MODEL IDENTIFICATION

CAR BODY DESIGNATIONS

Body Code (1)	Models
"C"	Park Avenue
"E"	(2) Eldorado
"F"	Camaro, Firebird
"G"	(2) Aurora, (2) Riviera
"H"	Boneville, Eighty Eight, LeSabre, LSS, Regency
"J"	Cavalier, Sunfire
"K"	(2) Concours, (2) DeVille, (2) Seville
"N"	Achieva, Cutlass, Grand Am, Malibu, Skylark
"V"	(2) Catera
"W"	Century, Cutlass Supreme, Grand Prix, Intrigue, Lumina, Monte Carlo, Regal
"Y"	Corvette

(1) Body codes are determined by fourth character of VIN code.

(2) Vehicle is equipped with automatic A/C-heater system.

TRUCK MODEL IDENTIFICATION

Series (1)	Models
"C"	2WD Pickup, Sierra, Suburban, Tahoe & Yukon
"G"	Express, Savanna & Van
"K"	4WD Pickup, Sierra, Suburban, Tahoe & Yukon
"L"	AWD Astro & Safari
"M"	2WD Astro & Safari
"P"	Commercial Van/Motorhome
"S"	2WD Blazer, Jimmy, Pickup & Sonoma
"T"	4WD Blazer, (2) Bravada, Jimmy, Pickup & Sonoma
"U"	Silhouette, Trans Sport & Venture

(1) Vehicle series is fifth character of VIN code.

(2) Vehicle is equipped with automatic A/C-heater system.

REFRIGERANT SYSTEM DIAGNOSIS

INSUFFICIENT COOLING

NOTE: Quick check procedure may be used to check for proper refrigerant charge, provided ambient temperature is more than 70°F (21°C). On vehicles with Cycling Clutch Orifice Tube (CCOT) system, compressor will cycle on and off to meet system requirements.

Quick Check Procedure

1. Engine must be at normal operating temperature. Open vehicle doors and hood. Select MAX A/C or RECIRC mode. Move temperature lever to COLD position. Blower switch in HIGH position. Engine should be at normal idle speed.
2. While compressor is engaged, feel temperature of accumulator surface and evaporator inlet pipe. If temperature of both components is the same, system is normal. If evaporator inlet pipe is frosted or feels cooler than accumulator surface, refrigerant charge is low.
3. Add refrigerant in 4-ounce increments, allowing system to stabilize between additions, until accumulator and inlet pipe are the same temperature. Add an additional 14 ounces of refrigerant.

Thorough Check Procedure

Begin diagnosis at V5/TXV SYSTEM DIAGNOSIS (STEP 1) or V5/VDOT SYSTEM DIAGNOSIS (STEP 1). For further diagnosis, go to appropriate trouble shooting chart. See **TROUBLE SHOOTING CHART DIRECTORY** .

V5/TXV SYSTEM DIAGNOSIS (STEP 1)

Preliminary Checks

Check and repair the following:

- Connect Tech 1 Scan Tool. Check for stored trouble codes. If codes are found, see TESTS W/CODES in ENGINE PERFORMANCE.
- Check A/C fuse.
- Check A/C blower operation.
- On vehicles with cable operated temperature door, move temperature lever rapidly from cold to hot. Listen for temperature door hitting travel stops at each end. Adjust as necessary.
- Check A/C compressor clutch coil connection.
- Check A/C pressure transducer connection.
- Check compressor belt condition. Adjust or replace as necessary.
- Check cooling fan operation.
- Check for restricted airflow across condenser.
- Check Technical Service Bulletins (TSBs) for A/C system updates.

V5/VDOT SYSTEM DIAGNOSIS (STEP 1)

Preliminary Checks

Check and repair the following:

- Check A/C fuse.
- Check A/C blower operation.
- On vehicles with cable operated temperature door, move temperature lever rapidly from cold to hot. Listen for temperature door hitting travel stops at each end. Adjust as necessary.
- Check clutch coil and connections at rear head switch(es).
- Check compressor belt condition. Adjust or replace as necessary.
- Check cooling fan operation.
- Check for restricted airflow across condenser.
- Check Technical Service Bulletins (TSBs) for A/C system updates.

If discharge air temperature with A/C on is normal after making repairs, system is operating properly. If further trouble shooting is required, go to appropriate trouble shooting chart. See **TROUBLE SHOOTING CHART DIRECTORY** .

HEATER SYSTEM DIAGNOSIS

HEATER OUTPUT TEMPERATURE CHECK

1. Select heater (floor) mode, high temperature setting and high blower speed. Idle engine for about 20 minutes or until engine reaches normal operating temperature.
2. Drive vehicle at 30 MPH (48 km/h). Measure ambient air temperature and floor outlet air temperature. If floor outlet air temperature exceeds minimum specification, heater output temperature is considered sufficient. See **HEATER OUTPUT TEMPERATURE MINIMUM SPECIFICATIONS** .

HEATER OUTPUT TEMPERATURE MINIMUM SPECIFICATIONS

Ambient Air Temp. °F (°C)	Floor Outlet Air Temp. °F (°C)
0 (-18)	110 (43)
25 (-4)	125 (50)
50 (10)	140 (60)
75 (24)	150 (66)

FUNCTIONAL TEST

1. Idle engine for about 20 minutes until warm or until thermostat opens. Ensure coolant temperature is about 194°F (90°C). Select bi-level mode. Move temperature lever to coldest temperature setting. Select high blower speed. Air should exit all outlets and should be about the same temperature as outside air.
2. Select vent mode. Air should exit vent outlets and should be about the same temperature as outside air. Air should not exit floor, defrost or window defogger outlets.
3. Select heater (floor) mode. Most air should exit floor outlets, with remaining air exiting defrost and window defogger outlets. Air should not exit vent outlets. Air should be about the same temperature as outside air.

4. Select blend (floor-defrost) mode. Equal volume of air should exit defrost and floor outlets, with some air exiting side window defogger outlets.
5. Select defrost mode. Most air should exit defrost outlets, with a low volume of air exiting floor outlets.
6. Select bi-level mode. Move temperature lever to maximum hot setting. Air should exit vent outlets and its temperature should rapidly increase to about 131°F (55°C) or greater. For more precise heater output temperature check, see **HEATER OUTPUT TEMPERATURE CHECK** . Defrost nozzle airflow volume should diminish and floor outlet airflow volume may increase slightly.
7. Move temperature lever to maximum cold setting. Air temperature should decrease to about the same temperature as outside air.
8. Slowly turn blower motor speed control knob toward OFF position. stopping briefly at each intermediate position to check force of airflow exiting instrument panel center outlets to hear blower noise. Airflow and blower noise should decrease noticeably at each intermediate position.

TROUBLE SHOOTING CHART DIRECTORY

Application	Figures
Cars, Light Trucks & Vans (1)	
CCOT System	1-5
V5/TXV System	6-12
V5/VDOT System	13-19
Heater System	20-24

(1) Vehicles with Harrison V5 5-cylinder compressor use a Variable Displacement Orifice Tube (VDOT) or Thermal Expansion Valve (TXV) system, referred to as V5/VDOT and V5/TXV systems. Vehicles with any other compressor use the Cycling Clutch Orifice Tube (CCOT) system.

INSUFFICIENT COOLING (CCOT SYSTEM)

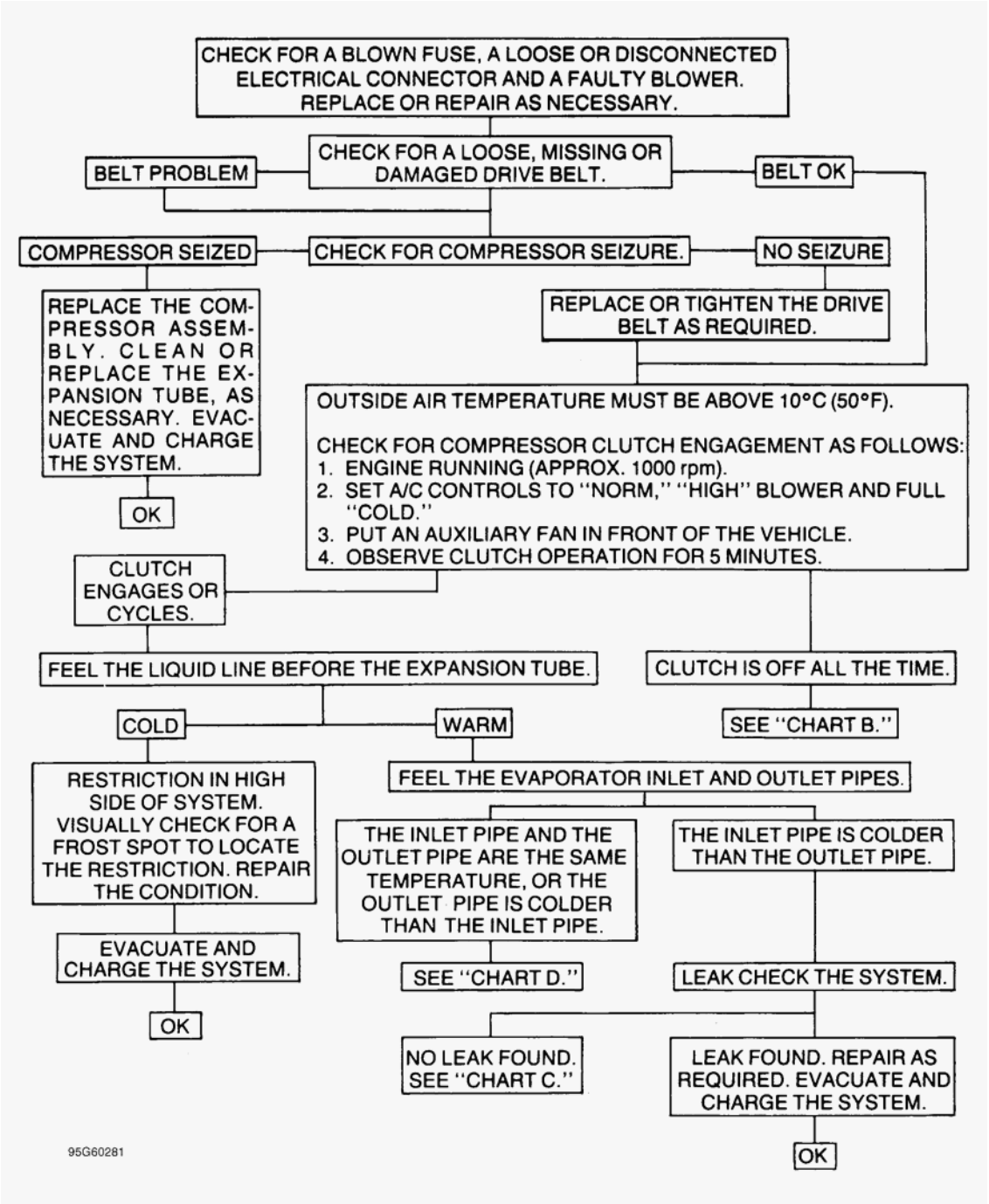


Fig. 1: Insufficient Cooling Chart "A" (CCOT System)
Courtesy of GENERAL MOTORS CORP.

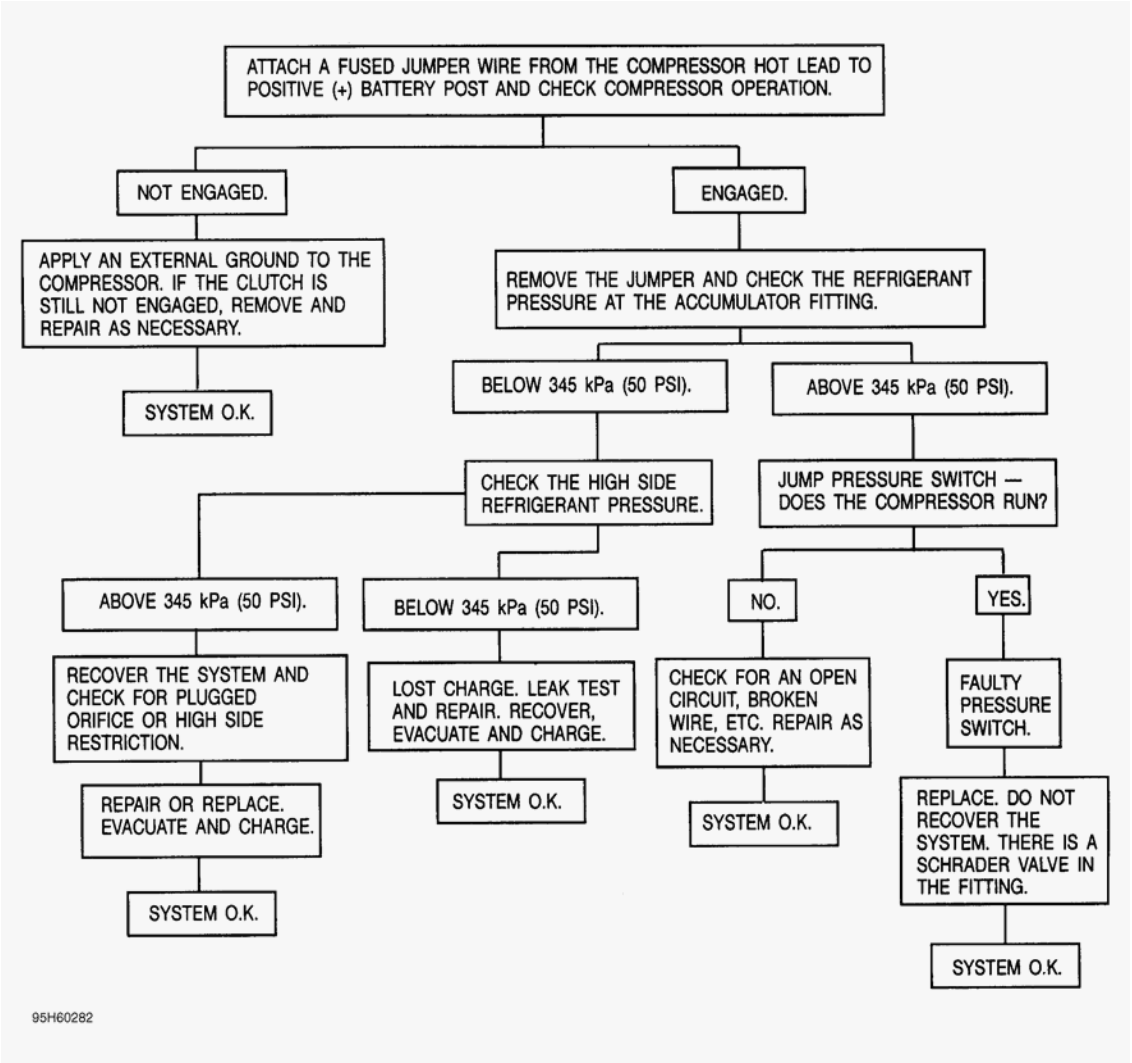


Fig. 2: Insufficient Cooling Chart "B" (CCOT System)
Courtesy of GENERAL MOTORS CORP.

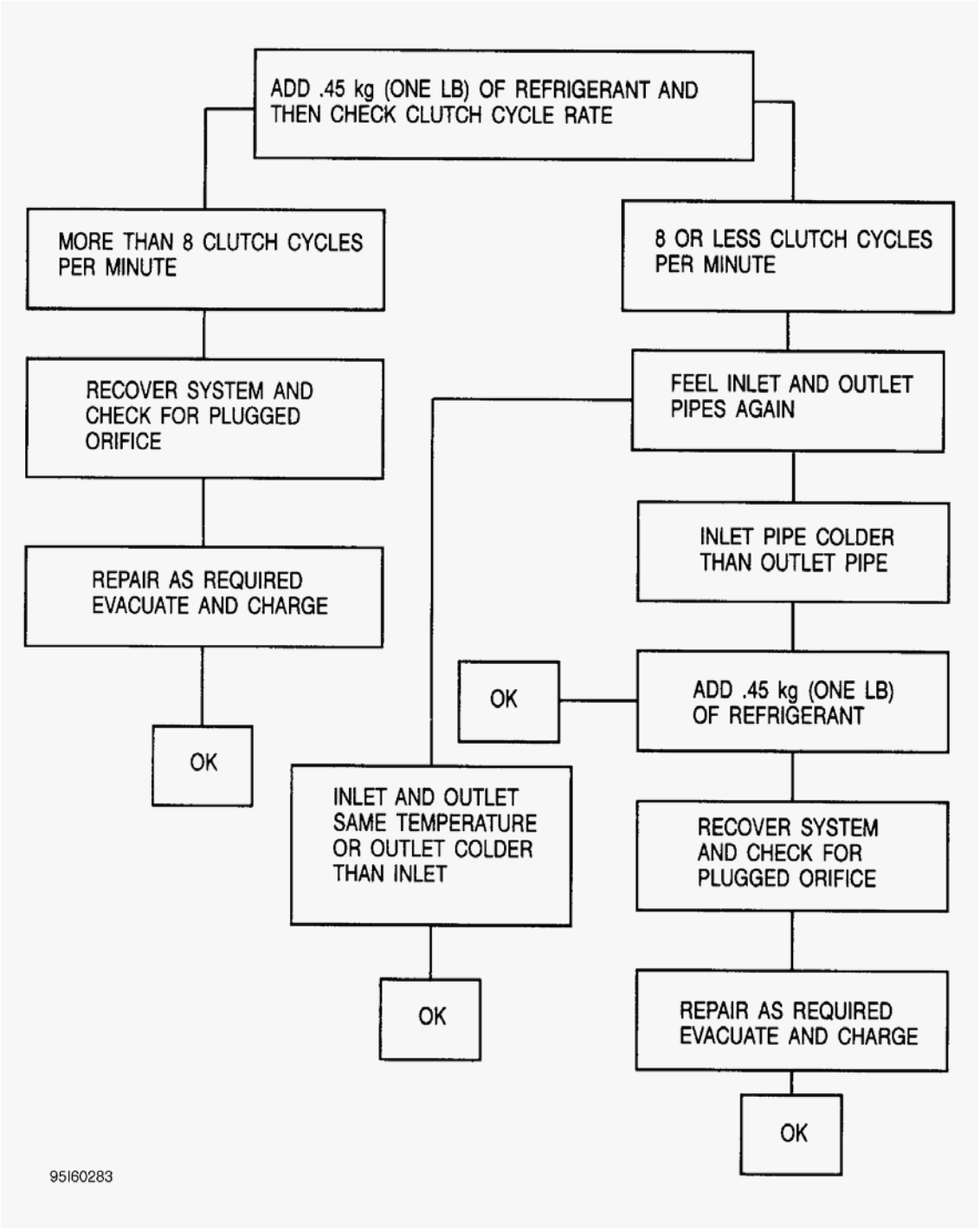
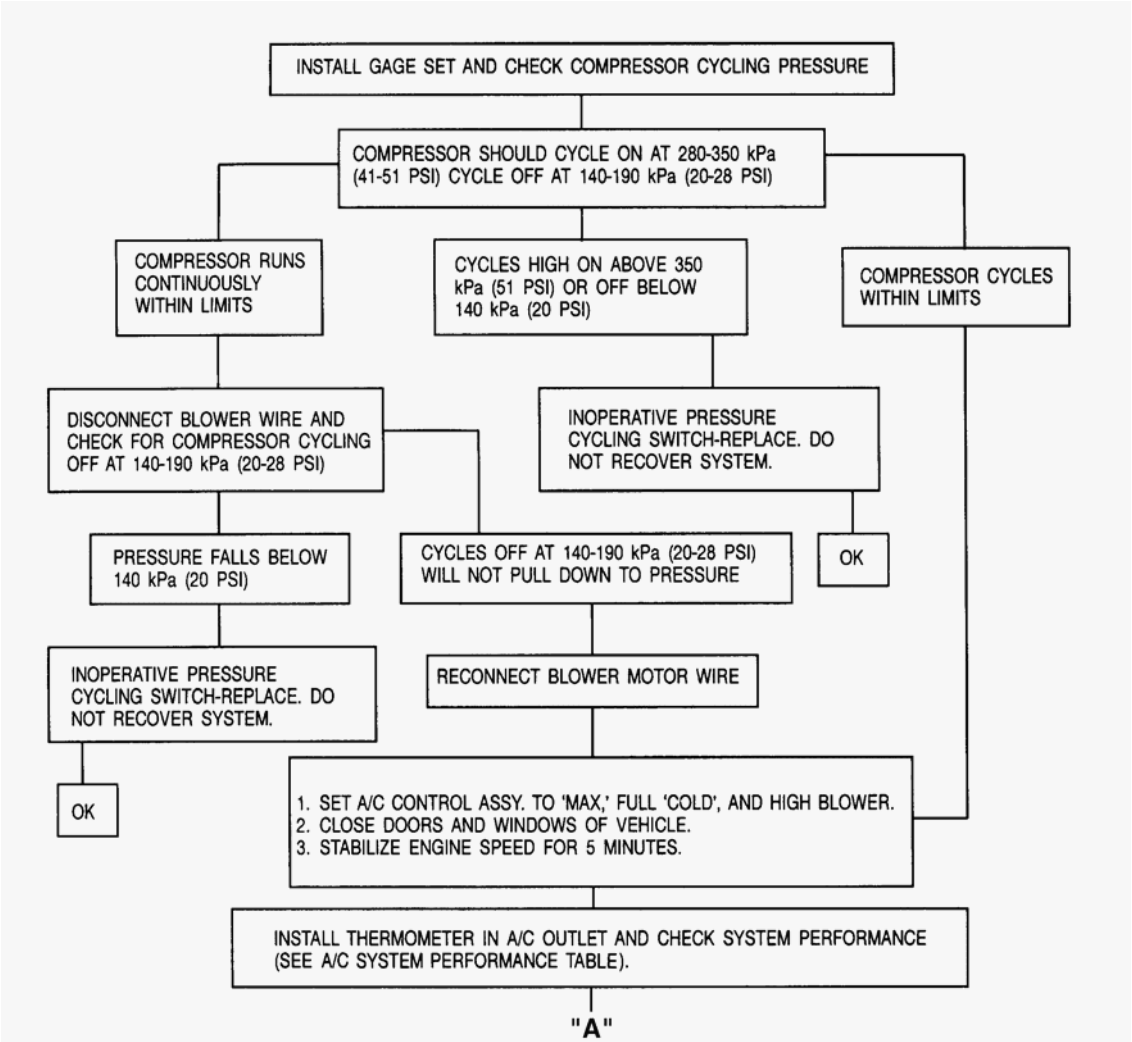


Fig. 3: Insufficient Cooling Chart "C" (CCOT System)
Courtesy of GENERAL MOTORS CORP.



A/C SYSTEM PERFORMANCE

Relative Humidity %	Ambient Temp. °F (°C)	Max Outlet Temp. °F (°C)
20	70 (21)	43 (6)
	80 (27)	44 (7)
	90 (32)	50 (10)
	100 (38)	51 (11)
30	70 (21)	45 (7)
	80 (27)	47 (8)
	90 (32)	54 (12)
	100 (38)	57 (14)
40	70 (21)	46 (8)
	80 (27)	50 (10)
	90 (32)	57 (14)
	100 (38)	63 (17)
50	70 (21)	48 (9)
	80 (27)	53 (12)
	90 (32)	60 (16)
	100 (38)	69 (21)
60	70 (21)	50 (10)
	80 (27)	56 (13)
	90 (32)	63 (17)
	100 (38)	75 (24)
70	70 (21)	52 (11)
	80 (27)	59 (15)
	90 (32)	67 (19)
80	70 (21)	53 (12)
	80 (27)	62 (17)
	90 (32)	70 (21)
90	70 (21)	55 (13)
	80 (27)	65 (18)

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Fig. 4: Insufficient Cooling Chart "D" (CCOT System)
Courtesy of GENERAL MOTORS CORP.

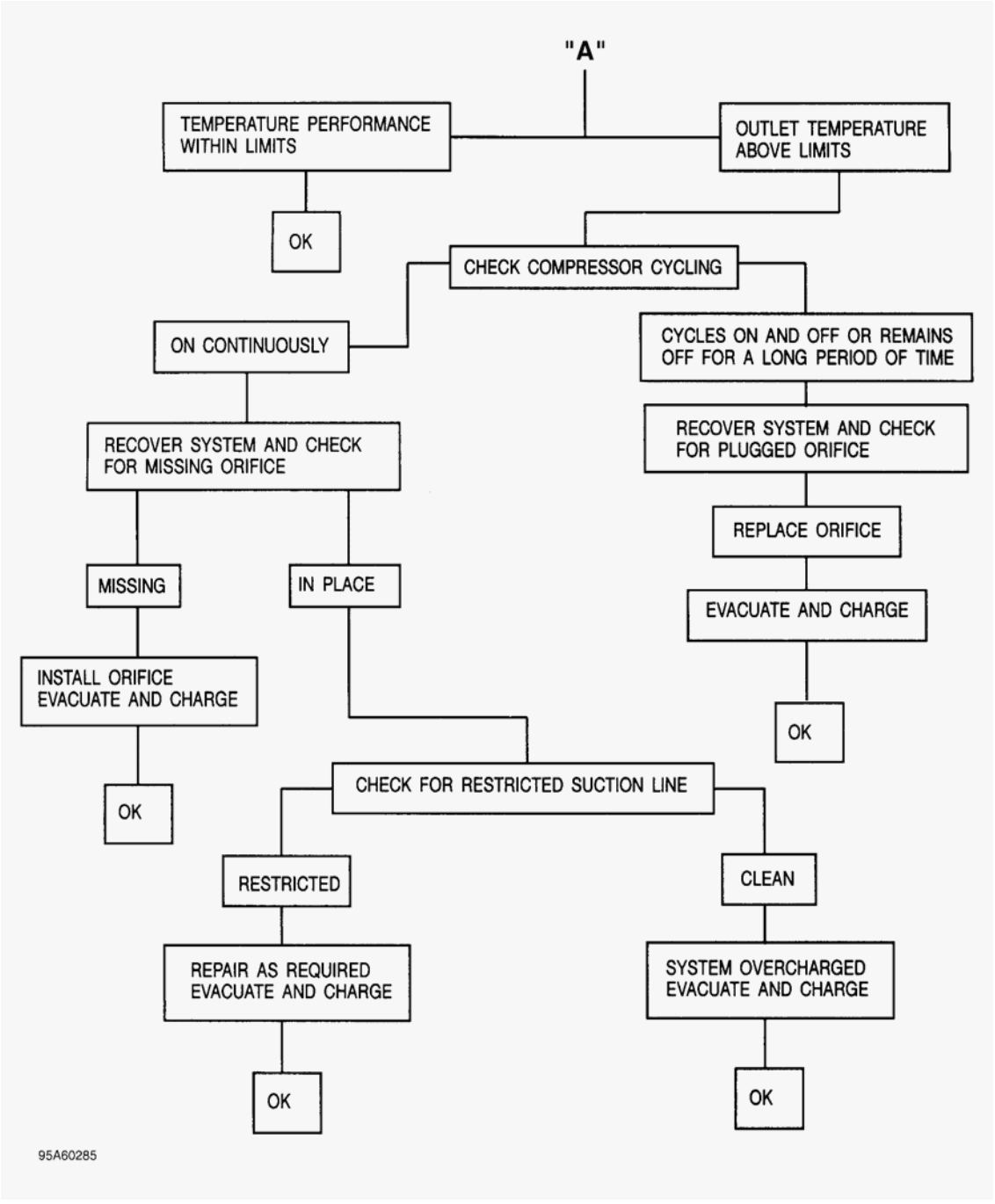

Fig. 5: Insufficient Cooling Chart "E" (CCOT System)
Courtesy of GENERAL MOTORS CORP.

CHECKING REFRIGERANT CHARGE - STEP 2 (V5/TXV SYSTEM)

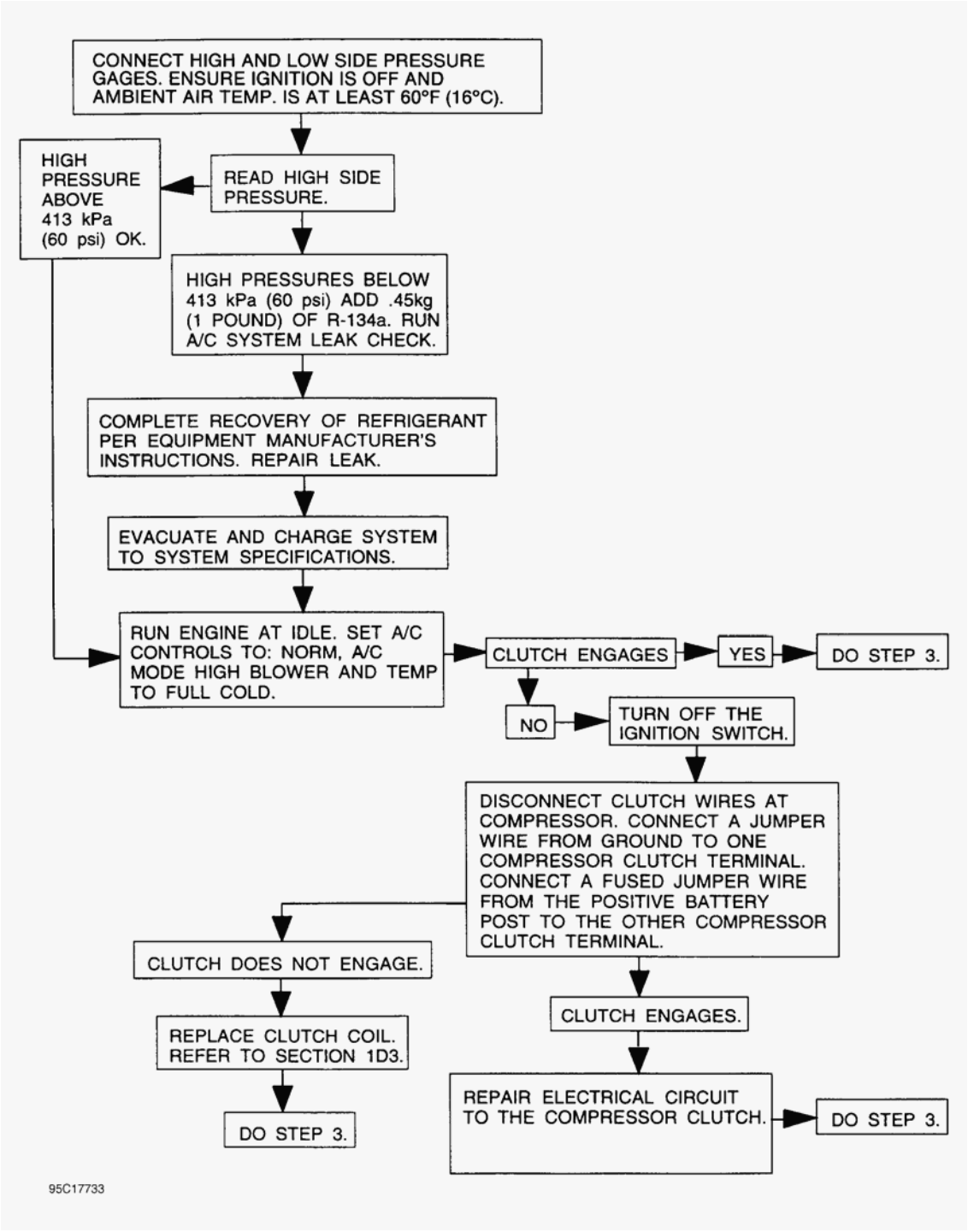

Fig. 6: Checking Refrigerant Charge - Step 2 (V5/TXV System)
Courtesy of GENERAL MOTORS CORP.

CHECKING COMPRESSOR CLUTCH ENGAGEMENT - STEP 3 (V5/TXV SYSTEM)

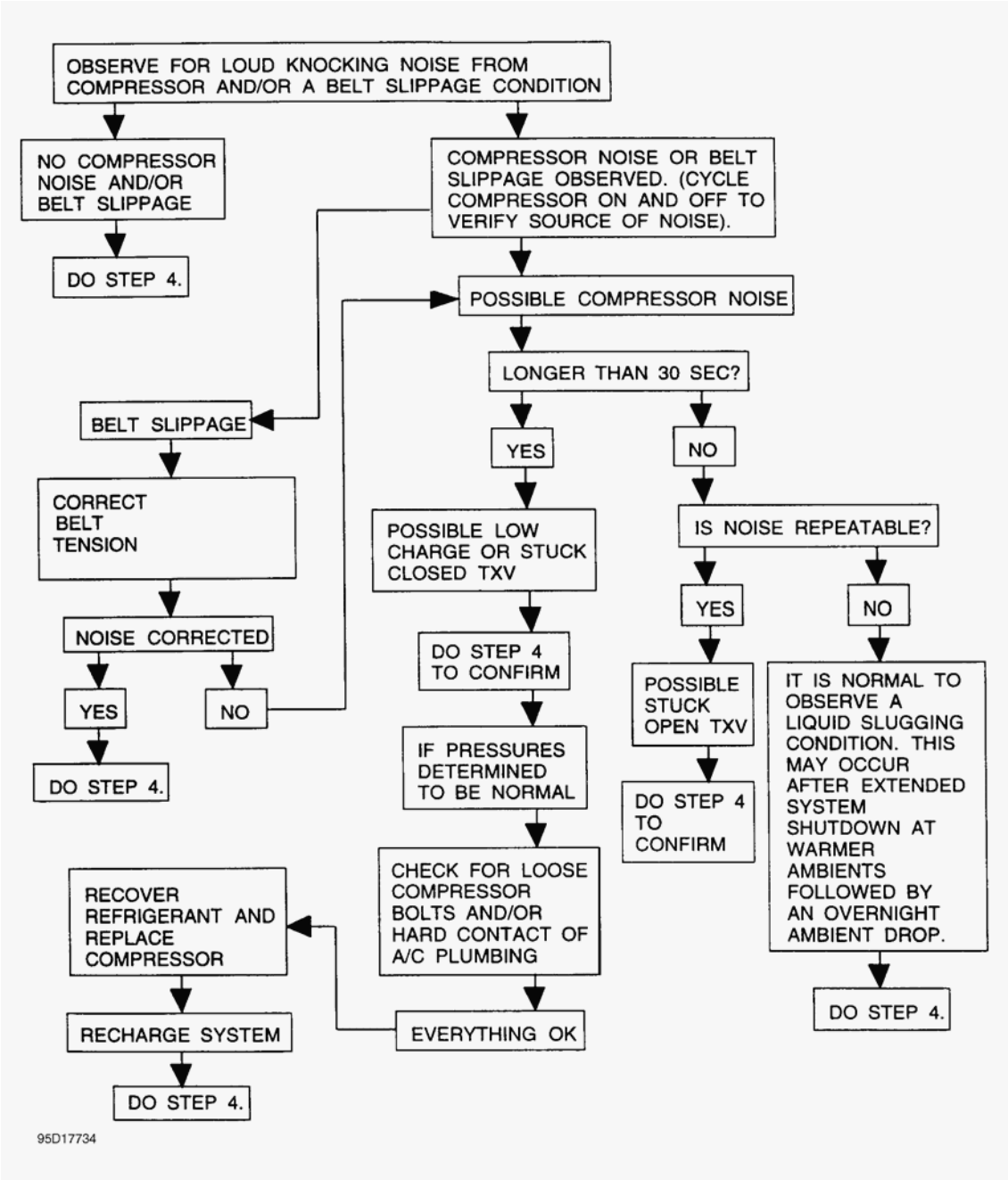

Fig. 7: Checking Clutch Engagement - Step 3 (V5/TXV System)
Courtesy of GENERAL MOTORS CORP.

CHECKING SYSTEM PERFORMANCE - STEP 4 (V5/TXV SYSTEM)

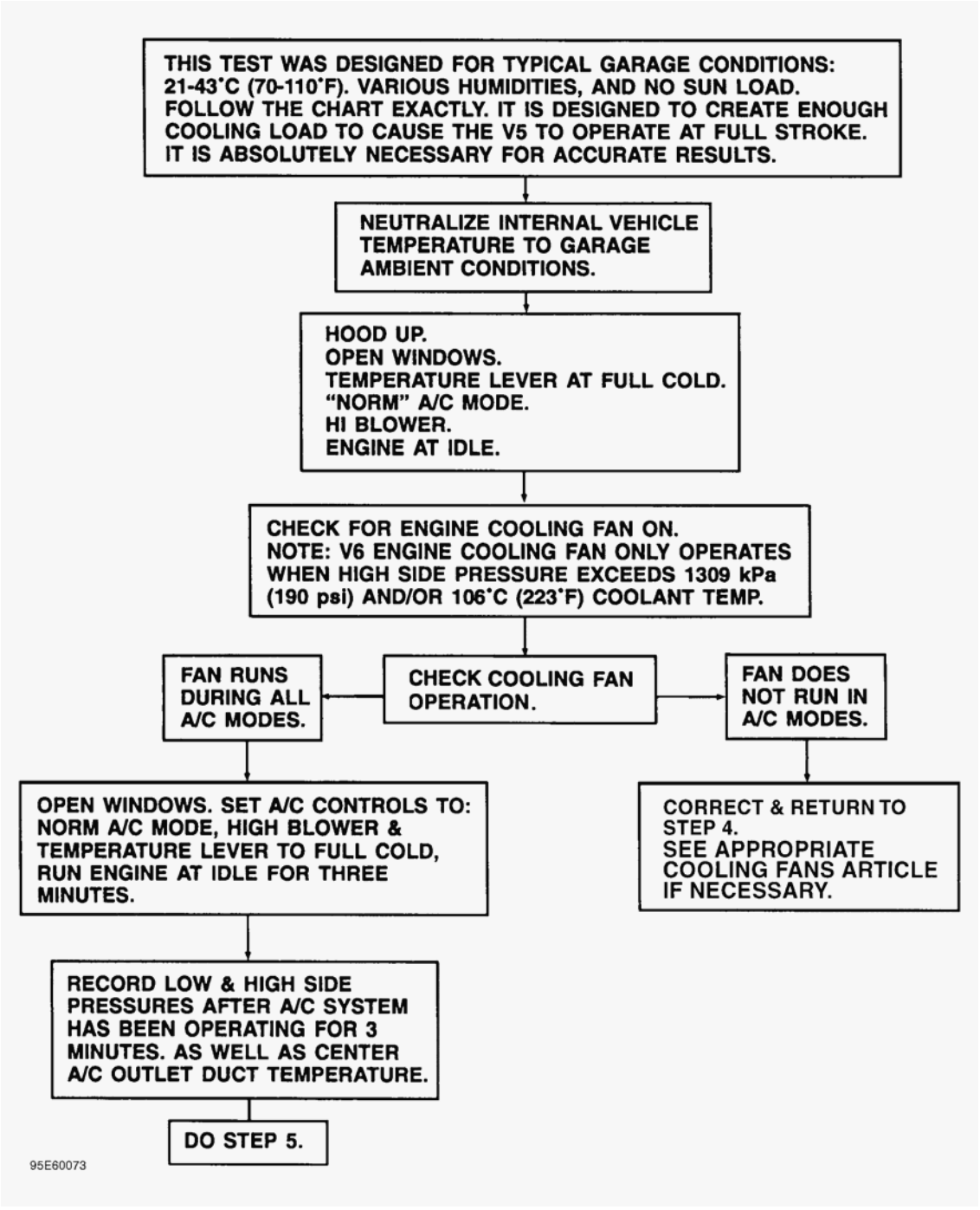

Fig. 8: Checking System Performance - Step 4 (V5/TXV System)
Courtesy of GENERAL MOTORS CORP.

PERFORMANCE DIAGNOSTIC CHART - STEP 5 (V5/TXV SYSTEM)

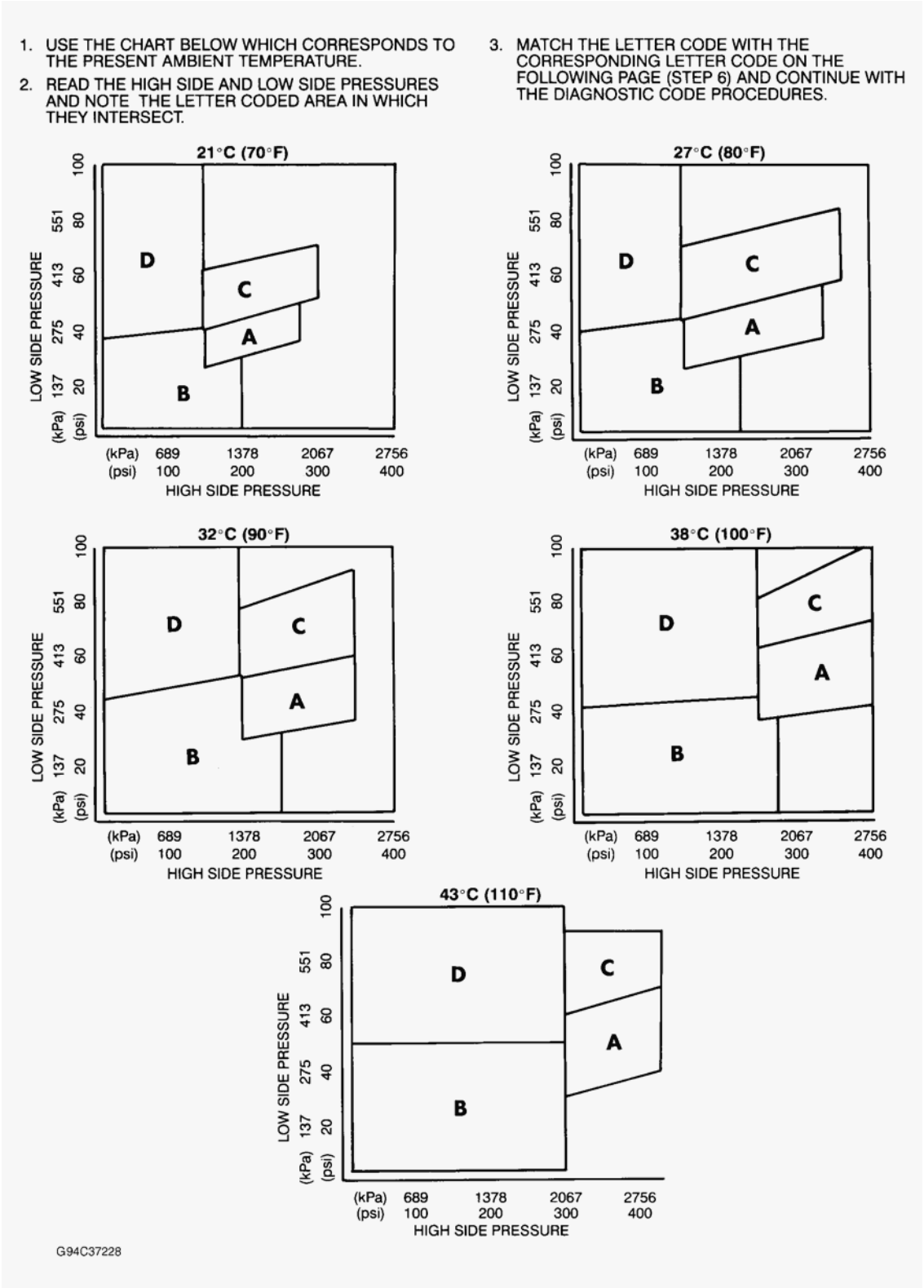

Fig. 9: Performance Diagnostic Chart - Step 5 (V5/TXV System)
Courtesy of GENERAL MOTORS CORP.

DIAGNOSTIC CODE PROCEDURES - STEP 6 (V5/TXV SYSTEM)

Refer to appropriate diagnostic code chart (Step 5) for ambient garage conditions.

IF you find...	THEN the problem may be...
1. High and Low pressures intersect in area **'A'**	No Problem – Normal System – Rule of Thumb: Outlet temperature is typically 20°F less than outside air temperatures.
2. High and Low pressures intersect in area **'B'** – may also hear a "motorboat"-like noise inside the vehicle with windows up and with the blower motor on low speed – may also see rapid fluctuation of low side gage	Low Charge OR Failed Closed TXV – Evacuate system and weigh charge; if less than 0.8 kg (1.75 lbs.) is removed and there was no rapid fluctuation of the low side gage, then recharge the system to specifications. – If the charge removed is within specifications, and rapid fluctuation of the low side gage was noted, then replace TXV
3. High and Low pressures intersect in area **'C'** – high and low side pressures equalize quickly upon turning A/C off. – may also be accompanied with a "slugging" noise upon vehicle start-up	Stuck Open TXV – Replace TXV
4. High and Low pressures intersect in area **'D'**	Destroked Compressor OR No-Pump Compressor – Do Step 7 (Next Page) to confirm and follow procedures listed in the diagnostic tree
5. High and Low pressures are higher than normal and the compressor cycles off due to high side pressure in excess of 425 psi. The compressor may re-engage after a period of time and then cycle off again	High Charge – Complete recovery per equipment manufacture's instructions, evacuate and charge to system specifications
6. An abrupt drop in temperature along the high side plumbing, condenser, or receiver/dryer. The high side should be warm/hot from the compressor discharge all the way to the TXV	High Side Restriction – Replace component where restriction is occurring
7. System appears to perform normally, but may go warm temporarily on extended drives and recorrect itself after vehicle shut-down at which time a large puddle of water will be noticed under the vehicle	Evaporator Core Freeze-Up – Do Step 8 (On page following the next page) to confirm compressor control valve failed low

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Fig. 10: Diagnostic Code Procedures - Step 6 (V5/TXV System)
Courtesy of GENERAL MOTORS CORP.

CHECKING FOR NO STROKE COMPRESSOR - STEP 7 (V5/TXV SYSTEM)

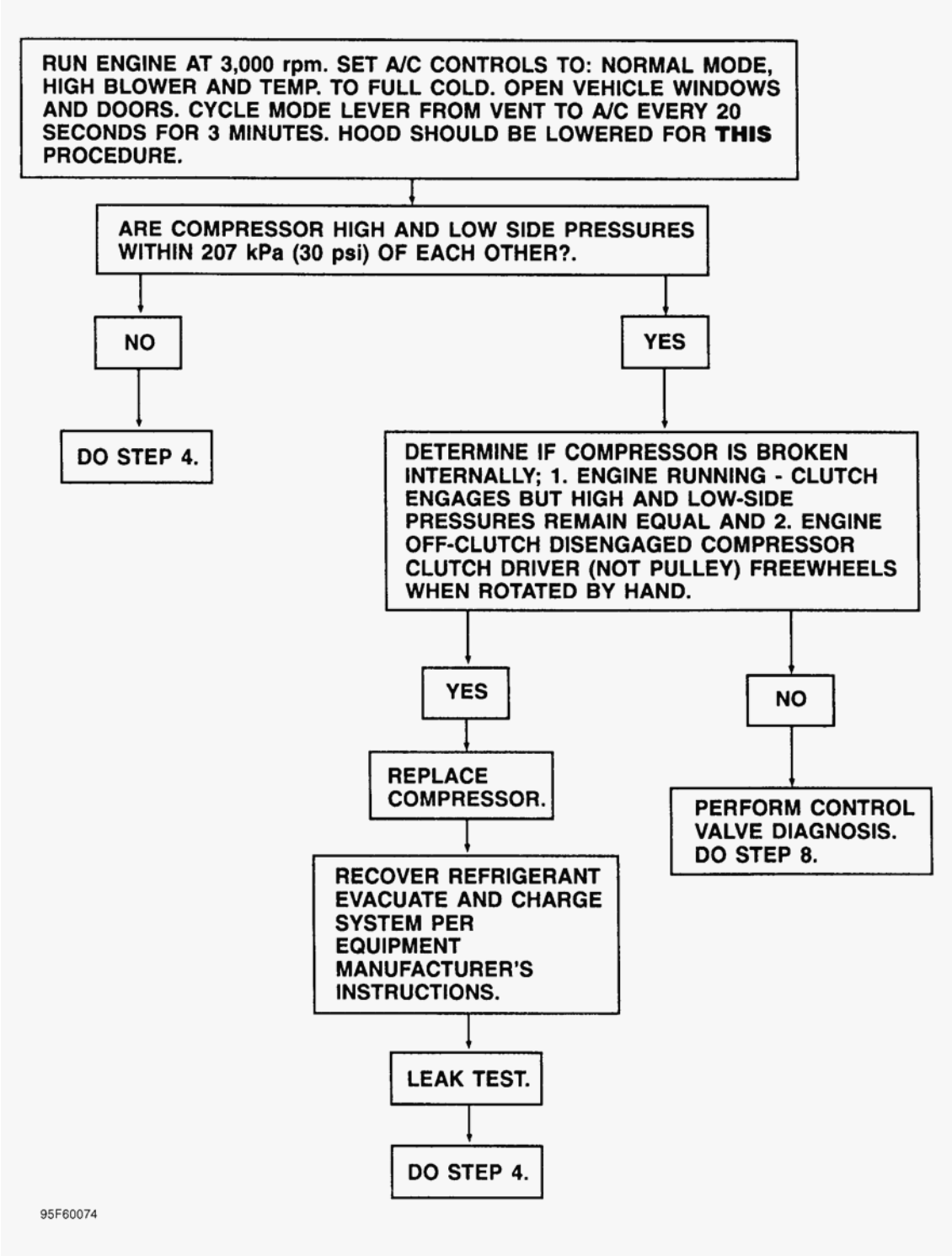


Fig. 11: Checking For No Stroke Compressor - Step 7 (V5/TXV System)
Courtesy of GENERAL MOTORS CORP.

CONTROL VALVE DIAGNOSIS - STEP 8 (V5/TXV SYSTEM)

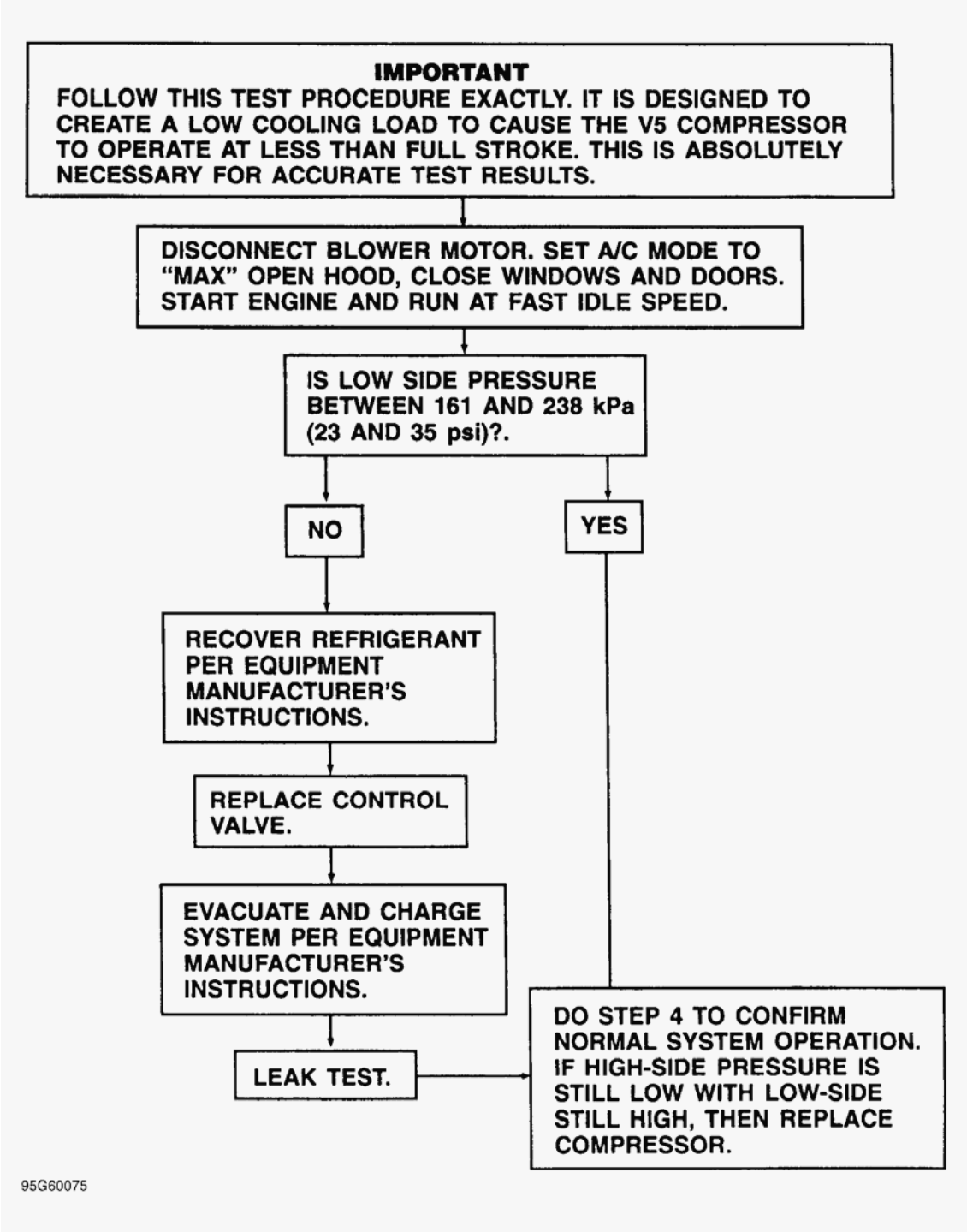


Fig. 12: Control Valve Diagnosis - Step 8 (V5/TXV System)
Courtesy of GENERAL MOTORS CORP.

CHECKING REFRIGERANT CHARGE - STEP 2 (V5/VDOT SYSTEM)

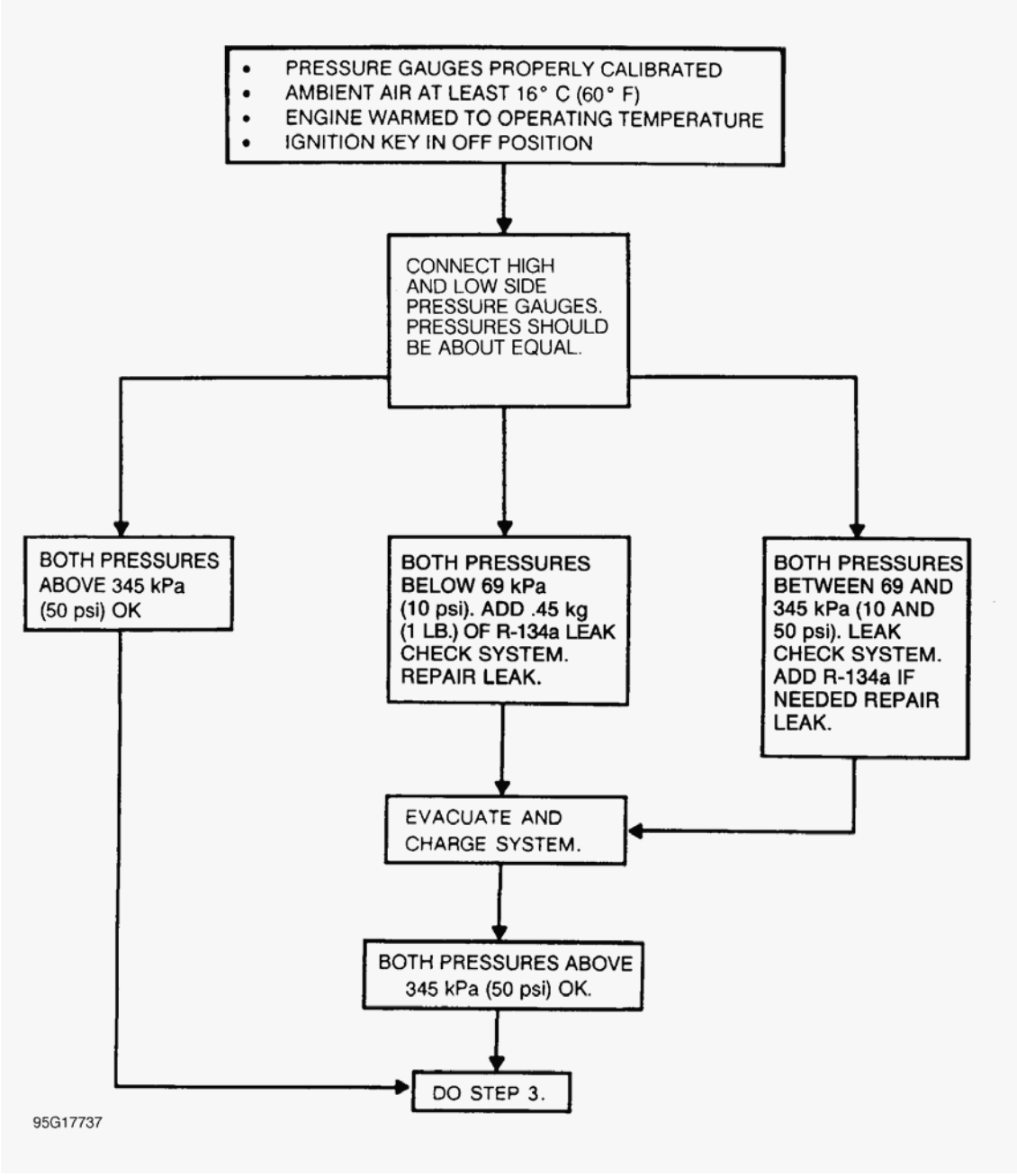


Fig. 13: Checking Refrigerant Charge - Step 2 (V5/VDOT System)
Courtesy of GENERAL MOTORS CORP.

CHECKING COMPRESSOR CLUTCH ENGAGEMENT - STEP 3 (V5/VDOT SYSTEM)

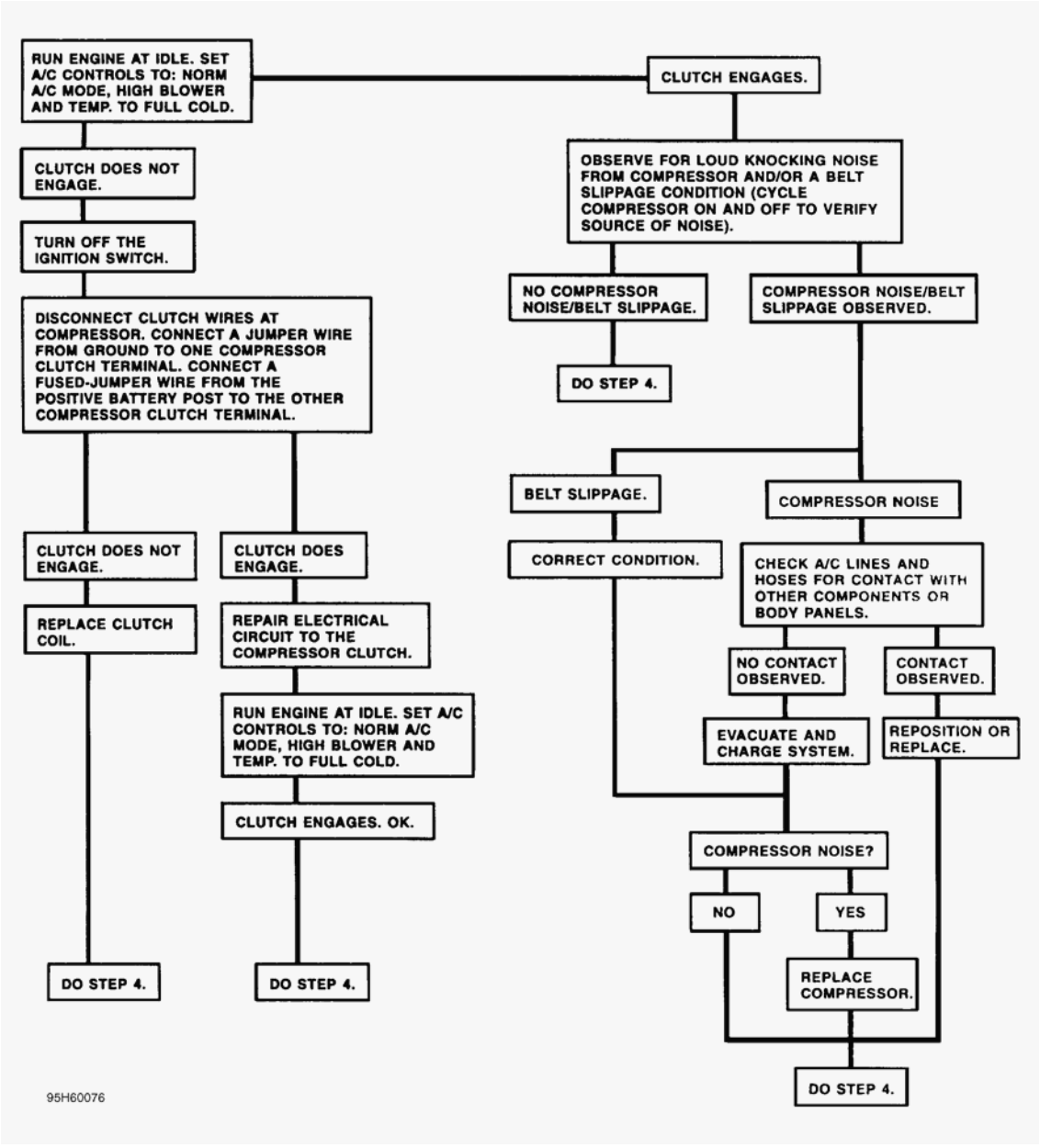


Fig. 14: Checking Clutch Engagement - Step 3 (V5/VDOT System)
Courtesy of GENERAL MOTORS CORP.

CHECKING SYSTEM PERFORMANCE - STEP 4 (V5/VDOT SYSTEM)

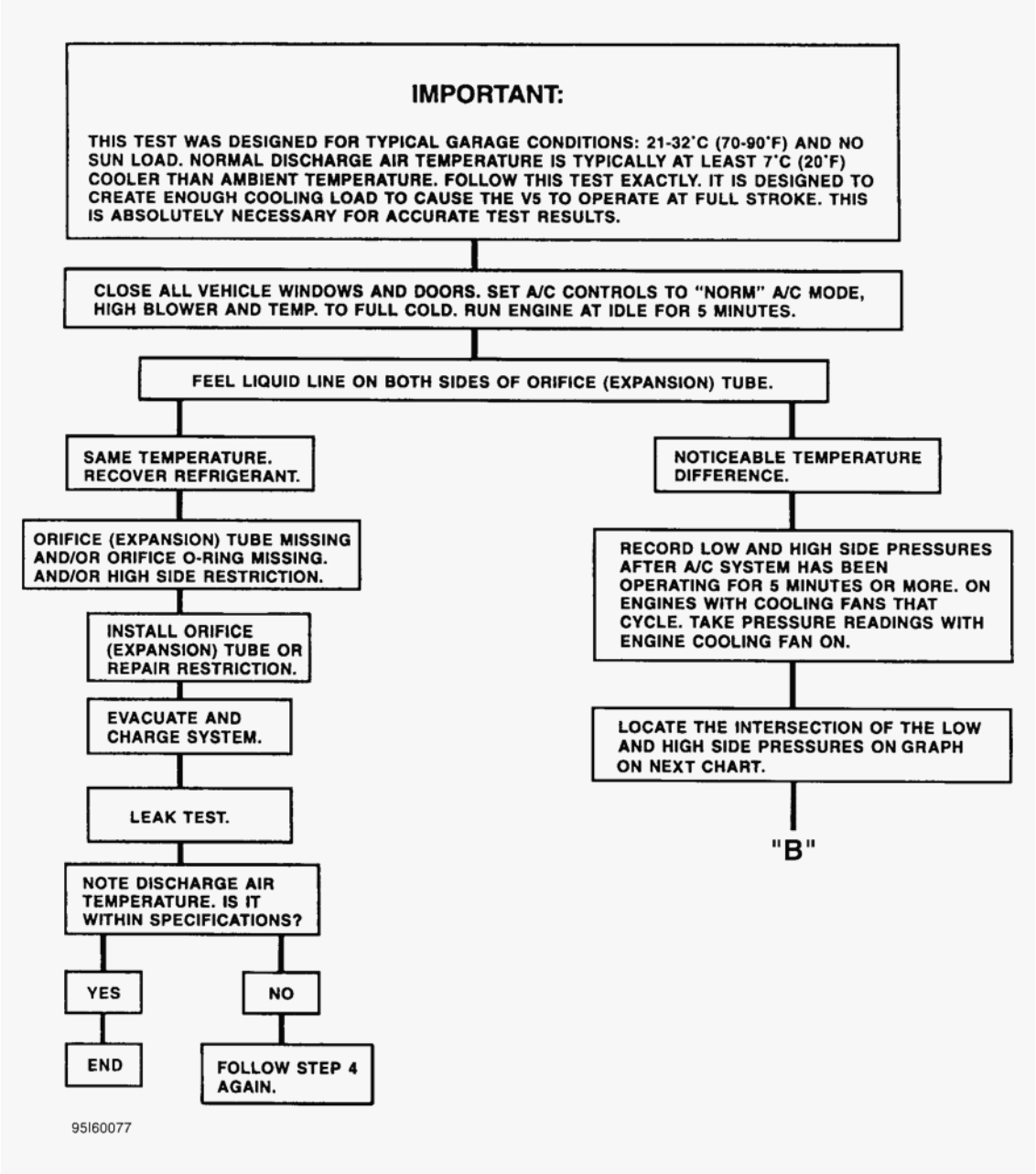
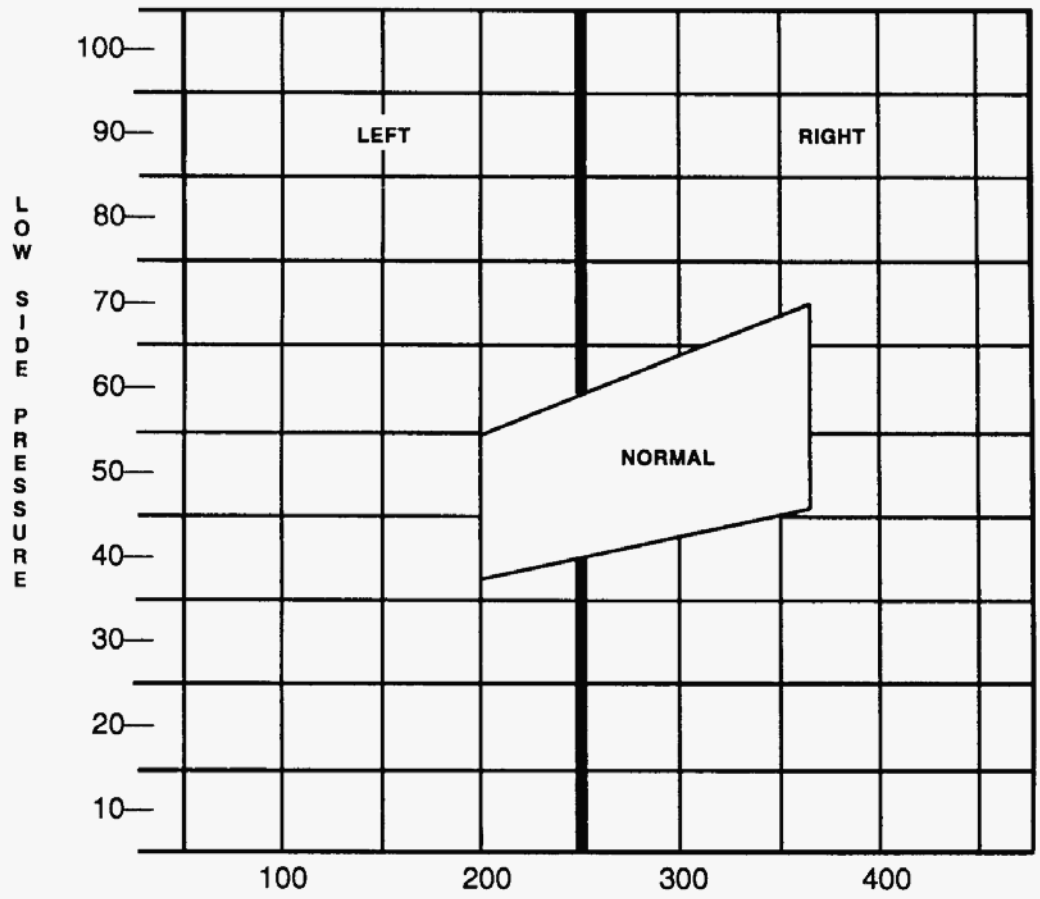


Fig. 15: System Performance - Step 4 (V5/VDOT System - 1 Of 2)
Courtesy of GENERAL MOTORS CORP.

CHECKING SYSTEM PERFORMANCE - STEP 4 (CONT.) (V5/VDOT SYSTEM)



"B"

HUMIDITY AND TEMPERATURE VARIABLES CAN CREATE BORDERLINE DIAGNOSTIC CONDITIONS. IF THE CHART DIRECTS YOU TO FOLLOW PROCEDURES IN ONE STEP, BUT THOSE PROCEDURES DO NOT LEAD YOU TO CORRECT THE PROBLEM, FOLLOW THE PROCEDURES FOR THE OTHER STEP.

LOW AND HIGH SIDE PRESSURES INTERSECT IN THE LEFT AREA OF THE CHART. DO STEP 6.

LOW AND HIGH SIDE PRESSURES INTERSECT IN THE RIGHT AREA OF THE CHART. DO STEP 5.

LOW AND HIGH SIDE PRESSURES INTERSECT IN THE WHITE AREA OF THE CHART. NORMAL AREA MEANS ALL COMPONENTS OF THE REFRIGERANT SYSTEM ARE FUNCTIONING PROPERLY. IF INSUFFICIENT COOLING EXISTS, AIR HANDLING SYSTEM IS AT FAULT.

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Fig. 16: System Performance - Step 4 (V5/VDOT System - 2 Of 2)
Courtesy of GENERAL MOTORS CORP.

RIGHT AREA DIAGNOSIS & SERVICE - STEP 5 (V5/VDOT SYSTEM)

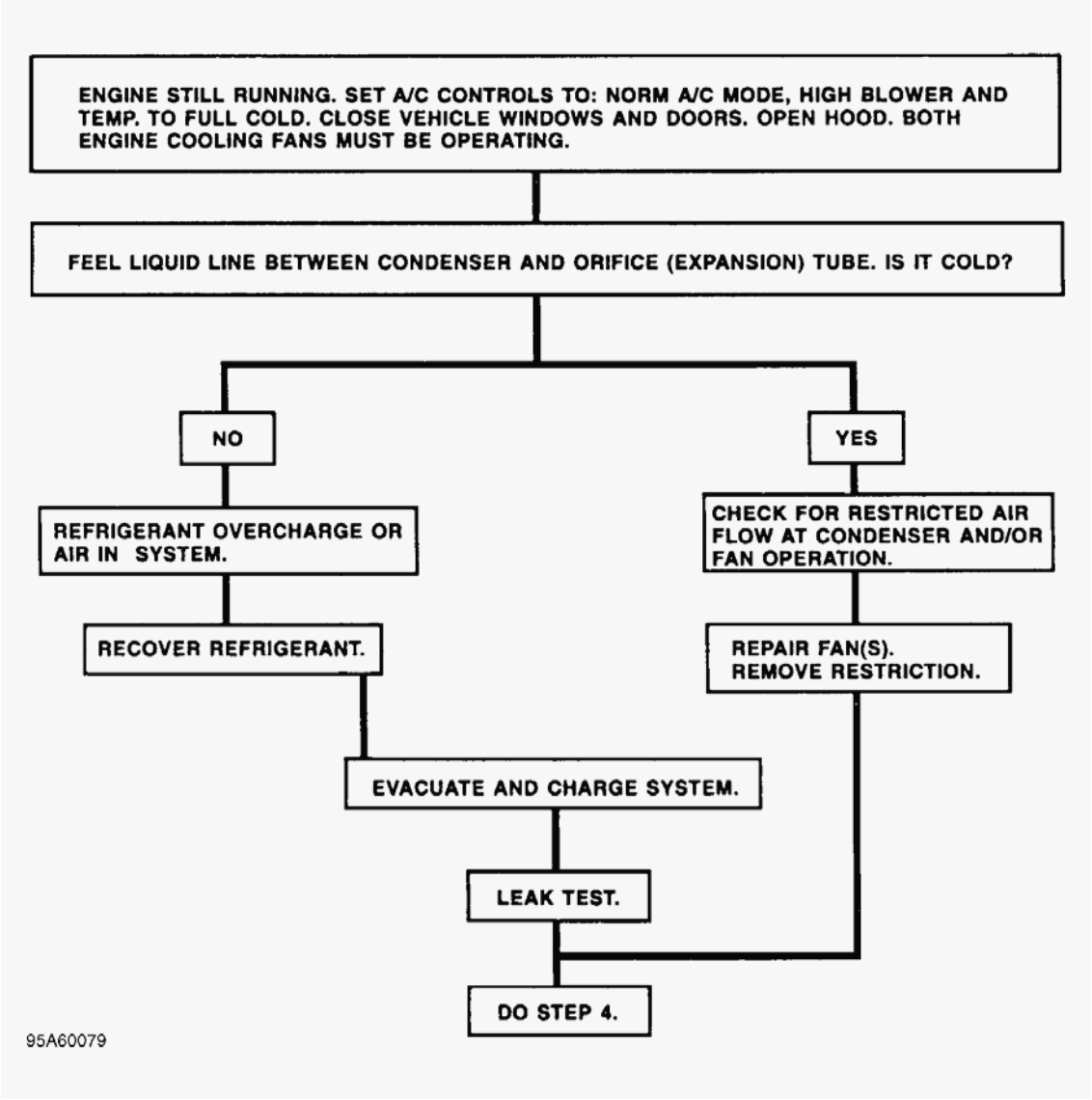

Fig. 17: Right Area Diagnosis & Service - Step 5 (V5/VDOT System)
Courtesy of GENERAL MOTORS CORP.

LEFT AREA DIAGNOSIS & SERVICE - STEP 6 (V5/VDOT SYSTEM)

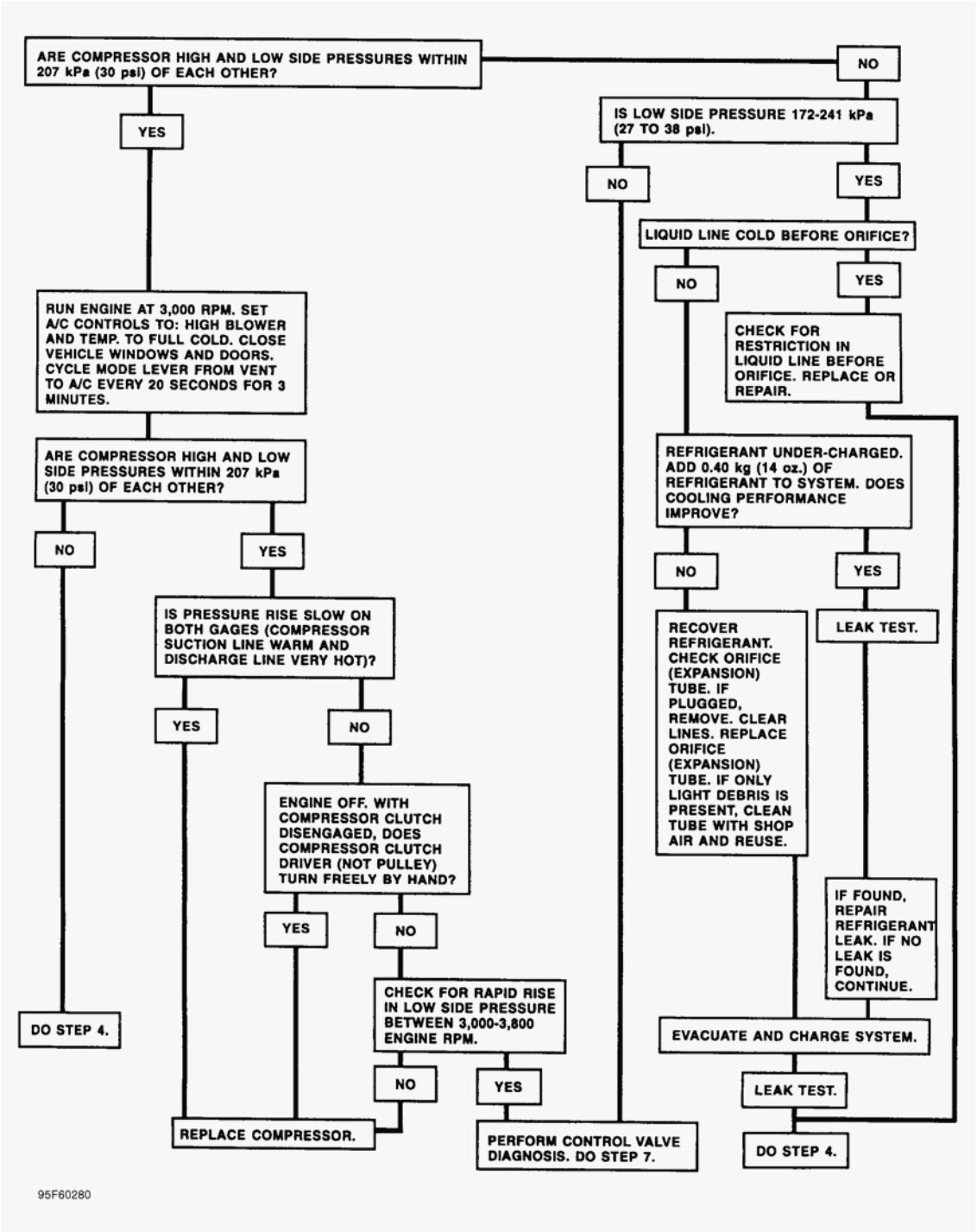

Fig. 18: Left Area Diagnosis & Service - Step 6 (V5/VDOT System)
Courtesy of GENERAL MOTORS CORP.

CONTROL VALVE DIAGNOSIS - STEP 7 (V5/VDOT SYSTEM)

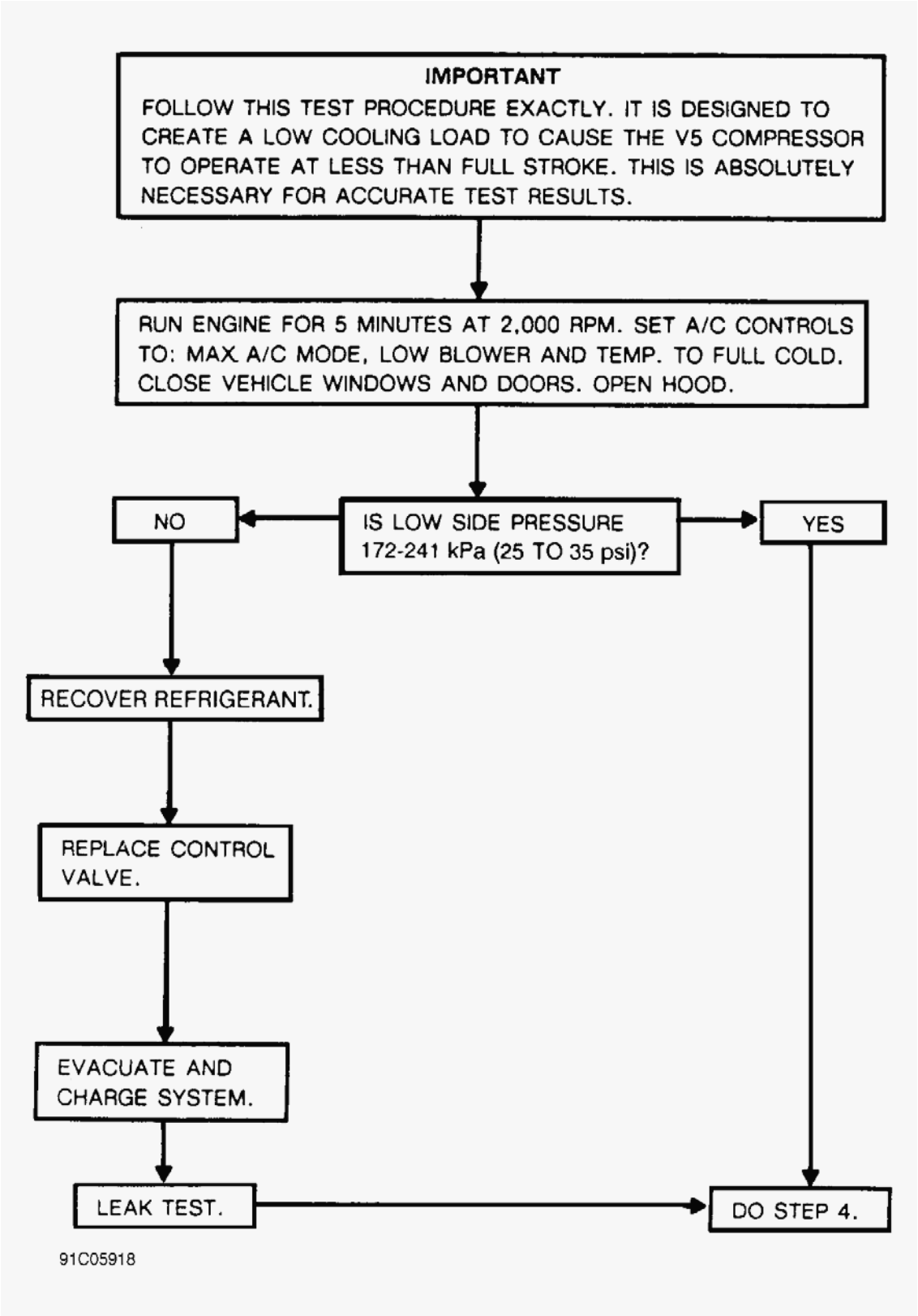

Fig. 19: Control Valve Diagnosis - Step 7 (V5/VDOT System)
Courtesy of GENERAL MOTORS CORP.

INSUFFICIENT HEAT OR DEFROSTING (MANUAL A/C-HEATER SYSTEMS ONLY)

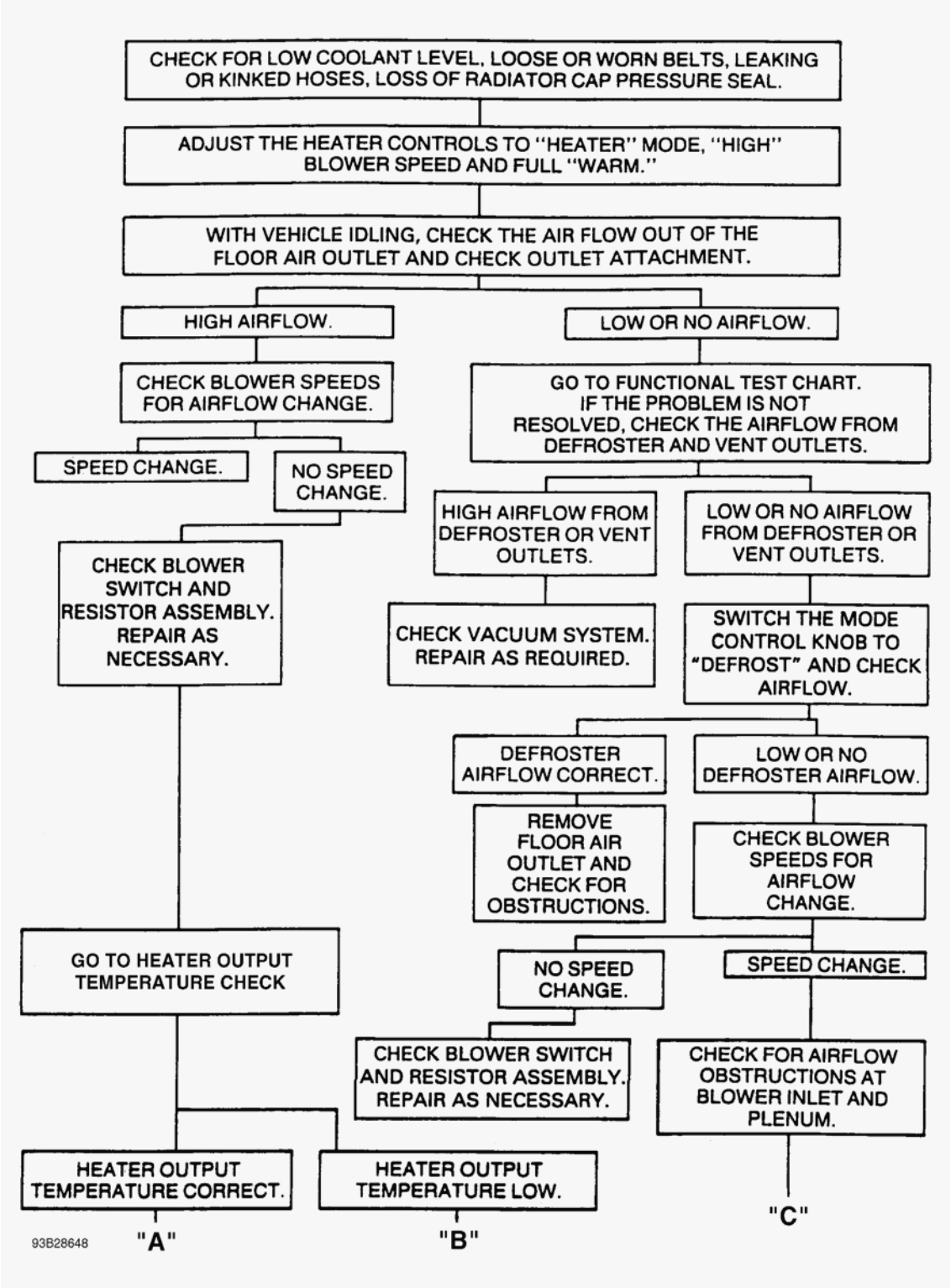

Fig. 20: Insufficient Heat or Defrosting (Manual A/C-Heater Systems Only - 1 of 2)
Courtesy of GENERAL MOTORS CORP.

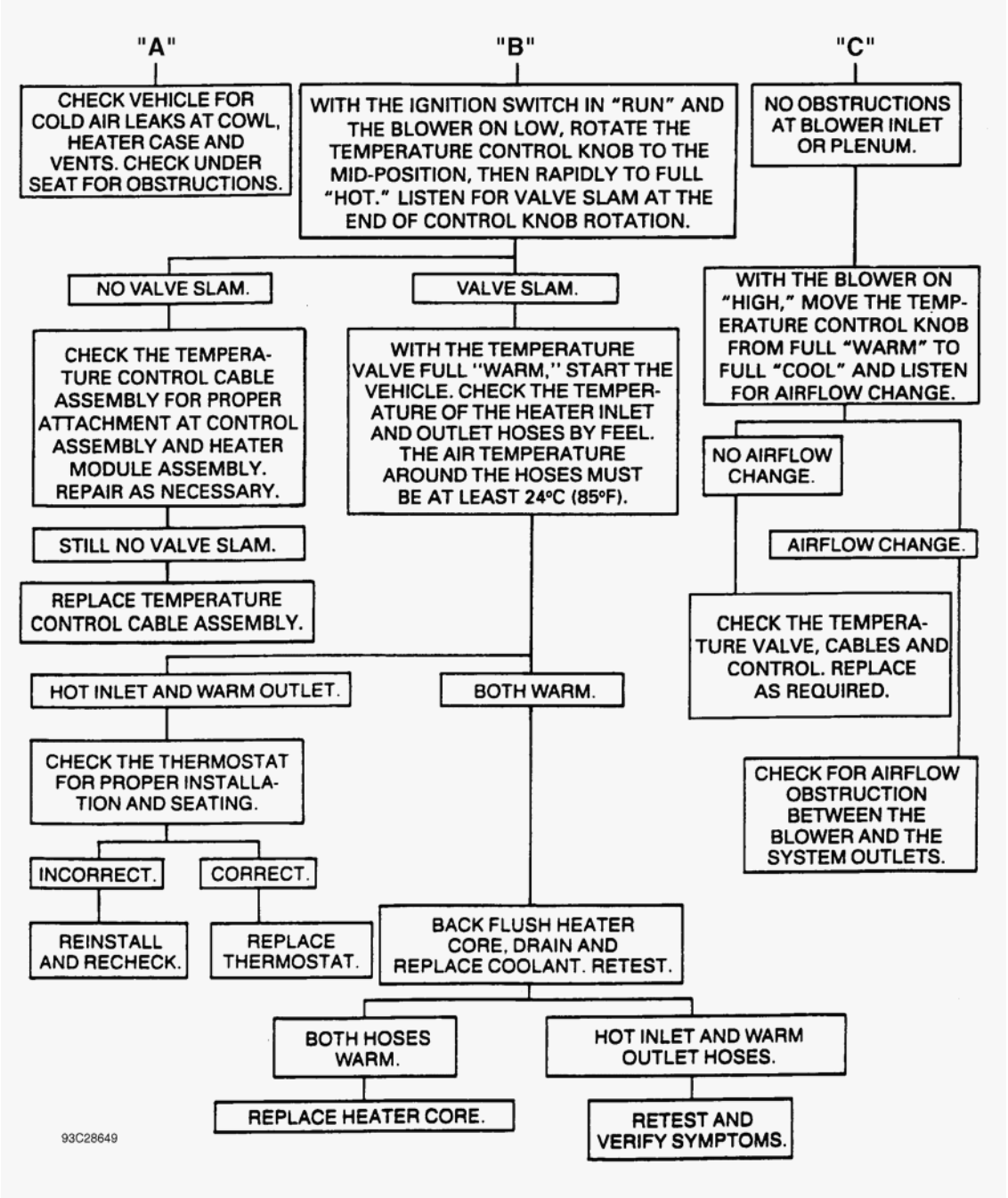

Fig. 21: Insufficient Heat or Defrosting (Manual A/C-Heater Systems Only - 2 of 2)
Courtesy of GENERAL MOTORS CORP.

TEMPERATURE CONTROL DIAGNOSIS (MANUAL A/C-HEATER SYSTEMS ONLY)

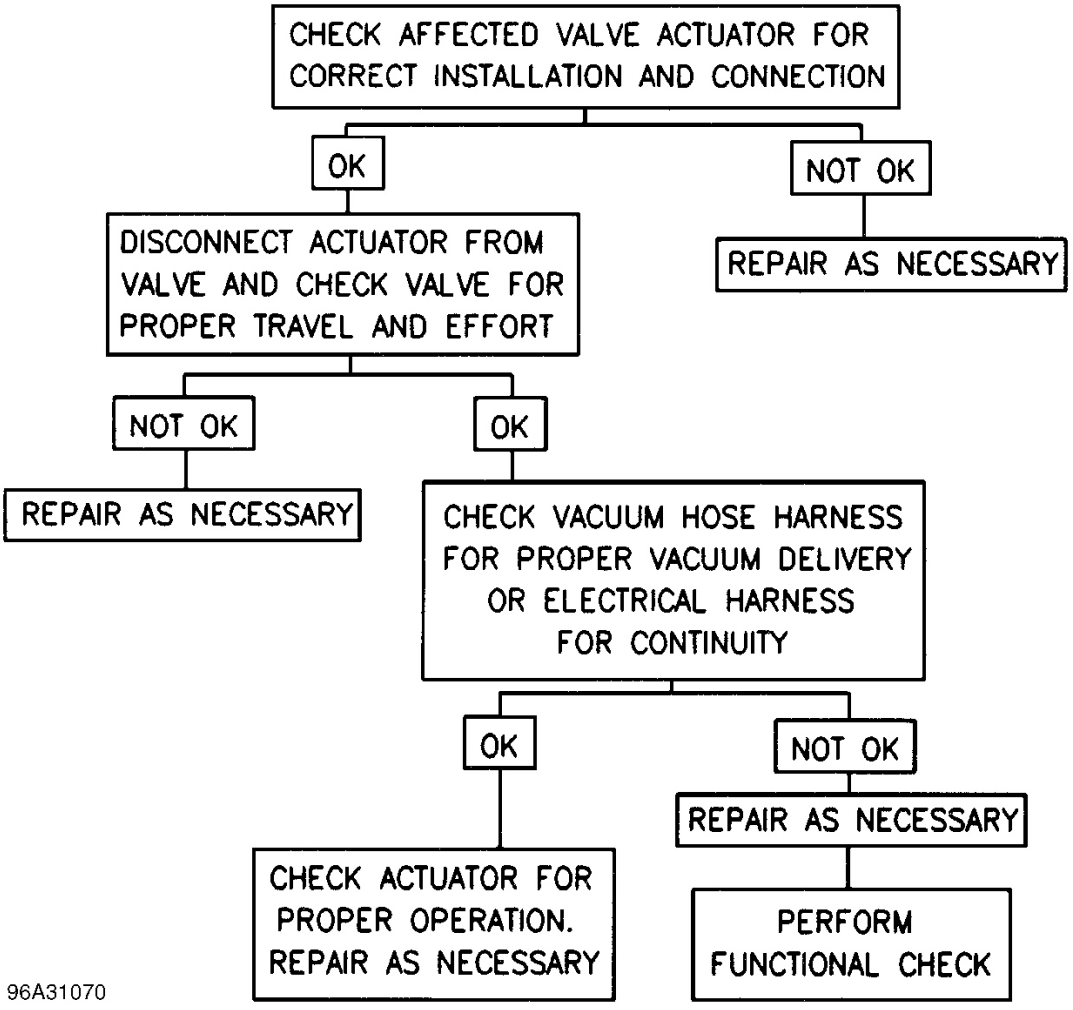

Fig. 22: Temperature Control Diagnosis (Manual A/C-Heater Systems Only)
Courtesy of GENERAL MOTORS CORP.

BLOWER NOISE DIAGNOSIS

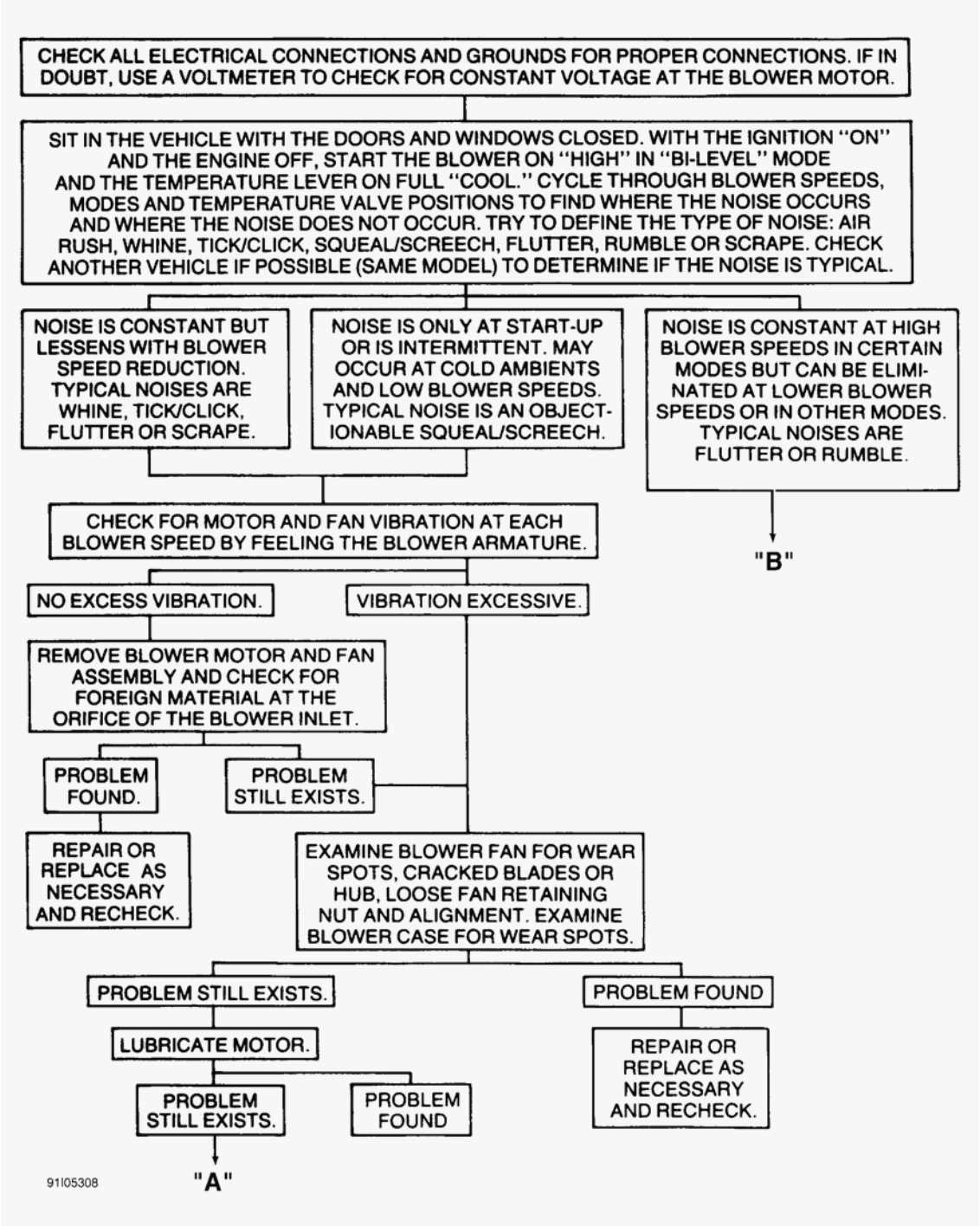

Fig. 23: Blower Noise Diagnosis (1 of 2)
Courtesy of GENERAL MOTORS CORP.

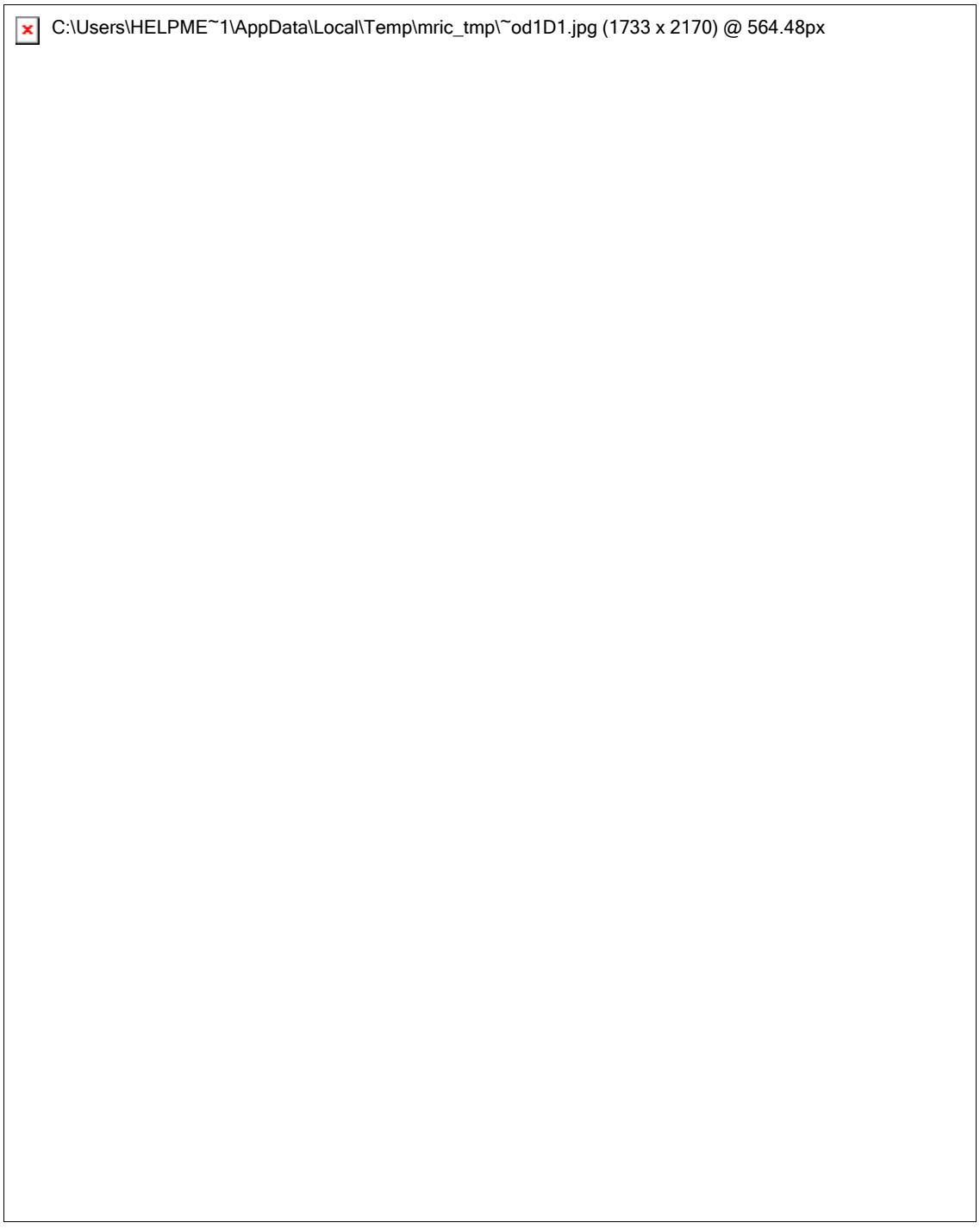

Fig. 24: Blower Noise Diagnosis (2 of 2)
Courtesy of GENERAL MOTORS CORP.

OPERATIONAL TESTING

When trouble shooting and diagnosing an air conditioning system, always refer to appropriate vacuum and wiring diagrams for the system involved. See A/C-HEATER SYSTEM article.

If blower operates at all speeds and compressor clutch engages, electrical circuits are functioning properly. If evaporator inlet pipe and accumulator surface appear to be the same temperature when felt by hand, system is properly charged with refrigerant. Ensure vacuum and diaphragm function properly when moving selector control.

ELECTRICAL TROUBLE SHOOTING

BLOWER MOTOR WILL NOT RUN

Check fuses. Turn ignition switch to RUN position. Check for voltage at function control switch. Place blower switch in HI position. Check for voltage at switch and at high-speed blower relay. Ground blower motor with ignition switch in RUN position. If blower operates, motor is okay.

BLOWER DOES NOT OPERATE IN HI

Check for voltage at high-speed blower relay with ignition switch in RUN position and blower switch in HI position. If voltage is not present, check for voltage at blower switch.

BLOWER OPERATES ONLY IN HI

Check blower resistors for open condition. Check blower switch for voltage at each position.

A/C DOES NOT WORK

With engine running and function control switch at NORM position, check for voltage at pressure cycling switch. Check for voltage between pressure cycling switch and compressor clutch. Ground compressor clutch circuit. If clutch engages, check wide-open throttle cut-out switch and A/C compressor cut-off switch.