1.0 INTRODUCTION:

This specification covers the General Requirements, Functional Requirements, System Requirements, Technical Requirements for “Level Crossing Gate Control & Monitoring System” for use over Indian Railway and is issued under specification No. RDSO/SPN/TC/49/2010. Further requirements of Test & Inspection are also covered in this specification.

1.1 This specification covers the technical provision only and does not include the provision of a contract. In the absence of IRS specification, the procurement may be made as per draft specification.

1.2 This specification requires references to the following standards specifications:

<table>
<thead>
<tr>
<th>SN</th>
<th>Specification No.</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>IS-9000 (Series)</td>
<td>Basic Environment Testing Procedure for Electronic and Electrical items.</td>
</tr>
<tr>
<td>2.</td>
<td>IS-9001 (Series)</td>
<td>Guidance for Environmental Testing</td>
</tr>
</tbody>
</table>

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

2.0 GENERAL REQUIREMENTS

2.1 The objective of this System is to provide reliable recorded Data & Voice Communication System between Station and Level Crossing Gates for exchange of Private Number amongst Station Master and Gatemen for Closing/Opening of Gates.

2.2 The System shall be designed in such a way that Station Master shall be able to control at least 4 Gates on either side of the Station from his Station Equipment. This System comprise of Station Equipment and LC Gate Equipment. A General System Schematic is given in Figure-1. An overall Network Diagram of the System is given in Figure-2.

2.3 Manned Level Crossing Gates (LC Gates) over Indian Railways are classified in following five categories.

a) Engineering LC Gate, Interlocked, Normally Open to Road Traffic
b) Engineering LC Gate, Non-Interlocked, Normally Open to Road Traffic
c) Engineering LC Gate, Non-Interlocked, Normally Closed to Road Traffic
d) Traffic LC Gate, Interlocked, Normally Open to Road Traffic
e) Traffic LC Gate, Non-Interlocked, Normally Close to Road Traffic
Figure-1 : System Schematic Diagram
Figure-2: System Network Diagram
2.4 LC Gate Equipment shall be configurable to any Category of LC Gates as defined in Clause 2.3. Station Equipment shall be configurable to accommodate any combination of Category of LC Gates on either side of Station as defined in Clause 2.3.

2.5 Station Equipment and LC Gate Equipment shall be suitable for working in Single Line, Double Line and Multiple Lines.

2.6 The System shall follow the method of exchanging Private Number between Station Master and Gateman as stipulated in Annexure-II. The mode of Working is called ‘MANUAL MODE’

2.7 Other Mode of Working is called ‘AUTO Mode’ in which Private Number will be automatically generated. This method (Automatic Generation of Private Number instead of using Private Number Booklet) of exchanging Private Number between Station Master and Gateman will be as stipulated in Annexure-III.

2.8 Station Equipment and Gate Equipment shall be configurable to work in MANUAL Mode’ or AUTO Mode’. During commissioning of System, it must be ensured that Station Equipment and all LC Gate Equipments for a Station are configured in same Mode of Working. Presently ‘MANUAL Mode of working is followed on various Zonal Railways, and therefore ‘AUTO Mode’ shall be selected by user only after due consideration.

2.9 All the events like Gate Closing, Gate Opening and Messaging etc. must be stored in the Data Logger of Station Equipment and LC Gate Equipment with Date, Time, Train No. Gate Number, Exchanged Private Number of Station Master and Gateman. It should be possible to retrieve this Data by connecting Laptop to a Port provided on the equipment. Further it should be possible to check previously stored data on One-Line Displays of the equipments using SCROLL UP & SCROLL DOWN Keys.

2.10 When Station Master or Gateman wishes to have voice communication, the same shall be possible by using Telephone Instrument provided with the equipments.

2.11 During Failure of ‘Station Equipment’ and/or ‘LC Gate Equipment ‘, it shall be possible for Station Master and/or Gateman to Switch-over to ‘Telephone Mode’ by manually operating ‘standby/Main Switch’. In this mode Electronic Circuitry of equipments will be completely by passed and Telephone Instruments will be directly connected to 2-Wire Omnibus Line to facilitate Voice Communication.

3.0 FUNCTIONAL REQUIREMENTS

3.1 Panel Layout of ‘Station Equipment’ and ‘LC Gate Equipment’ are also attached as Appendix-I.

3.2 ‘Station Equipment’ and ‘LC Gate Equipment’ shall be provided with mechanical Key-Locking arrangement to prevent unauthorized operation of the system. ‘Station Equipment’ and L.C Gate Equipment ‘ shall operate only when Keyed in. When Key is taken out, these equipments shall hold in their last operated position. However during Key-Out position, System Power shall remain in ON condition and these equipments shall continue to receive
messages and also continue to play Audio Messages. In ‘Telephone Mode’ even if Key is taken out, Telephone will continue to work.

3.3 ‘Station Equipment’ and ‘LC Gate Equipment’ shall work in MANUAL Mode in which case Private Number shall required to be fed by Station Master and Gateman in ‘Station Equipment’ and ‘LC Gate Equipment’. Working of different category of LC Gate using this System in MANUAL Mode is explained in Appendix-II attached. Bold sentences indicate action to be taken ‘Station Master or Gateman’.

3.4 ‘Station Equipment’ and ‘LC Gate Equipment’ shall work in AUTO Mode in which case Private Number shall be automatically generated by ‘Station Equipment’ and ‘LC Gate Equipment’ and displayed on Displays provided on the equipments. Working of different category of LC Gate using this System in AUTO Mode is explained in the Appendix-III attached. Bold sentences indicates action to be taken Station Master or Gateman.

3.5 The Message sent by Station Master from Station Equipment for a particular LC Gate shall go to that LC Gate Equipment only. Similarly the Message from LC Gate Equipment shall go to concerned Station Equipment only. As such Station Equipment are provided with ‘Station Id’ and LC Gate Equipments are provided with ‘Gate Id’. These ‘Station Id’ and ‘Gate Id’ are only for internal working of equipments and Station Master & Gateman are not required to be concerned for these Ids.

3.6 The Audio Message shall be in Hindi, English or any Regional Language. Selection of any two languages depending upon the requirement of the Zonal Railway shall be possible.

3.7 As the display at LC Gate Equipment will show only numbers and symbols, the display will be in English Only. Display of Station Equipment will also be in English only.

3.8 Configuration of ‘Station Equipment’ and ‘LC Gate Equipment’ shall be carried preferably using Dip Switches/Jumper Setting. Configurable features include ‘Station Id’, ‘Gate Id’, ‘Gate Category’, ‘Operation Mode’, ‘Key Type’, ‘Language’ etc.

3.9 Programming of ‘Station Equipment’ and ‘LC Gate Equipment’ should be protected suitably using User Id and Password. Without correct User Id and Password it shall not be possible to change the setting of parameters of the equipment like ‘Gate Number’, ‘Station Name’, Date, Time etc.

3.10 Data recording in ‘Station Equipment’ and ‘LC Gate Equipment’ will record all the events related to operation automatically duly Date & Time Stamped. These Recorded events shall be retrieved using Laptop.

3.11 During Failure of ‘Station Equipment’ and/or ‘LC Gate Equipment’ and/or ‘LC Gate Equipment’ it shall be possible for Station Master and Gateman to Switch-Over to ‘Telephone Mode’ by manually operating ‘Standby/Main Switch’. In this mode Electronic Circuitry of equipments will be completely bypassed and Telephone Instruments will be
directly connected to 2-Wire Omnibus Line. During this ‘Telephone Mode’, following facilities using Inbuilt Electronic Circuitry of Telephone Instruments shall be available:

3.11.1 In Telephone Mode, Telephones shall work in Master-Slave configuration. Station Telephone will work as ‘Master’ and LC Gate Telephones will work as ‘Slave’.

3.11.2 Station Telephone will have the facility to call any of the LC Gate individually by pressing corresponding ‘Gate Switch’ designated for a particular gate or to call all LC Gates collectively by ‘ALL Call Switch Button’. When Master presses “ALL CALL Switch/Button, all the Gate Telephones are activated and can converse to the Master as well as among themselves.

3.11.3 In addition to these switch Station Telephone shall have another ‘Disconnect Switch/Button’ for disconnecting All Gate Telephones. All the Gate Telephones will be disconnected and Indicating LED on Station Telephone meant for all the Gate Telephones will go OFF, when Disconnect switch of Master Telephone is pressed.

3.11.4 Gate Telephone will have the facility to send an indication to Station Telephone that it wants to talk to the Station Master. The Gate Telephone will have only one switch/button by pressing which it will draw the attention of the Station Master.

3.11.5 Unless permitted and activated by the Station Master, “Gate to Station” or “Gate to Gate” or “Station to Gate” conversation shall not be possible. Only when Station Master presses ‘Gate Switch’ designated for a particular gate, that Gate Telephone will be activated for conversation.

3.11.6 When SM is having communication with any Gateman, then another Gateman shall not be able to listen the ongoing conversation.

3.11.7 Only when Station Master presses two or more Gate Switches/Button, those Gates are activated and will be able to converse to the Master as well as between them. The activated Gate Telephone will remain activated for conversation even if the handset of the master telephone is placed on the hook so that conversation between the Gate Telephones can continue.

3.12 Voice Recording at ‘Station Equipment’ shall be provided, which will record all the Voice Communication taking place between Station Master and Gateman. These Voice Recordings can be retrieved by transferring it to a Laptop. If Voice Recording is not taking place, it should be reported by ‘Alarm’.

3.13 In case Gateman is unable to execute the order of Station Master for closing the gate, he will immediately talk to Station Master over Telephone. As such Gate man should be able to promptly communicate with Station Master with the help of Telephone Instrument provided with the equipment. As such even without switching over to Telephone Mode, Telephonic Feature as given in Clause 3.12 shall be available albeit using Electronic Circuitry of Station Equipment and/or LC Gate Equipment. During this Voice Conversation, events like Ringing, Handset Lifting, Call Through, Called Disconnect etc. will be recorded.

3.14 Voice Communication shall be Duplex when system is working on Physical Line. Similarly Voice Communication shall be Semi-Duplex/Simplex when system is working through Wireless on VHF Radio Sets.
3.15 System display shall indicate train details, where train number is of alphanumeric like Goods Train & Service Vehicles etc.

4.0 SYSTEM REQUIREMENTS

4.1 The System shall be capable of working on both Wired (Overhead Line or Underground Cable) or Wireless(25 Watt VHF Radio Set). When System is working on physical line, the radio set shall be in Hot Standby Mode, so that in case of any failure of physical line, the system should automatically switch over to Wireless.

4.2 Normally voice as well as data communication between Station Equipment and LC Gate Equipment will be through 2-Wire Physical Media. In case of Physical Line failure, alternate Wireless Medium shall work. There shall be dynamic switching to select first available working medium.

4.3 Physical Line or Radio indication shall appear on Station Control Equipment as well as LC Gate Control Equipment so the advise to the maintenance staff shall be made without delay in case of Physical Line failure.

4.4 Station Equipment as well as LC Gate Equipment must have provision to operate from any of the two available source of Power Supply i.e. Electric Mains and Battery. However, Solar Panel must be another source to charge the battery at LC Gate and this shall be part of the LC Gate equipment.

4.5 Data Logging:

4.5.1 Station Equipment as well as LC Gate Equipment shall have Data Logger to record all the events automatically with Date, Time, Train Number, Direction, Gate Number and Exchanged Private Number between Station Master and Gateman, which can be retrieved by connecting a Laptop. The provision of simultaneous data logging shall be made in both Station Equipment and LC Gate Equipment.

4.5.2 Station Equipment and LC Gate Equipment shall have facility to record all the events related to their operation including event of Voice Communication.

4.5.3 Station Equipment as well as LC Gate Equipment shall have facility to store minimum one lakh events.

4.5.4 The data shall be stored in the FLASH memory so that the stored events can not be erased in case of power failure or fluctuations.

4.5.5 When the Flash memory will be full with the logged data, then ‘FIRST IN’ information will be ‘FIRST OUT’ from the memory i.e. The system will follow FIFO architecture.

4.5.6 Format of retrieved data shall be as follows:

<table>
<thead>
<tr>
<th>SN</th>
<th>DATE</th>
<th>TIME</th>
<th>MODE</th>
<th>FROM</th>
<th>GATE</th>
<th>PVT No.</th>
<th>ACTIVITY</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>17/10/2010</td>
<td>13:02:03</td>
<td>LINE</td>
<td>STN</td>
<td>102A</td>
<td>23</td>
<td>CLOSE ORDER-TRAIN</td>
</tr>
</tbody>
</table>
When retrieving data for viewing through Display using SCROLL UP & SCROLL DOWN Keys, one line at a time will be retrieved and displayed. While retrieving data through Laptop, it shall be possible to search and select the data to be retrieved.

4.6 **Voice Logging:**

4.6.1 The System should be designed in such a way that it should have built-in arrangement to process, record and store any ongoing Voice Communication from Station Equipment to LC Gate Equipment and Vice Versa.

4.6.2 The recording and storage of Voice Communication should start as soon as call is established between Station Equipment to LC Gate Equipment and the same should be terminated with the replacement of handset of the Telephone Instrument provided with Station Control Equipment to LC Gate Control Equipment. The recorded voice data shall be stored with date and time stamping.

4.6.3 The storage of Voice Communication should be arranged in FIFO architecture and in no way it should get corrupted once it is stored.

4.6.4 There shall not be any compression of the input voice signal and the originality of the recorded voice communication shall be ensured. The storage device recording capacity shall be 72 Hrs minimum.

4.6.5 **Retrieval of Voice Communication:** There shall be an Ethernet interface port through which stored voice communication can be transferred from Station Control Equipment to any
PC/Laptop for listening and taking backup on CD/DVD media. Facility shall also be available using PC/Laptop for selection of any voice/ data for playing by entering desired date and time for specified duration.

4.6.6 In case of any problem in voice recording, there shall be visual alarm to draw the attention of the ASM on duty, the same shall keep on glowing till such time acknowledged by the ASM.

4.6.7 The distortion of the recorded voice input signal when reproduced through speaker shall not be more than 5% w. r. t. original input signal.

4.7 Station Equipment shall be equipped with GPS Clock. LC Gate Equipment shall have inbuilt RTC Clock, which shall synchronize itself with Station Equipment GPS Clock once every 24 Hour.

4.8 The LCDs used for System Information with Station Equipment as well as LC Gate Equipment must meet the following minimum specifications.

<table>
<thead>
<tr>
<th>Display Content</th>
<th>16 Char x 2 Row</th>
</tr>
</thead>
<tbody>
<tr>
<td>Character Dots</td>
<td>5x8 or 5x7</td>
</tr>
<tr>
<td>Character size</td>
<td>9-10 mm x 4-5 mm</td>
</tr>
<tr>
<td>LCD Display Type</td>
<td>STN or FSTN</td>
</tr>
<tr>
<td>LCD Category</td>
<td>Transmissive or Transflective</td>
</tr>
<tr>
<td>Minimum Viewing Angle</td>
<td>Horizontal -60º, Vertical - 90º</td>
</tr>
</tbody>
</table>

4.9 The LCD used for Train Information with Station Equipment as well as LC Gate Equipment must meet the following minimum specifications:

<table>
<thead>
<tr>
<th>Display Content</th>
<th>20 Char x 4 Row</th>
</tr>
</thead>
<tbody>
<tr>
<td>Character Dots</td>
<td>5x8 or 5x7</td>
</tr>
<tr>
<td>Character size</td>
<td>9-10 mm x 4-5 mm</td>
</tr>
<tr>
<td>LCD Display Type</td>
<td>STN or FSTN</td>
</tr>
<tr>
<td>LCD Category</td>
<td>Transmissive or Transflective</td>
</tr>
<tr>
<td>Minimum Viewing Angle</td>
<td>Horizontal -60º, Vertical - 90º</td>
</tr>
</tbody>
</table>

4.10 Seven-Segment Displays used for Private Number display with Station Equipment as well as LC Gate Equipment shall be of Industry Standard and Height of 9-10 mm.

4.11 LEDs used for Station Equipment and LC Gate Equipment shall be SMD type with minimum size of 3.6 mm x 3.2 mm.
4.12 Keys used for Station Equipment and LC Gate Equipment shall be preferably of embossed Membrane Type of minimum 1 CM x 1 Cm size or Momentary Pushbutton Type with protection from dust ingress.

4.13 **Physical Communication Line Protection:** Surge/Transient Protection shall be supplied and provided between Station/LC Gate Equipment and 2-Wire Physical Communication Line in Series. The Surge Protective Device (SPD) should be as per the IEC 61643-21 or in compliance with UL Specification. Surge Protective Device shall be supplied alongwith Mounting, Termination & Housing Arrangement. Surge Protective Device shall meet following requirements:

- Pluggable Device along with Base
- Maximum Continuous DC voltage: 170 V
- Total Nominal Discharge Current (8/20 μs pulse): 10KA
- Impulse Limiting Voltage/Let Through Voltage: Line – Ground for 1 KV/ μs pulse: 1000KA
- DC Spark Over Voltage of voltage limiting component: 230 V (-20% to +30%)
- Operating Temperature range: -10º C to +60ºC
- Relative Humidity: 5% to 95%
- Degree of Ingress Protection: IP 20.
- Bandwidth: 2.3 MHz minimum
- No. of wires : 2 Wire/4 Wire
- The Voltage Limiting Device shall fail in Short Circuit Mode.
- Nominal Load Current: Not less than 120 mA.

4.14 **Power Line Protection (at the 230V AC Input of SMPS Power Supply of Station /LC Gate Equipment):**

(a) The Stage 1 protection shall consist of coordinated Class I/ B & II/ C type SPDs at the entry point of Input 230V AC supply in TT configuration in a separate wall mountable box. The Class I/B SPD shall be provided between Line to Neutral & Neutral to Earth. They shall be a voltage switching device and tested as per IEC 61643 with the following characteristics and features-

<table>
<thead>
<tr>
<th>SN</th>
<th>Parameters</th>
<th>Limits</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Between Line &amp; Neutral</td>
</tr>
<tr>
<td>1</td>
<td>Nominal Voltage (U₀)</td>
<td>230V</td>
</tr>
<tr>
<td>2</td>
<td>Maximum continuous operating voltage (U₀)</td>
<td>≥ 255V</td>
</tr>
<tr>
<td>3</td>
<td>Lightning Impulse current 10/350μs (Iₘₚ)</td>
<td>≥ 25KA</td>
</tr>
<tr>
<td>SN</td>
<td>Parameters</td>
<td>Limits (between Line &amp; neutral)</td>
</tr>
<tr>
<td>----</td>
<td>---------------------------------------------------------------------------</td>
<td>---------------------------------</td>
</tr>
<tr>
<td>1</td>
<td>Nominal Voltage (U₀)</td>
<td>230V</td>
</tr>
<tr>
<td>2</td>
<td>Maximum continuous operating voltage (Uₑ)</td>
<td>≥ 300V</td>
</tr>
<tr>
<td>3</td>
<td>Nominal discharge current 8/20μs (I₀)</td>
<td>≥ 10KA</td>
</tr>
<tr>
<td>4</td>
<td>Maximum discharge current 8/20μs (Iₑₘₐₓ)</td>
<td>≥ 40KA</td>
</tr>
<tr>
<td>5</td>
<td>Response time (Tₑ)</td>
<td>≤ 25 ñs</td>
</tr>
<tr>
<td>6</td>
<td>Voltage protection level (Uₚ)</td>
<td>≤ 1.5 KV</td>
</tr>
<tr>
<td>7</td>
<td>Operating temperature / RH</td>
<td>- 10°C to +60°C/ 95%</td>
</tr>
<tr>
<td>8</td>
<td>Mounted on</td>
<td>Din rail</td>
</tr>
<tr>
<td>10</td>
<td>Indication</td>
<td>Mandatory</td>
</tr>
</tbody>
</table>

(b) The Class I/ B SPD will be followed by Class II/ C SPD adjacent to it and connected between Line & Neutral. The device shall be a single compact varistor of proper rating and in no case a number of varistors shall be provided in parallel. It shall be voltage clamping device, thermal disconnecting type and shall be tested as per IEC 61643 with the following characteristics and features-
<p>| | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>11</td>
<td>Pluggability</td>
<td>Mandatory</td>
</tr>
<tr>
<td>12</td>
<td>Potential free contact for remote monitoring</td>
<td>Mandatory</td>
</tr>
<tr>
<td>13</td>
<td>Degree of protection</td>
<td>IP20</td>
</tr>
<tr>
<td>14</td>
<td>Housing</td>
<td>Fire retardant as per UL 94</td>
</tr>
</tbody>
</table>

(c) Class I/B and class II/C SPDs of Stage I shall be so coordinated that the voltage protection level of the coordinated devices is ≤ 1.5 KV. As such, these devices shall be from the same manufacturer and necessary test certificate in this regard shall be submitted by the manufacturer/ supplier.

4.15 **Lightening Arrestor for Antenna:** The provision of Lightning Arrestor for Stacked Dipole Omni-Directional Antenna shall be made to protect the Radio Set from lightning or EMI. The protection system as described shall be earthed with the equipment earth. Lightening Arrestor for protection of 25 watt VHF base station sets, to be provided on coaxial cable.

- Max. continuous DC Voltage : 180 V
- Nominal load Current: 1 Amp
- Nominal discharge current (8/20 μs) Core-Ground: 10kA
- Impulse limiting voltage/Let through Voltage Core – Ground (1kV/ μs pulse): 1000 V
- Operating temperature range: -10ºC + 60ºC
- Relative humidity: 5% to 95%
- Degree of protection: IP 20 for providing near the equipment. And IP 54 for providing near antenna.
- Connector: BNC/N/UHF connector or any other connector (As specified by the purchaser).
- Bandwidth: 200 MHz Minimum
- Insertion loss 0.2 dB maximum in 136-174 MHz
- Power Handling: 50 Watts
- Characteristic impedance: 50 ohms

5.0 **TECHNICAL REQUIREMENTS**

5.1 Station Equipment must be designed such that it does not use any Operating System Software for the operation. Also the Station Equipment design shall ensure faster speed of operation between it and LC Gate Equipment. Station Equipment shall preferably use 16-bit or higher databus microcontroller and shall consist of

- MIL 810 C/D/E Compliant 25 Watt VHF Radio Set
- Omni Directional Stacked Dipole Antenna having SWR less than 1.5
- RG 217 Coaxial Cable
- GPS Receiver along with Antenna
- Power Supply
Battery  
Solar Panel  
Telephone Instruments  
Electronic Circuit including, Data Logger, Voice Logger, Storage Etc.

5.2 LC Gate Equipment must be designed such that it does not use any Operating System Software for the operation. Also the LC Gate Equipment design shall ensure faster speed of operation between it and Station Equipment. LC Gate Equipment shall preferably use 16-bit or higher databus microcontroller and shall consist of

- MIL 810 C/D/E Compliant 25 Watt VHF Radio Set
- Omni Directional Stacked Dipole Antenna having SWR less than 1.5
- RG 217 Coaxial Cable
- Power Supply
- Battery
- Solar Panel
- Telephone Instruments
- Electronic Circuit including, Data Logger, Storage etc.

5.3 Station Equipment and LC Gate Equipment shall work with 12 V +/- 10% DC Power Supply, Current Consumption of Station Equipment/LC Gate Equipment shall be 10 Amp Maximum while working on Wireless Mode and shall be 1 Amp Maximum while working on Wired Model.

5.4 SMPS Power Supply shall be supplied alongwith Station Equipment, Power Supply shall consist of Battery Charger having 165-260 V, 50Hz AC Input Power Supply and having following outputs:

- 27.2V +/- 0.5V DC, Output with current capacity of Minimum 2 Amp.
- 12V +/-0.5V DC, Output with current capacity of Minimum 10 Amp

Power Supply in addition to supplying the load shall also Charge 24Volt Battery. The Sealed Maintenance Free Battery is provided for backup of at least 24 hours. The capacity shall not be less than 120 AH. However, Railway may plan for a higher capacity of the battery to commensurate with the Load and Backup Period requirements.

5.5 SMPS Power Supply shall be supplied along with each LC Gate Equipment. This SMPS Power Supply shall work with 165-260 V, 50Hz AC Input Power Supply and produce 12V +/- 10% DC Output Power supply with current capacity of Minimum 10 Amp. Power Supply in addition to supplying the load shall also Charge 12 Volt Sealed Maintenance Free Battery. The capacity of 12 Volts sealed Maintenance Free Battery shall be 120 AH. The Sealed Maintenance Free Battery is provided for backup of at least 96 Hours.

5.6 Provision of Solar Panel along with Solar Charger shall also be made at Level Crossing Gate. Solar Panel Modules with Nominal Voltage of 12 Volt and Nominal Output Power of 80 Watt as per IRS:S 84/92 with Latest Amendments shall be provided. Mounting Bracket &
Bracing Plate for Solar Panel Modules, shall be as per requirement of site and as selected by
the Purchaser amongst the options given in IRS:S 84/92 with Latest Amendments. However
actual requirement of number of Solar Panels & its capacity may be specified by the
Purchaser based upon the actual site requirement for 96 Hrs backup.

5.7 Speaker Output Level shall be 3 Watt Maximum. Knob to adjust Speaker Output Level shall
be provided at Station Equipment.

5.8 **25 Watt Radio**: VHF Radio Set of 25 Watt for wireless communication shall be DGS&D
approved. The radio shall be MIL Grade, 810C/D/E compliant. This 25 Watt Radio shall
meet following specification:

<table>
<thead>
<tr>
<th>SN</th>
<th>Parameters</th>
<th>Characteristics</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>GENERAL</td>
<td></td>
</tr>
<tr>
<td>A1</td>
<td>Frequency Range</td>
<td>136 to 174 MHz</td>
</tr>
<tr>
<td>A2</td>
<td>Channel Spacing</td>
<td>12.5 kHz</td>
</tr>
<tr>
<td>A3</td>
<td>Emission</td>
<td>11K50F3</td>
</tr>
<tr>
<td>A4</td>
<td>Frequency Spread</td>
<td>5 MHz or ore without degradation in Tx/Rx Specification</td>
</tr>
<tr>
<td>A5</td>
<td>Frequency Stability</td>
<td>5 PPM or better</td>
</tr>
<tr>
<td>A6</td>
<td>Type of Operation</td>
<td>Simplex , Press to talk</td>
</tr>
<tr>
<td>A7</td>
<td>Output Impedance</td>
<td>50 Ω</td>
</tr>
<tr>
<td>B</td>
<td>TRANSMITTER</td>
<td></td>
</tr>
<tr>
<td>B1</td>
<td>RF Power Output</td>
<td>25 Watt +/- 0.5 dB</td>
</tr>
<tr>
<td>B2</td>
<td>Frequency Deviation</td>
<td>+/-2.5 kHz Max. For 100% at 1 KHZ</td>
</tr>
<tr>
<td>B3</td>
<td>Modulation Sensitivity</td>
<td>1 to 10 mV at 1 KHz at Mic. Input for +/- 1.5 KHz Standard</td>
</tr>
<tr>
<td>B4</td>
<td>Modulation distortion</td>
<td>Less than 5% at 1 KHz reference +/- 1.5 KHz Standard</td>
</tr>
<tr>
<td>B5</td>
<td>Modulation fidelity</td>
<td>Within +1, -3 dB of 6 dB / Octave Pre-emphasis characteristics from 350 Hz. to 2700 Hz. with 1 KHz as reference.</td>
</tr>
<tr>
<td>B6</td>
<td>Spurious and Harmonics</td>
<td>Better than 60 dB</td>
</tr>
<tr>
<td>B7</td>
<td>Output Impedance</td>
<td>50 Ω</td>
</tr>
<tr>
<td>C</td>
<td>RECEIVER</td>
<td></td>
</tr>
<tr>
<td>C1</td>
<td>Sensitivity</td>
<td>0.3μv / -118 dbm at 12 dB SINAD</td>
</tr>
<tr>
<td>C2</td>
<td>Selectivity</td>
<td>Better than 60 dB</td>
</tr>
<tr>
<td>C3</td>
<td>Image and Spurious</td>
<td>Better than 65 dB</td>
</tr>
<tr>
<td>C4</td>
<td>AF distortion</td>
<td>Better than 5%</td>
</tr>
<tr>
<td>C5</td>
<td>Audio output</td>
<td>1 W with less than 5% distortion at 1 kHz ref. measured at specified AF output.</td>
</tr>
<tr>
<td>C6</td>
<td>Squelch Sensitivity</td>
<td>0.25μv or better at threshold.</td>
</tr>
<tr>
<td>C7</td>
<td>AF Response</td>
<td>Within +1 , -3 dB of 6 dB / Octave de-emphasis characteristics from 350 Hz. to 2700 Hz. with 1 KHz as reference.</td>
</tr>
</tbody>
</table>

5.9 **Specifications of Stacked Dipole Omni Directional Antenna**

<table>
<thead>
<tr>
<th>SN</th>
<th>Parameters</th>
<th>Characteristics</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
### ELECTRICAL SPECIFICATIONS

<table>
<thead>
<tr>
<th></th>
<th>Parameters</th>
<th>Characteristics</th>
</tr>
</thead>
<tbody>
<tr>
<td>A1</td>
<td>Frequency Range – MHz</td>
<td>136 - 174</td>
</tr>
<tr>
<td>A2</td>
<td>Bandwidth – MHz</td>
<td>10</td>
</tr>
<tr>
<td>A3</td>
<td>Impedance – Ohms</td>
<td>50 unbalanced</td>
</tr>
<tr>
<td>A4</td>
<td>VSWR – less than</td>
<td>1.5</td>
</tr>
<tr>
<td>A6</td>
<td>RF Power handling capacity – Watt</td>
<td>100</td>
</tr>
<tr>
<td>A8</td>
<td>Termination</td>
<td>N – female</td>
</tr>
<tr>
<td>A9</td>
<td>Lightening Protection</td>
<td>Direct Ground</td>
</tr>
</tbody>
</table>

5.10 Specifications of Antenna Cable:

<table>
<thead>
<tr>
<th>Sl No</th>
<th>Parameters</th>
<th>Characteristics</th>
</tr>
</thead>
<tbody>
<tr>
<td>A1</td>
<td>Length</td>
<td>As per site requirement</td>
</tr>
<tr>
<td>A2</td>
<td>Size</td>
<td>RG 217 Low Loss Cable</td>
</tr>
<tr>
<td>A3</td>
<td>Characteristic Impedance</td>
<td>50 + / - 1 ohm</td>
</tr>
<tr>
<td>A4</td>
<td>Average Power Rating</td>
<td>1.00 kW at 100 MHz</td>
</tr>
<tr>
<td>A5</td>
<td>Attenuation</td>
<td>0.05 dB / Meter at 100 MHz</td>
</tr>
</tbody>
</table>

5.11 Specification of Telephone Instrument: Telephone Instrument provided with Station Control Equipment and Gate Control Equipment shall be as per Appendix-IV.

5.12 Terminals / Connectors:

5.12.1 It is necessary to terminate the 2Wire input lines through Screw Terminals / Connectors to achieve lowest contact resistance & to avoid possibility of corrosion due to different climatic conditions, all metallic parts of the connectors / terminals should be non ferrous. The terminals & connectors should have locking arrangement so that input lines to the equipment should not get disconnected inadvertently.

5.12.2 RJ11 & RJ 45 connectors shall be used to connect the 2 W telephone sets /lines / PC to eliminate any inadvertent disconnection of the input/output lines.

5.12.3 All other connectors like antenna, power and solar panel shall be lockable so that it can not get disconnected inadvertently

5.13 Provision of Earth Terminal shall be made in the Station Equipment and LC Gate Equipment to extend Erthing. The Earthing arrangement shall be provided by the Railways & is not the part of the equipment.

6.0 ENVIRONMENTAL REQUIREMENTS:

6.1 The equipments shall be capable of working in Non-Air Conditioned environment in the field.

6.2 The equipments shall be suitable for installation on AC/DC Electrified and Non-Electrified sections. It shall be suitable in all areas including where locomotives having thyristor.
controlled Single Phase or 3-Phase Induction Motors haul Passenger or Freight Trains and where Chopper Controlled EMU Stocks are operated.

7.0 TESTING & INSPECTION

7.1 Type Test: Type Test shall comprise of the following Inspection/Test/Trial.

a) Visual Inspection
b) Applied High Voltage Test
c) Endurance Test
d) Performance Test
e) Climatic Test
f) Vibration Test
g) Surge & Transient Test
h) Final Performance Test

One ‘Station Control Equipment’ and Two ‘LC Gate Control Equipments’ with all accessories shall be tested during Type Test. The ‘Station Control Equipment’ and ‘LC Gate Control Equipments’ shall successfully pass all the Inspection/Test/Trial for proving conformity with this specification. If any of the equipment fails in any of the Inspection/Test/Trial, RDSO may call for further equipment(s) and subject it to all the tests or to the test(s) in which failure occurred. No failure shall be permitted in the repeat test(s).

7.2 Acceptance Tests: Acceptance Test shall comprise of the following Inspection/Test.

a) Visual Inspection
b) Applied High Voltage Test
c) Performance Test

Acceptance Test shall be carried out on all Station Control Equipment. For LC Gate Control Equipment, the Double Sample Plan given as below shall be adopted during Acceptance Test:

<table>
<thead>
<tr>
<th>Lot consisting LC Gate Control Equipment</th>
<th>1st Sample size (N1)</th>
<th>2nd Sample size (N2)</th>
<th>Combined Sample size (N1 + N2)</th>
<th>Acceptance Number (C1)</th>
<th>Rejection Number (C2)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Under 25</td>
<td>C1</td>
<td>C2</td>
<td>C3</td>
<td>C4</td>
<td>C5</td>
</tr>
<tr>
<td>25 to 50</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>51 to 100</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>101 to 200</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>201 to 300</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>301 to 500</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

| | C1 | C2 | C3 | C4 | C5 | C6 |
| | 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  |
The number of LC Gate Control Equipment (N1) as given in Column C2 shall first be selected and subjected to the Acceptance Test. If in the first sample, the number of defective LC Gate Control Equipment, that is those failing in one or more acceptance test is less than or equal to the corresponding number (C1) given in C5, that lot shall be considered as conforming to the requirement of the acceptance test. If the number of defective level crossing gate control equipment in the first sample is greater than or equal to the rejection number in C6, the lot shall be considered as not conforming to the requirements of the acceptance test. If number of defective level crossing gate control equipment in the first sample lies between C1 and C2 a second sample of size N2 as given in Col.3 shall be selected and subjected to the acceptance test. If in the combined sample, the number of defective level crossing gate control equipment is less than C2, the lot shall be considered as conforming to the requirement of acceptance test.

7.3 Routine Tests: Routine Test shall be conducted by manufacturer on every equipment and test results will be submitted during the inspection. Routine Test shall comprise of the following:

a) Visual Inspection
b) Applied High Voltage Test
d) Performance Test

7.4 Visual Inspection:

7.4.1 The equipment shall be visually inspected to ensure that it is free from any cracks or any other imperfection including marking and painting etc.
7.4.2 The equipment shall be checked to satisfy general requirement of Marking & Packing.
7.4.3 The visual inspection shall be carried out to ensure that the equipment is of sound construction and, meets its specified requirement of Specification.

7.5 Applied High Voltage Test: The equipment shall withstand without any damage a test voltage of 1KV, applied for a period of one minute, between the body and all the current carrying terminals looped together.

7.6 Endurance Test: The equipment shall be capable of withstanding Burn-In Test for 72 hours during Type Test (8 Hours during Acceptance Test) at an ambient temperature of 50(+ 2) °C when the equipment is working. This test may be performed in a temperature-controlled room with free airflow. The ambient temperature shall be measured at a distance of 1 foot from the equipment under test. The necessary set up for the purpose shall be provided by the manufacturer.

The equipment shall be burn – in for a period of one day at 50 °C prior to the actual measurement of the parameters. During the burn-in, the equipment shall be kept in ‘ON’ condition.

7.7 Performance Test: The Performance test shall be conducted as per Performance Test Procedure proposed by manufacturer duly reviewed and approved by RDSO/Lucknow. The Performance Test shall include comprehensive series of measurements of the characteristics
of the equipment to check its performance in accordance with the Functional, System & Technical requirements of the specification. The Performance Test shall also include Power Supply Variation Test and Power Supply Interruption Test.

The Performance Test shall include comprehensive series of measurements of the characteristics of the equipment to check that its performance is in accordance with the functional requirements of the particular equipment concerned, including any special requirements of its individual specification. The Performance Test shall also include Power Supply Variation Test and Power Supply Interruption Test.

7.8 Climatic Test:

7.8.1 Under Climatic Test, Station Control Equipment and Gate Control Equipments shall undergo following Tests:

<table>
<thead>
<tr>
<th>SN</th>
<th>TEST</th>
<th>REFERENCE</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Change of Temp Test</td>
<td>IS 9000 Part XIV Sect. II</td>
</tr>
<tr>
<td></td>
<td>Low temp</td>
<td>–10°C ± 3°C</td>
</tr>
<tr>
<td></td>
<td>High temp</td>
<td>+55°C ± 2°C</td>
</tr>
<tr>
<td></td>
<td>Rate of change in</td>
<td>1°C ± 0.2°C / min</td>
</tr>
<tr>
<td></td>
<td>Duration</td>
<td>3 Hrs at each temp. –10°C &amp; +55°C</td>
</tr>
<tr>
<td></td>
<td>Cycle</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>Condition</td>
<td>Fully functional during Test</td>
</tr>
<tr>
<td>2.</td>
<td>Dry Heat Test</td>
<td>IEC-571; IS:9000 Part-III Sect 3</td>
</tr>
<tr>
<td></td>
<td>Temp</td>
<td>+55°C ± 0.2°C</td>
</tr>
<tr>
<td></td>
<td>Duration</td>
<td>12 hrs</td>
</tr>
<tr>
<td></td>
<td>Condition</td>
<td>Fully functional during Test</td>
</tr>
<tr>
<td>3.</td>
<td>Cold Test</td>
<td>IS 9000 Part II Sect. III</td>
</tr>
<tr>
<td></td>
<td>Temp</td>
<td>–10°C ± 3°C</td>
</tr>
<tr>
<td></td>
<td>Duration</td>
<td>2 hours</td>
</tr>
<tr>
<td></td>
<td>Condition</td>
<td>Fully functional during Test</td>
</tr>
<tr>
<td>4.</td>
<td>Damp Heat Test (Cyclic)</td>
<td>IS 9000 Part V Sect. 2, 12+12 Hours Cycle, Variant 1</td>
</tr>
<tr>
<td></td>
<td>Upper temp</td>
<td>40°C ± 2°C</td>
</tr>
<tr>
<td></td>
<td>Humidity</td>
<td>95% (+1%, -5%)</td>
</tr>
<tr>
<td></td>
<td>Cycles</td>
<td>6</td>
</tr>
<tr>
<td></td>
<td>Condition</td>
<td>Fully functional during one hour</td>
</tr>
<tr>
<td>5.</td>
<td>Damp Heat Test (Steady State Storage)</td>
<td>IS 9000 Part IV</td>
</tr>
<tr>
<td></td>
<td>Temp</td>
<td>40°C ± 2°C</td>
</tr>
<tr>
<td></td>
<td>Humidity</td>
<td>93% (+2%, -3%)</td>
</tr>
<tr>
<td></td>
<td>Severity</td>
<td>4 days</td>
</tr>
<tr>
<td></td>
<td>Condition</td>
<td>Fully functional during Test.</td>
</tr>
<tr>
<td>6.</td>
<td>Salt Mist Test</td>
<td>IS 9000 Part XI Procedure 1</td>
</tr>
<tr>
<td></td>
<td>Duration</td>
<td>48 Hours</td>
</tr>
</tbody>
</table>
7.8.2 During some of the above Climatic Tests, which requires equipments to be kept in Operating Condition, functioning of all the major module LCD Display, LED Indications, VHF Set, Voice Logger, Telephone Instrument shall be observed.

**7.9 Vibration Test**

7.9.1 **Vibration Test** shall be conducted as per IS:9001 Pt. XIII in Operating Condition. The Vibration Test shall be conducted to withstand the following test conditions.

<table>
<thead>
<tr>
<th>(i)</th>
<th>Frequency</th>
<th>5 to 150 Hz</th>
</tr>
</thead>
<tbody>
<tr>
<td>(ii)</td>
<td>Acceleration</td>
<td>2 g Constant Acceleration</td>
</tr>
<tr>
<td>(iii)</td>
<td>Direction of Vibration</td>
<td>X,Y,Z</td>
</tr>
<tr>
<td>(iv)</td>
<td>Sweep Cycle per Axis</td>
<td>20</td>
</tr>
</tbody>
</table>

7.9.2 The frequency is to be varied continuously from the lowest to the highest value over the specified range, at such rate that resonances can be easily detected. The rate of change of frequency will not normally exceed one octave in one minute. Resonances may be observed by stroboscope or other means. All frequencies at which assemblies are detected to resonate shall be noted. At the end of the test the equipment is to be examined for mechanical damages.

**7.10 Surge & Transient Test:** Station Equipment, LC Gate Equipment shall undergo Basic Immunity Requirement Tests of Surge & Transient as follows:

7.10.1 2-Wire Physical Communication Line Port of Station Equipment & LC Gate Equipment shall be tested for Basic Immunity Requirements of Surges as per Test Method IEC 61000-4-5. During this test, 5 (five) Pulses of 10/700µS with Amplitude of 1.0 KV (CM) and 0.5KV (DM) each in Positive as well as Negative Polarity shall be applied. During and after the Test, Station Equipment & LC Gate Equipment shall continue to operate as intended without any malfunctioning and degradation in performance.

7.10.2 2-Wire Physical Communication Line Port of Station Equipment & LC Gate Equipment shall also be tested for Basic Immunity Requirements of Fast Transient as per Test Method IEC 61000-4-4. During this test, Pulses with Amplitude of 0.5KV each in Positive as well as Negative Polarity shall be applied. During and after the test, Station Equipment & LC Gate Equipment shall continue to operate as intended without any malfunctioning and degradation in performance.

7.10.3 230V AC Power Supply Port of SMPS Power Supply of Station Equipment as well as LC Gate Equipment shall be tested for Basic Immunity Requirements of Surges as per Test Method IEC 61000-4-5. During this Test, 5(Five) Pulses of 1.2/50µS with Amplitude of 1.0 KV (CM) and 0.5 KV (DM) each in Positive as well as Negative Polarity shall be applied. During and after the Test, Power Supply shall continue to operate as intended without any malfunctioning and degradation in performance.
7.11 **Final Performance Test**: After completion of all above said tests as explained above, Final Performance Test shall be conducted.

**8.0 TYPE APPROVAL**: The ‘Level Crossing Gate Control & Monitoring System’ should have Type Approval from RDSO. The type approval process shall include Type Test & Field Trial to check the compliance of the specified parameters.

8.1 The Type Test shall be conducted preferably at RDSO/Lucknow. However, in case of any difficulty of infrastructure or any other facility at RDSO/Lucknow, the Type Test may be conducted either at Manufacturer’s Premises or in any other mutually agreed Test Laboratory. All instrumentation and set up required for the Type Test shall be provided by the manufacturer.

8.2 Performance Tests will not be carried out on 25 Watt Radio, as this item will be DGS&D/DCPW approved. The certificate of the same shall be submitted at the time of Type Approval.

8.3 **Field Trial**: After successful completion of all Tests mentioned in Clause 7.4 to 7.11, field trial for 3 Months shall be conducted by installing complete equipment in a selected station and gates on a selected selection to judge the performance of the system.

8.4 After successful completion of Type Test and Field Trial, Type Approval may be processed.

**9.0 MARKING & PACKING**: The following information shall be clearly Embossed/Engraved/Screen Printed at a conspicuous places.

   a) Item Name
   b) RDSO Specification No.
   c) Name or Monogram of the Manufacturer
   d) Year of Manufacture
   e) Serial Number

9.1 Equipment shall be suitably packed so as to avoid any damage or loss during storage and transit.

**10.0 TECHNICAL LITERATURE**: Technical literature consisting of Principles of Working, Circuit/Block Diagram, Maintenance and Trouble Shooting Procedures, Assembly Drawing, Spares Parts Catalogue, Printed Card Layout Diagram, shall be supplied along with equipment unless otherwise not desired by the user Railway.

**11.0 INFORMATION TO BE FURNISHED BY PURCHASER**

   a) Capacity of Battery as defined in Clause 5.4.
   b) Length of Antenna Cable as per Clause 5.10 (A1).
   c) Antenna Specification: If purchaser wishes to procure any other type of antenna depending upon the site requirement instead of Omni Directional Antenna as defined in Clause 5.9.
   d) Capacity of Solar Panel as per Clause 5.6.

*****END*****
Panel Diagram for LC Gate Equipment.

Panel Diagram for Station Equipment
(A) **Engineering LC Gate, Interlocked, Normally Open to Road Traffic**

**Intimation to Gateman for Approaching Train**

1. To advise Gateman about approaching Train, **Station Master shall feed ‘Train No.’, ‘Expected Time of Passage’ & ‘Outgoing Private Number’. Subsequently SM shall press ‘Common Button’ and ‘Advise Button’ of concerned LC Gate for 3 Seconds.** This will transmit ‘Direction of Train’, ‘Train No.’, ‘Expected Time of Passage’ and ‘Outgoing Private Number’ to LC Gate. ‘Advise Display’ for concerned LC Gate on Station Equipment will also start flashing ‘- -’. This will also clear the ‘Outgoing Private Number Display’ of Station Equipment.

   For a Group Message to more than one, Engineering, Interlocked, Normally Open to Road Traffic LC Gate, **Station Master shall press ‘Advise Buttons’ of all the concerned LC Gate simultaneously along with ‘Common Button’ for 3 Seconds.**

2. On receipt of above messages at LC Gate, ‘Train No.’ & ‘Expected Time of Passage’ will be shown in Main Display and ‘Incoming Private Number’ will be shown flashing on ‘Advise Display’. Audio Message will also start playing at LC Gate Equipment. **On Pressing ‘MUTE Button’ by Gateman for 1 Seconds, audio will stop playing. The Gateman shall feed ‘Outgoing Private Number’. Subsequently Gateman shall press ‘Advise Button’ along with ‘Common Button’ for 3 seconds. This will transmit the Private Number to Station and ‘Advice Display’ will also become steady. This will also clear the ‘Outgoing Private Number Display’ of LC Gate Equipment.**

3. On receipt of this Private Number from LC Gate, it will be shown on ‘Advise Display’ of concerned LC Gate on Station Equipment.

4. **On Pressing ‘Clear Button’ along with ‘Common Button’ by Station Master for 1 Seconds, Main Display and ‘Advise Display’ will be cleared.**

5. **On Pressing ‘Clear Button’ along with ‘Common Button’ by Gateman for 1 Seconds, Main Display and ‘Advise Display’ will be cleared.**
(B) Engineering LC Gate, Non-Interlocked, Normally Open to Road Traffic

Closing the Gate for Road Traffic

(1) To advise Gateman about approaching Train, Station Master shall feed ‘Train No.’, ‘Expected Time of Passage’ & ‘Outgoing Private Number’. Subsequently SM shall press ‘Common Button’ and ‘Advise Button’ of concerned LC Gate for 3 Seconds. This will transmit ‘Direction of Train’, ‘Train No.’, ‘Expected Time of Passage’ and ‘Private Number’ to LC Gate. ‘Advise Display’ for concerned LC Gate on SM Equipment will also start flashing ‘- -’. This will also clear the ‘Outgoing Private Number Display’ of Station Equipment.

For a Group Message to more than one, Engineering, Non-Interlocked, Normally Open to Road Traffic LC Gate, Station Master shall press ‘Advise Buttons’ of all the concerned LC Gate simultaneously along with ‘Common Button’ for 3 Seconds.

(2) On receipt of above messages at LC Gate, ‘Train No.’ & ‘Expected Time of Passage’ will be shown in Main Display and ‘Incoming Private Number’ will be shown flashing on ‘Advise Display’. Audio Message will also start playing at LC Gate Equipment. On Pressing ‘MUTE Button’ by Gateman for 1 Seconds, audio will stop playing. The Gateman shall feed ‘Outgoing Private Number’. Subsequently Gateman shall press ‘Advise Button’ along with ‘Common Button’ for 3 seconds. This will transmit the Private Number to Station and ‘Advise Display’ will also become steady. This will also clear the ‘Outgoing Private Number Display’ of LC Gate Equipment.

(3) On receipt of this Private Number from LC Gate, it will be shown on ‘Advise Display’ of concerned LC Gate on Station Equipment.

(4) After Closing the Gate, Gateman shall feed ‘Outgoing Private Number’. Subsequently Gateman shall press ‘Common Button’ and ‘Close Button’ for 3 Seconds. This will transmit ‘Private Number’ to Station Master and ‘Close Display’ on LC Gate Equipment will also start flashing ‘- -’. This will also clear the ‘Outgoing Private Number Display’ of LC Gate Equipment.

(5) On receipt of this message at Station Equipment, ‘Incoming Private Number’ will be shown flashing on ‘Close Display’ of concerned LC Gate and Audio Message will also start playing. On pressing MUTE Button by Station Master for 1 Seconds, audio will stop playing. Station Master shall feed Private Number. Subsequently Station Master shall press ‘Close Button’ of concerned LC Gate along with ‘Common Button’ for 3 Seconds. This will transmit ‘Private Number’ to concerned LC Gate and ‘Close Display’ for concerned LC Gate will become steady. This will also clear the ‘Outgoing Private Number Display’ of Station Equipment.

(6) On receipt of this Private Number from Station, it will be shown on ‘Close Display’ of LC Gate Equipment.

Opening the Gate for Road Traffic

On some railways, if for opening of LC Gate if permission of Station Master under exchange of Private Number is required, then following procedure(Steps 7, 8 & 9) will be followed.
(7) For opening the LC Gate, **Gateman shall feed ‘Private Number’**. Subsequently, **Gateman shall press ‘Common Button’ and ‘Open Button’ for 3 Seconds**. This will transmit ‘Private Number’ to Station and ‘Open Display’ will start flashing ‘- -’ at LC Gate Equipment. This will also clear ‘Outgoing Private Number Display’ from LC Gate Equipment.

(8) On receipt of this ‘Private Number’, it will be shown flashing on ‘Open Display’ of concerned LC Gate on Station Equipment, and Audio Message will also start playing at Station Equipment. On **pressing MUTE Button for 1 Seconds**, audio will stop playing. If SM wish to permit Gateman to Open LC Gate to Road Traffic, **he shall feed Private Number. Subsequently Station Master shall press ‘Open Button’ of concerned LC Gate alongwith ‘Common Button’ for 3 Seconds**. This will transmit ‘Private Number’ to LC Gate. ‘Open Display’ for concerned LC Gate will also become Steady. This will also clear the ‘Outgoing Private Number Display’ of LC Gate Equipment.

(9) On receipt of above message from Station, Private Number will be shown in ‘Open Display’. This will authorize the Gateman to open the LC Gate for Road Traffic.


----xxxx----
(C) Engineering LC Gate, Non-Interlocked, Normally Closed to Road Traffic

Opening the Gate for Road Traffic

(1) For opening the LC Gate, Gateman shall feed ‘Private Number’. Subsequently, Gateman shall press ‘Common Button’ and ‘Open Button’ for 3 Seconds. This will transmit Private Number to Station and ‘Open Display’ will start flashing ‘- -’ at LC Gate Equipment. This will also clear Outgoing Private Number from ‘LC Gate Equipment’.

(2) On receipt of this ‘Private Number’ it will be shown flashing on ‘Open Display’ of concerned LC Gate on Station Equipment and Audio Message will also start playing at Station Equipment. On pressing MUTE Button for 1 Seconds, audio will stop playing. If SM wish to permit Gateman to Open LC Gate to Road Traffic, he shall feed Private Number. Subsequently Station Master shall press ‘Open Button’ of concerned LC Gate alongwith ‘Common Button’ for 3 Seconds. This will transmit Private Number to LC Gate. ‘Open Display’ for concerned LC Gate will also become Steady. This will also clear the ‘Outgoing Private Number Display’ of Station Equipment.

(3) On receipt of above message from Station, ‘Private Number’ will be shown in ‘Open Display’. This will authorize the Gateman to open the LC Gate for Road Traffic.

Closing the Gate for Road Traffic

(4) After Closing the Gate, Gateman shall feed ‘Outgoing Private Number’. Subsequently Gateman shall press ‘Common Button’ and ‘Close Button’ for 3 Seconds. This will transmit ‘Private Number’ to Station Master and ‘Close Display’ on LC Gate Equipment will also start flashing ‘- -’. This will also clear the ‘Outgoing Private Number Display’ of Station Equipment.

(5) On receipt of this message at Station, Incoming Private Number will be shown flashing on ‘Close Display of concerned LC Gate and Audio Message will also start playing. On pressing MUTE Button by Station Master for 1 Seconds, audio will stop playing. Station Master shall feed Private Number. Subsequently Station Master shall press ‘Close Button’ of concerned LC Gate alongwith Common Button for 3 Seconds. This will transmit Private Number to concerned LC Gate and ‘Close Display’ for concerned LC Gate will become steady. This will also clear the ‘Outgoing Private Number Display’ of Station Equipment.

(6) On receipt of this ‘Private Number’ will be shown on ‘Close Display’ of LC Gate Equipment.

(7) On Pressing ‘Clear Button’ alongwith ‘Common Button’ by Station Master for 1 Seconds, ‘Close Display’ & ‘Open Display’ will be cleared.


----xxxx----
(D) Traffic LC Gate, Interlocked, Normally Open to Road Traffic

Intimation to Gateman for Approaching Train

(1) To advise Gateman about approaching Train, Station Master shall feed ‘Train No.’, ‘Expected Time of Passage’ & ‘Outgoing Private Number’. Subsequently SM shall press ‘Common Button’ and ‘Advise Button’ of concerned LC Gate for 3 Seconds. This will transmit ‘Direction of Train’, ‘Train No.’, ‘Expected Time of Passage’ and ‘Outgoing Private Number’ to LC Gate. ‘Advise Display’ for concerned LC Gate on Station Equipment will also start flashing ‘- -’. This will also clear the ‘Outgoing Private Number Display’ of Station Equipment.

For a Group Message to more than one, Traffic, Interlocked, Normally Open to Road Traffic LC Gate, Station Master shall press ‘Advise Buttons’ of all the concerned LC Gate simultaneously alongwith ‘Common Button’ for 3 Seconds.

(2) On receipt of above messages at LC Gate, ‘Train No.’ & ‘Expected Time of Passage’ will be shown in Main Display and ‘Incoming Private Number’ will be shown flashing on ‘Advise Display’. Audio Message will also start playing at LC Gate Equipment. On Pressing ‘MUTE Button’ by Gateman for 1 Seconds, audio will stop playing. The Gateman shall feed Private Number which will be shown on ‘Outgoing Private Number Display’ of Gate. Subsequently Gateman shall press ‘Advise Button’ alongwith ‘Common Button’ for 3 seconds. This will transmit the Private Number to Station and ‘Advise Display’ will also become steady. This will also clear the ‘Outgoing Private Number Display’ of Station Equipment.

(3) On receipt of this Private Number from LC Gate, it will be shown on ‘Advise Display’ of concerned LC Gate on Station Equipment.

(4) On Pressing ‘Clear Button’ alongwith Common Button by Station Master for 1 Seconds, Main Display and ‘Advise Display’ will be cleared.

(5) On Pressing ‘Clear Button’ alongwith ‘Common Button’ by Gateman for 1 Seconds, Main Display and ‘Advise Display’ will be cleared.

----xxxx----
(E) Traffic LC Gate, Non-Interlocked, Normally Closed to Road Traffic

Opening the Gate for Road Traffic

(1) For opening the LC Gate, Gateman shall feed ‘Private Number’. Subsequently, Gateman shall press ‘Common Button’ and ‘Open Button’ for 3 Seconds. This will transmit Private Number to Station and ‘Open Display’ will start flashing ‘- -’ at LC Gate Equipment. This will also clear Outgoing Private Number from ‘LC Gate Equipment’.

(2) On receipt of this ‘Private Number’ it will be shown flashing on ‘Open Display’ of concerned LC Gate on Station Equipment, and Audio Message will also start playing at Station Equipment. On pressing MUTE Button for 1 Seconds, audio will stop playing. If SM wish to permit Gateman to Open LC Gate to Road Traffic, he shall feed Private Number. Subsequently Station Master shall press ‘Open Button’ of concerned LC Gate along with ‘Common Button’ for 3 Seconds. This will transmit Private Number to LC Gate. ‘Open Display’ for concerned LC Gate will also become Steady. This will also clear Outgoing Private Number from ‘Station Equipment’.

(3) On receipt of above message from Station, Private Number will be shown in ‘Open Display’. This will authorize the Gateman to open the LC Gate for Road Traffic.

Closing the Gate for Road Traffic

(4) After Closing the Gate, Gateman shall feed ‘Outgoing Private Number’. Subsequently Gateman shall press ‘Common Button’ and ‘Close Button’ for 3 Seconds. This will transmit Private Number to Station Master and clear ‘Outgoing Private Number Display’ from ‘LC Gate Equipment’. ‘Close Display’ on LC Gate Equipment will also start flashing ‘- -’. This will also clear Outgoing Private Number from ‘LC Gate Equipment’.

(5) On receipt of this message at Station, Incoming Private Number will be shown flashing on ‘Close Display’ of concerned LC Gate and Audio Message will also start playing. On pressing MUTE Button by Station Master for 1 Seconds, audio will stop playing. Station Master shall feed Private Number. Subsequently Station Master shall press ‘Close Button’ of concerned LC Gate along with Common Button for 3 Seconds. This will transmit ‘Private Number’ to concerned LC Gate and ‘Close Display’ for concerned LC Gate will become steady. This will also clear Outgoing Private Number from ‘Station Equipment’.

(6) On receipt of this Private Number from Station it will be shown in ‘Close Display’ of LC Gate Equipment.

(7) On Pressing ‘Clear Button’ along with ‘Common Button’ by Station Master for 1 Seconds, ‘Close Display’ & ‘Open Display’ will be cleared.

(8) On Pressing ‘Clear Button’ along with ‘Common Button’ by Gateman for 1 Seconds, ‘Close Display’ & ‘Open Display’ will be cleared.

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APPENDIX-III

WORKING OF DIFFERENT CATEGORY OF LC GATES in AUTO Mode

(A) Engineering LC Gate, Interlocked, Normally Open to Road Traffic

Intimation to Gateman for Approaching Train

(1) To advise Gateman about approaching Train, Station Master shall feed ‘Train No.’ & ‘Expected Time of Passage’. Subsequently SM shall press ‘Common Button’ and ‘Advise Button’ of concerned LC Gate for 3 Seconds. This will automatically generate Private Number and transmit it along with ‘Direction of Train’, ‘Train No.’ & ‘Expected Time of Passage’ to LC Gate. This will also show the ‘Outgoing Private Number’ on ‘Outgoing Private Number Display’ of Station Equipment. ‘Advise Display’ for concerned LC Gate on Station Equipment will also start flashing ‘- -’.

For a Group Message to more than one, Engineering, Interlocked, Normally Open to Road Traffic LC Gate, Station Master shall press ‘Advise Buttons’ of all the concerned LC Gate simultaneously along with ‘Common Button’ for 3 Seconds.

(2) On receipt of above messages at LC Gate, ‘Train No.’ & ‘Expected Time of Passage’ will be shown in Main Display and ‘Incoming Private Number’ will be shown flashing on ‘Advise Display’. Audio Message will also start playing at LC Gate Equipment. On Pressing ‘MUTE Button’ by Gateman for 1 Seconds, audio will stop playing. Gateman shall press ‘Advise Button’ along with ‘Common Button’ for 3 seconds. This will automatically generate Private Number and transmit it to Station. This will also show the ‘Outgoing Private Number’ on ‘Outgoing Private Number Display’ of LC Gate Equipment’. ‘Advise Display’ will also become steady.

(3) On receipt of this Private Number from LC Gate, it will be shown on ‘Advise Display’ of concerned LC Gate on Station Equipment.

(4) On Pressing ‘Clear Button’ along with ‘Common Button’ by Station Master for 1 Seconds, Main Display and ‘Advise Display’ will be cleared.

(5) On Pressing ‘Clear Button’ along with ‘Common Button’ by Gateman for 1 Seconds, Main Display and ‘Advise Display’ will be cleared.

-----xxxx----
(B) Engineering LC Gate, Non-Interlocked, Normally Open to Road Traffic

Closing the Gate for Road Traffic

(1) To advise Gateman about approaching Train, Station Master shall feed ‘Train No.’ & ‘Expected Time of Passage’. Subsequently SM shall press ‘Common Button’ and ‘Advise Button’ of concerned LC Gate for 3 Seconds. This will automatically generate Private Number and transmit it alongwith ‘Direction of Train’, ‘Train No.’ & ‘Expected Time of Passage’ to LC Gate. This will also show the ‘Outgoing Private Number’ on ‘Outgoing Private Number Display’ of Station Equipment. ‘Advise Display’ for concerned LC Gate on Station Equipment will also start flashing ‘- -’.

For a Group Message to more than one, Engineering, Non-Interlocked, Normally Open to Road Traffic LC Gate, Station Master shall press ‘Advise Buttons’ of all the concerned LC Gate simultaneously alongwith ‘Common Button’ for 3 Seconds.

(2) On receipt of above messages at LC Gate, ‘Train No.’ & ‘Expected Time of Passage’ will be shown in Main Display and ‘Incoming Private Number’ will be shown flashing on ‘Advise Display’. Audio Message will also start playing at LC Gate Equipment. On Pressing ‘MUTE Button’ by Gateman for 1 Seconds, audio will stop playing. Gateman shall press ‘Advise Button’ alongwith ‘Common Button’ for 3 seconds. This will automatically generate Private Number and transmit it to Station. This will also show the ‘Outgoing Private Number’ on ‘Outgoing Private Number Display’ of LC Gate Equipment’. ‘Advise Display’ will also become steady.

(3) On receipt of this Private Number from LC Gate, it will be shown on ‘Advise Display’ of concerned LC Gate on Station Equipment.

(4) After Closing the Gate, Gateman shall press ‘Common Button’ and ‘Close Button’ for 3 Seconds. This will automatically generate Private Number and transmit it to Station. This will also show the ‘Outgoing Private Number’ on ‘Outgoing Private Number Display’ of LC Gate Equipment’. ‘Close Display’ on LC Gate Equipment will also start flashing ‘- -’.

(5) On receipt of this message at Station Equipment, ‘Incoming Private Number’ will be shown flashing on ‘Close Display’ of concerned LC Gate and Audio Message will also start playing. On pressing MUTE Button by Station Master for 1 Seconds, audio will stop playing. Station Master shall press ‘Close Button’ of concerned LC Gate alongwith ‘Common Button’ for 3 Seconds. This will automatically generate Private Number and transmit it to concerned LC Gate. ‘Close Display’ for concerned LC Gate will also become steady.

(6) On receipt of this Private Number from Station, it will be shown on ‘Close Display’ of LC Gate Equipment.

Opening the Gate for Road Traffic
On some railways, if for opening of LC Gate if permission of Station Master under exchange of Private Number is required, then following procedure (Steps 7, 8 & 9) will be followed.

(7) For opening the LC Gate, **Gateman shall press ‘Common Button’ and ‘Open Button’ for 3 Seconds.** This will automatically generate Private Number and transmit it to Station. ‘Open Display’ will start flashing ‘- -’ at LC Gate Equipment. This will also show the ‘Outgoing Private Number’ on ‘Outgoing Private Number Display’ of LC Gate Equipment.

(8) On receipt of this ‘Private Number’ it will be shown flashing on ‘Open Display’ of concerned LC Gate on Station Equipment, and Audio Message will also start playing at Station Equipment. On pressing MUTE Button for 1 Second audio will stop playing. If SM wish to permit Gateman to Open LC Gate to Road Traffic, **he shall press ‘Open Button’ of concerned LC Gate alongwith ‘Common Button’ for 3 Seconds.** This will automatically generate Private Number and transmit it to SM to LC Gate. ‘Open Display’ for concerned LC Gate will also become Steady. This will also show the ‘Outgoing Private Number’ on ‘Outgoing Private Number Display’ of Station Equipment.

(9) On receipt of above message from Station, Private Number will be shown in ‘Open Display’. This will authorize the Gateman to open the LC Gate for Road Traffic.


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(C) Engineering LC Gate, Non-Interlocked, Normally Closed to Road Traffic

Opening the Gate for Road Traffic

(1) For opening the LC Gate, **Gateman shall press ‘Common Button’ and ‘Open Button’ for 3 Seconds.** This will automatically generate Private Number and transmit it to Station. ‘Open Display’ will start flashing ‘- -’ at LC Gate Equipment. This will also show the ‘Outgoing Private Number’ on ‘Outgoing Private Number Display’ of LC Gate Equipment.

(2) On receipt of this ‘Private Number’ it will be shown flashing on ‘Open Display’ of concerned LC Gate on Station Equipment, and Audio Message will also start playing at Station Equipment. **On pressing MUTE Button for 1 Seconds,** audio will stop playing. If SM wish to permit Gateman to Open LC Gate to Road Traffic, **he shall press ‘Open Button’ of concerned LC Gate alongwith ‘Common Button’ for 3 Seconds.** This will automatically generate Private Number and transmit it to Station to LC Gate. ‘Open Display’ for concerned LC Gate will also become Steady. This will also show the ‘Outgoing Private Number’ on ‘Outgoing Private Number Display’ of Station Equipment.

(3) On receipt of above message from Station, Private Number will be shown in ‘Open Display’. This will authorize the Gateman to open the LC Gate for Road Traffic.

Closing the Gate for Road Traffic

(4) After Closing the Gate, **Gateman shall press ‘Common Button’ and ‘Close Button’ for 3 Seconds.** This will automatically generate Private Number and transmit it to Station. ‘Close Display’ on LC Gate Equipment will also start flashing ‘- -’. This will also show the ‘Outgoing Private Number’ on ‘Outgoing Private Number Display’ of LC Gate Equipment.

(5) On receipt of this message at Station Equipment, ‘Incoming Private Number’ will be shown flashing on ‘Close Display’ of concerned LC Gate and Audio Message will also start playing. **On pressing MUTE Button by Station Master for 1 Seconds,** audio will stop playing. **Station Master shall press ‘Close Button’ of concerned LC Gate alongwith ‘Common Button’ for 3 Seconds.** This will automatically generate Private Number and transmit it to concerned LC Gate. ‘Close Display’ for concerned LC Gate will also become steady. This will also show the ‘Outgoing Private Number’ on ‘Outgoing Private Number Display’ of Station Equipment.

(6) On receipt of this Private Number from Station, it will be shown on ‘Close Display’ of LC Gate Equipment.

(7) **On Pressing ‘Clear Button’ alongwith ‘Common Button’ by Station Master for 1 Seconds,** ‘Close Display’ & ‘Open Display’ will be cleared.

(8) **On Pressing ‘Clear Button’ alongwith ‘Common Button’ by Gateman for 1 Seconds,** ‘Close Display’ & ‘Open Display’ will be cleared.
(D) Traffic LC Gate, Interlocked, Normally Open to Road Traffic

Intimation to Gateman for Approaching Train

1. To advise Gateman about approaching Train, Station Master shall feed ‘Train No.’, ‘Expected Time of Passage’ & ‘Outgoing Private Number’. Subsequently SM shall press ‘Common Button’ and ‘Advise Button’ of concerned LC Gate for 3 Seconds. This will automatically generate Private Number and transmit it along with ‘Direction of Train’, ‘Train No.’ & ‘Expected Time of Passage’ to LC Gate. This will also show the ‘Outgoing Private Number’ on ‘Outgoing Private Number Display’ of Station Equipment. ‘Advise Display’ for concerned LC Gate on Station Equipment will also start flashing ‘- -’.

For a Group Message to more than one, Traffic, Interlocked, Normally Open to Road Traffic LC Gates, Station Master shall press ‘Advise Buttons’ of all the concerned LC Gates simultaneously along with ‘Common Button’ for 3 Seconds.

2. On receipt of above messages at LC Gate, ‘Train No.’ & ‘Expected Time of Passage’ will be shown in Main Display and ‘Incoming Private Number’ will be shown flashing on ‘Advise Display’. Audio Message will also start playing at LC Gate Equipment. On Pressing ‘MUTE Button’ by Gateman for 1 Seconds, audio will stop playing. Gateman shall press ‘Advise Button’ along with ‘Common Button’ for 3 seconds. This will automatically generate Private Number and transmit it to Station. This will also show the ‘Outgoing Private Number’ on ‘Outgoing Private Number Display’ of LC Gate Equipment’. ‘Advise Display’ will also become steady.

3. On receipt of this Private Number from LC Gate, it will be shown on ‘Advise Display’ of concerned LC Gate on Station Equipment.

4. On Pressing ‘Clear Button’ along with ‘Common Button’ by Station Master for 1 Seconds, Main Display and ‘Advise Display’ will be cleared.

5. On Pressing ‘Clear Button’ along with ‘Common Button’ by Gateman for 1 Seconds, Main Display and ‘Advise Display’ will be cleared.

----XXXX----
(E) Traffic LC Gate, Non-Interlocked, Normally Closed to Road Traffic

Opening the Gate for Road Traffic

(1) For opening the LC Gate, **Gateman shall press ‘Common Button’ and ‘Open Button’ for 3 Seconds.** This will automatically generate Private Number and transmit it to Station. ‘Open Display’ will start flashing ‘- -’ at LC Gate Equipment. This will also show the ‘Outgoing Private Number’ on ‘Outgoing Private Number Display’ of LC Gate Equipment.

(2) On receipt of this ‘Private Number’ it will be shown flashing on ‘Open Display’ of concerned LC Gate on Station Equipment and Audio Message will also start playing at Station Equipment. **On pressing ‘MUTE Button’ for 1 Second, audio will stop playing. If SM wish to permit Gateman to Open LC Gate to Road Traffic, he shall press ‘Open Button’ of concerned LC Gate alongwith ‘Common Button’ for 3 Seconds.** This will automatically generate Private Number and transmit it to Station to LC Gate. ‘Open Display’ for concerned LC Gate will also become Steady. This will also show the ‘Outgoing Private Number’ on ‘Outgoing Private Number Display’ of Station Equipment.

(3) On receipt of above message from Station, Private Number will be shown in ‘Open Display’. This will authorize the Gateman to open the LC Gate for Road Traffic.

Closing the Gate for Road Traffic

(4) After Closing the Gate, **Gateman shall press ‘Common Button’ and ‘Close Button’ for 3 Seconds.** This will automatically generate Private Number and transmit it to Station. ‘Close Display’ on LC Gate Equipment will also start flashing ‘- -’. This will also show the ‘Outgoing Private Number’ on ‘Outgoing Private Number Display’ of LC Gate Equipment.

(5) On receipt of this message at Station Equipment, ‘Incoming Private Number’ will be shown flashing on ‘Close Display’ of concerned LC Gate and Audio Message will also start playing. **On pressing ‘MUTE Button’ by Station Master for 1 Seconds, audio will stop playing. Station Master shall press ‘Close Button’ of concerned LC Gate alongwith ‘Common Button’ for 3 Seconds.** This will automatically generate Private Number and transmit it to concerned LC Gate. ‘Close Display’ for concerned LC Gate will become steady. This will also show the ‘Outgoing Private Number’ on ‘Outgoing Private Number Display’ of Station Equipment.

(6) On receipt of this Private Number from Station Master, it will be shown in ‘Close Display’ of LC Gate Equipment.

(7) **On Pressing ‘Clear Button’ alongwith ‘Common Button’ by Station Master for 1 Seconds, ‘Close Display’ & ‘Open Display’ will be cleared.**

(8) **On Pressing ‘Clear Button’ alongwith ‘Common Button’ by Gateman for 1 Seconds, ‘Close Display’ & ‘Open Display’ will be cleared.**
1.0 GENERAL REQUIREMENTS OF TELEPHONE INSTRUMENTS:

1.1 The Telephone Instrument provided with Station Control Equipment will be called Station Telephone and Telephone Instrument provided with Gate Control Equipment will be called Gate Telephone.

1.2 Station Telephone and Gate Telephone shall work in Master-Slave Mode, with Station Telephone as Master and Gate Telephone as Slave.

1.3 Station Telephone shall have the facility to call individually any of the LC Gates by pressing the corresponding Push Button switch designated for a particular LC Gate Telephone. LC Gates which are not called by Station Master should neither be able to listen nor talk.

Station Telephone shall also have the facility to call collectively all the gates by ‘ALL CALL’ Push Button. On pressing this button, a general ring will go to all the Gate Telephones simultaneously. For imparting certain common instruction simultaneously or for conference purposes this ALL CALL general ring will be used.

In addition to these Push Buttons, Station Telephone shall have another Push Button ‘DISCONNECT’ for disconnecting the Gate Telephone(s). When this switch is pressed, all the Gate Telephone(s) connected in the circuit will be deactivated and speech will not be through to and from those Gate Telephone(s).

1.4 Gate Telephone will have the facility to send an indication to the Station Telephone that it wants to talk to the Station Master. The Gate Telephone will have only one Push Button by pressing which it will draw the attention of the Station Master.

1.5 DTMF Codes for above activities are given below. These Two-Digit DTMF Codes shall be generated by pressing Single Push Button or by an action of Handset. Duration of Code will be as per \(200 \pm 50\) ms(Presence Time), \(100 \pm 50\) ms(Absence Time).

(a) DTMF Codes generated by Master Telephone when it presses Gate Telephone Buttons.

| Master presses Gate Telephone Up 1 | 21 |
| Master presses Gate Telephone Dn 1 | 22 |
| Master presses Gate Telephone Up 2 | 23 |
| Master presses Gate Telephone Dn 2 | 24 |
| Master presses Gate Telephone Up 3 | 25 |
| Master presses Gate Telephone Dn 3 | 26 |
| Master presses Gate Telephone Up 4 | 27 |
| Master presses Gate Telephone Dn 4 | 28 |

(b) DTMF Codes generated by Gate Telephones when they call Master Telephone.

| Gate Telephone Up 1 Calls Master Tel | 31 |
Gate Telephone Dn 1 Calls Master Tel 32
Gate Telephone Up 2 Calls Master Tel 33
Gate Telephone Dn 2 Calls Master Tel 34
Gate Telephone Up 3 Calls Master Tel 35
Gate Telephone Dn 3 Calls Master Tel 36
Gate Telephone Up 4 Calls Master Tel 37
Gate Telephone Dn 4 Calls Master Tel 38

(c) DTMF Codes generated by Gate Telephones when Gate Telephone Handset is put down

|Gate Telephone Up 1 puts down its Handset| 51 |
|Gate Telephone Dn 1 puts down its Handset| 52 |
|Gate Telephone Up 2 puts down its Handset| 53 |
|Gate Telephone Dn 2 puts down its Handset| 54 |
|Gate Telephone Up 3 puts down its Handset| 55 |
|Gate Telephone Dn 3 puts down its Handset| 56 |
|Gate Telephone Up 4 puts down its Handset| 57 |
|Gate Telephone Dn 4 puts down its Handset| 58 |

(d) When Master Telephone Press ALL CALL Switch, DTMF Code Generated is 88.

(e) When Master Telephone Press DISCONNECT Switch, DTMF Code Generated is 99.

1.6 The Station Telephone and Gate Telephone shall permit working of Voice Communication and Signaling on 2-Wire Omnibus Circuit.

1.7 It shall be possible to send the signaling code even when two or more parties are in conversation.

1.9 AUDIO-VISUAL INDICATIONS:

1.9.1 Master Telephone:

|Power ON LED| Power ON LED is of Green colour and will glow when handset of the telephone is lifted. This LED is to be fixed on the right hand side of the telephone. |
|Calling Indications:| Eight Red colored LEDs will be provided near the eight Calling push switches. Gate telephone numbers shall be suitably printed to designate the push switch and the LED. When a Gateman calls Station Master by pressing the CALL ASM switch, the corresponding LED in Master Telephone will blink, as well as a piezo buzzer will sound. This blinking LED will glow steadily when master presses the corresponding push switch. This LED will also glow steadily when Master calls some gate by pressing the corresponding switch. These LEDs will go OFF when “Disconnect” switch is pressed. |
A piezo buzzer will also sound when it is being called by the gate telephone and it should generate an interrupted / musical sound.

1.9.2 **Gate Telephone** :

<table>
<thead>
<tr>
<th><strong>Power ON LED</strong></th>
<th>This is of Green color and will glow when handset of the telephone is lifted. This is to be fixed on the right hand side of the telephone.</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Calling Indications</strong></td>
<td>A Red colour LED will be in the left side of the telephone. This LED will glow when Master calls the Gate. This LED will go OFF when the handset of the telephone is lifted. The LED will glow and Piezo Buzzer will also sound both in ON hook and OFF hook condition.</td>
</tr>
<tr>
<td><strong>Ring back Tone</strong></td>
<td>Ring Back Tone (RBT) will be sent back to the Master Telephone when a Gate Telephone Rings. The level of RBT at the Gate Telephone output point will be more than –12 dBm.</td>
</tr>
</tbody>
</table>

2.0 **TECHNICAL REQUIREMENTS OF TELEPHONE INSTRUMENTS:**

2.1 The telephone shall be protected from Surge and Transients by using “GDT”, “PTC” “MOVR” and Inductor based surge protection system.

2.2 The receiver of the telephone instrument shall be protected from acoustic shocks by providing two rectifiers in parallel and with opposite polarity across the receiver.

2.3 Workmanship should conform to good engineering practice so as to ensure that the instrument is free from defects, rust, cracks and other defects that could impair the operation or serviceability while in use or under storage. The treatment and finishes shall be such that under operating conditions, no deterioration occurs to any of the parts.

2.4 All the components, switches, connectors etc., shall be of High Quality/Industrial Grade/CACT Approved Type and should be procured from renowned manufacturer. The components should be freely available in the market. All the numbers of components should be clearly indicated. The LED indicators wherever used shall be of superior quality wide angle with metallic holders. The component type numbers shall not be defaced.

2.5 The layout of components and wiring shall be such that all parts are easily accessible for inspection, repair and replacement.

2.6 The Master and Gate Telephones should work properly from individual DC Power source of 12 V DC ± 20%.

2.7 Unless permitted and activated by the Master, “Gate to Master” or “Gate to Gate” or “Master to Gate” conversation is not possible. Only when Master presses a particular key designated for a particular Gate, that Gate Telephone will be activated for conversation.
2.8 Only when Master presses two or more Gate switches, those Gates are activated and will be able to converse to the Master as well as between them. The activated Gate Telephone will remain activated for conversation even if the handset of the master telephone is placed on the hook so that conversation between the Gate Telephones can continue. The Gate Telephone will be disconnected and Indicating LED on Master telephone meant for that particular Gate Telephone will go OFF, when the handset of that particular Gate Telephone is placed on the hook.

2.9 In Telephone Mode, all the 9 Telephones connected as per Figure-1 should work from this Single Power Source and no separate Power supply will be provided at the Gates.

2.10 When in Telephone Mode, and available voltage at a Gate Telephone is less than 9.6 Volt at the time of All Call Ringing(due to Longer Distance or due to High Conductor Loop Resistance or due to Location of other Telephones), this Gate Telephones should work satisfactorily with individual Power Supply arrangement of 12 V DC+20%.

2.11 Current consumption by the telephones at 12 V DC shall not be more than the limits mentioned below:

For Master Telephone:
- 15 mA in idle condition.
- 200 mA during ring with all 8 LEDs glowing.
- 40 mA during speech condition

For Slave Telephone:
- 15 mA in idle condition.
- 35 mA during ring
- 25 mA during speech condition.

3.0 CONSTRUCTION AND MATERIALS

3.1 The body of the telephone instrument shall be made of ABS (Acrylonitrile Butadiene Styrene) Plastic material.

3.2 The Handset when resting on the cradle of completely assembled telephone shall push the plunger(s) down to the limits of travel. The plunger(s) shall be free and shall not stick. The plunger(s) lifting spring shall be tensioned to give a positive action. Handset of the Telephone when ON Hook or OFF Hook shall operate the Cradle Switch Mechanism, which shall be checked electrically.

3.3 Piezo Electric Buzzer operating at suitable voltage generated internally by the circuitry shall be provided. Buzzer of proper size shall be fixed inside the telephone body firmly. Suitable holes or grills should be available in the body of the telephone instrument for audibility of sound from piezo electric buzzer.
3.4 Standard DTMF Tone Generator shall be provided to produce DTMF tones. It shall be possible to assign any code to a Gate telephone (Slave telephones) using ‘DIP’ switches.

3.5 Standard DTMF decoder shall be provided. On receipt of the valid code/tone, it shall be decoded and Piezo electric buzzer & LED shall be activated when the handset of the telephone is ON or OFF the cradle.

3.6 The wiring shall normally be by means of coloured PVC insulated multi strand flexible wire of good quality and of suitable size.

3.7 Glass Epoxy PCB of minimum 1.6mm thickness shall only be used. The PCB shall be coated with epoxy based anti fungal varnish to provide protection against dust, humidity, fungal infection and mechanical abuses.

3.8 The wiring to the components shall be provided with sufficient slack to permit the components to be swung clear of the assembly without any disconnection.

3.9 **Transformer:** Ferrite Material shall be used for core so as to obtain required Electrical Properties. Manufacturer shall provide documentary evidence for use of Ferrite Material. The complete winding shall be protected by proper insulation to avoid ingress of moisture.

4.0 **ELECTRICAL CHARACTERISTICS:**

4.1 Electrical Circuit of the Telephone Instrument shall provide good matching between Line and the Instrument with minimum Sidetone.

4.2 The output of the Code Generator shall be adjustable from 0 dBm to –7dBm when measured across 600 Ohm resistance connected across Line Terminals L1 and L2.

4.3 It shall be possible to work the Signaling System with a minimum input level of -25 dBm at the Line Terminals with the Line S/N ratio of 15. The Telephone shall work satisfactorily for input level of -25dBm to –2dBm.

4.4 One Station Telephone and Eight Gate Telephones are connected together through an artificial line with distributed loop resistance as shown in Figure below and it should be possible to call and get ring on all the Gate Telephones. Speech quality should be good.