TRANSTEL

A Division of Transnet Limited
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SPECIFICATION FOR ANTENNA DUPLEXER

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I DOCUMENT AUTHORISATION

FUNCTION	NAME	TITLE & DIVISION	SIGNATURE	DATE
Compiled by :	MS Gqada	Transmission Engineering	*Signed MS Gqada*	10/11/2006
Reviewed by :	T Dean	Head of Quality Assurance	*Signed T Dean*	06/11/2006
Reviewed by :	M Nuttall	Divisional Manager, Transmission	*Signed M Nuttall*	10/11/2006
Authorised by :	DF Botha	Group Executive, Technology	*Signed DF Botha*	10/11/2006

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 2006	Transmission	New document

IV CHANGES SINCE LAST REVISION

CLAUSE	DESCRIPTION
None	

V ABBREVIATIONS, ACRONYMS AND DEFINITIONS

ABBREVIATIONS AND ACRONYMS	DESCRIPTION
dB	Decibel
mW	Milliwatt
RF	Radio Frequency
Rx	Radio receiver
Tx	Radio transmitter
VSWR	Voltage Standing Wave Ratio
W	Watt

DEFINITIONS	DESCRIPTION
GENERAL	
dB	The decibel is 1/10 of a Bel. DB is the logarithm of the ratio between a measured quantity and an agreed reference level.
Insertion Loss	Insertion loss is the minimum amount of loss to the signal passing through a filter at a designated frequency. For example, a filter may have 1 dB insertion loss at its centre frequency and if two filters are used in series in a duplexer, the duplexers insertion loss would be 2 dB. Insertion losses occur in both the transmit and receive paths of a duplexer and they may be different amounts. The greater the insertion loss, the less the output level.
Carrier Power	The mean power available at the output terminals of a radio transmitter in the absence of modulation.
Tuning Stability	The ability of the filter to remain tuned at the desired frequency over time and variations in temperature, orientation and vibration. Many aspects of filters are designed to overcome these variables, such as the use of temperature compensating metals, elimination of threaded tuning rods which can store mechanical torque stresses, added cooling, fine tuning adjustments, etc.
Extreme Transmitter Loads	Conditions under which the radio transmitter operates into an open circuit or short circuit.

V RELEVANT DOCUMENTATION

APPLICABLE

DOCUMENT NO.	DESCRIPTION	LOCATION
BS 3939	Standard Graphic Symbols for Circuit, Schematic and Architectural Diagrams	External

RELEVANT

DOCUMENT NO.	DESCRIPTION	LOCATION
SPC-01274	Technical Specification and Methods of Measurement for Angle Modulation Radio Equipment.	Document Control Centre

1. SCOPE

This specification covers the requirements of Transnet for the supply of an antenna duplexer, for radio units operating in the UHF frequency band in order to obviate use of two antennas.

2. COMPLIANCE

2.1 Tenderers must submit their main offers in terms of this specification, and must indicate clause-by-clause in the separate document of COMPLIANCE to the specification whether their offer is fully in COMPLIANCE with this specification or not.

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 component parts, including wiring, etc. must be manufactured and processed to ensure reliable operation under continuous operation.

4. SCHEDULE OF REQUIREMENTS

4.1 Where only equipment in terms of this specification is required by Transnet, a Schedule of Requirement will accompany this specification. Where a system, including other equipment, is to be supplied, a main specification will be included in the tender document 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. ANTENNA DUPLEXER

5.1 General Requirements

5.1.1 Duplexer should be able to protect the radio receiver from being damaged by high RF signal levels such as the power of radio transmitters.

5.1.2 One of its main purposes should be to obviate the use of two antennae.

5.1.3 The equipment must be designed and rated for continuous transmission duty.

5.1.4 Units to be provided with a unique serial number.

5.1.5 All units supplied should be provided with a date of calibration.

5.1.6 Calibration certificate should also be provided for each unit.

5.1.7 Unit should be able to be mounted in the centre on a 19" Modem tray of same colour as Transtel cabinets (Siemens Grey)

5.1.8 All units will be tested at the Transtel Quality Assurance National Test Centre for compliance with Standard SPC-01274.

5.2 Technical Requirements

5.2.1 The duplexer must be able to operate in the following UHF range :

TX 455,0 – 456,6375 MHz

RX 465,0 – 466,6375 MHz

(To be aligned by supplier)

5.2.2 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 and must state the insertion loss in transmit and receive paths.

5.2.3 Impedance matching should be 50 Ω (all ports).

5.2.4 The voltage standing wave ratio (VSWR) must not exceed 1.5:1 for both transmit and receive paths.

5.2.5 The insertion loss must not exceed 1.2 dB in both transmit and receive paths.

5.2.6 The tenderer must state the "drift" in subclauses 5.2.1, 5.2.2 and 5.2.3 over the temperature range of -10 °C to +60 °C.

5.2.7 Duplexer must be able to handle transmit power of 35 watt minimum up to 50 watt. It must be capable of handling the transmitter radio frequency power output over a temperature range of -10 °C to +60 °C.

5.2.8 Terminations must be N – Type Female connectors (Gold pin).

5.2.9 Filters should have tuning stability.

5.2.10 Duplexer should be able to survive under extreme transmitter loads – short circuit and open circuit.

6. QUALITY OF MATERIALS

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 No unmarked and/or untested components may be used.

6.8 Only new components must be used.

6.9 Where different metals are used in conjunction with each other, tenderers must explicitly guarantee that no electrolytic corrosion shall occur under operating conditions.

6.10 The number of component types must be kept to a minimum consistent with good design of the equipment.

6.11 All terminals (ports) must be clearly marked.

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 of compliance.

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 The technical handbooks must be packed with the equipment.

9.3 Each set of handbooks must include the following :

9.3.1 Operating instructions.

9.3.2 Complete maintenance instructions.

9.3.3 Complete and detailed alignment procedures in a proven and easy to follow order.

9.3.4 A detailed technical description of the equipment.

9.3.5 Complete circuit diagrams, drawings and photographs of the equipment.

9.4 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.

9.5 No hand-written notes and numbers must appear in a handbook supplied by a tenderer. All writing must be of proper printed form.

9.6 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.

9.7 A copy of the entire technical manual must be available on CD.

10. 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