Service Literature

LGA/LCA

25 and 30 Ton
(88 and 105 kW)

The LGA/LCA 25 and 30 ton (88 and 105 kW) units are configured to order units (CTO) with a wide selection of factory installed options. The LGA300/360H gas/electric rooftop units are available in 260,000 Btuh or 470,000 Btuh (76.2 kW or 137.7 kW) heating inputs. Gas heat sections are aluminized steel tube heat exchangers. The LCA300/360H cooling packaged rooftop units are equipped with the same cooling sections as the LGA300/360H units. Optional electric heat is factory-or field installed in LCA units. Electric heat operates in single of multiple stages depending on the kW input size. 30kW through 120kW heat sections are available for the LCA300/360H. LGA and LCA units have identical refrigerant circuits with 25 and 30 ton (88 and 105kW) cooling capacities. LGA/LCA1360H units utilize three compressors, while the LGA/LCA300H units utilize four compressors.

The LGA and LCA units are designed to accept any of several different energy management thermostat control systems with minimum field wiring. Factory or field provided control options connect to the unit with jack plugs. When “plugged in” the controls become an integral part of the units wiring.

Information contained in this manual is intended for use by a qualified service technicians only. All specifications are subject to change. Procedures outlined in this manual are represented as a recommendation only and do not supersede or replace local or state codes.

If the units must be lifted for service, rig unit by attaching four cables to the holes located in the unit base rail (two holes at each corner). Refer to the installation instructions for the proper rigging technique.

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SPECIFICATIONS - LCA/LGA 300/360

Model No.			LCA/LGA300H		LCA/LGA360H	
Cooling Ratings	Gross Cooling Capacity — Btuh (kW)		298,000 (87.3)		355,000 (104.0)	
	★Net Cooling Capacity — Btuh (kW)		284,000 (83.2)		336,000 (98.4)	
	Total Unit Power (kW)		28.4		33.6	
	★EER (Btuh/Watt)		10.0		10.0	
	★Integrated Part Load Value (Btuh/Watt)		10.4		10.4	
Refrigerant Charge Furnished (HCFC-22)	Circuit 1		11 lbs. 0 oz. (4.99 kg)		18 lbs. 0 oz. (8.16 kg)	
	Circuit 2		11 lbs. 0 oz. (4.99 kg)		18 lbs. 0 oz. (8.16 kg)	
	Circuit 3		11 lbs. 0 oz. (4.99 kg)		18 lbs. 0 oz. (8.16 kg)	
	Circuit 4		11 lbs. 0 oz. (4.99 kg)		- - - -	
Two Stage Heating Capacity (Natural or LPG/Propane Gas (at Sea Level)	**Model No.**		**LGA300H**		**LGA360H**	
	Heat Input Type		**Standard (S)**	**High (H)**	**Standard (S)**	**High (H)**
	Input (low) — Btuh (kW)		169,000 (49.5)	305,000 (89.4)	169,000 (49.5)	305,000 (89.4)
	Output (low) — Btuh (kW)		135,000 (39.6)	244,000 (71.5)	135,000 (39.6)	244,000 (71.5)
	Input (High) — Btuh (kW)		260,000 (76.2)	470,000 (137.7)	260,000 (76.2)	470,000 (137.7)
	Output (High) — Btuh (kW)		208,000 (60.9)	376,000 (110.2)	208,000 (60.9)	376,000 (110.2)
	A.G.A./C.G.A. Thermal Efficiency		80.0%			
Gas Supply Connections npt — in. Natural or LPG/Propane			1			
Recommended Gas Supply Pressure — wc. in. (kPa)		Natural	7 (1.7)			
		LPG/Propane	11 (2.7)			
Evaporator Blower and Drive Selection	Blower wheel nominal diameter x width — in. (mm)		(2) 18 x 15 (457 x 381)			
	5 hp (3.7 kW) [1] Motor & Drives	Nominal motor output — hp (kW)	5 (3.7)			
		Max. usable motor output — hp (kW)	5.75 (4.3)			
		Voltage & phase	208/230v, 460v or 575v-3ph			
		(Drive kit #) RPM range	(1) 660 - 810 or (2) 770 - 965			
	7.5 hp (5.6 kW) [1] Motor & Drives	Nominal motor horsepower (kW)	7.5 (5.6)			
		Max. usable motor output — hp (kW)	8.6 (6.4)			
		Voltage & phase	208/230v, 460v or 575v-3ph			
		(Drive kit #) RPM range	(3) 715 - 880 or (4) 770 - 965			
	10 hp (7.5 kW) [1] Motor & Drives	Nominal motor output — hp (kW)	10 (7.5)			
		Max. usable motor output — hp (kW)	11.5 (8.6)			
		Voltage & phase	208/230v, 460v or 575v-3ph			
		(Drive kit #) RPM range	(3) 715 - 880 or (5) 850 - 1045			
Evaporator Coil	Net face area — sq. ft. (m^2)		33.3 (3.1)			
	Tube diameter — in. (mm) & No. of rows		3/8 (9.5) — 2		3/8 (9.5) — 3	
	Fins per inch (m)		14 (551)			
	Drain connection no. & size — in. (mm) fpt		(1) 1 (25)			
	Expansion device type		Thermostatic Expansion Valve			
Condenser Coil	Net face area — sq. ft. (m^2)		70.6 (6.6)			
	Tube diameter — in. (mm) & No. of rows		3/8 (9.5) — 2			
	Fins per inch (m)		16 (630)			
Condenser Fans	Diameter — in. (mm) & No. of blades		(6) 24 (610 — 3)			
	Total Air volume — cfm (L/s)		21,500 (10,145)			
	Motor horsepower (W)		(6) 1/3 (249)			
	Motor rpm		1075			
	Total Motor watts		2170			
Filters (furnished)	Type of filter		Disposable, commercial grade, pleated			
	No. and size — in. (mm)		(12) 20 x 20 x 2 (508 x 508 x 51)			
Electrical characteristics			208/230v, 460v or 575v — 60 hertz — 3 phase			

[1] Using total air volume and system static pressure requirements determine from blower performance tables rpm and motor output required. Maximum usable output of motors furnished by Lennox are shown. In Canada, nominal motor output is also maximum usable motor output. If motors of comparable output are used, be sure to keep within the service factor limitations outlined on the motor nameplate.

★Tested at conditions included in ARI Standard 340/360; 95°F (35°C) outdoor air temperature and 80°F (27°C) db/67°F (19°C) wb entering evaporator air; minimum external duct static pressure. Integrated Part Load Value tested at 80°F (27°C) outdoor air temperature.

NOTE — Net capacity includes evaporator blower motor heat deduction. Gross capacity does not include evaporator blower motor heat deduction.

ELECTRICAL DATA - LCA/LGA 300/360

Model No.			LCA/LGA300H									LCA/LGA360H								
Line voltage data — 60 Hz — 3 phase			208/230v			460v			575v			208/230v			460v			575v		
Compressors	No. of compressors		4									3								
	Rated load amps each (total)		18.6 (74.4)			9.0 (36.0)			7.4 (29.6)			30.1 (90.3)			15.5 (46.5)			12.1 (36.3)		
	Locked rotor amps each (total)		156.0 (624.0)			70.0 (280.0)			54.0 (216.0)			225.0 (675.0)			114.0 (342.0)			80.0 (240.0)		
Condenser Fan Motors	No. of motors		6																	
	Full load amps each(total)		2.4 (14.4)			1.3 (7.8)			1.0 (6.0)			2.4 (14.4)			1.3 (7.8)			1.0 (6.0)		
	Locked rotor amps each (total)		4.7 (28.2)			2.4 (14.4)			1.9 (11.4)			4.7 (28.2)			2.4 (14.4)			1.9 (11.4)		
Evaporator Blower Motor	Motor Output	hp	5	7.5	10	5	7.5	10	5	7.5	10	5	7.5	10	5	7.5	10	5	7.5	10
		kW	3.7	5.6	7.5	3.7	5.6	7.5	3.7	5.6	7.5	3.7	5.6	7.5	3.7	5.6	7.5	3.7	5.6	7.5
	Full load amps		16.7	24.2	30.8	7.6	11	14	6.1	9	11	16.7	24.2	30.8	7.6	11	14	6.1	9	11
	Locked rotor amps		105	152	193	45.6	66	84	36.6	54	66	105	152	193	45.6	66	84	36.6	54	66
Rec. max. fuse size (amps)	With Exhaust Fans		125	150	150	60	70	70	50	50	60	150	150	175	80	80	90	60	60	70
	Less Exhaust Fans		125	125	150	60	60	70	50	50	60	150	150	150	80	80	80	60	60	60
†Minimum Circuit Ampacity	With Exhaust Fans		117	126	134	57	61	65	46	50	52	137	144	151	70	74	77	55	58	60
	Less Exhaust Fans		110	119	127	54	57	61	43	47	49	129	137	144	66	70	73	52	55	57
Optional Power Exhaust Fans	(No.) Horsepower (W)		(3) 1/3 (249)																	
	Full load amps (total)		7.2			3.9			3.0			7.2			3.9			3.0		
	Locked rotor amps (total)		14.1			7.2			5.7			14.1			7.2			5.7		
Service Outlet (2) 115 volt GFCI (amp rating)			15																	

†Refer to National or Canadian Electrical Code manual to determine wire, fuse and disconnect size requirements.
NOTE — Extremes of operating range are plus and minus 10 % of line voltage.
NOTE — Where current does not exceed 100 amps, HACR type circuit breaker may be used in place of fuse (U.S. only).

FACTORY INSTALLED OPTIONS

Item	LCA/LGA300H	LCA/LGA360
Cold Weather Kit (Canada Only) — Electric heater automatically controls minimum temperature in gas burner compartment when temperature is below -40°F (-40°C). C.G.A. certified to allow operation of unit down to -60°F (-50°C) LGA Models Only	Factory	
Corrosion Protection — Phenolic epoxy coating, applied to condenser coils (with painted base section) and evaporator coils (with painted evaporator base section and painted blower housings), factory applied to either section or both sections	Factory	
[1] **Disconnect Switch—** Accessible from outside of unit, spring loaded weatherproof cover furnished	Factory	
Service Outlets (2) — 115v ground fault circuit interrupter (GFCI) type	Factory	
Service Valves — Fully serviceable brass valves installed in discharge and liquid lines	Factory	
[2] **Stainless Steel Heat Exchanger (LGA Models)**	Factory	

[1] Not available for 208/230v models with 90 or 120 kW electric heat.
[2] Required if mixed air temperature is between 30 and 45°F (-1 and 7°C).

FIELD INSTALLED ACCESSORIES

Item		LCA/LGA300H	LCA/LGA360
Coil Guards — Galvanized steel wire guards to protect outdoor coil. Not used with Hail Guards.		**88K53**	
Dehumidistat - Monitors humidity levels, reports to the IMC board which allows the heating and cooling to run simultaneously as needed. Lowers indoor humidity for process air applications.		**65F86**	
Diffusers - Aluminum grilles, large center grille, insulated diffuser box with flanges, hanging rings furnished, interior transition (even air flow), internally sealed (prevents recirculation), adapts to T-bar ceiling grids or plaster ceilings- Net Weight	**Step-Down -** double deflection louvers	LARTD30/36 - 437 lbs. (198 kg)	
	Flush - fixed blade louvers	LAFD30/36 - 414 lbs. (188 kg)	
Grille Guards — Protects the space between outdoor coils and main unit		**86K30**	
Hood for Down-Flow Gravity Exhaust Dampers		LAGEH30H/36	
Hail Guards — Constructed of heavy gauge steel, painted to match cabinet, helps protect outdoor coils from hail damage. Not used with Coil Guards		**88K26**	
Horizontal Gravity Exhaust Dampers — Aluminum blade dampers prevent blow back and outdoor air infiltration during off cycle, field installed in return air duct, bird screen furnished- Net Weight		LAGEDH30/36 - 20 lbs. (9 kg)	
Horizontal Return Air Panel Kit — Required for horizontal applications with horizontal roof mounting frame, contains panel with return air opening for field replacement of existing unit panel and panel to cover bottom return air opening in unit, see dimension drawings- Net Weight		**38K48** - 43 lbs. (20 kg)	
IMC Software and Manual Only — Interfaces individual or networked (up to 32 units) IMC to PC for field service and diagnostics. Program includes: setup, main status of unit, main status of network, error code download, economizer status, equipment configuration, ECTO parameter edit and two unit test screens (one for simulating a room thermostat demand and one for controlling individual control outputs). System requirements: PC with DOS 3.3 or higher, hard drive and free COM port. Color monitor recommended		**32K22**	
IMC Software / PC Interface Kit — Includes IMC/PC Interface Kit and IMC Software Kit.		**86K84**	
IMC/PC Interface Kit Only — RS-485 to RS-232 converter and cable for connecting IMC to PC. Includes instruction manual.		**28K56**	
Indoor Air Quality (CO_2) Sensor — Monitors CO_2 levels, reports to Integrated Modular Control (IMC) board which adjusts economizer dampers as needed		**93J69**	
Indoor Air Quality Sensor Aspiration box — for duct mounting of Indoor Air Quality Sensor		**47N18**	
LPG/Propane Kits — to field change over LGA units from Natural Gas to LPG		**41L15** (2 kits required)	
Roof Mounting Frame — Nailer strip furnished, mates to unit, U.S. National Roofing Contractors Approved, shipped knocked down - Net Weight	14 inch (356 mm) height	LARMF18/36-14 - 160 lbs. (73 kg)	
	24 inch (610 mm) height	LARMF18/36-24 - 220 lbs. (100 kg)	
Roof Mounting Frame - Full Perimeter (Canada Only)	14 inch (356 mm) height	LARMF30/36-14SFC	
	18 inch (457 mm) height	LARMF30/36-18SFC	
	24 inch (610 mm) height	LARMF30/36-24SFC	
Roof Mounting Frame (Horizontal) — Nailer strip furnished, mates to unit, converts unit from down-flow to horizontal (side) air flow, shipped knocked down, return air is on unit, supply air is on frame, see dimension drawings. Requires Horizontal Return Air Panel, see above. Net Weight	30 inch (762 mm) height **(for slab applications)**	LARMFH30/36-30 - 445 lbs. (202 kg)	
	41 inch (1041 mm) height **(for rooftop applications) -** meets National Roofing Code requirements	LARMFH30/36-41 - 725 lbs. (329 kg)	
Roof Mounting Frame (Horizontal) Insulation Kit - helps prevent sweating of horizontal roof mounting frames	30 inch (762 mm) frames	**73K33**	
	41 inch (1041 mm) frames	**73K35**	
Transitions (Supply and Return) — Used with diffusers, installs in roof mounting frame, galvanized steel construction, flanges furnished for duct connection, fully insulated		LASRT30/36 - 85 lbs. (39 kg)	
Vertical Vent Extension Kit - to exhaust flue gases vertically above unit (LGA Models Only)		LB-94710A (**40L80**) 2 Required	

FACTORY OR FIELD INSTALLED ACCESSORIES

Item		LCA/LGA300H	LCA/LGA360
Blower Proving Switch — Monitors blower operation, shuts down unit if blower fails		**18L89**	
Condensate Drain Trap - field installed only, may be factory enclosed to ship with unit	PVC	**37K70**	
	Copper	**48K14**	
Dirty Filter Switch — Senses static pressure increase indicating a dirty filter condition		**30K48**	
Down-Flow Gravity Exhaust Dampers — Aluminum blade dampers prevent blow back and outdoor air infiltration during off cycle, bird screen furnished - Net Weight		LAGED30/36 - 28 lbs. (13 kg)	
Economizer — Opposing gear driven recirculated air and outdoor air dampers, plug-in connections to unit, nylon bearings, neoprene seals, 24 volt fully modulating spring return motor, adjustable minimum damper position, damper assembly slides in unit, outdoor air hood must be ordered separately (see below), optional down-flow gravity exhaust dampers available (see below), choice of economizer controls (see below)		LAREMD30/36 - 98 lbs. (45 kg)	
Economizer Control Choice — **Sensible Control —** Furnished on IMC board in unit, uses outdoor air sensor furnished with unit to measure outdoor air temperature and control damper position **(Furnished)** **Global Control —** Furnished on IMC board in unit, used with Direct Digital Control (DDC) systems, uses global air sensor to control damper position, determines when to use outdoor air for cooling or set damper at minimum position **(Furnished)** **Outdoor Enthalpy Control —** Adjustable enthalpy sensor, senses outdoor air enthalpy for economizer control**,** 0 to 100% outdoor air **Differential Enthalpy Control —** Two solid-state enthalpy sensors allow selection between outdoor air and return air (whichever has lowest enthalpy)		**16K96** (Outdoor) **16K97** (Differential)	
Electric Heat (EHA) — helix wound nichrome elements, time delay for element staging, individual element limit controls (45, 60, 90 and 120 kW), may be two-stage controlled, wiring harness furnished, requires Electric Heat Control Module, Fuse Block and Terminal Block (LCA Models Only)		See Electric Heat Data Tables	
Electric Heat Control Module — Required with 45, 60, 90 and 120 kW electric heaters, provides control of second stage heating		LCA Models Only See Optional Electric Heat Accessories	
Electric Heat Fuse Block — Required with electric Heat, mounting screws furnished			
Electric Heat LTB2 Terminal Block — Required with electric heat			
Outdoor Air Damper Section - mechanical dampers, 0 to 25% outdoor air ,installs in unit cabinet, outdoor air hood must be ordered separately (see below) - Net Weight	**Automatic Operation** - Gear driven, adjustable outdoor air, fully modulating spring return damper motor, plug-in connection	LAOADM30/36 - 60 lbs. (27 kg)	
	Manual Operation - Linked dampers, adjustable fixed position outdoor air	LAOAD30/36 - 55 lbs. (25 kg))	
Outdoor Air Hood — Required with LAREMD30/36 Economizer, LAOAD30/36 and LAOADM30/36 Outdoor Air Damper Sections, five cleanable aluminum mesh fresh air filters furnished- Net Weight		LAOAH30/36 - 55 lbs. (25 kg.) filter size: (5) 16 x 25 x 1 in. (406 x 635 x 25)	
Power Exhaust Fan — Installs external to unit for down-flow applications only with economizer option, provides exhaust air pressure relief, interlocked to run when return air dampers are closed and supply air blower is operating, fan runs when outdoor air dampers are 50% open (adjustable), motor is overload protected, steel cabinet and hood painted to match unit	Model Number - Net Weight	LAPEF30/36 - 99 lbs. (45 kg)	
	Dia. - in. (mm) No. Blades	(3) 20 (508) - 5	
	Total air volume - cfm (L/s**)**	12,800 (6040) @ 0 in. wg (0 PA)	
	Motor Horsepower (W)	(3) 1/3 (249)	
	Total Watts Input	1125	
Smoke Detector — Photoelectric type, installed in supply air section or return air section or both sections	Supply	**70K87**	
	Return	**70K86**	

OPTIONAL ELECTRICAL HEAT ACCESSORIES

ELECTRIC HEAT CONTROL MODULE AND UNIT FUSE BLOCKS				
Unit Model No.			**LCA300H**	**LCA360H**
Electric Heat	Model No.		EHA (see Electric Heat Data tables for additional information)	
	kW Input Range		30-45-60-90-120	
Electric Heat Control Module (45, 60, 90 & 120 kW)			**15K13** (208/230v), **15K92** (460v), **15K93** (575v)	
Unit Fuse Block (3 phase)	**With** Power Exhaust Fans	208/230v - 5 hp (3.7 kW)	**25K19**	**35K01**
		460v - 5 hp (3.7 kW)	**25K14**	**35K04**
		575v - 5 hp (3.7 kW)	**25K13**	**25K14**
		208/230v - 7.5 hp (5.6 kW)	**35K01**	**35K01**
		460v - 7.5 hp (5.6 kW)	**35K03**	**35K04**
		575v - 7.5 hp (5.6 kW)	**25K13**	**25K14**
		208/230v - 10 hp (7.5 kW)	**35K01**	**35K02**
		460v - 10 hp (7.5 kW)	**35K03**	**48L63**
		575v - 10 hp (7.5 kW)	**25K14**	**35K03**
	Without Power Exhaust Fans	208/230v - 5 hp (3.7 kW)	**25K19**	**35K01**
		460v - 5 hp (3.7 kW)	**25K14**	**35K04**
		575v - 5 hp (3.7 kW)	**25K13**	**25K14**
		208/230v - 7.5 hp (5.6 kW)	**25K19**	**35K01**
		460v - 7.5 hp (5.6 kW)	**25K14**	**35K04**
		575v - 7.5 hp (5.6 kW)	**25K13**	**25K14**
		208/230v - 10 hp (7.5 kW)	**35K01**	**35K01**
		460v - 10 hp (7.5 kW)	**35K03**	**35K04**
		575v - 10 hp (7.5 kW)	**25K14**	**25K14**

LTB2 ELECTRIC HEAT TERMINAL BLOCK - LTB2-175 (30K75) 175 amps, **LTB2-335 (30K76)** 335 amps
(Required for units WITHOUT disconnect/circuit breaker but WITH single point power source

Unit Model No.			**LCA300H and LCA360H**
LTB2 Terminal Block (3 Phase)	30 kW [1] 208/230v-3ph	5 hp (3.7 kW)	**30K75**
		7.5 hp (5.6 kW)	**30K75**
		10 hp (7.5 kW)	**30K75**
	45 kW [1] 208/230v-3ph	5 hp (3.7 kW)	**30K75**
		7.5 hp (5.6 kW)	**30K75**
		10 hp (7.5 kW)	**30K76**
	60 kW [1] 208/230v-3ph	5 hp (3.7 kW)	**30K75**
		7.5 hp (5.6 kW)	**30K76**
		10 hp (7.5 kW)	**30K76**
	90 kW [1] 208/230v-3ph	5 hp (3.7 kW)	**30K76**
		7.5 hp (5.6 kW)	**30K76**
		10 hp (7.5 kW)	**30K76**
	120 kW [1] 208/230v-3ph	5 hp (3.7 kW)	**30K76**
		7.5 hp (5.6 kW)	**30K76**
		10 hp (7.5 kW)	**30K76**

[1] **NOTE — ALL 460V AND 575V UNIT VOLTAGES USE LTB2-175 (30K75) TERMINAL BLOCK.**
NOTE — Terminal Block is factory installed in units with factory installed electric heat without disconnect/circuit breaker but with single point power source.

BLOWER DATA-BASE UNIT

BLOWER TABLE INCLUDES RESISTANCE FOR LCA300H BASE UNIT ONLY WITH DRY INDOOR COIL & AIR FILTERS IN PLACE.

FOR ALL UNITS ADD:

1 - Wet indoor coil air resistance of selected unit.
2 - Any factory installed options air resistance (heat section, economizer, etc.)
3 - Any field installed accessories air resistance (duct resistance, diffuser, etc.)

Then determine from blower table blower motor output and drive required.

MINIMUM AIR VOLUME REQUIRED FOR USE WITH OPTIONAL ELECTRIC HEAT - 10,500 cfm (4955 L/s).

BOLD ITALIC INDICATES FIELD FURNISHED DRIVE

Air Volume cfm (L/s)	TOTAL STATIC PRESSURE — Inches Water Gauge (Pa)											
	.20 (50)	.40 (100)	.60 (150)	.80 (200)	1.00 (250)	1.20 (300)	1.40 (350)	1.60 (400)	1.80 (450)	2.00 (495)	2.20 (545)	2.40 (595)	2.60 (645)
	RPM BHP (kW)	RPM BHP (kW)	RPM BHP (kW)	RPM BHP (kW)	RPM BHP (kW)	RPM BHP (kW)	RPM BHP (kW)	RPM BHP (kW)	RPM BHP (kW)	RPM BHP (kW)	RPM BHP (kW)	RPM BHP (kW)	RPM BHP (kW)
7500 (3540)	***380 1.05 (0.78)***	***465 1.50 (1.12)***	***540 1.90 (1.42)***	***600 2.30 (1.72)***	660 2.70 (2.01)	715 3.15 (2.35)	765 3.60 (2.69)	810 4.00 (2.98)	855 4.45 (3.32)	895 4.90 (3.66)	935 5.35 (3.99)	975 5.85 (4.36)	1010 6.30 (4.70)
8000 (3775)	***390 1.25 (0.93)***	***475 1.65 (1.23)***	***545 2.10 (1.57)***	***610 2.55 (1.90)***	665 2.95 (2.20)	720 3.45 (2.57)	770 3.90 (2.91)	815 4.35 (3.25)	860 4.85 (3.62)	900 5.30 (3.95)	940 5.75 (4.29)	980 6.30 (4.70)	1015 6.75 (5.04)
8500 (4010)	***405 1.40 (1.04)***	***485 1.90 (1.42)***	***555 2.35 (1.75)***	***620 2.80 (2.09)***	675 3.30 (2.46)	725 3.75 (2.80)	775 4.20 (3.13)	820 4.70 (3.51)	865 5.20 (3.88)	905 5.70 (4.25)	945 6.20 (4.63)	985 6.75 (5.04)	1020 7.25 (5.41)
9000 (4245)	***415 1.60 (1.19)***	***495 2.10 (1.57)***	***565 2.60 (1.94)***	***625 3.10 (2.31)***	685 3.60 (2.69)	735 4.10 (3.06)	785 4.60 (3.43)	830 5.10 (3.80)	870 5.60 (4.18)	915 6.15 (4.59)	955 6.70 (5.00)	990 7.20 (5.37)	1025 7.70 (5.74)
9500 (4485)	***430 1.85 (1.38)***	***505 2.35 (1.75)***	***575 2.90 (2.16)***	***635 3.40 (2.54)***	690 3.90 (2.91)	745 4.50 (3.36)	790 4.95 (3.69)	835 5.50 (4.10)	880 6.05 (4.51)	920 6.60 (4.92)	960 7.15 (5.33)	995 7.70 (5.74)	1035 8.30 (6.19)
10,000 (4720)	***445 2.10 (1.57)***	***520 2.65 (1.98)***	***585 3.20 (2.39)***	***645 3.75 (2.80)***	700 4.30 (3.21)	750 4.85 (6.49)	800 5.40 (4.03)	845 5.95 (4.44)	885 6.50 (4.85)	925 7.05 (5.26)	965 7.65 (5.71)	1000 8.20 (6.12)	1040 8.85 (6.60)
10,500 4955)	***455 2.35 (1.75)***	***530 2.95 (2.20)***	***595 3.50 (2.61)***	***655 4.10 (3.06)***	710 4.70 (3.03)	760 5.25 (3.92)	805 5.80 (4.33)	850 6.40 (4.77)	895 7.00 (5.22)	935 7.60 (5.67)	970 8.15 (608)	1010 8.80 (6.56)	1045 9.40 (7.01)
11,000 (5190)	***470 2.60 (1.94)***	***545 3.25 (2.42)***	***605 3.85 (2.87)***	665 4.45 (3.32)	720 5.10 (3.80)	765 5.66 (4.22)	815 6.30 (4.70)	860 6.90 (5.15)	900 7.50 (5.60)	940 8.10 (6.04)	980 8.75 (6.53)	1015 9.35 (6.98)	- - - -
11,500 (5425)	***485 2.95 (2.20)***	***555 3.60 (2.69)***	***620 4.25 (3.17)***	675 4.85 (3.62)	730 5.55 (4.14)	775 6.10 (4.55)	820 6.70 (5.00)	865 7.40 (5.52)	910 8.05 (6.01)	945 8.65 (6.45)	985 9.30 (6.94)	1020 9.95 (7.42)	- - - -
12,000 (5665)	***500 3.30 (2.46)***	***570 4.00 (2.98)***	***630 4.65 (3.47)***	685 5.30 (3.95)	740 6.00 (4.480	785 6.60 (4.92)	830 7.25 (5.41)	875 7.95 (5.93)	915 8.60 (6.42)	955 9.25 (6.90)	995 9.95 (7.42)	1030 10.60 (7.91)	- - - -
12,500 (5900)	***515 3.65 (2.72)***	***580 4.35 (3.25)***	***640 5.05 (3.77)***	695 5.75 (4.29)	750 6.50 (4.85)	795 7.10 (5.30)	840 7.80 (5.82)	885 8.55 (6.38)	925 9.20 (6.86)	965 9.90 (7.39)	1000 10.55 (7.87)	1035 11.25 (8.39)	- - - -
13,000 (6135)	***530 4.05 (3.02)***	***595 4.80 (3.58)***	***655 5.55 (4.14)***	710 6.25 (4.66)	760 7.00 (5.22)	805 7.65 (5.71)	850 8.40 (6.27)	890 9.05 (6.75)	930 9.75 (7.27)	970 10.50 (7.83)	1010 11.30 (8.43)	- - - -	- - - -
13,500 (6370)	***545 4.45 (3.32)***	***610 5.25 (3.92)***	665 6.00 (4.48)	720 6.75 (5.04)	770 7.50 (5.60)	815 8.25 (6.15)	860 9.00 (6.71)	900 9.70 (7.24)	940 10.45 (7.80)	980 11.20 (8.36)	- - - -	- - - -	- - - -
14,000 (6605)	***560 4.90 (3.66)***	***620 5.70 (4.25)***	680 6.55 (4.89)	730 7.30 (5.45)	780 8.10 (6.04)	825 8.85 (6.60)	870 9.65 (7.20)	910 10.40 7.76)	950 11.15 (8.31)	- - - -	- - - -	- - - -	- - - -
14,500 (6845)	***575 5.40 (4.03)***	***635 6.25 (4.66)***	690 7.05 (5.26)	745 7.90 (5.89)	790 8.65 (6.45)	835 9.45 (7.05)	880 10.30 (7.68)	920 11.10 (8.28)	- - - -	- - - -	- - - -	- - - -	- - - -
15,000 (7080)	***590 5.90 (4.40)***	***650 6.80 (5.07)***	705 7.65 (5.710	755 8.50 (6.340	800 9.30 (6.94)	845 10.10 (7.53)	890 11.00 (8.21)	- - - -	- - - -	- - - -	- - - -	- - - -	- - - -

BLOWER DATA ALL MODELS
FACTORY INSTALLED DRIVE KIT SPECIFICATIONS

FACTORY INSTALLED BELT DRIVE KIT SPECIFICATIONS

Motor Outputs				RPM Range				
Nominal hp	Maximum hp	Nominal kW	Maximum kW	Drive 1	Drive 2	Drive 3	Drive 4	Drive 5
Standard or High Efficiency - 5	5.75	3.7	4.3	660-810	770-965	- - - -	- - - -	- - - -
Standard or High Efficiency - 7.5	8.6	5.6	6.4	- - - -	- - - -	715-880	770-965	- - - -
Standard or High Efficiency - 10	11.5	7.5	8.6	- - - -	- - - -	715-880	- - - -	850-1045

*Using total air volume and system static pressure requirements determine from blower performance tables rpm and motor output required. Maximum usable output of motors furnished by Lennox are shown. In Canada, nominal motor output is also maximum usable motor output. If motors of comparable output are used, be sure to keep within the service factor limitations outlined on the motor nameplate.

FACTORY INSTALLED OPTIONS/FIELD INSTALLED ACCESSORY AIR RESISTANCE

FACTORY INSTALLED OPTIONS/FIELD INSTALLED ACCESSORY AIR RESISTANCE								
Air Volume		Total Resistance — inches water gauge (Pa)						
		Wet Indoor Coil		Gas Heat Exchanger (LGA Models)		Electric Heat (LCA Models)	Economizer	Horizontal Roof Mounting Frame
cfm	L/s	300H	360H	Standard Heat	High Heat			
7500	3540	.04 (10)	.07 (17)	.15 (37)	.25 (62)	.03 (7)	.02 (5)	.11 (27)
8000	3775	.05 (12)	.08 (20)	.17 (42)	.28 (70)	.03 (7)	.02 (5)	.13 (32)
8500	4010	.05 (12)	.08 (20)	.20 (50)	.31 (77)	.04 (10)	.03 (7)	.15 (37)
9000	4245	.06 (15)	.09 (22)	.22 (55)	.34 (85)	.04 (10)	.04 (10)	.17 (42)
9500	4485	.06 (15)	.10 (25)	.24 (60)	.38 (94)	.05 (12)	.04 (10)	.19 (47)
10,000	4720	.07 (17)	.11 (27)	.27 (67)	.42 9104)	.05 (12)	.05 (12)	.21 (52)
10,500	4955	.07 (17)	.12 (30)	.30 (75)	.46 (114)	.06 (15)	.06 (15)	.24 (60)
11,000	5190	.08 (20)	.12 (30)	.33 (92)	.50 (137)	.06 (15)	.07 (17)	.27 (67)
11,500	5425	.08 (20)	.13 (32)	.37 (92)	.55 (137)	.07 (17)	.08 (20)	.30 (75)
12,000	5665	.09 (22)	.14 (35)	.40 (99)	.60 (149)	.07 (17)	.10 (25)	.33 (82)
12,500	5900	.09 (22)	.15 (37)	.44 (109)	.65 (162)	.08 (20)	.11 (27)	.37 (92)
13,000	6135	.10 (25)	.16 (40)	.48 (119)	.70 (174)	.08 (20)	.13 (32)	.40 (99)
13,500	6370	.11 (27)	.17 (42)	.53 (132)	.76 (189)	.09 (22)	.14 (35)	.44 (109)
14,000	6605	.11 (27)	.18 (45)	.57 (142)	.82 (204)	.10 (25)	.16 (40)	.49 (122)
14,500	6845	.12 (30)	.19 (47)	.62 (154)	.89 (221)	.10 (25)	.18 (45)	.53 (132)
15,000	7080	.13 (32)	.20 (50)	.68 (169)	.95 (236)	.11 (27)	.21 (52)	.58 (144)

BLOWER DATA ALL MODELS

CEILING DIFFUSER AIR RESISTANCE						
Unit Size	Air Volume		Total Resistance — inches water gauge (Pa)			
			LARTD30/36 Step-Down Diffuser			LAFD30/36 Flush Diffuser
	cfm	L/s	2 Ends Open	1 Side/2 Ends Open	All Ends & Sides Open	
300H & 360 Models	7500	3540	.37(92)	.31 (77)	.25(62)	.29 (72)
	8000	3775	.42 (104	.36 (90)	.29 (72)	.34 (85)
	8500	4010	.48 (119)	.41 (102)	.34 (85)	.39 (97)
	9000	4245	.55 (137)	.47 (117)	.39 (97)	.44 (109)
	9500	4485	.62 (154)	.53 (132)	.45 (112)	.51 (127)
	10,000	4720	.70 (1740	.60 (149)	.51 (127)	.57 (142)
	10,500	4955	.78 (194)	.68 (169)	.58 (144)	.65 (162)
	11,000	5190	.87 (216)	.76 (190)	.65 (162)	.72 (179)
	11,500	5425	.97 (241)	.85 (211)	.73 (182)	.81 (201)
	12,000	5665	1.08 (269)	.94 (234)	.82 (204)	.90 (223)
	12,500	5900	1.19 (296)	1.04 (259)	.91 (226)	.99 (246)
	13,000	6135	1.30 (323)	1.15 (286)	1.00 (249)	1.10 (274)
	13,500	6370	1.43 (356)	1.26 (313)	1.10 (374)	1.20 (298)
	14,000	6605	1.56 (388)	1.38 (343)	1.20 (298)	1.31 (326)
	14,500	6845	1.69 (420)	1.50 (373)	1.31 (326)	1.43 (356)
	15,000	7080	1.84 (457)	1.63 (405)	1.43 (356)	1.56 (388)

CEILING DIFFUSER AIR THROW DATA						
Model No.	Air Volume		[1] Effective Throw Range			
			LARTD30/36 Step-Down		LAFD30/36 Flush	
	cfm	L/s	ft.	m	ft.	m
300H Models 360 Models	9000	4245	40 - 47	12 - 14	29 - 35	8 - 11
	9500	4485	43 - 50	13 - 15	33 - 41	10 - 12
	10,000	4720	46 - 54	14 - 16	37 - 46	11 - 14
	10,500	4955	50 - 58	15 - 18	42 - 51	13 - 15
	11,000	4190	53 - 61	16 - 19	46 - 56	14 - 17
	11,500	5425	55 - 64	17 - 20	50 - 61	15 - 19
	12,000	5665	58 - 67	18 - 20	54 - 66	16 - 20
	12,500	5900	61 - 71	19 - 22	58 - 71	18 - 22
	13,000	6135	64 - 74	20 - 23	62 - 75	19 - 23
	13,500	6370	67 - 77	20 - 23	66 - 79	20 - 24

[1] Throw is the horizontal or vertical distance an airstream travels on leaving the outlet or diffuser before the maximum velocity is reduced to 50 ft. (15 m) per minute. Four sides open.

POWER EXHAUST FANS PERFORMANCE			
Return Air System Static Pressure		Air Volume Exhausted	
in. w.g.	Pa	cfm	L/s
0	0	12,800	6040
0.05	12	12,200	5760
0.10	25	11,500	5430
0.15	37	10,800	5100
0.20	50	9900	4670
0.25	62	9000	4250
0.30	75	7900	3730
0.35	87	6750	3190
0.40	100	5450	2570
0.45	112	4150	1960
0.50	125	2900	1370

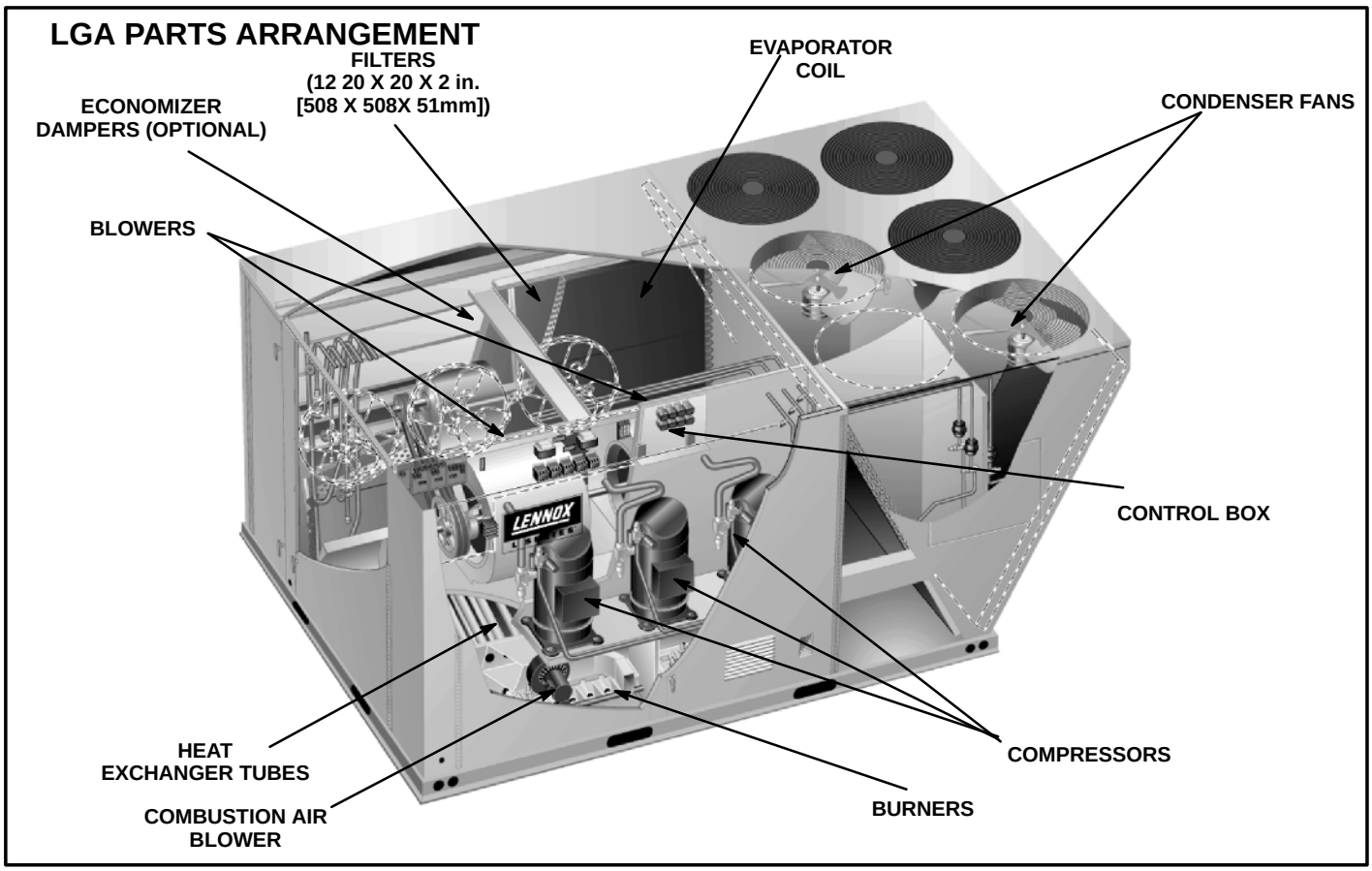


FIGURE 1

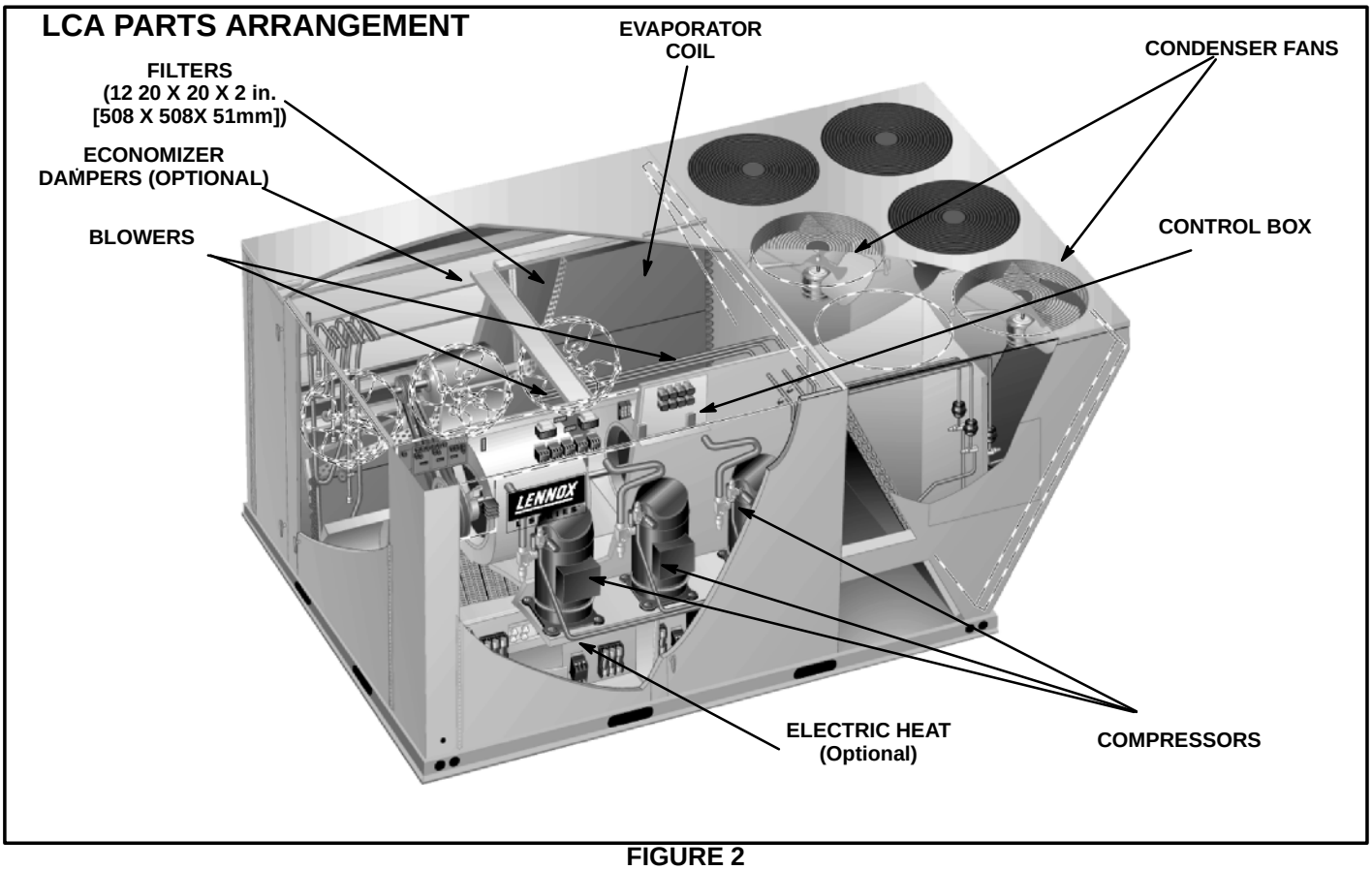


FIGURE 2

LGA/LCA CONTROL BOX

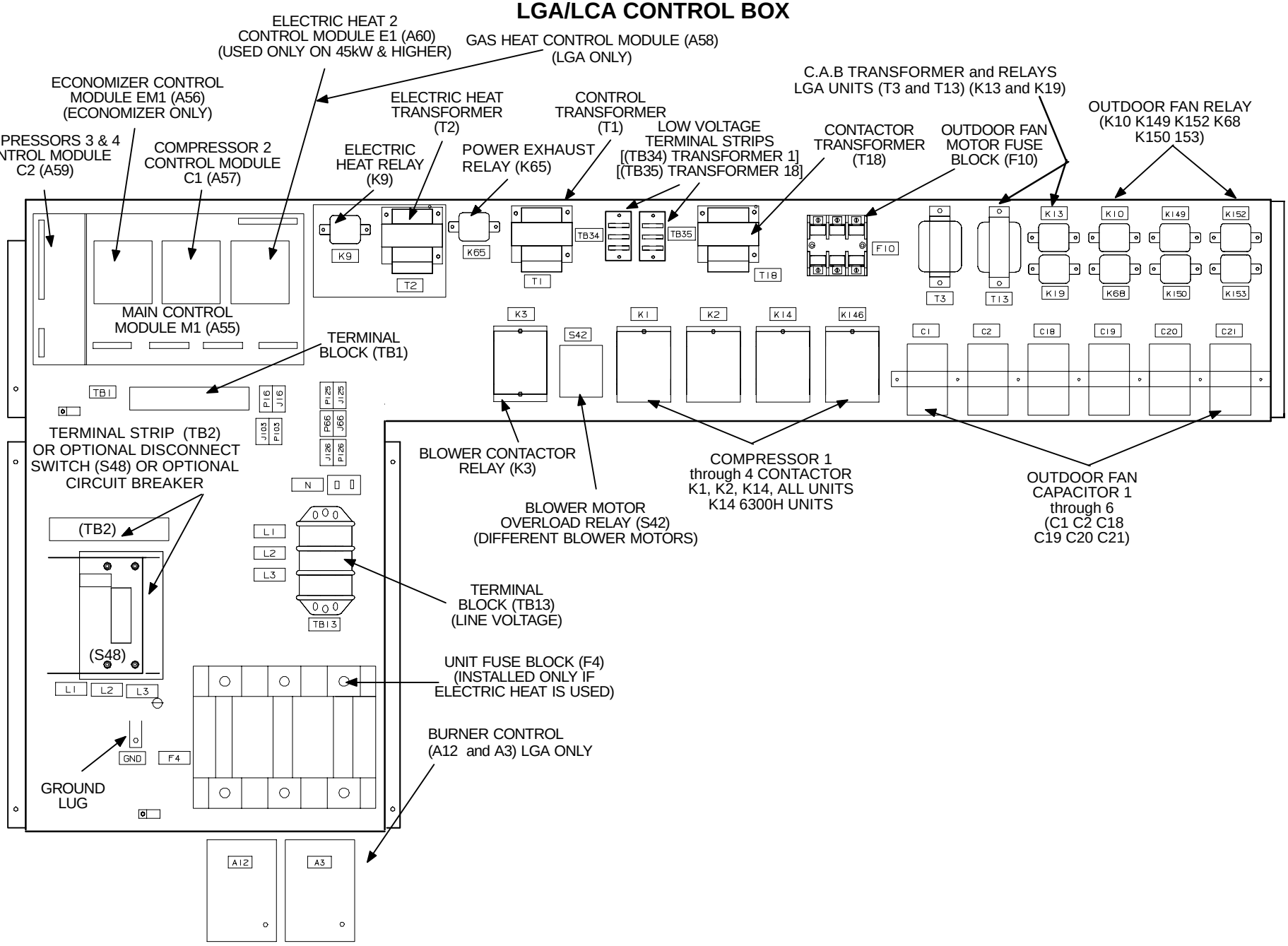


FIGURE 3

I-UNIT COMPONENTS

ELECTROSTATIC DISCHARGE (ESD)
Precautions and Procedures

⚠ CAUTION

Electrostatic discharge can affect electronic components. Take precautions during furnace installation and service to protect the furnace's electronic controls. Precautions will help to avoid control exposure to electrostatic discharge by putting the furnace, the control and the technician at the same electrostatic potential. Neutralize electrostatic charge by touching hand and all tools on an unpainted unit surface, such as the gas valve or blower deck, before performing any service procedure.

LGA / LCA 25 and 30 ton (88 and 105 kW) units are configure to order units (CTO). The LGA and LCA unit components are shown in figures 1 and 2. All units come standard with hinged unit panels. The unit panels may be held open with the door rod located inside the unit. All L1, L2, and L3 wiring is color coded; L1 is red, L2 is yellow, and L3 is blue.

A-Control Box Components

LGA/LCA control box components are shown in figure 3, The control box is located in the upper left portion of the compressor compartment.

1-Disconnect Switch S48 (Optional all units)

All LGA/LCA units may be equipped with an optional disconnect switch S48. Other factory or field installed optional circuit breakers may be used, such as CB10. S48 and CB10 are toggle switches, which can be used by the service technician to disconnect power to the unit.

2-Control Transformer T1 (all units)

All LGA/LCA/LHA series units use a single line voltage to 24VAC transformer mounted in the control box. Transformer supplies power to control circuits in the unit. The transformer is rated at 70VA and is protected by a 3.5 amp circuit breaker (CB8). The 208/230 (Y) voltage transformers use two primary voltage taps as shown in figure 4, while 460 (G) and 575 (J) voltage transformers use a single primary voltage tap. Units will be factory wired for 230V (orange and black). 208V (red and black) applications should be rewired in the field.

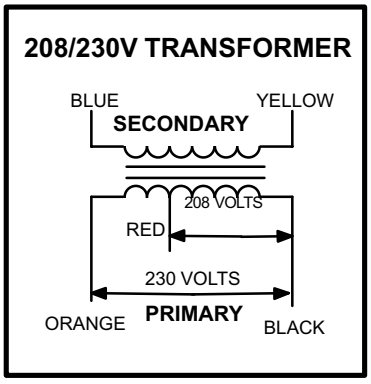


FIGURE 4

3-Contactor Transformer T18 (LGA / LCA units)

T18 is a single line voltage to 24VAC transformer used in all LGA/LCA series units. Transformer T18 is protected by a 3.5 amp circuit breaker (CB18). T18 is identical to transformer T1. The transformer supplies 24VAC power to the contactors.

4-C. A. B. Transformers T3 & T13 (LGA 460V & 575V units)

All LGA 460 (G) and 575 (J) voltage units use two auto voltage to 230VAC transformers mounted in the control box. The transformers have an output rating of 0.5A. T3 transformer supplies 230 VAC power to combustion air blower motor (B6), while T13 transformer supplies power to combustion air blower motor (B15).

5-Terminal Strips TB1, TB2, TB13, TB34, TB35

TB1 terminal strip distributes 24V power and common from the thermostat to the control box components. TB13 terminal strip distributes line voltage power to the line voltage items in the unit. TB34 terminal strip distributes 24V power from T1 to the control box components. TB35 terminal strip distributes 24V power from T18 to the contactors in the control box. TB2 distributes line voltage to the unit and is found more commonly on LCA units equipped with electric heat. TB2 can be replace with Disconnect switch S48. All L1, L2, and L3 wiring is color coded; L1 is red, L2 is yellow, and L3 is blue.

6-Outdoor Fan Motor Fuse Block & Fuses F10 (all units)

Three line voltage fuses F10 provide overcurrent protection to all condenser fans (and optional power exhaust fans) in all LGA / LCA units. The fuses are rated at 30A in 208/230V units and 15A in all others.

7-Unit Fuse Block & Fuses F4 (LCA units only)

Three line voltage fuses F4 provide short circuit and ground fault protection to all cooling components in the LCA units. The fuses are rated in accordance with the amperage of the cooling components.

8–Outdoor Fan Capacitors C1, C2, C18, C19,C20, C21 (all units)

Fan capacitors C1, C2, C18, C19, C20 and C21 are 370V / 10 MFD capacitors used to assist in the start up of condenser fans B4, B5, B21, B22, B23 and B24. respectively.

9-Compressor Contactor K1, K2 & K14 (all units), K146 (LGA/LCA300H units)

All compressor contactors are three pole double break contactors with a 24VAC coil. In all LGA/LCA360H units K1 (energized by A55), K2 (energized by A57), and K14 (energized by A59) energize compressors B1, B2, and B13 respectively in response to first or second stage cooling demands. In all LGA/LCA300H units K1 (energized by A55), K2 (energized by A57), K14 and K146 (energized by A59) energize compressors B1, B2, B13, and B20 respectively.

10–Blower Contactor K3 (all units)

Blower contactor K3, used in all units, is a three-pole-double-break contactor with a 24VAC coil used to energize the indoor blower motor B3 in response to blower demand. K3 is energized by main control panel (A55).

11-Outdoor Fan Relay K10, K68, K149, K150, K152, K153 (all units)

Outdoor fan relays K10, K68, K149, K150, K152 and K153 used in all units, are DPDT relays with a 24VAC coil. In all LGA/LCA units, K10(energized by A55) K68 (eneregized by A57), K149, K150, K152 and K153 (energized by A59) energize condenser fans B4 (fan 1), B5 (fan 2), B21 (fan 3), B22 (fan 4), B23 (fan 5) and B24 (fan 6) respectively, in response to thermostat demand. On LCA300H units condenser fans B4, B5 and B21 energize on first stage cool demand (Y1). Condensr fans B22, B23 and B24 energize on second stage cool demand (Y2). On LCA360H units condenser fans B4, B5, B21, B22, B23 and B24 energize on first stage cool demand (Y1).

12-Combustion Air Blower Relay K13 (LGA units - first burner section)

Combustion air blower relay K13, used in all LGA units, is a DPDT relay with a 24VAC coil. K13 is energized by the main control module A55 after a first stage heating demand from the thermostat. K13 remains energized throughout the heating demand. When energized, K13 N.O. contacts close to energize combustion air blower and begin a heating sequence. Pressure switch S18, located in the compressor compartment, closes as combustion air static pressure falls to “prove” combustion air blower operation. When S18 closes, the ignition controls and gas valves are energized to begin a heating sequence.

13-Combustion Air Blower Relay K19 (LGA units - second burner section)

Combustion air blower relay K19, used in all LGA units, is a DPDT relay with a 24 VAC coil. K19 is energized by the gas valve control module A58 after a first stage heating demand from the thermostat. K19 remains energized throughout the first stage heating demand. When energized, K19 N.O. contacts close to energize the second heat section combustion air blower and begin second section heating sequence. Pressure switch S45, located in the compressor compartment, closes as combustion air static pressure falls to “prove” combustion air blower operation. When S45 closes, the second section of the ignition control and gas valve are energized to begin the second section heating sequence.

14-Burner Controls A3 & A12 (LGA units)

All LGA units have two burner controls. A3 controls gas heat section one, while A12 controls gas heat section two. The first gas heat section and the second gas heat section burner controls are identical. Both burner controls are factory set and are not adjustable. The control makes three attempts at ignition and then locks out the system if ignition is not obtained after the third trial. Reset after lockout requires only breaking and remaking thermostat demand. The control shuts off gas flow immediately in the event of a gas or power failure. Upon restoration of gas and power, the control will restart the ignition sequence and continue until flame is established or system locks out. For a more detailed description see the Gas Heat Components section.

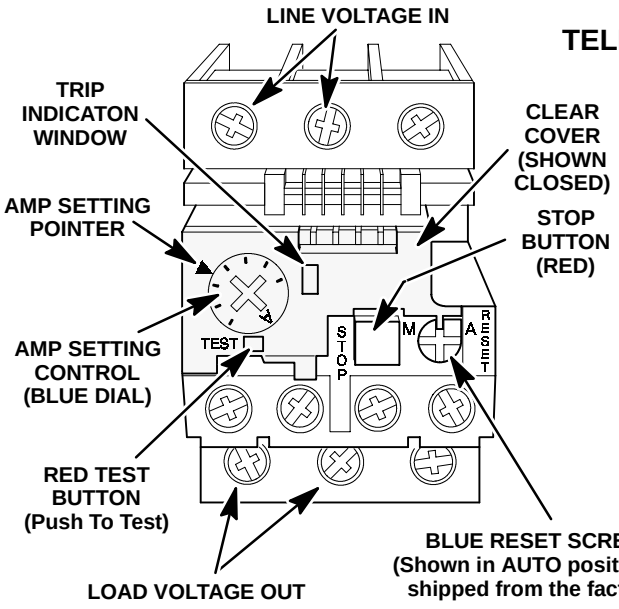
15–Power Exhaust Relay K65 (PED units)

Power exhaust relay K65 is a N.O. DPDT relay with a 24VAC coil. K65 is used in all LGA/LCA units equipped with the optional power exhaust dampers. K65 is energized by the economizer control panel (A56), after the economizer dampers reach 50% open (adjustable in ECTO). When K65 closes, the exhaust fans B10, B11 and B12 are energized.

16–Blower Motor Overload Relay S42 (units with high efficiency motors & standard efficiency motors of 7.5 HP and above)

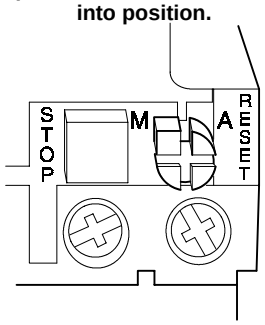
The blower motor overload relay is used in all L series units equipped with high efficiency motors, as well as units with standard efficiency motors 7.5 HP and higher. The relay (S42) is connected in line with the blower motor to monitor the current flow to the motor. When the relay senses an overload condition, a set of normally closed contacts open to de-energize pin #9 in plug 110 of the A55 main control module. A55 de-energizes all outputs. Early model units have been equipped with a control manufactured by Telemecanique which is detailed in figure 5. Units built after November 21, 1997, are equipped with a relay manufactured by Siemens which is detailed in figure 6. 7.5 HP motors used in units built after late 1998, will have an internal overload relay.

TELEMECANIQUE OVERLOAD RELAY



DETAIL SHOWING RESET BUTTON ADJUSTED TO MANUAL POSITION

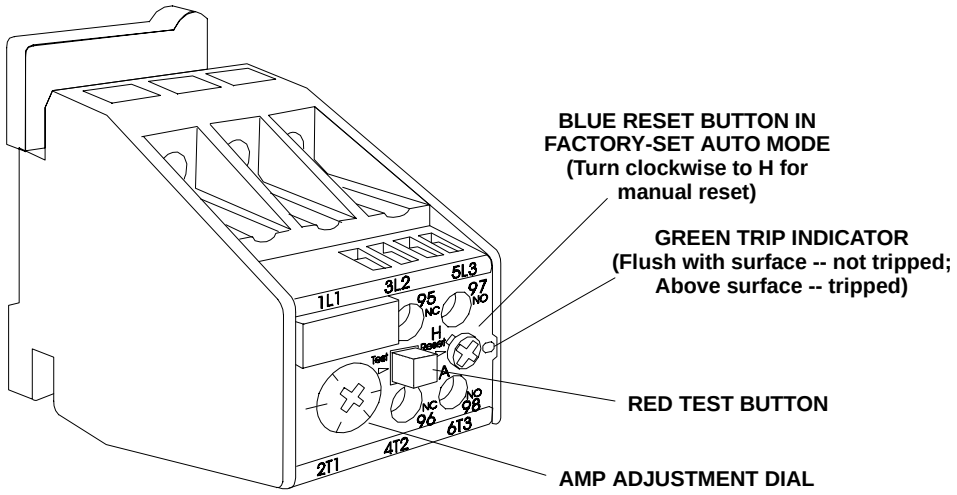
Lift clear cover and turn adjustment screw counterclockwise. Reset screw will pop out when pointer is in M (manual position). Close cover to lock reset screw into position.



Lift clear cover to adjust relay amp setting according to value given on the blower motor nameplate. Proper relay amp setting equals motor nameplate FLA X service factor of 1.15 X .95.
Cover must also be lifted to adjust control mode from automatic reset to manual reset (see detail above) and to test the control.
Control must be in the manual reset mode to perform a test. Use a pointed object to press the small red test button. A yellow marker should appear in the trip indication window to the right of the amp setting control. Press the blue reset screw to reset the relay.
The red STOP button opens the normally closed contacts which power the blower motor. This button stops blower motor operation as long as it is pressed in.

FIGURE 5

SIEMENS OVERLOAD RELAY



Adjust relay amp setting according to value given on the blower motor nameplate. Proper relay amp setting equals motor nameplate FLA X service factor of 1.15 X .95.
Use small slotted screwdriver to adjust control mode from automatic reset (A) to manual reset (H).
Control must be in the manual reset mode (H) to perform a test. Press the red test button. Green trip indicator should pop out. Press the blue reset screw to reset the relay.

FIGURE 6

ELECTRIC HEAT CONTROL SECTION (45 - 120 kW electric heat only)

17-Electric Heat Relay K9

All LCA/LHA series units with 45 - 120 kW electric heat use an electric heat relay K9. K9 is a N.O. SPST pilot relay intended to electrically isolate the unit's 24V circuit from the electric heat 24V circuit. K9 is energized by the main control board A55. K9-1 closes, enabling T2 to energize the electric heat control panel A60 and contactors K17 and K18.

18-Electric Heat Transformer T2

All LCA series units with 45 - 120 kW electric heat use a single line voltage to 24VAC transformer mounted in the electric heat control hat section in the control box. The transformer supplies power to all electric heat controls (contactors and coils). The transformer is rated at 70VA and is protected by a 3.5 amp circuit breaker CB13. The 208/230 (Y) voltage transformers use two primary voltage taps as shown in figure 4. Transformer T2 is identical to T1.

INTEGRATED MODULAR CONTROL BOARDS

The Integrated Modular Control (IMC) is a series of control boards which integrates most control functions required for the LGA/LCA units. The control boards are located in the upper left hand corner of the control box. The control includes complete unit diagnostics with permanent code storage, field programmable control parameters and control options, on-site testing, and serial communications. Seven different printed circuit boards (see figure 7) make-up the modular configurations for the LGA/LCA units. See table 1 for a list of control panels used for each unit. See figure 7 for control location. For further information refer to Integrated Modular Control Guide sent with each unit.

TABLE 1

UNIT	CONTROL PANELS						
	A55	A57	A59	A58	A60	A61	A56
LGA	X	X	X	X			OPT
LCA	X	X	X		X		OPT

19-Main Control Module A55 (all units)

The main control module A55 is the heart of the system. It controls one compressor, one two-stage gas valve (first stage), one bank of electric heat, one outdoor fan, and one blower. A55 includes the thermostat inputs, serial communications ports, diagnostic code display, control pushbutton, system configuration dip switches, and four expansion ports. A diagnostic code list is located on the back side of the left access panel.

20-Compressor 2 Control Module A57 (all units)

The compressor 2 control module A57 controls one additional compressor stage for the LGA/LCA units. A57 includes all inputs and outputs required for compressor and fan control, compressor stages diagnostics, and low ambient control.

21-Compressor 3 & 4 Control Module A59 (all units)

The compressor 3 & 4 control module A59 controls two additional compressor stages for the LGA/LCA units. A59 includes all inputs and outputs required for compressor and fan control, compressor stage diagnostics, and low ambient control.

22-Gas Valve Control Module A58 (LGA units)

The gas valve control module A58 controls an additional burner with a two-stage gas valve. A58 includes all inputs and outputs required for control and diagnostics of one two-stage gas valve burner (second stage).

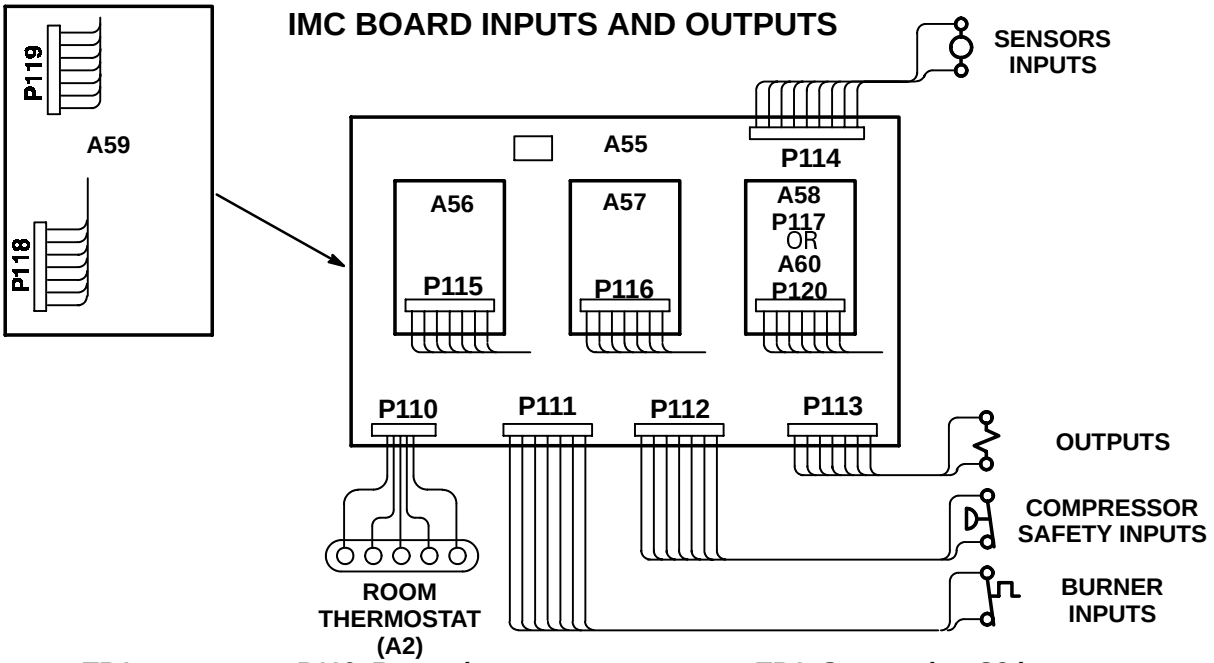
23-Electric Heat Control Module A60 (LCA units if 45 - 120 kW electric heat is used)

The electric heat control module A60 is used to control a second electric heat bank. A60 is used on the LCA units.

24-Economizer Control Module A56 (Economizer only)

The economizer control module A56 controls the economizer. A56 has four different cooling modes, sensible temperature, outdoor enthalpy, differential enthalpy, and global control.

IMC BOARD INPUTS AND OUTPUTS



TB1 connects to P110. Room thermostat connects to TB1. See section C2 in the wiring diagram section P.65

IMC AND ADD-ON BOARD LOCATION AND OPERATION

A59 (LCA / LGA): Compressors 3 and 4 and Outdoor Fans (4)

A55: 1 Blower, 1 Compressor, 1 Outdoor fan; 1 Gas valve, 1 Reversing valve, 1 Electric heat section

A56: Optional Economizer and/or Power Exhaust Fan

A57 (LCA / LGA): Second compressor, 1 Outdoor fan

A58: Second Gas Valve
or
A60: Second Electric Heat Section

FIGURE 7

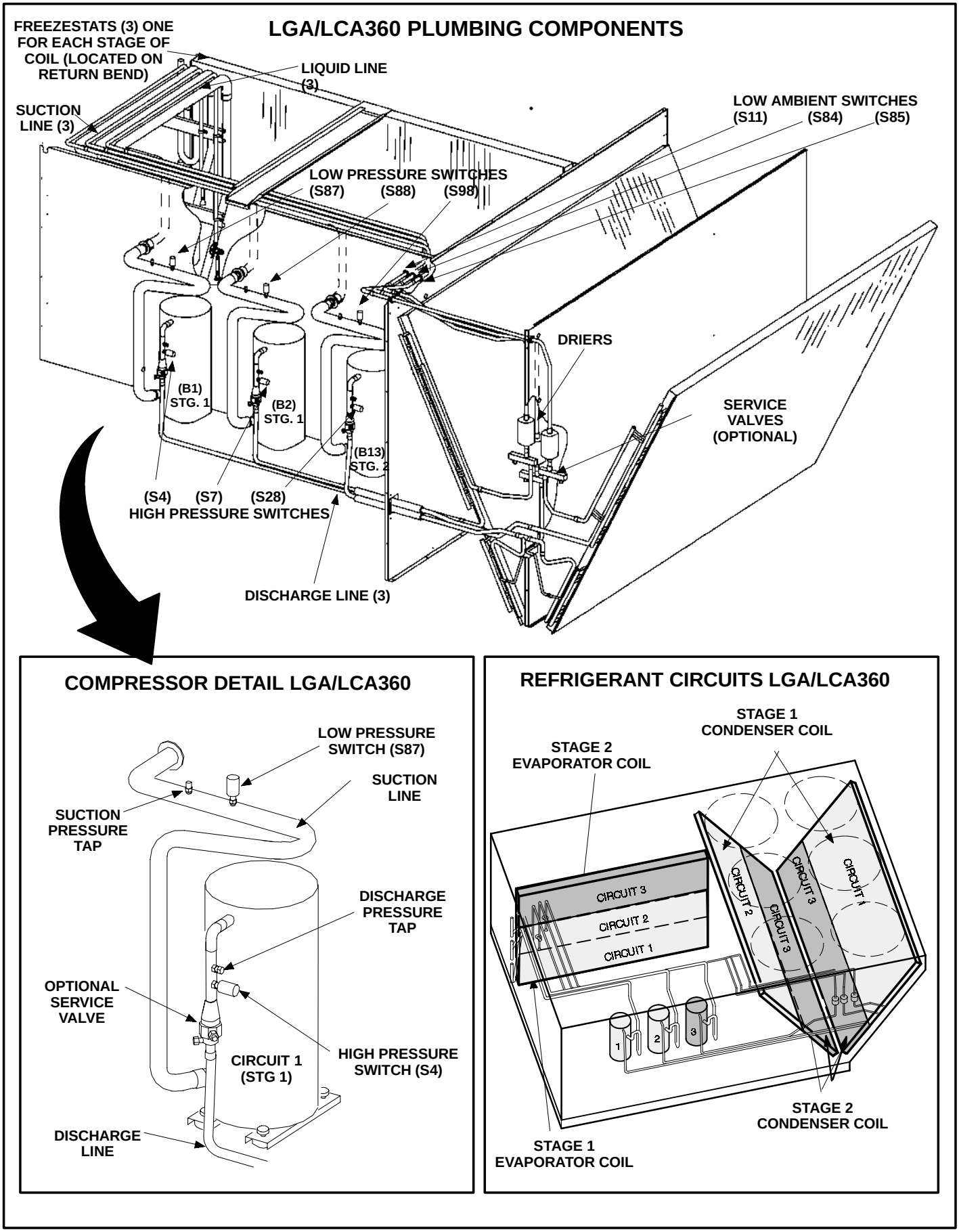
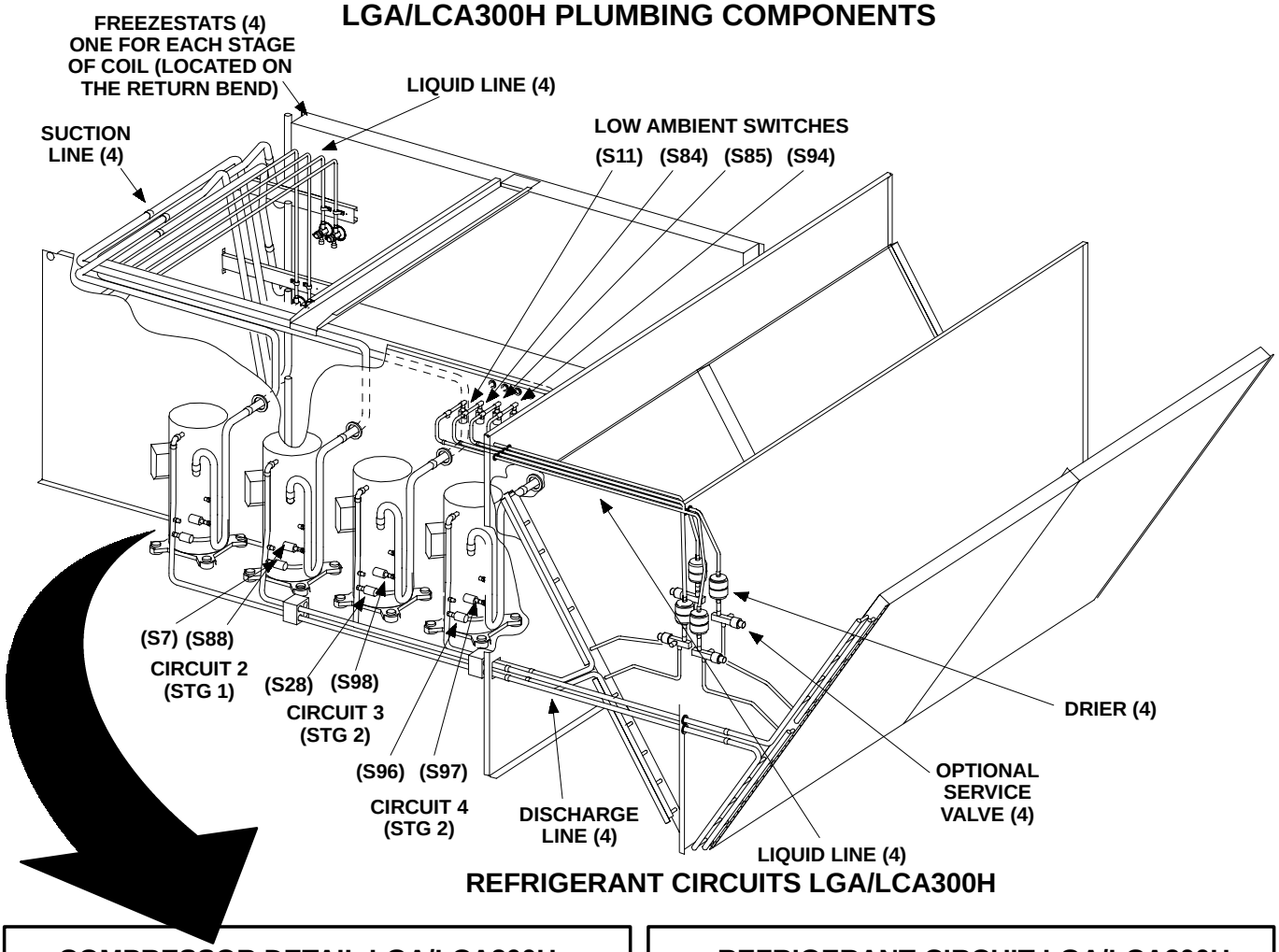

LGA/LCA360 PLUMBING COMPONENTS
FREEZESTATS (3) ONE FOR EACH STAGE OF COIL (LOCATED ON RETURN BEND)
LIQUID LINE (3)
SUCTION LINE (3)
LOW AMBIENT SWITCHES (S11) (S84) (S85)
LOW PRESSURE SWITCHES (S87) (S88) (S98)
DRIERS
(B1) STG. 1
(B2) STG. 1
(B13) STG. 2
SERVICE VALVES (OPTIONAL)
(S4) (S7) (S28) HIGH PRESSURE SWITCHES
DISCHARGE LINE (3)
COMPRESSOR DETAIL LGA/LCA360
LOW PRESSURE SWITCH (S87)
SUCTION LINE
SUCTION PRESSURE TAP
DISCHARGE PRESSURE TAP
OPTIONAL SERVICE VALVE
CIRCUIT 1 (STG 1)
HIGH PRESSURE SWITCH (S4)
DISCHARGE LINE
REFRIGERANT CIRCUITS LGA/LCA360
STAGE 1 CONDENSER COIL
STAGE 2 EVAPORATOR COIL
CIRCUIT 3
CIRCUIT 2
CIRCUIT 1
CIRCUIT 2
CIRCUIT 3
CIRCUIT 1
1
2
3
STAGE 2 CONDENSER COIL
STAGE 1 EVAPORATOR COIL

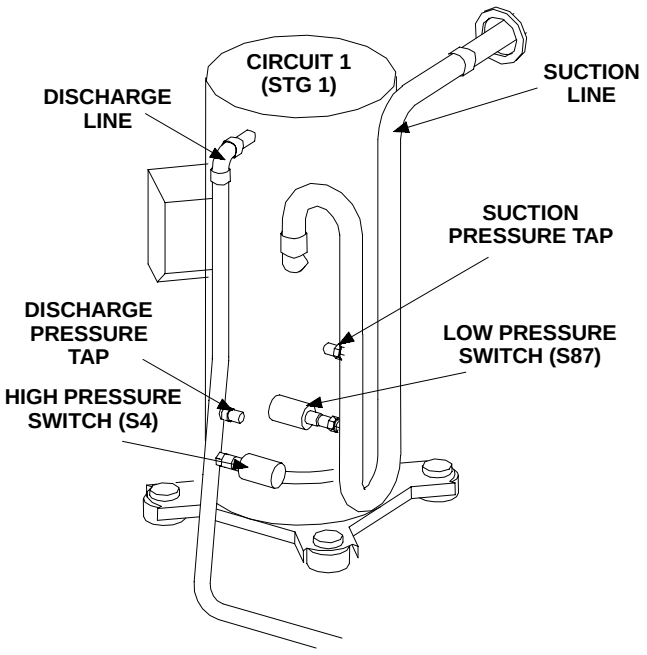
FIGURE 8

LGA/LCA300H PLUMBING COMPONENTS



REFRIGERANT CIRCUITS LGA/LCA300H

COMPRESSOR DETAIL LGA/LCA300H



REFRIGERANT CIRCUIT LGA/LCA300H

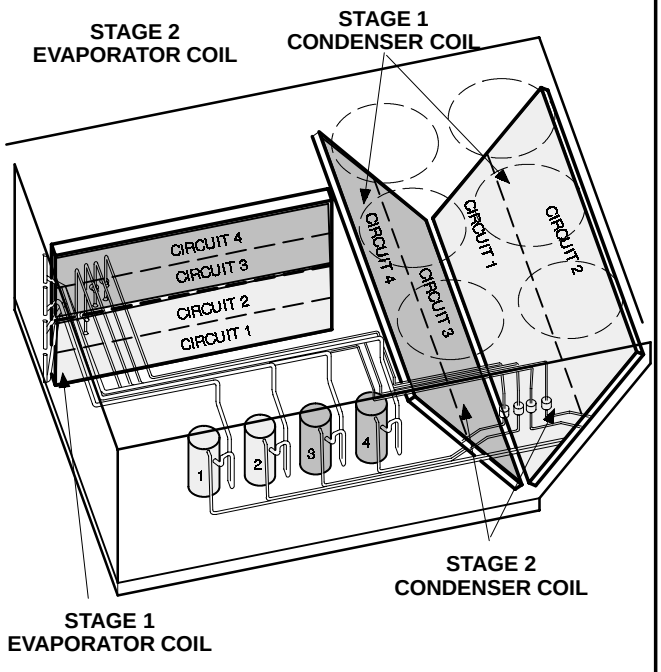


FIGURE 9

B-Cooling Components

LGA/LCA units use independent cooling circuits consisting of separate compressors, condenser coils and evaporator coils. See figures 8 and 9. Six draw-through type condenser fans are used in all units. All units are equipped with belt-drive blowers which draw air across the evaporator during unit operation.

Cooling may be supplemented by a factory- or field-installed economizer. The evaporators are slab type and are stacked. Each evaporator uses a thermostatic expansion valve as the primary expansion device. Each evaporator is also equipped with enhanced fins and rifled tubing. In all units each compressor is protected by a crankcase heater, high pressure switch and low pressure switch. Additional protection is provided by low ambient switches and freezestats (on each evaporator).

1-Compressors B1, B2 and B13 (all units) B20 (LGA/LCA300H units)

All LGA/LCA high efficiency units use scroll compressors. All LGA/LCA 30 ton (105 kW) units use three nine ton (31.6 kW) compressors and 25 ton (88 kW) units use four six ton (21 kW) compressors. All units are equipped with independent cooling circuits. Compressor capacity may vary from stage to stage. In all cases, the capacity of each compressor is added to reach the total capacity of the unit. LGA/LCA360H-1 model units are equipped with Copeland Specter scroll compressors, with rotalock fittings and external overloads. LGA/LCA360H-2 units use Copeland Summit scroll compressors, with sweat fittings and internal overloads. Compressor electrical specifications can be found in the SPECIFICATIONS section in this manual.

⚠ WARNING

Electrical shock hazard. Compressor must be grounded. Do not operate without protective cover over terminals. Disconnect power before removing protective cover. Discharge capacitors before servicing unit. Failure to follow these precautions could cause electrical shock resulting in injury or death.

Each compressor is energized by a corresponding compressor contactor.

NOTE-Refer to the wiring diagram section for specific unit operation.

2-Crankcase Heaters HR1, HR2 and HR5 (all units) HR11 (LGA/LCA300H)

All LGA/LCA units use belly-band type crankcase heaters. Heater HR1 is installed around compressor B1, heater HR2 compressor B2, HR5 compressor B13, and HR11 compressor B20. Crankcase heater wattage varies by compressor size.

3-High Pressure Switches S4, S7 and S28 (all units) S96 (LGA/LCA300H)

The high pressure switch is an auto-reset SPST N.C. switch which opens on a pressure rise. All LGA/LCA units are equipped with this switch. The switch is located in the compressor discharge line and is wired in series with the compressor contactor coil.

S4 (first circuit), S7 (second circuit), S28 (third circuit), and S96 (fourth circuit) are wired in series with the respective compressor contactor coils.

When discharge pressure rises to 410 ± 10 psig (2827 ± 69 kPa) (indicating a problem in the system) the switch opens and the respective compressor is de-energized (the economizer can continue to operate). When discharge pressure drops to 310 ± 20 psig (2137 ± 138 kPa) the pressure switch will close. Main control A55 has a three-strike counter before locking out the particular compressor circuit. This means the control allows three high pressure trips per one thermostat demand. The control can be reset by breaking and remaking the thermostat demand or manually resetting the control.

4-Low Ambient Switches S11, S84 and S85 (all units) S94 (LGA/LCA 300H)

The low ambient switch is an auto-reset SPST N.O. pressure switch which allows for mechanical cooling operation at low outdoor temperatures. All LGA/LCA units are equipped with this switch. In all models a switch is located in each liquid line prior to the indoor coil section.

In the LGA/LCA360H units S11 (compressor one), S84 (compressor two), and S85 (compressor three) are wired in parallel, wired to the low ambient switch relay K159. In the LGA/LCA 300H units S11 and S84 are in parallel, wired to outdoor fan relay K10, while S85 and S94 (compressor four) are in parallel, wired to third outdoor fan relay K149.

When liquid pressure rises to 275 ±10 psig (1896 ± 69 kPa), the switch closes and the condenser fan is energized. When discharge pressure in one refrigerant circuit drops to 150 ± 10 psig (1034 ± 69 kPa), the switch opens and the condenser fan in that refrigerant circuit is de-energized. This intermittent fan operation results in higher evaporating temperature allowing the system to operate without icing the evaporator coil and losing capacity.

5-Low Pressure Switches S87, S88 and S98 (all units) S97 (LGA/LCA300H)

The low pressure switch is an auto-reset SPST N.O. switch (held N.C. by refrigerant pressure) which opens on a pressure drop. All LGA/LCA units are equipped with this switch. The switch is located in the compressor suction line.

S87 (compressor one), S88 (compressor two), S98 (compressor three), and S97 (compressor four) are wired in series with the main control module A55.

The main control module A55 governs the low pressure switches by shunting the switches during start up until pressure is stabilized. After the shunt period, the control has a three-strike counter, during first thermostat demand, before the compressor is locked out. The control is reset by breaking and remaking the thermostat demand or manually resetting the control.

When suction pressure drops to 25 ± 5 psig (172 ± 34 kPa) (indicating low pressure), the switch opens and the compressor is de-energized. The switch automatically resets when pressure in the suction line rises to 55 ± 5 psig (379 ± 34 kPa), due to many causes such as refrigerant being added.

6-Service Valve (optional on LGA/LCA units)

LGA/LCA units may be equipped with service valves located in the discharge and liquid lines. The service valves are manually operated valves used for service operation.

7-Filter Drier (all units)

LGA/LCA units have a filter drier located in the liquid line of each refrigerant circuit at the exit of each condenser coil. The drier removes contaminants and moisture from the system.

8-Freezestats S49, S50 and S53 (all units) S95(LGA/LCA300H)

Each unit is equipped with a low temperature switch (freezestat) located on the return bend of each evaporator coil. S49 (first circuit), S50 (second circuit), S53 (third circuit), and S95 (fourth circuit) are located on the corresponding evaporator coils.

Each freezestat is wired to the main control module A55. Each freezestat is a SPST N.C. auto-reset switch which opens at 29°F ± 3°F (-1.7°C ± 1.7°C) on a temperature drop and closes at 58°F ± 4°F (14.4°C ± 2.2°C) on a temperature rise. To prevent coil icing, freezestats open during compressor operation to temporarily disable the respective compressor until the coil warms sufficiently to melt any accumulated frost.

If the freezestats are tripping frequently due to coil icing, check the unit charge, airflow and filters before allowing unit back in operation. Make sure to eliminate conditions which might promote evaporator ice buildup.

9-Condenser Fans B4, B5, B21, B22, B23 and B24 (all units)

See Specifications section in this manual for specifications of condenser fans used in LGA/LCA units. All condenser fans used have single-phase motors. All units are equipped with six condenser fans. The complete fan assembly may be removed for servicing and cleaning by removing the fan grill and turning the complete assembly until the motor brackets line up with the notches in the top panel. Lift the fan assembly out of the unit and disconnect the jack plug located on the motor.

C-Blower Compartment

The blower compartment in all LGA/LCA units is located between the evaporator coil and the compressor / control section on the opposite side of the condenser coil. The blower assembly is accessed by disconnecting the blower motor jack plug J98/P98 (and all other plugs) and removing the screws on either side of the sliding base. The base pulls out as shown in figure 10.

1-Blower Wheels (all units)

All 25 through 30 ton (88 through 105 kW) LGA/LCA units have two 18 in. x 15 in. (457 mm x 381 mm) blower wheels. Both wheels are driven by one motor.

2-Indoor Blower Motor B3 (all units)

All LGA/LCA units use three-phase single-speed blower motors. CFM adjustments are made by adjusting the motor pulley (sheave). Motors are equipped with sealed ball bearings. All motor specifications are listed in the SPECIFICATIONS section in this manual. Units may be equipped with motors manufactured by various manufacturers, therefore electrical FLA and LRA specifications will vary. See unit rating plate for information specific to your unit.

OPERATION / ADJUSTMENT

Blower Operation

NOTE-The following is a generalized procedure and does not apply to all thermostat control systems.

1- Blower operation is dependent on the thermostat control system option that has been installed in the LGA/LCA units. Refer to operation sequence of the control system installed for detailed descriptions of blower operation.

2- Generally, blower operation is set at the thermostat fan switch. With the fan switch in “ON” position and the **OCP** input is **“ON”**, the blower operates continuously. With the fan switch in “AUTO” position, the blower cycles with demand.

3- In most cases, the blower and entire unit will be off when the system switch is in the “OFF” position. The only exception is immediately after a heating demand when the blower control keeps the blower on until all heat is extracted from the heat exchanger.

Determining Unit Air Volume

1– The following measurements must be made with a dry indoor coil. Run blower without cooling demand. Air filters must be in place when measurements are taken.

2– With all access panels in place, measure static pressure external to unit (from supply to return).

3– Measure the indoor blower wheel RPM.

4- Use static pressure and RPM readings to determine unit air volume. Refer to blower tables at front of this manual (see table of contents) to determine air volume.

5– The RPM can be adjusted at the motor pulley. Loosen Allen screw and turn adjustable pulley clockwise to increase RPM. Turn counterclockwise to decrease RPM. See figure 10.

Blower Belt Adjustment

Proper pulley alignment and belt tension must be maintained for maximum belt life.

NOTE-Tension new belt after 24-48 hours of operation. This will allow belts to stretch and seat in grooves.

1– Loosen four screws securing blower motor to sliding base. See figure 10.

2– *To increase belt tension –*
Turn belt tension adjusting screw to the left, or counterclockwise, to tighten the belt. This increases the distance between the blower motor and the blower housing.
To loosen belt tension –
Turn the adjusting screw to the right, or clockwise to loosen belt tension.

3– Tighten four screws securing blower motor to sliding base once adjustments have been made.

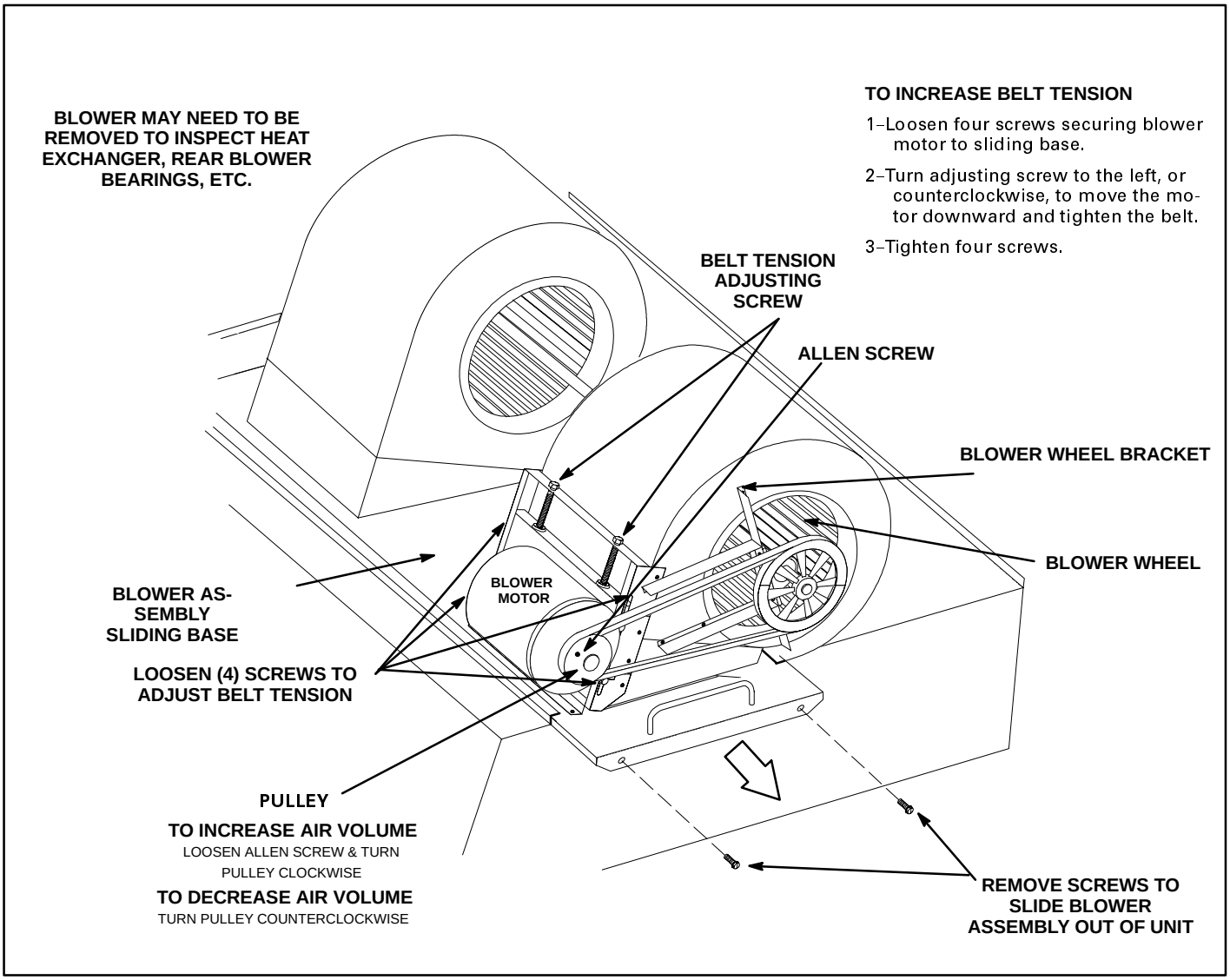


FIGURE 10

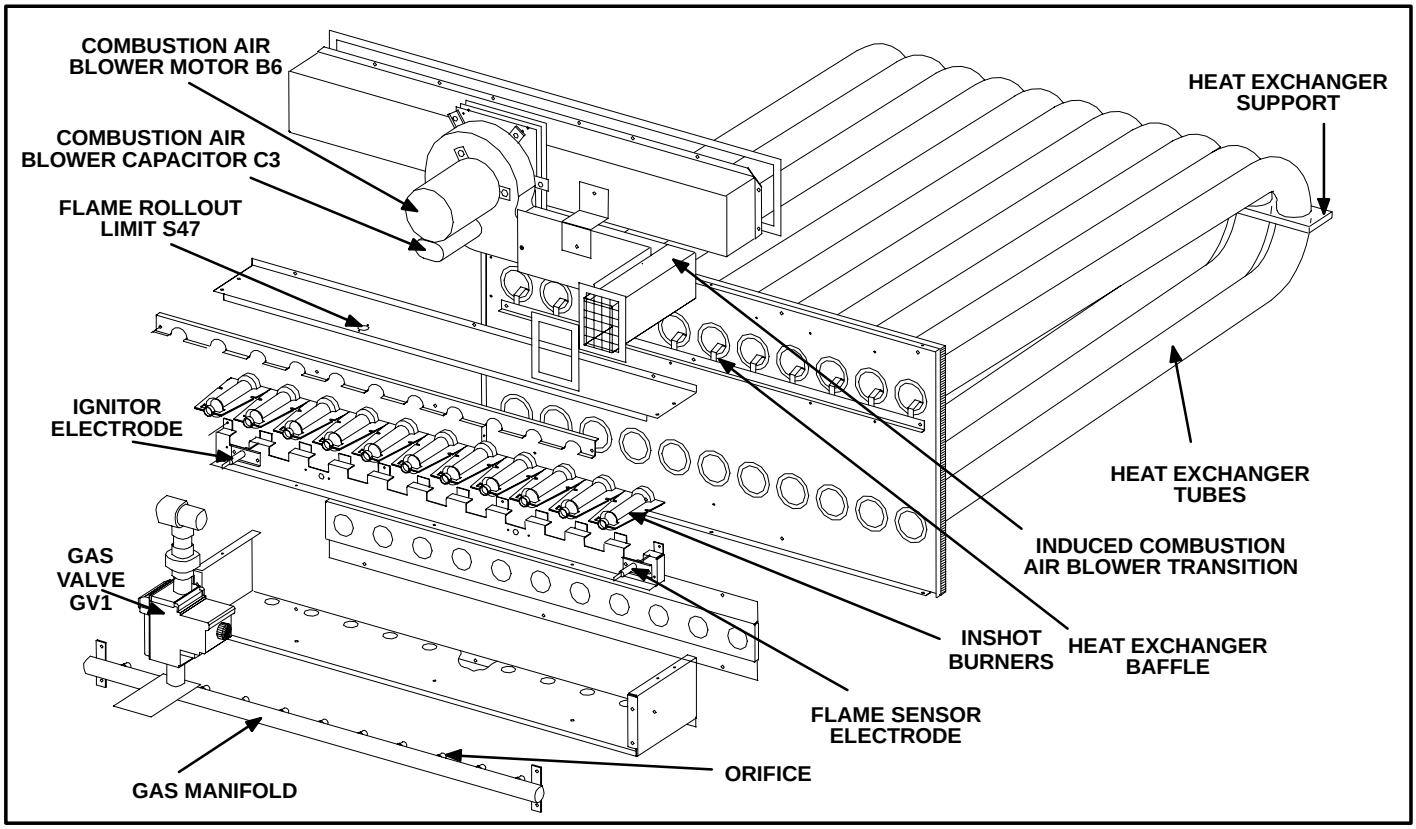


FIGURE 11

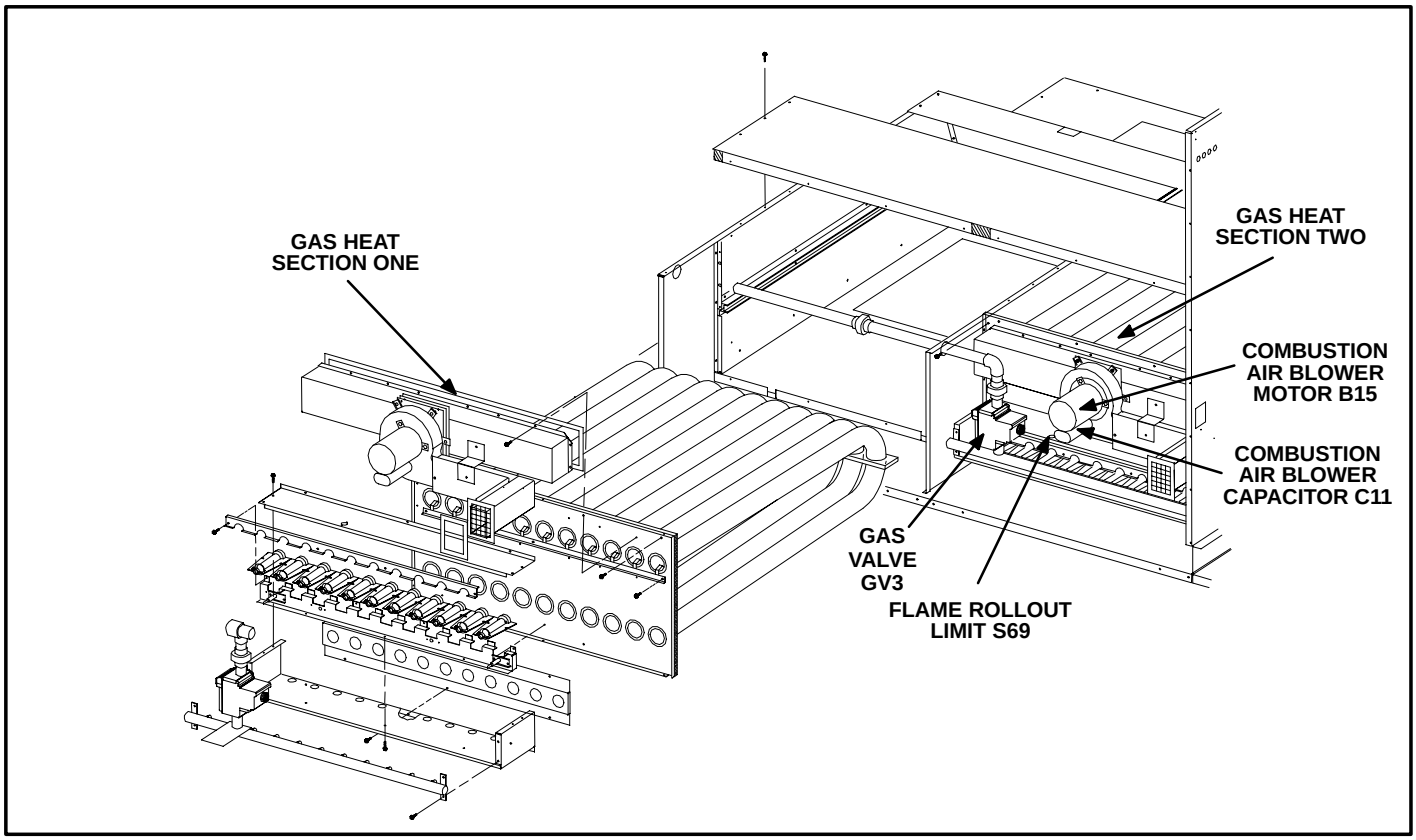


FIGURE 12

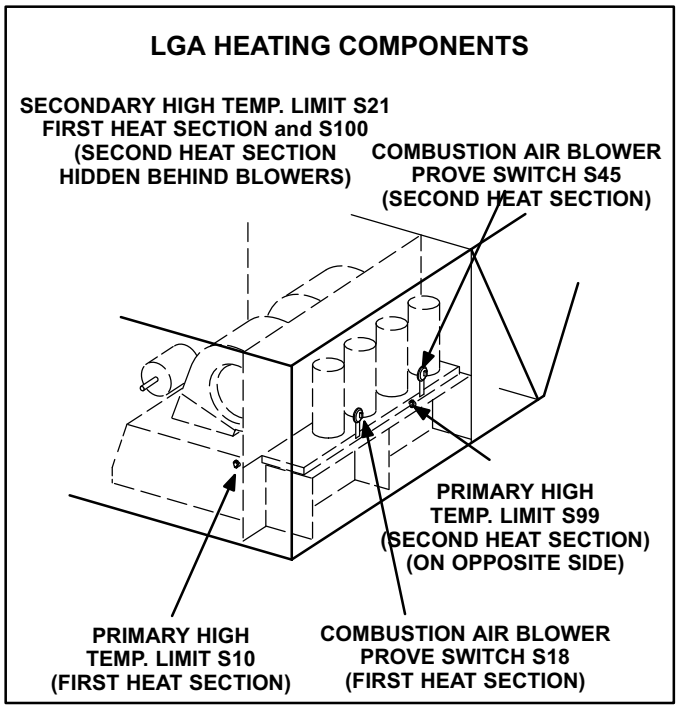


FIGURE 13

D-GAS HEAT COMPONENTS (all LGA units)

LGA300/360 units are available in 260,000 BTUH (76.2 kW) (standard gas heat) or 470,000 BTUH (137.7 kW) (high gas heat) sizes. All units are equipped with two identical gas heat sections (gas heat section one and gas heat section two).

1-Control Box Components A3, A12, A55, A58, T3, T13, K13 and K19

The main control box (see figure 3) houses the burner controls A3 and A12, main control module A55, gas valve (burner) control module A58, combustion air blower transformers T3 and T13, combustion air blower relay K13, and second heat section relay K19. For a description of the components see section I-A. A more detailed description of burner controls A3 and A12 is given below.

Burner Ignition Control A3 and A12

The ignition controls are located in the control box. Three different manufacturers' (Fenwal, Johnson Controls, and RAM) controls are used in the LGA units. All three ignition controls operate the same.

The ignition control provides three main functions: gas valve control, ignition, and flame sensing. The unit will usually ignite on the first attempt; however, the ignition attempt sequence provides three trials for ignition before locking out. The lockout time for the Johnson control is 5 minutes. The lockout time for the Fenwall and RAM control is 1 hour. After lockout, the ignition control automatically resets and provides three more attempts at ignition. Manual reset after lockout requires breaking and remaking power to the ignition control. See figure 15 for a normal ignition sequence and figure 16 for the ignition attempt sequence with retrials (nominal timings given for simplicity). Specific timings for the ignition controls are shown in figure 17.

Flame rectification sensing is used on all LGA units. Loss of flame during a heating cycle is indicated by an absence of flame signal (0 microamps). If this happens, the control will immediately restart the ignition sequence and then lock out if ignition is not gained after the third trial. See table 9 for microamp signal values .

The control shuts off gas flow immediately in the event of a power failure. Upon restoration of gas and power, the control will restart the ignition sequence and continue until flame is established or system locks out.

On a heating demand, the ignition control is energized by the main control module A55. The ignition control then allows 30 to 40 seconds for the combustion air blower to vent exhaust gases from the burners. When the combustion air blower is purging the exhaust gases, the combustion air prove switch is closing proving that the combustion air blower is operating before allowing the ignition control to energize. When the combustion air prove switch is closed and the delay is over, the ignition control activates gas valve, the spark electrode and the flame sensing electrode. Sparking stops immediately after flame is sensed. The combustion air blower continues to operate throughout the heating demand. If the flame fails or if the burners do not ignite, the ignition control will attempt to ignite the burners up to two more times. If ignition cannot be obtained after the third attempt, the control will lock out. The ignition control is not adjustable.

The Johnson control is illustrated in figure 14. The spade connections are used to connect the control to unit. Each of the spade terminals are identified by function. The spark electrode wire connects to the spark-plug-type connector on top of the control.

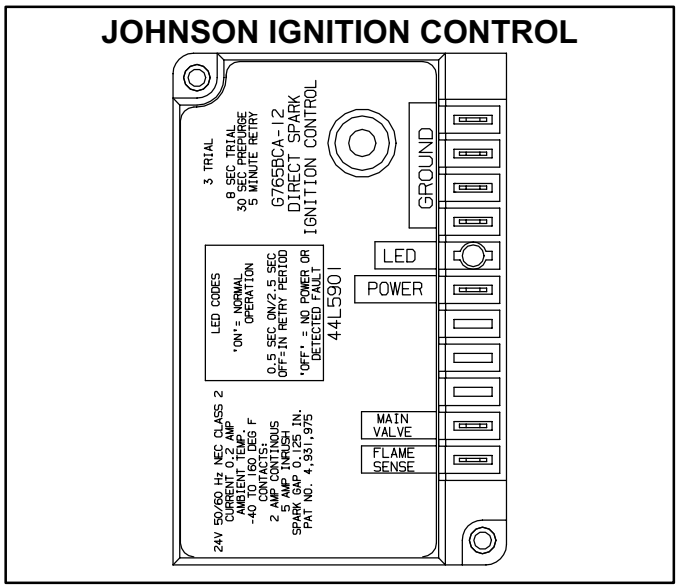


FIGURE 14

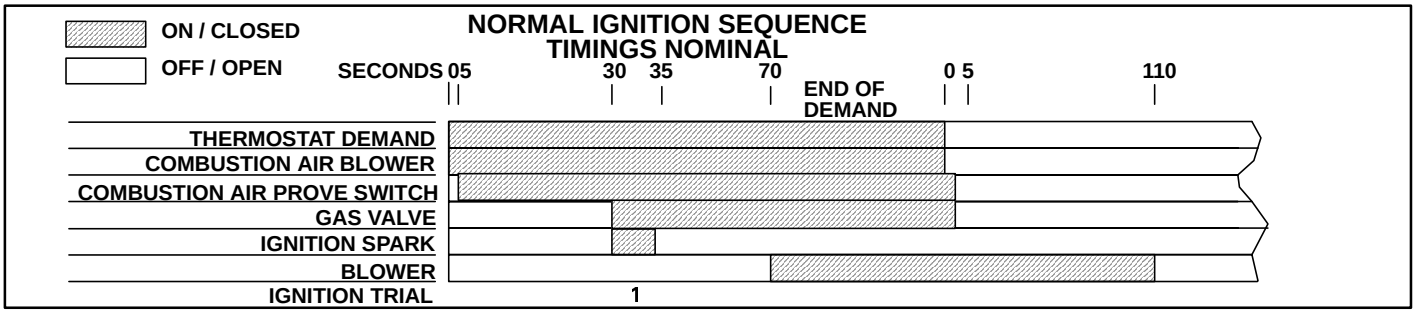


FIGURE 15

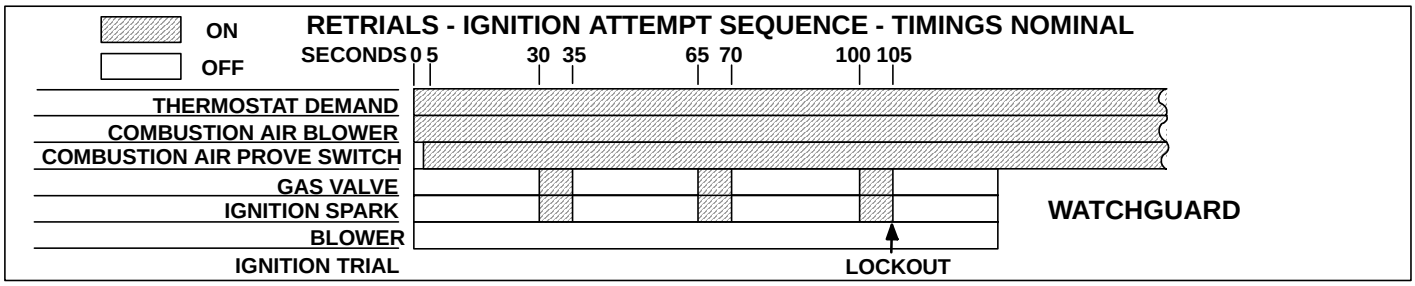


FIGURE 16

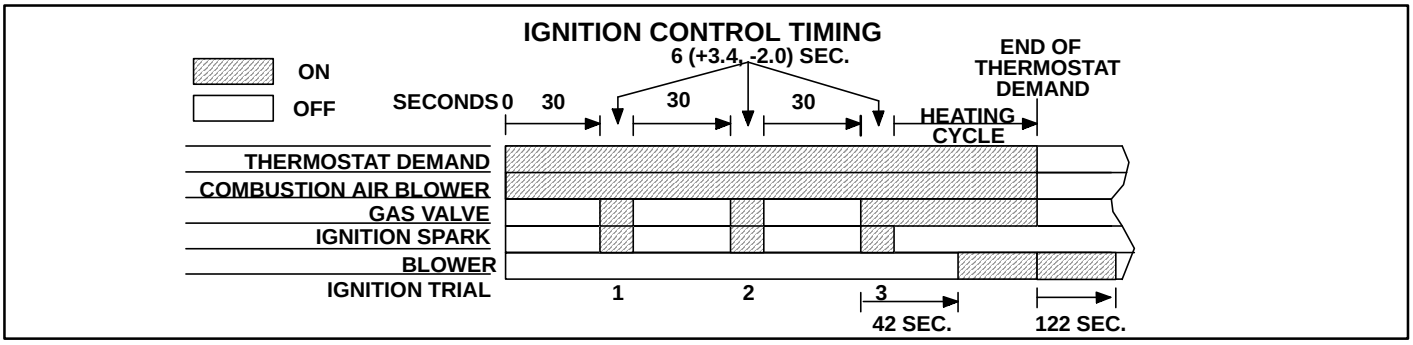


FIGURE 17

⚠ WARNING

SHOCK HAZARD. SPARK RELATED COMPONENTS CONTAIN HIGH VOLTAGE WHICH CAN CAUSE PERSONAL INJURY OR DEATH. DISCONNECT POWER BEFORE SERVICING. CONTROL IS NOT FIELD REPAIRABLE. UNSAFE OPERATION WILL RESULT. IF THE CONTROL IS INOPERABLE, SIMPLY REPLACE THE ENTIRE CONTROL.

2-Heat Exchanger (Figure 11)

The LGA units use aluminized steel inshot burners with matching tubular aluminized steel (stainless steel is an option) heat exchangers and two-stage redundant gas valves. LGA uses two eleven tube/burners for high heat and two six tube/burners for standard heat. Each burner uses a burner venturi to mix gas and air for proper combustion. Combustion takes place at each tube entrance. As hot combustion gases are drawn upward through each tube by the combustion air blower, exhaust gases are drawn out the top and fresh air/gas mixture is drawn in at the bottom. Heat is transferred to the air stream from all surfaces of the heat exchanger tubes. The supply air blowers, controlled by the main control panel A55, force air across all surfaces of the tubes to extract the heat of combustion. The shape of the tubes ensures maximum heat exchange.

The gas valves accomplish staging by allowing more or less gas to the burners as called for by heating demand.

3-Burner Assembly (Figure 18)

The burners are controlled by the spark electrode, flame sensing electrode, gas valve and combustion air blower. The spark electrode, flame sensing electrode and gas valve are directly controlled by ignition control. Ignition control and combustion air blower is controlled by main control panel A55.

Burners

All units use inshot burners (see figures 18 and 19). Burners are factory set and do not require adjustment. A peep hole with cover is furnished in the heating access panel for flame viewing. Always operate the unit with the access panel in place. Burners can be removed individually for service. Burner maintenance and service is detailed in the SERVICE CHECKS sections of this manual.

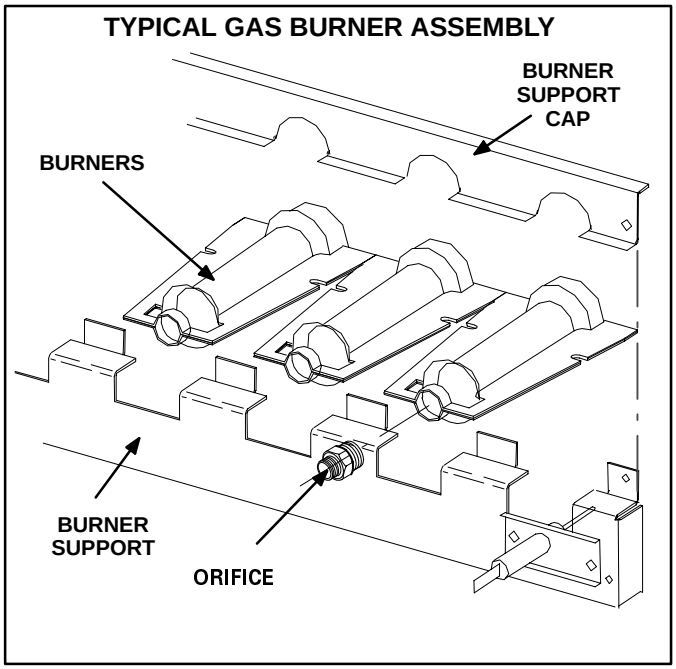


FIGURE 18

Orifice

Each burner uses an orifice which is precisely matched to the burner input. The orifice is threaded into the burner manifold. The burner is supported by the orifice and will easily slide off for service.

NOTE-Do not use thread sealing compound on the orifices. Using thread sealing compound may plug the orifices.

Each orifice and burner are sized specifically to the unit. Refer to Lennox Repair Parts Listing for correct sizing information.

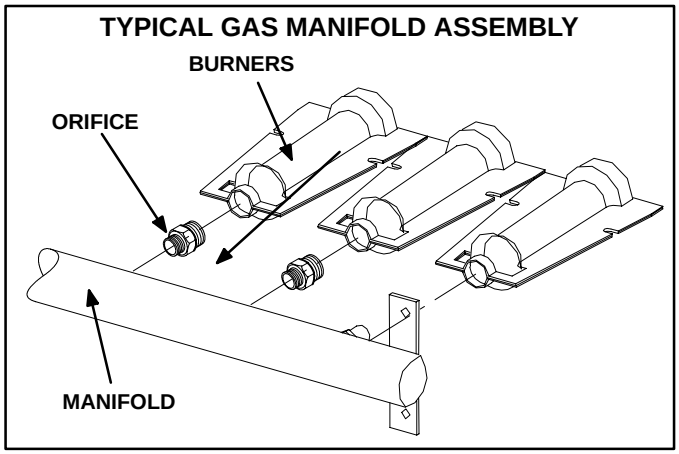


FIGURE 19

NOTE-In primary and secondary high temperature limits S10, S99, S21, and S100 the ignition circuits in both gas heat sections one and two are immediately de-energized when terminals 1-3 open and the indoor blower motor is immediately energized when terminals 1-2 close. This is the primary and secondary safety shutdown function of the unit.

4-Primary High Temperature Limits S10 & S99

S10 is the primary high temperature limit for gas heat section one, while S99 is the primary high temperature limit for gas heat section two. S10 is located in the blower compartment and is mounted on the end of the blower support panel which divides the blower compartment from the heating compartment (see figure 13). S99 is located on the blower support panel which separates the second gas heat section from the outdoor condenser section (see figure 13). S99 is accessed through a patch plate on the condenser divider wall.

Primary limit S10 is wired to the main control panel A55 which energizes burner 1 control (A3), while primary limit S99 is wired to the gas 2 panel A58 which energizes burner 2 control (A12). Its N.C. contacts open to de-energize the ignition control when excessive temperature is reached in the blower compartment. At the same time, the N.O. contacts of S10 and S99 close energizing the blower relay coil K3 through control A55. If either limit trips the blower will be energized. Three limits with different actuating temperatures are used for limits S10 and S99 (standard and high first heat section use two different limits, while yet another limit is used for the second heat section). All three limits are SPDT N.C. auto-reset limits.

Limit S10 in standard heat units is factory preset to open at 140°F ± 6°F (60.0°C ± 3.3°C) on a temperature rise and automatically reset at 100°F ± 7°F (37.8°C ± 3.9°C) on a temperature fall. Limit S10 and S99 in high heat units open at 170°F ± 5°F (76.6°C ± 2.8°C) on a temperature rise and automatically resets at 140°F ± 6°F (60.0°C ± 3.3°C) on a temperature fall. Limit S99 in standard heat units opens at 155°F ± 5°F (68.3°C ± 2.8°C) on a temperature rise and automatically resets at 125°F ± 6°F (51.6°C ± 3.3°C) on a temperature fall.

5-Secondary High Temperature Limits S21 & S100

S21 is the secondary high temperature limit for heat section one, while S100 is the secondary high temperature limit for heat section two. Like the primary limits, the secondary limits are located in the blower compartment. S21 and S100 are mounted on a horizontal panel located behind the blowers (see figure 13).

Secondary limit S21 is also wired to the main control panel A55, while secondary limit S100 is wired to the gas 2 panel A58. The secondary limits function in the same manner as the primary limits, but are factory set to actuate at different temperatures. The N.O. contacts of both S21 and S100 are connected to the blower relay coil K3 through control A55. If either limit trips the blower will be energized. All limits used are SPDT N.C. auto-reset limits.

Limit S21 and S100 in standard and high heat units are factory preset to open at 170°F ± 6°F (76.6°C ± 3.3°C) on a temperature rise and automatically reset at 140°F ±7°F (60.0°C ± 3.9°C) on a temperature fall. This is a secondary safety shut-down function of the unit.

6-Flame Rollout Limits S47 and S69

Flame rollout limits S47 (first heat section) and S69 (second heat section) are SPST N.C. high temperature limits located just above the burner air intake opening in the burner enclosures (see figure 11). S47 is wired to the main control panel A55, while S69 is wired to the gas 2 panel A58. When S47 or S69 senses flame rollout (indicating a blockage in the combustion air passages), the corresponding flame rollout limit trips, and the ignition control immediately closes the gas valve.

Limit S47 and S69 in standard heat units are factory preset to open at 250°F ± 12°F (121.1°C ± 6.7°C) on a temperature rise, while on high heat units both limits open at 270°F ± 12°F (132.2°C ± 6.7°C) on a temperature rise. All flame rollout limits are manual reset.

7-Combustion Air Prove Switches S18 & S45

The combustion air prove switch S18 (first heat section) and S45 (second heat section) are SPST N.O. pressure switches located in the compressor compartment (see figure 13). Both switches are identical and are used to monitor combustion air blower operation. Switch S18 is wired to the main control panel A55, while S45 is wired to the gas 2 panel A58. The switch actuates at 0.80"W.C. ± 0.05" (198.9 Pa ± 12.4 Pa) for standard heat units and 1.0" W.C. ± 0.05" (248.6Pa ± 12.4 Pa) for high heat units on pressure fall.This pressure fall and switch actuation allows power to the ignition control (proves, by closing, that the combustion air blower is operating before allowing the ignition control to energize.) The combustion air prove switch is factory set and not adjustable. The switch will automatically open on a pressure rise at 0.65" W.C. ± 0.05" W.C. (161.6 Pa ± 12.4 Pa) for standard heat units and .85" W.C. ± 0.05" W.C. (211.3 Pa ± 12.4 Pa) negative pressure for high heat units.

8-Combustion Air Blowers B6 and B15

Combustion air blowers B6 (first heat section) and B15 (second heat section) are identical blowers which provide fresh air to the corresponding burners while clearing the combustion chamber of exhaust gases. The blowers begin operating immediately upon receiving a thermostat demand and are de-energized immediately when thermostat demand is satisfied.

Both combustion air blowers use a 208/230V single-phase PSC motor and a 4.81in. x 1.25in. (122mm x 32mm) blower wheel. All motors operate at 3200RPM and are equipped with auto-reset overload protection. Blowers are supplied by various manufacturers. Ratings may vary by manufacturer. Specific blower electrical ratings can be found on the unit rating plate.

All combustion air blower motors are sealed and cannot be oiled. The blower cannot be adjusted but can be disassembled for cleaning.

9-Combustion Air Motor Capacitors C3 & C11

The combustion air blower motors in all LGA units require run capacitors. Capacitor C3 is connected to combustion air blower B6 and C11 is connected to combustion air blower B15. Both capacitors are rated at 3 MFD and 370VAC.

10-Gas Valves GV1 and GV3

Gas valves GV1 and GV3 are identical. The gas valves are two-stage redundant valves. Units are equipped with valves manufactured by White-Rodgers. First stage (low fire) is quick opening (on and off in less than 3 seconds). Second stage is slow opening (on to high fire pressure in 40 seconds and off to low fire pressure in 30 seconds). On a call for first stage heat (low fire), the valve is energized by the ignition control simultaneously with the spark electrode. On a call for second stage heat (high fire), the second stage operator is energized directly from A55 (GV1) and A58 (GV3). When demand is satisfied, second stage must be closed (30 seconds to close completely) before first stage can close. Low fire outlet pressure is non-adjustable, while high fire outlet pressure is adjustable from 2.5" W.C. to 5.0" W.C. (621.6 Pa to 1243.2 Pa) with a normal operating pressure of 3.7" W.C (920 Pa). A manual shut-off knob is provided on the valve for shut-off. Manual shut-off knob immediately closes both stages without delay. Figure 20 shows White-Rodgers gas valve components. Table 2 shows factory gas valve regulation for LGA series units.

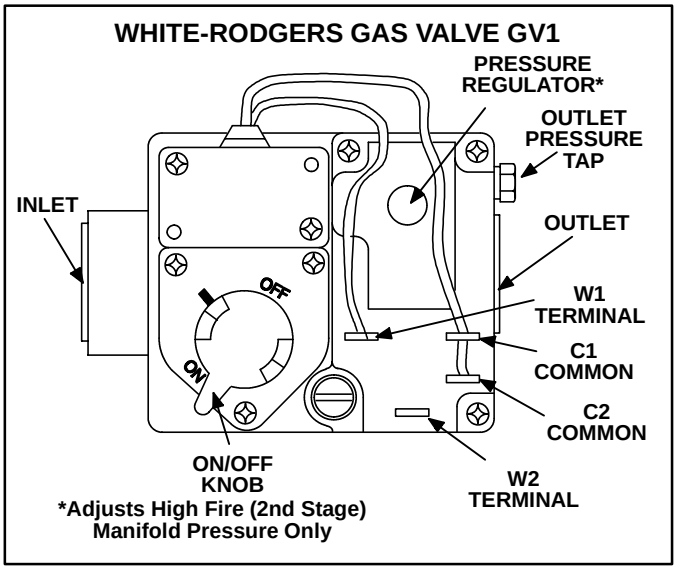


FIGURE 20

TABLE 2

GAS VALVE REGULATION FOR LGA UNITS			
Operating Pressure (outlet) Factory Setting			
Natural		L.P.	
Low	High	Low	High
1.6±0.2"W.C. 398±50Pa	3.7±0.3"W.C. 920±75Pa	5.5±0.3"W.C. 1368±75Pa	10.5±0.5"W.C. 2611±125Pa

11-Spark Electrodes

An electrode assembly is used for ignition spark. Two identical electrodes are used (one for each gas heat section). The electrode is mounted through holes on the left-most end of the burner support. The electrode tip protrudes into the flame envelope of the adjacent burner. The electrode assembly is fastened to burner supports and can be removed for service without removing any part of the burners.

During ignition, spark travels through the spark electrode (figure 21) and ignites the left burner. Flame travels from burner to burner until all are lit.

The spark electrode is connected to the ignition control by a 8 mm silicone-insulated stranded high voltage wire. The wire uses 1/4" (6.35 mm)female quick connect on the electrode end and female spark plug-type terminal on the ignition control end.

NOTE-IN ORDER TO MAXIMIZE SPARK ENERGY TO ELECTRODE, HIGH VOLTAGE WIRE SHOULD TOUCH UNIT CABINET AS LITTLE AS POSSIBLE.

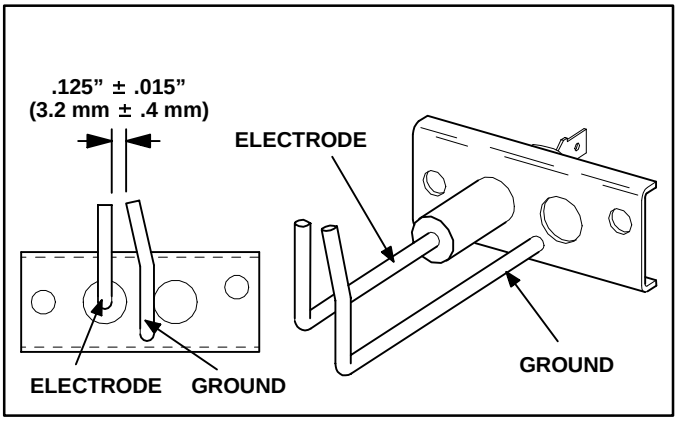


FIGURE 21

12-Flame Sensors

A flame sensor is located on the right side of each burner support. The sensor is mounted through a hole in the burner support and the tip protrudes into the flame envelope of the right most burner. The sensor assembly is fastened to burner supports and can be removed for service without removing any part of the burners.

When flame is sensed by the flame sensor (indicated by microamp signal through the flame) sparking stops immediately. During operation, flame is sensed by current passed along the ground electrode (located on the spark electrode), through the flame and into the sensing electrode. The ignition control allows the gas valve to stay open as long as a flame signal (current passed through the flame) is sensed.

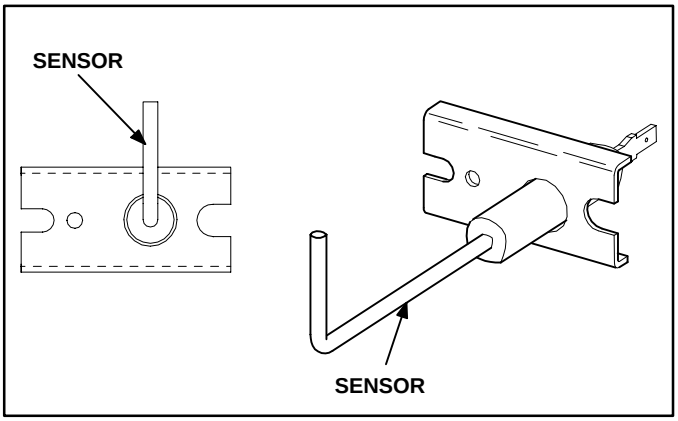


FIGURE 22

TABLE 3 Electric Heat Data

300H

kW Size Required	Electric Heat Model No. (see footnote) & Net Weight	No. of Steps	Volts Input	kW Input	Btuh Output	Total Unit, Power Exhaust Fans and Electric Heat †Minimum Circuit Ampacity		
						5 hp (3.7 kW)	7.5 hp (5.6 kW)	10 hp (7.5 kW)
30 kW	†(1) EHA360-15 208/230v **(99J22)** 460v **(99J24)** 575v **(99J26)** and †(1) EHA360S-15 208/230v **(99J23)** 460v **(99J25)** 575v **(99J27)** 59 lbs. (27 kg) (total weight)	1	208	22.5	76,800	117	126	134
		1	220	25.2	86,000	120	130	138
		1	230	27.5	93,900			
		1	240	30.0	102,400			
		1	440	25.2	86,000	59	64	67
		1	460	27.5	93,900			
		1	480	30.0	102,400			
		1	550	25.2	86,000	47	51	54
		1	575	27.5	93,900			
		1	600	30.0	102,400			
45 kW	¥(2) EHA360-22.5 208/230v **(99J28)** 460v **(99J29)** 575v **(99J30)** 76 lbs. (35 kg) (total weight)	1 2	208	33.8	115,300	147	157	165
		1 2	220	37.8	129,000	165	175	183
		1 2	230	41.3	141,000			
		1 2	240	45.0	153,600			
		1 2	440	37.8	129,000	82	86	90
		1 2	460	41.3	141,000			
		1 2	480	45.0	153,600			
		1 2	550	37.8	129,000	66	69	72
		1 2	575	41.3	141,000			
		1 2	600	45.0	153,600			
60 kW	¥(2) EHA150-30 208/230v **(99J07)** 460v **(99J08)** 575v **(99J09)** 76 lbs. (35 kg) (total weight)	1 2	208	45.0	153,600	155	164	173
		1 2	220	50.4	172,000	174	184	192
		1 2	230	55.1	188,000			
		1 2	240	60.0	204,800			
		1 2	440	50.4	172,000	87	91	95
		1 2	460	55.1	188,000			
		1 2	480	60.0	204,800			
		1 2	550	50.4	172,000	69	73	75
		1 2	575	55.1	188,000			
		1 2	600	60.0	204,800			
90 kW	¥(2) EHA150-45 208/230v **(99J10)** 460v **(99J11)** 575v **(99J12)** 84 lbs. (38 kg) (total weight)	1 2	208	67.6	230,700	218	227	235
		1 2	220	75.6	258,000	246	256	264
		1 2	230	82.7	282,200			
		1 2	240	90.0	307,100			
		1 2	440	75.6	258,000	123	127	131
		1 2	460	82.7	282,200			
		1 2	480	90.0	307,100			
		1 2	550	75.6	258,000	98	102	104
		1 2	575	82.7	282,200			
		1 2	600	90.0	307,100			
120 kW	¥(2) EHA150-60 208/230v **(99J13)** 460v **(99J14)** 575v **(99J15)** 98 lbs. (45 kg) (total weight)	1 2	208	90.2	307,800	280	289	298
		1 2	220	100.8	344,000	318	328	335
		1 2	230	110.2	376,100			
		1 2	240	120.0	409,500			
		1 2	440	100.8	344,000	159	163	167
		1 2	460	110.2	376,100			
		1 2	480	120.0	409,500			
		1 2	550	100.8	344,000	127	130	133
		1 2	575	110.2	376,100			
		1 2	600	120.0	409,500			

†NOTE - For field installed electric heat, order (1) of each heater shown to make up heater size required.

¥NOTE - For field installed electric heat, order (2) of same heater shown to make up heater size required.

†Refer to National or Canadian Electrical Code manual to determine wire, fuse and disconnect size requirements. Use wires suitable for at least 167°F (75°C).

1 May be used with two stage control.

2 Electric Heat Control Module required on 45, 60, 90 & 120 kW sizes only (module furnished with factory installed electric heaters).

NOTE — Fuse block must be ordered extra. Factory installed heaters will have the fuse block factory installed. Fuse block must be installed in field installed heaters. Also requires LTB2 Terminal Block. See Optional Electric Heat Accessories tables.

360

kW Size Required	Electric Heat Model No. (see footnote) & Net Weight	No. of Steps	Volts Input	kW Input	Btuh Output	Total Unit, Power Exhaust Fans and Electric Heat †Minimum Circuit Ampacity		
						5 hp (3.7 kW)	7.5 hp (5.6 kW)	10 hp (7.5 kW)
30 kW	†(1) EHA360-15 208/230v **(99J22)** 460v **(99J24)** 575v **(99J26)** and †(1) EHA360S-15 208/230v **(99J23)** 460v **(99J25)** 575v **(99J27)** 59 lbs. (27 kg) (total weight)	1	208	22.5	76,800	137	144	151
		1	220	25.2	86,000			
		1	230	27.5	93,900			
		1	240	30.0	102,400			
		1	440	25.2	86,000	70	74	77
		1	460	27.5	93,900			
		1	480	30.0	102,400			
		1	550	25.2	86,000	55	58	60
		1	575	27.5	93,900			
		1	600	30.0	102,400			
45 kW	¥(2) EHA360-22.5 208/230v **(99J28)** 460v **(99J29)** 575v **(99J30)** 76 lbs. (35 kg) (total weight)	1 2	208	33.8	115,300	147	157	165
		1 2	220	37.8	129,000	165	175	183
		1 2	230	41.3	141,000			
		1 2	240	45.0	153,600			
		1 2	440	37.8	129,000	82	86	90
		1 2	460	41.3	141,000			
		1 2	480	45.0	153,600			
		1 2	550	37.8	129,000	66	69	72
		1 2	575	41.3	141,000			
		1 2	600	45.0	153,600			
60 kW	¥(2) EHA150-30 208/230v **(99J07)** 460v **(99J08)** 575v **(99J09)** 76 lbs. (35 kg) (total weight)	1 2	208	45.0	153,600	155	164	173
		1 2	220	50.4	172,000	174	184	192
		1 2	230	55.1	188,000			
		1 2	240	60.0	204,800			
		1 2	440	50.4	172,000	87	91	95
		1 2	460	55.1	188,000			
		1 2	480	60.0	204,800			
		1 2	550	50.4	172,000	69	73	75
		1 2	575	55.1	188,000			
		1 2	600	60.0	204,800			
90 kW	¥(2) EHA150-45 208/230v **(99J10)** 460v **(99J11)** 575v **(99J12)** 84 lbs. (38 kg) (total weight)	1 2	208	67.6	230,700	218	227	235
		1 2	220	75.6	258,000	246	256	264
		1 2	230	82.7	282,200			
		1 2	240	90.0	307,100			
		1 2	440	75.6	258,000	123	127	131
		1 2	460	82.7	282,200			
		1 2	480	90.0	307,100			
		1 2	550	75.6	258,000	98	102	104
		1 2	575	82.7	282,200			
		1 2	600	90.0	307,100			
120 kW	¥(2) EHA150-60 208/230v **(99J13)** 460v **(99J14)** 575v **(99J15)** 98 lbs. (45 kg) (total weight)	1 2	208	90.2	307,800	280	289	298
		1 2	220	100.8	344,000	318	328	335
		1 2	230	110.2	376,100			
		1 2	240	120.0	409,500			
		1 2	440	100.8	344,000	159	163	167
		1 2	460	110.2	376,100			
		1 2	480	120.0	409,500			
		1 2	550	100.8	344,000	127	130	133
		1 2	575	110.2	376,100			
		1 2	600	120.0	409,500			

†NOTE - For field installed electric heat, order (1) of each heater shown to make up heater size required.

¥NOTE - For field installed electric heat, order (2) of same heater shown to make up heater size required.

†Refer to National or Canadian Electrical Code manual to determine wire, fuse and disconnect size requirements. Use wires suitable for at least 167°F (75°C).

1 May be used with two stage control.

2 Electric Heat Control Module required on 45, 60, 90 & 120 kW sizes only (module furnished with factory installed electric heaters).

NOTE — Fuse block must be ordered extra. Factory installed heaters will have the fuse block factory installed. Fuse block must be installed in field installed heaters. Also requires LTB2 Terminal Block. See Optional Electric Heat Accessories tables.

E-Optional Electric Heat Components

Table 4 through shows all possible LCA to EHA matchups and electrical ratings.

EHA parts arrangement is shown in figures 24 and 25. All electric heat sections consist of electric heating elements exposed directly to the airstream. Two electric heat sections (first section and second section) are used in all 30kW through 120kW heaters. See figure 23. Multiple-stage elements are sequenced on and off in response to thermostat demand.

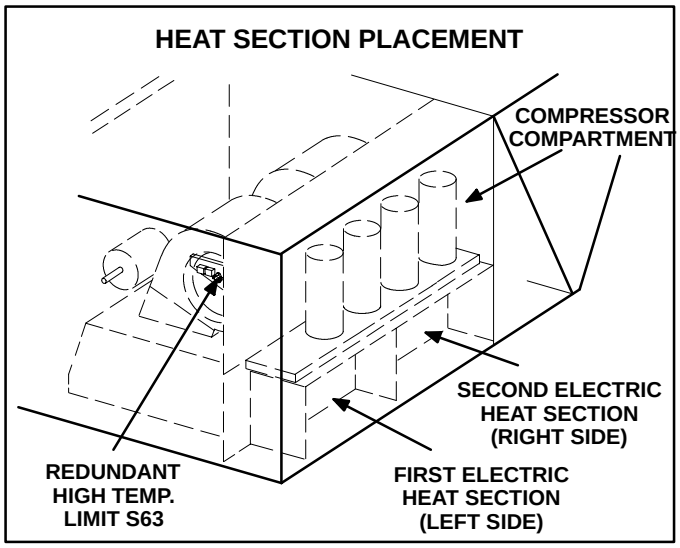


FIGURE 23

1-Main Control Box Components A55, A60, K9, T2, and F4

The main control box (see figure 3) houses a few of the electric heat controls, such as: the main control module A55, second electric heat section control panel A60, electric heat control section for 45 - 120 kW (electric heat relay K9 and transformer T2), and unit fuse block F4. For a description of the components see section I-A.

2-Contactors K15, K16, K17 and K18

Contactors K15, K16, K17 and K18 are all three-pole double-break contactors located on the electric heat vestibule. K15 and K16 are located on the first electric heat section, while K17 and K18 are located on the second electric heat section. However, in the 30kW heaters, the first section houses all contactors and fuses. All contactors are equipped with a 24VAC coil. The coils in the K15 and K16 contactors are energized by the main panel A55, while the coil in the K17 and K18 contactors are energized by the electric heat 2 control panel A60. Contactors K15 and K17 energize the first stage heating elements, while K16 and K18 energize the second stage heating elements.

3-High Temperature Limits S15 and S107 (Primary)

S15 and S107 are SPST N.C. auto-reset thermostats located on the back panel of the electric heat section below the heating elements. S15 is the high temperature limit for the first electric heat section, while S107 is the high temperature limit for the second electric heat section. Both thermostats are identical and are wired in series with the first stage contactor coil. When either S15 or S107 opens, indicating a problem in the system, contactor K15 is de-energized. When K15 is de-energized, first stage and all subsequent stages of heat are de-energized. All LCA300H/360 electric heat section thermostats are factory set to open at 170°F ± 5°F (76.7°C ± 2.8°C) on a temperature rise and automatically reset at 130°F ± 6°F (54.4°C ± 3.3°C) on a temperature fall. The thermostats are not adjustable.

4-High Temperature Limit S63 (Redundant)

S63 is a SPST N.C. manual-reset thermostat located on the suction line bracket inside the blower compartment (see figure 23). S63 is a redundant temperature limit factory installed in all LCA / LHA units. Like the primary temperature limits, S63 is wired in series with the first stage contactor coil (K15). When S63 opens, all contactors (K15, K16, K17, K18) are de-energized. When the contactors are de-energized, first stage and all subsequent stages of heat are de-energized. The thermostat is factory set to open at 170°F ± 8°F (76.7°C ± 4.4°C) on a temperature rise and can be manually reset when the temperature falls below 160°F ± 6°F (71.1°C ± 3.3°C).

5-Terminal Strip TB3

Electric heat line voltage connections are made to terminal strip TB3 (or a fuse block on some models) located in the upper left corner of the electric heat vestibule.

6-Heating Elements HE1 through HE14

Heating elements are composed of helix wound bare nichrome wire exposed directly to the airstream. Three elements are connected in a three-phase arrangement. The elements in 208/230V units are connected in a “Delta” arrangement. Elements in 460 and 575V units are connected in “Wye” arrangement. See EHA wiring diagram in WIRING DIAGRAM AND OPERATION SEQUENCE section in back of this manual. Each stage is energized independently by the corresponding contactors located on the electric heat vestibule panel. Once energized, heat transfer is instantaneous. High temperature protection is provided by primary and redundant high temperature limits and overcurrent protection is provided by fuses.

7-Fuse F3

Fuse F3 are housed in a fuse block which holds three fuses. Each F3 fuse is connected in series with each leg of electric heat. Figure 25 and table 4 show the fuses used with each electric heat section. For simplicity, the service manual labels the fuses F3 - 1 through F3 - 8.

TABLE 4

LCA / LHA ELECTRIC HEAT SECTION FUSE RATING									
EHA QUANTITY & SIZE	**VOLTAGES**	**FUSE (3 each)**							
		F3 - 1	**F3 - 2**	**F3 - 3**	**F3 - 4**	**F3 - 5**	**F3 - 6**	**F3 - 7**	**F3 - 8**
(1) EHA360-15 & (1) EHA360S-15 (30 kW Total) or (1) EHA156-15 & (1) EHA156S-15	208/230V	60 Amp 250V	60 Amp 250V	-----	-----	-----	-----	-----	-----
	460V	50 Amp 600V	-----	-----	-----	-----	-----	-----	-----
	575V	40 Amp 600V	-----	-----	-----	-----	-----	-----	-----
(2) EHA360-22.5 (45 kW Total) or (2) EHA156-22.5	208/230V	50 Amp 250V	-----	-----	25 Amp 250V	50 Amp 250V	-----	-----	25 Amp 250V
	460V	25 Amp 600V	-----	-----	15 Amp 600V	25 Amp 600V	-----	-----	15 Amp 600V
	575V	20 Amp 600V	-----	-----	10 Amp 600V	20 Amp 600V	-----	-----	10 Amp 600V
(2) EHA150-30 (60 kW Total) or (2) EHA156-30	208/230V	50 Amp 250V	-----	-----	50 Amp 250V	50 Amp 250V	-----	-----	50 Amp 250V
	460V	25 Amp 600V	-----	-----	25 Amp 600V	25 Amp 600V	-----	-----	25 Amp 600V
	575V	20 Amp 600V	-----	-----	20 Amp 600V	20 Amp 600V	-----	-----	20 Amp 600V
(2) EHA360-45 (90 kW Total)	208/230V	50 Amp 250V	-----	60 Amp 250V	60 Amp 250V	50 Amp 250V	-----	60 Amp 250V	60 Amp 250V
	460V	25 Amp 600V	-----	-----	50 Amp 600V	25 Amp 600V	-----	-----	50 Amp 600V
	575V	20 Amp 600V	-----	-----	40 Amp 600V	20 Amp 600V	-----	-----	40 Amp 600V
(2) EHA150-60 (120 kW Total)	208/230V	60 Amp 250V	60 Amp 250V	60 Amp 250V	60 Amp 250V	60 Amp 250V	60 Amp 250V	60 Amp 250V	60 Amp 250V
	460V	50 Amp 600V	-----	-----	50 Amp 600V	50 Amp 600V	-----	-----	50 Amp 600V
	575V	40 Amp 600V	-----	-----	40 Amp 600V	40 Amp 600V	-----	-----	40 Amp 600V

EHA 30, 45, 60, 90 and 120 KW
ELECTRIC HEAT SECTION PARTS ARRANGEMENT

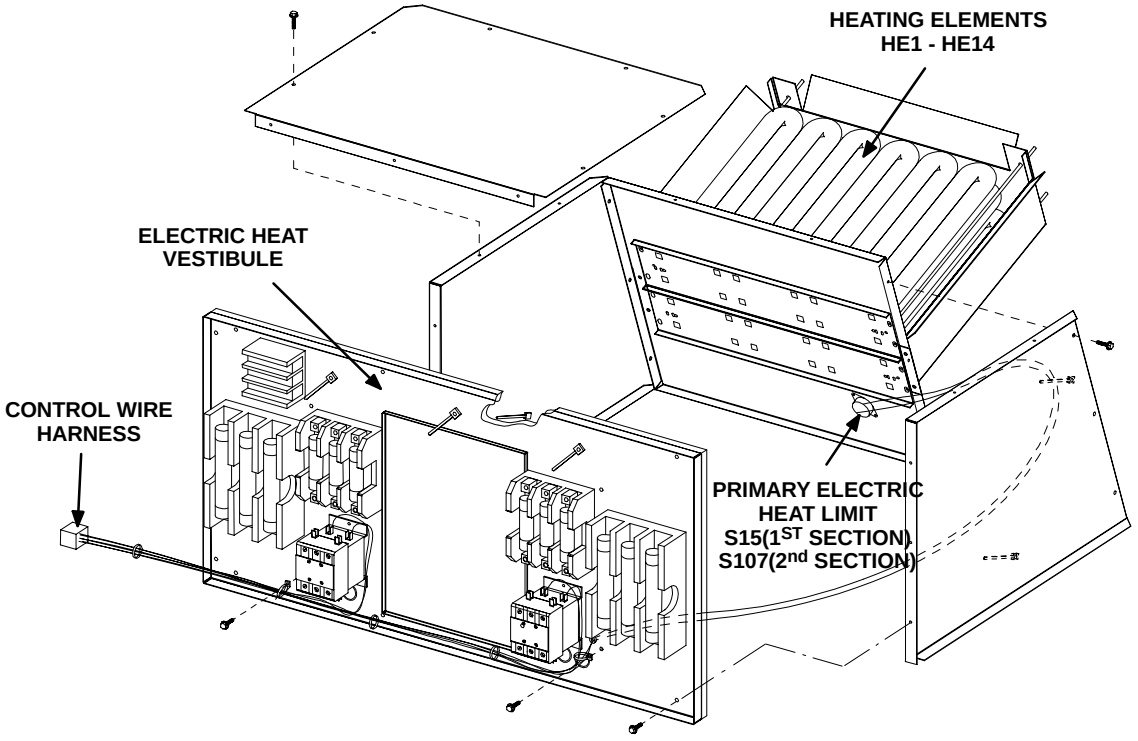
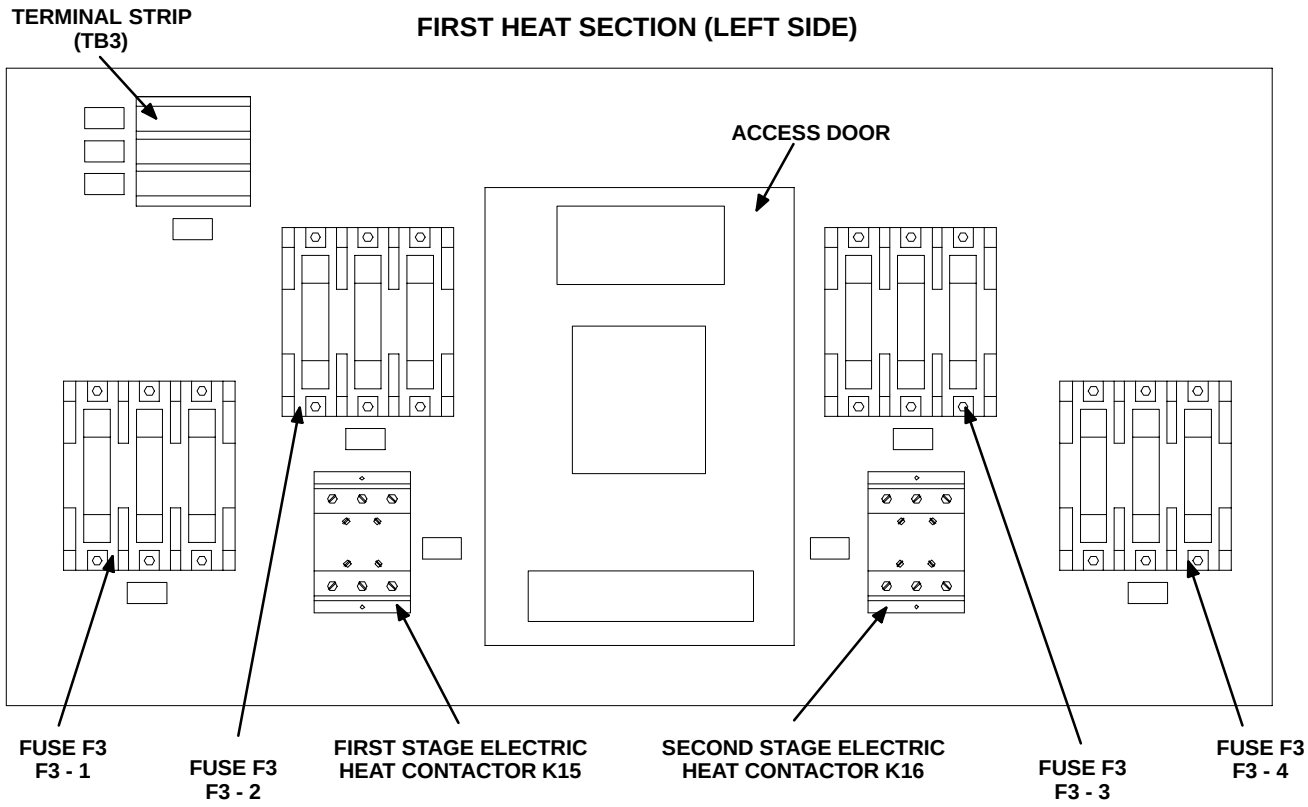


FIGURE 24

ELECTRIC HEAT VESTIBULE PARTS ARRANGEMENT



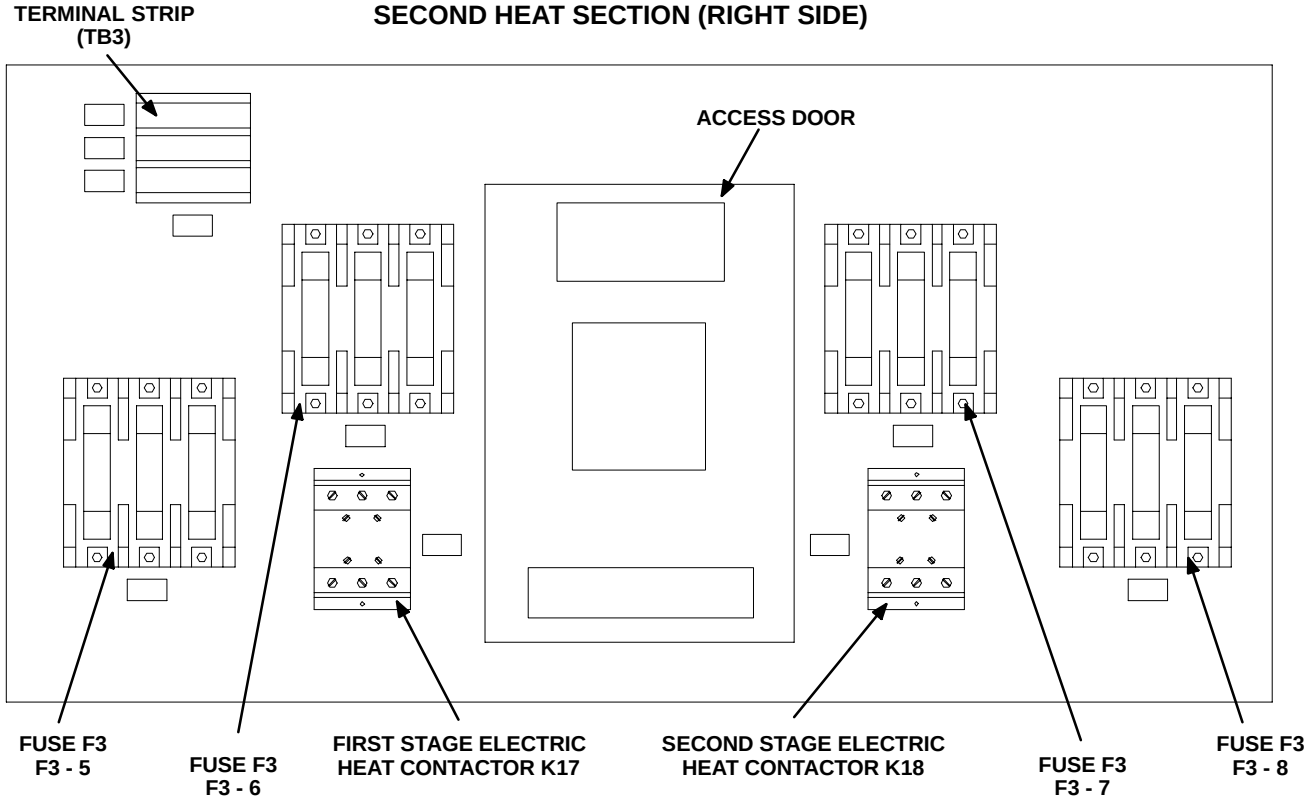


FIGURE 25

II-PLACEMENT AND INSTALLATION

Make sure the unit is installed in accordance with the installation instructions and all applicable codes. See accessories section for conditions requiring use of the optional roof mounting frame (LARMF18/36 or LARMFH30/36).

III-CHARGING

D–Refrigerant Charge and Check

WARNING-Do not exceed nameplate charge under any condition.

This unit is factory charged and should require no further adjustment. If the system requires charge, *reclaim the charge, evacuate the system,* and *add required nameplate charge.*

*NOTE - System charging is not recommended below 60° F (15° C). In temperatures below 60° F (15° C) , the charge **must** be weighed into the system.*

If weighing facilities are not available, or to check the charge, use the following procedure:

1- Attach gauge manifolds and operate unit in cooling mode until system stabilizes (approximately five minutes).

2- Check each system separately with all stages operating.

3- Use a thermometer to accurately measure the outdoor ambient temperature.

4- Apply the outdoor temperature to tables 5 or 6 to determine normal operating pressures.

5- Compare the normal operating pressures to the pressures obtained from the gauges. Minor variations in these pressures may be expected due to differences in installations. Significant differences could mean that the system is not properly charged or that a problem exists with some component in the system. **Correct any system problems before proceeding.**

6- If discharge pressure is high, remove refrigerant from the system. If discharge pressure is low, add refrigerant to the system.

- Add or remove charge in increments.
- Allow the system to stabilize each time refrigerant is added or removed.

7- Use the following approach method along with the normal operating pressures to confirm readings.

TABLE 5
LGA/LCA300H NORMAL OPERATING PRESSURES

Outdoor Coil Entering Air Temp.	CIRCUIT 1		CIRCUIT 2		CIRCUIT 3		CIRCUIT 4	
	Dis.± 10 psig	Suct .± 5 psig	Dis. ± 10 psig	Suct. ± 5 psig	Dis. ± 10 psig	Suct. ± 5 psig	Dis. ± 10 psig	Suct. ± 5 psig
75°F	185	66	192	70	190	73	183	68
85°F	220	68	225	72	225	75	219	70
95°F	255	69	258	73	258	76	255	71
105°F	290	71	292	75	293	78	292	73
115°F	325	73	325	77	328	80	327	75

TABLE 6
LGA/LCA360H NORMAL OPERATING PRESSURES

Outdoor Coil Entering Air Temp.	CIRCUIT 1		CIRCUIT 2		CIRCUIT 3	
	Dis. ± 10 psig	Suct. ± 5 psig	Dis. ± 10 psig	Suct. ± 5 psig	Dis. ± 10 psig	Suct .± 5 psig
75°F	210	71	212	77	213	77
85°F	240	72	240	78	242	78
95°F	270	73	270	80	275	80
105°F	301	75	302	81	304	82
115°F	332	77	335	82	340	84

E-Charge Verification - Approach Method

1- Using the same thermometer, compare liquid temperature to outdoor ambient temperature.

Approach Temperature = Liquid temperature minus ambient temperature.

2- Approach temperature should match values in table 7. An approach temperature greater than value shown indicates an undercharge. An approach temperature less than value shown indicates an overcharge.

3- Do not use the approach method if system pressures do not match pressures in tables 4 and 6. The approach method is not valid for grossly over or undercharged systems.

TABLE 7

LGA/LCA UNIT	APPROACH TEMPERATURE — LIQUID TEMP. MINUS AMBIENT TEMP.			
	CIRCUIT 1	CIRCUIT 2	CIRCUIT 3	CIRCUIT 4
300H	**7°F ± 1 (3.9°C ± 0.5)**	**8°F ± 1 (4.4°C ± 0.5)**	**6°F ± 1 (3.3°C ± 0.5)**	**6°F ± 1 (3.3°C ± 0.5)**
360H	**10°F ± 1 (5.6°C ± 0.5)**	**10°F ± 1 (5.6°C ± 0.5)**	**8°F ± 1 (4.4°C ± 0.5)**	**NA**

IV-STARTUP - OPERATION

Refer to startup directions and refer closely to the unit wiring diagram when servicing. See unit nameplate for minimum circuit ampacity and maximum fuse size.

A-Preliminary and Seasonal Checks

1- Make sure the unit is installed in accordance with the installation instructions and applicable codes.

2- Inspect all electrical wiring, both field and factory installed for loose connections. Tighten as required. Refer to unit diagram located on inside of unit control box cover.

3- Check to ensure that refrigerant lines are in good condition and do not rub against the cabinet or other refrigerant lines.

4- Check voltage at the disconnect switch. Voltage must be within the range listed on the nameplate. If not, consult the power company and have the voltage corrected before starting the unit.

5- Recheck voltage and amp draw with unit running. If voltage is not within range listed on unit nameplate, stop unit and consult power company. Refer to unit nameplate for maximum rated load amps.

6- Inspect and adjust blower belt (see section on Blower Compartment - Blower Belt Adjustment).

B-Cooling Startup

NOTE-The following is a generalized procedure and does not apply to all thermostat control systems. Electronic and ramping thermostat control systems may operate differently. Refer to the operation sequence section of this manual for more information.

⚠ WARNING

Crankcase heaters must be energized for 24 hours before attempting to start compressors. Set thermostat so there is no compressor demand before closing disconnect switch. Attempting to start compressors during the 24-hour warm-up period could result in damaged or failed compressors.

1- Set fan switch to AUTO or ON and move the system selection switch to COOL. Adjust the thermostat to a setting far enough below room temperature to bring on all compressors. Compressors will start and cycle on demand from the thermostat (allowing for unit and thermostat time delays).

2- Each circuit is charged with R-22 refrigerant. See unit rating plate for correct charge amount.

3- Refer to Cooling System Service Checks and Charging sections for proper method of checking and charging the system.

C-Heating Startup

1 Set the fan switch to AUTO or ON and move the system selection switch to HEAT. Adjust thermostat setting above room temperature.

2 The indoor blower, first stage gas (LGA only) and first stage electric heat (LCA only) immediately start.

3 Additional stages are controlled by the indoor thermostat.

D-Safety or Emergency Shutdown

Turn off power to the unit.

V- SYSTEMS SERVICE CHECKS

A-LGA Heating System Service Checks

All LGA units are A.G.A and C.G.A. design certified without modification.

Before checking piping, check with gas company or authorities having jurisdiction for local code requirements. Refer to the LGA Installation, Operation and Maintenance instruction for more information.

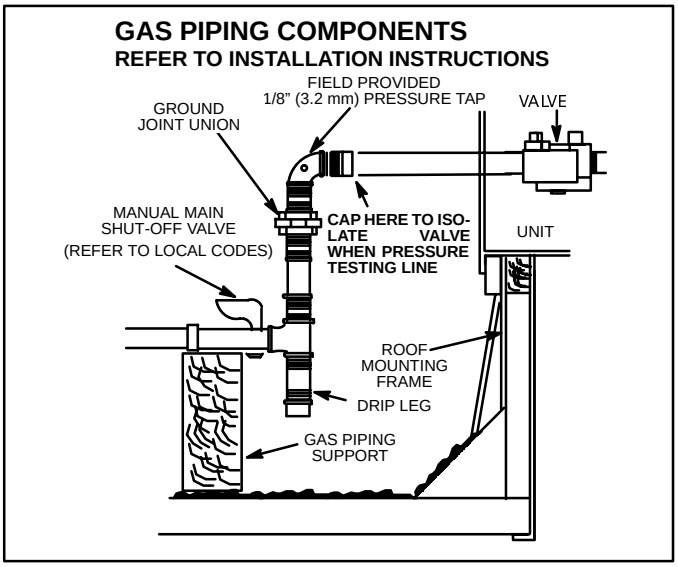


FIGURE 26

1-Gas Piping

Gas supply piping must not allow more than 0.5"W.C. (124.3 Pa) drop in pressure between the gas meter and the unit. Supply gas pipe must not be smaller than the unit gas connection. Refer to installation instructions for details.

2-Testing Gas Piping

NOTE-In case emergency shutdown is required, turn off the main manual shut-off valve and disconnect the main power to the unit. These controls should be properly labeled by the installer.

When pressure testing gas lines, the gas valve must be disconnected and isolated. Gas valves can be damaged if subjected to more than 0.5 psig [14"W.C. (3481 Pa)]. See figure 26.

When checking piping connection for gas leaks, use the preferred means. Common kitchen detergents can cause harmful corrosion on various metals used in gas piping. The use of specialty Gas Leak Detector is strongly recommended. It is available through Lennox under part number 31B2001. See CORP 8411-L10, for further details.

Do not use matches, candles, flame or any other source of ignition to check for gas leaks.

3-Testing Gas Supply Pressure

When testing gas supply pressure, connect test gauge to the inlet pressure tap (field provided - figure 26). Test supply gas pressure with unit firing at maximum rate (both stages energized). Make sure the reading falls within the range of the following values. Low pressure may result in erratic operation or "underfire." High pressure can result in permanent damage to the gas valve or "overfire." For natural gas units, operating pressure at the unit gas connection must be between 4.7"W.C. and 10.5"W.C. (1168 Pa and 2610 Pa). For L.P. gas units, operating pressure at the unit gas connection must be between 10.8"W.C. and 13.0"W.C. (2685 Pa and 3232 Pa).

On multiple unit installations, each unit should be checked separately while operating at maximum rate, beginning with the one closest to the supply gas main and progressing to the one furthest from the main. Multiple units should also be tested with and without the other units operating. Supply pressure must fall within the range listed in the previous paragraph.

4-Check and Adjust Manifold Pressure

After line pressure has been checked and adjusted, check manifold pressure. Move test gauge to the outlet pressure tap located on unit gas valve GV1. See figure 20 for location of pressure tap on the gas valve.

The manifold pressure is factory set and should not require adjustment. If manifold pressure is incorrect and no other source of improper manifold pressure can be found, the valve must be replaced. White-Rodgers gas valve can be adjusted from 2.5" W.C. to 5.0" W.C. (621.6 Pa and 1243.2 Pa) with a normal operating pressure of 3.7" (920 Pa). Refer to figure 20 for location of gas valve (manifold pressure) adjustment screw.

All gas valves are factory regulated. The gas valve should completely and immediately cycle off in the event of gas or power failure. The manual shut-off knob can be used to immediately shut off gas supply.

⚠ CAUTION

For safety, connect a shut-off valve between the manometer and the gas tap to permit shut off of gas pressure to the manometer.

Manifold Adjustment Procedure

1- Connect test gauge to the outlet pressure tap on the gas valve. Start the unit (call for second stage heat) and allow five minutes for the unit to reach steady state.

2- While waiting for the unit to stabilize, notice the flame. The flame should be stable without flashback and should not lift from the burner heads. Natural gas should burn basically blue with some clear streaks. L.P. gas should burn mostly blue with some clear yellow streaks.

3- After allowing the unit to stabilize for five minutes, record the manifold pressure and compare to the values given for gas supply pressure in table 2.

⚠ CAUTION

Disconnect heating demand as soon as an accurate reading has been obtained.

5-Proper Gas Flow

To check for proper gas flow to burners, determine Btuh input from unit rating plate or the gas heating capacity tables in the SPECIFICATIONS section of this manual. Divide this input rating by the Btuh per cubic foot of available gas. Result is the number of cubic feet per hour required. Determine the flow of gas through gas meter for two minutes and multiply by 30 to get hourly flow of gas to the burners.

NOTE - To obtain accurate reading, shut off all other gas appliances connected to meter.

6-High Altitude Derate

Natural gas units may be installed at altitudes up to 2000 feet (610m) above sea level without any modification. At altitudes above 2000 feet (610 m), units must be derated to match gas manifold pressures shown in the following table.

NOTE-This is the only permissible derate for these units.

TABLE 8

Altitude - ft. (m)	Gas Manifold Pressure - in. w.g. (kPa)
2001 - 3000 (610 - 915)	3.6 (0.90)
3001 - 4000 (915 - 1220)	3.5 (0.87)
4001 - 5000 (1220 - 1525)	3.4 (0.85)
5001 - 6000 (1525 - 1830)	3.3 (0.82)
6001 - 7000 (1830 - 2135)	3.2 (0.80)
7001 - 8000 (2135 - 2440)	3.1 (0.77)

Derate Procedure:

1- Check manifold pressure at the gas valve pressure tap with unit operating at high fire (second stage).

2- To reduce maximum input, turn regulator adjusting screw (figure 20) counterclockwise.

3- Re-check manifold pressure.

7-Inshot Burner

Burners are factory set for maximum air and cannot be adjusted. Always operate unit with access panel in place. A peep hole is furnished in the heating access panel for flame viewing. Natural gas should burn basically blue with some clear streaks. L.P. gas should burn mostly blue with some clear yellow streaks.

Figure 27 shows how to remove burner assembly.

1- Turn off power to unit and shut off gas supply.

2- Remove screws holding the burner support cap.

3- Slide each burner off its orifice.

4- Clean and reassemble (reverse steps 1-3).

5- Be sure to secure all wires and check plumbing.

6- Turn on power to unit. Follow lighting instructions attached to unit and operate unit in heating mode. Check burner flames. They should be blue with yellow streaks.

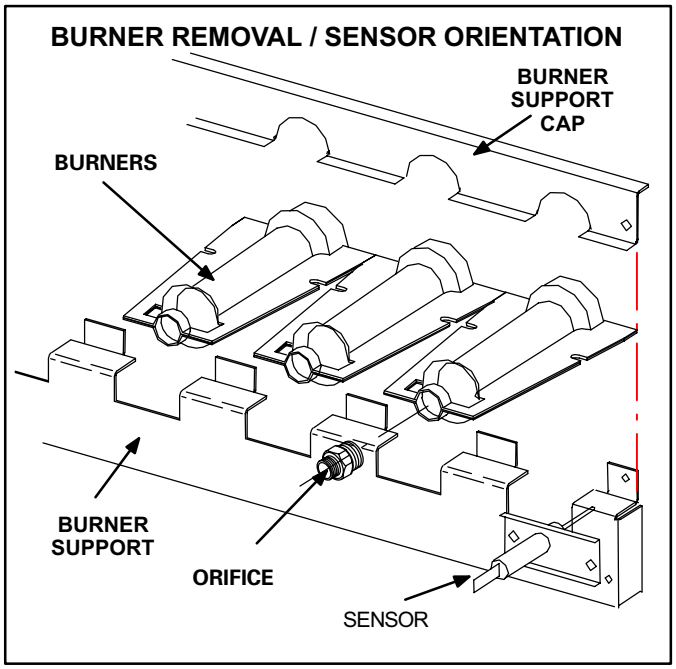


FIGURE 27

8-Heat Exchanger

To Access or Remove Heat Exchanger From Unit:

1- Turn off gas and electric power.

2- Remove access panel(s) and unit center mullion.

3- Remove gas valve, manifold assembly and burners.

4- Remove combustion air blower and flue box. Pay careful attention to the order in which gaskets and orifice are removed.

5- Support heat exchanger (to prevent it from falling when final screws are removed.)

6- Remove screws supporting heat exchanger and slide out.

7- To install heat exchanger, reverse procedure. Be sure to secure all wires and check plumbing and burner plate for airtight seal. Screws must be torqued to 35 in.-lbs. (155.7 N) to ensure proper operation.

9-Spark Electrode Gap

The spark electrode assembly can be removed for inspection by removing two screws securing the electrode assembly and sliding it out of unit.

For proper unit operation, electrodes must be positioned and gapped correctly.

Spark gap may be checked with appropriately sized twist drills or feeler gauges. Disconnect power to the unit and remove electrode assembly. The gap should be between 0.125" ± 0.015" (3.2 mm ± .4 mm). See figure 21.

10-Flame Sensing

Flame current is an electrical current which passes from the ignition control through the sensor electrode during unit operation. The current passes from the sensor through the flame to the ground electrode (located on the flame electrode) to complete a safety circuit. See table below for flame signal range. The electrodes should be located so the tips are at least 1/2" (12.7 mm) inside the flame envelope. Do not bend electrodes. To measure flame current, follow the procedure below:

NOTE-Electrodes are not field adjustable. Any alterations to the electrode may create a hazardous condition that can cause property or personal injury.

1- Disconnect power to unit.

2- Remove lead from sensing electrode and install a 0-50DC microamp meter in series between the sensing electrode and the sensing lead.

3- Reconnect power and adjust thermostat for heating demand.

4- When flame is established compare reading to table 9. Do not bend electrodes.

5- Disconnect power to unit before disconnecting meter. Make sure sensor wire is securely reconnected before reconnecting power to unit.

TABLE 9

Manufacturer	Nominal Signal	Drop Out
RAM	1.7-3.6	0.5
JOHNSON	0.5-1.0	.09
FENWALL	1.7-3.6	0.7

NOTE-If the meter scale reads 0, the leads are reversed. Disconnect power and reconnect leads for proper polarity.

11-Combustion Air Blower

The combustion air blower is factory set and is not field adjustable. However, operation should be monitored to ensure proper operation. The combustion air blower is used to draw fresh air into the combustion chamber while simultaneously expelling exhaust gases. The blower operates throughout the heating cycle.

On a heating demand, the ignition control is energized by the main control module A55. The ignition control then allows 30 to 40 seconds for the combustion air blower to vent exhaust gases from the burners. When the combustion air blower is purging the exhaust gases, the combustion air prove switch is closing proving that the combustion air blower is operating before allowing the ignition control to energize. When the combustion air prove switch is closed and the delay is over, the ignition control activates the first stage operator of the gas valve (low fire), the spark and the flame sensing electrode. Sparking stops immediately after flame is sensed.

B-Cooling System Service Checks

LGA / LCA units are factory charged and require no further adjustment; however, charge should be checked periodically using the normal operating pressure method.

1-Gauge Manifold Attachment

Service gauge ports are identified in figures 8 and 9. Attach high pressure line to discharge line schrader port and the low pressure line to the suction line schrader port.

NOTE-When unit is properly charged discharge line pressures should approximate those in tables 5 or 6.

VI-MAINTENANCE

⚠ CAUTION

Electrical shock hazard. Turn off power to unit before performing any maintenance, cleaning or service operation on the unit.

A-Filters

LGA / LCA units are equipped with twelve 20” x 20” x 2” (508mm x 508mm x 51mm) pleated throw-away type filters. Filters may be accessed through the economizer / filter access door (left of the blower door). All filters are removed by pulling on the pull tab, located on the bottom of each row of filters. Filters should be checked monthly (or more frequently in severe use) and cleaned or replaced regularly. Take note of the “AIR FLOW DIRECTION” marking on the filter frame when re-installing.

NOTE-Filters must be U.L.C. certified or equivalent for use in Canada.

⚠ CAUTION

Be careful when servicing unit to avoid accidental contact with sharp metallic edges which may cause personal injury.

B-Lubrication

All motors and blower wheels used in LGA / LCA units are prelubricated; no further lubrication is required.

C-Supply Air Blower Wheel

Annually inspect supply air blower wheel for accumulated dirt or dust. Turn off power before attempting to remove access panel or to clean blower wheel. If balancing clips are removed, make sure they are reinstalled in the same location when cleaning is completed.

NOTE-Do not lose balancing clips.

D-Evaporator Coil

Inspect and clean coil at beginning of each season. Clean using mild detergent or commercial coil cleanser. Check condensate drain pan and line, if necessary. Flush coil and condensate drain with water taking care not to get insulation, filters and return air ducts wet. Check connecting lines and coil for evidence of oil and refrigerant leaks.

E-Condenser Coil

Clean condenser coil annually with detergent or commercial coil cleaner and inspect monthly during the cooling season. Check connecting lines and coil for evidence of oil and refrigerant leaks.

NOTE-If owner complains of insufficient cooling, the unit should be gauged and refrigerant charge checked. Refer to Gauge Manifold Attachment and Charging sections in this manual.

F-Electrical

1- Check all wiring for loose connections.

2- Check for correct voltage at unit (unit operating).

3- Check amp-draw on both condenser fan motor and blower motor.
Fan Motor Rating Plate ____ Actual _____
Indoor Blower Motor Rating Plate____ Actual____

VII-ACCESSORIES

The accessories section describes the application of most of the optional accessories which can be factory or field installed to either the LGA / LCA units.

A-LARMF18/36-14, 24 or LARMH30/36-30,41 Mounting Frames

When installing either the LGA / LCA units on a combustible surface for downflow discharge applications, the Lennox LARMF18/36 14-inch or 24-inch (356 mm or 610mm) height roof mounting frame is used. For horizontal discharge applications, use LARMFH30/36 30-inch or 41-inch (762mm or 1041mm) height roof mounting frame. This frame converts unit from down-flow to horizontal air flow. The 14 and 24 inch (356 and 610mm) downflow and 41 inch (1041mm) horizontal frame meets National Roofing Code requirements. The roof mounting frames are recommended in all other applications but not required. If the LGA / LCA units are not mounted on a flat (roof) surface, they MUST be supported under all edges and under the middle of the unit to prevent sagging. The units MUST be mounted level within 1/16" per linear foot or 5mm per meter in any direction.

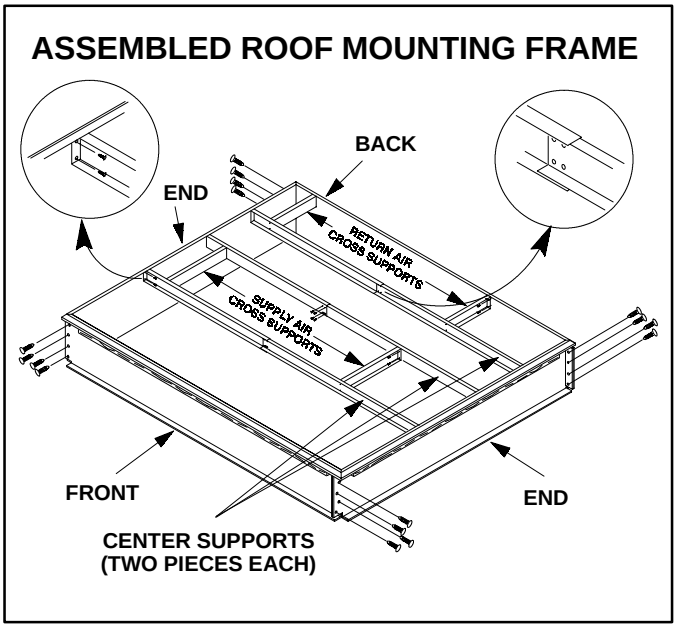


FIGURE 28

The assembled LARMF18/36 mounting frame is shown in figure 28. Refer to the roof mounting frame installation instructions for details of proper assembly and mounting. The roof mounting frame MUST be squared to the roof and level before mounting. Plenum system MUST be installed before the unit is set on the mounting frame. Typical roof curbing and flashing is shown in figure 29. Refer to the roof mounting frame installation instructions for proper plenum construction and attachment.

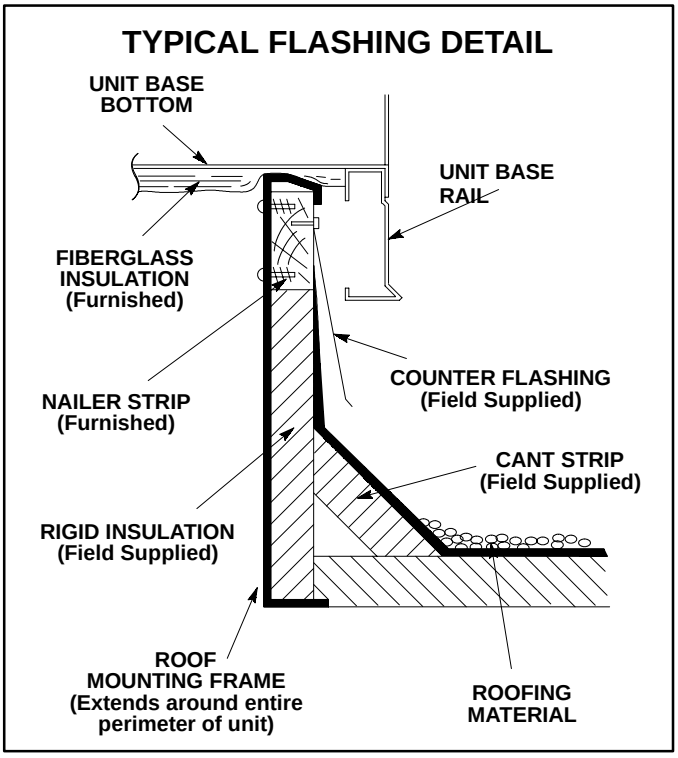


FIGURE 29

B-Transitions

Optional supply/return transitions LASRT30/36 are available for use with LGA / LCA series units utilizing optional LARMF18/36 roof mounting frame. Transition must be installed in the LARMF18/36 mounting frame before mounting the unit to the frame. Refer to the manufacturer's instructions included with the transition for detailed installation procedures.

C-Supply and Return Diffusers

Optional flush mount diffuser/return FD11 and extended mount diffuser/return RTD11 are available for use with the LGA / LCA units. Refer to manufacturer's instructions included with transition for detailed installation procedures.

D-LAOAD(M) 30/36Outdoor Air Dampers

LAOAD(M)30/36 consists of a set of dampers which may be manually or motor (M) operated to allow up to 25 percent outside air into the system at all times (see figure 30). Either air damper can be installed in LGA/ LCA units. Washable filter supplied with the outdoor air dampers can be cleaned with water and a mild detergent.It should be sprayed with Filter Handicoater when dry prior to reinstallation. Filter Handicoater is R.P. Products coating no. 418 and is available as Lennox Part No. P-8-5069.

E-LAREMD30/36 Economizer

(Field or Factory Installed)

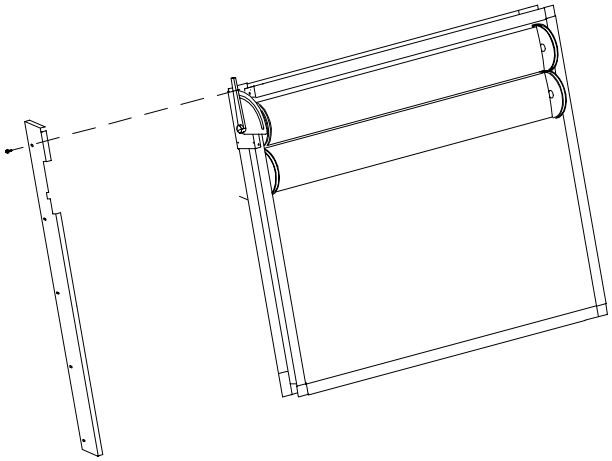
The optional LAREMD30/36 economizer can be used with LGA / LCA units in downflow and horizontal air discharge applications. The LAREMD30/36 economizer uses outdoor air for free cooling when temperature and/or humidity is suitable. An economizer hood is required and must be ordered separately.

NOTE - Gravity exhaust dampers are required with power exhaust.

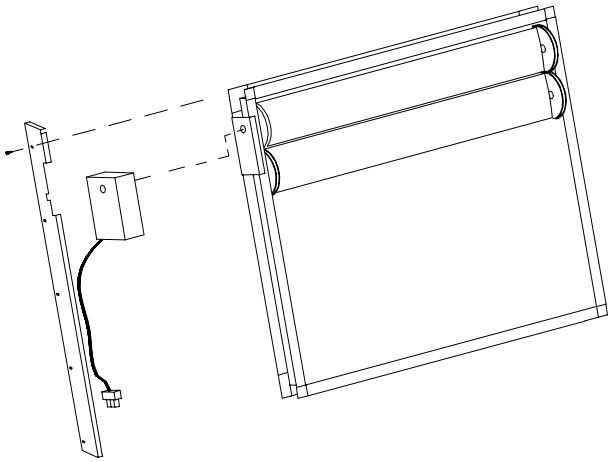
The economizer is controlled by the economizer control module A56 which connects to the main control module A55. Both boards are part of the Integrated Modular Control (IMC) which controls "L" series unit operation.

The economizer will operate in one of four modes. Each mode requires a different EM1 economizer DIP switch setting. Each mode also requires different sensors.

LAOAD 30/36 MANUAL OUTDOOR AIR DAMPER



LAOAD(M) MOTORIZED OUTDOOR AIR DAMPER



FILTER BRACKET SIDE VIEW

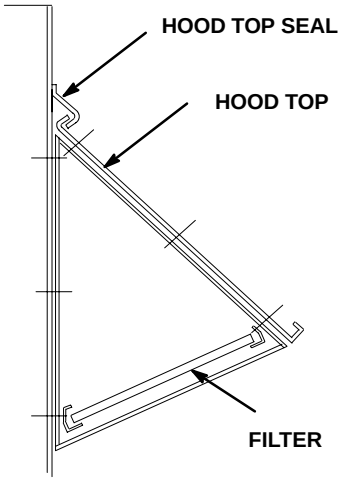


FIGURE 30

1-"TMP" MODE (SENSIBLE TEMPERATURE)

In the "TMP" mode, the IMC uses input from the factory installed RT6 Supply Air Sensor, RT16 Return Air Sensor, and RT17 Outdoor Air Sensor to determine suitability of outside air and economizer damper operation. When outdoor sensible temperature is less than return air sensible temperature, outdoor air is used for cooling. This may be supplemented by mechanical cooling to meet comfort demands. This application does not require additional optional sensors.

2-"ODE" MODE (OUTDOOR ENTHALPY)

The "ODE" or outdoor enthalpy mode requires a field–provided and –installed Honeywell C7400 enthalpy sensor (16K96). The sensor monitors outdoor air temperature and humidity (enthalpy). When outdoor air enthalpy is below the enthalpy control setpoint, the economizer modulates to allow outdoor air for free cooling.

3-"DIF" MODE (DIFFERENTIAL ENTHALPY)

The "DIF" or differential enthalpy mode requires two factory or field–provided and –installed Honeywell C7400 enthalpy sensors (16K97). One sensor is installed in the outside air opening and the other sensor is installed in the return air opening. When the outdoor air enthalpy is below the return air enthalpy, the economizer opens to bring in outdoor air for free cooling.

4-"GLO" MODE (GLOBAL)

Global Mode – The "GLO" or global mode is used with an energy management system which includes a global control feature. Global control is used when multiple units (in one location) respond to a single outdoor air sensor. Each energy management system uses a specific type of outdoor sensor which is installed and wired by the controls contractor.

Motorized Outdoor Air Damper – The "GLO" mode is also used when a motorized outdoor air damper is installed in the system.

NOTE - All economizer modes of operation will modulate dampers to 55° F (13° C) supply air.

F-LAGED(H)30/36 Gravity Exhaust Dampers

LAGED(H)30/36 dampers are used with LGA / LCA series units. LAGED dampers are used in downflow and LAGEDH are used in horizontal air discharge applications. LAGED gravity exhaust dampers are installed in the return air cokpartment of the unit (see figure 31). The dampers must be used any time power exhaust fans are applied to LGA / LCA series units and are optional with an economizer.

LAGEDH horizontal gravity exhaust dampers are installed in the return air duct. Gravity exhaust dampers allow exhaust air to be discharged from the system when an economizer and/or power exhaust is operating. Gravity exhaust dampers also prevent outdoor air infiltration during unit off cycle. See installation instructions for more detail.

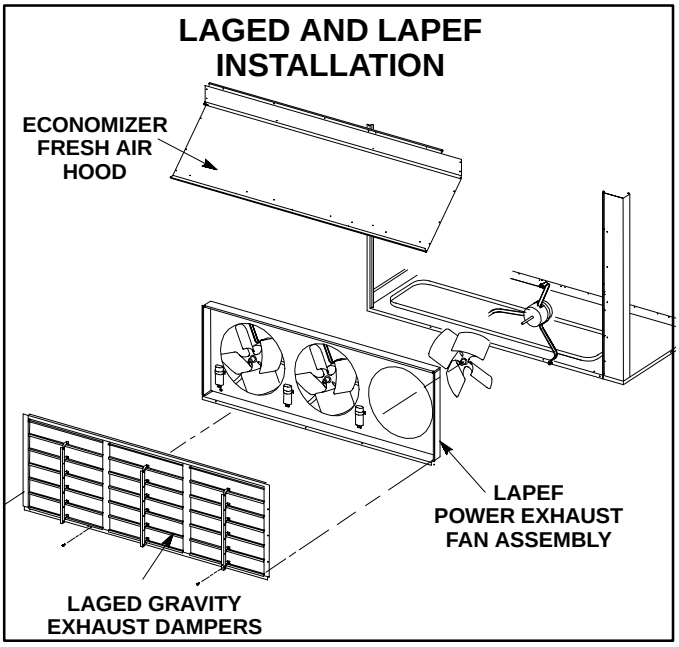


FIGURE 31

G-LAPEF30/36 Power Exhaust Fans

LAPEF30/36 power exhaust fans are used with LGA / LCA series units. LAPEF (requires optional down-flow gravity exhaust dampers and LAREMD economizer) is used in downflow applications only. Power exhaust fans provide exhaust air pressure relief and run when return air dampers are closed and supply air blowers are operating. Figure 31 shows location of the LAPEF. See installation instructions for more detail.

H-Optional Cold Weather Kit (Canada only)

Electric heater is available to automatically control the minimum temperature in the gas burner compartment. Heater is C.G.A. certified to allow cold weather operation of unit down to -60° F (-50° C).

The kit includes the following parts:

1- Transformer (T20) is a 600V to 120/240V stepdown transformer mounted in the blower compartment.

2- T20 has two in line fuses (F20), one on each leg of the transformer. Both are rated at 15 amps.

3- The strip heater (HR6) is located as close as possible to the gas valve. It is wired in series with T20. The strip heater is rated at 500 Watts.

4- A thermostat mounting box is installed on the vestibule of the heating compartment. Included in the box are the following thermostat switches:

a - Thermostat switch (S59) is an auto-reset SPST N.C. switch which opens on a temperature drop. The switch is wired in series with 24v power and the combustion air blower switch. When the temperature drops below -20° F (-28.9° C) the switch opens and the gas heat section is de-energized. The switch automatically resets when the heating compartment temperature reaches 10° F (-12.2° C).

b - Thermostat switch (S60) is an auto-reset SPST N.C. switch which opens on a temperature rise. The switch is wired in series with HR6 and T20. When the temperature rises above 20° F (-6.7° C) the switch opens and the electric heater is de-energized. The switch automatically resets when the heating compartment temperature reaches -10° F (-23.3° C).

c -Thermostat switch (S61) is an auto-reset SPST N.O. switch which closes on a temperature drop. The switch is wired in series with HR6 and T20. When temperature drops below 20° F (-6.7° C) the switch closes and electric heater is energized. The switch automatically opens when heating compartment temperature reaches 50° F (10° C).

I-Control Systems

Three different types of control systems may be used with the LGA / LCA series units. All thermostat wiring is connected to terminal block TB1 located in the control box of the unit. Each thermostat has additional control options available. See thermostat installation instructions for more detail.

1- Electro-mechanical thermostat (13F06)

The electro-mechanical thermostat is a two stage heat / two stage cool thermostat with dual temperature levers. A non-switching or manual system switch subbase may be used.

2- Electronic thermostat (see price book)

Any two stage heat / two stage cool electronic thermostat may be used.

3- Honeywell T7300 thermostat (81G59)

The Honeywell T7300 thermostat is a programmable, internal or optional remote temperature sensing thermostat. The T7300 provides occupied and unoccupied changeover control.

J-Smoke Detectors A17 and A64

Photoelectric smoke detectors are a factory installed option. The smoke detectors can be installed in the supply air section (A64), return air section (A17), or in both the supply and return air section. Wiring for the smoke detectors are shown on the temperature control section (C2) wiring diagram in back of this manual.

K-Blower Proving Switch S52

The blower proving switch monitors blower operation and locks out the unit in case of blower failure. The switch is N.O. and closes at .14" W.C. (34.9 Pa) The switch is mounted on the upper left hand corner of the blower deck. Wiring for the blower proving switch is shown on the temperature control section (C2) wiring diagram in back of this manual.

L-Dirty Filter Switch S27

The dirty filter switch senses static pressure increase indicating a dirty filter condition. The switch is N.O. and closes at 1" W.C. (248.6 Pa) The switch is mounted on the top filter channel corner. Wiring for the dirty filter switch is shown on the temperature control section (C2) wiring diagram in back of this manual. Actuation of this switch does not affect unit operation.

M-Indoor Air Quality (CO_2) Sensor A63

The indoor air quality sensor monitors CO_2 levels and reports the levels to the main control module A55. The board adjusts the economizer dampers according to the CO_2 levels. The sensor is mounted next to the indoor thermostat or in the return air duct. Refer to the indoor air quality sensor installation instructions for proper adjustment. Wiring for the indoor air quality switch is shown on the temperature control section (C2) wiring diagram in back of this manual.

N-LP / Propane Kit

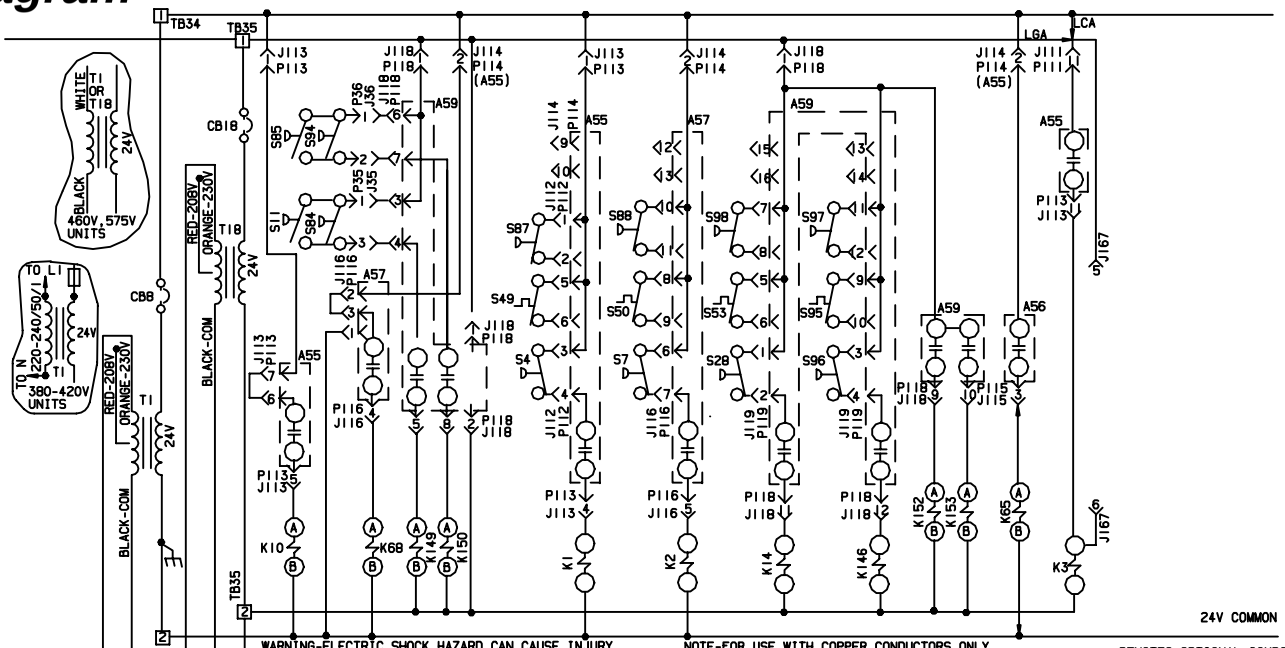
Two natural to LP / propane gas changeover kits are required for gas conversion on LGA300H/360H series units (one for each gas heat section). The kit includes one gas valve, eleven burner orifices, and three stickers. For more detail refer to the natural to LP gas changover kit installation instructions.

VIII-WIRING DIAGRAMS AND OPERATION SEQUENCE

The following pages contain the wiring diagrams for LGA, LCA300/360 series units. An economizer and thermostat are also shown. Each wiring diagram is followed by a sequence of operation. The sequence is outlined by numbered steps which correspond to circled numbers on the wiring diagrams.

Each wiring diagram is identified with a letter A, B, C, or D followed by a number. Each LGA / LCA unit wiring diagram is assigned a "B" number (likewise, each control system is assigned a "C" number, each heating section an "A" number and each economizer diagram a "D" number). Use the numbers when joining the schematics to help you identify how the unit is set up.

B6 diagram



KEY	DESCRIPTION COMPONENT
J167	JACK-BLOWER OVERRIDE,STD
K1.-|	CONTACTOR-COMPRESSOR 1
K2.-|	CONTACTOR-COMPRESSOR 2
K3.-|	CONTACTOR-BLOWER RELAY
K10.-|.2	RELAY-OUTDOOR FAN 1
K14.-|	CONTACTOR-COMPRESSOR 3
K65.-|.2	RELAY-EXHAUST FAN
K68.-|	RELAY-OUTDOOR FAN 2
K148.-|	CONTACTOR-COMPRESSOR 4
K149.-|	RELAY-OUTDOOR FAN 3
K150.-|	RELAY-OUTDOOR FAN 4
K152.-|.2	RELAY-OUTDOOR FAN 5
K153.-|	RELAY-OUTDOOR FAN 6
P18	PLUG-PED
P24	PLUG-EXHAUST FAN
P35	PLUG-TEST,HEAT
P36	PLUG-TEST,COOL
P47	PLUG-OUTDOOR FAN 1
P52	PLUG-OUTDOOR FAN 2
P98	PLUG-BLOWER DECK
P106	PLUG-MOTOR,OUTDOOR FAN 3
P107	PLUG-MOTOR,OUTDOOR FAN 4
P108	PLUG-MOTOR,OUTDOOR FAN 5
P109	PLUG-MOTOR,OUTDOOR FAN 6
P111	PLUG-GAS 1 OUTPUT
P112	PLUG-COOLING SENSOR INPUT
P113	PLUG-BLOWER & COOL 1 CONT
P114	PLUG-SENSOR INPUT
P115	PLUG-ECONOMIZER OUTPUT
P116	PLUG-COMPRESSOR 2
P118	PLUG-COMP 3 & 4 CONTROL
P119	PLUG-COMP 3 & 4 INPUT
P132	PLUG-BLOWER EXHAUST FAN MTR
P133	PLUG-B11 EXHAUST FAN MOTOR
P134	PLUG-B12 EXHAUST FAN MOTOR
P138	PLUG-EXHAUST FAN 2
P139	PLUG-EXHAUST FAN 3
S4	SWITCH-LIMIT,HI PRESS,COMP 1
S7	SWITCH-LIMIT,HI PRESS,COMP 2
S11	SWITCH-LOW PRESS,LOW AMB KIT
S28	SWITCH-LIMIT,HI PRESS,COMP 3
S42	OVERLOAD-RELAY,BLOWER MOTOR
S48	SWITCH-DISCONNECT

KEY	DESCRIPTION COMPONENT
S49	SWITCH-FREEZESTAT,COMP 1
S50	SWITCH-FREEZESTAT,COMP 2
S53	SWITCH-FREEZESTAT,COMP 3
S84	SWITCH-LOW PRESS,LOW AMB COMP 2
S85	SWITCH-LOW PRESS,LOW AMB,COMP 3
S87	SWITCH-LOW PRESS,COMP 1
S88	SWITCH-LOW PRESS,COMP 2
S94	SWITCH-LOW PRESS,LOW AMB,COMP 4
S95	SWITCH-FREEZESTAT,COMP 4
S96	SWITCH-HIGH PRESS,COMP 4
S97	SWITCH-LOW PRESS,COMP 4
S98	SWITCH-LOW PRESS,COMP 3
S117	SWITCH-GFI
T1	TRANSFORMER-CONTROL
T18	TRANSFORMER-CONTACTOR
T29	TRANSFORMER-GFI
TB13	TERMINAL STRIP-POWER DISTRIB
TB34	TERMINAL STRIP-TRANS T1
TB35	TERMINAL STRIP-TRANS T18

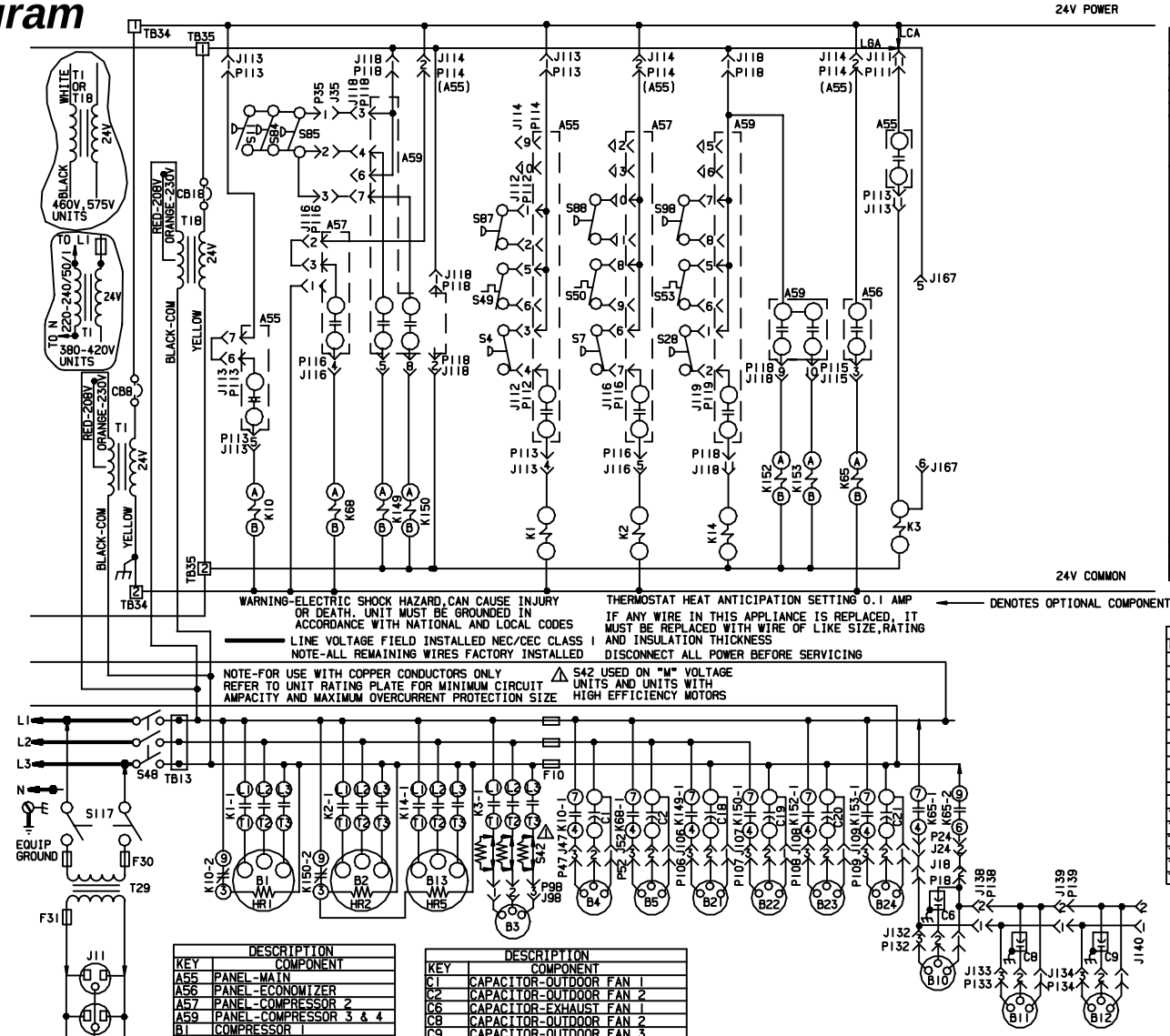
KEY	DESCRIPTION COMPONENT
A55	PANEL-MAIN
A56	PANEL-ECONOMIZER
A57	PANEL-COMPRESSOR 2
A59	PANEL-COMPRESSOR 3 & 4
B1	COMPRESSOR 1
B2	COMPRESSOR 2
B3	MOTOR-BLOWER
B4	MOTOR-OUTDOOR FAN 1
B5	MOTOR-OUTDOOR FAN 2
B10	MOTOR-EXHAUST FAN 1
B11	MOTOR-EXHAUST FAN 2
B12	MOTOR-EXHAUST FAN 3
B13	COMPRESSOR 3
B20	COMPRESSOR 4
B21	MOTOR-OUTDOOR FAN 3
B22	MOTOR-OUTDOOR FAN 4
B23	MOTOR-OUTDOOR FAN 5
B24	MOTOR-OUTDOOR FAN 6
C1	CAPACITOR-OUTDOOR FAN 1
C2	CAPACITOR-OUTDOOR FAN 2
C6	CAPACITOR-EXHAUST FAN 1

KEY	DESCRIPTION COMPONENT
C8	CAPACITOR-EXHAUST FAN 2
C9	CAPACITOR-EXHAUST FAN 3
C18	CAPACITOR-OUTDOOR FAN 3
C19	CAPACITOR-OUTDOOR FAN 4
C20	CAPACITOR-OUTDOOR FAN 5
C21	CAPACITOR-OUTDOOR FAN 6
CB8	CIRCUIT BREAKER-TRANS T1
CB18	CIRCUIT BREAKER-TRANS T18
F10	FUSE-OUTDOOR FAN MOTOR
F30	FUSE-TRANS.T29,PRIMARY
F31	FUSE-TRANS.T29,SECONDARY
HR1	HEATER-COMPRESSOR 1
HR2	HEATER-COMPRESSOR 2
HR5	HEATER-COMPRESSOR 3
HR11	HEATER-COMPRESSOR 4
J11	JACK-GFI RECEPTACLE
J18	JACK-PED
J24	JACK-EXHAUST FAN
J35	JACK-TEST,HEAT

KEY	DESCRIPTION COMPONENT
J36	JACK-TEST,COOL
J47	JACK-OUTDOOR FAN 1
J52	JACK-OUTDOOR FAN 2
J98	JACK-BLOWER DECK
J106	JACK-MOTOR,OUTDOOR FAN 3
J107	JACK-MOTOR,OUTDOOR FAN 4
J108	JACK-MOTOR,OUTDOOR FAN 5
J109	JACK-MOTOR,OUTDOOR FAN 6
J111	JACK-GAS 1 OUTPUT
J112	JACK-COOLING SENSOR INPUT
J113	JACK-BLOWER & COOL 1 CONT
J114	JACK-SENSOR INPUT
J115	JACK-ECONOMIZER OUTPUT
J116	JACK-COMPRESSOR 2
J118	JACK-COMP 3 & 4 CONTROL
J119	JACK-COMP 3 & 4 INPUT
J132	JACK-BLOWER EXHAUST FAN MTR
J133	JACK-B11 EXHAUST FAN MOTOR
J134	JACK-B12 EXHAUST FAN MOTOR
J138	JACK-EXHAUST FAN 2
J139	JACK-EXHAUST FAN 3
J140	JACK-EXHAUST FAN 4

WIRING DIAGRAM	1/98
COMBINATION PACKAGED/ROOFTOP	
LCA,LGA-300-1-G,J,M,Y	
HEAT/COOL SECTION B8	
Supersedes Form No. 532,580W	New Form No. 532,743W

B7 diagram



KEY	DESCRIPTION COMPONENT
J138	JACK-EXHAUST FAN 2
J139	JACK-EXHAUST FAN 3
J140	JACK-EXHAUST FAN 4
J167	JACK-BLOWER OVERRIDE STD
K1,-1	CONTACTOR-COMPRESSOR 1
K2,-1	CONTACTOR-COMPRESSOR 2
K3,-1	CONTACTOR-BLOWER
K10,-1,2	RELAY-OUTDOOR FAN
K14,-1	CONTACTOR-COMPRESSOR 3
K65,-1,2	RELAY-EXHAUST FAN 1
K68,-1	RELAY-OUTDOOR FAN 2
K149,-1,2	RELAY-OUTDOOR FAN 3
K150,-1,2	RELAY-OUTDOOR FAN 4
K152,-1,2	RELAY-OUTDOOR FAN 5
K153,-1	RELAY-OUTDOOR FAN 6
P18	PLUG-PED
P24	PLUG-EXHAUST FAN
P35	PLUG-TEST,HEAT
P47	PLUG-OUTDOOR FAN 1
P52	PLUG-OUTDOOR FAN 2
P98	PLUG-BLOWER DECK
P106	PLUG-MOTOR,OUTDOOR FAN 3
P107	PLUG-MOTOR,OUTDOOR FAN 4
P108	PLUG-MOTOR,OUTDOOR FAN 5
P109	PLUG-MOTOR,OUTDOOR FAN 6
P111	PLUG-GAS 1 OUTPUT
P112	PLUG-COOLING SENSOR INPUT
P113	PLUG-BLOWER & COOL 1 CONT
P114	PLUG-SENSOR INPUT
P115	PLUG-ECONOMIZER OUTPUT
P116	PLUG-COMPRESSOR 2
P118	PLUG-COMP 3 & 4 CONTROL
P119	PLUG-COMP 3 & 4 INPUT
P132	PLUG-B10 EXHAUST FAN MOTOR
P133	PLUG-B11 EXHAUST FAN MOTOR
P134	PLUG-B12 EXHAUST FAN MOTOR
P138	PLUG-EXHAUST FAN 2
P139	PLUG-EXHAUST FAN 3
S4	SWITCH-LIMIT,HI PRESS,COMP 1
S7	SWITCH-LIMIT,HI PRESS,COMP 2
S11	SWITCH-LOW PRESS,LOW AMB KIT

KEY	DESCRIPTION COMPONENT
S28	SWITCH-LIMIT,HI PRESS,COMP 3
S42	OVERLOAD-RELAY,BLOWER MOTOR
S48	SWITCH-DISCONNECT
S49	SWITCH-FREEZESTAT,COMP 1
S50	SWITCH-FREEZESTAT,COMP 2
S53	SWITCH-FREEZESTAT,COMP 3
S84	SWITCH-LOW PRESS,LOW AMB COMP 2
S85	SWITCH-LOW PRESS,LOW AMB,COMP 3
S87	SWITCH-LOW PRESS,COMP 1
S88	SWITCH-LOW PRESS,COMP 2
S98	SWITCH-LOW PRESS,COMP 3
S117	SWITCH-GFI
T1	TRANSFORMER-CONTROL
T18	TRANSFORMER-CONTACTOR
T29	TRANSFORMER-GFI
TB13	TERMINAL STRIP-POWER DISTRIBUTION
TB34	TERMINAL STRIP-TRANS T1
TB35	TERMINAL STRIP-TRANS T18

KEY	DESCRIPTION COMPONENT
A55	PANEL-MAIN
A56	PANEL-ECONOMIZER
A57	PANEL-COMPRESSOR 2
A59	PANEL-COMPRESSOR 3 & 4
B1	COMPRESSOR 1
B2	COMPRESSOR 2
B3	MOTOR-BLOWER
B4	MOTOR-OUTDOOR FAN 1
B5	MOTOR-OUTDOOR FAN 2
B10	MOTOR-EXHAUST FAN 1
B11	MOTOR-EXHAUST FAN 2
B12	MOTOR-EXHAUST FAN 3
B13	COMPRESSOR 3
B21	MOTOR-OUTDOOR FAN 3
B22	MOTOR-OUTDOOR FAN 4
B23	MOTOR-OUTDOOR FAN 5
B24	MOTOR-OUTDOOR FAN 6

KEY	DESCRIPTION COMPONENT
C1	CAPACITOR-OUTDOOR FAN 1
C2	CAPACITOR-OUTDOOR FAN 2
C6	CAPACITOR-EXHAUST FAN 1
C8	CAPACITOR-OUTDOOR FAN 2
C9	CAPACITOR-OUTDOOR FAN 3
C18	CAPACITOR-OUTDOOR FAN 3
C19	CAPACITOR-OUTDOOR FAN 4
C20	CAPACITOR-OUTDOOR FAN 5
C21	CAPACITOR-OUTDOOR FAN 6
CB8	CIRCUIT BREAKER-TRANS T1
CB18	CIRCUIT BREAKER-TRANS T18
F10	FUSE-OUTDOOR FAN MOTOR
F30	FUSE-TRANS.T29,PRIMARY
F31	FUSE-TRANS.T29,SECONDARY
HR1	HEATER-COMPRESSOR
HR2	HEATER-COMPRESSOR 2
HR5	HEATER-COMPRESSOR 3
J11	JACK-GFI RECEPTACLE
J18	JACK-PED

KEY	DESCRIPTION COMPONENT
J24	JACK-EXHAUST FAN
J35	JACK-TEST,HEAT
J47	JACK-OUTDOOR FAN 1
J52	JACK-OUTDOOR FAN 2
J98	JACK-BLOWER DECK
J106	JACK-MOTOR,OUTDOOR FAN 3
J107	JACK-MOTOR,OUTDOOR FAN 4
J108	JACK-MOTOR,OUTDOOR FAN 5
J109	JACK-MOTOR,OUTDOOR FAN 6
J111	JACK-GAS 1 OUTPUT
J112	JACK-COOLING SENSOR INPUT
J113	JACK-BLOWER & COOL 1 CONT
J114	JACK-SENSOR INPUT
J115	JACK-ECONOMIZER OUTPUT
J116	JACK-COMPRESSOR 2
J118	JACK-COMP 3 & 4 CONTROL
J119	JACK-COMP 3 & 4 INPUT
J132	JACK-BLOWER EXHAUST FAN MOTOR
J133	JACK-B11 EXHAUST FAN MOTOR
J134	JACK-B12 EXHAUST FAN MOTOR

WIRING DIAGRAM 4/98

COMBINATION PACKAGED/ROOFTOP

LCA,LGA-360-2-G,J,M,Y

HEAT/COOL SECTION B9

Supersedes Form No.	New Form No.
532,744W	532,832W

Litho U.S.A.

SEQUENCE OF OPERATION
B6 and B7 DIAGRAM - LGA, LCA300/360 G J M Y

Power:

1- Line voltage from TB2, unit disconnect S48, or other factory or field installed optional power disconnects, such as CB10, energizes transformer T1 and T18. Transformer T1 provides 24VAC power to terminal strip TB34 and T18 provides 24VAC power to terminal strip TB35. The two terminal strips provide 24VAC power to the unit cooling, heating and blower controls and thermostat.

2- Terminal strip TB13 is also energized when the unit disconnect closes. TB13 supplies line voltage to compressor crankcase heaters, compressors, blower motors, and fan motors.

Blower Operation (OCP input must be on):

3- The main control module A55 receives a demand from thermostat terminal G. A55 energizes blower contactor K3 with 24VAC.

4- N.O. K3-1 closes, energizing blower B3.

Economizer Operation:

5- The economizer control module A56 receives a demand and energizes exhaust fan relay K65 with 24VAC at 50% (travel) outside air damper open (adjustable).

6- N.O. K65-1 and K65-2 both close, energizing exhaust fan motors B10, B11 and B12.

1st Stage Cooling

7- First stage cooling demand energizes Y1 and G in the thermostat. G energizes blower, if blower is not already running (see step 3).

8- 24VAC is routed through TB34 to the main control module A55. After A55 proves N.C. low pressure switch S87, N.C. freezestat S49, and N.C. high pressure switch S4, compressor contactor K1 is energized.

9- N.O. contacts K1-1 close energizing compressor B1.

10-Control module A55 energizes condenser fan contactor K10.

11- N.O. contacts K10-1 close energizing condenser fan B4 and N.C. contacts K10-2 open de-energizing compressor crankcase heaters HR1 (and HR2 on 300H units).

12- Simultaneous with step 8, 24VAC is routed through the compressor 2 control module A57. After A57 proves N.C. low pressure switch S88, N.C. freezestat S50, and N.C. high pressure switch S7, compressor contactor K2 is energized.

13- N.O. contacts K2-1 close energizing compressor B2.

14- **LGA300**-Compressor 2 control module A57 energizes condenser fan 2 relay K68. Compressor 3 control module A59 energizes condenser fan relay K149 through N.O. low ambient pressure switches S11 or S84.

15- N.O. contacts K68-1 and K149-1 close energizing condenser fans B5 and B21.

16- **LGA360**-Compressor 2 control module A57 energizes condenser fan 2 relay K68. Compressor 3 control module A59 energizes condenser fan relay K149 and K150 through N.O. low ambient pressure switches S11 or S84. A59 also energizes condenser fan relays K152 and K153.

17- N.O. contacts K68-1, K149-1, K150-1, 152-1 and K153-1 close energizing condenser fans B5, B21, B22, B23 and B24. N.C. contacts K150-2 open de-energizing compressor crankase heater HR2 and HR5.

2nd Stage Cooling

18- Second stage cooling demand energizes Y2.

19-**LGA300**-24VAC is routed through TB35 to compressor 3 and 4 module A59. After A59 proves N.C. low pressure switches S98 and S97, N.C. freezestats S53 and S95, and N.C. high pressure switches S28 and S96, compressor contactors K14 and K146 are energized.

20- N.O. contacts K14-1 close energizing compressor B13.

21- N.O. contacts K146-1 close energizing compressor B20.

22-N.O. low ambient pressure switches S85 and S94 close to energize condenser fan relay K150.

23-N.O. contacts K150-1 close energizing condenser fan B22.

24- Compressor 3 and 4 module A59 energizes condenser fan relay K152 and K153.

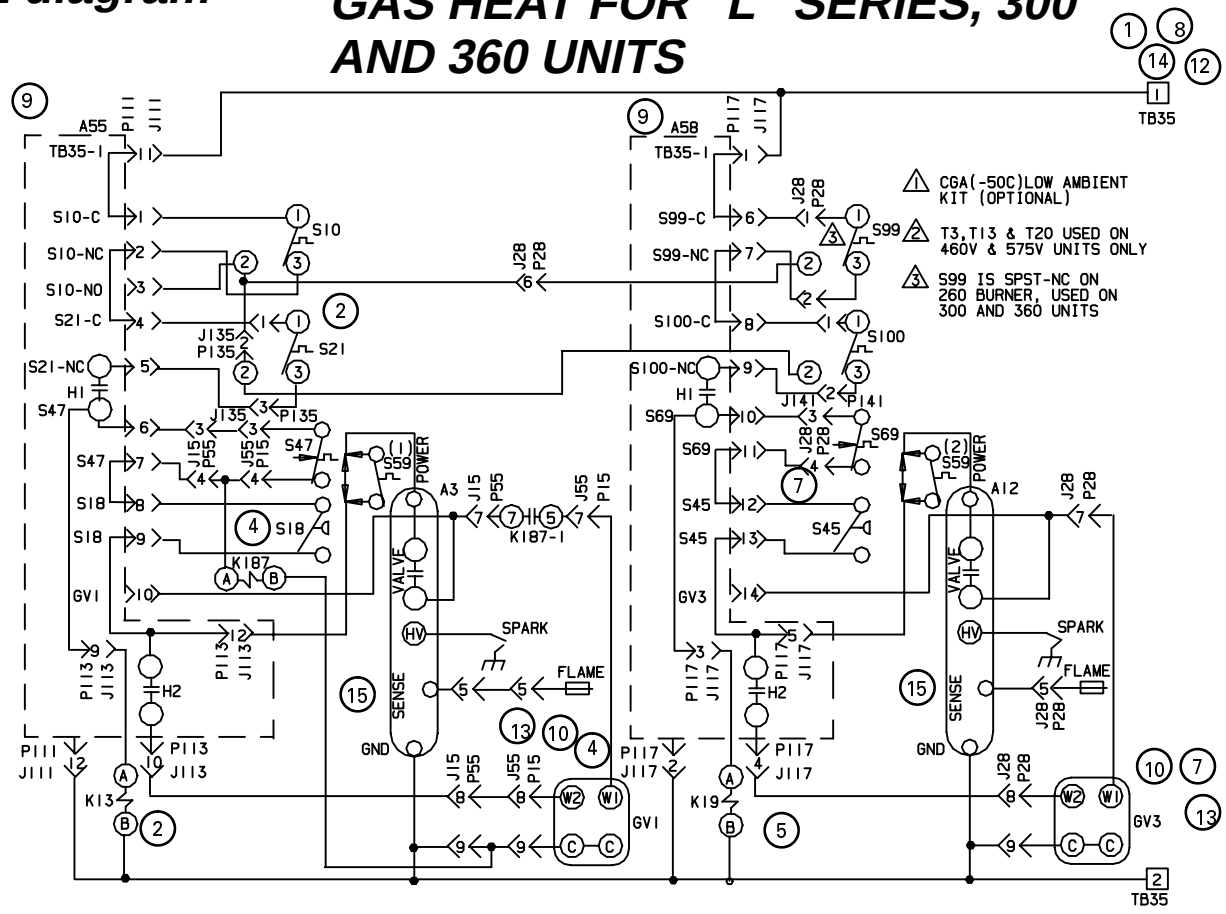
25-N.O. contacts K152-1 and K153-1 close energizing condenser fan B23 and B24. N.C. contacts K152-2 open de-energizing compressor 3 crankcase heater HR5 and compressor 4 crankcase heater HR11.

26-**LGA360**-24VAC is routed through TB35 to compressor 3 module A59. After A59 proves N.C. low pressure switch S98, N.C. freezestat S53 and high pressure switch S28, compressor contactor K14 is energized.

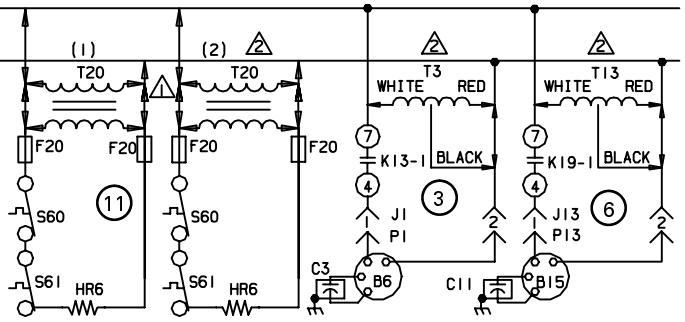
27- N.O. K14-1 contacts close energizing compressor B13.

A2 diagram

GAS HEAT FOR "L" SERIES, 300 AND 360 UNITS



DENOTES OPTIONAL COMPONENTS



DESCRIPTION	
KEY	COMPONENT
A3	CONTROL-BURNER 1
A12	CONTROL-BURNER 2
A55	PANEL-MAIN
A58	PANEL-GAS 2
B6	MOTOR-COMBUSTION AIR BLOWER 1
B15	MOTOR-COMBUSTION AIR BLOWER 2
C3	CAPACITOR-COMB AIR BLOWER,MTR 1
C11	CAPACITOR-COMB AIR BLOWER,MTR 2
F20	FUSE,-50C LOW AMBIENT KIT
GV1	VALVE-GAS 1
GV3	VALVE-GAS 2
HR6	HEATER,-50C LOW AMBIENT KIT
J1	JACK-GAS LIMIT
J13	JACK-GAS
J15	JACK-GAS
J28	JACK-ECONOMIZER PROGRAM
J55	JACK
J111	JACK-GAS 1,OUTPUT
J113	JACK-BLOWER & COOL 1 CONTROL
J117	JACK-GAS 2 CONTROL
J135	JACK-SECONDARY LIMIT
J141	JACK-SEC LIMIT,BURNER 2
K13,-1	RELAY-COMBUSTION AIR BLOWER
K19,-1	RELAY-STAGE 2, HEAT
K187,-1	RELAY-ISOLATION
P1	PLUG-GAS LIMIT
P13	PLUG-GAS
P15	PLUG-GAS
P28	PLUG-ECONOMIZER PROGRAM
P55	PLUG
P111	PLUG-GAS 1,OUTPUT
P113	PLUG-BLOWER & COOL 1 CONTROL
P117	PLUG-GAS 2 CONTROL
P135	PLUG-SECONDARY LIMIT
P141	PLUG-SEC LIMIT,BURNER 2
S10	SWITCH-LIMIT, PRIMARY GAS

DESCRIPTION	
KEY	COMPONENT
S18	SWITCH-COMB AIR BLOWER, PROVE
S21	SWITCH-LIMIT, SEC GAS HEAT
S45	SWITCH-LIMIT,COMB AIR BWR,PROVE 2
S47	SWITCH-FLAME ROLLOUT, BURNER 1
S59	THERMOSTAT,-35 C OPEN,-50 C
S60	THERMOSTAT,-23C CL,-7C OP,-50C LOW AMB KIT
S61	THERMOSTAT,+24C OPEN,-50C LOW AMB KIT

DESCRIPTION	
KEY	COMPONENT
S69	SWITCH-FLAME ROLLOUT 2
S99	SWITCH-LIMIT,PRIMARY BURNER 2
S100	SWITCH-LIMIT,SECOND. BURNER 2
T3	TRANSFORMER-COMB AIR BLOWER 1
T13	TRANSFORMER-COMB AIR BLOWER 2
T20	TRANSFORMER,-50C LOW AMBIENT KIT
TB35	TERMINAL STRIP-TRANS T1

WIRING DIAGRAM	7/98
COMBINATION UNIT-ROOFTOP	
GAS HEAT FOR "L" SERIES,260 AND 470 UNITS (C AND D BOX)	
HEATING SECTION-A2	
Supersedes Form No. 531,827W	New Form No. 532,903W

Litho U.S.A.

SEQUENCE OF OPERATION
A2 DIAGRAM - GAS HEAT FOR "L" SERIES, 300/360UNITS

FIRST STAGE HEAT:

1 - Heating demand initiates at W1 in thermostat.

2 - 24VAC is routed through TB35 to the main control module A55. After A55 proves N.C. primary limit S10 and N.C. secondary limit S21 the combustion air blower relay K13 is energized.

3 - N.O. K13-1 contacts close allowing line voltage (or transformer T3 in 460V and 575V only) to energize combustion air blower B6.

4 - After the combustion air blower B6 has reached full speed, the combustion air proving switch (S18) contacts close. The A55 routes 24VAC through N.C. burner 1 flame rollout switch S47 and the closed contacts of the combustion air proving switch (S18) to energize the ignition module A3. After a 30 second delay A3 energizes the W1 terminal (low fire) of gas valve GV1.

5 - As steps 2, 3 and 4 occur, 24VAC is also routed to the gas valve control module A58. After A58 proves N.C. primary gas heat limit S99 and N.C. secondary limit S100 the combustion air blower relay K19 is energized.

6 - N.O. K19-1 contacts close allowing line voltage (or transformer T13 in 460V and 575V only) to energize combustion air blower B15.

7 - After the combustion air blower B15 has reached full speed, the combustion air proving switch (S45) contacts close. The A58 routes 24VAC through N.C. burner 2 flame rollout switch S69 and the closed contacts of the combustion air proving switch (S45) to energize the ignition module A12. After a 30 second delay A12 energizes the W1 terminal (low fire) of gas valve GV3. Indoor blower energizes after time delay Time delay is field adjustable with a factory set default of 40 seconds.

SECOND STAGE HEAT:

8 - With first stage heat operating, an additional heating demand initiates W2 in the thermostat.

9 - A second stage heating demand is received by both A55 and A58 modules.

10 - Each module will energize the corresponding W2 terminal (high fire) of gas valves GV1 and GV3 respectively.

OPTIONAL LOW AMBIENT KIT
(C.G.A. -50° C LOW AMBIENT KIT):

11 - Line voltage (or transformer T20 in 460V and 575V only) is routed through the low ambient kit fuses F20 and N.C. low ambient kit thermostats S60 and S61 to energize low ambient kit heater HR6.

END OF SECOND STAGE HEAT:

12 - Heating demand is satisfied. Terminal W2 is de-energized.

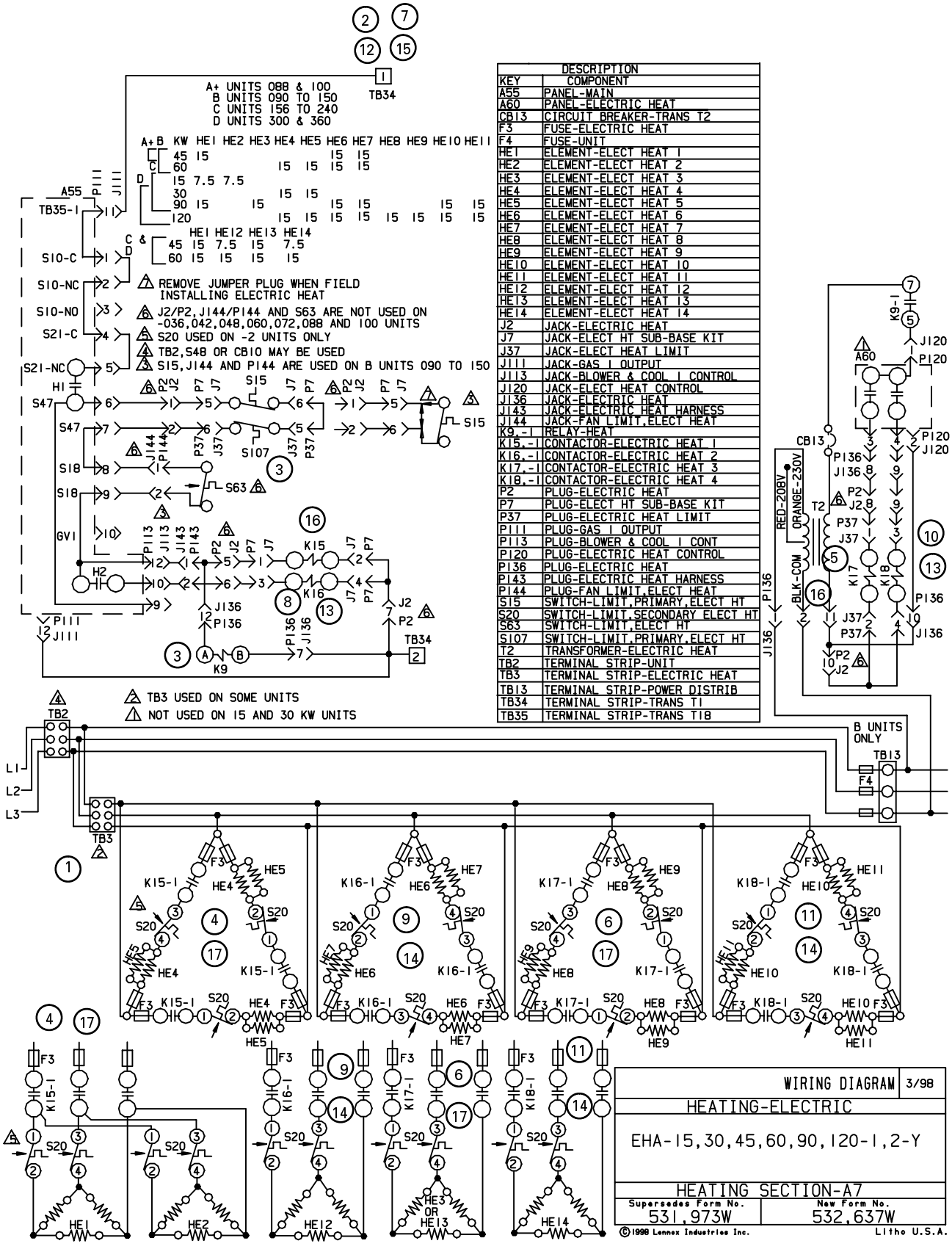
13 - Terminals W2 (high fire) of GV1 and GV3 are de-energized by the A55 and A58 Module.

END OF FIRST STAGE HEAT:

14 - Heating demand is satisfied. Terminal W1 is de-energized.

15 - Ignition module A3 is de-energized by A55 in turn de-energizing terminal W1 of GV1. Combustion blower relay K13 is also de-energized. At the same instant, ignition module A12 is de-energized by A58 module in turn de-energizing the W1 terminal of GV3. K19 combustion air blower relay is also de-energized.

A7 diagram EHA-30, 45, 60, 90, 120 - Y



DESCRIPTION	
KEY	COMPONENT
A55	PANEL-MAIN
A60	PANEL-ELECTRIC HEAT
CB13	CIRCUIT BREAKER-TRANS T2
F3	FUSE-ELECTRIC HEAT
F4	FUSE-UNIT
HE1	ELEMENT-ELECT HEAT 1
HE2	ELEMENT-ELECT HEAT 2
HE3	ELEMENT-ELECT HEAT 3
HE4	ELEMENT-ELECT HEAT 4
HE5	ELEMENT-ELECT HEAT 5
HE6	ELEMENT-ELECT HEAT 6
HE7	ELEMENT-ELECT HEAT 7
HE8	ELEMENT-ELECT HEAT 8
HE9	ELEMENT-ELECT HEAT 9
HE10	ELEMENT-ELECT HEAT 10
HE11	ELEMENT-ELECT HEAT 11
HE12	ELEMENT-ELECT HEAT 12
HE13	ELEMENT-ELECT HEAT 13
HE14	ELEMENT-ELECT HEAT 14
J2	JACK-ELECTRIC HEAT
J7	JACK-ELECT HT SUB-BASE KIT
J37	JACK-ELECT HEAT LIMIT
J111	JACK-GAS 1 OUTPUT
J113	JACK-BLOWER & COOL 1 CONTROL
J120	JACK-ELECT HEAT CONTROL
J136	JACK-ELECTRIC HEAT
J143	JACK-ELECTRIC HEAT HARNESS
J144	JACK-FAN LIMIT, ELECT HEAT
K9,-1	RELAY-HEAT
K15,-1	CONTACTOR-ELECTRIC HEAT 1
K16,-1	CONTACTOR-ELECTRIC HEAT 2
K17,-1	CONTACTOR-ELECTRIC HEAT 3
K18,-1	CONTACTOR-ELECTRIC HEAT 4
P2	PLUG-ELECTRIC HEAT
P7	PLUG-ELECT HT SUB-BASE KIT
P37	PLUG-ELECTRIC HEAT LIMIT
P111	PLUG-GAS 1 OUTPUT
P113	PLUG-BLOWER & COOL 1 CONT
P120	PLUG-ELECTRIC HEAT CONTROL
P136	PLUG-ELECTRIC HEAT
P143	PLUG-ELECTRIC HEAT HARNESS
P144	PLUG-FAN LIMIT, ELECT HEAT
S15	SWITCH-LIMIT, PRIMARY, ELECT HT
S20	SWITCH-LIMIT, SECONDARY ELECT HT
S63	SWITCH-LIMIT, ELECT HT
S107	SWITCH-LIMIT, PRIMARY, ELECT HT
T2	TRANSFORMER-ELECTRIC HEAT
TB2	TERMINAL STRIP-UNIT
TB3	TERMINAL STRIP-ELECTRIC HEAT
TB13	TERMINAL STRIP-POWER DISTRIB
TB34	TERMINAL STRIP-TRANS T1
TB35	TERMINAL STRIP-TRANS T18

WIRING DIAGRAM	3/98
HEATING-ELECTRIC	
EHA-15,30,45,60,90,120-1,2-Y	
HEATING SECTION-A7	
Supersedes Form No. 531,973W	New Form No. 532,637W

Litho U.S.A.

SEQUENCE OF OPERATION
A7 DIAGRAM - EHA-30, 45, 60, 90, 120 - Y
A6 DIAGRAM - EHA-30, 45, 60, 90, 120 - G, J

Diagrams A7 and A6 are the EHA electric heat sections used in the LHA and LCA units. The Y voltage diagram (A7) use elements configured in a Wye. The G and J voltage diagram (A6) use elements configured in a Delta. Both diagrams A7 and A6 follow the following sequence of operation:

NOTE:Two electric heat sections are used in all 30kW through 120kW heaters. The heat sections are labelled first electric heat section (left side) and second electric heat section (right side). See figure 23.

NOTE: In the case of EHA 30kW, the second heat section (right side) is a slave (only has electric heat elements and a limit). In this case the A60 module, T2 transformer, and K9 heat relay are not used. Line voltage is supplied to elements in both heat section one (left side) and two (right side) by the contactors in heat section one (left side) and all control is through the A55 module.

HEATING ELEMENTS:

1 - Terminal strip TB3 is energized when the unit disconnect closes. TB3 supplies line voltage to electric heat elements HE1 through HE14. Each heating element is protected by fuse F3.

FIRST STAGE HEAT:

2 - Heating demand initiates at W1 in thermostat.

3 - 24VAC is routed through TB34 to the main control module A55. After A55 proves N.C. primary limits S15 (heat section one, left side), S107 (heat section two, right side), and redundant electric heat limit S63, the electric heat contactor K15 and heat relay K9 are energized. Indoor blower is energized with no time delay.

4 - N.O. contact K15-1 closes allowing the first bank of elements in heat section one (left side) to be energized.

5 - At the same time, line voltage is routed through transformer T2, which provides 24VAC to the electric heat control module A60. A60 is energized when N.O. contacts K9-1 close. A N.O. contact in A60 closes, energizing electric heat relay K17.

6 - N.O. contacts K17-1 close allowing the first set of elements in heat section two (right side) to be energized.

SECOND STAGE HEAT:

7 - With the first stage heat operating, an additional heating demand initiates at W2 in the thermostat.

8 - 24VAC is routed through the main control module A55, which in turn energizes the electric heat contactor K16.

9 - N.O. contacts K16-1 close allowing the second set of elements in heat section one (left side) to be energized.

10 - Simultaneous with step eight, a N.O. contact in the electric heat control module A60 closes, allowing 24VAC to energize electric heat contactor K18.

11 - N.O. contacts K18-1 close allowing the second set of elements in heat section two (right side) to be energized.

END OF SECOND STAGE HEAT:

12 - Heating demand is satisfied. Terminal W2 in the thermostat is de-energized.

13 - Electric heat contactors K16 and K18 are de-energized.

14 - The second set of electric heat elements in heat sections one (left side) and two (right side) are de-energized.

END OF FIRST STAGE HEAT:

15 - Heating demand is satisfied. Terminal W1 in the thermostat is de-energized.

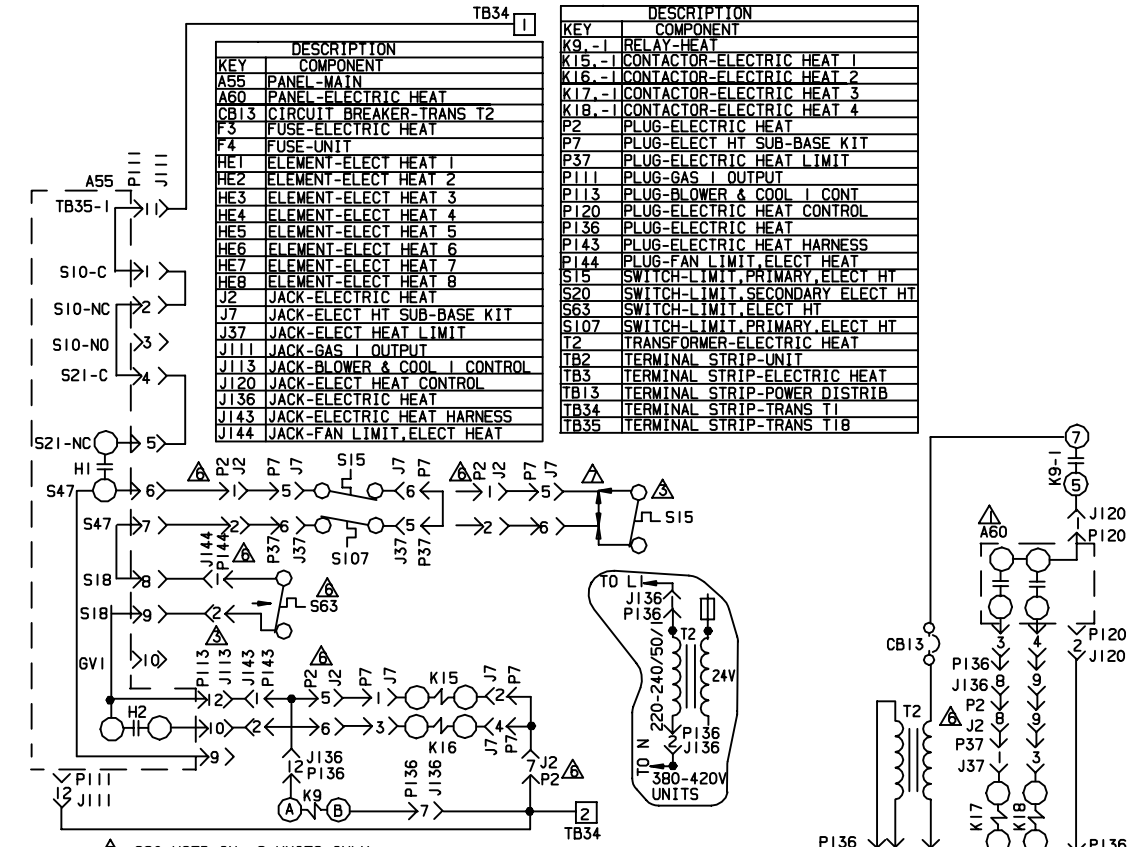
16 - Electric heat contactors K15 and K17 are de-energized.

17 - The first set of electric heat elements in heat sections one (left side) and two (right side) are de-energized.

A6 diagram EHA-30, 45, 60, 90, 120 - G, J

KEY	COMPONENT
A55	PANEL-MAIN
A60	PANEL-ELECTRIC HEAT
CB13	CIRCUIT BREAKER-TRANS T2
F3	FUSE-ELECTRIC HEAT
F4	FUSE-UNIT
HE1	ELEMENT-ELECT HEAT 1
HE2	ELEMENT-ELECT HEAT 2
HE3	ELEMENT-ELECT HEAT 3
HE4	ELEMENT-ELECT HEAT 4
HE5	ELEMENT-ELECT HEAT 5
HE6	ELEMENT-ELECT HEAT 6
HE7	ELEMENT-ELECT HEAT 7
HE8	ELEMENT-ELECT HEAT 8
J2	JACK-ELECTRIC HEAT
J7	JACK-ELECT HT SUB-BASE KIT
J37	JACK-ELECT HEAT LIMIT
J111	JACK-GAS 1 OUTPUT
J113	JACK-BLOWER & COOL 1 CONTROL
J120	JACK-ELECT HEAT CONTROL
J136	JACK-ELECTRIC HEAT
J143	JACK-ELECTRIC HEAT HARNESS
J144	JACK-FAN LIMIT,ELECT HEAT

KEY	COMPONENT
K9,-1	RELAY-HEAT
K15,-1	CONTACTOR-ELECTRIC HEAT 1
K16,-1	CONTACTOR-ELECTRIC HEAT 2
K17,-1	CONTACTOR-ELECTRIC HEAT 3
K18,-1	CONTACTOR-ELECTRIC HEAT 4
P2	PLUG-ELECTRIC HEAT
P7	PLUG-ELECT HT SUB-BASE KIT
P37	PLUG-ELECTRIC HEAT LIMIT
P111	PLUG-GAS 1 OUTPUT
P113	PLUG-BLOWER & COOL 1 CONT
P120	PLUG-ELECTRIC HEAT CONTROL
P136	PLUG-ELECTRIC HEAT
P143	PLUG-ELECTRIC HEAT HARNESS
P144	PLUG-FAN LIMIT,ELECT HEAT
S15	SWITCH-LIMIT,PRIMARY,ELECT HT
S20	SWITCH-LIMIT,SECONDARY ELECT HT
S63	SWITCH-LIMIT,ELECT HT
S107	SWITCH-LIMIT,PRIMARY,ELECT HT
T2	TRANSFORMER-ELECTRIC HEAT
TB2	TERMINAL STRIP-UNIT
TB3	TERMINAL STRIP-ELECTRIC HEAT
TB13	TERMINAL STRIP-POWER DISTRIB
TB34	TERMINAL STRIP-TRANS T1
TB35	TERMINAL STRIP-TRANS T18



3 S20 USED ON -2 UNITS ONLY
4 TB2,S48 OR CB10 MAY BE USED
3 S15,J144 AND P144 ARE USED ON B UNITS 090 TO 150
5 TB3 IS USED ON SOME UNITS NOT USED ON 15 AND 30KW UNITS
7 REMOVE JUMPER PLUG WHEN FIELD INSTALLING ELECTRIC HEAT
6 J2/P2,J144/P144 AND S63 NOT USED ON -036,042,048, 060,072,088 AND 100 UNITS

A+ UNITS 088 & 100
B UNITS 090 TO 150
C UNITS 156 TO 240
D UNITS 300 & 360

	B KW	HE1	HE2	HE1A	HE2A	HE3	HE4	HE5	HE6	HE7	HE8
A+	45	15				15	15				
C	60	15	15			15	15				
D	15			7.5	7.5						
	30			15	15						
	45	15				7.5		15		7.5	
	60	15				15		15		15	
	90	15				15	15	15		15	15
	120	15	15			15	15	15	15	15	15

WIRING DIAGRAM 3/98

HEATING-ELECTRIC

EHA-15,30,45,60,90,120-1,2-G,J,M

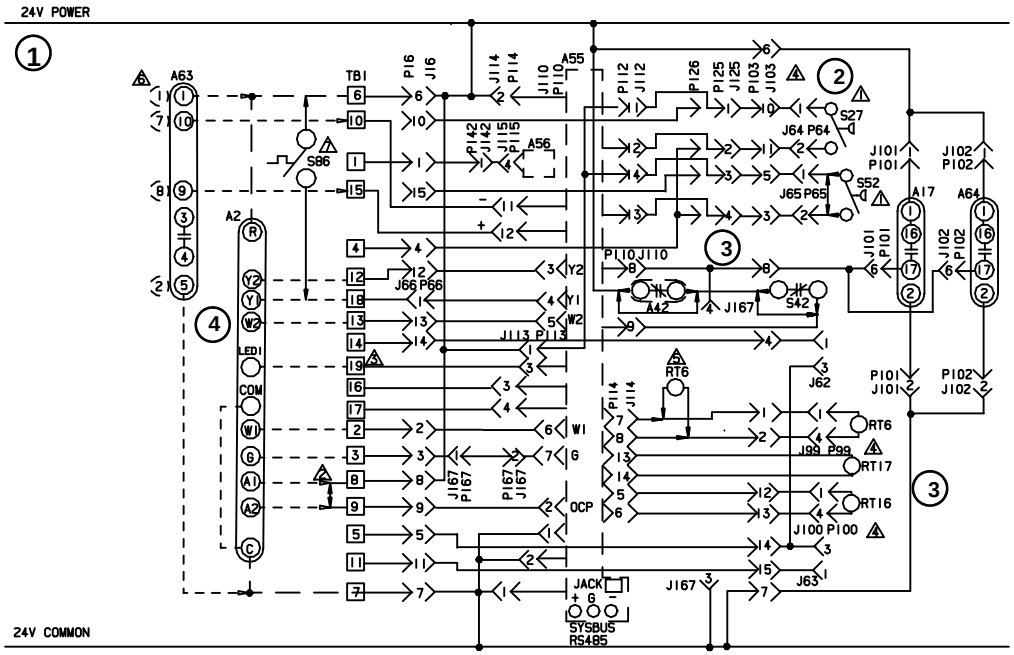
HEATING SECTION-A6

Supersedes Form No.	New Form No.
531,972W	532,636W

Litho U.S.A.

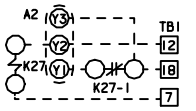
C2 diagram

ELECTRONIC OR ELECTROMECHANICAL THERMOSTAT



KEY	DESCRIPTION COMPONENT
A2	SENSOR-ELECTRONIC
A17	DETECTOR-SMOKE
A42	MONITOR-PHASE PROTECTION
A55	PANEL-MAIN
A56	PANEL-ECONOMIZER
A63	SENSOR-CO2(IAQ)
A64	DETECTOR-SMOKE,SUPPLY AIR
J16	JACK-UNIT
J62	JACK-A2 RETURN AIR SENSOR
J63	JACK-RTI DISCH. AIR SENSOR
J64	JACK-S27 FILTER SWITCH
J65	JACK-S52 FAN SWITCH
J66	JACK-COOL 1 INTERFACE
J99	JACK-DISCHARGE TEMP SENSOR
J100	JACK-RETURN TEMP SENSOR
J101	JACK-SMOKE DETECTOR,RETURN AIR
J102	JACK-SMOKE DETECTOR,SUPPLY AIR
J103	JACK-SENSORS,CONTROL
J110	JACK-THERMOSTAT INPUT
J112	JACK-COOLING SENSOR INPUT
J113	JACK-BLOWER & COOL 1 CONTROL
J114	JACK-SENSOR INPUT
J115	JACK-ECONOMIZER OUTPUT
J125	JACK-BLOWER PROVING
J126	JACK-JUMPER,BLOWER PROVING
J142	JACK-ECONOMIZER HARNESS
J167	JACK-BLOWER OVERRIDE,STD
K27,-1	RELAY-TRANSFER 2
P16	PLUG-UNIT
P64	PLUG-S27 FILTER SWITCH
P65	PLUG-S50 FAN SWITCH
P66	PLUG-COOL ONE
P99	PLUG-DISCHARGE TEMP SENSOR
P100	PLUG-RETURN TEMP SENSOR
P101	PLUG-SMOKE DETECTOR,RETURN AIR
P102	PLUG-SMOKE DETECTOR,SUPPLY AIR

KEY	DESCRIPTION COMPONENT
P103	PLUG-SENSORS,CONTROL
P110	PLUG-THERMOSTAT INPUT
P112	PLUG-COOLING SENSOR INPUT
P113	PLUG-BLOWER & COOL 1 CONTROL
P114	PLUG-SENSOR INPUT
P115	PLUG-ECONOMIZER OUTPUT
P125	PLUG-BLOWER PROVING
P126	PLUG-JUMPER,BLOWER PROVING
P142	PLUG-ECONOMIZER HARNESS
P167	PLUG-BLOWER OVERRIDE,STD
RT6	SENSOR-A55 DISCHARGE (IMC)
RT16	SENSOR-RETURN AIR TEMP
RT17	SENSOR-OUTSIDE AIR TEMP
S27	SWITCH-FILTER
S42	OVERLOAD-RELAY,BLOWER MOTOR
S52	SWITCH-AIR FLOW
S86	SWITCH-DEHUMIDISTAT 65F860I
TB1	TERMINAL STRIP-24V CLASS II



THERMOSTAT HOOKUP FOR SELECTABLE OPTION #3, ECTO 5.04 ON W1-5 IMC BOARD (A55)

TO PROVIDE THREE COMPRESSOR STAGES. REQUIRES 3 HEAT,3 COOL THERMOSTAT AND K27 RELAY

1. S27 AND S52 ARE OPTIONAL
2. REMOVE JUMPER WHEN OCCUPIED-UNOCCUPIED OPERATION IS DESIRED. UNIT REMAINS IN OCCUPIED OPERATION WITH JUMPER
3. TB1-I9 IS SERVICE RELAY OUTPUT (24VAC). IF USED CONNECT TO A INDICATOR LIGHT OR RELAY COIL (MAX 4VA)
4. J99/P99,J100/P100 AND J103/P103 ARE NOT USED ON-036,042,048,060,072,088 AND 100 UNITS
5. ALTERNATE REMOTE LOCATION OF RT6
6. ALTERNATE TERMINAL DESIGNATIONS WHEN USING ENGELHARD 8000 SERIES SENSOR
7. USE S86 DEHUMIDISTAT FOR OPTIONAL REHEAT SCHEME. SET PARAMETER 4.24 TO CONTROL VALVE 1 FOR SIMULTANEOUS HEATING AND COOLING

DESIGNATES OPTIONAL WIRING

CLASS II FIELD WIRING

WIRING DIAGRAM	4/99
ACCESSORIES	
ELECTRONIC OR ELECTROMECHANICAL THERMOSTAT FOR "L" SERIES UNITS	
TEMPERATURE CONTROL SECTION C2	
Supersedes Form No. 531,279W	New Form No. 532,583W

 Litho U.S.A.

SEQUENCE OF OPERATION
C2 DIAGRAM - ELECTRONIC OR ELECTROMECHANICAL THERMOSTAT

POWER:

1 - Terminal strip TB34 energizes the thermostat components with 24VAC via TB1.

OPERATION:

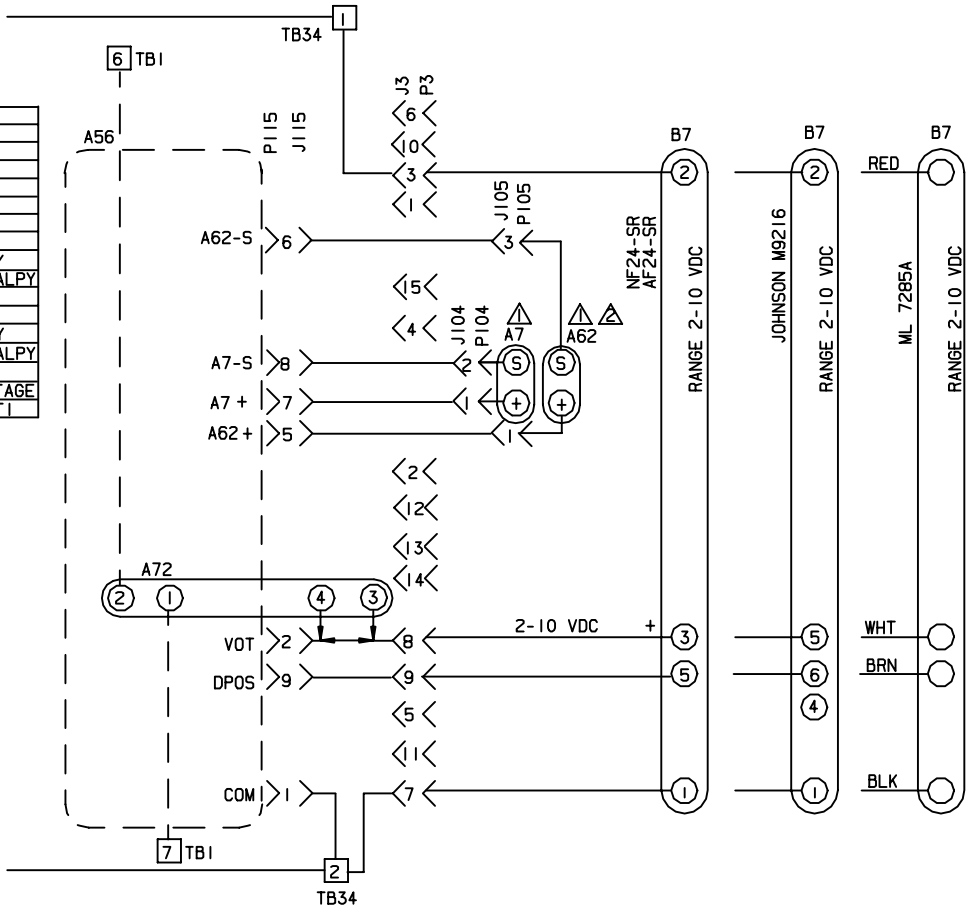
2 - The main control module A55 proves the optional N.O. filter switch S27(indicates dirty filter when closed), optional N.O. air flow switch S52(indicates no air [i.e. broken belt] system shuts down), and optional C.G.A. -50°C low ambient kit thermostat S59 (used in C.G.A. units only).

3 - The main control module A55 receives data from the supply and return smoke detectors A17 and A64, optional phase protection monitor A42, blower motor overload relay S42, discharge sensor RT6, return air sensor RT16, and the outdoor air sensor RT17.

4 - The main control module A55 receives data from the electronic thermostat A2 (Y1, Y2, W1, W2, G, OCP) and the CO_2 sensor (if economizer is used) via terminal strip TB1. A55 energizes the appropriate components.

D1 diagram *"L" SERIES ECONOMIZER*

DESCRIPTION	
KEY	COMPONENT
A7	SENSOR-SOLID STATE ENTHALPY
A56	PANEL-ECONOMIZER
A62	SENSOR-ENTHALPY, INDOOR
A72	CONTROL-REMOTE, MIN POS(OPT)
B7	MOTOR-DAMPER
J3	JACK-UNIT ECONOMIZER
J104	JACK-SENSOR, OUTDOOR ENTHALPY
J105	JACK-SENSOR, RETURN AIR ENTHALPY
J115	JACK-ECONOMIZER, OUTPUT
P3	PLUG-UNIT ECONOMIZER
P104	PLUG-SENSOR, OUTDOOR ENTHALPY
P105	PLUG-SENSOR, RETURN AIR ENTHALPY
P115	PLUG-ECONOMIZER, OUTPUT
TB1	TERMINAL STRIP-CLASS II VOLTAGE
TB34	TERMINAL STRIP-TRANSFORMER TI



NOTE: THIS DIAGRAM USED ONLY WHEN ECONOMIZER OR MOTORIZED OUTDOOR AIR DAMPERS ARE INSTALLED

⚠1 DELETE A7 AND A62 (IF USED) FOR EITHER GLOBAL ENTHALPY OR SENSIBLE TEMPERATURE CONTROL

⚠2 FOR UNIT DIFFERENTIAL ENTHALPY CONTROL, ADD A62 RETURN AIR ENTHALPY SENSOR

WIRING DIAGRAM	8/97
ACCESSORIES	
"L" SERIES ECONOMIZER AND MOTORIZED OUTSIDE AIR DAMPER	
ECONOMIZER-SECTION D1	
Supersedes Form No. 531,713W	New Form No. 531,770W

SEQUENCE OF OPERATION
D1 DIAGRAM - "L" SERIES ECONOMIZER

POWER:

1 - Terminal strip TB34 energizes the economizer components with 24VAC.

OPERATION:

2 - The main control module A55 along with outdoor enthalpy sensor A7 and indoor enthalpy sensor A62 (if differential enthalpy is used) communicates to the economizer control module A56 when to power the damper motor B7.

3 - The economizer control module A56 supplies B7 with 0 - 10 VDC to control the positioning of economizer.

4 - The damper actuator provides 2 to 10 VDC position feedback.

NOTES