

IRS TC 75-99

GOVERNMENT OF INDIA
MINISTRY OF RAILWAYS

INDIAN RAILWAYS
STANDARD SPECIFICATION

For
4 Wire / 2 Wire Portable Control Telephone

(Tentative)
Serial No. TC 75-99

RESEARCH DESIGNS & STANDARDS ORGANISATION
LUCKNOW - 226011

INDIAN RAILWAY
STANDARD SPECIFICATION
FOR

1/2 WIRE PORTABLE CONTROL TELEPHONE

This specification is issued under the fixed serial No. TC 75 followed by the year of adoption as standard or in the case of revision, the year of latest revision.

ADOPTED, 1999

0.2 This specification requires reference to the following Indian Railway Standard (IRS) and Indian Standard (IS) specifications:

IRS:S 23	Electrical Signalling & Interlocking equipment.
IS: 104	Ready mixed paint, brushing, zinc chrome priming.
IS: 2074	Ready mixed paint, red oxide zinc chrome priming.
IS:5608 (Pt. I & II)	Low frequency wires and cables with PVC insulation and sheath.
IS:9128	Heavy Duty dry batteries.
IS:9000	Basic environmental testing procedures for electronic and electrical items.
IRS: TC 74-97	Electrodynamic Transducer
IRS: TC 52-97	2-Wire Portable Control Telephone
IRS: TC 34-97	4-Wire Emergency Control Telephone Used in 25 KV AC Electrified Area
IRS:TC-42-87	Six pin plug.
IS: 319	Free cutting brass rods and sections.
IS: 1079	Hot rolled carbon steel sheet and strip.
IS: 4800	Enamelled round winding wire. (Pt. I)

IS: 6297
(Pt. I & III)

Transformers and inductors (power, audio, pulse and switching) for electronic equipment.

0.3 Wherever in this specification any of the above mentioned specifications are 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 technical requirements of 4-Wire/2-Wire Portable Control Telephone to be used on 4 Wire basis in 25 KV AC Electrified Area & on 2 Wire basis in non-RE area (in one combined unit) and does not include all the necessary provisions of a contract.

1. SCOPE:

1.1 This specification covers the requirements and provisions of tests and inspection of 4-Wire/ 2 Wire portable control telephone used for communication on 4Wire/ 2 Wire Railway Control circuits.

1.2 This specification covers the constructional features, electrical characteristics and technical requirements of 4Wire/ 2 Wire portable control telephone.

2. TERMINOLOGY:

2.1 For the purpose of this specification, the terminology given in IRS:S23 shall apply.

2.2 The term referred to in this specification but not covered in IRS:S23 are defined below:-

2.2.1 Lot: A lot is constituted by the 4Wire/ 2 Wire portable control telephones of the same type manufactured in the same factory during the same period using the same process and materials.

3. GENERAL REQUIREMENTS:

3.1 The shape of the container of the 4 W/2 W portable control telephone shall be in the form of a rectangular box made of mild steel consisting of main body and lid cover. The main body shall accommodate HMT (Hand Micro Telephone), cords, 6 Pin Plug, two matching transformer, PCB and screw terminals. The mounting plate shall have a separate compartment with a lid with sealing facilities to house two flash light cells of 1.5V each as shown in Annexures I, IA & IB.

3.2 The six pin plug shall be as per specification no. IRS: TC-42/87 and drawings TC 15221 to TC 15224. This item shall be supplied alongwith 4W/2W portable control Telephone required for 4W working.

3.3 poles for portable control Telephone with arm assembly (required for extending working of portable control Telephone on 2 Wire basis with overhead telecom alignment) & poles container shall be as per RDSO drg.no. TCA 3101 & TCA 3450 respectively or as per any other drawing required by the purchaser. However, this item shall not form part of supply along with portable control Telephone unless specifically asked and mentioned by the purchaser.

3.4 Drawings showing the salient features of portable control Telephone are at Annexures I IA, IB.

3.5 The Equipment shall be protected from :-

1. Reverse polarity.
2. Surge and Transient.
3. Acoustic protection to receiver.

4. CONSTRUCTION AND MATERIALS:

4.1 The weight of the 4 W/2 W portable control telephone with all the components shall be as low as possible. The gross weight shall not exceed 3 Kg.

4.2 4W/2W Portable control telephone shall consist of the following components.

- (a) Main body and cover.
- (b) Hand micro telephone with micro switch.
- (c) Electrodynamic Transducer as Transmitter.
- (d) Electrodynamic Transducer as Receiver.
- (e) Transformer.
- (f) Battery compartment with batteries.
- (g) Cords
- (h) Screw terminals (on PCB)
- (i) Condensers and other components.
- (j) Changeover switch from 4 wire to 2 wire.
- (k) Line terminals L1 & L2 for 2 wire operation.
- (l) Six pin plug for 4 wire operation.
- (m) 2 Wire Pole with arm assembly and container. However it shall not form part of supply along with portable control Telephone.

MAIN BODY AND LID COVER:

- 4.3.1 The mild steel sheet used for the fabrication of the box shall be of 1 mm thick grade ST-34 to IS:1079.
- 4.3.2 The dimension of the box shall not exceed 250mm , 125mm and 150mm in length, width and height respectively.
- 4.3.3 It shall be possible to place the HMT securely in a clamp and cords and 6 Pin plug within the main body of the box. The lid cover shall be closed by means of at least one hasp. Under such conditions, the micro switch of the HMT shall not get pressed when the box is closed.
- 4.3.4 The hinges shall be on entire length of the cover and the screws shall be nickel plated.
- 4.3.5 Nylon strap shall be provided to enable the 4W/2W portable control telephone to be carried on the shoulder. The strap shall be 3 mm thick, 25 mm wide and 1200 mm. in length. It shall be provided with a buckle to adjust the loop length.
- 4.3.6 Sealing facility shall be provided so that the box can be sealed after testing which shall be capable of being broken during emergency.
- 4.3.6.1 Additional sealing facilities for S&T department shall be provided on battery compartment lid to avoid theft of batteries.
- 4.3.7 Box shall be given two primer coats, one of zinc chrome to IS: 104 and the other of red oxide zinc chrome to IS: 2074. The box shall be finished with stoving enamel paint on the inside and outside powder coated paint with admiralty grey.
- 4.3.8 Cable entry holes for the cable coming from PCB terminals shall be provided with suitable rubber grommets

4.4 HAND MICRO TELEPHONE (HMT):

- 4.4.1 The hand micro telephone (HMT) shall be Siemen's type made of ABS co-polymer conforming to the requirements of Appendix-B.
- 4.4.2 The micro-switch provided in the HMT shall be of LC50 approved type.

4.5 TRANSMITTER:

4.5.1 Electrodynamic Transducer conforming to specification no. IRS:TC 74-97 shall be used as a transmitter.

4.5.2 The transmitter shall work on 3V D.C. with the associated amplifier for its operation.

4.6 RECEIVER:

4.6.1 Electrodynamic Transducer conforming to specification no. IRS:TC 74-97 shall be used as a receiver.

4.6.2 For the protection against acoustic shock, two rectifiers in parallel and with opposite polarity shall be provided across the receiver.

4.7 Induction Coil/Transformer

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

4.7.2 These transformers shall conform to grade 3 category 3, conforming to IS: 6297 Pt.-I/Pt.-III except the parameters specified in this specification.

4.7.3 The transformer core shall be of cold rolled grain oriented silicon steel of suitable grade or of ferrite to meet the electrical characteristics and other parameters of this specification.

4.7.4 The winding ends shall be terminated on the terminal plate with soldered lugs. The outside connections shall be on the soldered lugs. The terminations shall be such that windings and terminations shall not get disturbed or get loosened when the connections are soldered.

4.7.5 Each transformer shall be suitably marked "TR" and "RC" to identify the trans and receive transformers respectively.

4.7.6 Synthetic enamelled winding wire complying to IS:4800 Pt.I shall be used.

4.7.7 Transformers shall be vacuum impregnated.

4.7.8 The complete windings shall be protected by proper insulation to avoid ingress of moisture.

4.8 Condenser:

4.8.1 1.5 to 2 micro farad condenser operating voltage minimum 400V shall be used to avoid tripping of the circuit breaker of the control circuit.

4.8.2 Condenser if used shall be made of metallised polyester

4.9 BATTERY COMPARTMENT WITH BATTERIES:

4.9.1 Dry batteries (heavy duty) conforming to IS: 9128, type R-20 (dia 33mm x 60mm) shall be used.

4.9.2 The D.C. supply shall be made available on terminals 3 & 4 of P.C.B. as shown in Annexure-II as per drawing.

4.10 CORDS:

4.10.1 The coiled cord between HMT and PCB shall be made of tinsel wires. This cord shall be of 6 core and of not less than 2 metres in length.

4.10.2 The cord between the 6 pin plug and screw terminals shall be made of 18 strand PVC insulated wires conforming to IS 5608 (Pt. II) This cord shall be of 6 cores and shall not be less than 2 metres in length.

4.11 TERMINALS & PCB :

4.11.1 Two line terminals marked as L_1 and L_2 provided with insulating nuts. Switch shall work on one side with wire control line and opposite on 4 wire. 2 wire and wire shall be legibility engrave on the mounting plate also on switch, filled with Red paint.

4.11.2 Direct PCB mounting screw terminals shall be provided inside the telephone. Cord from HMT shall be connected to the screw terminals 7 to 12 and cord from 6 pin plug shall be connected on the screw terminals 1, 2 & 5, 6 as shown Annexure-II. Internal wires from transformers shall be soldered on the tags of the terminals.

4.11.3 Connections of 6 pin plug shall be:-
Two outermost pins shall be connected on trans, next on receive and centre two numbers shall have connection.

4.11.4 The HMT coiled cord will consist of 6 wires, 2 each for transmitter, receiver and battery circuit.

4.12 INTERNAL WIRING/PCB :

- 4.12.1 The internal wiring of components of the telephone shall be as per Annexure-II.
- 4.12.2 The internal wiring shall be done with 0.5mm overall dia., seven strand copper conductors with PVC insulation conforming to IS:5608.
- 4.12.3 Glass epoxy PCB of 1.6 mm (minimum thickness) shall only be used. The PCB shall be coated with epoxy base antifungal 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.

5. Electrical Characteristics:

5.1 HIGH VOLTAGE TEST:

- 5.1.1 Both "TX and "RX" transformers shall withstand a voltage of 2 kV, 50 Hz AC sinusoidal r.m.s. applied between primary and secondary, primary and earth and secondary and earth for one minute. The test voltage shall be increased gradually at the rate of 500 V/sec.
- 5.1.2 Insulation Resistance: The insulation resistance between All terminals of six Pin Plug & L_1 - L_2 connected together and the main body of the 4W/2W portable control telephone shall not be less than 100 Mega ohms when tested with a 500V DC Megger at ambient temperature.
- 5.1.3 Telephone shall be subjected to various transmission tests by connecting in the test set up as indicated in figures 1 to 4 (Annexure-III).

i) Send Efficiency: Test set up shall be as shown in fig.1

T_1 & T_2 : Terminals of Transmitter Insets.

R_1 & R_2 : Terminals of Receiver

L_1 & L_2 : Line Terminals.

B_1 & B_2 : Battery terminals.

LM : Level meter

The transmitter of a Hand set shall be removed and simulated by non Inductive Resistance of 100+100 ohms and the receiver replaced by a non inductive resistance of 200 ohms. Terminals B_1 & B_2 are to be connected to a 3V battery with proper polarity. The oscillator level shall

be adjusted such that it is -44 dBm at 1000Hz measured across the terminals T_1 and T_2 with the microswitch pressed to talk position. The line terminals shall be terminated by non inductive resistance of 600 ohms. The level across L_1 and L_2 shall be greater than 0 dBm. Total Harmonic distortion shall not be more than 3%. When the selector switch shall be at 2 Wire side.

For 4 wire, trans terminal of six pin plug shall be terminated by non inductive resistance of 1120 ohm. The level across 1120 ohm shall be greater than + 3.8 dBm and total harmonic distortion shall not be greater than 3%, when the selector switch shall be at 4 wire side.

(ii) Side Tone (For 2 Wire only) : Test set up shall be as shown in fig.2.

The level measured across R_1 and R_2 at 1000 Hz shall not be more than - 18 dBm with the oscillator level maintained at - 44 dBm and selector switch shall be at 2 wire side only.

(iii) Receive Efficiency: The test set up is as shown in fig.3. The line shall be simulated by non inductive resistance of 300+300 ohms. The level at 1000Hz across terminals L_1 and L_2 shall be adjusted to -12 dBm. The level across R_1 and R_2 shall not be less than -18 dBm. The total harmonic distortion shall not be more than 3%. The selector switch shall be at 2 wire side.

For 4 wire (Fig.3b), change the selector switch from 2 wire to 4 wire side, the line shall be then simulated by non inductive resistance of 560+560 ohms. the level and frequency at Rx terminals of six pin plug shall be adjusted to -20 dBm and 1000 Hz respectively. The level measured across terminals R_1 & R_2 shall be greater than -26 dBm.

The frequency response of cl. 5.2.2.(i), and 5.2.3(iii) shall be +/- 0.5dB in the frequency range of 300 to 3400 Hz.

(iv) Insertion Loss: The test set up is as shown in fig.4

(a) Listen condition: With the set up as in fig.4(a) for 4 wire oscillator level is set to 0 dBm across 600 ohms without the telephone being connected. The microphone shall be disconnected and terminal T_1 & T_2 shall be terminated with 200 ohm non inductive resistance. Then the telephone terminal L_1 and L_2 to be connected and the drop in the reading of the level meter shall not be greater than 0.2dB as in fig.4(a) and 0.5 dB when receive terminal is connected across 1120 ohms resistance as in fig. 4(b) for 4 wire.

(b) Talk Condition: With the same set up as in fig.4(a) for 2 wire the oscillator level is set to 0 dBm across 600 ohms. With the microswitch pressed in talk position, the drop in the reading of the level meter shall not be greater than 0.8dB and 1.0 dB when trans terminal is connected across 1120 ohms resistance as in fig. 4(b) for 4 wire.

5.2 PERFORMANCE TEST:

5.2.1 The conversation between two portable control telephone shall be checked with 25 dB attenuator for clarity of speech and audibility for 2 wire and 4 wire both.

6. INSPECTION:

6.1 The inspection and test shall be carried out to the satisfaction of the purchaser or his nominee.

6.2 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 4W/2W portable control telephones 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.

6.3 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 testings 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.

6.4 Test certificates incorporating the results of the routine tests and other manufacturing tests must be furnished in quadruplicate prior to the inspection for the use of purchaser/his nominee.

6.5 Visual Inspection:

6.5.1 The instrument shall be visually inspected to ensure that the mouldings are free from cracks, other imperfections and that all the components are fitted properly.

- 6.5.2 Instruments shall be checked to satisfy General Requirements (Cl.3), Construction (Cl.4) and Marking (Cl.10), (Cl.11).
- 6.5.3 The faulty sub- assembly and or samples failing in routine/acceptance test shall be destroyed effectively.. The exercise of effective destruction during the manufacture/routine test shall also be shown to the inspecting authority as and when asked for.
- 6.6 Type Tests: Type tests shall include complete tests in accordance with this specification.
 - 6.6.1 Type tests shall comprise of the following :-
 - 6.6.2
 - (a) Visual Inspection (Cl.6.5);
 - (b) Electrical tests (Cl.5);
 - (c) Climatic requirements (Cl.9);
 - (d) Performance test (Cl.5.7.1)
 - (e) Type test on Electrodynamic transducer as per clause 9 of IRS : TC 74-97.

If the Electrodynamic Transducer used for transmitter & receiver in 4wire/2Wire portable Control Telephone is from the DOT approved sources whose type approval is currently valid & complies the requirements of Spec No. IRS:TC 74-97 or inspected by the field inspection unit & inspection certificate issued, type test clause of the Electrodynamic Transducer referred to in clause no. 6.6.2 (e) shall not be repeated.

- 6.6.3 3 samples shall be selected at random for type tests from the normal production.
- 6.6.4 The sequence of type tests shall be in accordance with the Appendix-'A'
- 6.7 Acceptance Tests:
 - 6.7.1 Acceptance tests shall comprise of the following test. taken in sequential order as follows :-
 - (a) Visual inspection (Cl.6.5)
 - (b) Electrical requirements (Cl.5)
 - (c) Performance test (Cl.5.2.1)

6.8 Routine Tests:

- 6.8.1 Following routine tests shall be conducted on the 4 wire/2 wire emergency portable control Telephone :-
 - (a) Visual inspection (Cl.6.5) - on 100% of the sample
 - (b) Electrical Tests (Cl.5) - on 100% of the samples.

(c) Performance test (Cl. 5.7.1)

6.8.2 Any other tests required by the manufacturer to ensure that portable control telephone is in conformity with the requirement of this specification.

7. SAMPLING :

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

Lot consisting of 4W/2Wire portable control telephone	1st sample size (N_1)	2nd sample size (N_2)	combined sample size (N_1+N_2)	Acceptance Number (C_1)	Rejection Number (C_2)
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

7.2 The number of 4W/2 W Portable Control Telephone (N_1) as given in col. 2 shall first be selected and subjected to the acceptance test. If in the first sample, the number of defective 4W/2W portable control telephone, that is those failing in one or more acceptance tests, is less than/equal to the corresponding number (C_1) given in Col.5 the lot shall be considered as conforming to the requirements of the acceptance test. If the number of defective 4W/2W portable control telephone 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 4W/2W portable control telephones in the first sample lies between (C_1) and (C_2) a second sample of size (N_2) as given in Col. 3 shall be selected and subjected to acceptance test. If in the combined sample, the number of defective 4W/2W portable control telephones is less than (C_2) the lot shall be considered as conforming to the requirements of acceptance test.

7.3 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 rth package shall be selected until the requisite number of packages are obtained:-

Total number of packages in the lot.

'r' being the integral part of : -----
Total number of packages to be selected.

7.4 The sampling plan for conducting acceptance tests of Electrodynamic transducer shall be as per IRS:TC 74-97.

8. REJECTION :

8.1 Any of the materials which does not comply with the requirements of this specification may be rejected.

9. Climatic and Environmental Requirements:

9.1 4W/2W Emergency Portable Control Telephone shall function satisfactorily under the following climatic and environmental conditions tested as per IS:9000 series excepting Transducers which are covered under specn. No IRS:TC 74-97.

9.1.1 Change of Temperature Test (Part XIV - Section 2):

Low temperature : $-10^{\circ}\text{C} \pm 3^{\circ}\text{C}$
High temperature : $+55^{\circ}\text{C} \pm 2^{\circ}\text{C}$

Rate of change of temperature over a period of not more than 5 minutes should be $\pm 0.2^{\circ}\text{C}/\text{min}$

Duration : 3 hours.
No. of cycles : 2.

9.1.2 Dry heat test (Part III Section 3): $55^{\circ}\text{C} \pm 2^{\circ}\text{C}$.
Duration : 12 hours

9.1.3 Damp heat (cyclic test) (Part V Section 2):
Duration : 12+12 hours.
1st cycle of two cycles.
Upper temperature : 40°C
Variant : 1.

9.1.4 Cold test (Part II Section 3) : $-10^{\circ}\text{C} \pm 3^{\circ}\text{C}$.
Duration : 2 hours.

9.1.5 Damp heat cyclic test : 12+12 hours.
2nd cycle of 2 cycles
Upper temperature : 40°C .
Variant : 1.

9.1.6 Salt Mist Test (Part XI) : Procedure 1.
Duration : 48 hours.

- 9.1.7 Vibration (Sinusoidal) test (Part VIII):
- | | |
|--|--|
| Frequency Range | : 10 to 55 Hz |
| Vibration Amplitude | : 0.35mm. |
| Duration of Endurance for Sweep | : 20 Sweep Cycles between 10 Hz to 55 Hz |
| Duration at Resonance | : 30 minutes +/- 1 minute on each of the three Co-ordinate axes. |
| Magnitude of 'g' may also be specified | : 1 g |

- 9.1.8. The electrical test (Cl.5) shall be done after the completion of climatic test and the parameter shall be within +/- 5% of the initial value. The visual inspection as per (Cl.6.5) and performance as per (Cl.5.7) shall also be checked.

10. MARKING :

- 10.1 The following shall be legibly and indelibly screen printed on the outer surface of the cover of the portable control telephone:-
- Manufacturers name.
 - Year of manufacture.
 - Legend : 4W/2W Emergency Portable Control Telephone
 - Specification No. IRS:
 - Serial Number.
- 10.2 A printed copy of the sketch showing interconnection and operating instruction shall be pasted on the inner surface of the top cover. It shall be given adequate protection so that the diagram does not fade out with the passage of time.
- 10.3 Any other information specially required by the purchaser.
- 10.4 Line terminal should be indicated as L_1 and L_2 and battery terminals as positive (+ve) and negative (-ve), and any other information specially required by the purchaser.

11. PACKING:

- 11.1 4W/2W Portable emergency control telephone 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 vital factors so as to eliminate damage/deterioration of the items in transit/transshipment/handling or during storage.

Sequence of type tests

(Cl. 6.6.4)

(Three samples)

Visual Inspection
(Cl. 6.5)

Performance test
(Cl. 5.2.1)

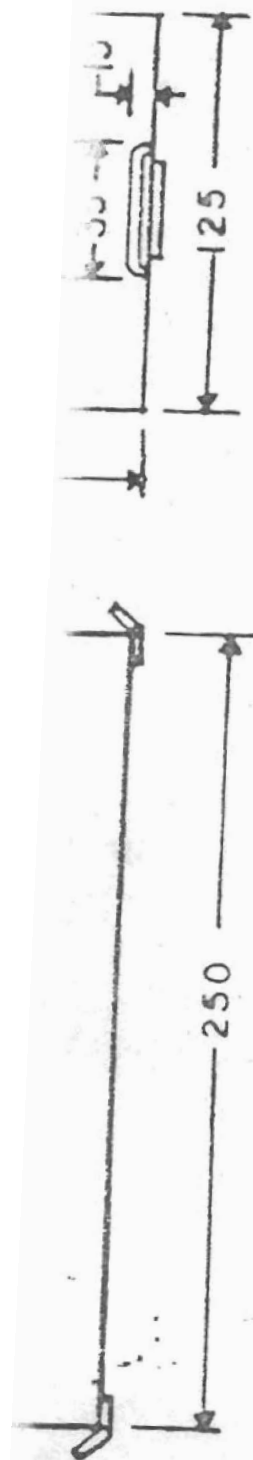
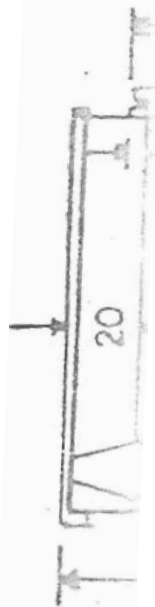
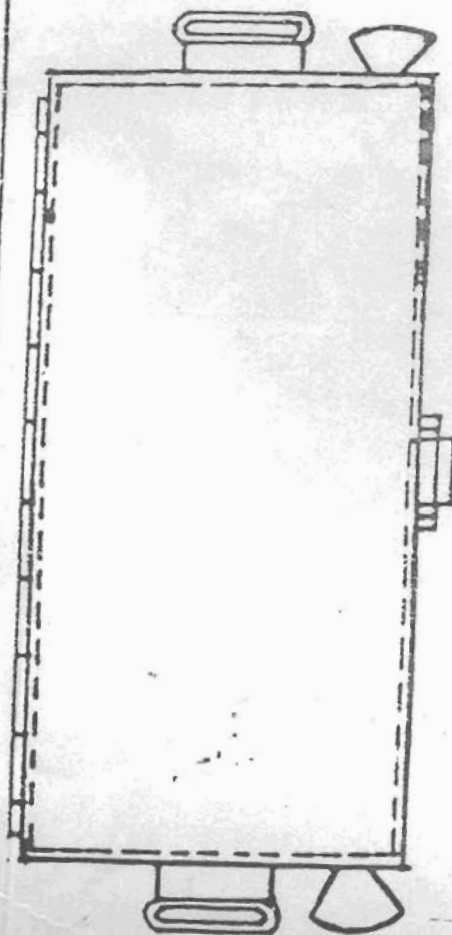
Electrical characteristics
(Cl. 5)

Two samples
Climatic requirements.
(Cl. 9.1.1, 9.1.2, 9.1.3,
9.1.4 & 9.1.5)

One sample
vibration test
(Cl. 9.1.7)

Salt Mist test
(Cl. 9.1.6)

ANNEXURE - 1
(CLAUSE) - 3.4
NO. IRS: TC-75-99



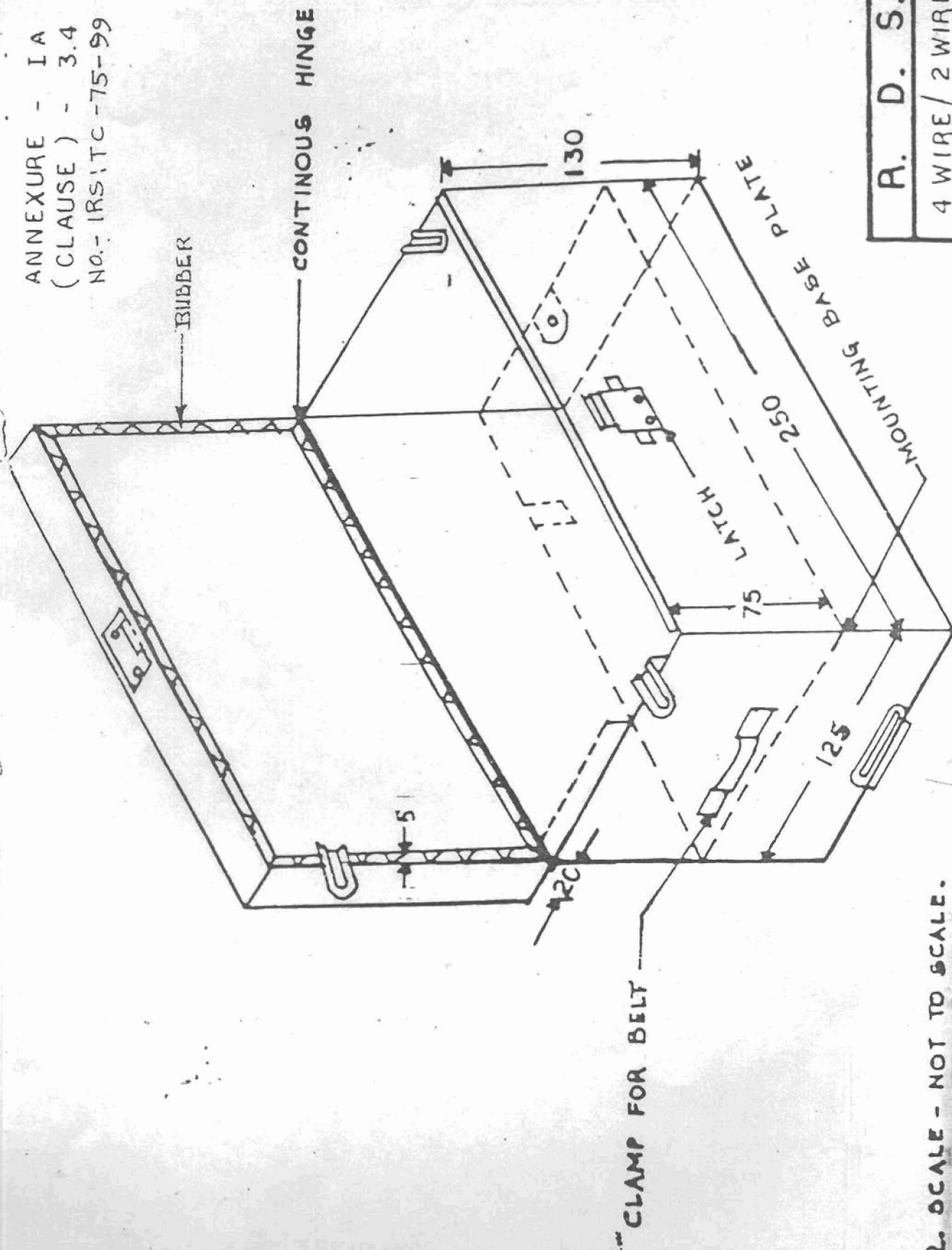
A. D. S. O.

4 WIRE / 2 WIRE
PORTABLE CONTROL
TELEPHONE (BOX)

2. SIZE - NOT TO SCALE.
1. ALL DIMENSIONS IN m.

NOTE:-

ANNEXURE - I A
(CLAUSE) - 3.4
No. - IRS/TC-75-99



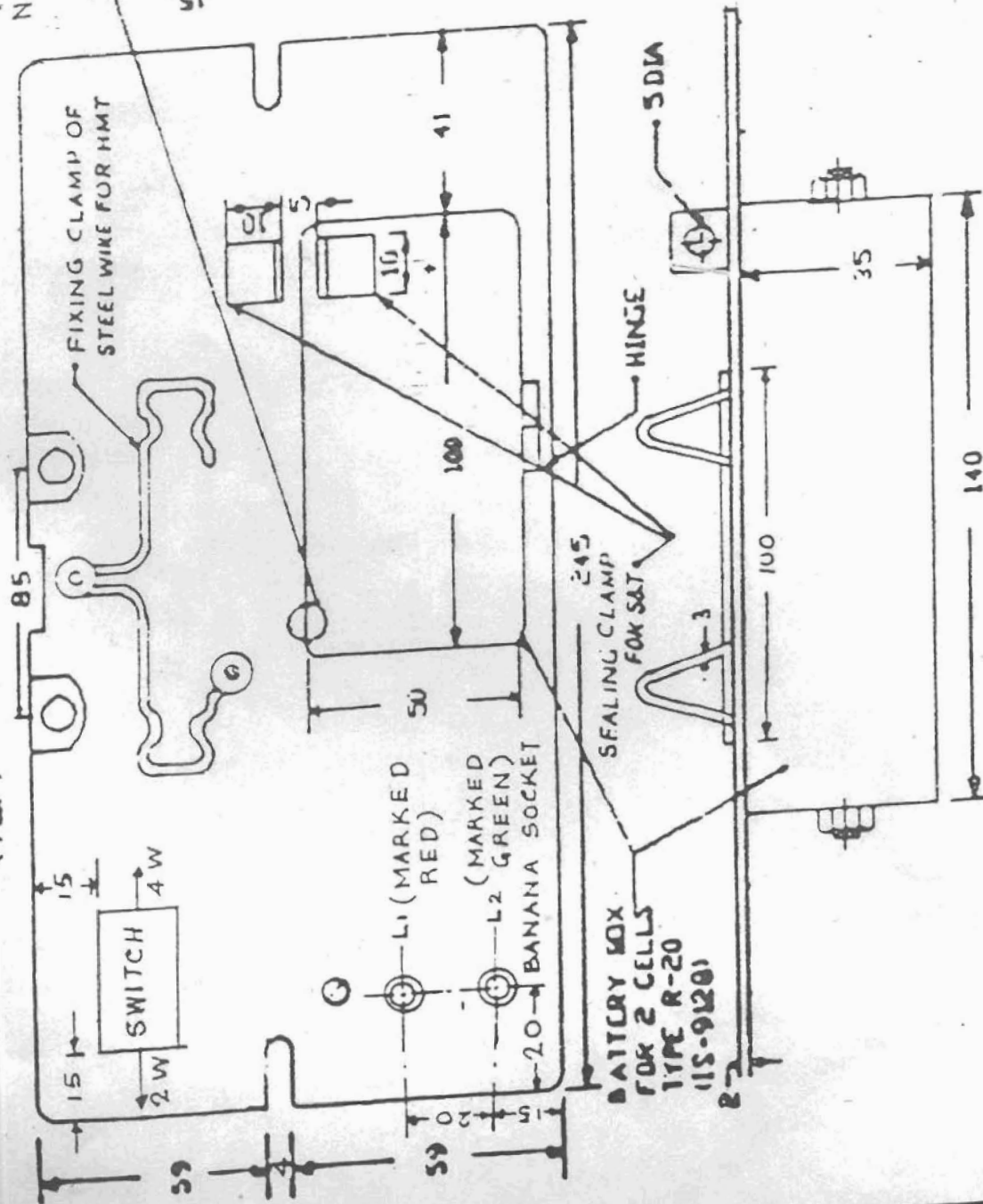
A. D. S. O.

4 WIRE / 2 WIRE

2. SCALE - NOT TO SCALE.

PLAN (TOP)

ANNEXURE - IB
(CLAUSE) - 3.4
NO-1RS:TC-75-99.



- 4- SELF LOCKING SCREW
DOUBLE KNURLED HEAD,
SIZE M3X20.
- 3- SEALING ARRANGEMENT
IMPROVEMENT.

R.D.S.O.

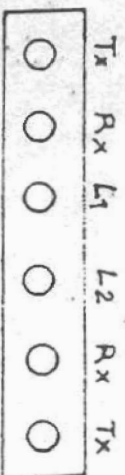
MOUNTING BASE PLATE

2 WIRE / 4 WIRE
PORTABLE CONTROL
TELEPHONE.

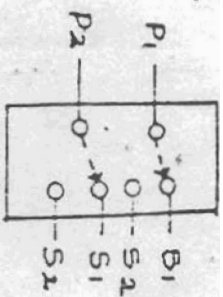
ELEVATION

2. SCALE - NOT TO SCALE.
1. ALL DIMENSIONS IN mm.
NOTE:-

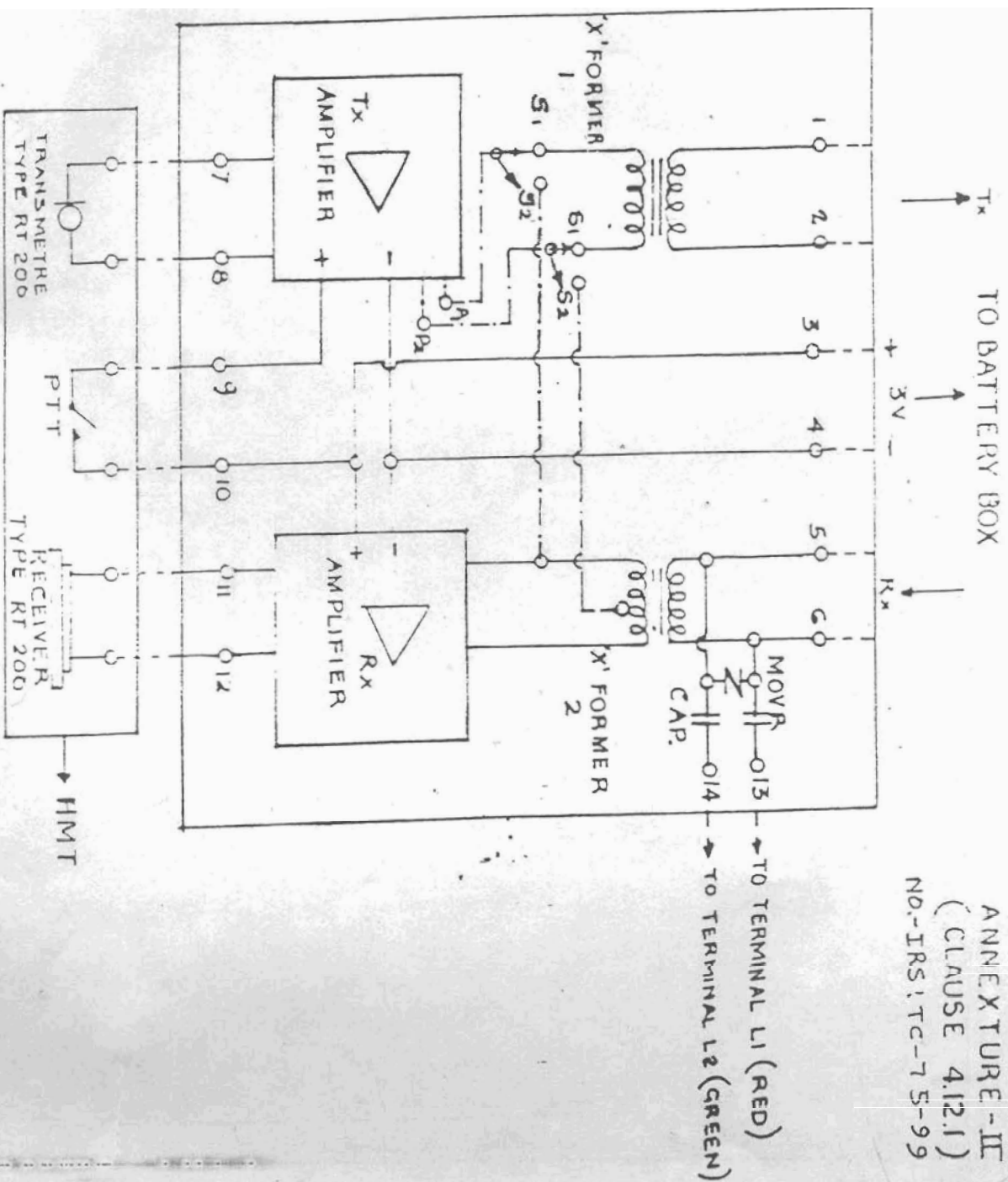
SIX PIN EMERGENCY PLUG



DPDT SWITCH



1. TERMINALS 1 TO 14 DIRECTLY MOUNTED ON PCB.
NOTE:-



WIRING DIAGRAM OF 4 WIRE/2 WIRE PORTABLE CONTROL TELEPHONE

ANNEXURE-II
(CLAUSE 4.12.1)
NO. IRS/TC-75-99

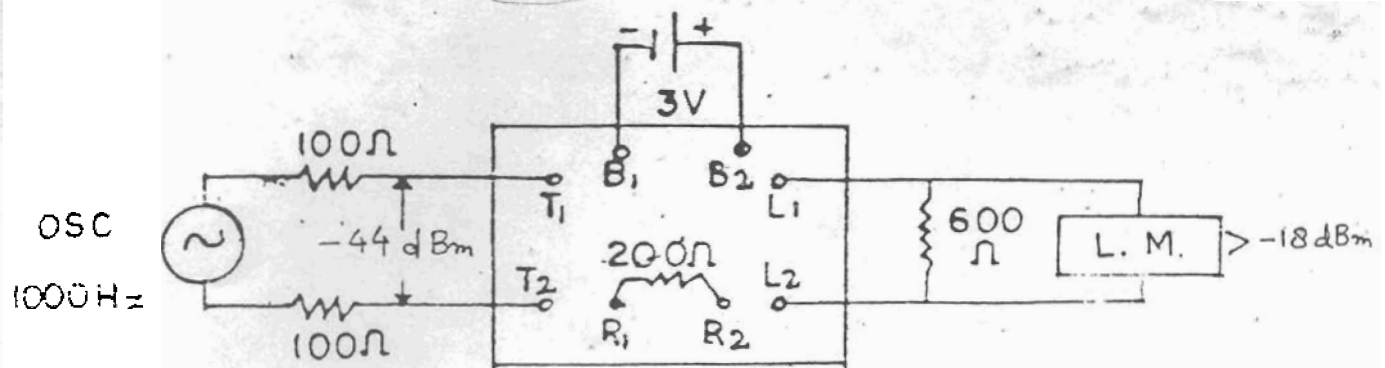
(i) SEND EFFICIENCY (CL. 5.1.3)

FIG. 1(a)

TEST SET UP FOR SEND EFFICIENCY

T_1 AND T_2 : TERMINALS OF TRANSMITTER INSETS.
 R_1 AND R_2 : TERMINALS OF RECEIVER.
 L_1 AND L_2 : LINE TERMINALS.
 B_1 AND B_2 : BATTERY TERMINALS.
 L. M. : LEVEL METER

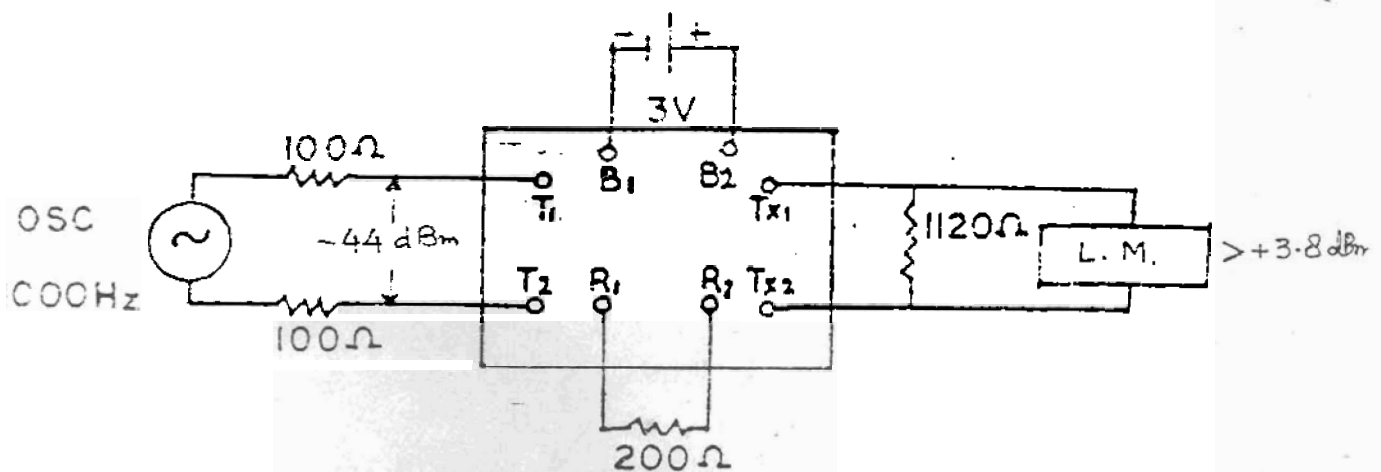


FIG. 1(b)

T_{x1} AND T_{x2} : TRANS TERMINAL OF SIX PIN PLUG

TEST SET UP FOR SEND EFFICIENCY (4 WIRE)

(ii) SIDE TONE (CL.5.)

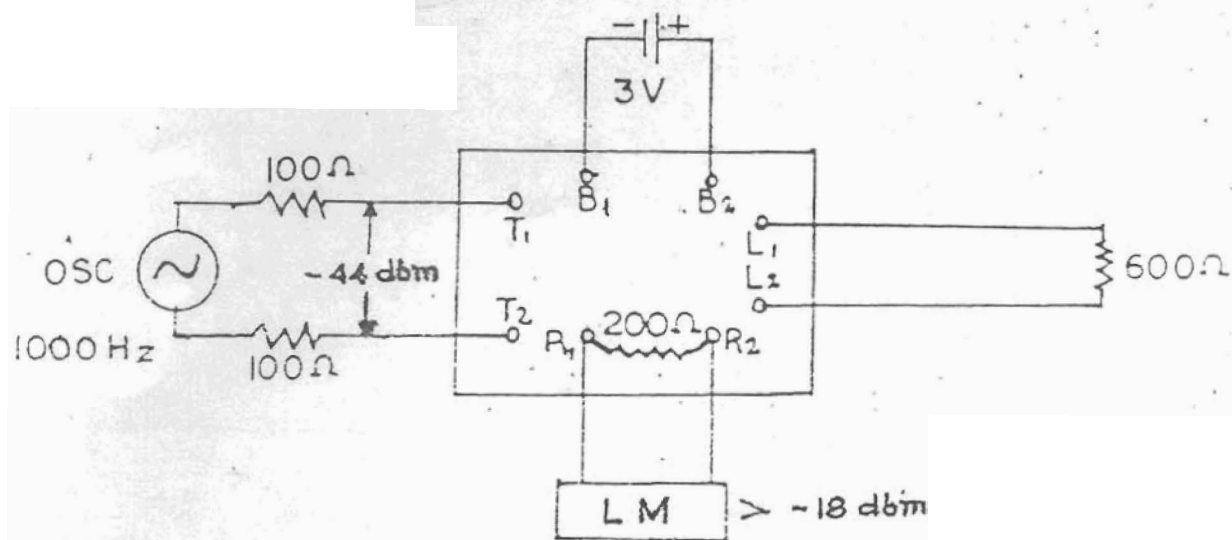


FIG. 2

TEST SET UP FOR SIDE TONE (2WIRE)

(iii) RECEIVE EFFICIENCY (CL.5.1.3)

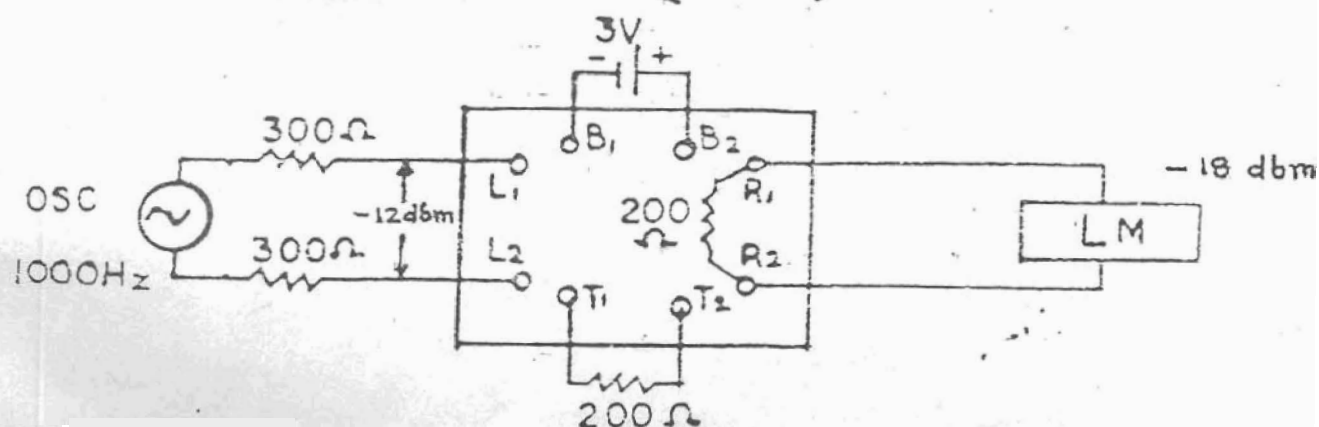
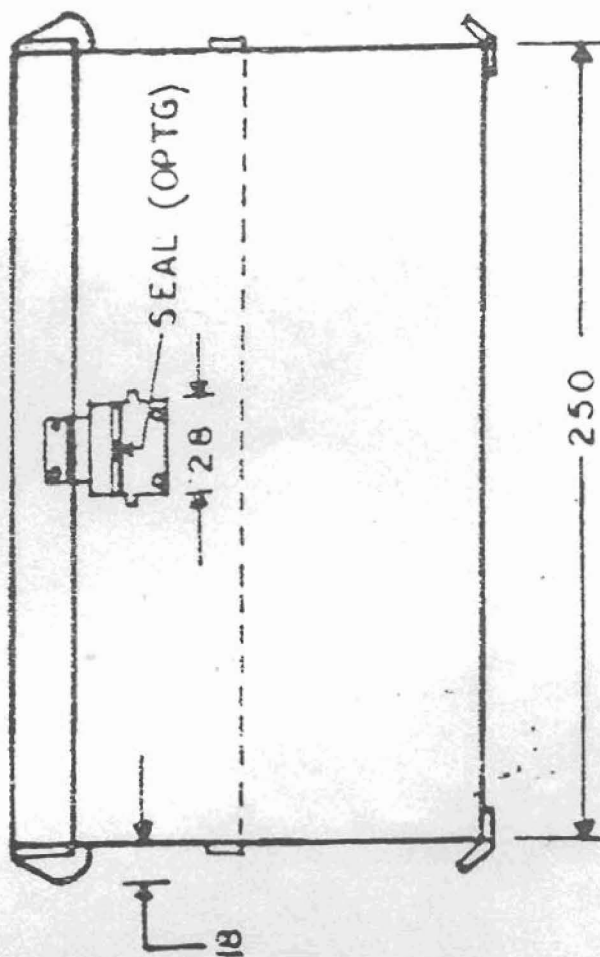
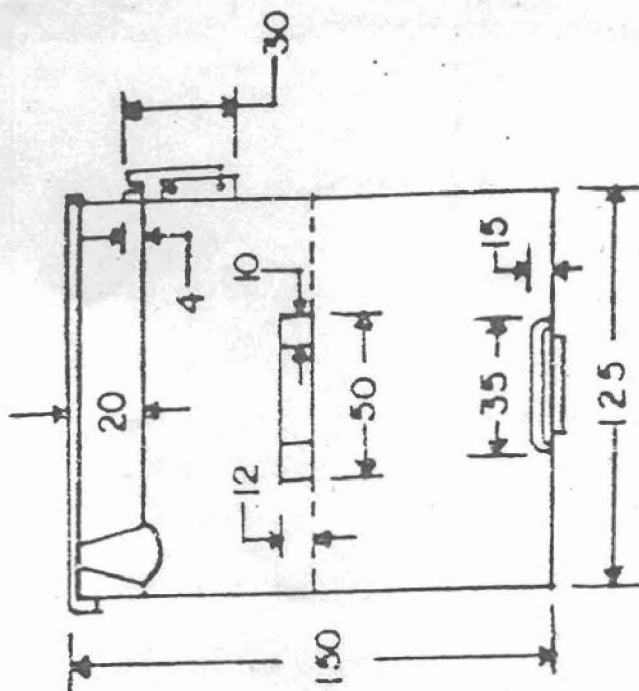
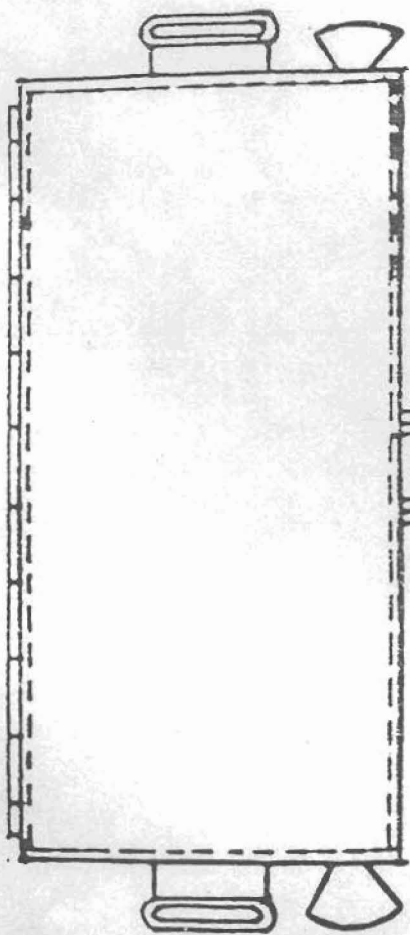


FIG. 3(a)

TEST SET UP FOR RECEIVE EFFICIENCY (2WIRE)

ANNEXURE - 1
(CLAUSE) - 3.4
NO. IRS:TC-75-99



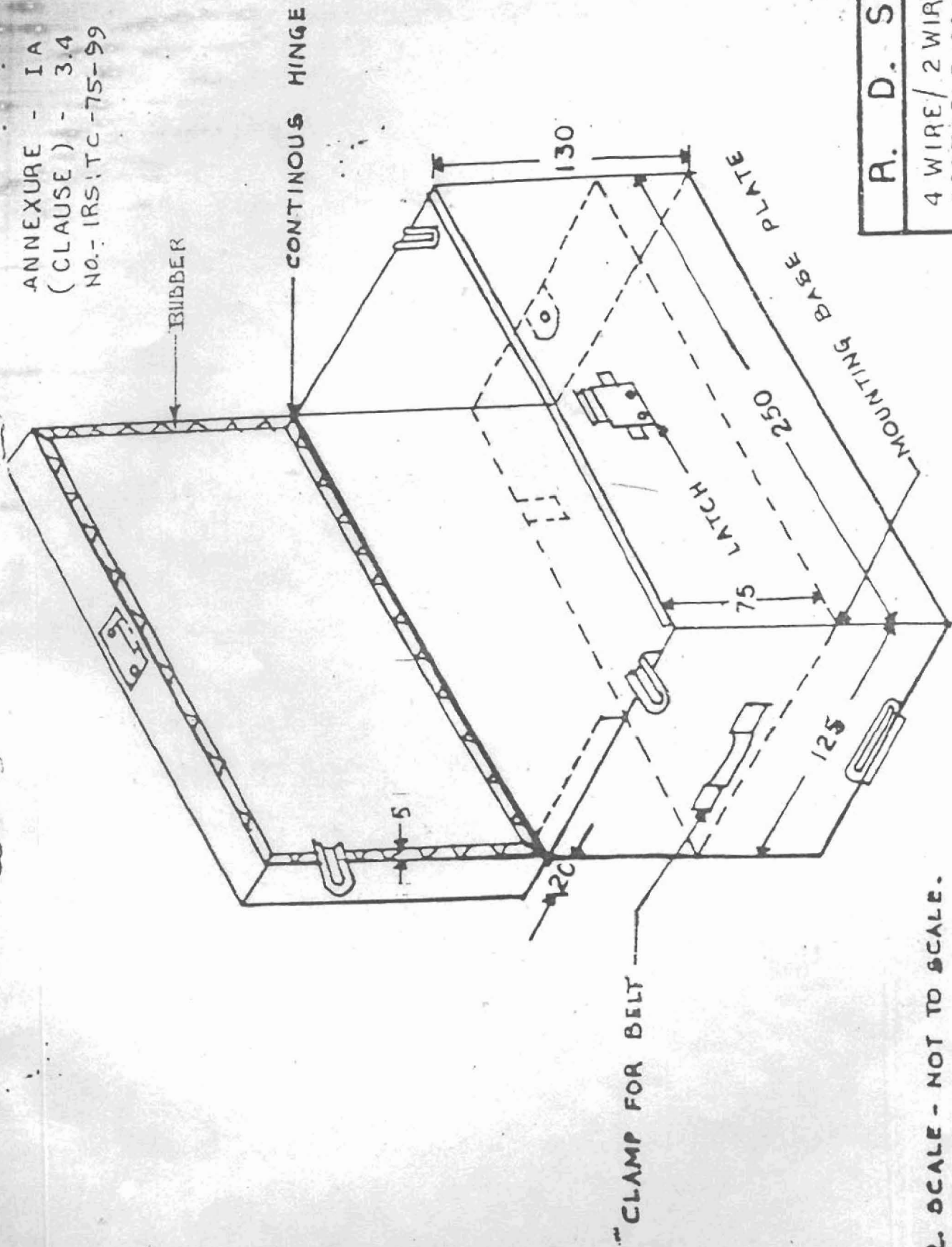
2. SIZE - NOT TO SCALE.
1. ALL DIMENSIONS IN mm.

NOTE:-

A. D. S. O.

4 WIRE / 2 WIRE
PORTABLE CONTROL
TELEPHONE (BOX)

ANNEXURE - I A
(CLAUSE) - 3.4
NO. - IRS/TC-75-99



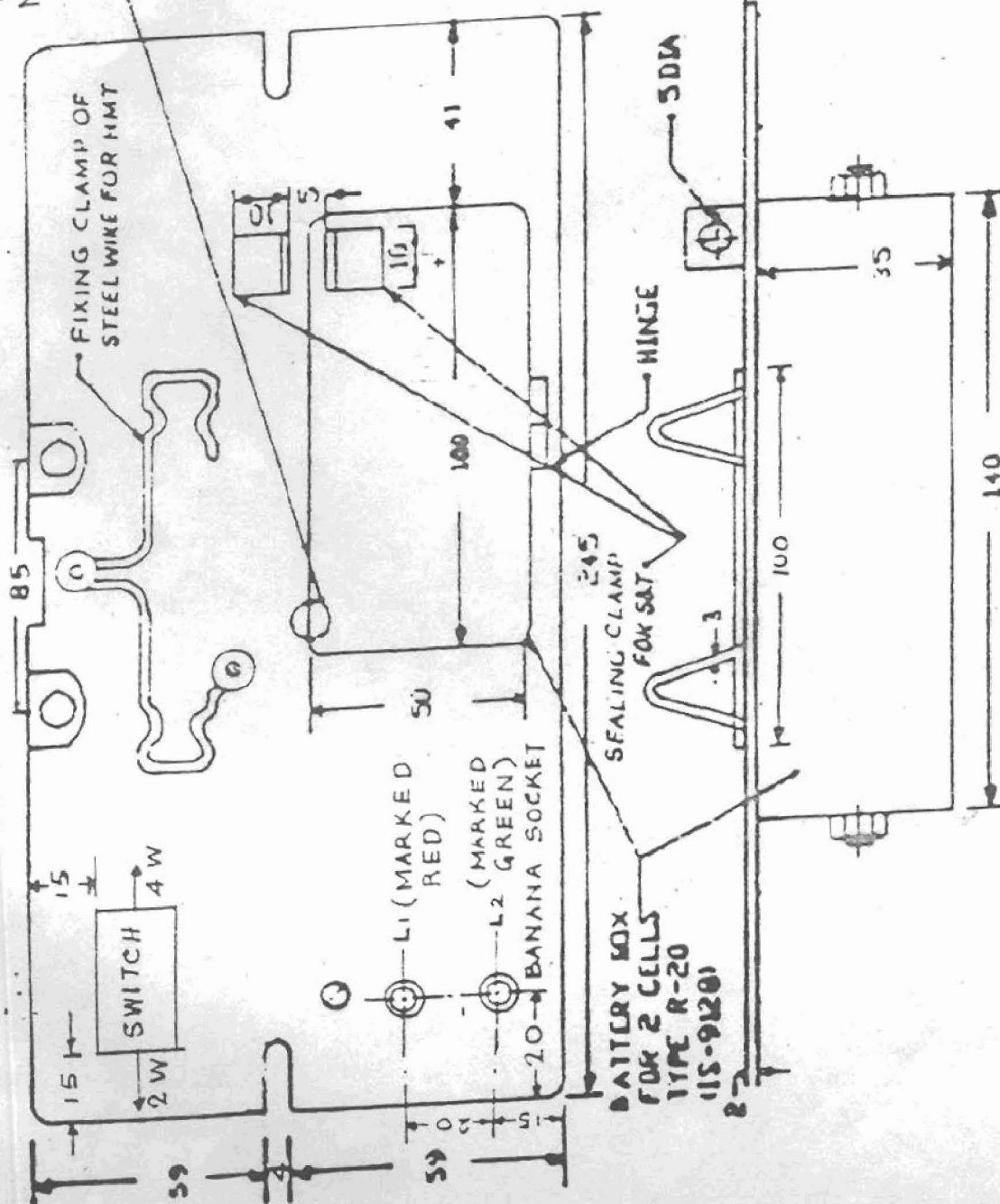
A. D. S. O.

4 WIRE / 2 WIRE
PORTABLE CONTROL
TELEPHONE (BOX)

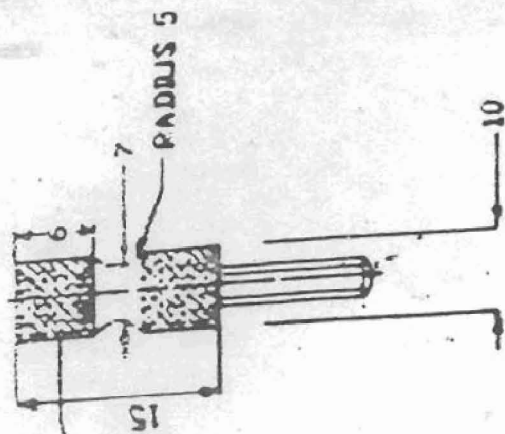
2. SCALE - NOT TO SCALE.
1. ALL DIMENSIONS IN mm.

NOTE:-

PLAN (TOP)



ANNEXURE - IB
(CLAUSE) - 3.4
NO. 1RS: TC-75-99.



4 - SELF LOCKING SCREW
DOUBLE KNURLED HEAD,
SIZE M3X20.
3 - SEALING ARRANGEMENT
IMPROVEMENT.

R. D. S. O.

MOUNTING BASE PLATE

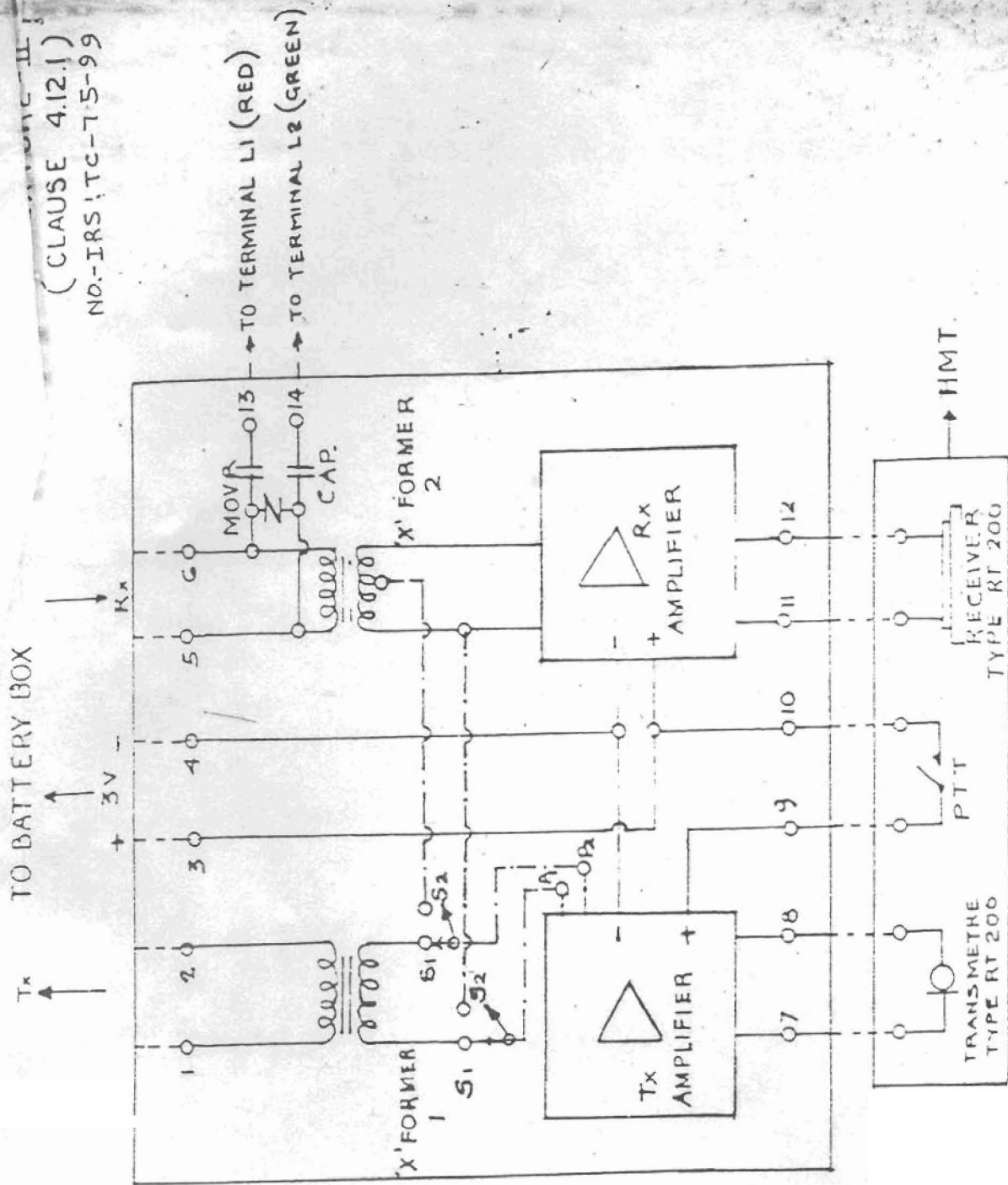
2 WIRE / 4 WIRE

PORTABLE CONTROL
TELEPHONE.

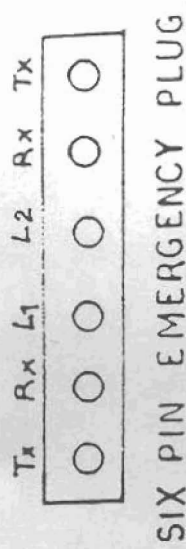
ELEVATION

2. SCALE - NOT TO SCALE.
1. ALL DIMENSIONS IN MM.
NOTE:-

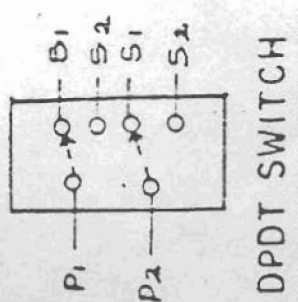
(CLAUSE 4.12.1)
 NO.-IRS:TC-75-99



WIRING DIAGRAM OF 4 WIRE/2 WIRE
 PORTABLE CONTROL TELEPHONE



SIX PIN EMERGENCY PLUG



DPDT SWITCH

1. TERMINALS 1 TO 14 DIRECTLY
 MOUNTED ON PCB.

NOTE:-

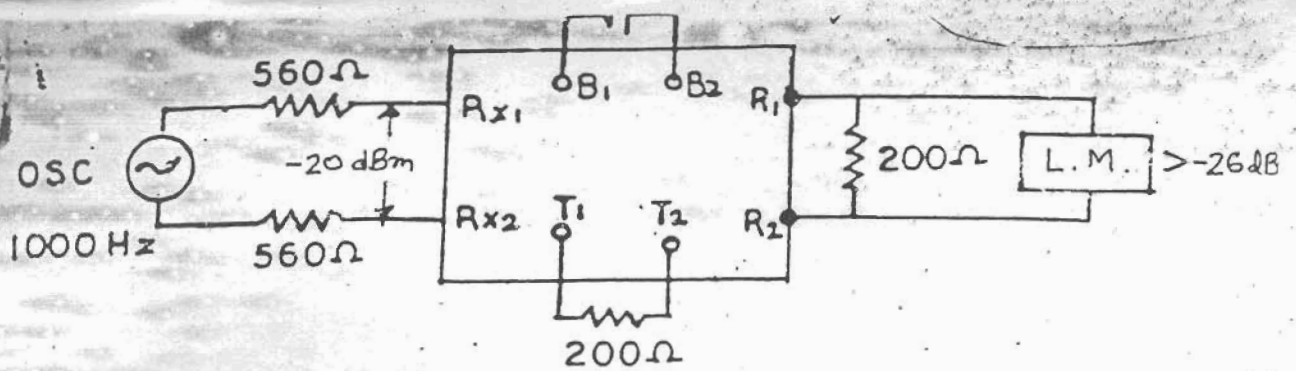


FIG. 3(b)

TEST SET UP FOR RECEIVE EFFICIENCY (4 WIRE)

(iv) INSETION LOSS (CL 5.3)

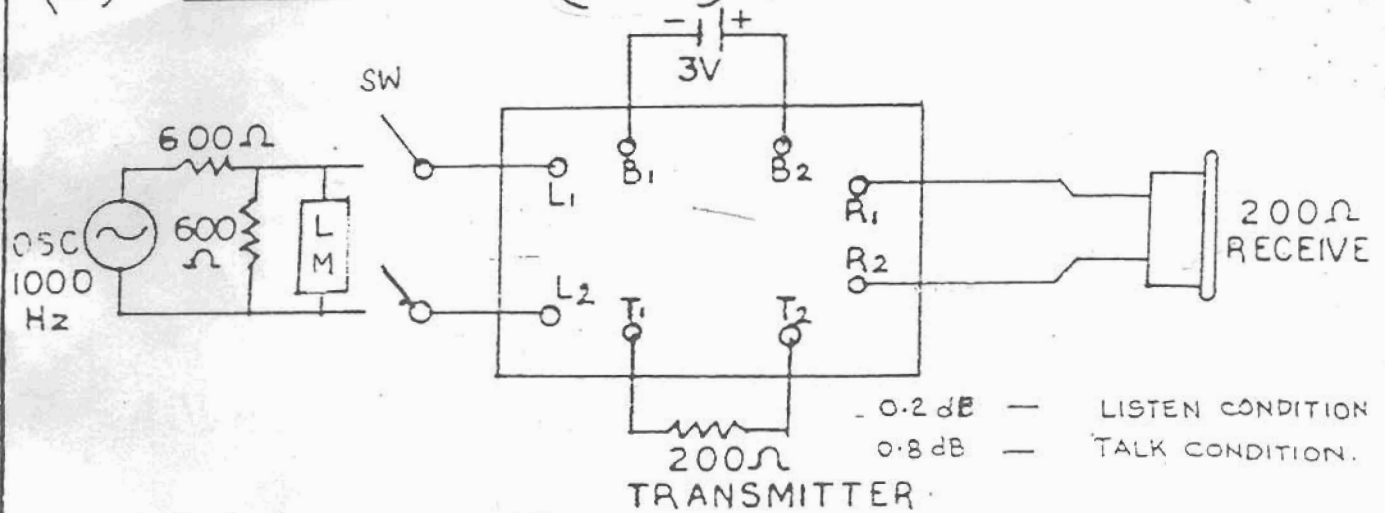


FIG. 4(a)

TEST SET UP FOR INSERTION LOSS (2 WIRE)

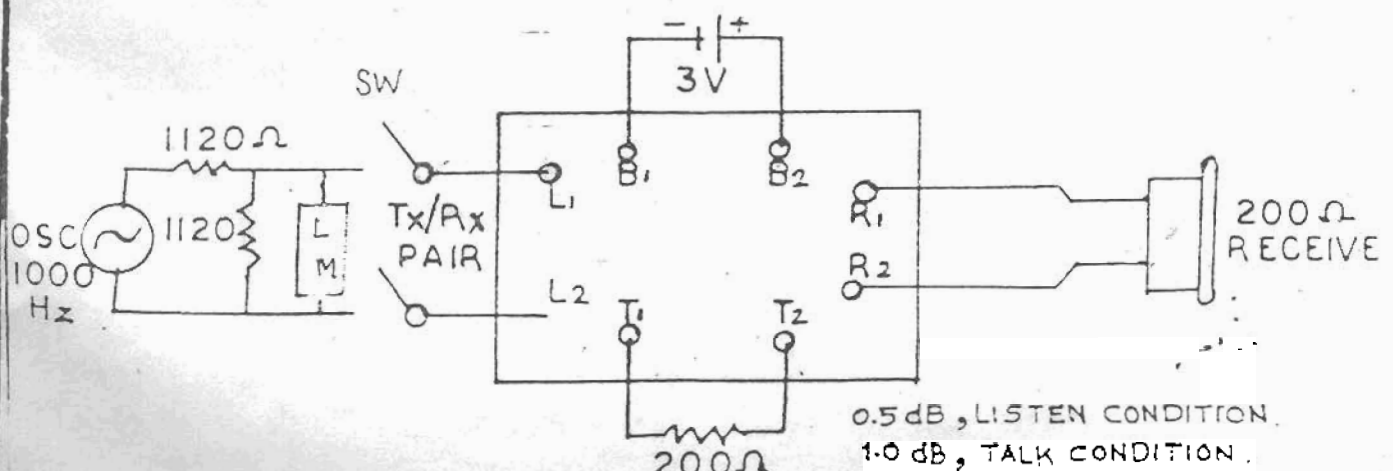


FIG. 4(b)

TEST SET UP FOR INSERTION LOSS (4 WIRE)

01-0522-450500
रेलमार्ग कलकत्ता
Telegram : RAILMANK, Lucknow
फोन/Tele : 451200 (PGX)
450567 (DII)



भारत सरकार, नया दिल्ली
आयुक्त सचिव, रेलमार्ग विभाग
दिल्ली - 200011
Ministry of India - Ministry of Railways
Research Designs & Standards Organisation
Lucknow - 226011



ISO 9001 REGISTERED ORGANISATION
The Indian Railways

No. STI/RE/C/EC/337

Date: 3.4.2001

To : As per list, Overleaf.

Sub:- Amendment No. 1 to 4 wire/2 wire
Portable Control Telephone to Specn.
No. IRS:TC-75-99.

Ref:- Eastern Railway's letter No. W/EC/3/3/31
(B) ECF/133 dated 22.6.2000.

A new clause has been included as under in the
specification No. IRS:TC 75-99 for 4 wire/2 wire Portable
Control Telephone.

This is for your information and reference.

Amendment No. 1

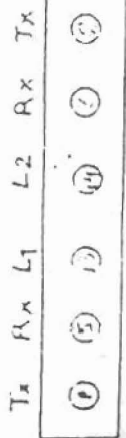
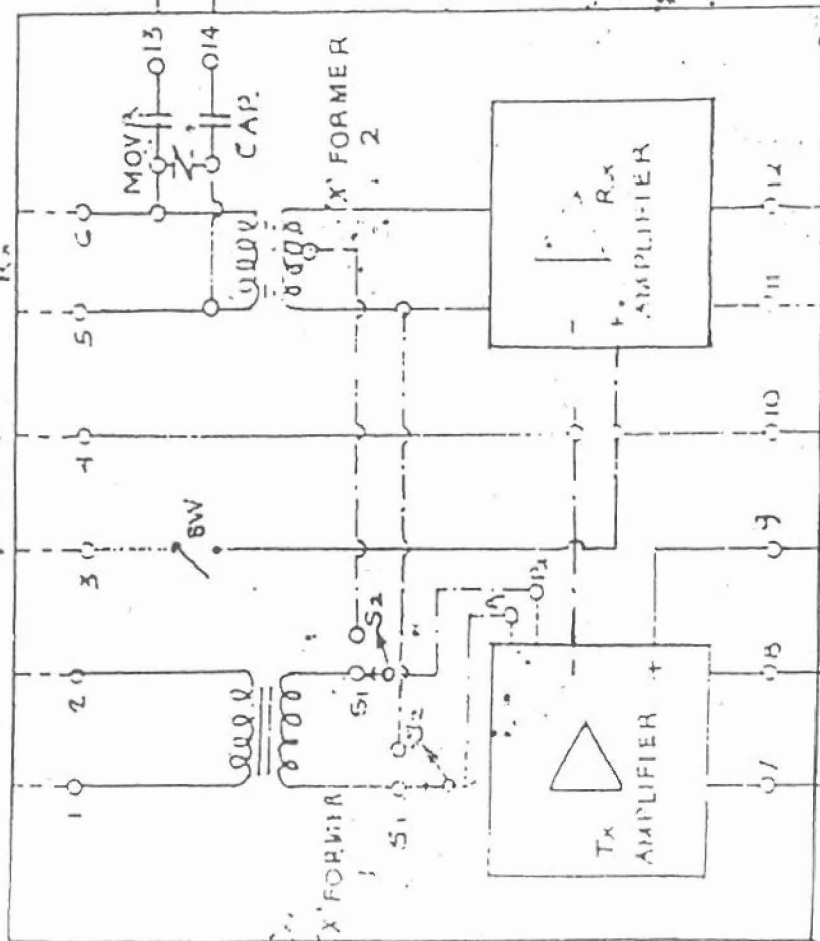
Clause 4.3.9:- A battery ON/OFF heavy duty rocker type
switch with Power ON LED (Red Colour) indication shall
be provided on mounting base plate such that it shall not
infringe the switch. 'ON' and 'OFF' shall be marked to
indicate switch position.

DA: Clause 4.12.1 Switch provided as per
(Annexure-III) clause 4.3.9.

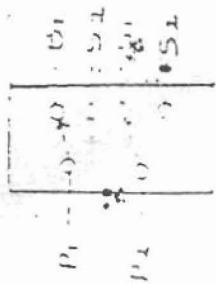
Nareish
(Nareish Saini)
101 Director General/telecom.

ANNEX TURE - III
(CLAUSE 4.12.1)
NO.-IRS:TC-75-99

TO BATTERY BOX



SIX PIN EMERGENCY PLUG



DPDT SWITCH

WIRING DIAGRAM OF 4 WIRE / 2 WIRE
PORTABLE CONTROL TELEPHONE

REMARKS: 1. TO 14 DIRECTION
2. TO 14 DIRECTION

NOTE:-

Corrected Amendment No. 2 to Specification No. IRS: TC 75-99

टेलीफोन / Tele : 2451200 (PBX)
2450115 (DID)
फैक्स / Fax : 91-0522-2458500



अनुसंधान अभिकल्प और मानक संगठन
लखनऊ - 226 011

Government of India-Ministry of Railways.
Research Designs & Standards Organisation
Lucknow - 226 011



No. STT/G/TCSC-32 (2005)

Dated: 20.10.2005

The General Manager (S&T),

1. Central Railway, CST, Mumbai-400001
2. Eastern Railway, Fairly Place, Kolkata-700001
3. Northern Railway, Baroda House, New Delhi-110001
4. North Frontier Railway, Maligaon, Guwahati-781011
5. North Eastern Railway, Gorakhpur-273012
6. Southern Railway, Park Town, Chennai-600003
7. South Central Railway, Rail Nilayam, Secunderabad-500371
8. South Eastern Railway, Garden Reach, Kolkata-700043
9. Western Railway, Churchgate, Mumbai-400020
10. East Central Railway, Hajipur-844101
11. North Western Railway, Jaipur.
12. North Central Railway, Allahabad
13. East Coast Railway, Bhubaneswar
14. West Central Railway, Jabalpur
15. South East Central Railway, Bilaspur
16. South Western Railway, Hubli.
17. The General Manager (S&T)/CORE, Civil Lines, Allahabad- 211011.
18. The General Manager (S&T), Metro Railway, 33/1, Chowringhee Road, Kolkata
19. The CPM, IRPMU, Shivaji Bridge, Behind Shanker Market, New Delhi-110001.
20. The Director/IRISET, Lalaguda, Tarnaka Road, Secunderabad.
21. The Managing Director/RailTel, Bank of Baroda Building, Parliament Street, New Delhi.
22. The Executive Director/CAMTECH, Maharajpur, Gwalior.

Sub: Corrected Amendment No. 2 to Specification No. IRS: TC 75-99 for
4 Wire/ 2 Wire Portable Control Telephone.

Ref: i) This office letter of even no. Dated 28.12.2004 pertaining to minutes of
32nd TCSC.

ii) This office letter of even no. Dated 7.3.2005 and Railway Board's order
on the minutes of 32nd TCSC.

A copy of the corrected Amendment No.2 for 4 Wire/ 2 Wire Portable Control
Telephone is sent herewith for your information and reference please.

The Amendment No.2 issued vide this office letter of even number dated
06.4.2005 has been withdrawn.

SCHEDULE OF IMPLEMENTATION

Duly corrected Amendment No.2 enclosed herewith will come into force w.e.f. 1st December, 2005. All the firms are hereby advised to submit the improved sample in the Telecom Laboratory, RDSO, Lucknow through QA/S&T, RDSO for incremental testing as per the amendment. On successful completion of the testing, the firms/manufacturers concerned will be approved with the current amendment.

Enc: As above.


(M.K. Yadav)
For Director General/Telecom

Copy to: 1. The Secretary (Telecom), Railway Board, Rail Bhawan, New Delhi
for information please.

2. ED/QA (S&T), 4th Floor, Annexe-II, Manak Nagar, Lucknow

3. The Director/Jt. Director Inspection (S&T), RDSO: -

- i) 4th Floor, West Wing, 17, N.S. Road, Kolkata-700001
- ii) IRCOT Complex, Behind Shanker Market, Near Shivaji Bridge, New Delhi-110001.
- iii) 1st Floor, New Annexe Bldg., Churchgate Station, Western Railway, Mumbai-400020.
- iv) Ground Floor, DRM Office Bldg., Southern Railway, Bangalore-560023 for information and necessary action please.

4. Copy forwarded to the following approved firms for information, implementation and compliance thereof.

1. M/s Epsilon Electronic Equipment & Components Pvt Limited, B-2, Electronic Industrial Estate, Kushaiguda, Hyderabad-500062.

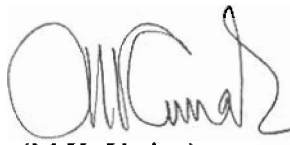
2. M/s INDISCO, 8, Upton Estate, Panki, Kanpur-208022.

3. M/s Bentrion Power Systems, 21/1, Kedarnath Chatterjee Road, Behala, Kolkata-700034.

4. M/s Tummala Electronics Limited, SB-54, 2nd Cross, Peenya Industrial Estate, Bangalore-560058.

5. Smt. Latika Singh, SE/Tele for record.

Enc: As above.


(M.K. Yadav)
for Director General/Telecom

Corrected Amendment No.2 to Specification No. IRS: TC 75-99 for 4 Wire/2
Wire Portable Control Telephone.

The following amendments are issued in IRS: TC 75-99. The existing clauses will henceforth be read as given below: -

Clause No. 4.3.7 – The box shall be finished with powder coated paint, inside and outside with admiralty gray.

Clause No. 4.4 - Handset

Clause No. 4.4.1 – Handset of the telephone shall be made of ABS material. ABS raw material shall be procured from a reputed manufacturer like Bhansali Polymer, Lanxes ABS Ltd., Bayers, L.G. and HPCL conforming to the property mentioned in Appendix B (Clause 4.4.1). Raw material manufacturer's test certificate has to be submitted at the time of type test. The test carried out on finished product shall be as per para-3 of Appendix B.

Clause No. 4.4.2 – The microswitch provided with handset shall be from LCSO/CACT approved sources having valid and current type approval certificate.

Clause No. 4.5.1 – CACT approved Electrodynamic Transducer shall be used as a transmitter.

Clause No. 4.6.1 – Receiver shall be Electrodynamic Transducer type procured from CACT approved sources.

Clause No. 4.7.2 - These transformers shall conform the functional requirement of the equipment and meet the parameter specified in Clause No. 4.7.3, 4.7.4, 4.7.5, 4.7.6, 4.7.7 and 4.7.8.

Clause No. 4.7.8 – The complete windings shall be protected by proper insulation or suitably protected by potting with epoxy compound to avoid ingress of moisture.

Clause No. 4.11.1- Two line terminals, marked as L1 , L2 shall be provided with insulating nuts .Switch shall work on one side with 2W control line and opposite side on 4W control circuit .2Wand 4Wshall be legibly engraved on mounting plate filled with red paint or screen printed.

Clause No. 5.1.2 - Insulation Resistance: The insulation resistance between all terminals of six pin plug & L₁ – L₂ connected together and the main body of the 4W/2W portable control telephone shall not be less than 100 Mega Ohms when tested with a 500V DC Megger/million mega ohm meter at ambient temperature.

Clause No. 5.1.3 (iii) - Receive Efficiency: The test set up is as shown in Fig.3. The line shall be simulated by non-inductive resistance of 300+300 ohms. The level at 1000Hz across terminals L_1 and L_2 shall be adjusted to -12dBm. The level across R_1 and R_2 shall not be less than -18dBm. The total harmonic distortion shall not be more than 3%. The selector switch shall be at 2 Wire side. For 4 Wire (Fig.3b), change the selector switch from 2 wire to 4 wire side, the line shall be then simulated by non inductive resistance of 560+560 ohms. The level and frequency at Rx terminals of six-pin plug shall be adjusted to -20 dBm at 1000 Hz respectively. The level measured across terminals R_1 and R_2 shall be greater than -26dBm. The frequency response of cl: 5.1.3 (i), and 5.1.3 (iii) shall be $\pm 3\text{dB}$ in the frequency range of 300 to 3400 Hz.

Clause No. 6.6.2 – (e) Type test on Electrodynamic transducer as per clause 9 of IRS: TC 74-97 shall be carried out. If the Electrodynamic Transducer used as transmitter & receiver in 4 Wire/2 Wire portable control telephone is procured from the CACT approved sources, then the type test specified in clause 9 of specification of IRS TC: 74-97 need not to be carried out.

Cl. No. 3.1, 4.2.2, (b), 4.4.3, 4.3.7 & 4.11.4 – In the above mentioned clauses please read “hand set” in place of “HMT”.

New Clause Appendix B Para-3: - 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 below: -

<u>Properties</u>	<u>Specified values</u>	<u>Test Method</u>
1. Specific Gravity	1.04 – 1.07	ASTM D-792
2. Vicat Softening Point	100 - 108° C	ASTM D – 1525

-End of Amendment-.

Telephone : +91 – 522 – 2465755
Fax : +91 – 522 – 2462635
E-mail : dtelewlrds@gmail.com



सत्यमेव जयते

भारत सरकार, रेल मंत्रालय
अनुसंधान अभिकल्प और मानक संगठन
लखनऊ-226 011

Government of India - Ministry of Railways
Research Designs & Standards
Organisation LUCKNOW – 226011



No- STT/RE/C/EC/337

Date: 01.04.2015

To,

महाप्रबंधक / संकेत एवं दूरसंचार,	1	GM/S&T
मध्य रेलवे, मुम्बई सी.एस.टी.।	i	Central Rly, Mumbai CST-400 001
पश्चिम रेलवे, चर्च गेट, मुम्बई।	ii	Western Rly, Churchgate, Mumbai-400020
पूर्व रेलवे, फेयरली प्लेस, कोलकाता।	iii	Eastern Rly, Fairlie Place, Kolkata- 700 001
दक्षिण पूर्व रेलवे, गार्डन रीच, कोलकाता।	iv	South Eastern Rly., Garden Reach, Kolkata-700043
उत्तर रेलवे, बड़ौदा हाउस, नई दिल्ली।	v	Northern Rly., Baroda House, New Delhi-110 001
पूर्वोत्तर रेलवे, गोरखपुर।	vi	Northeastern Rly., Gorakhpur -273 012
पूर्वोत्तर सीमान्त रेलवे, मालीगांव, गुवाहाटी।	vii	North Frontier Rly., Maligaon, Guwahati-781 011
दक्षिण रेलवे, पार्क टाउन, चेन्नई।	viii	Southern Rly., Park Town, Chennai -600 003
दक्षिण मध्य रेलवे, सिकन्द्राबाद।	ix	South Central Rly, Rail Nilayam, Secunderabad-500371
पूर्व मध्य रेलवे, हाजीपुर।	x	East Central Railway, Hazipur--844101
उत्तर पश्चिम रेलवे, जयपुर।	xi	North Western Railway, Jaipur-300206
पूर्व तटीय रेलवे, रेल विहार बी.डी.ए. रेंटल कालोनी, चन्द्रशेखरपुर, भुवनेश्वर।	xii	East Coast Railway, Rail Vihar, BDA, Rental Colony, Chandra shekherpur, Bhubneshwar-751023
उत्तर मध्य रेलवे, हेस्टिंग रोड, इलाहाबाद।	xiii	North Central Railway, HQ's office (S&T Branch), Ganga Parisar, Subedarganj, Allahabad-211033.
दक्षिण पश्चिम रेलवे, मुख्य कार्यालय, हुबली।	xiv	South Western Railway, Headquarter Office, Hubli-580020
पश्चिम मध्य रेलवे, ओ0एस0डी0 कार्यालय, जबलपुर।	xv	West Central Railway, OSD Office, Jabalpur-482000.
दक्षिण पूर्वोत्तर मध्य रेलवे, आर0ई0 ऑफिस काम्पलेक्स, बिलासपुर।	xvi	South East Central Railway, R. E. Office Complex, Bilaspur-495004
महाप्रबंधक/ संकेत एवं दूरसंचार, कोर, नवाब युसुफ रोड सिविल लाइन्स इलाहाबाद।	2	The General Manager (S&T), CORE, Nawab Yusuf Road, Civil Lines, Allahabad- 211001
महाप्रबंधक/ संकेत एवं दूरसंचार, मेट्रो रेलवे, 33/1, चौरंगी रोड, कोलकाता।	3	The General Manager (S&T), Metro Railway, 33/1, Chowringhee Road, Kolkata-700 071
मुख्य प्रशानिक अधिकारी, आईआर – पीएमयू, शिवाजी ब्रिज, शंकर मार्केट के पीछे, नई दिल्ली	4	The CAO, IRPMU, Shivaji Bridge, Behind Shanker Market, New Delhi -110 001.
निदेशक / इरीसेट, सिकन्द्राबाद।	5	Director/IRISET/Lalaguda/Secunderabad.
महाप्रबंधक, प्रोजेक्ट, रेलटेल, बैंक आफ बड़ौदा बिल्डिंग, नई दिल्ली।	6	General Manager(Projects)/RAILTEL/Bank of Baroda, Building, Parliament Street, New Delhi.

Sub : Amendment No. 3 to specification No. IRS: TC 75/99
(with amendment no.1 & 2) for 4 Wire/ 2 Wire Portable
Control Telephone.

Amendment No. 3 to specification No. IRS: TC 75/99 (with amendment no.1 & 2) for 4 Wire/ 2 Wire Portable Control Telephone has been finalised and is being sent herewith for your information and reference please. This amendment No. 3 is effective from 01.04.2015.

शरेश सहारिया
(राकेश सहारिया)
कृते महा निदेशक/दूरसंचार

प्रतिलिपि :

का.का. निदेशक/गुणवत्ता आश्वासन, चौथी मंजिल, एनेक्सी-2, अ.अ.मा.सं., लखनऊ।	1	ED/QA(S&T), 4 th floor, Annexee-II, RDSO, Lucknow.
निदेशक (निरीक्षण)/ गुणवत्ता आश्वासन/सिगनल एवं दूरसंचार, अ0अ0मा0स0, निकट इरकॉट, शंकर मार्केट के पीछे नई दिल्ली।	2	Director/QA/S&T/RDSO, Near IRCOT Building, 1st Floor, Behind Shanker Market, New Delhi-110001
निदेशक (निरीक्षण)/ गुणवत्ता आश्वासन / सिगनल एवं दूरसंचार अ0अ0मा0स0, भूतल, डी0आर0एम0 ऑफिस., बंगलोर - 560 023।	3	Director/QA/ S&T/RDSO, Ground Floor, DRM's Office, Bangalore- 560023
निदेशक (निरीक्षण)/गुणवत्ता आश्वासन/संकेत एवं दूरसंचार, अ0अ0मा0स0, प्रथम तल, न्यू एनेक्सी बिल्डिंग, चर्चगेट, पश्चिम रेलवे, मुम्बई।	4	Director/QA/S&T/RDSO, 1 st floor, New Annexie Building, Western Railway, Churchgate, Mumbai-400020
निदेशक (निरीक्षण)/ गुणवत्ता आश्वासन/सिगनल एवं दूरसंचार, अ0अ0मा0स0, चौथी मंजिल, 17 एन.एस. रोड, वेस्ट विंग, फेयरली प्लेस, कोलकाता - 70001	5	Director/QA/S&T/RDSO, 4 th floor, West Wing, Fairlie Place, 17 N.S. Road, Kolkata - 700001
निदेशक (निरीक्षण)/ गुणवत्ता आश्वासन/सिगनल एवं दूरसंचार, अ0अ0मा0स0, हसनपुरा रोड, रेलवे हास्पिटल के सामने, जयपुर - 302 006	6	Director/QA/S&T/RDSO, Hasanpura Road, In front of Railway Hospital, Jaipur - 302 006.
मैसर्स बेंट्रॉन पावर सिस्टम, 21/1 केदारनाथ चैटर्जी रोड, बेहाला, कोलकाता- 700034	7	M/s Bentron Power System, 21/1, Kedarnath Chatterjee Road, Behala, Kolkata-700034 Ph : 040-27120436, 27144114, 27123643 Fax: 040-27143532
मैसर्स एपसीलान इलेक्ट्रॉनिक इक्विपमेंट एंड कम्पोनेन्ट प्राइवेट लिमिटेड, बी-2, इलेक्ट्रॉनिक इंडस्ट्रियल इस्टेट, ई.सी.आई. एल. "X" रोड, हैदराबाद- 500 062 फैक्स नं0 040-27143532	8	M/s Epsilon Electronic Equipment & Components Pvt. Ltd., B-2, Electronic Industrial Estate, ECIL "X" Roads, Hyderabad - 500 062 Phone No. : 040-27120436/27144114 Telefax No. : 040-27143532
मैसर्स इंडस्ट्रियल इंस्ट्रुमेंट और कंट्रोल्स 8 अपट्रॉन स्टेट, पनकी, कानपुर - 208022	9	M/s Industrial Instruments & Controls 8, Uptron Estate, Panki, Kanpur-208022 Ph:0512-26915171, Fax:0512-2691881
फाइल सं. STT / G / VENDOR (75)	10	File No. STT / G / VENDOR (75)

शरेश सहारिया
(राकेश सहारिया)
कृते महा निदेशक/दूरसंचार

**Amendment No. 3 to Specification No. IRS:TC 75/99 (Amendment No. 1&2)
for 4 Wire/ 2 Wire Portable Control Telephone.**

S. No.	Cl. No.	Existing Clause		Amended Clause	
1.	0.2	This specification requires reference to the following Indian Railway Standard (IRS) and Indian Standard (IS) specifications:		This specification requires reference to the following Indian Railway Standard (IRS) and Indian Standard (IS) specifications:	
		IRS: S 23	Electrical Signalling & Interlocking equipment	IRS: S 23	Electrical Signalling & Interlocking equipment
		IS : 104	Ready mixed paint, brushing, zinc chrome priming.	IS : 104	Ready mixed paint, brushing, zinc chrome priming.
		IS : 2074	Ready mixed paint, red oxide zinc chrome priming.	IS : 2074	Ready mixed paint, red oxide zinc chrome priming.
		IS : 5608 (Pt. I & II)	Low frequency wires and cables with PVC insulation and sheath.	IS : 5608 (Pt. I & II)	Low frequency wires and cables with PVC insulation and sheath.
		IS : 9128	Heavy Duty dry batteries.	IS : 9128	Heavy Duty dry batteries.
		IS : 9000	Basic environmental testing procedures for electronic and electrical items.	IS : 9000	Basic environmental testing procedures for electronic and electrical items.
		IRS:TC 74-97	Electrodynamic Transducer	IRS:TC 42-87	Six pin emergency plug & socket.
		IRS:TC 52-97	2-Wire Portable Control Telephone.	IS : 319	Free cutting brass rods and sections.
		IRS:TC 34-97	4-Wire Emergency Control Telephone Used in 25 KV Electrified Area.	IS : 1079	Hot rolled carbon steel sheet and strip.
		IRS:TC 42-87	Six pin plug.	IS : 4800	Enamelled round winding wire.
		IS : 319	Free cutting brass rods and sections.	IS : 6297 (Pt. I & III)	Transformers and inductors (power, audio, pulse and switching) for electronic equipment.
		IS : 1079	Hot rolled carbon steel sheet and strip.		
		IS : 4800	Enamelled round winding wire.		
		IS : 6297 (Pt. I & III)	Transformers and inductors (power, audio, pulse and switching) for electronic equipment.		

S. No.	Cl. No.	Existing Clause	Amended Clause
2.	4.4.2	The microswitch provided with handset shall be from LCSO/CACT approved sources having valid and current type approval certificate.	The Manufacturer of “microswitch provided with handset” shall have valid ISO 9000 certificate for manufacturing of this item. It shall be preferably procured from CACT /LCSO/ CDOT/ SISI (Small industries service institution) approved sources (if available).
3.	4.5.1	CACT approved Electrodynamic Transducer shall be used as a transmitter.	Electro Dynamic Transducer shall be used to perform function of transmitter. The Manufacturer of transmitter shall have valid ISO 9000 certificate for manufacturing of this item. Transmitters shall be preferably procured from CACT /LCSO/ CDOT/ SISI (Small industries service institution) approved sources (if available).
4.	4.6.1	Receiver shall be Electro dynamic transducer type procured from CACT approved Sources.	Electro Dynamic Transducers shall be used to perform function of receiver. The Manufacturer of receiver shall have valid ISO 9000 certificate for manufacturing of this item. Receiver shall be preferably procured from CACT /LCSO/ CDOT/ SISI (Small industries service institution) approved sources (if available).
5.	6.6.2 (e)	Type test on Electrodynamic transducer as per clause 9 of IRS: TC 74-97 shall be carried out. If the Electrodynamic Transducer used as transmitter & receiver in 4 Wire/2 Wire portable control telephone is procured from the CACT approved sources, then the type test specified in clause 9 of specification of IRS TC: 74-97 need not to be carried out.	Deleted

Telephone : +91 - 522 - 2465755
Fax : +91 - 522 - 2462635
E-mail : dtelwlrds@gmail.com



सत्यमेव जयते

भारत सरकार, रेल मंत्रालय
अनुसंधान अभिकल्प और मानक संगठन
लखनऊ-226 011
Government of India - Ministry of Railways
Research Designs & Standards
Organisation LUCKNOW - 226011

No: STT/RE/C/EC/337

Date: 16.11.2016

To,

महाप्रबंधक / संकेत एवं दूरसंचार,	1	GM/S&T
मध्य रेलवे, मुंबई सी.एस.टी.।	i	Central Rly, Mumbai CST-400 001
पश्चिम रेलवे, चर्च गेट, मुंबई।	ii	Western Rly, Churchgate, Mumbai-400020
पूर्व रेलवे, फेयरली प्लेस, कोलकाता।	iii	Eastern Rly, Fairlie Place, Kolkata- 700 001
दक्षिण पूर्व रेलवे, गार्डन रीच, कोलकाता।	iv	South Eastern Rly., Garden Reach, Kolkata-700043
उत्तर रेलवे, बड़ौदा हाउस, नई दिल्ली।	v	Northern Rly., Baroda House, New Delhi-110 001
पूर्वोत्तर रेलवे, गोरखपुर।	vi	Northeastern Rly., Gorakhpur -273 012
पूर्वोत्तर सीमान्त रेलवे, मालीगांव, गुवाहाटी।	vii	North Frontier Rly., Maligaon, Guwahati-781 011
दक्षिण रेलवे, पार्क टाउन, चेन्नई।	viii	Southern Rly., Park Town, Chennai -600 003
दक्षिण मध्य रेलवे, सिकन्दराबाद।	ix	South Central Rly, Rail Nilayam, Secunderabad-500371
पूर्व मध्य रेलवे, हाजीपुर।	x	East Central Railway, Hazipur--844101
उत्तर पश्चिम रेलवे, जयपुर।	xi	North Western Railway, Jaipur-300206
पूर्व तटीय रेलवे, रेल विहार बी.डी.ए. रेंटल कालोनी, चन्द्रशेखरपुर, भुवनेश्वर।	xii	East Coast Railway, Rail Vihar, BDA, Rental Colony, Chandra shekherpur, Bhubneshwar-751023
उत्तर मध्य रेलवे, हेस्टिंग रोड, इलाहाबाद।	xiii	North Central Railway, HQ's office (S&T Branch), Ganga Parisar, Subedarganj, Allahabad-211033.
दक्षिण पश्चिम रेलवे, मुख्य कार्यालय, हुबली।	xiv	South Western Railway, Headquarter Office, Hubli-580020
पश्चिम मध्य रेलवे, ओएसडी कार्यालय, जबलपुर।	xv	West Central Railway, OSD Office, Jabalpur-482000.
दक्षिण पूर्वोत्तर रेलवे, आरओ ऑफिस काम्पलेक्स, बिलासपुर।	xvi	South East Central Railway, R. E. Office Complex, Bilaspur-495004
महाप्रबंधक/ संकेत एवं दूरसंचार, कोर, नवाब युसुफ रोड सिविल लाइन्स इलाहाबाद।	2	The General Manager (S&T), CORE, Nawab Yusuf Road, Civil Lines, Allahabad- 211001
महाप्रबंधक/ संकेत एवं दूरसंचार, मेट्रो रेलवे, 33/1, चौरंगी रोड, कोलकाता।	3	The General Manager (S&T), Metro Railway, 33/1, Chowringhee Road, Kolkata-700 071
मुख्य प्रशासनिक अधिकारी, आईआर - पीएमयू, शिवाजी ब्रिज, शंकर मार्केट के पीछे, नई दिल्ली	4	The CAO, IRPMU, Shivaji Bridge, Behind Shanker Market, New Delhi -110 001.
निदेशक / इरीसेट, सिकन्दराबाद।	5	Director/IRISET/Lalaguda/Secunderabad.
महाप्रबंधक, प्रोजेक्ट, रेलटेल, बैंक आफ बड़ौदा बिल्डिंग, नई दिल्ली।	6	General Manager(Projects)/RAILTEL/Bank of Baroda, Building, Parliament Street, New Delhi.

Sub : Amendment No. 4 to specification No. IRS: TC 75/99
(with amendment no.1,2 & 3) for 4 Wire/ 2 Wire Portable
Control Telephone

Amendment No. 4 to specification No. IRS: TC 75/99 (with amendment no.1,2 & 3) for 4 Wire/ 2 Wire Portable Control Telephone has been finalised and is being sent herewith for your information and reference please. This amendment No. 4 is effective from 16.11.2016.

2 नवंबर 2016 16/11/16

(राकेश सहारिया)
कृते महा निदेशक / दूरसंचार

प्रतिलिपि :

म.का. निदेशक/गुणवत्ता आश्वासन, चौथी मंजिल, एनेक्सी-2, अ.अ.मा.सं., लखनऊ।	1	ED/QA(S&T), 4 th floor, Annexee-II, RDSO, Lucknow.
निदेशक (निरीक्षण)/ गुणवत्ता आश्वासन/सिगनल एवं दूरसंचार, अ0अ0मा0सं0, निकट इरकोट, शंकर मार्केट के पीछे नई दिल्ली।	2	Director/QA/S&T/RDSO, Near IRCOT Building, 1st Floor, Behind Shanker Market, New Delhi-110001
निदेशक (निरीक्षण)/ गुणवत्ता आश्वासन / सिगनल एवं दूरसंचार अ0अ0मा0सं0, भूतल, डी0आर0एम0 ऑफिस, बंगलोर - 560 023।	3	Director/QA/ S&T/RDSO, Ground Floor, DRM's Office, Bangalore- 560023
निदेशक (निरीक्षण)/गुणवत्ता आश्वासन/संकेत एवं दूरसंचार, अ0अ0मा0सं0, प्रथम तल, न्यू एनेक्सी बिल्डिंग, चर्चगेट, पश्चिम रेलवे, मुंबई।	4	Director/QA/S&T/RDSO, 1 st floor, New Annexe Building, Western Railway, Churchgate, Mumbai- 400020
निदेशक (निरीक्षण)/ गुणवत्ता आश्वासन/सिगनल एवं दूरसंचार, अ0अ0मा0सं0, चौथी मंजिल, 17 एन.एस. रोड, वेस्ट विंग, फेयरली प्लेस, कोलकाता - 70001	5	Director/QA/S&T/RDSO, 4 th floor, West Wing, Fairlie Place, 17 N.S. Road, Kolkata - 700001
निदेशक (निरीक्षण)/ गुणवत्ता आश्वासन/सिगनल एवं दूरसंचार, अ0अ0मा0सं0, हसनपुरा रोड, रेलवे हास्पिटल के सामने, जयपुर - 302 006	6	Director/QA/S&T/RDSO, Hasanpura Road, in front of Railway Hospital, Jaipur - 302 006.
मैसर्स बेंट्रॉन पावर सिस्टम, 21/1 केदारनाथ चैटर्जी रोड, बेहाला, कोलकाता- 700034	7	M/s Bentron Power System, 21/1, Kedarnath Chatterjee Road, Behala, Kolkata-700034 Ph : 040-27120436, 27144114, 27123643 Fax: 040-27143532
मैसर्स एप्सिलान इलेक्ट्रॉनिक इक्विपमेंट एंड कम्पोनेन्ट प्राइवेट लिमिटेड, बी-2, इलेक्ट्रॉनिक इंडस्ट्रियल इस्टेट, ई.सी.आई. एल. "X" रोड, हैदराबाद- 500 062 फैक्स नं0 040-27143532	8	M/s Epsilon Electronic Equipment & Components Pvt. Ltd., B-2, Electronic Industrial Estate, EQL "X" Roads, Hyderabad - 500 062 Phone No. : 040-27120436/27144114 Telefax No. : 040-27143532
मैसर्स इंडस्ट्रियल इंस्ट्रुमेंट और कंट्रोल्स, 8 अपट्रॉन स्टेट, पनकी, कानपुर - 208022	9	M/s Industrial Instruments & Controls 8, Uptron Estate, Panki, Kanpur-208022 Ph:0512-26915171, Fax:0512-2691881
फाइल सं. STT / G / VENDOR (75)	10	File No. STT / G / VENDOR (75)

DA : As above

2 नवंबर 2016 16/11/16

(राकेश सहारिया)
कृते महा निदेशक / दूरसंचार

**Amendment No. 4 to Specification No. IRS:TC 75/99 (Amendment No.1,2 & 3)
for 4 Wire/ 2 Wire Portable Control Telephone.**

S. No.	Cl. No.	Existing Clause	Amended Clause
1.	4.5.1	Electro Dynamic Transducer shall be used to perform function of transmitter. The Manufacturer of transmitter shall have valid ISO 9000 certificate for manufacturing of this item. Transmitters shall be preferably procured from CACT /LCSO/ CDOT/ SISI (Small industries service institution) approved sources (if available).	Electro Dynamic Transducer of 150+20% ohm impedance shall be used to perform function of transmitter. The Manufacturer of transmitter shall have valid ISO 9000 certificate for manufacturing of this item. Transmitters 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 location 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.
2.	4.6.1	Electro Dynamic Transducers shall be used to perform function of receiver. The Manufacturer of receiver shall have valid ISO 9000 certificate for manufacturing of this item. Receiver shall be preferably procured from CACT /LCSO/ CDOT/ SISI (Small industries service institution) approved sources (if available).	Electro Dynamic Transducer of 150+20% ohm impedance shall be used to perform function of receiver. The Manufacturer of receiver shall have valid ISO 9000 certificate for manufacturing of this item. Receivers or condenser microphone shall be preferably procured from CACT /LCSO/ CDOT/ SISI (Small industries service institution) approved sources (if available). The transducers shall be fixed in the

S. No.	Cl. No.	Existing Clause	Amended Clause
			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.
3.	5.1.3	Telephone shall be subjected to various transmission tests by connecting in the test setup as indicated in fig 1 to 4 (Annexure III) i) Send Efficiency : The test set up shall be as shown in Fig. 1 . T1 and T2 :Terminals of Transmitter Insets. R1 and R2 : Terminals of receivers. L1 and L2 : Line Terminals. B1 and B2 : Battery Terminals LM : Level Meter The Transmitter of a hand set shall be removed and simulated by 100 + 100 ohms non inductive resistance as shown and the receiver replaced by a non inductive resistance of 200 ohms. Terminals B1 & B2 are to be connected to a 3 V battery with proper polarity. The oscillator level shall be adjusted such that it is -44 dBm at 1000 Hz measured across terminals T1 and T2 with the microswitch pressed to talk position. The line terminals shall be terminated by non inductive resistance of 600 ohms. The level across L1 & L2 shall be	Telephone shall be subjected to various transmission tests by connecting in the test setup as indicated in fig 1 to 4 (Annexure III) i) Send Efficiency : The test set up shall be as shown in Fig. 1 . T1 and T2 :Terminals of Transmitter Insets. R1 and R2 : Terminals of receivers. L1 and L2 : Line Terminals. B1 and B2 : Battery Terminals LM : Level Meter The Transmitter of a hand set shall be removed and simulated by $R/2 + R/2$ ohms non inductive resistance as shown and the receiver replaced by a non inductive resistance of R ohms (where $R = 150 \text{ ohm} \pm 20\%$). Terminals B1 & B2 are to be connected to a 3 V battery with proper polarity. The oscillator level shall be adjusted such that it is -44 dBm at 1000 Hz measured across terminals T1 and T2 with the microswitch pressed to talk position. The line terminals shall be terminated by non inductive resistance of 600 ohms. The level across L1 & L2 shall be greater than 0 dBm. Total harmonic distortion shall not be more than 3%. When the selector switch shall be at 2 wire side. For 4 wire, trans terminal of six pin

S. No.	Cl. No.	Existing Clause	Amended Clause
		greater than 0 dBm. Total harmonic distortion shall not be more than 3%. When the selector switch shall be at 2 wire side. For 4 wire, trans terminal of six pin plug shall be terminated by non inductive resistance of 1120 ohm. The level across 1120 ohm shall be greater than + 3.8 dBm and total harmonic distortion shall not be more than 3%. When the selector switch shall be at 4 wire side.	plug shall be terminated by non inductive resistance of 1120 ohm. The level across 1120 ohm shall be greater than + 3.8 dBm and total harmonic distortion shall not be more than 3%. When the selector switch shall be at 4 wire side.
4.	5.1.3 (iv)	Insertion Loss : The test setup as in fig.4 (a) Listen Condition : with the setup as in fig. 4(a) for 4 wire oscillator level is set to 0 dBm across 600 ohms without the telephone being connected. The microphone shall be disconnected and terminal T1 and T2 shall be terminated with 200 ohm non inductive resistance. Then telephone terminal L1 and L2 to be connected and the drop in the reading of the level meter shall not be greater than 0.2 dB as in fig. 4(a) and 0.5 dB when receive terminal is connected across 1120 ohm resistance as in fig. 4(b) for 4 wire.	Insertion Loss : The test setup as in fig.4 (a) Listen Condition : with the setup as in fig. 4(a) for 4 wire oscillator level is set to 0 dBm across 600 ohms without the telephone being connected. The microphone shall be disconnected and terminal T1 and T2 shall be terminated with R ohms non inductive resistance (where $R = 150 \text{ ohm} \pm 20\%$). Then telephone terminal L1 and L2 to be connected and the drop in the reading of the level meter shall not be greater than 0.2 dB as in fig. 4(a) and 0.5 dB when receive terminal is connected across 1120 ohm resistance as in fig. 4(b) for 4 wire.
5.	7.4	The sampling plan for conducting acceptance tests on Electrodynamic transducer shall be as per IRS:TC 74-97.	Deleted
6.	9.1	4W/2W Emergency Portable Control Telephone shall be function satisfactorily under the following climatic environmental conditions tested as per IS:9000 series excepting Transducers which are covered under specn. IRS:TC 74-97.	4W/2W Emergency Portable Control Telephone shall be function satisfactorily under the following climatic environmental conditions tested as per IS:9000 series.

S. No.	Cl. No.	Existing Clause	Amended Clause
7.	Page No. 19, 20, 25	Figures	Figures at existing page no. 19, 20 & 25 of the specification (page no. 5,6&7 of this document) are amended accordingly.
8.	Page No. 16, 17, 24	Figures	Deleted
9.	12	New Clause	All the provisions contained in RDSO's ISO procedures laid down in Document No. QO-D-7.1-11 dated 19.07.2016 (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

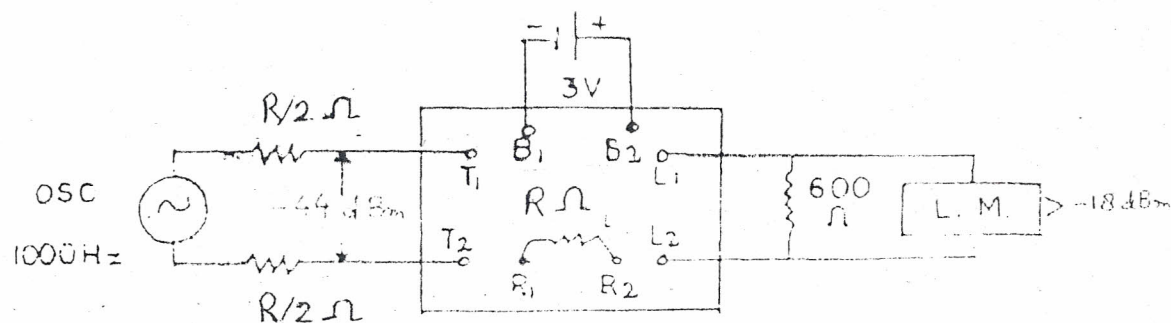
(i) SEND EFFICIENCY (CL. 5.1.3)

FIG. 1(a)

TEST SET UP FOR SEND EFFICIENCYT₁ AND T₂ : TERMINALS OF TRANSMITTER INSETS.R₁ AND R₂ : TERMINALS OF RECEIVER.L₁ AND L₂ : LINE TERMINALS.B₁ AND B₂ : BATTERY TERMINALS.

L.M. : LEVEL METER

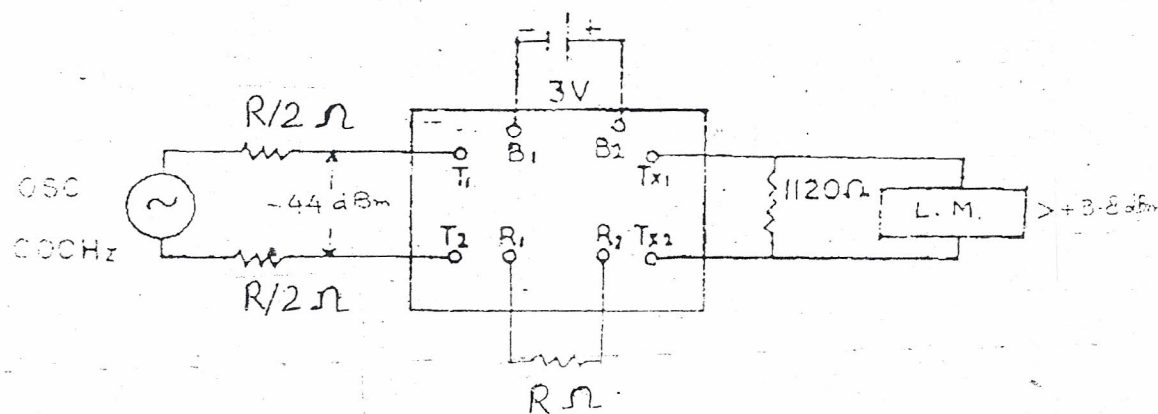


FIG. 1(b)

T_{x1} AND T_{x2} : TRANS TERMINAL OF SIX PIN PLUGTEST SET UP FOR SEND EFFICIENCY (4 WIRE)

NOTE : R = (150 ± 20%) ohm

(ii) SIDE TONE (CL.5)

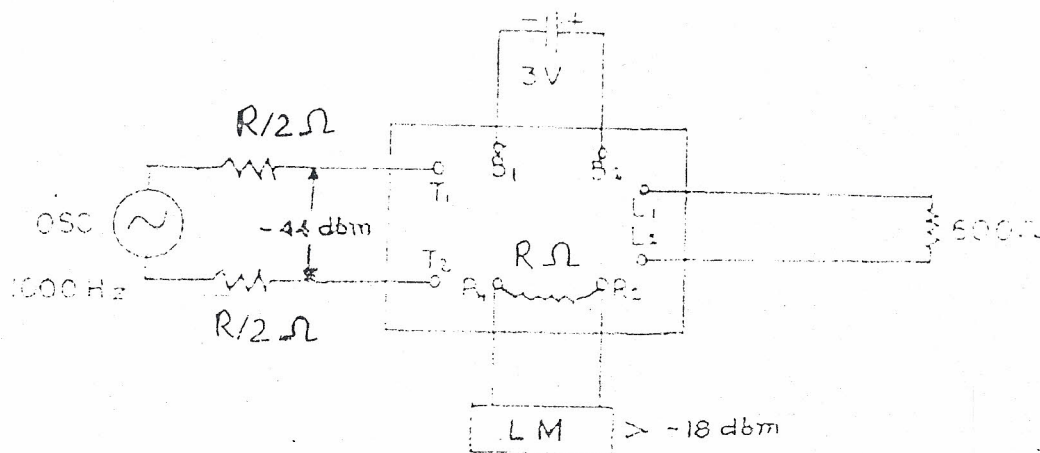


FIG 2

TEST SET UP FOR SIDE TONE (2WIRE)

(iii) RECEIVE EFFICIENCY (CL.5.1.3)

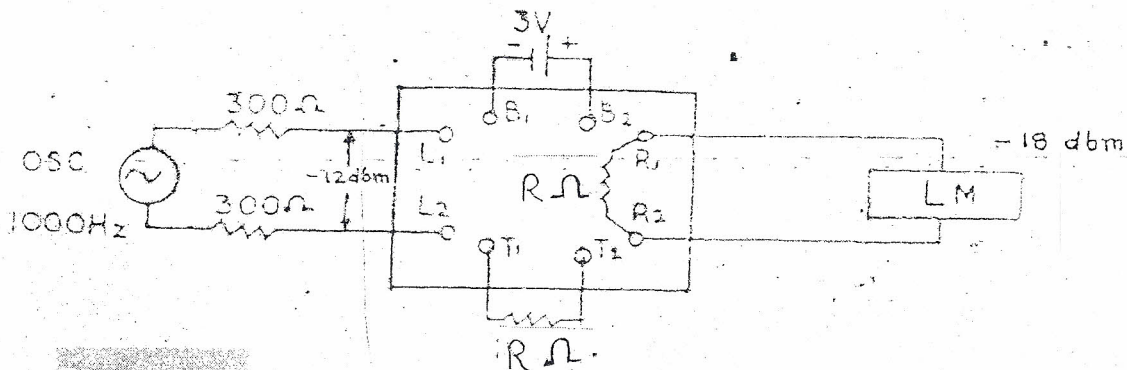


FIG. 3(a)

TEST SET UP FOR RECEIVE EFFICIENCY (2WIRE)

NOTE : $R = (150 \pm 20\%) \text{ ohm}$

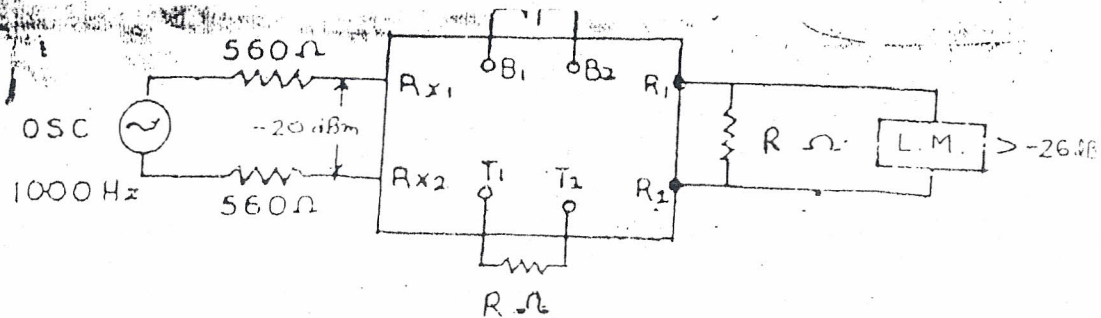


FIG. 3(b)

TEST SET UP FOR RECEIVE EFFICIENCY (4 WIRE)

(iv) INSETION LOSS (CL 5.5)

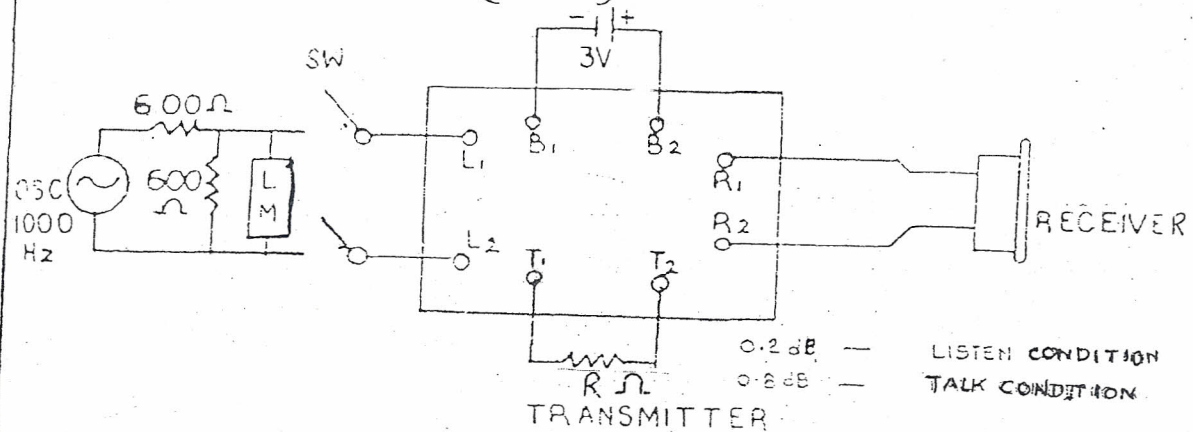


FIG. 4(a)

TEST SET UP FOR INSERTION LOSS (2 WIRE)

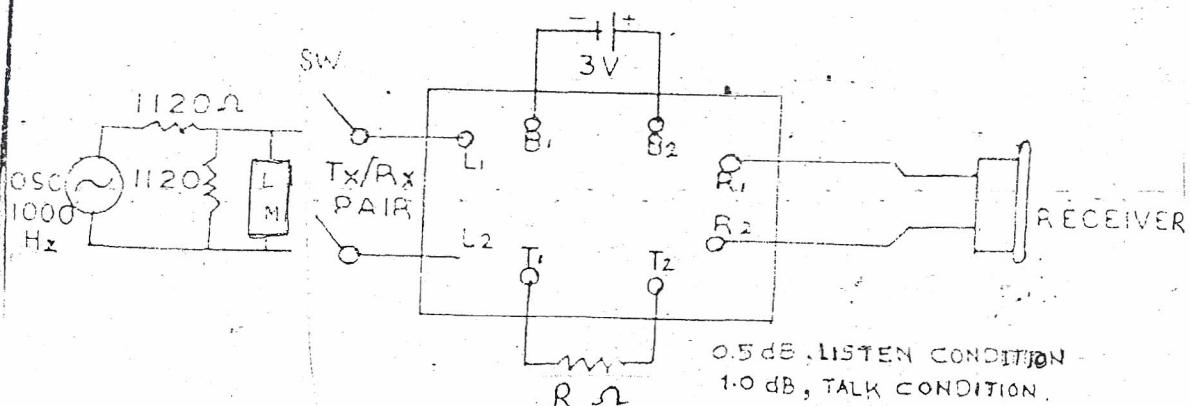


FIG. 4(b)

TEST SET UP FOR INSERTION LOSS (4 WIRE)

NOTE : $R = (150 \pm 20\%) \text{ ohm}$

ISO 9001-2015	Document No. IRS: TC-78/2020	Version: 1.1	Date Effective: 06.06.2022
Document Title: Specification for Light Weight Portable Control Telephone (4-Wire /2-Wire)			

GOVERNMENT OF INDIA MINISTRY OF RAILWAYS



RESEARCH DESIGNS & STANDARD ORGANISATION
MANAK NAGAR, LUCKNOW-226 011

IRS: TC-78/2020

SPECIFICATION

FOR

LIGHT WEIGHT PORTABLE CONTROL TELEPHONE (4 Wire /2 Wire)

ISSUED BY
S&T DIRECTORATE

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I. Amendment History:

S.N.	Amendment Date	Version	Reason for Amendment
1	2000	-	First Issue
2	29.09.2005	-	Corrected Amendment No. 1 to the specification Issued
3	01.04.2015	-	Amendment No.2 to the specification Issued.
4	16.12.2016	-	Amendment No. 3 to the specification Issued.
5	27.05.21	1.0	Specification revised. Approved by ED/Tele-I at Note#18 of subject e-file.
6	06.06.2022	1.1	Correction of typographical errors. Re-arranging clauses as per first issue. Approved by PED/S&T at Note#46 of subject e-file.

II. Document Control Sheet

Designation	Organization	Function	Level
SSE/Tele	RDSO	Member	Assist/Prepare
ADE/Tele	RDSO	Member	Assist/Prepare, Check
Jt. Dir./Tele-II	RDSO	Member Secretary	Prepare, Review, Issue
PED/S&T	RDSO	Approving Authority	Approve

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0.0 FORWARD

- 0.1** This specification is issued under the serial No. IRS: TC-78-20 followed by the year of adoption as standard or in the case of revision, the year of latest revision.
- 0.2** This specification requires reference to the following Indian Railway Standard (IRS) and Indian Standard (IS) specifications.

IRS: S-23/88	Electrical Signaling & Interlocking Equipment
IRS: TC 42-87	Six Pin Emergency Plug
IS : 9000/2008	Basic Environmental Testing Procedures for Electronic & Electrical Items
IS: 6297 (Pt. I & III)	Transformers & Inductors (Power audio pulse & Switching)for Electronic Equipment
IS: 4800 (Pt. I)/1968	Enameled round winding wire
IS: 5608 (Pt. I & II)/2000	Low frequency wires & cables with PVC insulation and sheath

- 0.3** Whenever in this specification any of the above mentioned specifications are 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 technical requirements of Light weight 4w/2w Control Telephone to be used on (4 Wire basis in 25 KV AC Electrified Area & on 4 wire basis on quad cable or 2 wire basis on Overhead alignment respectively in non-RE area) in one combined unit and does not include all the necessary provisions of a contract.

1.0 SCOPE

- 1.1** This specification covers the requirements and provisions of tests and inspection of Light Weight Portable Control Telephone (Hand held version) used for communication on 4 Wire/2 Wire Railway Control & Emergency Circuits.
- 1.2** This specification covers the constructional features, electrical characteristics and technical requirements of Light Weight Portable Control Telephone.

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:-
- 2.2.1 Lot:** A lot is constituted by the Light Weight Portable Control Telephones of the same type manufactured in the same factory during the same period using the same process and materials.

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3.0 GENERAL REQUIREMENTS

- 3.1** The shape of the body of the Light Weight Portable Control Telephone shall be in the form of a rectangular box made of mild steel/ABS Plastic.
- 3.2** The six pin plug shall be as per specification no. IRS: TC-42-87 and drawings TC-15221 to TC-15224 procured from approved source. This item shall form an integral part and shall be supplied along with Light Weight Portable Control Telephone.
- 3.3** Poles for Light Weight Portable Control Telephone with arm assembly required for extending working on 2 wire basis with overhead telecom alignment and poles container shall be as per RDSO Drg. NO. TCA 3101 and TCA 3450 respectively or as per any other Drawing required by the purchaser. However this item shall not form part of supply along with Light Weight Control Telephone unless specifically asked and mentioned by the purchaser.
- 3.4** The Telephone instrument shall be supplied in a water proof carrying case/ pouch made from durable Rexene/Nylon material and having a zip and a shoulder strap of suitable size for protection and as a handy carrier. The telephone instrument & the 6 pin plug should be tie able together by means of straps provided inside case/pouch.
- 3.5** Sealing facility of carrying case/pouch by providing two Zipper chain handles shall be provided so that it can be sealed after testing which shall be capable of being broken during emergency.
- 3.6** The equipment shall be protected from:-
1. Surge and transient.
 2. Acoustic protection to receiver

4.0 CONSTRUCTION AND MATERIALS

- 4.1** The weight of the Light Weight Portable Control Telephone with all the components shall be as low as possible. The gross weight without cord & connector shall not exceed 400 gms in case of mild steel body and 350 gms in case of ABS plastic body.
- 4.2** Light Weight Portable Control Telephone shall consist of the following components:-
- a) Body of telephone instrument (Made of mild steel or ABS plastic)
 - b) Electrodynamic Transducer/Condenser microphone/Ceramic microphone as Transmitter
 - c) Electrodynamic Transducer as Receiver
 - d) Transformer/Induction coil
 - e) Battery compartment
 - f) Battery indication
 - g) Cord

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- h) Internal wiring Terminals and PCB
- i) Condensers and other components
- j) Changeover switch from 4wire to 2 wire
- k) Six pin plug for 4 Wire and 2Wire working
- l) Battery ON-OFF switch
- m) Press to talk (PTT) switch
- n) Terminals for 2 Wire (L1 & L2) connection

4.3 Body of the Telephone

- 4.3.1** The mild steel sheet if used for the fabrication of the body of the telephone instrument shall be between 0.5 and 0.6 mm (Foil/sheet) thick and the ABS plastic if used for fabrication of body of telephone instrument shall be robust.
- 4.3.2** Mild steel, if used for the fabrication of the body , shall be painted with powder coating in admiralty Grey colour both inside and outside of the body after ensuring that the body has been made free from rust.
- 4.3.3** The plastic if used for the body shall be of ABS material of any light colour. In no case colour should be black. It shall withstand properties as given in Appendix-A. ABS raw material shall be procured from reputed manufacturers like Bhansali, Polymers, Bayers, LG & HPCL as per the specification at Appendix-A. The certificate from manufacturer confirming to specification shall be submitted at the time of type test. The test carried out on the finished products shall be as per para 3 of the Appendix-A.
- 4.3.4** Drawing showing the dimensions of Light Weight Portable Control Telephone is at Annexure-I. The dimensions of the body shall not exceed the dimensions shown in the Annexure. The body should be free from sharp edges and sharp corners. The cover of the body of the telephone should be fitted with main body with at least four flat headed screws one on each of the four sides. The screw should not protrude outside the body. Permitted Tolerance to outer dimensions are ± 2 mm i.e. (175x50x40) mm ± 2 mm.
- 4.3.5** Except for holes for microphone and receiver, there shall not be any opening to avoid ingress of moisture and dust.

4.4 Transmitter

- 4.4.1** Electrodynamic Transducer/Condenser Microphone/Ceramic Microphone of $150 \pm 20\%$ ohm impedance shall be used as a transmitter. The Manufacturer of transmitter shall have valid ISO 9000 certificate for manufacturing of these items. Transmitters 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 location 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.
- 4.4.2** The transmitter shall work on 3 V DC with the associated amplifier for its operation.

4.5 Receiver

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4.5.1 Electrodynamic Transducer of $150 \pm 20\%$ ohm impedance shall be used to perform functions of receiver. The Manufacturer of receiver shall have valid ISO 9000 certificate for manufacturing of these items. Receivers shall be preferably procured from CACT/LCSO/CDOT/SISI (Small industries service institution) approved sources (if available). The transducers shall be fixed in the Receiver locations of the handset. Proper locking arrangements shall be ensured. The transducer shall be properly protected against ingress of moisture, dust and insects. The frequency response over the range 300 to 3400 Hz shall be uniform.

4.5.2 For the protection against acoustic shock, two rectifiers in parallel and with opposite polarity shall be provided across the receiver.

4.6 Transformer/Induction Coil

4.6.1 Two sets of transformers shall be provided to match the transmitter and receiver Impedance's with that of the line.

4.6.2 These transformers shall confirm to functional requirement of the equipment and meet the parameter specified in Cl. No. 4.6.3, 4.6.4, 4.6.5 & 4.6.6.

4.6.3 The transformer core shall be of cold rolled grain oriented silicon steel of suitable grade or of ferrite to meet the electrical characteristics and other parameters of this specification.

4.6.4 Synthetic enameled winding wire complying to IS: 4800 Pt. I shall be used.

4.6.5 Transformers shall be vacuum impregnated.

4.6.6 The complete windings shall be protected by proper insulation to avoid ingress of moisture.

4.7 Battery compartment with batteries

4.7.1 The telephone instrument shall work on 3 V DC on two nos. dry batteries of 1.5 V each.

4.7.2 Dry batteries (heavy duty pen light cell) conforming to IS: 9128 type R-6105 shall be used. This will not be part of supply by the manufacturer.

4.7.3 Dry batteries shall be housed in a plastic holder fitted with spring to give proper contact pressure to batteries. The battery holder shall be rugged and well-fixed to the body or be an integral part of the body moulding .The quality of spring shall be such that these are rust proof.

4.7.4 The cover of the battery compartment or recess shall be of press fit type or screwed flush with the telephone body. Screw used on the cover should be of flat head type and should not protrude outside the body.

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4.7.5 Batteries along with their plastic holder should be so placed or secured inside the body as not to allow hitting or damage to the internal circuitry or components whenever the battery cells are replaced.

4.7.6 The maximum working current of telephone instrument during talk condition shall not be more than 25 mA.

4.8 Battery indication

4.8.1 Dual type LED battery indication shall be provided in the front side of the telephone instrument. When battery ON/OFF switch put to "ON" position, GREEN light shall appear for normal battery voltage and RED light for low battery voltage. In latter case, batteries are required to be changed by new ones.

4.9 Cord

4.9.1 The cord between six pin plug and screw terminals shall be straight and made of multi strand PVC insulated wire suitable to meet the requirements of this specification. The manufacturer of cordage shall have valid ISO 9000 certificate for manufacturing of this item.

The cordage shall be preferably procured from CACT/ITI/SISI (Small industries service institution) (if available).

This cord shall be of six cores and shall not less than 1.5 meters in length. The cord's inserted end shall be firmly held inside the body of the telephone instrument so that it cannot get pulled out due to jerks, dangling of plug, repeated usage, rough handling etc.

4.10 Internal wiring, terminals & PCB

4.10.1 The internal wiring of component of Light Weight Portable Control Telephone shall be as per Annexure-II.

4.10.2 Glass epoxy PCB of 1.6 mm (minimum thickness) shall only be used. The PCB shall be coated with epoxy base antifungal varnish to provide protection against dust, humidity, fungal infection and mechanical abuses. The copper cladding thickness shall not be less than 35 microns (tolerance $\pm 10\%$) and shall be suitably tinned.

4.11 DC Blocking Capacitor

4.11.1 1.5 to 2.2 micro Farad capacitor of operating voltage minimum 400 V shall be used to avoid tripping of the circuit breaker of the control circuit.

4.11.2 Capacitor used shall be made of metallized polyester.

4.12 Changeover switch from 4 Wire to 2 Wire

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4.12.1 Sliding type switch shall be provided. It shall work on one side with 2 Wire control line and opposite side with 4 Wire control line. “2 Wire” and “4 Wire” shall be legibly printed on the body to signify the exact position of the switch. The switch knob shall not protrude outside the telephone body surface.

4.13 Six pin plug for 4 wire and 2 wire working

4.13.1 Connections of 6 pin plug shall be such that two outermost pins shall be connected on receive, next two on trans and central two pins shall be connected to terminal L1 and L2 for 2 wire working.

4.14 Battery ON-OFF switch

4.14.1 Battery ON-OFF switch shall be provided as per Annexure-I preferably 1 inch below LED or at an alternatively convenient place in case of constraints of layout of PCB and components etc. The switch shall not protrude outside the body of the telephone.

4.14.2 The switch shall be sliding/ON OFF type.

The manufacturer of switch shall have valid ISO 9000 certificate for manufacturing of this item.

This switch shall be preferably procured from CACT/LCSO/CDOT/SISI (Small industries service institution) (if available).

4.14.3 The switch shall be in the series with 3V Battery and shall extend power to receive amplifier of the circuit when pressed to ON position. It shall also extend power to LED when in the ON position which will glow to indicate that the telephone is ready for use.

4.15 Press to talk (PTT) switch

4.15.1 Press to talk (PTT) switch shall be provided as per Annexure-I.

4.15.2 The manufacturer of PTT switch shall have valid ISO 9000 certificate for manufacturing of this item. This PTT switch shall be preferably procured from LCSO/CACT/CDOT/SISI (Small industries service institution) approved sources (if available).

4.15.3 When the PTT switch is pressed, it shall extend power to Trans amplifier & when released, it shall disconnect supply to this amplifier.

4.16 Terminals for 2 Wire (L1 & L2) connection

4.16.1 Separate L1 & L2 terminals at the bottom of the telephone body for 2 wire connections may be provided if asked by the purchaser.

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4.16.2 In case separate L1 & L2 terminals are provided central two pins in clause 4.13.1 shall be without any connection.

4.16.3 Banana type terminals of good quality shall be used.

5.0 Electrical Characteristics:

5.1 Insulation Resistance

5.1.1 The insulation resistance between all terminals of six pin plug connected together and the main body of the Light Weight Portable Control Telephone shall not be less than 100 Mega ohms when tested with a 500V DC Megger at ambient temperature.

5.1.2 High Voltage Test

A voltage of 2 KV, 50Hz AC Sinusoidal r.m.s shall be applied between all terminals of six pin plug connected together and the main body of the Light Weight Portable Control Telephone for one minute. The test voltage shall be increased gradually at the rate of 500V per sec. It shall withstand this voltage, no flash/smoke shall occur and no damage shall take place.

5.2 Transmission Tests

5.2.1 Telephone shall be subjected to various transmission tests by connecting in the test set up as indicated in Annexure-III a/b/c.

5.2.2 Send Efficiency: The set up shall be as per fig 1 (a) and 1 (b) of Annexure III a.

T1 & T2	: Terminals of transmitter
R1 & R2	: Terminals of Receiver
L1 & L2	: line Terminals of 2 wire (Two centre pins of 6 pin plug)
B1 & B2	: Battery Terminals
Tx1 & Tx2	: Trans terminals of 6 pin plug
Rx1 & Rx2	: Receive terminals of 6 pin plug

LM : Level Meter

5.2.2.1 4 wire testing (Selector switch shall be on 4 wire side) -fig. 1(a)

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 3V 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 with the PTT switch pressed. 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 +3.8 dBm and total harmonic distortion shall not be more than 3%.

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5.2.2.2 2 wire testing (Selector switch shall be on 2 wire side) fig. 1 (b)

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 3V battery with proper polarity. The oscillator level shall be adjusted such that it is -44 dBm at 1000Hz measured across the terminals T1 & T2 with the PTT switch pressed. Centre two pins of six pin plug or L1 & L2 terminal shall be terminated by non-inductive resistance of 600 ohms. The level across L1 & L2 shall be greater than 0 dBm. Total harmonic distortion shall not be more than 3%.

5.2.3 Side tone (For 2 wire only): Test set up shall be as shown in fig. 2 of Annexure -III-b.

The level measured across R1 & R2 at 1000 Hz shall not be more than -18 dBm with the oscillator level maintained at -44 dBm.

5.2.4 Receive Efficiency: The test set up is as shown in fig. 3a and 3b of Annexure III-b and Annexure III-c, respectively.

5.2.4.1 4 wire testing (Selector switch shall be on 4 wire side)-fig.3(a)

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 -20 dBm and 1000 Hz respectively. The level measured across terminals R1 & R2 shall be greater than -26 dBm. The total harmonic distortion shall not be more than 3%.

5.2.4.2 2 Wire testing (Selector switch shall be on 2 wire side) fig. 3(b)

The line shall be simulated by non-inductive resistance of 300 + 300 ohms. The level and frequency across L1 & L2 terminals shall be adjusted to -12 dBm and 1000 Hz respectively. The level measured across terminals R1 & R2 shall not be less than -18 dBm. The total harmonic distortion shall not be more than 3%.

The frequency response of cl. 5.5.2 and 5.2.4 shall be +/- 0.3 dB in the frequency range of 300 to 3400 Hz.

5.2.5 Insertion loss: - The test set up is as shown in fig.4 (a) and 4(b) of Annexure III c.

5.2.5.1 (a) Listen condition (4 wire):

With the set up as in fig.4 (a) 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 receive terminals of six pin plug are connected across 1120 ohms resistance as shown in fig. 4(a) . The drop in the reading of the level meter shall not be greater than 0.5 dB.

5.2.5.1 (b) Listen Condition (2 wire):

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With the set up as in fig.4(b), oscillator level is set to 0 dBm across 600 ohms without the telephone being connected. The microphone shall be disconnected and terminal T1 & T2 shall be looped together. Then the telephone terminals L1 & L2 to be connected to 600 ohm resistance as shown in fig.4(b). The drop in the reading of the level meter shall not be greater than 0.2 dB.

5.2.5.2 (a) Talk Condition (4 wire):

With the same set up as in fig. 4(a), the oscillator level is set to 0 dB across 1120 ohms without the telephone being connected. Then trans terminals are connected to 1120 ohms with the PTT switch pressed. The drop in the reading of the level meter shall not be greater than 1.0 dB.

5.2.5.2 (b) Talk Condition (2 wire):

With the same set up as in fig. 4(b), the oscillator level is set to 0 dB across 600 ohms without the telephone being connected. Then the L1 & L2 terminals are connected to 600 ohms with PTT switch pressed. The drop in the reading of the level meter shall not be greater than 0.8 dB.

5.3 Performance Test

5.3.1 The conversation between two light weight portable control telephone shall be checked with 25 dB attenuator for clarity of speech and audibility for both 2 wire and 4 wire operation.

6.0 Inspection

6.1 The inspection and test shall be carried out to the satisfaction of the purchase or his nominee.

6.2 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 light weight portable control telephones 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.

6.3 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

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conducting the tests for which firm is not having in-house test facilities.

6.4 Test certificate incorporating the results of the routine test and other manufacturing test must be furnished in quadruplicate prior to the inspection for the use of purchaser/his nominee.

6.5 Visual Inspection:

6.5.1 The instrument shall be visually inspected to ensure that the mouldings are free from cracks (for ABS body), other imperfections and that all the components are fitted properly.

6.5.2 Instruments shall be checked to satisfy general requirements (Cl.3.0), Construction (Cl.4.0) and Marking (Cl.10.0).

6.5.3 The faulty sub-assembly and or samples failing in routine/acceptance test shall be destroyed effectively. The exercise of effective destruction during the manufacture/routine test shall also be shown to the inspecting authority as and when asked for.

6.6 Type test

Type test shall include complete tests in accordance with this specification.

6.6.1 Type tests shall comprise of the following:-

- 6.6.2** (a) Visual Inspection (Cl. 6.5)
- (b) Electrical Tests (Cl. 5.0)
- (c) Climatic and environmental Requirements (Cl. 9.0)
- (d) Performance tests (Cl. 5.3)

If the Electrodynamic Transducer used for transmitter and/or receiver in light weight portable control telephone, the manufacturer of Electrodynamic Transducer shall have valid ISO 9000 certificate for manufacturing of this items.

This Electrodynamic Transducer shall preferably be procured from LCSO/SISI/CDOT approved sources (if available).

6.6.3 2 Samples shall be selected at random for type tests from the normal production.

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

6.7 Acceptance Tests:

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

- (a) Visual inspection (Cl. 6.5)

- (b) Electrical requirements (Cl. 5.0)
- (c) Performance test (Cl. 5.3)

6.8 Routine Test

6.8.1 Following routine tests shall be conducted on the 4 wire/2 wire light weight control telephone:-

- (a) Visual inspection (Cl. 6.5)- On 100% of the samples
- (b) Electrical requirements (Cl. 5.0)- On 100% of the samples
- (c) Performance test (Cl. 5.3)

6.8.2 Any other tests required by the manufacturer to ensure that light weight portable control telephone is in conformity with the requirement of this specification.

7.0 Sampling

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

1	2	3	4	5	6
Lot consisting of 4W/2W portable control telephone	1 st Sample size (N1)	2 nd sample size (N2)	Combined sample size (N1+N2)	Acceptance Number (C1)	Rejection Number (C2)
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

7.2 The number of Light Weight Portable Control Telephone (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 Light Weight portable control telephone, that is those failing in one or more acceptance tests, is less than/equal to the corresponding number (C1) given in Column 5, the lot shall be considered as conforming to the requirements of the acceptance test. If the number of defective Light Weight portable control telephone in the first sample is greater than or equal to the rejection number given Column 6, the lot shall be considered as not conforming to the requirement of the acceptance test. If the number of defective Light Weight Portable Control Telephone in the first sample lies between (C1) and (C2) a second sample of size (N2) as given in Column 3 shall be selected and subjected to acceptance test. If in the combined sample, the number of defective Light Weight Portable Control Telephone is less than (C2) the lot shall be considered as conforming to the requirements of acceptance tests.

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7.3 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' th package shall be selected until the requisite number of package are obtained.

Total Number of packages in the lot

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

8.0 Rejection

8.1 Any of the materials which do not comply with the requirements of the specification may be rejected.

9.0 Climatic and Environmental requirements

9.1 Light weight portable control telephone shall function satisfactorily under the following climatic and environmental conditions tested as per IS: 9000 series.

9.1.1 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

9.1.2 Dry heat test (Part III Section 3):

55 °C +/- 2°C
 Duration : 12 hours

9.1.3 Damp heat (cyclic test) (Part V Section 2):

1st cycle of two cycles; Upper temperature : 40°C Variant 1

9.1.4 Cold test (Part II Section 3):

-10°C +/- 3°C Duration : 2 hours

9.1.5 Damp heat cyclic test

: 12+12 hours
 2nd cycle of 2 cycle's Upper temperature : 40°C Variant : 1

9.1.6 Salt Mist test (Part XI) : Procedure 1

Duration : 48 hours

9.1.7 Vibration Test

9.1.7.1 The equipment shall be subjected to vibration test as per IS: 9000 (Part VIII).

i) Freq. Range : 10Hz to 55 Hz

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- ii) Vibration amplitude : 0.35mm
- iii) Duration of endurance : 20 sweeps cycles for sweep (10 Hz -55Hz-10Hz)
- iv) No. of axes : 3 coordinate axes
- v) Duration at resonant : 30 minutes +/- 1 minute frequency
- vi) Value of 'g' : 1 'g'

9.1.8 Drop test

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

9.1.8.2 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.

9.1.8.3 The minimum number of drops shall be six.

9.1.9 The electrical test (Cl. 5.0) shall be done after the completion of Climatic test Vibration test and Drop test the parameters shall be within +/- 5% of the initial value. The visual inspection as per (Cl. 6.5) and performance as per (Cl. 5.3) shall also be checked.

10.0 Marking

10.1 The following shall be legibly and indelibly screen printed on the outer surface of the Light Weight Portable Control Telephone.

- (a) Manufacturers name
- (b) Year of manufacture
- (c) Light weight portable control telephone (4Wire/2 Wire)
- (d) Serial Number

11.0 Packing

11.1 Light Weight Portable Control Telephone shall have to undergo arduous transportation before reaching the destination and will have to do store 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 vital factors so as to eliminate damage/deterioration of the telephones in transit/transshipment/handling or during storage.

12.0 Information to be supplied by the purchaser

12.1 Separate terminals (L1 & L2) on the body of the telephone will be required for 2 Wire connections or central two pins of six pin plug to be used for the same (Cl.4.13 and Cl. 4.16).

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12.2 The material of the body of the telephone will be of mild steel or ABS plastic.

13.0 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 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.

Appendix-‘A’

Requirements of ABS (ACRYLONITRILE BUTADIENE STYRENE) Co-Polymer Moulding Material

- 1. Properties:-** The material from test sample of finished body shall satisfy the following properties:

		Property	ASTM Test
1.1	Mechanical Properties		
1.1.1	Tensile Strength	380 kgf/cm ² *	D-638
1.1.2	Izod Impact Strength Noticed	i) at 23°C: 25 kg-cm /cm(Min) ii) at 0°C : 20kg-cm/cm(Min)	D-256(A)
1.2	Thermal Properties		
1.2.1	Heat deflection temp.	i) at 18.5 kg/cm ² 90°C (Min) ii) at 4.6 kg/cm ² 100°C (Min)	D-648
1.2.2	Flammability	1.5 inches/minute(Max.81cm)	D-635
1.3	Hardness	95-110 on R scale	D-785

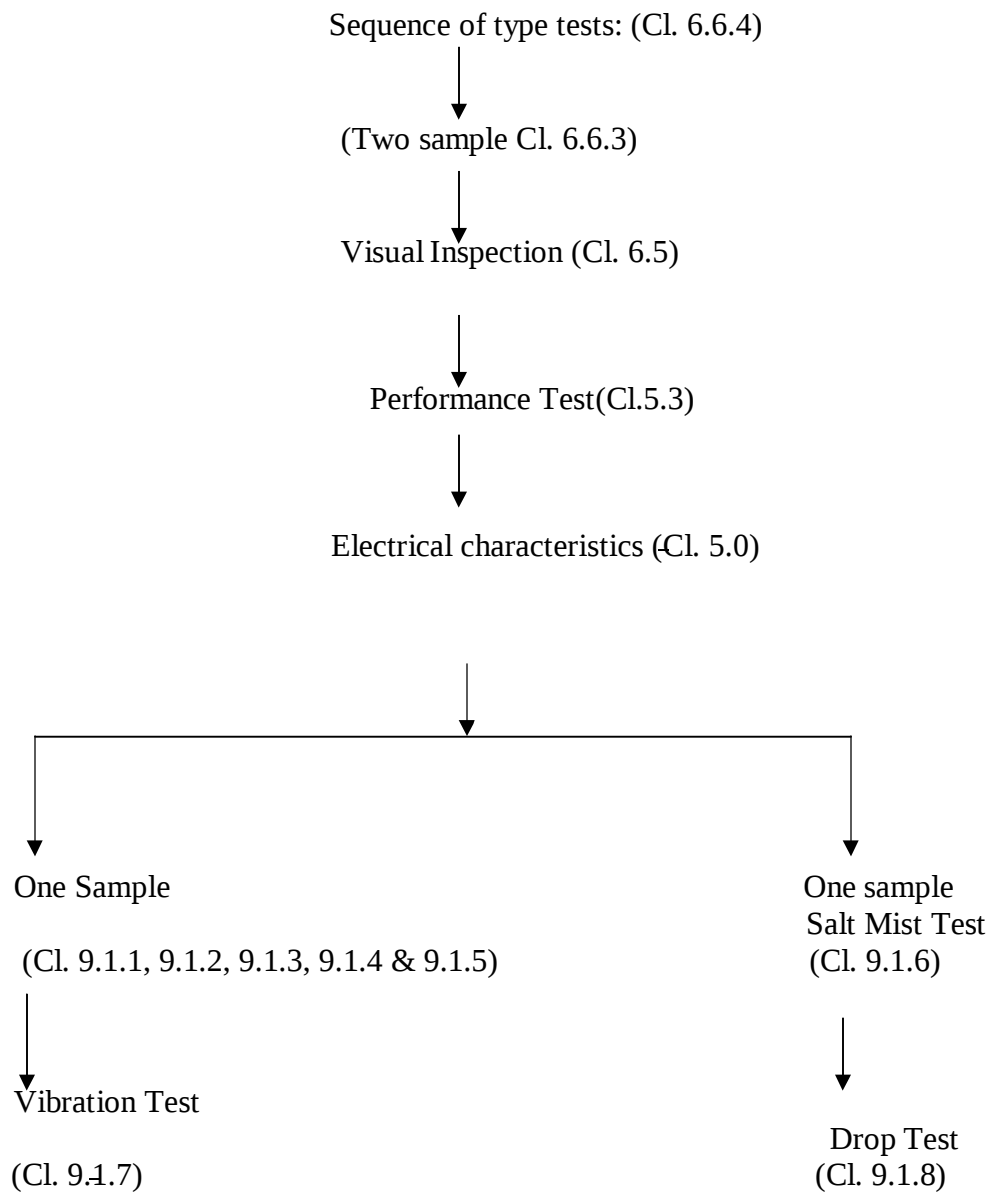
2. *Note: - This value is for raw material and may differ for the test sample obtained from the finished body & the value for the latter shall be specified after conducting tests on sufficient samples of the same.

3. Test on Finished Product made of ABS Material

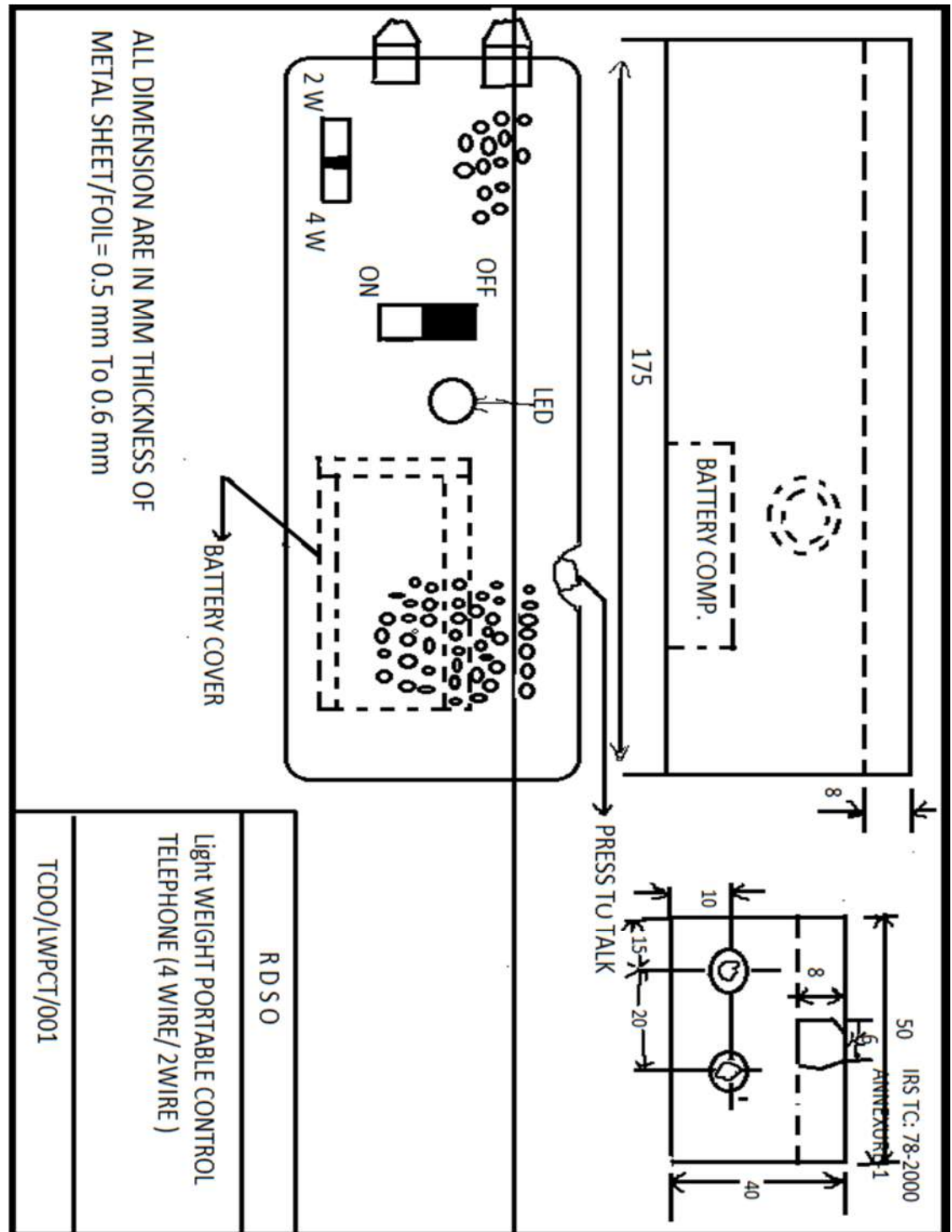
A special sample of the size as required and mentioned in the test method ASTM D-1525 and ASTM -D-792, should be manufactured from the same raw material as used for moulding the body of telephone or a part of the telephone body will be cut to conduct the tests mentioned below:-

<u>Properties</u>	<u>Specified values</u>	<u>Test Method</u>
1. Specific Gravity	1.04 - 1.07	ASTM D-792
2. Vicat Softening Point	100 - 108°	ASTM D -1525

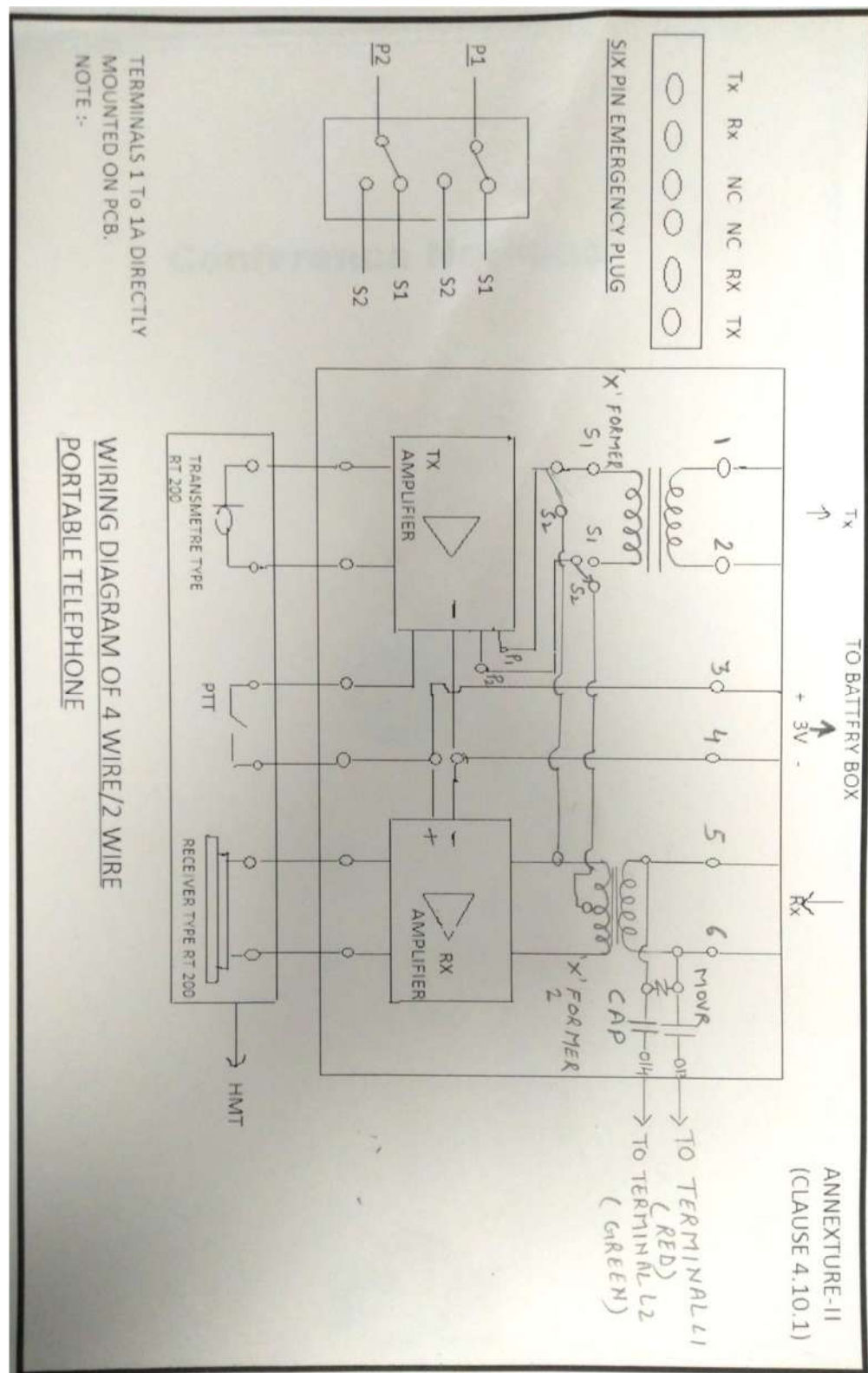
APPENDIX 'B'



Annexure-I



Annexure-II- Internal wiring of component of Light Weight Portable Control Telephone



Annexure-IIIa

