Engineering Standard
Signalling and Control Systems

ST S 43021

Set to Work, Test and Certify Track Circuit (SCS21)

Version 1.0

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Standard

Transport Sydney Trains

NSW GOVERNMENT

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Document control

Version	Date	Author/ Prin. Eng.	Summary of change
1.0	29 May 2018	Mark Albrecht	First issue as Sydney Trains document

Summary of changes from previous version

Summary of change New Publication	Section

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1 Set to Work, Test and Certify Track Circuit (SCS21)

This unit covers the application of knowledge required to lead a team in setting to work, certifying safe for normal operation, a newly installed track circuit. The work includes clearing of any previous track circuit equipment and connections, completion of previously installed new connections and track bonding, inspection of new equipment and installation, powering-up, setting of final operating parameters, completion of functional checks and recording of as-commissioned settings and values.

1.1	Elements	1.2	Performance Criteria
SCS21.1	Prepare to undertake track circuit set to work and certification	SCS21.1.1	All necessary configuration documents, manuals and work instructions are obtained.
		SCS21.1.2	All necessary resources, including competent staff, tools and test equipment are obtained
		SCS21.1.3	All necessary planning and reporting arrangements for track access and worksite protection ('work on track') are complied with.
SCS21.2	Complete track circuit changeover and set to work	SCS21.2.1	Any previous track circuit connections and equipment are disconnected and made safe.
		SCS21.2.2	Final installation of new equipment and connections is completed. Standard initial bridging is installed in accordance with track circuit type, frequency and configuration.
		SCS21.2.3	Complete track circuit and equipment are inspected for compliance with design and standards.
		SCS21.2.4	Equipment is powered up. Connect operation of track relay and response to fixed shunt are observed.
		SCS21.2.5	Failure to function in accordance with standards is recognised; causes of failure are identified and corrected.
		SCS21.2.6	Equipment details and set-up test values are recorded
SCS21.3	Adjust critical operating parameters, perform operational tests and record operating values.	SCS21.3.1	Critical operating parameters are measured, assessed for compliance with standards and adjusted as necessary.

		SCS21.3.2	Critical operating values are recorded.
		SCS21.3.3	Standards functional tests are completed, and test value recorded
		SCS21.3.4	Where required, operation of track circuit is corresponded to indicating circuits and panel.
		SCS21.3.5	Measurement and test results are assessed for compliance with standards. Any anomalies are investigated and resolved, or reported for later resolution.
SCS21.4	Finalise certification of track circuit	SCS21.4.1	Track circuit is left in safe working condition – links in place, temporary bridges etc removed.
		SCS21.4.2	Outstanding or unresolved issues are documented and reported for further action in accordance with requirements.
		SCS21.4.3	Certification documents (master sheets, history cards, work instructions) are completed, signed and submitted.

1.3 Range of Variables

Track circuits include:

- AC, Audio frequency (jointless and jointed form), High voltage impulse
- Single-rail and double-rail traction configuration
- End-fed and centre-fed configuration
- Traction return arrangements and bonding
- Track stick and cut-track arrangements

Track circuit components include:

- Power supplies
- Transmitters, receivers, amplifiers, relays
- Trackside-matching & turning units, data pickup units (DPU, 'pin-point detector')
- Insulated rail joints
- Overhead wiring earthing switches and spark gaps, electrolysis bonds
- Impedance bonds
- Tail cables, Track cables and traction bonds, crimped and welded connections

Relevant ASA standards and Sydney Trains instructions include:

- RailCorp *Track Circuits Setup and Adjustment Procedures* (TMG 1352 to TMG 1357)
- Sydney Trains and OEM equipment manuals
- SPG711.3 *Inspection and Testing Principles*
- Sydney Trains *Signalling Safeworking Procedures* (MN S 40000)
- RailSafe Network Rules and procedures – 'Work on Track' (NWT) requirements

Standard configuration documents and records include:

- Track plan / signalling plan, Track insulating / bonding plan, circuit book
- Track Circuit Commissioning Master Card (Set to Work, Commission) Track Circuit History Card
- Commissioning Work Instruction

1.4 Knowledge Requirements

The following underpinning knowledge elements are requirements for the achieving of this competency.

For each type of track circuit for which accreditation is sought, the candidate will

- Understand the critical nature of track circuits and their correct operation
- Understand the role of track circuits and bonding in traction current return areas
- Be able to read track plan and track insulation plan and interpret their details on the ground
- Know how the track circuit operates
- Know the normal range of operating levels for various track lengths and configurations
- Know how to set up and adjust the track circuit for correct operation
- Recognise when the track circuit is not operating correctly
- Recognise basic types of failure, and suggest the probable cause

1.5 Competency Requirements

The following knowledge, competency and qualification requirements shall be achieved as a pre- requisite to the awarding of this competency.

Pre-Requisite Entry requirements

- Rail Industry Safety Induction card (RISI)
- Minimum of Signal Electrician Work Group Leader or (or supervisor equivalent) or
- Relevant Tertiary Qualification

Training requirements

- TfNSW Training EI15 Introduction to Track Circuits
- TfNSW Training EJ04 Track Circuit Fundamentals
- TfNSW Training EJ20 Track Circuit Operation and Principles

- TfNSW Training EI40 Sydney Trains Signalling Safeworking Procedures (applicable parts - signalling standards and associated instructions / regulations for working on or interfering with signalling circuits and other equipment)
- TfNSW Training ST46 Signal Circuit Inspection and Testing / SPG 711.3 Inspection and Testing Principles
- The following cores are compulsory with the appropriate course for the type of track circuit to be assessed:
  - EI96 Track Circuits Log Book
  - EJ08 Track Circuit Log Book Coaching

  And the appropriate course for the type of track circuit to be assessed:
  - EI97 Track Circuits AC
  - EJ01 Track Circuits FS2500
  - EJ02 Track Circuits FS2600
  - EI98 Track Circuits HVI
  - EJ03 Track Circuits TI21
  - EI99 Track Circuits UM71

Competency Requirements

- Be assessed as competent in Competency Standard *ST S 43021 Set to Work and Certify Track Circuit (SCS21)* using Competency Assessment Tool *MN S 43021 Setting to Work and Certify Track Circuit (SCT21)*, and
- UEENEEN109A *Install and Maintain Train Detection Equipment*;

1.6 Evidence Guide

This provides essential advice for the assessment of the unit and must be read in conjunction with the performance criteria and range statement.

Each element and associated performance criteria must be demonstrated on at least two occasions in accordance with the “Assessment Guidelines UEE11”.

Before the critical aspects of evidence are considered, all pre-requisites must be met

Candidates demonstrate their knowledge and understanding of track circuit fundamentals and operation by:

- Documentary evidence of appropriate training and qualifications held
- Evidence of completed training courses
- Log book showing relevant on-track experience
- Responses to questioning by the competence assessor

Candidates demonstrate their competency to perform the required setup, adjustment and testing activities by:

- Performing the setup, adjustment and testing activities under actual track conditions, on working track or an off-track training facility.

Critical aspects of evidence required to demonstrate competency in this unit:
Demonstrated consistent performance across a representative range of contexts from the prescribed items below:

Lead the setting to work and certification of a track circuit including the following:

- Site access obtained correctly
- Signalling and general Safeworking procedures accurately applied
- Interpreting plans and specifications correctly
- Selecting and using tools and test equipment safely
- Planning the efficient performance of track circuit certification activities
- Directing and communicating effectively with team members
- Performing all checks, tests and measurements correctly
- Checking that technical and operational specifications are complied with
- Completing relevant records and documentation
- Dealing with unplanned events by drawing on essential knowledge and skills to provide appropriate solutions incorporated in the holistic assessment with the above listed items

1.7 Assessment Context

This unit should be assessed as it relates to normal workplace practice using procedures, information and resources typical of a workplace. This should include a suitable work environment, facilities, equipment and materials to undertake actual work as prescribed in this unit.

Where simulation is considered a suitable strategy for assessment, conditions must be authentic and, as far as possible, replicate the workplace.