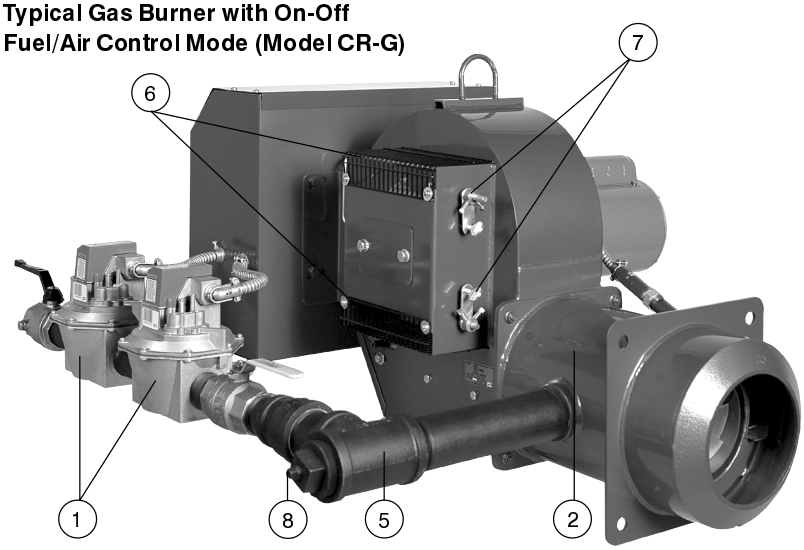
3. MECHANICAL OPERATION OF FUEL/AIR CONTROL MODES

Figure 17

Typical Gas Burner with On-Off Fuel/Air Control Mode (Model CR-G)



MECHANICAL OPERATION: This system uses a combination Diaphragm Gas Valve and Integral Pressure Regulator (1) to control the on-off operation of gas to the Blast Tube (2). A proven spark ignited gas pilot provides ignition for the main flame. Gas flow control rate is accomplished by adjustment of the main gas pressure regulator and by a Limiting Orifice (a limiting orifice is used when the gas flow rate - BTU input - through the gas train components is higher than desired), located in the Orifice Tee fitting (5) at the inlet to the gas manifold. The Air Dampers (6) are adjusted and locked in place with the Air Damper Arms (7) for a fixed firing rate. When the gas pilot* has been proven by the flame detector*, the Diaphragm Gas Valve will open slowly, allowing gas to the Blast Tube. Blast Tube gas pressures are measured at the 1/4" Plugged Gauge Test Port (8) in the Side Orifice Tee. Refer to page 37, Table 10 for orifice sizing information. See page 37, Figure 38 for side orifice detail.

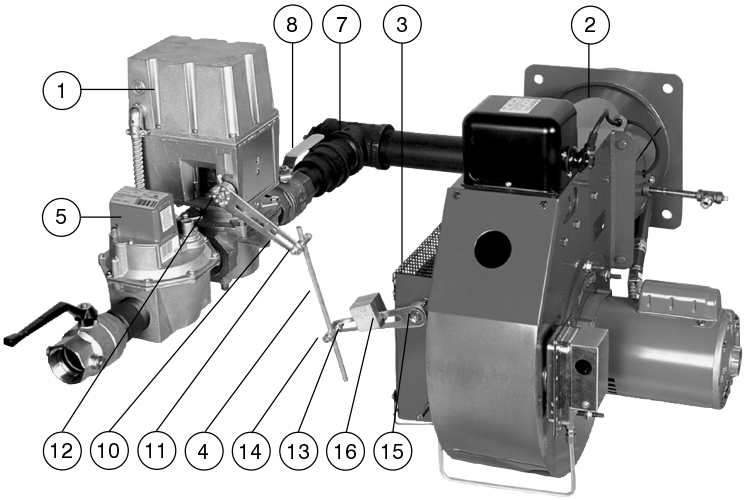
* Not shown in this depiction. See page 3, Figure 1.

Note 1
Component operational sequencing will vary with the specific Flame Safeguard Control being used. Refer to the specific Flame Safeguard Control bulletin supplied with the burner for complete information.

Note 2
Optional On/Off systems may be supplied using a separate gas pressure regulator and separate diaphragm or motorized gas valve in place of the combination regulator/valve unit depicted. Other components would remain as described.

Figure 18

Typical Gas Burner with Low-High-Off or Low-High-Low Fuel/Air Control Mode (Model C-G)



MECHANICAL OPERATION: The Low-High-Off system uses a Motorized Gas Valve (1) to control the Low-High-Off operation of gas to the Blast Tube (2), as well as movable Air Dampers (3) by means of the mechanical Linkage (4). Gas flow control rate is accomplished by adjustment of the Main Gas Pressure Regulator (5) and by a Limiting Orifice (when installed) located in the Side Orifice Tee fitting (7) at the inlet piping to the gas manifold. A proven spark ignited gas pilot* provides ignition for the main flame. When the gas pilot* has been proven by the flame detector (scanner)*, the Motorized Gas Valve begins to open, allowing a controlled fuel/air mixture to the Blast Tube for low fire light off - and continues to open, increasing the fuel/air flow until the high fire position has been reached. Firing Head gas pressures are measured at the 1/4" plugged Gauge Test Port (8) in the Side Orifice Tee. Refer to page 37, Table 10 for orifice sizing information. The burner operates at high fire until the system load demand is satisfied, at which time the Motorized Gas Valve closes and the Air Dampers are returned to the light off position in preparation for the next operating cycle. This depiction shows the Linkage in the low fire start position.

The Low-High-Low system is identical to the Low-High-Off system except that - the Motorized Gas Valve (1) has a

Low Fire Operating Position Adjustment in addition to the light off and high fire operating positions. (See manufacturer's bulletin included with the burner.)

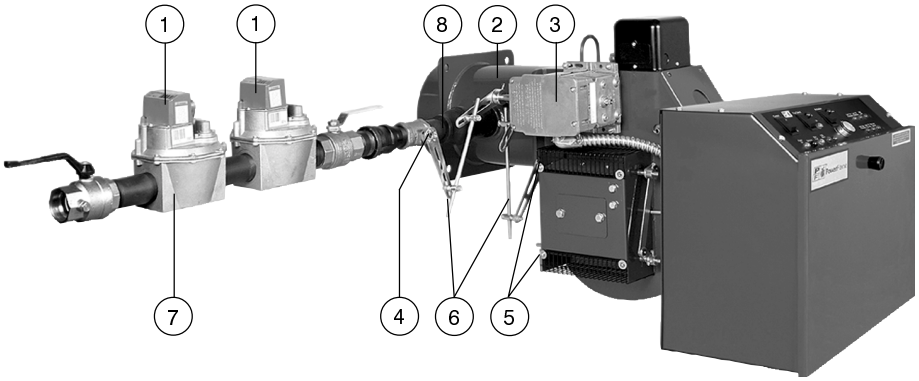
An additional temperature or pressure controller is added to the system, which at a selected preset point will electrically switch the Motorized Gas Valve and Air Dampers (3) to either the low fire or the high fire position, as the system load demand requires. Depending on system load conditions, the burner can alternate indefinitely between the low and the high fire positions without shutting down. When the system demand is satisfied, the Motorized Gas Valve closes (normally the burner will be in the low fire position at this time) and the Air Dampers are returned to the light off position, in preparation for the next operating cycle. The Driver Arm (10) connected to the Motorized Gas Valve will increase the travel of the Air Damper Arm (13) as the Linkage Rod ball joint (11) is moved away from the Gas Valve Crank Shaft (12). The travel of the Air Damper Driven Arm will be increased as the Linkage Rod ball joint (14) is moved toward the Air Damper Axle Shaft (15). When adjusting linkage travel, make certain that the driven arm Linkage Return Iron Weight (16) does not interfere with the Linkage operation - and that all linkage components are free from binding.

* Not shown in this depiction. See page 4, Figure 2.

Note 1
Component operational sequencing will vary with the specific Flame Safeguard Control being used. Refer to the specific Flame Safeguard Control bulletin supplied with the burner for complete information.

Figure 19

Typical Gas Burner with Full Modulation Fuel/Air Control Mode (Model C-G)



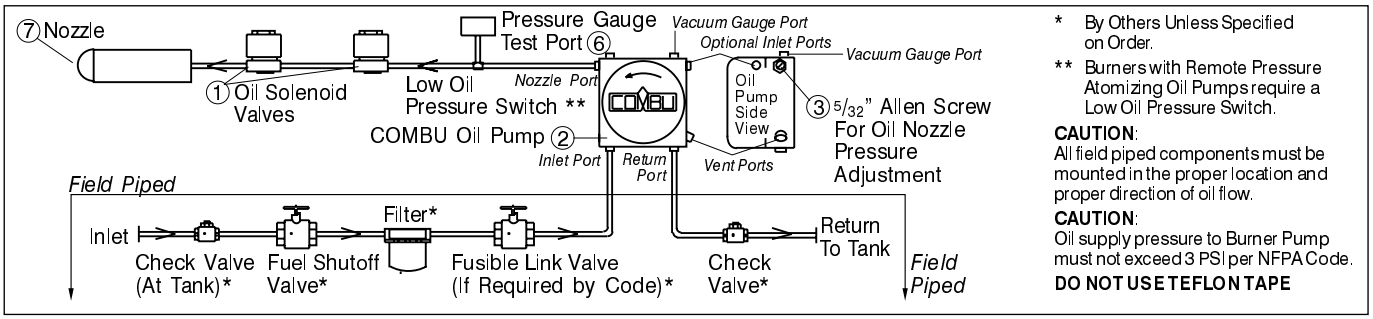
MECHANICAL OPERATION: This Full Modulation system uses a Diaphragm (1) or Motorized Gas Valves to ensure opening and positive closure of the gas source to the Blast Tube (2). A Modulating Motor (3) controls the positioning of a Modulating Butterfly Gas Valve (4) and movable Air Dampers (5) through Mechanical Linkage (6). The gas flow control rate is accomplished through adjustment of the Main Gas Pressure Regulator (7) and the Butterfly Valve. A proven spark ignited gas pilot* provides ignition for the main flame. When the gas pilot has been proven by the flame detector*, the Diaphragm or Motorized Gas Valve opens and allows gas at a rate controlled by the Butterfly Valve to go to the Blast Tube for main flame low fire light off. After a short period of time at the low fire position, the Modulating Motor will drive the Butterfly Valve and the Air Dampers to the high fire position. The burner will stay at high fire until the system pressure or temperature increases to a selected preset point, at which time a modulating type controller will drive the Modulating Motor to low fire, or whatever firing position between low and high fire is required to match the system load demand. The Modulating Motor will continually reposition the firing rate in an effort to exactly match system load demand. Blast Tube gas pressures can be taken at the $^1/_4$" Plugged Test Port (8) located between the Butterfly Valve and the gas Blast Tube. Refer to the Burner Specification computer printout supplied with the burner, for specific high fire gas pressure values. When the system pressure or temperature cutoff point is reached, the Diaphragm or Motorized Gas Valve closes (normally the burner will be at the full low fire position at this time) and the Air Dampers will go to the low fire light off position in preparation for the next firing cycle. This depiction shows the Linkage in the low fire light off position. Refer to page 22, Figure 27 for information on linkage adjustments. Also see page 22 for information on the Varicam™ modulating characterized fuel metering system.

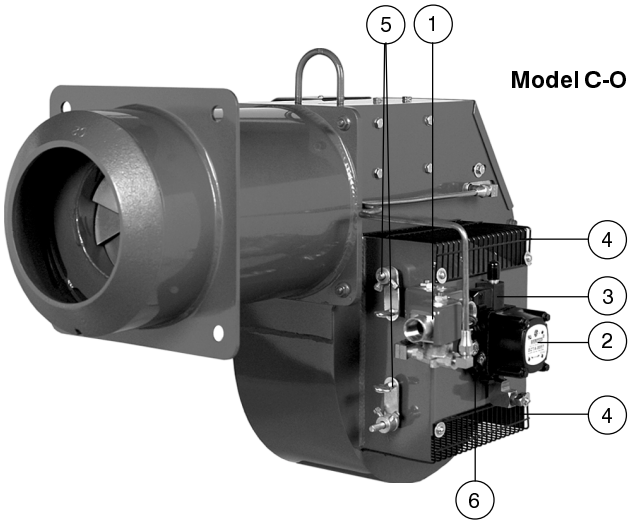
* Not shown in this diagram. See page 4, Figure 3.

Note 1
Component operational sequencing will vary with specific Flame Safeguard Control being used. Refer to the specific Flame Safeguard Control bulletin supplied with the burner for complete information.

Figure 20

Typical Oil Burner with On-Off Fuel/Air Control Mode





MECHANICAL OPERATION: The On-Off system uses a single stage, high suction lift Oil Pump (2) with a Simplex Oil Nozzle. A direct spark oil ignition system is standard on typical oil burners (a gas pilot is standard on Gas/Oil burners), but certain insurance company codes could require a spark ignited gas pilot* to provide ignition for the main oil flame. The nozzle oil flow rate is set by adjusting the Oil Pump Pressure Regulating Valve (3). Turn clockwise to increase the pressure and counter-clockwise to decrease the pressure to the Nozzle. Normal nozzle pressure will be 100 to 300 PSI. Refer to page 33, Table 9 to determine specific nozzle pressures and firing rates. Nozzle pressures are taken at the plugged Nozzle Pressure Gauge Port (6). The oil on-off flow to the Nozzle is controlled by the Oil Solenoid Valve (1). The Air Dampers (4) are adjusted and locked in place with the Air Damper Arms (5). The burner operates at one fixed firing rate. See page 12, Figure 11 and pump manufacturer's bulletin packed with the burner for more information.

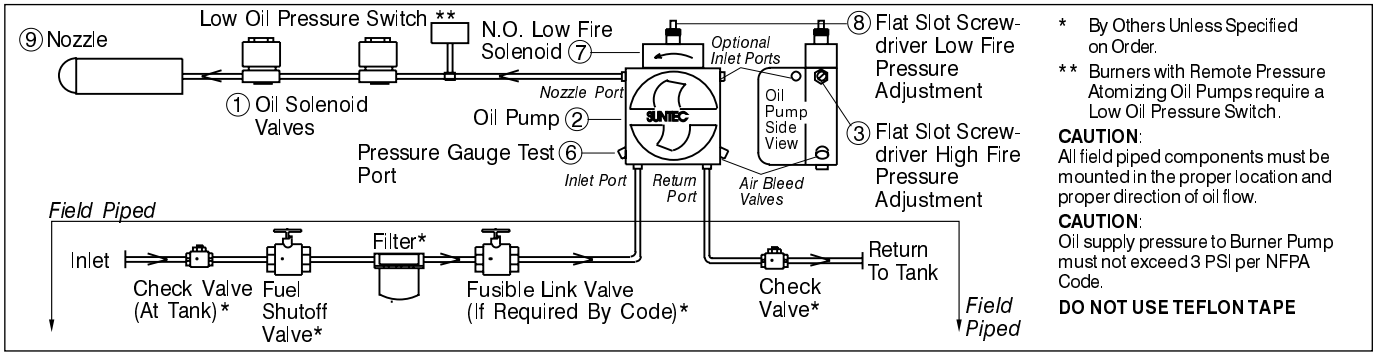
* Not shown in this depiction. See page 3, Figure 1.

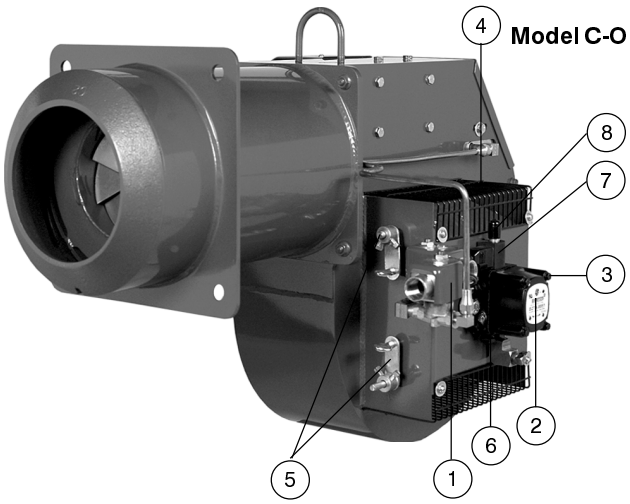
Note 1
Component operational sequencing will vary with the specific Flame Safeguard Control being used. Refer to the specific Flame Safeguard Control bulletin supplied with the burner for complete information.

Note 2
The system depicted above is based on the use of an oil pump manufactured by COMBU Incorporated. If your system uses other than a COMBU pump, refer to the oil piping diagram and oil pump manufacturer's bulletin supplied with the burner for specifics pertaining to your system.

Figure 21

Typical Oil Burner with Fixed Air Low Fire Start Fuel/Air Control Mode





MECHANICAL OPERATION: The fixed air low fire start system uses a two-step, two-stage Oil Pump (2) with a Simplex Oil Nozzle. A direct spark oil ignition system is standard on typical oil burners (a gas pilot is standard on Gas/Oil burners), but certain insurance company codes could require a spark ignited gas pilot* to provide ignition for the main oil flame. The nozzle flow rate pressures are taken at the Plugged Pump Nozzle Pressure Gauge Port (6). The low fire oil flow rate is set by adjusting the Oil Pump Low Pressure Regulator (8). The high fire oil flow rate is set by adjusting the Oil Pump High Pressure Regulator (3). For both high and low fires, turn the adjustment screws clockwise to increase the pressure and counterclockwise to decrease the pressure to the Nozzle. **Approximate low fire pressures** are 150 to 225 psig and high fire, 200 to 300 psig. **Remember, you will be lighting off at full air and reduced fuel. Raise low fire enough to obtain dependable light off with these conditions.** The Air Dampers (4) are adjusted and locked in place with the Air Damper Arms (5) for correct combustion values at the high fire rate. At light off, the Main Oil Solenoid Valve (1) is energized, allowing fuel to flow to the Nozzle. The normally open Low Fire Solenoid Valve (7) allows a reduced amount of oil to the Nozzle for low fire start. When the flame is proven by the flame detector*, the low fire solenoid valve closes, providing full high fire pressure to the Oil Nozzle. The burner operates at the high fire position until the system load demand is satisfied. Refer to page 34, Table 9 for specific nozzle pressures and firing rates. See page 12, Figure 11 and the pump manufacturer's bulletin supplied with the burner for additional information.

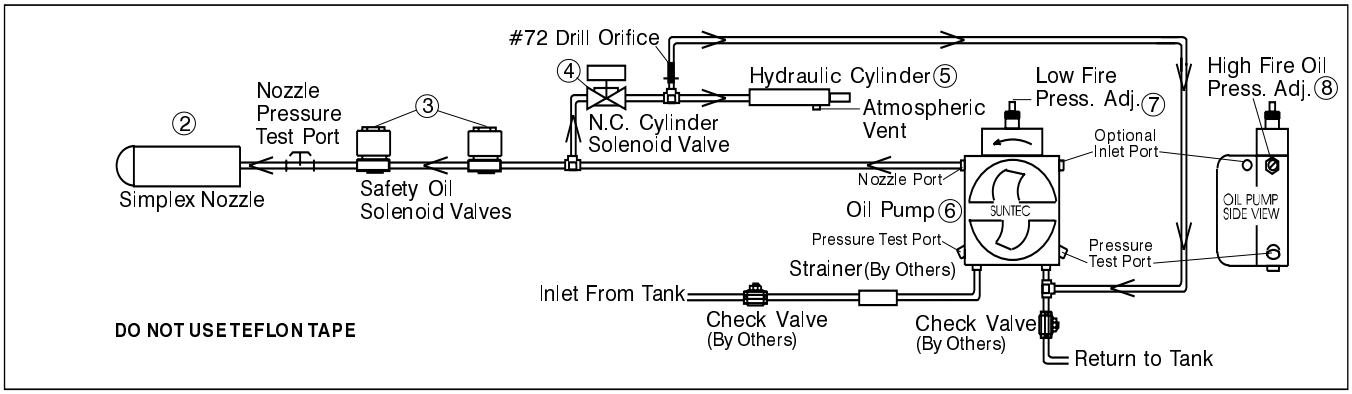
* Not shown in this depiction. See page 3, Figure 1.

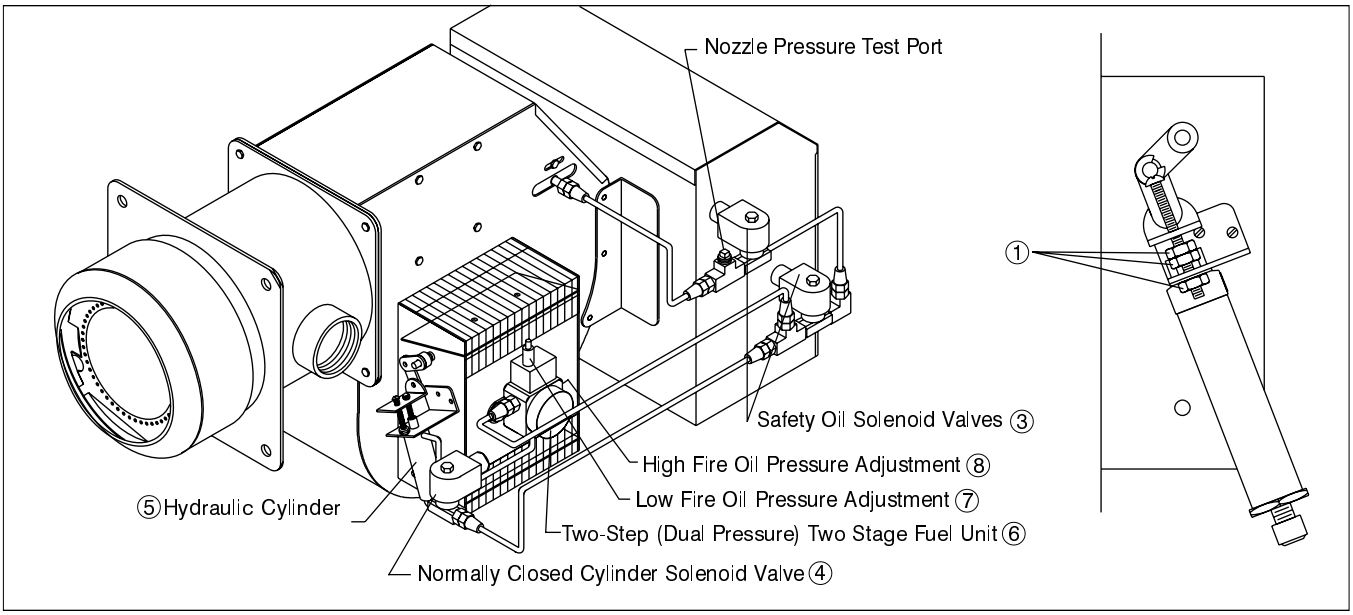
Note 1
The system depicted uses a two-step Suntec oil pump. If a pump that does not have the integral two-step function has been specified and supplied, it will be provided with an N.C. nozzle bypass oil solenoid valve and a separate adjustable low fire relief valve. Refer to the oil piping diagram and the oil pump manufacturer's bulletin supplied with the burner for the specifics on your system.

Note 2
Component operational sequencing will vary with the specific Flame Safeguard Control being used. Refer to the specific Flame Safeguard Control bulletin supplied with the burner for complete information.

Figure 22

Typical Oil or Gas/Oil Burner with Reduced Air, Low Fire Start *RALFS*



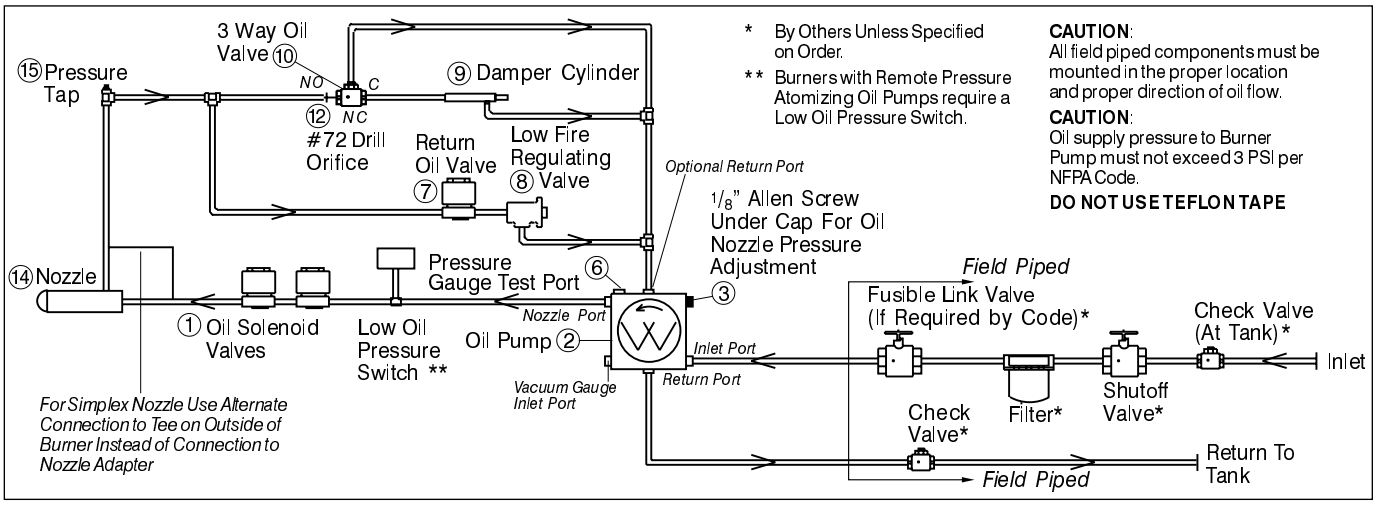


MECHANICAL OPERATION: The RALFS system uses a two step, two stage dual pressure Oil Pump (6), or fuel unit, with a simplex nozzle. Either a direct spark or a gas pilot ignition system may be provided for ignition of the main oil flame. The air damper is spring loaded to an open position suitable for maximum desired capacity and proper combustion.

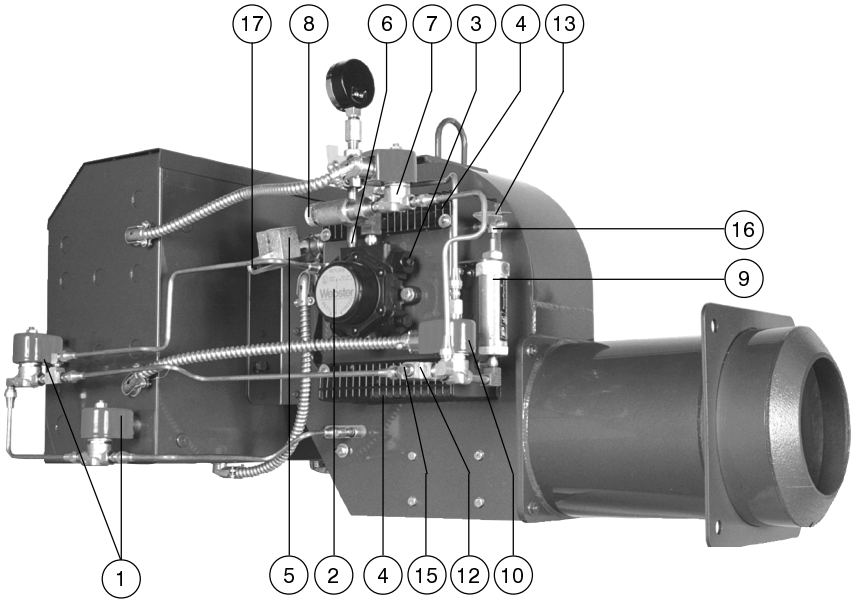
OIL CYCLE: After a 30 second pre-purge is accomplished, the direct spark ignition transformer is energized. At the same time the normally closed Cylinder Solenoid Valve (4) is energized, moving the Hydraulic Cylinder (5) and air damper to a reduced air setting (combustion air dampers approx. $^{3}/_{8}$" open). Combustion air is to be set by loosening the set screws from the damper arm that connects to the damper shaft. Set the damper opening so as to provide a smooth and immediate light-off. The amount of combustion air needed for this temporary setting should be minimal-just enough to prevent the unit from producing smoke. A smooth light off with minimal air is the objective. The Low Fire Pressure Adjustment (7) or the light-off fuel setting should be set between 90 p.s.i. to 120 p.s.i. After the air dampers have been driven to the reduced air setting or light-off fire position the Safety Oil Solenoid Valves (3) will be energized by the flame safe-guard igniting the low fire oil flame or the light-off flame which is proven by flame sensor (scanner). After approximately five seconds, the normally closed Cylinder Solenoid Valve will be deenergized, causing the combustion air dampers to open to the fixed air setting for maximum desired capacity. The return oil valve (normally open) which is integral to the Suntec two step pump (fuel unit) will now be energized, providing full high fire oil pressure for the oil nozzle. At the same time, the main oil valve terminal on the flame safeguard will be energized and the Safety Oil Solenoid Valves will open. The adjustment for fixed air setting or full fire position will be made with the two bottom $^{1}/_{4}$-20 hex nuts - see item #1. Combustion air dampers should be adjusted to provide $11^{1}/_{2}$ to $12^{1}/_{2}$% CO_2 or 4 to $5^{1}/_{2}$% O_2 at full input (oil high fire rate) with zero smoke. High Fire Oil Pressure (8) setting should be set to the required p.s.i. for high fire oil rate (see burner specification sheet for setting). The low fire should be rechecked for light-off pressure and performance. The gas combustion will be initiated (after 30 seconds pre-purge period) by proof of spark ignited gas pilot (by scanner) which energizes dual gas safety valves. If input for gas is comparable to oil input then previous air damper adjustment for oil combustion should be satisfactory for gas firing.

Figure 23

Typical Oil Burner with Low-High-Off or Low-High-Low Fuel/Air Control Mode Using Webster 22R Oil Pump



MECHANICAL OPERATION: This Low-High-Off system uses a two-stage Oil Pump (2) with a Simplex Oil Nozzle (see note 1, page 20) or an internal bypass nozzle in conjunction with Movable Air Dampers (4) to provide a low fire start and a high fire run sequence. A direct spark oil ignition system is standard on typical oil burners (a gas pilot is standard on Gas/Oil burners) at firing rates up to 45 GPH, with a spark ignited gas pilot* to ignite the main oil flame above that point. Certain insurance company codes could require the gas pilot system on lower input sizes. Nozzle supply pressure is set by adjusting the Oil Pump Pressure Regulator (3). Turn clockwise to increase the pressure and counter-clockwise to decrease the pressure to the Nozzle. Nozzle supply pressure is taken at the plugged Pump Nozzle Pressure Gauge Port (6). Nozzle supply pressure will normally be approximately 300 PSI at both high and low firing rates. Flow rate pressure for both high and low fire



is taken at Bypass Pressure Gauge Tee (15). Low fire pressures are set by adjusting the low fire Regulating Valve (8). Turning the low fire Regulating Valve adjustment nut clockwise will increase the pressure at the Bypass Pressure Test Tee Gauge (increasing the low fire input) and counter clockwise will reduce the pressure at the gauge (decreasing the low fire input). Low fire return pressure will normally be in 60 to 100 PSI range and at high fire in the 180 to 225 PSI range, but both pressures will vary according to the specific nozzle being used, as well as job conditions. At light off, the Main Oil Solenoid Valve (1) is energized, allowing fuel to flow to the Nozzle. At the same instant a portion of the oil bypasses the Nozzle through the adjustable low fire regulating valve, reducing the pressure at the Nozzle as required for low fire rates. When the low fire flame is proven by the flame detector*, the Return Oil Solenoid Valve (7) is deenergized, putting full high fire pump pressure on the Nozzle. Simultaneously, the Three-Way Solenoid Valve (10) is energized, allowing oil into the Hydraulic Cylinder (9) which mechanically drives the Air Damper Arm (13) to the high fire position. The burner operates at full high fire until the system demand is satisfied. Refer to page 31, Table 8 or page 34, Table 9 to determine nozzle return flow pressure and flow rates. This depiction shows the Air Dampers and Hydraulic Cylinder at the low fire light off position.

The Low-High-Low system is identical to the Low-High-Off system, except that an additional pressure or temperature controller is added to the system, which at a selected preset point will electrically switch the burner to either the high or low fire position. When the burner is running at high fire and the controller calls for low fire, the normally closed Oil Solenoid Return Valve (7) (closed at high fire) is energized, reducing nozzle pressure to the low fire rate. Simultaneously, the Three-Way Solenoid Valve (10) is de-energized, allowing oil to flow out of the Hydraulic Cylinder (9) back to the Pump and driving the Air Dampers (4) to the low fire position. Responding to load conditions, the burner can alternate indefinitely between the low and high fire positions without shutting down. When system load demand is satisfied, all fuel valves are de-energized and the Air Dampers are placed in the light off position in preparation for the next firing cycle. The opening distance of the Air Dampers is controlled by positioning the Air Damper Drive Arm (13) relative to the Acorn Nut (16) mounted on the end of the Hydraulic Cylinder piston rod. The maximum travel is with the Damper Drive Arm positioned to be in contact with the hydraulic oil cylinder Acorn Nut at all times. If less travel is desired, set the Air Damper Drive Arm to allow a gap between it and the Acorn Nut. (Depending on Air Damper positioning, it may be necessary to loosen its set screws to attain proper Air Damper opening distance.) The wider the gap (when the burner is off), the less the overall travel when going to the high fire position. When setting the Drive Arm position relative to the Acorn Nut, make certain that the Air Dampers' travel is correct for proper combustion at all firing positions and that there is no binding of the Linkage or Dampers. Make certain the cast iron Linkage Return Weight (5) is secure on its Air Damper Arm (17).

***** Not shown in this depiction. See page 4, Figure 2

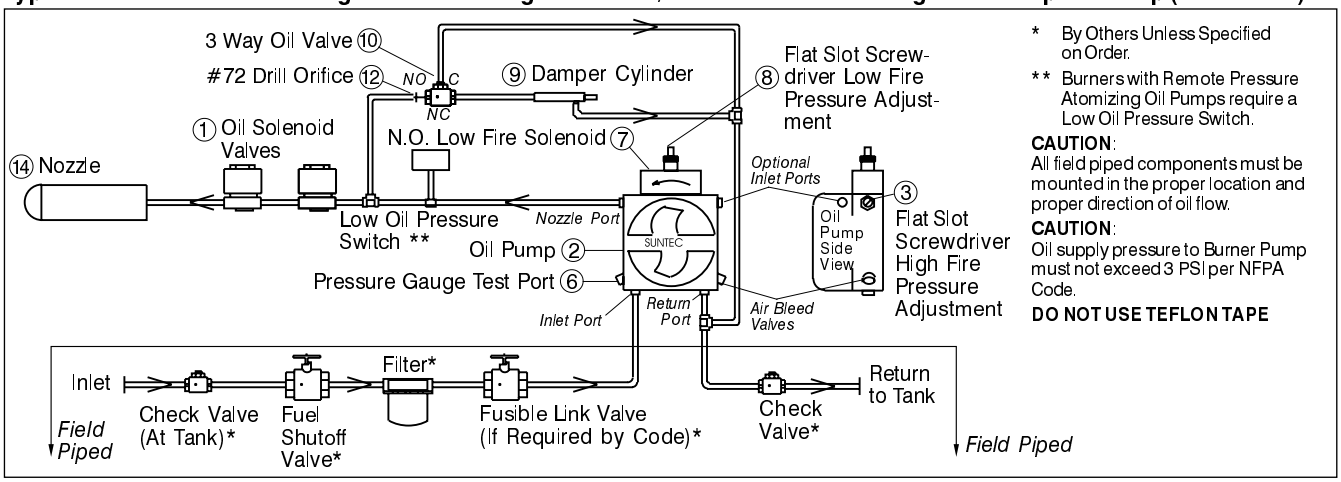
Note 1
The system depicted in Figure 23 uses a Webster Model 22R oil pump. If your system uses a Suntec H model pump, the sequence

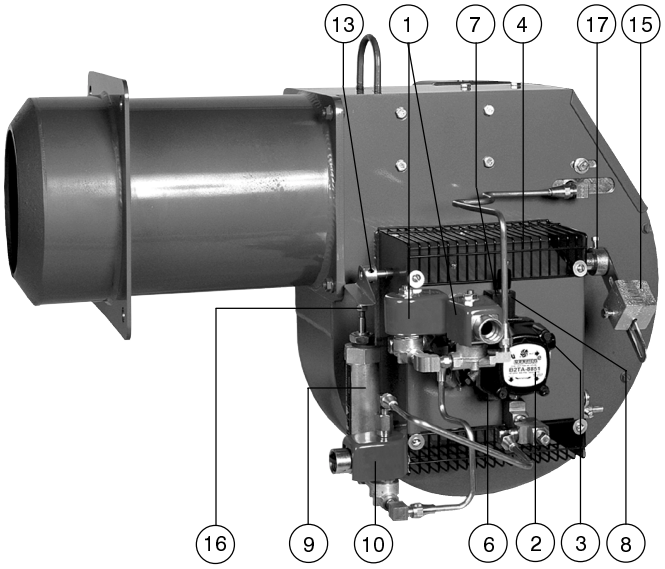
of operation and the oil components would be identical to the Webster 22R system. For additional information on your specific system refer to the oil piping diagram and the oil pump manufacturer's bulletin supplied with the burner.

Note 2
Component operational sequencing will vary with the specific Flame Safeguard Control being used. Refer to the specific Flame Safeguard Control bulletin supplied with the burner for complete information.

Figure 24

Typical Oil Burner with Low-High-Off or Low-High-Low Fuel/Air Control Mode Using a Two-Step Oil Pump (Model C-O)





MECHANICAL OPERATION: This Low-High-Off system uses a Two-Step Oil Pump with a Simplex Oil Nozzle (14) in conjunction with movable Air Dampers (4) to provide a low fire start and a high fire run sequence. A direct spark oil ignition system is standard on typical Oil burners (a gas pilot is standard on Gas/Oil burners), but certain insurance company codes could require a spark ignited gas pilot* to provide ignition for the main oil flame. Nozzle flow rate pressure is taken at the $^1/_8$" Plugged Pump Pressure Gauge Port (6). The low fire oil rate is set by adjusting the Oil Pump Low Pressure Regulator (8). The high fire oil flow rate is set by adjusting the Oil Pump High Pressure Regulator (3). For both high and low fires turn the adjustment screws clockwise to increase the pressure and counterclockwise to decrease the pressure to the Nozzle. Approximate low fire oil pressures are 100 to 125 psig and high fire, 200 to 300 psig. Both settings will vary depending upon the specific nozzle size selected and job conditions. See pages 30-33, Tables 8 & 9 for specific nozzle pressures and flow rates. At light off the Main Oil Solenoid Valves (1) are energized, allowing fuel to the Nozzle. A normally open pump mounted Oil Solenoid Valve (7) allows a controlled flow of oil to the Nozzle in accordance with the pressure setting of the pump low fire adjustment. When the low fire flame is proven by the flame detector*, the pump mounted, normally open Solenoid Valve is energized (closes), putting full high fire pump pressure on the nozzle. Simultaneously, the Three-Way Solenoid Valve (10) is energized, allowing oil into the Hydraulic Oil Cylinder (9) which mechanically drives the Air Damper Arm (13) to the high fire open position. The burner operates at full high fire until the system demand is satisfied. This depiction shows the Air Dampers and the Hydraulic Cylinder at the low fire light off position.

The Low-High-Low systems are identical to the Low-High-Off system, except that an additional temperature or pressure controller is added to the system. At a selected preset point, it will electrically switch the Oil Valves and Air Damper components to place the firing rate either in the low or the high fire run position. When the burner is running at high fire and the controller calls for low fire, the normally open pump mounted Solenoid Valve (7) (which is closed at high fire) is de-energized (opens), reducing nozzle pressure to the low fire rate. Simultaneously, the Three-Way Solenoid Valve (10) is de-energized, allowing oil to flow out of the Hydraulic Cylinder back to the Pump (2) and driving the Air Dampers (4) to the low fire position. Depending on load conditions, the burner can alternate indefinitely between the low and the high fire positions without shutting down. When system demand is satisfied all fuel valves are de-energized and the Air Dampers are placed in the light off position for the next start up. The Air Damper position for low fire run and light off position are one and the same in this system. The opening distance of the Air Dampers is controlled by positioning the Air Damper Drive Arm (13) relative to the Acorn Nut (16) mounted on the end of the Hydraulic Cylinder (9) piston rod. The maximum travel is with the Damper Drive Arm positioned to be in contact with the hydraulic oil cylinder Acorn Nut at all times. If less travel is desired, set the Air Damper Drive Arm to allow a gap between it and the Acorn Nut. (Depending on Air Damper positioning, it may be necessary to loosen its set screws to attain proper Air Damper opening distance.) The wider the gap (when the burner is off), the less the overall travel when going to high fire position. When setting the Drive Arm position relative to the Acorn Nut, make certain that the Air Damper travel is correct for proper combustion at all firing positions

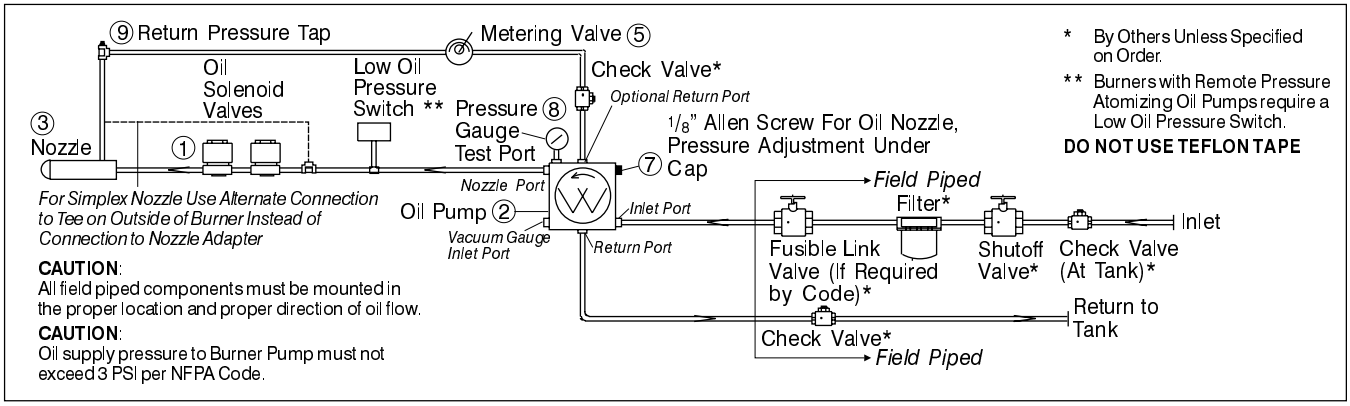
and that there is no binding of the Linkage or Dampers. Make certain the cast iron Linkage Return Weight (15) is secure on its Linkage Arm (17).

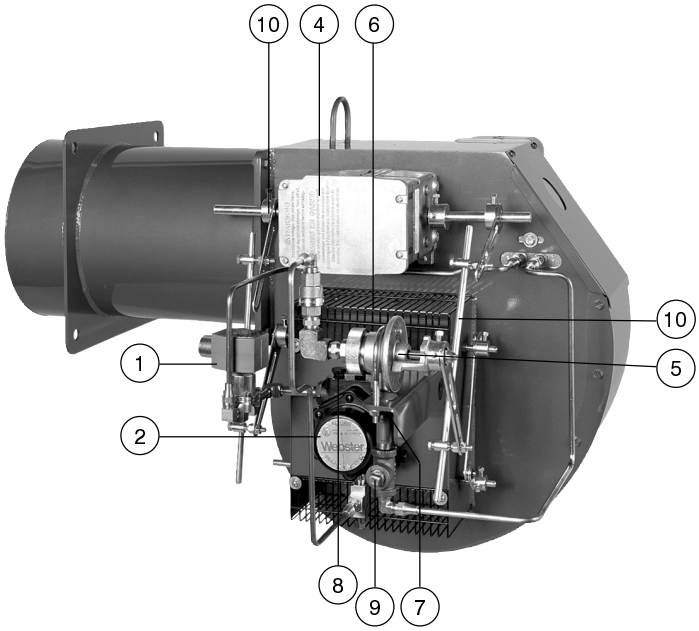
* Not shown in this depiction. See page 4, Figure 2.

Note 1
Component operational sequencing will vary with the specific Flame Safeguard Control being used. Refer to the specific Flame Safeguard Control bulletin supplied with the burner for complete information.

Figure 25

Typical Oil Burner with Full Modulation Fuel/Air Control (Model C-O)





MECHANICAL OPERATION: The Full Modulation system uses a two-stage Oil Pump (2) with an internal bypass type Oil Nozzle (See page 19, note 1). A Modulating Motor (4) controls the positioning of the Air Dampers (6) and the Modulating Oil Valve (5) in the nozzle return line through mechanical linkage. A direct spark oil ignition system is standard on typical oil burners (a gas pilot is standard on Gas/Oil burners) at firing rates up to 45 GPH, with a spark ignited gas pilot* to ignite the main oil flame above that point. Certain insurance company codes could require the gas pilot system on lower input sizes. At main flame light off the normally closed Oil Valve (1) is energized, allowing oil to flow to the Nozzle. The Modulating Oil Valve is adjusted to allow a controlled amount of oil to bypass the Nozzle, which keeps the pressure reduced to the nozzle for low fire light off. Nozzle oil supply pressure is set by adjusting the Oil Pump pressure regulator (7). Turn clock-wise to increase the pressure and counter-clockwise to decrease the pressure to the nozzle. The low fire nozzle pressures should be taken at the plugged Oil Pump Gauge Port (8) and should be approximately 300 PSI with pressure at the Nozzle Bypass Gauge Port (9) from 60 to 100 PSI, these pressures varying with nozzle size and job conditions. A typical low fire oil flow setting on the Modulating Oil Valve would be number 7, but will vary with job conditions. After a brief period of time for the low fire flame to stabilize, the Modulating Motor will drive the Fuel/Air Linkage (10) to the high fire position. At this point the Air Dampers will be full open (or as required for good combustion) and the Modulating Oil Valve will be at the *closed* position and the nozzle bypass line will be fully closed, putting full oil pressure to the Nozzle. The Oil Pump Pressure Gauge Port pressure reading will show approximately 300 PSI and pressures at the bypass pressure gauge port will be 180 to 225 PSI, although this will vary with the specific nozzle size being used. Refer to page 34, Table 9 to determine specific nozzle pressures and firing rates. A modulating temperature or pressure controller will now modulate the firing rate to match the load demand of the system, while maintaining proper fuel/air ratios. Prior to reaching the system pressure or temperature operating control cut off point, the burner should be at or near the low fire operating position. At the end of the firing cycle, the normally closed Oil Valve will be de-energized and the Modulating Motor will position the Air Dampers and Modulating Valve to the low fire position, ready for the next start up sequence. This depiction shows the Linkage in the low fire light off position.

See page 22, Figure 27 for linkage adjustment information. Also see page 22, Figure 28 for information on the Varicam™ modulating characterized fuel metering system.

* Not shown in this depiction. See page 4, Figure 3.

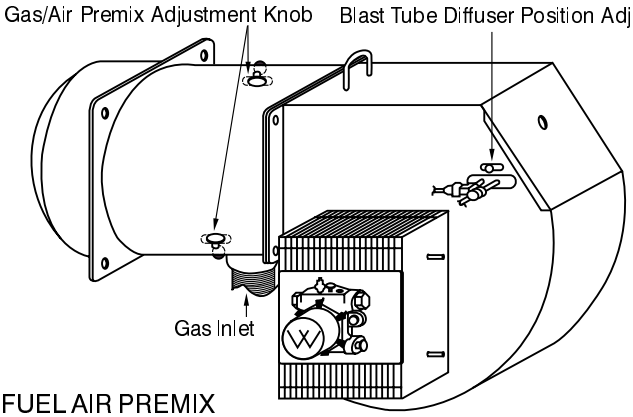
Note 1
Some modulating Low-High-Off and Low-High-Low burners will be supplied with simplex, rather than internal bypass type, oil nozzles. The mechanical operation of the simplex nozzle system is essentially the same as the internal bypass system - except that low fire oil pressures should be set at 100 to 125 psig (adjust to suit job conditions) and high fire oil pressures at 280 to 300 psig at the oil pump nozzle pressure gauge test port. Refer to the Burner Specification sheet shipped with the burner and/or page 34, Table 9 for high fire oil pressures and flow rates.

The oil pump depicted in the oil flow schematic above is as manufactured by Webster Electric Company Inc. If the pump on your burner is not Webster, refer to the oil pump bulletin shipped with the burner for specific adjustment information. Also see page 12, Figure 11.

Note 2
Component operational sequencing will vary with the specific Flame Safeguard Control being used. Refer to the specific Flame Safeguard Control bulletin supplied with the burner for complete information.

Figure 26

Gas or Gas/Oil Burner Fuel/Air Premix Adjustment - Gas, Oil or Gas/Oil Burner Diffuser Adjustment



FUEL AIR PREMIX ADJUSTMENT(OPTIONAL)

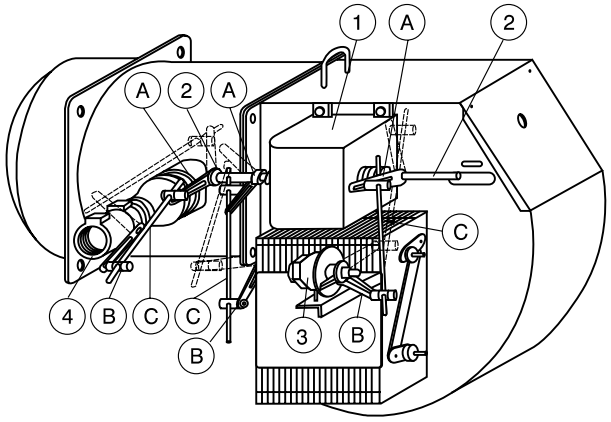
The adjustable premix blast tube (optional) incorporates an adjustable gas/air premix within the burner firing head. The premix configuration is primarily used for cylindrical combustion chambers or high heat release pressurized fireboxes. Moving the adjustment knob back increases the premix air; moving it forward decreases the premix air. Generally, the best (quietest/smoothest) operation is in the full forward position with minimum premix air. The premix adjustment is set at the factory in the full forward position. To attain the best combustion results for specific job conditions, change position in small increments.

DIFFUSER POSITION ADJUSTMENT

Moving the blast tube diffuser assembly fore or aft on gas or oil firing will move the flame front (point of retention) in order to attain the best (quietest/smoothest) combustion for specific job conditions. If the initial midway point factory setting does not provide satisfactory results, move fore or aft in small increments to achieve the best combustion results. If unit is oil or combination gas/oil, the attached, flexible copper oil nozzle line will move fore or aft with the assembly. When firing on oil, moving the assembly forward will tend to broaden the flame pattern and moving it back will narrow the flame pattern. Similar results are obtained on gas, but observation of sound and combustion tests are the best determinants of results on either gas or oil.

Figure 27

Gas/Oil Linkage Adjustment For Full Modulation Standard System



Typical general linkage arrangement for combination gas/oil full modulation burner, shown in low fire light off position. Dotted lines indicate approximately high fire position. When making adjustments, make certain the motor can make its full 90° stroke without any linkage binding.

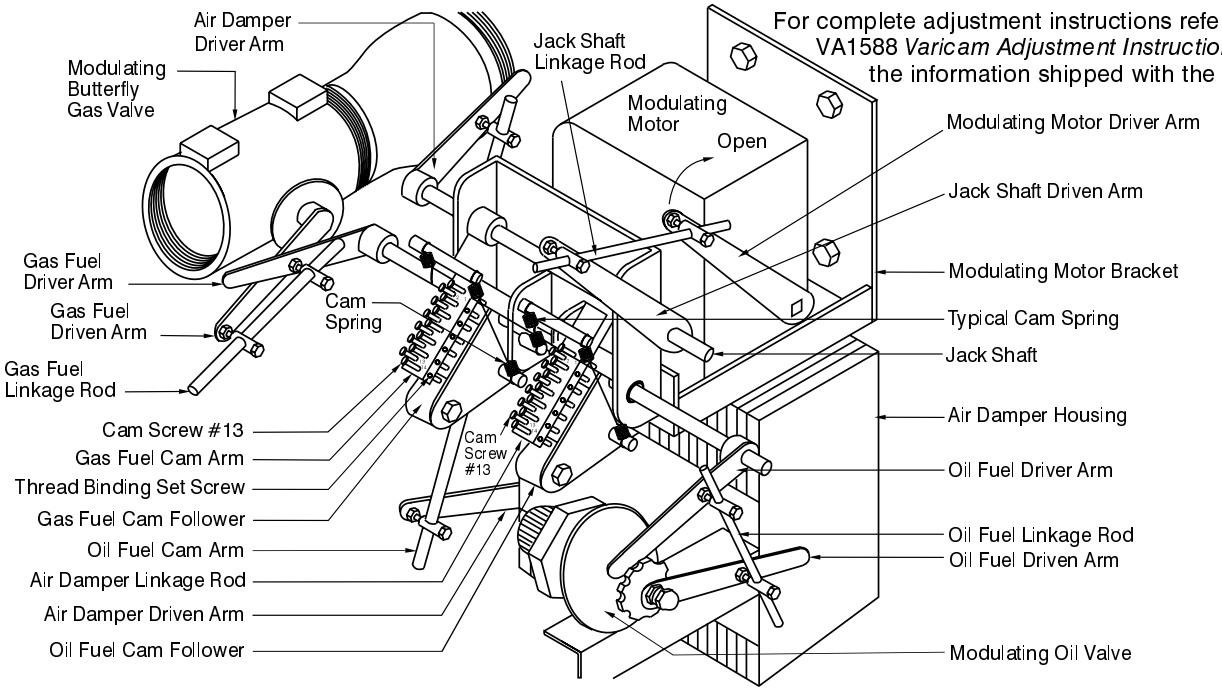
Driver Arms (A) connected to the Modulating Motor (1) Jack Shaft (2) will increase the travel of the Driven Arms (B) as the Linkage Rod (C) ball joint is moved away from the Jack Shaft. The travel of the Driven Arms will be increased as the Linkage Rod ball joint is moved toward the shaft of the driven device.

1. Modulating Motor
2. Jack Shaft
3. Modulating V Port Oil Valve
4. Modulating Butterfly Valve

A. Driver Arms
B. Driven Arms
C. Linkage Rods

Figure 28

Gas/Oil - Detail and Adjustments on Modulating Varicam™ Characterized Fuel Metering System.



For complete adjustment instructions refer to bulletin VA1588 *Varicam Adjustment Instructions* included in the information shipped with the burner.