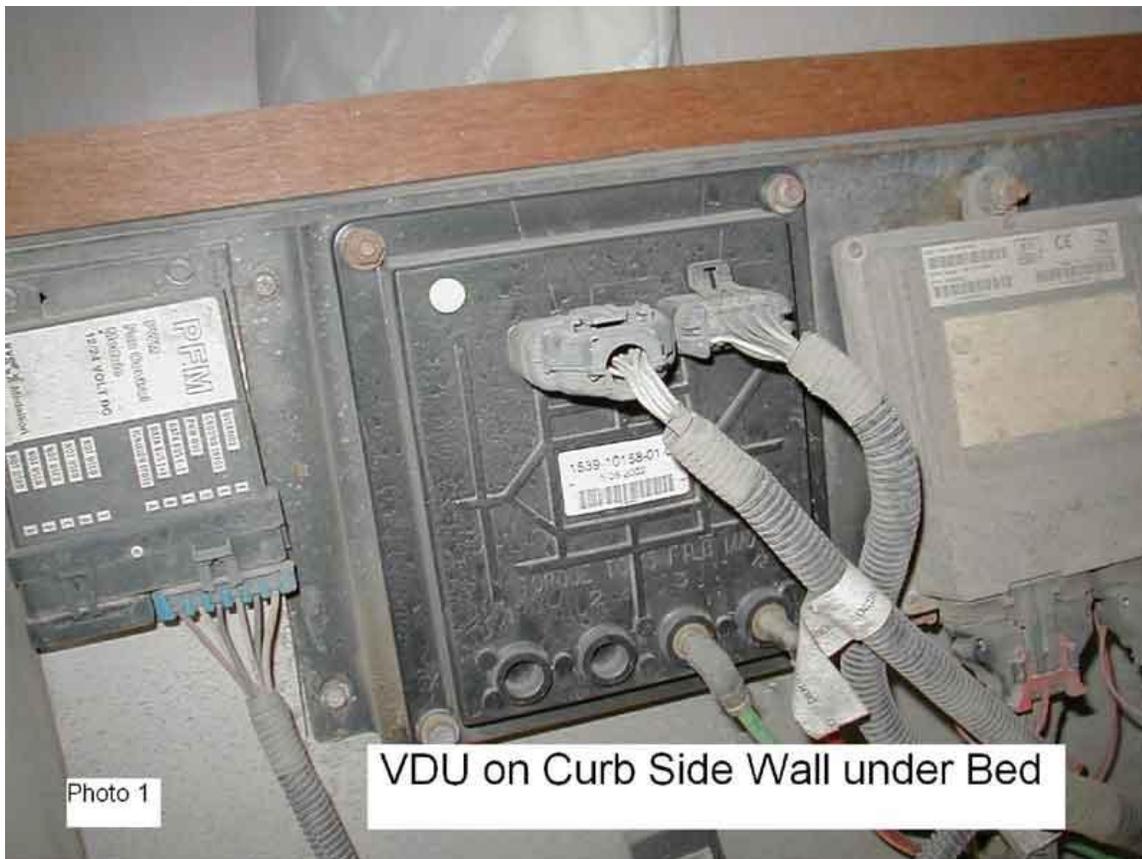


The information in this document were prepared by Jim Godward and Jim Epting.

As originally diagnosed by Jim Godward, the Vehicle Data Unit (VDU) installed in the 1999-2001 Freightliner chassis has significant manufacturing quality control issues. The issues have lead to erratic performance and some frustrating instrument cluster problems, though non of the problems are known to have caused a shut-down or need for road service. This note addresses one of the instrument cluster issues, false low air pressure warnings on both the warning light and pressure gauge. (In fact, the Freightliner representative at the 2006 Quartzite Newmar Rally indicated that the vehicle would run and drive without an operating VDU, but with no instrument panel gauge operation. This is untested by the writer.)

The VDU is a small black box which gathers and conditions various vehicle data destined to be displayed on the drivers instrument panel. This data is multiplexed onto a single digital bus, and passed to the instrument cluster, where it is de-multiplexed and displayed by the various individual instruments. In the 1999-2001 coaches, the box is attached to the curbside vertical engine bay wall, accessible by lifting the under-bed engine hatch. The box is approximately six by seven inches, less mounting flange, and one inch thick. It is attached by four small bolts in the corners, with rubber shock mounts surrounding each mounting bolt. The VDU has two multi-wire quick disconnect plugs and two small air lines of ¼ inch diameter attached. The airlines are color coded red and green and are apparently routed to the front and rear air brake reservoirs. The VDU is easily identified by looking for the color coded air hoses. Photo 1 below show the VDU mounted in under the bed in the engine compartment. The mounting bolts, quick release plugs, and the air lines are clearly visible.

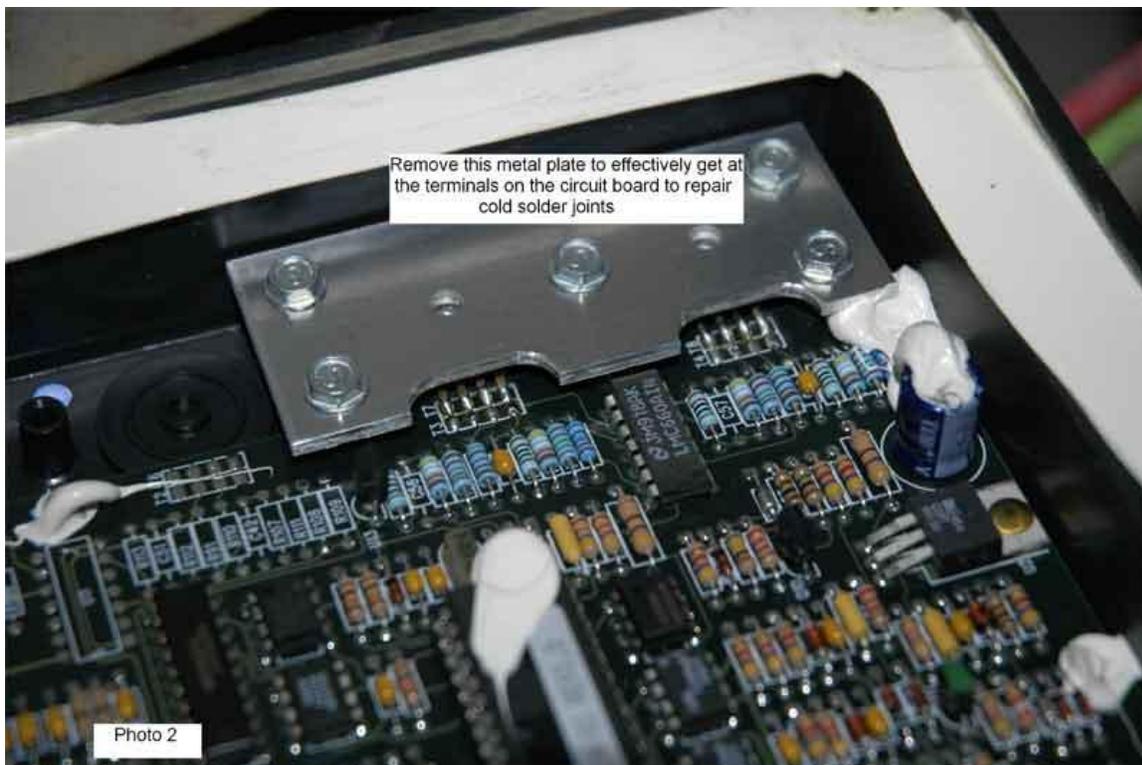


The full range of VDU problems indications is not known, but it is a fairly good bet that any false instrument indication may well be traceable to this unit. Some have reported various false indications which Freightliner dealers have resolved by replacing the VDU. On Jim Godward's and Jim Epting's units, the VDU caused false low air brake pressure warnings, including both the light and the gauge. It is only

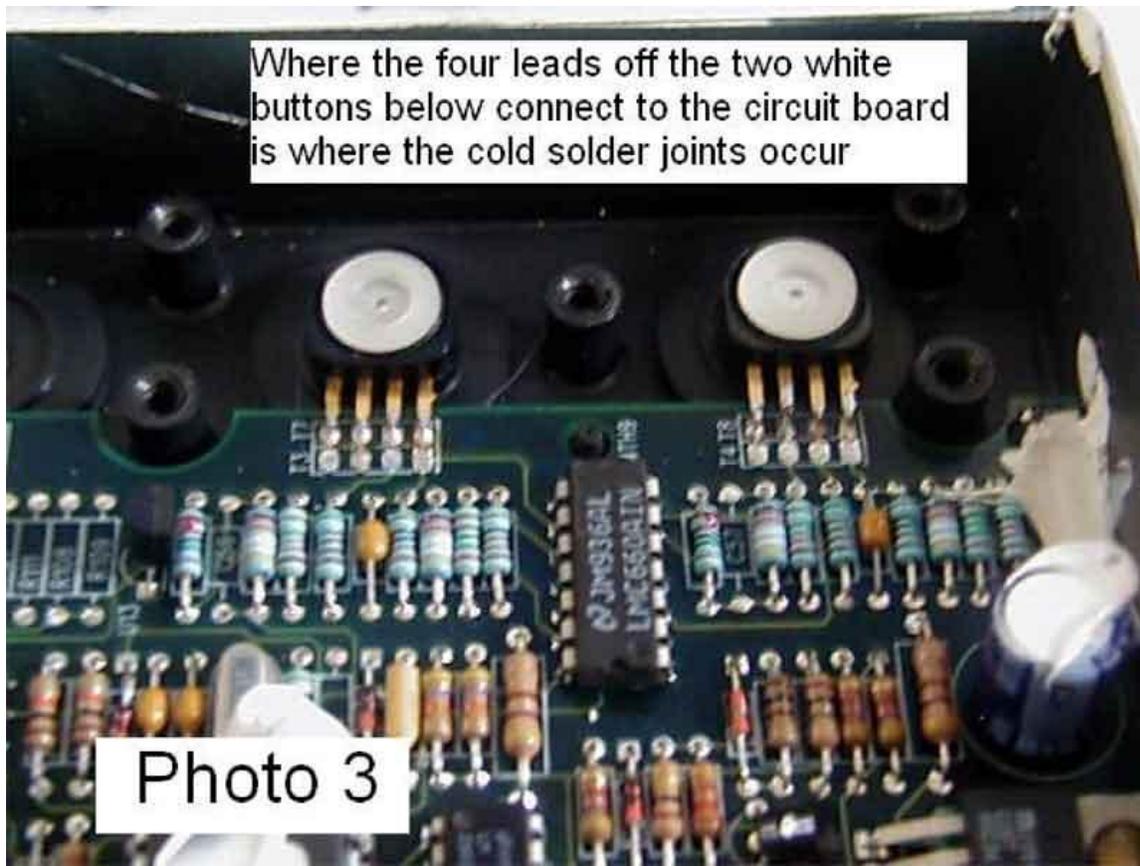
this type failure which is addressed by this note. There is a possibility of other repairs by a qualified electronics technician.

If the individual owner is inclined to attempt brake warning repair of the VDU, it should be removed from the engine bay, wiped clean, and removed to an adequate working area. Several safety measures should be taken. First, completely drain the air from the brake system. This can be accomplished by using the tank purge drains. Second, disconnect the chassis battery positive leads. Third, find an adequate prop for the heavy under-bed engine cover so the risk of it falling is minimized. Release the air hoses by pressing and holding the lock collars in the direction of the box fittings by about 1/32 inch. The lock collars are concentric with the hose, and constitute the tip of the air fittings. The air hoses can then be pulled out of the fittings. Pry the locking tabs open on the two quick disconnect plugs and gently work the plugs loose. Upon removing the four corner mounting nuts, note the very minimal torque, allowing the shock mounts to flex. The VDU cover is simply bonded in place and can be carefully worked off with a pair of sharp knives. Photo 2 shows a view of the internals of the VDU. As a small logistical suggestion, before attempting repair it would be wise to locate the nearest Freightliner Oasis dealer, just in case the situation is made worse and a replacement VDU is needed.

The primary quality control problems are with cold solder joints on the air pressure sensors, which become immediately clear when the unit is opened. Upon opening the VDU one will observe that the internals of the VDU consist primarily of a single printed circuit board and two attached brake pressure sensors. The air pressure sensors are covered by the small screw mounted aluminum plate which should be removed for repairs, shown in Photo 2.



The primary soldering problem seems to be with the four attachment leads that each of the two brake sensors have on the printed circuit board. The connections to the air pressure sensors are just visible in the "notches" of the aluminum cover. (See picture below with cover removed) In both the Godward and the Epting cases, the solder joints were "cold." (Cold joints are characterized by a dull, grainy, rough appearance. Good joints are characterized by a bright, shiny, smooth appearance which "flows" onto the subject material.) All eight of the attachment leads (See Photo 3) had obvious cold joints, and there were visible cracks in some. This is an easy fix for someone with soldering experience, even without if careful.



The conductors and component leads on the VDU are quite small, though certainly larger than the current microcircuit level. These components cannot tolerate a lot of soldering heat, so a small iron is needed. Repairs are clearly within the realm of possibility, with a small pencil tip soldering iron and some care. I purchased a 40 watt pencil tip iron and a bit of fine resin core solder at Radio Shack. Just apply the tip of the soldering iron to each of the eight joints for a few seconds, and apply a very small drop of fine, resin core solder. After using the soldering iron, I now think that a 30 watt iron would have been even better, but one wants to get a good joint and not produce another cold joint. The entire operation took no more than an hour, once all the planning and preparations were made. If one has no soldering skills, or experience, then it would perhaps be better to find a friend who does.

When finished, the VDU must be resealed to avoid moisture and road spray. The original sealant is a tough, somewhat pliable material of undetermined origin. Mr. Godward, and aerospace electronics expert, advises the use of a small amount of butyl rubber sealant to reseal the unit. If this is unavailable, an epoxy would seem to work well. Mr. Godward advises against silicon since it releases a potentially destructive acid as it cures. Reinstallation is straight forward, but care must be exercised to avoid over tightening the four shock mount bolts. The shock mounts should not be compressed since this might distort the case, or cause excess vibration. The elastic locking nuts will prevent the nuts from backing off. The air hoses will lock in place when pressed back into the pressure fittings. Reconnect the chassis battery and test the repair.

Jim Epting and Jim Godward