ITW Ransburg
Electrostatic Systems

SERVICE INSTRUCTION
**SI-70-52-10-B**
REPLACES SI-70-52-10-A

# FIBER OPTIC PULSETRACK™ SPEED MONITOR AND CONTROL SYSTEM SERVICE INFORMATION


**IMPORTANT: Read and follow all instructions and SAFETY PRECAUTIONS before using this equipment. Retain for future reference.**

U.S.A. AND FOREIGN PATENTS PENDING

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## FIGURES



## SAFETY PRECAUTIONS

This manual contains information that is important for you to know and understand. This information relates to USER SAFETY and PREVENTING EQUIPMENT PROBLEMS. To help you recognize this information, we use the following symbols. Please pay particular attention to these sections.

**⚠ DANGER**

**Urgent safety information – a hazard that will cause serious injury or loss of life.**

**WARNING**

**IMPORTANT SAFETY INFORMATION – A HAZARD THAT MAY CAUSE SERIOUS INJURY OR LOSS OF LIFE.**

**CAUTION**

**Important information that tells how to prevent damage to equipment, or how to avoid a situation that might cause minor injury.**

**Note**

Information that you should pay special attention to.

## SAFETY PRECAUTIONS

### MAJOR HAZARDS

**WARNING**

**THE FOLLOWING HAZARDS MAY OCCUR DURING THE NORMAL USE OF THIS EQUIPMENT. PLEASE READ THE FOLLOWING CHART.**

| AREA<br>Tells where hazards may occur. | HAZARD<br>Tells what the hazard is. | SAFEGUARDS<br>Tells how to avoid the hazard. |
|---|---|---|
| **Personnel Safety - Electrical Hazards**<br>  | The high voltage equipment used in this application creates a hazard for personnel. The high voltage can cause injury, and a spark from the equipment to a person is capable of igniting coating material. | High voltage equipment must be isolated from personnel. Booths, fencing, railings or other means must be placed around the equipment and maintained to assure safe isolation of the process. The high voltage equipment must be deenergized prior to allowing personnel to enter the spray area. |
| **Personnel Safety - Mechanical Hazards**<br>  | The atomizer rotates at speeds up to 60,000 RPM. At these speeds, the edge of the bell can easily cut into skin. Loose articles can also be caught by the rotating bell. | Personnel must stay clear of the bell whenever it is rotating.<br><br>Before touching the bell, the turbine air must be shut off.<br><br>If the bell has been rotating, allow at least three minutes for it to come to a complete stop before touching it. If the air brake feature is utilized, the bell can be stopped in a shorter period. |
| **General Use and Maintenance** | Personnel must be properly trained in the use of this equipment. Improper operation or maintenance can cause hazardous conditions. | Personnel must be given training in accordance with the requirements of NFPA-33, Chapter 15.<br><br>Read all instructions prior to use.<br><br>Reference NFPA-33,OSHA 1910.107 and your particular local codes and insurance requirements. |

## DESCRIPTION

The Fiber Optic PulseTrack turbine speed monitor and closed loop control system, Figure 1, consists of an SMC-501 Electronics Panel, an SMC-507 Monitor Package (for RPM installation), or an SMC-508 Monitor Package (for RMA installation), and either an SMC-503 or SMC-505 Control Package (for 115 V installation) or an SMC-503A or SMC-505A Control Package (for 230 V installation). Fiber Optic PulseTrack monitor-only systems do not include the SMC-503/505 or SMC-503A/505A Control Packages.

The Fiber Optic PulseTrack system connects to the DeVilbiss Aerobell Air Bearing Rotary Atomizer to monitor and control its turbine speed. The Fiber Optic PulseTrack can monitor and control from 1 to 5 Aerobells. Each Aerobell being monitored requires a separate monitor package. Each Aerobell being monitored and controlled requires a separate monitor package and a control package. Refer to the Fiber Optic PulseTrack Configuration Table on the next page.

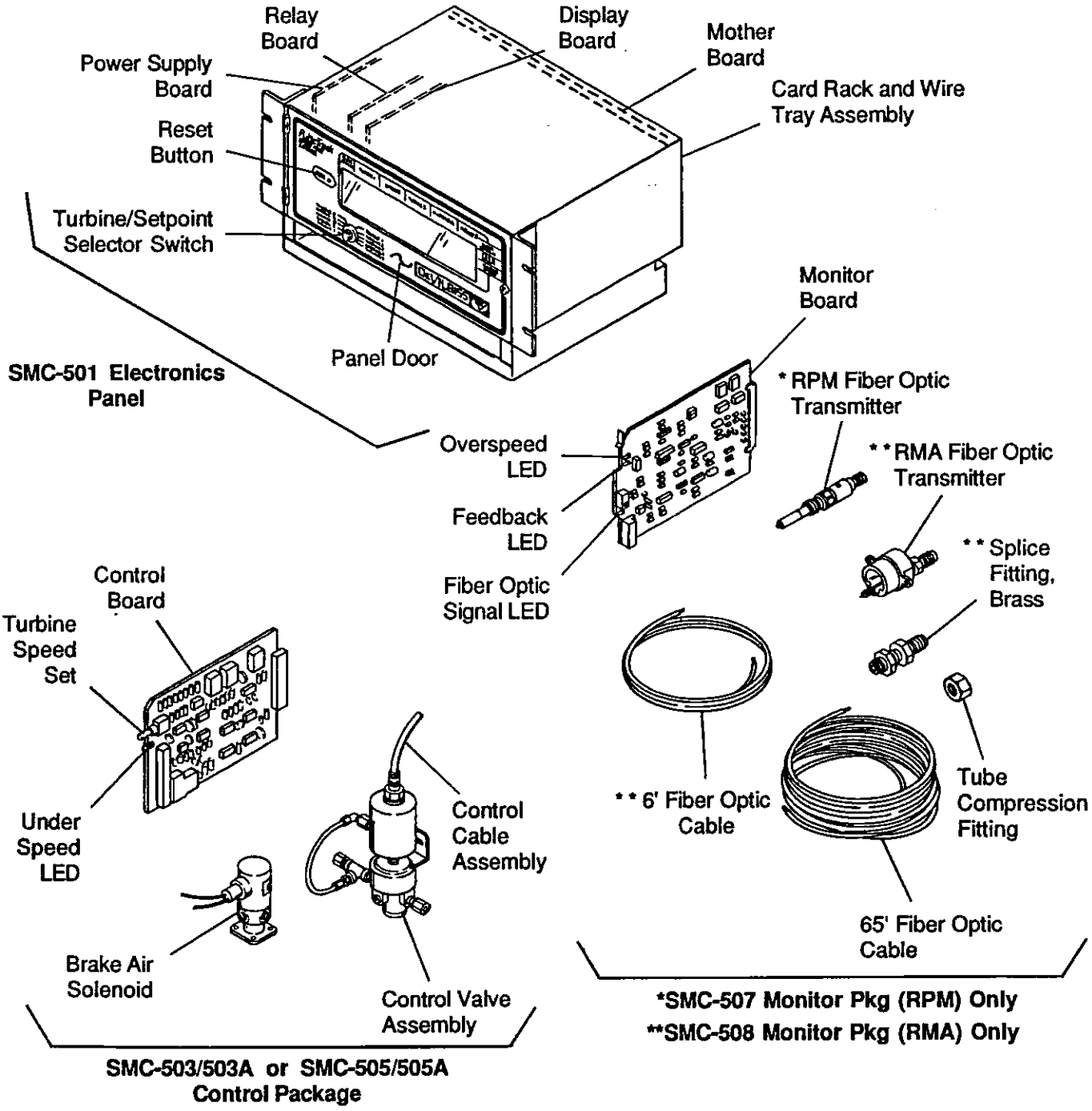



**Figure 1. PulseTrack Speed Monitor and Control**

## PULSETRACK CONFIGURATION TABLE

**SMC-501** Electronics Panel - Includes
**SMC-401** Card Rack and Wire Tray Assembly
**SMC-402** Power Supply Board Assembly
**SMC-403A** Relay Board Assembly
**SMC-404** Display Board Assembly
**SMC-411** Mother Board Assembly

ONE of two Monitor Packages:

1. **SMC-507 RPM Fiber Optic Monitor Package** - Includes
   SMC-29 RPM Fiber Optic Transmitter Assembly
   SMC-405A Monitor Board Assembly
   SMC-424 Fiber Optic Cable -- 65 feet
   SSP-7823 Compression Fitting

2. **SMC-508 RMA Fiber Optic Monitor Package** - Includes
   SMC-405A Monitor Board Assembly
   SMC-420 Fiber Optic Cable -- 6 feet
   SMC-421 RMA Fiber Optic Transmitter Assembly
   SMC-424 Fiber Optic Cable -- 65 feet
   SMC-427 Fiber Optic Splice Fitting Brass
   SSP-7823 Compression Fittings (3 per channel)

ONE of four Control Packages:

1. **SMC-503 Control Package** (for 115 V installations) - Includes
   SMC-406 Control Board Assembly (4 to 20 mA setpoint)
   SMC-409 Control Valve Assembly
   SMC-410 Control Cable Assembly
   SMC-414 Brake Air Solenoid Assembly (110 volt AC version)

2. **SMC-503A Control Package** (for 230 V installations) - Includes
   SMC-406 Control Board Assembly (4 to 20 mA setpoint)
   SMC-409 Control Valve Assembly
   SMC-410 Control Cable Assembly
   SMC-414A Brake Air Solenoid Assembly (220 volt AC version)

3. **SMC-505 Control Package** (for 115 V installations) - Includes
   SMC-409 Control Valve Assembly
   SMC-410 Control Cable Assembly
   SMC-414 Brake Air Solenoid Assembly (110 volt AC)
   SMC-416 Control Board Assembly (0 to 6 volt DC setpoint)

4. **SMC-505A Control Package** (for 230 V installations) - Includes
   SMC-409 Control Valve Assembly
   SMC-410 Control Cable Assembly
   SMC-414A Brake Air Solenoid Assembly (220 volt AC)
   SMC-416 Control Board Assembly (0 to 6 volt DC setpoint)

Notes:
1. Each electronics panel accommodates up to five monitor and control packages.
2. Each monitor or control package accommodates only one Aerobell.
3. Each control package requires a separate monitor package.
4. For remote setpoint with 4 to 20 milliamp operation, use SMC-406 Control Board Assembly. For remote setpoint with 0 to 6 volt operation, use SMC-416 Control Board Assembly.

Monitor System

The Fiber Optic PulseTrack monitor board receives feedback signals from the Aerobell turbine as shown in Figure 2. As the turbine rotates, two magnets located on the turbine rotor generate a flashed feedback signal each time they pass before a fiber optic transmitter's magnetic probe. This feedback signal energizes a high intensity, light-emitting diode (LED) mounted in the fiber optic transmitter, which causes the LED to flash. As the turbine speed increases, the frequency of the LED flashes increases as well. The LED light pulse is transmitted through the fiber optic cable to the monitor board.

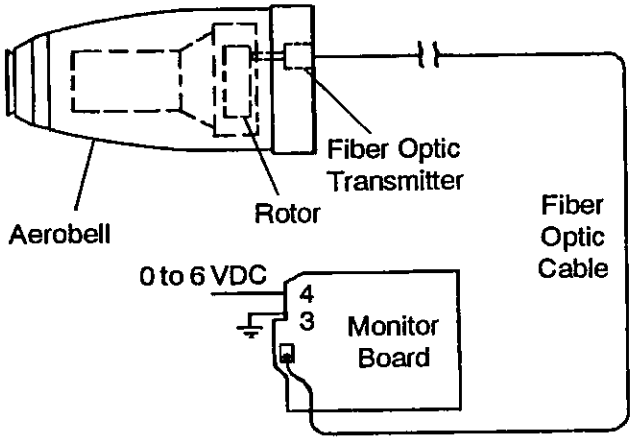



**Figure 2. Signal Flow Diagram**

In the monitor circuits, the feedback signals are changed into a voltage level from 0 to 9 volts DC. The voltage signal is directly proportional to the speed (RPM) of the Aerobell turbine being monitored. The signal is sent to terminal block TB401 pin 4 (TB401 pin 3 ground) for external display. The signal is also sent to the mother board for use by the control board and display board.

As the turbine generates feedback signals, the monitor system keeps a lookout for two fault conditions. The first fault condition is Loss-of-Feedback (LOF). If the feedback signal cannot be detected by the monitor board, the LOF relay on the relay board energizes, and an LED indicator on the electronics panel lights up. The LOF relay will energize when the turbine speed drops below 1500 rpm, or when there is a break in the feedback circuit.* The second fault condition is turbine overspeed. If the turbine speed exceeds 66,000 RPM, the monitor detects a fault condition, energizes the overspeed relay, and lights the overspeed fault LED on the electronics panel, Figure 3. If desired, the user can interlock the overspeed relay with a solenoid valve to shut down turbine air in the event of an overspeed condition.

* Loss-of-feedback also causes the control board to shut off the control signal to the control valve.

The monitor board also sends a turbine speed signal to the meter board where the speed (in thousands of RPM's) of any monitored turbine can be displayed with the turn of a selector switch. For example, 40,500 RPM is displayed as 40.5. Turbine speed output signals are also available from the monitor board as inputs to user-supplied remote display units, chart recorders, meters, etc.

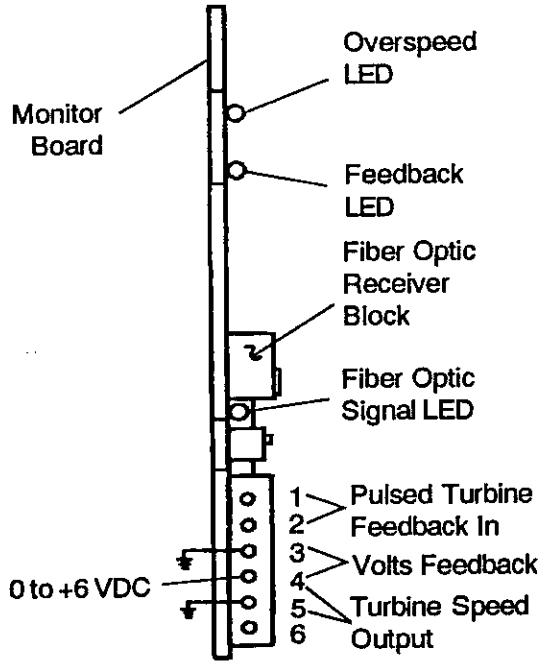



**Figure 3. Monitor Board Terminals and LED's**

Monitor and Control System

The Fiber Optic PulseTrack closed loop monitor and control system includes all the components of the monitor system plus additional control system components to provide both speed monitor and control capabilities. These capabilities include all the functions of the monitor system plus the following:

The control system uses the turbine speed information output from the monitor circuits to control the Aerobell turbine speeds, Figure 4. The output signals from the monitor circuits inform the control circuits of changes in turbine speeds. The control circuits use this information to determine the amount and direction (increase or decrease) of speed adjustments required to maintain the operator-selected setpoint speed. The necessary speed adjustments are then made by regulating an electromechanical control valve in the turbine air supply line.

Use of the optional air brake feature is recommended for optimal response to turbine speed setpoint changes. If the operator reduces the turbine speed setpoint ad-

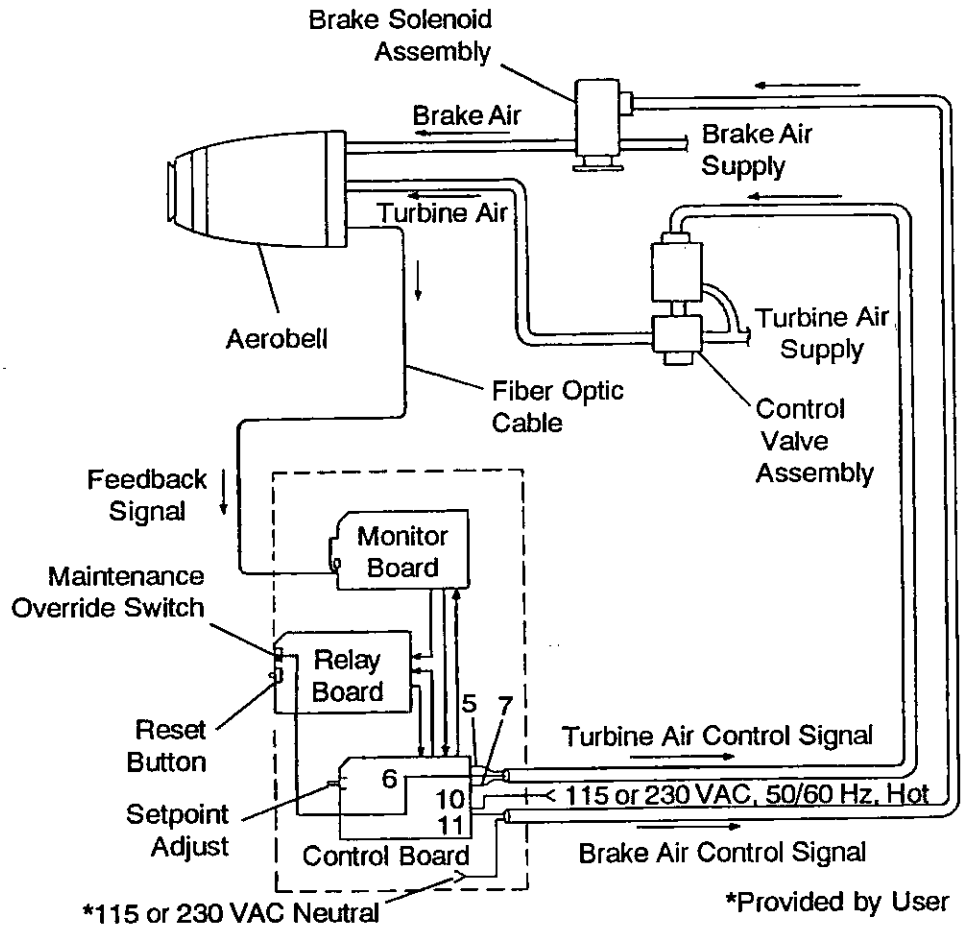



**Figure 4. Monitor and Control Signal Diagram**

justment by more than 3000 RPM, the control circuits close the control valve assembly in the turbine air supply line and open a brake solenoid in the turbine brake air supply line. Brake air is then directed against the rotation of the turbine, quickly slowing the speed of the turbine to approximately the new setpoint speed. When the turbine speed is within 3000 RPM of the new setpoint, the brake solenoid is shut off and the turbine control valve is automatically regulated to bring the turbine speed to the setpoint.

Operator responsibilities include entering the desired setpoint speed, activating the turbines, responding to fault conditions when a problem in the Aerobell system arises, and restarting the turbines after the problem is corrected. Among the fault conditions the control system can detect are loss-of-feedback, turbine overspeed, and percent underspeed. Loss-of-feedback and turbine overspeed are as discussed in the monitor system description, with the following exceptions: a loss-of-feedback fault will require a reset in the monitor and control system, and an overspeed or loss-of-feedback fault will cause the turbine air to shut down. The overspeed fault relay engages at 66,000 RPM and remains engaged until the reset button is pushed or a trigger signal is entered.*

The percent underspeed fault condition can only be detected with a monitor and control system.

Whenever the turbine speed falls below 50% of the selected setpoint speed, the control board activates the underspeed relay and lights the underspeed fault LED. (An underspeed fault will not shut down the turbines, unless configured to do so by the user.) The underspeed fault LED will remain lit until the problem is corrected and the RESET button is pushed or a remote reset is entered.*

Loss-of-feedback and overspeed may be latched or not latched using switches SW-402 and SW-403 on the monitor board. Loss-of-feedback must be unlatched for monitor only systems.

Loss-of-feedback and overspeed should be latched in normally operating control systems. Some retrofit (i.e., Behr retrofit) systems require overspeed to be unlatched for proper operation. Contact your DeVilbiss representative for further information.

* A remote reset can be provided by either a contact closure across pins 17 and 18 of the relay board or a DC voltage of 12 or 24 volts directly to pin 17.

Remote Controls and Indicators

Control connections are provided for remote setpoint and remote trigger inputs on the control and relay boards, Figure 5. Three modes of system control can be configured through these connections:

Maintenance or Setup Only

**Local setpoint control with maintenance override switch.**

Typical Modes of Operation

**Local setpoint control with remote trigger input.**

**Remote setpoint control with remote trigger input.**

Remote Setpoint Control

A local/remote slide switch on the control board, when moved to the remote position, gives the option to adjust setpoint speed from a remote control. To control setpoint speed remotely, a variable setpoint signal must enter at terminal 1 on the control board. A return ground-level signal line must be connected at terminal 2.

There are two modes of operation for remote setpoint input to the system: a modified 4 to 20 milliamp/1 to 5 VDC format (SMC-406 Control Board Assembly) and a 0 to 6 volt DC format (SMC-416 Control Board Assembly).

4 to 20 Milliamp Format/1 to 5 Volt DC Format

The SMC-406 Control Board Assembly uses a variation of the 4 to 20 milliamp/1 to 5 volt DC format commonly found in industrial environments ($Z_{IN}$ = 249 ohms). The current signal input to terminal 1 must be in a range from 4.8 milliamps (minimum speed) to 16 milliamps (maximum speed). A linear relationship exists between the setpoint current signal and the turbine speed as defined in the following equation:

Setpoint Current Signal

EQUATION: $I_{SP}$ = (desired speed ÷ 5000) mA + 4 mA
$V_{SP}$ = ([desired speed ÷ 5000] mA + 4 mA) x 249 Ohms

EXAMPLE: If desired speed is 55,000 RPM, then
$I_{SP}$ = (55,000 ÷ 5000) mA + 4 mA
= 11 mA + 4 mA
$I_{SP}$ = 15 mA

EXAMPLE: If desired speed is 40,000 RPM, then
$V_{SP}$ = ([40,000 ÷ 5000] mA + 4 mA) x 249 ohms
= (8 mA + 4 mA) x 249 ohms
= 12 mA x 249 ohms
$V_{SP}$ = 3.00 volts DC

The following table is useful for determining proper setpoint current.

**SMC-406 CONTROL BOARD**

| Current Input (milliamps) 4-20 | | (volts) 1-5 VDC | *Speed (RPM) |
|---|---|---|---|
| 4.8 | minimum level | 1.20 | 4,000 |
| 5.0 | | 1.25 | 5,000 |
| 6.0 | | 1.50 | 10,000 |
| 8.0 | | 2.00 | 20,000 |
| 10.0 | | 2.50 | 30,000 |
| 12.0 | | 3.00 | 40,000 |
| 14.0 | | 3.50 | 50,000 |
| 16.0 | maximum level | 4.00 | 60,000 |

*All speeds are ±1% of full scale.

A current setpoint input of more than 16 milliamps to terminal 1 of the control board will not raise the setpoint above 60,000 RPM. A current setpoint input of less than 4.8 milliamps may cause the loss-of-feedback circuit to indicate a fault condition and require the operator to reset. To avoid incorrect fault indications, limit the input levels electronically to provide at least 4.8 milliamps. Remote setpoint controls can be provided with a separate control for each turbine or one control for all turbines.

0 to 6 Volt DC Format

The SMC-416 Control Board Assembly uses a setpoint voltage signal to terminal 1 of the control board in the range of 0.400 VDC (minimum speed) to 6 VDC (maximum speed) to establish the turbine speed. A linear relationship exists between the setpoint voltage signal and the turbine speed as defined in the following equation:

Setpoint Voltage Signal

EQUATION: $V_{SP}$ = (desired speed ÷ 10,000) volts DC

EXAMPLE: If desired turbine speed is 47,500 RPM, then
$V_{SP}$ = (47,500 ÷ 10,000) volts DC
$V_{SP}$ = 4.75 volts DC

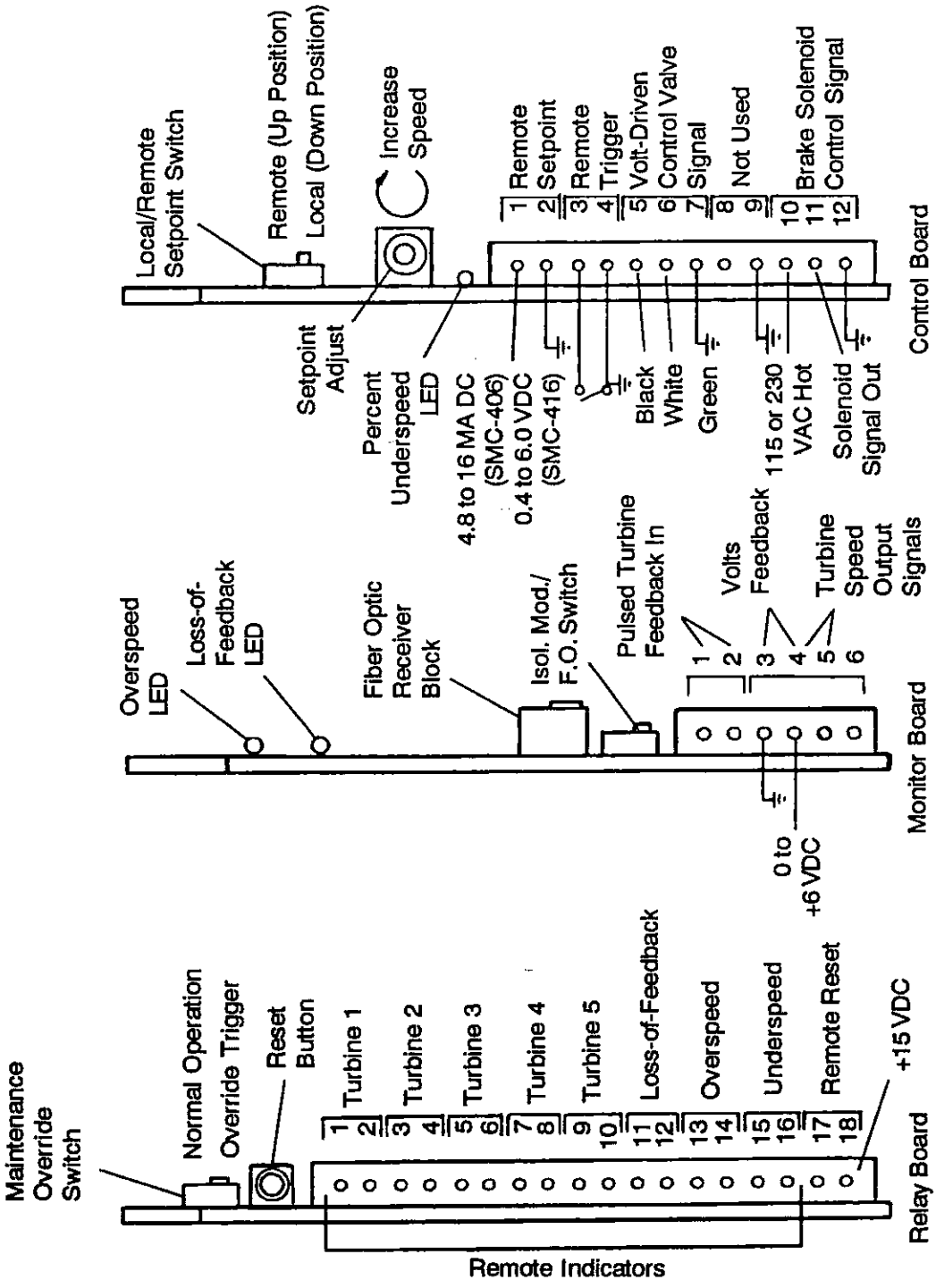



**Figure 5. Relay, Monitor, and Control Board Terminals**

The following table is useful for determining the proper setpoint voltage:

**SMC-416 CONTROL BOARD**

| Voltage Input (volts) 0-6 VDC | | *Speed (RPM) |
|---|---|---|
| 0.40 | (minimum level) | 4,000 |
| 1.00 | | 10,000 |
| 2.00 | | 20,000 |
| 3.00 | | 30,000 |
| 4.00 | | 40,000 |
| 5.00 | | 50,000 |
| 6.00 | (maximum level) | 60,000 |

*All speeds are ±1% of full scale.

A voltage setpoint input signal of more than 6 volt DC to terminal 1 of the control board will not raise the setpoint above 60,000 RPM. A voltage setpoint input signal of less than 0.40 volts DC may cause the loss-of-feedback circuit to indicate a fault condition and require an operator reset. To avoid incorrect fault conditions, limit the input levels electronically to provide at least 0.40 volts DC. Remote setpoint controls can be provided with a separate control for each turbine or one control for all turbines.

Remote Trigger Input

Terminals 3 and 4 on the control board are used for trigger control. A remote toggle switch, programmable logic controller, contact closure, opto isolator, or similar device can be connected to these terminals to provide remote actuation of the Aerobell turbines.* Each turbine must be individually triggered ON or OFF when remote triggering is used.

Maintenance Override Input

Located on the relay board is a slide switch; this is the maintenance override switch. This switch triggers all control boards in the rack simultaneously. It is intended for system setup and maintenance only.

* The control format is grounding contact between terminal 3 and terminal 4 (ground).

**WARNING**

**THE MAINTENANCE OVERRIDE SWITCH OVERRIDES ANY AND ALL REMOTE TRIGGER SWITCHES OR INPUTS. NEVER SWITCH THE MAINTENANCE OVERRIDE SWITCH TO THE ON POSITION WHEN PERSONNEL ARE IN THE SPRAY BOOTH. TURNING ON THE MAINTENANCE OVERRIDE SWITCH MAY CAUSE SERIOUS PERSONAL INJURY.**

The hookup of a remote trigger to terminals 3 and 4 of the control board does not completely disable the maintenance override switch on the relay board. Even if a remote hookup has been made, moving the maintenance override switch to the ON position will still trigger all of the turbines.

Remote Reset

For units shipped before June 1989, a remote reset can be made by closing a contact set across terminals 17 and 18 of the relay board. This resets the latches on all monitor and control boards.

For units shipped after June 1989, a remote reset can be made by closing a contact set across terminals 17 and 18 of the relay board or a 12 or 24 volt DC signal directly to pin 17. This resets the latches on all monitor and control boards.

Local Reset

A local reset can be made by pressing the green reset switch button on the relay board. This switch button is available with the front panel open or closed, and resets the latches on all monitor and control boards.

Remote Indicators

Remote fault indicator lamps or alarm signals may be connected to terminals 1 through 16 on the relay board, Figure 5. The normally open contacts of the feedback, overspeed, underspeed, and turbine relays are connected to these terminals. Each relay will carry a maximum of 120 volts AC, 5 amps, under normal load conditions. Avoid subjecting these relays to severe surges in voltage or current demands. These relays provide a contact closure when a related fault condition occurs. The remote fault indicator or alarm system must include a separate power source.

## SPECIFICATIONS

Dimensions of Card Cage:

Height - 8.25 in. (209.6 mm)
Width - 19.00 in. (482.6 mm)
Depth - 10.00 in. (254 mm)

Weights per Channel:

SMC-501 - 18.17 lbs (39.97 kg)
SMC-507 - 3.03 lbs (6.66 kg)
SMC-508 - 3.03 lbs (6.66 kg)
SMC-503 - 12.74 lbs (28.03 kg)
SMC-503A - 12.74 lbs (28.03 kg)
SMC-505 - 12.74 lbs (28.03 kg)
SMC-505A - 12.74 lbs (28.03 kg)

Power Input Requirements:

Voltage - 115/230 volts AC, 50/60 Hz
Voltage - 100/200 volts AC, 50/60 Hz

Current - 1 ampere

Power Output:

Maximum - 250 milliamps at 15 volts DC per SMC-503/505 or SMC-503A/505A Control Package

## INSTALLATION

**⚠ DANGER**

**Electric shock hazard. Insulating sheets have been placed over the solder joints on various locations of the relay circuit board. These insulating sheets will prevent electrical shock in event of accidental contact. Never remove these insulating sheets. Never operate the monitor if the insulating sheets have been removed or damaged. Wet hands, high humidity, jewelry, or other metal objects can increase the likelihood of a hazard.**

**WARNING**

**IF IMPROPERLY LOCATED, CERTAIN ELECTRICAL EQUIPMENT WILL BECOME A SOURCE OF IGNITION AND MAY CAUSE FIRE OR EXPLOSION. THE SMC-501 ELECTRONICS PANEL MUST BE LOCATED OUTSIDE CLASS I OR II, DIVISION 1 AND 2 HAZARDOUS AREAS (REFERENCE NFPA NO. 33, LATEST EDITION.).**

Electronics Panel Mounting

The PulseTrack electronics panel is designed for wall or rack mounting; two mounting brackets are provided. For wall mounting, bolt the brackets to the cabinet sides, flush with the back of the cabinet, Figure 6. For rack mounting, bolt the brackets to the cabinet sides, flush with the front of the cabinet. The rack mount bracket positions are used when mounting the electronics panel into the optional cabinet or any standard 19 inch rack.

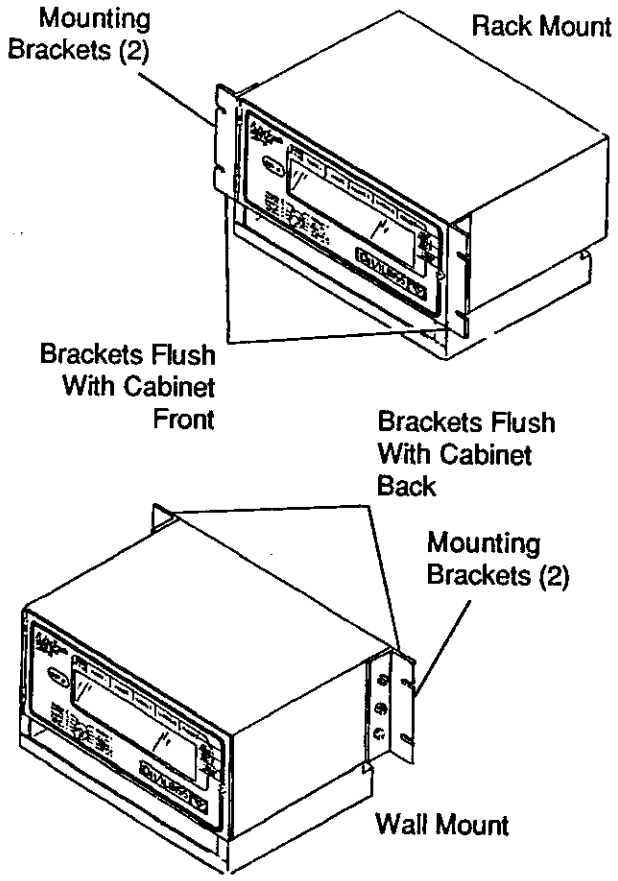



**Figure 6. Electronics Panel Mounting**

Main AC Voltage Supply

The main disconnect must be fused for 5 amps and grounded to building steel. Grounding between the main disconnect and the electronics panel must also be provided. Minimum input supply wiring must be 16 to 18 gauge stranded, insulated wiring, 600 volt AC, with a green ground wire. All wiring must conform to state and local codes.

1. AC input power lines are connected to screw terminals at the front of the power supply board, Figure 7.

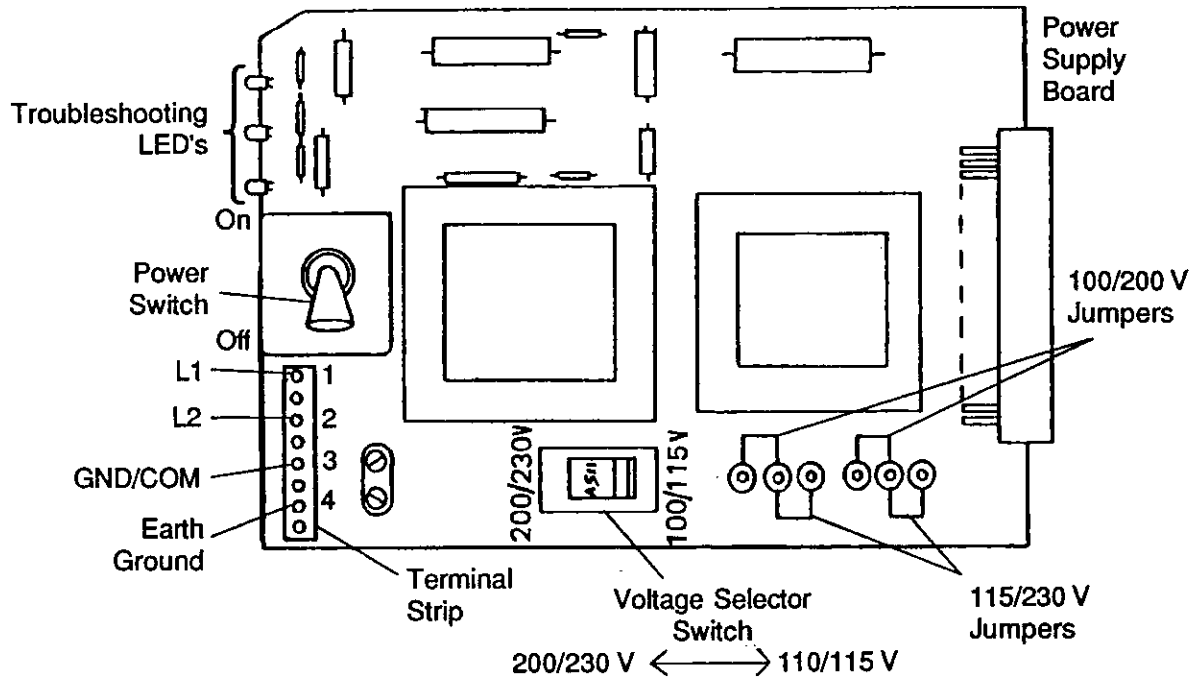



**Figure 7. AC Line Connections**

2. Connect the AC power lines to terminals L1 and L2 and the ground line to GND/COM. Connect the earth ground to building steel. DO NOT turn the AC power on at this time.

3. Fiber Optic PulseTrack systems are shipped with the voltage selector switch (Figure 7) in the 230 volt position for circuit protection. Select the proper voltage for your installation with the voltage selector switch as follows:

   For either 115 volt/60 Hz or 100 volt/50 Hz - select 115 V.
   For either 230 volt/60 Hz or 200 volt/50 Hz - select 230 V.

4. Fiber Optic PulseTrack systems are shipped with the voltage selector jumpers set up for 115/230 volt AC operation. The positions of the jumpers must be changed for 100/200 volt AC operation. This is a simple adjustment and is indicated on the power supply board. Both jumpers must be set for 115/230 volt AC or 100/200 volt AC.

**Monitor Board Setup (Refer to Figure 8)**

Monitor Only Systems - Initial Setup:

Loss-of-Feedback Switch - DISABLE
Overspeed Switch - ENABLE
Isolation Module/Fiber Optic Switch - ISOL MOD for Isolation Module Systems or FIBER OPTIC for Fiber Optic Systems

Monitor and Control Systems - Initial Setup:

Loss-of-Feedback Switch - ENABLE
Overspeed Switch - ENABLE
Isolation Module/Fiber Optic Switch - ISOL MOD for Isolation Module Systems or FIBER OPTIC for Fiber Optic Systems

For BEHR Retrofit Systems - Initial Setup:

Overspeed Switch - DISABLE
Other switches same as above.

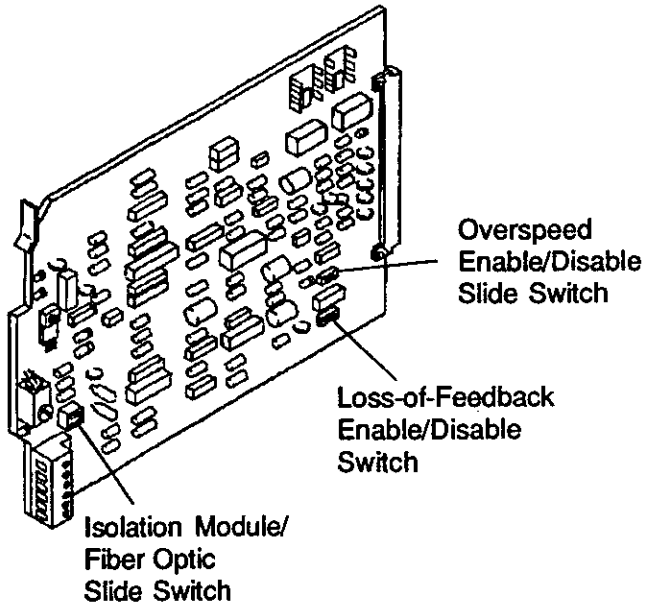



**Figure 8. Monitor Board**

## Fiber Optic Equipment

Fiber optic cables are available in standard 6 foot and 65 foot lengths. Other lengths can be created by using the KK-4913 Fiber Optic Cable Maintenance Kit to either shorten the standard size fiber optic cables or to splice pieces of fiber optic cable to create a longer cable.

**Note**

Installing splices between fiber optic cables reduces the strength of the light signal being transmitted. When no splices are used, the maximum length of a fiber optic cable is 120 feet. If one splice is used, the total length of the two spliced cables must not exceed 100 feet. If two splices are used, the total length of the three spliced cables must not exceed 80 feet. A fiber optic cable with more than two splices cannot be used with the Fiber Optic PulseTrack system, Figure 9.

Special orders for unusually long, unspliced fiber optic cables may be ordered. Contact your DeVilbiss representative for information.

**Note**

Fiber optic cable assembly should be treated like a 1/4 inch air tube. A minimum bend radius of 3 inches is required. As with all other air tubing, care must be taken to prevent kinking of the fiber optic cable.

**Note**

Avoid exposing the ends of fiber optic cables to chemicals such as paint or solvents. Exposing the ends of a fiber optic cable to such chemicals crazes the cable and severely reduces the light signal from the fiber optic transmitter. A cable that has been crazed must be repaired or replaced.

There are two different types of fiber optic transmitters available for use with the Fiber Optic PulseTrack system. They are electrically identical; however, their shape and mounting arrangements are different. One type is used with the RPM Aerobell (Figure 10) and the other with the RMA Aerobell (Figure 12). The two types are not interchangeable, and they are installed into the Fiber Optic PulseTrack system in different ways.

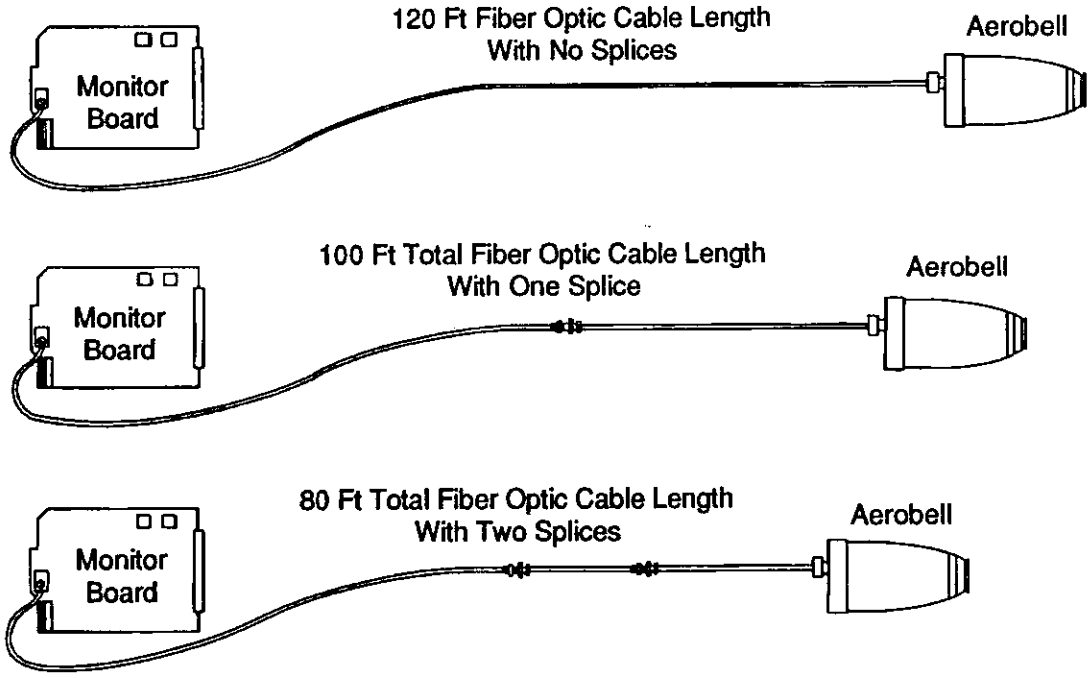



**Figure 9. Fiber Optic Cable Splices and Cable Length**

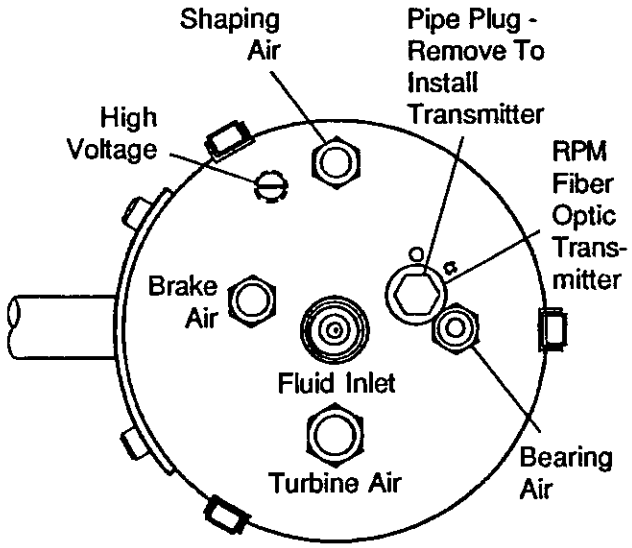



**Figure 10. RPM Fiber Optic Transmitter Manifold Connections**

RPM Installations

1. Remove the pipe plug from the rear of the manifold (Figure 10). Install the F/O transmitter into the opening. Tighten to 50 inch pounds only; do not overtighten. Do not use pipe dope or teflon tape.

2. Use the tube compression fitting supplied with the Fiber Optic Cable Assembly to attach the output end of the RPM fiber optic transmitter to one end of a 65 foot fiber optic cable, Figure 11.

3. Avoid kinking the fiber optic cable by maintaining a 3 inch minimum bend radius while extending the 65 foot fiber optic cable as needed to reach the Fiber Optic PulseTrack rack assembly. Do not place cable in walkways or other areas where it may pose a safety hazard or be easily damaged. Mounting the cable on walls, on posts, or over doorways may help to keep the cable from being a safety hazard or becoming damaged. Position the cable so that it does not limit the use of the Aerobell atomizer.

4. Insert the other end of the 65 foot fiber optic cable into the fiber optic receiver block on the Fiber Optic PulseTrack monitor board.

5. Tighten the nylon setscrew in the fiber optic receiving block to hold the 65 foot fiber optic cable in place, Figure 11.

6. Place the monitor board in its correct position in the Fiber Optic PulseTrack rack assembly.

RMA Installations

1. The fiber optic transmitter and 6 foot cable assembly are factory installed into the RMA atomizer, Figure 13.

2. Slide the SSP-7823 compression fitting over the free end of the 6 foot fiber optic cable. Insert the fiber optic cable into the brass SMC-427 fiber optic splice fitting until it bottoms out. Tighten the compression fitting; refer to Figure 14.

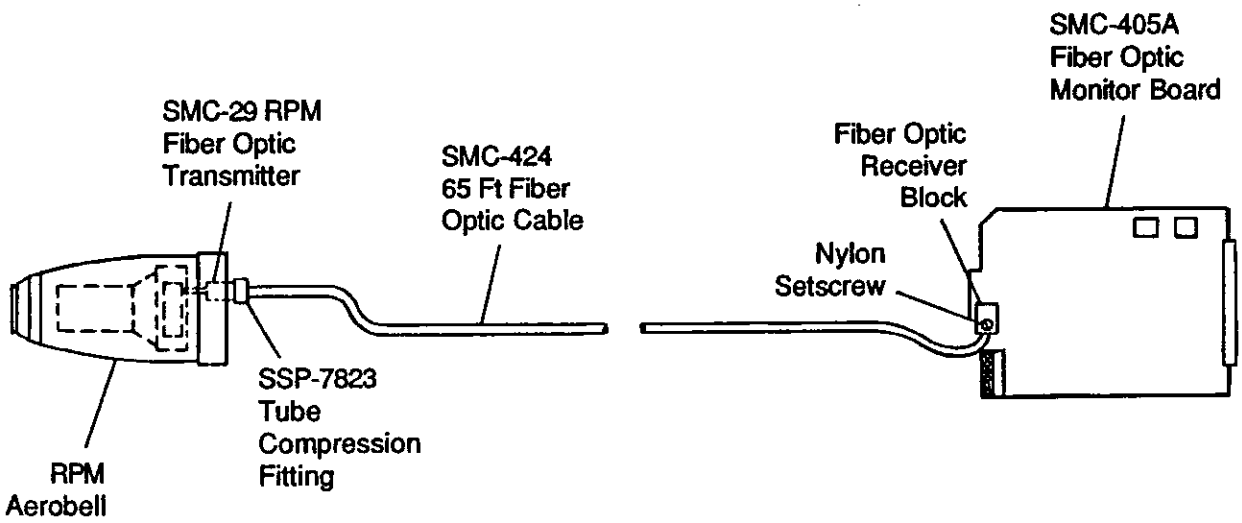



**Figure 11. RPM Fiber Optic Equipment Installations**

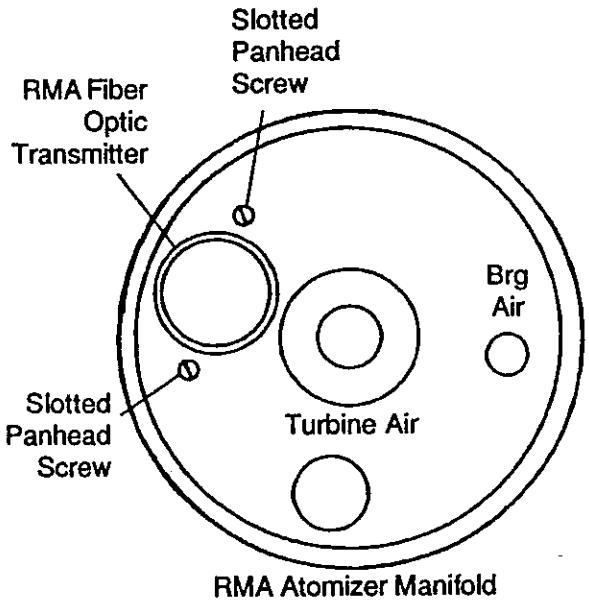



**Figure 12. RMA Fiber Optic Transmitter Manifold Connections**

3. Remove the cover from the RMA manifold assembly by removing the four screws on the sides of the cover.

4. Feed one end of the 65 foot fiber optic cable assembly through the hole in the rear of the manifold assembly.

5. Slide the SSP-7823 compression fitting over the cable end; then insert the cable into the brass SMC-427 fiber optic splice fitting until it bottoms out. Tighten the compression fitting; see Figure 14.

6. Replace the cover on the manifold assembly after all connections are made.

**Note**

Refer to RMA Service Manual for further installation information on the manifold assembly.

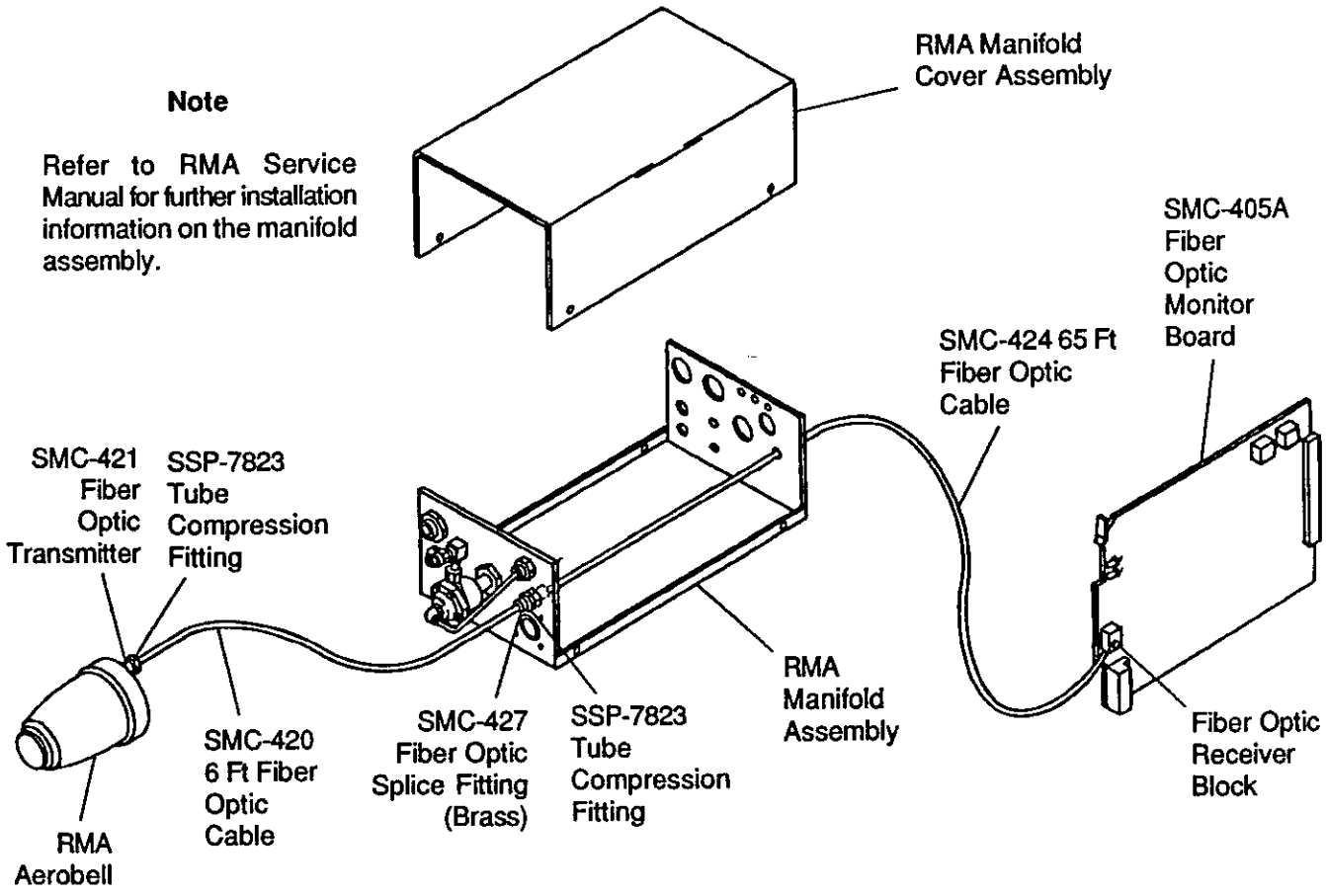



**Figure 13. RMA Fiber Optic Equipment Installation**

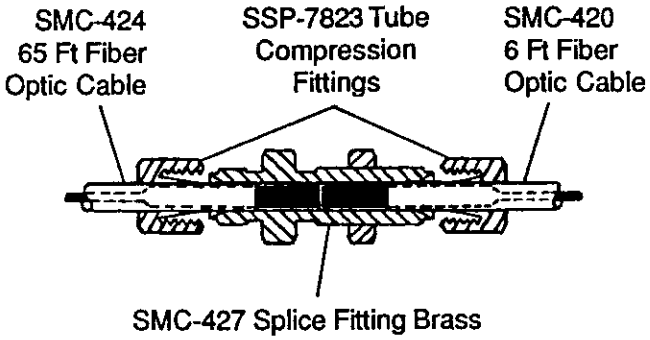



**Figure 14. Splice Fitting Connection**

**Note**

To ensure proper signal transmission between the 6 foot and 65 foot fiber optic cables, the cable ends must be clean, smooth, and make full contact within the splice. The tube compression fittings must be tightened securely to ensure that the cables will not move apart during use of the RMA Aerobell Atomizer. See Figure 14.

7. Position the RMA manifold assembly in a way that will not interfere with the use of the RMA Aerobell Atomizer. The manifold assembly should be located so that it will not be vulnerable to damage or pose a safety hazard.

8. Avoid kinking the fiber optic cable by maintaining a 3 inch minimum bend radius while extending the 65 foot fiber optic cable as needed to reach the Fiber Optic PulseTrack rack assembly. Do not place the cable in walkways or other areas where it may be easily damaged. Mounting the cable on walls, on posts, or over doorways may help to keep the cable from being a safety hazard or becoming damaged. Position the cable so that it does not limit the use of the RMA Aerobell Atomizer.

9. Insert the free end of the 65 foot fiber optic cable into the fiber optic receiver block on the monitor board.

10. Tighten the nylon setscrew in the fiber optic receiver block to hold the fiber optic cable in place on the monitor board.

11. Place the monitor board in its correct position in the Fiber Optic PulseTrack rack assembly.

Double check all monitor system connections; refer to Figure 15. Pay particular attention to the system grounds. All components should have a common ground potential equivalent to an earth ground. Measured resistance checks of the ground circuits are recommended.

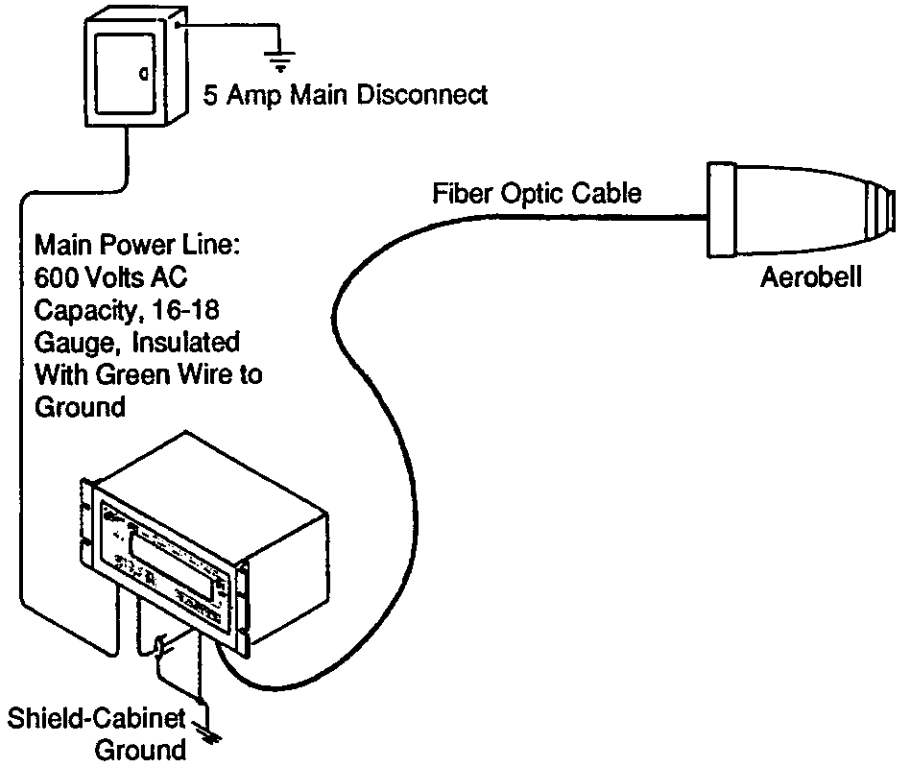



**Figure 15. Monitor System Connections**

**Note**

Ensure AC power to power supply board is off; then verify that the voltage selector switch is in the correct position for the system voltage.

If correct, and a control system is not being installed, AC input to the system can now be turned ON. If a control system is being installed, leave the power off and continue with the installation instructions.

Control Valve Assembly

**WARNING**

**IF IMPROPERLY LOCATED, CERTAIN ELECTRICAL EQUIPMENT WILL BECOME A SOURCE OF IGNITION AND MAY CAUSE FIRE OR EXPLOSION. THE SMC-409 CONTROL VALVE ASSEMBLY MUST BE LOCATED OUTSIDE CLASS I OR II, DIVISION 1 AND 2 HAZARDOUS AREAS (REFERENCE NFPA NO. 33, LATEST EDITION.).**

1. Install the SMC-409 control valve assembly between the turbine supply line filter (RPM-417) and the Aerobell, Figure 16. The control valve assembly must be located outside the spray booth, but no further than 60 feet from the turbine.

2. Mount the control valve assembly to the outside wall of the spray booth or inside an appropriate cabinet, using the assembly mounting bracket provided. Ground the assembly to building steel.

3. The valve assembly includes a 1/2 inch fitting on the inlet side and a 1/2 inch quick-disconnect tube connector on the outlet side of the assembly. Connect the valve assembly inlet to the outlet of the supply line filter. Connect the valve assembly outlet to the Aerobell turbine air inlet. Use 1/2 inch OD x 1/16 inch wall tubing for turbine air connections.

4. Plug the SMC-410 control cable into the top of the control valve assembly. Firmly tighten the connection using the threaded locking ring provided. Run the terminal end of the cable to the PulseTrack electronics cabinet. Connect the cable signal wires to the control board terminals as follows:

   Terminal 5 - Source Voltage (black)
   Terminal 6 - Signal lead (white)
   Terminal 7 - Ground lead (green)

5. Connect a grounding strap from the ground lug on the control valve assembly to an earth ground or building steel. This ground is in addition to the ground wire in the control cable assembly.

**Note**

The SMC-410 control cable assembly must be firmly attached to the SSE-9814 control valve. A loose connection may cause erratic operation.

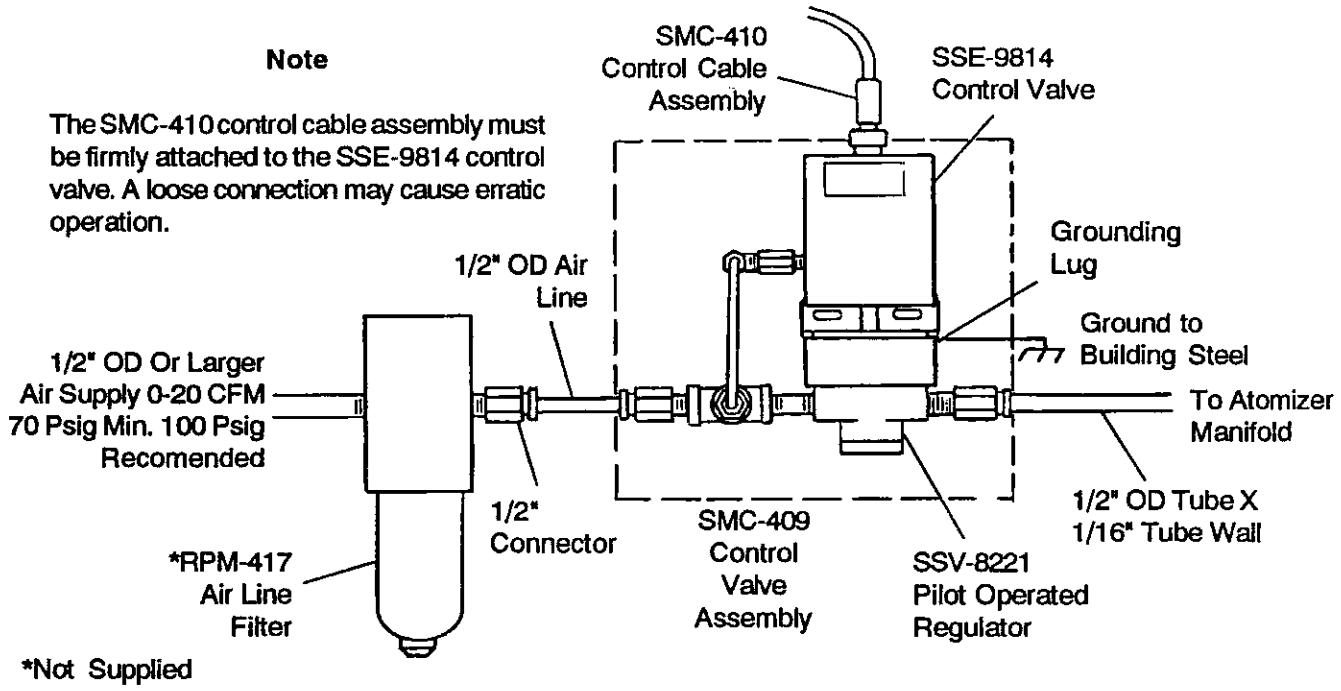



**Figure 16. Turbine Air Control Valve Assembly**

Brake Solenoid Assembly

**WARNING**

**IF IMPROPERLY LOCATED, CERTAIN ELECTRICAL EQUIPMENT WILL BECOME A SOURCE OF IGNITION AND MAY CAUSE FIRE OR EXPLOSION. THE SMC-414 OR SMC-414A BRAKE SOLENOID ASSEMBLY MUST BE LOCATED OUTSIDE CLASS I OR II, DIVISION 1 AND 2 HAZARDOUS AREAS (REFERENCE NFPA NO. 33, LATEST EDITION.).**

1. Mount the brake solenoid assembly (Figure 17) to a suitable support outside of the spray booth.

2. Using a 3/8 inch OD x 1/16 inch wall tubing, connect a 3/8 inch filtered air supply line to the input port of the solenoid valve.

3. Using 3/8 inch OD x 1/16 inch wall tubing, connect the brake solenoid assembly to the Aerobell manifold air brake port.

4. Run an 18 gauge stranded, 600 volt AC, 2 wire cable between the brake solenoid and the Fiber Optic PulseTrack electronics panel. Conduit should be run from the brake solenoid to a junction box where the cable leads can be connected to the brake solenoid leads. Refer to Figure 4 and connect the brake solenoid assembly to the 115 or 230 volt AC power source at the control board terminals as follows:

   Terminal 10 - External 115 (SMC-414) or 230 (SMC-414A) volt AC, 50/60 Hz, hot
   Terminal 11 - Black solenoid lead
   115 volt AC neutral - White solenoid lead

5. Install a grounding strap between the solenoid and an earth ground or building steel.

Paint/Turbine Air Interlock

In Aerobell/PulseTrack systems where the user wants the material flow to the Aerobell to be shut off when the bell is not rotating, either of the following methods may be used:

1. For systems using a programmable controller or computer to control the process, the PulseTrack underspeed output, pins 15 and 16 of the SMC-403A relay board, may be used to provide a contact closure if the fault condition occurs under normal operation. This contact closure, when tied to the software program, can be used to shut off material flow when the bell is rotating at less than 50% of the selected speed.

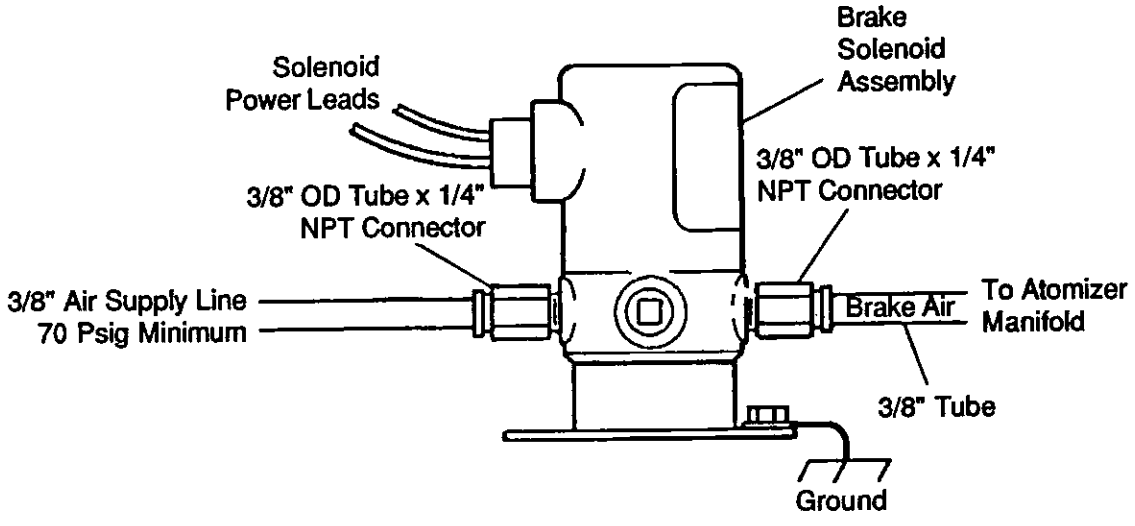



**Figure 17. Air Brake Solenoid Assembly**

2. When the system requires a pneumatic signal for the interlock, one of the two gauge ports on the SSV-8221 pilot operated regulator, Figure 16, may be used as a source for the pneumatic signal. By removing a pipe plug in the base of the regulator, a 1/4 NPT to 1/4 tube fitting (or any other tube size) can be installed for a pneumatic signal line. The use of the gauge port eliminates the need for additional fittings, and also eliminates pressure drops downstream of the regulator that could degrade system performance.

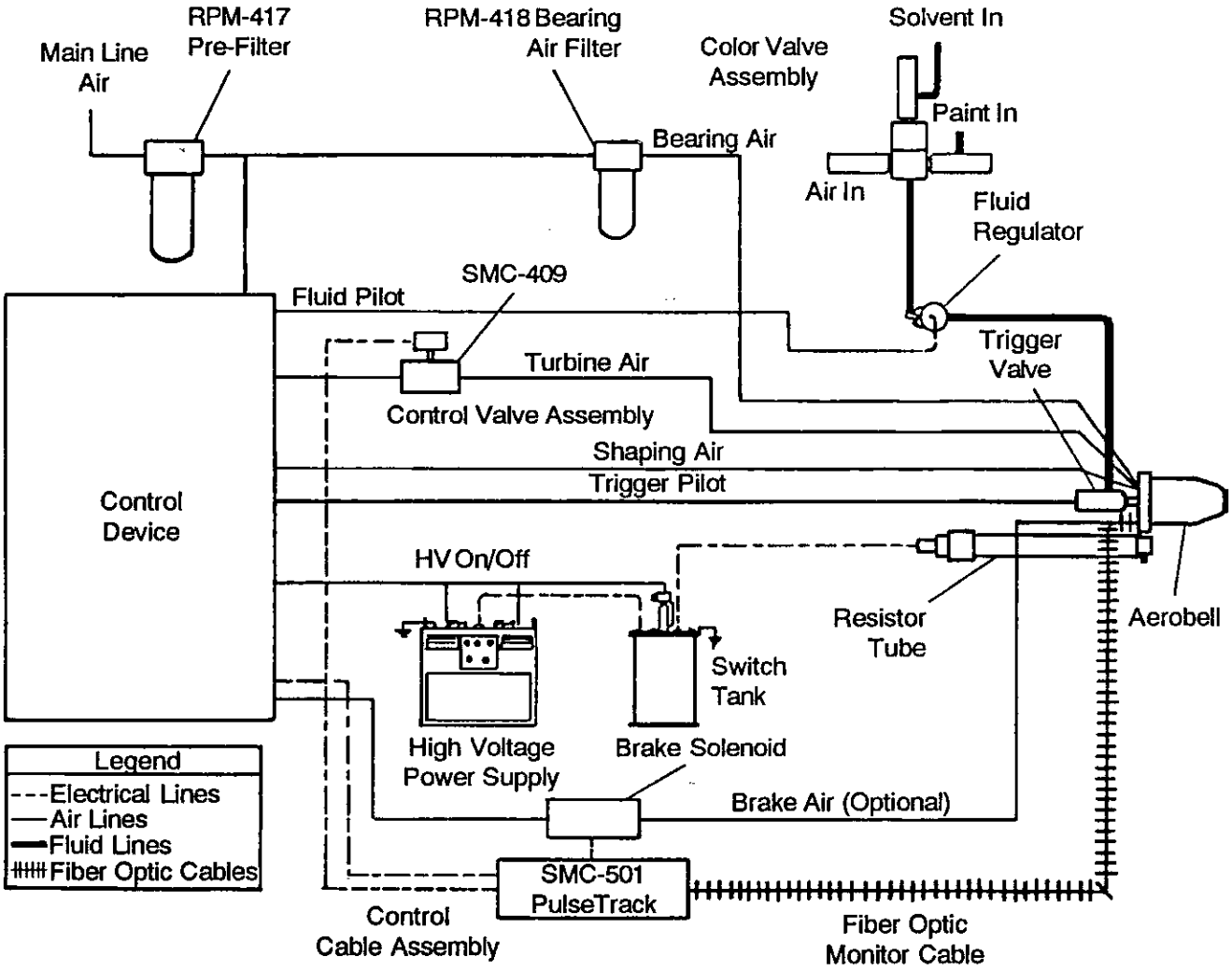



**Figure 18. Simplified PulseTrack System Installation (RPM Type)**

## OPERATION

**⚠ DANGER**

**Electric shock hazard. Insulating sheets have been placed over the solder joints on various relay circuit boards. These insulating sheets will prevent electrical shock in event of accidental contact. Never remove these insulating sheets. Never operate the monitor if the insulating sheets have been removed or damaged. Wet hands, high humidity, jewelry, or other metal objects can increase the likelihood of a hazard.**

Controls and Indicators

Power ON/OFF Switch -- The ON/OFF switch is located on the power supply board behind the panel door. It can only be reached with the door open. The ON/OFF switch contains a circuit breaker for overload protection. The circuit breaker trips at 1.0 amp of current draw. It is reset by toggling the switch OFF and then ON again.

RESET Pushbutton -- The RESET switch is used to return the fault relays to their normally open ready state. If the indicated fault that tripped the relay is corrected, pushing the RESET button will cause the fault indicator LED's to go out. The RESET button is accessible with the panel door open or closed.

TURBINE/SETPOINT Selector Switch -- The turbine selector switch is used to select one of five Aerobells for readout of turbine or setpoint speed. In the monitor-only system, it selects a specific Aerobell for a readout of turbine speed. In a monitor and control system it provides the monitor speed readout but also provides an RPM readout to check the turbine speed setpoint.

LED Indicators -- Each fiber optic monitor board includes three LED indicators facing the display window of the electronics panel. Two of the LED's are positioned close together near the top of the monitor board's edge. The upper LED, when lit, indicates a turbine overspeed condition, i.e., turbine speed in excess of 66,000 RPM. The middle LED, when lit, indicates a loss of feedback signal caused by either a break in the feedback signal line, or a turbine speed lower than 1500 RPM. The bottom LED, located further down the edge of the board (not visible through the front panel), indicates that the Fiber Optic PulseTrack monitor board is receiving feedback from the fiber optic transmitter.

On monitor and control systems, a fourth LED, located on the control board, lights to indicate turbine underspeed, i.e., turbine speeds that are less than 50% of the selected setpoint speed.

Labeling on the front of the Fiber Optic PulseTrack rack assembly display panel identifies the information provided by the LED's. Turbine numbers at the top of each LED's window identify which turbine is involved when the LED turns on.

Operating Procedures (Monitor System)

**⚠ DANGER**

**Electric shock hazard. The power on/off switch is located between circuit boards. To prevent electrical shock, an insulating sheet has been placed over the solder joints of the adjacent relay board. Never remove these insulating sheets. Never operate the monitor if the insulating sheet has been removed or damaged. Avoid reaching carelessly between the boards. Wet hands, high humidity, jewelry, or other metal objects can increase the likelihood of a hazard.**

1. STARTUP: Open the electronics panel door and turn the power ON/OFF switch to the ON position. A readout of any value on the digital display indicates that the power is on.

2. After turning the power ON, close and latch the panel door.

3. TO RESET RELAYS: Push the RESET button to return the PulseTrack latches and relay outputs to a ready condition. The fault LED indicators will go out, indicating a no-fault condition.

   If a loss-of-feedback LED indicator remains on, either the indicated turbine is idle, spinning at less than 1500 RPM, or a problem exists in the feedback circuit.

   When the loss-of-feedback (LOF) switch is disabled, the loss-of-feedback relay will not be affected by a manual reset when the turbine speed is below 1500 RPM. If the circuit is good, the LED will go out when the turbine exceeds 1500 RPM.

A loss-of-feedback (LOF) fault or an overspeed (OVS) fault will require a manual reset, unless the configuration is changed by the user. To change the configuration, reposition the ENABLE/DISABLE slide switch on the monitor board, Figure 8.

4. MONITOR TURBINE SPEEDS: Turn the TURBINE/SETPOINT selector switch to the desired turbine location. The speed is displayed in thousands of RPM's on the digital display. Note the decimal point between the second and third digit; a readout of 25.3 indicates a turbine speed of 25,300 RPM.

Operating Procedures (Monitor and Control System)

**⚠ DANGER**

**Electric shock hazard. The power on/off switch is located between circuit boards. To prevent electrical shock, an insulating sheet has been placed over the solder joints of the adjacent relay board. Never remove these insulating sheets. Never operate the monitor if the insulating sheet has been removed or damaged. Avoid reaching carelessly between the boards. Wet hands, high humidity, jewelry, or other metal objects can increase the likelihood of a hazard.**

1. STARTUP: Open the control panel door and turn the power ON/OFF switch to the ON position. A readout of any value on the digital display indicates that the power is on.

2. After turning the power ON, close and latch the panel door.

3. Reset the Fiber Optic PulseTrack. The PulseTrack can be reset manually or by PLC control. This is required before continuing normal operation. Failure to do so will cause random fault modes when the unit is first turned on.

4. The overspeed and underspeed LED indicators will go out, indicating a no-fault condition.

   If a loss-of-feedback LED indicator remains on, either the indicated turbine is idle, spinning at less than 1500 RPM, or a problem exists in the feedback circuit. If the circuit is good, the LED will go out when the turbine is turned on and the reset is pushed.

A loss-of-feedback (LOF) fault will require a manual or remote reset, unless the configuration is changed by the user. To change the configuration, reposition the lower ENABLE/DISABLE slide switch on the monitor board. See MONITOR BOARD SETUP and Figure 8.

If an overspeed LED indicator remains on, either the indicated turbine is spinning faster than 60,000 RPM, or a problem exists in the speed monitor circuit. If the circuit is good, the LED will go out when the turbine is turned on and the reset is pushed.

An overspeed fault will require a manual or remote reset, unless the configuration is changed by the user. To change the configuration, reposition the upper ENABLE/DISABLE slide switch on the monitor board, Figure 8.

5. ENTER LOCAL SETPOINT: To enter or change the setpoint value of any turbine, put switch on control board in LOCAL position, then:

   a. Rotate the TURBINE/SETPOINT selector switch to the proper setpoint position.

   b. Open the door on the electronics panel.

   c. Rotate the potentiometer on the face of the appropriate control board to give the desired readout on the meter board display.

   If the turbine is operating while the setpoint is being changed, its speed will change as the potentiometer is turned. Clockwise rotation of the pot increases the setpoint speed.

6. ENTER REMOTE SETPOINT. Have the PLC or host controller send a setpoint voltage or current to the control board terminal block TB501-1. When a contact closure is made across terminals TB501-3 and 4, the turbine will accelerate to the desired setpoint.

   If the turbine is already running at some speed, an increase in the setpoint speed will initiate the internal delay timers and the turbine will accelerate to the new turbine speed.

If the turbine is already running at some speed, a decrease in the setpoint speed will temporarily shut off the control valve. The turbine will coast down to the new setpoint speed. If the brake solenoid is installed, the deceleration will be much faster.

7. CHECK SETPOINT: Turn the TURBINE/SETPOINT selector switch to the setpoint position of the turbine being checked. The setpoint value is displayed in thousands of RPM's on the display panel readout.

8. MONITOR TURBINE SPEEDS: Turn the TURBINE/SETPOINT selector switch to the desired turbine location. The speed is displayed in thousands of RPM's on the digital readout. Note the decimal point between the second and third digit; a readout of 25.3 indicates a turbine speed of 25,300 RPM. Differences of up to 1% between the setpoint value and the actual turbine speed shown on the digital display are normal. Readouts will be most accurate under stable operating conditions.

Interim Operation of Aerobell Without PulseTrack

The PulseTrack is designed for maximum reliability. In the unlikely event that the PulseTrack should fail, there is a fairly simple process that will allow open loop operation until the PulseTrack is operational again.

1. Remove the SSE-9814 control valve from the SMC-409 control valve assembly, Figure 16.

2. Substitute a manual pilot pressure regulator with a 0 to 60 psi pressure gauge, Figure 19.

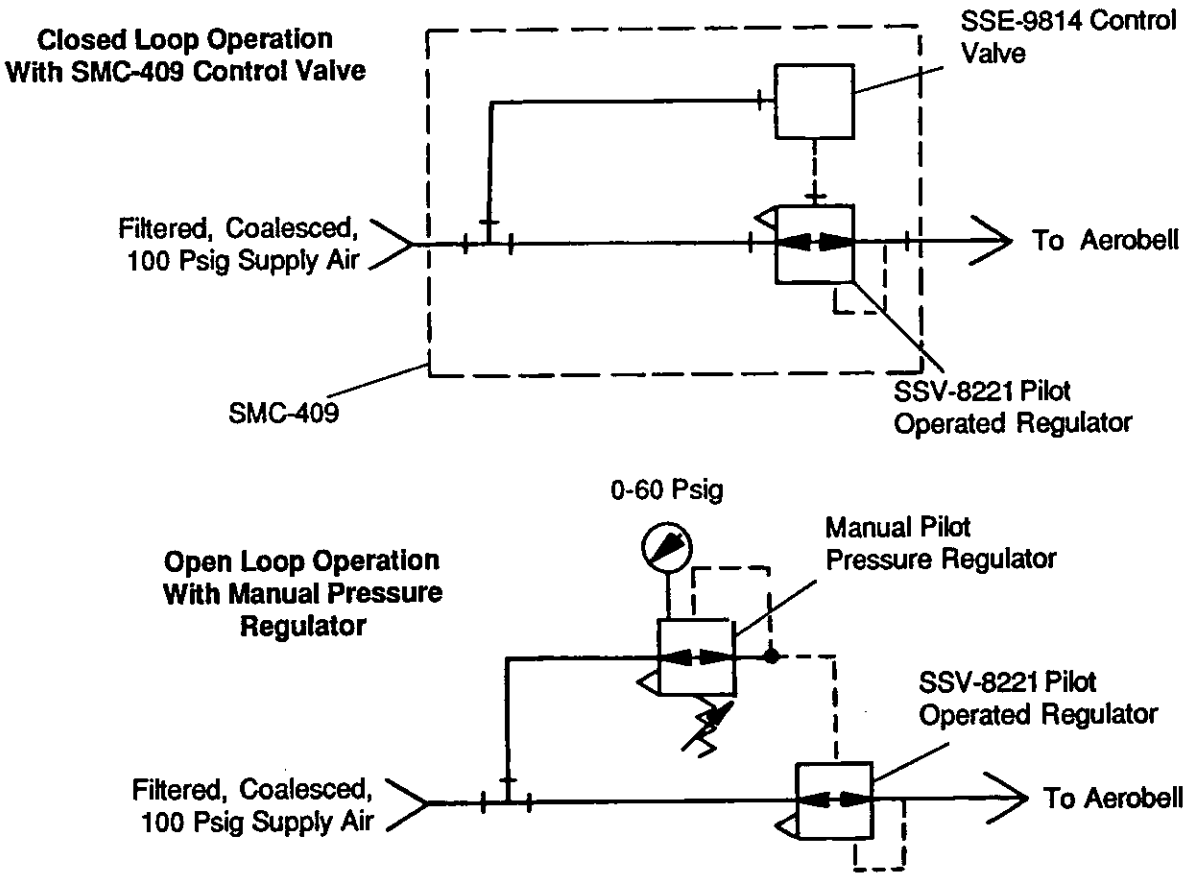



**Figure 19. Substitution of Manual Pressure Regulator**

3. Set the desired speed by referring to the following table:

| Turbine Air Pressure | Speed (RPM) (Unloaded) RPM Type Aerobell | RMA Type Aerobell |
|---|---|---|
| 45 | 60,000 (maximum) | ____ |
| 40 | 56,000 | ____ |
| 35 | 52,600 | ____ |
| 30 | 48,300 | 59,000 |
| 25 | 43,400 | 53,700 |
| 20 | 37,700 | 47,600 |
| 15 | 31,000 | 40,000 |
| 10 | 23,000 | 30,400 |
| 5 | 13,000 | 18,200 |

**Shutoff Procedure**

Emergency Shutoff

Turn OFF remote trigger switches. Open the PulseTrack panel door and turn OFF AC power switch.

**WARNING**

**PERFORMING TROUBLESHOOTING OR REPAIRS ON THE AEROBELL SYSTEM MAY EXPOSE PERSONNEL TO HIGH VOLTAGE SOURCES OR MOVING PARTS. PRIOR TO PERFORMING ANY TROUBLESHOOTING OR REPAIRS:**

1. **TURN OFF AC POWER TO THE PULSETRACK AT THE MAIN POWER DISCONNECT BOX.**
2. **TAG POWER SWITCHES AND REMOTE TRIGGER SWITCHES TO SHOW THAT MAINTENANCE IS BEING PERFORMED.**
3. **ALLOW THREE MINUTES FOR THE AEROBELL TURBINE TO STOP SPINNING BEFORE ENTERING THE SPRAY BOOTH.**
4. **TURN OFF THE HIGH VOLTAGE SOURCE AND GROUND ALL HIGH VOLTAGE ELEMENTS IN THE BOOTH TO AVOID ELECTROSTATIC SHOCKS.**

Normal Shutoff

Prior to any production shutdown, flush the Aerobell and its material feed lines in accordance with the cleaning procedures outlined in Aerobell Service Instruction Manual.

Turn OFF all remote trigger switches if used. Turn OFF the AC power switch on the power board. Close and latch the PulseTrack control panel door.

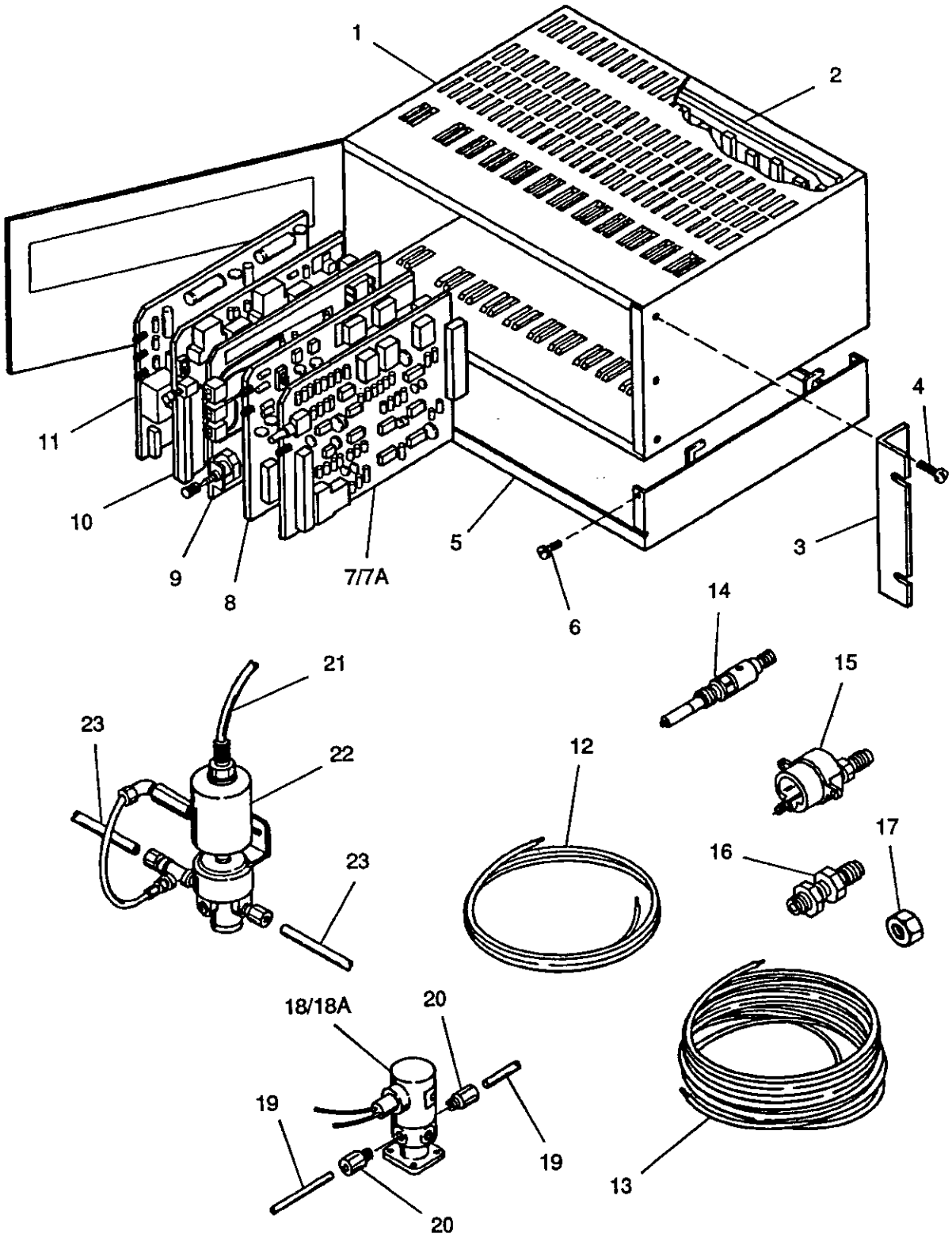



**Figure 20. PulseTrack Speed Monitor and Control (Not to Scale)**

## PARTS LIST

| Item | Part No. | Description | Qty |
|---|---|---|---|
| +1 | | Card Rack and Wire Tray Assembly (Includes Items 1 thru 6) | 1 |
| +2 | SMC-411 | Mother Board Assembly | 1 |
| +3 | | Mounting Bracket | 2 |
| +4 | | Screw, Pan Head, 10-32 x 5/16" | 6 |
| +5 | | Wire Tray | 1 |
| +6 | | Screw, Pan Head, 6-32 x 1/4" | 2 |
| *7 | SMC-406 | Control Board Assembly (4 to 20 mA) | 1# |
| *7A | SMC-416 | Control Board Assembly (0 to 6 VDC) | 1# |
| @8 | SMC-405A | Monitor Board Assembly | 1# |
| +9 | SMC-404 | Display Board Assembly | 1 |
| +10 | SMC-403A | Relay Board Assembly | 1 |
| +11 | SMC-402 | Power Supply Board Assembly | 1 |
| $@12 | SMC-420 | 6 ft Fiber Optic Cable (for RMA) | 1# |
| $@13 | SMC-424 | 65 ft Fiber Optic Cable | 1# |
| @14 | SMC-29 | RPM Fiber Optic Transmitter | 1# |
| @15 | SMC-421 | RMA Fiber Optic Transmitter | 1# |
| @16 | SMC-427 | Fiber Optic Splice Fitting Brass | 1# |
| @17 | SSP-7823 | Compression Fitting | AR |
| *18 | SMC-414 | Solenoid, Brake Air, 115 V (Includes Item 20) | 1# |
| *18A | SMC-414A | Solenoid, Brake Air, 230 V (Includes Item 20) | 1# |
| 19 | | Tubing, 3/8" OD x 1/16" Wall | AR |
| *20 | | Connector, 3/8" Tube x 1/4" Wall | 2# |
| *21 | SMC-410 | Control Cable Assembly | 1# |
| *22 | SMC-409 | Control Valve Assembly (See Figure 21) | 1# |
| 23 | | Tubing, 1/2" OD x 1/16" Wall | AR |

+ SMC-501 Electronics Panel includes items 1 thru 6, 9, 10, and 11.

* SMC-503 Control Package includes items 7, 18, 19, and 20, 21, and 22.

* SMC-503A Control Package includes items 7, 18A, 19, and 20, 21, and 22.

* SMC-505 Control Package includes items 7A, 18, 19, 20, 21, and 22.

* SMC-505A Control Package includes items 7A, 18A, 19, 20, 21, and 22.

# Quantities shown are for the control or monitor of one Aerobell. For more than one Aerobell, multiply the quantity shown by the number of Aerobells in the system.

@ SMC-507 Fiber Optic Monitor Package (RPM) includes items 8, 13, 14, and one compression fitting (item 17).

@ SMC-508 Fiber Optic Monitor Package (RMA) includes items 8, 12, 13, 15, 16, and three compression fittings (item 17).

AR As Required

$ For breakdown of Fiber Optic Cable see Figure 21.

**Note**

For especially long fiber optic cables that cannot be created by splicing cables together, i.e., lengths between 90 and 120 feet, special one piece lengths may be ordered. Contact your DeVilbiss representative for information. Special one piece lengths may also be constructed by the user. Any length may be ordered by using the bulk part numbers for the SSW-200 Fiber Optic Carrier Cable and the H-2339 Outer Polyethylene Tube. A KK-4913 Fiber Optic Cable Maintenance Kit will also be needed to construct the special length fiber optic cable.

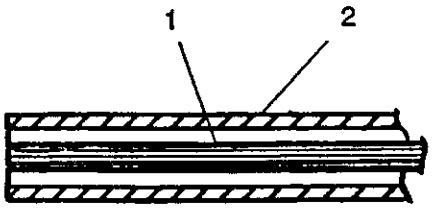



**Figure 21. Fiber Optic Cable Breakdown**

| Item | Part No. | Description | Qty |
|---|---|---|---|
| 1 | SSW-200 | Fiber Optic Carrier Cable | AR |
| 2 | H-2339 | Outer Poly-ethylene Tube | AR |

The KK-4913 Fiber Optic Cable Maintenance Kit includes the following items:

| Part No. | Description | Qty |
|---|---|---|
| SI-70-52-13 | Service Instruction Manual | 1 |
| ------ | Fiber Optic Ferrules | 2 |
| ------ | Sandpaper, 280 grit | 1 |
| ------ | Sandpaper, 400 grit | 1 |
| ------ | Fiber Optic Splice Fitting Nylon | 1 |
| ------ | Adhesive | 1 |
| ------ | Accelerator for Adhesive | 1 |
| SSP-7823 | Compression Fitting | 2 |

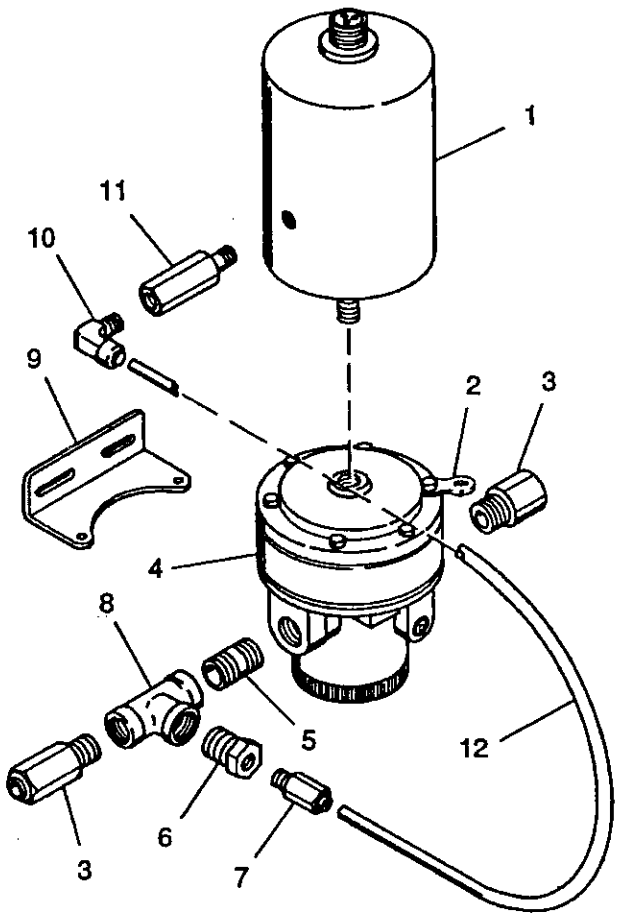



**Figure 22. Control Valve Assembly**

| Item | Part No. | Description | Qty |
|---|---|---|---|
| 1 | SSE-9814 | Control Valve | 1 |
| 2 | ------ | Ground Lug | 2 |
| 3 | ------ | Connector, 1/2" Tube x 1/2" NPT | 2 |
| 4 | SSV-8221 | Air Regulator | 1 |
| 5 | ------ | Nipple, 1/2" NPT | 1 |
| 6 | ------ | Reducer, 1/2 x 1/8" NPT | 1 |
| 7 | ------ | Connector, 1/4" Tube x 1/8" NPT | 1 |
| 8 | ------ | Tee, 1/2 x 1/2 x 1/2" NPT | 1 |
| 9 | ------ | Mounting Bracket | 1 |
| 10 | ------ | Connector, Elbow, 1/4" Tube x 1/8" NPT | 1 |
| 11 | SSM-5504 | Filter, 1/8" NPT | 1 |
| 12 | H-3010 | Tubing, 1/4" OD x 1/16" Wall | AR |

## RECOMMENDED SPARE PARTS

| Part No. | Description | Number of Aerobells 1-5 | 6-10 | Over 10 |
|---|---|---|---|---|
| SMC-405A | Monitor Board Assembly | 1 | 1 | 1 or 2 |
| # *SMC-406 | Control Board Assembly | 1 | 1 | 1 or 2 |
| +*SMC-416 | Control Board Assembly | 1 | 1 | 1 or 2 |
| SMC-402 | Power Supply Board Assembly | 1 | 1 | 1 |
| SMC-403A | Relay Board Assembly | 1 | 1 | 1 or 2 |
| SMC-404 | Display Board Assembly | 1 | 1 | 1 or 2 |
| *SMC-409 | Control Valve Assembly | 1 | 1 | 1 or 2 |
| *SMC-410 | Control Cable Assembly | 1 | 1 | 1 or 2 |
| SSW-4021 | LED Display, 7 Segment (Part of SMC-404) | 3 | 3 | 6 |
| SSE-1036 | 40 Pin I.C., ICL-7107 (Part of SMC-404) | 1 | 1 | 2 |
| KK-4913 | Fiber Optic Cable Maintenance Kit | 1 | 3 | 5 |

* Recommended if PulseTrack includes Speed Control Function
\# Order SMC-406 for use with SMC-503/503A Control Package
\+ Order SMC-416 for use with SMC-505/505A Control Package

## PREVENTIVE MAINTENANCE

**WARNING**

**RISK OF PERSONAL INJURY. TURN OFF AC POWER TO THE PULSETRACK AT THE MAIN DISCONNECT BOX BEFORE PERFORMING ANY MAINTENANCE OR CLEANING.**

**CAUTION**

**Do not remove the circuit boards with the AC power on because damage will occur to the circuit boards. Always turn the AC power off at least 30 seconds before removing the circuit boards.**

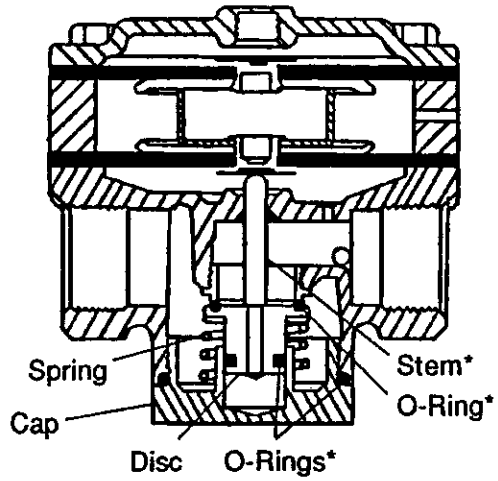
**CAUTION**

**Do not use strong solvents such as paint thinner to clean the electronics panel face. These solvents can cause severe damage to certain electrical components. Use only cleaning agents recommended for use with electronics equipment when cleaning the electronics cabinet.**

At regular intervals, inspect all air and electrical connections. Air fittings and lines must be connected tightly and be free of cuts, cracks, or severe abrasions. All signal lines must be free of cuts, cracks, and frayed ends. Check all electrical connections for tightness. Check all components near or in the spray booth for good ground connections.

Every 6 months remove filter (11, Figure 22) for cleaning. Clean by flushing with solvent through the outgoing port until all debris is removed. Before reinstalling carefully clean out the pipe dope residue from the threads in the control valve. Be careful not to allow any pipe dope to get inside of control valve (1) (could cause control valve to malfunction). Apply a small amount of pipe dope on the male threads of the filter (2 threads back from the lead thread) before reinstalling the filter. Again, be careful not to allow any pipe dope or other contaminants to get inside of control valve.

Every six months, disassemble the SSV-8221 regulator (Figure 22, Item 4) of the SMC-409 control valve by removing the cap, spring, and disc assembly, Figure 23. Lubricate the O-rings and stem with either Vaseline or non-silicone light grease.




*Lubricate With Vaseline or Non-Silicone Light Grease.

**Figure 23. Regulator of the Control Valve Assembly**

## TROUBLESHOOTING

| PROBLEM | CAUSE | SOLUTION |
|---|---|---|
| A. Turbine won't start when triggered. | 1. Turbine air supply off. | 1. Turn on air supply. |
| | 2. System not reset after AC power turned on. | 2. Reset system. |
| | 3. PulseTrack power off. | 3. Turn power switch ON. |
| | 4. Maintenance override switch or remote trigger in OFF position. | 4. Turn trigger ON. |
| | 5. Control cable disconnected or loose. | 5. Reconnect or tighten. |
| | 6. Air filter plugged. | 6. Clean or replace filter. |
| | 7. Faulty control board. | 7. Replace board. |
| | 8. Faulty power supply board, one or more troubleshooting LED's off. | 8. Replace board. |
| | 9. Faulty monitor board. | 9. Replace board. |
| B. Turbine won't stop with trigger in OFF position | 1. Relay board maintenance override switch ON. | 1. Turn maintenance override switch OFF. |
| | 2. Faulty remote trigger signal. | 2. Problem not in PulseTrack. Correct at source. |
| | 3. Faulty control board. | 3. Replace board. |
| | 4. Faulty relay board. | 4. Replace board. |
| | 5. Faulty control valve assembly. | 5. Replace control valve assembly. |
| C. Loss of feedback indicator ON. When triggered, no speed indication on display and unit turns off after approximately 10 seconds. | 1. Fiber optic transmitter damaged. | 1. Replace transmitter. |
| | 2. Fiber optic cable damaged or not properly installed. | 2. Replace or install properly. |
| | 3. Switch SW-401 on monitor board is in wrong position. | 3. Slide actuator to correct position. |
| | 4. Faulty monitor board. | 4. Replace board. |

## TROUBLESHOOTING

| PROBLEM | CAUSE | SOLUTION |
|---|---|---|
| D. Turbine runs at greater than setpoint speed | 1. Faulty monitor board.<br>2. Faulty control board.<br>3. Faulty control valve assembly. | 1. Replace board.<br>2. Replace board.<br>3. Replace control valve assembly. |
| E. Turbine runs at less than set-point speed; % underspeed LED may or may not be lit. | 1. Faulty monitor board.<br>2. Faulty control board.<br>3. Faulty turbine control valve assembly.<br>4. Blocked or insufficient air supply, dirty air filter(s).<br>5. Paint build-up in Aerobell. | 1. Replace board.<br>2. Replace board.<br>3. Replace control valve assembly.<br>4. Correct condition.<br>5. Clean. |
| F. Turbine speed unstable | 1. Faulty power supply board.<br>2. Faulty fiber optic cable or fiber optic transmitter.<br>3. Faulty control valve assembly.<br>4. Control valve assembly regulator malfunction. | 1. Replace board.<br>2. Replace fiber optic cable or transmitter.<br>3. Replace control valve assembly.<br>4. Lubricate as shown in Figure 23. |
| G. No digital readout at panel | 1. PulseTrack power off.<br>2. PulseTrack circuit breaker tripped.<br>3. Main power loss.<br>4. Faulty display board.<br>5. Faulty power supply board. | 1. Turn power switch ON.<br>2. Turn power switch OFF and then ON again.<br>3. Check main disconnect.<br>4. Replace board.<br>5. Replace board. |
| H. Overspeed indicator remains ON. | 1. Faulty control board.<br>2. Faulty monitor board.<br>3. Faulty control valve assembly. | 1. Replace control board.<br>2. Replace monitor board.<br>3. Replace control valve assembly. |

End