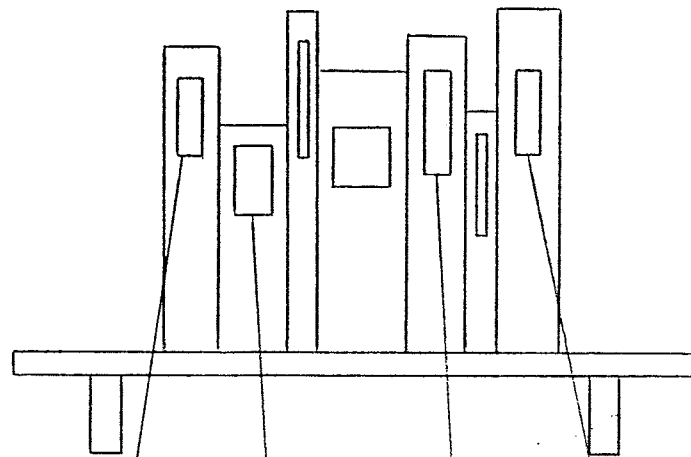


DIRECTOR OF S & T ENGINEERING.
WEST MIDLANDS PROJECTS GROUP.

*SELECTED INSTRUCTIONAL
HANDBOOKS
CURRENTLY IN USE*



SIGNALLING
INSTALLATION
HANDBOOK

SIGNALLING
DESIGN
HANDBOOK

ENGINEERS
HANDBOOK

SIGNALLING
WORKS
TESTING
HANDBOOK

SELECTED INSTRUCTIONAL HANDBOOKS CURRENTLY IN USE

ENGINEERS HANDBOOK BR 13439

This book is a guide to S & T staff who have the control of staff and use of S & T equipment. It is intended as a source of reference and outlines the procedures involving staff and the maintenance and installation of equipment. It will include or refer to all information not covered in other handbooks or documents.

An example of the designers involvement is EH H001 "Correlation of Circuit records and actual wiring prior to undertaking signalling work."

BRITISH RAILWAYS		No.	EH H001
Signal & Telecommunications	ENGINEERS HANDBOOK	Page	01
Engineering Department		Issue	01
		Date	07/89

**CORRELATION OF CIRCUIT RECORDS & ACTUAL WIRING PRIOR TO UNDERTAKING
SIGNALLING WORK**

AIM

To provide a method of working which ensures total correlation between existing wiring records and actual wiring prior to the design of any alteration.

Prime causes for deficiency in this correlation are:-

Site equipment or wiring has been altered for maintenance or installation purposes without prior or subsequent reference to the design function.

Alterations have been advised to the design function but the records have not been updated.

Different schemes at the same location have been carried out in a different order to that in which they were designed. Thus the presumption of one design that a previous design is complete is false.

SELECTED INSTRUCTIONAL HANDBOOKS CURRENTLY IN USE

GENERAL INSTRUCTIONS TO S & T STAFF BR 13445/10

This book contains instructions which must be adhered to by all S & T staff involved in lineside or technical work, they supplement, but in no way supersede, the rule book. It contains instructions for personal safety and procedures for dealing with S & T equipment.

An example of a procedure for dealing with equipment is illustrated by GI A06 section 7 "BR Automatic Warning System".

BRITISH RAILWAYS Signal & Telecommunications Engineering Department	GENERAL INSTRUCTIONS TO S & T STAFF	No. Date Page Issue	GI A06 05/88 01 01
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7. BR AUTOMATIC WARNING SYSTEM

- 7.1 Maintenance of track equipment includes checking that all fixtures are tight noting the condition of the inductor cases and ramps advising your Superior of any requiring attention.
- 7.2 Where the electro-inductor is controlled by the arm of a semaphore signal the arm contact should make at 25 - 30 degrees and break again at a maximum of 65 degrees from the horizontal, unless, otherwise instructed by the Signal and Telecommunications Engineer, See Fig 3.
- 7.3 Regular tests of magnetic field strength must be carried out using the strength and polarity indicator which should be placed upright in the centre of the top surface of each inductor.
- 7.4 Standard strength inductors are painted yellow. On third rail electrified lines where AWS is installed, extra strength inductors must be used and these are painted green. Strength and polarity (S & P) indicators are available for each type of inductor and are coloured to match. MK2 extra strength inductors must be tested using a green S and P indicator positioned on a 46 mm high wooden plinth.

7.13 Operating Values

	Yellow Electro Inductors		Green Electro Inductors MK1 Extra Strength			Green Electro Inductors MK2 Extra Strength	Yellow Suppressor Inductor	MK2 Extra Strength Green Suppressor
Classification Voltage	12	24	12	24	48	66	24	100
Minimum Working Voltage	10.5	21	30	30	53	60	22	100
Maximum Voltage	-	-	-	-	-	-	28	110
Power at Classification Voltage	9 watts		56 watts			120 watts	30 watts	450 watts

SELECTED INSTRUCTIONAL HANDBOOKS CURRENTLY IN USE

SPECIAL INSPECTION NOTICES (SIN) BR 13445/40

This contains information regarding defects in either equipment and or wiring design etc.

Information on defects with equipment is illustrated by SIN 001, "Detection Circuits".

BRITISH RAILWAYS	SPECIAL	No.	SIN 001
Signal & Telecommunication	INSPECTION	Date	03/87
Engineering Department	NOTICE	Page	01
		Issue	01

DETECTION CIRCUITS

BACKGROUND

There has been a derailment where the detection circuit of a set of clamp locks was wired incorrectly. It appears that a clamp lock body was changed at some time and straps which had been on the body from a previous installation were left in place on the detection terminal blocks.

The detection appeared to work correctly whilst correspondence between all ends was maintained. However, when this end failed to move (due to a fault in the motor brushes), detection was achieved even though the points were out of correspondence.

This incident demonstrates the importance of fully testing the equipment after installation or renewal, and in particular, the importance of Out of Correspondence testing of points.

ACTION

All electrically operated points having more than one end must be checked to ensure that there are no straps on the detection other than shown on the circuit diagrams.

URGENCY

To be checked at time of next facing point lock test.

DURATION OF NOTICE



Until all detection circuits checked.

NOTICES CANCELLED

None.

NOTICE BOARD BR 13445/50

Provides additional information to staff involved in technical work on new material, changes in practices, safety matters and any other item of news connected with signalling. An example of which is shown opposite.

**NOTICE BOARD**

Signal & Telecommunication Engineering Department

WIRING TERMINATIONS

During a count which was being undertaken by experienced staff a wire which had not been properly connected to its spade was found. As the wire was not labelled, the contact analysis which was being used for the wire count was used to find where it had come from. This showed that there should be two wires on A6 where there was only one. The loose wire was hanging very close to A6.

The wire was reconnected to A6. Some time later it was found that the signal was clearing incorrectly.

The detached wire should have gone in A3, not A6. The contact analysis was incorrect showing two wires in A6 and one in A3 rather than one in A6 and two in A3.

The mistake was an easy one to make - also an easy one to avoid if further investigation had taken place.

What went wrong? The wiring diagram was correct, but the loose wire was not checked against it. The contact analysis did not match the diagram. The wire was put back to where it seemed to have come from rather than checking the wiring. The signalman was not contacted whilst this work was proceeding. No proper test was carried out after the repair.

The moral of this? Don't make assumptions - our customers lives depend on your being right. You would not have made this mistake - or would you?

J S Firth
Signalling Maintenance Engineer

Date 11/89 No 017

SELECTED INSTRUCTIONAL HANDBOOKS CURRENTLY IN USE

SIGNALLING DESIGN HANDBOOK BR 13439/90

This book contains the procedures to enable the designer to carry out all the design tasks commonly required for a signalling scheme. Typical example for colouring is SDH E51 "Production of design details - presentation".

BRITISH RAILWAYS	SIGNALLING	No.	SDH E51
Signal & Telecommunications	DESIGN BOOK	Page	01
Engineering Department	HANDBOOK	Issue	01
		Date	02/90

PRODUCTION OF DESIGN DETAILS - PRESENTATION

1. For alteration to existing installations a two colour code system is to be used as follows:

Green to identify existing wires/equipment to be recovered Red to identify new wires/equipment to be installed.

See Appendix A for colour convention.

2. Where complex alterations involve large scale recoveries/modifications to existing circuits, consideration should be given to the production of 2 copies of each drawing, showing the alterations as follows:

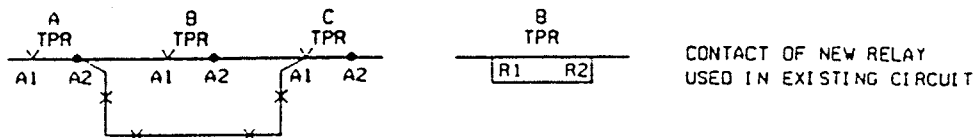
First copy - showing existing wires/equipment to be removed (green).

Second copy - showing new wires/equipment to be installed (red).

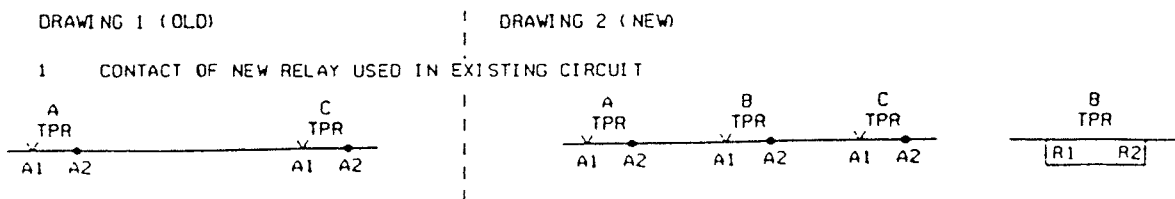
See Appendix B for colour convention.

APPENDIX A - COLOUR CONVENTIONS FOR ALTERATIONS TO EXISTING CIRCUITS

NEW & OLD SHOWN ON SAME DRAWING



APPENDIX B - COLOUR CONVENTIONS FOR ALTERATIONS TO EXISTING CIRCUITS



continued

SELECTED INSTRUCTIONAL HANDBOOKS CURRENTLY IN USE

SIGNALLING TESTING AND DESIGN GUIDELINES BR 13445/80

Information provided about design weaknesses and testing shortcomings, gives advice on future practices and the need for retrospective action.

An extract of this is illustrated by STDG 006 "Materials suitable for the environment".

BRITISH RAILWAYS	SIGNALLING	No.	STDG 006
Signal & Telecommunications	TESTING &	Page	01
Engineering Department	DESIGN	Issue	01
	GUIDELINES	Date	01/90

MATERIALS SUITABLE FOR THE ENVIRONMENT

BACKGROUND

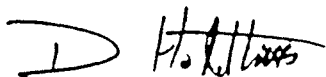
A series of plungers was installed in the Severn Tunnel to provide an emergency replacement facility for signals leading into the tunnel. Each plunger was provided with a red LED to indicate that the replacement had been effective and a green LED for fault finding.

Within one year both the plungers and LEDs were found to be seriously corroded and a technical evaluation showed that the equipment was inadequate to resist the salt water spray found in the tunnel. The equipment will be replaced by units designed to a suitable more demanding specification which have passed an accelerated corrosion test.

ACTION

DESIGNERS

This highlights the importance of choosing materials and equipment suitable for the environment, particularly when the environmental conditions are expected to be harsh. If in doubt seek expert advice eg. from the Technical Investigation Centres.



for Director of S & T Engineering

SELECTED INSTRUCTIONAL HANDBOOKS CURRENTLY IN USE

STANDARD SIGNALLING EQUIPMENT CATALOGUE BR 13439/85

A list of standardised equipment and catalogue numbers for design and ordering purposes. Two extracts showing typical examples of the layout in the catalogue are illustrated below.

A.1.3. 50v DC BIASED RELAYS TO SPEC. 930

CAT. NO.	RELAY	USAGE	REPLACES	COMMENTS
85/860	Spec. 932 Code 027 12F/4B AC Immune BA	GPR's etc. Pole change line circuits	<u>ZB 562 ZB 5622</u> <u>ZB 362 ZB 3622</u> <u>41 M08 41 M42</u> G4 BA	Relays in use of 8F/4B (85/870) Contact arrangement to be replaced by 12F/4B
85/1850	Spec. 961 Code 049 2 x 6F/2B AC Immune BA	Twin Relay Internal Repeat Relay GS, UCR, TSPR's Point Detection GPR's		On small relay rooms to be used instead of Spec. 960

SELECTED INSTRUCTIONAL HANDBOOKS CURRENTLY IN USE

SIGNALLING WORKS TESTING HANDBOOK BR 13439/70

This handbook is issued to all staff qualified to test and contains the procedures to enable the qualified signalling tester to carry out the tests and checks necessary to guarantee the safe operation of new or altered signalling. An extract showing the definition of checks to be carried out is illustrated by SWT C 4.2 "Testing of system components".

BRITISH RAILWAYS	SIGNALLING	No.	SWT C 4.2
Signal & Telecommunications	WORKS	Page	01
Engineering Department	TESTING	Issue	01
	HANDBOOK	Date	07/90

TESTING OF SYSTEM COMPONENTS

4.2 DEFINITION OF TESTS

4.2.1 WIRE COUNT

1. This is a visual examination to ensure that the correct number of wires is connected to each terminating point as shown on the wiring diagrams and analysis. All other terminating points must be examined, to ensure that no wires are present.
2. The wire count is carried out with all wires terminated and labelled.
3. Whilst making the wire count a check must be made to ensure that all spades are locked in relay bases, all nuts are tightened (whether they are in use or not) and that there are no loose nuts, washers, off-cuts of wire or other superfluous metal objects in the vicinity of working circuits.
4. On all new installations a wire count of all terminations on plug-in and shelf type relays, lever locks and circuit controllers shall initially be done to the contact analysis, ie. the wires are checked from each individual relay to the contact analysis thus any extraneous use of contacts/wires is found.
5. The wire count of terminations where no analysis is provided should be done in conjunction with the continuity tests. Relay contacts already checked to the analysis shall be similarly checked and recorded on the wiring diagram.

SELECTED INSTRUCTIONAL HANDBOOKS CURRENTLY IN USE

This also applies to fuses, links, terminations etc. ie. as the tester applies one end of the test apparatus he clearly states the termination point and the number of wires. In this instance the diagrams are marked as Appendix E.

6. On altered circuitry (see also Section 4.4.4) where a wire cannot be terminated initially it must be checked as being present ready for termination and identified as shown in Appendix E. At the time of commissioning this will then be re-checked to ensure correct number of wires terminated to the diagram. Where a number of wires are to be changed a complete wire count of the surrounding area (relay or row or rack) will be done as decided in the test plan.
7. As a final check prior to commissioning a final wire count shall be performed on all new and altered installation to the contact analysis where provided. This is a re-check that all modifications have been identified, all redundant wiring removed and provides an excellent base for a correlation check on any proposed future schemes.

SELECTED INSTRUCTIONAL HANDBOOKS CURRENTLY IN USE

JOINT DEPARTMENTAL PROCEDURES HANDBOOK BR 13439/40

Contains instructions and procedures approved by the S & T Departments in conjunction with one or more other departments. A typical example to be found in this book is the "Code of practice for signalling sighting" (CP8).

1. Constitution of Signal Sighting Committee

The Signal Sighting Committee shall normally have representation from the following Departments:-

S & T
Operations (Signalling and Traction)
M & E Engineer (on electrified lines only)
CE if required.

2. Terms of Reference

To consider and recommend the most suitable and economical form and position of any signal and associated equipment which is being provided or renewed or which is subject to investigation. A prime consideration is the drivers approach view. Regard must be given to:-

- (1) The signalling arrangements shown on the approved signalling plan.
- (2) The Rule Book, Section C.
- (3) BR Standard Signalling Principles.

3.4 Main Colour Light Signals

The long range multi-unit type of colour light signal shall be used and 'spreadlight' lens may be provided as required.

Colour light signals should be positioned as near as possible to Drivers eye level and when on straight posts should have the most restrictive aspect 11'-0" (3.353 m) above rail level and 6'-7" (2.006 m) from the inside running edge of the rail.

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3.5 Semaphore Signals

The limit of mechanical operation of semaphore signals is one mile (1.61 Km) and may be less in unfavourable circumstances.

Semaphore signals should be kept as low as possible consistent with the Driver obtaining a proper view.

The height of the arm of straight post signals should not normally be greater than 18'-0" (5.486 m) above rail level. Where this distance is required to be exceeded the Committee should report the circumstances on the back of the Sighting Form.

A distant signal should be combined with a stop signal which is in close proximity and which applies to the same route. The distance between Stop and Distant arms on the same post should be 6'-0" (1.829 m).

Sight boards are to be provided if necessary.

SELECTED INSTRUCTIONAL HANDBOOKS CURRENTLY IN USE

SIGNALLING INSTALLATION HANDBOOK BR 13439/75

This book is primarily for the information of the Signalling Technician engaged in Signalling installations. However it contains useful information to enable the designer to ensure that the design is suitable to enable the installer to produce a quality product. A good example is SIH 2G10 - "Locations - fitting out".

BRITISH RAILWAYS	SIGNALLING	No.	SIH 2G 10
Signal & Telecommunications	INSTALLATION	Page	01
Engineering Department	HANDBOOK	Issue	01
		Date	09/90

LOCATIONS: FITTING OUT

EQUIPMENT LAYOUT

Figures 1 and 2 show the front and back views of a typical standard layout. The layout shown in installation drawings should not be changed. There may be good reason for a designed arrangement, particularly where electronic equipment is concerned.

In the event of the drawings showing an impracticable design, it must be referred back to the design office through your supervisor.

A diagram holder (usually in the form of a plastic tube) to house the maintenance drawings, should be fitted in each location.

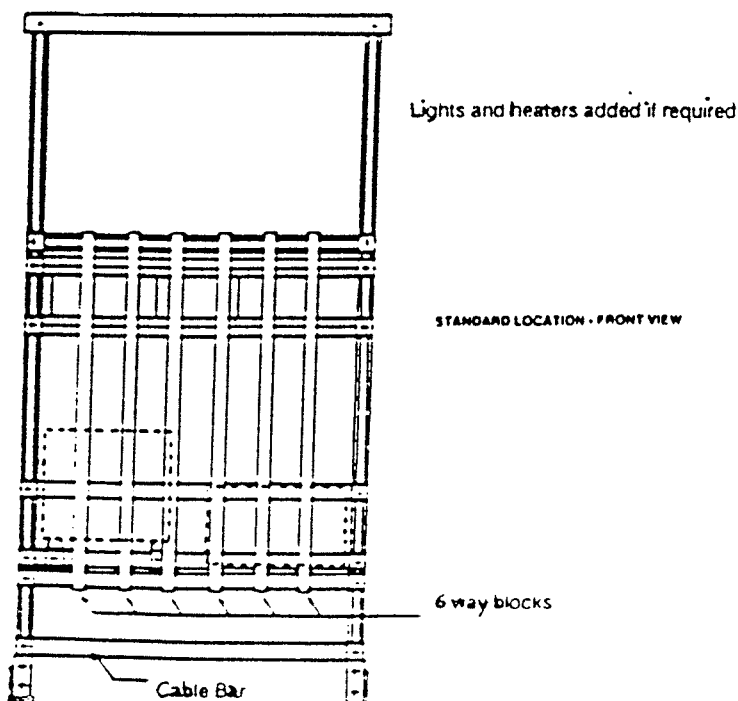


FIGURE 1.

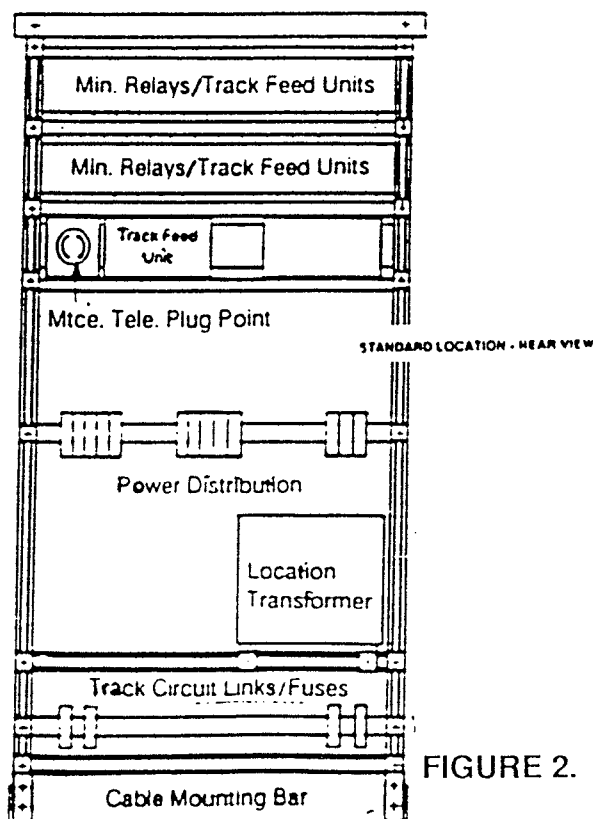


FIGURE 2.