



RFQ / TENDER

Tender No: HAM 14

Vendor No: 72063557

BOARD LIST
BOARDL
BOARDL
2000

Purchaser : Helena Mauger
Telephone : 011 584 0604
Fax Number: .

Please quote reference:
DD3/6000556998

Deliver to:
TFR Head Office
Supply Chain Services
2000 Johannesburg

Closing Date :15.06.2010
Validity Date :15.09.2010
RFQ No :6000556998

PREVIEW COPY ONLY

1. RETURN OF QUOTATION/S:

1.1 QUOTATION/S MUST BE SUBMITTED PUNCTUALLY AT 10:00 ON THE CLOSING DATE AND LATE QUOTATIONS WILL NOT BE CONSIDERED.

1.2 IF POSTED:

SECRETARY (TRANSNET ACQUISITION COUNCIL)
PO BOX 4244
JOHANNESBURG
2000

1.3 IF DELIVERED BY HAND:

SECRETARY (TRANSNET ACQUISITION COUNCIL)
GROUND FLOOR
INYANDA HOUSE NO 1
21 WELLINGTON ROAD
PARKTOWN
2193

2. CONDITIONS:

2.2 ANY PURCHASE ORDER PLACED AS A RESULT OF YOUR QUOTATION WILL BE SUBJECT TO THE STANDARD TERMS AND CONDITIONS OF CONTRACT, FORM US7, (LATEST), GENERAL TENDER CONDITIONS, FORM CSS5 (LATEST) AND CONDITIONS MENTIONED HEREIN.

2.3 TENDERERS MAY OFFER AN EARLIER VALIDITY DATE, BUT THEIR QUOTATION MAY, IN THAT EVENT, BE DISREGARDED FOR THIS REASON.

2.4 TENDERERS ARE REQUIRED TO OFFER ONLY FIRM PRICES. PRICES SUBJECT TO REVIEW IN TERMS OF CLAUSE 32 OF FORM US7 WILL ONLY BE CONSIDERED SHOULD THE DELIVERY PERIOD REQUIRED EXCEED 6 MONTHS.

2.5 BEST DELIVERY TIME MUST BE OFFERED.

2.6 DISCOUNT (TRADE DISCOUNT) CASH DISCOUNT (CONDITONAL DISCOUNT) VALUE ADDED TAX (VAT) MUST BE SHOWN SEPARATELY.

2.7 TRANSNET RESERVES THE RIGHT TO NEGOTIATE PRICES AND COMMERCIAL ASPECTS AFTER THE CLOSING DATE

DATE: SIGNATURE OF TENDERER(S):

CONTACT PERSON: TEL No:

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OF THE QUOTATION.

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2.8 DIRECT DELIVERY INTIMATES DELIVERY BEING EFFECTED INTO THE WAREHOUSE OR THE ACTUAL POINT OF SUPPLY AND SHOULD THEREFORE INCLUDE ANY TRANSPORTATION MODE DEEMED NECESSARY IN EXECUTING THIS METHOD OF DELIVERY BASIS IN ORDER TO MEET THE REQUIRED DELIVERY DATE.

TAX CLEARANCE CERTIFICATES:

The Regulations in terms of the Public Finance Management Act, 1999: Framework for Supply Chain Management as published in Government Gazette No. 25767 dated 5 December 2003, Clause 9 (1) (d), stipulates that the accounting officer or accounting authority of an institution to which these regulations apply must reject any bid from a supplier who fails to provide written proof from the South African Revenue that the supplier either has no outstanding tax obligations or has made arrangements to meet outstanding tax obligations.

Tenderers will be disqualified if a valid tax clearance certificate or written proof from the South African Revenue Service that supplier has made arrangements to meet outstanding tax obligations is not submitted with the tender.

BROAD BASED BLACK ECONOMIC EMPOWERMENT (BBBEE)

Transnet fully endorses and supports the Government's Broad-based Black Economic Empowerment Programme and it is strongly of the opinion that all South African Business Enterprises have an equal obligation to redress the imbalances of the past.

Transnet will therefore prefer to do business with local business enterprises who share these same values. Transnet will endeavour to do business with local business enterprises that possess a BBBEE "recognition level" of at least a level 5. Transnet urges Tenderers (large enterprises and QSE's - see below) to have themselves accredited by any one of the various Accreditation Agencies available, who do their BBBEE ratings in accordance with the latest Codes (i.e. those promulgated on 9 February 2007) and whose names appear on the present ABVA (Association of BEE Verification Agencies) - "List of Full Members" as displayed on the ABVA website (www.abva.co.za).

Although no agencies have, as yet, been accredited by SANAS (SA National Accreditation System), Transnet will, in the interim, accept rating certificates of tenderers who have been verified by any of the listed agencies.

Enterprises will be rated by such agency based on the following:

1. Large Enterprises (i.e. annual turnover >R35million)
 - " Rating level based on all seven elements of the BBBEE scorecard.
2. Qualifying Small Enterprises - (QSE) (i.e. annual turnover >R5million but <R35million):
 - " Rating based on any four elements of the BBBEE scorecard.

NB:

3. Emerging Micro Enterprises - (EME) (i.e. annual turnover <R5m) are exempted from being rated/verified:
 - " Automatic rating of Level 4 BBBEE irrespective of race of ownership, i.e. 100% BBBEE recognition
 - " Black ownership >50% or Black Women ownership >30% automatically qualifies as Level 3 BBBEE, i.e. 110% BBBEE recognition
 - " EME's should provide certified documentary proof of annual turnover (i.e. audited financials) plus proof of Black ownership if Black ownership >50% or Black Women ownership >30% from the EME's Auditor/Accounting Officer.

4. In addition to the above, Tenderers who wish to enter into a Joint Venture or subcontract portions of the contract to BBBEE companies, must state in their tenders the percentage of the total contract value that will be allocated to such BBBEE companies, should they be successful in being awarded any business. A rating certificate in respect of such BBBEE JV-partners and / or sub-contractor/s, as well as a breakdown of the distribution of the aforementioned percentage must also be furnished

In view of the high emphasis which Transnet places on Broad-based Black Economic Empowerment, Transnet will allow certain preference points for BBBEE in the evaluation of all responses. Depending upon the value of the ensuing business award (i.e. below or in excess of R2m), the 80/20 or 90/10 point preference systems will be utilized where BBBEE will count out of 20 or 10 respectively in the evaluation process.

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EACH RESPONDENT IS REQUIRED TO FURNISH PROOF OF THE ABOVE TO TRANSNET. FAILURE TO DO SO WILL RESULT IN A SCORE OF ZERO BEING ALLOCATED FOR BBBEE.

Turnover: Kindly indicate your company's annual turnover for the past year R _____

- * If annual turnover <R5m, please attach certified confirmation from your Auditor/Accounting Officer
- * If annual turnover >R5m please attach original or certified copy of accreditation certificate and detailed scorecard by an ABVA accreditation agency (registered as a "Full Member")

PAYMENT TERMS

The following payment terms will apply as from 1-October 2008.

- * All suppliers will be paid 30 days from receipt of month end statement, i.e. payment term F055.
- * All CIDB suppliers will be paid 21 days from date of invoice, i.e. payment term F057.

CONDITIONS:

This quotation is subject to the provisions of the Standard Terms and Conditions of Contract, Form US7, (Latest) and the General Tender Conditions, Form CSS5 (Latest) and any other standard or special conditions mentioned and/or embodied in the quotation request.

SCHEDULE OF REQUIREMENTS

TENDERERS SHOULD INSERT THEIR PRICE/S UNDER THE APPROPRIATE HEADINGS HEREUNDER.

IN THIS REGARD THE TENDERER'S ATTENTION IS DIRECTED TO PARAGRAPH 16 OF FORM CSS5 (LATEST).

NB. TENDERERS OFFERING GOODS FROM IMPORTED SUPPLIES MUST SUBMIT THEIR PRICES ON THE DELIVERY BASIS APPEARING UNDER COLUMN (C) OF THIS SCHEDULE OF REQUIREMENTS.

Item	Qty	Material	Description	
00010	18	UHF Repeater - Complete		R..... Each

Delivery Date: 16.07.2010

FULL DETAILS OF DESCRIPTION

UHF Repeater - Complete as per Specification SPC-00851 dated January 2007 attached, and Schedule of Requirements for UHF

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Item	Qty	Material	Description
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Repeater Stations attached.

Substitute Transtel wherever it appears with Transnet Freight Rail.

All prospective tenderers are to submit their Radio Dealers license as well as ICASA approval of their product.

FULL COMPLIANCE TO SPECIFICATION SPC-00851 DATED JANUARY 2007 AND SCHEDULE OF REQUIREMENT IS REQUIRED.

00020 1 Calibration Unit & Toolkit

R.....

Each

Delivery Date: 16.07.2010

FULL DETAILS OF DESCRIPTION

00030 1 Technical Manual - hard copy

R.....

Each

Delivery Date: 16.07.2010

FULL DETAILS OF DESCRIPTION

Technical Manual - hard copy. In English only

00040 1 Delivery charges to Bellville

R.....

Each

Delivery Date: 16.07.2010

FULL DETAILS OF DESCRIPTION

Delivery of Equipment to Bellville

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DATE:

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3. ADDITIONAL INFORMATION REQUIRED: (WHERE APPLICABLE)

3.1 THE FOLLOWING ADDITIONAL INFORMATION IS REQUIRED:

- (A) TRADE DISCOUNT:.....
- (B) PRICE/S FIRM:
- (C) PRICE/S FIRM UNTIL THEREAFTER SUBJECT TO REVIEW.

(D) DELIVERY DATE:

TENDERERS MUST FURNISH THEIR ACTUAL DELIVERY AND MANUFACTURING PERIOD HEREUNDER NOTWITHSTANDING THE DELIVERY DATES SPECIFIED BY TRANSNET.

THE FOLLOWING MUST ALSO BE FURNISHED IN REGARD TO THE ABOVE:

- 1. PERIOD REQUIRED TO OBTAIN RAW MATERIAL.(DAYS)
- 2. MANUFACTURING PERIOD.(DAYS)
- 3. PERIOD TO TRANSPORT MATERIAL TO DESTINATION.(DAYS)

MATERIAL NO.	1.(PERIOD)	2.(PERIOD)	3.(PERIOD)
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____

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DATE:

SIGNATURE OF TENDERER(S):

**TRANSTEL**

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

SPECIFICATION FOR RADIO REPEATER STATIONS

**SPC-00851
JANUARY 2007**

Revision 3.00

NON-DISCLOSURE OF INFORMATION

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Doc. No. : SPC-00851

Author : MS Gqada

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(Jan 2007).doc

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I DOCUMENT AUTHORISATION

FUNCTION	NAME	TITLE & DIVISION	SIGNATURE	DATE
Compiled by :	MS Gqada	Transmission Engineering	<i>Signed MS Gqada</i>	19/01/2007
Reviewed by :	T Dean	Head of Quality Assurance	<i>Signed T Dean</i>	19/01/2007
Reviewed by :	ML Nuttall	Divisional Manager, Transmission	<i>Signed ML Nuttall</i>	19/01/2007
Authorised by :	DF Botha	Group Executive, Technology	<i>Signed DF Botha</i>	19/01/2007

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	October 1994	FS Botha	New document
2.00	August 2006	Selby Mchunu	Converted to ISO Standard
3.00	November 2006	MS Gqada	Changes

IV CHANGES SINCE LAST REVISION

CLAUSE	DESCRIPTION
Revision 2.00	
6.2.12	Changed wording / addition of new requirement
6.3.2	Add the words — via the front panel
6.3.11	Changed wording / addition of new requirement
6.4.4	Changed wording / addition of new requirement
10.7	Add new subclause / addition of new requirement
Various clauses	Add new clauses and subclause
Revision 3.0	
5.1.1.2	Changed 48 volt – 60 volt to accommodate different power supplies
10.2	Re-worded the whole subclause
14	Moved to the beginning of specification
Various clauses	Add new clauses and subclause

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V ABBREVIATIONS, ACRONYMS AND DEFINITIONS

ABBREVIATIONS AND ACRONYMS	DESCRIPTION
CD	Compact Disk
dB	decibel
dB(C)	decibel relative to the carrier
dB(W)	decibel relative to Watts
DC	Direct Current
FM	Frequency Modulation
Hz	Hertz
ISO	International Standards Organisation
kHz	kilohertz
LED	Light Emitting Diode
MHz	Megahertz
Pd	Power density
RF	Radio Frequency
SANS	South African National Standard
SWR	Standing Wave Ratio
Tx	Transmit
UHF	Ultra High Frequency

DEFINITIONS	DESCRIPTION
flat	As is

VI RELEVANT DOCUMENTATION

The following standards are referred to in this specification :

APPLICABLE

DOCUMENT NO.	DESCRIPTION	LOCATION
ISO 9000	Quality management systems.	
BS 3939	Graphics symbols for electrical, power, telecommunications and electronic diagrams.	External
SANS 10313	Protection of dwelling houses against lightning.	External
SANS 61643-1	Surge arrestors for low voltage distribution systems.	External

The latest issues of the abovementioned standards must apply.

RELEVANT

DOCUMENT NO.	DESCRIPTION	LOCATION
SPC-00851	Old specification No. SCEH-59	Document Control Centre

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1. SCOPE

This specification covers the requirements of Transnet for the supply of a radio repeater station, operating in the UHF frequency band with 12,5 kHz channel spacing.

2. COMPLIANCE

- 2.1 Tenderers must indicate clause by clause, either that their offers comply in every respect with this specification, or, if not, precisely how they differ.
- 2.2 Offers which include deviations of a minor nature, not departing greatly from the specification, will be considered at the discretion of Transnet.
- 2.3 Tenderers may offer alternatives for consideration. Alternative offers are to be reflected on a separate schedule and the following particulars are to be provided :
- 2.3.1 A fully detailed technical description in English explaining the functioning of the individual components, the operation of the items of equipment as well as the procedure to be followed in clearing faults and maintenance.
- 2.3.2 Drawings and brochures supporting the offer.
- 2.3.3 Details of deviations from the specifications of Transnet.
- 2.3.4 The value of imported and local components of complete items are to be stated separately.

3. SERVICE CONDITIONS

- 3.1 The equipment must be suitable for continuous operation under the following conditions :
- | | | |
|----------------------|---|---|
| Altitude | : | 0 to 1 800 metres above sea level. |
| Ambient temperatures | : | Minus 10 °C to plus 60 °C. |
| Air pollution | : | Heavily saline laden industrial and locomotive fumes. |
| Relative humidity | : | As high as 95%. |
| Lightning | : | Severe. |
- 3.2 All stated ambient temperature ranges in this specification must be from -10 °C to +60 °C.
- 3.3 All component parts, including wiring, etc. must be manufactured and processed to ensure reliable operation under these conditions.

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4. SCHEDULE OF REQUIREMENTS

- 4.1 Where only equipment in terms of this specification is required by Transnet, a Schedule of Requirements will accompany this specification. Where a system, including other equipment, is to be supplied, a main specification will be included in the tender documents together with a Schedule of Requirements for all the equipment.
- 4.2 The equipment required is listed in the Schedule of Requirements. The equipment must comply with the details therein, in addition to the requirements of the relevant clauses of this specification.
- 4.3 The tenderers statement of compliance as per clause 2 must also cover the relevant clause of the Schedule of Requirements.

5. REPEATER

5.1 General

- 5.1.1 The repeater equipment must comprise of a transmitter, receiver, associated electronic equipment, duplexer and power supply mounted in a corrosion resistant metal cabinet, which must be suitable for indoor installation.
- 5.1.2 It must be possible to control the repeater station by all of the following methods :
- 5.1.2.1 Extended local control, where the repeater is connected to a control console by means of a multi-core cable up to 100 metres in length.
- 5.1.2.2 Remote control, where the equipment is connected to a control console by means of a single telephone cable pair up to 10 kilometres in length.
- 5.1.2.3 Line controlled over telephone carrier channels on a 6-wire basis with E and M signalling. This method will require the use of a line branching unit or a line terminating unit.
- 5.1.3 The interface equipment described in subclause 5.1.2 must be available as standard production items. Tenderers for equipment which cannot meet this requirement will not be considered.
- 5.1.4 The equipment must be designed and rated for continuous transmission duty.

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- 5.1.5 An engineering panel must be provided for local control and testing of the repeater and line interface equipment. Facilities to key the transmitter and monitor-received audio must be included. A monitor loudspeaker with volume control must be provided. A handset with a dynamic microphone must be, provided as part of the engineering panel for speech transmission from the repeater.
- 5.1.6 Pre-emphasis of 6 dB per octave must be used in the transmitter with de-emphasis in the receiver. Provision must be made to switch to flat frequency response.
- 5.1.7 The equipment must be suitable for operating in frequency bands using 12,5 kHz channel spacing.
- 5.1.8 The equipment must be supplied complete for operation in the frequency band specified in the Schedule of Requirements.
- 5.1.9 The successful tenderer will be advised of the actual frequencies once the order has been placed.
- 5.1.10 The repeater must be suitable for transmitting and receiving on a single antenna. The antenna duplexer must be included in the equipment cabinet.
- 5.1.11 The operating voltage and negative or positive earth of the equipment shall be as indicated in the Schedule of Requirements.
- 5.1.12 The equipment must be able to operate in the following DC voltage ranges without degrading the performance.
- | | | |
|----------------------|---|---|
| For a 12 volt system | : | Nominal operating voltage 13,8 volt.
Operating range 10,8 volt to 15,6 volt |
| For a 24 volt system | : | Nominal operating voltage 27,6 volt.
Operating range 21,6 volt to 31,2 volt. |
| For a 48 volt system | : | Nominal operating voltage 55,2 volt.
Operating range 43,2 volt to 62,4 volt. |
- 5.1.13 The terminals for the connection of the DC voltage must be clearly marked and the equipment protected against incorrect polarity, short-circuiting, and over voltage. Full particulars of all protective devices offered must be submitted.
- 5.1.14 Tenderers must guarantee that there will be no cross-coupling or any other degradation in radio equipment performance due to a common battery and charger combination being used to supply the, repeater.
- 5.1.15 The equipment must be of fully solid-state design.

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- 5.1.16 Tenderers are to submit their recommendations for earthing of the equipment.
- 5.1.17 All the miscellaneous items such as plugs, connectors and cables, necessary for a complete installation, must be supplied with the equipment.
- 5.1.18 The RF switching bandwidth of the equipment offered must be 1,7 MHz without degradation in transmitter or receiver performance. The tenderer must state the degradation in receiver sensitivity, transmitter power and any other parameter for the switching bandwidth 2,0 MHz .
- 5.1.19 The repeater must be able to reverse the operating channels e.g. Tx low and Rx high and Tx high and Rx low.
- 5.1.20 The transmitter circuitry must incorporate protective devices to protect the output circuitry when the transmitter is operated with the antenna open circuit or, short-circuit, or for any excessive voltage standing wave ratio (VSWR) on the antenna feeder cable.
- 5.1.21 The repeater must be provided with standard multipin sockets and plugs for the easy interconnection of control consoles, carrier circuits, batteries and any other devices stated in the schedule of requirements.
- 5.1.22 Tenderers must state the DC current consumption at the nominal operating voltage of all equipment offered under transmit, receive and stand-by conditions.
- 5.1.23 The equipment will be used where severe lightning and voltage surges occur. The repeater must therefore be provided with adequate line protection devices. Voltage transient surge protection must be provided in the AC mains supply input.
- 5.1.24 All parameters shall be measured as specified in the controlled document TECHNICAL SPECIFICATION AND METHODS OF MEASUREMENT FOR ANGLE MODULATED RADIO EQUIPMENT. The latest version shall apply.

5.2 Transmitter

- 5.2.1 The transmitter RF power output at the operating voltage as well as the operating frequency, must be as specified in the Schedule of Requirements.
- 5.2.2 The conducted spurious emissions must not exceed a level of -36 dBm .
- 5.2.3 When provision must be made for an audio input (e.g. from a land line) to the transmitter, the audio frequency response must be within -1 to +3 dB of a true 6 dB per octave pre-emphasis characteristic between 300 and 3 000 Hz (reference level 0 dB at 1 000 Hz).

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- 5.2.4 The audio frequency total harmonic distortion must be $\leq 2,0$ % at a modulating frequency of 500 Hz and 1 000 Hz at a modulation factor of 60% of maximum rated system deviation.
- 5.2.5 The angle modulation hum and noise ratio must be at better than 34 dB .
- 5.2.6 The maximum frequency deviation shall not exceed the values as indicated :

Modulating frequency	Maximum deviation
0,3 to 2,55 kHz	2,5 kHz
2,55 kHz to 6,0 kHz	2,5 kHz at a modulating frequency of 2,55 kHz 0,75 kHz at a modulating frequency of 6,0 kHz
6,0 kHz to 12,5 kHz	0,75 kHz having a -14 dB/octave slope.

- 5.2.7 The measured and calculated AM hum and noise level must be less than -34 dB .
- 5.2.8 The carrier frequency error must not be greater than 1,0 kHz .
- 5.2.9 The power measured at the adjacent channels must be less than 70 dBc .
- 5.2.10 The intermodulation attenuation must exceed 40 dB .
- 5.2.11 The transmitter shall operate into a 50 Ω impedance antenna system.

5.3 Receiver

- 5.3.1 The minimum usable sensitivity for a 12 dB SINAD ratio must be -115 dBm or better, without the duplexer.
- 5.3.2 The usable sensitivity shall not vary more than 3 dB during extreme conditions (power supply and temperature).
- 5.3.3 The receiver must be provided with an electronic squelch control the sensitivity of which must be adjustable. The squelch closing threshold must be $\leq 3,0$ dB below the opening threshold.
- 5.3.4 The adjacent channel selectivity and desensitisation ratio must be ≥ 70 dB .
- 5.3.5 The spurious response attenuation must not be less than 75 dB .

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- 5.3.6 The intermodulation spurious response attenuation must be ≥ 70 dB for a wanted input signal of a level equivalent to usable sensitivity.
- 5.3.7 The audio power output into the built-in monitor loudspeaker must be at least 2 watts at less than 5% harmonic distortion.
- 5.3.8 When provision must be made for an audio output (e.g. to a land line) from the receiver, the audio frequency response must be within +1 dB to -3 dB of a true 6 dB per octave de-emphasis characteristic from 300 Hz to 3 000 Hz . It will be stated in the Schedule of Requirements if an audio output is required.
- 5.3.9 The frequency stability must be at least $\pm 0,0005\%$ over the temperature range of -30 °C to +60 °C (reference temperature +25 °C).
- 5.3.10 The modulation acceptance bandwidth must not be $\geq 3,75$ kHz .
- 5.3.11 The signal to hum and noise ratio must be ≥ 60 dB in the case of a squelched receiver, and ≥ 39 dB in the case of an unsquelched receiver.
- 5.3.12 Tenderers must state what protection will be provided, and what maximum signals the receiver will be protected against without damage.
- 5.3.13 The co-channel rejection ratio must not exceed 12 dB .
- 5.3.14 The impedance of the antenna terminal shall be 50 Ω .
- 5.3.15 The audio frequency total harmonic distortion must be $\leq 2,0$ % at a modulating frequency of 500 Hz and 1 000 Hz with a modulation factor of 60% of maximum rated system deviation. Standard RF input signal level is -60 dBm .
- 5.3.16 The conducted spurious radiation must be ≤ -57 dBm .
- 5.3.17 The blocking shall be ≥ 84 dB .
- 5.3.18 The amplitude characteristics shall be ≤ 3 dB .
- 5.3.19 The receiver shall retain its selectivity for high RF signal levels up to -7 dBm .
- 5.3.20 Squelch closing time - the audio level shall reduce with 10 dB from the standard output power (nominal -10 dBm) within 250 mS from the time the carrier ceased.

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5.4 Through Signals

- 5.4.1 The audio output power measured at the demodulator must not vary more than ± 3 dB (with de-emphasis and pre-emphasis) or ± 2 dB (without de-emphasis and pre-emphasis) when the modulating frequency is varied between 300 Hz to 3 000 Hz with a standard RF input signal.
- 5.4.2 Modulation factor linearity. The modulation factor measured at the transmitter must not vary with more than $\pm 0,1$ kHz from a standard RF signal input with a modulation factor varying from 20% to 100% of maximum rated system deviation, at the receiver. The modulating frequency must be 1 000 Hz. Standard RF input signal level is -60 dBm .
- 5.4.3 Response time. The transmit carrier voltage level must reaches a value 6 dB below the steady-state value within 300 mS after the receiver received an RF signal which is 12 dB above the usable sensitivity level.
- 5.4.4 The audio frequency total harmonic distortion measured at the transmitter must be $\leq 5,0$ % at a modulating frequency of 1 000 Hz with a modulation factor of 60% of maximum rated system deviation. Standard RF input signal level at the receiver is -60 dBm .

5.5 Antenna Duplexer

- 5.5.1 The repeater equipment must be supplied complete with antenna duplexer to obviate the use of two antennas.
- 5.5.2 The duplexer must provide at least 80 dB isolation between transmitter output and receiver input to ensure that the receiver performance is not degraded when the equipment is operated in the duplex mode. The tenderer must submit response curves of the antenna duplexer offered.
- 5.5.3 The antenna duplexer must be capable of handling the transmitter radio frequency power output over a temperature range of -10 °C to +60 °C.
- 5.5.4 All terminal impedances must be 50 Ω and the voltage standing wave ratio must not exceed 1,5:1.
- 5.5.5 The insertion loss must not exceed 1,2 dB in both the transmit and receive paths.
- 5.5.6 The tenderer must state the "drift" in the tuning, over the temperature range of -10 °C to +60 °C.

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6. QUALITY OF MATERIAL

- 6.1 Preference will be given to manufacturers who guarantee that they comply with the provisions of the code of practice for quality management systems as set out in ISO 9000.
- 6.2 Tenderers must note that the technical personnel of Transnet will carry out inspections to determine whether the code of practice has been adhered to.
- 6.3 Tenderers must submit details of procedures they intend to adopt to comply with ISO 9000.
- 6.4 Materials which may, under the influence of heat, light or pressure, decompose or liberate elements or compounds likely to corrode or affect other materials or cause electrolytic corrosion will not be acceptable.
- 6.5 Mounting screws, where used, must not be self-tapping. Bushes and threaded inserts must be used.
- 6.6 All covers, jacks, sockets etc. must be provided with adequate seals.
- 6.7 Indication lamps must be rated for reliable long life and must be protected against surges where necessary. Pilot indicator lamps must be light emitting diode (LED) types.
- 6.8 Printed wiring boards must be of epoxy glass fibre laminate or better. Phenolic paper or bakelised paperboards are not acceptable.
- 6.9 Printed wiring boards must be properly washed and, if necessary, neutralised after the etching process so that no hygroscopic crystals remain in the board or printed wiring.
- 6.10 Printed wiring boards must be guaranteed not to promote or permit the growth of fungi under any conditions.
- 6.11 Printed wiring boards must be fitted with robust plugs and sockets or another approved manner of connecting the boards reliably to the wiring. Edge connectors may be used provided that :
- 6.11.1 A suitable tolerance for the correct fitting of the board between guides and the wiring socket can be guaranteed.
 - 6.11.2 Sufficient contact area is provided to guarantee reliable contact.
 - 6.11.3 Sufficient contact pressure is provided to ensure contact but not to remove precious metal from the contacts.
 - 6.11.4 In the final protective coating of the boards, no varnish or other protective material is permitted to cover the contacts.

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- 6.11.5 After 500 insertions and withdrawals, there must be no noticeable deterioration of the contacts of either the board or socket.
- 6.12 All printed wiring board sockets, plugs or edge connectors must be gold plated or better.
- 6.13 Heavy components must not be mounted on printed wiring boards unless it can be guaranteed that the board will stand up to severe handling without fracturing with the components so mounted.
- 6.14 No unmarked and/or untested components may be used.
- 6.15 Only new components must be used.
- 6.16 All subassemblies and printed circuit boards must be permanently marked with an identification code.
- 6.17 Test points must be provided on all units, subunits and printed circuit boards for the measurement of all important circuit characteristics without the unsoldering of wires. Such test points must be clearly marked and identified in the equipment.
- 6.18 All wiring and terminations between subassemblies must be identified.
- 6.19 No printed circuit board must have terminations to points other than the edge of the printed circuit board.
- 6.20 No termination must have more than one conductor per solder joint.
- 6.21 Soldering direct to the chassis of any equipment will not be permitted. All chassis terminations must be made with soldering tags.
- 6.22 All pre-set variable controls must be clearly marked and readily identified in the equipment.
- 6.23 Terminations on printed circuit boards must not be made direct to the printed wiring. Where edge connectors are not used, termination to printed wiring must be made via terminal posts.
- 6.24 Where different metals are used in conjunction with each other, tenderers must explicitly guarantee that no electrolytic corrosion must occur under operating conditions.
- 6.25 The equipment must be solid state throughout.
- 6.26 All components used must be types, which can be readily obtained from local stocks.

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- 6.27 The equipment must be built in such a manner that faulty modules can be easily and quickly detected, removed and replaced, but steps must be taken to minimise unnecessary movement of plug-in modules on a trial and error basis when locating faults.
- 6.28 Solid-state devices are to be so constructed that they may be easily tested for correct functioning without having to disturb wiring.
- 6.29 The number of component types must be kept to a minimum consistent with good design of the equipment.
- 6.30 Solid-state boards must be provided on a plug-in or other approved basis so that they can, when necessary, be readily removed for repairs.
- 6.31 Full details of the types of lamps and lenses offered must be furnished with the tender.
- 6.32 The functions of all controls, switches, etc. must be clearly engraved or otherwise permanently marked by means of approved symbols in English.
- 6.33 All components must be suitably rated for the function they have to perform without interference to neighbouring material.
- 6.34 Resistors and restive components must not rise in temperature so that mounting boards or markings thereon are burnt or discoloured.
- 6.35 Fuses must be rated to give adequate protection to the circuit served while not rupturing prematurely.
- 6.36 The equipment layout must be planned to facilitate fault clearance and maintenance.
- 6.37 All components must be clearly marked and must be capable of easy reference to circuit diagrams and handbooks that are supplied with the equipment.
- 6.38 Equipment using plug-in modules must be fitted with guides for the insertion of modules. It must not be possible to incorrectly insert a module.

7. ACCEPTANCE TESTS

- 7.1 Transnet will conduct acceptance tests on the equipment. The equipment will not be accepted nor payment authorised until these tests have been completed and it has been confirmed that the equipment supplied is fully in accordance with the requirements of this specification and/or the stated claims of the tenderer as accepted by Transnet.
- 7.2 The successful tenderer must agree to rectify any defects at no cost to Transnet, where the equipment does not meet the tender requirements and/or the stated claims made by the tenderer.

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8. MAINTENANCE AND SERVICE

- 8.1 The tenderer must give full particulars of the maintenance, spare parts and service facilities which will be available in the Republic of South Africa. The names and addresses of the companies concerned must be furnished.
- 8.2 The tenderer must list the major centres where maintenance facilities can be provided and must state if repairs under guarantee can be undertaken at these centres.
- 8.3 Tenderers must state what provision will be made to ensure an adequate supply of locally available spare components for a period of 10 years after the order is placed.
- 8.4 Transnet will not consider tenders from tenderers who cannot provide an efficient spares and maintenance service. Tenderers must state whether they are prepared to agree to an inspection of their maintenance premises by the engineering personnel of Transnet.

9. TECHNICAL HANDBOOKS

- 9.1 Technical handbooks must be clearly and professionally printed in English on quality paper. Photostat copies will not be acceptable unless it simulates professional printing quality and in colour where applicable.
- 9.2 Technical information (handbooks) on compact disc is acceptable.
- 9.3 The technical handbooks must be packed with the equipment.
- 9.4 Each set of handbooks must include the following :
- 9.4.1 Operating instructions.
 - 9.4.2 Complete maintenance instructions.
 - 9.4.3 Complete and detailed alignment procedures in a proven and easy to follow order.
 - 9.4.4 A detailed technical description of the equipment.
 - 9.4.5 Complete circuit diagrams, drawings and photographs of the equipment. The photographs and drawings must clearly indicate component and module location in the equipment. All component numbers must be clearly indicated.
 - 9.4.6 A list of parts, giving the values of all components, i.e. resistive, capacitive, inductive, integrated circuit and semi-conductor numbers for each schematic, drawing.

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- 9.4.7 Detailed printed circuit board wiring diagrams showing component numbers and positions and the wiring itself. Multilayer board wiring must be shown to include all layers of printed wiring clearly and discernible.
- 9.4.8 Voltage levels, current values and test points, clearly indicated on circuit diagrams and printed circuit board layouts.
- 9.4.9 Complete circuit diagrams of all individual modules.
- 9.5 All symbols and notations used on drawings and circuit diagrams preferably comply with the requirements laid down in BS 3939. Where symbols and notations do not comply with these requirements, each drawing shall be accompanied by a legend clearly detailing BS 3939 equivalents.
- 9.6 No hand-written notes and numbers must appear in a handbook supplied by a tenderer. All writing must be of proper printed form.
- 9.7 Transnet reserves the right to reproduce in whole or in part, by any means whatsoever, any technical handbook or instruction manual supplied by the successful Contractor. Any such reproductions will be for the sole use of Transnet.

10. ALARMS

10.1 Transmitter Alarms

- 10.1.1 Tx SWR alarm.
- 10.1.2 Tx Low Power alarm.

10.2 Power Supply Alarms

- 10.2.1 Mains failure.
- 10.2.2 Battery Low Non-urgent and Urgent Alarms depending on supply voltage used are as follows :

10.2.2.1 For 12 volt system.

10.2.2.1.1 Low Non-urgent alarm is 12 volt.

10.2.2.1.2 Low urgent alarm is 11 volt.

10.2.2.2 For 24 volt system.

10.2.2.2.1 Low Non-urgent alarm is 24 volt.

10.2.2.2.2 Low urgent alarm is 22 volt.

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10.2.2.3 For 48 volt system.

10.2.2.3.1 Low Non-urgent alarm is 48 volt.

10.2.2.3.2 Low urgent alarm is 43 volt.

11. POWER SUPPLY

Should the equipment be supplied with a mains power supply/charger, the battery charging circuit must be provided with load shed.

12. LINE INTERFACE

The line interface should be totally isolating all external equipment, both signalling and audio.

13. GENERAL

The tenderer must submit technical specification pamphlets and schematic diagrams covering the equipment offered. Photographs and complete drawings clearly displaying the external dimensions and physical appearance of the equipment, must also be submitted with the tender.

END OF DOCUMENT

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MAY 2010

SCHEDULE OF REQUIREMENTS FOR UHF REPEATER STATIONS

1. SCOPE

The schedule covers the requirements of Transnet for the supply of UHF Radio Repeater Stations that will be installed along the Ore railway line. This document must be read in conjunction with **Specification SPC-00851**, for Radio Repeater Stations. The equipment must comply with the specifications and requirements of both documents.

2. OPERATING FREQUENCY BAND (Item 5.1.8 of the specification)

2.1. All the equipment will operate in the 440 to 470 MHz frequency band.

2.2. The correct frequencies will be supplied after adjudication of the contract.

3. DUPLEXERS (Items 5.1.10 and 5.5.1 of the specification)

It is not required for the repeater equipment to be supplied with Duplexers.

4. OPERATING VOLTAGE (Item 5.1.11 of the specification)

4.1. The repeater equipment supplied must operate from 13.8 Volt DC.

4.2. The equipment must be negative earthed.

5. TRANSMITTER OUTPUT POWER (Item 5.2.1 of the specification)

The equipment supplied must be 50 Watt continuous rated as a minimum requirement.

6. AUDIO OUTPUT (Item 5.3.8 of the specification)

An audio output, 600 ohm balanced line option will be required with an adjustable output from -15 dBm to +5dBm.

7. DIAGNOSTICS AND REMOTE MONITORING (Item 10 of the specification)

7.1. Must be supplied with an onboard diagnostic system with remote monitoring capabilities.

7.2. The monitoring connection point to the diagnostic system must be via a TCP/IP (LAN) interface.

7.3. The diagnostic system must have the following additional functionality as a minimum requirement:

- Must give the actual values of transmitter power, reflected power and VSWR.
- Must also be able to give the RSSI values.
- Must give you the input and output audio levels.
- Must be able to remotely control the repeater transmitter and receiver.

8. OTHER REQUIREMENTS

8.1. The equipment quoted on must comply with **Specification SPC-00851** and this "**Schedule of Requirement**". Please provide a compliance document with your quotation.

8.2. Transnet reserves the right to call for samples of equipment offered.

8.3. All radio equipment provided must be ICASA approved.

8.4. UHF Repeater stations supplied that have not been tested and approved by the Transnet Test Center will require this approval and the supplier will have to carry the cost of such an approval process.

9. QUANTITIES OF EQUIPMENT AND SERVICES TO SUPPLY

Item	Description	Quantity
1	UHF Repeater – complete as per specification	18
2	Calibration Unit and Tool Kit	1
3	Technical Manual – hard copy	1
4	Delivery of equipment to Bellville	All

This is the end of the schedule of requirements.