press the ▼ key until PGM OUT appears.

10. Press the ▶ key until the display shows Follo .

11. Press the ▼ key until the PGM mode appears.

12. Press the ▶ key until the display shows tinnE .

13. Press the RUN PGM key to switch to the run mode. The unit is now programmed and calibrated. To prevent the program from being changed, set switch 5 on the back of the unit to the on (up) position.

Customer Options

1. To display no digits after decimal, go to step 2 and enter 0. To display two digits after the decimal, enter .00.

2. To display process time in seconds: $\mathbf{K = \frac{N \times L}{P}}$

   Set appropriate **CAL DP** in step 4. Then enter **K** in steps 5 and 6.

2/90

Process Time Indicator

Troubleshooting Guide

The following tests must be performed with power applied to the control cabinet. These tests must be performed only by qualified personnel familiar with proper safety procedures. Be certain everyone has been warned and is clear of the control cabinet.

Proximity Detector

1. The red LED (light emitting diode) on the side of the proximity detector should light when a metallic object (coin or screwdriver blade, etc.) touches the end of the proximity detector.

2. Check to be sure that +12V D.C. appears at the proximiy detector between the brown wire (+) and the blue wire (common).

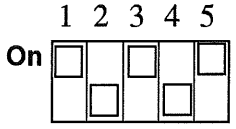
3. The signal appears between the black wire (+) and the blue wire (common). The signal should be high (10-20V) when the LED is on and low (0-.6V) when the LED is off.

Process Time Indicator

1. If the display is not lighted, check that either 115V or 220V is present between terminals 1 and 2.

2. Read +12V D.C. between terminals 7 (+) and 6 (common).

3. Check that the dip switch on the back of the unit is set as shown below:



4. Refer to **Process Time Readout Setup Procedure** for additional information.

2/90

Water Analysis for Mueller Plates

The quality of water going into the Mueller plates must be evaluated periodically for mineral content. Follow the instructions below to learn the stability index of the water in your plant. According to the results of your analysis, you should adjust the preventive maintenance schedule of flushing the plates or you should isolate the plates in their own closed loop system.

Stability Index

A. Total Solids (PPM)		C. Calcium Hardness (PPM of $CaCO_3$)		D. Total Alkalinity (PPM of $CaCO_3$)	
50 - 300	.01	10 - 12	0.6	10 -12	1.0
400 - 1000	0.2	12 - 13	0.7	12 - 13	1.1
		14 - 17	0.8	14 - 17	1.2
B. Temperature (Degrees F)		18 - 22	0.9	18 - 22	1.3
		23 - 27	1.0	23 - 27	1.4
		28 - 34	1.1	28 - 34	1.5
32 - 34	2.6	35 - 43	1.2	35 - 43	1.6
35 - 42	2.5	44 - 55	1.3	44 - 55	1.7
43 - 48	2.4	56 - 69	1.4	55 - 69	1.8
49 - 56	2.3	70 - 87	1.5	70 - 87	1.9
57 - 62	2.2	88 - 110	1.6	88 - 110	2.0
63 - 70	2.1	111 - 138	1.7	111 - 138	2.1
71 - 80	2.0	139 - 174	1.8	139 - 174	2.2
81 - 88	1.9	175 - 220	1.9	175 - 220	2.3
89 - 98	1.8	221 - 270	2.0	221 - 270	2.4
99 - 110	1.7	271 - 340	2.1	271 - 340	2.5
111 - 122	1.6	341 - 430	2.2	341 - 430	2.6
123 - 132	1.5	431 - 550	2.3	431 - 550	2.7
133 - 146	1.4	551 - 690	2.4	551 - 690	2.8
147 - 160	1.3	691 - 870	2.5	691 - 870	2.9
161 - 178	1.2	871 - 1000	2.6	871 - 1000	3.0

1. From the water analysis, use the above table to obtain the values of A, B, C, and D.

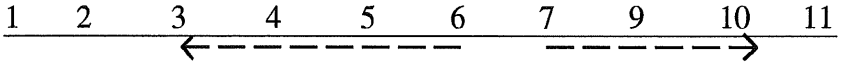
2. Find the pHs (pH of saturation) using the following formulation:

   $pHs = (9.3 + A + B) - (C + D)$

3. After determining the pHs, calculate the Stability Index.

   S.I. = 2 pHs - Actual pH

4. Look up the stability index on the line graph below.



If the S.I. is between 3.0 and 6.2, flush the template with mild muriatic solution **every 6 months**. If the S.I. is less than 3.0, then isolate the plates with a plate and frame heat exchanger.

Automatic Steam Flow Control System (Optional Equipment)

The automatic steam flow control system consists of three major components: the motor-driven steam flow control valve (on oven), the steam flow transducer (on oven) and the steam flow controller (on control cabinet).

To set the steam flow rate required for the product, press the up or down arrow on the Eurotherm steam flow controller.

Operating Principle

The signal from the steam flow transducer is connected to the input of the steam flow controller. This is similar to the thermocouple input to a temperature controller. The steam flow transducer measures the actual steam flow rate and sends a signal to the controller that is proportional to the steam flow rate.

The output of the steam flow controller is connected to the motorized steam flow control valve. This valve performs a function similar to the modutrol motor on the burner.

If the steam flow transducer signal to the controller is below the set point, the controller signals the steam flow control valve to open and let more steam flow. If the transducer signal is above the set point, the steam flow controller signals the steam flow control valve to close, reducing steam flow.

Calibration

The steam flow transducer has been calibrated to produce a full scale signal (20 milliamps) at a flow rate of 1500 lb/hr (750 kg/hr). The controller has also been calibrated to display 0 lb/hr at 4 milliamps.

The transducer produces a signal which is proportional to the volumetric flow. The pounds per hour passing through the transducer is a function of the steam pressure.

Controller Set Up

The Eurotherm steam flow controller (mounted in the control cabinet) is programmed to the values shown below. Refer to the controller instruction manual (in the **Component Data Sheet** section of your manual) for details.

	Parameter	Setting	
Mnemonic	Description	Lb/hr	Kg/hr
Tune	Auto tuning	Off	Off
Hi Al	High Alarm		
Lo Al	Low Alarm		
D Al	Deviation Alarm		
Prop	Proportional Gain	1200	545
INT.T	Integral Time Constant	10	10
derT	Derivative Time Constant	Off	Off
Sp H	Set Point High	1200	545
Sp L	Set Point Low	0	0
H Ao	High Alarm Output	Off	Off
L Ao	Low Alarm Output	Off	Off
d Ao	Deviation Alarm Output	Off	Off
H Pl	High Power Limit (%)	100	100
Sn bP	Sensor Break Power	0.0	0.0
Sn	Sensor Type	LIN	LIN
Add r	Address		
bAud	Baud Rate		
IdNo	Identification Number		
CTrL	Control Type	Pld	Pld
oP1	Output 1	4-20	4-20
oP2	Output 2	Off	Off
A H	Auto/Hand	Auto	Auto
Pb d	Proportional Band Units	LIN	LIN
T Su	Tune At Start Up	No	No
Cb o	Cutback Operation	Auto	Auto
Act	Control Action	Rev	Rev
Hi L	High Sensor Break Point	1500	680
Lo L	Low Sensor Break Point	-100	-45
Fil	Filtering	1.00	1.00
Proc	Process Calibration Points	*	*
Accs	Parameter Access	**	**
Cal	Calibration	***	****

The process calibration points are:

P_1 = 0 with 4 milliamp input

P_2 = 1200 (or 545 for Kg/hr) with 20 milliamp input

** After unit is programmed, access to all parameters should be set to **Read**.

*** Calibration should be attempted by qualified personnel only.

Open programming switch inside unit when programming is complete. 3/90

Warranty

1. For a period of ninety (90) days from the date of start-up by us or one hundred twenty (120) days from the shipment where there is no start-up by us, we warrant that the material in and workmanship on the product covered hereby will be free from defects. If, during such period of time, purchaser establishes to our satisfaction that any part or parts manufactured by us were defective at the time they were shipped, we will repair or replace the defective parts, exclusive of installation and shipping charges. Our liability under this warranty is limited to the furnishing of such replacement parts and we will make no allowances for corrective work done unless we agree thereto in writing. Defects do not include damage or deterioration due to extraordinary wear and tear or improper maintenance or lubrication. This warranty is conditioned upon our being promptly notified of the alleged defect and upon the part in question being returned without delay for replacement. This warranty does not apply to Flat-Flex wire belt and to defects arising out of material provided, or design specified by purchaser.

2. We have not made and will not make any representations or warranties of merchantability or fitness or any other representations or warranties not set forth herein and will not be liable for any consequential or indirect damages.

3. The machinery and equipment, including motors, covered by this document, which shall be manufactured by others will carry the customary warranty of manufacturers, which we will obtain for the purchaser's benefit upon request. We make no warranty whatsoever that the product described in this document complies with state, local and national health and safety laws, regulations or rules. It will be the purchaser's sole responsibility to comply therewith.

9/27/82

Recommended Food Machinery Lubricant

4025 (AA)
Lubrication Engineers
Fort Worth, TX 76111

Authorized by USDA for use in Federally inspected meat and poultry plants. Non-toxic and clean; suitable for all food processing. Contains QUINPLEX; very tacky, resists washing and pounding action. Excellent mechanical stability (shear stable.) Rust and corrosion inhibited. NLGI Grade 2.

Typical applications: General lubricant for food processing applications in dairies, canneries, bakeries, meat packing and poultry processing plants, and frozen food operations. Superior where heat, steam and water create severe operating conditions. Use from 30 degrees F (-1 degrees C) 370 degrees F (187 degrees C) in bearings up to 3,000 rpm.

Keystone Division
Pennwalt Corporation
21st & Lippincott Sts.
Philadelphia, PA 19132

NEVASTANE NT-1, multi-purpose grease which operates in the 0 degrees F (-17 degrees C) to 300 degrees F (149 degrees C) temperature range. It has a dropping point of 450 degrees F (232 degrees C) dropping point, is made in NLGI #1 consistency, boasts excellent oxidation and mechanical atability and contains anti-rust and anticorrosion additives. NERASTANE HT-1 meets the requirements for use under FDA regulation Section 121.2553. It is manufactured with USP white oil and contains no whitening agents, oxides or materials used for similar purposes. Water and steam resistant.

Use NEVASTANE HT-1 for general lubrication in food plants where incidental contact with the finished product may occur. It is perfect for valves, slides, stuffing boxes, packings and chains, and you may apply it with a grease gun, grease cup, brush or Keystone PORTALUBE unit.

Rexlube Specialty Greases
No. 82 Medium Temperature Grease

American Industrial Research Corp.
800 Main Street
Patterson, N.J. 07530
201-279-6464
800-631-0289

Useable from 0 degrees F (-17 degrees C) to 450 degrees F (232 degrees C). It resists alkalines, acids, detergents and soaps, is highly water resistant and can be used on bearings to 1800 rpm. REXLUBE No. 82 MEDIUM TEMPERATURE GREASE is authorized for use by the USDA under the "AA" classification.

2/81

Recommended Spray Lubricant

Ivory-Sol Spray Lubricant
Lubest-Momar

Momar, Inc.
Atlanta, Georgia U.S.A.
404-355-4580

Useable at temperatures from -100° F to 450° F.

2/90

Chapter 5

Spare Parts

Minimum Order Notice

There is a minimum charge of $20.00 for parts orders. The reason for this is that packing, shipping and billing of an order amounting to a few cents costs us more than the total value of the parts.

Restocking Charges

There is a 20% restocking charge for all parts returned to Stein that were ordered in error by the customer, or are returned for any reason other than a shipping error on the part of Stein.

Stein, Inc.
1622 First Street
CN 5001
Sandusky, Ohio 44871
U.S.A.

Telephone	**(419) 626 -0304**
Toll Free	**(800) 553 - 1941**
FAX	**(419) 626 - 9560**
Telex	**825 - 907**

Revised 10/2/87 RFM

Service Parts Orders

To be able to give you our best and fastest service and supply you with the correct parts, we do need your cooperation when ordering parts from us.

1. Please give us the name, model and serial number of the equipment.

2. Please give us the correct name and number of thepart as shown on the bill of material in the Operation and Service manual for the piece of equipment.

Because it is very costly to return wrong parts, we will require all of the above information before parts shipments will be made.

Please follow these instructions to avoid delays.

Bob Johnson
Parts Manager

Using Bills of Material and Drawings

The following computer-printed pages are lists of recommended spare parts for various assemblies in your oven. These lists show the parts, recommended by Stein Engineering, that you should have on hand to be sure you can complete preventive maintenance on schedule and replace parts quickly in case of failure.

The **Assembly Part Number** and **Assembly Part Description** are listed near the top of the page. These numbers are the same as those on Bills of Material and/or drawings in the **Assembly Drawings** chapter of this manual.

The Bills of Material and assembly drawings are tied together through the item number on the assembly drawing. Look at the drawing for the assembly in which the part you need is located. You will find the item number of the part in the "balloon" attached to that part. Now find the item number on the bill of material connected to that drawing, which is either on the drawing itself, or inserted just before the drawing in the chapter. After the item number, in the column titled **Part Number**, is the Stein part number, which you will need when you order.

Chapter 6

Installation

Start Up Supervision

With the purchase of certain Stein equipment, start up supervision will be provided by a Stein Service Engineer for the number of days stated on the order confirmation. This service is also available on equipment that does not include start up supervision for a fixed daily rate plus all living and travel expenses.

This service includes the following:

1. Equipment check out for proper installation and operation.

2. Instruction to personnel for proper and safe operation, cleaning and maintenance of Stein equipment.

This service does not include physical installation of the equipment, necessary utilities (piping, ductwork, electrical, air, gas, CO_2 systems etc.) or specific product development.

The service department requires five days notice for scheduling domestic service and a minimum of two weeks notice for overseas service.

2/10/83

Motor Ratings

Stein equipment is used throughout the world, and operated from electrical power systems of various voltages and frequencies. The motors used on Stein equipment are conservatively rated to operate properly at the voltage for which a machine is sold.

The voltage rating of a motor assumes a line frequency of either 50 or 60 hertz. This voltage rating, though, means nothing until it is paired with a frequency rating. You'll find both numbers on the motor nameplate. **The ratio between these numbers (volts/hertz ratio) defines whether the motor will operate on the electrical power system in your plant.**

In other words, learn the volts/hertz ratio from the motor nameplate to determine whether the motor will work. A motor rated 460V, 60Hz will operate properly at 380V, 50Hz because the volts/hertz ratios are the same.

The speed of the motor changes with the frequency, however, and this is taken into account by Stein when designing the machine. Motors are designed to operate properly even when the rated voltage changes by as much as plus or minus 15%.

Motors of the following voltage and frequency ratings will deliver the same torque. The speed will change, depending on the line frequency:

460V, 60 Hz
415V, 50 Hz
400V, 50 Hz
380V, 50 Hz

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Customer Responsibilities

For proper installation of the Stein Oven, the customer must supply or complete the following:

1. All permits, fees and local, state, federal and provincial taxes.
2. Customs duty or exchange.
3. Alterations to existing equipment and/or buildings.
4. Construction labor.
5. Unload, uncrate and move the oven zone(s) (individual oven sections) into position in the plant.
6. Level each oven zone. (See Installation Instructions, immediately following.)
7. Install the infeed and outfeed extensions, the belt and belt track.

⚠ Note All wiring must conform to the applicable nationwide electrical code and all applicable local codes.

8. Install wiring as shown on Interconnection Drawing (see **Electrical Drawings** section.)

⚠ Note Check all motors for correct direction of rotation.

⚠ CAUTION **Never apply power to *any* motor for *any* reason until it has been completely installed in its system. When checking rotation of fan motors, first check the system to be sure that no debris has been left in the ducts and that all guards are in place.**

9. If oven is so equipped: supply and install remote hydraulic reservoir and pump unit. Supply and install hoses for connection to oven.

11. Supply and install piping:

a. Hydraulic, if the oven is so equipped: from the remote reservoir/pump unit to the remote flow control (which should be mounted near the control panel). Also from the flow control to the hydraulic belt drive motor.

b. Gas lines: up to and including the specified gas drops, including a gas pressure regulator between source and oven which will reduce incoming pressure to oven to between 0.50 and 1 PSI (3.445 - 6.89 kPa).

⚠ **Note** Regulator should be vented to the outside.

c. Water supply to, and drain lines from the oven.

d. Pressurized air drop for burner purge system, and equilibration chamber hood lift , if so equipped.

e. Steam system: up to and including the specified oven steam drops.

⚠ **Note** Customer must supply and install a steam pressure regulator upstream of the steam flow meter which provides 60 - 80 psi (413.4 - 551.2 kPa) steam pressure to the oven. See the specification sheet for volume of steam required.

Steam System Notes

** Sanitary steam is free of germs and contamination by toxic or other hazardous materials.

** To produce Sanitary steam use water that is softened (e.g. filtered and deionized).

** A boiler that has been used in any other application must be cleaned with a boiler water compound and blown down at an accelerated rate until thoroughly cleaned. **Do not use boiler water compound when generating sanitary steam.**

** Inspect and clean the boiler inlet filter at regular intervals.

** Inspect and clean the make-up water storage tank at least every 30 days, more often if necessary.

** To minimize water discoloration due to oxidation, corrosion or residue from piping:

a. blow down boiler after each use.

b. blow down and drain all water from steam lines before start-up.

⚠ **Note**

To avoid plugging and blow out problems, do not use an in-line strainer in the steam line.

11. Install all ductwork above the oven as shown in the utility drawing.

12. Install any additional supports required for exhaust fans, ducting, electrical conduit and piping for water or steam.

13. Install any required air pollution devices.

Plumbing Facility Requirements

⚠ Note

A copy of the Utility drawing is included in the **Drawings** section of this manual. It may be photocopied and distributed to contractors as needed.

Plumbing facilities required for each oven zone:

The following are plumbing facility requirements for each oven zone. Refer to the Utility Drawing for illustration.

Cold water:
A 1/2 inch cold water supply pipe is connected to the line near the discharge end of the oven.

This pipe supplies water for pan cooling and water seals.

Steam:
A 1-1/2 inch regulated steam supply pipe is attached to the steam control valve on the oven near the center of the back side.

This steam is clean process steam used in the oven for humidity control.

Gas:
A 1-1/2 inch gas supply pipe is attached to the operator's side of the oven. The maximum supply line pressure should be 1 PSI (6.89 kPa).

⚠ Note

A supply line regulator may be needed to maintain supply line pressure between 0.50 and 1 PSIG (3.445 - 6.89 kPa). The regulator should be vented to the outside.

The pressure regulator vent must also be connected to the outside.

Drainage:
Connect the CIP drain, located on the back side of the oven between the screen box and the CIP pump, to the floor drains.

Plumbing facilities required for the entire oven:

The following plumbing facility requirements apply to the entire oven, and are not repeated for each oven zone.

Hydraulic (if the oven is so equipped):

Hydraulic pressure and return lines are connected to the belt and brush control valves on the left side of the oven near the discharge end.

Mount and plumb the belt speed control (flow) valve at or near the control box.

Install a length of hydraulic hose in both the supply and return lines as a vibration isolator from the hydraulic system.

If desired, an electrically actuated hydraulic solenoid valve may be installed so that the conveyor can be started and stopped from the control cabinet. This will also stop the conveyor when the Group Stop pushbutton is used. The solenoid coil rating must be less than 1 amp.

Drainage:

There are two drains that need to be connected to the floor drains. They are:

The drain on the brush drip pan located under the belt cleaning brush.

The drain on the wash tank at the discharge end of the oven.

Electrical Facility Requirements

3-phase power to control box (rated per unit)

Conduit from control box:

* to oven junction box for 3-phase and control circuit power.

* to oven junction boxes for temperature sensors, belt speed sensors and fan speed sensor wires.

* to burner UV sensor wire.

* to circulation fan for 3-phase power.

* to exhaust fans for 3-phase power.

⚠ **Note** For complete details on the electrical installation, refer to the **Interconnection Diagram** and the **Composite Wiring Diagram** in the **Electrical Drawings** section of this manual.

Also refer to **Utility Drawing.**

Sheet Metal Facility Requirements

14" (355.6 mm) ductwork for powered vent:
from infeed and discharge vent housing to the roof of the building.

Two 8" (203.2 mm) exhaust ducts:
from the non-powered exhaust stacks. Depending on the oven configuration, these will be capped, connected to transition or equilibration chambers or ducted to the roof of the building. Refer to the serial-number-specific **Utility Drawing** for this oven.

Installation Instructions

1. Unload, uncrate and move oven zone(s) (individual oven sections) and auxiliary equipment to proper location in plant.

2. Remove the lifting channels, if installed.

3. Install the transition chamber between oven zones, if so equipped.

4. Level the oven zones by completing the following steps:

   a. Adjust all leveling screws on the frame so that they are firmly contacting the floor.

   b. Check the tank and frame of the oven to be sure it is level by completing the following steps:

      1. Rest a carpenter's level on the top edge of the lip of the water trough of the oven tank.

      2. Check both across the width and along the length.

      3. Adjust leveling screws as needed.

   c. Check to be sure each of the lift tubes is vertical by holding the carpenter's level against the tube. The tube should not tilt away from vertical, as measured in either the belt travel direction or in the cross-belt direction.

   d. If any of the lift tubes is not vertical according to the level, loosen the bolts in the jack screw mounting brackets and carefully adjust the tube position. Use the level to re-check the tube after you have adjusted it.

⚠ Note The jack screw mounting bracket and the double sprockets on top of the oven have a common adjusting and mounting plate.

5. Install the drip tray between oven zones.

6. Using the lifting yoke provided, lift and install the circulation fan(s).

Important Installation Notes

* The clearance between fan box and cone is critical to the performance of the oven. Consult the New York Blower information in the **Component Data Sheet** section of the manual for precise measurements. Mount the fans according to these measurements.

* Use RTV to create a seal between the oven and fan mountings.

* Tighten the fan mounting bolts securely.

* Be certain to match fan identification numbers with hole numbers when mounting fans.

* Check to be sure the fan impeller rotates freely in the correct direction, as indicated by the arrow on the fan motor.

⚠ CAUTION

Never apply power to *any* motor for *any* reason until it has been completely installed in its system. When checking rotation of fan motors, first check the system to be sure that no debris has been left in the ducts and that all guards are in place.

7. Install drain troughs on each end of drip tray if required and equipped.
8. Install the infeed and discharge assemblies.
9. Install burner(s).
10. Mount the gas train and main junction box on the oven.
11. Connect gas piping between the burner(s) and the gas train.
12. Connect the flexible gas hose to the customer-mounted gas drop.
13. Install ignitor(s) on burner(s) if they have been removed for shipping.
14. Install the gas train cover.
15. Install powered exhaust stack(s).
16. Install non-powered exhaust stacks and guards. (See **Utility Drawing.**)

⚠ Note

Use RTV to create a seal between the flanges.

17. Install the steam meter assembly and connect it to the plant sanitary steam piping.

18. Locate and attach the CIP tank to the main tank drain on each oven zone.

19. Attach the CIP pump/filter assembly to the CIP tank.

20. Attach the CIP piping to pump(s).

21. Attach the CIP filter outlet to the oven with braided hose.

22. Install the CIP nozzles in the powered exhaust stack and pipe to the CIP system. (See **Utility Drawing.**)

23. Install conveyor belt.

24. Connect oven discharge-section hydraulic connections to plant hydraulic system, if the oven is equipped with hydraulic drive.

25. Connect wiring from control cabinet to oven according to the wiring diagrams in the **Electrical Wiring** section of this manual.

⚠ Note

The wires from the UV detector to the flame safety are very sensitive. Be sure they are run in a **separate conduit.** A very small amount of moisture can cause leakage to ground, shutting down the burner and/or preventing start-up.

For Ovens With Variable Speed Controller

The variable speed controller **must** be located in a clean, dry area, remote from the processing environment. The control cabinet for the unit is not made to withstand production and/or washdown conditions.

26. Level the oven hood by completing the following steps:

    a. Open the oven hood two to three inches (2 - 3", 51 - 76mm.)

    b. Check to be sure the hood is level by holding a carpenter's level against the hood's lower edge both along the length and across the width.

c. If hood is not level, adjust it by completing the following steps on each lift tube as needed:

⚠ CAUTION **Turn off and lock out electrical power before attempting the following steps. Severe personal injury could result from contact with the chain drive or lift screw if they are accidentally turned on while adjustments are being made.**

⚠ CAUTION **Securely support the hood at all four corners, using blocks between the hood and the tank. After you place the blocks at the corners, lower the hood so that it is resting solidly on the blocks.**

1. Remove all lift system guards.

2. Disconnect the chain between the double sprocket and the jack screw sprocket.

3. Turn the sprocket in the lift tube to adjust the jack screw height.

⚠ Note Turn the screw clockwise until it "bottoms out", then turn it counterclockwise far enough to compensate for the height of the blocks supporting the hood on the tank.

4. Replace the chain between the double sprockets and the jack screw sprocket.

d. Measure distances from centerline to centerline on all lift tubes along each side, across both ends (see **Fig. 5 - 1**) and on each diagonal. The measurements should be within 1/4 inch (6mm) in each direction.

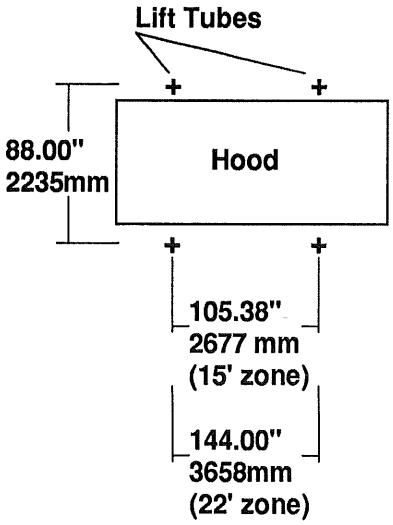

Fig. 5 - 1

Chapter 7

Electrical Drawings

How to Find Control Cabinet Parts

At the front of this section, you will find the **Control Cabinet Assembly Guide** drawing followed by several computer-printed Bills of Material with numbers that conform to the Stein part numbering system (000-00-0000). A list of modules included in the control cabinet appears on the first sheet of the Assembly Guide.

To find the Stein part number of a device in the control cabinet:

1. Find the part on the assembly guide and check the item number in the "balloon" attached to the part on the drawing.

2. Use the module list on the first sheet of the assembly guide to determine which module contains that item number.

3. Turn to the Bill of Material for that module and find the part by its item number. The Stein part number, which you will need to order the part, is listed under the heading "Component Part Number".

Chapter 8

Assembly Drawings

How to Use Drawings and Bills of Material

The engineering drawings and bills of material in this chapter document each machine system. In the upper left corner of each bill of material is its number (123-12-1234). In most cases the drawing that follows the bill has the same number in the lower right corner. In some cases there will be only a bill of material for a part of a system and no drawing.

The item numbers in balloons on the drawings correspond to the item numbers on the bill of material for that drawing. The **Component Part Number** column on the bill gives the Stein part number of each component, which you can use to order replacement parts if necessary.

Chapter 9

Component Data Sheets