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II. ECM TROUBLE SHOOTING

A. DIAGNOSTC FEATURES

The control board is equipped with 4 green Input Status LEDs and 1 red Board Status LED. These are intended to provide a quick view into furnace performance without requiring a voltmeter.

The green Input Status LEDs are driven by the "Y", "W", "G", and "DEHUM" inputs and are located directly below those inputs. They will light to indicate the presence of these signals.

The red Board Status LED has two functions:

It will light when the board recognizes a valid input signal and will stay lit until all valid signals are removed. This is intended to show that the board is functioning and able to respond to input signals.

It will flash rapidly while120VAC is missing from the LIMIT switch. This is intended to give a quick visual indication of the High LIMIT switch.

B. GENERAL GUIDELINES TO TROUBLESHOOTING GE ECM – DRIVEN SYSTEMS

⚠CAUTION: Disconnect power from unit before removing or replacing connectors, or servicing motor. Wait at least 2 minutes after disconnecting power before opening motor.

SYMPTOM	CAUSE/PROCEDURE
Motor rocks slightly when starting	• This is normal start-up for ECM
Motor won't start • No movement	• Check power at motor • Check low voltage (24 VAC R to C) at motor • Check low voltage connections (G,PWM,W,R,C,) at motor • Check for unseated pins in connectors on motor harness • Test with a temporary jumper between R – G • Check motor for tight shaft • Run **Moisture Check**
• Motor rocks, but won't start	• Check for loose or compliant motor mount • Make sure blower wheel is tight on shaft • Perform motor/control replacement check
Motor oscillates up & down while being tested off of blower	• It is normal for motor to oscillate with no load on shaft.
Motor starts, but runs erratically • Varies up and down or intermittent	• Check line voltage for variation or "sag" • Check low voltage connections (G,PWM,W,R,C,) at motor, unseated pins in motor harness connectors • Check "Bk" for erratic CFM command (in variable speed applications) • Check-out system controls – T'stat? • Perform Moisture Check
• "Hunts" or "puffs" at high CFM (speed)	• Does removing panel or filter reduce "puffing"? ➢ Reduce restriction ➢ Reduce max airflow
• Stays at low CFM despite system call for cool or heat CFM	• Check low voltage (T'stat) wires and connections

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	• Verify fan is not in delay mode – wait until delay complete • "R" missing/not connected at motor
• Stays at high CFM	• "R" missing/not connected at motor • Is fan in delay mode? – wait until delay time complete
• Blower won't shut off	• Current leakage from controls into G,Y or W?

Excessive noise	• Determine if it's air noise, cabinet, duct or motor noise – interview customer, if necessary
• Noisy blower or cabinet	• Check for loose blower housing, panels, etc. • High static creating high blower speed? ➢ Check for air whistling thru seams in ducts, cabinets or panels ➢ Check for cabinet/duct deformation
• "Hunts" or "puffs" at high CFM (speed)	• Does removing panel or filter reduce "puffing"? ➢ Reduce restriction ➢ Reduce max airflow
Evidence of Moisture	
• Motor failure or malfunction has occurred and moisture is present	• Replace motor and perform **Moisture Check**
• Evidence of moisture present inside air mover	• Perform **Moisture Check**

DO	**DON'T**
• Check-out motor, controls, wiring and connections thoroughly before replacing motor	• Automatically assume the motor is bad.
• Orient connectors down so water can't get in ➢ Install "drip loops"	• Locate connectors above 7 and 4 o'clock positions
• Use authorized motor and control model #'s for replacement	• Replace one motor or control model # with another (unless an authorized replacement)
• Keep static pressure to a minimum: ➢ Recommend high efficiency, low static filters ➢ Recommend keeping filters clean ➢ Design ductwork for min static, max comfort ➢ Look for and recommend ductwork improvement, where necessary, in replacement	• Use high pressure drop filters – some have ½" H_2O drop! • Use restricted returns
• Size the equipment wisely	• Oversize system then compensate with low airflow
• Check orientation before inserting motor connectors	• Plug in power connector backwards • Force plugs

Moisture Check

- Connectors are orientated "down" (or as recommended by equipment manufacturer)
- Arrange harnesses with "drip loop" under motor
- Is condensate drain plugged?
- Check for low airflow (too much latent capacity)
- Check for undercharged condition

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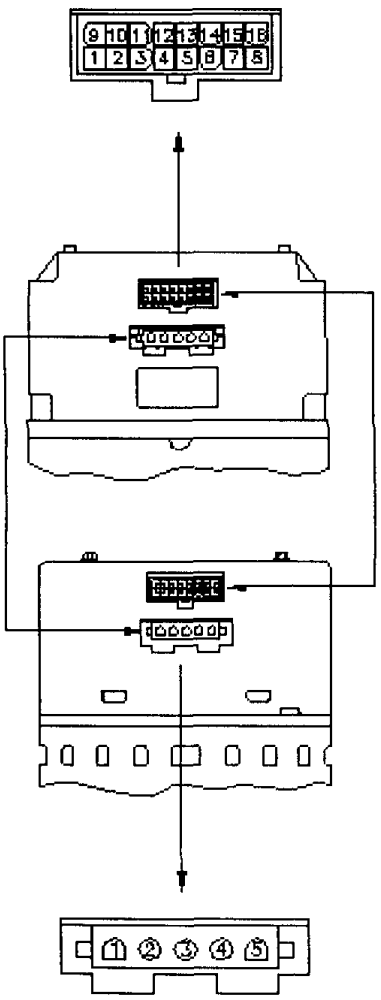
- Check and plug leaks in return ducts, cabinet

Comfort Check

- Check proper airflow settings
- Low static pressure for lowest noise
- Set low continuous-fan CFM
- T'stat in bad location?



CONTROL CONNECTOR ***	
PWB HEADER | AMP 770974-1	
PIN	DESCRIPTION
1	C1
2	W/W1
3	C2
4	DELAY
5	COOL
6	Y1
7	ADJUST
8	OUT-
9	O
10	BK/PWM
11	HEAT
12	R
13	EM/W2
14	Y/Y2
15	G
16	OUT+

*** SUGGESTED MATING CONNECTOR
HOUSING – AMP 770583-1
CONTACT – AMP 770904-1

POWER CONNECTOR *	
PWB HEADER | AMP 1-350949-0	
PIN	DESCRIPTION
1	JUMPER PIN 1 TO PIN 2 FOR 120VAC LINE INPUT *ONLY* **
2	
3	CHASSIS GROUND
4	AC LINE
5	AC LINE

* SUGGESTED MATING CONNECTOR
HOUSING – AMP 1-480763-1
CONTACT – AMP 350537-1

**** WARNING - APPLYING 240VAC LINE INPUT WITH PIN 1 TO PIN 2 JUMPER IN PLACE WILL PERMANENTLY DAMAGE UNIT.**

Figure 3: ECM PIN CONNECTORS

Troubleshooting table above and Figure 2 adapted from GE Industrial Systems publication GED-7161C, "Troubleshooting GE ECM – Driven Systems".

C. TROUBLESHOOTING CHARTS

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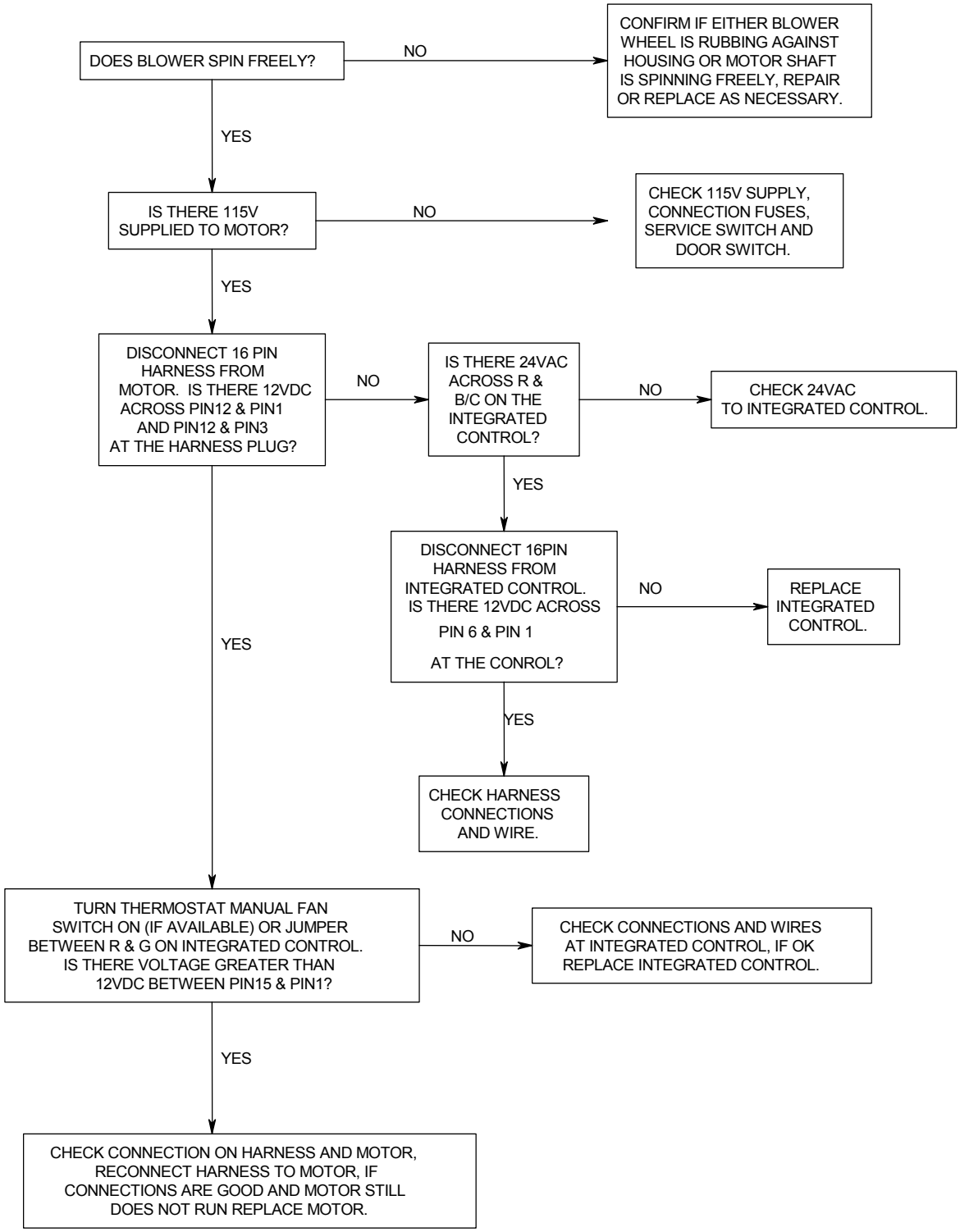
THIS GUIDE SHOULD BE USED IN THE CASE OF A STOPPED OR MANFUNCTIONED ECM BLOWER MOTOR. THE FOLLOWING SHOULD HELP ESTABLISH THE TYPE OF MALFUNCTION OR DEVIATION FROM THE NORMAL BLOWER OPERATION.

TO USE THIS DIAGRAM, YOU JUST NEED TO FOLLOW THE INSTRUCTIONS IN THE BOXES.



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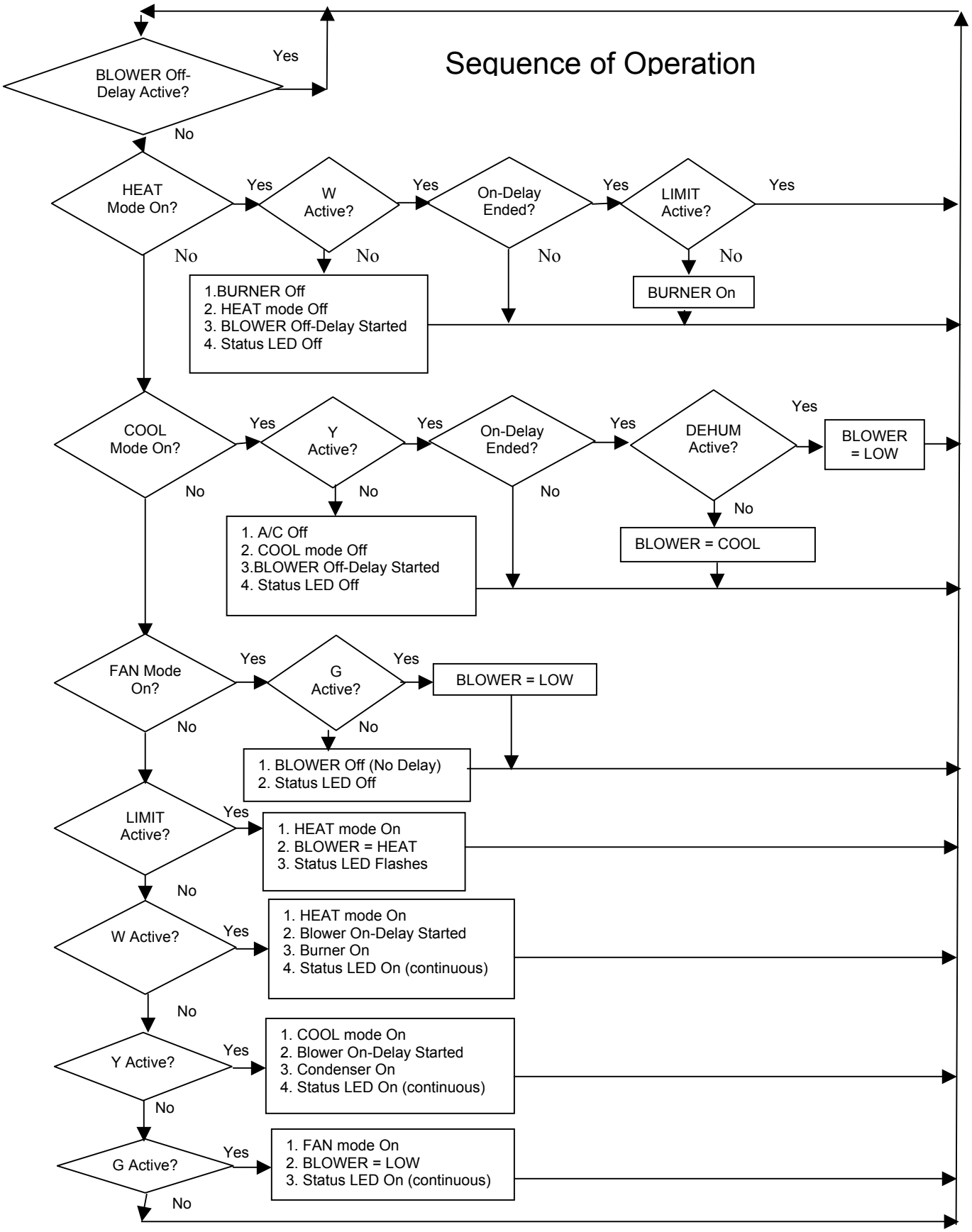

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Sequence of Operation Glossary

Inputs: LIMIT - 120vac power from the High Limit Switch used to power the burner.
W- Switched 24vac indicating a Heat call from the thermostat.
Y - Switched 24vac indicating a Cool call from the thermostat.
G - Switched 24vac indicating a call for blower operation from the thermostat.
DEHUM - Switched 24vac indicating a call for Dehumidification from a de-humidistat.

BLOWER Speeds:
HEAT - The Heating Blower speed selected by positions 1, 2 & 3 of SW1 (CFM tables on page 6)
COOL - The Cooling Blower speed selected by positions 4, 5 & 6 of SW1 (CFM tables on page 6)
LOW - The LOW Blower speed selected by positions 4, 5 & 6 of SW1 (CFM tables on page 6)

ECM – PSC Replacement

In an emergency situation, a defective ECM motor can be replace with a PSC motor to provide temporary circulating air flow for heating or cooling. This is done by replacing the ECM motor in the motor mounting bracket with a PSC motor of similar Horsepower. Wire the common lead (typically white) of the replacement PSC motor to the neutral (common) terminal on the fan control board (N - 1 through 7). Connect the high-speed replacement PSC motor lead (typically black) to the EAC terminal on the fan control board. The EAC contact is energized with 115VAC any time the control board is calling for fan operation whether in heating or cooling mode. This replacement should be only used in emergency situations and only until a replacement ECM motor can be obtained and reinstalled.