



Up To Standards

By Mike Weinberg
Contributing Editor

Before you get into this discussion of the Chrysler all-wheel-drive system that is found in minivans with the 604 automatic transaxle, it might be a good idea to grab last month's magazine with Part 1 for reference. In the first installment we discussed the theory of operation and the role each of the sub-assemblies plays in the overall operation of the all-wheel-drive system. Here we continue with operation and diagnostic challenges of the vacuum, electronic and mechanical systems involved in this design.

The viscous clutch acts like a center differential and allows for differences in rotational speed of the front and rear driveshafts. The viscous coupling splits torque between the front and rear axles with a 10% torque split normally going to the rear wheels. If the front wheels begin to slip, the shearing action of the alternately splined plates in the coupling heats the silicone fluid, causing the fluid to expand and compress the plates. Under these conditions, up to 95% of the torque can be transferred to the rear wheels. As the front wheels regain their traction the silicone fluid cools and the torque split to the rear subsides to 10% again.

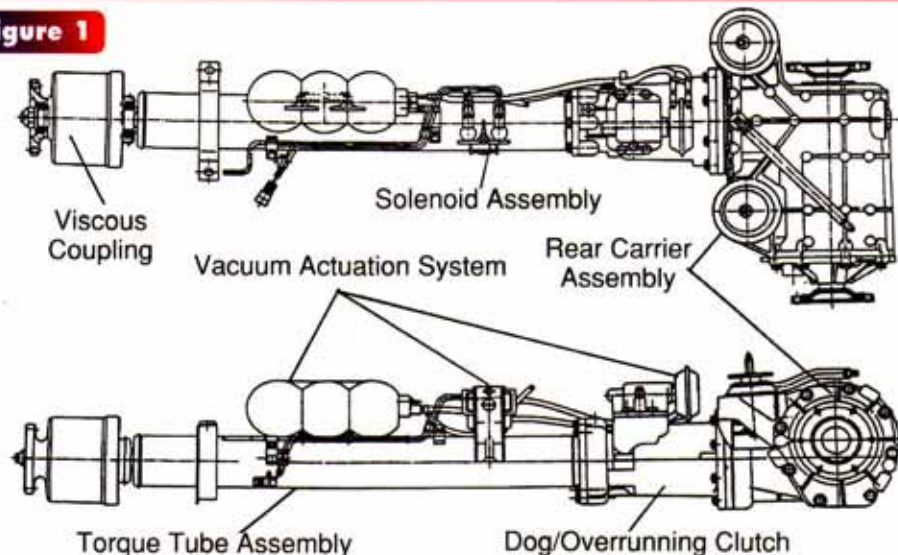
Chrysler AS-Body All-Wheel-Drive Diagnostics, Part 2

Since these vehicles are driven primarily by passenger-car buyers who want the added control and stability of all-wheel-drive without the "truck feel" of 4-wheel-drive vehicles, the manufacturers are engineering new components to satisfy their customers. Chrysler has added an overrun/dog clutch to the rear driveshaft to stop the windup and wheel hop inherent in 4WD systems. Since the front brakes do most of the stopping with the rear brakes biased to keep the vehicle stable and in a straight line while stopping, the overrun clutch, which is basically a sprag unit, permits the rear wheel to turn faster than the front under hard braking to avoid wheel hop and oversteer. This overrunning-clutch section has 12.4 ounces of ATF for lubrication. Now as we all know, a sprag or one-way clutch can transmit power in only one direction; therefore, in reverse there is no way power can be transmitted to the rear wheels. In order to

achieve all-wheel-drive in reverse, a dog-clutch unit was incorporated in the design to lock the overrunning clutch in reverse. The dog clutch consists of a vacuum-operated shift fork and sliding collar (clutch) to lock the normally free-wheeling sprag in reverse. Two electric solenoids port manifold vacuum to a double-acting vacuum motor (servo) mounted on the rear drive unit to engage the dog clutch in reverse or disengage it when the driver selects any other range. A vacuum reservoir stores manifold vacuum that will flow to the solenoids and shift motor when needed at a constant rate under changing throttle conditions. When the selector lever is placed in reverse, the backup lights are receiving 12 volts. Wired into that circuit are the solenoids that port vacuum to engage the dog clutch or disengage it when the driver selects another range. A coil spring on the shift rail helps to disengage the dog

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Figure 1

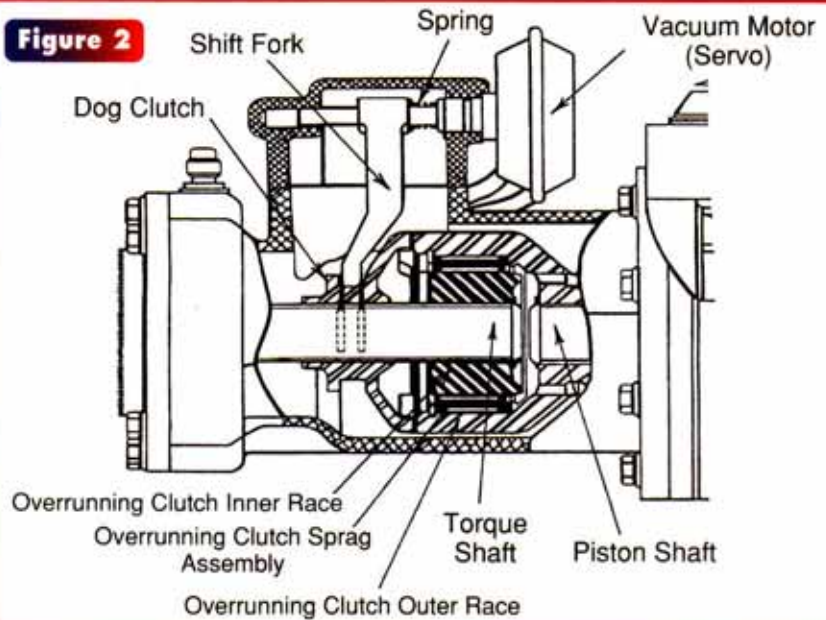


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clutch and ensures that the dog clutch cannot remain locked if there is a loss of vacuum. Needless to say, the wiring and correct routing of the vacuum hoses are essential to proper operation of this system and to the safety and stability of the vehicle.

The rest of this article is devoted to electrical and vacuum schematics and diagnostic trees to help you correct problems you encounter. It might be wise to cut these articles out and keep them together with your 604 tech bulletins so that they will be handy when one of these units needs your tender loving care.

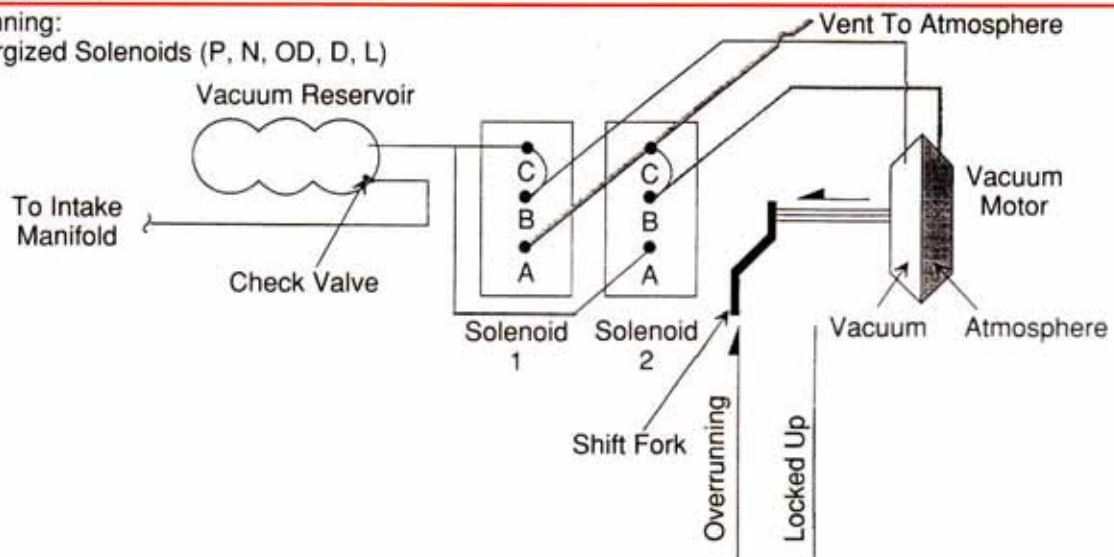
Figure 2



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Overrunning:

De-energized Solenoids (P, N, OD, D, L)



Locked Up:

Energized Solenoid (R) Reverse
Common Ports: B-A

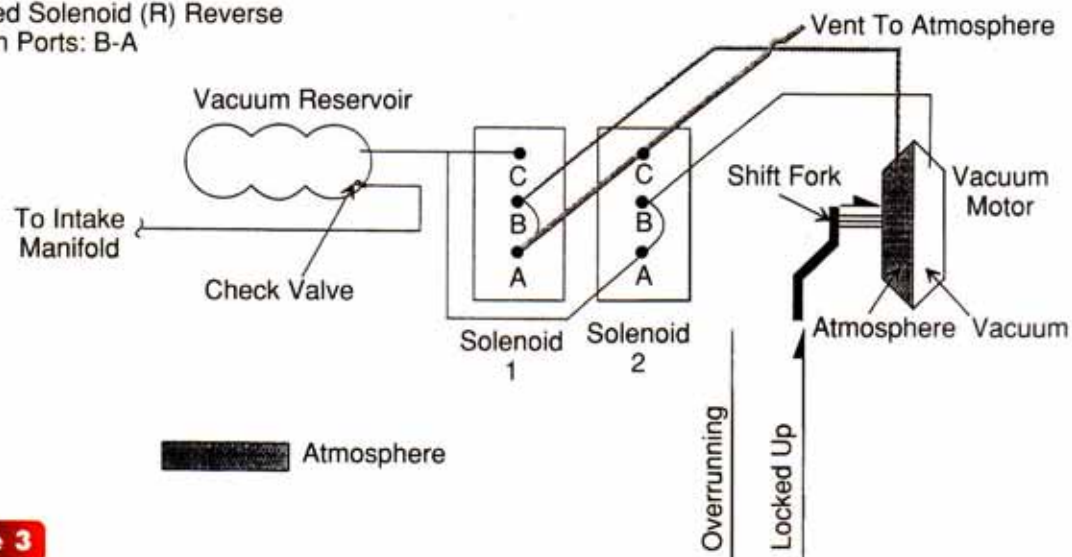
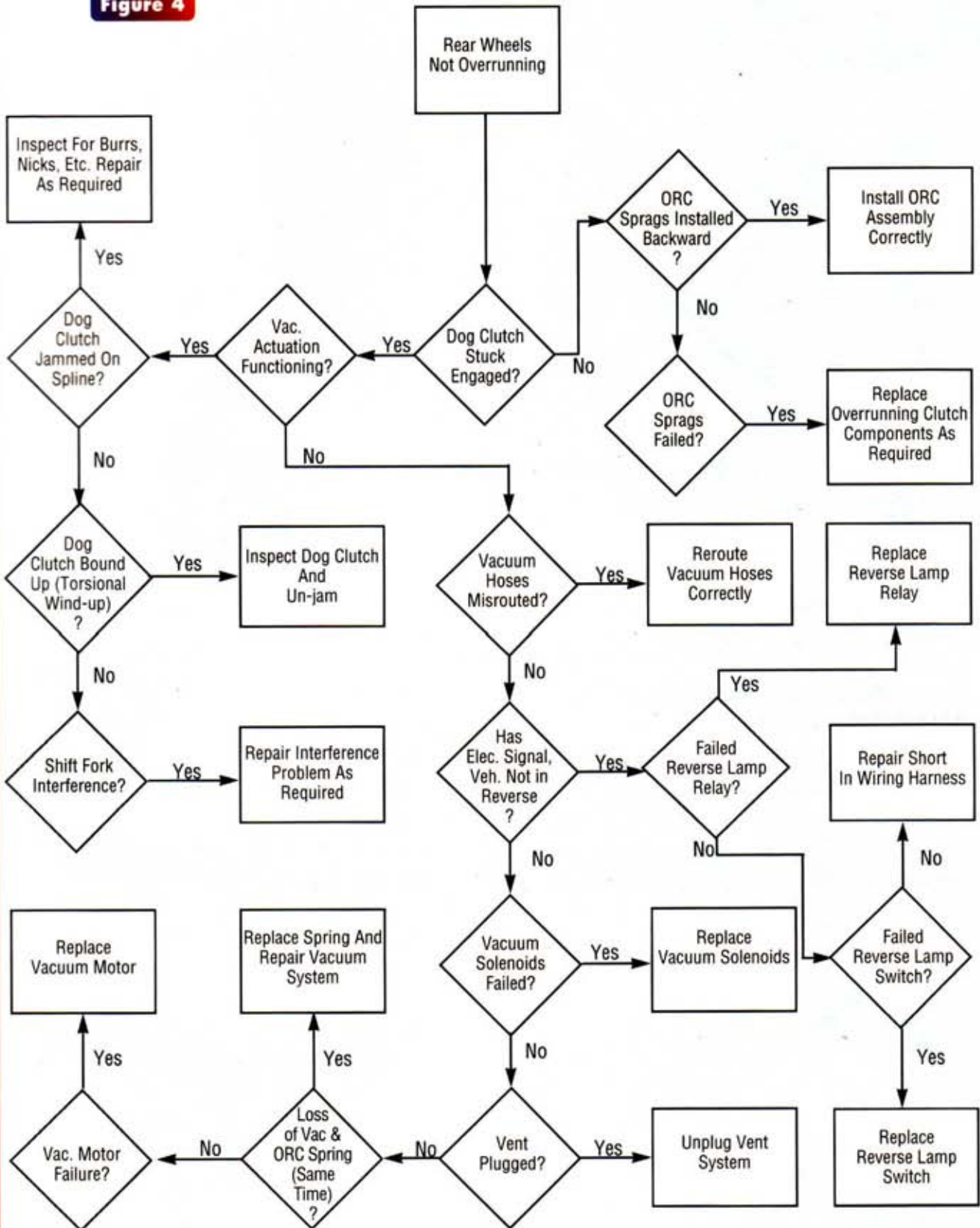


Figure 3

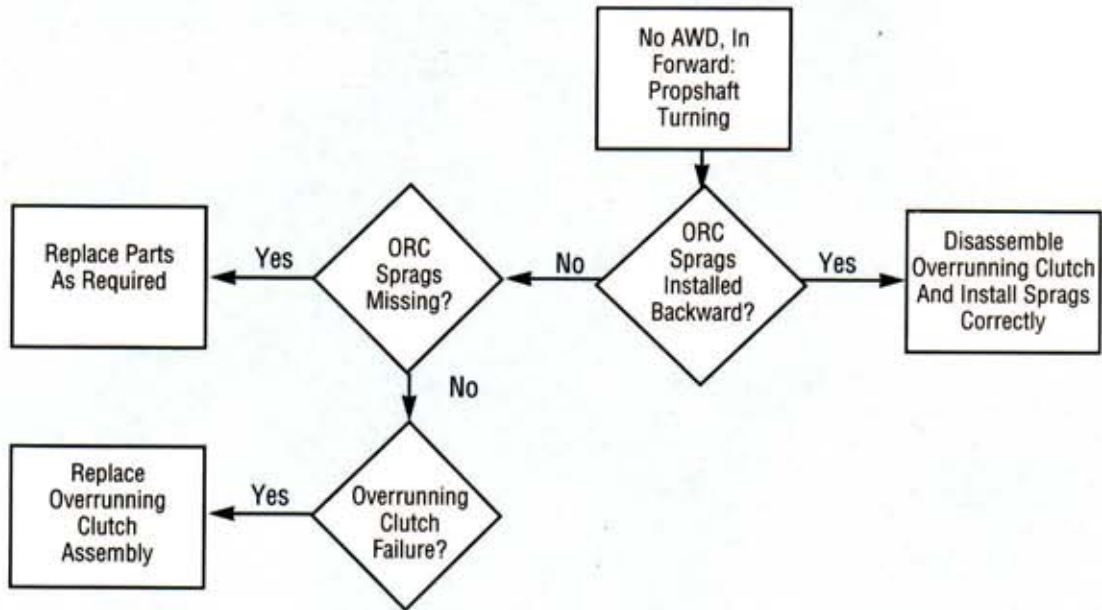
Figure 4



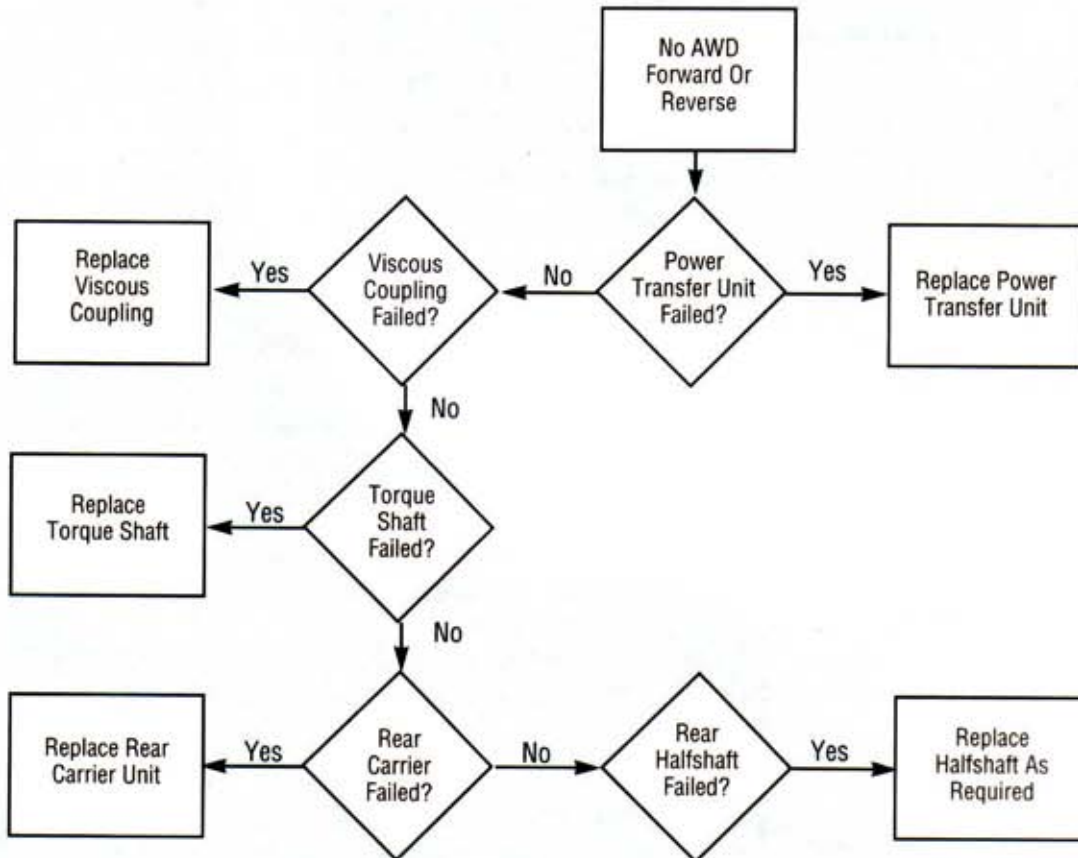
*To Driveline Solenoids

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No All-Wheel-Drive In Forward, Propeller Shaft Turning



No All-Wheel-Drive Forward Or Reverse



THE BOTTOM LINE:

Tell us your opinion of this article:
 Circle the corresponding number on the free information card.
 87 Useful information.
 88 Not useful information.
 89 We need more information.

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Figure 6

No All-Wheel-Drive, Reverse Only, Propeller Shaft Turning

