

**GOVERNMENT OF INDIA, MINISTRY OF RAILWAYS**

सत्यमेव जयते

**SPECIFICATION FOR  
PUBLIC ADDRESS (PA) SYSTEM****SPECIFICATION NO. RDSO/SPN/TC/63/2006****Version-1****Issued by**

TELECOM DIRECTORATE  
RESEARCH DESIGNS & STANDARDS ORGANISATION  
MANAK NAGAR, LUCKNOW-226011

**REVISIONS:**

Version	Chapter/ Annexure	Revision	Effective from Month/Year
RDSO/SPN/TC/63/2006	-	FIRST ISSUE	Nov-2006
RDSO/SPN/TC/63/2006, Ver.-1	All Pages	1 <sup>st</sup> Revision	Dec-2020

<b>DOCUMENT DATA SHEET</b>	
<b>Specification No:</b>	RDSO/SPN/TC/63/2006, Ver.-1
<b>Title of the document:</b>	Public Address (PA) System
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<b>Approved by:</b>	D. K. Singh Executive Director/Telecom
<b>Abstract:</b>	This document specifies technical specification of Public Address (PA) System.

<b>DOCUMENT CONTROL SHEET</b>			
Designation	Organization	Function	Level
Director/Telecom-1	RDSO	Member, Issuing Authority	Prepare
Executive Director/Telecom	RDSO	Approving Authority	Approval

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**I. SUMMARY:**

This document covers the technical requirements of Public Address System to be provided at Railway Stations for making announcement at platforms, concourse, foot over bridges etc.

**II. SOURCE:**

Specification RDSO/SPN/TC/63/2006, Ver.-1 has been prepared by RDSO, Lucknow as per Railway Board letter No. 2004/Tele/TCM/1, dated: 27/12/2005 and 03/04/2006.

**III. FOREWORD:**

This specification is circulated to customers/ Railways and field inspection units for comments.

In the absence of IRS specification, procurement may be made as per RDSO/SPN specification.

This specification requires the reference to the following specifications:

IRS: S23	Electrical signaling and interlocking equipment
RDSO/SPN/144	The Safety and reliability requirement of electronic signaling equipment
IS:9000	Basic environmental testing procedures for electronic and electrical items

Wherever, reference to any specifications appears in this document, it shall be taken as a reference to the latest version of that specification unless the year of issue of the specification is specifically stated.

For the purpose of this specification, the terminology given in IRS: S23 and RDSO/SPN/144 shall apply.

## 1.0 SCOPE:

The specification of Public Address System covers technical requirement of Call Station, Paging Microphone, System Controller, Booster Amplifier, and various types of loudspeakers like column speakers, horn speakers, sound projector speakers and ceiling speakers for making announcement at platforms, concourse, foot over bridges and other areas of railway stations.

## 2.0 SYSTEM DESCRIPTION:

A full Zonal Public Address System shall consist of Call Station, System Controller, Router, Booster Amplifiers, Paging Microphone, various types of loudspeakers, along with associated power supply arrangement and cables & wiring for making announcement at stations. Call Station is used to make announcement on zonal basis, output of which is connected to a System Controller. Depending on the number of zones and the output power required, suitable number of routers and booster amplifiers shall be connected to the system. Wirings to various type of loudspeakers fixed at different locations are to be done from the booster amplifiers.

Public Address System, suitable for small stations where zonal paging is not required, shall consist of a Paging Microphone, one or more booster amplifiers, and suitable speakers.

Schematic diagram of Public Address System to be provided at different categories of Railways stations showing the various elements (and their interconnections) has been given in diagram-1.

## 3.0 GENERAL REQUIREMENTS:

- 3.1 Original Equipment Manufacturer of Public Address System shall have base and service support in India, either directly or through authorized integrator/ agents / dealers / distributors.
- 3.2 Screened cable & shielded wires shall be used for signal transmission between different elements of the Public Address System to avoid effect of 25 KV, 50 Hz AC traction and other type of interferences.
- 3.3 All the equipments for PA system shall be designed such that their performance is not affected by 25 KA, 50Hz AC traction or 1500 Volts DC traction.
- 3.4 System shall have facility to announce on all the platforms at a time, or at only certain locations selected from the Call Station. This does not apply to C-category stations where no Call Station is used.
- 3.5 Suitable capacity of Constant Voltage Transformer (CVT) of standard make shall be provided to ensure stable power supply to all devices and equipments of PA system. Adequate capacity of 24 Volts maintenance free battery with charger suitable for telecom system shall also be provided to ensure battery back up of complete Public Address system for at least three hours or as specified by purchaser in case of interruption in normal supply.

Battery back up should be optional and to be provided as per discretion of purchaser.

- 3.6 The PA system shall be so designed as to work the farthest loudspeakers satisfactorily.
- 3.7 Separate standard cabinet of suitable dimension is to be provided in announcer room or equipment room to house all type of devices and equipments required for PA system such as System Controller, Routers, Booster Amplifiers, CVT, battery, charger and other accessories.
- 3.8 Cabinet should be made of aluminum of minimum thickness of 2 mm to achieve modular and ergonomic design for good maintainability. The cabinet should be powder coated, rust free enamel painting in black colour or any other colour as specified by purchaser. It should have front door of tinted toughened glass and a metal rear door. Adjustable shelves shall be provided to accommodate the equipments. 220 Volts AC distribution box with required numbers of sockets of atleast 220 Volts/ 5 amp rating shall be provided in the cabinet
- 3.9 The front and back sides of the cabinets shall have the facility for locking the equipment. Gland plates shall be provided on the top and bottom panel of cabinet for cable entry. Proper cable guides are also to be provided inside cabinet. Suitable ventilation should be provided from both sides and rear of cabinet such that possibility of dust accumulation inside the cabinet is minimized.
- 3.10 Public Address System shall also take audio input from PC Based Announcement System for making prerecorded announcements, playing music, slogans etc.

#### **4.0 TECHNICAL REQUIREMENTS:**

The various elements of the Public Address System shall be mainly followings:

##### **4.1 Call Station:**

- 4.1.1 Call Station shall be used for selecting a particular zone of the station for making announcements selectively.
- 4.1.2 Each call station should have provision for a minimum of 6 zones, which can be selected individually by pressing a button, or by dialing a code from a keypad. It should also be possible to press or dial a code for making announcements simultaneously in all zones.
- 4.1.3 Call Station shall be expandable up to 60 zones as per requirement by subsequent addition of modules / units.
- 4.1.4 A uni-directional dynamic microphone cartridge on a flexible gooseneck of minimum length 390mm should be provided on the Call Station for making announcements. The minimum frequency response (-10db) of the microphone cartridge shall be 140Hz - 10 KHz.

## Public Address (PA) System

- 4.1.5 The call station shall allow the operator to generate announcements to the selected zone. Suitable indication of the selected zone number should be provided on the Call Station by means of LED or a LCD panel.
- 4.1.6 Announcements going from the Call Station should override background music and any announcement being generated from a microphone connected to the System Controller.
- 4.1.7 The Call Station shall have provision for receiving computer generated analogue audio announcements, and passing them on to the zones selected by the Call Station operator.
- 4.1.8 The Call Station shall have a balanced audio output of 1 volt (nominal).
- 4.1.9 Mains voltage for operation of Call Station should be 220 V AC  $\pm 10\%$ , 50 Hz. Battery backup provisions shall also be provided. The battery voltage should be 24V DC,  $+20\%$  /  $-10\%$ . The power supply for the Call Station may be inbuilt, or provided as a separate unit.
- 4.1.10 The Call Station shall be capable of working in an ambient temperature range of  $-5^{\circ}\text{C}$  to  $+55^{\circ}\text{C}$  and relative humidity up to 95% at ambient temperature range of  $40^{\circ}\text{C}$  without any degradation.

**4.2. System Controller:**

- 4.2.1 System Controller shall receive audio signals as well as zone selection data from the Call Station. It shall generate suitable command signals to the routers to ensure that the announcements are routed to those zones selected from the Call Station.
- 4.2.2 System Controller shall have provision for attaching a music source with nominal output 200mV for playing background music in all zones.
- 4.2.3 System Controller shall have provision for attaching a Paging Microphone to make announcements simultaneously in all zones. The System Controller shall give priority to these announcements over the background music source.
- 4.2.4 Mains voltage for operation of System Controller shall be 220 V AC  $\pm 10\%$ , 50 Hz. Battery backup provisions should also be provided. The battery voltage should be 24V DC,  $+20\%$  /  $-10\%$ .
- 4.2.5 The System Controller shall be 19" rack mountable, or be supplied with accessories which enable mounting it on a 19" rack.
- 4.2.6 The System Controller shall be capable of working in an ambient temperature range of  $-5^{\circ}\text{C}$  to  $+55^{\circ}\text{C}$  and relative humidity up to 95% at ambient temperature range of  $40^{\circ}\text{C}$  without any degradation.
- 4.2.7 The maximum allowed total cable length between the system controller and the Call Station shall be 1000 meters.

4.2.8 The system shall comply with the following standards:

- a). EMC emission according to EN 55103-1
- b). EMC immunity according to EN 55103-2
- c). Safety according to IEC 60065

#### **4.3 Router:**

4.3.1 The router shall receive audio as well as suitable command signals from the System Controller and shall switch the Call Station signal to the desired zones.

4.3.2 Each router shall have provision for minimum six zonal outputs.

4.3.3 It should be possible to connect up to 10 routers together and cater to up to 60 zones.

4.3.4 The Routers shall work on a mains voltage of 220V AC,  $\pm 10\%$ , 50 Hz. Battery backup provision shall be also provided. The battery voltage should be 24V DC,  $+20\%$  /  $- 10\%$ .

4.3.5 Since it may be required to connect more than one Router, it shall be possible to assign a unique identification to each Router by means of DIP switches provided on the Routers.

4.3.5 The Router shall comply with the relevant provisions of IEC 60065.

4.3.6 The Router shall be 19" rack mountable, or to be supplied with accessories which enable mounting it on a 19" rack.

4.3.7 The Router shall be capable of working in an ambient temperature range of  $-5^{\circ}\text{C}$  to  $+55^{\circ}\text{C}$  and relative humidity up to 95% at ambient temperature range of  $40^{\circ}\text{C}$  without any degradation.

#### **4.4 Booster Amplifier:**

4.4.1 Booster amplifier shall be 19" rack mountable, or to be supplied with accessories which enable it to be mounted on a 19" rack.

4.4.2 The boosters shall be available with either (a) 120 watts power output at 1% THD; or (b) 240 watts power output at 1% THD, when operated on 220V AC mains, as specified by purchaser.

4.4.3 Booster Amplifier shall be able to drive 70V/100V constant voltage and low-impedance loudspeaker loads.

4.4.4 Booster Amplifier shall be able to operate reliably even with (a) mains voltage fluctuations of up to 10% either way from the nominal 220VAC; and (b) 24V DC backup battery supply. However, the power output under these two cases may be different from that specified in 4.4.2 above.

4.4.5 Booster Amplifier shall be protected against overload, short circuits and over-heating.



- 4.4.6 It shall be possible to cascade two or more booster amplifiers together for increased output power.
- 4.4.7 In case the booster amplifier has more than one input socket, it shall have an inbuilt priority circuit to ensure that announcements can override any music source which may be connected directly to the booster.
- 4.4.8 The booster amplifier shall have a frequency response (-3 db) of minimum 60Hz - 14 KHz.
- 4.4.9 The booster amplifier shall have, on the front panel, a suitable display of the signal level through a set of LEDs, or LCD panel, or VU Meter and power ON status.
- 4.4.10 The booster amplifier shall have an input socket with sensitivity of 1 volt.
- 4.4.11 The Booster Amplifier shall be capable of working in an ambient temperature range of -5°C to +55°C and relative humidity up to 95% at ambient temperature range of 40° C without any degradation.

#### **4.5. Horn Loudspeaker:**

- 4.5.1 Horn loudspeakers with inbuilt driver unit shall provide excellent speech clarity and sound distribution. They are normally to be provided for outdoor like uncovered part of platforms, overhead bridges, parking areas etc. Since sound pressure level of horn loudspeakers is high, these can also be used on covered platforms or in indoor areas where ambient noise is high.
- 4.5.2 To avoid rust and to have adequate strength & lightweight, the horn loudspeakers should be made from either ABS plastic or aluminium. In case horn loudspeakers are made of aluminium, their edges shall be covered with a PVC profile for protection against impact damage.
- 4.5.3 The horn loudspeaker shall be water and dust protected according to IEC 60529-IP66.
- 4.5.4 The horn loudspeaker shall be suitable for connecting to the 100V line running from the booster amplifier, and shall include an inbuilt line matching transformer with taps on the primary winding to allow different power settings. The different power taps shall be selectable through an inbuilt rotary switch.
- 4.5.5 A cable of minimum 50 cm length shall be attached to the horn loudspeaker for connection to the 100V line coming from the booster amplifier. The cable shall be two core sheathed cable with each core having minimum 20 copper strands of 36 SWG.
- 4.5.6 The horn loudspeakers shall be supplied complete with sturdy adjustable mounting bracket, allowing the sound beam to be suitably directed.
- 4.5.7 The 100V horn loudspeakers shall comply with the relevant safety regulations of IEC 60065.
- 4.5.8 Horn Loudspeaker shall have following specifications:

Rated power handling capacity	30 W, taps at 30,25,20,15,10 & 5 W.
Sound pressure level at 1KHz, 1m at 30 W/1 W	120 dB/107 dB minimum
Minimum Effective frequency range (-20 dB)	300 Hz to 5.5 kHz minimum
Rated operating voltage	100 V
Nominal impedance at 1KHz	330 $\Omega$ at 30 W tap
Ambient temperature range	-5° to +55°C

4.5.9 Horn loudspeakers shall be designed to withstand operation at their rated noise power for 100 hours in accordance with IEC 268-5.

#### **4.6. Line Array Loudspeaker (Column Loudspeaker):**

4.6.1 The line array (column) loudspeakers shall be normally used in large indoor and covered environments like covered part of platforms, waiting rooms, lobbies, ticketing/ enquiry areas etc. It shall be suitable for both announcement and music reproduction.

4.6.2 The column loudspeaker shall be suitable for connecting to the 100V line running from the booster amplifier, and shall include an inbuilt line matching transformer with taps on the primary winding to allow different power settings.

4.6.3 The column loudspeaker shall have a rated power handling capacity of 30 watts RMS, with taps on the line matching transformer at 30, 20, 10, & 5W.

4.6.4 It shall provide a sound pressure level of minimum 91db at 1W / 1 KHz / 1m, and 104 dB at 30W / 1 KHz / 1m.

4.6.5 It shall have an effective frequency range (-10db) of 180 Hz to 8 kHz.

4.6.6 The different power taps of the line matching transformer shall be selectable through an inbuilt rotary switch.

4.6.7 To prevent rusting, the outer body of the column loudspeaker shall be made of extruded aluminium section, with pressure die-cast aluminium end-plates. Front grill shall be of aluminium sheet.

4.6.8 The loudspeaker shall be able to withstand operation at its rated noise power for 100 hours in accordance with IEC 268-5 Power Handling Capacity standards.

4.6.9 The loudspeaker should operate safely within an ambient temperature range of -5° to + 55° C.

4.6.10 The loudspeaker shall be supplied with accessories as required for mounting either on a wall, or on a floor stand with M8 threaded bolt as specified by purchaser.

4.6.11 The loudspeaker shall comply with all relevant provisions of IEC 60065.

#### 4.7 Ceiling Type Loudspeaker:

4.7.1 A flush-mounting ceiling loudspeaker shall be normally used in indoor locations where a false ceiling is available like offices, cabins, cafeteria/ restaurants etc.

4.7.2. The speaker assembly shall consist of a 6 Watt loudspeaker and frame with a metal fire-dome. It shall be suitable for connecting to the 100V line running from the booster amplifier, and shall include an inbuilt line matching transformer with taps on the primary winding to allow different power settings. The taps on the line matching transformer shall be connected to a terminal strip for easy access during installation.

4.7.3 It shall comply with the following specifications:

Rated power handling capacity	6W, with taps 6, 3, & 1.5 W
Sound pressure level at 6 W/ 1 W	97dB/ 90dB minimum
Effective frequency range (-10 dB)	300 Hz to 8 kHz minimum
Rated voltage	100 V
Rated impedance	1667 $\Omega$ at 6W tap
Ambient temperature range	-5° to + 55°C

4.7.4 Ceiling type loudspeakers shall be designed to withstand operation at their rated noise power for 100 hours in accordance with IEC 268-5.

4.7.5 The loudspeaker shall comply with all relevant provisions of IEC 60065.

#### 4.8 Sound Projector:

4.8.1 The sound projector shall be normally used in indoor applications where directing the sound beam is desirable like corridors, entrance of lobbies, cafeteria/ restaurants etc.

4.8.2 Sound Projector units shall be suitable for connecting to the 100V line running from the booster amplifier, and shall include an inbuilt line matching transformer with taps on the primary winding to allow different power settings. It shall be possible to select different power taps by rotating an inbuilt switch.

4.8.3 Sound Projector enclosures shall be supplied with steel mounting brackets suitably painted for rust protection. They shall be suitable for mounting onto walls or ceilings.

4.8.4 These type of loudspeakers shall be designed to withstand operation at their rated noise power for 100 hours in accordance with IEC 268-5.

4.8.5 The Sound Projector shall comply with IEC 60529-IP65.

4.8.6 Sound Projector type loudspeaker shall be of following specification.

Rated power handling capacity	15 W with taps at 15, 10, 5 & 2.5 W.
Min. Sound pressure level at rated power 10 W/1 W	102 dB/92 dB minimum
Effective frequency range (-10 dB)	160 Hz to 10 kHz minimum
Nominal impedance	670Ω on 15W tap
Ambient temperature range	-5° to +55°C

4.8.7 The loudspeaker shall comply with all relevant provisions of IEC 60065.

#### 4.9 Wall Loudspeaker:

4.9.1 A Wall Loudspeaker shall be normally used for wall mounting in indoor areas and in covered areas like offices, cabins, cafeteria/ restaurants, corridors & other areas where false ceiling is not available.

4.9.2 The Wall Loudspeaker shall consist of an 8W loudspeaker housed in a steel cabinet (suitably painted to avoid rusting) or high quality ABS cabinet, with inbuilt line matching transformer for operation on 100V line.

4.9.3 It shall have a rated power handling capacity of 8 watts, with power taps 8, 4 and 2 watts easily selectable on a terminal strip.

4.9.4 It shall have an effective frequency range (-10 db) of at least 200 Hz to 8 KHz.

4.9.5 It shall have an output of at least 90 db at 1 KHz / 1W / 1m and 98 db at 1 KHz / 8W / 1m.

4.9.6 These type of loudspeakers shall be designed to withstand operation at their rated noise power for 100 hours in accordance with IEC 268-5.

4.9.7 The loudspeaker shall comply with all relevant provisions of IEC 60065.

#### 4.10 Paging Microphone:

4.10.1 A Paging Microphone shall be used for making announcements, at stations where there is no need of zone selection, and the Call Station / System Controller. It can also be used with a System Controller for announcements to be made from the Control Room.

4.10.2 The Paging Microphone shall be suitable for keeping on a desktop, and shall have following specifications.

- a). A suitable unidirectional dynamic microphone cartridge, with frequency response (- 10 db) of minimum 140Hz - 10KHz, mounted on a gooseneck of length minimum 390mm.
- b). Switch for initiating and terminating announcements.
- c). Nominal audio output of 1 volt to drive the booster amplifier.
- d). LED, LCD panel or other visual indication of ON status.

4.10.3 Mains voltage for operation of Paging Microphone shall be 220 V AC  $\pm$ 10%, 50 Hz. Battery backup provision shall also be provided. The battery voltage shall be 24V DC, +20% / -10%. The power supply for the Paging Microphone may be inbuilt, or provided as a separate unit.

4.10.4 The Paging Microphone shall be supplied with a suitable shielded cable of minimum length 10 meters with a connector suitable for connecting it to the booster amplifier & system controller.

4.10.5 The Paging Microphone shall comply with IEC 60065.

4.10.6 The Paging Microphone shall be capable of working in an ambient temperature range of -5°C to +55°C and relative humidity up to 95% at ambient temperature range of 400 C without any degradation.

## **5.0 CABLE AND WIRING:**

5.1 The loudspeaker cable connected from power amplifiers to the loudspeakers operates at 100 volts. The generic type of cable shall be insulated copper wire with minimum 32 strands of 0.2mm thick wire, compliant with IS:694:1990 and IS:5831.

## **6.0 TEST REQUIREMENTS:**

### **6.1 Conditions of Tests:**

6.1.1 Unless otherwise specified all tests shall be carried out at ambient atmospheric conditions.

6.1.2 Relevant clauses of IRS: S23 and RDSO/SPN/144 shall apply for inspection of material.

6.1.3 Inspection and testing shall be carried out to the effect that all requirements of this specification are complied with.

6.1.4 Inspection shall be carried out for various types of Booster Amplifiers, Horn Loudspeakers, Line Array Loudspeakers (Column Loudspeakers), Ceiling Type Loudspeakers, Sound Projectors, Wall Loudspeakers, Call Station, Paging Microphone, System Controller, Router.

### **6.2 Type Tests:**

6.2.1 For type test, two complete systems consisting of all type of devices & equipments as per specification mentioned in clause 3, 4 & 5 shall be subjected to following tests as applicable.

- a) Visual inspection (Clause 7.1)
- b) Insulation Resistance Test (Clause 7.2)
- c) Applied High Voltage Test (Clause 7.3)
- d) Environmental/ Climate Tests (Clause 7.4)
- e) Performance Test (Clause 7.5)
- f) Endurance test (Clause 7.6)
- g) Card-level & module level functional tests on all the cards.
- h) System level functional tests.

6.2.2 Following systems should be submitted to RDSO for approval.

- a) Call Station
- b) System Controller
- c) Router
- d) Booster Amplifier
- e) Horn Loudspeaker
- f) Line Array Loudspeaker (Column Loudspeaker)
- g) Ceiling Type Loudspeaker
- h) Sound Projector
- i) Wall Loudspeaker
- j) Paging Microphone

6.2.3 The system shall successfully pass all the type tests for proving conformity with this specification. If any one of the equipment fails in any of the type tests, the purchaser or his nominee at his discretion, may call for another equipment/card(s) of the same type and subject it to all tests or the test(s) in which failure occurred. No failure (of the same model) shall be permitted in the repeat test(s)

6.2.4 Any other tests shall be carried out as considered necessary by the purchaser.

### **6.3 Acceptance Tests:**

6.3.1 The following shall constitute the acceptance tests which shall be carried out by the inspecting authority for the purpose of acceptance on 20% of the lots (minimum 2 each type of system) offered for inspection by the supplier:

- a) Visual inspection of complete system (Clause 7.1)
- b) Insulation Resistance Test (Clause 7.2)
- c) Performance Test (Clause 7.5)
- d) System level functional tests.

6.3.2 Any other tests shall be carried out as considered necessary by the purchaser.

### **6.4 Routine Tests:**

6.4.1 The following shall comprise the routine tests and shall be conducted by manufacturer on every equipment and the test results will be submitted to the

inspection authority before inspection. The application software in proper format shall also be submitted to the inspection authority in advance.

- a) Visual inspection of complete system (Clause 7.1)
- b) Insulation Resistance Tests (Clause 7.2)
- c) Performance test (Clause 7.5)
- d) Card-level & module level functional tests on all the cards/ modules.
- e) System level functional tests.

6.4.2 Any other tests shall be carried out as considered necessary by the purchaser.

## **7.0 TEST PROCEDURE:**

The test procedure shall be based on the system design. The methodologies to be adopted for various tests shall be decided taking into account the system design/configuration.

### **7.1 Visual Inspection:**

Each equipment of the system shall be visually inspected to ensure compliance with the requirement of clauses 3, 4 & 5 of this specification. The visual inspection shall broadly include:

#### **7.1.1 System Level Checking:**

- Constructional details.
- Dimensional check.
- General workmanship.
- Configuration.
- Mechanical polarisation on cards.

#### **7.1.2 Card Level Checking:**

- General track layout.
- Quality of soldering and component mounting.
- Legend printing.
- Green masking.

#### **7.1.3 Module Level Checking:**

- General shielding arrangement of individual cards, wherever applicable.
- Indications and displays.
- Mounting and clamping of connectors.
- Proper housing of cards.

### **7.2 Insulation Resistance Test:**

7.2.1 Insulation Resistance Test shall be conducted as per RDSO/SPN/144.

### **7.3 Applied High Voltage Test:**

7.3.1 Applied High voltage test shall be conducted as per RDSO/SPN/144

#### **7.4 Environmental/ Climate Tests:**

7.4.1 Environmental/ climate tests shall be conducted as per RDSO/SPN/144.

#### **7.5 Performance Test:**

7.5.1 The equipment shall comply with the requirements as specified in Clauses 3, 4 & 5.

#### **7.6 Endurance Test:**

7.6.1 Endurance test shall be conducted on one of the modules for continuous operation which shall be 30 days operation without giving any deterioration in performance.

### **8.0 QUALITY ASSURANCE:**

8.1 All materials & workmanship shall be of good quality.

8.2 Since the quality of the equipment bears a direct relationship to the manufacturing process and the environment under which it is manufactured, the manufacturer shall ensure Quality Assurance Program of adequate standard.

8.3 Validation and system of monitoring of QA procedure shall form a part of type approval. The necessary Plant, Machinery and Test instruments as given below shall be available with the manufacturer.

#### **8.3.1 Plant & Machinery:**

- i. Electronic instruments for checking the frequency response of booster amplifiers and various types of loudspeakers, the power output of booster amplifiers, and the sound pressure level of loudspeakers.
- ii. Burn in chamber
- iii. Anti-static precautions at locations where microprocessors are mounted on the printed circuit board.
- iv. Microprocessor programming system
- v. Computer aided design system
- vi. Any other machinery & equipments required

8.4 Along with the prototype sample for type test, the manufacturer shall submit the Quality Assurance Manual.

### **9.0 MARKING & PACKING:**

9.1 The brand name or name of the manufacturer, together with model number shall be clearly marked on each equipment.

9.2 The equipment and its sub assemblies shall be packed in cardboard boxes with thermocole buffers. Before keeping in the cardboard box, the equipment shall be wrapped with polythene or bubble sheet. The equipment shall be finally packed in a wooden case of sufficient strength so that it can withstand bumps and jerks encountered in a road/rail journey.



**10.0 INFORMATION TO BE FURNISHED BY THE PURCHASER:**

10.1 The tenderer should clearly indicate details of required items for Public Address System which shall mainly consist of items mentioned in clause no. 3, 4 & 5 as per site requirement.

**11.0 TRAINING:**

11.1 Onsite training shall be provided to the Railway staff which shall include complete assembly of the system through the use of various modules, integration of hardware with software, if any, and complete operation of the system.

11.2 Sets of service manual in two hard copies and two soft copies containing details of technical specifications, installation and commissioning, trouble shooting & maintenance schedule etc. shall be supplied along with the equipment.

**12.0 DOCUMENTS TO BE SUPPLIED BY THE MANUFACTURER:**

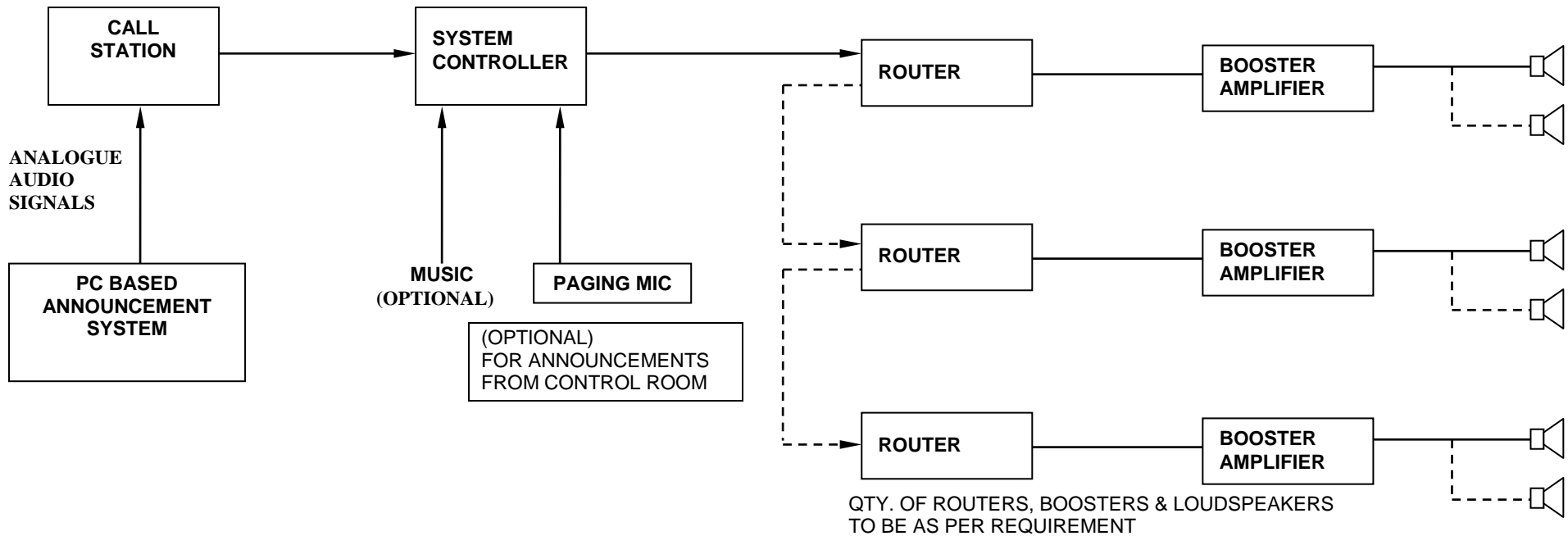
12.1 The following documents should be supplied along with the system:

- a) Mechanical drawings of each sub system/ rack.
- b) Operating Instructions and Service Manual incorporating, among other things, necessary installation instructions.
- c) Pre-commissioning check list.

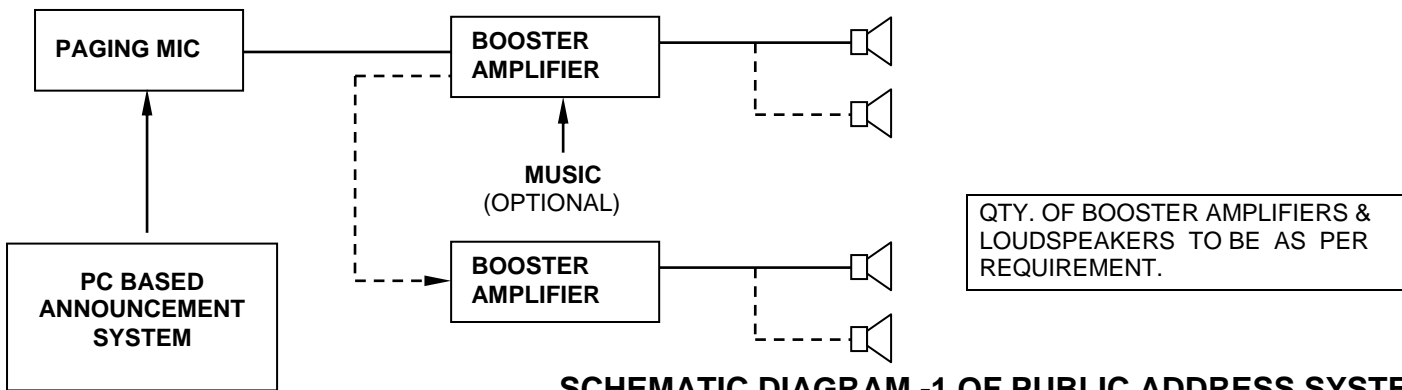
**13.0 ISO Binding Clause:**

All the provisions contained in RDSO's ISO procedures laid down in Document No. QO-D-8.1-11 (Latest Version) (titled "Vendor-Changes in approved status") and subsequent versions/amendments thereof, shall be binding and applicable on the successful vendor/vendors in the contracts floated by Railways to maintain quality of products supplied to Railways.

**1. PA System Arrangement for Model Stations, A & B Category Stations:**



**2. PA System Arrangement for C Category Stations:**



**SCHEMATIC DIAGRAM -1 OF PUBLIC ADDRESS SYSTEM**