ERL MAINTENANCE SUPPORT SDN BHD

Co. Reg. No. 199901023674 (498574-T)



Effective Railway Operations; Reliable System Maintenance

SYSTEMS (SYS) DEPARTMENT

SIGNALLING (SIG) MAINTENANCE TECHNICAL INSTRUCTION

Ref. No. E00.OME.M12950.BT. 1001.A

Location	Reference	Rev.	Date	Page No.	Document Title
E-MAS Offices	E00.OME.M12950.BT.1001	А	26.8.2021	Page 2 of 94	Signalling (SIG) Maintenance Technical Instruction

Release

Released:	f	Ham Mow Wai	Maintenance	19.1.22	M
Checked:	ł	Anthony Arokianathan	Systems	(9.1.22	M
Checked:		Noel Devan	Systems	19 Jan 22	<u>N</u>
Checked:		Tengku Nadzuan	Systems	01.12.2021	1 Sfr
Checked:		Laxchumy	Systems	07/10/2021	forchit
Checked:		Mohd Hasan	Systems	13/10/21	Julifa
Checked:		Azuansyamsany	Systems	17.01.2022	- Augr.
Author:		Asmawi Jusoh	Systems	7/10/21	-Anni.
		Name	Dept.	Date	Signature

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

Location	Reference	Rev.	Date	Page No.	Document Title
E-MAS Offices	E00.OME.M12950.BT.1001	А	26.8.2021	Page 3 of 94	Signalling (SIG) Maintenance Technical Instruction

Change Record and Configuration Control

А	26.8.2021	Department re-structuring (ELT and SIG Merged into SYSTEMS) and Technical Instruction updated.	Tengku Nadzuan and Asmawi
Revision	Date	Modification	Name

Planning Of Changes Reference For Revision: E00.OME.M12950.BT.1001.A										
Issues To Consider	Chec	ked	(Please mark)	()	Remarks					
1) Are there any negative impact?	YES		NO	Х						
2) Will the integrity of QEMS be affected?	YES		NO	Х						
3) Resources available?	YES	Х	NO							
4) Allocation or relocation of responsibilities and authorities required?	YES		NO	х						

ERL Maintenance Support Sdn. Bhd., Kompleks Rel Udara, Bandar Baru Salak Tinggi, 43900 Sepang, Selangor Darul Ehsan

Co. Reg. No. 199901023674 (498574-T)

	Location	Reference	Rev.	Date	Page No.	Document Title
E	E-MAS Offices	E00.OME.M12950.BT.1001	А	26.8.2021	Page 4 of 94	Signalling (SIG) Maintenance Technical Instruction

TABLE OF CONTENTS

1 Purpose	6
2 Scope. Distribution & Access	6
3 Axle Counter Maintenance Technical Instruction	7
3.1 Resetting an Axle Counter	7
3.2 Re-tuning ASB Card	8
3.3 Replacement of ZBG Card	10
3.4 Replacement of ASB Card	11
3.5 Replacement of Wheel Sensor	12
3.6 Axle Counter Failure Rectification Works	13
4 Point Machine Maintenance Technical Instruction (Siemens and AZD Praha)	15
4.1 Point Machine Detection Missing	15
4.2 Point Machine "Detection Missing" and "Trailed"	16
4.3 Replacement of SIWES	17
4.4 Point Machine (No Go) Test	18
4.5 Point Machine (GO) Test	19
4.6 Replacement of Point Control Unit (PCU)	20
4.7 Point Control Unit (PCU) Relay Condition	21
5 ATP Maintenance Technical Instruction	22
5.1 ATP Trainbone	22
5.1.1 Confirming the Track Data for Train	22
5.1.2 Changing of Train Data in Units	23
5.1.3 Changing of train Data in Absolute Numbers	24
5.1.4 Keying new Time and Date at MMI	25
5.1.5 Keying New Wheel Diameter	26
5.1.6 Checking for Fault On the MMI	27
5.1.7 Clearing ATP Fault and Releasing the EB via MMI	27
5.1.8 Keying in New Position and Track number.	28
5.1.9 No Telegram Fault message	29
5.1.10 Lost Position fault	30
5.1.10 Lost Position fault (Continued)	31
5.1.11 Train ATP Computer Download	32
5.1.12 Real Time Monitoring on ATP diagnostic software	32
5.1.13 Position Measuring Probe Failure	33
5.1.14 Replacement of Wheel Pulse Generator	34
5.1.15 Wheel Pulse Generator Commissioning	35
5.2 ATP Indoor	37
5.2.1 Downloading ATP Computer in Interlocking	37
5.2.2 Inserting Speed Restriction from Interlocking	38
5.2.3 Inserting Speed Restriction from OCC	39
5.2.4 Check Inserting Speed Restriction from Interlocking.	40
5.2.5 Cancelling Speed Restriction (Interlocking and OCC)	40
5.2.6 Clearing of ATP fault (via OCC MMI & Interlocking MMI)	41
5.2.7 ATP Station borders and overlaps	41
5.3 ATP Outdoor	44
5.3.1 Measurement of Impedance Transformer	44
5.3.2 Measurement of SLA	45

Co. Reg. No. 199901023674 (498574-T)

	Location	Reference	Rev.	Date	Page No.	Document Title					
	E-MAS Offices	E00.OME.M12950.BT.1001	А	26.8.2021	Page 5 of 94	Signalling (SIG) Maintenand Technical Instruction	ce				
(5.3.3 Reading the ATP Telegram Using Train										
	6.1 Signal Transformer Voltage & Current Measurement										
6.2 Signal Transformer Voltage Measurement - Shunt Signal											
6.3 Call ON Signal Voltage Measurement											
		r Light Signais Failure Shunt & Shunt Signal Fa	iluro	•••••			.00				
	6.6 LED S	Signal Failure (KA S21 -	$\langle A S \rangle$	24 KA RS2	1 and KA R		60				
	6.7 LED S	Signal Failure (KA T31 a	nd KA	A T34)		021)	.61				
	6.8 Signal	Route Indicator Failure					.62				
	6.9 LED F	Route Indicator Failure (I	KA T3	31, KA T34	, KA S21 an	d KA S24)	.63				
7	7 Cable Ma	intenance Technical Ins	tructio	on			.64				
	7.1 Cable	Megger Testing					.64				
	7.2 Corres	pondence Test – Main S	Signa	I for Color I	_ight Signal	· · · · · · · · · · · · · · · · · · ·	.65				
	7.2 Corres	pondence Test- Main S	ignai	for Color Li	ignt Signal (d	continuea)	.66				
	7.3 Corres	spondence Test – LED S	Signal				.07				
	7.3 Corres	nondence Test – Shunt	Signa	al	ı)		69				
	7.4 Shunt	Signal Correspondence	Test	(continued)		.70				
	7.5 LED S	hunt Signal Correspond	ence	Test – LED) Shunt Sign	al	.71				
	7.5 LED S	hunt Signal Correspond	ence	Test (conti	nued)		.72				
	7.6 Corres	pondence Test – Call O	n Sig	nal			.73				
	7.6 Corres	pondence Test- Call Or	i sign	al (continue	∋d)		.74				
	7.7 Corres	pondence Test – Point	Mach	ine			.75				
	7.7 Corres	pondence Test- Point N	lachir	ne (continue	əd)		.76				
	7.8 Corres	pondence Test – Whee	I Sens	SOT	 Madal and I	nduatrania Madal	.//				
C	81 To Ba	nienance recimical inst polace I CC531 Power C	ontro	1 / RS-485 (Communica	tion Board (SAF)	.70				
	8.2 To Re	place LCC500 Micro- C	ontrol	ller Board			.79				
	8.3 To Ch	ange LCD Module (SAF	=)				.80				
	8.4 To Ch	ange Converter Card (S	ŚΑF).				.81				
	8.5 Proce	ss for Soft Reset FIA PI	DS S	oftware (SA	\ F)		.82				
	8.6 To Ch	ange Power Supply Uni	t (PS	U) for PIDS	S Display (In	dustronic Model)	.83				
	8.7 To Ch	ange Controller Card fo	r PID	S Display (Industronic I	Model)	.84				
	8.8 LED N	Module Display Card Re	place	ment (Indu	stronic Mode	əl)	.85				
	IMS Mair	ntenance lechnical instr	UCTIO	n Na Diannir	·····		.86				
	9.1 FUNCTIONS	cing and Testing Data T	ranefa	able Flatitili or Tools on	CST 70 and		.00 .87				
	9.3 TSP t	ask fail to export to File	excha	ande servei	r con 70 and	103171	.07				
	9.4 Kev in	the TMS username and	d dow	nload the l	oa File		.90				
	9.5 Perfor	m Task TSP using CD/I	DVD I	Rom at ILT	IS workstatio	on	.91				
	9.6 Resto	ration of YST 28 or YST	29 o	r both goes	s down		.92				
-	10 OPERA	TING INSTRUCTION F	OR U	IPS (Uninte	erruptable Po	ower Supply)	.93				
	10.1 UPS I	Maintenance START-UF	Proc	edure			.93				
	10.2 UPS	Maintenance BY-PASS	Proce	dure			.94				

Location	Reference	Rev.	Date	Page No.	Document Title
E-MAS Offices	E00.OME.M12950.BT.1001	А	26.8.2021	Page 6 of 94	Signalling (SIG) Maintenance Technical Instruction

1 Purpose

- 1.1 This document provides a structured guidance / process flow for the purpose of maintenance on the various SYSTEMS Signalling sub-systems.
- 1.2 This Technical Instruction / process flow is extracted from the O&M Manual and also based on the experience acquired from the daily maintenance of the SYS- Sig sub-system.
- 1.3 The guidance / process flow outlined in this document shall be used by all SYS-Sig personnel for carrying out maintenance activities as and when required.

2 Scope, Distribution & Access

- 2.1 This document is specific for the various SYS Sig sub-systems used in the ERL system.
 - 2.2 A hardcopy of this document shall be made available for each SYS Sig personnel as a personal guide. This document can also be accessed electronically via the common shared folder and Electronic Documentation Maintenance System (EDMS).

If there is any doubt in the references provided below, please refer to your superior immediately.

Location	Reference	Rev.	Date	Page No.	Document Title
E-MAS Offices	E00.OME.M12950.BT.1001	А	26.8.2021	Page 7 of 94	Signalling (SIG) Maintenance Technical Instruction

3 Axle Counter Maintenance Technical Instruction

3.1 Resetting an Axle Counter



Co. Reg. No. 199901023674 (498574-T)

Location	Reference	Rev.	Date	Page No.	Document Title
E-MAS Offices	E00.OME.M12950.BT.1001	А	26.8.2021	Page 8 of 94	Signalling (SIG) Maintenance Technical Instruction

3.2 Re-tuning ASB Card



Co. Reg. No. 199901023674 (498574-T)

Location	Reference	Rev.	Date	Page No.	Document Title
E-MAS Offices	E00.OME.M12950.BT.1001	A	26.8.2021	Page 9 of 94	Signalling (SIG) Maintenance Technical Instruction

3.2 Re-tuning ASB Card (Continued)



Co. Reg. No. 199901023674 (498574-T)

Location	Reference	Rev.	Date	Page No.	Document Title
E-MAS Offices	E00.OME.M12950.BT.1001	А	26.8.2021	Page 10 of 94	Signalling (SIG) Maintenance Technical Instruction

3.3 Replacement of ZBG Card



Co. Reg. No. 199901023674 (498574-T)



ERL Maintenance Support Sdn. Bhd., Kompleks Rel Udara, Bandar Baru Salak Tinggi, 43900 Sepang, Selangor Darul Ehsan

 Location
 Reference
 Rev.
 Date
 Page No.
 Document Title

 E-MAS Offices
 E00.OME.M12950.BT.1001
 A
 26.8.2021
 Page 12 of 94
 Signalling (SIG) Maintenance Technical Instruction

3.4 Replacement of ASB Card (Continued)



3.5 Replacement of Wheel Sensor



Location	Reference	Rev.	Date	Page No.	Document Title
E-MAS Offices	E00.OME.M12950.BT.1001	А	26.8.2021	Page 13 of 94	Signalling (SIG) Maintenance Technical Instruction

3.6 Axle Counter Failure Rectification Works



Location	Reference	Rev.	Date	Page No.	Document Title
E-MAS Offices	E00.OME.M12950.BT.1001	А	26.8.2021	Page 14 of 94	Signalling (SIG) Maintenance Technical Instruction

3.6 Axle Counter Failure Rectification Works (Continued)



Location	Reference	Rev.	Date	Page No.	Document Title
E-MAS Offices	E00.OME.M12950.BT.1001	А	26.8.2021	Page 15 of 94	Signalling (SIG) Maintenance Technical Instruction



ERL Maintenance Support Sdn. Bhd., Kompleks Rel Udara, Bandar Baru Salak Tinggi, 43900 Sepang, Selangor Darul Ehsan

Location	Reference	Rev.	Date	Page No.	Document Title
E-MAS Offices	E00.OME.M12950.BT.1001	A	26.8.2021	Page 16 of 94	Signalling (SIG) Maintenance Technical Instruction

4.2 Point Machine "Detection Missing" and "Trailed"

Do not adopt any shortcut method during this process Point position at site Right Left Check PCU last LR relay ST relay no 3 Check PCU last called position pick up picked up called position LL relay picked up Change PCU in Crank the LL relay picked up LR relay picked up consultation with point to right Supervisor Point detection Crank the Point point to Left detection UL down UL up UR up UR down Check point and ELP with Crank the point until OCC if the message the detection contacts "Detection Missing" has are properly made cleared from TMS Crank the point until the detection contacts are properly made YES Check AM relay condition Check AM NO relay condition AM relay pick up AM relay drop AM relay pick up Test a few operation AM relay drop Switch Off & On 48v detection of point. If everything Switch Off & On is normal. Release MCB 48v detection point for service. MCB Is AM relay drop Is the UR relay Done YES pick up No Yes Further NO rectification in consultation with

Supervisor

LocationReferenceRev.DatePage No.Document TitleE-MAS OfficesE00.OME.M12950.BT.1001A26.8.2021Page 17 of 94Signalling (SIG) Maintenance
Technical Instruction

4.3 Replacement of SIWES



Location	Reference	Rev.	Date	Page No.	Document Title
E-MAS Offices	E00.OME.M12950.BT.1001	А	26.8.2021	Page 18 of 94	Signalling (SIG) Maintenance Technical Instruction

4.4 Point Machine (No Go) Test

Do not adopt any shortcut method during this process



Location	Reference	Rev.	Date	Page No.	Document Title
E-MAS Offices	E00.OME.M12950.BT.1001	А	26.8.2021	Page 19 of 94	Signalling (SIG) Maintenance Technical Instruction

4.5 Point Machine (GO) Test



Co. Reg. No. 199901023674 (498574-T)

Location	Reference	Rev.	Date	Page No.	Document Title
E-MAS Offices	E00.OME.M12950.BT.1001	А	26.8.2021	Page 20 of 94	Signalling (SIG) Maintenance Technical Instruction

4.6 Replacement of Point Control Unit (PCU)



Location	Reference	Rev.	Date	Page No.	Document Title
E-MAS Offices	E00.OME.M12950.BT.1001	А	26.8.2021	Page 21 of 94	Signalling (SIG) Maintenance Technical Instruction

4.7 Point Control Unit (PCU) Relay Condition

PCU relay condition for point set to Left

	LL 🕇	PR	Ļ	ST	Ļ	AN	Ļ	AM	Ļ	TIMEF	3
LR	Ļ	L	Ļ	ST	Ť	AN	Ļ	UL	Ť	UR	↓

PCU relay condition for point set to Right

LL	\downarrow	PR	↓	ST	↓	AN	¥	AM	¥	TIMER
LR	Ť	L	Ť	ST	Ť	AN	Ļ	UL	Ļ	UR 🛉

Location	Reference	Rev.	Date	Page No.	Document Title
E-MAS Offices	E00.OME.M12950.BT.1001	А	26.8.2021	Page 22 of 94	Signalling (SIG) Maintenance Technical Instruction

5 ATP Maintenance Technical Instruction

5.1 ATP Trainbone

5.1.1 Confirming the Track Data for Train

Note: the train data has to be confirmed before the train can be moved.

The description of the train data is as given below:

L1U	: Length of one train	=	68m or 1u
B2C	: Brake code 2	=	65% or 2C
V160	: Maximum running speed	=	160km/h Currently speed 145km/h until further notice.

Follow the process below to confirm train data:



Location	Reference	Rev.	Date	Page No.	Document Title
E-MAS Offices	E00.OME.M12950.BT.1001	А	26.8.2021	Page 23 of 94	Signalling (SIG) Maintenance Technical Instruction

5.1.2 Changing of Train Data in Units



Location	Reference	Rev.	Date	Page No.	Document Title
E-MAS Offices	E00.OME.M12950.BT.1001	А	26.8.2021	Page 24 of 94	Signalling (SIG) Maintenance Technical Instruction

5.1.3 Changing of train Data in Absolute Numbers



Co. Reg. No. 199901023674 (498574-T)

Location	Reference	Rev.	Date	Page No.	Document Title
E-MAS Offices	E00.OME.M12950.BT.1001	А	26.8.2021	Page 25 of 94	Signalling (SIG) Maintenance Technical Instruction

5.1.4 Keying new Time and Date at MMI



Location	Reference	Rev.	Date	Page No.	Document Title
E-MAS Offices	E00.OME.M12950.BT.1001	А	26.8.2021	Page 26 of 94	Signalling (SIG) Maintenance Technical Instruction

5.1.5 Keying New Wheel Diameter



Location	Reference	Rev.	Date	Page No.	Document Title
E-MAS Offices	E00.OME.M12950.BT.1001	А	26.8.2021	Page 27 of 94	Signalling (SIG) Maintenance Technical Instruction

5.1.6 Checking for Fault On the MMI



5.1.7 Clearing ATP Fault and Releasing the EB via MMI

NOTE: Reset and clearing of ATP fault can be done only when the train is at complete stop.



Location	Reference	Rev.	Date	Page No.	Document Title
E-MAS Offices	E00.OME.M12950.BT.1001	А	26.8.2021	Page 28 of 94	Signalling (SIG) Maintenance Technical Instruction

5.1.8 Keying in New Position and Track number.





Location	Reference	Rev.	Date	Page No.	Document Title
E-MAS Offices	E00.OME.M12950.BT.1001	А	26.8.2021	Page 29 of 94	Signalling (SIG) Maintenance Technical Instruction

5.1.9 No Telegram Fault message



ERL Maintenance Support Sdn. Bhd., Kompleks Rel Udara, Bandar Baru Salak Tinggi, 43900 Sepang, Selangor Darul Ehsan

Co. Reg. No. 199901023674 (498574-T)

Location	Reference	Rev.	Date	Page No.	Document Title
E-MAS Offices	E00.OME.M12950.BT.1001	А	26.8.2021	Page 30 of 94	Signalling (SIG) Maintenance Technical Instruction

5.1.10 Lost Position fault



Location	Reference	Rev.	Date	Page No.	Document Title
E-MAS Offices	E00.OME.M12950.BT.1001	А	26.8.2021	Page 31 of 94	Signalling (SIG) Maintenance Technical Instruction

5.1.10 Lost Position fault (Continued)

Trainborne MMI Blank / Hang after EB.

- > Request OTD to hard reset the MCB for ATP in Cab A1 or Cab B1 for 10Second.
- Hard Reset done. Mandatory for OTD to key in the new correct position and track number.
 - OTD need to re-enter Position [40km] and Track number [0], Drive below 25Km/h until reached and aligned to the KM-Board, between OCL pole and train driver window.
 - With KM-Board number, OTD need to inform and **retrieve new position and track number from OCC**.
 - Enter new Position and Track number given by OCC only.



Co. Reg. No. 199901023674 (498574-T)

Location	Reference	Rev.	Date	Page No.	Document Title
E-MAS Offices	E00.OME.M12950.BT.1001	А	26.8.2021	Page 32 of 94	Signalling (SIG) Maintenance Technical Instruction

5.1.11 Train ATP Computer Download



5.1.12 Real Time Monitoring on ATP diagnostic software



Description on dropdown menu	Details
Display Speeds	Display actual speed of train (V-act) and maximum allowable speed by ATP (V-Moni)
Compare actual speeds	Compares the speed on all the calculators simultaneously. V-act (I, p, n) 0000,0000,0000
Compare positions	Compares the position of all the calculators simultaneously. Pos. (I, p, n) 0000000, 0000000,0000000
Real Odometer device	Shows the actual speed and the direction of travel. Vact: - 0000; dist + 0000000000
Receipt Cor. Telegram	Measures the telegram received at both the antenna. Channel 1/ Channel 2 0005/ 0006

•								
	Location	Refere	ence	Rev.	Date	Page No.	Doc	cument Title
	E-MAS Offices	E00.OME.M12	950.BT.1001	А	26.8.2021	Page 33 of 94	Signalling (Techni	SIG) Maintenance cal Instruction
	5.1.13 Positi Note: 1) Whe 2) The 3) Afte be c	on Measurin eel Pulse gen y are connect r changing th commissioned ATP MMI shows hory logged mes	ng Probe F erator (WP ted to the ju ne wheel pu d. the message ssage "Sonde	ailure G) is in unctio Ilse ge e "Whe (1 or 2	enstalled at n box by ca enerator, th el Sensor (1 2)". The whe	axle no 5 (s ables, which ie new whee or 2)" and AT el pulse gener	ide 2) and 6 n are labele el pulse ger P error rator has to	6 (side1). d. herator has to
			be che		r replaced.]
	Train shou	ld be in the mai	n workshop. (↓ Check	all the conne	ctors of the w	heel pulse ge	enerator.
Re- test	connect the con the train at test test track	nectors and track at the	YES Dis	sconne	cted?	NO	Withdraw ne pulse genera store	w wheel tor from
	Does the problem re-occur?		YES			F C th	Replaced on pulse generat on axle 5 or 6 e train at the Refer 5.1.14 for the guid	e-wheel or (either) and test test track. page 33 leline)
NC					NC	, /	Does the	ne
Peri (refo down memo	form ATP downl er 5.2.1 page 36 nload and delete ory. Release the for operation.	oad i) to the train					proble re-occu	m r? YES
\subset	DONE	,			NO	pi 5. te	nange the otr Ilse generato 1.15 (page 3- st again in th	r (refer 4) and e test YES
I							Inform super SYS-ESD	visor or

Location	Reference	Rev.	Date	Page No.	Document Title
E-MAS Offices	E00.OME.M12950.BT.1001	А	26.8.2021	Page 34 of 94	Signalling (SIG) Maintenance Technical Instruction

5.1.14 Replacement of Wheel Pulse Generator

Note: Once the Wheel Pulse Generator is suspected/ identified to be faulty, the following process is to be followed.



Location	Reference	Rev.	Date	Page No.	Document Title
E-MAS Offices	E00.OME.M12950.BT.1001	А	26.8.2021	Page 35 of 94	Signalling (SIG) Maintenance Technical Instruction

5.1.15 Wheel Pulse Generator Commissioning

Note: Follow the following procedure and tick the provided YES or NO column. For any NO
ticked, consult with SYS-ESD

Name	Staff ID	Signature	Train ID	Date

Wheel Pulse Generator 1 (Axle 05)

Switch Off trainborne ATP Computer. Disconnect DB connector for WPG02. Connect DB connector for WPG01. Switch ON trainborne ATP Computer. Connect the ATP diagnostic laptop to the ATP computer and select to view the real time for position.

- 1. Fault Indication no longer present.
- 2. Move train in direction of KLIA specific distance (min. 15m) Position measurement indication positive (+ve)
- 3. Speed Indication positive (+ve).
- 4. After _____m LEDs 3 and 4 on the position measuring interface illuminate.
- 5. The fault lamps on the Man Machine Interface on the display unit come ON.
- 6. When the fault is queried, the message "Wheel Sensor 1" at MMI displayed.

Move the Train the same distance forward (Direction KLS) using CAB 2

- 7. Position measurement indication negative (-ve).
- 8. Speed indication negative (-ve).
- 9. Move forwards at a defined speed in accordance with the analogue tachometer. The indicated speed on the display unit is correct.

for position.							
YES	NO						

Location	Reference	Rev.	Date	Page No.	Document Title
E-MAS Offices	E00.OME.M12950.BT.1001	А	26.8.2021	Page 36 of 94	Signalling (SIG) Maintenance Technical Instruction

5.1.15 Wheel Pulse Generator Commissioning (Continued)

Note: Follow the following procedure and tick the provided YES or NO column. For any NO ticked, consult with SYS-ESD.

Name	Staff ID) Signature		Date

YES

NO

Wheel Pulse Generator 2 (Axle 06)

Switch Off trainborne ATP Computer. Disconnect DB connector for WPG01. Connect DB connector for WPG02. Switch ON trainborne ATP Computer. Connect the ATP diagnostic laptop to the ATP computer and select to view the real time for position.

- 1. Fault Indication no longer present.
- 2. Move train in direction of KLIA specific distance (min. 15m) Position measurement indication positive (+ve)
- 3. Speed Indication positive (+ve).
- 4. After _____m LEDs 1 and 2 on the position measuring interface illuminate.
- 5. The fault lamps on the Man Machine Interface on the display unit come ON.
- 6. When the fault is queried, the message "Wheel Sensor 2" at MMI displayed.

Move the Train the same distance forward (direction KLS) using CAB 2

- 7. Position measurement indication negative (-ve).
- 8. Speed indication negative (-ve).
- 9. Move forwards at a defined speed in accordance with the analogue tachometer. The indicated speed on the display unit is correct.
| Location | Reference | Rev. | Date | Page No. | Document Title |
|---------------|------------------------|------|-----------|---------------|---|
| E-MAS Offices | E00.OME.M12950.BT.1001 | А | 26.8.2021 | Page 37 of 94 | Signalling (SIG) Maintenance
Technical Instruction |

5.2 ATP Indoor

5.2.1 Downloading ATP Computer in Interlocking

Note: Ensure there are no trains moving in the section when doing the ATP download.



Location	Reference	Rev.	Date	Page No.	Document Title
E-MAS Offices	E00.OME.M12950.BT.1001	А	26.8.2021	Page 38 of 94	Signalling (SIG) Maintenance Technical Instruction

5.2.2 Inserting Speed Restriction from Interlocking

Note: Under normal condition, the ATP MMI in the interlocking is inactive and has to be activated by requesting from OCC.







Location	Reference		Date	Page No.	Document Title
E-MAS Offices	E00.OME.M12950.BT.1001	А	26.8.2021	Page 41 of 94	Signalling (SIG) Maintenance Technical Instruction

5.2.6 Clearing of ATP fault (via OCC MMI & Interlocking MMI)



5.2.7 ATP Station borders and overlaps





BANDAR TASIK SELATAN (BTS)



Location	Reference	Rev.	Date	Page No.	Document Title
E-MAS Offices	E00.OME.M12950.BT.1001		26.8.2021	Page 42 of 94	Signalling (SIG) Maintenance Technical Instruction

CROSSOVER (XA)



	Location	Reference	Rev.	Date	Page No.	Document Title	
	E-MAS Offices	E00.OME.M12950.BT.1001	А	26.8.2021	Page 43 of 94	Signalling (SIG) Maintenance Technical Instruction	
	KUALA LUMPU	IR INTERNATIONAL AIRPO	<u>)RT</u>	<u>(KA)</u>			
ļ	48'360	56'180					
	I					I	
I	I I I To STS			- -			
						To KLIA2	
	KUALA LUMPU	IR INTERNATIONAL AIRPO	<u>0RT 2</u>		<u>(KA2)</u>		
:	56'180					58'270.5	
I	 					 	
.	To KLIA					End of KLIA2	

Location	Reference	Rev.	Date	Page No.	Document Title
E-MAS Offices	E00.OME.M12950.BT.1001	А	26.8.2021	Page 44 of 94	Signalling (SIG) Maintenance Technical Instruction

5.3 ATP Outdoor

5.3.1 Measurement of Impedance Transformer





Location	Reference	Rev.	Date	Page No.	Document Title
E-MAS Offices	E00.OME.M12950.BT.1001	А	26.8.2021	Page 46 of 94	Signalling (SIG) Maintenance Technical Instruction

5.3.3 Reading the ATP Telegram Using Train



Location	Reference	Rev.	Date	Page No.	Document Title
E-MAS Offices	E00.OME.M12950.BT.1001	А	26.8.2021	Page 47 of 94	Signalling (SIG) Maintenance Technical Instruction

5.3.4 Measurement of ATP loop cable resistance



Co. Reg. No. 199901023674 (498574-T)

Location	Reference	Rev.	Date	Page No.	Document Title
E-MAS Offices	E00.OME.M12950.BT.1001	А	26.8.2021	Page 48 of 94	Signalling (SIG) Maintenance Technical Instruction

5.3.5 IW, Transmitter and ATP loop configuration

Station	Transmitter no:	IW & SLA	Signals and point affected	Call and Advise OCC
	1	IW 01/01 (KM100+264) SLA 01/01 (KM100+000))	Signals: N34, T34, N33, T33, T32, N32, T31, N31, S27, N42 Points: 201,202,302,223,322,323,221	 Override all signal and points. All trains shall proceed with max speed lower than 80km/h from KM 0-979 to KM 0-270. Note: Advice OCC to run Trains via Bi- directional and override element if the Trains EB for 2 or more consecutive signal occurred
KLS	2	IW 01/ 02 (KM100+620) SLA 01/02 (KM1.400)	Signal: N23, N22, T42, T43, N13, N12, T3011, RN13, N2013 Points: 325,326,225,226	 Override all signal and points. All trains shall proceed with max speed lower than 80km/h from KM 0-270 to KM1.400 Note: Advice OCC to run Trains via Bi- directional and override element if the Trains EB for 2 or more consecutive signal occurred.
	3	IW 01/03 (KM 3.400) SLA 01/03 (KM1.401)	Signal: T3021, N2023, T3023, N2029 Points: Nil	 Override all signal and points. All trains shall proceed with max speed lower than 80km/h from KM 1.400 to KM 3.700 Note: Advice OCC to run Trains via Bi- directional and override element if the Trains EB for 2 or more consecutive signal occurred.
	4	IW 01/04 (KM 3.700) SLA 01/04 (KM5.876)	Signals: T3039, N2039, T3051, N2049 Points: Nil	 Override all signal and points. All trains shall proceed with max speed lower than 80km/h from KM 3.700 to KM 6.000. Note: Advice OCC to run Trains via Bi- directional and override element if the Trains EB for 2 or more consecutive signal occurred.

Loc	ation		Reference	Rev.	Date	Page No.	Documen	t Title	
E-MAS	Offices	E00.OM	E.M12950.BT.1001	A 26.8.2021 Page 49 of 94 Signalling (SIG Technical		Signalling (SIG) N Technical Ins	Maintenance struction		
	IW 08/01 (Km 8.29) Signals: N2059, T3063, N2069, T3073, R T22 N2077, T23, T22 SLA 08/01 (Km 5.88) Points: Nil					 Override all signal and points. All trains shall proceed with max speed lower than 80km/h from KM 5.900 to KM 8.300. Note: Advice OCC to run Trains via Bi- directional and override element if the Trains EB for 2 or more consecutive signal occurred. 			
BTS		2	IW 08/02 (Km 8.93) SLA 08/02 (Km 8.23)	Signals N31, N Points	s; 32, T31, T32 : 2 305 206 3;	2, T33, T34, N3	33, N34	 Override all signal and points. All trains shall proceed with max speed lower than 80km/h from KM 8.200 to KM 9.500. Note: Advice OCC to run Trains via Bi- 	
BTS		3	(Km 8.23) IW 08/03 (Km 9.22) SLA 08/03 (Km 11.41)	Signals N23, N Points Nil	s: 22, T3097, F	RN 23, N2015,	T3113	 Override a Override a All trains s than 80km Note: Advidirectional EB for 2 or 	and override element if the Trains more consecutive signal occurred. all signal and points. shall proceed with max speed lower i/h from KM 9.100 to KM 11.400. ce OCC to run Trains via Bi- and override element if the Trains more consecutive signal occurred.
ХА		1	IW 16/01 (KM 13.700) SLA 16/01 (KM 11.414)	Signals N2115 Points Nil	s: , T3125, N21	125		- Override a - All trains s than 80km Note: Advi directional EB for 2 or	all signal and points. Shall proceed with max speed lower b/h from KM 11.400 to KM 13.700. Ce OCC to run Trains via Bi- and override element if the Trains more consecutive signal occurred.

Loc	Location R		Reference	Rev.	Date	Page No.	Documen	t Title			
E-MAS	AS Offices E00.OME.M12950.BT.1001 A 26.8.2021 Page 50 of 94 Signalling (SIG) Technical In		Signalling (SIG) N Technical Ins	Maintenance struction							
		2	IW 16/02 (KM 13.700) SLA 16/02 (KM 15.800)	Signal T3135 Points Nil	; , N2135, T31	45, RT 22, N2	151	 Override all signal and points. All trains shall proceed with max speed lower than 80km/h from KM 13.7 to KM 15.8. Note: Advice OCC to run Trains via Bi- directional and override element if the Trains EB for 2 or more consecutive signal occurred. 			
		3	IW 16/03 (KM 17.100) SLA 16/03 (KM 15.801)	Signal T23, T Points 302.20	: 22, N33, N32 : 2	2		 Override a All trains s than 80km Note: Advi directional 	verride all signal and points. Il trains shall proceed with max speed lower an 80km/h from KM 15.800 to KM 17.100. te: Advice OCC to run Trains via Bi-		
ХА		4	IW 16/04 (KM 17.101) SLA 16/04	Signal T33, N Points	23, T32, N22	2, T3193		EB for 2 or - Override a - All trains s than 80km Note: Advi	more consecutive signal occurred. all signal and points. shall proceed with max speed lower h/h from KM 17.1 to KM 19.200. ce OCC to run Trains via Bi-		
		5	(KM 19.200) IW 16/05 (KM 21.300) SLA 16/05 (KM 19.201)	Signal: RN 23 Points: Nil	25 , N 2195, T 3	3207, N 2207		- Override a - All trains s than 80km Note: Advi directional	and override element if the Trains more consecutive signal occurred. all signal and points. shall proceed with max speed lower h/h from KM 19.200 to KM 21.300. ce OCC to run Trains via Bi- and override element if the Trains		
		6	IW 16/06 (KM 21.301) Signal: N 2221. T 3227 SLA 16/06 (KM 23.739) Points: Nil						all signal and points. shall proceed with max speed lower h/h from KM 21.300 to KM 23.500. ce OCC to run Trains via Bi- and override element if the Trains more consecutive signal occurred.		

Loc	ation		Reference	Rev.	Date	Page No.	Documen	t Title	
E-MAS	Offices	E00.OM	E.M12950.BT.1001	A	26.8.2021	Page 51 of 94	Signalling (SIG) N Technical Ins	Maintenance struction	
		1	IW 31/01 (KM26.050) SLA 31/01 (KM 23.740)	Signals N2235 Points: Nil	s: , T 3247, N2	251		 Override a All trains s than 80km Note: Advi directional EB for 2 or 	all signal and points. shall proceed with max speed lower n/h from KM 23.500 to KM 26.100. ce OCC to run Trains via Bi- and override element if the Trains more consecutive signal occurred.
		2	IW 31/02 (KM26.050) SLA 31/02	Signals T 3267 Points:	s: /, N 2267, R1	Γ 12, N 2281		- Override a - All trains s than 80km Note: Advi	all signal and points. shall proceed with max speed lower n/h from KM 26.000 to KM 28.500. ce OCC to run Trains via Bi-
			(KW 28.500) IW 31/03	Signal				EB for 2 or - Override a - All trains s	all signal and points. shall proceed with max speed lower
PJS		3	(KM 30.560) SLA 31/03 (KM 28.501)	T13, T Points: 302,20	12, N43, N42 2	2, T23, T22		than 80km Note: Advidirectional EB for 2 or	h/h from KM 28.500 to KM 30.600. ce OCC to run Trains via Bi- and override element if the Trains more consecutive signal occurred.
		4	IW 31/04 (KM 31.360)	Signals N34, N	s: 133, N32, N3	1, T34, T33, T	32, T31	- Override a - All trains s than 80km	all signal and points. shall proceed with max speed lower n/h from KM 30.600 to KM 31.700.
			SLA 31/04 (KM 31.480)	Points: 305,20	6,322,221,32	25,225		Note: Advi directional EB for 2 or	ce OCC to run Trains via Bi- and override element if the Trains more consecutive signal occurred.
		5	IW 31/05 (KM 31.400)	Signals N 23, N	s: N 22, T 3325			- Override a - All trains s than 80km	all signal and points. shall proceed with max speed lower n/h from KM 31.300 to KM 33.600.
		5	SLA 31/05 (KM 33.600)	Points: Nil				Note: Advi directional EB for 2 or	ce OCC to run Trains via Bi- and override element if the Trains more consecutive signal occurred.

	Loca	ation		Reference	Rev.	Date	Page No.	Documen	t Title	
	E-MAS	Offices	E00.OM	E.M12950.BT.1001	A	26.8.2021	Page 52 of 94	Signalling (SIG) N Technical Ins	Maintenance struction	
	PJS		6	IW 31/06 (KM 36.000) SLA 31/06 (KM 33.601)	Signals RN 23 Points Nil	s: , T 3345, N 2 :	2341, N 2359		 Override a All trains s than 80km Note: Advi directional EB for 2 or 	all signal and points. shall proceed with max speed lower h/h from KM 33.600 to KM 36.00. ce OCC to run Trains via Bi- and override element if the Trains more consecutive signal occurred.
			7	IW 31/07 (KM 36.001) SLA 31/07	Signals T 3361 Points:	s: , T3377, N 2	377		- Override a - All trains s than 80km Note: Advi	all signal and points. shall proceed with max speed lower h/h from KM 36.000 to KM 38.400 ce OCC to run Trains via Bi-
			(KM 38.418) Nil						directional EB for 2 or	and override element if the Trains more consecutive signal occurred.
			1	IW 46/01 (KM 40.500)	Signals T3397	s: , N2397			- Override a - All trains s than 80km	all signal and points. shall proceed with max speed lower n/h from KM 38.400 to KM 40.500.
				SLA 46/01 (KM 38.419)	Points: Nil				Note: Advi directional EB for 2 or	ce OCC to run Trains via Bi- and override element if the Trains more consecutive signal occurred.
Š	STS		2	IW 46/02 (KM 40.501)	Signals T3415	s: , RT 12, N 24	417		- Override a - All trains s than 80km	all signal and points. shall proceed with max speed lower n/h from KM 40.500 to KM 42.600.
				SLA 46/02 (KM 42.600)	Points: Nil	:			Note: Advi directional EB for 2 or	ce OCC to run Trains via Bi- and override element if the Trains more consecutive signal occurred.
			3	IW 46/03 (KM 44.155)	Signals N53, T	s: 13, N52, T12	2, T15		- Override a - All trains s than 80km	all signal and points. shall proceed with max speed lower h/h from KM 42.600 to KM 44.100.
			5	SLA 46/03 (KM 42.601)	Points: 302,20	2,206,106			Note: Advi directional EB for 2 or	ce OCC to run Trains via Bi- and override element if the Trains more consecutive signal occurred.

Co. Reg. No. 199901023674 (498574-T)

Loc	ation		Reference	Rev.	Date	Page No.	Documen	t Title	
E-MAS	Offices	E00.OM	E.M12950.BT.1001	A	26.8.2021	Page 53 of 94	Signalling (SIG) N Technical Ins	Maintenance struction	
		4	IW 46/04 (KM 45.999) SLA 46/04 (KM 44.055)	Signals N43, T Points 325	s: 23, N42, T22	2		 Override a All trains s than 80km Note: Advi directional EB for 2 or 	all signal and points. shall proceed with max speed lower n/h from KM 44.000 to KM 46.000 ce OCC to run Trains via Bi- and override element if the Trains more consecutive signal occurred.
STS		5	IW 46/05 (KM 45.920) SLA 46/05 (KM 44.570)	Signals T35, N Points 106, 10	s: 45, N46 5 08, 508, 901			- Override a - Speed res Note: Advi directional EB for 2 or	all signal and points. striction not required. ce OCC to run Trains via Bi- and override element if the Trains more consecutive signal occurred.
		6	IW 46/06 (KM 46.100) SLA 46/06 (KM 45.670)	Signals N31, T Points 114,11	s: 32, T31, T36 5,216,221	3		 Override a All trains s than 80km Note: Advidirectional EB for 2 or 	all signal and points. shall proceed with max speed lower h/h from KM 45.800 to KM 46.500. ce OCC to run Trains via Bi- and override element if the Trains more consecutive signal occurred.
	7 7 8 IW 46/07 (KM 48.000) 8 IA 46/07 (KM 46.000)			Signals N34, N Points 322, 3	s: 133, T34, T33 25, 225	3, N23, T 3476,	, N22	 Override a All trains s than 80km Note: Advi directional EB for 2 or 	all signal and points. shall proceed with max speed lower n/h from KM 46.000 to KM 48.000. ce OCC to run Trains via Bi- and override element if the Trains more consecutive signal occurred.
STS		8	IW 46/08 (KM 48.001) SLA 46/08 (KM 50.360)	Signals RN 23 Points Nil	s: , T 3491, N24	487, T3503, N2	2503	 Override a All trains s than 80km Note: Advi directional EB for 2 or 	all signal and points. shall proceed with max speed lower h/h from KM 48.000 to KM 50.400 ce OCC to run Trains via Bi- and override element if the Trains more consecutive signal occurred.

Γ	Loca	ation		Reference	Rev.	Date	Page No.	Documen	t Title	
	E-MAS	Offices	E00.OM	E.M12950.BT.1001	A	26.8.2021	Page 54 of 94	Signalling (SIG) N Technical Ins	Maintenance struction	
			1	IW 55/01 (KM 52.500) SLA 55/01 (KM 50.361)	Signals T3517 Points Nil	s: 7, N2517, N2 :	503		 Override a All trains s than 80km Note: Advi directional EB for 2 or 	all signal and points. Shall proceed with max speed lower I/h from KM 50.200 to KM 52.500. CE OCC to run Trains via Bi- and override element if the Trains more consecutive signal occurred.
		:	2	IW 55/02 (KM 52.501)	Signals T3533	s: , N2533, RT ⁻	12, T13, T12, N	12541	- Override a - All trains s than 80km	all signal and points. shall proceed with max speed lower n/h from KM 52.500 to KM 54.7.
к	LIA			SLA 55/02 (KM 54.700)	SLA 55/02 Points: (KM 54.700) Nil					ce OCC to run Trains via Bi- and override element if the Trains more consecutive signal occurred.
		:	3	IW 55/03 (KM 54.701)	Signals N43, N	s: I42, T23, N3	3, T33, N34, T	34, S24, T44	- Override a - All trains s than 80km	all signal and points. shall proceed with max speed lower //h from KM 54.700 to KM 56.1
				SLA 55/03 (KM 56.140)	Points: 302,20	:)3,303,322,4	21,425,426		Note: Advi directional EB for 2 or	ce OCC to run Trains via Bi- and override element if the Trains more consecutive signal occurred.
к	LIA2		4	IW 55/04 (KM 55.015)	55/04 Signals: 55.015) N32, T32, T31, S21, T41, RS21, RS24				- Override a - All trains s than 80km	all signal and points. shall proceed with max speed lower n/h from KM 55.000 to KM 58.256.
				SLA 55/04 (KM 58.256)	Points 20120	: 3,303,221,12	2,125,126,425	,426	Note: Advi directional EB for 2 or	ce OCC to run Trains via Bi- and override element if the Trains more consecutive signal occurred.

Co. Reg. No. 199901023674 (498574-T)

Location	Reference	Rev.	Date	Page No.	Document Title
E-MAS Offices	E00.OME.M12950.BT.1001	A	26.8.2021	Page 55 of 94	Signalling (SIG) Maintenance Technical Instruction

6 Signal Maintenance Technical Instruction

6.1 Signal Transformer Voltage & Current Measurement



Location	Reference	Rev.	Date	Page No.	Document Title
E-MAS Offices	E00.OME.M12950.BT.1001	А	26.8.2021	Page 56 of 94	Signalling (SIG) Maintenance Technical Instruction

6.2 Signal Transformer Voltage Measurement - Shunt Signal



Location	Reference	Rev.	Date	Page No.	Document Title
E-MAS Offices	E00.OME.M12950.BT.1001	А	26.8.2021	Page 57 of 94	Signalling (SIG) Maintenance Technical Instruction

6.3 Call ON Signal Voltage Measurement



Co. Reg. No. 199901023674 (498574-T)



Co. Reg. No. 199901023674 (498574-T)

Location	Reference	Rev.	Date	Page No.	Document Title
E-MAS Offices	E00.OME.M12950.BT.1001	A	26.8.2021	Page 59 of 94	Signalling (SIG) Maintenance Technical Instruction

6.5 LED Shunt & Shunt Signal Failure



ERL Maintenance Support Sdn Bhd Co. Reg. No. 1999

Co. Reg. No. 199901023674 (498574-T)

Location	Reference	Rev.	Date	Page No.	Document Title
E-MAS Offices	E00.OME.M12950.BT.1001	А	26.8.2021	Page 60 of 94	Signalling (SIG) Maintenance Technical Instruction

6.6 LED Signal Failure (KA S21, KA S24, KA RS21 and KA RS24)



Co. Reg. No. 199901023674 (498574-T)

Loca	ation	Reference	Rev.	Date	Page No.	Document Title
E-MAS	Offices	E00.OME.M12950.BT.1001	А	26.8.2021	Page 61 of 94	Signalling (SIG) Maintenance Technical Instruction

6.7 LED Signal Failure (KA T31 and KA T34)



Co. Reg. No. 199901023674 (498574-T)





Co. Reg. No. 199901023674 (498574-T)

Location	Reference	Rev.	Date	Page No.	Document Title
E-MAS Offices	E00.OME.M12950.BT.1001	A	26.8.2021	Page 64 of 94	Signalling (SIG) Maintenance Technical Instruction

7 Cable Maintenance Technical Instruction

7.1 Cable Megger Testing



Location	Reference	Rev.	Date	Page No.	Document Title
E-MAS Offices	E00.OME.M12950.BT.1001	А	26.8.2021	Page 65 of 94	Signalling (SIG) Maintenance Technical Instruction

7.2 Correspondence Test – Main Signal for Color Light Signal

This test to be conducted after repairing or replacing of cables and also after continuity and megger test. Route is in released condition. Main and shunt signal is at "stop" aspect, Call ON signal is blank.



-					e et i tegi i				
	Location	Reference	Rev.	Date	Page No.	Document Title			
	E-MAS Offices	E00.OME.M12950.BT.1001	Α	26.8.2021	Page 66 of 94	Signalling (SIG) Maintenance Technical Instruction			
7	7.2 Correspondence Test- Main Signal for Color Light Signal (continued)								
	Signal must show Yellow aspect.								
	Confirm with OCC the same aspect is showing on TMS.								
		Remove yel	low as	pect bulb.					
			¥		.]				
		Check the status of	RM re	elay. It must c	drop.				
	Г	Chook TMC massage "Ma		al Aspest" m		1			
		Check TWIS message. Ma	in Sigr	nal Aspect In	iust appear.				
		Benlac	♦ • the l	bulb					
		Періас							
		TMS fault me	▼ ssage	disappear.					
		Request OCC to	set th	e ahead route	e.				
			↓ I						
		The signal under	test m	nust show gre	een.				
			↓ ↓			_			
		Confirm with OCC the sam	ie aspe	ect is showing	g on TMS				
	Remove green aspect bulb								
	Check the status of RM relay. It must drop.								
	Check TMS message. "Main Signal Aspect" must appear.								
	Replace bulb. TMS fault message must disappear.								
	×								
	Completed								



Co. Reg. No. 199901023674 (498574-T)

Location	Reference	Rev.	Date	Page No.	Document Title
E-MAS Offices	E00.OME.M12950.BT.1001	А	26.8.2021	Page 68 of 94	Signalling (SIG) Maintenance Technical Instruction

7.3 Correspondence Test – LED Signal (continued)



Co. Reg. No. 199901023674 (498574-T)

Location	Reference	Rev.	Date	Page No.	Document Title
E-MAS Offices	E00.OME.M12950.BT.1001	A	26.8.2021	Page 69 of 94	Signalling (SIG) Maintenance Technical Instruction

7.4 Correspondence Test – Shunt Signal



Location	Reference	Rev.	Date	Page No.	Document Title
E-MAS Offices	E00.OME.M12950.BT.1001	А	26.8.2021	Page 70 of 94	Signalling (SIG) Maintenance Technical Instruction

7.4 Shunt Signal Correspondence Test (continued)



Location	Reference	Rev.	Date	Page No.	Document Title
E-MAS Offices	E00.OME.M12950.BT.1001	A	26.8.2021	Page 71 of 94	Signalling (SIG) Maintenance Technical Instruction

7.5 LED Shunt Signal Correspondence Test – LED Shunt Signal




Co. Reg. No. 199901023674 (498574-T)

Location	Reference	Rev.	Date	Page No.	Document Title
E-MAS Offices	E00.OME.M12950.BT.1001	A	26.8.2021	Page 73 of 94	Signalling (SIG) Maintenance Technical Instruction

7.6 Correspondence Test – Call On Signal

This test to be conducted after repairing or replacing of cables and also after continuity and megger test. Route is in released condition. Call ON signal is Blank.



ERL Maintenance Support Sdn. Bhd., Kompleks Rel Udara, Bandar Baru Salak Tinggi, 43900 Sepang, Selangor Darul Ehsan

Co. Reg. No. 199901023674 (498574-T)



Co. Reg. No. 199901023674 (498574-T)

Location	Reference	Rev.	Date	Page No.	Document Title
E-MAS Offices	E00.OME.M12950.BT.1001	Α	26.8.2021	Page 75 of 94	Signalling (SIG) Maintenance Technical Instruction

7.7 Correspondence Test – Point Machine

This test to be conducted after repairing or replacing of cables or point machine and also after continuity and megger test. Route is in released condition. Point is unlocked. MCB for the said Point machine (3phase & 48vdc) is OFF. Set Point-lock (scotch) to the same position as the PCU last operated position.



Location	Reference	Rev.	Date	Page No.	Document Title
E-MAS Offices	E00.OME.M12950.BT.1001	А	26.8.2021	Page 76 of 94	Signalling (SIG) Maintenance Technical Instruction

7.7 Correspondence Test – Point Machine (continued)



Co. Reg. No. 199901023674 (498574-T)

Location	Reference	Rev.	Date	Page No.	Document Title
E-MAS Offices	E00.OME.M12950.BT.1001	Α	26.8.2021	Page 77 of 94	Signalling (SIG) Maintenance Technical Instruction

7.8 Correspondence Test – Wheel Sensor



Location	Reference	Rev.	Date	Page No.	Document Title
E-MAS Offices	E00.OME.M12950.BT.1001	А	26.8.2021	Page 78 of 94	Signalling (SIG) Maintenance Technical Instruction

8 PIDS Maintenance Technical Instruction For SAF Model and Industronic Model.

8.1 To Replace LCC531 Power Control / RS-485 Communication Board (SAF)



Co. Reg. No. 199901023674 (498574-T)

Location	Reference	Rev.	Date	Page No.	Document Title
E-MAS Offices	E00.OME.M12950.BT.1001	А	26.8.2021	Page 79 of 94	Signalling (SIG) Maintenance Technical Instruction

8.2 To Replace LCC500 Micro – Controller Board



Location	Reference	Rev.	Date	Page No.	Document Title
E-MAS Offices	E00.OME.M12950.BT.1001	А	26.8.2021	Page 80 of 94	Signalling (SIG) Maintenance Technical Instruction

8.3 To Change LCD Module (SAF)



Co. Reg. No. 199901023674 (498574-T)



Co. Reg. No. 199901023674 (498574-T)

Location	Reference	Rev.	Date	Page No.	Document Title
E-MAS Offices	E00.OME.M12950.BT.1001	А	26.8.2021	Page 82 of 94	Signalling (SIG) Maintenance Technical Instruction

8.5 Process for Soft Reset FIA PIDS Software (SAF)



Note:

Soft-reset only can be done at Depot Interlocking and after approval from Supervisor or Superior and OCC.

Location	Reference	Rev.	Date	Page No.	Document Title
E-MAS Offices	E00.OME.M12950.BT.1001	А	26.8.2021	Page 83 of 94	Signalling (SIG) Maintenance Technical Instruction

8.6 To Change Power Supply Unit (PSU) for PIDS Display (Industronic Model).



Location	Reference	Rev.	Date	Page No.	Document Title
E-MAS Offices	E00.OME.M12950.BT.1001	А	26.8.2021	Page 84 of 94	Signalling (SIG) Maintenance Technical Instruction

8.7 To Change Controller Card for PIDS Display (Industronic Model).



Location	Reference	Rev.	Date	Page No.	Document Title
E-MAS Offices	E00.OME.M12950.BT.1001	Α	26.8.2021	Page 85 of 94	Signalling (SIG) Maintenance Technical Instruction

8.8 LED Module Display Card Replacement (Industronic Model).



Co. Reg. No. 199901023674 (498574-T)

Location	Reference	Rev.	Date	Page No.	Document Title
E-MAS Offices	E00.OME.M12950.BT.1001	А	26.8.2021	Page 86 of 94	Signalling (SIG) Maintenance Technical Instruction

9 TMS Maintenance Technical Instruction

9.1 Functions of Abbreviation in the Timetable Planning

D- Availability stop

Causes the next set point to not setting automatically. As the train approaches, 'Operate signals' request will be activated.

H- Absolute stop

Same as D, except without an 'Operate Signals' request.

A (K)- Waiting for connection

Next set point is not set until the reference train has reached the programmed place and the connection time programmed in the system has elapsed.

B (K)- Waiting for delay

The next set point is not set until the reference train has reached the programmed place.

T (K)- Departure time

The next set point is not set until the departure time is reached.

S- Setting-back train

Drive train in the opposite direction with the same train number.

W- Push and Pull train

Travels in the opposite direction with a new train number.

N- New train number during stop

The new train number can be changed during a stop,

M- New train number on a moving train

Train number is changed when the train passes the station.

Z- Stop at the block signal

If a train has to stop at a block signal lying along the routes, a Z is programmed. Without a Z, the corresponding track is used as a diversion point for trains passing through.

F- Train number stepping

This function is used to step a train number to any routing track.

X-Interruption in the route

Set at the place where the train left the train guidance zone. The routing track where the train re-enters the train guidance zone is programmed as the next routing track.

V- Delayed start

The driving position for a signal may be delayed in order to put back the start of barrier procedure in case of trains that stop or in order to prevent the premature blocking of the other routes.

Co. Reg. No. 199901023674 (498574-T)

Location	Reference	Rev.	Date	Page No.	Document Title
E-MAS Offices	E00.OME.M12950.BT.1001	А	26.8.2021	Page 87 of 94	Signalling (SIG) Maintenance Technical Instruction

9.2 Checking and Testing Data Transfer Tools on CST 70 and CST 71.



Location	Reference	Rev.	Date	Page No.	Document Title
E-MAS Offices	E00.OME.M12950.BT.1001	А	26.8.2021	Page 88 of 94	Signalling (SIG) Maintenance Technical Instruction

9.3 TSP task fail to export to File exchange server.

- 1. If the tool no longer works, error messages are displayed on the user interface. These messages are not always written to the log file.
- 2. The lines "Last Transfer time <computer>" show the last transfers. This is useful for tests. If a file is changed on the computer with the monitored directory, e.g. new file name, the display should refresh.

ILTIS Da	ta Transfer Tool		
	Last Transfer Time Maintenance:	2018-12-03 20:41	:23
Stop	Last Transfer Time Supervisor:	2018-12-03 20:43	:33
Version 1.0.	.0.4	Copy Structure	Admin

- 3. You need full access to the directories and this only works with iadmin <password>. Best practice for configuring this:
 - 1. Login as support and Password as xxxxxx
 - 2. Open Total Commander \rightarrow (Right click to run as administrator)
 - 3. Map a network drive (Net)

Bles Bark commands bet Shoe	Configuration Start Lab 105 25k *	👻 🔊 🥝 🌪 🔤 🔤 兴
TOXilisV.* Name Ext [] [iadmin] [install] [releases] [sites] [support]	Map Network Drive Map Network Drive X Attempting to connect to \\10.3.5.70\iltisap Cancel	IX
Windows Security Enter Network Password Enter your password to connect to: 10.3.5.70 iadmin iadmin Domain: CST81 Remember my credentials OK	Y: (\\10.3.5.70\ildisap) Image: state	Browse

- 4. Choose any drive letter and key in the path of the remote (both WorkStation)
 - X: $\underline{\times 10.3.5.70} = \underline{\times 10.3.5.70}$
 - Y: <u>\\10.3.24.71\iltisap</u> → <u>OCS Workstation</u>
- 5. Click reconnect at logon and connect using different credentials
- Enter network password; use iadmin <password>, this step must be done by SYS-SIG TMS Administrator staff.

Location	Reference	Rev.	Date	Page No.	Ľ	Document Title	
E-MAS Offices	E00.OME.M12950.BT.1001	A	26.8.2021	Page 89 of 94	Signallin Tecł	g (SIG) Maintena nnical Instruction	nce
Windo Ente	Bes Bark Commands Bark Show Image: Show Bark Bark </td <td>Configuration Lab '05 22 ccd '06 SC 368764 k fi Map Netwo Attemptir</td> <td>n Start. Sk ★ Sk A Start. ree work Drive with Drive mg to connect to \\10.3.5. Canc X \Y: (\\10.3.5.70\it Example: \\serve Ø Beconnect a</td> <td>R S S S S S S S S S S S S S S S S S S S</td> <td>Initian Initian Initian</td> <td></td> <td>×</td>	Configuration Lab '05 22 ccd '06 SC 368 764 k fi Map Netwo Attemptir	n Start. Sk ★ Sk A Start. ree work Drive with Drive mg to connect to \\10.3.5. Canc X \Y: (\\10.3.5.70\it Example: \\serve Ø Beconnect a	R S S S S S S S S S S S S S S S S S S S	Initian Initian		×
Domain: C5T81 Z Remember my credentials OK Cancel			Connect usin	ng different gredentials eb site that you can use to s	tore your documer	nts and pictures.	

- 7. Logon File Exchange Server (NMS)
 - Login as Iltisexport and enter password SigILTIS2017
 - Double click FILE and choose Data Export. •
 - Choose File Maintenance and check all folder and file. •
 - Log out. •

Elles Mark Commands Net Sho	g Configuration Start	
2 😼 👯 💡 😪 🚓	y.cd '06 S0k * * * * * * * * * *	🛃 🛃 🐏 🜒 🥥 🌺 🔤 🔤 兴
D - [iltis] 73'273'560 k of 9	4'368'764 k free \ \	D - [iltis] 73'273'560 k of 94'368'764 k free
■ D:\illis*.**	Ap Network Drive	X
+ Name Ex	Map Network Drive	X
12 [] □ [iadmin] □ [install] □ [releases] □ [sites] □ [support]	Attempting to connect to \\10.3.5.70\iltisap Cancel	y want to connect to:
Windows Security	Y: (\\10.3.5.70\iltisap)	
Enter Network Password	\\10.3.5.70\iltisap	Browse
Enter your password to connect to: 10.3.5.70	Example: \\server\share	
iadmin	 <u>Reconnect at logon</u> <u>Connect using different credentials</u> 	
Domain: CST81	<u>Connect to a Web site that you can us</u>	e to store your documents and pictures.
OK	Cancel	

Location	Reference	Rev.	Date	Page No.	Document Title
E-MAS Offices	E00.OME.M12950.BT.1001	А	26.8.2021	Page 90 of 94	Signalling (SIG) Maintenance Technical Instruction

9.4 Key in the TMS username and download the log File



ERL Maintenance Support Sdn Bhd Co. Reg. No

Co. Reg. No. 199901023674 (498574-T)

Location	Reference	Rev.	Date	Page No.	Document Title
E-MAS Offices	E00.OME.M12950.BT.1001	А	26.8.2021	Page 91 of 94	Signalling (SIG) Maintenance Technical Instruction

9.5 Perform Task TSP using CD/DVD Rom at ILTIS workstation



Location	Reference	Rev.	Date	Page No.	Document Title
E-MAS Offices	E00.OME.M12950.BT.1001	А	26.8.2021	Page 92 of 94	Signalling (SIG) Maintenance Technical Instruction

9.6 Restoration of YST 28 or YST 29 or both goes down.



ERL Maintenance Support Sdn. Bhd., Kompleks Rel Udara, Bandar Baru Salak Tinggi, 43900 Sepang, Selangor Darul Ehsan

Loc	cation	Reference	Rev.	Date	Page No.	Document Title		
E-MAS Offices E00.OME.M12950.BT.1001		А	26.8.2021	Page 93 of 94	Signalling (SIG) Maintenance Technical Instruction			
0 Op	erating	Instruction For UPS	(Unin	terruptabl	e Power Su	pply).		
0.1	1 UPS Maintenance START - UP Procedure							
		WARNING: 'A WRONG	G PROC	EDURE CO	ULD DISCONN	IECT THE LOAD'		
	UPS	S IN MAINTENANCE E <u>OFF, a</u>	Y-PA	SS operati 2 ON and b	on, with ser battery F8-F	rvice switches Q1 and 9 OFF.		
		• LC • LE • LE	D will D 2, 8 D 1, 3	display "L0 8, 9 & Servi 8, 4a, 4b, 5	OAD OFF". ce check, Al , 6, 7 & Batte	arm & Light "ON". ery level Indicator "OFF".		
	STEP	- 1 TURN SV • LC • LE • LE • LE • AI • AI • Gr	WITCH D will D 3 F D 1, 2 D 4a, arm & ter 30 reen L	I "Q4" TO display "L0 lashing. 2, 8, 9 & Se 4b, 5, 6 & Light "ON" to 40 Seco ED beside	" ON" POSI DAD OFF". rvice check 7 "OFF". nd LED 3 St Battery Fuse	TION. "ON". eady & e Lights up.		
	STEP	- 2 PUSH IN • LE • AI	" ON " D 4b arm &	' THE BAT & Battery le Light "OFF	TERY FUSE	8 & 9. r "ON".		
	STEP	-3 "Q1" SW • LC • LE • LE	/ITCH 2D will 2D 1, 2 2D 4a,	" ON" POS display "L(2, 3, 4b, 7, 3 5, 6 "OFF"	DAD ON BY- 3, 9 "ON". & Service cl	-PASS". heck "OFF".		
	STEP	- 4 "Q2" SW • LE • LE	/ ITCH D 1, 2 D 4a,	" OFF" PO 2, 3, 4b, 7 8 5, 6 & 9 "C	sition. & 8 "ON".)FF".			
	STEP	- 5 PRESS	I	KEY once	•			
		 LE LE LE LE LC 	D 1, 2 D 5 S D 6 w D 6 w D 4a, D will	2, 3, 4b & 8 tart Flashir ill "ON" afte 7 & 9 "OFf display "L0	"ON". ng for 5 Secc er 20 Second =". OAD ON INV	onds then Steady. ds. /ERTER".		

Location Reference Rev. Date Page No. Document Title E-MAS Offices E00.OME.M12950.BT.1001 A 26.8.2021 Page 94 of 94 Signalling (SIG) Maintenance Technical Instruction 10.2 UPS Maintenance BY – PASS Procedure WARNING: 'A WRONG PROCEDURE COULD DISCONNECT THE LOAD' UPS IN NORMAL operation, with service switches Q1 and Q4 QN, and Q2 OFF, batter FB-F9 ON and Load On Inverter. LCD will display "LOAD ON INVERTER". LED 1, 2, 3, 4B, 5, 6 & 8 "ON". LED 4a, 7 & 8 "OFF". STEP - 1 PRESS O KEY once, Then press again (within 5 Seconds) I. LED to will display "LOAD ON BY-PASS". I. LED 1, 2, 3, 4b, 7 & 8 "ON". I. LED 1, 2, 3, 4b, 7 & 8 "ON". I. LED 1, 2, 3, 4b, 7 & 8 "ON". I. LED 1, 2, 3, 4b, 7 & 8 "ON". I. LED 1, 2, 3, 4b, 7 & 8 "ON". I. LED 1, 2, 3, 4b, 7 & 8 9 Service Check "ON". I. LED 4a, 5 & 6 "OFF". STEP - 3 "Q1" SWITCH "OFF" POSITION. I. LED 4a, 5 & 6 "OFF". STEP - 4 PRESS "LOAD OFF" PUSH BUTTON by lifting red cover. I. LCD will display "LOAD OFF". I. LED 1, 2, 3, 4b, 5, 6 8 7 "OFF". STEP - 5										
E-MAS Offices E00.OME.M12950.BT.1001 A 26.8.2021 Page 94 of 94 Signalling (SG) Maintenance Technical Instruction 10.2 UPS Maintenance BY – PASS Procedure WARNING: 'A WRONG PROCEDURE COULD DISCONNECT THE LOAD' UPS IN NORMAL operation, with service switches Q1 and Q4 ON, and Q2 OFF, battery F8-F9 ON and Load On Inverter. I UCD will display "LOAD ON INVERTER". LED 1, 2, 3, 4B, 5, 6 & 8 "ON". LED 4a, 7 & 8 "OFF". STEP – 1 PRESS OFF: LED 1, 2, 3, 4B, 7, 8 & 9 "OFF". LED 1, 2, 3, 4b, 7, 8 & 9 "ON". LED 1, 2, 3, 4b, 7, 8 & 9 "ON". LED 1, 2, 3, 4b, 7, 8 & 9 "ON". LED 1, 2, 3, 4b, 7, 8, 9 & Service Check "ON". LED 1, 2, 3, 4b, 7, 8, 9 & Service Check "ON". LED 1, 2, 3, 4b, 7, 8, 9 & Service Check "ON". LED 1, 2, 3, 4b, 7, 8, 9 & Service Check "ON". LED 1, 2, 3, 4b, 7, 8, 9 & Service Check "ON". LED 1, 2, 3, 4b, 7, 8, 9 & Service Check "ON". LED 1, 2, 3, 4b, 7, 8, 9 & Service Check "ON". LED 1, 2, 3, 4b, 7, 8, 9 & Service Check "ON". <td co<="" th=""><th></th><th>Loo</th><th>cation</th><th>Reference</th><th>Rev.</th><th>Date</th><th>Page No.</th><th>Document Title</th></td>	<th></th> <th>Loo</th> <th>cation</th> <th>Reference</th> <th>Rev.</th> <th>Date</th> <th>Page No.</th> <th>Document Title</th>		Loo	cation	Reference	Rev.	Date	Page No.	Document Title	
 10.2 UPS Maintenance BY - PASS Procedure WARNING: 'A WRONG PROCEDURE COULD DISCONNECT THE LOAD' UPS IN NORMAL operation, with service switches Q1 and Q4 ON, and Q2 OFF, battery F8-F9 ON and Load On Inverter. LCD will display "LOAD ON INVERTER". LED 1, 2, 3, 48, 5, 6 & 8 "ON". LED 4a, 7 & 8 "OFF". STEP - 1 PRESS CO KEY once, Then press again (within 5 Seconds) LED 5, 4a, 6 & 9 "OFF". LCD will display "LOAD ON BY-PASS". LED 1, 2, 3, 4b, 7 & 8 "ON". STEP - 2 "Q2" SWITCH "ON" POSITION. LED 4a, 5 & 6 "OFF". STEP - 3 "Q1" SWITCH "OFF" POSITION. LED 4a, 5 & 6 "OFF". STEP - 3 "Q1" SWITCH "OFF" POSITION. LED 4a, 5 & 6 "OFF". STEP - 4 PRESS "LOAD OFF" PUSH BUTTON by lifting red cover. LCD will display "LOAD OFF". LED 1, 2, 3, 4b, 7, 8, 9 & Service Check "ON". LED 1, 2, 3, 4b, 8, 9 & Service check "ON". LED 4a, 5, 6 & 7 "OFF". STEP - 5 TURN SWITCH "Q4" TO "OFF" POSITION. LCD will display "LOAD OFF". LED 2, 4a, 8, 9 & Service check "ON". LED 4a, 5, 6 & 7 "OFF". STEP - 6 BATTERY FUSE 8 & 9 "OUT". LCD will display "LOAD OFF". LED 1, 2, 3, 4a, 5, 6, 7 "OFF". STEP - 6 BATTERY FUSE 8 & 9 "OUT". LCD will display "LOAD OFF". LED 1, 3, 4a, 4b, 5, 6, 7 "A Battery Level Indicator "OFF". Press "mute" button to acknowledge Alarm. 		E-MAS	S Offices	E00.OME.M12950.BT.1001	А	26.8.2021	Page 94 of 94	Signalling (SIG) Maintenance Technical Instruction		
WARNING: 'A WRONG PROCEDURE COULD DISCONNECT THE LOAD' UPS IN NORMAL operation, with service switches Q1 and Q4 ON, and Q2 OFF, battery F8-F9 ON and Load On Inverter. LCD will display "LOAD ON INVERTER". LED 1, 2, 3, 4B, 5, 6 & 8 "ON". LED 4a, 7 & 8 "OFF". STEP - 1 PRESS Image: Color of the press again (within 5 Seconds) LED 5, 4a, 6 & 9 "OFF". LCD will display "LOAD ON BY-PASS". LED 1, 2, 3, 4b, 7 & 8 "ON". LED 1, 2, 3, 4b, 7 & 8 "ON". LED 4a, 5 & 6 "OFF". STEP - 2 "Q2" SWITCH "ON" POSITION. LED 1, 2, 3, 4b 7, 8 & 9 "ON". LED 1, 2, 3, 4b 7, 8 & 9 Service Check "ON". LED 4a, 5 & 6 "OFF". STEP - 3 "Q1" SWITCH "OFF" POSITION. LED 1, 2, 3, 4b 7, 8, 9 & Service Check "ON". LED 4a, 5 & 6 "OFF". STEP - 4 PRESS "LOAD OFF" PUSH BUTTON by lifting red cover. LCD will display "LOAD OFF". LED 4a, 5, 6 & 7 "OFF". LED 4a, 5, 6 & 7 "OFF". LED 4a, 5, 6 & 7 "OFF". LED 1, 3, 4b, 5, 6 & 7 "OFF". LED 1, 3, 4b, 5, 6 & 7 "OFF". LED 1, 3, 4b, 5, 6 & 7 "OFF". LED 1, 3, 4a, 9 & Service chec		10.2 UPS Maintenance BY – PASS Procedure								
 UPS IN NORMAL operation, with service switches Q1 and Q4 ON, and Q2 OFF, battery F8-F9 ON and Load On Inverter. LCD will display "LOAD ON INVERTER". LED 1, 2, 3, 4B, 5, 6 & 8 "ON". LED 4a, 7 & 8 "OFF". STEP - 1 PRESS 1 KEY once, Then press again (within 5 Seconds) LED 5, 4a, 6 & 9 "OFF". LCD will display "LOAD ON BY-PASS". LED 1, 2, 3, 4b, 7 & 8 "ON". STEP - 2 "Q2" SWITCH "ON" POSITION. LED 1, 2, 3, 4b 7, 8 & 9 "ON". LED 1, 2, 3, 4b 7, 8 & 9 "ON". LED 1, 2, 3, 4b 7, 8 & 9 "ON". LED 4a, 5 & 6 "OFF". STEP - 3 "Q1" SWITCH "OFF" POSITION. LED 4a, 5 & 6 "OFF". STEP - 4 PRESS "LOAD OFF" PUSH BUTTON by lifting red cover. LCD will display "LOAD OFF". LED 4a, 5, 6 & "OFF". STEP - 4 PRESS "LOAD OFF" PUSH BUTTON by lifting red cover. LCD will display "LOAD OFF". LED 1, 2, 3, 4b, 8, 9 & Service check "ON". LED 1, 2, 3, 4b, 8, 9 & Service check "ON". LED 1, 2, 3, 4b, 5, 6 & 7 "OFF". STEP - 5 TURN SWITCH "Q4" TO "OFF" POSITION. LCD will display "LOAD OFF". LED 1, 3, 4b, 5, 6 & 7 "OFF". STEP - 6 BATTERY FUSE 8 & 9 "OUT". LCD will display "LOAD OFF". LCD will display "LOAD OFF". LED 1, 3, 4a, 5, 6 & 7 "OFF". STEP - 6 BATTERY FUSE 8 & 9 "OUT". LCD will display "LOAD OFF". LCD will display "LOAD OFF". LCD will display "LOAD OFF". LED 1, 3, 4a, 4b, 5, 6, 7 & Battery Level Indicator "OFF". LED 2, 8, 9 & Service check, Alarm & Light "ON". LED 1, 3, 4a, 4b, 5, 6, 7 & Battery Level Indicator "OFF". 		WARNING: 'A WRONG PROCEDURE COULD DISCONNECT THE LOAD'								
 LCD will display "LOAD ON INVERTER". LED 1, 2, 3, 4B, 5, 6 & 8 "ON". LED 4a, 7 & 8 "OFF". STEP - 1 PRESS 1 KEY once, Then press again (within 5 Seconds) LED 5, 4a, 6 & 9 "OFF". LCD will display "LOAD ON BY-PASS". LED 1, 2, 3, 4b, 7 & 8 "ON". STEP - 2 "Q2" SWITCH "ON" POSITION. LED 1, 2, 3, 4b, 7 & 8 "ON". LED 1, 2, 3, 4b, 7 & 8 9 "ON". LED 1, 2, 3, 4b 7, 8 & 9 "ON". LED 1, 2, 3, 4b 7, 8 & 9 "ON". LED 4a, 5 & 6 "OFF". STEP - 3 "Q1" SWITCH "OFF" POSITION. LED 4a, 5 & 6 "OFF". STEP - 4 PRESS "LOAD OFF" PUSH BUTTON by lifting red cover. LCD will display "LOAD OFF". LED 4a, 5, 6 & 7 "OFF". STEP - 5 TURN SWITCH "Q4" TO "OFF" POSITION. LED 2, 4a, 8, 9 & Service check "ON". LED 1, 3, 4b, 5, 6 & 7 "OFF". STEP - 6 BATTERY FUSE 8 & 9 "OUT". LCD will display "LOAD OFF". LED 1, 3, 4a, 4b, 5, 6, 7 & Battery Level Indicator "OFF". Press "mute" button to acknowledge Alarm. 		UPS IN NORMAL operation, with service switches Q1 and Q4 ON, and Q2 OFF, battery F8-F9 ON and Load On Inverter.								
STEP - 1PRESSImage: Content of the second sec	 LCD will display "LOAD ON INVERTER". LED 1, 2, 3, 4B, 5, 6 & 8 "ON". LED 4a, 7 & 8 "OFF". 							ÆRTER".		
 LED 5, 4a, 6 & 9 "OFF". LCD will display "LOAD ON BY-PASS". LED 1, 2, 3, 4b, 7 & 8 "ON". STEP - 2 "Q2" SWITCH "ON" POSITION. LED 1, 2, 3, 4b 7, 8 & 9 "ON". LED 4a, 5 & 6 "OFF". STEP - 3 "Q1" SWITCH "OFF" POSITION. LED 1, 2, 3, 4b 7, 8, 9 & Service Check "ON". LED 4a, 5 & 6 "OFF". STEP - 4 PRESS "LOAD OFF" PUSH BUTTON by lifting red cover. LCD will display "LOAD OFF". LED 1, 2, 3, 4b, 8, 9 & Service check "ON". LED 1, 2, 3, 4b, 8, 9 & Service check "ON". LED 1, 2, 3, 4b, 8, 9 & Service check "ON". LED 4a, 5, 6 & 7 "OFF". STEP - 5 TURN SWITCH "Q4" TO "OFF" POSITION. LCD will display "LOAD OFF". LED 2, 4a, 8, 9 & Service check "ON". LED 1, 3, 4b, 5, 6 & 7 "OFF". STEP - 6 BATTERY FUSE 8 & 9 "OUT". LCD will display "LOAD OFF". LED 1, 3, 4a, 4b, 5, 6, 7 & Battery Level Indicator "OFF". Press "mute" button to acknowledge Alarm. 			STEP	-1 PRESS	0	KEY once	e, Then pres	ss again (within 5 Seconds)		
STEP - 2"Q2" SWITCH "ON" POSITION. 				• LEI • LCI • LEI	D 5, 4 D will D 1, 2	a, 6 & 9 "O display "LC , 3, 4b, 7 &	FF". DAD ON BY- 8 "ON".	-PASS".		
STEP - 3"Q1" SWITCH "OFF" POSITION. • LED 1, 2, 3, 4b 7, 8, 9 & Service Check "ON". • LED 4a,5 & 6 "OFF".STEP - 4PRESS "LOAD OFF" PUSH BUTTON by lifting red cover. • LCD will display "LOAD OFF". • LED 1, 2, 3, 4b, 8, 9 & Service check "ON". • LED 4a, 5, 6 & 7 "OFF".STEP - 5TURN SWITCH "Q4" TO "OFF" POSITION. • LCD will display "LOAD OFF". • LED 2, 4a, 8, 9 & Service check "ON". • LED 1, 3, 4b, 5, 6 & 7 "OFF".STEP - 6BATTERY FUSE 8 & 9 "OUT". • LCD will display "LOAD OFF". • LED 1, 3, 4a, 4b, 5, 6, 7 & Battery Level Indicator "OFF". • LED 1, 3, 4a, 4b, 5, 6, 7 & Battery Level Indicator "OFF".			STEP	- 2 "Q2" SWI • LEI • LEI	TCH D 1, 2 D 4a,	" ON" POS , 3, 4b 7, 8 5 & 6 "OFF	ITION. & 9 "ON". 			
STEP - 4PRESS "LOAD OFF" PUSH BUTTON by lifting red cover. 			STEP	- 3 "Q1" SWI • LEI • LEI	TCH D 1, 2 D 4a,\$	" OFF" PO , 3, 4b 7, 8 5 & 6 "OFF	SITION. , 9 & Service '.	e Check "ON".		
 STEP – 5 TURN SWITCH "Q4" TO "OFF" POSITION. LCD will display "LOAD OFF". LED 2, 4a, 8, 9 & Service check "ON". LED 1, 3, 4b, 5, 6 & 7 "OFF". Alarm & Light "ON". STEP – 6 BATTERY FUSE 8 & 9 "OUT". LCD will display "LOAD OFF". LED 2, 8, 9 & Service check, Alarm & Light "ON". LED 1, 3, 4a, 4b, 5, 6, 7 & Battery Level Indicator "OFF". Press "mute" button to acknowledge Alarm. 			STEP	- 4 PRESS "I • LCI • LEI • LEI	_OAD D will D 1, 2 D 4a,	OFF" PU display "LC , 3, 4b, 8, 9 5, 6 & 7 "O	SH BUTTON DAD OFF". & Service of FF".	V by lifting red cover. check "ON".		
STEP - 6BATTERY FUSE 8 & 9 "OUT".• LCD will display "LOAD OFF".• LED 2, 8, 9 & Service check, Alarm & Light "ON".• LED 1, 3, 4a, 4b, 5, 6, 7 & Battery Level Indicator "OFF".Press "mute" button to acknowledge Alarm.			STEP -	- 5 TURN SW • LCI • LEI • LEI • Ala	/ITCH D will D 2, 4 D 1, 3 rm &	l " Q4" TO display "LC a, 8, 9 & S , 4b, 5, 6 & Light "ON".	" OFF" POS DAD OFF". ervice check 7 "OFF".	ITION. ("ON".		
			STEP -	- 6 BATTERY • LCI • LEI • LEI • LEI • Press "m	/ FUS D will D 2, 8 D 1, 3 ute" I	E 8 & 9 "C display "LC , 9 & Servio , 4a, 4b, 5, button to a	DUT". DAD OFF". ce check, Al 6, 7 & Batte cknowledg	arm & Light "ON". ery Level Indicator "OFF". e Alarm.		