

DOCUMENT CONTROL NUMBER /

FIRERAY 2000 OPTICAL BEAM SMOKE DETECTOR

SERVICE AND MAINTENANCE

1. GENERAL

This document details the routine servicing and maintenance procedures and provides a fault finding guide for the Fireray 2000 optical beam smoke detector.

The publication comprises:

- Yearly checks
- Fault finding guide
- Alignment procedures
- Testing
- Spares list

When an incorrect response is obtained from a check, locate and rectify the fault as described in Section 3.

When returning a faulty unit or PCB for repair, package it in the bag that was used for its replacement.

2. ROUTINE CHECKS

The recommended routine checks must be carried out as stated.

2.1 YEARLY CHECKS

Inspect the Control Box, Transmitter and Receiver Units for damage and ensure they are physically secure.

Clean the lenses on the Transmitter and Receiver Units. (If the units are installed in a 'clean area' or dust free environment the lenses need be cleaned only every two years).

Align and the test system as necessary.

3. FAULT FINDING GUIDE

This section details some of the possible faults which may occur during testing of the Beam Detector Set. Most of the faults can be easily rectified.

If the unit is suspected as faulty, retry the alignment procedure.

If the Beam Detector Set is still faulty replace the Beam Detector Set with a new one.

If the problem persists, contact the Helpdesk at Sunbury.

Table 1 lists the internal controls and their function.

CONTROL	FUNCTION
Signal Level (RV1)	Alters the gain of the received signal from the transmitter. If the gain is set too low the Beam Detector Set will not work correctly. Do not set to maximum position in NORMAL working mode.
Test / Reset Switch	Sets the AGC level for the alignment checks (ON) and arms the Beam Detector Set after a fire alarm (OFF). Reset can also be done by removing the power for 2 seconds or by connecting the external reset input to 0V. Test/Reset switch is normally in the OFF position.

Table 1 Controls and their Function

3.1 POSSIBLE CAUSES OF FAULT ALARMS

- a) Receiver placed in the Reset state. Check that the Test/Reset Switch (Fig. 1) is set to OFF.
- b) The beam between the Transmitter and the Receiver is obscured for more than 94% of the beam area for one second. Check the beam is not obscured or that the round glass areas on the Transmitter or Receiver are dirty. Clean as required.
- c) Signal Level Control set too low at the Receiver. Turn control (RV1) clockwise.
- d) Receiver in Test mode. Ensure the Test/Reset switch set to OFF.
- e) Misalignment of the Transmitter and Receiver detectors. Re-align as in the Alignment procedure.
- f) Loss of power. Check out the power supplies.
- g) Source of infra-red setting of the alarm. Check for sources of infra-red. For example: heat emitting lights (eg, incandescent light bulbs), direct sunlight, heaters and radiators at close proximity to detectors.

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Table 2 gives the meaning of the LED indications on the PCB in the Control Box - see Fig 1.

LED INDICATION	MEANING OF INDICATION	ACTION
Fire Alarm front panel (RED)	When ON smoke present for 5 seconds. (40% to 93% obscuration of IR beam).	Wait for conditions to clear and reset the unit by switching OFF/ON/OFF on Test/Reset switch
Both Signal High and Signal Low lit	Normal for initial calibration state, both LEDs should switch off within 45 seconds.	
Signal High (GREEN)	Increase of about 10% of signal input (by AGC)	Ensure that the AGC will reduce the gain to bring down the signal down to the nominal level
Signal Low (GREEN)	Loss of about 10% of signal input	Ensure that in normal operation the AGC will increase the gain to bring the signal up to nominal
Fault (YELLOW)	1 ON when maximum Gain is reached	No more levels of compensation are available*
	2 ON when Reset switch is ON	Ensure Test/ Reset switch is in Test position when returning the detector to normal operation
	3 ON if the Both Signal High and Signal Low fail to extinguish after the 45 second calibration period.	Faulty unit

Table 2 LED Indication (Circuit Board in Control Box)

* When the received signal level changes, either an increase or decrease by more than 10%, the corresponding Signal High (LED 2) or the Signal Low (LED 3) will come ON and an AGC change is requested.

If this request is continuous in each time period (9 hours in increase and about 2 minutes to decrease) the AGC responds automatically by changing the receiver gain in order to bring the received signal level back to the nominal required level. Only one stage gain (10%) is affected.

When 15 stages of the AGC gain have been used, ie, the gain increased, the fault relay is turned on then off at a rate of one per 2 seconds (0.5Hz). The fire alarm will have no further levels of gain compensation available and must not be used.

Note: If maximum AGC gain is reached the alarm will not be reliable and must not be used.

If the signal is reduced any further then the alarm will be signalled.

Check any causes of reaching the AGC limit, such as dirty transmitter or detector round glass area or misalignment. Clean the glasses thoroughly and check alignment.

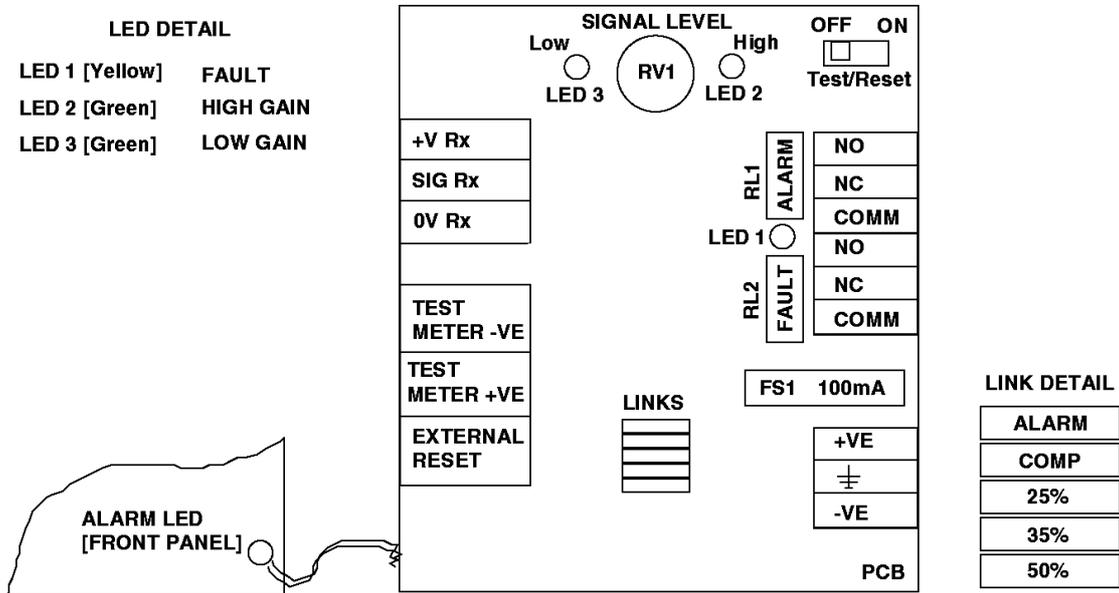


Fig. 1 PCB Layout

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4. ALIGNMENT

The detectors can be aligned by either using a dc voltmeter, which is positioned at the Transmitter head and connected via a 2-core cable to the Control Box or an Alignment Aid which can be substituted for the voltmeter.

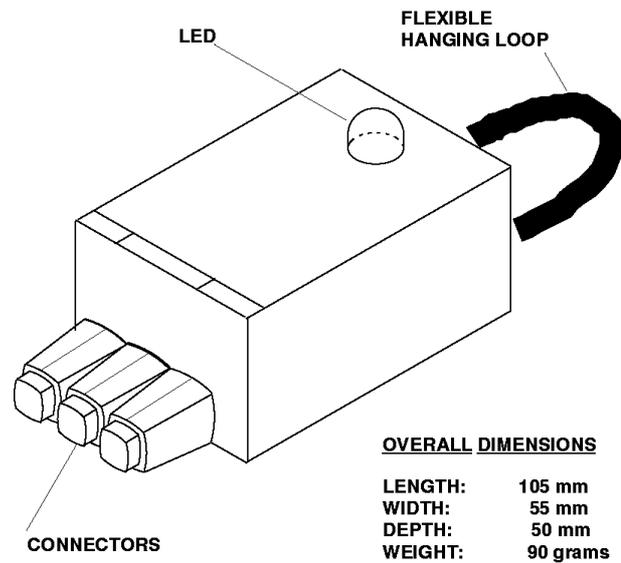


Fig. 2 Alignment Aid

The Alignment Aid (Fig. 2) is lighter and more robust than a meter and provides a convenient method of aligning the detector heads. The display LED flashes at a faster rate when correct alignment is achieved.

Align the detector heads as follows:

- Switch on the 24V dc Supply to the Control Box and the Transmitter/Detector.
- Ensure the Test/Reset Switch on the Control Box is set to OFF.
- Set the Test/Reset Switch to ON.
- Check the Signal Level control RV1 in the Control Box is set to the mid-way position.
- The High Gain (LED 3) and Low Gain (LED 2) may both be lit.

Note: At this stage other LEDs in the Control Box may be lit. This is due to the beams not being aligned exactly.

- Connect the Alignment Aid or dc voltmeter as shown in Fig. 1 using 2-core cable.

- Adjust the Transmitter head horizontally and vertically so that the receiver detects the beam in the round glass area such that either:
 - The Alignment Aid LED flashes at a high rate - adjust for the fastest flashing rate.
 - Or if using a voltmeter, adjust for a maximum reading. (A no-signal reading is approximately 2.6 volts).
- When this has been done fully tighten the screws holding the receiver and transmitter to the ceiling brackets. Ensure that all fixings are firmly tightened. Re-check the alignment aid for faster flashing of the light (to check the Beam Detector Set is working correctly).
 - At the Control Box adjust RV1 until the High Gain (LED 2) just goes off.
 - Switch off the power and disconnect the Alignment Aid or voltmeter.
 - Set the Test/Reset switch to the off position. Wait at least 45 seconds before performing any tests.

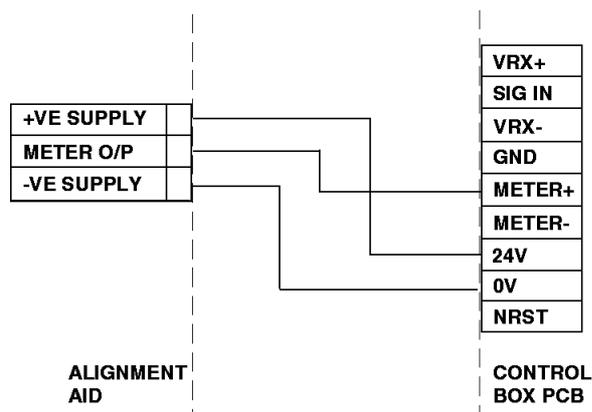


Fig. 3 Connection of Alignment Aid

When the detector heads are fitted for retro-reflective operation the alignment procedure is as for normal operation but with an additional test as follows:

When the system is aligned and in operating mode block off the reflector at the reflector end. The detector should go into fault condition. If the detector does not go into fault condition then it is possible that the signal is being returned, not by the retro-reflector, but by some other reflecting surface.

5. TESTING THE BEAM DETECTOR SET

The following tests must be carried out after the first installation, after any maintenance, or after every fire or fault alarm to ensure fail-safe operation of the Beam Detector Set.

Supplied inside the Control Box is an acetate test card (filter) with black markings on it which is used to provide obscuration of the beam during tests.

Note: After the tests have been performed this acetate card should be held with the system log book and not inside the Control Box.

5.1 SMOKE ALARM TEST

Proceed as follows:

- a) Hold the test filter in the beam path
- b) After approximately 9 seconds:
 - i) the Fire Relay contact operates (the relay contacts will click once as it operates).
 - ii) the Fire alarm LED (red) on the front panel will light.
- c) Remove the test filter, the alarm will reset in approximately 4 seconds (unless in latching mode).

- d) Reset the Beam Detector Set either by:
 - i) Moving the Test/Reset switch to OFF, then ON and then OFF, or
 - ii) Disconnecting the power for 2 seconds, or
 - iii) Taking the External Reset terminal to 0 volts for one second.
- e) The Beam Detector Set is now reset and armed.

5.2 FAULT ALARM TEST

Proceed as follows:

- a) Totally obscure the beam with an opaque object such as a piece of card.
- c) After about 10 seconds check that Fault LED (LED 1) lights, and the fault relay contacts change state.
- d) Remove the Test Card obscuring the beam.
- e) Check that the Beam Detector Set resets itself automatically within 4 seconds.
- f) Secure the front cover, the Beam Detector Set is now reset and armed.

Note: After the tests have been performed the recorded values should be held with the system log book and not inside the Control Box.

6. ORDERING INFORMATION

Fireray 2000 complete:	516-015-006A
Fireray 2000 complete:	516-015-006T
LPBD520:	557-180-217
Retro-Reflector (TKS 100 x 100):	516-015-007
Alignment Aid:	516-015-008

7. ASSOCIATED PUBLICATIONS

05A-02-S1 FIRE SYSTEMS - GENERAL SERVICE AND MAINTENANCE INSTRUCTIONS

CB/jm

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