

TECHNICAL INSTRUCTION

TI 160
Issue 1
25 May 2011
Page 1 of 17



NETWORK RAIL - SIGNAL ENGINEERING

Campaign Change – Conversion of Aster U/SF15 TC to Aster21 TC

Relevant Standard: TI 159

Purpose

Network Rail have some 3000 Aster track circuits which have been in service for 20 years or more. The Aster equipment, with the exception of the ACT, is no longer manufactured or supported by the manufacturer (Bombardier Transportation). Unipart Rail service centres are able to support transmitter or receiver repairs but not tuning units.

Due to this unavailability and the high cost of total replacement with *EBI* Track 200 TI21 under a full works testing regime, Network Rail Headquarters and Bombardier have developed a hybrid Aster / *EBI* Track 200 TI21 architecture to replace existing Aster equipment. This provides for an increased spares pool and increased reliability whilst at the same time retaining the existing track circuit boundaries and interlocking interfaces.

This Technical Instruction supports the Process for Campaign Change TI 159 where Aster U or Aster SF15 Track Circuits are replaced with an Aster / *EBI* Track 200 TI21 hybrid known as Aster21. This TI allows the change of the Aster track circuit to Aster21 by using the campaign change Test Plan contained within this TI. This work will replace the Aster Transmitter, Aster Receiver and Aster Tuning Units with *EBI* Track 200 TI21 equivalents. This work is deemed as non conceptual design.

Scope

This TI applies to the campaign change programme for Aster21 that is being managed by the delivery unit organisation and shall not be used for any other changes. The Sites that this and the supporting technical instructions can be applied to have been identified within the campaign change remits / investment papers.

Abbreviations & Definitions

RAM (S&T)	Route Asset Manager (Signal and Telecom)
IME	Infrastructure Maintenance Engineer
S&TME	Signal and Telecoms Maintenance Engineer
AS&TME	Assistant Signal and Telecoms Maintenance Engineer
Aster21	A hybrid track circuit comprising of an Aster U/SF15 with <i>EBI</i> Track 200 TI-21 components
ACT	Air Core Transformer
TI	Technical Instruction

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TECHNICAL INSTRUCTION

TI 160
Issue 1
25 May 2011
Page 2 of 17

Action Required

The document 'Process for the Campaign Change conversion of Aster to Aster21 TCs', TI159, shall be used to establish the ability to deliver the work.

- An initial site assessment shall be made to consider the viability of performing the change using TI 159 and this TI. The current installation and circuitry shall be assessed in conjunction with the *example* diagram (see Appendix A) and allowable configurations (see Appendix B) to establish that the work can be achieved within the auspices of the TI and Test Plan.
- Following the installation and testing in accordance with the Campaign Change Test Plan for the Aster21 a copy of drawings shall be left on site with a second copy of the drawings of the installation sent to the campaign change RAM organisation / Project Manager so that the source records can be amended. A third copy shall be kept as an office copy by the S&TME.
- The campaign change RAM organisation / Project Manager shall be informed of the completion of each installation.
- The RAM organisation / Project Manager shall be responsible for providing funding for the campaign change and verifying that on completion of the work at a site, a copy of the updated drawings are submitted to the Records Update Group for inclusion on the source record .

Compliance Requirements

The requirements of this TI apply to the sites that have been listed within the campaign change remits / investment papers for Aster21. It shall not be used for any other site.

Note - *Once the unit has been changed and brought into use then SMTH shall be used to replace any failed components.*

Staff to be Briefed

- RAM organisation / Project Managers involved in the campaign change (by NR HQ)
- Maintenance Depots (by the RAM S&T)
 - o IME
 - o S&TME
 - o AS&TME
 - o Section Manager (Signals)
 - o Staff selected to carryout the campaign change
 - o Other staff that maybe involved in the delivery of the campaign change work

Training Requirements

All staff involved with the setting up/ testing/commissioning of the Aster21 track circuit shall have attended and completed, as a minimum, the *EBI* Track 200 Digital Receiver Brief.

TECHNICAL INSTRUCTION

TI 160
Issue 1
25 May 2011
Page 3 of 17

Design Requirements

The Campaign Change is valid for the following Aster track circuit architectures as shown in Appendix B. **No other configuration is permitted:**

- Transmitter against Block Joints
- Receiver against Block Joints
- Transmitter against Tuned Zone
- Receiver against Tuned Zone
- Centre fed configurations are allowed as long as the receivers butt up to block joints or a tuned zone.

The designer is required to understand the Aster architectures as described in the Aster Handbook BR134482/2 'Aster Type U Jointless Track Circuits for Non electrified Lines' dated October 1976. (This includes information on the SF15 equipment). Appendix A illustrates an equipment change for a typical Tx/Rx Tuned Zone scenario.

The components required for the Campaign change of a single Aster track circuit are:

Item	Bombardier Part No	PADS Number
<i>EBI</i> Track 200 Transmitter (Frequencies A to D)	See Certificate in Appendix C	See Certificate in Appendix C
<i>EBI</i> Track 200 Receiver (MOD 2 or later) (24V version)	L520002392	086/043750
Installation Kit Comprising: Rx Mounting Plate, Tx Connector Adaptor, Rx Connector Adaptor, Cable Bombs for un-terminated wires, Spade Crimps for Earth wires.	L520038614	086/043751
Set-Up Key	L520002500	086/081324
Frequency Key (Frequencies A to D)	See Certificate in Appendix C	See Certificate in Appendix C

Campaign Change Test Plan

Includes: Replace Aster U/SF15 equipment with *EBI* Track 200 TI21 equipment.

Excludes: All other types of Track Circuits

NOTE: This test plan is for the campaign change in accordance with TI 159 and once the Aster equipment has been changed then the appropriate test plan within the SMTH shall be used to replace failed equipment.

Preparation Before Installation Work

A pre-installation site assessment is required to establish that the proposed replacement can be achieved and that the current installation is of the type that allows the campaign change to be achievable using this test plan and with reference to the example drawings.

Check availability of Location/REB earthing connection.

One version of the Type 1053 surge arrestor base has an integral air gap. This type shall be replaced with the type without an air gap (i.e. it does not have air gap electrodes fitted to the base of the centre clip)

Check the following equipment is available and of the correct type:

TECHNICAL INSTRUCTION

TI 160
Issue 1
25 May 2011
Page 4 of 17

- *EBI* Track 200 Transmitter (with WAGO plug coupler) of the correct frequencies for the site.
- *EBI* Track 200 Receiver MOD 2 or later (24V Relay version)
- Conversion installation kit
- Set up and frequency keys
- Tuning Units of the correct frequencies and track connections compliant with TI147
- Surge arrestors and bases as required.
- Earth cabling as required.

Check whether there is an Earth loop connected to the B24 or N24. (Note this will need removing as part of the work)

There is no requirement to change the 24V power supply, Track Relay or the ACT

Three copies of circuit drawings are required, one will be left on site following the conversion, the second shall be returned for the signalling records to be updated and new Maintenance prints to be issued, the third shall be kept as an office copy in the event of the on site drawings being lost or damaged. The site drawings shall be endorsed with check marks to indicate wiring or contacts have been checked / tested/ hand traced.

Before Installation Work

1. Check replacement Aster21 equipment *not damaged* and is *correct* type.
2. Check existing wiring has *safe insulation*.
3. *WIRE COUNT* and correlate existing Aster equipment and all other affected circuits to the campaign change site specific installation drawing.
4. Where wiring is to be recovered each wire shall be hand traced to establish it is as the diagram indicates e.g. Earth to B24/N24 looping.
5. Check existing wiring is *correctly labelled*
6. Check existing track circuit equipment is isolated from the supply.

Installation Work

When recovering wires these shall be done one at a time so that the correct wire is recovered. Cables and wiring are to be installed in accordance with the site specific drawings that have been created as part of the campaign change.

Specifically:.

- Remove any Earth to B24/N24 looping.
- Run earth wires to each *EBI* Track 200 Transmitter and Receiver
- Replace Surge arrestor bases as required.

After Installation Work

7. Check replacement Aster21 equipment is *correctly installed*
8. Check wiring is replaced as labelled
9. *WIRE COUNT* and correlate replacement Aster21 equipment to the campaign change site specific installation drawing
10. Check any links and red dome nuts are correctly replaced and secure. Re-instate all links, fuses and relays removed for testing
11. Check terminations are secure and suitably protected.

12. Set up TC in accordance with the procedure in the SMS Test 253 and confirm correct operation remembering that the relay drive output to the track relay is a nominal 24v and the tuned zone ratio must be not less than 3:1.
 - Note that if two adjacent Asters are to be converted at the same time, they should both be converted and energised before the SMS is carried out.
 - Note that the Interference Test requires that all track circuits in the vicinity are energised in their final configuration for return to operational service, if more than one Aster is to be converted at the same time, the Interference Test on each should be carried out after they have all been converted and energised.
13. Carry out a full test of abutting track circuits if not being converted to Aster21.
14. *EARTH TEST* circuits if designed to be earth free.
15. *Check*, or arrange for, *correct labelling* of the Aster21 equipment.
16. Repeat test plan for all other Aster21 tracks circuits.
17. Full set of Red/Green drawings are to be left on site. (Arrangements must be in place to replace these once amended 'Final' drawings have been produced.)

Completion of Design

After the installation work has been completed and the Aster21 tracks commissioned, the following must be completed:

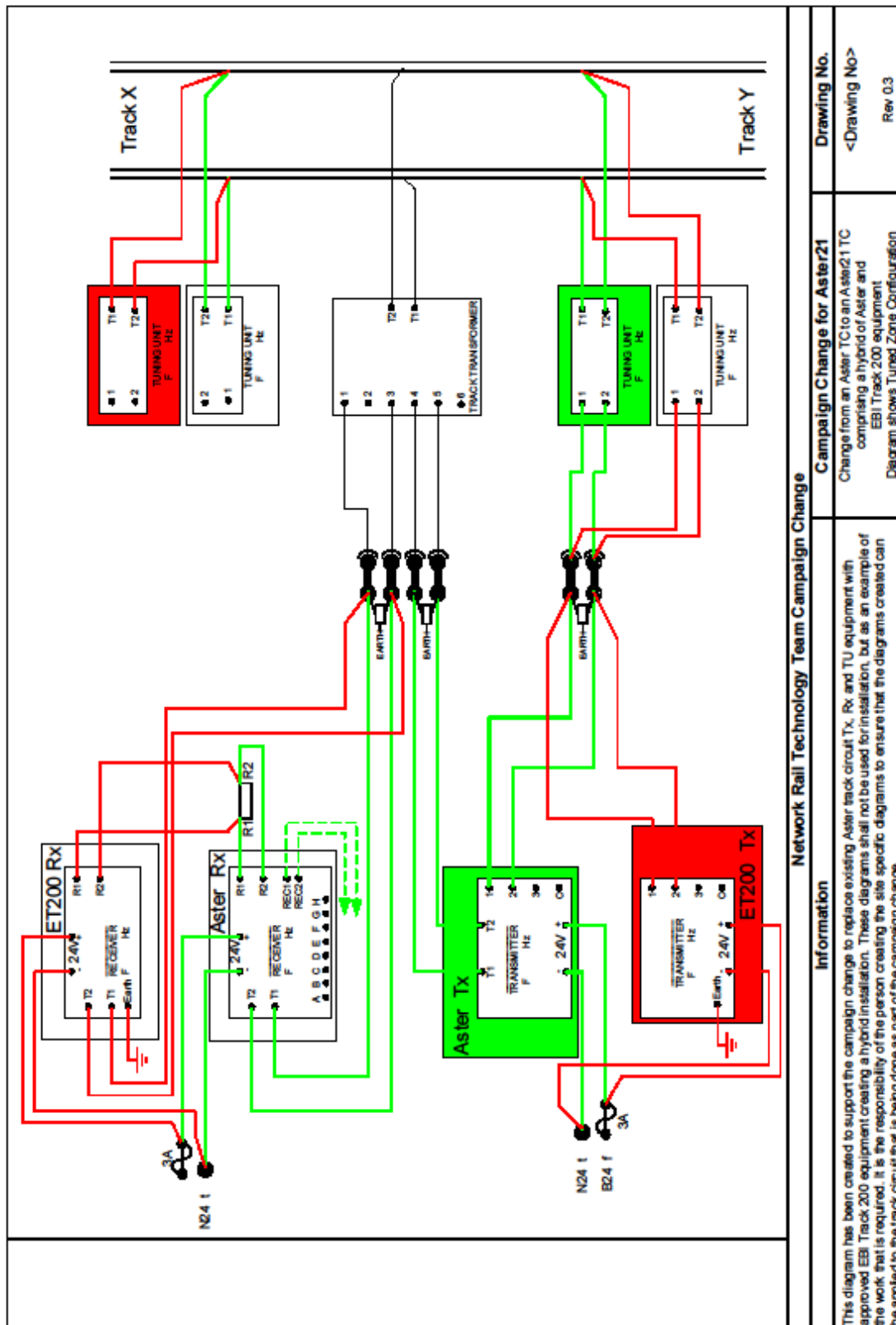
- Final set of wiring drawings to be produced from the red/green copies including any site testing amendments .
- Provide final set of wiring drawings to be placed in equipment cabinets.
- Provide final set of wiring drawings for the S&TME and National Records Group.

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TECHNICAL INSTRUCTION

TI 160
Issue 1
25 May 2011
Page 6 of 17

APPENDIX A



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