Date 2 October 1980

Instruction Manual

FOR
MODEL KM-140
Continuous Ice Cream Freezer

Serial No. C-0178 - KM-140
Order No. 47-6333-02 J3941
Drawing No. 07B-P-367751 OLD/REV

When requesting information about your machine, always state serial number, name of machine, and model number, or any other pertinent information that might apply.

READ COMPLETE INSTRUCTIONS BEFORE INSTALLATION

Keep this manual in a safe place for future reference.

Additional copies may be purchased for $ 7.00 each

ENGLAND

CREPACO, inc.

Executive and International Sales Office — 8303 W. Higgins Road, Chicago, Illinois 60631

SALES BRANCHES

ATLANTA, GA. 30336
P.O. Box 43067 or
4150 Shirley Dr., S.W.
404-691-7317

CHARLOTTE, N.C. 28209
P.O. Box 3727
Dilworth Station or
2400 Dunavant St. 28203
704-376-0209

COLUMBUS, O. 43229
6999 Huntley Rd.
614-846-8500

DALLAS, TEX. 75247
8204 Sovereign Row
214-631-2170

DENVER, COLO. 80207
6300 East 39th Ave.
303-321-1821

DOWNERS GROVE, ILL. 60515
1426-28 Brook Dr.
312-626-5544
312-495-9700

HACKENSACK, N.J. 07601
214 Main St.
201-487-0578

LOS ANGELES, CAL. 90023
2905 E. 11th St.
213-261-0151

MINNEAPOLIS, MINN. 55427
701 N. County Rd. 18
612-544-8731

NASHVILLE, TENN. 37204
2936 Foster Creighton Dr.
615-255-0342

PENNSAUKEN, N.J. 08109
9526 Royal Hwy.
609-662-7095

RIVERSIDE, MO. 64150
P.O. Box 9036 or
4106 West Riverside St.
816-741-7700

SALT LAKE CITY, UTAH
4380 S. 500 W. 84107
801-262-8494

SAN LEANDRO, CAL. 94577
730 Whitney St.
415-635-1083

SEATTLE, WASH. 98114
P.O. Box 3162 or
707 S. Lane St. 98104
206-623-5482

WELLESLEY HILLS, MASS.
310 Washington St. 02181
617-237-4160

IN CANADA

APV Crepaco of Canada, Ltd.
1250 Ormont Drive
Weston, Ont. M9L-2V4
416-742-8250

APV Crepaco Montreal, Ltee.
1490 Mazurette St.
Montreal, Que. H4N1H2
514-382-6420

The Creamery Pkg. Mfg. Co.
(Far East) Ltd.
Hoko Bldg., Ginza 1-8-19
Chuo-Ku, Tokyo 104, Japan
Telex - 02523295 - Type for C.P.F.E.

Crepaco International, Ltd.
28, Bld. St. Michel 5 & 6
1040 Brussels, Belgium
Telex 26243

IMPORTANT NOTICE

These instructions are for installing, operating, cleaning and maintenance procedures expected to be encountered in the assumed normal applications for this equipment, and are presented as a general guide to the purchaser in his interest in obtaining optimum performance and useful life.

Modifications to these recommended procedures may be necessary to adjust to the varying conditions and techniques of processing and use procedures. Such modifications, as well as proper care and maintenance, are the sole responsibility of the purchaser.

These instructions do not constitute a warranty either expressed or implied nor do they modify the standard warranty of Crepaco, Inc.

Crepaco, Inc. reserves the right to improve, change or modify the construction of its equipment or any parts thereof without incurring any obligation to provide like changes to equipment previously sold.

CREPACO
FOOD EQUIPMENT AND REFRIGERATION
AN APV COMPANY

STANDARD WARRANTY

We warrant to the original purchaser only that the products manufactured by us (and all parts thereof) are free from defects in material and workmanship under normal use and service. Our obligation hereunder shall be limited to repairing or replacing F.O.B. our factory any part of said product which proves to be defective within one year from date of original installation and which our examination thereof shall disclose to our satisfaction to be defective in material or workmanship. Component parts not manufactured by us are warranted only to the extent of the manufacturers' warranties. We are not responsible for damages or consequential damages except as above and all such claims are expressly waived by the purchaser.

This warranty is in lieu of all other warranties expressed or implied and of all other obligations or liabilities on our part, and we neither assume nor authorize any other person to assume for us any other obligation or liability in connection with such products.

CREPACO

FOOD EQUIPMENT AND REFRIGERATION

AN APV COMPANY

Table of Contents

12. Suction Line Shut-off Valve (to be furnished by customer)

A 51 mm. (2 inch) Hand Shut-off Valve is installed downstream from the Back Pressure Valve, both of which are located in the Suction Line. This Hand Shut-off Valve is used only when making repairs on the Machine. To prevent the accidental closing of the Valve, remove the Valve Handle (see the Diagram on Page II-9).

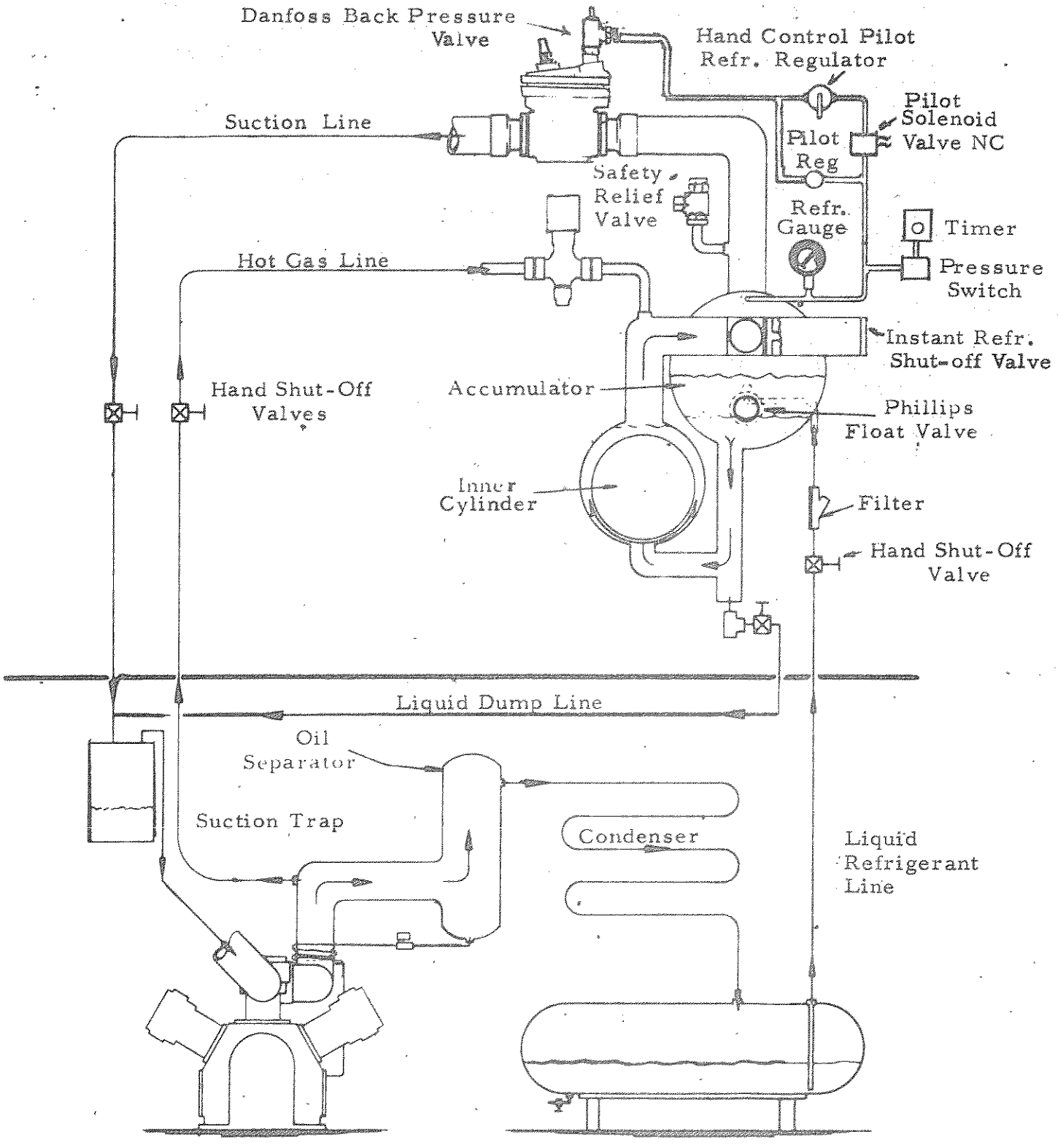
13. Hot Gas Defrost (Solenoid) Valve

This Valve is located adjacent and to the left of the Back Pressure Regulator. When the Solenoid Valve is energized by operating the "HOT GAS" Button (see the Diagram on Page IV-1), the Valve opens to inject hot gas into the Refrigerant Jacket.

14. Safety Relief Valve

This Valve is located on the Suction Line above the Accumulator. It is preset to relieve at 10.6 kg/cm^2 (150 lbs. per sq. inch) to prevent excessive refrigeration pressure build-up in the system. The Safety Relief Line must be piped to the outside atmosphere. This line must be unobstructed and free of Valves (the Dual Safety Relief Valve and its dual line to the outside atmosphere are used on some export Machines).

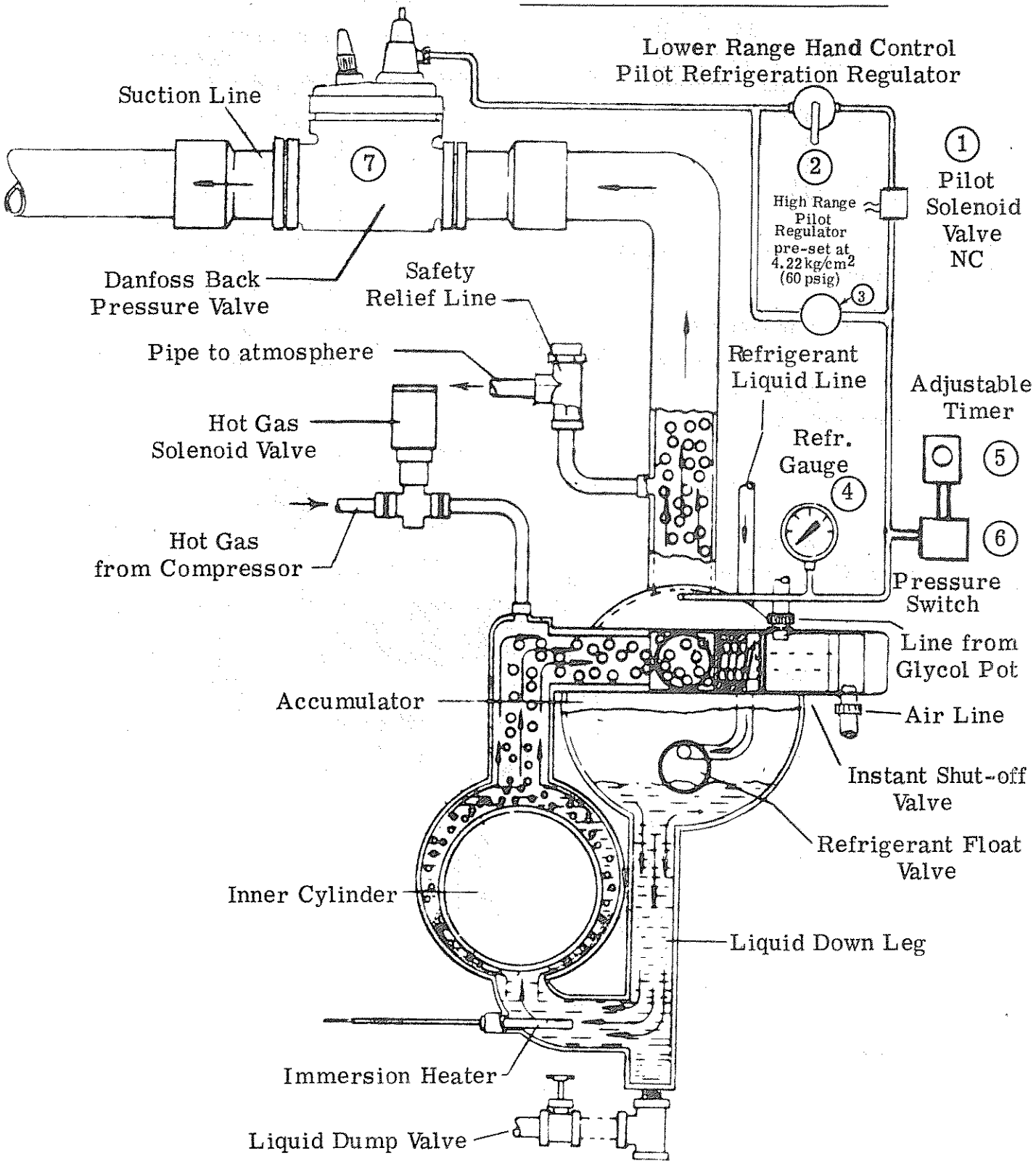
COMPLETE REFRIGERATION SYSTEM



MACHINE REFRIGERATION SYSTEM

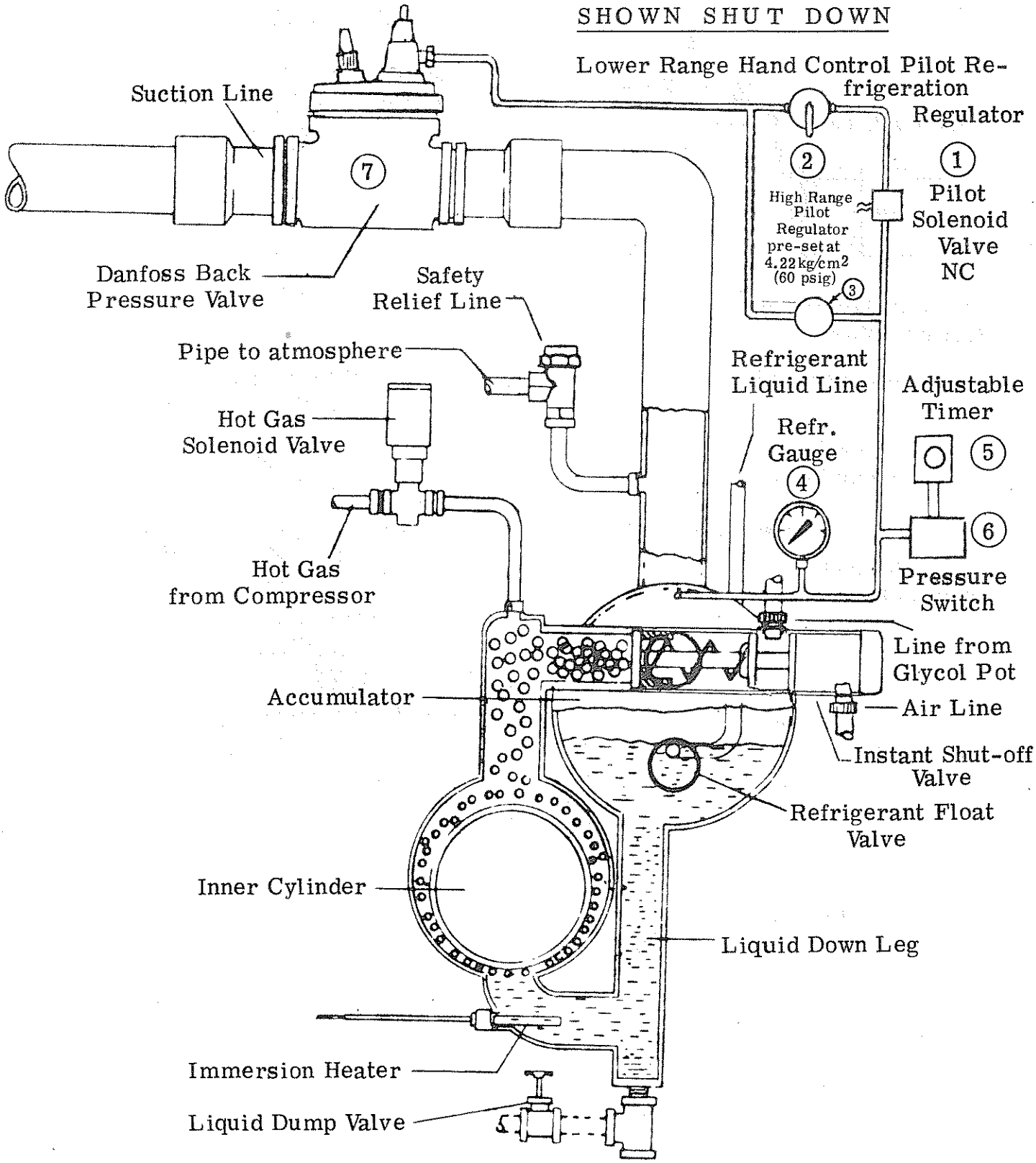
with the Automatic Defrost System and Series 80 Dashers

SHOWN IN OPERATION



MACHINE REFRIGERATION SYSTEM

with the Automatic Defrost System and Series 80 Dasher



SECTION I - GENERAL INFORMATION

A. MODEL KM-140 MACHINE SPECIFICATIONS

1. Product Output: 380 to 1520 liters (100 to 400 U.S. Gallons) of 100% overrun product per hour.*
2. Product Input: 190 to 760 liters (50 to 200 U.S. Gallons) with 12% fat, 15.5% sucrose, 10.5% milk Solids, .5% stabilizers and emulsifiers giving 38.5% total solids per hour.
3. Product Input Temperature: 4.4° C. (40° F.).
4. Drawing Temperature: -5.6° C. (22° F.).
5. Refrigeration load will be approximately: 50,400 K Cal (18.6 U.S. Tons) and 200,000 B T Us per hour at 0 kg/cm^2 (0 psig) suction pressure in the suction main at the rear of the Machine when using R-717 (Ammonia), or 0.53 kg/cm^2 (7.5 psig) suction pressure using R-22; 0.85 kg/cm^2 (12 psig) suction pressure using R-502.
6. Refrigeration evaporating pressures required to maintain a -9.4° C. (-23° F.) temperature in the freezer evaporator (refrigerant jacket for a -5.56° C. (22° F.) drawing temperature are as follows:

Ammonia (R-717)	0.16 kg/cm^2 (2.22 psi)
R-502	0.94 kg/cm^2 (13.37 psi)
R-22	0.59 kg/cm^2 (8.47 psi)
R-12	2.44 cm Hg. (.96 in. Hg)

   As drawing temperatures are lowered, the refrigerant evaporating temperatures and pressures will change accordingly.

   A 0.28 kg/cm^2 (4 psi) minimum pressure differential is required between the freezer evaporator (refrigerant jacket) and the refrigerant suction line for proper operation of the Back Pressure Regulator.

7. Motor Drives:
   a. Dasher: One 20 H.P., 1800/1500 rpm, with a Dasher speed of approximately 230 rpm (may be purchased with the Machine or supplied and mounted by the customer).
   b. Pump Motors: One 2 H.P., Variable Speed Drives

---

* Output capacities listed are reduced by 15% when using halocarbon refrigerants except for R-12 when the output capacity may be reduced by as much as 25-30%.

B. COMPONENTS AND SERVICES TO BE FURNISHED BY CUSTOMER

Before installation of the Machine, the following customer-furnished components should be available:

1. Electrical wiring shall be of the correct size for the power required.
2. All disconnect switches, fuses, and motor starters shall be furnished by the customer (see particulars on the Main Wiring Diagram, Page II-5).

3. One - Air Regulator to reduce air pressure to 4.2 kg/cm^2 (60 lbs. per sq. inch). If the Machine employs By-pass Pumps for the Kwik Clean, Kwik Clean-Kwik Fill, or the Programmed Systems, then this Air Regulator should reduce pressure to 5.3 kg/cm^2 (75 lbs. per sq. inch) to accommodate the by-pass feature of these Pumps. The capacity of plant air should be approximately 0.90 m^3/hr. (30 ft^3/hr.).
4. Hot Refrigerant Gas and the necessary piping from the Compressor's high side to the machine (refer to Page I-6).
5. One - 12.7 mm. nominal (1/2 inch) I.P. S. (Iron Pipe Size, US Standard) Hand Shut-off Valve for the Hot gas Line.
6. One - 50.8 mm. nominal (2 inch) I. P. S. Hand Shut-off Valve for the Suction Line and the necessary piping to the Headers.
7. One - 25.4 mm. nominal (1 inch) I. P. S. Line to the outside atmosphere from the Safety Relief Valve outlet. If a Dual Safety Relief Valve is used, two separate lines to the outside atmosphere must be used and these lines or piping may NOT be manifolded or obstructed in any way.
8. One - 12.7 mm. nominal (1/2 inch) I. P. S. Hand Shut-off Valve for the Refrigerant Liquid Line.
9. One - Booster (Centrifugal) Pump is recommended to be placed between the product Tank and the Product Inlet on the Product Pump. This Pump should be of sufficient capacity to develop between 1.06 - 1.41 kg/cm^2 (15 to 20 lbs. per sq. inch) pressure to the Product Input Pump, or, in the case of the Mix-Air System, the First Stage or Mix Pump.

   If no Booster (Centrifugal) Pump is used, a desired pressure to the Product Input or Mix Pump (First Stage) should be maintained at a minimum steady pressure of 1.0 kg/cm^2 (14 lbs. per sq. inch) to maintain a non-fluctuating overrun. In the Mix-Air Systems this pressure will give the correct mix-to-air balance between the First Stage and Second Stage Pumps.

C. REFRIGERATION INFORMATION

1. General Information

The Machine employes a full-flooded type refrigeration system. The Refrigeration Jacket surrounding the Inner Cylinder (evaporator) is fed by gravity from an accumulator which is above the Refrigerant Jacket. The Jacket is fully flooded when the Instant Shut-off Valve is open (refer to the Diagram on Page I-7). When the Instant Shut-off Valve is closed (refer to the Diagram on Page I-8), the vaporous refrigerant instantly returns the liquid refrigerant to the Accumulator, thus effecting an immediate interruption of chilling or freezing. When the Instant Shut-off Valve is reopened, chilling or freezing is quickly resumed.

A modulating Refrigerant Float Valve maintains the desired liquid refrigerant level in the Accumulator during the operation.

The refrigerant pressure, temperature, and rate of evaporation which surrounds the Inner Cylinder is controlled by the gas-operated Back Pressure Regulator in the Suction Line. This Back Pressure Regulator is adjusted by means of a control on the Front Panel of the Machine. The pressure (and temperature) of the refrigerant in the Accumulator and Inner Cylinder Jacket is indicated by the Refrigerant Gauge on the Instrument Panel.

2. Automatic Defrost System for Machine with Series 80 Dashers

   a. Refer to Pages I-7, I-8, II-6a, IV-1, IV-2, and IV-3.

   b. The Back Pressure Valve is a dual-pressure type. During the normal operation a Solenoid Valve (1) is opened in the Pilot Line between the Manual (lower range) Refrigerant Control Pilot Regulator (2) and the Back Pressure Valve (7) so that adjustments in suction pressure may be easily made by the Manual Control Pilot Regulator (2) on the front of the Machine.

   The Stall Monitor, located in the Control Panel on the front of the Machine, is a Dasher Motor Load Indicator as well as a current sensing relay. This device is adjusted to sense the Dasher Drive Motor current and to trip a relay when the current reaches a pre-set level. When the first level (set at 110% motor load) is reached, a warning bell is actuated, and the air-operated Refrigeration Instant Shut-off Valve closes. At the second sensing level (set at 120% full load), the Pilot Solenoid Valve (1) is closed, and the high range Pilot Regulator (3), pre-set at 4.22 kg/cm^2 (60 psig), goes into operation allowing pressure to be built up to this pre-set point. At the same time, the Hot Gas solenoid Valve is opened to emit hot gas, the Dasher stops, and all product Pumps stop. When the pre-set pressure of 4.22 kg/cm^2 (60 psig) is reached, a pressure switch (6) actuates an adjustable Timer (5) which is engaged for up to a maximum of 10 minutes for 60 Hz. circuits or 12 minutes for 50 Hz. circuits. The adjustable Timer may be set to a selected time which will insure the defrosting of the Inner Cylinder and release of the frozen Dasher. At the end of this period, all conditions return to normal, which means that the Machine must be manually put into operation as would be done in an initial start-up.

   During the selected time period, the Dasher, Pumps, and Instant Shut-off Valve cannot be started or activated until timed out. If the Accumulator pressure drops below 4.22 kg/cm^2 (60 psig), the time cycle will be reset until the 4.22 kg/cm^2 (60 psig) pressure is maintained.

   If this cycle does not free the Dasher for normal operations, a manual override is provided through an actuating switch ("HOT GAS") on the Control Panel that, when energized, will restart the Timer, and the defrost cycle will be returned to operation. The defrost cycle is complete when the hot gas lamp in the Control Panel is no longer illuminated. The suction pressure in the Machine's Accumulator will be at the defrost pressure until such time that the refrigeration Instant Shut-off Valve is actuated as in a sequence start up.

3. Refrigeration Instant Shut-off Valve

   The Instant Shut-off Valve is a two-way, air-operated, piston type valve actuated by an air solenoid valve which, in turn, is controlled by the Refrigeration Button. The air to open the piston operates against a column of glycol (contained in a small reservoir). The glycol, therefore, is actually exerted against the Instant Shut-off Valve Piston to its opened position. The piston is returned to its closed position directly by air pressure, thus forcing the glycol back into its reservoir. The glycol system is placed in the air control line to prevent possible freezing of the valve through condensate build-up.

   When the Shut-off Valve is opened, it permits the refrigerant gas to be drawn off through the suction line and suction valve; thus, more liquid refrigerant is released from the Accumulator and drawn off as a gas, the continually moving gas passing the outer wall of the Inner Cylinder. When the Shut-off Valve is closed, the refrigerant gas pressure forces the liquid refrigerant back to the Accumulator, the freezing or chilling ceases immediately.

4. Gas-operated Back Pressure Regulator

The gas-operated Back Pressure Regulator's Piston, which is normally closed, is held closed by a spring. The piston is opened by gas pressure piped from the Accumulator. The gas pressure necessary to open the piston in the Regulator is controlled by the Manual Refrigeration Control Pilot Regulator Handle on the front panel of the Machine (refer to the Diagrams on Pages I-7 and I-8, and IV-2) is labeled "AMMONIA" or "REFRIGERATION" Control. Turning the Handle clockwise increases the pressure in the Refrigerant Jacket thus raising the drawing temperature; turning the Handle counter-clockwise decreases the pressure thus lowering the drawing temperature.

5. Refrigerant Gauge

This Gauge is located directly under the Control Panel and indicates the pressure and the corresponding temperature of the refrigerant in the Accumulator.

6. Refrigerant Float Valve

The Refrigerant Float Valve (Phillips Liquid Level Modulating Valve) is in the Accumulator to maintain a constant level of Liquid Refrigerant during the operation. A mesh Screen Stainer is located within the Float Valve.

7. Liquid Line Strainer

The Liquid Line Stainer, which is in the Refrigerant Liquid Line, prevents obstructions from entering the Float Valve mechanism. It is located at the rear of the Machine.

8. Immersion Heater

An Immersion Heater is located underneath the Refrigerant Jacket and remains on at all times. This Heater aids in boiling off the refrigerant in the Refrigerant Jacket (Evaporator) during a shut-down. Should this Heater Element burn out or fail to function a Warning Lamp will glow. This Lamp is located between the Air Gauge and the Motor Load Indicator (or Stall Monitor) in the Control Panel (refer to the Diagram on Page IV-1).

9. Oil Drain and Liquid Dump Valve

This Valve, which is located beneath the Accumulator, facilitates the drainage of oil that may have collected around the Inner Cylinder. Also, it may be used for draining the Accumulator of liquid refrigerant when a Liquid Dump Line is available.

10. Refrigerant Supply Line Hand Shut-off Valve (to be furnished by customer)

This Hand Shut-off Valve is installed upstream from the Liquid Line Strainer, both of which are located in the Liquid Refrigerant Line. This Hand Shut-off Valve is necessary when draining the Machine of Liquid Refrigerant or when changing the Liquid Line Strainer. The Valve should also be closed at the end of the day's operation.

11. Hot Gas Line Hand Shut-off Valve (to be furnished by customer)

A Hand Shut-off Valve is installed upstream from the Hot Gas Solenoid Valve, both of which are located in the Hot Gas Defrost Line. It should be closed at the end of a day's operation (refer to the Diagram on Page II-9).

D. MECHANICAL INFORMATION

1. C P Mix-Air Overrun System

a. General Information

The C P Continuous Machine Mix-Air Overrun System uses sanitized plant compressed air. This air is incorporated into the product at a junction between the two rotary-type pumps. The First Stage Pump meters the product into the sytem; the Second Stage Pump will pump the product and air combination into the Inner Cylinder. A necessary Inner Cylinder pressure is developed and maintained because the Second Stage Pump is pumping the product-air combination at a faster rate than the Product Discharge Pump which is pumping the product from the Inner Cylinder. The Pump speed ratios aid in equalizing the Cylinder pressure. An Inner Cylinder pressure is desirable for efficient scraping of the Cylinder Walls by the Scraper Blades; the pressure also maintains a better air and product combination.

b. Air Supply Control

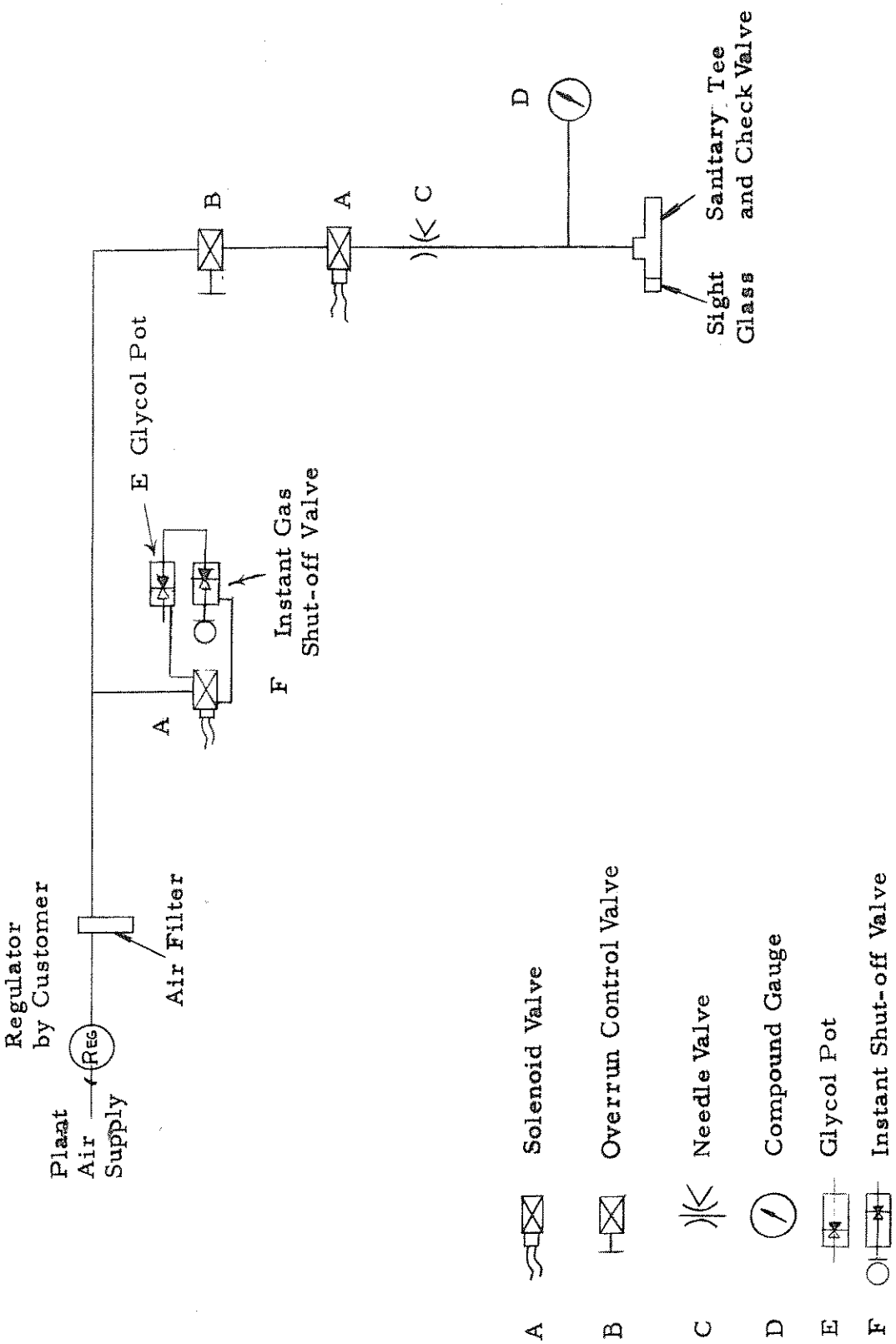
The Plant Air Line enters an Air Filter (which also removes moisture from the Plant Air Supply Line) at the rear of the Machine, hence to the Overrun Control Valve at the front of the Machine. The Overrun Control Valve is regulated by the "OVERRUN CONTROL" Handle located on the Front Panel. Turning the Handle clockwise permits more air to enter the line, thus increasing the amount of overrun and decreasing the Compound Gauge vacuum reading. Turning the Handle counter-clockwise decreases the amount of air, thus decreasing the amount of overrun and increasing the Gauge vacuum reading.

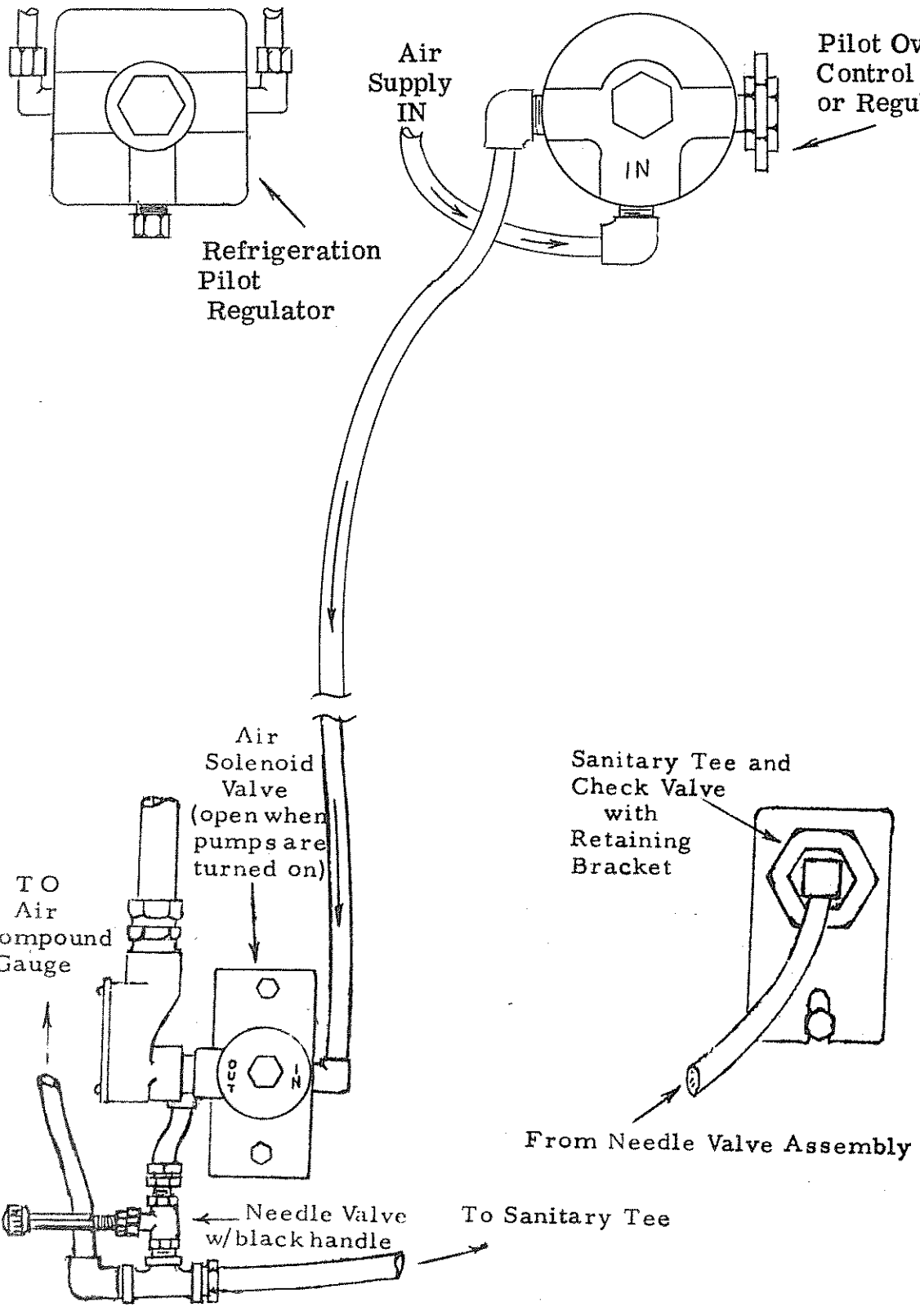
From the Overrun Control Valve the air passes through the Air Supply Solenoid Valve. This Valve is opened and closed by the "MIX PUMP" Switch; therefore, when the pumps are on, this Solenoid Valve is automatically opened permitting air to enter the product. This system permits the stopping and starting of the Machine without the necessity of adjusting the Overrun Control Regulator. This Solenoid Valve is positioned below the Overrun Control Regulator and is mounted on the Machine's Inside Front Panel (refer to the Diagram on Page I-11). In the case of the Programmed Machines, this Overrun Solenoid Valve is located in the Air Solenoid Cabinet at the side of the Machine (refer to the Diagram on Page II-11a).

In the Kwik Clean, Kwik-clean - Kwik-fill, and Programmed Systems, plant compressed air is used to operate the Vent Valves and the by-pass feature of the Product Pumps. Air to the Vent Valves will be on continually, thus the Valve is closed under normal and operating periods. When its solenoid is energized, air is removed from inside this valve and its spring will OPEN its port during the filling cycle only. Air to the by-pass feature of the product pumps is off during non-operating periods, and during the filling, cleaning and sanitizing periods. The Solenoid Valves to these pumps are energized during the production period only. Refer to the Electrical Wiring Diagram on Page II-5, as as Pages I-10, II-11a, III-4, IV-1 and IV-2.

KM-118, KRM-118, and KM-140, KRM-140

AIR SCHEMATIC





c. Pumps for the Mix-Air and Product Discharge System

The First Stage, Second Stage, and Product Discharge Pumps for each cylinder are driven by one variable speed drive, which is located below the Refrigerant Jacket (refer to Page V-16). The "MIX PUMP" Switch on the Control Panel starts and stops the Motor to this Variable Drive. To increase the volume of product entering the Inner Cylinder, the speed of this Drive must be increased. This is done by turning the Crank marked "MIX PUMP" counter-clockwise. To decrease the amount of product entering the Inner Cylinder, turn this Crank clockwise (refer to the Diagram on Page IV-2).

A Booster (Centrifugal) Pump (furnished by the customer), located between the Product Tanks and the Machine, supplies the First Stage or Product Input Pump. This Pump is used to meter the product into the Mix-Air System.

The Second Stage Pump operates at a greater speed than either the First Stage Pump or the Product Discharge Pump. Since the Second Stage Pump has a greater speed than that of the Product Discharge Pump, the desired Inner Cylinder pressure will result.

If the Machine is a Mix-Air Re-circulation Machine (KRM), a Re-circulation Pump is employed to re-circulate a certain portion of the finished product back into the product-air combination before this combination enters the Inner Cylinder. Thus, without interfering with the rated product capacity of the Machine, the incoming product may be pre-chilled to the best temperature for air incorporation, body, and texture control.

The Product Discharge Pump, in addition to aiding the Second Stage Pump maintain the Inner Cylinder Pressure, meters the finished product out of the Machine and into the Discharge Pipe to the Filling Machine.

d. The Product Discharge Valve

The Product Discharge Valve is spring loaded and may be left either in an unlocked (closed) or in a locked-out (open) position. It is left in an unlocked (closed) position when the Inner Cylinder is being filled with product before a start up. Also, it is left in this unlocked (closed) position when the finished product is to have an overrun under 50%. Otherwise the Machine should be operated with the Valve in a locked-out (open) position.

2. The Dasher

The primary function of the Dasher is to keep the product in constant motion. Blades on the Dasher scrape the chilled or frozen product from the Inner Cylinder Walls. The unique triangular design of the solid Dasher employed in this Machine works and agitates the product as it is being chilled or frozen. As the product is frozen or chilled it is pumped toward the product discharge end of the Inner Cylinder under pressure. The Dasher rotates in a counter-clockwise direction and is driven by the Dasher Drive Motor, the Motor being located at the rear of the Machine. This Motor operates at a constant speed and is turned on by the "DASHER" Button on the Control Panel.

SECTION II - INSTALLATION

A. ESTABLISHING THE MACHINE IN YOUR PLANT

1. Receiving and Inspection

For long, economical, and satisfactory service, careful initial installation is vital. While uncrating the Machine, check against the packing list for damaged and missing parts. Care must be taken to check for small parts that may be in the packing material. If there is a loss or there is damage in transit, a claim must be filed against the carrier. It is best to file a claim at the time of delivery, but, even though inspected by the carrier, a claim must be filed within five days after delivery. One of our customer services is to assist in handling these claims.

It is recommended that as soon as the Machine is installed a "Suggested Initial Inventory of Service Parts" be ordered. This inventory is found at the rear of the "Service Parts Manual."

2. Location

When planning the location of the Machine, the following factors must be considered:

a. Minimum front clearance (permit removal of Dasher): 45 inches (1143 mm.)

b. Minimum rear clearance (permit maintenance): 24 inches (610 mm.).

c. Minimum side clearance (both sides): 24 inches (610 mm.).

d. Close proximity to the Product Tanks.

e. Adequate lighting.

3. Moving and Leveling

a. Uncrating and Unskiding

CAUTION: The stainless steel Side Panels are attached to the Machine and extend below the frame of the Machine. After uncrating the Machine, remove these Side Panels to prevent their being damaged.

Remove the shipping straps. To remove skid, the machine must be raised as illustrated in Figs. 2a and 2b. Two wood beams may be placed through the frame work of the machine (from one side through to the other side): one beam as close to the front of the machine as possible; the other beam towards the rear of the machine. Place four jacks (screw lifts) at the four corners of the machine, close to the skid, and underneath each of the beam ends. Then raise the machine far enough (operating each jack alternately and evenly), to clear the leveling legs. Pull the skid from underneath the machine. Gradually lower the machine to the floor.

b. Leveling

It cannot be over emphasized the importance of leveling a machine. An unleveled machine will eventually settle, its frame will eventually become out of line, and the result will be excessive wear and possible malfunctioning of parts.

Level the front of the machine by placing a length of straight steel (channel, angle, etc.) or board underneath the two front leveling pads. Place a level on this length of steel or board and adjusting the front leveling legs to bring the level into true. To level the machine from front to rear, place the level in the inner cylinder and adjust the rear leveling legs either up or down to bring the level into true. Adjust the rear of the machine by using the same procedure that you did to adjust the front. Re-check the level of the inner cylinder (front to rear). Make sure that the threads of the leveling legs are not exposed. Refer to Page II-3.

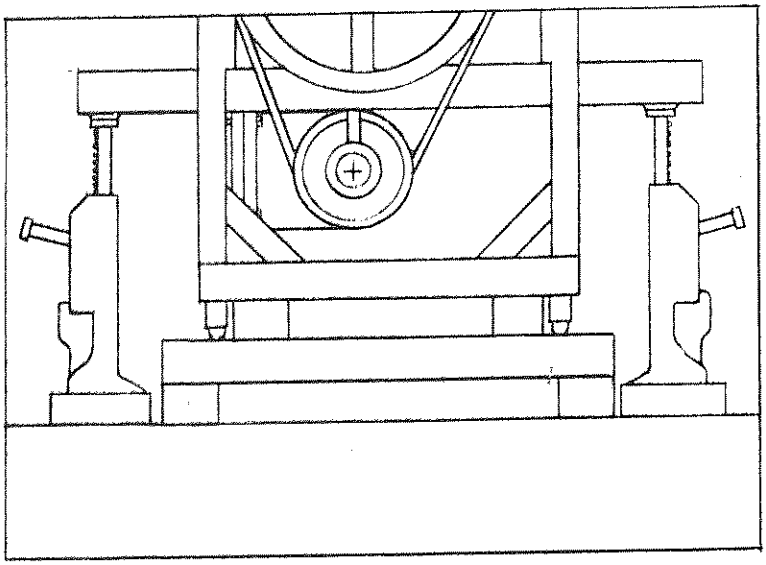


Fig. 2a

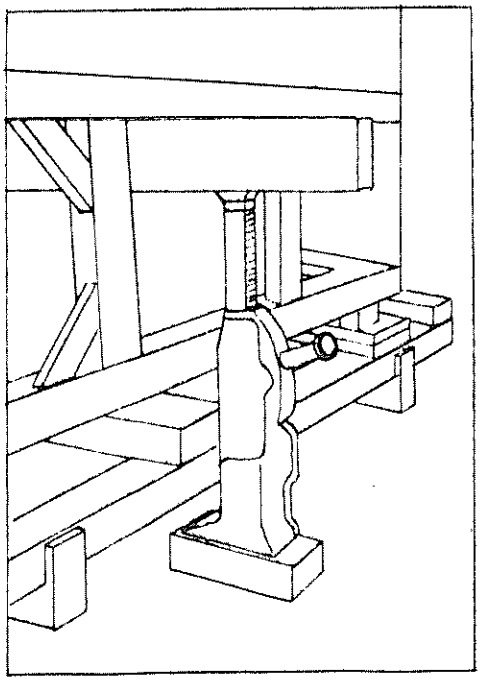
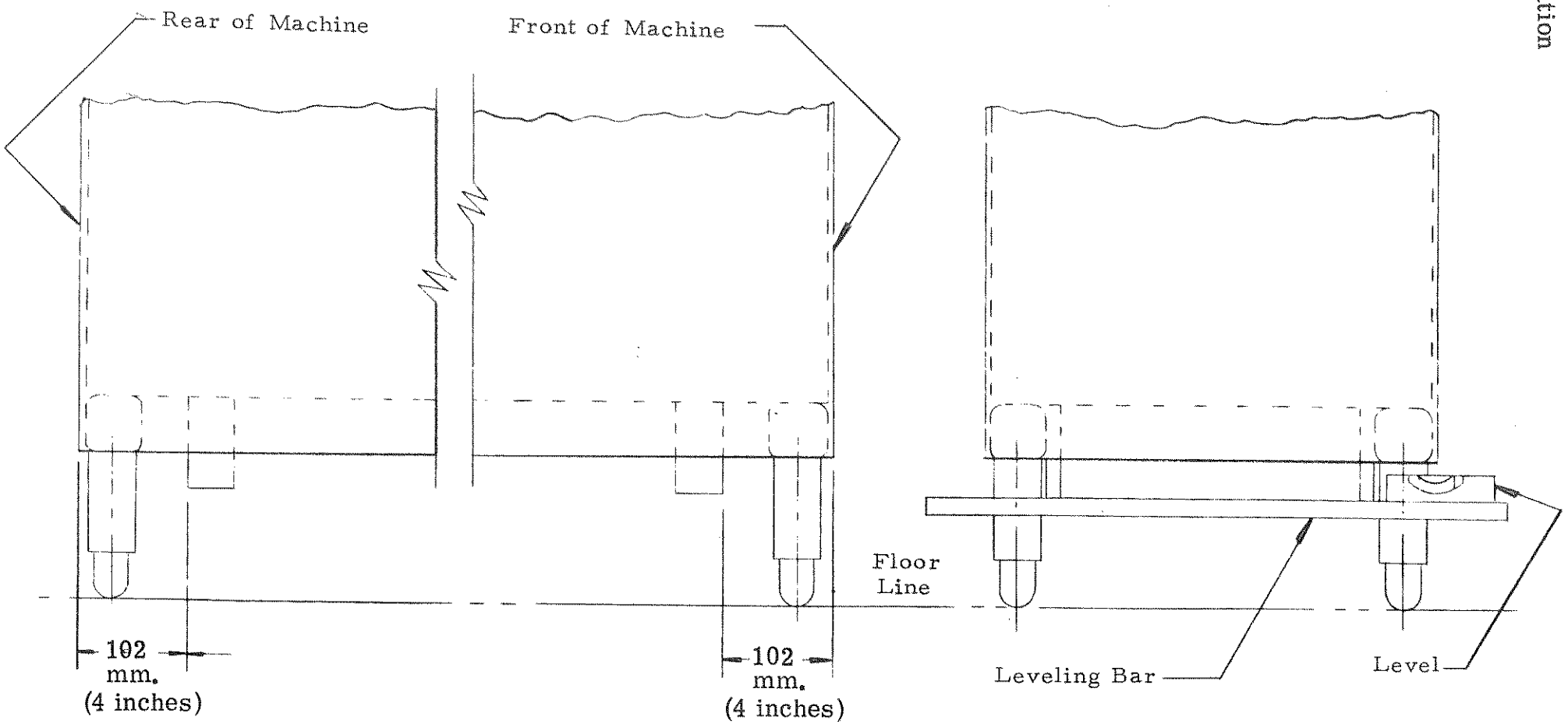


Fig. 2b



MACHINE LEVELING

Lug Location

B. ELECTRICAL CONNECTIONS

1. An experienced electrician should make all electrical connections.
2. The wiring diagrams are shipped with the Machine; also the Main or Primary Wiring Diagram is on Page II-5.
3. Safety Disconnect Switches must be of the correct size for the motors used on this Machine.
4. Installation wiring must be connected between the Magnetic Disconnect and the Machine as shown in the Main or Primary Wiring Diagram.
5. The Power Supply Line, which terminates at the Rear Wiring Enclosure, may be brought up from underneath the Machine and through the Splash Shield (located below the Inner Cylinder). Cut holes into the Rear Wiring Enclosure (at rear of Machine) to suit the electrical installation requirements (refer to Figs. 7a and 7b on Page II-7). Also, cut holes into the Back Panel of the Control Panel to suit the electrical installation of the Control Circuit. Wiring should be done according to the Main Wiring Diagram and local codes.
6. The Control Panel Push Button Switches may be used with any standard Magnetic Starter. These Starters should be equipped with Overload Protectors and should be of the correct size for motor voltage and amperage.

   CAUTION: All C P Machines are wired with lower CONTROL Voltage than that of the Power or Line Voltage. This lower voltage wiring protects the operating personnel from possible injury. Refer to Specific machine Wiring Diagram for further instructions. If local codes require an isolated transformer, refer to the Main Wiring Diagram for specifications.
7. The Motor Load Indicator is wired to a Westinghouse Current Transformer, and it must be wound to match the full motor load amperage. Refer to Page II-6.

   CAUTION: Never allow the Secondary Winding to become open circuited when the current is flowing in the Primary Winding because, under this condition, the difference in potential between the Secondary Terminals will rise to a DANGEROUS value. Also, the accuracy of the Transformer may be impaired. Therefore, ALWAYS short circuit (jumper) the Secondary Terminal before disconnecting the Secondary Load (Motor Load Indicator or Stall Monitor). Refer to Page II-6 and the tag attached to the Transformer for further instructions.
8. Machines equipped with Stall Monitor Motor Load Indicators are wired for 115 Volts, 60 Hz. or 115 Volts, 50 Hz. If the Control Electrical Supply is not of this voltage, a remote transformer shall be installed to reduce the voltage to meet this standard. This Transformer is included in "Parts Shipped with the Machine." Refer to the Main or Primary Wiring Diagram on Page II-5.
9. The installing electrician should mount the Control Circuit Transformer or the Heater Circuit Transformer in a well ventilated area near the motor starters. The tansformer shall not be mounted in any of the Freezer Wiring Enclosures; these enclosures are not large enough to provide adequate ventilation, and the transformer will over heat.

I-5

SCHEMATIC DIAGRAM

CONTROL SUPPLY
.3KVA-220, 230 OR 240 VOLTS
SINGLE PHASE
60 HERTZ OR 50 HERTZ

MAXIMUM FUSE SIZE-15 AMPERES

HEATER TRANSFORMER
200 V. 208 V. 220 V. 230 V. 240 V. 250 V.

MAXIMUM FUSE SIZE-3.2 AMPERES

115 VOLTS

TERMINAL X2 MAY BE GROUNDED.

RESET TIMER
CLUTCH
MOTOR
1TR-1

DASHER STOP START
DASHER STARTER
1M

MIX PUMP STOP START
3SOL AIR
MIX AIR SOLENOID VALVE
MIX PUMP STARTER
2M

REFRIGERATION OFF ON
ICR
REFRIGERATION CONTROL RELAY

RUN R PUMP DOWN
1SOL AIR
REFRIGERATION SOLENOID VALVE

HOT GAS ON
2SOL NH3
HOT GAS SOLENOID VALVE

INDICATING FUSEHOLDER
NEON
1 AMPERE FUSE

OIL TRAP HEAT
55 WATTS-115 VOLTS
1H

CONNECTION DIAGRAM

MOTOR LOAD INDICATOR

INDICATING FUSEHOLDER
1 AMPERE FUSE

CONTROL BOX

CONTROL RELAY ICR

CONTROL PANEL COVER VIEWED FROM REAR OR WIRING SIDE

REFRIGERATION · HOT GAS · DASHER · MIX PUMP

R PUMP DOWN RUN
KEY OPERATED

RESET TIMER
CLUTCH
1TR-1 MTR
1TR-2

1SOL AIR · 2SOL NH3 · 3SOL AIR

QIL TRAP HEATER
55W., 115 VOLTS

REFRIGERANT · HOT GAS · MIX AIR
SOLENOID VALVES

MAXIMUM FUSE SIZE-15 AMPERES

(LINE L2 MAY BE GROUNDED)

CONTROL SUPPLY
.9 KVA
220, 230 OR 240 VOLTS
SINGLE PHASE
60 HERTZ OR 50 HERTZ

HEATER TRANSFORMER
FURNISHED WITH THE FREEZER; TO BE INSTALLED IN THE FIELD.

MAXIMUM FUSE SIZE 3.2 AMPERES
.3 KVA
200 V. 208 V. 220 V. 230 V. 240 V. 250 V.

HEATER & STALL MONITOR SUPPLY-115 VOLTS ±10%
60 HERTZ OR 50 HERTZ

TERMINAL X2 MAY BE GROUNDED

CHOOSE THE PROPER PRIMARY TAP TO MATCH THE AVAILABLE CONTROL POWER SUPPLY.

SPECIAL NOTE: THE OIL TRAP HEATER IS TO BE ON CONTINUOUSLY. THEREFORE, THE CONTROL POWER SUPPLY SHOULD BE LEFT ON DAY AND NIGHT, AND ONLY DISCONNECT IT FOR SERVICE WORK.

DASHER MOTOR STARTER
WYE-DELTA STARTER
1M

MIX PUMP MOTOR STARTER
FULL VOLTAGE STARTER
2M

MAIN POWER SUPPLY
220, 230, 240, 380, 400 OR 415 VOLTS
3 PHASE
60 HERTZ OR 50 HERTZ

ITR-2 METER SHORTING CONTACT

MOTOR LOAD INDICATOR & CURRENT TRANSFORMER

DASHER MOTOR STARTER
1CT
1M

DASHER MOTOR
20 HP, 3 PHASE
4 POLE
WYE START-DELTA RUN
1MTR

MIX PUMP MOTOR STARTER
2M

MIX PUMP DRIVE
2 HP, 3 PHASE
VARIABLE SPEED
2MTR

MAIN POWER SUPPLY
220, 230, 240, 380, 400 OR 415 VOLTS
3 PHASE
60 HERTZ OR 50 HERTZ

WIRING ENCLOSURE AT THE REAR OF THE FREEZER

CURRENT TRANSFORMER FOR WIRING INSTRUCTIONS SEE DRAWING 07X-P-225680

GROUND TERMINAL

DASHER MOTOR
20 HP, 3 PHASE
4 POLE
WYE START-DELTA RUN
USE GREEN WIRE TO GROUND MOTOR FRAMES
1MTR

MIX PUMP DRIVE
2 HP, 3 PHASE
VARIABLE SPEED
2MTR

SOLID LINES INDICATE FACTORY WIRING.
DASHED LINES INDICATE FIELD WIRING.

WIRING INSTRUCTIONS:

ALL MOTOR WIRES TO BE BLACK
WIRE NO. 2 (GROUNDED L2) SHALL BE WHITE.
WIRES 70 & 71 TO THE LOAD INDICATOR TO BE YELLOW.
ALL GROUNDING WIRES TO BE GREEN.
WIRES 201, 202 & 203 (TO THE HEATER) TO BE ORANGE.
ALL OTHER CONTROL WIRES SHALL BE RED.
USE TYPE AWM WIRE OR EQUIVALENT, 600 V., MINIMUM SIZE NO. 14 AWG. AND TO BE LABELED ON BOTH ENDS WITH BRADY WIRE MARKERS.

CAUTION:
THE CURRENT TRANSFORMER MUST BE WOUND TO MATCH THE MOTOR FULL-LOAD CURRENT AT LINE VOLTS.

FOLLOW THE MOTOR STARTER MANUFACTURER'S RECOMMENDATIONS WHEN SIZING THE OVERLOAD RELAY HEATER UNITS.

NOTE:

ALL DISCONNECT SWITCHES, FUSES, AND MOTOR STARTERS SHALL BE FURNISHED BY THE CUSTOMER.
SIZES SHALL BE DETERMINED FROM THE LINE VOLTAGE AND THE FULL-LOAD CURRENTS OF THE MOTORS.
STARTER COILS SHALL BE RATED FOR THE CONTROL SUPPLY VOLTAGE
MOTOR CONDUCTORS SHALL BE SIZED FOR MOTOR FULL LOAD AMPS.
ALL WIRING SHALL COMPLY WITH LOCAL ELECTRICAL CODES.
THE FRAME OF THE MACHINE SHALL BE SECURELY GROUNDED.

OPTIONAL EQUIPMENT:

A STALL MONITOR KIT MAY BE ADDED TO THIS FREEZER. PLEASE REFER TO ONE OF THE FOLLOWING WIRING DIAGRAMS:
STANDARD STALL MONITOR SYSTEM-WIRING DIAGRAM 07X-P-313677;
FREEZE-UP PREVENTION SYSTEM-WIRING DIAGRAM 07X-P-313537.

REFRIGERANT: AMMONIA.

DATE	LOC	NO	C.N. NO.	REVISION	BY
4-28-77	L	5	70114	ROLL FOR SHEET 47-1535-01	CA

UNLESS OTHERWISE SPECIFIED
SURFACE ROUGHNESS √ NOT TO EXCEED ____ ON MACHINE FINISHED SURFACES
ALL DIMENSIONS IN INCHES
MACHINED FILLETS .005 TO .015 R
BURR SHARP EDGES .005 TO .015
TOLERANCE ON ANGLES ± ½°
TOLERANCES FOR MACHINING:—
REAMED HOLES ± .0005
DEC. DIM'S ± .005
FRACTIONAL DIM'S ± ⅛

07X-P-329294

CREPACO, Inc.

WIRING DIAGRAM- KM140 FREEZER
CONTROLS: 220, 230 OR 240 VOLTS - 60 HERTZ OR 50 HERTZ
MAT SERIES 80 DASHER
DWG NO. 07X-P-329294
DSN'R REP/RM DATE 4-26-77 CHK'D MM TRACED REG
THIS PRINT IS LOANED SUBJECT TO RETURN UPON DEMAND AND UPON THE EXPRESS CONDITION THAT IT WILL NOT BE USED DIRECTLY OR INDIRECTLY IN ANY WAY DETRIMENTAL TO OUR INTERESTS. — CREPACO, Inc.

I Full-Load Current	II Primary Turns	III Secondary Turns	IV Winding Diagram
9.5	18	+1	B
9.8	17	0	A
10.1	17	+1	B
10.2	16	-1	C
10.4	16	0	A
10.7	16	+1	B
10.9	16	+2	B
11.1	15	0	A
11.4	15	+1	B
11.6	14	-1	C
11.9	14	0	A
12.1	14	+1	B
12.5	13	-1	C
12.8	13	0	A
13.2	12	-2	C
13.5	12	-1	C
13.9	12	0	A
14.3	12	+1	B
14.6	12	+2	B
14.8	11	-1	C
15.2	11	0	A
15.4	10	-3	C
15.8	10	-2	C
16.3	10	-1	C
16.7	10	0	A
17.1	9	-3	C
17.5	10	+2	B
17.6	9	-2	C
17.9	10	+3	B
18.1	9	-1	C
18.5	9	0	A
19.0	9	+1	B
19.2	8	-3	C
19.4	9	+2	B
19.8	8	-2	C
19.9	9	+3	B

I Full-Load Current	II Primary Turns	III Secondary Turns	IV Winding Diagram
20.3	8	-1	C
20.8	8	0	A
21.3	8	+1	B
21.4	7	-4	C
21.9	8	+2	B
22.0	7	-3	C
22.4	8	+3	B
22.6	7	-2	C
23.2	7	-1	C
23.8	7	0	A
24.4	7	-1	B
25.0	6	-4	C
25.5	7	+3	B
25.7	6	-3	C
26.1	7	+4	B
26.4	6	-2	C
27.1	6	-1	C
27.8	6	0	A
28.5	6	+1	B
29.1	5	-5	C
29.8	6	+3	B
30.0	5	-4	C
30.6	6	+4	B
30.8	5	-3	C
31.3	6	+5	B
31.7	5	-2	C
32.5	5	-1	C
33.3	5	0	A
34.2	5	+1	B
35.0	5	+2	B
35.4	4	-6	C
35.8	5	+3	B
36.4	4	-5	C
36.7	5	+4	B
37.5	4	-4	C
38.3	5	+6	B

I Full-Load Current	II Primary Turns	III Secondary Turns	IV Winding Diagram
38.5	4	-3	C
39.6	4	-2	C
40.6	4	-1	C
41.7	3	-10	C
42.7	4	+1	B
43.1	3	-9	C
43.8	4	+2	B
44.4	3	-8	C
44.8	4	+3	B
45.8	3	-7	C
46.8	4	+5	B
47.3	3	-6	C
47.9	4	+6	B
48.6	3	-5	C
48.9	4	+7	B
50.0	3	-4	C
51.4	3	-3	C
52.8	3	-2	C
54.2	3	-1	C
55.6	3	0	A
56.9	3	+1	B
58.3	3	+2	B
59.8	3	+3	B
61.1	3	+4	B
62.5	2	-10	C
63.9	3	+6	B
64.6	2	-9	C
65.3	3	+7	B
66.7	2	-8	C
68.1	3	+9	B
68.8	2	-7	C
69.4	3	+10	B
70.8	2	-6	C
72.9	2	-5	C
75.0	2	-4	C
77.1	2	-3	C

I Full-Load Current	II Primary Turns	III Secondary Turns	IV Winding Diagram
79.0	2	-2	C
81.3	2	-1	C
83.3	2	0	A
85.4	2	+1	B
87.5	2	+2	B
89.6	2	+3	B
91.7	2	+4	B
93.8	2	+5	B
95.8	2	+6	B
108.3	1	-14	C
110.0	1	-13	C

WINDING INSTRUCTIONS:

1. From the Dasher Motor nameplate - obtain the Motor Full-Load Current for the voltage at which the motor will operate.
2. From the Table, Column I - choose the Full-Load Current value that is nearest the actual nameplate current.
3. Column II will give the number of primary turns to wind through the Transformer opening. Use one of the Motor Conductors.
4. Column III will give the number of secondary turns to be added or subtracted. A zero indicates that no turns are required.
5. Column IV indicates the sample winding diagram which must be followed.
6. Install the windings exactly in the manner shown in the proper diagram. Count as turns, only those conductors that pass through the opening of the Transformer.

Diagram A

No Secondary Turns Required

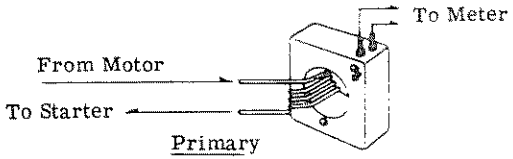


Diagram B

To Add Secondary Turns

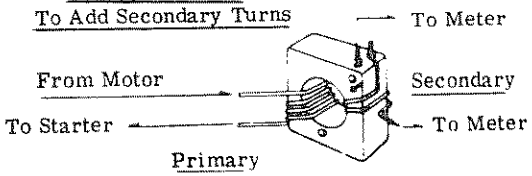
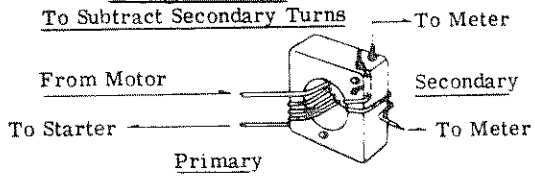


Diagram C

To Subtract Secondary Turns



CAUTION — Never allow the Secondary Winding to become open circuited when current is flowing in the winding, as, under this condition, the voltage between the Secondary Terminals will rise to a DANGEROUS VALUE.

Always short circuit (jumper) the Secondary Terminals if the Meter must be disconnected.

NOTE — The factory shall attach Westinghouse Tag No. I. T. 209-D to Transformer at final assembly.

The Instructions shall be used ONLY for K Model Freezers and Whipper Chillers. (Ipri. = 1.2 FLA).

Use only with No. 607-S-1489 Current Transformer, Westinghouse Type ECI, Current Ratio 200:5 and No. 607-S-1490 Percent Load Indicator or Stall Monitor Kit.

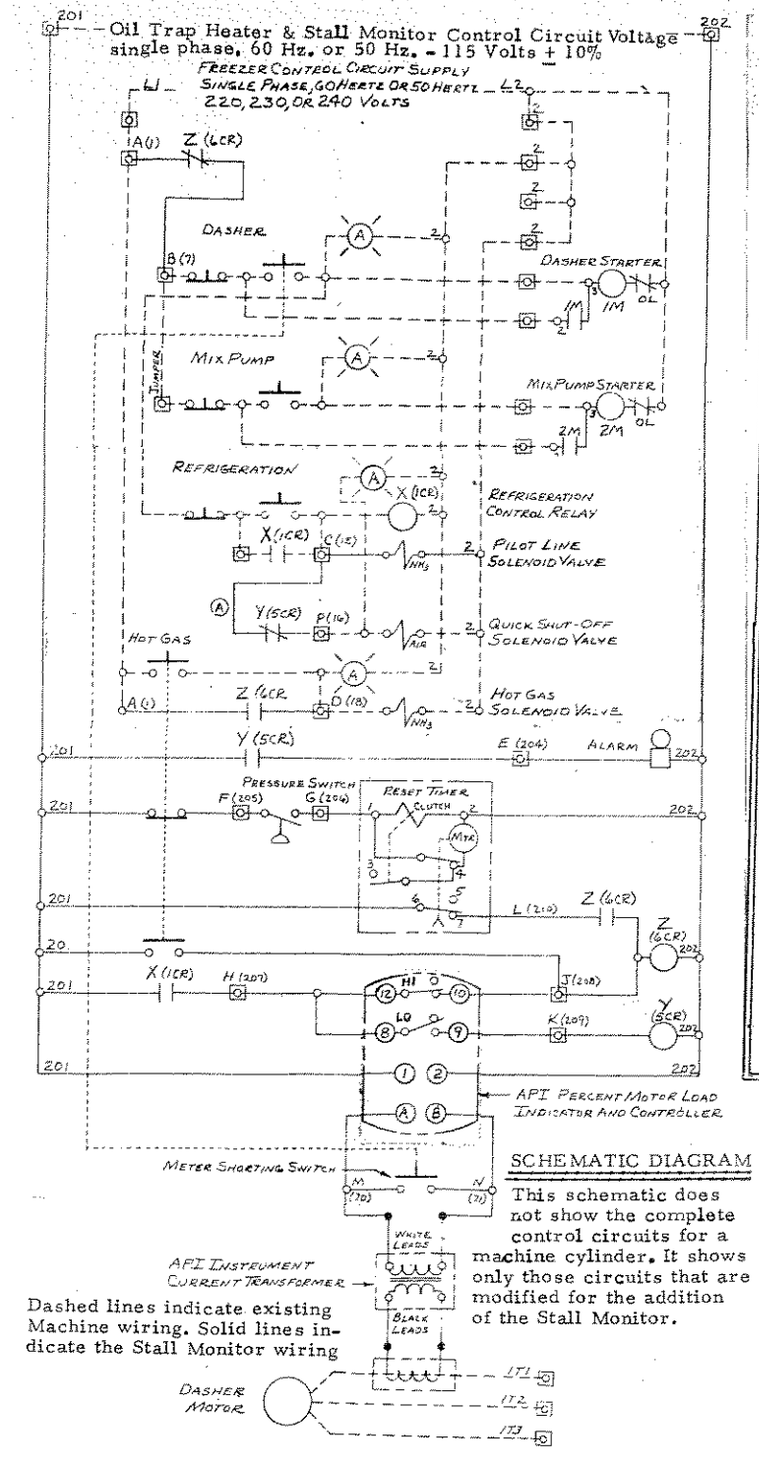
For use with Dasher Motors as follows: 10,15, 20, 25, 30, or 40 H.P., 50 or 60 Hz., 200 thru 575 Volts.

INSTRUCTIONS for CURRENT TRANSFORMER WINDING PERCENT MOTOR LOAD INDICATOR Model K Machines
Date: 1/4/67 Drawn by: MK Dwg. No. 07X-P-225680

Rev. 6/11/79

NOTE: The API Instruments Co. recommends that the power supply to the instrument be left on continuously to minimize condensation within the unit and to obtain maximum lamp life.

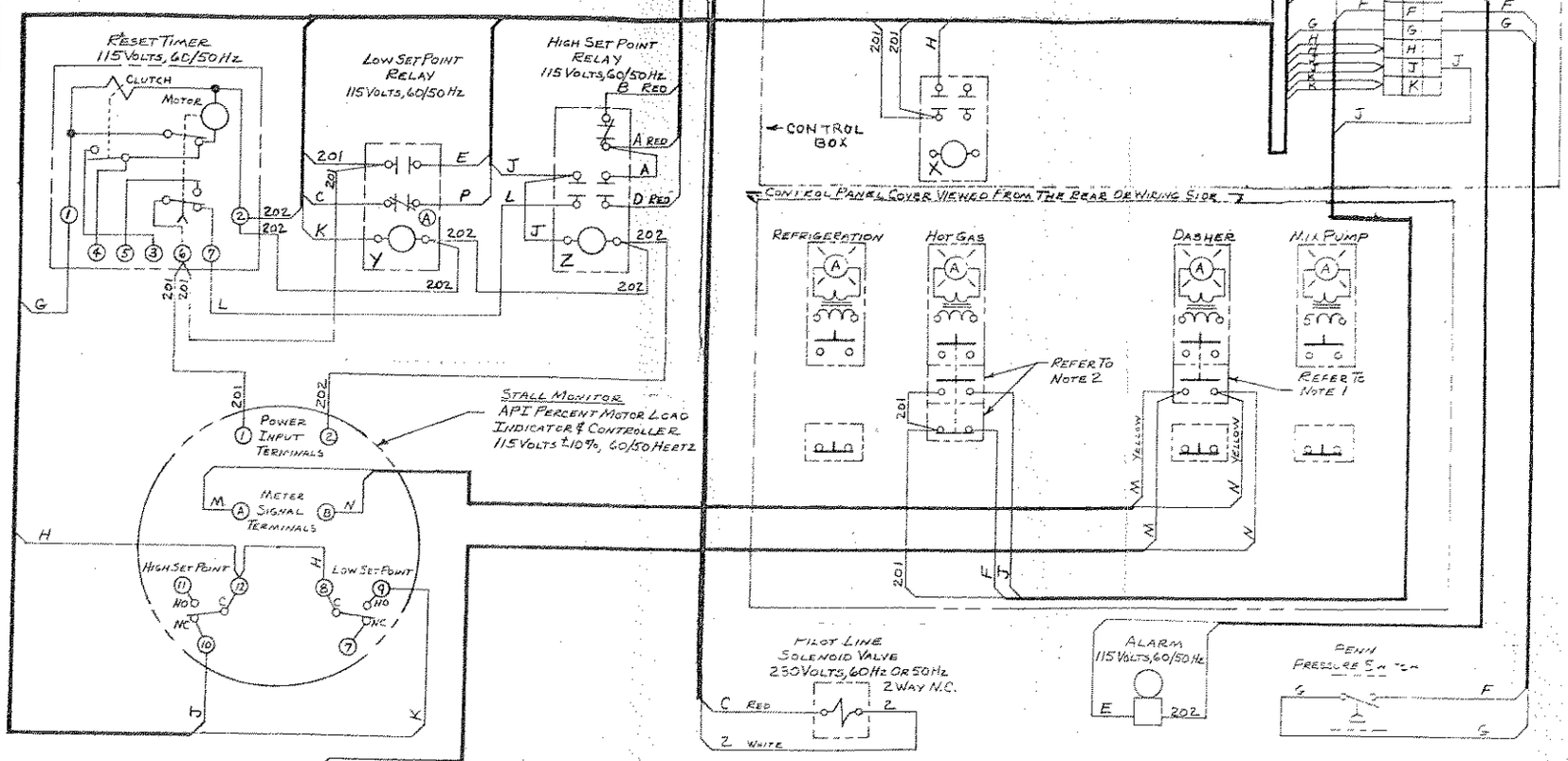
Standard Machines have jumpers between Terminals "A" and "P". These jumpers must be removed.



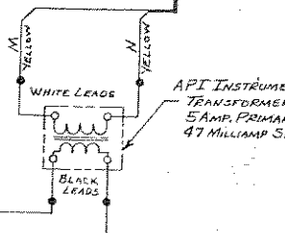
SCHEMATIC DIAGRAM

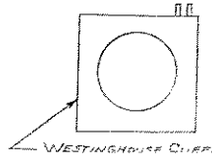
This schematic does not show the complete control circuits for a machine cylinder. It shows only those circuits that are modified for the addition of the Stall Monitor.

Dashed lines indicate existing Machine wiring. Solid lines indicate the Stall Monitor wiring



ALL WIRE SHALL BE ORANGE EXCEPT WHERE A SPECIFIC COLOR IS SHOWN ON THIS DIAGRAM.





CONNECT THE PRIMARY LEADS (BLACK) OF THE API CURRENT TRANSFORMER TO THE SECONDARY LEADS OF THE WESTINGHOUSE CURRENT TRANSFORMER.

WESTINGHOUSE CURRENT TRANSFORMER IN FREEZER

NOTE 1: ADD ONE NORMALLY OPEN CONTACT BLOCK TO THE DASHER START PUSHBUTTON.

NOTE 2: ADD ONE NORMALLY OPEN CONTACT BLOCK AND ONE NORMALLY CLOSED CONTACT BLOCK TO THE HOT GAS PUSHBUTTON.

TERMINAL & WIRE NUMBER CHART															RELAY NUMBER		
DRAWING SYMBOL	A	B	C	D	E	F	G	H	J	K	L	M	N	P	X	Y	Z
CYLINDER No. 1	1	7	15	18	204	205	206	207	208	209	210	70	71	16	1CR	5CR	6CR
CYLINDER No. 2	3	22	30	33	214	215	216	217	218	219	220	72	73	31	2CR	7CR	8CR
CYLINDER No. 3	4	37	45	48	224	225	226	227	228	229	230	74	75	46	3CR	9CR	10CR
CYLINDER No. 4	60	63	81	84	234	235	236	237	238	239	240	76	77	82	4CR	11CR	12CR

CONNECTION DIAGRAM - Wiring Diagram Stall Monitor for Model K Machines with 220, 230, or 240 Volt Control Circuit with Series 80 Dasher.

Use with Stall Monitor Kit - 07W-P-313536

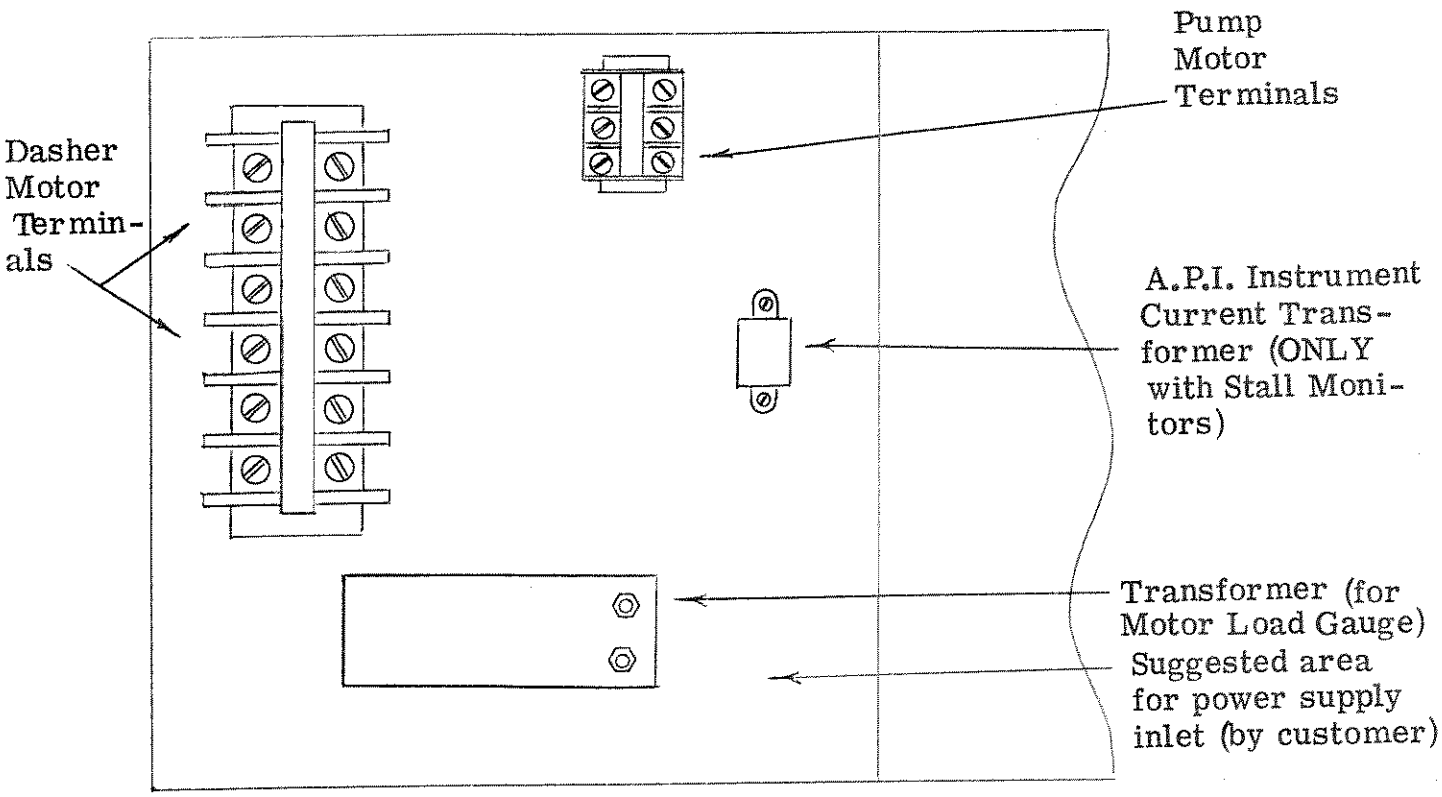


Figure 7a

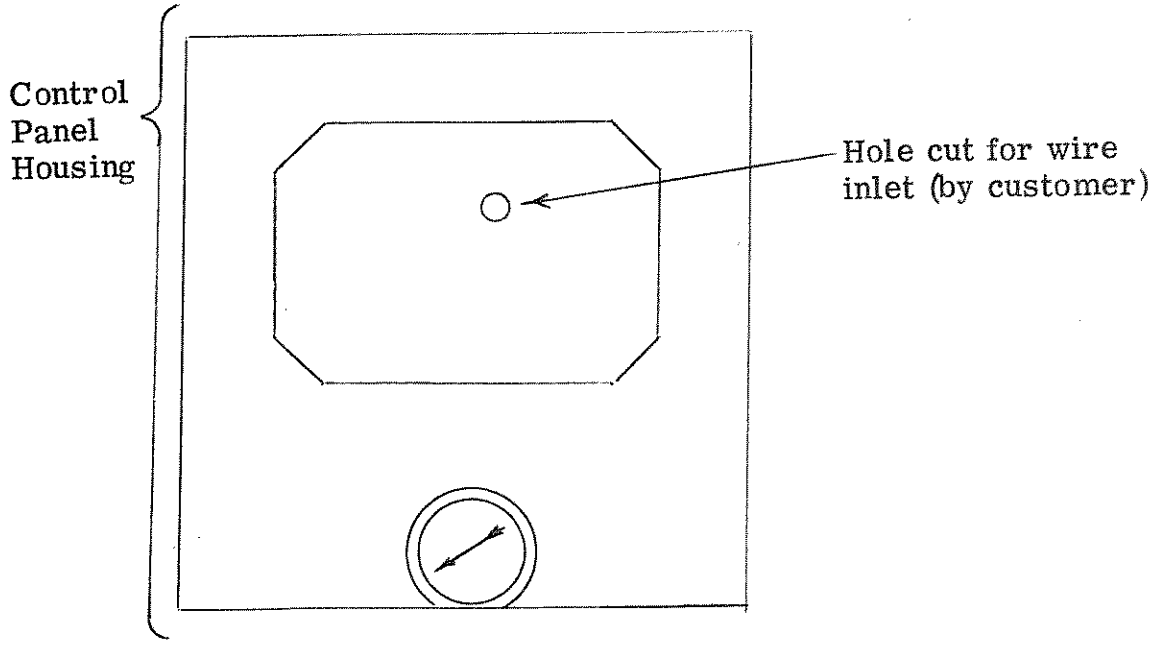


Figure 7b

NOTE: Refer to Main Wiring Diagram on Page II-5 for the correct wiring details. For Stall Monitors option, also refer to Page II-6a.

C. REFRIGERATION CONNECTIONS

1. General Installation Instructions

   Refer to the Diagram on Page II-9 for the recommended method of installing the refrigerant lines. The recommended installation will prevent interference of maintenance work at the rear of the Machine.

2. Liquid Refrigerant Lines

   The 12 mm. (1/2 inch) I.P.S. (Iron Pipe Size, U.S. Standard) Refrigerant Liquid Line (s) should be installed with a Hand Shut-off Valve (furnished by customer). The Valve should be conveniently located for quick closing.

3. Suction Lines

   A 50 mm. (2 inch) I.P.S. (Iron Pipe Size, U.S. Standard) Refrigeration Suction Line connection (s) should be made at the outlet of the Back Pressure Regulator (refer to the Diagram on Page II-9). A Hand Shut-off Valve (furnished by customer) should be installed in the Suction Line. To prevent the Valve from being accidently closed, remove the Handle. For the proper operation of this machine, a constant 0 kg/cm^2 (0 psig) suction for ammonia must be maintained on the downstream side of the Back Pressure Regulator.

4. Hot Gas Lines

   The 12 mm. (1/2 inch) I.P.S. (Iron Pipe Size, U.S. Standard) Line, which supplies the hot gas to the Machine must be connected to the Hot Gas Valve Inlet. This lines carries a minimum of 7 kg/cm^2 (100 psig) from the high side of the Refrigerant Compressor. If necessary, insulate the line. A readily accessible Shut-off Valve should be installed by the customer (refer to the Diagram on Page II-9).

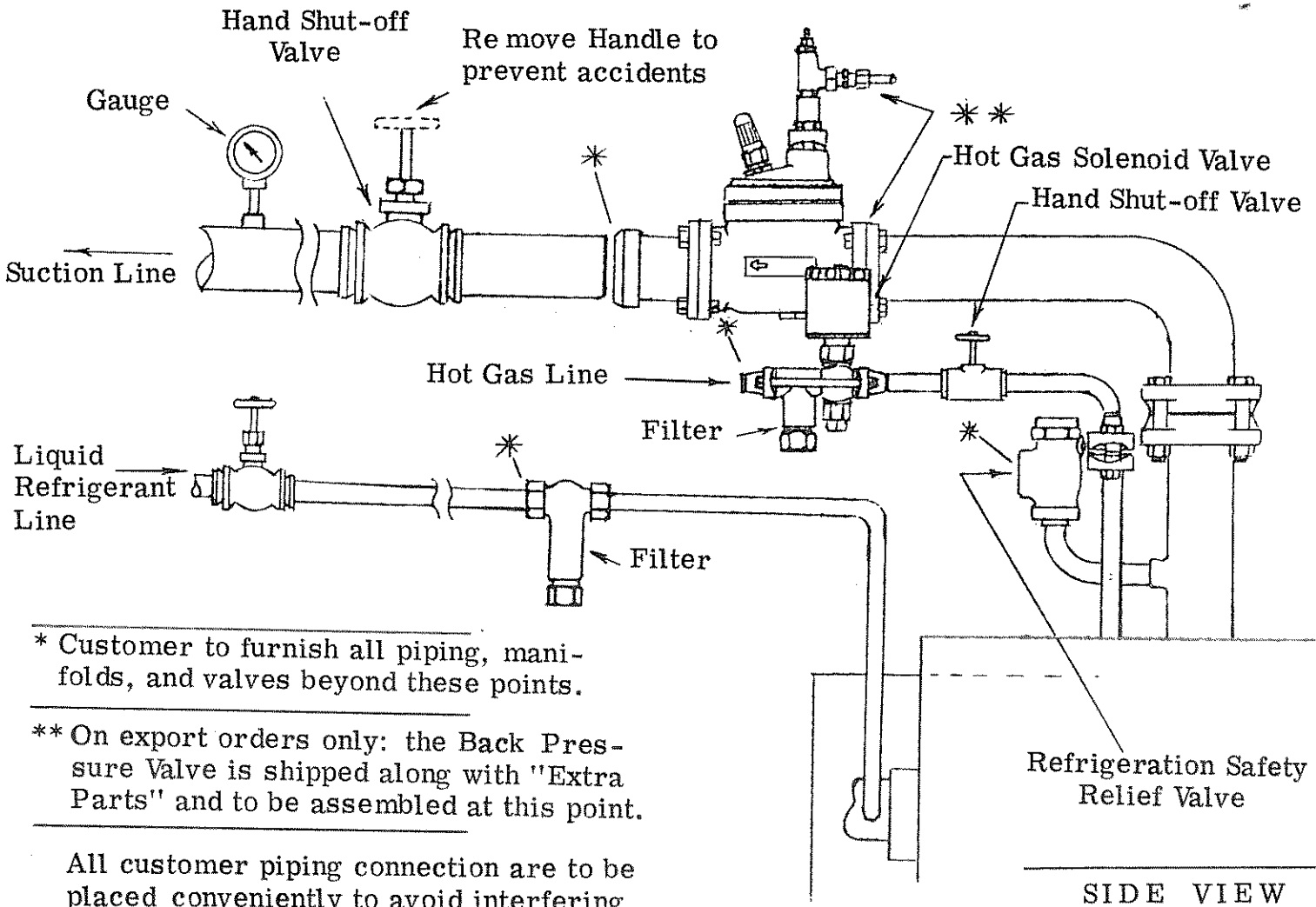
5. Safety Relief Valve (s)

   A 25 mm. (1 inch) I.P.S. (Iron Pipe Size, U.S. Standard) Line (s) must be connected to the Safety Relief Valve outlet (s) and piped to the outside atmosphere. The Line (s) to the outside atmosphere should have no obstructions whatsoever, and should never be piped into the Suction Line. Nor should the safety Relief Lines be connected into a common line to the outside atmosphere. If a dual relief system is employed, each of the Safety Relief Valves must be piped to the outside atmosphere separately.

6. Oil Drain-Liquid Dump Line (s)

   If a Suction Trap on the suction side of the Refrigerant Compressor is available, a 12 mm. (1/2 inch) I.P.S. (Iron Pipe Size, U.S. Standard) connecting line(s) should be installed at the outlet of the Oil Drain-Liquid Dump Valve.

TYPICAL REFRIGERANT LINE INSTALLATION



SIDE VIEW

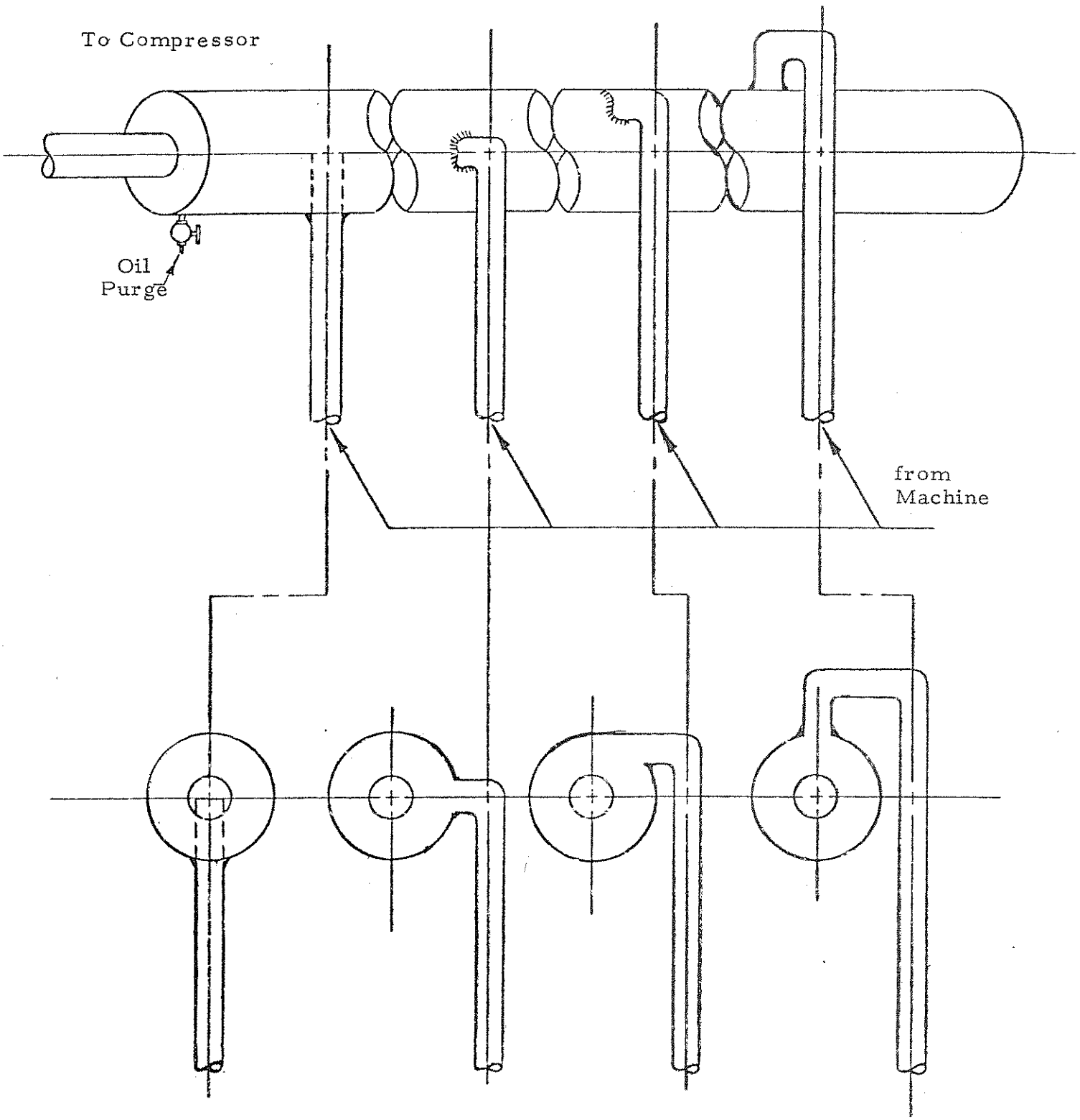
* Customer to furnish all piping, manifolds, and valves beyond these points.

** On export orders only: the Back Pressure Valve is shipped along with "Extra Parts" and to be assembled at this point.

All customer piping connection are to be placed conveniently to avoid interfering with maintenance.

SUCTION PIPING

Four acceptable arrangements for connecting Machine Suction Lines to Compressor Suction Lines or Headers



HEADER DETAIL

7. Use of other Refrigerant (applicable only to Machines using ammonia)

   This Machine will operate with fluorocarbon refrigerants. However, to adapt from ammonia (R-717) to either Refrigerants R-12, R-22, or R-502 the Machine requires several engineering changes; namely, changes are required to the Liquid Float, Inner Cylinder Seal Rings, Instant Shut-off Valve Seat, Back Pressure Regulator, and the Accumulator Pressure Gauge.

D. AIR SUPPLY CONNECTIONS (furnished by customer)

1. A 6 mm. (1/4 inch) I.P.S. (Iron Pipe Size, U.S. Standard) Air Supply Line must be connected to the Air Filter Inlet, which is located at the rear of the Machine.

2. An Air Regulator (furnished by the customer) to reduce the plant air supply to 4.2 kg/cm^2 (60 lbs. per sq. inch) must be installed immediately up stream from the Air Filter.

   IMPORTANT: If the Machine has By-pass Pumps for the Kwik Clean, Kwik Clean - Kwik Fill, or Programmed Systems, this customer-furnished regulator is to be set at 5.3 kg/cm^2 (75 lbs. per sq. inch) to effectively operate the by-pass feature on these Pumps.

3. If the Machine employs a separate nitrogen or inert gas line to facilitate the overrun or specific gravity factor, a separate regulator must be employed for this line. This Regulator must reduce the nitrogen or inert gas pressure to not less than 3.5 kg/cm^2 (50 lbs. per sq. inch) and not over 6.0 kg/cm^2 (85 lbs. per sq. inch).

E. SANITARY PIPING AND BOOSTER (CENTRIFUGAL) PUMP

1. To avoid strains on valves and pumps, all sanitary tubing or pipe lines should be supported by brackets.

2. The Product Line between the Product Tank and the Booster (Centrifugal) Pump should be a 50 mm. (2 inch) Sanitary Tube. The Line between the Booster (Centrifugal) Pump and Machine's Input (or First Stage) Pump should be 38 mm. (1-1/2 inch) Sanitary Tubing.

3. A Booster (Centrifugal) Pump, having a 50 mm. (2 inch) inlet opening and a 38 mm. (1-1/2 inch) outlet opening, is to be sized for the system by a qualified engineer. This Pump should be installed near the Product Valve on the Mix or Product Tank.

4. Sanitary Tubing from the Product Discharge Outlet to the Filling Machine (indicated for each producing cylinder)

   a. Short Tube Runs

      Tubing runs of 3,000 mm. (10 feet) or less with three elbows or the equivalent and 750 liters (200 U.S. gallons) per hour for K-18 Machines or 1,500 liters (400 U.S.gallons) per hour for K-40 Machines, use 38 mm. (1-1/2 inch) sanitary tubing from the Product Discharge Outlet on the Discharge Pump to the Filling Machine.

   b. Longer Tube Runs

      (1) If the Machine's output is 560 liters (150 U.S. gallons) or less for K-18 Machines or 1130 liters (300 U.S. gallons) or less for K-40 Machines, use 38 mm. (1-1/2 inch) sanitary tubing.

      (2) If the finished output exceeds the volume listed in the foregoing paragraph, 50 mm. (2 inch) sanitary tubing is recommended for the tubing run from the Machine to the Filling Machine.

   c. Always maintain lines as short as possible.

   d. The pressure drop will vary depending on the type of product, its temperature, overrun (or specific gravity), etc.

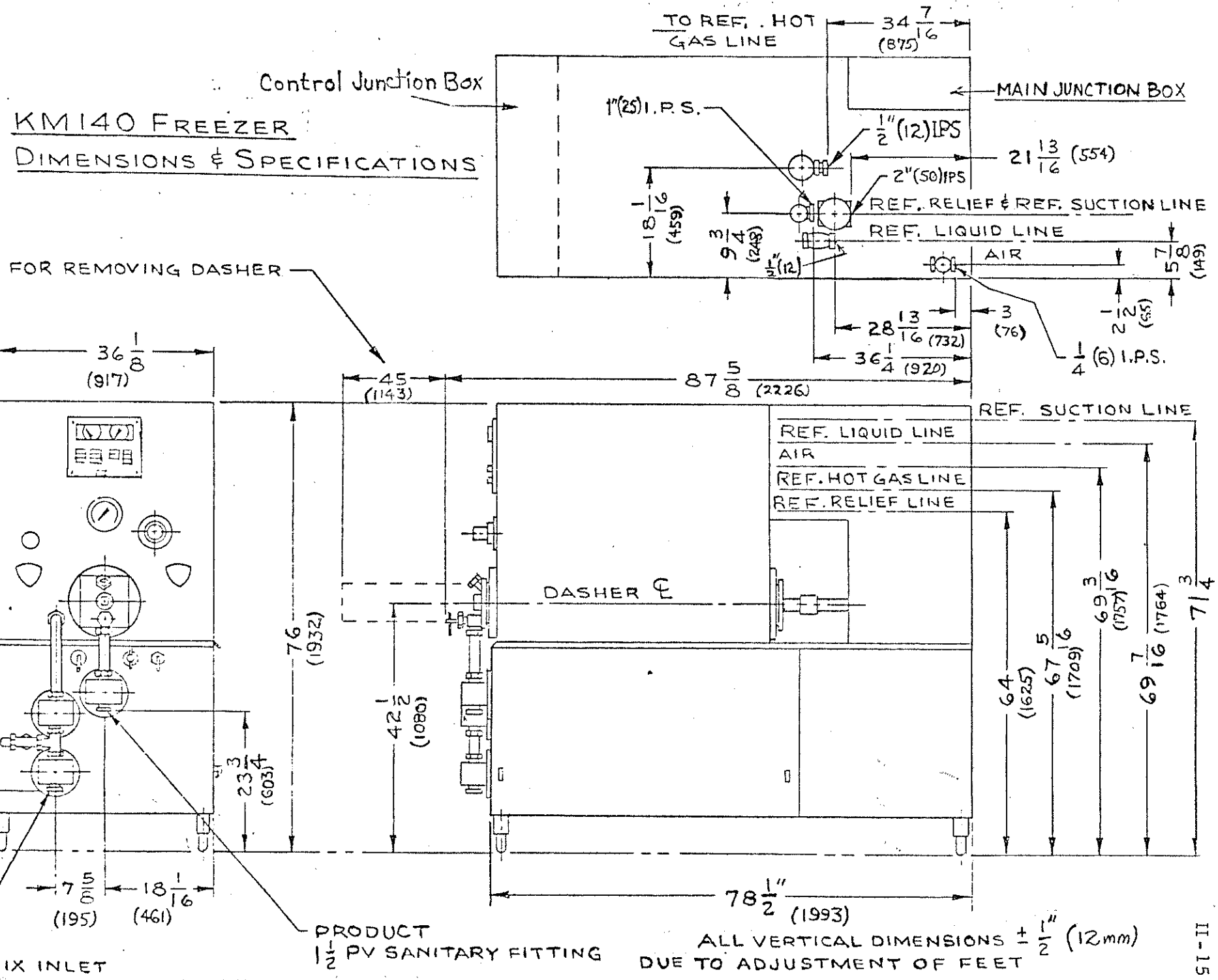
F. PRODUCT TANKS (furnished by the customer)

1. The Product Tank should be place as near to the Machine as possible. This Tank should be of sufficient capacity for a minimum of 45 minutes operation.
2. When using the Product Tank for a cleaning Solution Tank in the CIP System, the Booster (Centrifugal) Pump is used as a supply Pump for the system.

G. CHECK POINTS BEFORE INITIAL OPERATION

1. On export machines only:
   a. For shipping purposes, the Back Pressure Regulator had been removed. This assembly is included in the "Extra Parts" box and it must be assembled onto the Back Pressure Pipe Flange by the customer.
   b. Refer to the diagram on Page II-9 and Paragraph Q on Page V-25.
   c. A flow direction identification and the assembly of the welded flanges prevents the Regulator from being assembled in the wrong direction.
   d. The Flange Gasket is taped to the Regulator for shipping. To prevent twisting or pinching, this Gasket must be properly seated into the main body of the Regulator.
   e. Tighten the four Hex Screws alternately and evenly to assure a leak-proof connection.
2. Turn the Stem on the Phillips Liquid Valve Body fully counter-clockwise (refer to Page V-21, Item "G").
3. Check the Variable Speed Pump Drive Motor oil level (refer to Page V-1 and Motor Bulletin as an addenda at the rear of the Manual).
4. Check the oil level in the Gear Cases of all the Product Pumps (refer Page V-2).
5. To check the rotation of the Dasher, remove the Dasher from the Inner Cylinder. Push the Start "DASHER" Button. As you face towards the front of the Machine, the Dasher Drive Shaft should rotate in a counter-clockwise direction.
6. Remove the Scraper Blades from the "Extra Parts" box and assemble the the Blades onto the Dasher, taking care that the Blades are assembled onto the Dasher correctly (refer to the Daigram on Page III-17).
7. Check the Dasher Drive Shaft clearance (refer to the Diagram on Page V-14).
8. Check the tension on the Dasher Drive V-Belt, which is located at the rear of the Machine (refer to Pages V-17 and V-18).
9. Remove the Pump Covers to check the proper Rotor Shaft rotation. The center direction of the shaft MUST rotate toward the Inlet of the Pump. All Pumps have the word "IN" stamped on the Pump Body.
10. Check the tension of the Pump Drive Chain (refer to Page V-18).
11. Set the Plant Air Supply Line Regulator for 4.2 kg/cm^2 (60 lbs. per sq. inch). If the Machine has Kwik-clean or Kwik-clean, Kwik-fill and employs Pumps with by-pass covers, the Air Supply Line must be set to 4.9 to 5.6 kg/cm^2 (70 - 80 lbs. per sq. inch) to keep these covers closed during the Machines normal operation. If the air to these Pumps is to be separate, then the setting to the overrun and Instant Shut-off Refrigeration Valve is to be set at the normal 4.2 kg/cm^2 (60 lbs. per sq. inch).
12. Open the Air Restrictor Needle (with black handle) seven full turns from its closed position (refer to the Diagram on Page I-11).
13. Wash and sanitize the Machine following the procedures in Section III, "Cleaning and Sanitizing".
14. Follow starting instructions beginning in Section IV, "Operating Instructions."

KM140 FREEZER
DIMENSIONS & SPECIFICATIONS



SECTION III - CLEANING AND SANTIZING

A. INITIAL HAND CLEANING BEFORE A START UP

1. Before the initial operation of the Machine, it must be hand cleaned to remove traces of protective mineral oil that was applied during manufacturing. After years of use if an overhaul becomes necessary, use the same initial procedure. Also, the operator will have the advantage of becoming familiar with the component parts during this cleaning.

2. Disassembly of the Machine for initial hand cleaning before a start up, refer to Sub-section C. below.

3. Hand cleaning before the initial start up, refer to Sub-section D.

4. Sanitizing after re-assembly, refer to Sub-heading G.

B. GENERAL INFORMATION

1. Once each month the Machine should be disassembled, and all the product-contact surfaces (EXCEPT the Inner Cylinder) should be hand washed to remove deposits of product, and also for inspection for worn parts.

2. Daily cleaning may be done by using the CIP (Clean in Place) System.

C. DISASSEMBLY IN PREPARATION FOR HAND CLEANING AND INSPECTION

1. Rear of Machine

   a. Refer to the Diagram on Page III-3.

   b. Disconnect the Product Inlet Tube, which comes in from the front of the Machine and is connected to the Product Inlet Tube on the Rear Door.

   c. If the Machine is Standard Air (KA or KRA) model, unscrew the Hex Nut which holds the Overrun Air Check Valve onto the Product Inlet Tube.

2. Front of the Inner Cylinder

   a. Refer to the Figure on Page III-4.

   b. Remove the Stainless Sanitary Tubing between the Product Discharge Valve and the Product Discharge Pump.

   c. Remove the Nut from the end of the Dasher Shaft.

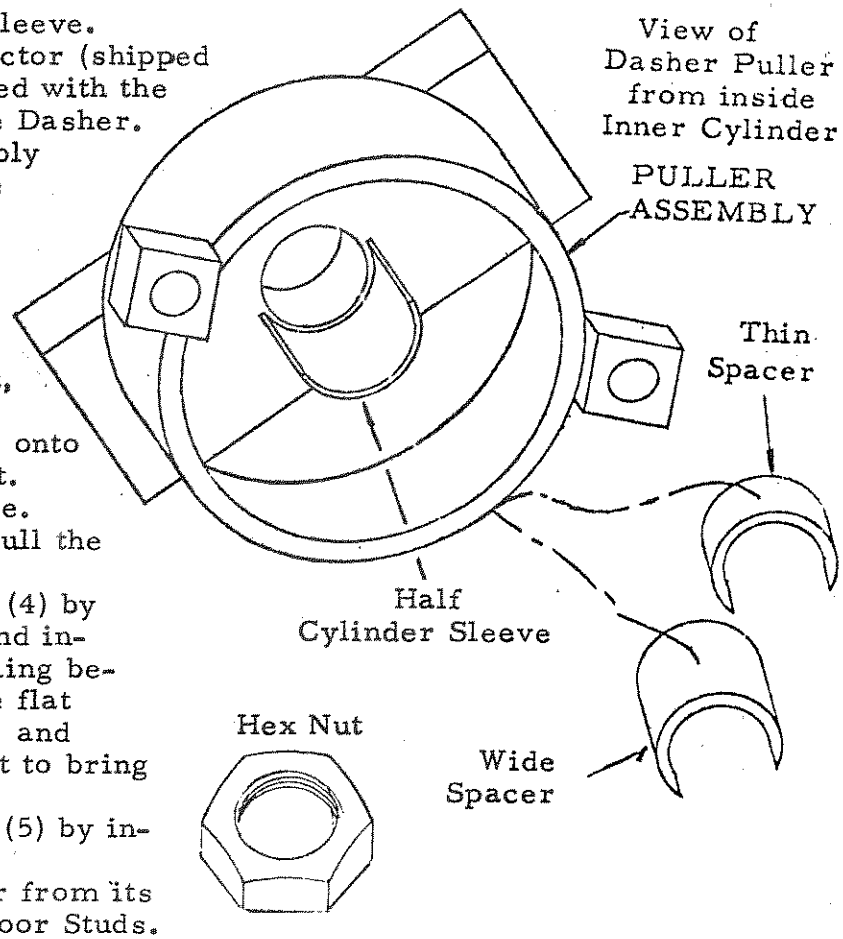
   d. Remove the Front Door along with the Front Support Bearing.

   e. To remove the Dasher Assembly properly, carefully follow the instructions for the use of the Dasher Puller Assembly that has been shipped as "Extra Parts Shipped with the Machine."

INSTRUCTIONS FOR USING THE DASHER PULLER ASSEMBLY

Part No. 07H-P-309389, 07A-P-218214

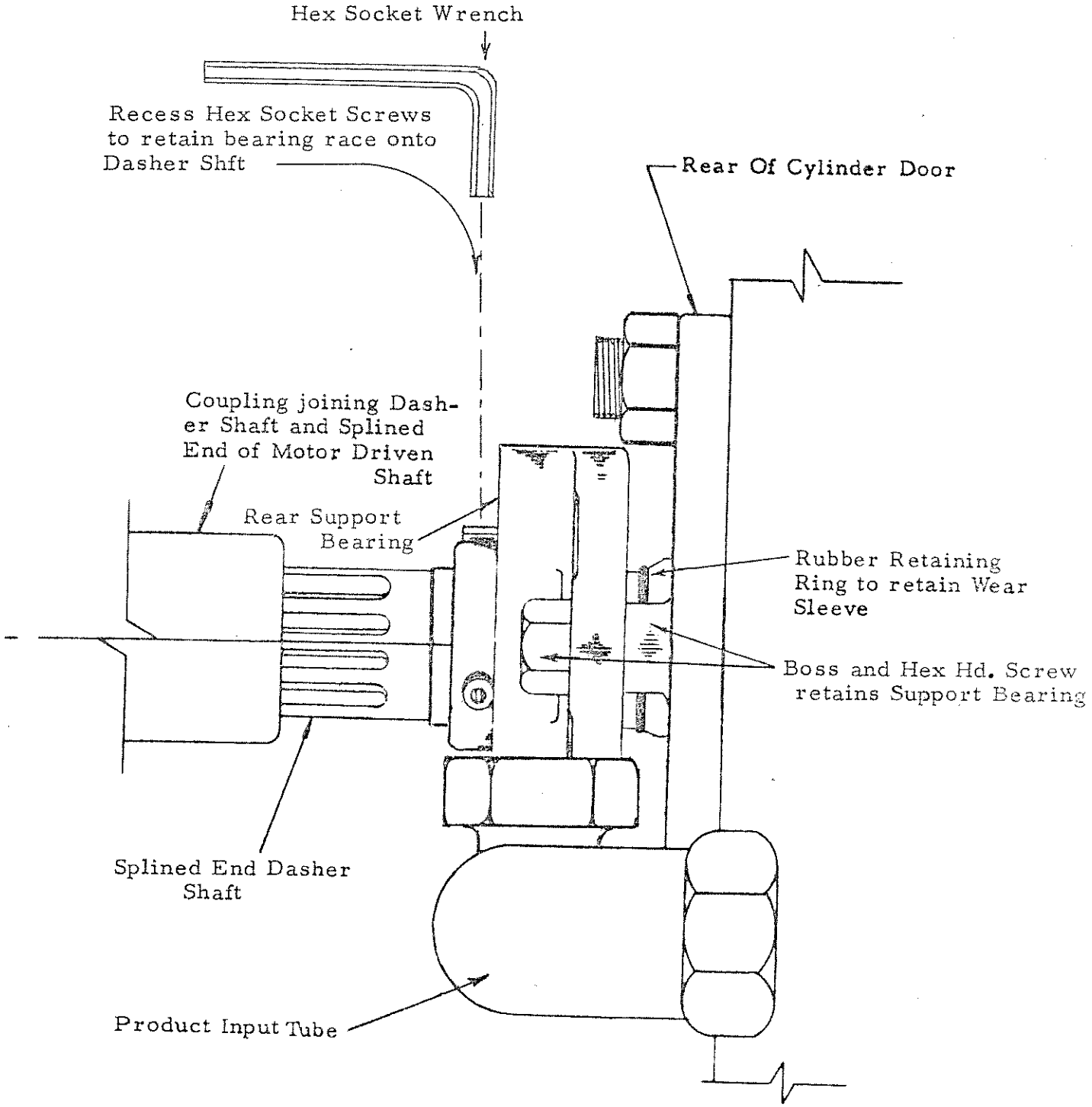
(1) Remove the Front Wear Sleeve.
(2) Insert the Cylinder Protector (shipped as an "Extra Parts Shipped with the Machine") underneath the Dasher.
(3) Install the Puller Assembly over the Door Studs. The Half Cylinder Sleeve of the Puller Assembly should be installed down and inward toward the Inner Cylinder.
(4) Install the 1-3/4" Hex Nut, which is shipped with the Dasher Puller Assembly, onto the threaded Dasher Shaft. Tighten this Nut clockwise. Tightening this Nut will pull the Dasher forward.
(5) If necessary, repeat Step (4) by backing off the Hex Nut and inserting the Thin Spacer Ring between the Hex Nut and the flat Face Plate of the Puller, and once again turning the Nut to bring the Dasher forward.
(6) If necessary, repeat Step (5) by inserting the Wide Spacer.
(7) Remove the Dasher Puller from its position over the Front Door Studs.



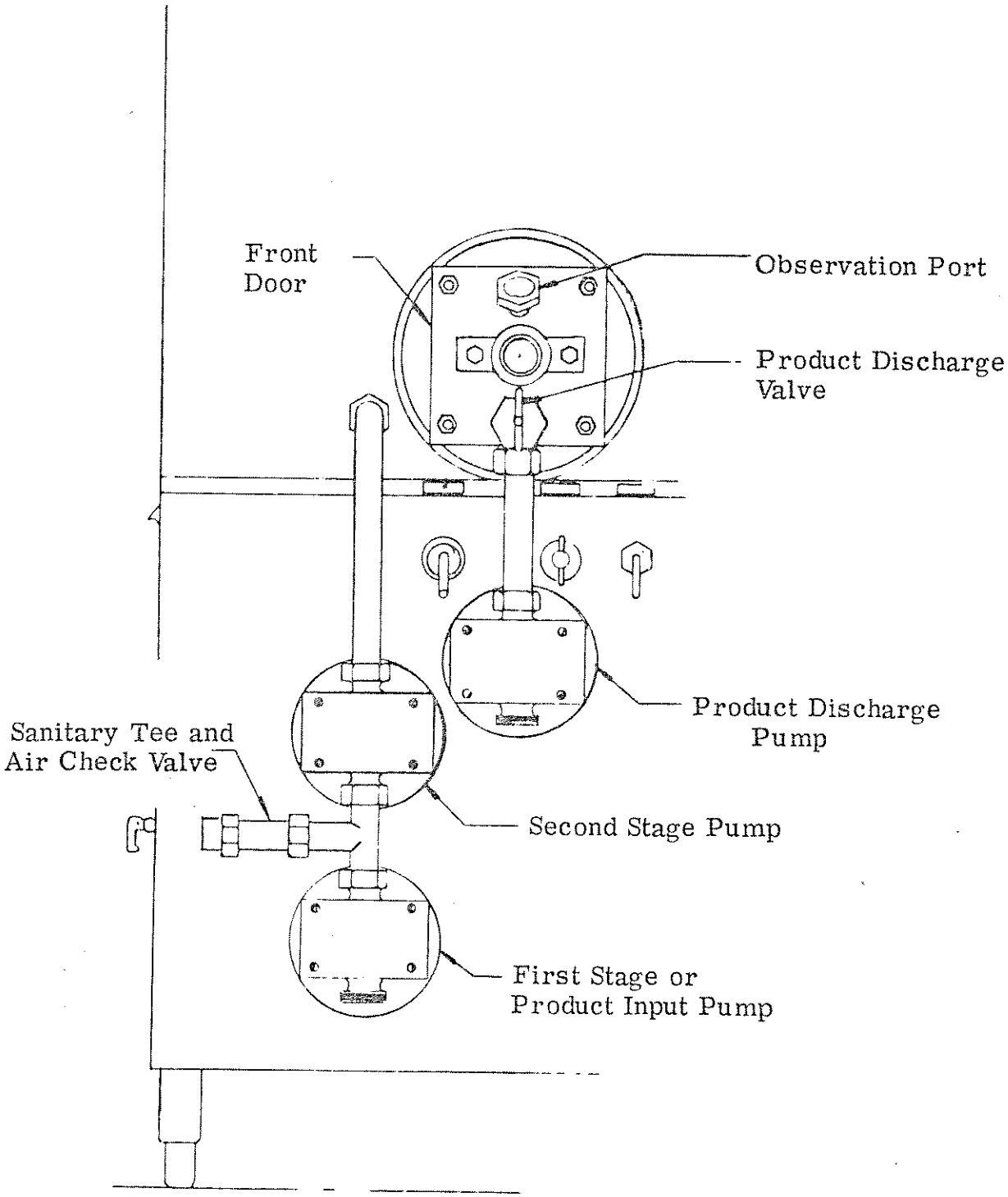
(8) The Cylinder Protector will remain. If possible withdraw the Dasher from the Inner Cylinder without disturbing the Cylinder Protector. Take great care to see that the Scraper Blades do not come in contact with the Inner Cylinder Walls.
(9) Place the Dasher on the Dasher Holder.
(10) Remove the Cylinder Protector.

PROCEDURE FOR LOCKING REAR-of-DASHER BEARING

REAR VIEW OF INNER CYLINDER



Front view of Machine with Series 80 Dashers



3. After placing the Dasher on the Dasher Holder, remove and inspect all Scraper Blades (refer to the Diagram on Page III - 17). After the Machine has been in operation for a time, the Scraper Blades may require sharpening (refer to Page V-11).
4. For Machines using Series 15 Dashers only, remove the Beater from inside the Dasher.
   a. Refer to the Diagram on Page III-14.
   b. Depress and remove the Snap Retaining Ring holding the Front Head.
   c. Remove the Front Head and inspect its Bushing for wear.
   d. Remove the entire Beater Assembly from inside the Dasher.
   e. Dis-assemble the Twin Beater Assembly and inspect the Bushing for wear.
   f. Remove the Stub Shaft from the rear of the Dasher by unscrewing the Socket Head Cap Screw. Inspect the Stub Shaft Gasket for deterioration.
   g. If necessary, remove the Wear Sleeve by removing the Retaining Ring that retains the Wear Sleeve onto the Dasher's Driven Shaft. Slip the Wear Sleeve from the Driven Shaft. Remove the "O" Ring from inside the Wear Sleeve. Carefully inspect the "O" Ring, the Retaining Ring, and Wear Sleeve for wear; replace if necessary.
   h. Remove the "O" Ring from the Front Door Groove, and inspect this "O" Ring for deterioration; replace if necessary.
5. Rear Cylinder Door
   a. Refer to the Diagram on Page 3 and Paragraph C.1. on Page III-1.
   b. If the Machine is a standard air machine (KA, KRA), disassemble the air piping to the Rear Door and remove all the Air Check Valve parts from the Elbow (refer to the Diagrams on Pages III-3 and III-12).
   c. To remove the Rear Cylinder Door, unscrew the four Hex Nuts. Remove the Rear Cylinder Door and extract the large "O" Ring.
   d. IMPORTANT: The Seal Ring must be removed each time the Dasher is removed from the Machine (refer to Page III-13), and re-assembled only after the Dasher has been assembled into the Inner Cylinder.
      (1) Refer to Page III-13.
      (2) Remove the Cap Nut, then the Back Up Ring and the Seal Ring.
      (3) Inspect the Seal Ring for wear or deterioration; replace if necessary.
   e. If necessary, remove the Wear Sleeve from the Dasher Shaft. Inspect both the Wear Sleeve, its Retaining Ring and inside "O" Ring for wear; replace if necessary.
6. For Machines using Series 80 Dashers only, the Seal Ring in the Front Door must also be removed each time the Front Door is removed.
   a. Refer to Pages III-13 and III-14.
   b. Unscrew the two Hex Screws that retain the Bearing onto the Front Door.
   c. Pull the Bearing far enough forward to clear the Brass Ring so that the Back Up Ring and Seal Ring may be removed.
      (1) Remove the Back Up Ring then the Seal Ring.
      (2) Inspect the Seal Ring for wear or deterioration; replace if necessary.
   d. IMPORTANT: the Seal Ring, along with its Back Up Ring, is to be assembled only after the Dasher has been assembled into the Inner Cylinder, and the Front Door has been assembled.
7. For Machines using Series 80 Dashers only: if necessary, remove the Front Wear Sleeve. Inspect both the Wear Sleeve and its inside "O" Ring for wear; replace if necessary.

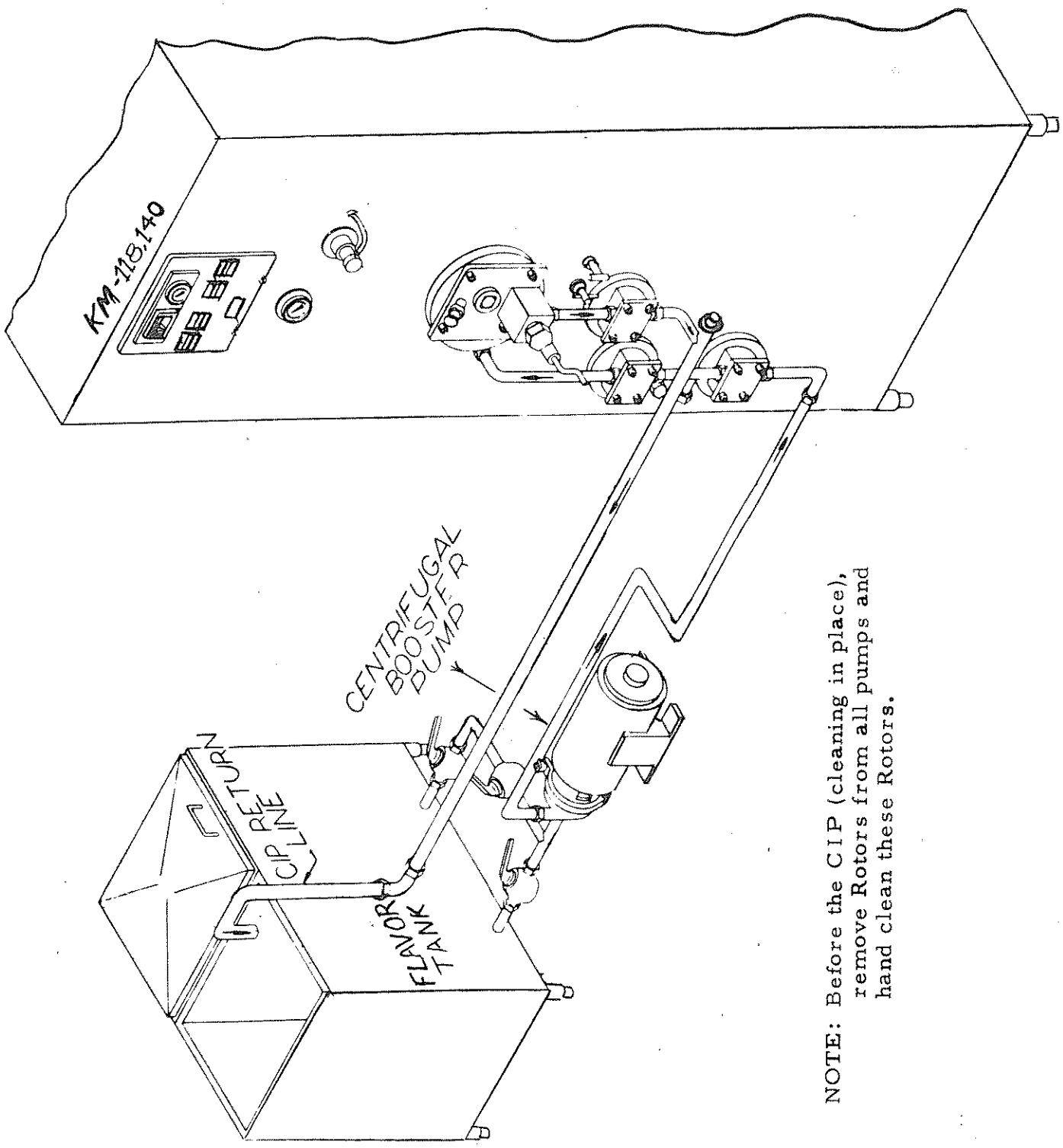
6. Sanitary Tee and Air Check Valve (for Mix-Air Machines) or Air Check Valve (for Standard Air Machines)

   (refer to Page III-12 for the mechanical schematic of this assembly)

7. All Pumps
   a. Refer to the Diagrams on Page III-10 (Page 10a if there is more than one style of pump employed on the Machine).
   b. If the Machine has By-pass Pumps, disconnect all Air Lines to the Pumps.
   c. In the case of the regular Product Pumps, remove the four Hex Nuts that secure the Pump Cover and remove the Cover, taking care that while removing the Cover not to score the threaded Gear Case Studs.
   d. If the Machine has Full-flow By-pass Pumps, remove the Air Amplifier Housing and its Piston/s. Care must be taken not to score the threaded screws that retain the housing.
      (1) Dis-assemble the By-pass Cover along with the Face Plate by unscrewing the Nuts that retain the Inner Cover on to the Gear Case Studs. Care must be taken not to score the threads of the Gear Case Studs while removing the Inner Cover.
      (2) Dis-assemble the Face Plate from inside the Inner Cover. Great care must be taken to inspect the rubber "O" Ring that is on the periphery of the Face Plate for wear or deterioration. If any defects are discovered, this "O" Ring must be replaced.
      (3) Inspect the "U" Seals and "O" Ring to all parts of the Air Amplifier Piston/s for wear or deterioration; replace if necessary.
      (4) These parts, particularly the Face Plate, are to be hand cleaned.
   e. On the 1F-AR Pumps, the Paper Gaskets should be removed and discarded.
   f. Using the Rotor Puller (service part), remove the Rotors.
   g. Remove the Chamber Assembly from the Gear Case Studs. On the 2F-AR Pumps, the Chamber Seals (one on either side of the Chamber Assembly) should be inspected for deterioration or breaks. The 3F-AR Pumps have "O" Rings in lieu of Chamber Seals and these "O" Rings should be treated the same as the Chamber Seals; replace if necessary.
   h. The Shaft Seals should be removed from the Back Plate. Inspect these shaft Seals for wear or deterioration; replace if necessary.
   i. On all models of Pumps, remove the Bearing Seals and "O" Rings from the Rotor Shafts. Inspect the "O" Rings for wear or deterioration; replace if necessary.
   j. Refer to Page III-11 for re-assembly of Pumps.

D. HAND CLEANING

1. Wash all the individual parts that have been dis-assembled with a solution of Wyandotte Kelvar at 43°- 49° C. (110°-120° F.) by mixing .0025 kg. Kelvar to 1 liter (1 ounce to 1 gallon water) or by using an equivalent detergent at the same temperature. Brush inside the Inner Cylinder with the same solution.
2. Rinse all parts with 38° C. (100° F.) potable water. However, with the rinsing of the Inner Cylinder make a swirling motion with the water hose to avoid localized heating, which may cause a strain on the Inner Cylinder.
3. This washing should be followed by an acid washing of all parts (EXCEPT for the inside of the Inner Cylinder Wall) with a solution of Wyandotte Servac at 43°- 49° C. (110°- 120° F.) using .007 kg. to 1 liter water (1 ounce to 1 gallon water) or by using an equivalent solution at the same temperature.
4. Rinse again by following directions in Sub-section 2 (above).



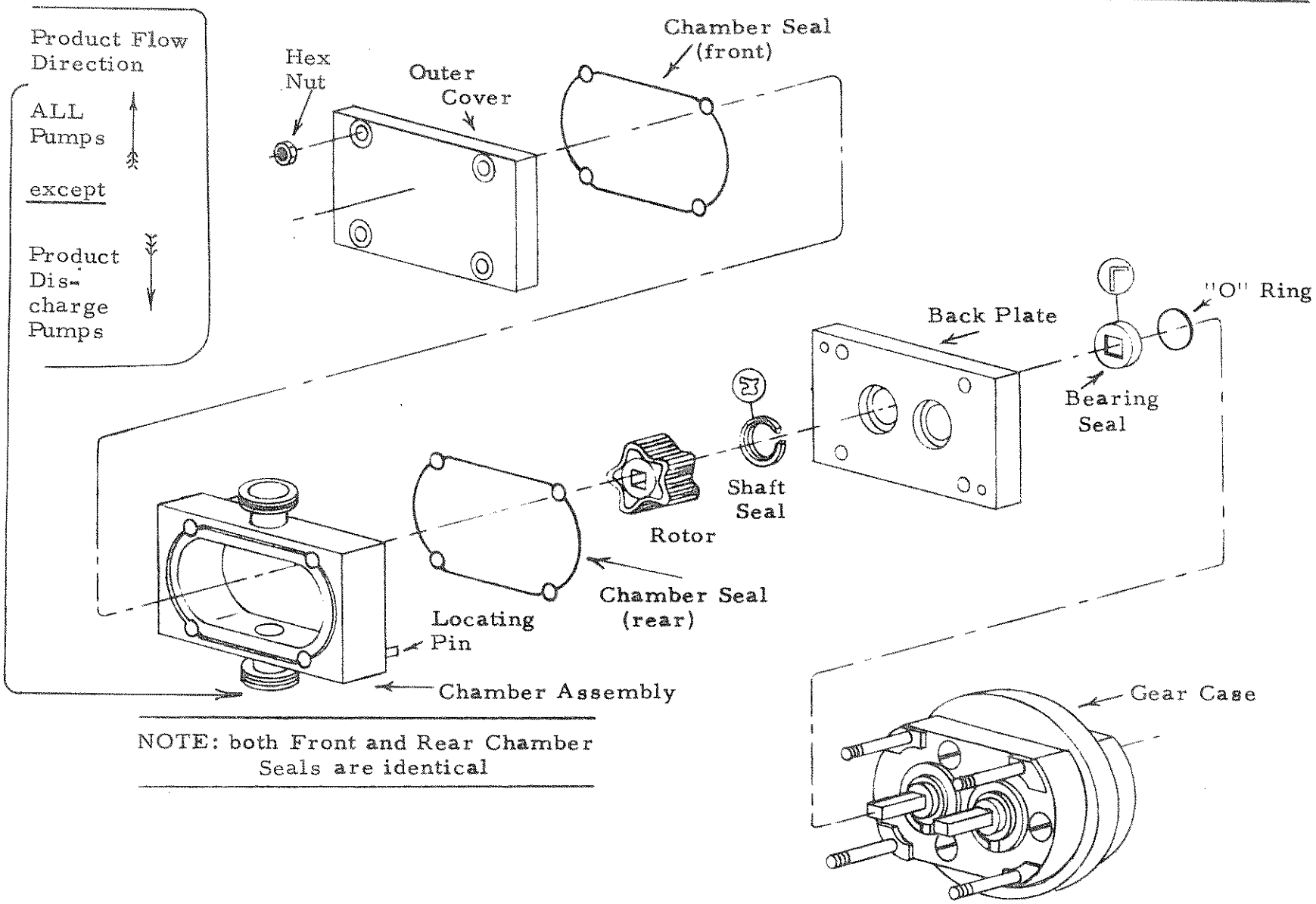
NOTE: Before the CIP (cleaning in place), remove Rotors from all pumps and hand clean these Rotors.

E. CIRCULATION OR CLEANING IN PLACE (CIP)

CAUTION: DO NOT use an acid type cleaner.

1. Follow carefully the instructions for "Stopping at End of Run" in Section IV on Page IV-10 (the Machine is now rinsed).
2. Refer to the Diagram on Page III-8.
3. Remove the Rotors from all product Pumps.
   a. Refer to the Diagram on Page III-10.
   b. Remove the Pump Covers, using the Rotor Puller (Service Part), remove the Rotors.
   c. Re-assemble the Pump Covers and hand tighten the Hex Nuts retaining the Covers.
4. Remove the Special Sanitary Tee and Check Valve Assembly and cap its connection into the tubing between the First and Second Stage Pumps. Refer to the Diagram on Page III-12.
5. It is permissible to clean the Observation Port Plug by loosening up its Hex Nut, thus permitting the cleaning, rinsing, and sanitizing solutions to pass around the Plug. Otherwise, this Plug must be removed for hand cleaning, etc.
6. Lock out the Product Discharge Valve by pulling out its Handle and turning.
7. If you have an auxilliary CIP Line, connect this line into the system. Also, as illustrated in the Diagram on Page III-8, the Product Tanks and Booster (Centrifugal) Pump may be incorporated into the line as a part of the CIP System.
8. Using 57°-60° C. (135°-140° F.) water, rinse the Machine again. Press the start "MIX PUMP" Button to start the Booster (Centrifugal) Pump (if the Booster Pump has not been wired through the "MIX PUMP" Switch, start the Booster Pump first. Circulate the water for about 5 minutes.
9. Jog the Dasher once by pushing the start "DASHER" Button and then stopping immediately by pushing the stop "DASHER" Button.
10. Slow the "SPEED CONTROL MIX PUMP" Crank down to 2 or 3 on its indicator to flush the system into the drain with 57°-60° C. (135°-140° C.) water for 5 minutes or until all traces of product are removed. Changing the Pump speed must be done only while the pumps are running.
11. Stop the draining. Add and circulate a cleaner to the system. Refer to Page III-11 for directions to mix the correct cleaner.
12. Jog the Dasher once only like before.
13. Rinse to the drain (water at same temperature) until all traces of cleaner are removed, and the water is clear.
14. Hand clean the Pump Rotors and re-assemble back into the Pumps, making sure that the dimpled marking on the Rotor Shaft match the flat angled corner in the Shaft Hole of the Rotor itself and that the markings on the core of the Rotor are on the outside.
15. Re-assemble the Pump Covers. In the case of the 2F-AR Pumps, make sure that the Chamber Seal is securely seated into the Seal Cavity. In the case of the 1F-AR Pumps, assemble a new Paper Gasket over the Pump Studs and against the flat of the Chamber. Assemble the Pump Cover and assemble the four Hex Nuts and tighten these Nuts alternately and evenly.
16. Remove the Cap that was placed over the Sanitary Tee connection and re-assemble the Sanitary Tee. If necessary, refer to Page III-12.
17. The Machine is now ready to Sanitize. Refer to Sub-section G on Page III-16.

2F-AR ROTARY PUMP (No. 03B-P-268728) - K-40 Machines and 1st Stage on K-60 Machines



NOTE: both Front and Rear Chamber Seals are identical

NOTE: a recommended C I P cleaning solution: use Wyandotte Cle-Chlor by dissolving .005 kg. cleaner to 1 liter water (3/4 ounce to 1 gallon water) or use Interest at .0035-.005 kg. cleaner to 1 liter water (1/2 - 3/4 ounce to 1 gallon water) or use an equivalent cleaner. The maintained temperature of the solution in all cases should be 54°- 60° C. (130°- 140° F.). The rinse water should hold the same range of temperature.

F. ASSEMBLY OF MACHINE AFTER HAND CLEANING

1. All Pumps

a. Refer to the Diagram on Page III-10 and Page III-10a (if more than one pump is employed).

b. Inspect the small "O" Ring for wear or deterioration; replace it if necessary. Apply sanitary lubricant on the "O" Ring and slip it over the Rotor Shaft and back into the Gear Case. This should be followed by the Bearing Seal.

c. Place the Back Plate over the Gear Case Studs, making sure that the stamped number on the Gear Case matches those numbers stamped on the Back Plate.

d. Inspect the Shaft Seals for wear or deterioration; replace if necessary. Apply sanitary lubricant to these seals and insert into the Back Plate. The Seal Grooves with the "V" tapered edge must be towards the front of the Pump.

e. Apply sanitary lubricant to the Rotors and place them onto the Drive Shafts. The Puller Grooves of the Rotors must be toward the front. A punch mark on the end of the Shaft must correspond to a dimple makr on the Rotor.

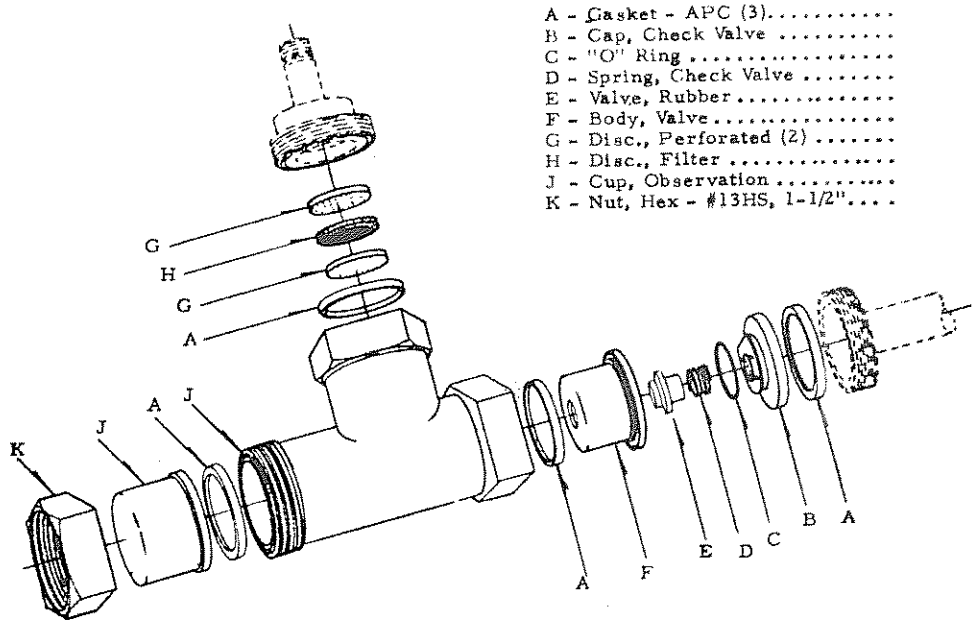
f. On the 2F-AR and 3F-AR Pumps inspect the Chamber Seals and/or "O" Rings (on the 3F-AR Pumps) for wear or deterioration; replace if necessary. On the 1F-AR Pumps replace the Paper Gaskets. On the 2F-AR and 3F-AR Pumps sanitary lubricate the Chamber Seals or "O" Rings (3F-AR Pumps) and place them in the Chamber Grooves (one on either side of the Chamber), making sure that they are well seated and will not bind when the Chamber Body is assembled onto the Gear Case Studs and against the Back Plate.

g. On all By-pass Pumps: make sure that the "O" Ring for the Face Plate is not worn or deteriorated; replace if necessary. Sanitary lubricate this "O" Ring and assemble over the periphry of the Face Plate.

(1) Assemble the Face Plate into the cavity of the By-pass cover.
(2) Assemble the now-assembled By-pass Cover with its Face Plate onto the Gear Case Studs and secure with the 4 Retaining Nuts, tightening these Nut alternately and evenly.
(3) If the Air Amplifier had been dis-assembled, assemble this section according to the diagram, inspecting the "O" Rings, "U" Rings for any wear or deterioration; replace if necessary. Sanitary lubricate all "O" Rings and "U" Ring before assembly.
(4) If the By-pass Pump has a Double Air Amplifier, the Spacer Retaining Ring along with the Spacer Plate must be assembled after the assembly of the first Air Amplifier Piston.
(5) Care must be taken to see that the Air Amplifier Pistons and "U" Rings are in the correct position in relation to the position of the Pump.
(6) Assemble the now-assembled Air Amplifier Housing onto the By-pass Cover, using the Long Hex Screws and the Spacers. Tighten these Hex Screws alternately and evenly.
(7) Assemble all air connections to all Pumps.

h. On the Standard Pumps, assemble the Cover and secure with its retaining nuts, tightening these nuts alternately and evenly.

SPECIAL or SANITARY TEE and AIR CHECK VALVE



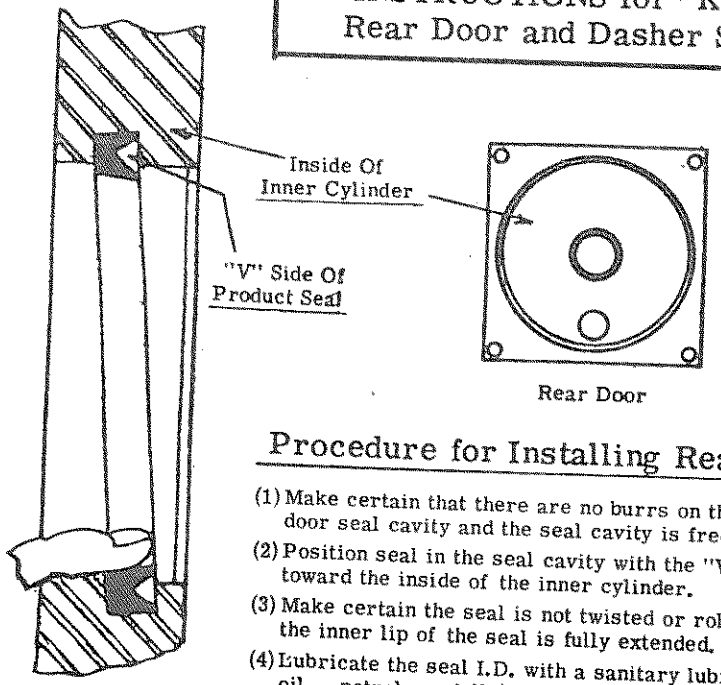
2. Special or Sanitary Tee and Air Check Valve

   a. As illustrated in the diagram on Page III-4, this Valve is located on the lower Front Panel of the Machine between the First and Second Stage Pumps.

   b. For re-assembly of this Valve, refer to the above diagram. A new Filter Disc. (H) should be installed before assembly. At the same time inspect the "O" Rings, Gaskets, and the Rubber Valve (E) for wear or deterioration; replace if necessary.

   c. After the completion of the assembly in its right order, connect the Tee to the Air Inlet with the Sanitary Hex Nut and to the tubing between the First and Second Stage Pumps with its Hex Nut. To prevent air leaks these connections should be properly tightened, and the Gaskets between the connections should be properly seated.

INSTRUCTIONS for "K" Machine Rear Door and Dasher Shaft Seals



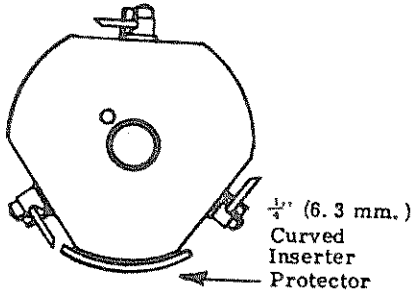
Procedure for Installing Rear Door Seals

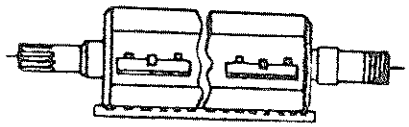
(1) Make certain that there are no burrs on the O.D. of the rear door seal cavity and the seal cavity is free from soil.

(2) Position seal in the seal cavity with the "V" side of the seal toward the inside of the inner cylinder.

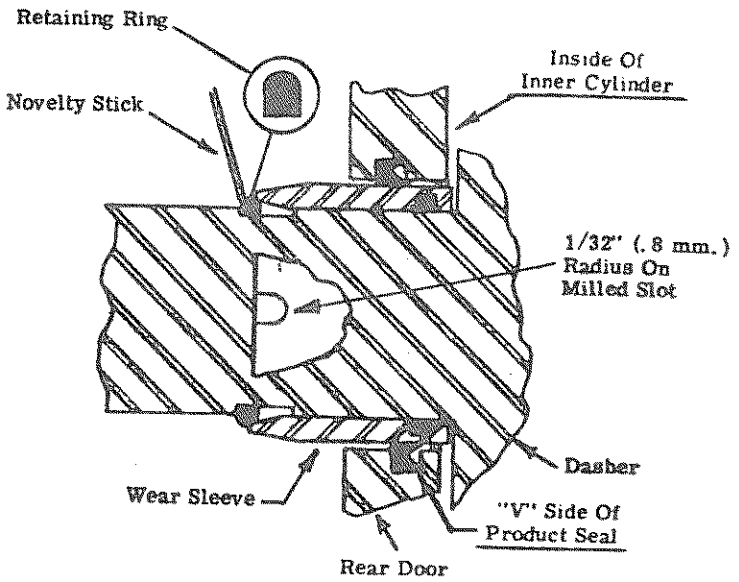
(3) Make certain the seal is not twisted or rolled over and that the inner lip of the seal is fully extended.

(4) Lubricate the seal I.D. with a sanitary lubricant (orange solid oil — petroleum jelly). DO NOT use spray lubricants.





Series 80 Displacement Dasher



Installation of the Dasher into Inner Cylinder

(1) Make certain that the dasher wear sleeve has been installed correctly and that the milled slot is well radiused. The retaining ring must be forced into its proper position.

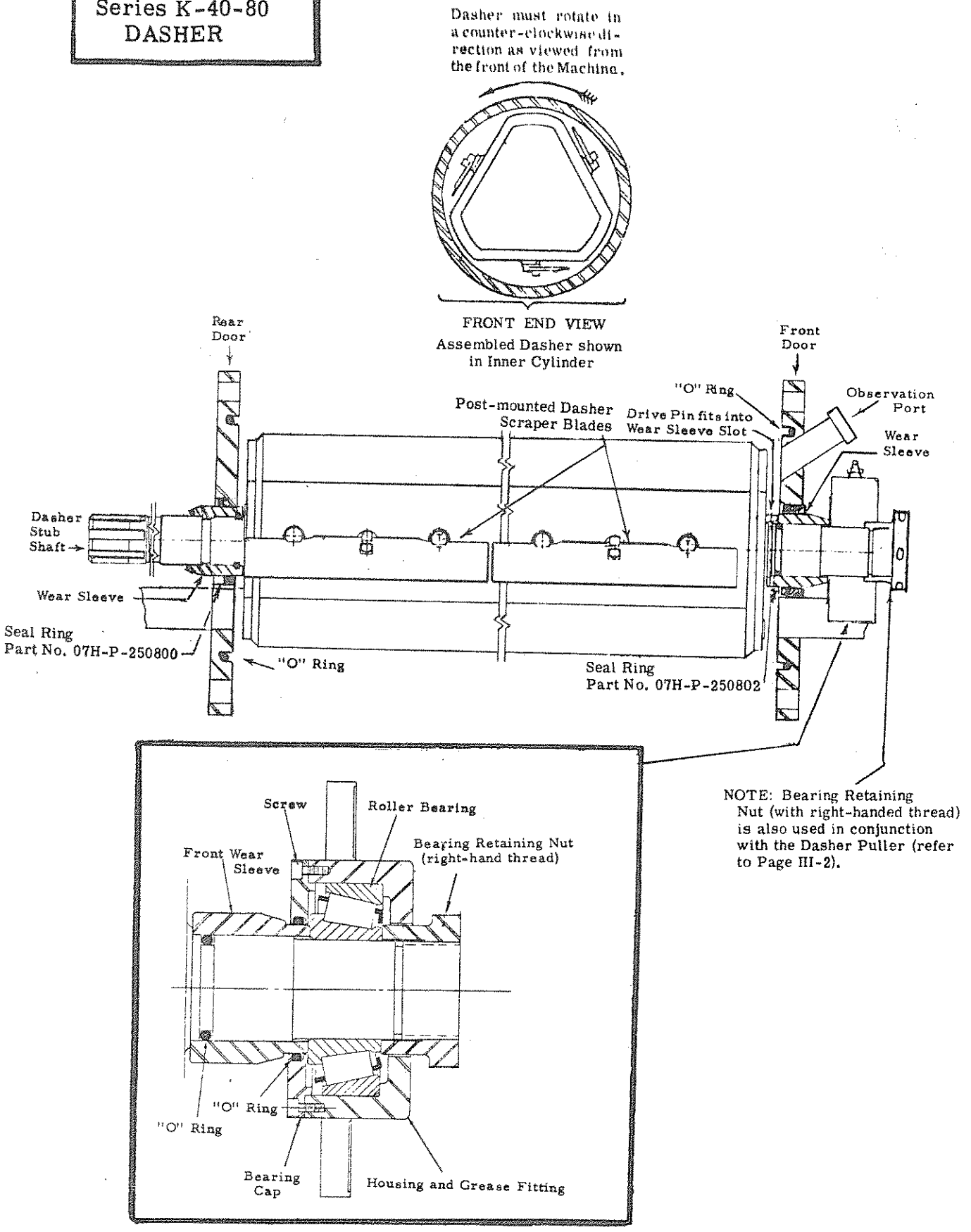
(2) For Series 80 (displacement) dasher, use the 6.3 mm. (1/4 inch) curved inserter protector.

These inserter protectors position the dasher on center so that the dasher stub shaft will pass through the rear door seal and not damage the seal lip.

(3) Lubricate the dasher stub shaft, splines and wear sleeve with a sanitary lubricant. DO NOT use spray lubricants.

(4) With the correct inserter protector in place, and the rear seal, stub shaft, splines and wear sleeve lubricated, gently push the dasher into the inner cylinder and through the rear door seal. A slight rotary movement may be required to engage the spline coupling. After the coupling is engaged, remove the inserter protector and proceed to assemble the machine.

Series K-40-80 DASHER



NOTE: Bearing Retaining Nut (with right-handed thread) is also used in conjunction with the Dasher Puller (refer to Page III-2).

4a. Procedure for Installing the Front Door Seal {Series 80 Dasher only}

a. Refer to Figure 4.
b. If it had not been done, remove the Front Support Bearing from the Front Door along with its Spacers and Retaining Nuts.
c. Assemble the Front Door. Refer to Paragraph 6, Page III-15.
d. Lubricate the Front Seal Ring with sanitary lubricant and assemble over the Front Wear Sleeve and into the Front Door Cavity. IMPORTANT: the "V" side of the Seal Ring must be placed towards the Dasher.
e. Assemble the Special Back Up Ring over the Front Wear Sleeve so that the peripheral surface of the Special Back Up Ring is against the flat of the Seal Ring.
f. Assemble the Support Bearing over the two Support Bearing Studs and against the Front Door Bosses.
g. Assemble the Bearing Retaining Nut onto the threaded portion of the Front Dasher Shaft.
h. Assemble the two Spacers and two Retaining Nuts. Securing the Retaining Nuts will contain the Front Seal Ring and its Back Up Ring into their correct position.

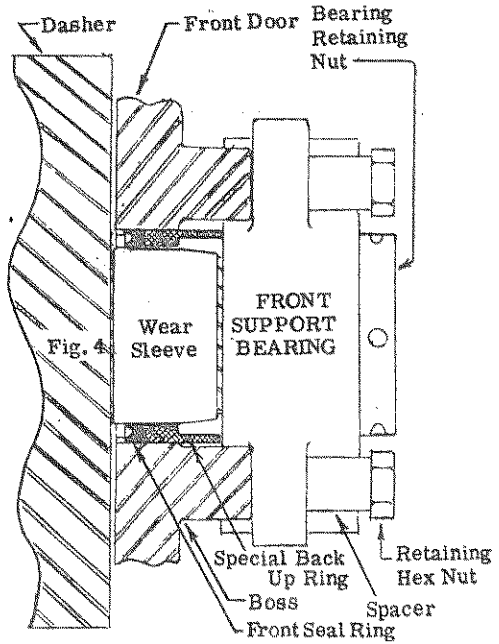


Fig. 4

6. Re-assembly of the Front Door

   a. Inspect the large "O" Ring that fits into the inside of the Front Door for wear or deterioration; replace if necessary. Make sure that the "O" Ring is properly assembled into its groove.

   b. If the Machine employes a Series 80 Dasher, the Front Wear Sleeve must first be assembled onto the Front of the Dasher Shaft. Make sure that the Slot in the Wear Sleeve fits into the Drive Pin, the Drive Pin being anchored into the end wall of the Dasher.

   c. Remove the Inner Cylinder Inserter Protector if this had not been done.

   d. Install the Front Door over the Dasher Shaft (or, in the case of the Series 15 Dasher for the K-110s, K-18s, and K-40s, the Beater Support Shaft), and lift the Front Door slightly to align the holes in the Door with Studs...then give the Door a forward thrust. Secure the Front Door with its four Hex Nuts and tighten these Nuts alternately and evenly.

   e. Replace the Observation Port Plug and its Hex Nut. If the Machine has a Vent Valve in lieu of the Observation Port Plug, and the Valve had been dis-assembled, inspect the "O" Rings for wear or deterioration; replace if necessary. Assemble this Vent Valve onto the Front Door and secure with its Hex Nut.

7. Re-assemble the Product Discharge Valve

   a. If this Valve had been dis-assembled, inspect its "O" Rings and Seals for wear or deterioration; replace if necessary.

   b. Before re-assembly, lubricate these "O" Ring liberally.

   c. Re-assemble this Discharge Valve using the same procedure that was used to dis-assemble this Valve.

   d. If the Machine is to be filled with product, this Valve should be locked in (closed) or, in the case of a Machine that employes an air-operated Discharge Valve, the air hose should be connected to the Valve.

8. Re-assembly of all Product Tubing

   a. Refer to the Diagram on Page III-4.

   b. Inspect the Tubing Gaskets for possible wear or deterioration; replace if necessary.

   c. Re-assemble all Sanitary Tubing from the Booster (Centrifugal) Pump to the Inlet of the First Stage or Product Input Pump and from the Outlet of the Second Stage or the Product Input Pump to the Tubing to the rear of the Machine. If the Machine is equipped with a Recirculation Pump, re-assemble the Product Input Tube to the outlet of the Recirculation Pump and the Discharge Tube to the inlet of the Recirculation Pump.

      NOTE: Make sure that the Tubing Gaskets are securely seated before screwing the Tubing Hex Nuts.

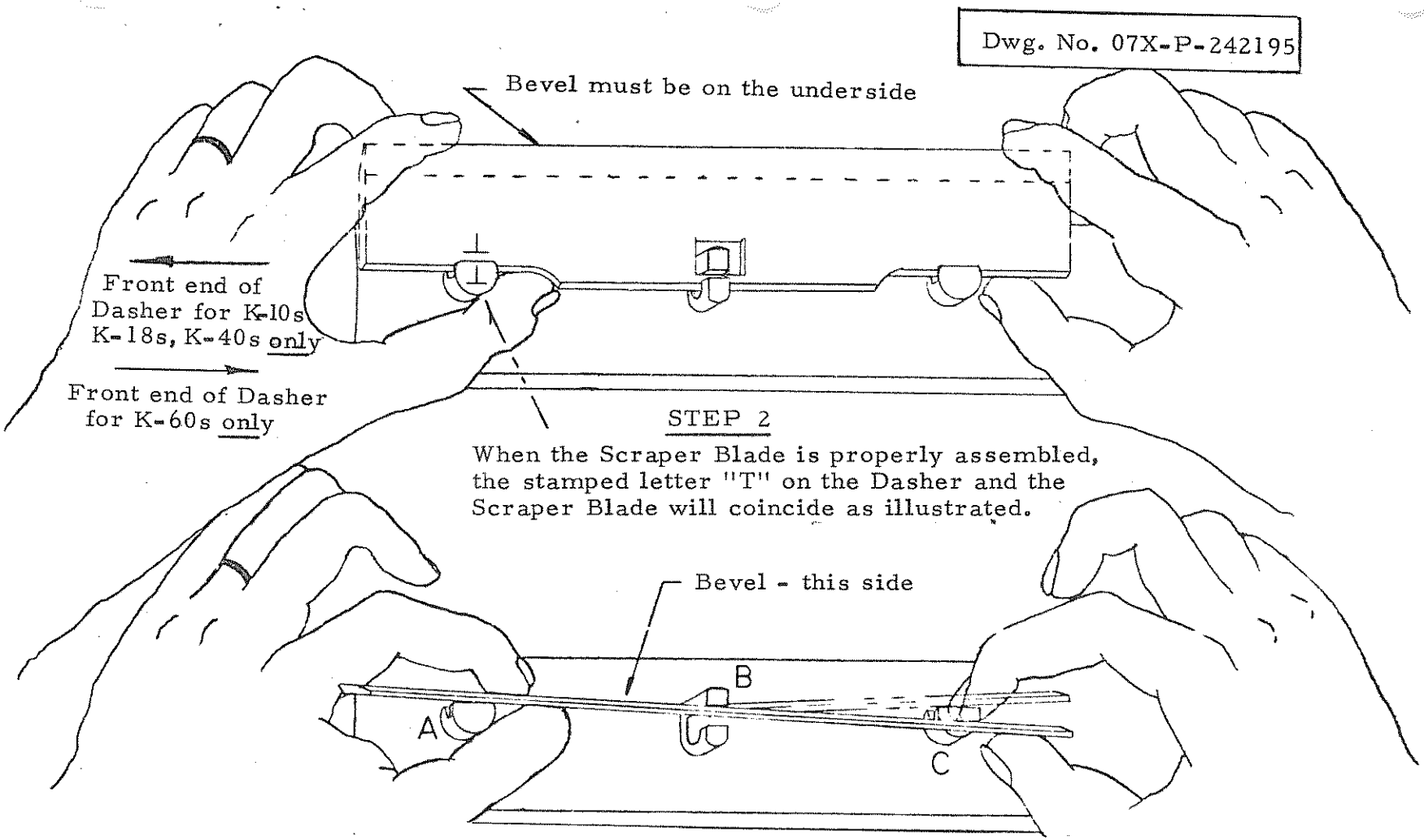
G. SANITIZING THE MACHINE

1. CAUTION: Sanitizing must never be done more than 15 minutes before the operation of the Machine. Sanitizing solutions are very corrosive to stainless steel and to the chromium plating on the inside of the Inner Cylinder. When sanitizing solutions dry they become concentrated and consequently even more corrosive. If the sanitizing process is in effect for more than 15 minutes before the operation of the Machine, rinse the sanitizing solution from the Machine with potable water.
2. Sanitizing should be done only after the Machine is completely cleaned either by hand or cleaned in place (CIP) and re-assembled.
3. Circulate a 100 ppm sanitizing solution, such as Wyandotte Multi-Chlor or Antibac or an equivalent at 29° C. (85° F.) for a period not exceeding three minutes.
4. Refer to Page III - 9. Circulate the sanitizing solution using the same procedure that was done with the circulation of the cleaning solution.
5. Drain all sanitizing solution from the system before beginning the production operation. If using the Product Tanks and the minimum CIP System as illustrated on Page III-8, drain the system by disconnecting the Product Inlet Tubing.

H. MILKSTONE REMOVAL

1. Once each month all product-contact surfaces of the Machine should be hand washed to remove accumulations of milkstone deposits.
2. Carefully follow instructions for "Stopping Machine at End of Run" in Section IV.
3. Disassemble the Machine by following instructions in Sub-section C, "Disassembly in Preparation for Hand Cleaning."
4. Follow the same instructions for Hand Cleaning in Sub-section D, "Hand Cleaning."
5. Re-assemble the Machine following instructions in Sub-section F, "Reassembly of the Machine after Hand Cleaning."
6. Sanitize the Machine according to instructions in Sub-section G, "Sanitizing the Machine."

CAUTION: It is important that the instructions for cleaning and sanitizing be followed closely. Deviations from the recommended procedures may result in corrosion to critical parts such as the Dasher, Scraper Blades, and the interior of the Inner Cylinder, etc.



TO ASSEMBLE:

1. Position the Blade so that the beveled edge is facing away from you, and the letter "T" on both the Blade and Dasher coincide. Referring to Step 1, vertically position the Blade between Pins A and B, making sure that the square hole in the Blade is directly in the center of Pin B. Push the right side of the Blade forward with the thumb of your right hand, bending the Blade enough so that you are able to push the Blade down behind Pin C.
2. Push the Blade forward again (and if it has been correctly positioned in Pin B) it will snap into the correct articulate position as illustrated in Step 2.

TO DIS-ASSEMBLE: (Caution it is advisable to wear gloves while removing blades)

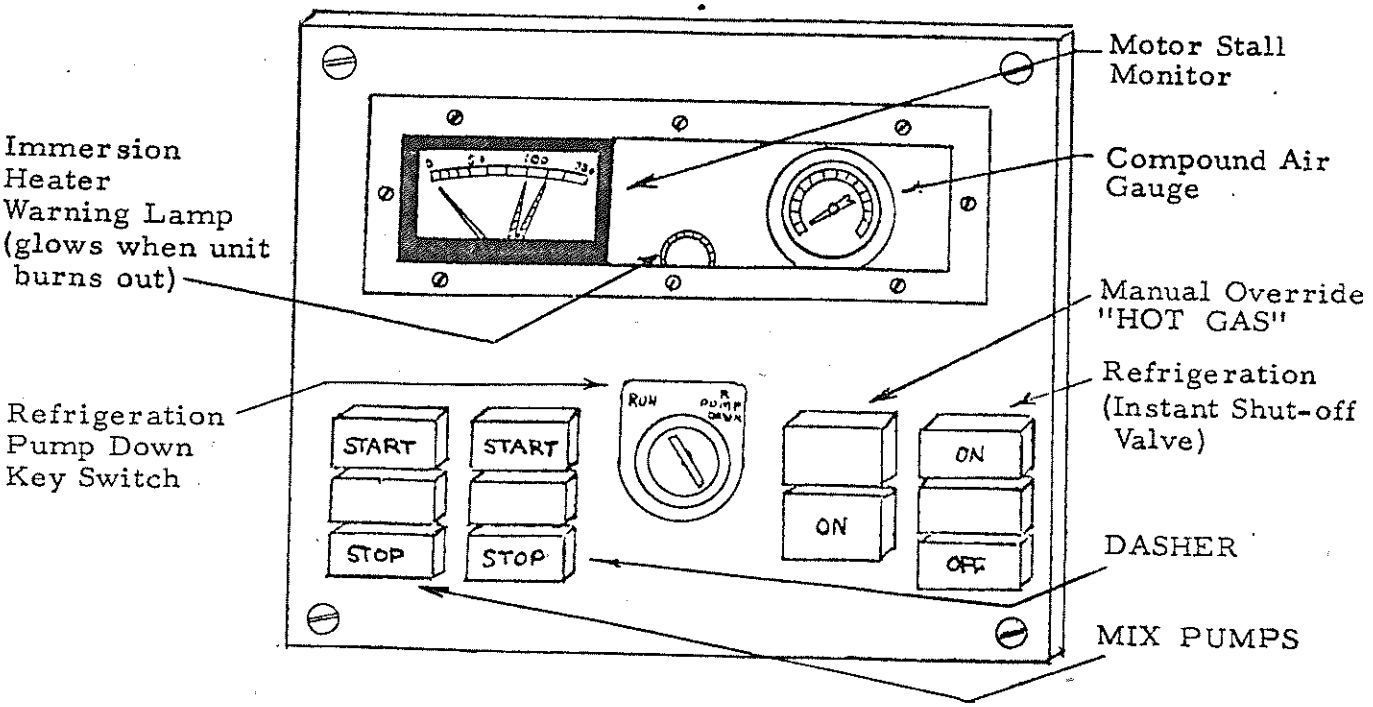
1. Tip the Blade up so that it is positioned as illustrated in Step 1.
2. Press forward with the right thumb while lifting the right end of the Blade up and away from the Dasher.

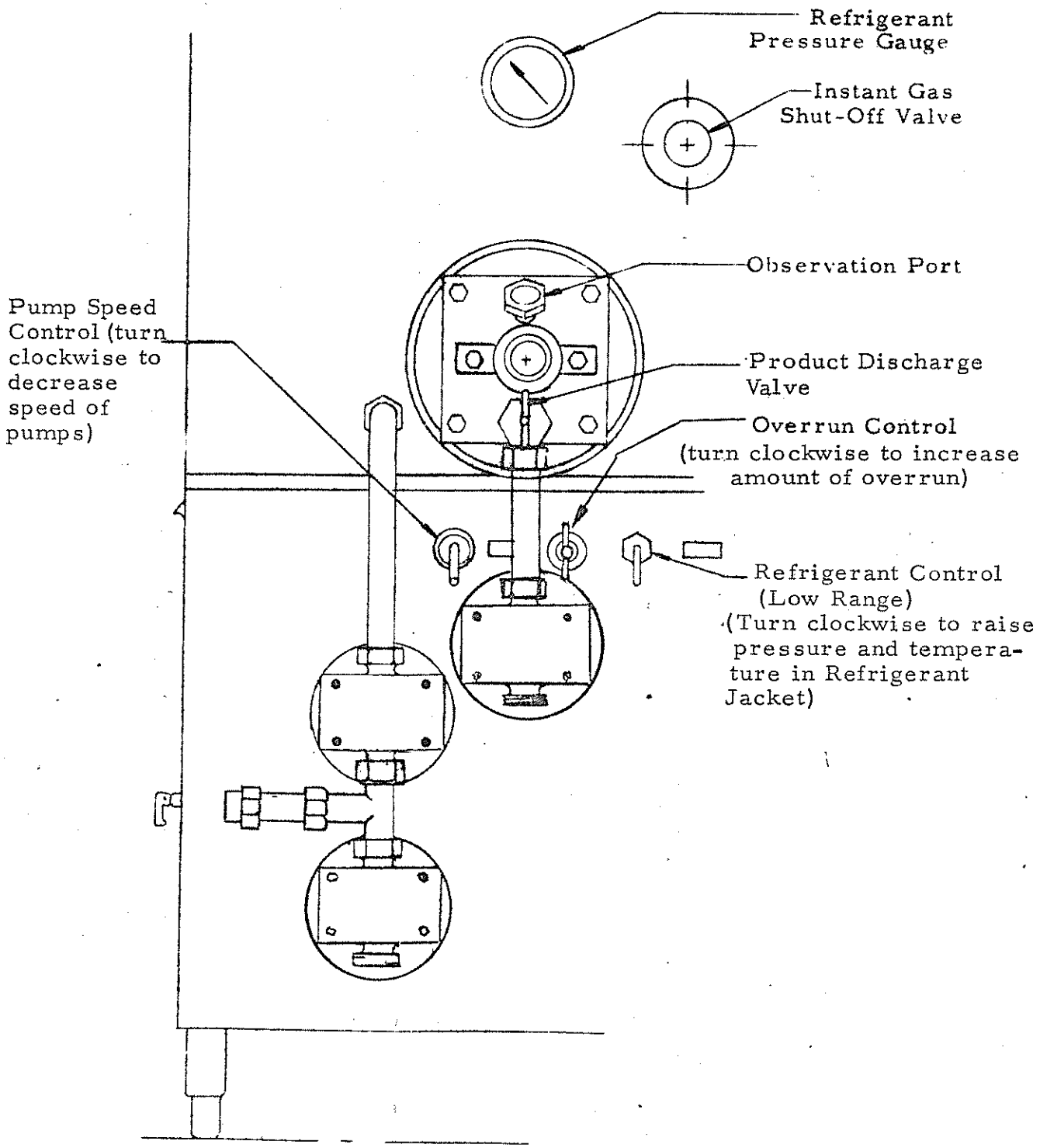
SECTION IV - OPERATING INSTRUCTIONS

All K-18s and K-40s Mix-Air
Machines with Series 80 Dashers - Standard Clean

A. STARTING THE MACHINE

1. Refer to the Diagram below.
2. Make sure that the Refrigerant Liquid-Drain Hand Valve (at the base of the Refrigerant Jacket) is closed if it has, for some reason, been opened.
3. Turn the Refrigeration Pump Down Key Switch to the "RUN" position and remove the key if this has not been done.
4. Place the Product Discharge Valve in the in (closed) position.
5. Make sure that the Lower Range Manual Refrigeration Control Pilot Regulator is closed (by turning clockwise all the way - refer to Page IV-2).
6. Open the Liquid Refrigerant Hand Shut-off Valve.
7. Remove the Observation Plug from the Observation Port on the Front Door.
8. Open the Valve on the Product Tanks.
9. Push the Start "PUMP" Button, starting all Pumps and the Booster or Centrifugal Pump (if the Booster Pump has been wired separately, start this Pump FIRST before starting the other Pumps).
10. Continue to run the pumps until the product level in the Inner Cylinder has reached the Observation Port.
    a. Replace the Observation Plug, and secure the Plug with it Hex Nut.
    b. To insure that the Inner Cylinder is full of product, run the Pumps for an additional 30 seconds, or until the spring-loaded Product Discharge Valve opens.
    c. Stop the Pumps.





11. Start the Dasher by pushing the On "DASHER" Button.
12. Start the Pumps by pushing the On "MIX PUMP" Button (machines with the Series 80 Dashers should have product flow through the Inner Cylinder before refrigeration commences).
13. Adjust the "OVERRUN" to read 24 - 30 cm. Hg. (10 - 12 inches vacuum) normally will give a finished 100% overrun product. As the Pumps wear, the vacuum reading required for the same product may move towards 0 kg/cm^2 (0 psig).
14. Open the Instant Shut-off Valve by pushing the On "REFRIGERATION" Button.
15. To obtain the desired product-out stiffness, slowly lower the refrigeration pressure by turning the Manual Refrigeration Control Pilot Regulator Handle (lower range) counter-clockwise (refer to the Diagram on Page IV-2).
    a. For 100% overrun product, the refrigerant pressure should be adjusted to 0.70 - 0.85 kg/cm^2 (10 - 12 lbs. per sq. inch).
    b. Because of oil contamination after the Machine has been in operation a short time, a lower refrigerant pressure and temperature may be required.
16. Keep the Dasher Motor running and observe the percent reading on the Motor Load Gauge or Stall Monitor. This Gauge will indicate the stiffness of the product (refer to the Diagram on Page IV-1).
    a. For the first day of operation 70% on the Stall Monitor is sufficient for proper chilling or freezing.
    b. After the Machine has been operation, and after experience, the Stall Monitor may read 80% - 90% to achieve the same finished product.
    c. The Stall Monitor is pre-set at the factory:
        (1) Refer to Pages I-3, and I-7, I-8 for pertinent information on the Stall Monitor's function to prevent "freeze-ups".
        (2) When the Indicating Needle reaches the first pre-set Needle (110%) an Alarm Bell will sound. Immediately the Refrigeration Instant Shut-off Valve closes and the freezing or chilling ceases.
        (3) If the Indicating Needle reaches the Second Pre-set Needle (120%), the Pilot Solenoid Valve is closed, and the high range Pilot Regulator, pre-set at 4.22 kg/cm^2 (60 psig), goes into operation allowing pressure to be built up to this pre-set point. At the same time, the Hot Gas Solenoid Valve is opened to emit hot gas, the Dasher stops, and all product pumps stop. When the pre-set pressure of 4.22 kg/cm^2 (60 psig) is reached, a pressure switch actuates an adjustable Times which is engaged for up to a maximum of 10 minutes for 60 Hz. circuits or 12 minutes for 50 Hz. circuits. At the end of this period, all conditions return to normal, which means that the Machine must be manually put into operation as would be in an initial start-up.
        (4) During the selected time period, the Dasher, pumps, and Instant Shut-off off Valve cannot be started or activated until timed out. If the Accumulator pressure drops below 4.22 kg/cm^2 (60 psig), the time cycle will be reset until the 4.22 kg/cm^2 (60 psig) pressure is maintained.
        (5) If this cycle does not free the Dasher for a normal operation, a manual override is provided through an actuating switch ("HOT GAS"). When When this Hot gas On Button is energized it will restart the Timer, and the defrost cycle will be returned to operation.

(6) When the automatic defrost is actuated, the Manual (lower range) Refrigeration Control Pilot Regulator must be closed two or three turns so that the suction pressure in hte Accumulator will be raised above the operating suction pressure when the shutdown occured. IF THIS IS NOT DONE, THE OPERATING SUCTION PRESSURE AT THE TIME OF SHUT DOWN WILL BE RE-ESTABLISHED AND A FREEZE-UP COULD OCCUR.

(7) The defrost cycle is complete when the hot gas lanp in the Control Panel is no longer illuminated.

(8) The suction pressure in the freezer Accumulator will be at the defrost pressure until such time that the refrigeration Instant Shut-off Valve is actuated as in a sequence start-up.

17. To obtain the desired output, adjust the speed of the pumps by turning the "MIX PUMP" Crank counter-clockwise to increase the output and clockwise to decrease output. CAUTION: change the speed of the Pumps only while the pumps are in operation.

18. When the lines and other product-contact surfaces have cooled to product temperatures, check for overrun and stiffness; make the necessary adjustments to achieve the desired product consistency.

B. ADJUSTMENTS FOR OVERRUN DURING OPERATIONS

1. If the overrun is lower than desired:
   a. Turn the "OVERRUN CONTROL" Handle clockwise to increase the amount of air entering the product between the First and Second Stage Pumps.
   b. This will indicate a decrease in vacuum on the Air Compound Gauge.
2. If the overrun is higher than desired:
   a. Turn the "OVERRUN CONTROL" Handle counter-clockwise to decrease the amount of air entering the product between the First and Second Stage Pumps.
   b. This will indicate an increase in vacuum on the Air Compound Gauge.

OVERRUN TABLE - Metric

Weight in grams of finished product in various sized containers*			Overrun percent for various densities (grams/litres) of Mix (product) input			
1/4 litre	1/2 litre	1 litre	% overrun at 1080 gm/lit	% overrun at 1092 gm/lit	% overrun at 1104 gm/lit	% overrun at 1116 gm/lit
108	216	432	150	153	156	158
110	219	438	147	149	152	155
111	222	444	143	146	149	151
113	225	450	140	143	145	148
114	228	456	137	139	142	145
116	231	462	134	136	139	142
117	234	468	131	133	136	138
119	237	474	128	130	133	135
120	240	480	125	127	130	133
122	243	486	122	125	127	130
123	246	492	120	122	124	127
124	249	498	117	119	121	124
126	252	504	114	117	119	121
128	255	510	112	114	116	119
129	258	516	110	112	114	116
130	261	522	107	109	111	114
132	264	528	105	106	109	111
134	267	534	102	104	106	109
135	270	540	100	102	104	107
136	273	546	97	100	102	104
138	276	552	96	98	100	102
139	279	558	94	96	97	100
141	282	564	91	94	95	98
143	285	570	89	92	93	96
144	288	576	88	90	91	94
146	291	582	86	88	89	92
147	294	588	84	86	87	90
148	297	594	82	84	85	88
150	300	600	80	82	84	86
151	303	606	78	80	82	84
153	306	612	76	78	80	82
154	309	618	75	77	78	80
156	312	624	73	75	76	79
157	315	630	71	73	75	77
159	318	636	70	72	73	75
160	321	642	68	70	71	74
162	324	648	67	68	70	72
164	327	654	65	67	68	70
165	330	660	64	65	67	69
166	333	666	63	64	66	67
168	336	672	61	63	64	66
170	339	678	59	61	63	65
171	342	684	58	60	61	63
173	345	690	57	58	60	62
174	348	696	55	57	59	60
176	351	702	54	56	57	59
177	354	708	53	54	56	58
179	357	714	51	53	55	56
180	360	720	50	52	53	55

* Before calculating weights, make certain that weight of container is subtracted.

3. Determining the Overrun Factor

   a. To determine the overrun factor in a product, use the following formula (use decimals and change back to percentage): weight of a given volume of PRODUCT minus the weight of the same volume of a FINISHED PRODUCT divided by the weight of this same volume of the FINISHED PRODUCT times 100, thus . . .

$$\% \text{ Overrun} = \frac{(\text{wt. product}) - (\text{wt. same volume Finished Product})}{(\text{wt. same volume Finished Product})} \times 100$$

   b. For example: weight per liter of PRODUCT is 1.08 kg. and the yield weight in the FINISHED PRODUCT is .600 kg. per liter . . .

$$.80 \text{ or } 80\% = \frac{(1.08 \text{ kg. Product}) - (.600 \text{ kg. per liter Finished Product})}{(.600 \text{ kg. per liter Finished Product})} \times 100$$

4. Determining the Machine Capacity

   a. For example: the yield per cylinder for the K-40 Series Machines is approximately 1500 liters of 100% overrun finished product per hour from 750 liters of input product.

   b. Using the foregoing conditions: if less than 100% overrun is desired in the finished product, the yield in the finished product will be less (by volume) in proportion to the input product.

   c. To determine the output of the finished product in ratio to the product input, multiply the product input times the percent of overrun plus 100% (changing the percent to decimals):

      (overrun % + 1.00) x (volume Product Input) = (volume Finished Product)

      (1) For example using 80% overrun:

      (.80 + 1.00) x (757 liters Product Input) = (1362 liters Finished Product)

      (2) A lower refrigerant back pressure will be required while processing a lower overrun product.

      (3) For a product that is to have a higher overrun, use the same formula to determine the yield from the product input.

      (4) A higher refrigerant back pressure will be requied while processing a higher overrun product.

C. OPERATING PROBLEMS

1. Conditions and their causes

a. Soft finished product may be caused by:

(1) Back pressure on the suction line and refrigerant jacket is too high.
(2) Refrigerant contaminated with oil or water or a combination of both.
(3) Liquid refrigerant line too small.
(4) Liquid refrigerant line filter clogged (does not apply to most halocarbon refrigerants).
(5) Refrigerant level in receiver too low.
(6) Compressor not developing capacity.
(7) Dull or damaged scraper blades.
(8) Product input too warm.

b. Overrun too low may be caused by:

(1) Air lines not tight.
(2) Air pressure too low.
(3) Finished product either too warm or too cold.
(4) Product input has poor air holding capacity.
(5) Internal parts of pumps worn excessively.

c. Overrun too high may be caused by:

(1) Air pressure too high.
(2) Too much re-run in the product tanks.
(3) Air leak in the product line.
(4) Excessive slippage in the product input pump.

d. Unsteady overrun may be caused by:

(1) Fluctuating air pressure.
(2) Leak in the product line.
(3) Excessive or no agitation in the product tanks.
(4) Too much re-run in the product tanks.
(5) Fluctuating back pressure in the refrigerant suction line.

e. Air slugs in finished product may be caused by:

(1) Inner cylinder not full.
(2) Too much re-run poured back into product tank.
(3) Product has poor air retaining ability.
(4) Product entering machine is too cold.

2. Correcting Product Stiffness Problems

a. Increasing Stiffness

(1) To increase product stiffness, lower the refrigerant pressure by turning the Refrigerant Control Handle counter-clockwise (this will also increase the finished product discharge pressure).
(2) If you DO NOT wish to adjust the Refrigerant Control Valve, reduce the product input by turning the PUMP Speed Control Crank clockwise. This will result in an increase in overrun.

b. Decreasing Stiffness

To decrease stiffness, refer to the foregoing directions in Sub-section "a (1), a (2)" and reverse these procedures.

c. Product Input Temperature

(1) If the product input temperature is too high, decrease the refrigerant back pressure by turning the Refrigerant Control Handle counter-clockwise. This will give the Inner Cylinder more chilling efficiency, thus yielding a stiffer product.
(2) If the product input temperature is too low, increase the refrigerant back pressure by turning the Refrigerant Control Handle clockwise. This will give the Inner Cylinder less chilling efficiency, thus yielding a softer product.

3. Maintaining Correct Overrun Control

a. To have good overrun control, a constant pressure at the Product Input Pump must be maintained. Therefore, a Booster (Centrifugal) Pump must be installed between the Product Tank and this Pump (see Diagram on Page III-8).

b. The Product Tank must be of a suitable size to supply the high capacity of a continuous Machine. Product pumped from a nearly empty tank will contain more air than that of a product pumped from a full tank.

c. When adjusting the Overrun Control, and the Air Gauge does not respond properly to the adjustment, check for air leaks in the ...

(1) Product Line to the Product Input Pump.
(2) Air Check Valve or the Sanitary Tee Valve Assembly.
(3) Pump Seals.

d. Too much re-run product dumped into the Product Tank will cause an increase in overrun. If great amounts of re-run product are returned to the Product Tanks, care should be taken to remove the air from the re-run before pouring it back into the Product Tank.

All Machines

D. ICE CREAM MIX (Product Input)

1. In many cases of too high, too low, or fluctuating overrun, the mix rather than the Machine itself may be the cause of poor air incorporation.
2. Basic principle of freezing the mix into ice cream:
   a. The water in the mix commences to freeze at approximately -2.8° C. (27° F.).
   b. As soon as ice crystals begin to form, and the unfrozen solution portion becomes more concentrated in relation to its soluble constituents, the original temperature of approximately -2.8° C. (27° F.).
   c. As the temperature is progressively reduced to a lower freezing point, more of the water in the mix will freeze.
   d. Within the Inner Cylinder the mix is partially frozen, and at the same time, air is incorporated into the mix.
   e. The mix freezes as a thin film on the cylinder walls and is removed by the revolving scraper blades.
   f. During the freezing process, air is incorporated into the mix as small air cells which are uniformly distributed.
3. Emulsifiers in the ice cream mix:
   a. Emulsifiers are incorporated into the ice cream mix to improve the air retention capacity of the mix and ...
   b. are used to promote stiffness, dryness, and structural rigidity in the finished ice cream.
      (1) The emulsifier causes the fat in the mix to agglomerate during the freezing process.
      (2) Often the emulsifiers used as stiffening and drying agents have adverse effects on the whipping qualities of the mix.
      (3) Therefore, a combination of emulsifiers and stabilizers may be required to facilitate the different types of mixes and the various characteristics of the desired finished product.
4. Stabilizers in the ice cream mix prevent the formation of large ice crystals, thereby preventing or delaying the development of a coarse textured product.
5. Homogenizing the mix
   a. Homogenizing is the primary factor in giving the mix its satisfactory whipping ability. Therefore, if there is whipping or body and texture difficulties, homogenization efficiency of the mix should be given first consideration.
   b. Proper homogenization, under microscopic examination, should show the fat in the mix as small individual globules uniformly dispersed rather than in clusters or clumps.

E. STOPPING AND RESTARTING MACHINE DURING PRODUCTION

1. Stopping Machine

   a. Refer to the Diagrams on Pages IV-1 and IV-2.

   b. Push the Off "REFRIGERATION" Button.

   c. Turn the Low Range Pilot Refrigeration Control Handle clockwise two turns, thus increasing the refrigeration back pressure and temperature of the Refrigerant Jacket.

   d. If the Machine is a standard Air Machine (KA or KRA), turn the "OVER-RUN CONTROL" Handle all the way counter-clockwise to shut off the overrun. If the Machine is a Mix-Air Machine (KM or KRM), the over-run air is automatically turned off when the Pumps are turned off. In the case of these Machines, therefore, it is not necessary to adjust the overrun air in any way.

   e. When the Indicator on the Dasher Motor Load Gauge or Stall Monitor begins to drop, push the Stop "DASHER" Button to stop the Dasher.

   f. Push the Stop "PUMP" Button. Stop the Booster (Centrifugal) Pump at the same time.

   CAUTION: If the Machine has Full-flow Pumps, DO NOT change these pumps from their normal operating position; that is, from the closed position.

   On the halocarbon Machines DO NOT turn the Refrigerant Dump switch to its Open position for a temporary shut-down.

2. Restarting Machine

   a. Refer to the Diagrams on Pages IV-1 and IV-2.

   b. Push the Start "PUMP" Button. Start the Booster (Centrifugal) Pump at the same time.

   c. If the Machine is a Standard Air Machine (KA or KRA), turn the "OVER-RUN CONTROL" Handle clockwise to open the air to its original reading on the Air Pressure Gauge (about 2.1 - 2.5 kg/cm^2 (20 - 35 lbs. per sq. inch). If the Machine is a Mix-Air Machine (KM or KRM), the overrun air is automatically turned on when the Pumps are turned on, and, therefore, the overrun or reading on the Air Compound Gauge should resume to normal.

   d. Push the Start "DASHER" Button.

   e. Push the On "REFRIGERATION" Button.

   f. Turn the Low Range Pilot Refrigeration Control Handle counter-clockwise two turns, thus decreasing the refrigeration back pressure and temperature of the Refrigerant Jacket. The Motor Load Indicator or Stall Monitor Indicator Needle should reach its original reading.

F. STOPPING MACHINE AT END OF RUN

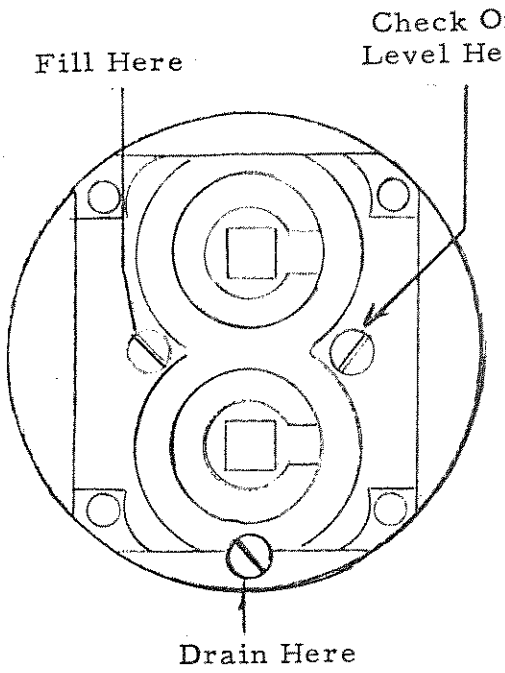
1. Close the Liquid Refrigerant Supply Line Valve 5 to 10 minutes before stopping the Machine.
2. To avoid air incorporation into the Product Line, add cold water to the Product Tank just before the input product or mix is depleted from the Tank.
3. Just before the water enters the product line, turn the Low Range Pilot Control Handle (Overrun Control Handle) clockwise to increase the back pressure and temperature in the Refrigeration Jacket.
4. Push the Off "REFRIGERATION" Button.
5. NOTE: If the Machine is a halocarbon refrigeration machine, turn the "REFRIGERANT DUMP" Switch to the "Open" position. This will evacuate all liquid refrigerant from the Machine.
6. NOTE: If the Machine has Full-flow Pumps, keep these pumps in a normal operating or closed position. This would also include the Vent Valve and Plunger Piston in the Discharge Valve in certain Machines — that is, they would be held in their normal operating positions.
7. When the water has been discharging for 30 seconds, push the Stop "DASHER" Button. CAUTION: DO NOT let the Product or Mix Tanks run dry; do not let the water run for more than 30 seonds.
8. After the Machine has been through this quick and temporary flushing, push the Stop "PUMP" Button, stopping all Pumps. Also, the Booster (Centrifugal) Pumps must be stopped at the same time.
9. If the Machine is a Mix-Air Machine (KM or KRM), the Overrun Solenoid Valve will be turned off at the same time the pumps are turned off. However, if the Machine is a Standard-Air Machine (KA or KRA), turn the Overrun Control Handle all the way counter-clockwise to shot off the overrun air supply.
10. Close the Handle to the Hot Gas Line Shut-off Valve.
11. Open the Oil Drain Liquid Dump Valve (not for Machines using Halocarbons).
12. If the Machine is to be evacuated of refrigerant, and this is to be done only by qualified maintenance personnel, follow this procedure:
    a. Refer to the Diagrams on Page III-8 and IV-1.
    b. Insert the key into the Refrigeration Pump Down Switch.
    c. Turn the key to the "R PUMP DOWN."
    d. Press the On "REFRIGERATION" Push Button. This will, in the "R PUMP DOWN" position, allow the opening of Instant Shut-off Refrigeration Valve and Back Pressure Regulator without having the Pumps and Dasher on.
    e. The maintenance person should then turn the switch back to "RUN" and remove the key.
13. Refer to Page III-9 for the operation of the CIP (Clean in Place) Instructions.

SECTION V — MAINTENANCE

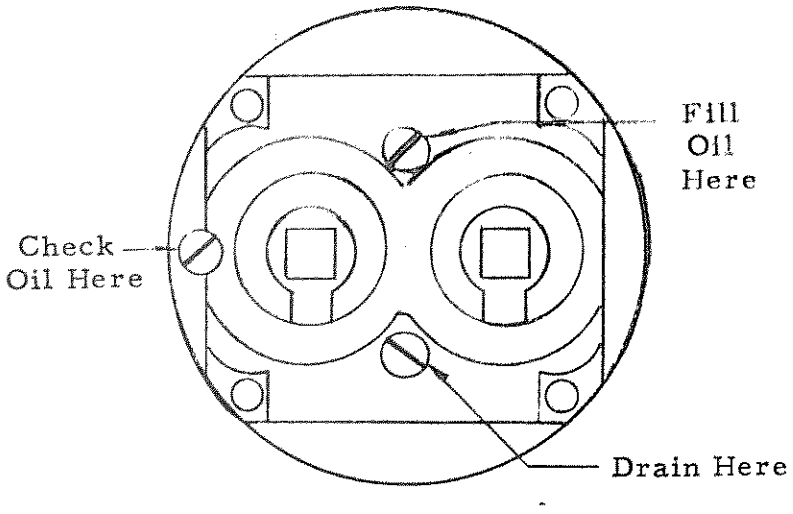
A. LUBRICATION

	Type of Lubrication	Interval
1. Lubrication and Frequency		
a. Dasher Drive Pillow Block Bearings	Orange #390	3 months
b. Dasher Support Bearings	Orange #390	Daily
c. Drive Motor Bearings	Orange #390	Consult Motor Instructions
d. Variable Pump Drives:		
(1) Reeves Vari-Speed Drives	Orange #390	2 weeks
(2) Graham-Shimpo Variable Speed Drives	CAUTION - use only special gold oil — refer to important instructions on Page V-1a	
(3) Speed Reducers (Pump Drive on KA, KAC-110s, and special Dasher Drives)	SAE #50 oil	Change every 6 months
e. Chain Drives (see Page V-18)	CP Homolube 902-S-1456	1 month
f. Pump Speed Adj. Crank and Shaft	Orange #390	1 month
g. All Product Pumps - Gear Case	CP Homolube 902-S-1456	Change 500 hrs. running
h. Hyd. Pump Drive Motor (K-60s with Hydraulic Driven Beaters)	Orange #390	4 months
i. Hyd. Reservoir - for Orbital Beater Motor (K-60s with Hydraulic Driven Beaters)	CP Hydraulic Lube #502-S-5781	4 months
j. Instant Shut-off Valve	CP Lubricant 902-S-4826	Whenever dis-assembled

2. Apply C P Sanitary Lubricant to all product lubricated bearings and seals. Apply to all wearing surfaces each day during assembly.
3. C P Homolube is a special high grade No. 30 non-emulsifying oil (C P No. 902-S-1456). In certain areas of the World where C P Homolube is not available, the following oils are available and are adequate for C P Rotary Pumps:
   a. Hunble Oil and Refining Co. (Esso) ----------Teresstic or Teresso 65
   b. America Indiana Oil Company ----------Am. Indiana Oil #51
   c. Texaco ----------Tex. Regal Oil PER&O
   d. Mobile Oil Company ----------Mobile DTE Oil - Heavy
   e. Shell Oil Company ----------Tellus #41
   f. British Petroleum Company ----------BP Energol HL 150
4. The following listed greases may be substituted for Orange #390:
   a. Mobile Oil Company ----------Mobile EP #1
   b. Texaco ----------Texaco Novatex #1
   c. Shell Oil Company ----------Alvania



VERTICAL



HORIZONTAL

5. Procedure for Lubricating Pumps:

It is important that a DEFINITE LUBRICATING PROGRAM be established for all Pumps. All Gear Cases are filled with the proper oil at the factory. However, the oil level should be checked before starting the Pumps. The level of oil should be up to the level of the Middle or Oil Level Plug.

a. Remove the Pump Body of the Pump exposing three large slotted Plugs.

b. The center or middle Plug (refer to above diagram) is for indicating the correct oil level. Check every week for the oil level.

c. Drain and fill the Pumps according to the two diagrams illustrating the Pumps both in a horizontal and vertical position.

d. Drain and fill with fresh C P Homolube (C P No. 902-S-1456) every 500 hours of running time.

e. The Gear Case oil capacity is as follows:

(1) 1F-AR, 2F-AR (all types) in a vertical position ----- .25 liters (1/2 pints)
(2) 1F-AR, 2F-AR (all types) in a horizontal position --- .50 liters (1 pint)
(3) 3F-AR (all types) in either a vertical or horizontal position (applies only to the Second Stage and the Product Discharge Pumps on the K-60 Machines -- .60 liters (1-1/4 pints)

f. If C P Homolube is not immediately available, refer to Page V-1 for comparable brands.

g. Inspect the Gear Case during every oil change for indications of loose Shaft Bearings. See "Bearing Adjustment", Page V-3.

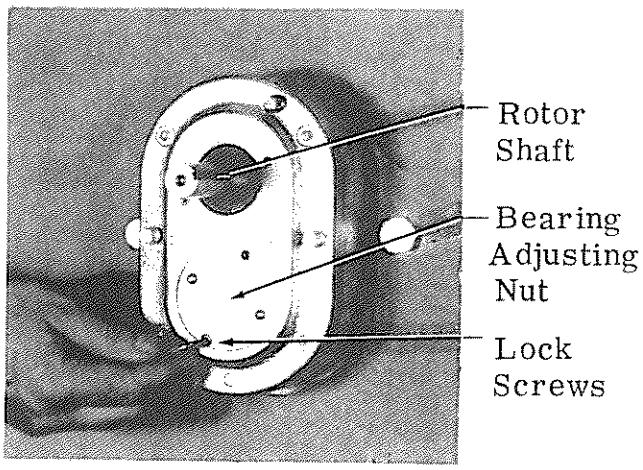


Fig. 3a

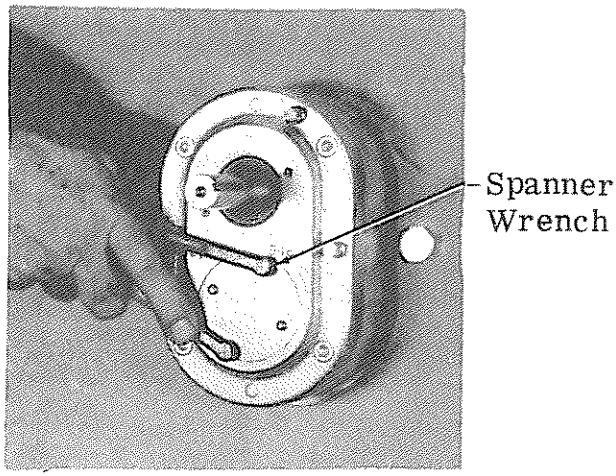


Fig. 3b

B. PUMP MAINTENANCE

1. Bearing Adjustment:

   To test for loose Shaft Bearings, grasp the Rotor Shaft firmly and move in and out while the Pump is dis-assembled. If the Bearings show looseness by a "chucking" sound or there is a feel of movement, tighten by the following procedure:

   a. Remove the Lock Screw in each of the Bearing Adjustment Nuts (Fig. 3a).

   b. Using a Spanner Wrench, tighten one Bearing Adjustment Nut at a time (Fig. 3b).

   c. Rotate the Rotor Shafts back and forth 180^{o} during adjustments.

   d. Tighten one Adjustment Nut until a slight reisistance to Shaft rotation is felt...no more. Mark its position and back the Adjustment Nut off one-half turn.

   e. Tighten the other Adjustment Nut the same way, but leave it in its tightened position (do not back off).

   f. Replace Lock Screw and secure.

   g. Move the first Adjustment Nut back to its mark (refer Paragraph d.). Replace Lock Screw and secure.

   h. Spanner Wrenches for the Bearing Adjustment Nuts are available from the factory.

2. Rotor Care

a. Before starting Machine, and after cleaning, lubricate Pump Body Interior with sanitary, food grade lubricant (see Page III-10 and 11). DO NOT use silicon compounds.

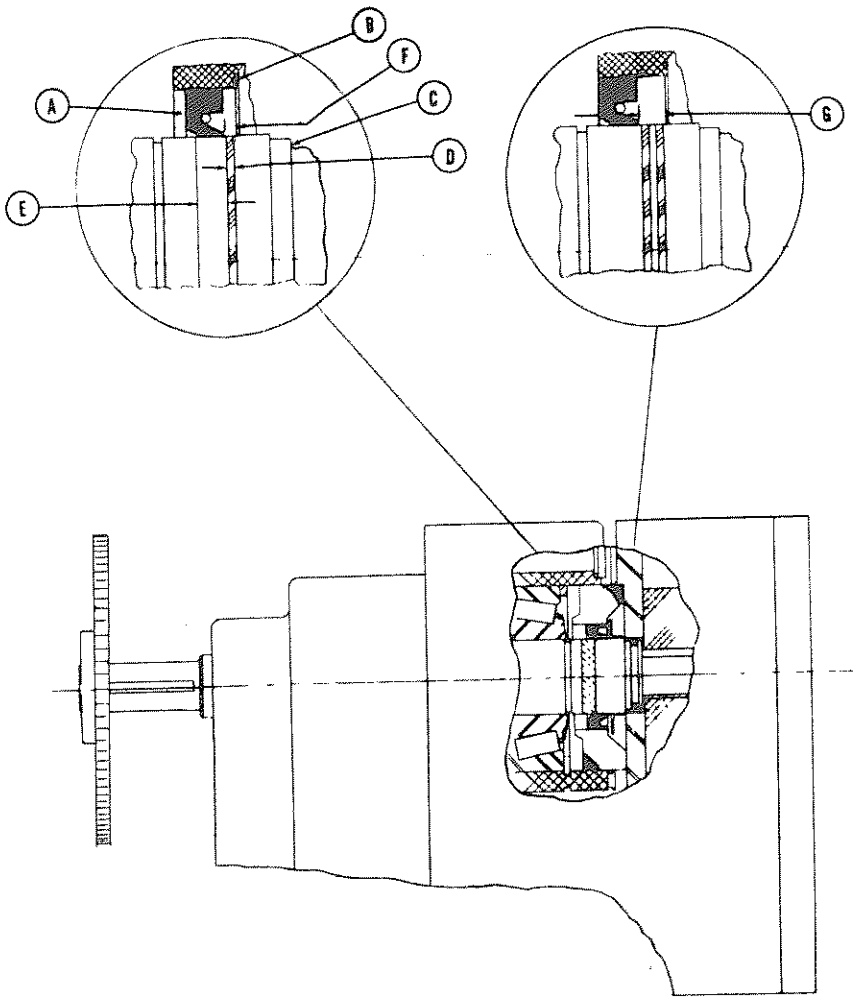
b. Since the amount and location of wear will differ with each Pump, do not interchange rotors and other Pump parts (interchanging parts may result in erratic operations).

c. NEVER permit Pumps to run dry. The most common cause of Rotor damage and wear is lack of lubrication or lack of fluids being pumped. Running Pumps dry or without lubrication may cause Rotor surface temperatures to rise to a damaging point within a few minutes after starting.

3. Rotary Pump Problems

	Condition	Cause
a.	Product Leak	Shaft Seal excessively worn Seal Bearing excessively worn Seal Parts improperly cleaned and Lubricated Nicks and burrs in Seal Cavity and/or Seal Bearing Loose Bearings Abrasive Product Seals improperly installed
b.	Excessive Bearing Wear	Oil contamination Operating at excessive pressure and at excessive speeds Improper Bearing adjustment
c.	Oil Contamination	Prolonged product leakage Failure to change oil Breather positioned wrong Oil Seals improperly installed Failure to clean Gear Case Front regularly
d.	Short Life for Shaft Seal	Running Pump dry Nicks or burrs in Seal Bearings or in Seal Cavity Improper Seal installation Loose Bearings

e. Excessive Rotor Wear	Running Pump dry Pumping abrasive product Circulating cleaning solution with Rotors in Nicks in Body and Cover Excessive speeds and pressures Extreme and sudden product temperature changes
f. Rotor Damage	Running Pump dry Hard substances passing through Pump Circulating cleaning solutions with Rotors in Loose Bearings Nicks and burrs in Cover and Body
g. Oil Leak	Breather plugged Oil Seals excessively worn Loose Bearings Excessive wear on Shaft at contact with Oil Seal Improper Oil Seal installation
h. Excessive Shaft Wear at Contact with Oil Seals	Excessive exposure of Oil Seals to external abrasives Oil Contamination Failure to clean Gear Case Front regularly
i. Excessive Cover Wear	Running Pump dry Excessively pressure and speeds Abrasive product run through the Pump



ROTARY PUMP SHAFT

OIL SEAL RELOCATION

A Oil Seal

B Locating Plug

C Shaft

D Wear area on Shaft from contact with Oil Seal.

Normal width approximately 1.6 mm. (1/16 inch)

E Available unworn Shaft area.

F Recess - approximately 3.175 mm. (1/8 inch).

G Recess - approximately 6.350 mm. (1/4 inch).

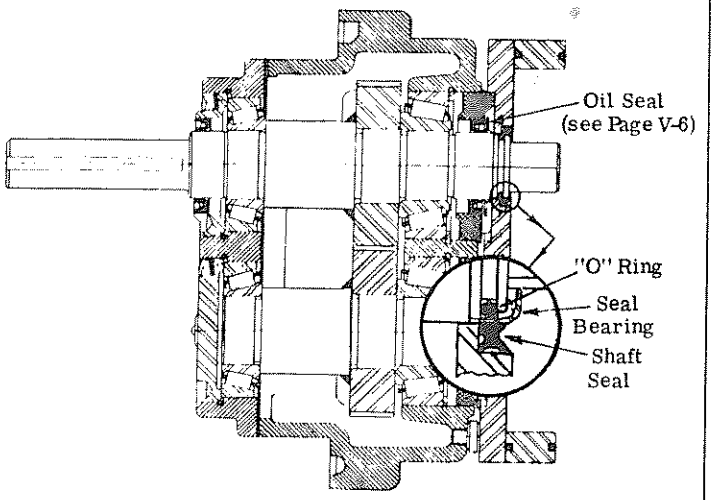
4. OIL SEAL RELOCATION

a. Refer to the above Diagram.

b. To prevent excessive leakage, replacement of Oil Seal Rings should be included during routine maintenance.

c. Seals that have been neglected or installed wrong may cause leaks of the product into the Gear Case. This condition will show up as grooving or scoring of the Shaft at the Seal location.

d. A new Seal should therefore be installed, but, if the grooving or scoring of the Shaft is evident, this newly installed Seal may be installed away from the grooved or scored area at two possible locations. Refer to the above diagram for these locations.

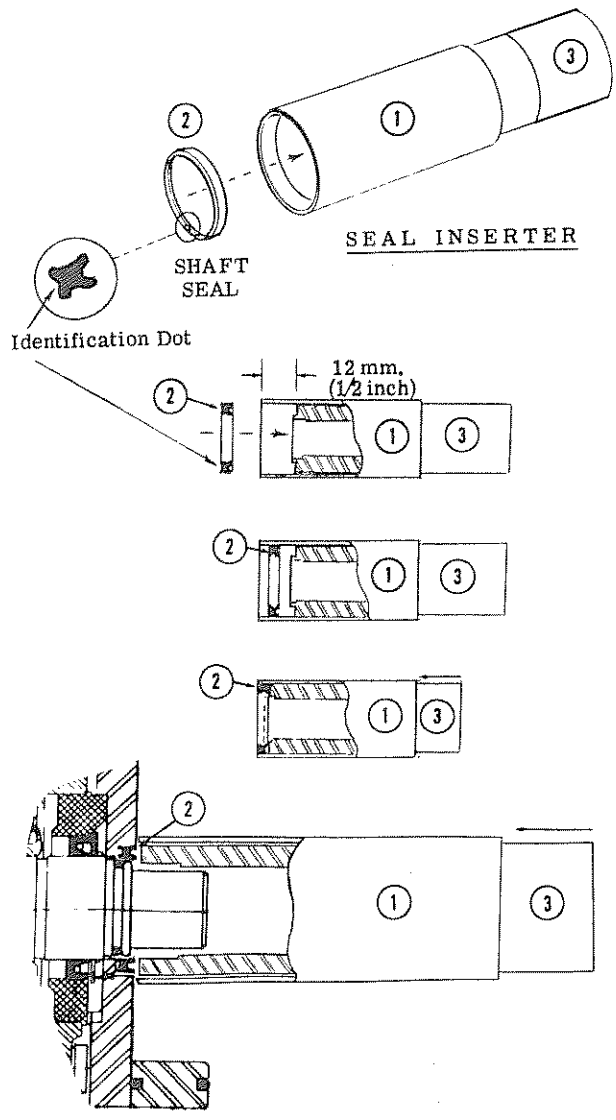


5. ROTARY PUMP SHAFT SEALS

Shaft Seals should be replaced monthly or when leaking occurs.

a. Remove worn Shaft Seals.

b. Check Seal Bearings and "O" Rings for wear; replace if necessary (see circle insert on pump illustration).



c. Use Seal Inserter to replace Shaft Seals.

(1) Lubricate new Shaft Seal (2) with sanitary lubricant.

(2) Slide back Inside Cylinder (3) until recessed 12 mm. (1/2 inch).

(3) Insert new Shaft Seal into recessed area of Inserter (1), making sure Identification Dot of Seal (2) is visible or facing to the outside of Inserter (1).

(4) Slide forward Inside Cylinder (3), bringing Seal even with the front rim of the Inserter (1).

(5) Slide Inserter (1) over Pump Rotor Shaft and Pump Body.

(6) Push Inside Cylinder (3) slowly forward against Pump Body, inserting Seal (2) into its cavity.

(7) Remove Seal Inserter (1).

(8) Check the newly assembled Seal (2), making sure the lips of Seal are not twisted and the lip of Seal is even with periphery of the cavity.

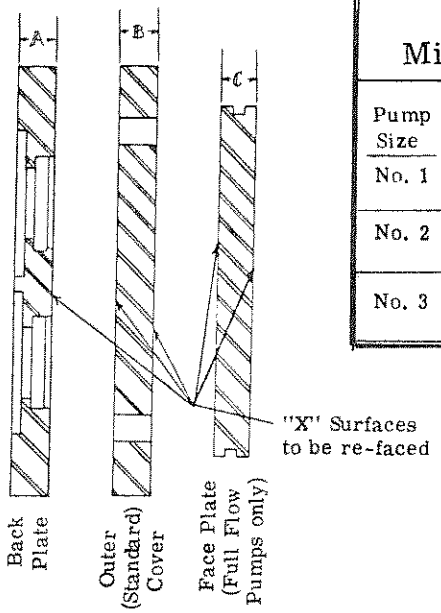
6. RECONDITIONING or RE-FACING FAR PUMP BACK PLATES, OUTER (Standard) COVERS, and FACE PLATES (Full Flow Pumps only)

a. Wear on Back Plates, Outer Covers, and Face Plates is a normal occurance.

b. Along with a good Rotor replacement program, surface reconditioning of these parts will greatly improve the efficiency of the pumps, thus improving the performance of the freezer or chiller.

c. When wear on these surface exceeds .130 to .254 mm. (.005 to .010 in.) some reduction in pumping efficiency may be noticed.

d. On the diagram below, surfaces marked "X" may be re-faced (surface ground) as many times as required until minimum dimensions are reached (see Diagram below for minimum dimensions).



RE-FACING
Minimum Dimensions

Pump Size	A	B	C
No. 1	12,7 mm. (.500 in.)	9,83 mm. (.387 in.)	12,7 mm. (.500 in.)
No. 2	12,7 mm. (.500 in.)	9,83 mm. (.387 in.)	12.7 mm. (.500 in.)
No. 3	12,7 mm. (.500 in.)	12,7 mm. (.500 in.)	12,7 mm. (.500 in.)

e. Surfaces marked "X" may be refaced many times.

f. Surface grinding or refacing beyond these dimensions may impair the operation of the pump.

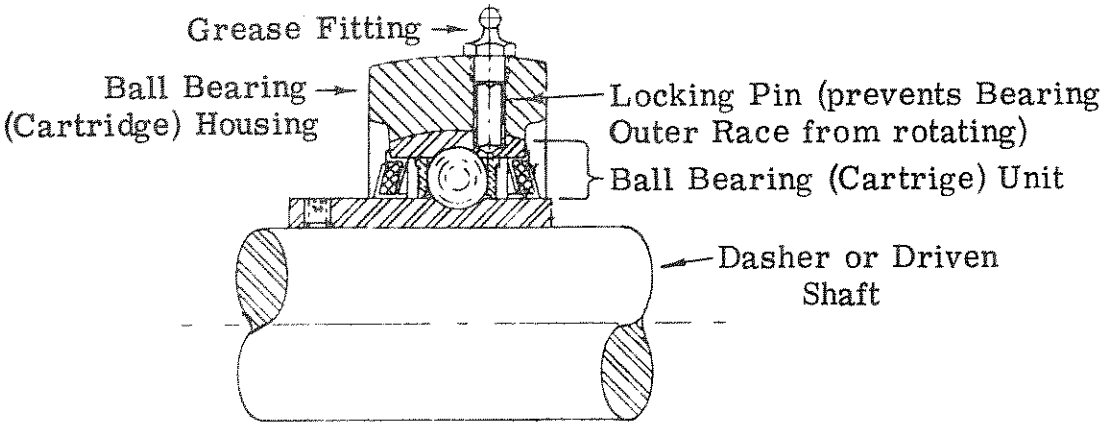
g. Only reface or grind enough to insure that signs of wear are removed and that surfaces are flat.

h. Either side of the Outer (Standard) Cover and Face Plate may be used as the product contact surface.

C. DASHER SUPPORT BEARINGS, DRIVE SHAFT PILLOW BLOCK BEARINGS, and WEAR SLEEVES

(The K-60 Machines have Front and Rear Dasher Support Bearings, K-18s and K-40s with Series 80 Dashers have Front Dasher Support Bearings. Some K-18s and 40s also have Rear Support Bearings. All Machines are equipped with two Drive Shaft Pillow Block Bearing per cylinder).

1. All Bearings should be greased daily before starting up. This will aid in flushing out any water that may have collected in the Bearing Race. Refer to the Lubrication Chart on Page V-1.
2. All Bearing should be checked regularly, and if looseness is apparent, these Bearings should be replaced. Refer to the instructions and diagram below.
3. On all Machines check for worn Wear Sleeves (refer to Diagrams on Pages III-13, III-14, and V-14). The Dasher must be removed for this check. If the Sleeve leaks with a newly installed Seal Ring, the Sleeve must be replaced.



4. To remove and replace a Ball Bearing Unit (Cartridge) from its housing:
   a. If the Bearing is a Dasher Support Bearing, remove this Bearing from the Machine and clamp in a vise.
   b. If a Drive Shaft Bearing must be replaced, replace while the Pillow Block is mounted on its frame.

      NOTE: Never remove the Drive Shaft Pillow Blocks from their mountings on the Machine (REMOVING IS ONLY DONE WHEN RE-ALIGNMENT DASHER and DRIVEN SHAFT IS NECESSARY — refer to Page V-12).

   c. Remove the Grease Fitting and Locking Pin from the housing.
   d. Remove the Ball Bearing Unit (Cartridge) by rotating 90^{o} from the Shaft center line within the Housing until the Ball Bearing Unit is in line with the Removing Slots in the housing.
   e. Replace the new Ball Bearing Unit (Cartridges) by using the reverse procedures in Paragraphs a., b., c.

E. Post-Mounted Scraper Blade Care

1. GENERAL INFORMATION

a. Scraper Blades are extremely hard and therefore subject to nicks.

b. They are designed to give maximum service but will wear out more under certain operating conditions:

(1) Running certain products that have a high percentage of water that is to be frozen. Also certain products that may contain fruits or grit.

(2) Running Dasher too long with just water during the cleaning operation, or by running Dasher dry.

c. Care should be taken to avoid bending the blades when removing the Dasher from the Inner Cylinder. This can easily happen if the weight of the Dasher is carried on the Blades when the Dasher is almost out of the Cylinder (Refer to Page III-2 for proper removal of Dasher). Bent Blades should never be used because they will not scrape the Cylinder Walls properly thus greatly lowering the efficiency of the Machine.

d. Scraper Blades need reconditioning whenever the scraping edge becomes knife-sharp, rounded, or nicked. Remove the Blade for reconditioning every 3 weeks and replace with a reconditioned set of Blades. If a sharp decrease in Machine capacity is noticed, the Scraper Blades may need to be reconditioned more often. The length of time which Blades remain in good condition will depend largely on the type of product being processed, and the length of time the Dasher is run during the cleaning operation.

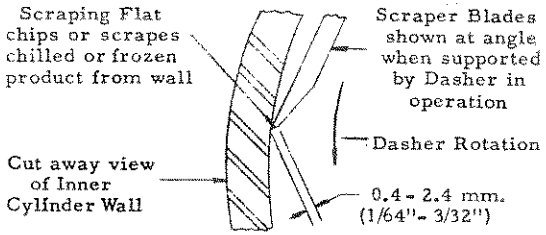


Fig. 11a Blade in Operation

2. BLADE RECONDITIONING

a. Blades have an excess heel over 2.5 mm. (3/32 inch) are no longer safe for efficient operation and should be reconditioned (Fig. 11b). After the Blade has been repeatedly filed or reconditioned

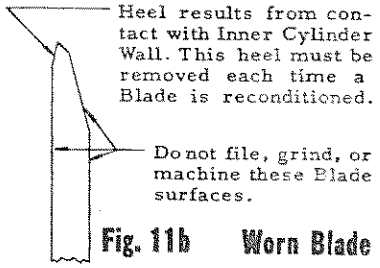


Fig. 11b Worn Blade

down to 31.7 mm. (1¼ inch) width (Fig. 11d), it should be replaced with a new Blade. To permit sufficient time for good reconditioning, a spare set of Blades should always be kept available. To prevent chatter and the resulting rough surface on the Blade, use a clean, sharp (preferably new) 350 mm. (14 inch) mill bastard, single-cut file.

b. To recondition a Blade by hand filing:

(1) Clamp the Blade Filing Fixture in a vise and place the Scraper Blade in the Fixture (Fig. 11c).

(2) Hold the File at a 90° angle to the side of the Blade Fixture. With a single continuous stroke, file the full length of the Blade Flat (Fig. 11c).

(3) Continue to file until the heel is removed and the flat is 0.4 - 0.8 mm. (1/64 - 1/32 inch) wide. Remove any burrs with a piece of hardwood by drawing it along both sides of the flat. A good test for proper reconditioning is to draw the thumbnail down across the Blade Flat towards the Mounting Holes; a properly reconditioned Blade will shave flakes from the thumbnail.

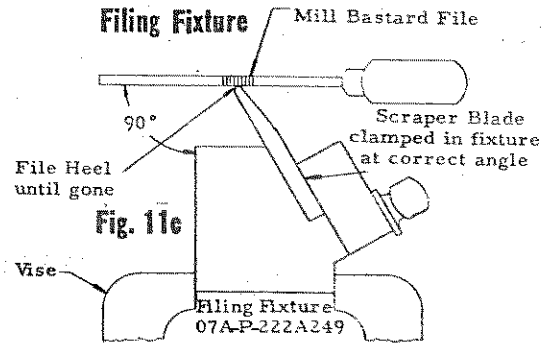


Fig. 11c

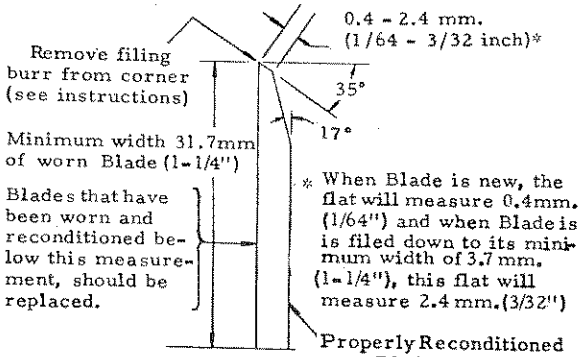
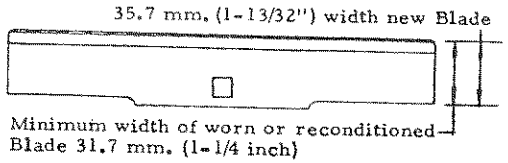


Fig. 11d Blade Angles



3. SPECIAL CLEANING INSTRUCTIONS

a. C P Scraper Blades are made from the highest quality, hardened stainless steel. However, certain conditions may cause small spots to develop. If unchecked, these spots may enlarge resulting in serious corrosion and pitting, and this condition may actually impair the continued use of the Blades.

b. At the first indication of these spots, treat the Blades as follows:

(1) Remove Blades from the Dasher and immerse them in a solution of 20% Nitric Acid, 2% Potassium or Sodium Dichromate, and 78% Water.

(2) A minimum immersion time of 30 minutes at an approximate temperature of 43°C. (110°F.) is recommended.

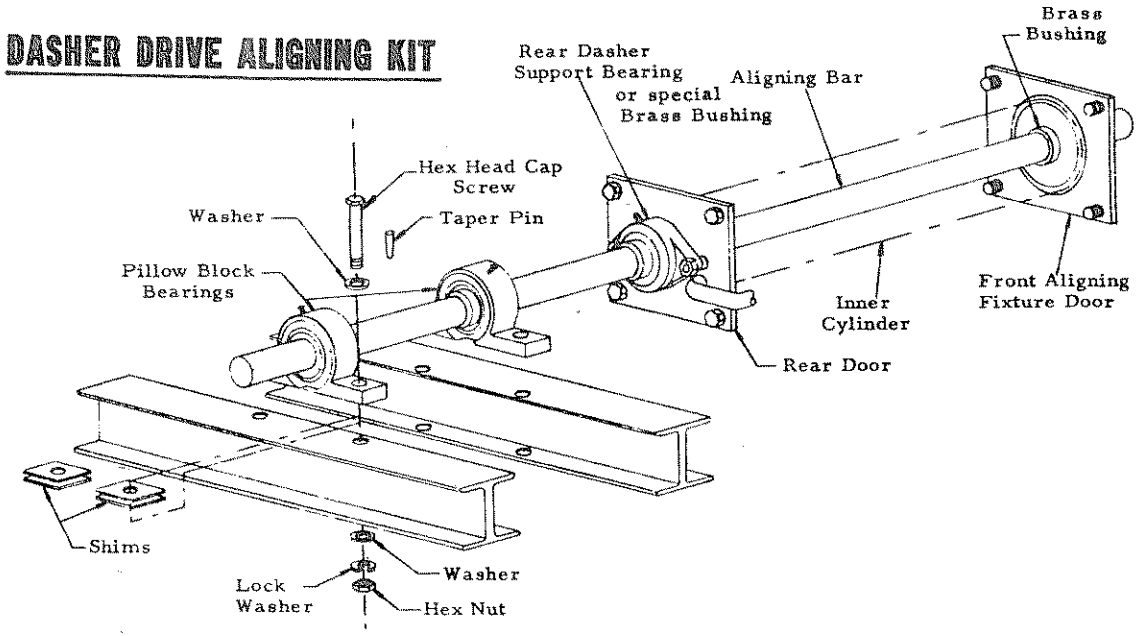
(3) Rinse Blades thoroughly in clear water. Dry.

(4) If necessary, clean daily after a day's run until all colored spots have disappeared (it is important to remove all colored spots).

(5) To prevent further damage to the Blades, a periodic cleaning in this solution is recommended.

(6) CAUTION: Never allow the cleaning solution to come in contact with the nickle Inner Cylinder.

DASHER DRIVE ALIGNING KIT



INSTRUCTIONS AND USE OF THE DASHER DRIVE ALIGNING KIT TO ALIGN PILLOW BLOCK BEARINGS

1. The Kit contains all material necessary to replace all bearings of a three cylinder machine. In many cases some of the parts are not required; therefore, the excess parts along with the aligning tools should be returned to the factory for credit. Charges will be made only for parts and tools not returned.

2. The Aligning Dasher Drive Shaft Kit may be ordered through your CP Representative. Specify the Model and Serial Number of your machine.

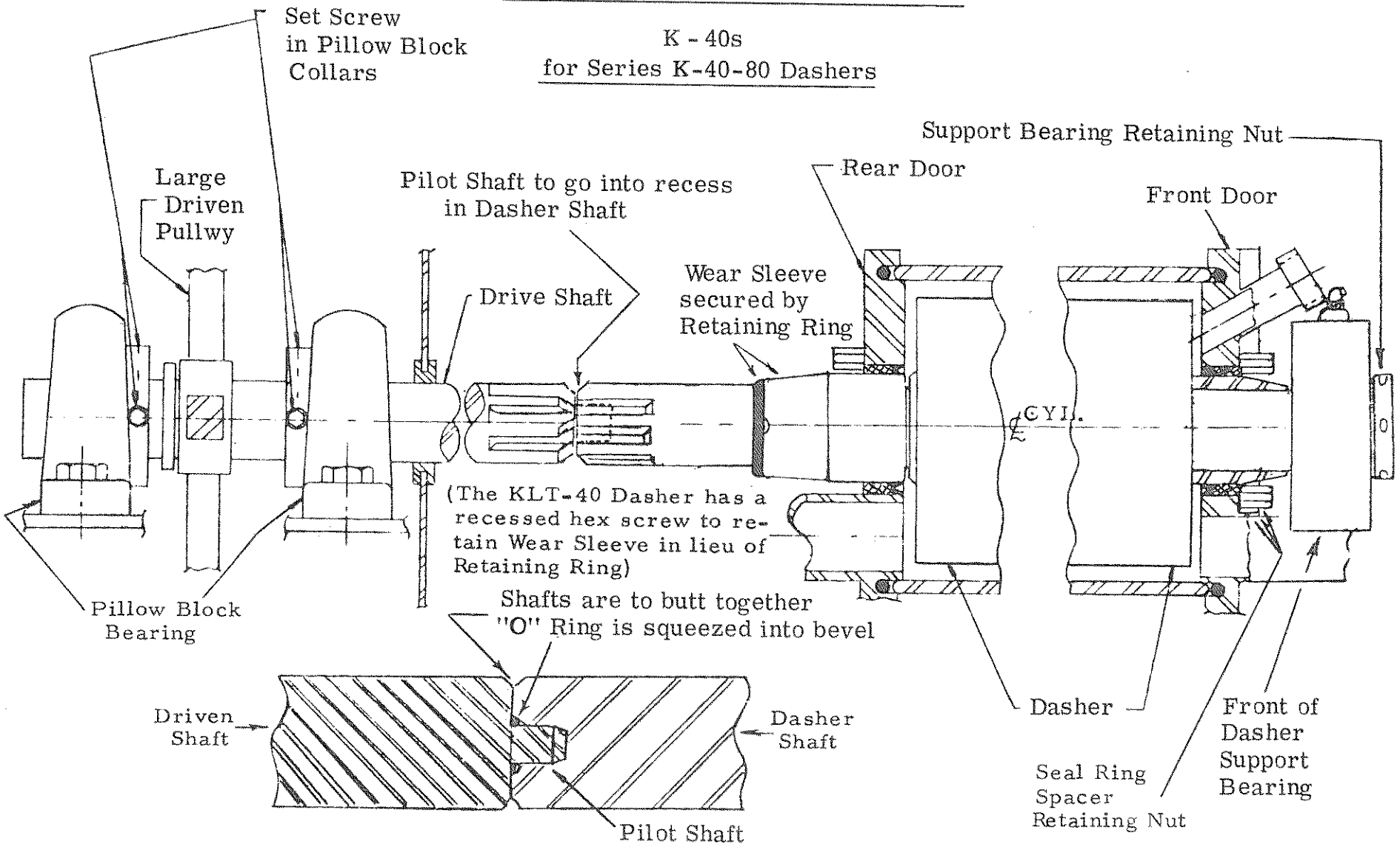
3. CAUTION: Handle the Aligning Bar with care. DO NOT drop, bend, or scratch.

4. To insure the proper efficiency of the "O" Ring Seal in the Rear Door of the Machine, it is necessary to align the Dasher Drive Bearing in relation to the center line of the Inner Cylinder. Whenever a Pillow Block Housing is removed or replaced, it is necessary to check the alignment of these Bearings in the following order:

   a. Remove the Dasher (see Instructions in Manual).
   b. Remove Stainless Steel Panel from back of Machine.
   c. Loosen Motor Pulley tension. Remove V-Belt from Pulley.
   d. Loosen the two Set Screws in the Bearing Collars.
   e. Loosen the Large Driven Pulley and support it. Remove the Drive Shaft from the Pulley and Shaft Pillow Blocks.
   f. Remove tapered Bushing from the Large Driven Pulley Hub so that when the Aligning Bar is inserted, it does not have to support the weight of the Large Driven Pulley.
   g. Remove Pillow Block Bearing Assemblies that need replacing.
   h. Install Aligning Fixture Door to the front of the Inner Cylinder. Insert Brass Bushing into Aligning Fixture Door and insert the proper Bushing in the Rear Door.
   i. Slide the Aligning Bar through the Brass Bushing in the Front Aligning Fixture Door, and to and through the Bearing or Brass Bushing in the Rear Door.
   j. Slide the Aligning Bar up to first Pillow Block mount. Place new Bearing on Frame. If necessary to facilitate perfect alignment, shim with Shim material provided in Kit.
   k. To determine if the Bearing is properly aligned, the Aligning Bar should now slide through the Bearing with no interference. This is to be done only after the Bearing has been tightened down.
   l. Slide Aligning Bar through the Large Driven Pulley Hub and up to the rear-most Pillow Block Bearing mount. Repeat Steps "j" and "k". Now that the Aligning Bar is all the way through, it should rotate freely.
   m. Drill two new 1/4" (6.3 mm) holes on the opposite corners of the Pillow Block from where the original holes were drilled. Use a #5 Taper Reamer and ream these two new holes for the two #5 x 1-1/2 Taper Pins, both of which are furnished in the Kit.
   n. Drive the Taper Pins into position.
   o. Remove Aligning Bar, and Front Aligning Fixture Door.
   p. Re-assemble tapered Bushing back into Large Driven Pulley Hub. Insert Drive Shaft through rear-most Pillow Block, Drive Shaft Hub, and then the front Pillow Block.
   q. Before locking the Set Collar in place on the Drive Shaft, slide the Dasher in place, and, with the Front Door in place and all Nuts tightened on the Door, adjust the Drive Shaft for proper end clearance.
   r. After the Set Collars have been tightened to hold the Drive Shaft in place, the Pulley should be positioned so that the V-Belts run straight. This may be done by laying a Straight Edge along the face of the Motor Pulley and that of the Large Drive Pulley.
   s. After the Pulleys and V-Belt have been secured, the V-Belt tension should be adjusted. The Bearings should be greased before replacing the Rear Housing Cover.
   t. So that the Ball Bearings are being lubricated, check to make sure that the grease is getting to the inner race of the Bearing.

DRIVE SHAFT POSITIONING

K - 40s
for Series K-40-80 Dashers



F. DRIVE SHAFT POSITIONING

1. When V-Belts, Bearings, Dasher, or Driven Shaft Pillow Blocks are changed or replaced, the Dasher Driven Shaft must be re-checked for its correct position in relation to the Dasher Shaft.
2. To position the Driven Shaft:
   a. Refer to the Diagram on Page V-14.
   b. If it had not been done, loosen the Set Screws in the Pillow Block Collars and pull the Driven Shaft back far enough to expose the Pilot Shaft on the Dasher Snaft.
   c. Remove the small "O" Ring that had been retained over the Pilot Shaft.
   d. Insert the Dasher into the Inner Cylinder, and see that its Splined Shaft is inserted into the internally splined Driven Shaft. So that the splines mesh, it may require a slight turning adjustment of either the Driven Shaft or the Dasher.
   e. Assemble the Front Door, along with the Tapered Timken Support Bearing, over the Front Dasher Shaft.
   f. Assemble the Support Bearing Retaining Nut and tighten this Nut.
   g. Lightly tap the Driven Shaft forward so that it is assured that the two surfaces illustrated in the cross section diagram fit snug or butt together.
   h. Tighten the Hex Set Screws in the Pillow Block Collars.
   i. Remove the Front Door with the Front Support Bearing assembled and bring the Dasher forward and far enough to expose the Pilot Shaft, which is on the Splined Dasher Shaft at the rear of the machine.
   j. Re-assemble the "O" Ring over this Pilot Shaft. If this "O" Ring is worn or deteriorated, replace it with a new "O" Ring.
   k. Re-assemble the Dasher and Front Door back into the machine. This Adjustment procedure will assure the proper loading of the Front Tapered Support Bearing.

G. DRIVEN SHAFT PILLOW BLOCK BEARINGS

1. To maintain alignment, the Bolts securing the Pillow Blocks must be tight at all times. They should be checked monthly.
2. The Hex Set Screws in the Pillow Block Collars must be tight against the Driven Shaft at all times. These Set Screws should be checked monthly for tightness.

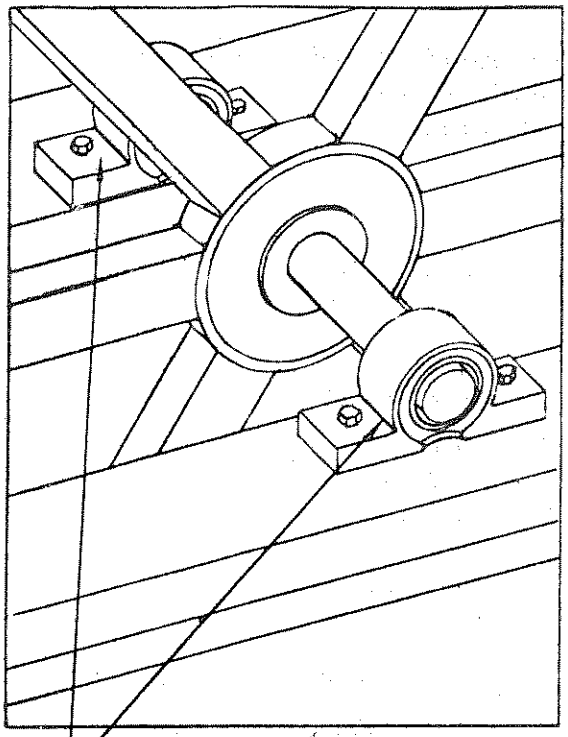


Fig. 16a

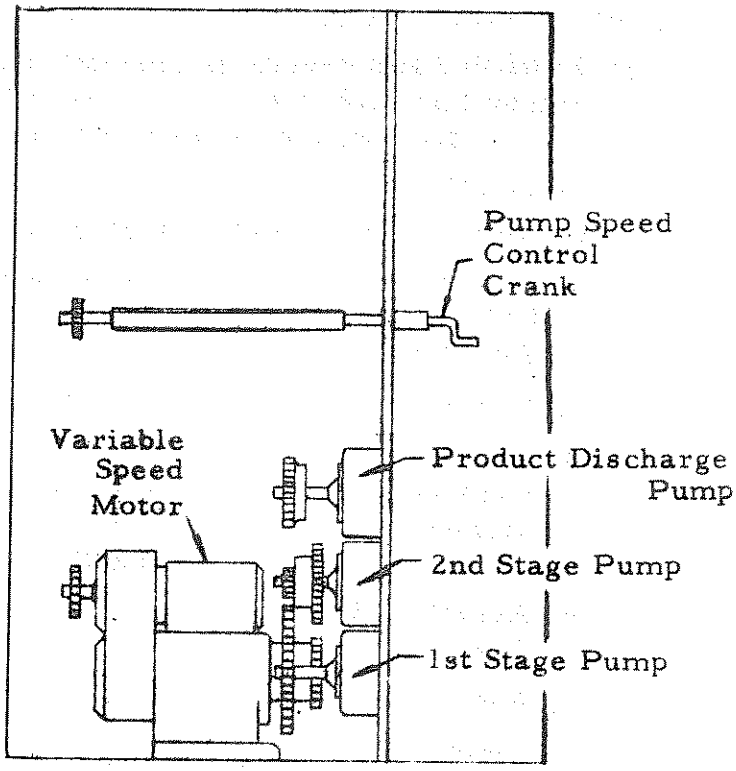


Fig. 16b

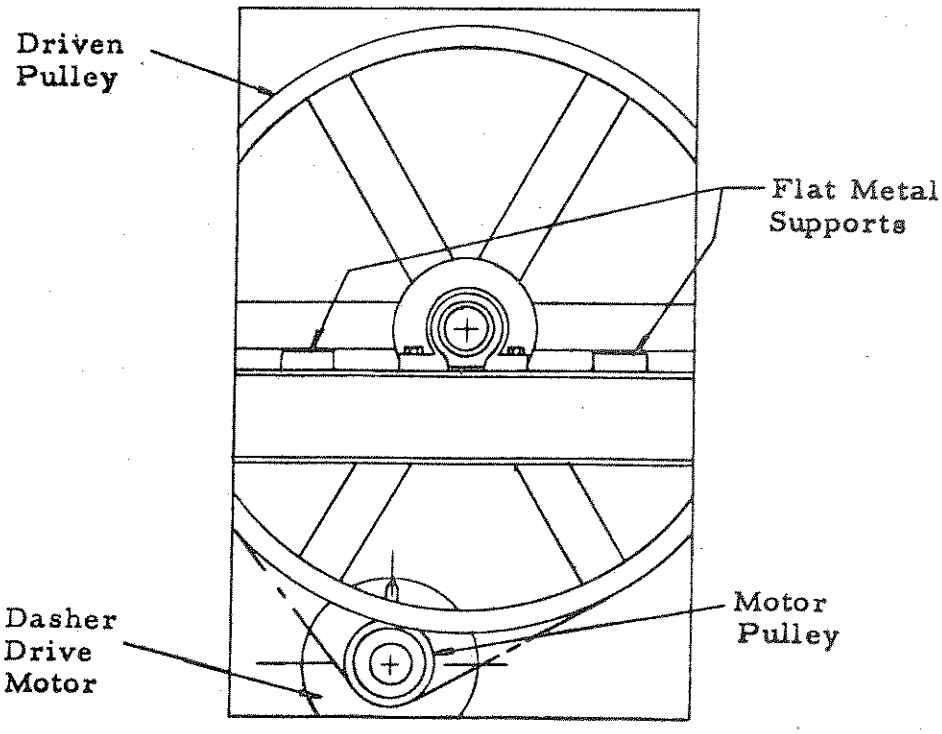


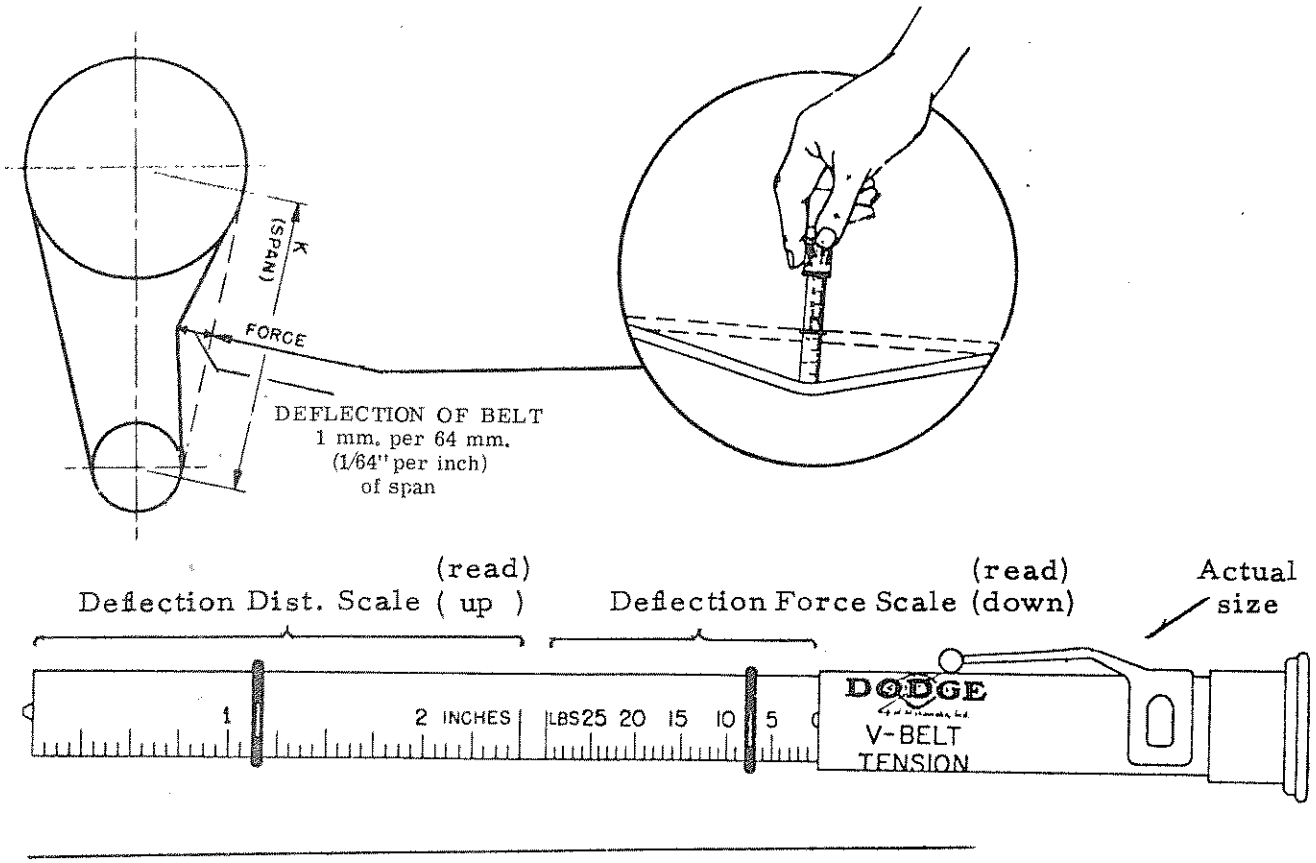
Fig. 16c

H. REPLACING THE DRIVE V-BELTS

1. Remove the Dasher from the Inner Cylinder.
2. Loosen the V-Belts by turning the Motor Base Adjusting Nuts located underneath the Drive Motor. Then remove the Belts from Motor Pulley.
3. Loosen the two Set Screws in the Pillow Block Collars (the Pillow Blocks to the front and to the rear of the Large Pulley), and slide the Shaft and Pulley towards the front of the Machine.
4. Replace the worn Belts with a COMPLETE set of new matched Belts.
5. Slide the Pulley Shaft back into the Pillow Block Bearing. This may be easily done by placing two pieces of wood or metal (these will also act as levers) through the Pulley as illustrated in Fig. 16c. on Page V-16. Pull back on the Pulley while moving one of the levers up and down.
6. Replace the Dasher in the Inner Cylinder. Tighten the Front Cylinder Door. Position the Drive Shaft by following the instructions on Page V-15 and the Diagram on Page V-14. Position the Drive Shaft and the Dasher Shaft for the correct clearance.

I. CARE OF DRIVE BELTS

1. A new type V-Belt is used in this Machine. The Machine, therefore, requires fewer Belts with higher horsepower ratings and greater operating tension per Belt.
   a. When static tension is applied to the drive, the individual tension on the new V-Belts will feel greater than that of the conventional V-Belts.
   b. All V-Belt Drives require an initial "run-in" period during which the initial stretch is removed from the Belts, and the proper seating of the Belts in the Pulley Grooves takes place.
2. To compensate for this loss in tension, the Drive is installed with greater tension than is normally required with regular V-Belts. To keep these V-Belts properly tensioned during the "Run-in" period, use the following directions:
   a. To tension Belts for the "Run in" period, use the V-Belts Tension Tester (shipped as an "Extra Part with the Machine". Refer to Page V-18).
      (1) Measure the span distance and divide this span length by 64. This will give the correct belt deflection for a Belt of this span.
      (2) Set the "O" Ring at the base of the Tester to this deflection distance.
      (3) With the "distance end" of the Tester, hold it perpendicular to and at the center of the span, apply a force sufficient to deflect the Belt until the pre-et or distance scale "O" Ring is flush with the top of the adjacent Belt. Or, as an alternative, use a straight edge across the Drive Pulley and the Driven Pulley.
      (4) By deflecting the Tester, the top of the Tester will depress the upper "O" Ring to a given "lb." reading (read the lb. reading at the upper portion of the "O" Ring).
   b. The reading or downward pressure on the Tester for a NEW set of Belts should be 3.6 kg. (8 lbs. on the Tester). This means that the Belt was deflected 12 mm. (1/2 inch on the Tester) from its original span.
   c. After operating the Motor for 24 to 48 hours, it should only require 1.8 to 2.8 kg. (4 to 6 lbs. on the Tester) of downward pressure to deflect these Belts to the required 12 mm. (1/2 inch on the Tester). Therefore, adjustment of the Drive Motor Base to tension these Belts properly during this period is necessary.



J. CARE OF PUMP DRIVE CHAIN

1. Tensioning Drive Chain

   a. Chain should never run tight against the Driving Teeth on the Sprocket

   b. The Chain should run with a small amount of slack.

   c. New Chains while "running in" will elongate slightly. Therefore, the Chain should be checked for proper tension, especially when the Chain is new.

   d. Should the Chain have too much slack or little or no slack, reset the Chain Tightener by unscrewing the Bolt holding the Tightener onto its Base and shifting the Tightener to properly adjust the Chain. Always make sure that at least three teeth of the Tightener Sprocket engage the Chain.

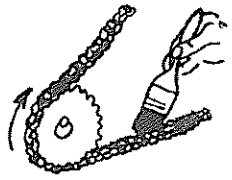
2. Lubrication of the Pump Drive Chain

   a. To maintain long life and satisfactory service, proper lubrication is important. During operation an oscillating motion takes place between the Bushings and Rollers of the Chain. There must be a lubricating film between these hardened, precision-ground chain parts. Also, the lubrication will prevent rust.

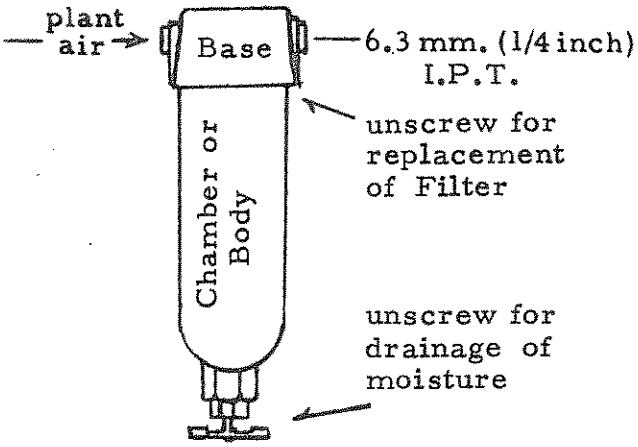
   b. It is best to apply a good grade S.A.E. No. 40 Oil with a brush to the underside of the Chain.

   c. Regulate the amount of oil so that it is not thrown off the Chain when the Motor is running.

   d. The frequency of lubrication is governed by local conditions, but twice a week is sufficient for continuous operation.

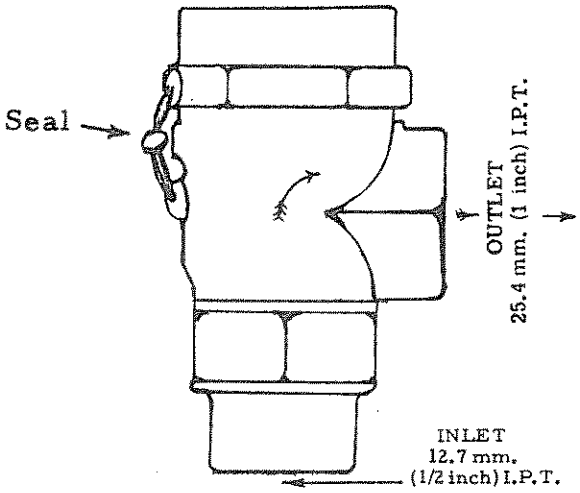


K. AIR LINE CONDENSATE TRAP (located at rear of machine)



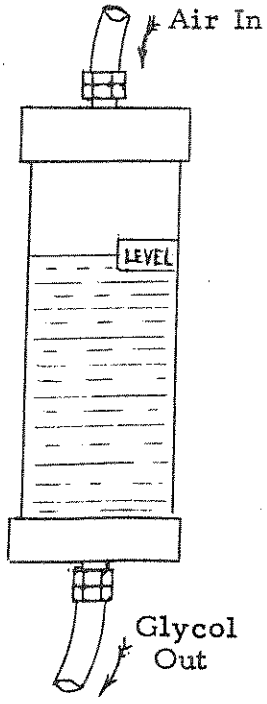
1. At regular intervals open the Drain Petcock at the bottom of the Condensate Trap to drain the moisture that may have collected. This will prevent moisture from collecting in the Air Lines.
2. The Mositure Collecting Chamber may may be removed for periodic inspection by unscrewing the body of the unit from its Base (top). The Filter, which is on the inside, may have to be cleaned of dirt or replaced.

L. SAFETY RELIEF VALVE



1. Machines employing Ammonia as a refrigerant have a Safety Relief Valve that relieves at 10.6 kg/cm^2 (150 lbs. per sq. inch). Machines that employ R-12, R-22, or R-502 as a refrigerant have a Safety Relief Valve that relieves at 17.6 kg/cm^2 (250 lbs. per sq. inch).
2. These Safety Relief Valves are pre-set to the correct relieving pressure at the factory. As a safety measure and to avoid tampering, these Valves are sealed. No maintenance or adjustment should be necessary. If for some reason, the Valve is found defective, it should be replaced.

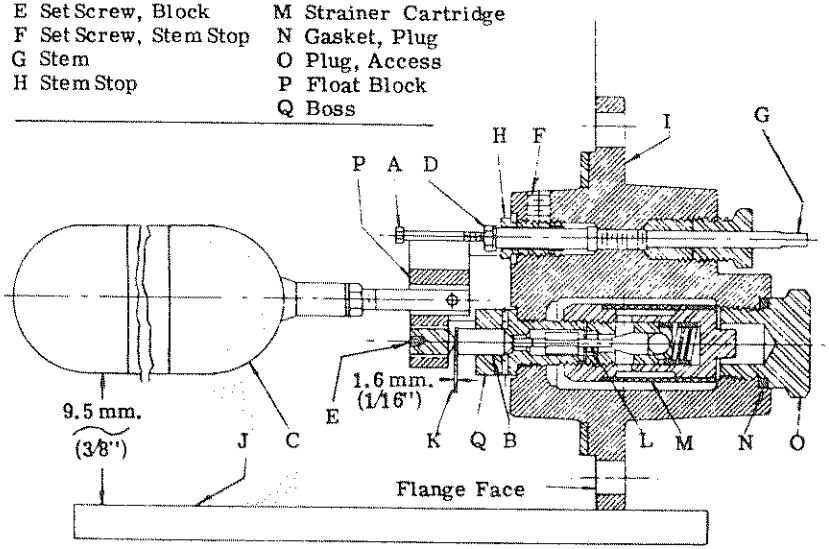
L-2. GLYCOL POT (Tank - Air, Glycol Cylinder)



1. The Glycol Pot (Air-Glycol Cylinder) is used, thru the employment of glycol pressure, to open the the Instant Refrigeration Valve. This principle is employed to prevent condensate build-up in this Valve, and could result in a frozen valve were it not for the glycol.
2. When the refrigeration is off the level of the glycol shall be at the "LEVEL" mark or about 2/3 full. The machine is shipped with the Pot or Cylinder at the proper level.
3. Should this Pot or Cylinder become low, use a solution of one half Ethylene Glycol (or U.S.P. Glycerine) and one half water (preferably distilled).

M. PHILLIPS LIQUID REFRIGERANT FLOAT VALVE

A Adjusting Piece
B Cam Needle
C Float Ball
D Lock Nut, Adj.
E Set Screw, Block
F Set Screw, Stem Stop
G Stem
H Stem Stop
I Valve Body
J Horizontal Bar
K Spacer
L Pusher
M Strainer Cartridge
N Gasket, Plug
O Plug, Access
P Float Block
Q Boss



1. Refer to the Diagram.
2. This entire Valve Assembly is located in the Accumulator and requires periodic adjustment and maintenance.
3. Refrigerant Float Valve Strainer Maintenance
   a. This second Refrigerant Strainer Cartridge (the first Strainer Cartridge is located in the Liquid Refrigerant Line to the Machine) is located within the Float Valve Body.
   b. Excessive leakage through the Float Valve indicates that the Strainer Cartridge is probably wire drawn and therefore must be, in most cases, replaced with a new Cartridge. The replacement must be done as follows:
      (1) Shut the Hand Shut-off Valve on the Liquid Refrigerant Line (see Diagram on Page II-9).
      (2) Allow the Compressor to run until the Scale Trap (in the Liquid Refrigerant Line Strainer) and the Liquid Lines are empty.
      (3) Turn the Stem (G) down clockwise until firm or snug. Do NOT use a heavy wrench. This Stem, when turned clockwise, bears down against the Float Block (P) and forces the Cam Needle (B) to close the back seat in the Boss (Q). The Strainer Cartridge Chamber is thus isolated.
      (4) Cautiously unscrew Access Plug (O) and vent.
      (5) With a 9.5 mm. (3/8 inch) Square Socket Wrench remove the Strainer Cartridge. Carefully inspect unit for dirt or wear; replace if necessary.
      (6) Using a Long Nose Pliers, remove the Pusher (L), which is located just in front of the Cartridge. If this assembly shows signs of wear on its corners or its pin, replace it also.
      (7) To re-assemble, insert Pusher; then screw in Strainer Cartridge firmly but with not too much pressure. Screw in the Access Plug (O) along with its Gasket (N).
      (8) Back off the Stem (G), turning it full counter-clockwise. The Valve is now ready for operation.
4. If the Float Valve requires maintenance other than the inspection or replacemnt of the Strainer Cartridge or Pusher, full pump down of the Machine is required. See Page V-25 for pumping the Machine down.
   a. Place Valve in position of diagram above with the Stem (G) fully out (counter-clockwise).
   b. Set bottom of Float (C) 9.5 mm. (3/8 inch) higher than low point of casting. This adjustment is made with Adjusting Piece (A) and then locked with Adjusting Lock Nut (D).
   c. Adjust Set Screw (E) by turning clockwise so that the Cam Needle (B) moves 2 mm. (5/64 inch) towards its closed position.
   d. Turn the Stem (G) clockwise until Cam Needle (B) is just seated. Then give the Stem (G) another 1/2 turn. Turn Stem Stop (H) in against shoulder on Stem (G) and lock Stem Stop (H) in place with Set Screw (F).
   e. Back Stem (G) fully counter-clockwise.
   f. Re-assemble Valve back into Machine. Check for refrigerant leaks before replacing Stainless Steel Cover.

N. LIQUID REFRIGERANT LINE STRAINER and FLOAT VALVE STRAINER

1. Refer to Figures 22a and 22b.
2. Machines employing halocarbon refrigerants usually do not have a Strainer in the Liquid Refrigerant Line, but only a Strainer in the Phillips Float Valve (refer to Page V-21).
3. The refrigerant must be pumped down before removing the Liquid Line Strainer. For this operation, refer to Paragraph F. in Section IV. For removal of the Strainer Cartridge in the Phillips Liquid Float Valve, refer to Paragraph M., 3b. in Section V on Page V-21. To prevent accidental escaping of dangerous refrigeration gas, caution and directions must be followed explicitly.
4. The Fine Mesh Screen in the Liquid Line Strainer, which is at the rear of the Machine, should be removed and cleaned at regular intervals to prevent obstructions in the refrigerant that passes through the Machine.
5. Also, the Strainer Cartridge in the Phillips Liquid Refrigerant Float Valve must be inspected, replaced, or cleaned periodically. Refer to Paragraph M on Page V-21.
6. Both Screens should be cleaned after the first few days of operation of a newly installed Machine. Also, the Screens should be cleaned shortly after a shut-down for repairs.

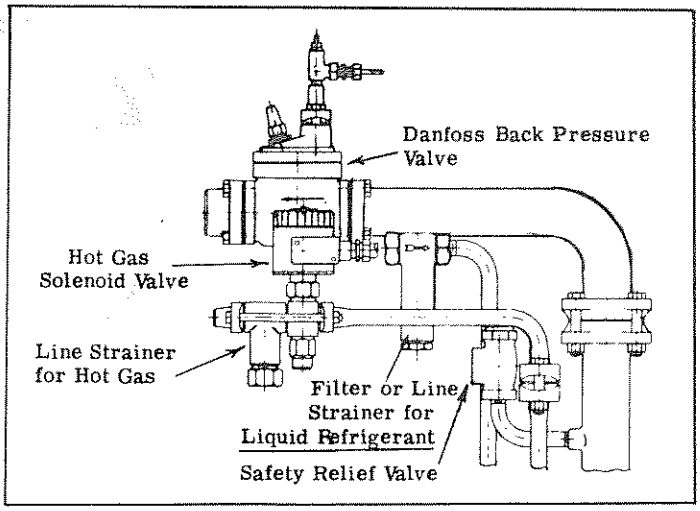


Fig. 22a

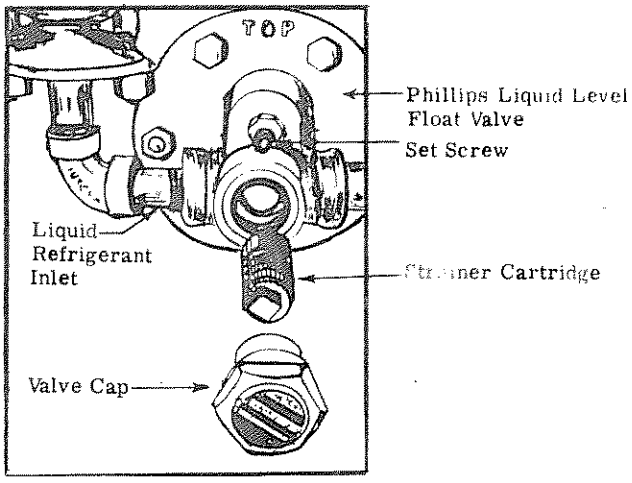


Fig. 22b

O. REFRIGERATION PILOT CONTROL REGULATOR

1. Periodically, and more particularly, after a Machine is newly installed or recently has had major maintenance, the Refrigeration Pilot Regulator should be dis-assembled and cleaned. Dirt or possible flakes of metal on the face of the Pilot Seat will cause dimples or scoring on the Metal Diaphragm. This results in a false or erratic control pressure to the Back Pressure Regulator. Not only will the Metal Diaphragm in Pilot Regulator be damaged, but the Machine's refrigeration will have a tendency to operate wide open.

2. Refer to the Diagrams 23a and 23b. The Pilot Control Regulator may be isolated and removed from the Machine without shutting down the Machine or evacuating the liquid refrigerant.
   a. Close the small Angle Valve which is mounted on the front of the Accumulator (refer to Figure 23b.).
   b. Close the small Angle Valve on the top of the Back Pressure Regulator (refer to Figure 23a.).
   c. Disconnect the Pilot Line leading into and out of Pilot Control Regulator.

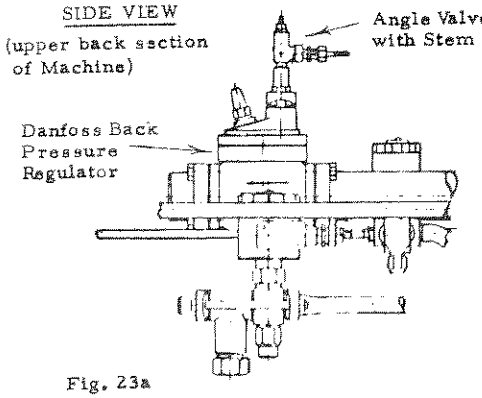


Fig. 23a

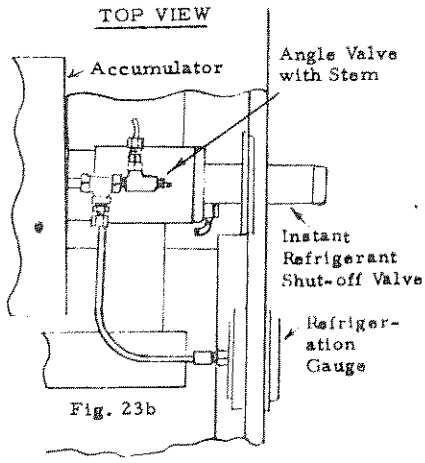


Fig. 23b

3. Dis-assembly of Regulator for inspection, cleaning, and maintenance.
   a. Refer to the Diagrams on Pages I-11 and IV-2 as well as the Diagram on Page V-24.
   b. Turn the Adjusting Handle (A) fully counter-clockwise (all the way out).
   c. Unscrew the Handle Set Screw (B) and remove Handle (A).
   d. Unscrew the large Hex Retaining Nut (C) that retains the Regulator to the Front Panel of the Machine. Remove the Regulator from the back of the Front Panel.
   e. Remove the four Bonnet Cap Screws (D) and dis-assemble the Bonnet (E) from the Body (F).
   f. Remove the Diaphragm (G). Inspect both the Diaphragm (G) and the Pilot Seat (H) for metal flecks and dirt. Clean both the Diaphragm (G) and the Pilot Seat (H).

g. If the Diaphragm (G) is dimpled or scored, it must be replaced. Also the Bonnet "O" Ring (I) and the Diaphragm Gasket (J) along with the Packing Ring (K), the Stuffing Box Nut (L), and Washer (M) should be inspected for wear and deterioration. These parts may be purchased as a kit for rebuilding this Regulator. Refer to the parts manual for this kit.

h. When re-assembling this Regulator make sure that the Adjusting Screw Plate (N), Spring (O), Lower Spring Plate (P), and Diaphragm Follower (Q) are in the correct position.

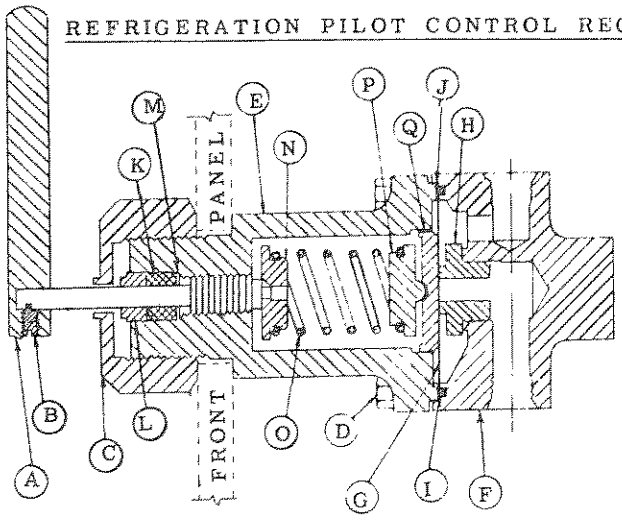


Fig. 24a

P. LIQUID DOWN LEG IMMERSION OR SUMP HEATER CARTRIDGE

1. The Immersion or Sump Heater Cartridge, wired live at all times, is located below the Inner Cylinder and may need replacing in time (see the Diagram below).

   IMPORTANT: If the Cartridge does burn out, a warning lamp will glow. This Lamp is between the Motor Load Indicator and Air Gauge in the Control Panel. Refer to the Wiring Diagram and the Diagram on Page IV-1.

2. To replace the Cartridge:

   a. Shut off the main power source at the customer-installed magnetic disconnect.

   b. Unscrew the Hex Head Plug; remove old Cartridge and replace with a new one. Refer to Figure 24b below.

   c. The Cartridge may be replace without emptying the Accumulator.

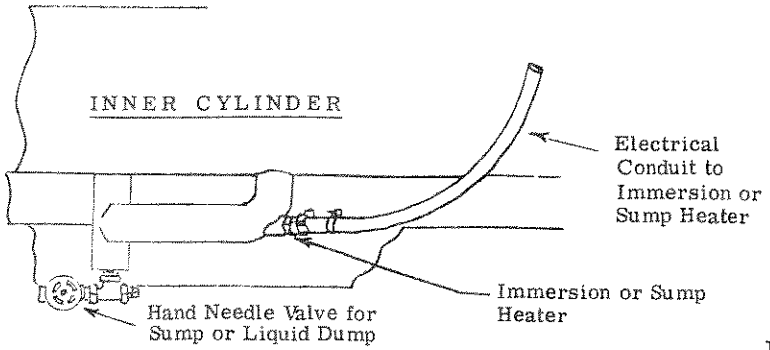
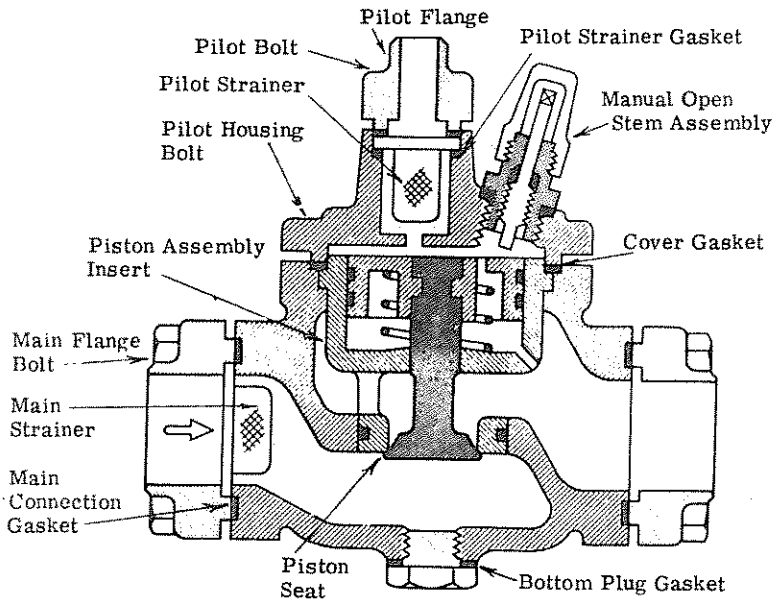


Fig. 24b

Q. DANFOSS BACK PRESSURE VALVE OR REGULATOR

1. Refer to the Diagram below.
2. Should this Valve fail to operate — that is, should the Valve cease to open and the refrigeration commence — the Valve may be opened manually by removing the Cover to the Manual Open Stem Assembly and turning the Stem clockwise.
3. Should the Valve operate open all the time — that is, should the refrigeration be on continually without response to a shut-down by the Refrigeration Pilot Control Valve -- it means that the Piston Assembly Insert is stuck open. This condition may be caused by a fleck of metal or dirt lodged in the Piston Seat or possibly poor assembly or re-assembly of this Valve.
4. If this Valve or Regulator is dis-assembled for any reason — either to check for dirt in the Piston Seat or to do major maintenance (overhaul) on the Valve — EXTREME caution must be made to tighten the Pilot Housing Bolts alternately and evenly. If this procedure is not followed, the Cover Gasket may bind on the Piston Assembly Insert preventing the Piston to open.
5. If dis-assembled, inspect both the Pilot Strainer and the Main Strainer for deterioration and dirt.
6. Kits are readily available from the factory to overhaul or rebuild this Valve. New gaskets plus both the Pilot Strainer and Main Strainer are included in the Kit.



R. SHUT-DOWN OF MACHINE IN PREPARATION FOR MAJOR MAINTENANCE

1. All Refrigeration Compressors require oil for lubrication. Small amounts of this oil will be carried over into the refrigerant and collect on the outer wall of the Inner Cylinder, thus decreasing the freezing or chilling capacity of the Inner Cylinder.
2. It is periodically necessary, therefore, to remove the hardened oil and scale from the outer walls of the Inner Cylinder. Follow the directions in Section S., Page V-26, for the removal and cleaning of the Inner Cylinder. Before removing the Inner Cylinder from the Machine, all liquid refrigerant must be evacuated from the Machine.
   a. Follow directions for "Stopping Machine at End of Run" on Page IV-10, Paragraphs a. thru g. for K-110s; Page IV-10, Paragraphs 1.thru 8. for the K-60s; and a. thru i. for the K-18s and 40s. In addition to these instructions, close the Hand Shut-off Valve for the Suction Line (the Handle to this Valve should be removed until it is to be once again opened up).

All Machine

b. Open the Oil Drain and Liquid Dump Valve and allow this Valve to remain open for at least overnight for complete drainage of liquid refrigerant any remaining oil. If the Machine operates on refrigerant other than ammonia, this Valve will act only as a Liquid Refrigerant Dump Valve, the oil in this case having been bled off the surface of the refrigerant in the upper par of the Accumulator or Refrigerant Jacket.

c. The K-60s, K-40s, and K-18s have Immersion Heater Elements. To prevent this Element from burning out, the main power to the Machine should be shut-off. This is especially true if the lower section of the Refrigerant Jacket contains no liquid and the Machine is down for a long period of time.

S. INNER CYLINDER

1. Excessive contamination on the outer wall of the Inner Cylinder will cause chilling or freezing efficiency of the Cylinder.

2. If the Inner Cylinder becomes contaminated too rapidly, the Refrigerant Compressor may be worn, cracked, or it may have cracked Piston Rings.

3. Under normal conditions the Inner Cylinder should be removed annually for cleaning by the following procedure:

   a. Refer to Section R., "Shut-down of Machine in Preparation for Major Maintenance" to empty the liquid refrigerant from the Machine.

   b. The Suction Line Hand Shut-off Valve must be closed. The Handle of this Valve should have been removed for reasons of safety.

   c. Close the Liquid Refrigerant Line Hand Shut-off Valve and the Hot Gas Line Hand Shut-off Valve. Check once again to see that the Suction Line Hand Shut-off Valve is closed.

   d. Remove the Dasher. Remove the Front and Rear Cylinder Doors.

   e. Remove the Front and Rear Spacer Ring Covers by unscrewing the four Cylinder Door Studs (refer to the Diagram, Fig. 26a below).

      (1) While removing the Studs, check the Shims between the Spacer Ring Cover and the Stud Shoulder; tape any Shims on the Studs to keep the Shims in place.

      (2) Place a number on each Door Stud and a corresponding number near the hole through which the Stud protruded.

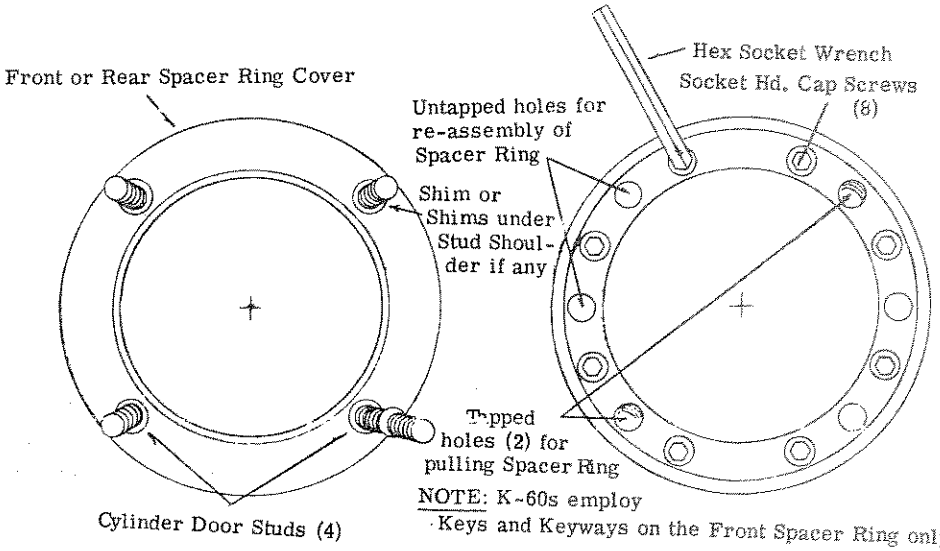


Fig. 26a

NOTE: K-60s employ Keys and Keyways on the Front Spacer Ring only.

Fig. 26b

f. Remove the Inner Cylinder's REAR Spacer Ring first.

(1) Refer to the Diagram, Fig. 27a below.
(2) Remove the Socket Head Cap Screws from the Ring, using a 3/8 inch (9.6 mm.) Hex Socket Wrench.
(3) For replacing the Spacer Ring back in its exact position, make corresponding marks on both the Spacer Ring and on the Machine.
(4) Insert two 1/2 - 13 x 4 inch fully threaded Hex Headed Screws into the tapped Spacer Ring Pulling Holes.
(5) Withdraw the Spacer Ring by turning these Screws evenly and alternately.

g. Remove the Inner Cylinder's FRONT Spacer Ring.

(1) Use exactly the same procedure that you did when removing the Cylinder Rear Spacer Ring referring to the Diagram, Fig. 27a.
(2) On the K-60 Machines only, remove the four Cylinder Locking Key Clamps from the Spacer Ring (refer to the Diagram, Fig. 28a). Remove the Ring from the Cylinder using a wooden or hard rubber mallet.
(3) Or, if desired, on the K-60 Machines, the Spacer Ring may be removed with the keys in place while removing the Inner Cylinder.

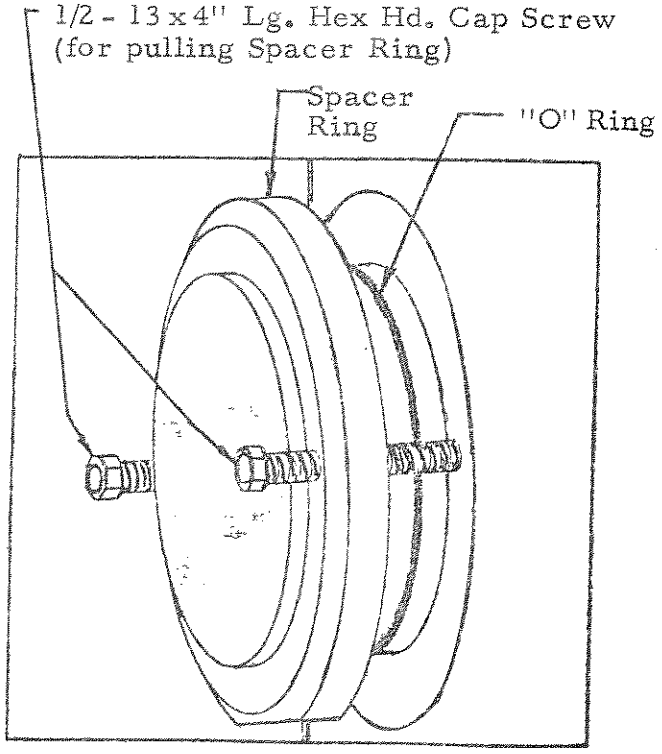


Fig. 27a

4. Cleaning the Inner Cylinder

   a. Cleaning the Inner Cylinder Outer Wall

      (1) Remove the Inner Cylinder from the Machine.
      (2) Clean the Outer Wall of the Inner Cylinder with a compressor oil solvent.
      (3) If oil is caked and hard, use solvent and coarse steel wool; scrub vigorously.
      (4) Wipe the solvent and pieces of steel wool from the surfaces.

   b. Clean accumulated compressor oil from inside the Refrigerant Jacket by wiping with a lint-free cloth.

   c. Clean all caulking and grease from the Front and Rear Cover Rings, Spacer Rings, and from the front of the Machine.

   d. Remove all old "O" Rings and discard.

5. Replacing Cylinder back into the Machine.

   a. To avoid nicking and scratching of the Inner Cylinder, tape the rear end of the Cylinder.

   b. Place the Inner Cylinder back into the Refrigerant Jacket. Position the Cylinder properly so that the protruding ends of the Cylinder are equidistant from the Accumulator Flanges (this should be approximately 33 mm. (1-5/16 inches) protrusion at either end (refer to the Diagram, Fig. 31a).

For K-60 Machines only - Keys and Keyways securing Front Spacer Ring to Inner Cylinder

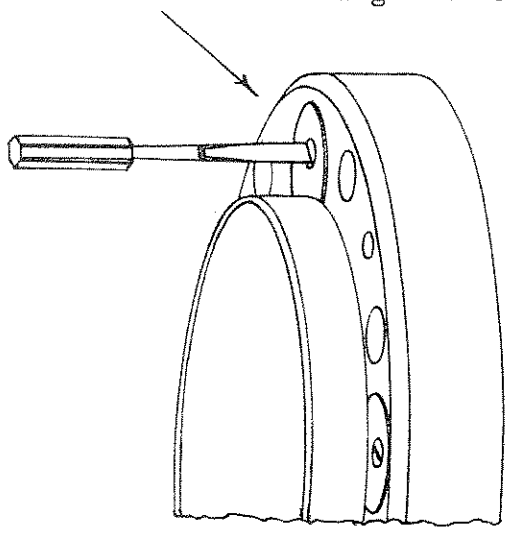


Fig. 28a

6. Replacing the Front Spacing Ring

a. If, in the case of the K-60 Series, the Front Spacer Ring (with its Keys in place) was removed along with the Inner Cylinder, these instructions do not apply.

b. Place a Wood Brace (refer to Fig. 30a) across the rear end of the Inner Cylinder; secure with two 1/2-13 x 4 inch Hex Head Cap Screws. These Screws may be screwed into any pair of tapped holes in the Refrigerant Jacket Flange.

c. Remove tape from the front of the Cylinder and clean with solvent any residue left by the tape.

d. Apply a coating of sanitary lubricant around the front end of the Cylinder; also around the "O" Ring Grooves in the Front Spacer Ring.

e. Slide a NEW "O" Ring Seal over the end of the Cylinder. Install two NEW "O" Ring Seals in the Spacer Ring.

f. Placing Spacer Ring over the Inner Cylinder Front

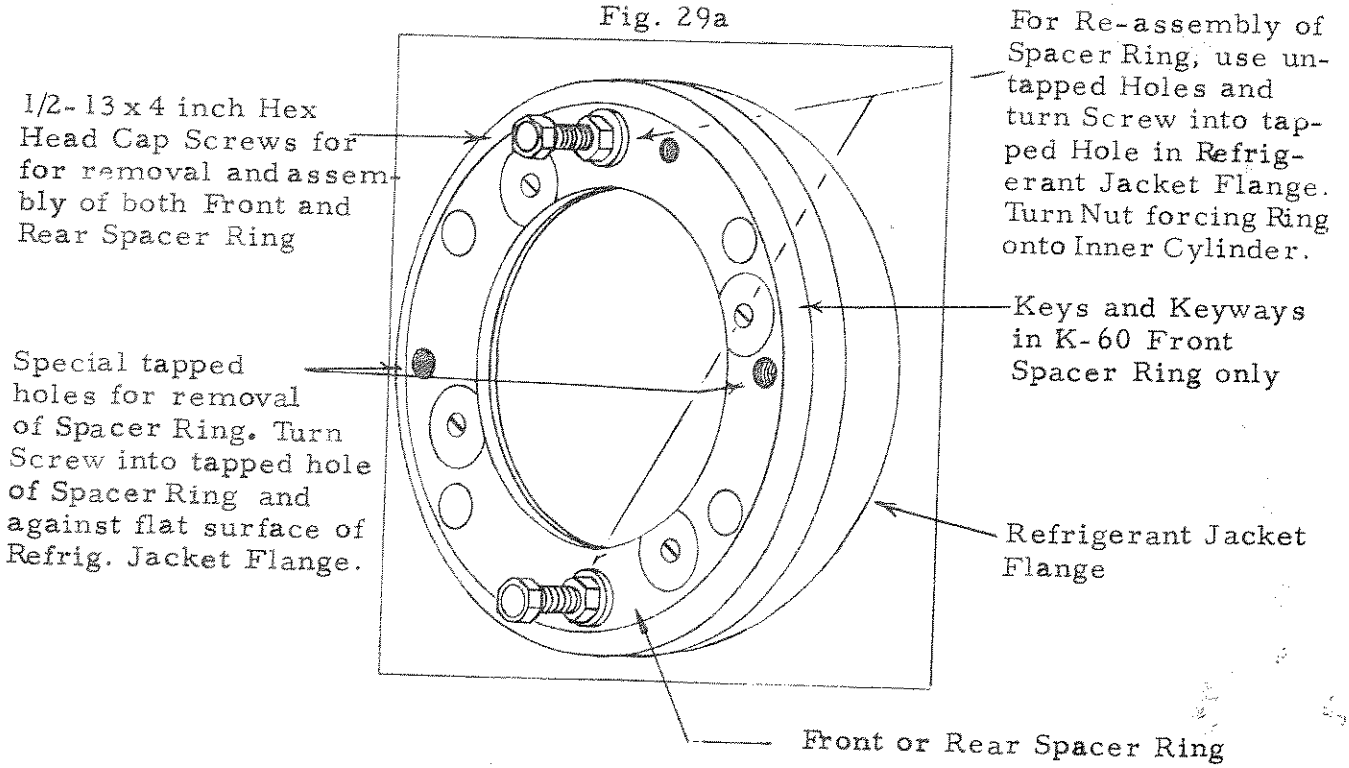
(1) To four 1/2-13x4 inch Screws screw a 1/2 inch Nut to each Screw, screwing these Nuts all the way to the head of the Screw. Over each Nut place a Washer.

(2) Place these Screws through the four Untapped Door Stud Holes in the Spacer Ring and screw them securely into the tapped Door Stud Holes in the Refrigerant Jacket Flange (refer to the Diagram, Fig. 26b).

(3) Using a Wrench, turn the Nuts alternately and evenly down onto the Spacer Ring, bringing the Spacer Ring evenly over the Inner Cylinder Outer Wall and up to the Refrigerant Jacket Flange.

(4) In the case of the K-60 Inner Cylinder, and if the Keys and the Spacer Ring were removed, the Keyways and Key Seats must be aligned. If they are not aligned, remove the Wood Brace at the rear of the Inner Cylinder, and, using gloves, grip the taped end of the Cylinder and turn to achieve proper alignment. When the Keys are properly secured in the Slots in the outer Cylinder Walls and assembled into the Keyways, and the Spacer Ring assembled onto the Accumulator Flange, no further adjustments are necessary.

Fig. 29a



g. Now that the Spacer Ring is in place against the Refrigerant Jacket Flange, remove the four Screws.

h. Fasten the Spacer Ring to the Refrigerant Jacket Flange with the eight Socket Head Cap Screws (refer to the Diagram, Fig. 26b), turning these Screws alternately and evenly. Do not tighten these screws.

i. Re-check the protrusion on both ends of the Inner Cylinder (refer to the Diagram, Fig. 31a). Then tighten the eight Socket Head Cap Screws.

j. Apply a ring of waterproof caulking around the Cylinder at the point where the Cylinder comes in contact with the Spacer Ring (refer to Fig. 31b).

k. On the K-10 Series Machines only, replace the Front Panel and secure the four Front Door Studs (refer to the Diagram, Fig. 26a), employing, of course, the same Shims that were originally on each of these Studs. Also, on the K-10 re-assemble the Front Panel just enough so that the Machine might be tested for refrigerant leaks.

   On all other K Series Machines replace the Front Spacer Ring Cover and secure with the four Cylinder Door Studs (refer to the Diagram, Fig. 26a) employing, of course, the same Shims that were originally on each of these Studs.

l. Using the Cylinder Stud Shim Gauge (extra part shipped with the Machine) as shown in Fig. 31b, check for the correct spacing between the face of any one of the Stud Shoulders and the end of the Inner Cylinder (.005 inch (.127 mm) clearance is acceptable at Point "A" and "B").

   NOTE: On the K-60s because of the locking Keys no adjustment can be made.

   (1) If the Cylinder does not protrude far enough to the front, the slight adjustment required may be made by tightening the two Hex Nuts on the Screws that had been placed through the wood brace at the rear of the Inner Cylinder. Adjust the spacing of the Inner Cylinder so that the Stud Shim Gauge is brought in line with the face on one of the Stud Shoulders (refer to the Diagram, Fig. 31b).

   (2) If the Cylinder protrudes too far to the front, remove the two Door Studs that are diagonally spaced from one another (refer to the Diagram, Fig. 31a). Across the front of the Inner Cylinder place the Wood Brace and its Screws and Nuts that were used on the rear of the Inner Cylinder. Turn these Screws into the Stud Holes and bring the Brace up to the Inner Cylinder. Turning the Nuts on evenly and alternately will force the Inner Cylinder backwards. Using the Cylinder Stud Shim Gauge, adjust the spacing of the Cylinder so that the Gauge is brought up to the face on the Stud Shoulder (refer to Diagram, Fig. 31b).

REAR SPACER RING with WOOD BRACE

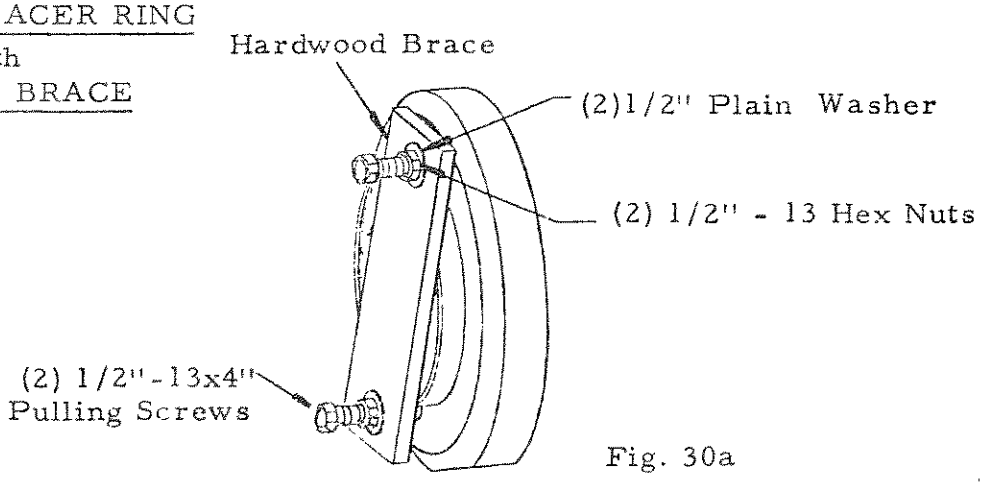


Fig. 30a

PLACEMENT OF SPACER RING AND DOOR ONTO REFRIGERANT JACKET

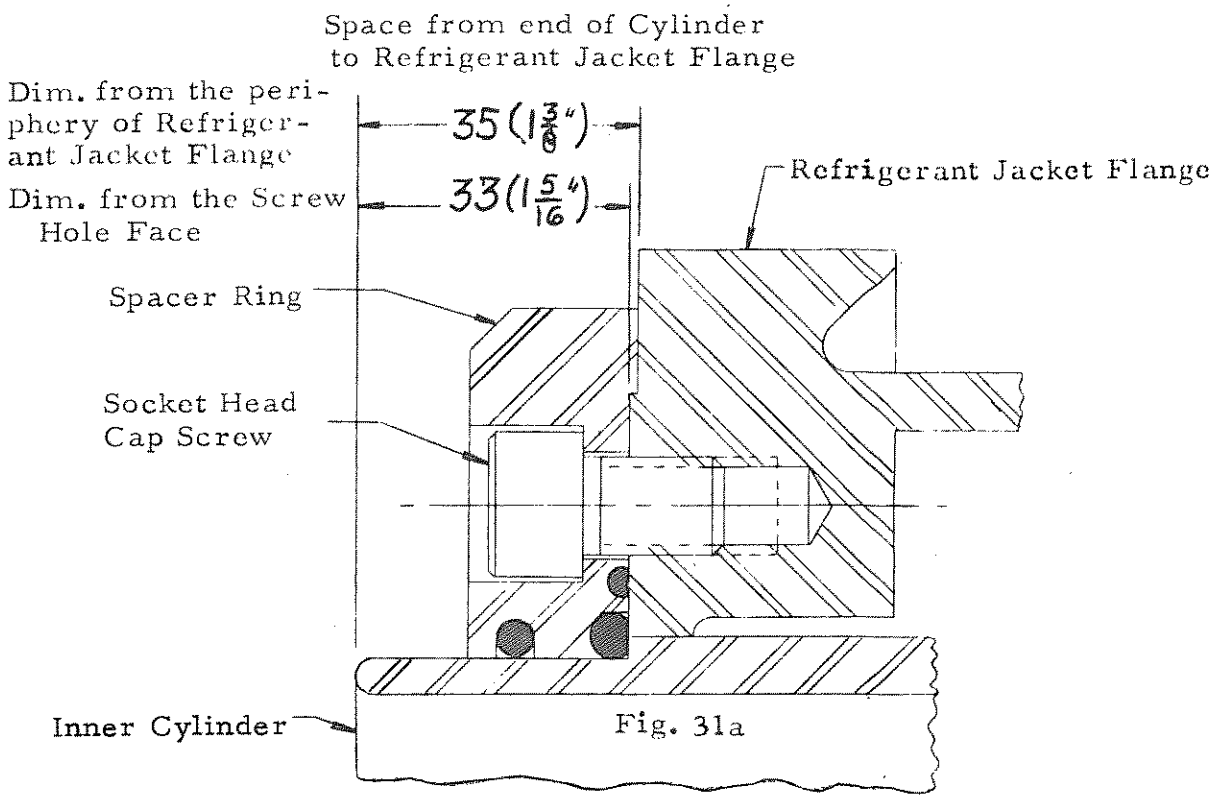


Fig. 31a

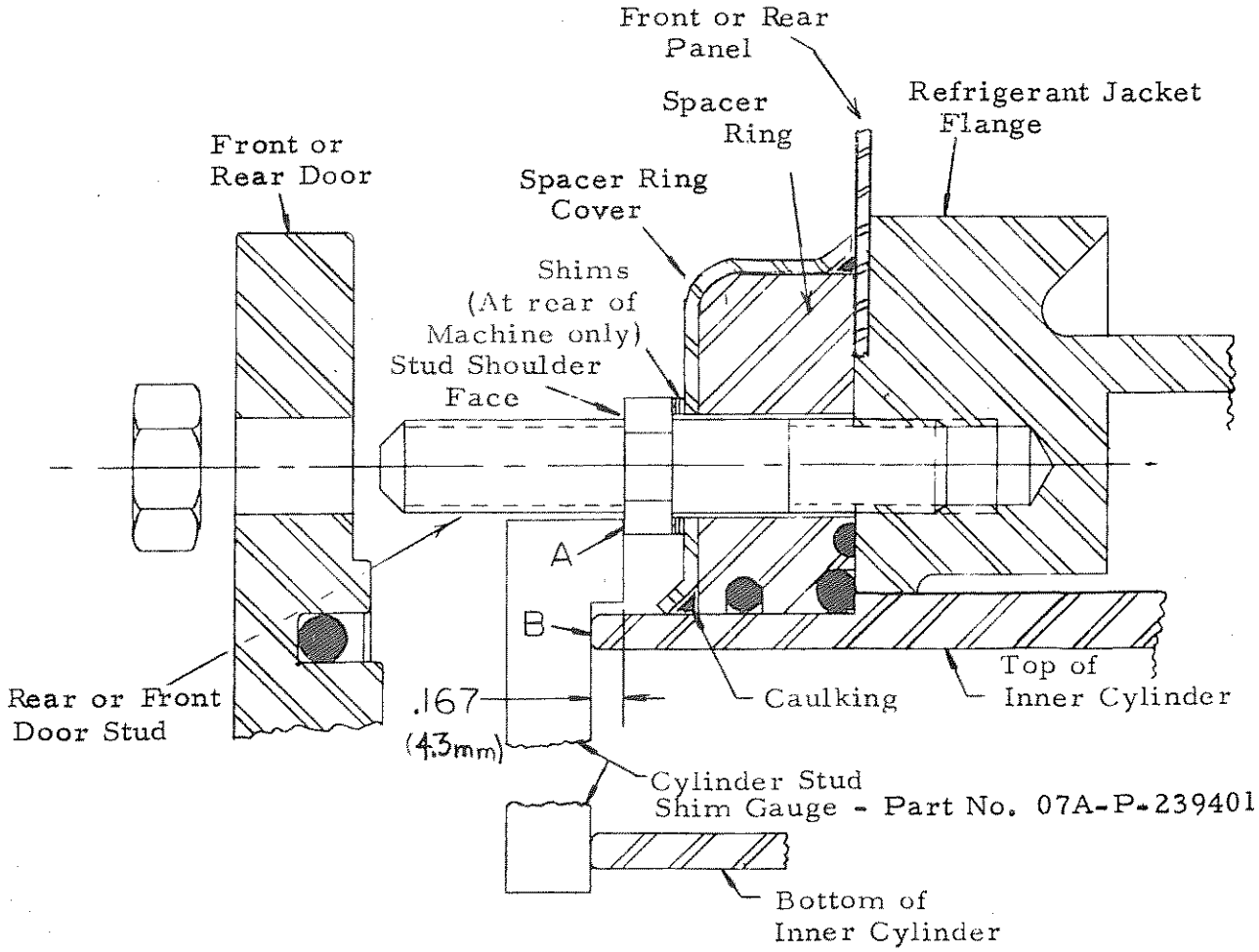


Fig. 31b

7. Replacing the Rear Spacer Ring

   a. Remove the Hardwood Brace from the rear of the Inner Cylinder (if it is still secured to the rear), and secure this Brace at the front of the Inner Cylinder following instructions under Sub-section 6., but, when doing this, only bring the Brace snug against the end of the Inner Cylinder. Refer to the Diagram, Fig. 30a.

      Because of the Keys and Keyways on the front of the K-60 Inner Cylinders, it is not necessary to apply the Brace to the front of the Cylinder when replacing the Rear Spacer Ring on the K-60s.

   b. Remove the tape from the rear of the Inner Cylinder and clean with solvent any residue that may be left by the tape.

   c. Apply sanitary lubricant around the Inner Cylinder end and around the "O" Ring Grooves in the Rear Spacer Ring. Slide a NEW "O" Ring Seal over the end of the Cylinder. Install two NEW "O" Rings in the Rear Spacer Ring.

   d. Placing the Spacer Ring over the Inner Cylinder. Refer to the Diagram, Fig. 29a, and the directions in Sub-section 6.f. on Page V-29.

   e. Then follow directions in Sub-section 6.g., 6.h., and 6.j. on Page V-30.

      In the case of the K-10 Series, replace the Rear Panel and secure with the four Cylinder Door Studs. Assemble the Rear Panel just enough to test the Machine for refrigerant leaks.

      On all other K-Series Machines, replace the Rear Spacer Ring Cover, and secure with the four Cylinder Door Studs.

   f. Using the Cylinder Stud Shim Gauge (extra part shipped with the Machine), once again test for clearance space between the end of the Inner Cylinder and the Stud Shoulder Face (refer to the Diagram, Fig. 31b on Page V-31; .005 (.127 mm.) clearance is acceptable at Points "A" or "B"). Shim where necessary, referring to the Diagram, Fig. 31b on Page V-31.

8. To test the Refrigerant Jacket and Inner Cylinder for leaks:
   a. Open the Hand Shut-off Valve in the Suction Line.
   b. Turn the Refrigerant Control Handle clockwise all the way.
   c. Open the Hot Gas Line Hand Shut-off Valve.
   d. Push and hold the "HOT GAS DEFROST" Button until the refrigeration builds up to 20 - 25 lbs. per sq. inch (1.4 - 1.8 kg/cm^2) maximum.
   e. Check the Seal Rings for leakage.
   f. If no leaks are detected, again push the "HOT GAS DEFROST" Button until the pressure builds up to 55 - 60 lbs. per sq. inch (3.9 - 4.2 kg/cm^2) maximum.
   g. Again check the Seal Rings for leakage.
   h. If no leaks are detected, open the Hand Shut-off Valve in the Liquid Refrigerant Line long enough to admit a partial charge of Liquid Refrigerant.
   i. If a leak is observed at any point, open the Liquid Dump Line, or, if no Dump Line is available, pump the liquid from the Machine and replace the leaking Seals.
9. Remove the Cylinder Door Studs from the Spacer Rings. Apply a ring of waterproof caulking around the Cylinder and also on the outer perimeter of the Spacer Ring.
10. Replace the Front and Rear Spacer Ring Covers. Replace the Cylinder Door Studs, making sure that the Studs and their Shims are in their original location.

INSTRUCTION MANUAL G-3014-2

INSTALLATION OPERATION
AND MAINTENANCE

REEVES
Vari-Speed
MOTODRIVE®
200 - 300

Part No. 503-S-3269-P
R.P.M.: 37-370
Frame No. 222
Cycles: 50 Hz. H.P.: 2
Volts: 208-416 Phase: 3

IMPORTANT REMINDERS

1. Change Motodrive speeds only when the unit is running.
2. Reeves Motodrives are assembled to operate under requirements of the unit assembly number. Motodrive units with reducers should not be changed to a different assembly number without factory approval.
3. Motodrives with reducers are shipped with reducers drained. Do not operate unit before adding proper amount of lubricating oil.
4. Reeves reducers are effectively vented. Do not allow reducer vent to become clogged.
5. Check your power supply with motor nameplate rating before making electrical connections.
6. **CAUTION: Do not attempt to remove tension spring from its safety cartridge.**

MOTODRIVE INSTALLATION

1. A rigid base is essential for mounting the Motodrive.
2. Mount and fasten the Motodrive into position so that the output (variable speed) shaft of the Motodrive is in alignment with the driven shaft of the equipment. Use shims, when necessary, to obtain alignment. Motodrive shafts should turn freely when the unit is secured to the mounting.
3. Connect the Motodrive output shaft to the driven shaft of the equipment by desired method. Accurate alignment of the shafts is very important when flexible couplings or gears are used. In addition to accurate shaft alignment, sprocket or pulley alignment on the shafts is important for chain or belt connections.
4. Lubricate the Motodrive as detailed in the lubrication section. (Lubrication instructions are also shown on the Motodrive nameplate.)
5. Reeves Vari-Speed Motodrives are set for the specified speed range and tested at the factory. Following complete lubrication, Motodrives are ready for immediate use.
6. CAUTION: Before placing in operation remove and discard red plug in reducer. Insert and use vent plug attached to red tag.

NOTE: Change speeds only when unit is running.

OPERATION AND CARE

1. Keep belt contact surfaces of the discs clean.
2. When a Motodrive is not to be operated for a period of 30 days or more, before final stopping of the unit, shift into low speed position. (Tension spring will then place minimum pressure on the belt.)
3. Correct lubrication is essential to good Motodrive operation and care.

LUBRICATION INSTRUCTIONS

LUBRICANT: A properly refined neutral mineral grease, free of acid, alkali and sulphur with a consistency corresponding to No. 1 NLGI consistency. Type and grade of lubricants suitable for Motodrives are suggested by the following list:

SOCONY – MOBIL MOBILTEMP No. 1; TEXACO NOVATEX No. 1; SINCLAIR GREASE No. 1; AMERICAN OIL CO. AMOLITH GREASE No. 1; SHELL ALVANIA No. 1; HUMBLE OIL CO. GREASE No. 5139.

The following lubrication instructions apply to Motodrives operating under normal service conditions. To insure correct lubrication when operating under conditions other than normal, the drive should have added protection as recommended by the factory.

1. Lubricate sliding discs at not less than 2 week intervals. Apply two or three effective grease gun strokes to lubrication fittings at points A and B, diagram 1.
2. The frame bearings on the variable speed shaft and thrust bearing on constant speed disc assembly are pre-lubricated; they require no further lubrication.
3. Lubricate reducers with a good grade of lubricating oil.

For proper oil viscosity select SAE No. as follows:

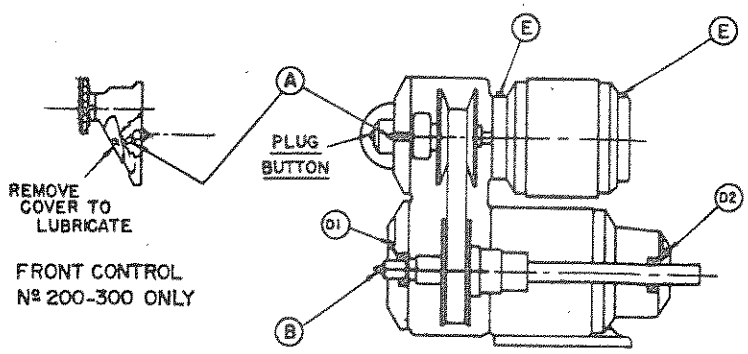


Diagram No. 1. Motodrive Lubrication Points

Ambient temperature	SAE No.
0° F. to 40° F.	20
40° F. to 100° F.	40
100° F. to 140° F.	50

Reducers are shipped without oil. Fill reducer housing to correct oil level — verify at oil level plug — before the drive is placed in service.

Correct oil level is important for the splash type self-lubrication used for Motodrive reducers. Check oil level at 60 day intervals; add oil if required. Each six months drain oil and flush the reducer housing.

NOTE: Be sure reducer vent is not clogged.

4. Lubricate right angle reducer sizes 25 and 30 with a type and grade of oil suitable for worm gear reducers as suggested by the following chart.

AMBIENT TEMPERATURE	VISCOSITY-SEC. S. U. V. @ 210° F	BRAND NAME	MANUFACTURER
0° F — 90° F	125 — 150	STANDARD WORM GEAR OIL	STANDARD OIL CO.
0° F — 90° F	125 — 150	CYLINDER OIL 600 W	SOCONY-MOBIL
91° F — 120° F	150 — 190	CALUMET 5H CYLINDER OIL	STANDARD OIL CO.
91° F — 120° F	150 — 190	CYLINDER OIL EXTRA HECLA	SOCONY-MOBIL

BELT REPLACEMENT INSTRUCTIONS

Reeves Vari-Speed Motodrives are designed for easy servicing and replacement of belts.

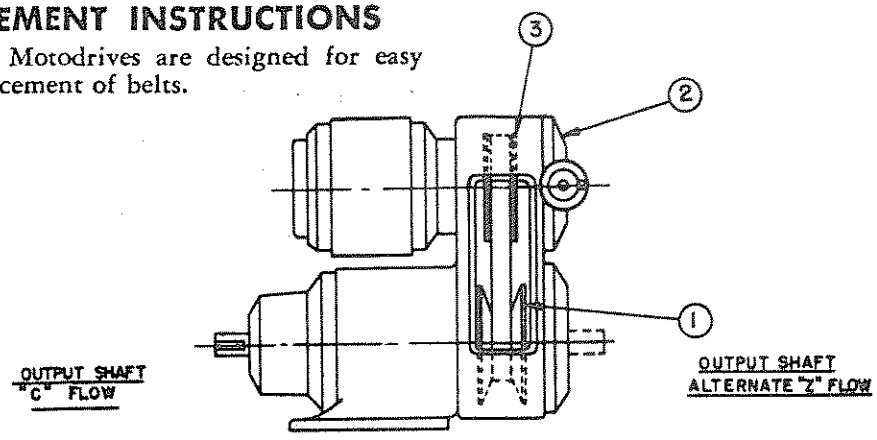


Diagram No. 2. Belt changing procedure, "C" flow

1. If Motodrive belt is in operating condition shift Motodrive, while running, to high speed position.

2. Remove side inspection plate "1", diagram No. 2.

3. Remove (4) cap screws holding control assembly "2", and remove control assembly from the Motodrive, diagram No. 2.

Remove sliding disc "3", diagram No. 2 (Thrust bearing and thrust bearing housing "11" is attached to "3"), diagram No. 3. Do not disturb position of the fixed disc on motor shaft.

4. Pull upper loop of the belt over the end of the fixed disc hub, diagram No. 3 On some units additional spreading of the variable shaft discs may be necessary to gain enough belt slack for the belt to clear the fixed disc hub.

5. Remove variable shaft bearing plate "4" after belt is freed from fixed disc hub.

6. Free the belt from the variable discs "5" and remove from the case.

7. Place the new belt into the case, positioned loosely around the variable speed discs "5" and replace bearing plate "4".

8. Spread the variable speed discs "5" and position the belt between the discs deep enough to secure belt slack; then loop the belt over the fixed disc hub.

9. Replace sliding disc "3", with attached thrust bearing and housing, onto fixed disc hub.

10. (200 and 300 Motodrives only) Replace control assembly "2". Prongs on the shifting yoke can be properly positioned in the lugs on the thrust bearing housing "11", only when the housing lugs are below the prongs. (Ref. Part No. 42, Page 4)

11. Replace inspection plate "1".

12. Lubricate constant speed disc assembly at point "A", diagram No. 1, and Motodrive is ready for operation.

NOTE: No additional adjustment required for correct belt alignment.

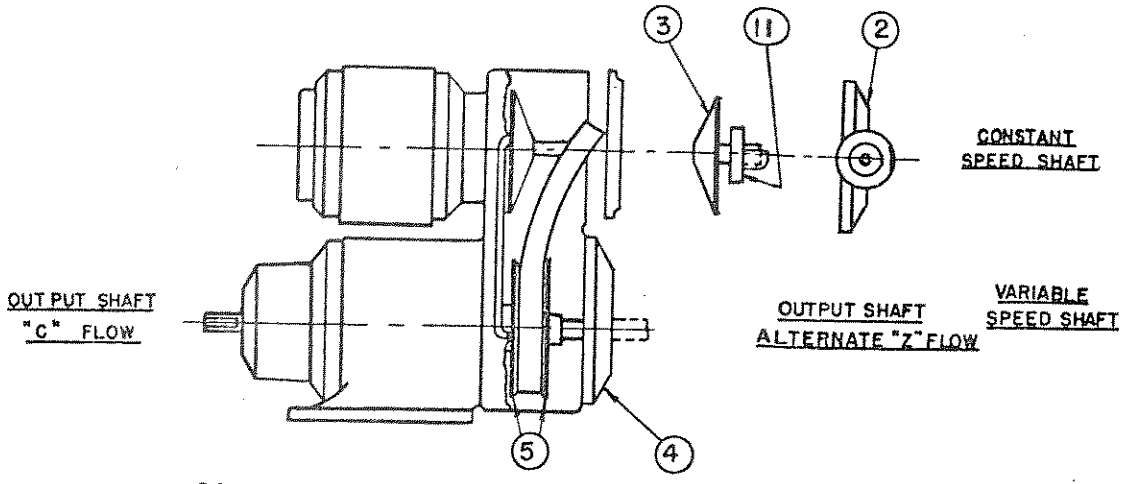
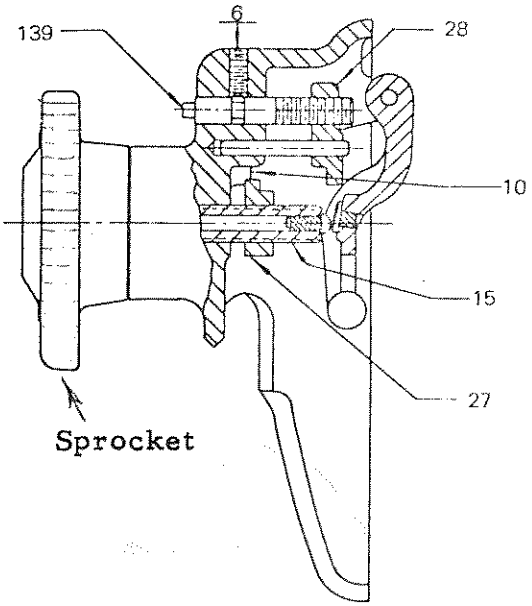


Diagram No. 3. Belt changing procedure, "C" flow

INSTRUCTIONS FOR SETTING MAXIMUM AND MINIMUM SPEED STOPS

FRONT HANDWHEEL CONTROL

SIZES 200 and 300



1. THE MINIMUM SPEED STOP MAY BE SET BY FIRST LOOSENING THE SET SCREW IN THE STOP NUT (27). SHIFT MOTODRIVE TO THE DESIRED MINIMUM SPEED. TURN THE STOP NUT (27) ON THE SHIFTING SCREW (15) UNTIL IT COMES IN CONTACT WITH THE BUILT IN LOW SPEED STOP (10). TIGHTEN THE SET SCREW IN THE STOP NUT (27).

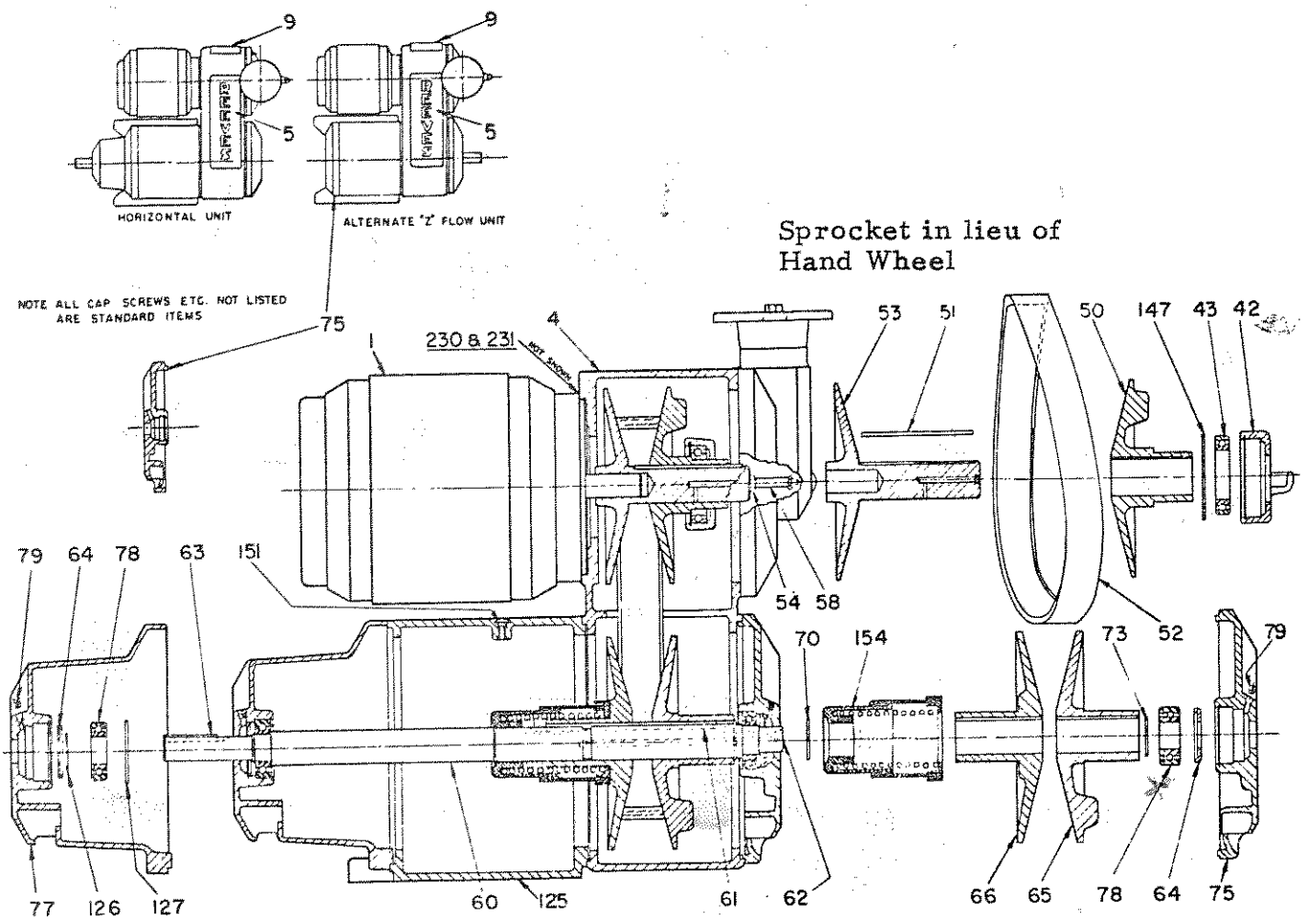
   NOTE: ON THE #200 AND 300 MOTODRIVE THERE ARE TWO GROOVES IN THE SHIFTING SCREW AND THREE SET SCREW HOLES IN THE STOP NUT WHICH PERMIT SMALL POSITION CHANGES OF THE STOP NUT TO OBTAIN A MORE EXACT SPEED CONTROL SETTING.

2. TO SET THE MAXIMUM SPEED STOP LOOSEN THE SET SCREW (6) IN THE TOP OF THE CONTROL HOUSING WHICH HOLDS THE ADJUSTABLE SCREW (139) IN PLACE.

   CAUTION: LOOSEN SCREW ONLY ENOUGH TO ENABLE THE ADJUSTABLE SCREW TO BE TURNED. FACING THE CONTROL TURN THE ADJUSTABLE SCREW (139) CLOCKWISE AND AT THE SAME TIME SHIFT THE MOTODRIVE TO THE DESIRED MAXIMUM SPEED. THE STOP NUT (27) ON THE SHIFTING SCREW SHOULD CONTACT THE HIGH SPEED STOP (28) AT MAXIMUM SPEED. TIGHTEN SET SCREW (6) IN POSITION.

REEVES VARI-SPEED MOTODRIVES PARTS LIST — FOR SIZES 200 - 300

"C" Flow Style — Vertical, 45° and Horizontal Models



1 MOTOR

4 CASE
5 PLATE, INSPECTION
9 PLATE, NAME

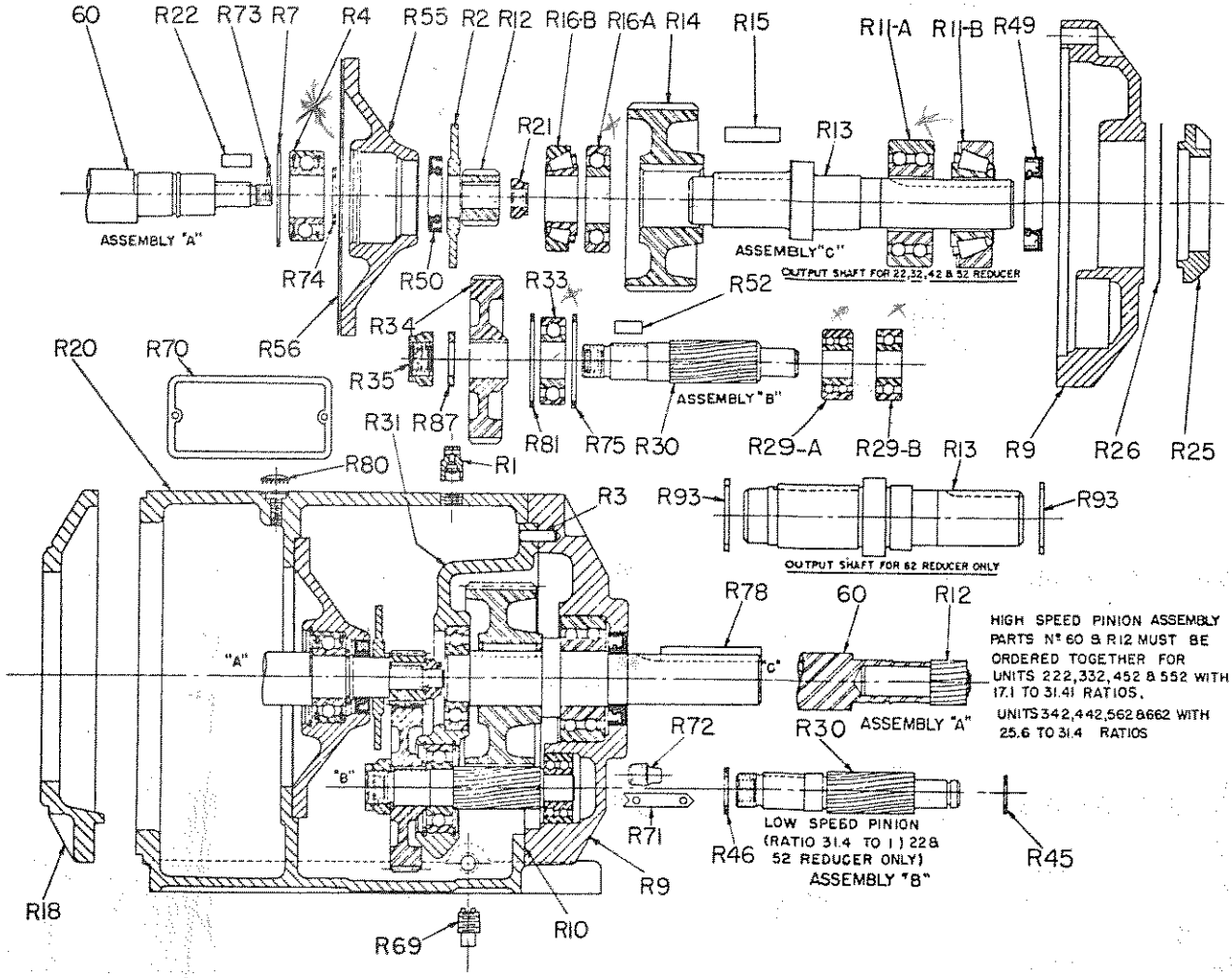
42 HOUSING (THRUST BEARING)
43 BEARING, THRUST
50 DISC, SLIDING (CONSTANT)
51 KEY(CONSTANT DISC)
52 BELT
53 DISC, FIXED (CONSTANT)
54 ADAPTOR, LUB FITTING
58 FITTING, LUB (INCLUDED WITH CONTROL PARTS)
60 VARI-SHAFT
61 KEY (VARIABLE SHAFT)
62 FITTING, LUB (VARI-SHAFT)
63 KEY, OUTPUT (VARI-SHAFT)
64 BAFFLE, GREASE
65 DISC, FIXED (VARIABLE)
66 DISC, SLIDING (VARIABLE)
70 RING, RETAINING (SPRING COVER)
73 RING, RETAINING (FIXED DISC VARIABLE)
75 PLATE, BEARING (C.S.) ALSO M.S ON ALTERNATE "Z" FLOW UNITS
77 PLATE, BEARING (M.S.)
78 BEARING, VARI-SHAFT
79 PLUG
125 SUPPORT, CASE
126 RING, RETAINING (BEARING)
127 RING, RETAINING (BEARING)
147 RING, RETAINING, BEARING HOUSING
151 PLUG, BUTTON CASE SUPPORT
154 CARTRIDGE, TENSION SPRING ASSEMBLY

230 ADAPTOR, MOTOR (MAX. RANGE) (2 & 300 MD. ONLY)
231 PLATE, COVER (MAX. RANGE) (2 & 300 MD. ONLY)

When ordering Motodrive replacement parts refer to this bulletin number and give serial number, assembly number, and unit size number

PARTS LIST — FOR DOUBLE REDUCTION REDUCERS — SIZE 22

(200 size Motodrives)



60 SHAFT, VARIABLE
R1 PLUG, VENT
R2 SLINGER, OIL (CEILING MTD. UNITS ONLY)
R3 PIN, DOWEL
R4 BEARING, HIGH SPEED
R7 RING, RET. H.S. BRG.
R9 HEAD, GEAR BOX
R10 GASKET, HEAD
R11-A BRG. OUTER L.S. (22 & 32 RED. ONLY)
R11-B BEARING, OUTER, LOW SPEED (42,52,62 RED. ONLY)
R12 PINION, HIGH SPEED
R13 SHAFT, OUTPUT
R14 GEAR, LOW SPEED
R15 KEY, LOW SPEED GEAR
R16-A BEARING, INNER, LOW SPEED (22 & 32 RED ONLY)
R16-B BEARING, INNER, LOW SPEED (42,52,62 RED. ONLY)
R18 ADAPTOR, RING (32,42,52,62 RED ONLY)

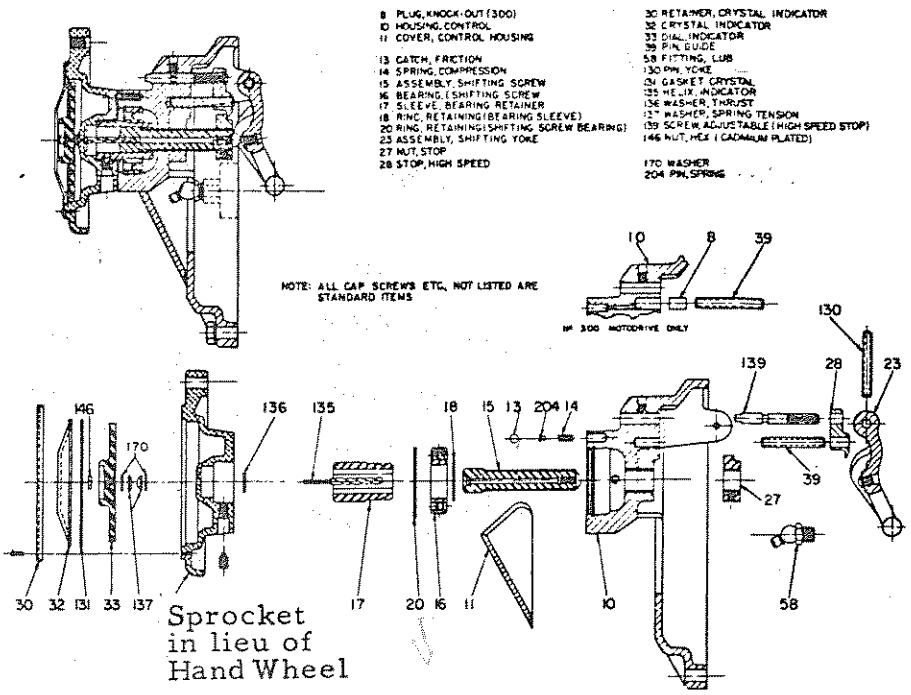
R20 HOUSING, CASE SUPPORT
R21 NUT, HIGH SPEED PINION
R22 KEY, HIGH SPEED PINION
R25 RETAINER, BEARING (42,52,62 RED. ONLY)
R26 SHIM, BEARING RETAINER (42,52,62 RED. ONLY)
R29-A BEARING, OUTER L.S. PINION (22 RED ONLY)
R29-B BEARING, OUTER L.S. PINION (32,42,52 & 62 RED. ONLY)
R30 PINION, LOW SPEED
R31 CENTERPIECE, GEAR
R33 BEARING, INNER L.S. PINION
R34 GEAR, HIGH SPEED
R35 NUT, LOW SPEED PINION
R45 RING, RETAINING (22,42,52,62 RED. ONLY)
R46 RING, RETAINING (22 & 52 RED. RATIO 31.4 ONLY)
R49 SEAL, OIL - LOW SPEED
R50 SEAL, OIL - HIGH SPEED
R52 KEY, HIGH SPEED GEAR
R55 PLATE, BEARING (INTERNAL)
R56 GASKET, BEARING PLATE (INTERNAL)

R69 PLUG, DRAIN (MAGNETIC)
R70 PLATE, RATIO & LUBRICATION
R71 INDICATOR, OIL LEVEL
R72 PLUG, OIL LEVEL
R73 RING, RET. INNER H.S. BRG. (342,452,562 RED)
R74 RING, RETAINING, OUTER H.S. BEARING
R75 RING, RETAINING, OUTER LOW SPEED PINION BEARING (22,42,52,62 RED. ONLY)
R78 KEY, OUTPUT SHAFT
R80 PLUG, BUTTON (HOUSING, CASE SUPPORT)
R81 RING, RETAINING, INNER L.S. PINION BEARING
R87 WASHER, GEAR HIGH SPEED (52,62 RED. ONLY)
R93 RING, RETAINING (62 REDUCER ONLY)

NOTE: ALL CAP SCREWS ETC., NOT LISTED ARE STANDARD ITEMS.

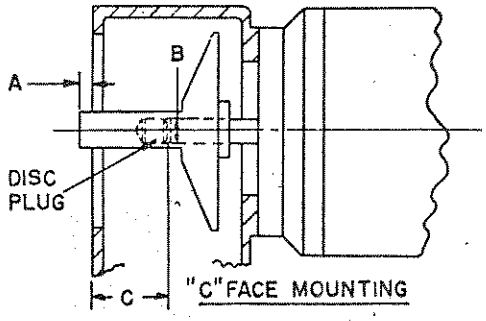
When ordering Motodrive replacement parts refer to this bulletin number and give serial number, assembly number, and unit size number

SPROCKET in lieu of Hand Wheel Control



When ordering Motodrive replacement parts refer to this bulletin number and give serial number, assembly number, and unit size number

MOTOR INSTALLATION INSTRUCTIONS — FOR SIZES 200 and 300 REEVES



	CLASS "D" TO "G"		CLASS "M"	
SIZE	200	300	200	300
MOTOR FRAME	182 184	213 215	182 184	213 215
A	$\frac{1}{32}$	$\frac{17}{32}$	$\frac{1}{32}$	$\frac{17}{32}$
B	$\frac{7}{8}$	$1\frac{1}{8}$	$\frac{7}{8}$	$1\frac{1}{8}$
C	$4\frac{1}{8}$	$4\frac{3}{4}$	$4\frac{7}{8}$	$5\frac{25}{32}$

"C" FACE MOUNTING

1. Disconnect electrical service to unit.

2. Refer to Belt Replacement Instructions, page 3, items 1 through 4, for removal of control and constant sliding disc assembly.

3. Loosen (2) set screws and remove the fixed disc from motor shaft.

4. Remove motor - by removing (4) motor mounting screws from inside the case.

4a. On the No. 200 and 300 maximum range units and No. 500 unit with motor frame 284UC or 286UC an adaptor is used between the motor and case

5. Install new motor: CAUTION: Be sure motor shaft key is tightly in place in motor shaft keyway. Place new motor into position and secure with (4) motor mounting screws to the Motodrive case.

5a. On units where a motor adaptor is used be sure the adaptor is installed properly between the case and motor before securing motor.

6. Replace constant speed fixed disc on motor shaft: be sure disc plug is in place in disc bore: locate position of disc as shown in diagram above and secure to motor shaft with the (2) set screws.

7. Refer to Belt Replacement Instructions, page 4 items 8 through 12, for replacing constant disc assembly and control.