

A Division of Transnet Limited
Registration Number 1990/000900/06

**SPECIFICATION FOR UHF HANDHELD AND
DESKTOP RADIOS FOR SHUNT YARDS**

**SPC-01284
NOVEMBER 2006**

Revision 1.00

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I DOCUMENT AUTHORISATION

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II DISTRIBUTION

Once updated, a copy of the latest revision will be published in the document management system in use. E-mail to this effect will be sent to the relevant personnel or heads of department.

III DOCUMENT CHANGE HISTORY

ISSUE NO.	DATE ISSUED	ISSUED BY	HISTORY DESCRIPTION
1.00	November 2006	Solution Design	New document

IV CHANGES SINCE LAST REVISION

CLAUSES	DESCRIPTION
None	

V ABBREVIATIONS, ACRONYMS AND DEFINITIONS

ABBREVIATIONS AND ACRONYMS	DESCRIPTION
EIA	Electronic Industries Alliance
ICASA	Independent communication Authority of South Africa
kHz	Kilo-hertz
MHz	Megahertz
PABX	Private Automatic Branch Exchange
PSTN	Public Switched Telephone Network
PTT	Push to talk
RF	Radio Frequency
Rx	Receive
TCO	Train controlling officer
Tx	Transmit
UHF	Ultra High Frequency

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DEFINITIONS	DESCRIPTION
Train radio	Radio installed in the locomotive cab
Base station	A radio installed on a desktop most likely at the CTC office
Open Channel	Conventional radio
Trunked mode	MPT 1327 trunking mode
Shunt mode	Conventional radio used in simplex/shunt yards

VI RELEVANT DOCUMENTATION

APPLICABLE

Must be ICASA approved.

Where there is a conflict between the above specifications and this SCHEDULE OF REQUIREMENT DOCUMENT, the SCHEDULE OF REQUIREMENT DOCUMENT takes precedence.

The equipment must comply with the latest issue of the following specifications:

APPLICABLE

DOCUMENT NO.	DESCRIPTION	LOCATION
ISO 9000	Quality Management Systems	External
ETS 300 086	European Telecommunication Standards for Radios	External

British Department of Trade and Industry Specification:

MPT 1317	Code of Practice for Transmission of Digital Information over Land Mobile Radio Systems	External
MPT 1327	A signalling Standard for Trunked Private Mobile Radio Systems	External
MPT 1343	System Interface Specification for Radio Units to be used with Commercial Trunked Networks	External

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1. INTRODUCTION

Freight Rail is currently engaged in a project replacing UHF radio equipment in Freight Rail's shunt yards countrywide. This enquiry covers replacement of radio equipment in shunt yards countrywide.

2. SCOPE

2.1 This specification is for the supply of both conventional and trunked hand held and base station radio equipment and accessories as per attached Schedule of Requirements (Appendix A).

2.2 It is envisaged that equipment for this enquiry will be ordered and supplied to Freight Rail's nominated address(es) over the period July 2008 to February 2009.

3. COMPLIANCE

3.1 Tenderers shall submit their main offers in terms of this specification, and shall indicate in their proposal document the compliance to this specification.

3.2 Alternative offers, will be considered at Freight Rail's discretion, provided that such offers provide equivalent functionality to that specified in this document.

4. TENDER REQUIREMENTS

4.1 Tenders shall submit a clause-by-clause statement of compliance for this **Specification**. Failure to comply will exclude Tenderers from consideration.

4.2 Tenderers shall submit a clause-by-clause statement of compliance for equipment items offered on the attached **Schedule of Requirements (Appendix A)** in the columns provided. Failure to comply will exclude Tenderers from consideration.

4.3 Tenderers shall complete the attached **Cost Schedule (Appendix B)** for equipment. Tenderers will be excluded from supplying any items not priced.

4.4 Freight Rail will carry out all programming and installation of the supplied equipment.

4.5 Pricing shall be supplied for the upgrading of Software when future versions of Software become available.

4.6 Tenderers shall submit pricing for training courses on all the radio equipment models offered on training cost template (Appendix C).

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5. SERVICE CONDITIONS

5.1 The equipment offered must be suitable for continuous operation under the following conditions :

Ambient temperature : -10° to 60° Celsius.

Relative humidity : As high as 95 %.

5.2 Component parts, including wiring, must be manufactured and processed to ensure reliable operation under these conditions.

5.3 The equipment must be suitable for operation under the stated conditions without the use of blower fans, heaters or air-conditioners etc.

6. GENERAL REQUIREMENTS

6.1 The radios must be ICASA type approved as well as Freight Rail type approved. Costs of type approval must be obtained from ICASA and the Freight Rail Testing laboratory [(011) 774-8227].

6.2 The radios supplied must be programmed for open channel working as well as trunked working within the 132 channels allocated to Freight Rail (from 465,0 MHz). The radio must be able to select any of the channels for simplex/shunt mode operation, at low power. It must be possible for Transnet Freight Rail radio maintenance personnel to reprogram the radios if required to do so at a later stage.

6.2.1 The radio RF output power must be adjustable up to 20 watts, software selectable for the desktop radio.

6.2.2 The handheld radio must be able to be programmed to 4-watt power output on simplex/shunt mode.

6.3 Signal strength must be indicated on the display.

6.4 The Tx and Rx must be reversible, selectable per user defined plan

6.5 User programmable simplex/shunt selection must be available (from all 132 channels).

6.6 Software version must be available for display.

6.7 The software to program the radio must be Microsoft Windows compatible.

6.8 The selection between trunked, conventional and simplex/shunt modes must be simple and selectable.

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6.9 Frequencies

- 6.9.1 Except when in simplex mode, the radio must operate in half-duplex (two frequency simplex) mode, with a duplex frequency spacing of 10 MHz, as follows :
- 6.9.1.1 The transmit frequency must be in the range 450 — 470 MHz .
 - 6.9.1.2 The receive frequency must be in the range 450 — 470 MHz .
 - 6.9.1.3 Channel spacing must be 12,5 kHz . Channel 1 must be defined as 465,0 MHz transmit and 455,0 MHz receive. The radio must be capable of operating on all channels in the specified range.
 - 6.9.1.4 The radio must be able to operate in a simplex and or shunt mode.
 - 6.9.1.5 The functioning of the radio must be such that the Rx and Tx frequency can be programmed in either modes, Tx high Rx low, or Rx high Tx low. [Which will be dependent on spectrum allocation usage by the regulator.]

7. TRUNKED RADIO OPERATION

- 7.1 The radio must operate as a trunked radio in accordance with recommendations MPT 1327 and MPT 1343. It must comply with all of the mandatory requirements for radio units, as described in these recommendations. Tenderers must indicate which standard options and optional facilities are offered.
- 7.2 Trunked control channel must be displayed.
- 7.3 The radio must be able to send and receive short data messages in trunked mode via the control channel.
- Transmitting the standard MPT 1327 short message string.
- 7.4 The handset/display must display in short or long message mode indications that the radio is busy with transmitting or receiving data.
- 7.5 The radio must be capable of initiating and receiving the following MPT 1327 call types :
- 7.5.1 Individual and group voice calls.
 - 7.5.2 Individual and group non-prescribed data calls.
 - 7.5.3 Individual and group short data messages (SDMs).

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- 7.5.4 Individual status messages.
- 7.5.5 Calls to and from PABX and PSTN.
- 7.5.6 Inter-prefix calls.
- 7.6 **UHF Full feature MPT 1327 Trunked Portable radio**
 - 7.6.1 The radio must be able to operate on 132 channels in the Trunked mode.
 - 7.6.2 The radio must be able to operate on a minimum of 32 channels in the conventional mode.
 - 7.6.3 The radio must operate in the 450 to 470 MHz frequency band.
 - 7.6.4 Channel spacing must be 12,5 kHz .
 - 7.6.5 Battery must High capacity 1400 mAh or more.
- 7.7 **UHF Full feature MPT 1327 Trunked Desktop radio**
 - 7.7.1 The radio must be able to operate on 132 channels in the Trunked mode.
 - 7.7.2 The radio must be able to operate on a minimum of 32 channels in the conventional mode.
 - 7.7.3 The radio must operate in the 450 to 470 MHz frequency band.
 - 7.7.4 12,5 kHz channel spacing.
 - 7.7.5 The radio must have a 7-hour battery backup.
- 8. **OPEN CHANNEL OPERATION**
 - 8.1 **UHF Conventional Portable**
 - 8.1.1 The radio must be able to operate on a minimum of 32 channels.
 - 8.1.2 The radio must operate in the 450 to 470 MHz frequency band.
 - 8.1.3 Channel spacing must be 12,5 kHz .
 - 8.1.4 Battery must High capacity 1400 mAh or more.

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8.2 UHF Conventional Desk Top radio

- 8.2.1 The radio must be able to operate on a minimum of 32 channels.
- 8.2.2 The radio must operate in the 450 to 470 MHz frequency band.
- 8.2.3 12,5 kHz channel spacing.
- 8.2.4 The radio must have a 7,5-hour battery backup.

9. QUALITY OF MATERIAL

- 9.1 All material used must be of the best quality and of the class most suitable for the purpose for which it is required. Unless otherwise specified or approved, all materials must be to the most recent published standards applicable in the country of origin. Tenderers must quote the authorised standards to which the materials or the equipment offered conform. The workmanship must be of the highest standard.
- 9.2 Where racksides are not fully equipped, blanking-off panels must be fitted to all vacant positions.

10. TECHNICAL HANDBOOKS

- 10.1 Technical handbooks must be clearly printed in English. Photostat copies will not be acceptable.
- 10.2 Programming software and service manuals to be supplied on a CD-ROM and hard copy.

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APPENDIX A : SCHEDULE OF REQUIREMENTS**SCHEDULE OF REQUIREMENTS FOR TRUNKED AND CONVENTIONAL UHF RADIOS AND ACCESSORIES**

- A1. TENDERS are invited in respect of the following Schedule of Requirements. Tenderers to indicate which items they comply with. Prices to be inserted in the COST SCHEDULE annexure :

ITEM	DESCRIPTION	COMPLY YES/ NO / NA
1	UHF Conventional Portable . The radio must be able to operate on a minimum of 32 channels. The radio must operate in the 450 to 470 MHz frequency band 12,5 kHz channel spacing	
2	High capacity battery (1400 mAh +) for item 1	
3a	Six Bay rapid rate Charger for item 1	
3b	Single bay rapid rate Charger for item 1	
3c	Four bay rapid rate Charger for item 1	
4	Leather carry bag and shoulder strap for item 1	
5a	Shunter type chest harness for item 1	
5b	Weather proof body glove for item 1	
6a	Programming software for item 1	
6b	Programming Hardware: leads and adaptors for item 1	
7a	Set of workshop manuals/ technical handbooks for the radio and charger for item 1	
7b	Set of manuals and software on CD for item	
8	UHF Full feature MPT 1327 Trunked Portable radio . The radio must be able to operate on a minimum of 32 channels in the conventional mode. The radio must operate in the 450 to 470 MHz frequency band 12,5 kHz channel spacing.	
9	High capacity Battery (1400 mAh +) for item 8	
10a	Single bay rapid rate Charger for item 8	
10b	Six Bay rapid rate Charger for item 8	
10c	Four Bay rapid rate Charger for item 8	
11a	Leather carry bag for item 8 with shoulder strap	
11b	Belt clip for item 8	
12a	Programming software for item 8	
12b	Programming Hardware: Leads and adaptors for item 8	

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ITEM	DESCRIPTION	COMPLY YES/ NO / NA
12c	Weather proof body glove for item 8	
13a	Set of workshop manual/ technical handbook for item 8	
13b	Set of manuals and software on CD for item 8	
14a	UHF Full feature MPT 1327 Trunked Desktop radio. The radio must be able to operate on a minimum of 32 channels in the conventional mode. The radio must operate in the 450 to 470 MHz frequency band, 12,5 kHz channel spacing. 7Ah battery backup	
14b	Single ear headset with boom microphone for item 14a	
14c	Foot PTT switch for item 14a	
14d	Desktop microphone for item 14a	
14e	Fist microphone for 14a	
15	Transmit and receive audio output for voice logger adjustable between 0 and -10 dBm	
16a	Programming software for item 14a	
16b	Programming Hardware: leads and adaptors for item 14a	
17a	Set of workshop manuals/ technical handbooks for item 14a	
17b	Set of manuals and software on CD for item 14a	
18a	UHF Conventional Desk Top radio. The radio must be able to operate on a minimum of 32 channels. The radio must operate in the 450 to 470 MHz frequency band. 12,5 kHz channel spacing. 7,5 Ah battery backup	
18b	Single ear headset with boom microphone for item 18a	
18c	Foot PTT switch for item 18a	
18d	Desktop microphone for item 18a	
18e	Fist microphone for 18a	
19	Transmit and receive audio output for voice logger adjustable between 0 and -10 dBm	
20a	Programming software for item 18a	
20b	Programming Hardware: leads and adaptors for item 18a	
21a	Set of workshop manuals/ technical handbooks for item 18a	
21b	Set of manuals and software on CD for item 18a	
22	Remote speaker/microphone unit for item 18a	
23	Remote speaker/microphone for item 18a	

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APPENDIX B : COST SCHEDULE**COST SCHEDULE FOR TRUNKED AND CONVENTIONAL UHF RADIOS AND ACCESSORIES**

To be read in conjunction with Schedule of Requirements.

Indicate the cost per unit for orders of the quantities indicated in the respective columns

ITEM	DESCRIPTION	MODEL/PART NO.	UNIT COST (1-10 Units)	UNIT COST 10-100 Units)	UNIT COST (More than 100-500 Units)	UNIT COST (More than 500 Units)
1	UHF Conventional Portable radio including antenna. The radio must be able to operate on a minimum of 32 channels. The radio must operate in the 450 to 470 MHz frequency band 12,5 kHz channel spacing. The radio must be priced excluding a battery.					
2	High capacity (1400 mAh +) for item 1					
3a	Six Bay rapid rate Charger for item 1					
3b	Single bay rapid rate Charger for item 1					
3c	Four bay rapid rate Charger for item 1					
4	Leather carry bag and shoulder strap for item 1					
5a	Shunter type chest harness for item 1					
5b	Weather proof body glove for item 1					
6a	Programming software for item 1					
6b	Programming Hardware: leads and adaptors for item 1					
7a	Set of workshop manuals, technical handbooks for the radio and charger for item 1					
7b	Set of manuals and software on CD for item					
8	UHF Full feature MPT 1327 Trunked Portable radio including antenna. The radio must be able to operate on a minimum of 32 channels in the conventional mode. The radio must operate in the 450 to 470 MHz frequency band 12,5 kHz channel spacing					
9	High capacity Battery (1400 mAh +) for item 8					
10a	Single bay rapid rate Charger for item 8					
10b	Six Bay rapid rate Charger for item 8					

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ITEM	DESCRIPTION	MODEL/PART NO.	UNIT COST (1-10 Units)	UNIT COST 10-100 Units)	UNIT COST (More than 100-500 Units)	UNIT COST (More than 500 Units)
10c	Four Bay rapid rate Charger for item 8					
11a	Leather carry bag for item 8 with shoulder strap					
11b	Belt clip for item 8					
12a	Programming software for item 8					
12b	Programming Hardware: leads and adaptors for item 8					
12c	Weather proof body glove for item 8					
13a	Set of workshop manual/ technical handbook for item 8					
13b	Set of manuals and software on CD for item 8.					
14a	UHF Full feature MPT 1327 Trunk Desktop radio. The radio must be able to operate on a minimum of 16 channels in the conventional mode. The radio must operate in the 450 to 470 MHz frequency band, 12,5 kHz channel spacing. 7 AH battery backup					
14b	Single ear headset with boom microphone for item 14a					
14c	Foot PTT switch for item 14a					
14d	Desktop microphone for item 14a					
14e	Fist microphone 14a					
15	Transmit and receive audio output for voice logger adjustable between 0 and -10 dBm					
16a	Programming software for item 14a					
16b	Programming Hardware: leads and adaptors for item 14a					
17a	Set of workshop manuals/ technical handbooks for item 14a					
17b	Set of manuals and software on CD for item 14a					
18a	UHF Conventional Desk Top radio. The radio must be able to operate on a minimum of 32 channels. The radio must operate in the 450 to 470 MHz frequency band. 12,5 kHz channel spacing. 7,5 Ah battery backup					

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ITEM	DESCRIPTION	MODEL/PART NO.	UNIT COST (1-10 Units)	UNIT COST 10-100 Units)	UNIT COST (More than 100-500 Units)	UNIT COST (More than 500 Units)
18b	Single ear headset with boom microphone for item 18a					
18c	Foot PTT switch for item 18a					
18d	Desktop microphone for item 18a.					
18e	Fist microphone 18a					
19	Transmit and receive audio output for voice logger adjustable between 0 and -10 dBm					
20a	Programming software for item 18a.					
20b	Programming Hardware: leads and adaptors for item 18a.					
21a	Set of workshop manuals/ technical handbooks for item 18a					
21b	Set of manuals and software on CD for item 18a.					
22	Remote speaker/microphone unit for item 1					
23	Remote speaker/microphone for item 8					

Spare parts		UNIT PRICE
24a	Display item 1	
24b	Display item 8	
25a	Speaker item 1	
25b	Speaker item 8	
26a	PTT switch item 1	
26b	PTT switch item 8	
27a	Antenna item 1	
27b	Antenna item 8	

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APPENDIX C : TRAINING REQUIREMENT SCHEDULE

Tenderers shall submit costs for training courses, per course regardless of the number of students, on all the radio equipment models offered on the following basis :

Item No.	Training Required	Cost Transnet Freight Rail venue (Johannesburg/ Pretoria)	Cost Transnet Freight Rail venue (Cape Town)	Cost Transnet Freight Rail venue (Durban)	Cost Transnet Freight Rail venue (PE)	Course duration
1	Operation and features of radio equipment / model					
2	Programming and setting parameters / model					
3	Repair to component level / model					
4	Set operating and repair manuals per student					

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APPENDIX D**Bill of Quantities**

Description	Quantity
1.) UHF Conventional Portable (32 Channel)	
Motorola Model C160 or similar	0
Battery NPN4497	0
Charger (Single) WPLN4139-R	20
Charger (Single) WPLN4162-R	0
Shunter Safety Vest/Harness	0
2.) UHF Conventional Portable (128 Channel or better)	
Hand Held Radios	400
Batteries	1300
Charger (Single)	15
Charger (6 Bay)	20
Leather Poach	0
Shunter Safety Vest/Harness	0
3.) UHF Full Feature MPT1327 Trunked Portable (132 Channel Trunk Mode - 32 Channel Conventional Mode)	
Hand Held Radios	80
Battery	160
Charger (Single) BC-160	0
Leather Poach	0
Shunter Safety Vest/Harness	0
4.) UHF Full Feature MPT1327 Trunked Portable (132 Channel Trunk Mode - 100 Channel or better Conventional Mode)	
Hand Held Radios	60
Battery	70
Charger	60
Leather Poach	0
Shunter Safety Vest/Harness	0

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Bill of Quantities (Cont.)

Description	Quantity
5.) VHF (136-174MHz) Conventional Portable (32 Channel)	
Hand Held Radio	15
Batteries	30
Charger (Single)	15
Headset with Boom Mic.	3
Leather Poach	12
6.) VHF (136-174MHz) Desk Top Radio (25W) with Integrated 220V Power supply (4Channel or better)	
Radios	5
Desk Top Mic.	3
DTMF Mic	2
	0
	0
	0
7.) VHF (136-174MHz) "Portaback" Radio (25W) (4 Channel or better)	
Radios	12
DTMF Mic.	12
Charger	12
	0
	0
8.) VHF/UHF Full Feature "Dual Bander" Handheld (5W)	
Hand Held Radios	2
Battery	4
Charger	2
Leather Poach	2
	0

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APPENDIX E

Delivery Schedule

The supplied equipment must be delivered to the following locations. The exact address will be supplied on signing of the contracts.

Description	Radio Workshop Richards Bay	Transport Telecomm. Johannesburg	Radio Workshop Pretoria	Total
UHF Conventional Portable (32 Channel)				
Motorola Model C160 or similar	0	0	0	0
Battery NPN4497	20	0	0	20
Charger (Single) WPLN4139-R	0	0	0	0
Charger (Single) WPLN4162-R	0	0	0	0
Shunter Safety Vest/Harness	0	0	0	0
UHF Conventional Portable (128 Channel or better)				
Hand Held Radios	300	0	15	315
Batteries	1200	0	200	1400
Charger (Single)	0	0	15	15
Charger (6 Bay)	20	0	0	20
Leather Poach	0	0	0	0
Shunter Safety Vest/Harness	0	0	0	0
UHF Full Feature MPT1327 Trunked Portable (132 Channel Trunk Mode - 32 Channel Conventional Mode)				
Hand Held	80	0	0	80
Batteries	160	0	0	160
Charger (Single)	0	0	0	0
Leather Poach	0	0	0	0
Shunter Safety Vest/Harness	0	0	0	0
UHF Full Feature MPT1327 Trunked Portable (132 Channel Trunk Mode - 100 Channel or better Conventional Mode)				
Hand Held	50	10	0	60
Batteries	50	20	0	70
Charger	50	10	0	60
Leather Poach	0	0	0	0
Shunter Safety Vest/Harness	0	0	0	0

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Delivery Schedule

The supplied equipment must be delivered to the following locations. The exact address will be supplied on signing of the contracts.

Description	Radio Workshop Richards Bay	Transport Telecomm. Johannesburg	Radio Workshop Pretoria	Total
VHF (136-174MHz) Conventional Portable (32 Channel)				
Hand Held Radios	0	15	0	15
Battery NPN4497	0	30	0	30
Charger (Single) WPLN4139-R	0	15	0	15
Charger (Single) WPLN4162-R	0	3	0	3
Leather Poach	0	15	0	12
VHF (136-174MHz) Desk Top Radio (25W) with Integrated 220V Power Supply (4 Channel or better)				
Radios	0	5	0	5
Desk Top Mic.	0	3	0	3
DTMF Mic.	0	2	0	2
	0	0	0	0
	0	0	0	0
	0	0	0	0
VHF (136-174 MHz) "Portaback" Radio (25W) (4 Channel or Better)				
Radios	0	12	0	12
DTMF Mic.	0	12	0	12
Charger	0	12	0	12
	0	0	0	0
	0	0	0	0
UHF Full Feature MPT1327 Trunked Portable (132 Channel Trunk Mode - 100 Channel or better Conventional Mode)				
Hand Held	0	2	0	2
Batteries	0	2	0	2
Charger	0	2	0	2
Leather Poach	0	2	0	2
	0	0	0	0

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