



## START-UP PROCEDURE

### **100% OUTSIDE AIR MAKE-UP UNITS WITH MAXITROL SERIES 14 OR 44 TEMPERATURE CONTROL**

Start-up must be performed by a trained, experienced service person.

The following general start-up procedure applies directly to standard 100% air make-up units. Please note any added options for a specific unit which may affect the control sequence or terminal numbering prior to attempting start-up or service work. Read the entire start-up procedure and review all reference material (Unit Specifications, Gas Train/Burner Specifications, Sequence of Operation, Parts Lists, and Electrical Schematic) supplied with each unit.

#### STEP 1

Turn off incoming electrical power and gas supply to the unit. Electrical power can be turned off at the unit disconnect. Gas supply shut-off is at the inlet of unit's gas manifold.

At the remote panel, turn the Summer-Off-Winter (S-O-W) switch to the off position and the temperature selector to the lowest setting.

#### STEP 2

Verify incoming electrical and gas supply match the name plate requirements (i.e., voltage/amp capacity, gas pressure and volume capacities, etc). If they do not, stop at this point and contact Titan Air.

#### STEP 3

Open the access doors to blower and control vestibule sections. Check all electrical connections and hardware (blower drives, bearings, damper linkages, etc.) for tightness and correct field wiring connections.

#### STEP 4

Check all gas, pilot, vent, and pressure sensing lines are properly connected and unobstructed. Verify the incoming gas line was "blown out" to flush out debris prior to connecting gas line to unit. Also verify incoming gas line has been purged of air up to unit's gas inlet.

#### STEP 5

At the manifold pressure test port, downstream of the modulating gas valve (V-5), connect a gas pressure gauge (pressure gauge must read inches of water column to 10" with the capability of reading a negative pressure).

#### STEP 6

Turn on incoming electrical power at unit disconnect. Make sure the blower access door is securely held open. Turn the blower service switch (SW-5) on.

#### STEP 7

If an optional intake or discharge damper is installed, the blower will not start until the damper motor's internal "proof open" end switch closes (damper motor and end switch wiring are generally completed in the field after damper is mounted). If an intake or discharge damper is not installed, the blower should start immediately. Check the blower for proper rotation direction. If the rotation is reversed, turn both SW-5 and the disconnect switch off. For 3 phase motors, reverse any two leads. For single phase motors, see instructions on the motor.

#### STEP 8

With proper blower rotation verified, check and record the RPM of the blower. If



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the blower speed needs to be adjusted to change the rated CFM of the unit, the profile plates around the burner will have to be adjusted also. Provide the factory with the AMP draw of the motor and RPM of the blower and a new profile opening will be calculated.

### STEP 9

Turn the unit off. Close and latch the blower access door.

### STEP 10

Start unit with SW-5. Check and record the motor amp draw. If the motor amp draw exceeds listed Full Load Amps (FLA), stop and call the factory.

### STEP 11

Check and record the negative pressure reading on your burner manifold pressure gauge. This measurement is necessary for proper setting of the burner manifold pressure when the unit is forced into high fire mode. At this time, also measure the pressure drop across the airflow switch ports (remove caps from fittings in tubing for air flow switches and connect tubing from differential pressure gauge to fittings). This measurement can be used as a simple indication of proper airflow through the unit. If this second measurement is not between 0.7" w.c. and 0.5" w.c.  $\Delta P$ , the blower speed may need to be adjusted. If assistance is needed, contact Titan Air.

### STEP 12

Turn the unit off. Check the pilot gas line for proper and tight connections with no leaks. For shipping purposes, the pilot lines are disconnected.

### STEP 13

Turn on the main gas valve and slowly open the manual pilot gas valve. If the unit is supplied with a low gas pressure switch (P-2), reset to on position.

### STEP 14

Place the run-check switch (located on flame safeguard programmer module) in the check position. This will allow the pilot to light without lighting the main burner. If the unit is equipped with an inlet ductstat (T-1), set this stat above the outside air temperature. Start unit with SW-5 and enable the burner with the burner service switch (SW-6).

Note that the burner should not be operated continuously in the check position for more than 1 minute because the ignition transformer is not rated for continuous duty.

### STEP 15

The unit should go through its complete burner ignition sequence with only the pilot ignited. The sequence can be observed by following the indicating LED's on the flame safeguard. On new installations, resetting of the flame safeguard may be required to purge air from the pilot line. If the unit does not cycle through its burner ignition sequence after a few attempts, refer to the service information in the following section for troubleshooting instructions.

### STEP 16

In the center of FS-1 are 2 voltmeter test ports. Set the volt-ohm meter to approximately 30 VDC scale and insert the meter leads into the test ports (common lead in black port, positive lead in red port).

### STEP 17

With only the pilot operating, record the DC volt signal. The DCV range is noted



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on the amplifier module of the controller (FS-1). There should be a steady DCV signal in the upper range stated on the controller.

### STEP 18

Once stable pilot is achieved, shut unit down and place run-check switch in the run position. Disconnect one of the wires from the transformer (TR-3) supplying power to the Maxitrol amplifier (TC-1). This will force the burner into a low fire condition. Start unit allowing it to operate in low fire. Check and record DC voltage as in the previous step. Check to make sure the flame is contained in the burner casting and extends the full length of the burner with no breaks in the flame. An ideal low fire setting results in a small flame with no breaks and that also produces a stable DC voltage signal in the upper end of the range listed on the flame safeguard amplifier module. If the low fire setting is adjusted, verify that both the DC voltage signal and visual appearance of the flame are satisfactory. See figure 1 & 2 at end of start-up procedure for low fire adjustments if necessary. Reconnect the wire at TR-3.

### STEP 19

Remove wire from terminal #4 on the TC-1 (Series 14) or terminals #2 and #4 (Series 44). This will force the burner into a high fire condition. On your manifold pressure gauge, check the manifold pressure. The reading on your manifold pressure gauge needs to be added to the negative pressure recorded in step 11. The resulting total manifold pressure should be compared to the unit's rated manifold pressure. If the total is higher or lower than the rated pressure, adjustment can be made at the gas pressure regulator. See figure 1 & 2 at the end of start-up procedure. Total manifold pressure should not exceed unit's rated manifold pressure.

Because of possible variations in the BTU content of gas, it may be necessary to set the manifold pressure to the rated temperature rise (temperature difference between the incoming air and the unit discharge air).

The high fire flame should be visually observed to verify proper combustion. Experienced service personnel should be able to assess the appearance of a proper high fire flame. If assistance is needed, contact the factory.

### STEP 20

With the burner on high fire, turn the high temperature limit (TL-1) to its lowest setting. The limit should trip out and shut down the burner. Turn TL-1 back to the factory setting of 185 deg. F and reset the control. Reconnect wire(s) at TC-1.

### STEP 21

With all wiring in place and the unit operating in the winter mode, adjust temperature setpoint on the remote mounted controller (TD-1) up and down (from highest to lowest setting) observing the modulation of the burner. When actual discharge air is below TD-1's setpoint, the unit should discharge maximum temperature. When actual discharge air is above TD-1's setpoint, the unit should discharge minimum temperature.

### STEP 22

With the unit operating in the summer mode, cycle the burner from SW-6. Verify that burner fully lights within a few seconds of proved pilot.



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### STEP 23

If the unit is equipped with a low temperature safety (LTS-1), check this control's operation. Standard LTS-1 can be checked by disconnecting the sensor wires. The unit should then shut down after the built-in timer setting has "timed-out". Replace the sensor wires when proper operation has been verified. Turn the unit off and back on to reset LTS-1.

### STEP 24

With the unit operating in the winter mode, close the 2nd manual gas shutoff valve (GT-3). The burner should shut down in a few seconds (look for flame LED to go out on FS-1) with the unit shutting down in 30 seconds or less. Open GT-3 and reset FS-1 by pressing button protruding through cover.

### STEP 25

Turn SW-5, SW-6 and the disconnect off. Verify all terminals, electrical connections and hardware (bearings, sheaves, blower wheels, etc.) are securely tightened. Adjust all controls to desired settings. Remove all gauges, meters, and hand tools from the unit. Replace all covers on controls. Make sure all safety devices are reset.

### STEP 26

Turn the disconnect on. Start the unit from the remote panel. Verify proper operation in all modes according to unit's sequence of operation.

The unit should be ready for operation. If any problems arise, refer to the service information on the following page. To assure long lasting and efficient operation of Titan equipment, a regular service inspection should be set up. Refer to the maintenance section at the back of this manual for detailed maintenance information.

## LOW FIRE AND HIGH FIRE ADJUSTMENTS

