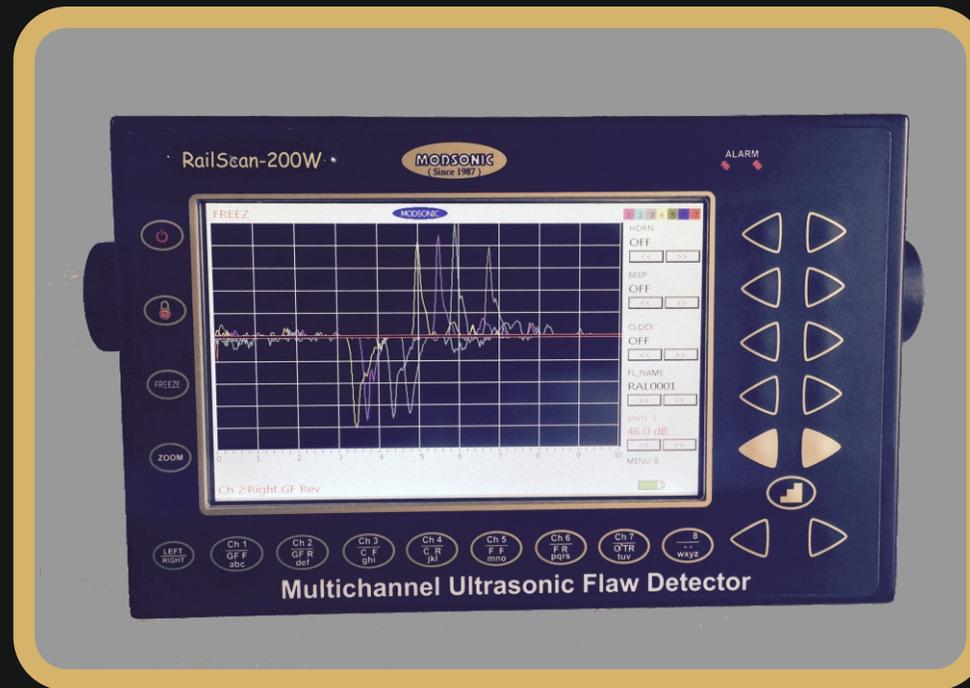


**MODSONIC**  
(Since 1987)

Simplifying NDT

# RailScan-200W

Operating Manual



**MODSONIC INSTRUMENTS MFG. CO.(P) LTD.**  
Ahmedabad INDIA.  
[www.modsonic.com](http://www.modsonic.com)

**RailScan-200W Operating Manual**

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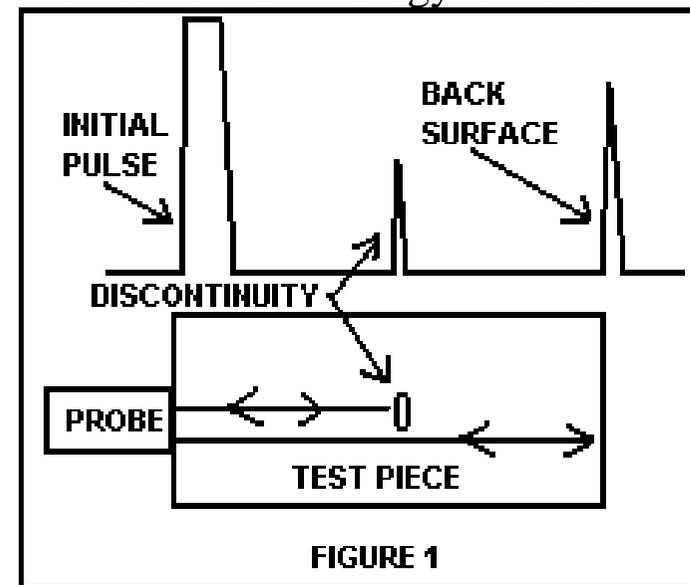
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## **1 Introducing RailScan-200W**

RailScan-200W is a portable, compact, light in weight and user friendly Multi Channel Digital Ultrasonic Flaw Detector. RailScan-200W has COLOR LCD display, it provides wide viewing angle and allows fast scanning speed. Fully charged battery gives continuous working of eight hours and charging time is just 5 to 5 ½ hours. Trace pattern can be stored in internal Memory or on USB pen Drive.

## 2 How does an Ultrasonic Flaw detector Work

RailScan-200W is a 14 channel Ultrasonic-testing instrument used for the inspection of homogeneous material for the presence of inclusions, porosity and other discontinuities that could affect the performance of material and components. It can also be used for thickness gauging of homogeneous material, requiring access from only one side of the test piece. High frequency sound (Ultrasonic sound) waves are introduced into the test material/part from a transducer/probe that is usually coupled to the test piece by water or other suitable coupling liquid. The transducer converts electric signals to Ultrasound and vice versa. A short burst of Ultrasound is introduced into test material so some or all of the energy is reflected by discontinuities. The reflection of the ultrasound energy is a function of the ratio between the acoustic impedance of the discontinuity and the base material. The greater the impedance ratio the more sound energy will be reflected. The principle of Ultrasonic testing is shown in fig. 1. It shows the ultrasonic energy generated in the test piece and resultant instrument display. Thickness gauging with RailScan-200W Operates on the principle of the time-of-flight



measurement. This principle utilizes the precise timing of the transit time of a short burst of ultrasound energy, through a material under test. The ultrasound waves travel to the far side of the test piece and reflect back to the transducer/probe and a measurement is obtained.

Basically three typed of transducers/probes are available for different types of applications:

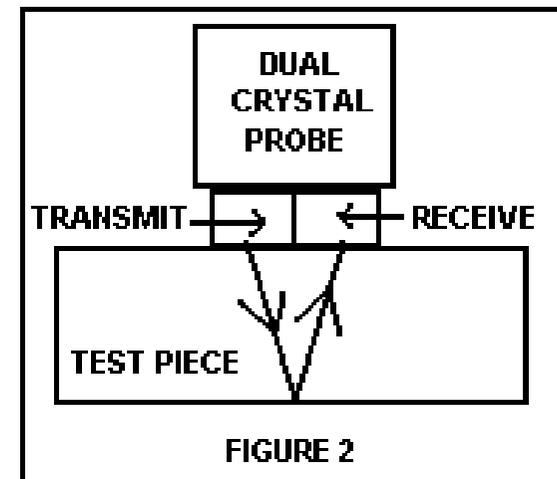
**1> Straight beam Probe (Normal probe)**

**2> TR probe (Dual crystal probe)**

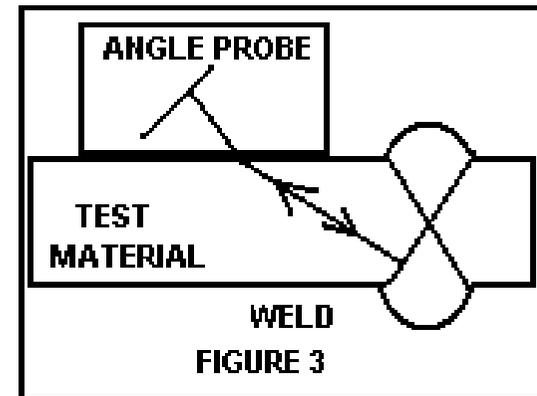
**3> Angle beam Probe**

**1> Straight beam Probe:** This probe introduces ultrasound normal to the test piece surface utilizing longitudinal or compression waves. Normal beam probe is used mostly for flaw detection and thickness gauging (refer figure 1.)

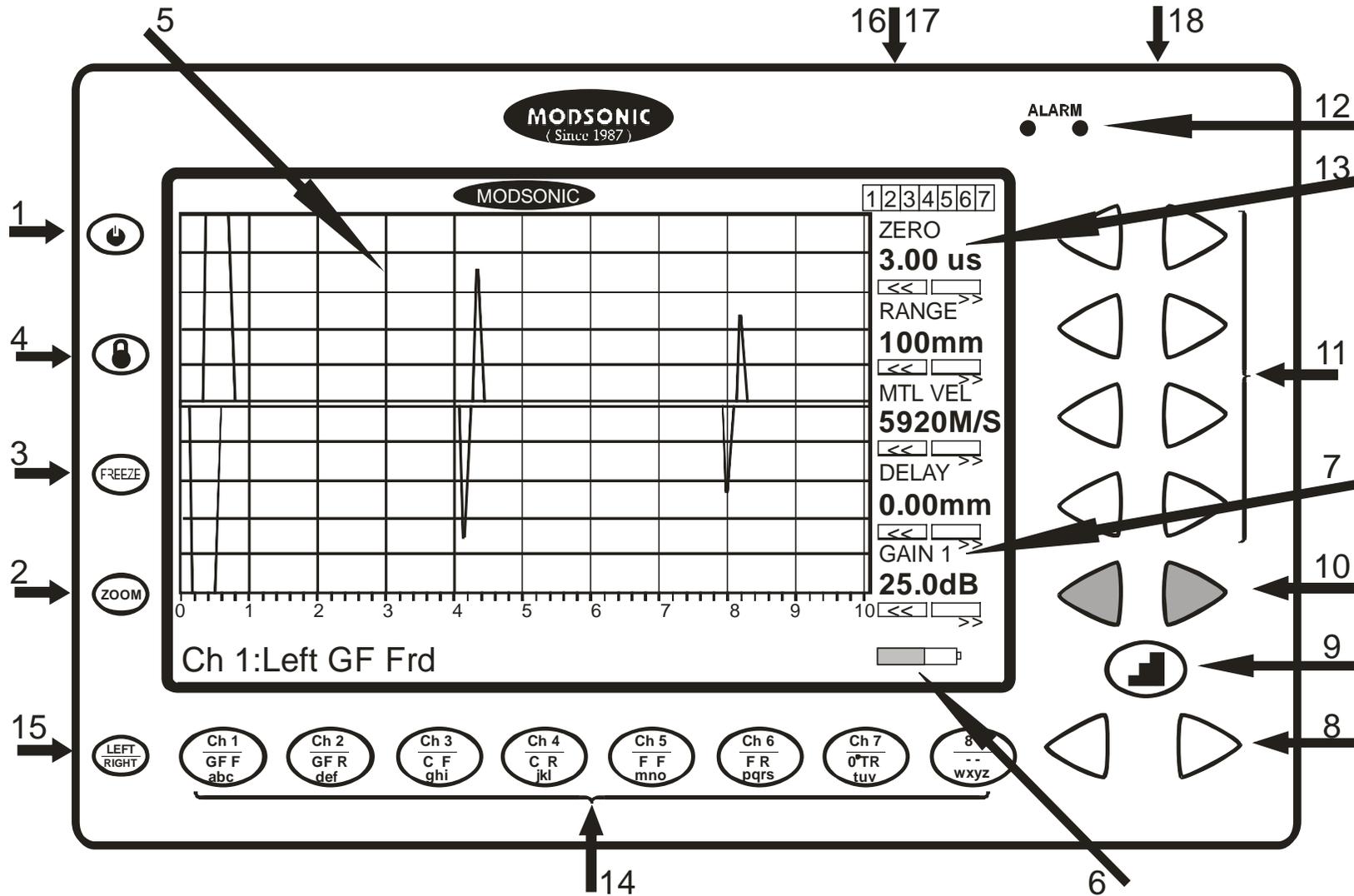
**2> TR probe:** This probe contains separate transmitting and receiving elements as showing in figure 2 usually mounted on delay lines. This design improves near surface resolution by separating the initial pulse from the received echoes. TR probe is suitable for the thickness gauging of pitting and corrosion and also for better surface resolution.



**3> Angle Beam Probe:** This probe introduces ultrasound at an angle to the surface of the test piece. In most angle beam probes, the wave energy is mode converted from a longitudinal wave to a shear wave by the refraction principle. This probe is suitable for inspection of the welds. The reason for this is its ability to position the transducer/probe away from the weld bead yet propagate energy into the weld zone. Another reason to use angle beam testing on the welds is to position the sound beam more normal to the expected discontinuities since the flaws in welds are usually perpendicular to the test piece (except porosity). Figure 3 shows the principle of angled beam weld testing.



### 3 Parts and Controls of RailScan-200W

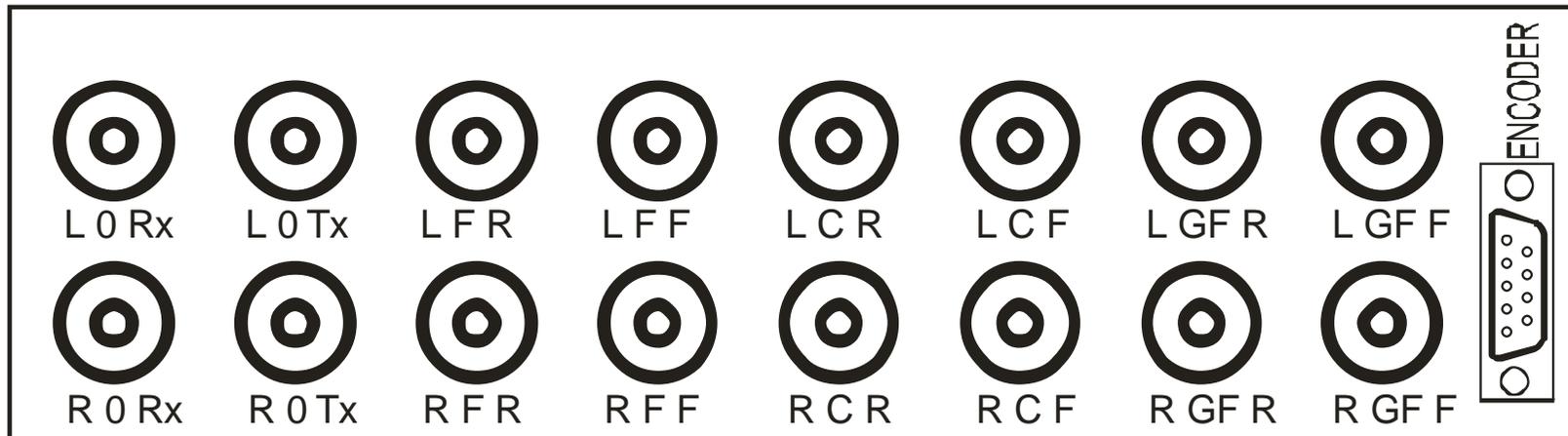


1. POWER key : RailScan-200W can be switched ON and OFF using this key.
2. ZOOM key : By pressing this key only A-Scan of currently selected channel will appear on. By pressing again all channels will be display again.
3. FREEZE key : By pressing this key A-Scan can freeze. By pressing again machine starts normal operation.
4. LOCK key : By pressing this key all function (keys) gets locked which prevents accidental pressing of any key. To unlock, simultaneously press Step key and LOCK key .
5. LCD Screen : It displays A-Scan Trace pattern and Menu Parameters.
6. Battery Status : When all the three cells are displayed empty, then the battery Indicator needs to be recharged.
7. Gain Step : This location displays Gain Step value. This value can be changed by pressing Step Key and Gain up/down key simultaneously. It follows 0.5, 1, 2, 6, and 14 dB Step sequence.
8. Menu keys : By using these keys the Menu can be changed.
9. Hot key : When this key is pressed simultaneously with any other parameter Step Key key then the change in value takes place in coarse steps.

10. GAIN UP/DN : Gain can be incremented/decremented using these keys in the step selected by dB STEP key.
11. UP/DN key : Respective parameters can be incremented or decremented using these keys.
12. MONTOR LED : It is visual indication of MONITOR getting triggered.(LED 1 and LED 2 represent Monitor Gage 1 and Gate 2 respective.)
13. Parameter Values : All function (parameter) values are displayed in this area of LCD.
14. Channel Keys : By pressing appropriate key channels gets selected to Set/adjust parameter of the channel.
15. LEFT/RIGHT : By pressing this key Left side or Right side channel group Selected.
16. Charge Connector: Used to charge the Battery or to operate machine using supplied charger.
17. USB Connector: Used for transferring data from machine to USB pen Drive.
18. Battery Compartment : Battery is fitted in this compartment.
19. Encoder Connector: D-Sub 9 pin connecter located at back side of the machine. Encoder cable to be connect on this connector.

20. BNC Connectors : BNC connectors located at back side of the machine.  
 Ultrasonic Probe cables to be connect on these connectors.

**Back Side Connector Detail**



“L” Stands for Left Side, “R” Stands for Right Side,  
**0 Rx** Normal Probe Receiver                      **0 Tx** Normal Probe Transmitter  
**F F** Field Face (Non Gauge) Forward            **F R** Field Face (Non Gauge) Reverse  
**C F** Center Forward                                    **C R** Center Reverse  
**GF F** Gauge Face Forward                        **GF R** Gauge Face Reverse

## 4 Operation detail

**Display and Channel Selection** This equipment is 14 channel so A-Scan of the Left side seven channel will appear on Top half and A-Scan of Right side seven Channel will appear in bottom half in inverted mode normally. There is seven different color for each channel so it can be easily identified by the operator. For the identification A-Scan color/channel, Color Bar with channel number is displayed above the Menu Bar.

If operator wants to see particularly one channel then press ZOOM key so A-Scan of the currently selected channel will be display on LCD. To view all channel press again ZOOM key.

To Adjust parameter of the any channel like Range, Velocity etc first select appropriate channel by pressing channel number/name Key and then adjust parameter value as required.

Switch over from Left side to Right side or Right side to Left side press “LEFT/RIGHT” key.

RailScan-200W is user friendly, menu driven Ultrasonic Flaw Detector. To access any parameter, various menus are available. Details of all menus and parameters are as per below. **First menu** is Basic menu. In this menu, Basic functions of an Ultrasonic Flaw Detector (UFD) like Range, Fine Range, Delay and Gain functions are covered.

ZERO 2200	ZERO : It is to calibrate Artificial zero of the probe.
RANGE 0100 MM	RANGE : The required test range can be set directly in terms of mm The range available for steel is from 50 to 600 mm By pressing step key coarse adjustment of Range is also possible
VEL M/S 5920	VELOCITY : The required velocity can be set directly in terms of met./Sec. By pressing hot key it steps through preset value.
DELAY 000.0MM	DELAY : Partial Range can be set using these keys.
GAIN 1 25.0 dB	Gain Step: Gain step value can be set pressing hot key and Gain UP/DN key simultaneously, it follows dB in steps of 0.5, 1, 2, 6, and 14 dB. GAIN : Gain can be increased/decreased as per value of step by using GAIN UP/DN keys.

**Example: RailScan-200W is to be calibrated for 100 mm Test Range using Single crystal (Normal) probe.**

- > Set required range to 100 mm using RANGE UP/DN keys.
- > Couple the probe on 25mm thickness of V1 reference block and set first echo at 25mm using ZERO UP/DN keys.
- > Set 4<sup>th</sup> echo at 100 mm using VELOCITY UP/DN keys, if required.
- > Repeat above two steps until both the echoes are at their respective positions.
- > Amplitudes of the echoes can be varied using GAIN keys.

**Second Menu** covers MONITOR GATE 1 functions.

GATE a OFF
STARTa 0030.0
WIDTHa 0100.0
LEVELa 040 %
GAIN 1 25.0 dB

GATE a : Gate can be changed to PLOGIC, NLOGIC or OFF.

PLOGIC : When PLOGIC is selected, the MONITOR is triggered if an echo is present within the gate and its height is equal to or crosses the set Threshold Level.

NLOGIC : When NLOGIC is selected, the MONITOR is triggered if there is no echo within the gate or the height is lower than the Threshold Level.

STARTa : Gate starting position can be set using START UP/DN keys. Using these keys Gate start can be directly set in terms of mm.

WIDTHa : Gate End position can be set using END UP/DN keys. Using these keys Gate width can be directly set in terms of mm.

LEVELa : Gate Threshold Level can be directly set in terms of the percentage of the Full Scale Height (FSH).

Example: **The MONITOR to be triggered when any echo crosses the 50% FSH between 35mm and 80mm.**

- > In the Gate setting, select PLOGIC using GATE UP/DN keys.
- > Set Gate START to 35mm using START UP/DN keys.
- > Set Gate END to 80mm using END UP/DN keys.
- > Set Gate LEVEL to 50% using LEVEL UP/DN keys.

**Third Menu** covers MONITOR GATE 2 functions.

GATEb OFF
STARTb 0040.0
WIDTHb 0100.0
LEVEL 050 %
GAIN 1 25.0 dB

GATE b : Gate can be ch --13-- PLOGIC, NLOGIC, or OFF.

PLOGIC : When PLOC --13-- elected, the MONITOR is triggered if an echo is present within the gate and its height crosses the set Threshold Level.

NLOGIC: When NLOGIC is selected, the MONITOR is triggered if there is no echo within the gate or the height is lower than the Threshold Level.

STARTb : Gate starting position can be set using START UP/DN keys. Using these keys, Gate start can be directly set in terms of mm.

WIDTHb: Gate width can be set using END UP/DN keys. Using these keys, Gate width can be directly set in terms of mm.

LEVELb : Gate Threshold Level can be directly set in terms of the percentage of the Full Scale Height (FSH).

**Forth Menu** covers Memory storage/recall and Trace printout functions.

MEMORY A SCAN	MEMORY : Memory function can be selected A SCAN or SET-UP using MEMORY UP/DN keys.
MEM NO* 001	MEM NO : Desired memory location can be selected using MEM NO UP/DN keys. When changing Memory no. If Data is stored and valid then asterisk (“*”) will be displayed next to “MEM NO”.
ACTION RECALL	ACTION : Required functions like RECALL,SAVE,DETAIL, DELETE, COPY,CPY ALL or SETUP D can be selected using ACTION UP/DN keys. When DETAIL is selected it shows Note data of Stored A Scan. When SETUP D is selected it shows Calibration Setup data on LCD
NOTE ENTER	
GAIN 1 25.0 dB	ENTER :By pressing Right key of the ENTER, the ACTION selected is performed. On pressing Left key Note menu will displayed and Side text menu will be change for Text editing as per shown. If required then edit/change Note detail. By pressing appropriate keys. Note can be edited. For exit press Exit UP/DN keys.

Machine Sr No: DEMO1 Op. Name/Code: ABC Division.....: XYZ Km. Post.....: 12 34 Section.....: WR Rail-LH/RH.....: LH Road- Up/Dn....: Dn Location of defect: Head Rolling Mark.....: Forward Probe Type.....: L FR 70 Flaw Code.....: OMR Peak details.....: XYZ Defect Class.....: OBS OBS / IMR/OBSW/IMRW Previ Def Class...: IMR Remark.....: TESTED OK	LINE
	UP/DN
	CURSOR
	MOVE
	ACTION
	RECALL
	NOTE
	EXIT
	GAIN 1
	25.0 dB

Example: **To SAVE current Calibration Set-Ups to Memory no 2.**

- > Calibrate/Set parameters of the machine as per required
- > Set MEMORY to SET-UP using MEMORY UP/DN keys.
- > Set MEM NO to 2 using MEM NO UP/DN keys.
- > Set ACTION to SAVE using ACTION UP/DN keys.

> Press Right side key of <NOTE/ENTER key so current Calibration data gets stored at Memory no 2 and “\*” will appear next to the Memory number to indicate data is stored successfully. “\*” next to MEM NO indicates data is stored in this MEM NO.

**Example: To SAVE current Calibration and A scan in Memory no 3.**

- > Get required pattern which to be stored. Press FREEZE key.
- > Select A SCAN using Memory UP/DN keys.
- > Set MEM NO to 3 using MEM NO UP/DN keys.
- > Set ACTION to SAVE using ACTION UP/DN keys.

Then press NOTE/ENTER Left key so Note menu will be displayed. If required then edit it and exit from note menu.

- > Then press NOTE/ENTER Right key to store A Scan. By pressing Right key Current Calibration, A Scan pattern and Note DATA will be stored UP/DN key to store the current calibration set-up at memory no. 3.

**Edit/Enter Note Data**

In the Memory Menu Press Left Key of “<NOTE/ENTER” key so Note data will display as per below.

Machine Sr No: DEMO1 Op. Name/Code: ABC Division.....: XYZ Km. Post.....: 12 34 Section.....: WR Rail-LH/RH.....: LH Road- Up/Dn....: Dn Location of defect: Head Rolling Mark.....: Forward Probe Type.....: L FR 70 Flaw Code.....: OMR Peak details.....: XYZ Defect Class.....: OBS OBS / IMR/OBSW/IMRW Previ Def Class...: IMR Remark.....: TESTED OK	LINE
	UP/DN
	CURSOR
	MOVE
	ACTION
	RECALL
	NOTE
	EXIT
	GAIN 1
	25.0 dB

**Note Data entry** To write data in the Data field like Operator etc

- >> By Pressing Line UP/DN key cursor can be move to other data field/line as per required.
- >> By Pressing CURSOR Move Up/Dn key cursor position can be move as per required.
- >> By pressing Channels key appropriate character can be inserted at cursor position
- >> Using Menu DN key special character can be inserted.
- >> Menu UP work as a backspace key to delete character at cursor position.
- >> LEFT/RIGHT key used for selection of Uppercase/lower case alphabets.

>> To Exit from Report Data entry press NOTE/EXIT right key.

**To Display NOTE data of stored memory location follow below step**

>> Select appropriate Mem no

>> Set ACTION to DETAIL so Note data will be gets display on Screen of selected MEM NO.

**To copy Stored A-scan data to USB Pen Drive**

>> Insert USB Pen drive in USB connector.

>> Select appropriate Mem No.

>> Set ACTION to “COPY”.

>> Press Right key of <NOTE/ENTER Up/Dn key so currently selected Memory number A-Scan data gets copy into USB pen Drive.

**To copy All A-scan data to USB Pen Drive**

>> Insert USB Pen drive in USB connector.

>> Select appropriate Mem No.

>> Set ACTION to “CPY ALL”.

>> Press Right key of <NOTE/ENTER Up/Dn key so currently selected Memory number A-Scan data gets copy into USB pen Drive.

**Note:** If data is already stored at Memory NO, then the message will be displayed on LCD screen as “OVER WRITE DATA” “YES - PRESS HOT KEY”, “NO – PRESS ANY KEY”. So press HOT KEY to overwrite data.

### **To Delete A-scan data/Set-Up data**

- > Set MEMORY to ASCAN/SET-UP as required using MEMORY UP/DN keys.
- > Set MEM NO to appropriate no using MEM NO UP/DN keys.
- > Set ACTION to DELETE using ACTION UP/DN keys.
- >> Press Right key of <NOTE/ENTER Up/Dn key so currently selected Memory number ASCAN/SET-UP data gets deleted.

### **To Store A-Scan data directly on USB pen Drive**

To Store A-Scan Data directly on USB pen drive.

- >> In the Memory menu set MEMORY to ASCAN
- >> Decrement MEM NO below 1 number so “USB DSK” will appear.
- >> Select ACTION to SAVE and then press <NOTE/ENTER Up key so A-Scan of currently active channel gets stored in the USB pen drive with file name selected in FL\_NAME. (refer Menu Eight for more details).

### To Display all channel data

>> In the Memory Menu set ACTION to SETUP D using per up/down key.

>> So setting of the all channels will be get display on the LCD.

>> To remove Setup data display from the screen change setting in the ACTION to other then the “SETUP D”.

### SETUP Data Display

CHANNEL	GAIN	DELAY	RANGE	REJ	GST_A	GWD_A	GTH_A	GST_B	GWD_B	GTH_B
CH L1	25.0	0.00	100.0	00	30.0	40.0	30	40.0	50.0	40
CH L2	25.0	0.00	100.0	00	30.0	40.0	30	40.0	50.0	40
CH L3	25.0	0.00	100.0	00	30.0	40.0	30	40.0	50.0	40
CH_L4	25.0	0.00	100.0	00	30.0	40.0	30	40.0	50.0	40
CH L5	25.0	0.00	100.0	00	30.0	40.0	30	40.0	50.0	40
CH L6	25.0	0.00	100.0	00	30.0	40.0	30	40.0	50.0	40
CH L7	25.0	0.00	100.0	00	30.0	40.0	30	40.0	50.0	40
CH R1	25.0	0.00	100.0	00	30.0	40.0	30	40.0	50.0	40
CH R2	25.0	0.00	100.0	00	30.0	40.0	30	40.0	50.0	40
CH R3	25.0	0.00	100.0	00	30.0	40.0	30	40.0	50.0	40
CH R4	25.0	0.00	100.0	00	30.0	40.0	30	40.0	50.0	40
CH R5	25.0	0.00	100.0	00	30.0	40.0	30	40.0	50.0	40
CH R6	25.0	0.00	100.0	00	30.0	40.0	30	40.0	50.0	40
CH R7	25.0	0.00	100.0	00	30.0	40.0	30	40.0	50.0	40

**Fifth Menu** covers Rejection of unwanted signal, Set Reference, Video setting and Testing mode selection function.

REJECT 000 %
VIDEO ENVELOP
SET REF OFF
GAIN 1 25.0 dB

**REJECT** : For the rejection of unwanted signals. Using REJECT UP/DN keys Rejection level can be set as per requirement. It can be set directly in terms of percentage of FSH. Rejection will Applied to currently selected channels only.

**VIDEO** : Echo signals can be selected to appear as line (ENVELOP) or solid (FILLED) or ECHO Dynamic using VIDEO UP/DN keys.

In ENVELOP mode, echo signals appear same as in Analog Ultrasonic Flaw Detector.

In FILLED mode, echo signals looks solid for better visibility.

In DYNAMIC mode echo signals gets plotted to show echo dynamic movement and draws envelop.

**SET REF** : To set any A-scan pattern as a reference, achieve reference pattern, then set SET REF ON, so reference pattern sets in background for easy comparison. A-scan Pattern From Memory location can be recalled and set as a reference.

**Sixth Menu** covers Measurement ON/OFF, Background color, Brightness control and Display configuration selection.

MEASURE OFF
BACKCLR BLACK
BRIGHT 50%
DISPLAY TOP/BTM
GAIN 1 25.0 dB

MEASURE: When MEASURE selected to “ON G A” Measurement readings of GateA echo signal display on screen.  
 MEASURE selected to “ON G B” Measurement readings of GateB echo signal display on screen.  
 MEASURE selected to “ON G AB” Measurement readings of Both Gate echo signal display on screen.  
 MEASURE selected to “OFF” Measurement goes off.

BACKCLR : A-Scan area background color BLACK color WHITE color can be selected using BACKCLR Up/Dn keys.

BRIGHT : Brightness of the LCD Display can set using BRIGHT Up/Dn Keys. Less brightness gives more battery operating time.

DISPLAY : Different display configuration gets selected using DISPLAY Up/Dn keys.

In **FULL** mode A-Scan gets display in bigger size and LEFT side echo signal will display in Top half and Right side signal display in Bottom half in inverted with appropriate color.  
 In **TOP/BTM** mode LEFT side echo signal will display in Top half and Right side signal display in Bottom half in inverted with appropriate color in addition to that there is some space so Graduation, Measurement reading/Encoder position/Clock etc gets display if its selected to ON. In **ALL SUP** mode all A-Scan gets super imposed and gets display like conventional Flaw Detector with different color.

**Seventh Menu** covers settings related to Measurement parameters.

X-OFF OFF	X-OFF : Set X-OFF value to same as Angle probe index point to Front face distance so Surface Distance will be displayed on LCD will be distance from angle probe front face to defect position.
ANGLE 0.0 DEG	ANGLE : Value to be set as per Angle of the probe. If angle value not zero and Measure is set to ON then appropriate Surface and Depth of defect is calculated and display on LCD.
THICK 100.0mm	THICK : Thickness value should be set as per the thickness of the test piece, so as to enable in calculation of depth/distance accounting for multiple skips.
TRIGGER FLANK	TRIGGER: Select Measurement point Weather trigger by FLANK or on PEAK
GAIN 1 25.0 dB	

**Example: To measure Beam path, Surface and Depth distance when 70 deg. probe is used.**

> Go to GATE a menu and make Gate to PLOGIC/NLOGIC.

- > Set Gate START and Gate END value in such a way so defect signal within the GATE.
- > Set Gain or Threshold so height of the echo/defect beyond the GATE.
- > Go to measure menu and set MEASURE to “ON G A” so measurement reading like Sound path, Depth and Surface distance Echo Amplitude will be displayed on screen.
- > Set angle value to 70 DEG. using ANGLE UP/DN keys.
- > Set appropriate THICK value so it can account multiple skips for DEPTH distance calculation.

**Eighth menu** covers Horn, BEEP, Clock, File Name settings

HORN OFF	HORN : Horn can be switched ON or OFF using HORN UP/DN keys. When HORN is switched ON, then it gives out an audible alarm each time MONITOR is triggered.
BEEP OFF	BEEP : Key press will be acknowledge by sound if BEEP is selected to ON. Otherwise it will not give beep sound when set to OFF.
CLOCK OFF	CLOCK : Clock can be switched ON or OFF using CLOCK UP/DN keys. If CLOCK is set to ON then date and time will be displayed at bottom of A-Scan.
FL_NAME RAL0001	FL_NAME : USB File Name. If operator wants to store A-Scan data directly on the USB Pen Drive then A-Scan data will be gets stored with this File Name “RALXXXX”. Operator can set last four digits by pressing FL_NAME Up/Dn keys.
GAIN 1 25.0 dB	

To Store A-Scan Data directly on USB pen drive goto memory menu and set MEMORY to ASCAN and then decrement MEM NO below 1 number so “USB DSK” will appear then select ACTION to SAVE and then press <NOTE/ENTER Up key so A-Scan of currently active channel gets stored in the USB pen drive with file name selected in FL\_NAME.

**Ninth Menu** covers setting of the Encoder parameters.

ENCODER PAUSE
CAL FAC 1000
ST POS 00100
GAIN 1 25.0 dB

**ENCODER** : When Encoder is selected to ON then it current position of trolley gets display. When Encoder selected to PAUSE then Increment/Decrement of position will not take place and reading also not get display on screen. During lifting of trolley if Encoder Switched to PAUSE then encoder position reading will not get change and when trolley put again on the rail at proper location and if operator switches ENCODER to ON then machine will starts counting position onwards from where it was switched paused.

To Reset encoder to Zero Press Step key and keep it press and select Encoder to ON so Encoder position will gets set to Zero.

**CAL FAC** : Used for calibration of Encoder.

**ST POS** : Starting Position. Set start position value to as per testing starts so this starting position value will display in A-Scan final report for records.

**To Calibrate Encoder follow below steps.**

- >> Reset Encoder position to Zero. (refer above procedure)
- >> Move Trolley for the known Distance (5 meter or more. More travel distance gives more accuracy)

>> Chang CAL FAC values using CAL FAC Up/Dn keys so Encoder position values gets change. Using appropriate CAL FAC Up/Dn key bring/set Encoder position readings to Actual Travel Distance. Note Down this value and check/set before starting of the testing

## 5. Calibration for Rail Testing

For the test Range settings and sensitivity setting below Items are required.

- a>> DRT Trolley, Main equipment with and Adequate couplant.
- b>> Probes with Suitable cables.
- c>> IIW x V1 Block.
- d>> Standard defect Rails for the sensitivity settings.
- e>> 50x50x50/60mm block if available.

### **Range calibration of Angle probe channels**

Left and Right Side channel 1 to 6 used for the Angle probe

- >> Select Left Side Channel 1 and Set test Range to 165mm and MTL VEL to 3250 m/s.
- >> Connect 70 deg probe to Left side Channel 1 and couple probe on V1 Block and get Echo from the 100mm arc and maximize the echo signal. If required then set Gain using GAIN Up/Dn keys.
- >> Shift/set Echo position to 6.1 division using ZERO Up/Dn keys.
- >> Repeat above steps for Left side channels 1 to 6 and for Right side channels 1 to 6.

**NOTE:** During SEJ testing when 45 deg angle probe is used then set test Range to 275mm MTL VEL to 3250 and Back-wall echo position at 3.6 division.

**Range Calibration of Normal Probe channels (Zero deg Dual Crystal probe)**

Left and Right Side channel 7 used for the Normal probe

- >> Select Left Side Channel 7 and Set test Range to 200 mm and MTL VEL to 5920 m/s.
- >> Connect Normal probe to Left side Channel 7 and couple probe on 50mm Thick side of 50x50x50/60mm Block and get Back-wall Echo. If required then set Gain using GAIN Up/Dn keys.
- >> Shift/set first reflecting Back-wall Echo position to 2.5 divisions using ZERO Up/Dn keys.
- >> Repeat above steps for Right side channels 7.

NOTE: If 50x50x50/60mm block is not available then use V1 block and couple probe on 25mm thick side of V1 block and consider second Back-wall echo and set it to 2.5 divisions.

Save the calibration Set-up to appropriate Memory Location.

**Sensitivity Setting of Angle Probe channels**

- >> Mount all probes in the Trolley and connect appropriate cables to the probes and main equipment. Make sure probe to be fitted in a such way so probe gets properly coupled on the rail and there is minimum gap between Rail and probe surface to avoid wearing of the probe face.

- >> Place trolley on the Sensitivity setting block and start couplant.
  - >> Disengage and move down the probe holder mechanism of both side.
  - >> Move the Trolley and bring the Left side Gauge Face Forward probe appropriate location so echo from the 5mm FBH and Back-wall echo gets display on the screen.
  - >> Set the gain so appropriate echo signal with sufficient height gets display on screen.
  - >> Move Trolley Backward Forward and Maximize the 5mm FBH echo signal and then set its amplitude to 60% using GAIN Up/Dn keys.
  - >> Repeat above steps by selecting LEFT and Right side channels 1 to 6.
- Note:** For the Center probe Left/Right channel 3 and 4 get echo from the 12mm SDH hole.

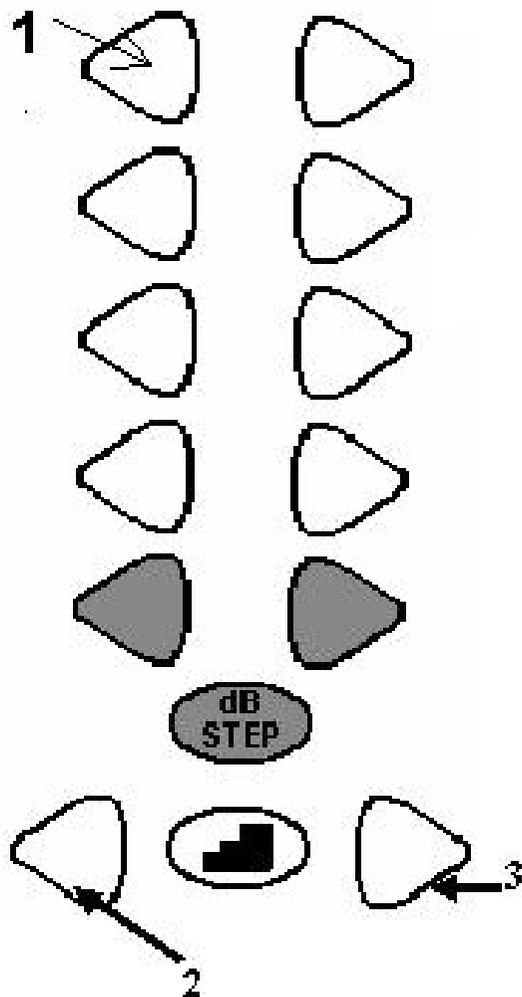
### **Sensitivity Setting of Normal Probe channels**

- >> Select Left side channel 7 and then bring Normal probe on the Rail so back-wall echo display on the screen.
- >> Move Trolley Backward Forward and check proper coupling of the probe.
- >> Set the Back-wall signal height to 100% using GAIN Up/Dn keys.

Save the calibration Set-up to appropriate Memory Location.

**6. Setting of time** Keep key 1 press and switch ON RailScan-200W. After display of menu Parameter, release key 1 and again press key 1 so Time setting menu will be displayed.

Now set required Time/Data by pressing UP/DN parameter key. Then press key 2 for to store/set current time to value set as per display. Press key 3 to exit without store/set current time.



## 7. Power Supply

RailScan-200W is powered by a Lithium-Ion battery pack ATB1, which is fitted in RailScan-200W using two screws. It electrically connects to RailScan-200W via two internal terminal contact points. With fully charged battery pack ATB 1, RailScan-200W can operate continuously for eight hours, under typical operating conditions. The battery pack ATB 1 can be charged when inside RailScan-200W by connecting Battery charger ATC 1 to the connector. Alternatively, the battery pack ATB 1 can be charged outside RailScan-200W which allows uninterrupted use of RailScan-200W using multiple battery packs.

### Battery Charging

The battery Charger ATC 1 supplied with RailScan-200W is a special quick-charge charger. The charging time is just 5 to 5 ½ hours. ATC 1 battery charger is suitable for use with mains supply from 100 to 240 volts AC/50 Hz. The LED on charger illuminates to indicate power on. When the battery voltage is low (discharge condition) the LED glows RED. When the battery is almost charged the LED turns to yellow. When the battery is full charged the LED glows green. The output voltage from the charger is 16.4 Volts DC. The charging current is constant at 2.0 Amps.

## 8. Double Rail Tester Trolley

Double Rail Tester Trolley is light in weight , durable and designed for easy operation.

Operator can easily Lift and hold/latch the Probe Holder in up-position when trolley is not in use or during the transporting to avoid damages to the probe and probe holder.

Probe Position of Gauge face side and Non Gage side position can be move laterally to cover the required testing width of track. Encoder is directly fitted on the wheel so there is no any extra mechanism to hold the encoder.

### **Maintenance of Trolley**

- >> Probe holders are moving Up/Dn and moves laterally using the Guide rods so these rods to be cleaned and oil to be applied periodically to avoid any rusting and smooth movement of the internal Bearing.
- >> Probe Tool post moving Up/Dn using the Guide Rails so this Guide rails to be cleaned and oil to applied properly to avoid rusting and smooth movement.
- >> Guide Roller touches to the Track and its rotates during the Testing so oil to be applied periodically to the guide roller to avoid rusting of bearings and smooth rotation of the roller.
- >> Grease to apply to Main Wheels bearings for smooth operation.

## 9. Precaution

- > Avoid shock to the RailScan-200W and probes.
- > Wipe the couplant off the probe and RailScan-200W after use.
- > When battery pack is out-of RailScan-200W, keep battery contacts away from metal object
- > Never heat the battery pack ATB 1 nor throw into a fire.

### **Do's and Don'ts**

- >> Li-Ion batteries don't have Memory Effect (like in Nickel-Cadmium or Nickel-Metal Hydride) but over-charging (excessive charging) must be avoided.
- >> For this ensure that the battery is fully discharged before charging. This must be done at least once in 15 days (This prevents excessive charging).
- >> If machines operated on mains using supplied charger then it would be badly affected due to excessive charging. It is desirable to operate machine on the battery as much as possible.
- >> Don't store in temperature above 55°C.

## Trouble Shootings

>> Machine not getting ON

a> Check Battery voltage it should be above 13.5VDC.

b> Check Battery terminals are ok and there is no any sign of damage.

c> Check working by connecting supplied charger directly to the equipment and if its works ok it means something wrong with Battery or connecting system.

>> Battery not getting charge

a> Check Charger connecting cable and connector.

b> Check output voltage of the Charger be careful during checking and avoid any short-circuit it may damage charger.

>> No echo signal display on Screen of particular channel.

a> Check connecting cable

b> Check by replacing connecting cable and probe also and check again working of the particular channel.

## Frequency Asked Questions

a> Why each parameters required to set separately for each channels?

This is multi channel equipment and to compensate variation in the sensitivity and testing requirement is also different for each channel may also different so as per requirement each channel parameters can adjust separately.

c> Why the velocity setting is different for Angle probe and TR probe?

Angle probe generates share wave in the test object where as TR probe sends longitudinal ultrasonic waves in the test object so appropriate velocity to be set in the equipment.

d> How to identify GATE A and GATE B ?

Starting and ending of the GATE is marked with “>” and “<” where as GATE B Starting and ending of the GATE is marked with “|” and “|”.

e> How to review stored data in the Computer?

Special Software “RailSoft-200W” is provided on the CD with the equipment so install that application programme in the computer and then Run this application and then Open the data files.

f> How to take print out of the stored data/A-scan image?

Copy stored data to USB pen driver and then open stored data in the Computer using “RailSoft-200W” software and then Select File and then select appropriate printer and then give print command.

g> Can user take print out on the Black &White printer?

Yes there is not a specific requirement of the color printer. Data reports gets print on A4 size paper in the single page.

h> How to generate soft report so user can share it ?

Install Acrobat distillatory with help of IT person so after opening data file in the “RailSoft-200W” select that as a printer and then apply print command so PDF file gets generated.

i> How to use/copy some data/A-scan image to the word doc file to make custom report as per requirement?

Open the stored data file in the “RailSoft-200W” software then press “SCREEN PRINT” key of the Keyboard then open Paint programe (Which is part of window operating system Start>> Programe >> Accessories>> Paint” ) then select Paste in the Paint programme so whatever image displayed during press of SCREEEN PRINT will get pasted in the Paint programme then select required appropriate area and copy and paste in word file to make custom report as per user requirement.

## 10 Specification of RailScan-200W

Test Range	: 50 mm to 600mm (in steel). Adjustable in step of 1mm.
Velocity	: 1000 met./sec to 9999 met./sec. In Hot Key mode it has 7 preset values. Fine Mode adjustable in step of 1 met/sec.
Delay	: Variable from 0 to 120 mm.
Gain	: 80dB calibrated gain adjustable in 0.5, 1, 2, 6 or 14 dB step.
Rejection	: 0 to 80%FSH.
Rectification	: Full-wave rectified with filtering.
No of Channel	: Total 14 Channel. (12 Channel Single Crystal and 2 channel Dual Crystal)
Test Modes	: 12 channel Pulse echo and 2 channel Transmit/Receive.
Frequency	: Broad Band amplifier 0.5 MHz. to 10MHz.
Transmitter	:Transmission pulse Negative Square wave
Connectors	: BNC for Ultrasonic Probe connection Total 16 connectors.
Freeze/Peak Freeze	: A-Scan freeze and Peak Freeze available. In Peak freeze it holds echo dynamic pattern which is useful for angle beam probing to locate peak signal.
Monitor	: Dual gate adjustable in 1% of Screen width with Positive/Negative Logic.

- A-Scan memory : 300 Trace Patterns can be stored (with Note/Detail),recalled, or Copy to USB Pen drive.
- Calibration Set-up : 20 different calibration set-ups can be Stored and Recalled.
- Software : RaiSoft Software for Windows base operating system provided to open/review/Print A-Scan report file.
- Display : High brightness Color TFT LCD Display. Display area 800 x 480 pixel (152.4 x 91.44 mm). Seven different color for different channels.
- Screen Configuration : Left side seven channel gets display in top half and Right side seven channel display in bottom half in inverted mode in full Screen or with some space to display measure values on screen or all channel gets display in superimposed.
- Reference A-Scan : Reference A-Scan pattern of standard test object can saved and recalled in the background for easy comparison during testing.
- Digital Readout : Thickness/Depth can be displayed in digital readout when using a normal probe and Sound path, Surface Distance, Depth and Echo heights are directly displayed when angle probe is in use. Measurement point can be selected to be Peak or Flank.
- Measurement Unit : Metric.
- PRF : 4Khz.

Update Rate	: 50 Hz.
USB connector	: USB connector Type A for USB Pen Drive interface.
I/O Connector	; D Sub 9 pin for Positional Encoder interface.
Power	: Lithium-Ion Battery pack 14.4VDC, 4AH, gives 8 hours continuous operation from fully charged battery.
Charger	: Input voltage 100 to 240 VAC. Charge status indicators provided.
Temperature	: 0 to 55° C.
Size	: 152 x 255 x 70 mm (HxWxD).
Weight	: 2.3 kg. with Battery.

**11 Menu Tree**

<b>First Menu</b>	<b>ZERO</b>	<b>RANGE</b>	<b>VEL</b>	<b>DELAY</b>
<b>Second Menu</b>	<b>GATE<sub>a</sub></b>	<b>START<sub>a</sub></b>	<b>WIDTH<sub>a</sub></b>	<b>LEVEL<sub>a</sub></b>
	OFF			
	PLOGIC			
	NLOGIC			
<b>Third Menu</b>	<b>GATE 2</b>	<b>START<sub>b</sub></b>	<b>WIDTH<sub>b</sub></b>	<b>LEVEL<sub>b</sub></b>
	OFF			
	PLOGIC			
	NLOGIC			
<b>Forth Menu</b>	<b>MEMORY</b>	<b>MEM NO</b>	<b>ACTION</b>	<b>NOTE</b>
	SET-UP	Memory No	RECALL	ENTER
			SAVE	
			DETAIL	
			DELETE	
	A SCAN	USB DSK	RECALL	
		Memory No	SAVE	
			DETAIL	
			DELETE	
			COPY	
			CPY ALL	

			SEUP D	
<b>Fifth Menu</b>	<b>REJECT</b>		<b>VIDEO</b>	<b>SET REF</b>
			ENVELOP	ON
			FILLED	OFF
			DYNAMIC	
<b>Sixth Menu</b>	MEASURE	BACKCLR	BRIGHT	DISPLAY
	OFF	BLACK		FULL
	ON G A	WHITE		TOP/BOT
	ON G B			ALL SUP
	ON G AB			
<b>Seventh Menu</b>	<b>X-OFF</b>	<b>ANGLE</b>	<b>THICK</b>	<b>TRIGGER</b>
				FLANK
				PEAK
<b>Eighth Menu</b>	<b>HORN</b>	<b>BEEP</b>	<b>CLOCK</b>	<b>FL_NAME</b>
	OFF	OFF	OFF	RAL0001
	ON	ON	ON	
<b>Ninth Menu</b>	<b>ENCODER</b>	<b>CAL FAC</b>	<b>ST POS</b>	
	PAUSE			
	ON			

All possible care has been taken in the preparation of this operation manual. If you find any errors or would like to make suggestions for improvement to this operation manual, then please write to:

## MODSONIC INSTRUMENTS MFG. CO. (P) LTD.

Plot No.33, Phase III, GIDC Industrial Estate, Naroda, Ahmedabad – 382 330 INDIA.

Tel.:- +91 (079) 2281 1217, 2281 3131, 2284 1294 Fax.:- +91 (079) 2282 0012.

E-mail: [modsonic@modsonic.com](mailto:modsonic@modsonic.com) Web site: [www.modsonic.com](http://www.modsonic.com)

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# **RailScan-200W**

## **Operating Manual**

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