



AUSTRALIAN RAIL TRACK CORPORATION LTD

Discipline: Engineering (Signalling)

Category: Procedure

Microtrax Coded Track Circuits

ESM-07-03

Applicability

ARTC Network Wide	✓	CRIA (NSW CRN)	✓
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Primary Source

SMP 37

Document Status

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Contents

1	Introduction	3
2	References.....	3
3	Repair	3
4	Maintenance	3
4.1	Master and Slave Units	3
4.2	Power Down Before Removing or Replacing Cards.....	3
4.3	Track Circuit Shunt Tests and Adjustment	4
4.4	Insulation Testing	4
5	Analysis of Data	4
5.1	Error Codes.....	4
5.2	Margin.....	4
6	System Failure and Initialisation	5
6.1	Initialisation	5
6.2	Failure of CPU Module.....	5
6.3	Failure of EPROM – Microlok Plus Coded Tracks	5
6.4	Failure of Data – Microlok II Coded Tracks.....	5
6.5	Replacement of Modules	6
6.6	Failure Reporting	6
7	Booking Equipment Out of Use - Microtrax	6
7.1	Points.....	6
7.2	Signal to the Loop.....	6
7.3	Signal to the Main and Point Indicators	6
7.4	Microtrax Track.....	6
8	Reinstatement	7
8.1	With Data Replacement	7
8.2	Without Data Replacement.....	7
9	Security of Microtrax Software	7

1 Introduction

This procedure defines the tests to be followed when carrying out routine maintenance, fault finding and attending to failures on Microtrax coded track circuits.

2 References

The Microtrax Coded Track Circuit System Service Manual 6470B is required. In particular Section V Field Maintenance forms the basis for these instructions. Where there is conflict between this document and Manual 6470B, this document will take precedence.

3 Repair

Field repairs are not to be carried out on any Microtrax plug-in module, or track interface module. These items must be returned to the manufacturer, or his agent, for repair.

4 Maintenance

4.1 Master and Slave Units

At prescribed intervals (refer to appropriate TMP) the following tasks are to be conducted at both Master and Slave ends of the Microtrax:

- a) Ensure the card file is securely mounted and all plug-in modules are fully inserted and the front panel hold down screws is tight. Vacant positions are to have cover plates fitted at all times. Ensure these are also tightly secured.
- b) Check all wiring terminations for loose or defective connections and rectify as necessary. Check for any damaged lightning protection equipment.
- c) Using the display, determine and log the margin.
- d) Download the event log and the error log into a laptop computer. This is to be backed up onto the appropriate system server when required. The log files should be examined for any abnormal occurrences. The time and date are to be checked and corrected if necessary. Any action taken should also be noted, together with the name of the signalling maintainer on the track history card. Critical errors are to be recorded and reported to the Signal Manager, Signal Engineer or Team Manager Signals for attention.
- e) Record the Microtrax supply voltage, and the location supply voltage.
- f) During the maintenance visit the Microtrax should be operated on batteries only (ie. turn off battery charger). This is done to ensure sufficient battery charge. Measure the battery terminal voltage to ensure it is not below the battery specifications. Switch the battery charger back on before leaving the site.
- g) Use the track history card for recording maintenance visit details.
- h) Wiring from the Microtrax unit to the Track Interface Panel should not be shorted or open circuited with the Microtrax in operation. The Microtrax must be turned off at both ends before interfering with this wiring. Failure to do this will place the Microtrax in selective shut down mode.

4.2 Power Down Before Removing or Replacing Cards

Do not remove or replace any cards or the Vital Power Failure Relay (VPFR) with the Microtrax unit powered as noted in Section 5.2C of Service Manual 6470B.

4.3 Track Circuit Shunt Tests and Adjustment

Track circuit shunt tests are to be performed in accordance with:

- Track Circuits and train detection devices ESM-07-01
- No relay is provided for the Microtrax although in some installations an equivalent track relay may be added. When shunt testing, go to the Master end and setup the Display Margins on the front panel or maintenance laptop computer using Microlok tool box. A zero percent margin level indicates the track is de-energised. A good shunt is observed when the Master end has a Margin of 0% and indicates that the track is shunted with the AS 0000 indication. The valid message LED will be extinguished and the track LEDS will not be lit when the Master is in Receive mode. The units can take up to 15 seconds to indicate a shunt.
- A Drop Shunt test should be conducted at the Master end with a 0.4 ohm drop shunt at time of initial setup. A fixed shunt test of 0.25 should be conducted at both ends and at any other extremities.
- After consultation with the Signal Manager or Signal Engineer or Team Manager Signalling adjustment to the programmed track circuit length must only be performed by use of a laptop computer. This shall not be adjusted by the front panel switches as this may result in over energising the track circuit. It is important that both ends are set to the same length at all times.
- The master and slave units must be connected so as to be able to communicate with each other. Adjacent Microtrax tracks must have opposite polarity across the block joints. This polarity test is done using the supplied test meter or with a storage oscilloscope.
- Some Microtrax tracks have additional 0.2 - 0.25 ohm series resistors installed in the Track Interface Panels at each end of the track. This resistor is in series with the track connection leads. This resistor is necessary to give a higher drop shunt. Removal of this resistor will affect the track shunt characteristics.
- After re-railing has occurred a test needs to be done to confirm that trains can correctly shunt the track. This confirmation is done by going to the Microtrax slave end and observe the track LEDS. If the track LEDS are permanently extinguished when the train is on the re-railed section of track then a proper shunt is being achieved ie. no messages from the master are reaching the slave due to a proper train shunt. If the track LEDS are flashing then this indicates that the slave unit is receiving some signals from the master end and that a perfect shunt has not been achieved.

Note that it is still possible for the slave end to have the valid message LED lit even though the track LEDS are extinguished because of the good shunt.

4.4 Insulation Testing

Care is to be taken that wiring connected directly to the Microtrax is not insulation tested. However testing must be carried out on wiring which can be isolated from the Microtrax by the removal of fuses, links, or by the de-energisation or removal of relays.

5 Analysis of Data

5.1 Error Codes

Error Codes are provided with explanations in the 6470B Manual Appendix B. Any codes that indicate a possible safety related problem are to be referred immediately to the after consultation with the Signal Manager or Signal Engineer or Team Manager Signalling.

5.2 Margin

A track circuit where the margin is reduced to 110% or less is in danger of failing. Ensure that there is an explanation for any variation such as weather conditions or ballast conditions and bring to the attention of the after consultation with the Signal Manager or Signal Engineer or

Team Manager Signalling any continuing trend in the Margin. Should the margin exceed 260% the after consultation with the Signal Manager or Signal Engineer or Team Manager Signalling must be advised and the track should be shunt tested. Margins are to be recorded on the track history card.

6 System Failure and Initialisation

6.1 Initialisation

When initialising the system, or restoring from a critical failure follow the instruction in Section 5.3 of the 6470B Manual. Never remove or insert modules unless the power to the unit is turned off.

In the event of a power interruption, the system will restore to normal operation after power has been available for about 1 minute.

For Microtrax units operating at crossing loops the following should be noted. Should the points have been in the reverse position when the power failure has occurred, then it is possible that the system did not see a train entering or departing the loop and hence the self-normalising call would not have been made.

In this situation, if the Points Free Light is available, call the points normal by depressing the appropriate push button, and then cancelling any signal clearance that may occur. If The Points Free Light is not lit, press the 'CANCEL' button to restore any signal or point indicator that is set and the points should drive normal automatically after two minutes.

6.2 Failure of CPU Module

Microlok Plus. In the event of a CPU Module failure, the EPROMs must be removed from the defective module and inserted into the new module where EPROM's are not fitted. EPROMS must be installed in the correct position with respect to the notch (ie not backwards). Ensure that EPROMs are not damaged during this process, or interchanged, and that any switches on the new module are adjusted to the same position as the module being replaced.

Microlok II. In the event of a CPU Module failure, the firmware must be uploaded from the laptop computer into the new module using controlled data. Ensure that any switches and dip switches on the new module are adjusted to the same position as the module being replaced.

6.3 Failure of EPROM – Microlok Plus Coded Tracks

Spare EPROMs must be registered and kept in a secured place under strict version control by the nominated Signal Engineer. The nominated Signal Engineer or his delegate is to attend and supervise the installation of replacement EPROM's.

Care must be taken that the correct EPROM is installed.

A report on the EPROM change is to be made to the nominated Signal Engineer or nominated Signalling representative at the same time a replacement EPROM is requested. The defective EPROM from site is to be labelled 'DEFECTIVE' on the underside and on the topside (the version details are to remain visible) and be returned to the nominated Signal Engineer or nominated Signalling representative for cancellation. Under no circumstances are vital EPROM's to be duplicated by maintenance staff.

6.4 Failure of Data – Microlok II Coded Tracks

Backup data must be registered and kept in a secured place under strict version control by the nominated Signal Engineer. The nominated Signal Engineer or his delegate is to attend and supervise the installation of replacement data.

Care must be taken that the correct data is installed.

A report on the data change is to be made to the nominated Signal Engineer or nominated Signalling representative at the same time a replacement data is requested.

See also Microlok II maintenance procedures.

6.5 Replacement of Modules

Do not remove or replace any cards or the VPFR with the Microtrax unit powered.

Should any modules be replaced as being initially considered faulty, and the fault cannot be rectified, the original module should be returned to the unit, prior to further testing.

Suitable anti static procedures must be observed when changing out modules and EPROM's. New and recovered modules and EPROM's shall be stored in appropriate anti static packaging.

Any time a module is removed and replaced, the periodic inspection in Manual 6470B, Section 5.2C is to be carried out, to the limit restricted by the change of that module only. As a general rule, modules should not be removed and replaced unless fault finding.

After any module has been removed or changed, the inputs and outputs to that module should be checked for correct operation by exercising each function and observing the correct operation of the LED's provided on the panel face.

Defective modules are to be tagged with the date, defect, and location and returned for repair in accordance with the procedures required by the manufacturer. This information shall be recorded on a transmittal form that accompanies the equipment sent for attention.

6.6 Failure Reporting

It is important that all failures and problems with the Microtrax are carefully recorded on the history card so that an accurate assessment can be made of the reliability of the system.

Items to be recorded should include:

- fault observed
- error codes reported by Microtrax error log
- faulty cards/items replaced

All items including a reset of the Microtrax should be recorded.

7 Booking Equipment Out of Use - Microtrax

7.1 Points

Refer to procedure SMP 09.

7.2 Signal to the Loop

Refer to procedure SMP 09.

7.3 Signal to the Main and Point Indicators

Refer to procedure SMP 09.

7.4 Microtrax Track

Refer to procedure SMP 09.

8 Reinstatement

8.1 With Data Replacement

When the system is brought back into use after data replacement then a function test shall be performed. The function test shall be performed by the network controller and shall confirm operation of all signals and points for that section.

8.2 Without Data Replacement

When the system is brought back into use after card replacement or power down operation then an operation test shall be performed. The function test shall be performed by the network controller and shall confirm operation of all signals and points for that section.

9 Security of Microtrax Software

The application data and executive software must be securely maintained in accordance with the configuration management procedure and not on any signalling maintainer's computer.

Under no circumstances is any Microtrax diagnostic, application data and executive software to be copied onto third party machines or supplied to unauthorised personnel.