Advance®

#12 DCM

# SRL-250 USER'S MANUAL

S/N SRL250C320205
2/2/05

## Servo Reciprocating Linear Die Spray System

Advance®

# FEATURES

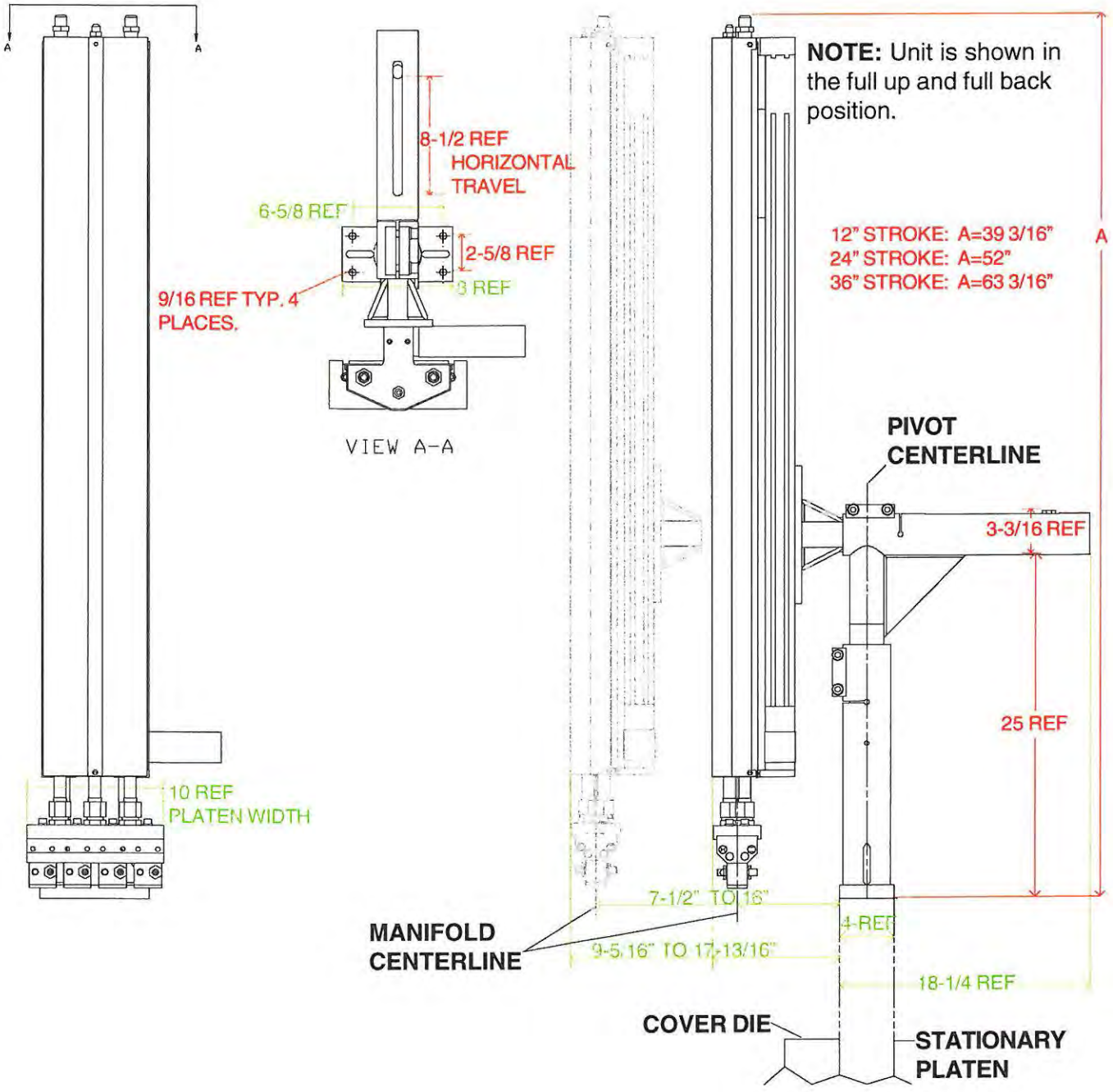
The Advance SRL-250 die sprayer is designed to be used with both zinc and aluminum die cast machines, ranging in size from 150 ton to 400 ton machines. The unit is controlled by an industry proven Mitsubishi FX1s series programmable logic controller. Programming is done through a menu driven, two line back lit liquid crystal display, using push buttons for data entry. There is program storage for up to 8 different programs. Programs can have up to 20 different spraying positions. At each position, the unit can spray lube, blow off the dies, or perform both actions a once.

The SRL-250 has two axis of movement, vertical and horizontal. The **vertical axis** movement is **servo driven**. The servomotor is coupled directly to a gear box which is then connected to a belt driven linear actuator. The top speed of the vertical axis is 72 in/sec. The vertical axis is programmed through the HMI on the main control panel. The **horizontal axis** is **manually adjusted**. The horizontal axis can be adjusted 8-1/2" to accommodate various die thickness'. In addition, to help with die change outs, both the vertical and horizontal axis can be rotated about the base to provide the needed clearance to remove the dies.

As a standard, the SRL-250 comes with a 4 spray head, 10" long bar manifold. A 6 head, 15" long manifold is also available. Air blast is provided with both manifolds.

The SRL-250 uses a remote valve package that can be mounted for customer convenience. The valve package is mounted to a 1/2" x 10" x 15-1/2" plate for ease of installation. The valve package consists of a 3/8" lube valve, a 3/4" spray air valve with pressure regulator, and a 3/4" air blast valve.

The main control cabinet for the SRL-250 is a wall mount Nema 12 rated cabinet. The overall size of the cabinet is 8-1/2" deep x 15-3/4" wide x 19-3/4" tall. Twelve foot cables come standard with the control cabinet. The control cabinet needs 120 VAC to run.




***SRL-250 Dimensions***
**FIGURE 1-1**

# TECHNICAL SPECIFICATIONS - 1 -

- **Motor**

  AC brushless servo motor with high resolution encoded and electromagnetic spring-action safety brake.

  Manufacturer: Mitsubishi
  Servomotor Model: HC-MFS43B
  Rated Output: 400 W
  Rated Torque: 1.3 N-m
  Rated Speed: 3000 rpm

- **Unit**

  Size: See Figure 1.
  Weight: 240 Lbs.

- **Control Box**

  Size: 8-1/2" deep x 15-3/4" wide x 19-3/4" tall
  Power Requirements: Single-phase, 110 VAC, 15 amps
  Weight: 45 Lbs.

- **Valve Package**

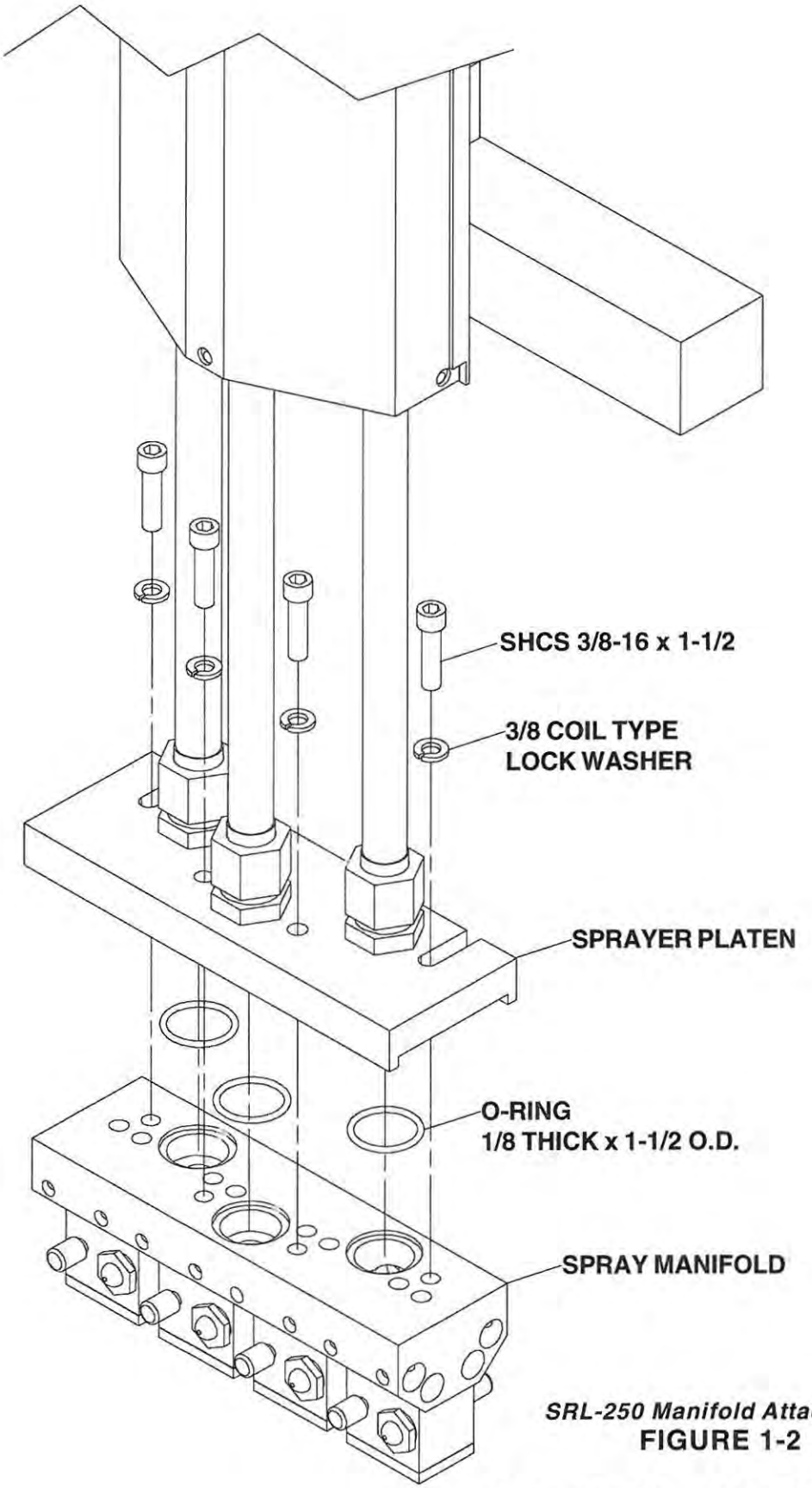
  Size: 8-3/4" deep x 10" wide x 15-1/2" tall
  Weight: 40 Lbs.

  **Air Requirements**

  Air Flow: 50 cubic feet per minute
  Air Pressure: 50-to-90 psi.
  Air connection: 3/4" NPT

  **Lube Requirements**

  Lube Pressure: 40-to-80 psi
  Lube connection: 3/8" NPT




*SRL-250 Manifold Attachment*
**FIGURE 1-2**

# UNPACKING AND SETUP - 2 -

## UNPACKING

The SRL-250 contains the following:

- (1) sprayer mechanism.
- (1) valve package
- (1) main control cabinet.
- (1) Lube filter
- (1) spray manifold.

Perform the following steps to unpack the unit:

1. Unfasten the sprayer from the shipping container.
2. Move X-axis member to the full retracted position
3. Remove the main control cabinet from the shipping container and set aside.
4. Remove the valve package from the shipping container and set aside.

Caution, the unit is top heavy, do not leave free standing until the unit is bolted down

## MOUNTING THE SPRAY MANIFOLD

If the spray manifold is already mounted to the sprayer mechanism, proceed to the next section, "PREPARATIONS FOR MOUNTING THE SPRAYER."

1. Install O-rings in the spray manifold. O-ring sizes are:
   O.D.: 1-1/2", width: 1/8", material: Viton
   Dash No: -218
2. Align the ports in the sprayer platen to the holes in the spray manifold.
3. Bolt the spray manifold to the platen using (4) 3/8 coil type lock washers, and (4) 3/8-16 x 1-1/2" shcs.

See Figure 1-2.

## PREPARATIONS FOR MOUNTING THE SPRAYER

1. The sprayer is designed so the base is mounted on the stationary platen so the front of the base is mounted flush with the front of the stationary platen. See Figure 1-1. Four ½-13 shcs along with lock washers are to be used to fasten the sprayer to the platen.
2. Drill and tap the (4) ½-13 holes so there are at least 1" of useable threads.
3. Lift the sprayer into position on the platen and fasten in place.
4. If required, the linear actuator can be moved vertically up or down, relative to the base, because of clearance issues. To do this, hold the linear actuator from falling. Loosen the (6) hhcs that hold the mounting blocks, APC P/N: 10207, to the base. Raise or lower the linear actuator as required. Retighten the (6) hhcs.

## MOUNTING THE CONTROL CABINET

CAUTION: Do not mount the control cabinet on the die cast machine where vibrations could cause damage to its components.

1. If you wish to mount the control cabinet to a fixed location, use the (4) mounting holes in the control cabinet.

## CONNECTING THE AIR AND LUBE LINES

(The standard SRL-250 sprayer is designed to rotate 90 degrees during a die change out. Make your air and lube connections to allow for this rotation.)

1. Use a 1/2" I.D. hose or pipe to supply lube to the sprayer valve package. Plumb the provided lube filter into the lube line. The lube connection at the sprayer is 3/8 NPT. Be sure to flush the lube lines before connecting them to the sprayer to keep contaminants from entering the sprayer.
2. Use a 3/4" I.D. hose or pipe to supply filtered air to the sprayer valve package. (Filter is not supplied.)
3. After mounting the valve plate at the desired location, make up (1) spray air hose, (1) blast air hose, and (1) lube hose. Both the blast air hose and the spray air hose need to have ¾ FJIC fitting on both ends. The lube hose needs to have 3/8 FJIC fitting on both ends.
4. Connect the lube hose between the lube valve and the sprayer mechanism.
5. Connect the spray air hose between the spray air valve, the valve with the pressure regulator, and the sprayer mechanism. See Figure 5-1 for the correct connection point.
6. Connect the blast air hose between the blast air valve and the sprayer mechanism. See Figure 5-1 for the correct connection point.

## CONNECTING THE CABLES

1. The motor control and encoder cables have plug connectors at the motor. Connect these two cable.
2. The proximity switch cable needs to be wired in to the junction box near the sprayer motor.
3. The valves need to be wired to the control box. Holes are already provided in the bottom of the control box and on the junction box on the valve plate.

## CONNECTING THE AC POWER

1. The sprayer is designed to run on 120 VAC, single phase, 15 amp service. Connect power to through the provided hole in the bottom of the control cabinet.

# PROGRAMMING & SOFTWARE - 3 -

The software used by the Mitsubishi operator terminal in the sprayer system is the application program that is used as a Human Machine interface (HMI). By using this operator interface, the operator can change several variables, or parameters, involved in the sprayer system to modify its behavior as desired.

The software system uses different menus as options to change the variables or parameters of the sprayer. These menus are shown in Figure 3-1 below:

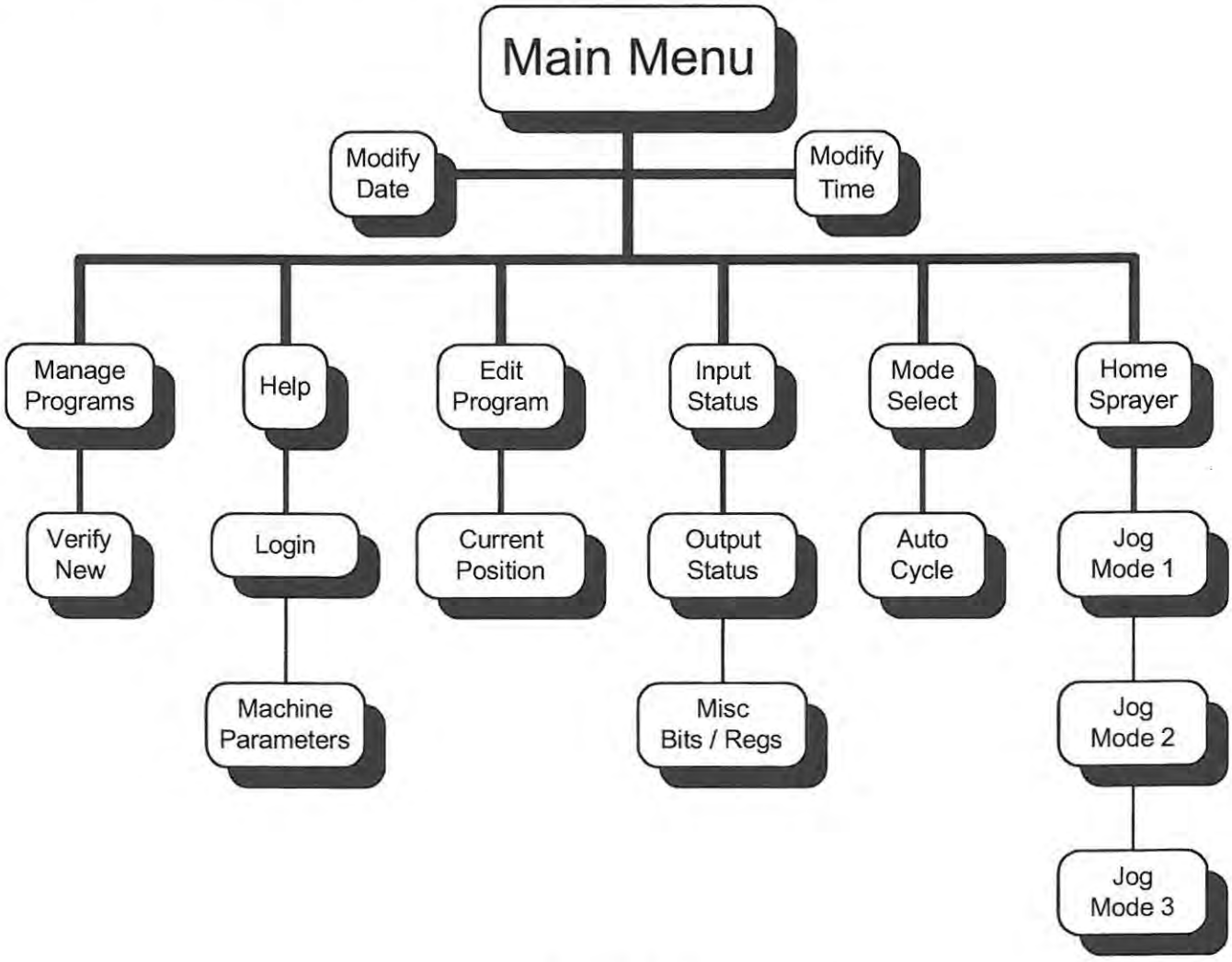



**Figure 3-1**
**APC Sprayer software diagram**

To change any program or machine parameter of the sprayer system, use the operator panel and its different sections on the keypad. A general procedure of how the operator interacts with the sprayer system, via the operator panel, will be explained below and before entering the software menus explanation.

To select a menu, it is necessary to use function keys. Once selected, a menu for the corresponding screen will be displayed. The function keys available on the sprayer system can be seen in Figures 3-2 and 3-3.

Note that only 2 lines are displayed on the operator panel. To see any more information associated with the screen displayed, it is necessary to push the down arrow button. ▼

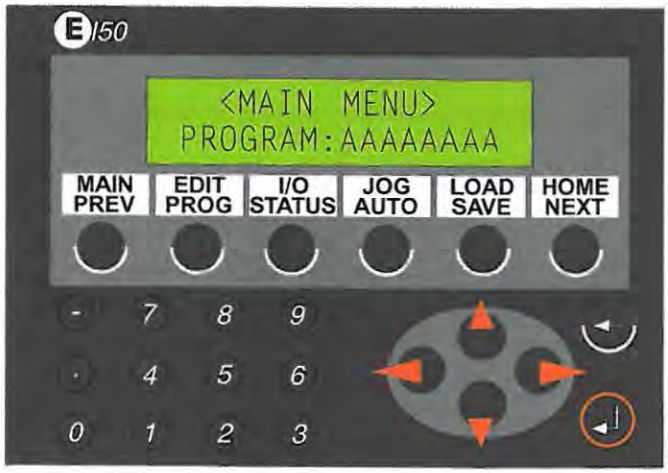



**Figure 3-2**
**E150 Operator Panel**

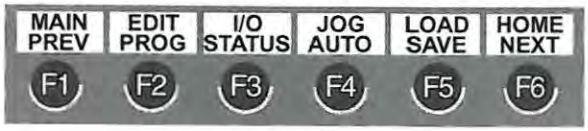



**Figure 3-3**
**Function keys on the E150 Operator Panel**

## INITIAL AND NORMAL RUNNING MENUS

Once the sprayer system is powered, pull the red power button. The display will show the startup screen shown in Figure 3-4.

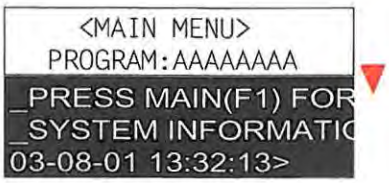
```
E150 V6.03
FX-SERIES (CPU)
```

**Power-up Screen Figure 3-2**

After the power-up screen is displayed, the Main Menu screen is displayed.

## MAIN MENU

This is the first screen as shown in Figure 3-4. From this screen all other screens may be reached.




**Main Menu Figure 3-4**

This screen shows the actual sprayer program that is loaded into memory. The sprayer program is identified by the *"Program:"* on the display, followed by the program name. In the example, the program name used is: *AAAAAAAA*.

Push the down arrow button to see the lines shown in reverse video in Figure 3-4. The date is displayed in European Date Format in the bottom left hand corner with the year listed first followed by the month and then the day. In this case, the year is 2003, the month is August and the day is the 1st.

The time is displayed next to the date in the bottom line. To change the date, type the new entry over the old.

**Note**: See the table in Figure 3-5 for the dash and colon entries. To display later push entries, you must push the key again in quick succession. For example: Push the zero key once to get 0. Push the zero key twice quickly to get **the R** symbol. Push the zero key three times quickly to get the % symbol. Push the zero key four times quickly to get the # symbol. Push the zero key five times quickly to get the : symbol.

To change the time, the date must first be re-entered, then enter the time. Please note that the time is 24 hour time. (No AM or PM.)

Push the enter key to complete your entry of the date and time.

| Key | Push # | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 |
| 0 | **R** | % | # | : | | | | |
| 1 | Y | Z | y | z | ! | ? | | |
| 2 | Å | Ä | Ö | å | ä | ö | | |
| 3 | < | > | ( | ) | | | | |
| . | | ' | @ | | | | | |
| 4 | M | N | O | P | m | n | o | p |
| 5 | Q | R | S | T | q | r | s | t |
| 6 | U | V | W | X | u | v | w | x |
| - | + | / | * | = | | | | |
| 7 | A | B | C | D | a | b | c | d |
| 8 | E | F | G | H | e | f | g | h |
| 9 | I | J | K | L | i | j | k | l |

**AlphaNumeric Entry Table Figure 3-5**

## HOME

Performing a Home Sequence is required after power is applied. This allows setting a zero reference position, relative to a programmed move in a user program. The HOME/NEXT key is used to perform a sprayer home sequence. After touching the HOME/NEXT key, the following screen appears.

```
Home Sprayer. PRESS
 HOME(F6) To Start
```

**Home Screen Figure 3-6**

Once the Start Home Sequence key is touched, the sprayer arm will begin moving back to the home position. During that time, the current position is displayed next to *Position:* in a screen similar to Figure 3-7 below.

```
Home in Progress...
Position:-7.12
```

**Home in Progress Screen Figure 3-7**

The Stop Move key should be pressed if it is necessary to abort the move.

Press the MAIN key when you are ready to return to the Main Menu.

The NEXT key is inactive at this time.

## PROGRAM SELECTION

```
    <MAIN MENU>
 PROGRAM:AAAAAAAA
_PRESS MAIN(F1) FOR
_SYSTEM INFORMATION.
03-08-01 13:32:13>
```

**Main Menu Figure 3-8**

Program selection can be initiated by pressing the LOAD/SAVE function key on the Main Menu as shown in Figure 3-8. Then the program selection screen, similar to the one in Figure 3-9 is displayed.

```
__PROGRAM  OPTIONS__
 NEW  DEL SAVE  LOAD
```

**Program Selection Screen Figure 3-9**

*Note: To create a new program, you must be in EDIT MODE by pressing the EDIT (F2) key from the main menu.* Press the LOAD/SAVE (F5) key. Select NEW by and press the SAVE function key. You now have the option to CLEAR the program. Select the CLEAR (F2) to start with a clean program, select NO(F5) to retain the original values and make changes. **CAUTION:** Starting in the EDIT MODE, this option will not clear the original program that was saved in memory, but if you started from the MAIN MENU this option will clear the original program. Type the LOAD/SAVE (F5) key. Type the name of the new program. Type OK. Type the MAIN/PREV key (F1). The new program will now be loaded and changes can be made at any time. Type EDIT PROGRAM (F2) key. Enter new values in program.

To delete a program, from the Main Menu, press the LOAD/SAVE function key.

```
__PROGRAM  OPTIONS__
 NEW  DEL SAVE  LOAD
```

**Program Selection Screen Figure 3-11**

Push the DEL function key <F3> and a screen similar to the one below is displayed.

```
>ALL FILES
SELEC                EXIT
```

**DEL Program Selection Screen Figure 3-12**

Pressing the SELEC function key <F2> deletes the program displayed above the SELEC key. In this case, ***ALL*** programs will be deleted. Push the down arrow ▼ to see the complete list of stored program files that can be deleted. Press the EXIT function key <F5> to return to the Program Selection Screen as shown in Figure 3-13.

```
__PROGRAM  OPTIONS__
 NEW  DEL SAVE  LOAD
```

**Program Selection Screen Figure 3-13**

Push the LOAD function key <F5> and the screen shown in Figure 3-14 is displayed.

```
>ZZ11Y22I
SELEC                EXIT
```

**LOAD Screen Figure 3-14**

Press the up arrow ▲ and down arrow ▼ keys to cycle through the program names available. Press the SELEC function key <F2> to load the program into memory. Press the EXIT function key <F5> to return to the program selection screen.

```
__PROGRAM  OPTIONS__
 NEW  DEL SAVE  LOAD
```

**Program Selection Screen Figure 3-15**

Touch the MAIN/PREV function key <F1> to return to the Main Menu shown in Figure 3-10 is displayed.

```
    <MAIN MENU>
PROGRAM:AAAAAAAA
_PRESS MAIN(F1) FOR
_SYSTEM INFORMATION.
03-08-01 13:32:13>
```

**Main Menu Figure 3-16**

## PROGRAM EDIT

Program editing may be initiated by pressing the EDIT/PROG function key on the Main Menu as shown in Figure 3-8. Then the program edit screen, similar to the one in Figure 3-17, is displayed.

```
1:P:00.00 S:00.00
D:00.0L:OffA:Off P:N
2:P:00.00 S:00.00
D:00.0L:OffA:Off P:N
.
.
.
20:P:00.00 S:00.00
D:00.0L:OffA:Off P:N
```

**Edit Program Screen Figure 3-17**

Each screen shows 2 lines of program information at a time. Each program may contain up to 20 program steps. After entering values for Step 10, you must press the EDIT PROG key to reach step 11-20. Press the up arrow ▲ and down arrow ▼ keys as shown in Figure 3-18 to cycle through the program steps.

Press the left arrow ◄ and right arrow ► keys as shown in Figure 3-18 to move between the fields on the screen.

**Arrow Keys on the E150 Keypad Figure 3-18**

The edit screen is displayed with the cursor on the position field, ready for keypad entry. Press the desired numbers with or without a decimal point. Press the <ENTER> key for the number to be placed in the current program in memory.

**Enter Key on the E150 Keypad Figure 3-19**

If the number entered is too large or too small, screens similar to the ones shown in Figure 3-20 are displayed and the cursor is returned to the offending field.

```
Val > Max 35
```

```
Val < MIN  0
```

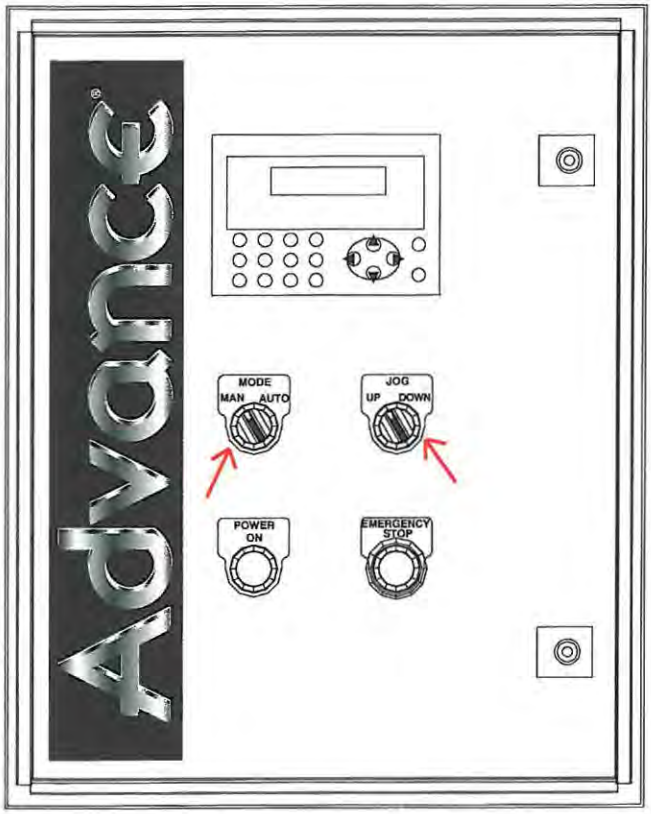
**Position Entry Error Screens Figure 3-20**

The speed and dwell values can be entered in a similar fashion.

To toggle the Lube, Air and Part Detect, press the <ENTER> key as shown in Figure 3-21 below.

**Enter Key on the E150 Keypad Figure 3-21**

## JOG Functions




**Front Console Figure 3-23**

To enter JOG mode, make sure that the mode switch is pointed to MAN, as shown in Figure 3-23, which enables the JOG up and down switch also shown in Figure 3-23.

To view the Jog Selection Screen (Figure 3-25), press the JOG/AUTO function key <F4> on the Main Menu as depicted below.

```
<MAIN MENU>
PROGRAM:AAAAAAAA
_PRESS MAIN(F1) FOR
_SYSTEM INFORMATION.
03-08-01 13:32:13>
```

**Main Menu Figure 3-24**

```
_<< SELECT MODE >>
JOG              AUTO
```

**Jog Selection Screen Figure 3-25**

Press the JOG function key <F2> to display a

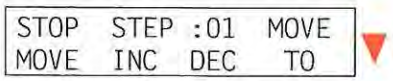
Jog Screen similar to the one shown in Figure 3-26.


**Jog Screen Figure 3-26**

Pressing the SPEED function key <F2> toggles the speed between SLOW and FAST. Pressing the SPRAY/LUBE function key <F4> causes lube to be sprayed while the <F4> function key is depressed. Pressing the BLAST/AIR function key <F5> causes air to be blown while the <F5> function key is depressed.

Press the down arrow ▼ key to display the current position.

Press the HOME/NEXT function key <F6> to display a screen similar to the one shown in Figure 3-27.




**Jog Screen Figure 3-27**

Pressing the STOP MOVE function key <F2> stops any move currently in progress. Pressing the INC function key <F3> causes the step number to be incremented by one, up to step number 20. Pressing the DEC function key <F4> causes the step number to be decremented down one, but not below step number one. Pressing the MOVE TO function key <F5> causes the sprayer to move to the position specified in the currently displayed step number.

Press the HOME/NEXT function key <F6> to display a screen similar to the one shown in Figure 3-28.

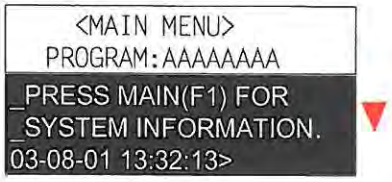

**Jog Screen Figure 3-28**

Press the down arrow ▼ key to display the current position.

Pressing the SAVE function key <F5> stores the current position in the current program step number.

## I/O STATUS

These menus can be displayed by choosing the <I/O Status> function key <F3> on the Main Menu shown in Figure 3-29.

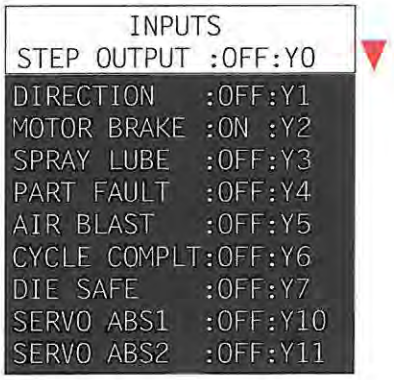



**Main Menu Figure 3-29**

The first screen shown is the INPUTS screen as shown in Figure 3-30. This screen shows the status of the digital inputs to the sprayer system; for example, limit switches, push buttons and some incoming signals from the customer.

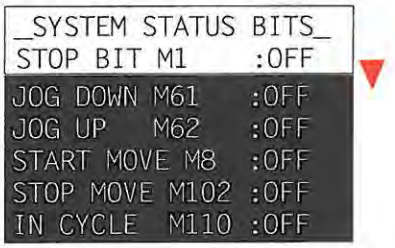

**INPUTS Screen Figure 3-30**

Touch the HOME/NEXT key to display the OUTPUTS screen shown in Figure 3-31.




**OUTPUTS Screen Figure 3-31**

Touch the HOME/NEXT key to display the SYSTEM STATUS BITS screen shown in Figure 3-32.




**SYTEM STATUS BITS Screen Figure 3-32**

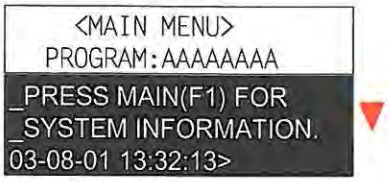
## MACHINE SETTINGS
## (Caution!)

In this section there are several menus containing the main machine parameters. By changing these parameters you can change the complete behavior of the sprayer system. Great care must be taken in changing any of these parameters. These parameters should only be modified by qualified technical personnel.

This section allows the user to change any of the parameters on the sprayer system.

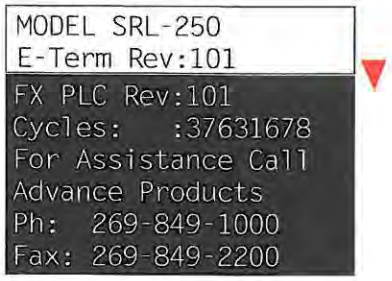
**IMPORTANT: These parameters are set at the factory and are critical for proper machine operation. Modifying these parameters may cause machine damage and/or injury to personnel operating the sprayer. Do not make any changes to these settings without a thorough understanding of each parameter (refer to the Main Default Parameters discussed on Page 18.)**

To begin, press MAIN/PREV on the Main Menu as depicted in Figure 3-33 below.




**Main Menu Figure 3-33**

The System Information screen is then displayed as shown in Figure 3-34.

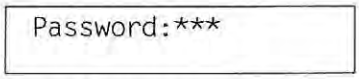



**System Information screen Figure 3-34**

Press MAIN/PREV again and the following screen will be displayed.


**Login Required screen Figure 3-35**

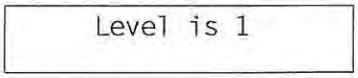
Before changing parameters, an authorization code must be entered and recognized by the system. Press HOME/NEXT function key <F6> for entry of the password as shown in Figure 3-36.




**Password Entry screen Figure 3-36**

Touch the 3 key, the 0 key and the 3 key. Touch the enter key in the lower right hand corner.

The system will display the following screen momentarily to indicate that the system is now unlocked and Machine Setting modifications are possible.



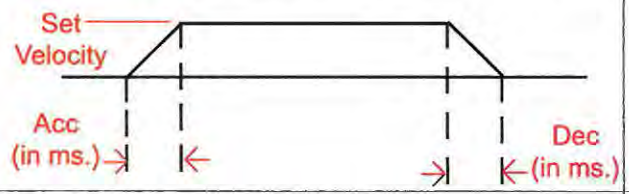

**System Unlocked screen Figure 3-37**

Figure 3-38 is then displayed.


**Login Required screen Figure 3-38**

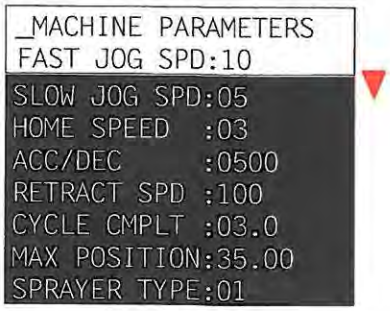
Press MAIN/PREV and the machine parameter

# MACHINE PARAMETER DEFINITIONS

| PLC Parameter Description | Parmeter Definition | Default Values |
|---|---|---|
| Fast Jog Speed | The speed the arm moves when being jogged manually in fast mode. | 10.0 |
| Slow Jog Speed | The speed the arm moves when being jogged manually in slow mode. | 5.0 |
| Home Speed | The speed at which the arm moves during a home sequence after power up. | 3.0 |
| Acc / Dec | The acceleration value in milliseconds used when the arm moves to ramp up and down to the program speed.   | 300 |
| Retract speed | The speed of the arm during a an emergency retract operation or end of cycle. | 100 |
| Cycle Complete Time | The time in seconds the cycle output will stay on. | 3.0 |
| Maximum Stroke in Inches | The maximum distance from home to the furthest spray position. | 35.0 |
| Sprayer Type | The sprayer type is set in the Sprayer Type Setting screen. For the MMI to run the correct program, the ladler type must be accurate. | 1 |

| Servo Amp Parameter # | Parmeter Definition | Default Values | Notes |
|---|---|---|---|
| 2 | Auto Tune | 0105 | |
| 3 | Pulse Per/Pls | 96 | |
| 19 | Unlock | 000E | Cycle Power After Setting |
| 21 | Pulse & Direction | 300 | |
| 41 | DIA | 0110 | |
| 54 | Motor Direction | 0001 | |

screen similar to the one below is shown. (The following screen depicts the default Machine Parameter values.)

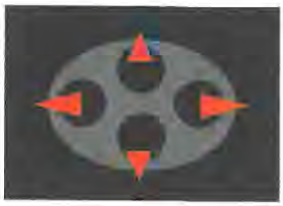



**Machine Parameters screen Figure 3-39**

To show different lines of Machine Parameters, press the up arrow ▲ and down arrow ▼ keys as shown in Figure 3-40. Press the left arrow ◄ and right arrow ► keys as shown in Figure 3-40 to move between the fields on the screen. Any entry may be changed by positioning the cursor over the desired field, enter a new value and press the <ENTER> key to accept it. If the selected value is out of range when entered, the parameter value will not be changed.

Of interest on this screen is the sprayer type. For the MMI to run the correct program, the sprayer type must be accurate.

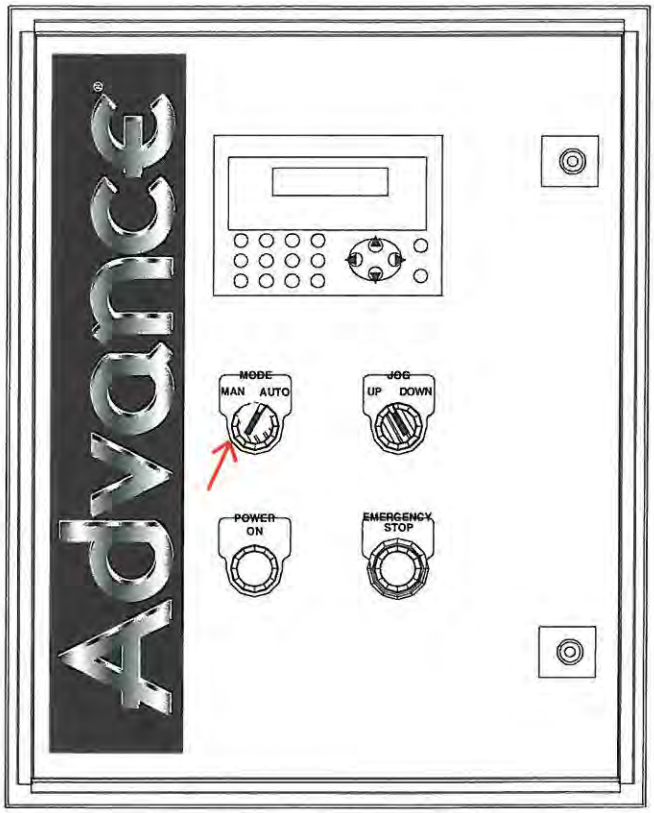
To select a different sprayer type, just touch the appropriate sprayer model number.



**Arrow Keys on the E150 Keypad Figure 3-40**

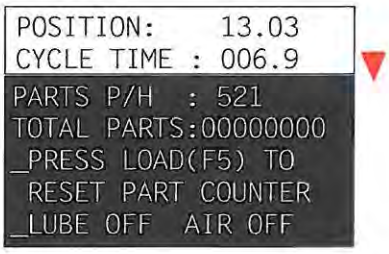
## AUTO CYCLE

To enter Auto Cycle, make sure the mode switch is pointed to AUTO as shown below in Figure 3-40. A customer supplied input is required to run an AUTO CYCLE.




**Front Console Figure 3-40**

While in Auto Cycle, a screen similar to the one below is displayed.




**Auto Cycle screen Figure 3-41**

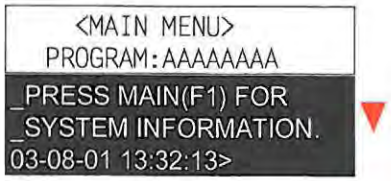
The Auto Cycle screen shows the cycle time, Parts per hour, and total parts.

As the sprayer arm moves, the current arm position of the sprayer is updated in the Position field.

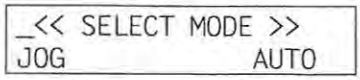
The Auto Cycle screen also shows the current

status of the lube valves and air valves.

To view the Auto Screen (Figure 3-25), press the JOG/AUTO function key <F4> on the Main Menu as depicted below.

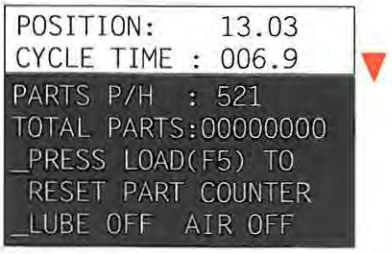



**Main Menu Figure 3-42**




**Auto Selection Screen Figure 3-43**

Press the AUTO function key <F5> to display an Auto Screen similar to the one shown in Figure 3-44.




**Auto Cycle screen Figure 3-44**

To edit lines in the currently running program, press the EDIT/PROG function key <F2>.

Press the LOAD/SAVE function key <F5> to set the counters back to zero.

Press the MAIN/PREV function key <F1> to return to the Main Menu.

# TROUBLESHOOTING - 4 -

This part of the Manual will help you locate and correct difficulties that might occur in your Reciprocating Die Spray System. The following chart lists specific problems, and one or more conditions that could cause each difficulty. Also refer to the "Technical Documentation", section 6 of this Manual, for additional information concerning pinout, jumper configurations, schematics, etc. for each board or module discussed in this section.

If you need to order parts, refer to the "Replacement Parts" list on page 7-1 to obtain descriptions for each part.

In an extreme case where you are unable to resolve a difficulty, please contact Advance Products and we will do all we can to help you resolve the problem. Our address and telephone number are located at the bottom of the front page in this Manual, or by pressing the **Help** keypad on the Operator's Panel.

IMPORTANT: If it becomes necessary to ship any part of your Reciprocating Die Spray System to Advance for repair, please make sure that you include a thorough description of the problem(s) you are having on your Return Materials Authorization form received from ADVANCE®.

## CHART

| *PROBLEM* | *POSSIBLE CAUSE* | *SOLUTIONS* |
|---|---|---|
| • Sprayer will not power up. | • Disconnect switch not on.<br>• Missing 120 VAC power.<br>• E-Stop jumper missing or customer interface is not connected. | • Turn disconnect switch on.<br>• Check 120 VAC line fuses.<br>• Install jumper (see Elect. Schematic Line 1.) |
| • Sprayer powers up, but won't run in Auto. | • Home sequence not performed.<br>• Auto/Manual selector switch not in Auto.<br>• No position entered in MMI program.<br>• No cycle start received. | • Home sequence must be performed after initial power up.<br>• Turn selector switch to AUTO.<br>• Enter a position other than zero. |

**Chart (continued)**

| *PROBLEM* | *POSSIBLE CAUSE* | *SOLUTIONS* |
|---|---|---|
| • Sprayer won't do a home sequence. | • Auto/Manual selector switch not in manual or is defective.<br>• Mechanical linkage bound up.<br>• Defective Servo Amp.<br>• Defective motor. | • Turn selector switch to MANUAL.<br>• Check mechanical linkages for binding.<br>• Check Servo Amp indicators for faults.<br>• Replace Servo Amp if unable to clear faults. |
| • Sprayer goes to spray positions, but does not spray. | • No air pressure.<br>• No lube pressure.<br>• Low lube pressure.<br>• Air or lube line is plugged.<br>• Spray head is clogged.<br>• Lube valve will not shift.<br>• Air valve will not shift.<br>• Spray head air pressure too low.<br>• Tank is out of lube.<br>• Control not programmed to spray. | • Restore air pressure.<br>• Restore lube pressure.<br>• Adjust lube pressure.<br>• Remove obstruction.<br>• Clean spray head with a solvent.<br>• Check output/replace lube valve.<br>• Check output/replace air valve.<br>• Adjust air pressure.<br>• Restore supply.<br>• Check program. |
| • Spray head constantly drizzles. | • Foreign material under poppet assembly.<br>• Spring broken.<br>• Poppet assembly worn.<br>• Lube valve will not turn off. | • Disassemble and clean.<br>• Replace spring.<br>• Replace poppet assembly.<br>• Replace lube valve. |

**Chart (continued)**

| *PROBLEM* | *POSSIBLE CAUSE* | *SOLUTIONS* |
|---|---|---|
| • Inconsistent spray mist. | • Spray head clogged under poppet assembly.<br>• Spray head nozzle clogged.<br>• Lube strainer plugged (on the incoming line to sprayer).<br>• Inadequate air supply.<br>• Tank is out of lube.<br>• Spray head needle is set for too fine a spray.<br>• Inadequate air supply or lube supply pressure. | • Clean spray head with a solvent.<br>• Rinse Lube strainer (on the incoming line to sprayer).<br>• Increase air supply.<br>• Add lube to tank.<br>• Adjust spray head needle.<br>• Check for minimum pressure fluctuation in air & lube. |
| • Sprayer retracts up too far. | • Home Limit switch out of adjustment.<br>• Defective Home Prox. switch. | • Lower prox. switch bracket. |
| • Sprayer completes cycle, but won't re-start. | • Cycle Start signal did not release. | • Verify Cycle Start signal and interface relay. Cycle Start is a momentary signal. |

| Servo Drive Errors | |
|---|---|
| AL10 Undervoltage | AL24 Motor output ground fault |
| AL12 Memory error 1 | AL25 Absolute position erase |
| AL13 Clock Error | AL30 Regenerative error |
| AL15 Memory error 2 | AL31 Overspeed |
| AL16 Encoder error 1 | AL32 Overcurrent |
| AL17 Board error 2 | AL33 Overvoltage |
| AL19 Memory error 3 | AL35 Command pulse frequency error |
| AL1A Motor combination error | AL37 Parameter error |
| AL20 Encoder error 2 | AL45 Main circuit device overheat |

| Servo Drive Warnings | |
|---|---|
| ALE0 | Excessive regenerative warning |
| ALE1 | Overload warning |
| ALE3 | Absolute position counter warning |
| ALE5 | ABS time-out warning |
| ALE6 | Servo emergency stop |
| ALE9 | Main circuit off warning |
| ALEA | ABS servo on warning |

**CAUTION: When any alarm has occurred, eliminate its cause, ensure safety, then reset the alarm, and restart operation. Otherwise, injury may occur.**

When any of the following alarms has occurred, always remove its cause and allow about 30 minutes for cooling before resuming operation. If operation is resumed by switching control circuit power off, then on to reset the alarm, the servo amplifier and servo motor may become faulty.

- **Regenerative error (AL30)**
- **Overload 1 (AL50)**
- **Overload 2 (AL51)**

***The alarm can be deactivated by switching power off, then on or by turning on the reset signal (RES).***

When an alarm occurs, the trouble signal (ALM) switches off and the dynamic brake is operated to stop the servomotor. At this time, the display indicates the alarm number.
The servo motor comes to a stop. Remove the cause of the alarm in accordance with this section. The optional Servo Configuration Software may be used to refer to the cause.

| Display | Name | Definition | Cause | Action |
|---|---|---|---|---|
| AL10 | Undervoltage | Power supply voltage dropped. MR-J2S uA: 160V or less. | 1. Power supply voltage is low. | Inspect the power supply. |
| | | | 2. Power failed instantaneously for 15 ms or longer. | |
| | | | 3. Shortage of power supply capacity caused the power supply voltage to drop at start, etc. | |
| | | | 4. Power switched on within 5s after it had switched off. | |
| | | | 5. Faulty parts in the servo amplifier<br>Checking method<br>Alarm (AL10) occurs if power is switched on after all connectors are disconnected. | Change the servo amplifier. |
| AL12 | Memory error | RAM, memory fault | Faulty parts in the servo amplifier<br>Checking method<br>Alarm (any of AL12,13 and 15) occurs if power is switched on after all connectors are disconnected. | Change the servo amplifier |
| AL13 | Clock error | Printed board fault | | |
| AL15 | Memory error | EEP-ROM fault | | |
| AL16 | Encoder error 1 | Communication error occurred between encoder and servo amplifier | 1. CN2 connector disconnected. | Connect correctly. |
| | | | 2. Encoder fault | Change the servo motor. |
| | | | 3. Encoder cable faulty (Wire breakage or shorted) | Repair or change cable. |
| | | | 4. Wrong combination of servo amplifier and servo motor. | Use correct combination. |
| AL17 | Board error 2 | CPU/parts fault | Faulty parts in the servo amplifier<br>Checking method<br>Alarm (AL17 or AL19) occurs if power is switched on after all connectors are disconnected. | Change the servo amplifier. |
| AL19 | Memory Error | ROM memory fault | | |
| AL1A | Motor combination error | Wrong combination of servo amplifier and servo motor. | Wrong combination of servo amplifier and servo motor connected. | Use correct combination. |
| AL20 | Encoder error 2 | Communication error occurred between encoder and servo amplifier. | 1. Encoder connector disconnected. | Connect correctly. |
| | | | 2. Encoder cable faulty (Wire breakage or shorted) | Repair or change the cable. |
| AL24 | Motor output ground fault | Ground Fault occurred at the servo motor outputs (U,V and W phases) of the servo amplifier. | 1. Power input wires and servo motor output wires are in contact at main circuit terminal block (TE1). | Connect correctly. |
| | | | 2. Servo motor power cable insulation deteriorated. | Change the cable. |
| AL25 | Absolute position erase | Absolute position data in error | 1. Reduced voltage of super capacitor in encoder. | After alarm has occurred, hold power on for a few minutes, and switch it off once, then on again. Make home position return again. |
| | | | 2. Battery voltage low | Change battery.<br>Make home position return again. |
| | | | 3. Battery cable or batter is faulty. | |

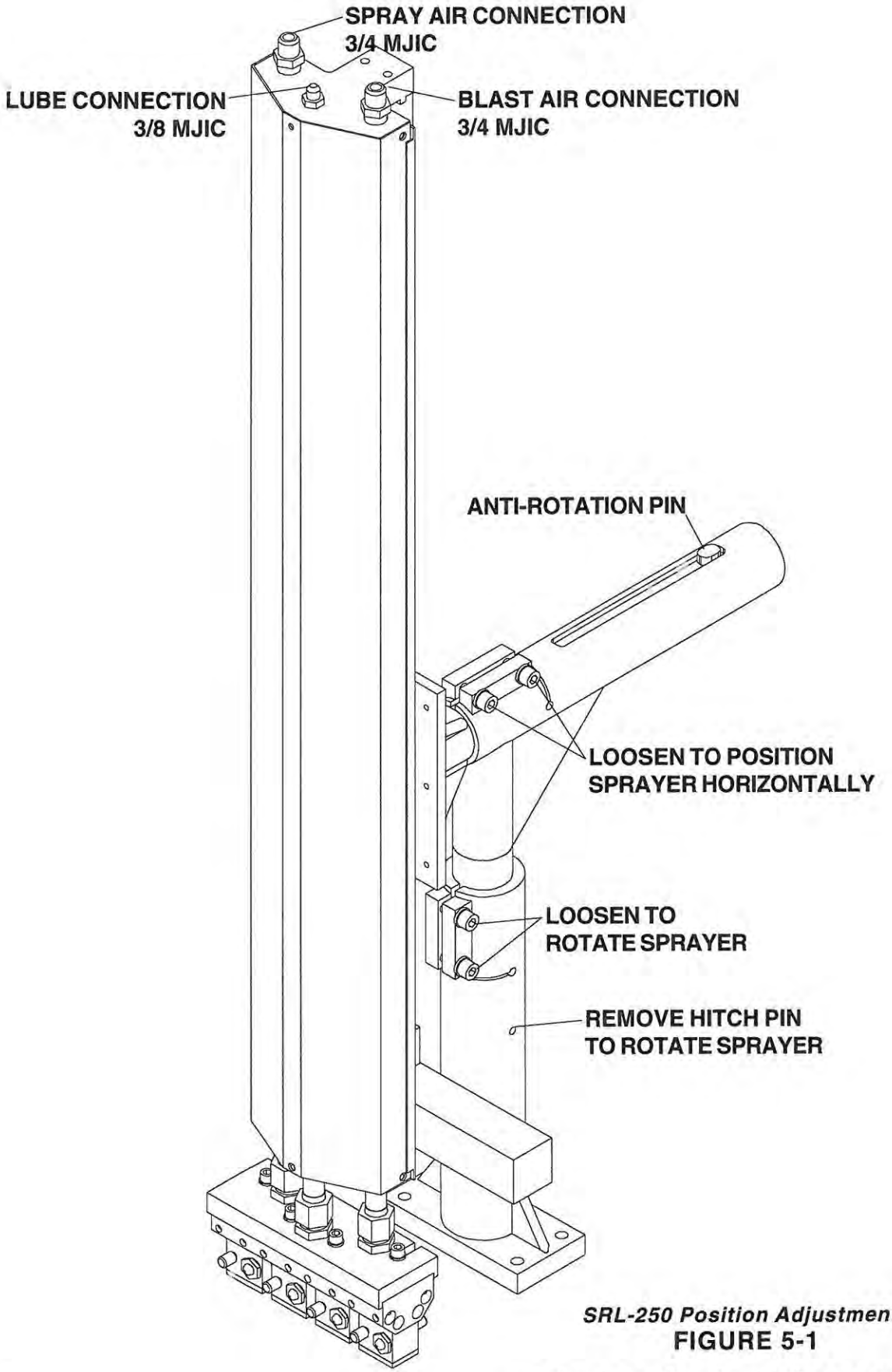
| Display | Name | Definition | Cause | Action |
|---|---|---|---|---|
| AL30 | Regenerative alarm | Permissible regenerative power of the built-in regenerative brake resistor or regenerative brake option is exceeded. | 1. Wrong setting of parameter No. 0 | Set correctly. |
| | | | 2. Built-in regenerative brake resister or regenerative brake option is not connected. | Connect correctly. |
| | | | 3. High-duty operation or continuous regenerative operation caused the permissible regenerative power of the regenerative brake option to be exceeded.<br>Checking method<br>Show the status display and check the regenerative load ratio. | 1. Reduce the frequency of positioning.<br>2. Use the regenerative brake option of larger capacity.<br>3. Reduce the load. |
| | | | 4. Power supply voltage is abnormal. 260V or more. | Inspect power supply. |
| | | Regenerative transistor fault. | 5. Regenerative transistor faulty.<br>Checking method<br>1) The regenerative brake option has overheated abnormally.<br>2) The alarm occurs even after removal of the built-in regenerative brake resistor or regenerative brake option. | Change the servo amplifier. |
| AL31 | Overspeed | Speed has exceeded the instantaneous permissible speed. | 1. Input command pulse frequency exceeded the permissible instantaneous speed frequency. | Set command pulses correctly. |
| | | | 2. Small acceleration/deceleration time constant caused overshoot to be large. | Increase acceleration/deceleration time. constant. |
| | | | 3. Servo system is unstable causing overshoot. | 1. Re-set servo gain to proper value.<br>2. If servo gain cannot be set to proper value:<br>1) Reduce load inertia moment ratio: or<br>2) Reexamine acceleration / deceleration time constant. |
| | | | 4. Electronic gear ratio is large (parameters No.3, 4) | Set correctly. |
| | | | 5. Encoder faulty. | Change the servo motor. |
| AL32 | Overcurrent | Current that flew is higher than the permissible current of the servo amplifier. | 1. Short occurred in servo amplifier. output phases U, V and W. | Correct the wiring. |
| | | | 2. Transistor (IPM) of the servo amplifier faulty.<br>Checking method<br>Alarm (AL32) occurs if power is switched on after U,V and W are disconnected. | Change the servo amplifier. |
| | | | 3. Ground fault occurred in servo amplifier output phases U, V and W. | Connect the wiring. |
| | | | 4. External noise caused the overcurrent detection circuit to misoperate. | Take noise suppression measures. |

| Display | Name | Definition | Cause | Action |
|---|---|---|---|---|
| AL33 | Overvoltage | Converter bus voltage exceeded 400V. | 1. Lead of built-in regenerative brake resistor or regenerative brake option is open or disconnected. | 1. Change lead<br>2. Connect correctly. |
| | | | 2. Regenerative transistor faulty. | Change servo amplifier. |
| | | | 3. Wire breakage of built-in regenerative brake resistor or regenerative brake option. | 1. For wire breakage of built-in regenerative brake resistor, change servo amplifier. |
| | | | | 2. For wire breakage of regenerative brake option, change regenerative brake option. |
| | | | 4. Capacity of built-in regenerative brake resistor or regenerative brake option is insufficient. | Add regenerative brake option or increase capacity. |
| AL35 | Command pulse frequency error | Input pulse frequency of the command pulse is too high. | 1. Pulse frequency of the command pulse is too high. | Change the command pulse frequency to a proper value. |
| | | | 2. Noise entered command pulses. | Take action against noise. |
| | | | 3. Command device failure. | Change the command device. |
| AL37 | Parameter error | Parameter setting is wrong. | 1. Servo amplifier fault caused the parameter setting to be rewritten. | Change the servo amplifier. |
| | | | 2. Regenerative brake option not used with servo amplifier was selected in parameter No. 0. | Set parameter No. 0 correctly. |
| AL45 | Main circuit device overheat | Main circuit device overheat | 1. Servo amplifier faulty. | Change the servo amplifier. |
| | | | 2. The power supply was turned on and off continuously by overloaded status. | Review the drive method. |
| AL46 | Servo motor overheat | Servo motor temperature rise actuated the thermal protector. | 1. Ambient temperature of servo motor is over 40°C. | Review environment so that ambient temperature is 0 to 40°C. |
| | | | 2. Servo motor is overloaded. | 1. Reduce load.<br>2. Review operation pattern.<br>3. Use servo motor that provides larger output. |
| | | | 3. Thermal protector in encoder is faulty. | Change servo motor. |
| AL50 | Overload 1 | Load exceeded overload protection characteristic of servo amplifier.<br>Load ratio 300%: 2.5s or more<br>Load ratio 200%: 100s or more | 1. Servo amplifier is used in excess of its continuous output current. | 1. Reduce load.<br>2. Review operation pattern.<br>3. Use servo motor that provides larger output. |
| | | | 2. Servo system is unstable and hunting. | 1. Repeat acceleration/ deceleration to execute auto tuning.<br>2. Change auto tuning response setting.<br>3. Set auto tuning to OFF and make gain adjustment manually. |
| | | | 3. Machine struck something. | 1. Review operation pattern.<br>2. Install limit switches. |
| | | | 4. Wrong connection of servo motor. Servo amplifier's output terminals U, V, W do not match servo motor's input terminals U, V, W. | Connect correctly. |
| | | | 5. Encoder faulty.<br>Checking method<br>When the servo motor shaft is rotated slowly with the servo off, the cumulative feedback pulses should vary in proportion to the rotary angle. If the indication skips or returns midway, the encoder is faulty. | Change the servo motor. |

| Display | Name | Definition | Cause | Action |
|---|---|---|---|---|
| AL51 | Overload 2 | Machine colision or the like, caused max. output current to flow successively for several seconds. Servo motor locked: 1s or more | 1. Machine struck something. | 1. Review operation pattern.<br>2. Install limit switches. |
| | | | 2. Wrong connection of servo motor. Servo Amplifier's output terminals U, V, W do not match servo motor's input terminals U, V, W. | Connect correctly. |
| | | | 3. Servo system is unstable and hunting. | 1. Repeat acceleration/deceleration to execute auto tuning.<br>2. Change auto tuning response setting.<br>3. Set auto tuning to OFF and make gain adjustment manually. |
| | | | 4. Encoder faulty.<br>Checking method<br>When the servo motor shaft is rotated slowly with the servo off, the cumulative feedback pulses should vary in proportion to the rotary angle. If the indication skips or returns midway, the encoder is faulty. | Change the servo motor. |
| AL52 | Error excessive | Droop pulse value of the deviation counter exceeded 80k pulses. | 1. Acceleration/deceleration time constant constant is too small. | Increase the acceleration/deceleration time constant. |
| | | | 2. Torque limit value (parameter No. 28) is too small. | Increase torque limit value. |
| | | | 3. Motor cannot be started due to torque shortage caused by power supply drop. | 1. Review the power supply capacity.<br>2. Use servo motor which provides larger output. |
| | | | 4. Position control gain 1 (parameter No. 6) value is small. | Increase set value and adjust to ensure proper operation. |
| | | | 5. Servo motor shaft was rotated by external force. | 1. When torque is limited, increase the limit value.<br>2. Reduce load.<br>3. Use servo motor that provides larger output. |
| | | | 6. Machine struck something. | 1. Review operation pattern.<br>2. Install limit switches. |
| | | | 7. Encoder faulty | Change the servo motor. |
| | | | 8. Wrong connection of servo motor. Servo amplifier's output terminals U, V, W do not match servo motor's input terminals U, V, W. | Connect correctly. |
| AL8A | Serial communication time-out | RS-232 or RS-422 communication stopped for longer than the time set in parameter No. 56. | 1. Communication cable breakage. | Repair or change communication cable. |
| | | | 2. Communication cycle longer than parameter No. 56 setting. | Set correct value in parameter. |
| | | | 3. Wrong protocol. | Correct protocol. |
| AL8E | Serial communication | Serial communication error occurred between servo amplifier and communication device (e.g. personal computer). | 1. Communication connector is disconnected. | Connect correctly. |
| | | | 2. Communication cable fault. (Open cable or short circuit) | Repair or change the cable. |
| | | | 3. Communication device (e.g. personal computer) faulted | Change the communication device (e.g. personal computer). |
| 8.8.8.8.8 | Watchdog | CPU, parts faulty | Fault of parts in servo amplifier.<br>Checking method<br>Alarm (8.8.8.8.8) occurs if power is switched on after all connectors are disconnected. | Change servo amplifier |

Warnings:
If ALE1 (overload warning) occurs, operation may be continued but an alarm may take place or proper operation may not be performed. If another warning (ALE6 or ALE9) occurs, the servo smplifier will go into a servo-off status. Eliminate the cause of the warning according to this section. Use the optional Servo Configuration software to refer to the cause of warning.

| Display | Name | Definition | Cause | Action |
|---|---|---|---|---|
| AL92 | Open battery cable warning | Absolute position detection system battery voltage is low. | 1. Battery cable is open. | Repair cable or replace. |
| | | | 2. Battery voltage dropped to 2.8V or less. | Change battery. |
| AL96 | Zero setting error | 1. In incremental system: Zeroing could not be made.<br>1. In absolute position detection system: Zero setting could not be made. | 1. Droop pulses remaining are greater than the in-position range setting. | Remove the cause of droop pulse occurance. |
| | | | 2. Command pulse entered after the clearing of droop pulses. | Do not enter command pulse after clearing of droop pulses. |
| | | | 3. Creep speed high. | Reduce creep speed. |
| ALE0 | Excessive regenerative warning | There is a possibility that regenerative power may exceed permissible regenerative power of built-in regenerative brake resistor or regenerative brake option. | Regenerative power increased to 85% or more of permissible regenerative power of built-in regenerative brake resistor or regenerative brake option.<br>Checking method<br>Invoke the status display and check the regenerative load ratio. | 1. Reduce frequency of positioning.<br>2. Change regenerative brake option for the one with larger capacity.<br>3. Reduce load. |
| ALE1 | Overload warining | There is a possibility that overload alarm 1 or 2 may occur. | Load increased to 85% or more of overload alarm 1 or 2 occurance level.<br>Cause, checking method<br>Refer to AL50, AL51. | Refer to AL50, AL51 |
| ALE3 | Absolute position counter warning | Absolute position encoder pulses faulty. | 1. Noise entered the encoder. | Take noise suppression measures. |
| | | | 2. Encoder faulty. | Change servo motor. |
| ALE5 | ABS time-out warning | | 1. PC ladler program wrong. | Contact APC for program correction. |
| | | | 2. ST2 - TLC signal mis-wiring | Connect properly. |
| ALE6 | Servo emergency stop | EMG-SG are open. | External emergency stop was made valid. (EMG-SG opened.) | Ensure safety and deactivate emergency stop. |
| ALE9 | Main circuit off warning | Servo was switched on with main circuit power off. | | Switch on main circuit power. |
| ALEA | ABS servo on warning | Servo on signal (SON) turned on more than 1s after servo amplifier had entered absolute position data transfer mode. | 1. PC ladder program wrong. | 1. Contact APC for program correction. |
| | | | 2. SON signal mis-wiring | 2. Connect properly. |




***SRL-250 Position Adjustments***
**FIGURE 5-1**

# MAINTENANCE AND ADJUSTMENTS

- 5 -

## SPRAYER POSITION ADJUSTMENTS

The sprayer mechanism is not designed to be removed from the base. The sprayer can be rotated in the base to provide clearance during a die change out. To rotate the sprayer, follow the below procedure:

1. Loosen the (2) ½-13 SHCS in the front of the base.
2. Remove the 3/8 hitch pin from the base
3. Rotate the sprayer mechanism in the base.

Repeat this procedure in reverse order to reposition the sprayer in the correct position after the new die has been installed.

The horizontal distance between the spray manifold and the base can also be adjusted.

1. Loosen the (2) ½-13 shcs on the horizontal tube of the sprayer. There is an anti rotation pin that will prevent the unit from rotation when these SHCS' are loosened.
2. Manually push the sprayer to the desired position. Caution: DO NOT push against the manifold or against the chromed tubes when trying to reposition the sprayer. This may damage the sprayer.
3. Tighten the (2) ½-13 shcs to prevent the sprayer from moving.

See Figure 3.

## MAINTENANCE

**30 days**

Fully extend the spray manifold into the die area. Turn the sprayer off to prevent accidental movement of the sprayer.

Remove the front cover of the sprayer mechanism. There are (3) ¼-20 bolts on the top and bottom of the cover that hold the cover in place.

Wipe the 2 chromed inner telescoping tubes clean with a clean cloth.

Wipe the 3 chromed outer telescoping tubes clean with a clean cloth.

Check that all air and lube fittings are tight. These fittings are located on the mechanism and the valve plate located remote from the sprayer mechanism. Tighten any lose fitting.

Inspect the lube hose for wear or damage. Replace if it is damaged.

Check that the fittings that hold the outer telescoping tube to the platen and the mechanism are tight. Tighten any lose fitting.

Check that the (6) mounting blocks that hold the linear actuator to the base are tight. Tighten any lose blocks.

Wipe the motor and gearbox clean with a clean cloth.

Replace the sprayer cover, power the unit up, move the sprayer to the home position.

**90 days or 100,000 cycles**
Fully extend the spray manifold into the die area. Turn the sprayer off to prevent accidental movement of the sprayer.

Remove the front cover of the sprayer mechanism. There are (3) ¼-20 bolts on the top and bottom of the cover that hold the cover in place.

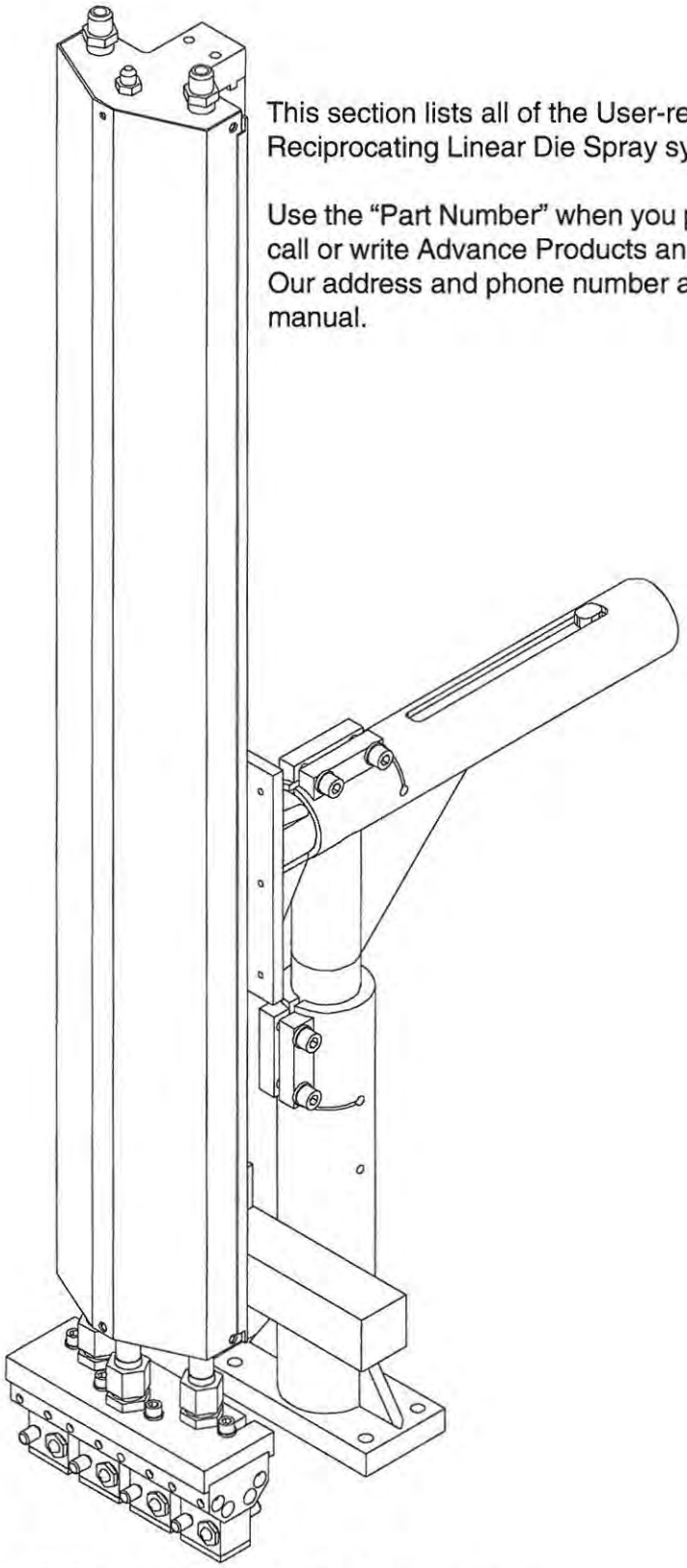
Lubricate the drive unit rails by the below process.

1. At about half the stroke press and manually move the belt in order to see one of the two rails inside the unit,
2. Using a grease syringe or brush, apply a conspicuous quantity of grease on the raceways. Use a lithium based grease of medium consistency.
3. Repeat this procedure for the other rail.

Replace the sprayer cover, power the unit up, move the sprayer to the home position. Cycle the unit up and down 5 – 10 times for the full stroke of the unit at slow speed to distribute the grease on the full length of the rails.

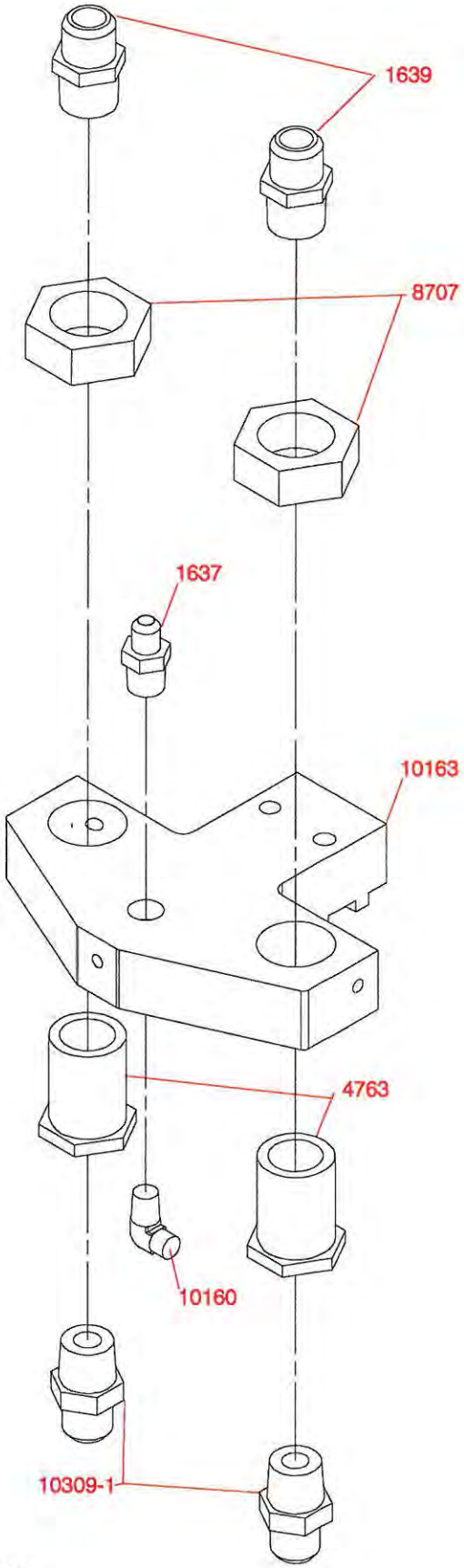
**6 months**
Remove and replace the lube filter with new. This interval may change depending on your die lube. Dirty lube can cause your spray head to malfunction. Small contaminants in the lube can prevent the poppet inside of the spray head from sealing properly. This will cause the spray head to leak. As these small contaminates build up in the spray head, the spray head may become plugged and no lube will pass through the spray head.

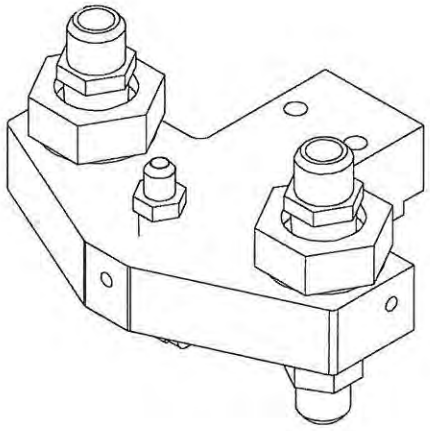
# REPLACEMENT PARTS - 6 -



This section lists all of the User-replaceable components in the SRL-250 Servo Reciprocating Linear Die Spray system.

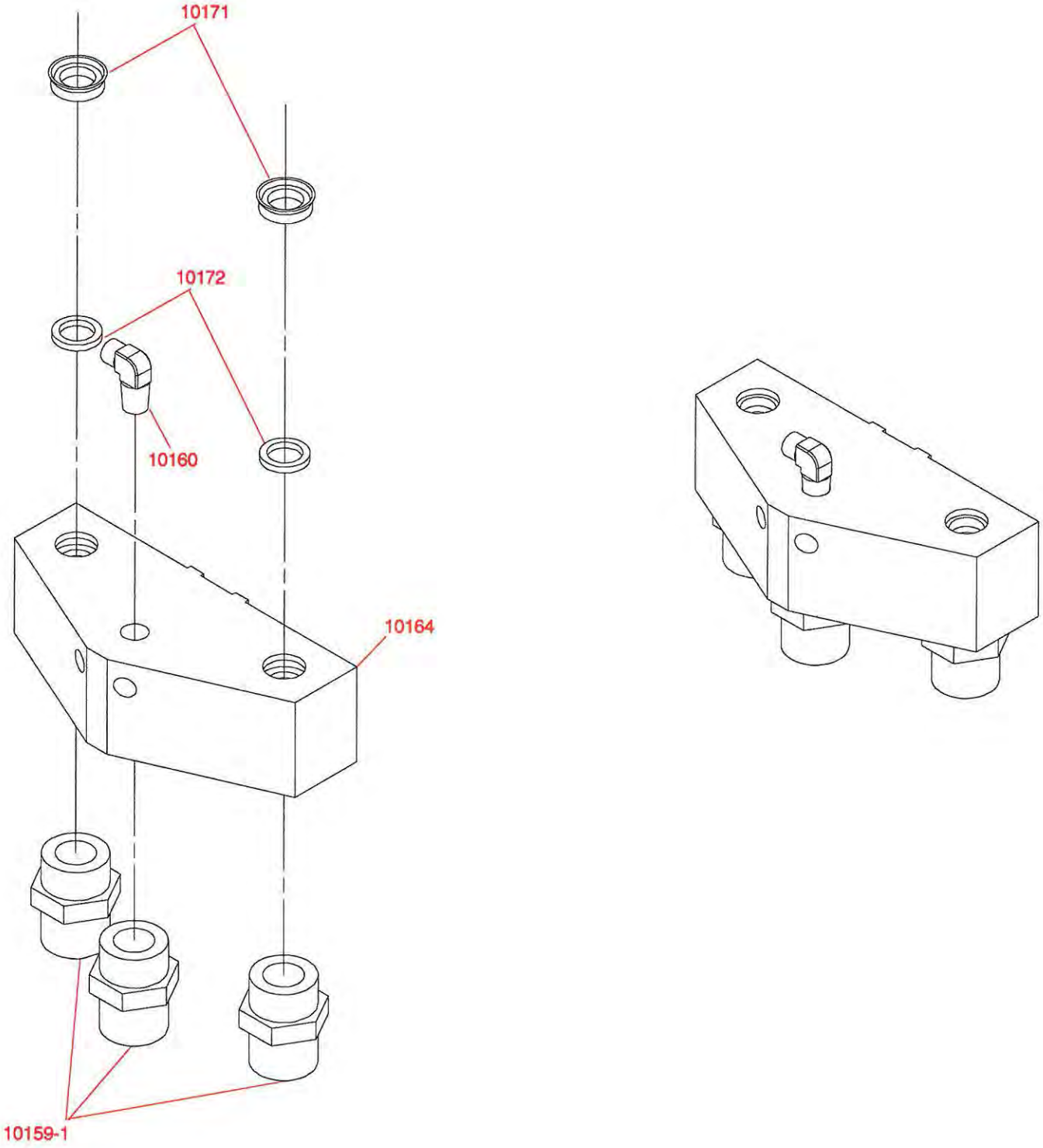
Use the "Part Number" when you place your order to help speed delivery. You can call or write Advance Products and we will ship the part to you as soon as possible. Our address and phone number are listed at the bottom of the front page of this manual.



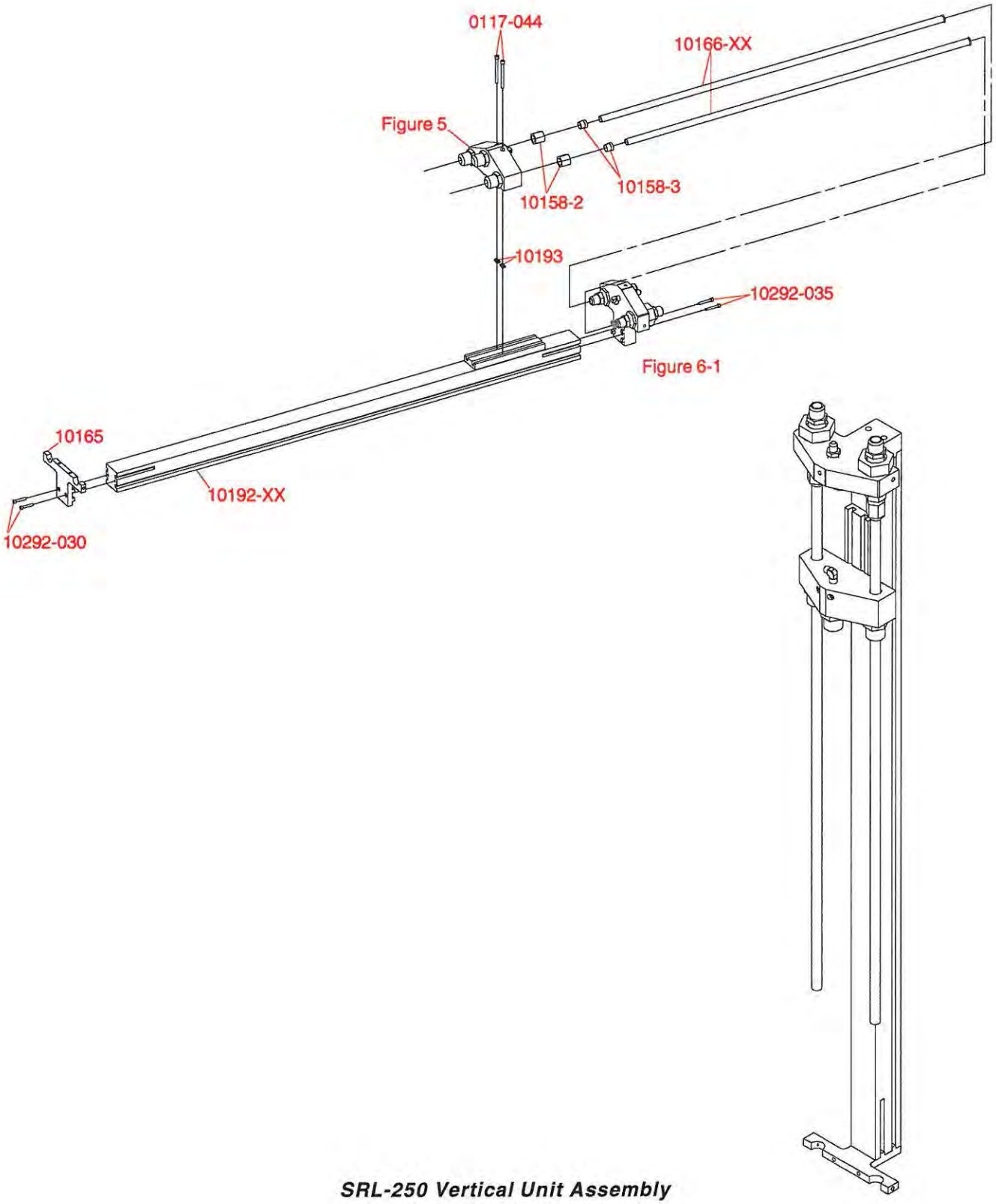



***SRL-250 Top Block Assembly***

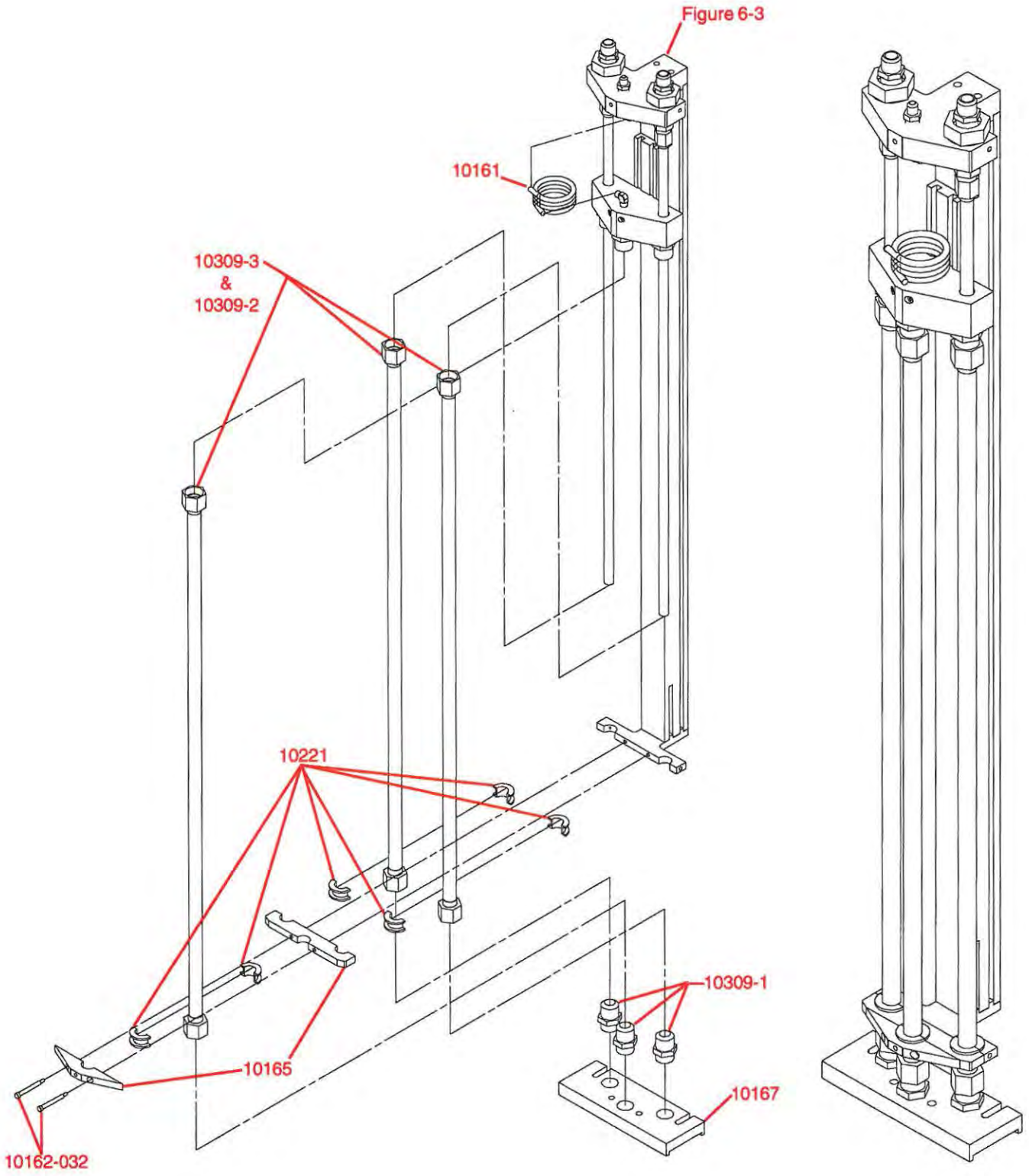
**FIGURE 6-1**



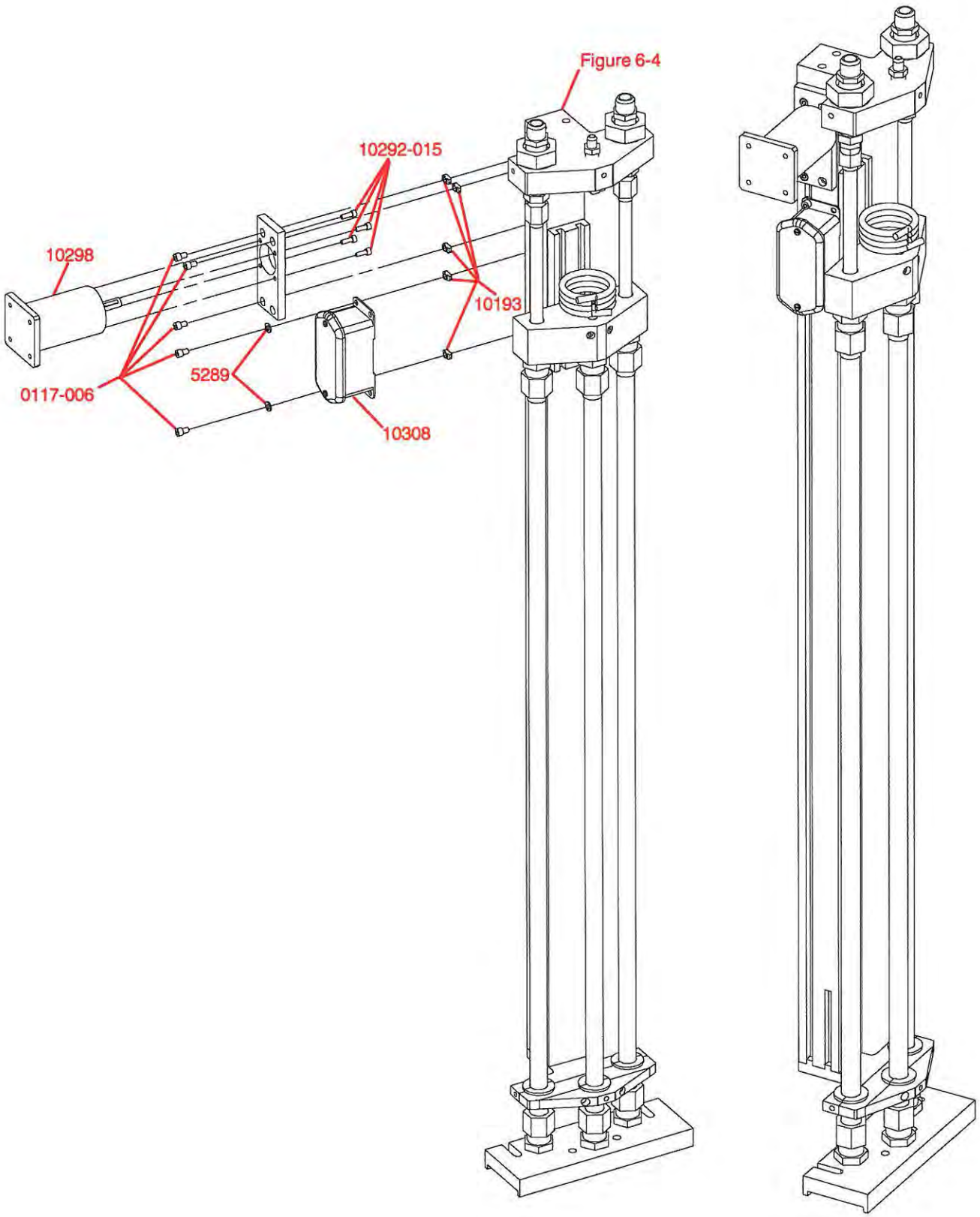

***SRL-250 Slide Block Assembly***
**FIGURE 6-2**



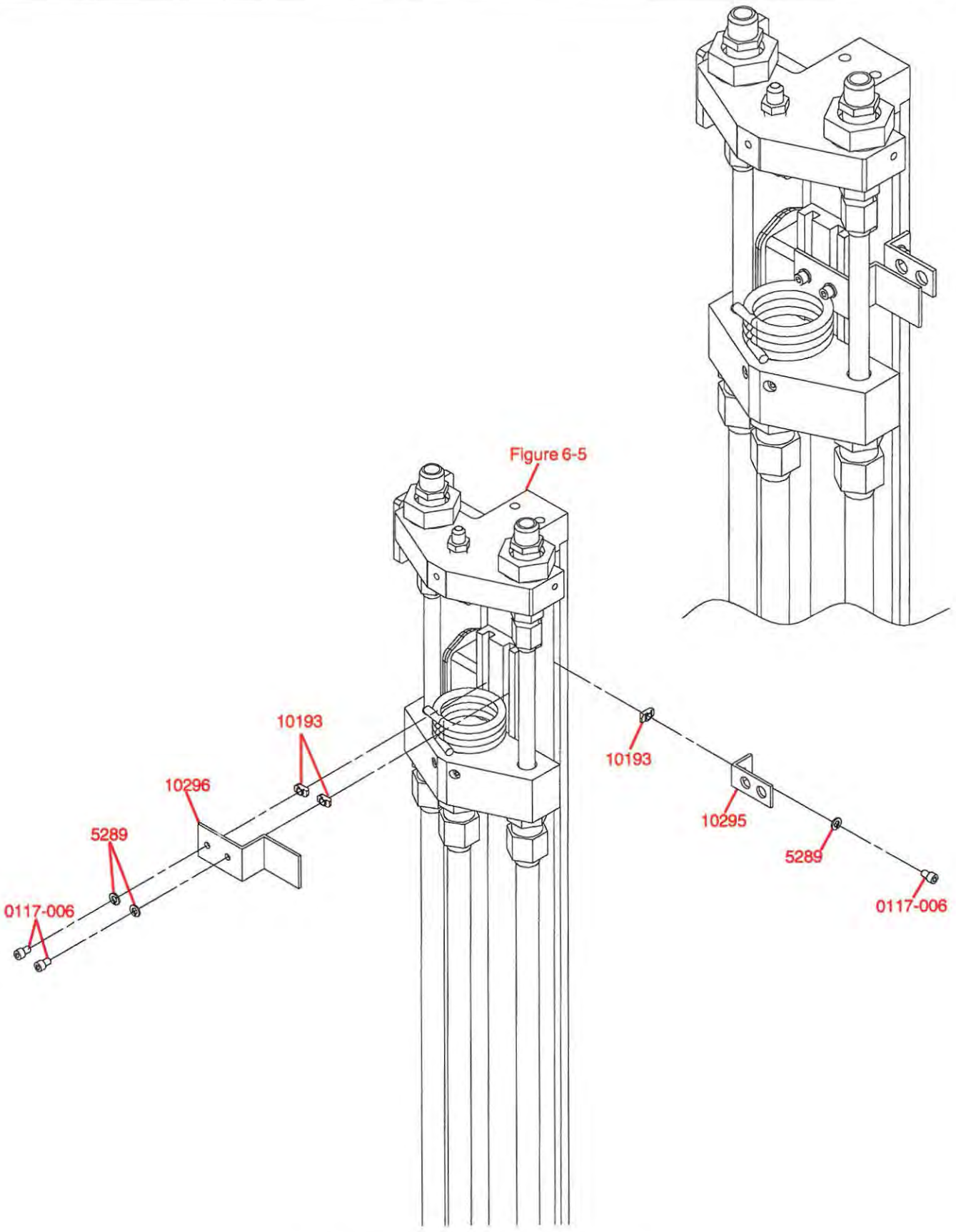

***SRL-250 Vertical Unit Assembly***
**FIGURE 6-3**



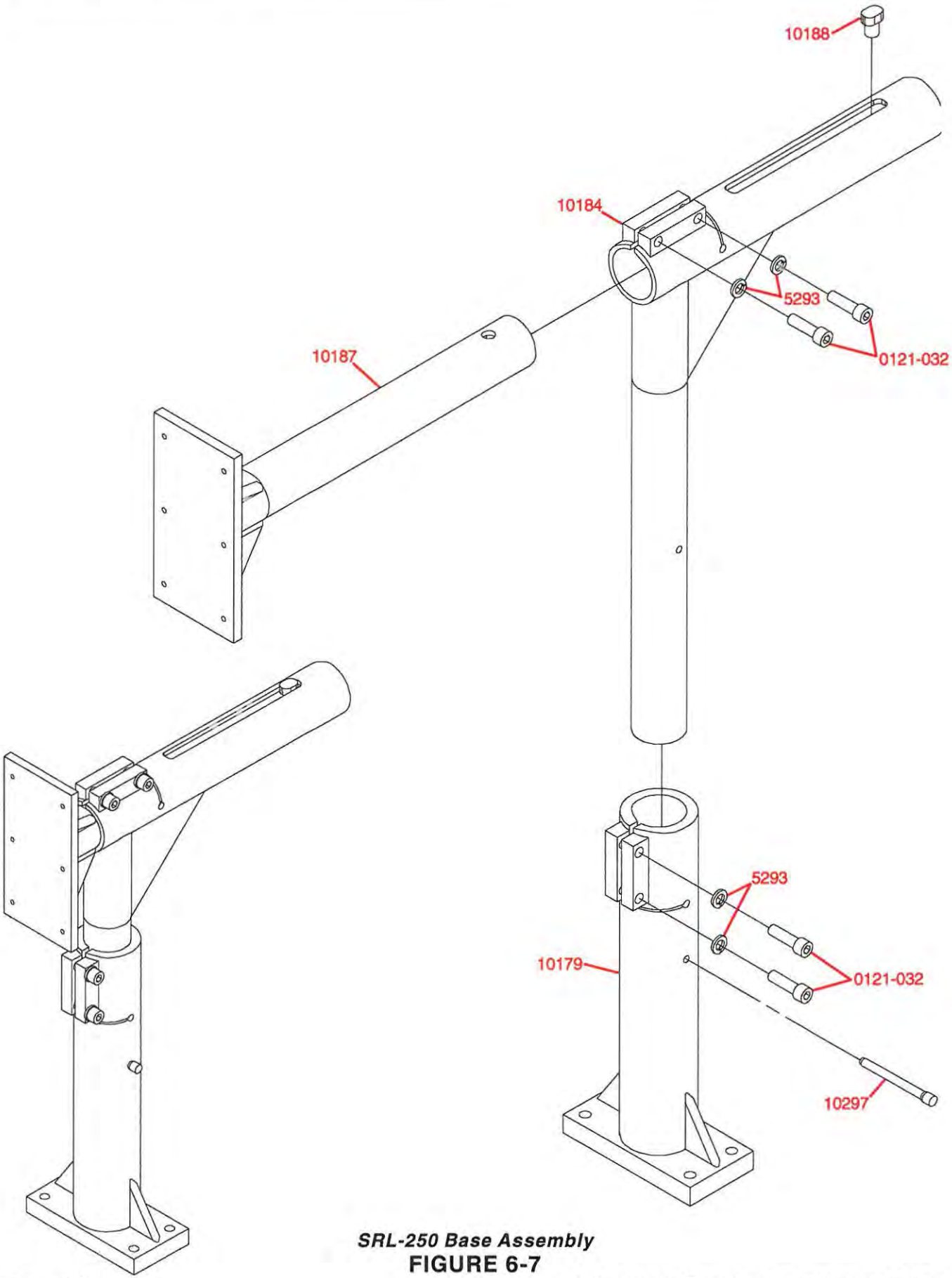

***SRL-250 Vertical Unit Assembly 2***
**FIGURE 6-4**



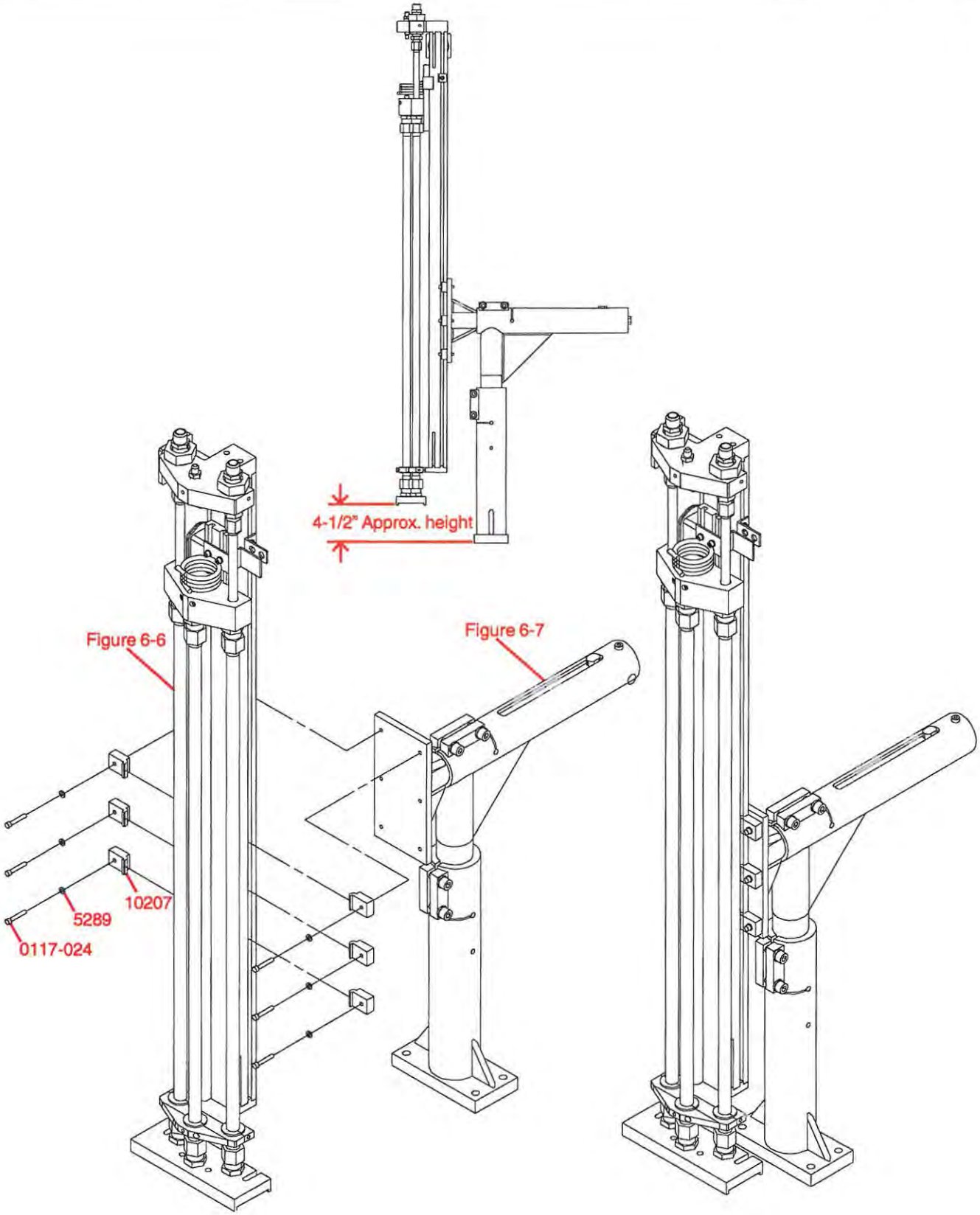

***SRL-250 Gearbox Attachment Assembly***
**FIGURE 6-5**



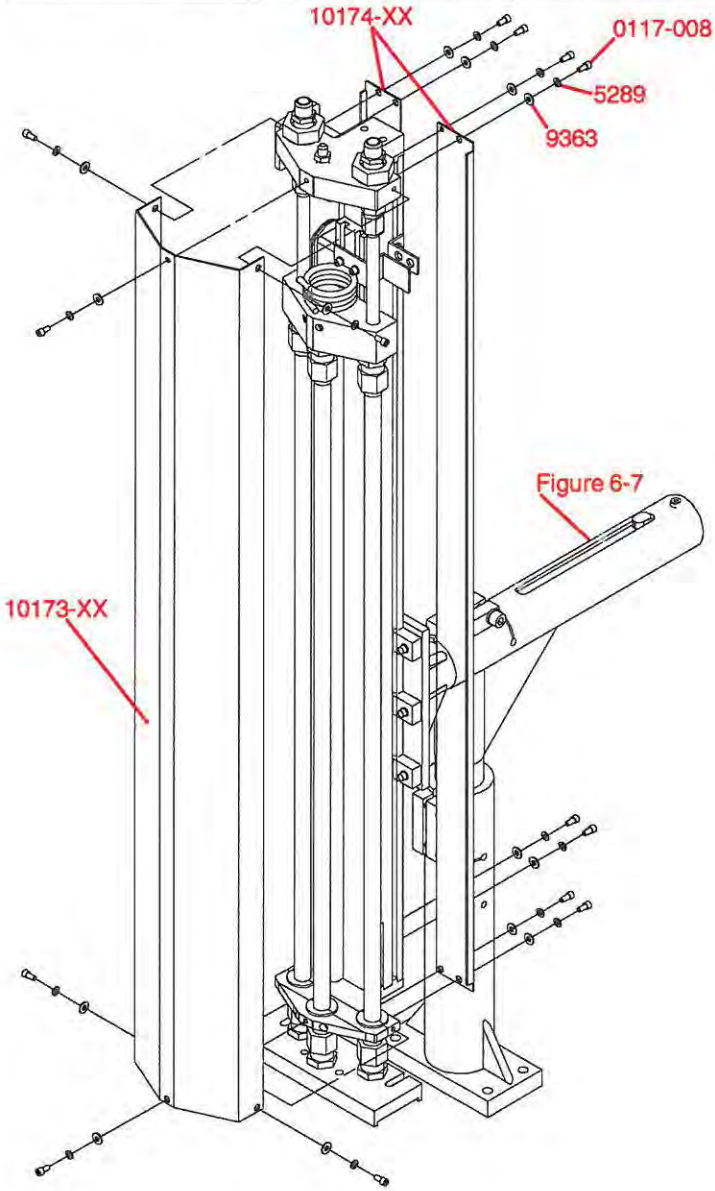

***SRL-250 Prox. Switch Bracket Assembly***
**FIGURE 6-6**

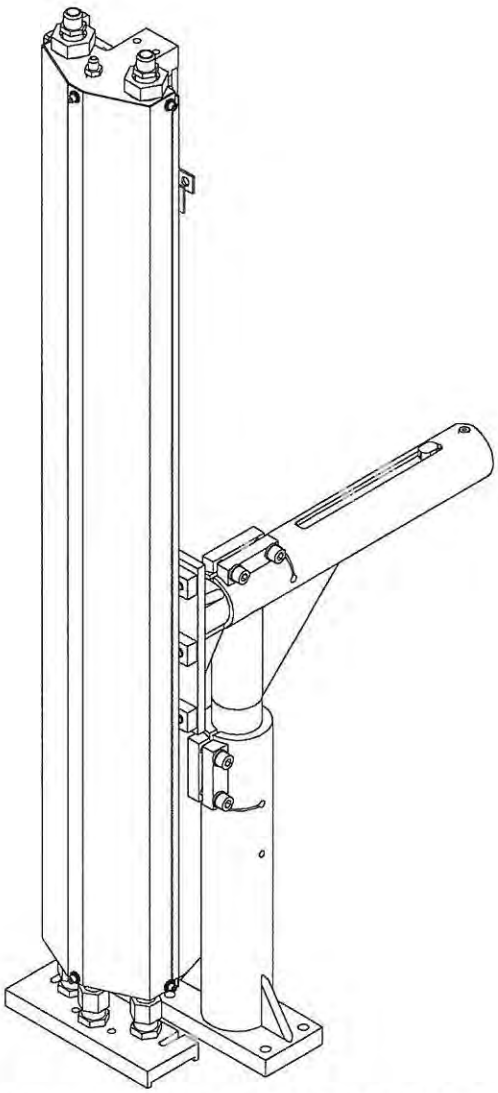



***SRL-250 Base Assembly***
**FIGURE 6-7**



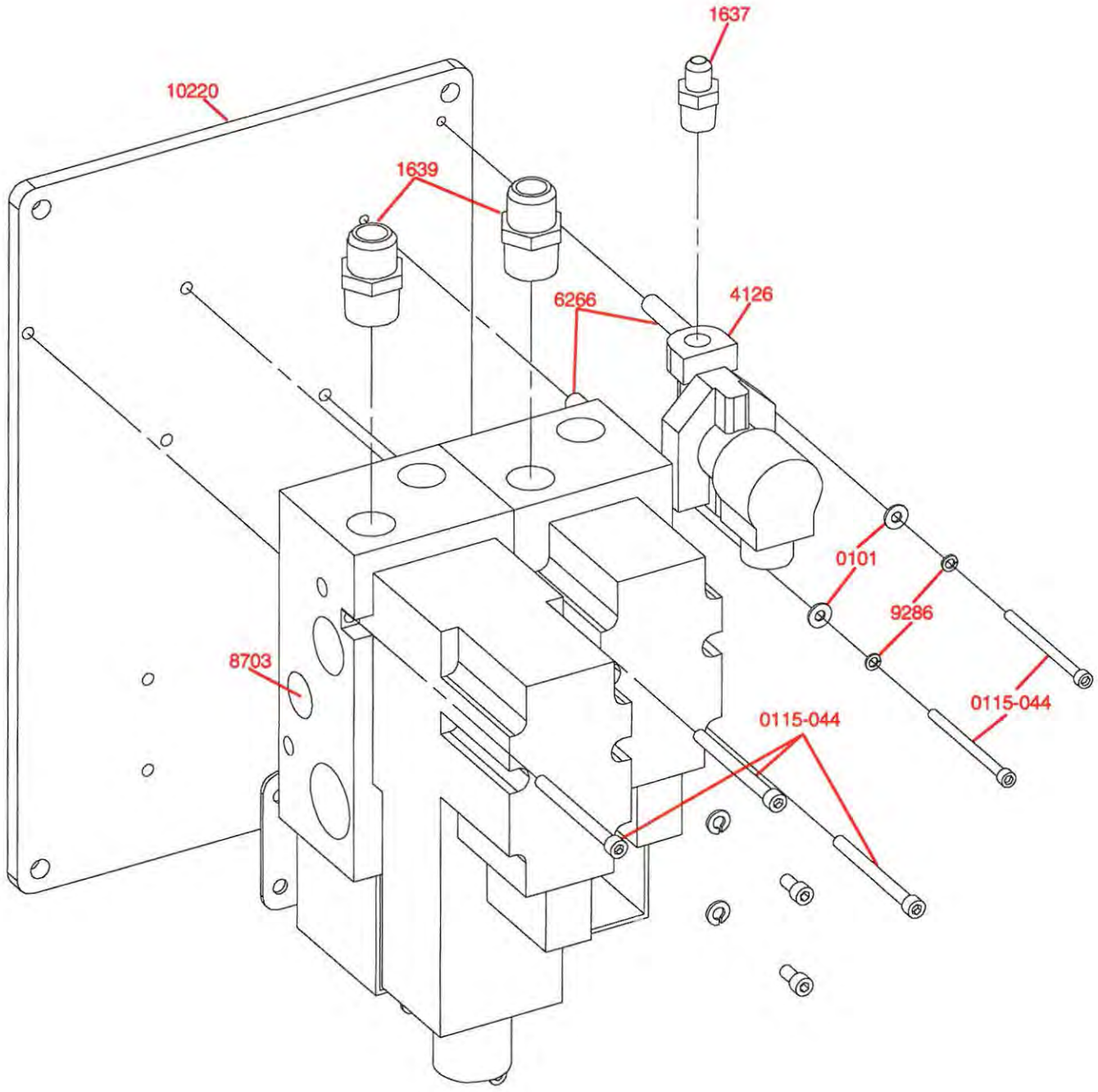

***SRL-250 Mounting Vertical Unit to Base Assembly***
**FIGURE 6-8**



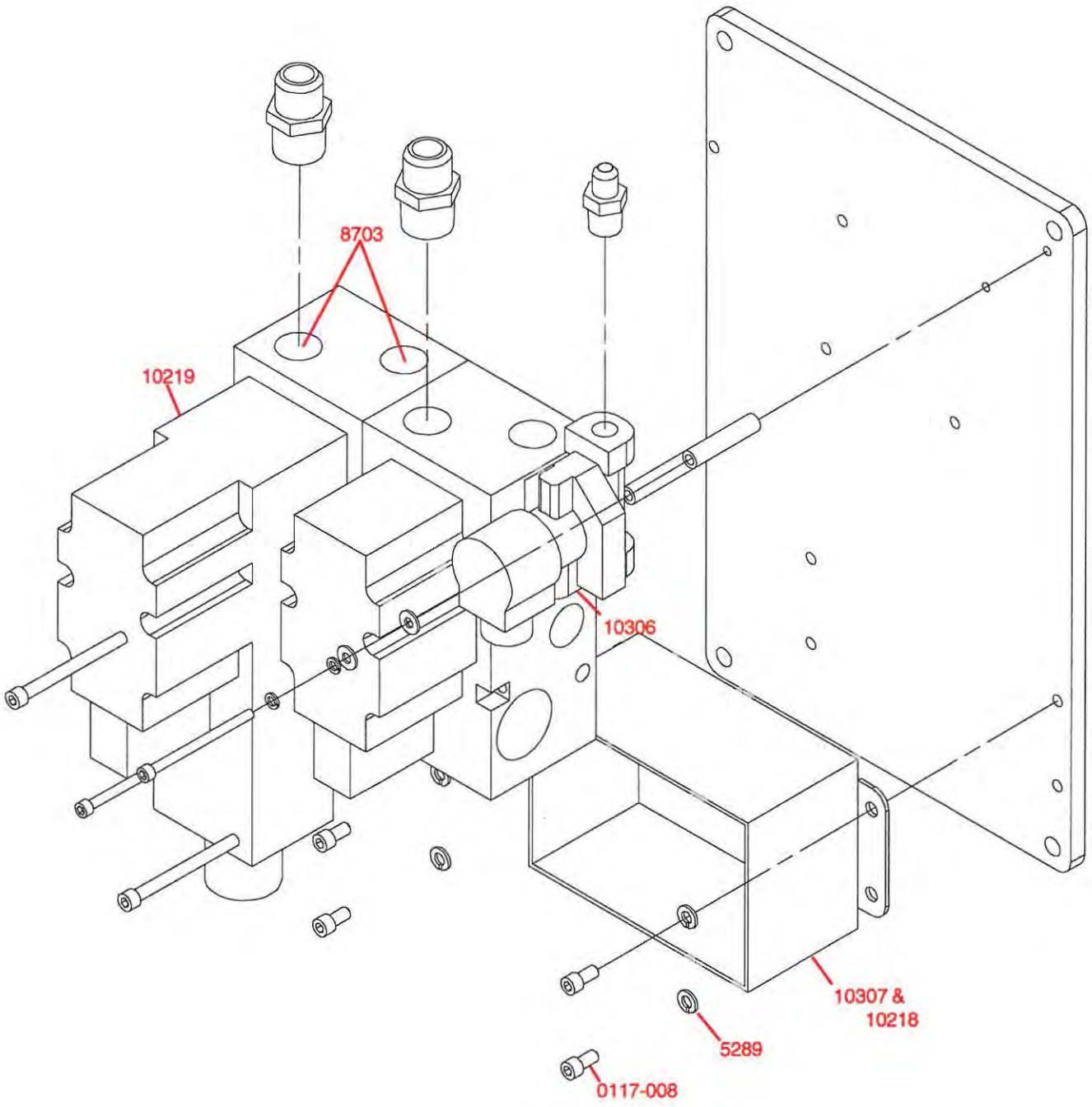



***SRL-250 Cover Installa***

**FIGURE 6-9**




***SRL-250 Valve Plate Assembly***
**FIGURE 6-10A**




***SRL-250 Valve Plate Assembly***
**FIGURE 6-10B**

## MODEL SH-3000 SPRAY HEAD

After years of research and development, Advance, the industry leader in spraying technology, has developed the ultimate spray head for die spraying. It is the Advance Model SH-3000 spray head.

The Model SH-3000 has fewer parts and an improved design over previous Advance models. Adjustablility is greatly improved with a full three-turn range compared to 1-1/2 on the Model 2000. There is also improved atomization consistency over a larger variation of air to lube pressure.

The Model SH-3000 offers a wide range of spray patterns with 9 interchangeable nozzles from ultra-fine mist to maximum output. Special nozzles are available that offer consistent flow/lube rates at a given pressure regardless of air pressure.

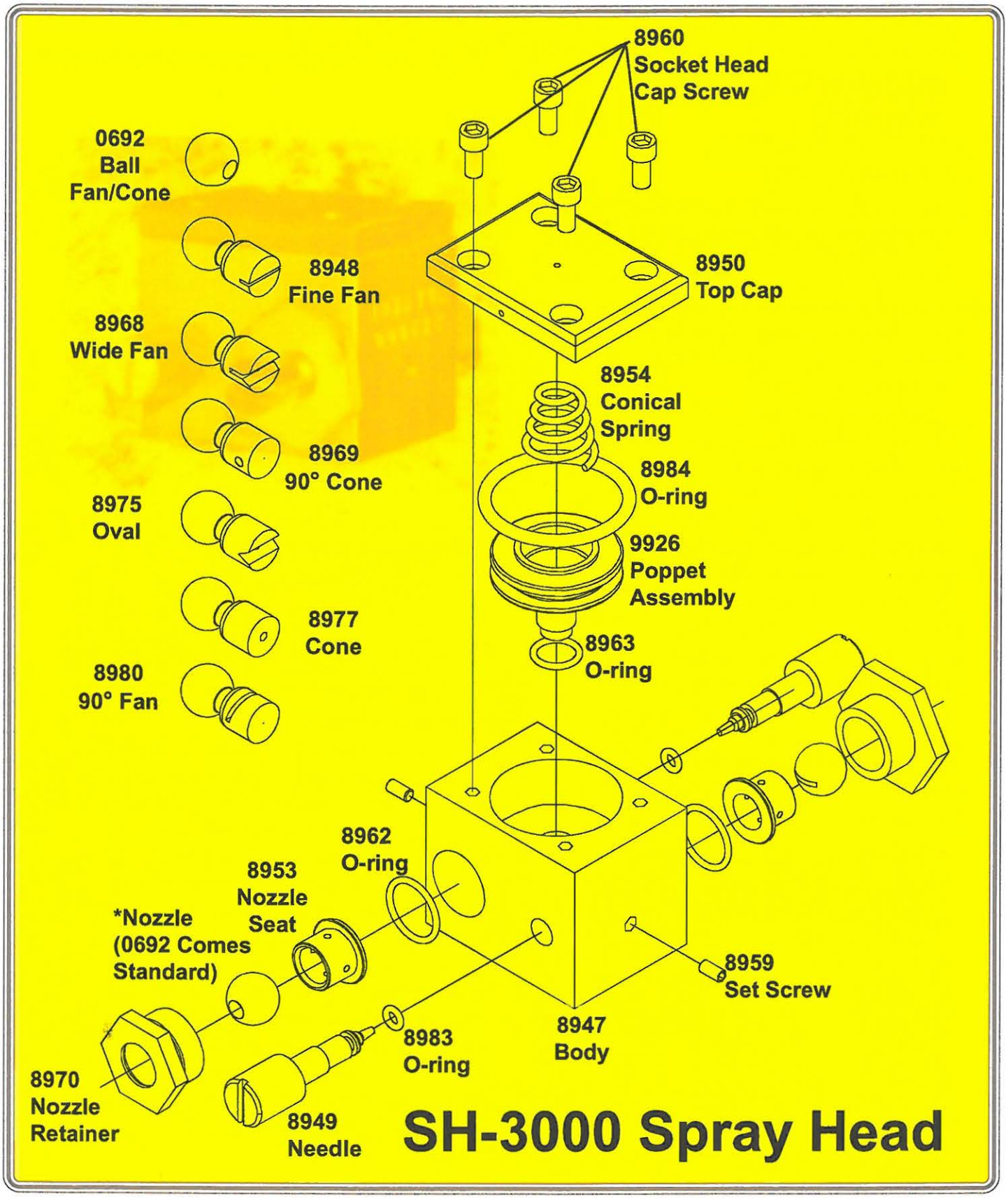
All internal parts are warranted for 1,000,000 cycles. The spray head body has a 10 year warranty.

***Advance Model SH-3000 Spray Head***

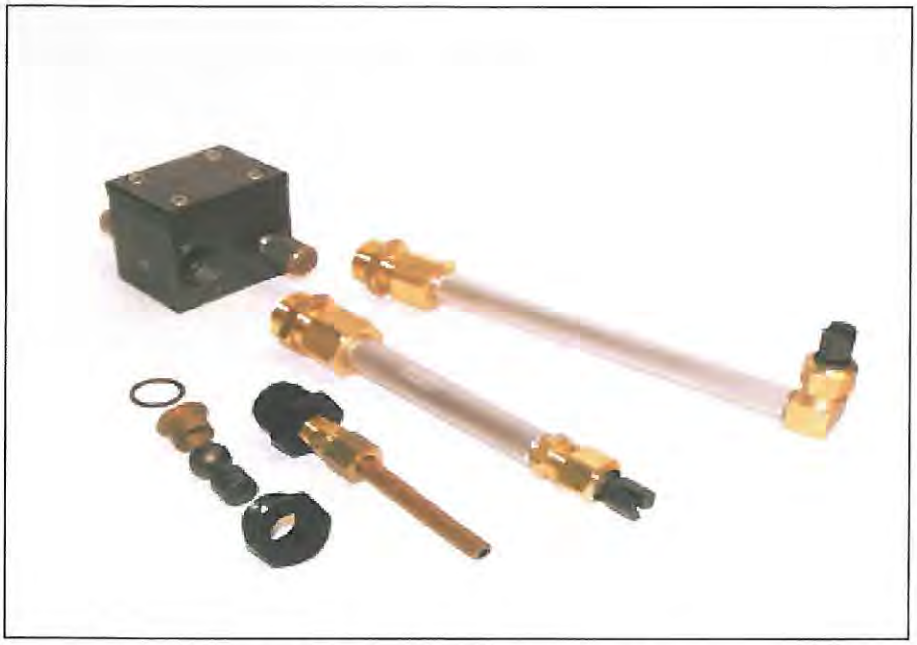
**FIGURE 7-1**

## FEATURES

- Wide range of spray volumes from ultra-fine mist to heavy dosing.
- Not dependent on the same air and lube pressures. In fact, the independent air and lube pressures can vary from 40 psi to 110 psi without affecting each other.
- .5 GPM per each nozzle outlet.
- No leak construction GUARANTEED. Advance's new positive shutoff doesn't permit leaking.
- Either internal or external mix nozzle outlets can be used on the same head. **An APC exclusive!**
- All internal parts are warranted for1,000,000 cycles against leakage. Body warranted for 10 years.




***Spray Head Assembly***
**FIGURE 7-2**



***SH-3000 Extensions, Accessories***
**FIGURE 7-3**

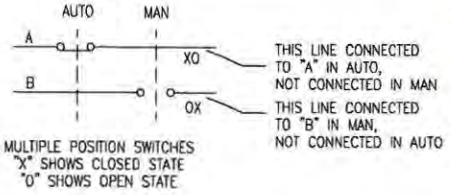
# AVAILABLE HEADS AND TUBES

| SERIES | TUBE SYLE / LENGTH |
|---|---|
| SH-3000 (Dual Outlet Opposed Side) | None* (SH-TUBE-000) |
| | 1/4" copper/2" (SH-TUBE-001) |
| SH-3000DC (Dual Outlet Cover Side) | 1/4" copper/4" (SH-TUBE-002) |
| | 1/4" copper/6" (SH-TUBE-003) |
| SH-3000DE (Dual Outlet Ejector Side) | 1/2" alum. straight/2" (SH-TUBE-004) |
| | 1/2" alum. straight/4" (SH-TUBE-005) |
| | 1/2" alum. straight/6" (SH-TUBE-006) |
| | 1/2" alum. 90°/2" (SH-TUBE-007) |
| | 1/2" alum. 90°/4" (SH-TUBE-008) |
| | 1/2" alum. 90°/6" (SH-TUBE-009) |

## DRAWING STANDARDS:

### SYMBOLS:

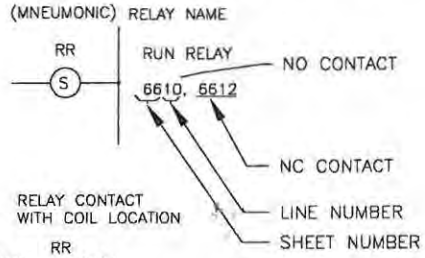
- NOTE REFERENCE (SEE THIS SHEET)
- COMMON CONNECTION (INTERNAL TO LOGIC ASSEMBLY ONLY)
- PLUG
- (S) 'S' INDICATES RELAY SUPPRESSION
- ARROW INDICATES FUNCTION INCREASE (ALWAYS CLOCKWISE)
- TERMINAL BOARD CONNECTION



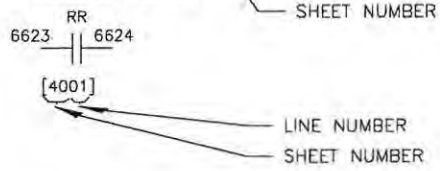

MULTIPLE POSITION SWITCHES
"X" SHOWS CLOSED STATE
"O" SHOWS OPEN STATE

- AC — AC TWISTED PAIR — SHIELDED CABLE (GROUNDED ON ONE END ONLY)
- DC — DC TWISTED PAIR
- DC W/T — DC TWISTED PAIR CAN BE RUN WITH TAN WIRE INSIDE CONTROL ENCLOSURE
- P — PULSE TRAIN TWISTED PAIR
- TWISTED TRIPLE
- BLU — BLUE WIRE FOR LOW VOLTAGE (LESS THAN 50 VDC UNSUPPRESSED INDUCTIVE LOAD)
- YEL — YELLOW WIRE IS USED WHEN A CONTACT MAY BE USED IN AN EXTERNALLY POWERED CIRCUIT. POWER MUST DISCONNECTED AT ITS SOURCE AS WELL AS THE DRIVE POWER.

RELAY NAMING CONVENTION WITH CONTACT LOCATIONS




RELAY CONTACT WITH COIL LOCATION




**GENERAL NOTE** – ALL NOTES ABOVE HAVE BEEN PRE-NUMBERED. ONLY NOTES INDICATED ON THE ELECTRICAL OR INTERCONNECTION DIAGRAMS APPLY

ANY ADDITION OR DELETION TO THIS ENGINEERED CONTROL SYSTEM WITHOUT WRITTEN AGREEMENT BY MITSUBISHI, IS THE RESPONSIBILITY OF THE INSTALLING PERSONNEL.

C MOUNTED ON CABINET.
P MOUNTED ON CONTROL PANEL.
D MOUNTED ON DOOR.
J JUMPER ON TERMINAL STRIP
DR MOUNTED ON DRIVE.

1 **WARNING** – THIS EQUIPMENT MAY BE AT LINE VOLTAGE EVEN WHEN NOT IN OPERATION. TO AVOID ELECTRIC SHOCK, DISCONNECT.

2 **WARNING** – NEVER REMOVE OR INSERT ANY MODULE OR CARD WHILE THE POWER IS ON.

3 CONNECT A-C INPUT TO L1, L2 AND L3 AS SHOWN. IF THE PHASE SEQUENCE INDICATOR DOES NOT LIGHT, INTERCHANGE L1 AND L3 CONNECTIONS.

4 REMOVE JUMPER IF ADDITIONAL INTERLOCK IS ADDED.

5 SEPARATELY MOUNTED – NOT SUPPLIED BY MITSUBISHI.

6 SEPARATELY MOUNTED – SUPPLIED BY MITSUBISHI.

7 SEPARATELY MOUNTED.

8 USE TWISTED TWO – CONDUCTOR CABLE. THIS CABLE MUST BE IN A SEPARATE SIGNAL CONDUIT. IT CANNOT BE RUN WITH OTHER CONDUCTORS OR CABLES. REFER TO TABLE 1 BELOW FOR WIRE SPECIFICATION DATA

9 SIGNAL WIRE CABLES WITH THIS NOTE NUMBER CAN BE IN THE SAME SEPARATE SIGNAL CONDUIT. THEY CANNOT BE RUN WITH NON-SIGNAL WIRES. FOR TWISTED TWO CONDUCTOR CABLES, USE BELDEN PART NUMBER 9497 OR EQUIVALENT FOR TWISTED THREE CONDUCTOR CABLES. REFER TO TABLE 1 BELOW FOR WIRE SPECIFICATION DATA.

10 REFER TO NOTE 9. THE NUMBER FOLLOWING THE NOTE 9 IDENTIFIES THE CABLES THAT MAY BE GROUPED TOGETHER IN THE SAME SIGNAL CONDUIT. FOR EXAMPLE, CABLES REFERENCED WITH NOTE 10 CANNOT BE RUN IN THE SAME SIGNAL CONDUIT WITH NOTE 9-2 CABLES.

11 **WARNING** – DO NOT OPEN DISCONNECT SWITCH WHILE THE MOTOR IS ENERGIZED.

12 REFER TO TRANSFORMER NAMEPLATE FOR CONNECTIONS OF PRIMARY LEADS.

13 **WARNING** – TRANSFORMER IS CONNECTED TO LINE VOLTAGE EVEN WHEN THE A-C DISCONNECT IS OPEN.

14 MOUNTED ON CONTROL PANEL.

15 MOUNTED ON REMOTE CONTROL STATIONS

16 MOUNTED ON OPERATOR CONSOLE

17 MOUNTED & WIRED, SUPPLIED BY CUSTOMER

G GROUND DEVICE TO PANEL GROUND STUD/BUS BAR

### TABLE 1

| BELDEN PART NO. (SPEC. NO.) | NUMBER OF CONDUCTORS | TWISTS PER FOOT (LAY) | NOMINAL O.D. | COLOR |
|---|---|---|---|---|
| 9497 | TWO TWISTED | 24 (1/2") | 0.2" | BLK & ORG ORANGE |
| 9498 | THREE TWISTED | 8 (1 1/2") | 0.3" | BLK, ORG, & ORG WITH BLK TRACER |
| BOTH HAVE THE FOLLOWING CHARACTERISTICS: VOLTAGE RATING – 600 VOLTS AWG SIZE – 16 STRANDING – 19 X 29 INSULATION – PVC TEMPERATURE – (-)40°C TO (+)105°C | | | | |

### SIGNAL CONDUIT

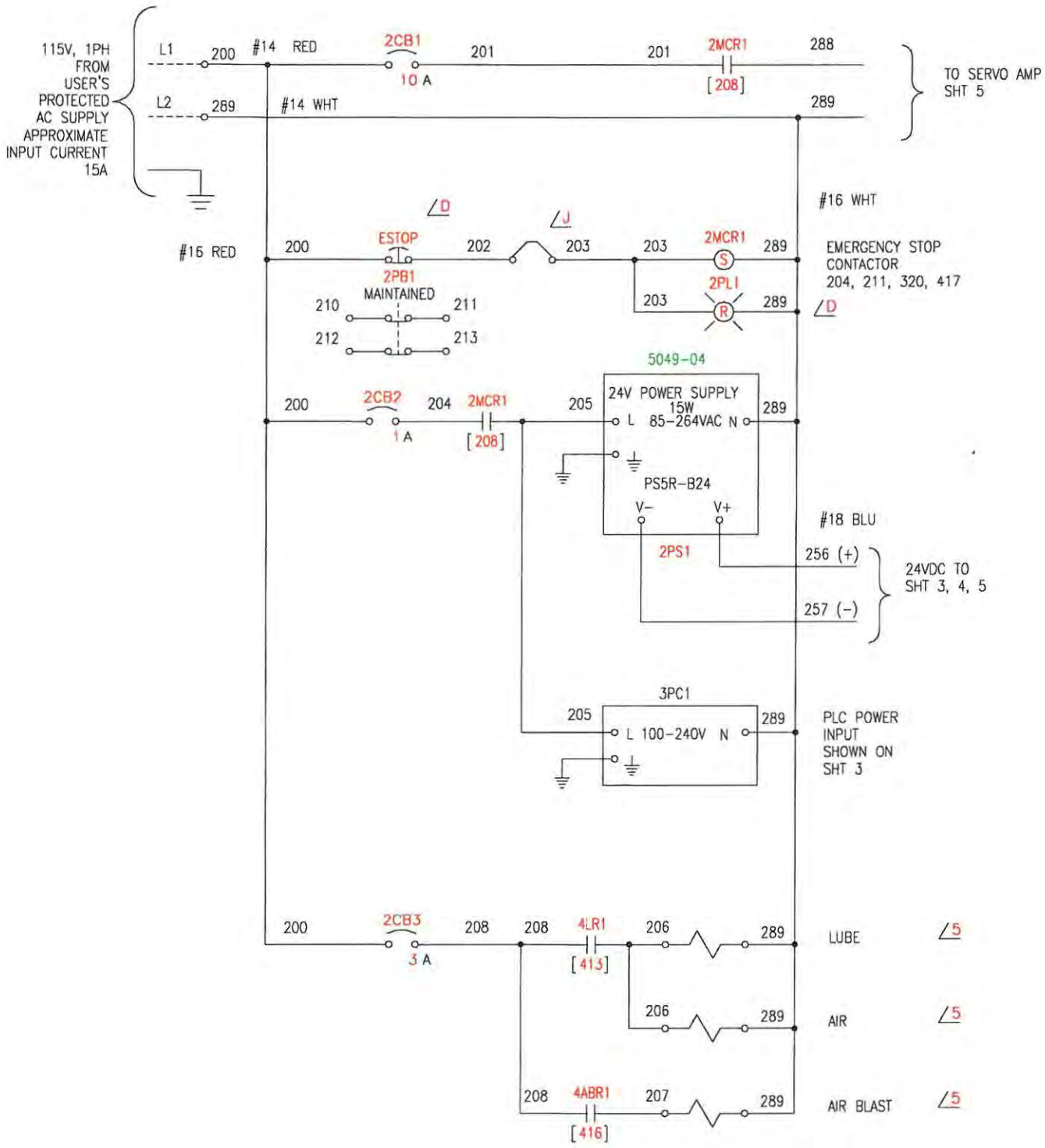
1. USE EITHER:
   A. RIGID STEEL, OR
   B. FLEXIBLE ARMORED STEEL CABLE
2. WILL CROSS NON-SIGNAL CONDUIT AT AN ANGLE OF BETWEEN 45 DEGREES AND 90 DEGREES.
3. WILL NOT BE ROUTED THROUGH JUNCTION OR TERMINAL BOXES THAT CONTAIN NON-SIGNAL WIRING.
4. REFER TO THE ELECTRICAL DIAGRAM WHEN SELECTING CONDUIT. DO NOT ASSUME ALL SIGNAL WIRE WILL BE IN THE SAME CONDUIT.

### SIGNAL WIRE (PREFERRED)

1. WILL BE NON-SHIELDED TWISTED CONDUCTOR.
2. WILL NOT BE RUN WITH NON-SIGNAL WIRE.
3. WILL ALWAYS BE RUN IN STEEL CONDUIT.
4. WILL BE TWISTED TWO – OR THREE – CONDUCTOR CABLE. SPECIFIC INSTRUCTIONS FOR EACH SIGNAL CABLE ARE FOUND ON THE ELECTRICAL DIAGRAMS.

IF SHIELDED WIRE IS USED FOR SIGNAL WIRE, THE GROUND/SHIELD IS TO BE GROUNDED ON ONE END ONLY TO AVOID SIGNAL GROUND LOOPS AND ERRATIC OPERATION.

**SRL-250 INSTALLATION Note Sheet**
**FIGURE 7-4**




***SRL-250 1PH POWER DISTRIBUTION***
**FIGURE 7-5**

# MAKING THE INTERFACE CONNECTIONS

You will need to provide some of the following inputs. These inputs can be as a dry contact closure, or a 120 VAC (24 VDC available upon request) signal from a PLC output. The following isolation relays supplied by Advance Products provide normally-open contacts that are prewired to the proper inputs.

The following section provides you with information you will need to make the interface connections.

NOTE: Due to noise on the control lines, we require that all interfacing for the inputs be switched through isolation relays. These relays are supplied by Advance Products and provide normally-open contacts that are prewired to the proper inputs to the PLC.

## INPUT DEFINITIONS

***Description***

### Die Open (3DOR1)

A user input signal on wires 322 and 323 that enables the sprayer to move down in the die opening. If this signal is missing during automatic operation, an "emergency retract" condition will occur. The spray arm will retract to the "home" position.

### Cycle Start (3CSR1)

This input will start the sprayer cycle if it is in the "Auto" mode and relay 3CSR1 is energized. This input is "anti-repeat" so it must be released before the sprayer will cycle again. The "cycle start" signal can be found on wires 320 and 321.

***Description***

### Part Sensor (3PSR1)

Optional input for part detection that can be added by the customer on wires 324 and 325. If this input is activated during an "auto cycle" and it is enabled during the current step of the program, the sprayer will stop any active move and return to the home position and abort the cycle. A part detect error is generated on the display.

## OUTPUT DEFINITIONS

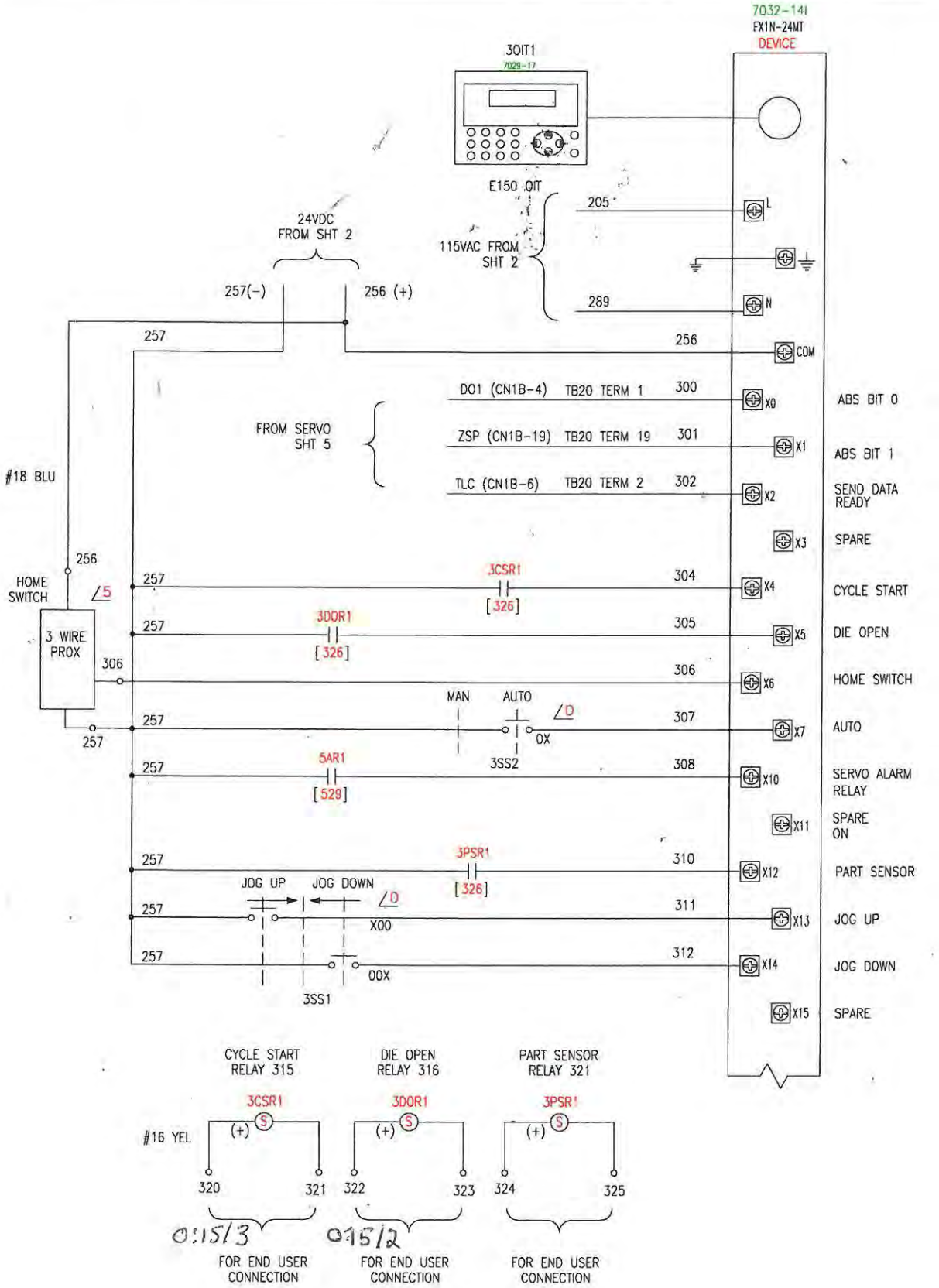
***Description***

### Die Safe (4DSR1)

This output will be enabled by the "home" proximity switch input. Contacts from terminal **4DSR1** are supplied on wire numbers 412 and 413. These must be interlocked with the customers "die close" circuitry.

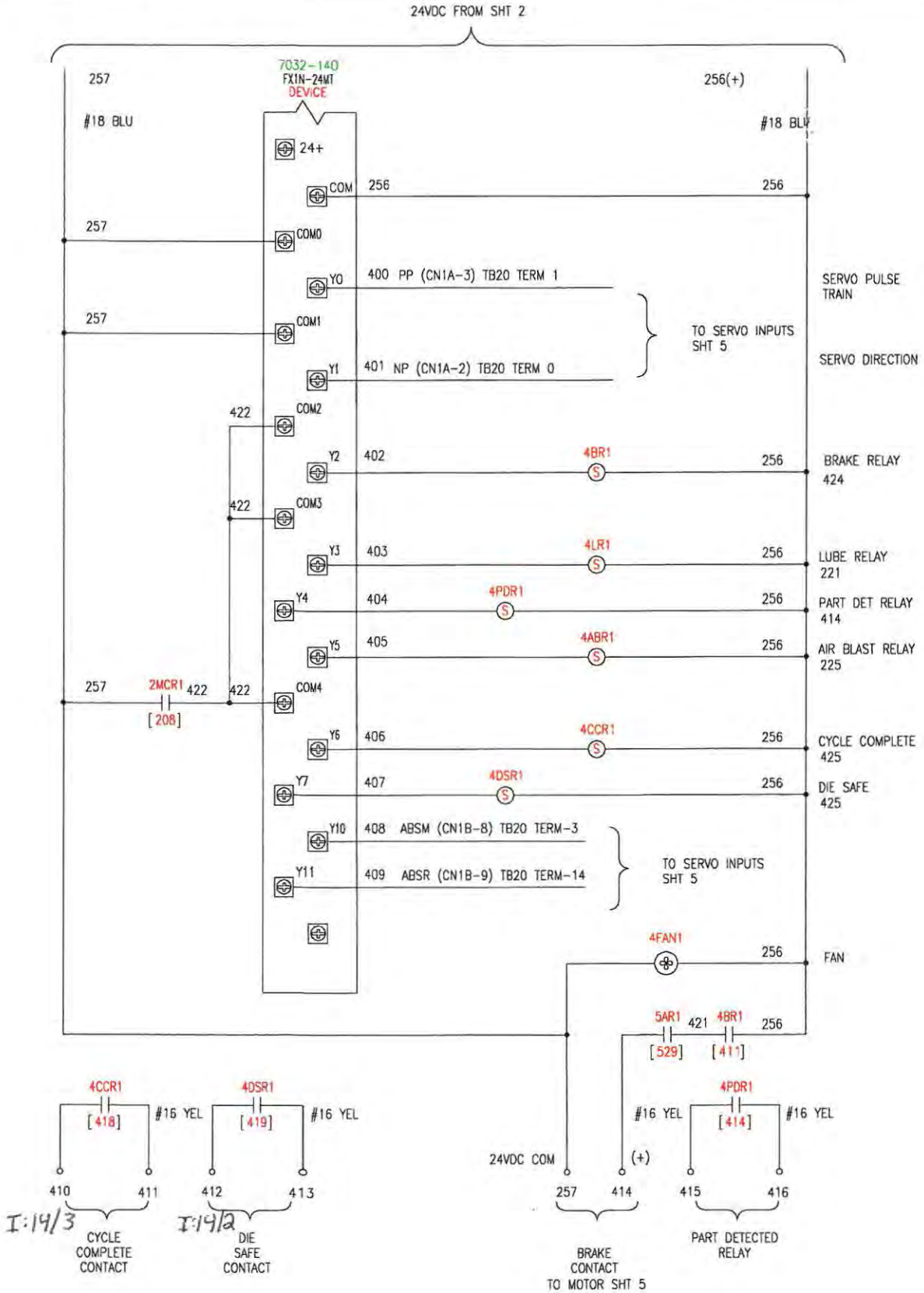
### Cycle Complete (4CCR1)

This output is enabled at the end of a Spray Cycle. The contact is on wire numbers 410 and 411, and is a momentary contact closure. This may be used to start the Die Close Cycle.



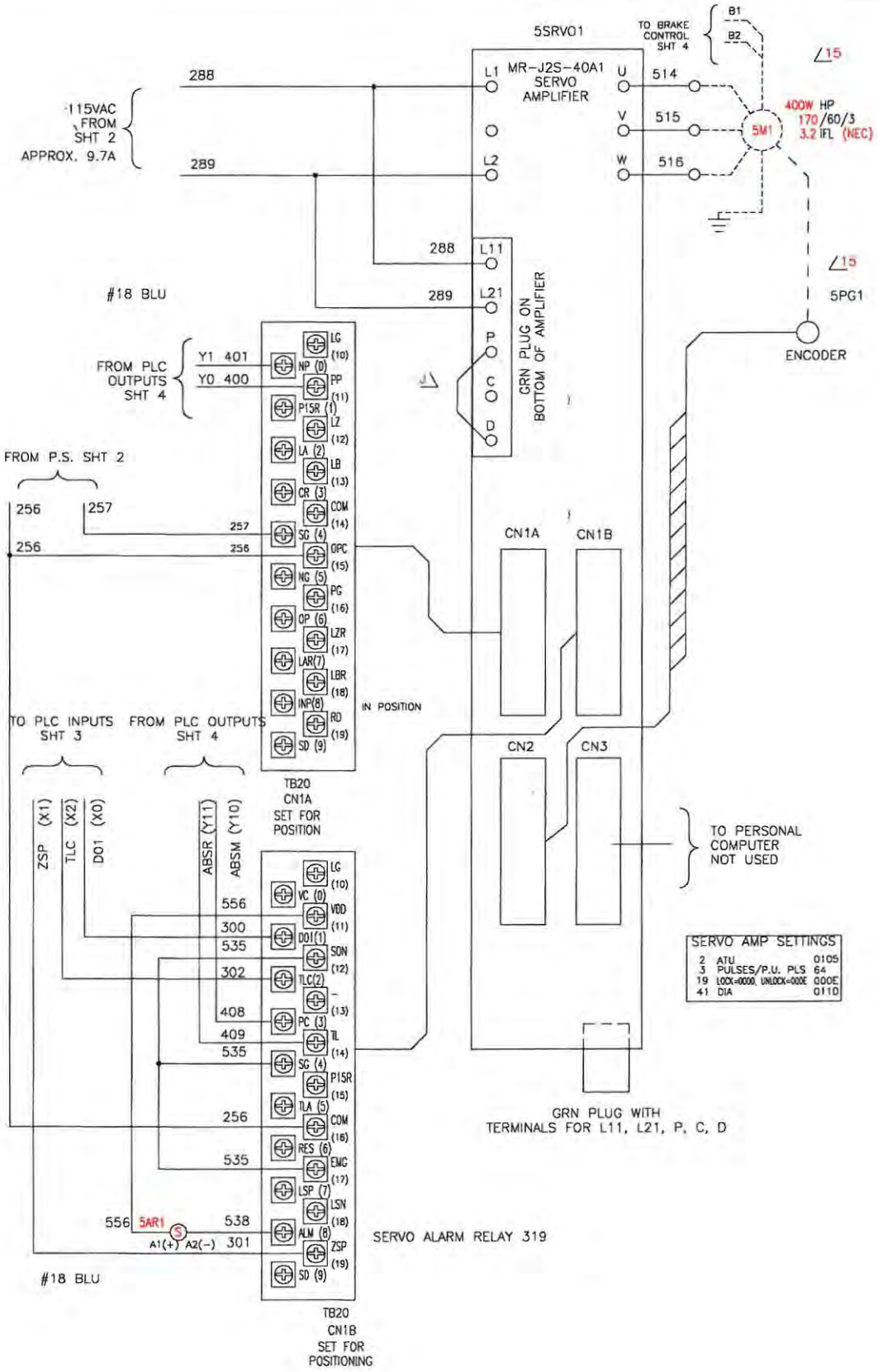

***SRL-250 PLC INPUTS, 400 W SERVO SYSTEM***

**FIGURE 7-6**



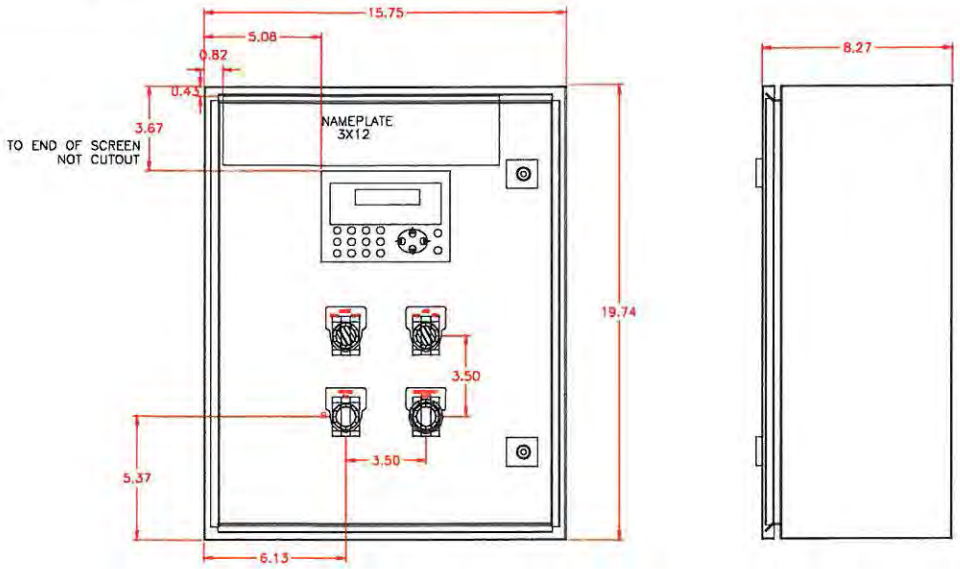

***SRL-250 PLC OUTPUTS, 400 W SERVO SYSTEM***

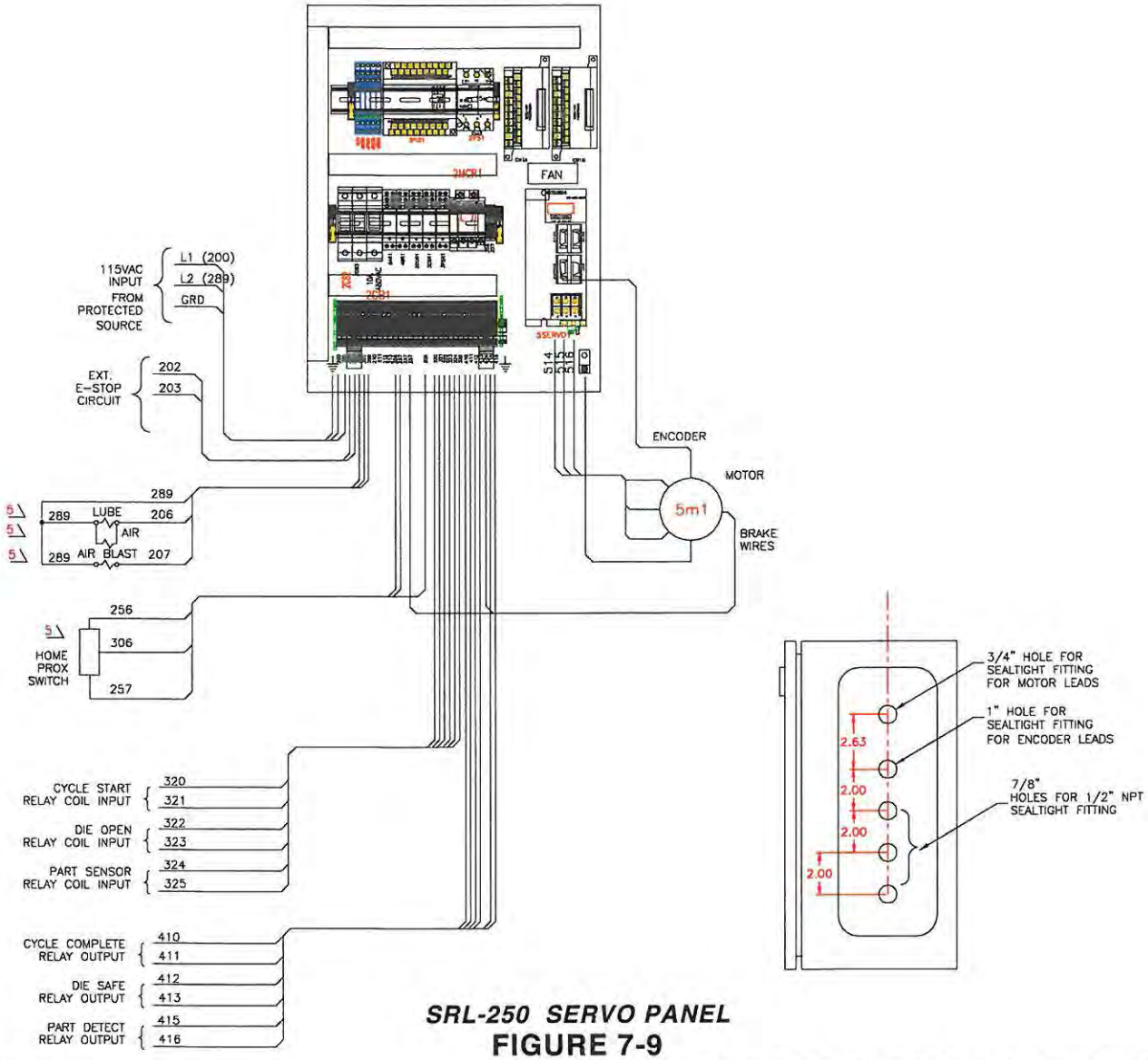
**FIGURE 7-7**




***SRL-250 400 W SERVO AMPLIFIER***

**FIGURE 7-8**




***SRL-250 SERVO PANEL***
**FIGURE 7-9**

# ELECTRICAL CABINET REPLACEMENT PARTS

| QTY | DESCRIPTION | PART DESIGNATION | APC PART# |
|---|---|---|---|
| 1 | RITTAL, AE1045 CABINET | | 10559 |
| 1 | IDEC PS5R-B24 P.S. | 2PS1 | 10560 |
| 5 | OMRON, 0860YK SOCKET | 4BR1,5AR1, 3DOR1, 3CSR1, 3PSR1 | 8019 |
| 3 | OMRON, GR2-SN 120VAC RELAY | 3DOR1, 3CSR1, 3PSR1 | 7404 |
| | | | |
| 2 | OMRON, G2R-SN 24VDC RELAY | 4BR1, 5AR1 | 7405 |
| | | | |
| 1 | ABB, S271-K1, 1A 1PH, CB | 2CB2 | 10562 |
| 1 | ABB, S271-K3, 3A, 1PH, CB | 2CB3 | 10563 |
| 1 | ABB, S271-K10, 10A CB | 2CB1 | 10564 |
| 1 | ABB, CBK-C3SK, 3POS SW | 3SS1 | 10565 |
| 1 | ABB, CBK-KLF8R, RED P/L | 2PL1 | 10566 |
| 1 | ABB, CBK-C2AMK, 2POS SW | 2SS2 | 10567 |
| 1 | ABB, CBK-PMP3R, MSHD PB | 2PB1 | 10568 |
| 3 | ABB, CBK-CB10, NO CONTACT | 3SS1, 3SS2 | 10569 |
| 3 | ABB, CBK-CB01, NC CONTACT | 2PB1 | 10570 |
| 5 | FINDER, 38-51-7-024-0050 TB RELAY | 4LR1, 4AR1, 4ABR1, 4CCR1, 4SCR1 | 8314 |
| 1 | GRAINGER, 4WT37 FAN | 4FAN1 | 10558 |
| 1 | MITSUBISHI, FX1N-24MT, PLC | 3PLC1 | 10556 |
| 1 | MITSUBISHI, MR-J2S-40A1, SERVO AMP | 5SRVO1 | 10555 |
| 1 | MITSUBISHI, HC-MFS43BK MOTOR | 5M1 | 10522 |
| 1 | MITSUBISHI, MR1B-5M MOTOR CABLE | X INDICATES LENGTH | 10520-X |
| 1 | MITSUBISHI, JCCBL5M-H CABLE | X INDICATES LENGTH | 10521-X |
| 2 | MITSUBISHI, MR-J2TBL05M CABLE | | 9865 |
| 2 | MITSUBISHI, MR-TB20, SERVO TB | CN1A, CN1B | 9866 |
| 1 | MITSUBISHI, E150, OIT | 3OIT1 | 10557 |
| 1 | MITSUBISHI, CAB19-3M CABLE | | 9873 |
| 1 | MITSUBISHI, SN11AC120V RELAY | 2MCR1 | 10561 |
| 34 | ALTECH, CTS4U-N6, 25A, 600V TB | | 8839 |
| 2 | ALTECH, 1056.2, GRD BLOCK | | 8843 |
| 4 | ALTECH, CA802, END STOP | | 8803 |
| | | | |

# NOTES

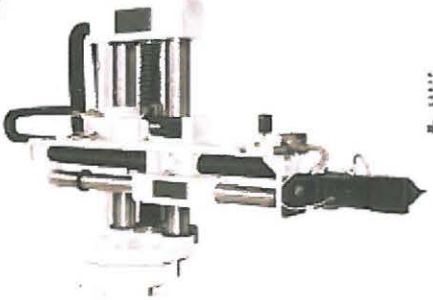
# Advance®

## ADVANCE AUTOMATION EQUIPMENT

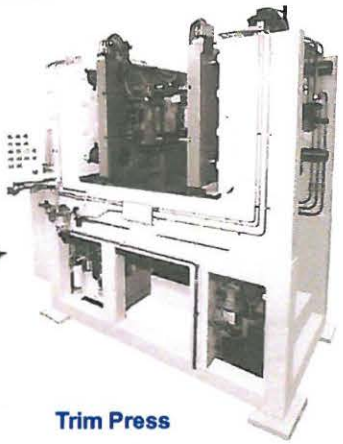
Digital Servo Reciprocating Sprayers



Digital Servo Ladlers



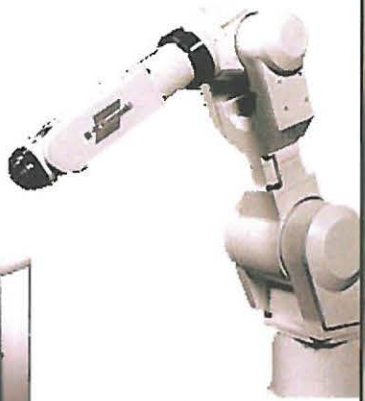
Die Casting Extractor



Trim Press

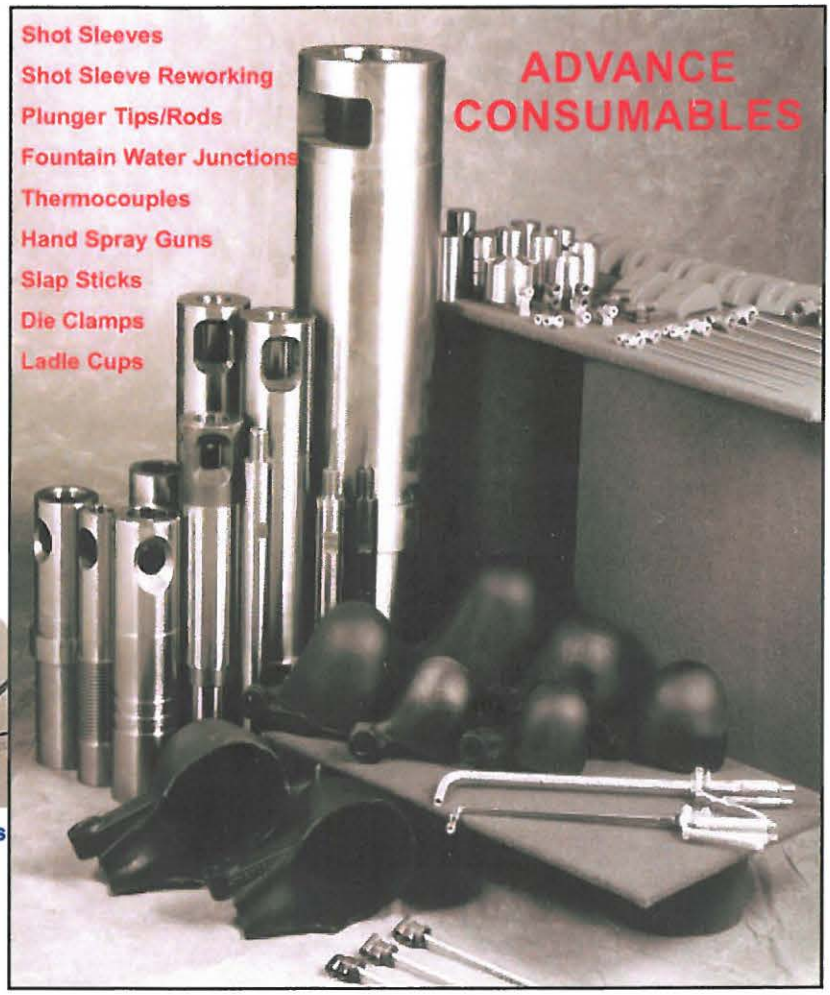

Mini-Max Die Lube Reclaimer

Tool-Temp Temperature Control Unit



Kawasaki Robots

Central Lube Systems

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