

INNOVATIONS AND PROCEDURAL REFORMS FOR EXPENDITURE CONTROL

1. FIXTURE FOR LOADING EXTRA BOGIE in BRN

- The contract for the bogie transportation by lorry was started on 09.11.2020 valid up to 08.11.2020 for 300 trips from Chennai to IOH/ SRR and back. The bogies could not be transported by lorry from March 2020 onwards due to lock down.
- Meanwhile bogies were transported by BRN wagons from October 2020 onwards because of road block and other restriction due to Covid-19 Pandemic. Only 3 bogie could be loaded in a BRN wagon, which was very much less than the carrying capacity (57 Tonnes) of the BRN wagon. Six BRN wagons were spared for bogie transportation and the charges for one way movement of six BRN with 18 bogies was Rs 178700/-.
- The Gadget manufactured for double stacking of bogies in a BRN wagon enabled loading of 6 bogies in a single BRN wagon. Thus for the same cost of Rs1,78,700/-, 36 bogies could be transported in a single trip instead of 18 bogies which brought down per bogie transportation cost from Rs. 11,250/- to Rs.4964/- thus saving Rs 6286/- per bogie.
- Since the introduction of double stacking of bogies, till September 2021, a total of Rs.58.84 lakhs could be saved in transportation cost of IOH released bogies from SRR to PER and IOHed bogies from PER to SRR.

Trip	Distance in Km	Mode of transport	Cost per trip in Rs	No. of Bogies	Cost/Bogie in Rs
SRR-PER	612	Lorry	45,000.00	4	11,250.00
SRR-PER	601	BRN	29,783.00	6	4964.00
PER-SRR	601	BRN	29,783.00	6	4964.00

- The annual requirement of ICF bogies for PGT division is 672 bogies for 506 coaches. As such the annual savings for to and fro transportation of bogies by BRN wagon is to the tune of **Rs.84.48 lakhs**.
- This fixture was developed in - house at Shoranur depot of PGT division and was fabricated mainly from condemned/discarded railway materials. The mainframe was made with 3 inches diameter steel pipes of 3 mm thickness released from RCD/CAN. Intermediate members were made with condemned C - channels of size 4 inches arranged from works department. The design was conceived by a group of Supervisors and the idea was put in to practice by a group of creative technicians.
- Overall Dimensions:
- Length: 13 feet and Width: 6 feet



2. IN-HOUSE DEVELOPMENT AND REPLACEMENT OF INFLATABLE TOWER LIGHT CLOTH IN ART/ SRR

Four damaged inflatable tower light cloths in ART/SRR was replaced by using diffusion fabric cloth which was purchased and stitched locally. This is an in-house development and had made a saving of Rs. Three Lakhs (approx) towards the Railway exchequer.

Different parameters were checked and found the performance as satisfactory.

SI No.	Description	Tower light cloth supplied by OEM	Tower light cloth developed at SRR
1	Total expense	Rs. 80,000 per unit	Rs. 5000 per unit
2	Time to inflate	01 minute	01 minute
3	Time to full illumination	03 minutes	03 minutes
4	Total height	4.5 m	4.5 m
5	Maximum temperature while working.	40°C	38°C
6	Brightness	42000 Lumen	42000 Lumen
7	Area	Apr. 10,000 sq.M	Apr. 10,000 sq.M



Merits

- Durable and abrasion -resistant
- Water- resistant
- Resistant to damage from oil and chemicals.
- Easily washable
- Stable in rainy and windy weather conditions.



3. COST REDUCTION IN ON BOARD HOUSE KEEPING

Total No. of Trains Provided with OBHS – 10 pairs. OBHS on 9 pairs of trains are discontinued after expiry of contract in view of revision of expenditure –Annual saving 2.68 Cr/year.

4. COST REDUCTION IN AMOC of BIO- TOILET

New AMOC contract of Bio-Toilet started from 01.02.2020 Payment is made on Number of Toilet attended instead of Number of coaches attended.

Comparative saving expenditure is tabulated below

Depot	Previous monthly Bill	New contract monthly Bill *	% of saving
SRR	RS 3,20,050/-	Rs.2,18,450/- From 16.09.21 Rs.1,45,633/-	31.74% to 54.49%
MAQ	RS 13,50,000/-	Rs.8,90,108/- From 16.09.21 Rs.5,87,471/-	34% to 56.48%

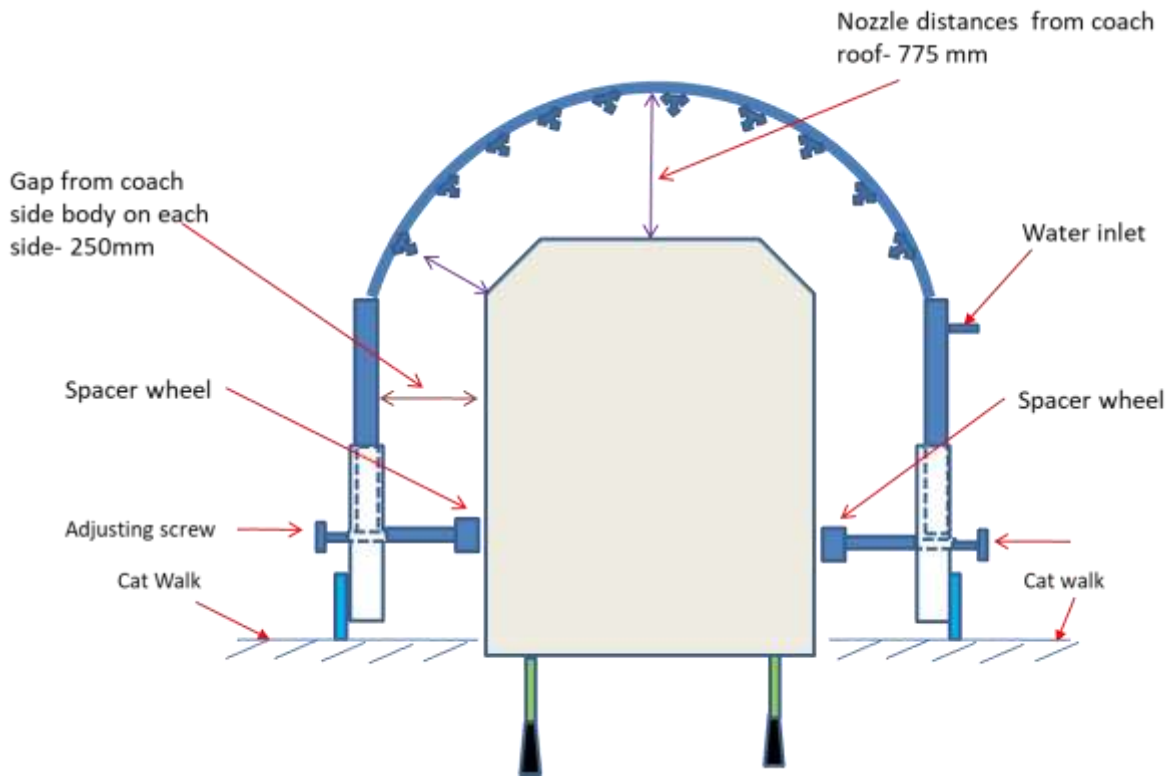
5. SAVINGS THROUGH DEPARTMENTAL MAINTENANCE WITHOUT AMC BY OEM

Preventive and routine maintenance of the under mentioned machineries were undertaken departmentally. Replacement of spares whenever required is being procured through NS indent/ imprest. Since already spare machines are available day-to-day maintenance will not be affected during maintenance.

SI No	Description	Qty	Total cost (In Rs)
1	AMC of Air plasma cutting equipment at PGT Division MAQ & SRR Depot	4	13,76,824/-
2	CAMC of Bio-toilet sewage evacuation machine at MAQ	1	2,61,908/-

5. ROOF LEAKAGE DETECTION GADGET





SCHEMATIC ARRANGEMENT OF ROOF LEAKAGE DETECTION GADGET

Roof leakage of coaches is one of the major causes for public complaint during monsoon season. The main hindrance to attend roof leakage is difficulty in identifying the exact location of leakage during maintenance in the absence of rain. To address this issue, one roof leakage detection gadget is developed at MAQ coaching depot. The gadget consists of two curved 25 mm MS pipes bent so that it can be passed above the coach body. Total 35 Nos of Nozzles (6 mm) are fixed along the pipe directed towards the coach body. Hose connection for taking water from hydrant line is provided at the end. The whole gadget can be moved along the catwalk by means of wheel trolley system fixed at the bottom portion. The Spacer wheel provided at both ends ensure proper gap of 250 mm is maintained from the coach body. This simple, yet effective gadget helps to identify the roof leakages during Primary Maintenance by showering water over the roof.

6. MOTORISED LIGHT WEIGHT TROLLEY



Mangalore coaching depot has developed a motor driven trolley with disc brake for the use in ART during accidents. This trolley is light weight and can be assembled at site within five minutes. It is driven by a single phase series electric motor of 1.5HP powered by a 5 KVA petrol generator which is available in ART standard list. The speed of the motor is reduced using a reduction gear and the trolley moves at a constant speed of 7Km/H. This reduces the fatigue of staffs in carrying the heavy HRE equipments at accident site and also saves time taken for material transportation. The trolley can carry approximately 1000Kg. This trolley is also provided with mechanical hand brake for additional safety. The approximate cost of the trolley excluding the generator is Rs.36,500 only.

Fabrication Cost:

SL NO	ITEM	COST
1	Electric Motor with Reduction Gear	25000/-
2	Generator (already available in ART)	80000/-
3	Disc brake system(KTM Brand, old one)	3500/-
4	Nylon wheels (4 Nos)	6000/-
5	Platform top sheet (Aluminium chequered plate)	2000/-

7. CONVERSION OF CONDEMNED INSPECTION CAR TO MEETING HALL



Mangalore coaching depot was facing acute shortage of space for conducting meeting, classes etc. In order to tide over the above problem, a condemned inspection car of DRM/PGT No, SR RA 3611 was converted into a meeting hall with the following facilities.

- Conference Table with 25 chairs plus one executive chair.
- Fully Air conditioned with four split AC.
- False ceiling, side panelling and Flooring with wooden compreg sheet.
- Conference Mic
- LED Lighting.
- Mini Pantry
- Toilet

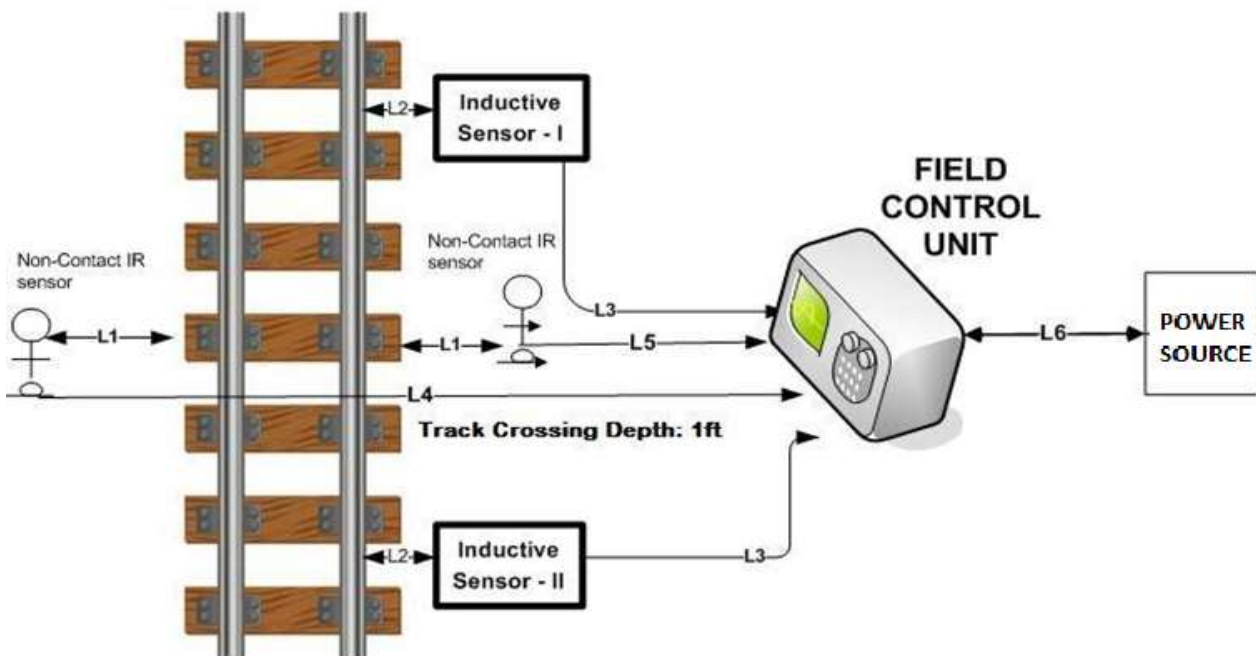
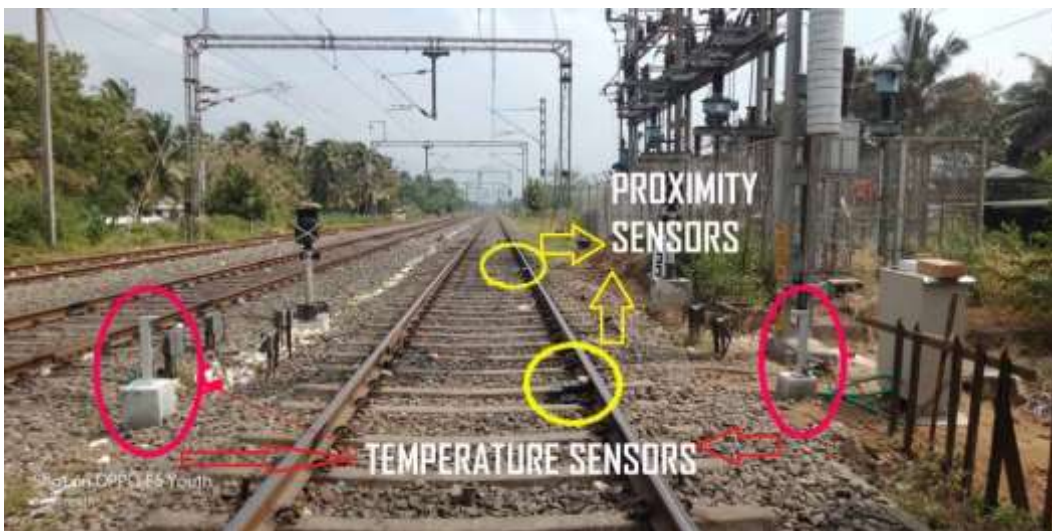
8. Beautification of ART/MAQ

Staffs of ART /MAQ had painted the interior of the ART coaches which have improved the aesthetics of the coaches considerably. The Tools & equipment are stacked in an orderly manner which makes it easy to access during break. The entire work was carried out departmentally and was lauded by DRM and other officers from the zonal HQs. The artistic skill of the mechanical staff was well utilised for maintaining and beautifying the ART coaches in good fettle



9. INSTALLATION OF HABD AT VARIOUS LOCATIONS

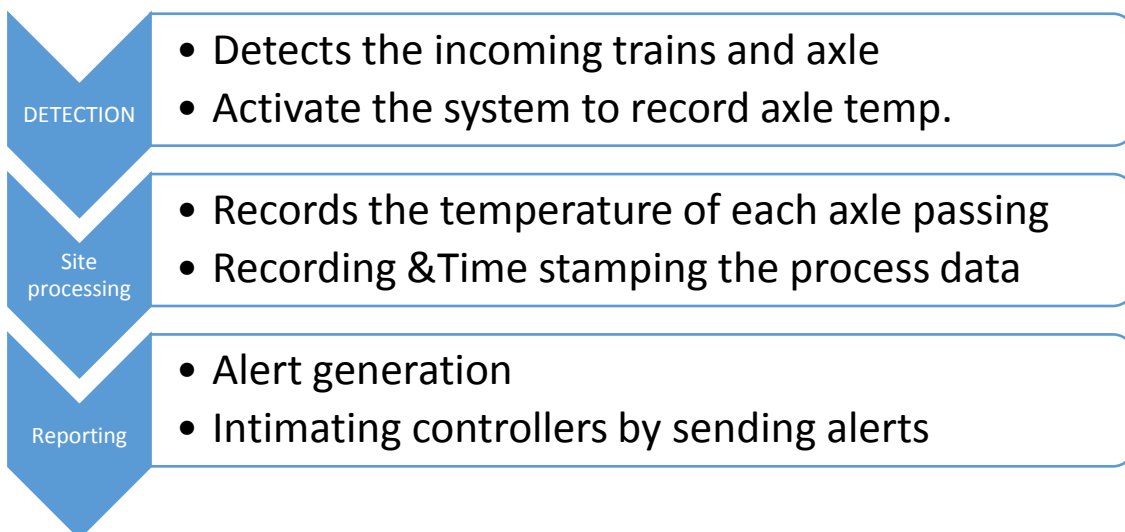
Automatic Hot Axle Box Detectors are installed at PGT, SRR, CLT and MAJN for identifying hot boxes in rolling stocks. The high temperature identified can be verified at the adjacent C&W depot and if the temperature exceeds the limit, an alert is sounded and thus enabling C&W staffs to take a judicious call in further permitting the train and hence preventing Enroute failures



The Main components of the system are as follows

1. **Rectangular Inductive proximity Sensor** – detects the incoming trains and counts the axles passed
2. **Non-Contact IR based Temperature Sensor** – Senses the Temperature of each and every axle passed with capability of measuring in high speeds (110kmph) also.
3. **Intelligent Field data processing unit** – Captures the data from axle counter and temperature sensors, Process it and sends to the server. The real time software possesses the intelligence to process the recorded data and produces the report with axle wise temperature information and transmits the data to Traffic Control or Monitoring Station.
4. **Centralized Cloud Server**- Stores, process and manage the data, user interfaces, process management,etc
5. **Control Centre Display Interface** – Enables the user to configure the system such as setting threshold limits, alarm limits, etc.

Works Flow Diagram:



10. UN LOADING OF OXYGEN TANKERS AT MDKI

As a part of the initiative by the GOI in making Oxygen available to the beneficiaries, Railways had risen to the occasion and run oxygen special trains on top priority from Rourkela to MDKI. Six oxygen special trains had transported 366.72 MT of oxygen in 23 oxygen trucks. The existing Ramp at MDKI was modified to enable easy and fast unloading of Oxygen tankers from BWT wagons.



11. ATTENTION TO ROOF LEAKING IN WAGONS & COACHES

As a part of Monsoon precaution, a special drive was conducted to identify the leakage in wagon roof. As such total 126 wagons were marked sick and roof leakage attended. This helped to reduce rejection of wagons for loading and avoid running of embedded empty wagons on formations certified by MAJN depot. Roof leakage in 46 coaches were also attended during this period.



12. CONVERSION OF COACHES TO ISOLATION WARDS.

On the wake of spreading of COVID19 pandemic, total 32 coaches were converted to isolation wards in the division inclusive of 20 coaches (12 GSCN and 8 GS) at MAQ and 12 coaches (All GS) at SRR.



13. MANUFACTURING OF PP EQUIPMENT.

Total 1500 numbers face masks, 26 litres of sanitizer were manufactured and utilised for departmental use. Five numbers pedal operated hands free washing system were assembled and installed in various depots. Four numbers pedal operated dispensers and three numbers automatic dispensers were also manufactured and installed at C&W depots.



14. IMPROVEMENT IN TESTING OF BIO TOILET EFFLUENT.

Previously testing of effluents from bio toilets for pH value, TS (Total solids), TVS (Total Volatile Solids) and TDS (Total dissolved Solids) were done at Bio-lab/SRR. Now improved tests namely COD and FCC (Chemical Oxygen Demand and Faecal Coli Count) have been started during the year at this lab to evaluate the standard of discharge from bio toilets and thereby ensuring proper functioning of bio-toilets.



15. RUNNING OF SHRAMIK SPECIAL TRAINS.

Total 127 Shramik special trains run by the division out of which 114 were primarily maintained and BPC issued from the division.

16. ACTION TAKEN TO CONTAIN SECOND WAVE OF COVID19

To monitor spread of COVID 19 among employees, Pulse Oxy-meters are procured in all depots and all staffs are tested with Pulse Oxy-meter and Hand held thermometer before joining duty.



17. GADGET TO ATTEND SIDE STANCHION AND BEND DOORS IN WAGONS



A gadget was manufactured by MAQ/C&W/Depot for pressing the stanchion of wagon to facilitate welding/attention. This is accomplished by fixing the gadget to the wagon by hooks. A Brake cylinder is utilised to press the pillar with sole bar. This gadget reduces the time taken to attend the repair as well as the man power required for attention. This gadget can also be used to attend bend doors in wagons.

18. GADGET FOR CLOSING OF SLIDING DOORS OF COACHES AND WAGONS

A Gadget for closing of sliding doors of coaches and wagons was manufactured by C&W depot/SRR. This gadget facilitates closing of doors in locations where there is no platform by a single person. This gadget reduces the door closing time and also the number of persons required for door attention.



19. WAGON CBC WORKING MODEL



SOUTHERN RAILWAY
PALAKKAD DIVISION MECHANICAL BRANCH

TELL TALE SIGNS FOR ENSURING PROPER LOCKING IN AAR H TYPE CBC

THREE THUMB RULES TO ENSURE PERFECT LOCKING

1. CLEAR VIEW OF INVERTED "V"
2. VERTICAL POSITION OF ROTARY LEVER
3. CLEAR VISIBILITY OF LOCK LIFT ASSEMBLY



- Tell-tale (inverted "V") mechanism provided on the CBC head at the bottom of the lock hole helps to ensure perfect locking of mating CBC's.
- If the tell-tale recess is clear, it indicates perfect locking.
- If tell-tale recess is not clear it is an indication of partial locking / not locked.



CLEAR VIEW IN TELL TALE RECESS (INVERTED 'V')



POSITION OF LOCK IN PARTIALLY LOCKED CBC



TELL TALE SIGNS FOR ENSURING PROPER LOCKING IN AAR HT TYPE CBC (FITTED IN WAGONS)



1. POSITION OF LOCK IN PERFECTLY LOCKED CBC



2. POSITION OF LOCK IN PARTIALLY LOCKED CBC



3. PROPERLY LOCKED CBC



4. PARTIALLY LOCKED CBC



5. CORRECT POSITION OF OPERATING ROD

IMPORTANT POINTS TO BE NOTED

- PERFECTLY LOCKED POSITION IS INDICATED BY THE TOGGLE WHICH SHOULD BE CLEARLY VISIBLE BELOW THE COUPLER HEAD (REFER FIG 3).
- THE OPERATING ROD SHOULD NOT BE BENT AND ANTI ROTATION LUG OF HANDLE TO BE PROPERLY HOUSED IN SLOT OF BEARING PIECE OF SUSPENSION BRACKET OF CBC OPERATING HANDLE TO AVOID ROTATION ON RUN (REFER FIG 5).
- IN OPEN WAGONS, ROPES OF TARPULIN COVER SHOULD NOT BE ALLOWED TO BE TIED WITH OPERATING HANDLE.
- OVERALL LENGTH OF THE CBC OPERATING ROD PROJECTING DOWNWARDS SHOULD NOT BE MORE THAN 305 mm.

As a part of system improvement, MAQ depot had manufactured a working model of AAR modified H type CBC fitted in LHB coaches. This is installed in the sick line to educate C&W staffs regarding the working of CBC. Similar model for wagon CBC is also installed in front of SRR & PGT crew lobby so that LP & guard can physically see the coupling & uncoupling of the CBC along with the individual parts. This will help them in clearing their doubts regarding proper coupling of CBC during GDR checking of rakes there by avoiding chances of train parting.

20. AIR HOSE POROSITY TESTING GADGET

MAJN depot developed a gadget to check the porosity of Air hoses. The BP and FP air hoses are tested with 8 Kg/cm² to 10 Kg/cm² pressure using this gadget before providing in the coach or wagon. This gadget enables to detect even the minute leakage in the air hoses that escapes detection during normal air testing. This can avoid possible brake bindings due to air leakage.

The gadget is connected to the air compressor through a flexible hose. A hose from the gadget is connected to the rubber hose for BP and FP and the Palm end of rubber hose for BP and FP is temporarily closed by using dummy. Air pressure of 8 to 10 Kg/Cm² is supplied to the gadget. The rubber hose for BP and FP is fixed on the clamps on either side. When the lever is lowered the rubber hose pipe for BP and FP gets submerged in the water tank and its kept stable under the water and compressed air is applied. If the hose is porous, bubbles will appear.



21. BOOKLET TO ATTEND LOCO DERAILMENT

During accidents involving Locos, difficulties were experienced by ART supervisors in ascertaining the location where the jacks are to be placed, as there are different types of both Electric and Diesel locos. In order to tide over the problem, ART supervisor and staffs from MAQ & SRR were sent to Erode Electric & Diesel loco sheds to get trained in the above matter. Based on this, a booklet with photographs of different types of locos and the locations where the jacks are to be placed has been prepared and kept in both ART/MAQ & SRR as a ready reckoner.



22. PROVISION OF FIRE HYDRANT

FIRE audit of the SRR depot was conducted by the state Fire Force Department and as a part of safety improvement suggested to provide Fire Hydrant in the IOH shed and a Fire hydrant has been installed at IOH shed/ SRR.

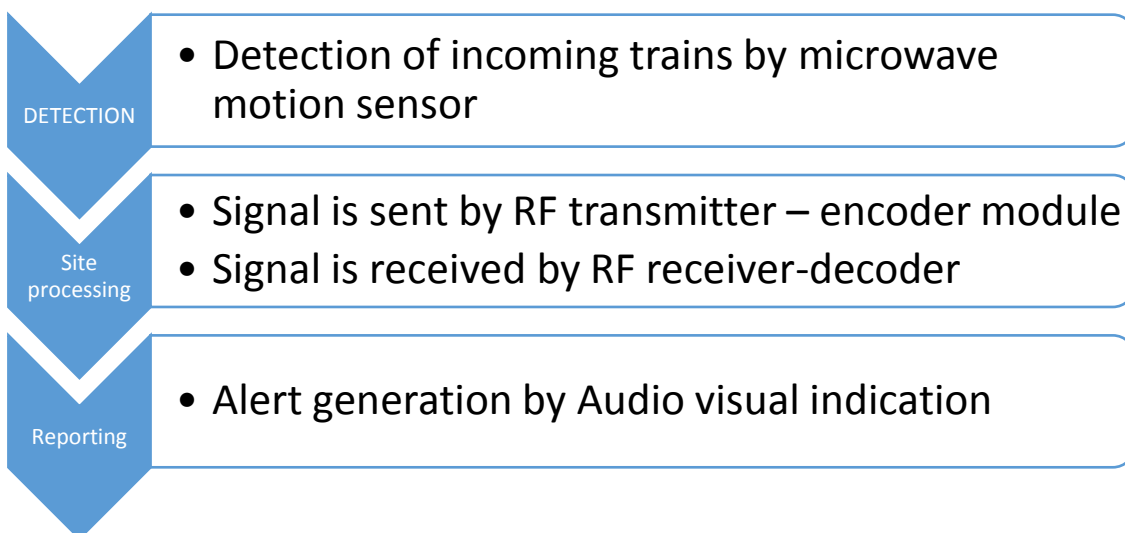


23. AUTOMATIC SHUNTING ALERT SYSTEM

Working Principle

One microwave motion sensor installed at trackside detects the motion of the train. The output of microwave motion sensor is fed to RF transmitter – encoder module. The signal sent by the RF transmitter is received by RF receiver-decoder which in turn is fed to the timer relay used to switch on and off the hooter circuit.

Works Flow Diagram:

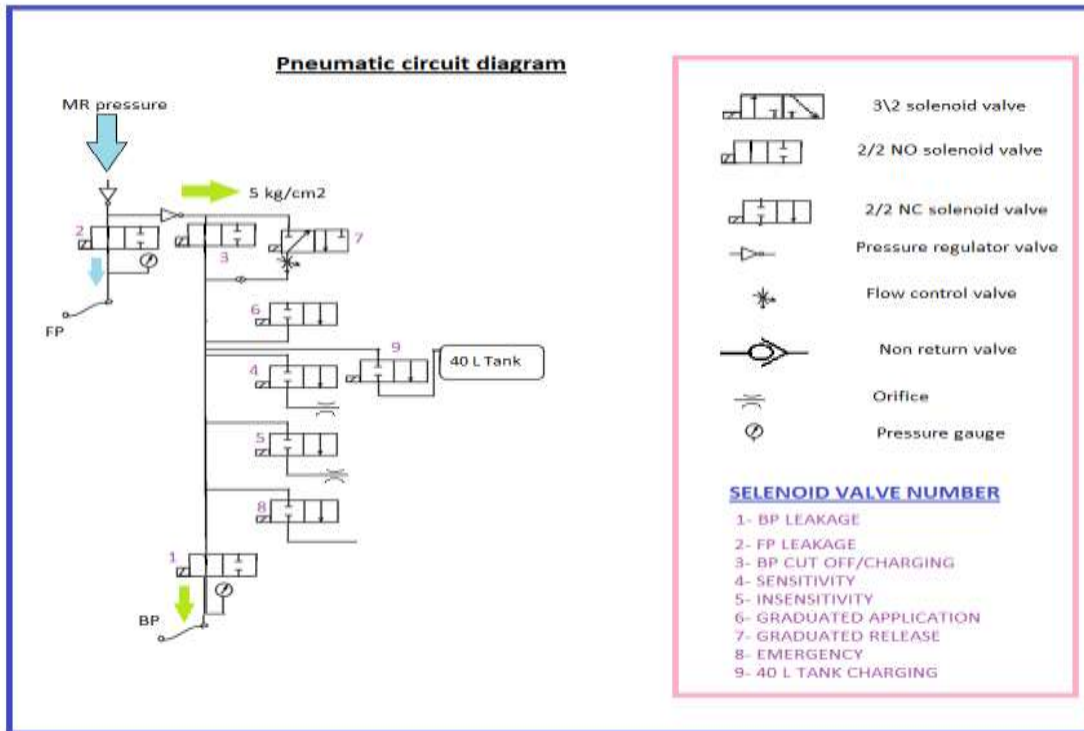


Merits:

1. Staffs are alerted and cautioned well in advance during the shunting operation.
2. Is weatherproof.
3. Reliable and robust.
4. Promotes safer working environment.

24. ELECTRO PNEUMATIC SINGLE CAR TEST RIG

Electro pneumatic single car test rig (EPSCTR) is used for performing single car test of coaches and wagons in a digital manner. In conventional SCTR ball valves operated manually are used to control air flow whereas in EPSCTR solenoid valves are used instead. In addition all tests can be done using Remote control and timings of different tests are controlled by Delay Timers, which makes the system a semi-automated one. Analog pressure gauges are replaced with digital pressure gauges. Quick coupling is used for easy engaging and disengaging of hose pipe.



Working : Electro pneumatic single car test rig (EPSCTR) works in 230V AC supply. Each valves are controlled by separate switches and IR remote controller. Compressed air from MR (8 kg/cm²) is reduced to 6 kg/cm² and 5 kg/cm² by using two Pressure regulator valves to charge FP and BP respectively.

Sensitivity and insensitivity tests are conducted by using orifice for flow control and off delay timers for controlling operational time. Three step graduated application and graduated release is done using flow control valves and OFF delay and ON delay timers. All the operations can be controlled by using both electrical switches and remote controller.

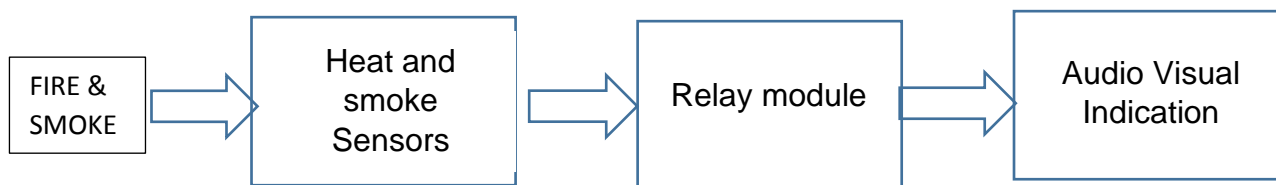
25. AUTOMATIC HEAT AND SMOKE DETECTION SYSTEM



An wholly indigenous a gadget to detect heat and smoke is developed at MAQ coaching depot and is placed at the room used to store paint, oil and lubricants (POL room). On detection of Fire/Smoke above the allowed pre-set value it generates an audio alarm visual alarm duly enabling the staffs to get alerted.

Components used

1. Photo electric Smoke detector.
2. Fixed temperature heat detector.
3. 24V, 10amps SMPs.
4. 24V Hooter,120 dB.
5. Indicator light.
6. Reset switch.
7. Relay Module.



MERITS:

1. Staffs can be alerted for fire and smoke.
2. Lifesaving gadget.
3. Cheap and robust.
4. Promotes safer working environment.