

PRASAR BHARTI  
BROADCASTING CORPORATION OF INDIA  
DIRECTORATE GENERAL: DOORDARSHAN

**Specifications for Digital Peripherals - Audio & Video Equipment**

Specifications No.: SD 08/2010

Dated: 19.05.10

**1. Scope:**

The specifications lay down the performance requirement of the broadcast quality Audio Video peripheral and associated equipment, which are required for TV Studio chain of Doordarshan network. The equipment are to be installed at different TV Studios/OB Van in Doordarshan Network.

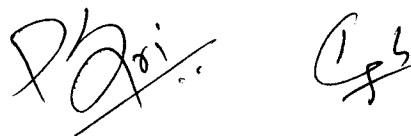
The broadcast quality peripheral equipment is required for the processing of Audio and video in the TV Studio/OB chain. The following broadcast quality peripheral equipment are required:

**(I) Category-I: Required for Analog/Digital Video Processing in the Chain**

S. No.	Item Description
1.	Analog Video Distribution Amplifier
2.	Digital Video Distribution Amplifier (with Reclocking)
3.	Analog composite (PAL) to Serial Digital Component (SDI) Converter
4.	Serial Digital Component (SDI) to Analog Composite (PAL) Converter
5.	Analog Component (YUV) to Serial Digital Component (SDI) Converter
6.	Serial Digital Component (SDI) to Component Analogue (YUV) Converter
7.	Analog Audio & SDI Video Multiplexer Unit( Embedder)
8.	Analog Audio & SDI Video De-multiplexer unit (De-Embedder)
9.	19" Rack Frame mounting with auto switchable redundant power supply unit to hold 10 nos. of different cards.

**(II) Category-II: Audio Peripheral:**

S. No.	Item Description
1.	Broadcast Quality Analog Dual Mono/Stereo Audio Distribution Amplifier (ADA)
2.	Rack frame to hold 4 ADA cards with auto switchable redundant power supply.





#### 4. General Technical Specifications for Category-I:

Each offered item has to be complied for the following general specifications (wherever applicable) in the quote.

S. No.	Parameter	Performance
1.	<b>Analogue video System</b>	PAL, 2:1 interlace 625 lines, 25 frames, 50 fields.
2.	<b>Digital processing</b>	
(a)	Sampling ratio	4:2:2
(b)	Sampling rate (Y/Cb/Cr)	13.5/6.75/6.75 MHz
(c)	Quantization	10 bit or better
(d)	Data rate	270 M bit/sec. Confirming to ITU-R- 601 and ITU-R- 656 with respect to interface
3.	<b>Input/output Handling</b>	Minimum 10 bit
4.	<b>Connectors</b>	2 (Configurable as Dual Mono or Single Stereo)
(a)	Video	BNC as per IEC 169-8
(b)	Control	BNC, Mini XLR, RS-422 or GPI.
5.	<b>Signal</b>	
(a)	<b>Input/output Level</b>	
(b)	(i) Analog Composite Video	1 Vp-p, 0.3 V Sync. across 75 $\Omega$ /BNC
	(ii) Analog Component (Y, B-Y, R-Y)	0.7 Vp-p across 75 $\Omega$ /BNC
	(iii) Component SDI signal	0.8 Vp-p $\pm$ 10% across 75 $\Omega$ /BNC
(c)	<b>Reference signal</b>	Composite/Black Burst/Digital black burst (whichever applicable)
(d)	<b>Clamping</b>	Reference to Sync
(e)	<b>Filtration</b>	As per ITR-R.BT 601
(f)	<b>SDI Output Jitter &amp; Rise/fall time</b>	As per SMPTE 259 M standards
6.	<b>Operating temperature &amp; Relative Humidity</b>	5 to 40 Degrees Celsius and 95% non-condensing maximum.
7.	<b>Rack frame</b>	Standard 19 inches Rack Mounting frame/ housing to hold 10 different cards with Auto-switchable redundant power supply unit
8.	<b>Power Supply</b>	230 $\pm$ 5% Volts, 50 Hz

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#### **4.1 Detailed Technical Specifications for Analog Video Distribution Amplifier**

**(a) Input:**

No. of Input : 1 No. with Differential looping, 75Ω, BNC, nominal 1Vp-p±10%

**(b) Processing:**

- i. Input Return loss : > 40 dB upto 5 MHz
- ii. Input Equalisation : Upto 300 metres for Belden 1694A or equivalent cable
- iii. Frequency response : ± 0.5 dB upto 10 MHz or better
- iv. Differential gain : < 0.2 % at 5 MHz
- v. Differential Phase : < 0.2 Deg. at 5 MHz
- vi. Output return loss : > 40 dB upto 10 MHz
- vii. Signal to Noise Ratio : >65 dB (un-weighted)

**(c) Output:**

Nos. of Outputs : 8 Nos. Or more/nominal 1 V p-p±10%

#### **4.2 Detailed Technical Specifications for Digital Video Distribution Amplifier (with Reclocking)**

**(a) Input** : 1 no. SDI 270 Mbps

**(b) Processing**

- i. Input Equalisation : Minimum 200 metres for Belden 1694A or equivalent cable
- ii. Input Return Loss : >15 dB at 270 Mbps
- iii. Output Return Loss : >15 dB at 270 Mbps

**(c) Output**

Nos. of Outputs : 8 or more SDI reclocked outputs



#### **4.3 Detailed Technical Specifications for Analog composite (PAL) to Serial Digital Component (SDI) Converter**

##### **(a) Input**

Input : PAL Composite signal

##### **(b) Processing**

- i. Input Return loss : > 35 dB at 5.5 MHz
- ii. Input Equalisation : Minimum 200 metres for Belden 1694A or equivalent cable
- iii. Frequency response :  $\pm 0.5$  dB upto 5.5 MHz
- iv. Differential gain : <1.0 %
- v. Differential Phase : <1.0 Deg.
- vi. Output return loss : >15 dB at 270 MHz
- vii. Signal to Noise Ratio : >57dB

##### **(c) Output:**

Nos. of Output : 4 Nos. or more SDI at 270 Mbps

#### **4.4 Detailed Technical Specifications for Serial Digital Component (SDI) to Analog Composite (PAL) Converter**

##### **(a) Input**

Input : 1 No. SDI/270 Mbps

##### **(b) Processing**

- i. Input Equalisation : Minimum 200 metres for Belden 1964A or equivalent Cable.
- ii. D/A conversion : 10 bits or more
- iii. Input Return loss : > 15 dB at 270 MHz
- iv. Serial Output Return Loss : > 15 dB at 270 MHz
- v. Analog Composite Return Loss : > 35 dB upto 5.5 MHz
- vi. Frequency response :  $\pm 0.15$ dB upto 5.0MHz or better
- vii. S/N ratio : >60 dB or better (un-weighted)
- viii. Differential gain : <1%
- ix. Differential phase : <1.5 Deg.

##### **(c) Output**

Output : 3 Nos. or more analog composite outputs

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**4.5 Detailed Technical Specifications for Analog Component (YUV) to Serial Digital Component (SDI) Converter**

**(a) Input:**

Input : 1 set BNC for Analogue Component,  
(Y, B-Y, R-Y) 0.7 Vp-p

**(b) Processing:**

- i. Return loss : > 35 dB upto 5.5 MHz
- ii. Output Return Loss : > 15 dB at 270 MHz
- iii. Frequency response
  - Y : ± 0.1 dB upto 5.5 MHz or better
  - B-Y & R-Y : ± 0.2 dB upto 2.75 MHz or better

**(c) Output:**

Nos. of Outputs : 2 or more Component SDI (270 Mbps)

**4.6 Detailed Technical Specifications for Serial Digital Component (SDI) to Component Analogue (YUV) Converter:**

**(a) Input:**

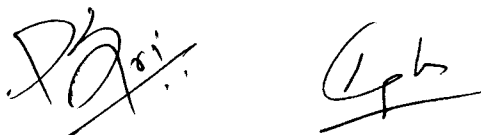
Input : Serial Digital Component (SDI)

**(b) Processing:**

- i. Input Return loss : >15 dB at 270 Mbps
- ii. Input Equalisation : Minimum 200 metres for Belden 1694A or equivalent cable.
- iii. Signal to Noise Ratio : > 60 dB
- iv. Output Return Loss : > 35 dB upto 5.5 MHz
- v. Frequency response
  - Y : ± 0.1 dB upto 5.5 MHz
  - B-Y & R-Y : ± 0.2 dB upto 2.75 MHz

**(c) Output:**

Nos. of Output : 1 or more set BNC/Analogue  
Component, (Y, B-Y, R-Y), 0.7 Vp-p

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#### **4.7 Detailed Technical Specifications for Analog Audio & SDI Video Multiplexer Unit( Embedder)**

##### **(a) Input:**

- i. Analog Audio Inputs : 2 or more analog audio ( 2mono or one stereo) with high input impedance > 10 K  $\Omega$  and selectable 600  $\Omega$  termination with adjustable inputs level upto 24 dBu
- ii. Serial digital video Input : 1 no. SDI (270 Mbps)

##### **(b) Processing:**

- i. Audio processing : 20 bits or more, 48 kHz sampling
- ii. Audio Frequency Response :  $\pm 0.1$  dB (20 Hz to 20KHz) or better
- iii. Audio (THD + noise) : better than -90 dB at 1 kHz
- iv. Audio Dynamic range : 100 dB or more
- v. Audio Delay : Equal to Video Delay
- vi. Serial input return loss : > 15 dB at 270 MHz
- vii. Serial output return loss : > 15 dB at 270 MHz

##### **(c) Output:**

- Nos. of Outputs : 2 or more SDI signal with Embedded audio

#### **4.8 Detailed Technical Specifications for Analog Audio & SDI Video De-multiplexer unit (De-Embedder)**

##### **(a) Input:**

- input : 1 no. Serial Digital component with embedded audio presence indicator

##### **(b) Processing:**

- i. Audio processing : 20 bits or more, 48 kHz sampling
- ii. Audio Frequency Response :  $\pm 0.2$  dB (20 Hz to 20KHz) or better
- iii. Audio (THD + noise) : better than -90 dB at 1 kHz
- iv. Audio Dynamic range : 100 dB or more
- v. Audio Delay : Equal to Video Delay



- vi. Serial input return loss : > 15 dB at 270 MHz
- vii. Serial output return loss : > 15 dB at 270 MHz

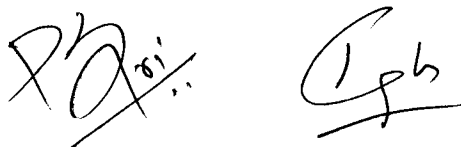
**(c) Output:**

- i. SDI Video Outputs : 2 or more
- ii. Analog Audio Out : 2mono or one stereo with output impedance 50  $\Omega$  or less

**5. Specifications for Category-II (Broadcast Quality Analog Dual Mono/single Stereo Audio Distribution Amplifier):**

**5.1 Essential Features:**

- (a) The required distribution amplifier should have excellent performance features like “high Input impedance”, “flat frequency response”, “carefully controlled roll-off”, “very low distortion” and “extremely high signal to noise ratio (S/N)” i.e. required distribution amplifier should have virtually transparent transmission and distribution path.
- (b) The required distribution amplifier should be dual and have two balanced analog audio channels with minimum four balanced outputs per channel.
- (c) Each of the input/outputs should also be configurable as dual mono or single stereo e.g single stereo in- 4 stereo out or single mono in- 8 mono out.
- (d) The required distribution amplifier should provide excellent output isolation and inter channel crosstalk, preferably by providing individual drivers for each output.
- (e) The required distribution amplifier should have the gain control knob on the front edge of the card for gain adjustment in steps of 0.5 dB.
- (f) The required amplifier must be of card type and should be fitted in industry standard 19” rack frame.
- (g) The rack frame should be fitted with auto-switchable redundant power supply units and should accommodate 4 or more amplifier cards in the same rack frame.
- (h) The offered rack frame/housing should be capable of necessary computer interface to enable the testing, alignment, remote monitoring and control of various parameters of the audio distribution amplifier. The necessary hardware and software interface should be offered as **optional** item.
- (i) The input & output connections should be through male & female XLR type. If necessary, 19” rack mountable breakout panel having XLR male &

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female connectors for Input and Output with 3 meter high quality shielded audio cable with necessary connector at amplifiers card end for interconnection should be offered alongwith the bid.

## 5.2 Technical Specifications:

<b>S. No.</b>	<b>Parameter</b>	<b>Performance</b>
<b>5.2.1 INPUT</b>		
1.	Channels	: 2 (Configurable as Dual Mono or Single Stereo)
2.	Impedance	: >10 K $\Omega$ balanced
3.	Maximum Level	: +24dBm on 600 $\Omega$ or better
4.	Common Mode Rejection	: > 50 dB @ 50 Hz
5.	Input Configuration	: 2 (Dual Mono or single Stereo)
<b>5.2.2 OUTPUT</b>		
1.	Channels	: 2 (Configurable as Dual Mono or Single Stereo)
2.	Impedance	: < 50 $\Omega$
3.	Outputs	: Minimum 4 as stereo or 8 as mono
4.	Output to Output isolation	: >68 dB, 20 Hz to 20 KHz
5.	Max Level	: +24dBm on 600 $\Omega$ or better
<b>5.2.3 PERFORMANCE</b>		
1.	S/N Ratio	: > 90 dB (unweighted) @ unity gain 20 Hz to 20 KHz
2.	Gain Range	: -6 to +24 dB adjustable with knob or potentiometer on the front edge of card
3.	Frequency Response	: < $\pm$ 0.25 dB 20 Hz to 20 KHz
4.	Total Harmonic Distortion	: < 0.025%, @ +22dBu at 1kHz
5.	Inter-channel cross talk	: > 90 dB, 20 Hz to 20 KHz
<b>5.2.4 ENVIORNMENTAL</b>		
1.	Power Supply	: 230 $\pm$ 5% V AC @50 Hz
2.	Operating Temperature	: 0 $^{\circ}$ C to 40 $^{\circ}$ C
3.	Humidity	: 0to 90% Non-condensing

*Parisi* *QPL*

## 6. Software:

All the necessary software required for proper working of the system is to be supplied in original and should be licensed to Doordarshan with perpetual validity.

## 7. Compliance:



- (a) Any substandard equipment included in the offer may cause the rejection of complete offer with the sole responsibility of bidder.
- (b) The firm should provide the offered un-priced bill of material in electronic form also in addition to the hard copy for ease of technical evaluation.
- (c) **A point-by-point compliance statement from the principal manufacturer in respect of all the points laid down in these specifications is to be enclosed along with the offer in the format given below. Mere signature on the copy of the specifications shall not be accepted as a compliance statement.**

**The figures so mentioned should be supported by record of these in the technical literature enclosed with the tender and reference to the page number of enclosed literature for all features and technical specifications should be mentioned in the relevant column. Offers without the compliance statement or with incomplete compliance statement will liable to be rejected with the sole responsibility of the bidder. Any deviation from the specification detailed in the compliance statement is to be highlighted separately.**

Sr. No of DD specs.	DD specs.	Compliance (Yes/No)	Performance Fig. of equipment Offered.	Reference to the Page Number of enclosed literature	Deviations, in case of non-compliance	Optional items if any reqd. to make the sys. Compliant to DD specs.	Features in the offered Product which exceeds DD specs.

## 8. Accessories:

All the essential accessories like power cables, power supply units, software and connector etc. required to complete the system should be offered by the firm and the firm should certify the completeness of the system. All the optional items should also be quoted separately. The firm must provide enough details about such optional items to decide its utility.

**9. Documentation:**

One set of printed technical and operation & maintenance manuals for all the equipments are to be provided on non-returnable basis along with the tender to facilitate the technical evaluation, otherwise the tender is liable to be ignored. The successful bidder will have to supply one set of printed operation, service and maintenance manuals with respect to each equipment.

**10. Guarantee:**

- (a) The system should be guaranteed for two years of trouble free operation from the date of supply. In case of any equipment failure including software and hardware within this period, the same shall be rectified or replaced free of cost to Doordarshan.
- (b) The guarantee should cover all hardware, software and modules of the complete system.

**11. Demonstration:**

If necessary, the firm may be asked for demonstration of the offered system as part of the technical evaluation. In such case the firm will have to make suitable arrangement for the demonstration of the offered system at Doordarshan Bhawan, New Delhi, on notice of 7 days. Accordingly the firm should be in readiness for demonstration on a notice of 7 days.

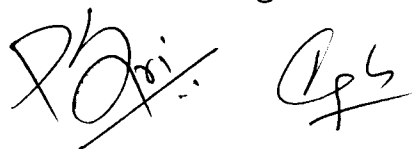
**12. Inspection:**

The equipment shall be subjected to inspection by Doordarshan officials at New Delhi.

**13. Enclosures:**

The bidder must necessarily submit the following enclosures along with the technical bid:

- (a) Compliance statement with respect to all the points of the specifications duly signed by the OEM.
- (b) The reference to the page number of enclosed literature for all features and technical specifications should be essentially mentioned in the relevant column of the compliance statement.
- (c) Technical manuals/Detailed technical literature/catalogues for all the offered products for substantiating the model no. and technical specification.

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- (d) **Model specific broadcast user list of the offered product.**
- (e) Any other document mentioned elsewhere in the tender document.

**The tender is liable to be rejected in the absence of the above enclosures with the sole responsibility of the bidder.**

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**Category-I:**

**Total Quantity Required: 31 Sets**

**Bill of Material per Set**

<b>Sl. NO.</b>	<b>Details of Item</b>	<b>Qty. per Set</b>
1)	Analog Video Distribution Amplifier	2 Nos.
2)	Digital Video Distribution Amplifier (with Reclocking)	7 Nos.
3)	Analog composite (PAL) to Serial Digital Component (SDI) Converter	1 No.
4)	Serial Digital Component (SDI) to Analog Composite (PAL) Converter	<b>NIL</b>
5)	Analog Component (YUV) to Serial Digital Component (SDI) Converter	<b>NIL</b>
6)	Serial Digital Component (SDI) to Component Analogue (YUV) Converter	<b>NIL</b>
7)	Analog Audio & SDI Video Multiplexer Unit(Embedder)	2 Nos.
8)	Analog Audio & SDI Video De-multiplexer unit (De-Embedder)	2 Nos.
9)	19" Rack Frame mounting with auto switchable redundant power supply unit.	2 Nos.
10)	Operation manual/User Guide/ Technical Manual/ Installation Manual etc.	1 Set
11)	Service & Maintenance Manuals	1 Set

**Category-II:**

**Total Quantity Required: 31 Sets**

**Bill of Material per Set**

<b>Sl. No.</b>	<b>Details of Item</b>	<b>Qty. per Set</b>
1)	Analog Dual Mono/Stereo Audio Distribution Amplifier	2 Nos.
2)	19" Rack Frame mounting with auto switchable redundant power supply unit.	1 No.
3)	19" rack mountable breakout panel having XLR male & Female connectors for Input and Output with 3 meter high quality shielded audio cable with necessary connector at amplifiers card end for interconnection.	2 Sets
4)	Operation manual/User Guide/ Technical Manual/ Installation Manual etc.	1 Set
5)	Service & Maintenance Manuals	1 Set



**EQUIPMENT UNDER CATEGORY-I & II ARE BEING PROCURED FOR  
THE FOLLOWING DOORDARSHAN CENTRES**

Sl. No.	Zone	Location of Doordarshan Centre	Qty.
1.	<b>North Zone (NZ)</b>	Jammu	1 set
2.		Chandigarh	1 set
3.		Bareilly	1 set
4.		Shimla	1 set
5.		Allahabad	1 set
6.		Mau	1 set
7.	<b>East Zone (EZ)</b>	Daltonganj	1 set
8.		Mujjafarpur	1 set
9.		Ranchi	1 set
10.		PPC Guwahati	1 set
11.		Siliguri	1 set
12.		shillong	1 set
13.		Tura	1 set
14.		Kohima	1 set
15.		Itanagar	1 set
16.		Imphal	1 set
17.		Silchar	1 set
18.		Dibrugarh	1 set
19.		Aizwal	1 set
20.		Agartala	1 set
21.		Sambalpur	1 set
22.	Gangtok	1 set	
23.	<b>South Zone (SZ)</b>	Gulbarga	1 set
24.		Pondicherry	1 set
25.		Vijayavada	1 set
26.		Portblair	1 set
27.	<b>West Zone (WZ)</b>	Panaji	1 set
28.		Raipur	1 set
29.		Rajkot	1 set
30.		Pune	1 set
31.		Indore	1 set
<b>TOTAL</b>			<b>31 sets</b>

*Pd*

*Opb*