Go straight to Trouble Shooter [Page 29] Frequently Asked Questions (Website, Technical)

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Working with modern cars

Increasingly complex
The environments in which towing electrics are being fitted are becoming less and less simple. In-car systems are increasingly complex and it is essential for after-market fitters to guard against causing damage to them.

Guide to safe fitting

This Guide, along with the Vehicle Data database of vehicles, will provide essential information and support to help ensure work can be undertaken competently and safely.

Traditionally, cars had rear lights fitted with standard 5, 10 and 21watt bulbs, switched on and off by conventional switches and relays.
Modern cars have many and varied rear light systems. Car manufacturers are trying to create failsafe rear lighting. **CANbus systems** have appeared, reducing the number of wires running through cars by using remote digital signals to control the lights and other functions via local control units.

Current features in vehicle rear lights

In association with CANbus systems, a variety of sophisticated techniques have been developed by

- car makers. Using special bulbs, e.g. Multi-function tungsten filament bulbs
- LED's (light emitting diodes) that need much less power to
- drive them Making one single filament bulb function at
- different intensities. One bulb doubles as the 5W sidelight
- and the 21W brake light.
- One bulb doubles as the 5W sidelight and the 21W fog light.

Making one wire handle two functions, e.g. One wire controls both side and brake lights; one wire controls both side and fog lights

- Making one bulb take over the function of another that has failed: e.g. Brake or fog light takes over when a sidelight fails, and dims to sidelight intensity; sidelight takes over when a brake light fails, and brightens to brake light intensity.
- Constant testing and monitoring of lighting systems through: circuit-monitoring signals; low-current circuit-test pulses

Interfacing and the use of relays

Adding loads to existing circuits

Very rarely, it is possible to connect the towbar wiring directly to the vehicle's rear light circuits so that the car's wiring carries the additional load when the trailer lights are on. This system is found on many older cars or on modern cars when the car manufacturer has designed for it.

Possible dangers of adding loads to existing circuits

The wiring in most modern cars is designed for maximum efficiency: wire gauge is matched closely to the load it will carry; sometimes one wire will perform more than one function, supplying different lights at different times. There is rarely any spare capacity that would allow extra lamps to be attached. If loads are crudely added, faults may be created.

The following list shows faults of increasing seriousness:

- Trailer lights may work poorly because there is not enough power
- Trailer lights may flash in response to test pulses from the vehicle
- Vehicle fuse may be prone to blowing
- Vehicle may show a bulb-failure warning when the trailer is attached
- Vehicle wires may overheat
- Vehicle's control systems may be compromised
- Vehicle central processing units (CPU's) may be damaged

SmartCAN modules and Bypass Relays protect the vehicle.

Bypass relays and SmartCAN modules protect the vehicle by making sure that the towbar wiring puts virtually no extra load on the vehicle's rear light circuits.

SmartCAN Multi-Compatible CANbus Towing Module

Interfaces directly to CAN - Identifies the vehicle it is fitted in

Enables activation of car's towing related functions

Has built-in caravan auxiliary function.

Interfaces directly to CAN

The TF2302 towing module connects directly to the vehicle's CANbus network. All the signal data to the towing module comes from a direct connection to the vehicle's CAN HI, CAN LO wires.

Identifies the vehicle in which it is fitted: dedicates itself

As soon as the module is connected and powered up, it analyses the data the car is sending, recognises the vehicle it is in, dedicates itself to that vehicle and applies the correct codes.

Enables activation of car's towing related functions

The smart module is interactive and enables the activation towing-related functions,

Caravan auxiliary function.

The SmartCAN module has a CAN activated 12S function to control caravan auxiliary circuits. Two switched 12S outputs on the module are activated when the CAN detects that the engine is running.

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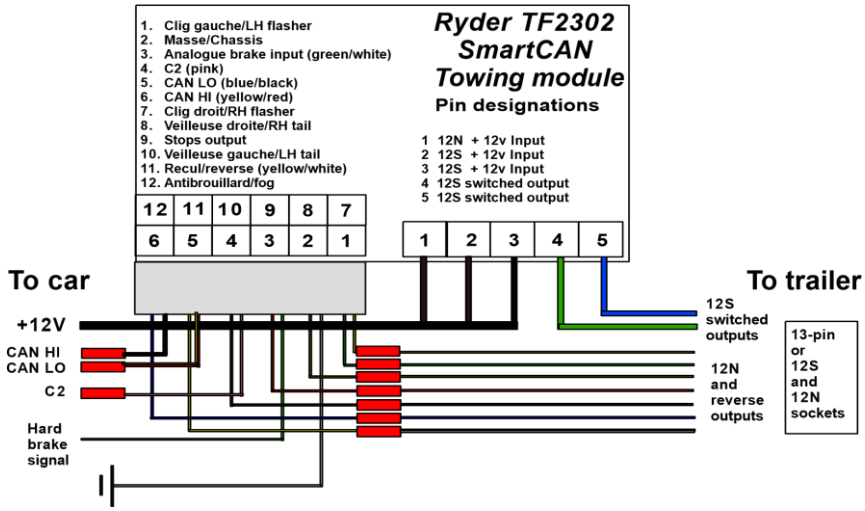
The diagram below shows the module and the short loom.

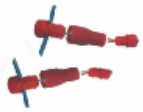


Introduction to the module

The short loom that mates with this socket carries the following circuits:

CAN HI: From Pin 6, red wire and **CAN LO** Pin 5, black wire.

These are in the grey, shielded twin signal cable. This cable is one metre long as standard but is available in looms with longer lengths. In Vehicle-specific kits, it is supplied in the ideal length for the vehicle.



Connection to the CAN is by red Posi-Tap connectors

C2: Pink: This wire is a positive switch for an external C2 trailer flasher warning lamp or buzzer. There is no buzzer on board the module.

"Hard" (analogue) brake input* Green/white single unterminated wire.

Some cars do not have brake lights on the CAN so a "hard" brake connection is required. Also, it is common for a "belt and braces" approach to be used, with the "hard" brake connection made even if there is a brake function on the car's CANbus system. The brake signal has to be picked up from a feed that supplies a single function bulb. not from a modulated feed that operates both the brake light and sidelight *(otherwise the trailer brakes will come on with the sidelights).*

6 outputs to the trailer socket. These are terminated with red butt connectors for connection to the 7-core or 13-core cable

Yellow, blue, green, brown, red, black and yellow/white. Fit a prewired trailer socket (7-pin or 13-pin) in the normal way, thread the cable into the car and connect the socket wires to the corresponding colours on the short loom. Connect the trailer reverse light wire to yellow/white on the short loom.

5-way screw terminal block: This block carries 12N and 12S power inputs and two switched caravan auxiliary outputs:

Pin 1: 12V input for trailer light outputs. Protect with a 15 amp fuse, close to power source.

Pin 2: 12V input for caravan auxiliary outputs. Protect with a 20 amp fuse close to the power source.

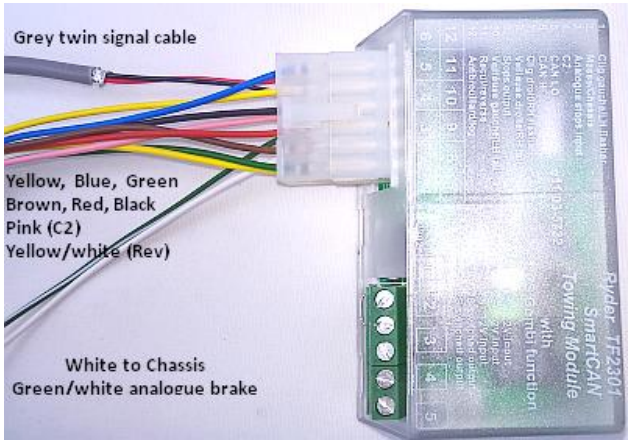
Pin 3: 12V unswitched caravan auxiliary output.

Pin 4: Switched 12V output CAN controlled

Pin 5: Switched 12V output CAN controlled

The picture below shows the module and loom, and the the connections on the loom plug

.



Fitting procedure

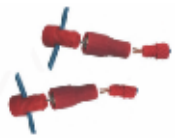
Disconnecting the battery: *If you do disconnect the battery, make sure the ignition is switched off before you disconnect. Only disconnect for the shortest possible time.*

Details for all cars of where to connect and details of the CAN interface are given on the car- specific sheets (SmartCAN Data) are available in Vehicle Data/Latest Vehicle Databas: Click this link - Vehicle Data

Install all components, including connecting the module to the trailer socket cable(s). If you decide to disconnect the battery, do so now.

Make your connections to Can HI and CAN LO. Cut a suitable length of grey two-core data cable and connect one end to the red and black CAN wires in the short loom, red to red and black to black.

Connect the other end to the vehicle CAN wires: red to CAN HI, black to CAN LO, using the red Posi-tap connectors supplied. The vehicle's HI and LO wires are usually a twisted pair. If the instruction refers you to a connector or OBD2, connect to the wires leading to the specified pins of the OBD2 socket.



Connect both power inputs to the power source but do not fit the fuses. If you have disconnected the battery, reconnect it now.

Switch on the ignition.

Insert the fuses that protect the module and test the installation.

Module working

When the module is powered up, it sets itself and give three rapid flashes*

If you have connected the wrong way round to CAN HI / CAN LO, you will not damage the vehicle or the unit, but the module will not work. The LED in the module will flash in the sequence: ***3 rapid - pause/3 rapid pause***, etc. In this case, simply reverse your connections to HI and LO.

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The correct flash sequence is:

REGULAR 1 SECOND – locked on and working

Error sequences are:

NO FLASH – No CAN detected or asleep

STEADY LIGHT – Incompatible with vehicle

3 RAPID FLASHES - PAUSE/3 RAPID FLASHES - PAUSE, etc – CAN wires reversed

*[*Please note that an intermittent fault in the power or earth lines would also cause the module to reset itself intermittently, with three flashes each time.]*

Overload protection: As well as the fuse protection you put on the input cables, the module has on board protection against overloads – it will shut down any lighting circuit that shorts, etc. In service, making this a very durable unit.

The SmartCAN module recognises the host vehicle: Data from all the vehicles on the application list is programmed into the Smart module. Once fitted, the module recognises its host and becomes specific to that vehicle

Recoding: Some vehicles automatically accept data back from the unit and alter some functions when a trailer is connected. Some require a recode before they do this and others react partially without a recode, adding new functions when they have been recoded.

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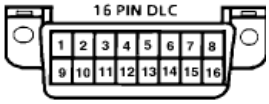
OBD II: In some cases, the CAN connection is found on the car's diagnostic socket (OBDII)

OBD II (On-board diagnostic) data link connectors (DLC) are the international standard for the diagnostic interface. They have to be within easy reach of the driver's seat, sometimes in the centre console, sometimes under the dash. Two of the pins are CAN HI, CAN LO and these are listed in the data chart in these instructions.



Sophisticated Bypass Belays: SMART LOGIC

TF2218/7H series SMART LOGIC Bypass

This smart bypass fits virtually all cars, handles cars with standard or modulated (e.g. two lamps on one wire) circuitry, and has a quiescent current measured in MicroAmps. Interface to the car is via signal wires from the relay; interface to the trailer is via screw terminals.

The TF2218/7H relays are quick and easy to fit, and very cost-effective. They bypass all the vehicle's bulb-failure warning systems and:

- Monitor the trailer flashers with both a built-in audible output and terminal outputs for a remote sounder or warning lamp.
- Totally transparent: the car does not detect the relay
- Fully snubbed against "spikes" and other hazards
- Type-approved for EMC compliance
- Protected: stands rough treatment, accidental current reversals, etc.
- The TF2218/7-S is ready fitted with the SuperSplice plug-in connector (See page 25)

Fitting the TF2218/7H/TF2218/7HS

Route your power source cable(s) from the boot to the battery. Fit a fuseholder in line in the cable, close to the battery. (Check the fuse value on **Chart A)**. Do not insert a fuse yet

Follow the instructions in **Chart A** and connect together your 7-core cable, your relay and the appropriate wires in the vehicle loom. Connect your power cable to the battery and connect a test board. Insert the fuse.

Test the installation by turning the car lights on and off and observing the lights on the test board.

Chart A: Wiring the relay(s)			Fuse 2 x 10 amps on relay loom, 1 x 15 amps by the power source.			
Socket pin No.	7 core cable colour	to	Relay terminal number	Wire colour/ SuperSplice number	to	Vehicle circuit
1	Yellow		1	Yellow - 1		LH flasher
2	Blue		2	Blue – 2		Fog lamp
3	White		-	White		Chassis earth
4	Green		4	Green - 4		RH flasher
5	Brown		5+7	Brown - 5		RH tail light
6	Red		6	Red - 6		Brake lights
7	Black		5+7	Black - 7		LH tail lights
12S Pin 1	Aux Yellow		R	Grey		Reverse
-	-		+12V (both)	Orange		Power source
			+12V (both)	Orange		(Fuse each 10 amps)
			C2 (option)**	Pink		Telltale switch (negative)

Special notes*

C2 Pink is NEGATIVE. Connect the positive side of a buzzer to +12V and the negative side to this pink wire.

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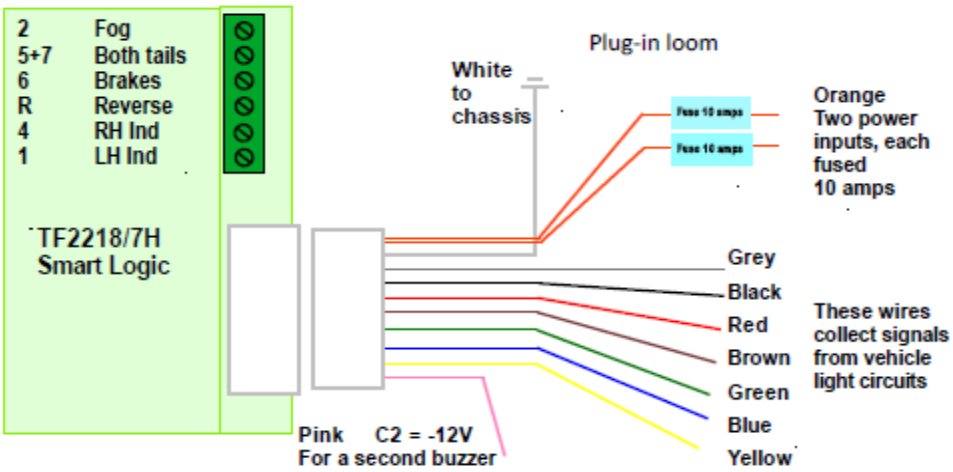
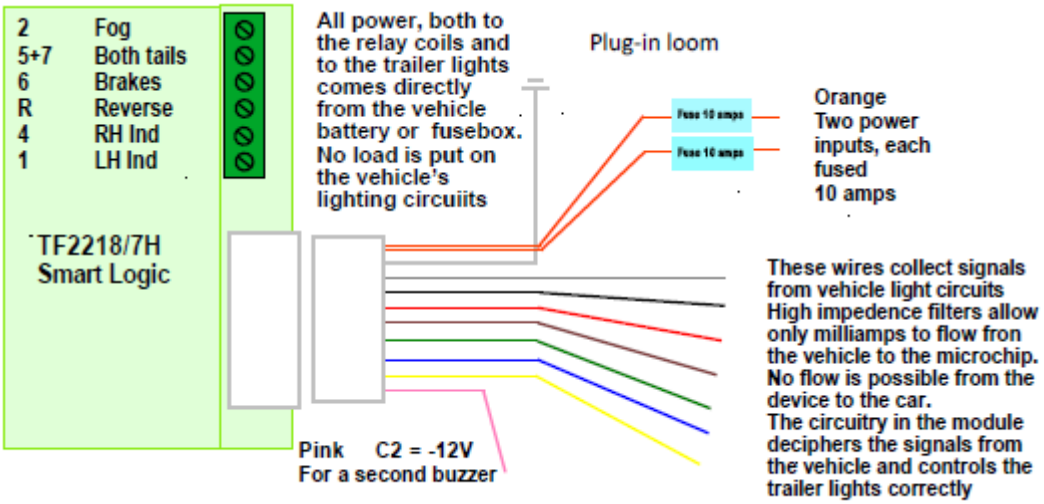


How Ryder Smart Bypass relays protect the vehicle

They are virtually isolated from the car's wiring



As can be seen from the diagram above, the interface between the bypass relays and the car's lighting system is highly protected. The relay cannot "send" any electrical pulses or signals to the car's wiring.

The current taken from each of the car circuits to activate the microcircuits is less than one milliamp.

When the car is powered down, the device takes only micro-amps from the car's power source. It cannot impose a drain on the battery or "use up" any of the narrow margin of quiescent current that some modern cars allow. This protection and additional circuitry within the bypass relay, also means that the device will not be damaged by electrical surges (spikes) from the car.

Provided that Ryder Smart Bypass relays are properly installed, with well-made connections and appropriate fuse protection, they can safely be fitted in practically any car.

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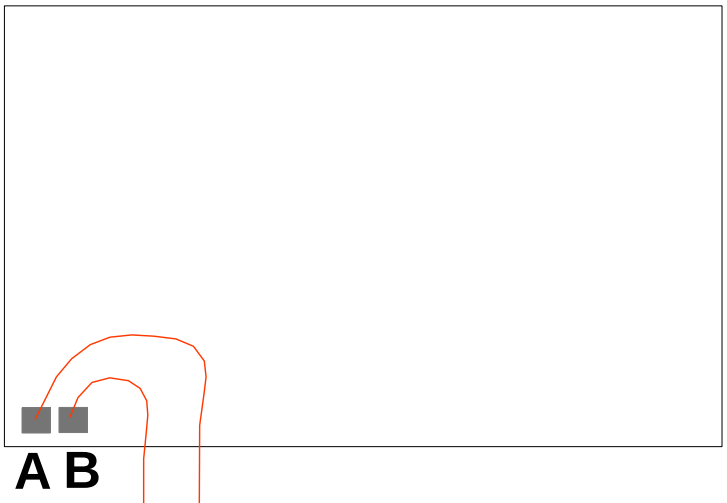
TF2218/7H fuse split



Fuse B protects:
Stop lights
RH tail light
LH tail light

Fuse A protects:
LH flasher
RH flasher
Reverse
Fog
AND the LOGIC circuits

Simple Bypass Relays

TF1011: Single bulb-failure bypass relay

This device incorporates a single relay.
It is typically used to switch a single lamp, usually the fog lamp.

On most vehicles the switching function is controlled by the application of a current to the coil input wire but increasing numbers of vehicles have earth-switched fog lamps and in these vehicles this relay can also be earth-switched. (See relevant diagram below)

Diagram 1: Normal installation

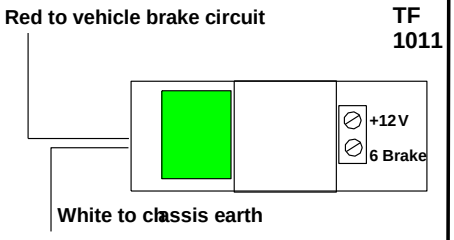
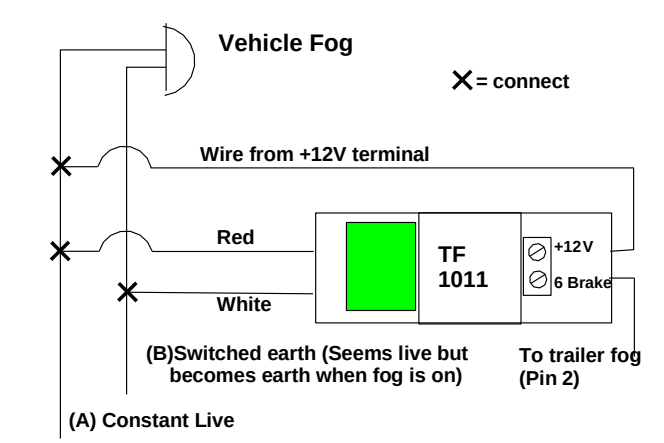


Diagram 2: Installation for a negative-switched fog light



Operation:
When vehicle fog light is switched on, line (B) becomes an earth and switches the trailer fog-lamp on.

Both the +12V terminal AND the red wire are connected to the constant live wire

Fuse 5 amps

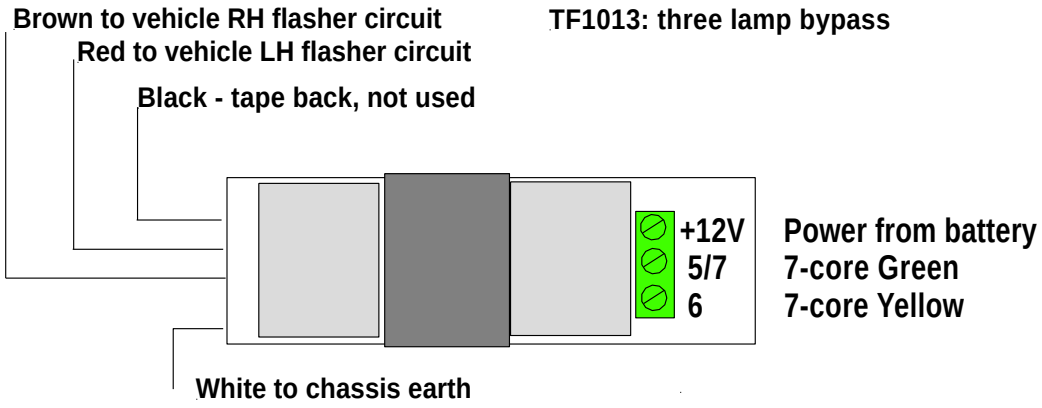
Fitting the TF1011 (Standard application)

Refer to the general instructions in Appendix 3 at the back of this manual.
Connect the appropriate wire of the 7-core cable to the terminal of the relay marked “6 Brake”. (You will have selected which circuit you wish the relay to control.)
Connect the thin red signal wire to the vehicle’s circuit that you have selected.
Connect white to a good chassis earth.
Bring a reliable power line (1.0mm^2) from the vehicle battery to the +12V terminal. Fuse this cable close to the battery using a 5amp fuse.
Do not connect to the battery or insert the fuses until the rest of the installation is complete.
Connect the remaining 7-core wires to the loom as follows but use the TF1011 relay on the single circuit you have selected.
Connect the brown wire of the 7-core to the vehicle RH Tail light circuit*.
Connect the black wire of the 7-core to the vehicle LH Tail light circuit*.
Connect the red wire of the 7-core to the vehicle brake light circuit*.
Connect the blue wire of the 7-core to the vehicle fog lamp circuit*.
Connect the flasher circuits following the instructions with the flasher relay you are fitting*.

* It is important that you check whether or not to fit bypass relays to these circuits. These instructions assume that you have made this check correctly.
When the installation is complete, make the battery connection, insert the power fuse and test the operation.
Bypass Relays

TF1013 Three-lamp bypass relay

This device incorporates two relays.
The two relays operate independently of each other when switched by the coil input but have a common earth.
Typical Application
• to switch the two side lamps (fed from both sides of the car) and the brake lamps.



It has three wires for connection to the vehicle loom: Red/white for brakes, Black/white for LH tail, Brown/white for RH tail, and an earth wire.
Connection to the trailer 7-core cable and to the wire bringing power from the battery is made by screw connectors.

Fuse: 10 amps

Fitting the TF1013

Refer to the general instructions in Appendix 3 at the back of this manual.

Connect the 7-core cable, according to the number and function codes marked on the printed circuit board.
Connect white to a good chassis earth.
Bring a reliable power line (1.0mm^2) from the vehicle battery to the power terminal +12v Fuse this cable close to the battery using a 10amp fuse. **Do not connect to the battery or insert the fuses until the rest of the installation is complete.**

Connect the signal wires to the loom as follows

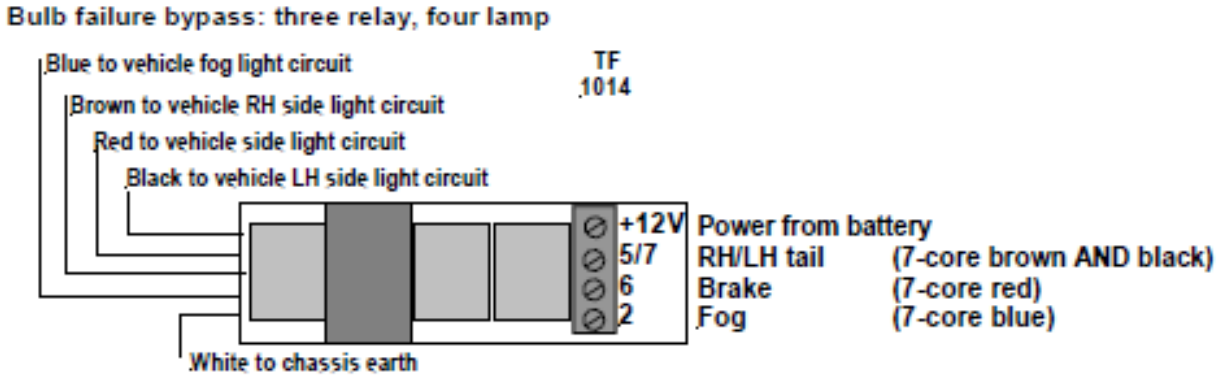
Brown	to	RH Tail lamp circuit
Black	to	LH Tail lamp circuit
Red	to	Brake lamp circuit

Connect the fog lamp circuit (7-core blue) using a fog cut out relay if appropriate.
Connect the flasher circuits following the instructions with the flasher relay you are fitting.
When the installation is complete, make the battery connection, insert the power fuses and test the operation.
Bypass Relays

TF1014: Four lamp bypass relay
This device incorporates a set of three relays.

Typical Application
• to switch the two side lamps (fed from both sides of the car) the brake lamps and the fog lamp.

The three relays operate independently of each other when switched by the coil input but have a common earth.
White to chassis earth



It has four screw terminals: three to accept the trailer lamp wires and one for power input from the vehicle battery. It has four signal wires for connection to the vehicle's lamp circuits and an earth wire for connection to the chassis.

Fuse: 10 amps
Fitting the TF1014
Refer to the general instructions in Appendix 3 at the back of this manual.
Connect the 7-core cable, according to the number and function codes marked on the printed circuit board.
Connect white to a good chassis earth.
Bring a reliable power lines (1.0mm^2) from the vehicle battery to the power terminals +12v Fuse this cable close to the battery using a 10amp fuse. **Do not connect to the battery or insert the fuses until the rest of the installation is complete.**
Connect the signal wires to the loom as follows

Brown	to	RH Tail lamp circuit
Black	to	LH Tail lamp circuit
Red	to	Brake lamp circuit
Blue	to	Fog lamp circuit

Connect the flasher circuits following the instructions with the flasher relay you are fitting.
When the installation is complete, make the battery connection, insert the power fuses and test the operation.

Trouble Shooting Simple Bypass Relays
Because these are basically simple relays, there is very little about them to cause confusion or problems.

Operation
A basic test to see if they are working properly is as follows.
Connect the power-in wire or terminal to a 12-volt source. Connect the earth wire to a reliable earth. Connect a bulb to each of the designated output wires or terminals in turn and touch the appropriate signal wire to the 12-volt source. The bulb should light.

How these relays work.
Current from the vehicle's lighting circuit is picked up by the signal wires and passes through the electromagnetic coil of the relay to earth. As it does so, it energises the coil; the core of the coil becomes a magnet and pulls the electrical contacts together connecting the power-in wire or terminal directly to the

designated output wires or terminals. It only takes 0.038 of an amp to energise each coil: this is why the vehicle does not detect their presence.

Flasher Monitors

The function of a flasher monitor is to meet the legal requirement to provide a warning, visible or audible, that the indicator lights of a drawn trailer are working or not working.
Monitors measure current and react to it by generating some kind of signal. This is usually in the form of an electrical signal capable of lighting a lamp, causing a buzzer to sound or switching a relay. Monitors are NOT switches although they can be used to trigger relays that are switches.

Flasher monitors that fit in the boot
TF1152 Audible monitor
This is a very simple device consisting of a buzzer and two monitoring circuits, one circuit for each side of the vehicle. It is fitted in the rear part of the vehicle, close to the rear lamp clusters. When current passes through either trailer flasher circuit, it is detected and the monitor circuit causes the buzzer to buzz.

It has five wires for connection: left hand input wire (yellow/black*) left hand output wire (yellow) earth for the buzzer (white) right hand input wire (green/black*) right hand output wire (green).
*The stripe may be white

It is fitted in line between the vehicle's flasher circuits and the wires that carry current via the towing socket to the trailer's indicator lamps.
It only buzzes when current passes through it to the trailer flasher lamps. Thus when no trailer is connected it remains silent.
If a trailer is connected and the audible monitor does not buzz when the flashers operate, this warns the driver that his trailer flashers are not working properly.
The reasons for the overwhelming popularity of this audible monitor amongst towbar fitters are its simplicity, its reliability, its relative cheapness and its ease of fitting.
Fitting the TF1152
Follow the general instructions for fitting 12N boot fitting relays and monitors, printed in the Appendix 3 at the back of this guide .
Chart A

Socket pin number	7 core cable colour	to	Relay wire colour or terminal number	Relay wire colour or terminal number	to	Vehicle circuit
1	Yellow		Yellow	Yellow/white		LH flasher
2	Blue		Direct	Direct*		Fog lamp
3	White		Chassis	White		Chassis earth
4	Green		Green	Green/white		RH flasher
5	Brown		Direct	Direct*		RH tail light
6	Red		Direct	Direct*		Brake lights
7	Black		Direct	Direct*		LH tail lights
-	-		-	N/A		Power (battery)

**Unless fitting a fog cut-out or bypass relay.*

Follow the instructions in **Chart A** and connect together your 7-core cable, your TF1152 monitor and the appropriate wires in the vehicle loom.
Use a suitable test board to test the circuits. Make sure the"Tell-tale" warning buzzer is working correctly.

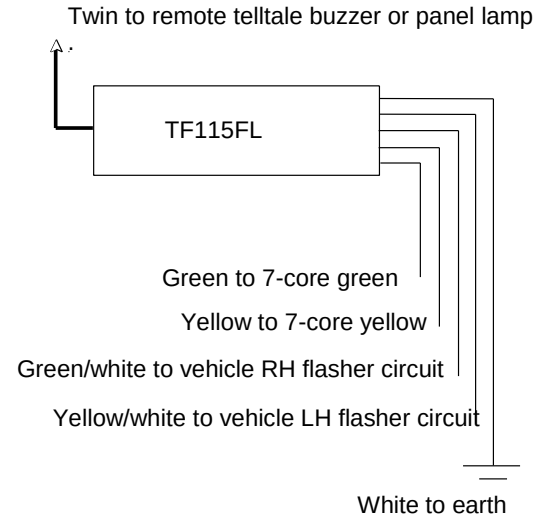
TF115FL Audible monitor with flying lead.

This is a special version of the TF1152. It is fitted with a 4 metre twin flying lead, connected where the buzzer's positive lead would normally be connected, and supplied with a separate buzzer which can be connected to the flying lead.

In all other respects its function and operation are the same as the TF1152.

It is fitted in vehicles where the buzzer has to be remote from the monitoring circuits. An example would be in a pickup. The monitor, suitably housed, would be installed close to the rear lamps of the pickup whilst the buzzer, to be audible to the driver, would be placed in the cab.

A panel lamp or similar device can be connected in place of the buzzer if required.



Fitting the TF115FL

Follow the instructions for the TF1152 but add the specific instructions relating to the tell-tale on the diagram above.

Trouble-Shooting: TF1152 and TF115FL & bypass buzzers	
Buzzer does not sound.	Check all connections Check trailer (test board) flashers are working. Check your test board is drawing enough current (21watts) to make the buzzer work properly. LED testers do not draw significant current. ***On TF2218/7H*** C2 Pink is NEGATIVE. Connect the positive side of a buzzer to +12V and the negative side to this pink wire.
Bypass buzzers	Check all the above Test the relay: With the test board in place and the relay powered and earthed, apply 12 volts to the green and yellow signal wires in turn. If the test board indicators light, the buzzer should sound. Otherwise, it is faulty. One-off solution: If everything works except the buzzer, you can fit a simple TF1152 type in line in the green and yellow wires in the 7-core to the trailer socket.
Buzzer is not loud enough.	Check it has not been trapped or covered. Move it to a better place Fix it to a surface that resonates In the case of a TF1152, replace it with a TF115FL and use the extension wire to put the mini-buzzer where it can be heard.

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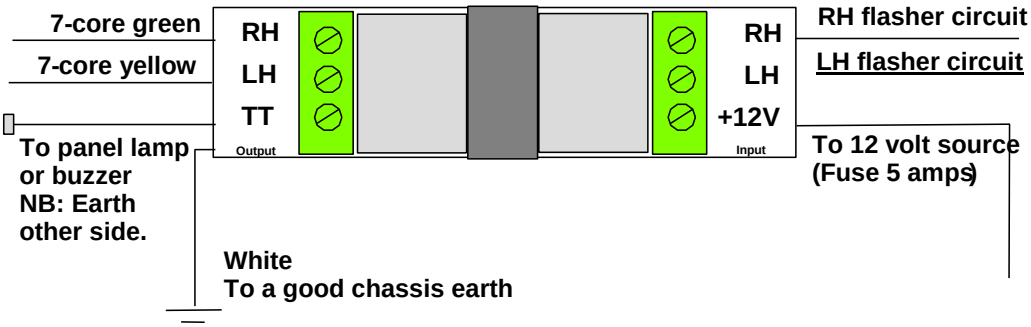
TF110RX Flasher booster/bulb-failure bypass relay with built-in "tell-tale"
This device incorporates two relays mounted with other circuits as described below. The diagram below illustrates its appearance and application

Fitting Instructions
Refer to the general instructions in Appendix 3 at the back of this manual.



Connect as follows:

Output side		
RH	to	7-core green
LH	to	7-core yellow
TT	to	Positive side of Buzzer/one side of panel light
White wire Input side	to	Earth (chassis)
RH	to	RH flasher circuit on car
LH	to	LH flasher circuit on car
+12V	to	Battery via 1mm^2 wire and 5 amp fuse

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Trouble Shooting (TF110R/TF110RX)

1. See general details under *BYPASS RELAYS.*
2. Details specific to the TF110R:

Tell-tale light does not come on
Check all connections
Check connections to panel lamp/buzzer (NB earth.)
Check power source is adequate and constant
Check lamps on trailer or test board are flashing and that they draw enough current to activate the telltale. (LED testers do NOT draw enough current)

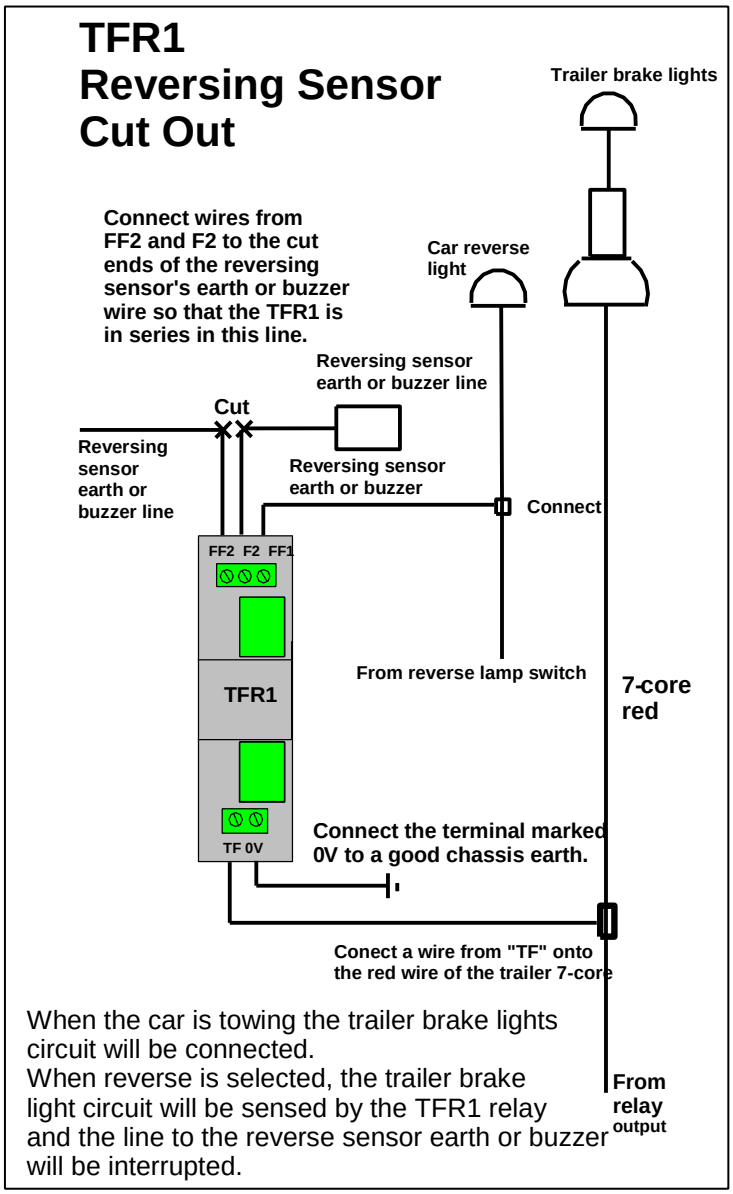
Tell-tale light comes on without a trailer or test board
Check all connections
Check there are no shorts in the trailer socket
Replace unit and test again. If the condition continues, review your circuits and connections. (This is an unlikely fault in any unit and very unlikely indeed to be found in two consecutive units.)
Contact Ryder Towing for further advice. 01253 881008

Reversing Sensor Cut Out

This device is designed to switch off the reversing (parking) sensors of a vehicle when any trailer is connected. It must be fitted in conjunction with a bypass relay on the circuit supplying the trailer brake. How it works and how it is installed is described below.

1. Connect the blue/white wire of the relay to the car's reverse light supply.
2. Connect the blue wire of the TFR1 relay to the Red trailer brakes wire of the 12N 7-core at any convenient point.
3. Cut the earth wire (or one side of the buzzer lead) of the car's reversing sensor system and wire the blue/black wire and the green/black wire of the relay in series (in line) in the line you have just cut.
4. Take the white wire of the relay to a good chassis earth

Note: If you fit a TF2218/7EPIN bypass relay, you can use a simple change-over relay to cut off the reversing sensor.



Fog Cut-out Relays

These relays are designed to switch off the fog lamp(s) of a towing vehicle when the fog lamp of a towed trailer is on. The reason for turning off the vehicle fog lamp is to avoid a distracting glare being reflected by the towed trailer, especially if the trailer is a caravan.

A fog cut-out relay is, in fact, a combined monitor and relay: the relay that switches off the towing vehicle's fog lamp is switched by a monitoring circuit that operates when it detects current flowing through it to the trailer fog lamp. The switched side is fitted in line in the vehicle fog lamp circuit and the monitoring side is fitted in the cable going to pin 2 of the vehicle's trailer socket.

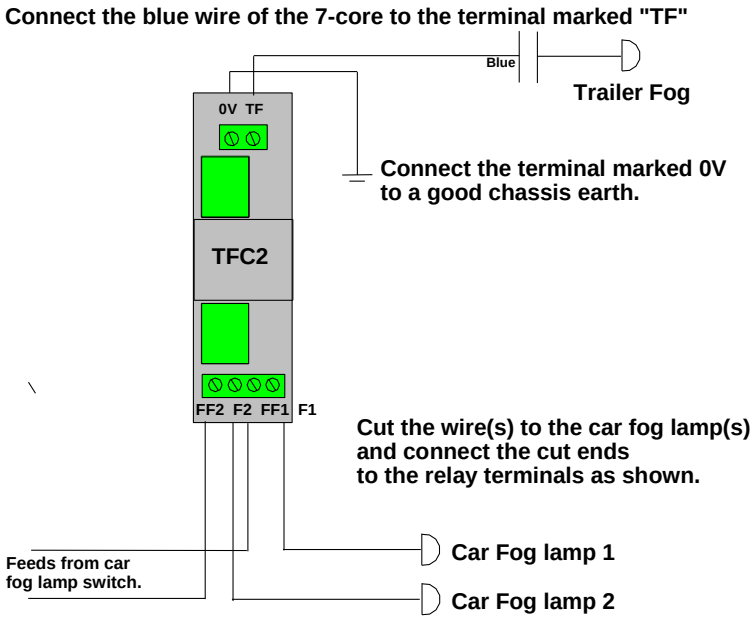
NOTE: If you fit a TF2218/7EPIN bypass relay, that relay has a fog cut-out function.

Where the diagram shows that you have to cut the vehicle's own wiring to install the relay in line, make sure you make the best possible connections to the relay's screw terminals.

The fog cut out relay will turn one or both of the vehicle's fog lights off if a trailer fog lamp is connected. When the trailer fog lamp is not present, the vehicle fog lights should work as normal.

Use a suitable test board to test the circuits. Make sure the vehicle's fog light(s) and the trailer fog lamp(s) are working correctly and that no warning lamps are showing.

TFC2: Fog cut out Relay
Wiring instructions



FF1 to car fog feed 1
F1 to car fog lamp 1
FF2 to car fog feed 2 **(**See note below)**
F2 to car fog lamp 2

****Important Note: Terminal FF2If the car is likely to tow a trailer with two fog lamps but has only one fog lamp itself, it would be wise to bring an independent 12 volt supply to connect to terminal FF2 to supplement the supply to the fog lamps on the trailer.**

Trouble-shooting TFC1 and TFC2

Before fitting:

- Check how many fog lamps on the vehicle you wish to cut out
- Check fuse-loadings to the vehicle's fog lamp circuits to make sure one side can support two fog lamps in case two are fitted to any trailer.

- **24 Volt Systems**
- ***24V to 24V***
- ***Advanced Bypass Relay TF2218/7H24: 7-way all lamps***
- This is a wholly 24volt relay, designed to supply 24 volts to trailer lights from a 24 volt vehicle. Apart from being in a 24 volt vehicle, installation is the same as for the standard 12 volt
- TF2218/7H24,
-
-
- Connect the 7-core wires to the relay's screw terminals as shown on the diagram. Connect both brown and black to pin E.
- Feed one good 24 volt supply into one of the terminals marked +24V. Put a 15 amp fuse near the power source for this line.
-
- ***24V to 12V***
-
- Use TF2218/7H
- To supply 12 volts to a trailer from a 24V vehicle, use the standard 12-volt **TF2218/7H**. The operation of this relay is entirely controlled by solid-state chips that happily tolerate a 24-volt environment. Under the control of the chip, the current to the relay coils is taken directly from the power source. As long as the power source to the +12V terminals is 12V, the relay coils will receive 12V.
- With this set up, when you feed 12 volts into the power input terminals L1 and L2 and connect the signal wires (or multi-connector) directly to the vehicle's lamp circuits you get 12-volt outputs at all the terminals 1 to 7.

Fitting TF2218/7H in a 24-volt vehicle, without a voltage dropper

A 24-volt battery is, in fact, two 12 volt batteries connected in series. A 12 volt feed is obtained by connecting a wire to the + post of the first battery (that is, the battery which is directly earthed to the chassis.) Feed the 12V so obtained into the relay's +12V terminal and make all earths on the chassis. *Fitting with a voltage dropper: Next page*

Fitting with a voltage dropper

(For commercial vehicles, the fitting of a voltage dropper is usually preferred.)
Part Numbers: TF24510 (Switch-mode converter) and TF2217LOGIC (P or S) (Relay Set)

Find a suitable 24-volt power source capable of supplying 10 amps continuous current.
Connect the Switch-mode converter to the Relay Array, TF2217LOGIC as follows:
Output (+) terminal (plus terminal) from converter to relay terminal **+12v** (Put a 15 amp blade fuse in this line.)

Connect the wires **from the trailer socket** to the terminals of the relay set as follows:

7-core Yellow to relay terminal **A**
7-core Blue to relay terminal **C**
7-core Green to relay terminal **B**
7-core Brown to relay terminal **E**
7-core Red to relay terminal **D**
7-core Black to relay terminal **E**
7-core White to converter output minus terminal (-).
Connect one side of a panel lamp or buzzer to the terminal marked "TT"
Connect the other side to the converter output minus terminal (-).with the 7-core white wire

Connect the thin wires **from the TF2217LOGIC relay set** to the vehicle's light circuit as follows:
Yellow to LH Flasher
Grey to Fog lamp (1 to fog lamp, the other grey to chassis earth)
Green to RH Flasher
Brown to RH Tail lamp
Red to Brake light
Black to LH Tail lamp
The thin plain **white** wire from the relay to a good earth point on the vehicle chassis Connect the remaining wires of the **Converter** as follows:
Input + (plus terminal) to the **24-volt source you identified at step 1.**
Put a 10 amp blade fuse in this line, as close to its source as possible.
Input - (minus terminal) to a good earth point on the vehicle chassis.

TF24510 Switch mode converter 24V to 12V

Caravan (12S) Relays

Smart Combi Relays: TF1170-4, TF1170-3

Introduction: Caravan fridges and auxiliary batteries. Protecting the vehicle battery.

When a vehicle tows a caravan and the caravan is equipped with a 12-volt fridge or an auxiliary battery or both, it is necessary to provide a connection between the caravan and the towing vehicle to provide power to these.

When such a connection is provided it is advisable to protect to vehicle's own battery from being accidentally drained by the caravan fridge and auxiliary battery. In the U.K. the usual way of providing this protection is to install a suitable relay or pair of relays that will turn off the connections when the vehicle's alternator is not running.

Alternator or Ignition-switched? Smart Combination Relay: switches itself

They can be switched by a connection to the alternator or to some suitable ignition-switched source. The TF1170 series Smart Combination Relays make the installation of these relays much easier and safer. They do away with the need to find a signal/current from the alternator or ignition to switch the relays.

Function

A ***TF1170 series Smart Combination Relay*** incorporates a trigger device that switches two built-in relays when certain voltages occur. The normal operating environment is a nominally 12-volt DC circuit within a motor vehicle.

Application

Typically it is used in an auxiliary towbar electrical circuit, connected to a single feed from the vehicle's battery, to switch the caravan battery charging circuit and the fridge circuit on and off. When the voltage in the line from the battery reaches the appropriate level as the alternator begins to charge the battery, the trigger system switches the relays on. When the alternator ceases to charge and the voltage drops, it switches the relays off, isolating the caravan fridge and battery from the car.

There are two versions of the Smart Combination Relay

The **TF1170-4**, "Mighty Atom"will handle up to 22 amps. Use for most vehicles.

The **TF1170-3**, "Super Combi" will handle up to 30 amps. Use for vehicles likely to tow caravans with large fridges.

Minimise voltage drop: Keep resistance down Choose the right cable.

For a standard fitting to supply a fridge and charge a battery, we recommend twin 35's ($2x2.5mm^2$) or single 44's (1x3.0mm2) at least. For the largest vehicles and caravans, twin 44's ($2x3.0mm^2$) is required if the customer wants his big caravan fridge to work properly. Thinner cable is likely to produce excessive voltage drops under heavy load conditions.

(Finding other, thinner wires, such as the boot lamp wire, to feed the auxiliary circuits is potentially dangerous as these wires may overheat under load. It is unlikely that the trigger unit would operate under such circumstances, which could be just as well!)

Fit the correct fuse

The correct fuse rating for the TF1170-4 is 20amps and for the TF1170-3, 30 amp.

[We recommend blade or good quality ceramic fuses. Traditional glass fuses have different operating characteristics and are not recommended.]

Make sure that all connections are well made.

Amongst the most common problems encountered by fitters using these Smart units has been the problem of voltage drop caused by connections that are badly made. Of these, loose battery nuts, and crimp terminals weakly crimped are the worst culprits. In any event, poor connections can get hot or very hot under load conditions and may therefore become dangerous. ***Safety***

One of the greatest safety features built into the Smart combination relay is that, under load in unsafe conditions, as described above, they will switch off the current to the caravan.

How the Smart Combi does its job

Accommodating different cars and different conditions.

In order to work effectively, the unit has to accommodate a number of variables. Some variables occur between one car and another and some occur within individual cars depending on circumstances. Therefore, the trigger unit has, at the outset, to be pre-set very precisely to operate within that narrow window of conditions that can be identified as common to all or, at least, the great majority of cars in most circumstances.

1. Variations between one car and another

The performance of battery and alternator will vary between one car and another. Factors that affect performance include good or poor battery condition, alternator condition and slipping alternator belts.

2. Variations within each particular car.

The performance of the battery and alternator of any individual car will also be affected by circumstances. For instance, not only do winter conditions make batteries and alternators work harder by virtue of the fact that heaters, wipers, lamps etc. are used more but in cold weather the voltage drop observed in a battery when even a fairly small load is applied to it is
much greater than it would be in warm conditions.

Other factors that affect performance and battery condition include night driving, frequent short journeys and additional loads created by in-car accessories.

3. Voltage drop under load

One very important variable is the voltage drop that always occurs when a load is put on a battery (and the consequent rise in voltage when the load is removed). There is also some voltage drop across the length of supply cable.

4. Accommodating normal voltage drops.

To succeed in doing its job in the context of all these variables the device has to be preset very precisely as described above. The unit is also intelligent enough to deal with a number of other variables that would otherwise prevent it working efficiently. It is also equipped with a time delay that allows it to ignore transitory voltage changes.

5. Conditions that will not be accommodated

It is inevitable that some cars will fall outside the defined operating window of the Smart relay. In most cases, the poor condition of the battery or alternator or even the alternator belt will be to blame but it is possible that some cars may be “set up” differently even in prime condition. On such cars the trigger unit will not work properly.

It is also inevitable that, even in cars where the system works well, there will be times when, due to the use of other accessories that subject the battery to heavy loads, the trigger unit will turn off. This should not be regarded as a failure since the device is effectively protecting the battery from further overload but owners should be informed of the possibility and advised to monitor it

Fitting the TF1170-4/TF1170-3

TF1174 (24 volt) is exactly the same as TF1170-3 but for 12V substitute 24V and reduce the fuse rating by 50%

General Instruction, 12S installations (Caravan auxiliary circuits)

Find a suitable entry point or near to the socket mounting point on the towbar. (If you have to drill a hole, take great care to ensure that you drill in a safe place where you will not damage wires, pipes, bodywork, etc.) Treat the edges of the hole with a rust inhibitor and line it with the grommet provided.

Wire the trailer socket, as shown in **Chart C** and mount it on the towbar. Lead the 7-core cable into the boot through the entry point.

Route your power source cable(s) from the boot to a suitable power source. Fit a fuse in line in the cable, close to the power source. Do not connect yet

Follow the instructions in **Chart C** and connect together your 7-core cable and your relay.

Note that post 1998 caravans use pins 4 and 2 differently from the way pre 1998 caravans did. If you wire according to these instructions, <u>all caravans</u> will be properly accommodated.

Connect your power cable(s) to the power source and insert the fuse(s) provided. Check that the fuse is of the value shown in **Chart C**.

Use a suitable test board to test the circuits. The loads created by the test board must simulate the load created by a caravan fridge (red, Pin 6) and battery (yellow, pin 2 or green, pin 4). Make sure that the relay stays on under load.

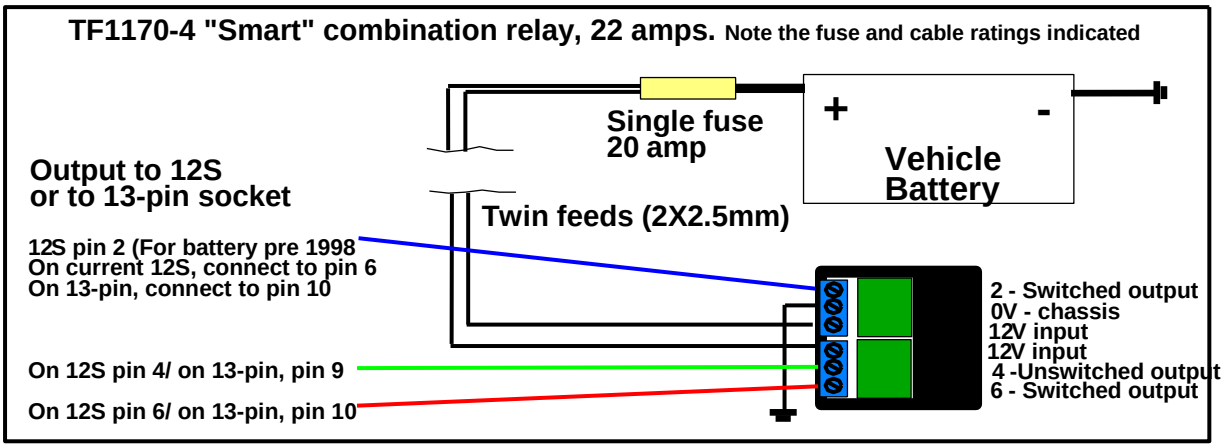
Chart C: Wiring the 12S Socket & connecting to the vehicle: TF1170 type Self Switching Combi

Relay function: Switches the caravan auxiliary circuits on when the vehicle alternator provides sufficient power

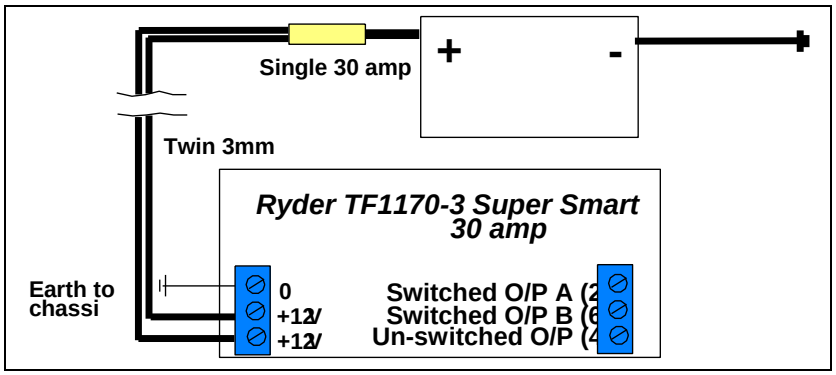
Fuse rating: TF1170-4 20 amp; TF1170-3 30 amp

12 Socket pin (13 pin in brackets)	7-core cable colour (13 core in brackets)		Relay pin	Vehicle circuit
		to		
1 (8)	Yellow (Pink)	to	N/A	Reversing light
2 (N/A)	Blue (N/A)	to	2	Switched live
3 (13)	White (White/red)	to	N/A	Chassis earth
4 (9)	Green (Orange)	to	4	Permanent live
5 (N/A)	Brown (N/A)	-	N/A	Spare
6 (10)	Red (Grey)	to	6	Switched live
7 (11)	Black (White/black)	to	N/A	Chassis earth

The feed cable from the battery must be heavy duty. We recommend TF15430D1, double-insulated 27.5amp.



This cable must be fused, as close to the power source as practically possible: TF1170-4 20 amp; TF1170-3 30 amp



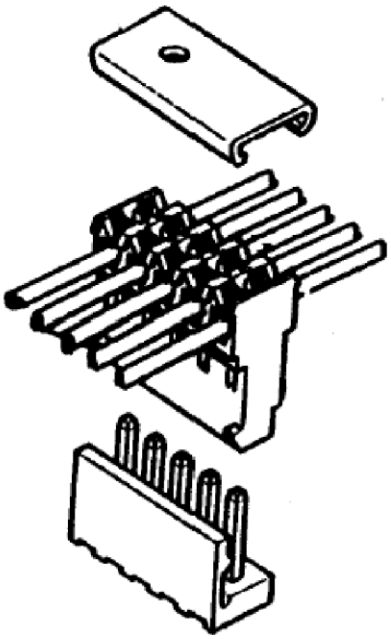
Trouble shooting the TF1170 Series (TF1170-4, TF1170-, TF1174)

SYMPTOMS	COMMENT/LOOK FOR
Relay feels warm:	This is normal. The relay coil warms when it is powered. Mount where there is space for some air circulation.
Relay will not switch on:	Poor battery condition Poor alternator performance
Relay switches on but switches off again when load is applied:	Poor connections. Loose battery nuts and crimp terminals not made with the appropriate ratchet crimping tool are the most common culprits
Relay cycles on and off:	Poor connections as above Feed cable too thin (Use 2.5 mm 2 or 3 mm 2 cable) Overload: Current over 22 amps may cause excessive voltage drop. Check auxiliary battery, short circuits, etc. Check fuse in relay circuit.
Relay takes time to switch off:	Poor connections as above. Faulty battery causing abnormal voltage drop under load. Lower value fuse in power line causing voltage drop as it heats up. Caused by battery maintaining high voltage. Try draining battery slightly by applying load (switching on fan, brake lights, etc.) for a few seconds. Relay should switch off within approx 30 seconds of engine being switched off although some batteries can maintain unusually high voltage (above 13.2 volts unloaded) especially in warm weather. Check if there is any load on relay. Try another unit. Check thickness of power cables. Check all connections for heating (sign of voltage drop) Check trailer socket pins, caravan plug, etc. Possibly double earth

All units are thoroughly tested. If you think a unit is faulty try another unit. It is extremely unlikely that you will find two in a row that are incorrectly calibrated.
IF IN DOUBT EMAIL US AT THE ADDRESS BELOW

Back to Trouble Shooter Chart

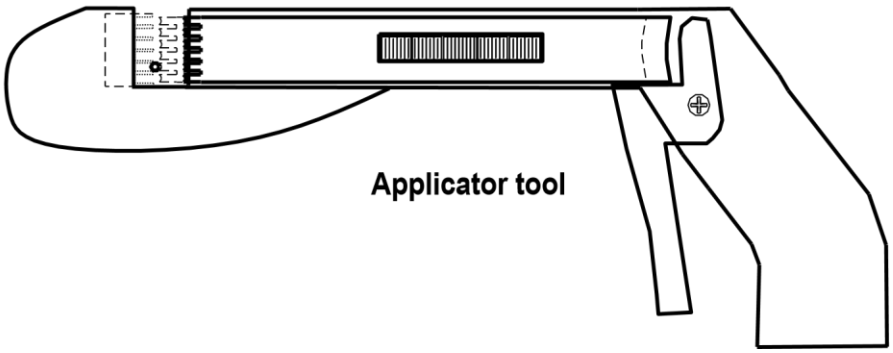
SuperSplice plug-in connector system
(Fitted to TF2218S and TF2217LOGICS)
This system, using multiple insulation displacement connectors, makes an ideal alternative to Scotchlok-type connectors because of the neat and compact design of the terminals and the high quality of the connections they make. The connector block is spliced into six vehicle loom cables as they run together, making a permanent access socket. Components are then plugged into the block using matched plugs. "Slave" wires are used to bring connections from wires not found at the main connection point. The dedicated Supersplice tool makes fitting both easy and accurate.



The cap completes a neat and secure assembly.

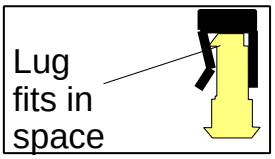
The applicator tool applies the connector block to the wires of the car loom with precision and accuracy to create a high-quality connection.

The header, connected to the towing relay, is plugged into the connector.

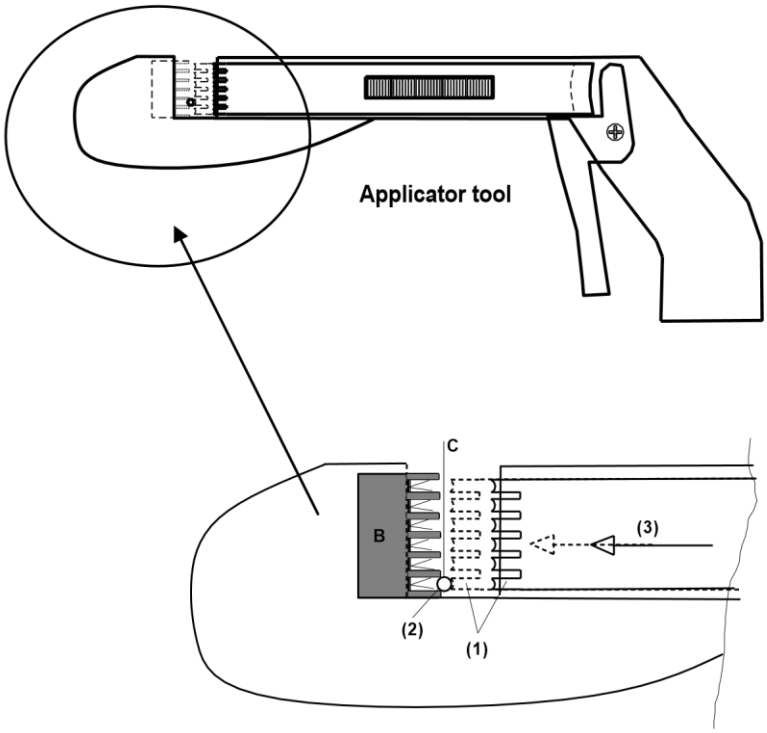


Part Numbers: Tool TT7052
Combined Multi-splice and screw connector block (6-way) TV2086
Combined Multi-splice and screw connector block (3-way) TV2083
Multi-splice connector is built into the TF2217LOGIC and TF2218 series relays.
User Guidance
TT7052
Splice tool (and SuperSplice plug-in connector)

Putting the receptacle block into the tool
Insert the SuperSplice receptacle into the tool so that the small lugs on one side of the receptacle block are accommodated in the shaped space that you can see on the left side of the front end of the tool when you hold the tool normally.



Connecting the SuperSplice receptacle to the car loom.
Connect directly to the car's loom wires.
First of all, identify the rear light wires in the car loom, close to the light clusters if practical. If you cannot find all six of the road light wires together, you may have to bring "slave" wires across from other parts of the loom to join to the SuperSplice receptacle.
Only try to insert one wire at a time into the SuperSplice receptacle. Each wire requires a force of approximately 7kg to press it home.
Make sure the tool pushes all the wires fully home into their appropriate slots.
It is advisable not to leave the top space (1) until the last when you are inserting the wires because, with the other wires in place and the slight flexing that occurs as the tool is operated, the travel of the plunger is restricted and the top wire is unlikely to push fully home.



Connector block "B" is inserted into the special holder in the tool: this holds it firmly in place while the connections are made.

Wire "C" is presented to the appropriate slot in the connector.

hen the trigger is squee ed, the applicator tips ( ) on the tool's sliding bar push the wires into the connector slot ( ) when the sliding applicator bar (3) is driven forqward by the action of the trigger.

Matching the wires to the receptacle.
When the receptacle is inserted into the tool with the lugs in the shaped space (see diagram above) the top slot is number 1 and the other slots correspond in order with the terminal numbers on 7-pin plugs. The tool is colour coded, from the top: yellow, blue, green, brown, red, black. This matches the normal colours of the 7-core cable.

Match the wires of the car loom to these numbers with care.

Appendix 1: Ryder Standard Colour and Terminal Codes

12N

The following colour, letter and number code governs all wires and terminals on our 12N relays. The colours and numbers are based on the familiar 12N colours and numbers. (* Except TF2100, Clones)

Relay terminal number	Relay terminal letter (TT2217 series etc)	Relay input wire	Relay output wire	Relay application
1	A	Yellow	Yellow	Lh indicator
2	F	Blue	Blue	Fog
0V	-	White	White	Earth
4	B	Green	Green	RH Indicator
5	E	Brown	Brown	RH Side light
6	D	Red	Red	Brake light
7	E	Black	Black	LH Side light
+12V	-	Orange	Orange	Power feed in
TT or C2	TT or C2	Pink	Pink	Telltale (Buzzer, etc.)

Thirteen Pin Wiring Codes

Note: Pins 1 to 7 as 12N.		7-core (13-core)
Pin 8 Pin 9 Pin 10 Pin 11 Pin 12 Pin 13	Reversing light Constant live Ignition-controlled power supply Earth (for pin 10) Coding for coupled Trailer Earth (for pin 9) Cut off Blue and Brown	Yellow (Pink) Green (Orange) Red (Grey) Black (White/black) None (None or white/blue) White (White/red)

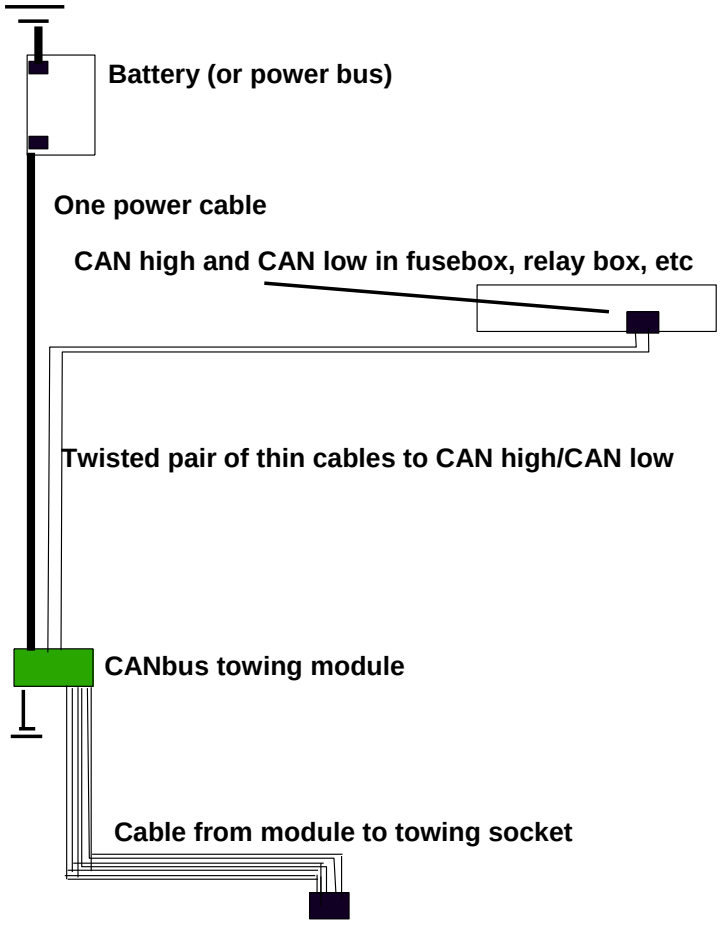
Appendix 2: CANbus systems

CANbus is becoming increasingly common on today's vehicles, and will become more common as the technology matures and reduces in cost.

Although "Smart" bypass relays will still be applicable to most vehicles with CANbus controlled rear lights, CANbus-dedicated towing kits may be required in certain cases. For example, vehicles with a trailer stability program (an extension of electronic stability control) **may** need to recognise the attachment of a trailer. This would require a towing module that communicates with the CANbus network

Because connection to the CANbus network usually requires only two wires, installing properly designed CANbus relays is not particularly difficult, once the fitter has gained some practice. The schematic below illustrates this.

Fitting a CANbus module is relatively simple



Appendix 3: General Fitting Instruction, 12N relays and monitors

Before you start

Examine the car carefully to see that all electrical circuits are working correctly and that no warning lights are showing.

Decide whether to disconnect the battery. Take into account:

Would disconnection disrupt memory circuits, etc? (You may need a device to keep memory circuits safe.)

Can you make your electrical connections safely with the battery connected?

Installation

Find a suitable entry point or drill a 12mm hole in a suitable place reasonably close to the socket mounting point on the towbar. (Take great care to ensure that you drill in a safe place where you will not damage wires, pipes, bodywork, etc.) Treat the edges of the hole with a rust inhibitor and line it with the grommet provided.

Wire the trailer socket, as shown in **Chart A** and mount it on the towbar. Lead the 7-core cable into the boot through the entry point. Make sure the cable is a snug fit in its grommet to prevent fumes coming into the car.

Use a suitable probe tester to identify which wire feeds each rear lamp.

If you need to take a power source for a bypass relay, etc.

Route your power source cable(s) from the boot to a suitable power source. Fit a fuse in line in the cable, close to the power source. Do not connect yet.

When routing the cable, take care to route it where it will not be cut or crushed. Pay particular attention to points where the cable passes through bulkheads, etc.

In all cases

Follow the instructions in **Chart A** and connect together your 7-core cable, your relay(s) and/or monitor and the appropriate wires in the vehicle loom

If applicable, connect your power cable to the power source and insert the fuse provided. Check that the fuse is of the correct value.

Use a suitable test board to test the circuits. Make sure any “Tell-tale” warning light or buzzer is working correctly.

Chart A

Socket pin number	7 core cable colour	to	Relay terminal number (wire colour)		Relay signal wire colour	to	Vehicle circuit
1	Yellow		1		Yellow		LH flasher
2	Blue		2		Blue		Fog lamp
3	White		Chassis		White		Chassis earth
4	Green		4		Green		RH flasher
5	Brown		5		Brown		RH tail light
6	Red		6		Red		Brake lights
7	Black		7		Black		LH tail lights
-	-						
			+12V (Orange)		N/A		Power (battery)

Trouble Shooter Index				
Symptom	Click the links below for information			
CANbus Module: How to know it's working	CAN LED			Page 4
CANbus Module's LED flashes three times, repeatedly	Sequence			Page 6
CANbus Module: Why are CAN HI and CAN LO a twisted pair?	Pair			Page 46
CANbus Module: Which vehicles are compatible?	Vehicle Data			www.rydertowing.co.uk
CANbus Module: How can I recode the vehicle for towing?	Recoding			www.rydertowing.co.uk
CANbus Module: How does the 12S function work?	12S CAN			Page 4
CANbus Module: How can SmartCAN be "Dedicated"?	Dedicated			Page 4
Loom: wire on car does not activate relay	Check the loom	Relay function		Page 32
Bypass Relay "chatters" on fitting or soon afterwards	Chatter			Page 32
Bypass Relay "jams" leaving e.g. one light on; etc.	Test relay function	Reset		Page 33
Bypass Relay malfunction on some or all output circuits to trailer socket – e.g. wrong lights light up.	Initial fail	Check the loom	Page 33	Page 33
Smart Combi Relay seriously overheats/burns out	Burn out			Page 32
Smart Combi Relay takes time to switch off	Combi issues			Page 23
Smart Combi Relay will not switch on	Combi issues			Page 23
Bypass Relay: buzzer does not sound	Buzzer			Page 14
Bypass Relay: buzzer screams continuously when unit is powered	C2 Error			Page 34
Bypass Relay: no lights on the test board light up	Relay function`			Page 31
Bypass Relay: one or more lights on the test board stays on	Relay function	Check the loom		Page 31/32
Bypass Relay: some lights on the test board do not light up	Relay function			Page 31
Relay: trailer lights fail in use	Relay function			Page 31
Smart Combi relay feels warm	Combi issues			Page 45
Smart Combi relay cycles on and off or switches on but switches off again when load is added.	Combi issues			Page 45
Smart Combi relay: caravan battery does not charge and/or fridge does not work properly	Combi issues			Page 45
Smart Combi relay: power cable is warm or hot	Combi issues			Page 23
Socket centre pin burns out	Socket burnout			Page 34
Socket fills with water	Socket water			Page 32
Vehicle battery goes flat	Current drain			Page 31
Vehicle: part of system fails allegedly caused by the relay	Bypass protects			Page 8
Vehicle: some or all rear lights will not come on after the towbar electrics have been installed	Relay function	Reset	Fuses	Pages 31/33
BMW 3 Series 2001 model Trailer brake light locks on	See Vehicle Data	www.rydertowing.co.uk		

BMW X5: Slow tick in relay when sidelights are on	See Vehicle Data	www.rydertowing.co.uk
Jaguar "S" Type: Relay activated 45 mins after parking.	See Vehicle Data	www.rydertowing.co.uk - Fit latest TF2217Jag
Rover 75 Relay fails: lights on car and trailer do not work	See Vehicle Data	Reconnect light clusters. Switch lights on and off in turn to reset. Vehicle Data
Vauxhall Insignia Sports Tourer: using a TF2601 Bridge. Known wiring error.	On theTF2601 bridge, Pins 1 and X are both connected to LH indicator. If the black relay wire is accidentally wired to Pin X instead of Pin 5 next door, the trailer tail lights will flash with the LH indicator.	
Vauxhall Vectra: 10/15 second "tick" when vehicle off and number plate light still on	See Vehicle Data	Car test signals "click" the relay. Just muffle relay.

SmartCAN- Twisted pair

The CAN wires are twisted into a twisted pair because signals carried in a twisted pair are protected against being corrupted.

Current drain

Car battery goes flat in use or when vehicle is parked. When the bypass relay is not activated, it draws no current.

The Smart Combi relay, TF1170-3 or TF1170-4 draws a small current, too little to drain a battery. However, if it is badly set up and stays on when it should switch off, two relay coils will be live, each taking about 40 milliAmps.

Bypass relays protect the car

Part of car system (e.g. CPU) fails allegedly caused by the relay The bypass relay properly fitted, cannot damage the vehicle

The interface between the bypass relay and the vehicle is heavily protected to prevent any back feed from the relay to the vehicle's lighting circuits. Click here for more detail Bypass Relays protect

Return

In the event of a claim, please recover the relay and send it to us with a clear note of the issues so we can test it. Phone our office first to start the returns procedure: 01253 881008

Appropriate test
Relay function

Responding to claims
Your response to claims

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Vehicle Lamp "Failure"

Some or all vehicle rear lights will not come on after the towbar electrics have been installed

This type of problem usually indicates that the car has registered a fault and needs to reset itself.
Look at Vehicle Data for guidance about the particular vehicle you are working on. If you have disconnected the light clusters, you may have to switch the lights on and off in turn to "register" them again.

RESET

The most common way to reset is to power the car down completely (switch everything off, lock the car and leave it for a few minutes.)
If a reset does not cure the car, check the fuses in case you have inadvertently created a short and blown a fuse. See *Fuse Check* button below.
If none of these checks solves the problem, you should consult an auto electrician.
Click this link Vehicle Data to see information on the Ryder Towing web site.

Appropriate test
Fuses

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Check you have the right vehicle wires

Click this link to Vehicle Data on the Ryder Towing web site.

Vehicles sometimes have two identically coloured wires in the same bundle. Sometimes, more than one wire will appear to become "live" when a particular light is switched on, even though only one is the genuine feed. Sometimes they go live then negative.

Check the status of the wire without the light on; see if it is affected by other lights being on; in other words, be prepared to look beyond the obvious.

Buzzer screams continuously:

Pink wire has been earthed. Detach it and seal the end

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Relay Chatters

If the bypass relay chatters when no lights are on, there must be a wrong connection to the loom, feeding a low voltage signal to one of the relay circuits, not quite strong enough to fully switch the relay. Check your connections carefully.

If the relay chatters when one or more lights are turned on, it is receiving a signal on, typically, the side light circuit that it interprets as a brake light (or fog light) and is trying to turn that relay on – that relay is only managing to "Chatter". This problem has occurred with some relays in relation most commonly to Vauxhalls. We have altered the relays to prevent this (Oct 2009). If you have this problem, you may be able to wire to the car's number plate and high level brake light. Or change the relay. In any event we will replace the relay (01253 881008)

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Trailer lights fail in use

This is most likely to have been caused by an overload or short circuit in the wiring from the relay to the trailer. With the TF2218/7E series, this should have only blown one of the two fuses in the power line. With the TF2218/7 series with a single power input, it may have blown the relay.

If you can get the relay, you can test it. (Click Relay function) or send it to us with a clear note of the issues so we can test it.

Phone our office first to start the returns procedure: 01253 881008

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Relay (bypass) seriously heats or burns out

This can occur if there is a continuous overload from the trailer (too many lights, partial short in wiring) that is not quite enough to blow the fuse. It is less likely in then TF2218/7E series with the twin fused power inputs, but is has occurred on one occasion with the single power fused TF2218/7 series. The wiring to the trailer socket should be checked and the owner should address any problem with the wiring and/or the number of lamps on the trailer.

If you can get the relay, send it to us with a clear note of the issues so we can examine it.
Phone our office first to start the returns procedure: 01253 881008

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Test procedures

Check the relay, the socket and the test board:

Check the power supply is good and adequate

Make sure the vehicle battery is fully charged
Check the fuse to your power source
If you are taking power from a cable, make sure:
The cable you are tapping into is heavy enough
Your connection is not causing a voltage drop when a load is applied Check the vehicle

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Check the earth connections are clean and firm from the relay and from the trailer socket to the chassis

Check both the board and the trailer socket: by connecting your test board and applying a good, fused 12-volt source to each of the trailer socket wires, 1,2,4,5,6, and 7. The corresponding lights on the test board must light up.

If these checks are OK:

If the problem is battery drain, test the *quiescent current* ***of the relay***

Make only the connections shown:

Connect the relay's power input wire(s) to your good 12-volt source

Connect the relay's white earth wire firmly and cleanly to the chassis

Using a circuit tester/ammeter check that the current through the relay is within the limits described in the specifications.

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Test that the relay is working properly (functions test)

Do not connect to thin signal wires to the loom

Connect wires from the trailer socket to the relay (white earth wire to chassis) Plug in the test board

Connect the relay's power input wire(s) to your good 12-volt source

Connect the relay's white earth wire firmly and cleanly to the chassis

Take each of the thin signal wires in turn, strip a tiny bit of the insulation from its free end so that the conductor is exposed, and apply the exposed conductor to a good 12 volt source.

In each case, the corresponding light on the test board must light up. If the relay is faulty, change it and start again.

If the relay, trailer socket and wiring, and the test board are all working properly, the fault must be in either:

the connections to the vehicle's lighting circuits

the type of voltage or current the vehicle is sending to its rear lights

Poor conditions in the vehicle

Relay not working: check the vehicle

Make sure the battery is not low – start the engine and run it for a few minutes. See if this makes a difference.

Make sure then vehicle's own check systems have not been alerted. If they have, reset the vehicle.

RESET

Problem on the vehicle: Test the vehicle wiring and fuses

Make sure the battery is not low – start the engine and run it for a few minutes. See if this makes a difference.

Make sure then vehicle's own check systems have not been alerted. If they have, reset the vehicle.

RESET

Check the wiring around your installation for any breaks, disconnected terminals, badly fitting connectors, etc.

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Check the vehicle's fuse box/fuse boxes

If there are no blown fuses, especially if more than one circuit is down, test the fuse bus bar(s) to see if any are not live. If this is the case, look for a large fuse array near the car battery that feed the fuse boxes. Check these fuses too.

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Socket fills with water (13-pin)

13-pin sockets have no drain holes, so they retain any water that gets in. Water can only enter via the cable, either because the cable is not snug as it passes through the back seal or because water gets in through the end of the sleeving if the sleeving does not reach into the vehicle or if it can receive water (e.g. condensation) within the vehicle.

Solutions
Drill a hole on the bottom wall of the socket
Make sure the seal is waterproof
Put a small downward loop in the cable immediately behind the socket
Make sure no water can enter the sleeving.

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Socket centre pin burns out (12S)
This is caused by a combination of heavy earth loads and the compression of the centre pin of the plug. The centre pin is longer that the others and gets squeezed when it "waggled" into place in the socket. Compressed it makes a poor connection, hence the overheating.
Solution.
Take a wire from Pin 5 (spare) to earth in the vehicle, giving 2 earths. In the caravan plug, fit a loop between Pin 5 and Pin 7, so Pin 5 shares the earth load. Remind the caravan owner to maintain the 12S socket in good condition and to spread pin 7 if it seems to be compressed.

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Responding to claims that a bypass relay you have fitted has damaged the vehicle

Since a bypass relay, properly fitted and not damaged or faulty, cannot damage the vehicle it is fitted to, you should respond to any claims in a manner that reflects this fact.
We recommend you conduct the entire correspondence in writing: that way it is always clear what has been said.

1. From the outset, make no assumptions about blame. Conduct a careful and open-minded enquiry into the claim.
2. If at all possible, critically examine the vehicle and your fitting and make notes about what you find.
3. Contact us so we know what is happening.
4. You should ask for a written description from the garage making the accusation of exactly how they think the relay caused the problem.
5. You should get back the relay in question and send it, very clearly marked, to us for testing, with a brief description of the circumstances. Phone us first to start the formal returns procedure: 01253 881008
6. You can furnish your customer with our support document "Bypass relays protect your vehicle". Protecting the Vehicle
7. If the garage does provide the written description asked for, share it with us so we can see how to proceed.

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