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ERL MAINTENANCE SUPPORT SDN BHD

(Company No. 498574-T)

E-MAS

Effective Railway Operations; Reliable System Maintenance

ROLLING STOCK DEPARTMENT

TRAIN SCHEDULED & UNSCHEDULED MAINTENANCE PROCEDURE

Ref. No. R00.OMR.M90001.BT.1001.B

Release

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	Name	**Department**	**Date**	**Signature**

Amendments or additions to this procedure must be indicated with a vertical black line in the adjacent left margin.

Change Record and Configuration Control

B	10.03.15	Overall content have been revised, rearranged & updated.	Mohamad
A	29.04.13	New – This document is a combination of two procedures. It supercedes the previous procedures created separately under Scheduled Maintenance Process Guide, [G00.OMR.M90000.PG.0005] & Unscheduled Maintenance Process Guide, [G00.OMR.M90000.PG.0001].	Mohamad
Revision	**Date**	**Modification**	**Name**

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1 Purpose

This procedure is to provide a guideline to all Rolling Stock staff regarding train scheduled and unscheduled maintenance work process. This document specifies the action to be taken to initiate the maintenance works until the works completed and the compilation of reports and records.

2 Scope, Distribution & Access

This Procedure is applicable to all Rolling Stock staff. The distribution and access shall be available for all staff via Electronic Document Management System and via RST Portal athttp://express50/E-MAS_Portal/RST.html. A hardcopy is also available in the Foreman's Room.

3 Reference, Abbreviations and Definitions

Abbreviations used in this document are as Table 1, Abbreviations used.

EDMS	Electronic Document Management System
E-MAS	ERL Maintenance Support Sdn. Bhd. (Company No. 498574-T)
EMS	Environmental Management System
ERLSB	ERLSB Rail Link Sdn Bhd (Company No. 375839-H)
HM	Heavy maintenance
HOD	Head of Department
LM	Light maintenance
OCC	Operation Control Center
OEM	Original Equipment Manufacturer
O&M	Operation & Maintenance
MMT	Material Management/Administration – Material Management Unit
RST	Rolling Stock
QMD	Quality, Environment & Documentation
SAP	System application Product
ZCAN	Cannibalization Work Order
ZRPO	Repair Work Order
ZSMO	Scheduled maintenance work order
ZUMO	Unscheduled maintenance work order
ZMOD	Modification work order

Table 1: Abbreviations used

4 Reference Manual & Procedures

All maintenance works shall be carried out in according with O&M Manuals that provided by the manufacturer. These manuals are available in form of hardcopy and softcopy. The softcopy manuals are available in \\Express66\rst\Manual Version C and accessible to all RST, refer to Figure 1, O&M Manuals Folder.

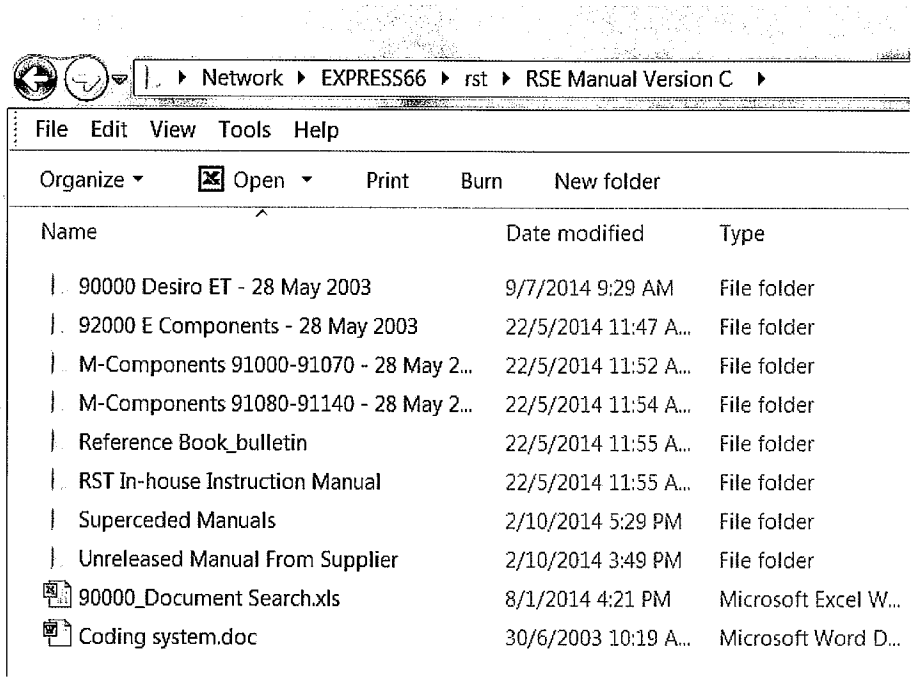

Figure 1: O&M Manuals Folder

Where necessary, RST staff also shall refer to the RST Procedures and RST In-house Technical Instruction that could be accessed via RST Portal at http://express50/E-MAS_Portal/RST/RST Procedures.html.

5 Maintenance Monitoring and Records

In addition to the SAP System, a few others methods have been applied for monitoring and recording of the scheduled maintenance activities, as briefed in the sub-section follows.

5.1 SAP system for Maintenance

SAP System is used for recoding failure, man-hours and material cost on every maintenance works by creating work order and notification. Further detail on the work order process guide could be referred to SAP - Plant Maintenance End User Process Guide Procedure[1].

Upon completion of the maintenance task, the group supervisor/inspector then has to ensure all the man-hours done are captured and check the material issued accordingly into

[1] Refer to appendices for reference numbers.

the work order. Once confirmed, the group supervisor/inspector has to sign and submit the work order to RST HOD or delegate for further verification before submit to QMD.

5.2 RST Maintenance Monitoring & Records

As addition to SAP System, RST Maintenance Monitoring & Records Folder is created in \\Express66\rst\ RST Maintenance Monitoring & Records, for monitoring and recording all the maintenance activities record in softcopy files. This folder consists of a few sub-folders, which divided according to the RST groups, refer to Figure 2: RST Maintenance Monitoring & Records.

The technical executive or person in charge of the respective group is responsible to ensure the monitoring and records are updated from time to time. The list of softcopy file record could be referred to Record Matrix – RST[1].

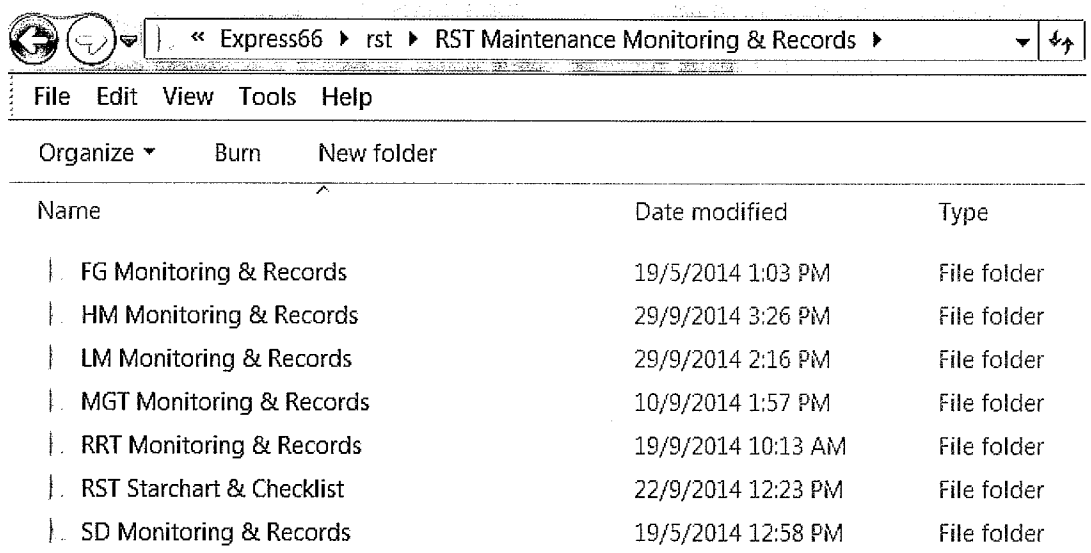

Figure 2: RST Maintenance Monitoring & Records

5.3 Starchart

All the components or systems that required for scheduled maintenance as instructed in the O&M Manuals are compiled and formed as a starchart. However, during carry out maintenance work, the technicians MUST always refer to the O&M Maintenance Manuals, for a clearer instruction and reference.

The RST Scheduled Maintenance Starchart could be retrieved from EDMS and \\Express66\rst\ RST Maintenance Monitoring & Records\RST Starchart & checklist folder, by all RST.

The scheduled maintenance starchart used in RST are as listed in Table 2, RST Scheduled Maintenance Starchart as follow.

[1] Refer to appendices for reference numbers.

Starchart Descriptions	Reference no.
T2-T5 Scheduled Maintenance Starchart	R00.OMR.M12990.PT.0016.*
1st T6 Scheduled Maintenance Starchart	R00.OMR.M12990.DQ.0003.*
2nd T6 Scheduled Maintenance Starchart	R00.OMR.M14100.PT.1004.*
3rd T6 Scheduled Maintenance Starchart	R00.OMR.M14100.PT.1006.*
4th T6 Scheduled Maintenance Starchart	R00.OMR.M14100.PT.1009.*

Table 2: RST Scheduled Maintenance Starchart

T6 scheduled maintenance starchart are created on every stage of T6 scheduled maintenance to suit with the maintenance work process flow.

Supervisor/inspector has to print the starchart according to the maintenance level and distribute the tasks to their technicians or sub-ordinates.

The technicians have to stamp on the designated column in the starchart according to the task that they had done.

Upon completion of all the tasks in the starchart, the respective group supervisor/inspector has to verify and confirm by stamp on designated column in every sheet of the starchart.

Reminder:
Please always use the latest updated starchart.

5.4 Checklist

Where necessary, a checklist is created in order to capture the require data or to provide a guideline to the technician on a critical work. It is also to ensure all the tasks in the checklist are done accordingly and the technicians are accountable on their works. However, the technicians must always refer to the O&M Manuals before commencing the works.

The technicians have to stamp on the designated column in the checklist according to the task that they had done.

Upon completion of all the tasks in the checklist, the respective group supervisor/inspector has to verify and confirm by stamp on designated column in every sheet of the checklist.

All maintenance checklists are categorized and compiled in one excel file and profiled in EDMS. These checklists are also available in \\Express66\rst\ RST Maintenance Monitoring & Records\RST Starchart & checklist folder. Please refer to Table 3, RST Maintenance Checklist as below.

* Refer to latest version.

Checklist Descriptions	Reference no.
RST T1-T5 Scheduled Maintenance Checklist	R00.OMR.M14100.PT.0002.*
RST Unscheduled Maintenance Checklist	R00.OMR.M14100.PT.0003.*
RST Heavy Maintenance Checklist	R00.OMR.M14100.PT.1007.*
RST Overhaul Maintenance Checklist	R00.OMR.M14100.PT.1008.*
WBL's Part Performance Test Checklist	R00.OMR.M12990.DT.0004.*

Table 3: RST Maintenance Checklist

The list of these checklists on every category could be referred to the first worksheet of this file that named as 'content' in every file.

Reminder: Please always use the latest updated checklist.

5.5 Record Filling

After completion of the entire maintenance task, the respective group supervisor/inspector has to ensure all the relevant starchart and/or checklist sheets are completely filled in and stamped by their technicians.

The respective group supervisor/inspector is also responsible to keep all the completed starchart and/or checklist into the designated folder accordingly. All the Rolling Stock hardcopy of maintenance record folders are numbered, please refer to Record Matrix – RST[1].

Reminder:
Please ensure all the starchart and/or checklist completely filled and stamped before keep it in the folder.

6 Scheduled Maintenance

Scheduled maintenance is maintenance activities that shall be carried out at the specified interval, in accordance with the manuals supplied by the SYZ Consortium or OEM. The maintenance interval terms could be in mileage (KM), running hours (H) or calendar basis (daily, weekly, monthly, yearly and etc.) as stated in the OEM manuals .

Trains maintenance intervals are as shown in Table 4, Train Maintenance Interval.

* Refer to latest version.
[1] Refer to Appendices for reference numbers.

Maintenance Term	Inspection Descriptions	Train Mileage Base
T1	Daily Inspection (DI)	Daily before train release for revenue
T2	General Inspection 1	10,000 km ±10%
T3	General Inspection 2	30,000 km ±10%
T4	General Inspection 3	150,000 km ±10%
T5	General Inspection 4	750,000 km ±10%
T6	Overhaul	1,500,000 km ±10%

Table 4: Train Maintenance Interval

The work process of scheduled maintenance activities are described as sub-sections as follows.

If there are any scheduled maintenance activities that do not have checklist or when the checklist is not consistent or contain error, the staff shall highlight this to RST HOD for immediate action.

6.1 Daily Inspection (DI) (T1)

All the serviceable trains (ERL & CRS), which subject for revenue service or standby, have to carry out Daily Inspection before the revenue service hours or before the train released for revenue service. The components or systems required for inspection are listed in Daily Inspection Checklist, refer to RST T1-T5 Scheduled Maintenance Checklist as shows in Table 3, RST Maintenance Checklist.

The staff who carried out the Daily Inspection have to stamp on the checklist and concurred by shift supervisor/Inspector in the designated column. The shift supervisor/inspector also has to ensure the checklists are completely filled and stamped before kept in the designated folder (i.e. Folder no. 002, Daily Inspection Record).

After the Daily Inspection completed, the shift supervisor/Inspector also has to update the required data in the SAP System – Order > ZCLN – Interior Cleaning.

6.2 T2 – T6 Scheduled Maintenance

Normally, T2 – T4 scheduled maintenance are carry out by LM group and T5 – T6 scheduled maintenance are carry out by HM group. However this practice is subjected to change depends on the current requirement.

The relevant group technical executive, supervisor and inspector have to monitor daily train mileage in order to ensure the train schedule maintenance plan is done within the timeframe. Once the train mileage reaches the scheduled maintenance plan, the relevant

group supervisor/inspector has to print the work order, starchart and checklist. Supervisor/inspector then has to assign the maintenance tasks as in the starchart to their sub-ordinates.

The works order for scheduled maintenance (ZSMO) is automatically generated once the train reaches the plan mileage and could be printed via transaction IP10 – Scheduled Maintenance Plan in SAP system.

The relevant group technical executive, supervisor and inspector also have to monitor and update all the required softcopy record in \\Express66\rst\RST Maintenance Monitoring & Records\.

The management of all the maintenance records shall be referred in Section 4, Maintenance Monitoring & Record.

6.3 Heavy Maintenance

Heavy maintenance tasks are as listed in Table 5, Heavy Maintenance Task as below and normally carried out by HM group.

Heavy Maintenance Task Descriptions	Mileage Interval (KM)
Wheel change programme	2,000,000[2]
Brake disc replacement	1,300,000[2]
Primary spring replacement	1,300,000[3]
Vibration damper replacement	1,300,000[3]

Table 5: Heavy Maintenance Task

Before commencing the maintenance task, the HM technical executive or supervisor has to create the work order and print the relevant checklists as in Table 4, RST Maintenance Checklist.

The HM technical executive, supervisor and inspector also have to monitor and update all the required softcopy record in \\Express66\rst\RST Maintenance Monitoring & Records\HM Monitoring & Records\. Normal practice, T2-T4 scheduled maintenance done by LM group and T5-T6 scheduled maintenance done by HM group.

The management of all the maintenance records shall be referred in Section 4, Maintenance Monitoring & Record.

6.4 Modification or Upgrade of System

In circumstances that require modification or upgrade in order to increase the capability on the train system or sub-system, RST HOD or sub-ordinate shall initiate with a formal

[2] Estimated mileage only, the replacement shall follow the condition monitoring or when ever required.
[3] Refer to Suspension System (GMT, Phoenix, SIEMENS) Correspondence Summary Memorandum, reference no. OMR.OMN.M91123.0002.A.

memorandum for installation and testing work. The memorandum shall have sufficient information on technical and safety instruction as a reference for staff to carry out the task.

The memorandum shall be distributed to the staff by RST HOD via email. The memorandum also could be retrieved by the staff from EDMS or in \\Express66\rst\RST Maintenance Monitoring & Records\RST Memorandum.

Upon completion of the modification or upgrade work, RST HOD has to ensure the availability of OEM maintenance manual or in-house technical as a guideline to RST staff for inspection or servicing. This document shall be profiled in EDMS and accessible to RST staff. The starchart and/or checklist shall be updated or created if necessary.

The modification work order (ZMOD) shall be used for these works to capture all the man-hours and material involved.

7 Unscheduled Maintenance

Unscheduled maintenance is a type of maintenance to be carried out when any failure found on the train systems or components during revenue service or maintenance i.e. defective, damage, malfunction, missing, broken and etc.

All the rectification works to be done must always refer to the O&M Standard Manual that supplied by ERLSB unless otherwise specified. The O&M Manuals is available in the foreman's room (hardcopy) or in \\Express66\rst\Manual Version C (softcopy).

RST staff also shall refer to RST Procedures and RST In-house Technical Instructions that available in RST Portal, (http://express50/E-MAS_Portal/RST.html).

7.1 Notification of Failure

Every failure found has to be reported via SAP System in order to notify the failure of the systems or components.

The following are the types of notifications used for mode of failure on the train system.

7.1.1 Maintenance Required Notification (MR)

The notification of failures that found during scheduled maintenance, standby or additional inspections and reported by RST Department staff via SAP System.

7.1.2 Service Failure Notification (SF)

The notification of failures that found during train service operation and reported by train driver, station staff or other parties thru the OCC. The OCC then will create the notification via SAP System to notify RST Department for further action.

7.2 Work Order

There are three order types could be used during unscheduled maintenance activities as briefed as follows.

7.2.1 Unscheduled Work Order (ZUMO)

Upon the failure notification is notified and confirmed, the shift supervisor/inspector is responsible to create ZUMO. The work order must be created with reference to the relevant failure notification. Shift supervisor/inspector or SAP key user has to ensure all the data required (e.g. function location, order type, operation description and etc) in notification and order are correctly entered before being saved and print the work order for task execution.

7.2.2 Repair Work Order (ZRPO)

The ZRPO shall be used for internal and external repair work of defective part or component, which has been removed from train. A ZRPO work order shall be created as sub-order from the related ZUMO work order in order to ensure the material movement is traceable. The ZRPO work order will be partially closed after the part is retuned to store and will be completely closed upon the part returned after repaired and tested serviceable. The ZRPO work order normally captures labor cost for internal repair work and external repair cost for outsourced work.

7.2.3 Cannibalization Work Order (ZCAN)

In certain cases, when there is no spare part available in store and the part to be cannibalized from other train. A ZCAN shall be created under the function location of the train that to be cannibalized. This work order is to capture the man-hours involve and for monitoring or recording the material status and movement. The work order has to be partially closed after the part has been cannibalized and has to be completely closed only after the cannibalized part is replaced and tested serviceable.

8 Material Movement

Spare parts and consumables are stocked and controlled by MMT. Further detail procedure regarding warehouse operations could be referred to Warehouse Operations Procedure[1].The guideline regarding the material movement during maintenance is briefed as follows.

8.1 Issuance of Material

A work order number of the maintenance or task must be given to the storekeeper prior to the issuance of material that required for the work. The person who requests the material from warehouse has to use a correct work order. The group supervisor/inspector is responsible to ensure only the relevant materials issued in the work order after completion of the task in the SAP System.

8.2 Returning of Repairable Parts.

The repairable part that removed from train and required for repair outside of RST, must be returned to warehouse for delivery process. A ZRPO and repair form as stated in Purchasing Procedure[1], shall be presented together with the repairable parts.

[1] Refer to Appendices for reference numbers.

8.3 Scrapped Parts.

Every unusable consumable and non-reparable part or uneconomical to repair, will be returned to MMT as a scrapped items. Each group supervisor or technical executive have to check and confirm the part condition prior scrapping and get approval from RST HOD.

A scrapping form as stated in Warehouse Operations Procedure[1] shall be filled and submitted to the warehouse together with the scrap parts upon approved by RST HOD.

9 Train Request & Release Train for Maintenance

LM supervisor on duty is responsible person to request and release train for maintenance works. He also responsible to ensure all the safety precaution prior receiving and releasing the train. The detail of train movement procedure upon receiving and releasing shall refer to Train/Track Bound Vehicle Movement Into & Out of Work Areas Within Depot Procedure[1].

Beside the request and release procedure as mentioned above, there also have additional inspection and precaution imposed on certain maintenance work activity, in order to ensure the train released for service is reliable and safe. Follow are additional precautions that shall be followed by the maintenance supervisor prior releasing the train.

9.1 Releasing After Major Maintenance Work

For train called for maintenance as specify as below, the supervisor/inspector has to print and carry out inspections as stated in the checklist, Train Release Inspection Checklist SD/HM/LM[1], before releasing the train for revenue.

1. T6 schedule maintenance
2. Main transformer, APC & electrical container removal
3. Bogie/wheelset/supension removal
4. Train down for maintenance more than 2 weeks.

Once completed, the checklist then shall be kept in the designated folder in RST foreman room.

9.2 Non RST Request to Work on Train

If non RST, i.e. others department in E-MAS or outsider require to work on train, they have to get permission from on duty LM supervisor via filling in a Non RST Requisition to Work on Train Form[1], and fill in the "IN" column. Before leaving the workshop, the non RST requester shall report to LM supervisor and fill in the "OUT" column of the form in order to update the status their work.

Both non RST requester and LM Supervisor have to check and confirm the parts/components and working areas are in order and fit for service prior releasing the train for service.

Once completed, the form then shall be kept in the designated folder in RST foreman room.

[1] Refer to Appendices for reference numbers.

10 Appendices

No.	Document Name	Document Reference No.
1	Record Matrix – RST	G00.OMR.M11460.QB.0001.*
2	SAP – Plant Maintenance Processes, Terminology, Definition & Application of Notification & Work Order Types	G00.OMQ.M11070.CA.0001.*
3	Warehouse Operation Procedure	G00.OMM.M13500.CA.0002.*
4	Purchasing Procedure	G00.OMU.M10540.CD.0008.*
5	Train/Track Bound Vehicle Movement Into & Out of Work Areas Within Depot Procedure	G00.OMR.M11450.DS.0002.*
6	Train Release Inspection Checklist SD/HM/LM	R00.OMR.M90000.DQ.1003.*
7	Non RST Requisition to Work on Train Form	R00.TRD.M90001.DQ.1001.*

* Refer to latest version.