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ELECTRICAL WIRING FOR D.C. REFRIGERATORS / FREEZERS FITTED TO A VEHICLE.

One of the most often heard complaints about 12V fridge/freezers mounted in vehicles is that frozen food defrosts overnight when the vehicle engine is not running.

This often results in the fridge being condemned as useless, despite the fact that factory tests prove the unit's performance to be acceptable.

Closer investigation of the problem indicates that in 99 cases out of 100 the fault lies in the power supply to the fridge. A few basic rules must be followed to ensure reliable running.

1. The battery must provide an adequate power reserve to operate the fridge when the vehicle is stationary.

2. The wiring system between battery and fridge should be designed to minimise voltage drop.

3. Opening of the fridge or freezer must be carefully controlled.

1. BATTERY SELECTION:

Other than for very limited periods the vehicle's main battery should not be used to operate a freezer. A properly installed dual battery system utilizing a Low Maintenance, Deep Cylce Battery of approximately 100 Ah capacity should be used. A Deep Cycle Battery will tolerate the constant discharging and recharging cycle associated with fridge use far better than an automotive battery which can be expected to expire after 15 or 20 discharge cycles. In addition the Deep Cycle battery provides a greater portion of its stored charge (up to 70% in some makes) before the voltage drops to the level at which the fridge low voltage cut out operates.

With dual batteries it is advisable to ensure that only the auxilliary battery is left in circuit when the engine is switched off. Most split charging systems will ensure that this is accomplished. Alternatively a relay operated by the ignition circuit should be fitted to connect the auxilliary battery to the alternator charging circuit when the engine is running. With the correct battery system properly charged all that remains is to transfer power efficiently to the fridge.

2. WIRING SYSTEM

Most compressor operated fridges have a built in battery protection cut out which will stop the fridge when the voltage at the compressor terminals reaches either 11 or 10,5 Volts.

It is not generally realised that a 12V DC fridge compressor can draw up to 20 Amps for a few seconds on start up. This high current will cause a voltage drop due to the resistance found in the wiring between the battery and the fridge. The wiring circuit, its connections and any switches used should be able to carry the 20Amp starting current with a voltage drop not exceeding 0,5 V.

If the voltage drop in the wiring is higher than this and the battery is not fully charged, the voltage at the compressor can drop below the cut off voltage when starting. The compressor then cuts out, the voltage at the terminals rises because there is now no load and hence no volt drop. The battery protection cut out now allows the fridge to attempt to start and the whole cycle repeats itself. Prolonged operation in this way could damage the compressor.

As a general rule, all plugs and switches in the circuit should have a 20 Amp DC rating and wiring should have a cross section area of 1mm^2 for each metre installed. i.e. Wiring measuring 4m from battery to fridge should be 4mm^2 cross section.

A separate earth (negative) wire should run from the fridge to the auxilliary battery. Do not use the vehicle chassis as an earth. This wire should be the same thickness as the positive wire.

3. OPERATION

To obtain best results from the limited power resources of the battery a few basic steps should be followed.

1. Load pre -frozen food if possible

2. When running the vehicle engine turn the fridge thermostat to its lowest setting. This 'stores' cold in the frozen food. When stopped and running from the battery only turn the thermostat to -10°C to just maintain frozen conditions.

3. Limit lid openings to a minimum. Take frozen food out to defrost in a cooler box and use this"cold" to cool drinks etc.

With all the above simple rules followed the performance of any 12V compressor driven Fridge/Freezer will be enhanced.