

ISO 9001: 2015	Specification No. IRS: TC 83-2020	Version No. 1.1	Date effective- 01.07.2024
Document Title- Specification for Auto Dialling System for Emergency Socket			

2949510/2024/O/o Jt. Director/tele-2/RDSO

**GOVERNMENT OF INDIA, MINISTRY OF  
RAILWAYS**



**INDIAN RAILWAY  
STANDARD SPECIFICATION**

**For**

**AUTO DIALLING SYSTEM FOR EMERGENCY  
SOCKET**

**ISSUED BY**

**S&T DIRECTORATE  
RESEARCH DESIGNS & STANDARDS ORGANISATION  
LUCKNOW-226011**

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### I. Amendment History:

S.N.	Amendment Date	Version	Reason for Amendment
1.	01.09.2007	0	First Issue
2.	28.08.2007	Amd.1	Amendment No. 1 to the specification issued.
3.	16/20.12.2016	Amd.2	Amendment No. 2 to the specification issued.
4.	19.05.2021	1.0	Specification revised. Approved by ED/Tele-I at Note#50 of subject e-file.
5.	01.07.2024	1.1	Correction of typographical errors. Clauses re-arranged as per ver. 0. Approved by PED/S&T at Note#77 of subject e-file RDSO-TELE0LK0(TECH)/3/2020

### II. Document control Sheet

Designation	Organization	Function	Level
JE/Tele	RDSO	Member	Assist/Prepare
ADE/Tele	RDSO	Member	Assist/Prepare, Check
Director/Telecom-II	RDSO	Member Secretary	Prepare, Review, Issue
Principal Executive Director/ S&T	RDSO	Approving Authority	Approve

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## 0.0 FORWARD

- 0.1 This specification is issued under the fixed serial No. IRS: TC 83-2007. The final No. indicates year of original adoption as standard or in event of revision, the year of last revision.
- 0.2 This specification requires reference to the following Indian Railway Standard (IRS), Indian Telegraphs Department (ITD), Indian Standards (IS) and American Society for Testing and Materials (ASTM) specifications :-

IRS:- S 23	Electrical Signalling & Interlocking Equipment
IS- 5608	Low Frequency Wires & Cable With PVC Insulation and Sheath
IRS:TC- 42	Six Pin Emergency Plug & Socket
IS- 6297	Specification For Transformer And Inductors (Power, Audio, Pulse And Switching) For Electronic Equipment
IS - 4800 (Pt.)	Enamelled round winding wires
IS - 9000	Basic environmental testing procedures for electronic and electrical items

- 0.3 Wherever, in this specification any of the above mentioned specification is referred to by number only, the latest issue of that specification is implied. Wherever the year of issue is mentioned, the particular issue referred to is meant.
- 0.4 This specification is intended chiefly to cover the general & operating requirements, constructional features, electrical characteristics and performance requirements of Auto Dialling System for Emergency Socket and does not include the necessary provisions of a contract.

## 1.0 SCOPE

- 1.1 This specification covers the requirements and provision of tests and inspection of Auto Dialling System for Emergency Socket. The system will include one Way side telephone and one Base Station Unit.
- 1.2 The Wayside Telephone shall work from existing Emergency Sockets provided alongside the Railway Track on Underground RE/Quad Cable. Communication Network and Base Station Unit shall be installed in the Test Room and shall work as part of the overall Auto Dialling system.
- 1.3 The Auto Dialling system through Base Station Unit shall facilitate connectivity to Railway Exchange or DOT Exchange by pressing the designated button from the Wayside telephone.
- 1.4 Wayside Telephone will work similar to Auto Telephone and shall become a subscriber of Railway Telephone Exchange by pressing (\*) Star and shall become a subscriber of DOT telephone exchange by pressing (#) hash. Connectivity shall be achieved automatically through Base Station Unit provided in the Test Room.

## 2.0 TERMINOLOGY

- 2.1 For the purpose of this specification, the terminology given in IRS: S-23 shall apply.
- 2.2 The term referred to in this specification but not covered in IRS:S-23 are defined below.

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- 2.2.1 **Lot:-** A lot of Auto Dialling System is constituted by the same type manufactured in the same factory during same period using same process and materials.

## PART I – WAYSIDE TELEPHONE

### 3.0 GENERAL AND OPERATING REQUIREMENTS

- 3.1 Auto Dialling Telephone shall be assembled in Siemens type ABS plastic body.
- 3.2 The wayside telephone shall be capable of working on 4-Wire Omni Bus circuit on loaded or unloaded Underground RE/Quad cable system of Indian Railways.
- 3.3 The wayside telephone shall be provided with Reverse polarity protection.
- 3.4 The wayside telephone shall be protected from Surge and Transients by “MOVR” based surge protection system.
- 3.5 The receiver of the telephone instrument shall be protected from acoustic shocks by providing two rectifiers in parallel and with opposite polarity across the receiver.
- 3.6 Workmanship should conform to good engineering practice so as to ensure that the instrument is free from defects, rust, cracks and other defects that could impair the operation or serviceability while in use or under storage. The treatment and finishes shall be such that under operating conditions, no deterioration occurs to any parts of the wayside Telephone.
- 3.7 All the components, switches, connectors etc. shall be of good quality & industrial grade and its manufacturer shall have valid ISO: 9000 certificate for manufacturing of these items.
- All the numbers of components should be clearly indicated. The LED indicators wherever used shall be of superior quality wide angle with metallic holders. The component type numbers shall not be defaced.
- Switches & Connectors shall preferably be CACT/LCSO/CDOT/SISI (Small Industries Service Institution) approved (if available).
- 3.8 The layout of components and wiring shall be such that all parts are easily accessible for inspection, repairs and replacement.
- 3.9 In way side telephone, two LEDs shall be provided as an indication of DoT or Railway Exchange connection. One of these LED should glow when concerned key (\*or #) is pressed and remain glowing until the line is disconnected.
- 3.10 The current consumption at 12V DC supply shall not be more than:-
- (i) 20mA in idle condition
  - (ii) 100mA during ringing period
  - (iii) 50mA during conversation
- 3.11 The telephone shall be capable of working on 12V DC  $\pm 20\%$ .
- 3.12 **The power supply arrangement:** A 12V and 7 AH sealed maintenance free battery shall be provided for working of way side telephone.
- 3.12.1 Arrangement shall also be made for charging the battery with Power ON/OFF, Battery charging in progress as well as Battery fully charged Indications.

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- 3.12.2 "Low battery" indication shall be provided in the telephone so that whenever battery Voltage drops to 10.8 V, a red LED indication should glow.
- 3.12.3 Battery charging circuit shall be in the modular form and it shall be capable to charge the battery @ C/10.
- 3.12.4 An ON/OFF switch shall be provided in the telephone power supply circuit.
- 3.12.5 An plug shall be mounted on the backside of the box to connect with the AC power.
- 3.12.6 Battery shall be firmly clamped in to the box so that it should not topple down during the transportation.

#### 4.0 CONSTRUCTION AND MATERIALS

- 4.1 The wayside Telephone instrument shall consist of mainly the following parts.
- Body of the Telephone
  - Transmitter and Receiver
  - Handset
  - Cordage
  - Cradle Switch
  - Six Pin Emergency Plug
  - Transformers/Induction Coil
  - Push Button Dialer
  - Internal wiring and Printed Circuit Board

#### 4.2 Body of the Telephone

- 4.2.1 The Body of the telephone instrument shall be made of ABS (Acrylonitrile Butadiene Styrene) plastic material. Properties of ABS material used shall be as per Appendix A, in case the firm moulds the body at their premises. Alternatively, if the body has been procured from outside, it shall be from TEC approved sources having valid and current type approval certificate, the proof of which is required to be submitted in that case test of ABS material shall not be carried out. The color of ABS material used for making the body of the telephone shall be light and in no case it should be black .The manufacturer should provide a thick water proof bag to protect it from rain water and dust inside it and also for portability.

#### 4.3 Transmitter and Receiver

- 4.3.1 Electro Dynamic Transducer of  $150 \pm 20\%$  ohm impedance shall be used to perform functions of transmitter and receiver.

The manufacturer of transmitter & receiver shall have valid ISO 9000 certificate for manufacturing of these items.

Both transmitters and receiver shall be preferably procured from CACT/LCSO/CDOT/SISI (Small Industries Service Institution) approved sources (if available).

The transducers shall be fixed in the transmitter and receiver locations of the handset. Proper locking arrangements shall be ensured. The transducers shall be properly protected against ingress of moisture, dust and insects. The frequency response over the range 300 to 3400 Hz shall be uniform. Howling shall not exist when two Telephones Instruments are connected in parallel in OFF-HOOK positions and when one of the handset is placed with the Transmitter/Receiver in flush with a flat surface. It includes glass surface also.

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#### 4.4 Handset

- 4.4.1 The handset shall be of Siemens type made of ABS copolymer confirming to the requirement of Appendix A.

#### 4.5 Cordage

- 4.5.1 The coiled cord between Handset and PCB of the Telephone shall be made of tinsel wire. This cord shall be of min. 4 core and not less than 2 meters in the length to meet the requirements of this specification.

The Manufacturer of cordage shall have valid ISO 9000 certificate for manufacturing of this item.

This cordage shall be preferably procured from CACT/LCSO/CDOT/SISI (Small Industries Service Institution) (if available).

- 4.5.2 The cord between six pin plug and telephone instrument shall be straight and made of multi strand to meet the requirements of this specification.

The Manufacturer of cordage shall have valid ISO 9000 certificate for manufacturing of this items.

This cordage shall be preferably procured from CACT/LCSO/CDOT/SISI (Small Industries Service Institution) (if available.)

#### 4.6 Cradle Switch

- 4.6.1 Cradle switch shall be of miniature type which shall be operative with minimum one plunger. The plunger shall be pushed and released by the Handset.

#### 4.7 Six Pin Emergency Plug

- 4.7.1 The Six Pin Emergency Plug shall be as per IRS: TC 42.

#### 4.8 Speech Circuit

- 4.8.1 The speech circuit shall consist of following parts:-

- i) Trans and Receive amplifier circuits.
- ii) 2 Sets of transformers for isolation and matching.

##### 4.8.1.1 Trans and Receive Amplifiers

Two amplifiers shall be provided one for Trans and one for Receive. The amplifiers shall be designed with new technology to give the flat frequency response in the range of Voice Frequency with very low distortion. The output level of Tx and Rx amplifiers shall be adjustable by preset provided on PCB.

#### 4.9 Transformers/Induction Coil:

- 4.9.1 Two sets of transformers shall be provided to match the transmitter and receiver impedances with the line.

- 4.9.2 These Transformers shall conform to grade 3 category 3, conforming to IS: 6297 Part I/Part III except for parameters specified in this specification.

- 4.9.3 The transformer core shall be Cold Rolled Grain Oriented (CRGO) silicon steel of suitable grade or of ferrite to meet the electrical characteristics and other parameters of this specification.

- 4.9.4 Each transformer shall be suitably marked Tx and Rx to identify the trans and receive transformers respectively.

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- 4.9.5 Synthetic enameled winding wire complying to IS 4800 Pt I shall be used. Transformer shall be vacuum impregnated.
- 4.9.6 The complete winding shall be protected by proper insulation to avoid ingress of moisture.

#### **4.10 Decoder circuit**

- 4.10.1 Standard decoder circuit shall be provided.

#### **4.11 Ringer circuit**

- 4.11.1 On receipt of the designated number it shall be decoded and a piezo electric buzzer shall be activated even if hand set is off hook.
- 4.11.2 Along with actuation of buzzer respective LED indication (DoT or Railway) should continue to lit until the handset is lifted OFF the cradle.
- 4.11.3 The output level of Buzzer shall be adjustable internally by means of fixed pad.
- 4.11.4 Buzzer sound level shall be minimum 85dBm SPL at a distance of 30 cm from wayside Telephone in all directions around the telephone.

#### **4.12 Ring Back Tone Circuit**

- 4.12.1 When the buzzer in the wayside telephone is activated, a ring tone shall be automatically transmitted to the calling Telephone in acknowledgment of the receipt of ring. The level of the ring back tone when measured at receive terminal of Base Unit shall not be less than -10dBm.

#### **4.13 Push Button Dialer Circuit**

- 4.13.1 This circuit consists of a key pad of 4x3 matrix and shall be capable of generating standard DTMF tones.

#### **4.14 Internal Wiring and Printed Circuit Board**

- 4.14.1 The wiring shall be by means of coloured, multi-strand; and PVC insulated wires and shall be capable of carrying the maximum required current of the telephone instrument.
- 4.14.2 The wiring to components shall be provided with sufficient slack to permit the components to be swung clear of the assembly without any disconnection.
- 4.14.3 Glass epoxy PCB having minimum 1.6 mm thickness shall only be used. The PCB shall be coated with epoxy base anti-fungal varnish to provide protection against dust, humidity, fungal infection and mechanical abuses. The copper cladding thickness shall not be less than 35 microns and shall be suitably tinned.
- 4.14.4 The internal wiring of components of telephone instrument shall be as per Annexure-I.

### **5.0 ELECTRICAL CHARACTERISTICS**

#### **5.1 Applied High Voltage Test and Insulation Resistance Test**

- 5.1.1 The wayside telephone instrument shall withstand without any damage to a test voltage of 1KV, 50Hz, AC rms, applied for a period of one minute, between body and all terminals of Emergency Plug tied together.
- 5.1.2 The insulation resistance measured with 500V DC between body and all terminals of Emergency Plug tied together and shall not be less than 10 Mega

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ohms.

## 5.2 Transmission Test

5.2.1 Telephone shall be subjected to various transmission tests by connecting in the test set up as indicated in Annexure-II.

5.2.2 **Send Efficiency:** Test set up shall be as per Fig.1 of Annexure-II.

T1 & T2	Terminals of Transmitter
R1 & R2	Terminals of Receiver
B1 & B2	Battery Terminals
Tx1 & Tx2	Trans terminals of Six Pin Plug
Rx1 & Rx2	Receive terminals of Six Pin Plug
LM	Level Meter
P	Any key of key pad.

The transmitter of the telephone shall be removed and the receiver replaced by a non-inductive resistance of 160 ohms. Terminals B1 & B2 are to be connected to a 12V battery with proper polarity. The oscillator level shall be adjusted such that it is -44 dBm at 1000 Hz measured across the terminals T1 & T2. The trans terminals of Six Pin Plug shall be terminated by non-inductive resistance of 1120 ohms. The level across 1120 ohms shall be greater than 0 (zero) dBm and total Harmonic Distortion (THD) shall not be more than 3%.

5.2.3 **Tone Generator Level:** The level of the tone generator shall be adjustable from -4 to -10 dBm across the trans terminals.

5.2.4 **Receive Efficiency:** The test set up is as shown in Fig.2 of Annexure-II.

The line shall be simulated by non-inductive resistance of 560+560 ohms. The level and frequency at Rx terminals of Six Pin Plug shall be adjusted to -20dBm and 1000Hz respectively. The level measured across terminals R1 & R2 shall be greater than -18dBm. The total harmonic distortion (THD) shall not be more than 3%.

The frequency response of Cl. 5.2.2 and 5.2.4 shall be  $\pm 3$ dBm in the frequency range 300 to 3400 Hz.

5.2.5 **Insertion Loss:** The test set up is as shown in Fig.3 of Annexure-II.

### 5.2.5.1 (a) ON Hook Condition

With the set up as in Figure 3, oscillator level is set to 0 dBm across 1120 ohms without the telephone being connected. The microphone shall be disconnected and terminal T1 & T2 shall be looped together. Then the trans or receive terminals are connected across 1120 ohms resistance as shown in Fig. The drop in the reading of the level meter shall not be greater than 0.5 dB.

### 5.2.5.2 (b) OFF Hook Condition

With the same set up as in Fig.3, the oscillator level is set to 0 dB across 1120 ohms without the telephone being connected. Then trans or receive terminals are connected to 1120 ohms. The drop in the reading of the level meter shall not be greater than 1.0dB.

## 5.3 Decoder Test

5.3.1 The telephone shall respond faithfully for the signaling from DTMF Control

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Office equipment or similar type telephone with a minimum level of -25dBm and maximum level up to 0 dBm even when the line S/N Ratio is 15 dBm.

- 5.3.2 Decoder shall not respond for any frequency or combination of frequencies other than DTMF frequencies.

#### **5.4 Performance Test**

- 5.4.1 The connection between two telephone instruments shall be made as shown in Annexure-III. The conversion and Signaling shall be checked for:-
- (i) Clarity of speech and audibility
  - (ii) Signaling performance

### **PART-II BASE STATION UNIT**

#### **6.0 GENERAL REQUIREMENTS**

- 6.1 It shall consist of 2 Way Voice Communication circuit and code reception.
- 6.2 This shall be provided in the test room and shall have aesthetic look. This shall be suitable for mounting on 19" rack. The dimensions and layout will be as per Annexure-IVa & IVb.
- 6.3 All the components, Switches and connectors shall be of industrial grade and its manufacturer shall have valid ISO 9000 certificate for manufacturing of these items.
- Switches & Connectors shall preferably be CACT/LCSO/CDOT/SISI (Small Industries Service Institution) approved (if available).
- 6.4 All the indications at the unit shall be of continuous type and shall be by colored 'LED' or 7- Segment Red 'LED' displays.
- 6.5 All the switches, connectors and indications shall be legibly marked/ embossed in bold alphanumeric characters in English.
- 6.6 Base unit housing will be made up of 'Aluminum alloy sheet confirming to IS: 737, NS-3, half hard, 2.0±0.2 mm and finishing powder coated Siemens light grey.

#### **7.0 OPERATING REQUIREMENTS**

- 7.1 The system shall permit working of Voice Communication and signaling on an Omnibus Circuit from Emergency Sockets on 4-Wire basis.
- 7.2 It shall be possible to connect Railway Telephone Exchange or DOT Telephone Exchange on reception of valid code from the field, only one at a time.
- 7.3 The base unit shall be compatible to work with PET Quad (characteristic impedance 470 ohms), paper quad (characteristic impedance 1120 ohms) and also on PCM channel (OFC having characteristic impedance of 600 ohms.).
- 7.4 All the incoming lines terminated on the base unit shall have Surge Protection Device (SPD). The Surge Protection Devices are to be installed before the Base Unit. These SPD should be a combination of GD tube & Suppressor Diode & should be able to discharge a total surge current of 10 KA of 8/20 µs.

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These SPD should be rated for 185 V DC. The residual voltage should be  $\leq 50$  V. These Surge Protection Devices should be provided at following interfaces:

- (i) External telecommunication interface to DoT Exchange & Railway Exchange.
- (ii) 4-Wire Interface toward Emergency Socket side of PET Quad or Paper Quad.

- 7.5 Audio Visual indication shall be provided on the Base Station Unit to indicate the connected Exchange. The LED shall continue to glow until line is disconnected, but buzzer should sound only for approximately 2 seconds. If concerned relay in the base unit does not operate LED indication would not come, only buzzer will sound for 2 seconds as an indication that the way station telephone tried to establish a connection with the exchange.
- 7.6 A loudspeaker and associated amplifier shall be provided for Auto monitoring of the Ring. Ring Back Tone and conversation between the Wayside Telephone and Exchange subscriber.
- 7.7 12 digits, seven segments LED display shall be provided to indicate the called telephone number.
- 7.8 The selected Exchange shall be disconnected when the same digit code is again pressed from Wayside Telephone. It shall not be possible to disconnect the selected Exchange by any other code.
- 7.9 It shall not be possible to select both Exchanges at the same time.
- 7.10 It shall be possible to call Wayside Telephone by dialing a designated number from any exchange and ringing shall be produced to the Wayside Telephone. It shall be possible to connect the Wayside Telephone to incoming call by pressing \* or #, respective LED indicating (DOT or Rly) should continue to lit until the \* or # key of telephone is again pressed to disconnect the line.

## 8.0 CONSTRUCTION AND MATERIALS

- 8.1 The base unit shall consist of the following parts:-

- (i) 4 Wire to 2 Wire conversion circuit
- (ii) DTMF Decoder and Relays circuit
- (iii) Speech Circuit
- (iv) Loud Speaker Amplifier
- (v) LED Indications and 7 segment display circuit

### 8.2 4 Wire to 2 Wire Conversion Circuit

- 8.2.1 This circuit shall have a hybrid to convert 4 Wire circuit which is coming from Emergency circuit to base unit in to 2 Wire circuit.
- 8.2.2 It shall have a Trans amplifier and a Receiver amplifier and on 2-Wire side, shall have speech band pass filter.

### 8.3 DTMF Decoder Circuit

- 8.3.1 Decoder circuit shall faithfully decode any DTMF tone and drive the 7 Segment display.
- 8.3.2 First digit shall lit one LED among any two LED provided to indicate Rly. or DOT and also operate the desired relay to connect any one of the required exchange line. Rest of the dialed digits shall be displayed by 7 segment LED display provided for numeric display.

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#### **8.4 Speech Circuit**

- 8.4.1 The speech circuit (Tx, Rx) shall work with the 4-Wire/2-Wire conversion circuit.
- 8.4.2 Provision to connect the Handset shall also be provided.

#### **8.5 Loud Speaker Amplifier Circuit**

- 8.5.1 A loud speaker amplifier circuit shall be provided with volume control to monitor the Incoming and outgoing speech.

#### **8.6 LED Indication and 7-Segment Display**

- 8.6.1 2 LEDs shall be provided on the front panel of base unit. RED LED shall indicate 'RLY' and 'GREEN' shall indicate "DoT".
- 8.6.2 7-Segment LED display shall be provided to display the dialed number from the Wayside Telephone in numeric form.

#### **8.7 Internal Wiring & Printed Circuit Board**

- 8.7.1 The wiring shall be by means of coloured wires, multi-strand PVC insulated and shall be capable of carrying the maximum required current of the unit.
- 8.7.2 The wiring to components shall be provided with sufficient slack to permit the components to be swung clear of the assembly without any disconnection.
- 8.7.3 Glass epoxy PCB having minimum 1.6mm thickness shall only be used. The PCB shall be coated with epoxy base anti-fungal varnish to provide protection against dust, humidity, fungal infection and mechanical abuses. The copper cladding thickness shall not be less than 35 microns and shall be suitably tinned.
- 8.7.4 The internal wiring of components of the Unit shall be as per Annexure-V.

### **9.0 ELECTRICAL CHARACTERISTICS**

#### **9.1 Applied High Voltage Test & Insulation Resistance Test**

- 9.1.1 The Unit shall withstand without any damage to a test voltage of 1KV, 50Hz, AC rms, applied for a period of one minute, between body and all terminals of the Base Unit tied together.
- 9.1.2 The insulation resistance measured with 500V DC between body and all terminals of the Base Unit tied together, shall not be less than 10 Mega ohms.

#### **9.2 Transmission Test**

- 9.2.1 The base unit shall be subjected to various transmission tests by connecting the set up as given in Annexure-VI.

##### **9.2.1.1 Send Level**

An audio oscillator shall be connected to Rx terminal of base unit. The level and frequency of the oscillator shall be adjusted at 0dBm at 1000Hz. The level measured across 2 Wire terminals shall not be less than 0dBm with maximum Total Harmonic Distortion of 3% when it is terminated by 600 ohms non-inductive resistance.

##### **9.2.1.2 Receive Level**

Oscillator shall be connected to 2 Wire terminal at the level 0dBm and 1000Hz frequency. The level measured across Rx terminal of base unit shall not be less than 0dBm with maximum harmonic distortion of 3% when it is

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terminated by 1120 ohm non-inductive resistance.

- 9.2.1.3 The frequency response of both the above tests shall be within  $\pm 3\text{dBm}$ . Tx and Rx amplifiers shall not overload up to 0 dBm output. The impedances of Tx, Rx and 2-Wire terminal shall be 1120, 1120 and 600 ohm  $\pm 10\%$  respectively for proper impedance matching to line.

### 9.3 Performance Test

- 9.3.1 A 4-Wire DTMF Telephone shall be connected to Tx and Rx terminal of the base unit and a 2-wire Control Telephone at 2-Wire terminal. Railway Exchange terminal to Railway Exchange line and DOT terminal to DOT Exchange line as indicated in Annexure-VII.

The following operation of the base unit shall be checked:-

- i) Clarity of speech between the telephone
- ii) Loudness of Voice and action of volume control in loud speaker circuit
- iii) Operation of Relay 1 & Relay 2
- iv) Dial tone and Ring back of both exchanges
- v) Conversation between 4-Wire DTMF telephone to both subscriber telephone (Rly and DOT) one by one
- vi) Indication and numeric display

### 10.0 INSPECTION

- 10.1 The inspection and test shall be carried out to the satisfaction of the purchaser or his nominee.
- 10.2 The purchaser or his nominee shall have the right to be present during all stages of manufacture and shall be accorded all reasonable/complete facilities to satisfy himself that the Auto Dialling System are being manufactured in accordance with the terms and conditions of the specification. The purchaser or his nominee shall have the right to reject any material that fails to conform to the specification.
- 10.3 When the inspection is carried out during the manufacturing process, the manufacturer shall supply the material and samples required for testing free of charge and shall at his own cost prepare and furnish the necessary test pieces and appliances for such testing as may be carried out at his own premises in accordance with the specification. The manufacturer shall bear the cost of carrying out the tests at an approved test laboratory for conducting the tests for which firm is not having in-house test facilities.
- 10.4 Test certificates incorporating the results of the routine test and other manufacturing tests must be furnished in quadruplicate prior to the inspection for the use of purchaser/his nominee.

### 10.5 Visual Inspection

- 10.5.1 The instrument shall be visually inspected to ensure that the moulding are free from cracks (for ABS body), other imperfections and that all the components are fitted properly.
- 10.5.2 Instruments shall be checked to satisfy general and operating requirements (Cl. 3), construction (Cl. 4) of Wayside Telephone and General Requirements (Cl.6), Operating Requirements (Cl. 7), Construction (Cl.8) of Base Station Unit and Marking (Cl. 15).
- 10.5.3 The faulty sub-assembly and or samples failing in routine/acceptance test shall be destroyed effectively. The exercise of effective destruction during the

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manufacture/routine test shall also be shown to the inspecting authority as and when asked for.

## 11.0 TYPE TESTS

11.1 Type tests shall include complete tests in accordance with this specification

11.2 Type tests shall comprise of the following:-

- a) Visual inspection (Cl. 10.5)
- b) Electrical tests (Cl.5 & 9)
- c) Climatic and Environmental Requirements (Cl.14)
- d) Performance tests (Cl. 5.4 & 9.3)

11.3 Two samples of each (Way side Telephone and Base Unit) shall be selected at random for type tests from the specially made sample for initial type test or from normal production for Maintenance Type Approval.

11.4 The sequence of type tests shall be in accordance with the Appendix-B.

## 11.5 Acceptance Tests

11.5.1 Acceptance tests shall comprise of the following tests taken in sequential order as follows:-

- (a) Visual inspection (Cl. 10.5)
- (b) Electrical requirements (Cl. 5 & 9)
- (c) Performance Test (Cl. 5.4 & 9.3)

## 11.6 Routine Tests

11.6.1 Following routine tests shall be conducted on Auto Dialling Systems

- (a) Visual Inspection (Cl. 10.5)
- (b) Electrical Tests (Cl. 5 & 9).
- (c) Performance Test (Cl. 5.4 & 9.3)

11.6.2 Any other tests required by the manufacturer to ensure that Auto Dialling System is in conformity with the requirements of this specification.

## 12.0 SAMPLING

12.1 Unless otherwise agreed to by the purchaser and the supplier, the double sample plan given below shall be adopted:-

Lot consisting of Auto Dialling System	1 <sup>st</sup> sample size (N1)	2 <sup>nd</sup> sample size (N2)	Combined sample size(N1+N2)	Acceptance Number (C1)	Rejection Number (C2)
(1)	(2)	(3)	(4)	(5)	(6)
Under 25	3	6	9	0	2
25 to 50	7	14	21	0	3
51 to 100	10	20	30	0	3
101 to 200	13	26	39	0	5
201 to 300	20	40	60	1	5
301 to 500	25	50	75	1	6

12.2 The number of Auto Dialling System (N1) as given in Col. (2) shall first be selected and subjected to the acceptance test. If in the first sample, the number of defective Auto Dialling System, that is those failing in one or more

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acceptance tests, is less than/equal to the corresponding number (C1) given in Col.(5), the lot shall be considered as conforming to the requirements of the acceptance test. If the number of defective Auto Dialling System in the first sample is greater than or equal to the rejection number given in Col.(6), the lot shall be considered as not conforming to the requirement of the acceptance test. If number of defective Auto dialing system in the first sample lies between (C1 ) and (C2), a second sample of size (N2) as given in Col.(3) shall be selected and subjected to acceptance test. If in the combined sample, the number of defective Auto Dialling system is less than (C2), the lot shall be considered as conforming to the requirements of acceptance test.

- 12.3 The sample shall be selected at random from at least 10% of the packages. For random selection of packages, all the packages in the lot shall be arranged in a serial order and every 'r' the package shall be selected until the requisite number of packages is obtained.

'r' being the integral part of: 
$$\frac{\text{Total Number of packages in the lot}}{\text{Total number of packages to be selected}}$$

### 13.0 REJECTION:

- 13.1 Any of the materials which do not comply with the requirements of this specification may be rejected.

### 14.0 CLIMATIC AND ENVIRONMENTAL REQUIREMENTS

- 14.1 Auto Dialling System shall function satisfactorily under the following climatic and environmental conditions tested as per IS: 9000 series.

#### 14.1.1 Change of Temperature Test (Part XIV –Section 2)

Low Temperature :	-10°C±3°C
High Temperature :	+55°C±2°C

Rate of change of temperature over a period of not more than 5 minutes should be ±0.2°C/minute

Duration :	3 hours
No. of cycles :	2

#### 14.1.2 Dry heat test (Part III- Section 3)

Temperature :	55±2°C
Duration :	12 hours

#### 14.1.3 Damp heat (cyclic test) (Part V Section 2)

Duration :	12+12 hours
1 <sup>st</sup> cycle of two cycles	
Upper temperature :	40°C
Variant :	1

#### 14.1.4 Cold Test (Part II Section 3):

Temperature :	-10°C±3°C
Duration :	2 hours

#### 14.1.5 Damp heat cyclic Test:

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Duration	:	12+12 hours
2 <sup>nd</sup> cycle of two cycles		
Upper temperature	:	40°C
Variant	:	1

#### 14.1.6 Salt Mist Test (Part (XI)) Procedure 1.

Duration: 48hours.

#### 14.1.7 Vibration test:-

14.1.7.1 The system i.e. both equipments shall be subjected to vibration test as per IS:9000 (Part VIII).

(i)	Frequency Range	:	10Hz to 55Hz
(ii)	Vibration amplitude	:	0.35 mm
(iii)	Duration of endurance for sweep	:	20 sweeps cycles (10Hz-55Hz-10Hz)
(iv)	No. of axes:		3 coordinate axes
(v)	Duration at resonant freq.	:	30 minutes $\pm$ 1 minute
(vi)	Value of 'g'	:	1 'g'

#### 14.1.8 Drop Test

14.1.8.1 The equipment shall be allowed to drop freely from the height of 25 mm on to a 13 mm thick steel plate, which has been wet-floated on and bolted down to a fully set block of concrete at least 500 mm thick.

14.1.8.2 The height of drop shall be 25mm measured from that point of the equipment nearest to the surface of the steel plate when suspended prior to dropping.

14.1.8.3 The minimum number of drops shall be six.

14.1.9 The electrical test (Cl. 5.0 & 9.0) shall be repeated after the completion of climatic test, vibration test and drop test. The parameters shall be within  $\pm$ 5% of the initial value. The visual inspection as per (Cl.10.5) and performance as per (Cl. 5.4 & 9.3) shall also be checked.

#### 15.0 MARKING

15.1 The following shall be legibly and indelibly screen printed on the outer surface of Auto Dialling System (both units).

- Manufacture's name
- Specification Number
- Month & Year of Manufacture
- Serial Number
- Batch No.

#### 16.0 PACKING

16.1 Auto Dialling System shall have to undergo arduous Transportation before reaching the destination and will have to be stored and handled in tropical climatic conditions (including monsoon) before they are put to actual use. It is therefore imperative that the packing is decided by taking into consideration, inter-alia, the above two factors so as to avoid damage/deterioration of the system in transit/trans-shipment/handling or during storage.



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- 17.0** 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") and sub sequent 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.

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**APPENDIX –‘A’**  
**REQUIREMENTS OF ABS (ACRYLONITRILE BUTADIENE**  
**STYRENE) CO-POLYMER MOULDING MATERIAL**

**1-PROPERTIES:**

The material from test sample of finish body shall satisfy the following properties.

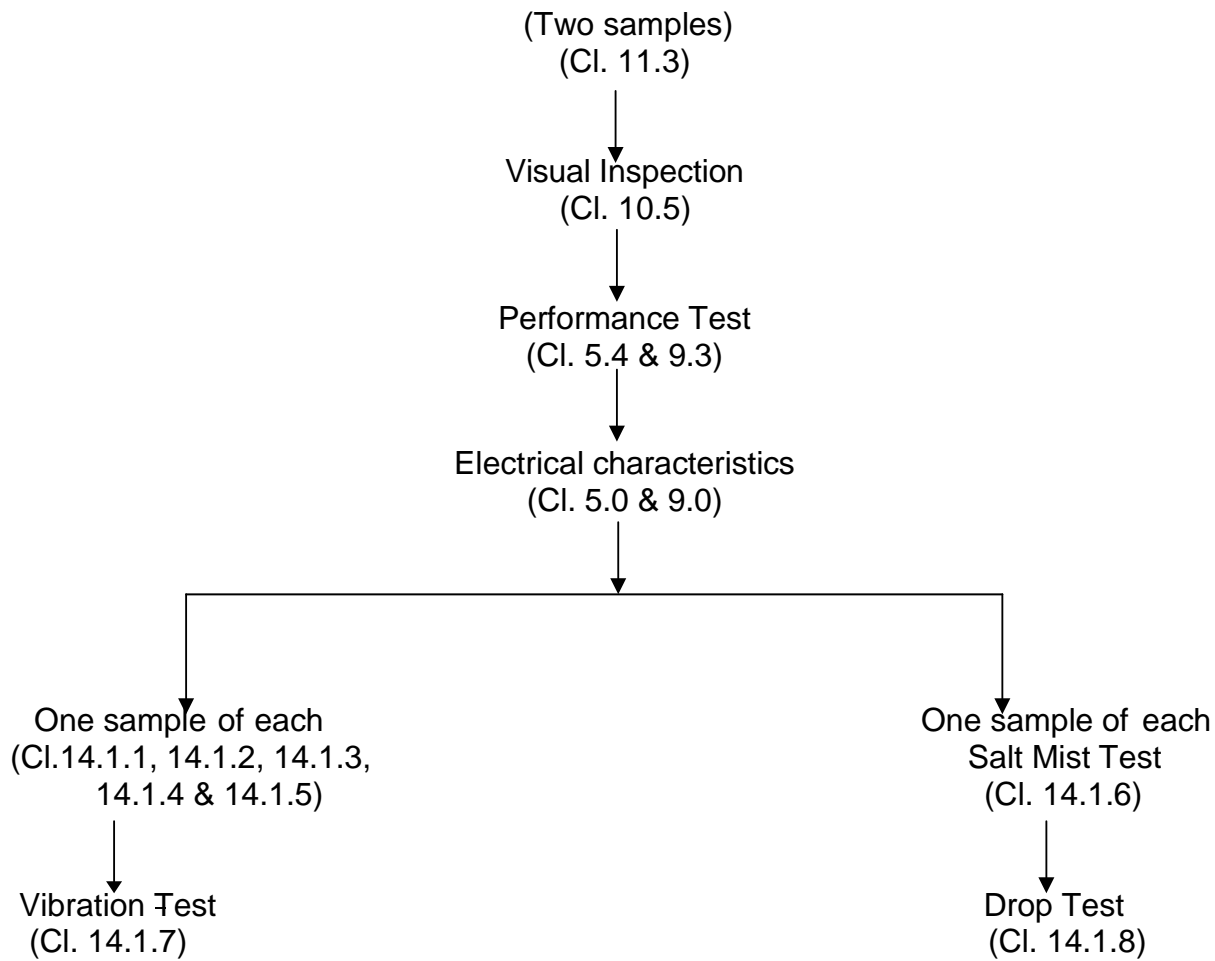
S. No.	Property	ATSM Test
1.1	<b>Mechanical properties</b>	
1.1.1	Tensile strength.	380Kgf/cm <sup>2</sup>
1.1.2	Izod Impact Strength Noticed	i) at 23°C F:25kg-cm/cm(Min.) ii) at 0°C: 20 kg-cm/cm (Min.)
1.2	<b>Thermal Properties</b>	
1.2.1	Heat Deflection temp.	i) at 18.5kg/cm <sup>2</sup> 99°C (Min) ii) at 4.6kg/cm <sup>2</sup> 100°C (Min)
1.2.2	Flammability	1.5 inches/minute (Max. 81cms)
1.3	Hardness	95-110 on R Scale
1.4	<b>Test on Finished Product made of ABS material</b>	
1.4.1	Specific Gravity	1.04 – 1.07
1.4.2	Vicat Softening Point	100 - 108° C

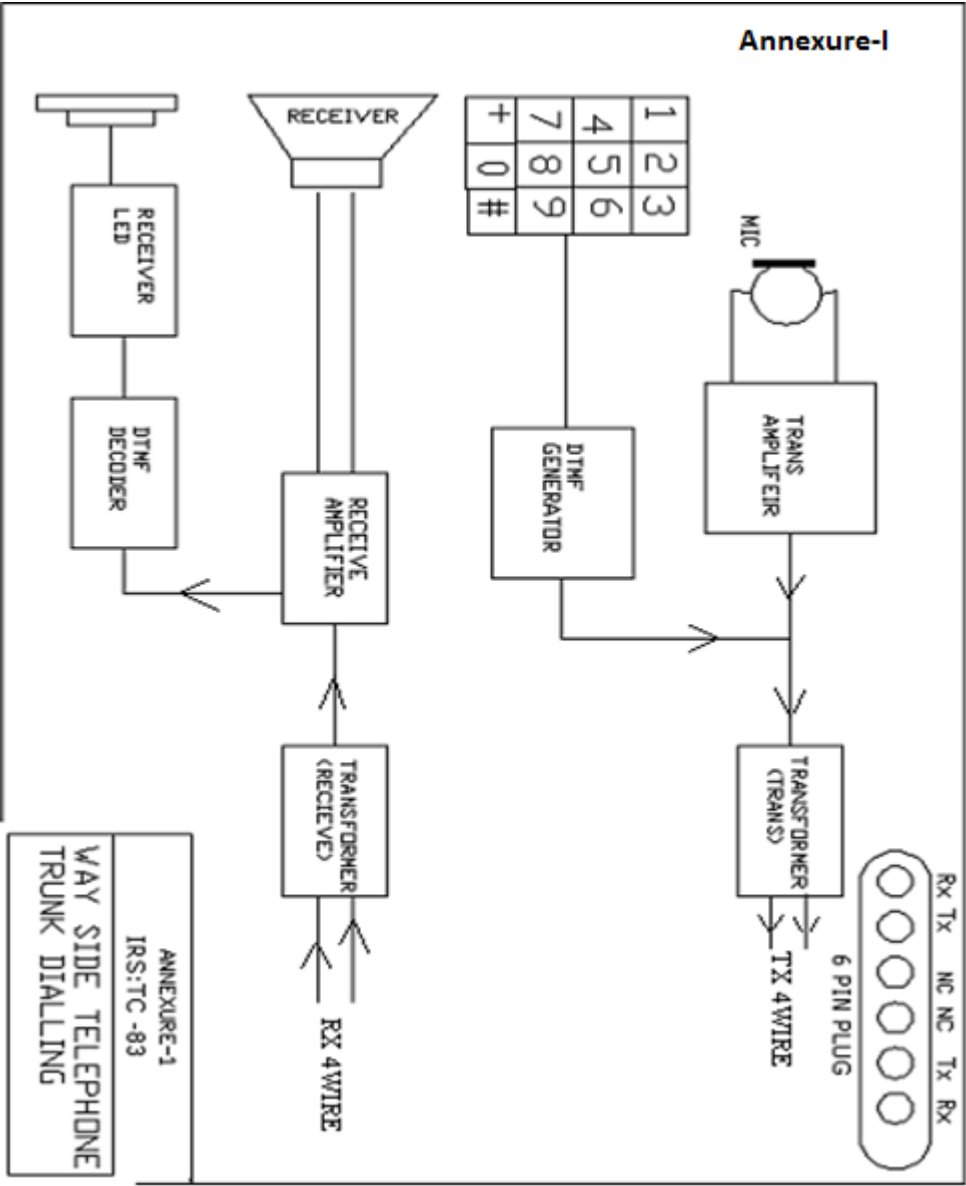
**Test on Finished Product made of ABS material**

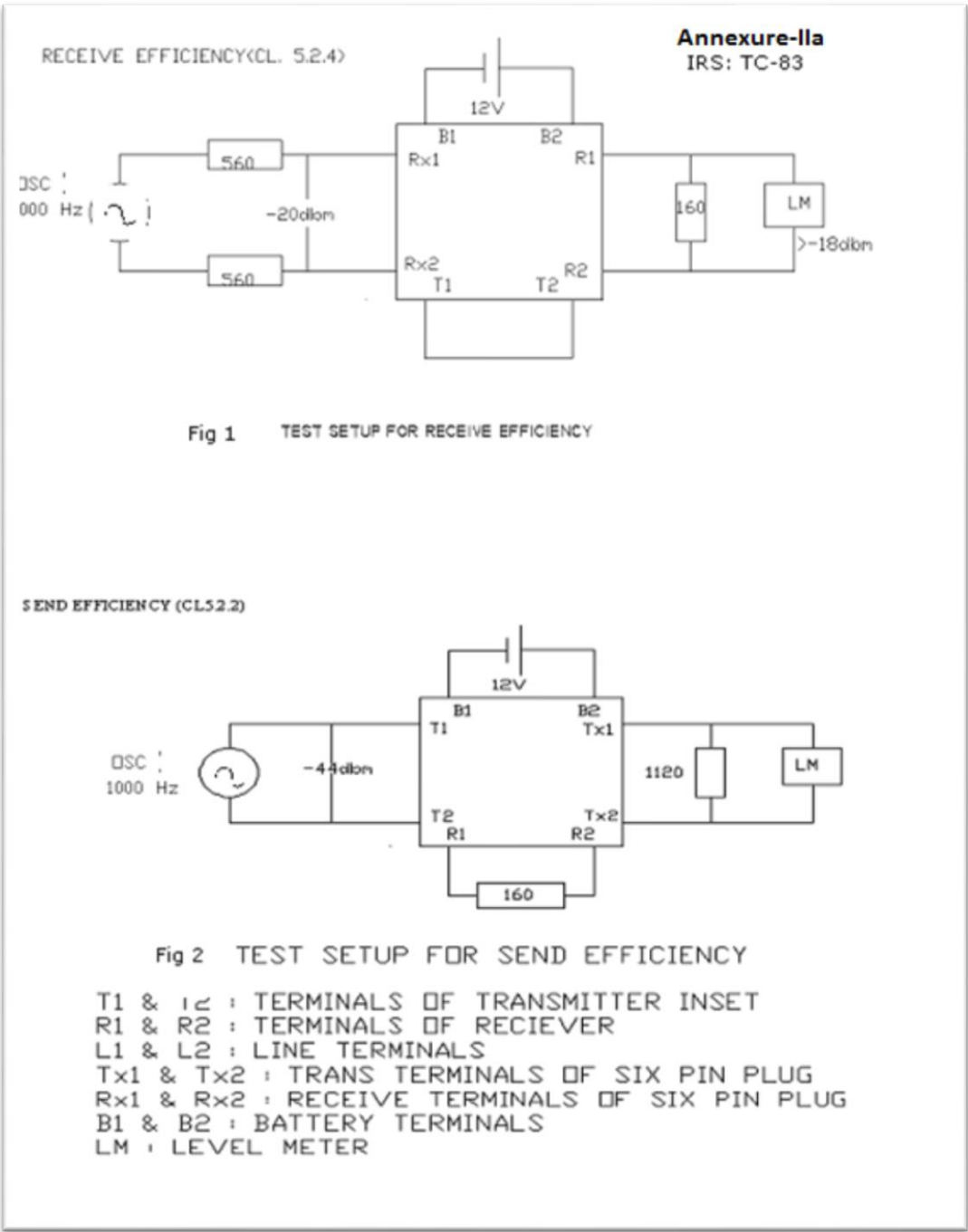
A special sample of the size as required and mentioned in the test method ASTM-D-1525 and ASTM-D-792, should be manufactured from the same raw material as used for moulding the body of Telephone or a part of the Telephone body will be cut to conduct the tests mentioned in Para 1.4.1 & 1.4.2 of Appendix ‘A’

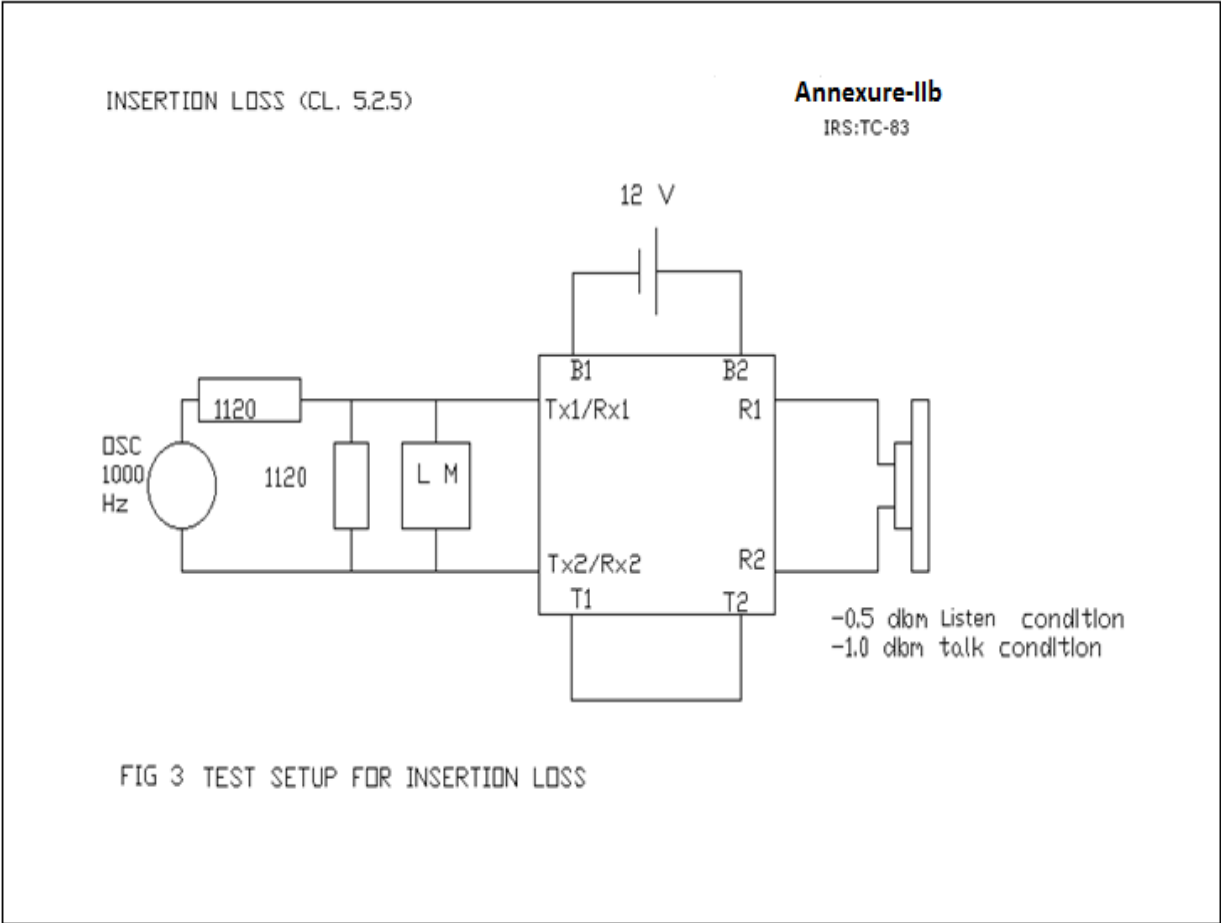
APPENDIX ‘B’

Sequence of type tests: (Cl. 11.4)



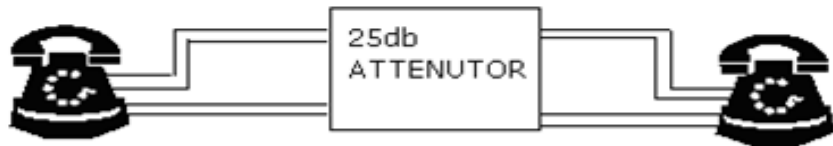


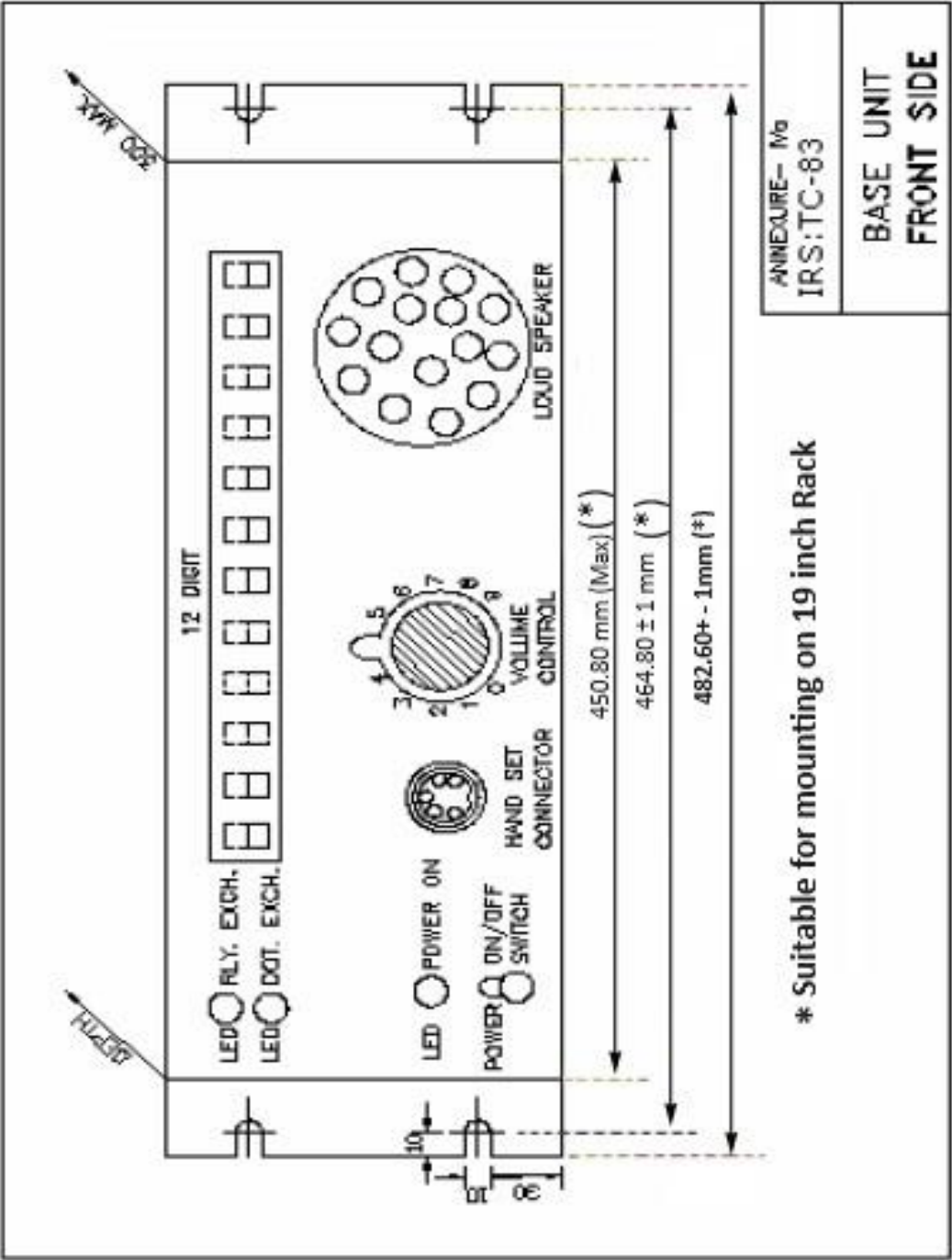




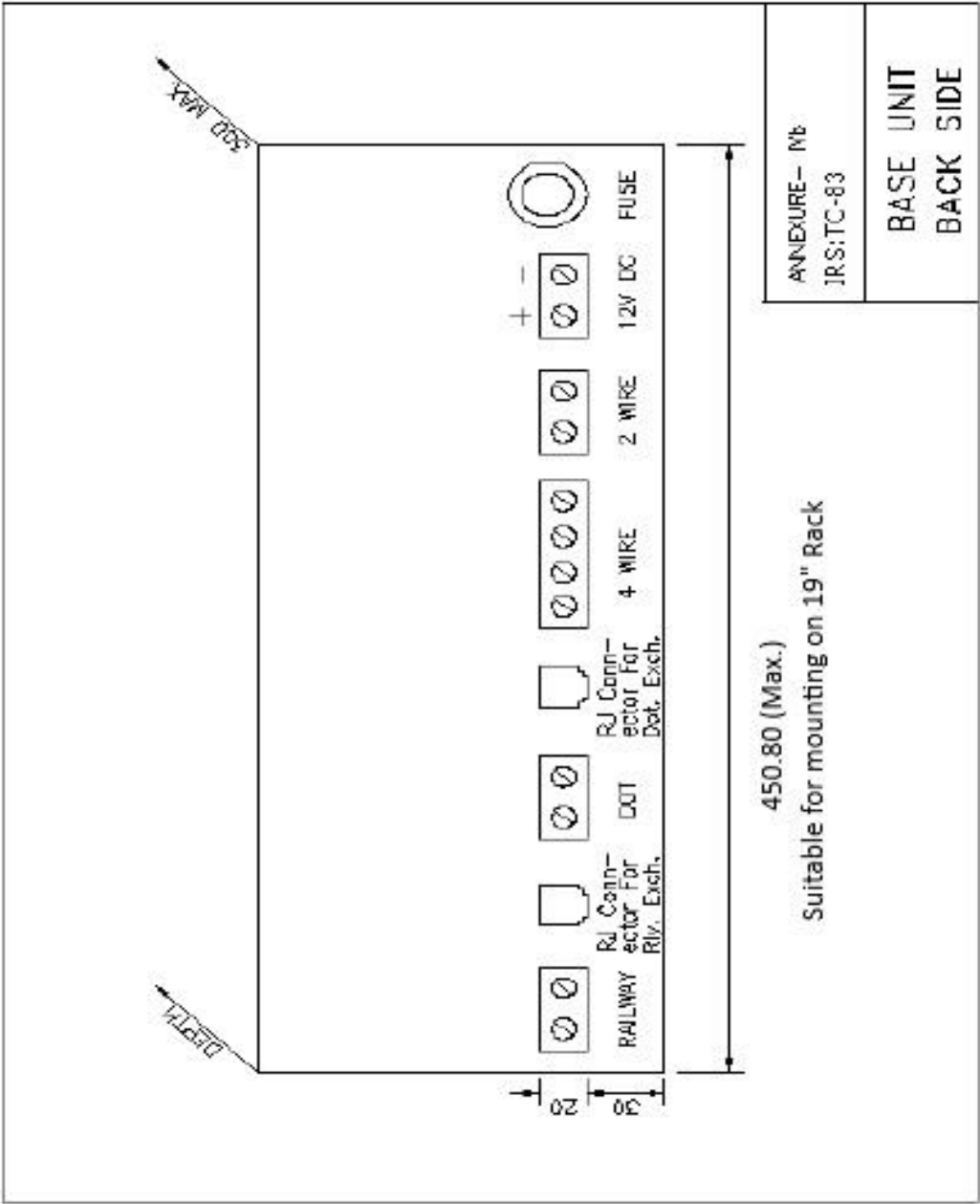
Peformance Test (Cl.5.4)

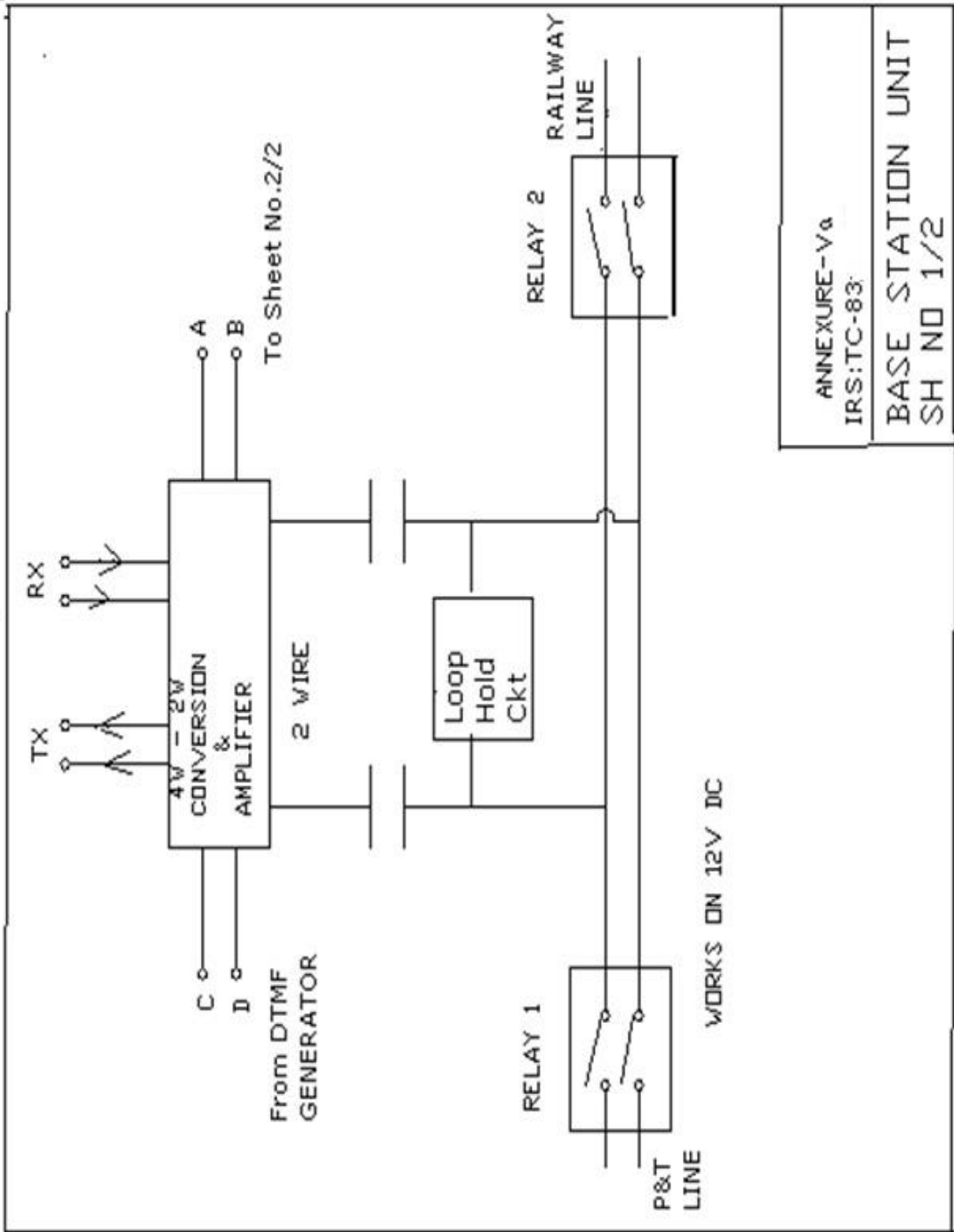
ANNEXURE-III  
IRS:TC-83

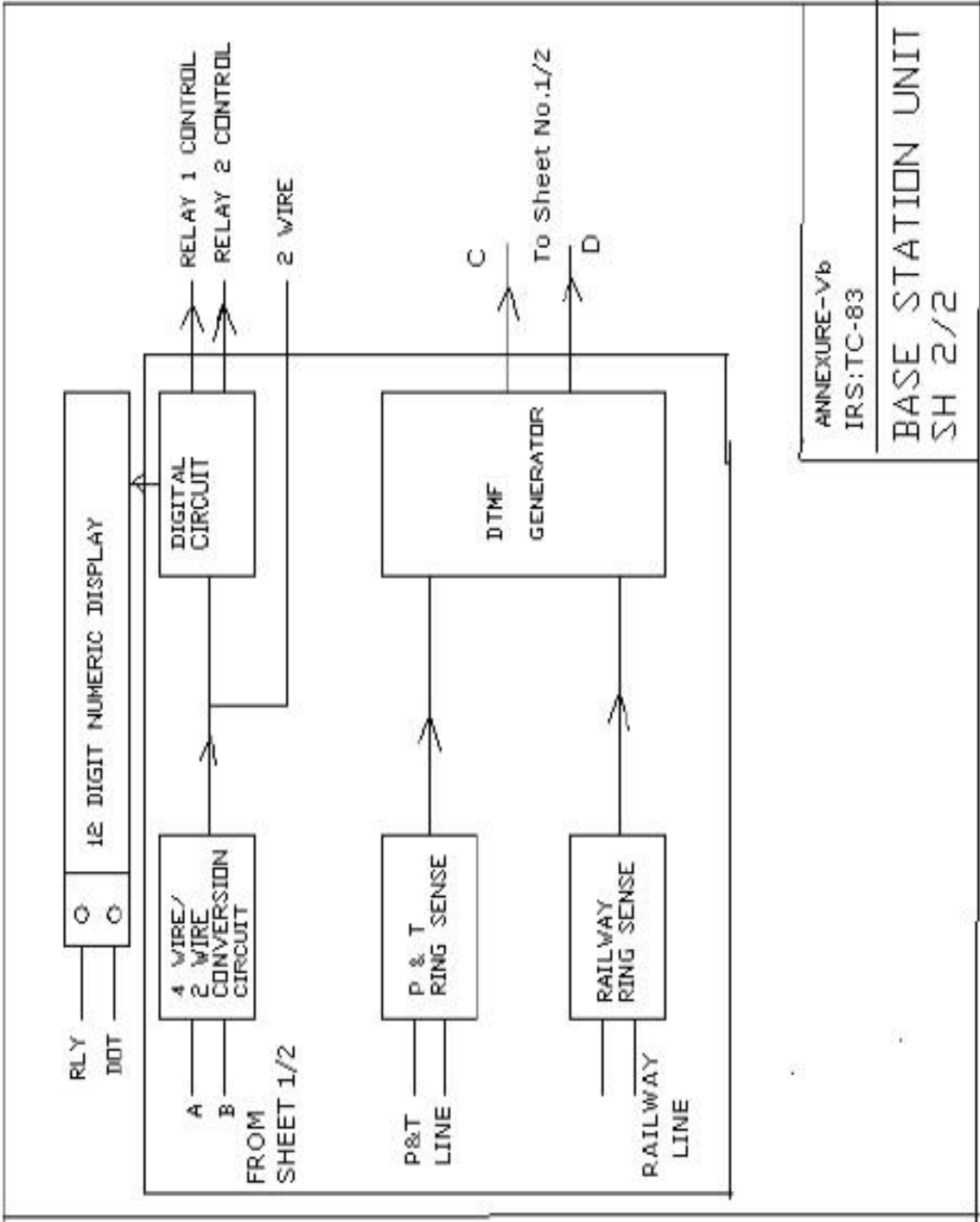












ANNEXURE-Vb  
IRS:TC-83

BASE STATION UNIT  
SH 2/2

