

ISO 9001:2015	Document No.: RDSO/SPN/TC/038-2002	Version: 2.0	Date Effective: 01.05.2021
Document Title: Specification for Voice Data Logger/Monitor For Control Circuits			



सत्यमेव जयते

**TELECOM DIRECTORATE
RESEARCH DESIGNS AND STANDARDS ORGANISATION
MINISTRY OF RAILWAYS
MANAK NAGAR, LUCKNOW-226011**

RDSO/SPN/TC/038-2002

SPECIFICATION FOR

VOICE DATA LOGGER/MONITOR FOR CONTROL CIRCUITS

I. Amendment History:

S. No.	Date of Amendment	Page	Version No.	Reason for Amendment
1.	01.05.2003	All	Rev. 1	1. Name of the subject has been modified. 2. Alterations done based upon the comments received from Railways and Industry.
2.	14.08.2003	3	Rev. 1.1	As per recommendation of CRS vide Letter No. 2003/Tele/AR/8, dated 06.08.2003 received from Railway Board.
3.	08.09.2003	3	Correction No. 1	Correction No. 1 issued. Clause No. 1.2 modified.
4.	27.05.2005	Corresponding pages	Amd. 1	Amendment No. 1 issued. Clause Nos. 1.2, 1.3, 1.4 (b), 1.4.1.2, 1.4.2.3, 1.4.3.1, 1.4.3.2, 1.4.4.1, 1.4.4.2, 1.4.5.1, 1.4.6, 1.5, 4.0, 4.1, 5.1.2 (a), 5.1.2 (j), 5.1.4, 5.1.6, 6.2 (a), 8.0 modified.
5.	22.11.2016	Corresponding page	Amd. 2	Amendment No. 2 issued. Clause No. 10 added in compliance to vigilance cell RDSO letter 13/Vig/Policy dated 26/07/2016 & 08/09/2016

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6.	01.05.2021	All	2.0	<ol style="list-style-type: none"> 1. Opened for review by all stakeholders and reviewed internally as per DG's directives vide Note No. DG/Misc. dated 10 June 2020. 2. Merging of all amendments 3. Incorporation of Clause for feature of GPS synchronization of system clock. 4. 'Revision' word changed to 'Version' to maintain uniformity. 5. Document re-structured resulting in changes of clause Nos. etc.
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II. Document Data Sheet:

Specification Number: RDSO/SPN/TC/038-2002, Ver. 2.0
Title of Document: Voice Data Logger/Monitor For Control Circuits
Prepared by: Designation: Director/Telecom-I
Approved by: Designation: Executive Director/Telecom-I
Abstract: This document defines specification of Voice Data Logger/Monitor For Control Circuits

III. Document Control Sheet

Designation	Organisation	Function	Level
JRE/Telecom	RDSO	Member	Prepare
ADE/Telecom	RDSO	Member	Prepare, Check
Director/Telecom-I	RDSO	Member	Prepare/Review/Issue
ED/Telecom-I	RDSO	Approving Authority	Approve

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IV. Summary:

This specification covers the requirement of Voice Data Logger for Control Circuits in control offices along with an optional facility for Missed Call Monitoring.

V. Foreword:

Research Designs and Standards Organization (RDSO) is an attached office of the Ministry of Railways, engaged in design and standardization of equipment for use on Indian Railways.

RDSO/SPN specification is issued for developing/newly developed products.

RDSO/SPN along with comments received from various quarters is discussed in Telecom Standards Committee Meeting (TCSC). Recommendation made by TCSC is put up to the Railway Board for approval. After approval from Railway Board, the specification is given an IRS number and issued as Indian Railway Standard Specification.

Till the IRS specifications are issued, procurements may be made as per this specification RDSO/SPN/TC/038-2002 Version 2.0.

VI. Reference Documents:

This specification requires reference to following specifications/standards:

Sr. No.	Document No.	Document Title
1	QM-333	Environmental Testing for Telecommunication Equipment.
2	IEC 61000-4-5	Electromagnetic Compatibility (EMC)- part 4-5: Testing and measurements techniques- Surge immunity test

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1.0 System Requirement:

1.1 General:

Objective of the Voice Recorder of control circuits in a control office is to develop an equipment for recording conversations of at least last “170 hours per channel” of control circuits and other important circuits, as deemed necessary in a control office for its subsequent use required for Railway’s operational needs. Optionally the equipment shall also work as ‘Missed Call Monitor’, if such an option is required by the user. The details of Missed Call Monitor function are as per clause 1.4.7.2.

1.2 The equipment shall have a capacity to record a minimum of 04 and maximum of 16 Nos. of conversations simultaneously of different control circuits, telephone lines, wireless channels for at least 170 hours per channel. The recording capacity per channel can be increased beyond 170 hours as per requirement of purchaser by increasing the capacity of hard disk or solid state storage at the additional cost. However, the minimum recording capacity required on the hard disk or solid state storage shall be 5 GB/channel for 170 hours.

1.3 Input to the system shall be taken from the trans & receive port of electrical circuits of the respective channel with a level of at least 20 dB below the electrical signal level transmitted into the control circuit network and with a compatible level of the receive signal of the channel/circuit as per design of the system.

1.4 The system shall consist of following sub systems.

- (a) Interface for each channel separately for inputting from a control circuit of 2 wire E/M or 4 Wire E/M or Telephone line or Wireless any one at a time. It should be possible to have different varieties of inputs to different channels.
- (b) Storage equipment as per Clause 1.4.4 and 1.5.
- (c) Playback functions as specified in Clause 1.4.7.1 (a).
- (d) Alarms system as specified in Clause 1.4.6.
- (e) Missed call monitoring as specified in clause No. 1.4.7.2 (Optional)
- (f) GPS synchronization facility as specified in clause No. 1.6

1.4.1 Telephone Interface:

1.4.1.1 Telephone interface shall take input from analogue telephone lines with tip and ring connection in parallel.

1.4.1.2 It shall have an input impedance of more than 20 K ohms at 1 KHz.

1.4.1.3 Frequency response shall be ± 1 dB for a frequency range from 300 Hz to 3400 Hz.

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1.4.2 **Hardware for different subsystems:**

- 1.4.2.1 Hardware shall consist of industrial grade components in order to meet the requirements of QM-333 B₂ category. All the modules shall either be manufactured by the vendor or if from a third party, shall be of reputed brands like IBM, HP, DELL, Apple, Vaio, Samsung, Toshiba etc.
- 1.4.2.2 The operating system of the equipment shall be decided by the manufacturer but the user interface shall not require additional training for the operator used to Windows and shall be able to accommodate the provisions given in 1.4.4.
- 1.4.2.3 The whole equipment shall be kept into one unit with 19-inch (width) rack mounted/fixed properly along with PC, Power Supply, UPS and Logger units (VDRPU).
- 1.4.2.4 The system shall be rugged enough to withstand continuous working round the clock in a non-air-conditioned room with the temperature, humidity and dust extremes encountered in the area of operation.

1.4.3 **Voice recording inputs up to 16 channels:**

- 1.4.3.1 Monitoring facilities of any channel shall be provided either through VDRPU or PC without interrupting ongoing recording of any channel.
- 1.4.3.2 The volume level shall be from -40 dBm to +9 dBm (electrical) with a signal to noise ratio of 26 dB (electrical).
- 1.4.3.3 The corresponding acoustic values of signal to noise ratio shall be 48 dB and acoustic energy shall be 85 dB measured at 30 cm distance from the loudspeaker. The system should have suitable AGC and compressions technique for maintaining standards as mentioned above.

1.4.4 **Storage Equipment:**

- 1.4.4.1 The storage device shall preferably be a hard disk or solid state storage device of suitable capacity as per requirement of para 1.1 and 1.2 fitted into the PC and another hard disk or solid state storage device of the same capacity shall be fitted in the VDRPU as per requirement mentioned in para 1.5. It shall be possible to retrieve data from either hard disk or solid state storage device.
- 1.4.4.2 Secondary backup storage shall be provided to take up data on DVD writer/ USB Drive/ Solid State Storage device or removable hard disk. The system shall be provided with DVD Writer. All other secondary backup storage devices as desired by the user shall be optional. The software shall have a facility to provide either manual or automatic backup. The backing up process shall not interfere with the normal functioning of the equipment. It shall also be possible to copy any selected record on

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DVD writer/USB Drive /Solid State Storage device or removable separate hard disk or flash memory or any other memory device attachment. The backup software shall be fully integrated with the system.

1.4.5 **Play back of all the individual Voice Recordings:**

1.4.5.1 There shall be provision of online monitoring of any channel through VDRPU. The playback shall be either from speaker or from earphone jack to listen to the desired conversation of any selected channel.

1.4.5.2 While replaying, acoustic values of signal to noise ratio shall be 48 dB and acoustic energy shall be 85 dB measured at 30 cm distance from the loudspeaker.

1.4.6 **Alarms of the System:**

There shall be alarms and indications for:

- (a) Voice card not responding
- (b) All the backup devices are full/faulty.
- (c) Line Idle Alarm (no recording/ activity on a control circuit for more than 30 minutes).
- (d) Any other abnormal conditions.

Alarms shall be displayed on the monitor as well as audio alarm on speaker of the PC.

1.4.7 **User Interface:**

1.4.7.1 The operator interface shall be user friendly and shall have at least three display modes:

- (a) The screen to show date wise/time wise/lengthwise recordings of selected channels with ability to play any or all the selected records sequentially. The screen shall have a listing of recordings with facilities for play, stop, pause, go to record etc. It shall be possible to copy selected records on a flash memory/pen drive/external storage devices.
- (b) A general screen showing the overall activities of the system, which may have icons for various channels, alarms etc. The channel icons shall indicate the current mode i.e. recording, standby etc. It shall also be possible to monitor the recording of any channel by checking on its icon. The alarm icon shall activate with sound in case of any abnormality as per clause 1.4.6.
- (c) The third mode shall be for backup management. There shall be provision of automatic backup on the secondary storage device as per clause 1.4.4.2, at a pre-decided period or to make backup manually. There shall also be indication of space

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available on the storage media, with a warning when the media is full and roll over starts.

1.4.7.2 If the equipment is intended to be used with telephone lines such as Railway enquiry system or any other utility which requires monitoring of public dealings, a suitable software has to be provided for 'Missed Call Recording' with the following features:

- (a) Date-Time stamping for every missed call.
- (b) Caller Line identification for calls if CLI facility is available in the telephone line.
- (c) Operator identification stamp.
- (d) User friendly and easy searching criteria.
- (e) Logged data printout facility after event analysis.
- (f) Minimum number of rings to register the call shall be programmable. The system shall record only those missed calls where this number has been exceeded.

This is an optional feature which shall be embedded in the equipment if required by the user. This feature shall be fully software based and additional hardware shall not be required.

1.4.8 Data Security:

1.4.8.1 It shall not be possible to delete any records. It shall also not be possible to format the hard disk or solid state storage device by conventional methods.

1.4.8.2 When the capacity of the main storage media is exhausted or the specified recording hours are complete, whichever is more, there shall be automatic roll back i.e., the earliest records are overwritten with the latest records.

1.4.8.3 There shall be proper sealing of the equipment so that inadvertent handling/opening of the equipment is not possible.

1.4.9. **Software & Drivers;** The software supplied shall include the operating system, all the drivers, application software and software for the backup storage device and any other software required for functioning and maintenance of the system. All the software including any upgrades /updates shall be supplied with valid license.

1.5 Voice Data Recording & Processing Unit (VDRPU)

1.5.1 The system shall have facility for recording of continuous Voice Data on hard disk or any other solid state storage device from control & other logged input circuits, in addition to the recording and processing of same data into PC hard disk. VDRPU shall have independent online processing, recording and monitoring facility so that in case the PC crashes the recorded data can be retrieved from these units without interrupting ongoing recording.

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1.5.2 VDRPU front panel shall have following arrangements:

- (a) Visual Indication for ongoing recording of channel through red LED.
- (b) Channel number shall be screen printed below the LED indication.
- (c) Audio interface for online monitoring of any channel by inserting audio jack with headphone.

1.5.3 The hard disk or any other solid state storage device dedicated for voice recording will have storage capacity for channels as mentioned in the Clause No. 1.1 & 1.2.

1.5.4 VDRPU hard disk or solid state storage data can be transferred to PC for playing but cannot take data from PC so that recorded voice of the channels in VDRPU hard disk or solid state storage can neither get corrupted by any virus in the PC nor get affected in case the PC crashes.

1.5.5 The voice recording in the unit can be called by any computer in the network through Ethernet port provided in VDRPU unit to facilitate management to monitor play of voice records in any other place without going to control room.

1.5.6 VDRPU shall be designed in such a way that all the above functions can be achieved by its own software and hardware independent of PC operating system and application software. Wherever, RS-232 interface port is provided for software uploading/update, a compatible RS-232 to USB converter shall be supplied with the system.

1.5.7 There shall be provision of online monitoring of any channel through PC or VDRPU. The playback shall be from speaker as well as earphone jack to listen to the desired conversation of the channel.

1.6 **GPS synchronization of system clock:** The system should have a built-in GPS receiver system. The system shall continuously display time maintained by the local Real Time Clock (RTC). The RTC shall have accuracy of ± 3.5 PPM within operating temperature range of -10° C to $+55^{\circ}$ C. This RTC shall be synchronized at least once in 1 hour to the time received from the GPS receiver. In case no GPS data is available, the clock shall display the local RTC time.

1.7 **Marking:** Marking on equipment shall clearly indicate the following:

- a) Name/Trade mark of the manufacturer
- b) Specification No.
- c) Month & year of Manufacture
- d) Batch No.
- e) Serial Number
- f) Software version as applicable

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2.0 Power Supply:

The system shall work on Single Phase AC input power supply range of 180 volt to 260 volt & Input Frequency range 47 Hz to 53 Hz. The power requirement of the entire equipment shall be less than 500 Watt.

3.0 Environmental Conditions:

The equipment shall be designed to comply with environmental conditions as envisaged in Department of Telecommunication quality management document QM-333 in category B₂. Details of the tests are as specified in Cl. No. 5.5.

4.0 Warranty:

Unless otherwise specified by the purchaser, the equipment shall have a minimum warranty of one year with a liability of technical support in all respects like stores, AMC and technical guidance for another five years totaling six years.

4.1 Training:

Training for two nominated Railway officials shall be provided by suppliers to understand various operational, installation and maintenance procedures.

5.0 Tests and Performance Requirement:

5.1. **Visual Inspection:** As per clause No. 1.4.6, Cl. No. 1.5 (relevant clauses), Cl. No. 1.7 and other relevant clauses of specifications.

5.2. Burn-in:

The equipment shall be burn-in for a period of 24 Hrs at 50°C prior to the actual measurement of the parameters. During the burning, the equipment shall be ON (fully functional).

Report should be submitted in the following format;

1. No Of Channels of VDRPU.....consisting ofmodules
2. Module 1 of Sr. No.....
Module 2 of Sr. No.....
Module 3 of Sr. No.....
Module 4 of Sr. No.....
3. Temperature kept at 50° C.....
4. Duration of Burn in24Hrs.....
5. Burn In Test Starts at date.....time.....
6. Burn In Test Ends at date.....time.....

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Result:

The Burn In test was carried out with the Equipment kept in HOT AIR OVEN (Burn-in chamber.)

5.3. Electrical & performance Test:

5.3.1 Bench Test as per Clause No. 5.4

5.3.2 Test as per Clause No. 1.4 (a), & Clause No. 2.0.

5.4. Bench Tests:

Following test shall be conducted on all the Equipments:

- a) Measurement of input impedance at 1000 Hz. (Cl. 1.4.1.2)
- b) Voice recording on all the channels by recording total duration of storage in any sampled channel. (Cl. 1.2)
- c) Capacity of storage device. (Cl. 1.2)
- d) Physical monitoring of playback at different 10 points for 10 seconds period interval in the entire memory device.
- e) Monitoring (d) above on the speaker, earphone jack and re-record jack.
- f) Measurement of volume level (electrical) and signal to noise ratio (electrical) on all the individual channels. (Cl. 1.4.3.2)
- g) Measurement of volume level (acoustic) and signal to noise ratio (acoustic) on all the individual channels. (1.4.3.3)
- h) Physical verification of all the channels and its frequency response. (Cl. 1.4.1.3)
- i) Distortion Test: The distortion of the recorded signal when reproduced through the speaker shall not be more than 5% with respect to original input signal.

5.5 Environmental Tests:

5.5.1 Climatic Testing:

The ranges of ambient temperature and humidity within which the equipment performance specification shall be met as well as the ranges within which the equipment, it to remain operational without any irreversible damage are shown in Table 1 below (As per QM-333);

Table 1: Applicable Temp range & relative humidity (RH) values (As per QM-333)

S.N.	Requirements	Parameter	Remark
a.	Ambient temperatures range over which equipment is to remain operational without irreversible damage (50% RH at max. temp.) Min. Max.	-5°C 55°C	Applicable for Thermal Cycle only
b.	Ambient temperatures range over which		

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	specifications are guaranteed (50% RH at max. temp.) Min. Max.	0°C 50°C	
c.	Storage temperature (50% RH at max. temp.) without causing irreversible damage. Min. Max.	-5°C 60°C	
d.	Maximum Temperature for which specifications are guaranteed at 95% RH.	35°C	Applicable for Damp Heat Steady State.
e.	Maximum Temperature for which equipment shall survive at 95% RH.	40°C	

5.5.1.1 The recommended sequence for climatic testing shall consist of the following tests as applicable vide table 1 above in the order given below;

- a) Cold (Low Temperature)
- b) Dry Heat (High Temperature)
- c) Damp Heat cyclic (Tropical exposure)
- d) Rapid Temperature Cyclic
- e) Damp Heat Steady State

The climatic testing shall be conducted as per specification no. QM-333, March 2010 or latest namely “Environmental Testing for Telecom Equipment” issued by Telecommunication Engineering Centre (TEC), DOT. The testing shall be as per Category B₂.

All units shall be checked for power ON Status (By Indications or other means) during the cycles of climatic Test as per QM-333.

5.5.2 **Vibration Testing:**

Equipment shall also undergo vibration testing as per QM-333 March 2010 or latest namely “Environmental Testing for Telecom Equipment” issued by Telecommunication Engineering Centre (TEC), DOT.

5.6 **Surge/Transient Testing:**

Manufacturing & assembly of this equipment shall be made according to the standard practices adopted by International Electrotechnical Commission (IEC). The equipment shall undergo testing on surge and transient as per IEC 61000-4-5. The EUT (Equipment Under Test) shall be in energized condition during the test.

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6.0 Routine test:

The routine test shall be carried out on every system/modules and the results shall be submitted by the manufacturer to the inspecting authority at the time of inspection.

The following shall comprise the Routine test:

- a) **Visual inspection:** As per clause No. 5.1
- b) **Electrical & Performance Test:** As per clause No. 5.3

7.0 Acceptance Test:

Following shall constitute the Acceptance Test;

- a) **Burn-in:** The Burn-in Test shall be conducted by the Supplier as per Clause No. 5.2 and report to be submitted to the inspecting official before the start of acceptance test.
- b) **Visual Inspection:** As per Clause No. 5.1.
- c) **Electrical & Performance Test:** As per clause No. 5.3.

Visual Inspection & Electrical & Performance Test Shall be conducted after Burn-In test.

8.0 Type Tests:

The following shall comprise the Type Tests:

- a) **Burn-in:** As per Clause No. 5.2.
- b) **Visual Inspection:** As per Clause No. 5.1.
- c) **Electrical & performance Test:** As per clause No. 5.3.
- d) **Climatic Tests:** As per Clause No. 5.5.1
- e) **Vibration Test:** As per Clause. No. 5.5.2
- f) **Surge /Transient Test:** As per Clause No. 5.6
- g) **Visual, Electrical & Performance test after Environmental & Surge /Transient tests:** As per Clause No. 5.1 & Clause No. 5.3 respectively.

8.1 Field Trials:

Field trials to judge the performance of the system shall be conducted by installing complete equipment in a selected place of control office for a period of one month loading all channels at the time of Initial Type Approval.

9.0 Packing:

The equipment forming part of the system shall be so packed that there is no damage/deterioration in the performance of the equipment while the same are transported by Rail/Road on the typical Indian condition of transport.

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10.0 Technical Literature:

The following Technical literature/software shall be supplied with each system.

- 10.1 Operating Manual
- 10.2 Principal of Working of the system including circuit/block diagram, assembly diagram/drawing, PCB layout diagram etc.
- 10.3 Maintenance Manual describing maintenance and troubleshooting procedures.
- 10.4 Spares part catalogue.
- 10.5 The software (s) required for operation & maintenance of the system.

11.0 Indenting Information:

While specifying the device the following information shall be provided by the purchaser:

- a) The number of channels required.
- b) Facility for additional 'Missed Call Monitoring', if so required
- c) Whether the system has to be 19" rack mountable or not, if not, any special mounting required may be indicated.
- d) Capacity of recording / channel in hours to be mentioned.

- 12.0 All the provisions contained in RDSO's ISO procedures laid down in Document No. QO-D-8.1-11 (Titled-"Vendor-Changes in Approved Status") latest version/Amendments, shall be binding and applicable on the successful vendor/vendors in the contracts floated by Railways to maintain quality of products supplied to Railways.

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