











Safe Work Instruction	Issue date: 11/05/10
Train Radio Isolation	Review date: 10/03/13

Document no. SMS-06-SW-0891	Work description This SWI describes safe work practices related to the isolation of train radios.		
	Scope <p>This SWI describes the procedure for isolating Train Radios by RSD and Communication and Control personnel. This is to protect personnel from radiation exposure when working around or on train antennas or transponders, by preventing any emissions from them.</p> <p>This SWI does not apply to any work following the isolation procedure. Refer to relevant SWIs for any tasks to be undertaken whilst the train radio is isolated</p> <p>This document does not replace technical “how to” documents such as Engineering, Operational and Manufacturers’ instructions etc. Refer to Engineering Instructions that specifically relate to Train Radio Maintenance.</p>		
Review date 10/03/13	References <ul style="list-style-type: none"> • OHS Act 2000 • OHS Regulations 2001 • Rail Safety Act 2008 • AS 2772.2—1988 Radiofrequency Radiation, Part 2: Principles and Methods of Measurement—300 kHz to 100 GHz • AS 1188-1990 Radio Transmitters and Similar Equipment - Safe Practices • ARPANSA RPS 3 Radiation Protection Standard - Maximum Exposure Levels to Radiofrequency Fields - 3kHz to 300GHz, May 2002 • SMS-06-PR-0173 Plant and Equipment Lock-out Tag-out • SMS-06-SW-0812 Working in the Pit • SMS-06-SW-1284 – Train Body System (01): Safe Working • SMS-06-GD-1306 Radio Frequency Electromagnetic Energy at Fixed Sites • SMS-12-OI-0886 Red Flagging Trains in stabling yards, depots and Maintenance Centres • SMS-06-PR-0104 Workplace Risk Management. • SMS-12-OI-1361 Safe work arrangements for the fuel arrival roads at XPT Maintenance Centre, Sydenham 		
Responsible supervisor	PPE and precautions	Competencies or qualifications	Licences or permits required
Line Manager	As required for work being carried out following isolation	<ul style="list-style-type: none"> • Site specific induction • Rail Industry Safety Induction (RISI) • Electrical Safety Awareness 	
Tools and equipment required			
<ul style="list-style-type: none"> • Red flag • Personnel lock • Multi-lock Device • Lock Dog • “Do Not Operate” tag 			
IF CONTROL MEASURES ARE NOT SUITABLE AND MAJOR CHANGES ARE NEEDED, CONDUCT A RISK ASSESSMENT AND DEVELOP NEW CONTROLS ACCORDING TO SMS-06-PR-0104 Workplace Risk Management.			

Train Radio Isolation

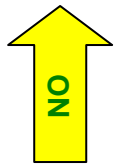
	<p>Note</p> <p>Pre work brief and task risk assessment. Ensure a pre-work brief and task risk assessment is undertaken with all team members involved in the work activity. If any new/additional team members arrive any time later they must be briefed before they commence work.</p>
	<p>Warning</p> <ul style="list-style-type: none"> Train radio antennas generate a radiation field that can be hazardous to personal health. Whenever personnel work in the vicinity of train antennas personnel must isolate. Refer to example on page 4 of 5 steps 1 to 6. Regarding radiation refer to the following: <ol style="list-style-type: none"> Australian Radiation Protection and Nuclear Safety Agency (ARPANSA) RPS 3 Radiation Protection Standard - Maximum Exposure Levels to Radiofrequency Fields - 3kHz to 300GHz, May 2002. AS 1188-1990 Radio Transmitters and Similar Equipment - Safe Practices. AS 2772.2—1988 Radiofrequency radiation, Part 2: Principles and methods of measurement-300 kHz to 100 GHz.
	<p>Note</p> <ul style="list-style-type: none"> For lock-out tag-out procedure refer to; <u>SMS-06-PR-0173 Plant and Equipment Lock-out Tag-out.</u> There are 2 types of Train Radio antennas: <ol style="list-style-type: none"> Interrogator Antenna fitted under a car with Train Radio (used to interrogate transponders on the track which enable the radio on the train to determine what radio frequency to use and which signal box controls the area). UHF Radio antenna fitted on the roof of a car with Train Radio (used for voice and control data communication).
	<p>Note</p> <p>Train Radio System Power Up & Interrogator Antenna Activation.</p> <ul style="list-style-type: none"> If the reverser handle of that car's master controller is <u>NOT in the</u> "ISOLATION" position then the Train Radio and interrogator antenna remain active. If the reverser handle of that car's master controller is in the "ISOLATION" position the Train Radio and interrogator antenna is now inactive as the car's Train Radio has been turned off. For a car fitted with Train Radio, placing the reverser handle of that car's master controller out of "ISOLATION" will <u>power up</u> the Train Radio and activate the interrogator antenna on that car as long as the Train Radio miniature circuit breaker is set (switched on). This is irrespective of whether the pantograph(s) is raised or lowered.
	<p>Warning</p> <ul style="list-style-type: none"> Working in the pit can expose personnel to train radio radiation if the radio has not been isolated. For more information refer to <u>SMS-06-SW-0812 – Working in the Pit</u> and <u>SMS-06-GD-1306 Radio Frequency Electromagnetic Energy at Fixed Sites.</u> Working on the roof on some trains can expose personnel to train radio radiation. Whenever personnel work on the roof always work in accordance with <u>SMS-06-SW-1284 – Train Body System (01): Safe Working and</u> <u>SMS-06-GD-1306 Radio Frequency Electromagnetic Energy at Fixed Sites</u> for further information (refer to the standards above at items 2 and 3). Always verify that isolation has been achieved before proceeding with work near train radio antennas or transponders, refer to: <u>SMS-06-PR-0173 Plant and Equipment Lock-out Tag-out.</u> Never remove isolation before checking that all other personnel are safe from exposure to train radio radiation.

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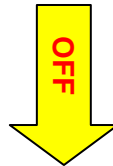
	<p>Warning When working on a train roof or pit, care MUST be taken to ensure minimum distances are maintained whilst the Train Radio antenna is operational, (refer to the appropriate Engineering Instructions).</p> <p>Interrogator Antenna</p> <ul style="list-style-type: none"> For an interrogator antenna you must maintain a distance of 35 cm immediately below the plastic antenna housing, and 20 cm to both the left and right of the antenna housing. If you are working at a distance of 10 cm from or below the antenna your maximum exposure limit is 15 seconds per minute with 45 seconds per minute spent away from the antenna. Ensure continuous exposure immediately beneath the antenna does not exceed 5 minutes after which a recovery time of at least 40 minutes must be spent away from the antenna. Avoid working beneath a train whilst the train radio is on and the interrogator antenna is active. If it is necessary to work beneath a train whilst the train radio and interrogator antenna is active maintain the safe distances as stated above. <p>UHF Antenna</p> <ul style="list-style-type: none"> For UHF antennas you must maintain a spherical distance of 30 cm from a transmitting antenna. For Tangaras the placing of the master controller out of "ISOLATION" on any driving car of the train will power up all Train Radios and activate their interrogator antennas on that Tangara train while the Train Radio miniature circuit breakers are switched on. For further information refer to the appropriate Engineering Instructions. Any work on the roof antenna or the connections leading to the antenna, requires the 1500V supply to be isolated and safety procedures for working on the roof of the train followed.
<p>Place Red Flag</p>	<p>To notify persons that work is being carried out on the train. You must place a Red Flag in accordance with <u>SMS-12-OI-0886 Red Flagging Trains in stabling yards, depots and Maintenance Centres</u>. In addition, for XPT maintenance centre refer to : <u>SMS-12-OI-1361 Safe work arrangements for the fuel arrival roads at XPT Maintenance Centre, Sydenham</u>.</p>
	<p>Important Warning SPECIFIC TO TANGARA TRAINS</p> <p>PLACING THE MASTER CONTROLLER OUT OF ISOLATION ON ANY DRIVING CAR OF THE TRAIN WILL POWER UP ALL TRAIN RADIOS IN THE SET AND ACTIVATE THEIR INTERROGATOR ANTENNAS AS LONG AS THE TRAIN RADIO CIRCUIT BREAKERS ARE SWITCHED ON.</p> <p>THEREFORE FOR THE TANGARA BOTH THE TRAIN RADIO CIRCUIT BREAKER SWITCHES MUST BE TURNED OFF AND LOCKED AND TAGGED OUT SEPARATELY <u>ON ALL DRIVING CARS OF THE SET</u>.</p>
	<p>Warning</p> <p>This isolation process may differ from train type to train type therefore assess the risk before undertaking this task and verify the isolation process with a suitably qualified person and consult with your Line Manager.</p>
	<p>Note</p> <p>As a general requirement isolate train radio before conducting any working on or around train.</p> <p>Three mandatory steps for train isolation before any work is undertaken:</p> <p>Step 1. Isolate and tag out master controller.</p> <p>Step 2. Switch off all Train radio circuit breakers and tag out.</p> <p>Step 3. Visually check that the UHF digital display unit (DDU) is blank and that no lights are showing on the interrogator unit and the DC/DC converter if fitted.</p> <p>IF DISPLAY OR LIGHTS ARE VISIBLE ISOLATION HAS NOT BEEN ACHIEVED, <u>DO NOT COMMENCE WORK</u>.</p>
	<p>Note</p>

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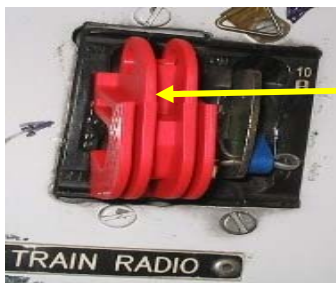
Below is an example of a lock-out tag-out process using a S-Set Train

**Step 1**

Identify the circuit breaker required to isolate the radio.
Check the Train Radio display is on.

**Step 2**

Turn circuit breaker to the off position.
Check the Train Radio display is now off.

Step 3

Lock Dog

Step 4

Multi-lock

Fit the 'lock dog' to the circuit breaker to secure the circuit breaker in the '**OFF**' position.

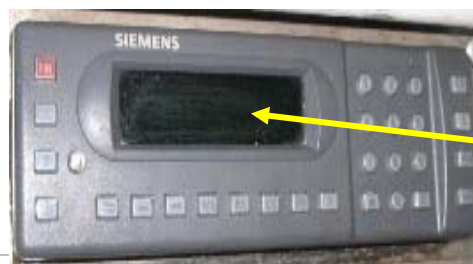
Fit a multi-lock device through lock dog.

Step 5

Personal Lock

Do not operate tag

Attach personnel lock to the multi-lock device.
Attach a 'Do Not Operate' tag to personnel lock.

Step 6

If successfully isolated display will be blank

Verification:


Check that isolation has been achieved by ensuring no display is visible on S, R & L Sets Train Radio. Check Interrogator Reader Unit to ensure all LEDs are not visible and check the DC-DC converter power supply front panel voltage indicator is off."

On Tangara and G Set Trains check Radio Supply Indicator Light is out to verify radio is isolated. Also check Interrogator Reader Unit to ensure all LEDs are not visible and check the DC-DC converter power supply front panel voltage indicator is off."

If display is still visible, isolation HAS NOT been achieved. Therefore do not proceed with work.

Warning

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	<i>Only remove your own isolation and Red Flag. The removal of another person's lock and / or tag or red flag may result in their injury or death. Offenders will be subject to strict disciplinary action and may be subject to prosecution by the regulator.</i>
Remove Red Flag	Remove your Red Flag, in accordance with <u>SMS-12-OI-0886 Red Flagging Trains in Stabling Yards, Depots and Maintenance Centres</u> . In addition for XPT maintenance centre Refer to : <u>SMS-12-OI-1361 Safe work arrangements for the fuel arrival roads at XPT Maintenance Centre, Sydenham</u> .
Additional controls	
<i>Additional controls may be necessary dependent upon the work that is being carried out. Refer to the relevant SWIs.</i>	