

MAXITROL®

Selectra® Series 14R

Installation Instructions and Field Service Checklist

⚠ WARNING

Read these instructions carefully. Failure to follow them could result in a fire or explosion causing property damage, personal injury, or loss of life. The product must be installed and operated according to all local regulations.

Service and/or installation must be performed by a trained experienced service technician.

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DESCRIPTION

Selectra SERIES 14R electronic gas flame modulation systems are designed primarily for make-up air heating, as components of direct fired equipment. They may be field installed on existing equipment or specified for new equipment installation.

The system uses Modulator or Modulator-Regulator valves, amplifiers which include low-fire start, and integral or remote temperature selection and a discharge air temperature sensor that is mounted within a mixing tube.

SYSTEM COMPONENTS

A1014R Amplifier



A1014R (all remote temperature ranges)
Included Integral Ranges:

40° to 80°F
55° to 90°F
90° to 140°F
110° to 160°F
160° to 210°F

Remote Temperature Selectors:



TD114: (55° to 90°F w/override 0° to 40°F over set point)
TD114A: (80° to 130°F)
TD114A-1: (80° to 130°F w/override 0° to 40°F over set point)
TD114B: (120 to 170°F)
TD114C: (160° to 210°F)
TD114D: (200° to 250°F)
TD114E: (100° to 250°F)
TD114F: (40° to 80°F w/override 0° to 40°F over set point)
TD114G: (90° to 140°F)
TD114-1: (55° to 90°F w/120° to 170°F override) use w/TS114
TD114-2: (55° to 90°F w/two outputs)
TD114G-2: (90° to 140°F w/two outputs)

Remote Temperature Selectors Continued

IMPORTANT: The A1014R integral or remote temperature selector's (TD114) temperature range must match the temperature sensor's (TS114) temperature range. See page 7 for available integral dial ranges.

Optional: ETD-1 enclosure, EFP-1 cover plate only - no enclosure

Discharge Air Temperature Sensors: use with Mixing Tube

TS114 (55° to 90° F)
TS114A (80° to 130° F)
TS114B (120° to 170° F)
TS114C (160° to 210° F)
TS114D (200° to 250° F)
TS114E (100° to 250° F)
TS114F (40° to 80° F)
TS114G (90° to 140° F)
TS114J (110° to 160° F) use w/ AD1014-1116,
TS214 (dual sensor - any comb. of 2 standard ranges avail.)

Example 1 - TS214G (55° to 90° F and 90° to 140° F, use w/ TD114 & TD114G, or TD214G [selector w/switch]).

Example 2 - TS214AD (80° to 130° F and 200° to 250° F, use w/TD114A & TD114D, or TD214AD [selector w/ switch])

Mixing Tubes: (and sensor)



MT1-9 or 2-9 (9" length)
MT1-12 or 2-12 (12" length)
MT1-23 or 2-23 (23" length)
MT1-28 or 2-28 (28" length)
MT1-57 (57" length)

Valves:



M411 (3/8" & 1/2" pipe size)
M511 (1/2" & 3/4" pipe size)
M611 (3/4" & 1" pipe size)
MR212D (1", 1-1/4", 1-1/2" pipe size)
MR212E (1-1/2" & 2" pipe size)
MR212G (2-1/2" & 3" pipe size)
MR212J (4" flanged)
MR212-2D, E, G, J (used for 2-speed blower or dual fuel operation)

NOTE: M (Modulator) valve requires a pressure regulator for high fire setting. MR (Modulator-Regulator) valve requires no pressure regulator up to 5 psi.

OPTIONAL SYSTEM COMPONENTS

Dual Temperature Selector:

Provides dual control for door heaters, or other applications such as paint spray booths (TD214_ or _X, or AD1214_).
 TD114HD use w/TS114 (door closed 55° to 90°F/open 90° to 140°F)
 TD214_ (dual selector w/switch - any comb. of 2 standard ranges avail.)

Example 1 - TD214G (55°-90°F [spray] and 90°-140°F [dry], use w/TS214G)

Example 2 - TD214AD (80°-130° F and 200°-250° F, use w/TS214AD.

TD214_X (same as TD214_, less enclosure)

Inlet Air Temperature Sensors: use with Mixing Tube

Provides inverse change in discharge air for each degree change in inlet air - when installed in a convenient duct location upstream of the burner.

TS10765A (8:1 ratio), TS10765B (5:1 ratio), TS10765C (3.5:1 ratio)

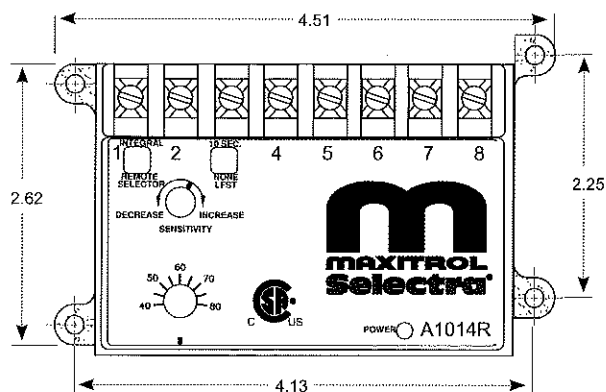
Room Override Thermostat:



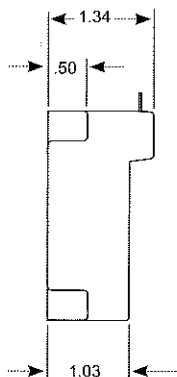
Provides space temperature control by raising the discharge air temperature to a pre-selected point - when used in conjunction with the remote temperature selector.

T115 (40° to 90° F) for use only with TD114, F, -1, A-1

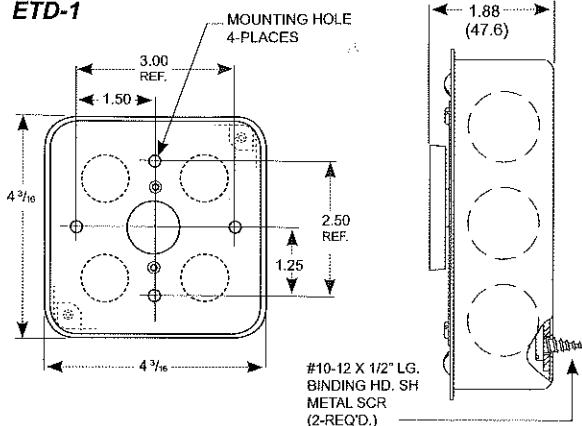
DIMENSIONS



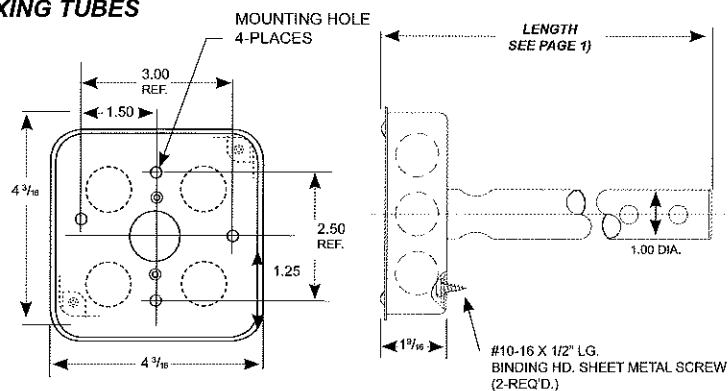
A1014R (front + side)



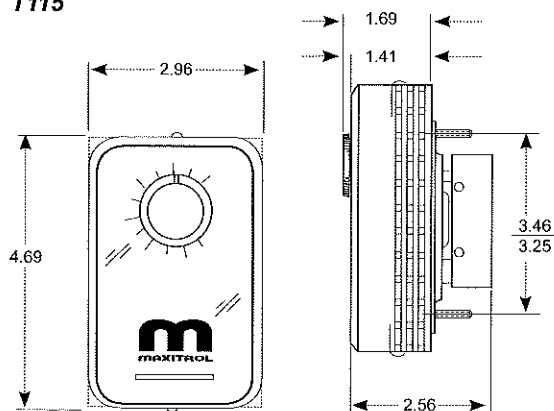
ETD-1



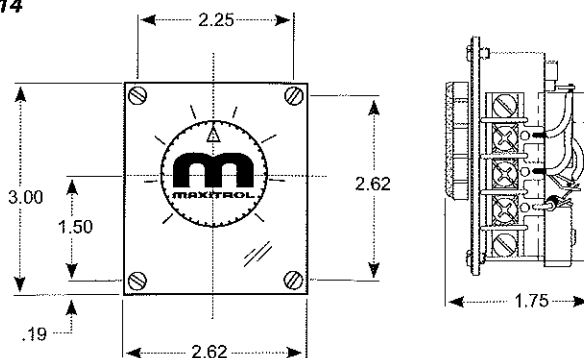
MIXING TUBES



T115



TD114



SPECIFICATIONS

Power Requirements:

24 VAC, 50/60 Hz Class II transformer

NOTICE

Transformer secondary must not be grounded in any portion of the circuit external to a Maxitrol amplifier. If existing transformer is grounded, a separate, independent transformer must be used. Electrical interference may affect performance and/or damage equipment.

Ambient Limits:

Operating..... -40° to 125° F / -40° to 52° C

Non-operating..... -50° to 185° F / -46° to 85° C

Gases: Suitable for natural, manufactured, mixed gases, liquefied petroleum gases, and LP gas-air mixtures.

Vent:

M411, 511, 611.....vertical vent outlet 1/8" NPT - 12A06 installed.

MR212.....two vents located in upper housing, both equipped with vent limiting means

Pressure Limits:

Maximum Discharge Pressure:

(M411, 511, 611)..... 7" w.c. / 17 mbar

Static Pressure Rating:

(M411, 511, 611).....5.0 psi / 345 mbar

Maximum Operating Inlet Pressure:

M411, 511, 611..... 1 psi / 70 mbar

MR212..... 5.0 psi / 345 mbar

Maximum Emergency Exposure*:

M411, 511, 611..... 3.0 psi / 210 mbar

MR212..... 12.5 psi / 862 mbar

* May not function properly at this pressure, but will suffer no internal damage

INSTALLATION OF COMPONENTS

NOTICE

Wiring Run: Control wires connected to the Override Stat, Discharge Air Sensor, or Remote Temperature Selector must not be run close to or inside conduit with power or ignition wires. Doing so may cause the unit to function erratically or may destroy the amplifier. If shielded wires are used, shield must be insulated and grounded at the amplifier location only. If control wiring is inside conduit with line voltage wiring, use shielded cable up to 100 ft. For best results up to 200 ft., run control wiring in separate conduit. For longer runs see Remote Selector below.

Amplifier / Amplifier-Selector: Contains the wiring terminals and sensitivity adjustment - install in any convenient location that is protected from the weather and contaminated atmosphere.

Remote (or Dual) Selector: Install in control cabinet or other chosen location. **NOTE:** Suffix letters must match, e.g. TS114A must be used with TD114A. For wiring runs longer than 200 ft. substitute ES261-1/ES261-2 for TD114. The ES261s are a 2-piece version of the TD114. ES261-1 is a temperature setting dial only, ES261-2 must be mounted at furnace location.

Discharge Temperature Sensor / Mixing Tube Assembly: Sensor housed in mixing tube, install in discharge air stream.

Dual Temp. Selector (optional): See preceding Remote/Dual Selector.

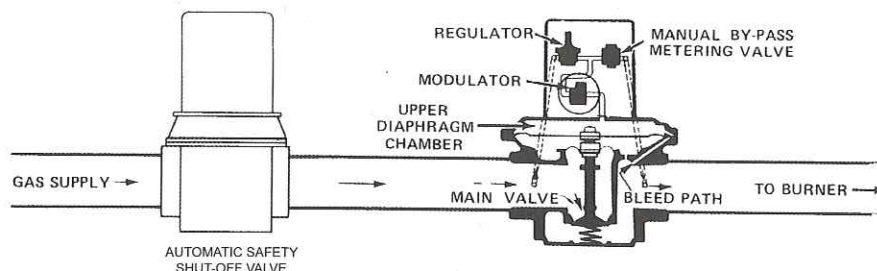
Room Override Stat (optional): Mount in heated area not in direct path of discharge air stream.

Inlet Air Sensor (optional): Install in convenient location upstream of burner, in intake air duct.

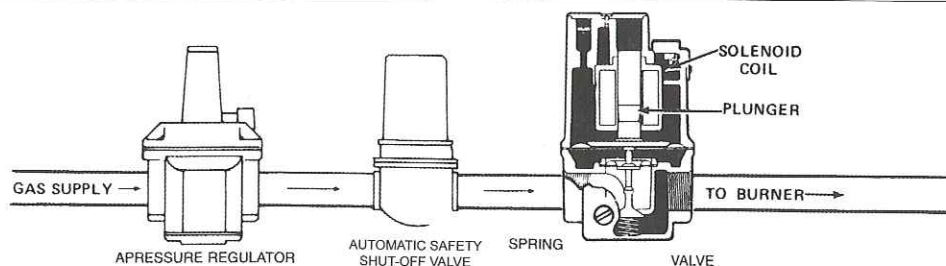
TYPICAL GAS TRAINS

Modulator (M) or Modulator-Regulator (MR) Valve: Mount in upright position in horizontal run of pipe, downstream of other controls - a separate gas pressure regulator must be used with any modulator (M) valve.

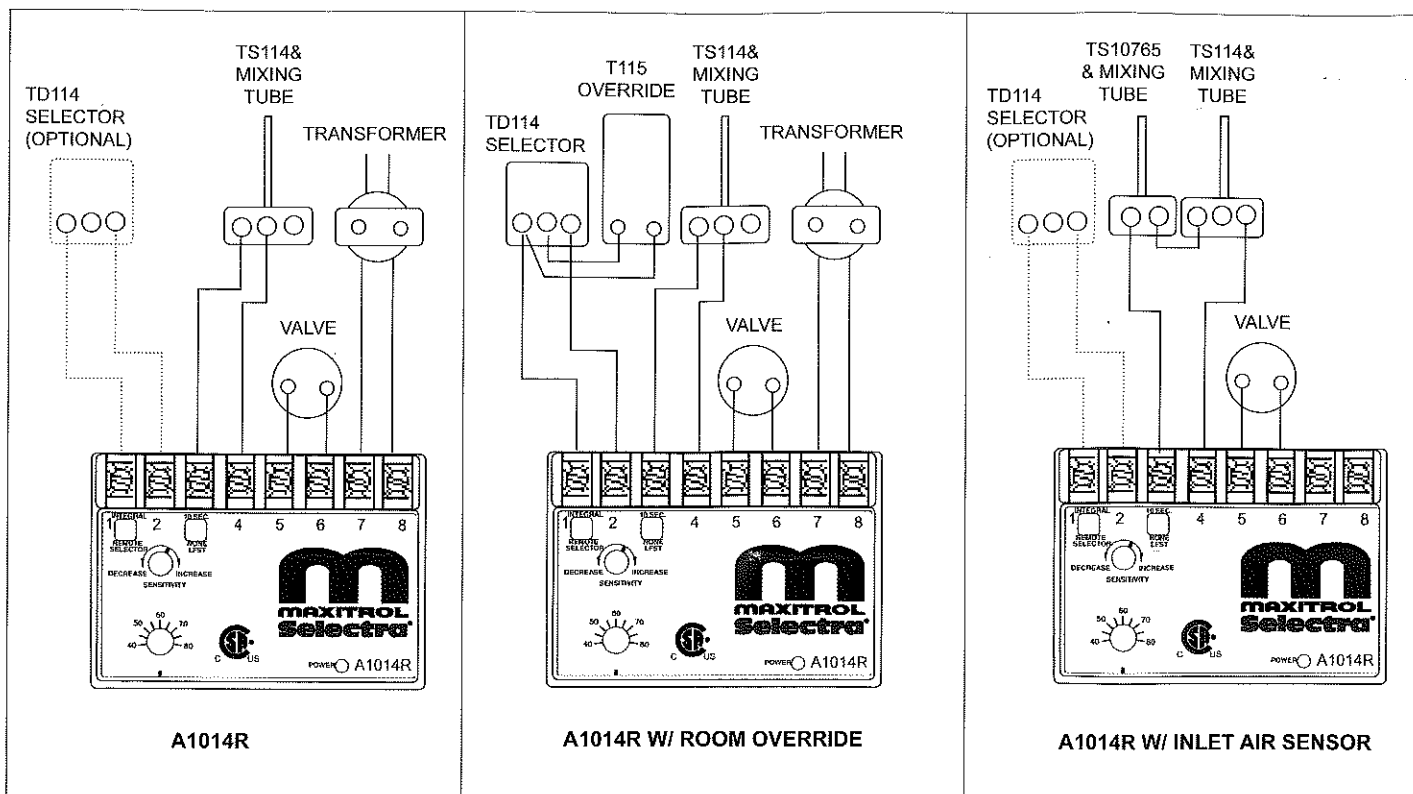
MR Valve: Modulator-regulator valve



M Valve: Regulator upstream of modulator valve



WIRING DIAGRAMS



SETTINGS

Sensitivity Adjustment

The sensitivity control will allow the user to control the response of the system. Caution should be exercised in the use of this adjustment. Under normal usage the pointer should be in line with the mark on the label.

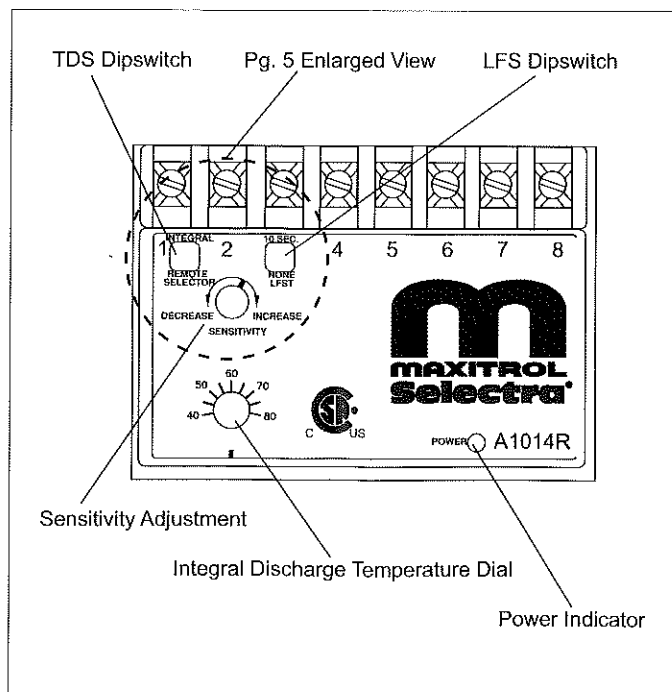
If hunting (oscillation) is encountered, rotating the sensitivity adjustment counter-clockwise will dampen the oscillation - stabilizing the flame.

DO NOT adjust unless necessary. Decreasing the sensitivity can increase the temperature "DROOP" of the system.

Integral or Remote Temperature Dial Selection (TDS): The desired discharge temperature can be selected using the amplifier's integral temperature dial or connecting a TD114 Remote Temperature Selector to terminals 1 & 2.

Set dipswitch #1 to the desired temperature setting selection mode (see page 5, Dip Switch Setting.) Placing dipswitch #1 in the "UP" position enables the integral dial. Placing dipswitch #1 in the "DOWN" position enables the remote dial. The amplifier will only respond to the dipswitch's selected temperature setting method, integral or remote.

IMPORTANT: The A1014R integral or remote temperature selector's (TD114) temperature range must match the temperature sensor's (TS114) temperature range. See page 7 for available integral dial ranges.



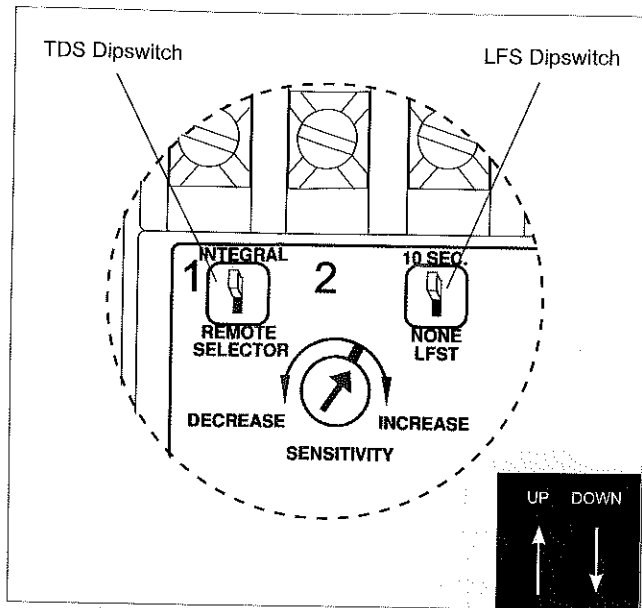
A1014R Model Amplifier

Low Fire Start (LFS) Time Adjustment

The low fire start duration can be set to 0 or approximately 10 seconds and begins timing after the amplifier has been energized.

The time is set by placing DIP Switch #2 to the appropriate position. LFS: Up = 10 Seconds, Down = 0 Seconds.

The M/MR valve remains in the low fire setting position during the low fire start time period.



A1014R Enlarged View: DIP Switch Setting

VALVE ADJUSTMENTS

(See bulletin MT2035 for additional M/MR valve information)

NOTE: Low fire adjustment should be checked whenever the high fire adjustment is changed.

MR 212 VALVE

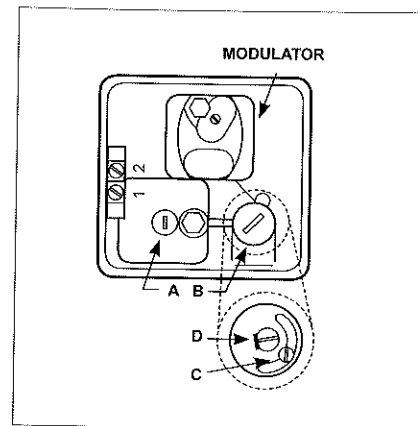
High Fire Manifold Adjustments:

1. Disconnect wires from amplifier terminal 4 (see page 4, A1014R Model Amplifier.) This causes the valve to call for continuous high fire.
2. Remove seal cap (A), and turn regulator pressure adjusting screw to obtain desired manifold pressure. (Clockwise rotation increases pressure.)
3. Reconnect the wires to amplifier terminal 4.

NOTE: If low fire bypass is on maximum, the desired high fire outlet pressure may not be achieved.

Low Fire or Bypass Adjustments:

1. Disconnect wire from amplifier terminal 8 (see page 4, A1014R Model Amplifier.) This causes the valve to call for continuous low fire.
2. Remove cap (B), and loosen lock screw (C). Turn (D) to desired low fire adjustment. (Clockwise rotation reduces minimum flow rate.)
3. Tighten set screw (C), replace cap (B) and reconnect wire to amplifier terminal 8.



MR212 Valve Adjustments

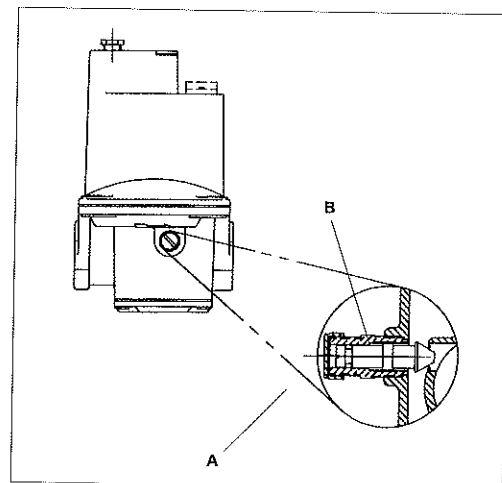
M411, 511, 611 VALVE

High Fire Manifold Adjustments:

1. Disconnect wires from amplifier terminal 4 (see page 4, A1014R Model Amplifier.), this causes the valve to call for continuous high fire.
2. Adjust the pressure regulator to obtain the desired manifold pressure (7" w.c. maximum).
3. Reconnect the wires to amplifier terminal 4.

Low Fire or Bypass Adjustments:

1. Disconnect wire from amplifier terminal 8, this causes the valve to call for continuous low fire.
2. Remove cap (A), and turn adjusting screw (B) to desired low fire adjustment. (Clockwise rotation reduces minimum flow rate.)
3. Replace cap (A), and reconnect wire to amplifier terminal 8.



M411, 511, 611 Valve Adjustments

FIELD SERVICE CHECKLIST

SYMPTOM	POSSIBLE CAUSE	FIELD TEST	REMEDY
A. No gas flow.	1. Modulating valve improperly installed.	1. Arrow on side of Valve should point in direction of gas flow.	1. Install properly.
B. Continuous Low Fire (electronics issue).	2. Short circuit or no voltage to the amplifier. 3. Open circuit in TD114. Remote Temperature Selector circuit or wiring. 4. Short circuit in TS114. Discharge Air Sensor circuit or wiring. 5. Amplifier is not operating properly. 6. Incorrectly set to external dial.	2. Check for power light or 24VAC at amplifier terminals 7 and 8. 3. Inspect for loose or broken wires between amplifier terminals 1 and 2, and TD114 terminals 1 and 2, and TD114 terminals 1 and 3. 4. Connect test resistor as described in Preliminary Circuit Analysis. Follow procedure outlined. 5. Check items 2, 3 and 4.	2. Prove the power source. 3. Tighten connections or replace wiring. 4. If modulating voltages are obtained. Check TS114 circuit for shorts. Replace TS114 if necessary. 5. If items 2, 3, and 4 check out and modulating voltages are still not obtained, amplifier may be assumed faulty. Replace. 6. Set Dipswitch #1 to Integral.
C. Continuous Low Fire (valve issue).	7. Short circuit or open circuit in Modulator Coil. 8. Plunger missing, jammed or improperly installed.	7. Measure resistance across modulator terminals with connecting wires detached. 8. Inspect. Plunger should be smooth, clean, and operate freely in solenoid sleeve. Install with Aluminum tip down.	7. Replace modulator head if not approximately 45-55 ohms for M611 Valve and 60-80 ohms for MR212 Valve. 8. Clean, or if necessary, replace plunger.
D. Correct Low Fire Erratic or Pulsating Flame.	9. Incorrect by-pass metering valve adjustment. 10. Excessive negative burner pressure.	9. See "Valve Adjustments" on page 5. 10. Close main gas supply and measure manifold pressure with blower operating. Reading should be less than 1.5" w.c. negative pressure.	9. Adjust to proper low fire. 10. If reading is greater than 1.5" negative pressure, check for clogged filters or other inlet air restrictions. Consult factory for other solutions.
E. Continuous High Fire (electronics issue).	11. Short circuit in TD114 Remote Temperature Selector circuit or wiring. 12. Open circuit in TS114/TS10765. Discharge or inlet Air Sensor Circuit or wiring.	11. Inspect for shorts at or between Amplifier terminals 1 and 2 or TD114 terminals 1 and 3. 12. Check TS114/TS10765 for open internal circuit. Connect test resistor as described in Preliminary Circuit Analysis. Follow procedure outlined.	11. Correct wiring if shorts exist. 12. If modulating voltages are obtained, check TS114/TS10765 for open circuits. Replace TS114/TS10765.
F. Continuous High Fire (valve issue).	13. Foreign object holding valve open. 14. Plunger jammed.	13. Remove bottom plate and inspect valve and seat. 14. Inspect. Plunger should be smooth, clean, and operate freely in solenoid sleeve. Install with Aluminum tip down.	13. Clean seat. Clean valve or replace if necessary. 14. Clean, or if necessary, replace plunger.
G. Incorrect High Fire.	15. Inlet pressure too low.	15. Read pressure at inlet to modulating valve using a manometer with unit operating at full fire. Pressure should be equal to the sum of outlet pressure setting plus pressure drop of the valve (see Maxitrol Capacity Chart).	15. Increase inlet pressure if possible.
H. Erratic or Pulsating Flame.	16. Incorrect outlet pressure adjustment of Pressure Regulator. 17. Hunting. 18. Erratic air patterns or improper TS114 location. 19. Wiring is run next to high voltage switching circuits causing induced voltages. 20. Amplifier not operating properly or erratic voltage supply.	16. Read manifold pressure using manometer and compare with recommendation of equipment manufacturer. 17. Adjust sensitivity control counter-clockwise. 18. Connect test resistor as described in Preliminary Circuit Analysis. Turn TD114 selector dial so heater goes through its entire modulating range. 19. Temporarily wire each of TD114, TS114, and MR212 externally and observe heater/equipment operation. 20. With test resistor connected (per item #18) and TD114 locally connected (per item #19), turn TD114 selector dial through entire modulating range. Observe D.C. voltage across modulator terminals.	16. See "Valve Adjustments" on page 5. 17. Adjust sensitivity control to maintain an even flame. 18. If the flame is steady throughout the entire modulating range, the TS114 must be moved. 19. If smooth operation results, isolate affected wiring from source of induced voltage. 20. If erratic or unstable D.C. voltages are obtained throughout the modulating range, the amplifier may be assumed faulty. Replace. If erratic operation is noted only over a small range of 2 or 3 volts, the voltage source may contain surges. Consult Maxitrol.
I. Incorrect Discharge Air Temperature.	21. Inlet Air Sensor is used. 22. Incorrect Wiring. 23. System out of calibration. 24. Improper TS114 location. 25. Room Override Thermostat circuit closed.	21. Inlet Air Sensor changes 1° for each 3.5°, 5°, or 8° outside temperature change from 60° (predetermined - turnaround varies with model used). 22. Check "Wiring Diagrams", page 4. 23. Sensing temperature (thermometer next to TS114) does not correspond to TD114 setting. 24. Sensing temperature (thermometer next to TS114) does not represent average discharge air temperature. 25. Remove Override Thermostat lead from terminal 2 of TD114.	21. Sensing temperature will vary from TD114 dial settings. This is intentional. 22. Correct wiring as shown in "Wiring Diagrams", page 4. 23. See calibration procedure. 24. Move TS114 to location where average representative temperature can be sensed. 25. TD114 dial setting, then check thermostat setting and/or check wiring for shorts.
J. Burned out Transformer.	26. Short circuit in modulator coil. 27. Short circuit between amplifier and modulator valve.	26. Measure resistance across modulator terminals with red lead wires disconnected. 27. Inspect wiring.	26. Replace modulator head if less than 40 ohms. 27. Correct wiring if short is found.
K. Discharge Air Temperature too Low when T115 is operative.	28. Too low an Override Temperature setting. 29. Burner capacity may be insufficient.	28. Check "Override Temperature Selector" of TD114. 29. Check for high fire (maximum manifold pressure specified for heater).	28. Reset to correct temperature. 29. If on high fire, control can do no more. Heater unable to furnish additional heat to raise temperature.

PRELIMINARY CIRCUIT ANALYSIS

For ease in troubleshooting, it is advisable to wire the system as follows (this differs from the normal connection). The Discharge Air Sensor is disconnected and replaced with a 10,000 ohm, 1/2 watt test resistor (terminals 3 and 4). If inlet air sensor is being used, disconnect and replace with a jumper. On units where the Remote Temperature Selector is located a considerable distance from the heater, it may be advantageous to use the selector at the heater location or use the integral selector.

Connect a DC volt meter (capable of reading 0-24 V DC) on the Modulator or Modulator-Regulator Valve terminals. Set the temperature to the minimum dial setting. The DC voltage should read 0 volts. The DC voltage should gradually increase to at least 20 volts as you slowly rotate the dial to the maximum dial setting. If these voltages are obtained, the valve function can now be checked out.

The operation of the valve with regard to voltage is as follows: from 0 volts to approximately 5 volts, the modulating valve should be on bypass flow with the heater operating on low or minimum fire. From approximately 5 volts to 15 volts DC, the valve should be performing its modulating function, and the heater should be firing at a modulated flow rate between low and high fire, depending upon the voltage. Above approximately 15 volts DC, the valve should be delivering full flow to the heater and the unit should be on full fire. If the DC voltage is obtained on the valve terminals, but the heater does not respond as described, the problem can be isolated to the valve itself or to the gas control manifold of the heater (see page 6, "Field Service Checklist").

In the event proper voltages are obtained, and the valve responds correctly to these DC voltages, the problem could well be in the wiring leading to the Discharge Air Sensor or the Discharge Air Sensor itself. This should be also reviewed in the Field Service Checklist.

If the proper voltages are not obtained when wired as instructed, the problem can be isolated to the electronics and this may once again be reviewed in the Field Service Checklist.

After the troubleshooting test, remove the test resistor and reconnect the Discharge Air Sensor to terminals 3 and 4. If Remote Temperature Selector has been moved or disconnected return it to its original position.

INTEGRAL TEMPERATURE DIAL LABEL INSTALLATION INSTRUCTIONS

IMPORTANT: Temperature range on dial must match sensor temperature range.

The A1014R comes with the 40°F - 80°F label factory installed.

Following labels are shipped loose with the amplifier and can be field installed:

Label Range	Matching Sensor
40°-80°F *	TS114F
55°-90°F	TS114
90°-140°F	TS114G
110°-160°F	TS114J
160°-210°F	TS114C

* Label factory installed.

- Locate desired label (to match sensor)
- DO NOT remove existing dial label.
- Make sure label surface is clean and dry.
- Remove adhesive backing from desired label.
- Carefully place label on top of range being replaced, lining up with the locating mark.
- Set desired temperature by using adjustment pointer to point to desired temperature.