GOVERNMENT OF INDIA
MINISTRY OF RAILWAYS

TROUBLE SHOOTING MANUAL OF PLASSER MAKE WORK SITE TAMPER (08-32)

REPORT NO. TM -117

February-2008

RESEARCH DESIGNS AND STANDARDS ORGANISATION

LUCKNOW-226011

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A large number of On-Track Machines are presently working on Indian Railways covering different works related to track maintenance and renewals. To improve utilization of these machines, it is important to reduce their downtime and repair them in the shortest possible time. In this context, need was felt to develop Trouble Shooting Manuals for different On-track Machines. The Trouble Shooting Manuals for Continuous Tamping Machine (CSM09-32), Ballast Cleaning Machine (BCM),Ballast regulating machine (BRM Model 66-4), TTM (UNO) & TTM (DUO), Point and Crossing Tamping Machine (Unimat), Point and Crossing Changing Machine(T-28) and Provisional Trouble Shooting Manuals for Dynamic Track Stabilizer (DGS), Shoulder Ballast Cleaning Machine (FRM-80) and PQRS have already been prepared and issued. This trouble shooting manual of Plasser make work site tamper (08-32) is also an effort in the same direction.

It is hoped that this manual will be quite useful for field staff attending breakdown of machines. However, there is always scope for improvement for which suggestions may be sent to the undersigned.

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February 2008

EXPLANATORY NOTES

While preparing the Trouble Shooting Manual of Plasser make work site tamper (08-32) the terms used and their meanings are explained below:

CHECK - Ensure a specific condition does (or does not) exist.

INSPECT - Look for damage and defects including breakage, distortion cracks, corrosion and wear, check for leaks, security and that all items are completed.

REPLACE Remove old parts and substitute with a new or overhauled or reconditioned part. Fit new or overhauled or reconditioned part in place of missing part.

OVERHAUL - Dismantle, examine, recondition or renew parts as necessary against given specifications, reassemble, inspect and test.

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I. ENGINE

S. No.	Faults	Probable Causes	Remedial Actions
1.	Engine does not start	1. Emergency stop switch is pressed.	1. Emergency stop switch should be in release position.
		2. No fuel in the tank.	2. Fill fuel in the tank and bleed air from fuel system as given in following steps: i) Loosen the bleed plug on the fuel filter and operate the priming pump until the fuel emerges free of bubbles. Tighten the bleed plug. ii) Then loosen banjo plug on injection pump and operate the priming pump until fuel emerges free of bubbles. Tighten the banjo plug.
		3. Shut down mechanism is stuck	3. Check the electrical supply at coil. if it is ok, then lubricate the piston of shut down coil and mechanism with lub oil and operate it manually. If still not working, then coil may be defective. Replace it.
		4. Air in fuel system.	4. Bleed air from fuel system as explained in item no. 2 above.
		5. Governor is stuck.	5. Replace the complete fuel injection pump
		6. Misconnection of starting switch.	6. Check starting switch and if any misconnection is noticed, rectify it.
		7. Valve clearance is not proper.	7. Adjust the valve clearance as given in engine manual.
		8. Weak batteries.	8. Check electrolyte level in the batteries. Terminals should be clean and the charging system should be working. Over-aged batteries should be replaced.
		9. Injectors not functioning properly.	9. Remove defective injectors and get them overhauled/calibrated or replace them with new one.

S. No.	Faults	Probable Causes	Remedial Actions
		10. Valves not seating properly.	10. i) Check the valves spring and replace the broken spring if any. ii) Lap the valves. iii) Lap the valve seat, if required.
2.	Engine running too hot.	1. Coolant level too low.	1. Check coolant level and top up to the mark in the filler neck.
		2. Defective thermostat	2. Check thermostat as given in the following steps: i) Drain cooling water and catch it for reuse. ii) Loosen hose clamps, pull back hoses and then remove thermostat. iii) Heat the water in container to approx. 85^{o} C and place thermostat in it. Maintain temperature of water by agitating iv) By short-circuiting and radiator opening, check whether the thermostat opens fully. If not, then install new thermostat.
		3. Defective water pump.	3. Check/repair the water pump.
		4. V-belt for water pump needs adjustment.	4. Check the V-belt tension. To adjust, release the guide pulley and regulate tension in the belt. Then tighten the guide pulley. If required, replace the V-belt.
		5. Oil cooler not working properly.	5. Repair / replace the Oil Cooler.
		6. Valve clearance is not proper.	6. Adjust the valve clearance as explained in engine manual.
		7. Air filter is choked.	7. Clean the air filter.
		8. RPM of coolant fan is too low.	8. Adjust the RPM of the motor to 1600. Check hydraulic system and change pump and motor if necessary.

S. No.	Faults	Probable Causes	Remedial Actions
		9. Water radiator choked.	9. Get the radiator cleaned.
		10.Radiator cap missing or worn out	10. Fit new cap.
		11. Water hose too old.	11. Replace the water hose.
3.	Engine misfiring	1. Dirty fuel filter.	1. Check fuel filters and if necessary Change it filter.
		2. No / less fuel in tank.	2. Fill fuel in the tank and follow steps as given in s. no.1, item no.2.
		3. Air in fuel system.	3. Bleed air from the fuel system as explained in s. no.1, item no.2.
		4. Defective Injector.	4. Remove the defective injector and get them overhauled/calibrated/ replace with new one.
		5. Valve clearance is not proper.	5 Adjust valve clearances as given in engine manual
		6. Fuel injection timing not proper.	6. Adjust the timings.
4.	Excessive engine smoking.	1. Engine oil level too high.	1. Check oil level. For this, draw dipstick and clean with lint-free cloth. Return dipstick, wait a little until the oil has wetted the dipstick. Then remove the dipstick again and check oil level.
		2. Defective injector	2. Follow the s.no.1, item no.9.
		3. Valve clearance is not proper.	3. Follow the s. no.1, item no.7.
		4. Air in fuel system.	4. Follow the s.no.1, item no.2.
		5. Clogged air cleaner.	5. Clean the element or change if required.
		6. Excessive carbon on cylinder head and piston.	6. De-carbonise the engine.

S. No.	Faults	Probable Causes	Remedial Actions
		7. Engine overloaded.	7. Check and reduce the load.
5.	Engine stops	1. No fuel.	1. Fill fuel in the tank and follow the steps as given in s. no. 1, item no.2.
		2. Air in the fuel system.	2. Bleed air from fuel system as explained in s. no.1, item no.2.
		3. Valve clearances are not proper.	3. Adjust the valve clearances as explained in s.no.1, item no.7 above.
		4. Governor is stuck.	4. Replace complete fuel injection pump.
		5. Overheating of engine	5. Take remedial action as given in s.no.5 below.
		6. Shut down circuit fails.	6. Check the electrical circuit and repair as required.
6.	Engine knocking	1. Incorrect Injector setting.	1. Remove the faulty injector and get it reset or replace it with new one.
		2. Mechanical damage to piston/cylinder.	2. Get the engine top overhauled.
		3. Valve clearance is not proper.	3. Adjust the valve clearance as given in engine manual.
		4. Fuel injection timing is not proper.	4. Correct the timings.
7.	Output of the engine too low	1. Dirty fuel filter and fuel line.	1. Check the fuel filters and if necessary change it.
		2. Air in fuel system.	2. Bleed the air from system as explained in s. no.1, item no.2.
		3. Defective Injectors.	3. Remove the defective injectors and get them overhauled or replace with new one.
		4. Valve clearances are not proper.	4. Adjust the valve clearances as given in engine manual.
		5. Air filter choked.	5. Clean the air filter element or replace if required.

S. No.	Faults	Probable Causes	Remedial Actions
		6. Improper compression	6. Engine needs to be top overhauled.
		7. Governor is stuck.	7. Replace the complete fuel injection pump.
8.	Oil pressure low.	1. Dirty lube oil filter.	1. Relace the lube oil filter.
		2. Oil control valve not working.	2. Repair the control valve or replace it.
		3. Dirty oil cooler	3. Clean the oil cooler.
9.	Oil film present in crank case ventilation	1. Incorrect compression.	1. Engine needs to be top overhauled
		2. Lube oil brands.	2. Use lube oil of proper brand and grade as recommended by the OEM.
10.	Engine speed is irregular.	1. Air in fuel system	1. Bleed air from the system as explained in s. no.1, item no.2.
		2. Governor is stuck.	2. Replace complete fuel injection pump.
11.	Fuel consumption too high.	1. Use of incorrect lube oil brand.	1. Use proper grade and quality lube oil.
		2. Incorrect setting of Injector.	2. Overhaul/ Replace the defective injectors.
		3 Incorrect engine timing.	3. Get the engine timing reset.
		4. Clogged air filter.	4. Clean the air filter.
		5. Poor compression	5. Engine needs to be top overhauled.
12.	Lube oil consumption too high.	1. Incorrect lube oil brand.	1. Use proper grade and quality lube oil as recommended by OEM.
		2. Poor compression	2. Engine needs to be top overhauled.
		3. Oil filter dirty.	3. Replace the filter.

II. MACHINE GENERAL

S. No.	Faults	Probable Causes	Remedial Actions
1.	Only L.H.S Tamping unit is not coming downwards in working	1) Mechanical problem	i) Tamping unit locks may not be removed physically. Check and do the needful. ii) Fork of L.H.S Tamping depth transducer may not be in position with mechanical fork of tamping bank. Check and do the needful.
		2) Electrical problem	a) If lock and fork found O.K .Then by operating all the electrical switches Q10 should come on program control. If not so, then problem may be in electrical circuit. Check it as follows. i) Tamping unit selector switch (lowering) may be towards RHS. If so then input signal X1E will be coming on program control. Put the switch in middle position. ii) Input signal X5A for LHS tamping unit lock should come on program control. If it is coming then limit switch for LH Tamping unit lock may be mull functioning or defective. Check and do the needful. iii) Output signal Q68 for work system “ON” should come on program control. b) Q0B→X0B should come on program control If not coming on, then do as follows- i) LHS tamping unit may not be in top position. For top position input signal X13 should come on program control and green LED should glow in PCB 2U21, If not so then adjust the top position of LHS tamping unit by potentiometer P11 on 2U21, or there may be any defect in PCB circuit. ii) Fuse si 1 of 2U21 may also be burned. Check and do the needful. iii) Check 24V supply at terminal 30Z of 2U21. If it is coming then relay Re3 may not getting ground signal due to any circuit defect in PCB. Check and do the needful. iv) Relay Re3 of 2U21 may also be defective. Check by replacing with new one and do the needful.

S. No.	Faults	Probable Causes	Remedial Actions
			v) If terminal 30z of 2U21 is showing 24V,then check it at terminal P15 in P.B. No. B50. If it is not coming there then brown wire of cable 50.23 may be damaged in between. Check and do the needful. vi) If terminal P15 is not showing the supply, then check it at coupler of proportional valve. If it is not found there then wire between P15 in B50 and coupler of proportional valve is damaged. Check and do the needful. vii) If +24V is found at coupler. Then coupler may be defective. Check and do the needful.
		3) Hydraulic problem	If by operating the coil Is17 of proportional valve for LHS tamping unit lowering manually, It is not coming down. Then there is hydraulic problem. Check it as follows- i) Unloader valve for working pressure should be set at 140 bar. It can be checked in hydraulic pressure gauge on hydraulic control panel at position "1" of pressure gauge selector ii) Proportional valve for LHS tamping unit up/down may also be defective. Check it by manual operation after removing the coupler. iii) No. 16 pressure pipe for LHS tamping unit cylinder downwards may also be chocked. It may be possible due to deposition of rubber at the time of new fitment of end fitting. Do the needful.
2.	Only R.H.S Tamping unit is not coming downwards in working	1) Mechanical problem	i) Tamping unit locks may not be removed physically. Check and do needful. ii) Fork of R.H.S Tamping depth transducer may not be in position with mechanical fork of tamping bank. Check and do the needful.
		2) Electrical problem	a) If lock and fork found O.K .Then by operating all the electrical switches Q11 should come on program control. If not so, then problem may be in electrical circuit. Check it as follows.

S. No.	Faults	Probable Causes	Remedial Actions
			ii) Tamping unit selector switch (lowering) may be towards LHS. If so then input signal X1D will be coming on program control. Put the switch in middle position. iii) Input signal X5B for RHS tamping unit lock should come on program control. If it is coming then limit switch for RH Tamping unit lock may be mull functioning or defective. Check and do the needful. iv) Output signal Q68 for work system "ON" should come on program control. b) Q0B→X0B should come on program control If not coming, then do as follows- i) RHS tamping unit may not be in top position. For top position input signal X14 should come on program control and green LED should glow in PCB 2U22, If not so then adjust the top position of RHS tamping unit by potentiometer P11 on 2U22, or there may be any defect in PCB circuit. ii) Fuse si 1 of 2U22 may also be burned. Check and do the needful. iii) Check 24V supply at terminal 30Z of 2U22. If it is coming then relay Re3 may not getting ground signal due to any circuit defect in PCB. Check and do the needful. iv) Relay Re3 of 2U22 may also be defective. Check by replacing with new one and do the needful. v) If terminal 30z of 2U22 is showing 24V,then check it at terminal P16 in P.B. No. B50. If it is not coming there then brown wire of cable 50.25 may be damaged in between. Check and do the needful. vi) If terminal P16 is not showing the supply, then check it at coupler of proportional valve. If it is not found there then wire between P16 in B50 and coupler of proportional valve is damaged. Check and do the needful. vii) If +24V is found at coupler. Then coupler may be defective. Check and do the needful.

S. No.	Faults	Probable Causes	Remedial Actions
		3) Hydraulic problem	If by operating the coil Is18 of proportional valve for RHS tamping unit lowering manually, It is not coming down. Then there is hydraulic problem. Check it as follows- i) Unloader valve for working pressure should be set at 140 bar. It can be checked in hydraulic pressure gauge on hydraulic control panel at position "1" of pressure gauge selector ii) Proportional valve for RHS tamping unit up/down may also be defective. Check it by manual operation after removing the coupler. iii) No. 16 pressure pipe for RHS tamping unit cylinder downwards may also be chocked. It may be possible due to deposition of rubber at the time of new fitment of end fitting. Do the needful.
3.	Machine is not moving forward without tamping	1) Electrical Problem	If all concerned electrical control switches are in 'ON' position, then Q08→X08 should come on program control and machine will move in forward direction. If not coming, then do as follows. i) Working drive direction switch on P.B. No.B2 may be in neutral position. Put it in forward direction. For this yellow LED for input signal X22 should glow on program control. ii) Yellow LED for input signal X11 should glow on program control. If not so, then peddle switch for machine drive may malfunctioning. Check and do the needful. iii) Fuse si33 for QL3 plate may be blown. Check and do the needful. iv) Relay QL30 may be defective. Check by replacing by new one and do the needful. v) If all above found OK, then 24V supply should come at terminal QL30 in P.B.No. B50. If it is not coming there, then wire of cable 2.28 between P.B.no. B2 and B50 may be damaged. Check and do the needful.

S. No.	Faults	Probable Causes	Remedial Actions
			vi) If 24V is coming in P.B.No.50 at terminal QL30, then check it at coupler 1s22 of 4-way valve HY-24RSJ-ET for driving bogie front. If it is not coming there, then either wire between B50 and 1s22 may be damaged or coupler may also be damaged itself. Check and do the needful.
		2. Hydraulic Problem	i) Unloader valve for working pressure should be set at 140 bars. It can be checked in hydraulic pressure gauge on hydraulic control panel at position'1' at pressure gauge selector. ii) 4-way valve HY24RSJ-ET for driving bogie front may be defective. Check and do the needful. iii) Double shock valve HY157.27 for driving bogie front may be defective. It will be replaced. iv) Driving motor of driving bogie front HY916.N.500 may also be defective. Replace it with new one.
4.	Machine is not moving forward during tamping	1) Electrical Problem	If all concerned electrical control switches are in 'ON' position, then Q08→X08 should come on program control and machine will move in forward direction. If not coming, then do as follows. i) Working drive direction switch on P.B. No.B2 may be in neutral position. Put it in forward direction. For this yellow LED for input signal X22 should glow on program control. ii) Tamping cycle selector switch should be towards single insertion or double insertion. For this X27 or X28 should come on program control. iii) Signal Q80→Q'80 should come on programme control. If not coming, then check all the condition of Q80→Q'80 through logic program and do the needful. iv) Signal Q0E→X0E should not come on programme control. If coming, then check all the condition through logic program and do the needful.

S. No.	Faults	Probable Causes	Remedial Actions
			v) Output signal Q68 should come on programme control. If not coming, then check all the conditions for Q68 from logic program and do the needful. vi) In case of double insertion signal Q00→X00 should not come on program control. If coming, then check all the condition Q00→X00 through logic program and do the needful. vii) Fuse si33 for QL3 plate may be blown. Check and do the needful. viii) Relay QL30 may be defective. Check by replacing by new one and do the needful. ix) If all above found OK, then 24V supply should come at terminal QL30 in P.B.No. B50. If it is not coming there, then wire of cable 2.28 between P.B.no. B2 and B50 may be damaged. Check and do the needful. x) If 24V is coming in P.B.No.50 at terminal QL30, then check it at coupler 1s22 of 4-way valve HY-24RSJ-ET for driving bogie front. If it is not coming there, then either wire between B50 and 1s22 may be damaged or coupler may also be damaged itself. Check and do the needful.
		2. Hydraulic Problem	i) Unloader valve for working pressure should be set at 140 bars. It can be checked in hydraulic pressure gauge on hydraulic control panel at position'1' at pressure gauge selector. ii) 4-way valve HY24RSJ-ET for driving bogie front may be defective. Check and do the needful. iii) Double shock valve HY157.27 for driving bogie front may be defective. It will be replaced. iv) Driving motor of driving bogie front HY916.N.500 may also be defective. Replace it with new one.

S. No.	Faults	Probable Causes	Remedial Actions
5.	Machine is not moving reverse during work	1.Electrical Problem	If all concerned electrical control switches are in 'ON' position, then Q09→X09 should come on program control and machine will move in reverse direction. If not coming, then do as follows. i) Working drive direction switch on P.B. No.B2 may be in neutral position. Put it in reverse direction. For this yellow LED for input signal X23 should glow on program control. ii) Yellow LED for input signal X11 should glow on program control. If not so, then peddle switch for machine drive may malfunctioning. Check and do the needful. iii) Fuse si33 for QL3 plate may be blown. Check and do the needful. iv) Relay QL31 may be defective. Check by replacing by new one and do the needful. v) If all above found OK, then 24V supply should come at terminal QL31 in P.B.No. B50. If it is not coming there, then wire of cable 2.28 between P.B.no. B2 and B50 may be damaged. Check and do the needful. vi) If 24V is coming in P.B.No.50 at terminal QL31, then check it at coupler 1s23 of 4-way valve HY-24RSJ-ET for driving bogie front. If it is not coming there, then either wire between B50 and 1s23 may be damaged or coupler may also be damaged itself. Check and do the needful.
		2. Hydraulic Problem	i) Unloader valve for working pressure should be set at 140 bars. It can be checked in hydraulic pressure gauge on hydraulic control panel at position'1' at pressure gauge selector. ii) 4-way valve HY24RSJ-ET for driving bogie front may be defective. Check and do the needful. iii) Double shock valve HY157.27 for driving bogie front may be defective. It will be replaced. iv) Driving motor of driving bogie front HY916.N.500 may also be defective. Replace it with new one.

S. No.	Faults	Probable Causes	Remedial Actions
6.	Automatic lining is out of order	1. Electrical Problem	For proper functioning output signal Q1A should come on program control. If not coming, then check whether Q0A →X0A is coming on program control or not, If it is also not coming then check the electrical circuit as follows. i) Q05→X05 should come on programme control, if not coming then check all conditions for the same through logic program. ii) Yellow LED for input signal X3D for lining control main switch on P.B.No..B7 should glow on programme control by operating the switch to 'ON' position, if not coming then either switch may be malfunctioning or orange/black wire of cable no. 2.23 between P.B. No. B2 and B7 may be damaged. Check and do the needful. iii) Measuring system preloading switch may be in neutral position. It should be towards LHS/RHS. For this yellow LED for input signal X4E or X4F should glow on programme control by operating the switch on P.B.No. B7. If not coming then either switch may be malfunctioning or wire of cable 2.23 for connector X4E or X4F may be damaged between P.B.No. B2 and B7. Check and do the needful. iv) LHS and RHS clamp unit should be in down position. For this yellow LED for input signal X24 and X25 should glow on program control. If not, then either blue/white or yellow/white or both wires of cable 50.1 and 50.2 between P.B.No. B2 and B50 may be damaged or cable 50.1 and 50.2 between P.B.No. B50 and magnetic sensor for LHS/RHS lifting unit lower position may be damaged. Check and do the needful. v) Yellow LED for input signal 2F should glow on program control. If not so, then brown/green wire of cable no. 2.23 between P.B.No. B2 and B7 may be damaged. Check and do the needful.

S. No.	Faults	Probable Causes	Remedial Actions
			vi) magnetic sensor for LHS/RHS lifting units lower position may also be malfunctioning. Replace the sensor. vii) By operating all electrical controls of lining, supply should come on terminal R17 in P.B.No. B50. If it is not coming then either Green/Red wire of cable 7.20 between P.B. No. B7 and B50 may be damaged or there is any problem in PCB EK 2286L-00(02) [7U6]. Check and do the needful. viii) If supply is coming at terminal R17 then check it at coupler 1s15 of servo valve for lining. If it is not coming there then wire of cable 50.55 between P.B.No. B50 and servo coupler may be damaged. Check and do the needful.
		2. Hydraulic problem	i) If electrical circuit found OK then the servo valve for lining may be malfunctioning. It may be reset or will be replaced. ii) Unloader valve should be set at 140 bar and safety valve at 175 bar.
7.	L.H. automatic levelling is out of order	1) Electrical Problem	Check weather signal Q06→X06 is coming on program control or not by operating all electrical controls. If it is coming then electrical circuit is OK and problem is somewhere else. If Q06→X06 is not coming then check the electrical circuit as follows. i) In put signal X2E should come on program control. For this yellow LED should glow. If not so then either switch for levelling control 'ON' on P.B. No. B7 may be malfunctioning or Red/Yellow wire of cable 2.23 between P.B.No. B2 and B7 may be damaged. Check and do the needful. ii) Signal Q05→X05 should come on Program control. If not coming then check all the conditions for the same from logic program and do the needful. iii) Input signal X1E should not come on program control. For that yellow LED for X1E should not glow on program control. If glowing then tamping unit operation switch may be towards RH or malfunctioning. Check and do the needful.

S. No.	Faults	Probable Causes	Remedial Actions
			iv) Input signal to program control X32 should not come on program control. For that yellow LED for X32 should not glow on program control. If not so, then power driver FT2 on PCB EK-2041LV.02A (7U2) may be malfunctioning. It should be replaced. v) Input indication X48 and X49 for front measuring trolley and measuring trolley unlocked should come on program control. If not then any one limit switch of front measuring trolley and measuring trolley may be malfunctioning. If so then 24V supply should come at terminal V3 and V10 in P.B.No. B7 but limit switch will not operate. In this case replace the defective limit switch. vi) Wire no. X48 and/or X49 of cable 2.23 between P.B. No.B2 and terminal V3 and/or V10 in P.B. No.B7 may be damaged. Check and do the needful. vii) Wire of cable no. 4.4 and 4.5 between P.B.No. B4 and limit switch for front trolley RHS/LHS may be damaged. Check and do the needful. viii) Wire V10 of cable 7.7 and 7.8 between P.B.No. B7 and limit switch for measuring trolley RHS/LHS may be damaged. Check and do the needful. ix) Input signal X24 for sensor of LHS clamp unit down or X2F for Rail sensor 'ON' should come on program control. If X24 is not coming on program control, then blue/white wire X24 of cable 2.27 between P.B.No. B2 and B50 may be damaged. Check the continuity and do the needful. x) Wire of cable 50.1 between P.B.No. B50 and magnetic sensor for LHS lifting unit may be damaged. Check and do the needful.. xi) Magnetic sensor for LHS lifting unit may also be malfunctioning. Replace the sensor. xii) Q02→X02 should not come on program control. If coming, then check all the conditions for the same from program logic.

S. No.	Faults	Probable Causes	Remedial Actions
			xiii) Relay QL2E may also be defective . Check by replacing with new one.and do the needful. xiv) Fuse si 32 may also be blown. If no one output signal is coming on QL2 plate, fuse have to be replaced. xv) If fuse and relay found OK , then yellow /black wire QL2E between P.B.No. B2 and B50 may be damaged. Check the continuity and do the needful. xvi) QL2E wire between P.B.No. B50 and 4-way valve HY-10RSG-B for LH Rail clamp lifting may be damaged. Check and do the needful.
		2) Mechanical Problem	i) Either both front measuring and measuring trolley or any one may not be unlocked and lowered properly. Check physically and do the needful. ii) LHS levelling chord wire may be broken. Check and do the needful.
		3) Hydraulic Problem	If electrical circuit found OK then check the hydraulic pressures. i) Unloader valve should be set at 140 bar. ii) Safety valve should be set at 175 bar. iii) Operate the 4-way valve HY10 RSG-B for LHS lifting unit. If lifting unit is not operating, then either the valve or concerned servo valve may be defective. Check and do the needful. iv) Pressure filter for servo valve of LHS lifting unit may also be choked. Replace the same.
8.	R.H. automatic levelling is out of order	1) Electrical Problem	Check weather signal Q07→X07 is coming on program control or not by operating all electrical controls. If it is coming then electrical circuit is OK and problem is somewhere else. If Q07→X07 is not coming then check the electrical circuit as follows. i) In put signal X2E should come on program control. For this yellow LED should glow. If not so then either switch for levelling control 'ON' on P.B. No. B7 may be malfunctioning or Red/Yellow wire of cable 2.23 between P.B.No. B2 and B7 may be damaged. Check and do the needful.

S. No.	Faults	Probable Causes	Remedial Actions
			ii) Signal Q05→X05 should come on Program control. If not coming then check all the conditions for the same from logic program and do the needful. iii) Input signal X1D should not come on program control. For that yellow LED for X1D should not glow on program control. If glowing then tamping unit operation switch may be towards LH or malfunctioning. Check and do the needful. iv) Input signal to program control X33 should not come on program control. For that yellow LED for X33 should not glow on program control. If not so, then power driver FT2 on PCB EK-2041LV.02A (7U4) may be malfunctioning. It should be replaced. v) Input indication X48 and X49 for front measuring trolley and measuring trolley unlocked should come on program control. If not then any one limit switch of front measuring trolley and measuring trolley may be malfunctioning. If so then 24V supply should come at terminal V3 and V10 in P.B.No. B7 but limit switch will not operate. In this case replace the defective limit switch. vi) Wire no. X48 and/or X49 of cable 2.23 between P.B. No.B2 and terminal V3 and/or V10 in P.B. No.B7 may be damaged. Check and do the needful. vii) Wire of cable no. 4.4 and 4.5 between P.B.No. B4 and limit switch for front trolley RHS/LHS may be damaged. Check and do the needful. viii) Wire V10 of cable 7.7 and 7.8 between P.B.No. B7 and limit switch for measuring trolley RHS/LHS may be damaged. Check and do the needful. ix) Input signal X25 for sensor of RHS clamp unit down or X2F for Rail sensor 'ON' should come on program control. If X24 is not coming on program control, then yellow/white wire X25 of cable 2.27 between P.B.No. B2 and B50 may be damaged. Check the continuity and do the needful.

S. No.	Faults	Probable Causes	Remedial Actions
			x) Wire of cable 50.2 between P.B.No. B50 and magnetic sensor for RHS lifting unit may be damaged. Check and do the needful.. xi) Magnetic sensor for RHS lifting unit may also be malfunctioning replace the sensor. xii) Q03→X03 should not come on program control. If coming, then check all the conditions for the same from program logic. xiii) Relay QL2F may also be defective. Check by replacing with new one.and do the needful. xiv) Fuse si 32 may also be blown. If no one output signal is coming on QL2 plate, fuse have to be replaced. xv) If fuse and relay found OK , then blue/black wire QL2F between P.B.No. B2 and B50 may be damaged. Check the continuity and do the needful. xvi) QL2F wire between P.B.No. B50 and 4-way valve HY-10RSG-B for RH Rail clamp lifting may be damaged. Check and do the needful.
		2) Mechanical Problem	i) Either both front measuring and measuring trolley or any one may not be unlocked and lowered properly. Check physically and do the needful. ii) RHS levelling chord wire may be broken. Check and do the needful.
		3) Hydraulic Problem	If electrical circuit found OK then check the hydraulic pressures. i) Unloader valve should be set at 140 bar. ii) Safety valve should be set at 175 bar. iii) Operate the 4-way valve HY10 RSG-B for RHS lifting unit. If lifting unit is not operating, then either the valve or concerned servo valve may be defective. Check and do the needful. iv) Pressure filter for servo valve of RHS lifting unit may also be choked. Replace the same.

S. No.	Faults	Probable Causes	Remedial Actions
9.	LHS front clamp is not getting open	1) Electrical problem	i) Switch for clamp unit always close should be in 'OFF' position. ii) Q62→X62 should not come on program control. If coming then check all the conditions from program logic and do the needful. iii) Switch for rear clamp close should be in 'ON' position. iv) Switch for right clamp should be in 'ON' position. v) Q63→X63 should not come on program control. If coming then check all the conditions from program logic and do the needful. vi) If all the above conditions are fulfilling but still clamps are not getting open then do as follows. a) Check 24V at coupler 1s486A of 4-way valve for LH front clamp open/close. If it is found there, then 4-way valve is stick up or defective. Check and do needful b) If 24V is not found at coupler then check it at terminal QL32 in PB no. B50. If it is found there then wire between coupler and B50 is damaged. Check and do needful. c) If 24V is not found at B50 then either relay QL32 is defective or wire between B50 and QL 32 is damaged. Check and do needful.
		2 Hydraulic problem	i) Unloader valve should be set at 140 bar. ii) Safety valve should be set at 175 bar. iii) Spool of 4-way valve HY6RSJ-B for LHS front clamp open/close may also be stickup. Check and do the needful.

S. No.	Faults	Probable Causes	Remedial Actions
10.	RHS front clamp is not getting open	1) Electrical problem	i) Switch for clamp unit always close should be in 'OFF' position. ii) Q62→X62 should not come on program control. If coming then check all the conditions from program logic and do the needful. iii) Switch for rear clamp close should be in 'ON' position. iv) Switch for right clamp should be in 'ON' position. v) Q63→X63 should not come on program control. If coming then check all the conditions from program logic and do the needful. vi) If all the above conditions are fulfilling but still clamps are not getting open then do as follows. a) Check 24V at coupler 1s453 of 4-way valve for RH front clamp open/close. If it is found there, then 4-way valve is stick up or defective. Check and do the needful b) If 24V is not found at coupler, then check it at terminal QL36 in PB no. B50. If it is found there then wire between coupler and B50 is damaged. Check and do the needful. c) If 24V is not found at B50 then either relay QL36 may be defective or wire between B50 and QL36 may be damaged. Check and do needful.
		2) Hydraulic problem	i) Unloader valve should be set at 140 bar. ii) Safety valve should be set at 175 bar. iii) Spool of 4-way valve HY6RSJ-B for RHS front clamp open/close may also be stickup. Check and do the needful.

S. No.	Faults	Probable Causes	Remedial Actions
11.	LHS rear rail clamp is not getting open	1) Electrical problem	i) Switch for clamp unit always close should be in 'OFF' position.
			ii) Q62→X62 should not come on program control. If coming then check all the conditions from program logic and do the needful. iii) Switch for front clamp close should be in 'ON' position. iv) Q63→X63 should not come on program control. If coming then check all the conditions from program logic and do the needful. . v) Switch for right clamp should be in 'ON' position. vi) If all the above conditions are fulfilling but still clamps are not getting open then do as follows. a) Check 24V at coupler 1s487A of 4-way valve for LH rear clamp open/close. If it is found there, then 4-way valve is stick up or defective. Check and do the needful b) If 24V is not found at coupler, then check it at terminal QL33 in PB no. B50. If it is found there then wire between coupler and B50 is damaged. Check and do the needful. c) If 24V is not found at B50 then either relay QL33 may be defective or wire between B50 and QL33 may be damaged. Check and do the needful.
		2) Hydraulic problem	i) Unloader valve should be set at 140 bar. ii) Safety valve should be set at 175 bar. iii) Spool of 4-way valve HY6RSJ-B for LHS rear clamp open/close may also be stickup. Check and do the needful.

S. No.	Faults	Probable Causes	Remedial Actions
12.	RHS rear rail clamp is not getting open	1) Electrical problem	i) Switch for clamp unit always close should be in 'OFF' position. ii) Q62→X62 should not come on program control. If coming then check all the conditions from program logic and do the needful. . iii) Switch for front clamp close should be in 'ON' position. iv) Q63→X63 should not come on program control. If coming then check all the conditions from program logic and do the needful. v) Switch for left clamp should be in 'ON' position. If all the above conditions are fulfilling but still clamps are not getting open then do as follows. a) Check 24V at coupler 1s454 of 4-way valve for RH rear clamp open/close. If it is found there, then 4-way valve is stick up or defective. Check and do the needful. b) If 24V is not found at coupler, then check it at terminal QL37 in PB no. B50. If it is found there then wire between coupler and B50 is damaged. Check and do the needful. c) If 24V is not found at B50 then either relay QL37 may be defective or wire between B50 and QL37 may be damaged. Check and do the needful.
		2) Hydraulic problem	i) Unloader valve should be set at 140 bar. ii) Safety valve should be set at 175 bar. iii) Spool of 4-way valve HY6RSJ-B for RHS rear clamp open/close may also be stickup. Check and do the needful.

S. No.	Faults	Probable Causes	Remedial Actions
13.	LHS front rail clamp is not getting close	1) Electrical problem	i) Switch for rear clamp close should be in 'OFF' position.
			ii) Switch for right clamp should be in 'OFF' position
			iii) Q62→X62 should come on program control. If not coming then check all the conditions from program logic and do the needful.
			iv) Q68→X68 should come on program control. If not coming then check all the conditions from program logic and do the needful. If all the above conditions are fulfilling but still clamps are not getting open then do as follows.
			a) Check 24V at coupler 1s486B of 4-way valve for LH front clamp open/close. If it is found there, then 4-way valve is stick up or defective. Check and do needful
			b) If 24V is not found at coupler then check it at terminal QL29 in PB no. B50. If it is found there then wire between coupler and B50 is damaged. Check and do needful.
			c) If 24V is not found at B50 then either relay QL29 may be defective or wire between B50 and QL29 may be damaged. Check and do the needful.
		2) Hydraulic problem	i) Unloader valve should be set at 140 bar.
			ii) Safety valve should be set at 175 bar.
			iii) Spool of 4-way valve HY6RSJ-B for LHS front clamp open/close may also be stickup. Check and do the needful.

S. No.	Faults	Probable Causes	Remedial Actions
14.	LHS rear rail clamp is not getting close	1) Electrical problem	i) Switch for front clamp close should be in 'OFF' position. ii) Switch for right clamp should be in 'OFF' position. iii) Q62→X62 should come on program control. If not coming then check all the conditions from program logic and do the needful. iv) Q68→X68 should come on program control. If not coming then check all the conditions from program logic and do the needful. v) If all the above conditions are fulfilling but still clamps are not getting open then do as follows. a) Check 24V at coupler 1s487B of 4-way valve for LH rear clamp open/close. If it is found there, then 4-way valve is stick up or defective. Check and do the needful b) If 24V is not found at coupler then check it at terminal QL2A in PB no. B50. If it is found there then wire between coupler and B50 is damaged. Check and do needful. c) If 24V is not found at B50 then either relay QL2A may be defective or wire between B50 and QL2A may be damaged. Check and do the needful.
		2) Hydraulic problem	i) Unloader valve should be set at 140 bar. ii) Safety valve should be set at 175 bar. iii) Spool of 4-way valve HY6RSJ-B for LHS rear clamp open/close may also be stickup. Check and do the needful.

S. No.	Faults	Probable Causes	Remedial Actions
15.	RHS front rail clamp is not getting close	1) Electrical problem	i) Switch for front clamp close should be in 'OFF' position. ii) Switch for left clamp should be in 'OFF' position. iii) Q62→X62 should come on program control. If not coming then check all the conditions from program logic and do the needful. iv) Q68→X68 should come on program control. If not coming then check all the conditions from program logic and do the needful. v) If all the above conditions are fulfilling but still clamps are not getting open then do as follows. a) Check 24V at coupler 1s28 of 4-way valve for RH front clamp open/close. If it is found there, then 4-way valve is stick up or defective. Check and do the needful b) If 24V is not found at coupler then check it at terminal QL3A in PB no. B50. If it is found there then wire between coupler and B50 is damaged. Check and do the needful. c) If 24V is not found at B50 then either relay QL3A may be defective or wire between B50 and QL3A may be damaged. Check and do the needful.
		2) Hydraulic problem	i) Unloader valve should be set at 140 bar. ii) Safety valve should be set at 175 bar. iii) Spool of 4-way valve HY6RSJ-B for RHS rear clamp open/close may also be stickup. Check and do the needful.

S. No.	Faults	Probable Causes	Remedial Actions
16.	RHS rear rail clamp is not getting close	1) Electrical problem	i) Switch for front clamp close should be in 'OFF' position. ii) Switch for right clamp should be in 'OFF' position. iii) Q62→X62 should come on program control. If not coming then check all the conditions from program logic and do the needful. iv) Q68→X68 should come on program control. If not coming then check all the conditions from program logic and do the needful. v) If all the above conditions are fulfilling but still clamps are not getting open then do as follows. a) Check 24V at coupler 1s29 of 4-way valve for RH rear clamp open/close. If it is found there, then 4-way valve is stick up or defective. Check and do the needful b) If 24V is not found at coupler ,then check it at terminal QL3B in PB no. B50. If it is found there then wire between coupler and B50 is damaged. Check and do the needful. c) If 24V is not found at B50 then either relay QL3B may be defective or wire between B50 and QL3B may be damaged. Check and do the needful.
		2) Hydraulic problem	i) Unloader valve should be set at 140 bar. ii) Safety valve should be set at 175 bar. iii) Spool of 4-way valve HY6RSJ-B for RHS rear clamp open/close may also be stickup. Check and do the needful.

S. No.	Faults	Probable Causes	Remedial Actions
17.	LHS Outside squeezing is out of order.	1) Electrical problem	Operate the concerned valve manually. If squeezing noticed, then problem is electrical. Check 24V supply at coupler 1s5 of solenoid valve for LHS outside squeezing by operating all electrical controls. If LHS outside cylinders are not getting squeezed, then check the electrical circuit as follows. i) Check 24V at coupler of solenoid 1s5.If it is not coming there, then check fuse si32 for QL2 plate (2u16). It may be blown. ii) If fuse found OK, then brown wire of cable no.50.32 between solenoid coupler and B50 may also be damaged. Check the continuity and do the needful. iii) If 24V is not found at terminal QL22 in P.B.NO. B50. Then check the orange/green wire of cable 2.28 between B50 and B2.It may be damaged. Check the continuity and do the needful. iv) If all wires are OK. Then relay QL22 may also be defective. Check and do the needful.
		2) Hydraulic Problem	If by operating the concerned valve, squeezing is not noticed. Then check the hydraulic circuit as follows. i) Check squeezing pressure at position 5 of multi station. It should show 110-125 bar. If not so then reduction valve HY 55R may not be set at proper pressure or damaged. Check and do the needful. ii) Unloader valve HY511.12 should be set at 150 bar. iii) Safety valve HY511.08 should be set at 175 bar. iv) 4-way valve (HY16RSD-ET) may also not functioning properly. Check and do the needful.

S. No.	Faults	Probable Causes	Remedial Actions
18.	RHS Outside squeezing is out of order.	1) Electrical problem	Operate the concerned valve manually. If squeezing noticed, then problem is electrical. Check 24V supply at coupler 1s7 of solenoid valve for RHS outside squeezing by operating all electrical controls. If RHS outside cylinders are not getting squeezed, then check the electrical circuit as follows. i) Check 24V at coupler of solenoid 1s7.If it is not coming there ,then check Fuse si32 for QL2 plate (2u16). It may be blown. ii) If fuse found OK, then brown wire of cable no.50.33 between solenoid coupler and B50 may also be damaged. Check the continuity and do the needful. iii) If 24V is not found at terminal QL23 in P.B.NO. B50. Then check the white/green wire of cable 2.28 between B50 and B2.It may be damaged. Check the continuity and do the needful. iv) If all wires are OK. Then relay QL23 may also be defective. Check and do the needful.
		2) Hydraulic Problem	If by operating the concerned valve, squeezing is not noticed. Then check the hydraulic circuit as follows. i) Check squeezing pressure at position 6 of multi station. It should show 110-125 bar. If not so then reduction valve HY 55R may not be set at proper pressure or damaged. Check and do the needful. ii) Unloader valve HY511.12 should be set at 150 bar. iii) Safety valve HY511.08 should be set at 175 bar. iv) 4-way valve (HY16RSD-ET) may also not functioning properly. Check and do the needful.

S. No.	Faults	Probable Causes	Remedial Actions
19.	LHS inside squeezing is out of order.	1) Electrical problem	Operate the concerned valve manually. If squeezing noticed, then problem is electrical. Check 24V supply at coupler 1s62 of solenoid valve for LHS inside squeezing by operating all electrical controls. If LHS inside cylinders are not getting squeezed, then check the electrical circuit as follows. i) Check 24V at coupler of solenoid 1s62.If it is not coming there, then check Fuse si32 for QL2 PCB (2u16). It may be blown. ii) If fuse found OK, then brown wire of cable no.50.34 between solenoid coupler and B50 may also be damaged. Check the continuity and do the needful. iii) If 24V is not found at terminal QL24 in P.B.NO. B50. Then check the violet/green wire of cable 2.28 between B50 and B2.It may be damaged. Check the continuity and do the needful. iv) If all wires are OK. Then relay QL24 may also be defective. Check and do the needful.
		2) Hydraulic Problem	i) Unloader valve HY511.12 should be set at 140 bar. ii) Safety valve HY511.15 should be set at 175 bar. iii) 4-way valve (HY16RSD-ET) may also not functioning properly. Check and do the needful.
20.	RHS inside squeezing is out of order.	1) Electrical problem	Operate the concerned valve manually. If squeezing noticed, then problem is electrical. Check 24V supply at coupler 1s63 of solenoid valve for RHS inside squeezing by operating all electrical controls. If RHS inside cylinders are not getting squeezed, then check the electrical circuit as follows. i) Check 24V at coupler of solenoid 1s63.If it is not coming there ,then check Fuse si32 for QL2 PCB (2u16). It may be blown. ii) If fuse found OK, then brown wire of cable no.50.31 between solenoid coupler and B50 may also be damaged. Check the continuity and do the needful.

S. No.	Faults	Probable Causes	Remedial Actions
			iii) If 24V is not found at terminal QL25 in P.B.NO. B50. Then check the grey/green wire of cable 2.28 between B50 and B2.It may be damaged. Check the continuity and do the needful. iv) If all wires are OK. Then relay QL25 may also be defective. Check and do the needful.
		2) Hydraulic Problem	i) Unloader valve HY511.12 should be set at 140 bar. ii) Safety valve HY511.15 should be set at 175 bar. iii) 4-way valve (HY16RSD-ET) may also not functioning properly. Check and do the needful.
21.	Tamping Units are not moving towards LHS/RHS	1) Electrical problem	If by operating the concerned valve manually, T/units are not moving LHS/RHS. Then check 24V at coupler 1s49/1s50 of 4-way valve HY24RSJ-B by operating all the electrical controls. If it is not coming there, then check the electrical circuit as follows. i) Check connector QL20/QL21 in P.B. No. B50.If it is coming there, then brown wire of cable no. 50.26 between 1s49/1s50 and P.B. No. B50 may be damaged. Check the continuity and do the needful. ii) If 24V is not coming at connector QL20/QL21 in P.B.No. B50. Then check it at connector QL20/QL21 in P.B.No.B2.If it is coming there, then red-yellow/brown-green wire of cable no.2.28 between P.B No. B50 may be damaged. Check the continuity and do the needful. iii) Fuse si32 of QL2 plate may also be blown. Check and do the needful. iv) Relay QL 20/QL21 may also be blown. Check and do the needful.
		2) Hydraulic problem	i) If by operating the concerned valve manually. Tamping units are not moving LHS/RHS. Then spool of 4-way valve may be stick up. Check and do the needful. ii) Safety valve should be set at 175 bar. Check and do the needful. iii) Unloader valve should be set at 140 bar. Check and do the needful.

S. No.	Faults	Probable Causes	Remedial Actions
22.	LHS clamp unit is not going upward	1) Electrical problem	If by operating all the electrical controls, LHS clamp unit is not going upward. Then operate the coil 1s3 of concerned valve manually. If clamp unit is going upward, then problem is in electrical circuit. Check it as follows. i) Check 24V at coupler 1s3 of concerned valve. If it is not found there, then check it at connector QL2E in P.B.No. B50. If it is coming there, then brown wire of cable no. 50.40 between coil 1s3 and connector QL2E in P.B. No. B50 may be damaged. Check the continuity and do the needful. ii) If 24V is not coming at connector QL2E in P.B. No. B50.Then check it at connector QL2E in P.B.No. B2.If it is found there, then yellow/black wire of cable 2.28 may be damaged. Check and do the needful. iii) Fuse si32 of QL2 plate may be blown. Check and do the needful. iv) Relay QL2E may also be blown. Check and the do needful.
		2) Hydraulic problem	If by operating the concerned valve manually, LHS clamp unit is not going upward. Then check the hydraulic circuit as follows. i) Check servo valve filter indication (LHS) and do the needful. ii) Unloader valve HY511.11 should be set at 140 bar. iii) Safety valve should be set at 175 bar.
23.	RHS clamp unit is not going upward	1) Electrical problem	If by operating all the electrical controls, RHS clamp unit is not going upward. Then operate the coil 1s4 of concerned valve manually. If clamp unit is going upward, then problem is in electrical circuit. Check it as follows. i) Check 24V at coupler 1s4 of concerned valve. If it is not found there, then check it at connector QL2F in P.B.No. B50. If it is coming there, then brown wire of cable no. 50.41 between coil 1s4 and connector QL2F in P.B. No. B50 may be damaged. Check the continuity and do the needful.

S. No.	Faults	Probable Causes	Remedial Actions
			ii) If 24V is not coming at connector QL2F in P.B. No. B50.Then check it at connector QL2F in P.B.No. B2.If it is found there, then blue/black wire of cable 2.28 may be damaged. Check and do the needful. iii) Fuse si32 of QL2 plate may be blown. Check and do the needful. iv) Relay QL2F may also be blown. Check and do needful.
		2) Hydraulic problem	If by operating the concerned valve manually, RHS clamp unit is not going upward. Then check the hydraulic circuit as follows. i) Check servo valve filter indication (RHS) and the do needful. ii) Unloader valve HY511.11 should be set at 140 bar. iii) Safety valve should be set at 175 bar. iv) If all above found OK. Then servo valve EL-T76.00MO may be defective. Check and adjust the null point or replace it.
24.	LHS clamp unit is not coming downward	1) Electrical problem	If by operating all the electrical controls, LHS clamp unit is not coming downward. Then operate the coil 1s8 of concerned valve manually. If clamp unit is coming downward, then problem is in electrical circuit. Check it as follows. i) Check 24V at coupler 1s8 of concerned valve. If it is not found there, then check it at connector QL2B in P.B.No. B50. If it is coming there, then brown wire of cable no. 50.38 between coil 1s8 and connector QL2B in P.B. No. B50 may be damaged. Check the continuity and do the needful. ii) If 24V is not coming at connector QL2B in P.B. No. B50.Then check it at connector QL2B in P.B.No. B2.If it is found there, then violet/black wire of cable 2.28 may be damaged. Check and do the needful. iii) Fuse si32 of QL2 plate may be blown. Check and do the needful. iv) Relay QL2B may also be blown. Check and the do needful.

S. No.	Faults	Probable Causes	Remedial Actions
		2) Hydraulic problem	If by operating the concerned valve manually, LHS clamp unit is not coming downward. Then check the hydraulic circuit as follows. i) Spool of 4-way valve HY10RSG-B for LHS clamp lifting/ lowering may be stick up. Check and do the needful. ii) Unloader valve HY511.11 should be set at 140 bar. iii) Safety valve HY511.15 should be set at 175 bar.
25.	RHS clamp unit is not coming downward	1) Electrical problem	If by operating all the electrical controls, RHS clamp unit is not coming downward. Then operate the coil 1s9 of concerned valve manually. If clamp unit is coming downward, then problem is in electrical circuit. Check it as follows. i) Check 24V at coupler 1s9 of concerned valve. If it is not found there, then check it at connector QL2C in P.B.No. B50. If it is coming there, then brown wire of cable no. 50.39 between coil 1s9 and connector QL2C in P.B. No. B50 may be damaged. Check the continuity and do the needful. ii) If 24V is not coming at connector QL2C in P.B. No. B50.Then check it at connector QL2C in P.B.No. B2.If it is found there, then green/black wire of cable 2.28 may be damaged. Check and do the needful. iii) Fuse si32 of QL2 plate may be blown. Check and do the needful. iv) Relay QL2C may also be blown. Check and do the needful.
		2) Hydraulic problem	If by operating the concerned valve manually, RHS clamp unit is not coming downward. Then check the hydraulic circuit as follows. i) Spool of 4-way valve HY10RSG-B for LHS clamp lifting/ lowering may be stick up. Check and do the needful.. ii) Unloader valve HY511.11 should be set at 140 bar. iii) Safety valve HY511.15 should be set at 175 bar.

III. HYDRAULIC PUMP

S. No.	Faults	Probable Causes	Remedial Actions
1.	Pump not delivering oil.	1. Pump driven in wrong direction (at the time of new pump fitment, this problem may occur).	1. Check the pump rotation by hand priming. Pour the hydraulic oil into inlet port and rotate the shaft. See whether the oil is delivering through outlet port or not. If not, change the rotation according to the engine shaft rotation.
		2. Oil level too low in the reservoir (if oil level is very low, aeration may take place and pump will not deliver oil).	2. Check oil level in reservoir. It should be above minimum mark. If necessary, recoup the oil.
		3. Intake filter/pipe choked.	3. Clean or replace filter for proper flow of oil.
		4. Air leaks at pump intake joints.	4. Pour hydraulic oil on intake joints and on observing abnormal sound, tighten the intake joint as required.
		5. Broken pump shaft or rotor.	5. Replace the broken shaft or rotor. Also align the prime mover shaft
		6. Pump speed too slow. (The delivery rate of discharge is prescribed at a certain rpm of engine. If engine speed become less than ideal speed, it may affect the proper suction of oil).	6. Pump should run at prescribed speed. Engine rpm should be checked.
		7. Dirty suction filter	7. Replace the filter.
		8. Faulty suction valve.	8. Repair or change the valve
		9. Air in system.	9. Discharge air from the system

S. No.	Faults	Probable Causes	Remedial Actions
		10. Pump drive inoperative	10. i) Replace the broken pump shaft. ii) Change defective coupling
		11. Clutch out of adjustment.	11. Adjust clutch
		12. Pump is damaged.	12. Replace with new one.
2.	Pump makes noise	1. Aeration.	1i) Fill the reservoir with the oil up-to required level to prevent aeration. ii) Check condition of pump shaft seal. Change, if required.
		2. Intake line or suction filter partly clogged	2. Clean or replace the filter or line.
		3. Pump running too fast.	3. Reduce speed up to prescribed limit.
		4. Coupling misaligned (Due to this bearing may get damaged, play at shaft may develop).	4. Realign the pump shaft and prime mover shaft
		5. Reservoir not vented properly.	5. Air breather screening element should be cleaned
		6. Suction filter too small in size.	6. Replace by proper size of filter.
		7. Air leaks at pump intake pipe joints and air drawn through inlet line.	7. Take action as explained in s.no.1, item no. 4.
		8. Oil viscosity too high. (In cold climate oil viscosity becomes high so no free flow will take place and cavitation will occur).	8. Start the engine for few minutes to warm-up the hydraulic oil used in machine for proper flow. Use only proper grade of oil.
		9. Cavitation.	9. i) Check condition of suction filter and return line filters. Clean or change as necessary. ii) Check clogging of inlet line. Clean or change as necessary. iii) Check loose fittings on suction lines. Tighten, if required. iv) Clean hydraulic tank breather.

S. No.	Faults	Probable Causes	Remedial Actions
		10. Shaft seal leaks.	10. Replace the seal.
		11. Foams in oil.	11. Vent the system.
		12. Casing leaks.	12. First tighten bolts, then check for cracks and sealing.
		13. Vane spring broken.	13.Change spring.
		14. Any part of pump defective.	14. Replace defective parts.
		15. Foreign bodies in suction line.	15. Remove foreign bodies. Flush the system if required.
		16. System dirty.	16. Flush the system
		17. Sharp bends in suction line.	17 Eliminate or reduce the bends in suction line.
		18. Oil temperature too high.	18.Check the hydraulic circuit. Oil cooler may be ineffective. Rectify the failure
		19. Boost pump failed.	19. Check boost pump and repair as required.
		20. Vibration in system	20. Check unusual occurrence in the system
		21. Pump worn out or damaged.	21. Pump should be overhauled or replaced.
3	Pump overheats	1. Wrong oil grade.	1. Fill oil as recommended.
		2. Oil speed in system too high.	2. Install pipes of proper size.
		3. Oil level too low.	3. Fill the oil up to safe level
		4. Pump rotor groove worn out	4. Change the worn out parts
		5. Radial or axial loading too high.	5. Loading should be restricted to prescribed limit. Check alignment limit.
		6. Initial speed rises	6. Check max. pressure. If needed replace with larger capacity and install pipe of nominal bore.

S. No.	Faults	Probable Causes	Remedial Actions
		7. Inadequate cooling	7. Increase cooling capacity
		8. Cooling system is dirty.	8. Clean the cooling system.
		9. Differential pressure too low	9. Increase pressure setting of relief valve.
		10. Pressure too high	10. Reduce pressure setting
		11. Wrong type of pressure valve	11. Replace by appropriate type of valve
		12. Wrong seal size	12. Replace by suitable size of seal.
		13. Filter dirty or too small.	13. Clean filter or replace by larger size.
		14.Pump running speed high	14. Reduce speed
		15. Cavitation	15. Bleed the system
		16. Foams in oil	16. Vent the system
		17. Venting dirty	17 Clean the vents
		18. System contaminated	18 Flush the system
		19. Sharp bends in suction line	19. Eliminate bends or at least reduce them
		20 Boost pump failed	20 Check boost pump and repair as required
4	Pump develops no pressure	1. Wrong pressure setting	1. Modify the pressure setting
		2. Pressure valve spool stuck	2. Repair/ Replace the valve.
		3. Leakage in system	3. Replace defective parts
		4. Pump shaft broken	4. Replace shaft
		5. System contaminated	5. Flush the system completely.
		6.Improper gasket and seal	6. Replace seals and gaskets
5.	Speed loss on pump.	1. Inlet pressure too low.	3. Increase pressure.
		4. Outlet pressure too high.	2.Check system pressure.
		3.Oil temperature too high.	3.Check the circuit.

S. No.	Faults	Probable Causes	Remedial Actions
6.	Pump does not work.	5. Pressure too low.	6. Increase pressure setting.
		2. 'O' Ring on port plate defective.	2.Replace 'O' Ring.
		3. Too much play in the shaft.	3. Replace bearing.
7.	Hydraulic oil overheated	1. System pressure is too high.	1. Adjust the pressure to the required limit.
		7. Dirty oil	8. Clean or change filters and strainers.
		3. Oil level is low.	3. Fill up the oil to the upper mark.
		4. Hydraulic oil of incorrect viscosity.	4. Check oil for proper viscosity. If, change of oil is required, flush the entire system and change filter before adding fresh oil.
		5. Faulty cooling system.	5. Check oil cooler for trash on out side cooling surfaces. Clean with air pressure or steam pressure.
		6. Internal leakage of hydraulic oil due to worn pump, valve, motor and cylinder.	6. Overhaul or replace faulty components.
8.	Bearing failure.	1. Chips or other contaminants in bearing.	1. Replace bearings and check intrusion of contaminants.
		2. Coupling misaligned.	2. Align prime mover shaft and pump.
		3. Inadequate lubrication.	3. Lubricate system properly.
		4. Pump running too fast.	9. Adjust speed of prime mover.
		5. Excessive or shock loads. (Excessive loads due to operating pressure may damage the bearing).	5. Reduce operating pressure.

IV. HYDRAULIC RELIEF VALVE

S. No.	Faults	Probable Causes	Remedial Actions
1.	Erratic pressure.	1. Foreign material in the oil.	1. Drain the oil, clean the tank and refill with clean oil.
		2. Worn poppet valve or seat. (oil from pilot stage will go to tank due to worn poppet valve or seat and pressure will drop).	2. Replace poppet valve or seat as required.
		3. Piston sticking in main body.	3. Clean piston after dismantling. Check free movement after re-assembling .
2.	Low pressure or no pressure.	1. Valve improperly adjusted.	1. Adjust valve by adjusting knob to proper pressure setting.
		2. Vent connection is open.	2. Plug the vent connection.
		3. Balance hole in main piston choked.	3. Remove piston and clean the orifice. Clean the tank and replace hydraulic oil.
		4. Poppet in cover not seating.	4. Check the poppet condition. If required, replace it.
		5. Broken or weak spring.	5. Replace the spring and again set the pressure with adjusting knob.
		6. Dirt, chip etc keeps valve partially open.	6. Clean the complete valve.
3.	Excessive noise or chatter.	1. High oil velocity through valve.	1. Check valve flow rating. Replace with larger valve, if necessary.
		2. Distorted control spring.	2. Replace spring.
		3. Worn poppet.	3. Replace the poppet.
		4. Vent line too long.	4. Replace restrictions e.g. needle valve or orifice. Plug in vent line next to the relief valve.

S. No.	Faults	Probable Causes	Remedial Actions
		5. Valve pressure setting too close to that of another valve in circuit.	5. Set relief valve pressure at-least 150 PSI higher than other valves in circuit.
4.	Valve do not function	1. Spool sticks.	1. Clean stuck spool.
		2. Water condensation in system.	2.Check condensed water.
		3. Oil temperature too high.	3.Check the function of oil cooler and clean the radiator fins.
		4. Oil speed too high.	4. Check speed of the pump.
		5. Internal leakage.	5.Prevent leakage.
		6.Tank line under high pressure.	6. Check pressure in tank line.
		7. Control line dirty.	7. Clean lines properly.
5.	Valve over-heating	1. System pressure too high.	1. Adjust spring pressure.
		2. Dirt in the system.	2.Clean the system.
		3. Spool sticks.	3.Check and clean spool.
		4. Spool defective	4. Check and replace spool, if defective.

V. HYDRAULIC UNLOADER VALVE

S. No.	Faults	Probable Causes	Remedial Actions
1.	Low or no pressure.	1. Orifice of main piston choked.	1. Clean the orifice.
		2. Vent connection open to tank.	2. Plug the vent connection.
		3. Safety valve at zero setting	3. Set the safety valve at proper pressure.
		4. Broken or weak spring	4. Replace the spring.
2.	Fails to completely unload pump.	1. Valve pressure setting too high.	1. Set valve at proper pressure.
		2. Valve spool binding in body.	2. Clean the spool or replace if required
		3. Incorrect assembly.	3. Assemble as per proper drawing.
		4. Nil or low nitrogen pressure in the accumulator.	4. Check pressure and recharge the accumulator .
		5. Punctured bladder.	5. Change the bladder.

VI. HYDRAULIC MOTOR

S. No.	Faults	Probable Causes	Remedial Action
1.	Motor makes loud Noise.	1. Vane spring broken.	1. Change the spring.
		2. Shaft seal leaks.	2. Replace the seal.
		3. Casing leaks.	3. First tighten bolts, then check for cracks and sealing.
		4. Oil temperature too high.	4. Check cooling circuits.
		5. Motor parts defective.	5. Replace defective parts. Tighten bolts uniformly.
2.	Motor overheats	1. Motor is of under capacity	1. Install motor of proper capacity
		2. Rotor worn out.	2. Change the rotor.
		3. Inadequate cooling.	3. Check cooling pump
		4. Pressure too high.	4. Reduce pressure setting on relief valve.
		5. Wrong seal size.	5. Replace by suitable seals.
3.	Speed loss on motor.	1. Inlet pressure too low.	1. Increase pressure by resetting relief valve.
		2.Motor parts defective.	2. Change defective parts.
		3. Oil temperature too high	3. Check cooling circuit. Hydraulic oil cooler may be defective.
		4. Out let pressure too high	4. Check the system pressure.
		5. Port plate does not make contacts.	5. Dismantle the motor and repair as per requirement.

A**nnexure**

GENERAL SAFETY NOTES

1. The machine has to be operated as per existing Indian Railways rules and regulations.
2. The safety of yourself and other people is a most important consideration in the operation and maintenance of the machine.
3. Remember the machine is a working unit, carrying delicate instruments. Therefore the machine should not be driven at excessive speed over bad track or turnouts.
4. Always keep your eyes open for other men working close to the machine.
5. Do not forget to look out for signals, switches and track obstructions.
6. Remember to make sure that all protection equipment and safety devices are in place on the machine and in working order especially when it is being driven from one site to another.
7. Always keep the machine clean. Excessive oil or grease on the machine can cause you to slip or fall and is also a potential fire hazard.
8. Always lock the machine before you leave. Make sure that the machine is protected in accordance with railways regulations.
9. Whenever you have the opportunity while waiting to get out on a job, do some of the smaller maintenance jobs such as tightening loose nuts and bolts and cleaning the machine.
10. Do not permit unauthorized persons to operate the machine.
11. It is prohibited to use exposed light or fire on or near the machine.
12. Do not tow the machine if the final drive is engaged.

ACKNOWLEDGEMENT

Following officers and staff have made their valuable contributions in finalization of Trouble Shooting Manual of Plasser make Work Site Tamper (08-32 New model).

RAILWAYS

1.	Shri.	Muslim Ahmad	Sr. Instructor/IRTMTC/ALD
2.	‘’	S.K.Dhiman	Sr. Instructor/IRTMTC/ALD
3.	‘’	A.K. Gautam	SE/TMC/NER

RDSO

1.	S/Shri	H.C. Pandey	Dy. Director/ Track Machines
2.	‘’ ‘’	Mohd. Naeem Siddiqui	SE/Engg./TM.
3.	‘’ ‘’	O.P. Malhotra	SE/Design/TM
4.	‘’ ‘’	A.N. Srivastava	SE/Research/TM.
5.	‘’ ‘’	Prem Kumar	SE/Research/TM