

COMPACT

FARMTRAC 25G HST

INDEX

Description	Page No.
KNOW YOUR TRACTOR	1
INSTRUMENT CLUSTER & FUNCTIONS.	2
ERROR CODES FOR CONTROLLER AND BATTERY	3-4
TRACTOR CONTROLS SOP	5
BATTERY DISMANTLING PROCESS	9
INFO OF CET BATTERY PACK	13
CHARGING CIRCUIT OF CET	14
MAIN DRIVE CIRCUIT	15
MOTOR CONTROLLER CIRCUIT	16
SEAT OPC CIRCUIT	18-42
MOTOR CONTROLLER ERROR CODE	43

KNOW YOUR TRACTOR

Compact Electric -HST with 15 KW AC induction motor closed loop system with both end drive. Motor 1st drive end connected to HST unit & other end of motor is connected to hydraulic pump 8CC for all hydraulic function.

Battery Pack (replacing fuel source)

Lithium-ion (NMC) 350AH Battery pack at 73VDC is the energy source for driving the motor



Battery Pack

Motor (replacing Engine)

15KW, 3 Phase AC induction Motor is the prime mover in place of the Diesel Engine

Controller

200A AC Traction Motor Controller for providing controlled power supply to the motor



Charger

Induction Motor

On Board Charger 3.3 KW, 40 A@ 73 VDC For charging the battery pack

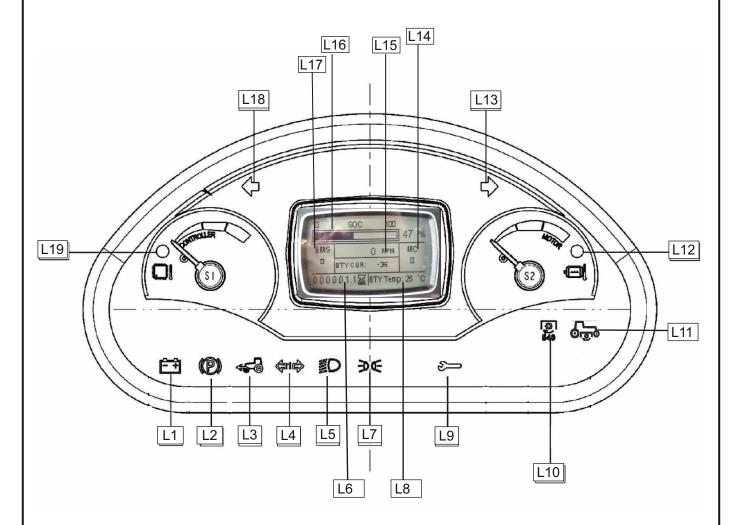
DC-DC Convertor

The DC-DC Convertor for charging the auxiliary battery and running other vehicle electrical loads



Charger

INSTRUMENT CLUSTER & FUNCTIONS.



- L1 Battery Charging
- L2 Parking Brake
- L3 4WD Engaged
- L4 Turn Trailer
- L5 Projector Lamp
- L6 HMR
- L7 Position Lamp
- L8 Battery Temperature
- L9 Malfunction
- L10 Rear PTO
- L11 MID PTO

L12	Motor Temperature	
L13	Right Indicator	
L14	Controller Temperature	
L15	Motor RPM	
L16	Battery State of Charge (SOC)	
L17	BMS Error	
L18	Left Indicator	
L19	Motor Controller Error Code	

ERROR CODES FOR CONTROLLER AND BATTERY

MOTOR CONTROLLER ERROR CODE

12	Controller Over Current	
13	Current Sensor Fault	
15	Controller Severe Undertemp	
16	Controller Severe Over temp	
17	Severe B+ Under voltage	
18	Severe B+ Overvoltage	
18	Severe KSI Overvoltage	
22	Controller Over temp Cutback	
23	B+ Under voltage Cutback	
24	B+ Overvoltage Cutback	
25	+5V Supply Failure	
28	Motor Temp Hot Cutback	
29	Motor Temp Sensor Fault	
31	Coil1 Driver Open/Short	
31	Main Open/Short	
32	Coil2 Driver Open/Short	
32	EM Brake Open/Short	
36	Encoder Fault	
36	Sin/Cos Sensor Fault	
37	Motor Open	
38	Main Contactor Welded	

39	Main Contactor Did Not Close	
41	Throttle Wiper High	
42	Throttle Wiper Low	
43	Pot2 Wiper High	
44	Pot2 Wiper Low	
45	Pot Low Over Current	
46	EEPROM Failure	
47	HPD/Sequencing Fault	
49	Parameter Change Fault	
72	PDO Timeout	
73	Stall Detected	
83	Driver Supply	
87	Motor Characterization Fault	
51	Vehicle lock without applying hand brake	
88	Encoder Pulse Count Fault	
89	Motor Type Fault	
92	EM Brake failed to set	
99	Parameter Mismatch	

ERROR CODES FOR CONTROLLER AND BATTERY

BMS ERROR CODES

100	SOC is too high		
101	SOC is toolow		
102	Total voltage is too high		
103	Total voltage is too low		
104	Charge current fault		
105	Discharge current fault		
106	Battery temperature is too low		
107	Battery temperature is too high		
108	Battery under voltage		
109	Battery overvoltage		
110	Battery temperature unbalance		
111	Battery voltage unbalance		
112	The battery does not match		
113	The temperature of the output pole is too high		
116	The parameters of memory fault		
117	Data memory fault		
118	Cell voltage detection fault		
119	Temperature detection fault		
120	Current detection fault		
121	Internal total voltage detection fault		
122	External total voltage detection fault		
123	Insulation monitoring fault		
124	Clock fault		
125	Internal CAN communication fault		
126	Serious insulation fault		
127	Slight insulation fault		
140	System fault level		
142	BMS fault need maintenance		
143	Battery fault need maintenance		
144	Battery system fault needs maintenance		
145	The battery needs to maintenance (full charging and full discharging)		
146	Maintenance mode status		

TRACTOR CONTROLS SOP

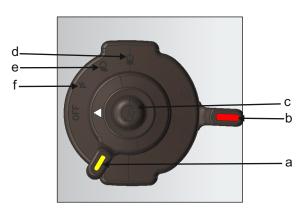
MSD(Manual Service Disconnect) Switch

Manual Service Disconnect On Battery Box –To Cut off the 73Volt output from Battery Box



Manual Service Device Switch

1. Combination Switch :- It is used for left and right Indicators, horn and head light switch. Turn the red switch into left and right direction to switch "ON" the left and right indicators. Turn the yellow switch to operate signature lamp, low and high beam of head light.

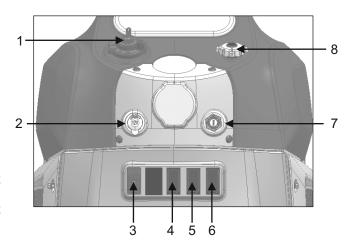


- a. Light Switch
- b. Turn Signal Switch
- c. Horn
- d. High Beam
- e. Low Beam
- f. Signature Lamp
- 2. Mobile Charging Socket:-For Mobile Charging
- **3. Cruise Control Switch:** During the long run operator can use the cruise control switch to hold the Forward/Reverse pedals on defined speed. Once the operator will press the brake pedals for sudden stop, Cruise function will automatically disengage which take the pedals back to neutral position. Operator can also disengage cruise control by pressing switch at OFF position.
- **4. Pto Wet Clutch Switch** :- Press the switch to engage the PTO.

5. DRIVE ON/OFF SWITCH

After key ignition drive switch when turned ON will start the motor and when turned OFF will turn of the motor.

- **6. Hazard Switch** :- Press the switch to operate the hazard lights.
- **7. Key Start Switch :-** The key operated switch actuates the stating motor.



- 1. COMBINATION SWITCH
- 2. MOBILE CHARGING SOCKET
- 3. CRUISE CONTROL SWITCH
- 4. PTO WET CLUTCH SWITCH
- 5. DRIVE ON-OFF SWITCH
- 6. HAZARD SWITCH
- 7. KEY START SWITCH
- 8. RPM CONTROL KNOB

8. RPM CONTROL KNOB

Rotate clockwise RPM control knob to increases motor speed, and rotate anti-clockwise decreases motor speed.

Charging Point

Charging point is provided to plug in the charging cable (provided In Place of Fuel Tank Cap)

RCD (Residual Current Device) Charging Cable

The Charging Cable can be plugged directly to 15 Amp Household Socket to charge the 73V battery of the tractor





Charging point

RCD



MSD (Main switch disconnect) switch - To Cut off the 73 Volt output from Battery Box



Charging Interlock – If the charger is plugged on Vehicle, tractor will not work (main controller will not give supply to drive motor)



Safety Interlock – Main motor will not run if the throttle and brake potentiometers are not at zero position before start



Seat OPC – If driver gets down without engaging the parking brake, tractor system will automatically shut Off within 7 Sec.

Step 1- Put the tractor on Parking Brake and ensure MSD is ON

Step 2- Plug the Cable into 15 Amp wall mounted socket and switch $\ensuremath{\mathsf{ON}}$

Step 3- Plug the other end of the charging cable on the vehicle side

Step 4- After Plugging in green light will blink on RCD device, it will continue to blink if charging OK.

Step 5- Once the charging starts, the charger fan starts rotating.

Step 6- Switching On the ignition key, battery symbol will show ON cluster which shows that tractor is in charging mode



RCD Charging Cable Plugged In

Charging Source: 15 Ampere, 230 Volt



(Charger & Fan) LHS of tractor

Switch on the MSD Switch



Turn On MSD

- Sit on the tractor
- ► Check if both the throttles(hand throttle foot throttle) and brake pot are at zero position



All throttles zero

- ▶ FNR switch should be in Neutral
- (if ignition key is turned on and FNR switch is in F or R mode, we need not switch off the ignition we just need to neutral the FNR switch and again select the F/R mode)
- Parking brake should be disengaged



Parking Brake

- Pump on/off switch be off (if ignition key is turned on and Pump switch is on, we need not switch off the ignition we just need to switch off and again switch on the pump switch)
- HLM Range lever should be in Neutral
- ▶ SNF switch can be used in any position, any time(Condition: if we change from S to N on the same throttle RPM, the RPM will rise wrt previous mode)
- Do not touch the vehicle and charger when there is lightning. A lightning strike may back feed into the charger causing damage and possible personal injury or death.
- Do not plug in or unplug the plug with wet hands and do not stand in water, liquid or snow. This may cause an electric shock which may result in serious personal injury or death.

If Warning tell tail glows on cluster, contact your dealer for assistance and repair.



Malfunction tell tail on cluster

If error code appears on cluster, look for the problem according to the error code chart.



Error Code Display

If any high heat condition or burning smell is noticed immediately park the tractor in a safe location, place the ignition in the OFF position, move yourself away quickly to a safe distance from the tractor and contact your dealer for assistance and repair.



Motor Temperature

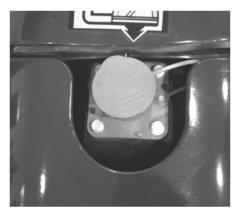
- > Do not store your tractor inside if any of the above noted conditions exist.
- Do not attempt to alter the tractor in any manner which would affect stability, control, or top speed. Such alterations may lead to serious injury or death, violate state and local laws, and will void the manufacturer's warranty.
- Charge the vehicle in ventilated area, under a shade.



Controller Temperature

- Do not touch the vehicle and charger when there is lightning. A lightning strike may back feed into the charger causing damage and possible personal injury or death.
- Do not plug in or unplug the plug with wet hands and do not stand in water, liquid or snow. This may cause an electric shock which may result in serious personal injury or death.
- Make sure the cap is closed on the charge port when charging is completed. If the charger cord is removed and the cap is open, water or foreign materials may enter the charge port.
- Make sure there is no water or foreign materials in the charge port, charge connector or electrical plug, and that they are not damaged or affected by rust or corrosion.





Charging Port

- Look for cluster alerts and error codes on cluster
- Clean the dust on electrical components
- Inspect and clean battery wires. Damage or frayed wires should be replaced by a qualified technician.
- Apply the parking brake
- Fully charge the battery before storing the tractor for long period
- Turn Off the MSD switch
- Charge the battery once within 3 months, if tractor not in use

BATTERY DISMANTLING PROCESS

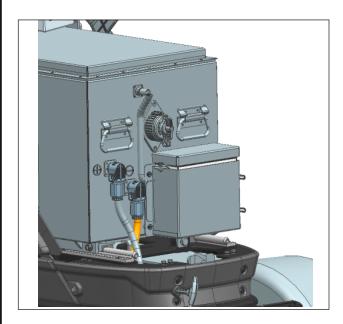




Step 1 – Open the hood



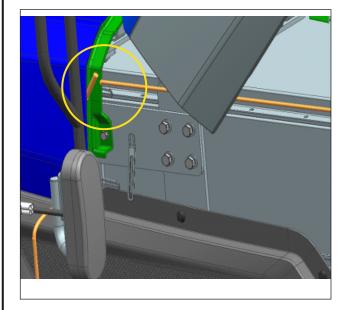
Step 4 – Dismantle Hood



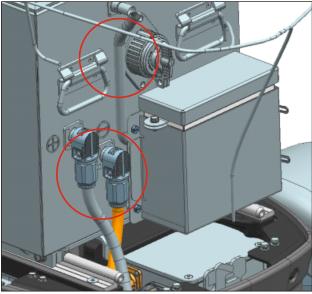
Step 2 - Switch off MSD



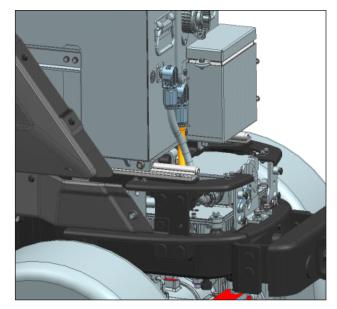
Step 5 – Disconnect Auxilary Battery Connector



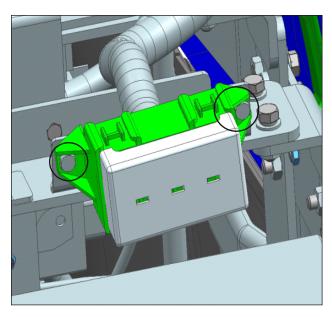
Step 3 – Disconnect Heap lamp connector



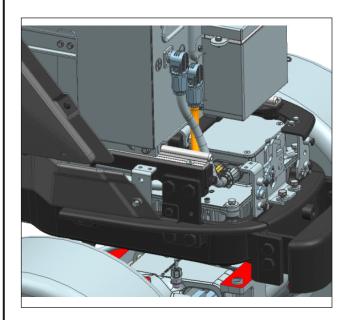
Step 6 – Disconnect BMS Co nnector and HV cables



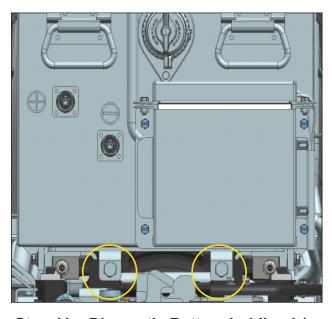
Step 7 - Dismantle front plastic cover



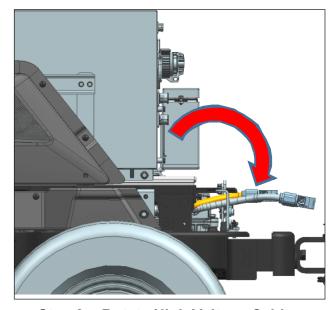
Step 10 – Open Fuse Box mounting bolts



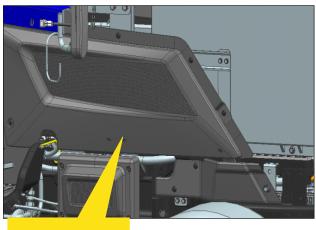
Step 8 - Dismantle Baffle Plate RH



Step 11 – Dismantle Battery holding h/w

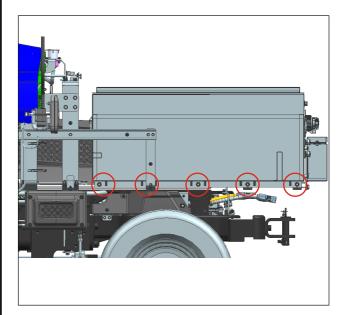


Step 9 – Rotate High Voltage Cables

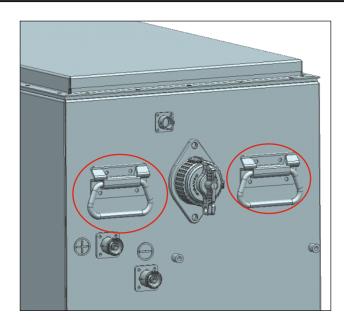


Battery Side Cover

Step 12 – Open Battery Side Cover



Step 13 – Slide the battery out till stopper. It will come outside by 485mm and dismantle battery holding bolts.

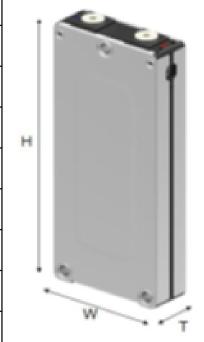


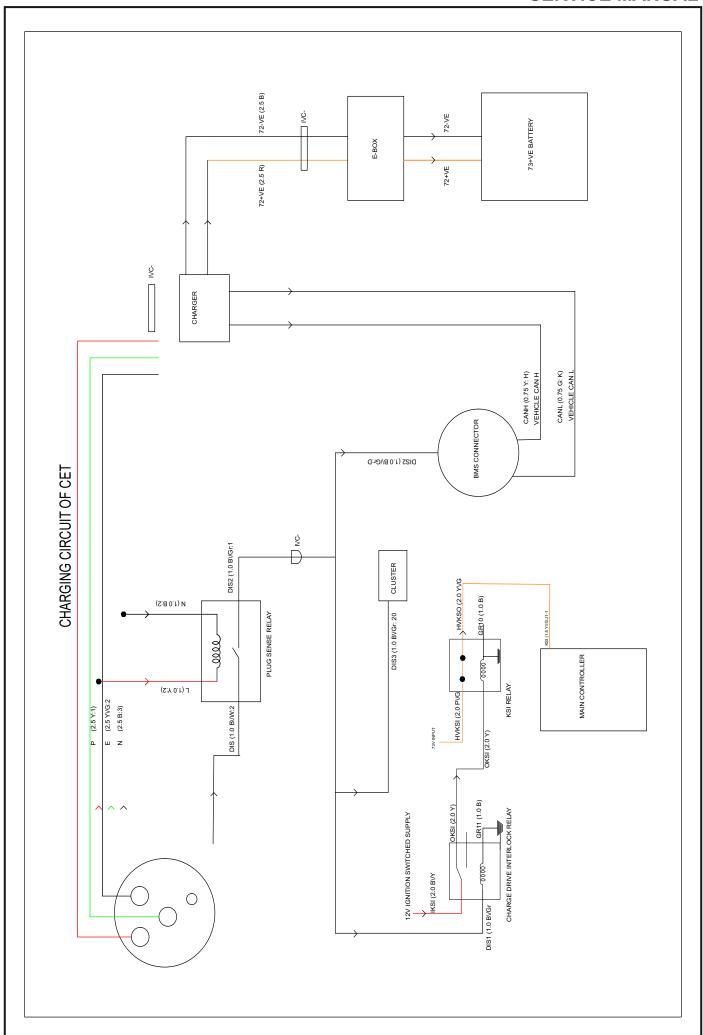
Step 14 – Use belts to anchor the battery box from handles and lift the battery box upside.

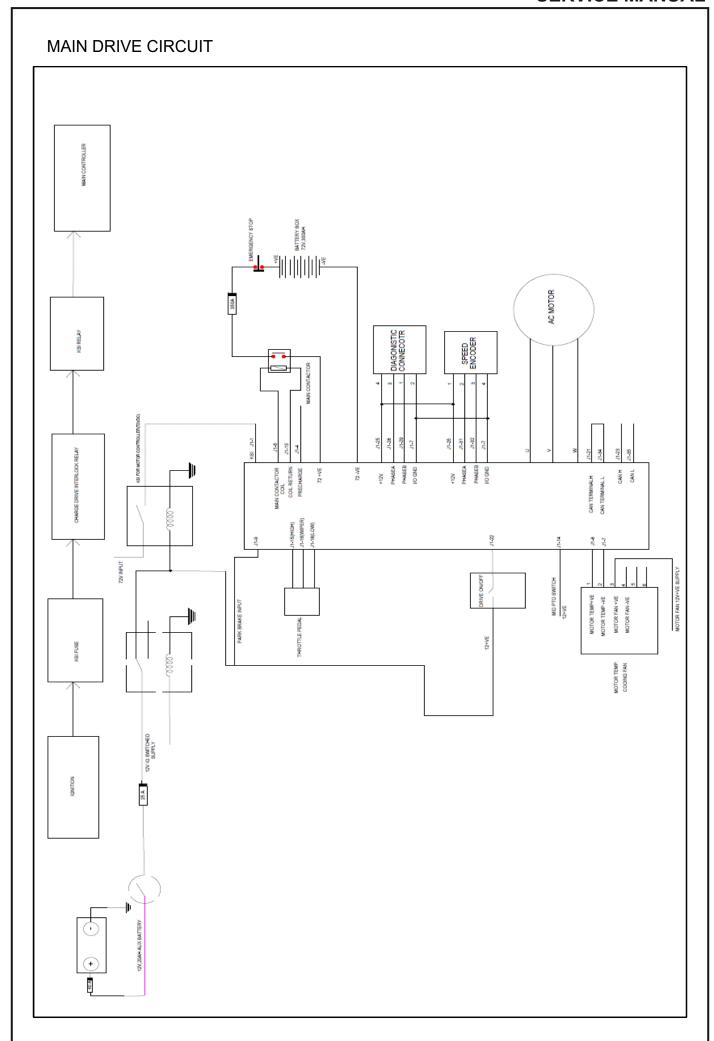
NOTE : Repeat the process In reverse direction to assemble the battery

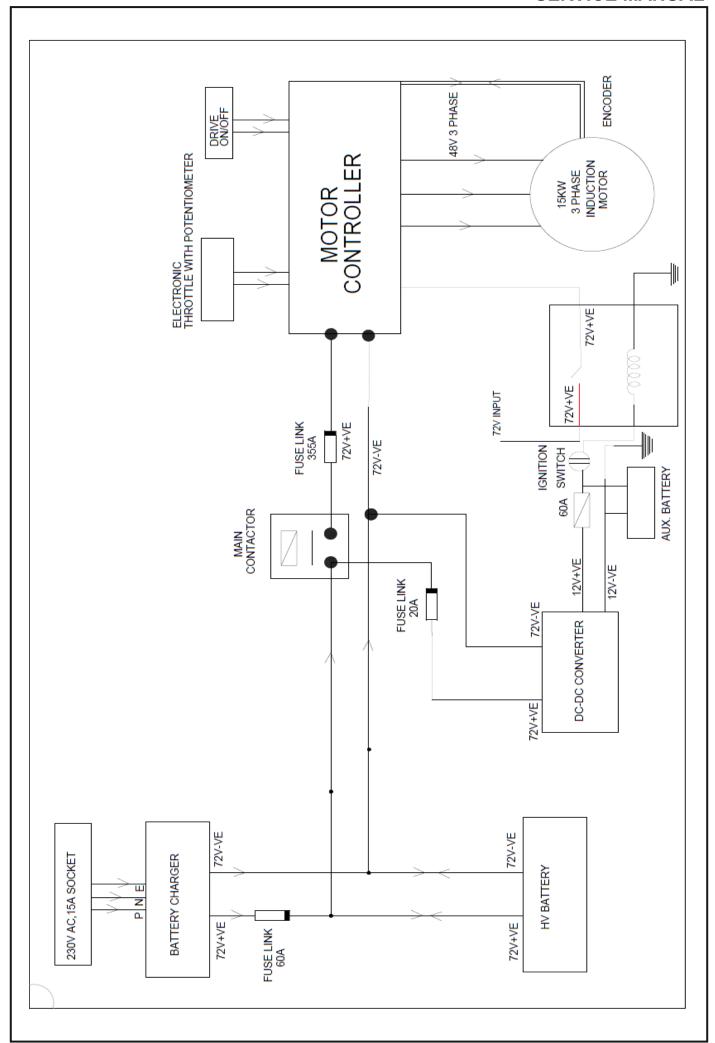
INFO OF CET BATTERY PACK

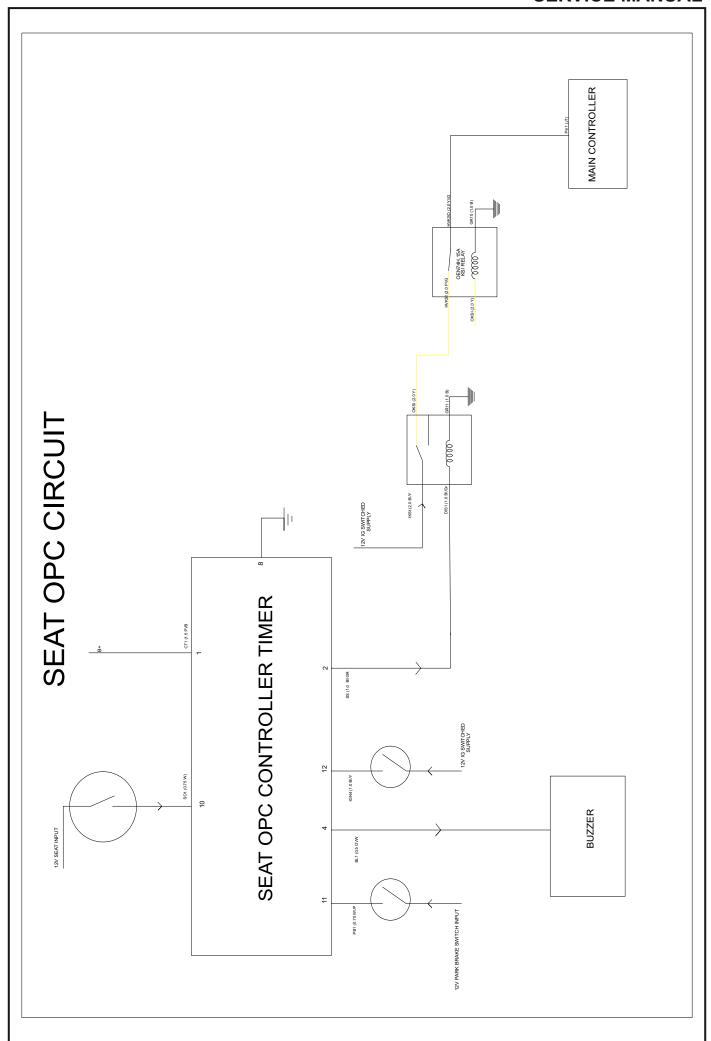
S.N	Parameter	Escorts Solution (NMC)
1	Dimension (Battery Box),mm	(900x400x400)
2	Energy Density, Wh/Kg.	178.218
3	Cell Type	SEPNI-8688190 (15AH)
4	Parallel / Series	5P15
5	Module Dimension (H+W+T) (mm)	245X97X45.5
6	Module Rated Capacity AH	75
7	Module Rated Voltage, V	3.6
8	Module Weight, kg	1.5.15
9	Module Energy Density, Wh/Kg.	178.218
10	Nominal Voltage, V	73
11	Total Power Module(73V-350Ah)	20S4P
12	Voltage Range, V	6084
13	Battery System Whole Energy (KWH), 23±2°C, Whole	21.6
14	Battery System Whole capacity (Ah), 1/3C	350

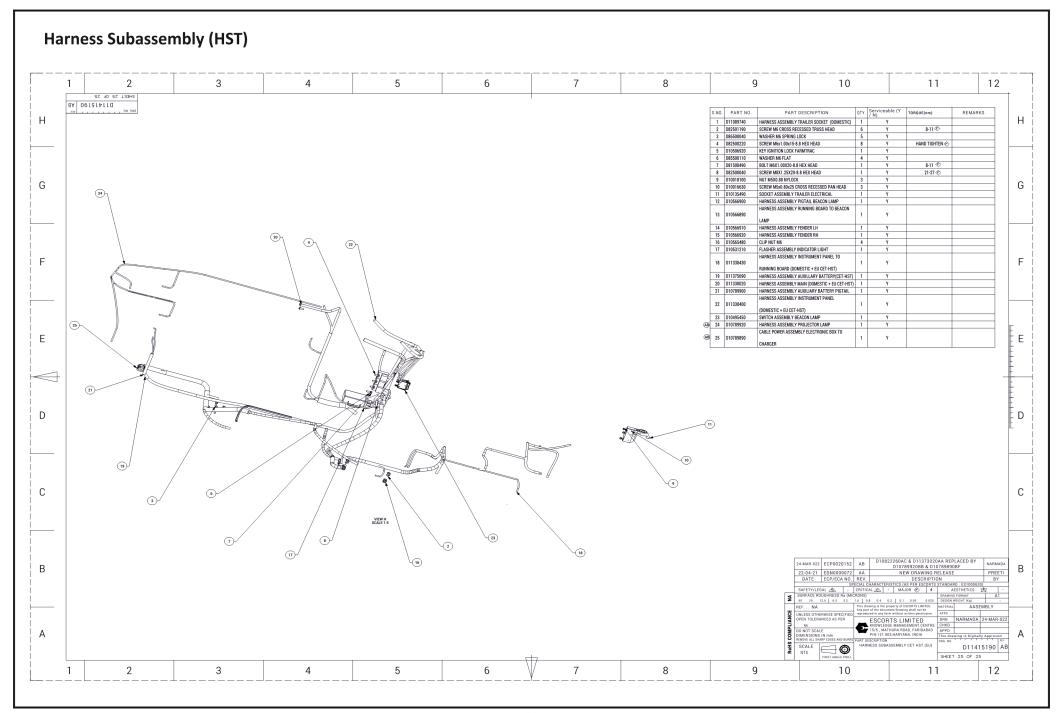


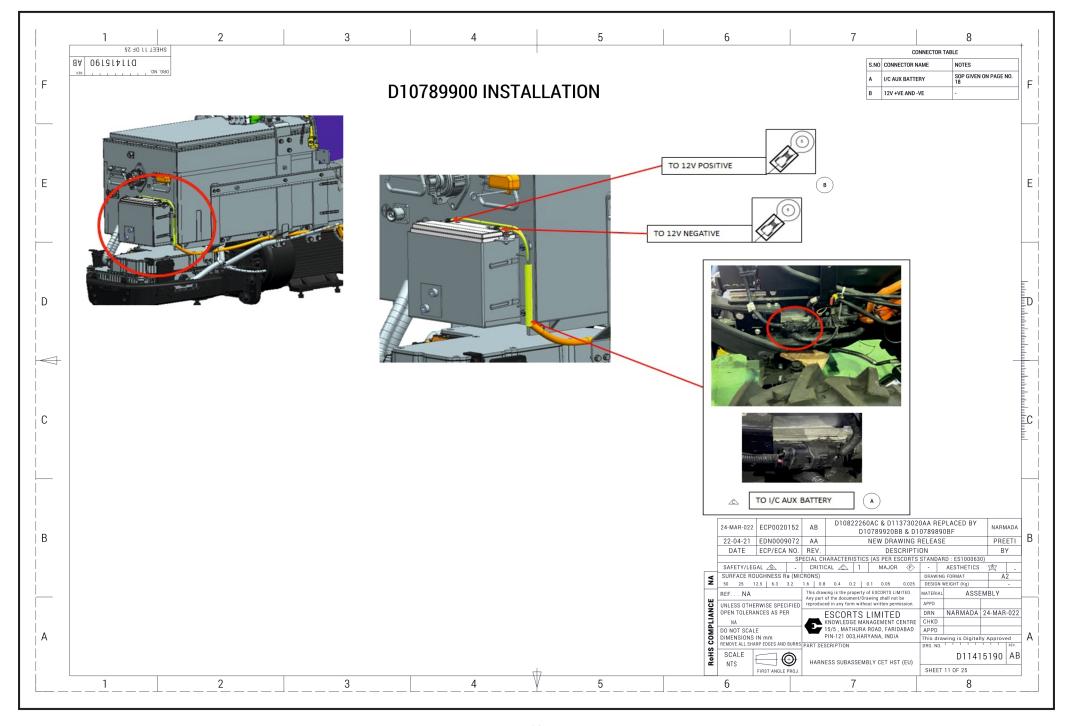


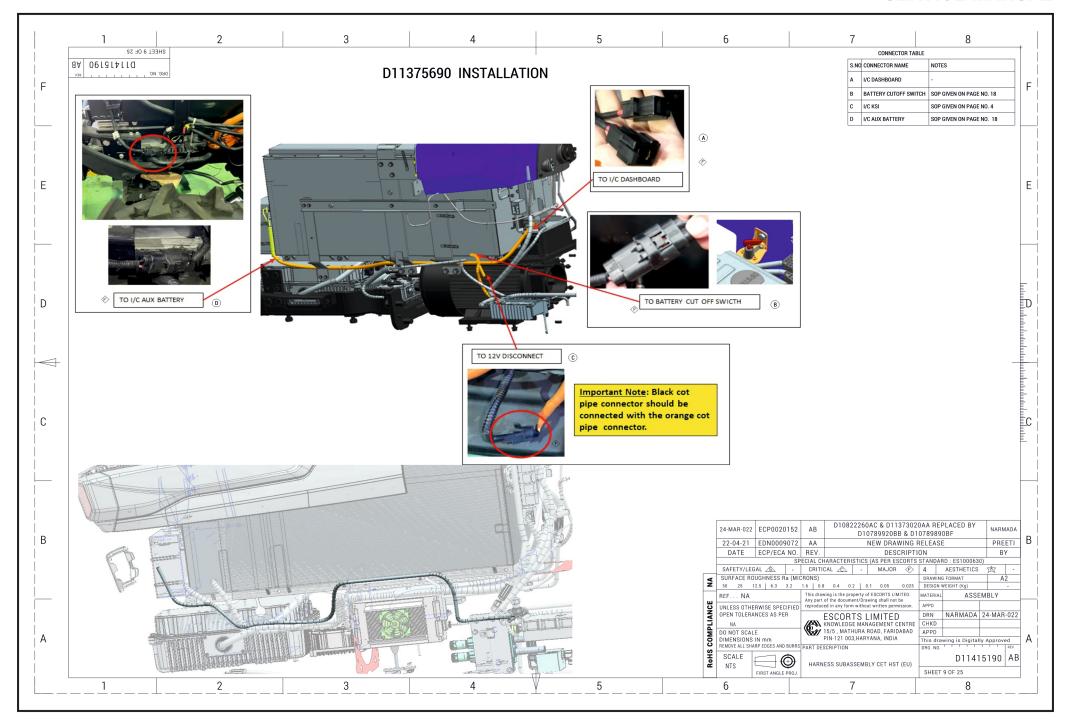


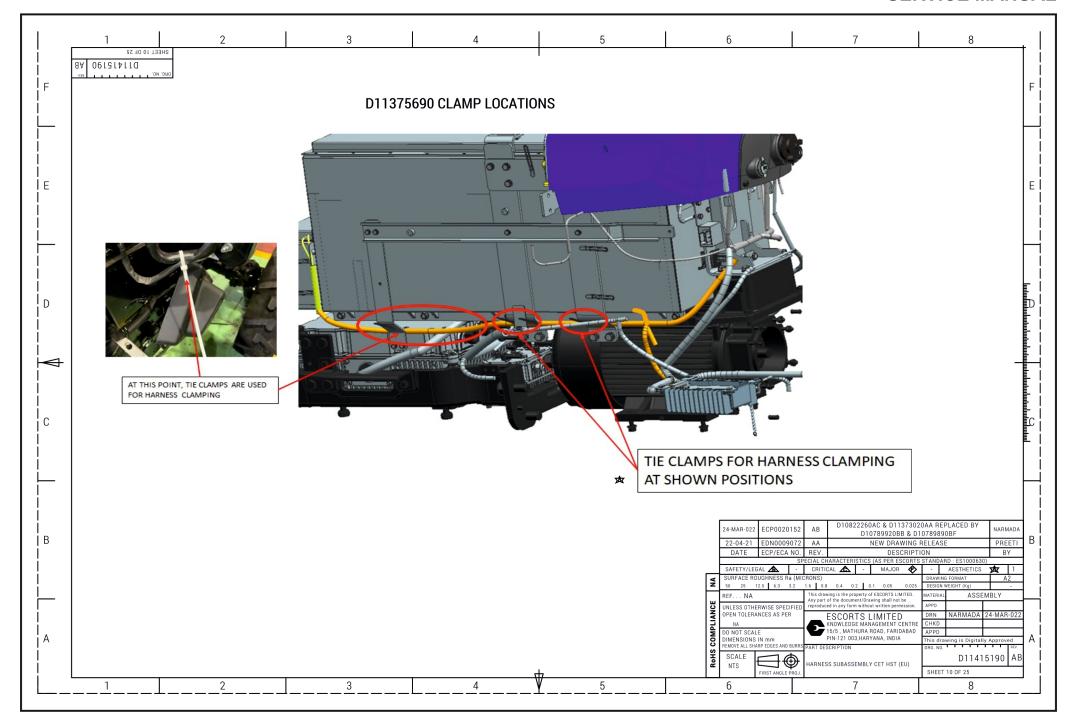


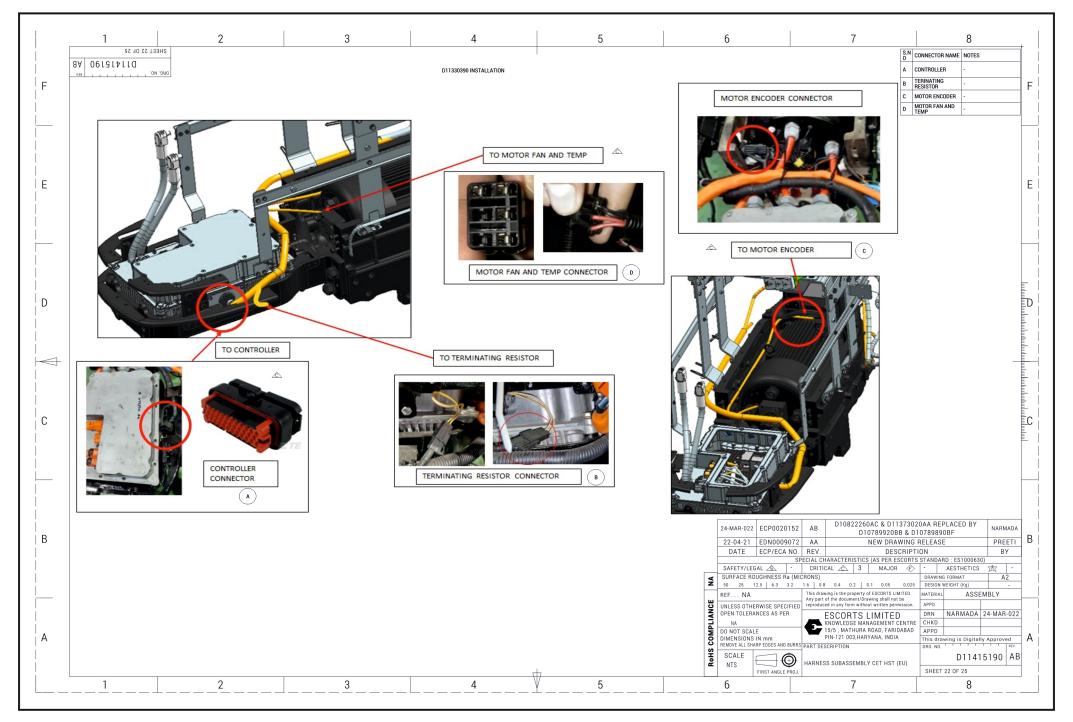


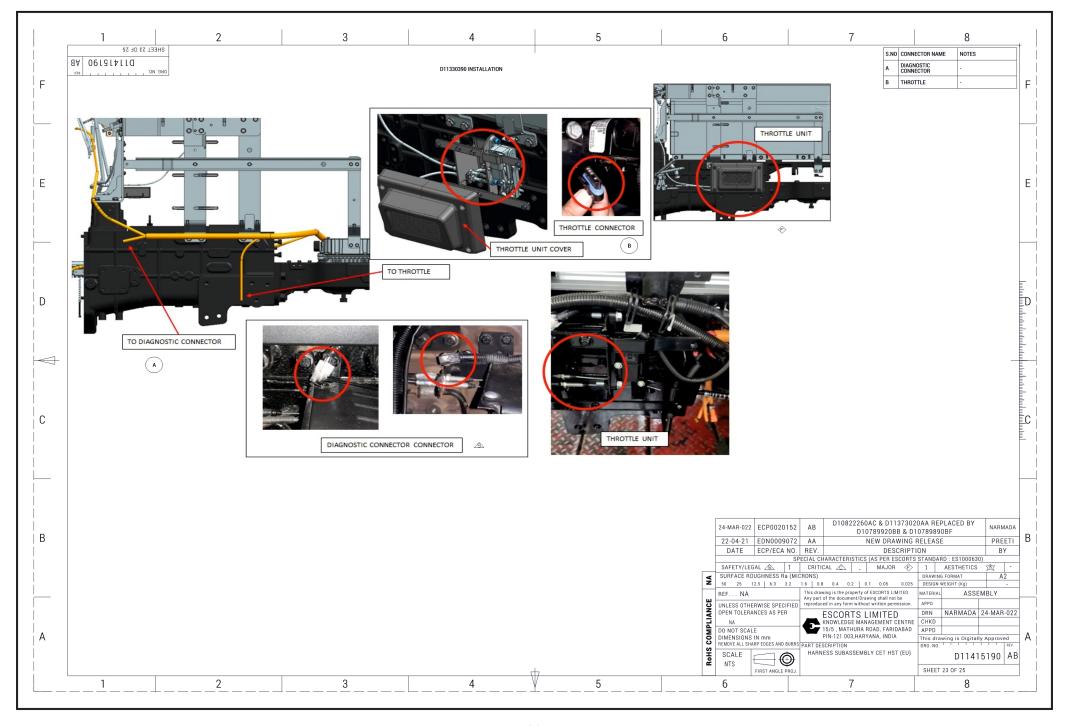


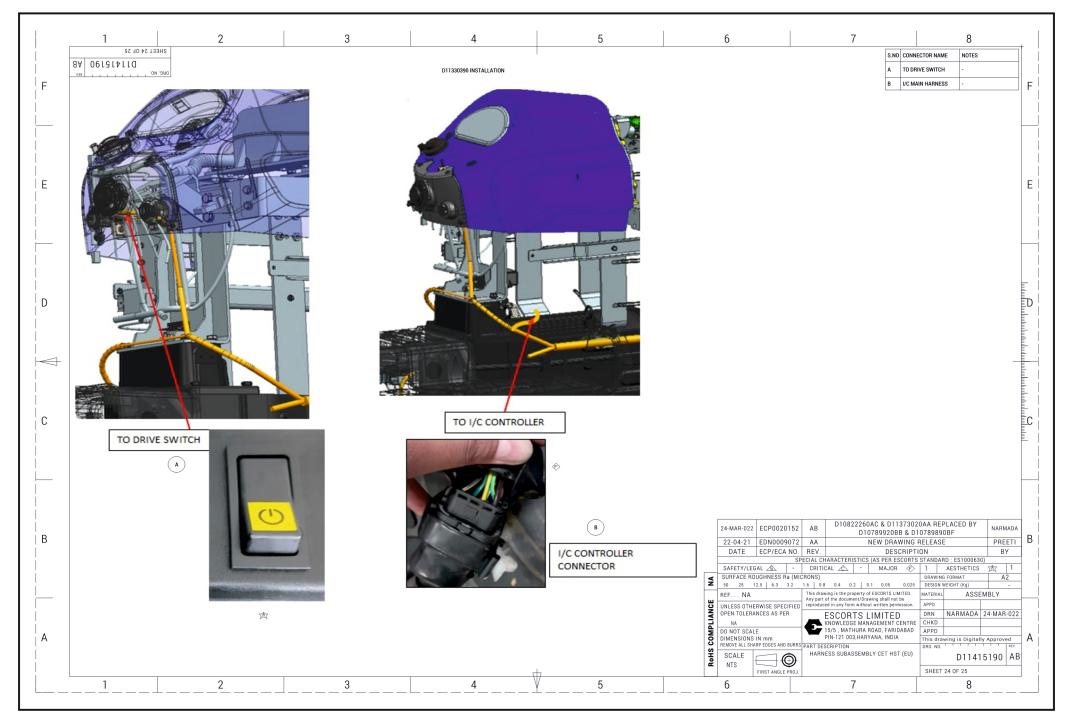


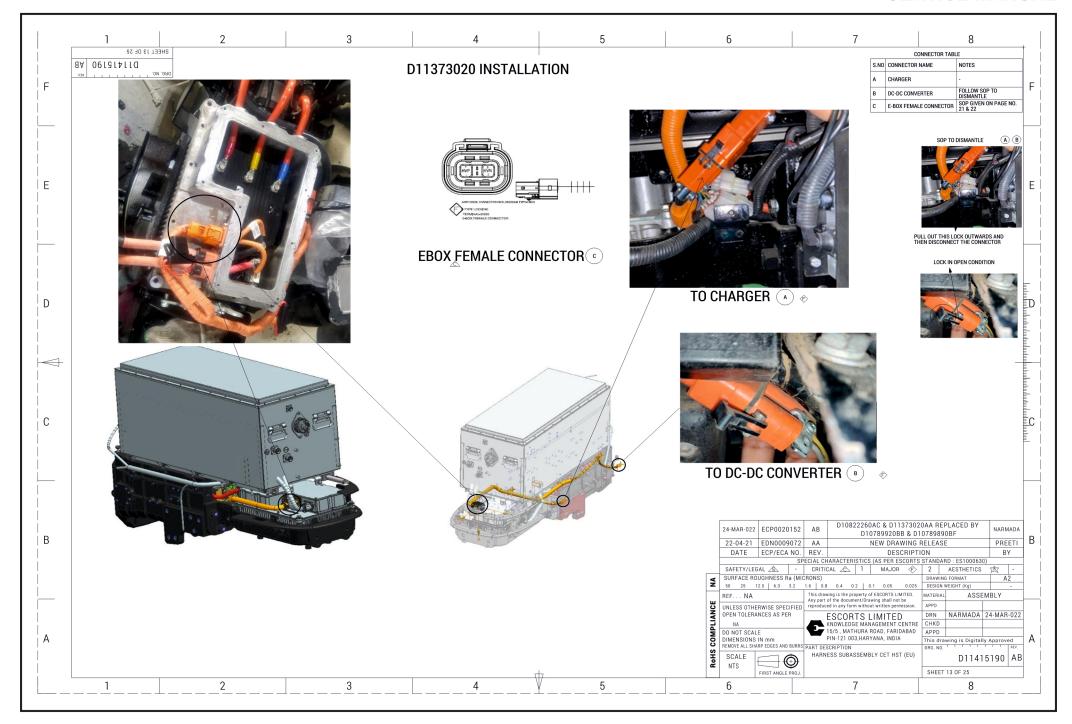


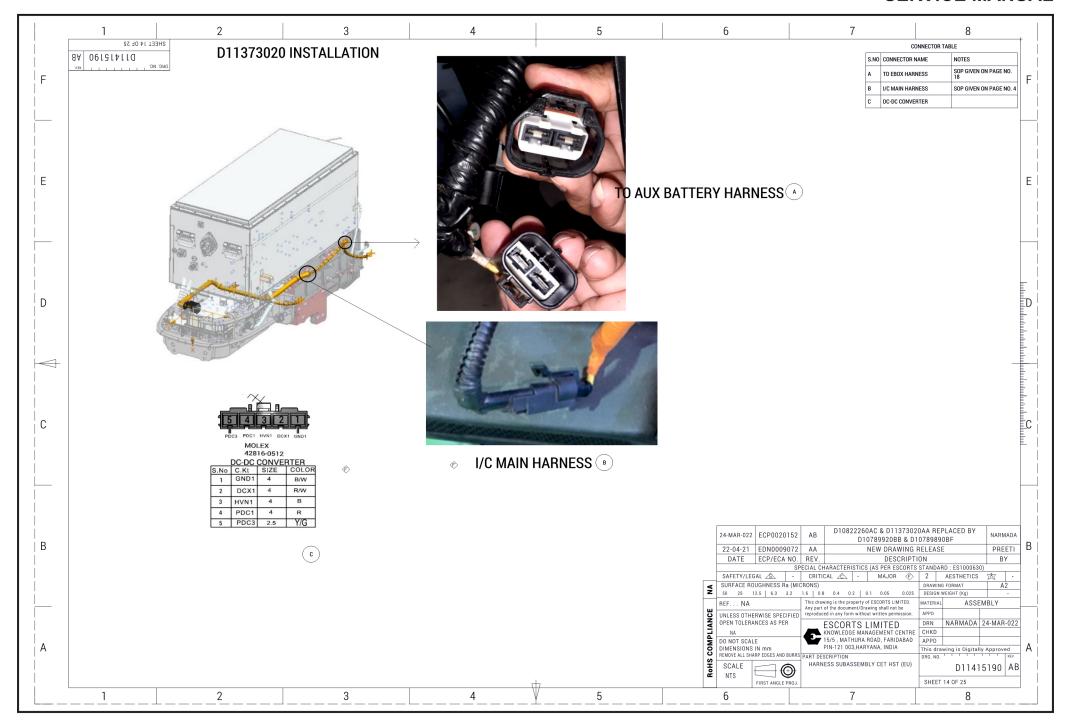


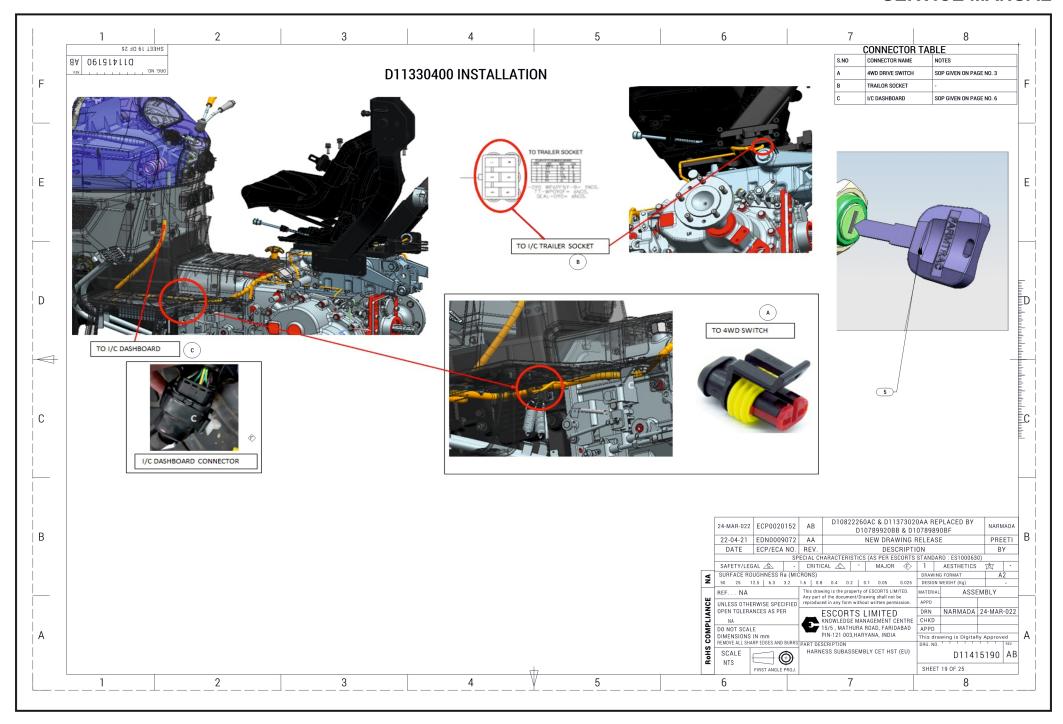


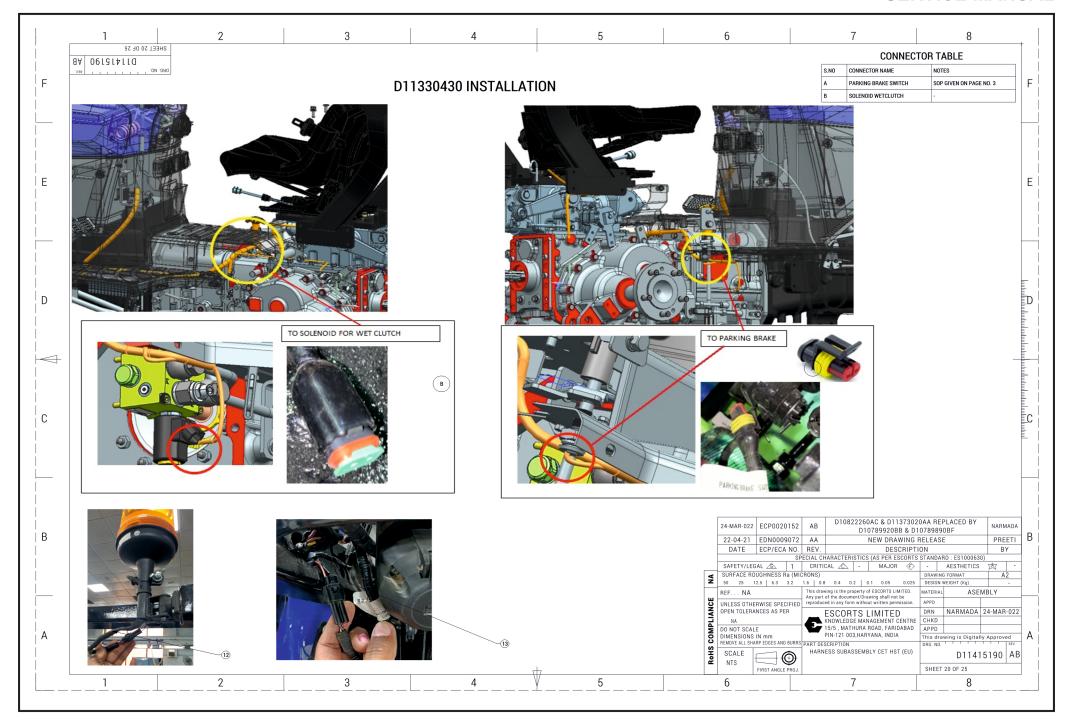


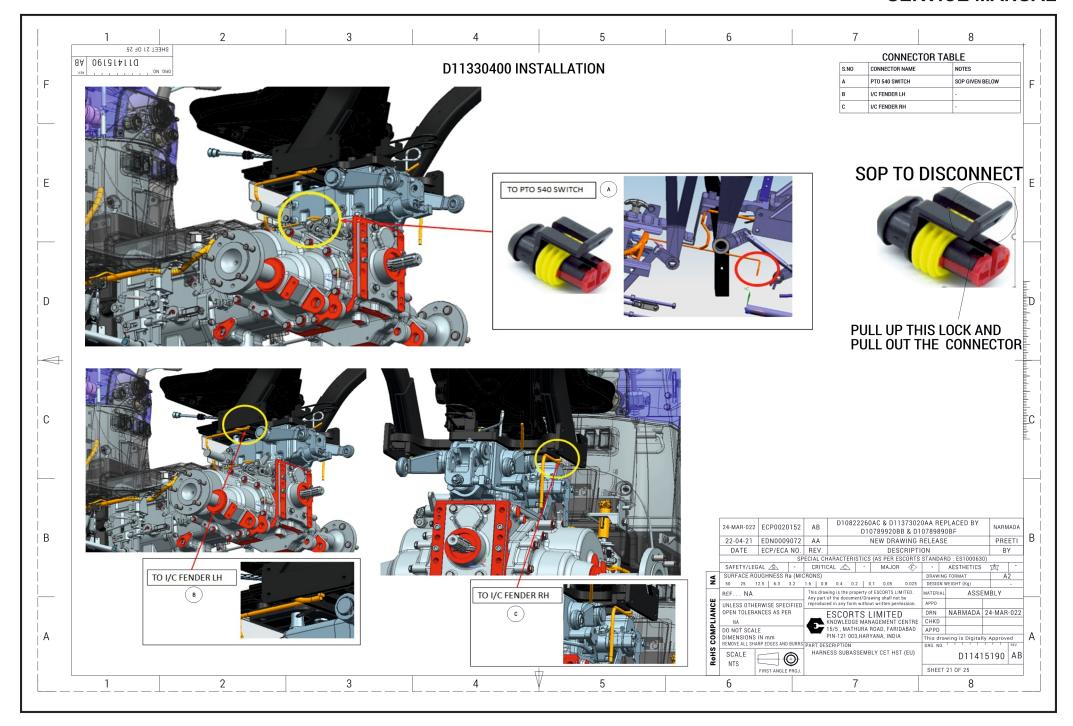


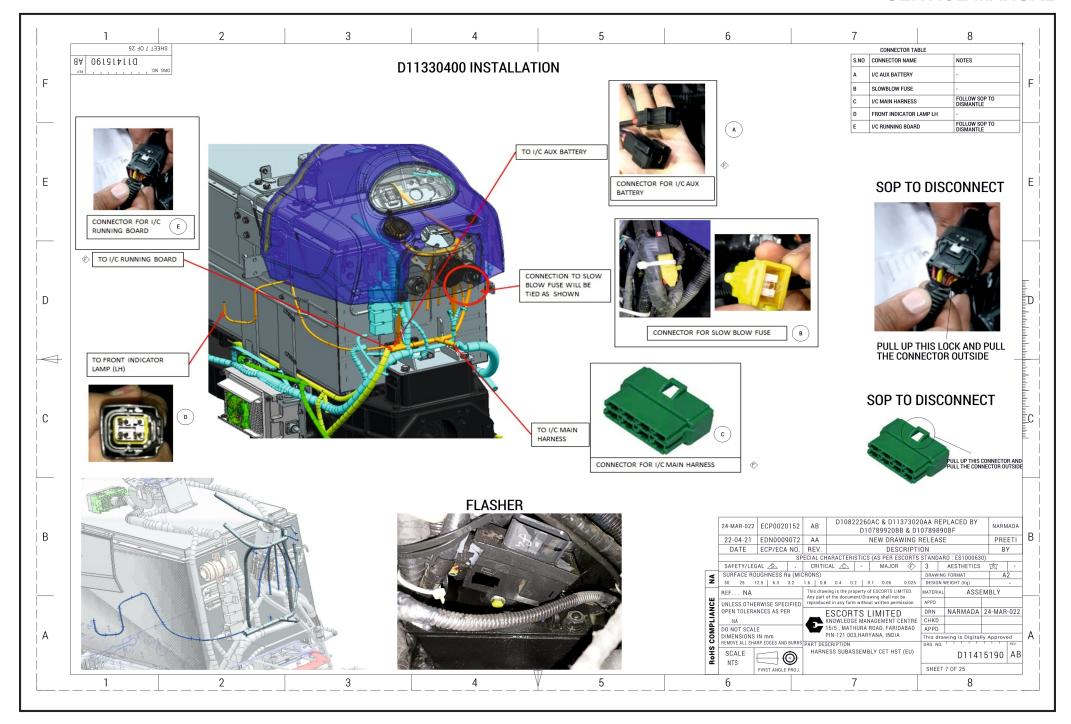


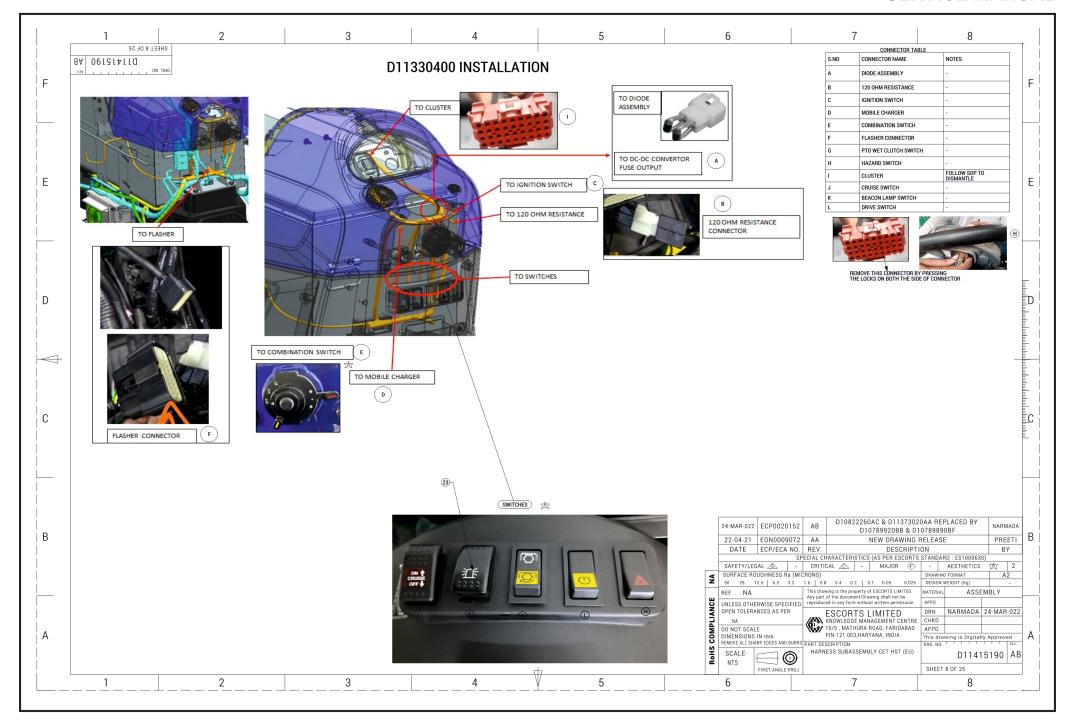


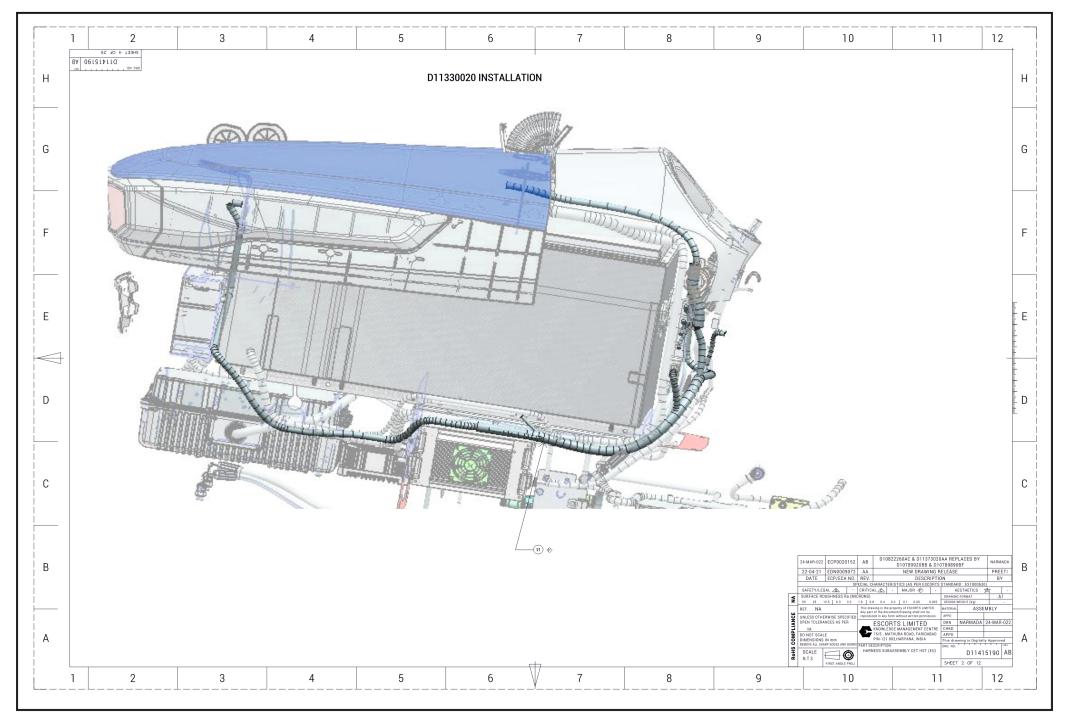


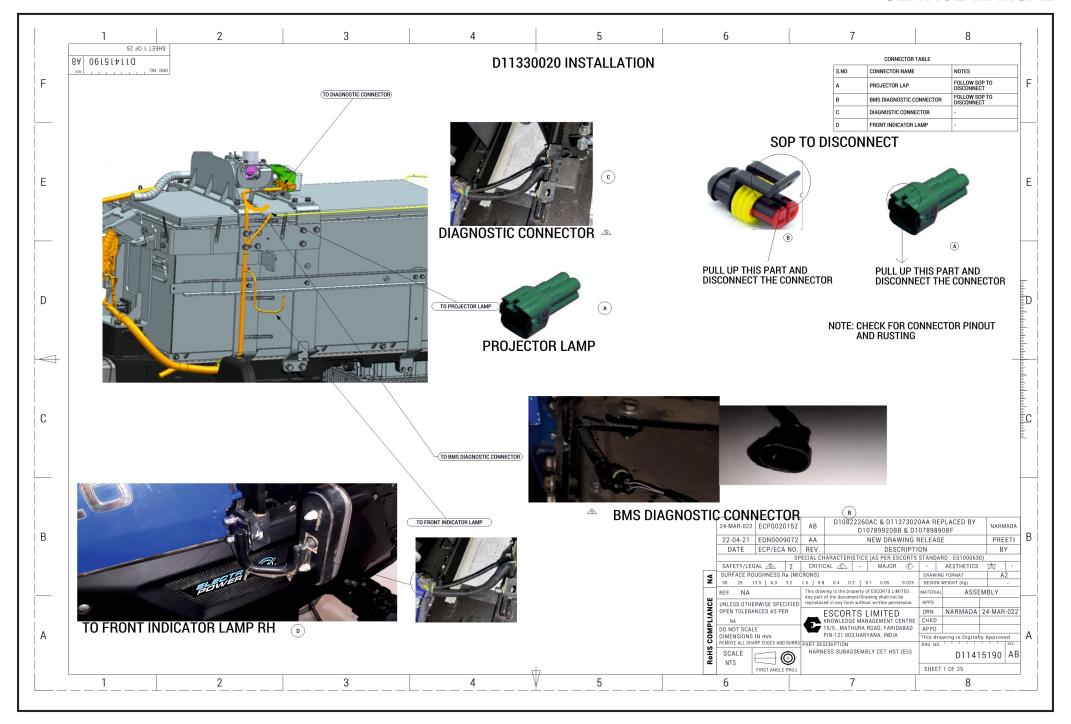


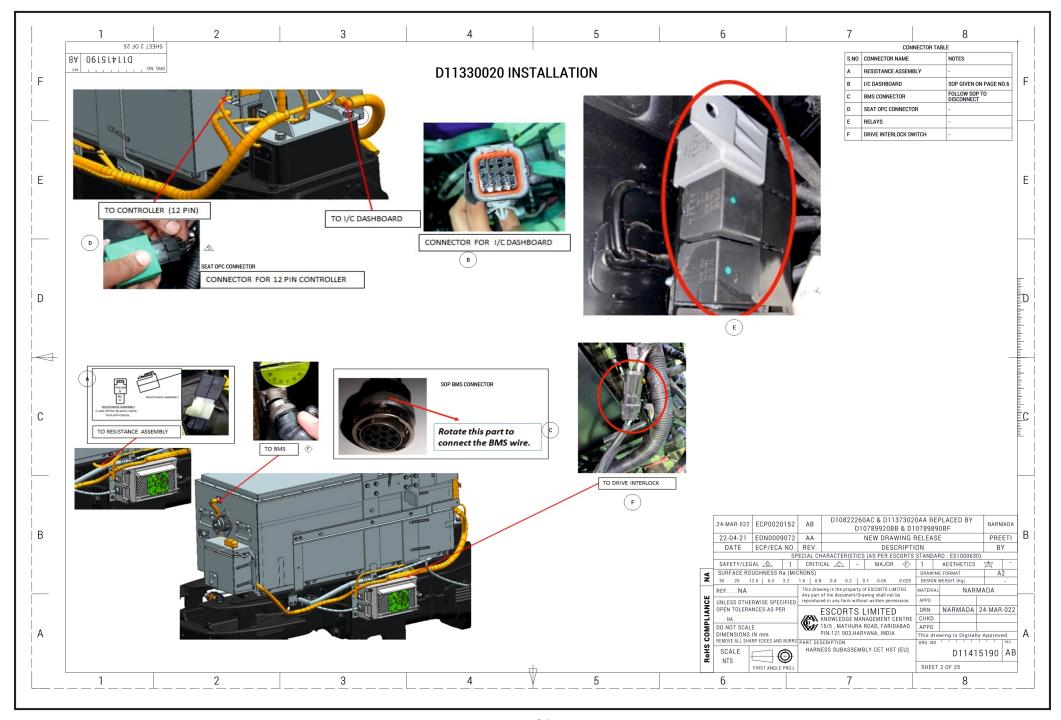


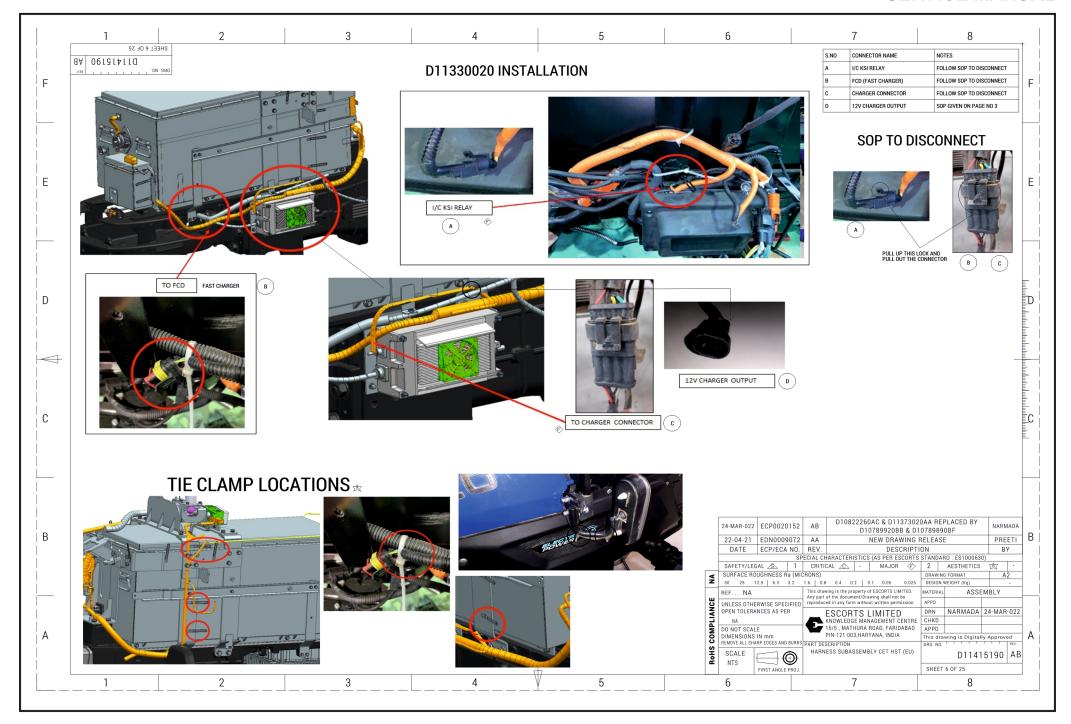


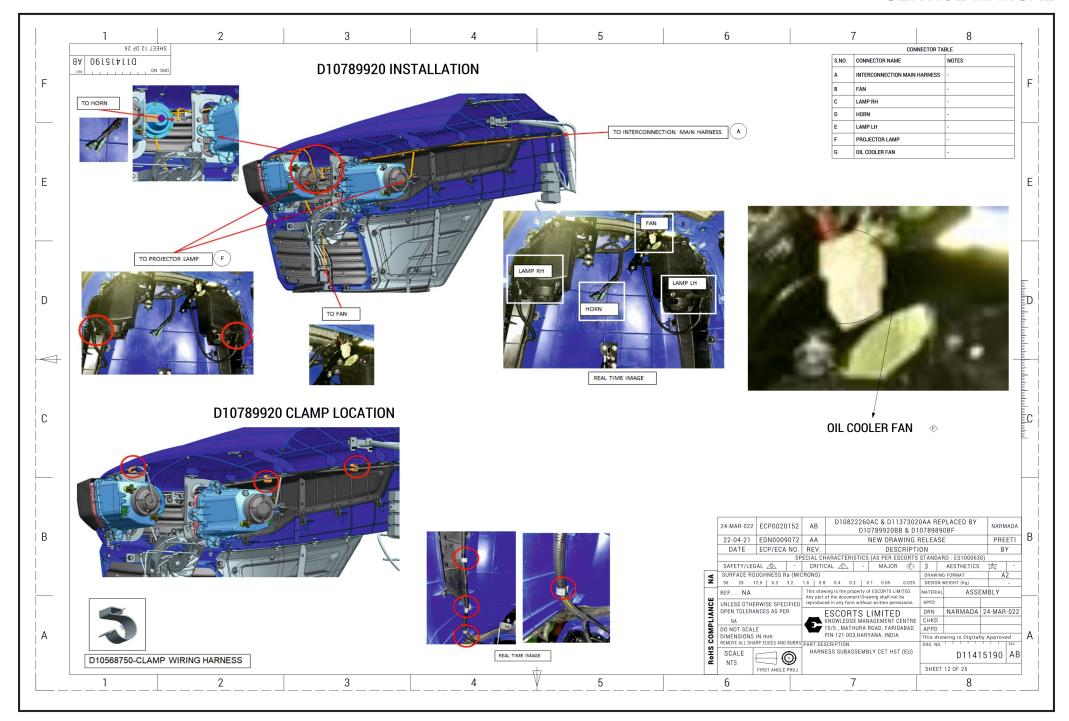


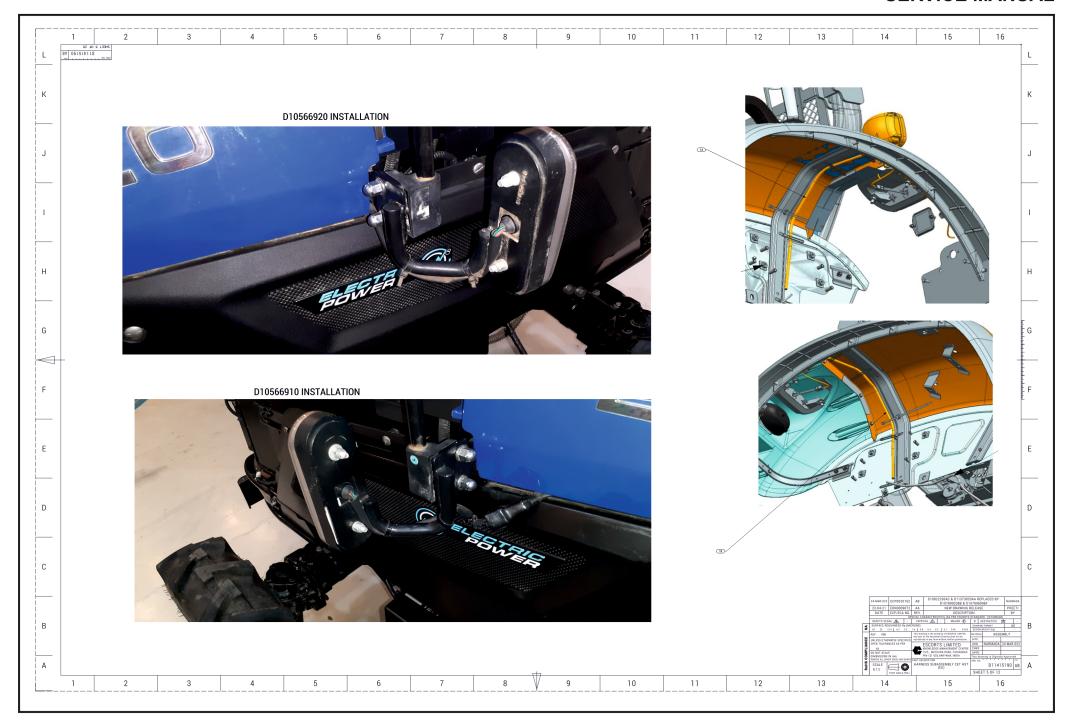


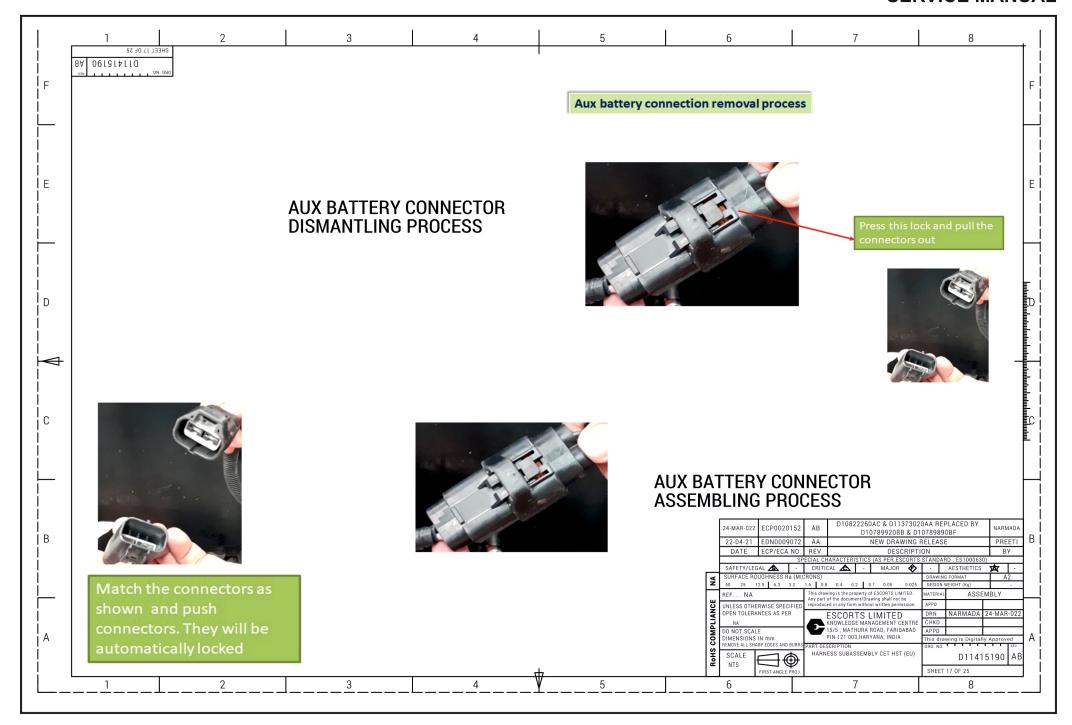


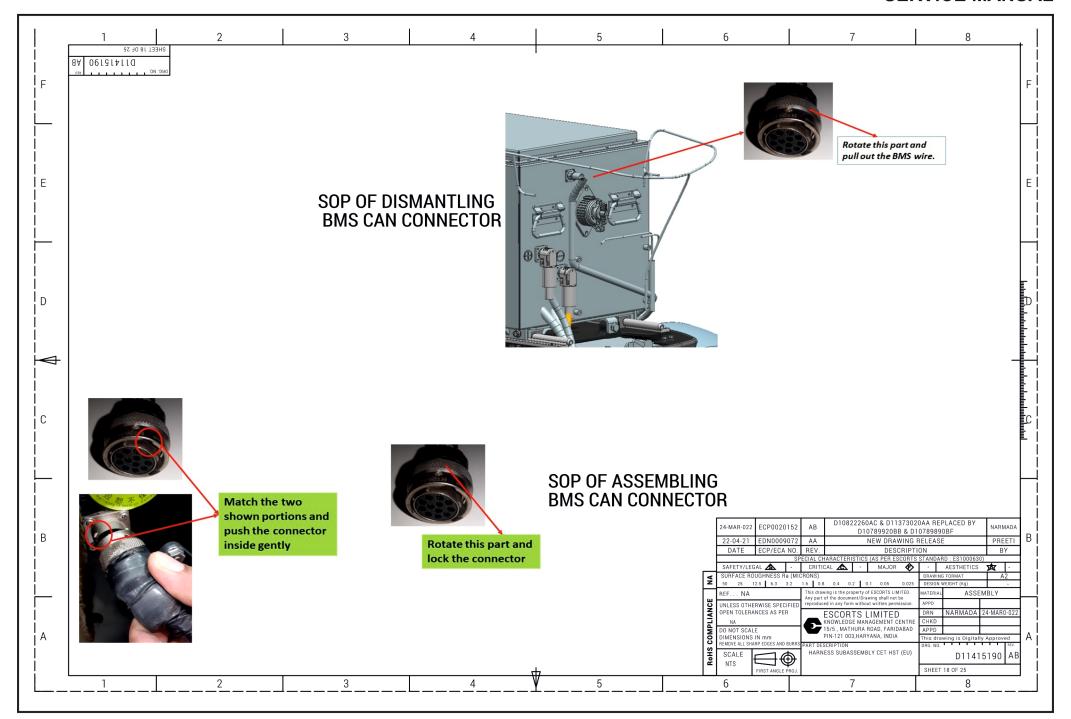














STEP2



STEP 3



Pressing this button, pull out the connector

Connector in closed condition

Pull this pin out

STEP 1



Connector in open condition



Match this arrow mark with the centre of red mark shown above and push the connector inside the mating part such that it fits in it

STEP 3



goes inside the mating part as shown above

STEP 4



STEP 1



Connector in Closed Condition

STEP 4



Connector will be partially dismantled

STEP 2



Pull the Lock / Unlock Lever to unlock position

STEP 5



Press the larger lever as shown above

STEP 3



Press the lock unlock Lever and pull connector outside

STEP 6



Pull the connector outside to dismantle completely





Push the Connector to mating part to fully close the same. Ensure that Lock / unlock lever is in Unlock position and connector is assembled in right direction as per snapshot



Push the lock / Unlock lever to Locking position as per snapshot

MOTOR CONTROLLER ERROR CODE

S. No.	Error Code (SPN)	Error Code on diagnostic tool	Name	Effect	Cause	Remedy
1	5920	12	Controller Over Current	Motor Shutdown & Vehicle Will not move	External short of phase U,V, or W motor connections. Motor parameters are mis-tuned 3. Controller defective. 4. Speed encoder noise problems.	1.1 Check short circuit of all individual wires. 1.2 If yes, rectify it. 2.1 Check the motor parameters, if required, set the correct value 3.1 Power up the controller, if it is not getting on, replace it. 4.1 Disconnect encoder connector, remove encoder, if dirty clean it and reconnect it. Set: Phase current exceeded the current measurement limit. Clear: Cycle KSI.
2	519365	13	Current Sensor Fault	Motor Shutdown & Vehicle Will not move	1.Leakage to vehicle frame from phase U,V, or W (short in motor stator). 2.Controller defective. 3.Internal HW fault 4.Current sensor may be faulty	1.1 Check short circuit of all individual wires. 1.2 If yes, rectify it. 2.1 Power up the controller, if it is not getting on, replace it. 3.1 Replace controller. Set: Controller current sensors have invalid offset reading. Clear: Cycle KSI.
3	8204	15	Controller Severe Undertemp	Motor Shutdown & Vehicle Will not move	Controller is operating in an extreme environment(low temp.)	Provide ambient temperature for cntroller to work. Set: Heatsink temperature below -40°C. Clear: Bring heatsink temperature above -40°C, and cycle interlock or KSI. 1- Provide ambient temperature for cntroller to work.
4	8204	16	Controller Severe Overtemp	Motor Shutdown & Vehicle Will not move	1. See temperature of Controller on cluster Temperature. It may be running in red zone 2. Controller is operating in an extreme environment. 3. Excessive load on vehicle. 4. Improper mounting of controller. 5.Inverter cooling fan failure or obstructed.	2. Reduce the excessive load 3. Check the mounting of controller, if improper, rectiy it. 4. Power up the inverter cooling fan, if it is not getting on, clean it. If still doesn't operate, replace it. 5. Check controller cooling fan, if faulty replace it. Set: Heatsink temperature above +70°C. Clear: Bring heatsink temperature below +70°C, and cycle interlock or KSI.
5	8086	17	Severe B+ Undervoltage	Motor Shutdown & Vehicle Will not move	1. Battery parameters are misadjusted. 2. Non-controller system drain on battery. 3. Battery resistance too high. 4. Battery disconnected while driving. 5. Blown B+ fuse or main contactor did not close. 6. System voltage low - battery or wiring /PDU fault	1. Check the battery parameters, if required, set the correct value 2. Check battery resistance. 3. Check battery connections. 4. Connect it properly. 5.1 Check B+ fuse. If blown out, replace it. 5.2 Check main contactor. if it does not close, replace it. 6.1 If voltage low, check for battery, wiring, and PDU. 6.2 And replace the component accordingly. Set: Capacitor bank voltage dropped below the Severe Undervoltage limit with FET bridge enabled. Clear: Bring capacitor voltage above Severe Undervoltage limit.
6	8086	18	Severe B+ Overvoltage	Motor Shutdown & Vehicle Will not move	1. Battery parameters are misadjusted. 2. Battery resistance too high for given regen current. 3. Battery disconnected while regen braking. 4.Contactor rapid opening or charger fault	Check the battery parameters, if required, set the correct value Chck battery connections if disconnected, connect them Check connection of contactor Set: Capacitor bank voltage exceeded the Severe Overvoltage limit (see page 25) with FET bridge enabled. Clear: Bring capacitor voltage below Severe Overvoltage limit, and then cycle KSI.
7	NA	18	Severe KSI Overvoltage	Motor Shutdown & Vehicle Will not move	Incorrect (to high) battery-voltage applied to KSI (pin 1) Note: Prevents the Main Contactor closure if KSI is greater than the Severe Overvoltage limit.	1.1 Check voltage level supplied at KSI. 1.2 reduce the current amount. 2.1 Bring KSI voltage below the Severe Overvoltage limit Set: KSI voltage exceeded Severe Overvoltage limit Clear: Bring KSI voltage below the Severe Overvoltage limit
8	8204	22	Controller Overtemp Cutback	Motor Shutdown & Vehicle Will not move	1. See temperature of Controller on cluster Temperature. It may be running in red zone 2. Controller is operating in an extreme environment. 3. Excessive load on vehicle. 4. Improper mounting of controller. 5.Inverter cooling fan failure or obstructed.	1. Provide ambient temperature for cntroller to work. 2. Reduce the excessive load 3. Check the mounting of controller, if improper, rectiy it. 4. Power up the inverter cooling fan, if it is not getting on, clean it. If still doesn't operate, replace it. 5. Check controller cooling fan, if faulty replace it. Set: Heatsink temperature above +70°C. Clear: Bring heatsink temperature below +70°C, and cycle interlock or KSI.
9	8086	23	B+ Undervoltage Cutback	Motor Shutdown & Vehicle Will not move	1. Battery parameters are misadjusted. 2. Non-controller system drain on battery. 3. Battery resistance too high. 4. Battery disconnected while driving. 5. Blown B+ fuse or main contactor did not close. 6. System voltage low - battery or wiring /PDU fault	1. Check the battery parameters, if required, set the correct value 2. Check battery resistance. 3. Check battery connections. 4. Connect it properly. 5.1 Check B+ fuse. If blown out, replace it. 5.2 Check main contactor. if it does not close, replace it. 6.1 If voltage low, check for battery, wiring, and PDU. 6.2 And replace the component accordingly. Set: Capacitor bank voltage dropped below the Severe Undervoltage limit with FET bridge enabled. Clear: Bring capacitor voltage above Severe Undervoltage limit.

. No.	Error Code	Error Code on	Name	Effect	Cause	Remedy
10	NA	24	B+ Overvoltage Cutback	Motor Shutdown & Vehicle Will not move	1. Battery parameters are misadjusted. 2. Battery resistance too high for given regen current. 3. Battery disconnected while regen braking. 4.Contactor rapid opening or charger fault	1. Check the battery parameters, if required, set the correct value 2. Chck battery connections if disconnected, connect them 3. Check connection of contactor Set: Capacitor bank voltage exceeded the Severe Overvoltage limit (see page 25) with FET bridge enabled.
11	7951	28	Motor Temp Hot Cutback	Motor Shutdown & Vehicle Will not move	2.Motor high temp due to high load or poor	Clear: Bring capacitor voltage below Severe Overvoltage limit, and then cycle KSI. 1. Reduce the motor load. if problem persists, provide proper cooling. Set: Motor temperature is at or above the Temperature Hot paramet setting.
12	7951	29	Motor Temp Sensor Fault	Motor Shutdown & Vehicle Will not move	cooling 1. Motor thermistor is not connected properly. 2. Temp sensor may be damaged 3. Motor temp sensor wire upto controller may be damaged	Clear: Bring the motor temperature within range. 1. Motor temp needle on cluster should show some value, if not, th controller is not getting inut from sensor 2. Connect sensor wire properly. 3. Check sensor and sensor wire upoto controller
13	NA	31	Coil1 Driver Open/Short	Motor Shutdown & Vehicle Will not move	Open or short on driver load. Dirty connector pins. Bad crimps or faulty wiring.	1.1 Check driver load for open or short ciruitory. 1.2 Connect them properly. 2.1 Clean connector pins. 3.1 Check for adequate crimping. Correct it. 3.2 Check for poor wiring. Replace it adequately.
14	NA	31	Main Open/Short	Motor Shutdown & Vehicle Will not move	Open or short on driver load. Dirty connector pins. Bad crimps or faulty wiring.	1.1 Check driver load for open or short ciruitory. 1.2 Connect them properly. 2.1 Clean connector pins. 3.1 Check for adequate crimping. Correct it. 3.2 Check for poor wiring. Replace it adequately.
15	NA	36	Encoder Fault	Motor Shutdown & Vehicle Will not move	Motor encoder failure. Bad crimps or faulty wiring.	1.1 Disconnect encoder connector, remove encoder, if dirty clean and reconnect it. 2.1 Check for adequate crimping. Correct it. 2.2 Check for poor wiring. Replace it adequately. Set: Motor encoder phase failure detected.
16	7950	36	Sin/Cos Sensor Fault	Motor Shutdown & Vehicle Will not move	Sin/Cos sensor failure. Bad crimps or faulty wiring. See Monitor menu » Motor: Motor RPM.	1.1 Power up the controller, if it is not getting on, replace it. 2.1 Check for adequate crimping. Correct it. 2.2 Check for poor wiring. Replace it adequately Set: Greater than Sin_Cos_Fault_Threshold % difference from expected value between two phases seen 5 times within one second. Clear: Cycle KSI, or VCL reset, or Entry into LOS mode if enabled, (or entry into an ACIM auto- characterization).
17	5920	37	Motor Open	Motor Shutdown & Vehicle Will not move	Motor phase is open. Bad crimps or faulty wiring.	Check for adequate crimping. Correct it. Check for poor wiring. Replace it adequately Set: Motor phase U, V, or W detected open. Clear: Cycle KSI.
18	NA	38	Main Contactor Welded	Motor Shutdown & Vehicle Will not move	Main contactor tips are welded closed. Motor phase U or V is disconnected or open. An alternate voltage path (such as an external precharge resistor) is providing a current to the capacitor bank (B+ connection terminal).	1.1 Check main contactor tips welding. 1.2 If welded, take suitable steps. 2.1 Check motor phase connections 2.2 If improper, rectify it. 3.1 Check for alternate voltage path. 3.2 If found, block it and provide suitable path. Set: Just prior to the main contactor closing, the capacitor bank voltage (B+ connection terminal) was loaded for a short time and the voltage did not discharge. Clear: Cycle KSI
19	NA	39 M	ain Contactor Did Not Clo:	Motor Shutdown & Vehicle Will not se move	Main contactor coil is not getting adequate supply Main contactor tips are oxidized, burned, or not making good contact.* External load on capacitor bank (B+connection terminal) that prevents capacitor bank from charging. A. Blown B+ fuse.	1. Replace contactor. 2. Reduce over loading. 3. Replace B+ fuse. Set: With the main contactor commanded closed, the capacitor bank voltage (B+ connection terminal) did not charge to B+. Clear: Cycle KSI. 4. Check wear & tear of coil wires which coming from controller
20	NA	41	Throttle Wiper High	Motor Shutdown & Vehicle Will not move	Throttle pot wiper voltage too high.	1.Throttle pot wiper (pin 16) voltage is higher than the high fault threshold (can be changed with the VCL function Setup_Pot_Faults()). Clear: Bring throttle pot wiper voltage below the fault threshold.
21	NA	42	Throttle Wiper Low	Motor Shutdown & Vehicle Will not move	Throttle pot wiper voltage too low.	1.Throttle pot wiper (pin 16) voltage is lower than the low fault threshold (can be changed with the VCL function Setup_Pot_Faults()). Clear: Bring throttle pot wiper voltage above the fault threshold.
22	NA	43	Pot2 Wiper High	Motor Shutdown & Vehicle Will not move	Potentiometer may get damage Potentiometer is not getting 5V supply from controller Controller is not getting Wiper (Output)form controller	Replace the potentiometer. Check the voltage between the low and high ends of potentiomete incorrect, check the wiring Check the output(wiper) at various instances.

S. No.	Error Code	Error Code on	Name	Effect	Cause	Remedy
22	NA	43	Pot2 Wiper High	Motor Shutdown & Vehicle Will not move	Potentiometer may get damage Potentiometer is not getting 5V supply from controller 3. Controller is not getting Wiper (Output)form controller	Check the battery parameters, if required, set the correct value Replace the potentiometer. Check the voltage between the low and high ends of potentiometer; if incorrect, check the wiring Check the output(wiper) at various instances.
23	NA	44	Pot2 Wiper Low	Motor Shutdown & Vehicle Will not move	Potentiometer may get damage Potentiometer is not getting 5V supply from controller 3. Controller is not getting Wiper (Output)form controller	Replace the potentiometer. Check the voltage between the low and high ends of potentiometer; if incorrect, check the wiring Check the output(wiper) at various instances.
24	519365	46	EEPROM Failure	Motor Shutdown & Vehicle Will not move	Failure to write to EEPROM memory. This can be caused by EEPROM memory writes initiated by VCL, by the CAN bus, by adjusting parameters with the programmer, or by loading new software into the controller. Internal HW fault	1.1 Check for Failure of EEPROM memory 1.2 Replace it. 2.1 Replace it. Set: Controller operating system tried to write to EEPROM memory and failed. Clear: Download the correct software (OS) and matching parameter default settings into the controller and cycle KSI.
25	NA	47	HPD/Sequencing Fault	Motor Shutdown & Vehicle Will not move	FNR may be engaged Throttle may be engaged	FMR and throttle should be in neutral position.
26	NA	49	Parameter Change Fault	Motor Shutdown & Vehicle Will not move	This is a safety fault caused by a change in certain parameter settings so that the vehicle will not operate until KSI is cycled. For example, if a user changes the Throttle Type this fault will appear and require cycling KSI before the vehicle can operate.	1.1 Check for parameter change and adjust the parameter setting accordingly. Set: Adjustment of a parameter setting that requires cycling of KSI. Clear: Cycle KSI.
27	NA	72	PDO Timeout	Motor Shutdown & Vehicle Will not move	Time between CAN PDO messages received exceeded the PDO Timeout Period.	1.1 Cycle KSI or receive CAN NMT message. Set: Time between CAN PDO messages received exceeded the PDO Timeout Period. Clear: Cycle KSI or receive CAN NMT message.
28	7950	73	Stall Detected	Motor Shutdown & Vehicle Will not move	Stalled motor. Motor encoder failure. Shad crimps or faulty wiring. Problems with power supply for the motor encoder. See Monitor menu » Motor: Motor RPM. 6.Motor mechanical load excessive	1.1 Reduce the load 2.1 Replace the motor. 3.1 Rectify the faulty crimps and wiring. 4.1 Replace the power supply 5.1 Reduce the excessive mechanical load. Set: No motor encoder movement detected. Clear: Either cycle KSI, or if parameter LOS Upon Encoder Fault = On and Interlock has been cycled, then the Stall Detected fault is cleared and Encoder LOS fault (code 93) is set, allowing limited motor control.
29	7950	88	Encoder Pulse Count Fault	Motor Shutdown & Vehicle Will not move	Encoder Steps parameter does not match the actual motor encoder. Motor sin/cos sensor or wiring faulty	1.1 Set: Detected wrong setting of the Encoder Steps parameter. Clear: Ensure the Encoder Steps parameter matches the actual encoder; cycle KSI.
30	NA	99	Parameter Mismatch	Motor Shutdown & Vehicle Will not move	Dual drive enabled on only one controller. Incorrect position feedback type chosen for motor technology in use. Dual drive is enabled in torque mode.	1.1 Rectify the parameters. 2.1 Rectify the tyoe of feedback chosen for motor technology. 3.1 Disable dual drive in torque mode. Set: When the Dual Drive software is enabled, the controller must be set to either Speed Mode Express or Speed Mode; otherwise this fault is set. Motor Technology=0 must be paired with Feedback Type=1, and Motor Technology=1 must be paired with Feedback Type=2; otherwise this fault is set. Clear: Adjust parameters to appropriate values and cycle KSI.
31		25	Supply Failure	Motor Shutdown & Vehicle Will not move	External load impedance on the +5V supply (pin 26) is too low. See Monitor menu » outputs: 5 Volts and Ext Supply Current.	1.1 Set: +5V supply (pin 26) outside the 5 V±10% range. Clear: Bring voltage within range.

MOTOR CONTROLLER ERROR CODE

S. No.	Error code (Diagnostic tool)	Name	Message ID	Effect	Cause	Remedy
1	100	SOC is too high	0x18F108F3	Battery over charged	BMS S/W faults which allow battery to get over charged BMS S/w get corrupted BMS not working	Rectify the causes Do not put vehicle on charge
2	101	SOC is too low	0x18F108F3	Battery is discharged below the threshold limit	BMS S/W faults which allow battery to discharge below threshold limit BMS S/w get corrupted 3. BMS not working	Rectify the causes Put vehicle on charge
3	102	Total voltage is too high	0x18F108F3	Battery over charged	BMS S/W faults which allow battery to get over charged BMS S/w get corrupted 3. BMS not working	Rectify the causes Do not put vehicle on charge
4	103	Total voltage is too low	0x18F108F3	Battery is discharged below the threshold limit	BMS S/W faults which allow battery to discharge below threshold limit BMS S/w get corrupted 3. BMS not working	Rectify the causes Put vehicle on charge
5	104	Charge current fault	0x18F108F3	Battery will not charge	Current sensor not working Current sensor callibration not okay Charging status from charger coming wrong	Replace current sensor Callibrate current sensor Check charger and replace if not working
6	105	Discharge current fault	0x18F108F3	Battery will not discharge	Current sensor not working Current sensor callibration not okay Discharging status from charger coming wrong	Replace current sensor Callibrate current sensor Check charger and replace if, not working
7	106	Battery temperature is too low	0x18F108F3	Battery will not allow charge and discharge	Check the ambient temp, it should not be below -10Deg C Temp sensor is faulty Check the wiring of temp sensor	Replace temp sensor Replace the wiring of temp sensor, if faulty 3.Stop charging and discharging the battery till the ambient temp (0-25
8	107	Battery temperature is too high	0x18F108F3	Battery will not allow charge and discharge if, temp rise above 54 Deg C	Temp sensor is faulty Check the wiring of temp sensor Battery is charging and discharging at full load condition and the temp rises at 54 Deg C	1. Replace temp sensor 2. Replace the wiring of temp sensor, if faulty 3. Stop charging and discharging the battery till the ambient temp(0- 25Deg C) is reached
9	108	Battery undervoltage	0x18F108F3	Battery is discharged below the threshold limit	BMS S/W faults which allow battery to discharge below threshold limit BMS S/w get corrupted BMS not working	Rectify the causes Put vehicle on charge
10	109	Battery overvoltage	0x18F108F3	Battery over charged	BMS S/W faults which allow battery to get over charged BMS S/w get corrupted BMS not working	Rectify the causes Do not put vehicle on charge
11	110	battery temperature unbalance	0x18F108F3	Battery will not allow charge and discharge	Check the ambient temp, it should be between 0-25 Deg C Temp sensor is faulty Check the wiring of temp sensor	Replace temp sensor Replace the wiring of temp sensor, if faulty Stop charging and discharging the battery till the ambient temp (0-25 peg C) is reached
13	112	The battery does not match	0x18F108F3	Battery will not allow charge and discharge		Replace the battery
14	113	The temperature of the output pole is too high	0x18F108F3	Battery will not allow charge and discharge	Check the ambient temp, it should be between 0-25 Deg C Temp sensor is faulty Check the wiring of temp sensor	Rectify the causes Replace the battery
15	116	The parameters of memory fault	0x18F108F3			
16	117	Data memory fault Cell voltage detection	0x18F108F3		1. Faulty cell	
17	118	fault	0x18F108F3		2. Current sensor faulty	
18	119	Temperature detection fault	0x18F108F3	Battery will not allow charge and discharge	Check the ambient temp, it should be between 0-25 Deg C Temp sensor is faulty Check the wiring of temp sensor	Rectify the causes Replace the battery
19	120	Current detection fault	0x18F108F3	Battery will not charge	Current sensor not working Current sensor callibration not okay Charging status from charger coming wrong	Replace current sensor Callibrate current sensor Check charger and replace if not working
20	121	Internal total voltage detection fault	0x18F108F3			Replace the battery
21	122	External total voltage detection fault	0x18F108F3			Replace the battery
22	123	Insulation monitoring fault	0x18F108F3	Vehicle will not move	1.Wiring fault	Check the whole wiring and replace accordingly.
23	124	Clock fault	0x18F108F3	NA	Wear and tear might have occurred	replace accordingly
24	125	Internal CAN communication fault	0x18F108F3			

MOTOR CONTROLLER ERROR CODE

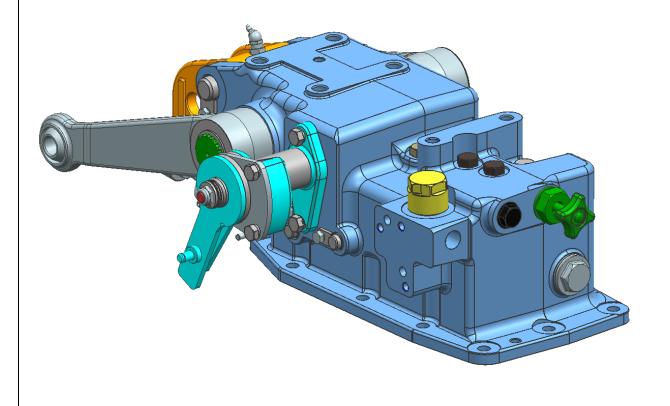
25	126	Serious insulation fault	0x18F108F3	Vehicle will not move	1.Wiring fault 2. Wear and tear might have occurred	Check the whole wiring and replace accordingly
26	127	Slight insulation fault	0x18F108F3	Vehicle will not move	1.Wiring fault 2. Wear and tear might have occurred	Check the whole wiring and replace accordingly
27	140	System fault level	0x18F108F3	Vehicle will not move	BMS hardware fault BMS software fault Relay (main) not working Battery fuse blowdown	Replace battery fuse Check the MSD, it should be ON at ignition ON condition Check BMS low voltage power supply(12V DC)
28	142	BMS fault need maintenance	0x18F108F3	Vehicle will not move	BMS hardware fault BMS software fault Relay (main) not working Battery fuse blowdown	Replace battery fuse Check the MSD, it should be ON at ignition ON condition Check BMS low voltage power supply(12V DC)
29	143	Battery fault need maintenance	0x18F108F3	Vehicle will not move	BMS hardware fault BMS software fault Relay (main) not working Battery fuse blowdown	Replace battery fuse Check the MSD, it should be ON at ignition ON condition Check BMS low voltage power supply(12V DC)
30	144	Battery system fault needs maintenance	0x18F108F3	Vehicle will not move	BMS hardware fault BMS software fault Relay (main) not working Battery fuse blowdown	Replace battery fuse Check the MSD, it should be ON at ignition ON condition Check BMS low voltage power supply(12V DC)
31	145	The battery needs to maintenance (full charging and full discharging)	0x18F108F3	Vehicle will not move	BMS hardware fault BMS software fault Relay (main) not working Battery fuse blowdown	Replace battery fuse Check the MSD, it should be ON at ignition ON condition Check BMS low voltage power supply(12V DC)
32	146	Maintenance mode status	0x18F108F3	Vehicle will not move	BMS hardware fault BMS software fault Relay (main) not working Battery fuse blowdown	Replace battery fuse Check the MSD, it should be ON at ignition ON condition Check BMS low voltage power supply(12V DC)



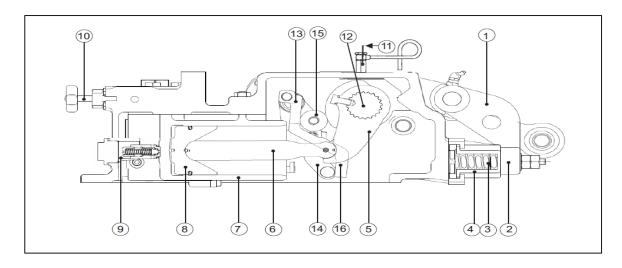
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HYDRAULIC LIFT INSTRUCTION MANUAL



S.NO.	CONTENTS	PAGE NO.
1.	Hydraulic System–Schematic	1
2.	External Controls	2
3.	Valves in the Lift Cylinder Assy.	3
4.	Adjustments	4
5.	Lift Assembly Installation Removal	6
6.	Draft Control	9
7.	Position Control	11
8.	Assembly	12
9.	Cover-Assembly	12
10.	Power Transfer Assembly	13
11.	Quadrant Housing Dis-Assembly	14
12.	Cylinder Dis-Assembly	15
13.	Oil Flow when Neutral	16
14.	Oil flow when Raising	18
15.	Oil Flow when Lowering	20
16.	Problem, Causes & Remedy	22



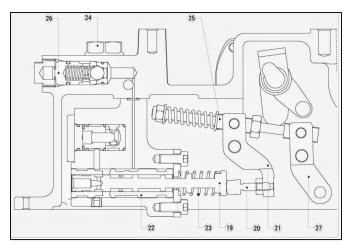


Figure 1 Hydraulic System – Schematic

- 1. ROCKER TOP LINK SENSING ASSEMBLY
- 2. BOLT M12x1.75x75-10.9 ALLEN
- 3. SPRING HPL DRAFT CONTROL MAIN
- 4. HOUSING HYDRAULIC DRAFT CONTROL SPRING
- 5. ARM HYDRAULIC LIFT RAM
- 6. ROD HYDRAULIC LIFT CONNECTING
- 7. CYLINDER HYDRAULIC LIFT
- 8. PISTON HYDRAULIC LIFT CYLINDER
- 9. VALVE ASSEMBLY HYDRAULIC LIFT SAFETY
- 10. TRANSPORT LOCK ASSEMBLY
- 11. BREATHER ASSEMBLY HYDRAULIC LIFT OIL
- 12. SHAFT SERRATED HYDRAULIC LIFT
- 13. SHAFT ASSEMBLY HYDRAULIC LIFT DRAFT

- 14. LEVER HYDRAULIC LIFT POSITION CONTROL
- 15. LEVER HYDRAULIC LIFT POSITION CONTROL
- 16. LINK HYDRAULIC LIFT POSITION CONTROL
- 17. VALVE HYDRAULIC LIFT CONTROL
- 18. ACTUATOR HYDRAULIC LIFT CONTROL VALVE
- 19. LINK HYDRAULIC LIFT SPOOL VALVE
- 20. BUSHING CONTROL VALVE HYDRAULIC LIFT
- 21. SPRING HYDRAULIC LIFT CONTROL VALVE
- 22. VALVE ASSEMBLY HYDRAULIC LIFT PUMP RELIEF
- 23. LINK SWIVEL ASSEMBLY HYDRAULIC LINKAGE
- 24. HYDRAULIC LIFT CHECK VALVE
- 25. LINK HYDRAULIC LIFT CONTROL VALVE ACTUATING

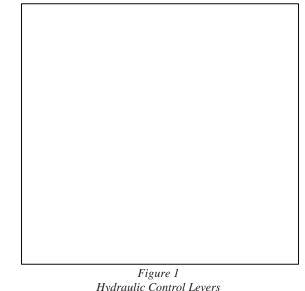
1. EXTERNAL CONTROLS

LIFT CONTROL LEVERS

This lift has two lever control system. The two-lever control system incorporates separate levers for draft and position control situated at the right-hand side of the operator's seat. The system enables operator to select full draft control (inner lever), full position control (outer lever) or a combination of both for maximum implement depth control, in addition to draft response...

POSITION CONTROL

Position control is selected by pushing the draft control lever to the bottom of the quadrant (there by making the draft control linkage inoperative) and moving the position control lever.



Hydraulic Control Levers

AUXILIARY SPOOL VALVE

To facilitate the operation of remote cylinder, Double Action Auxiliary Spool Valve is provided on the tractor. It can be used with both single acting as well double acting cylinders with the help of a Selector knob. It is operated by a lever located on the right hand side of the operator's seat above the auxiliary distributor, which is connected by pipe to quick-release couplers at the rear of tractor.

It works in both forward and backward positions and connects oil supply to remote couplers. Attach Blue color port in case of single acting cylinder and both for a double acting cylinder attachment.



Figure 3
QRC Couplers

2. VALVES IN THE LIFT CYLINDER ASSY.

CONTROL VALVE

The control valve is connected through internal linkage to the lift control levers and either directs the flow of hydraulic oil from the pump to the lift cylinder, to effect of raise condition, or to the reservoir for a neutral or lowering cycle.

To cater for the increased flow of hydraulic oil, the control valve has narrow section lands.

The control valve spool is matched with a unique color coded bushing.



Figure 4 Hydraulic Lift Control Valve

UNLOAD VALVE

The unload valve is operated by oil pressure as directed by the control valve and has two positions. In the lower position the valve allows oil to flow from the rear to the reservoir thereby unloading the system. In the raised position the unload valve seals off the connection to the reservoir and oil from the control valve is directed to the lift cylinder. Spring length of Unload Valve: 52 mm

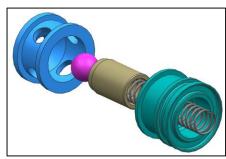


Figure 5 Hydraulic Lift Unload Valve

CHECK VALVE

A Simple one-way ball valve which allows hydraulic oil to pass to the lift cylinder or auxiliary equipment but it prevents the return of oil.



This spring operated valve is mounted directly into the lift cylinder wall. If shock loadings are encountered, for example when transporting implements over rough ground, the valve opens to relieve excess pressure and protect the system.



It limits the pressure at which oil is fed to the system so that the components are not overloaded. It opens at 169 Bar and fully opened at 180-187 Bar.

3. ADJUSTMENTS

POSITION CONTROL ADJUSTMENT

- 1. Place postion control lever (1) at bottom of quadrant, with hole 'Z' as shown.
- 2. Make sure that the lift arms are in the full down position.
- 3. Adjust the actuator hydraulic lift control valve **X** until the spool (5) and the cylinder face dimension **W** is 0.76+0.13
- 4. Then lock this position of \mathbf{X} with Nut M8x1.25-6 Hex (3).

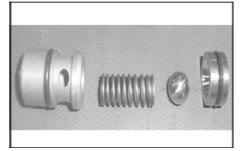


Figure 6 Check Valve



Figure 7 Lift Cylinder Safety Valve

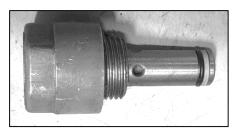


Figure 8
Pressure Relief Valve

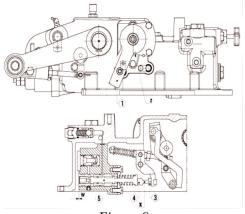
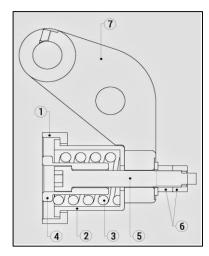


Figure 9
Position Control Adjustment

1	LEVER HYD. POSITION CONTROL
2	NUT M8X1.25-6 HEX
3	ACTUATOR HYD. CONTROL VALVE
4	VALVE SPOOL HYD. CONTROL

DRAFT CONTROL MAIN SPRING ADJUSTMENT

- 1. Assemble the Flange Draft Spring Housing (1), Spring HPL Draft Control Main (3), Guide Lower Lift Draft Control Spring (4) and Bolt M12 Allen (5) into the Spring Housing (2).
- 2. Re-assemble the spring housing assembly to the lift cover assemble with the draft control flange butt with the face of the cover, guided Bolt M12 Allen (5) aligned with the Rocker (7). Secure the two attaching M10 hex-head bolts and spring washer.
- 3. Hand tighten the M12 Nuts (6) with Bolt M12 Allen (5) and Rocker Hydraulic Lift (7) should be in between the nuts and Spring Housing (2).
- 4. Tighten the M12 Nut (6) till the play between Rocker Hydraulic Lift (7) and the Spring Housing (2) becomes negligible.
- 5. Finally lock the assembly with the help of locking nut (6).



1	FLANGE DRAFT SPRING HOUSING
2	HOUSING HYDRAULIC LIFT DRAFT
2	CONTROL SPRING
3	SPRING HPL DRAFT CONTROL MAIN
4	GUIDE LOWER LIFT DRAFT
4	CONTROL SPRING
5	BOLT M12x1.75x75-10.9 ALLEN
6	NUT M12x1.75-6 HEX (2 QTY.)
7	ROCKER TOP LINK SENSING
8	WASHER M12 FLAT

Figure 10
Draft Control Main Spring Adjustment

LIFT ASSEMBLY INSTALLATION REMOVAL

- 1. Remove the seat by unscrewing the 2 bolts from front side and 2 bolts from rear side holding the seat over the hydraulic cover.
- 2. Disconnect both the lift rods from hydraulic arms.
- 3. Disconnect the spool valve pipe connection from the top cover.
- 4. Loosen the hydraulic lift housing mounting bolts.
- Lift the hydraulic assembly using suitable hoist and place it on a clean flat surface table or fix it on stand.
- 6. Cover the rear Axle housing.





Figure 12 Lift Assembly Installation

CYLINDER ASSEMBLY ADJUSTMENT

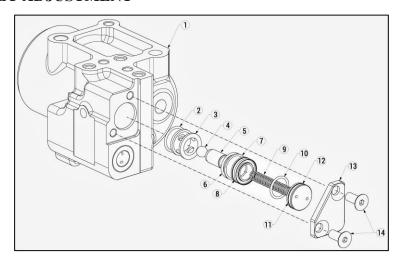


Figure 13
Cylinder Assembly

- 1 CYLINDER HYDRAULIC LIFT ASSEMBLY
- 2 RING SEALING
- 3 SEAT VALVE LOCKING BALL
- 4 BALL 10MM CHROMIUM STEEL
- 5 SEAT UNLOAD VALVE
- 6 RING SEALING
- 7 INSERT HYDRAULIC DISTRIBUTOR

- 8 RING SEALING
- 9 SPRING VALVE LOCK
- 10 RING SEALING
- 11 PLUG HYDRAULIC LIFT UNLOAD VALVE
- 12 RING SEALING
- 13 COVER HYDRAULIC DISTRIBUTOR BODY REAR
- 14 SCREW M8x1.25x20 COUNTERSUNK SOCKET HEAD

COVER ASSEMBLY ADJUSTMENT

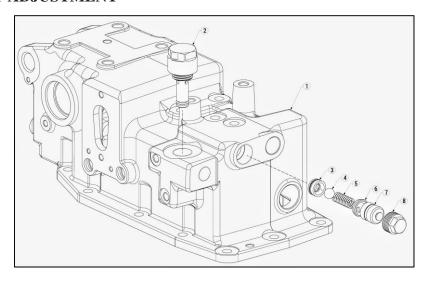


Figure 14 Cover Assembly

- 1 COVER HYDRAULIC LIFT TOP
- 2 VALVE ASSEMBLY HYD. LIFT PUMP RELIEF
- 3 SEAT HYD. LIFT CHECK VALVE AND SEAL ASSY.
- 4 BALL 15/32" DIAMETER

- 5 SPRING HYDRAULIC LIFT CHECK VALVE
- 6 RETAINER HYDRAULIC LIFT CHECK VALVE
- 7 SEAL O RING 0.103x0.625
- 8 PLUG HYDRAULIC LIFT CHECK VALVE

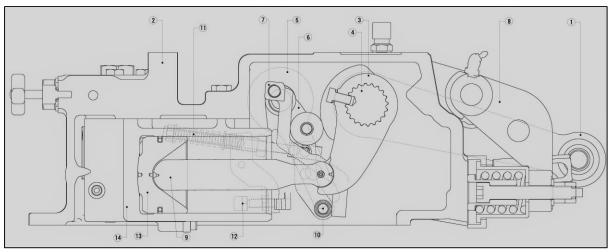


Figure 17
Position Control-Lowering

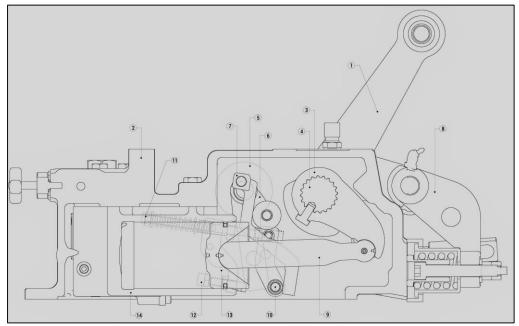


Figure 18
Position Control-Raising

1	ARM HYDRAULIC LIFT	8	ROCKER TOP LINK SENSING ASSY.
2	COVER HYDRAULIC LIFT TOP	9	ROD HYDRAULIC LIFT CONNECTING
3	ARM HYDRAULIC LIFT RAM	10	LINK HYDRAULIC LIFT OVERRIDE
4	SHAFT SERRATED HYDRAULIC LIFT	11	SPRING HYDRAULIC LIFT OVERRIDE
5	LEVER HYDRAULIC LIFT POSITION	12	ACTUATOR HYDRAULIC CONTROL VALVE
6	LEVER ASSY. HYD. LIFT POSITION CONTROL	13	PISTON HYDRAULIC LIFT CYLINDER
7	POSITION CONTROL LINK	14	CYLINDER HYDRAULIC LIFT

POSITION CONTROL

The system of Position Control enables the working depth or height of an implement to be preset and maintained. When the draft control lever is in the lowest position, the position control system function as follows:

RAISING

Upward movement of the position control lever causes the position lever to pivot about the forward roller.

When the position lever pivots it pushes against a roller attached to the actuating lever which moves forward. The override spring transmits the movement to the control valve lever which in turn moves the control valve forward in to the raise position. As the lift cross shaft rotates, a cam allows the roller to move rearwards. Due to the force of the control valve spring all the linkage follow the roller allowing the control valve to move rearward to the neutral position. As soon as the valve is in this position the lifting action stops. If a further lift is required, the position control lever is moved further up the quadrant and the above procedure is repeated.

LOWERING

Downward movement of the position control lever tends to allow the position lever to swing free of the roller but the rearward force of the control valve spring pushes the control valve lever and actuating lever roller against the foot of the position lever which maintain contact with the roller. The rearward movement of the control valve spring pulls the control valve into the lowering position.

As the lift cross-shaft rotates in a clockwise direction, the increasing radius of cam pushes the roller forward. This action forces the position lever and hence the control valve lever, forward until the control valve moves to the neutral position. Further downward movement of the position control lever will cause the lift arms to drop until such times as the valve is neutralized or the implement reaches the lowest position.

ASSEMBLY

A. COVER ASSEMBLY

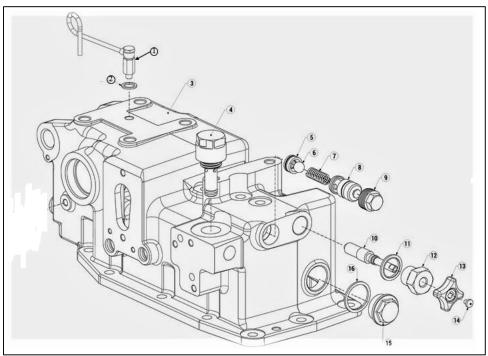


Figure 19 Cover Assembly

- BREATHER HYD. LIFT OIL
- 2 COPPER WASHER HYD. BREATHER
- 3 COVER HYD. LIFT TOP
- HYD. PUMP RELIEF VALVE ASSY. 4
- 5 CHECK VALVE SEAT WITH O-RING
- BALL 15/32" DIAMETER 6
- 7 CHECK VALVE SPRING HYD. LIFT
- HYD. CHECK VALVE RETAINER WITH O-RING 8
- 9

- HYD. ACCESSORY SPOOL COVER
- 11 BONDED SEAL M22 (DOWTY)
- 12 ADAPTER M22X1.5
- KNOB COVER 13
- 14 **SCREW**
- 15 PLUG M30x1.5x12
- 16 WASHER COPPER HYDRAULIC LIFT
- HYD. CHECK VALVE PLUG
- 1. Wash the Cover Hydraulic Lift (3) with suitable solvent and dry with clean lint free cloth or compressed air.
- 2. Insert the Check Valve Seat with O-ring (5) in the hole specified in the figure. Then insert the Ball (6) in behind the seat. After that insert the Spring (7) to keep the cap in place. Then, insert the Check Valve Retainer (8) with O-Ring and finally close the hole with Check Valve Plug (9) with the help of a pneumatic gun.
- 3. Insert the Accessory Spool (10) in the hole specified. Then, with spool shaft in between the Bonded Seal-Dowty (11) close the hole with help of M22 Adapter (12), make sure that the spool's shaft sticks out from the hole in the Adapter. Match the groove cut out in the spool shaft with Knob Cover (13) and fix it with the help of Screw (14).
- 5. Close the cylinder safety valve hole with help of Copper Washer (16) and M30 Plug (15).
- 6. Finally tighten the Relief Valve (4) with M30 socket and pneumatic gun in the hole as per the figure shown.

B. POWER TRANSFER ASSEMBLY

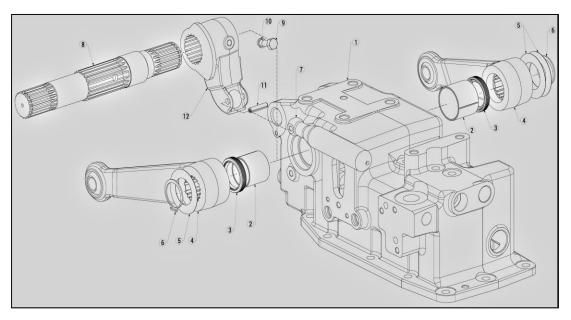


Figure 20 Cover Assembly

- 1 COVER HYDRAULIC LIFT TOP
- 2 BUSHING HYD. LIFT SHAFT RH & LH
- 3 SEAL OIL 35x45x9.0
- 4 ARM HYDRAULIC LIFT RH & LH
- 5 SHIM (2 QTY. FOR LH & 1 QTY. FOR RH)
- 6 CIRCLIP

- 7 ROD HYDRAULIC LIFT CONNECTING
- 8 SHAFT SERRATED HYDRAULIC LIFT
- 9 BOLT M8X1.25X16-8.8 HEX HEAD
- 10 WASHER M8 SPRING LOCK
- 11 PIN 6x30 SPRING DOWEL COMBINATION TYPE
- 12 ARM HYDRAULIC LIFT RAM
- 1. Fix the Cover in bench with help of cover mounting bolts and invert the fixture.
- 2. Take Ram Arm and Assemble it with connecting rod with help of Spring Dowel Pin. Insert the Dowel into the hole of Ram Arm keeping the Connecting Rod in between the socket.
- 3. Insert the Serration Shaft into the Cover Hydraulic Lift Top, shaft side with smaller diameter should inserted into the cover hole with bigger diameter. Put the Ram Arm assembly inside the cover and pass Serration Shaft through the Ram Arm spline and match the master spline.
- 4. With the help of tool insert the Bushing LH & RH. Make sure that the bushings are fitted according to the bore size, and while insertion the bushings doesn't get damaged.
- 5. After the bushing, with help of tool, insert the oil seal, Lip Side facing towards inside of cover, at both ends. Make sure that the seal position is butt with the inside face of the hydraulic cover. The seal is to be inserted with help of tool provided and shouldn't be damaged while insertion.
- 6. Fix the Ram Arm and Serration shaft with help of M6 Screw and Spring Washer, in between.
- 7. Insert the Lift Arm LH & RH by matching the master splines with serration shaft.
- 8. Fix the Lift Arm by inserting a couple of Shim on the LH side of the lift and a single Shim on the RH side of the lift. Finally fix the Lift Arms by inserting Circlip into the groove on both the sides of serration shaft.

C. QUADRANT HOUSING DIS-ASSEMBLY

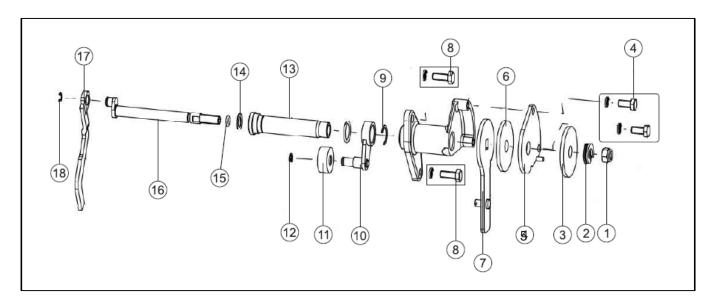
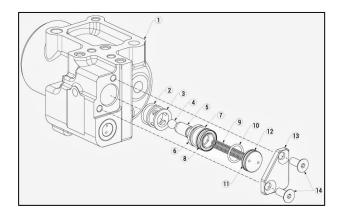


Figure 21
Quadrant Housing Dis-Assembly

- 1 NUT M10x1.50 NYLOCK HEX
- 2 WASHER HYDRAULIC LIFT CONTROL
- 3 SPRING WASHER LIFT CONTROL SHAFT CUP
- 4 BOLT M8x1.25x20 & M8 SPRING WASHER
- 5 DISC HYDRAULIC LIFT CONTROL
- 6 CONTROL DISC HYDRAULIC LIFT CONTROL
- 7 LEVER HYDRAULIC LIFT POSITION
- 8 BOLT M8x1.25x25 & M8 SPRING WASHER
- 9 RING 0.78" RETAINING TYPE

- 10 LEVER ASSY. POSITION CONTROL
- 11 ROLLER HYDRAULIC LIFT POSTION
- 12 CIRCLIP C6x0.85 N
- 13 SHAFT ASSY. DRAFT CONTROL SELECTOR
- 14 WASHER HYDRAULIC SHAFT THRUST
- 15 O- RING 2.62x20.50
- 16 SHAFT HYDRAULIC LIFT CONTROL LEVER
- 17 LINK HYDRAULIC LIFT POSTION CONTROL
- 18 CIRCLIP C6x0.85 N
- 1. Loosen the nylock nut (1) by using M10 ring spanner. Then take out ring washer (2)along with cup washer (3).
- 2. Loosen M8 bolts (4) using pneumatic gun. remove control disc (5) along with friction disc (6) and position control lever(7).
- 3. Loosen the cover mounting M8 bolt (8)in order to remove Quadrant housing. Make sure to scrap the applied sealant from the face of quadrant housing and cover
- 4. Take out the rest of the assembly from inside the cover. Remove the O-Ring from Control Shaft (16), replace the O-ring with new one.
- 5. Take the Cir-clip from Draft Control Shaft(16) and remove the Lever Assy. Position Control (10). Check wear marks on roller(11). If there replace the roller with a new one-by removing cir-clip (12).
- 6. Carefully inspect Draft Control Connector Link (13), Draft Control Link (16), Position control Link (17) after removing Circlip (18) with help of pliers, and check for cracks or wear marks on the actuating face where it hits the roller.
- 7. The installation procedure is inversely identical as the dis-assembly procedure.

D. CYLINDER DIS-ASSEMBLY



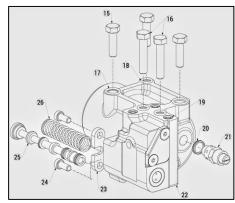


Figure 22 Cylinder Dis-Assembly

1	CVI INDED HVDD ALII IC LIET ACCEMBLY	1.4	CODEW MO-1 25-20 COLINTED CLINIZ
1	CYLINDER HYDRAULIC LIFT ASSEMBLY	14	SCREW M8x1.25x20 COUNTERSUNK
2	RING SEALING	15	BOLT M10X1.50X35-10.9 HEX (3 QTY.)
3	SEAT VALVE LOCKING BALL	16	BOLT M10x1.50x50-10.9 HEX HEAD (2 QTY.)
4	BALL 10MM CHROMIUM STEEL	17	SEAL O RING 2.40x16.30 (2 QTY)
5	SEAT HYDRAULIC DISTRIBUTOR	18	SEAL O RING 2.50x11.00 (3 QTY.)
6	RING SEALING	19	SEAL O RING 0.364"x0.066" (3 QTY.)
7	INSERT HYDRAULIC DISTRIBUTOR	20	GASKET HYDRAULIC LIFT SAFETY VALVE
8	RING SEALING	21	VALVE ASSEMBLY HYDRAULIC LIFT SAFETY
9	SPRING VALVE LOCK	22	CYLINDER HYDRAULIC LIFT
10	RING SEALING	23	COVER HYD. DISTRIBUTOR BODY FRONT
11	PLUG HYDRAULIC LIFT UNLOAD VALVE	24	SCREW M8x1.25x18 ALLEN (2 QTY.)
12	RING SEALING	25	VALVE HYDRAULIC LIFT CONTROL
13	COVER HYD. DISTRIBUTOR BODY REAR	26	SPRING HYDRAULIC LIFT CONTROL VALVE

- 1. Fix the lift on a fixture and turn the lift upside down.
- 2. Rotate the position control lever to down position so that the spool is free. Locate the cylinder mounting bolts (5 qty.). Loosen the cylinder mounting bolts (15 & 16) using pneumatic gun.
- 3. Carefully remove the cylinder assembly (1) from Cover hydraulic lift.
- 4. Inspect the Seal O-Rings (17 & 18) on the groove of cover. If the seal appears squeezed replace with new ones. The seal at diagonal opposite to marked seal 17 is similar. Seal placed diagonally opposite to seal marked 18 are similar.
- 5. Inspect the Seal O-Ring (19) -3 Qty. inside the groove of Cylinder Assy. and replace with new ones.
- 6. Loosen the Cylinder Safety Valve (21) check for leakage.
- 7. Loosen Allen Screw (24) 2 Qty. and take out the spool along with spring. Check for the easy sliding of spool on bushing inside cylinder. Check for and burrs/cracks on face of bush and lands of spool.
- 8. At the rear of the cylinder unscrew the Screw (14) using Allan key. Take out the Rear Cover Plate (13).
- 9. Using needle nose plier pull the Unload Valve Plug (11), remove Sealing Ring (12) and replace it with new one. Pull out the Insert Hydraulic (7) and change O-Ring (2, 6, 8 & 10) with new one. Check for dust and sludge in the holes. The assembly procedure is inversely identical as the dis-assembly procedure.

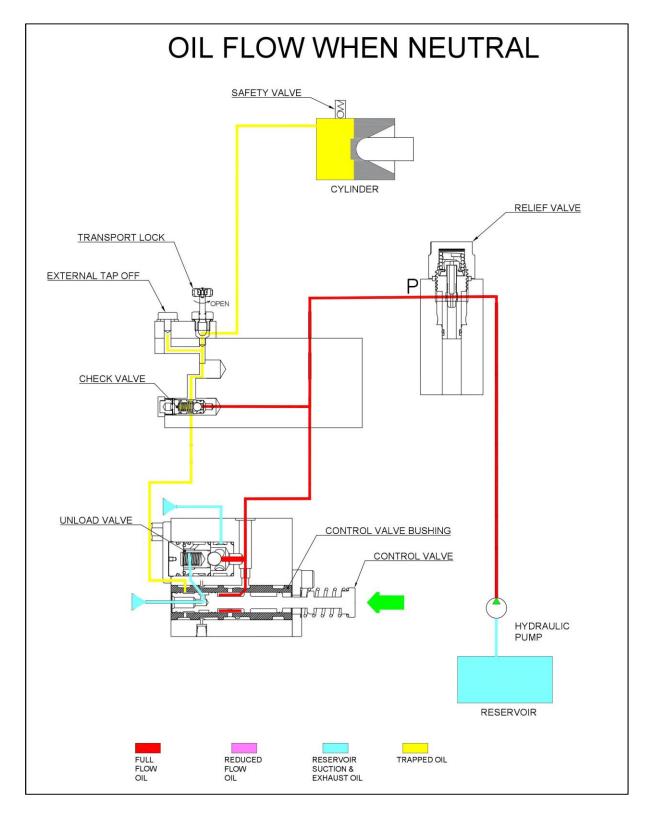


Figure 23
Oil Flow when Neutral

OIL FLOW WHEN NEUTRAL

In this palse the control valve keeps pressure on the oil contained in the cylinder thus allowing the oil coming from the pump to flow freely to the tank.

In this phase the control valve is in such a position to connect chamber of unload valve directly to discharge.

The oil coming from the pump enter the relief valve, through the galleries in control valve bushing and control valve oil enters unload valve and pushes the ball and spring arrangement and gets discharged to the tank.

The oil contained in the cylinder is kept under pressure by the check valve and by safety valve connected to cylinder thus holding the load applied to the lifting arms.

The safety valve secures protection from any possible over-pressure during the implement movement.

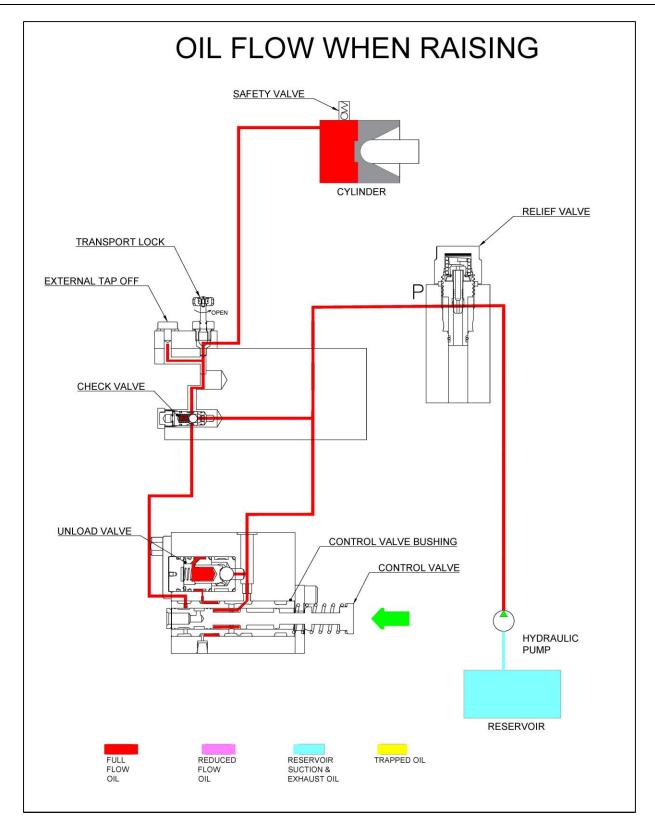


Figure 24
Oil Flow when Raising

OIL FLOW WHEN RAISING
During this phase the Control Valve supplies the oil under pressure to cylinder and it consequently lifts the arms.
The Control Valve is in such a position to connect chamber of Control Valve Bushing with unload valve. With the oil coming from pump through Control Valve Bushing making it's way to the unload valve itself to close.
The oil from pump finding the closed unload valve then goes to open check valve enters the cylinder.
The lifting depends on pump RPM.
In this phase the maximum lifting pressure is controlled by the relief valve that is connected in between oil inlet and Control Valves.
10

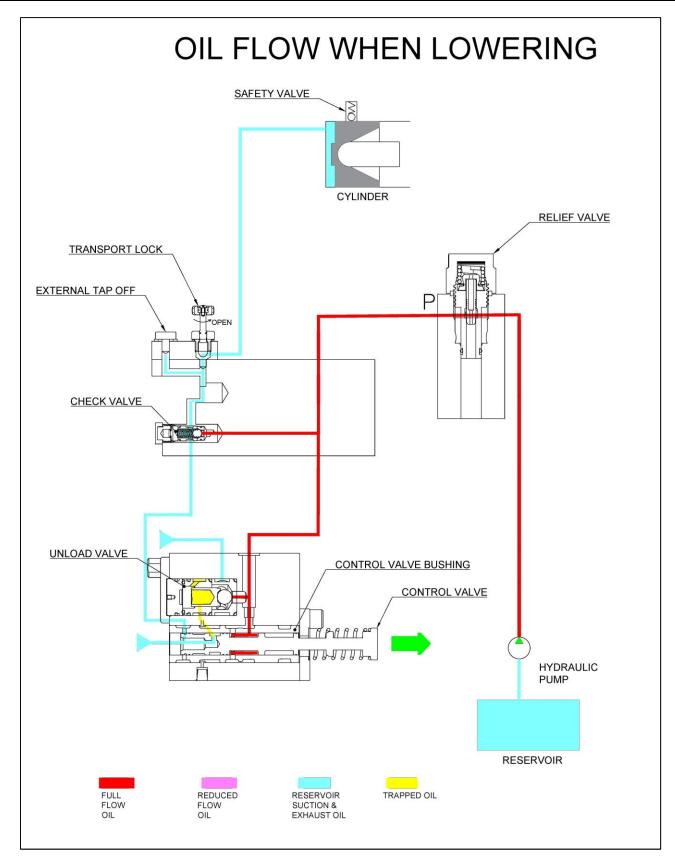


Figure 25
Oil Flow when Lowering

During this phase the control valve supplies at the same time the oil coming from the pump and the oil contained in the cylinder to the discharge causing the lowering of the arms.
The Control Valve is in such a position to connect chamber of Cylinder directly to discharge.
The oil coming from the pump enters in the Control Valve Bushing is able to go to unload valve and gets trapped in Unload Valve.
At the same time the pressure oil contained in the cylinder flows to the tank therefore causing the lowering of arms.
21
21

OIL FLOW WHEN LOWERING

PROBLEM	POSSIBLE CAUSES		REMEDY	
	1.	Low oil level.	1.	Fill system with correct grade and quantity of oil.
	2.	Hydraulic piston pump not primed.	2.	Prime pump.
	3.	Hydraulic pump pressure low.	3.	Adjust pump pressure.
	4.	Check valve damaged or worn.	4.	Install new check valve ball and seat.
Failure to Lift Under All	5.	Draft or position control linkage damaged.	5.	Install new parts and adjust linkage.
conditions	6.	Unload valve or back pressure valve faulty.	6.	Inspect and renew if necessary.
	7.	Lift piston seals damaged.	7.	Install new seals.
	8.	Unload valve plug worn.	8.	Install large size plug.
	9.	Lift cylinder, lift cover castings cracked or porous.	9.	Renew defective parts.
Failure to Lift Under Load	1.	Hydraulic pump pressure low.	1.	Adjust pump pressure.
	2.	Damaged "O" rings between lift cylinder and lift cover or between accessory cover and lift cover.	2.	Install new "O" rings.
	3.	Damaged "O" rings on hydraulic pump pipes.	3.	Install new "O" rings.
	4.	Damaged lift cylinder safety valve.	4.	Install new valve.
	5.	Faulty lift piston seals.	5.	Install new seals.
	6.	Cracked, porous lift cylinder or lift cover casting.	6.	Renew defective parts.
Excessive Corrections	1.	Selector valve worn or damaged.	1.	Install larger size spool.
	2.	Unload valve worn ball or seat plug.	2.	Install larger size plug.
	3.	Lift cylinder safety valve damaged.	3.	Install new valve.
in the raised or Transport Position	4.	Faulty lift piston seals.	4.	Install new seals.
***************************************	5.	Control valve worn.	5.	Install new (or larger) valve.
	6.	Worn or damaged check valve.	6.	Install new ball and seat.

FARMTRAC 25G HST (FT 25G HST) SERVICE MANUAL STEERING

STEERING SYSTEM

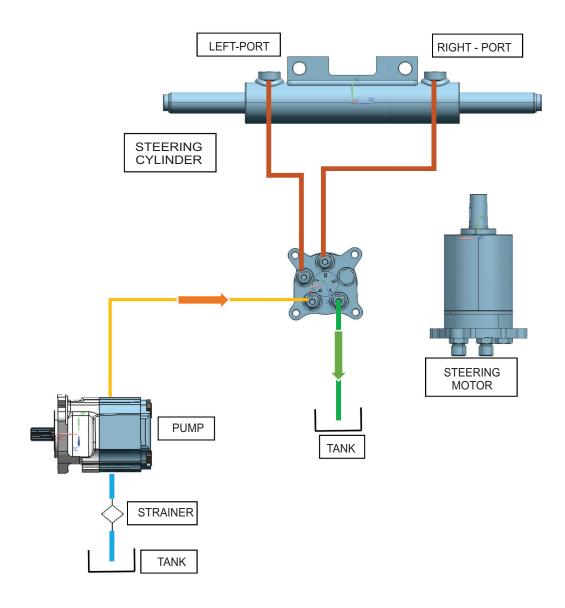
CO	NTENTS	PAGE
1.	STEERING SYSTEM IN NEUTRAL CONDITION	1
2.	STEERING SYSTEM IN LEFT TURN - CONDITION	2
3.	STEERING SYSTEM IN RIGHT TURN - CONDITION	3
4.	DESCRIPTION AND OPERATION	4
5.	EXPLODED VIEW OF HSU UNIT	5
6.	STEERING CYLINDER ASSEMBLY & DISASSEMBLY	6
7.	TORQUE SPECIFICATIONS	7

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OIL FLOW IN STEERING CIRCUIT

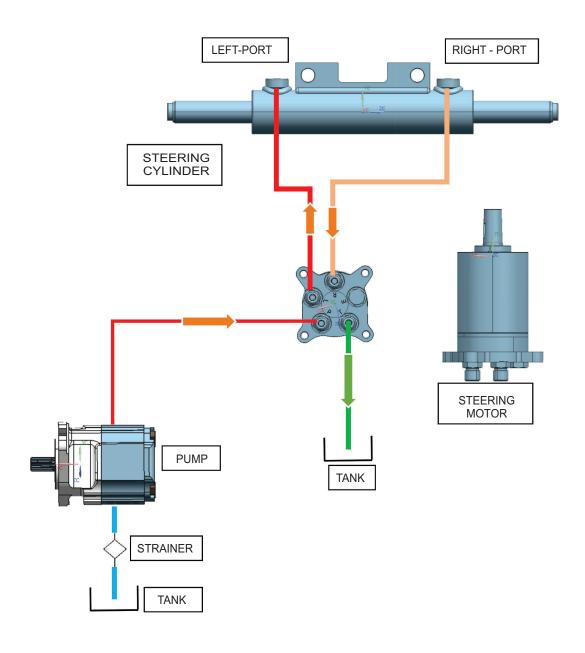
STEERING SYSTEM IN NEUTRAL - CONDITION

The below figure shows the steering system in NEUTRAL position. The fluid provided by the pump enters into the P Port located in the steering motor. The same fluid comes out of T Port and goes back to the tank. No oil will go in L and R Port joining the steering motor to the steering cylinder.



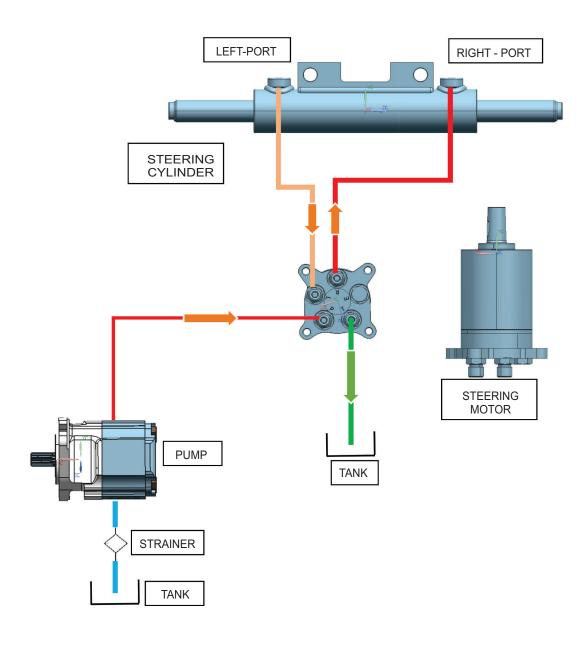
STEERING SYSTEM IN LEFT TURN - CONDITION

The below figure show the steering system in left turn position. The fluid provided by the pump enters into the P Port located in the steering motor while steering wheel turns left side. The P Port is connected to the L Port of steering motor. Oil will flow from L-port of steering motor to L-Port of steering Cylinder. The oil from the R Port of steering cylinder enters into the R Port of steering motor. The R Port is connected to the T Port of steering motor. Now oil will drain back to tank through T Port of steering Unit.



STEERING SYSTEM IN IN RIGHT TURN - CONDITION

The below figure show the steering system in right turn position. The fluid provided by the pump enters into the P Port located in the steering motor while steering wheel turns right side. The P Port is connected to the R Port of steering motor. Oil will flow from R-port of steering motor to R-Port of steering Cylinder. The oil from the L Port of steering cylinder enters into the L Port of steering motor. The L Port is connected to the T Port of steering motor. Now oil will drain back to tank through T Port of steering Unit.



STEERING SYSTEM

1. DESCRIPTION AND OPERATION

Farmtrac feature an hydraulic power assisted, hydrostatic steering system. The components are serviced separately and consist of the steering column shaft, steering motor, front steering cylinder, power steering pump, oil cover and reservoir, and the hoses and tubes required to connect the system.

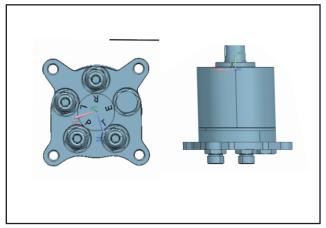
The integral power steering pump is mounted on the rear of the engine front cover plate at the lefthand side of the engine. The pump is connected to the steering motor by single oil tube.

The steering wheel is secured to the steering column shaft. The steering column upper shaft is joined to the power steering motor input shaft by a coupling secured with a pinch bolt. The power steering motor and steering column assembly are mounted on a housing bracket which is bolted at the clutch housing.

The hydrostatic steering motor uses a linear control valve to control the direction of the steered wheels and a metering unit to control the rate of turn. In the event of pump failure the metering unit functions as an hydraulic pump and the wheels can be turned manually.

2. STEERING CYLINDER

The double acting steering cylinder is transversely mounted on the front axle. The cylinder end of the assembly is bolted to an adjuster bar which forms an inlegral part of the front axle assembly and facilitialies re-positioning of the cylinder when adjusting the track setting. The rod end is attached to the left-hand spindle arm which is connected by the track rod to the right-hand spindle arm. The cylinder incorporates a piston centrally mounted on the piston rod. This arrangement enables the piston to present surfaces of equal area to the operating oil and the resultant forces ensure similar right and left-hand turning circles.



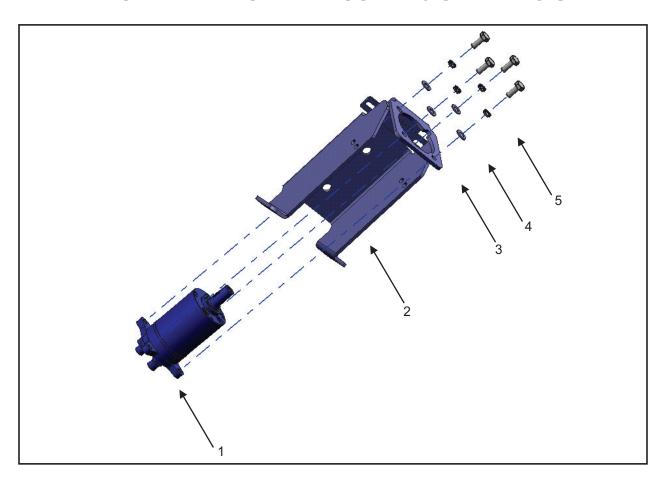
A. Steering Moter Connections and Pipes

3. HYDROSTATIC STEERING SYSTEM OVERHAUL

A. REMOVAL

- 1. Disconnect the battery ground cable at the battery.
- 2. Clean the flexible steering hose to rigid pipe connections.
- With a suitable container to store the escaping steering oil, mark and separate the flexible steering hoses from the rigid pipes. Cap and seal the pipes, using suitable plugs.
- Slacken the retainer bolts securing the pipes to the side of the engine.
- Unclip the separate the throttle screws and remove the lower steering column shroud by withdrawing main harness connector to gain access to the steering column to motor coupling.
- Remove the four bolts retaining the steering motor support bracket.
- Slacken clamp bolts securing the steering column to the motor and carefully withdraw the motor assembly from the left-hand side of the tractor.

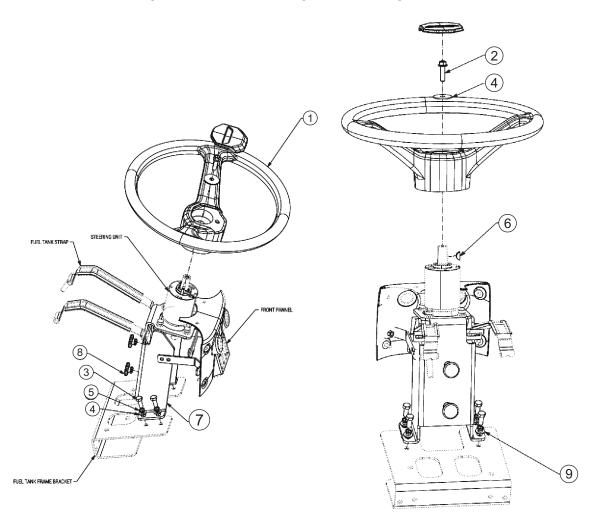
EXPLODED VIEW OF HYDROSTATIC STEERING UNIT



S.No.	PART NO.	DESCRIPTION
1.	D10524330	Power Steering Motor Assembly
2.	D10564510	Bracket Assembly Steering Column Mounting
3.	D85500050	Washer M8 Flat
4.	D86500030	Washer M8 Spring Lock
5.	D81500110	M8x1.25x20 Bolt (20-25 Nm)

STEERING WHEEL DISASSEMBLY

- Remove the cap using the screw driver.
- Remove the steering bolt and washer securing the wheel using the T rod with socket size 12mm.



S.NO.	PART NO. PART	DESCRIPTION	QTY.	TORQUE
1	D10569180	WHEEL ASSEMBLY STEERING	1	
2	D81502240	BOLT M8X1.25X30-10.9 HEX HEAD FLANGED	1	30-35Nm
3	D81500110	BOLT M8X1.25X20-8.8 HEX HEAD	4	20-25Nm
4	D85500700	WASHER M8 OD35 FLAT	1	
5	D86500030	WASHER M8 SPRING LOCK	4	
6	D91000280	WOODRUFF KEY 5X6.5	1	
7	D10564510	BRACKET ASSEMBLY STEERING COLUMN MOUNTING	1	
8	D10562340	GROMMET FUEL TANK	2	
9	D85500050	WASHER M8 FLAT	4	

4. HYDROSTATIC STEERING SYSTEM

CYLINDER-OVERHAUL REMOVAL AND DISSASSEMBLY

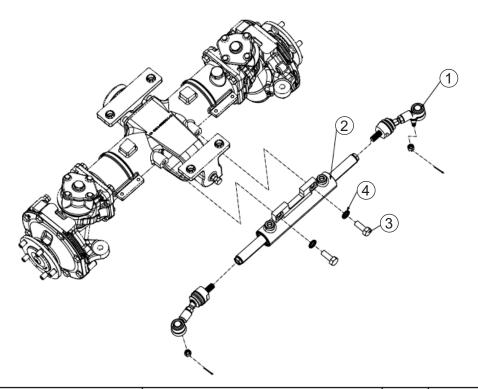
- 1. Disconnect the two oil feed pipes from the power cylinders. Cap the pipe ends.
- 2. Unscrew the ball stud nuts.
- Remove the power cylinder assembly from the tractor
- 4. Loosen the clamp retaining the ball end to the piston rod and unscrew the ball end assembly.
- 5. Remove the piston rod bush retaining snap ring and remove the scraper, outer seal, retainer and inner seal.

NOTE: The power cylinder assembly cannot be further dismantled and if faulty, must be replaced as a unit.

RE-ASSEMLY AND INSTALLATION

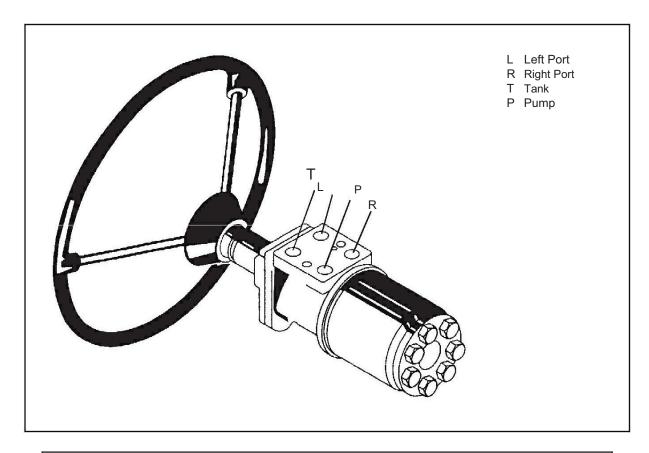
- Re-assembly and installation follows the disassembly and removal procedures in reverse.
 On installation observe the following requirements.
- Tighten all nuts to the correct torque i.e. 147 to 166.6 Nm
- Operate the Steering several times with the engine running to expel all air from the system then re-check the oil level.

WARNING: Do not mix oil types any mixture or an unapproved oil, could deteriorate the seal, Enough fluid could then leak to create a loss of power steering assists. Do not allow fluid level to go below fill line on dipstick. Before adding new fluid, completely drain oil from the system. It may be necessary also that you flush systems with clean oil.



S.NO.	PART NO.	PART DESCRIPTION	QTY.	TORQUE (Kg-M)
1	D10537731	LINK ASSEMBLY POWER STEERING	2	-
2	D10537740	CYLINDER ASSEMBLY POWER STEERING	1	-
3	D81500740	BOLT M14X2.00X35-10.9 HEX HEAD LOCK	2	15-17
4	D85500520	WASHER M14 LOCK (NORD TYPE)	2	-

5. TORQUE SPECIFICATIONS AND HYDRAULIC CONNECTIONS

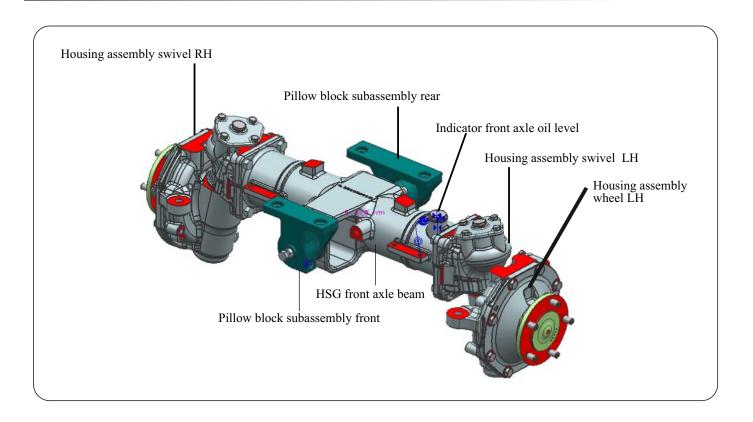


Max. Tightening Torque Nm				
Bolts	Bolts Spring Lock Washer Flat Washer			
M8x1.25x20	21.6-28 Nm	21.6-28 Nm		

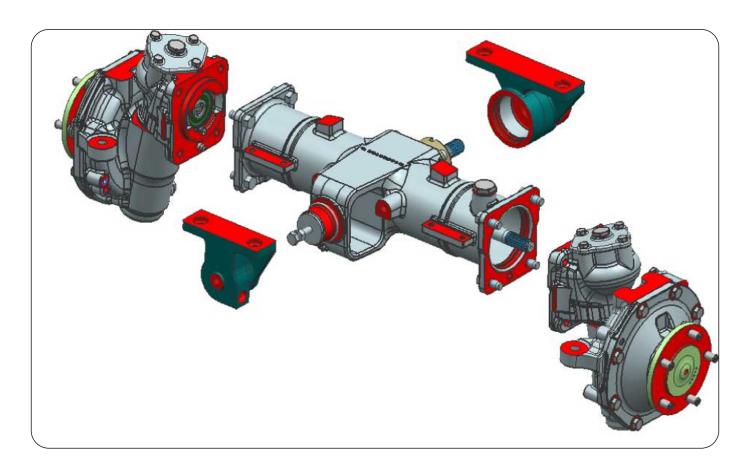
FRONT AXLE SERVICE MANUAL

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EXPLODED VIEW OF FRONT AXLE	1
FRONT AXLE DIS-ASSEMBLY	2
STEERING CYLINDER DIS-ASSEMBLY	3
EXPLODED VIEW OF STEERING CYLINDER	4
SWIVEL HOUSING DISASSEMBLY	5
EXPLODED VIEW OF SWIVEL HOUSING	6
KNUCKLE HOUSING DISASSEMBLY	7
EXPLODED VIEW OF KNUCKLE HOUSING DISASSEMBLY	9
EXPLODED VIEW OF DIFFERENTIAL ASSEMBLY	10
EXPLODED VIEW OF PILLOW BLOCK SUB ASSEMBLY FRONT	2
DISASSEMBLING OF PILLOW BLOCK SUBASSEMBLY REAR	14
DIFFERENTIAL ASSEMBLING	15
ASSEMBLING OF SWIVEL HOUSING	18
ASSEMBLING OF KNUCKLE HOUSING	20
ASSEMBLING WHEELEND HOUSING	24
CHART LIQUID SEALANT - COMPACT 9+3	28
SHIMMING PROCEDURE - DIFFERENTIAL	30
SHIMMING PROCEDURE - KNUCKLE HOUSING COVER	31
SHIMMING PROCEDURE - SWIVEL AND WHEEL HOUSING	32
SHIMMING PROCEDURE - KNUCKLE HOUSING COVER	33



EXPLODED VIEW OF FRONT AXLE



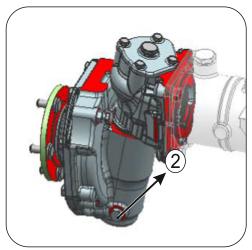
FRONT AXLE DIS-ASSEMBLY

Separating Front Axle

Draining front axle case oil

1. Place the oil pan underneath the front axle case.

- 2. Remove the both the right and left hand side drain plugs(2) with 18 no. socket and filling plug (1) to drain the oil.
- 3. After draining, reinstall the drain plugs (2).

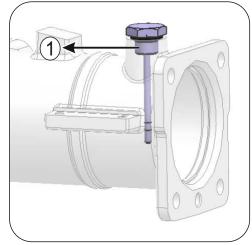


2) Drain plug

Refilling

Fill with new oil up to the upper notch on the dipstick. After fifteen minutes, check the oil level again and add oil to proper level. The oil capacity is 3.2 litre and oil grade is SAE 80W 90.

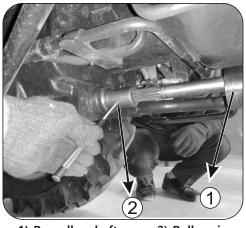
NOTE: If there is any repair needed in swivel HSG, just drain the oil and open 4 bolts to separate swivel HSG. No need to disconnect propeller shaft.



1) Filling plug with dipstick

Disconnecting propeller shaft

1. Loosen the clamps and slide the propeller shaft cover (1) in the forward direction.

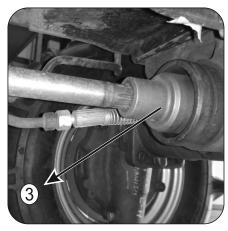


1) Propeller shaft cover 2) Roller pin

2. Tap out the roller pin (2) and slide the coupling (3) in the rearward direction.

Reassembling

Apply grease to the spline of the propeller shaft.



3) Coupler

Hydraulic hose

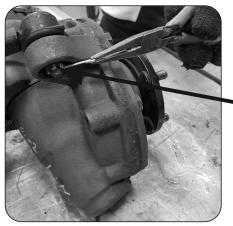
- 1. Remove the hydraulic hose (1) from the front cylinder assy from both sides.
- 2. Use 17 & 19 No. Spanner to remove hydraulic hose.



1) Hydraulic hose

STEERING CYLINDER GROUP DISASSEMBLY

1) Remove the cotter pin.



1. Cotter Pin

2) Unloose the steering arm locknut of some turns till it is over the end of the cotter pin. Beat on the nut with a hammer in order to disjoin the steering arm from the swivel housing.

Warning: Do not beat on the end of the cotter pin. **NOTE:** This is a destructive operation for the nut.



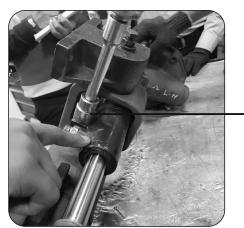
1. Opening bolt

3) Remove the guide tie rod by loosening the nut with a suitable wrench, then checks its conditions.



Shaft drift (aluminium)

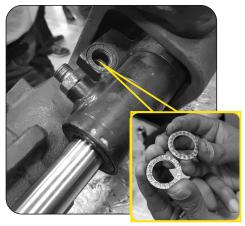
4) Unscrew the fastening screws of the cylinder, then remove the cylinder out of its seat and, if necessary, use a shaft drift hammer. Remove only that parts that need to be overhauled and/or replaced.



Opening bolt

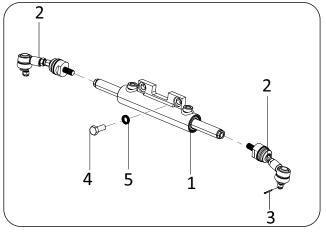
5) Detach the cylinder head from the cylinder case. Remove the cylinder head and the rod from the cylinder case. Remove all the seals.

NOTE: Some of the following pictures may not show exactly your axle, but the process is the same.



Step washer

EXPLODED VIEW OF STEERING CYLINDER

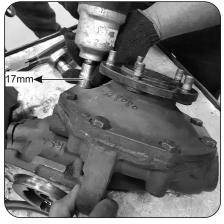


Complete power steering cylinder

- CYLINDER ASSEMBLY POWER STEERING
- 2 LINK ASSEMBLY POWER STEERING
- 3 PIN 3.2X25.0 COTTER
- 4 BOLT M14X2.00X35-10.9 HEX HEAD LOCK
- 5 WASHER M14 LOCK (NORD TYPE)

Swivel housing Disassembly

- 1) Drain the oil completely from the swivel housing assembly.
- 2) Unscrew 8 M10 bolts using 17mm socket.



Opening 8 bolts

3) Remove the wheel housing.

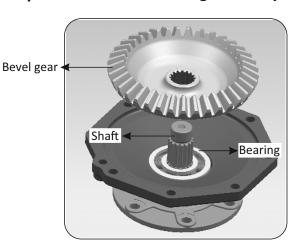


Swivel Assembly



Wheel Housing Assembly

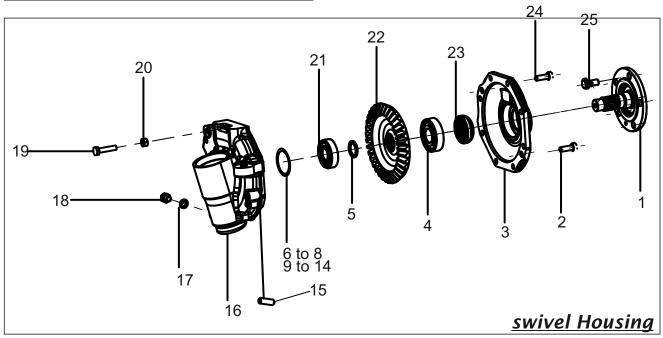
4) Remove the Bearing 6305 and remove the bevel Z-37 gear.



5. Remove Split washer from the shaft grove. Collect the bearing 6306 and check its condition.



EXPLODED VIEW OF SWIVEL HOUSING



ĬÉÖB	Part Name	Qty.
1	SHAFT FRONT AXLE WHEEL	1
2	BOLT M10X1.50X30-10.9 HEX HEAD	8
3	HOUSING WHEEL FRONT AXLE	1
4	BEARING BALL 6305	1
5	WASHER SPLIT WHEEL END	2
6	SHIM 60X50 (0.075 MM)	1
7	SHIM 60X50 (0.2285 MM)	1
8	SHIM 60.X50 (0.4065 MM)	1
9	SHIM REAR AXLE SHAFT (0.075 MM)	1
10	SHIM REAR AXLE SHAFT (0.125 MM)	1
11	SHIM REAR AXLE SHAFT (0.2285 MM)	1
12	SHIM REAR AXLE SHAFT (0.4065 MM)	1
13	SHIM REAR AXLE SHAFT (0.5335 MM)	1
14	SHIM REAR AXLE SHAFT (0.7875 MM)	1
15	DOWEL POSITIONING 10X25	1
16	HOUSING SWIVEL FRONT AXLE LH	1
17	WASHER 12.0X22.0 SCREW RAIL	1
18	SCREW M12X1.75X12-8.8 HEX HEAD	1
19	BOLT M10X1.50X45-8.8 HEX HEAD WITH ROUNDED TOP	1
20	NUT M10X1.50-8 HEX	1
21	BEARING BALL 6306	1
22	GEAR DRIVEN BEVEL WHEEL Z-37	1
23	SEAL OIL 35X60X14.5 PTO OUTPUT SHAFT	1
24	BOLT M10X1.50X30-10.9 HEX HEAD	8
25	BOLT M12X1.5 FRONT WHEEL HUB	5

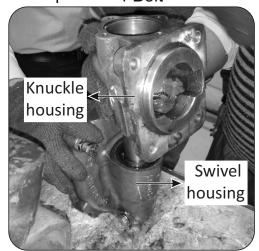
Knuckle housing disassembly

• Use 13 mm socket to open four bolts mounted on the top of knuckle housing.

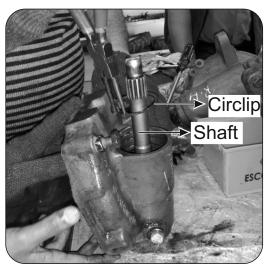


Top cover 4 Bolt

- Bearing no 30304 is inside knuckle housing & also in swivel housing bottom side.
- Shims are used between knuckle housing and knuckle cover.



 Remove circlip (B62) and bevel gear (Z10) from the knuckle housing. Remove Z16 gear which is inside knuckle housing through a slot.



NOTE: Sealing is done between knuckle housing & swivel housing to prevent oil leakage and dust entry.

- There is a slot to take out bevel gear.
- Ball bearing 6909 outside & 6908 inside used in swivel housing.
- Remove 30304 & washer then bevel gear Z16.
- · Taper roller bearing is inside knuckle housing.



- Remove taper roller bearing 30304 & washer.
- Remove the bevel gear.

NOTE: Z9 Shaft must fitted with cir-clip A-40 before fitment.

- (1) Remove circlip A-40 to separate knuckle HSG from swivel HSG.
- (2) Remove Oil seal.
- (3) Remove 6909 bearing.
- (4) Remove B-62 circlip.
- (5) Remove bearing 6908.
- (6) Remove Z-9 shaft.
- Note: Bearing 30304 cone press Z-9 shaft or cup pressed into swivel HSG.

TIPS: Bearing identification tip

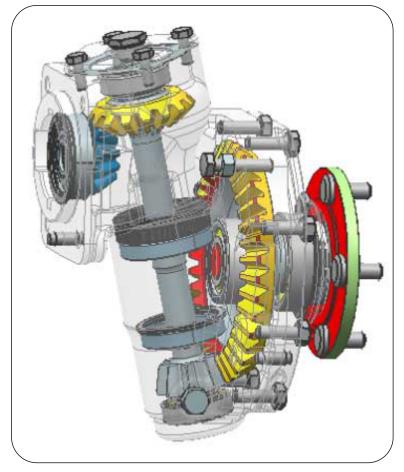
Last two digit on the bearing X = ID

For example

 $09 \times 5 = 45$ is ID for bearing.

NOTE: Cut side of knuckle housing keep it always toward inner side. knuckle housing Arrangement sequence order from bottom to top:

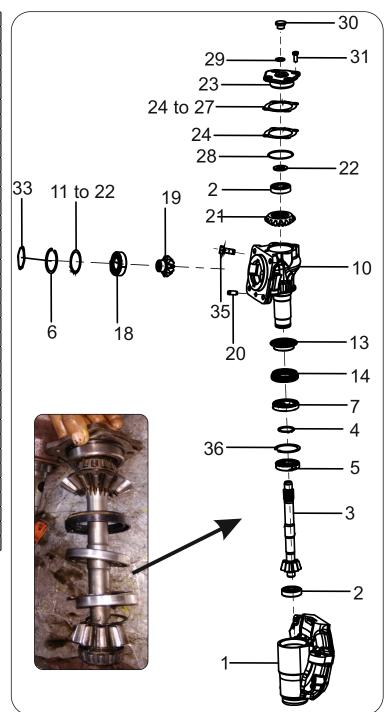
- (1) Bearing (30304)
- (2) Circlip A-40
- (3) Bearing 6908.
- (4) Circlip B-62
- (5) Bearing 6909.
- (6) seal.
- (7) sleeve.
- (8) bevel gear (Z16).
- (9) washer.
- (10) Bearing 30304.
- (11) Knuckle cover at the top.



Housing swivel front axle LH

EXPLODED VIEW OF KNUCKLE HOUSING DISASSEMBLY

S.no.	Part No.	Qty.
1	HOUSING SWIVEL FRONT AXLE LH	1
2	BEARING TAPER ROLLER 30304	2
3	SHAFT DRIVER BEVEL GEAR Z-9	1
4	CIRCLIP A40X1.75 N	1
5	BEARING BALL 6908	1
6	CIRCLIP B62X2.0 N (IS 3075 PART-II)	2
7	BEARING BALL 6909	1
8	SLEEVE OIL SEAL SWIVEL HOUSING	1
9	SEAL OIL SWIVEL HOUSING 52X70X10	1
10	HOUSING KNUCKLE FRONT AXLE	1
11	SHIM 61.8X51 (0.2285 MM)	1
12	SHIM 61.8X51 (0.4065 MM)	1
13	SHIM 61.8X51 (0.5335 MM)	1
14	SHIM 61.8X51 (0.7875 MM)	1
15	SHIM 61.8X51 (1 MM)	1
16	SHIM 61.8X51 (1.2 MM)	1
17	SHIM 61.8X51 (1.5 MM)	1
18	BEARING BALL 6206	1
19	GEAR DRIVER BEVEL KNUCKLE Z-10	1
20	DOWEL POSITIONING 10X25	3
21	GEAR DRIVEN BEVEL KNUCKLE Z-16	1
22	D85500450.9 WASHER 36.0X20.0X3.0	1
23	D10542450.9 COVER KNUCKLE HOUSING	1
24	SHIM COVER KNUCKLE (0.075 MM)	1
25	SHIM COVER KNUCKLE (0.125 MM)	1
26	SHIM COVER KNUCKLE (0.2285 MM)	1
27	SHIM COVER KNUCKLE (0.4065 MM)	1
28	SEAL O RING 2.62X62.00	1
29	WASHER M18 FLAT COPPER	1
30	PLUG M18X1.5X12-6.8 HEX HEAD	1
31	BOLT M8X1.25X20-8.8 HEX HEAD	4
32	NUT M10X1.50 NYLOCK HEX	1
33	SEAL O RING 3.53X95.0	1
34	LOCTITE 574 AR	AR
35	SCREW M12X1.75X30-10.9	4
36	CIRCLIP B62X2.0 N (IS 3075 PART-II)	1



Exploded View of Differential Assembly

First remove circlips (B90) by using pliers.



Remove spacer of 3mm. Remove shims.



Use drift shaft & hammer to hit the differential assembly to take out whole assembly from right hand side.



• In Differential assy, left hand shaft is smaller than right hand.



Page 10 Tap int. dowel pin.

• Remove dowel pin from shaft, then remove half axle shaft.



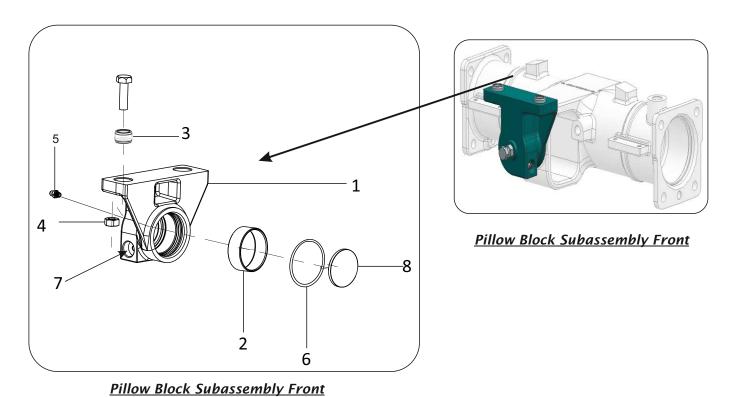
- Tap into dowel pin to remove the crown gear.
- Remove 6210 bearing in Differential assy.
- Spacer have slots that will be toward sun gear.



NOTE:

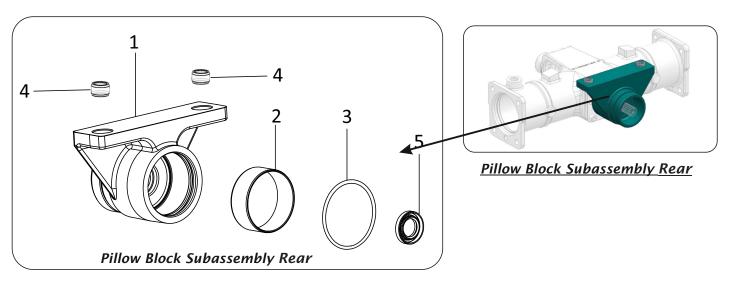
- Front wheel housing cut should be on top and all dowel and bolt should be aligned.
- Open face of the dowel pin should not face the gear as the force may result in damage.
- **Pinion pre-load** tight the nut to get pre-load 1.82 to 2.6 Nm and crimp the nut at same position.

Exploded View Of Pillow Block Sub Assembly Front



Sn. No.	Description	Qty
1	PILLOW BLOCK ASSEMBLY FRONT	1
2	BUSH PILLOW BLOCK FRONT	1
3	DOWEL BUSH PILLOW BLOCK	2
4	NUT M10X1.50-8 HEX	1
5	BOLT M10X1.50X35-6.6P HEX HEAD	1
6	SEAL O RING 2.62X55.0	1
7	GREASE NIPPLE B M6	1
8	WASHER 48.0X4.0 THRUST	1

Exploded View of Pillow Block Sub Assembly Rear



Disassembling of pillow block subassembly rear

Sn. No.	Description	Qty
1	PILLOW BLOCK ASSEMBLY REAR	1
2	BUSH PILLOW BLOCK REAR	1
3	SEAL O RING 3.53X72.0	1
4	DOWEL BUSH PILLOW BLOCK	2
5	SEAL OIL 22X37X7.0	1

Disassembling of pillow block subassembly rear

• Tap out rear pillow block & remove the oil seal.



• Open 4 bolts M8 allen & Use two jumping bolt to open



• Separate the Retainer & bevel pinion Shaft Assy.

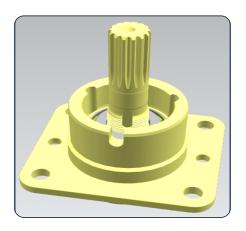


• Place the pinion shaft on fixture



Differential Assembling

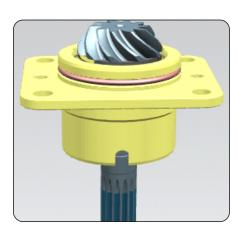
• Place the retainer on fixture and press pinion shaft into it.



• Put the tapper roller bearing along with locknut



• Put another tapper roller bearing in retainer.



• Place the differential case on fixture (opposite side of crown wheel).



Press it on the retainer.

Assemble the tail pinion with retainer and press inner race on tail pinion shaft.

Put seal o ring on retainer.

Tight the assembly with nuts.

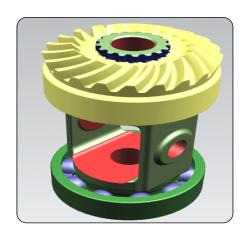
Set pre load of tail pinion at 1.8 - 2.6 nm with torque of chuck nut and lock with lock washer.

Gauging of tail pinion for distance measurement and shimming.

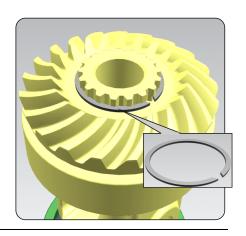
 Put the bearing 6210 on ram. Press it to the differential case (opposite side of crown wheel).



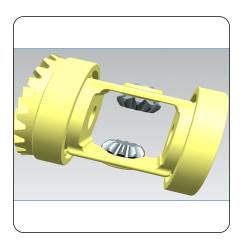
 Assemble the crown wheel with the ball bearing 6210. Assemble the crown wheel and bearing sub-assy on differential case splines.



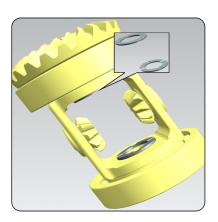
• Lock the assembly with snap ring.

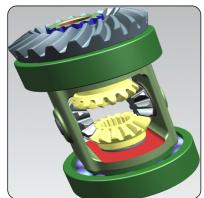


• Insert the star/spider gears inside the diff. case.

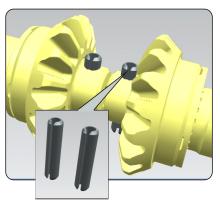


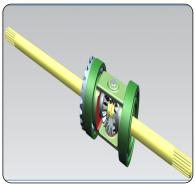
 Insert the sun gears inside the differential case along with washer washer groove side should face towards sun gear butting face"





 Assemble the LH and RH shaft in sun gear splines and lock with spring dowels

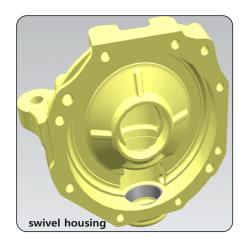




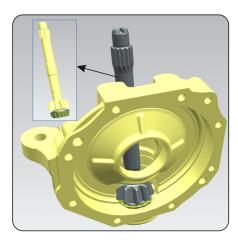
- Assemble differential assembly then put the Pinion & retainer assy. in beam assy. and check the backlash and adjust accordingly shimming and backlash.
- Oil seal should be face flushed.
- while assembling cut section should be at top in pillow block.
- Apply little grease on pillow block o-ring to adjust front axle float.

Assembling of swivel housing

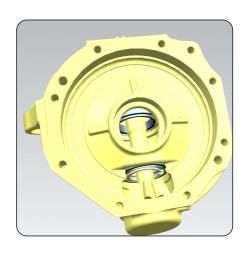
 Put the bevel shaft on fixture (on bevel shaft gear side).



Put the taper roller bearing(30304) on ram.
 Press it to the bevel gear shaft.
 Put the swivel housing on fixture.



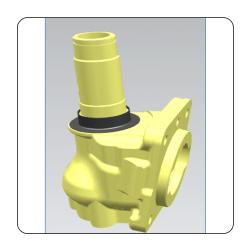
Press TRB 30304 outer race in swivel housing.
 Insert bevel shaft sub- assy on taper roller. bearing.
 Drop the circlip A-40.



 Insert bearing 6908 in swivel housing. Lock the bearing with circlip B62.
 Insert bearing 6909 in swivel housing.
 Press oil seal in swivel housing.



• Press sleeve oil seal on knuckle housing.

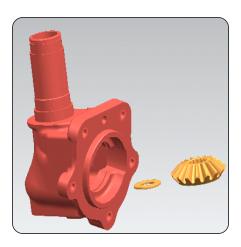


• Assemble the gear holding fixture to the knuckle housing.

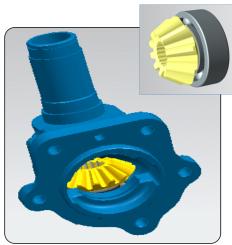


Assembling of knuckle housing

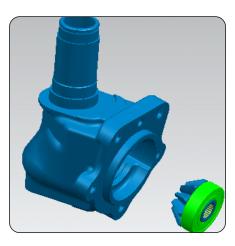
• Insert washer in knuckle housing



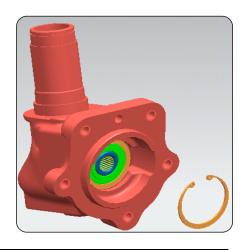
 Insert gear driven bevel Z-16 in knuckle housing, on fixture



Insert the knuckle housing sub. Assembly in swivel housing sub assembly

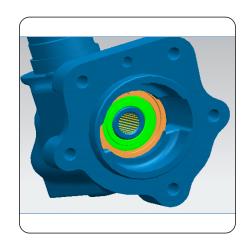


 Insert assembly of gear driver Z-10 in knuckle housing Lock the position of bearing with circlip B-62



Assembling of knuckle housing

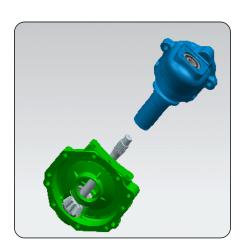
• Press gear driver bevel Z-10 in bearing 6206



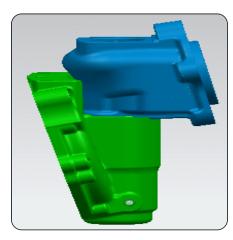
 Lock the knuckle housing in bottom ball bearing with circlip A-40.Remove the gear holding fixture from knuckle housing and assemble taper roller bearing inner race on bevel shaft top. Insert washer & bearing 30304.



 Press taper roller bearing outer race 30304 in cover knuckle.
 Apply loctite 574 on knuckle cover Housing.



 Assemble the cover knuckle housing on knuckle housing.



• Perform the pre loading of bevel shaft with pre loading and shimming gauge.



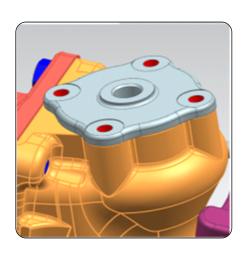
• Insert the o-ring and shim b/w cover knuckle housing and knuckle housing.

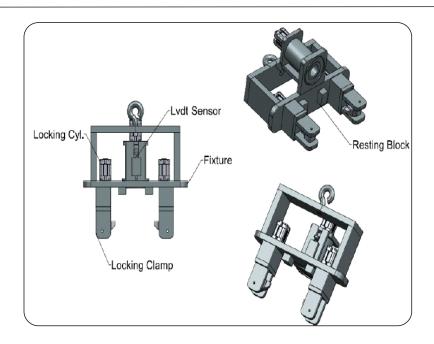


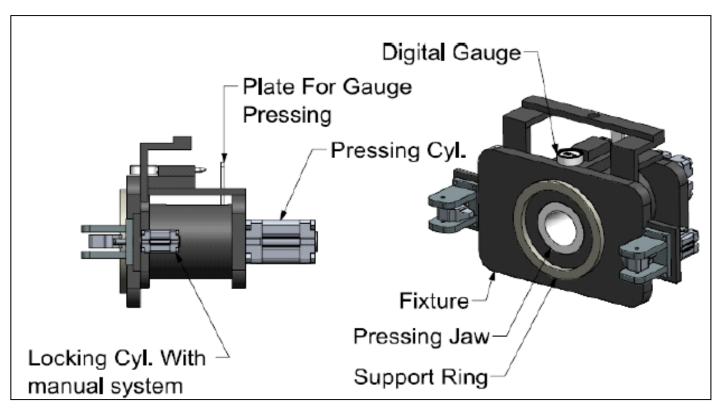
• Tight the cover with bolt M8 4 nos. And torque at 20-25 NM.



 After pre loading set the backlash of gear driver bevel Z-10 by putting shims between bearing 6206 and circlip.



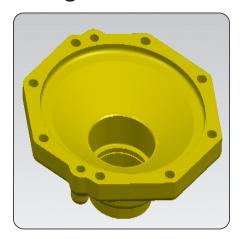




Assembly plug M18 on cover knuckle housing along with copper housing

Assembling wheelend housing

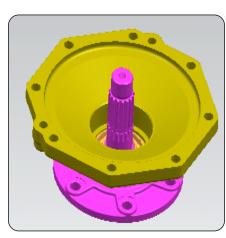
Place the housing wheel front axle on same fixture



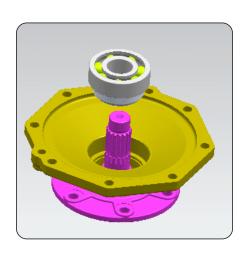
Press oil seal (35x60x14.5) in front wheel housing



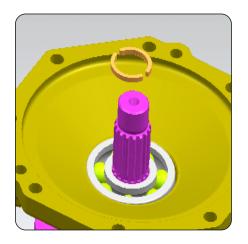
Place the shaft front axle on fixture. Press 5 bolts M12 on the wheel housing.



Press ball bearing 6306 on axle shaft



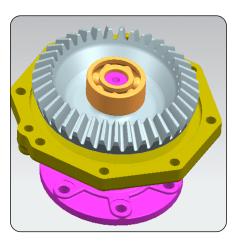
Assemble split washer on axle shaft groove



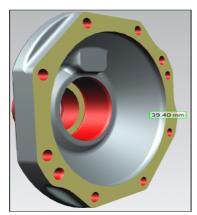
Insert and assemble the gear driven bevel Z-37 on front axle shaft splines.

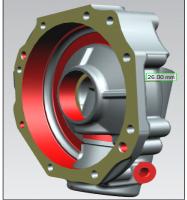


Check for the backlash and select the required shim from gauging.
Put ball bearing 6306 on front axle shaft.



Insert the required shim between wheel end housing and swivel housing.

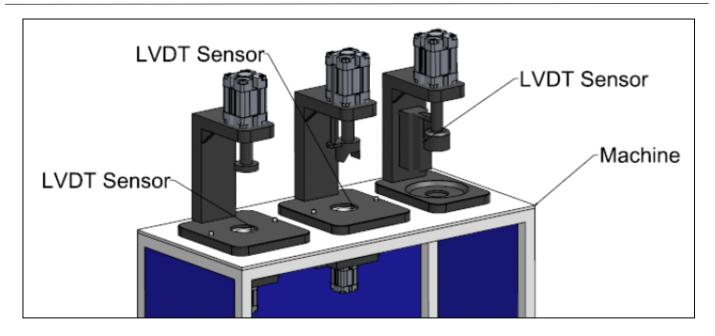




Apply loc-tite 574 on mating surface with roller.
Tight the housing with bolts m10x30, 8nos.
Torque all the bolts at 55-65 nm.

Press 5 m12 bolt on the front wheel hub.





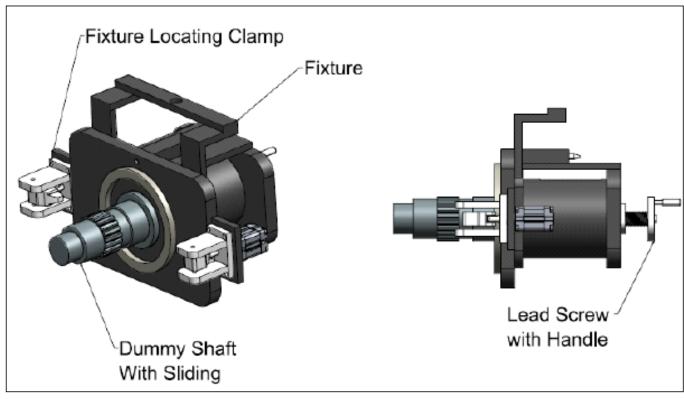




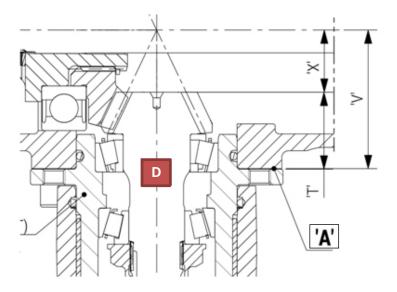
CHART LIQUID SEALANT - COMPACT 9+3

S.No.		JOINT LOCATION	Sealant Grade	D Code
	4WD FRONT AXLE	Front Axle Housing to Knuckle Housing	Loctite 574	D95000410
		Swivel Housing to Wheel End Housing		233000 110

S.NO.	Problem	Cause	Action
1	Differential is not working	- Differential Gear Broken	Replace Bevel Gears
1	Differential is flot working	- Bearing dia. not ok in Front Axle Beam	Check Front axle bearing dia
		- Excessive Load on Gear	Replace Bevel Gears
2	Gear Z-10/Z-16 Teeth pitting	- Contact pattern & Backlash is not ok	Check backlash value properly as
		- Preloading of TRB 30304 is not ok	recommended
			Replace CWP set
3	CMD set /7 10/7 21) teeth nitting	- Excessive Load on Pinion	Check backlash value properly as
3	CWP set (Z-10/Z-21) teeth pitting	- Contact pattern & Backlash is not ok	recommended
		- Pinion preload nut loosened	Torque nut to achive recommended
4	Gap between Knuckle Housing &	- Chamfer in Front Axle Beam is not ok	Checking O' Ring size & related dimn in
4	Front Axle Beam	- Size of o'ring is not ok	Front Axle Beam
İ		- Missing of O'Ring	Chack O'ring condition
5	Leakage from Knuckle housing &	- O'Ring damaged	Check O'ring condition
5	Knuckle cover	- Knuckle Cover Bolt not properly torque	Torque the bolts properly as recommended
		- Plug M18x1.5 not properly torque	Torque the plug properly as recommended
		- Seal pressing is not ok	Replace seal with new one & press properly
	Laskaga fram Kaualda hayaing 9	- Runout of seal face not ok	with proper tool
6	Leakage from Knuckle housing &	- Seal dia not ok in Swivel housing	Check runout of seal & should be as per
	Swivel Housing	- Seal lips damaged	recommended specs
		- Seal sleeve not pressed properly in Knuckle	Press sleeve properly
	Funnanius san hatuwan Kawalda	- Circlip A40x2.5 missing or jump out from	Assembled circlip & ensure inserting of
7	Excessive gap between Knuckle	groove	circlip in groove properly
	housing & Swivel Housing	- Seal sleeve not butting properly	Press sleeve properly
	Gear Z-9/Z-37 Teeth broken from	- Excessive Load on Gear	Replace Bevel Gears
8	edges	- Contact pattern & Backlash is not ok	Check backlash value properly as
			Ensure proper shimming for both backlash
		- Shimming value for backlash & contact	& contact pattern
•	Wheel end shaft not rotating or	pattern is not ok	Recheck torque value & toque bolts as per
9	jammed	- Over torquening of mounting bolts	recommended specs
		- Differential not working	Check Differential Assembly condition i.e
		-	gear broken
		- Mounting bolt chamfer not ok	
10	Gap between Wheel end shaft &	- Bolt dia not ok	Replace shaft with new one
	tyre mounting bolt	- Shaft hole dia not ok	Replace bolt with new one
		- Missing of Seal	Replace seal with new one & press properly
**		'-Seal pressing is not ok	with proper tool
11	Leakage from Pinion Shaft	- Runout of seal face not ok	Check runout of seal & should be as per
		- Seal lips damaged	recommended specs
4.5		- Missing of O'Ring	
12	Leakage from Retainer Pinion Shaft	- O'Ring damaged	Check O'ring condition
			Check torque value & re-torque nut to
12	Preload of pinion shaft disturb	- Torque value on Nut is not ok	ensure proper preloading of pinion shaft
	,	- Crimp of nut not properly in pinion slot	Crimp nut properly in pinion slot
		- Pillow Block washer missing	Assembled washer & ensure full tightening
13	Excessive float in Front Axle	- Bolt & nut not properly tightening	of bolt & nut then loose half thread of bolt
15	Assembly	- Pillow Block mounting hole not ok in Front	to ensure proper gap b/w Pillow block &
		I mow block mounting note not ok in Hollt	to chause proper gap by w I mow block &

Shimming Procedure - Differential

- A- Distance between beam butting face & retainer face
- B- Distance between washer and bearing 6210.



Shimming At Location 'a':

- X = Etch Value On Pinion Face (etched On Pinion Face 'd')
- T = Etching Face To Retainer Mounting Face
- V = Distance From Front Axle Housing Centre
 - To Retainer Butting Face
- Shim Size: (x + T) V

В

PART NO.	PART NAME (FOR SHIMMING)
D10541580	SHIM RETAINER PINION (0.075 (MM)
D10541590	SHIM RETAINER PINION (0.125 MM)
D10541600	SHIM RETAINER PINION (0.2285 MM)
D10541610	SHIM RETAINER PINION (0.4065 MM)

Shimming At Location 'b':

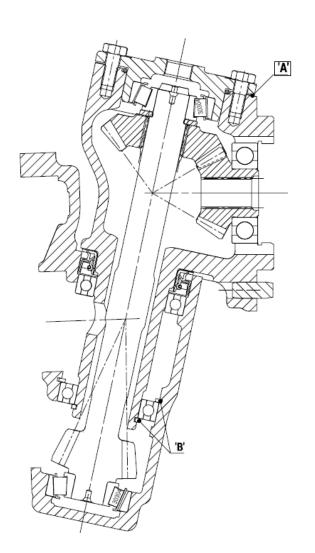
Select Shim At Location 'b' To Ensure Backlash Between Crown Wheel (z-21) & Pinion Shaft (z-10) Is $0.15\, To\, 0.3\, Mm$

PART NO.	PART NAME (FOR SHIMMING)
D10546970	SHIM 89.90x81.0 (0.125 MM)
D10546980	SHIM 89.90x81.0 (0.2285 MM)
D10546990	SHIM 89.90x81.0 (0.4065 MM)

NOTE: X Value is printed at location D. In case, it is not available, arrange another pinion crown set which has etch value written on it.

Shimming Procedure - Knuckle Housing Cover

- A Gap measured between cover & knuckle housing.
- B Bottom cir-clip rests on knuckle housing. Top cir-clip rests on swivel housing with bearing 6908 between them.



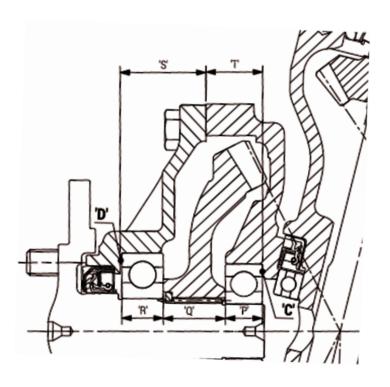
Shimming At Location 'A':

- Assemble Both Knuckle & Swivel Housing So That No Gap Between Bearing Ball 6908 & Cir-clip (at Location 'B').
- Measure The Gap Between Knuckle Cover
 Knuckle Housing with bolts (torque 20-25 Nm) at location 'A'.
- 3) Calculate Shim Thickness Thickness = A - 0.075

DESCRIPTION	DRAWING NO
SHIM COVER KNUCKLE (0.075 MM)	D10544670
SHIM COVER KNUCKLE (0.125 MM)	D10544680
SHIM COVER KNUCKLE (0.2285 MM)	D10544690
SHIM COVER KNUCKLE (0.4065 MM)	D10544700

Shimming Procedure - Swivel and wheel Housing

- P Width of swivel housing bearing.
- R Width of wheel housing bearing.
- Q Width of crown wheel between seating faces.
- S Distance from wheel housing mounting faces. to bearing 6306 butting face.
- T Distance from swivel housing mounting face to bearing 6305 butting face.



Shimming At Location 'c' & 'd':

Measure Shim Gap At Location 'c' & 'd' (gap G = C+d)Gap 'g' = T + S - (r + Q + P)

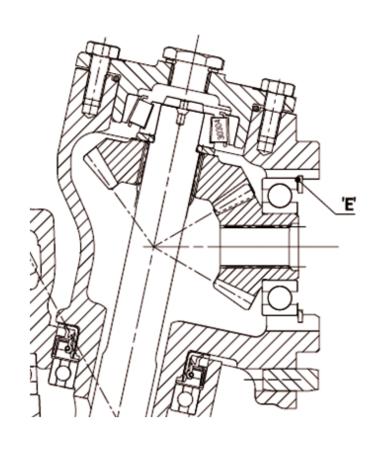
Total Shim At Location 'c' & 'd' =n = G-0.2mm

- 2) Select Shim At Location 'c' To Ensure Backlash Between Gear Driven Z-37 & Shaft Driver Z-9 Is 0.15 To 0.3mm
- 3) Shim Thickness At Location 'd' Thickness At 'd' = N - C

DESCRIPTION	DRAWING NO
SHIM AT LOCATION 'C'	
SHIM 60x50 (0.075 MM)	D10542390
SHIM 60x50 (0.2285 MM)	D10542390
SHIM 60X50 (0.4065 MM)	D10542400

SHIM AT LOCATION 'D'	
SHIM FRONT AXLE WHEEL SHAFT (0.075 MM)	D10537800
SHIM FRONT AXLE WHEEL SHAFT (0.125 MM)	D10537810
SHIM FRONT AXLE WHEEL SHAFT (0.2285 MM)	D10537820
SHIM FRONT AXLE WHEEL SHAFT (0.4065 MM)	D10537830
SHIM FRONT AXLE WHEEL SHAFT (0.5335 MM)	D10537840
SHIM FRONT AXLE WHEEL SHAFT (0.7875 MM)	D10537850

Shimming Procedure - Knuckle Housing Cover



Shimming At Location 'e':

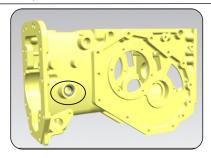
- Ensure No Gap Between Bearing Ball 6206 & Circlip.
- Check Backlash Between Gear Driven Z- 16
 & Gear Driver Z-10.
- 3) Select Shim Thickness At Location 'e' To Ensure Backlash Between Gear Driven Z- 16 & Gear Driver Z-10 Is 0.15 To 0.3mm

DESCRIPTION	DRAWN NO.
SHIM 61, 8x51 (0.2285 MM)	D10542310
SHIM 61, 8x51 (0.4065 MM)	D10542320
SHIM 61.8x51 (0.5335 MM)	D10542330
SHIM 61.8x51 (0.7875 MM)	D10542340
SHIM 61.8X51 (1.00MM)	D10542350
SHIM 61.8X51 (1.20 MM)	D10542360
SHIM 61.8X51 (1.50 MM)	D10542370

FARMTRAC 25G HST (FT 25G HST) SERVICE MANUAL REAR AXLE

<u>INDEX</u>

1. Assembly Process	1
2. Disassembly Process	17
3. Torque Chart	29
4. Liquid Sealant Chart	30
5 Trouble Shooting Chart	35

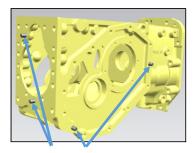


1. Press seal in rear housing.

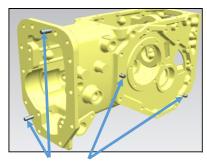
NOTE: Put oil seal in range shaft shifter hole on housing and press it. Face runout of seal with in 0.15 mm



- 2. After installing seal, install range shaft shifter
- 3. Press 4 dowels in rear and RH side of housing. Dowels should be 12 mm out.



Press 4 dowels in front and LH side of housing. Dowels should be 23 mm out.





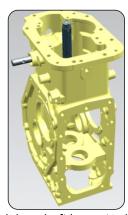
4. Put the bearing as shown in picture and press it.



5. Put the bearing in the CH housing from opposite side as show in pic.

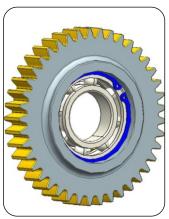


- 6. In the center of CH housing put the following parts.
- TRB 30206 outer race.
- Spacer.
- · Circlip.

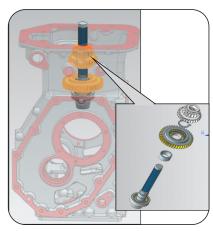


 Assemble pinion shaft in center housing & lock with circlip.
 Assemble lever range shifting in center housing.

Assemble level range similing in center nousin



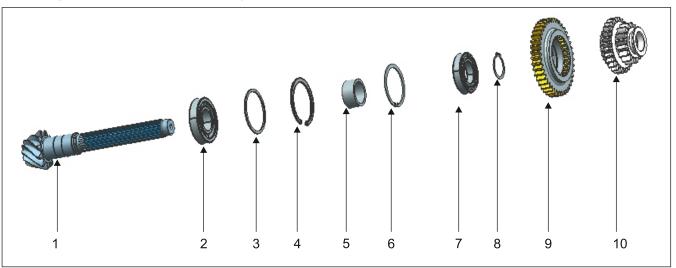
8. Assemble bearing 6006 in low driver gear & lock with circlip.



 Assemble Spacer & low driven gear assembly on pinion shaft & lock with circlip.
 Insert the cluster gear (gear driven high / medium range) along with rail & fork assembly range shifting.

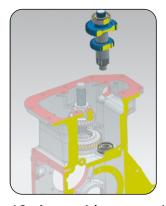
Rear Axle Assembly

Range driven shaft Assembly



- 1. Shaft bevel pinion rear axle differential
- 2. Bearing taper roller 30206
- 3. Spacer graded pinion shaft
- 4. Circlip B62
- 5. Spacer tail pinion shaft

- 6. Circlip
- 7. Bearing ball 6006
- 8.Circlip A30
- 9. Gear driven low range
- 10. Gear driven high/medium range

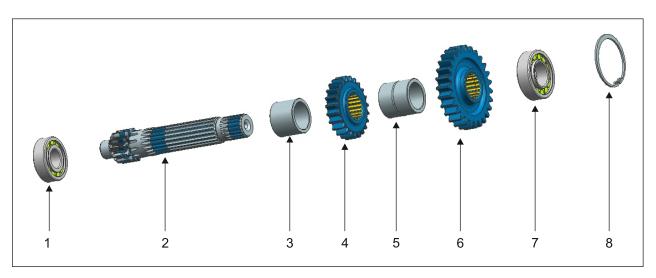


10. Assemble range driven shaft sub assembly in the CH As shown in the pic.

Range driven shaft Assembly

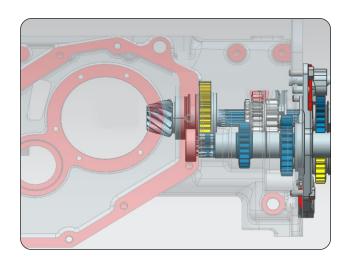
- 1 Insert bearing roller NJ204 in central housing.
- 2 Insert range driving shaft low gear and spacer.
- 3 Insert driving medium gear.
- 4 Insert Spacer driving high gear and insert gear driving high range.
- 5 Align and insert taper roller bearing NJ205 in the CH housing.
- 6 Align the circlip and lock the range drive shaft.

Range drive shaft Assembly

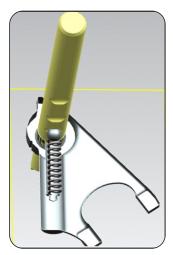


- 1. Bearing roller NJ204
- 2. Shaft range low gear
- 3. Spacer driving low gear
- 4. Gear driving medium
- 5. Spacer range driving high gear
- 6. Gear driving high range
- 7. Bearing roller NJ205
- 8.Circlip

11. Range driven & driving shaft final assembly



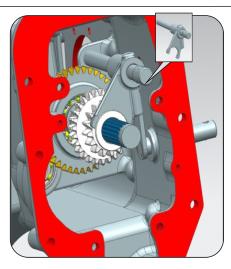
12. Range shifting fork assembly



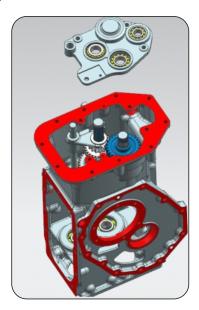
 Assemble rail range shifting with fork along with Ball & spring.
 Apply grease on ball and spring before assembly.



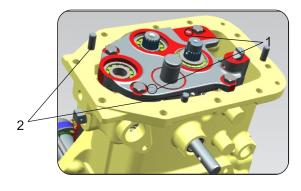
14. Put the intermediate plate on fixturePress 4WD pin in platePress bearing 30205 outer race.Press Bearing NJ205 outer race in plate.Lock NJ205 outer race with circlip.



15. Insert rail & fork range sub assembly on cluster gear align with bore in center housing as shown.

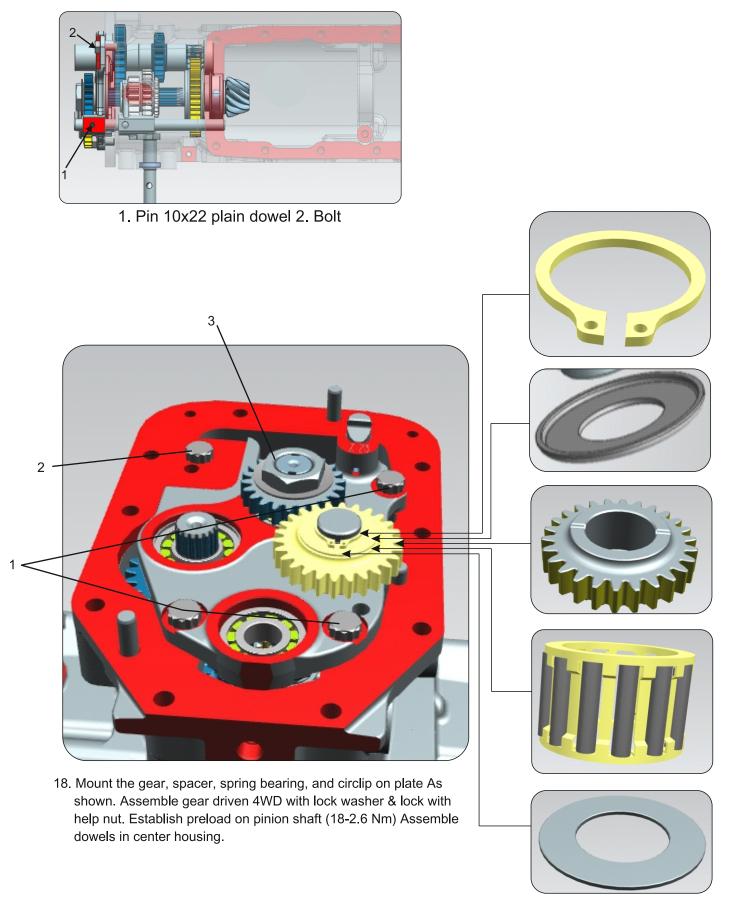


 Match the hole of rail range shifting & dowel hole in intermediate plate.
 Assemble plate on center housing.



17. Lock the rail range shifting in intermediate, plate through pin spring dowel. Lock plate with bolt.

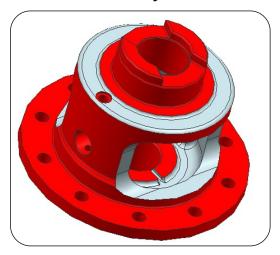
NOTE: press the dowel pin (1) on ch housing front face for intermediate plate assy. Top side (6mm out) Press the dowel pin (2) on ch housing front face for intermediate plate assy., bottom side (12mm out).



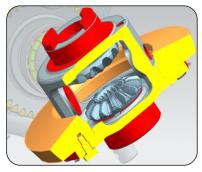
NOTE : Tighten Intermediate bolts (1) M10x30 (3 nos.) and bolt (2) M10x25 (1 nos.) to torque of 50-65 NM

Chuck nut tighten (3) and adjust the pinion shaft pre loading of 1.8-2.6 NM

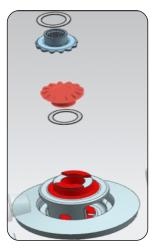
Differential Assembly



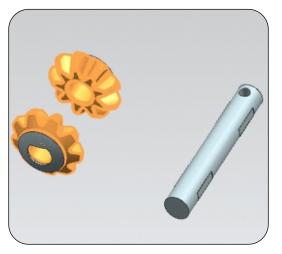
 Put diffcase on fixture.
 Use guide pin to guide differential case on crown wheel.



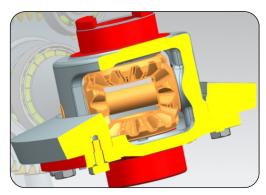
20. Insert the 2 planet gears on the sides of diffcase, matching with other 2 planet gears, along with washer and shaft spider & MOS2 grease.



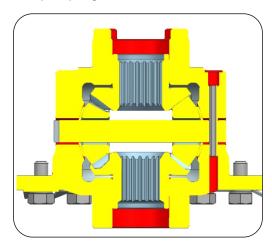
21. Insert the planet gears, fitted axially to the pinion side along with washers.



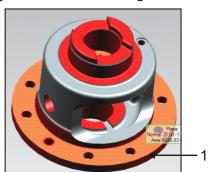
22. Insert the shaft spider differential case



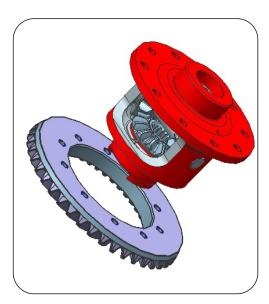
23. Lock the shaft spider differential case with pin spring dowel.



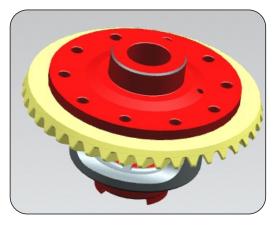
- 24. Ensure flushing of pin 5x40 spring dowel depth up to counterbore step shown.
- 25. Applying loctite 638 on flange of diffcase.



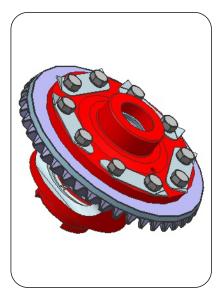
1. Flange



26. Press differential case housing on crown wheel

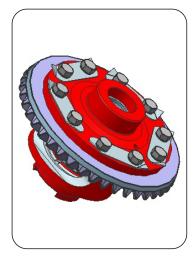


27. Applying loctite 638 on flange of differential case



28. Place the crown wheel & diffcase assy on fixture.
Assemble the M8 bolts 10 no.s along with

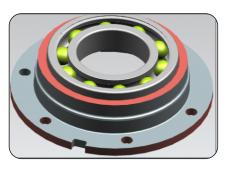
washer & lock washer on differential case.



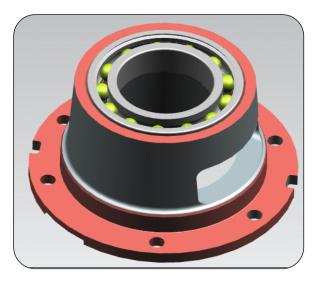
29. Tight all the bolts with pneumatic gun

Lock the bolts with lock washers by bending
it completely along that edge & not at corner

NOTE: Crown wheel & diffcase bolt torque-25-32 NM

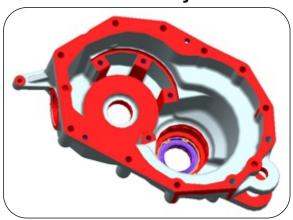


30. Place the retainer diffcase LHS on the hydraulic press fixture Mount the ball BRG 6211 on pressing ram. Press the ball bearing on retainer bearing differential LH.



31. Place the retainer diffcase RHS on the hydraulic press fixture. Press BRG 6011 in retain differential case RHS

Rear Axle Assembly



32. Assemble oil seal on rear axle housing RH/LH along with loctite 577 on bore ID of housing as shown in figure.

Assemble circlip in housing to lock position of oil seal inhousing

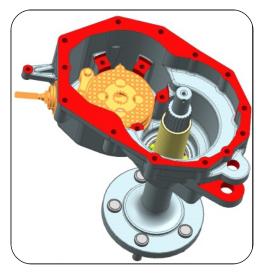
Note: Use oil to moisturize seal & o-rings before assembly. Proper pressing of sealing on housing seal run out 6.45- 6.55 MM



33. Press the ball bearing 6209 on rear axle house LH/RH Put circlip to lock the bearing in rear axle housing LH/RH



34. Assemble axle shaft LH/RH as shown assembly with bolt in rear axle shaft.

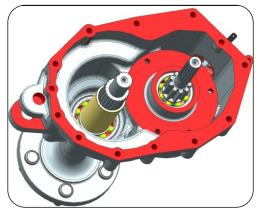


35. Assemble spacer LH/RH side on axle shaft. Assemble friction disc & steel plate & actuator assembly in rear axle housing LH/RH.



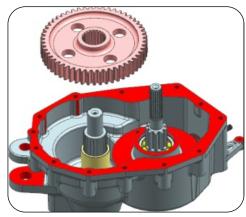
36. Assemble bull pinion shaft LH/RH with bearing & lock it with circlip Assemble bull pinion shaft assembly in brake housing LH/RH & lock with washer & Screw.

NOTE: Torque the housing break inner 50-60 NM. Torque the bull pinion shaft screw 25-30 NM.

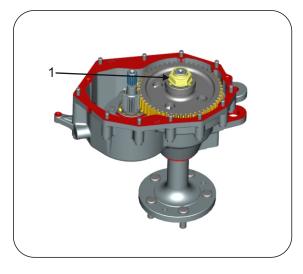


37. Assemble brake housing LH/RH assemble in rear axle housing LH/RH & tighten with bolts 5 nos.

NOTE : Torque the housing break inner to 50-60 NM

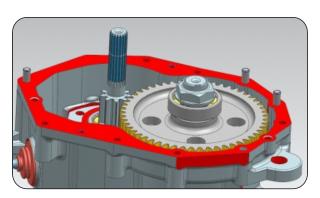


38. Assemble bull gear on rear axle shaft LH/RH as shown.

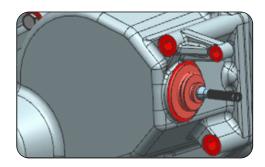


39. Assemble bearing on bull gear press bearing 6306 on axle shaft.

NOTE: Torque the nut (1) crimping m30 screw 60-70 NM

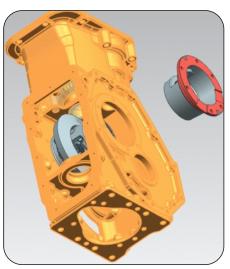


40. Lock tight the axle shaft assembly with lock nut M30. Perform the shim selection of axle shaft with the help of measuring gauge Place the shim as per the shimming chart on axle shaft bearing face.



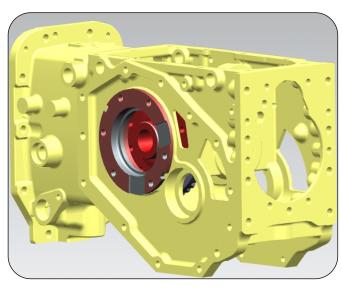
41. Apply loctite 515 in rubber boot
Assemble the rubber boot in HSG RH

Centre Housing Assembly

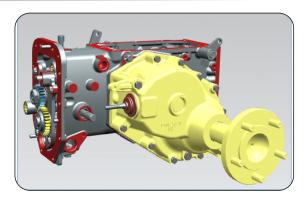


42. Assemble retainer sub assembly RH on CH housing with bolts & washers.

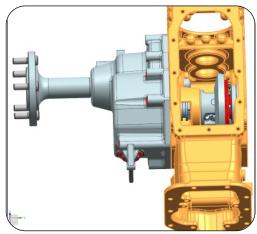
NOTE: Run-out of the crown face with diffcase MAX. 0.1MM



43. Assemble the differential case assembly in CH housing Assemble retainer differential LH subassembly CH housing & tighten bolts & washer.



- 44. Assemble the rear axle housing lh, along with shim, on ch housing by applying loctie 5188 on CH housing face.
- Tight the ch housing with bolts m10 (11 nos.) and washer m10 (11 nos.)
- Tight the drain plug along with washer on rear axle housing rh



45. Assemble the rear axle housing rh along with shim, on ch housing and difflock sleeve & by applying loctie 5188 on CH housing face. Tight the ch housing with bolt m10 (11 nos) and washer M10 (11 Nos)

PTO Assembly



46. Place the gear driven (Z- 49/ Z-51) on fixture. Put the bearing on ram



47. Press it to the gear Put a circlip to lock it

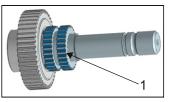


48. Assemble gear driven assembly Z-51 on PTO output shaft & lock with ciclip.

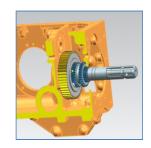


49. Assemble bearing 6305 on PTO output shaft as shown.

50. Insert the sleeve on PTO output shaft. Assemble the PTO output shaft with pre fitted front bearing and gear assy in ch housing bottom along with sleeve rear pto shift.



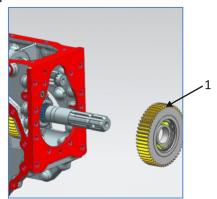
1. Sleeve



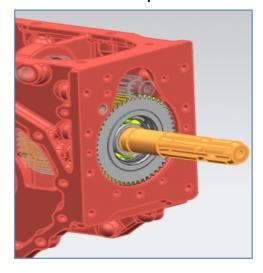


51. Assemble seal in PTO retainer as shown.

52. Insert the Gear output Z51 in the PTO output shaft



1. Gear output Z51



REAR PTO SHIFTING ASSEMBLY

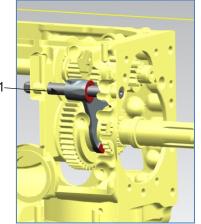
53. Align & insert PTO shifter fork on the PTO output sleeve

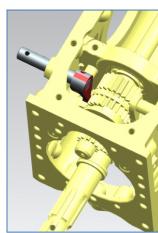




PTO shifter fork

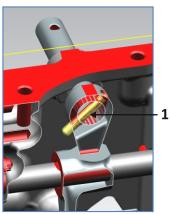
54. Insert PTO mid shifter rail Pass the shaft through ch housing and assemble with lever rear pto shifter in hsg by matching dowel hole of both shaft and lever.

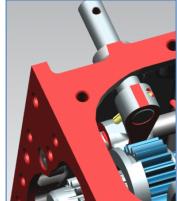




1. PTO MID SHIFTER RAIL

55. Lock the rail and pto output and position with pressing dowel spring pin(6x35) in lever, passing through shaft.

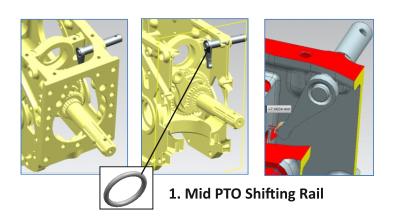




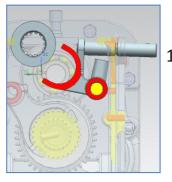
1. Dowel Spring Pin

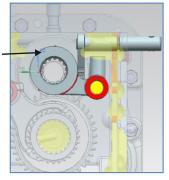
MID PTO SHIFTER ASSEMBLY

56. Insert PTO mid shifting rail with O ring.



57. Insert and align sleeve on mid pto shifter fork.



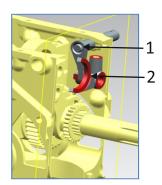


1. Sleeve

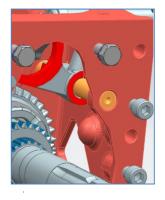
58. Place the fork mid PTO shifter in housing and keep with right side of hsg.

Insert the rail mid pto shifter in rhs hole and pass through pto sleeve shifter fork.





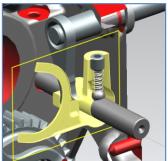
1. Shifter Rail 2. Fork

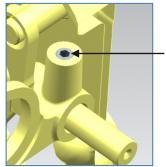




59. Lock the position of fork shifter in rail with steel ball, spring and screw grub in fork.

Flush the grub screw upto top face with grease(1 gm)

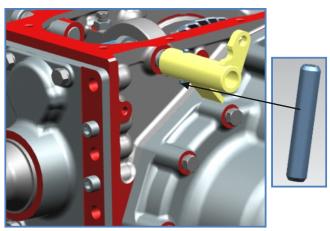




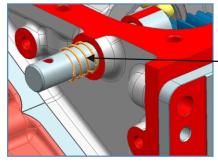
1. Ball & Spring

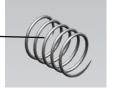
60. Assemble the spring & lever hub assy gear shifting (mid pto) on mid pto shifting sleeve shaft

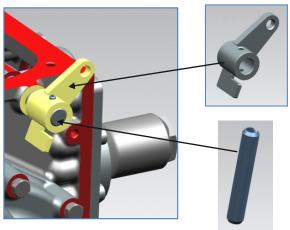




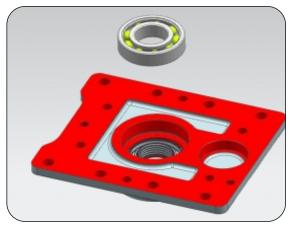
61. assemble the spring and lever/hub assy. gear shifting transmission (pto) with shaft rear pto shifter lhs.



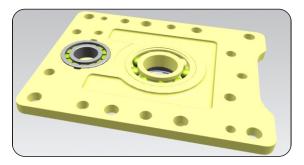




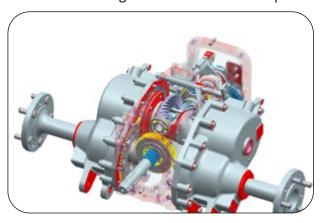
1



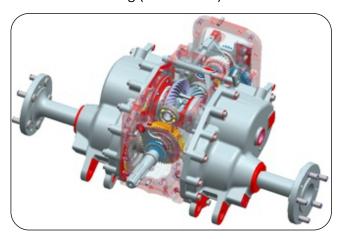
62. Press bearing 6207 in PTO retainer plate.



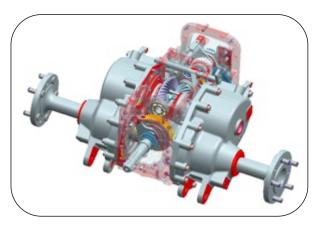
63. Press bearing NJ205 in PTO retainer plate



64. Assemble the PTO output shaft sub. Assembly with ch housing (bottom bar)

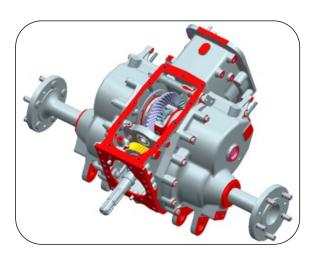


65. Insert sleeve & fork pto shifting on pto shaft output

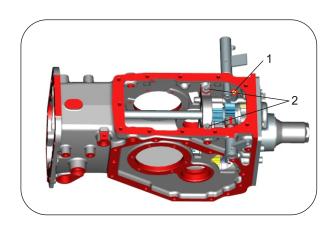


66.Insert rail PTOshifting from rear side of ch housing, passing through fork PTO shifting and assemble in CH housing front PTO wall.

Lock the rail PTO shifting in ch housing with nut (m10) and screw PTO rail lock. Tight nut and screw.



67. Tight the grub screw M10 in fork to flush up to the top face of fork.



NOTE: Ensure proper flushing of dowel with lever od. (Outer diameter)

Tight the grub screw (2) m10 in fork to flush up to the top face of fork

Flush the grub screw upto top face with one gram of grease.

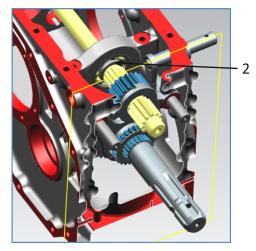


68. Assemble shaft input TO (Z 13/11) in center housing top bore from rear side.

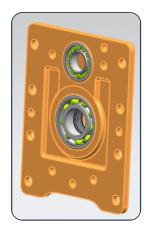
Align and assemble spacer on PTO input shaft.



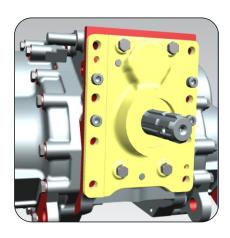
1. PTO input shaft.



2. Spacer



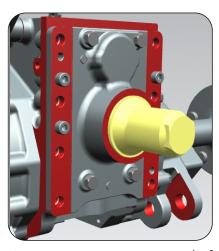
69. Apply loctie 5188 on cover PTO.



70. Assemble PTO & retainer plate with 4 nos. Allen bolt & 4 No. Hex head bolts.

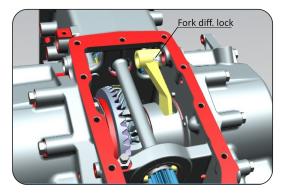
NOTE: Check the PTO shaft smooth rotation or smooth rotation of PTO shaft to be checked.

Press the dowel (2 nos) from the rear side of ch housing for pto retainer, 12mm out

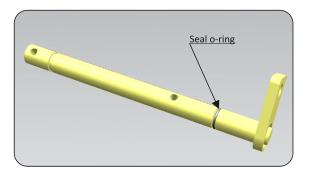


71. Put pto cover on output shaft

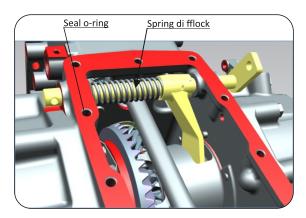
Differential lock assembly



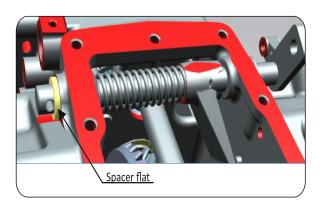
72. Place the fork diff. lock on slve diff. Lock



73. Assemble o-ring on shaft diff lock (ver side)

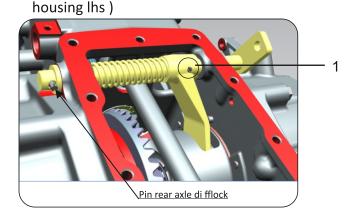


74. Insert the shaft assembly diff. lock iCH HOUSING AND PASS THROUGH FORK DIFF. LOCK



75. Put o-ring with oil on leading end of diff. lock shaft over Insert spring between ch housing and fork diff. lock Push the shaft diff. lock completely to other end of ch housing (passing through)

Place the spacer flat on di fflock shahaft (out side CH



Insert pin in diff lock lever after applying grease

76. Lock the position of shaft and spacer with pin diff lock on outer side.
Push the fork diff. lock towards LHS.
Tight the pin rear axle diff. lock and release the fork.

Rear Axle Dis-assembly

- Take out Roller pin.
- Open Pinion shaft nut using 36 no. socket.
- · Remove washer and gear.
- Remove circlip and washer from both side of the gear.

NOTE: Rounded teeth of gear should be outside and flat toward inside.

Range Driver Shaft

- NJ 204 bearing in rear side and NJ 205 bearing in forward side.
- · Cut part of the rail should be always down.

Trumpet Housing

- Open with 11 bolts with 16 no. socket.
- · Use two jumping bolt to open housing.
- Remove the crimp.
- Use 46 no. socket to remove main nut of trumpet housing.
- Hit on axle shaft bring out bearing washer, bull gear and spacer.

Differential Lock Lever

- Remove Screw bolt one from opposite side and one from inside and washer also.
- · Spring and fork will come out.
- · Coupler is only in right hand side.

Rear Braking Housing

- Open 4 bolts to open brake assy. completely.
- · wheel side two plates rest outside.

PTO Retainer Plate

- Open 8 bolts(4 hexa type & 4 Allen key) and washer to open retainer plate.
- Two jumping bolt to open PTO retainer.
- PTO shaft will come out.
- NJ205, NJ605 and Nj6305 bearing in PTO retainer assembly.
- Z51 centre mark gear.
- Z49 have no marks.
- · Remove the rail nuts.
- Remove spring roller pin to remove fork.
- · Remove the screw, spring to remove fork.
- Z49 gear both side circle

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Differential Case Retainer

Open 6 bolts of differential retainer case with 13 no. of socket.

Pinion Shaft

- · To remove shaft 1st remove circlip.
- · Spacer and clip comes out.

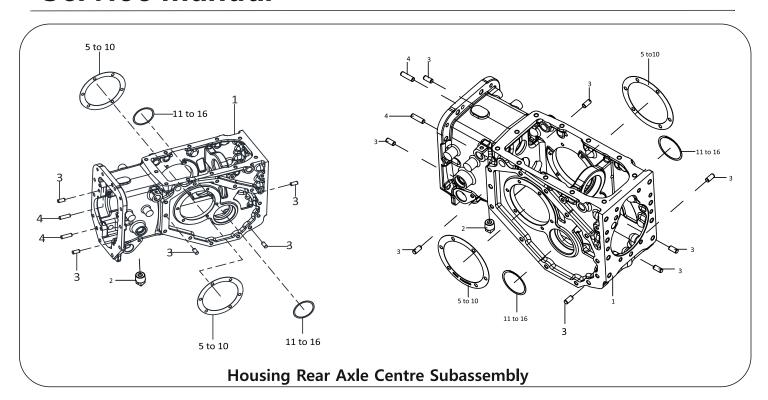
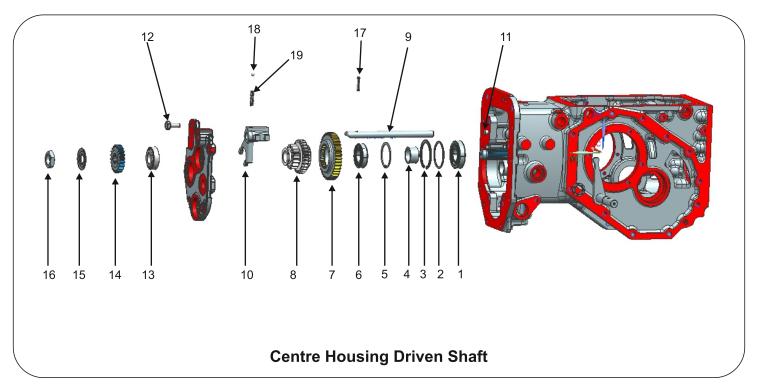
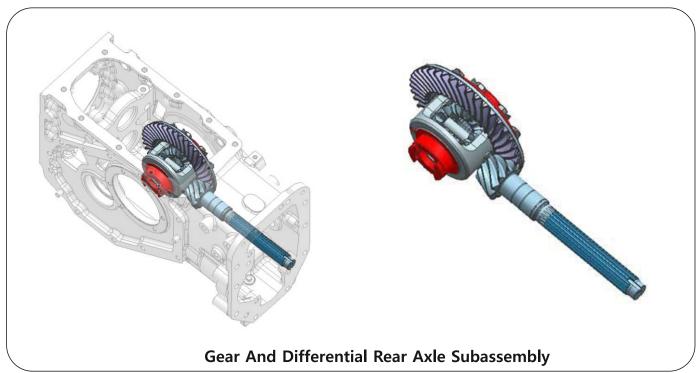


Fig. No.	Description	Qty
1	HOUSING REAR COMPACT 9+3	1
2	PLUG DRAIN 3/4-14 NPTF (MAGNETIC)	1
3	PIN 10X22 PLAIN DOWEL	9
4	PIN 10X35 PLAIN DOWEL	2
5	SHIM RETAINER DIFFERENTIAL (0.075 MM)	AR
6	SHIM RETAINER DIFFERENTIAL (0.125 MM)	AR
7	SHIM RETAINER DIFFERENTIAL (0.2285 MM)	AR
8	SHIM RETAINER DIFFERENTIAL (0.4065 MM)	AR
9	SHIM RETAINER DIFFERENTIAL (0.5335 MM)	AR
10	SHIM RETAINER DIFFERENTIAL (0.7875 MM)	AR
11	SHIM REAR AXLE SHAFT (0.075 MM)	AR
12	SHIM REAR AXLE SHAFT (0.125 MM)	AR
13	SHIM REAR AXLE SHAFT (0.2285 MM)	AR
14	SHIM REAR AXLE SHAFT (0.4065 MM)	AR
15	SHIM REAR AXLE SHAFT (0.5335 MM)	AR
16	SHIM REAR AXLE SHAFT (0.7875 MM)	AR



- 1. Bearing taper roller bearing 30206
- 2. Spacer graded pinion shaft
- 3. Circlip
- 4. Spacer tail pinion
- 5. Circlip
- 6. Bearing ball 6006
- 7. Gear driven low range Z41
- 8. Gear driven high medium range
- 9. Rail range shifting
- 10. Fork range shifting

- 11. 10.22 plain dowel
- 12. Bolt
- 13. Taper roller bearing 30205
- 14. Gear driver 4WD
- 15. Washer tablock
- 16. Nut M24
- 17. Pin 10x22 plain dowel
- 18. Ball
- 19. Spring



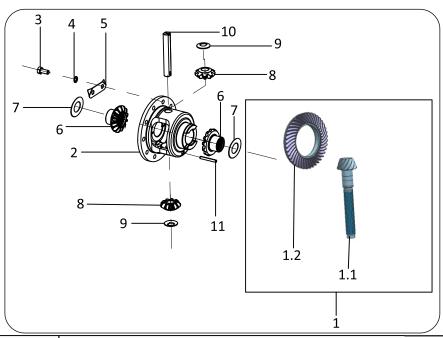


Fig. No.	Description	Qty
1	GEAR SET BEVEL PINION AND CROWN WHEEL REAR AXLE Z-41/11	1
1.1	SHAFT BEVEL PINION REAR AXLE DIFFERENTIAL Z-11	1
1.2	GEAR DRIVEN REAR AXLE DIFFERENTIAL Z-41	1
2	CASING DIFFERENTIAL REAR AXLE	1
3	SCREW M8X1.25X18-10.9 HEX HEAD	10
4	WASHER 8.1X13X1.0 FLAT	10
5	WASHER LOCK DIFFERENTIAL CROWN WHEEL GEAR	5
6	BEVEL SIDE GEAR DIFFERENTIAL Z-13	2
7	WASHER REAR AXLE DIFFERENTIAL THRUST	2
8	PINION GEAR DIFFERENTIAL Z-9	2
9	WASHER REAR AXLE DIFFERENTIAL PINION	2
10	SPIDER REAR AXLE DIFFERENTIAL	1
11	PIN 5X40 SPRING DOWEL	1
12	GREASE	AR

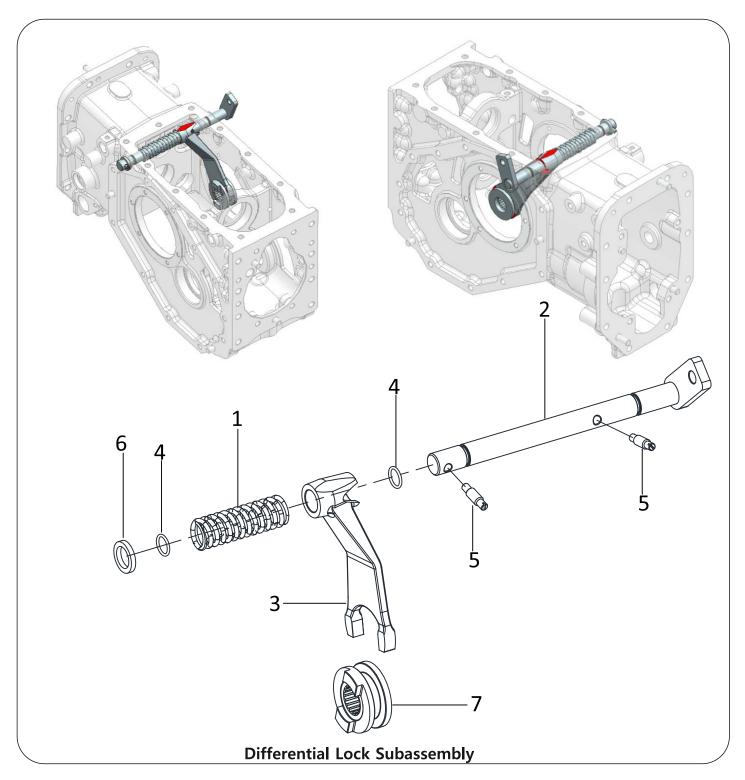


Fig. No.	Description	Qty
1	SPRING REAR AXLE DIFFERENTIAL LOCK	1
2	SHAFT AND LEVER ASSEMBLY REAR AXLE DIFFERENTIAL LOCK	1
3	FORK DIFFERENTIAL LOCK	1
4	SEAL O RING 2.00X14.00	2
5	PIN REAR AXLE DIFFERENTIAL LOCK SHAFT	2
6	SPACER 18X26X4.0 FLAT	1
7	SLEEVE REAR AXLE DIFFERENTIAL LOCK	1

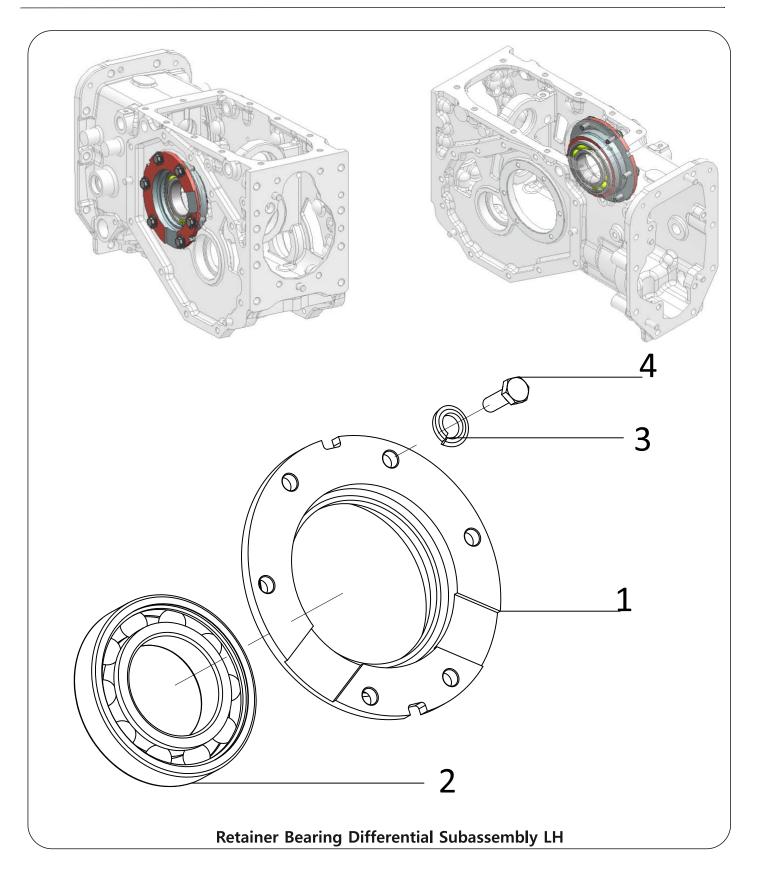


Fig. No.	Description	Qty
1	RETAINER BEARING DIFFERENTIAL LH	1
2	BALL BEARING 6211 CN	1
3	WASHER M8 SPRING LOCK	6
4	SCREW M8X1.25X25-8.8 HEX HEAD	6

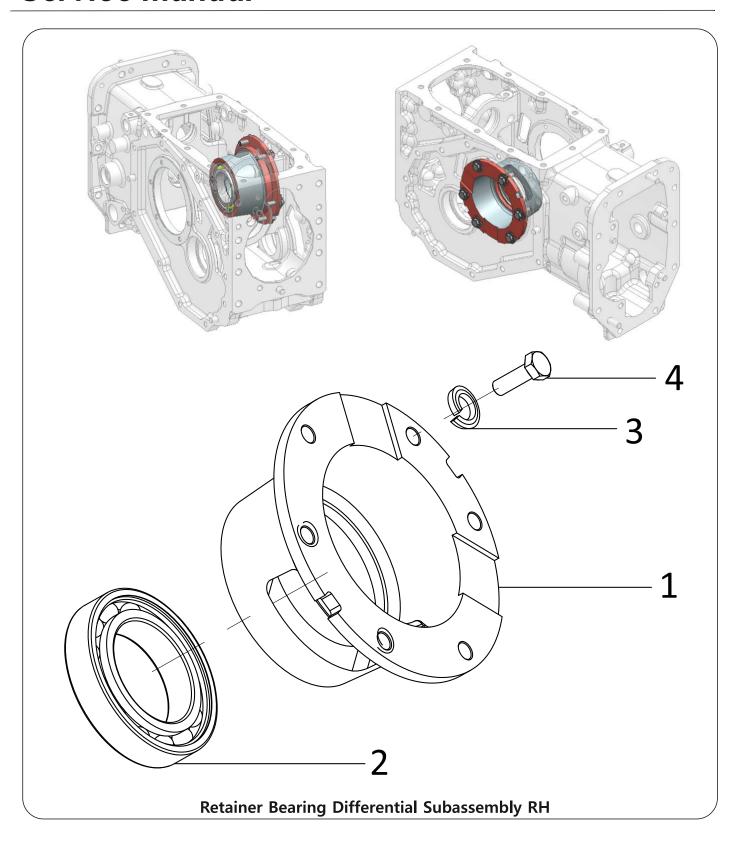


Fig. No.	Description	Qty
1	RETAINER BEARING DIFFERENTIAL RH	1
2	BEARING BALL 6011	1
3	WASHER M8 SPRING LOCK	6
4	SCREW M8X1.25X25-8.8 HEX HEAD	6

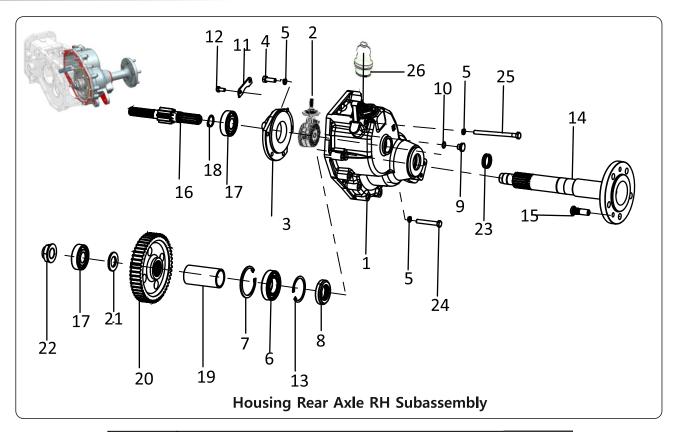


Fig. No.	Description	Qty
1	HOUSING REAR AXLE RH	1
2	BRAKE ASSEMBLY REAR WHEEL 4.5" (WET TYPE)	1
3	HOUSING BRAKE INNER RH	1
4	BOLT M10X1.50X30-10.9 HEX HEAD (16 A/F)	5
5	WASHER M10 SPRING LOCK	16
6	BEARING BALL 6209 CN	1
7	CIRCLIP B85X2.5 N	1
8	SEAL OIL 45X70X14.0	1
9	PLUG DRAIN M14X1.5X10	2
10	WASHER BONDED SEAL 14.7X22.0X1.5	2
11	WASHER LOCK BULL PINION SHAFT BEARING	1
12	SCREW M8X1.25X18-10.9 HEX HEAD	2
13	CIRCLIP B70X1.5 N	1
14	SHAFT AXLE REAR	1
15	BOLT M16X1.5X48-10.9 REAR WHEEL	5
16	SHAFT BULL PINION RH (Z-9)	1
17	BEARING BALL 6306	2
18	CIRCLIP A30.0X2.0 H	1
19	SPACER BULL GEAR LOCKING	1
20	GEAR DRIVEN FINAL DRIVE REDUCTION (Z-53)	1
21	SPACER AXLE SHAFT INNER	1
22	NUT CRIMPING M30X1.5	1
23	PLUG AXLE HOUSING REAR	1
24	BOLT M10X1.50X70-10.9 HEX HEAD	10
25	BOLT M10X1.50X143-10.9 HEX HEAD (16 A/F)	1
26	BOOT EXTERNAL REAR WHEEL BRAKE LINKAGE (DIA 50)	1
27	SEALANT LIQUID ANAEROBIC (HIGHER STRENGTH)	AR
28	GREASE	AR

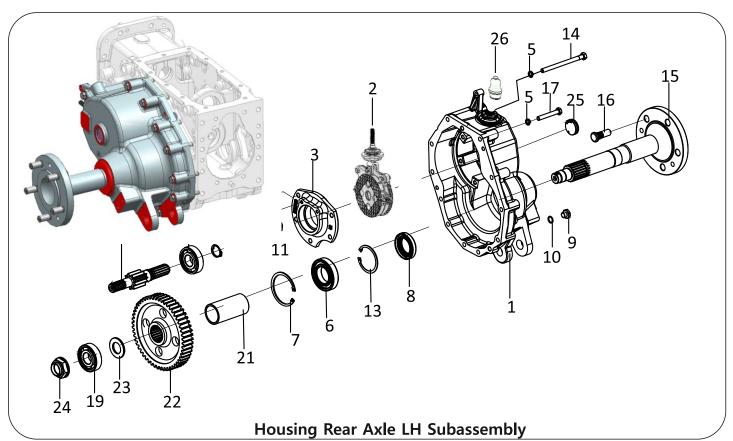
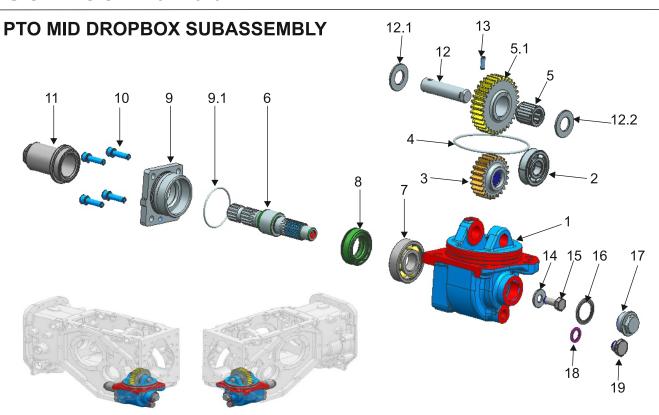


Fig. No.	Description	Qty
1	HOUSING REAR AXLE LH	1
2	BRAKE ASSEMBLY REAR WHEEL 4.5" (WET TYPE)	1
3	HOUSING BRAKE INNER LH	1
4	BOLT M10X1.50X30-10.9 HEX HEAD (16 A/F)	5
5	WASHER M10 SPRING LOCK	16
6	BEARING BALL 6209 CN	1
7	CIRCLIP B85X2.5 N	1
8	SEAL OIL 45X70X14.0	1
9	PLUG DRAIN M14X1.5X10	2
10	WASHER BONDED SEAL 14.7X22.0X1.5	2
11	WASHER LOCK BULL PINION SHAFT BEARING	1
12	SCREW M8X1.25X18-10.9 HEX HEAD	2
13	CIRCLIP B70X1.5 N	1
14	BOLT M10X1.50X143-10.9 HEX HEAD (16 A/F)	1
15	SHAFT AXLE REAR	1
16	BOLT M16X1.5X48-10.9 REAR WHEEL	5
17	BOLT M10X1.50X70-10.9 HEX HEAD	10
18	SHAFT BULL PINION LH (Z-9)	1
19	BEARING BALL 6306	2
20	CIRCLIP A30.0X2.0 H	1
21	SPACER BULL GEAR LOCKING	1
22	GEAR DRIVEN FINAL DRIVE REDUCTION (Z-53)	1
23	SPACER AXLE SHAFT INNER	1
24	NUT CRIMPING M30X1.5	1
25	PLUG AXLE HOUSING REAR	1
26	BOOT EXTERNAL REAR WHEEL BRAKE LINKAGE (DIA 50)	1
27	SEALANT LIQUID ANAEROBIC (HIGHER STRENGTH)	AR
28	GREASE	

Service manual



S.No.	DESCRIPTION	
1.	HOUSING DROP BOX MID PTO	
2.	BEARING BALL 6304	
3.	GEAR MID PTO DRIVEN	
4.	SEAL O RING 3.53 X 104.37	
5.	CAGE NEEDLE ROLLER BEARING	
5.1	GEAR MID PTO	
6.	SHAFT MID PTO OUTPUT	
7.	BEARING BALL 6305	
8.	SEAL OIL 35x60x14.5 PTO OUTPUT SHAFT	
9.	RETAINER SEAL MID PTO	
9.1	SEAL OIL 35x60x14.5 PTO OUTPUT SHAFT	
10.	SCREW M8x1.25x30 ALLEN (25-32 NM)	
11.	Mid PTO CAP	
12.	SHAFT GEAR MID PTO	
12.1, 12.2	SPACER GEAR MID PTO	
13.	PIN 6.0x18.0 SPRING DOWEL	
14.	WASHER 11x27x3.0	
15.	BOLT M10x1.50x25 - 10.9 HEX HEAD (55-65 NM)	
16.	WASHER SEALING M30	
17.	PLUG M30x1.50x12 WELCH (79-85 NM)	
18.	WASHER BONDED SEAL 14.7x22.0x1.5	
19.	PLUG DRAIN M14x1.5x10 (25-32 NM)	

HST Mid PTO drop box back lash setting

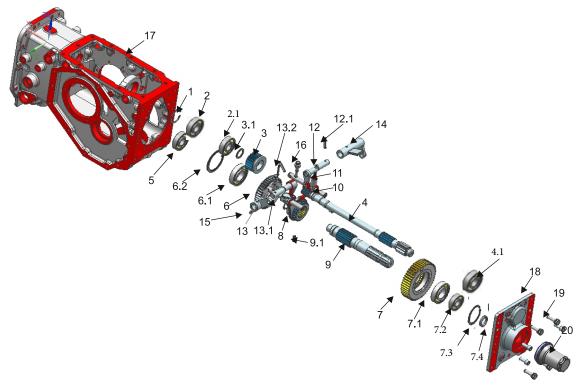
Align the dial gauge the mid PTO driven gear. Backlash should be between 0.15 to 0.30



1 -

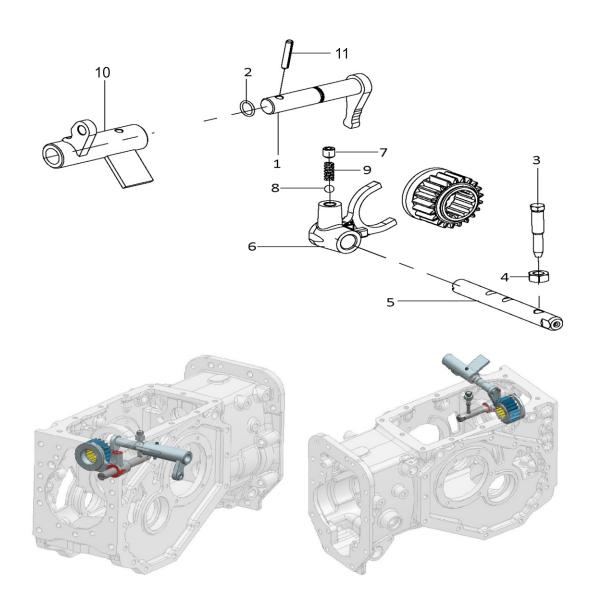
Dial Gauge

GEAR AND SHAFT PTO SUBASSEMBLY



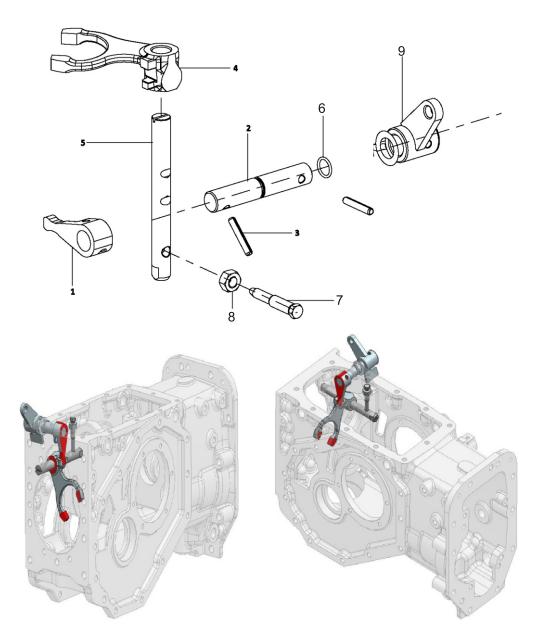
S.No.	DESCRIPTION			
1.	CIRCLIP	CIRCLIP		
2,2.1	BEARING BALL			
3.	HUB,			
3.1	WASHER			
4.	PTO INPUT SHAFT			
4.1, 5	BEARING			
6.	GEAR MID PTO OUTPUT			
6.1.	BEARING PTO COUNTER SHAFT			
6.2	CIRCLIP			
7.	GEAR MID PTO IDLER,			
7.1, 7.2	BEARNG PTO SHAFT COUNTER			
7.3	CIRCLIP			
7.4	OIL SEAL			
8.	SLEEVE PTO SHIFTING			
9.	PTO OUTPUT SHAFT			
9.1	BALL & SPRING			
10.	RAIL GEAR SHIFTING			
11.	SHIFTER CONNECTOR			
12.	SHAFT GEAR MID PTO			
12.1.	DOWEL			
13.	LEVER			
13.1.	FORK			
13.2.	DOWEL			
14.	CONNECTOR SHIFTER RH			
15.	CONNECTOR SHIFTER LH			
16.	SPRING, BALL, SCREW			
17.	CENTRE HOUSING REAR AXLE			
18.	PTO PLATE			
19.	SCREW & BOLT			
20.	COVER PTO OUTPUT SHAFT			

PTO MID SHIFTING SUBASSEMBLY



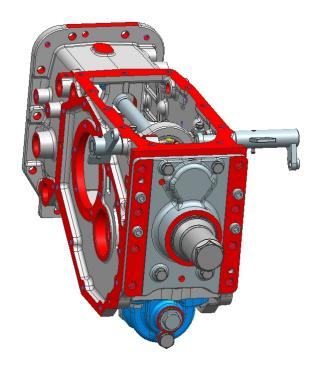
S.No.	DESCRIPTION
1	LEVER PTO SHIFTING
2	SEAL O RING 2.00X14.00
3	SCREW PTO RAIL LOCK
4	NUT M10X1.50-8 HEX
5	RAIL MID PTO SHIFTER
6	FORK MID PTO SHIFTER
7	SCREW GRUB M10X1.5X10 - 45H
8	BALL /5/16" SNAP LOCK
9	SPRING PTO SHIFTING
10	LEVER AND HUB ASSEMBLY GEAR SHIFTING TRANSMISSION (MID PTO)
11	PIN 6.0X35 SPRING DOWEL COMBINATION TYPE
12	GREASE

PTO REAR SHIFTING SUBASSEMBLY



S.No.	DESCRIPTION			
1	LEVER REAR PTO COMPACT			
2	SHAFT REAR PTO LEVER COMPACT			
3	PIN 6.0X35 SPRING DOWEL COMBINATION TYPE			
4	FORK REAR PTO SHIFTER			
5	RAIL MID POT SHIFTER			
6	SEAL O RING 2.00X14.00			
7	SCREW PTO RAIL LOCK			
8	NUT M10X1.50-8 HEX			
9	LEVER AND HUB ASSEMBLY GEAR SHIFTING TRANSMISSION (PTO)			

ORIENTATION OF MID & REAR PTO SHIFTING RAIL SUBASSEMBLY



TORQUE CHART COMPACT

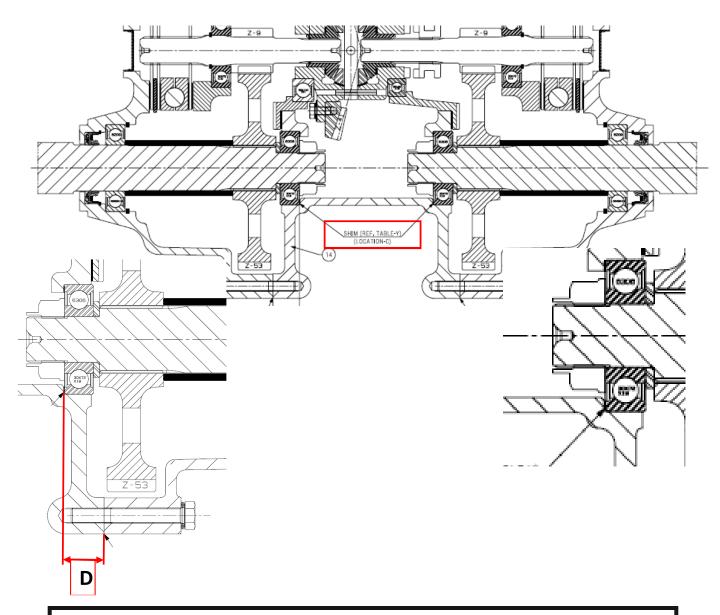
S.NO.	PART DESCRIPTION	SIZE	LENGTH	GRADE	QTY.	TORQUE VALUE (Nm)	REMARK
1	RETAINER TO CLUTCH HOUSING MOUNTING BOLT	M8x1.25	16	8.8	4	14-21	
2	CLUTCH CROSS SHAFT TO FORK MOUNTING BOLT	M8x1.25	40	10.9	2	25-32	
3	CLUTCH TO FLY WHEEL MOUNTING BOLT	M8x1.25	20	10.9	6	25-32	CLUTCH AREA
4	PLUG IN PLACE OF SENSOR	M16x1.5	16		1	45-50	
5	SENSOR	-	-	-	1	24.5-34.3	
6	TOP COVER MOUNTING BOLT	M8x1.25	20	8.8	10	21 - 28	
7	IDLER SHAFT LOCKING BOLT	M8x1.25	59		1	10-15	
8	PLUG INTERLOCK	1/4"	18	-	1	20-25	
9	FORK TIGHTENING SCREW	-	-	-	-	27-34	SPEED AREA
10	FORK TIGHTENING NUT	3/8"	24	-	2	27-34	
11	INDICATOR TRANSMISSION OIL LEVEL	-	-	-	-	55-65	
12	RETAINER 4WD COVER MOUNTING BOLT	M8x1.25	20	8.8	10	28-35	
13	INTERMEDIATE PLATE TO REAR HOUSING MOUNTING BOLT	M10x1.50	25	10.9	4	55 - 65	DEAD AVIE ADEA
14	DIFF. RETAINER TO REAR HOUSING MOUNTING BOLT	M8x1.25	25	8.8	12	20-25	REAR AXLE AREA
15	CRIMPING NUT FOR REAR AXLE SHAFT	M30X1.5	-	-	2	60-70	
16	BULL PINION SHAFT BEARING LOCK BOLT	M8X1.25	18	10.9	4	25-32	TRUMARET CURA COFAARIY A REA
17	DRAIN PLUG	M14X1.5	10	-	2	25-32	TRUMPET SUBASSEMBLY AREA
18	LH/RH RETAINER TO TRUMPET HOUSING BOLT	M10X1.50	30	10.9	10	55-65	
19	PTO RETAINER TO REAR HOUSING MOUNTING BOLT	M10X1.50	35	10.9	4	55-65	
20	PTO RETAINER TO REAR HOUSING MOUNTING ALLEN BOLT	M10X1.50	25	10.9	4	55-65	DTO ADEA
21	PTO RAIL LOCKING SCREW	-	-	-	1	25-33	PTO AREA
22	PTO RAIL LOCKING NUT	M10x1.50	8	-	1	25-33	
23	CROWN WHEEL MOUNTING BOLTS	M8x1.25	18	10.9	10	25-32	DIFFERENTIAL AREA
24	CLUTCH HOUSING TO ENGINE ADAPTOR PLATE MOUNTING BOLT	M10x1.50	35	10.9	13	55-65	
25	CLUTCH HOUSING TO ENGINE ADAPTOR PLATE MOUNTING BOLT	M10x1.50	95	10.9	1	55-65	
26	CLUTCH AND SPEED HOUSING MOUNTING BOLT	M10x1.50	35	10.9	8	55-65	
27	SPEED HOUSING TO REAR HOUSING MOUNTING BOLT (APPLY LOCTITE 542)	M10x1.50	35	10.9	2	55-65	BUCKLE UP BOLTS
28	SPEED HOUSING TO REAR HOUSING MOUNTING BOLT	M10x1.50	70	10.9	8	8 55-65	
29	TRUMPET HOUSING TO REAR HOUSING MOUNTING BOLT	M10x1.50	70	10.9	20	55-65	
30	TRUMPET HOUSING TO REAR HOUSING MOUNTING BOLT (APPLY LOCTITE 542)	M10x1.50	143	10.9	2	55-65	

Service manual

CHART LIQUID SEALANT - COMPACT

S.No.		JOINT LOCATION	Sealant Grade	D Code
1		Rear Housing to Hydraulic Mounting		
2		Rear Housing To PTO Retainer	Loctite 5188	D95013250
3	REAR AXLE	Rear Housing to Trumpet Mounting - LH/RH		
4	KLAK AXLL	On Rear Axle Seal Outer Dia LH/RH	Loctite 577	D95000130
5		Screws -Trumpet Housing (2 Nos. each Side)	Loctite 542	D95004560
6		Crown Wheel to Differential Casing	Loctite 638	D95002100

REAR AXLE SHAFT FLOAT SHIM SELECTION



SHIMMING PROCEDURE OF REAR AXLE HOUSING ASSEMBLY:-

D-DISTANCE BETWEEN AXLE SHAFT BEARING 6306 TO AXLE HOUSING MOUNTING FACE

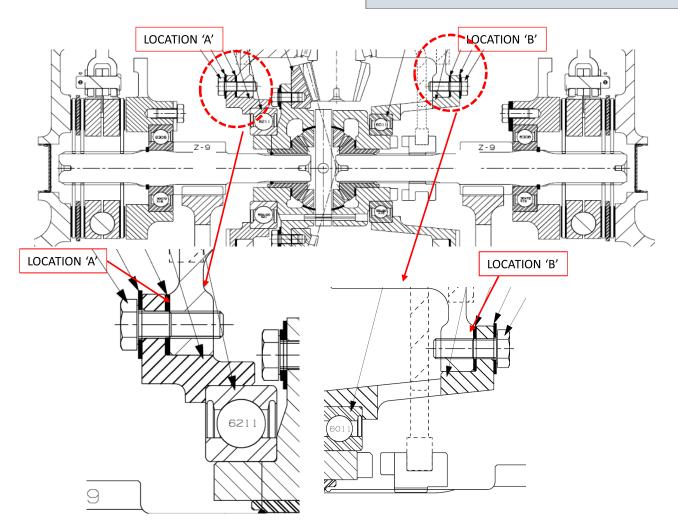
-SELECT SHIM AT LOCATION 'C SUCH THAT

SHIM THICKNESS 'T' + 'D'=26.35 TO 26.40

AXLE SHAFT AXIAL FLOAT SHOULD NOT EXCEED 0.4MM AFTER

TABLE-Y				
P'ART NO.	T (THICKNESS)			
D1053780	0.075			
D10537810	0.125			
D10537820	0.2285			
D10537830	0.4065			
D10537840	0.5335			
D10537850	0.7875			

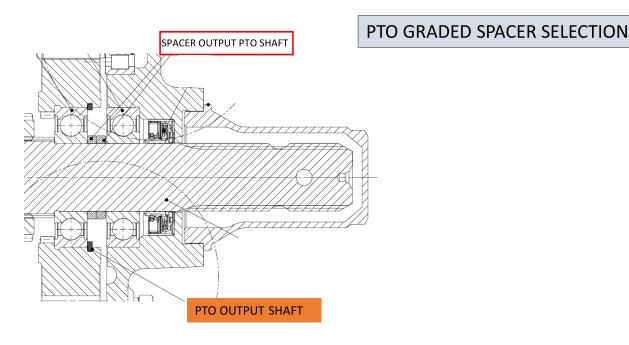
DIFFERENTIAL FLOAT SHIM SELECTION

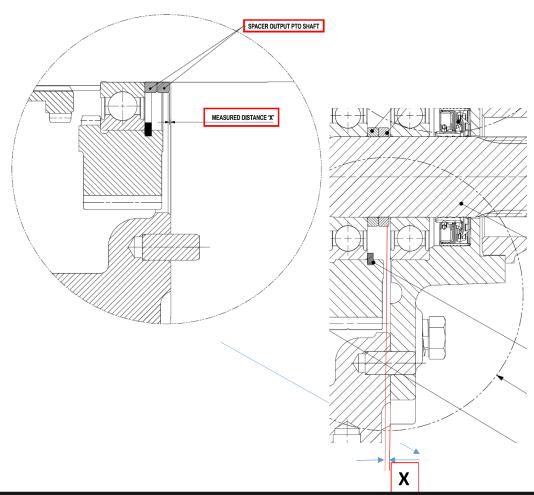


SHIMMING PROCEDURE OF DIFFERENTIAL ASSEMBLY: -

SELECT SHIMS AT LOCATION 'A' AND 'B' FOR BACKLASH & FLOAT ADJUSTMENT OF TP/CWPS, DIFFERENTIAL ASSEMBLY RESPECTIVELY DIFFERENTIAL ASSEMBLY FLOAT VALUES TO BE MAINTAINED BETWEEN 0.150-0.200 mm. BACKLASH BETWEEN BEVEL PINION AND CROWN GEAR S 0.15 TO 0.30 mm.

TABLE-Z				
P'ART NO.	T (THICKNESS)			
D10541130B	0.075			
D10541140B	0.125			
D10541150B	0.2285			
D10541160B	0.4065			
D10541170B	0.5335			
D10541180B	0.7875			





SPACER SELECTION PROCEDURE:-

X-MEASURE DISTANCE B/W CENTER HOUSING MOUNTING FACE TO SPACER BY USING DEFAULT SPACER 4.7+4.7 (2 NOS) SELECT SPACER COMBINATION SO THAT DISTANCE 'X' = 0.1 < X < 0.2

D10590350 SPACER PTO OUTPUT SHAFT (4.7 MM)
D10590360 SPACER PTO OUTPUT SHAFT (4.8 MM)
D10590370 SPACER PTO OUTPUT SHAFT (4.9 MM)
D10590380 SPACER PTO OUTPUT SHAFT (5.0 MM)
D10590390 SPACER PTO OUTPUT SHAFT (5.1 MM)

Service manual

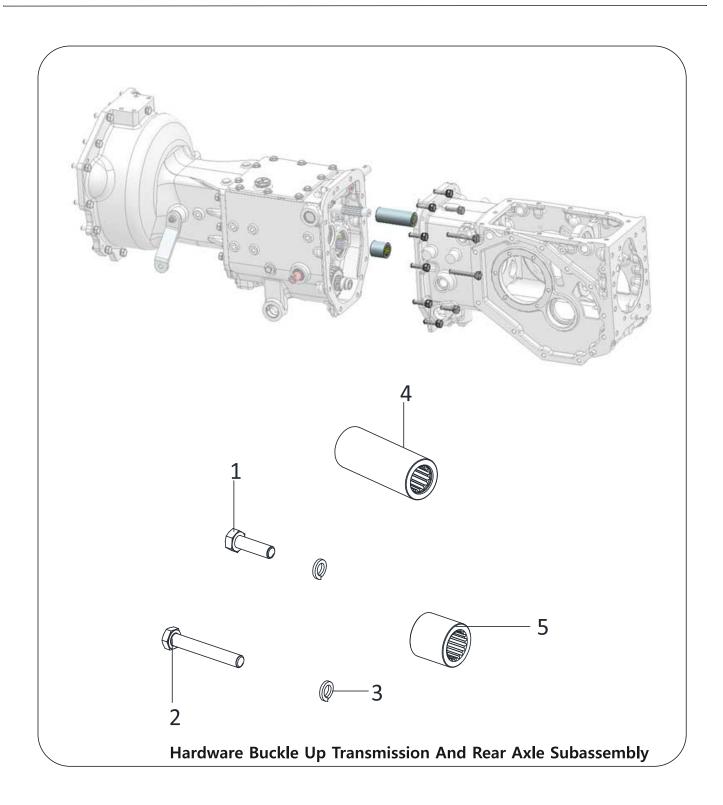


Fig. No.	Description	Qty
1	BOLT M10X1.50X35-10.9 HEX HEAD (16 A/F)	8
2	BOLT M10X1.50X70-10.9 HEX HEAD	2
3	WASHER M10 SPRING LOCK	10
4	COUPLING PTO INPUT SHAFT	1
5	COUPLING COUNTERSHAFT SPEED AND RANGE	1
6	SEALANT LIQUID ANAEROBIC (HIGHER STRENGTH)	AR

TROUBLESHOOTING CHART

		Improper backlash between Crown Wheel Gear & Pinion Shaft	Adjust
	ABNORMAL NOISE	Excess float in Differential Assembly	Adjust
	ADNORWAL NOISE	Improper backlash between Differential Pinoin and Side Gear	Replace and Adjust
		Differential Assembly Bearing wornout / rubbing with Diff Casing Casting	Replace failed component
		Differential washers wornout	Replace
	NOISE WHILE TURNING	Differential pinions gear or Side gears worn or damaged	Replace
		Bull Gear / Pinion Shaft Teeth damage	Replace
REAR AXLE		Differential Lock doesn't come out	Refer Below
	DIFFERENTIAL LOCK CAN	Differential lock fork bent / damaged	Replace
	NOT BE SET	Differential lock shifter sleeve splines damaged	Replace
	I DOESN'T RETURN	Differential lock fork guiding pin profile damaged / wornout	Replace Fork and Pin
		Rust in Differential Lock Linkage	Remove Rust or Replace
	LEAKAGE FROM REAR AXLE	Seal Damaged	Replace Seal with Sealant on OD
	LEAKAGE FROM PTO SEAL	Seal Damaged	Replace Seal
	LEAKAGE / SEEPAGE FROM WELCH PLUG	Improper sitting of welch plug in bore	Replace and assemble evenly
	LEAKAGE FROM PTO SHIFTING LEVER	Seal O Ring Damaged	Replace Seal O Ring
		Insufficient Oil	Refill Oil
	ABNORMAL NOISE DURING	Incorrect Oil Grade	Replace Oil
	BRAKING	Water Ingress in Oil	Replace Oil + Brake Friction Disc
		Uneven Brake Pedal Freeplay	Adjust
	UNEVEN BRAKING FORCE	Brake disc wornout	Replace
BRAKE		Actuator Assembly damage / wornout	Replace
BRAKE		High Freeplay in brake pedal	Adjust
	HIGH BRAKING FORCE	Brake disc worn-out	Replace
	REQUIRED TO STOP	Actuator Assembly damage / wornout	Replace
		Less Pedal Freeplay	Adjust
	BRAKE DRAGS	Actuator Ball Cam profile faulty / wornout	Replace
		Brake pedal return spring weaken or broken	Replace



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