



AUSTRALIAN RAIL TRACK CORPORATION LTD

Discipline: Engineering (Signalling)

Category: Standard

Electric Train Staff Instruments

ESM-08-01

Applicability

ARTC Network Wide	✓	CRIA (NSW CRN)	✓
-------------------	---	----------------	---

Primary Source

SMP 33

Document Status

Version	Date Reviewed	Prepared by	Reviewed by	Endorsed	Approved
1.2	13 August 2010	Standards	Stakeholders	Chief Operating Officer	Risk & Safety Committee 07/07/2008

Amendment Record

Version	Date Reviewed	Clause	Description of Amendment
1.0	22 May 08		First issue. Supersedes NSW Standard SMP 33 v1.3
1.1	07 Oct 09		Disclaimer updated as per Risk & Safety Committee 14/09/2009
1.2	13 August 2010	All	Issued as final.

© Australian Rail Track Corporation Limited 2009

Disclaimer:

This document has been prepared by ARTC for internal use and may not be relied on by any other party without ARTC's prior written consent. Use of this document shall be subject to the terms of the relevant contract with ARTC.

ARTC and its employees shall have no liability to unauthorised users of the information for any loss, damage, cost or expense incurred or arising by reason of an unauthorised user using or relying upon the information in this document, whether caused by error, negligence, omission or misrepresentation in this document.

This document is uncontrolled when printed.

Authorised users of this document should visit ARTC's intranet or extranet (www.artc.com.au) to access the latest version of this document.

Contents

1	General	3
2	Servicing of Staff Instrument	3
3	Special Requirements	4
3.1	Intermediate Instrument	4
3.2	Automatic Switch Boxes	4
3.3	Isolating Relays	5
4	Signal Engineers Tests	5
4.1	Bi-Annual Staff Instrument Test	5
4.2	District Audit	5
5	Lost and Stolen Staffs	6
5.1	Lost Staff	6
5.2	Stolen Staffs	7
5.2.1	Risks associated with Stolen Staffs	7
5.2.2	Mitigation of Risks associated with Stolen Staffs	7
6	Damaged Staff	8
7	Staff Balancing by Signal Maintainers	9
7.1	Balancing at Intermediate Instruments	10
7.2	General Requirements	10
8	Changing of Staff Instruments	10
9	Appendix 1 – Forms (examples only)	11

1 General

This Standard defines the procedures and tests to be followed when carrying out maintenance on Electric Train Staff Instruments.

Prior to commencing work on the staff instruments the Signal Maintainer shall advise and obtain concurrence of the Network Controller of the work to be carried out and ensure that the switchbox, if provided, is in ordinary working.

When working on intermediate staff instruments the four wires shall be disconnected by opening the links provided at the terminals and not reconnected until the work/examination is complete. When the wires have been reconnected the instruments shall be tested.

The Signal Maintainer shall not remove or place a staff in the staff instrument in connection with the working of trains. The suitably accredited Signal Maintainer shall not inadvertently give permission to any person at the opposite end of the section to withdraw a staff by holding down on the bell key.

Staff instruments shall never be left open or any staffs left out during the absence of the Signal Maintainer. Therefore, if the Signal Maintainer has cause to leave the instrument while examining or cleaning it, he/she shall replace all the staffs in the instrument and lock the instrument.

Should a train arrive at the station before the Signal Maintainer has completed the work, and the instrument is not ready to receive the incoming staff, the Signal Maintainer shall retain possession of the staff until the instrument is ready to receive it. The work shall be completed as quickly as possible so that the staff can be placed in the instrument.

A staff shall not be withdrawn for a train until the work has been completed and the instrument has been tested.

2 Servicing of Staff Instrument

On each rostered maintenance visit the signal maintainer shall undertake the following service procedure and record the results on *ESM0801F-01 Maintenance Visit Record*.

- a. Immediately on opening the instrument the position of the cam shall be noted and recorded in relation to the number of staffs in the instrument. On completion of maintenance the position of the cam shall be checked again in relation to the number of staffs in the instrument.
- b. Remove the top spindle and clean and oil. Thoroughly clean all lock components and inspect locking faces for wear.

Note: Only clock oil shall be used on the instrument. The oiling of spindles and bearings shall be carried out by using a clean oily rag sparingly. Under no circumstances is an oilcan to be used. It is vital that oil is not allowed to reach the fluted faces of magnetic locks.

- c. Rotate the drum and inspect for rust, accumulation of dust, or any stiffness of operation. Wipe the top surfaces of the drum clean.

In the event of any heavy rusting or stiffness in operation remove the drum, clean off the rust, and lightly oil spindle.

Whenever the drum is removed the opportunity shall be taken to thoroughly clean the inside of the instrument and inspect, clean and oil the back locks and springs.

- d. Check the magnetic lock for residual magnetism. Check that the magnetic lock does not stick due to oil or foreign matter on the pole faces. Check the fluted brass faces to ensure that they are securely fastened to the armature ie. riveted and soldered. Clean the flutes and faces carefully.

Note: It is vital that no oil is allowed on these faces.

- e. When replacing the spindles they must be carefully rotated into place. Do not bump them with the hand of any other object. Tighten the retaining screws on the top spindle to prevent it from moving or turning.
- f. Remove the five contact fingers one at a time and clean the bearing pin. Examine each contact for signs of fracture and loss of tension. Check that the clearance between make and break is ample. (Note where an automatic switchbox is in use at the other end of the section a 1 mm overlap, (make before break), is provided on number two (2) contact).
- g. Test the condition of all cells in the local, line, and the bell batteries.
- h. Check all screws and nuts for tightness (except for the bottom locks which shall be checked on a 12 monthly service and each time the drum is removed).
- i. Examine the gauge block or gauge plate and test with staffs from adjoining sections. (See also 12 monthly service for gauge block and gauge plate).
- j. Check that the insulated extension piece opens the index switch when a staff is withdrawn. The contact shall break as soon as (but not before) the drum has rotated sufficiently for the lock to clear the index in the drum.
- k. At intermediate instruments details of the currents through both coils shall be recorded on a *ESM0801F-01 Maintenance Visit Record* (kept in the terminal box).
- l. Test the operation of the electric lock with no current through the line coils by attempting to withdraw a staff and also manually to ensure that there is no tendency for the lock to lift. Check that the safety lever locks the ringing key, as it starts to lift and throughout the whole of its travel. Check that the electric lock is locked by the safety lever when the bell key is depressed, i.e. before number (3) contact makes.
- m. Test and record the line and local coil currents on *ESM0801F-01 Maintenance Visit Record*. Whenever possible, these tests shall be made with both ends in ordinary working, when this is not possible a note shall be made on the record card. When a new *ESM0801F-01 Maintenance Visit Record* has been compiled, the old card shall also be retained so that a minimum of 12 months record is kept. The record cards shall be kept in the locked battery cupboard.
- n. Examine all staffs to ensure that rings are not loose or broken and the inscriptions and numbers are clear and legible.
- o. With the instrument closed and the staff withdrawn test the instrument to ensure that a second staff cannot be obtained.

3 Special Requirements

When carrying out maintenance services to the TMP and Service Schedules the following shall apply:

3.1 Intermediate Instrument

Prior to commencing any work on an intermediate instrument the Network Controller shall be notified. When the Network Controller has been notified, the four line wires shall be disconnected by opening the links at the line termination terminals which are situated in the cupboard adjacent to and separate from the staff instrument and left opened until the work is completed. When the links at the termination terminals have been closed, the instruments shall be tested to ensure the correct phase relationship of the whole of the instruments concerned.

3.2 Automatic Switch Boxes

When maintaining the automatic switch box the operation of the time delay mechanism shall be checked. In the case of a relay type switch box ensure that the 'A' relay does not hold in due to residual magnetism. The air gap between the pole faces and the armature is to be approximately 0.05mm which is equivalent to the thickness of ordinary writing paper.

For pendulum units, observe operation and ensure that all parts are free and not binding.

3.3 Isolating Relays

Isolating relays are used on miniature electric train staff sections where the line voltage is in excess of 70 volts or 46 cells are used. Isolating relays shall be tested each maintenance visit to ensure that satisfactory contact conditions are being maintained. Isolating relays are provided to eliminate the possibility with high voltage DC circuits of a staff instrument contact, on opening, drawing and sustaining an arc.

Where Q Relays are used, no testing is required.

4 Signal Engineers Tests

4.1 Bi-Annual Staff Instrument Test

After the completion of the twelve monthly service work, on every second year in the presence of the Signal Engineer, the instrument shall be tested as follows:

- Test 1** A working test of line and local coils at failing currents shall be carried out using an adjustable resistor (rheostat). The failing current line coil is 90ma and for the local coil is 95ma.
- Test 2** When the circuit does not have an isolating relay, the local line battery at the station being tested, shall be connected across the line coil with the local coil disconnected, and an observation made that the lock does not lift, while lifting a staff into the head of the instrument.
- Test 3** Test that the line coil incoming current does not allow the lock to lift, while lifting a staff into the head of the instrument, while the local coil is disconnected.
- Test 4** Test that the local coil normal battery current does not enable the lock to lift while lifting a staff into the head of the instrument, while the line coil is disconnected.

Line Coil 115ma Minimum 130ma Maximum

Local Coil 110ma Minimum 125ma Maximum

All readings shall be recorded on the *ESM0801F-01 Maintenance Visit Record*. A minimum of twelve months record shall be kept. The record card shall be kept in the locked battery cupboard.

Testing shall be undertaken by inserting the adjustable resistor in the circuit and adjusting incrementally. For each increment the staff instrument is operated to attempt to release a staff. The current is noted and operation noted. When the staff instrument fails to release the staff, this value is recorded as the failing current.

When the failing current is less than 90ma for line coil and 95ma for local coils, the following mitigations must be undertaken:

- Undertake insulation resistance test on the instrument and the staff circuit
- Undertake earth leakage test on the instrument and the staff circuit
- Rectify any earth faults or line faults that are evidenced by the above tests and retest.
- Where the fail currents remain between 70ma and 90ma for line coil and 75ma and 95ma for local coils, then a waiver shall be submitted to endorse the resultant values.

4.2 District Audit

The Signal Engineer shall conduct an annual audit of the number of train staffs and their respective numbers on each Electric Train Staff section on the district.

If the audit does not agree with that shown on the Staff Instrument number plate, the Signal Manager, the Signal Standards Engineer and the Train Control Manager NSW are to be notified and appropriate measures put in place to safely manage the situation until resolved.

5 Lost and Stolen Staffs

5.1 Lost Staff

When a staff is lost the provisions of Network Rule ANSY 504 are to be followed. The Network Controller will advise the Signal maintainer of the loss, arrange to have blue emergency covers placed over the relevant instruments and introduce a method of special working as required.

The Signal Maintainer shall proceed to the station concerned and in the company of an ARTC Risk and Safety Officer test the instrument to ensure that a staff cannot be withdrawn. Then establish the individual number of the lost staff as follows:

- a. Examine the brass plate in the lid of the instrument and make a numerical list of the information shown thereon eg.1 to 36.
- b. Mark off the numbers of the staffs in the instrument at that end of the section.
- c. The Signal Maintainer shall attend the other end of the section and record the staff numbers. In addition the numbers of each staff in any intermediate instrument are to be checked and marked off the list. Check the entry in the Train Register Book for the staff number issued to the last train to enter the section where provided.
- d. Allow for any staffs which may be out of the instrument for repairs.
- e. The number not marked off will be the number of the lost staff.

When the individual number of the lost staff has been established the Signal Maintainer shall carry out a thorough eight (8) hour daylight search for the staff accompanied by the safeworking employee delegated by the Risk and Safety Officer.

This search shall include but not be limited to:

- a. A search of the train involved
- b. Station buildings and surrounds at both ends of the section
- c. Sidings in the section

Additional assistance may be arranged to carry out this search by the Signal Engineer who shall be advised as early as possible of the circumstances and kept informed throughout these procedures.

If the staff cannot be found during the eight hour daylight search, the Network Controller must be notified and when it is declared that the staff has been lost, the Network Controller will arrange for a Train Control Report to be made out advising of the loss and advertise the loss at the affected locations in accordance with Network Rule ANSY 504. Details are to be sent to the Signal Manager advising of the loss and that the search has failed to locate the missing staff together with full particulars of the lost staff.

The Signal Manager shall forward advice authorising the signal maintainer to place the instrument in order. This is done by turning the drum a quarter of a turn. The signal maintainer shall then turn each brass plate in the instruments over, and write thereon 'STAFF (INSERT NUMBER) LOST'.

The Signal Maintenance Engineer shall requisition new number plates showing the staffs remaining on the section. On receipt the Signal Maintenance Engineer shall check and forward these number plates to the signal maintainer who shall fit them in each instrument.

If after six months the staff has not been found, the Signal Maintenance Engineer shall requisition a new staff (nominating a new number) together with new number plates.

On receipt the Signal Maintenance Engineer shall check the new number plates, check the inscription (and key words if applicable) and gauge the new staff using a test gauge and forward them to the signal maintainer on a STEL locked box.

The signal maintainer shall not place the new staff in the instrument until the work has been authorised by the Network Controller and the replacement has been advertised in a Train Control Report (TCR) stating the time and date on which this may be done. The Signal Maintenance Engineer shall arrange with the Network Controller for the issue of such notice.

The new staff shall be tested in all the instruments, locks, and releases on the section. It shall be tested on adjoining sections to ensure that it will not enter the apparatus. The staff may then be placed in the instrument which previously had the drum turned. The drum shall then be turned a further quarter of a turn and the instruments tested to ensure that only one staff can be withdrawn. The Signal Maintenance Engineer is to be advised when the work is completed and that the instruments are correct and operating as designed.

If the staff is found after the Train Control Report has been sent the staff must be secured out of use and the Train Control Manager NSW informed in accordance with Network Rule ANSY 504. The Network Controller will advise the Signal Maintainer and both shall confer as to the arrangements for returning the staff to the instrument and advertising the return in a Train Control Report.

If the staff is found in a damaged condition after the Train Control Report has been issued, the Signal Maintainer shall advise the Signal Maintenance Engineer and forward the damaged staff with details in a STEL locked box to the Signal Maintenance Engineer. The Signal Maintenance Engineer shall arrange for the repair, replacement or destruction of the damaged staff. A record of destroyed staffs shall be kept by the Signal Maintenance Engineer.

Form *ESM0801F-02 Keys/Staffs Sent for Repairs or Alterations* shall be used when forwarding/returning keys/staffs sent for repairs or alterations.

The Signal Maintenance Engineer shall ensure that their electric train staff records are updated and kept accurate.

5.2 Stolen Staffs

The theft of staffs will introduce risks to the continued operation of trains under Electric Train Staff working. These risks must be understood and mitigated prior to the re-introduction of electric Train Staff working

5.2.1 Risks associated with Stolen Staffs

The following risks need to be considered when re-introducing Electric Train Staff working after the theft of staffs. These are detailed as the Element and Hazard.

- a. Unauthorised use of stolen staff – Stolen staff is re-entered into staff instrument when previous train is still in the section. Note staff may be re-entered into an instrument of same type in another section;
- b. Unauthorised use of the annett key on the stolen staff – Stolen staff with annett key is used to open a ground frame and set the points when train is in the section;
- c. Unauthorised use of the stolen staff – Stolen staff is left in staff hut and is used by train driver without entering it into the staff instrument;
- d. Unauthorised use of the stolen staff – Stolen staff is handed to train driver without first entering it into the staff instrument;
- e. Unauthorised use of the key on staff to operate Duplex lock and de-activate a level crossing – level crossing not activated for approaching train;
- f. Damage to staff instrument from theft actions – Staff instrument does not operate correctly and releases a staff not in accordance with the design;
- g. Modification of the annett key on the staffs to permit use on other locks – ground frame points operated when train is in section.

Mitigations must be undertaken for these risks before the re-introduction of Electric Train Staff working.

5.2.2 Mitigation of Risks associated with Stolen Staffs

Control measures are required to mitigate the risks detailed above. The following control measures are suitable mitigations for the Risks detailed above. The Signal Engineer shall review the Risks for specific situations and ascertain that the following mitigations controls are suitable and sufficient before proceeding with re-instatement of the Electric Train Staff working

- a. Issue a Safe Notice to all ARTC staff and Train Operators regarding the situation with the stolen staffs;
- b. Place a sign inside the Staff Hut detailing the stolen staff by name and number and the requirement to strictly follow the Network Rules;
- c. Provide an advice to Train Operators requiring strict adherence with Network Rule ANSY 504 and Network Procedure ANPR 729; Train Operators to provide an Advice to train drivers regarding these requirements to strictly adhere to the Network rules and Procedures. Specifically that train drivers must check the staff's name and number, that all staffs must be returned to the staff instrument before it is reused, that the driver must only be in possession of the staff for the section as authorised by the Network controller;
- d. Provide advice to Network Controllers requiring strict adherence to Network Rule ANSY 504 and Network Procedure ANPR 729; Network Controllers to provide approval for train drivers to release a staff from an instrument and to enter a section only when in possession of the respective staff; Network Controllers to keep track of all train movements in the electric Train Staff territory and to record these and the staff number on the Train Graph or other approved record.
- e. Where there are staffs with annett keys that have been stolen these risks shall be mitigated by; changing all affected ground frames from annett locks to Operator's locks and keys; where necessary install Mechanical Points Indicators (MPI) and Location boards for all ground frame locations; Book all ground frame points out of use and clip and lock with XL locks until the above changes

An alternative Interim Control Measure may be implemented to permit re-introduction of Electric Train Staff working immediately. These alternative measures are in place of items a, b, c, d above. These measures are: Provide a Protection Officer Level 2 or above at each location to secure each and every one of the staff instruments in a section of Electric Train Staff Working; The Protection Officer to ensure that the requirements of Network Rule ANSY 504 and Network Procedure ANPR 729 are strictly observed; The Protection Officer to ensure that there is no introduction of the stolen staffs into the staff instrument.

6 Damaged Staff

When an electric train staff is broken or damaged, the provisions of Network Rule ANSY 504 must be observed. It shall not be placed in the instrument and the Signal Maintainer shall take charge of the staff and the applicable procedures shall be adopted after a Train Control Report has been sent.

- a. The Signalling Maintainer shall remove the damaged staff and one other staff from the instruments, in order to balance the staff section. The damaged staff together with the other staff shall be placed in a staff dispatch box and secured with a STEL lock. If the undamaged staff does not require repairs, it shall be labelled 'removed for balancing purposes, repairs not required'.

Form *ESM0801F-02 Keys/Staffs Sent for Repairs or Alterations* shall be compiled and forwarded with the staff/s sent for repairs or alterations.

Note: Care shall be taken when compiling the ESM0801F-02 form that all details are legible and that the staff sections shown are exactly as shown on the staff. When the staffs are returned the inscriptions shall be checked to ensure they are identical to the other staffs on the section.

- b. Details of the damage staff shall be forwarded to the Signal Maintenance Engineer and the Network Controller. An entry shall be made in the Train Register Book (if available) at each end of the section.
- c. The locked box containing the damaged staff/s together with the completed ESM0801F-02 form shall be forwarded to the Signal Maintenance Engineer. The Signal Maintenance Engineer shall then arrange repair of the damaged staff.

- d. When the staff/s have been repaired and returned, the Signal Maintenance Engineer shall check the staff/s for correct inscription, number and gauge using a test gauge and forward them to the Signal Maintainer in a locked box.

Prior to replacing the staff/s in the instrument from which they were withdrawn, the staffs shall be tested in all the instruments, draw locks and key releases on the section. At each end of the section they shall also be tested to ensure that they will not enter the staff instrument for the adjoining section.

- e. An entry shall be made in the Train Register Book (if available). The Network Controller is to be advised and form *ESM0801F-02 Keys/Staffs Sent for Repairs or Alterations* is to be completed and forwarded to the Signal Maintenance Engineer.

7 Staff Balancing by Signal Maintainers

On electric train staff sections, due to traffic conditions, staffs may accumulate at one end of the section and must as a result be transferred back to the opposite end. Balancing shall be carried out by the Signal Maintainer following the procedures set out below:

- a. When the number of staffs in the instrument at one end of the section has reduced to six (6) and it is evident that they will not be balanced by train operations, the Network Controller shall notify the Signal Maintainer that balancing is required.
- b. On arrival at the station from which staffs are to be balanced, the Signal Maintainer shall advise the Network Controller of their intentions.
- c. The Signal Maintainer shall ensure that the automatic switchbox is in ordinary working before withdrawing or replacing any staffs.
- d. When opening the staff instrument the position of the cam shall be checked in relation to the number of staffs in the instrument. The position of the cam shall be noted in the 'Staff Balancing Book'.
- e. An even number of staffs shall be removed from the instrument.
- f. The number of staffs to be removed shall be determined by consultation between the signal maintainer and the Network Controller.
- g. As the staffs are removed from the instrument, their individual number and the total number of staffs removed shall be recorded in the 'Staff Balancing Book' by the Signal Maintainer and in the 'Train Register Book' if available, before they are placed in the 'Balancing Box'. The 'Balancing Box' shall then be locked by a STEL lock and shall remain in the possession of the Signal Maintainer until the staffs are replaced in the instrument at the opposite end of the section.
- h. Prior to closing the staff instrument the Signal Maintainer shall check the position of the cam which should be in the same position as before the staffs were withdrawn (as previously recorded in the 'Staff Balancing Book'), verifying that an even number of staffs have been withdrawn.
- i. The Signal Maintainer shall sign the entry in the 'Staff Balancing Book' and the 'Train Register Book' (if available). The automatic switch box shall be turned to automatic working and the staff instruments shall be tested.
- j. On arrival at the other end of the section the Signal Maintainer shall inform the Network Controller of the intention to replace the staffs.
- k. After ensuring that the switch box is in ordinary working, the Signal Maintainer shall open the instrument and check the position of the cam in relation to the number of staffs in the instrument. The position of the cam shall then be noted in the 'Staff Balancing Book'.
- l. The staffs may now be inserted in the instrument. As the staffs are inserted they shall be counted. The total number of staffs transferred and the position of the cam, when all staffs have been inserted, shall be checked against the details shown in the 'Staff Balancing Book'. The automatic switch box shall then be returned to automatic working and the staff instruments shall be tested.

- m. The 'Staff Balancing Book' shall be dated and signed by the Signal Maintainer certifying that the correct number of staffs have been replaced and the entry endorsed 'Unattended Station'.

7.1 Balancing at Intermediate Instruments

When balancing at intermediate staff instruments the following provisions are to be strictly observed.

When balancing at intermediate staff instruments the Signal Maintainer shall advise the Network Controller before the instrument is interfered with. The work shall be carried out when there is neither a train in the section nor a staff out for other working requirements.

The four line wires shall be disconnected by opening the links at the line termination terminals which are situated in the cupboard adjacent to and separate from the staff instrument before staffs are withdrawn. The individual numbers and number of the staffs removed shall be entered in the 'Staff Balancing Book'. After the removal of the staff/s, the four links at the line termination terminals shall be closed and the instruments tested to ensure that they are in correct phase relationship with the whole of the instruments concerned.

7.2 General Requirements

Two Balancing Books shall be kept by the Signal Maintainer one for each alternate month and each book shall be forwarded at the end of the relevant month to the Signal Maintenance Engineer for checking.

The Signal Maintainer, before joining a train for the purpose of balancing, shall inform the Network Controller, the number of the train by which the balancing will be carried out and the sections affected.

When balancing staffs, care shall be taken to ensure that the staff received from an incoming train has been placed in the instrument, or a staff has been withdrawn for an outgoing train, before commencing the balancing operation.

8 Changing of Staff Instruments

When it is necessary to change a staff instrument the provisions of Network Rules and Procedures ANWT 312 and ANPR 704 are to be observed.

If it is necessary to change a staff instrument the following procedures are adopted:

- a. The work must be carried out while no staffs are out of the instruments.
- b. The staffs must remain locked in the old instrument until the new instrument is installed and tested, the staffs may then be transferred with suitable entries made in the balancing book and Train Register Book where provided.
- c. The entry in the Train Register Book must be signed by the Signal Maintainer and show:
 - i. Date and time instrument disconnected.
 - ii. Date and time new instrument connected.
 - iii. Total number and individual numbers of staffs transferred.
- d. When the station is unattended the work will be carried out as traffic permits and in consultation with the Network Controller or Train Transit Manager.

9 Appendix 1 – Forms (examples only)

Engineering (Singalling) Standard - Form
 ESM-08-01 Electric Train Staff Instruments



Form number: ESM0801F-01

MAINTENANCE VISIT RECORD – MINIATURE ELECTRIC STAFF INSTRUMENTS

Reference: Engineering Standard –Signalling – ESM-08-01 Staff Instruments & SMS 15 Maint Schedules: SS 08 11 01 01, SS 08 11 01 02; SS 08 11 01 03

Section:	to	Location:	Number of Instrument:
Line & Local Coil Fail Values as Tested by Signal Engineer		Line Coil/ "A" End:	mA
<small>NOTE: On Intermediate Instrument Line Coil = "A" End Coil & Local Coil = "B" End Coil</small>		Local Coil/ "B" End:	mA
Date of visit		Date Tested:	Date Tested:
Position of CAM			
Number of Staffs in Instruments			
Service Schedule Performed <small>(insert SS01 or SS02 or SS03)</small>			
Line Battery Cells Tested <small>(Insert Number of Cells Replaced)</small> <small>NOTE: Not applicable on Intermediate Instruments</small>			
Local Battery Cells Tested <small>(Insert Number of Cells Replaced)</small> <small>NOTE: Not applicable on Intermediate Instruments</small>			
Isol Rly Battery Cells Tested <small>(Insert Number of Cells Replaced)</small> <small>NOTE: Not applicable on Intermediate Instruments</small>			
Bell Battery Cells Tested <small>(Insert Number of Cells Replaced)</small> <small>NOTE: Not applicable on Intermediate Instruments</small>			
Operating Current Line Out <small>NOTE: Not applicable on Intermediate Instruments</small>			
Operating Current Line In <small>NOTE: Not applicable on Intermediate Instruments</small>			
Operating Current Line Coil <small>NOTE: On Intermediate Instrument "A" End Coil</small>			
Operating Current Local Coil <small>NOTE: On Intermediate Instrument "B" End Coil</small>			
Insulation Test of Staff Instrument <small>(Insert Reading)</small>			
Insulation Test of Staff Lead-In Wires <small>(Insert Reading)</small>			
Audit of Staffs for Section <small>(12 Monthly)</small>			
Remarks: <small>(adjustment made, wear noted etc)</small>			
Signature			
Typical test results for reference only		Local Coil Resistance 65ohms – Fail at 95mA – Min 110mA to Max 125mA : Line Coil Resistance 95ohms – Fail 90mA – Min 110mA to Max 125mA	

Example Only

Engineering (Signalling) Standard - Form
 ESM-08-01 Electric Train Staff Instruments



Form number: ESM0801F-02

KEYS/STAFFS SENT FOR REPAIRS OR ALTERATION

Key/s Staffs No/s:		Section:	
Type:			
The above key/s staff/s have been forwarded to the Signal Maintenance Engineer for repairs.			
	FROM	Signal Maintainer:	
		Signed:	
		Dated:	
TO	Signal Maintenance Engineer		

Please arrange to repair / replace the above mentioned key/s staff/s			
Cost code:			
	FROM	Signal Maintenance Engineer:	
		Signed:	
		Dated:	
TO			

The above key/s staff/s have been repaired / replaced and forwarded to the Signal Maintenance Engineer			
	FROM	Signal Maintenance Engineer:	
		Signed:	
		Dated:	
TO	Signal Maintenance Engineer		

The above key/s staff/s have been inspected and forwarded to the Signal Maintainer			
	FROM	Signal Maintenance Engineer:	
		Signed:	
		Dated:	
TO	Signal Maintainer		

Key/s staff/s No.:		have been replaced on Section:		at		hours
	FROM	Signal Maintainer:				
		Signed:				
		Dated:				
TO	Signal Maintenance Engineer					