



All India Radio



**PRASAR BHARATI
BROADCASTING CORPORATION OF INDIA
DIRECTORATE GENERAL: ALL INDIA RADIO
(PLANNING AND DEVELOPMENT UNIT)**

F.No.27/12/Spec./CEs Comm.-V/2005-D(TD/FM)&File No. 30/2(2)/2004-D(TD/FM)

**SPECIFICATION FOR SUPPLY OF STEREO FM DIGITAL BROADCAST AUDIO
PROCESSOR
(FOR VHF FM TRANSMITTERS SET UP)**

Specification No.: Stereo FM Digital Broad Audio Pro/ 10th Plan /1/ October- May/2006-D(TD/FM)

[Total number of pages -15 Nos.]

Date of approval by
Committee of Chief
Engineers

: 31.01.2006, 08.02.2006, 22.02.2006 & 24.02.2006

Chief Engineers Committee :
Approval reference.

F.No.27/12/Spec./CEs Comm.-V/2005-D(TD/FM)&File No.
30/2(2)/2004-D(TD/FM)

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N.B. :

1. Each clause of this specification has to be complied with & supported by printed matter from the manufacturer of the equipment by the Tenderer, without which tender will be considered incomplete and failing which the tender shall be liable to be rejected. The Tenderer should make a detailed offer while quoting for the Stereo FM Digital Audio Broadcast processor.
2. All the Stereo FM Digital Audio Broadcast processor data, technical details, Schematic drawings and schedule of requirement/material must be submitted and enclosed with the tender by the tenderer and failing which the tender shall be liable to be rejected.
3. Tenderer shall quote the rate / cost of individual spares in the tender offer while submitting the offer for spares.
4. This Specification comprises of 15 pages.
5. The Tenderer shall submit schedule of material /requirement of Supply without price as above in Section 1.0 to Section 2.0 of AIR Specification (two bid system i.e. technical bid and commercial bid).
6. The tenderer shall submit the tender offer to AIR in the format given below.

Sr No. of AIR Spec. Section wise & Clause wise	Details of AIR Spec.	Performance figures of equipment, schematic drawing Nos. and Model No.	Compliance Yes/NO	Deviations in case of non-compliance	Ref to tender page No.	Remarks
Section 1.0						
Section 2.0						
Section 3.0						
Section 4.0						

7. The tenderers shall fill up their name in CAPITAL LETTERS, full address with pin code, phone number, fax number, e-mail address and with their full signatures before the submission of their tender offer to AIR.

GENERAL SPECIFICATIONS :

SECTION - 1.0

1.0 Please refer tender documents for general term and conditions of contract for supply including all the commercial aspects like ; Packing and Packing List, Insurance and Marine Risk etc., Guarantee, Payment terms, Penalty/Compensation for Delay, Damages and Liabilities, Time Period and Extension for Delay , Foreclosure of Contract due to Abandonment or Reduction in Scope of Supply , Cancellation of Contract in Full or Part, Recovery of Security Deposit, Performance Guarantee, Unsatisfactory Workmanship, Damages Incurred During transit, Tenderer Liable for Damages, Defects, Recovery of Compensation, Ensuring Payment and Amenities, Tenderer to Indemnify Government against Patent Rights, Release of Security Deposit, Safety Code, insurance from manufacturer's works/factory to respective site etc **i.e. in totality** .

2.0 INSPECTION:

Detailed inspection will be carried out by AIR representative as per details given in Section-3.0

Complete specifications & details will be checked and all parameter values will be measured. Acceptance to this has to be clearly stated in the tender document by the tenderer.

Prior intimation for carrying out Inspection is to be given by the tenderer to the indenter in advance .

3.0 Stereo FM Digital Audio Broadcast processor equipment as per AIR specification shall be used for round the clock for Continuous operation without any interruption in VHF FM broadcast service at AIR station for FM transmitter/studio setup.

3.1 INFORMATION TO BE SUPPLIED:

3.1.1 LANGUAGE / UNITS:

All information supplied by the Tenderer & all markings, notes, designation on the drawings & associated write-ups shall be in "English language" only.

All dimensions on drawings and all references to weights and measures and quantities shall be in metric units.

3.1.2 Compliance Statement , Complete as per AIR specification, parawise/ each clause .

- 3.1.3 Complete printed information in support of compliance statement should be furnished with the tender to assess the full merit of the offer. Similar information should be furnished in respect of Auxiliary items, Accessories and Spares etc. The tender & the associated information should be submitted in duplicate.
- 3.1.4 Descriptive information giving complete details of Equipment offered .
- 3.1.5 Stereo FM Digital Audio Broadcast processor Block diagram & full Schematic drawings.
- 3.1.6 Various technical details drawings and technical description of Stereo FM Digital Audio Broadcast processor.
- 3.1.7 Detailed Schedule of Materials offered in conformity with the Schedule of requirement/material.
This list should be in the same format as in the price bid without indicating the prices.
- 3.1.8 Dimensions(overall sizes), weights & photographs/ illustrations of the interior of the Stereo FM Digital Audio Broadcast processor. This should include characteristics affecting the environment, for example; heat dissipation, electromagnetic interference(EMI)/electromagnetic compatibility(EMC). This information should be in CD form also.
- 3.1.9 In support of Tenderer's claim an "up-to-date" list of their customers alongwith complete set of actual performance figures i.e. Stereo FM Digital Audio Broadcast processor Performance measurement taken shall be furnished alongwith the tender.

4.0 INFORMATION TO BE SUPPLIED BY THE TENDERER AFTER AWARD OF SUPPLY ORDER :

One printed & duely bound set of *Installation, Commissioning, Operation & Maintenance* manuals for Stereo FM Digital Audio Broadcast processor Equipment shall be supplied to the Director Engineering (Project), P&D Unit DG AIR New Delhi within one month of Acceptance of Tender.

All the details should be complete and exhaustive. One Soft copy of these documents is also required on CD for use with PC.

5.0 INFORMATION TO BE SUPPLIED ALONGWITH EQUIPMENT:

5.1 For each Stereo FM Digital Audio Broadcast processor one set of printed & duely bound copy of manuals and books for Installation, Testing, Commissioning, Operation, Maintenance, Fault diagnosis are to be supplied to each consignee.

5.2 Fourteen Complete sets , of these documents as per 5.1, against the order for Stereo FM Digital Audio Broadcast processor are required to be sent to (irrespective of number of Stereo FM Digital Audio Broadcast processor ordered), the following officers / offices / places:

5.2.1	DE(Proj.), P&D Unit, DG:AIR	- 1 sets
5.2.2	Zonal Office (Project Wing)	- 5 sets (One for each Zone)
5.2.3	Zonal Office (Maintenance Wing)	- 5 sets (One for each Zone)
5.2.4	DE(Transmitter Maintenance), DG:AIR	- 1 set
5.2.5	Technical Library, P&D Unit, DG:AIR	- 1 set
5.2.6	Staff Training Institute (Technical)	- <u>1 set</u>
	Total	- <u>14 sets</u>

One Soft copy of these documents is also required on CD for use with PC to be delivered to DE(Proj), P & D Unit, DG AIR .

5.3 One copy of the Inspection Report - of the inspection carried out at factory - should also be sent to all officers and offices as stated in above 5.1 and 5.2 and each consignee.

6.0 DELIVERY OF EQUIPMENT

Within three months from date of placing of order .

SECTION 2.0 (TECHNICAL SPECIFICATIONS)

STEREO FM DIGITAL AUDIO BROADCAST PROCESSOR

1.0 The specification for Stereo FM Digital Broadcast Audio Processor is meant for broadcast purpose in the audio chain of VHF FM transmitters at various places in All India Radio.

The processor should have Digital Signal Processing technique.

It should be able to provide multi band (minimum 5) compression, limiting and clipping , automatic wideband gain control.

The processor should have phase limiter to maximize audible transparency and should also have provision for stereo enhancement and high/low frequency enhancement.

The processor should have in-built feature of multiple user pre-set. The user pre-set should be stored in the memory and without any battery back up. By using the processor user pre-set, the factory pre-set of the Processor should not change.

The equipment shall be capable for continuous operation to ensure the uninterrupted broadcast without degradation in performance.

2.0 The Stereo FM Digital Audio Broadcast processor equipment shall have the following ;

2.1 The Stereo FM Digital Audio Broadcast processor should accept following inputs .

2.2.1 Digital AES / EBU inputs

2.2.2 Analogue left-right inputs

2.2.3 Sub-carrier inputs (Subsidiary Channel Authorization and Radio Data System/Radio Broadcast Data System)(SCA and RDS/RBDS)

2.2 The Stereo FM Digital Audio Broadcast processor should give following outputs.

2.2.1 Digital AES/EBU left-right output

2.2.1 Analogue left-right output

2.2.2 Composite stereo output/ multiplexed output.

2.3 Necessary function switches such as level/gain control etc. should be available on the front panel. All these control shall be rugged and reliable.

2.4 The processor should have visual monitoring of various technical parameters on the front panel and a compact one unit for ease of operation .All the monitoring must be front panel. In case a separate PC is required for control and operation of Stereo FM Digital Audio Broadcast processor the same must be quoted. The required computer should be of ISO certified manufacturer and of latest configuration.

2.5.1 (Optional) : It should be capable for operation ---- controlled remotely

with its Remote Control system.

It should have visual monitoring of various technical parameters through remote control through a PC etc.

2.5.2 (Optional): It should be capable for operation with Telemetry . It should have visual monitoring of various technical parameters through telemetry system also through a PC , modem etc.

2.6 The equipment is to be properly earthed with the existing equipment earthing system in the transmitter hall.

2.7 Radio Frequency Interference (RFI)/Electromagnetic Compatibility (EMC) filter shall be provided at mains input of the Stereo FM Digital Broadcast Audio Processor as per relevant provisions of standards for effective rejection of the interference from the high power transmitters operating in the premises.

These Stereo FM Digital Broadcast Audio Processor will be used in High Power Transmitter halls (upto 250 KW transmitter RF output power) i.e. the rack with full complement of equipment as to operate in a high RF field. As such all the specifications of the individual equipment as well as the full chain, are to remain valid in high RF fields.

5.0 SPECIFICATION OF EQUIPMENT ;

5.1	ANALOG AUDIO INPUT	
5.1.1	Configuration:	Stereo
5.1.2	Nominal Input Level:	Software adjustable from -10.0 to +12.0 dBu .
5.1.3	Maximum Input Level:	+24 dBu
5.1.4	Connectors:	Two XLR-type, female, EMI-suppressed.
5.1.5	A/D Conversion :	Minimum, 24-bit

5.2	ANALOG AUDIO OUTPUT :	
5.2.1	Configuration :	Stereo. Flat or pre-emphasised (at 50 μ s or 75 μ s), software-selectable.
5.2.2	Output Level(100% peak modulation):	Adjustable from -6 dBu to +20 dBu peak, into 600 Ω or greater load, software-adjustable.

5.2.3	Signal-to-noise: (20 Hz to 15 KHz)	≥ 80 dB unweighted
5.2.4	Distortion: (20 Hz to 15 KHz)	≤ 0.02 % THD.
5.2.5	Cross Talk (20 Hz to 15 KHz)	- 70 dB
5.2.6	Connectors:	Two XLR-type, male, EMI-suppressed.
5.2.7	D/A Conversion:	Minimum, 24-bit

5.3	DIGITAL AUDIO INPUT	
5.3.1	Configuration :	Stereo, AES/EBU standard, 24-bit resolution.
5.3.2	Sampling Rate :	32, 44.1 or 48 KHz automatically selected.
5.3.3	Connector :	XLR-type, female, EMI-suppressed.
5.3.4	Input reference level	Variable within the range of -25.0 to -10.0 dBFS
5.3.5	De-emphasis:	Software-selectable

5.4	DIGITAL AUDIO OUTPUT	
5.4.1	Configuration:	Stereo AES/EBU standard.
5.4.2	Sample Rate :	32, 44.1 or 48 KHz, selected in software
5.4.3	Connector :	XLR-type, male, EMI-suppressed.
5.4.4	Output Level(100% peak modulation) :	-20.0 to 0.0 dBFS, software-controlled.

5.5	COMPOSITE BASEBAND OUTPUT:	
5.5.1	Configuration :	Two outputs, with individual level controls.
5.5.2	Maximum Output Level:	+12.0 dBu
5.5.3	D/A Conversion:	Minimum, 24-bit
5.5.4	Signal-to-Noise Ratio:	≥ 85 dB.

	(20 Hz to 15 KHz)	
5.5.5	Distortion : (20 Hz to 15 KHz)	$\leq 0.02\%$ THD.
5.5.6	Stereo Separation: At 100% modulation (30 Hz to 15 KHz)	$>65\text{dB}$.
5.5.7	Cross talk-Linear main channel to sub channel, or sub channel to main channel	-75 dB, main channel to sub channel, or sub channel to main channel
5.5.8	38 KHz Suppression:	≥ 70 dB.
5.5.9	Pilot Protection :	-60 dB relative to 9% pilot injection, ± 250 Hz
5.5.10	57 KHz (RDS)Protection:	-50 dB relative to 4% sub carrier injection, ± 1.0 KHz.
5.5.11	Connectors:	Two BNC, EMI suppressed.

5.6	REMOTE CONTROL INTERFACE (OPTIONAL)	
5.6.1	Configuration:	Eight (8) inputs, opto-isolated and floating
5.6.2	Voltage :	6-24V AC or DC.
5.6.3	Connector :	Suitable for 5.6.1 , EMI suppressed.
5.6.4	Control :	User-programmable for multiple user presets, factory presets, bypass, test tone, stereo or mono modes, analog input, digital input.

5.7	REMOTE COMPUTER INTERFACE (OPTIONAL)	
5.7.1	Configuration:	Transmission Control Protocol (TCP)/ Internet Protocol (IP) protocol via modem or Ethernet interface.
5.7.2	Connectors:	RS-232 , EMI-suppressed. Ethernet or Modem card supported with PCMCIA .

5.8	POWER	
5.8.1	Voltage :	230 Volt AC , 50Hz
5.8.2	Connector :	IEC, EMI-suppressed. Detachable 3-wire power cord supplied.
5.8.3	Safety Standards :	ETL listed to UL standards, CE marked.

5.9	ENVIRONMENTAL	
5.9.1	Operating Temperature/RH:	- 5° C to 50°C for all operating voltage ranges. & 95% , NC.
5.9.2	Dimensions (Approximate) (W x H x D):	(485 mm x 100 mm x 425mm)

5.10	TECHNICAL DESCRIPTION	WHETHER BUILT IN OR NOT (Tenderer shall reply clearly)
5.10.1	The processor should have Digital Signal Processing technique.	YES/NO
5.10.2	It should be able to provide multi band (minimum 5) compression, limiting and clipping , automatic wideband gain control.	YES/NO
5.10.3	The processor should have phase limiter to maximize audible transparency and should also have provision for stereo enhancement and high/low frequency enhancement.	YES/NO
5.10.4	The processor should have in-built feature of multiple user pre-set. The user pre-set should be stored in the memory and without any battery back up. By using the processor user pre-set, the factory pre-set of the Processor should not change.	YES/NO
5.10.5	The equipment shall be capable for continuous operation to ensure the uninterrupted broadcast without degradation in performance.	YES/NO

5.10.6	Necessary function switches such as level/gain control etc. should be available on the front panel. All these control shall be rugged and reliable.	YES/NO
5.10.7	The processor should have visual monitoring of various technical parameters on the front panel and a compact one unit for ease of operation .All the monitoring must be front panel .	YES/NO
5.10.8	The Stereo FM Digital Audio Broadcast processor should accept following inputs . 5.10.9.1 Digital AES / EBU inputs 5.10.9.2 Analogue left-right inputs 5.10.9.3 Sub-carrier inputs (SCA and RDS/RBDS	YES/NO YES/NO YES/NO
5.10.9	The Stereo FM Digital Audio Broadcast processor should give following outputs. 5.10.9.1 Digital AES/EBU left-right output 5.10.9.2 Analogue left-right output 5.10.9.3 Composite stereo output/ multiplexed output.	YES/NO YES/NO YES/NO
5.10.10	(Optional) : It should be capable for operation ---- controlled remotely with its Remote Control system. It should have visual monitoring of various technical parameters through remote control through a PC etc.	YES/NO
5.10.11	(Optional):It should be capable for operation with Telemetry . It should have visual monitoring of various technical parameters through telemetry system also through a PC , modem etc.	YES/NO

5.11	The The Stereo FM Digital Audio Broadcast processor shall essentially have the following :
5.11.1	<u>Protection against current over-loads</u> : The equipment should mute in case of overload and revert to normal functioning once overload ceases to exist.
5.11.2	<u>Protection against thermal overload</u> : Temperature of equipment inside component should be monitored and the equipment should get muted with a visual indication whenever temperature exceeds permissible limits. In case of excessive temperature of inside component, the equipment should be protected.
5.11.3	The equipment should have protection against open circuit, full short circuit, ultrasonic frequencies and high RF fields
5.11.4	It should be switchable to all operating modes as per Technical specification.
5.11.5	Necessary function switches such as level/gain control etc. should be available on front panel. These controls shall be rugged and reliable.
5.12	<u>ACCESSORIES</u> : All necessary accessories like connection cords and connectors shall be supplied along with the units. The standard accessories should be clearly mentioned in the tender. Also, optional accessories, if considered useful/recommended by the supplier, should be quoted separately with technical details.
5.13	The equipment shall be mounted in the existing 19" rack (Stereo Programme input - cum -- monitoring rack).
5.14	<u>Protection against RF</u> : The equipment is to be provided with adequate interference shielding so as to perform satisfactory operation in the transmitter hall, without degradation in performance, which houses other high power medium wave or FM transmitters.
5.15	<u>Earthing</u> : An earth terminal shall be provided in the equipment body for connecting audio earth connection.
5.16	<u>SPARES(OPTIONAL)</u> : Essential and recommended spares components , PCBs, and modules shall be quoted separately including remote operation(optional) and telemetry(optional) .

SECTION 3.0 - INSPECTION

INSPECTION DETAILS

The inspection for acceptance of Stereo FM Digital Audio Broadcast processor will be carried out in accordance with Acceptance Test Procedure (ATP). Complete details and specifications of the Stereo FM Digital Audio Broadcast processor will be checked and all parameter values will be measured.

The complete Acceptance Test Procedure (ATP) will be prepared by the manufacturer and submitted for approval. This Procedure after modification (if required during the process of approval) shall form the basis for Performance / Inspection Tests to be carried out. ATP will also indicate full details of set up for measuring / testing equipment to be deployed during the Performance Measurement/ Inspection Test.

Operation checking of the complete Stereo FM Digital Audio Broadcast processor and measurements will be carried out as per Specification. Complete list of these measuring instruments along with their set ups may be forwarded along with the Tender.

Exhaustive checking's/measurements will be carried out so as to completely check the compliance of the Stereo FM Digital Audio Broadcast processor with the requirements as projected in the specifications.

It is mandatory that all these checking and measurements i. e. Operation checking of the Stereo FM Digital Audio Broadcast processor and measurements are carried out well in advance and these measurements details, graphical printout notes and figures must be available, at the time of inspection.

These must also be submitted to All India Radio along with the call for inspection of the Stereo FM Digital Audio Broadcast processor well in advance for analyzing etc.

Following information should also form part of above data which will also be checked for each Stereo FM Digital Audio Broadcast processor during inspection by indenter's representative at manufacturer's works :-

- 1 Make , type , model no and country of origin of the accessories and spares.
2. Measurements of all parameters as per Section II - of Technical Specification . All the parameters will be measured.

ANNEXURE- 4.0 SCHEDULE OF MATERIAL/REQUIREMENT FOR SUPPLY
(UNPRICED) (FOR ONE Set of Stereo FM Digital Audio Broadcast Processor)

SNo.	Description	Quantity																					
1.0	Stereo FM Digital Audio Broadcast processor equipment complete as per Specification No.: Stereo FM Digital Broad Audio Pro/ 10th Plan /1/ October- May /2006-D(TD/FM)	1 Set complete																					
2.0	Power supply cables, cords, audio cables and connectors for equipment .	1 set																					
3.0	Any other item offered by the firm for the completeness of equipment.(Details to be given)	1 lot																					
4.0	One printed & duly bound set of Installation, Commissioning, Operation & Maintenance manuals for Stereo FM Digital Audio Broadcast processor Equipment to DE(Project),P&D Unit, DG;AIR . One Soft copy of these documents is also required on CD for use with PC	1 Set																					
5.0	One printed & duly bound set of Installation, Commissioning, Operation & Maintenance manuals for Stereo FM Digital Audio Broadcast processor Equipment to Consignee.	1 Set																					
6.0	<p>Fourteen Complete set , printed & duly bound set of Installation, Commissioning, Operation & Maintenance manuals for Stereo FM Digital Audio Broadcast processor Equipment are required to be sent to (irrespective of number of Stereo FM Digital Audio Broadcast processor ordered), the following officers / offices / places:</p> <table style="margin-left: 40px;"> <tr> <td>6.1</td> <td>DE(Proj.), P&D Unit, DG:AIR</td> <td>- 1 set</td> </tr> <tr> <td>6.2</td> <td>Zonal Office (Project Wing) (One for each Zone)</td> <td>- 5 sets</td> </tr> <tr> <td>6.3</td> <td>Zonal Office (Maintenance Wing) (One for each Zone)</td> <td>- 5 sets</td> </tr> <tr> <td>6.4</td> <td>DE(Transmitter Maintenance), DG:AIR</td> <td>- 1 set</td> </tr> <tr> <td>6.5</td> <td>Technical Library, P&D Unit, DG:AIR</td> <td>- 1 set</td> </tr> <tr> <td>6.6</td> <td>Staff Training Institute (Technical)</td> <td>- <u>1 set</u></td> </tr> <tr> <td></td> <td style="text-align: right;">Total</td> <td>- <u>14 sets</u></td> </tr> </table> <p>One Soft copy of these documents is also required on CD for use with PC to be delivered to DE(Proj), P & D Unit, DG AIR .</p>	6.1	DE(Proj.), P&D Unit, DG:AIR	- 1 set	6.2	Zonal Office (Project Wing) (One for each Zone)	- 5 sets	6.3	Zonal Office (Maintenance Wing) (One for each Zone)	- 5 sets	6.4	DE(Transmitter Maintenance), DG:AIR	- 1 set	6.5	Technical Library, P&D Unit, DG:AIR	- 1 set	6.6	Staff Training Institute (Technical)	- <u>1 set</u>		Total	- <u>14 sets</u>	14 Sets
6.1	DE(Proj.), P&D Unit, DG:AIR	- 1 set																					
6.2	Zonal Office (Project Wing) (One for each Zone)	- 5 sets																					
6.3	Zonal Office (Maintenance Wing) (One for each Zone)	- 5 sets																					
6.4	DE(Transmitter Maintenance), DG:AIR	- 1 set																					
6.5	Technical Library, P&D Unit, DG:AIR	- 1 set																					
6.6	Staff Training Institute (Technical)	- <u>1 set</u>																					
	Total	- <u>14 sets</u>																					

ANNEXURE-4.0 (II) (OPTIONAL)

**SCHEDULE OF MATERIAL/REQUIREMENT FOR SUPPLY (OPTIONAL
INCLUDING ESSENTIAL AND RECOMMENDED SPARES)
(UNPRICED) (FOR ONE Set of Stereo FM Digital Audio Broadcast Processor)**

SNo.	Description	Quantity
	(OPTIONAL) :	
1.0	ESSENTIAL AND RECOMMENDED SPARES :	
1.1	Modules	1 Set
1.2	PCBs	1 Set
1.3	Any other item offered by the firm for the completeness of equipment	1lot
2.0	Remote Computer Interface (optional)	1 Set
3.0	Telemetry Interface etc. (optional)	1 Set