Patol Limited

TRAFIX - TRAIN FIRE CONTROL SYSTEM

Rail Vehicle Fire Protection: Detection, Alarm and Control

The Patol TRAFIX equipment is specifically designed for installation in railway rolling stock.

The TRAFIX scheme employs Linear Heat Detecting Cable (LHDC) to monitor for fire conditions within rail vehicles and provides both external and internal alarms, together with automatic operation of the train braking system.

Each vehicle is equipped with a control unit which operates from the train/carriage supply. The carriage controllers have associated batteries such that fire protection is maintained for a period after supply removal / locomotive disconnection.

The TRAFIX scheme incorporates a signalling technique which identifies to the driver the carriage initiating any alarm occurring. The driver's display and signal scheme includes test and fault monitoring features. The equipment automatically accommodates for re-marshalling and reversal of carriages.

Some of the prime features of TRAFIX are as follows:-

- **LHDC Fire Detection installed in a damage and vandal resistant manner.**
- **Two LHDC alarm levels. Two stage output operation.**
- **Outputs for Train Air Brake solenoid operation and/or extinguishing.**
- **Carriage alarm output for Sounders / Beacons.**
- **Driver's display of initiating carriage.**
- **All system cables monitored for fault conditions.**
- **Maintained operation after locomotive disconnection.**
- **Specifically designed to automatically accommodate for differently marshalled train configurations and carriage orientations.**
- **Ease of retrofitting to older rolling stock with minimum of installation cables.**
- **Accommodates trains of up to 19 carriages.**

TRAFIX - TRAIN FIRE CONTROL SYSTEM

Principals

Each carriage is equipped with a length of Linear Heat Detecting Cable (LHDC), together with a Carriage Control Unit (CCU). The LHDC is installed as a loop at a high level within the vehicle. The LHDC is mounted such as to be protected from damage. Fig.1

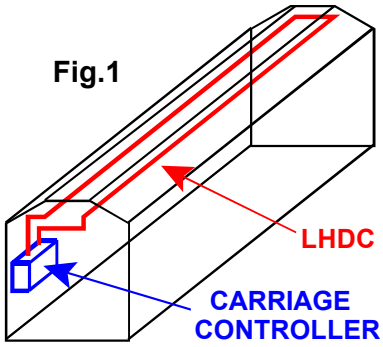


Fig.1

Alarm sounders are located within the carriage.

Mounted externally are Beacons or Sounder/Beacons.

The Train Brake Line is fitted with a solenoid valve.

The Carriage Controller (CCU) operates from the train supply sourced from the locomotive.

Carriage interconnection cable units are located at each carriage end. Each end is fitted with both male and female couplers in order to accommodate carriage reversals.

A TRAFIX Driver's Display Unit (DDU) is located in the locomotive. This is powered from the locomotive / train supply.

A typical connecting cable scheme is shown in Fig.2

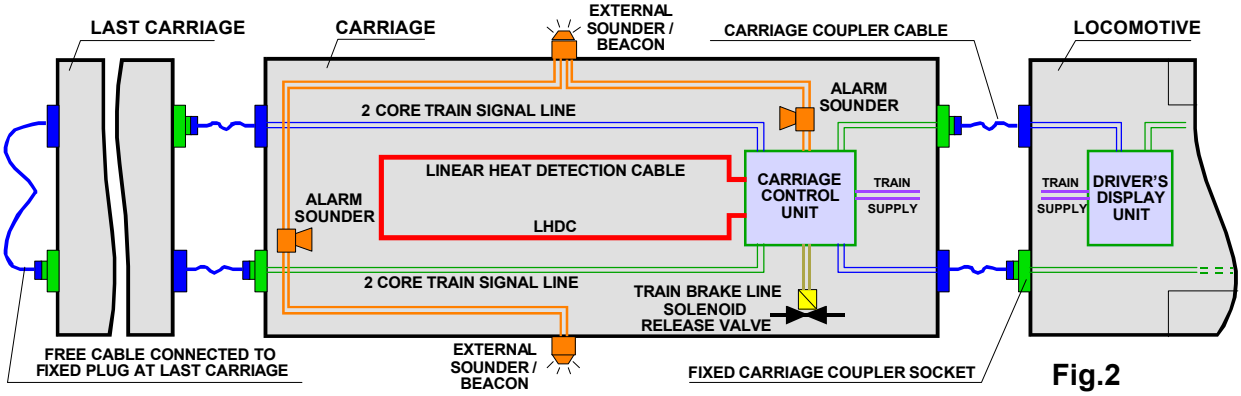
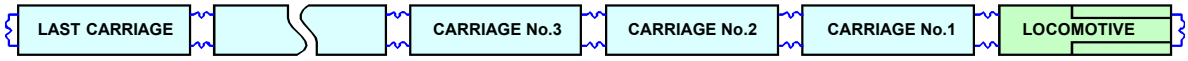


Fig.2

A train may be configured with between 1 and 19 carriages. Carriages may be coupled in either orientation. The locomotive is equipped with connectors at both ends and also may be operated in either direction. The free cables at the locomotive and last carriage are connected to the associated fixed socket

The system is self configuring and where the locomotive has a single driving position no further action is required from personnel. Fig.3

Fig.3



Double ended locomotives with two driving positions will have two DDUs installed and the driver will select the appropriate position.

After marshalling the driver may activate the DDU System Test feature. If the Train Signal Line has been correctly coupled the DDU will indicate the number of carriages connected.

If any CCU registers a Stage 1 (A1) alarm this is indicated at the DDU together with the carriage number. Carriages are numbered from the locomotive.

If the CCU registers a Stage 2 (A2) alarm the Train Brake Line solenoid is operated together with the carriage sounder / beacons. The driver is notified by the DDU.

System faults are indicated at appropriate CCU and DDU.

On failure of the Train Supply or Locomotive uncoupling, the carriage detection and alarm functions remain in operation until the integral batteries reach their usable discharge level. At this point the CCUs will automatically shut down.

On reinstatement of the Train Supply the batteries are automatically re-charged.

The Charge / Discharge duty cycle ratio is approximately 1 : 3

Carriage Control Unit

The unit comprises a grey polycarbonate case with smoked transparent cover lid. Viewed through the cover is an anodised style controls and indicator fascia.

Removal of cover and fascia provides access to the electronics module together with its connection terminals, fuses and LHDC set point adjustments.

Also located within the enclosure are two series connected Sealed Lead Acid batteries 12V 1.2 Ahr.

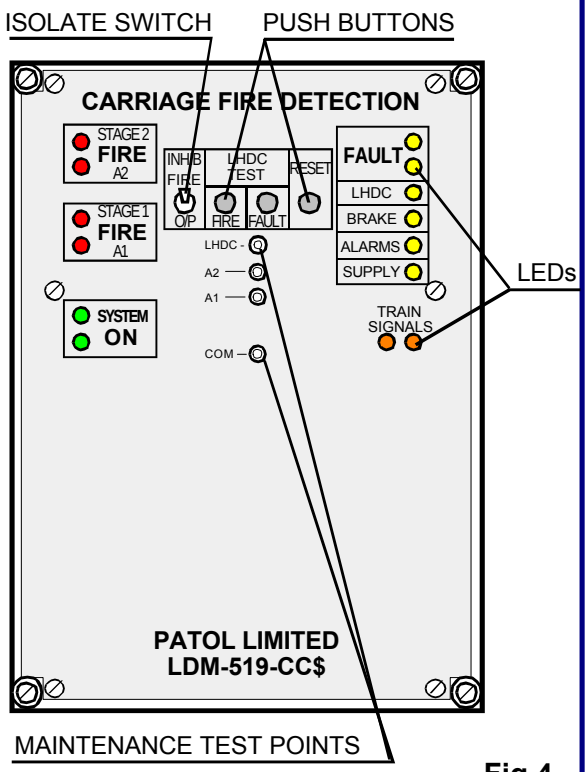


Fig.4

Indicators:-

STAGE 1 FIRE	Twin Red LEDs Illuminates on A1 Alarm.
STAGE 2 FIRE	Twin Red LEDs Illuminates on A2 Alarm.
SYSTEM ON	Twin Green LEDs Illuminated when CCU operating.
FAULT	Twin Yellow LEDs Illuminates on any fault as below.
LHDC	Single Yellow LED Illuminates on either open or short circuit fault of Linear Heat Detector Cable.
BRAKE	Single Yellow LED Illuminates on short circuit of Brake Solenoid cable and open circuit of cable or coil.
ALARMS	Single Yellow LED Illuminates on open or short circuit fault of Sounder / Beacon circuit cables.
SUPPLY	Single Yellow LED Illuminates on supply related faults: Train Supply fail / Battery disconnect / Charge fail.
TRAIN SIGS.	Orange LEDs Illuminated when Train Signal bus loop connected. One per loop side.

Controls:-

INHIBIT	Three position Isolate switch - Centre position normal. O/P - Down Brake and Sounder / Beacon outputs inhibited. Detection maintained. Fire - Up Fire detection function Isolated.
FIRE TEST	Push Button - Simulates LHDC fire condition - Only operable when O/P Inhibited.
FAULT TEST	Push Button - Simulates LHDC fault condition.
RESET	Push Button - Resets latched Fire alarms subsequent to normalised condition.

Maintenance Jacks and Adjustments:-

Test points are accessible at the main fascia providing measurement of the A1 / A2 set points and the LHDC analogue. On removing the fascia the associated adjustment potentiometers are accessible.

Fuses:-

In addition to Train Supply input and Battery connection, fuse protection is provided for both Brake and Alarm output circuits. The four fuses are accessed by removal of the fascia.

The Carriage Control Units can be provided with operational variances as necessary for any specific application. For full technical detail and specification refer to appropriate Data Sheets / specific Drawings.

Driver's Display Unit

The unit comprises a grey polycarbonate case with smoked transparent cover lid. Viewed through the cover is an anodised style controls and indicator fascia.

Located on the enclosure sides are driver / operator control push-buttons. An audible warning device is located on the enclosure lower face.

Removal of cover and fascia provides access to the electronics module together with its connection terminals and supply protection fuse.

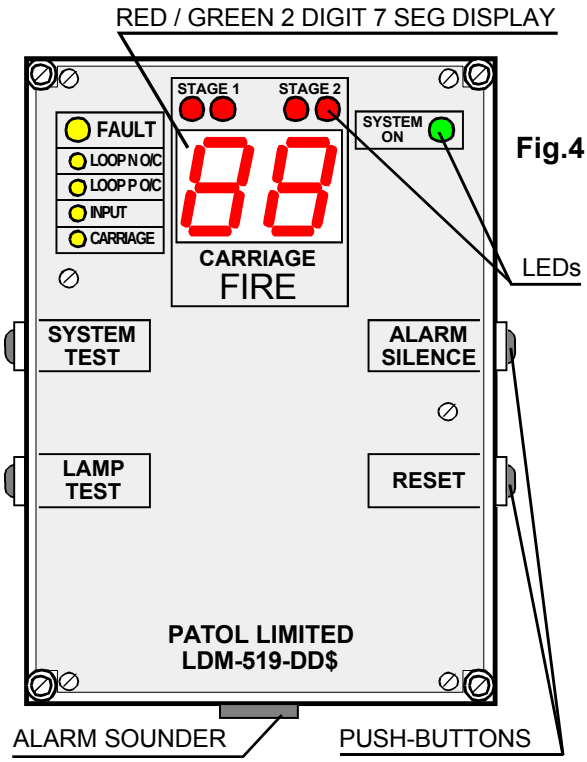


Fig.4

Indicators:-

STAGE 1 FIRE	Twin Red LEDs 10mm Illuminates on A1 Alarm.
STAGE 2 FIRE	Twin Red LEDs 10mm Illuminates on A2 Alarm.
CARRIAGE	Two Digit Seven Segment LED Two colour - Red / Green
FAULT	Single Yellow LED 10mm Illuminates on any fault as below.
LOOP P O/C	Single Yellow LED 5mm Illuminates on Train Signal Bus fault - Loop positive return open circuit.
LOOP N O/C	Single Yellow LED 5mm Illuminates on Train Signal Bus fault - Loop negative return open circuit.
INPUT	Single Yellow LED 5mm Illuminates on Train Signal Bus fault - Under range input / short circuit.
CARRIAGE	Single Yellow LED 5mm Illuminates on any CCU related faults and inhibit / isolate conditions.
SYSTEM ON	Single Green LED 10mm Illuminated when DDU operating.

Push-buttons:-

SYSTEM TEST	Initiates DDU self test routine including connected carriage count. See *Operation*.
LAMP TEST	Illuminates all fascia indicators - excluding carriage display.
SILENCE	Accepts new alarms. Silences sounder & steadies flashing LEDs. See *Operation*
RESET	Resets latched Fire alarms and Fault warnings subsequent to normalised condition.

Alarm operation :-

New Fire alarms and Fault warnings will result in the appropriate indicator flashing and sounder operating. Pulsed for faults, solid for fire. On first stage fire the numeric display will indicate the initiating carriage in red.

On operation of the Silence PB the indicator will steady and the audible will cancel.

System Test operation :-

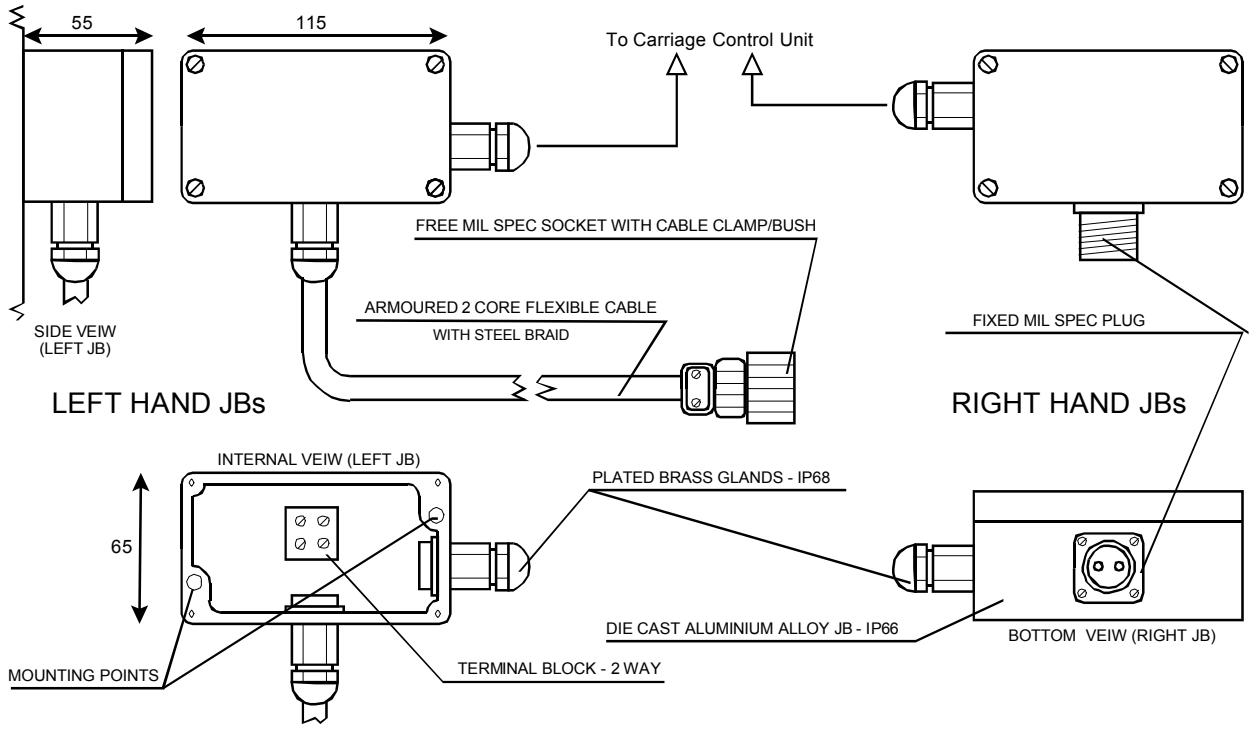
On PB operation each of the alarm functions is initiated in turn. The numeric display will indicate the number of connected carriages in green. Silence & Reset should be operated to normalise the system.

For full technical detail and specification refer to appropriate Data Sheets / specific Drawings.

Train Signal Bus Carriage Connectors

The carriage connection units comprise junction boxes fitted with glands and high integrity connectors. Two units are fitted at each carriage end such as to accommodate marshalling of trains with carriages in either direction.

The junction box locations and flexible cable length are chosen as appropriate to the coupling system and must permit mating of the free cable to the fixed socket at the last carriage.



Visit Patol's Web Sites :-
www.patol.co.uk
www.linear-heat-detectors.com

Email :-
info@patol.co.uk
patol.limited@ntlworld.com
patol@engineer.com

Patol Limited Rectory Road, Padworth Common, Berkshire, United Kingdom.
Tel: (0118) 9701900 Fax: (0118) 9701700